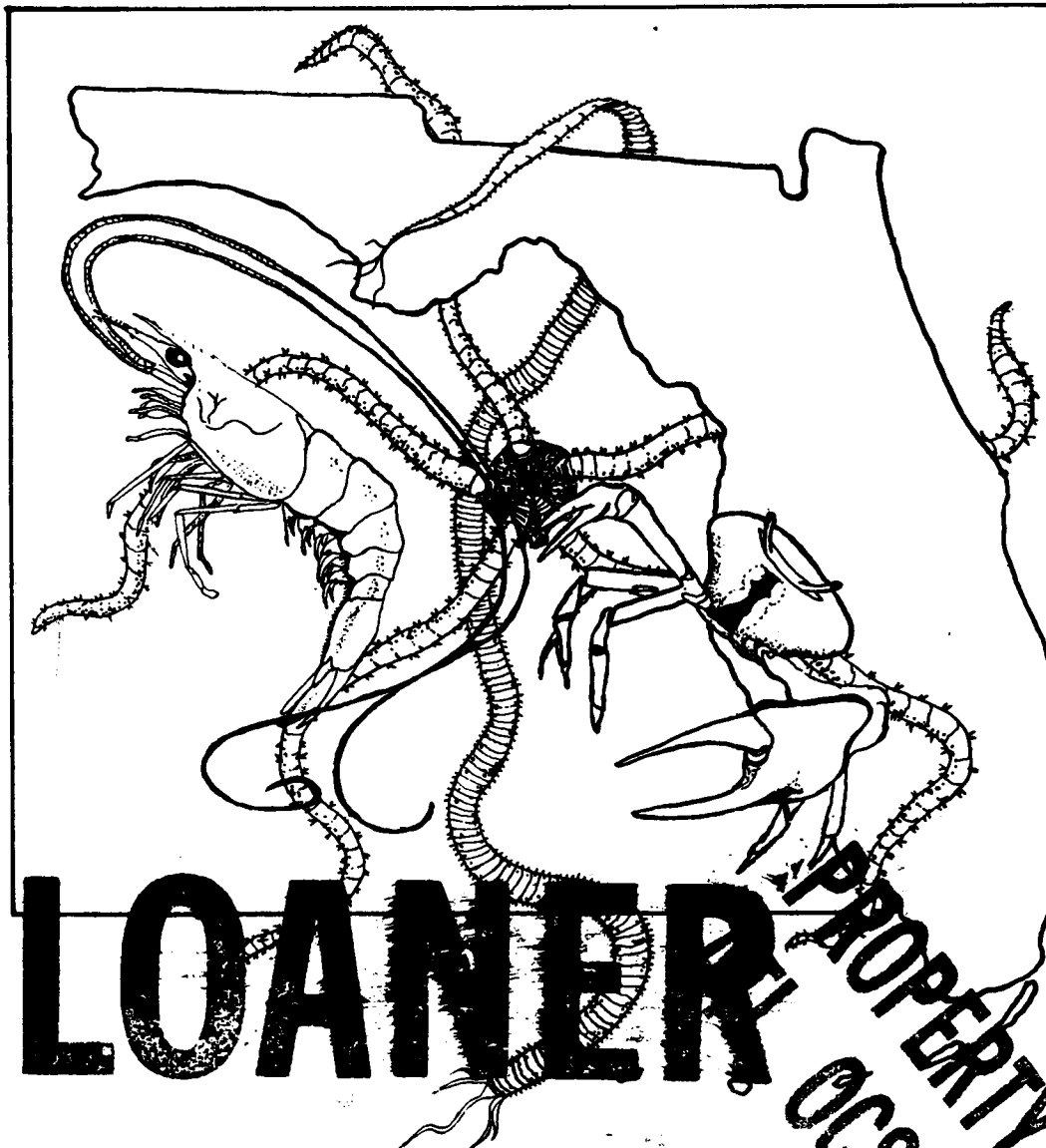


**Bibliography of Benthic Studies  
in the Coastal and Estuarine Areas  
of Florida**



**LOANER**

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A REVIEW AND ANNOTATED BIBLIOGRAPHY  
OF BENTHIC STUDIES IN THE COASTAL AND  
ESTUARINE AREAS OF FLORIDA

With a Selected Compilation of Worldwide Benthic  
Methodological References and Southeastern United States  
Benthic Taxonomic References

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Project support provided by:

Mote Marine Laboratory

Florida Sea Grant College  
Project No. IR-79-10  
Grant No. NA80AA-D-00038

Minerals Management Service  
U.S. Department of Interior  
MMS Contract No. 14-12-0001-29037

Partial funding support for publication  
provided by:

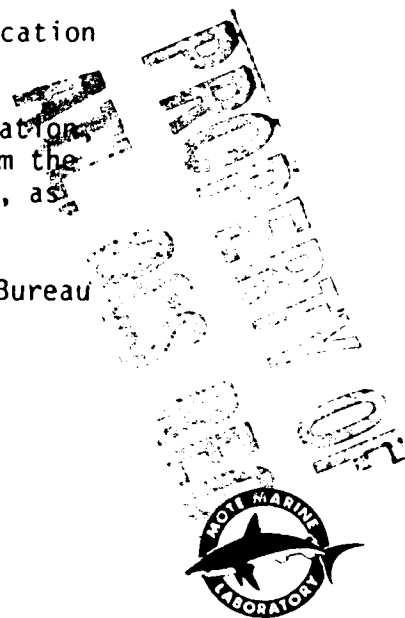
Department of Environmental Regulation,  
Office of Coastal Management, from the  
Coastal Zone Management Act, 1972, as  
amended, administered by NOAA.

Department of Natural Resources, Bureau  
of Marine Research

Cover Art: C.T. Goggin



Report Number 66  
Florida Sea Grant College  
August 1984





A REVIEW AND ANNOTATED BIBLIOGRAPHY  
OF BENTHIC STUDIES IN THE COASTAL AND  
ESTUARINE AREAS OF FLORIDA

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## PREFACE/ACKNOWLEDGEMENTS

This report is divided into four parts:

PART A:	Review and Summary
PART B:	Annotated Bibliography
PART C:	Methodological References
PART D:	Taxonomic References

Part A provides a general introduction to the report with a brief review and summary of existing benthic studies in Florida's coastal and estuarine areas.

Part B provides an annotated bibliography of over 1500 papers and reports relevant to Florida. The abstracts are arranged by each county and alphabetically within that county.

Part C provides a selected compilation of over 2300 worldwide methodological references considered to be useful for benthic studies.

Part D provides over 1000 citations of taxonomic descriptions and identification keys which are relevant to Florida's marine and estuarine benthos. The taxonomic citations are arranged according to major groups and alphabetically within each group.

To the best of our knowledge, the bibliography is a complete compilation of all published and most unpublished literature of benthic studies in Florida's coastal and estuarine waters through 1982. Some 1983 and 1984 papers and reports are included but do not represent a complete compilation for those years.

We gratefully acknowledge the financial support provided by the Florida Sea Grant College through Grant #IR-79-10, the Minerals Management Service (U.S. Department of Interior) through MMS Contract #14-12-0001-29037, and Mote Marine Laboratory. We appreciate the support, patience and encouragement of Drs. William Seaman (Sea Grant) and Thomas Ahlfeld (MMS) throughout the study. Our deepest gratitude is to Dr. William H. Taft who provided thoughtful guidance and enthusiastic support for the study. We appreciate Mr. James K. Culter's efforts in compiling the taxonomic citations, as well as the assistance of Miss Sarah Hartwell and Ms. Mary Parks (MML Librarians) in conducting computer searches and interlibrary loans. Ms. Laurie E. Fraser typed the report, and we thank her for her patience and perseverance. We appreciate the dedicated efforts of Mr. G.W. Patton and Ms. T.A. Stern in providing software support for the final printing of Part B. We thank Ms. Denise Latulippe for the graphics, MML's benthic taxonomists for their scrutiny of Part D, Messrs D. Bruzek, B. Weigle, and B.B. Boothe and Dr. Wm. Tavalga for their untiring efforts in both Parts C and D, and Ms. Margaret Spring and Mr. Paul Martin for their aid with Part B. Many MML staff members helped and we appreciate their support. Several governmental agencies, private organizations, universities and other staff members of MML freely allowed us access to their libraries; we are very grateful to them.

PART A

REVIEW AND SUMMARY

PART A  
REVIEW AND SUMMARY

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## 1.0. Introduction

Benthic ecology, the study of bottom dwelling flora and fauna, has flourished in the state of Florida in the last two decades. The abundance and diversity of benthic habitats in and around the state and the pressures of water use and waterfront development have both contributed to the advancement of research in this field. Almost 75% of the research on benthic habitats and organisms conducted in the last decade has been done to either evaluate or mitigate an environmental problem. The State of Florida's Department of Environmental Regulation has enacted a "biological integrity" rule which utilizes the relative health of benthic communities as criteria for regulating dredge and fill activities. Seagrasses, intertidal wetlands, oyster reefs, and hard bottom patch reefs are routinely considered as valuable benthic habitats, and activities in these habitats are stringently regulated by local, state and federal agencies. Soft-bottom habitats and their fauna, although studied more extensively, do not enjoy the same protection, but are used as excellent indicators of various types of pollution. The ability to sample these communities quantitatively, their relative immobility (hence, inability to avoid polluted areas) and long life histories make soft-bottom benthic communities extremely useful in the assessment of pollution effects. The availability of sophisticated data management hardware and software in recent years has tremendously improved the ability of benthic studies to provide synthesized and meaningful evaluations and interpretation. For example, a suite of physical, chemical and geological factors is usually responsible for the distributional patterns of benthic communities. It is possible today to take into consideration all of these factors, rank their relative influence through statistical procedures and interpret and/or predict the effect of a particular pollutant within a matter of a few hours of computer time. Although our capabilities in data management have vastly improved, sampling and laboratory analysis techniques have changed very little since the early 1900's. Hence, it remains that benthic studies are generally time consuming and slow in providing results. To the environmental regulators and industry managers, it is often frustrating that quick-fix decisions are not available from benthic ecological studies; therefore, they often rely on transient parameters of water quality (e.g., dissolved oxygen content, BOD, COD, metals, pesticides, etc.). The utility of benthic communities in the assessment of various types of pollution is definitely recognized; time factors and the lack of ease in obtaining historical information have often hampered utilization of benthic data for pollution assessment. Over seventy percent of benthic information from Florida is in the form of technical reports and unpublished material. While published information could be easily obtained through library searches, unpublished information is often difficult to obtain. As a result, a reasonable compilation of the majority of benthic studies conducted in Florida's waters has not been available to date; this report is an attempt on our part to do so, at least for the coastal and estuarine areas of Florida. When we began the project, we anticipated approximately 300 publications. However, the vast amount of material surprised us, but thanks to a computer and many dedicated persons, we were able to complete the project with a compilation of over 1,500 benthic studies.

## 2.0. General Review

Benthic studies in Florida have addressed all aspects of the science. Some general observations on the emphasis, however, could be made:

- o Fisheries: Several studies have concentrated on the benthic fisheries of Florida, especially on the pink shrimp, oysters, blue crabs, stone crabs and clams.
- o Pollution: Many studies have assessed and evaluated pollution effects, especially power plants, dredge and fill, sewer discharges and stormwater runoff. Some studies have addressed other types of pollution, such as petroleum, pesticides, metals and pulp mill effluents.
- o Baseline: Several background characterizations or baseline studies have been sponsored in anticipation of developmental activities. The Minerals Management Service (U.S. Department of Interior) has conducted several studies in the continental shelf area, anticipating oil drilling activities.
- o Species-Specific: Numerous species-specific studies have been conducted primarily as research theses of the several universities in Florida.
- o Several reviews and bibliographies on Commercially Important Species and some estuaries have been prepared.
- o Checklists: Several checklists, field guides and taxonomic descriptions have been prepared.
- o Methods: Many methodological studies have also been conducted, especially as they relate to the collection or sampling of the fauna and to the replanting of vegetation and construction and rehabilitation of reefs.

Bays, estuaries, and embayments have been studied intensively for their importance as nursery areas. Numerous studies have been conducted in Tampa Bay, Biscayne Bay, Escambia Bay and Apalachicola Bay. Charlotte Harbor is the least studied major estuary in Florida. Studies are generally concentrated in areas where there exist universities or marine laboratories, or where development pressures are heavy. National park areas and coral reef areas have also been studied to a greater degree than undeveloped areas of the state.

### 3.0. Methodology

Utilizing adequate methodology in the collection of samples is probably the most important single factor in the scientific credibility of a study. Although methods may vary depending upon the objectives of a study, it appeared from our review of benthic literature of Florida that many investigators placed the least importance on this aspect of the study. Methods used are often poorly described or not described at all. Where they are described, limitations of the methodology are often not recognized in the interpretation of results. Frequently, especially in soft-bottom studies, adequacy of replication is rarely considered, and adequacy of sieve size in separating organisms is rarely evaluated, as are depth of penetration of a sampler and its sampling area. Taxonomic groupings are inconsistent and inadequate, and applicability of statistical analyses used is rarely discussed. Similar problems are evident in many population studies as well as studies of the flora. Many of the community-type studies rarely discuss life history characteristics and/or ecological roles of even the dominant species of the community studied. Often, important physical and substrate characteristics are not taken into consideration in faunal and floral surveys; nevertheless, conclusions are reached on the basis of such an inadequate data base. In spite of the problems outlined above, the data base on the Florida benthic environment is excellent and appears to be evolving toward better scientific standards and control. There remains a need to strengthen it and geographically extend it throughout the state. Part C of this document is a compilation of worldwide methodological references as they relate to benthic investigations.



#### 4.0. Taxonomy

Taxonomic adequacy is extremely important in benthic studies. Available taxonomic references are scattered in literature and there is a dire need for well organized taxonomic guides. Ecological surveys need the strength of accurate taxonomy for a reasonable assessment of the environment. Practicing taxonomists are too few in Florida; therefore, very few taxonomic studies are being conducted on Florida's estuarine and coastal fauna. In Part D of this report, we have attempted to compile a list of taxonomic references which we feel are useful for identifying the flora and fauna of the coastal and estuarine areas of Florida.

#### 5.0. Summary

The intention of this report is to provide the reader with a reference document on available information (published and unpublished) on the benthic environment and its flora and fauna of Florida's estuarine and coastal areas. To facilitate ease of use, the annotated bibliography (Part B) is arranged by counties. Our hope is that this report will serve as a starting point for the investigators of benthic studies to be conducted in the next few decades. As is frequently the case with literature reviews, this report is already out of date beyond 1982. The methodological references compiled in Part C are intended to aid the investigator's awareness of the variety of methods available and to hopefully guide the investigator in choosing the best available methodology for achieving study objectives. The taxonomic references compiled in Part D of the report are intended to help the investigator by making available a majority of keys, descriptions and guides, thereby improving the taxonomic adequacy of the study. We hope that the report will also be useful to resource managers, regulators, and interveners by providing basic historical information in their respective areas of concern.

PART B

ANNOTATED BIBLIOGRAPHY

The purpose of the annotated bibliography is to provide scientists and resource managers a readily accessible document for obtaining background information on the benthos of Florida's estuarine and coastal environs. Except for studies on freshwater benthos, we have included all available literature on the benthos (and its environment) through the year 1982 (no beginning year was set; however, earliest studies annotated were published in 1918). Behavioral, morphological or taxonomic studies of single species were generally excluded from the bibliography. Geographic limitations set for the study were: all of the continental shelves bordering Florida (Atlantic and Gulf of Mexico) and all estuaries and bays within Florida. All benthic components (sediment, algae, macrophytes, coral reefs, macrofauna, meiofauna, microfauna and demersal fishes) were included in the bibliography. Both intertidal and subtidal environments were included.

Literature search was accomplished by the following means:

1. Computer searches on various biological and earth science data bases (Aquaculture, Aqualine, Aquatic Sciences and Fisheries Abstracts, Biosis Previews, CA Search, Comprehensive Dissertation Index, Enviroline, NTIS, Oceanic Abstracts, Pollution Index, Scisearch, SSIE Current Research).
2. Search of individuals', universities', and agencies' libraries.
3. Personal and letter contact with private organizations and individuals.
4. Interlibrary loans.

Literature obtained was abstracted onto a standardized form and edited. Specific information (when available) retrieved from each reference and footnoted with each abstract consisted of:

1. Correct Citation (Author(s), year, title journal or sponsor, publisher, volume and/or number, pages).
2. Abstract describing major objectives and findings of the study.
3. General Geographic Area (specific to county or estuary or coastline).
4. Study Duration (period in time, or actual dates).
5. Habitat (e.g., grassbed, sand, mud, etc.).
6. Type of Study (e.g., quantitative, qualitative).
7. Biological Component (i.e., flora, fauna).
8. Type of Sampler (e.g., grab, core).
9. Sieve Size used to separate organisms (e.g., 1.0 mm, 0.5 mm, etc.).
10. Number of Stations (sampling locations).
11. Number of Replicates/Station.
12. Temporal Frequency (collection intervals).
13. Abiotic Parameters Measured (e.g., temperature, salinity, etc.).
14. Dominant Species/Species Studied (name or names of species).

The abstracts were entered onto an Apple II Plus computer data bank, and utilizing software developed by Dr. Stephen A. Bloom, edited, sorted, and printed.

The annotated bibliography is arranged according to counties, beginning at the westernmost county (Escambia), following the counties south along the Gulf, then north following the counties along the Atlantic Coast, ending with Duval County (Figure 1). No references specific to Nassau County (the northernmost Florida East Coast County) were located. Also, references were not found for the following Counties: Okaloosa, Jefferson, Pasco, and Flagler.

Broader studies which addressed more than one county are listed first into the following groups.

- General Coastal Florida
- Tortugas
- Gulf Coast
- Southern Florida
- East Coast
- Indian River Region

An Author Index (Page 382) and a Subject Index (Page 396) are provided after the annotated bibliography. The subject index is divided according to the following major categories:

1. Study Duration
2. Habitat
3. Type of Study
4. Biological Component
5. Type of Sampler
6. Sieve Size
7. Number of Stations
8. Number of Replicates/Station
9. Temporal Frequency
10. Abiotic Parameters
11. Dominant Species (only genus indexed).



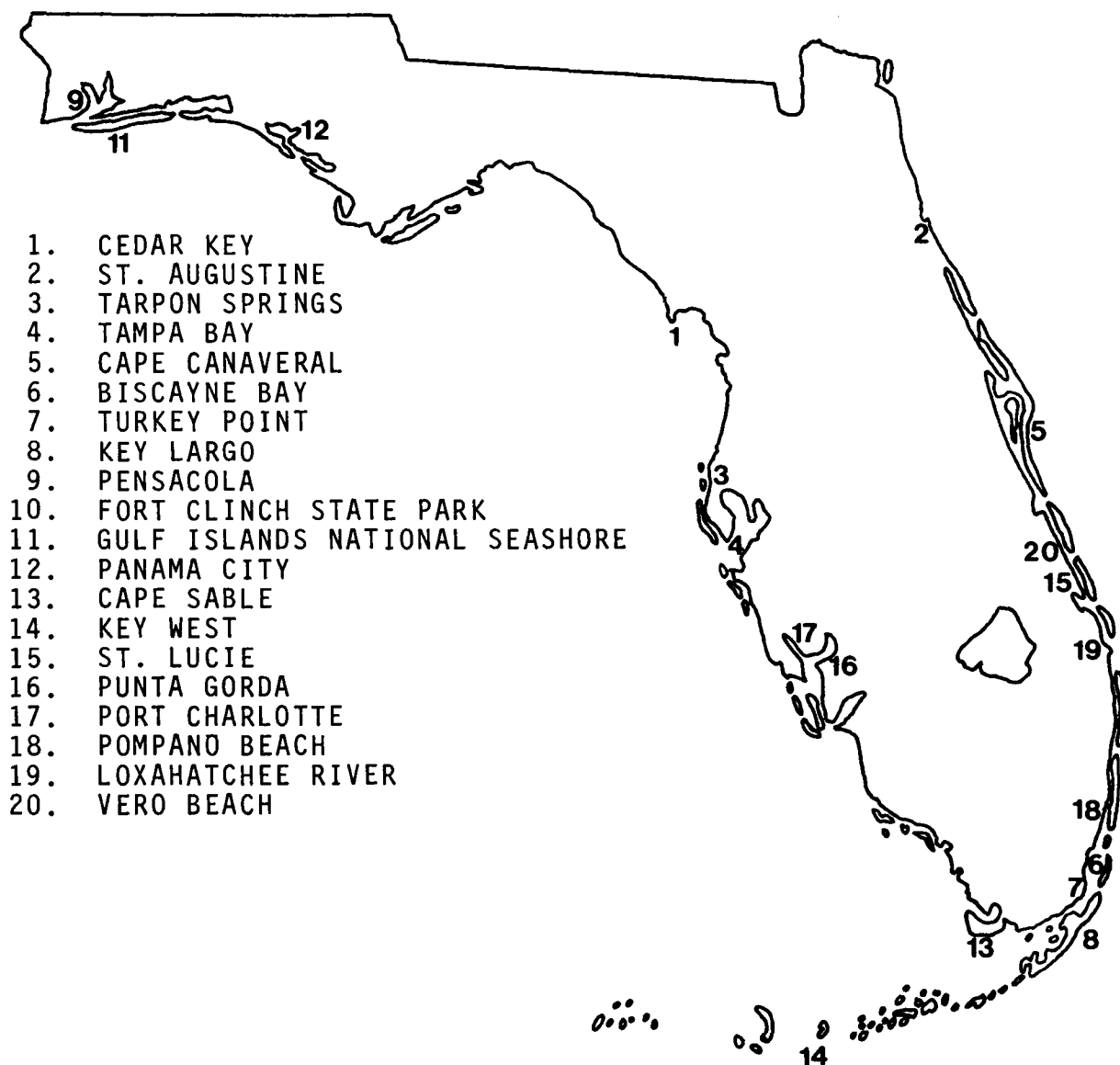
Figure 1. Coastal Counties of Florida (courtesy of P. Steele, State of Florida, Department of Natural Resources, St. Petersburg, Florida).

PART B  
ANNOTATED BIBLIOGRAPHY

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34 Volusia County	375
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36 Duval County	379
Author Index	382
Subject Index	396

# GENERAL COASTAL FLORIDA



(01.00001)

Adams, R.O. 1968. The color variation of *Neosinania* (Mollusca: Gastropoda) with notes on the natural history. Fla. State Univ. M.S. Thesis. 41 p.

The life history, behavior, ecology and distribution of the snail, *Neosinania acicularis* were studied. Color variations exhibited by the snail were shown to be a result of the pigments obtained from the gorgonian corals upon which they feed. The congener, *N. uniplicata* was proposed to be synonymous with *N. acicularis*.

Type of Study:Qualitative; Biological Component:Mollusca; Dominant Taxon/Taxa Studied:*Neosinania acicularis*, *N. uniplicata*;

(01.00002)

Albertson, H.D. 1980. Long term effects of high temperatures and low salinities on specimens of *Melongena corona* and *Nassarius vibex*. Univ. of Miami Ph.D. Dissertation.

Groups of *Melongena corona* and *Nassarius vibex* were maintained for 12 months or longer at each of 4 constant temperatures or 5 constant salinities to determine growth and survival. *M. corona* exhibited greatest growth at the highest temperature tested. *N. vibex* grew best at the lowest test temperature. Both species exhibited greatest growth at the highest test salinity.

Study Duration:12 months; Type of Study:Quantitative; Biological Component: Mollusc Fauna; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Melongena corona*, *Nassarius vibex*;

(01.00003)

Allen, D.M. 1972. References and subject index concerning the calico scallop, *Argopecten gibbus*. NOAA Informal Rept. No. 1, NMFS Southeast Fish. Ctr. 31 p.

This bibliography lists approximately 200 references pertaining to the biology, fishing methods, process, and marketing of calico scallops, *Argopecten gibbus*. Citations are listed alphabetically by author and are cross-referenced by 22 subject categories.

Type of Study:Bibliography; Biological Component:Mollusc fauna; Dominant Taxon/Taxa Studied:*Argopecten gibbus*;

(01.00004)

Allen, D.M. & T.J. Costello 1972. The calico scallop, *Argopecten gibbus*. NOAA Tech. Rept. NMFS SSRF- 656. 19 p.

This report summarizes information on the biology and fishery of the calico scallop, *Argopecten gibbus*. Shell morphology, color, and size range are given. The species is distributed throughout the western North Atlantic with the greatest known abundance off Cape Kennedy, Florida. Environmental factors affecting distribution and growth are discussed, and spawning activity and larval development are described. Although the calico scallop fishery has been slow in developing, it is predicted to increase harvest sizes with improvements in processing machinery.

Type of Study:Qualitative; Biological Component:Mollusca fauna; Dominant Taxon/Taxa Studied:*Argopecten gibbus*;

(01.00005)

Avent, R.M., Jr. 1970. The effect of hydrostatic pressure on selected intertidal and shallow water animals. Fla. State Univ. M.S. Thesis.

The behavioral changes of 143 intertidal and shallow marine invertebrates (representing 38 species and 7 phyla) subjected to increases in hydrostatic pressure (up to 3200 psi) were observed. The first response, and the pressure at which it occurred, were recorded to determine the relative sensitivities of each species. The taxonomic position of the organism and the biotope from which it was collected were related to the pressure sensitivities of each species.

Type of Study:Qualitative; Biological Component:Fauna; Abiotic Parameters Measured:Hydrostatic pressure;

(01.00006)

Avent, R.M., Jr. 1973. The effects of hydrostatic pressure and temperature on *Uca pugilator* (Bosc). Fla. State Univ. Ph.D. Thesis.

The effects of temperatures from 9° to 30°C and pressure up to 6000 psi on the behavior, metabolism, and lethality of *Uca pugilator* were studied over a one year period. Behavioral indices included first response (R<sub>1</sub>) and tetony (T). Similarities in temperature-pressure effects suggest that they stem from pressure-induced anomalies in the neuromuscular system. Further tests of pressure sensitivity are based on R<sub>1</sub>, T, oxygen consumption, and measurements of lethality. Pressure resistance is reduced with increased temperature at lethal dosages, which does not support earlier results of other investigators.

Study Duration:One year; Type of Study:Quantitative; Biological Component:Fauna; Abiotic Parameters Measured:Pressure, temperature; Dominant Taxon/Taxa Studied:*Uca pugilator*;



(01.00007)

Beaumariage, D.S. & E.J. Little 1976. Status report of Florida's research on spiny lobster biology. Proc. Gulf Caribb. Fish. Inst. 28th Annu. Sess. Oct. 1975:102-107.

Research on the population dynamics of Florida's spiny lobster was reviewed to summarize existing knowledge for use in evaluating management concepts. Development of larval lobsters and their method of recruitment have been studied intensively although larval stages cannot yet be identified to species. Recent use of SCUBA for in situ observations has increased knowledge on lobster behavior and migration. Understanding of spiny lobster population dynamics has been hindered by the lack of information on growth and the relationship between age and lobster size. The effects of fishing pressure on the structure of juvenile and adult populations is assessed. Increased investigation of lobster stocks in deeper water and areas peripheral to the main fishing grounds may provide information concerning lobster growth, migration, recruitment, interaction with inshore populations, and the potential as alternative fisheries.

Type of Study:Review; Biological Component:Crustacea; Dominant Taxon/Taxa Studied:*Panulirus*;

(01.00008)

Behensky, J.F. 1977. Reassessment of the distribution of benthic foraminifera of the shelf and slope of the Atlantic margin and Gulf of Mexico of the United States. Univ. of Miami M.S. Thesis. 119 p.

Distribution patterns of benthic foraminifera from the eastern and southern continental margins of the United States were determined based on approximately 1000 precompiled samples. In addition to temperature and depth, sediment type was analyzed as a controlling parameter in foram distribution. Sediment distribution was found to correlate closely with generic level foram distribution.

Type of Study:Qualitative; Biological Component:Foraminifera; Dominant Taxon/Taxa Studied:*Fursenkoina*, *Bulimina*, *Uvigerina*, *Brizalina*, *Textularia*, *Cibicides*, *Protonina*, *Hanzawaia*, *Miliolids*, *Elphidium*, *Ammonia*;

(01.00009)

Bert, T.M., R.E. Warner & L.D. Kessler 1978. The biology and Florida fishery of the stone crab, *Menippe mercenaria* (Say), with emphasis on southwest Florida. Fla. Sea Grant Tech. Pap. No. 9. 82 p.

This report summarizes the knowledge regarding the natural history of the stone crab, and evaluates the stone crab fishing industry. Baseline data for future use in monitoring a commercially exploited area was given. The relation of the southwest Florida stone crab fishery to that of the rest of the state was discussed.

Habitat:Variable; Type of Study:Qualitative; Biological Component:Decapod fauna; Dominant Taxon/Taxa Studied:*Menippe mercenaria*;

(01.00010)

Bingham, F.O. 1969. The influence of environmental stimuli on the direction of movement of the supralittoral gastropod *Littorina irrorata*, with notes on additional biological aspects of the species. Fla. State Univ. M.S. Thesis. 66 p.

The responses of *Littorina irrorata* to certain environmental parameters of its salt marsh habitat were studied to determine the snail's adaptations to the supralittoral environment and its heterogeneous distribution. Responses to salinity, light, and gravity were the most important in determining the distribution of *L. irrorata*. Adaptations for water conservation are cited.

Type of Study:Quantitative; Biological Component:Mollusca; Abiotic Parameters Measured:Salinity; Dominant Taxon/Taxa Studied:*Littorina irrorata*;

(01.00011)

Cake, E.W., Jr. 1975. Larval and postlarval cestode parasites of shallow water, benthic molluscs of the Gulf of Mexico from the Florida Keys to the Mississippi Sound. Fla. State Univ. Ph.D. Thesis.

Twelve species of cestodes were found in 2,470 specimens of benthic molluscs collected from the eastern Gulf of Mexico. Results show that benthic marine molluscs are hosts for many elasmobranch tapeworms. Host specificity was rarely found in these cestode-mollusc associations. Six of the species were found throughout the study area, while the other 6 had limited distribution patterns. The higher infection rates, infection loads, and cestode species diversity occurred in molluscs from shallow sand, mud, and grassflats. This environment serves as nursery grounds for the larval cestodes.

Habitat:Sand, grassbed; Type of Study:Quantitative; Biological Component:Fauna; Number of Stations:60; Dominant Taxon/Taxa Studied:*Tylocephalum* sp., *Rhinebothrium* sp., *Parachristianella* sp., *Acothobothrium* sp., *Eutetrachynchus* sp.;

(01.00012)

Capalda, P.S. 1968. Environmental factors influencing the zonation of three semi-terrestrial decapods: *Uca pugnax*, *Uca minax*, and *Sesarma reticulatum*. Fla. Instit. of Tech. M.S. Thesis.

The effects of salinity, tidal fluctuations, and sediment type on the zonation of 3 species of semi-terrestrial decapods (*Uca pugnax*, *U. minax*, *Sesarma reticulatus*) were investigated during the summer of 1976. Salinity and sediment composition were found to be the major factors influencing the zonation of *Uca pugnax* and *U. minax*. Salinity had less influence on the zonation of *S. reticulatus* than the presence of *Spartina alterniflora*.

Study Duration: Summer 1976; Habitat: Sand, silt; Type of Study: Quantitative; Biological Component: Crustacea; Abiotic Parameters Measured: Salinity, tide, sediment type; Dominant Taxon/Taxa Studied: *Uca pugnax*, *U. minax*, *Sesarma reticulatus*;

(01.00013)

Capone, D.G. 1978. Dinitrogen fixation in subtropical seagrass and macroalgal communities. Univ. of Miami Ph.D. Dissertation. 93 p.

Nitrogen fixation was studied in seagrass (*Thalassia testudinum*) meadows and the macroalgae *Microdictyon* sp. and *Laurencia* sp. Nitrogen fixation was found to be highly variable both spatially and temporally in the phyllosphere of *Thalassia*. High rates of nitrogen fixation were correlated with the presence of a heterocystous cyanobacterium, *Calothrix* sp. Seasonal and diurnal fluctuations were detected in phyllosphere nitrogen fixation. Rhizosphere nitrogen fixation was compared with that of the phyllosphere. Nitrogen fixation associated with benthic macroalgae was also mediated by cyanobacteria.

Habitat: Seagrass beds; Type of Study: Quantitative; Biological Component: Flora; Abiotic Parameters Measured: Temperature, light; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Microdictyon* sp., *Laurencia* sp.

(01.00014)

Carlton, J. 1974. An ecological survey of selected mangrove communities in Florida. Univ. of So. Fla. M.S. Thesis.

A survey of the mangrove community of Florida was conducted by transects at 6 sites from Cedar Key on the west coast to near St. Augustine on the east coast. The community, characterized by at least one of the mangrove species (*Avicennia germinans*, *Rhizophora mangle*, *Laguncularia racemosa*) was found to be more diverse than commonly believed. A variety of temperate and tropical species compose the flora. The constituent species of each site are given.

Study Duration: April-May 1973; Habitat: Mangrove forest; Type of Study: Qualitative; Biological Component: Flora; Number of Stations: 6; Abiotic Parameters Measured: Salinity; Dominant Taxon/Taxa Studied: *Avicennia germinans*, *Rhizophora mangle*, *Laguncularia racemosa*;

(01.00015)

Carlton, J.M. 1976. A partial bibliography of papers on coastal plant vegetation. Proc. of the Third Annu. Conf. on Restoration of Coast. Vegetation in Fla. p. 114-147.

The annotated bibliography of literature on coastal vegetation is divided into 6 sections: 1) papers from symposia, proceedings and special issues; 2) general references; 3) articles specific to sand dune/strand vegetation; 4) salt marsh; 5) seagrasses; and 6) mangroves. Papers are listed alphabetically according to author, except for Section 1.

Type of Study: Bibliography; Biological Component: Flora;

(01.00016)

Carlton, J.M. 1977. A survey of selected coastal vegetation communities of Florida. Fla. Mar. Res. Publ. No. 30. 40 p.

The coastal vegetation of Florida was surveyed during 1973 and 1974. Seventeen representative sites were sampled quarterly using transects to determine species occurrence, relative densities, and habitat development and structure. Sorensen's Index of similarity was used to compare species composition within and between sites. Indices ranged from 4 (representing only one common plant between 2 sites) to 61%. Ecological interactions apparently alter species composition in seeming similar habitats. Use of the term "association" is suggested in place of "community" to better reflect the concept of a taxonomically unrelated group of plants occupying a particular habitat.

Study Duration: January 1973-December 1974; Habitat: Mangrove swamp, salt marsh, sand dune; Type of Study: Quantitative; Biological Component: Flora; Number of Stations: 17; Number of Replicates/Station: 4; Temporal Frequency: Quarterly; Abiotic Parameters Measured: Sediment type, tidal range, wave energy; Dominant Taxon/Taxa Studied: *Rhizophora mangle*, *Avicennia germinans*, *Laguncularia racemosa*, *Conocarpus erectus*, *Spartina alterniflora*, *Uniola paniculata*;

(01.00017)

Chalker, B.E. 1975. Calcification, metabolism, and growth by the staghorn coral, *Acropora cervicornis* (Lamarck). Univ. of Miami Ph.D. Dissertation.

Calcification in the staghorn coral, *Acropora cervicornis*, was investigated and compared to a Pacific congener, *A. formosa*. The effects of exogenous glucose, glycerol, and alanine on the calcification rate were determined under light and dark conditions in the presence of the photosynthetic inhibitor DCMU. The mechanisms of calcification and their

GEOG. CLASSIFICATION: General Coastal Florida 01.00018 to 01.00023

kinetics were examined by use of various inhibitors.

Habitat:Coral reef; Type of Study:Quantitative; Biological Component:Coral; Dominant Taxon/Taxa Studied:*Acropora cervicornis*;

(01.00018)

Commercial Fisheries Review 1960. Calico scallop fishery in Florida. Comm. Fish.Rev. 22(12):41-43.

The early development of the calico scallop fishery in Florida is discussed, including location of scallop beds, catch rates, and fishing gear and methods. The most extensive beds are located in 1960 off the east coast from Daytona Beach to Ft. Pierce in 60 to 192 feet of water. Other beds were found off Cape San Blas on the west coast in 1957. The initiation of research on the biology of the calico scallop, *Pecten (Argopecten) gibbus*, at the Bureau of Commercial Fisheries Gulf Breeze Biological Laboratory is noted.

Study Duration:1957-1960; Type of Study:Qualitative; Biological Component:Mollusca; Type of Sampler:Georges Bank type scallop dredge; Dominant Taxon/Taxa Studied:*Pecten (Argopecten) gibbus*;

(01.00019)

Costello, T.J. & D.M. Allen 1970. Synopsis of biological data on the pink shrimp, *Penaeus duorarum duorarum*. FAO Fish. Rept. 57:1499-1537.

This synopsis on the pink shrimp, *Penaeus duorarum duorarum* summarizes all available information concerning its taxonomy, distribution, life history and population dynamics. The shrimp fishery, management methods, and shrimp aquaculture are also discussed in detail. An extensive reference section is included.

Type of Study:Quantitative; Biological Component:Crustacea fauna; Dominant Taxon/Taxa Studied:*Penaeus duorarum duorarum*;

(01.00020)

Darovec, J.E., Jr., et al. 1975. Techniques for coastal restoration and fishery enhancement in Florida. Fla. Mar. Res. Publ. No. 15:27.

Guidelines for the reestablishment of sand dunes, salt marshes, mangroves, and seagrasses were outlined. Several perennial plants including sea oats and bitter panic grass were recommended for stabilizing sand dunes; smooth cord grass and black needlerush for marsh transplantations; black, red, and white mangroves for mangrove areas; and turtle grass, manatee, shoal grass and widgeon grass for grass bed restoration. For successful seagrass transplanting, sediment transfer along with the plant was advised. Planting densities, time of transplanting, and procedures for removal and care were discussed for each section. Guidelines also described habitat augmentation using artificial fishing reefs and oyster reefs.

Habitat:Salt marsh, mangroves, grassbed; Type of Study:Technique; Biological Component:Flora;

(01.00021)

Davis, J.H. 1940. The ecology and geologic role of mangroves in Florida. Carnegie Inst. Wash. Pub. 517:303-412.

The mangrove swamps of 5 coastal regions in Florida were surveyed over 5 seasons in a 5 year study of their general ecology and geologic significance. The floral communities of the mangrove and associated vegetation are described and the successional relationships between some of these communities examined. The dispersal and establishment of mangrove seeds and seedlings were investigated, and the results of experimental plantings are given. Major environmental conditions in and near the swamps were measured. The sedimentary accumulations within the mangrove swamps were studied as to their effect on land area changes and geologic history of the region.

Study Duration:5 seasons; Habitat:Mangrove swamp; Type of Study:Qualitative; Biological Component:Flora; Dominant Taxon/Taxa Studied:*Rhizophora mangle*, *Avicennia nitida (germinans)*, *Laguncularia racemosa*, *Conocarpus erecta*;

(01.00022)

Davis, J.H., Jr. 1975. Stabilization of beaches and dunes by vegetation in Florida. p. 52; In: Fla. Sea Grant Prog. Rept. No. 7.

Vegetation was described as a natural means of containing and directing some of the forces of nature, and using them to build and hold beaches and dunes. It was suggested that sand fences and other methods of fill, and the use of planting in bare areas could restore the vegetation and eventually restore and hold beaches and dunes.

Habitat:Beaches, dunes; Type of Study:Qualitative; Biological Component:Flora;

(01.00023)

Dawson, C.E. 1954. A bibliography of the lobster and the spiny lobster, Families Homaridae and Palinuridae. Fla. Bd. Conserv. Publ. 86 p.

This bibliography includes worldwide papers concerning lobsters of the families Homaridae and Palinuridae. A subject and author index is included.

Type of Study:Bibliography; Biological Component:Crustacea;

(01.00024)

Duquay, L.E. 1979. Calcium metabolism and photosynthetic carbon fixation in benthic foraminifera symbiotic with microalgae. Univ. of Miami Ph.D. Dissertation. 125 p.

Field and laboratory experiments were conducted on 3 species of benthic foraminifera symbiotic with microalgae to investigate calcium incorporation and photosynthetic carbon fixation. In all species calcification rates were approximately 2-3 times greater in light than in dark. In one species, *Archais angulata*, photosynthetic carbon fixation and calcification were proportional to light intensity in the range of 0-200  $\mu$  Einsteins/m/sec and saturated above that. The inhibitory effects of the herbicide DCMU were examined and calcification mechanisms were studied in *A. angulata*. The organic matrix of *A. angulata* was analyzed for amino acid and hexosamine content.

Type of Study:Quantitative; Biological Component:Foraminifera and algae; Abiotic Parameters Measured:Light intensity; Dominant Taxon/Taxa Studied:*Archais angulatus*, *Sorites marginalis*, *Cyclorbiculina compressa*;

(01.00025)

Dustan, P. 1975. Variability in building by reef corals. Fla. Sci. 38(Suppl. 1):21.

Ecological variability of corals is discussed in terms of the symbiotic relationship of the coelenterates and the zooxanthellae in hermatypic corals. Phenotypic variation of corals is due to variability both physiological and genetic in the animal host and the algal symbiont. Data here support the ecotype concept of species differentiation and that natural selection acts on both the animal and plant genomes. Coevolution may allow coral colonies the diversity of ecotypes.

Habitat:Coral reefs; Type of Study:Qualitative; Biological Component:Fauna;

(01.00026)

Estevez, E.D. & J.L. Simon 1974. Systematics and ecology of *Sphaerona* (Crustacea: Isopoda) in the mangrove habitats of Florida. In: Biology and management of mangroves. G.E. Walsh, S.L. Snedaker & H.J. Teas (eds.). Univ. of Fla., Gainesville. p. 286-304.

The systematics, distribution, and habitat of 3 species of the isopod, *Sphaerona*, in Florida mangrove forests were investigated. *Sphaerona terebrans* and *S. quadridentatum* both inhabit the prop roots of the red mangrove, *Rhizophora mangle*, although only *S. terebrans* is a known wood borer. Differences in the estuarine and coastal distributions of the 2 species are discussed. Distributions of *S. terebrans* throughout structurally different mangrove forests were compared, and burrow structure described. The influence of salinity on burrowing of *S. terebrans* in *Rhizophora* seedlings was examined.

Habitat:Mangrove forests; Type of Study:Quantitative; Biological Component:Crustacea; Abiotic Parameters Measured:Salinity; Dominant Taxon/Taxa Studied:*Sphaerona terebrans*, *Sphaerona quadridentatum*;

(01.00027)

Findlay, R.H. 1981. The effects of the sanddollar *Nellita quinquiesperforata* on the benthic microbial community. Fla. State Univ. M.S. Thesis. 42 p.

Analysis of sediment in which sanddollars (*Nellita quinquiesperforata*) had fed revealed increases in the oxidized sediment zone and decreases in amounts of several lipid components. This data and direct counts of the meiofauna indicate selective feeding by *Nellita* on microeucaryotes and bacteria attached to silt and clay.

Habitat:Mud, sand; Type of Study:Quantitative; Biological Component:Echinodermata; Dominant Taxon/Taxa Studied:*Nellita quinquiesperforata*;

(01.00028)

Florida Department of Environmental Regulation. 1979. Biological Monitoring Program Fiscal Year 80. Technical Report. State of Florida, Dept. Env. Regulation, Tallahassee, Florida.

Descriptions of the statewide biological monitoring program conducted by the Florida Department of Environmental Regulation were provided. The biological monitoring system consists of a network of primary and secondary stations. Only primary biological stations were included in the primary chemical monitoring program. Secondary stations were sampled once a year for biological and chemical parameters. Sampling schedules were provided. Methods were described for monitoring: macroinvertebrates - general; macroinvertebrates - artificial substrates; macroinvertebrates - natural substrates; macroinvertebrates - qualitative, periphyton, phytoplankton, macrophytes, and sediment. Additionally, the Bacteriological Monitoring Program was described. Methods, including sample collection and handling, general laboratory

practices, and bacterial analysis were described.

Habitat:Variable; Type of Study:Qualitative; Biological Component:Flora and fauna; Type of Sampler:Petite ponar grab, Ekman dredge, artificial substrate; Sieve Size:0.6 mm; Number of Stations:Variable per location; Number of Replicates/Station:Variable; Temporal Frequency:Variable;

(01.00029)

Frost, J.G. 1974. Subtidal algal stromatolites from the Florida back reef environment. J. Sediment. Petrol. 44(2):532-537.

Halocene algal stromatolites were found to occur in 3-4 m of water in the Florida back reef environment. The stromatolites were unlike algal oncolites and alga mats in that they were neither concentric, semi-concentric, nor mat-like in shape; and they were not continuous like subaerial or submarine mats. The subtidal algal stromatolites were domal and circular to elliptical in plan view. Growth forms of the blue-green algae stromatolites and their environmental occurrence were determined to be important when interpreting ancient depositional environments in terms of the water depth and relative position to the shoreline.

Habitat:Grassbed, sand; Type of Study:Qualitative; Biological Component:Benthic algae; Dominant Taxon/Taxa Studied:Schizothrix, Thalassia sp.;

(01.00030)

Futch, C.R. 1965. The blue crab in Florida. Fla. Bd. Conserv. Mar. Lab., Salt Water Fish. Leaflet. No. 1. 17 p.

This leaflet for general distribution summarizes information on the blue crab, *Callinectes sapidus* and Florida's blue crab fishery. The classification and description of *C. sapidus* are given, and similar species in Florida waters are described. The distribution, life history and parasites of the blue crab are discussed. Information concerning fishing gear and methods and techniques utilized in crab farming and processing is presented.

Type of Study:Qualitative; Biological Component:Crustacea; Dominant Taxon/Taxa Studied:*Callinectes sapidus*;

(01.00031)

Futch, C.R. 1966. The stone crab in Florida. Fla. Bd. Conserv. Mar. Lab., Salt Water Fish. Leaflet. No. 2. 6 p.

This brief leaflet reviews information on the stone crab, *Henippe mercenaria*, and the stone crab fishery in Florida. A general description and classification of *H. mercenaria* is given, and similar species in Florida waters are described. The life history of the stone crab is summarized and fishing gear and methods are briefly described. The problems of future stone crab cultivation are cited.

Type of Study:Review; Biological Component:Crustacea; Dominant Taxon/Taxa Studied:*Henippe mercenaria*;

(01.00032)

Futch, C.R. & J.M.Torpey 1966. Florida clams ... A resource with a future. Fla. Bd. Conserv. Mar. Lab., Salt Water Fish. Leaflet. No. 3. 6 p.

The potential for culturing clams in Florida is evaluated for 5 species: *Mercenaria mercenaria*, *M. campechiensis*, *Spisula solidissima*, *Rangia cuneata*, *Donax variabilis*. The distribution and commercial value of each clam species is summarized, and the natural and commercial history of the hard clams (*Mercenaria* spp.) is presented. Techniques for artificial cultivation of clams in Florida are discussed.

Type of Study:Review; Biological Component:Mollusca; Dominant Taxon/Taxa Studied:*Mercenaria mercenaria*, *M. campechiensis*, *Spisula solidissima*, *Rangia cuneata*, *Donax variabilis*;

(01.00033)

Garbisch, E.W., Jr. 1974. Salt marsh creation on dredge material and natural shores. Proc. of the First Annu. Conf. on Restoration of Coast. Vegetation in Fla. p. 1-2.

Saltwater marsh establishment on either existing shores or fill material was studied in relationship with wave stresses, salinities, and tidal amplitudes. Physical stress limited distributions of plants, while substrates played a minor role. Artificial areas were colonized by plants and animals within one year.

Type of Study:Qualitative; Biological Component:Flora; Abiotic Parameters Measured:Wave action, salinity, tidal amplitude, substrate characteristics; Dominant Taxon/Taxa Studied:*Spartina alterniflora*, *Distichlis spicata*, *Scirpus americanus*, *Spartina patens*, *Spartina cynosuroides*, *Panicum virgatum*, *Panicum communis*, *A. breviligulata*;

(01.00034)

Gehring, W.R. 1971. Sound perception and production in the pink shrimp, *Penaeus duorarum* Burkenroad. Univ. of Miami, Sea Grant Tech. Bull. 5:60 p.

This study investigated the sensitivity of the pink shrimp to sound and vibration. Experiments were also undertaken to

determine if this species produces sound in the audio range. Studies indicated that sound or vibration was perceived in the 40-150 Hz range. Further experiments indicated that this perception was probably due to vibration of the substrate rather than to sound. The pink shrimp apparently does not produce sound of a significant amplitude in the audio range.

Type of Study:Qualitative; Biological Component:Fauna; Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(01.00035)

Gifford, C.A. 1962. Some observations on the general biology of the land crab, *Cardisoma guanhumi* (Latreille), in South Florida. Biol. Bull. 123(1):207-223.

Various aspects of the biology of the land crab, *Cardisoma guanhumi*, were studied in southern Florida. *C. guanhumi* is distributed from Vero Beach on the east coast through the Florida Keys to Tampa Bay on the west coast. The habitat, growth stages, spawning behavior and periodicity and color variations of the land crab are described.

Type of Study:Qualitative; Biological Component:Crustacea; Dominant Taxon/Taxa Studied:*Cardisoma guanhumi*;

(01.00036)

Ginsburg, R.W. & E.A. Shinn 1964. Distribution of the reef building community in Florida and the Bahamas. Am. Assoc. Petrol. Geol. Bull. 48:527.

The distribution and diversity of coral reefs surrounding Florida and the Bahamas are reviewed. Reasons are given for the most luxuriant and continuous reef communities occurring along eastern facing margins of the Florida and Bahamas platforms. These factors include wave action, water circulation, salinity, water temperature, and suspended sediments. Western margins support small, discontinuous reefs with lower diversities due to the unfavorable qualities of these parameters.

Habitat:Coral reef; Type of Study:Qualitative; Biological Component:Corals;

(01.00037)

Goldberg, E.D., V.T. Bowen, J.W. Farrington, G. Harvey, J.H. Martin, P.L. Parker, R.W. Risebrough, W. Robertson, E. Schneider 1978. The mussel watch. Envir. Conserv. 5(2):101-125.

The levels of 4 sets of pollutants (heavy metals, artificial radionuclides, petroleum components, and halogenated hydrocarbons) were measured in U.S. coastal waters, using bivalves as sentinel organisms for indicating levels of pollutants. The strategies of carrying out this program were outlined and the results from the first year's work were reported. Varying degrees of pollution in U.S. coastal waters were indicated by elevated levels of pollutants in the bivalves, comprised by certain species of mussels (*Mytilus*) and oysters (*Ostrea*; *Crassostrea*) and collected at over 100 localities.

Habitat:Variable; Type of Study:Quantitative; Biological Component: Mollusc fauna; Number of Stations:107 (7 in Florida); Dominant Taxon/Taxa Studied:*Mytilus*, *Ostrea*, *Crassostrea*;

(01.00038)

Godcharles, M.F. & M.C. Jaap 1973. Fauna and flora in hydraulic clam dredge collections from Florida west and southeast coasts. Fla. St. Dept. Nat. Resources, Lab. Spec. Sci. Rept. No. 40. 89 p.

Live flora and fauna specimens were collected, identified, and counted from stations along the west and southeast coasts of Florida. Four hundred fifty three taxa of marine flora and fauna were identified. These specimens were taken from depths of 0.9 to 24.4 m. The majority of the reported taxa were molluscs and crustaceans. All specimens were listed in locality, depth and numbers collected.

Study Duration:May 1970 and September 1971; Habitat:Rock, sand, mud; Type of Study:Quantitative; Biological Component:Fauna, flora; Type of Sampler:Hydraulic clam dredge and soft shell escalator clam dredge; Number of Stations:654 and 192; Number of Replicates/Station:1; Temporal Frequency:0; e; Abiotic Parameters Measured:Temperature, salinity, depth, clarity;

(01.00039)

Haddad, K., W. Marr, S. McCall & F.T. Manheim 1976. Waste disposal along the coastal zone of Florida. Fla. Sci. 39(Suppl.): 16.

Marine policy studies have reviewed 4 major types of disposal problems: domestic (sewage) and industrial waste; thermal effluents; and dredge spoil. In 1974, estimated total domestic effluent potentially reaching coastal waters aggregated 700 mgd. About 11% of a total of 700 mgd of individual effluents was released into Florida marine waters. About 40% of this was from the pulp and paper industry in northern Florida. The 12 bgd of heated effluent that is discharged in coastal waters was determined to be stressful to many organisms and beneficial to others. Of 796,000 acres of estuarine habitat, about 59,700 are estimated to have been lost or altered owing to dredge and fill activity.

Habitat:Variable; Type of Study:Qualitative;

(01.00040)

Malusky, J.G. 1975. Locomotory activity rhythms in blue crabs, *Callinectes sapidus*, (Rathbun). Fla. State Univ. M.S. Thesis. 126 p.

The locomotory rhythm of small groups and individual blue crabs, *Callinectes sapidus*, were observed in the field and in various laboratory conditions. Crabs exhibited a diurnal-bimodal periodicity. They became active shortly after sunrise, decreased activity during mid afternoon and again increased activity just before sunset. After sunset and during the hours of darkness, they remained inactive. Much individual variation was found and is discussed.

Type of Study:Qualitative; Biological Component:Fauna; Dominant Taxon/Taxa Studied:*Callinectes sapidus*;

(01.00041)

Hansen, W.G., G. Bitton, J.L. Fox & P.L. Brezonik 1977. Hydrocarbon status in Florida real estate canals. Mar. Poll. Bull. 8(3):57-63.

Sediment samples from real estate canals at 4 locations, 2 each on the east and west coast of Florida, were analyzed for hydrocarbon concentrations. Results suggested that canals on the west coast are receiving an influx of petroleum products and the number of hydrocarbon degrading bacteria in the sediments is significantly higher in west coast canals.

Habitat:Real estate canals; Type of Study:Quantitative; Number of Stations:4; Number of Replicates/Station:7; Abiotic Parameters Measured:Sediment hydrocarbon content;

(01.00042)

Haydee, L. 1982. Observations on the ecology of benthic aquatic testaceans (Protozoa, Rhizopoda Testacealobosia). Florida Sci. 45 (Suppl 1) 25.

Living testaceans from North and South America were correlated with abiotic parameters (temperature, salinity, water depth and substrate). The distribution, abundance, shell ornamentation, shell composition and morphological type of the shell of each species are related to the type of the substrate and water depth rather than temperature, the optimal salinity for testaceans is 1-2 o/oo but isolated specimens were found in waters with 25 o/oo salinity.

Type of Study:Qualitative, quantitative; Biological component:Fauna, Protozoa; Type of Sampler:Core, bottom scraper; Abiotic parameters measured:Temperature, salinity, water depth, substrate characteristics; Dominant Taxon/Taxa Studied:Testaceans;

(01.00043)

Hicks, D.B. and T.R. Cavinder 1975. Finger-fill canal studies, Florida and North Carolina. U.S. EPA, Region IV, Surveillance and Analysis Div., EPA 904/9-76-017. 427 p.

Environmental baseline data were presented for consideration in the planning and construction of canal systems in the southeast region of the United States. Five distinct areas were investigated. Water quality, sediment analysis, and canal flushing were studied in each area, as was the effect of septic tanks on the canals. The abundance and diversity of benthic organisms were determined to be severely limited in the canal systems studied.

Study Duration:1 year; Type of Study:Qualitative; Biological Component:Flora and fauna; Type of Sampler:Petersen or Ekman grab, dip net; Sieve Size:0.6 mm; Number of Stations:5 areas; Number of Replicates/Station:4; Dominant Taxon/Taxa Studied:Abiotic Parameters Measured:Temperature, salinity, DO, BOD, TOC, metals, nutrients, pesticides;

(01.00044)

Houbrick, J.R. 1970. Reproduction and development in Florida *Cerithium*. Am. Malacolog. Union Annu. Rept. (1970):74.

The life histories of 5 species of *Cerithium* from Florida were examined. Two types of reproduction and development were found. Stenohaline species had many eggs, rapid cleavage and attainment of the veliger stage, a short incubation period, and free swimming planktotrophic veligers. Euryhaline species had fewer, larger eggs, slower development, a longer incubation period within egg capsules, and emergence of completely metamorphosed young. The sperm, spawn, and egg masses of each species are compared to those of other Cerithiidae.

Type of Study:Qualitative; Biological Component:Mollusca; Dominant Taxon/Taxa Studied:*Cerithium muscarum*, *C. variable*, *C. edurnum*, *C. litteratum*, *C. auricomum*;

(01.00045)

Houbrick, R. 1974. Growth studies on the genus *Cerithium* (Gastropoda: Prosobranchia) with notes on ecology and microhabitats. The Nautilus 88(1):14-27.

The growth rates and general ecology of four species of *Cerithium* were studied in Florida. Comparative ecological observations on world species of the genus were made. All *Cerithium* species are shallow water, subtidal or

intertidal dwellers and most are associated with marine grasses and algae. Some species were shown to occur in large populations. They appear to be selective algae detritus feeders and have style-bearing stomachs with complex ciliary sorting mechanisms. Species in Florida were determined to spawn from winter through spring, grow from juveniles to adult stages in a few months, and have life spans of about one year. Predation on *Cerithium* species occurs by carnivorous molluscs, crabs, starfish, and bony fish. Smaller *Cerithium* species tend to be intertidal.

Study Duration:3-1/2 years; Habitat:Sand, mud, grassbeds; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Push net; Sieve Size:0.25 cm; Number of Stations:4; Number of Replicates/Station:1; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, tides; Dominant Taxon/Taxa Studied:*Cerithium muscarum*, *C. lutosum*, *C. eburnum*, *C. atratum*;

(01.00046)

Hutton, R.F. 1964. A second list of parasites from marine and coastal animals of Florida. Trans. Am. Microsc. Soc. 83:439-447.

An earlier listing of parasites by Hutton and Sogandores (Bernal, 1960) collected from marine and coastal animals of Florida is expanded upon in this study. Correlations in identification and nomenclature were made where necessary. A complete list of species is given.

Type of Study:Qualitative; Biological Component:Fauna;

(01.00047)

Idyll, C.P. 1957. The commercial shrimp industry of Florida. Fla. Bd. Conserv. Mar. Lab., Educ. Ser. No. 6. 30 p.

This review of the commercial shrimp industry of Florida examines the life history of penaeid shrimp, the shrimp industry, and regulations concerning the fishery. Three commercially important shrimp species, *Penaeus duorarum*, *P. setiferus*, and *P. aztecus* are described and their individual importance to the fishery is assessed. The spawning and development of *P. setiferus*, which is typical of other penaeids, are summarized. The distribution of shrimp, fishing gear and methods, economic value of the shrimp industry, and aspects of handling, shipping, and processing shrimp are discussed. Present fishery regulations are presented and the necessity of analyzing population data before making future management decisions is cited.

Type of Study:Review; Biological Component:Crustacea; Dominant Taxon/Taxa Studied:*Penaeus duorarum*, *P. setiferus*, *P. aztecus*, *P. brasiliensis*;

(01.00048)

Ingle, R.M. & W.K. Whitfield, Jr. 1968. Oyster culture in Florida. Fla. St. Bd. Conserv., Div. Saltwater Fish., Ed. Ser. No. 5.

The State of Florida, Board of Conservation oyster culture program in Florida was discussed. The life history of *Crassostrea virginica*, including habitat, reproduction, predation, growth rates, methods and costs of oyster culture were described.

Type of Study:Qualitative; Biological Component:Dysters; Dominant Taxon/Taxa Studied:*Crassostrea virginica*;

(01.00049)

Ingle, R.M., B. Eldred, H.W. Sims & E.A. Eldred 1963. On the possible Caribbean origin of Florida's spiny lobster populations. Fla. St. Bd. Conserv. Mar. Lab., Tech. Ser. No. 40. 12 p.

The possibility of Caribbean water currents transporting larval spiny lobsters (*Paupulus argus*) to Florida is investigated. Previous research has documented the larval developmental period of *P. argus* at 150 to 180 days, allowing long distance transport and a wide distribution. Studies of the adult breeding season and the Caribbean distribution of larvae are cited. A review of published water current patterns suggested that Caribbean currents may be important in seeding spiny lobster beds in the Florida Keys and the mainland peninsula. Summer Caribbean currents flow through the Yucatan Straits into central northern Gulf of Mexico; records of tropical fish fauna in Louisiana and northern Florida provide evidence for this transport. Plankton sampling of 22 stations between Key West and the Yucatan Straits established that spiny lobster larvae emanate from south of the straits. Further sampling and analysis of other plankton samples was continuing to determine the geographical distribution and source of *P. argus* larvae.

Study Duration:2-5 August 1962; Type of Study:Quantitative; Biological Component:Crustacea; Type of Sampler:1 m plankton net, 1 ft dia. Turtox net; Number of Stations:22; Dominant Taxon/Taxa Studied: *Paupulus argus*;

(01.00050)

Johnson, F.F. & M.J. Lindner 1934. Shrimp industry of the South Atlantic and Gulf states. U.S. Bur. Fish. Invest. Rep. 21-83 p.

The shrimp fishery of the south Atlantic and Gulf states is reviewed. The methods and gear, economics, and catch statistics are discussed.



Type of Study:Review; Biological Component:Crustacea;

(01.00051)

Joyce, E.A., Jr. 1972. A partial bibliography of oysters, with annotations. Fla. Dept. Nat. Resour. Mar. Res. Lab., Spec. Sci. Rept. No. 34. 846 p.

This indexed bibliography includes 4,117 references to commercial oysters (and to a lesser degree, other commercial bivalves) of which approximately 45% are annotated. It updates the bibliography of J.L. Baughman (Texas A&M Res. Found., 1948) and contains many references not included in that work. Although it includes some later publications, the bibliography is most complete through mid-1969.

Type of Study:Bibliography; Biological Component:Oysters;

(01.00052)

Joyce, E.A., Jr. & B. Eldred 1966. The Florida shrimping industry. Fla. Bd. Conserv. Mar. Lab., Educ. Ser. No. 15. 47 p.

Florida's commercial shrimp industry is based on 3 species of shrimp: *Penaeus fluviatilis* (white shrimp); *P. aztecus* (brown shrimp); and *P. duorarum* (pink shrimp). All three species have similar life histories and overlapping ranges. Morphological and growth characteristics and spawning periods and seasonal migrations of each species are summarized. Information on commercial shrimping for food and bait shrimp, including catch sizes, types of trawls, production of shrimping areas, importance of minor shrimp species, and effectiveness of conservation regulations is reviewed. The potential, methods and problems for shrimp farming in Florida are discussed.

Type of Study:Review; Biological Component:Shrimp; Dominant Taxon/Taxa Studied: *Penaeus fluviatilis*, *P. aztecus*, *P. duorarum*;

(01.00053)

Juhl, R. & S.B. Drummond 1976. Shrimp bycatch investigations in the United States of America. A status rept. NOAA, NMFS, SE Fish. Ctr. Rept. p. 213-226.

Preliminary results from an NMFS shrimp bycatch investigation were presented in this report. *Penaeus aztecus*, *P. duorarum*, and *P. setiferus* were reported to make up the bulk of the catch. The center of the shrimp fishery was found to be in the Gulf of Mexico and along the SE seaboard of the U.S. The average annual catch of penaeids was determined and explanations were presented for variations.

Habitat:Variable; Type of Study:Qualitative; Biological Component:Decapod fauna; Type of Sampler:Commercial shrimp trawl; Dominant Taxon/Taxa Studied:*Penaeus aztecus*, *P. duorarum*, *P. setiferus*;

(01.00054)

Kirtley, D.W. 1966. Intertidal reefs of Sabellariidae (Annelida: Polychaeta) along the coasts of Florida. Fla. St. Univ. M.S. Thesis.

Coastal localities were surveyed to examine the occurrence and distribution of reef-building polychaetous annelids, family Sabellariidae. Large reefs constructed by *Phragmatopoma lapidosa* were found at Key Biscayne, Dade County, Florida. Other members of the family Sabellariidae including *Sabellaria floridensis stephensoni*, *S. vulgaris* and *S. vulgaris beaufortensis* were reported from Cape Kennedy, Brevard County, Florida, northward to the Georgia state line. These species, however, were not found to construct important reefs on the intertidal zone. It was suggested from their presence in the intertidal zone that the sabellariids may be widespread in the sublittoral and shallow shelf areas nearby. *S. floridensis* was found from Naples, Collier County, Florida to Panama City, Bay County, Florida. *S. floridensis* was found to build low encrusting structures (reefs) in the shallow nearshore waters at St. Theresa, Franklin County, Florida and also encrusting a wide variety of solid substrates in the shallow nearshore areas. The geological significance of sabellariid worms, the structures they build, and their role in coastal ecology were discussed.

Study Duration:1 year; Habitat:Reef; Type of Study:Qualitative; Biological Component:Polychaete fauna;

(01.00055)

Latch, M. 1972. Comparative tolerances of the barnacles *Balanus improvisus* and *Balanus eburneus* to varying salinities. Fla. State Univ. M.S. Thesis. 85 p.

The salinity tolerances of two species of *Balanus* were compared. Both *B. improvisus* and *B. eburneus* had equal upper tolerance levels (25.7 ppt) of salinity, but *B. improvisus* withstood lower salinities (as low as 0.0 ppt) than *B. eburneus*.

Type of Study:Quantitative; Biological Component:Crustacea; Abiotic Parameters Measured:Salinity; Dominant Taxon/Taxa Studied: *Balanus improvisus*, *B. eburneus*;

(01.00056)

Lewis, R.R., III 1983. Protection and management of seagrass meadows - is it working? Fla. Sci. 46(Suppl. 1):15.

The decline of submerged macroalgal and seagrass communities in Florida and the effectiveness of protection and management measures are discussed. Losses occur over many years and are not noticed or documented until they are very large. Tampa Bay, Florida is given as an example, where 81% of the seagrass cover has disappeared over the last 100 years, with continued losses expected. Differences between protection from losses in submerged and emergent vegetation are noted.

Habitat:Seagrass beds; Type of Study:Review; Biological Component:Flora;

(01.00057)

McClintock, J.B. 1983. Escape response of *Argopecten irradians* (Mollusca:Bivalvia) to *Luidia clathrata* and *Echinaster* sp. (Echinodermata: Asteroidea). Florida Sci. 46 (2):95-100.

The bay scallop *Argopecten irradians* showed a strong escape response to contact with *Luidia clathrata* and a minimal response to contact with *Echinaster* sp. Homogenates of the asteroids injected into the scallops produced similar results. The response of the scallops may be related to the feeding habits of the asteroids; *Luidia* feeds primarily on macrofauna while *Echinaster* feeds primarily on detritus.

Type of Study:Qualitative; Biological Component:Faua; Dominant Taxon/Taxa Studied:*Argopecten irradians*, *Luidia clathrata*, *Echinaster* sp.;

(01.00058)

Menzel, R.W. 1968. Cytotaxonomy of species of clams (*Mercenaria*) and oysters (*Crassostrea*). Proc. Symp. Mollusca, Part 1.

A discussion of the cytotaxonomy of two species of clams and two species of oysters were presented. The two species of quahog clams were found to hybridize readily in the laboratory. Additionally, some hybridization was determined to be occurring in nature. Chromosome studies of the species and hybrids were conducted at meiosis and mitosis, and the chromosomal behavior of the hybrids was found to be normal. Since species determination based on shell morphology was confusing (the shape of the shell is determined partly by the substrate and the ecological conditions), attempts were made to cross species from as many areas as possible. It was determined that *Crassostrea virginica* and *C. gigas* will cause cleavage, but that the embryos die within several days at the straight line stage. All species crosses made had caused cleavage with limited success in rearing the hybrids except crosses with *Crassostrea commercialis* from Australia.

Type of Study:Qualitative; Biological Component:Mollusc fauna; Dominant Taxon/Taxa Studied:*Crassostrea virginica*, *C. gigas*, *Mercenaria mercenaria*, *M. campechiensis*;

(01.00059)

Menzel, W. 1976. Comprehensive report on the quahog clam (*Mercenaria spp.*) industry in Florida. Rept. submitted to Univ. Del. School of Mar. Sci., 20 p.

A comprehensive report on the quahog clam industry in Florida was presented. The middle east coast supports a fairly large fishery, mainly of the northern quahog. Clams are also abundant in the lower Tampa Bay area and are harvested fairly extensively for home use. The commercial landings and value of quahog clams to the fishermen was presented. Information on the harvesting of clams was also given.

Type of Study:Qualitative; Biological Component:Mollusc fauna; Dominant Taxon/Taxa Studied:*Mercenaria mercenaria*, *M. campechiensis*;

(01.00060)

Merrill, A.S. & H.S. Tubiash 1970. Molluscan resources of the Atlantic and Gulf Coast of the United States. Proc. Symp. Mollusca, Pt. III; p. 925-948.

A review of the molluscan resources of the Atlantic and Gulf Coast of the United States was presented. Approximately 15 species of molluscs were being harvested commercially off the east coast of the U.S. and the Gulf of Mexico, but the major bulk of fisheries were made up by *Crassostrea virginica*, *Placopecten magellanicus*, *Mercenaria mercenaria*, *Mya arenaria*, *Spisula solidissima*. The total dollar value of these species was given. Noteworthy changes during the past 10 years have been the increasing importance of the relatively new surf clam fishery and the increasing dominance of the Chesapeake Bay in the soft shell clam fishery.

Type of Study:Qualitative; Biological Component:Mollusc fauna; Dominant Taxon/Taxa Studied:*Crassostrea virginica*, *Placopecten magellanicus*, *Mercenaria mercenaria*, *Mya arenaria*, *Spisula solidissima*;

(01.00061)

GEOG. CLASSIFICATION: General Coastal Florida 01.00062 to 01.00066

Mikkelsen, P.S. 1980. A comparison of two Florida populations of the coquina clam, *Donax variabilis* Say, 1822 (Bivalvia: Donacidae). I. Intertidal density, distribution and migration. *Veliger* 23(3):230.

Density, distribution and migration of *Donax variabilis* were investigated at 2 locations, Indiatlantic Beach and Sanibel Island, during April to September 1976. Migratory behavior has been observed by other researchers and is thought to be stimulated by the acoustic shock of waves. Densities are variable and an even greater density than the record 15600/m<sup>2</sup> was found in this study. Also, a nonmigratory population was found. Explanations for the distributions are given.

Study Duration: April-September 1976; Habitat: Beach, sand; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: PVC core, 15 cm dia.; Sieve Size: 1.2 mm; Number of Stations: 8 transects; Temporal Frequency: Monthly; Dominant Taxon/Taxa Studied: *Donax variabilis*;

(01.00062)

Mitchell-Tapping, H.J. 1981. Particle breakdown of recent carbonate sediment in coral reefs. *Florida Sci.* 44(1):21-29.

Carbonate sediment of reef shoal environments from the Bahamas, Dry Tortugas, Lower Florida Keys, Grand Cayman Island and U.S. Virgin Islands were examined with a scanning electron microscope. Particle-size abundances (or modes) for each site were found to be a product of the sorting potential of wave energy. This sorting potential is the major factor in the breakdown of sand sized skeletal particles rather than micro-architectural structure as proposed by the Sorby principle.

Habitat: Coral reefs; Type of Study: Qualitative; Abiotic Parameters Measured: Sediment characteristics;

(01.00063)

Moore, D.R. 1963. Distribution of the seagrass, *Thalassia*, in the United States. *Bull. Mar. Sci. Gulf Caribb.* 13(2):329-342.

A discussion of the distribution of *Thalassia testudinum* in the U.S. was presented. Ecological factors limiting the distribution of turtle grass include temperature, water depth, turbidity, salinity, and wave action. Gaps in distribution were determined to be due to one or more unfavorable conditions. Aquatic populations derive both food and shelter from grassy areas.

Habitat: Grassbed; Type of Study: Qualitative; Biological Component: Benthic flora; Dominant Taxon/Taxa Studied: *Thalassia testudinum*;

(01.00064)

Moore, D.R. 1964. The family Vitrinellidae in South Florida and the Gulf of Mexico. Univ. Miami Ph.D. Dissertation.

A discussion on the Vitrinellidae fauna in South Florida and the Gulf of Mexico was presented. Eight out of a total of 64 species for the western Atlantic were determined to be endemic to the Gulf of Mexico. All of the species are known only in the northern Gulf. Several species have a very limited distribution off the northwest coast of Florida. One species, *Aerotrena cistronium*, previously known only as a Pliocene fossil along the west coast of the United States was found to have a range extending from southern New England to Florida, whereas an analogous species, *Circulus striatus* (Philippi) was found from the British Isles to the Mediterranean. Although the Atlantic and Pacific faunas appear to be closely related, only 11 of the 21 genera were found to be common to both oceans. It was, however, suggested that they may be largely an artifact of inadequate collecting and lack of study of collected material.

Type of Study: Qualitative; Biological Component: Mollusc fauna;

(01.00065)

Moulton, M.P. 1971. An inquiry into the use of plastic "grass" as a substitute for *Thalassia*. Fla. State Univ. M.S. Thesis.

A comparative study was made between a plastic grass and *Thalassia testudinum* and the flora and fauna associated with each. Different densities of plastic grass were planted in an area where *T. testudinum* had never grown and where it had grown but no longer did. Epiphytes of plastic and *T. testudinum* were similar. Seasonal variations are discussed. The densest plastic grass contained the largest fauna and flora. In all areas of the study plastic grass successfully substituted for *T. testudinum*.

Study Duration: July 1969-July 1970; Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Flora and fauna; Dominant Taxon/Taxa Studied: *Thalassia testudinum*;

(01.00066)

Nelson, M.G. 1980. A comparative study of amphipods in seagrasses from Florida to Nova Scotia. *Bull. Mar. Sci.* 30(1):80-89.

No significant differences in mean density, number of species, diversity, and evenness of seagrass-associated amphipods

GEOG. CLASSIFICATION: General Coastal Florida 01.00067 to 01.00071

were found between samples from 3 faunal provinces (12 sites) from Florida to Nova Scotia. Values of density, number of species, and evenness were lower in *Thalassia testudinum* sites than samples from *Halodule wrightii* or *Zostera marina*. Amphipod density decreased with increasing latitude in *Zostera* beds. Significant differences in the size and relative abundance of epifaunal species between most northern sites and most southern sites are believed to be due to differences in predation intensities.

Study Duration: June 1975-June 1976; Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Crustacea; Type of Sampler: Hand corer; Sieve Size: 1 mm; Number of Stations: 12; Number of Replicates/Station: 10; Abiotic Parameters Measured: Salinity, temperature; Dominant Taxon/Taxa Studied: *Gammarus oceanicus*;

(01.00067)

Nicol, D. 1977. Geographic relationship of benthic marine molluscs of Florida. *Nautilus* 91(1):4-7.

The geographic relationships of some benthic marine molluscs were studied. Fourteen percent of a total of 1,137 species were found to be Florida endemics. Species migrating southward on the Atlantic coast constituted 3.7%, while 68.4% were species migrating northward from the Caribbean. Those species migrating eastward along the Gulf of Mexico comprised 13.9% of the total.

Type of Study: Qualitative; Biological Component: Mollusc fauna;

(01.00068)

Odum, W.E., C.C. McIvor, & T.J. Smith, III 1982. The ecology of the mangroves of South Florida: a community profile. U.S. Fish Wildl. Serv., Off. of Biol. Serv., Washington, DC. FWS/OBS-81/24. 144 p.

This profile provides extensive information on the mangrove community and its role in the regional ecosystem of south Florida. Mangroves occur along the coast primarily between Cape Canaveral and Tarpon Springs, with patchy distribution in more northern areas. Among the subjects treated are mangrove species descriptions, community types, autecology of mangroves, ecosystem structure and function, associated biota, importance, and management implications. Extensive data on mangrove associated organisms including microorganisms, plants, invertebrates, fishes, amphibians, reptiles, birds and mammals is summarized.

Type of Study: Quantitative; Dominant Taxon/Taxa Studied: *Rhizophora mangle*, *Avicennia germinans*, *Laguncularia racemosa*, *Conocarpus erecta*;

(01.00069)

Oremland, R.S. 1976. Studies on the methane cycle in tropical marine sediments. Univ. of Miami Ph.D. Dissertation. 108p.

A study of in situ production of methane in several types of tropical benthic communities revealed the highest rates in seagrass (*Thalassia testudinum*) beds. Bubbles in the rhizosphere of *Thalassia* contained oxygen, nitrogen, and methane, all of which varied diurnally. Data suggested a net transport of oxygen from the rhizomes to the sediments and oxidation of methane on the rhizome surface. Methane production was found to be microbially mediated. The production process is summarized and the inhibitory effect of acetylene and ethylene is discussed.

Habitat: Seagrass beds; Type of Study: Quantitative; Biological Component: Bacteria and fauna; Dominant Taxon/Taxa Studied: *Thalassia testudinum*;

(01.00070)

Perkins, T.H. & T. Savage 1975. A bibliography and checklist of polychaetous annelids of Florida, the Gulf of Mexico, and the Caribbean region. Fla. Mar. Research Publ. No. 14, 62 p.

A bibliography and checklist of polychaete species recorded from northern Brazil to northern Florida, including the West Indies, the Bahama Islands, northern South America, eastern Central America, and the Gulf of Mexico were reported. The checklist was annotated to update the taxonomy of the species included, and species names were cross-referenced to bibliographic citations.

Type of Study: Qualitative; Biological Component: Polychaete fauna; Type of Sampler: Dredges & trawls;

(01.00071)

Phillips, R.C., C. McMillan & K.W. Bridges 1981. Phenology and reproductive physiology of *Thalassia testudinum* from the western tropical Atlantic. *Aquat. Bot.* 11(3):263-277.

Phenological investigations of *Thalassia testudinum* from seagrass beds at 5 sites in Texas, Florida, and St. Croix, U.S. Virgin Islands, and laboratory reproductive physiology studies indicate that flowering occurs in response to temperature patterns following winter minimum temperatures. Phenological analyses showed that flowering of *T. testudinum* may be nearly synchronous at all sites, but temperature responses of St. Croix plants are probably genotypically different from those of Florida and Texas. No significant site differences that were related to latitude were found for the five phenophases investigated. Seagrass from all locations produced flowers under continuous light, indicating that photoperiod is not a significant controlling factor in flowering phenology.

Study Duration: February 1976-May 1979; Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Flora; Number of Stations: 5; Temporal Frequency: Monthly; Abiotic Parameters Measured: Water temperature, salinity; Dominant Taxon/Taxa Studied: *Thalassia testudinum*;

(01.00072)

Pierce, E.L. 1965. The distribution of lancelets (*Amphiox*) along the coasts of Florida. *Bull. Mar.Sci.* 15(2):480-494.

The inshore area along the coast of Florida was sampled for lancelets. The single species collected was *Branchiostoma caribaeum*. This species occurred at times in excess of 15 specimens per liter of sand. The east coast, Indian River, and Florida Keys yielded few or no lancelets. The west coast from Cape Sable to Cedar Key was the region where the largest numbers were found. A more intensive investigation of the distribution of lancelets was made in the Cedar Key area. Certain features common to the habitats which supported the largest numbers of lancelets include: clean siliceous sand with shell fragments; noticeable tidal currents; salinities usually between 22 and 35‰; and abundant phytoplankton.

Study Duration: 4 years; Habitat: Sand, shell; Type of Study: Qualitative; Biological Component: Lancelets; Type of Sampler: Metal sand dredge; Abiotic Parameters Measured: Salinity; Dominant Taxon/Taxa Studied: *Branchiostoma caribaeum*;

(01.00073)

Pilsbry, H.A. & T.L. McGinty 1949. New marine mollusks of Florida and the Bahamas. *Nautilus* 63(1):9-15.

New marine molluscs of Florida and the Bahamas were described. They include the genus *Spodosis* and the species *Apodosis novimundi*, *Coralliophila manskieldi*, *Nitri fordii*, *Nitri fluviinaris*, *Thericius biniense*, and *Amphithalamus dysbatus*.

Type of Study: Qualitative; Biological Component: Mollusc fauna; Dominant Taxon/Taxa Studied: *Apodosis novimundi*, *Coralliophila manskieldi*, *Nitri fordii*, *Nitri fluviinaris*, *Thericius biniense*, *Amphithalamus dysbatus*;

(01.00074)

Pilsbry, H.A. & T.L. McGinty 1950. Vitrinellidae of Florida: Part 5. *Nautilus* 63(3):85-87.

Two new species and one new genus of Vitrinellidae were described from collections off coastal Florida. Included are *Solarioribis euzonus*, *Macromphalina palmaritoris* and *Parvitorboides*.

Type of Study: Qualitative; Biological Component: Mollusc fauna;

(01.00075)

Provenzano, A.J., Jr. 1958. The shallow water hermit crabs of Florida. Univ. of Miami M.S. Thesis.

A record of the hermit crab species known to occur in the shallow waters of Florida was presented. Also included were keys, descriptions, and illustrations to facilitate the identifications of these species.

Type of Study: Qualitative; Biological Component: Pagurid fauna;

(01.00076)

Quick, J.A., Jr. 1972. Oyster parasitism by *Labyrinthomyxa marina* in Florida. Univ. So. Fla. M.S. Thesis.

The fungus *Labyrinthomyxa marina* was found as an oyster parasite in all adequately sampled growing areas along the salinities from 6 ‰ to 36 ‰. It was suggested that high summer temperature was the most important factor contributing to high rates of parasitism. Field studies indicated that *L. marina* kills an average of over 50% of Florida's adult oysters yearly. In addition to this annual enzootic destructiveness, intermittent oyster epizootics were found to cause very rapid and intense mortalities. Techniques were developed for measuring annual death rates and for estimating high, short term oyster kills. An oyster growing program was proposed for use in central Florida to obtain the most oyster meats of highest quality in the shortest time with minimum mortality.

Study Duration: 5 years; Habitat: Oyster bed; Type of Study: Qualitative; Biological Component: Fungal oyster parasites; Type of Sampler: Oyster tongs, scallop dredge; Number of Stations: 120; Number of Replicates/Station: 1 or more; Temporal Frequency: Monthly; Dominant Taxon/Taxa Studied: *Labyrinthomyxa marina*, *Crassostrea virginica*;

(01.00077)

Quick, J.A., Jr. & J.G. Mackin 1971. Oyster parasitism by *Labyrinthomyxa marina* in Florida. Fla. Dept. Nat. Resources, Mar. Res. Lab. Prof. Pap. Ser. No. 13; 55 p.

A fungal oyster parasite, *Labyrinthomyxa marina*, was found to occur along the Gulf and Atlantic coasts of Florida. It was found concomitantly with the host throughout the year and at salinities from 6 ‰ to 36 ‰. High temperature was implicated as the most important factor contributing to high rates of parasitism. Field studies indicated that *L. marina* kills an average of over 50% of Florida's adult oysters yearly. Sampling and observation of the intermittent

oyster/epizootics caused by this fungus showed that mortalities could be very rapid and intense. Oyster mortality estimation methods were evaluated and one technique was developed for measuring annual death rates and another for estimating high, short-term oyster kills. An oyster growing program was proposed for use in central Florida to obtain the most oyster meats of highest quality in the shortest time with the smallest effective mortality.

Study Duration:5 years; Habitat:Oyster bed; Type of Study:Qualitative; Biological Component:Fungal oyster parasite; Type of Sampler:Oyster tongs, scallop dredge; Number of Stations:91; Number of Replicates/Station:12; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Labyrinthomyxa marina*, *Crassostrea virginica*;

(01.00078)

Radwin, G.E. & R.W. Wells 1968. Comparative radular morphology and feeding habits of Muricid gastropods from the Gulf of Mexico. Bull. Mar. Sci. 18(1):72-85.

The radulae of 11 species of Muricid gastropods were compared. Feeding habits and prey preferences as determined in laboratory experiments were found to be related to the radular morphology of several of these species. Certain applications of radular morphology and the classification of Muricid gastropods were briefly discussed.

Type of Study:Qualitative; Biological Component:Gastropods; Dominant Taxon/Taxa Studied:*Murex pomum*, *M. fulvescens*, *M. florifer*, *M. beaui*, *M. cellulatus*, *M. recurvirostris rubidus*, *Muricopsis ostrearum*, *Urosalpinx perrugata*, *U. tampaensis*, *Eupleura sulcidentata*, *Thais floridana*;

(01.00079)

Rehm, A. 1974. A study of the marine algae epiphytic on the prop roots of *Rhizophora mangle* L. from Tampa to Key Largo, Florida. Univ. of So. Fla. Ph.D. Dissertation.

The distribution and ecology of marine algae epiphytic on the prop roots of the red mangrove, *Rhizophora mangle*, was investigated at 4 sites from Tampa Bay to Key Largo, Florida. A total of 74 species of marine algae were found to be prop root epiphytes. Changes in epiphytic algal composition were observed from Tampa Bay to Key Largo. Four abiotic factors influencing the variety and abundance of algae on the roots were identified. In addition, the presence of the boring isopod *Sphaeroma terebrans* significantly reduced algal abundance and diversity. Tolerance tests to salinity and desiccation were conducted on selected algal epiphyte and zonation profiles are given for 13 species at Tampa Bay and 18 species in Key Largo.

Study Duration:March 1971-January 1972; Habitat:Mangrove forest; Type of Study:Qualitative; Biological Component:Flora; Number of Stations:4; Temporal Frequency:Bimonthly; Abiotic Parameters Measured:Temperature, salinity, tidal data; Dominant Taxon/Taxa Studied:*Rhizophora mangle*, *Sphaeroma terebrans*;

(01.00080)

Reinschmidt, D.C. 1969. Regeneration in the sea cucumber *Thyonella gemmata* (Pourtales). Fla. State Univ. M.S. Thesis.

Results indicate that *Thyonella gemmata* has several interesting regeneration abilities. First, evisceration does not occur under low oxygen, high temperature, or high ammonia stresses, but if removed manually, the viscera will be regenerated. As little as 5 % of the posterior end, or 70% of the anterior end are required for regeneration of a complete animal. Anterior tip removal allows wound healing and regeneration in segments as small as 12.5%. Gonads can regenerate from nonreproductive tissue. The reproductive system regenerates last and seems to be enhanced by abundance of food supply.

Type of Study:Quantitative; Biological Component:Fauna; Abiotic Parameters Measured:Oxygen, temperature, ammonia; Dominant Taxon/Taxa Studied:*Thyonella gemmata*;

(01.00081)

Rey, J.R. 1979. Colonization, turnover, and equilibrium of arthropods on *Spartina alterniflora* islands in northwest Florida. Fla. State Univ. Ph.D. Thesis.

A set of experiments was set up to study aspects of the equilibrium theory of insular biogeography by censusing arthropods on previously defaunated islands. In about 20 weeks defaunated islands returned to predefaunation levels. Out of area, distance to the mainland, and distance to the nearest large land mass variables, only area proved to be significant as a determinant of species richness. Immigration and extinction rates are discussed. Several of the factors investigated point to a reestablishment of equilibrium with turnover at about 20 weeks.

Type of Study:Quantitative; Biological Component:Fauna; Number of Stations:6; Abiotic Parameters Measured:Distance to nearest land mass; Dominant Taxon/Taxa Studied:*Spartina alterniflora*;

(01.00082)

Rheinhardt, J.M. & H.C. Aldrich 1982. Electron microscopy of epiphytes on the marine alga *Dictyota*. Florida Sci. 45

(Suppl. 1):23.

*Dictyota* is a common algae of Florida waters that may provide biomass for methane production. Diatoms, bacteria, blue-green algae, filamentous red algae, fungi and protozoa all colonize on *Dictyota*. Scanning and transmission electron microscopy and epi-flourescence UV microscopy were used to examine the effects of the epiphytes on *Dictyota*. Wall degradation was seen frequently and shading by the epiphytes could cause reduced algal growth.

Type of Study:Qualitative; Biological Component:Flora; Dominant Taxon/Taxa:*Dictyota*;

(01.00083)

Rowe, G.T., P.T. Polloni & S.G. Homer 1974. Benthic biomass estimates from the northwestern Atlantic Ocean and the northern Gulf of Mexico.

Deep sea life was found to be more abundant in the Atlantic Ocean than in the Gulf. The abundance of life followed an exponential decline with depth. The rate of decline could be related to the rate of decrease in phytoplankton production in an offshore direction and the efficiency of water column heterotrophs at utilizing sinking organic matter. The regressions also indicate that both benthos and zooplankton follow similar exponential decays in quantity of life with depth.

Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Anchor dredge, Van Veen grab; Sieve Size:0.42 mm; Number of Stations:22; Number of Replicates/Station:1;

(01.00084)

Rudloe, A.E. 1978. Some ecologically significant aspects of the behavior of the horseshoe crab *Limulus polyphemus*. Fla. State Univ. Ph.D. Thesis.

One little known aspect of the ecology and behavior of *Limulus polyphemus*, that of locomotory behavior, was studied in terms of orienting and regulating stimuli. Activity cycles, time budgets, and locomotory behavior changes during ontogeny and the life cycle were examined. Adult *L. polyphemus* orient to wave surge during breeding migrations. Activity rhythms shift from circadian rhythms with nocturnal peaks and lunar periodicity as larva, to tidal and diurnal activity rhythms as juveniles, and back again to nocturnal and lunar activity rhythms as adults. Other results are discussed.

Type of Study:Quantitative; Biological Component:Fauuna; Abiotic Parameters Measured:Water depth, wave surge, bottom topography; Dominant Taxon/Taxa Studied:*Limulus polyphemus*;

(01.00085)

Savage, T. 1972. Florida mangroves: A review. Fla. Dept. Nat. Resour. Lab. Leaflet. Ser. 7(2):1. 15 p.

This leaflet serves as a brief review of the Florida mangroves: red mangrove (*Rhizophora mangle*); black mangrove (*Avicennia germinans*); and white mangrove (*Laguncularia racemosa*). The taxonomy, distribution, growth, development, zonation, and succession of Florida mangroves are described. The morphology of leaves, flowers, and fruits of each species is given, and the use of growth rings in aging mangroves is discussed. An extensive bibliography is included.

Habitat:Mangrove forest; Type of Study:Review; Biological Component:Flora; Dominant Taxon/Taxa Studied:*Rhizophora mangle*, *Avicennia germinans*, *Laguncularia racemosa*;

(01.00086)

Sherman, K.M., D.A. Meeter & J.A. Reidenauer 1983. A technique for subsampling meiofauna. Presented at Benthic Ecol. Meet., Fla. Instit. of Tech., Melbourne.

A technique which allows subsampling of an abundant taxon, such as Nematoda, and complete sampling of rarer taxa is described. A triply balanced square design is used to choose one quarter of the sorting field for enumeration of nematodes. No bias was found in testing the technique; accuracy was to within +/- 0.7% when there were more than 200 nematodes per sample. The technique gave subsamples of abundant nematode species which did not differ significantly from expectation.

Type of Study:Quantitative (technique); Biological Component:Nematoda;

(01.00087)

Shinn, E.A. 1968. Burrowing in recent lime sediments of Florida and the Bahamas. J. Paleontol. 42(4):879-894.

The use of burrowing structures by 5 infaunal species (4 crustaceans and 1 coelenterate) in interpreting ancient rocks is discussed. Crustacean burrowers can produce up to 3 feet deep networks in muddy marine sediments in supratidal, intertidal, and subtidal environments of Florida and the Bahamas. The use of polyester plastic casts of burrows and other techniques is described.

GEOG. CLASSIFICATION: General Coastal Florida 01.00088 to 01.00093

Habitat:Mud; Type of Study:Qualitative; Biological Component:Crustacea, Coelenterata; Dominant Taxon/Taxa Studied:*Alpheus*, *Callinassa*, *Cardisoma*, *Uca*, *Phyllactis*;

(01.00088)

Shoemaker, C.R. 1933. Amphipoda from Florida and the West Indies. *Am. Mus. Novit.* 598:1-24.

A collection of amphipoda species from coastal Florida, Cuba, Dominica, the West Indies, Martinique, Barbados, Trinidad, British Guiana and Gulf of Mexico waters was studied. Ten families, 14 genera (one of which was newly described), and 17 species (five of which were newly described) were represented in the collections.

Type of Study:Qualitative; Biological Component:Amphipod fauna;

(01.00089)

Sims, H.W., Jr. 1966. The Florida spiny lobster. *Fla. Bd. Conserv. Mar. Lab., Salt Water Fish. Leaflet No. 7.* 5 p.

This leaflet, intended for public distribution, is a general review of the Florida spiny lobster, *Panulirus argus*, and the spiny lobster fishery. *P. argus* and similar species in Florida waters are described and a brief history of the spiny lobster is given. The fishing gear and methods of the lobster industry are summarized and the possibility of future lobster cultivation is discussed.

Type of Study:Review; Biological Component:Crustacea; Dominant Taxon/Taxa Studied:*Panulirus argus*;

(01.00090)

Smith, F.G.W. 1958. The spiny lobster industry of Florida. *Fla. Bd. Conserv. Mar. Lab., Educ. Ser. No. 11.* 34 p.

This review summarizes information on the spiny lobster, *Panulirus argus*, and the spiny lobster industry in Florida. A classification and description of *P. argus* is given and a key to the western Atlantic spiny lobsters is provided. The life history, habitat, migrations, and sexual characteristics of *P. argus* are summarized. The possibility of cultivating spiny lobsters and the fishing methods used in the industry are discussed. The economic value of the spiny lobster fishery in Florida is given and the regulations governing the fishery are presented.

Type of Study:Qualitative (review); Biological Component:Crustacea; Dominant Taxon/Taxa Studied:*Panulirus argus*;

(01.00091)

Stephens, W.M. 1968. The turtle grass community. *Nat. Hist.* 77(2):50-57.

A general discussion on the turtle grass, *Thalassia testudinum*, community was presented. The flowering and seeding of *Thalassia* was discussed. Additionally, other benthic floral species were described. The disappearance of *Zostera* along the Atlantic coast from southern North Carolina to Labrador was noted. Invertebrate species including seahorses, holothurians, decorator crabs, and sea urchins and their relationship to the turtle grass community were described. The nursery ground aspect and the effects of dredge and fill and pollution to these communities were reviewed.

Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Benthic flora and fauna; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Zostera*, *Syringodium filiforme*, *Halodule (Diplanthera) wrightii*;

(01.00092)

Stone, R.B. 1974. A brief history of artificial reef activities in the United States. *Proc. Int. Conf. Artificial Reefs, TAMU-SG-74-103.* p. 24-27.

The history of artificial reefs within U.S. waters was briefly discussed. In addition, 10 reefs were constructed to provide technical assistance to states and other groups. Two projects in particular were discussed: one in cooperation with the South Carolina Wildlife Resources Dept. on a reef off Murrells Inlet, SC; and the other was a cooperative study with the National Park Service comparing a small tire reef in Biscayne National Monument with a similar size adjacent patch reef. Preconstruction surveys to determine the species and number of fishes living on reef sites were conducted. The surveys were continued once the reefs were constructed, and also trapping and tagging were used to gather information on species composition, relative abundance, and movement of fishes on and between reefs. In addition a number of nontoxic scrap materials were evaluated (including car bodies, building rubble, concrete culverts, ships and barges, and tires). It was found that by increasing the amount of reef habitat, artificial reefs provide the potential for increasing the stock sizes of fishes. It was suggested that artificial reefs could be an effective management tool that states or other management agencies could use to develop fisheries which benefit both anglers and the economy of coastal communities and conserve the resource by increasing habitat.

Habitat:Artificial reefs; Type of Study:Qualitative;

(01.00093)

Storr, J.F. 1957. The sponge industry of Florida. *Fla. Bd. Conserv. Mar. Lab., Educ. Ser. No. 9.* 28 p.



This general review of the sponge industry of Florida is intended for public education. A general description of sponges is given and the types of sponges found in Florida are noted. Information is presented on the feeding, growth, reproduction, and commercial use of sponges. Extensive information concerning the sponge industry is summarized, including the location of commercial sponges, methods of collection and cleaning, and the economic value and yields of the industry. The future of the industry and the potential for cultivating sponges are discussed.

Type of Study:Review; Biological Component:Porifera;

(01.00094)

Thompson, J.R. 1963. The bathyalbenthic caridean shrimps of the southwestern North Atlantic. Duke Univ. Ph.D. Dissertation.

The caridean shrimps (Crustacea; Decapoda; Natantia; Caridea) of the upper and middle continental slope from Cape Hatteras, North Carolina, to the Equator were considered from taxonomic, ecologic, and zoogeographic standpoints. Two new species were described and a new superfamily and family were erected, bringing the total of caridean superfamilies to 10. Niches occupied in the bathyalbenthic community by members of the principal groups studied were outlined and background discussions of the slope environment were provided. The hypothesis was presented that members of superfamily Oplophoridae are closest to primitive caridean condition. Evidence was presented that migrations of Caridea to bathyalbenthic depths and niches is still continuing. Members of Oplophoridae showed all gradations from strictly pelagic (majority) through semipelagic to benthic. It was postulated that the migration in this family proceeded from the littoral or neritic environment to the pelagic and from there to the bathyalbenthic. Migrations of other groups seem to have proceeded across the shelf and directly down the slope or indirectly following or accompanying geographic migration. All of the bathyalbenthic carideans appeared to be of recent origin. World relationships of the caridean groups were outlined, and the distribution of the species was portrayed in a series of outline charts.

Study Duration:10 years; Type of Study:Qualitative; Biological Component:Decapod fauna; Type of Sampler:Trawl, tumbler dredge, scallop dredge; Number of Stations:1181; Number of Replicates/Station:1; Abiotic Parameters Measured:Temperature, currents, color, clarity, bottom slope;

(01.00095)

Thompson, S.H. 1967. Estuaries: An action program to save them. Proc. Gulf Caribb. Fish. Instit. 20th Annu. Sess. 55-59p.

The importance of estuaries to both commercial and sport fishery resources was described. Also documented was the danger of destruction facing this unique coastal zone. An active and growing interest in our nation's conservation programs was also reported. To guarantee that estuaries have a prominent place in these efforts, an action program that will 1) get the facts; 2) inform the public; and 3) formulate and support rational legislation was suggested. Progress along these lines was reported.

Habitat:Estuarine; Type of Study:Qualitative;

(01.00096)

Thorhaug, A. 1976. Transplantation techniques for the seagrass *Thalassia testudinum*. Univ. Miami Sea Grant Tech. Bull. No. 34. 6 p.

Two methods of replanting impacted marine areas were demonstrated, and the advantages of each were discussed. The seeding method was reported to be advantageous because: 1) lateral spread of the plants allows for better revegetation; 2) the bed from which the seeds are gathered is left intact; 3) ease of transport and anchoring of seeds exceeds that of plugging; 4) on a large scale operation, seeding is less time consuming and demands less labor; 5) seeding can be done at any depth. The advantages of the plugging method include: 1) plugs from mature beds can be taken throughout the U.S. coastal waters whereas seeds are sparse and absent in many places; 2) transportation is cut to a minimum; and 3) plugging can be accomplished year around.

Habitat:Grassbed; Type of Study:Technique; Biological Component:Benthic flora; Dominant Taxon/Taxa Studied: *Thalassia testudinum*

(01.00097)

Thorhaug, A. & P.B. Shroeder 1978. Synergistic effects of substances emitted from power plants on sub tropical and tropical populations of the seagrass *Thalassia testudinum*: temperature, salinity, and heavy metals. Presented at Waste Heat Mgt. & Utilization Second Conf., Miami Beach, Fla. p. 11-B-72-90.

The effects of temperature and salinity on metal uptake in *Thalassia testudinum* were examined in an effort to determine synergistic relationships found in sites impacted by energy related industry. Metals used were zinc, cobalt, cesium, manganese, silver, and iron. Specimens were collected from the field but all work was done in the laboratory. Sublethal and lethal synergistic effects were found for several combinations of factors.

Type of Study:Quantitative; Biological Component:Flora; Abiotic Parameters Measured:Salinity, temperature, trace metal uptake; Dominant Taxon/Taxa Studied:*Thalassia testudinum*;

(01.00098)

Tiffany, W.J., III 1979. The role of benthic invertebrate communities in Florida salt marsh and mangrove ecosystems: implications of mosquito control. Proc. Fla. Anti-Mosquito Asso. 12 p.

The role of benthic invertebrates in Florida's coastal wetlands, was described in general and some specific individual roles were mentioned. Salt marshes and mangroves were determined to be significant contributors to the productivity of Florida coastal ecosystems via the detritus-based food chain. A major link between the production of these plants and higher consumers was reported to be an intermediate trophic level of benthic invertebrates. Not only do these benthic invertebrate communities form a significant link in the food chain, they also serve as important biogeochemical agents by recycling substances (e.g., phosphorus) in coastal ecosystems.

Type of Study:Qualitative; Biological Component:Benthic invertebrates;

(01.00099)

Voss, G.L., C.R. Robins & J.C. Staiger 1977. Study of the macrofauna of the tropical western Atlantic. Symp. on Prog. in Mar. Research in the Caribb. & Adjacent Regions, Caracas, Venezuela. p. 483-503. FAO, Rome.

An overview of the macrofaunal research conducted in the tropical western Atlantic by 4 University of Miami research vessels between 1964 and 1975 is presented. The locations, numbers of stations, and types of studies conducted on the cruises are summarized.

Study Duration:1964-1975; Type of Study:Quantitative, qualitative; Biological Component:Fauna;

(01.00100)

Wallace, D.H. 1966. Oysters in the estuarine environment. p. 68-78. In: A Symposium on Estuarine Fishes. Am. Fish. Soc. Spec. Publ. No. 3. 154 p.

Pollution of estuaries was reported as being a primary cause for the decline of the oyster industry in various parts of the United States. Alterations of estuaries through dredging for fill, and the filling of salt marshes have been detrimental to oysters and have made oyster farming even more difficult. It was suggested that the long term solution is developing oyster growing plants, producing seed, and growing the oysters under completely controlled conditions. Suspended culture and use of salt ponds where conditions can be controlled to some extent could offer some possibilities for continued oyster production.

Habitat:Estuarine; Type of Study:Qualitative; Biological Component:Oysters;

(01.00101)

Walton, T.L., Jr. 1977. Beach nourishment in Florida and on the lower Atlantic and Gulf coasts. Fla. Sea Grant Tech. Pap. No. 2. 64 p.

A short summary was presented of the past beach nourishment projects in Florida, where information was available. Quite often it was found that information was lacking on important technical aspects of the project such as sand grain size placed on the beach, or the natural beach characteristics. Information from various sources was also sometimes contradictory. The summary included date, material placed on beach, location of fill and borrow areas, length of fill, height of berm, characteristics of borrow material, characteristics of natural beach material, method of spoiling material on the beach, cost, engineers, dredger/contractor, and other comments.

Habitat:Sandy beach; Type of Study:Qualitative;

(01.00102)

Walton, T.L., Jr. 1978. Coastal erosion - some causes and some consequences (with special emphasis on the state of Florida). Mar. Tech. Soc. J. 12(4):6 p.

It was concluded that not much can be done to effectively prevent erosion along Florida's coastline. Several factors have contributed to this fact: rising sea level, decreased vegetation, and poor construction planning with respect to the beaches. More research was recommended.

Type of Study:Qualitative;

(01.00103)

Wanless, H.R. 1975. Sedimentary dynamics and significance of seagrass beds. Fla. Sci. 38(Suppl. 1):20.

The influence of grassbeds on sediment movement and resultant faunal communities is discussed. Roots and rhizomes impede sediment movement and these stabilized areas provide good settings for molluscan community development. Grassbed losses increase sediment instability, higher turbidity, and reduced benthic communities. Seagrass molluscan communities are different from others and perhaps the progression of the beds can be compared in ancient sedimentary environments, thereby leading to reconstruction of paleoenvironments.

GE06. CLASSIFICATION: General Coastal Florida 01.00104 to 01.00109

Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Flora; Abiotic Parameters Measured:Sediment characteristics;

(01.00104)

Matts, S.A., R.E. Scheibling, A.G. Marsh & J.B. McClintock 1983. Induction of aberrant ray numbers in *Echinaster* sp. (Echinodermata:Asteroidea) by high salinity. Florida Sci. 46(2):125-128.

Eggs of *Echinaster* sp. (Type II) were fertilized at field temperature and salinity and transferred to different temperatures (20, 25, 30° C) and salinities (25,32,39 o/oo). At 39 o/oo, at all temperatures, 45% of the organisms exhibited ray number abnormalities; 4-ray predominated over 3-ray by a 2:1 ratio. Individuals metamorphosed at 25 and 32 o/oo exhibited the normal 5-ray pattern.

Type of Study:Qualitative; Biological Component:Faua; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa:*Echinaster* sp.

(01.00105)

Werner, W.E., Jr. 1967. The distribution and ecology of the barnacle *Balanus trigonus*. Bull. Mar.Sci. 17(1):64-84.

Aspects of the life history and distribution were investigated for the barnacle *Balanus trigonus*. *B. trigonus* is intolerant of both high and low temperatures, which may be the limiting factor in its geographic and littoral distribution. Reproduction is year round, with the majority of settlement in spring and fall. Growth rates and factors affecting growth are discussed.

Type of Study:Quantitative; Biological Component:Faua; Abiotic Parameters Measured:Temperature, depth; Dominant Taxon/Taxa Studied:*Balanus trigonus*;

(01.00106)

Williams, R.H. 1950. Florida seaweeds and their commercial use. Fla. St. Bd. Conserv. Educ., Ser. No. 7.19 p.

This publication, intended for education of the public, names the commercially important seaweeds of Florida and provides a key for their identification. The commercial uses of the seaweeds (fertilizer, stock feed, agar, and algin) are described and the methods of harvesting and processing seaweed are explained. Management of seaweed resources and the potential for the seaweed industry in Florida are discussed.

Type of Study:Review; Biological Component:Flora; Dominant Taxon/Taxa Studied:*Sargassum natans*, *S. fluitans*, *Digenia simplex*, *Hypnea musciformis*, *Gracilaria foliifera*, *G. blodgettii*;

(01.00107)

Willis, C. & J. Carlton 1974. Florida Dept. of Nat. Resour. efforts in coastal vegetation restoration and marine habitat construction. Proc. of the First Annu. Conf. on Restoration of Coast. Vegetation in Fla. p. 13-14.

Several projects on reestablishment of coastal plant communities and construction of marine habitats by the DNR are reported. Transplanting of 3 mangrove species had a 98% success ratio. Transplant experiments with seagrass revealed that the main concern should be on the substrate and less on methods used for anchoring the plants. If the substrate is unsuitable, then initial substrate has to be transplanted with the seagrass.

Habitat:Seagrasses, mangroves; Type of Study:Quantitative; Biological Component:Flora; Dominant Taxon/Taxa Studied:*Avicennia germinans*, *Spartina alterniflora*;

(01.00108)

Winston, J.E. 1977. Distribution and ecology of estuarine ectoprocts: a critical review. Chesapeake Sci. 18(1):34-57.

A study on the distribution and ecology of estuarine ectoprocts revealed that 3 to 6 percent of the gyanolaemates were found to penetrate some distance into mixohaline water. The cyclostomes and ascophorans were determined to be least tolerant of diluted salinities and the itenostomes and the anascans most tolerant. Ectoprocts showed a decrease in numbers of species with decreasing salinity. The distribution of brackish water ectoprocts was found to depend not on salinity alone, but also on temperature, substrate availability, and the general stability of the environment.

Habitat:Estuarine; Type of Study:Qualitative; Biological Component:Benthic fauna; Number of Stations:56 worldwide; 5 in Florida; Abiotic Parameters Measured:Temperature, salinity;

(01.00109)

Woodburn, K.D. 1961. Operation baby clam in Florida. Fla. St. Bd. Conserv. Mar. Lab., Mimeo Rept. 9 p.

In this early attempt at experimental aquaculture of hard shell clams, lots of 600 juvenile *Mercenaria mercenaria* and 2000 juvenile hybrids (female *M. campechiensis* x male *M. mercenaria*) from Milford, Connecticut, were delivered to 6 sites around Florida. Clams were placed in screen-top boxes in protected coastal waters. From November, 1960 to June 1961, hybrid clams grew from lengths of 1/8 inch or less to maximum lengths of 1 1/2 inch, and individuals

GEOG. CLASSIFICATION: General Coastal Florida 01.00110 to 01.00111

of *M. mercenaria* grew from lengths of 1/4 - 1/2 inch to maximum lengths of 1 3/4 inch wherever protective boxes remained intact and predators were excluded. The history of hardshell clam production in Florida and methods for future aquaculture projects are discussed.

Study Duration: November 1960-June 1961; Type of Study: Quantitative; Dominant Taxon/Taxa Studied: *Mercenaria mercenaria*, *M. campechiensis*;

(01.00110)

Woodburn, K.D. 1963. A guide to the conservation of shorelines, submerged bottoms and saltwater with special reference to bulkhead lines, dredging and filling. Fla. Bd. Conserv. Saltwater Fish. Div. Ed. Bull. No. 14. 8 p.

A guide for evaluating marine productivity and standards for waterfront development was described. Features of the shorelines, submerged bottoms, and salt waters were included to assist the layman in making field inspections. Other methods for fact finding about the natural resources of the area such as interviews and consultation, and publications and maps were also included. Recommendations were made for guidelines in coastal conservation.

Type of Study: Qualitative;

(01.00111)

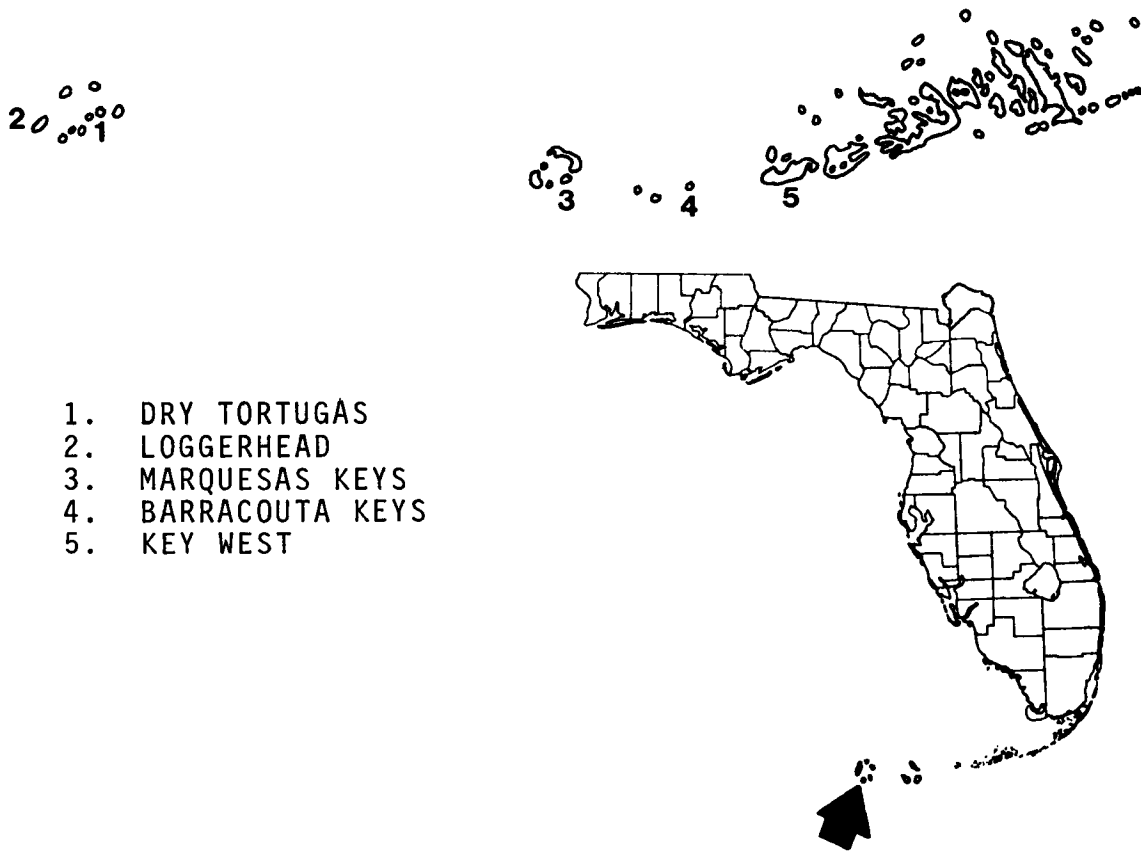
Woodburn, K.D. 1965. A discussion and selected annotated references of subjective or controversial marine matters. Fla. Bd. Conserv. Mar. Lab. Tech. Ser. No. 46. 50 p.

An annotated reference list of subjective or controversial marine matters was presented. Some of the topics covered included bait shrimping, commercial netting and trawling, dredging, filling and spoiling, fishing pressures and success, mortality and abundance, seismic and explosive operations, and spearfishing.

Type of Study: Qualitative;

See also: 20.00022, 27.00136, 27.00137, 29.00010, 33.00014.

# DRY TORTUGAS



(02.00001)

Berry, R.J. 1967. Dynamics of the Tortugas (Florida) pink shrimp population. U. of Rhode Island Ph.D. Thesis.

An analysis of historical information, a 3 yr. interview survey, and two mark-recapture experiments were used to assess the penaeid shrimp population of the Tortugas. Results suggest that a reduction in fishing pressure and management to increase the size of shrimp first exposed to capture would benefit the fishery.

Study Duration: 3 years; Type of Study: Qualitative, quantitative; Biological Component: Decapod fauna; Dominant Taxon/Taxa Studied: Penaeid shrimp;

(02.00002)

Bowman, H. 1918. Botanical ecology of the Dry Tortugas. Carnegie Inst. Wash. Pub. 252:109-138.

The aquatic and terrestrial flora of the Dry Tortugas was surveyed during the summers of 1915 and 1916. The distribution of plants throughout the area was determined and comparisons were made with a previous survey. A species list was assembled.

Study Duration: Summer 1915-summer 1916; Type of Study: Qualitative; Biological Component: Flora;

(02.00003)

Cary, L.R. 1918. Studies on Alcyonaria at Tortugas. Carnegie Inst. Wash. Yr. Book 16:175-177.

The growth rates of Alcyonarian corals were measured at Dry Tortugas, Florida. The effects of depth and temperature on growth rate were examined. The upper thermal lethal levels were determined for 13 species and their ecological significance discussed. Oxygen consumption rates were also measured and related to thermal stress.

Habitat: Coral reef; Type of Study: Qualitative; Biological Component: Coral; Abiotic Parameters Measured: Temperature; Dominant Taxon/Taxa Studied: *Pseudoplexaura crassa*, *Eunecia crassa*, *Plexaura flexuosa*, *P. homonalla*, *Plexaurella dichotoma*, *Plexaurella sp.*, *Eunecia rousseaui*;

(02.00004)

Cummings, W.C. 1961. Maturation and spawning of the pink shrimp, *P. duorarum*. Trans. Am. Fish. Soc. 90:462-468.

Life history parameters of the pink shrimp, *Penaeus duorarum*, were measured monthly in a year-long study on the Tortugas shrimp grounds. Four stages of female maturation were described using ovum size frequency, gross observation, and ratio of gonad weight to tail weight. Size at first sexual maturity, duration of spawning activity, and spawning frequency were determined. Spawning activity is believed to be closely correlated with annual temperature fluctuations.

Study Duration: December 1956-December 1957; Type of Study: Qualitative; Biological Component: Crustacea; Type of Sampler: Trawl; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature; Dominant Taxon/Taxa Studied: *Penaeus duorarum*;

(02.00005)

Davis, G.E. 1977. Anchor damage to a coral reef on the coast of Florida. Biol. Conserv. 11:29-34.

An assessment of the anchor damage to coral reefs was made at Fort Jefferson National Monument, Dry Tortugas, Florida. It was estimated that 20 percent of an extensive staghorn coral reef had been damaged by boat anchors. The author suggested that damage could occur in other coral reef sanctuaries unless anchor sensitive areas were identified and closed to anchoring, and mooring buoys were provided.

Study Duration: July 1975; Habitat: Sand, coral, rock; Type of Study: Qualitative; Biological Component: Coral; Number of Stations: 2 transects; Dominant Taxon/Taxa Studied: *Acropora cervicornis*;

(02.00006)

Davis, G.E. 1982. A century of natural change in coral distribution at the Dry Tortugas: a comparison of reef maps from 1881 and 1976. Bull. Mar. Sci. 32(2): 608-623.

Reef maps prepared in 1881 and 1976 were compared to determine changes in coral reef structure and composition at Dry Tortugas, Florida, over a 95 year interval. Little change in area occupied by living hermatypic coral, less than 4% of the 23,000 hectare area mapped, occurred during the interval. Coral species distribution and reef types exhibited major changes. An octocoral dominated hard bottom in 1881 had been replaced by a 220 hectare *Acropora cervicornis* reef in 1976. Forty four hectares of *A. palmata* in 1881 were reduced to two small patches totaling less than 600 m<sup>2</sup> in 1976. During the winter of 1976-77, 90% of *A. cervicornis* at Dry Tortugas was killed, apparently due to thermal shock. The importance of short term weather events in regulating coral reef structure and species distribution is discussed.

Study Duration: 1976; Habitat: Coral reef; Type of Study: Qualitative; Biological Component: Fauna and flora; Dominant

Taxon/Taxa Studied:*Montastrea annularis*, *Acropora cervicornis*, *A. palmata*, *Porites*, *Diploria*, *Thalassia testudinum*, *Syringodium filiforme*;

(02.00007)

Eldred, B. 1959. A report on the shrimps (Penaeidae) collected from the Tortugas controlled area. Fla. St. Bd. Conserv. Spec. Sci. Rept. No. 2. 6 p.

Periodic shrimp sampling in a Tortugas controlled area was conducted in order to obtain information on the frequency and abundance of undersized shrimp. *Penaeus duorarum*, *Trachypeneus constrictus* and *Sicyonia typica* were collected in samples or reported by other workers from the inshore bay areas of the west coast of Florida adjacent to the Tortugas grounds. *Trachypeneus constrictus*, *Sicyonia dorsalis*, *S. brevirostris*, *Solenocera atlantidis* and *Penaeopsis goodei* were not collected from these inshore areas, and no record of their occurrence in these bays was found in the literature. It was suggested that the study area could be utilized by these species as a breeding and nursery ground.

Study Duration: November 1957-October 1958; Type of Study: Semi-quantitative; Biological Component: Decapod fauna; Dominant Taxon/Taxa Studied: *Penaeus duorarum*, *Trachypeneus constrictus*, *Sicyonia typica*

(02.00008)

Eldred, B. 1962. The attachment of the barnacle, *Balanus amphitrite niveus* Darwin, and other fouling organisms to the rock shrimp, *Sicyonia dorsalis* Kingsley. Crustaceana 3(3):203-206.

One hundred thirty one sessile barnacles (*Balanus amphitrite niveus*) were found attached to the exoskeletons of 17 of 61 specimens of the rock shrimp, *Sicyonia dorsalis*, collected on the Tortugas shrimp ground. Three of the barnacle-fouled shrimp had attached hydroids, one of which had 2 polychaete worms (*Polydora* sp.) embedded in the fifth pleuron. Four other penaeid species (44 individuals) from the same sample were free of encrustations. The locations of attached barnacles and their probable effect on movement of the shrimp is reported. The timing of *Balanus* settlement in terms of the molting cycle of *S. dorsalis* is discussed.

Study Duration: 4 August 1958; Type of Study: Quantitative; Biological Component: Crustacea; Dominant Taxon/Taxa Studied: *Balanus amphitrite niveus*, *Sicyonia dorsalis*;

(02.00009)

Fontaine, C.T. & R.A. Neal 1971. Length-weight relations for three commercially important penaeid shrimp of the Gulf of Mexico. Trans. Am. Fish. Soc. 100:584-586.

Sexual variations in the size ranges of 2 penaeid shrimp species were determined for shrimp collected from the upper Texas coast and Florida Tortugas grounds. Length-weight relationships were determined for *Penaeus aztecus*, *P. setiferus*, and *P. duorarum* on a seasonal basis. Differences in size between sexes and species are given.

Type of Study: Quantitative; Biological Component: Crustacea; Temporal Frequency: Seasonally; Dominant Taxon/Taxa Studied: *Penaeus aztecus*, *P. duorarum*, *P. setiferus*;

(02.00010)

Ingle, R.M., B. Eldred, H. Jones & R.F. Hutton 1959. Preliminary analysis of Tortugas shrimp sampling data, 1957-58. Fla. St. Bd. Conserv. Mar. Lab., Tech. Ser. No. 32. 45 p.

Twelve stations in the Tortugas shrimp grounds were trawled weekly from November 1957 to October 1958 to examine the population dynamics of the area's commercial shrimp. Numerically, *Penaeus duorarum*, composed 65% of the shrimp population; the next most abundant species was *Trachypeneus* sp., comprising 23% of the population. Extensive data is presented on shrimp size, abundance, reproduction, and migration. A nursery area for young *P. duorarum* was suspected south of the sampling stations. Recommendations for the protection of the local shrimp population are made in light of the findings.

Study Duration: 18 Nov. 1957-18 Oct. 1958; Type of Study: Quantitative; Biological Component: Crustacea fauna; Type of Sampler: Otter trawl; Number of Stations: 12; Temporal Frequency: Weekly; Dominant Taxon/Taxa Studied: *Penaeus duorarum*, *Trachypeneus similis*, *T. constrictus*, *Sicyonia* sp., *Solenocera* sp., *Penaeopsis* sp.;

(02.00011)

Iverson, E.S. & C.P. Idyll 1960. Aspects of the biology of the Tortugas pink shrimp, *Penaeus duorarum*. Trans. Am. Fish. Soc. 89(1).

A one year survey of the pink shrimp, *Penaeus duorarum* from the Tortugas grounds off southern Florida yielded information on size frequency, growth, and migration. Female and male pink shrimp had an estimated winter growth of 5 and 7 counts per pound (number of shrimp per pound with heads off), respectively. Tagging studies indicated that adult shrimp generally migrate in a northwest direction. Maximum size of females was greater than that of males. Carapace length was directly related to total length. Using size frequency distributions, small shrimp were found to move into the Tortugas grounds from Florida Bay.

Study Duration: July 1957-June 1958; Type of Study: Quantitative; Biological Component: Crustacea; Type of Sampler: Otter trawl; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Penaeus duorarum*;

(02.00012)

Iverson, E.S. & A.C. Jones 1961. Growth and migration of Tortugas pink shrimp, *Penaeus duorarum*, and changes in the catch per unit of effort of the fishery. Fla. St. Bd. Conserv. Mar. Lab. Tech. Ser. No. 34. 28 p.

The growth and migratory behavior of tagged pink shrimp, *Penaeus duorarum*, were studied. The average rate of recovery of tagged shrimp was about 10 percent. Little apparent difference was seen between winter and summer growth rates. Considering both sexes together, small shrimp (67 count or 25 mm carapace length) increased about 10-11 counts per month; medium shrimp (33 count or 33 mm carapace length) increased about 2-3 counts per month; and large shrimp (20 count or 40 mm carapace length) increased about 0-1/2 count per month. On the fishing grounds, tagged shrimp were found to move about 5 miles per day and in all directions from the point of release. The majority moved to deeper water in a northwesterly direction. Despite increased fishing effort, the trend line of total production was determined to be approximately level. The catch per boat night has declined over the years 1950-1959.

Study Duration: 21 months; Habitat: Grassbed; Type of Study: Qualitative; Biological Component: Shrimp; Type of Samplers: Commercial shrimp trawls, tag and recovery; Dominant Taxon/Taxa Studied: *Penaeus duorarum*;

(02.00013)

Lindner, M.J. 1966. What we know about shrimp size and the Tortugas fishery. Proc. Gulf Caribb. Fish. Inst. 18:18-26.

Analyses were made of the population dynamics of *Penaeus duorarum* in the Tortugas area and used in conjunction with information on the fishing industry to determine optimum shrimp size for harvesting in consideration of costs. Harvesting should occur at the 50-60 count level in order to least deplete the shrimp population while still maintaining maximum profits. Problems of how to harvest at this level are discussed as well as recommendations to shrimp fishermen.

Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Shrimp nets; Dominant Taxon/Taxa Studied: *Penaeus duorarum*;

(02.00014)

Sugiri, G.K.A. 1971. A description of the Tortugas shrimp fishery and its maximum sustainable yield. Univ. of Miami M.S. Thesis. 96 p.

Data on the shrimp fishery efforts in the Tortugas was compiled to obtain figures on production, relative abundance, size composition, and distributions. Several sources were used including interviews, Bureau of Commercial Fisheries and Vessel listings. Various statistics are given and implications for the fishery industry are discussed.

Type of Study: Quantitative; Biological Component: Fauna;

(02.00015)

Tressler, W.L. 1949. Marine ostracoda from Tortugas, Florida. Wash. Acad. Sci. Wash., DC J. 39(10):335-343.

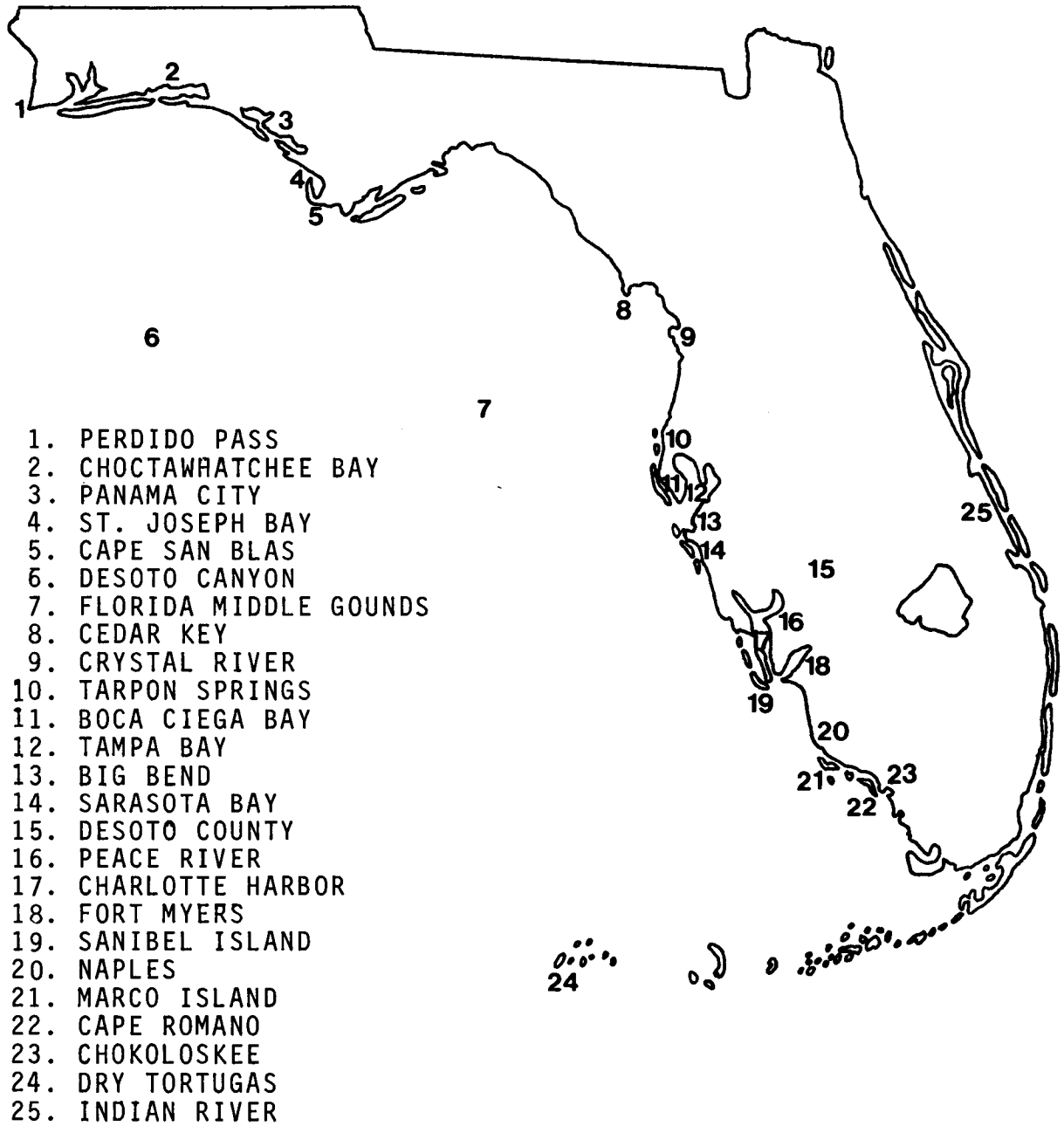
Thirteen species of marine ostracods, 7 of which are believed to be new, from the Dry Tortugas, Florida, were described. The material was obtained from several sources including from debris secured in the course of otter trawl hauls and from the cracking up of corals and rocks, seaweed washings, and rock scrapings, and also from the alimentary tracts of dissected fish.

Type of Study: Qualitative; Biological Component: Fauna; Type of Sampler: Trawl;

See also: 4.00005, 4.00038, 4.00056, 4.00063, 24.00003, 26.00014, 26.00026.



# GULF COAST



(03.00001)

Abele, L.G. 1970. The marine decapod crustacea of the northeastern Gulf of Mexico. Fla. St. Univ. M.S. Thesis. 137 p.

A survey of the shallow waters of the northeastern Gulf of Mexico resulted in 154 species of decapod crustaceans. Forty of these species were newly recorded for this area. The distribution patterns of all species known from this area were analyzed and it was concluded that the northeastern Gulf of Mexico is 16.5% tropical, 13.3% endemic, 33.7% widespread, and 36.5% Carolinian in character. Based on this data, the study recommended that the concept of a Carolinian Province be reexamined.

Habitat: Rock, sand, mud, grassbeds, shell, estuarine; Type of Study: Qualitative; Biological Component: Decapod crustaceans;

(03.00002)

Abele, L.G. 1974. Species diversity of decapod crustaceans in marine habitats. Ecology 55: 156-161.

Species diversities of decapod crustaceans were compared to various abiotic parameters. The numbers of species were found to be little affected by temperature range, salinity range, or tidal exposure. The number of substrates was determined to be the most important factor in determining the number of species present, probably because each species can make differential use of each substrate. Latitude and longitude did not influence the numbers of decapod species within habitats. For ten marine habitats, the numbers of species of decapod crustaceans were as follows: temperate sandy beach (8); tropical sandy beach (7); tropical sand mud beach (16); temperate *Spartina* marsh (14); tropical *Rhizophora* mangroves (17,20); temperate man-made jetties (34); tropical *Pocillopora* coral (55); and tropical rocky intertidal zones (67,78).

Study Duration: 1967-1972; Habitat: Sand, mud, rock, coral, salt marsh, mangroves; Type of Study: Qualitative; Biological Component: Decapod crustaceans; Abiotic Parameters Measured: Temperature, salinity, tides;

(03.00003)

Alexander, J.E. (editor) 1978. Final report on the Baseline environmental survey of the MAFLA lease areas. Contract No. 08550-CT4-11. Submitted to Bureau of Land Management, U.S. Dept. of Interior, by Florida Board of Regents Office on behalf of State University system of Florida. 190 p.

An extensive survey was conducted on the MAFLA shelf of the eastern Gulf of Mexico, from Mississippi to Clearwater, Florida. The sampling program was designed and conducted in the areas of geology, biology, and chemical and physical oceanography.

Study Duration: May-July 1974; Habitat: Continental shelf; Type of Study: Quantitative; Biological Component: Fauna, flora; Type of sampler: Boxcore, Capetown dredge, camera, Niskin bottle; Number of stations: 65 Benthic, 43 dive-dredge; Number of Replicates/Station: 11 benthic; Temporal frequency: Once; Abiotic Parameters Measured: Sediment characteristics, trace metals, hydrocarbons, ATP, D.O., nutrients, carbon, chlorophyll; Dominant Taxon/Taxa Studied: Benthic invertebrates, algae;

(03.00004)

Alexander, J.E., T.T. White, K.E. Turgeon & A.W. Blizzard 1977. Baseline monitoring studies, Mississippi, Alabama, Florida, outer continental shelf 1975-1976. 6 volumes. A report to the Bureau of Land Management, Wash. D.C., Contract No. 08550-CT5-30 submitted by State University System of Florida, Institute of Oceanography.

An extensive study was conducted on the Eastern Gulf of Mexico outer continental shelf prior to oil and gas development activities. The study was a broadened continuation of a 1974 baseline survey. Areas of investigation included geology, biology, and chemical and physical oceanography.

Study Duration: 1975-1976; Habitat: Continental shelf; Type of Study: Quantitative; Biological Component: Flora, fauna; Type of Sampler: Niskin samplers, nets, box core, plugs; Number of Stations: 45 (box core); Number of Replicates/Station: 11 (box core); Abiotic Parameters Measured: Sediment characteristics, trace metals, hydrocarbons, ATP, D.O., nutrients, carbon, chlorophyll; Dominant Taxon/Taxa: Benthic invertebrates, algae;

(03.00005)

Andress, M.E. 1970. Distribution of Foraminifera in the southeastern Gulf of Mexico. Fla. State Univ. M.S. Thesis.

An investigation was made of the frequency distribution of Foraminifera in the southeastern region of the Gulf of Mexico. From the 50 bottom sediment samples collected, 4 depth zones, each with its own foraminiferan species were described. The majority of samples were composed of species found in the Gulf of Mexico. Inconsistencies existed in the effect of bottom sediments on distribution and abundances. Above 90 m faunal trends were correlated only with depth changes.

Type of Study: Quantitative; Biological Component: Fauna; Number of Stations: 50;

(03.00006)

Atlas, E. 1981. Synthetic organics in the Gulf of Mexico - A review. In: Proc. of a Symp. on Environ. Research Needs in

the Gulf of Mexico, Key Biscayne, Fla., 30 Sept.-5 Oct. 1979. D.K. Atwood (Convener). Publ. by NOAA/ERL, Atlantic Oceanographic and Meteorological Lab., Miami, Fla. Vol. IIC. p. 131-165.

This summary paper reviews the state of knowledge on two classes of compounds (the halogenated hydrocarbons and the phthalate ester plasticizers) in the Gulf of Mexico. Concentrations of these trace organics in the Gulf of Mexico are summarized for the biota, water, and sediments. Analytical methodology and inputs, removal mechanisms, and transformation of the synthetic organics in the Gulf of Mexico are also reviewed. Gaps in existing knowledge are identified and suggestions for priority areas of research are made.

Type of Study: Qualitative (review); Biological Component: biota;

(03.00007)

Barnard, R.W. & P.N. Froelich, Jr. 1981. Nutrient geochemistry of the Gulf of Mexico. In: Proc. of a Symp. on Envir. Research Needs in the Gulf of Mexico, Key Biscayne, Fla., 30 Sept.-5 Oct. 1979. D.K. Atwood (Convener). Publ. by NOAA/ERL, Atlantic Oceanographic and Meteorological Laboratories, Miami, Fla. Vol. IIA. p. 127-146.

This summary paper reviews the state of knowledge on the elements known to be involved in biogeochemical pathways. Information on the water masses and sediments of the Gulf of Mexico as they relate to these elements are reviewed. The sparsity of information on sedimentary and interstitial water nutrient geochemistry is noted and suggestions for future research are made.

Type of Study: Qualitative (review);

(03.00008)

Bault, E.I. 1969. A study of the distribution and the zoogeography of the polychaetous annelids of the continental shelf in the northeastern Gulf of Mexico. Fla. State Univ. M.S. Thesis.

Polychaetes were obtained from bottom samples taken during November 1967 along the northeastern Gulf continental shelf to a depth of 183 m. Of the 4 major groups, the first consisted of species occurring on the Atlantic coast of the U.S. The second group were those endemic to the Gulf of Mexico. The third group was composed of polychaetes found in the West Indies, Bermuda, and Florida Keys areas. The fourth group was circumtropical circumundane. The large number of tropical and subtropical species was the most outstanding feature of this study of polychaetes.

Study Duration: November 1-November 15, 1967; Type of Study: Quantitative; Biological Component: Fauna; Number of Stations: 221;

(03.00009)

Bell, S.S. & J.B. McClintock 1981. Invertebrates associated with echinoderms from the west coast of Florida with special reference to harpacticoid copepods. Internat. Echinoderm Conf. Tampa, Fla. Sept. 14-17, 1981.

Meiofauna and macrofauna were collected from three echinoderm species from the Gulf coast of Florida. Harpacticoid copepods numerically dominated the echinoderm-associated assemblages. Nematodes, amphipods, and ostracods were also abundant on *L. variegatus*, but were present in low numbers on *Arbacia punctulata* and *Echinaster* sp.; The high densities of associated invertebrates on *L. variegatus* are believed to be a result of the echinoid's covering response which provides microhabitats for small invertebrates.

Type of Study: Quantitative; Biological Component: Fauna; Number of Stations: 2; Dominant Taxon/Taxa Studied: *Lytechinus variegatus*, *Arbacia punctulata*, *Echinaster* sp.;

(03.00010)

Benson, R.H. & G.L. Coleman, II 1963. Recent marine ostracodes from the Eastern Gulf of Mexico. Univ. Kansas Paleontol. Contrib. Article 2, p. 1-52, Pl. 1-8, Fig. 1-33.

Thirty species belonging to 23 genera of ostracodes were collected and described from 42 localities in the Eastern Gulf of Mexico. The samples were obtained from the open shelf in depths ranging from 19 to 239 ft in waters of normal marine to slightly hypersaline salinity. The distribution of recent ostracode species that were also found in Miocene rocks corroborates prior paleoecological interpretations of the environments in which the Miocene sediments were deposited. Depth of water (light penetration), wave base, and proximity to shore were major factors suggested to be the predominant factor influencing the distribution of recent ostracode species within the area of study. A biogeographic classification of the faunas was suggested, including Gulf realm, a Caribbean realm, and a deep basin realm. New diversions of the ostracode faunas from offshore of the west coast of Florida were suggested.

Study Duration: 1956 and 1957; Habitat: Sand-size calcareous frag. w/some quartz & minerals; Type of Study: Qualitative; Biological Component: Ostracod fauna; Type of Sampler: Orange peel dredge and core; Sieve Size: 0.25, 0.50, & 1.00 mm; Number of Stations: 42; Temporal Frequency: 3 times; Abiotic Parameters Measured: Temperature and salinity;

(03.00011)

Bieri, R. 1979. Hydrocarbons in demersal fish, macroepifauna, and zooplankton. Vol. II, Chapt. 9, In: MAFLA final rept.

(The Mississippi, Alabama, Florida outer continental shelf baseline environmental study. 1977/ 1978), prep. by Dames & Moore for BLM. Contr. #AA550-CT7-34. p. 531-571.

As part of a large scale study of the biota of the Mississippi, Alabama and west Florida continental shelves, the tissues of demersal fish, macroepifauna and zooplankton were analyzed for hydrocarbon content. Hydrocarbon fractions were identified, and spatial trends of hydrocarbon distribution over the study area were discussed. Little evidence for the presence of petroleum was found in demersal fish or macroepifauna.

Study Duration:1977-1978; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Dredge, trawl; Dominant Taxon/Taxa Studied:*Syacium papillosum*, *Clypeaster ravenielli*, *Encope michelini*, *Acquiptecten glyptus*;

(03.00012)

Birdsall, B. 1979. Eastern Gulf of Mexico, continental shelf phosphorite deposits. Univ. of So. Fla. M.S. Thesis.

Sediment samples were collected from the continental shelf in the eastern Gulf of Mexico to determine the abundance and distribution of phosphorite. The proportion of phosphorite ranged from 0.3 to 1.1% in sediment grain counts. Two modes of occurrence of phosphite in the study area are proposed.

Habitat: Sand, mud; Type of Study: Quantitative; Type of Sampler: Shipek grab, Reineck box corer;

(03.00013)

Bishop, D. 1980. The ecology of molluscan infauna on the southwestern continental shelf of Florida. Univ. of So. Fla. M.S. Thesis.

Twelve benthic stations were sampled seasonally from spring 1975 through winter 1976 for molluscan infauna on the continental shelf off Sanibel Island and Clearwater, Florida. A total of 216 taxa were identified. Depth and sediment grain size ranges were determined for each species. Seasonal variations in diversity were observed, and diversity was correlated with mean sediment grain size. Depth and sediment grain size were found to be important regulators of molluscan community composition.

Study Duration:Spring 1975-winter 1976; Habitat:Mud, sand; Type of Study:Quantitative; Biological Component:Mollusca; Type of Sampler:Box core; Number of Stations:12; Temporal Frequency:Seasonally; Abiotic Parameters Measured:Sediment grain size, depth;

(03.00014)

Blake, M.J. 1977. Infaunal macromolluscan assemblages of the Eastern Gulf of Mexico, 1975-76. Unpubl. Rept. U.S. Dept. of Int., BLM, Washington, DC. 43 p.

This report presents the results of the macroinfaunal molluscs study of the Bureau of Land Management sponsored program in the Mississippi, Alabama, Florida (MAFLA) outer continental shelf. One hundred forty one taxa of gastropods, 120 taxa of bivalves, 13 taxa of scaphopods, 7 taxa of polyplacophorons and 1 aplacophoran taxa were obtained from the study. Abundance of each of the 282 taxa ranged from 1 individual/ 0.54 m<sup>2</sup> to 605 individuals/0.54 m<sup>2</sup>. Shannon-Weaver diversity index values ranged from 0.26 to 3.36 and generally decreased offshore. Seasonal and spatial variations were present in both density and diversity. A classification analysis distinguished five major clusters. These faunal breaks appeared to be only partially related to sediment classification. Season, depth, latitude, and sampling problems appeared to be some of the other important factors.

Study Duration: 1975-76; Type of Study: Quantitative; Biological Component: Mollusca; Type of Sampler: 0.062 m<sup>2</sup> box core; Sieve Size: 0.5 mm; Number of Stations: 45; Number of Replicates/Station: 9; Temporal Frequency: 3 times, June and Sept.1975, Jan. 1976; Abiotic Parameters Measured: Temperature, salinity, DO, sediments; Dominant Taxon/Taxa Studied: *Tellina versicolor*, *Parviluncina multilineata*, *Abra lioica*, *Varicorbula operculata*;

(03.00015)

Blake, M.J. 1978. Histopathology of epifaunal invertebrates of the eastern Gulf of Mexico. Vol. II, Chapt. 18, In:MAFLA final report. (The Mississippi, Alabama, Florida outer continental shelf baseline environmental study. 1977/1978). prep. by Dames and Moore, Inc. for BLM contract # AA550-CT7-34. p. 837-860.

Since 1975, 14,732 slides were made and analyzed for pathological conditions. Ninety-eight epifaunal species are represented by the slides. The incidence of pathological conditions potentially induced by hydrocarbons was completely absent. The fauna of the study area may be described as healthy and the environment pristine in comparison to other shelf areas.

Study Duration:1977-1978; Biological Component:Fauna; Number of Stations:22; Temporal Frequency:Summer 1977, Fall 1977, Winter 1978; Dominant Taxon/Taxa Studied:*Portunus* spp., *Sicyonia brevirostris*, *Murex beaulti*, *Acquiptecten* spp., *Stenorychus seticornis*;

(03.00016)

Blake, M.J. 1979. Infaunal macromolluscs of the Eastern Gulf of Mexico. MAFLA Rept. submitted to Dames and Moore, Inc.

for U.S. Dept. Inter., Bur. Land Mgt. Contract AA550-CT7-34. p. 668-698.

The macromolluscs of the Eastern Gulf of Mexico were sampled over 7 seasons from 1975 to 1978. A total of 322 taxa were identified. The list includes both temperate and tropical species. In the northern sections of the Eastern Gulf of Mexico the molluscs were highly influenced by the discharge of the Mississippi River and as a result the species richness and abundance were low; the species present were mostly deposit feeders which can survive the fine sediments. In the southern areas species richness and abundance increased, although they were highly variable from one season to another and from one year to another. A total of 7 groups of stations resulted from cluster analysis. These groups appear to show a north-south linearity. Apparently the macromolluscan assemblages of the Eastern Gulf of Mexico are controlled not only by sediment and temperature, but also by water depth.

Study Duration: 3 1/2 years; Type of Study: Quantitative; Biological Component: Mollusc Fauna; Type of Sampler: Box core, anchor dredge; Sieve Size: 0.5 mm; Number of Stations: 107; Temporal Frequency: 8 times in 3 1/2 years;

(03.00017)

Bobbie, R.J. 1980. Characterization of the structure of marine and estuarine benthic and fouling microbial communities using lipid chemistry. Fla. State Univ. Ph.D. Dissertation. 162 p.

Assays for microbe derived lipid components were developed to aid in determining the structure of benthic microbial communities, which form the basis of trophodynamics in detrital and benthic ecosystems. Lipid analysis provided evidence for changes in biomass, relative dominance of prokaryotic and eukaryotic components, and species composition. Field verification studies revealed significant correlation between the fatty acids used to delineate microbial community structure and macrofaunal biomass, species diversity and species richness.

Type of Study: Quantitative; Biological Component: Fauna;

(03.00018)

Bock, W.D. 1977. Foraminifera of the MAFLA area (1975-76). Unpubl. Rept. submitted to U.S. Dept. of Int., BLM, Washington, DC. 23 p.

This report presents the results of the foraminifera study of the Bureau of Land Management sponsored program in the Mississippi, Alabama, Florida (MAFLA) outer continental shelf. The author presents a list of the dominant benthic foraminiferal species, diversity and evenness values and concludes: A comparison of the living benthonic foraminiferal faunas of the MAFLA area from 1974 and 1975 indicates changes in species distribution and abundance occur naturally. At some stations these changes are relatively unimportant while others are extreme. The causes for extreme change at one station while a station immediately adjacent has relatively little change are not completely understood at present. Seasonal sampling should clarify the causes for these changes. Several foraminiferal trends have become apparent in the MAFLA area. Many of these are at least partially understood, but, again, seasonal sampling should clarify the reasons for the trends. Stress indicator species occur in the MAFLA area and further monitoring should enable us to achieve a better understanding of their reactions to natural changes in the environment in addition to providing a means for determining introduction of man made pollutants and their potential danger to the environment.

Study Duration: 1975-1976; Type of Study: Quantitative; Biological Component: Foraminifera; Type of Sampler: 2.5 cm dia. core (subsample from box core); Sieve Size: 0.063 mm; Number of Stations: 45; Number of Replicates/Station: 2; Temporal Frequency: 3 times (June & September 1975, Jan. 1976); Abiotic Parameters Measured: Temperature, salinity, DO, sediments; Dominant Taxon/Taxa Studied: *Ammonia beccarii*, *Asterigerina carinata*, *Cibicides* aff *C. floridanus*, *Brizalina lowmani*, *Cassidulina curvata*;

(03.00019)

Bock, W.D. 1979. Foraminifera of the MAFLA area. Rept. submitted to Dames and Moore, Inc. for BLM. MAFLA Final Rept. [1977-78]. Contract #AA550-CT7-34. p. 626-639.

Sites along eight transects on the continental shelves of Mississippi, Alabama, and Florida (MAFLA) were sampled 4 times between summer of 1976 and winter of 1978 to examine benthic Foraminifera community structure. Seasonal fluctuations in foraminiferal abundance were relatively small, although abundance of major dominant species sometimes changed drastically. Comparisons of abundance and species composition are drawn with results from a 1975-76 study. Spatial trends of foraminifera in the MAFLA area are identified and related to depth and sediment type. Characteristic species of each depth zone are given.

Study Duration: 1977-1978; Habitat: Sand, mud; Type of Study: Quantitative; Biological Component: Foraminifera; Type of Sampler: 2.5 cm core (subsample from box core); Sieve Size: 0.063 mm; Number of Stations: 54; Number of Replicates/Station: 2; Temporal Frequency: 4 times (summer 1976, summer, fall 1977, winter 1978); Abiotic Parameters Measured: Temperature, salinity, DO, sediments; Dominant Taxon/Taxa Studied: *Ampistegina gibbosa*, *Asterigerina carinata*, *Rosalina concinna*, *R. columbiensis*, *Cibicides floridanus*, *Marzawaia strattoni*;

(03.00020)

Bortone, S.A., G.F. Mayer & R.L. Shipp 1977. BLM MAFLA demersal fish survey, 1975-1976. Unpubl. Rept. U.S. Dept. of Int., BLM, Washington, D.C. 18 p. + 2 appendices.

This report presents the results of the demersal fish study of the Bureau of Land Management sponsored program in the Mississippi, Alabama, Florida (MAFLA) outer continental shelf. The authors summarize the results as follows: A total of 8,882 specimens representing 204 species were captured, identified, weighed, measured, and archived. These data were then analyzed for species diversity, seasonal variation of species composition and biomass, dominant species and possible migratory activity. In addition, tissue samples were removed from selected individuals for subsequent hydrocarbon/trace metal analysis. Species diversity appeared most consistent at 183 m stations. However, differences in absolute diversity between depths were inconclusive. Numbers of species and biomass appeared only slightly higher at shallower depths. There appeared to be little geographical variation in any of these parameters. Species dominance was the most consistent and valuable faunal characterization noted. Based on species dominance, faunal variation was more marked between depths than between geographically separate stations of the same depth.

Study Duration:1975-1976; Type of Study:Qualitative; Biological Component:Fishes; Type of Sampler:9.1 m semiballoon trawl & Capetown dredge; Sieve Size:9.5 mm (trawl), 12.7 mm (dredge); Number of Stations:18; Number of Replicates/Station:1 (trawl), 2 (dredge); Temporal Frequency:3 times (June & Sept. 1975; Jan. 1976); Abiotic Parameters Measured:Temperature, salinity, DO, sediments; Dominant Taxon/Taxa Studied:*Syacium papillosum*, *Bellator ailiaris*, *Chronis scotti*, *Branchiostoma floridae*, *Prionotus stearnsi*, *Macrorhamphosus scolopax*;

(03.00021)

Bright, T.J. 1968. A survey of the deep sea bottom fishes of the Gulf of Mexico below 350 meters. Texas A&M Univ. Ph.D. Dissertation. 226 p.

The deep sea bottom fishes in the Gulf of Mexico were surveyed through dredging. No correlation between species distribution and sediment type within the soft bottom category was demonstrated. The number of fishes per 1000 m of bottom surveyed decreased with increasing depth. Diversity, in terms of numbers of species, was greatest between 350 and 1000 m. Fishes caught above 1000 m were two to three times larger than fishes caught below that depth. Polychaetes and crustaceans appeared to be preferred as food. Three modes of feeding were described. A poor correlation between sediment type and distribution was in part attributed to a lack of selectivity in feeding. A checklist, including distributional and ecological data, of the bottom fishes of the Gulf below 350 m was presented.

Habitat:Deep sea (below 350 m); Type of Study:Qualitative; Biological Component:Demersal fishes; Type of Sampler:Dredge;

(03.00022)

Bright, T.J., W.C. Jaap & C.W. Cashman 1981. Ecology and management of coral reefs and organic banks. In: Proc. of a Symp. on Environ. Research Needs in the Gulf of Mexico, Key Biscayne (Florida), 30 Sept.-5 Oct. 1979. D.K. Atwood (Convener). Publ. by NOAA/ ERL, Atlantic Oceanographic and Meteorological Laboratories, Miami, Fla. Vol. 11B. p. 53-160.

This summary paper provides a detailed description of the Gulf of Mexico reefs and hard bottom patches, reviews existing studies, describes their economic value, details the stresses affecting them, and lists the governmental agencies having justification over them. A list of recommendations for future studies is also presented. An extensive reference list is also provided.

Type of Study:Qualitative (review); Biological Component:Fauna;

(03.00023)

Brooks, G.R. 1981. Recent carbonate sediments of the Florida Middle Ground: northeastern Gulf of Mexico. Univ. of So. Fla. M.S. Thesis.

A total of 206 surface sediment samples from the Florida Middle Ground were collected and analyzed to characterize the sedimentology of the region. The sediment composition was similar to that of the surrounding west Florida shelf, except for the additional presence of barnacles due to the hard bottom of the Middle Ground. Sediment grain size and carbonate content were typical of other coral reefs. Well-sorted quartz of terrigenous origin was found only in non-reef areas. The depositional nature of the Middle Ground was determined to be transitional.

Habitat:Coral reef; Type of Study:Quantitative;

(03.00024)

Brooks, H.K. 1962. Observations on the Florida middle grounds. Geol. Soc. Am. Spec. Pap. 68:65-68.

SCUBA gear was used to study the nature and origin of the relief features of the Florida Middle Ground. Corals, algae, and fish populations are similar to those of Florida Key reefs. This is the first time such organisms have been reported at such depths and this far north in the Gulf. Recent reef growth has not greatly contributed to the development of the reef mass which is founded upon an older coral reef from the last interglacial stage.

Habitat:Coral reef; Type of Study:Qualitative; Biological Component:Fauna/flora;

(03.00025)

Brooks, J.M. 1981. Sources and distributions of petroleum hydrocarbons in the Gulf of Mexico: Summary of existing knowledge. In: Proc. of a Symp. on Environ. Research Needs in the Gulf of Mexico, Key Biscayne, Florida. 30 Sept.-5 Oct. 1979. D.K. Atwood (Convener). Publ. by NOAA/ERL, Atlantic Oceanographic and Meteorological Lab., Miami, Fla. Vol. IIC. p. 167-209.

This summary paper reviews the state of knowledge on inputs of petroleum hydrocarbons and their distribution in biota and sediments of the Gulf of Mexico. Major multidisciplinary programs involving petroleum hydrocarbons, of the Gulf of Mexico are also reviewed. Information needs are identified and future directions are recommended.

Type of Study:Qualitative (review); Biological Component: biota; Abiotic Parameters Measured:Sediment;

(03.00026)

Bullock, L.H. & G.B. Smith 1979. Impact of winter cold fronts upon shallow-water reef communities off west-central Florida. Fla. Sci. 42(3):169-171.

SCUBA observations of shallow water (12-37 m) reefs in the eastern Gulf of Mexico during the exceptionally cold winters of 1977 and 1978 revealed damage to the reef biota suffered during passage of cold fronts. Some reef fish were killed or injured either directly from the cold or from physical abrasion against the reef during heavy bottom surge. Stony corals were overturned and gorgonian corals were torn from their reef attachments during periods of heavy bottom surge. Recovery time of the damaged reefs is unknown, though coral recovery is undoubtedly slow, since most species are living near their northern limits of distribution.

Study Duration:February 1977-February 1978; Habitat:Coral reef; Type of Study:Qualitative; Biological Component:Coral and reef fish; Number of Stations:4; Number of Replicates/Station:2 (1 station), 1 (3 stations); Abiotic Parameters Measured:Water temperature; Dominant Taxon/Taxa Studied:*Lachnolaimus maximus*, *Lutjanus griseus*, *Muricea laxa*, *M. elongata*, *Stephanocoenia michelini*;

(03.00027)

Butler, P.A. 1973. Organochlorine residues in estuarine mollusks, 1965-72, National Pesticide Monitoring Prog. Pestic. Monit. J. 6(4):238-362.

This paper describes the development of the national program for monitoring estuarine molluscs in 15 coastal states (including Florida) and reports the findings for the period from 1965 to 1972. In most cases it was demonstrated that in recent years detectable DDT residues have declined in both number and magnitude in several species of estuarine molluscs. DDT pollution in many estuaries, as judged by the magnitude of residues in molluscs was found to have peaked in 1968 and to have been declining markedly since 1970. Because of the sensitivity of molluscs to organochlorine pollutants and the fact that they are filter feeders, it was assumed that the contribution of particulate DDT to estuaries from one or more primary sources such as drainage basin runoff waters, atmospheric fallout, and persistent reservoirs in bottom sediments had declined significantly.

Study Duration:1965-1972; Habitat:Variable; Type of Study:Quantitative; Biological Component:Molluscs; Number of Stations:9 Florida stations; Abiotic Parameters Measured:Pesticides; Dominant Taxon/Taxa Studied:*Crassostrea virginica*;

(03.00028)

Caine E.A. 1983. Community Interactions of *Caprella penantis* Crustacea Amphipods on Sea Whips. J. Crustacean Biol. 3(4):497-504.

*Caprella penantis* is the dominant epifauna on sea whips, *Leptogorgia virgulata*, occurring in *Thalassia testudinum* meadows in northwestern Florida. *Caprella penantis* densities were 23 times greater in winter when *Thalassia* dies back and fish predators are absent. The reduced densities may be caused by fish predation but the increases are a result of increased reproductive activity. After several molts the caprellids leave the sea whips to join the benthic macrofaunal community.

Type of Study:Qualitative; Biological Component:Caprellid amphipod fauna; Dominant Taxon/Taxa Studied:*Caprella penantis*, *Leptogorgia virgulata*, *Thalassia testudinum*;

(03.00029)

Cairns, S.D. 1977. Guide to the commoner shallow-water gorgonians (sea whips, sea feathers, and sea fans) of the Gulf of Mexico and the Caribbean region. Sea Grant Field Guide Ser. No. 6. 74 p.

General descriptions of the more common Florida, shallow-water gorgonians (phylum Coelenterata) are provided. This guide covers 27 species (of a total of 170 species of gorgonians known in the West Indian Province) that could be encountered without the use of SCUBA. A key to the identification of species was included.

Type of Study:Qualitative; Biological Component:Gorgonians;

(03.00030)

Cake, E.W., Jr. 1970. Some predator-prey relationships involving the sunray venus clam, *Macrocallista nimbosa* (Lightfoot) (Pelecypoda: Veneridae) along the Gulf coast of Florida. Fla. St. Univ. M.S. Thesis.

Captivity predation experiments were conducted with 24 known or suspected pelecypod consumers which occur with the sunray venus clam (*Macrocallista nimbosa*). Observations were made on (1) the ability of 14 gastropods, 2 cephalopods, 1 merostomatan, 5 crustaceans, and 2 benthic fish to penetrate (or open) and consume sunray clams in captivity; (2) the average rate at which these predators consumed the clams; (3) the prey size-selectivity they may or may not exhibit; and (4) the shell damage each species may or may not produce when penetrating the clam shells or removing flesh from them. Seventeen of those species (9 gastropods, 2 cephalopods, 1 merostomatan, and 5 crustaceans) employed at least 8 different shell-penetration methods when successfully attacking *M. nimbosa*. Ten predators produced characteristic shell damage which could be recognized when analyzing shell debris collected from the *Macrocallista* habitat. Predator size was suggested to be a factor controlling prey size-selectivity. The majority of the predators exhibited random prey size-selectivity in captivity.

Type of Study:Qualitative; Biological Component:Sunray venus clams; Dominant Taxon/Taxa Studied:*Macrocallista nimbosa* (Lightfoot);

(03.00031)

Camp, D.K. 1971. *Platysquilla horologii* (Stomatopoda, Lysiosquillidae), a new species from the Gulf of Mexico with an emendation of the generic definition. Proc. Biol. Soc. Wash. 84(15):119-128.

A description of the new species *Platysquilla horologii* was provided. An emendation of the generic definition of *Platysquilla* and the description of the new species was also presented.

Type of Study:Qualitative; Biological Component:Stomatopod crustaceans; Dominant Taxon/Taxa Studied:*Platysquilla horologii*;

(03.00032)

Carpenter, J.S. 1966. History of scallop and clam explorations in the Gulf of Mexico. Comm. Fish. Rev. 29(1):47-53.

The scallop and clam resources of the Gulf of Mexico are outlined from explorations conducted from 1954 to 1963. Maximum concentrations of calico scallops (*Aequipecten gibbus*) were found off Cape San Blas and St. George, Florida, and Gulf Shores, Alabama, in water shallower than 120 ft. Hard clam (*Mercenaria campechiensis*) beds were most productive off Pas-a-Grille, Venice, San Carlos, and Cape Romano, Florida in 18 to 24 ft.

Type of Study:Qualitative; Biological Component:Mollusca; Dominant Taxon/Taxa Studied:*Aequipecten (Argopecten) gibbus*, *Mercenaria campechiensis*, *Anusium papyraceus*, *Pitaria cordata*;

(03.00033)

Cheney, D.P. & J.P. Dyer, III 1974. Deep-water benthic algae of the Florida Middle Ground. Mar. Biol. 27: 185-190.

The composition and seasonality of the benthic algae of the Florida Middle Ground (an offshore area of extensive reef outcroppings, 25 to 60 m deep in the eastern Gulf of Mexico) were described. Ninety one algal species (92 taxa) were obtained, including 6 species newly reported for Florida and the eastern Gulf of Mexico. The flora was predominantly tropical, with Caribbean affinities. Marked seasonal differences in species diversity and abundance were present. An extensive or well-anchored holdfast system was a common feature of those species which appeared to be perennial.

Study Duration:1971 and 1972; Habitat:Shell, rock, coral, limestone outcroppings; Type of Study:Qualitative; Biological Component:Benthic marine algae; Type of Sampler:Scuba, hand collected; Number of Stations:5; Temporal Frequency:5 times; Dominant Taxon/Taxa Studied:*Codium carolinianum*, *C. intertextum*, *C. isthmocladum*, *Halimeda discoidea*, *Udotea flabellum*, *Valonia macrophysa*, *Amphiroa fragilissima*, *Botryocladia occidentalis*, *Fauchea peltata*, *Lithothamnium spp.*, *Peysonnelia rubra*, *Champia parvula*, *Coelarthrum albertisii*;

(03.00034)

Chesser, S.A. 1974. Sediments of the West Florida Shelf. Fla. State Univ. M.S. Thesis.

A total of 225 sediment samples from the west Florida shelf were analyzed to determine the distribution of sediment properties. Spatial trends in the distribution of sediment grain size are cited. Sand-sized sediments composed of quartz and carbonate were predominant. The carbonate fraction was determined to be mainly of biogenic origin.

Study Duration:December 1968-September 1969; Habitat:Sand, mud; Type of Study:Qualitative; Type of Samplers:Dietz-LaFonde & Peterson samplers, bucket dredge, shallow corer; Number of Stations:225; Abiotic Parameters Measured:Sediment grain size & composition;

(03.00035)

Cobb, S.P. 1971. Biology of the rock shrimp *Sicyonia brevirostris*. Univ. S. Fla. M.A. Thesis.

Rock shrimp were collected and studied during Project Hourglass, along the West Florida continental shelf. The



distribution of *Sicyonia brevirostris* was found to be related to the substratum and hydrographic properties with the greatest abundance at the 37 m stations. The greatest population density occurred from July through November, with fluctuation all year. The reproductive biology of *S. brevirostris* was examined, and information on ovarian development, spawning, size at first sexual maturity, and sex ratio were reported. *S. brevirostris* was found to feed primarily on molluscs and decapod crustaceans and may be considered a generalized carnivore. The feeding activity appeared to be nocturnal occurring throughout the year. No economically important concentrations of *S. brevirostris* were located in the study area.

Type of Study:Semi-quantitative; Biological Component:Decapod fauna; Dominant Taxon/Taxa Studied:*Sicyonia brevirostris*;

(03.00036)

Cobb, S.P., C.R. Futch & D.K. Camp 1973. The rock shrimp, *Sicyonia brevirostris*, Stimpson, 1871 (Decapoda: Penaeidae). Mem. Hourglass Cruises. Fla. Dept. Nat. Resources Mar. Research Lab. III (1):38.

An ecological analysis of rock shrimp collected in the Eastern Gulf of Mexico was conducted and existing knowledge of the species was synthesized. A total of 973 rock shrimp were weighed, measured, sexed and examined for morphological variation. Ovarian development, spawning, recruitment, sex ratio, and size at first sexual maturity were determined. The distribution was found to be related to substrate and hydrographic properties, and the greatest abundance was found at 37 m stations. The population density fluctuates seasonally, being greatest from July through November. *Sicyonia brevirostris* was found to feed primarily on molluscs and crustaceans nocturnally, throughout the year.

Study Duration:August 1965 - November 1967; Type of Study:Semi-quantitative; Biological Component:Decapod fauna; Type of Samplers:Dredge, trip net & otter trawl; Number of Stations:10; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, clarity; Dominant Taxon/Taxa Studied:*Sicyonia brevirostris*;

(03.00037)

Collard, S.B. & C.N. D'Asaro 1973. Benthic invertebrates of the Eastern Gulf of Mexico. In: A Summary of Knowledge of the Eastern Gulf of Mexico, Fla. St. Univ. Syst., Fla. Inst. Oceanogr. Vol III: 6 1-27.

A summary of the major scientific contributions in the past 20 years on benthic invertebrates from the Eastern Gulf was provided. Broadly applicable zoogeographical statements were made based on the existing literature. No clear-cut faunal boundaries were found in the Eastern Gulf. The distributional limits of benthic invertebrates, however, were determined to be influenced by temperature and salinity ranges. Overall, it was concluded that much still remains to be known about benthic invertebrate fauna of the Gulf of Mexico. The eastern shelf has not been thoroughly studied and information from some areas were wholly needed.

Type of Study:Qualitative; Biological Component:Benthic invertebrates;

(03.00038)

Continental Shelf Associates, Inc. 1980. Live bottom survey, Charlotte Harbor blocks 144 and 145. Unpublished Technical Report, Continental Shelf Associates, Tequesta, FL.

A live (hard) bottom site clearance survey of two oil and gas lease blocks in the eastern Gulf of Mexico was conducted using videotape and still photographic documentation of the substrate and epibiota.

Habitat:Hard bottom; Type of Study:Photographic clearance survey; Biological Component:Epibiota; Type of Sampler:Underwater television & still camera;

(03.00039)

Continental Shelf Associates, Inc. 1980. Live bottom survey of Charlotte Harbor blocks 188 and 231. Unpublished Technical Report, Continental Shelf Associates, Tequesta, FL.

Two oil and gas lease blocks in the eastern Gulf of Mexico were surveyed before drilling. Representative samples of the live (hard) bottom biota were collected, and television and still camera surveys of the substrate and epibiota were documented.

Habitat:Hard bottom; Type of Study:qualitative; Biological Component:Epibiota; Type of Sampler:Underwater television & still camera, biological sampler;

(03.00040)

Continental Shelf Associates, Inc. 1981. Pre- and post-exploratory drilling live bottom biological assessment, Charlotte Harbor area, block 144, Lease OCS-G-3906, Well No. 1. Unpublished Technical Report, Continental Shelf Associates, Tequesta, FL.

Underwater television and still camera surveys of a live bottom area surrounding a drill site in the eastern Gulf of Mexico were conducted before and after drilling operations. This environmental assessment was necessary to satisfy USGS environmental stipulations for bulk drilling mud discharges.

Type of Study:Photographic reconnaissance; Type of Sampler:Underwater television & still camera;

(03.00041)

Continental Shelf Associates, Inc. 1981. Ground truth survey of Charlotte Harbor block 715. Prepared for John Chance & Assoc. Unpublished Technical Report, Continental Shelf Associates, Tequesta, Fl.

An underwater television and still camera survey was conducted near a proposed drill site in Charlotte Harbor block 715 off the Florida west coast to ground truth certain side scan sonar signatures previously detected during a geographical survey for shallow hazards.

Type of Study:Qualitative; Type of Sampler:Underwater television & still camera;

(03.00042)

Continental Shelf Associates, Inc. 1981. Survey of potential live bottom areas, Vernon area block 654; live bottom survey, the Elbow blow 915; survey of potential live bottom areas in the Elbow blocks 565 and 566 off the west coast of Florida; and survey of potential live bottom areas in Tarpon Springs block 277 off the western coast of Florida. Unpublished Technical Report, Continental Shelf Associates, Tequesta, Fl.

Site clearance surveys of five oil and gas lease blocks in the eastern Gulf of Mexico were conducted. The live (hard) bottom substrate and its epibiota were documented by underwater television and still camera, biological sample collection and analyses.

Habitat:Hard bottom; Type of Study:Photographic clearance survey; qualitative; Biological Component:Epibiota; Type of Sampler:Underwater television & still camera, biological sampler;

(03.00043)

Continental Shelf Associates, Inc. 1981. Survey of potential live bottom areas in DestinDome blocks 562 and 563 off the western coast of Florida. Unpublished Technical Report, Continental Shelf Associates, Tequesta, Fl.

A live (hard) bottom site clearance survey of two oil and gas lease blocks in the eastern Gulf of Mexico was conducted using underwater television and still photographic documentation of the substrate and epibiota. In addition, biological specimens were collected and chemical parameters were measured.

Habitat:Hard bottom; Type of Study:Photographic clearance survey, qualitative; Biological Component:Epibiota; Type of Sampler:Underwater television & still camera, biological samplers;

(03.00044)

Cooksey, K.E. & J.H. Paul 1978. ATP determination in the MAFLA tract, 1977-1978. Vol. II, Chapt. 11, 1M: MAFLA final report. (The Mississippi, Alabama, Florida outer continental shelf baseline environmental study 1977/1978). Prep. by Dames and Moore, Inc. for BLM contract #AAS50-C17-34. p. 608-625.

Three seasonal variations in sediment ATP levels were found in the MAFLA area. These variations correspond to three distinct geographic areas and to hydrographic and sediment calcium carbonate data for the areas. No correlation was found for ATP and sediment size or total organic carbon.

Study Duration:1977-1978; Type of Study:Quantitative; Number of Stations:47; Abiotic Parameters Measured:Sediment characteristics, ATP;

(03.00045)

Creeze, M.R. & F.J. Maturo 1977. Meiofauna of the MAFLA area (1975-76). Unpubl. Rept. submitted to the U.S. Dept. of Int., BLM, Washington, DC. 19 p.

This report presents the results of the meiofauna study of the Bureau of Land Management sponsored program in the Mississippi, Alabama, Florida (MAFLA) outer continental shelf. The authors summarize the results as follows: The results of this study, so far as analysis has been possible, show an abundant nematode and copepod fauna, with densities comparable with the few values previously reported. Presumably, the nematodes will be quite diverse, with the most abundant ten species making up about 50% of the assemblage. Perhaps one third as many species of copepods would be expected. The next most abundant groups are the Turbellaria and Gastrotricha, although Kinorhynchia may be more common in muds. We have found about 200 species of turbellarians in the MAFLA area. Although samples have been a little too small to adequately sample the turbellarian assemblage for diversity measures, characteristic groups have been found. Furthermore, grouping of species into more easily recognized taxonomic units has proven valuable. Gastrotrich genera and some of the "minor" taxonomic groups also offer promise of helping to characterize sediments with several "cross referencing" indicator groups allowing a sensitive biological indicator of environmental conditions.

Study Duration:1975-1976; Type of Study:Quantitative; Biological Component:Meiofauna; Type of Sampler:2.5 cm dia. core [subsample from box core]; Sieve Size:0.063 mm; Number of Stations:45; Number of Replicates/Station:1; Temporal Frequency:3 times (June & Sept. 1975; Jan. 1976); Abiotic Parameters Measured:Temperature, salinity, DO, sediments;

Dominant Taxon/Taxa Studied: Nematodes, copepods, *Carcharodorynchus* (turbellaria), *Acanthodasys* (turbellaria), *Diplodasys* (turbellaria), *Tubilucus coralicola* (Priapulida) and Kinorhynchs;

(03.00046)

Crout, R. 1981. Sediment influx into the Gulf of Mexico - A review. In: Proc. of a Symp. on Environ. Research Needs in the Gulf of Mexico, Key Biscayne, Florida. 30 Sept.-5 Oct. 1979. D.K. Atwood (Convener). Publ. by NOAA/ERL, Atlantic Oceanographic and Meteorological Lab., Miami, Fla. Vol. IIC, p. 1-32.

This summary paper reviews the state of knowledge on sediment influx, suspended particulates, transport of sediments, bottom material and the processes that affect Gulf of Mexico sediments. Description of sediments is divided into nine regions in the Gulf of Mexico including the west Florida shelf and the eastern Gulf shelf.

Type of Study: Qualitative (review); Biological Component: Sediments;

(03.00047)

Culter, J.K. & S. Mahadevan 1984. Importance of Box Core Penetration and Sieve Size for Macroinfaunal Studies on the Southwest Florida Continental Shelf. Fla. Sci. 47 (Suppl. 1): 27.

Two "typical" soft substrate benthic stations were sampled with a modified Reineck box core sampler (0.045 m<sup>2</sup> surface area) to a depth of 30cm. Five replicate samples from each station were separated into upper and lower 15cm sediment fractions and the macroinfauna retained on a 1.0mm and 0.5mm were identified and enumerated for each fraction. The upper 15 cm. sediment fractions contained 95% of the total taxa found at both stations. The majority of individuals collected (94% and 96%) were from the upper 15cm, with the relative proportions of taxa and individuals varying only slightly between polychaete and non-polychaete faunal groups. Slightly more than half of the enumerated taxa were retained on the 1.0mm sieve; the majority of individuals were retained by the 0.5mm sieve. The 1.0mm sieve was deemed inadequate for quantitative macroinfaunal studies.

Type of Study: Technique; Biological Component: Fauna; Type of Sampler: Box Core; Sieve Size: 1.0mm, 0.5mm;

(03.00048)

Cupka, D.M. 1970. Observations on the biology and bathymetric distribution of the bathybenthic octopod *Opisthoteuthis agassizi*. Fla. State Univ. M.S. Thesis.

Morphological differences, growth rates and distribution of *Opisthoteuthis agassizi* from the DeSoto Canyon area of the Gulf were investigated. Analysis included delineation of morphological differences between males, females, and juvenile specimens and determination of whether growth of various body parts during ontogeny proceeds isometrically or allometrically. Distribution was examined in terms of abundance and the ranges of physiochemical parameters. Gross morphology is described.

Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Otter trawl; Abiotic Parameters Measured: Temperature, salinity, oxygen; Dominant Taxon/Taxa Studied: *Opisthoteuthis agassizi*;

(03.00049)

Dames and Moore, Inc. 1979. The Mississippi, Alabama, Florida, Outer Continental Shelf baseline environmental survey, 1977/1978. Vol. I-B; Executive Summary. Rept. submitted by Dames and Moore, Los Angeles, CA to U.S. Dept. of Inter. Bur. of Land Mgt. Contract AA550-CT7-34. 27 p.

This report summarized the results of the baseline environmental survey conducted in the Outer Continental Shelf (OCS) environments off Mississippi, Alabama and Florida (MAFLA). The field studies were conducted between the years 1974 and 1977. The purpose of the surveys was to determine ongoing or potential ecological impacts on the OCS environments from oil and gas development. Marine biological studies included investigations of microbial biomass, Foraminifera, meiofauna, macroepifauna, demersal fishes, and histopathology of selected macroinvertebrates. Supportive physical, chemical, and geological studies were also conducted.

Study Duration: 1974-1977; Habitat: Sand, shell, algae terraces; Type of Study: Quantitative and qualitative; Biological Component: Fauna; Type of Sampler: Box core, anchor dredge, trawls; Sieve Size: 0.5 mm; Number of Stations: 107;

(03.00050)

Darcy, G.H. & E.J. Gutherz 1978. Abundance and density of demersal fishes on the west Florida shelf, January 1978. Bull. Mar. Sci.

Three hundred thirty eight stations were trawled on the west Florida shelf during January 1978 to determine fish species composition and abundance. At least 246 species of fish from 71 families were collected. Northern stations had approximately twice the fish density as southern stations. Total catch rates were usually highest in shallow water. Some commercially important shrimps (*Penaeus setiferus*, *P. duorarum*, *Sicyonia brevirostris*, *Scyllarides nodifer*) were also caught. Although qualitatively similar to other areas of the northern Gulf, the fish fauna of the west Florida shelf consisted of different dominant families and species. Differences in fish faunal composition are related to bottom type.

Study Duration:7-31 January 1978; Habitat:Live bottom, sand; Type of Study:Quantitative; Biological Component:Fish; Type of Sampler:Shrimp trawl; Number of Stations:338; Dominant Taxon/Taxa Studied:*Diplectrum formosum*, *Syacium papillosum*, *Monacanthus hispidus*, *Lactophrys quadricornis*, *Centropristis ocyurus*, *Synodus intermedius*, *S. foetens*;

(03.00051)

Dawes, C.J. & J.F. Van Breedveld 1969. Benthic marine algae. Memoirs of the Hourglass Cruises, Mar. Research Lab., Fla. Dept. Nat. Resources, 1, Pt. II. 47 p.

One hundred and fifty-seven species of marine algae including 38 species of Chlorophyta, 29 species of Phaeophyta, 85 species of Rhodophyta and 5 species of Cyanophyta had been identified from the Hourglass Cruises of the Florida Board of Conservation, Marine Research Laboratory. The collections were made on the continental shelf at depths of 6 to 73 meters. Eighteen new species for Florida were recorded.

Study Duration:28 months; Type of Study:Qualitative; Biological Component:Benthic marine algae; Type of Sampler:Dredge, trynet; Number of Stations:10; Number of Replicates/Station:1; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, clarity;

(03.00052)

Dawson, C.E., Jr. & F.G.W. Smith 1953. The Gulf of Mexico sponge investigation. Fla. State Bd. Conserv. Tech. Ser. No. 1. 27 p.

Thirty eight stations from Dry Tortugas to Panama City were sampled from December 1947 to October 1948 in a survey of Florida commercial sponge beds. Commercial sponges were found at 12 stations in depths from 18 to 60 feet. Although dead or damaged commercial sponges were observed at several locations, there was no evidence of the 1939 sponge disease. However, few sponges of commercial size were found at any site, and the low abundance of small commercial sponges indicated a slow recovery of the Florida sponge industry.

Study Duration:7 December 1947-27 October 1948; Habitat:Rock, coral, sand, mud; Type of Study:Qualitative; Biological Component:Porifera fauna; Number of Stations:38; Abiotic Parameters Measured:Water temp., salinity, DO, pH, inorganic phosphate; Dominant Taxon/Taxa Studied:*Hippiospongia lachne*, *Spongia zimocca*;

(03.00053)

Defenbaugh, R. 1973. Distribution of selected benthic macroinvertebrates of the northern Gulf of Mexico. Am. Zool. 13(4):1327.

More than 200 species of benthic macroinvertebrates were identified from 150 trawl samples in depths of 18 to 183 meters between Corpus Christi, Texas and Pensacola, Florida. The most common or conspicuous species include pennatulid alcyonarians; gastropods of the families Strombidae, Melongenidae, Conidae, Turridae, and Buccidae; bivalves of the families Arcidae, Pectinidae, Cardiidae, and Veneridae; penaeid and stomatopod shrimps; crabs of the families Paguridae, Raninidae, Leucosiidae, Calappidae, Portunidae, and Majidae; and asteroid and echinoid echinoderms. Species assemblages vary with depth, sediment type, and season. Distribution patterns of certain macroinvertebrates are discussed.

Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Trawl;

(03.00054)

Dehn, P.F. 1980. Growth and reproduction in *Luidia clathrata* (Say) (Echinodermata: Asteroidea). Univ. of So. Fla. Ph.D. Dissertation.

Growth and reproduction of *Luidia clathrata* were studied in populations from Tampa Bay and Charlotte Harbor, Florida. The gametogenic cycle of both populations is described and 5 stages of gametogenesis are identified. Feeding experiments conducted in the laboratory at room and environmental temperatures during reproductive and nonreproductive seasons revealed changes in gonadal and digestive gland indices. Relationships between growth or resorption of body reserves and gonads were determined.

Type of Study:Quantitative; Biological Component:Echinodermata; Abiotic Parameters Measured:Temperature; Dominant Taxon/Taxa Studied:*Luidia clathrata*;

(03.00055)

Doyle, L.J. & P.H. Feldhausen 1981. Bottom sediments of the eastern Gulf of Mexico examined with traditional and multivariate statistical methods. Mar. Geol. 13(2):93-117.

Sediment grain size and chemical data from a four year study of surface sediments of the eastern Gulf of Mexico were analyzed with several multivariate statistical methods. Comparison of results with a surface sediment facies map and dynamic patterns created using traditional sediment textural and compositional parameters and single moment method statistics indicated more subtle relationships among variables. Parameter trends and relationships, including seasonal variation in sediment distribution, relationships between organic carbon and trace metal content, and biological influence on trace metal abundance are cited.

Study Duration: Summer 1974-Winter 1978; Habitat: Sand, mud; Type of Study: Quantitative; Type of Sampler: Box core; Number of Stations: 85; Number of Replicates/Station: 2-16; Temporal Frequency: Seasonal; Abiotic Parameters Measured: Sediment grain size, total organic carbon, trace metal content;

(03.00056)

Doyle, L.J. & T.W. Sparks 1980. Sediments of the Mississippi, Alabama, and Florida (MAFLA) continental shelf. J. Sediment. Petrol. 50(3):905-916.

A large scale sediment sampling program covering 4 years has been used to describe the sediment characteristics of the eastern Gulf of Mexico continental shelf. To the west of Cape San Blas, Florida is the eastern portion of the Gulf coast Geosyncline, a clastic sand body called the MAFLA Sand Sheet, which grades westward into the muds of the Mississippi pro-delta. East of Cape San Blas is the West Florida Margin, composed of carbonate and evaporitic rocks underlying a surface of shell hash and foraminiferal, algal, and oolitic sands called the West Florida Sand Sheet. The inshore and slope sediments of the West Florida Shelf are described. Reasons for variation in clay mineral composition are hypothesized.

Study Duration: 4 years; Habitat: Sand, mud; Type of Study: Quantitative; Abiotic Parameters Measured: Sediment grain size, total carbon;

(03.00057)

Doyle, L.J. & T. Sparks 1979. Sediments of MAFLA. Rept. submitted to Dame and Moore, Inc. MAFLA Final Rept. to BLM. Contract #AA550-CT7-34. p. 311-344.

A large scale sediment sampling program covering 4 years has been used to describe the sediment characteristics of the eastern Gulf of Mexico continental shelf. To the west of Cape San Blas, Florida is the eastern portion of the Gulf Coast Geosyncline, a clastic sand body called the MAFLA Sand Sheet, which grades westward into the muds of the Mississippi pro-delta. East of Cape San Blas is the West Florida Margin, composed of carbonate and evaporitic rocks underlying a surface of shell hash and foraminiferal, algal, and oolitic sands called the West Florida Sand Sheet. The inshore and slope sediments of the West Florida Shelf are described. Reasons for variations in clay mineral composition are hypothesized.

Study Duration: 4 years; Habitat: Sand, mud; Type of Study: Quantitative; Type of Sampler: Box core; Sediment grain size, total organic carbon, clay mineralogy, percent calcium Abiotic Parameters Measured: carbonate;

(03.00058)

Doyle, L.J., B. Birdsall, G. Hayward, L. Lehman, S. Szydluk & E. Warren III 1977. MAFLA Baseline Study Standard Sediment Parameters. Technical Report. Submitted to the Bureau of Land Management, Washington D.C. (MAFLA-OCS Program).

Sediment analysis of samples from the West Florida Shelf revealed two major divisions of sediments within the MAFLA area. West of Cape San Blas sediments are dominantly clastic; east of Cape San Blas carbonates dominate. The study area is divided into 8 zones based on different sediment characteristics.

Study Duration: 1974, 1975; Type of Study: Qualitative; Type of Sampler: Box core; Number of Stations: 45; Abiotic Parameters Measured: Sediment characteristics;

(03.00059)

E.G. & G. Environmental Consultants (Waltham, MA) 1975. Physical, chemical and biological investigations in the Gulf of Mexico. Prepared for E.I. DuPont de Nemours & Co., Inc., Wilmington, DE.

These investigations were designed by DuPont and the EPA to provide baseline biological, physical, and chemical data at a proposed disposal site and at continental shelf stations. Plankton and benthos species (only at shelf stations) were enumerated. Annelids represented the greatest percentage of the organisms collected [36.6%]. Arthropods were second [22.9%], followed by molluscs [14.6%], cnidarians [8.7%], echinoderms [6.4%], ecotoprocts [5.5%], chaetognaths [3.7%], and lower chordates [1.8%]. Further analysis of benthos was not attempted because of the low numbers of species collected in the single collection reported.

Study Duration: June 1974; Habitat: Variable; Type of Study: Qualitative; Biological Component: Plankton, benthic fauna; Type of Sampler: Grab, dredges; Number of Stations: 12 total (7 benthic); Abiotic Parameters Measured: Temperature, salinity, DO, currents, light, pesticides, nutrients, metals;

(03.00060)

Eldred, B., J. Williams, G.T. Martin & E.A. Joyce, Jr. 1965. Seasonal distribution of penaeid larvae and postlarvae of the Tampa Bay area, Florida. Fla. Bd. Conserv. Mar. Lab., Tech. Ser. No. 44. 47 p.

Thirteen stations offshore of Tampa Bay, Florida were sampled monthly with plankton and trynet tows to identify the spawning grounds and months of *Penaeus duorarum* and other penaeids. Seven subadult and adult penaeids were collected offshore from depths of 12 to 126 ft, the most abundant of which were *Penaeus duorarum*, *Trachypenaeus constrictus*,

and *Sicyonia* spp. The abundance of penaeid larvae and postlarvae and adults are given. Areas of intensive spawning varied from year to year and were related to changes in temperature. Diurnal and lunar rhythms of postlarval abundance are cited.

Study Duration: October 1961-June 1963; Type of Study: Quantitative; Biological Component: Crustacea; Type of Sampler: Plankton net, trynet, dredge; Number of Stations: 13; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Penaeus duorarum*, *Trachypeneus constrictus*, *Sicyonia brevirostris*, *S. typica*, *S. laevigata*, *Penaeopsis goodei*, *Solenocera atlantidis*;

(03.00061)

Fanning, K.A., P.R. Betzer, R.H. Byrne, J.A. Breland & R.R. Jolley 1979. Characteristics of a submarine geothermal spring on the west Florida shelf. Fla. Sci. 42(Suppl.):21.

Mud Hole Submarine Spring, a geothermal spring on the west Florida continental shelf was examined in terms of its biological, geological, chemical, and physical aspects. The flow rate of the spring is greater than  $2.3 \times 10^4$  l/day; the discharge rate is apparently influenced by tidal fluctuations. Water temperature at the discharge vent is approximately 36°C, although turbid surface water is often cooler than ambient water. Salinity of undiluted vent water averages 34.9 o/oo, less than surrounding waters. Dissolved oxygen content, pH, and alkalinity of the discharge water are very low. Nitrate, ammonia, and phosphate are present at very low concentrations. Densities of benthic epifauna and nekton appear increased in the spring area. Mud Hole and a second spring, Steward Spring, serve as habitats for one or more large loggerhead turtles.

Type of Study: Quantitative; Biological Component: Fauna; Water temperature, salinity, pH, alkalinity, DO, inorganic nutrient Abiotic Parameters Measured: concentrations;

(03.00062)

Florida Department of Natural Resources 1979. Project Hourglass--A systematic ecological study of West Florida shelf biotic communities. Mar. Research Lab. Publ. 9 p.

This paper describes the systematic sampling program of Project Hourglass and lists the reports published from the collected data. During Project Hourglass, 5 stations in depths of 6, 18, 37, 55, and 73 m, along two east-west transects on the west Florida shelf were sampled from August 1965 to November 1967. The transects were located off Sanibel Island and Tampa Bay approximately 160 km apart. Benthic and planktonic fauna and flora were collected, and environmental parameters were measured at each station. Thus far, 76 publications have resulted from Project Hourglass data, with an additional 75-80 reports expected.

Study Duration: August 1965-November 1967; Type of Study: Quantitative; Biological Component: Fauna and flora; Number of Stations: 10; Abiotic Parameters Measured: Temperature, salinity;

(03.00063)

Foster, R. 1974. The macrobenthos of selected habitats from the west coast of Florida: a multivariate analysis. New College of the Univ. S. Fla. Envir. Stud. Prog. 57 p.

The study applied principal components analysis to a largely unfathomable ecological data base to yield a simple model of a many-sided situation. The statistical properties and biological implications of the multivariate analysis (known as principal component analysis) were described in detail. Data on the macrobenthos of 4 separate areas were collected. This analysis was limited to those species which occurred in at least 4 samples in any one area. Complete lists of data used were included. Through the analysis, gradients, distributions, and the relative health of these estuarine communities were discussed.

Habitat: Mangrove, grassbed, sand; Type of Study: Quantitative and technique; Biological Component: Benthic fauna; Type of Sampler: Core; Number of Stations: 100 for 4 acres; Number of Replicates/Station: 4; Temporal Frequency: Once; Abiotic Parameters Measured: Salinity, DO, pH, CO<sub>2</sub>, nutrients;

(03.00064)

Futch, C.R. 1967. Potentially commercial clams of the genus *Macrocallista*. Fla. Bd. Conserv. Mar. Lab., Suppl. to Salt Water Fish. Leaflet. No. 3. 2 p.

This brief supplement notes the potential of a clam fishery for the sunray venus clam, *Macrocallista nimbosa* which was found in great abundance off the northwest coast of Florida. The size, distribution, and habitat of *M. nimbosa* is summarized, and current field and laboratory studies to determine the long range production potential of the species are cited. The trade potential of a smaller congener, *M. maculata*, is also suggested.

Habitat: Sand; Type of Study: Qualitative; Biological Component: Mollusca; Dominant Taxon/Taxa Studied: *Macrocallista nimbosa*, *M. maculata*;

(03.00065)

Gearing, P., J.N. Gearing, T.F. Lytle & J.S. Lytle 1976. Hydrocarbons in 60 northeast Gulf of Mexico shelf sediments: a

preliminary survey. *Geochim. Cosmochim. Acta* 40:1005-1017.

Sixty sediment and 10 benthic algae samples were collected in the northeastern Gulf of Mexico and analyzed for hydrocarbons using gas chromatography. Two distinct hydrocarbon environments were identified, one from sediments (sand and shell hash) off Florida and the other from sediments (silts and clays) near the Mississippi River. Sediments from the Alabama shelf exhibited intermediate characteristics.

Study Duration: May-June 1974; Type of Study: Quantitative; Type of Sampler: Box corer; Number of Stations: 60; Abiotic Parameters Measured: Hydrocarbon content;

(03.00066)

Godcharles, M.F. & W.C. Jaap 1973. Exploratory clam survey of Florida nearshore and estuarine waters with commercial hydraulic dredging gear. Fla. St. Dept. Nat. Resources, Mar. Res. Lab. Prof. Pap. Ser. No. 21. 77 p.

The entire west and southwest coast of Florida was surveyed for the presence and abundance of commercial clams. Sunray venus clams (*Macrocallista nimbosa*) were found to occur along the entire west coast, but were more abundant north of Tampa Bay. Southern quahogs (*Mercenaria campechiensis*) were most abundant near passes along central and southwest Florida. In bays, both species were usually associated with seagrasses, but seldom at depths greater than 9.2 m. The most abundant bivalve was the marsh clam (*Rangia cuneata*) confined to brackish areas of the Peace and Myakka Rivers. At lower salinities marsh clams were larger and had more size classes.

Study Duration: 2 years; Habitat: Mud, grassbed; Type of Study: Semi-quantitative; Biological Component: Mollusc fauna; Type of Sampler: Nantucket clam dredge, Maryland soft shell escalator clam dredge; Number of Stations: 846; Number of Replicates/Station: 1; Temporal Frequency: Once; Dominant Taxon/Taxa Studied: *Macrocallista nimbosa*, *Mercenaria campechiensis*, *Rangia cuneata*;

(03.00067)

Gould, G.F. & M.L. Moberg 1978. Analysis of marine samples from the outer continental shelf of Mississippi, Alabama, and Florida (MAFLA) for high molecular weight hydrocarbons in benthic samples. Vol. II, Chapt. 8, IN: MAFLA final report. (The Mississippi, Alabama, Florida outer continental shelf baseline environmental study. 1977/1978). Prep. by Dames & Moore, Inc. for BLM contract #AA550-CT7-34. p.494-530.

Analysis of 976 benthic sediments, demersal fish, and macroepifaunal samples was conducted for high molecular weight hydrocarbon. Some pooling of small samples was required. Results appear to be comparable to those reported for earlier MAFLA studies. Laboratory techniques are described.

Study Duration: 1976-1978; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Dredge, trawl; Dominant Taxon/Taxa Studied: *Syacium papillosum*, *Clypeaster ravenielli*, *Encope nichelini*, *Aequipecten glyptus*;

(03.00068)

Gould, G.F. & M.L. Moberg 1978. Analysis of marine samples from the outer continental shelf of Mississippi, Alabama, and Florida (MAFLA) for trace metals in demersal fish and macroepifauna. Vol II, Chapt. 5, IN: MAFLA final report. (The Mississippi, Alabama, Florida outer continental shelf baseline environmental study. 1977/1978). Prep. by Dames and Moore, Inc. for BLM contract #AA550-CT7-34. p. 406-422.

A total of 605 demersal fish and macroepifaunal samples were analyzed for trace metals. Smaller samples required pooling. Results appear to be comparable to those reported for earlier MAFLA studies.

Study Duration: 1977-1978; Type of Study: Quantitative; Biological Component: Fauna; Temporal Frequency: Summer-1976, Summer-1977, Fall-1977, Winter-1978; Abiotic Parameters Measured: Cadmium, chromium, copper, iron, nickel, lead, zinc; Dominant Taxon/Taxa Studied: Demersal fish, macroepifauna;

(03.00069)

Greiner, G.O.G. 1970. Distribution of major benthonic foraminiferal groups on the Gulf of Mexico continental shelf. *Micropaleontology* 16(1):83-101.

Results of an earlier study are expanded upon in this study of the distribution of major foraminiferal groups in the Gulf of Mexico. The three major groups of foraminifera: agglutinated, hyaline, and porcelaneous wall types, are compared in their need for and the availability of  $\text{CaCO}_3$ .  $\text{CaCO}_3$  availability is dependent on temperature, salinity and hydrostatic pressure. The three wall types have different methods of obtaining  $\text{CaCO}_3$  and are therefore affected differently by environmental variables.

Type of Study: Quantitative; Biological Component: Fauna; Abiotic Parameters Measured: Temperature, salinity, depth,  $\text{CaCO}_3$  availability;

(03.00070)

Grimm, D.E. & T.S. Hopkins 1977. Preliminary characterization of the octocorallian and scleractinian diversity at the Florida Middle Ground. *Proc. Third Internat. Coral Reef Symp.*, Miami, Fla., May 1977. 1:135-142.

Transects at 6 sites on the Florida Middle Grounds were sampled in September 1975 and February/March 1976 to determine the species composition and diversity of the coral fauna. Range extensions were recorded for both scleractinian and octocorallian species. Diversity of octocorals was highest at northern stations; whereas scleractinians had the greatest diversity at southern stations. Both groups exhibited a regular zonation pattern despite a high degree of habitat variability. The coral communities of the Florida Middle Grounds are thought to represent pioneer species occurring in a marginally favorable environment.

Study Duration: September 1975-March 1976; Habitat: Coral reef; Type of Study: Qualitative; Biological Component: Coral; Number of Stations: 6; Temporal Frequency: Twice; Dominant Taxon/Taxa Studied: *Madracis decactis*, *Porites divaricata*, *Dichocoenia stellaris*, *D. stokesii*, *Scolymia cubensis*, *S. lacera*;

(03.00071)

Gunter, G., R.H. Williams, C.C. Davis & F.G.W. Smith 1948. Catastrophic mass mortality of marine animals and coincident phytoplankton bloom on the west coast of Florida, November 1946 to May 1947. Ecol. Monogr. 18.

The effects of phytoplankton blooms on marine organisms were observed between November 1946 and August 1947 on the southern Florida Gulf Coast. In laboratory and field experiments, *Gymnodinium brevis* was specifically lethal to marine organisms when it was present in large numbers. An increased supply of nutrient salts caused by meteorological disturbances was suggested to have led to the plankton bloom.

Study Duration: November 1946-August 1947; Type of Study: Qualitative; Biological Component: Flora, fauna; Abiotic Parameters Measured: DO; Dominant Taxon/Taxa Studied: *Gymnodinium*, (*Ptychodiscus*) *brevis*;

(03.00072)

Hanlon, R. & G. Voss 1975. Guide to seagrasses of Florida, the Gulf of Mexico and the Caribbean region. Sea Grant Field Guide Ser. No. 4. 30 p.

A field guide to the seagrasses of Florida, the Gulf of Mexico, and the Caribbean region was presented. Included was a key to the grasses, and descriptions of the following species: *Thalassia testudinum*, *Halodule wrightii*, *Syringodium filiforme*, *Ruppia maritima*, *Halophila baillonis*, *Halophila engelmanni*, *Zostera marina*. The importance of the grasses to the welfare of the commercial fisheries was discussed as was their role in the prevention of erosion.

Type of Study: Qualitative; Biological Component: Seagrass; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Halodule wrightii*, *Syringodium filiforme*, *Ruppia maritima*, *Halophila baillonis*, *Halophila engelmanni*, *Zostera marina*;

(03.00073)

Hart, T.L. 1977. An ecological study of epipsammic diatoms from sediments associated with *Juncus roemerianus* in a northwest Florida salt marsh. Fla. State Univ. Ph.D. Dissertation. 191 p.

The community structure of epipsammic diatoms from the sediments associated with *Juncus roemerianus* in a saltmarsh and the metabolic requirements of isolated epipsammic diatom species were investigated. Epipsammic diatoms dominated the sand grain microflora with the maximum quantities occurring at the sediment surface. From the surface the number of diatoms per sand grain decreased with depth until a minimum was reached at 5 cm. An hypothesis is put forth to explain the existence and development of the epipsammic diatom community within the sediments.

Study Duration: 13 months; Habitat: Sediment; Type of Study: Quantitative; Biological Component: Flora; Type of Sampler: Core; Abiotic Parameters Measured: pH, salinity, sulfides; Dominant Taxon/Taxa Studied: Epipsammic diatoms;

(03.00074)

Hastings, R.W. 1972. The origin and seasonality of the fish fauna on a new jetty in the northwestern Gulf of Mexico. Fla. State Univ. Ph.D. Dissertation. 555 p.

A study of fish fauna colonization on a new jetty at East Pass in Okaloosa County, Florida from June 1968 to January 1971 emphasizes analysis of successional and seasonal changes in the fish population. Comparisons are made with populations of older reef habitats in the northeastern Gulf of Mexico. The primary successional observation was a yearly increase in number of species. Seasonal variations were significant. Comparative investigation showed diversification at East Pass jetty had reached levels found at the previously established reef communities. A discussion of the jetty habitat and of reef fishes is also included.

Study Duration: June 1968-January 1971; Habitat: Jetty; Type of Study: Quantitative; Biological Component: Fauna; Abiotic Parameters Measured: Temperature;

(03.00075)

Hayes, P.F. 1979. The reproductive cycle of early setting *Crassostrea virginica* (Gmelin) in the northern Gulf of Mexico and its implications for population recruitment. Fla. State Univ. M.S. Thesis.

Collection of oysters in the northeast Gulf was made during April to November of 1978 in order to study their



reproductive cycle. It is calculated that those which set early in the spawning season reach sexual maturity and spawn before the end of that season. After 1 year, oysters undergo two major spawning periods. Young oysters contribute little to the population recruitment.

Study Duration: April-November 1978; Type of Study: Quantitative; Biological Component: Fauna; Number of Stations: 2; Temporal Frequency: Weekly/biweekly; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Crassostrea virginica*;

(03.00076)

Heard, R.W. 1978. Macroarthropods from the MAFLA box core program (summer 1977 - winter 1978). Final Rept. Rept. submitted to Dames and Moore, Inc. for U.S. Dept. of Inter. Bur. Land Mgt., Contract AA550-CT7-34. p. 749-835.

Macroarthropod samples from the 1977-78 MAFLA box-core program were fine-sorted and identified. Of the 10,584 specimens collected, 9,014 were identified to species level. Nine major groups, Pycnogonida (3 spp.); Nebaliacea (2 spp.); Stomatopoda (8 spp.); Mysidacea (5 spp.); Cumacea (28 spp.); Tanaidacea (9 spp.); Isopoda (47 spp.); Amphipoda (129 spp.); and Decapoda (134 spp.) represented 88 families, 225 genera, and 360 species. Decapods and amphipods comprised 72% of the number of species with the latter making up approximately 50% of the total number of specifically identified specimens (4,468). Tanaids ranked second in number of specimens (1,445), but they were represented by only 9 species. Decapods ranked third (1,371), isopods fourth (1,113) and cumaceans fifth (428). The remaining four groups together made up less than 8% of the total specimens. Important infaunal species from each of the five large groups were documented based on the total number of specimens and the number of different station occurrences. Approximately 30% of the 360 species identified appear to be new records. Amphipods and cumaceans rank highest in this category. Difficulties in drawing conclusions about zoogeographical affinities, diversity and evenness indices, and seasonal abundance were briefly discussed.

Study Duration: 3 1/2 years; Type of Study: Quantitative; Biological Component: Macroarthropods; Type of Sampler: Box core, anchor dredge; Sieve Size: 0.5 mm; Number of Stations: 107; Temporal Frequency: 8 times in 3 1/2 years;

(03.00077)

Heffernan, J.J. & T.L. Hopkins 1981. Vertical distribution and feeding of the shrimp genera *Gennadas* and *Bentheogennema* (Decapoda: Penaeidae) in the eastern Gulf of Mexico. J. Crust. Biol. 1(4):461-473.

Two hundred five trawl collections of 2 shrimp genera were made over 3 depth zones in the eastern Gulf of Mexico. Five species of *Gennadas* were found to migrate daily, with the majority of the population concentrating at 650-850 m in the day and 150-400 m at night. *Bentheogennema intermedia* inhabits depths below 900 m. The most abundant species is *G. valens*, comprising 63% of the *Gennadas* catch. Stomach contents analysis showed all 6 species to have similar diets of small (1-5 mm) plankton, primarily copepods. Structural adaptations for capture of prey items are discussed and evidence for temporal-spatial resource partitioning between species is evaluated.

Study Duration: June 1975-October 1977; Type of Study: Quantitative; Biological Component: Crustacea; Number of Stations: 1; Temporal Frequency: Yearly; Dominant Taxon/Taxa Studied: *Gennadas valens*, *G. bouvieri*, *G. scutatus*, *G. capensis*, *G. talismani*, *Bentheogennema intermedia*;

(03.00078)

Hopkins, T.L. 1978. Macroepifauna from the MAFLA program. Final Rept. Rept. submitted to Dames and Moore, Inc. for U.S. Dept. of Inter. Bur. Land Mgt., Contract AA550-CT7-34. p. 789-835.

Macroepifaunal invertebrates were collected by dredging and trawling in the MAFLA tract of the eastern Gulf of Mexico over 3 seasons in 1977-1978. In addition, archived samples, from 20 dredge/trawl and 6 dive stations, were also analyzed. Results report a species list of 51 coelenterates, 260 molluscs, 250 decapod crustaceans, 15 stomatopod crustaceans, 9 pycnogonids, and 95 echinoderms to the generic rank and below; 26 families of the Polychaeta area reported. Molluscs were found to be good potential indicators of seasonality and decapod crustaceans and echinoderms may be good indicators of substrate at certain depths. Faunal assemblages are stronger along contour gradients and species numbers decrease with depth. Each station appeared to have a characteristic assemblage which probably related to such factors as annual temperature and substrate. There is continuing evidence that the MAFLA macroepifauna has its greatest affinities with West Indian stocks.

Study Duration: 3 1/2 years; Type of Study: Quantitative; Biological Component: Benthic epifauna; Type of Sampler: Box core, anchor dredge, trawls; Number of Stations: 107; Temporal Frequency: 8 times in 3 1/2 years;

(03.00079)

Hopkins, T.S. 1977. Epifaunal and epifloral benthic communities in the MAFLA Year 02 lease area (1975-76). Unpubl. Rept., U.S. Dept. of Int., BLM, Washington, DC. 98 p.

This report presents the results of the epibiota study of the Bureau of Land Management sponsored program in the Mississippi, Alabama, Florida (MAFLA) outer continental shelf. A total of 236 species of molluscs, approximately 190 species of crustaceans, over 65 species of echinoderms, 25 species of Octocorallia, 30 species of Scleractinia, over 100 species of polychaetes, 48 species of sponges, and 194 species of algae were collected in the study by dredges, trawls

and diving. Trellis diagrams portraying faunal similarity between stations and seasons are presented for each major taxa. Three distinct shelf assemblages were recognized in the study: 1) Middle Shelf I (30-60 m); 2) Middle Shelf II (60-140 m); 3) Deep Shelf (140 m - shelf break). The Florida Middle Ground reef is recognized to contain unique faunal and floral assemblages (dissimilar to the West Flower Garden Bank reef in the Northwestern Gulf of Mexico) that recruit their larvae from the loop current.

Study Duration:1975-1976; Type of Study:Qualitative and quantitative; Biological Component:Epibiota; Type of Sampler:Capetown dredge, 9.1 m semiballoon trawl, diving, photography; Number of Stations:18; Number of Replicates/Station:Various; Temporal Frequency:3 times (June & Sept. 1975, Jan. 1976); Abiotic Parameters Measured:Temperature, salinity, DO, sediments; Dominant Taxon/Taxa Studied:*Chlamys benedicti*, *Nuxea beaulti*, *Oliva sayana*, *Turritella exoleta*, *Aequipecten muscosus* (Mollusca), *Stenorynchus seticornis*, *Portunus spinicarpus*, *Nithrax* spp. (Crustacea), *Luidia clathrata*, *Coscinasterias tenuispina*, *Arbacia punctulata*, *Goniaster tessellatus*, *Lytechinus variegatus* (Echinoderms), *Diodogorgia nodilifera*, *Bebryce parastellata* (Octocorallia), *Clodocora arbuscula*, *Madracis decactis*, *Madrepora carolina*, *Porites divaricata* (Scleractinia), *Halymenia floridana*, *Caulerpa sertularioides*, *Gracilaria mammillaris* (Algae);

(03.00080)

Hopkins, T.S. & J.S. Valentine 1981. The echinoderm fauna of the continental shelf of the east and central Gulf of Mexico. Internat. Echinoderm Conf., Tampa, Fla.

Approximately 100 echinoderm species covering five classes were identified in bottom studies of the continental shelf of the east and central Gulf of Mexico in waters 30 to 200 m deep from 1974 to 1978. Depth zones and habitats characterized by recurring taxa were classified at 30-60 m, 90-110 m, and 180-200 m. Observations were made of *Echinaster*, the rare species *Ophioderma pallidum*, and an apparently endemic *Ophiactis*.

Study Duration:1974-1978; Biological Component:Echinoderm fauna; Dominant Taxon/Taxa Studied:*Echinaster*, *Ophiactis*, *Ophioderma pallidum*;

(03.00081)

Hopkins, T.S., D.R. Blizzard, S.A. Brawley, et al 1977. A preliminary characterization of the biotic components of composite strip transects on the Florida Middle Grounds, Northeastern Gulf of Mexico, p. 31-37. In: Proc. Third Internat. Coral Reef Symp. Vol. 1. Biology. Rosenstiel School of Mar. & Atmos. Sci., Univ. of Miami.

The coelenterate, molluscan, decapod crustacean, echinoderm, polychaete, and poriferan fauna of the Florida Middle Grounds was described and compared with that of the West Flower Garden Bank of the northwestern Gulf of Mexico. Sharp dissimilarities were found in the composition of the invertebrate faunas of the two reef areas, but their ichthyofaunas were less dissimilar. The Florida Middle Grounds has a more dense seasonal algal flora than does the West Flower Garden Bank. Both temperate and tropical species occur in the Middle Grounds, which are probably maintained by the Florida Loop Current moving warm water up from the Florida Keys.

Study Duration:June 1975-July 1976; Habitat:Coral reef; Type of Study:Quantitative; Biological Component:Faua, flora; Temporal Frequency:3 times (Jun., Sept. 1975; Feb./Mar., Jun/Jul. 1976); Abiotic Parameters Measured:Temperature; Dominant Taxon/Taxa Studied:*Millepora alcicornis*, *Aglaophenia*, *Monastrea*, *Plumularia*, *Sertularia*, *Condylactis gigantea*, *Bartholomea anulata*, *Periclemnes*, *Phycothous crucifer*, *Cerithium litteratum*;

(03.00082)

Hopkins, T.S., D.R. Blizzard & D.K. Gilbert 1977. The molluscan fauna of the Florida Middle Grounds with comments on its zoogeographical affinities. Northeast Gulf Sci. 1(1):39-47.

A study was made of the molluscan fauna of the Florida Middle Ground during June and September 1975 and February-March 1976 to determine the effect that discontinual substrate distribution has on molluscan fauna. Of the 75 species collected, more are of the "Caribbean eurythermic" and "Caribbean restricted" forms. Analysis of the results indicate that the zoogeographic status of the Gulf of Mexico should be reconsidered for other faunal groups.

Study Duration:June, Sept. 1975, Feb.-March 1976; Habitat:Reef (coral); Type of Study:Quantitative; Biological Component:Faua; Number of Stations:6; Abiotic Parameters Measured:Temperature;

(03.00083)

Hoss, D.E. & W.F. Hettler 1981. Gulf of Mexico Fisheries: Current state of knowledge and suggested contaminant-related research. In: Proc. of a Symp. on Environ. Research Needs in the Gulf of Mexico, Key Biscayne, Florida, 30 Sept.-5 Oct. 1979. D.K. Atwood (Convener). Publ. by NOAA/ERL, Atlantic Oceanographic and Meteorological Lab., Miami, Fla. Vol. IIB, p. 161-185.

This summary paper presents a selective, discursive review of the Gulf of Mexico fishery resources and a discussion of the research programs that the authors believe offer a possible assessment of the environmental health of the area. Sections on the habitat, recent and ongoing fishery research, and research needs are provided.

Type of Study:Qualitative (review); Biological Component:Fauna;

(03.00084)

Huang, W.H. 1977. Clay mineral studies of surface sediments from the MAFLA DCS baseline monitoring sites. Technical report. Submitted to the Bureau of Land Management, Washington, D.C. (MAFLA-DCS Program).

Sediments along six transects on the West Florida Shelf were sampled and analyzed. Clay mineral analysis revealed that kaolinite is the most abundant, followed by chlorite-vermiculite mixed layer which is unique in this area. The distribution pattern of clay minerals is different from that on the Mississippi-Alabama Shelf where smectite predominates and virtually no vermiculite-chlorite mixed layer occurs.

Study Duration:1975; Type of Study:Qualitative, quantitative; Type of Sampler:Box cores; Number of Stations:42; Temporal Frequency:Once; Abiotic Parameters Measured:Sediment characteristics;

(03.00085)

Hulings, M.C. 1958. An ecological study of the recent ostracods of the Gulf coast of Florida. Fla. State Univ. Ph.D. Dissertation. 224 p.

The distribution of ostracods on the Gulf coast of Florida was determined from 165 benthic samples taken from Ochlockonee Bay, Apalachee Bay, and an offshore transect from Panama City to St. Petersburg. A total of 83 species was collected, 47 of which were identified to species. The temperature, salinity, and bottom type conditions of all sampling areas were measured and various biozones were distinguished on the basis of substratum type and species composition. The distribution of living ostracods was related to the measured hydrographic conditions.

Study Duration:July 1956-July 1957; Habitat:Sand, mud, seagrass beds; Type of Study:Qualitative; Biological Component:Crustacea; Type of Sampler:Peterson bottom grab; Number of Stations:165; Abiotic Parameters Measured:Temp., sal., bottom type, secchi disc, current velocity & direction; Dominant Taxon/Taxa Studied:*Aurila coradi*, *Cushmanidea* sp., *Cyprideis littoralis*, *Cytheretta multicaudata*;

(03.00086)

Humm, H.J. 1973. Seagrasses. In: A summary of knowledge of the Eastern Gulf of Mexico. J.I. Jones, R.E. Ring, M.O. Rinkel & R.E. Smith (eds.), State Univ. Syst. Florida Instit. Oceanogr. St. Petersburg, IIIC-1-IIIC-10.

The eastern Gulf of Mexico supports five species of seagrass, representing 4 genera, in abundance. *Thalassia testudinum* (turtle grass); *Halodule wrightii* (manatee grass); and *Syringodium filiforme* (shoal grass) are the most abundant species, occurring in shallow inshore areas, intertidally to depths of 10-20 meters. Two other species, *Halophila baillonis* and *H. engelmannii* also occur in shallow waters, but their distribution extends to depths of 70 meters. These seagrasses occupy thousands of square miles of the inner continental shelf, providing habitat for many invertebrate and fish populations.

Habitat:Seagrass beds; Type of Study:Qualitative (review); Biological Component:Flora; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Halodule wrightii*, *Syringodium filiforme*, *Halophila baillonis*, *H. engelmannii*;

(03.00087)

Humm, H.J. 1973. Mangroves. In: A summary of knowledge of the Eastern Gulf of Mexico. J.I. Jones, R.E. Ring, M.O. Rinkel & R.E. Smith (eds.). State Univ. Syst. of Florida Instit. of Oceanogr. St. Petersburg, IIID1-IIID6.

Four mangrove species are native to the eastern Gulf of Mexico: red, black, white, and buttonwood. The geographic distribution in Florida and the vertical zonation of mangroves are summarized. The manner by which mangrove forests accumulate debris and detritus and provide habitats for marine organisms is discussed.

Habitat:Mangrove forest; Type of Study:Qualitative (review); Biological Component:Flora; Dominant Taxon/Taxa Studied:*Rhizophora mangle*, *Avicennia germinans*, *Laguncularia racemosa*, *Conocarpus erecta*;

(03.00088)

Humm, H.J. 1973. Benthic algae of the eastern Gulf of Mexico. In: A summary of knowledge of the Eastern Gulf of Mexico. J. Jones, R. Ring, M. Rinkel & R. Smith (eds.). State Univ. Syst. Florida, Inst. Oceanogr. p. IIIB-1-IIIB-15.

The diversity and abundance of benthic algae in the eastern Gulf of Mexico is reviewed. The regional scarcity of rocky substrata is cited in limiting the abundance of the epibenthic flora. Biomass comparisons are drawn between benthic algae and seagrasses. Commercial uses of the native algae are summarized and the feasibility of harvesting seaweed from the continental shelf is discussed.

Type of Study:Qualitative (review); Biological Component:Flora;

(03.00089)

Inglis, A. & E. Chin 1966. The bait shrimp industry of the Gulf of Mexico. U.S.F.W.S. Fish. Leaflet. No. 582. 10 p.

A general review of the Gulf of Mexico bait shrimp industry is presented. The types of shrimp used for bait and their general life histories are summarized. Fishing gear and methods of operation are described. Bait shrimp marketing practices in Florida and Texas are also included.

Type of Study: Review; Biological Component: Crustacea; Dominant Taxon/Taxa Studied: *Penaeus duorarum*, *Penaeus setiferus*, *P. aztecus*;

(03.00090)

Ivester, M.S. 1978. Analysis of benthic meiofauna from the MAFLA/Eastern Gulf of Mexico. Submitted to Dames & Moore, Inc. for BLM. MAFLA Final Rept. (1977-78), Contract #AAS50-CT7-34. p. 640-666.

Benthic samples from the continental shelves of Mississippi, Alabama and Florida during 1977-78 showed meiofaunal densities were maximum in shallow inshore waters and decreased to minimum values in depth over 100 m. Free living nematodes were dominant, comprising 70.3% of the total meiofauna; copepods and polychaetes accounted for 14.2% and 4.5% of the meiofauna, respectively. Medium to fine sands with moderate to high carbonate content supported the highest meiofaunal densities. No seasonal, spatial, or association patterns were evident. Relationships between taxa and physical conditions were weak, probably due to the limited taxonomic identification.

Study Duration: Summer 1977-winter 1978; Habitat: Mud, sand; Type of Study: Quantitative; Biological Component: Meiofauna; Type of Sampler: Box core; Sieve Size: 0.5 mm, 0.063 mm; Number of Stations: 36; Number of Replicates/Station: 6; Temporal Frequency: 3 times (summer 1977; fall 1977; winter 1978); Abiotic Parameters Measured: Depth, total organic content, calcium, carbonate content, sediment grain size;

(03.00091)

Johnson, P.G. 1981. Standardization of identifications of benthic polychaetous annelids from the Gulf of Mexico outer continental shelf. Am. Zool. 21(4):223. (Abstract).

This abstract reports on the preparation of a manual for the identification and distribution of polychaetes collected on the outer continental shelf of the Gulf of Mexico. Included will be taxonomic keys and descriptions for more than 600 species representing 296 genera in 58 families, illustrations of diagnostic features, distributional maps, and habitat information for each species. Described in the introduction will be the geographical setting, materials and methodology, terminology and techniques used in polychaete identifications, and general information on the biology, ecology and zoogeography of polychaetes from the Gulf of Mexico. This publication will provide a common, comparable taxonomic basis for benthic macroinfaunal studies. (Anticipated completion date is September 1983.)

Type of Study: Qualitative; Biological Component: Polychaete fauna;

(03.00092)

Johnson, P.G. & J.M. Uebelacker 1983. Ecological characterization of macrofaunal communities of the eastern Gulf of Mexico. Presented at Benthic Ecol. Meet., Fla. Instit. of Tech., Melbourne.

Benthic macroinfaunal polychaetes and crustaceans were sampled at 107 stations on the Mississippi, Alabama, and western Florida outer continental shelf from June 1975 to February 1978. A total of 204,414 individuals were collected, representing approx. 600 polychaete species in 60 families and 360 crustacean species in 88 families. Trends in community structure and composition were identified and examined in terms of relevant environmental parameters. Animal/sediment relationships, feeding types and general zoogeographical affinities among the polychaete-crustacean assemblages were discussed.

Study Duration: Jun. 1975-Feb. 1978; Type of Study: Quantitative; Biological Component: Fauna; Number of Stations: 107;

(03.00093)

Jolley, J.W., Jr. 1972. Exploratory fishing for the sunray venus clam, *Macrocallista nimbosa*, in northwest Florida. Fla. Dept. Nat. Resour. Mar. Res. Lab., Tech. Ser. No. 67. 42 p.

A 48 inch hydraulic Nantucket clam dredge was used in exploratory dredging to locate commercially significant beds of the sunray venus clam, *Macrocallista nimbosa*, and to survey benthic fauna in water depths less than 68 ft. One hundred seventy three stations in southwest Florida were sampled. *Macrocallista nimbosa* was the most abundant and frequently caught clam; 95% were taken in 10-40 ft and the highest catch per unit effort was in 10-15 ft. It was found predominantly in sandy substrates and in greatest numbers near Panama City and Cedar Keys. No other potentially commercial clam populations were located offshore (41-68 ft). Lack of small sunrays (<126 mm) lends support to the hypothesis that subadults move from inshore to offshore areas. Over 140 invertebrate and fish species were identified from catches. Faunal associations varied with depth in some areas; several benthic species were commonly associated with *M. nimbosa*, and a predatory relationship is suggested for two species.

Study Duration: November 23, 1969-April 30, 1970; Habitat: Sand; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Hydraulic Nantucket clam dredge; Number of Stations: 178; Abiotic Parameters Measured: Temperature, substrate type, depth, salinity, water clarity; Dominant Taxon/Taxa Studied: *Macrocallista nimbosa*;

(03.00094)

King, C.E. 1960. Some aspects of the ecology of two psammolittoral nematode communities in the northeastern Gulf of Mexico. Fla. State Univ. M.S. Thesis. 48 p.

Sediment samples were collected from the littoral zone in sandy areas of the northeastern Gulf and sieved to obtain specimens of nematodes. Both quantitative and qualitative samples were taken. Various aspects of the ecology of the nematodes found in the sediments were examined in light of the psammolittoral physical and chemical characteristics.

Study Duration: August-September 1959; Type of Study: Quantitative, qualitative; Biological Component: Fauna; Sieve Size: 60 micron;

(03.00095)

Koenig, C.C., R.J. Livingston, & C.R. Cripe 1976. Blue crab mortality: Interaction of temperature and DDT residues. Arch. Envir. Contam. Toxicol. 4:119-128.

Serial observations of DDT-contaminated and uncontaminated waters in the northern Gulf of Mexico were made. Blue crab mortalities observed in the DDT-contaminated marsh during the period were correlated with reduced daily temperature minima. Gas chromatographic analysis of hepatopancreas and swimmeret muscle tissues of dead and dying crabs revealed total DDT residue concentrations as high as 39.0 ppm and 1.43 ppm, respectively. It was suggested that the DDT body burdens and reduced temperatures interact to produce acutely toxic effects. Several physiological and behavioral mechanisms were proposed.

Study Duration: 3 months; Habitat: Salt-marsh; Type of Study: Semi-quantitative; Biological Component: Decapod fauna; Abiotic Parameters Measured: Temperature; Dominant Taxon/Taxa Studied: *Callinectes sapidus*;

(03.00096)

Kritzer, H. 1977. Estimation of biomass of benthic invertebrate macrofauna and identification of polychaetous annelids for the BLM MAFLA extended baseline and monitoring study (1975-76). Unpubl. Rept. U.S. Dept. of Int., BLM, Washington, DC. 39 p. + appendix.

This report presents partial results of the biomass and polychaete study of the Bureau of Land Management sponsored program in the Mississippi, Alabama, Florida (MAFLA) outer continental shelf. The author summarizes his findings as follows: Homogeneity of sampled polychaete assemblages appeared consistent with evaluation of representativeness (as number of replicates per sample) which was considered inadequate for 17 of 27 samples collected in July 1975. No consistent correlation between biomass and depth was seen. At most stations high polychaete diversity could be correlated with widespread distribution of fine sediment, in itself an indicator of environmental stability. Five types of significantly associated polychaete species groups were detected, affording a basis for classifying the stations. The existence of more than one distinct polychaete assemblage, correlated with the general character of the sediments was demonstrated at some stations.

Study Duration: 1975-76; Type of Study: Quantitative; Biological Component: Polychaeta; Type of Sampler: 0.06 m<sup>2</sup> box core; Sieve Size: 0.5 mm; Number of Stations: 27; Number of Replicates/Station: 9; Temporal Frequency: 3 times (June & Sept. 1975; Jan. 1976); Abiotic Parameters Measured: Temperature, salinity, DO, sediments; Dominant Taxon/Taxa Studied: *Aedicira belgicae*, *Aglaophanus verrilli*, *Ampharete acutifrons*;

(03.00097)

LaRock, P.A. 1977. Adenosine triphosphate (ATP) in the MAFLA tract area (1975-76). Unpubl. Rept. U.S. Dept. of Int., BLM, Washington, DC. 35 p.

This report presents the results of the sediment ATP study of the Bureau of Land Management sponsored program in the Mississippi, Alabama, Florida (MAFLA) outer continental shelf. The author summarized the significant findings of the study as follows: 1) This work indicates that the ATP method can be used to effectively characterize the sediment microbes and quantify seasonal and environmental variables. 2) Sediment ATP concentrations exhibit seasonal variations with the greatest concentrations encountered in the early fall (September) with decreasing amounts found in the winter (January) and the least present in the early summer (June). 3) ATP content of sediments is directly proportional to the mean grain size distribution. ATP was found to increase as the grain size increased. 4) In the MAFLA tract area, Transects I, II, III and IV (West Florida Shelf) are similar in their ATP-grain size relationship. 5) Transect V (Northwest Florida Shelf) showed no relationship to grain size, and organic carbon. In fact, stations of this transect appear to be independent of all of the parameters measured and might possibly be governed by the overlying water column. It is known that a gyre does split off from the eastward flow from the Mississippi and move northward over Transect V. 6) Transect VI (Mississippi-Alabama Shelf) is highly variable, and has a region of greatly elevated ATP concentrations, and showed marked variation over the year. It is suggested that Mobile Bay exerts significant influence over this portion of the transect. 7) Organic carbon was found to exhibit an inverse relationship to ATP. As the organic carbon concentration increased, the ATP concentration decreased. This situation suggests that the quality as well as the quantity of the organic substrate is important in determining the magnitude of the microbial population that will develop. A large population as evidenced by high ATP concentrations, will consume most of the organic carbon present if possible. Where a high carbon content exists in the sediments, one finds a low ATP. This suggests that carbon compounds are microbially refractory.

Study Duration:1975-1976; Type of Study:Quantitative; Biological Component:Sediment (microbes); Type of Sampler:2 cc glass tube (subsample from box core); Number of Stations:45; Number of Replicates/Station:1; Temporal Frequency:3 times (June & Sept. 1975; Jan. 1976);

(03.00098)

Lee, W.Y., A. Morris & D. Boatwright 1980. Mexican oil spill: A toxicity study of oil accommodated in sea water on marine invertebrates. Mar. Poll. Bull. 11(8):231-234.

The blowout of the Mexican Ixtoc oil well on June 3, 1979, has resulted in the contamination of Texas coastal waters. Two series of laboratory experiments were carried out on the acute toxicity of oil accommodated in seawater (OAS) made from spilled Mexican oil. In one experiment, mixed natural zooplankton were immersed in the OAS for 96 hrs. A vital staining method was used to distinguish the dead from live individuals. In another experiment, a subtidal amphipod, *Parhyale hawaiiensis* was exposed to the OAS for 1 week. Mortality was determined daily during the experiments. Results showed that even at concentrations of up to 40% OAS, the aged oil was not acutely toxic to the test invertebrate species.

Study Duration:1 week; Habitat:Plankton; Type of Study:Qualitative; Biological Component:Fauna; Dominant Taxon/Taxa Studied:*Parhyale hawaiiensis*, *Acartia tonsa*;

(03.00099)

Lehman, H.K. 1978. A study of an association between the gastropod *Netrina reclinata* and the seagrass, *Ruppia maritima*. ASB Bull. 25(2):32.

The association between the gastropod *Netrina reclinata* and the seagrass *Ruppia maritima* was studied. Analysis of the data from controlled laboratory experiments showed that *N. reclinata* did not consume the seagrass *R. maritima*, but did ingest many algae epiphytes. The data also suggested feeding by the snail significantly reduced the associated algae epiphyte populations.

Study Duration:5 weeks; Type of Study:Qualitative; Biological Component:Flora and fauna; Dominant Taxon/Taxa Studied:*Netrina reclinata*, *Ruppia maritima*;

(03.00100)

Lindall, W.W., Jr. & C.N. Saloman 1977. Alteration and destruction of estuaries affecting fishery resources of the Gulf of Mexico. Mar. Fish. Rev. 39(9):1-7.

A discussion of the dependency of commercial and recreational fishing industries on estuaries was presented. It was determined that about 90% of commercial catch and 70% of the recreational catch are made composed species that are estuarine-dependent. Alteration of estuaries by man was suggested to be threatening these resources. The total acreage of estuarine areas including open water areas, emergent tidal vegetation areas, submerged grassbeds, and oyster beds were presented. Additionally the area of federally maintained navigation channels, acres of fill, and acres closed to shellfishing because of pollution were provided.

Habitat:Estuarine; Type of Study:Qualitative; Biological Component:Fauna;

(03.00101)

Lindberg, M.J. 1980. Behavior of a xanthid crab occupying bryozoan colonies, and patterns of resource use with reference to mating systems. Fla. State Univ. Ph.D. Dissertation. 121 p.

A study of *Pilumnus sayi* (a xanthid crab) and *Schizoporella pungens* (a bryozoan) in grassbeds of the northern Gulf of Mexico showed a shortage of the bryozoan resource for the *P. sayi* population. Laboratory behavior and spatial patterning in nature of *P. sayi* were indicative of resource defense polygyny. Behavioral scaling, incorporating resource structure and risk of predation, may be important to this crab's mating system.

Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Fauna; Dominant Taxon/Taxa Studied:*Pilumnus sayi*, *Schizoporella pungens*;

(03.00102)

Lochen, T.J. 1972. A sedimentological study of the area surrounding DeSoto Canyon head, northeastern Gulf of Mexico. Fla. State Univ. M.S. Thesis.

Sediment size and composition, clay mineralogy and bathymetry of the head of DeSoto Canyon were examined to determine if the canyon serves as a funnel for sediment transport. Sediments were found to be homogenous and to decrease with depth. The source of the sediments and the historical formation of the canyon are discussed. It was concluded that the canyon is not an active sediment funnel.

Study Duration:September 1971; Type of Study:Qualitative; Type of Sampler:Kullenburg gravity corer; Number of Stations:58; Abiotic Parameters Measured:Sediment grain size & mineralogy, bathymetry;

(03.00103)

Lyons, W.G. 1970. Scyllarid lobsters (Crustacea: Decapoda). Memoirs of the Hourglass Cruises. Vol. 1, Pt. IV, Fla. Dept. Nat. Resources, Mar. Research Lab. 74 p.

Five species of scyllarid lobsters were captured offshore Florida. *Scyllarides nodifer* occurred from the Gulf of Mexico to North Carolina and Bermuda in depths of 2 to 91 m. The Florida current and Gulf Stream were suggested to be responsible for prohibiting the distribution of larvae southward. *Scyllarus americanus* had been collected from the Gulf of Venezuela to North Carolina in depths of 0 to 46 m, and was common at some inshore locations off west Florida. *Scyllarides aequinoctialis* occurred throughout the Caribbean and northward to Bermuda, but only rarely in the Gulf of Mexico. *Scyllarus chacei* ranged from Brazil to North Carolina in 11 to 320 m. of water. Adult *Scyllarus depressus* were known from southern Brazil to North Carolina in depths of 29 to 265 m, with postlarvae usually occurring farther north.

Study Duration: 28 months; Habitat: Variable; Type of Study: Qualitative; Biological Component: Decapod fauna; Type of Sampler: Trawl, dredge, wood traps, wire traps; Number of Stations: 10; Temporal Frequency: Monthly; Dominant Taxon/Taxa Studied: *Scyllarides nodifer*, *Scyllarus chacei*, *Scyllarus americanus*, *Scyllarus depressus*, *Scyllarides aequinoctialis*;

(03.00104)

Lyons, W.G. 1972. New Turridae (Gastropoda: Toxoglossa) from South Florida and the Eastern Gulf of Mexico. Nautilus 86(1):3-7.

Three new species, *Cerodrillia girardi*, *Brachycythara barbae*, *Granoturris presleyi*, were described primarily from collections taken in the eastern Gulf of Mexico, and were compared with other related species. *Daphnella margaretae* was described from south Florida. *Daphnella retifera* Dall, *D. margaretae* and *D. bartschi* Dall, a closely related species from the tropical eastern Pacific were assigned to the subgenus *Paradaphne* Laseron, previously known only from the Indo-Pacific.

Habitat: Variable; Type of Study: Qualitative; Biological Component: Mollusc fauna; Dominant Taxon/Taxa Studied: *Cerodrillia girardi*, *Brachycythara barbae*, *Granoturris presleyi*;

(03.00105)

Lyons, W.G. 1976. Distribution of *Cerithium litteratum* (Born) (Gastropoda: Cerithiidae) off western Florida. Veliger 18(4):375-377.

Nineteen living specimens of *Cerithium litteratum* were collected on two dates from the Florida Middle Ground in the first substantiated report of this species from the west coast of Florida. All specimens were taken in coral reef habitats at depths of 13.7 - 37 m. The collected individuals resembled those found on the West Flower Garden Bank in the northwestern Gulf of Mexico, where it is the most abundant gastropod among corals in depths less than 30 m. Although the origin of the Florida Middle Ground population of *C. litteratum* is unknown, it is speculated that its long lived planktonic veligers may be transported northward by the Florida Loop Current from Caribbean waters.

Study Duration: June 1974-January 1975; Habitat: Coral reef; Type of Study: Qualitative; Biological Component: Mollusc; Type of Sampler: Diver; Number of Stations: 2; Dominant Taxon/Taxa Studied: *Cerithium litteratum*;

(03.00106)

Lyons, W.G. 1980. Molluscan communities of the West Florida Shelf. Bull. Am. Malacol. Union 1979(45):37-40.

The molluscan fauna of the west Florida shelf is characterized from the Dry Tortugas northward to Cape San Blas using data collected principally from the Hourglass Cruises. The inshore fauna varies from predominantly tropical Caribbean species in the south to warm-temperate continental species in the north. Several discernible communities are defined by temperature, salinity and substrate. Four vertical zones of faunal distribution have been differentiated seaward from the coastal estuaries: shoreward zone (0-10 m); shallow shelf (10-30 m); middle shelf (30-140 m); and outer shelf (140-200 m). The number of species, dominant molluscs and their supposed source are cited for each zone in addition to ambient abiotic parameters.

Type of Study: Qualitative; Biological Component: Mollusc; Abiotic Parameters Measured: Water temperature, salinity, substrate type, depth;

(03.00107)

Lyons, W.G. & S.B. Collard 1974. Benthic invertebrate communities of the Eastern Gulf of Mexico, In: R.E. Smith (ed.) Proc. Mar. Envir. Implications of Offshore Drilling in the Eastern Gulf of Mexico. Conf./Workshop State Univ. Syst. Fla. Instit. Oceanogr. St. Petersburg, Fla., Contrib. No. 233, FOMR/MRL. p. 157-165.

A discussion was presented on the physical and biotic characteristics controlling composition of benthic invertebrate communities of the region. The communities were broken down into zones (geologic and hydrographic) and descriptions were presented. It was concluded that benthic invertebrates of the Eastern Gulf are a highly diverse group with several

dissimilar zones of distribution ranging from the estuaries to the continental slope.

Habitat: Oyster reefs, grassbed; Type of Study: Qualitative; Biological Component: Benthic invertebrates; Abiotic Parameters Measured: Temperature, salinity, nutrients;

(03.00108)

Lytle, J.S. & T.F. Lytle 1977. High molecular weight hydrocarbons in MAFLA sediments and benthic algae and rig monitoring sediments. Technical report. Submitted to the Bureau of Land Management, Washington, D.C. (MAFLA-OCS Program).

Sediments and algae were collected from the West Florida Shelf and analyzed for high molecular weight hydrocarbons. Sediment was also collected before, during and after operation of a drilling rig at various distances from the rig. Deep water station samples are comprised chiefly of terrestrial hydrocarbons. Of 36 specimens of benthic algae, 15 contain oil-like hydrocarbons. Gravimetric and gas chromatographic data and cluster analysis reveal only minimal changes caused by the drilling rig operation.

Study Duration: 1974-1976; Type of Study: Quantitative; Biological Component: Flora; Type of Sampler: Box core; Number of Stations: 45; Abiotic Parameters Measured: Hydrocarbons, sediment characteristics; Dominant Taxon/Taxa Studied: Benthic algae;

(03.00109)

Lytle, J.S. & T.F. Lytle 1977. Sediment hydrocarbons as environmental indicators in the northeast Gulf of Mexico. In: Fate and effects of petroleum hydrocarbons in marine organisms and ecosystems. D.A. Wolfe (ed.). Pergamon Press.

Sediment samples were collected from 45 sites in the eastern Gulf of Mexico from Ft. Myers, Florida to Pascagoula, Mississippi, and analyzed for hydrocarbons in a survey of man induced and seasonal effects on hydrocarbon levels. Three zones were distinguished by their aliphatic hydrocarbon distributions. Seasonal variation in hydrocarbon characteristics were minimal in all areas.

Study Duration: June 1975-January 1976; Type of Study: Quantitative; Type of Sampler: Box corer; Number of Stations: 45; Abiotic Parameters Measured: Sediment grain size, carbonate content, hydrocarbon content;

(03.00110)

Lytle, J.S., T.F. Lytle, J.N. Gearing & P.J. Gearing 1979. Hydrocarbons in benthic algae from the eastern Gulf of Mexico. Mar. Biol. 51(3):279-288.

Five transects along the west Florida continental shelf yielded 36 samples of benthic algae, collected by scuba divers, dredge, or trawl. The algae contained 82.8 +/- 143 ppm aliphatic hydrocarbons by dry weight, and 11.8 +/- 22.7 ppm aromatic and polyolefinic hydrocarbons. The concentration ranges of the hydrocarbon constituents are given for each class of algae. No petroleum pollution of recent origin was found in any specimen, although approximately 30% of the samples have hydrocarbons similar to degraded petroleum residues.

Study Duration: June 1975-January 1976; Type of Study: Quantitative; Biological Component: Flora; Type of Sampler: Dredge, trawl, scuba; Number of Stations: 36; Dominant Taxon/Taxa Studied: *Nalimeda* sp., *N. discoidea*, *Codium carolinianum*, *Dictyota dichotoma*, *Gracilaria blodgettii*, *G. mammillaris*, *Caulerpa sertularoides*;

(03.00111)

Mahadevan, S., J.K. Culter, J.R. Leverone, E.D. Estevez, W.L. Dovel & G.S. Comp 1982. Soft bottom biology, southwest Florida shelf ecosystem study. Year 01- draft final report. Submitted to Continental Shelf Assoc. by Mote Marine Laboratory, Sarasota, Florida. 181 p.

The epibiota and macroinfauna of the southwest Florida shelf were characterized to provide the Minerals Management Service with preliminary information for decisions on leasing activities and environmental stipulations. Areas of analysis include species composition, density, dominance, similarity, and sediment-infauna and epifauna-infauna relationships.

Study Duration: Fall 1980, Spring 1981; Habitat: Soft bottom; Type of Study: Qualitative, quantitative; Biological Component: Fauna, flora; Type of Sampler: Box core, otter trawl, photographs; Sieve size: 1.0 mm, 0.5 mm; Number of Stations: 15; Number of Replicates/Station: 5; Temporal Frequency: Twice; Abiotic Parameters Measured: Sediment characteristics; Dominant Taxon/Taxa Studied: *Synalaxis albi*, *Ampharete acutifrons*, *Fabricia* sp., *Lucina radians*, *Prionospio cristata*, *Paraonidae* sp;

(03.00112)

McCaffrey, P.M. 1977. Studies on the composition and organization of the demersal ichthyofauna of the continental shelf zone in the northeastern Gulf of Mexico. Fla. State Univ. Ph.D. Dissertation.

Trawl samples from the study area yielded 209 fish species representing 122 genera and 59 families. The synodontid *Saurida brasiliensis* was the most abundant species. Species were grouped on the basis of spatial and temporal



occurrence.

Study Duration: 27 months; Type of Study: Qualitative; Biological Component: Fauna; Type of Sampler: Trawl; Dominant Taxon/Taxa Studied: *Saurida brasiliensis*;

(03.00113)

McCormick, R. 1979. The shrimp industry: Gulf of Mexico trawling. Fish. News Int. 18(10):77.

This general review article of the shrimp industry of the Gulf of Mexico summarizes information on the species caught, their life histories and their distributions. Seasonal variations in the abundance and distribution of the 3 *Penaeus* species are discussed.

Type of Study: Qualitative; Biological Component: Crustacea; Dominant Taxon/Taxa Studied: *Penaeus aztecus*, *P. setiferus*, *P. duorarum*;

(03.00114)

McCoy, E. & S. Bell 1982. Marine biogeographic boundaries on Florida's west coast. Presented at Annu. Meet. Fla. Field Biologists, Tampa, Fla.

The distribution of 5 major taxa (teleost fish, decapod crustaceans, polychaetous annelids, and bivalve and gastropod molluscs) on the west coast of Florida was examined from distributional literature to determine whether or not Tampa Bay serves as a biogeographic boundary between temperate and tropical fauna. Species distributions were compiled from 8 shallow water sites between Pensacola/Panama City and Florida Bay and analyzed with Pielou's coincident end point technique and Raup and Crick's probabilistic similarity technique. Although a large number of endemic species were recorded for Tampa Bay, no true boundary was detected. Several species present in Florida Bay but absent at sites immediately to the north may indicate a boundary in the vicinity of Cape Romano; however, many of these species may be found in deeper water offshore far north of the Cape Romano area.

Type of Study: Review; Biological Component: Fauna;

(03.00115)

McCoy, E.D. & S.S. Bell 1982. Tampa Bay: The end of the line? Presented at Tampa Bay Area Scientific Information Symposium, Tampa, Fla.

The distribution of 5 major taxa (teleost fish, decapod crustaceans, polychaetous annelids, and bivalve and gastropod molluscs) on the west coast of Florida was examined from distributional literature, to determine whether or not Tampa Bay serves as a biogeographic boundary between temperate and tropical fauna. Species distributions were compiled from 8 shallow water sites between Pensacola/Panama City and Florida Bay and analyzed with Pielou's coincident end point technique and Raup and Crick's probabilistic similarity technique. Although a large number of endemic species were recorded for Tampa Bay, no true boundary was detected. Several species present in Florida Bay but absent at sites immediately to the north may indicate a boundary in the vicinity of Cape Romano; however, many of these species may be found in deeper water offshore far north of the Cape Romano area.

Type of Study: Review; Biological Component: Fauna;

(03.00116)

McCoy, E.D., S.S. Bell & K. Walters 1983. A simple technique for locating floral and faunal boundaries. Presented at Benthic Ecol. Meet., Fla. Instit. of Tech., Melbourne.

A simple probabilistic Monte Carlo test is presented for locating boundaries among groups of animals or plants. Using data from the North Atlantic, the technique was compared to other methods for 3 examples: the location of faunal zones on the Gulf coast of Florida; the location of boundary layers in oceanic plankton communities; and the separation of mollusks on a tidal gradient. The application of the technique in the benthic environment is discussed.

Type of Study: Technique; Biological Component: Fauna;

(03.00117)

McNulty, J.K., W.N. Lindell, Jr. & J.E. Sykes 1972. Cooperative Gulf of Mexico estuarine inventory and study, Florida: Phase I, area description. Natl. Oceanic Atmos. Adm. Tech. Rept. NMFS Circ. 368. 126 p.

Newly developed tables and maps were presented depicting the dimensions of submerged vegetation, tidal marshes, mangrove swamps, commercial oyster beds, leased oyster-rearing areas, sources of pollution, drained tidal marshes, and filled areas of Florida's west coast estuaries. Published and unpublished information on temperature, salinity, geology, artificial fishing reefs, stream discharge, human pollution, commercial fishing, and economic development was presented. Roughly one half of the total area of estuaries was unvegetated; the remaining half was about equally divided among mangroves, tidal marshes, and submerged vegetation. It was stated that increases in human population in coastal areas has resulted in adverse effects from pollution, filling for residential and industrial development, and draining of tidal

marshes for mosquito control.

Habitat:Estuarine; Type of Study:Qualitative; Biological Component:Flora and fauna;

(03.00118)

Menzel, R.W. 1956. Some additional differences between *Crassostrea virginica* and *Ostrea equestris* in the Gulf of Mexico. Proc. Natl. Shellfish. Assoc. 46:76-81.

Differences between the two genera (*Ostrea* and *Crassostrea*), represented by *C. virginica* and *O. equestris* in the Gulf of Mexico were reported. The present report deals primarily with the differences in the reactions of *C. virginica* and *O. equestris* at low temperatures.

Type of Study:Qualitative; Biological Component:Oysters; Dominant Taxon/Taxa Studied:*Crassostrea virginica*, *Ostrea equestris*;

(03.00119)

Mills, C.E. 1976. Studies on the behavior and life histories of several species of hydroids and hydromedusae. Fla. State Univ. M.S. Thesis.

The abundance and reproductive biology of 2 species of hydroids inhabiting hermit crab shells were studied in Bodega Bay, Florida. Abundance of *Podocoryne selena* and *Hydractinia echinata* increased rapidly from January through May 1975. *H. echinata* was twice as numerous as *P. selena*. Reproductive activity increases progressively throughout the spring for young colonies, although small numbers of both species reproduce year round. Preference tests for hydroid covered and clean shells were performed for 3 species of hermit crab. The behavior of polyps was also observed.

Type of Study:Qualitative; Biological Component:Cnidaria and crustacea; Dominant Taxon/Taxa Studied:*Podocoryne selena*, *Hydractinia echinata*, *Pagurus longicarpus*, *P. pollicaris*, *Clibanarius vittatus*;

(03.00120)

Moon, R.E., T.N. Krumrei & D.F. Martin 1980. An investigation of compounds cytolytic toward the red tide organism *Ptychodiscus brevis* (Davis) Steidinger, from Florida marine sediments. Microbios. Lett. 14:7-15.

Analysis of sediment samples from 15 stations along Florida's west coast revealed similar chemical and biological characteristics to aponin, a substance produced by the cyanobacteria *Gomphosphaeria aponina* which is cytolytic towards the Florida red tide organism *Ptychodiscus brevis*. Chemical activity was demonstrated by two chromatographic techniques and biological activity of sediment extracts was examined with cytolytic and fungicidal bioassays. The widespread distribution of cytolytic agents in marine sediments and their potential use in controlling *P. brevis* proliferation are discussed.

Study Duration:March 1979; Habitat:Sand, mud; Type of Study:Quantitative; Biological Component:Flora; Type of Sampler:Ship-X grab sampler; Number of Stations:15; Dominant Taxon/Taxa Studied:*Gomphosphaeria aponina*, *Ptychodiscus brevis*;

(03.00121)

Moore, D.K. & H.R. Bullis 1960. A deep water coral reef in the Gulf of Mexico. Bull. Mar. Sci. Gulf Caribb. 10(1):125-128.

The Fish and Wildlife Service M/V OREGON discovered, with a strip chart depth recorder, a peculiar structure on the continental slope 40 miles east of the Mississippi River mouth, at depths of 230-250 fathoms. A shrimp trawl was used to drag sample the structure and about 300 pounds of the deep water colonial coral *Lophelia prolifera* were recovered. It was determined that *L. prolifera* had formed an extensive reef over half a mile long and up to 180 ft thick vertically. This species is known to form deep water reefs in the northeastern Atlantic, but this is the first *Lophelia* reef to be reported from the Americas.

Habitat:Coral reef; Type of Study:Qualitative; Biological Component:Faua; Type of Sampler:Trawl; Number of Stations:1; Dominant Taxon/Taxa Studied:*Lophelia prolifera*;

(03.00122)

Moore, D.R. 1962. Occurrence and distribution of *Neopsis bachei* Agassiz (Hydrozoa) in the northern Gulf of Mexico. Bull. Mar. Sci. Gulf & Caribb. 12(3): 399-402.

The distribution and abundance of *Neopsis bachei* from the Northern Gulf of Mexico was investigated. Measurements of temperature and salinity influences revealed that temperature regulates the time of medusa development. *N. bachei* appears to be an inshore form surviving a wide range of environmental conditions. Variations in reports of its range are discussed.

Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Plankton tow; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Neopsis bachei*;

(03.00123)

Moore, D.R. 1965. New species of Vitrinellidae from Gulf of Mexico and adjacent waters. *Nautilus* 78(3):73-79.

The systematics of the families Vitrinellidae and Tornidae were briefly reviewed and reasons given for maintaining the two families as separate entities. New species of Vitrinellidae from the Gulf of Mexico were described and include: *Macromphalina floridana*, *Vitrinella texana* and *Solariorbis senipunctus*.

Type of Study:Qualitative; Biological Component:Mollusc fauna;

(03.00124)

Moore, D.R. 1977. Micromolluscs. Rept. to BLM on small molluscs collected in the MAFLA area during 1975-76. Unpubl. Rept. U.S. Dept. of Int., BLM, Washington, DC. 48 p.

This report presents the results of the micromolluscs study of the Bureau of Land Management sponsored program in the Mississippi-Alabama-Florida (MAFLA) outer continental shelf. A total of 317 live specimens and 24,443 dead specimens were collected from small subsampling cores. The author summarizes the results as follows: Live collected micromolluscs were not abundant in the subsamples due to the small surface area of the cores. Enough material was collected, however, to make some basic assumptions: 1) Small molluscs are relatively abundant in shallow water (<50 m) in the northeastern Gulf of Mexico (about 700/m<sup>2</sup>). 2) Small molluscs are uncommon on the deeper shelf (50 to 186 m) in this area (about 125/m<sup>2</sup>). 3) The continental shelf from Cape San Blas, Florida, to the Chandeleur Islands is an area of low productivity for molluscs. 4) Live bivalves are more abundant than live gastropods. 5) Browsing gastropods are rare in depths of more than 50 m. 6) Browsing gastropods are extremely rare in areas with much fine sediment. 7) Two most important factors influencing abundance and distribution of small molluscs are sediment type and depth of water.

Study Duration:1975-1976; Type of Study:Quantitative; Biological Component:Molluscs; Type of Sampler:5.5 cm dia. core (subsample from box core); Sieve Size:0.25 mm; Number of Stations:45; Number of Replicates/Station:1; Temporal Frequency:3 times (June 1975; Sept. 1975; Jan. 1976); Abiotic Parameters Measured:Temperature, salinity, DO, sediments; Dominant Taxon/Taxa Studied:*Parvilucina multilineata*, *Gouldii cerina*, *Vesicomya pilula*, *Crassinella lunulata*, *Varicorbula operculata* (bivalves); *Finella dubia*, *Caecum pulchellum*, *Meioceras cubitatum*, *Caecum bipartitum*, *Alvania auberiana* (gastropods);

(03.00125)

Nall, L.E. 1979. Age and growth of the southern flounder, *Paralichthys lethostigma*, in the northern Gulf of Mexico with notes on *Paralichthys albigutta*. Fla. State Univ. M.S. Thesis.

A study of age and growth of the southern flounder, *Paralichthys lethostigma*, from the northern Gulf of Mexico was conducted from May to September 1975. Total and standard lengths, weight, sex, and gonadal development were recorded, and left otoliths were removed for age determinations. The length-weight relationships are given for *P. lethostigma* and *P. albigutta*. *P. lethostigma* was found to have a relatively slow growth rate and a life span exceeding 20 years. Management of the flounder harvest is discussed.

Study Duration:May-September 1975; Type of Study:Quantitative; Biological Component:Fish; Type of Sampler:Gigging, otter trawl; Dominant Taxon/Taxa Studied:*Paralichthys lethostigma*, *P. albigutta*;

(03.00126)

Nettles, M.S. 1976. Intertidal calcite muds along the west coast of Florida. Univ. of Fla. M.S. Thesis.

The depositional history of a marine mud in the Big Bend area was investigated during 1975. Low diversity brackish water foraminiferal and saltmarsh molluscan fauna characterize the mud. Results indicate that the calcitic mud was not deposited in a saltmarsh environment. Carbon 14 dating of gastropods points to the mud forming at the Gotland Emergence of Fairbridge or the Pacific I climatic event of Bryson. Mud characteristics suggest a distinct alteration in depositional environments with the depositional environment being characteristic of a supratidal flat which is periodically flooded by storm tides. Recent marsh sediments overlaying the mud suggest a currently rising sea level.

Study Duration:March 1975-September 1975; Habitat:Mud; Type of Study:Quantitative; Number of Stations:17; Abiotic Parameters Measured:Salinity, sediment characteristics;

(03.00127)

Odum, W.E. & E.J. Heald 1972. Trophic analysis of an estuarine mangrove community. *Bull. Mar. Sci.* 22(3): 671-738.

Summaries of food habits for most of the fish and aquatic invertebrates which occur in the North River mangrove ecosystem were presented. Analyses of 10,000+ stomach contents plus information from other publications were summarized. For most species, an estimate of relative importance in terms of abundance in the study area was presented. The study was conducted to determine the energy basis for this large population of animals and to delineate the route by which energy is transferred through the food web.

Study Duration:2 years; Habitat:Mangrove, estuarine; Type of Study:Qualitative; Biological Component:Fish, aquatic

invertebrates; Type of Sampler: Bag seine, throw net, dip net, lift net, traps, trammel net, hook & line, roller beam trawl, plankton net, Van Veen grab, Ockelman dredge;

(03.00128)

Desterling, M.J. 1976. Reproduction, growth, and migration of blue crabs along Florida's Gulf coast. Mar. Advis. Prog., Fla. Sea Grant Publ. SUSF-SG-76-003. 19 p.

The reproduction, growth, and migration of blue crabs along Florida's Gulf coast were studied from November 1974 through December 1975. It was determined that male crabs remained in their general home estuary after tagging. Female crabs did travel further than males, relative to their home estuary. Migrations of females were determined to be directly linked to reproduction. It was observed that the blue crab population along Florida's Gulf coast behaves in an onshore/along shore pattern rather than an onshore/offshore pattern as formerly believed.

Study Duration: 1 year; Type of Study: Qualitative; Biological Component: Decapod fauna; Number of Stations: 10; Dominant Taxon/Taxa Studied: *Callinectes sapidus*;

(03.00129)

Parker, P.L. 1981. Organic geochemistry in the natural setting of the Gulf of Mexico. In: Proc. of a Symp. on Environ. Research Needs in the Gulf of Mexico, Key Biscayne, Fla., 30 Sept.-5 Oct. 1979. D.K. Atwood (Convener). Publ. by NOAA/ERL, Atlantic Oceanographic and Meteorological Lab., Miami, Fla. Vol. IIC, p. 103-130.

This summary paper reviews the state of knowledge on the organic geochemistry of particulate and dissolved organic matter, blue green algal mats, marsh and seagrass environments, coastal sediments, carbonates and amino acids, and deep sea sediments of the Gulf of Mexico. Scarcity of available data is noted and recommendations for future studies provided.

Type of Study: Qualitative (review); Biological Component: Sediments;

(03.00130)

Pearse, A.S. 1908. Descriptions of four new species of amphipodous crustacea from the Gulf of Mexico. Proc. U.S. Natl. Mus. 34 (1594): 27-32.

Four newly described species were included in a collection of amphipods from the Gulf of Mexico; this collection was sent to the author for study by the United States National Museum.

Type of Study: Qualitative; Biological Component: Amphipod fauna; Dominant Taxon/Taxa Studied: *Ampelisca holmesii*, *Haustorius americanus*, *Naera ratheumae*, *Protellopsis stebbingii*;

(03.00131)

Pequegnat, W.E., L.H. Pequegnat, J.A. Kleypas, B.M. James, E.A. Kennedy 1983. Ecological Communities of the Continental Slope and Adjacent Regimes of the Northern Gulf of Mexico. Executive Summary. Minerals Management Service, U.S. Dept. Interior, Wash., D.C. Report No.: MMS-GM-PT-83-018:46p.

A comprehensive overview of the deep sea benthic environment of the Gulf of Mexico from the continental slope to the abyssal plain is presented. Macroinfaunal and megaepifaunal samples and accompanying photographic documentation were acquired and analysed from 1964-1973. An assessment was made of the potential impacts of gas and oil exploration and production on the benthic communities.

Study Duration: 9 years; Type of Study: Qualitative, Quantitative;

(03.00132)

Pequegnat, W.E., L.H. Pequegnat, J.A. Kleypas, B.M. James, E.A. Kennedy 1983. Ecological communities of the continental slope and adjacent regimes of the Northern Gulf of Mexico: Text, Photographic Atlas, and Appendices (Final Report). Minerals Management Service, U.S. Dept. Interior, Wash., D.C. Report No: MMS-GM-PT-83-017:675 p.

A comprehensive overview of the deep sea benthic environment of the Gulf of Mexico from the continental slope to the abyssal plain is presented. Macroinfaunal and megaepifaunal samples and accompanying photographic documentation were acquired and analyzed from 1964-1973. An assessment was made of the potential impacts of gas and oil exploration and production on the benthic communities.

Study Duration: 9 years; Type of Study: Qualitative, Quantitative;

(03.00133)

Phifer, C.B., Jr. 1976. Distance chemoreception in the predator-prey relationship of *Melospiza corona johnstonei* Clench and Turner and *Littorina irrorata* Say (Prosobranchia: Gastropoda). Fla. State Univ. M.S. Thesis.

Studies revealed that the predator *Melospiza corona* uses chemoreception to locate its prey, *Littorina irrorata*, on beaches in north Florida. Current mediated distance chemoreception allows *M. corona* to locate clusters of *L.*

*irrorata* up to 2 m away and individuals up to 20 cm away. On the other hand, *L. irrorata* exhibits an escape response and rapid evacuation from the water in the presence of chemical stimuli from *M. corona*. Adaptive advantages are discussed.

Habitat:Sand; Type of Study:Quantitative; Biological Component:Fauna; Dominant Taxon/Taxa Studied:*Melongena corona johnstonei*, *Littorina irrorata*;

(03.00134)

Phillips, R.C. 1960. Ecology and distribution of marine algae found in Tampa Bay, Boca Ciega Bay, and at Tarpon Springs, Florida. *Quart. J. Fla. Acad. Sci.* 23(3):222-260.

Marine algae were sampled monthly at 9 stations, 3 each in Tampa Bay, Boca Ciega Bay, and Tarpon Springs, from September 1957 to April 1959. A total of 195 taxa of algae were collected: 86 from Tampa Bay; 111 from Boca Ciega Bay; and 95 from Tarpon Springs. Unattached red algae and attached green algae were dominant at most stations. A complete species list is presented, in addition to extensive hydrographic data for each area. It is concluded that salinity exerts the greatest influence on algal growth. Boca Ciega Bay exhibited a flora transitional between the brackish water flora of Tampa Bay and the marine flora of Tarpon Springs.

Study Duration:September 1957-April 1959; Habitat:Mud, sand, seagrass; Type of Study:Qualitative; Biological Component:Flora; Type of Sampler:Dredge; Number of Stations:9; Temporal Frequency:Monthly; Abiotic Parameters Measured:Water temperature, depth, salinity, tide; Dominant Taxon/Taxa Studied:*Enteromorpha intestinalis*, *Ulva lactuca*, *Hypnea musciformis*, *Gracilaria verrucosa*, *Spyridia filamentosa*, *H. cornuta*, *Laurencia poitei*;

(03.00135)

Pierce R.H. & R.C. Brown 1983. Hydrocarbon analysis of surficial sediment in support of Southwest Florida shelf regional biological communities survey cruise II, 1982 and cruise III, 1983. Final report prepared for: Mineral Management Services, Contract #AAB51-CT2-48, subcontract from: Continental Shelf Associates, Tequesta, Florida. 33 p.

Hydrocarbons from soft bottom sampling sites on the Southwest Florida shelf were analyzed to determine predrilling conditions and to provide cause and effect relationships with biological community surveys for assessing impacts from future oil drilling operations. Petroleum contamination in the areas studied was not apparent.

Habitat:Soft bottom; Type of Study:Qualitative; Type of Sampler:Diver operated core; Number of Stations: 10; Number of Replicates/Station:3; Abiotic Parameters Measured:Hydrocarbons;

(03.00136)

Presley, B.J., M.C. Dobson, R.F. Shokes & J.H. Trefry 1977. Heavy metal analysis of bottom sediment on the West Florida Shelf. Technical report. Submitted to the Bureau of Land Management, Washington, D.C. (MAFLA-OCS Program).

Sediments were collected from the MAFLA lease area and analyzed for heavy metals. Of 42 stations 21 were sampled on two different occasions. Wide variations were found in the % Fe, % CaCO<sub>3</sub> and % fine-grained material not only in the MAFLA area but even within transects. Trace metals showed similar variability. Fundamental sediment characteristics were shown to correlate with metal concentrations. Data show that Fe may be used as an index for predicting trace metal concentration, thus providing a means for assessing possible future anthropogenic input.

Study Duration:1974, 1975; Type of Study:Quantitative; Type of Sampler:Box Core; Number of Stations:42; Abiotic Parameters Measured:Cadmium, chromium, copper, iron, lead, nickel, sediment characteristics;

(03.00137)

Rey, J.R. 1978. Abundance patterns of terrestrial arthropods in north Florida salt marshes. Fla. State Univ. M.S. Thesis.

The effects of the plant zonation in marshes of northwest Florida on the abundance patterns of terrestrial arthropods were investigated. The general aspects of saltmarsh physiography and the arthropod abundance patterns were the two major areas of study.

Habitat:Marsh; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Muslin net; Dominant Taxon/Taxa Studied:*Juncus roemerianus*, *Spartina alterniflora*;

(03.00138)

Ribelin, B.W. 1978. Salt marsh detrital aggregates: a key to trophic relationships. Fla. State Univ. Ph.D. Dissertation.

The production and cycling of detrital material was investigated in a Gulf coast saltmarsh. Over 98% of the exported detritus was composed of amorphous aggregates produced by benthic microflora, rather than by microbial decomposition of the dominant plant, *Juncus roemerianus*. Transport of the detrital material by tidal movements of water was determined. Production rates of detrital aggregates were maximum in late summer and maximum in winter. Experimental removal of *J. roemerianus* from a small model marsh did not affect detrital production. The effect of light on

aggregate formation was examined.

Study Duration: March 1976; Habitat: Salt marsh; Type of Study: Quantitative; Number of Stations: 7; Temporal Frequency: Monthly; Abiotic Parameters Measured: Tidal parameters; Dominant Taxon/Taxa Studied: *Juncus roemerianus*;

(03.00139)

Rowe, G.T. & D.W. Menzel 1971. Quantitative benthic samples from the deep Gulf of Mexico with some comments on the measurement of deep sea biomass. Bull. Mar. Sci. 21(2): 556-566.

Benthic samples and a photographic survey of 23 stations in the deep Gulf of Mexico revealed a depauperate benthic fauna compared with other basins. Infaunal biomass and abundance decreased logarithmically with depth, indicating a loss of energy along a complex food chain through the water column. An attempt is made to explain east-west differences in biomass with organic carbon in the sediment.

Habitat: Soft bottom; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Anchor dredge, Blake trawl; Sieve Size: 0.42 mm; Number of Stations: 23; Abiotic Parameters Measured: Organic carbon;

(03.00140)

Saloman, C.H. 1975. A selected bibliography of the nearshore environment: Florida west coast. Army Corps Engr, Coast. Eng. Res. Ctr., Misc. Pap. No. 5-75. 268 p.

A collection of over 2,900 references on ecological and coastal engineering subjects related to the nearshore environment of the Florida west coast was presented. References were grouped by subject and alphabetized by author within each subject heading.

Type of Study: Bibliography;

(03.00141)

Savage, T. 1972. Florida mangroves as shoreline stabilizers. Fla. Dept. Nat. Resour. Mar. Res. Lab., Prof. Pap. Ser. No. 19. 46 p.

The effectiveness of transplanting mangroves to stabilize and protect shorelines was studied in laboratory and field tests at 5 sites in Tampa Bay and Sarasota Bay, Florida. The black mangrove, *Avicennia germinans*, was determined to be the best species for statewide use because of its broad latitudinal range, tolerance of adverse soil conditions, extensive early root system, and ease of transplanting. It is at least as effective in natural coastal protection as the red mangrove, *Rhizophora mangle*. The most successful planting procedure was also determined.

Study Duration: September 1970-October 1971; Habitat: Mangroves; Type of Study: Quantitative; Biological Component: Flora; Number of Stations: 5; Abiotic Parameters Measured: Salinity; Dominant Taxon/Taxa Studied: *Rhizophora mangle*, *Avicennia germinans*, *Laguncularia racemosa*;

(03.00142)

Savage, T., J.R. Sullivan & C.E. Kalman 1975. An analysis of stone crab (*Menippe mercenaria*) landings on Florida's west coast, with a brief synopsis of the fishery. Fla. Mar. Res. Publ. No. 13. 37 p.

Claws of the stone crab, *Menippe mercenaria*, from the west coast of Florida were examined for handedness, claw type (major or minor) and stridulatory pattern during the 1970-1971 and 1973-1974 commercial seasons. Of the 13,497 claws inspected, 48.4% were right handed major claws. Data is summarized on the proportion of regenerated claws, their sizes, and succession of stridulatory patterns during claw regeneration. A hypothesis is presented to explain the progression of sizes of crabs contributing claws to the fishery through the season.

Study Duration: Nov. 1970-Apr. 1971, Nov. 1973-Apr. 1974; Habitat: Seagrass beds, oyster reefs; Type of Study: Quantitative; Biological Component: Crustacea fauna; Type of Sampler: Wooden slat trap; Temporal Frequency: Bimonthly; Dominant Taxon/Taxa Studied: *Menippe mercenaria*;

(03.00143)

Scheibling, R.E. 1981. Differences in body size and growth rate between *Echinaster* morphs from the Gulf of Mexico. Internat. Echinoderm Conf., Tampa, Fla.

Analysis of size-frequency distributions of populations of "Type 1" and "Type 2" (Sensu Atwood, 1973) morphs of *Echinaster* in various habitats revealed that *E. Type 1* (maximum radius = 95 mm) is consistently larger than *E. Type 2* (maximum radius = 63 mm) owing to local differences in the food supply. *E. Type 1* juveniles had a natural growth rate 2-3 times greater than that of *E. Type 2* juveniles during their first year. Laboratory growth rate of hybrid (*E. Type 2* x *Type 1*) juveniles was 1.6 times greater than that of *E. Type 2* juveniles during their first year. Differences in growth rate and body size between *E. Type 1* and *Type 2* are explained by differences in reproductive characteristics and suggest that the two morphs are separate species.

Type of Study: Quantitative; Biological Component: Echinoderm fauna; Dominant Taxon/Taxa Studied: *Echinaster Type 1*

and E. Type 2;

(03.00144)

Scott, M.R. 1981. Radionuclides in the Gulf of Mexico. In: Proc. of a Symp. on Environ. Research Needs in the Gulf of Mexico, Key Biscayne, Florida, 30 Sept.- 5 Oct. 1979. D.K. Atwood (Convener). Publ. by NOAA/ERL, Atlantic Oceanographic and Meteorological Lab., Miami, Fla. Vol. IIB. p. 187-223.

This summary paper reviews the state of knowledge on the radionuclides of the Gulf of Mexico. Sections on natural-occurring radionuclides (Uranium and Thorium decay series) and cosmogenic and anthropogenic radionuclides (Carbon-14, Tritium, Cesium-137 and Plutonium isotopes) describe sediment concentrations and processes. Scarcity of existing data is noted and recommendations for future studies (especially in the nearshore environments) in the Gulf of Mexico are made.

Type of Study:Qualitative (review); Biological Component:Sediments;

(03.00145)

Shipp, R.L. & S.A. Bortone 1978. Demersal fishes of the MAFLA lease area. Vol. II, Chapt. 19, In: MAFLA final report. (The Mississippi, Alabama, Florida outer Continental Shelf baseline environmental study. 1977/1978). Prep. by Dames and Moore, Inc. for BLM contract #AA550-CT7-34. p. 848-888.

Demersal fishes from the MAFLA lease area were collected, identified, weighed, measured and archived. Initial indications are of significant range extensions of fishes in the northeastern Gulf of Mexico. Several undescribed species were collected. Species associations were analyzed and a complete species list compiled.

Study Duration:1977-1978; Type of Study:Qualitative, quantitative; Biological Component:Fauna; Type of Sampler:Dredge, trawl; Number of Stations:22; Temporal Frequency:Summer-1976, summer-1977, fall-1977, winter-1978; Dominant Taxon/Taxa Studied:*Dasyatis sayi*, *Eucrinostomus gula*, *Micropogon undulatus*, *Holocentrus bullisi*, *Chaetodon aya*, *Apogon quadrisquamatus*, *Gobiosoma xanthipora*, *Hypoplectrus puella*, *Evermannichthys spongieola*, *Epinephelus morio*, *Rypticus maculatus*, *Astrapogon stellatus*, *Synodus intermedius*, *Centropristes ocyurus*, *Syacium papillosum*, *Sphocroides dorsalis*, *Histrio histrio*, *Symphurus pusillosus*;

(03.00146)

Shipp, R.L. & T.S. Hopkins 1978. Physical and biological observations of the northern rim of the DeSoto Canyon made from a research submersible. Northeast Gulf Sci. 2(2):113-121.

The research submersible DIAPHUS made 14 dives on and around the northern rim of DeSoto Canyon (located at depths of 50-60 m) in the north central Gulf of Mexico during June 1978. The macroinvertebrates of the area are of two principal assemblages. One assemblage, associated with a sand-shell-coraline algae slope, was dominated by attached pennatulaceid coelenterates, decapod crustaceans, and asteroid and echinoid echinoderms. The other faunal assemblage, associated with a limestone block ledge, consisted mainly of sponges, the scleractinian coral *Oculina diffusa*, decapod crustaceans, gastropod molluscs and ophiuroid and echinoid echinoderms. The ichthyofauna was dominated by deep water reef species, 30 of which were identified and their habitat and abundance described.

Study Duration:June 1978; Habitat:Sand/shell, limestone ledge; Type of Study:Qualitative; Biological Component:Fauna; Number of Stations:14; Dominant Taxon/Taxa Studied:*Oculina diffusa*, *Clypeaster* sp., *Renilla* sp., *Isostichopus badioatus*;

(03.00147)

Shokes, R.F., M. Hansen, A. Abusamara, J. Reed 1978. Barium and vanadium in surficial sediments. MAFLA benchmark survey, 1977-1978. Final report. Vol II, Chapt. 4, In: MAFLA final report. (The Mississippi, Alabama, Florida outer Continental Shelf baseline environmental study. 1977/1978). Prep. by Dames and Moore, Inc. for BLM contract #AA550-CT7-34. p.375-405.

Concentration data for total and leachable sedimentary barium and vanadium on the outer continental shelf were obtained. No anthropogenic influences on the distribution of these two elements were observed. The low amounts of leachable barium found over the study area make it a potentially sensitive monitoring tool to safeguard the area during oil and gas production.

Study Duration:Summer-1976 to Winter 1978; Type of Study:Quantitative; Number of Stations: 52; Temporal Frequency:6 months; Abiotic Parameters Measured:Barium, vanadium, sediment characteristics;

(03.00148)

Shokes, R.F., R.R. Sims, Jr., M. Hansen, A. Abusamara, J. Reed 1978. Barium and vanadium in demersal fish and macroepifauna. MAFLA final report. (The Mississippi, Alabama, Florida outer Continental Shelf baseline environmental study 1977/1978). Prep. by Dames and Moore, Inc. for BLM contract #AA550-CT7-34, p.464-493.

Barium and vanadium concentration data from demersal fish and macroepifauna from the southwest Florida shelf are presented. Macroepifauna demonstrated no observable seasonal or geographic trends. *Syacium papillosum*, the only

demersal fish sampled extensively, revealed no geographic trends for either metal, but experienced lower barium tissue burdens in the winter than in the summer. This may have been caused by specimen maturity, feeding habits, or some combination of the two.

Study Duration:1977-1978; Type of Study:Quantitative; Biological Component:Fauna; Number of Stations:7; Temporal Frequency:Aug-Sept. 1977, Nov. 1977, Feb. 1978; Abiotic Parameters Measured:Barium, vanadium; Dominant Taxon/Taxa Studied:*Syacium papillosum*, sponges, molluscs, crustaceans, echinoderms;

(03.00149)

Smith, F.G.W. 1954. Gulf of Mexico Madreporaria. In: Gulf of Mexico, its origin, waters, and marine life. Fish. Bull. U.S. 55(89):291-295.

The general biology of Madreporaria in the Gulf of Mexico is discussed. Features studied included distribution, growth rates, and limiting factors including temperature, salinity, turbidity, current velocity, and light intensity. Both hermatypic and ahermatypic corals are described. Species lists are given of both types of corals found in the Gulf of Mexico.

Type of Study:Qualitative; Biological Component:Fauna;

(03.00150)

Smith, F.G.W. 1954. Biology of the spiny lobster. In: Gulf of Mexico, its origin, waters, and marine life. Fish. Bull. U.S. 55(89):463-465.

The biology of *Panulirus argus* (in the Gulf of Mexico) is discussed. Several aspects of the distribution and the factors determining distribution are described. Other major categories that are discussed include sexual characters, habitat characteristics, food and enemies, breeding habits and life history, molting, migrations, and growth rates.

Type of Study:Qualitative; Biological Component:Fauna; Dominant Taxon/Taxa Studied:*Panulirus argus*;

(03.00151)

Smith, F.G.W. 1954. Biology of the commercial sponges. In: Gulf of Mexico, its origin, waters, and marine life. Fish. Bull. U.S. 55(89):263-266.

General aspects of the biology of sponges found in Gulf of Mexico waters are described. Discussion includes reproduction, development, morphology, physiology, distribution, and roles in the community. Particulars of each area of discussion are drawn from work by other researchers.

Type of Study:Quantitative; Biological Component:Fauna; Dominant Taxon/Taxa Studied: *Hippiospongia gossypina*, *H. lachne*, *S. graminea*, *Spongia zimocca* sp. *barbara*, *S. officinalis* ss. *dura*, *S. officinalis* ss. *obliqua*;

(03.00152)

Smith, G. 1978. Ecology and distribution of mid-eastern Gulf of Mexico reef fishes. Univ. of So. Fla. Ph.D. Dissertation.

A study of reef fish in the eastern Gulf of Mexico between May 1970 and August 1976 yielded 102 species, representing 38 families. The ichthyofauna of the eastern Gulf was compared with those of the western Gulf and western Atlantic. Spatial trends in species composition and abundance were cited. Seasonal variations in diversity and abundance were limited, except during a dinoflagellate bloom (red tide) which occurred in the summer of 1971. Reef fish colonization data were analyzed for applicability to the MacArthur-Wilson species equilibrium model developed for insular biotas.

Study Duration:May 1970-August 1976; Habitat:Coral reef; Type of Study:Qualitative; Biological Component:Fish;

(03.00153)

Smith, G.B. 1976. Ecology and distribution of eastern Gulf of Mexico reef fishes. Fla. Dept. Nat. Resour. Mar. Res. Lab. Publ. 19. 78 p.

One hundred one reef fish species representing 38 families were collected and/or observed at 12-40 m depths in the eastern Gulf of Mexico. Comparisons of the eastern Gulf and other western Atlantic ichthyofaunas revealed greater intra-Gulf homogeneity and Caribbean-West Indian affinity than previously suspected. Preliminary observations at the Florida Middle Ground indicate a diverse and abundant resident tropical ichthyofauna including numerous insular (West Indian) elements rare or absent at other studied Gulf reefs.

Study Duration:May 1970-October 1972; Habitat:Reefs; Type of Study:Qualitative; Biological Component:Fauna; Number of Stations:35; Dominant Taxon/Taxa Studied:Fish;

(03.00154)

Socci, A. & M.G. Dinkelman 1981. Sediments and sedimentation in the Gulf of Mexico -- A review. In: Proc. of a Symp. on



Environ. Research Needs in the Gulf of Mexico, Key Biscayne, Florida, 30 Sept.-5 Oct. 1979. D.K. Atwood (Convener). Publ. by NOAA/ERL, Atlantic Oceanographic and Meteorological Lab., Miami, Fla. Vol. IIC. p. 33-101.

This summary paper reviews the state of knowledge on the geologic setting, sediments, geochemistry, and animal-sediment relationships in the Gulf of Mexico. An extensive reference list accompanies the paper. Scarcity of available data is noted and several recommendations for future studies in the Gulf of Mexico are provided.

Type of Study:Qualitative (review);

(03.00155)

Soto, L.A. 1972. Decapod shelf fauna of the northeastern Gulf of Mexico, distribution and zoogeography. Fla. St. Univ. M.S. Thesis.

A total of 120 decapod species were obtained from a survey of the northeastern Gulf of Mexico. Five species were newly recorded, while the geographic and bathymetric range of others were extended into the northeastern Gulf. The seasonal occurrence, relative abundance, sex ratio, and distribution was presented for each species. The DeSoto Canyon was inferred as a western boundary in the northeastern Gulf, confining some species to the eastern half. Other species displayed an ubiquitous dispersion on the shelf, though they were less commonly found in the area between the Mississippi Delta and DeSoto Canyon, or western half of the northeastern Gulf. No sharp temperature gradients were reported in the area of study which might be cause for such type of dispersions. Thermal tolerances, substratum, and depth preferences were discussed as possible factors influencing the distribution of selected species. The decapod shell fauna was classed into 6 groups according to the geographic range of the species: 43% tropical; 43% widespread, 6% Carolinian, 4% endemic, 2% occurs in both Eastern and Western Atlantic, and 2% cosmopolitan. The decapod shelf fauna was determined to be integrated by both coastal and deep sea forms, having 30.6% and 27.5% of the total population, respectively; 41.9% of the species were indigenous to the shelf habitat.

Study Duration:1 year; Type of Study:Semi-quantitative; Biological Component:Decapod fauna;

(03.00156)

Storr, J.F. 1957. Progress of recovery of the commercial sponge beds of Florida. Proc. Gulf & Caribb. Fish. Inst. Nov. 1956.

The results to date are reported on the recovery of commercial sponge beds located between Tampa Bay and Carrabelle. Past and present distribution studies are discussed and data is given on sponge productivity, growth rates, and factors affecting distribution. Using the results of these investigations, estimates were made on the probable distribution in 5 and 10 years.

Type of Study:Quantitative; Biological Component:Fauna; Number of Stations:88; Abiotic Parameters Measured:Current direction;

(03.00157)

Storr, J.F. 1964. Ecology of the Gulf of Mexico commercial sponges and its relation to the fishery. U.S. Fish Wildl. Serv. Spec. Sci. Rept. Fisheries 466.

A 2 year study of the ecology of commercial sponges was conducted on the west coast of Florida. Reproduction of sponges and the effects of temperature and population density are discussed. The growth rate of wool sponges was determined and a growth formula was calculated. Environmental parameters are related to sponge distribution. The sponge industry from 1936 to 1958 is reviewed, as well as the present stature of the fishery. Recommendations for increasing the sponge harvest are stated.

Study Duration:1955-1957; Type of Study:Qualitative; Biological Component:Porifera; Abiotic Parameters Measured:Temperature, salinity, depth, current velocity;

(03.00158)

Storr, J.F. 1976. Ecological factors controlling sponge distribution in the Gulf of Mexico and the resulting zonation. p. 261-276. In: F.W. Harrison and R.R. Cowden (eds.) "Aspects of Sponge Biology". Academic Press, New York. 354 p.

Sponge diversity and abundance along the northwestern coast of Florida in the Gulf of Mexico were found to be controlled by a combination of ecological factors. The rapid decline in mean low temperatures northward was of major importance to overall decline in diversity. Zone by zone, however, it was found that factors such as rock bar abundance, lower wave activity, and the presence of the influx of nutrients from rivers, increased abundance and diversity. These factors augmented growth, reproduction rates, and sponge diversities. Limiting factors were excessive algal growth, which killed sponges; wide sandy areas, which inhibited sponge distribution because of the limited life span of sponge larvae; and high sedimentation rates resulting from strong tidal or wave activity which depleted the energy of the sponges. From the sponge diversity it was possible to establish zones of sponge distribution, which correspond closely with the sponging grounds of the commercial sponges.

Study Duration:2 years; Habitat:Sand, shell, algae; Type of Study:Qualitative; Biological Component:Sponges; Number of

Stations:97; Abiotic Parameters Measured:Temperature, depth, currents, nutrient levels; Dominant Taxon/Taxa Studied:*Geodia gibberosa*, *Hippiospongia lachne*, *Homaxinella rudis*, *Ircinia fasciculata*, *Microciona juniperina*, *Spherospongia vesparium*;

(03.00159)

Tanner, W.F. 1959. Nearshore studies in sedimentology and morphology along the Florida panhandle coast. J. Sediment. Pet. 29(4):564-574.

A general survey of the nearshore (<10 miles offshore) sediments of the Florida panhandle region was conducted from 1955 to 1958. Sedimentological parameters investigated included chemical composition, grain size and roundness, heavy mineral content, microfaunal assemblage, and ripple marks and related features. Quartz was found to be dominant while heavy minerals were rare within the study area. Sediment grain size increased in a seaward direction. Sedimentation was thought to be regulated by small changes in bathymetry. Shell fragments were uncommon in most locations, although fauna containing hard parts were abundant.

Study Duration:1955-1958; Type of Study:Qualitative; Abiotic Parameters Measured:Sediment grain size;

(03.00160)

Thayer, G.W. & J.F. Ustach 1981. Gulf of Mexico Wetlands: Value, state of knowledge and research needs. In: Proc. of a Symp. on Environ. Research Needs in the Gulf of Mexico, Key Biscayne, Florida, 30 Sept.-5 Oct. 1979. D.K. Atwood (Convener). Publ. by NOAA/ERL, Atlantic Oceanographic and Meteorological Lab., Miami, Fla. Vol. IIB. p. 1-30.

This summary paper provides an overview of the importance of tidal marshes, mangrove forests and seagrass meadows along the Gulf of Mexico coastline. A general review of the scientific literature relating to these wetlands is provided and includes descriptions of plant species, primary and detritus production, and animal utilization of the wetlands. The authors note the sparsity of: 1) quantitative data on mixed species communities of submergent macrophytes; 2) information on the factors regulating growth and production of most wetland plants; 3) quantitative data on the abundance and distribution of faunal components and resource partitioning within wetland habitats; 4) data on the production, decomposition, utilization and export of detrital material from Gulf wetlands. The authors recommend that intensive long-term studies on a few systems and extensive short-term studies on many systems on a regional basis be conducted to understand natural variability among organisms and their habitats, as well as the range of conditions and variability of wetland ecosystems.

Type of Study:Qualitative (review); Biological Component:Fauna and flora;

(03.00161)

Thistle, D. & F.G. Lewis, III 1981. Literature search on the soft-bottom benthos of the open waters of the Gulf of Mexico. In: Proc. of a Symp. on Environ. Research Needs in the Gulf of Mexico, Key Biscayne, Florida, 30 Sept.-5 Oct. 1979. D.K. Atwood (Convener). Publ. by NOAA/ERL, Atlantic Oceanographic and Meteorological Lab., Miami, Fla. Vol. IIB. p. 31-52.

This summary paper presents a review of soft-bottom benthic faunal studies from intertidal, continental shelf, and deep sea habitats of the Gulf of Mexico. Studies on the effects of pollutants on benthic communities are also included. The sparsity of information on the continental shelf and deep sea benthos is noted. The authors recommend intensive studies on the continental shelf benthos and a whole suite of studies on individual organism and community responses to pollutants.

Type of Study:Qualitative (review); Biological Component:Fauna;

(03.00162)

Thomas, L.P. 1965. A new species of *Ophiophragus* (Ophiurididea: Echinodermata) from the Gulf of Mexico. Bull. Mar. Sci. 15(4):850-854.

An ophiurid brittle star from the Gulf of Mexico, *Ophiophragus moorei*, new species, was described. Specimens from the shallow coastal waters of Mississippi, Louisiana, and Texas were compared with specimens of related species. *Ophiophragus moorei* was determined to be very similar to *O. murdmani* (Lyman, 1860), but differed from that species in the length and shape of the arm spines and in coloration.

Type of Study:Qualitative; Biological Component:Amphiurid fauna; Dominant Taxon/Taxa Studied:*Ophiophragus moorei*;

(03.00163)

Topp, R.W. & F.H. Hoff, Jr. 1972. Flatfishes (Pleuronectiformes). Mem. Hourglass Cruises, IV(II):135.

Eighteen flatfish species were collected by trawl and box dredge off southwestern Florida. Keys to the genera and species known to occur on the Florida shelf were given. The following information was presented for each species, based on Hourglass material, various museum collections and published reports: a list of recent literature; descriptive data; geographical distribution; environmental correlates; seasonality; diurnality; food and feeding; reproduction; size; abundance; and commercial importance. An "ecological key" illustrates those attributes allowing the 18 species (plus

*Trinectes maculatus*) to coexist along the same shelf segment. Primary differences in species were recognizable in food and feeding, habitat, and behavior. Zoogeography of Gulf of Mexico flatfishes was examined using a modified analysis of faunal coincidence in which relative species abundance was considered. The flatfish fauna of the Gulf of Mexico (including the Florida Keys) was determined to be more closely related to the fauna of the eastern United States than to that of the Caribbean.

Study Duration: 28 months; Type of Study: Qualitative; Biological Component: Fish; Type of Sampler: Trawl, box dredge, otter trawl; Number of Stations: 10; Number of Replicates/Station: 1; Temporal Frequency: Monthly; Dominant Taxon/Taxa Studied: *Syacium papillosum*, *Etropus rimosus*, *Bothus robbinsi*, *Symphurus dionedianus*, *Cyclopsetta finbriata*, *Citharichthys macrops*, *Citharichthys gymnorhinus*, *Etropus crassotus*, *Gymnachirus melas*, *Symphurus urspilus*, *Symphurus minor*, *Symphurus plagiosa*, *Achirus lineatus*, *Gastropsetta frontalis*, *Symphurus parvus*, *Paralichthys albigutta*, *Ancylopsetta quadrocellata*, *Bothus ocellatus*;

(03.00164)

Trefry, J.H. 1981. A review of existing knowledge on trace metals in the Gulf of Mexico. In: Proc. of a Symp. on Environ. Research Needs in the Gulf of Mexico, Key Biscayne, Florida, 30 Sept.-5 Oct. 1979. D.K. Atwood (Convener). Publ. by NOAA/ERL, Atlantic Oceanographic and Meteorological Lab., Miami, Fla. Vol. IIB. p. 225-259.

This summary paper reviews the state of knowledge on the trace metals in the Gulf of Mexico. Sediment metal studies for the Gulf of Mexico show that carbonate rich Florida shelf to be almost devoid of sedimentary metals in great contrast to the Mississippi Delta and outer shelf areas to the west of the Delta. The author notes that these differences are strictly a function of source material, in that >90% of the massive sediment load of the Mississippi River is deposited in an area <1% of the Gulf. The scarcity of available data is noted, and future research needs are outlined.

Type of Study: Qualitative (review); Biological Component: Sediments;

(03.00165)

Trefry, J.H. & P.H. Feldhausen 1979. Trace metal geochemistry of Florida Gulf coast sediments. Fla. Sci. 42(Suppl.1):21.

Over 400 sediment samples from the West Florida continental shelf were analyzed for total and leachable Ba, Cd, Cr, Cu, Fe, Ni, Pb, V, and Zn to determine the distribution and abundance of heavy metals in shelf sediments. Total metal concentrations showed an increasing trend offshore and to the west, which was correlated with increased abundance of sediment clays and organic carbon. Distribution trends are presented for each metal and the proportion of metal leached, and correlated with sediment type. Five trace metal regions and several modes of metal accumulation are identified.

Habitat: Sand, mud; Type of Study: Quantitative; Abiotic Parameters Measured: Heavy metal content;

(03.00166)

Trefry, J.H., A.D. Fredericks, S.R. Fay & M.L. Byington 1978. Heavy metal analysis of bottom sediment. Final Rept. for BLM, MAFLA outer continental shelf study. p. 345-374.

Three hundred sixty-four sediment samples from 48 stations on the outer continental shelf of Mississippi, Alabama, and Florida (MAFLA) were collected and analyzed for Cd, Cr, Cu, Fe, Ni, Pb, and Zn during 1977 and 1978. All samples were analyzed after leaching with nitric acid. Although large variations in metal content were found, overall means were low. Sediments with low metal contents were generally found in shallow water, nearshore areas, and on the west Florida shelf in carbonate rich sediments. Fine-grained sediments from the Mississippi Delta and outer shelf areas yielded the highest metal content. Leaching with nitric acid removed about 60% of the total sediment metal load. Carbonate-rich sediments of central shelf areas had near complete removal, whereas very nearshore, noncarbonate sand and outer shelf clay-containing sediments had lower percent removal. The observed distribution of trace metals is explained by statistical analysis of data and the relative sensitivity of the area to anthropogenic metal input is predicted.

Study Duration: 1977-1978; Habitat: Sand, mud; Type of Study: Quantitative; Type of Sampler: Box core; Number of Stations: 48; Number of Replicates/Station: 1-6; Abiotic Parameters Measured: Sediment grain size, heavy metal content;

(03.00167)

Trefry, J.H., R. Trocine & S. Metz 1981. Trace metal analysis of bottom sediment. Final Rept. for BLM, Southwest Florida Outer Continental Shelf Study. 26 p.

Sediment samples from 15 sites on the southwest Florida continental shelf were analyzed for Ba, Cd, Cr, Cu, Fe, Ni, Pb, V, and Zn to provide baseline data on sediment trace metal content of areas proposed as oil drilling sites. All samples were analyzed after leaching with nitric acid. Trace metal concentrations throughout the area were low and uniform, due to the high carbonate fraction (>90% at 13 or 15 sites) of the sediment, which is characteristic of the area. The potential biological availability of sediment metals is assessed.

Study Duration: 1980-1981; Habitat: Sand, mud; Type of Study: Quantitative; Type of Sampler: Box core; Number of Stations: 15; Number of Replicates/Station: 1-7; Abiotic Parameters Measured: Sediment grain size, trace metal content;

(03.00168)

Turgeon, D.D. & W.G. Lyons 1977. A tropical marine molluscan assemblage in the northeastern Gulf of Mexico. Bull. Am. Malacol. Union Inc. 88-89. (Abstract).

Two hundred and fifty-one molluscan species, including 179 gastropods, 63 bivalves, 8 polyplacophorans, and 1 scaphopod, are reported from the Florida Middle Ground, a reef in the northeastern Gulf of Mexico. Specimens occurred as epizooics on corals, among fouling organisms, and in biogenic sediments in three samples from the reef. Of the gastropod species, 64% belong to 9 families of typically small taxa (micromolluscs). Most bivalves are reef-inhabiting epizooics or borers along with some sponge dwellers and small species adapted for living among coarse sediments. This molluscan assemblage has distinct tropical affinities with nearly all species also occurring commonly in shallow water communities in the Florida Keys, Bahamas, and Caribbean.

Habitat: Coral reef, coarse sediment; Type of Study: Quantitative; Biological Component: Mollusca; Number of Stations: 1; Number of Replicates/Station: 3; Dominant Taxon/Taxa Studied: *Calliostoma barbouri*, *Astraea tecta*, *Rissoina aberrans*, *R. fischeri*, *Caecum pulchellum*, *Cerithium litteratum*, *Cerithiopsis taeniolata*, *Triphora turritiformis*, *Muricopsis oxytatus*, *Pisania karinae*, *Leucozonia nassa*, *Odostomia didyma*, *Turbonilla pupoides*, *Ischnochiton papillosus*, *Tonicia schrami*, *Stenoplax floridana*, *Arca imbricata*, *Barbatia cancellaria*, *B. domingensis*, *Gregariella coralliophaga*, *Isognomon radiatus*, *Malleus candeanus*, *Spondylus americanus*, *Aligona cf. texasiana*, *Carditopsis smithi*, *Crassinella martinicensis*;

(03.00169)

Van Tine, R.F. 1977. An ecological comparison of the benthic macroflora of a power plant impacted estuary and an adjacent estuary. Univ. of Fla. M.S. Thesis. 142 p.

The community structure of benthic flora was examined seasonally for 2 years in 2 adjacent estuaries on the west coast of Florida, one of which is subject to thermal discharge from an electric power generating plant. Species composition, biomass, seasonality, diversity, and distribution of seaweeds and seagrasses were compared with respect to pertinent physical factors. Diversity and biomass of benthic macrophytes decrease near the thermal plume, both diversity and biomass are higher in the control estuary. Responses of benthic flora to heat stress are discussed, and consequences of the addition of a nuclear unit to the plant are predicted.

Study Duration: 1972-1974; Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Flora; Type of Sampler: Dredge; Temporal Frequency: Seasonally; Abiotic Parameters Measured: Temperature, turbidity; Dominant Taxon/Taxa Studied: *Halodule beaudettei*;

(03.00170)

Vittor, B.A. 1977. Benthic fauna of MAFLA study transects V and VI (1975-76). Unpubl. Rept. U.S. Dept. of Int., BLM, Washington, DC. 28 p.

This report presents the results of the polychaete study for transect V (West Florida Shelf) and transect VI (Mississippi-Alabama Shelf) of the Bureau of Land Management sponsored program in the Mississippi, Alabama, Florida (MAFLA) outer continental shelf. The author summarizes his findings as follows: 1) The number of species and individuals differed, with respect to both season and location. September values were generally lowest for both parameters, while stations with fine sediments supported fewest species and individuals. 2) Polychaete wet weight biomass estimates also varied with season and location (sediment type). Seasonal and sediment effects were the same as for numbers of species and individuals. 3) Species diversity and evenness were highest during June. The decrease in  $H'$  and  $H_{max}$  in September coincided with decreases in species and individual abundance. 4) Dominant species are distributed according to sediment type and geographical location. Family groupings show the same patterns. 5) Species diversity decreases as mean sediment particle size decreases, regardless of season or geographical location.

Study Duration: 1975-1976; Type of Study: Quantitative; Biological Component: Polychaeta; Type of Sampler: 0.06 m<sup>2</sup> box core; Sieve Size: 0.5 mm; Number of Stations: 18; Number of Replicates/Station: 9; Temporal Frequency: 3 times (June & Sept. 1975; Jan. 1976); Abiotic Parameters Measured: Temperature, salinity, DO, sediments; Dominant Taxon/Taxa Studied: *Syllis hyalina*, *Glycera capitata*, *Lunbrineris parvipedata*, *Paraprionospio pinnata*, *Prionospio cristata*;

(03.00171)

Vittor, B.A. 1978. Abundance, diversity and distribution of benthic polychaetous annelids in the Eastern Gulf of Mexico. MAFLA Rept. submitted to Dames and Moore, Inc. BLM Contract AA550-CT7-34. p. 699-747.

Approximately 195,400 individual polychaetes from the Eastern Gulf of Mexico continental shelf were identified and counted, representing 60 families and 1,056 taxa. Wet weight biomass, individual abundance, and diversity varied with respect to the sediment type, season, latitude, and salinity. Average biomass values ranged from 39.04 to 306.53 mg/0.06m<sup>2</sup> at deep stations, and from 392.02 to 2226.06 mg/0.06m<sup>2</sup> at depths less than 100 m. Southern stations had generally higher standing crops. Polychaete abundance showed similar patterns as expected. Species richness and diversity, however, were higher north of Cape San Blas, Florida, and in shallow water habitats. Coarse sediments supported more polychaete individuals and species than either medium or fine sediments, although differences were small between coarse and medium benthos. Polychaete assemblages appeared to be arranged with respect to the same environmental parameters. Disjunct distributions of some groups were related to salinity and substrate preferences. Polychaete taxonomy and zoogeography were also discussed.

Study Duration:3 1/2 years; Type of Study:Quantitative; Biological Component:Polychaetous annelids; Type of Sampler:Box core, anchor dredge; Number of Stations:107; Temporal Frequency:8 times in 3 1/2 years;

(03.00172)

Voss, G.L. 1954. Cephalopoda of the Gulf of Mexico. In: Gulf of Mexico, its origin, waters, and marine life. Fish. Bull. U.S. 55(89):475-478.

A short summary of distribution and taxonomic work on cephalopods of the Gulf of Mexico is given. The life histories, feeding behavior, abundances and reproduction of cephalopods are discussed. A list of species sighted to date in the Gulf of Mexico is given.

Type of Study:Qualitative; Biological Component:Faua; Dominant Taxon/Taxa Studied:*Octopus vulgaris*, *O. briareus*, *O. joubini*, *Loliguncula brevis*, *Loligo pealei*;

(03.00173)

Voss, G.L. 1956. A review of the cephalopods of the Gulf of Mexico. Bull. Mar. Sci. Gulf & Caribb. 6(2):85-178.

An extensive effort was made to collect and identify specimens of Cephalopods collected during trawls from 1950 to 1956 in the Gulf of Mexico. Identification, classification, and distribution of cephalopods is discussed. Illustrations and a synopsis of species are given.

Study Duration:1950-1956; Type of Study:Qualitative; Biological Component:Faua; Type of Sampler:Trawl;

(03.00174)

Wagner-Merner, D.T. 1972. Arenicolous fungi from the south and central Gulf coast of Florida. Nova Hedwigia, 23: 915-922.

The occurrence and distribution of arenicolous fungi from the south and central Gulf coast of Florida was studied by periodically sampling foam from four Gulf beaches. The results revealed that fungal spores do occur, and their distribution and diversity was noted to be influenced by the location of the beaches to marshes, mangroves, and estuaries. The role of fungi in foam was suggested to possibly contribute to the release of spores to the air.

Study Duration:3 years; Habitat:Sandy beach; Type of Study:Qualitative; Biological Component:Arenicolous fungi; Number of Stations:4; Number of Replicates/Station:1; Temporal Frequency:5 times in 3 years; Dominant Taxon/Taxa Studied:*Vericosporina ramulosa*, *Corollospora maritima*, *C. trifurcata*, *C. comata*, *Trematosphaeria mangrovis*;

(03.00175)

Walker, L.M. 1980. Dinoflagellate cysts from Florida inshore sediments. Fla. Sci. 43(Suppl. 1):14.

The life histories of *Ptychodiscus brevis* and *Gonyaulax monilata* from sediment samples of west coast and Indian River areas were examined. Forty-nine cyst types were isolated for incubation, of which 28 excysted releasing 8 dinoflagellate species. Tampa Bay samples of *G. monilata* cysts supported laboratory data on the sexual cycle and cyst formation. Further research into encystment and excystment are needed.

Type of Study:Quantitative; Biological Component:Flora; Number of Stations:36; Dominant Taxon/Taxa Studied:*Ptychodiscus brevis*, *Gonyaulax monilata*;

(03.00176)

Wanless, H.R. & J. Dravis 1977. Carbonate sediment constituents of MAFLA shelf. Technical report. Submitted to the Bureau of Land Management, Washington, D.C. (MAFLA-OCS Program). 45 p.

Surface sediments from the continental shelf of the eastern Gulf of Mexico were analyzed for carbonate and biogenic constituent composition. Results generally agree with those of previous studies. A number of quantitative differences are discussed.

Study Duration:1974, 1975; Type of Study:Quantitative; Type of Sampler:Box core; Number of Stations:108; Abiotic Parameters:Sediment characteristics;

(03.00177)

Wanless, H.R. J. Park & B. Bohlke 1977. Molluscan lithotope assemblages of MAFLA shelf. Technical report. Submitted to the Bureau of Land Management, Washington, D.C. (MAFLA-OCS Program). 63 p.

The molluscan lithotope (shell depth assemblage) was examined for the MAFLA lease area to acquire information about the benthic community character and dynamics, and the dominant substrate processes. Pending analysis will address some of the following: compare species distribution with other textural parameters; define assemblages and assemblage sequences; compare lithotope and biotope; correlate species-weathering assemblages with substrate attributes; and map critical species-weathering assemblages.

Study Duration:1974, 1975; Type of Study:Qualitative, quantitative; Type of Sampler:Box core; Abiotic Parameters Measured:Sediment characteristics;

(03.00178)

Wells, H.W. 1966. Barnacles of the northeastern Gulf of Mexico. *Quart. J. Fla. Acad. Sci.* 29(2):81-95.

Thirty one taxa of barnacles were recorded from inshore waters of the northeastern Gulf of Mexico, including 16 which were newly reported from the area. Six taxa were newly recorded for the Gulf of Mexico, including *Balanus venustus obscurus*, *Chthamalus stellatus bisinuatus*, *Chelonibia caretta*, *Platylepas hexastylus* variety, *Conchoderma virgatum* and *Peltogaster* sp. This barnacle fauna consisted of a mixture of warm temperate and tropical species. Many species exhibiting specific symbiotic relationships with sea turtles, crabs, and other marine organisms were represented.

Study Duration:5 years; Habitat:Sandy beach, marsh, shell, jetties, pilings; Type of Study:Qualitative; Biological Component:Barnacles;

(03.00179)

Williams, J.T. & R.L. Shipp 1980. Observations on fishes previously unrecorded or rarely encountered in the northeastern Gulf of Mexico. *Northeast Gulf Sci.* 4(1):17-27.

Between 1974 and 1978 twenty-one species of marine fishes previously unrecorded or rarely found in the northeastern Gulf of Mexico were taken by trawl, dredge, spear, or hand capture or observed by SCUBA or research submersible. Overall, 28 trawls/dredges were taken from 15-183 m depth between Mobile Bay, Alabama and Ft. Myers, Florida. SCUBA observations were made during a study of the Florida Middle Ground and an artificial reef off the coast of Alabama, and the submersible observations were concentrated on the northern rim of DeSoto Canyon. Detailed species accounts are given along with collection dates, number of individuals collected, standard length, locality, and depth. Several species are shown to have permanent populations in the region.

Study Duration:1974-1978; Type of Study:Quantitative; Biological Component:Ichthyofauna; Type of Sampler:Semi-balloon trawl, Capetown dredge;

(03.00180)

Williams, S.E. 1972. The temporal and spatial variation of selected thecosomatous pteropods from the Florida Middle Ground. *Fla. State Univ. M.S. Thesis.*

Nine trips to the Florida Middle Ground were made between July 1969 and May 1970 to study the temporal and spatial variation of thecosomatous pteropods. Seven different water masses, the presence of upwelling, and diurnal vertical migration patterns of selected pteropods were defined using spatial and temporal distribution patterns and the relationships to hydrological conditions. The use of thecosomatous pteropods as bioindicators is discussed.

Study Duration:July 1969 to May 1970; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:200 micron mesh plankton net; Abiotic Parameters Measured:Temperature, salinity;

(03.00181)

Wood, B.K. & J.H. Trefrey 1983. The distribution and provenance of trace metals in Gulf of Mexico sediments. *Fla. Sci.* 46(Suppl. 1):46-47.

Trends in the distribution of Fe, Cr, Ni, and Pb in surface shelf sediments of the Gulf of Mexico were identified using CALCOMP computer techniques and related to important geochemical variables such as sediment grain size, carbonate content, and clay mineralogy. Trace metal concentrations range from low values in the sediments of the west Florida Shelf to high values on the Mississippi Delta and south Texas shelf, with intermediate values in the intervening regions. Observed metal distributions correlate closely with river discharge into the Gulf.

Type of Study:Quantitative; Abiotic Parameters Measured:content; Trace metal concentrations, sediment grain size, clay mineralogy, carbonate content;

(03.00182)

Woodburn, K.D., B. Eldred, E. Clark, R.F. Hutton & R.M. Ingle 1957. The live bait shrimp industry of the west coast of Florida (Cedar Key to Naples). *Fla. Bd. Conserv. Mar. Lab., Tech. Ser. No. 21.* 83 p.

This report reviews the live bait shrimp industry from Cedar Key to Naples, Florida. Five species of penaeid shrimp are the basis of the industry, although it is centered around *Penaeus duorarum*. The economic value of the industry is summarized by county. The detrimental effect of shrimp trawls on grassbeds is cited. The possibility of using so called trash-fish captured with bait shrimp in stock and poultry feeds is discussed.

Type of Study:Qualitative; Biological Component:Crustacea; Dominant Taxon/Taxa Studied:*Penaeus setiferus*, *P. aztecus*, *P. duorarum*, *P. brasiliensis*, *Xyphopenaeus kroyeri*;

(03.00183)

Woodward-Clyde Consultants & Continental Shelf Associates, Inc. 1983. Southwest Florida shelf ecosystems study-year 1. Final Report and 2 Appendices. Prepared for U.S. Dept. of Interior, Minerals Management Service, Metairie, LA. Contract 14-12-0001-29142.

Results of an extensive study of the southwest Florida continental shelf are given. The study was conducted because of potential oil and gas deposits beneath the outer shelf. Chapters describe these major areas of study: geophysical investigations, underwater camera observations, water quality, sediment and substrate characteristics, trace metals, soft and live bottom biota, and potential impacts of gas and oil operations. Two appendices include supporting data (A) and methodology (B). The study will encompass 3 years.

Study Duration: Oct.-Nov. 1980 and April-May 1981; Habitat: Continental shelf, live bottom, soft bottom; Type of Study: Quantitative; Biological Component: Fauna, flora; Type of sampler: Television, still camera, box core, trawl; Sieve size: 1.0 mm., 0.5 mm.; Number of Stations: 15; Number of Replicates/Station: 5; Temporal Frequency: Twice; Abiotic Parameters Measured: Sediment characteristics, trace metals, weather, temperature, salinity, D.O., light penetration, nutrients, chlorophyll a; Dominant Taxon/Taxa Studied: *Syngnathus albius*, *Lucina radians*, *Faltricia sabella*, *Prionospio cristata*, *Mediomastus* sp., *Salpaxaria* sp., *Ampharete acutifrons*, *Paraonidae*, *Oligochaeta*, *Nemertina*;

(03.00184)

Woodward-Clyde Consultants & Continental Shelf Associates, INC. 1983. Southwest Florida shelf ecosystems study - year 1. Executive summary. Prepared for U.S. Dept. of Interior, Minerals Management Service, Metairie, LA. Contract 14-12-0001-29142.

A summary is given of year 1 data from the study of the southwest Florida continental shelf. The study was done because of potential oil and gas deposits beneath the outer shelf. Brief chapters describe these areas of study: geophysical investigations, underwater camera observations, water quality, sediment and substrate characteristics, trace metals, soft and live bottom biota, and potential impacts of oil and gas operations.

Study Duration: Oct.-Nov. 1980 and April-May 1981; Habitat: Continental shelf, soft bottom, live bottom; Type of Study: Quantitative;

(03.00185)

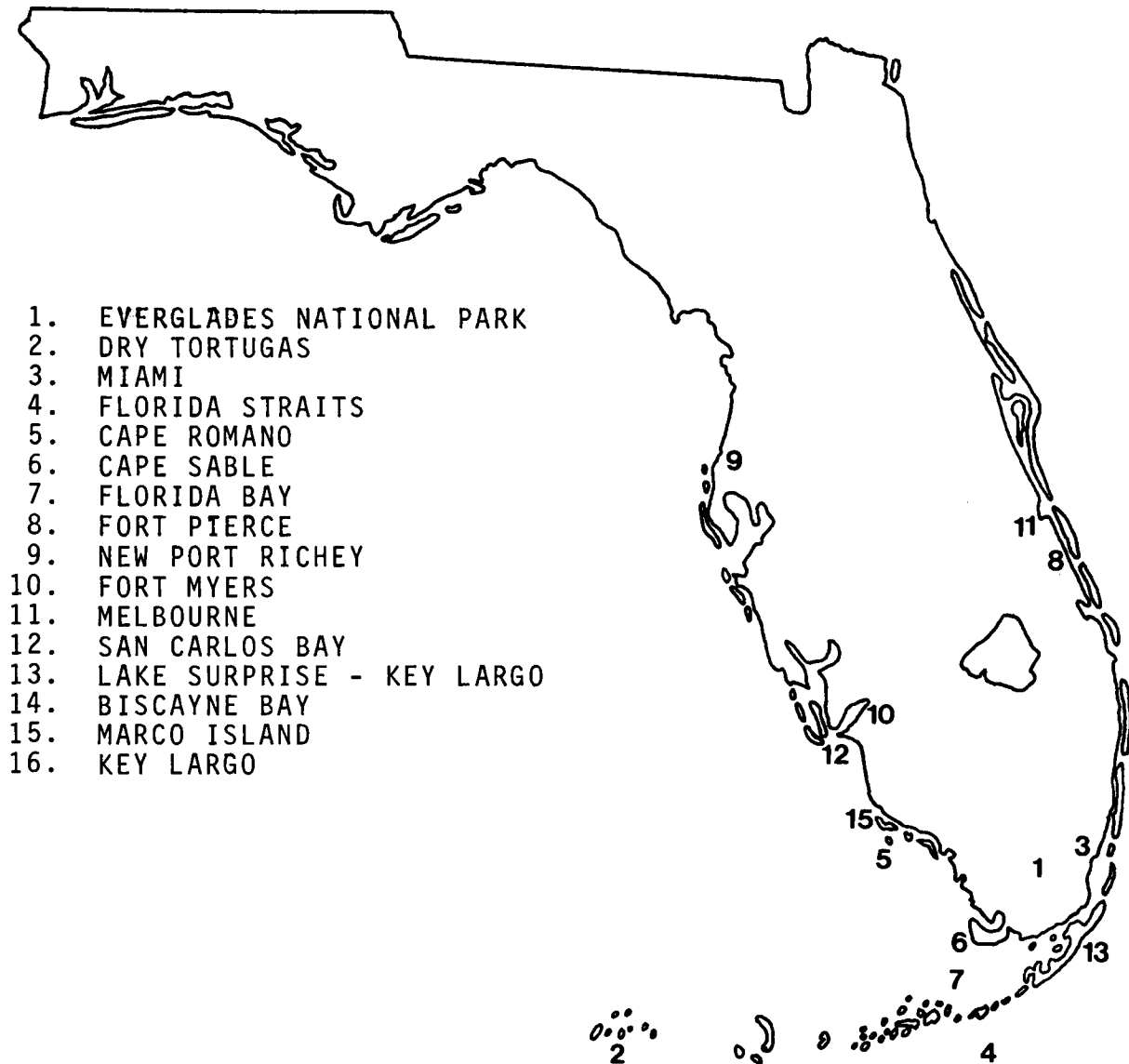
Yockey, R.H. 1974. An ecological survey of sponges from the eastern Gulf of Mexico. Univ. of Fla. M.S. Thesis. 59 p.

Collection of sponges from Cedar Key and Crystal River areas to Key West from April-June 1973 revealed several interesting observations on sponge communities. One hundred sixty two specimens from 25 of the 57 stations were classified into 125 species. Only 7.2% were recovered from more than one site, while 9.6% were recovered at more than one station. Mean depth range was 19.8 m, while sampling occurred to 180 m. Depth has a significant effect upon species composition and substrate is the primary factor influencing sponge distribution.

Study Duration: April-June 1973; Habitat: Grassbeds, mud, sand; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Pierce dredge, scallop dredge, trynet, Capetown epibenthic dredge, otter trawl; Number of Stations: 57; Abiotic Parameters Measured: Sediment characteristics;

See also: 12.00064, 13.00026, 24.00006.

# SOUTHERN FLORIDA





(04.00001)

Alexander, T.R. & A.G. Crook 1975. Recent and long-term vegetation changes and patterns in South Florida. Part II, Final Rept. Appendix 6 of the So. Fla. Ecol. Study. 827 p.

One hundred selected legal sections were treated as quadrats to study the vegetational changes in South Florida since 1940. These sections were distributed throughout the less disturbed parts of the ecosystem. The observations were recorded by mapping and description. Overall, it was found that all segments of the ecosystem have reacted in measurable ways to the many impacts that have occurred before and after 1940, and that the rate of change is increasing. It was concluded that unless water is returned to and distributed more properly in wild habitats, exotic plants and animals are controlled, and fire is managed, the natural ecosystem will continue to lose diversity and the ability to maintain in any resemblance to the pre-1940 condition. Salt-marshes, mangrove areas, and seagrass beds are described and mapped.

Study Duration:1940-1975; Habitat:Variable; Type of Study:Semi-quantitative; Biological Component:Terrestrial & aquatic (marine & freshwater) flora; Type of Sampler:Aerial photography; Number of Stations:100;

(04.00002)

Allen, D.M. & T.V. Costello 1966. Releases and recoveries of marked pink shrimp *Penaeus duorarum* Burkenroad, in South Florida waters, 1958-64. U.S. Dept. Interior, Bur. Comm. Fish, Bio. Lab., Contrib. No. 210, 79 p.

Pink shrimp were captured, stain-marked, and released for recapture in 17 experiments in the following areas: Biscayne Bay, Flamingo, Peterson Keys, Lower Matecumbe Key, Barnes Sound, Shark River, Hawk Channel, Bottle Key, Pine Island Sound, Tortugas grounds, Sanibel grounds and Indian Key. Data reported includes location date of release and recapture of shrimp, number, size, and sex of shrimp, and the stains used.

Study Duration:1958-1964; Habitat:Variable; Type of Study:Semi-quantitative; Biological Component:Shrimp; Type of Sampler:Roller frame trawl and wing net; Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(04.00003)

Beardsley, G.L., Jr. 1967. Distribution in the water column of migrating juvenile pink shrimp, *Penaeus duorarum* Burkenroad in Buttonwood Canal, Everglades National Park, Florida. Univ. of Miami, Ph.D. Dissertation, 91 p.

Studies on distribution showed that migrating juvenile pink shrimp occurred in Buttonwood Canal at various times. An analysis of the relation between environmental factors and distributional patterns revealed that the shrimp were on the surface of the canal under all conditions. However, during the full moon periods, a greater percentage were observed on the surface. Other evidence (from Coot Bay) also indicated that juvenile pink shrimp respond positively to moonlight during their emigration. No differences in vertical distribution were detected in relation to temperature, salinity, current velocity, changes in water depth, or sex. Changes in lateral distribution, however, occurred in Buttonwood Canal. Juvenile shrimp commonly cling to drifting vegetation when moving out with the tide, and their distribution is probably affected by prevailing winds when large amounts of vegetation are present in the water. At other times current patterns showed no features that might contribute to changes in lateral distribution. Mean carapace length and sex ratios were determined.

Study Duration:1964-1965; Habitat:Water column; Type of Study:Qualitative; Biological Component:Decapod fauna; Type of Sampler:Wing nets; Abiotic Parameters Measured:Temperature, salinity, current velocity, depth; Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(04.00004)

Beardsley, G.L., Jr. 1970. Distribution of migrating juvenile pink shrimp *Penaeus duorarum* Burkenroad, in Buttonwood Canal, Everglades National Park, Florida. Trans. Am. Fish. Soc. 99(2):401-408.

The horizontal and vertical distribution of migrating pink shrimp, *Penaeus duorarum*, was studied in Buttonwood Canal, Everglades National Park, Florida, by thrice monthly sampling with conical nets suspended from a bridge. Vertical and lateral movements of pink shrimp correlated with moonlight and tide. During ebb tide, *P. duorarum* exhibited a positive response to moonlight, by moving to the surface. During flood tides, they stayed on the bottom or at the sides of the canal.

Study Duration:June 1964-June 1965; Type of Study:Quantitative; Biological Component:Crustacea; Type of Sampler:Conical nets; Number of Stations:5; Number of Replicates/Station:3; Temporal Frequency:3 times/month; Abiotic Parameters Measured:Current velocity, salinity, temperature, depth; Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(04.00005)

Bert, T.M. 1983. Biases inherent in inferring the population dynamics of a large mobile decapod crustacean when using traps for sampling. Presented at Benthic Ecol. Meet., Fla. Instit. of Tech., Melbourne.

Data from several studies were used to examine bias in sampling of stone crabs (*Menippe mercenaria*) with traps. Changes in the population structure of the trapped crabs varied with trap type, duration between samplings, season and composition and density of the sampled populations. Caution against similar biases in trapping studies of other large

mobile decapod crustaceans is advised.

Study Duration:2 years; Habitat:Grassbeds, coral reef; Type of Study:Quantitative; Biological Component:Crustacea; Type of Sampler:Crab traps; Temporal Frequency:28 days (1-35 d); Dominant Taxon/Taxa Studied:*Menippe mercenaria*;

(04.00006)

Bert, T.M., J. Dodrill, G.E. Davis & J. Tilmont 1983. The population dynamics of the stone crab (*Menippe mercenaria*) in Everglades and Biscayne National Parks. Fla. Sci. 46(Suppl. 1):24.

Temporal and spatial variations in the distribution, abundance, sex ratio, size class frequency, and reproductive effort of stone crabs (*Menippe mercenaria*) were investigated for one year throughout south Florida nearshore waters. A major nursery area for stone crabs was discovered offshore from the Big Cypress and Everglades estuaries. It was hypothesized that crabs from that area disperse southward through Florida Bay and the Florida Keys. Stone crabs trapped in Biscayne National Park were not locally recruited, but may be migrating from farther north along the Florida east coast.

Study Duration:1 year; Type of Study:Quantitative; Biological Component:Crustacea; Type of Sampler:Crab traps; Dominant Taxon/Taxa Studied:*Menippe mercenaria*;

(04.00007)

Biffar, T.A. 1969. A study of the genus *Callinassa* (Crustacea: Decapoda) in south Florida. Univ. of Miami M.S. Thesis.

Descriptions and illustrations of 9 species of the Thalassinidean genus *Callinassa* currently known from south Florida were presented. Three new species, and an additional species of questionable status were discussed and compared with the other south Florida species. A review of the literature dealing with the western Atlantic *Callinassa* and two biological keys were presented. General notes on the distribution of the *Callinassa* species were also reported. However, scattered records of the species precluded a clear definition of its distribution patterns.

Type of Study:Qualitative; Biological Component:Decapod fauna;

(04.00008)

Bingham, F.D. 1973. Avoidance of desiccation in the Littorinidae (Mollusca: Gastropoda) of the South Florida area. Univ. of Miami, Ph.D. Dissertation. 85 p.

Seven species of littorinid gastropods were examined in a study of desiccation on rocky shores of south Florida. Water loss rates and periods of survival in desiccating conditions were determined in situ. The use of entrapped free water in the avoidance of desiccation was investigated in addition to the effects of snail size and temperature on survival during desiccating conditions. The efficiency of the operculum-shell seal and use of the mucus holdfast were determined for each species.

Habitat:Rock, seawall, jetty, mangrove forest; Type of Study:Quantitative; Biological Component:Molluscs; Abiotic Parameters Measured:Temperature; Dominant Taxon/Taxa Studied:*Tectarius muricatus*, *Echininus nodulosus*, *Modiolittorina tuberculata*, *Littorina lineata*, *L. lineolata*, *L. ziczac*, *L. neopillua*, *L. angulifera*;

(04.00009)

Borkowski, T.V. 1970. The biology and ecology of some tropical western Atlantic Littorinidae (Gastropoda: Prosobranchia). Univ. of Miami Ph.D. Dissertation. 162 p.

Aspects of spawning, growth, mortality, and productivity of 6 littorinid species were investigated along rocky shores on the southeast coast of Florida. Spawning occurred predominantly during mid to late summer. Seasonal growth patterns were detected for all species; growth and spawning varied inversely in 4 species, whereas in 2 species, they were simultaneous. Trends in growth rate and longevity appeared to be related. Data on somatic tissue and spawn production are presented.

Habitat:Rocky shore; Type of Study:Quantitative; Biological Component:Molluscs; Dominant Taxon/Taxa Studied:*Tectarius muricatus*, *Modiolittorina tuberculata*, *Echininus nodulosus*, *Littorina lineata*, *L. lineolata*, *L. ziczac*;

(04.00010)

Boss, K.J. & D.R. Moore 1967. Notes on *Malleus (Parinialleus) caudeanus* (D'Orbigny) (Mollusca: Bivalvia). Bull. Mar. Sci. 17(1):85-94.

Investigations of the ecology and occurrence of *Malleus caudeanus* were made in the southern Florida area, including the Florida Keys. Specimens were found living attached to coral or coralline rock in shallow water. There are 3 distinct stages in the development of the adult. The adaptive significance of the unique growth form is discussed. Some comparisons are made to closely related forms in the Indo-Pacific region.

Type of Study:Quantitative; Biological Component:Fauuna; Dominant Taxon/Taxa Studied:*Malleus caudeanus*;

(04.00011)

Brattegard, T. 1969. Marine biological investigations in the Bahamas. 10. Mysidacea from shallow water in the Bahamas and Southern Florida. Part 1. Sarsia 39:17-106.

The following new taxa were described: *Amathimysis gibba* et sp. nov. of the tribe Erythropini; *Mysidopsis mathewsoni* sp. nov., *M. eclipses* sp. nov., *M. brattstroemi* sp. nov., *M. robustispina* sp. nov., *Diotronysis spinosa* sp. nov., *D. paucispinosa* sp. nov. of the tribe Leptomysini; *Parvymysis bahamensis* gen. et. sp. nov. of uncertain systematic position within the sub-family Mysinae; and *Heteromysis nouveli* sp. nov. and *M. floridensis* sp. nov. of the tribe Heteromysini. The following species: *Mysidopsis nortenseni* W.M. Tattersall, *M. furea* Bowman, *M. alayra* Bowman, *M. bigelowi* W.M. Tattersall, *Brasilomysis castroi* Bacescu, *Mysidium gracile* (Dana), *M. integrum* W.M. Tattersall, *M. columbiae* (Zimmer), *Tahromysis bowmani* Bacescu, *Heteromysis formosa* S.I. Smith and *M. actinae* Clark were recorded, and easily observed characters that could be used for their identification were described. Keys for the identification of the known species of *Diotronysis* and *Mysidium* were provided, together with a key for the known species of *Mysidopsis* from tropical and warm temperate waters of the western Atlantic.

Study Duration:1967-1968; Habitat:Mud, sand, grassbed; Type of Study:Qualitative; Biological Component:Benthic fauna; Type of Sampler:Ockelmann detritus sledge, hand net; Sieve Size:0.14; 0.25; 0.50 mm; Number of Stations:2; Number of Replicates/Station:2;

(04.00012)

Brattegard, T. 1970. Marine biological investigations in the Bahamas. 13. Leptostraca from shallow water in the Bahamas and southern Florida. Sarsia 44:1-7.

Marine biological investigations in the Bahamas and southern Florida resulted in two newly recorded species of Leptostraca. *Paranebalia longipes* (Willemaes-Guhm) was recorded from the Bahamas and southern Florida, and *Nebalia* sp. was recorded from the Bahamas.

Study Duration:1967 and 1968; Habitat:Mud, sand, algae, grassbed; Type of Study:Qualitative; Biological Component:Leptostracan fauna; Type of Sampler:Ockelmann detritus sledge; Number of Stations:52 Bahamas, 21 Florida; Dominant Taxon/Taxa Studied:*Nebalia*, *Paranebalia*, *Nebaliopsis*, *Nabalilla*, *Epinebalia*;

(04.00013)

Brattegard, T. 1970. Marine biological investigations in the Bahamas 11. Mysidacea from shallow water in the Bahamas and southern Florida. Part 2. Sarsia 41:1-35.

The following new species were described in this report: *Bowmaniella sewelli* sp. nov., *B. parageia* sp. nov., *B. bacescui* sp. nov. The following species: *Siriella chierchiae* Coifmann, *Bowmaniella dissimilis* (Coifmann), *Anchialina typica* (Kroyer), *Mysidopsis bahia* Molenock, and *Metamysidopsis smithi* Bacescu were recorded, and easily observed characters that could be used for their identification were described.

Study Duration:1967-1968; Habitat:Mud, sand, grassbed; Type of Study:Qualitative; Biological Component:Benthic fauna; Type of Sampler:Ockelmann detritus sledge, hand net; Sieve Size:0.14; 0.25; 0.50 mm; Number of Stations:16; Number of Replicates/Station:10;

(04.00014)

Brook, I.M. 1981. Epibenthic and benthic sampling survey of the Whitewater Bay - Shark River estuary of Everglades National Park. Final Rept. Part II. NPS Contract No. CXS 280-9-1593. 74 p.

Monthly sampling of benthic communities in the Whitewater Bay - Shark River estuary of Everglades National Park was conducted during 1979 and 1980. In 1979 sampling sites showed no consistent relationship of abundance and species composition with seasonal variations in salinity. During 1980 additional stations in the original study areas were sampled to determine if original station data characterized the community structure of larger areas of the estuary. All stations in Tarpon Bay, where salinity was always less than 50/00, had extremely low abundances and diversity. Abundance and species composition in Oyster Bay was similar in both years. Ponce de Leon Bay, with oceanic salinities, had the highest diversity (75 taxa/station in November) and total taxa (226). Although abundance in Ponce de Leon Bay was usually low to moderate, it yielded the sample with the highest density (42300/m<sup>2</sup>). Original station data could not successfully predict taxonomic composition of the study areas; nearby stations were not taxonomically more similar than distant sites.

Study Duration:1979-1980; Type of Study:Quantitative; Biological Component:Fauna; Temporal Frequency:Monthly; Abiotic Parameters Measured:Salinity;

(04.00015)

Brook, M. 1983. Secondary productivity in a mangrove estuary: Questions raised from a benthic survey of the Whitewater Bay - Shark River estuary of Everglades National Park. Presented at Benthic Ecol. Meet., Fla. Instit. of Tech., Melbourne.

Monthly sampling of benthic communities in the Whitewater Bay - Shark River estuary of Everglades National Park was conducted during 1979 and 1980. In 1979 sampling sites showed no consistent relationship of abundance and species composition with seasonal variations in salinity. During 1980 additional stations in the original study areas were sampled to determine if original station data characterized the community structure of larger areas of the estuary. All stations in Tarpon Bay, where salinity was always less than 50/00, had extremely low abundances and diversity. Abundance and species composition in Oyster Bay was similar in both years. Ponce de Leon Bay, with oceanic salinities, had the highest diversity (75 taxa/station in November) and total taxa (226). Although abundance in Ponce de Leon Bay was usually low to moderate, it yielded the sample with the highest density (42300/m<sup>2</sup>). Original station data could not successfully predict taxonomic composition of the study areas; nearby stations were not taxonomically more similar than distant sites.

Study Duration:2 years; Habitat:Mangrove swamp; Type of Study:Quantitative; Biological Component:Faua; Number of Stations:5 (1st yr), 26 (2nd yr); Temporal Frequency:Monthly;

(04.00016)

Cairns, S.D. 1973. The distribution of the cephalopods collected by the R/V Gerda in the Straits of Florida. Univ. of Miami M.S. Thesis. 221 p.

During the period May 1962 to May 1972, 198 stations in the Straits of Florida were sampled for cephalopods. An account of the species recovered is presented as well as general information on Straits of Florida cephalopods. The horizontal and vertical distributions of the cephalopods are discussed.

Study Duration:May 1962-May 1972; Type of Study:Quantitative; Biological Component:Faua; Otter trawl, Isaacs-Kidd midwater trawl, dip net, night light, plankton net, Type of Sampler:dredge; Number of Stations:198;

(04.00017)

Chuensri, C. 1968. A morphometric and meristic study of postlarval brown shrimp, *Penaeus aztecus* Ives, pink shrimp, *P. duorarum* Burkenroad, and white shrimp, *P. setiferus* (Linnaeus). Univ. of Miami. M.S. Thesis. 108 p.

Specimens of *Penaeus aztecus*, *P. duorarum*, *P. setiferus* were collected from Everglades National Park, Key West, and Upper Matecumbe Key and a method was developed to easily distinguish the 3 species by using a new morphological character.

Study Duration:1967-1968; Type of Study:Quantitative; Biological Component:Faua; Dominant Taxon/Taxa Studied:*Penaeus aztecus*, *P. duorarum*, *P. setiferus*;

(04.00018)

Clark, S.H. 1974. A study of variation in trawl data collected in Everglades National Park, Florida. Trans. Am. Fish. Soc. 103(4):777-785.

A one year study of variation in trawl data was conducted at 8 stations in Whitewater Bay, Everglades National Park, using monthly roller frame trawl samples. A total of 52,190 fish, representing 66 species, were collected. Analyses of catch data performed on 15 of the species indicated a poisson distribution for the number of individuals per sample when sample densities were low and conformation to the negative binomial as population density increased. Variations between stations appeared to be closely related to differences in vegetation density. Sampling methods and tidal stage had no direct influence on catch rates, although some evidence was found for an interaction between them.

Study Duration:December 1968-November 1969; Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Fish; Type of Sampler:Roller frame trawl; Number of Stations:8; Number of Replicates/Station:7; Temporal Frequency:Monthly; Abiotic Parameters Measured:Salinity;

(04.00019)

Cohen, A.D. & W. Spackman 1980. Phytogenic organic sediments and sedimentary environments in the Everglades Mangrove complex of Florida. III. The alteration of plant material in peats and the origin of coal macerals. Palaeontogr. Abt. B. Palaeophytol. 172(5-6):125-149.

Microtome sections of peats derived from extant plant species from the Everglades-mangrove region were examined to determine the mode and degree of alteration of plant organs and tissues. Tissue peatification of individual plant organs was characteristic of its original composition and its incorporation into the peat deposit. Certain cells are altered in the direction of various bituminous coal macerals dependent upon their tissue color and structure with depth or age. Using this information, a list of coal ingredients hypothesized to be derivatives of plant organ tissues is determined.

Study Duration:1964-1968; Habitat:Everglades-mangrove; Type of Study:Qualitative; Biological Component:Flora; Dominant Taxon/Taxa Studied:*Rhizophora mangle*, *Acrostichum aureum*, *Maricus jamaicensis*, *Sagittaria lancifolia*, *Juncus roemerianus*, *Spartina* sp., *Salix* sp., *Persea borbonia*, *Nymphaea odorata*;

(04.00020)

D'Asaro, C.W. 1970. Egg capsules of prosobranch molluscs from south Florida and the Bahamas and notes on spawning in the laboratory. Bull. Mar. Sci. 20(2): 414-440.

The egg masses and capsules of 18 species of prosobranch molluscs were collected from southern Florida (mainly Biscayne Bay) and the Bahama Islands and described. Information on the type of development, capsular dimensions, and average number of embryos and capsules is presented. The duration of the breeding season for each species is given, and methods for handling spawning adults in the laboratory are discussed.

Habitat: Coral reef, sand, mud, rock, seagrass bed; Type of Study: Qualitative; Biological Component: Mollusca; Dominant Taxon/Taxa Studied: *Cerithium literatum*, *Thais rustica*, *Fasciolaria tulipa*, *Pleuroploca gigantea*, *Prunum apicinum*, *Oliva sayana*;

(04.00021)

Dawes, C.J., S.A. Earle & F.C. Croley 1967. The offshore benthic flora of the southwest coast of Florida. Bull. Mar. Sci. 17(1): 211-231.

One hundred and sixty four forms of marine algae, including 50 species and 11 varieties of Chlorophyta, 28 species and 2 varieties of Phaeophyta, 70 species and 1 variety of Rhodophyta and *Sargassum* were collected along the southwest coast of Florida. The area was divided into two distinct ecological zones based on the plants found and the physical data. An annotated list of species with ecological notes was presented along with abiotic parameters descriptions.

Study Duration: 5 days; Habitat: Grassbed; Type of Study: Qualitative; Biological Component: Benthic algae; Type of Sampler: Box dredge, otter trawl; Number of Stations: 19; Number of Replicates/Station: 1; Temporal Frequency: Once; Abiotic Parameters Measured: Temperature, salinity, light, sediment characteristics;

(04.00022)

Emiliani, C., J.H. Hudson, E.A. Shinn, R.Y. George & B. Lidz 1978. Oxygen and carbon isotopic growth record in a reef coral from the Florida Keys and a deep-sea coral from Blake Plateau. Science 202: 627-629.

A 30 year (1944-1974) growth of *Montastraea annularis* from Hen and Chickens Reef, Florida Keys, exhibited annual variation in the abundance of carbon-13 and oxygen-18 with an inverse relationship between the two isotopes. Annual dense bands, characterized by carbon-13 and oxygen-16, are formed during summer. Stress bands are created during unusually severe winters and are characterized by carbon-13 and oxygen-18. The temperature effect on the oxygen-18/oxygen-16 ratio is overshadowed by an isotopic effect of zooxanthellae metabolism. In the deep sea ahermatypic coral, *Bathypsammia tintinnabulum*, the abundance of carbon-13 and oxygen-18 is inversely related to growth rate, with both carbon and oxygen isotopes approaching equilibrium with increasing skeletal age.

Habitat: Coral reef; Type of Study: Quantitative; Biological Component: Cnidaria fauna; Dominant Taxon/Taxa Studied: *Montastraea annularis*, *Bathypsammia tintinnabulum*;

(04.00023)

General Dynamics Electric Boat Division. 1971. Potential environmental effects of an offshore submerged nuclear power plant. Vol. II, Sect. 4: Site Description for Waters off Southeastern Florida. Water Pollu. Contr. Res. Ser., Prog. 161306F1. 303 p.

This report presented a descriptive treatise and collation of data on the representative offshore sites for the assessment of the effects of power plant wastes on the marine flora and fauna. The biological description of the area was broken down into ecology, phytoplankton, zooplankton, principal fisheries, benthic organisms, and fouling.

Habitat: Variable; Type of Study: Qualitative; Biological Component: Flora and fauna; Abiotic Parameters Measured: Temperature, salinity, water clarity, depth; Dominant Taxon/Taxa Studied: *Thalassia testudinum*;

(04.00024)

Gomberg, D.M. 1976. Geology of the Pourtales Terraces, Straits of Florida. Univ. of Miami Ph.D. Dissertation. 371 p.

The geologic composition and origin of the Pourtales Terrace, a carbonate platform at 200-400 m depth in the southern Florida Straits, is described from benthic dredge samples. The bathymetric relief and sediment composition are summarized. Biogenic sediments include those derived from molluscs, Mio-pliocene marine vertebrate bones, and shark teeth. Coralline algae, bryozoans, attached pelecypods, and calcareous worm tubes occur on the surface, but show no recent signs of growth. The local stratigraphy and geologic history of the terrace is discussed.

Habitat: Rock, sand; Type of Study: Qualitative;

(04.00025)

Halpern, J.A. 1970. Growth rate of the tropical sea star *Luidia senegalensis* (Lamarck). Bull. Mar. Sci. 20(3): 626-633.

The growth of a recently metamorphosed population of the sea star, *Luidia senegalensis*, collected from the Everglades National Park, Florida was monitored from November 1965 through February 1966. Analysis of stomach contents revealed that the bivalve, *Abra aequalis*, was the dominant food source. The growth rate of *L. senegalensis* was found to be much greater than that of temperate asteroid species.

Study Duration: November 1965-February 1966; Habitat: Shell, sand; Type of Study: Quantitative; Biological Component: Echinodermata; Type of Sampler: Otter trawl; Number of Replicates/Station: 7; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Luidia senegalensis*;

(04.00026)

Heald, E.J. 1969. The production of organic detritus in a south Florida estuary. Univ. of Miami Ph.D. Dissertation. 110 p.

The annual production of organic debris by red mangroves, *Juacus*, and sawgrass was examined in North River, Everglades National Park, during 1967 and 1968. The rate of decomposition and the manner of degradation were determined, as well as the total contribution by each producer to the detrital load of the river. The nutritive value of mangrove debris and detritus is analyzed as to its significance as an energy source in the estuarine ecosystem and the importance of the mangrove community to adjacent bays is discussed.

Study Duration: 1967-1968; Habitat: Mangrove, saltmarsh; Type of Study: Quantitative; Biological Component: Flora and fauna; Temporal Frequency: Monthly; Dominant Taxon/Taxa Studied: *Juacus*, *Rhizophora mangle*;

(04.00027)

Heald, E.J. 1970. The Everglades estuary: an example of seriously reduced inflow of fresh water. Trans. Am. Fish. Soc. 99(4):847-848.

A description of reduced freshwater flow to the estuarine regions of the Everglades National Park caused by drainage and irrigation schemes in the central portion of the state was presented. The net result of the freshwater reduction was a lowering of the water table by as much as 6 feet, a gradual landward intrusion of saltwater, increased salinities in the estuarine bays and lagoons, and a reduction in the capacity of the system to withstand stresses of normal drought. At these extremely high salinities, the dominant producer of the bay, *Thalassia testudinum* is severely limited.

Habitat: Estuarine;

(04.00028)

Herrnkind, W.F. 1965. Investigations concerning homing directional orientation and insight in the sand fiddler crab, *Uca pugilator* (Bosc). Univ. of Miami M.S. Thesis. 146 p.

Homing ability of *Uca pugilator* was studied using specimens from south Florida shores. Crabs were moved several yards away from burrows and their speed and direction of travel were observed. The crabs shoreward orientation under water was also observed. It appeared that a sun-compass mechanism with time compensation was responsible for the orientation ability. Adaptive significance of this behavior is discussed.

Type of Study: Quantitative; Biological Component: Fauna; Dominant Taxon/Taxa Studied: *Uca pugilator*;

(04.00029)

Hildebrand, E.L. 1976. Growth physiology of a diatom isolated from mangrove sediments. J. Phycol. 12(Suppl.):12-13.

The growth rate of an epipelagic diatom, *Amphora* sp., from sediments of a south Florida mangrove swamp was measured under controlled environmental conditions determined from field measurements. *Amphora* sp. was found to be shade adapted and euryhaline, with maximum growth occurring at 28°C. The effects of 8 organic substances and 3 light intensities on the growth of the diatom were determined. The ecological significance of utilization of different organic substrates is discussed.

Study Duration: 2 years; Habitat: Mangrove swamp; Type of Study: Quantitative; Biological Component: Diatom; Abiotic Parameters Measured: Temperature, salinity, soluble organic carbon; Dominant Taxon/Taxa Studied: *Amphora* sp.;

(04.00030)

Hughes, D.A. 1968. Factors controlling emergence of pink shrimp (*Penaeus duorarum*) from the substrate. Biol. Bull. 134(1):48-59.

Mechanisms controlling the emergence of pink shrimp, *Penaeus duorarum*, from the substrate at sunset was investigated in shrimp collected from the Florida Everglades. Controlled laboratory experiments indicated that emergence and subsequent activity were under rhythmic control. Shifting the light-dark cycle resulted in a resynchronization of the rhythm phase, indicating that the light-dark cycle, or some associated factor, is the mechanism for emergence. The effect of feeding rhythm and shrimp size on emergence synchrony was also studied.

Type of Study: Quantitative; Biological Component: Crustacea; Dominant Taxon/Taxa Studied: *Penaeus duorarum*;

(04.00031)

Hughes, D.A. 1969. On the mechanisms underlying tide-associated movements of *Penaeus duorarum* Burkenroad. FAO Fish. Rept. 57(3):867-874.

The mechanism by which postlarval *Penaeus duorarum* move inshore to nursery grounds on flood tides and juveniles move offshore on ebb tides was investigated in the Everglades area of Florida. Postlarvae were found to respond to decreased salinity by moving to the substrate where they remain inactive and thereby avoid displacement by the ebb tide. As salinity increased on the flood tide, the postlarvae moved into the water column where they were transported inshore. Juveniles were found to be positively rheotactic during salinity increases (flood tide) and negatively rheotactic during decreases (ebb tide), thereby resisting inshore transport and enhancing offshore displacement. The effects of salinity on tide associated migrations of postlarval and juvenile shrimp may explain the positive correlations between the quantity of rainfall in nursery areas and the commercial catch of the following year.

Type of Study:Qualitative; Biological Component:Crustacea; Number of Stations:1; Abiotic Parameters Measured:Salinity; Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(04.00032)

Hughes, D.A. 1972. On the endogenous control of tide associated displacements of pink shrimp, *Penaeus duorarum* Burkenroad. Biol. Bull. Mar. Biol. Lab. Woods Hole 142:271-280.

The movement of *Penaeus duorarum* larvae from offshore spawning sites to inshore nursery areas in the Everglades was investigated. Results showed that displacement behavior is under endogenous control. In the laboratory both swimming direction and velocity showed a phase relationship with the tide cycle in the collection area of the previous day.

Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Plankton net; Abiotic Parameters Measured:Temperature, current velocity; Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(04.00033)

Idyll, C.P., E.S. Iversen & B.J. Yokel 1969. Variations in abundance of juvenile pink shrimp emigrating from the Everglades National Park estuary, in relation to the commercial catch. U.S. Fish. Wildl. Ser., Circ. No. 325, p. 14.

The abundance of juvenile pink shrimp emigrating from two areas in the Everglades National Park estuary was studied. At the Buttonwood Canal station, the relative abundance of emigrating shrimp was determined to have declined from 1965 to 1967. This decline was found to agree with the index of abundance established for the smallest shrimp caught commercially. Although a positive correlation was shown to exist in the trends of relative abundance, considerable variation was noted to be introduced because of the wide size range of the emigrants in most months and the apparent differences in the amount of time required for large shrimp to be recruited into the fishery compared to the time required for smaller shrimp. At the Joe River station, periods of high relative abundance were seen in June and September in 1966 and 1967. The relation between the relative abundance and the commercial index also showed considerable variation.

Study Duration:30 months; Habitat:Estuarine; Type of Study:Quantitative; Biological Component:Decapod fauna; Type of Sampler:Wing net; Number of Stations:2; Temporal Frequency:Twice monthly; Abiotic Parameters Measured:Temperature, salinity, current velocity, moon phase; Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(04.00034)

Jones, A.C. 1963. Distribution of pink shrimp larvae (*Penaeus duorarum* Burkenroad) in South Florida. Int. Congr. Zool. Proc. 16. p. 105.

The distribution of pink shrimp larvae on the southern Florida shelf was studied to determine their dispersion from an area of spawning. Variations in numbers of larvae exhibited in space and time were evaluated by an analysis of variance model with a factorial arrangement of the variables (month of collection, geographical area, and age of the larvae). The numbers of larvae in time were related to the annual temperature cycle. The numbers increased rapidly with rising temperature in spring, fluctuated about a high level in summer, decreased with falling temperature in autumn, and fluctuated about a low level in winter. Larvae were unequally distributed in the geographical area of study. The resultant water currents were shown to be of insufficient magnitude to transport larvae to the coastal estuaries. Migration can be accompanied by the larvae only by moving with the flood stream of tidal currents.

Type of Study:Qualitative; Biological Component:Decapod fauna; Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(04.00035)

Kimball, M.C. & H.J. Teas 1974. Nitrogen fixation in mangrove areas of southern Florida. In: Proc. of the Internat. Symp. on Biol. and Mgt. of Mangroves. Vol. II. G. Walsh, S. Snedaker & H. Teas (eds.) p. 654-660.

A study of nitrogen fixation by the soils of 5 mangrove communities in southern Florida found low rates of fixation in the surface sediments and soil profiles of the communities. Anaerobic organisms were primarily responsible for nitrogen fixation in mangrove sediments. Increased fixation rates in surface sediments in the presence of light was attributed to

blue green algae and photosynthetic bacteria. Variations in fixation rates with depth and between communities were determined.

Habitat:Mangrove forest; Type of Study:Quantitative ; Biological Component:Flora; Dominant Taxon/Taxa Studied:*Rhizophora mangle*, *Laguncularia racemosa*, *Avicennia germinans*, *Salicornia*, *Batis*;

(04.00036)

Kriegel, R. 1972. A study of the correlation between the zooxanthellae host polyp symbiosis and the latitude extent of hermatypic coral formations in southern Florida coastal waters. Fla. Instit. of Tech. M.S. Thesis.

The effect of latitude on the proportion of symbiotic zooxanthellae to host coral polyps was investigated in hermatypic corals from southern Florida waters. No significant differences in the quantities of endozoic zooxanthellae per host polyp were found from different sampling sites. It is concluded that the coral-zooxanthellae symbiosis does not influence the geographic distribution of hermatypic corals.

Type of Study:Quantitative; Biological Component:Coral and algae;

(04.00037)

Lindberg, S.E. 1974. Mercury in interstitial solutions and associated sediments from estuarine areas on the Gulf of Mexico. Fla. State Univ. M.S. Thesis. 127 p.

A study of mercury in sediments and interstitial water from the Florida Everglades and Mobile Bay, Alabama revealed that mercury content was closely related to organic levels. The Everglades samples had higher absolute levels of mercury than Mobile Bay sediments, but when normalized to the organic content of the sediment, Mobile Bay samples had higher relative mercury concentrations. Mechanisms of mercury incorporation into sediment and interstitial water were proposed and the effect of resuspended sediments on the mobility of sedimentary and interstitial mercury was determined.

Type of Study:Quantitative; Type of Sampler:Piston corer; Number of Stations:2; Abiotic Parameters Measured:pH, Eh, mercury content, organic content;

(04.00038)

Lyons, M.G. 1981. Possible sources of Florida's spiny lobster population. Proc. Gulf Caribb. Fish. Inst. 33:253-266.

The possible sources of Florida's lobster fishery was believed to be replenished by larvae recruited primarily from Caribbean spawning stocks, but some recent findings suggest that most recruitment may be directly from the spawn of the Florida population itself. However, Florida's year round larval recruitment cannot result from its 7 month (April-October) spawning period but may be derived from year round spawning of Caribbean populations. Abundance of larvae in transit from the Caribbean to south Florida via the Yucatan Channel during much of the year supports this hypothesis. Some contribution to recruitment by larvae spawned from the unfished Gulf of Mexico population is also probable. The author urged continued protection of Florida spiny lobsters by a closed season until irrefutable evidence indicates the population is derived from Caribbean stock.

Type of Study:Review; Biological Component:Spiny lobster; Dominant Taxon/Taxa Studied:*Panulirus argus*, *P. guttatus*, *P. laevis*;

(04.00039)

Manning, R.B. & H.E. Kumpf 1959. Preliminary investigation of the fecal pellets of certain invertebrates of the south Florida area. Bull. Mar. Sci. Gulf & Caribb. 9(3).

The fecal pellets of various gastropod and pelecypod molluscs and crustaceans from south Florida were collected and examined. The shape, consistency, and presence or absence of external and internal sculpture of the pellets were observed. Most of the invertebrates in a given group (usually at the generic level) excreted similar pellets.

Type of Study:Qualitative; Biological Component:Fauna;

(04.00040)

Mathis, J.M. 1973. Red mangrove decomposition: a pathway for heavy metal enrichment in Everglades estuaries. Fla. State Univ. M.S. Thesis.

The contribution of heavy metals from decomposition of red mangrove leaves was investigated in several estuaries of the Florida Everglades. Mangrove detritus contained 3 to 200 times the concentrations of Fe, Mn, Cu, and Cd as those of living leaves. The enrichment was believed to be caused by adsorption, complexation, and concentration of dissolved metals by mangrove detritus and associated microbiota. Variations in certain heavy metal concentrations between estuaries were associated with farmland runoff containing pesticides and fertilizers.

Study Duration:October 1971-August 1972; Type of Study:Quantitative; Biological Component:Mangrove; Abiotic Parameters Measured:Heavy metal concentrations; Dominant Taxon/Taxa Studied:*Rhizophora mangle*;



(04.00041)

McKeever, N.M. 1975. A survey of toxin producing marine macroalgae in south Florida coastal waters. Univ. of Miami M.S. Thesis.

A survey was made of macroalgae in south Florida with observations of fish mortality, fish erythrocyte hemolysis, gastropod tentacle withdrawal, and bacterial growth inhibition to determine the presence of toxins in the algae. Nineteen species were found to contain toxins. Extracts from 6 species were lethal to fish. Extracts from 3 species lysed fish erythrocytes. Extracts from 13 species caused gastropod tentacle withdrawal. Extracts from 10 species inhibited bacterial growth. Intra and interalgal comparisons were standardized using organic carbon, protein, and dry weight determinations.

Type of Study:Qualitative; Biological Component:Flora; Abiotic Parameters Measured:Carbon, protein;

(04.00042)

McNulty, J.K., R.C. Work & M.B. Moore 1962. Level sea bottom communities in Biscayne Bay and neighboring areas. Bull. Mar. Sci. Gulf Caribb. 12:204-233.

Grab samples were taken at 180 stations in the neighborhood of Biscayne Bay, Florida. These were from level soft bottom, free from seagrass beds, and in shallow water. All species of infauna taken are recorded together with their relative frequencies in relation to the particle size of the sediment. The following communities are distinguished and their significance discussed: *Amphioplus* - *Ophionephthys*, *Laevicardium* - *Codakia*, *Mellita* - *Tellina*, *Encope*, *Amphioplus* - *Dosinia*, *Plagiobrissus* - *Clypeaster*, *Venus*.

Study Duration:1962; Habitat:Sand, mud; Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Grab; Sieve Size:2.0; 1.0; 0.5; 0.25; 0.125; 0.063; Number of Stations:180; Number of Replicates/Station:20; 16; Temporal Frequency:Variable; Abiotic Parameters Measured:Temperature; Dominant Taxon/Taxa Studied:*Amphioplus coniertodes*;

(04.00043)

McPherson, B.F. 1968. The ecology of the tropical sea urchin, *Eucidaris tribuloides*. Univ. of Miami Ph.D. Dissertation. 147 p.

Aspects of reproduction, spawning, growth, size, longevity, feeding, and respiration were investigated in the sea urchin *Eucidaris tribuloides* from several habitats off southeastern Florida. On patch reefs of Margot Fish Shoal, gametogenic activity occurred year round, but spawning occurred predominantly in late summer and early fall of 1965 and 1966. Seasonal growth rates are given for different habitats and urchin sizes. Size variations also occurred between habitats. Ingestion of calcium carbonate by *E. tribuloides* indicated consumption of boring and encrusting organisms. Respiration was related to the nutritional condition and size of the urchin and to temperature. Seasonal variations in respiration due to temperature changes are diminished by partial seasonal acclimation in oxygen uptake.

Study Duration:1965-1966; Habitat:Patch reefs; Type of Study:Quantitative; Biological Component:Echinoderm; Abiotic Parameters Measured:Temperature; Dominant Taxon/Taxa Studied:*Eucidaris tribuloides*;

(04.00044)

McSweeney, E.S. 1968. A systematic study of five species of Tanaidacea (Crustacea: Malacostraca) collected in southern Florida. Univ. of Miami M.S. Thesis.

A systematic account was presented of five species of Tanaidacea collected in southern Florida. All species were completely described and illustrated. A brief historical resume of the order was presented, morphology and terminology of the group was discussed, and a key to the species covered in the work was presented.

Type of Study:Qualitative; Biological Component:Crustacean fauna;

(04.00045)

Messing, C.G. 1975. The systematics and distribution of the Crinoidea comatulida (exclusive of the Macrophreatina) collected by the R/V Cerda in the Straits of Florida and adjacent waters. Univ. of Miami M.S. Thesis.

Comatulid crinoids from 8 genera were studied from samples collected from the Straits of Florida. Observations were made on morphological variations and distributions. Analysis of geographic and bathymetric distributions revealed 5 distinct patterns of horizontal distribution. Cirrus morphology and substrate preference were investigated. Geographic ranges were extended and new species were described.

Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Otter trawl, trynet;

(04.00046)

Messing, C.G. 1979. *Pagurapseudes* (Crustacea: Tanaidacea) in southeastern Florida: Functional morphology, post-marsupial development, ecology and shell use. Univ. of Miami Ph.D. Dissertation. 241 p.

Functional and behavioral patterns of members of the tanaidacean genus *Pagurapseudes* were compared to those of

paguridean decapods (hermit crabs) using gross morphological, histological, and scanning electron microscopic analyses, in addition to observations of living animals. A life history pattern is proposed and compared to that of other tanaidaceans. Population fluctuations and habitat preferences are discussed. Aspects of shell morphology, size, and availability were examined as potential factors in selection of shell habitats by *Pagurapseudes*.

Study Duration:1-5 years; Type of Study:Qualitative; Biological Component:Crustacea; Dominant Taxon/Taxa Studied:*Pagurapseudes*;

(04.00047)

Moore, H.B., T. Jetare, J.C. Bauer & J.A. Jones 1963. The biology of *Lytechinus variegatus*. Bull. Mar. Sci. Gulf Caribb. 13:23-53.

*L. variegatus* is an abundant urchin along the southeastern coast of the United States. It feeds on *Thalassia*, and is eaten by various gastropods and birds. Gonads develop at a test diameter of about 40 mm and at an age of about one year. The growth rate shows a negative correlation with temperature. Spawning occurs throughout the summer, at Miami, but is briefer in Bermuda where it exhibits a lunar rhythm. Following an unusually cold winter in Miami, a large proportion were protandrous hermaphrodites and had an unusual test shape. Except in the oldest urchins, tissue production is 100-200 percent in 30 days. A tentative estimate of food requirements and efficiency is given.

Study Duration:1937-1961; Habitat:Grassbeds; Type of Study:Qualitative; Biological Component:Fauna; Type of Sampler:Quadrat; Abiotic Parameters Measured:Temperature; Dominant Taxon/Taxa Studied:*Lytechinus variegatus*;

(04.00048)

Mullins, H.T., A.C. Neumann, R.J. Wilber, A.C. Hine & S.J. Chinburg 1980. Carbonate sediment drifts in northern straits of Florida. Am. Assoc. Pet. Geol. Bull. 64(19):1701-1717.

Carbonate sediment drifts up to 600 m thick in the northern straits of Florida were sampled by piston corer. Distributions of sediment grain sizes within cores are given. Granules consisted of mainly submarine lithified intraclasts; fine sands were mostly planktonic foraminifera; and the coarser sands consisted of pteropods and shallow water material such as *Halimeda*, peneropolid foraminifera, fragments of coralline algae, ooids, or micritized mollusc debris. Interpretations of the rock record provided information on the formation of the carbonate sediment drifts.

Habitat:Mud, sand; Type of Study:Quantitative; Type of Sampler:Piston corer; Abiotic Parameters Measured:Sediment grain size;

(04.00049)

Newell, S.Y. 1974. The succession in the mycoflora of red mangrove (*Rhizophora mangle* L.) seedlings. Univ. of Miami Ph.D. Dissertation. 103 p.

Seedlings of *Rhizophora mangle* were collected in southern Florida in October 1970. One set of seedlings was untreated prior to placing it in the field, another was wet weighed and tagged, and a third was given uniform artificial injuries. Seedlings were recollected and compared for mycoflora. Succession of fungal groups was observed. Results of this study are compared with studies of terrestrial mycoseres, freshwater mycoseres, other marine mycoseres, and mycoseres of other mangrove structures.

Habitat:Mangrove; Type of Study:Quantitative; Biological Component:Flora; Dominant Taxon/Taxa Studied:*Rhizophora mangle*;

(04.00050)

Odum, W.E. 1969. Pathways of energy flow in a south Florida estuary. Univ. of Miami Ph.D. Dissertation. 162 p.

A study of energy flow in a mangrove ecosystem was conducted in the North River basin in southwest Florida between 1967 and 1969. Analysis of stomach contents revealed that phytoplankton and benthic algae were minor food sources compared to the annual production of mangrove leaves. A food web based on the bacterial and fungal degradation of mangrove leaves into organic detritus is developed, from detritus consumers to gamefish and wading birds at the highest trophic levels. The effect of large scale destruction or removal of mangroves on the trophic structure is considered.

Study Duration:1967-1969; Habitat:Mangrove forest; Type of Study:Qualitative; Biological Component:Fauna and flora;

(04.00051)

Pillsbry, H.A. & A.A. Olsson 1953. Materials for a revision of east coast and Floridan Volutes. Nautilus 67(1):1-13.

The Volutidae were described as comparatively rare shells in the recent fauna of eastern North America and the Caribbean region, and found almost solely by dredging in offshore waters. Taxonomical aspects of some Volutidae were discussed. In addition, a classification of east coast and Florida Volutidae was presented.

Type of Study:Qualitative; Biological Component:Mollusc fauna; Type of Sampler:Dredges;

(04.00052)

Pool, D.J., S.C. Snedaker & A.E. Lugo 1977. Structure of mangrove forests in Florida, Puerto Rico, Mexico, and Costa Rica. *Biotropica* 9(3):195-212.

Seven areas in Florida, Puerto Rico, Mexico and Costa Rica were investigated for differences and similarities in structural aspects of mangrove forests. DBH, species, density, basal area, and height of trees were measured. Forests of southwestern Florida had taller trees, larger basal areas than mangroves in southeastern Florida. Differences were found between north and south coast mangroves of Puerto Rico. In Costa Rica differences existed between Caribbean and Pacific coast sites. Influencing factors include climate, geographical location, and local geography.

Habitat:Mangrove forests; Type of Study:Quantitative; Biological Component:Flora;

(04.00053)

Quinn, B.G. 1965. Predation in sea urchins. *Bull. Mar. Sci.* 15(1):259-264.

When deprived of food, two *Diadema antillarum* specimens held in laboratory tanks during the summer of 1963 attacked certain species of sea urchins, as well as other echinoderm species. Over a period of days the spines, pedicellariae, and tests of the prey urchins were ingested by *Diadema antillarum*. This behavior is believed to have been induced by food scarcity, and is not considered normal under natural conditions when food is available. The motivation behind the selection of certain species as prey was not determined. This behavior is shown to occur in urchin species other than *Diadema*.

Study Duration:Summer 1963; Type of Study:Quantitative; Biological Component:Faua; Dominant Taxon/Taxa Studied:*Diadema antillarum*;

(04.00054)

Quinn, J.F., Jr. 1977. The systematics and zoogeography of the gastropod family Trochidae collected in the Straits of Florida and its approaches. Univ. of Miami M.S. Thesis. 181 p.

Collections were made in the Straits of Florida using a variety of samplers to obtain specimens of molluscs in the family Trochidae. Fifty four species were collected below depths of 180 meters. New species are described, illustrated and their distributions given.

Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Beam trawl, otter trawl, dredge;

(04.00055)

Roberts, M.H., L.J. Rouse, Jr., M.D. Walker & J.H. Hudson 1982. Cold water stress in Florida Bay and northern Bahamas: A product of winter cold-air outbreaks. *J. Sediment. Petrol.* 52(1):145-155.

In situ water temperatures, meteorological data, and thermal infrared data from the NOAA-5 meteorological satellite were used to study the thermal evolution of Florida Bay and Bahama Bank waters during January 1977 when 3 consecutive cold fronts crossed south Florida and the northern Bahamas, reducing shallow water temperatures below the lethal limit for most reef corals. Florida Bay water was depressed below 16°C, a thermal stress threshold for most reef corals, for 8 days. Minimum in situ temperature recorded was 12.6°C. Bathymetry controlled routes of cold water masses are described and their effect noted. Coral and fish kills were reported along the Florida Reef Tract and northern Bahamas, with up to 91% coral mortality at Dry Tortugas. This provides evidence that cold water stress conditions can exist over vast shallow water areas for periods of days, resulting in restriction of reef community development throughout the study area.

Study Duration:January 1977; Habitat:Coral reef; Type of Study:Quantitative; Biological Component:Cnidaria fauna; Abiotic Parameters Measured:Water & air temperature, wind velocity; Dominant Taxon/Taxa Studied:*Montastraea annularis*, *Acropora cervicornis*, *Porites porites*;

(04.00056)

Roessler, M.A. & R.G. Rehner 1971. Relation of catches of postlarval pink shrimp in Everglades National Park, Florida, to the commercial catches on the Tortugas grounds. *Bull. Mar. Sci.* 21(4) (in press).

Sampling of postlarval pink shrimp populations at Buttonwood Canal and Little Shark River, Everglades National Park, Florida was undertaken from July 1965 to December 1967. Environmental effects on postlarval catches were observed and the catches of immigrating *Penaeus* were compared with commercial catches of *Penaeus* on the Tortugas grounds. Postlarval *Penaeus* were more plentiful at night, during flood tides, in bottom samples, during new and first quarter lunar periods and during the summer. An index of abundance was chosen at the Everglades stations with which it was possible to predict 61% of the monthly variation in commercial Tortugas catches.

Study Duration:July 1965-December 1967; Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Plankton net (471 mesh); Number of Stations:2; Abiotic Parameters Measured:Temperature, salinity, current velocity; Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(04.00057)

Saloman, C.H., D.M. Allen & T.J. Costello 1968. Distribution of three species of shrimp (Genus *Penaeus*) in waters contiguous to Southern Florida. Bull. Mar. Sci. 18(2):343-350.

Shrimp of the genus *Penaeus* were collected from southern Florida and western Bahama waters, and were identified to determine species distribution and composition. *Penaeus duorarum* was the dominant species in southern Florida waters and, together with *P. aztecus*, occurred along the lower east and west coasts of the state. *P. brasiliensis* was found to occur near the Florida Keys and along the east coast of southern Florida, and was apparently the dominant species in the western Bahamas. In Biscayne Bay, Florida, *P. duorarum* was more abundant than *P. brasiliensis* in all catches examined.

Study Duration:1 year, 5 months; Habitat:Grassbeds; Type of Study:Qualitative; Biological Component:Decapod fauna; Type of Sampler:Frame trawl; Dominant Taxon/Taxa Studied:*Penaeus duorarum*, *Penaeus aztecus*, *Penaeus brasiliensis*;

(04.00058)

Saunders, S. 1971. A study of the food of migrating pink shrimp. *Penaeus duorarum* Burkenrod. Sea Grant Tech. Bull. No. 9. Univ. of Miami Sea Grant Prog. 36 p.

Investigation was made into the food and feeding habits of juvenile pink shrimp, *Penaeus duorarum*, during migration out of an estuary near Flamingo, Everglades National Park during 1963. Feeding activity was lowest in late winter and summer, while it was highest in September. Crustaceans and polychaetes were preferred food, while seagrasses, diatoms, and foraminifera were not preferred. There seemed to be no seasonal differences in kinds of food taken. Size classes showed no differences in diet or feeding activity.

Study Duration:1963; Type of Study:Quantitative; Biological Component:Fauuna; Type of Sampler:Channel net, wing net; Number of Stations:1; Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(04.00059)

Schmidt, T.W. 1979. Ecological study of fishes and the water quality characteristics of Florida Bay, Everglades National Park, Florida. U.S. Natl. Park Serv., So. Fla. Res. Ctr., Everglades Natl. Park, Final Proj. Rept. RSP-EVER M-36.

An ecological study in Florida Bay from May 1973 to October 1976 was conducted to understand the distribution of Florida Bay fishes in relation to changing environmental conditions. The 1066 km<sup>2</sup> Florida Bay system was found to support benthic seagrass and macroalgae communities composed primarily of *Thalassia testudinum*, *Diplanthera (Halodule) wrightii* and the carbonate-precipitating green algae *Penicillus* sp. Mixed stands of *T. testudinum* and *D. wrightii* made up nearly 70% of the principal benthic macrofloral communities in the sampled areas of Florida Bay. Ecological studies on the Florida Bay fishes were directed toward acquiring baseline information on their relative abundance by number and biomass, habitat types and the effect of environmental conditions on their distribution. A total of 182,530 fishes representing 128 species and 50 families were collected throughout Florida Bay. Their total biomass was 764.9 kg. An additional 21 species were identified from sport fish surveys and supplemental observations. In general, the greatest numbers and biomass of the fishes occurred during the wet season (summer and fall months) whereas the lowest numbers and biomass appeared during the dry season (winter and spring months). The greatest abundance and diversity of fishes existed in western Florida Bay followed by eastern and central Bay regions, respectively. Certain species and age-sizes of fish were abundant only in particular macrobenthic communities and habitats. Salinity was the major environmental limiting factor affecting fish distribution.

Study Duration:3 years, 4 months; Habitat:Grassbeds; Type of Study:Qualitative and quantitative; Biological Component:Fishes, benthic flora; Type of Sampler:Seine, otter trawl; Abiotic Parameters Measured:Temperature, salinity, DO, pH, wind, turbidity, rainfall; Dominant Taxon/Taxa Studied:*Anchoa hepsetus*, *Anchoa mitchilli*, *Eucinostomus gula*, *Lagodon rhomboides*, *Antherinonorus stipes*, *Floridichthys carpio*, *Dasyatis americana*, *Bairdilla chrysura*, *Lutjanus griesus*, *Lactophrys quadricornis*, *Chriodorus atherinoides*;

(04.00060)

Schmidt, T.W. 1979. Seasonal biomass estimates of marine and estuarine fishes within the western Florida Bay portion of Everglades National Park, May 1973 to July 1974, p. 665-672, In: Proc. 1st Conf. Sci. Res. Natl. Parks, Vol. 1, R.M. Linn (ed.), Natl. Park Ser. Trans. Proc. Ser. No. 5.

A total of 95,344 individuals, distributed among 109 species and 45 families were collected by seine and otter trawl. An additional 17 species were observed or collected in preliminary or supplemental studies. The quantitative distribution of marine and estuarine fishes in western Florida Bay was determined to undergo considerable fluctuation, not only in relation to the biological features of each unique habitat but more importantly, as they are influenced by the cyclicity of the hydroperiods.

Study Duration:1 year; Type of Study:Quantitative; Biological Component:Fish; Type of Sampler:Bag seine, semi-balloon otter trawl; Number of Stations:8 (seine), 4 (trawl); Number of Replicates/Station:1 (seine), 2 (trawl); Temporal Frequency:Monthly; Abiotic Parameters Measured, Rainfall, temperature, salinity, DO, pH, turbidity, cloud cover, wind direction and speed; Dominant Taxon/Taxa Studied:*Eucinostomus gula*, *Floridichthys carpio*, *Lucania parva*, *Lagodon rhomboides*, *Orthopristis chrysoptera*, *Anchoa mitchilli*, *Anchoa hepsetus*, *Dasyatis americana*;

(04.00061)

Schmidt, T.W. & G.E. Davis 1978. A summary of estuarine and marine water quality information collected in Everglades National Park, Biscayne National Monument, and adjacent estuaries from 1879 to 1977. U.S. Natl. Park Serv., So. Fla. Res. Ctr., Everglades Natl. Park, Rept. T-519, 79 p.

This report summarizes several published and unpublished reports of water quality information in Everglades National Park, Biscayne National Monument, and adjacent estuaries as the first step in the design, development, and implementation of a comprehensive monitoring system. Most of these data were collected in conjunction with short term multidisciplinary investigations. A total of 55 hydrographic studies were conducted dating from 1879 to the present, varying in duration from less than 1 year to over 5 years. Twenty three studies were conducted in Florida Bay; 17 in the Everglades estuary; 16 in southern Biscayne Bay; 14 in Card-Barnes Sound; 7 in the Big Cypress estuary; and 5 in the area of the northern coral reef tract. A summary of the water quality parameters minimum and maximum was also presented.

Habitat:Estuarine; Type of Study:Qualitative;

(04.00062)

Sell, M.G., Jr. 1977. Modeling the response of mangrove systems to herbicide spraying, hurricanes, nutrient enrichment and economic development. Univ. Fla. Ph.D. Dissertation.

The effects of various perturbations on the structure of mangrove forests were studied. Those perturbations studied include the impact of herbicides, hurricanes, nutrient enrichment, and economic development of mangrove forests. Simulations of the effect of herbicide spraying on the mangrove forests in So. Vietnam suggested that complete mangrove recolonization of sprayed areas may take 55 years to more than 100 years. Availability of seedlings and amount of wood cutting were factors. Herbicide spraying in a mangrove forest on Marco Island showed that *Laguncularia racemosa* was the most susceptible followed by *Rhizophora mangle* and *Avicennia germinans*. The sprayed sites recolonized at a slower rate than the harvested sites. Detritus feeding snails were reduced in numbers after the spraying but crab populations were little changed. Simulations of the effects of hurricanes on mangrove forests suggested that the growth cycle was adapted to recovery from major hurricanes that occur every 15-25 years. Field studies at Naples and Everglades City, Florida indicated that mangroves grew faster when bathed by tidal waters enriched with nutrients from sewage effluent. The management of mangroves for maximum contribution to the combined economy of nature and man requires maintaining access to nutrients and tidal exchange, abundant seedling supply after abating stress, and a high ratio of mangrove land with the kind of economic developments that are attracted by the energy values of the estuarine zones.

Study Duration:3 years; Habitat:Mangrove forests; Type of Study:Quantitative; Biological Component:Flora; Type of Sampler:0.25 m<sup>2</sup> baskets, 0.77 m<sup>2</sup> hoop, 0.40 m<sup>2</sup> hoop; Number of Stations:Variable; Number of Replicates/Station:Variable; Temporal Frequency:Variable; Dominant Taxon/Taxa Studied:*Laguncularia racemosa*, *Rhizophora mangle*, *Avicennia germinans*;

(04.00063)

Shinn, E.A., J.H. Hudson, R.B. Halley & B. Lidz 1977. Topographic control and accumulation rate of some Holocene coral reefs: South Florida and Dry Tortugas. In: Proc. Third Internat. Coral Reef Symp., Miami, Fla. 2:1-7.

Examination of cores drilled on 6 reef sites in the Florida Reef Tract and Dry Tortugas showed that reef morphology is determined primarily by underlying topography. Reef accumulation rates, determined from carbon-14 dating of coral, ranged from 0.38 m/1000 years in thin Holocene reefs to 4.85 m/1000 years in thicker reefs. Areas of slow accumulation rates were characterized by a higher incidence of cementation and alteration of corals than in areas of rapid accumulation rates. The primary reef builder in Florida, *Acropora palmata*, was absent at most reef sites, including the 13 m thick Holocene reef at Dry Tortugas. Instead, the chief reef builders are the same as those contained in the Pleistocene Key Largo formation, which has been considered a fossilized patch reef complex.

Habitat:Coral reef; Type of Study:Quantitative; Biological Component:Cnidaria fauna; Type of Sampler:Drill; Number of Stations:6; Dominant Taxon/Taxa Studied:*Acropora palmata*, *Montastraea annularis*, *Millepora* sp.;

(04.00064)

Soto, L.A. 1978. Faunistic study of the deep water crabs of the Straits of Florida (Decapoda; Brachyura). Univ. of Miami Ph.D. Dissertation.

Benthic trawl collections from the Straits of Florida between 1962 and 1972 were used in an ecological and zoogeographical study of deep water brachyuran crabs. Sixteen families were represented by 87 brachyuran species, 6 recorded for the first time. The horizontal and vertical distribution of the brachyuran fauna was related to water temperature, depth, and substrate type. Four distributional patterns in the straits were identified. The zoogeography, origin, and paleogeography of deep water brachyurans are discussed.

Study Duration:1962-1972; Type of Study:Quantitative; Biological Component:Crustacea; Type of Sampler:Trawl; Abiotic Parameters Measured:Temperature, depth, substrate type;

(04.00065)

Steinker, D.C. 1977. Foraminiferal studies in tropical carbonate environments - South Florida and Bahamas. Fla. Sci. 40(1):46-61.

This paper reviews studies on the distribution of foraminifera in carbonate sediments of the south Florida-Bahama region and proposes improved methods for further investigations. It is suggested that rose bengal stain is an unreliable indicator of living specimens and that direct observation should be used to distinguish between live and dead foraminifera. Living populations are more abundant on marine vegetation than in the sediments of the area. Those populations associated with sediments generally are sorted by waves and currents and therefore do not accurately reflect the biocoenosis of an area. It is suggested that foraminifera investigations should be more biologically oriented in order to better understand conditions of their natural habitats.

Habitat: Carbonate sediments, seagrass beds; Type of Study: Review; Biological Component: Foraminifera fauna; Dominant Taxon/Taxa Studied: *Archaias angulatus*, *Rotorbinella rosea*, *Nonotrema rubrum*;

(04.00066)

Steinker, D.C. 1982. Late Pleistocene Foraminifera, Florida Keys. Florida Sci. 45(4):234-244.

Fossil foraminifera have been identified from the late Pleistocene Miami limestone and Key Largo limestone of the Florida Keys. The same foraminiferal species are dominant in both the Miami limestone and recent oolite deposits of the Great Bahama Bank. A species list was compiled and relative abundance given for foraminifera from each sampling area.

Type of Study: Qualitative, quantitative; Biological component: Fauna; Dominant Taxon/Taxa Studied: Foraminifera;

(04.00067)

Sullivan, J.R. 1979. The stone crab, *Menippe mercenaria*, in the southwest Florida fishery. Fla. Mar. Res. Publ. No. 36. 37 p.

During the 1975-76 commercial trapping season in southwest Florida, 14,343 stone crabs were tagged and during the summer closed season, 4,563 additional crabs were tagged. The 4.4% tagged crabs returned indicated inshore movement in fall and offshore migration in spring with little movement by spawning females in summer. Spawning females were found during every month but most frequently from March to September. Ovigerous females were of similar size to nonovigerous females. Gravid females weighed more than similar sized nonovigerous females. Other morphometric relationships for males and females are summarized. The proportion of each size class composing the population is given and claw growth and regeneration rates were determined. Twenty to 25% of legal sized crabs were in the process of claw regeneration, implying intense fishery pressure, but indicating survival of declawed crabs. Population size was estimated at 9,057 to 32,036 legal sized crabs available to a trap line during one week. Approximately 3 to 8% of the available population was caught each time traps were checked, indicating that most legal sized crabs were captured during each commercial season.

Study Duration: October 1975-October 1977; Type of Study: Quantitative; Biological Component: Crustacea; Dominant Taxon/Taxa Studied: *Menippe mercenaria*;

(04.00068)

Sykes, J.E. 1972. Report of the National Marine Fisheries Service Biological Laboratory, St. Petersburg Beach, Fiscal Yrs. 1970 and 1971. Natl. Oceanic Atmos. Admin. Tech. Mem. NMFS SER-2. 13 p.

A biological report from the National Marine Fisheries Service presented the following conclusions concerning Florida's marine resources from 1970-1971 studies. Most of the major coastal and offshore fisheries of the United States depend upon species related to rearing and nursery areas in estuaries and the nearshore zone. To maintain and increase coastal shell fisheries, it is necessary to provide continuing biological production near shore. Such provision requires a thorough ecological knowledge of the nursery and rearing area. Currently, over 6,000 engineering proposals for estuarine areas are reviewed by federal agencies each year. In view of relentless pressures affecting estuaries, this laboratory works with other federal agencies and the Gulf states to provide data directly applicable to the preservation, maintenance, and enhancement of nursery areas that generate valuable commercial and recreational species.

Study Duration: 1 year; Biological Component: Marine flora and fauna;

(04.00069)

Tabb, D.C., D.L. Dubrow & A.E. Jones 1962. Studies on the biology of the pink shrimp, *Penaeus duorarum* Burkenroad, in Everglades National Park, Florida. St. Bd. Conser., Univ. Miami Mar. Lab. Tech. Ser. No. 37, 1-32 p.

Studies in the Everglades National Park indicated that populations of *Penaeus duorarum* postlarvae peaked during the spring and early summer, and reached low points in the late summer and fall. Peak numbers of postlarvae generally coincided with the peak velocity of the flooding tides. Juvenile *P. duorarum* abundance peaked from June to September and were lowest in December and January. *P. duorarum* were determined to be sensitive to sudden cold temperatures and were observed to respond by entering deeper water. Carapace length-frequency distributions demonstrated time and characteristics of periods of juvenile immigration into the nursery and size during emigration to offshore grounds. Pink shrimp were determined to be tolerant of diverse salinity ranges.

Study Duration:5 years; Habitat:Estuarine; Type of Study:Semi-quantitative; Biological Component:Marine fauna; Type of Sampler:Roller trawl, channel net, wing net; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(04.00070)

Thomas, L.P. 1959. A systematic study of the shallow water brittle stars of the family Amphiuridae of Florida. Univ. of Miami M.S. Thesis. 156 p.

A systematic study of the biology and ecology of the Amphiuridae of South Florida was conducted. Keys to the genera and species and illustrations of all the species were provided.

Type of Study:Qualitative; Biological Component:Amphiurid fauna;

(04.00071)

Thomas, L.P. 1962. The shallow water amphiurid brittle stars (Echinodermata: Ophiuroidea) of Florida. Bull. Mar. Sci. Gulf & Caribb. 12(4):623-694.

The shallow water amphiurid brittle stars of Florida were described in detail. A survey of the literature pertaining to tropical western Atlantic species was presented, along with a brief discussion of general biology and morphology. Nine genera and 21 species were reported, including illustrations and synonymies for each species. *Amphiodia trychra* and *Amphipholis pachyactera* H.L. Clark were recorded for the first time from Florida and the United States.

Type of Study:Qualitative; Biological Component:Marine fauna; Type of Sampler:Shovel; Number of Stations:9 sites;

(04.00072)

Vnuczenski, L.S. 1966. A contribution to the knowledge of the deep water barnacles of the Straits of Florida. Univ. of Miami M.S. Thesis.

Stations in the Straits of Florida were examined in 1963 for distributions and abundances of barnacles. Dredge and trawl results revealed a new distribution for *Pagurolepas conchicola* and *Poecilasma kaempferi inaequilaterale* form *breve* in the Straits of Florida. Substrate specificity and the relationship of depth to population size are described. Problems of barnacle identification with the current literature and specimen availability are discussed.

Study Duration:1963; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Isaacs-Kidd trawl, rock dredge, scallop dredge, Blake trawl, bottom dredge, otter trawl; Number of Stations:115; Dominant Taxon/Taxa Studied:*Salpella stroemii*, *Verruca rathbuniana*, *Pagurolepas conchicola*;

(04.00073)

Voss, M.A. 1959. Studies on the pulmonate gastropod *Siphonaria pectinata* (Linnaeus) from the southeast coast of Florida. Bull. Mar. Sci. Gulf & Caribb. 9(1):84-99.

Observations were made on *Siphonaria pectinata* from locations between Blowing Rocks and Key Largo on the southeast coast of Florida. Investigations covered feeding, habitats, spawning, larval development, distribution, growth and environmental and geographical variation. Illustrations were made of the veliger, egg masses, and newly settled young. Results showed *S. pectinata* spawns between December and March, it has large shell color variation, is limited by seasonal temperature extremes, grows from .4 mm. to 2.5 mm. per month depending on age, and is most abundant on hard substrates with a microscopic algal film.

Type of Study:Quantitative; Biological Component:Fauna; Number of Stations:8; Abiotic Parameters Measured:Temperature, tidal level; Dominant Taxon/Taxa Studied:*Siphonaria pectinata*;

(04.00074)

Mainright, S.C. & T.H. Perkins 1982. *Gynodorvillea floridana*, a new genus and species of Dorvilleidae (Polychaeta) from southeastern Florida. Proc. Biol. Soc. Wash. 95(4):694-701.

A new genus and species, *Gynodorvillea floridana* are proposed for specimens collected off southeast Florida. They appear to follow the *Schistoerlingos-Pettiboneia* line of evolution. The principal diagnostic characters are the lack of prostomial appendages and dorsal cirri, and a unique jaw apparatus.

Habitat:Sand; Type of Study:Qualitative; Type of Sampler:Core; Sieve Size:1.0 mm; Dominant Taxon/Taxa Studied:*Gynodorvillea floridana*;

(04.00075)

Malesky, R.E. 1976. A quantitative comparison of the epifauna on *Thalassia testudinum* Konig in three hydrographically distinct areas in southern Florida. Fla. Atlantic Univ. M.S. Thesis.

The invertebrate macrofauna and algae epiphytes occurring on *Thalassia* in three hydrographically distinct areas in

southern Florida were sampled. A total of 178 invertebrate species were collected. The dominant taxa included 98.8% of the fauna and 70.4% of the non-colonial invertebrate species. A relatively high faunal homogeneity was observed at each site. Turbidity and the abundance of algae epiphytes were found to be important environmental factors affecting the observed differences in the composition and density of the epifauna between sites. Similarities in diversity between the three sites were suggested to be due to equivalent substrates with similar degrees of environmental instability. The *Thalassia testudinum* epifauna showed a high degree of parallelism with *Zostera marina* epifauna.

Study Duration:1 week; Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Invertebrate macrofauna & algal epiphytes; Type of Sampler:0.25 m<sup>2</sup> iron frame w/attached net bag; Sieve Size:0.5 mm; Number of Stations:3; Number of Replicates/Station:3; Temporal Frequency:Once; Abiotic Parameters Measured:Salinity, DO, turbidity, sediment analysis;

(04.00076)

Waller, B.G. 1976. Analysis of selected benthic communities in the Florida Everglades with reference to their physical and chemical environment. U.S. Geol. Sur. Water Resources Invest., 76-28, 33 p.

Species diversity and numbers of benthic macroinvertebrates were determined at 12 stations, both canals and marshes, in the Everglades of south Florida. Long term trends in water quality and variation between study areas was determined from these values. Species diversity at all sites was generally in a range indicative of degraded water quality. The number of organisms per square meter of bottom surface was highly variable (43 - 8,200 organisms). No gross contamination from sewage or agricultural runoff in any of the canals where benthic organisms were collected was evident. Other physical factors were determined to be responsible for the low species diversities and variable numbers of organisms, rather than contamination from urban and agricultural areas.

Study Duration:1 1/2 years; Habitat:Variable; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Ekman dredge; Sieve Size:0.6 mm; Number of Stations:12; Number of Replicates/Station:10; Temporal Frequency:Twice per dry season; twice per wet season; Abiotic Parameters Measured:Water chemistry, flow velocity, DO, BOD, TOC;

(04.00077)

Wilson, K.A. 1983. Mangrove crab distribution: the risk of predation. Presented at Benthic Ecol. Meet., Fla. Instit. of Tech., Melbourne.

The effect of predation on the distribution and microhabitat use by 4 species of crabs (*Aratus pisonii*, *Sesarma curacaoense*, *Uca rapax*, *Eurytium limosum*) was investigated in a mangrove swamp in south Florida. Relative risk to predation by the blue crab (*Callinectes sapidus*), the mud crab (*Eurytium limosum*) and birds was measured in 3 microhabitats: the mud floor; prop roots; and tree canopy. Predation risk was maximum on the mud floor, less severe on the prop roots, and non-existent in the tree canopy. The influence of vulnerability to predation on the distribution and microhabitat of mangrove crabs was assessed.

Habitat:Mangrove swamp; Biological Component:Crustacea; Dominant Taxon/Taxa Studied:*Callinectes sapidus*, *Eurytium limosum*, *Aratus pisonii*, *Sesarma curacaoense*, *Uca rapax*;

(04.00078)

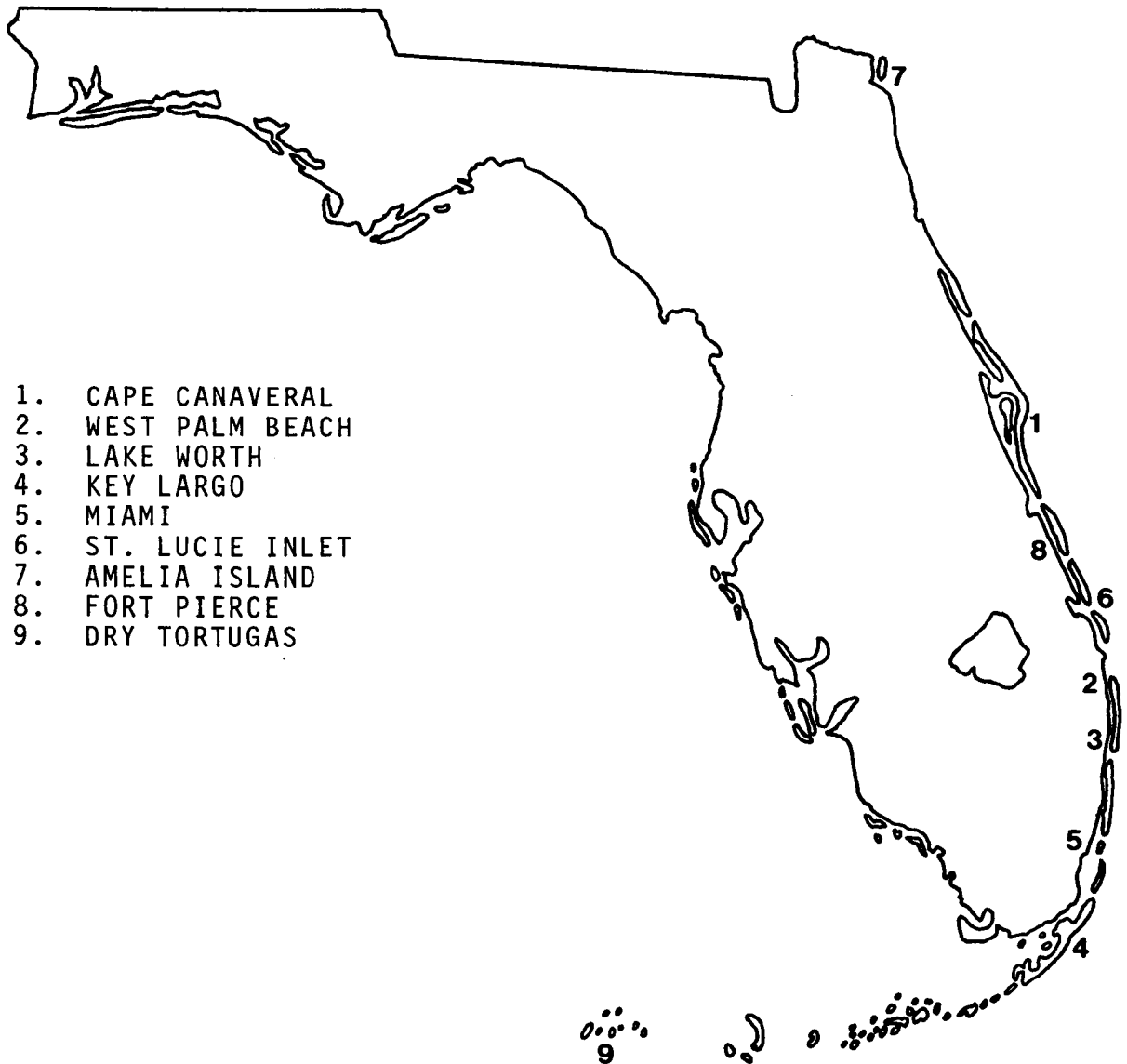
Woelkerling, W.J. 1976. South Florida benthic marine algae. Sedimenta V. The comparative Sedimentology Laboratory, Div. of Mar. Geol. & Geophys. Univ. of Miami.

Illustrated keys to the genera of green, brown, and red algae and to the genera and species of blue-green algae commonly found in marine benthic communities of Florida were presented. A glossary of morphological terms used in the keys, the literature pertaining to Florida marine algae, brief comments on marine algae habitats and communities and instructions for the collection, preservation, and examination of algae material were included.

Type of Study:Qualitative; Biological Component:Benthic flora;



# EAST COAST



(05.00001)

Anderson, W.W. 1970. Contributions to the life histories of several penaeid shrimps (Penaeidae) along the south Atlantic coast of the United States. U.S.F.W.S. Spec. Sci. Rept., Fish. No. 605. 24 p.

Trends in the shrimp fishery of the south Atlantic coast of the United States were examined as a whole, by states, and by species for the period 1958 to 1967. A steady decline in total shrimp landings was the major finding. Studies on the white shrimp (*Penaeus setiferus*) in 1931-1935 also yielded data on the brown shrimp (*P. aztecus*), the sea bob (*Xiphopenaeus kroyeri*) and *Trachypeneus constrictus*. Data were collected on the pink shrimp (*P. duorarum*) near Cape Kennedy, Florida in 1965-1967. Information is presented on size distribution, ovary development, sex ratios, and spawning seasons of several shrimp species.

Study Duration:1958-1967; Type of Study:Quantitative; Biological Component:Crustacea; Dominant Taxon/Taxa Studied:*Penaeus setiferus*, *P. aztecus*, *P. duorarum*, *Xiphopenaeus kroyeri*, *Trachypeneus constrictus*;

(05.00002)

Avent, R.M. & F.G. Stanton 1979. Observations from research submersibles of megafaunal distributions on the continental margin of central eastern Florida. Harbor Branch Found., Inc. Tech. Rept. No. 25.

Twelve east-west transects between 30 and 305 m depth along the central Florida continental shelf, from Cape Canaveral to Fort Worth, were traversed with research submersibles to survey the regional megafauna and sediment and hydrographic conditions. The distribution of epibenthic macrofauna was described and correlated with sediment type, temperature, and current. Three faunal boundaries were identified: between the inner and outer shelf (at about 50 m); between the shelf and slope (at about 110 m); and between the upper and central slope (at about 180 m). The shelf slope faunal transition was the most prominent and apparently varied in depth in response to spatial variations in the Florida Current. The distribution of some common crustaceans from previous trawl and dredge collections showed similarities to the submersible observations.

Type of Study:Quantitative; Biological Component:Fauana; Number of Stations:12 transects; Abiotic Parameters Measured:Temperature, current velocity, sediment type;

(05.00003)

Avent, R.M., F.B. Stanton, J.K. Reed & N.J. Eiseman 1976. Submersible reconnaissance and research program. Harbor Branch Found., Inc. Annu. Rept. 66 p.

This report cites changes in general methods for scientific operations of submersibles since 1975, including an increase to 1000' in depth safely allowed. A general account of the continental margin off central eastern Florida and the distribution of selected fauna (continental shelf, shelf-slope transition zone, and upper continental slope) is provided. Studies on coral communities from 3 study sites representing extremes and mid-depth range of the branching coral *Oculina* resulted in quantitative and quantitative data. Over 1000 animals were found on solitary coral heads from each study area. In situ growth and coral biometric studies have been initiated at each of the 3 study sites. Since growth studies have been initiated only recently, data will not be available until the study sites are revisited later. Ten stations were established for repeated sampling, where collections were made primarily by lockout divers from the submersibles, thus providing data on marine plants and benthic marine algae (of which 14 are new species records for the state of Florida) were collected and identified (including one species of seagrass). A taxonomic account is presented.

Study Duration:October 1975-October 1976; Habitat:Variable; Type of Study:Qualitative; Biological Component:Flora and fauna; Type of Sampler:Submersible; Number of Stations:12 transects; Abiotic Parameters Measured:Temperature, currents;

(05.00004)

Avent, R.M., M.E. King & R.H. Gore 1977. Topographic and faunal studies of shelf-edge prominences off the central eastern Florida coast. Int. Revue ges. Hydrobiol. 62(2):185-208.

Eighty topographic profiles made off the central Atlantic coast of Florida from November 1973 to September 1974 revealed the presence of a band of pinnacles, benches, mounds, and troughs along the shelf edge from Fort Pierce to Cape Canaveral and a massive mound off St. Lucie Inlet. Dredgings and submersible observations at 2 areas of extreme vertical relief demonstrated the presence of diverse invertebrate and fish populations associated with exposed limestone bedrock and the hard coral, *Oculina varicosa*.

Study Duration:November 1973-September 1974; Habitat:Rock, coral reef; Type of Study:Qualitative; Biological Component:Fauana; Type of Sampler:Dredge, submersible; Number of Stations:2; Dominant Taxon/Taxa Studied: *Oculina varicosa*;

(05.00005)

Blevins, W.L., T.A. Nevin & C.L. Noble 1976. Thiol synthesis by halophilic bacteria indigenous in a coastal lagoon. B. Env. Contam. Tox. 15(3):330-335.

The observation that H<sub>2</sub>S from the water column just above muds in control east coast lagoons disappeared with no increase in sulfur oxides was investigated. Chemical tests for the presence of H<sub>2</sub>S in incubated lagoon waters

included titrations, precipitations and other qualitative tests for the presence of sulfites, thiosulfates, and reduced sulfur. The results point to thiol synthesis by halophilic bacteria. Other results and environmental implications are discussed.

Habitat:Mud; Type of Study:Quantitative; Biological Component:Fauna; Abiotic Parameters Measured:Sulfites, thiosulfates, reduced sulfur;

(05.00006)

Borkowski, T.V. 1974. Growth, mortality, and productivity of south Floridean Littorinidae (Gastropoda: Prosobranchia). Bull. Mar. Sci. 24:409-438.

Growth, mortality, and productivity of Littorinidae collected from Key Largo to Lake Worth from August 1967 to August 1969 were investigated. Results revealed significant seasonal variations in growth rate while the growth pattern was affected by age, sex, mortality rates and size. Productivity measurements showed that 85% of secondary production was made up of spawn production. Other aspects of spawning and biomass are discussed.

Study Duration:August 1967-August 1969; Type of Study:Quantitative; Biological Component:Fauna; Number of Stations:6; Dominant Taxon/Taxa Studied:*Tectarius auricatus*, *Modiolittorina tuberculata*, *Echininus nodulosus*, *Littorina lineata*, *Littorina lineolata*, *Littorina ziczac*;

(05.00007)

Bullis, H.R., Jr. & J.R. Thompson 1965. Collections by the exploratory fishing vessels "Oregon", "Silver Bay", "Combat", and "Pelican" made during 1956-1960 in the southwestern North Atlantic. U.S. Fish Wildl. Serv. Spec. Sci. Rept. Fish. No. 510. 310 p.

This report summarizes the fishery explorations conducted by the Bureau of Commercial Fisheries between 1956 and 1960 from Cape Hatteras, North Carolina, to Brazil. The sampling methods and locations are described, as well as the physical parameters measured. It is believed that the resulting data should show the distributional patterns of the benthic fauna.

Study Duration:1956-1960; Type of Study:Qualitative; Biological Component:Fauna; Type of Sampler:Shrimp & fish trawls, scallop & clam dredges, seines & lampara nets, longlines; Abiotic Parameters Measured:Temperature, bottom type, depth;

(05.00008)

Bullis, H.R., Jr. & W.F. Rathjen 1959. Shrimp explorations off southeastern coast of the United States (1956-1958). Comm. Fish. Rev. 21(6):1-20.

The offshore area from Cape Hatteras, North Carolina, to Dry Tortugas, Florida was explored for shrimp grounds between 1956 and 1958 by vessels of the U.S. Bureau of Commercial Fisheries. Royal red shrimp of commercial size were found most consistently in depths of 180 to 220 fathoms between St. Augustine and Cape Canaveral, Florida. The shrimp resources and physical parameters of 7 sub regions are summarized. Fishing methods and catch sizes are given. Other commercial fishery resources of rock shrimp, scallops and flounder were located.

Study Duration:1956-1958; Type of Study:Qualitative; Biological Component:Crustacea; Type of Sampler:Shrimp trawl;

(05.00009)

Calder, D.R., P.J. Eldridge & E.B. Joseph (eds.) 1974. The shrimp fishery of the southeastern United States: A management planning profile. South Carolina Marine Resources Center. Tech. Rept. No. 5. 229 p.

Prepared under the auspices of the "South Atlantic Technical Committee for Shrimp Management", this report provides a comprehensive management planning for the shrimp fishery of the states of North Carolina, South Carolina, Georgia and the Atlantic coast of Florida. Section 1 (Introduction) provides a description of the problems and the objectives of the study. An excellent section on the description of resource describes the species composition, life history of the predominant species, population dynamics, food requirements, and geographical distribution. Other sections of the report describe the industry, yield, historical catch statistics, current laws and regulations, ongoing and projected research and monitoring, and a list of actual and potential problems to the fishery.

Study Duration:January 1973-September 1974; Habitat:Sand, shells, grassbeds; Type of Study:Quantitative (review); Biological Component:Crustacean fauna; Dominant Taxon/Taxa Studied:*Penaeus duorarum*, *P. setiferus*, *P. aztecus*;

(05.00010)

Center for Natural Areas 1977. A summary and analysis of environmental information on the continental shelf and Blake Plateau from Cape Hatteras to Cape Canaveral. Prep. by Ctr. for Natural Areas for BLM Contract #AA550-CT7-39.

An extensive survey was made of published literature, unpublished data, and ongoing research programs involving the continental shelf between Cape Hatteras and Cape Canaveral. The full report was completed in 1974 and is summarized in the present work in 1977. Subjects of study include geology, chemistry, plankton, benthos, marine vertebrates, as well as the social parameters of fisheries and recreational uses.

Type of Study:Quantitative; Biological Component:Fauna, flora;

(05.00011)

Commercial Fisheries Review 1970. "Bowers" explores for scallop off Florida's east coast. Commer. Fish. Rev. 32(6):8-9.

An exploratory cruise was made in April 1970 using the Remote Underwater Fisheries Assessment System (RUFAS) to assess scallop populations on the east coast. Heaviest scallop concentrations were found off Cape Kennedy at 19 to 25 fathoms. Other aspects of the performance of RUFAS are discussed.

Study Duration:April 1970; Type of Study:Quantitative; Biological Component:Fauna; Number of Stations:15 transects;

(05.00012)

Commercial Fisheries Review 1967. "Oregon" dredged scallops off Florida. Comm. Fish. Rev. 29(11):22-24.

The results of exploratory scallop dredging from St. Augustine to Ft. Pierce, Florida by the R/V Oregon are summarized. Scallop sizes, catch rates, and meat yields are given by area.

Study Duration:29 Aug.-22 Sept. 1967; Type of Study:Qualitative; Biological Component:Mollusca; Type of Sampler:North Carolina type scallop trawl; Dominant Taxon/Taxa Studied:*Pecten (Argopecten) gibbus*;

(05.00013)

Cummins, R., Jr. 1971. Calico scallops of the southeastern United States 1959-69. Nat. Mar. Fish. Serv., Spec. Sci. Rept. Fish. 627. 22 p.

The calico scallop (*Argopecten gibbus*) resources of the southeastern United States are discussed. The development of the calico scallop fisheries of North Carolina and Florida is described. The quality of the scallop and its parasites are given. The development of processing machinery and recent industry activity are summarized.

Type of Study:Qualitative; Biological Component:Mollusca; Dominant Taxon/Taxa Studied:*Argopecten gibbus*;

(05.00014)

Cutler, E.B. 1973. Sipuncula of the Western North Atlantic. Bull. Am. Mus. Nat. Hist. 152 (Article 3):105-204.

Over 8,300 sipunculans from more than 500 stations off the east coast of the United States were identified and described. Each species was characterized morphologically and zoogeographically. A key was provided for the identification of the 26 species collected. Distribution maps for the species were presented. In the description of each species, particular attention was paid to variation in morphology due to ontogeny. Based on abiotic niche features, the species were grouped into four major ecological units: southern, shallow warm water; northern, shallow cold water; slope; and abyssal. Competitive exclusion was found to operate within each of these groups except the abyssal fauna. The existence of a shallow-water, zoogeographical barrier at Cape Hatteras was reaffirmed. Three of four ecological groupings of species fit into pre-existing zoogeographical provinces, but a new province was proposed for the slope.

Habitat:Sand, shell hash, silt, clay; Type of Study:Qualitative; Biological Component:Sipuncula fauna; Type of Sampler:Bottom grab, dredge, trawl; Sieve Size:1.0 mm; Number of Stations:500 plus; Abiotic Parameters Measured:Temperature, currents, topography;

(05.00015)

Dawson, C.E., Jr. & C.P. Idyll 1951. Investigations on the Florida spiny lobster, *Paaulirus argus* (Latreille). Fla. St. Bd. Conserv., Tech. Ser. No. 2. 39 p.

This study examined the life history of the spiny lobster, *Paaulirus argus*, to provide a basis for management of the fishery. Spawning occurred from March to June, with a maximum spawning occurring in April. Data was summarized on sex ratios, weight-length and total length-tail length relationships. A tagging study demonstrated that lobsters migrated up to 125 miles/year, but that 90% more migrated less than 20 miles/year. It was concluded that the spiny lobster population probably did not decline during the study period and that overfishing did not occur. Recommendations were made for changes in fishery regulations.

Study Duration:1945-1949; Type of Study:Quantitative; Biological Component:Crustacea fauna; Type of Sampler:Lobster slat traps, bully nets; Dominant Taxon/Taxa Studied:*Paaulirus argus*;

(05.00016)

DeSylva, D.P. 1954. The live bait shrimp fishery of the northeast coast of Florida. Fla. Bd. Conserv. Mar. Lab., Tech. Ser. No. 11. 35 p.

The biological and economic aspects of the live bait shrimp fishery were investigated along the northeast coast of Florida from June to September 1953. The life histories of the 3 penaeid species included in the fishery are described. Seven shrimp producing areas are considered in terms of the locally important species, the sampling gear used, the catch

composition, and the ecology of the area. Methods of holding and transporting live shrimp are described and the economic importance of the industry is discussed.

Study Duration: June-September 1953; Type of Study: Quantitative; Biological Component: Crustacea; Dominant Taxon/Taxa Studied: *Penaeus duorarum*, *P. setiferus*, *P. aztecus*;

(05.00017)

Drummond, S.B. 1969. Explorations for calico scallop, *Pecten gibbus* in the area off Cape Kennedy, Florida, 1960-1966. Fish. Ind. Res. 5:85-101.

A survey of the calico scallop, *Pecten (Argopecten) gibbus*, was conducted along the east coast of Florida from 1960 to 1966. The location of scallop beds and typical catch rates were determined. The area between Ft. Pierce and the southeast shoal off Cape Kennedy in depths of 90-210 ft was found to be the most productive. Scallop abundance was determined to be sufficient to support a year round fishery.

Study Duration: 1960-1966; Type of Study: Quantitative; Biological Component: Mollusca; Type of Sampler: Georges Bank sea scallop dredge; Dominant Taxon/Taxa Studied: *Pecten (Argopecten) gibbus*;

(05.00018)

Duane, D.B. & E.P. Meisburger 1969. Geomorphology and sediments of the nearshore continental shelf Miami to Palm Beach, Fla. U.S. Army Corps of Eng. Coast. Engineering Res. Ctr., Ft. Belvoir, VA. Tech. Memo 29:47 p. + appendices.

A survey was made to determine the location and availability of suitable sand deposits on the continental shelf between Palm Beach and Miami, to be used for shore protection and restoration projects. Sediments varied from sand size calcareous skeletal fragments to fine-to-medium gray sand consisting of 50% quartz and 50% calcareous skeletal fragments. Estimates of volumes of sand and other sediments were made and discussion centered around suitability for a specific use.

Type of Study: Qualitative; Abiotic Parameters Measured: Sediment characteristics;

(05.00019)

Dymond, J. & E. Banatti 1967. Absolute age stratigraphic correlation and mineralogy of ash layers in tertiary sediments from Atlantic off Florida. Am. Assoc. Petrol. Geol. Bull. 51(3 pt. 1):462.

Sediment cores from the 1965 JOIDES drilling program which were collected off the eastern coast of Florida revealed volcanic ash layers. The ash consisted of fresh acidic glass in the 30-60 micron fraction. Foraminifera found in the ash date it to the Oligocene, as it is typical of fauna from Oligocene sections in other areas. Potassium argon dating provided absolute ages.

Study Duration: 1975; Type of Study: Qualitative; Type of Sampler: Cores; Abiotic Parameters Measured: Sediment characteristics; Dominant Taxon/Taxa Studied: *Glabroaonalina micra*, *Chilomenelina cubensis*, *Globorotalia postcretacea*, *G. yeguaensis*;

(05.00020)

Eckelbarger, K.J. 1976. Larvae development and population aspects of the reef-building polychaete *Phragmatopoma lapidosa* from the east coast of Florida. Bull. Mar. Sci. 26(2):117-132.

The larvae development and population biology of the reef-building polychaete *Phragmatopoma lapidosa*, were investigated. The growth rate was estimated by measuring the body lengths and tube diameters of specimens collected, following larvae settlements on the reefs. Larvae settlement under laboratory conditions occurred 14 to 30 days after fertilization. Temperature studies indicated that optimal larvae development occurred between 24° and 26°C, with only 50% of the larvae developing at 15.5° and 29.5°C. Larvae settlements were observed on only 4 occasions in the field during the study period and 3 types of settlement patterns were observed. Juveniles developed sex products about 6-8 weeks after settlement and shed fertilized eggs 4 months after settlement. Data from laboratory spawnings and fertilizations, observations of field settlements and the presence of larvae in the plankton suggest that some segments of the population may be spawning during most of the year in southern Florida.

Study Duration: January 1973-May 1975; Type of Study: Quantitative; Biological Component: Coral polychaete fauna; Abiotic Parameters Measured: Temperature; Dominant Taxon/Taxa Studied: *Phragmatopoma lapidosa*;

(05.00021)

Field, M.E. & E.P. Meisburger 1973. Erosional origin of inner shelf sediments: Evidence from north Florida. Am. Assoc. Petrol. Geol. Bull. 57(4):778.

Sediment cores were obtained and studied from the Atlantic continental shelf off central and northern Florida. The study revealed that most of the sediments from the Holocene come from erosion and reworking of shelf substrate, not from direct fluvial contribution. The present mixture of sediments is indicative of mixed local sources. The characteristics of low feldspar, high phosphorite, unstable heavy mineral assemblage and pronounced rounding of quartz grains were observed and

are indicative of an erosional origin. Other aspects of dating sediments and place of origin location procedures are discussed.

Type of Study:Qualitative; Type of Sampler:Vibratory core; Abiotic Parameters Measured:Sediment characteristics;

(05.00022)

Gore, R.H., L.E. Scotto & L.J. Becker 1978. Community composition, stability, and trophic partitioning in decapod crustaceans inhabiting some subtropical sabellariid worm reefs. Bull. Mar. Sci. 28(2):221-248.

A survey of the decapod and stomatopod crustaceans inhabiting the sabellariid biotope resulted in 92 species of 52 genera and 22 families. Species composition and the relative abundance and occurrence of the numerically important species were similar for the duration of the study. Gut content analyses and predator prey relationships among dominant species indicated that all feed to some extent on the sabellariid worms which construct the substratum of the biotope. In addition, it was determined from the nutritional modes among the dominant species that trophic partitioning occurs. The distribution of the 3 dominant crustaceans along the central eastern Florida coastline was shown to follow that of the sabellariid worm itself.

Study Duration:2 years; Habitat:Sabellariid worm reefs; Type of Study:Semi-quantitative; Biological Component:Decapod fauna; Number of Stations:3 night; 4 day; Number of Replicates/Station:1; Temporal Frequency:Approximately monthly; Dominant Taxon/Taxa Studied:*Pachycheles nonifer*, *Menippe nodifrons*, *Pachygrapsus transversus*;

(05.00023)

Hanson, R.B., K.R. Tenore, S. Bishop, C. Chamberlain, M. Panatier & J. Tietjen 1981. Benthic enrichment in the Georgia Bight related to Gulf Stream intrusions and estuarine outwelling. J. Mar. Res. 39(3):417-422.

Twelve stations on the continental shelf of the Georgia Bight were sampled by box core to determine the distribution of benthic biomass (microbiota, meiofauna, and macrofauna), which is believed to be influenced by nutrient inputs from intrusions of deep Gulf Stream waters at the shelf break. Microbiota biomass was lower in the mid shelf than in the inner and outer shelf. Along the shelf break microbiota biomass increased southward toward an area of frequent Gulf Stream intrusions off Florida. Maximum meiofaunal biomass occurred in the mid shelf area off Georgia which is sporadically subject to deep water intrusions. Macrofaunal biomass reached its maximum off Florida. Relationships between microbial, meiofaunal and macrofaunal biomass distribution are cited. Values for sediment granulometry, organic carbon, nitrogen content, benthic surface metabolism, and microbial activity are summarized in addition to faunal biomass and density. It is concluded that the mid shelf benthos is generally impoverished due to sporadic and patchy nutrient inputs, while the shelf break and inner shelf benthos are enriched by nutrients from deep Gulf Stream intrusions and estuarine outwelling, respectively.

Study Duration:June 1977; Habitat:Sand; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Box core; Sieve Size:0.5 mm, 0.044 mm; Number of Stations:12; Number of Replicates/Station:15; Abiotic Parameters Measured:Sediment grain size;

(05.00024)

Heck, K.L., Jr. 1979. Some determinants of the composition and abundance of motile macroinvertebrate species in tropical and temperate turtle grass (*Thalassia testudinum*) meadows. J. Biogeog. 6(2):183-200.

Epibenthic macroinvertebrates turtle grass (*Thalassia testudinum*) beds were sampled monthly from the northeast coast of Florida and from Panama to test the hypothesis that structurally similar habitats have similar species richness, independent of latitude. Species richness was found to be significantly greater in Panama; this was attributed to the proximity of faunally rich coral reefs to the Panamanian seagrass meadows. Variations in total macroinvertebrate abundance between the 2 areas was apparently caused by seasonal fluctuations in fish predators and species composition.

Study Duration:June-December 1972, July 1974-May 1975; Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Trawl; Number of Stations:4 (Florida), 3 (Panama); Number of Replicates/Station:7 (Florida), 10 (Panama); Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity;

(05.00025)

Joyce, E.A., Jr. 1965. The commercial shrimps of the northeast coast of Florida. Fla. St. Bd. Conserv., Mar. Lab. Prof. Pap. Ser. No. 6, 224 p.

Shrimp sampling was conducted along the northeast coast of Florida; inshore for 17 months, offshore for 12 months. A total of 9 different penaeids were collected. The biological patterns of the 3 major commercial species were summarized. Bait shrimping and commercial shrimping were discussed. Suggestions for the possibilities of increasing the commercial shrimp catch were made. The highest temperatures and salinities recorded during the study had little effect on the shrimp. Different low salinity tolerances among the species, however, were important in determining what nursery grounds were suitable for the juveniles, especially in the St. Johns River. The St. Johns River as a nursery ground and a source of fresh water, was found to be of prime importance.

Study Duration:17 months, 1 year; Habitat:Clay, mud, sand, rock, shell, coral, sponge; Biological Component:Decapod

fauna; Type of Sampler:Trynet; Number of Stations:30, 15; Number of Replicates/Station:1; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Penaeus fluviatilis*, *P. aztecus*, *P. duorarum*;

(05.00026)

Joyce, E.A., Jr. 1966. *Acetes* shrimp on the Florida east coast. Quart. J. Fla. Acad. Sci. 29(1):38.

This short note identifies the small (<2.5 cm) transparent shrimp found entangled by the millions in Florida east coast commercial shrimp nets as adult *Acetes americanus caroliniae*, a member of the family Sergestidae. Shrimp boat operators previously believed these shrimp, which dry out after the nets are brought aboard were the young of the commercially important white shrimp. *A. a. caroliniae* occurs from North Carolina throughout the Gulf of Mexico and south to Brazil and should in no way hinder shrimping operations on the east coast of Florida.

Type of Study:Qualitative; Biological Component:Shrimp fauna; Dominant Taxon/Taxa Studied:*Acetes americanus caroliniae*;

(05.00027)

Kennedy, F.S., J.J. Crane, R.A. Schlieder & D.G. Barber 1977. Studies of the rock shrimp, *Sicyonia brevirostris*, a new fishery resource on Florida's Atlantic shelf. Fla. Mar. Res. Publ. No. 27, 69 p.

Life history, fishery dynamics and potential stock locations of the area's population of rock shrimp were studied. The major population recruitments occurred from late spring through summer, although some recruitment occurred year round. Adult abundance followed a yearly cycle, peaking in fall and exponentially declining until a new year class appeared the next spring. Ovarian developmental stages, age of maturity, and peak spawning were discussed as was carapace length, weight, mortality rate and diet. The generalized distribution, life cycle, and seasonal abundance were also described.

Study Duration:2 years; Habitat:Variable; Type of Study:Qualitative; Biological Component:Decapod fauna; Number of Stations:1; Number of Replicates/Station:1; Temporal Frequency:Monthly and bimonthly; Abiotic Parameters Measured:Temperature, salinity, depth; Dominant Taxon/Taxa Studied:*Sicyonia brevirostris*;

(05.00028)

Kennedy, F.S., Jr. & D.G. Barber 1981. Spawning and recruitment of pink shrimp, *Penaeus duorarum* off eastern Florida. J. Crust. Biol. 1(4):474-485.

Otter trawl surveys from January 1973 through December 1974 along northeast Florida's continental shelf indicated fall and spring immigration of *Penaeus duorarum* to 26 m and 40 m depths. Year round spawning was evidenced by histological examination of ovaries with a primary spawning period during late spring and summer. The Florida Current and Gulf Stream are speculated to transport larvae from south Florida to Cape Canaveral and from Cape Canaveral to Cape Hatteras. The discontinuous distribution of adult populations of *P. duorarum* along the southeastern Atlantic coast is probably the result of discontinuous occurrence of acceptable sediments (>50% coarse carbonate sands) at suitable depths.

Study Duration:January 1973-December 1974; Type of Study:Quantitative; Biological Component:Crustacea; Type of Sampler:Otter trawl; Number of Stations:167; Number of Replicates/Station:24 (4 stations), once (163 stations); Temporal Frequency:Monthly; Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(05.00029)

Kolipinski, M.C. 1964. The life history, growth, and ecology of four intertidal gastropods (genus *Merita*) of southeast Florida. Univ. of Miami Ph.D. Dissertation. 131 p.

The zonation, reproduction, spawning, embryology, growth, and longevity of 4 species of the intertidal gastropod *Merita* were investigated from habitats in southeast Florida. The sex ratio was 1:1 in *M. tessellata* and *M. versicolor*, but females were more abundant among large *M. fulgurans*, probably due to greater longevity or faster growth rate of females as compared to males. *M. fulgurans* and *M. versicolor* spawn predominantly during early and late summer, whereas *M. tessellata* showed irregular spawning activity. The number of eggs per capsule varied interspecifically and intraspecifically. An atypical larval structure is described as well as the hatching behavior of *M. tessellata* and *M. fulgurans*. Seasonal growth rates and apparent life spans are given for each species. The data are used to derive life history patterns of the sympatric species.

Habitat:Intertidal; Type of Study:Quantitative; Biological Component:Mollusca; Dominant Taxon/Taxa Studied:*Merita fulgurans*, *M. peloronta*, *M. tessellata*, *M. versicolor*;

(05.00030)

Mahood, R.K. et al. 1970. A report on the cooperative blue crab study -- South Atlantic states. U.S. Bur. Comm. Fish. 32 p.

Blue crab populations were studied at 20 South Atlantic sampling stations to determine the cause of massive mortalities occurring between 1966 and 1968. Histopathological testing revealed that lethal levels of pathogens were not present.

In the laboratory, salinity and temperature tolerance studies showed crabs to be less tolerant at low salinity, high temperature and high salinity, low temperature conditions. Toxicity studies determined DDT and Toxaphene were increasingly lethal at low salinities and at temperatures varying from 15°C. The relationship between environmental conditions and crab survival time and metabolic rates is shown. Hydrological data is also included.

Type of Study:Quantitative; Biological Component:Fauna; Number of Stations:20; Abiotic Parameters Measured:Salinity, temperature, DO, pH, turbidity; Dominant Taxon/Taxa Studied:*Callinectes sapidus*;

(05.00031)

McKenney, C.L., Jr. & J.D. Costlow, Jr. 1982. The effects of mercury on developing larvae of *Rithropanopeus harrisii* (Gould). I Interactions of temperature, salinity, and mercury on larval development.

*Rithropanopeus harrisii* collected from Florida were reared in the laboratory from hatch to postlarva in 64 combinations of temperature, salinity and mercury concentrations. Survival of larvae under a broad range of salinities and temperatures characteristic of estuarine environments was reduced by constant exposure to Hg ranging from 5 to 20 parts 10<sup>-6</sup> Hg<sup>2+</sup>. Low mercury concentrations resulted in reduced plasticity of larvae to estuarine conditions and retarded development.

Type of Study:Quantitative; Biological Component:Fauna; Abiotic Parameters Measured:Salinity, temperature, mercury; Dominant Taxon/Taxa Measured:*Rithropanopeus harrisii*;

(05.00032)

McPherson, B.F. 1968. Contributions to the biology of the sea urchin *Eucidarus tribuloides* (Lamarck). Bull. Mar. Sci. 18(2):400-443.

*Eucidarus tribuloides* specimens were studied at sites representing "dead" reef, "patch" reef, grassbed and mud-sand habitats off southeastern Florida from 1965-1966. *Eucidarus* is best adapted to reef areas, where it anchors itself during the daylight hours for protection, and from which it derives nourishment. Test and gonad growth rates, as well as population growth rates were evaluated. Test growth rate decreased with increasing size of the urchin and also decreased during the summer. Growth rate of populations in areas close to shore was greatest. Ripe gonads formed in late summer and early fall. In the lab, *Eucidarus* eggs developed to the metamorphosis stage in 25 days.

Study Duration:1965-1966; Habitat:Reef, grassbed, patch reef; Type of Study:Quantitative; Biological Component:Fauna; Number of Stations:7; Temporal Frequency:Monthly; Dominant Taxon/Taxa Studied:*Eucidarus tribuloides*;

(05.00033)

Meisburger, E.P. and M.E. Field. 1976. Neogene sediments of Atlantic inner continental shelf off northern Florida. Am. Assoc. Pet. Geol. Bull. 60(11):2019-2037.

The northern Florida continental shelf was studied through 1,134 n. mi. of high resolution seismic-reflection profiles, vibratory cores and borings. Floral and faunal remains were found in most sediment underlying the shallow shelf. Chief contributors were mollusks, echinoids, barnacles, foraminiferans and ostracods. Analysis indicates these were deposited at various times from late Tertiary to Holocene in depths from littoral to 100 m.

Type of Study:Qualitative; Biological Component:Fossil fauna; Type of Sampler:Core; Number of Stations:200; Dominant Taxon/Taxa Studied:fossil molluscs, foraminifera;

(05.00034)

Pawson, D.L., J.E. Miller & C.M. Hoskin 1981. Distribution of *Holothuria lentiginosa enodis* Miller and Pawson in relation to a deep-water *Oculina* coral reef off Fort Pierce, Florida (Echinodermata: Holothuroidea). Internat. Echinoderm Conf., Tampa, Fla.

A population of *Holothuria lentiginosa enodis* is associated with a reef of the ahermatypic coral *Oculina varicosa* Lesueur in a depth of 75 m ap; proximately 30 km northeast of Fort Pierce Inlet, Florida. Transects 2 m wide by 80 m long were run in 3 directions from each of 4 permanent markers near the reef 11 times over a 2 year period, counting holothurians in 10 m increments. A patchy distribution was found with a maximum density of 2.2 individuals/m<sup>2</sup>. There was no apparent correlation of distribution with prevailing Gulf Stream currents. Holothurians usually occurred in areas where organic content of substratum averaged 4.4% (dry weight); they were usually absent in areas where organic content averaged 3.3% or less.

Study Duration:2 years; Habitat:Coral reef; Type of Study:Quantitative; Biological Component:Echinoderm; Type of Sampler:Submersible Johnson-Sea-Link; Number of Stations:12 transects; Temporal Frequency:11 times/2 years; Dominant Taxon/Taxa Studied:*Holothuria lentiginosa enodis*;

(05.00035)

Pettibone, M.H. 1977. The synonymy and distribution of the estuarine *Hypaniola florida* (Hartman) from the east coast of the United States (Polychaete: Ampharetidae). Proc. Biol. Soc. Wash. 90(2):205-208.



The author synonymized his species *Hypaniola grayi* found off Martha's Vineyard, MA, and from the St. Johns River, Florida with a species previously described by Hartman (1951) under the name of *Amphicteis gunneri floridus*. A record was made of the synonymy and an expansion of the known distribution of the species based on previous published records and collections sent to the author for identification was presented.

Type of Study:Qualitative; Biological Component:Polychaete fauna; Dominant Taxon/Taxa Studied:*Hypaniola grayi*;

(05.00036)

Reed, J.K. 1980. Distribution and structure of deep water *Oculina varicosa* coral reefs off central eastern Florida. Bull. Mar. Sci. 30:667-677.

A study of the distribution and growth form of the ahermatypic coral, *Oculina varicosa* was conducted off the central eastern Florida coast using dredge and trawl samples and submersible observations. Over 50 sites were found in depths of 50 to 100 m, where *O. varicosa* existed singly or as sparsely scattered groups. Contiguous colonies up to 2 m in height were located in 9 areas and extensive banks were found at 5 sites. The banks are 17 to 24 m high with steep slopes, especially on the south side which faces the Florida Current. The reef structure of *O. varicosa* was found to be similar to that of deep water *Lophelia prolifera* banks on the Blake Plateau.

Study Duration:December 1975-April 1979; Habitat:Coral reef; Type of Study:Qualitative; Biological Component:Coral fauna; Type of Sampler:Dredge, trawl, submersible; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Oculina varicosa*;

(05.00037)

Reed, J.K. & R.G. Gilmore 1981. Inshore occurrence and nuptial behavior of the rougtail stingray, *Dasyatis centroura* (Dasyatidae) on the continental shelf, east central Florida. Northeast Gulf Sci. 5(1):59-62.

Courtship behavior of a pair of rougtail stingrays (*Dasyatis centroura*) was observed for 10 minutes near the base of a *Oculina varicosa* coral bank in 80 m of water. Sizes of the male and female are estimated and their behavior described. Data is given on 17 specimens of *D. centroura* caught on hook and line off Melbourne Beach between March 1975 and December 1977. Distributions and migrations of *D. centroura* are related to seasonal water temperatures and a reproductive cycle is conjectured.

Study Duration:March 1975-December 1977; Habitat:Sand; Type of Study:Qualitative; Biological Component:Condriichthys; Abiotic Parameters Measured:Water temperature, current velocity & direction, visibiity; Dominant Taxon/Taxa Studied:*Dasyatis centroura*;

(05.00038)

Reed, T.L. 1976. Heavy metal concentrations in the sediments of a portion of the east Florida continental shelf. Fla. Instit. Tech. M.S. Thesis.

A discussion of the heavy metal geochemical aspects of the sediments of a portion of the east Florida continental shelf is presented. Baseline concentrations of six environmentally active heavy metals were established. A clear relationship between grain size distribution of sediments and heavy metal concentrations was not seen. An inverse correlation was seen between trace metals and quartz content of the sediments. Such an inverse correlation was also noted for lead and zinc in quartz rich sediment. Included in the benthic biota were polychaetes, crustaceans (mostly barnacles and crabs), echinoderms (sea stars, sea cucumbers and sand dollars), slipper shells (*Crepidula* spp.), chitons and some bryozoans and coelenterates (anemones). Calico scallop shells were very common, but living individuals were present only on the outer continental shelf. Vegetative cover was mostly lacking.

Habitat:Sand, coarse shell fragments; Type of Study:Qualitative; Biological Component:Benthic invertebrates; Type of Sampler:Ponar grab; Number of Stations:14; Abiotic Parameters Measured:Temperature, depth, currents;

(05.00039)

Roberts, M.H., Jr. 1974. A socioeconomic environmental baseline summary for the South Atlantic region between Cape Hatteras, North Carolina and Cape Canaveral, Florida. Vol. III. Chemical and biological oceanography. U.S. Dept. of Int., Bureau of Land Mgt. 772 p.

An environmental baseline summary was completed in 1974 on the coastal and offshore area between Cape Hatteras and Cape Canaveral. Volume III of this report encompasses the chemical and biological studies and is the third of five volumes. Included in the biological study is work on plankton, benthos, coastal vegetation, fish, birds, and mammals. A general description is given for most species covering distribution, abundance, reproduction, habitat and other characteristics.

Type of Study:Quantitative; Biological Component:Faua, flora;

(05.00040)

Spring, K.D. 1981. A study of spatial and temporal variations in the nearshore macrobenthic populations of the central Florida east coast. Fla. Instit. of Tech. M.S. Thesis.

The macrobenthos of a high energy beach on the east coast of central Florida was sampled monthly from June 1979 to April 1980. Samples were collected at 6 stations along 3 transects running from mean high water to 91 m offshore. An intertidal *Donax variabilis* - *Emerita talpoida* community subtended a subtidal assemblage composed of haustoriid amphipods, juvenile *Donax* sp. and polychaetes. Individuals of both communities were found in lower abundances in a transition zone between the two areas. Low species richness and diversity in winter samples were apparently related to wave induced changes in mean sediment grain size and depth, as were spatial variations in abundances of certain species.

Study Duration: June 1979-April 1980; Habitat: Sand; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Core; Number of Stations: 18; Abiotic Parameters Measured: Sediment grain size, depth; Dominant Taxon/Taxa Studied: *Donax variabilis*, *Emerita talpoida*;

(05.00041)

Stalter, R. 1976. The zonation of vegetation of southeastern saltmarshes. Proc. of the Third Annu. Conf. on Restoration of Coast. Vegetation in Fla. p. 24-35.

Zonation of vegetation in 12 southeastern saltmarshes located from Florida to North Carolina was studied to compare species composition. Four vegetation zones were described according to height above mean low water and species associations. Results showed differences in composition of the vegetation between zones at the 12 stations. Soil concentration (chlorinity, salinity, conductivity) and duration and depth of flooding determine zonation.

Habitat: Saltmarshes; Type of Study: Quantitative; Biological Component: Flora; Number of Stations: 12; Abiotic Parameters Measured: Chlorinity, salinity, electrical conductivity; Dominant Taxon/Taxa Studied: *Spartina alterniflora*, *Distichlis spicata*, *Salicornia virginica*, *Spartina patens*, *Borrchia frutescens*;

(05.00042)

Stephenson, T.A. & A. Stephenson 1952. Life between tide marks in North America. II. Northern Florida and the Carolinas. J. Ecol. 40(1):1-49.

An extensive study was made of the flora and fauna found in the tidal zone along the North Florida to North Carolina coast. The flora and fauna found in this region are very different from those in South Florida. The biota of this study are categorized as warm temperate. Physico-chemical and biological aspects of this region are discussed.

Type of Study: Quantitative; Biological Component: Fauna, flora;

(05.00043)

Thompson, M.J. & L.E. Gilliland 1980. Topographic mapping of shelf edge prominences off southeastern Florida. Southeastern Geol. 21(2):155-164.

The Sebastian Pinnacle system, a zone of topographic prominences along the eastern continental shelf edge of Florida was mapped with side scan sonar and fathometer tracings. The major features of the zone were formed from combined geophysical and biological forces. Substrate distribution patterns are a result of deposition and erosion by the Florida Current. Periods of lower sea level caused differential erosion and dissolution of underlying limestone, forming holes and crater like depressions throughout the area. Major relief was found to be due to mounds of oolitic limestone and relict coral reefs.

Study Duration: Spring 1977-November 1977; Habitat: Sand, shell, rock; Type of Study: Qualitative; Biological Component: Fauna; Dominant Taxon/Taxa Studied: *Oculina varicosa*, *Montastrea annularis*;

(05.00044)

Virnstain, R.W., M.A. Capone, K.D. Cairns & P.S. Mikkelsen 1983. A sharp change in macrofaunal density and dynamics at the continental shelf slope break. Presented at Benthic Ecol. Meet., Fla. Instit. of Tech., Melbourne.

An order of magnitude decrease in benthic macrofaunal density was found near the topographic shelf slope break from samples collected along a transect off the southeast Florida coast. Recolonization rates in defaunated sediments also decreased markedly along the transect. On the inner shelf (33 m depth), density and diversity returned to original values within a few weeks, whereas on the slope (310 m), recolonization required more than a year.

Habitat: Mud; Type of Study: Quantitative; Biological Component: Fauna; Number of Stations: 4; Number of Replicates/Station: 3;

(05.00045)

Winston, J.E. & N.J. Eiseman 1980. Bryozoan-algal associations from coastal and continental shelf waters of eastern Florida. Fla. Sci. 43(2):65-74.

In a survey of algal associated bryozoans from Sebastian Inlet to St. Lucie Inlet, Florida, 28 species of bryozoans were found on 12 algal species in shallow subtidal waters and 36 species of bryozoans were sampled from 12 algal species in deep (30-90 m) continental shelf waters. Trends in abundance and distribution of Bryozoa and algae were cited. Calcified

chlorophyta and massive species of Phaeophyta and Rhodophyta were the most common hosts. Bryozoans were not found on any noncalcified chlorophyta.

Study Duration: 11 Feb. 1975-6 Oct. 1975, Sept.-Nov. 1977; Habitat: Beach, sand, rock ledge, rubble; Type of Study: Quantitative; Biological Component: Flora and fauna; Number of Stations: 10; Abiotic Parameters Measured: Temperature, current velocity, turbidity; Dominant Taxon/Taxa Studied: *Membranipora tuberculata*, *Thalamoporella gothica floridana*, *Beania intermedia*, *Aetea sica*, *Microporella ciliata*;

(05.00046)

Zeigler, J.M. & M.A. Patton 1974. A socioeconomic environmental baseline summary for the south Atlantic region between Cape Hatteras, North Carolina and Cape Canaveral, Florida. Vol. IV. Geological Oceanography. Prep. by Virginia Instit. of Mar. Sci. for the Bureau of Land Mgt. 200 p.

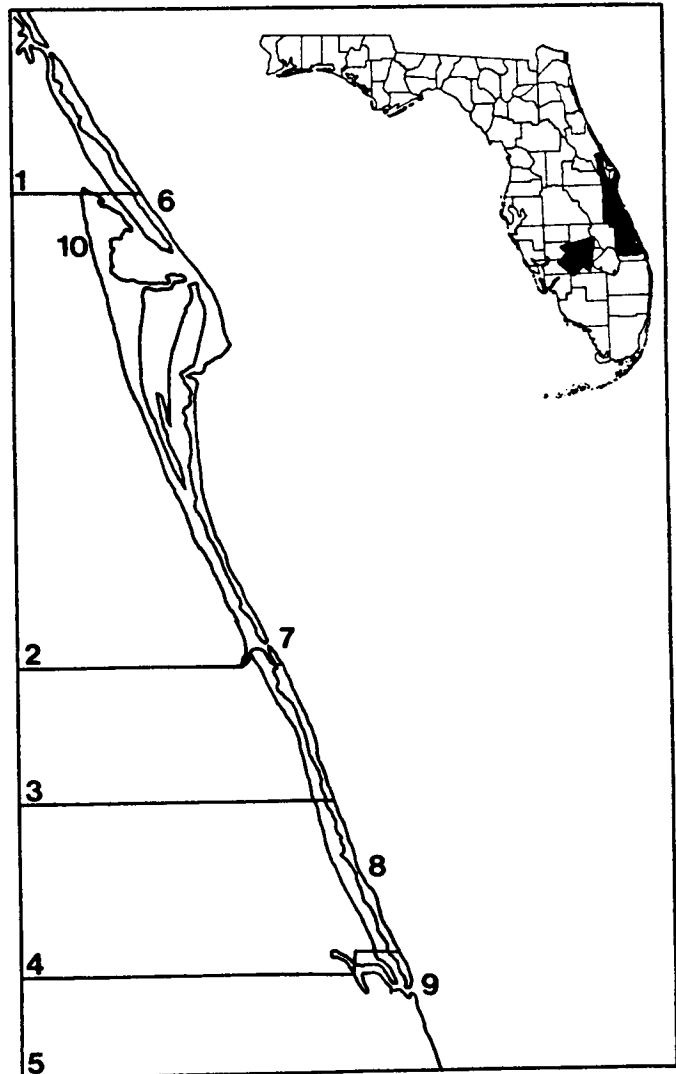
The geological oceanography of the continental shelf between Cape Hatteras, North Carolina and Cape Canaveral, Florida was reviewed as part of an environmental baseline study designed to provide a data base before oil and gas leasing begins in the study area. A general description of the area, its physiography, sediments, and exploitable resources are summarized for the coastal plains and continental shelves of 3 subzones and the Blake Plateau.

Type of Study: Qualitative (review);

See also: 27.00110, 29.00002.

# INDIAN RIVER REGION

1. VOLUSIA COUNTY
2. BREVARD COUNTY
3. INDIAN RIVER COUNTY
4. ST. LUCIE COUNTY
5. MARTIN COUNTY
6. INDIAN RIVER LAGOON
7. SEBASTIAN INLET
8. HUTCHINSON ISLAND
9. ST. LUCIE RIVER-  
ST. LUCIE INLET
10. TITUSVILLE



(06.00001)

Akimoto, D.K. 1972. Survey of the benthos at two sites in the Indian River for sulfide ions. Fla. Instit. of Tech. M.S. Thesis.

Benthic sediment samples from two sites in Indian River, Florida were analyzed for sulfide ion concentrations. Sediment from Vero Beach was found to be more anoxic than samples from Delespine. Sulfide ion concentrations were maximum at depths of 6 ft or more, probably due to decreased water turbulence at greater depth.

Type of Study:Quantitative; Number of Stations:2; Abiotic Parameters Measured:Total sulfide concentration;

(06.00002)

Barnett, D.R. 1977. Factors influencing the distribution of gastropods living in a soft substrate intertidal area. Fla. Instit. of Tech. M.S. Thesis.

Gastropods from a soft bottom intertidal area at Sebastian Inlet, Florida were sampled in January and May to determine the factors influencing their distribution. Various physical parameters were measured in addition to gastropod densities. Of the 13,714 gastropods (representing 11 species) collected, 89% were *Cerithium muscarum*. Gastropod distribution was not affected by fluctuations in water temperature or salinity. Organic carbon content, calcium carbonate content, median grain size, degree of sorting, dissolved oxygen, and water depth were significantly related to gastropod density, distribution, and diversity. Behavior patterns of *C. muscarum* and *Batillaria minima* were noted.

Study Duration:January-May 1977; Habitat:Mud; Type of Study:Quantitative; Biological Component:Mollusc fauna; Abiotic Parameters Measured:Temp., salinity, depth, DO, organic carbon, calcium carbonate content, sediment grain size distribution; Dominant Taxon/Taxa Studied:*Cerithium muscarum*, *Batillaria minima*;

(06.00003)

Buzas, M.A. 1982. Regulation of foraminiferal densities by predation in the Indian River, Florida. J. Foram. Res. 12(1):66-71.

Exclusion studies were conducted on foraminifera populations in the Indian River from March 1976 to August 1979. Predator species were excluded from the first test cages but not from the second test cages. Results consistently showed densities higher inside the first test cages than outside in the control area; however the second test cages showed reduced or equal densities to the control area. Gut content analysis of predators from the second test cage showed that a variety of deposit feeders ingested foraminifera. Larval predators inside both cages reduced densities in May and June.

Study Duration:March 1976-August 1979; Habitat:Sand; Type of Study:Quantitative; Biological Component:Fauuna; Sieve Size:63 micron; Number of Stations:2; Number of Replicates/Station:4; Abiotic Parameters Measured:Sediment grain size; Dominant Taxon/Taxa Studied:*Ammonia beccarii*, *Quinqueloculina impressa*, *Ephidium mexicanum*, *Q. seminula*, *E. gunteri*, *Haynesia germanica*;

(06.00004)

Buzas, M.A. & K.J. Carle 1979. Predators of foraminifera in the Indian River, Florida. J. Foram. Res. 9:336-340.

Macrofaunal specimens were collected from the Indian River estuary and examined to determine the animals that ingest foraminifera. A goby, decapods, molluscs, and polychaetes were all found to ingest foraminifera. Seasonal variations in densities were obtained but remained unexplained. Specifics of gut contents are discussed.

Type of Study:Quantitative; Biological Component:Fauuna;

(06.00005)

Buzas, M.A. & K.P. Severin 1980. Distribution and systematics of foraminifera in the Indian River, Florida. Smithsonian Contrib. Mar. Sci.

Documentation was made of the distribution and systematics of the foraminifera from the Indian River estuary. Collection, identification and canonical variate analysis was made and the results are discussed; 94 species were found and the 15 most abundant represented about 95% of the population. Graphic and micrographic results are given.

Study Duration:1975-1977; Habitat:Sand; Type of Study:Quantitative; Biological Component:Fauuna; Type of Sampler:3.5 cm dia. plastic core; Sieve Size:63 micron; Number of Stations:12; Number of Replicates/Station:2-4; Abiotic Parameters Measured:Salinity, temperature;

(06.00006)

Carlson, P., L. Yarbrow, C. Zimmerman & J. Montgomery 1982. The relationship of tidal inundation frequency and pore water chemistry to mangrove community structure. Florida Sci. 45 (Suppl 1):36.

Pore water chemistry was examined on an island in the Indian River, Florida. *Rhizophora mangle* dominated the

perimeter of the island but *Avicennia germinans* was only present in higher elevations, flooded frequently only in fall and late spring. Pore water constituents fell into two groups: those affected by mangrove transpiration (chloride and sulfate); and those related to tidal inundation frequency (iron, phosphate, ammonia, and sulphide). Differences were observed in pore water constituents between areas of *Rhizophora* and *Avicennia*.

Habitat:Mangrove; Type of Study:Quantitative; Biological Component:Flora; Abiotic Parameters Measured:Chloride, sulfate, iron, phosphate, ammonia, sulfide;

(06.00007)

Chen, P.S. 1969. A study of the decomposition rate of manatee grass (*Cynodoceum nanatorium*). Fla. Instit. of Tech. M.S. Thesis.

Laboratory and in situ measurements of decomposition of manatee grass, *Cynodoceum nanatorium* (*Syringodium filiforme*) were made in Indian River, Florida. Rates of change were measured for 7 parameters, 4 of which (chlorophyll, carbohydrate, caloric content, amino acid) correlated significantly with dry weight decrease during decomposition. Variations in protein and total lipids were associated with growth of large bacterial, fungal, and microinvertebrate populations on plant detritus.

Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Flora; Dominant Taxon/Taxa Studied:*Cynodoceum nanatorium*;

(06.00008)

Donnelly, P.J. & D.R. Morris 1980. Dinoflagellate cysts from the Indian River, Florida. Fla. Sci. 43(Suppl. 1):14.

Dormant cysts of several dinoflagellate species were collected from the water column and sediments of the Indian River over one year. Six species excysted in enriched seawater culture after 24-48 hours of isolation from morphologically similar cysts. When culture waters became nutritionally depleted, excysted motile forms were induced to reencyst. None of the cultures showed logarithmic growth. Changes in salinity and temperature did not affect cysts, but caused motile forms to become unviable.

Study Duration:12 months; Habitat:Sediment; Type of Study:Qualitative; Biological Component:Flora; Abiotic Parameters Measured:Salinity, temperature; Dominant Taxon/Taxa Studied:*Gonyaulax monilata*, *Pyrophacus horologium*, *Polykrikos hartmannii*, *Fragilidium heterolobum*, *Fragilidium* sp., *Cochlodinium* sp.;

(06.00009)

Down, C. 1983. Use of aerial imagery in determining submerged features in three east-coast Florida lagoons. Florida Sci. 46(3/4):355-362.

Low altitude aerial photographs and groundtruthing were used to delineate seagrass beds and other shallow water lagoons. Maps of grassbeds, oyster bars and dredged areas were produced. Photographs were taken in the spring of 1974 and winter of 1975 because of greater water clarity. Observations of color infrared transparencies over a light table proved most effective in delineating underwater features.

Type of Study:Technique, aerial imagery;

(06.00010)

Eiseman, N.J. & M.C. Benz 1974-75. Studies of the benthic plants of the Indian River Region, Chapt. 5, In: Indian River Coastal Zone, Second Annu. Rept. A Rept. on Research and Prog. October 1974-October 1975. Harbor Branch Consortium, Annu. Rept. 1974-75, 1:89-103.

A systematic inventory of the seagrass, mangrove and salt marsh species was completed and a similar inventory of the algae of the Indian River was continued. Observations on several algae communities are presented and compared to other areas of Florida.

Study Duration:1 year; Type of Study:Quantitative; Biological Component:Benthic flora; Type of Sampler:Plugs, aerial photos; Sieve Size:1.0 mm; Number of Stations:5; Number of Replicates/Station:4; Temporal Frequency:Approx. 5 week intervals; Dominant Taxon/Taxa Studied:*Halodule wrightii*, *Syringodium filiforme*, *Giffordia*, *Cladophora*, *Acrochetium*, *Nyriotrichia*, *Herposiphonia*, *Ceramium*;

(06.00011)

Eiseman, N.J., M.C. Benz & D.E. Serbousek 1976. Studies of the benthic plants of the Indian River Region. Chapt. 6, In: Harbor Branch Consortium Indian River Coast. Zone Study, 1975-1976. Annu. Rept. Vol. 1.

Two hundred and four specific and subspecific taxa of marine algae were identified (55 Chlorophyta, 23 Phaeophyta and 126 Rhodophyta) primarily from the drift algae community and from the continental shelf at depths greater than 30 m. Fifteen new geographic records and 3 new taxa are reported. Sixty three species of algae were found in the drift community. A preliminary model of the seasonal dynamics of *Halodule wrightii* based on data from 1974-1975 was tested for predictive capability. The model successfully predicted the standing crop in about 50% of the cases for a partial year's

data from 1976. Partial and multiple correlation coefficients are given for effects of environmental parameters on biomass of *N. wrightii*;

Study Duration:1974-1975; Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Benthic algae; Type of Sampler:Plug, 0.25 m<sup>2</sup> quadrat; Sieve Size:1.0 mm; Number of Stations:3 algae; 5 seagrass; Number of Replicates/Station:10 algae; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Dictyota dichotoma*, *Acanthophora spicifera*, *Hypnea cervicornis*, *N. musciformis*, *Spyridia filamentosa*;

(06.00012)

Eiseman, N.J., M. Meagher, R. Richards & G. Stanton 1974. Studies on the benthic and shoreline plants of the Indian River region. Chapt. 8, In: Harbor Branch Consortium Indian River Study. Annu. Rept. 1973-1974.

The species composition and distribution of the seagrass flora were determined and permanent stations for seagrass studies were established. Methods were developed for making inventories of seagrass stocks for continuing pollution related studies. Keys, descriptions and illustrations of the mangrove species are presented. A study of mangrove destruction by boring isopods was initiated, and some preliminary observations presented. An inventory of the shoreline and dune plants was initiated and a preliminary species list presented. Some preliminary work on the benthic algae of the Indian River is outlined. Efforts on the inventory of the benthic algae of the continental shelf are briefly discussed. The first year's work showed that surface vessels were relatively ineffective for this purpose.

Habitat:Mangrove, saltmarsh, beach, grassbed; Type of Study:Semi-quantitative; Biological Component:Benthic and shoreline flora; Type of Sampler:Posthole digger, Smith-McIntyre grab; Dominant Taxon/Taxa Studied: *Laguncularia racemosa*, *Rhizophora mangle*, *Avicennia germinans*, *Conocarpus erectus*, *Spartina alterniflora*;

(06.00013)

French, T.D. & J.R. Montgomery 1983. Temporal dynamics of copper chemistry in the shoal grass, *Halodule wrightii* Aschers. Florida Sci. 46(3/4):135-145.

Measurements of D.O., temperature, salinity, pH, and redox potential, or Eh revealed that shoal grass has resiliency and stability in the face of a major storm. Copper uptake by *Halodule* leaves was measured and transport of copper to the roots occurred. Observations of copper in *Halodule*, the major seagrass in the Indian River area, will reflect the occurrence of copper in the seagrass community.

Study Duration:April 1979 to October 1979, 7 months; Habitat:Seagrass, bare sand; Type of Study:Quantitative; Biological Component:Flora; Type of Sampler:Posthole digger; Sieve Size:4 mm; Number of Stations:1; Number of Replicates/Station:2; Temporal Frequency:variable, 6 times in 7 months; Abiotic Parameters Measured:pH, salinity, D.O., temperature, Redox potential, or Eh; Dominant Taxon/Taxa Studied:*Halodule wrightii*;

(06.00014)

Gilmore, R.G., D.W. Cooke & C.J. Donohoe 1981. A comparison of the fish populations and habitat in open and closed salt marsh impoundments in east central Florida. Northeast Gulf Sci. 5(2):25-37.

Impoundment and flooding of salt marshes along the Indian River lagoon resulted in decreased ichthyofauna and vegetation, as revealed by historical and recent biological surveys including aerial and ground level photographs. Two marsh impoundments, one closed to tidal influence from the Indian River and the other opened to tidal influence, were compared using monthly collections of fish made during 1979 and 1980. The closed impoundment contained 12 fish species, whereas the open impoundment had 41 species. The closed impoundment was shown to experience more extreme ranges of temperature, salinity, and dissolved oxygen than the open impoundment, which also exhibited large scale regrowth of marsh vegetation.

Study Duration:October 1977-December 1980; Habitat:Salt marsh; Type of Study:Quantitative; Biological Component:Fish fauna & flora; Type of Sampler:Heart trap, castnet, gill net, seine; Number of Stations:2; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO; Dominant Taxon/Taxa Studied:*Rhizophora mangle*, *Avicennia germinans*, *Batis maritima*, *Salicornia perennis*, *Anchoa mitchilli*, *Fundulus grandis*, *Gambusia affinis*, *Cyprinodon variegatus*;

(06.00015)

Gore, R.H. 1972. Zoogeographical aspects of decapod crustacea in the Indian River region of Florida. Am. Zool. 12(4):716.

Because of both freshwater runoff and oceanic water input, the decapod crustacean fauna in the Indian River was found to consist of freshwater, estuarine and strictly marine forms. A 1 year study on this fauna in the river and adjacent shallow Atlantic waters produced over 150 species, roughly divided into 3 groups: 1) species primarily tropical in affinity and occurring most abundantly in the Antillean province; 2) species of both tropical and water temperate affinity, occurring in both the Antillean and Carolinian provinces; and 3) species whose range extends beyond both the Carolinian province northward and the Antillean province southward. The majority of the species collected were primarily Antillean in their faunal affinities, but seemed to be those tropical and subtropical forms which were able to withstand the extreme temperature and salinity fluctuations.

Study Duration:1 year; Type of Study:Qualitative; Biological Component:Decapod fauna; Dominant Taxon/Taxa Studied:Abiotic Parameters Measured:Temperature, salinity;

(06.00016)

Gore, R.H. 1977. Studies on decapod crustacea from the Indian River region of Florida. VI. The identity of *Parthenope* (*Platylambrus*) *serrata* (H. Milne Edwards, 1834) and *Parthenope* (*Platylambrus*) *granulata* (Kingsley, 1879). Proc. Biol. Soc. Wash. 90(3):505-531.

A brief taxonomic history of some parthenopid crabs and a discussion on the status of *Lambrus serratus* and *L. crenulatus* is presented. Based on descriptions and illustrations, a partly revised synonymy for *Parthenope* (*Platylambrus*) *serrata* and *P. (P.) granulata* was constructed.

Habitat:Variable; Type of Study:Qualitative; Biological Component:Decapod fauna; Dominant Taxon/Taxa Studied:*Lambrus serratus*, *L. crenulatus*, *Parthenope* (*Platylambrus*) *serrata*, *P. (Platylambrus) granulata*;

(06.00017)

Gore, R.H. 1977. Decapod crustacean community structure and composition in drift algae - seagrass biotopes in the Indian River, Florida. Am. Zool. 17(4):920.

Sampling of the study area produced nearly 60,000 decapod crustaceans comprised of 31 species and 14 families. The decapod community was dominated by 5 species. Two alpheid shrimp and a majid crab were also determined to be numerically important benthic species. Positive correlation was found to exist between seagrass-drift algae biomass and the number of decapod: (A) species; (B) individuals; and (C) total crustacean biomass. Data indicated that a complex community trophic structure exists.

Study Duration:1 year; Habitat:Grassbed, estuarine; Type of Study:Quantitative; Biological Component:Decapod fauna; Type of Sampler:Drop net; Temporal Frequency:Monthly; Dominant Taxon/Taxa Studied:*Hippolyte pleuracanthus*, *Palaemonetes intermedius*, *Penaeus duorarum*, *Pagurus bonairensis*, *Neopanope packardii*;

(06.00018)

Gore, R.H. 1977. Studies on decapod crustacea from the Indian River region of Florida. VII. A field character for rapid identification of the swimming crabs (*Callinectes ornatus* Ordway, 1863; and *C. similis* Williams, 1966) (Brachyura, Portunidae). Proc. Biol. Soc. Wash. 90(3).

*Callinectes ornatus* and *C. similis*, both common in seagrass beds in the Indian River lagoon, have frequently been confused in the past. Color notes and photographs of live juveniles, as well as color patterns for adult specimens are presented. Identification notes for *C. sapidus* are also presented.

Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Decapod fauna; Dominant Taxon/Taxa Studied:*Callinectes ornatus*, *C. similis*, *C. sapidus*;

(06.00019)

Gore, R.H. & K.A. Wilson 1978. Studies on decapod crustacea from the Indian River region of Florida. X. A first continental record for *Discias atlanticus* Gurney, 1939. (Caridea; Disciadidae). Crustaceana 35 (Part 1):109-111.

A single male and female specimen of *D. atlanticus* were collected from shallow continental shelf waters off the central eastern Florida coast. These two specimens constituted the first record of the species for the continental United States.

Habitat:Artificial substrate; Type of Study:Qualitative; Biological Component:Decapod fauna; Type of Sampler:Multiple compartmented sediment recolonization tray; Dominant Taxon/Taxa Studied:*Discias atlanticus*;

(06.00020)

Gore, R.H. & L.E. Scotto 1979. Crabs of the family Parthenopidae (Crustacea, Brachyura: Oxyrhyncha) with notes on specimens from the Indian River region of Florida. Mem. Hourglass Cruises 3(6):98.

Eight species in 5 genera of parthenopid crabs were captured during this study. The collections were supplemented by additional material sampled over a 2 year period from the western Atlantic. At the time of this report, 22 species of the family Parthenopidae were known from the western Atlantic, and 12 were known to occur in the Gulf of Mexico. The species considered were tropical affinity, with only 2 occurring farther north than Cape Hatteras. More specimens of all species were collected by dredging than trawling, probably because of their semi-burrowing habits. The presence of ovigerous females in samples indicated several species have extended breeding seasons. Stomach contents analyses indicated omnivorous diets.

Study Duration:28 months and 2 years; Habitat:Variable; Type of Study:Qualitative; Biological Component:Decapod fauna; Type of Sampler:Flat, balloon, otter & Blake trawls, box & pipe dredges; Number of Stations:10 (2 transects); Number of Replicates/Station:2; Dominant Taxon/Taxa Studied:*Cryptopodia concava*, *Heterocrypta granulata*, *Mesorhoea sexspinoso*,



Parthenope agona, *P. fraterculus*, *P. serrata*, *P. granulata*, *Solenolambrus tenellus*, *P. pourtalesii*;

(06.00021)

Gore, R.H. & L.J. Becker 1975. Studies on stomatopod crustacea of the Indian River region of Florida I. Rediscovery and extension of range of *Heterosquilla armata* (Smith 1881). Proc. Biol. Soc. Wash. 88(3):21-28.

A single female *Heterosquilla armata* specimen, originally described in 1881 off the coast of New England was collected on the continental shelf off the central eastern Florida coast. A description including color and measurements, and its distribution is presented.

Type of Study:Qualitative; Biological Component:Stomatopod fauna; Dominant Taxon/Taxa Studied:*Heterosquilla armata*;

(06.00022)

Gore, R.H. & L.J. Becker 1976. Studies on stomatopod crustacea from the Indian River region of Florida. II. An annotated checklist of the central eastern Florida coast. Proc. Biol. Soc. Wash. 89(10):148-184.

Seventeen species of stomatopod crustaceans in 9 genera and 3 families were collected. Although no new species were found, the 341 specimens in 172 lots filled several gaps in previous distributional records for this region, as well as providing one notable range extension for *Heterosquilla armata*. Minor range extensions for 11 other species are noted.

Study Duration:November 1971-December 1974; Habitat:Grass, mud, coralline rubble; Type of Study:Qualitative; Biological Component:Stomatopod fauna; Type of Sampler:Seine net, Blake trawl, box & pipe dredge, otter trawl; Dominant Taxon/Taxa Studied:*Squilla empusa*, *S. edentata edentata*, *Gonodactylus bredini*;

(06.00023)

Gore, R.H. & R.E. Grizzle 1974. Studies on decapod crustacea from the Indian River region of Florida. III. *Callinectes bocourti* (Milne Edwards, 1879) (Decapoda, Portunidae) from the central east coast of Florida. Crustaceana 27(3):306-308.

Reported for the third time was a mature male specimen of *Callinectes bocourti*, a large swimming crab of some commercial importance. A description and measurements of the specimen is given.

Habitat:Estuarine; Type of Study:Qualitative; Biological Component:Decapod fauna; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Callinectes bocourti*;

(06.00024)

Gore, R.H., E.E. Gallaher, L.E. Scotto & K.A. Wilson 1981. Studies on decapod Crustacea from the Indian River region of Florida. XI. Community composition, structure, biomass, and species-area relationships of seagrass and drift algae-associated macrocrustaceans. Estuar. Coast. Mar. Sci. 12(4):485-508.

Macrocrustaceans associated with seagrass and drift algae were sampled with 10m<sup>2</sup> drop nets monthly for 1 year at 6 stations in the Indian River lagoon. Thirty eight species in 28 genera and 17 families were collected, the majority of which were caridean shrimp and brachyuran crabs. The community was numerically dominated by two caridean shrimp, a pagurid crab, and a penaeid shrimp, which composed 94.5% of all individuals taken. Numbers of individuals and total crustacean biomass both increased with increases in seagrass and drift algae biomass. Community diversity was apparently dependent on habitat complexity as measured by above ground plant abundance. The consistency of decapod species composition indicated a stable community, which was probably the result of habitat diversity produced by periodic increases in drift algae abundance. The within habitat diversity of the seagrass associated macrocrustacean community may be more closely regulated by competitive exclusion than by predation.

Study Duration:1 year; Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Crustacea fauna & flora; Type of Sampler:Drop net; Sieve Size:3.2 mm; Number of Stations:6; Number of Replicates/Station:5; Temporal Frequency:Monthly; Abiotic Parameters Measured:Water temperature, salinity; Dominant Taxon/Taxa Studied:*Hippolyte pleuracanthus*, *Palaemonetes intermedius*, *Pagurus bonairensis*;

(06.00025)

Gore, R.H., L.E. Scotto & L.J. Becker 1976. Crustacean community stability on sabellariid worm reefs in Florida. Am. Zool. 16(2):226.

Day and night collections of decapod and stomatopod crustaceans on surf zone sabellariid worm reefs in the Indian River area showed that 93 species in 52 genera and 21 families may occur in this biotope with 20 species considered common. Stability was seen in species composition, relative dominance, and in species numbers during 2 years' study. The sabellariid-associated macrocrustacean community was dominated numerically by a "hierarchy" of the 3 species (65%) with 3 other species comprising another 15% of all specimens. Species diversity and evenness generally decreased northward during 1974 but increased in 1975.

Study Duration:2 years; Habitat:Sabellariid worm reefs; Type of Study:Quantitative; Biological Component:Stomatopod and

decapod fauna; Dominant Taxon/Taxa Studied:*Pachycheles nonilifer*, *Menippe nodifrons*, *Pachygrapsus transversus*;

(06.00026)

Gore, R.H., L.J. Becker & L.E. Scotto 1974. Preliminary studies of the decapod and stomatopod crustaceans of the Indian River region. Chapt. 6, In: Harbor Branch Consortium, Indian River Study. Annu. Rept. 1973-1974.

Nearly 250 species in 38 families and 130 genera of primarily tropical decapod and stomatopod crustaceans were found to occur in the lagoonal and continental shelf region of the Indian River area. Several ranges were extended for species previously reported from the lower Caribbean and the discovery of at least one new species from the sabellariid worm reefs in the surf zone of the Indian River region was made. At the time of this report, the decapoda accessioned in to the Reference Museum totalled nearly 1400 lots comprising over 4000 specimens. An additional 400 lots from the lagoon and offshore brought the total number of lots and specimens to 1800 and over 8000, respectively. Additional studies on species diversity, biomass, and life histories would continue on selected decapod families with emphasis toward attaining a predictive capability in regard to both ecological and environmental concerns.

Habitat:Grassbed, worm reef, rock, sand, artificial substrate; Type of Study:Qualitative; Biological Component:Decapod & stomatopod fauna; Straight & balloon net otter trawls, Blake trawl, box dredge, pipe dredge, Type of Sampler:scallop dredge, Isaacs-Kidd mud water trawl; Number of Stations:Variable; Number of Replicates/Station:Variable; Temporal Frequency:Variable; Dominant Taxon/Taxa Studied:*Pachycheles nonilifer*;

(06.00027)

Gore, R.H., L.J. Becker, N. Blum, & L.E. Scotto 1976. Studies of decapod crustacea in the Indian River region of Florida Chapt. 12, In: Harbor Branch Consortium. Indian River Coast. Zone Study. 1975-1976 Annu. Rept. 1.

Preliminary analysis of data from this study indicated that the decapod crustacean community consists of about 30 species of which 14 appear to be unique and 7 may be considered common. A correlation was shown to exist between seagrass-algae biomass and faunal density in the decapod crustacean community. The data also suggest that crustaceans previously considered grassbed associates may be more correctly characterized as drift algae-seagrass associates in the Indian River region.

Study Duration:1 year; Habitat:Grassbed, sabellariid worm reef; Type of Study:Qualitative; Biological Component:Decapod fauna; Type of Sampler:Drop net; Number of Stations:1; Number of Replicates/Station:1; Temporal Frequency:Monthly; Dominant Taxon/Taxa Studied:*Hippolyte pleuracanthis*, *Palaeonetes intermedius*, *Periclimenes americanus*, *Penaeus duorarum*, *Pagurus bonairensis*, *Alpheus heterochaelis*, *Neopanope packardii*;

(06.00028)

Hall, M.O. & M.J. Eiseman 1980. Observations on the floristics and seasonality of seagrass epiphytes in a Florida coastal lagoon. Fla. Sci. 43(Suppl. 1):15.

Algae epiphytic on the seagrasses *Halodule wrightii*, *Syringodium filiforme*, *Thalassia testudinum* were collected from 5 stations in the Indian River, Florida, between December 1977 and December 1978 to analyze their seasonal floristics, phenology, and community structure. Forty one species of epiphytic algae were found: 17 Rhodophyta; 10 Phaeophyta; 10 Chlorophyta; and 4 Cyanophyta. The maximum and minimum number of species in one collection was 23 and 0, respectively. Epiphyte abundance was highest in January and February and lowest during the summer.

Study Duration:December 1977-December 1978; Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Flora; Number of Stations:5; Temporal Frequency:Monthly (3 stations), bimonthly (2 stations); Dominant Taxon/Taxa Studied:*Halodule wrightii*, *Syringodium filiforme*, *Thalassia testudinum*;

(06.00029)

Harrington, R.W., Jr. & W.L. Bidlingmayer 1958. Effects of Dieldrin on fishes and invertebrates of a salt marsh. J. Wildl. Mgt. 22(1):76-82.

Two thousand acres of Florida east coast tidal marsh, traversed by 354,000 linear feet of ditches, were treated with Dieldrin pellets that were air disseminated at one pound per acre to destroy sandfly (*Culicoides*) larvae. Resulting fish kill was substantial, although molluscs (snails, nudibranchs, tethyoids, and oysters) seemed to be unharmed by Dieldrin. Crustaceans were virtually exterminated throughout the area. The entire aquatic crab population was apparently destroyed and the fiddler crabs survived temporarily only in patches of marsh evidently missed by the pellets. A biweekly post treatment fish census indicated that repopulation began slowly about 4 weeks after the kill and increased. The general absence of dead and dying fishes and the scarcity of living fishes in the marsh after 2 weeks suggested that much of the fish population commuting between the marsh and adjacent inshore shallows of Indian River had been destroyed.

Study Duration:1 month; Habitat:Salt marsh; Type of Study:Semi-quantitative; Biological Component:Fish and invertebrates; Temporal Frequency:Every 2 weeks;

(06.00030)

Heffernan, J.J. & R.A. Gibson 1983. A comparison of primary production rates in Indian River Florida seagrass systems.

Florida Sci. 46(3/4):295-306.

*Thalassia testudinum*, *Syringodium filiforme*, *Halodule wrightii*, associated epiphytic flora, benthic microalgae and phytoplankton were sampled at three sites to determine primary production in seagrass meadows. Photosynthetic rates for Indian River seagrasses in March and July ranged between 0.009-0.395 mg C/g dry wt-h for *H. wrightii*, 0.005-0.79 for *T. testudinum*, and 0.009-1.72 for *S. filiforme*. Epiphytic productivity varied between seasons and stations. The productivity of epiphytes, benthic microalgae and phytoplankton did not vary greatly between stations but their importance in community productivity depended on the contribution on the seagrass species.

Study Duration:Two and one half years; Type of Study:Quantitative; Biological Component:Flora; Number of Stations:3; Temporal Frequency:Weekly; Abiotic Parameters Measured:Temperature, salinity, silicate, phosphate, nitrate, ammonia; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Syringodium filiforme*, *Halodule wrightii*, benthic microalgae, phytoplankton, epiphytes;

(06.00031)

Hendrix, G.Y. & R.H. Gore 1973. Studies on decapod crustacea from the Indian River region of Florida. I. *Alpheus thomasi* new species, a new snapping shrimp from the subtropical east coast of Florida (Crustacea: Decapoda: Caridea). Proc. Biol. Soc. Wash. 86(35):413-422.

A complete description based on material of the new species *Alpheus thomasi* and previously cited material is presented. Description, color, measurements, habitat, distribution, and etymology of this species are also presented. Comparisons were made with similar species.

Habitat:Sabellariid worm reef; Type of Study:Qualitative; Biological Component:Decapod fauna; Dominant Taxon/Taxa Studied:*Alpheus thomasi*;

(06.00032)

Howey, R.G. 1977. Environmental factors affecting the boring activity of *Sphaerona terebrans* in Florida red mangroves. Fla. Instit. of Tech. M.S. Thesis.

To study the infestation of the red mangrove (*Rhizophora mangle*) by the wood boring isopod, *Sphaerona terebrans*, two sites (one with infested and one with uninfested mangroves) were sampled monthly. Various physical parameters were monitored in addition to isopod density and boring rates. Isopod number and boring rate were positively correlated with salinity. Roots about 1 cm diameter were most heavily infested. Fungal softening of mangrove wood did not affect incidence of boring, but tannin concentrations were significantly higher in isopod infested roots. Temperature, pH, and dissolved oxygen values did not differ significantly between sites.

Habitat:Mangrove; Type of Study:Quantitative; Biological Component:Crustacea fauna; Number of Stations:2; Temporal Frequency:Monthly; Abiotic Parameters Measured:Macronutrients, salinity, pH, water temp., DO; Dominant Taxon/Taxa Studied:*Sphaerona terebrans*, *Rhizophora mangle*;

(06.00033)

Jennison, B.L. 1983. Reproductive biology of three species of sea anemones from the central Atlantic coast of Florida. Florida Sci. 46(3/4):179-186/

Three species of anemones from intertidal zones along the central Atlantic coast of Florida were studied over an eight month period. *Actinia beraudeensis* from Fort Pierce Inlet spawned at the end of September 1977; planulae were brooded throughout the year. Eighty-two animals examined consisted of 41 females, 5 males and 36 without gonads. *Aiptasia pallida* from Sebastian Inlet also spawned in September 1977. The 134 animals examined consisted of 34 females, 2 males, and 98 without gonads. *Bunodosoma cavernata* from Jupiter Inlet spawned in October 1977. The 75 animals examined consisted of 19 females, 29 males, 26 without gonads, and one hermaphrodite. Planulae were brooded throughout the year.

Study Duration:8 months; Habitat:Intertidal; Type of Study:Qualitative; Biological Component:Faua; Dominant Taxon/Taxa Studied:*Actinia beraudeensis*, *Aiptasia pallida*, *Bunodosoma cavernata*;

(06.00034)

Kerr, G.A. 1974-1975. Indian River Coastal Zone Study - Inventory. Harbor Branch Consortium. Annu. Rept. Vol. 2, 98 p. (unpub.)

An inventory of baseline information concerning the diversity of organisms and quality of the environment in the Indian River region is presented. The Biological and Chemical Master Data files which contain the major portion of information collected by the Indian River Coastal Zone Study are also presented. An inventory of 1,532 species found in the Indian River and on the adjacent continental shelf are listed.

Biological Component:Faua;

(06.00035)

Kornicker, L.S. 1977. Myodocopid ostracoda of the Indian River complex, Florida. Proc. Biol. Soc. Wash. 90(4):788-797.

Ostracod abundance was shown to increase during February to April, 1975 in the Banana River, and during February to May, 1975 in the Indian River. Diversity was low in the Indian River complex compared to that on the continental shelf. Reproduction was year-round for the two most abundant species in the complex.

Habitat:Mud; Type of Study:Qualitative; Biological Component:Ostracod fauna; Type of Sampler:Box core; Sieve Size:0.5; 1.0 mm; Number of Stations:8; Abiotic Parameters Measured:Temperature, salinity, depth; Dominant Taxon/Taxa Studied:*Sarsiella disparalis*, *S. zostericola*, *S. texana*, *Asteropteron oculistristis*, *Parasterope* sp.;

(06.00036)

Kulczycki, G.R., R.W. Virnstein & M.G. Nelson 1981. The relationship between fish abundance and algal biomass in a seagrass drift algae community. *Estuar. Coast. Mar. Sci.* 12(3):341-348.

Monthly drop net samples and 18 daily seine collections from a seagrass bed in Indian River, Florida indicated that abundances of both the cude goby *Gobiosoma robustum* and the gulf pipefish *Syngnathus scovelli* increased with increases in drift algae biomass. It is suggested that this relationship is due to the increased effectiveness of drift algae as a food source and refuge from predators.

Study Duration:April 1976-March 1977; Habitat:Seagrass-drift algae; Type of Study:Quantitative; Biological Component:Fish fauna & flora; Type of Sampler:Drop net, seine; Sieve Size:3.2 mm; Number of Stations:6; Number of Replicates/Station:5; Temporal Frequency:Monthly, daily; Dominant Taxon/Taxa Studied:*Gobiosoma robustum*, *Syngnathus scovelli*, *Halodule wrightii*, *Syringodium filiforme*, *Thalassia testudinum*, *Acanthophora spicifera*, *Chondria tenuissima*, *Dictyota dichotoma*, *Hypnea cervicornis*, *H. musciformis*;

(06.00037)

Lund, J.L. 1976. A study of *Cerithium muscarum* Say (Gastropoda: Prosobranchia) in selected *Halodule wrightii* grassbeds of the Indian River. Fla. Instit. Tech. M.S. Thesis.

Certain aspects of the life history of *Cerithium muscarum* from selected stations within *Halodule wrightii* grassbeds of the Indian River were examined. Parameters studied included population trends, densities and biomass, predator-prey relationships, and feeding habits. The life cycle of *C. muscarum* was found to be between 10 to 14 months with reproduction occurring from April to October if predation was not severe. Predation was shown to play a major role in preventing expansion of populations. Abiotic factors were shown to play a minor role other than temperature in initiating reproduction. The role of *C. muscarum* in accelerating biogeochemical cycling of organic material, serving as a food source for a number of primary carnivores, and providing empty shells that serve as a refuge for sipunculid worms and hermit crabs, was outlined and determined to be significant based on the abundance of this gastropod within the study area.

Study Duration:1 year; Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Mollusc fauna; Type of Sampler:15 cm x 15 cm x 20 cm corer; Number of Stations:4; Number of Replicates/Station:4; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, depth; Dominant Taxon/Taxa Studied:*Cerithium muscarum*, *Halodule wrightii*;

(06.00038)

Montgomery, J.R., C. Zimmermann, G. Peterson & M. Price 1983. Diel variations of dissolved ammonia and phosphate in estuarine sediment pore water. *Florida Sci.* 46(3/4):407-414.

A *Halodule wrightii* seagrass bed in the Indian River was sampled April 27 and 28, 1978. Variations of dissolved ammonia and phosphate in pore water at depths of 2 to 40 cm. were examined every 3 hrs. for 27 hours. Ammonia and phosphate were greatest at 10 cm. and decreased with depth. Eh values were consistently negative and pH ranged from 7.2 to 8.0. Dynamic ammonia and phosphate level changes were observed during the study period.

Study Duration:27 hrs.; Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Flora; Type of Sampler:Modified Syringe; Number of Stations:1; Number of Replicates/Station:2 or 3; Temporal Frequency:3 hrs; Abiotic Parameters Measured:Ammonium, DRP, nitrate, nitrite, temperature, salinity, Eh, pH.; Dominant Taxon/Taxa Studied:*Halodule wrightii*;

(06.00039)

Mook, D. 1976. Studies on fouling invertebrates in the Indian River I. Seasonality of settlement. *Bull. Mar. Sci.* 26(4):610-615.

The seasonality of settlement for fouling invertebrates in the Indian River estuary was studied, and a discussion presented. Invertebrates that established themselves in the cooler months were generally widely distributed forms, while those found in the warmer seasons were usually stenothermic tropical forms.

Study Duration:1 year; Type of Study:Qualitative; Biological Component:Fouling invertebrates; Type of Sampler:Artificial substrate; Number of Stations:1; Number of Replicates/Station:5; Temporal Frequency:2 four week intervals; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Balanus eburneus*, *Balanus*

amphitrite, *Spirorbis* spp., *Hydroides* spp.;

(06.00040)

Mook, D. 1981. Removal of suspended materials by fouling communities. *Mar. Ecol. Prog. Ser.* 5:279-281.

Fouling communities from the Indian River, consisting primarily of barnacles (*Balanus eburneus*), bryozoans (*Bugula* sp.), tube building amphipods (*Corophium lacustre*), hydroids, and sponges were studied to determine their role in removal of suspended particles. Particle consumption rates and particle size preference were measured with a coulter counter. Suspended particles of all sizes between 1 and 40  $\mu$ m were removed by the fouling communities with no size preference. Fecal particles emitted by some fouling species in the size range 1.5-5  $\mu$ m and >25  $\mu$ m may serve as a food source for other species of the community.

Study Duration:Spring 1980; Habitat:Fouling tiles; Type of Study:Quantitative; Biological Component:Fauna; Abiotic Parameters Measured:Water temperature, salinity; Dominant Taxon/Taxa Studied:*Balanus eburneus*, *Corophium lacustre*, *Bugula* sp.;

(06.00041)

Mook, D. 1983. Indian River fouling organisms, a review. *Florida Sci.* 46(3/4):162-167.

Seventy-three species of fouling organisms have been observed in the Indian River region. The Ft. Pierce Inlet area is dominated by stenotrophic colonial forms, while areas north of the inlet are dominated by eurytrophic solitary forms. This difference is believed to be caused by the increasing environmental stresses away from the inlet. Settlement occurs seasonally in some species and throughout the year in others. Fouling communities play an important role in converting suspended material to bottom sediments.

Type of Study:Review; Biological Component:Fauna; Dominant Taxon/Taxa Studied:Fouling organisms;

(06.00042)

Mook, D.H. 1981. Effects of disturbance and initial settlement on fouling community structure. *Ecology* 62(3):522-526.

The community structure of fouling organisms which settled on ceramic tiles in the Indian River, Florida was examined from November 1976 to October 1978. Treatments in which predation pressure was artificially increased or initial species composition was varied had no effect on community structure. Predator exclusion experiments altered the species composition of the fouling community, increasing the abundance of species which are normally eliminated by grazing.

Study Duration:November 1976-October 1978; Type of Study:Quantitative; Biological Component:Fauna;

(06.00043)

Nelson, W.G. 1981. The role of predation by decapod crustaceans in seagrass ecosystems. *Kiel Meeresforsch.* 5:529-536.

Seagrass associated macrobenthic invertebrates were exposed to various densities of natural fish (*Lagodon rhomboides*) and decapod (*Penaeus duorarum*, *Palaemonetes intermedius*, *Callinectes sapidus*) predators in laboratory and field predation experiments in the Indian River. Densities of amphipods, gastropods, bivalves, polychaetes, sipunculids, and tanaids had a negative exponential relationship with the total density of decapod crustaceans present; isopods and nemerteans showed no such relationships. A warning is given that oversimplification of intermediate trophic levels in trophic models may allow important regulatory pathways for seagrass community structure to be ignored.

Study Duration:21 days; Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Core; Sieve Size:1 mm; Dominant Taxon/Taxa Studied:*Penaeus duorarum*, *Palaemonetes intermedius*, *Callinectes sapidus*;

(06.00044)

Reed, J.K., R.H. Gore, L.E. Scotto & K.A. Wilson 1982. Studies on decapod crustacea from the Indian River region of Florida. XXIV. Community composition, structure, areal and trophic relationships of decapods associated with shallow and deep water *Oculina varicosa* coral reefs. *Bull. Mar. Sci.* 32(3):761-786.

Four stations on *Oculina varicosa* coral reefs in depths of 6, 27, 42, and 80 m off central east Florida coast were sampled for one year for decapod crustaceans. Over 2,300 individual decapods representing 15 families, 35 genera, and 50 species were collected among 42 samples of individual coral colonies. Most dominant were xanthid and majid crabs (10 and 6 species, respectively) and alpheid shrimp (9 species). Anomurans were abundant in the community, comprising 4 of the 6 most numerous species which accounted for 70% of all individuals collected. Similarity trends between stations and correlations of species assemblages with environmental parameters are stated. Community structure is related to coral age, size, percent mortality and habitat complexity.

Study Duration:September 1976-September 1977; Habitat:Coral reef; Type of Study:Quantitative; Biological Component:Crustacea; Number of Stations:4; Number of Replicates/Station:2-4; Temporal Frequency:Bi or trimonthly; Abiotic Parameters Measured: Sedimentation rates, water temperature, salinity, current velocity, light transmission; Dominant Taxon/Taxa Studied:*Pagurus carolinensis*, *Megalobrachium soriatum*, *P. piercei*, *Synalpheus townsendi*, *Galathea rostrata*, *Micropanope sculptipes*;

(06.00045)

Rice, J.D., R.P. Trocine & G.M. Wells 1983. Factors influencing seagrass ecology in the Indian River Lagoon. Florida Sci. 46(3/4):276-286.

Seagrass beds of *Halophila engelmannii*, *Halodule wrightii* and *Syringodium filiforme* between Cocoa and Grant, Florida were studied. Observations were made on the effects of water depth, water temperature, light intensity, epiphyte coverage, detrital accumulation and sediment resuspension and shifting on seagrass ecology. In vitro (<sup>14</sup>C) uptake experiments were conducted to determine photosynthetic capacity.

Study Duration:Seagrass beds; Type of Study:Qualitative, Quantitative; Biological Component:Flora; Abiotic Parameters Measured:Depth, temperature, light intensity, salinity; Dominant Taxon/Taxa Studied:*Halophila engelmannii*, *Halodule wrightii*, *Syringodium filiforme*;

(06.00046)

Rice, M.E., J. Piraino & H.F. Reichardt 1983. Observtions on the ecology and reproduction of the sipunculan *Phascolion cryptus* in the Indian River Lagoon. Florida Sci. 46(3/4):382-396.

*Phascolion cryptus*, the most abundant sipunculan found in the Indian River Lagoon was studied at a station 9 km north of the Fort Pierce Inlet. The sipunculan inhabits discarded gastropod shells and was found in densities of 667 to 3,856/m<sup>2</sup>. *Cerithium muscarum* shells were most commonly inhabited. Shell availability did not limit population numbers. Animals were reproductive throughout the year with a trend for higher reproductive activity from November through May.

Study Duration:June 1976 to May 1977, 1 year; Habitat:Sand and Grassbeds; Type of Study:Qualitative, quantitative; Biological Component:Fauna; Type of Sampler:Core; Sieve Size:2.8, 2.0 and 1.0 mm.; Number of Stations:1; Number of Replicates/Station:3 or 4; Temporal Frequency:Monthly; Abiotic Parameters Measured:Water depth, temperature, salinity; Dominant Taxon/Taxa Studied:*Phascolion cryptus*;

(06.00047)

Roberts, T.W. 1974. A study of the decomposition rate of manatee grass (*Cymodocea manatorum*). Fla. Instit. Tech. M.S. Thesis.

This in situ and laboratory study of the decomposition rate of manatee grass measured: 1) total lipids; 2) protein content; 3) carbohydrate content; 4) chlorophyll; 5) amino acid content; and 6) caloric content. Most of the manatee grass, especially the softer parts, decomposed during the first four weeks. Heavier cellulose parts, containing more lignin, continued to decompose, but at a much slower rate with some still remaining after 10 weeks. The fastest rate of decomposition was determined to occur between the second week and the fourth. Protein content and total lipid content appeared to reflect the growth of large populations of bacteria, fungi, and microinvertebrates that were feeding on the plant detritus. Although some differences were found between the in situ river stations and the laboratory culture groups, these variations were not statistically significant over the span of time of this study, and thus it was suggested that laboratory methods could be used in lieu of in situ studies with some degree of validity.

Study Duration:10 weeks; Habitat:Grassbed, laboratory; Type of Study:Qualitative; Biological Component:Benthic flora; Type of Sampler:Plastic milkjug (50 g); Number of Stations:2; Number of Replicates/Station:5; Temporal Frequency:Every 2 weeks; Dominant Taxon/Taxa Studied:*Cymodocea manatorum*;

(06.00048)

Salituri, J. 1975. A study of the thermal effects on the growth of manatee grass *Cymodoceum manatorum*. Fla. Instit. of Tech. M.S. Thesis.

The effect of thermal effluent from an electric generating plant on the growth of the seagrass, *Cymodocea manatorum* (*Syringodium filiforme*), was studied in the Indian River, Florida from February to May 1975. Growth increased up to 29°C, at which temperature a brown alga bloomed, causing a decrease in seagrass growth. When the seagrass was not covered by the brown alga, growth continued to increase up to 34.1°C. The thermal effluent caused a net annual decrease in productivity of manatee grass in the area of the power plant.

Study Duration:February-May 1975; Habitat:Seagrass beds; Type of Study:Quantitative; Biological Component:Flora; Abiotic Parameters Measured:Temperature, salinity, sediment grain size; Dominant Taxon/Taxa Studied:*Cymodocea manatorum* (*Syringodium filiforme*);

(06.00049)

Scofield, B.C. 1973. Mercury concentrations in tissues of the American oyster, *Crassostrea virginica* (Gmelin) along the Indian River in Florida. Fla. Instit. Tech. M.S. Thesis.

Four major sections of the soft tissues of oysters (*Crassostrea virginica*) including the mantle, gills, adductor muscle and digestive diverticula were analyzed for total mercury in order to see if one particular tissue was able to concentrate mercury more than another. Approximately 50 oysters were collected along the western shore of the Indian

River in Florida. Mercury detection was accomplished by Flameless Atomic Absorption Spectrophotometer. Mercury levels for the 4 tissues were quite low. More often, the digestive diverticula gave the greatest frequent incidence of mercury. Analyses of water samples for mercury in the Indian River were below detection levels of the instrument.

Study Duration:1 month; Habitat:Oyster bed; Type of Study:Qualitative; Biological Component:Mollusc fauna; Dominant Taxon/Taxa Studied:*Crassostrea virginica*;

(06.00050)

Sherman, J.C., T.A. Nevin & J.A. Lasater 1974. Hydrogen sulfide production from ethion by bacteria in lagoonal sediments. B. Env. Contam. Tox. 12(3):357-366.

Sediments were collected from the Indian River area and analyzed for ethion content and the production of hydrogen sulfide. Ethion is a pesticide used in orange groves and has great persistence. Breakdown byproducts of ethion interfere with many metabolic and physiological processes in fauna. This study deals with the production of hydrogen sulfide in sediments and bacterial subcultures.

Type of Study:Quantitative; Biological Component:Faua; Abiotic Parameters Measured:Hydrogen sulfide, ethion;

(06.00051)

Skov, A.L. 1976. A study of the food habits of the pinfish *Lagodon rhomboides* in the area of the Sebastian Inlet, Indian River, Florida. Fla. Instit. of Tech. M.S. Thesis.

The feeding habits of the pinfish *Lagodon rhomboides* were studied in the Indian River near Sebastian Inlet, Florida from October 1975 to June 1976. *L. rhomboides*, although omnivorous, preferred mainly animal material. Feeding activity was highest during early morning and late afternoon. Prey items varied with fish size and season and included amphipods, nematodes, gastropods, seagrasses, tanaids, polychaetes, bivalves, algae, anchovies and various crustaceans.

Study Duration:October 1975-June 1976; Type of Study:Quantitative; Biological Component:Faua; Dominant Taxon/Taxa Studied:*Lagodon rhomboides*;

(06.00052)

Thomas, J.R. 1974. Benthic species diversity and environmental stability in the northern Indian River, Florida. Fla. Instit. of Tech. M.S. Thesis.

Benthic samples were taken with a ponar grab along a transect in the northern Indian River, Florida, during the summer of 1973 to examine benthic species diversity. Species richness and evenness varied inversely with water depth. Species richness was also significantly related to the redox potential of the sediments. Oxygen availability, as determined from the redox potential, was believed to be more important than environmental stability in regulating species diversity. A biological indicator was proposed to assess sediment instability due to dredging activities in the estuary.

Study Duration:Summer 1973; Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Ponar grab; Abiotic Parameters Measured:Temp., DO, salinity, pH, redox potential;

(06.00053)

Trefrey, J.H., M. Sadoughi, M.D. Sullivan, J.S. Steward & S. Barber 1983. Trace metals in the Indian River Lagoon, Florida: the copper story. Florida Sci. 46(3/4):414:427.

The input of copper from anti-fouling paints was examined in the Indian River Lagoon and Eau Gallie River. Samples of water, suspended matter, sediments, barnacles, clams and crabs were analyzed for copper. Samples from the Eau Gallie Harbor had consistently higher copper levels which could be traced to vessel-related activities. Outside such tributaries in the Indian River normal copper levels were observed.

Duration of Study:November 1978 to May 1980, 18 months; Type of Study:Quantitative; Biological Component:Faua; Number of Stations:13; Number of Replicates/Station:2 (water), 5 to 20 (clams); Abiotic Parameters Measured:Salinity, temperature, pH, D.O., copper; Dominant Taxon/Taxa Studied:*Balanus eburneus*, *Callinectes sapidus*, *Mercenaria mercenaria*;

(06.00054)

Trocine, R.P. 1978. Effects of ultraviolet-B radiation on the photosynthesis of seagrasses. M.S. Thesis. Florida Institute of Technology.

The tolerance of different species of seagrasses to ultraviolet radiation was examined. The presence and effectiveness of photorepair mechanisms in reducing radiation damage and the role of epiphytes as shields to radiation were analyzed. Photosynthesis in *Halophila* was inhibited by UV-B. *Syringodium* was affected less and *Halodule* was affected least.

Habitat:Grassbed; Type of Study:Quantitative; Dominant Taxon/Taxa Studied:*Halophila engelmannii*, *Halodule wrightii*, *Syringodium filiforme*;

(06.00055)

Turner, R.L., D.W. Heatwole & S.E. Stancyk 1982. Ophiuroid discs in stingray stomachs: evasive autonomy or partial consumption of prey? In: Proc. Internat. Echinoderm Conf., Tampa, Fla.

Examination of stomachs of stingrays (*Dasyatis sabina*) collected from 5 locations in the Indian River revealed autotomized discs of the ophiuroid, *Ophiophragnus filograneus* but no skeletal parts. Experiments with an artificial stingray determined that disc loss was in response to the pumping activity of feeding rays. Reasons for disc loss by the brittlestars were investigated and the effect of stingray predation discussed.

Study Duration: 11 July 1979-19 May 1981; Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Echinodermata and fish; Type of Sampler: Box corer; Number of Stations: 5; Dominant Taxon/Taxa Studied: *Ophiophragnus filograneus*, *Dasyatis sabina*;

(06.00056)

Virnstien, R.W. 1977. The relative importance of predation on infauna in the York River, Virginia and the Indian River, Florida. Fla. Scientist 40(Suppl. 1):9-10.

The relative importance of predation on infauna was studied in the York River, Virginia and in the Indian River, Florida. The density of benthic infauna increased in enclosures much more in the York River than in the Indian River. The difference was attributed to the greater abundance of small decapod predators in the Indian River that could move through the wire mesh and were thus not effectively excluded from cages.

Habitat: Sand, mud; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Predator exclusion cages;

(06.00057)

Virnstien, R.W. 1978. Predator caging experiments in soft sediments: caution advised, In: M.L. Wiley (ed.) \* Estuarine Interactions, Academic Press, Inc. (New York, NY). pp. 261-273.

The York River experiments revealed that predators on infaunal macrobenthos are important in determining community structure and population densities. There appeared to be only 2 major predators in shallow water: the blue crab *Callinectes sapidus*, and the spot *Leiostomus xanthurus*. The same experiments in the Indian River, a coastal lagoon, showed no differences in faunal densities inside and outside enclosures. The differences between the results on the two geographic areas were attributed to the greater abundance in the Indian River of small decapod predators which were not excluded by the cages. These decapod predators actually increased in abundance in enclosures. Preliminary results from experiments on the shallow sandy shelf indicated that decapods and fishes were probably important here also as predators on the macrofauna. Problems of caging experiments encountered in the design, field, and interpretation stages are reviewed.

Habitat: Estuarine; Type of Study: Qualitative; Biological Component: Marine fauna; Type of Sampler: Predator enclosure cages; Sieve Size: 0.5 mm; Dominant Taxon/Taxa Studied: *Callinectes sapidus*, *Leiostomus xanthurus*;

(06.00058)

Virnstien, R.W. 1982. Leaf growth rate of the seagrass *Halodule wrightii* photographically measured in situ. Aquat. Bot. 12(3):209-218.

A clipped patch of *Halodule wrightii* in the Indian River, Florida was photographed in situ to record regrowth of grass blades. Growth rate of mean blade length was high (up to 8.5 mm/day) for several days after a 1-3 day lag time, slowing as older blades began to mature. The initial standing stock was completely replaced after 21 days. Leaf productivity during the period of rapid growth was 3.0 g dry wt/m<sup>2</sup>/day, representing a very high turnover rate (11%/day) when compared to the low standing stock (28 g dry wt/m<sup>2</sup>).

Study Duration: 19 March-9 April 1980; Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Flora; Abiotic Parameters Measured: Temperature, salinity, solar insolation; Dominant Taxon/Taxa Studied: *Halodule wrightii*;

(06.00059)

Virnstien, R.W., P.S. Mikkelsen, K.D. Cairns & M.A. Capone 1983. Seagrass beds versus sand bottoms: the trophic importance of their associated benthic invertebrates. Florida Sci. 46(3/4):363-381.

Seagrass beds in the Indian River Lagoon, Florida had 3 times the density of macrobenthic invertebrates found in nearby unvegetated sediments. This difference was attributed to the presence of epifauna in the seagrass. Heavy predation by decapods on the epifauna gives it more trophic significance than the infauna. A series of caging experiments were used to reveal the trophic processes of the different habitats.

Study Duration: April to June 1978; Habitat: Seagrass beds, sand bottoms; Type of Study: Qualitative, Quantitative; Biological Component: Flora, fauna; Type of Sampler: Post-hole type corer; Sieve Size: 0.5 mm; Number of Stations: 4; Temporal Frequency: Monthly; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Halodule wrightii*, macroinvertebrates;



(06.00060)

Wilcox, J.R. & H. Gamble 1974. The ecological significance of marine animal populations of the Indian River region. Chapt. 9, Pt. 1. In: Harbor Branch Found. Annu. Rept. on Indian River Study.

A study of the ecological significance of two marine animal populations (wood borers and sand dollars) of the Indian River region was conducted. *Eucopa michelini* and *Hellita quinquesperforata* were dominant benthic organisms on a biomass basis of the extensive nearshore sand areas of the east-central Florida continental shelf. Populations of these two species at Capion Shoals (an area close to Ft. Pierce and a nearly completed nuclear power plant) were being monitored for density, aggregations, spatial distribution, growth, and recruitment. On a yearly basis densities of *E. michelini* varied from 0.25-8.50 individuals/m<sup>2</sup>, with a mean of 3.05; densities of *H. quinquesperforata* ranged from 1.25-46.50 individuals/m<sup>2</sup>, with a mean density of 16.11. Sand dollars were determined to be good indicator organisms to detect environmental change since the animals are a conspicuous member of the benthos, easy to identify and count, relatively non-mobile, and susceptible to environmental stress. The numerical abundance of sand dollars, or simply their presence or absence, could allow for an assessment of the severity of an environmental perturbation.

Study Duration:2 years; Habitat:Sand, shell; Type of Study:Quantitative; Biological Component:Echinoderm fauna; Type of Sampler:4 m<sup>2</sup> grid; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Eucopa michelini*, *Hellita quinquesperforata*;

(06.00061)

Wilcox, J.R. & H. Gamble 1974. The ecological significance of marine animal populations of the Indian River region. Chapt. 9, Pt. 2, In: Harbor Branch Found. Annu. Rept. on Indian River Study.

Thirteen species of shipworms (Teredinidae) and one species of piddock (Pholadidae), wood-boring molluscs, were collected in the Indian River and their ecological role described. Data is preliminary. Waterlogged wood was collected by hand from spoil islands, mangrove fringes, and inlets, from which wood borers were extracted.

Study Duration:1 year; Type of Study:Qualitative; Biological Component:Molluscan fauna; Type of Sampler:Wood panels attached to cement blocks; Number of Stations:8; Number of Replicates/Station:1; Temporal Frequency:Every 2 months; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:Teredinidae and Pholadidae families;

(06.00062)

Winston, J.E. 1982. Marine Bryozoans Ectoprocts of the Indian River Area, Florida. Bull. Am. Mus. Nat. Hist. 173(2):102-176.

Eighty-four species of bryozoans were collected from different substrata in the Indian River area. Availability of suitable substrata appeared to control distribution of bryozoan species. Offshore species generally had tropical affinities while coastal and river species included both tropical and cosmopolitan bryozoans.

Study Duration:1 year; Type of Study:Qualitative; Biological Component:Bryozoan fauna; Number of Stations:21; Dominant Taxon/Taxa Studied:Bryozoans;

(06.00063)

Yarbo, L.A., P.R. Carlson, C.F. Zimmerman & J.R. Montgomery 1982. Sediment-water exchange of nutrients in the Indian River lagoon in Florida. Florida Sci. 45 (Suppl 1):37.

Fluxes of nutrients across the sediment-water interface was measured in situ (in clear domes) in grassbeds and sandy areas. Ammonia concentrations and filterable reactive phosphorus (FRP) remained the same or decreased during daylight when chamber oxygen was increasing, and increased at night when chamber oxygen decreased. Fluxes of ammonia, FRP and silicates were generally greater from silty seagrass sediments than nearby sandy areas. Primary produces at the sediment-water interface appear to affect flux of nutrients into the water column during the day.

Habitat:Grassbed, sand; Type of Study:Quantitative; Abiotic Parameters Measured:Ammonia, filterable reactive phosphorus, silicates;

(06.00064)

Young, D.X. 1975. Studies of benthic communities of the Indian River region, In: Indian River Coastal Study, Second Annu. Rept. A Rept. on Research and Progress. Oct. 1974 - Oct. 1975. Harbor Branch Consortium, Annu. Rept. Vol. 1, 189 p. (Unpub. manuscript).

The role and function of the benthic macrofauna community associated with the seagrass, *Halodule wrightii*, is described. Species diversity, species evenness and species richness are reported. Predation as a factor in regulating population sizes of opportunistic species and response to caging is discussed. The seasonality of settlement of common Indian River fouling organisms was determined for one year.

Study Duration:1 year; Habitat:Grassbeds; Type of Study:Quantitative; Biological Component:Benthic macrofauna; Type of Sampler:15 cm x 15 cm Italian quarry tiles; Number of Stations:5; Number of Replicates/Station:5; Temporal

GEOG. CLASSIFICATION: Indian River Region

Frequency:Monthly and bimonthly; Abiotic Parameters Measured:Temperature, salinity, depth; Dominant Taxon/Taxa Studied:*Polydora ligni*, *Exogone dispar*, *Phascolion n. sp.*, *Paratanoidae sp.*, *Clymenella mucosa*, *Fabriciella sp.*, *Cynadusa compta*, *Prionospio heterobranchia*, *Erichsonella filiformis isabelensis*, *Nemertinea*;

(06.00065)

Young, D.K. 1976. The Indian River study -- An adventure in marine pollution research. *Sea Tech.* 17(10):14-20.

An extensive study with multiple goals was set up to investigate the diversity of organisms and quality of the environment in the Indian River region over a 10 year period. A pre-pollution data base will be stored in an easily retrievable computerized system. It is hoped that the information will allow short and long term predictive capabilities on the effects of natural and man induced changes in the ecosystem.

Type of Study:Quantitative; Biological Component:Fauna/flora;

(06.00066)

Young, D.K. & M.W. Young 1977. Community structure of the macrobenthos associated with seagrass of the Indian River estuary, Florida. *Belle W. Baruch Symp. Mar. Sci., 6th Univ. So. Carolina*, 1977. *Ecology of Marine Benthos*, p. 359-376.

The effects of predation on community structure of the macrobenthos associated with dense stands of *Halodule wrightii* were studied, using cages. At the site characterized by a physically unstable and unpredictable environment, the increases of several species within the cage were in accord with predator-prey theory. Where the environment was more physically stable and predictable, increases in caged macrofauna were inconsistent with the current hypothesis of biological interactions affecting community structure.

Study Duration:6 months; Habitat:Grassbeds; Type of Study: Quantitative; Biological Component:Macrobenthic fauna; Type of Sampler:Coring device; Sieve Size:1.0 mm; Number of Stations:3; Number of Replicates/Station:5; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, tides; Dominant Taxon/Taxa Studied:*Halodule wrightii*, *Clymenella mucosa*, *Grandidierella sp.*, *Polydora ligni*;

(06.00067)

Young, D.K. & M.W. Young 1978. Regulation of species densities of seagrass associated macrobenthos: Evidence from field experiments in the Indian River estuary, Florida. *J. Mar. Res.* 36(4):569-593.

The regulation of seagrass associated macrobenthic densities were studied through field experiments. The effects of: 1) excluding predators by caging; 2) enclosing predators inside cages; 3) adding dense populations of suspension feeders; 4) providing organic enrichment; 5) removing seagrass blades; and 6) erecting cages at different times were studied. Macrobenthic species were found to differ markedly in their responses to the various treatments over a period of 1 year. Several species increased in density with organic enrichment and 1 increased depending on the time when a cage was erected. Some species increased with density when seagrass blades were clipped, and others decreased. Certain species occurred in high densities only inside predator exclusion cages.

Study Duration:25 months; Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Benthic flora and fauna; Type of Sampler:Core; Sieve Size:1.0 mm; Number of Stations:1; Number of Replicates/Station:4; Temporal Frequency:Monthly & bimonthly; Dominant Taxon/Taxa Studied:*Capitella capitata*, *Streblospio benedicti*, *Laconereis culveri*, *Polydora ligni*, *Tharyx annulosus*, *Clymenella mucosa*, *Phascolion cryptus*, *Nelita nitidia*, *Grandidierella bonnieroides*, *Cynadusa compta*, *Diastoma varium*;

(06.00068)

Young, D.K., G. Brown, M.A. Middleton, J.E. Miller, M.W. Young & D. Mook 1974. Studies of benthic communities of the Indian River region. Chapt. 7, In: *Harbor Branch Consortium, Indian River Study, Annu. Rept. 1973-1974*.

Methods were developed to efficiently sample, process and identify animals associated with seagrasses on a quantitative basis yielding statistically reliable data from the Indian River lagoon. No major differences were seen between numerically dominant species of macrofauna (organisms retained on a 1.0 mesh sieve) associated with the seagrasses *Thalassia testudinum*, *Syringodium filiforme* and *Halodule wrightii* with the exception that epizoans (attached or 'fouling' animals) were more abundant on *T. testudinum*. An assessment of the effects of water quality and predation on seagrass communities is presented. Benthic communities of the east-central Florida continental shelf were determined to be species rich, with representatives from a total of 18 phyla. Barnacles, polychaetes and tunicates were dominant members of fouling communities from the Indian River lagoon during early summer; hydroids, oysters, and bryozoans dominated in late summer. Preliminary studies of fouling communities indicated strong biological interactions regarding settlement times of larvae, competition for space and predation effects. Further studies will assess settlement times and growth rates of fouling organisms and how these organisms are affected by each other, predators and physiochemical variables. Fouling plates will also be examined as a tool in assessing pollution and changes in water quality.

Study Duration:1 year; Habitat:Grassbeds, mud; Type of Study:Quantitative; Biological Component:Benthic flora and fauna; Type of Sampler:Posthole digger, Smith-McIntyre grab, artificial substrates; Sieve Size: 1.0 mm or 0.5 mm; Number of Stations:20;

(06.00069)

Young, D.K., K.D. Cairns, M.A. Middleton, J.E. Miller & M.W. Young 1976. Studies of seagrass associated macrobenthos of the Indian River, Chapt. 8, In: Harbor Branch Consortium Indian River Coast. Zone Study 1975-1976, Annu. Rept. Vol. 1.

Studies on the structure and function of seagrass associated macrobenthos, particularly as related to their role in the seagrass based food web were conducted. Two separate research activities are reported, predation exclusion experiments, and intensive field experiments. Predator exclusion cages were erected for field monitoring. The 33 numerically most abundant taxa were selected for analyses of variance with interaction. The analyses showed that the effect of caging differed at 3 sites. At 2 of the sites, species densities increased inside the cages consistent with expectations, while at the third site densities of species decreased. The presence of carnivorous decapod crustaceans inside cages in larger numbers at the St. Lucie site explained the unpredicted decrease in species densities at that location. Field experiments consisting of 11 treatments were initiated at the Link Port site. Preliminary analyses of densities of the macrobenthos as affected by each treatment showed that the addition of Milorganite (a processed, organic rich sewage sludge) produced greatly increased populations of opportunistic polychaete worms. Population increases were greatest when the addition of Milorganite was superimposed upon protection from predation by caging. These results provided additional evidence to support the contention that susceptibility to predation is an important factor in regulating population sizes of certain opportunistic species which increase with density rapidly in the presence of organic enrichment.

Study Duration:1 year; Habitat:Grassbeds; Type of Study:Quantitative; Biological Component:Macrobenthos; Type of Sampler:Predator exclusion cages, posthole digger; Sieve Size:0.1 mm; Number of Stations:3; Number of Replicates/Station:4; Temporal Frequency:Every 2 months; Abiotic Parameters Measured:Temperature, salinity;

(06.00070)

Young, D.K., M.A. Buzas & M.W. Young 1976. Species densities of macrobenthos associated with seagrass: A field experiental study of predation. J. Mar. Res. 34(4):577-592.

Predator exclusion caging at 3 sites on the Indian River estuary had differing effects from each other. At two of the sites species densities increased inside the cages, consistent with expectations, while at the third site (St. Lucie) densities of species decreased. The presence of carnivorous decapod crustaceans inside cages in larger numbers at the St. Lucie site appeared to explain the unpredicted decrease in species densities at that location.

Study Duration:5 months; Habitat:Grassbeds; Type of Study:Quantitative; Biological Component:Macrobenthic fauna; Type of Sampler:Predator exclusion cages; Number of Stations:3; Number of Replicates/Station:4; Temporal Frequency:Every 5 weeks;

(06.00071)

Zimmerman, C.F., T.D. French & J.R. Montgomery 1981. Transplanting and survival of the seagrass *Halodule wrightii* under controlled conditions. Northeast Gulf Sci. 4(2):131-136.

*Halodule wrightii* was collected from the Indian River and transplanted into laboratory aquaria using 4 concentrations of the root rhizome stimulant, NAPH. Growth of the seagrasses was monitored from December 1978 to January 1980. Survival rates were greatest in the 0.5% and 1.0% NAPH treatments; in June 1979, 87% of the plants had survived compared to the 38-39% survival in the 0.05% and 0.1% concentrations and control group. Data on changes in biomass and leaf and rhizome length are summarized. Transplants treated with 0.5% NAPH demonstrated better leaf and rhizome growth than untreated seagrasses; although the other treated plants also showed increased leaf and rhizome development, their survival rate was less than that of the 0.5% NAPH treatment.

Study Duration:November 1978-January 1980; Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Flora; Abiotic Parameters Measured:Water temperature, salinity; Dominant Taxon/Taxa Studied:*Halodule wrightii*;

(06.00072)

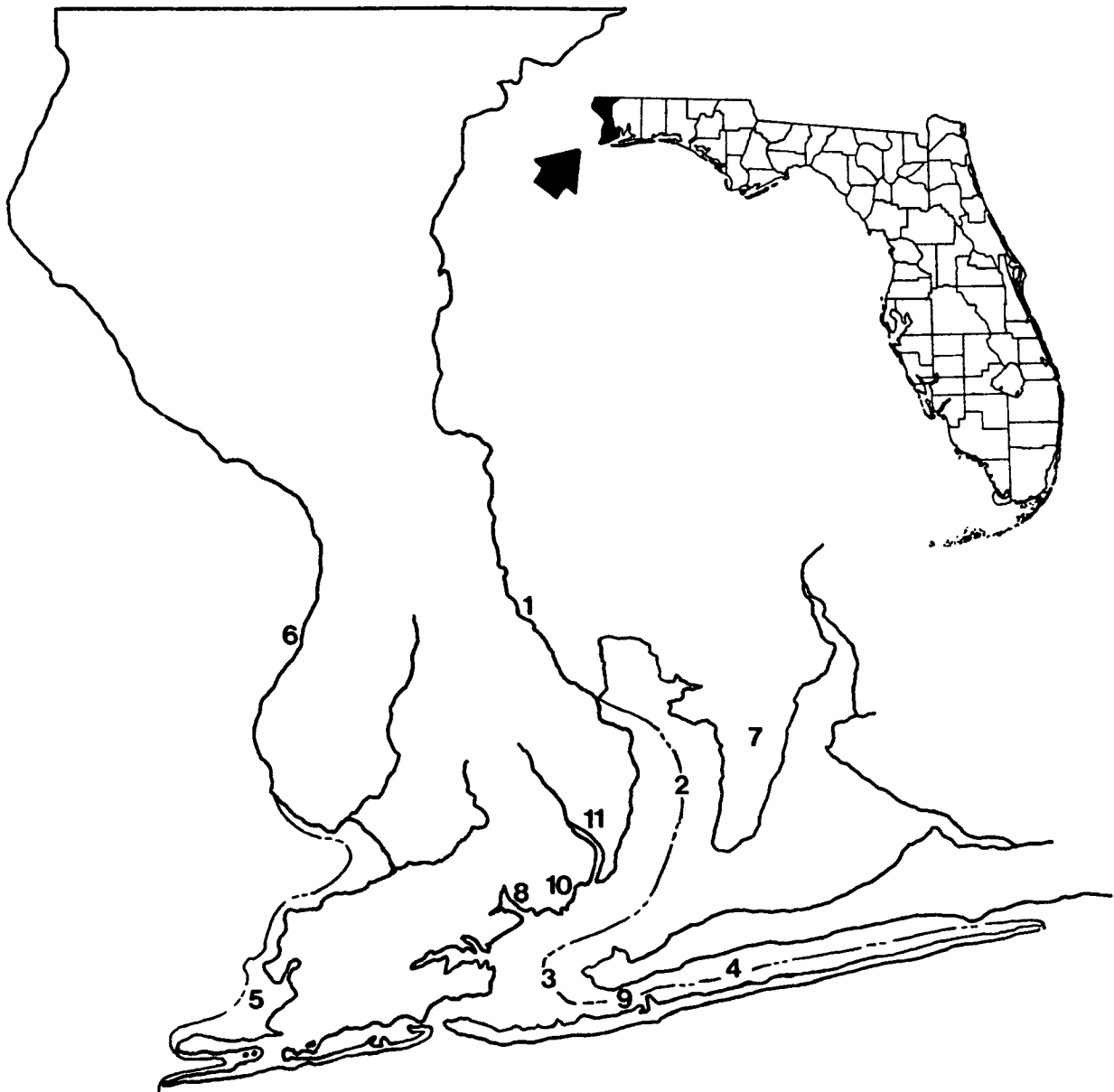
Zimmerman, R.J., R.A. Gibson & J.B. Harrington 1979. Herbivory and detritivory among gammaridean amphipods from a Florida seagrass community. Mar. Biol. 54(1):41-48.

Studies were made of the feeding habits of the amphipods *Cyadusa coapta*, *Gammarus mucronatus*, *Helita nitida*, and *Grandidierella bonnieroides* from grassbeds in the Indian River estuary. Large drift algae, small epiphytic algae, and seagrass debris were food sources. Both macrophagy and microphagy occurred. Carbon-14 uptake studies were done to show assimilation rates.

Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Fauuna; Abiotic Parameters Measured:<sup>14</sup>C-uptake; Dominant Taxon/Taxa Studied:*Cyadusa coapta*, *Gammarus mucronatus*, *Helita nitida*, *Grandidierella bonnieroides*.

See also: 3.00175, 13.00003, 19.00034, 20.00035.

# ESCAMBIA COUNTY



- |                     |                      |
|---------------------|----------------------|
| 1. ESCAMBIA RIVER   | 7. SANTA ROSA COUNTY |
| 2. ESCAMBIA BAY     | 8. BAYOU CHICO       |
| 3. PENSACOLA BAY    | 9. SABINE PT.        |
| 4. SANTA ROSA SOUND | 10. PENSACOLA        |
| 5. PERDIDO BAY      | 11. BAYOU TEXAR      |
| 6. PERDIDO RIVER    |                      |

(07.00001)

Cantelmo, F.R. and K.R. Rao 1978. Effect of pentachlorophenol (PCP) on meiobenthic communities established in an experimental system. Mar. Biol. 46:17-22.

The effect of Pentachlorophenol on meiobenthic communities was studied using aquaria containing clean sand and receiving a continuous supply of seawater from Santa Rosa Sound, mixed with known concentrations of PCP (7, 76, and 662 ug/l). After 9 weeks, nematodes accounted for 87% of the total meiofauna. Nematode biomass and densities were greatest in aquaria exposed to 76 ug:PCP/l and were least in aquaria exposed to 662 ug/l. Epistrate feeders were abundant in control aquaria and aquaria exposed to 7 and 76 ug PCP/l, but not in the highest concentration. Selective deposit- feeders were not abundant in the control aquaria and 7 ug PCP/l aquaria, but comprised 19% of the nematodes in the 76 ug PCP/l and 61% in the aquaria exposed to 622 ug PCP/l.

Study Duration: May 10-July 12, 1976; Habitat: Sand; Type of Study: Quantitative; Biological Component: Nematodes; Number of Stations: 36 aquaria; Number of Replicates/Station: 6;

(07.00002)

Cooley, N.R. 1978. An inventory of the estuarine fauna in the vicinity of Pensacola, Florida. Fla. Dept. Nat. Resources, Mar. Res. Publ. No. 31, 119 p.

Six Hundred Fifty Four species of benthic and pelagic animals were collected in the study area from 1961 through 1963 and casually in other years. Data for each species included salinity of sampling station, habitat, season in which collected, and relative abundance. The predominant species were listed. Spawning of a turbellarian, 7 molluscs and 25 crustaceans and breeding of horseshoe crabs were reported, but the data did not define duration of spawning or breeding seasons.

Study Duration: 1961-1963; Habitat: Sand, shell, mud, oyster bed; Type of Study: Qualitative; Biological Component: Fauna; Sieve Size: Type of Sampler: Otter trawl, covered scoop, Ekman dredge; Number of Stations: 6; Number of Replicates/Station: 4 trawl, 9 dredge; Temporal Frequency: Seasonal; Disturbance (pollution): Dominant Taxon/Taxa Studied: Abiotic Parameters Measured: Temperature, salinity;

(07.00003)

Gifford, C.A. 1978. Use of a floating tire breakwater to induce growth of high marsh and fore dune plants along a shoreline. In: D.P. Cole (ed.), The Restoration of Coastal Vegetation in Florida: Proc. Fifth Annu. Conf., May 13, 1978, Tampa, FL. 225 p.

A floating tire breakwater used for shoreline erosion control in Santa Rosa Sound induced volunteer growth of several species of high marsh and fore dune plants along the protected shoreline. Accreted detritus apparently contained viable seeds, plant fragments and nutrients. No planting, fertilizing, or other care was needed.

Study Duration: August 1976-June 1978; Type of Study: Qualitative; Biological Component: Flora; Abiotic Parameters Measured: Salinity, temperature; Dominant Taxon/Taxa Studied: *Iva imbricata*, *Distichlis spicata*, *Panicum amarulum*, *Spartina patens*

(07.00004)

Hansen, D.J. 1974. Aroclor (trade name) 1254: Effect on composition of developing estuarine animal communities in the laboratory. Contr. Mar. Sci. 18:19-33.

Various concentrations of Aroclor (trade name) 1254 were injected into aquaria with a flow through sea water system and communities developing from planktonic larvae were observed. In aquaria receiving smaller concentrations (0.1 ug/l) of this PCB, arthropods, primarily *Corophium volutator* dominated. In aquaria receiving higher doses (1 and 10 ug/l) the tunicate *Molgula manhattensis* dominated the fauna and number of arthropods decreased. Amphipods, bryozoans, crabs and molluscs were decreased by the PCB while annelids, brachipods, coelenterates, echinoderms and nemerteans showed no apparent effect.

Study Duration: 4 months; Habitat: Aquaria, sand; Type of Study: Quantitative; Biological Component: Fauna; Sieve Size: 1.0 mm; Abiotic Parameters Measured: Aroclor (trade name) 1254, PCB; Dominant Taxon/Taxa Studied: *Corophium volutator*, *Molgula manhattensis*;

(07.00005)

Hansen, D.J. & M.E. Tagatz 1980. A laboratory test for assessing impacts of substances on developing communities of benthic estuarine organisms. In: Aquatic Toxicology. ASTM STP 707. J.G. Eaton, P.R. Parrish & A.C. Hendricks (eds.), Am. Soc. Test. Mat. p. 40-57.

The effect of several pollutants on the structure of a developing benthic community was examined in 3 treatment concentrations and a control for 2 to 4 months. Six substances were used (separately): Aroclor 1254; toxaphene, pentachlorophenol, Domicide G-ST, barite, and a lignosulfonate drilling mud. Tested communities averaged more than 4000 individuals, representing 50 species in 7 phyla. The effects of each pollutant on the numbers of individuals and species are summarized for each phylum. These experiments demonstrated that they can be at least as sensitive as chronic

exposures of single species because the early developmental stages, which are often more sensitive, are exposed, and the affected species are often representatives of phyla that are also sensitive in single species tests. Also, the test can detect impacts of substances that affect community structure by physical alteration of the substrate.

Study Duration:16 weeks; Habitat:Sand; Type of Study:Quantitative; Biological Component:Fauna; Sieve Size:1 mm; Dominant Taxon/Taxa Studied:*Molgula manhattensis*, *Capitella capitata*, *Laevicardium mortoni*, *Diastoma varium*;

(07.00006)

Hansen, D.J. and M.E. Tagatz 1981. Evaluation of a laboratory test for assessing impacts of substances on developing communities of benthic estuarine organisms. Fla. Dept. Nat. Res. Mar. Lab., St. Petersburg, Fla. 33 p.

The effect of Aroclor (R) 1254, toxaphene, pentachlorophenol, Dovicide (R) 6-ST, barite, and a lignosulfonate drilling mud on the development of estuarine communities was assessed by comparing the numbers, species, and phyla of benthic animals that grew from planktonic larvae in an uncontaminated apparatus and three identical apparatus continuously contaminated. The results of these tests were compared to the results of acute and chronic exposures of single species. The test provided data relative to sensitivity of species not normally tested, thereby aiding in the selection of sensitive species for additional toxicity tests. It was also determined that the test could also assess impacts of substances that affect community structure by physically altering the substrate.

Study Duration:16 weeks; Type of Study:Technique; Biological Component:Benthic fauna; Number of Stations:4 apparatus; Number of Replicates/Station:10; Temporal Frequency:Twice per month; Abiotic Parameters Measured:Temperature, salinity;

(07.00007)

Hopkins, T.S. 1975. The interrelationships of the biology, chemistry, and geology of Escambia Bay and adjacent waters. Univ. West Fla., Yr. 01, Annu. Rept. Florida Sea Grant.

Biological sampling was conducted in Escambia and East Bays, and included: 1) algae species and biomass; 2) C<sub>14</sub> and chlorophyll productivity; and 3) zooplankton. Correlation matrices were produced for representative stations using major chemical parameters and phytoplankton density and biomass. Statistically significant relationships were discussed. Comparatively, the upper bay stations in both systems differed in the relationship between TKN and phytoplankton biomass. In Escambia Bay the TKN was other than the phytoplankton, probably detrital in nature. An additional factor of great influence on the ecology of Escambia Bay was the greater turbidity found there than was found in East Bay. Although the two bays are situated in the same major estuary, they were determined to be different with regard to ecological interactions in the surface waters.

Study Duration:One year; Type of Study:Quantitative; Biological Component:Fauna and flora; Type of Sampler:Plankton net, cores; Number of Stations:14 (Escambia Bay), 11 (East Bay); Temporal Frequency:13 to 15 times per year; Abiotic Parameters Measured:Temperature, salinity, DO, TOC, TKN, TP, NO<sub>2</sub>-NO<sub>3</sub>, NH<sub>3</sub>, PO<sub>4</sub>;

(07.00008)

Horvath, G.J. 1968. The sedimentology of the Pensacola Bay system, northwestern Florida. Fla. State Univ. M.S. Thesis.

A total of 214 bottom samples from Pensacola Bay, Florida, were analyzed to determine the distribution of sediment size and composition. Sand and silty clay were the most abundant sediment types. Terrigenous clastics composed the majority of the sediments. Mean grain size increased seaward and toward the mouths of rivers. Clay mineralogy and calcium carbonate content of the sediments were determined. Patterns of water circulation were derived from the distribution of sediment characteristics.

Habitat:Sand, mud; Type of Study:Qualitative; Type of Sampler:LaFonde Dietz grab; Number of Stations:214; Abiotic Parameters Measured:Sediment grain size and composition;

(07.00009)

Little, E.J. & J.A. Quick, Jr. 1976. Ecology, resource rehabilitation and fungal parasitology of commercial oysters, *Crassostrea virginica* (Gmelin) in Pensacola Estuary, Florida. Fla. Mar. Res. Publ. No. 21, 89 p.

Four hundred fifty two artificial oyster reefs composed of 26,000 m<sup>2</sup> of oyster mudshell and/or clam (*Rangia cuneata*) shell were placed on approximately 8.5 hectares at 3 sites in Escambia Bay and 2 sites in East Bay between April 1972 and July 1973. These reefs were constructed to help replenish oyster stocks depleted by poor recent annual recruitment and by a severe epizootic of parasitic fungus, *Labyrinthomyxa varia*, in September 1971. Some Escambia Bay sites were stocked with oysters dredged from natural reefs closed to harvesting, providing oystermen with a resource until artificial reefs became productive. Oyster predators and fouling organisms were generally too scarce to threaten rehabilitation. Successful recruitment was negligible in 1970, increased markedly by autumn 1974, and occurred primarily in late summer and/or autumn. Recruitment dropped substantially with increasing proximity to northern Escambia Bay. High recruitment in autumn 1973 and 1974 resulted in increased abundance of seed oysters, which were initially sparse on artificial reefs. Average oyster growth was 20-25 mm/yr. Information on fungal parasitology, oyster spawning incidence, and meat conditions is given.

Study Duration:April 1972-July 1973; Habitat:Oyster reef; Type of Study:Quantitative; Biological Component:Mollusc

fauna; Abiotic Parameters Measured:Salinity, water temperature, DO, pH; Dominant Taxon/Taxa Studied:*Crassostrea virginica*;

(07.00010)

Little, E.J., Jr. 1973. Summary of Florida's Pensacola area oyster culture program. Natl. Shellfish Assoc. Proc. 64:4-5.

A summary of the progress of the Pensacola area oyster culture program was presented. Mounds of clam shells and oyster shells were planted on firm mud bottoms. Additionally, 5,725 bushels of live seed oysters were relocated to planting areas in Escambia Bay. Spatfall on cultch plantings and on asbestos tiles was determined to be negligible, except in September and October, 1972. The effects of siltation, predators and fouling organisms were determined to be generally slight. Spatfall was better on East Bay plantings than on those in Escambia Bay.

Study Duration:12 months; Habitat:Estuarine, oyster beds, mud; Type of Study:Qualitative; Biological Component:Mollusc fauna; Number of Stations:5; Temporal Frequency:Once; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Crassostrea virginica*;

(07.00011)

Livingston, R.J. 1977. Time as a factor in biomonitoring estuarine systems with reference to benthic macrophytes and epibenthic fishes and invertebrates. Biol. Monitor. Water and Effluent Qual., ASTM STP 607, J. Cairns, Jr., K.L. Dickson, & G.F. Westlake (eds.), Am. Soc. Test. Mat. p. 212-234.

The implications of temporal variation of the natural environment were discussed relative to the biological sampling necessary to account for such variability. Examples were taken from studies in three bay systems along the Florida Gulf coast. Community structure could be masked or distorted by inadequate sampling either on a short term or seasonal basis. Additionally, the actual impact of a given pollutant could be seasonally directed. It was recommended that these factors be taken into consideration in the design of biomonitoring programs. The goals of each project should be, therefore, reconciled with the short and long term variations of the biological systems in question.

Study Duration:3 years; Type of Study:Quantitative; Biological Component:Macrophytes, epibenthic fish and invertebrates; Type of Sampler:1 m<sup>2</sup> aluminum hoop, otter trawl; Number of Stations:17; Number of Replicates/Station:Variable; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO, color, pesticide analysis; Dominant Taxon/Taxa Studied:*Pennaeus setiferus*, *P. duorarum*, *Trachypeneus constrictus*, *Callinectes sapidus*, *Palaeonetes pugio*;

(07.00012)

Moshiri, G.A. & M.G. Crumpton 1978. Some aspects of redox trends in the bottom muds of a mesotrophic bayou estuary. Hydrobiologia 57(2):155-158.

Redox profiles, pH, bacterial numbers and organism content of sediments in the study area were examined in an effort to delineate spatial and temporal patterns. These data were accompanied by field determinations of DO, pH, temperature and salinity. The importance of bacterial activity and bottom water DO upon the redox status of the sediments was demonstrated. It was suggested that in certain systems, the redox status of deeper sediments may reveal long-term trends which are obscured at the sediment-water interface by transient effects.

Study Duration:December 1974 - March 1975; Habitat:Mud; Type of Study:Quantitative; Type of Sampler:Core; Number of Stations:1; Number of Replicates/Station:1; Temporal Frequency:Bimonthly; Abiotic Parameters Measured:Temperature, salinity, DO, pH, sediment analysis, Eh;

(07.00013)

Nimmo, D.R., J. Forester, P.T. Heitmuller, & G.H. Cook 1974. Accumulation of Aroclor (R) 1254 in grass-shrimp (*Palaeonetes pugio*) in laboratory and field exposures. Bull. Environ. Contam. Toxicol. 11(4):303-308.

Concentrations of Aroclor 1254 in *Palaeonetes pugio*, after exposure to contaminated sediments for 3 months was equivalent to a laboratory exposure of 0.09 ug/l in water for 2 weeks. Concentrations of Aroclor 1254 in caged shrimp exposed to contaminated sediments appeared to reach a plateau, but this was not the case in laboratory exposures where an equilibrium was not reached. It was therefore believed that grass shrimp exposed to the sediments might have obtained PCB from the water or food singly, but shrimp exposed to Aroclor in the lab obtained the chemical from two sources, water and food. No significant mortality was observed in caged shrimp and none could be predicted since residues produced in the field were similar to those found in shrimp after laboratory exposures which caused no death. However, lower residues in *P. pugio* from Escambia Bay may be due to amounts of PCB in bay sediments and behavioral patterns of the animals.

Study Duration:3 months; Habitat:Grassbeds, control aquaria; Type of Study:Quantitative; Biological Component:Crustacea fauna; Dominant Taxon/Taxa Studied:*Palaeonetes pugio*;

(07.00014)

Olinger, L.W., R.G. Rogers, P.L. Fore, R.L. Todd, B.L. Mullins, F.T. Bisterfeld & L.A. Wise, II. 1975. Environmental and recovery studies of Escambia Bay and the Pensacola Bay System, Florida. EPA, Region IV. Surveillance and Analysis

Division, Escambia Bay Recovery Study. EPA 904/9-76-016.

Methods of accelerating the recovery of Escambia Bay over and above reducing waste discharges into the bay were determined. The distribution of distinct benthic communities existing in Escambia Bay was defined. The effects of recovery techniques such as revegetation of seagrass beds on the benthic fauna and the effects of domestic or industrial waste discharge on the nearby benthic fauna were determined. Biomass, species number, numbers of benthic macroinvertebrates and diversity increased from mud to sand stations. Oyster bed stations were found to have the highest number of species diversity and biomass of any other habitat in Escambia Bay. At the industrial discharge stations, there was a shift in species types from molluscs and crustaceans to polychaetes.

Study Duration: 2 years; Habitat: Grassbed, mud, sand; Type of Study: Quantitative; Biological Component: Benthic macroinvertebrates; Type of Sampler: Van Veen grab, Ponar grab; Sieve Size: 1.0 mm; Number of Stations: 6; Number of Replicates/Station: 12 or 5; Abiotic Parameters Measured: Temperature, salinity, tides, weather;

(07.00015)

Parker, M.M. 1968. A sedimentologic study of Perdido Bay and adjacent offshore environments. Fla. State Univ. M.S. Thesis.

The distribution of bottom sediments from Perdido Bay, Florida, and the adjacent continental shelf was determined from textural and mineralogical analyses of 146 sediment samples collected during the spring of 1967. The regional sediments are characterized by terrigenous clastics. The mineralogical composition of the sediments and spatial trends in grain size variations are given. The distribution of various sediment characteristics was found to be influenced primarily by water circulation within the estuary and by waves and longshore currents in offshore areas.

Study Duration: Spring 1967; Type of Study: Qualitative; Type of Sampler: LaFonde Dietz grab; Number of Stations: 146; Abiotic Parameters Measured: Sediment grain size and composition;

(07.00016)

Pilotte, J.D., J.W. Winchester, & R.C. Glassen 1978. Detection of heavy metal pollution in estuarine sediments. Water Air Soil Poll. 9:363-368.

Thirty four sediment samples were collected from 17 stations in Bayou Chico, a polluted estuary, and analyzed for heavy metal content. Trace metal concentrations are given for Ni, Pb, Fe, Cu, and Rb in surface samples. Trace metal concentrations for Ti, Cr, Mn, Zr, and Rb in buried samples are also given. The authors noted that variations in heavy metal content may not be reliably detected based on concentration values or ratios of metal concentrations to those of a reference element because of natural variations in both. Instead, the anomaly may be detected by the departure of a measurement from a regression line between metal and reference element concentrations.

Habitat: Sand; Type of Study: Quantitative; Type of Sampler: Corer; Number of Stations: 17; Number of Replicates/Station: 2; Abiotic Parameters Measured: Heavy metal content;

(07.00017)

Rogers, R.G. 1974. Seagrass revegetation in Escambia Bay, Florida. Proc. First Annu. Conf. on Restor. of Coast. Veg. in Florida. p. 21-25.

Transplantation of *Vallisneria americana*, *Ruppia maritima*, *Halodule wrightii*, and *Thalassia testudinum* was attempted in 8 areas of Escambia Bay. In an effort to increase diversity and escalate recovery of the Bay, methods were developed to test revegetation results, including analysis of physical, chemical, and benthic fauna parameters of the habitats. A second undertaking included the placement of artificial seaweed mats consisting of a plastic sheet or mesh with buoyant plastic fronds in 3 locations. Artificial seaweed is hoped to temporarily increase diversity and enhance sport fishing until normal recovery of the bay increases.

Type of Study: Quantitative; Biological Component: Flora; Number of Stations: 8; Dominant Taxon/Taxa Studied: *Vallisneria americana*, *Ruppia maritima*, *Halodule wrightii*, *Thalassia testudinum*;

(07.00018)

Rubinstein, M.I. 1979. A benthic bioassay using time-lapse photography to measure the effect of toxicants on the feeding behavior of lugworms (Polychaeta: Arenicolidae). In: Marine Pollution: Functional Responses. Academic Press, Inc. p. 341-351.

Six lugworms (*Arenicola cristata*) were exposed to various concentrations of the pesticide Kepone to determine the effects of the pollutant on the substrate-reworking activity of the infaunal polychaetes. Lugworms exposed to Kepone concentrations as low as 2.8 ug/l exhibited a significant decrease in sediment-processing activity, as measured by time-lapse photography, when compared to control animals. The effects of reduced substrate-reworking activity by *A. cristata* and other deposit-feeders on sediment-water column interactions and trophic dynamics are discussed.

Study Duration: 72 hr; Habitat: Sand; Type of Study: Quantitative; Biological Component: Polychaete fauna; Dominant Taxon/Taxa Studied: *Arenicola cristata*;



(07.00019)

Rubinstein, M.I., C.N. D'Asaro, C. Sommers & F.G. Wilkes 1980. The effects of contaminated sediments on representative estuarine species and developing benthic communities. In: Contaminants and sediments, Vol. I. R.A. Baker (ed.). Ann Arbor Sci. Publ., Inc., Ann Arbor, MI. p. 445-461.

A bioassay was created to determine the effects of contaminated sediments on developing benthic communities. Three species of estuarine organisms, the mysid, *Nysidopsis bahia*; oyster, *Crassostrea virginica*; and lugworm, *Arenicola cristata*, were exposed to sediments contaminated with various concentrations of the pesticide Kepone. After 10 days, mysid mortality was 37% at 10.0 ppm Kepone-sediment; 30% at 1.0 ppm; and 20% at 0.1 ppm, compared to 3% in the control group. Oyster shell growth was significantly inhibited at concentrations of 10.0 and 1.0 ppm Kepone sediment. Sediment processing by lugworms was completely inhibited at 10 ppm Kepone sediment. No mortality occurred at any exposure concentration for either oysters or lugworms. Dredge spoils from the James River, Virginia and Houston Ship Channel were then tested with the perfected bioassay and results were summarized. Advantages of this bioassay over standard bioassays were explained.

Study Duration: April-December 1978; Habitat: Sand; Type of Study: Quantitative; Biological Component: Fauna; Dominant Taxon/Taxa Studied: *Nysidopsis bahia*, *Crassostrea virginica*, *Arenicola cristata*;

(07.00020)

Rubinstein, M.I., F.G. Wilkes & C.N. D'Asaro 1979. Effects of contaminated sediment on selected estuarine organisms and developing benthic communities. Pap. Pres. ACS Meet., Hawaii, April 1-6, 1979. 15 p. (Unpub.)

Representative marine organisms were used in bioassays as indicators of the environment activity of xenobiotics associated with dredged material. Dredged material bioassays cannot be considered precise predictors of environmental impact (due to the number of variables that cannot be addressed in the laboratory), but they do serve as quantitative estimators of environmental effects. Based on the findings of bioaccumulation of Kepone in marine organisms, the introduction of Kepone-sorbed sediment would have an unacceptable impact on marine biota at the disposal site.

Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Fauna; Dominant Taxon/Taxa Studied: *Nysidopsis bahia*, *Crassostrea virginica*, *Arenicola cristata*; Abiotic Parameters Measured: Temperature, salinity, DO, pH, sediment analysis, Eh;

(07.00021)

Stoner, A.W., H.S. Greening, J.D. Ryan & R.J. Livingston 1983. Comparison of Macrobenthos Collected With Cores and Suction Sampler in Vegetated and Unvegetated Habitats. Estuaries 6(1):76-82

Shallow water benthic macrofauna was collected from Pensacola Bay with hand-held cores and a suction sampler. Hand-held cores were found to provide the best estimate of macrofaunal density and composition. In a bare sand habitat, suction methods collected 72.8% fewer individuals per unit surface area of sediment. In a seagrass habitat (*Halodule wrightii*) the difference was 32.6%. Low cost and ease of construction make core tubes the preferred gear for sampling small macrobenthos in soft sediments, with or without vegetation.

Habitat: Sand, grassbed; Type of Study: Qualitative, review; Biological Component: fauna; Type of Sampler: Hand-held corers & Suction corers;

(07.00022)

Tagatz, M.E. & J.M. Ivey 1981. Effects of fenvalerate on field- and laboratory-developed estuarine benthic communities. Bull. Environ. Contam. Toxicol. 27:256-267.

The responses of laboratory- and field-colonized benthic communities exposed to fenvalerate, an insecticide which strongly adsorbs to sediment and particulate matter in water, were investigated at Santa Rosa Sound, Florida. A total of 79 species were examined, 15 of which were common to both field and laboratory communities. Treatments of 0.1 and 1.0 ug fenvalerate/liter significantly altered community structure in both studies. The toxicant significantly altered abundance of amphipods, but not molluscs or annelids, in both field and laboratory situations. Concentrations less than 1 ug/l were particularly toxic to *Corophium acherusicum*, *Nysidopsis bahia*, *Penaeus duorarum*, *Cragon septespinosus*, and *Brachiosoma caribaeum*. It was concluded that concentrations of fenvalerate beyond the limits of detection may adversely affect ecological relationships among benthic and water column organisms.

Study Duration: 16 June-4 November 1980; Habitat: Sand; Type of Study: Quantitative; Biological Component: Flora; Sieve Size: 1.0 mm; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Molgula saanhattensis*, *Corophium acherusicum*, *Acteocina canaliculata*, *Capitella capitata*, *Branchiostoma caribaeum*;

(07.00023)

Tagatz, M.E. & M. Tobia 1978. Effect of barite (BaSO<sub>4</sub>) on development of estuarine communities. Estuar. Coast. Mar. Sci. 7:401-407.

Barite, the primary component of oil drilling muds, was placed in aquaria with flowing estuarine water, and communities

developing from planktonic larvae were observed. Aquaria contained: sand only; 1 part barite and 10 parts sand; 1 part barite and 3 parts sand; or sand covered by 0.5 cm barite. After 10 weeks exposure fewer animals were found in barite covered sand and the 1 barite:3 sand aquaria. Annelids were particularly affected. Data indicate large quantities of barite could affect the colonization of benthic animals.

Study Duration:10 weeks; Habitat:Aquaria, sand; Type of Study:Quantitative; Biological Component:Fauna; Sieve Size:1.0 mm; Dominant Taxon/Taxa Studied:*laevicardium mortoni*, *Prionospio heterobranchia texana*, *Armandia agilis*, *Molgula manhattensis*;

(07.00024)

Tagatz, M.E., J.M. Ivey, M.R. Gregory & J.L. Oglesby 1981. Effects of pentachlorophenol on field- and laboratory-developed estuarine benthic communities. Bull. Environ. Contam. Toxicol. 26:137-143.

The response of benthic communities exposed to various concentrations of the insecticide pentachlorophenol (PCP) was investigated in 8 week old benthic communities developed in the laboratory and field. Laboratory communities included 800 animals representing 24 species of 5 phyla; field communities yielded 346 animals representing 32 species of 6 phyla. Community structure was significantly altered by 141 ug PCP/l (field) and 140 ug/l (laboratory). Average number of species per treatment was less in the highest PCP concentration than in control treatments; only the laboratory-developed communities had significantly less numbers of individuals. Abundance of arthropods (mostly amphipods) and chordates (*Molgula manhattensis*) were not significantly affected by PCP treatments; mollusc abundance was significantly reduced by exposure to PCP, with 96% mortality of *Esis minor* in field aquaria and 97% mortality in laboratory aquaria.

Study Duration:10 March-5 May 1980; Habitat:Sand; Type of Study:Quantitative; Biological Component:Fauna; Sieve Size:1.0 mm; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Cistenides gouldii*, *Capitella capitata*, *Esis minor*, *Mulinia lateralis*, *Molgula manhattensis*;

(07.00025)

Tagatz, M.E., J.M. Ivey, H.K. Lehman & J.L. Oglesby 1978. Effects of a lignosulfonate-type drilling mud on development of experimental estuarine macrobenthic communities. NE Gulf Sci. 2(1):35-42.

Communities developing from planktonic larvae in aquaria containing flowing estuarine water and various proportions of sand and drilling mud were evaluated. Annelids and coelenterates were fewer in aquaria containing drilling mud than aquaria with sand only. Exposures to drilling mud reduced both numbers of individuals and species. These and other data suggest large discharges of drilling mud could adversely affect the colonization of substrata by benthic animals.

Study Duration:Eight weeks; Habitat:Aquaria, sand; Type of Study:Quantitative; Biological Component:Fauna; Sieve Size:1.0 mm; Dominant Taxon/Taxa Studied:*Armandia maculata*, *Medionastus californiensis*, *Polydora socialis*, *Trochochaeta multisetosa*, *Acteocina canaliculata*, *Corophium acherusicum*, *Aiptasia pallida*;

(07.00026)

Tagatz, M.E., J.M. Ivey, H.K. Lehman & J.L. Oglesby 1979. Effects of Sevin on development of experimental estuarine communities. J. Tox. & Envir. Health, 5:643-651.

The insecticide Sevin was added in different concentrations to aquariums and the composition of animal communities developing from planktonic larvae was observed. Average number of species was less in aquariums containing 11.1 or 103 ug/l than those containing 1.1 ug/l of Sevin. The numbers of the amphipod *Corophium acherusicum* were reduced by the insecticide, while the polychaete *Polydora ligni* increased, corresponding to a decrease in other annelids. The clam, *Esis minor*, grew less in higher concentrations of Sevin.

Study Duration:10 weeks; Habitat:Aquariums, sand; Type of Study:Quantitative; Biological Component:Fauna; Sieve Size:1.0 mm; Temporal Frequency:Weekly; Abiotic Parameters Measured:Insecticide, Sevin; Dominant Taxon/Taxa Studied:Mollusks, arthropods, annelids, nemerteans, *Corophium acherusicum*, *Polydora ligni*, *Esis minor*;

(07.00027)

Tagatz, M.E., J.M. Ivey, & J.L. Oglesby 1979. Toxicity of drilling-mud biocides to developing estuarine macrobenthic communities. Northeast Gulf Sci. 3(2):88-95.

The effects of the biocides Surflo B33 (25% dichlorophenol and other chlorophenols) and Aldicide (91% paraformaldehyde), which are used in drilling muds for exploratory drilling for oil offshore, on developing macrobenthic communities were examined from laboratory treatments lasting 7 weeks. Thirty seven species from 6 phyla were represented among the 1,941 animals developed from planktonic larvae. Abundances of chordates, molluscs, and annelids were significantly reduced in treatments of 819 ug Surflo-B33/l as compared to controls; molluscs were also significantly fewer in treatments of 41 ug/l. Aldicide concentrations of 15 and 300 ug/l did not significantly affect average numbers of animals or species, indicating that paraformaldehyde should be considered as an alternative biocide to highly toxic chlorophenols for use in natural waters.

Study Duration:31 July-18 September 1978; Habitat:Sand; Type of Study:Quantitative; Biological Component:Fauna; Sieve

Size:1.0 mm; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Molgula manhattensis*, *Mulinia lateralis*, *Acteocina canaliculata*, *Mediomastus californiensis*;

(07.00028)

Tagatz, M.E., J.M. Ivey, J.C. Moore & M. Tobia 1977. Effects of Pentachlorophenol on the development of estuarine communities. *J. Toxicol. Environ. Health* 3:501-506.

Pentachlorophenol affected the composition of communities of estuarine organisms developed in sand from planktonic larvae in flow-through seawater systems. Ten control aquaria and 10 aquaria per exposure concentration (averaging 7, 76, or 662 ug/l) were used. Annelids, arthropods, and molluscs were the numerically dominant phyla when animals were collected in a 1.0 mm mesh sieve after 9 weeks of exposure. Molluscs were markedly fewer at 7 ug/l; annelids and arthropods at 76 ug/l. Almost no animals occurred at 662 ug/l. The total numbers of individuals and species were significantly less ( $\alpha = 0.01$ ) in aquaria exposed to 76 ug/l than in those not exposed or exposed to 7 ug/l.

Study Duration:9 weeks; Habitat:Control aquaria; Type of Study:Quantitative; Biological Component:Fauna; Sieve Size:1.0 mm;

(07.00029)

Tagatz, M.E., J.M. Ivey & M. Tobia 1978. Effects of Domicide (trade name) G-ST on development of experimental estuarine macrobenthic communities. Reprinted from Pentachlorophenol. Edited by K. Ranga Rao. Plenum Pub. Co., N.Y.

Macrofaunal communities developing in aquaria containing sand and flowing seawater received different concentrations of Domicide (trade name) G-ST (79% sodium pentachlorophenol). Exposure to higher concentrations caused a reduction in numbers of individuals and species. Molluscs were the most sensitive to PCP. Data indicate discharge of PCP into natural waters could alter benthic communities.

Study Duration:13 weeks; Habitat:Aquaria, sand; Type of Study:Quantitative; Biological Component:Fauna; Sieve Size:1.0 mm; Abiotic Parameters Measured:PCP; Dominant Taxon/Taxa Studied:*Esis minor*, *Balanus amphitrite*, *Polydora ligni*;

(07.00030)

Tagatz, M.E., R.W. Borthwick, G.H. Cook, & D.L. Coppage 1974. Effects of ground applications of Malathion on salt marsh environments in northwestern Florida. *Mosq. News* 34(3):309-315.

Deaths caused by Malathion were not observed among confined blue crabs, grass shrimp, pink shrimp, or sheepshead minnows. Brain acetylcholinesterase activity was not reduced in confined sheepshead minnows exposed to one or more treatments. Confined animals and a snail contained no measurable Malathion. The chemical was not detected in sediment, but concentrations as high as 4.10 ppm were found in *Juncus* sp.; trace amounts persisted as long as 14 days. Highest concentration in marsh water after fogging was 5.2 ppb, and after ULV aerosol spraying, 0.49 ppb. For each method of application only trace amounts persisted in marsh water as long as one day.

Habitat:Estuarine, salt marsh; Type of Study:Quantitative; Biological Component:Benthic and marine fauna; Abiotic Parameters Measured:Temperature, salinity, pH; Dominant Taxon/Taxa Studied:*Callinectes sapidus*, *Palaeomonetes pugio*, *Penaeus duorarum*, *Cyprinodon variegatus*, *Littorina irrorata*;

(07.00031)

Tagatz, M.E., P.W. Borthwick & J. Forester 1975. Seasonal effects of leached Mirex on selected estuarine animals. *Arch. Envir. Contam. Toxicol.* 3:371-383.

A report on the seasonal effects of leached Mirex on estuarine organisms in Gulf Breeze, Florida was presented. Mirex leached from fire ant bait by freshwater and then mixed with salt water was determined to be toxic to blue crabs, pink shrimp and grass shrimp but not to sheepshead minnows. The experiments also demonstrated that Mirex can be leached from bait by fresh water, concentrated by estuarine organisms, and can be toxic to crabs and shrimp.

Study Duration:1 year; Habitat:Laboratory-simulated estuary; Type of Study:Qualitative; Biological Component:Fauna; Number of Stations:1; Number of Replicates/Station:4; Temporal Frequency:Quarterly; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Callinectes sapidus*, *Penaeus duorarum*, *Palaeomonetes pugio*, *Cyprinodon variegatus*;

(07.00032)

Tagatz, M.E., M.R. Gregory, & G.R. Plaia 1982. Effects of chlorpyrifos on field- and laboratory-developed estuarine benthic communities. *J. Toxicol. Environ. Health* 10:411-421.

The effects of various concentrations of the insecticide chlorpyrifos on macrobenthic community structure were investigated in field-and laboratory- developed animals. Concentrations of chlorpyrifos of 0.1 ug/l or greater significantly reduced arthropod abundance in laboratory treatments; similar results occurred in 5.9 ug/l treatments in field communities. The highest tested concentrations (8.5 ug/l laboratory; 5.9 ug/l field) did not significantly affect abundances of annelids and chordates. Developing molluscan larvae in laboratory aquaria were sensitive to concentrations of 0.1 ug/l or greater, but older developmental stages from field aquaria were not sensitive to concentrations of 5.9

ug/l or less.

Study Duration:16 June-11 August 1980; Habitat:Sand; Type of Study:Quantitative; Biological Component:Fauna; Sieve Size:1.0 mm; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Molgula manhattensis*, *Capitella capitata*, *Acteocina canaliculata*, *Corophium acherusicum*, *Cistenides gouldii*, *Haploscoloplos sp.*, *Laevicardium murtoni*, *Branchiostoma caribaeum*, *Acanthobaustorius willsi*;

(07.00033)

U.S. Dept. of Interior 1970. Effects of pollution on water quality of Escambia River and Bay, Florida. U.S. Dept. Int., Fed. Water Poll. Control Adm., Southeast Water Lab., Tech. Ser. Prog. 122 p.

The entire upper section of Escambia Bay was determined to be in a state of accelerated eutrophication as shown by unstable dissolved oxygen variations resulting from algae activity, high carbon, nitrogen and phosphorus concentrations, and oxygen demanding sludge deposits. Dredging and filling also contributed to degraded water quality. The lower section of the bay also had degraded water quality due to sludge deposits, but flushing and exchange of pollution out of the area in a short period of time was believed to prevent a worsening situation. Major dischargers of carbonaceous, nitrogenous, and phosphorus wastes were named. Discharges of acrylonitrile (a compound toxic to fish) and heated effluents were recognized. Benthic fauna showed no significant damage from waste sources in part of the study area, but during periods of extreme low flow in the Escambia River diversity of the biota at other areas was appreciably affected.

Study Duration:2 months; Type of Study:Quantitative; Biological Component:Flora and fauna; Abiotic Parameters Measured:Temperature, salinity, DO, pH, nutrients, BOD, TOC, coliform count;

(07.00034)

U.S. Environmental Protection Agency 1971. Circulation and benthic characterization studies, Escambia Bay, Florida. U.S. EPA, Water Qual. Off., S.E. Water Lab., Tech. Ser. Prog., Athens, GA. p. 213-302.

Circulation and benthic characterization studies were conducted during a period of low Escambia River discharge (1,068 cfs) in September and October, 1969. The tidal circulation and more extensive sediment characteristics of the bay were described. Further circulation and more extensive sediment characterization studies were conducted in 1970 at much higher river flows (59,533 cfs). Comparisons of the two studies' results were presented. Both studies showed that Escambia Bay sediments were highly organic and tidal circulation in Upper Escambia Bay was poor. The benthic characterization study indicated counterclockwise bay circulation. The benthic study also suggested that wastes discharged along the eastern shore of the bay are generally swept northwest and deposited along with wastes from Monsanto and Container Corp. in the eastern and western portions of the upper and lower bay.

Study Duration:3 months; Type of Study:Qualitative; Abiotic Parameters Measured:Climatology, tides, sediments;

(07.00035)

U.S. Environmental Protection Agency 1973. Effects of heated discharges from Gulf Power on the temperature regime and biota of the Lower Escambia River. U.S. EPA, Surveillance and Analysis Div., PB257960. 71 p.

Thermal studies of the Lower Escambia River were reported. Studies of the invertebrate fauna and flora and in situ bioassay studies were conducted during September and October, 1972. In July 1972, discharges from the Gulf Power steam facility flowing into the Escambia River increased surface water temperature to 93°F, 100 yards downstream from the point of discharge. This represented an 11°F increase over ambient temperature recorded upstream from the point of discharge.

Study Duration:3 months; Type of Study:Qualitative; Biological Component:Invertebrate fauna, fish, flora; Type of Sampler:Ponar grab; Number of Stations:18 (temp.); 6 (fish), 2 (macroinvertebrates); Abiotic Parameters Measured:Temperature, salinity, DO, conductivity; Dominant Taxon/Taxa Studied:*Oscillatoria*, *Gammarus*, *Nelita*, *Corophium*, *Hytilus*, *Mulinia*, *Lepomis macrochirus*, *Lepomis microlophus*;

(07.00036)

Whiting, W.J. 1972. The effect of substrate on the distribution of *Uca minax* (Crustacea:Decapoda). Univ. West Fla., M.S. Thesis.

A study on the distribution of *Uca minax* revealed that it prefers to burrow into the substrate with the highest organic content although this substrate was shown to have the lowest substrate oxygen. It was thus suggested that this detritivore prefers a substrate of high energy value, and an explanation was provided for its adaptation to withstand low oxygen tensions. Population density experiments revealed a point at which *Uca minax* avoids intraspecific encounter at higher population densities by burrowing and subsequently covering the burrow. Seasonal monitoring of burrow temperatures showed the stability of this microenvironment.

Study Duration:3 years; Habitat:Sand, mud; Type of Study:Qualitative; Biological Component:Crabs; Type of Sampler:30 cm x 34 cm x 14 cm cubes; Number of Stations:8; Abiotic Parameters Measured:Temperature, oxygen relationships; Dominant Taxon/Taxa Studied:*Uca minax*;

(07.00037)

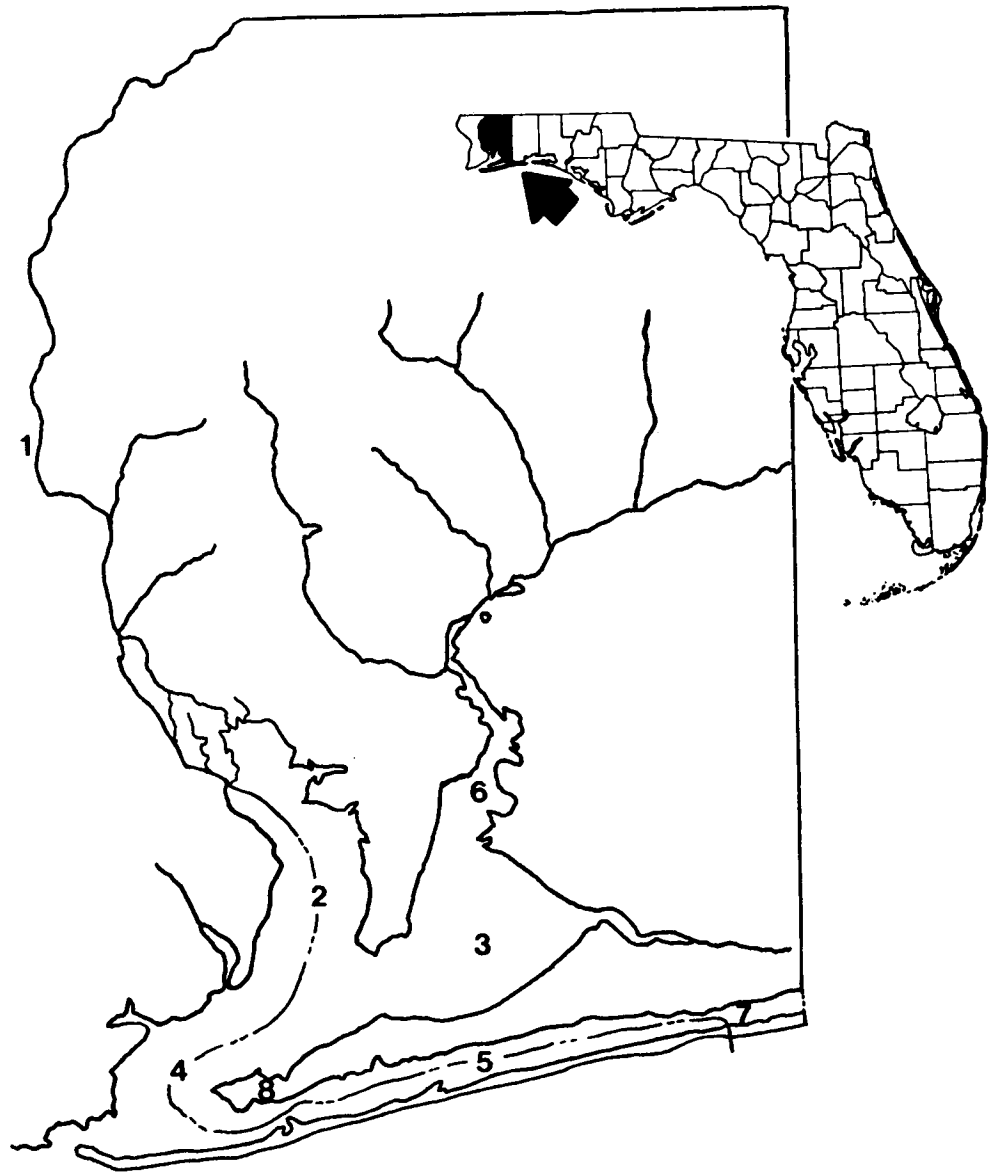
Wilson, A.J. & J. Forester 1978. Persistence of Aroclor 1254 in a contaminated estuary. Bull. Environm. Toxicol., 19:637-640.

Following an accidental leak of a local industry on the Escambia River, Aroclor 1254 was carried downstream into Escambia Bay and contiguous waters and detected in oysters as well as blue crabs, fish, sediment and water. The concentrations of PCB's in oyster tissue decreased after the leak was eliminated, but the data suggest that a steady-state concentration was reached. Aroclor 1254 was never detected in the water at the stations but sediments contained relatively low amounts in 1970 and 1971. Continued presence of PCB in oysters may have been caused by leaching from the highly contaminated sediments of the upper bay and river that are carried downstream during periods of turbulence. The persistence of this compound long after point source discharges were eliminated was discussed.

Study Duration:7 years; Habitat:Estuarine, oyster beds; Type of Study:Qualitative; Biological Component:Oysters; Number of Stations:3; Number of Replicates/Station:1; Temporal Frequency:Monthly; Abiotic Parameters Measured:Water chemistry, sediment analysis, pesticide analysis; Dominant Taxon/Taxa Studied:*Crassostrea virginica*;

See also: 26.00049.

# SANTA ROSA COUNTY



- |                   |                     |
|-------------------|---------------------|
| 1. ESCAMBIA RIVER | 5. SANTA ROSA SOUND |
| 2. ESCAMBIA BAY   | 6. BLACKWATER BAY   |
| 3. EAST BAY       | 7. NAVARRE PASS     |
| 4. PENSACOLA BAY  | 8. GULF BREEZE      |

(08.00001)

Horlick, G. & C.B. Subramanyam 1982. Macroinvertebrate infauna of a salt marsh tidal creek. Florida Sci. 45 (Suppl 1):26.

Spatial and temporal distributions of benthic infauna in a north Florida tidal creek were studied for one year. Four stations equidistant along the creek yielded a total of 111 species. Highest abundance and specimen numbers occurred at the creek mouth and lowest numbers at the creek origin. Results suggest tidal creeks act as ecotones between salt marshes and estuaries.

Study Duration:1 year; Habitat:Tidal creek; Type of Study:Qualitative, quantitative; Biological component:Fauna; Number of Stations:4;

(08.00002)

Livingston, R.J. 1977. Analysis of the environmental implications associated with the reopening of the Navarre Pass (Santa Rosa Sound, Santa Rosa County, Florida). Fla. Dept. Envir. Reg., Div. Envir. Permitting.

An objective evaluation of the proposed reopening of a pass in the barrier island system of the Santa Rosa Sound in the vicinity of Navarre Beach was presented. The Santa Rosa Sound was determined to represent a relatively unpolluted estuary of moderately high productivity. There were indications that the creation of a pass in a barrier island system would cause local increases in salinity and stabilization of the physico-chemical environment of the associated estuary. In view of the projected salinities after completion of the pass it was determined that the effect on the nursery function or productivity could be considerable.

Study Duration:1-1/2 months; Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Flora and fauna; Abiotic Parameters Measured:Temperature, salinity, visibility;

(08.00003)

Livingston, R.J., P.F. Sheridan, G.G. Kobylinski, F.G. Lewis, III 1976. Associations of epibenthic fishes and invertebrates. p. 270-411 In: Fla. Sea Grant Tech. Pap. Final Rept. Proj. R/EM-4. 473 p.

Five years of information concerning long term fluctuations of epibenthic assemblages in the Apalachicola Estuary were presented. Data analysis included trends in the movement of organochlorine compounds through the system during the first three years of study. It was suggested that there are predictable temporal successions of dominant species in 'undisturbed' estuaries which can be summarized as annual patterns or 'fingerprints' of species associations, despite broad seasonal variations in key physical forcing functions. It was also suggested that such patterns could serve as models to test the relative influence of discrete shocks to the system in the form of natural events or human activities.

Study Duration:5 years; Habitat:Mudflats and grassbeds; Type of Study:Qualitative; Biological Components:Epibenthic fishes; Type of Sampler:5 m otter trawl; Abiotic Parameters Measured:Temperature, DO, rainfall, turbidity, water color; Dominant Taxon/Taxa Studied:*Anchoa mitchilli*, *Micropogon undulatus*, *Cynoscion arenarius*, *Harengula pensacolata*, *Brevoortia patronus*;

(08.00004)

Mitchell, V. and J. Winstead 1974. Macroinvertebrates. In: Baseline study of physical, chemical, biological and socio-economic parameters of Navarre Beach. Univ. West Fla., Natl. Sci. Foundation Student Originated Study. p. 50-68.

Baseline information on the chemical, physical, biological and socio-economic environment of the area prior to construction of the proposed pass was presented. Benthic, epibenthic, and shoreline areas were sampled. The results showed that the majority of organisms were polychaete worms. Molluscs ranked second in numbers of different species, with crustaceans ranking third. The lack of numerous bivalve molluscs and the limitations of the samplers were also discussed.

Study Duration:3 months; Habitat:Grassbed, mud flat; Type of Study:Quantitative; Biological Component:Macroinvertebrates; Type of Sampler:Eckman grab, diver-operated core; Sieve Size:2.0 mm; Number of Stations:13; Number of Replicates/Station:5; Temporal Frequency:Variable; Dominant Taxon/Taxa Studied:*Loimia viridis*, *Amphioxus*, *Medionastus californiensis*;

(08.00005)

Rubinstein, M.I. 1976. Thermal and haline optima and lethal temperature limits affecting the culture of *Arenicola cristata* Stimpson (Polychaeta: Arenicolidae). Univ. West Fla., M.S. Thesis.

A temperate zone lugworm, *Arenicola cristata*, was reared at five combinations of temperature and salinity to determine the temperature-salinity regime which produces the most rapid growth when other environmental variables were held constant or optimal. Temperature and salinity tolerance levels for *A. cristata* were also determined. Optimum temperature and salinity levels for lugworm culture were estimated (by step-wise multiple regression) to be 26° C and 23 ‰ respectively. The temperature tolerance range for lugworms was observed to be less than 0.5 to 38° C (without acclimation). The salinity tolerance range (without acclimation) was found to be 8 to 34 ‰, for a 48 hour period. These data were used to suggest the geographic range in North America within which lugworm aquaculture facilities could

expect to function successfully.

Study Duration:6 months; Habitat:Control lab; Type of Study:Qualitative; Biological Component:Polychaete fauna;  
Dominant Taxon/Taxa Studied:*Arenicola cristata*;

(08.00006)

Tagatz, M.E., J.M. Ivey, H.K. Lehman, and J.L. Oglesby 1978. Effects of a lignosulfonate type drilling mud (as used in exploratory drilling for oil offshore) on the development of estuarine macrobenthic communities was studied. Specifically, the effects on the community composition were: 1) annelids and coelenterates were significantly fewer in aquaria containing drilling mud than in the control aquaria, and 2) arthropods were significantly affected by mud cover over sand. Molluscs were also diminished in this environment but not significantly. Overall, it was concluded that the discharge of large quantities of drilling mud at levels tested in the laboratory will adversely affect the colonization of various substrata by benthic animals in nature. Key Words:; Study Duration:2 months; Habitat:mud; Type of Study:Quantitative; Biological Component:Macrobenthos; Dominant Taxon/Taxa Studied:*Armandia maculata*, *Mediomastus californiensis*, *Acteocina canaliculata*, *Corophium acherusium*, *Aiptasia pallida*. END OF ENTRY Tagatz, M.E., J.M. Ivey & M. Tobia 1978 Effects of Domicide (Trade Name) G-ST on development of experimental estuarine macrobenthic communities. In: Pentachlorophenol. K.R. Rao, ed. Plenum Pub. Co., New York, NY. p. 157-163.

Aquaria containing clean sand received a continuous supply of flowing seawater from Santa Rosa Sound, mixed with known quantities of Domicide (Trade Name) G-SN for thirteen weeks. The measured concentrations of pentachlorophenol (PCP) in the aquaria were 1.8, 15.8 and 161 ug/l. At the end of the experiment, macrofauna established in control and experimental aquaria was examined. Although exposure to 1.8 ug PCP/l resulted in no effect, the higher concentrations of PCP caused marked reduction in the numbers of individuals and species. Molluscs were determined the most sensitive taxonomic group to PCP. These results and previous studies on the effects of a nine week exposure to PCP on the establishment of macrobenthic communities indicated that the discharge of PCP into natural waters may alter the normal colonization by benthic animals and could affect various ecological relationships among localized populations.

Study Duration:13 weeks; Habitat: Laboratory controlled aquaria; Type of Study:Quantitative; Biological Component:Benthic macrofauna;

(08.00007)

Tyler-Schroeder, D.B. 1976. Effects of two polychlorinated biphenyls. Aroclor (R) 1016 and 1242, on the grass shrimp, *Palaemonetes pugio*. Univ. West Fla., M.S. Thesis.

An investigation into the separate effects of Aroclor 1016 and 1242 on larvae, post larvae, and adult specimens of grass shrimp was initiated. Both short- and long-term exposures during larvae development were conducted in order to determine lethal and sublethal effects, with emphasis on toxicity during larvae development. The 96 hour LC<sub>50</sub> values for all larvae, post larvae and adult *Palaemonetes pugio* were presented. Both age group and season were noted to affect the response of the shrimp to the toxicants. No statistically significant difference was detected in the toxicity between the two Aroclors than were the larvae. There were no significant differences in lethal toxicity between Aroclor 1016 and 1242. Statistical analysis revealed little or no effect of any but the highest concentration (10.0 ug/l) of either Aroclor 1016 or 1242 on metamorphosis to the post larvae stage. Significant differences in total length of shrimp at the end of the experiment were determined to be related to exposure concentration.

Study Duration:Thirty-five days; Habitat:Laboratory controlled; Type of Study:Quantitative; Biological Component:Shrimp; Type of Sampler:Seine; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Palaemonetes pugio*;

(08.00008)

Winstead, J.T. & V. Mitchell 1975. Macroinvertebrates of the Navarre Pass, Florida area. Annu. Meet. Fla. Acad. Sci., Lakeland, Fla. 38(Suppl. 1):7.

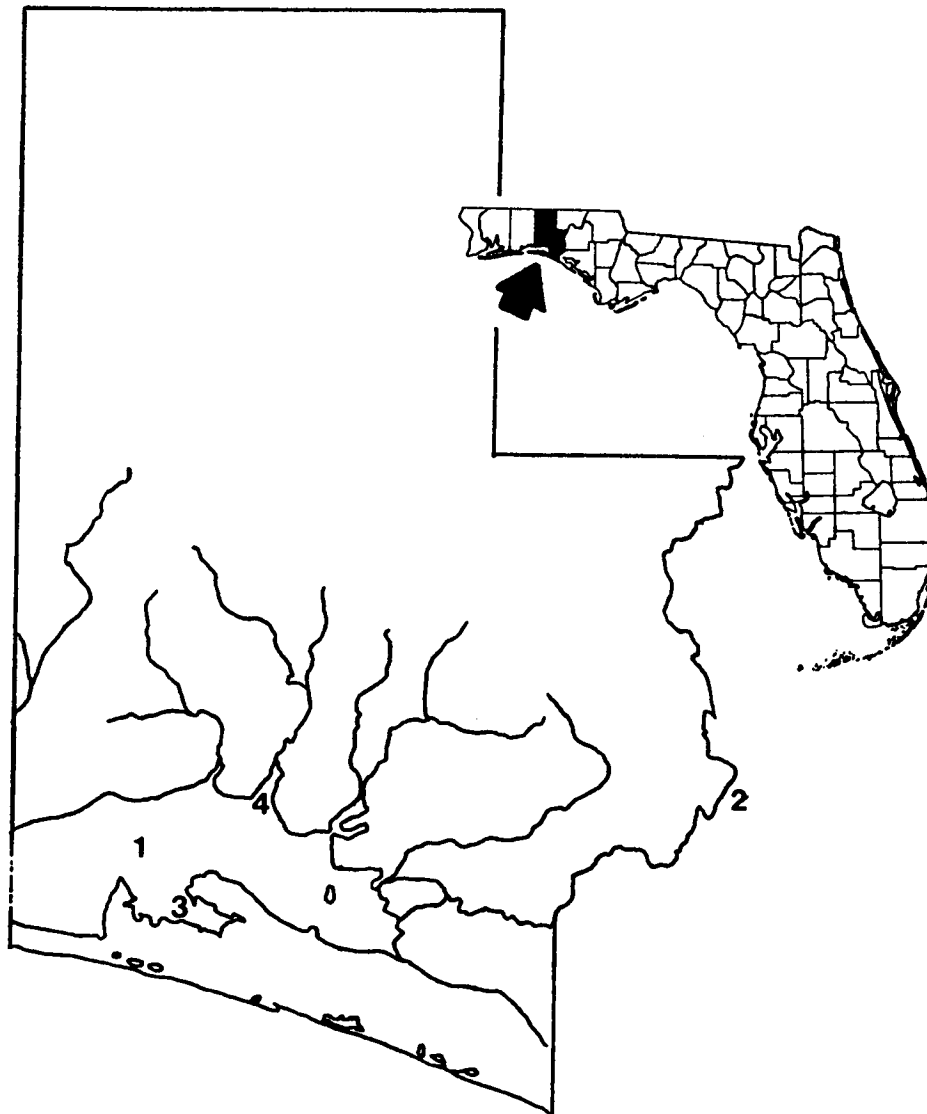
A baseline study of macroinvertebrates of the Navarre Pass area was made in 1974 prior to construction of a pass. Polychaetes, molluscs, and crustaceans, respectively, were the most abundant organisms. Biomass varied from 760 mg to 4755 mg. The data should be useful in a follow-up assessment of construction effects.

Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Core, otter trawl, 10 m seine; Number of Stations:13; Dominant Taxon/Taxa Studied:*Loimia viridis*;

See also: 3.00074, 7.00002, 7.00003, 7.00007, 7.00008, 7.00009, 7.00010, 7.00011, 7.00014, 7.00017, 7.00021, 7.00033, 7.00037.



# WALTON COUNTY



1. CHOCTAWHATCHEE BAY
2. CHOCTAWHATCHEE RIVER
3. HOGTOWN BAYOU
4. ALAQUA BAYOU

(09.00001)

Goldsmit, V. 1966. The recent sedimentary environment of Choctawhatchee Bay, Florida. Fla. State Univ. M.S. Thesis.

The sedimentary environment of Choctawhatchee Bay, Florida was described from 314 sediment samples taken during June 1965. The bay was divided into 3 areas based on sediment size and composition. The sedimentary history of the bay was discussed.

Study Duration: June 1965; Habitat: Sand, mud; Type of Study: Qualitative; Type of Sampler: Campbell grab; Number of Stations: 314 (sediment & water), 7 (currents); Abiotic Parameters Measured: Sediment grain size & composition, current velocity & direction, pH, Eh;

(09.00002)

Hastings, R.W. 1979. The origin and seasonality of the fish fauna on a new jetty in the northeastern Gulf of Mexico. Bull. Fla. State Mus., Biol. Sci. 24(1): 1-122.

The fish fauna on a new jetty at East Pass, Choctawhatchee Bay, Florida was observed biweekly or monthly from June 1968 to January 1971. The new jetty fauna originated from local species (such as sand beach inhabitants, ubiquitous estuarine species, and some pelagic species) attracted to reef habitats and reef fishes from permanent populations on offshore reefs. Continued recruitment of species included strays from other local habitats and more tropical species carried into the northern Gulf by currents. Three groups of reef fishes of the northern Gulf of Mexico were identified based on their occurrence. The number of species on the jetty increased yearly; seasonal variations in the number of fish species are noted. Comparisons are drawn between the fish fauna of the East Pass jetty and that of a nearby jetty at St. Andrew.

Study Duration: June 1968 - January 1971; Habitat: Jetty; Type of Study: Quantitative; Biological Component: Fish fauna; Type of Sampler: Hand net, fish trap, spear, angling; Number of Stations: 2; Temporal Frequency: Biweekly or monthly; Abiotic Parameters Measured: Temperature, salinity, water clarity, water movement; Dominant Taxon/Taxa Studied: *Harengula pensacolae*, *Leiostomus xanthurus*, *Lagodon rhomboides*;

(09.00003)

Hyne, N.J. 1965. Sedimentary environments and submarine geomorphology of the continental shelf in the area of Choctawhatchee Bay, Florida. Fla. State Univ. M.S. Thesis.

Sedimentary characteristics and distributional patterns were related to submarine geomorphology in Choctawhatchee Bay. Interpretation of ancient sedimentary rocks is dependent on the recognition and interpretation of similar present day environments.

Type of Study: Qualitative; Abiotic Parameters Measured: Sediment characteristics;

(09.00004)

Hyne, N.J. &amp; H.G. Goodell 1967. Origin of the sediments and submarine geomorphology of the inner continental shelf off Choctawhatchee Bay, Florida. Mar. Geol. 5(4): 299-313.

Sediment studies were conducted to determine the age and origin of sand bodies on the continental shelf near Choctawhatchee Bay. Sediments of the sand bodies differ from surrounding sediments by their larger grain size and higher heavy mineral content. The ridges differ from the troughs by having better sorted sediments and higher heavy minerals. This evidence points to an origin as barrier islands during the Late Wisconsin regression. Radiocarbon dating placed the sand body at least 5,000 yrs B.P.

Type of Study: Qualitative; Number of Stations: 25; Abiotic Parameters Measured: Sediment characteristics;

(09.00005)

Palacas, J.G., A.H. Love, &amp; P.M. Gerrild 1972. Hydrocarbons in estuarine sediments of Choctawhatchee Bay, Florida, and their implications for genesis of petroleum. Bull. Am. Assoc. Petrol. Geol. 56:1402-1418.

The distribution of bitumen, particularly hydrocarbons, in Choctawhatchee Bay, Florida, was determined from analysis of 159 sediment samples. The bitumen content consisted of 0.5% of the organic carbon in estuarine mud, whereas clean quartz sand contained bitumen content averaging 1.3% of organic carbon. Hydrocarbon composed an average of 50% of the bitumen in the mud and 22% of the bitumen in the sand. The geological significance of bituminous substances in recent sands is discussed.

Habitat: Sand, mud; Type of Study: Quantitative; Type of Sampler: Claashell grab sampler, Phleger gravity corer; Number of Stations: 102; Abiotic Parameters Measured: Sediment grain size & composition, organic carbon, bitumen content;

(09.00006)

Pastula, E.J., Jr. 1967. The ecology and distribution of recent foraminifera of Choctawhatchee Bay, Florida. Fla. State Univ., M.S. Thesis.

Out of a total of 78 samples from the recent sediments of Choctawhatchee Bay, only 26 yielded foraminifera. Twenty eight

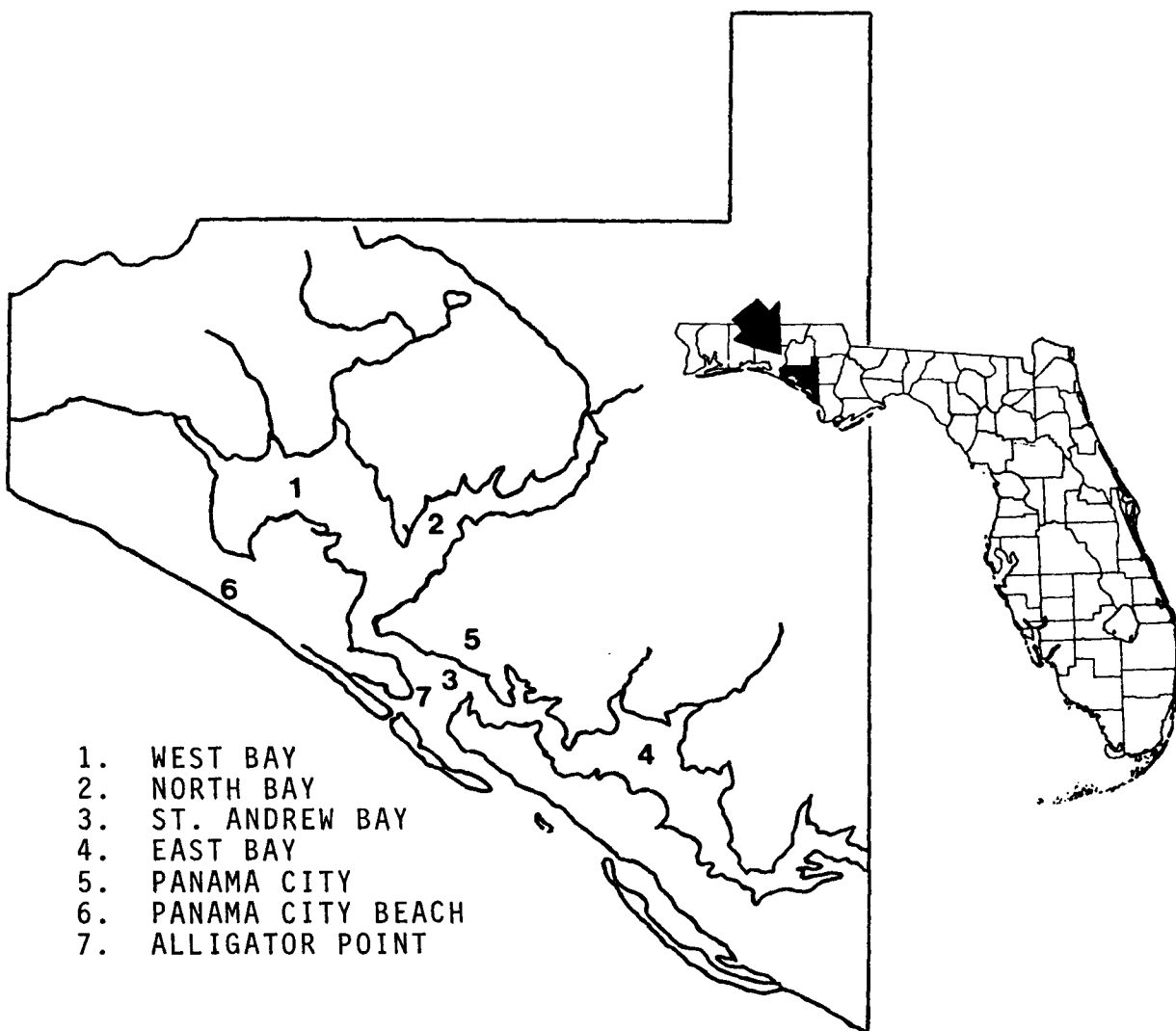
GEOS. CLASSIFICATION: Walton

genera and 40 species made up the foraminiferal assemblage. With the exception of a few open Gulf species, the foraminifera were found to be typically brackish marine. No direct, consistent correlation between the foraminiferal distribution and the ecological factors of depth, calcium carbonate, and mean grain size were determined. However, secondary relationships between these factors and bay foraminiferal assemblage were observed. A direct correlation between salinity and the foraminiferal distribution was observed, and this factor appeared to be an important limiting parameter affecting the foraminiferal assemblage. Transportation effects of tidal currents was suggested to be partially responsible for a probable foraminiferal emigration from the western part of the bay to the eastern sector.

Type of Study:Quantitative; Biological Component:Foraminiferal fauna; Dominant Taxon/Taxa Studied:*Ammonia*, *Elphidium*;

See also: 3.00074.

# BAY COUNTY



(10.00001)

Bingham, F.O. 1972. Several aspects of the reproductive biology of *Littorina irrorata* (Gastropoda). Nautilus 86(1):8-10.

The copulatory and spawning behavior of the salt marsh periwinkle, *Littorina irrorata*, was described from weekly observations near Panama City, Florida. Copulation occurs during warm months while the snails are out of the water on marsh grass. Spawning occurs at the air-water interface or just below the water surface at a rate of 4-5 capsules per second for 2-4 hours. Between 43,000 and 85,000 clear, planktonic capsules, each containing one egg, are shed by a female.

Study Duration: January-October 1969; Habitat: Salt marsh; Type of Study: Qualitative; Biological Component: Mollusca; Temporal Frequency: Weekly; Dominant Taxon/Taxa Studied: *Littorina irrorata*;

(10.00002)

Bingham, F.O. 1972. The influence of environmental stimuli on the direction of movement of the supralittoral gastropod *Littorina irrorata*. Bull. Mar. Sci. 22(2):309-335.

The distribution of *Littorina irrorata* was investigated in a salt marsh near Panama City, Florida, in relation to salinity, food supply, substrate elevation and slope, tidal exposure, vegetation and wave action. The effects of light, gravity, air-water interface, desiccation, starvation, temperature, and tide on the movement of *L. irrorata* were also studied. The behavioral responses found to be of importance in upward and downward movement of the snail were determined.

Study Duration: January-October 1969; Habitat: Salt marsh; Type of Study: Quantitative; Biological Component: Mollusca; Number of Stations: 41; Temporal Frequency: Weekly; Abiotic Parameters Measured: Air & water temperature, salinity, relative humidity; Dominant Taxon/Taxa Studied: *Littorina irrorata*;

(10.00003)

Bingham, F.O. 1972. Shell growth in the gastropod *Littorina irrorata*. Nautilus 85(4): 136-141.

Shell growth of 169 marked *Littorina irrorata* in a salt marsh near Panama City, Florida, was determined over a 5 month period. A hypothetical growth curve calculated from the results indicated that maximum size of *L. irrorata* could be attained in 20 months. Geographic variation in shell shape and color was also investigated, as was shell dimorphism.

Study Duration: March-August 1969; Habitat: Salt marsh; Type of Study: Quantitative; Biological Component: Mollusca; Dominant Taxon/Taxa Studied: *Littorina irrorata*;

(10.00004)

Brusher, H.A. and L.H. Ogren 1976. Distribution, abundance, and size of penaeid shrimps in the St. Andrew Bay System, Florida. Fish. Bull. 74(1):158-166.

Investigations into the distribution, abundance, and size of penaeid shrimps were conducted in St. Andrews Bay. Penaeids were found to be more abundant in the bay sections close to the Gulf of Mexico. Shrimp of the genus *Penaeus* were found to be larger in deeper sections of the bay. The greater similarity of the St. Andrew Bay system to the waters of the northern Gulf was suggested to account for the relatively high abundance of shrimps of the genera *Trachypenaeus* and *Sicyonia*. This similarity was also suggested to delay the gulfward migration of the genus *Penaeus* and to account for their large sizes in the system.

Study Duration: September 1972 - August 1973; Habitat: Sand, grassbed; Type of Study: Quantitative; Biological Component: Decapod fauna; Type of Sampler: Ming trawl; Number of Stations: 2; Number of Replicates/Station: 1; Temporal Frequency: Biweekly; Abiotic Parameters Measured: Temperature, salinity, DO, turbidity; Dominant Taxon/Taxa Studied: *Penaeus duorarum*, *Trachypenaeus similis*, *Sicyonia brevirostris*, *S. doralis*, *T. constrictus*, *P. aztecus*, *S. typica*;

(10.00005)

Culter, J.K. & S. Mahadevan 1982. Long-term effects of beach nourishment on the benthic fauna of Panama City Beach, Florida. Misc. Report No. 82-2. U.S. Army Corps of Engineers, Fort Belvoir, Va. 94 p.

Benthic fauna and sediment were sampled along 9 transects and 2 borrow sites on Panama City Beaches. Data were compared to baseline data collected by Saloman (1976). A small number of species were dominant at nearly all stations. Species diversity was lowest in the swash zone and sandbar stations and highest offshore. No long-term adverse effects of beach nourishment were detected.

Habitat: Sand, beach; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Plug, core; Sieve size: 0.5 mm.; Number of Stations: 47; Number of Replicates/Stations: 5; Abiotic Parameters Measured: Temperature, D.O., salinity, sediment characteristics; Dominant Taxon/Taxa Studied: *Paraonis fulgens*, *Scolecopsis squamata*, *Haustorius* n. sp., *Bommaniella* spp., *Spiophanes bombyx*, *Acanthohaustorius* sp., *Protohaustorius* n. sp.,

*Pseudohastorius n. sp.*, *Myriochele oculata*;

(10.00006)

Futch, C.F. & J. Martina, Jr. 1967. A survey of the oyster resources of Bay County, Florida with special reference to selection of cultch planting sites. Fla. Bd. Conserv. Spec. Sci. Rept. 16, 5 p.

The estuarine area of Bay County consisting of North, West, St. Andrews and East Bays were surveyed to determine the oyster resources and to select suitable areas for cultch planting for rehabilitation of the oyster fishery. Several areas were recommended for state-sponsored and financed cultch planting.

Type of Study:Qualitative; Biological Component:Fauna; Number of Stations:159; Abiotic Parameters Measured:Salinity, temperature, tides;

(10.00007)

Grady, J.R. 1981. Properties of seagrass and sandflat sediments from the intertidal zone of St. Andrews Bay, Florida. Estuaries 4(4):335-344.

Textural characteristics, organic carbon and carbonate carbon of the substrates underlying *Halodule wrightii* and *Thalassia testudinum* seagrass beds in the intertidal zone of St. Andrews Bay were compared to adjacent unvegetated sandflats and to subtidal slopes of the bay. While both seagrass sediments and sandflat sediments were fine grains, seagrass sediments were slightly more negatively skewed and more leptokurtic than those of the sandflats. Also, the seagrass sediments were less well sorted than were the sandflat sediments. The average organic and carbonate contents of the seagrass beds were 1.9 times greater than that of the sandflats but much less than that of the subtidal seagrass meadows.

Study Duration:Unknown; Habitat:Seagrass beds, sand; Type of Study:Quantitative; Biological Component:Sediments; Number of Stations:310; Number of Replicates/Station:1; Temporal Frequency:Monthly;

(10.00008)

Hicks, D., P. Murphy & D. Lawhorn 1978. Sediment oxygen demand studies. Mobile, Alabama and Panama City, Florida. U.S. EPA, Region IV, Surveillance and Analysis Div., 14.

Sediment oxygen demand (SOD) studies were conducted at Mobile Bay, Alabama and St. Andrews Bay, Florida. The St. Andrew's Bay SOD rates were found to be consistent, ranging between 0.13 gm O<sub>2</sub>/m<sup>2</sup>/hr to 0.06 gm O<sub>2</sub>/m<sup>2</sup>/hr at an ambient temperature of 28°C. Opaque plexiglass domes were used to measure exchange rates of dissolved oxygen between the water column and benthic community. No significant difference was found between dark and clear dome rates which could be attributed to photosynthesis. A significant difference at the 95% confidence level was, however, seen between the benthic respiration at a station affected by pulp mill discharges and an unaffected station.

Study Duration:18 days; Type of Study:Quantitative; Type of Sampler:Plexiglass dome; Number of Stations:3; Number of Replicates/Station:6; Temporal Frequency:Once; Abiotic Parameters Measured:Temperature, salinity, DO, light, SOD;

(10.00009)

Hulings, N.C. 1961. The barnacle and decapod fauna from the nearshore area of Panama City, Florida. Quart. Jour. Fla. Acad. Sci. 24(3):215-222.

A total of 53 species and subspecies of decapods were reported from the nearshore area off Panama City, Florida. The few species of decapods collected in 1957 and 1959 were determined to be in line with the paucity of other living macrobenthic invertebrates. The greatest number of species of decapods and other invertebrate species as well as individuals were encountered in 1958 when the live scallops, *Aequipecten gibbus*, were in abundance. Live scallops were not found in 1957 nor in 1959. It was suggested that the scallops, decapods and other invertebrates represent a rather well-defined community. The known northern range of eight species was extended considerably. Three new species were collected. A total of eight species of barnacles were collected from the survey area.

Study Duration:2 years; Habitat:Sand; Biological Component:Macrobenthic fauna; Type of Sampler:Dredge trawl, Scuba; Abiotic Parameters Measured:Temperature, salinity, currents, transparency, clarity; Dominant Taxon/Taxa Studied:*Arenaeus cribrarius*, *Calcinus tibicen*, *Nithrax pleuracanthus*, *Portunus depressifrons*, *Alpheus noronhai*, *Callinectes sapidus*, *Ovalipes ocellatus quadulpensis*, *Penaeus duorarum*, *Petrochirus diogenes*, *Odorchela sidneyi*, *Portunus spinicarpus*, *Sicyonia brevirostris*, *Remus cristulipes*, *Metoparhaphis calcarata*, *Pericleneus americanus*, *Spiropagurus dispar*, *Synalpheus townsendi*, *Upogebia affinis*;

(10.00010)

Marmelstein, A.D., P.W. Morgan & W.E. Pequegnat 1968. Photoperiodism and related ecology in *Thalassia testudinum*. Bot. Gaz. 129(1):63-67.

A study was conducted to determine, through ecological observations and experimental manipulation, whether the marine angiosperm *Thalassia testudinum* is responsive to photoperiod. The field observations made in St. Andrews Bay and in Biscayne Bay revealed the following. *Thalassia* bloomed in St. Andrews Bay, which extended its previously described

flowering range considerably northward. Flowering was seasonal and limited in many cases to discrete areas within a grassflat. Natural flowering in *Thalassia* was apparently influenced to some extent by photoperiod, as indicated by its seasonal nature and response to water depth and clarity. Laboratory culture of *Thalassia* at 6, 12, 18, and 24 hr photoperiods resulted in the following observations: 1) Vegetative growth in *Thalassia* was highly responsive to photoperiod and was favored by intermediate day lengths; 2) Flowering was also favored by intermediate day lengths; 3) The flowering response of *Thalassia* to photoperiod appeared to be one of expression rather than induction; and 4) There was an apparent requirement for a minimum day length as well as minimum night length. These observations led to a tentative classification of *Thalassia* as an "intermediate-day plant" with respect to flowering and vegetative growth.

Study Duration:1 year; Habitat:Grassbed, laboratory; Type of Study:Qualitative; Biological Component:Marine Flora; Dominant Taxon/Taxa Studied:*Thalassia testudinum*;

(10.00011)

Noffler, M.D. 1976. Sexual reproduction in Florida *Thalassia* (seagrass). Fla. Scientist, 39 (Suppl.):6.

*Thalassia* fruit production was surveyed. Flowering and developing fruits were seen on 30 percent of St. Andrews Bay plants and 40 percent of those at Anclote Anchorage. In the Florida Keys, however, fruits were not formed and flowering was scattered and less than 5 percent. Later observations of Anclote plants revealed that most developing fruits had blasted.

Study Duration:6 months; Habitat:Grassbed; Type of Study:Semi quantitative; Biological Component:Benthic flora; Dominant Taxon/Taxa Studied:*Thalassia testudinum*;

(10.00012)

Nickels, J.S., R.J. Bobbie, R.F. Martz, G.A. Smith, D.C. White & M.L. Richards 1981. Effect of silicate grain shape, structure, and location on the biomass and community structure of colonizing marine microbiota. Appl. Environ. Microbiol. 41(5):1262-1268.

Silica grains of the same size and water pore space, but with different microtopography, support microbiota with differences in biomass and community structure after 8 weeks in running seawater. Smooth silica grains had significantly less total microbial biomass than grains with cracks and crevices. Smoothness of sand grain surface was inversely related to abundance of procaryotes and algal microeucaryotes and directly related to microeucaryotic grazer abundance. A comparison of microbial biomass and community structure is made between experimental treatments and the actual benthic population of a sediment core from the sea floor (32 m) off Panama City, Florida.

Habitat:Sand; Type of Study:Quantitative; Biological Component:Fauna and flora;

(10.00013)

Pequegnat, W.D. & L.H. Pequegnat 1968. Ecological aspects of marine fouling in the northeastern Gulf of Mexico. Texas A&M Research Found., A&M Proj. 286-6, Ref. 68-22T. 80 p.

The progressive development and reorganization of potential fouling assemblages in the northeastern Gulf of Mexico was followed. Differences in both species composition and diversity existing among the stations (located 2, 11, and 25 miles offshore) and at different depths at the same station (4 to 44 m) revealed that the water masses bathing the floats often had very different origins and histories. The placement of the 25-mile fouling station in a region thought to be devoid of natural hard surfaces revealed the presence of pelagic larvae of epifaunal species that do not exist along the shore of Panama City. Oceanographic data indicated the possibility that some of these larvae may have been carried by currents from points as distant as Yucatan (about 400-500 nautical miles).

Study Duration:2 years; Type of Study:Qualitative; Biological Component:Epifauna; Type of Sampler:Artificial substrates (floats); Number of Stations:14; Temporal Frequency:Variable, Biweekly to yearly; Abiotic Parameters Measured:Temperature, salinity, currents;

(10.00014)

Pequegnat, W.D., R.S. Gaille, & L.H. Pequegnat 1967. Biofouling studies off Panama City, Florida. II. The two-mile offshore station. Texas A&M Research Found., A&M Proj. 286-6, Ref. 67-18T. 51 p.

Two arrays of plastic floats were installed at a station 2 miles offshore, one unprotected, the other with an organotin compound. Differences in the accumulations were accounted for through the influences of temperature, salinity, and organotin. The influences of distance from shore, depth, and season upon temperature and salinity were also evaluated.

Study Duration:2 years; Type of Study:Quantitative; Biological Component:Epifauna; Type of Sampler:Smooth, oval plastic floats; Number of Stations:3; Number of Replicates/Station:4; Temporal Frequency:Biweekly; Abiotic Parameters Measured:Temperature, salinity;

(10.00015)

Radwin, G.E. 1964. Morphological and ecological differentiation in muricid gastropods of the northeastern Gulf of Mexico.

Fla. State Univ. M.S. Thesis.

Although the shell form has served as a criterion for species identification and separation of species, this study reveals that a particular type of radular dentition is characteristic of Muricidae and can help in identification. The opercular morphology is useful only to the subfamily level. Other criteria include protoconchs, egg-capsules, and accessory boring organ. Niche characteristics are useful in species characterization but not as taxonomic criteria.

Type of Study:Quantitative; Biological Component:Fauna; Abiotic Parameters Measured:Depth, substrate, salinity, tidal effects; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Urosalpinx perrugata*, *Aequipecten irradians*, *Cantharus multangulus*;

(10.00016)

Saloman, C.H. 1976. The benthic fauna and sediments of the nearshore zone off Panama City Beach, Florida. Army Corps of Engineers, Misc. Rept. No. 76-10. 256 p.

A study of the sediments and benthic fauna of the nearshore zone off Panama City Beach, Florida, was conducted. The surface sediments exhibited uniformity over time and location. The benthic invertebrates were represented by 170 species in 26 taxa, with Polychaeta being most abundant. The effect of Hurricane Eloise on Panama City Beach was determined to be extensive. The beach and primary sand dune were severely eroded. The number of species and individuals increased following the storm and then gradually decreased nine days after the storm. Following the storm, seven additional species occurred in the samples that had not been found in the previous eleven months.

Study Duration:1 year; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Core; Number of Stations:45; Number of Replicates/Station:4; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, sediment characteristics; Dominant Taxon/Taxa Studied:*Dispio uncinata*, *Magelona rioja*, *Paraonis fulgens*, *Scolecopsis squamata*, *Spio pettibonae*, *Donax texianus*, *Ervelia concentrica*, *Nannocuma* sp., *Acanthohaustorius* n. sp., *Haustorius* n. sp., *Protohaustorius* n. sp., *Pseudohaustorius* n. sp., *Emerita talpoida*, *Branchiostoma floridae*;

(10.00017)

Saloman, C.H. 1979. New records of Caridean shrimps (Decapoda, Caridea) from the nearshore area of Panama City Beach, Florida, U.S.A. Crustaceana, Suppl. 5:147-152.

Records of the occurrence and a habitat description of five caridean shrimp collected from the nearshore area of Panama City Beach, Florida are presented. This information was collected as part of a benthic sampling program conducted in 1974-75.

Type of Study:Qualitative; Biological Component:Fauna; Dominant Taxon/Taxa Studied:*Ambidexter symmetricus*, *Processa vicina*, *Processa hemphilli*, *Tozeuma cornutum*, *Ogyrides alphaerostris*;

(10.00018)

Saloman, C.H. & S.P. Naughton 1977. Effect of Hurricane Eloise on the benthic fauna of Panama City Beach, Florida, USA. Mar. Biol. 42:357-363.

The effect of Hurricane Eloise on the benthic invertebrates at Panama City Beach was studied. The effect of the storm was determined to be not adverse, as the number of individuals occurring in the swash zone was nearly the same after the storm as before. The number of species of invertebrates increased after the storm but later dropped to approximately the same as before the storm. The increase in number of species was determined to be primarily due to the influx of species that normally occur further offshore. The lack of rainfall that usually accompanies a hurricane was suggested to be a factor enabling benthic organisms that normally live in high salinities to survive.

Study Duration:1 month; Habitat:Sand; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Stainless steel plug; Sieve Size: 0.701 mm; Number of Stations:9; Number of Replicates/Station:8; Temporal Frequency:Daily, then longer frequency; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Emerita talpoida*, *Haustorius* sp., *Scolecopsis squamata*, *Donax texianus*;

(10.00019)

Saloman, C.H. & S.P. Naughton 1978. Benthic macroinvertebrates inhabiting the swash zone of Panama City Beach, Florida. Northeast Gulf Sci. 2(1):65-72.

The benthic macroinvertebrates inhabiting the swash zone at Panama City Beach were studied and were found to be typical of other sandy beach fauna elsewhere in the Gulf of Mexico. The numbers of individuals fluctuated from month to month and from station to station. The macroinvertebrates were patchy in their distribution and diversities were low, indicating an oligomictic and stressed or physically controlled environment, dominated by a few species and a large number of individuals. The principal stress was determined to be wave energy.

Study Duration:August 1974 - July 1975; Habitat:Sand; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Stainless steel plug; Sieve Size:0.701 mm; Number of Stations:8; Number of Replicates/Station:4; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Donax*



texasianus, *Scolecopsis squamata*, *Haustorius*, sp. and *Euerita talpoida*;

(10.00020)

Saloman, C.H., S.P. Naughton & J.L. Taylor 1982. Benthic faunal assemblages of shallow water and seagrass habitats, St. Andrews Bay, Florida. U.S. Fish & Wildl. Serv. 27 p.

This study presented information on the taxonomy and ecology of the benthic fauna found in the sand and seagrass habitats of St. Andrews Bay. Phylogenetic listing of species, species occurrence and frequency, species dominance and sediment characteristics are given.

Study Duration: June-August 1974; Habitat: Sand, seagrass; Type of Study: Qualitative; Biological Component: Fauna; Number of Stations: 149; Abiotic Parameters Measured: Sediment characteristics;

(10.00021)

Saloman, C.H., S.P. Naughton & J.L. Taylor 1982. Benthic community response to dredging borrow pits, Panama City Beach, Florida. For U.S. Army Corps of Engineers, Misc. Rept. No. 82-3.

The major short-term environmental effects of offshore dredging on benthic fauna at Panama City Beach were studied through analyses of the hydrology, sediments, and benthos of the area. Pre- and post-dredging sediments showed many of the same characteristics. Fauna were compared between dredged and undredged areas on the basis of species richness and abundance. The results showed that recovery began quickly and was nearly complete within 1 year from the time of dredging.

Study Duration: 1974-1977; Habitat: Sand; Type of Study: Qualitative; Biological Component: Fauna; Number of Stations: 6; Abiotic Parameters Measured: Salinity, temperature, sediment characteristics;

(10.00022)

Saloman, H. 1981. Aspects of the biology of *Spilocuana salomani* (Cumacea: Boditriidae). Northeast Gulf Sci. 4(2):99-104.

The study of *Spilocuana salomani* at Panama City Beach from August 1974 to March 1977 revealed a temporal change in density over the sampling period as well as variation in distribution. Highest density, 78.5 per m<sup>2</sup>, occurred in May 1975 and averaged 16.7 over the sampling period. *S. salomani* was most abundant at a depth of about 1 m, decreasing seaward from the beach. Deposition of sand onshore had little effect on *S. salomani*. Fecundity was lower than that reported for other cumaceans. Gravid females were found year round.

Study Duration: August 1974-March 1977; Habitat: Sand; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Plug; Sieve Size: 0.701 mm; Number of Stations: 55; Number of Replicates/Station: 4; Abiotic Parameters Measured: Sediment size, temperature, salinity; Dominant Taxon/Taxa Studied: *Spilocuana salomani*;

(10.00023)

Tiffany, W.J., III 1968. The life cycle and ecology of the beach clam *Donax variabilis* Say (Mollusca: Pelecypoda: Donacidae). Fla. St. Univ., M.S. Thesis.

A thorough investigation of all aspects of the life history and ecology of *Donax variabilis* was presented. *D. variabilis* inhabits the intertidal zone of sandy beaches ranging from Texas around the tip of Florida to the shores of the Carolinas. In Florida *D. variabilis* spawns in the late spring. New populations were determined to grow at a maximum rate of five to six millimeter per month and mature within five months. The greatest mortality of individuals was observed to occur during the first five months of life when 50-70% of the new population die. The life span was determined to be about 17 months. It was determined that eggs of *D. variabilis* can be artificially fertilized in the laboratory. Populations of *D. variabilis* remain in the saturated area of the wash zone, and a definite sorting by size of individuals takes place. It was shown that the tidal migration of *D. variabilis* is not triggered by intrinsic mechanisms, but by the constantly changing environment. Shell coloration is influenced by the type of available food. Maximum individual size depends partly upon the number of clams per area on the beach, sparser populations supporting larger individuals. The commensals, parasites, and predators of *D. variabilis* at Alligator Point were also discussed.

Habitat: Sandy, intertidal; Type of Study: Qualitative; Biological Component: Benthic fauna; Dominant Taxon/Taxa Studied: *Donax variabilis*;

(10.00024)

Tiffany, W.J., III 1971. The tidal migration of *Donax variabilis* Say (Mollusca: Bivalvia). The Veliger 14(1):82-85.

Tidal migration of *Donax variabilis* revealed that it responds to acoustic shock by jumping into the uprushing water. The clams were found to respond to the shock only if they were situated in the saturated wash zone. It was postulated that the interstitial water in this area carries the acoustic shock to the animals.

Habitat: Sandy beach; Type of Study: Qualitative; Biological Component: Benthic fauna; Dominant Taxon/Taxa Studied: *Donax*

GEOG. CLASSIFICATION: Bay

10.00025

variabilis;

(10.00025)

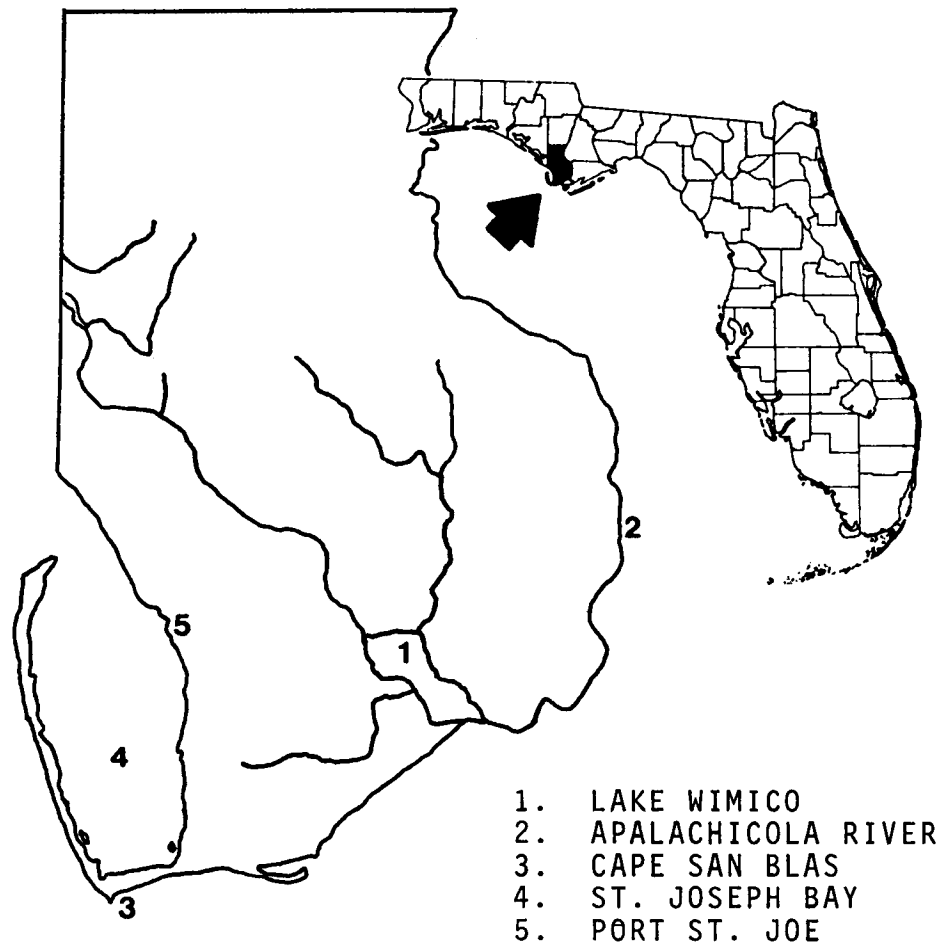
Waller, R.A. 1961. Ostracods of the St. Andrews Bay system. Fla. State Univ. M.S. Thesis.

The distribution and abundance of ostracods in St. Andrews Bay, Florida were examined in relation to several biotic and abiotic parameters. A significant relationship was found between ostracod and seagrass occurrence; sediment type was believed to have a secondary influence on ostracod distribution. Species richness and salinity were directly correlated. Ostracod abundance also varied with seasonal fluctuations in temperature.

Study Duration:February 1-December 15, 1960; Type of Study:Quantitative; Biological Component:Crustacea fauna; Type of Sampler:Corer; Temporal Frequency:Bimonthly; Abiotic Parameters Measured:Temperature, salinity;

See also: 13.00023.

# GULF COUNTY



(11.00001)

Bell, C.K. 1979. Nitrogen fixation (acetylene reduction) associated with seagrasses along the northern Florida Gulf coast. Fla. State Univ. M.S. Thesis.

Investigation of nitrogen fixation associated with the seagrasses *Thalassia testudinum*, *Syringodium filiforme* and *Halodule wrightii* was conducted during June-August 1978 on the northern Gulf coast. At one station, N-fixation, leaf area index, and leaf plus epiphyte biomass decreased with depth, suggesting that light influences seagrass and epiphyte growth and the N-fixation associated with epiphytes. The amount of organic matter increased from west to east stations, which was accompanied by increases in epiphyte biomass and N-fixation and a decrease in root biomass. These results support the hypothesis that the morphology of *T. testudinum* is related to the percentage of ash free dry weight of the sediment, which indirectly affects N-fixation.

Study Duration: June-August 1978; Habitat: Grassbeds; Type of Study: Quantitative; Biological Component: Fauna and flora; Number of Stations: 2; Abiotic Parameters Measured: Organic content, sediment grain size; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Syringodium filiforme*, *Halodule wrightii*;

(11.00002)

Bullis, H.R. & R.M. Ingle 1959. A new fishery for scallops in western Florida. Proc. Gulf Caribb. Fish. Inst. 11th Annu. Sess. p. 75-78.

The initiation of a commercial fishery for the calico scallop, *Pecten (Argopecten) gibbus*, in the Gulf of Mexico is documented in this paper. The Fish and Wildlife Service exploratory vessel, "Oregon", began active exploration for commercial concentrations of *P. gibbus* in 1954. Scallops were first harvested by commercial fishermen in March 1958, near St. Andrews Bay. Production values, locations of other scallop beds, and size distributions are summarized.

Study Duration: April 1954-September 1958; Habitat: Sand; Type of Study: Review; Biological Component: Mollusc fauna; Dominant Taxon/Taxa Studied: *Pecten (Argopecten) gibbus*;

(11.00003)

Eidemiller, J.A. 1972. Marine meadows of Florida: a look at turtle grass communities. Bull. Am. Litt. Soc. 7(4):22-25.

This report describes the diverse and abundant fauna thriving in a Florida seagrass community. Among those species described are sea horses, octopi, hermit crabs, horseshoe crabs, scallops, and juvenile commercial and sport fishes.

Habitat: Grassbed; Type of Study: Qualitative; Biological Component: Flora and fauna; Abiotic Parameters Measured: Temperature; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, (*Diplanthera*) *Halodule wrightii*, *Syringodium filiforme*;

(11.00004)

Eidemiller, J.A. 1972. Significant associations of the motile epibenthos of the turtle grassbeds of St. Josephs Bay, Florida. Fla. St. Univ. M.S. Thesis.

The technique (devised by E. W. Fager) for the determination of statistically significant recurrent groups of species was applied to quantitative samples of the motile epibenthic fauna of the turtle grassbeds on St. Josephs Bay. An attempt was made to correlate the results of this procedure with behavioral interactions as they were observed in the field by means of SCUBA diving. Seventy species of small fishes and invertebrates were collected in the first sample. Sixty two species were collected in the second sample. Recurrent groups were discussed in terms of (1) affinities between groups; (2) relationships of associates to their groups; (3) differences and similarities within the larger recurrent groups; (4) possible significance of the two species groups, and characteristic species not grouped. A comparison of the two seasonal samples was made.

Study Duration: July-December 1971; Habitat: Grassbed; Type of Study: Semi-quantitative; Biological Component: Benthic fauna; Type of Sampler: Scuba diver monitored dredge; Number of Stations: 20; Dominant Taxon/Taxa Studied: *Hippolyte pleuracantha*, *Lytechinus variegatus*, *Pagurus bonairensis*;

(11.00005)

Haines, M.L. 1975. The reproductive cycle, larval development, culture, and tolerances of the sunray venus clam *Macrocallista nimbosa* (Lightfoot 1736). Fla. St. Univ. Ph.D. Dissertation.

The biology of the sunray venus clam, *Macrocallista nimbosa*, was studied. Spawning and reproductive data and larvae development and growth information were included. Salinity tolerance studies of embryos and veligers revealed that survival and growth was significantly limited by salinities above and below 30 o/oo, whereas survival of two day old straight hinge veliger larvae grown at 30 o/oo was little affected when transferred and maintained for 6 days in salinities of 25, 30 and 35 o/oo. Both salinity and temperature (the combined effect) were found to significantly affect survival. Within a suitable temperature range (13-20°C) adult survival was found to be most affected by salinity, ranging between 25 and 30 o/oo for 100% survival. *M. nimbosa* exhibited thermal tolerance limits of 5.5°C and 31°C under laboratory conditions. The adults were found to be unable to tolerate consistently high temperatures for extended periods of time.

Study Duration:1 year; Habitat:Sand; Type of Study:Qualitative; Biological Component:Mollusc fauna; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied: *Macrocallista nimbosa*;

(11.00006)

Hudson, J.H. 1971. The calico scallop: fishery and research developments. Am. Malacol. Union, Inc. Bull., Symp. Commer. Mar. Molluscs of the U.S. Annu. Rept. 1970, p. 27-28.

Geographic areas and physical factors such as temperature and depth limiting the abundance of calico scallops were presented. Methods for commercial harvesting using an 8 ft tumbler dredge and factors influencing commercial production were discussed. The use of Remote Underwater Fishery Assessment System (RUFAS) and a towed sled equipped for continuous motion picture or video tapes of scallop concentrations was also discussed. Biological research on the calico scallop in such areas as spawning, larval development and dispersal, spat set, age, growth, movement, mortality, and environmental factors affecting scallop beds were also briefly discussed.

Type of Study:Qualitative; Biological Component:Mollusc fauna; Type of Sampler:Tumbler dredge; Dominant Taxon/Taxa Studied:*Argopecten gibbus*;

(11.00007)

Joyce, E.A., Jr. 1970. History and current status of the sunray venus clam fishery in northwest Florida. Annu. Rept. Am. Malacol. Union 1970:29-30.

This study documented the initial commercial harvest of sunray venus clams, *Macrocallista nimbosa*, near Port St. Joe. A 27 inch hydraulic Nantucket dredge was used to harvest a rich bed of sunrays from a sand bottom in depths less than 35 ft. Clams were of uniform size, averaging 130 mm in length. Preliminary investigations indicate these clams to be about 4 to 5 years old, with much more rapid growth occurring in smaller clams. Inshore from the fishing grounds, catch lengths ranged from 25 to 130 mm, suggesting a movement of young adults from inshore to offshore areas. Average catch sizes are given and the economics of this virgin fishery are discussed.

Study Duration:February-June 1967; Habitat:Sand; Type of Study:Quantitative; Biological Component:Mollusc fauna; Type of Sampler:Nantucket dredge; Dominant Taxon/Taxa Studied:*Macrocallista nimbosa*;

(11.00008)

Joyce, E.A., Jr. 1971. History and current status of the sunray venus clam fishery in northwest Florida. Am. Malacol. Union Inc., Symp. Commer. Mar. Mollusks of the U.S., Annu. Rept. 1970, p. 29-30.

The initiation of a new fishery, utilizing the sunray venus clam, near Port St. Joe, Florida, was discussed in terms of methods and harvesting success. The market value of this resource was estimated. Further explorations and research into locating large populations of this clam and gathering data on the occurrence, distribution, abundance and bathymetric range was suggested.

Type of Study:Qualitative; Biological Component:Mollusc fauna; Type of Sampler:27 inch Nantucket dredge; Dominant Taxon/Taxa Studied:*Macrocallista nimbosa*;

(11.00009)

Menzel, M. 1976. Comprehensive report on the sunray venus clam (*Macrocallista nimbosa*) industry in Florida. Rept. submitted to Univ. Delaware, School of Mar. Sci. 15 p.

A comprehensive report on the sunray venus clam industry in Florida was presented. A fishery for the sunray venus clam existed in the Bell Shoals areas from 1967 to 1974, during in which over 2 1/2 million pounds were harvested by dredges. The abundance of the clams in this area and along coastal Florida was discussed. Clams were never in high enough concentration to justify commercial operations except at Bell Shoals. The entire fishery was localized from one shucking processing firm, and although there were only two permits for dredges in 1976, there were no processing plants in operation. Harvesting was continued throughout the year and one study showed that there was little variation in the percent dry solids to wet weight throughout the year. Harvesting processes and industry problems were discussed. Biology, diseases (of which none are known), and recommendations were described.

Study Duration:7 years; Habitat:Sand; Type of Study:Qualitative; Biological Component:Mollusc fauna; Type of Sampler:Nantucket type dredge; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Macrocallista nimbosa*;

(11.00010)

Myers, G.J. 1979. The taxonomy and natural history of a new species of the genus *Peltogaster* (Crustacea: Rhizocephala) parasitic on hermit crabs in the northeastern Gulf of Mexico. Fla. State Univ. M.S. Thesis.

Collection of *Pagurus bonairensis* from the Gulf County area revealed a previously unknown parasite of the genus *Peltogaster*. Reproduction and larval stages are described. Study of the parasitic relationship showed: an infection rate of 1.28%; a lack of multiple infections; simultaneous infections with larval ascarids and adult eutoniscids; no sex

preferences; and parasitism effects on the host causing the males to approach the female condition and the females, the juvenile condition.

Study Duration: April 1974-April 1975; Habitat: Grassbeds; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Pushnet; Temporal Frequency: Monthly/semimonthly; Dominant Taxon/Taxa Studied: *Pagurus bonairensis*, *Thalassia testudinum*, *P. longicarpus*, *Peltogaster* sp.;

(11.00011)

Osborne, N.M. 1979. The influence of sediment characteristics and seagrass species on the distribution and abundance of polychaetous annelids in north Florida seagrass beds. Fla. State Univ. M.S. Thesis.

The distribution and abundance of polychaetes in seagrass beds was investigated in St. Josephs Bay, Florida, in relation to seagrass species composition and leaf area, sediment organic content, and sediment stability. Of 3 polychaete communities from adjacent *Thalassia testudinum* beds with different sediment characteristics, 2 were affected by sediment composition, while the third community was influenced by leaf biomass. Infaunal trophic structure did not vary significantly between sites. In a separate study phase, polychaete species composition and infaunal trophic structure varied sharply along a transect through a seagrass bed containing 3 species of seagrass. Variations in community structure were related to plant density, seagrass species composition, and sediment stability.

Study Duration: August-September 1978; Habitat: Seagrass beds; Type of Study: Quantitative; Biological Component: Polychaeta and flora; Type of Sampler: Corer; Sieve Size: 1.0 mm; Number of Stations: 8; Number of Replicates/Station: 3; Temporal Frequency: 1 sampling; Abiotic Parameters Measured: Sediment grain size; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Halodule wrightii*, *Syringodium filiforme*;

(11.00012)

Phillips, R.C. 1977. Seagrass bed development on dredged spoil at Port St. Joe, Florida. p. 1-11. In: Proceedings of the Fourth Annual Conference on Restoration of Coastal Vegetation in Florida. Hillsborough Comm. Coll., Envir. Stud. Ctr., Cockroach Bay, in Cooperation with Tampa Port Authority.

A total of 1488 plugs of the seagrass, *Halodule wrightii*, were transplanted on two dredge spoil sites in St. Joseph Bay, Port St. Joe, Florida. The sites were on either side of a channel which drains effluents from a nearby paper mill. Three plots were installed on each site; one with plugs on 3 ft centers, one with plugs on 6 ft centers, and one with plugs on 9 ft centers. Two of the plots contained plugs of two sizes, i.e., a cylindrical plug with an area of 30 in<sup>2</sup> (195 cm<sup>2</sup>) and a rectangular plug with an area of 60 in<sup>2</sup> (390 cm<sup>2</sup>). The monitoring visit on 20-22 January 1977 was made during the coldest winter of the century. Survival of the plugs varied from 27% (on a portion of a spoil bank eroded and lost) to 97%. Increase of plants over the bottom varied from 4% to 70%.

Study Duration: 8 days; Habitat: Grassbed; Type of Study: Semiquantitative; Biological Component: Benthic flora; Number of Stations: 2 sites, 3 plots per site; Number of Replicates/Station: 244, 248 or 252; Temporal Frequency: Twice (August and January); Dominant Taxon/Taxa Studied: *Halodule wrightii*;

(11.00013)

Phillips, R.C., M.K. Vincent & R.T. Huffman 1978. Habitat development field investigations, Port St. Joe seagrass demonstration site, Port St. Joe, Florida, Summary Report. Army Corps of Engineers, Waterways Exp. Sta. Dredged Mat. Res. Prog., Tech. Rept. D-78-33. 52 p.

Transplants of *Halodule wrightii* at Port St. Joe, Florida indicated that it may be feasible to propagate seagrass on dredged material. Using the plug technique on coarse-grained dredged material, many of the transplants demonstrated a significant amount of growth before the project failed almost 13 months after planting. It was hypothesized that the factors involved in the project's failure included stresses from an unusually cold winter, exposure, erosion, sedimentation, variations in water quality, and heavy surf.

Study Duration: 13 months; Habitat: Grassbed, sand; Type of Study: Qualitative; Biological Component: Benthic flora; Type of Sampler: PVC core; Number of Stations: 2; Number of Replicates/Station: 2; Temporal Frequency: Once; Abiotic Parameters Measured: Temperature, salinity, pH, turbidity, suspended solids; Dominant Taxon/Taxa Studied: *Halodule wrightii*;

(11.00014)

Stauble, D.K. 1971. The bathymetry and sedimentation of Cape San Blas shoal and shelf off St. Joseph Spit, Florida. Fla. State Univ. M.S. Thesis.

One hundred forty-four dredge samples were collected from Cape San Blas shoal and the shelf off St. Joseph Spit, Florida, to determine the distribution of sediment characteristics. Five provinces were identified on the basis of mean grain size and sediment composition. The bathymetry and sediment budget of the study area were determined.

Study Duration: November 16-19, 1970; Habitat: Sand, mud; Type of Study: Qualitative; Type of Sampler: Bucket dredge; Number of Stations: 144; Abiotic Parameters Measured: Sediment grain size;

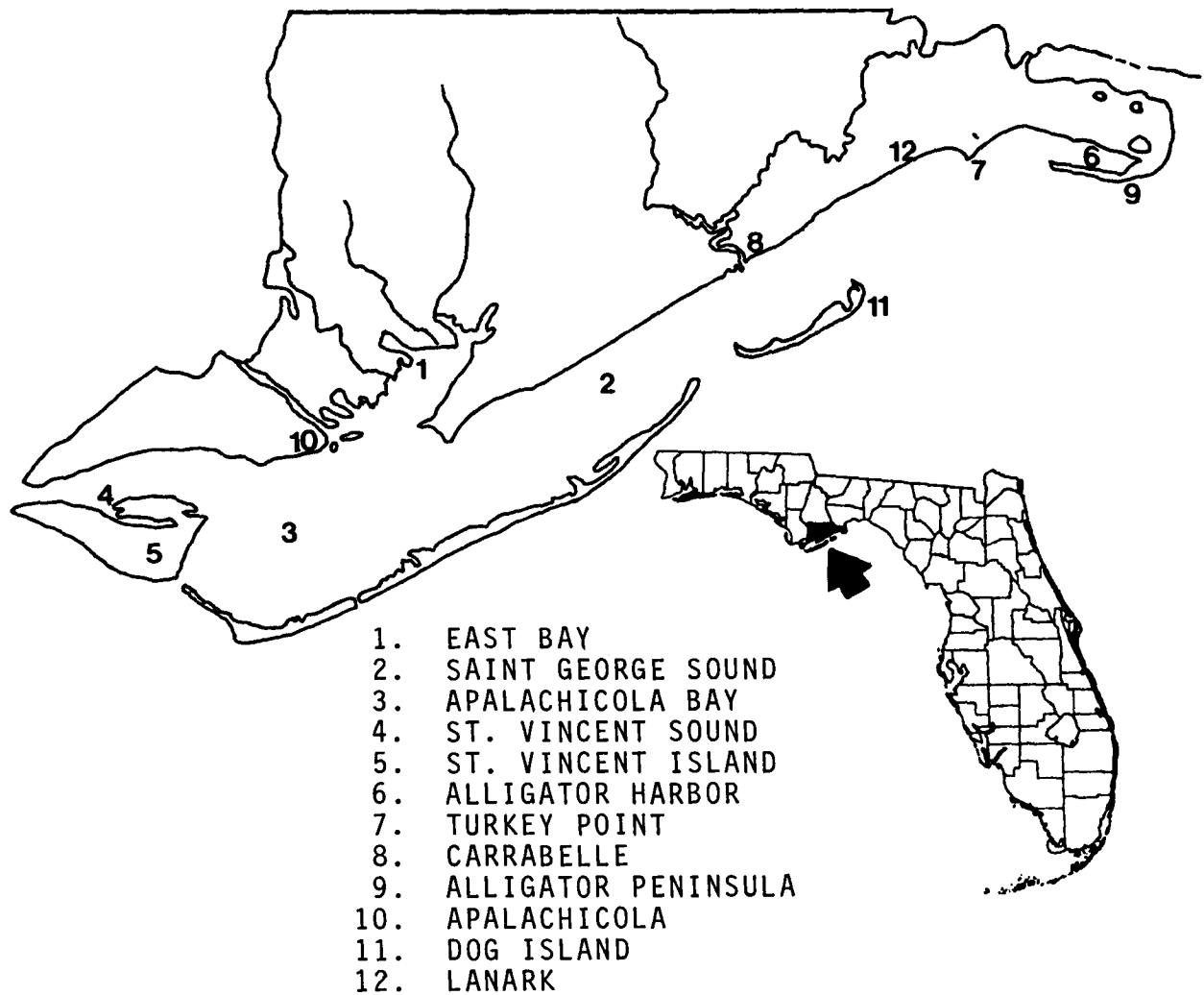
(11.00015)

Stokes, R.J., E.A. Joyce, Jr. & R.M. Ingle 1968. Initial observations on a new fishery for the sunray venus clam, *Macrocallista nimbosa*, (Solander). Fla. Bd. Conser. Mar. Research Lab., Tech. Ser. No. 56. 27 p.

A discussion on a new fishery for sunray venus clams, *Macrocallista nimbosa* was presented. It was concluded that the sunray venus clam could be harvested in commercial quantities, provided that hydraulic dredging equipment be used and be maintained in good working condition. Other species of commercial value were harvested in association with this clam. Growth was found to be rapid, with clams reaching commercial size in four to five years. The described dredge was not found to be harmful to the marine resources of the area.

Study Duration:4 months; Habitat:Sand; Type of Study:Qualitative; Biological Component:Sunray venus clams; Type of Sampler:27 in Mantucket dredge; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied: *Macrocallista nimbosa*;

# FRANKLIN COUNTY





(12.00001)

Akin, R.M. & H.J. Humm 1959. *Macrocallista nimbosa* at Alligator Harbor. Quart. J. Fla. Acad. Sci. 22(4):226-228.

A dense population of sunray venus clams (*Macrocallista nimbosa*) was reported from sand flats at Alligator Harbor, Florida. A total of 84 live clams were collected from 13 one-meter quadrats, an average of 6.46 clams/m<sup>2</sup>. Maximum density of clams was 16/m<sup>2</sup>. Most clams were found in sandy depressions surrounded by seagrass. The average length, height, and width and their ranges are given for a sample of 30 clams. The possibility of similar dense populations in nearby suitable habitat, which might support a commercial fishery, was suggested.

Study Duration: July 15-22, 1959; Habitat: Seagrass beds, sand; Type of Study: Quantitative; Biological Component: Mollusc fauna; Number of Stations: 13; Dominant Taxon/Taxa Studied: *Macrocallista nimbosa*;

(12.00002)

Alvis, C.A. 1971. Trophic relationships between significantly associated species of macrobenthos in the shoal grass habitat. Fla. St. Univ. M.S. Thesis.

Nineteen hypothetical trophic relationships between significantly associated species of macrobenthos in the shoal grass habitat in St. Georges Sound, Florida, were reasonably justified by gut analyses. Gut analyses on 31 species revealed 64 plant, animal or miscellaneous gut items, most of which were suspected of being components or inhabitants of detritus, the most prevalent gut item. Tests of significance (at 0.05 level) of the difference in gut item proportions between species showed that all species were detritus feeders with a tendency toward either a herbivorous or a carnivorous feeding habitat.

Habitat: Grassbed; Type of Study: Qualitative; Biological Component: Macrobenthos;

(12.00003)

Bishop, J.M. 1970. Burying, growth, and molting of pink shrimp *Penaeus duorarum* under selected photoperiods of white light and U-V light. Fla. St. Univ. M.S. Thesis.

The comparative effects of different photoperiods of UV light and white light on the burying, growth and molting of *Penaeus duorarum* were studied under controlled conditions. Statistically significant differences for growth and molting rates were not evident when data were analyzed on an average daily basis. Ecdysis occurred during the scotophase of any photo period. A circadian burying activity was found in shrimp exposed to continuous UV light. Shrimp kept in continuous darkness molted significantly more during the time coinciding with scotophase, and thus exhibited a weak endogenous molt rhythm. The poorest growth occurred in groups exposed to UV light and best under constant dark and 12 hour light:12 hour dark conditions. Since approximated maximum daily growths were found to be less than the best estimates of natural growth, it was suggested that other factors (crowding, available space, food, water quality and cannibalism) might be involved.

Study Duration: 1969; Type of Study: Quantitative; Biological Component: Decapod fauna; Number of Stations: 10 aquaria; Number of Replicates/Station: 10 shrimp/aquaria; Temporal Frequency: Measured weekly; Dominant Taxon/Taxa Studied: *Penaeus duorarum*;

(12.00004)

Bittaker, H.F. & R.L. Iverson 1976. *Thalassia testudinum* productivity: A field comparison of measurement methods. Mar. Biol. 37(1):39-46.

Net primary production rates in *Thalassia testudinum* from the NE Gulf of Mexico were measured during a study comparing the Wetzel inorganic <sup>14</sup>C uptake and Zieman leaf biomass techniques of measuring primary production rates. There were no significant differences for the two methods when the <sup>14</sup>C uptake technique was corrected for sediment <sup>14</sup>C "uptake", incubation chamber energy absorption, and differences in total light energy. The results confirm previous evidence that the <sup>14</sup>C technique estimates net particulate-carbon production.

Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Flora; Number of Stations: 1; Abiotic Parameters Measured: <sup>14</sup>C uptake; Dominant Taxon/Taxa Studied: *Thalassia testudinum*;

(12.00005)

Bobbie, R.J., S.J. Morison &amp; D.C. White 1978. Effects of substrate biodegradability on the mass and activity of the associated estuarine microbiota. Appl. &amp; Environ. Microbiol. 35(1):179-184.

Morphologically similar polyvinyl chloride needles and needles from slash pine were used to assay microbial mass and activities of colonizing estuarine detrital microbiota. Pine needle microbiota showed higher values of extractable STP, rates of O<sub>2</sub> utilization, activities of alkaline phosphatase and phosphodiesterase as well as muramic acid, than did polyvinyl chloride needle microbiota. Other aspects of activity as well as measures of densities of the microbial population are discussed.

Type of Study: Quantitative; Biological Component: Fauna;

(12.00006)

Borror, A.C. 1961. Morphology and ecology of the benthic ciliated protozoa of Alligator Harbor. Fla. St. Univ. Ph.D. Dissertation, 167 p.

The morphological, anatomical, ecological and taxonomic details of 54 species of ciliates were presented. Detailed attention was given to the fine structure and variation of ciliature, and their applicability to systematics. A new collecting method was used to quantitatively sample two benthic habitats in Alligator Harbor. Relative and absolute abundance of at least 65 species were calculated. Twice as many species and five times as many individual ciliates were collected per unit volume in sand, due to differences in salinity range, isolation, number of macroinhabitats, and food supply in the two habitats. The low number of species common to both stations was suggested to indicate that the local occurrence and abundance of cosmopolitan ciliates might be determined by the type and availability of suitable microhabitats.

Habitat: Sand, diatom detritus sediment; Type of Study: Quantitative; Biological Component: Benthic ciliated protozoa; Number of Stations: 2; Number of Replicates/Station: 10; Dominant Taxon/Taxa Studied:

(12.00007)

Breneman, L. 1957. Preliminary sedimentary study of certain sand bodies in the Apalachicola delta. Fla. State Univ. M.S. Thesis.

Sediment samples were taken to study the physical expression of sedimentary features in the Apalachicola delta. North and south sand bodies were found to be sorted similarly to sediments in rivers in the area. Poor sorting indicated low intensity wave and current action or a short time span. Results were found to be inconclusive.

Type of Study: Qualitative; Type of Sampler: Core; Abiotic Parameters Measured: Sediment characteristics;

(12.00008)

Byrne, C.J. 1976. The effects of the water soluble fractions of crude and refined oils on the larvae of the quahog clam *Merceuarina* sp. Fla. St. Univ. M.S. Thesis.

Bioassays were conducted to determine the effects of the water soluble fractions (WSF's) of six test oils common to the Gulf of Mexico coastal region on the embryos and veliger larvae of the quahog clam. It was found that the WSF's of the refined oils are more toxic to the embryonic and larvae stages of the quahog clam than the WSF's of the crude oils. The WSF's of the Florida "Jay" crude and the used crankcase motor oil were the most toxic of all the oils tested. However, they possess other toxicants (e.g., heavy metals and sulphur compounds) in addition to the petroleum hydrocarbons. Although the concentrations of petroleum hydrocarbons used were relatively high and were not found in the natural marine environment, it was concluded that, in an oil spill, concentrations could reach these values with possible toxic effects.

Type of Study: Quantitative; Biological Component: Quahog clams; Dominant Taxon/Taxa Studied: *Merceuarina* sp.;

(12.00009)

Caine, E.A. 1978. Habitat adaptations of *Isocheles murdewani* Stimpson (Crustacea: Anomura: Diogenidae) and seasonality of occurrences in northwestern Florida. Contrib. Mar. Sci. 21:117-123.

A study of the life history and habitat adaptations of the hermit crab, *Isocheles murdewani*, was conducted on the Gulf beaches of St. George Island, Florida. Reproductive activity was found to coincide with maximum densities in spring and fall. The feeding behavior of *I. murdewani* is described. The hermit crabs were found to prefer shells of *Thais floridana*.

Study Duration: 1 year; Habitat: Beach; Type of Study: Qualitative; Biological Component: Crustacea; Dominant Taxon/Taxa Studied: *Isocheles murdewani*;

(12.00010)

Carpenter, D.G. 1951. A study of the ecology, distribution and taxonomy of the polychaetous annelids of the Alligator Harbor area, Franklin County, Florida. Fla. St. Univ. M.S. Thesis.

A study of the ecology, taxonomy and distribution of the polychaete annelids in the shallow waters of the Alligator Harbor region, Franklin and Wakulla Counties, Florida was conducted for one year during 1950-1951. Forty three polychaete species were collected including four new species and one new genus. The intertidal and subtidal distribution of each species was determined. Some of the physical and biotic factors that appeared to affect each station were noted, and a discussion of the geographical distribution of those worms was made comparing them with those found at other areas of the Atlantic coast of the United States. A tentative scheme of zonation for the Alligator Harbor macrofauna was suggested. An annotated list of families, genera and species was made and included in an appendix. Local and worldwide distribution for each species was given as far as possible. A dichotomous key for the identification of the polychaetes collected with accompanying illustrations was presented.

Study Duration: 1950-1951; Type of Study: Qualitative; Biological Component: Macrofauna; Number of Stations: 4-Alligator

Harbor, 4-Gulf of Mexico;

(12.00011)

Cripe, C.R. & R.J. Livingston 1977. Dynamics of Mirex and its principal photoproducts in a simulated marsh system. Archives of Envir. Contam. & Tox. 5:295-303.

Oysters, blue crabs, sediment, marsh plants, fiddler crabs and 2 species of minnows were placed in artificial marsh habitats with simulated tidal fluctuations. Mirex bait was added to the system and samples of water, bait and animals periodically taken. All animals concentrated Mirex. Three photoproducts accumulated on the bait, and oysters and one species of fish accumulated one of the photoproducts.

Study Duration:3 months; Type of study:Quantitative; Biological component:Flora, fauna; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Fundulus grandis*, *Fundulus similis*, *Uca pugilator*, *Callinectes sapidus*, *Crassostrea virginica*, *Juncus roemerianus*, *Spartina alterniflora*;

(12.00012)

Dalton, R.C. 1977. The reproductive cycles of the northern and southern quahogs, *Mercentaria mercenaria* (L.) and *M. campechiensis* (Gmelin), and their hybrids, with a note on their growth. Fla. St. Univ. M.S. Thesis.

Descriptions and comparisons were made of the reproductive cycles of the northern, southern, and hybrid quahogs. Stained gonadal sections were examined histologically to determine reproductive cycles. All four groups of clams exhibited protandric gonadal development. A single spawning period with peak activity was seen in early February for *M. campechiensis*. *M. mercenaria* exhibited three minor spawning peaks (late January, late April, and mid-September). *M. campechiensis* and *M. mercenaria* exhibited a major and minor spawning period, and although data for the reciprocal hybrid was incomplete, two spawnings were indicated. Growth trends among the four groups were similar, with *M. mercenaria* exhibiting the best growth.

Study Duration:November 1974 - November 1975; Habitat:Sand; Type of Study:Qualitative; Biological Component:Mollusc fauna; Type of Sampler:Hand collected; Number of Stations:1; Number of Replicates/Station:10 clams; Temporal Frequency:Monthly; Dominant Taxon/Taxa Studied:*Mercentaria mercenaria*, *M. campechiensis*, reciprocal hybrids;

(12.00013)

Duncan, J.L. 1977. Short-term effects of storm water runoff on the epibenthic community of a North Florida estuary (Apalachicola, Florida). Fla. State Univ. M.S. Thesis, 126 p.

The short term effects of stormwater runoff on benthic community structure was investigated in Apalachicola Bay, Florida. Acidic runoff resulted in water with low pH, high color, lowered dissolved oxygen, and decreased salinity. During periods of runoff benthic community biomass and abundance decreased significantly. Dominant species, *Anchoa mitchilli*, *Cynoscion arenarius*, *Penaeus setiferus*, usually avoided areas affected by runoff, though certain species, such as juvenile *Callinectes sapidus*, may be attracted to these areas.

Study Duration:7 months; Habitat:Mud; Type of Study:Quantitative; Biological Component:Faua; Type of Samplers:Otter trawl; Number of Stations:3; Number of Replicates/Station:7; Temporal Frequency:Biweekly; Abiotic Parameters Measured:Sediment grain size, salinity, temperature, DO, pH, water color; Dominant Taxon/Taxa Studied:*Anchoa mitchilli*, *Cynoscion arenarius*, *Penaeus setiferus*, *Callinectes sapidus*;

(12.00014)

Forbes, M.L. 1962. Studies on *Ostrea perna* and aspects of its relationship to the host sponge *Stelletta grubii*. Fla. St. Univ. Ph.D. Dissertation. 90p.

A study of the anatomy, ecology, growth, reproduction, and larvae behavior of the commercial oyster *Ostrea perna*, Cowerby, was conducted, with emphasis on relationships to its host, the sponge *Stelletta grubii* Schmidt. Common associates of oyster-sponges in Alligator Harbor were identified. Indications were strong that *S. grubii* provides *O. perna* protection from drills, xanthid crabs, *Polydora* and encrusting organisms. *O. perna* was found almost exclusively on *S. grubii* in Alligator Harbor. In the laboratory *O. perna* larvae set on shell and grass, but not as readily as upon *S. grubii*. Experiments indicated that substrate specificity of *O. perna* depends on responses of eyed larvae at contact with substrates during the creeping phase.

Habitat:Rock, sand, grassbed; Type of Study:Qualitative; Biological Component:Mollusc and porifera fauna; Dominant Taxon/Taxa Studied:*Ostrea perna*, *Stelletta grubii*;

(12.00015)

Bitschlag, G.R. 1978. Salinity effects on survival and growth of larvae of the quahog clams *Mercentaria mercenaria*, *M. campechiensis* and their hybrid. Fla. St. Univ. M.S. Thesis.

This study investigated the effects of four salinities (20, 25, 30, and 35 o/oo) on the survival and growth of larvae resulting from three crosses of quahog clam, *M. mercenaria* x *M. mercenaria*, *M. campechiensis* x *M. campechiensis*, *M. campechiensis* x *M. mercenaria*. Poor growth in all cultures and extensive mortality at fourteen days indicated poor

culture conditions which probably resulted from the food source, *Mannochloris oculata*. Fair survival at eight days showed *M. campechiensis* generally survived better at salinities above 20 o/oo. Salinity did not have a significant effect on survival of 8 day *M. mercenaria* and hybrid larvae. The hybrid alone displayed substantial survival at fourteen days, indicating the possibility of hybrid vigor and perhaps inadequate rearing conditions for *M. mercenaria* and *M. campechiensis*. The hybrid exhibited fastest growth with *M. campechiensis* ranking second and *M. mercenaria* last.

Habitat:Sand; Type of Study:Semi quantitative Biological Component:Quahog clams; Type of Sampler:Predator exclusion basket; Temporal Frequency:Checked every 2 weeks; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Mercenaria mercenaria*, *M. campechiensis*;

(12.00016)

Graham, D.S., K. DeCosta & B.A. Christensen 1978. Stormwater runoff in the Apalachicola Estuary. Final Rept. Proj. R/EM-11. Sea Grant Program 1/1/77-12/31/77.

An outline was presented which described the present status of surface water quality modeling. Currently popular models were described, and limitations to the modeling approach were discussed. It was suggested that available models exist now to simulate a great many water-quality situations, and that the modeling techniques are far ahead of the application methods. It was concluded that modeling cannot be substituted for on-site scientific studies, but can be of tremendous assistance for interpreting the results. The major problems for successful modeling were determined to be (1) excessive complexity of the prototype; and (2) inadequate field data for verification. A modeling effort for the stormwater runoff in the Apalachicola Estuary was determined to be feasible.

Study Duration:1 year; Habitat:Estuarine; Type of Study:Qualitative;

(12.00017)

Griffin, D.R. 1983. Presented at Benthic Ecology Meetings. Fla. Instit. of Tech. Melbourne.

The polychaete community of stingray (*Dasyatis sabina*) feeding pits were sampled off Florida's Gulf coast to test the model of Grassle and Sanders (1973) which states that inferior competitors survive in a community by migrating between disturbed patches. The results for one species, *Exogone dispar*, fit the model, indicating that natural disturbance may be instrumental in persistence of *E. dispar* in the soft bottom community.

Study Duration:14 days; Type of Study:Quantitative; Biological Component:Polychaeta, ray; Temporal Frequency:Daily; Dominant Taxon/Taxa Studied:*Dasyatis sabina*, *Exogone dispar*;

(12.00018)

Hiskey, R.M. 1973. Indirect estimate of biomass in polychaetous annelids by allometry. Fla. St. Univ. M.S. Thesis.

An indirect estimate of biomass in polychaetous annelids by allometry was described. Allometry was described as the detection of constant proportional relationships between parts and the whole of the organism as they develop from egg to adult or random samples of individuals taken from natural populations. Correlations were made between polychaetes volume (weight) and polychaete tube inner diameter, head width vs. live volume, and head width vs. preserved volume. Worm weight and worm tube inner diameter was shown to exhibit the highest degree of correlation.

Habitat:Sand, grassbed; Type of Study:Technique; Biological Component:Polychaetous annelids Dominant Taxon/Taxa Studied:*Nereis pelagica occidentalis*, *Onuphis erevita oculata*, *Diopatra cuprea*, *Owenia fusiformis*, *Streblosoma hartmannae*, *Glycera americana*, *Melinna maculata*;

(12.00019)

Horlick, R.G. 1974. Macrofaunal structure and biomass of the sandy beach *Donax* community in the Gulf of Mexico. Fla. St. Univ. M.S. Thesis.

A survey of the macrofaunal structure and biomass of the sandy beach *Donax* community was conducted at three sites along the Gulf of Mexico; two in Florida, and one in Louisiana. It was determined that tidal action was a more important factor to the species found at Alligator Peninsula Beach than were temperature, salinity or sediment size. Increases and decreases in certain faunal species were determined to be correlated to seawater temperature changes. Small changes in salinity were found to not adversely affect the fauna of Alligator Peninsula Beach. Grain size was determined to be possibly correlated to the type and number of species found on sandy beaches. All beaches studied were shown to have low diversity indices possibly as a result of an unstable environment. The average density and biomass of the Louisiana beaches studied was greater than the Florida beaches studied. No long lasting effects on the macrofaunal inhabitants of the Alligator Peninsula Beach were observed following Hurricane Agnes.

Study Duration:1 year and 2 winters; Habitat:Sand; Type of Study:Quantitative; Biological Component:Intertidal macrofauna; Type of Sampler:122 cm<sup>2</sup>, 737 cm<sup>2</sup>, 2907 cm<sup>2</sup> quadrat; Sieve Size:1.5 mm; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature (air and water), salinity, precipitation, sediment characteristics; Dominant Taxon/Taxa Studied:*Donax*, *Emerita*;

(12.00020)

Ingle, R.M. 1950. Summer growth of the American oyster in Florida waters. Science 112(2908).

The growth rate of the oyster, *Ostrea (Crassostrea) virginica* was measured in Apalachicola Bay, Florida, between May and October 1949. Comparisons with growth data on *O. virginica* in Chesapeake Bay and other northern areas indicate much more rapid growth in Apalachicola oysters, at least during the summer months. The study was to continue monitoring oyster growth rates during the rest of the year.

Study Duration: May-October 1949; Habitat: Oyster reef; Type of Study: Quantitative; Biological Component: Mollusc fauna; Dominant Taxon/Taxa Studied: *Ostrea (Crassostrea) virginica*;

(12.00021)

Ingle, R.M. 1951. Spawning and setting of oysters in relation to seasonal environmental changes. Bull. Mar. Sci. Gulf &amp; Caribb. 1(2):111-135.

The controlling environmental factors of oyster spawning were investigated, and in *Crassostrea virginica* specimens collected from Apalachicola Bay. Particular attention was paid to temperature influences. Only at temperatures above 26.0°C did mass spawning occur, while isolated spawning did not occur below 22.5°C. Variations were found between populations from different areas in the Bay, suggesting either physiological races of oysters or environmental modification of the temperature reaction of maturing gonads.

Study Duration: February 10, 1949-spring 1950; Habitat: Oyster reef; Type of Study: Quantitative; Biological Component: Mollusc fauna; Number of Stations: 9; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Crassostrea virginica*;

(12.00022)

Ingle, R.M. 1956. Intermittent shrimp sampling in Apalachicola Bay with biological notes and regulatory applications. Proc. Gulf Caribb. Fish. Inst. 9:6-17.

Weekly otter trawl collections of commercial shrimp were made in Apalachicola Bay from March 1955 to September 1956 to provide biological data necessary for regulatory applications. Seasonal variations of shrimp size, abundance, and habitat preference were noted for *Penaeus duorarum*, *P. aztecus*, and *P. setiferus*. Sparse numbers of *P. duorarum* indicated that night collections may be needed to effectively sample the population. The history of shrimp management in Apalachicola Bay is summarized and a series of flexible regulations is proposed.

Study Duration: March 1955-September 1956; Type of Study: Quantitative; Biological Component: Crustacea fauna; Type of Sampler: Otter trawl; Number of Stations: 14; Temporal Frequency: Weekly or daily; Dominant Taxon/Taxa Studied: *Penaeus duorarum*, *P. aztecus*, *P. setiferus*;

(12.00023)

Ingle, R.M. &amp; C.E. Dawson 1951. Variation in salinity and its relation to the Florida oyster. Proc. Gulf &amp; Caribb. Fish. Inst. Nov. 1950.p.35-42.

The oyster stock and salinity conditions of Apalachicola Bay, Florida, were surveyed from February 1949 to July 1950. Annual variations in salinity ranged from 0 to 42.5‰ ppt. Commercial oyster production occurred in areas subject to weekly salinity changes averaging 11 ‰ and tidal salinity fluctuations of 4.8 ‰. Growth rates under these salinity conditions averaged 1 inch in 5 weeks and 2.6 inches in 16 weeks. Low glycogen content of Apalachicola oysters was thought to be due to the great variation in salinity.

Study Duration: February 1949-July 1950; Habitat: Oyster reef; Type of Study: Quantitative; Biological Component: Mollusc fauna; Number of Stations: 13; Abiotic Parameters Measured: Salinity; Dominant Taxon/Taxa Studied: *Crassostrea virginica*;

(12.00024)

Ingle, R.M. &amp; C.E. Dawson, Jr. 1950. Variation in salinity and its relation to the Florida oyster. Salinity variation in Apalachicola Bay. Proc. Gulf Caribb. Fish. Inst. 3:35-42.

The salinity conditions of Apalachicola Bay, Florida were monitored between February 1949 and July 1950 and related to the distribution of commercial oyster stocks. Commercial production of oysters was found to occur in areas which experienced annual variations in salinity from 0 ‰ to 42.5 ‰ and weekly variations averaging 11 ‰. Growth rates of 2.6 in/16 weeks were measured. The low glycogen content of Apalachicola oysters was attributed to the euryhaline conditions of the bay.

Study Duration: February 1949-July 1950; Habitat: Oyster reef; Type of Study: Quantitative; Biological Component: Mollusca; Number of Stations: 13; Temporal Frequency: Weekly; Abiotic Parameters Measured: Salinity; Dominant Taxon/Taxa Studied: *Crassostrea virginica*;

(12.00025)

Ingle, R.M. & C.E. Dawson, Jr. 1952. Growth of American oysters in Florida waters. Bull. Mar. Sci. Gulf Caribb. 2(2):393-404.

Basic growth curves remained the same despite seasonal and environmental changes. Oysters setting in the fall had very nearly the same growth pattern as those which attached in the spring. Minor aberrations in all states of growth were encountered in areas of good growing conditions but the fundamental pattern did not differ. Oysters which had been periodically exposed exhibited rapid growth when transferred to places where they remained covered by water at all times. Those which continued to be exposed had a diminished growth rate. Apalachicola Bay oyster bars which are exposed at low tide support inferior, small oysters. Extremely long and intensive spawning seasons did not alter the basic growth pattern as growth was continuous throughout the year. Those oysters which are of low glycogen content and presumably low vigor still showed rapid growth rates.

Study Duration: May 1949-August 1951; Habitat: Oyster bar; Type of Study: Qualitative; Biological Component: Fauna; Type of Sampler: Cultch trays; Temporal Frequency: 6 weeks; Abiotic Parameters Measured: Temperature salinity; Dominant Taxon/Taxa Studied: *Crassostrea virginica*;

(12.00027)

Ingle, R.M. & C.E. Dawson, Jr. 1953. A survey of Apalachicola Bay. Fla. St. Bd. Conserv. Tech. Ser. No. 10, 38 p.

The oyster resources of Apalachicola Bay, Florida, were surveyed at 9 stations between February 1949 and August 1953. Aspects of the bay and oysters which were investigated included oyster spawning, growth, condition, parasites, predators, disease, cultivation, bay hydrography, dredging effects, and pollution. In situ culture of oysters was studied by experimental planting of junk metal, dredged oyster shell, steamed oyster shell, freshly shucked oyster shell, cement-coated objects, and live oysters. Steamed shell was found to be the most successful spat catching substratum. The most rapid growth rate recorded for *Crassostrea virginica* was observed in Apalachicola Bay. The condition of Apalachicola oysters were compared with that of Long Island Sound and Chesapeake Bay oysters.

Study Duration: February 1949-August 1953; Habitat: Oyster reef, sand, mud; Type of Study: Quantitative; Biological Component: Bivalve fauna; Number of Stations: 9; Number of Replicates/Station: 20; Temporal Frequency: Weekly or biweekly; Abiotic Parameters Measured: Temperature, salinity, current velocity & direction; Dominant Taxon/Taxa Studied: *Crassostrea virginica*;

(12.00028)

Kofoed, J.W. 1961. Sedimentary environments in Apalachicola Bay and vicinity, Florida. Fla. State Univ. M.S. Thesis.

Data was gathered on the distribution of sediment transported by the Apalachicola River into Apalachicola Bay. Source, transport, site of deposition and diagenesis parameters were evaluated in order to discuss the nature and variability of the sediments. It is hoped that work of this nature will aid in the interpretation of similar ancient environments recorded in sedimentary rocks.

Study Duration: August 1959-February 1960; Type of Study: Qualitative; Type of Sampler: Van Veen sampling device; Abiotic Parameters Measured: Sediment characteristics;

(12.00029)

Kofoed, J.W. & D.S. Gorsline 1963. Sedimentary environments in Apalachicola Bay and vicinity, Florida. J. Sediment. Pet. 33:205-223.

Sediment characteristics were analyzed with respect to submarine topography in Apalachicola Bay from August 1959 to February 1960. Coarse sediments were located on elevations, channel floors and distant shelf areas. Fine-grained sediment distribution is dependent on the physiography which is formed by the coarse sediments. Aspects of grain size, carbon content and standard deviation patterns are discussed in relation to topography and sediment trap formations.

Study Duration: August 1959-February 1960; Type of Study: Qualitative; Abiotic Parameters Measured: Sediment characteristics;

(12.00030)

Kruczynski, W.L. & R.T. Huffman 1978. Use of selected marsh and dune plants in stabilizing dredged materials at Panacea and Apalachicola Bay, Florida, in: D.P. Cole (ed.) The Restoration of Coastal Vegetation in Florida: Proc. of the Fifth Annu. Conf. May 13, 1978, Tampa, FL. 255 p.

Attempts were made to establish intertidal and supratidal marshes on two islands in the northeast Gulf of Mexico. Panic grass, beachgrass and sea oats were effective in stabilizing supratidal dredged material deposits on Panacea Island. *Spartina alterniflora* planted on Drake Wilson Island grew best when culms were planted 1, 2, and 3 ft apart.

Study Duration: 14 months; Habitat: Marsh; Type of Study: Quantitative; Biological Component: Flora; Abiotic Parameters Measured: Grain size, organic carbon, cation exchange, salinity, pH, orthophosphate, sulfide; Dominant Taxon/Taxa Studied: *Spartina alterniflora*, *S. patens*, *Juncus roemerianus*, *Panicum amarulum*, *Distichlis spicata*, *Uniola paniculata*, *Amnophila breviligulata*;

(12.00031)

Kruczynski, W.L., R.T. Huffman & M.K. Vincent 1978. Habitat development field investigations, Apalachicola Bay, Florida. Summary Report. Army Corps of Engineers, Waterways Exp. Sta., Dredged Mat. Res. Prog., Tech. Rept. D-78-32, 39 p.

The feasibility of developing marsh on fine-grained and coarse-grained dredged material in a brackish water intertidal environment was tested at a dredged material disposal site in Apalachicola Bay, Florida. Smooth cordgrass and salt meadow cordgrass sprigs were planted at different spacing intervals to evaluate optimum conditions for growth. Natural invasion of plant species was also documented during the period of study. Results indicate that the development of marsh plants on dredged material can be readily accomplished in the area of study.

Study Duration:14 months; Habitat:Intertidal; Type of Study:Qualitative; Biological Component:Flora; Number of Stations:10 plots; Number of Replicates/Station:1; Abiotic Parameters Measured:Salinity, pH, sediment characteristics, nutrients; Dominant Taxon/Taxa Studied:*Spartina alterniflora*, *S. patens*;

(12.00032)

Lapinski, M.J. 1957. The distribution of foraminifera off part of the Florida panhandle coast. Fla. St. Univ. M.S. Thesis.

The distribution of foraminiferal fauna in the shallow water beyond the barrier islands south of Carrabelle, Florida was studied and found to be composed of typically open gulf species. No correlation was found between the distribution of the benthonic foraminifera and the factors of temperature, salinity and depth. The total number of benthonic foraminifera in one gram of sediment was found to be greater in areas where the median grain size is generally less than 0.2 mm and where limestone crops out or is covered by only a very thin veneer of sediment. These relationships were believed to be the result of an increased food supply in these areas. With the exception of three arenaceous species, the median grain size was found to have no consistent effect on the distribution of the most common species of benthonic foraminifera.

Type of Study:Qualitative; Biological Component:Foraminiferal fauna; Dominant Taxon/Taxa Studied:Abiotic Parameters Measured:Temperature, salinity, depth;

(12.00033)

Laughlin, R.A. 1976. Field and laboratory avoidance reactions of blue crabs (*Callinectes sapidus*) to stormwater runoff. Fla. State Univ. M.S. Thesis. 102 p.

Avoidance responses of blue crabs (*Callinectes sapidus*) to stormwater runoff were investigated in laboratory and field conditions in Apalachicola Bay, Florida. Laboratory experiments demonstrated significant avoidance of crabs to acidic runoff and experimentally-reduced pH test water. In the field, large crabs were absent from acidic runoff areas, but small crabs were abundant. Factors other than pH were believed to partially regulate field distributions of blue crabs.

Type of Study:Quantitative; Biological Component:Crustacea; Type of Sampler:Trawl; Number of Stations:3; Number of Replicates/Station:7; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO, pH, turbidity, Secchi depth, rainfall; Dominant Taxon/Taxa Studied:*Callinectes sapidus*;

(12.00034)

Laughlin, R.A., C.R. Cripe and R.J. Livingston 1978. Field and laboratory avoidance reactions by blue crabs (*Callinectes sapidus*) to stormwater runoff. Trans. Am. Fish. Soc. 107:78-86.

Avoidance responses of blue crabs (*Callinectes sapidus*) to stormwater runoff were investigated in laboratory and field conditions in Apalachicola Bay, Florida. Laboratory experiments demonstrated significant avoidance of crabs to acidic runoff and experimentally-reduced pH test water. In the field, large crabs were absent from acidic runoff areas, but small crabs were abundant. Factors other than pH were believed to partially regulate field distributions of blue crabs.

Type of Study:Quantitative; Biological Component:Crustacea fauna; Type of Sampler:Trawl; Number of Stations:3; Number of Replicates/Station:7; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO, pH, turbidity, Secchi depth, rainfall; Dominant Taxon/Taxa Studied:*Callinectes sapidus*;

(12.00035)

Livingston, R.J. 1976. Diurnal and seasonal fluctuations of organisms in a North Florida estuary. Estuar. Coast. Mar. Sci. 4:373-400.

The diurnal and seasonal fluctuations of organisms in Apalachicola Bay were monitored. Several species richness and diversity indices were compared. Regular diurnal (24 hr) and seasonal variations of such parameters were related to complex interactions which included river flow, salinity variations and temperature changes. Apalachicola Bay was seen as an unpolluted system that underwent considerable seasonal fluctuations of richness and diversity in response to extreme variations of natural (physical) functions. Such changes were stable over time, and this form of variation was seen as a considerable limitation to the general use of species diversity as an indicator of pollution and other

man-induced activities in such estuarine systems.

Study Duration: 2 years; Habitat: Grassbed, mud; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Trawl net; Number of Stations: 6; Number of Replicates/Station: 2; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature, salinity, DO, riverflow; Dominant Taxon/Taxa Studied: *Polydactylus octonemus*, *Anchoa mitchilli*, *Symphurus plagiusa*, *Menticirrhus americanus*, *Micropogon undulatus*, *Cynoscion arenarius*, *Porichthys trachypneus*, *Callinectes sapidus*, *Trachypneus constrictus*, *Neopanope texana*, *Panopeus spp.*, *Squilla eximia*, *Porichthys porosissimus*;

(12.00036)

Livingston, R.J. 1977. Estuarine and coastal research in Apalachee Bay and Apalachicola Bay, In: Coastal Zone Management Symposium, Univ. of West Florida.

A long term study was begun to study the environments of Apalachee and Apalachicola Bays. The 8 year study uses field, laboratory, and statistical/computer methods to monitor physicochemical parameters and biological functions from permanent offshore stations. The primary purpose of the initial research is to gather enough data to begin a time series analysis to determine long term trends and interactions of biotic and abiotic functions.

Study Duration: 8 years; Type of Study: Quantitative; Biological Component: Flora/fauna; Number of Stations: 20; Abiotic Parameters Measured: Salinity, temperature, DO;

(12.00037)

Livingston, R.J. 1980. The Apalachicola experiment: research and management. *Oceanus* 23(4): 14-21.

This review of long term ecological research in Apalachicola Bay describes the estuarine system and summarizes the information gained since environmental baseline assessment began in 1971. The impact of municipalization and industrialization of the flood plain on the various sport and commercial fisheries is discussed. Research goals and problems are cited and management measures are proposed.

Type of Study: Qualitative; Biological Component: Fauna and flora;

(12.00038)

Livingston, R.J. & J. Duncan 1979. Climatological control of a north Florida coastal system and impact due to upland forestry management. In: *Ecological Processes in Coastal and Marine Systems*, R.J. Livingston (ed.), Plenum Press, London, U.K.

Forestry operations such as road building, ditching, and draining tend to alter natural drainage and channelize runoff from local precipitation into receiving water bodies. Long term studies in the Apalachicola estuary indicated that such altered drainage, together with extensive clear cutting, caused temporary flashing of runoff which, in addition to causing rapid changes in salinity, was responsible for periodic increases in nutrient levels and water color and decreases in dissolved oxygen and pH in upper portions of the bay. Reductions in the species richness and abundance of epibenthic organisms was also characteristic of shocked upper bay areas. Water quality effects were associated with the timed interactions of clear cutting events and long term rainfall patterns and tended to be of short duration during the summer-fall periods of intense precipitation and high estuarine productivity. It is inferred that wetlands vegetation in upland drainage areas tends to stabilize pulsed movements of water through such systems, thus reducing the acute effects of runoff.

Study Duration: March 1975-February 1978; Habitat: Epibenthic; Type of Study: Qualitative; Biological Component: Fauna; Type of Sampler: Otter trawl; Number of Stations: 3; Number of Replicates/Station: 7; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature, salinity, turbidity, DO, water color, light penetration, pH, nutrients; Dominant Taxon/Taxa Studied: *Anchoa mitchilli*, *Cynoscion arenarius*, *Panopeus setiferus*, *Callinectes sapidus*;

(12.00039)

Livingston, R.J., C.R. Cripe, R.A. Laughlin & F.B. Lewis, III 1976. Avoidance responses of estuarine organisms to stormwater runoff and pulp mill effluents. In: *Estuarine Processes*, Vol. 1. Uses, Stresses, and Adaptation to the Estuary. Academic Press, Inc., New York, p. 313-331.

Laboratory experiments to test avoidance reactions of the blue crab (*Callinectes sapidus*) and pinfish (*Lagodon rhomboides*) to specific pollutants were correlated with field responses of these organisms to point sources of the pollutants in Apalachicola and Apalachee Bays. Juvenile and adult blue crabs avoid runoff stormwater with pH levels below 6.0 under laboratory conditions. In field studies, although adult crabs were not found in such affected areas, juveniles were actually more abundant in areas characterized by increased runoff and low pH. Pinfish demonstrated laboratory avoidance reactions to low concentrations of bleached kraft mill effluent (0.1% by volume), but did not exhibit expected field distributions. Factors other than avoidance response, such as interspecific and intraspecific competition, predation, and habitat alteration, were considered to contribute to field distributions of experimental organisms.

Type of Study: Quantitative; Biological Component: Crustacea and fish fauna; Type of Sampler: Otter trawl; Number of



Stations:28; Number of Replicates/Station:7; Temporal Frequency:Monthly; Abiotic Parameters Measured:pH; Dominant Taxon/Taxa Studied:*Callinectes sapidus*, *Lagodon rhomboides*;

(12.00040)

Livingston, R.J., R.L. Iverson, R.H. Eastabrook, V.E. Keys & J. Taylor, Jr. 1975. Major features of the Apalachicola Bay system: Physiography, biological and resource management. Fla. Scientist 37(4):245-272.

Primary productivity and secondary productivity were discussed in relation to various forcing functions. Problems associated with development include dredging, sewage effluents, pesticides and a number of upriver activities such as industrialization, cattle ranching, channelization and damming.

Study Duration:2 months; Habitat:Sand, silt, clay; Type of Study:Qualitative; Biological Component:Flora, fauna; Type of Sampler:Seine, dip net, otter trawl; Abiotic Parameters Measured:Temperature, salinity, turbidity, chlorophyll 'a', nutrients; Dominant Taxon/Taxa Studied:*Crassostrea virginica*, *Callinectes sapidus*, *Penaeus duorarum*, *P. aztecus*, *P. setiferus*, *Thalassia testudinum*, *Syringodium filiforme*, *Diplanthera wrightii*, *Halophila engelmannii*;

(12.00041)

Livingston, R.J., R.L. Iverson & D.C. White 1976. Energy relationships and the productivity of Apalachicola Bay. Fla. Sea Grant Tech. Pap. Final Rept. Proj. R/EM-4, 437 p.

Short and long term changes in habitat structure, energy relationships and biotic functions of the Apalachicola Estuary were presented. The following areas were discussed: biomass transformations; sedimentology and habitat structure; phytoplankton productivity and nutrient analysis; detritus micro and macroparticulates; microbial contribution to the energy budget of Apalachicola Bay; litter associated organisms; benthic infauna; grassbed (*Vallisneria spiralis*) assemblages; associations of epibenthic fishes and invertebrates; and trophic resource partitioning among juvenile fishes. Also given was a compartmental model of the Apalachicola Bay system and its application to planning and management.

Study Duration:5 years; Habitat:Estuarine; Type of Study:Qualitative; Abiotic Parameters Measured:Temperature, salinity, pH, DO, turbidity, color, currents, rainfall, tides;

(12.00042)

Livingston, R.J., G.J. Kobylinski, F.G. Lewis, III & P.F. Sheridan 1976. Long term fluctuations of epibenthic fish and invertebrate populations in Apalachicola Bay, Florida. Fish. Bull. 74(2):311-321.

The long term fluctuations of epibenthic fish and invertebrate populations in Apalachicola Bay were monitored. It was found that fishes were more cosmopolitan in their distribution throughout the bay than were the invertebrates. High levels of relative dominance prevailed for both groups, with the top three species for each group accounting for more than 80% of the total individuals collected. The Apalachicola estuary was viewed as a seasonally stable system with regular temporal fluctuations of the biota through each annual cycle.

Study Duration:3 years; Habitat:Estuarine; Type of Study:Quantitative; Biological Component:Epibenthic fauna; Type of Sampler:Otter trawl; Number of Stations:6; Number of Replicates/Station:1, 2, or 3; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO, turbidity, color, riverflow, climatological information; Dominant Taxon/Taxa Studied:*Anchoa mitchilli*, *Micropogon undulatus*, *Cynoscion arenarius*;

(12.00043)

Livingston, R.J., P.S. Sheridan, B.G. McLane, F.G. Lewis, III & G.G. Kobylinski 1977. The biota of the Apalachicola Bay system: functional relationships. Fla. Res. Publ. No. 26, R.J. Livingston & E.A. Joyce, Jr. (eds.). 75-100 p.

The Apalachicola Bay system was described as a natural resource and the basic biological components were outlined. Regular seasonal variations in parameters directly related to riverflow, including salinity, turbidity, color and detritus deposition were described. Qualitative and quantitative aspects of macrodetritus distribution were found to be seasonally variable. The Apalachicola estuarine biota was described as being characterized by regular species-specific phase relationships on a seasonal basis, which are temporarily stable and broadly adapted to the physiochemical functions of the bay.

Study Duration:2 years; Habitat:Variable; Type of Study:Quantitative; Biological Component:Flora and fauna; Type of Sampler: Otter trawl, beach seine, trammel net, dredge net, detritus basket, plankton net, corer; Sieve Size:0.5 mm; Number of Stations:Variable; Number of Replicates/Station:Variable; Temporal Frequency:Weekly or monthly; Abiotic Parameters Measured:Temperature, salinity, DO, turbidity, color; Dominant Taxon/Taxa Studied:*Leptochelia rapax*, *Grandidierella bonnieroides*, *Meteronastus filiformis*, *Medionastus californiensis*, *Ameliscia vadorum*, *Streblospio benedicti*, *Aphidictis gunneri floridus*;

(12.00044)

Livingston, R.J., M.P. Thompson & D.A. Meeter 1978. Long-term variation of organochlorine residues and assemblages of epibenthic organisms in a shallow north Florida (USA) estuary. Mar. Biol. 46(4):355-372.

Prior to their restricted use in 1972, moderate levels of organochlorine residues (DDT, DDE, DDD, PCB's, Mirex) were found in various species (trawl susceptible organisms). A subsequent precipitous decline in organochlorine residues was attributed to decreased upland usage, major flushing of the river basin in early 1973, and various factors associated with estuarine function. No Mirex was found in sediments or aquatic organisms. Apparently, the half life of organochlorines is relatively short in this bay system. Relative dominance of fish species declined and stabilized while bay-wide species richness and diversity increased with time. Temporally clustered fish associations reflected the importance of riverflow in the estuarine environment. Direct correlation of fish distribution with the rapid disappearance of organochlorine compounds was complicated by aperiodic storms and river fluctuations. The relatively predictable annual succession of fish associations allowed an appraisal of key forcing functions.

Study Duration:4 years; Habitat:Shallow mud flats; Type of Study:Quantitative; Biological Component:Epibenthic flora and fauna; Type of Sampler:5 m (16 ft) otter trawl, Kemerer bottle; Number of Stations:18; Number of Replicates/Station:1; Temporal Frequency:Monthly; Abiotic Parameters Measured: Temperature, salinity, DO, riverflow, rainfall, turbidity, light, chlorophyll 'a', water chemistry; Dominant Taxon/Taxa Studied:*Ruppia maritima*, *Anchoa mitchilli*;

(12.00045)

Mahoney, B.M.S. 1981. Effects of predation on benthic infauna in the Apalachicola Bay estuary, Florida. *Am. Zool.* 21(4):933.

Long-term monitoring studies revealed a negative correlation between the abundance of bottom-feeding fishes and benthic macrofaunal density, suggesting a causal relationship. To test this hypothesis, large (3 x 3 m) topless predator exclusion cages (mesh opening - 6 mm) were constructed at two shallow mud-bottom oligohaline stations. Two-sided control cages and uncaged control areas were also sampled. Experiments were conducted at times of maximum predator abundance. In general, predation was found to be of minimal importance in regulating the densities of most infaunal species. It is postulated that seasonal changes in river flow and salinity, coupled with fluctuations in larval availability, may be responsible for the observed temporal patterns of infaunal abundance.

Habitat:Mud; Type of Study:Quantitative; Biological Component:Fauna;

(12.00046)

Mahoney, B.M.S. 1982. Seasonal fluctuations of benthic macrofauna in the Apalachicola estuary, Florida: the role of predation and larval availability. Ph.D. Dissertation, Fla. State Univ., 112 p.

A 72 month study using 3 physico-chemical variables at 5 stations in the Apalachicola estuary as conducted to analyze seasonal fluctuations of benthic macrofauna densities. Increased river flow and lowered salinities during winter/spring reduced larval recruitment which may cause the decline of macrofaunal densities. Large predators seemed insignificant in determining densities.

Study Duration:72 months; Habitat:Mud, sand; Type of Study:Quantitative; Biological Component:Fauna; Number of Stations:5; Abiotic Parameters Measured:River flow, water temperature, salinity; Dominant Taxon/Taxa Studied:*Leiostomus xanthurus*, *Micropogonias undulatus*, *Penaeus setiferus*, *Hedionastus ambiseta*, *Streblospio benedicti*, *Hobsonia florida*;

(12.00047)

Mahoney, B.M.S. & R.J. Livingston 1982. Seasonal fluctuations of benthic macrofauna in the Apalachicola estuary, Florida, USA: The role of predation. *Mar. Biol.* 69:207-214.

Benthic macrofaunal density in Apalachicola estuary was found to be negatively correlated with abundance of bottom-feeding fishes (*Leiostomus xanthurus*; *Micropogonias undulatus*) during long-term monitoring studies. To determine whether this relationship was causal, large (3 x 3 m) topless predator-exclusion cages (mesh size = 6 mm) of a design that produced minimal physical artifacts were constructed at two shallow mud-bottom stations. Two-sided control cages and uncaged control areas were also sampled. Short-term (2 month) exclusion experiments during spring and fall of 1980 showed that large predators (those excluded by 6 mm mesh) were not a major factor in controlling densities of most macrofaunal species. The effect of predation was not investigated during other seasons. Although densities of bottom-feeding fishes were reduced during 1980, macrofaunal abundance still declined during late winter/early spring. Low salinities due to increased river flow during that period may be partially responsible for the decrease in macrofaunal densities through reduction of larval recruitment.

Study Duration:July 1978-December 1980; Habitat:Sand, mud; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Core (7.62 cm dia.); Sieve Size:0.5 mm; Number of Stations:5; Number of Replicates/Station:10; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO, color, turbidity, pH, Secchi depth; Dominant Taxon/Taxa Studied:*Leiostomus xanthurus*, *Penaeus setiferus*, *Micropogonias undulatus*, *Callinectes sapidus*;

(12.00048)

McLane, B.G., P.F. Sheridan & R.J. Livingston 1976. Benthic infauna, In: Energy relationships and the productivity of Apalachicola Bay. p. 256-264. Fla. Sea Grant Tech. Pap. Final Rept., Proj. R/EM-4: 473 p.

An ecological investigation of benthic infauna communities was conducted in the Apalachicola estuary. Portions of East Bay and Apalachicola Bay were sampled to determine seasonal changes and spatial relationships of biomass, species composition, and community structure. A list of species collected was presented. The eleven most abundant species were described in terms of salinity and temperature tolerances, abundance, food habits, and habitat.

Study Duration:5 years; Habitat:Estuarine; Type of Study:Quantitative; Biological Component:Benthic infauna; Type of Sampler:Hand operated corer; Sieve Size:0.5 mm; Number of Stations:8; Number of Replicates/Station:10; Temporal Frequency:Monthly; Dominant Taxon/Taxa Studied:*Leptochelia rapax*, *Grandidierella bonnieroides*, *Heteronastus filiformis*, *Medionastus californiensis*, *Ameliscia vadorum*, *Streblospio benedicti*, *Amphicteis gunneri floridus*, *Oligochaete sp. 2*, *Aricidea fragilis*, *Dicronatendipes sp.*, *Cerapus sp.*;

(12.00049)

McLean, R.B. 1975. A description of a marine benthic faunal habitat web: a behavioral study. Fla. State Univ. Ph.D. Dissertation. 176 p.

Field and laboratory experiments and observations of marine benthic faunal communities at 4 stations in Gulf and Franklin counties demonstrated the importance of hermit crab gastropod shell preference to shell utilizers, symbionts, and shell opening predators in the community. Complex interactions between members and their roles in shaping the community structure are emphasized.

Habitat:Grassbed, sand; Type of Study:Qualitative; Biological Component:Fauna; Number of Stations:4; Dominant Taxon/Taxa Studied:*Pagurus pollicaris*, *Clibanarius vittatus*, *Callinectes tricolor*;

(12.00050)

Meeter, D.A. & R.J. Livingston 1978. Statistical methods applied to a four year multivariate study of a Florida estuarine system. Biological Data in Water Pollution Assessment: Quantitative and Statistical Analyses, ASTM STP 652, K.L. Dickson, J. Cairns, Jr. & R.J. Livingston (eds.), Am. Soc. Test. Mat. p. 53-67.

A determination of the long term changes of organochlorine compound concentrations and of associations of epibenthic fishes and invertebrates in the study area was presented. The relative effectiveness of a number of statistical techniques for describing the effects of key physiochemical variables on the estuarine biota was described. The techniques used included transformations, correlation, regression with dummy variables, two and three way analysis of variance, multivariate analysis of variance, principal components analysis, factor analysis, canonical correlation and cluster analysis. Several problems were encountered peculiar to studies of this type including missing observations, the sheer size of the data base in numbers of variables and observations, the domination of other effects by riverflow, and extreme and noncyclical variation of some measures over the four year study period.

Study Duration:4 years; Habitat:Estuarine; Type of Study:Quantitative; Biological Component:Epibenthic fishes and invertebrates; Type of Sampler:Otter trawl; Number of Stations:10; Number of Replicates/Station:7; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO, turbidity, nutrients, color, chlorophyll 'a', tides, wind, riverflow, rainfall;

(12.00051)

Menzel, R.W. 1957. Marine biology of Alligator Harbor, Florida. ASB Bull. 4(4): 51-54.

A summary was presented on the taxonomy, ecology, and distributions of the marine flora and fauna of Alligator Harbor, Florida. Abundant species of algae, planktonic diatoms, and higher plants were reported. Vertebrate and invertebrate animal species present in the study area were discussed. The information was compiled from student dissertations and projects.

Habitat:Estuarine; Type of Study:Qualitative; Biological Component:Flora and fauna; Abiotic Parameters Measured: Temperature, salinity;

(12.00052)

Menzel, R.W. 1961. Seasonal growth of the northern quahog, *Merceenaria merceenaria* and the southern quahog, *M. campechiensis*, in Alligator Harbor, Florida. Proc. Natl. Shellfish. Assoc. 52:37-46.

Monthly shell length measurements were made of *Merceenaria merceenaria* for 3.5 years and of *M. campechiensis* for 2 years in Alligator Harbor, Florida. The northern clams were laboratory reared natives of Long Island Sound. They showed the best growth recorded for any locality, with greatest growth in spring and fall, less in winter, and least in summer. The southern clams, which originated in Alligator Harbor, grew faster than the northern species, with greatest growth in spring and fall, almost as much in summer, and least in winter. *M. merceenaria* grew from a length of 3 mm to a length of 67 mm in 3.5 years, and from 16.2 mm initial length to 67.0 mm in 3 years. *M. campechiensis* grew from 16.5 mm initial length to 74 mm in 2 years.

Study Duration:3.5 years; Habitat:Sand; Type of Study:Quantitative; Biological Component:Quahog clams; Type of Sampler:Predator exclusion cages; Dominant Taxon/Taxa Studied:*Merceenaria merceenaria*, *Merceenaria campechiensis*;

(12.00053)

Menzel, R.W. 1964. Report on preliminary studies on the blue crab in Alligator Harbor and adjacent Gulf of Mexico with some observations on stone crab larvae. Rept. Fla. Bd. Conserv.

Preliminary studies on the blue crab in Alligator Harbor and adjacent Gulf of Mexico were presented. Blue crab zoea were most numerous 6 to 12 miles offshore and were found out to 20 miles but none were found at the station in the approximate middle of the Harbor. Stone crab zoea followed the same distributional pattern as the blue crab except they generally were closer inshore and were found in some abundance in the Harbor itself. Little salinity gradient or stratification was shown at the stations and there was also little variation in temperature. Samples from crab traps and crab pots showed the population of crabs in the Harbor to be more than half males and all to be females outside the Harbor. Alligator Harbor acts as a nursery ground for blue crabs with a seemingly resident population of males and a migration outward of the females when they spawn. There is a high incidence of the stalked barnacle, *Octolasmis lowei*, on the gills of crabs in the area, especially if the crabs have not molted recently. Almost 5% of the crabs caught in Alligator Harbor were parasitized with the sacculinid, *Loxothylaeus texanus*.

Study Duration: 3 months; Habitat: Variable; Type of Study: Quantitative; Biological Component: Decapod fauna; Type of Sampler: Crab pots; Number of Stations: 12; Number of Replicates/Station: Variable; Temporal Frequency: Variable; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Callinectes sapidus*, *Menippe mercenaria*, *Octolasmis lowei*, *Loxothylaeus texanus*;

(12.00054)

Menzel, R.W. & F.E. Nichey 1958. Studies of the distribution and feeding habits of some oyster predators in Alligator Harbor, Florida. Bull. Mar. Sci. Gulf Caribb. 8(2):125-145.

The distribution of *Busycon contrarium*, *Helongena corona*, *Thais haenastona*, *Murex ponua*, *Menippe mercenaria*, *Pleuroploca gigantea* and *Callinectes sapidus* in Alligator Harbor and their ability to kill oysters were presented. *Busycon contrarium* were determined to be very numerous and very destructive to oysters, killing them mainly by chipping the edges of the shell and also by forcing the oysters' valves apart. *M. corona* were observed to feed by inserting their proboscis in the relaxed open oyster. They were found to be locally abundant sometimes, but were not established as a serious oyster predator. *M. ponua* were abundant but only subtidally below the intertidal oyster reefs and killed available oysters by drilling the shell. *T. haenastona* were scarce and of no importance as an oyster enemy in the area. *P. gigantea* were sporadic and did not feed on oysters. *Menippe mercenaria* and other xanthid crabs were very abundant and destroyed many oysters by breaking the shells. *C. sapidus* were abundant and killed healthy small oysters, but only weakened larger ones.

Study Duration: 7 months; Habitat: Oyster reefs; Type of Study: Qualitative; Biological Component: Oysters, molluscs, decapod crustaceans; Type of Sampler: Predator inclusion cages; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Busycon contrarium*, *Helongena corona*, *Thais haenastona*, *Murex ponua*, *Menippe mercenaria*, *Pleuroploca gigantea*, *Callinectes sapidus*;

(12.00055)

Menzel, R.W., E.W. Cake, M.L. Haines, R.E. Martin & L.A. Olsen 1976. Clam mariculture in northwest Florida: field study on predation. Proc. Natl. Shellfish. Assoc. 65:59-62.

Twenty thousand small hatchery reared *Mercearia* clams were planted for a period of nine months in a predation experiment at two field locations in northwest Florida. At each location four 4.5 m<sup>2</sup> plots were established, in each of which were planted 2,500 clams. One plot was prepared with a substrate of pea gravel and one with crushed oyster shell at each location. Two plots at each location received no substrate additive and served as controls. One control plot at each location was covered with a wire cage to exclude predators. Survival was over 50% in the wire covered control plots and less than 1% in the unprotected control plots with gravel. In this area, gravel and crushed shell added to the substrate do not ensure satisfactory survival of small clams. Based on general observations in Florida, adequate survival cannot be obtained with protective substrate additives such as shell and gravel.

Study Duration: 2 years; Habitat: Sand, silt, clay; Type of Study: Qualitative; Biological Component: Quahog clams; Type of Sampler: Wire cages; Number of Stations: 2; Number of Replicates/Station: 4; Abiotic Parameters Measured: Sediment analysis; Dominant Taxon/Taxa Studied: *Mercearia mercenaria*, *M. campechiensis*;

(12.00056)

Menzel, R.W., M.C. Hulings & R.R. Hathaway 1958. Causes of depletion of oysters in St. Vincent Bar, Apalachicola Bay, Florida. Natl. Shellfish. Assoc. 48:66-71.

An investigation into causes behind the depletion of oysters in St. Vincent Bar, Apalachicola Bay, Florida was conducted. Below normal rainfall was found to have resulted in increased salinity, allowing for the establishment of several important oyster predators on the reef. An increase in rainfall beginning in the spring of 1957 lowered the salinity as well as the number of predators. Spatfall was abundant during the two year study, but mortality was very high. The numbers of oysters per unit area was found to be considerable, but no oyster over 50 mm in length was found. Predator exclusion cages (excluding drills, stone crabs) examined monthly, resulted in a lower mortality of the oysters. Lengths

of 70 to 80 mm were reached by the oysters before the end of the period. This evidence suggested that predation, especially by drills and stone crabs was the primary cause of mortality and the lack of large oysters.

Study Duration:2 years; Habitat:Oyster reef; Type of Study:Qualitative; Biological Component:Mollusc fauna; Type of Sampler:Predator exclusion cages; Temporal Frequency:Monthly; Abiotic Parameters Measured:Salinity; Dominant Taxon/Taxa Studied:*Ostrea equestris*, *Crassostrea virginica*, *Thais haemastoma*, *Menippe mercenaria*;

(12.00057)

Menzel, R.W., M.C. Hulings & R.R. Hathaway 1966. Oyster abundance in Apalachicola, Florida in relation to biotic associations influenced by salinity and other factors. Gulf Res. Rept. 2(2):73-96.

Oyster abundance in Apalachicola Bay was monitored relative to biotic associations influenced by salinity and other factors. Depth and bottom types as well as salinity were found to limit certain species of animals. Past records indicate that the bay had formerly been less saline resulting in several animals less euryhaline than oysters becoming established on some of the reefs. Field experiments showed predation by *Thais haemastoma* and *Menippe mercenaria* to be the main cause of depletion to the reef.

Study Duration:2 years; Habitat:Oyster reef; Type of Study:Quantitative; Biological Component:Mollusc fauna; Number of Stations:3; Number of Replicates/Station:2; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Ostrea equestris*, *Crassostrea virginica*;

(12.00058)

Menzies, R.J. & R.Y. George 1972. Temperature effects on behavior and survival of marine invertebrates exposed to variations in hydrostatic pressure. Int. Life Oceans, Coast. Wat. 13(2):155-159.

The effect of hydrostatic pressure in living specimens of tropical stenothermal species was studied in order to evaluate the relationship between the high temperatures and organisms genetically and physiologically adapted to a warm water milieu. The effect of pressure on eurythermal stenobathial species physiologically acclimated to high and low temperatures was also studied. Generally, increasing temperature increases the pressure required to elicit reversible reactions such as "increased activity" and tetany, or paralysis, whereas increasing temperature generally evokes the irreversible response of death (LD 50) at a decreasing pressure. Tropical stenotherms tend to be more sensitive to hydrostatic pressure than eurythermal-temperate species at the same or similar temperatures.

Type of Study:Qualitative; Biological Component:Marine invertebrates; Abiotic Parameters Measured:Temperature, salinity, pressure; Dominant Taxon/Taxa Studied:*Uca rapax*, *U. pugilator*, *Sesarma ricordi*, *S. reticulatus*, *Talorcccestia* sp., *Littorina ziczac*, *L. irrorata*;

(12.00059)

Miller, R.W. 1972. Aspects of the biology of the Gulf oyster drill *Urosalpinx perrugata* (Conrad, 1846). Fla. State Univ. M.S. Thesis.

Distribution, reproductive biology, and tolerance to reduced salinities were investigated using *Urosalpinx perrugata* from the Franklin County area. Salinity-induced mortalities occurred at salinities less than 12.9 o/oo, while no mortalities occurred above 19 o/oo salinity. Study of reproductive biology revealed sexual dimorphism, differences in maturation rates, and differences in male and female abundances. Other investigations included copulatory behavior, egg capsule deposition, and emerging protoconchs. Limiting factors in distribution are discussed.

Type of Study:Quantitative; Biological Component:Fauna; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Urosalpinx perrugata*;

(12.00060)

Morrison, S.J. 1980. Trophic interactions between detrital microbiota and detritus feeding estuarine gammaridean amphipods. Fla. State Univ. Ph.D. Thesis.

Examining evidence for microbial succession on all ochthonous plant litter in Apalachicola Bay, the effects of grazing by gammaridean amphipods on the detrital microbiota, and the use of the detrital microbiota as a food source by estuarine gammaridean amphipods, a study of detrital microbiota was conducted in an estuarine trophic system. Amphipod grazing affected the microbial community composition, biomass and metabolic activity. Successional changes in microbial communities created changes in hydrolytic, respiratory, catabolic and lipid biosynthetic activities. Methods and results are further discussed.

Type of Study:Quantitative; Biological Component:Fauna;

(12.00061)

Mullins, A.T. 1959. A study of marine terrigenous sediments from the Gulf of Mexico. Fla. State Univ. M.S. Thesis.

Thirty eight sediment samples were collected from a 45 sq. mi. area south of St. George Island, Florida, and analyzed for composition and grain size parameters. Fourteen types of heavy metals were identified, two of which were authigenic.

Sediment size and content differed between the ridges and troughs which characterize the area. Statistical comparisons were made between the sediments of the study area and an eastern area off Dog Island.

Study Duration: Spring 1957; Type of Study: Qualitative; Number of Stations: 38; Abiotic Parameters Measured: Sediment grain size and composition;

(12.00062)

Nagvi, S.M.Z. 1966. Effect of predation on infaunal invertebrates of Alligator Harbor region. Fla. St. Univ. M.S. Thesis.

The effects of predation on infaunal invertebrates of the Alligator Harbor region were studied. Animals were offered protection by wire baskets with three different size meshes; quarter inch, half inch, and one inch. Eleven hundred and forty-seven invertebrates were collected, consisting of nemertines, phoronids, amphipods, isopods, bivalves, and polychaetes. The total number of infaunal invertebrates found inside the baskets was 830, and outside 317. One hundred and fourteen epifaunal invertebrates were collected, consisting of decapod crustaceans and gastropods. Of 34 species of polychaetes collected, six newly recorded species were reported. Depth preferences of infaunal invertebrates were noted, based on the maximum number of each species present within a certain range of depth. Quantitative analysis of the substrate from inside and outside the baskets indicated that a larger percentage of fine sand and mud occurs within the basket area, caused by selective mud ingesting behavior of certain polychaetes. Spawning of two polychaetes and one gastropod were noted.

Study Duration: 6 months; Habitat: Littoral zone; Type of Study: Quantitative; Biological Component: Infaunal invertebrates; Number of Stations: 6;

(12.00063)

Nichy, F.E. & R.W. Menzel 1960. Mortality of intertidal and subtidal oysters in Alligator Harbor, Florida. Proc. Natl. Shellfish. Assoc. 51:33-41.

The tidal range in Alligator Harbor was determined to not normally exceed 65 cm, and oysters were found to be restricted to a band from about 5 cm above mean low water to 45 cm below. Predation (primarily the webk, *Busycos contrarius*, and xanthid crabs secondarily) was determined to be the factor responsible for the absence or extreme scarcity of oysters near and below mean low water. High temperatures during the summer when the tide was low, in addition to lack of spatfall, was suggested to limit the upper level at which oysters can live.

Study Duration: 7 months; Habitat: Oyster reef; Type of Study: Qualitative; Biological Component: Mollusc fauna; Type of Sampler: Predator inclusion and exclusion cages; Number of Stations: 3; Number of Replicates/Station: 1; Temporal Frequency: Weekly; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Crassostrea virginica*;

(12.00064)

Oesterling, M.L. & G.L. Evink 1977. Relationships between Florida's blue crab population and Apalachicola Bay. Fla. Mar. Res. Publ. No. 26, R.J. Livingston & E.A. Joyce, Jr. (eds.).

An onshore/along shore pattern of movement was described for the blue crab population in Apalachicola Bay rather than the formerly classic description of onshore/offshore movement. Following mating, female blue crabs were found to leave the mating estuary and move toward specific spawning areas. The primary spawning ground for the Florida Gulf coast was determined to be located in the Apalachicola Bay region. A hypothesis for the redistribution of larvae to southwestern Florida included the transport through surface circulation patterns associated with the Loop Current.

Study Duration: 1 year; Type of Study: Qualitative; Biological Component: Decapod fauna; Dominant Taxon/Taxa Studied: *Callinectes sapidus*;

(12.00065)

Olsen, L.A. 1973. Food and feeding in relation to the ecology of two estuarine clams, *Rangia cuneata* (Gray) and *Polymesoda caroliniana* (Bosc). Fla. State Univ. M.S. Thesis.

Comparisons with respect to feeding mechanisms, ingested material, burrowing activity, and ability to survive under various food conditions were made between *Rangia cuneata* and *Polymesoda caroliniana* collected from the Ochlockonee River estuary. Analysis revealed that both clams have similar feeding mechanisms and consumed essentially the same food items. Adults survive at least a month without food; however, survival in mud substrate is higher, suggesting the ability to utilize detritus as a food source.

Type of Study: Quantitative; Biological Component: Fauna; Dominant Taxon/Taxa Studied: *Rangia cuneata*, *Polymesoda caroliniana*;

(12.00066)

Olsen, L.A. 1976. Reproductive cycles of *Polymesoda caroliniana* (Bosc) and *Rangia cuneata* Gray, with aspects of desiccation in the adults, and fertilization and early larval stages in *P. caroliniana*. Fla. State Univ. Ph.D.

## Thesis.

Reproductive cycles of *Polymesoda caroliniana* and *Rangia cuneata* from the Ochlockonee River were compared from November 1974 to October 1975. Both clams are fall spawners, as indicated by total solids and percent glycogen. Under desiccation conditions, *P. caroliniana* survived twice as long as *R. cuneata*, which corresponded to field conditions of each clam's habitat.

Study Duration: November 1974 to October 1975; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Clam rake; Abiotic Parameters Measured: Salinity, temperature, relative humidity; Dominant Taxon/Taxa Studied: *Polymesoda caroliniana*, *Rangia cuneata*;

(12.00067)

Purcell, B. & R.J. Livingston 1976. Grassbed (*Vallisneria americana*) assemblages, p. 265-269, In: Energy relationships and the productivity of Apalachicola Bay. Fla. Sea Grant Tech. Pap. Final Rept. Proj. R/EM-4, 473 p.

A determination of the seasonal variation of *Vallisneria* beds on East Bay in terms of plant biomass and the associated assemblages of organisms was presented. Sampling sites were placed to determine the potential effects of stormwater runoff from the clear cut areas in the Tate's Hell Swamp. Differences in the spatial distribution of macrophytes were found to be responsible for some month to month variability. Sampling methods used also contributed to variability. Biomass values of macrophytes sampled in East Bay were presented.

Study Duration: 1 year; Type of Study: Quantitative; Biological Component: Benthic macrophytes; Type of Sampler: 0.25 m<sup>2</sup> hoops; Number of Stations: 2; Number of Replicates/Station: 8; Temporal Frequency: Monthly; Dominant Taxon/Taxa Studied: *Vallisneria americana*, *Meritina reclinata*;

(12.00068)

Purcell, B.H. 1977. The ecology of the epibenthic fauna associated with *Vallisneria americana* beds in a north Florida estuary. Fla. State Univ. M.S. Thesis.

A study from November 1975 to October 1976 dealt with the ecology of epibenthic fauna from two *Vallisneria americana* beds in East Bay. *V. americana* biomass and growth was limited by temperature and salinity. Species composition and abundance were determined by trophic relationships and reproductive cycles. Many species used the grassbeds as nursery grounds. Invertebrate species composition was made up of equal number of freshwater and marine species, while there were more marine fish species. Differences between daytime and nocturnal collections and surface and benthic species composition, abundances, biomass, and diversity were reported. The abundance and biomass of the community followed that of the dominant species, *Meritina reclinata*. High dominance and low species diversity was found.

Study Duration: November 1975-October 1976; Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Dredge net, circular net; Number of Stations: 2; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature, salinity, DO, pH; Dominant Taxon/Taxa Studied: *Vallisneria americana*, *Meritina reclinata*;

(12.00069)

Ravenel, W.S. 1980. The effect of sediment characteristics on the distribution of subtidal harpacticoid copepods. Fla. State Univ. M.S. Thesis.

A study was set up to investigate the effects of sediment characteristics on abundances and distribution of *Enhydrosoma littorale* and *Zausodes cf. arenicolus* from St. George Sound. Observed abundance differences were investigated in the laboratory by testing the effect of differences in percent total organic matter, percent silt/clay, and degree of sorting. With *E. littorale* results showed that bacteria attached to sand grains played a major role in sediment performance. Factors external to the sediment were responsible for the distribution of *Z. cf. arenicolus*.

Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Core; Number of Stations: 2 transects; Temporal Frequency: Monthly; Abiotic Parameters Measured: Sediment characteristics, organic content; Dominant Taxon/Taxa Studied: *Enhydrosoma littorale*, *Zausodes cf. arenicolus*;

(12.00070)

Ravenel, W.S. & D. Thistle 1981. The effect of sediment characteristics on the distribution of 2 subtidal harpacticoid copepod species. J. Exp. Mar. Biol. Ecol. 50 2-3: 289-301.

Two species of harpacticoid copepods were sampled monthly from two adjacent subtidal, soft bottom habitats in St. George Sound, Florida. Both species had significantly higher abundances in one area. In laboratory preference tests, the distribution of *Enhydrosoma littorale* was shown to be a result of sediment-attached microbes, and not due to grain size or organic matter. The second species, *Zausodes cf. arenicolus*, did not prefer sediments from its field area of high abundance, suggesting that factors other than sediment type, such as hydrographic or biological parameters, accounted for its distribution.

Study Duration: June 1978-September 1979; Habitat: Sand, seagrass beds; Type of Study: Quantitative; Biological Component: Crustacea fauna; Type of Sampler: Corer; Sieve Size: 0.062 mm; Number of Stations: 2; Number of

Replicates/Station:5; Temporal Frequency:Monthly; Abiotic Parameters Measured:Total organic matter, sediment grain size; Dominant Taxon/Taxa Studied:*Enhydrosoma littorale*, *Zausodes cf. arenicolus*;

(12.00071)

Reidenauer, J.A. 1981. The role of ray disturbance in a subtidal soft-bottom Harpacticoid copepod community. Fla. State Univ. M.S. Thesis.

The disturbance of subtidal soft-bottom harpacticoid copepod communities created by *Dasyatis sabina* was studied in St. George Sound from August to October 1979. After disturbance, abundances took 24 hrs and number of species took 5 hrs to reach background levels. No species seems to have evolved to exploit the opened space of a pit.

Study Duration:August-October 1979; Habitat:Sand; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:2.54 cm dia. core; Number of Stations:3 transects; Abiotic Parameters Measured:Sediment characteristics; Dominant Taxon/Taxa Studied:*Dasyatis sabina*;

(12.00072)

Ruddell, J.M. 1976. A quantitative comparison of meiofaunal distributions in an open sand area and a seagrass bed (*Thalassia testudinum*). Fla. St. Univ. M.S. Thesis.

This study quantitatively compared the distribution of meiofauna from a subtidal seagrass bed and an adjacent sand area in the northeastern Gulf of Mexico. Three extraction techniques, Ulig sea ice, Boisseau and decanting were evaluated for extraction efficiency and variability. Only the decanting procedure provided adequate quantitative results for samples collected in this study area. Total meiofauna densities were not significantly different at any of the stations at a sampling frequency of 16 sampling units per station. At the major group level, a variety of distribution patterns were evident. The results suggest that numbers alone, even at the major group level, may not be sufficient to distinguish distribution patterns. Analysis at the species level using Harpacticoids as an example revealed two distinct communities (grass, sand) and a transitional zone.

Study Duration:2 days; Habitat:Grassbed, sand; Type of Study:Quantitative; Biological Component:Benthic meiofauna; Type of Sampler:Hand corers; Sieve Size:0.063 mm; Number of Stations:4; Number of Replicates/Station:16; Temporal Frequency:Twice; Abiotic Parameters Measured:Temperature, salinity, sediment analysis;

(12.00073)

Sastry, A.M. 1961. Studies on the bay scallop, *Aequipecten irradians concentricus* Say, in Alligator Harbor, Florida. Fla. St. Univ. Ph.D. Dissertation.

Studies in Alligator Harbor revealed that the bay scallop, *Aequipecten irradians* Lamarck has a wide distribution, and that pronounced variation in morphological characters occur in populations of different geographical areas in its range. The distribution of the subspecies did correspond to the temperature zones on the Atlantic Coast. Bay scallops beyond an age of 19 months were not collected. A limiting factor during the summer months was the high temperature, sometimes causing severe mortalities of population. It was suggested that scallops could tolerate a wide range of salinities. Other factors concerning the bay scallops that were discussed included unfavorable hydrographic features, attached organisms, predation, low tides and temperatures. The development of the scallop including gametogenesis, spawning, egg and larval development and settlement and growth were described. Additionally, the relation with the commercial crab, *Pinnotheres maculatus*, that lives in the mantle chamber of the scallop was described.

Study Duration:1 year; Type of Study:Qualitative; Biological Component:Mollusc fauna; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Aequipecten irradians*;

(12.00074)

Sastry, A.M. 1962. Some morphological and ecological differences in two closely related species of scallops, *Aequipecten irradians* LeMark and *Aequipecten gibbus* Dall from the Gulf of Mexico. Quart. J. Fla. Acad. Sci. 25(2):89-173.

Bay scallops were collected from the western Gulf coast near Alligator Harbor, Franklin County, Florida. Calico scallops were obtained from collections made by the U.S. Fish and Wildlife Service during cruises in the Gulf of Mexico. The overlapping morphological characters in the species *Aequipecten irradians concentricus* and *A. gibbus* from the Gulf of Mexico make difficult a clear identification of the species. The differences in habitat as well as the differences in time of spawning of the two species would render hybridization unlikely although it cannot be excluded. *A. irradians concentricus* was divided into three subspecies because of the variability of the morphological characters and each subspecies was highly variable. *A. gibbus* was also highly variable. Although it was demonstrated that there was much overlap in the morphological features of the two species from extensive material, the possibility of intergrades was not investigated thoroughly. An aid in identifying intergrades would be the rearing of the hybrids in the laboratory, if possible, for a comparison of the morphology.

Habitat:Grassbed, sand, shell; Type of Study:Qualitative; Biological Component:Mollusc fauna; Dominant Taxon/Taxa Studied:*Aequipecten irradians concentricus*, *Aequipecten gibbus*;



(12.00075)

Scanland, T.B. 1966. A description of the community associated with two arcs *Arca zebra* and *A. imbricata* (Pelecypoda: Arcidae) in the offshore northeastern Gulf of Mexico. Fla. St. Univ. M.S. Thesis.

The offshore rock pavement habitat south of Dog Island is characterized by a solid substrate covered with a shallow, unstable coarse sediment. This habitat was found to be dominated by two species of arcids, *Arca imbricata* and *A. zebra*, which attach to the limestone, remain unburied, and offer most of the available substrate for an epifaunal community. The dominant members of the epifauna included barnacles, ectopods, serpulids, *Chama* sp., and *Ostrea* sp. The subdominants were encrusting algae and boring barnacles. A diamond shaped trophic level representation in place of the more common pyramid shape was noted. The central, horizontal bulge represents a predominance of primary consumers' (principally filter feeders) in the community, and the narrow bottom is due to the general paucity of primary producers. As a result of this organization, this community was not determined to be self sustaining but must rely on the plankton to balance its trophic deficit. This community, containing 153 species, was compared in detail with one in the Bahamas, one off North Carolina and briefly with two more northerly communities, and was found to be most similar to the Carolinian scallop community.

Habitat: Rock and coarse sediment; Type of Study: Qualitative; Biological Component: Fauna; Dominant Taxon/Taxa Studied: *Arca imbricata*, *Arca zebra*;

(12.00076)

Scanland, T.B. 1979. The epibiota of *Arca zebra* and *Arca imbricata*: A community analysis. Veliger 21(4):475-485.

The epifaunal community of two attached clams, *Arca imbricata* and *A. zebra*, which dominate a limestone bank off Dog Island, was examined from a total of 250 clams collected between June 1965 and June 1966. Approximately 180 species representing 12 phyla were found in addition to 10 algal species. The density, frequency of occurrence (among the total number of arcs sampled) and area occupied was calculated for 18 groups of encrusting organisms. Four groups showed evidence of seasonal variation. Approximately 50% of shell surface, mostly on the dorsal side, was generally unoccupied. The most common errant members of the epifauna were 2 polychaetes, *Dorvillea rubra* and *Lunbrineris inflata*. Results were compared with other studies of epifaunal and fouling communities.

Study Duration: June 1965-June 1966; Habitat: Limestone rock; Type of Study: Quantitative; Biological Component: Fauna and flora; Abiotic Parameters Measured: Water temperature, salinity, visibility; Dominant Taxon/Taxa Studied: *Arca zebra*, *Arca imbricata*;

(12.00077)

Shier, C.F. 1965. A taxonomic and ecological study of shallow water hydroids of the northeastern Gulf of Mexico. Fla. State Univ. M.S. Thesis.

Collection of hydroids between St. Marks and Lanark produced 32 species, 5 previously unknown, unnamed ones, and 3 which are new to the Gulf of Mexico. Temperature is the primary factor affecting distribution and abundance, both spatially and temporally. Substrate colonization varies greatly. Most species were cosmopolitan in distribution. Other measurements included frequency, area, and density.

Study Duration: 1 year; Type of Study: Quantitative; Biological Component: Fauna; Number of Stations: 6; Temporal Frequency: Monthly; Abiotic Parameters Measured: Salinity, temperature;

(12.00078)

Sinclair, M.E. 1972. The intraspecific antagonistic behavior of the stone crab, *Hemippe mercenaria* (Say). Fla. State Univ. M.S. Thesis.

Behavioral analysis was made of antagonistic interactions of *Hemippe mercenaria* using a two act sequence test. There was significant difference between behavior of dominant and subordinate crabs during homo- and heterosexual encounters in animals less than and greater than 0.20 size index. Chela removal from dominant crabs significantly changed the behavior of dominant and subordinate animals.

Habitat: Oyster bar, grassbed, rock outcroppings; Type of Study: Quantitative; Biological Component: Fauna; Dominant Taxon/Taxa Studied: *Hemippe mercenaria*;

(12.00079)

Taylor, J.L. 1961. Polychaetous annelids of the Seahorse Key area. Univ. Fla. M.S. Thesis.

A taxonomic study of marine annelids occurring in the vicinity of Seahorse Key was conducted. Specimens were collected from channels, sediments in shallow water and various submerged objects. Results include the identification and description of 104 species in 79 genera and 36 families. Two families and 18 species were newly reported for the Gulf of Mexico, and the range of 47 species was extended. Keys to families and species were furnished and illustrations of representative species provided. Polychaetes of the Seahorse Key area showed affinities with an apparently endemic Gulf fauna, estuarine species, species of rarely encountered families, circumtropical and cosmopolitan species, and species

otherwise known principally from the eastern Pacific, Europe, the northeastern and eastern United States and the Caribbean. These diverse relationships and continuous distribution of many species indicated that the polychaete fauna within the Gulf of Mexico is not strictly partitioned into zoogeographic provinces. A table listing the families and species of polychaetes collected together with their habitat preference and zoogeographic distribution was prepared.

Type of Study:Qualitative; Biological Component:Polychaetous annelids;

(12.00080)

Taylor, J.L. 1966. A Pacific polychaete in southeastern United States. Quart. J. Fla. Acad. Sci. 29(1):21-26.

The occurrence of *Poecilochaetus johnsoni* in the southeastern United States was reported. Additional biological information on this rarely collected species was presented including environmental conditions, habitat, life history and reproduction.

Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Marine polychaete; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Poecilochaetus johnsoni*;

(12.00081)

Trott, L.B. 1960. A quantitative study of certain benthic communities in Alligator Harbor. Fla. St. Univ. M.S. Thesis.

A quantitative survey of the benthic animals of the Alligator Harbor was conducted utilizing the methods introduced by Petersen and Jensen in 1911. A preliminary comparison of a Petersen bottom sampler of the same size as a Van Veen demonstrated the latter to be the more efficient apparatus. The quantitative faunal results were reported in 32 tables, one for each sample taken, indicating for each species or larger group the number and weight obtained in each sample, and the number and weight per m<sup>2</sup> for each species for each station. The polychaetous annelids collected included possibly two new species, possibly a new genus and a genus and family new to the Gulf of Mexico. Standardization of equipment and methods used in future investigations was suggested. This investigation revealed the Van Veen bottom sampler quite suitable for level-bottom inshore surveys, and recommended the use of this apparatus for comparable studies. The use of a 0.5 mm mesh sieve greatly enhanced the accuracy in this quantitative estimate of the benthic communities of Alligator Harbor, and was also recommended for future benthic studies.

Study Duration:7 months; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Van Veen grab, Petersen grab; Sieve Size:0.5 mm; Number of Stations:5 hydrographic, 4 faunal; Number of Replicates/Station:2; Temporal Frequency:Every other month; Abiotic Parameters Measured:Temperature (air and water), salinity, DO, pH, sediment analysis; Dominant Taxon/Taxa Studied:*Nellita quinquesperforata*, *Amphipholis gracillina*;

(12.00082)

Vause, J.E. 1959. Underwater geology and analysis of Recent sediments off the northwest Florida coast. J. Sediment. Pet. 29(4):555-563.

Diver-collected sediment samples were used in transect surveys of the sedimentary environment of the shallow continental shelf off the west coast of Florida. Sediment grain size was found to increase and sorting decrease in a seaward direction. Surface ripple marks were generally parallel to the shoreline and were apparently wave formed. Sea urchins of the genus *Clypeaster* were observed erasing ripple marks.

Type of Study:Qualitative; Abiotic Parameters Measured: Sediment grain size;

(12.00083)

Vause, J.E., Jr. 1957. Submarine geomorphic and sedimentological investigations off part of the Florida panhandle coast. Fla. State Univ. M.S. Thesis.

Textural and compositional analysis of 34 sediment samples collected off Carabelle, Florida, revealed 4 different bottom types, all composed largely of quartz sand. The 4 bottom types and their distributions are described. The source of the sediments and the transport mechanisms are discussed.

Habitat:Sand; Type of Study:Qualitative; Number of Stations:34; Abiotic Parameters Measured:Sediment grain size and composition;

(12.00084)

Nass, M.L. 1953. A survey of the Decapoda of Alligator Harbor and adjacent littoral areas. Fla. State Univ. M.S. Thesis.

A survey of decapod crustaceans from Alligator Harbor and adjacent littoral areas from June 1952 to April 1953 yielded 112 species in 69 genera and 22 families. A key to 110 species is given, and the geographic distribution and abundance of certain species are presented. Spawning periods were determined for 51 species by the presence of ovigerous females. Five new species are described and range extensions are given for 3 species.

Study Duration:June 1952-April 1953; Type of Study:Quantitative; Biological Component:Crustacea; Type of Sampler:Otter trawl, scallop dredge, seine; Dominant Taxon/Taxa Studied:*Periclineneus wilsoni*, *Typton tortugae*, *Leptodius*

floridanus, Pinnixa spp., Paguristes spp., Callianassa jamaicensis louisianensis;

(12.00085)

Wells, F.E., Jr. 1969. An ecological study of two sympatric species of *Fasciolaria* (Mollusca: Gastropoda) in Alligator Harbor, Florida. Fla. State Univ. M.S. Thesis.

To determine the similarities and differences in their ecology, the sympatric *Fasciolaria hunteria* and *F. tulipa* were studied in Alligator Harbor. Studies of shell morphology, radulae, distribution, age classes, fertilization, activity, and behavior show that they are geographically sympatric but do not share the same distribution in one harbor. Contact between the two is lessened by diversification in the ecological niches.

Study Duration: January-April 1969; Type of Study: Quantitative; Biological Component: Fauna; Dominant Taxon/Taxa Studied: *Fasciolaria hunteria*, *F. tulipa*;

(12.00086)

Wells, F.E., Jr. 1970. An ecological study of two sympatric species of *Fasciolaria* (Mollusca: Gastropoda) in Alligator Harbor, Florida. Veliger 13(1): 95-108.

Analysis was made of habitats, population structure, mating habits, predators, escape responses, and anatomy of the two sympatric gastropods, *Fasciolaria hunteria* and *F. tulipa* from Alligator Harbor. From study of the above characteristics it is hoped that it will be possible to discover the mechanisms that allow these two closely related species to live sympatrically.

Study Duration: January-April 1969; Type of Study: Quantitative; Biological Component: Fauna; Dominant Taxon/Taxa Studied: *Fasciolaria hunteria*, *F. tulipa*;

(12.00087)

Wells, H.W. & J.T. Tomlinson 1966. A new burrowing barnacle from the western Atlantic. Quart. J. Fla. Acad. Sci. 29(1):27-37.

Numerous specimens of an undescribed species of burrowing barnacle were collected from the northeastern Gulf of Mexico. The new species, *Kochloria floridana*, collected at 8-10 meters depth in the Gulf of Mexico off Dog Island, Franklin County, Florida was described and illustrated.

Type of Study: Qualitative; Biological Component: Crustacean fauna; Dominant Taxon/Taxa Studied: *Kochloria floridana*;

(12.00088)

White, D., R.J. Livingston et al. 1979. Effects of surface composition, water column chemistry and time of exposure on the detrital microflora and associated macrofauna in Apalachicola Bay, Florida, In: Ecological Processes in Coastal and Marine Systems. R.J. Livingston (ed.).

The biomass, morphology, and activity of detrital microflora were measured in litter baskets (containing artificial or natural plant detritus) incubated in Apalachicola Bay, Florida, and compared to the biomass, abundance, and diversity of associated macrofauna. Changes in microbial mass, morphology, and activity were not correlated with changes in the macrofaunal population. In incubation of different litter types at 2 different stations, the gross measures of microbial biomass, nutritional history, and respiratory activity were correlated with the litter type. Macrofaunal populations were correlated with water chemistry, but were not influenced by gross measures of detrital microflora. Fine structure of the detrital microbial population was found to be significantly correlated with certain bacterial components of the microflora and the abundance, biomass, and species richness of the detritus associated macrofauna.

Study Duration: 17 August-26 October 1977; Habitat: Mud, seagrass beds; Type of Study: Quantitative; Biological Component: Fauna and flora; Type of Sampler: Litter baskets; Sieve Size: 0.297 mm; Number of Stations: 2; Number of Replicates/Station: 4; Temporal Frequency: Biweekly or monthly; Abiotic Parameters Measured: Temperature, salinity, DO, pH, light penetration, turbidity, water color, riverflow, rainfall; Dominant Taxon/Taxa Studied: *Ruppia maritima*, *Vallisneria americana*, *Gracilaria* spp., *Gracilaria bonnieroides*, *Corophium louisianum*, *Helita* spp., *Meritina reclinata*, *Callinectes sapidus*, *Palaeonetes pugio*;

(12.00089)

White, D.C., R.H. Findlay, S.D. Fazio, R.J. Bobbie, J.S. Nickels, M.M. Davis, G.A. Smith & R.F. Martz 1980. Effects of bioturbation and predation by *Meritina quinquesperforata* on sedimentary microbial community structure, In: Estuarine Perspectives. Academic Press, Inc., New York, NY. p. 163-171.

Sediment processing by sand dollars (*Meritina quinquesperforata*) modified the benthic microbial community without significantly altering gross nutrient balances. Cellular and membrane biomass remained unchanged as did prokaryotic biomass and total metabolic activity. Processed sands showed enrichment of prokaryotic fatty acids and reduction of microeukaryotic fatty acids. Lipid neutral carbohydrate exhibited the same trends. A significant decrease in foraminifera abundance suggested that sand dollars selectively prey on some microeukaryotes, but have little effect on the biomass or metabolic activity of benthic prokaryotes.

Study Duration: 3 weeks (summer 1979); Habitat: Sand; Type of Study: Quantitative; Biological Component: Fauna; Abiotic Parameters Measured: Temperature, salinity, pH, DO, light intensity; Dominant Taxon/Taxa Studied: *Nellita quinquesperforata*;

(12.00090)

White, D.C., R.J. Bobbie, S.J. Morrison, D.K. Osterhof, C.W. Taylor & D.A. Meeter 1977. Determination of microbial activity of estuarine detritus by relative rates of lipid biosynthesis. *Limnol. Oceanogr.* 22(6):1089-1099.

Microorganisms colonizing allochthonous detritus (live oak leaves) showed metabolic activity that could be assayed reproducibly by the incorporation of  $(32P)H_2PO_4$  and  $(1-^{14}C)$  sodium acetate into the lipids in a 2 hr period without introducing subculture bias. Relatively uncolonized live oak leaves showed only about 1% of the biosynthetic capacity of leaves incubated in the estuary for 1 week. Lipid synthesis was proportional to time for at least 2 hr and was also proportional to detrital mass. Rates of phospholipid synthesis parallel the total extra table ATP and the alkaline phosphatase activity during a 6 week incubation of live oak leaves in Apalachicola Bay. Rates of  $^{14}C$  incorporation into lipids parallel the respiratory and the C-D- mannosidase activities over the same period, suggesting that lipid biosynthesis is a reasonable measure of detrital microbial activity.

Study Duration: Approximately 6 weeks; Habitat: Estuarine; Type of Study: Semiquantitative; Biological Component: Flora; Type of Sampler: Weighted leaf baskets; Abiotic Parameters Measured: Salinity, DO, depth;

(12.00091)

White, K.H. 1971. The relationship between the sedimentary materials used by polychaetes in tube building and the microdistribution of sediments in Apalachee Bay and St. Georges Sound, Florida. Fla. St. Univ. M.S. Thesis.

Five different species of worms were collected from fourteen sites and the environmental material and tube material were studied qualitatively, quantitatively, and statistically. Evidence of a correlation between the sedimentary materials used by polychaetes in tube construction and the microdistribution of sediments in the study areas was found and was determined to vary with different species. It was found that although the character of the sediment is important for some species, other parameters and environmental conditions also regulate the distribution of worms. It was observed that certain species of tubiculous polychaetes selectively sort the sediment, while others do not. This selective removal of the coarser fraction by the polychaetes for their tubes results in a greater sorting of the flat's sands. The sedimentary parameters of the tube material from two species differ from the sedimentary parameters of the environmental material in which they were found, however, this was not true for the other three species.

Habitat: Grassbed, shell, sand, mud; Type of Study: Qualitative; Biological Component: Benthic polychaetes; Type of Sampler: Vertical sedimentary core; Number of Stations: 17; Dominant Taxon/Taxa Studied: *Owenia fusiformis*, *Pectinaria gouldii*, *Loinia veridis*, *Axiobella mucosa*, *Clymenella torquata calida*;

(12.00092)

Whitfield, W.K. 1973. Construction and rehabilitation of commercial oyster reefs in Florida from 1949 through 1971 with emphasis on economic impact in Franklin County, Florida. Fla. Dept. Nat. Resources, Mar. Research Lab., Spec. Sci. Rept. No. 38, 42 p.

Oyster reef construction and rehabilitation were described and mapped. Over 4.2 million bushels of oyster shell and other cultch materials have been planted in 10 Florida counties (1.9 million bushels planted in three counties from 1967-1971) at a cost of 9.5 cents/bushel. Planting costs were less than one percent of the estimated value of the oysters expected to be produced from these reefs over a 20 year period. These planted reefs comprised up to 12% of the local reef acreage used by oystermen.

Study Duration: 22 years; Habitat: Oyster beds; Type of Study: Qualitative; Biological Component: Oysters; Dominant Taxon/Taxa Studied: *Crassostrea virginica*;

(12.00093)

Whitfield, W.K., Jr. 1974. Artificial oyster reef development. NOAA, NMFS, Proj. No. 2-150-D, 17 p.

A description and evaluation of the construction of 203.5 acres of artificial oyster reefs was presented. Additionally, the rehabilitation of depleted bars by the state of Florida in cooperation with the U.S. Department of Commerce was discussed.

Study Duration: 4 years; Habitat: Oyster bed; Type of Study: Qualitative; Biological Component: Oysters; Dominant Taxon/Taxa Studied: *Crassostrea virginica*;

(12.00094)

Whitfield, W.K. 1977. Development of artificial oyster reefs. NOAA, NMFS, Project No. 2-224-D, 19 p.

A report of 114 acres of public oyster reefs, constructed at an average cost of \$1,867 per acre, was presented. These reefs were constructed using 402,244 bushels of shucked oyster shell, 109,070 bushels of mined *Rangia* shell, 35,428

bushels of shucked Callico scallop shell, and 6,059 bushels of mined limestone aggregate. In addition, 1,215,964 bushels of shucked oyster and 60,720 bushels of shucked Callico scallop shell were collected and stockpiled. Emphasis was placed on reef construction and rehabilitation, and shell collection took place in areas outside Franklin County. Studies of the new and old reefs demonstrated the continued success, necessity, and economic feasibility of this program to the Florida commercial and recreational oyster fishery.

Study Duration:3 years & 3 months; Habitat:Oyster beds; Type of Study:Qualitative; Biological Component:Oysters;  
Dominant Taxon/Taxa Studied:*Crassostrea virginica*;

(12.00095)

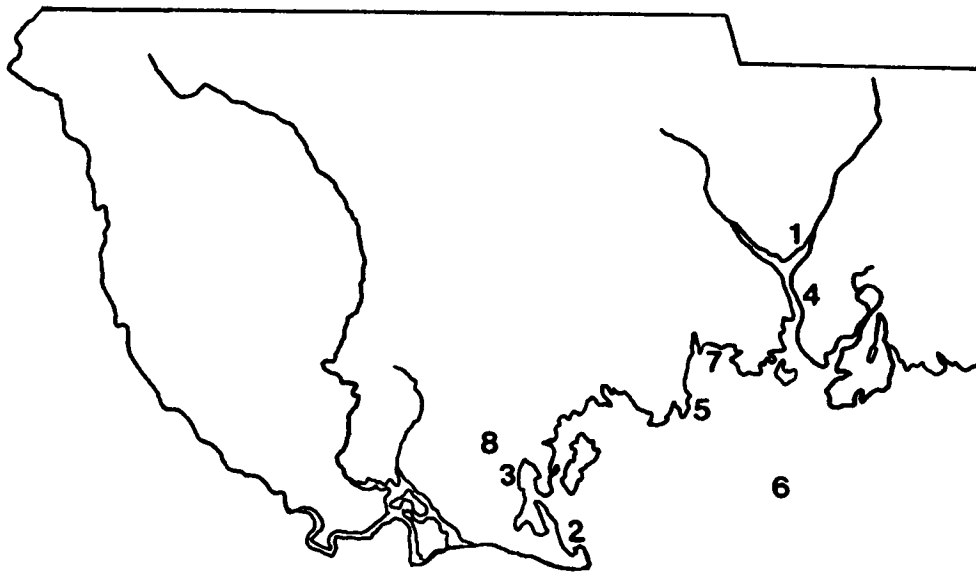
Yentsch, C.S. 1953. Some of the factors influencing distribution of sessile invertebrates in Alligator Harbor, a neutral estuary. Fla. St. Univ. M.S. Thesis.

A method for observing the distribution of sessile marine invertebrates in Alligator Harbor was described. This method involved use of stations set throughout the harbor in a grid network of 500 yard intervals. Masonite strips were attached to 48 stations in this network. No major hydrographic barriers in the harbor were found and the circulation encouraged widespread dispersal of planktonic larvae. Coefficients of correlation were computed to analyze relationships between size of organisms, their abundance, and vertical distribution compared to water depths and station location within the harbor. Factors influencing distributions include light and sensitivity to dessication.

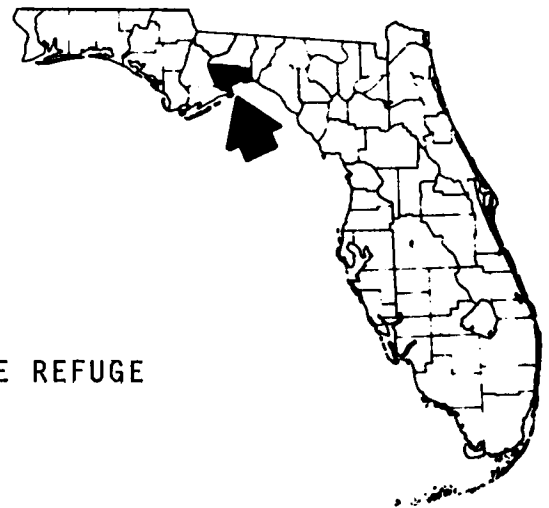
Study Duration:1 month; Type of Study:Qualitative; Biological Component:Marine invertebrates; Type of Sampler:Masonite strips; Number of Stations:48; Dominant Taxon/Taxa Studied:*Citharus fragilis*, *Balanus eburneus*, *Bugula neritina*, *Bougainvillia carolinensis*, *Balanus amphitrite niveus*;

See also: 7.00011, 10.00015, 13.00005, 13.00023, 13.00027.

# WAKULLA COUNTY



1. ST. MARKS
2. DICKSON BAY
3. PANACEA HARBOR
4. ST. MARKS RIVER
5. LIVE OAK ISLAND
6. APALACHEE BAY
7. WAKULLA BEACH
8. ST. MARKS NATIONAL WILDLIFE REFUGE



(13.00001)

Bobbie, R.J., J.S. Nickels, G.A. Smith, S.D. Fazio, R.H. Findlay, W.M. Davis & D.C. White. 1981. Effect of light on biomass and community structure of estuarine detrital microbiota. *Appl. Environ. Microbiol.* 42(1):150-158.

Variations in community structure were observed in estuarine detrital microbiota grown with and without light in the absence of macroscopic grazing by analysis of associated biochemical measures. Growth in light showed small increases in measures of procaryotes and microfauna. Algae and fungi biomass increased 10 to 15 times when grown in light. Increases in diatom growth were maximal in light, as confirmed by scanning electron microscopy.

Study Duration:8 weeks (summer 1979); Type of Study:Quantitative; Biological Component:Faua and flora; Abiotic Parameters Measured:Temperature, salinity, pH, DO, light intensity;

(13.00002)

Brady, K.D. 1981. Seasonal and spatial distribution of ichthyoplankton in seagrass beds of Apalachee Bay. Fla. State Univ. M.S. Thesis. 169 p.

Sampling was conducted in Apalachee Bay from October 1977 to September 1978 to obtain specimens of ichthyoplankton from seagrass habitats. Warm and cold-water seasonal assemblages occurred, the former being largely *Lagodon rhomboides*, and the latter *Anchoa mitchilli*. The 4 areas supported different ichthyoplankton assemblages. Life history data were obtained for the 5 major species.

Study Duration:October 1977-September 1978; Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Plankton net, 0.505 mm mesh; Number of Stations:4; Number of Replicates/Station:5; Temporal Frequency:Monthly; Dominant Taxon/Taxa Studied:*Lagodon rhomboides*, *Anchoa mitchilli*, *Gobiosoma robustum*, *Microgobius gulosus*, *Leiostomus xanthurus*;

(13.00003)

Carawan, T.C. 1979. Experimental evaluation of the seagrass, *Halodule wrightii*, as a refuge for the caridean shrimp, *Hippolyte pleuracanthus*, from one of its fish predators, the silver perch, *Bairdiella chrysura*. Fla. State Univ. M.S. Thesis. 47 p.

A two part experimental study of the role of seagrass as a refuge for caridean shrimp from a fish predator used organisms from Indian River estuary and Apalachee Bay estuary in a large, running seawater tank, and a small, closed system tank, respectively. The results were inconclusive because the difference between shrimp consumption in test and control trials was not significant.

Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Faua, flora; Dominant Taxon/Taxa Studied:*Halodule wrightii*, *Hippolyte pleuracanthus*, *Bairdiella chrysura*;

(13.00004)

Cherr, G.D. 1974. Species composition and diel variations in the ichthyofaunal community of an intertidal grassbed in the northeastern Gulf of Mexico. Fla. State Univ. M.S. Thesis.

Studies of the intertidal ichthyofaunal community were conducted at a *Spartina* grassbed at Live Oak Island from April to December 1973. Seasonal changes in water temperature or adequate cover in grassbeds created variations in the presence and abundance of some species. Of 47 species, only 5 were year-round residents. Day light and darkness, high tide and low tide cycles were tied to short distance and short duration migrations in and out of the intertidal zone.

Study Duration:April 1973-December 1973; Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Seine, pushnet (1/4 in. mesh); Number of Stations:1; Temporal Frequency:Twice weekly; Abiotic Parameters Measured:Air & water temperature, salinity, tidal level, DO; Dominant Taxon/Taxa Studied:*Spartina*;

(13.00005)

Federle, T.W., M.A. Mullar, R.J. Livingston, D.A. Meeker & D.C. White 1983. Biochemical analysis of the spatial distribution, biomass, and community composition of microbial assemblages in estuarine, mudflat sediments. *Appl. Environ. Microbiol.* 45(1):58-63.

Biochemical analysis of lipids and lipid components was used to examine the spatial distribution of communities in estuarine mudflat sediments. Total biomass was measured using total phospholipid and community composition using fatty acids. The biomass correlated well with the fatty acid "signatures" of bacteria but less well with the long-chain polynuc fatty acids of the microfauna.

Study Duration:December 7-9, 1981; Habitat:Mudflat; Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:3.2 cm dia. PVC core; Sieve Size:500 micron; Number of Stations:3; Abiotic Parameters Measured:Lipid content, phosphate, fatty acids;

(13.00006)

Greening, H.S. & R.J. Livingston 1982. Diel variation in the structure of seagrass-associated epibenthic

macroinvertebrate communities. Mar. Biol. Prog. Ser. 7(2):147-156.

Diurnal and nocturnal epibenthic samples were collected monthly from seagrass beds at four stations in Apalachee Bay to examine macroinvertebrate community structure. Data on species composition, numbers of individuals and species, and relative abundance distribution are summarized. At 3 of the 4 stations the number of individuals collected was significantly different between diurnal and nocturnal samples. Individual species increase or decrease their numbers in nocturnal samples, altering the relative abundance distribution with time of sampling. The amount of diel variation in number of individuals is apparently dependent upon habitat complexity (determined by plant biomass and red algae volume); such is not the case for number of species. The effect of exclusively diurnal sampling on analysis of macroinvertebrate community structure is discussed.

Study Duration:1973-1981; Habitat:Seagrass beds; Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Epibenthic crab scrape; Sieve Size:6.3 mm; Number of Stations:4; Number of Replicates/Station:8; Temporal Frequency:Monthly; Abiotic Parameters Measured:Water temperature, salinity, depth, Secchi depth, water color; Dominant Taxon/Taxa Studied:Hippolyte zostericola, Pagurus bonairensis, Anachis avara, Penaeus duorarum, Periclinenes longicaudatus, Tozeuna carolinense;

(13.00008)

Gunter, G. & R.W. Menzel 1957. The crown conch: *Melongena corona*, as a predator upon the Virginia oyster. Nautilus 70(3):84-87.

Over 200 crown conchs, *Melongena corona*, were observed feeding on laboratory maintained oysters (*Crassostrea virginica*). *M. corona* does not drill the shell as does the common oyster predator, *Thais*, but inserts its proboscis between the oyster valves after exploring the opening with its antennae. This feeding behavior has been confirmed in the field by oyster fishermen. The radula of the crown conch is relatively small, but its proboscis can be extended more than the length of its shell. A review of the literature revealed that *M. corona* also preys upon *Busysca*, *Ensis minor*, *Tagelus divisus*, *Anadara ovalis*, scallops and even its own young when no other food is available.

Study Duration:March 17-April 8, 1956; Habitat:Oyster reefs; Type of Study:Qualitative; Biological Component:Mollusk fauna; Abiotic Parameters Measured:Salinity, air temperature; Dominant Taxon/Taxa Studied:*Melongena corona*, *Crassostrea virginica*;

(13.00009)

Harlos, D.P. 1976. Environmental distribution of *Melampus bidentatus* (Pulmonata) and *Cerithidea scalariformis* (Prosobranchia) in a Florida tidal marsh. Fla. State Univ. M.S. Thesis: 66 p.

*Melampus bidentatus* and *Cerithidea scalariformis* distributions were studied from October 1973 to April 1974 at a saltmarsh in Wakulla Beach. *M. bidentatus* distribution was found to be predator controlled, while *C. scalariformis* distribution was determined by substrate salinities.

Study Duration:October 1973-April 1974; Habitat:Saltmarsh; Type of Study:Qualitative; Biological Component:Faua; Temporal Frequency:Monthly; Abiotic Parameters Measured: Soil carbon content, transect slope, incident light intensity, relative humidity, salinity; Dominant Taxon/Taxa Studied:*Melampus bidentatus*, *Cerithidea scalariformis*;

(13.00010)

Heck, K.L., Jr. 1976. Community structure and the effects of pollution in seagrass meadows and adjacent habitats. Mar. Biol. 35(4):345-357.

Two areas with large differences in abundance and dominance relationships, related to the presence of pulp-mill effluents were studied. Several commonly used indicators of pollution stress were tested in these areas and were determined to be ineffective in differentiating between the two.

Study Duration:6 months; Habitat:Grassbed, mudflat, oyster bed; Biological Component:Epibenthic invertebrates; Type of Sampler:Otter trawl; Number of Stations:14; Number of Replicates/Station:2; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, turbidity, water clarity; Dominant Taxon/Taxa Studied:*Pagurus bonairensis*, *Tozeuna carolinense*, *Thalassia testudinum*, *Syringodium filiforme*, *Halodule beaudetti*;

(13.00011)

Jackson, C.R. 1951. Topographic, edaphic, and climatic factors affecting plant zonation in a tidal marsh. Fla. State Univ. M.S. Thesis.46 p.

The influence of elevation, sediment type, and various physical factors on plant zonation was investigated in a tidal marsh near Apalachee Bay, Florida. Seven zones were delineated and their topography, sediment characteristics, and vegetation described. Growth was found to be determined by interactions of tidal exposure, sediment characteristics, and climatic factors at a given elevation. Salinity was the most important condition in regulating zonation of plant communities.



Habitat:Saltmarsh; Type of Study:Qualitative; Biological Component:Flora; Abiotic Parameters Measured: Salinity, tides, wind direction and velocity;

(13.00013)

Kruczynski, W.L. & C.B. Subrahmanyam 1978. Distribution and breeding cycle of *Cyathura polita* (Isopoda: Anthuridae) in a *Juncus roemerianus* marsh of northern Florida. *Estuaries* 1(2):93-100.

Monthly benthic samples taken from a *Juncus roemerianus* marsh near St. Marks, Florida, between January 1973 and July 1974 showed that the isopod, *Cyathura polita*, was the most abundant infaunal macroinvertebrate. Average density was 58 individuals/m<sup>2</sup> in the lower marsh and 75/m<sup>2</sup> in the upper marsh, with a maximum density 200 m inland of low water. Reproduction of *C. polita* occurred from April through June. Males matured before females; there was evidence for possible protogynous hermaphroditism. Comparisons with other reported populations of *C. polita* revealed that the St. Marks population had a smaller body size, shorter maturation period, and a different environment. It is suggested that this population represents a new ecotype.

Study Duration:January 1973-July 1974; Habitat:Salt marsh; Type of Study:Quantitative; Biological Component:Crustacea fauna and flora; Sieve Size:1.0 mm; Number of Stations:4; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO; Dominant Taxon/Taxa Studied:*Cyathura polita*, *Juncus roemerianus*;

(13.00014)

Kruczynski, W.L. & G.U. Myers 1976. Occurrence of *Apanthura magna* Menzies and Frankenberg, 1968 (Isopoda: Anthuridae) from the west coast of Florida, with a key to the species of *Apanthura* Stebbing, 1900. *Proc. Biol. Soc. Wash.* 89(28):353-360.

In this paper *A. magna* female is redescribed to include the correct configuration of the mandibular palp. Immature and mature males from Florida are also described. The range of *A. magna* was extended from Georgia to northwestern Florida, and a key has been prepared for the species *Apanthura* Stebbing, 1900.

Study Duration:2 months; Type of Study:Qualitative; Biological Component:Anthurid isopod; Dominant Taxon/Taxa Studied:*Apanthura magna*;

(13.00015)

Kruczynski, W.L., C.B. Subrahmanyam & S.H. Drake 1978. Studies on the plant community of a north Florida salt marsh. Part I. Primary production. *Bull. Mar. Sci.* 28:316-334.

*Juncus roemerianus* is the dominant salt marsh angiosperm in northwestern Florida, and its growth and production was determined by various methods in three soil zones. Productivity of *Spartina alterniflora* and *Distichlis spicata* was also measured. Total net aerial production of *J. roemerianus* decreased landward from 949 g/m<sup>2</sup>/yr in low marsh to 595 g/m<sup>2</sup>/yr in upper marsh and 243 g/m<sup>2</sup>/yr in high marsh. Production of *S. alterniflora* also decreased landward from 700 g/m<sup>2</sup>/yr low marsh, 335 g/m<sup>2</sup>/yr upper marsh, and 130 g/m<sup>2</sup>/yr high marsh. Height and diameter of *Juncus* leaves and diameter of rhizomes also decreased landward. Annual mean below ground biomass in low, upper, and high marsh zones. Decomposition rates of *Juncus* and *Spartina* decreased landward and rates in low and upper marsh were higher than any previously reported in either species. *Spartina* decomposed faster than *Juncus*.

Study Duration:July 1974-August 1975; Habitat:Salt marsh; Type of Study:Quantitative; Biological Component:Flora; Type of Sampler:Hand; Number of Stations:6; Temporal Frequency:Monthly; Dominant Taxon/Taxa Studied:*Juncus roemerianus*, *Distichlis spicata*, *Spartina alterniflora*;

(13.00018)

Kruczynski, W.L., C.B. Subrahmanyam, & S.H. Drake 1978. Studies on the plant community of a north Florida saltmarsh. Part II. Nutritive value and decomposition. *Bull. Mar. Sci.* 28(4):707-715.

Bimonthly measurements of nutritive values of *Juncus roemerianus*, *Spartina alterniflora*, and *Distichlis spicata* were made in a salt marsh near St. Marks, Florida, from September 1974 to August 1975. Samples from three marsh zones showed significant differences in ash content of live *Juncus* leaves, ash and lipid of dead leaves, and ash, crude fiber, protein, lipid, and phosphorus content of rhizomes. *Spartina* leaves exhibited significant zonal differences in ash, lipid, and protein content. Values of annual decomposition are given for *Juncus* and *Spartina* in all marsh zones.

Study Duration:September 1974-August 1975; Habitat:Salt marsh; Type of Study:Quantitative; Biological Component:Flora; Number of Stations:3; Temporal Frequency:Bimonthly; Dominant Taxon/Taxa Studied:*Juncus roemerianus*, *Spartina alterniflora*, *Distichlis spicata*;

(13.00019)

Leber, K.M. 1983. Influence of a microhabitat on decapod predation in seagrass beds. Presented at Benthic Ecology Meeting. Fla. Instit. of Tech., Melbourne.

The importance of vegetation as a prey refuge from *Penaeus duorarum*, the dominant predatory decapod crustacean in a

Gulf of Mexico seagrass bed was investigated in Apalachee Bay, Florida. Experiments with replicate inclusion (treatment) and exclusion (control) cages across a gradient of increasing habitat complexity revealed significant predation effect for both species number and total densities for all prey taxa in the simple (low plant biomass) habitat. Prey population responses across habitats varied within each taxa, but generally showed diminished effects on species numbers and densities across the vegetation gradient. The results suggest that pink shrimp predation is affected by habitat complexity, but that other factors contribute to the high correlations between plant biomass and densities of seagrass-associated fauna.

Study Duration:1 year; Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Crustacea; Type of Sampler:Suction dredge; Sieve Size:1.5 mm; Number of Stations:1; Number of Replicates/Station:16; Temporal Frequency:Monthly; Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(13.00021)

Lewis, F.G., III & A.W. Stoner 1981. An examination of methods for sampling macrobenthos in seagrass meadows. Bull. Mar. Sci. 31(1):116-124.

The samples of 3 different sized corers were compared in a test of macrofaunal sampling methods conducted in a shallow water seagrass bed in Apalachee Bay, Florida. Sieving of core samples with both 0.5 and 1.0 mm mesh screens yielded significant differences in numbers of individuals found with only 51-57% of the total macrofauna retained by the 1.0 mm sieve. The small corer (5.5 cm dia.) collected significantly more organisms than the 2 larger corers (7.6 and 10.5 cm dia.), although the total numbers of species collected with each sampler were similar. The greater sampling efficiency of the smaller corer is explained and recommendations are presented for macrofaunal sampling in seagrass beds.

Study Duration:3 April 1978; Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Faua and flora; Type of Sampler:Corer; Sieve Size:0.5 mm, 1.0 mm; Number of Stations:1; Number of Replicates/Station:104; Abiotic Parameters Measured:Temperature, salinity, DO; Dominant Taxon/Taxa Studied:*Levins sp.*, *Rudilimboides naglei*, *Prionospio heterobranchia*, *Leptochelia rapax*;

(13.00022)

Lewis, T.C. 1982. The reproductive anatomy, seasonal cycles, and development of the Atlantic stingray, *Dasyatis sabina* (Lesueur) (Pisces, Dasyatidae) from the northeastern Gulf of Mexico. Fla. State Univ. Ph.D. Dissertation. 205 p.

*Dasyatis sabina* specimens were collected in Wakulla County from February 1976 to November 1977 in order to study features of its reproductive biology. Anatomy, seasonal cycles, and development of both sexes were investigated. The male cycle consisted of 5 phases: latent, early spermatogenesis, mid-spermatogenesis, late spermatogenesis, and pre-latent. Sperm were ripe from September to May, while oocytes developed over the year. Sperm storage probably occurs between October and April. Other features of ovulation, fetal development, and birth are reported.

Study Duration:February 1976-November 1977; Type of Study:Quantitative; Biological Component:Faua; Temporal Frequency:Monthly and weekly or biweekly; Dominant Taxon/Taxa Studied:*Dasyatis sabina*;

(13.00023)

Little, E.J., Jr. 1958. The sponge fauna of the St. George's Sound, Apalachee Bay, and Panama City regions of the Florida Gulf coast. Fla. St. Univ. M.S. Thesis.

An extensive survey of the sponge fauna of the Apalachee Bay region of the Florida Gulf coast was conducted for a period of two years. In addition to this work, specimens were also collected in the Panama City area of the Florida Gulf coast and included in the systematic section which lists species in 49 genera. Six undescribed species were reported: *Cliona* sp. nov., *Coelosphaera* sp. nov., *Eurypoa* sp. nov., *Holoplocania* sp. nov., *Leiosella* sp. nov. and *Rhaphisia* sp. nov. *Suberites undulatus*, placed in certae sedis by de Laubenfels (1947), was found, as was *Tethya aurantia*, which is common north of Cape Hatteras. *Tethya diploderna*, commonest south of Cape Hatteras was not found. *Halisarca magellanica* was reported from this region. This was the third record of this species. A detailed key to the sponges of this area was included, as was a very general discussion of the ecological principles governing the sponge fauna of the region.

Study Duration:2 years; Type of Study:Qualitative; Biological Component:Porifera fauna; Dominant Taxon/Taxa Studied:*Cliona* sp. nov., *Coelosphaera* sp. nov., *Eurypoa* sp. nov., *Holoplocania* sp. nov., *Leiosella* sp. nov., *Rhaphisia* sp. nov.;

(13.00024)

Livingston, R.J., R.S. Lloyd & M.S. Zimmerman 1976. Determination of sampling strategy for benthic macrophytes in polluted and unpolluted coastal areas. Bull. Mar. Sci. 26(4):569-575.

An appropriate sampling strategy for benthic macrophytes in the Apalachee Bay was presented. It was found that the biomass (dry weight) of relatively dominant species was adequately determined with only a few subsamples while less prevalent species were found to be unreliable in a quantitative sense. For species representation, it was found that when rare species were excluded from the analysis, stations characterized by low numbers of species (S) and reduced biomass

(W) required a greater sampling effort for comparable results. When rare species were included, stations with high S and W values or with very low S values required more samples to achieve adequate species representation.

Study Duration:1-1/2 years; Habitat:Variable; Type of Study:Quantitative; Biological Component:Flora; Number of Stations:14; Number of Replicates/Station:16; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Digenia simplex*, *Padina vickersiae*;

(13.00025)

Main, K.L. 1983. Behavioral response of a caridean shrimp to fish predators. Presented at Benthic Ecology Meeting, Fla. Instit. of Tech., Melbourne.

The predator avoidance behavior of the caridean shrimp, *Tozeuma carolinense* from 2 diurnal fish predators (*Lagodon rhomboides*; *Syngnathus floridae*) was studied by laboratory and field observations conducted in Apalachee Bay, Florida. *T. carolinense* exhibited a marked increase in the frequency of certain rare behaviors and a decrease in common behaviors in the presence of fish predators, suggesting that the rare behaviors may be important in avoiding predation.

Habitat:Seagrass bed; Type of Study:Qualitative; Biological Component:Crustacea, fish fauna; Number of Stations:1; Dominant Taxon/Taxa Studied:*Tozeuma carolinense*, *Lagodon rhomboides*, *Syngnathus floridae*;

(13.00026)

McNulty, J.K., W.N. Lindall, Jr. & E.A. Anthony 1974. Data on the biology phase, Florida portion, Cooperative Gulf of Mexico Estuarine Inventory. NOAA, NMFS Data Rept. 95, 232 p.

Data from the Florida portion of the biology phase of the Cooperative Gulf of Mexico Estuarine Inventory were presented. Data was summarized as follows: 1) monthly number of samples, surface salinity, temperature and average trawl and seine catches per unit effort at each location; 2) distribution by temperature and salinity intervals of species taken with seines and trawls in Florida from January 1968 through March 1969, showing number of seine and trawl hauls, numbers of animals per haul, minimum, maximum and mean total length; 3) numbers of animals taken by monthly seining and trawling; 4) annual average seine and trawl catches per unit of effort; 5) number of males, females and juveniles of selected species caught by one trawl haul and one seine haul each; 6) weight of animals caught by trawl and seine; 7) catch of the major groups of plankton sampled monthly; and 8) volume of plankton sampled monthly.

Study Duration:1 year; Habitat:Estuarine; Type of Study:Qualitative; Biological Component:Faua; Type of Sampler:Seine, trawl, plankton net; Number of Stations:5; Number of Replicates/Station:1; Temporal Frequency:Monthly; Dominant Taxon/Taxa Studied:Abiotic Parameters Measured:Temperature, salinity;;

(13.00027)

Menzel, R.W., Ed. 1971. Checklist of the marine fauna and flora of the Apalachee Bay and the St. George's Sound area. Fla. St. Univ. Dept. Oceanogr. Rept. 126 p.

A compilation (annotated checklist) of the marine fauna and flora of the St. George's Sound - Apalachee Bay region was presented. Included in this edition were large groups of hydrozoans and bryozoans, as well as additions and corrections to other groups including barnacles, decapod crustaceans and fishes.

Habitat:Grassbed, mud, sand, shell, gravel, saltmarsh, oyster bed; Type of Study:Qualitative; Biological Component:Flora and fauna;

(13.00028)

Oglesby, L.C. 1960. Osmoregulation in the nereid polychaetes, *Laeonereis culveri* and *Neanthes succinea*. Fla. State Univ. M.S. Thesis.

Osmoregulation and volume regulation of *Laeonereis culveri* and *Neanthes succinea* from Apalachee Bay were studied and compared to conditions in natural habitats. *L. culveri* could regulate its body volume and osmotic concentration in hypotonic media, while *N. succinea* dies in media lower than 3 o/oo chlorinity. In nature, *L. culveri* lives in waters of low salinity with freshwater inundations. *N. succinea* is found only in salinities greater than 10 o/oo. Thus, physiological differences in osmoregulatory ability appear to define separate niches for these two polychaetes.

Type of Study:Quantitative; Biological Component:Faua; Abiotic Parameters Measure:Salinity; Dominant Taxon/Taxa Studied:*Neanthes succinea*, *Laeonereis culveri*;

(13.00029)

Reidenauer, J.A. & D. Thistle 1983. The effect of seagrass blades on harpacticoid copepod abundances. Presented at Benthic Ecology Meeting. Fla. Instit. of Tech., Melbourne.

A study of harpacticoid copepod abundance conducted at Apalachee Bay, Florida found significantly higher densities of copepods surrounding single blades of the seagrass *Syringodium filiforme* than in adjacent unvegetated sand areas. Experiments with artificial seagrass blades had similar results, suggesting that the physical structure of the seagrass blade influences harpacticoid abundances, possibly by providing refuge from predation or by altering near bottom current

flow. No single harpacticoid species was disproportionately abundant around seagrass blades in comparison to sand areas, indicating that the effect is not species specific.

Habitat:Seagrass, sand; Type of Study:Quantitative; Biological Component:Crustacea fauna; Dominant Taxon/Taxa Studied:*Syringodium filiforme*;

(13.00030)

Sherman, K.M., J.A. Ridenauer, D. Thistle & D. Meeter 1983. Role of a Natural Disturbance in an Assemblage of Marine Free-Living Nematodes. Mar. Ecol. Prog. Ser. 11(1):23-30.

Marine nematodes in subtidal sediments are frequently disturbed by stingrays (*Dasyatis sabina*). Observations of nematode densities were made in disturbed and background sediments. It was determined that small-scale natural disturbances are not important in the maintenance of nematode species in this community.

Habitat:Soft-bottom; Type of Study:Quantitative, qualitative; Biological Component:Nematode fauna; Dominant Taxon/Taxa Studied:Nematode;

(13.00031)

Stoner, A.W. 1979. Species specific predation on amphipod Crustacea by the pinfish, *Lagodon rhomboides*: Mediation by macrophyte standing crop. Mar. Biol. 55(3):201- 208.

Predatory behavior of *Lagodon rhomboides* was investigated in seagrass habitats in Apalachee Bay from April to September 1977. It was determined that the microhabitat of prey species and not amphipod abundances influenced predatory preferences. Consumption selectivity increased with macrophyte biomass. The importance of this type of predator behavior on species richness and abundance is discussed.

Study Duration:April-September 1977; Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Trawl; Number of Stations:4; Temporal Frequency:Monthly; Abiotic Parameters Measured:Salinity; Dominant Taxon/Taxa Studied:*Lagodon rhomboides*;

(13.00032)

Stoner, A.W. 1979. The macrobenthos of seagrass meadows in Apalachee Bay, Florida, and the feeding ecology of *Lagodon rhomboides* (Pisces: Sparidae). Fla. State Univ. Ph.D. Dissertation. 187 p.

A 12 month analysis of feeding behavior in pinfish (*Lagodon rhomboides*) was conducted concurrently with surveys of benthic macrofauna, zooplankton, water quality, and sediment structure at four shallow subtidal sites in Apalachee Bay, Florida. Biomass of benthic macrophytes was found to be an important regulator of abundances, dominance, species richness, and trophic organization in macrobenthic assemblages. Likewise, fish abundance and feeding behaviors were mediated by macrophyte standing crops.

Study Duration:12 months; Habitat:Seagrass; Type of Study:Quantitative; Biological Component:Fauna; Number of Stations:4; Dominant Taxon/Taxa Studied:*Lagodon rhomboides*;

(13.00033)

Stoner, A.W. 1980. The role of seagrass biomass in the organization of benthic macrofaunal assemblages. Bull. Mar. Sci. 30(3):537-551.

Benthic macrofauna were sampled monthly at 4 subtidal sites in Apalachee Bay, Florida, from December 1976 to November 1977. Stations had similar granulometric properties, but different standing crops of benthic macrophytes. Macrofauna density and species number were directly related to macrofloral biomass. Species composition of the unvegetated site was distinctly different from that of vegetated sites. Relationships between species abundance and macrophyte biomass are noted for epifaunal amphipods and polychaetes. Biomass of benthic macrophytes greatly influenced species abundances, dominance, diversity, and trophic structure in macrofaunal assemblages.

Study Duration:December 1976-November 1977; Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Fauna and flora; Type of Sampler:Hand corer; Sieve Size:0.5 mm; Number of Stations:4; Number of Replicates/Station:12; Temporal Frequency:Monthly; Abiotic Parameters Measured:Sediment grain size; Dominant Taxon/Taxa Studied:*Elasmopus levis*, *Appelisia verrilli*, *A. vadorum*, *Aricidea taylori*, *Prionospio heterobranchia*, *Platynereis dumerilii*, *Thalassia testudinum*, *Syringodium filiforme*;

(13.00034)

Stoner, A.W. 1980. Abundance, reproductive seasonality and habitat preferences of amphipod crustaceans in seagrass meadows of Apalachee Bay, Florida. Contrib. Mar. Sci. 23:63-78.

A survey was made of the amphipod fauna in Apalachee Bay which produced 31 species in 15 months. Although the majority of species were associated with vegetated areas, *Appelisia* species were abundant in unvegetated areas. Reproductive activity was not based on physical-chemical aspects or macrophyte biomass, but rather on individual reproductive processes and fish predators. Epibenthic forms preyed upon by *Lagodon rhomboides* showed the most seasonality. The

mechanisms regulating abundances vary with species, season, and locality.

Study Duration:15 months; Type of Study:Quantitative; Biological Component:Fauna; Number of Stations:4; Abiotic Parameters Measured:Salinity, turbidity, water depth, DO, temperature, sediment characteristics; Dominant Taxon/Taxa Studied:*Lagodon rhomboides*, *Amplisca sp.*, *Malophila engelmanni*, *Thalassia testudinum*, *Syringodium filiforme*, *Halodule wrightii*;

(13.00035)

Stoner, A.W. & R.J. Livingston 1980. Distributional ecology and food habits of the banded blenny, *Paraclinus fasciatus* (Clinidae), a resident in a mobile habitat. Mar. Biol. 56(3):239-246.

The effects of physical/chemical conditions in Apalachee Bay on the survival of *Paraclinus fasciatus* were studied from June 1971 to May 1979. Population density was unrelated to physical/chemical and seagrass characteristics at the stations. Unattached red algae correlated with numbers of *P. fasciatus*. Major food sources are those found in association with the unattached red algae. Aspects of population changes and reproductive behavior are discussed. *P. fasciatus* has euryhaline tolerance. The drift-algae habitat supplies shelter and food and aids in dispersal for the banded blenny, *P. fasciatus*.

Study Duration:June 1971-May 1979; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:5 m otter trawl; Number of Stations:14; Number of Replicates/Station:7; Temporal Frequency:Monthly; Abiotic Parameters Measured:Salinity, turbidity, color, Secchi disc; Dominant Taxon/Taxa Studied:*Paraclinus fasciatus*;

(13.00036)

Subrahmanyam, C.B. & C.L. Coultas 1980. Studies on the animal communities in two north Florida salt marshes. Part III. Seasonal fluctuations of fish and macroinvertebrates. Bull. Mar. Sci. 30(4):790-818.

Species distribution patterns and seasonal variation in species abundance of fish and macroinvertebrate communities were investigated in two salt marshes in Apalachee Bay, Florida. Variations in temperature, salinity, and oxygen were responsible for less than 20% of seasonal changes in species numbers and biomass. Sediment particle size did not affect invertebrate density or trophic type. Temporal variation of community composition was more closely related to biological factors (breeding patterns, recruitment, and seasonal succession of dominants) than physical parameters. Trends in species dominance, diversity, and distribution were summarized. Changes in composition of both communities were primarily results of population variations; however, predation by fish populations partially regulated the macroinvertebrate community structure.

Study Duration:July 1972-August 1974; Habitat:Salt marsh; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Seine, trap; Sieve Size:1 mm; Number of Stations:14; Number of Replicates/Station:2 (6 stations); Temporal Frequency:Monthly; Abiotic Parameters Measured: Sediment grain size, pH, organic carbon, soil to water suspension, total nitrogen, water & air temperature, salinity, DO, water depth; Dominant Taxon/Taxa Studied:*Leiostomus xanthurus*, *Hugil cephalus*, *Poecilia latipinna*, *Palaemonetes pugio*, *P. intermedius*, *Callinectes sapidus*;

(13.00037)

Subrahmanyam, C.B. & S.H. Drake 1975. Studies on the animal communities in two north Florida salt marshes, Part I. Fish communities. Bull. Mar. Sci. 25(4):445-465.

A study of the seasonal fluctuations of temperature, salinity, numerical abundance, and biomass of fish in three tidal creeks at each marsh provided data for community diversity indices which were used to interpret the temporal changes in the composition of fish communities. The average numerical abundance and biomass were greater at low tides. Neither type of overall abundance was correlated with seasonal temperature or salinity. Temperature showed a negative correlation with the abundance of *Leiostomus xanthurus* and a positive correlation with cyprinodontiform species. Salinity showed a positive correlation with *Leiostomus xanthurus* and *Lagodon rhomboides*. The species of fish were grouped into permanent residents, species utilizing marshes as a nursery, foraging species and sporadic species. Most of the species were represented by juveniles. Diversity index showed an increase with the onset of warmer temperature.

Study Duration:1 year; Habitat:Salt marsh; Type of Study:Semiquantitative; Biological Component:Marine fish; Type of Sampler:Seine net; Number of Stations:3; Number of Replicates/Station:1; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature (air & water), salinity, depth; Dominant Taxon/Taxa Studied:*Menidia beryllina*, *Leiostomus xanthurus*, *Eucinostomus argenteus*, *Anchoa mitchilli*.

(13.00038)

Subrahmanyam, C.B. & M.L. Kruczynski 1978. Colonization of polychaetous annelids in the intertidal zone of a dredged material island in north Florida. Proc. 2nd Internat. Ecol. Congr., Jerusalem, Israel, 28 p.

The sequence of colonization and community formation on a man-made island with dredged spoil was studied. Though densities (per m<sup>2</sup>) displayed pronounced seasonal variations, the mean densities of spoil and control stations were comparable. No definite correlation between substrate and trophic types was detected. A total of 29 species colonized the island, seasonal species succession and habitat expansion within the intertidal zone occurred, and a Petersen type

community with visible dominants became established. There were slight differences in dominance hierarchy between stations. Seasonal patterns of variations of species diversity and species richness indicated that immigration of new species governed the diversity. The species overlap between stations was considerable, indicating that the whole polychaete assemblage was one community. Species equilibrium within one year was not observed.

Habitat: Sand, grassbed; Type of Study: Quantitative; Biological Component: Polychaetous annelids; Type of Sampler: 0.0625 m<sup>2</sup>, 10 cm deep metal corer; Sieve Size: 0.5 mm; Number of Stations: 4; Number of Replicates/Station: 3; Temporal Frequency: Monthly; Abiotic Parameters Measured: Sediment analysis; Dominant Taxon/Taxa Studied: *Brania clavata*, *Laeonereis culveri*, *Eteone heteropoda*, *Glycera americana*, *Scoloplos fragilis*, *Sabella microphthalma*, *Nereis agilis*, *Aricidea fragilis*, *Paraonis fulgens*;

(13.00039)

Subrahmanyam, C.B., W.L. Kruczynski, and S. H. Drake; 1976. Studies on the animal communities in two north Florida saltmarshes. Part II. Macroinvertebrate communities. Bull. Mar. Sci. 26(2):172-195.

Studies on the macroinvertebrates communities of salt marshes in St. Marks and Wakulla, FL were reported.

The mean density of marsh invertebrates in trap samples was determined to be 475/m<sup>2</sup>, and average densities were significantly higher in low marsh (540/m<sup>2</sup>) than in the upper marsh (381/m<sup>2</sup>). Peaks of abundance were observed in winter and fall. Mean biomass for the year was 123g/m<sup>2</sup>. Species richness and equitability closely followed the seasonal trends of species diversity. Mean homogeneity of species occurrence was 33% between the low and upper marsh zone.

Study Duration: 1 year; Habitat: Salt marsh; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: 1 m<sup>2</sup> traps; Number of Stations: 6; Number of Replicates/Station: 1; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature, salinity, DO; Dominant Taxon/Taxa Studied: *Juncus roemerianus*, *Spartina alterniflora*, *Scoloplos fragilis*, *Neanthes succinea*, *Laeonereis culveri*, *Uca sp.*, *Melampus bidentatus*, *Cerithidea scalariformis*;

(13.00040)

Thistle D. 1980. The Response of a Harpacticoid Copepod Community to a Small-scale Natural Disturbance. J. Mar. Res. 38(3):381-396.

The colonization of enterpneust fecal mounds by harpacticoid copepods was analyzed. The time required for copepod densities to reach the densities found in background samples was 23 hr. 10 min. Fourteen species never became disproportionately abundant during recolonization of the mounds. Two species appeared to exploit the opened habitat space and became disproportionately abundant during recolonization.

Habitat: Soft-bottom; Type of Study: Qualitative, quantitative; Biological Component: Harpacticoid copepods; Dominant Taxon/Taxa Studied: *Paralaophonte sp.*, *Laophonte coraui*, *Eurytemora sp.*, *E. littorale*, *Leptastacus aberrans*, *Paradactylopusia sp.*, *Nitocra sp.*, *Malectinosoma spp.*, *Parastenhelia ornatissima*, *Zausodes arenicolus*, *Mesochra pygmaea*, *Hastigerella leptomorpha*, *Ecinosoma spp.*, *Scottolana canadensis*, *Pseudobradia f. exilis*, *Robertgurneya rostrata*;

(13.00041)

Thompson, S.M. 1977. Vascular plant communities and environmental parameters under tidal influence on the Wakulla and St. Marks Rivers, Florida. Fla. State Univ. M.S. Thesis.

Using the quadrat method submerged, intertidal, and marsh vegetation of the Wakulla and St. Marks Rivers were studied at 5 sites from September 1975 to August 1976. Monthly measurements were made of salinity, DO, light penetration, pH, alkalinity, total hardness, and temperature. Differences in distribution and abundance of submerged and intertidal species, in marsh vegetation from the river banks to the flatwoods, and in species composition and abundance from site to site in the marsh zone were determined.

Study Duration: September 1975-August 1976; Type of Study: Quantitative; Biological Component: Flora; Number of Stations: 5; Temporal Frequency: Monthly; Abiotic Parameters Measured: Salinity, DO, light penetration, pH, alkalinity, total hardness, temperature;

(13.00042)

Williams, S.A. 1981. Salinity differences between a high and low marsh of northwestern Florida. Florida Sci. 44 (4):224-228.

Soils were analyzed from a high marsh and low marsh along the coastal border of St. Marks Wildlife Refuge. The soils contained large amounts of sand, were low in cation exchange capacity and exchangeable cations and contained high levels of soluble salts. Soils from the low marsh had higher cation exchange capacities than did the layers below.

Habitat: Saltmarsh; Type of Study: Quantitative, qualitative; Number of Stations: 2; Number of Replicates/Station: 2; Abiotic Parameters Measured: Sediment characteristics, pH, cation exchange capacity, organic Carbon, total Nitrogen, salinity, exchangeable cations; Dominant Taxon/Taxa Studied: *Juncus roemerianus*.

(13.00043)

**GEOG. CLASSIFICATION: Wakulla**

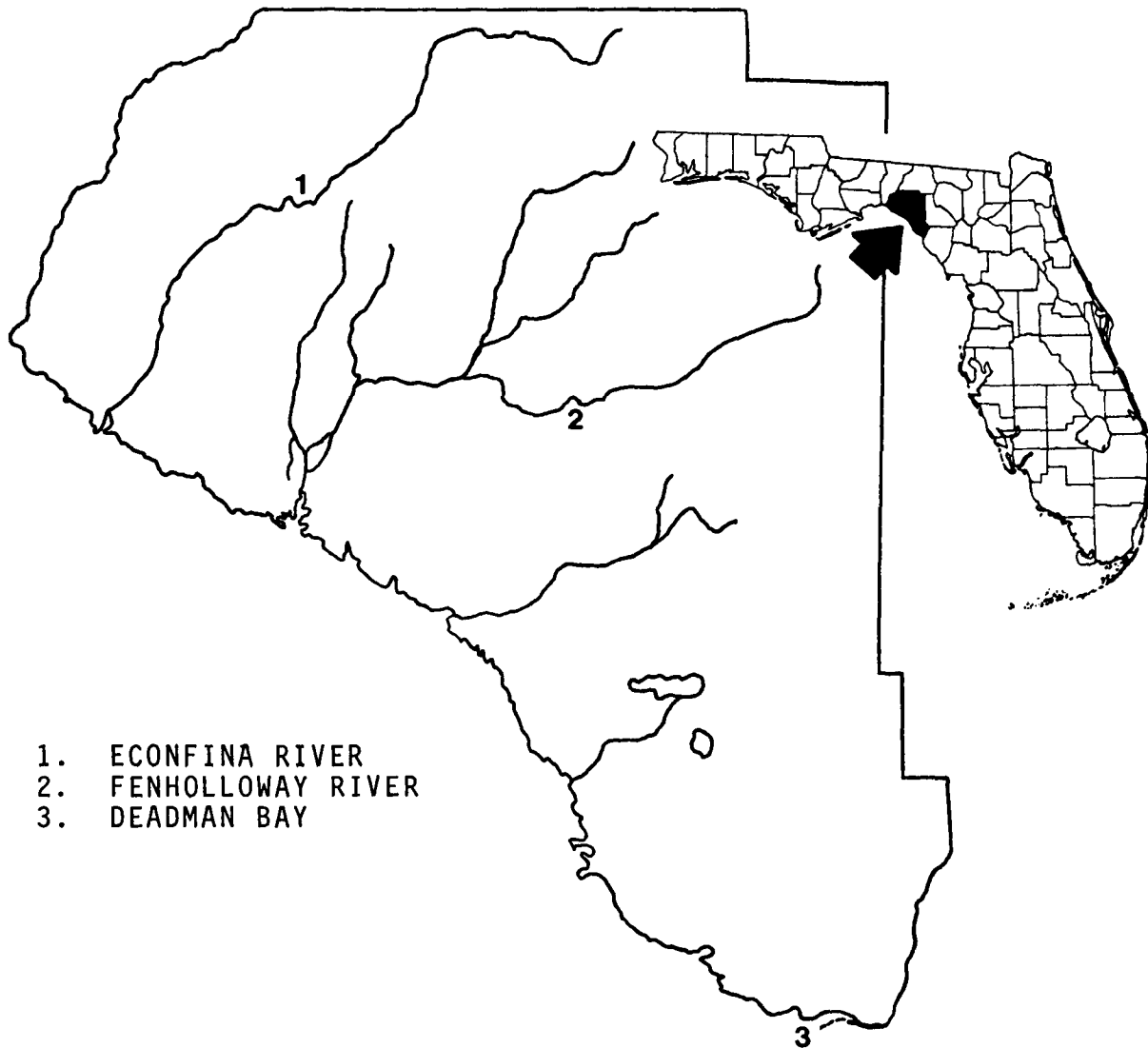
Zimmerman, M.S. & R.J. Livingston 1976. Seasonality and physico-chemical ranges of benthic macrophytes from a north Florida estuary (Apalachee Bay). *Contrib. Mar. Sci.* 20:33-45.

The seasonality of benthic macrophytes was investigated in Apalachee Bay, Florida, from February 1972 to April 1973. Thirty nine species were collected, 17 of which belonged to Rhodophyta. *Thalassia testudinum* (turtle grass) and *Halimeda incrassata* (a green alga) were the most abundant species. The environmental limits (temperature, salinity) are given for each species and are related to species distribution. Most species were considered to be eurythermal tropical species with adaptations to warm temperature conditions. Both euryhaline and stenohaline species were found in Apalachee Bay.

Study Duration:February 1972-April 1973; Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Flora; Type of Sampler:Otter trawl; Number of Stations:14; Number of Replicates/Station:1 (Mar.-Oct. 1972) 2 (Nov. 1972-Apr. 1973); Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, turbidity, water color; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Halimeda incrassata*, *Polysiphonia harveyi*;

See also: 3.00085, 7.00011, 8.00003, 12.00030, 12.00036, 12.00042, 12.00049, 12.00077, 12.00078, 12.00091.

# TAYLOR COUNTY





(14.00001)

Bittaker, H.F., II 1975. A comparative study of the phytoplankton and benthic macrophyte primary productivity in a polluted versus an unpolluted coastal area. Fla. St. Univ. M.S. Thesis.

Corresponding stations in the polluted Fenholloway River and the unpolluted Econfinia River showed that the Fenholloway was characterized by higher phosphate, nitrite and nitrate concentrations along with larger month to month nutrient variations; higher turbidities, color values, vertical extinction coefficient values, and chlorophyll 'a' concentrations; shallower secchi disk readings; lower benthic macrophyte biomasses and benthic macrophyte productivity rates; greater surface and water column phytoplankton productivity rates, smaller phytoplankton assimilation numbers; larger benthic macrophyte assimilation numbers and lower total water column productivity rates. Productivity differences between the two areas were hypothesized to be due to the increased nutrient concentrations and decreased benthic light conditions at the Fenholloway stations. It was concluded that although some first stage recovery was noted in the polluted area following initiation of the water pollution abatement program, physical conditions, and slow dominant species recovery rates deemed it unlikely that the area will support well developed seagrass communities in the immediate future.

Study Duration: July 1972 - July 1974; Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Benthic macrophytes; Number of Stations: 16 coastal, 7 river; Temporal Frequency: Quarterly to monthly; Abiotic Parameters Measured: Temperature, salinity, pH, color, turbidity, nutrients, chlorophyll, wind; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Syringodium filiforme*, *Halodule wrightii*, *Holophila engelmannii*;

(14.00002)

Coen, L.D., K.L. Heck, Jr., & L.G. Abele 1981. Experiments on competition and predation among shrimps of seagrass meadows. Ecology 62(6):1484-1493.

An evaluation was made of the distribution and abundance of *Palaemonetes vulgaris* and *Palaemon floridanus*, found in Apalachee Bay. Microhabitat associations, behavioral interactions and predator-prey relationships were studied. Superior competitive ability of *P. floridanus* excluded *P. vulgaris* from experimental habitats. Displacement of *P. vulgaris* by *P. floridanus* increased predation on the former. There was an inverse relationship between predation success and physical complexity of the habitat. The importance of refuges were discussed.

Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Trawl, dipnet; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Palaemon floridanus*, *Palaemonetes vulgaris*;

(14.00003)

Dugan, P.J. & R.J. Livingston 1982. Long-term variation of macroinvertebrate assemblages in Apalachee Bay, Florida. Estuar. Coast. Shelf Sci. 14:391-403.

Results of a seven year study on the trawlable epibenthic macroinvertebrates (primarily decapods) of a polluted (Fenholloway drainage) and unpolluted (Econfinia drainage) portions of Apalachee Bay are presented. Although the relative abundance of dominant species and species richness in the two areas were similar. The number of individuals collected in the Econfinia area was at least always twice that taken in the Fenholloway. The greater seagrass biomass at the Econfinia is attributed as a cause for this difference in faunal density. In spite of the pollution abatement program at the Fenholloway and the considerable natural seasonal variability, the authors conclude that there was enhanced species persistence and long-term stability of key invertebrate populations in the unpolluted estuarine system.

Study Duration: June 1972-May 1979; Habitat: Seagrasses, sand, mud; Type of Study: Quantitative; Biological Component: Benthic epifauna; Type of Sampler: Otter trawl; Sieve Size: 6 mm; Number of Stations: 8; Number of Replicates/Station: 7; Temporal Frequency: Monthly; Dominant Taxon/Taxa Studied: *Palaemon floridanus*, *Pagurus n. sp.*, *Neopanope texana*, *Tozeuma carolinense*, *Palaemonetes intermedius*, *Hippolyte pleuracanthus*, *Periclinenes longicaudatus*;

(14.00004)

Heck, K.L., Jr. 1973. The impact of pulp mill effluents on species assemblages of epibenthic invertebrates in Apalachee Bay, Florida. Fla. St. Univ. M.S. Thesis.

A comparison of epibenthic species of the Econfinia and Fenholloway estuaries revealed that less than half the number of individuals but nearly the same number of species found in the Econfinia area, were present in the Fenholloway estuary. The lower population sizes and reduced dominance in the Fenholloway area were suggested to be the result of a greatly reduced seagrass habitat. Seagrass beds typically harbor large populations of epibenthic species, and such grassbeds in the Fenholloway were greatly reduced when compared to the Econfinia estuary. This reduction is probably a result of reduced light penetration through the highly turbid waters and heavy siltation in the areas influenced by the pulp mill effluents (PME). The overall effects of the PME were to alter the proportion of available habitats and consequently to reduce population sizes and change dominance relationships. From the available evidence, it does not appear that the PME have any acutely toxic effects on epibenthic invertebrates in the study area.

Habitat: Estuarine; Type of Study: Quantitative; Biological Component: Invertebrate fauna;

(14.00005)

Hooks, T.A. 1973. An analysis and comparison of the benthic invertebrate communities in the Fenholloway and Econfinia

Estuaries of Apalachee Bay, Florida. Fla. State Univ. M.S. Thesis.

Over 28,000 invertebrate animals were collected by systematic trawling during a one year study of Apalachee Bay, Florida. The number of individuals of any particular species was generally greater in the Econfinia system than in the Fenholloway. The hermit crab, *Pagurus bonairensis*, was the dominant species in both areas of the bay. Little difference in the number of species collected in each area was observed.

Study Duration:1 year; Type of Study:Qualitative; Biological Component:Fauna; Type of Sampler:Trawl; Number of Stations:14; Dominant Taxon/Taxa Studied:*Pagurus bonairensis*;

(14.00006)

Hooks, T.A., K.L. Heck, Jr., & R.J. Livingston 1976. An inshore marine invertebrate community structure and habitat association in the northeastern Gulf of Mexico. Bull. Mar. Sci. 26(1):99-109.

Monthly trawl samples were collected from unpolluted (Econfinia estuary) and polluted (Fenholloway estuary) waters from July 1971 to December 1972 to compare epibenthic community structure. A total of 79 species were found, representing 4 phyla: Arthropoda, Mollusca, Annelida, and Echinodermata. Although the number of species from each estuary was not significantly different, the Econfinia estuary yielded more than 2 1/2 times the number of individuals as the Fenholloway estuary. Abundance of the numerically dominant species was relatively greater in the Econfinia estuary. Four different macroinvertebrate assemblages were sampled in the study area, each associated with a different habitat: grassbeds, oyster reefs, mudflats, and red algae.

Study Duration:July 1971-December 1972; Habitat:Seagrass bed, oyster reef, mudflat; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Otter trawl; Sieve Size:6 mm; Number of Stations:14; Temporal Frequency:Monthly; Abiotic Parameters Measured:Salinity, temperature; Dominant Taxon/Taxa Studied:*Pagurus bonairensis*, *Tozeuma carolinense*, *Neopanope texana*, *Palaemon floridanus*, *Diopatra cuprea*;

(14.00007)

Livingston, R.J. 1975. Impact of Kraft pulp-mill effluents on estuarine and coastal fishes in Apalachee Bay, Florida, USA. Mar. Biol. 32:19-48.

The impact of pulp-mill effluents (PME) on the fish fauna of the Fenholloway drainage system was tested by utilizing various indices of community structure. Estuarine and marsh fish assemblages in areas of acute impact were severely reduced in terms of numbers of individuals and species. Offshore areas exposed to varying (chronic) levels of PME were characterized by complex interactions that included seasonal variations of impact. In general, the effects of PME on offshore fish assemblages appeared to be caused by a complex combination of habitat alteration, reduced benthic productivity, and individual behavioral reactions.

Study Duration:2 years; Habitat:Estuarine; Type of Study:Quantitative ; Biological Component:Fish; Type of Sampler:Seines, dip nets, gill & trammel nets, otter trawl; Number of Stations:34; Number of Replicates/Station:Variable; Temporal Frequency:Bimonthly and monthly; Abiotic Parameters Measured:Temperature, DO, color, turbidity, light; Dominant Taxon/Taxa Studied:*Anchoa mitchilli*;

(14.00008)

Zimmerman, M.S. 1974. A comparison of the benthic macrophytes of a polluted drainage system (Fenholloway River) with an unpolluted drainage system (Econfinia River). Fla. State Univ. M.S. Thesis.

The comparative study of benthic macrophytes from the Fenholloway and Econfinia Rivers from March 1972 to April 1973 showed a difference in biomass but not in species numbers. Of the 30 species from the Econfinia and 29 from the Fenholloway, 28 were common to both. The Econfinia area had 18 times more macrophytes than the Fenholloway area. There was seasonality in the biomass, with both areas having peaks in October 1972. The lower productivity of benthic macrophytes in the Fenholloway River is likely caused by higher color and turbidity.

Study Duration:March 1972-April 1973; Habitat:Grassbed; Type of Study:Qualitative and quantitative; Biological Component:Flora; Type of Sampler:Otter trawl; Number of Stations:14 and 6 transects; Number of Replicates/Station:1 for 1/2 of study, 2 for 2nd half; Temporal Frequency:Monthly; Abiotic Parameters Measured:Salinity, temperature, turbidity, color; Dominant Taxon/Taxa Studied:*Halimeda incrassata*, *Penicillus capitatus*, *Thalassia testudinum*, *Halodule wrightii*, *Halophila engelmannii*;

(14.00009)

Zimmerman, M.S. & R.J. Livingston 1976. Seasonality and physicochemical ranges of benthic macrophytes from a north Florida estuary (Apalachee Bay). Contrib. Mar. Sci. 20:33-45.

The environmental limits of temperature and salinity for each benthic macrophyte species were presented. Most species appeared to be eurythermal, which was considered an adaptation of tropical species for existence in a temperate region. Both euryhaline and stenohaline species were found to co-exist in Apalachee Bay. Species distribution in response to factors such as turbidity, color, and depth was discussed.

Study Duration:14 months; Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Benthic macrophytes; Type of Sampler:Otter trawl; Number of Stations:14; Number of Replicates/Station:2; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, turbidity, color ; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Halimeda incrassata*;

(14.00010)

Zimmerman, M.S. & R.J. Livingston 1976. Effects of Kraft-mill effluents on benthic macrophyte assemblages in a shallow-bay system (Apalachee Bay, North Florida). Mar. Biol. 34:297- 312.

A determination was made of the impact of a single (point) source of Kraft mill effluents (KME) on offshore benthic macrophyte distribution through a comparison of an unpolluted (control) area with a polluted system. The affected area was characterized by higher levels of color and turbidity. Inshore areas associated with high levels of KME were characterized by severely reduced benthic macrophyte biomass, reduced numbers of species per unit area, and altered species composition when compared to control stations. Areas of chronic impact also had reduced levels of biomass, although the total number of species taken were not significantly different from the controls. In polluted areas, red and brown algae were proportionally more abundant than chlorophytes and spermatophytes. Except for areas of acute impact, there was no significant difference in species diversity (H') between polluted and unpolluted portions of the Bay. The benthic plant assemblages reflected variations in dominance, the occurrence of opportunistic species, and ecological diversity that resulted in a continuum of disturbance phenomena ranging from sparsely distributed groups in grossly polluted systems to well developed plant assemblages in areas that remain unaffected by KME.

Study Duration:14 months; Habitat:Grassbeds; Type of Study:Quantitative; Biological Component:Benthic macrophytes; Type of Sampler:1 m<sup>2</sup> aluminum hoop; Number of Stations:7; Number of Replicates/Station:1, 2, or 5; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO, turbidity, color; Dominant Taxon/Taxa Studied:*Halimeda incrassata*, *Thalassia testudinum*, *Syringodium filiforme*, *Digenia simplex*;

(14.00011)

Zimmerman, M.S. & R.J. Livingston 1979. Dominance and distribution of benthic macrophyte assemblages in a north Florida estuary (Apalachee Bay, Florida). Bull. Mar. Sci. 29(1):27-40.

A comparative analysis was made concerning the distribution of benthic macrophyte assemblages in shallow portions of Apalachee Bay, Florida. This included a comparison of areas affected by bleached Kraft mill effluents (BKME) of the Fenholloway River system with appropriate uncontaminated control stations (the Econfinia River system). Meter square samples of benthic macrophytes were collected monthly in both areas. Relative dominance was generally higher in the unpolluted areas. Four species of red algae (*Laurencia poitei*, *Digenia simplex*, *Gracilaria verrucosa*, *Gracilaria foliifera*) were found at all stations. Areas of acute effect were found to have extremely low biomass and characteristic assemblages of various macrophyte species. Most of the species in unpolluted areas were present in portions of the bay characterized by chronic (low) levels of BKME. However, biomass was consistently reduced in such areas when compared to control stations. It was postulated that selective removal of dominant species by BKME (e.g., increased level of color and turbidity) allowed recruitment of various "rare" species in areas of chronic impact, thus contributing to anomalous patterns of community structure when compared to published data from other pollution stressed aquatic systems.

Study Duration:7 years; Habitat:Grassbeds; Type of Study:Quantitative; Biological Component:Benthic macrophytes; Type of Sampler:1 m<sup>2</sup> hoop; Number of Stations:14; Number of Replicates/Station:1; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, turbidity, color ; Dominant Taxon/Taxa Studied:*Laurencia poitei*, *Digenia simplex*, *Gracilaria verrucosa*, *Gracilaria foliifera*;

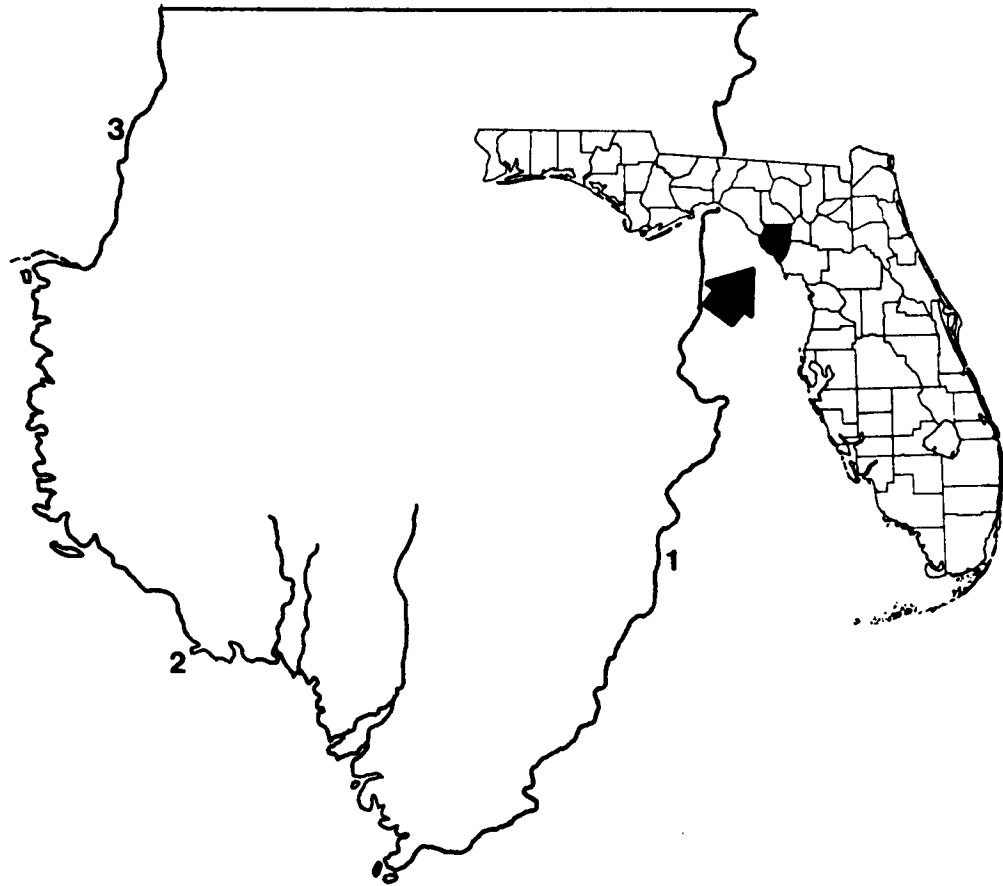
(14.00012)

Zimmerman, M.S. & R.J. Livingston 1979. Dominance and distribution of benthic macrophyte assemblages in a north Florida estuary (Apalachee Bay, Florida). Bull. Mar. Sci. 21:27-40.

Benthic macrophyte assemblages were sampled monthly from shallow water zones offshore of the Fenholloway River and the Econfinia River in Apalachee Bay, Florida. Four species of red algae were found at all 14 sampling sites. Stations in polluted areas (Fenholloway River) had higher relative dominance than stations in unpolluted areas (Econfinia River). Comparisons of macrofloral biomass and species composition are made between polluted and unpolluted sites. It was theorized that reduction of dominant species by high pollutant levels permitted recruitment of relatively rare species, creating a community structure dissimilar to those of other pollution stressed marine systems.

Study Duration:March 1972-April 1973; Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Flora; Number of Stations:14; Number of Replicates/Station:1 or 2; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, turbidity; Dominant Taxon/Taxa Studied:*Laurencia poitei*, *Digenia simplex*, *Gracilaria verrucosa*, *G. foliifera*, *Syringodium filiforme*, *Halodule wrightii*, *Thalassia testudinum*, *Halimeda incrassata*;

# DIXIE COUNTY



1. SUWANNEE RIVER
2. HORSESHOE POINT
3. STEINHATCHEE RIVER

(15.00001)

Camp, D.K., S.P. Cobb & J.F. Van Breenveld 1973. Overgrazing of seagrasses by a regular urchin, *Lytechinus variegatus*. *BioScience* 23(1):37-38.

An offshore seagrass bed in the Gulf of Mexico was denuded during the summers of 1970 and 1971 by overgrazing by dense aggregations of the sea urchin, *Lytechinus variegatus*. The grassbed, composed primarily of *Thalassia testudinum*, extended southward from Steinhatchee River 26 km to Horseshoe Point and offshore 5.5 to 9.25 km. The urchin concentrations, averaging 636/m<sup>2</sup> at the front, damaged approximately 20% of the grassbed, with the most intensive destruction occurring at Pepperfish Keys. Scores of aggregations moved through the grass at an average rate of 1.6 m/week. Sizes of *L. variegatus* were relatively uniform (mean test diameter = 40.1 mm; s = 4.75), indicating that the population was composed of mainly one year class. No factors were cited as potential reasons for the massive population increase, although organic pollution was not considered responsible. Analysis of remaining *Thalassia* rhizomes suggest that regrowth of denuded grassbeds will not be rapid.

Study Duration: August-October 1971; Habitat: Seagrass beds; Type of Study: Quantitative; Biological Component: Flora and echinoderm fauna; Dominant Taxon/Taxa Studied: *Lytechinus variegatus*, *Thalassia testudinum*, *Syringodium filiforme*, *Diplanthera wrightii*;

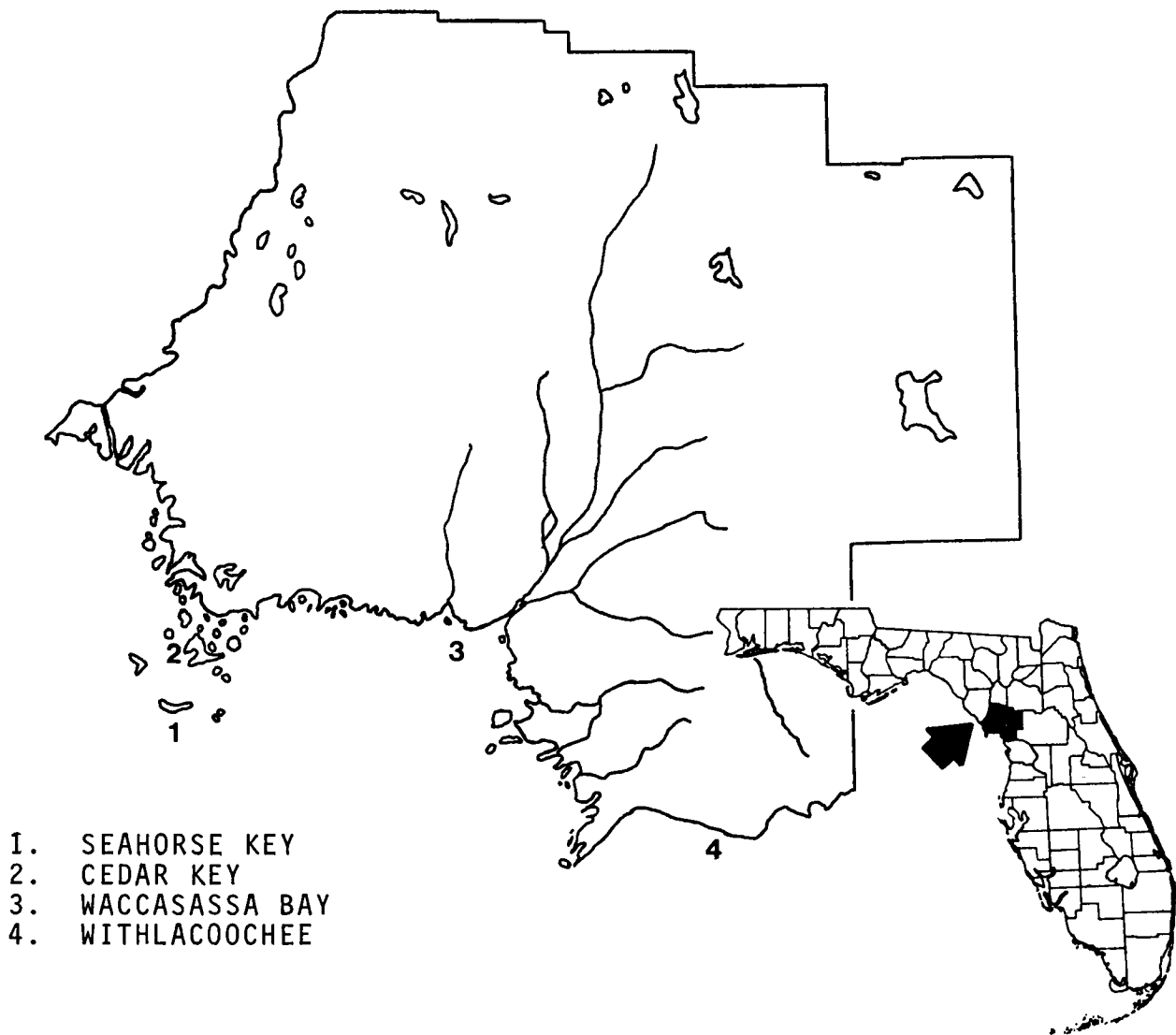
(15.00002)

Grinnell, R.S., Jr. 1974. Vertical orientation of shells on some Florida oyster reefs. *J. Sediment. Petrol.* 44(1):116-122.

Vertical orientation of shells of the common oyster (*Crassostrea virginica*) was found to be widespread on three large oyster reefs located off the entrance to the Suwannee River on the Gulf coast of Florida. Orientation was found on the surfaces of the reefs particularly on and just west of actively building shell bars that occur along the eastern margins of the reefs. The orientation was noted to consist largely of densely packed right valves and right valve fragments of *Crassostrea virginica* and tended to form shell patches at less than two square meters. Mean sizes of vertically orientated shells ranged from 1.80 - 4.20 in. The majority of the shells were found to be in positions that were either transverse or diagonal to prevailing current directions. Vertical orientation was suggested to represent a position of stability for the oyster shells in a regime dominated by tidal currents.

Study Duration: Summers, 1968-1971; Habitat: Oyster bed; Type of Study: Qualitative; Biological Component: Oysters; Number of Stations: 15; Number of Replicates/Station: 5; Temporal Frequency: Single; Dominant Taxon/Taxa Studied: *Crassostrea virginica*;

# LEVY COUNTY



(16.00001)

Bender, E.S. 1971. Studies of the life history of the stone crabs, *Menippe mercenaria* (Say), in the Cedar Key area. Univ. Fla. M.S. Thesis.

The life history of the stone crab, *Menippe mercenaria*, was studied at Cedar Key, Florida. Females with eggs were commonly found in burrows on *Thalassia* grassflats in the spring through late summer, and most males were found there in the fall. Juveniles were most abundant on shell bottoms, grassflats, sponge, and rock. Many juveniles were found to move to oyster bars the following spring. Sexual maturity was probably reached the second fall. After mating in winter, females moved to deep grassflats and channels, while many males moved to deep water and offshore in the spring. Apparently two populations exist - one population offshore, mostly males, migrates in the early winter for mating and possibly for protection from predators; and a second population, mostly females, remains inshore all year and spawn from March to October. Stridulation is described, but function was not determined for this process. Adult crabs need several molts to replace a new claw that is large enough to be commercially harvested for the second time. Harvest of the entire male crab over 8.5 cm carapace width is suggested to replace the present practice of claw removal.

Study Duration: June 1970 - July 1971; Habitat: Grassbeds, shell, rock, oyster beds, and sponge; Type of Study: Qualitative; Biological Component: Decapod fauna; Dominant Taxon/Taxa Studied: *Menippe mercenaria*;

(16.00002)

Best, B.A. 1978. The effects of suspension feeding by the bivalve, *Mercentaria mercenaria*, on community structure. Univ. of Fla. M.S. Thesis. 39 p.

The role *Mercentaria mercenaria* plays in structuring the soft bottom community around Seahorse Key was examined through manipulations of adult densities. Increased densities of *M. mercenaria* caused decreased recruitment of species with pelagic larvae. Juvenile densities of benthic brooders were also reduced by the presence of *M. mercenaria*. The suspension feeding activity of *M. mercenaria* reduced organics available to deposit feeders in the study area, thereby reducing densities of deposit feeders.

Habitat: Muddy sand; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: 10.1 cm dia. PVC coring device; Sieve Size: 0.5 mm; Number of Stations: 3; Number of Replicates/Station: 4; Abiotic Parameters Measured: % organic content, sediment size; Dominant Taxon/Taxa Studied: *Mercentaria mercenaria*;

(16.00003)

Caldwell, J.W. 1972. Development, metamorphosis, and substrate selection of the larvae of the sand dollar, *Mellita quinquiesperforata*. Univ. of Fla. M.S. Thesis, 64 p.

The study of development, metamorphosis, and substrate selection of *Mellita quinquiesperforata* larvae from the Seahorse Key region revealed several important facts. First, development from fertilization to metamorphosis required 7-9 days and is believed to have evolved due to the stresses of estuarine conditions. Abundant organic matter appears to play a larger role than sand grain size or numbers of microorganisms in larval substrate selection. Juvenile growth rate is greatest during the first two months.

Type of Study: Quantitative; Biological Component: Fauna; Number of Stations: 3; Abiotic Parameters Measured: Sediment size; Dominant Taxon/Taxa Studied: *Mellita quinquiesperforata*;

(16.00004)

Chow, F.H. & D.E. Stokes 1978. Nematodes from an estuarine habitat near Cedar Key, Florida. *Nematropica* 8(1):1-5.

Emphasis of a survey of nematode fauna in estuarine habitats was placed upon the recovery of free-living marine nematodes and plant-parasitic nematodes. In general, more nematodes were recovered when tap water rather than sea water was used in the second centrifugation. *Haliplectus* spp. were the most common nematodes found; also some dorylaimids and tylenchids were recovered in the sample from the beach area. *Helicotylenchus*, *Hoplolaimus*, *Dolichodorus* n. sp. and Tylenchidae were recovered from other samples and were very tolerant to the highly saline habitat.

Habitat: Estuarine, sandy beach; Type of Study: Quantitative; Biological Component: Nematode fauna; Number of Stations: 10; Number of Replicates/Station: 30; Abiotic Parameters Measured: Salinity, pH; Dominant Taxon/Taxa Studied: *Haliplectus* spp.;

(16.00005)

Eng, L.L. 1968. A study of the biology of the pink shrimp, *Penaeus duorarum* Burkenroad, in the Cedar Key area with notes on the non-commercial shrimp. Univ. of Fla. M.S. Thesis, 49 p.

*Penaeus duorarum* was studied in the Cedar Key area in order to determine abundance and distribution and the causal factors. Results showed that temperature and the abundance of juveniles were the important factors affecting the abundance of shrimp. Shrimp were less abundant during colder winter months, which may be due to their burrowing for protection from the cold. The recruitment period for *P. duorarum* is roughly June to November.

Study Duration: May & June 1967; September 1967-June 1968; Type of Study: Quantitative; Biological Component: Fauna; Type

of Sampler: Beam trawl with 1/4" mesh, plankton net, pushnet, dipnet; Number of Stations: 4; Temporal Frequency: Twice monthly; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Penaeus duorarum*;

(16.00006)

Godcharles, M.F. 1971. A study of the effects of a commercial hydraulic clam dredge on benthic communities in estuarine areas. Fla. St. Dept. Nat. Resources, Mar. Res. Lab., Tech. Ser. No. 64. 51 p.

The effects of a commercial hydraulic clam dredge on benthic flora and fauna were studied. Substrate alteration and the versatility of escalator harvesters were discussed. Recommendations were made for modifications to the harvester, so that damage would be lessened and efficiency would increase.

Habitat: Estuarine; Type of Study: Quantitative; Biological Component: Fauna, flora; Type of Sampler: Escalator clam dredge, try net, box dredge, plug; Number of Stations: 170; Number of Replicates/Station: 1; Temporal Frequency: Once; Abiotic Parameters Measured: Temperature, salinity, pH, clarity; Dominant Taxon/Taxa Studied: *Mercenaria campechiensis*, *Spisula raveneli*, *Thalassia testudinum*, *Syringodium filiforme*, *Caulerpa prolifera*;

(16.00007)

Gong, S.W. 1977. Factors governing the distributional patterns of two pagurid hermit crabs (*Pagurus impressus* and *Pagurus pollicaris*) in the Cedar Keys region. Univ. of Fla. M.S. Thesis. 66 p.

Habitat partitioning of the hermit crabs *Pagurus impressus* and *Pagurus pollicaris* was studied in the Cedar Keys area. The two factors thought to influence this habitat partitioning are selection of different habitats and/or the exclusion of one species from the habitat of choice. From lab experiments it appears *P. impressus* is excluded from inshore areas by an inability to survive the environment's physical instability and the presence of a dominant shell competitor. Oppositely, active habitat selection and higher stress tolerance allows *P. pollicaris* to survive inshore areas.

Habitat: Mud and grassflats/sand; Type of Study: Quantitative; Biological Component: Crustacea, Fauna; Type of Sampler: Scallop dredge; Dominant Taxon/Taxa Studied: *Pagurus impressus*, *Pagurus pollicaris*;

(16.00008)

Ingle, R.M. & C.E. Dawson, Jr. 1953. A survey of the Cedar Key area. Fla. Bd. Conserv. Mar. Lab., Tech. Ser. No. 9. 26 p.

A general study of hydrographic and biological conditions in the Cedar Key region was conducted from September 1948 until August 1953 to evaluate the area's oyster production potential and to locate the most ideal areas and methods for oyster cultivation. Growth rates of native and imported Apalachicola oysters were found to be lower than previously reported rates for Apalachicola. Success of experimental plots was limited, presumably due to adverse effects of local oyster predators, parasites, and disease organisms. A long spawning season was observed and subsequent recruitment was intense region-wide. Areas with the highest potential for future oyster cultivation were identified.

Study Duration: September 1948-August 1953; Habitat: Oyster reef; Type of Study: Quantitative; Biological Component: Mollusca; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Crassostrea virginica*;

(16.00009)

Krakauer, J.M. 1969. The ecology of *Aplysia willcoxi* Eilprin at Cedar Key, Florida. Univ. of Fla. M.S. Thesis. 88 p.

Work on *Aplysia willcoxi* included: documenting the occurrence of the animal at Cedar Key from April 1968 through July 1969; their life cycle; seeding habits; defense mechanisms; and population size and movements. It was found that *A. willcoxi* is present year round in March and April; growth rate of adults is constant; feeding is primarily upon Rhodophyta; defense mechanisms include cryptic coloration, acrid odor, unpalatability and ink; and death occurs mainly because of genetic limitations on the lifespan.

Study Duration: April 1968-July 1969; Habitat: Grassbeds; Type of Study: Quantitative; Biological Component: Mollusk, Fauna; Type of Sampler: Trynet, scallop dredge, beam trawl; Temporal Frequency: Weekly; Dominant Taxon/Taxa Studied: *Aplysia willcoxi*;

(16.00010)

Leffler, C.W. 1971. Some temperature effects on growth and metabolism of juvenile blue crabs, *Callinectes sapidus* (Rathbun). Univ. of Fla. M.S. Thesis. 54 p.

Metabolic rate and blood osmolality was determined for juvenile blue crabs (*Callinectes sapidus*) grown in the laboratory under various temperature/salinity conditions. Growth increased with temperature, and increase in size per molt was found to be lower at higher temperatures. Growth was not affected by salinities between 15 and 27 ppt. Blood osmolality of juvenile blue crabs was more closely associated with temperature than salinity. Results were applied to the effects of heated discharge from electrical generators on blue crabs living in the impacted area.



Study Duration: September 1970-June 1971; Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Crustacea, fauna; Type of Sampler: Shrimp trawl, seine; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Callinectes sapidus*;

(16.00011)

Leffler, C.W. 1974. Ionic and osmotic regulation, metabolic response to salinity, and physiological response to pesticides of juvenile *Callinectes sapidus* Rathbun. Univ. of Fla. Ph.D. Dissertation. 58 p.

This two part study investigated the osmotic and ionic regulation and the metabolic response to salinity of juvenile *Callinectes sapidus* and the effects of ingested DDT and Mirex. Hemolymph sodium and chlorine concentrations increased with increasing external concentrations. Internal K<sup>+</sup> concentrations were always higher than external concentrations within the range tested. Juveniles were found to be metabolic regulators. The crabs were sensitive to DDT and Mirex with results showing metabolic rate elevations, reduction in critical oxygen concentration, inhibition of the autotomy reflex, and reduced carapace thickness.

Study Duration: 1971-1974; Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Fauna, Crustacea; Abiotic Parameters Measured: Salinity, DDT, Mirex; Dominant Taxon/Taxa Studied: *Callinectes sapidus*;

(16.00012)

Maden, C.B. 1978. Seasonal changes in Turbellarian communities of a sandy beach. Univ. of Fla. M.S. Thesis. 63 p.

This study dealt with the seasonal changes in turbellarian communities on a sandy beach of Seahorse Key during 1977. Results show that the upper intertidal populations had distinct size variations while the lower intertidal populations exhibited less variability. Diversity was lower and community composition was less stable at the upper intertidal station, which seems to support the prediction relating lower diversity to lower stability. Feeding type categories changed seasonally at the upper but not lower intertidal station.

Study Duration: January 1977-December 1977; Habitat: Sand; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: 1.6 cm internal dia. plastic tubes; Number of Stations: 2; Number of Replicates/Station: 3; Temporal Frequency: 9 times/yr; Abiotic Parameters Measured: Temperature, salinity, granulometry analysis, carbon analysis;

(16.00013)

Marshall, H.L. 1966. An ecological study of the American oyster, *Crassostrea virginica* (Gmelin), in the Cedar Key area, Florida. Univ. Fla. M.S. Thesis.

An ecological study of the American oyster *Crassostrea virginica* in the Cedar Key area was conducted. Temperature, salinity, and tide were determined to be the major hydrographic factors affecting oysters in the Cedar Key area. Since water temperature was determined to be the major factor that influences the spawning season of oysters, those in the Cedar Key area were determined to have a reproductive period of approximately 7 months. Biological factors discussed include glycogen content, spatfall, mortality, and predators, and commensals. The inshore areas were described to offer the best overall oyster habitats in the Cedar Key area. Recommendations for the management of the oyster bars were also presented.

Habitat: Oyster bar; Type of Study: Qualitative; Biological Component: Mollusc fauna; Dominant Taxon/Taxa Studied: *Crassostrea virginica*;

(16.00014)

Marshall, M.J. 1977. Serologically detected patterns of gastropod predation on an intertidal bar. Univ. of Fla. M.S. Thesis. 50 p.

The effects of predation of *Busycon contrarium*, *Nelongena corona*, and *Fasciolaria hunteria* on populations of *Urosalpinx perrugata*, *Murex florifer*, and *Crassostrea virginica* were studied. *B. contrarium* and *Nelongena corona* prey on oysters only. *F. hunteria* preys on both oysters and *U. perrugata*. The predation activity does not seriously diminish the oyster populations. However, *F. hunteria* predation of *U. perrugata* did seem to limit population sizes in the study area.

Habitat: Crushed shell/mud; Type of Study: Quantitative; Biological Component: Mollusk, fauna; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Busycon contrarium*, *Nelongena corona*, *Fasciolaria hunteria*, *Urosalpinx perrugata*, *Murex florifer*, *Crassostrea virginica*;

(16.00015)

Merz, R.A. 1979. A study of the behavioral and biomechanical defenses of *Strombus alatus*, the Florida fighting conch. Univ. of Fla. M.S. Thesis. 58 p.

Biochemical and behavioral defense mechanisms of *Strombus alatus* to predation by certain crabs and snails were examined. Serial lips on whorls frustrated crab attempts to crush the shell. Early reproduction is delayed to allow more energy for early growth since a larger columella thwarts crabs' attempts to crush the shell. Escape locomotion is

greater in the presence of predacious gastropods. Shell righting time increases drastically after manipulation by crabs, showing a cautionary behavior.

Habitat:Sand; Type of Study:Qualitative; Biological Component:Fauna; Type of Sampler:Dredge; Dominant Taxon/Taxa Studied:*Strombus alatus*, *Menippe mercenaria*;

(16.00016)

Paige, J.A. 1973. The nudibranchs of Cedar Key, Florida, with special reference to the life history and ecology of *Hypselodoris edenticulata* (White, 1952). Univ. of Fla. M.S. Thesis. 120 p.

In the Cedar Key area a survey of nudibranchs was conducted and the life history and ecology of *Hypselodoris edenticulata* was studied in detail. Eleven species were found to be common. Tests showed partitioning of the environment according to food source distributions. The eolids and dendronotid fed primarily on coelenterate polyps, while some dorid species fed on sponges. *H. edenticulata* fed only on the sponge *Dysidea* sp. and had a 14 day larval life after 6 days of spawning.

Habitat:Soft bottomed flats/oyster bars; Type of Study:Quantitative; Biological Component:Fauna Mollusk; Number of Stations:8; Temporal Frequency: ; Abiotic Parameters Measured:Salinity, temperature; Dominant Taxon/Taxa Studied:*Hypselodoris edenticulata*;

(16.00017)

Stancyk, S.E. 1970. Studies on the biology and ecology of ophiuroids at Cedar Key, Florida. Univ. of Fla. M.S. Thesis.

Five species of brittlestars were sampled regularly from 5 stations near Cedar Key, Florida, to investigate their morphology, reproductive biology, feeding habits, substrate and habitat preferences, and salinity tolerances. Ophiuroids were found to partition their substratum vertically, with burrowing species responding most strongly to sediment type. Spawning occurs from spring to fall. The direct development of four of the species was suggested to be an adaptation to low salinity.

Study Duration:September 1969-April 1970; Habitat:Sand, mud, shell, seagrass bed; Type of Study:Quantitative; Biological Component:Echinoderm, fauna; Type of Sampler:Trawl; Number of Stations:5; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Ophiophragmus filograneus*, *Ophioderma brevispinum*, *Amphioplus* sp., *Ophiothrix angulata*, *Ophiopsis elegans*;

(16.00018)

Stancyk, S.E. 1974. Life history patterns of three estuarine brittlestars (Ophiuroidea) at Cedar Key, Florida. Univ. of Fla. Ph.D. Dissertation.

Three populations of brittlestars were sampled monthly from February 1972 to June 1974 at Cedar Key, Florida, to examine their life histories. Growth, mortality, reproduction, and respiration rates were measured for *Ophiothrix angulata*, *Ophiophragmus filograneus*, and *Ophioderma brevispinum*. Differences in the life history patterns of the 3 species and their adaptations to environmental variability were discussed.

Study Duration:February 1972-June 1974; Habitat:Sand, shell, mud, seagrass bed; Type of Study:Quantitative; Biological Component:Echinoderm, fauna; Type of Sampler:Scallop dredge; Number of Stations:3; Temporal Frequency:Monthly; Abiotic Parameters Measured:Salinity, temperature, pH; Dominant Taxon/Taxa Studied:*Ophiothrix angulata*, *Ophiophragmus filograneus*, *Ophioderma brevispinum*;

(16.00019)

Strawn, K. 1953. A study of the dwarf seahorse, *Hippocampus regulus* Ginsbur, at Cedar Key, Florida. Univ. of Fla. M.S. Thesis.

The life history and distribution of the dwarf seahorse, *Hippocampus regulus*, was studied on 3 intertidal grassbeds near Cedar Key, Florida, from February 1950 to February 1951. Seahorse size, growth, breeding season, fecundity, and age at sexual maturity were determined. Distribution of *H. regulus* was controlled by seagrass zonation, which is affected by tidal level and prevailing winds. The distribution of the seahorse relative to salinity, temperature, and feeding conditions is discussed.

Study Duration:17 February 1950-11 February 1951; Habitat:Seagrass beds; Type of Study:Qualitative; Biological Component:Fish; Type of Sampler:Beam trawl; Number of Stations:3; Temporal Frequency:Biweekly; Abiotic Parameters Measured:Temperature, salinity, tides; Dominant Taxon/Taxa Studied:*Hippocampus regulus*;

(16.00020)

Strawn, K. 1961. Factors influencing the zonation of submerged monocotyledons at Cedar Key, Florida. J. Wildl. Manage. 25:178-189.

Distribution and zonation of submerged monocotyledons at Cedar Key were studied in an effort to learn what factors influence their growth and abundance. Zonation in shallow inshore water is determined by tidal level. Shallow water and

the winter climate favor plants with flexible leaves. Desiccation occurs in prolonged exposure to air. Equilibrium between particle sizes of sediments, ground cover provided by plants, and depth of water at low tide determine the distance between the mean low water level and the bottom. Human interference effects are discussed.

Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Flora; Dominant Taxon/Taxa Studied:*Diplanthera (Halodule) wrightii*, *Ruppia maritima*, *Halophila engelmanni*, *Thalassia testudinum*, *Syringodium filiforme*;

(16.00021)

Thursby, G.B. 1976. Substrate specificity of marine periphyton near Seahorse Key, Florida. Univ. of Fla. M.S. Thesis, 120 p.

The spatial and temporal distribution dynamics of floral periphyton were investigated near Seahorse Key between August 1975 and March 1976. The hypothesis was that specialists are more abundant in harsher environments while generalists are more abundant in favorable environments. One hundred eleven species were found on 7 substrates. Degree of specialization was determined by evenness of distribution. Most substrate specialists were time generalists and most time specialists were substrate generalists. Only 15 species were specialists with respect to both, and only 8 were generalists with respect to both.

Study Duration:August 1975-March 1976; Habitat:Grassbed, oyster reef, mangroves; Type of Study:Quantitative; Biological Component:Flora; Number of Stations:7; Abiotic Parameters Measured:Temperature, salinity, light penetration;

(16.00022)

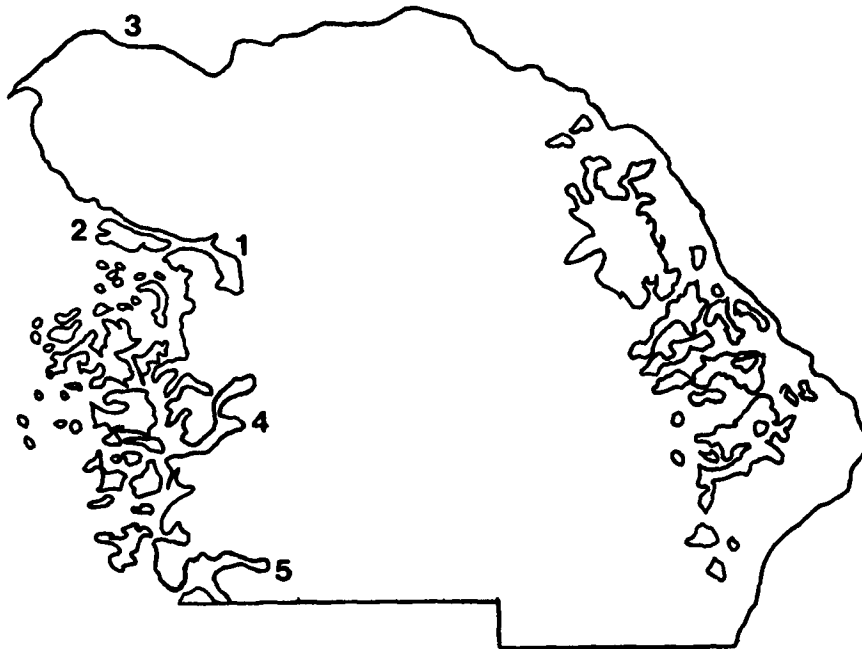
Vann, A.C.N. 1980. The ecology of the caridean dominated shrimp community in seagrass beds off Cedar Key, Florida. Univ. of Fla. Ph.D. Dissertation. 893 p.

Niche overlap and shrimp community structure were investigated in grassbeds off Cedar Key in 1977. By determining sizes, abundances, densities, percentages of ovigerous females and lengths of the reproductive seasons, it was found that the shrimp community is regulated mainly by the physical environment and to a lesser extent by predation. Of the two most numerous species, *Hippolyte pleuracantha* appeared to be more tolerant of temperature extremes than *Tozeuma carolinense*, but *T. carolinense* seemed to suffer less from predation.

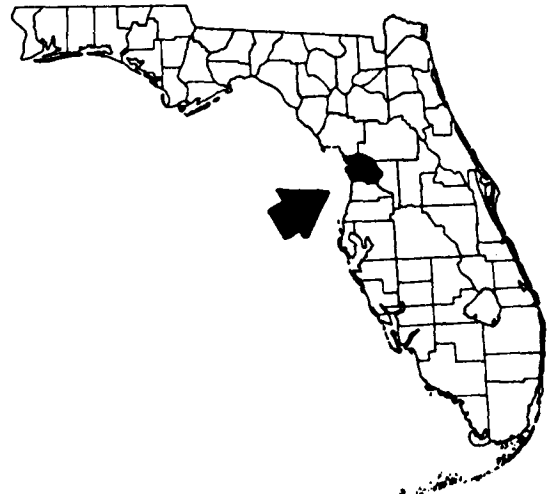
Study Duration:February 1977-January 1978; Habitat:Grassbeds; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Scallop dredge; Sieve Size:1.7 mm; Number of Stations:1; Number of Replicates/Station:3; Temporal Frequency:Monthly; Dominant Taxon/Taxa Studied:*Hippolyte pleuracantha*, *Tozeuma carolinense*;

See also: 3.00142, 12.00079, 13.00026, 20.00090.

# CITRUS COUNTY



1. CRYSTAL RIVER
2. CRYSTAL BAY
3. WITHLACOOCHEE RIVER
4. HOMOSASSA RIVER
5. CHASSAHOWITZKA RIVER



(17.00001)

Adams, C.A., G.L. Evink, M.J. Desterling, W. Seaman & R. Van Tine 1977. Appendix A. Phylogenic listing of estuarine species at Crystal River, Florida, p. 111-147-164. In: Crystal River Power Plant Environmental Considerations, Final Rept. to Interagency Research Advisory Committee. Florida Power Corp. Vol. III. 443 p.

This report presents a list of species, arranged in phylogenic sequence, and incorporates all of the plant and animal species which have been collected in the Crystal River estuarine area. The phylogenic nomenclature includes class, order and family, followed by the species binomial. Included are species codes which are used throughout the report, in addition to names, for cross-referencing convenience.

Habitat:Estuarine, saltmarsh; Type of Study:Qualitative; Biological Components:Flora and fauna;

(17.00002)

Adams, C.A., M.J. Desterling & S.C. Snedaker 1974. Effects of impingement and entrapment on the Crystal River blue crab, *Callinectes sapidus* Rathbun, population. In: Crystal River Power Plant: Environmental Considerations. Final Rept. to Interagency Res. Advis. Comm. Vol. III, p. 107-146.

A tag-and-recapture study of *Callinectes sapidus* was conducted to examine the effects of impingement due to the Crystal River Power Plant, Crystal River, Florida. A northern migration of female blue crabs was found to occur between mid-October and late January. During the migration the crabs congregate on the southern sides at the intake canals where they are efficiently taken by commercial crabbers. Impingement was found to affect a smaller proportion of the population than commercial trapping. However, the intake canals may obstruct the natural migratory route of the blue crab population.

Study Duration:September 1973-September 1974; Type of Study:Quantitative; Biological Component:Crustacea, fauna; Type of Sampler:Crab traps; Number of Stations:48; Temporal Frequency:Weekly; Dominant Taxon/Taxa Studied:*Callinectes sapidus*;

(17.00003)

Alden, R.W. 1976. Growth, reproduction, and survival of some marine copepods subjected to thermal and mechanical stress. Univ. of Fla. Ph.D. Dissertation. 339 p.

In the study of the effects of power plant entrainment and thermal stress on the copepods of the Crystal River during 1974 it was found that temperature, salinity, and temperature-salinity interactions were the major factors in mortality. Under low temperature and moderate salinities, mechanical damage had a major lethal effect but produced relatively lower mortalities than other temperature-salinity stresses. Sublethal effects dealt with were lower fecundity, slower growth rates, and accelerated mortality rates with increasing temperatures.

Study Duration:November 1973-September 1974; Type of Study:Quantitative; Biological Component:Fauna, Crustacea; Type of Sampler:64 micron mesh, 0.5 m diam. plankton net; Temporal Frequency:Biweekly; Abiotic Parameters Measured:Temperature, salinity, length of exposure to heated effluent, mechanical damage; Dominant Taxon/Taxa Studied:*Oithona* spp., *Acartia tonsa*, *Paracalanus crassirostris*, *Euterpina acutifrons*, *Pseudodiaptomus coronatus*, *Tortanus setacaudatus*, *Labidocera* spp.;

(17.00004)

Applied Biology, Inc. 1982. Post Operational Ecological Monitoring Program, Crystal River Units 1, 2, and 3. Annu. Rept. 1981. Benthic Community Structure Study. A Tech. Rept. submitted to Fla. Power Corp. Sections A-J.

This annual report summarizes the benthic data collected in the vicinity of the Crystal River Power Plant during 1981. The authors note several key differences between the discharge and control basin benthic communities, speculate that differences in physical characteristics between basins (prior to Unit 3 operation) were probably the reasons for faunal differences and conclude that the operation of Unit 3 has had little additional impact above that exerted by Units 1 and 2.

Study Duration:January-December 1981; Habitat:Seagrass beds, sand, marshes; Type of Study:Quantitative; Biological Component:Fauna and flora; Type of Sampler:Core and Venturi sampler; Sieve Size:0.5 mm (core), 2.0 mm (Venturi); Number of Stations:12; Number of Replicates/Station:5 (core), 1 (Venturi); Temporal Frequency:Quarterly; Abiotic Parameters Measured:Temperature, salinity, DO; Dominant Taxon/Taxa Studied:(Flora) *Syringodium filiforme*, *Halodule wrightii*, *Ruppia maritima*, (Fauna): *Aricidea philibinae*, *A. taylori*, *Laonereis culveri*, *Streblospio benedicti*, *Capitella capitata*, *Tharyx dorsobranchialis*, *Prionospio h. texana*, *Medionastus* spp., *Branchidontes* spp., *Nassarius vibex*, *Neopanope* spp.;

(17.00005)

Applied Biology, Inc. 1983. Post-operational ecological monitoring program, Crystal River Units 1,2 and 3, 1977-1981. Summary report, Benthic community structure studies. 103 p.

The nearshore marine environment adjacent to Florida Power Corporation's Crystal River Power Plant was monitored to assess effects of the power plant on benthic communities. Areas of study included seagrasses, salt marshes, oyster

reefs, sediments and benthic macroinvertebrates.

Study Duration:1977-1981; Habitat:Grassbed, oyster reef, sand, saltmarsh; Type of study:Quantitative; Biological Component:Flora, fauna; Type of Sampler:Core, dredge, quadrat; Number of Stations:Infauna-12, macrophytes-12, oyster reef fauna-9; Number of replicates:Infauna-5, macrophytes 3-5, oyster reef fauna-2; Temporal Frequency:Quarterly; Abiotic Parameters Measured:Temperature, D.O., salinity; Dominant Taxon/Taxa Studied:*Aricidea philbiniae*, *Tharyx* sp, *Ischadium recurvum*, *Brachidontes* spp., *Crassostrea virginica*, *Spartina*, *Juncus*, *Halodule*, *Syringodium*;

(17.00006)

Barbee, S.J. 1971. Temporal distribution of interstitial fauna in a beach and in a sandflat with respect to physical factors. Fla. State Univ. M.S. Thesis.

Along the northern Gulf coast from July 1970 to January 1971 temporal distribution and abundance of intertidal meiofauna from two distinct habitats were studied. Numbers of organisms peaked during September and October, though one station had nearly 6 times more individuals. Dominant groups increased from turbellarians, polychaetes, harpacticoid copepods to nematodes. Temperature, stratification, DO, and turbulence influenced vertical distribution. Discussion of other physical factors affecting distribution is included.

Study Duration:July 1970-January 1971; Habitat:Sand; Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Plastic coring tube; Temporal Frequency:Weekly; Abiotic Parameters Measured:Temperature, DO, pH, salinity, total organic carbon, grain size distribution;

(17.00007)

Berkert, K.A. 1980. Annual productivity and simulation models of the chaetognath, *Sagitta hispida*, exposed to a thermal plume at Crystal River, Florida. Univ. of Fla. M.S. Thesis. 80 p.

Monitoring of *Sagitta hispida* at Crystal River from July 1977 to July 1978 in comparison to a control bay revealed production of *S. hispida* to be similar between the two. Production was unimodal in the control bay but switched to bimodal in the impacted bay. Food was the limiting factor, there being a direct correlation between the biomass of chaetognaths and their prey, copepods. A model of the population was developed and simulated.

Study Duration:July 1977-July 1978; Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Plankton net, 202 micron mesh; Number of Stations:2; Number of Replicates/Station:2/3; Temporal Frequency:Monthly; Abiotic Parameters Measured:Salinity, temperature, water depth, wind, tidal stage, Secchi disk; Dominant Taxon/Taxa Studied:*Sagitta hispida*;

(17.00008)

Caldwell, J.W. & H.T. Odum 1978. Florida Power Corporation Post-Operational Ecological Monitoring Program. Crystal River Units 1, 2, and 3. Annual Rept. 1978, Vol. II. 323 p.

This study reports indices of metabolism used to monitor estuarine ecosystems at Crystal River, Florida, in 1978. The Crystal River ecosystem was divided initially into 5 subsystems: inner discharge bay and control; outer discharge bay and control; canals (intake and discharge); the marshes (intake and discharge) and oyster reefs. Metabolism for each area was determined and compared to pre-operational data. Documentation of existing conditions as well as a model depicting the interactions of energy flows on the various storages, producers, and consumers in the system were developed. Some of the models were used to simulate predicted conditions with the addition of the nuclear generators unit. The subsystem models were combined to form a model of the entire ecosystem and an energy cost-benefit analysis was conducted to compare estuary cooling versus cooling towers.

Study Duration:1978; Habitat:Estuarine, salt marsh; Type of Study:Quantitative; Biological Component:Flora and fauna; Abiotic Parameters Measured:Temperature, salinity, DO, percent cloud cover, light penetration; Dominant Taxon/Taxa Studied:*Juncus roemerianus*, *Spartina alterniflora*;

(17.00009)

Caldwell, J.W. & H.T. Odum 1980. Post Operational Ecological Monitoring Program, Crystal River Units 1, 2, and 3. Annu. Rept. 1979. Vol. II, Annu. Record of Metabolism of Estuarine Ecosystems at Crystal River, Florida. A tech. rept. submitted to Fla. Power Corp. 316 p.

This annual report summarizes the benthic community metabolism data from the power plant discharge basin, a control basin and the marsh ecosystem at Crystal River during 1979. An ecosystem model to measure the impact of power plant operations at Crystal River is also presented.

Study Duration:January-December 1979; Habitat:Marshes, seagrass beds, sand; Type of Study:Quantitative; Abiotic Parameters Measured:Temperature, salinity, DO; Dominant Taxon/Taxa Studied:*Juncus*, *Spartina*;

(17.00010)

Carr, W.E.S. & C.A. Adams 1973. Food habits of juvenile marine fishes occupying seagrass beds in the estuarine zone near Crystal River, Florida. Trans. Am. Fish. Soc. 102(3): 511-540.

Quantitative gravimetric analyses of stomach contents were carried out on juveniles of 21 species of fish that inhabit seagrass beds near Crystal River, Florida. The analyses was based on dry weights of food items and were expressed as percent of total stomach contents. Those species studied were: *Harengula pensacolae*, *Opisthonema oglinum*, *Anchoa hepsetus*, *Anchoa mitchilli*, *Synodus foetens*, *Strongylura marina*, *Hyporhamphus unifasciatus*, *Oligoplites saurus*, *Trachinotus falcatus*, *Eucinostomus gula*, *Haemulon plumieri*, *Orthopristis chrysoptera*, *Bairdiella chrysura*, *Cynoscion nebulosus*, *Diplodus holbrooki*, *Lagodon rhomboides*, *Microgobius gulosus*, *Chasmodes saburrae*, *Nemidia beryllina*, *Trinectes maculatus*, and *Sphaeroides nephelus*.

Study Duration: October 23, 1970 - August 25, 1971; Habitat: Sand, mud, grassbed; Type of Study: Quantitative; Biological Component: Fish; Type of Sampler: Bag seine, castnet; Abiotic Parameters Measured: Temperature, salinity;

(17.00011)

Connell, Metcalf & Eddy 1978. Crystal River community structure study for Florida Power Corporation. Crystal River Florida Power Corp., Unit 3, Annu. Envir. Operating Rept. Vol. 1 - Non-radiological 1-14-77 to 12-31-77.

The effects of the thermal plume from the Crystal River power generating plant on benthic and zooplankton communities were studied. A significant difference between the benthic faunal communities of the control and discharge basin was demonstrated only for total organisms collected with the Venturi suction sampler. The benthic flora of the discharge basin showed a depauperate macroalgae community and a seagrass community of completely different composition, when compared to the control basin. In addition, the bottom sediment types were found to be different between the two basins and the mean values of both temperature and salinity were significantly different. A comparison was made between this study and studies conducted during 1973 and 1974 in the same areas, and differences in the benthic community structure were found, suggesting an alteration of environmental conditions within the discharge basin.

Study Duration: 1977; Habitat: Variable; Type of Study: Quantitative; Biological Component: Flora and fauna; Type of Sampler: Core, Venturi suction pump, frames, plankton net; Sieve Size: 0.5 mm; Number of Stations: 9 benthic, 2 zooplankton; Number of Replicates/Station: 1, 5; Temporal Frequency: 4 times (benthic), twice (zooplankton); Abiotic Parameters Measured: Temperature, salinity, DO, percent cloud cover;

(17.00012)

Connell, Metcalf & Eddy 1979. Crystal River Community Structure Study for Florida Power Corp. Annu. Rept. 1978, p. 1, 1-165. In: Post-operational Ecological Monitoring Program Crystal River Units 1, 2, 3 Annu. Rept. for 1978, Vol. 1.

The results of the post-operational monitoring program for Florida Power Corporation Crystal River Power Plant were reported. Both control and discharge basins were determined to have changed considerably in macrophyte composition and in benthic fauna and oyster abundance and biomass between the pre-operational and 1977-78 studies. A proliferation of macroalgae, an increase in macrophyte and macroinvertebrate biomass, and an increase in macroinvertebrate and oyster abundance was shown in the control basin. The discharge basin had increased in total macrophyte and macroinvertebrate biomass, macroinvertebrate abundance, and abundance of the seagrass *Halodule beaudettei* (at the virtual exclusion of macroalgae). Oyster and spat abundance and biomass, however, declined in the discharge basin. It was not determined whether the differences between pre- and post-operational studies could be attributed to the operation of units or to differences in sampling techniques.

Study Duration: 1978; Habitat: Salt marsh, estuarine; Type of Study: Quantitative; Biological Component: Flora and fauna; Type of Sampler: Core, Venturi suction pump, aluminum box, plankton net; Sieve Size: 0.5 mm; Number of Stations: 12 benthic, 2 zooplankton, 9 oyster; Number of Replicates/Station: Variable; Temporal Frequency: 4 times - benthic, twice - zooplankton; Abiotic Parameters Measured: Temperature, salinity, DO, percent cloud cover;

(17.00013)

Connell, Metcalf & Eddy, Inc. 1980. Post Operational Ecological Monitoring Program, Crystal River Units 1, 2, and 3. Annu. Rept. 1979. Vol. I, Part I, Community Structure Study, A tech. rept. submitted to Fla. Power Corp. 181 p.

This annual report summarized the benthic data collected during 1979 in the vicinity of the Crystal River Power Plant. Sampling was conducted in the power plant discharge basin and a control basin. Benthic community structure data indicated that the control basin contained a more diverse fauna than the control basin. Although several species were common to both basins, they were generally more widely distributed in the control area. In terms of diversity and productivity of seagrasses, the control basin was again higher than the discharge basin. The authors' note that physical differences other than the thermal effluent between the basins complicate the interpretation of environmental effects.

Study Duration: January-December 1979; Habitat: Seagrass beds, sand; Type of Study: Quantitative; Sieve Size: 0.5 mm and 2.0 mm; Number of Stations: 12 (fauna), 17 transects (flora); Number of Replicates/Station: 5 replicates (core), 1 replicate (Venturi sampler); Temporal Frequency: Quarterly; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: (Flora): *Halodule beaudettei*, *Halophila engelmannii*, *Ruppia maritima*, *Syringodium filiforme*, (Fauna): *Aricidea philibinal*, *A. taylori*, *Fabricia* sp., *Syllis* sp., *Tharyx* sp., *Nassarius vibex*, *Crepidula* spp., *Nitrella lunata*, *Periploma* sp., *Alpheus* spp., *Hippolyte* spp., *Brachidontes* spp., *Eurypanopeus depressus*, *Panopeus herbstii*;

(17.00014)

Connell, Metcalf & Eddy, Inc. 1981. Post Operational Ecological Monitoring Program, Crystal River Units 1, 2, and 3. Annu. Rept. 1980. Vol. I, Part I. Community Structure Study. A tech. rept. submitted to Fla. Power Corp. 194 p.

This annual report summarizes the benthic data collected during 1980 in the vicinity of the Crystal River Power Plant. Sampling was conducted in the power plant discharge basin and a control basin. Benthic community structure data indicated that the control basin contained a more diverse fauna than the discharge basin. Although several species were common to both basins, they were generally more widely distributed in the control area. In terms of diversity and productivity of seagrasses, the control basin was again higher than the discharge basin. The authors' note that physical differences other than the thermal effluent between the basins complicate the interpretation of environmental effects.

Study Duration: January-December 1980; Habitat: Seagrass beds, sand; Type of Study: Quantitative; Sieve Size: 0.5 mm and 2.0 mm; Number of Stations: 12 (fauna) 17 transects (flora); Number of Replicates/Station: 5 replicates (core), 1 replicate (Venturi sampler); Temporal Frequency: Quarterly; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: (Flora) *Halodule beaudettei*, *Halophila engelmannii*, *Ruppia maritima*, *Syringodium filiforme*. (Fauna): *Aricidea philibral*, *A. taylori*, *Fabricia* sp., *Syllis* sp., *Tharyx* sp., *Nassarius vibex*, *Crepidula* spp., *Nitrella lunata*, *Periploma* sp., *Alpheus* spp., *Hippolyte* spp., *Brachidontes* spp., *Eurypanopeus depressus*, *Panopeus herbstii*;

(17.00015)

Cottrell, D.J. 1974. Report C: Sediment composition and distribution at Crystal River Power Plant: Erosion vs. deposition. In: Crystal River Power Plant, Environ. Considerations, Vol. II, Fla. Power Corp., St. Petersburg, Fla. p. 309- 376.

The distribution and composition of sediment in the area of the Crystal River Power Plant, Crystal River, Florida were determined from 341 sediment samples. Sediment composition was correlated with the distribution and abundance of macrophytes. Areas of erosion or deposition were identified, and depositional environments of the discharge and intake areas were compared.

Study Duration: December 1973-September 1974; Habitat: Sand; Type of Study: Quantitative; Biological Component: Flora; Type of Sampler: Hand-held dredge; Abiotic Parameters Measured: Sediment grain size, organic & carbonate content;

(17.00016)

Dawson, C.E. 1955. A study of the oyster biology and hydrography at Crystal River, Florida. Contrib. Mar. Sci., Univ. of Texas 4(1):279-302.

An investigation was made of the biology and hydrography of oyster-producing areas in the estuary of Crystal River from August 1951 to August 1952. Temperature and salinity measurements were correlated with growth and mortality. Growth and spatfall were compared with 4 other Florida localities, showing that the Crystal River oysters were lower in both aspects compared to oysters from Apalachicola Bay.

Study Duration: August 1951-August 1952; Type of Study: Quantitative; Biological Component: Fauna; Number of Stations: 20; Abiotic Parameters Measured: Salinity, temperature; Dominant Taxon/Taxa Studied: *Crassostrea virginica*;

(17.00017)

Evink, G., B. Green & C.A. Adams 1977. Report E. Benthic invertebrate comparisons in two estuaries adjacent to the Crystal River Power Generation Facility. p. III 1-106. Report F. Comparison of selected vertebrate populations in two estuaries adjacent to the Crystal River Power Generation Facility, Vol. III. 443 p. In: Crystal River Power Plant Environmental Considerations. Final Rept. to the Interagency Advisory Committee. Florida Power Corporation.

The species composition, abundance, and biomass of benthic invertebrates and fishes (primarily juvenile stages) in the estuarine areas adjacent to the Crystal River power-generating plant were studied on a per-unit area and per-unit time basis. A total of 37,329 fish and 65 distinct species were identified from these collections. Fish biomass showed greater variability between seasons than between discharge and intake estuaries. Regardless of bottom type, spring and summer samples were found to generally yield higher fish biomass than the fall and winter samples. For both intake and discharge stations, higher fish biomass per sample was recovered when water temperatures became warmer. Higher fish biomass per sample was also recovered when collections were made during rising and falling tides. Water depth of approximately 3 feet also generally resulted in higher fish biomass per sample.

Study Duration: Winter 1973 - summer 1974; Habitat: Estuarine; Type of Study: Quantitative; Biological Component: Vertebrate and invertebrate fauna; Type of Sampler: Venturi suction pump, core, drop net; Number of Stations: Discharge and intake; Temporal Frequency: Quarterly; Abiotic Parameters Measured: Temperature, salinity, depth, tides, bottom type;

(17.00018)

Fox, J.L. & M.S. Moyer 1975. Effect of power plant chlorination on estuarine productivity. Chesapeake Sci. 16(1):66-68.

The effects of chlorination on in situ net primary production in the discharge waters of a power plant at Crystal River,



Florida, were studied. Primary production values were found to decrease an average of 57% due to plant passage and chlorination. In the absence of chlorine, the average decrease in primary production values was determined to be 13%.

Study Duration: July 1972 - March 1972; Habitat: Estuarine; Type of Study: Quantitative; Number of Stations: 6; Number of Replicates/Station: 5; Temporal Frequency: Bimonthly; Abiotic Parameters Measured: Temperature;

(17.00019)

Grimes, C.B. 1971. Thermal addition studies of the Crystal River steam electric station. Fla. Dept. Nat. Resources, Mar. Research Lab. Prof. Pap. Ser. No. 11. 53 p.

A field investigation was initiated to determine the ecological effects of hot water discharge by a steam electric generating plant in Crystal River. Trawl sampling data disclosed that only shallow inshore areas near the discharge were thermally affected. Comparison of data from affected vs. nonaffected trawl stations revealed a greater abundance of fishes during late fall and early winter, but no large differences during other seasons. Statistical comparison of the coefficient of regression (affected vs. nonaffected) revealed no significant differences in annual growth increments within any of the three species studied. In addition, no significant differences for affected vs. nonaffected areas were seen for spawning time, age, composition, and relative species abundance. Slight shifts in diversity toward the discharge in winter and away in summer were noted. Substantial increases in copper and zinc in discharge canal oysters were noted. These increases were suggested to be related to increased ion presence in discharge waters and increased water temperature.

Study Duration: 1 year; Habitat: Sand, rock, mud; Type of Study: Quantitative; Biological Component: Invertebrate and vertebrate fauna; Type of Sampler: Trawl; Number of Stations: 21; Number of Replicates/Station: 1; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature, salinity, DO, CO<sub>2</sub>, pH; Dominant Taxon/Taxa Studied: *Bairdiella chrysura*, *Lagodon rhomboides*, *Orthopristis chrysopterus*;

(17.00020)

Homer, M. 1977. Seasonal abundance, biomass, diversity, and trophic structure of fish in a salt-marsh tidal creek affected by a coastal power plant. Thermal Ecology II, Tech. Info. Ctr., Energy Research and Develop. Admin. p. 259-267.

Measurements were made of the seasonal abundance, biomass, species diversity, and trophic composition of fish inhabiting the tidal creeks of saltmarshes receiving thermal discharge near Crystal River, Florida. From May through September, 1974, mean abundance in the creek receiving thermal discharge was 0.46 individuals/m<sup>2</sup> and mean biomass was 2.2 g (preserved weight)/m<sup>2</sup>. In a control area, creek values in the warm months were 6.77 individuals/m<sup>2</sup> and 9.1 g (preserved weight)/m<sup>2</sup>. During the cold months (October, 1974 through February, 1975) there were 0.48 individuals/m<sup>2</sup> and 8.3 g (preserved weight)/m<sup>2</sup> in the discharge area and 0.58 individuals/m<sup>2</sup> and 7.4 g (preserved weight)/m<sup>2</sup> in the control area. In all months except May, 1974 and February, 1975 species diversity as species per 1,000 individuals was higher in the discharge creek. No apparent differences in fish trophic structure were observed.

Study Duration: 10 months; Habitat: Salt marsh, estuarine; Type of Study: Quantitative; Biological Component: Fish; Type of Sampler: Block net; Number of Stations: 2; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Mugil cephalus*, *Menidia beryllina*, *Fundulus similis*, *F. grandis*, *Eucinostomus argenteus*, *Mugil trichodon*;

(17.00021)

Klauserwitz, R.H., S.L. Palmer, B.A. Rogers & K.L. Carder 1974. Natural heating of salt marsh waters in the area of the Crystal River Power Plant. Tech. Rept. No. 3. p. 379-412. In: Crystal River Power Plant Environmental Considerations. Final Rept. to the Interagency Research Advisory Committee. Florida Power Corporation. Vol. III. 443 p.

The quantitative value of the natural heating in the shallows (storage volume of water and heat budget) was determined and a means was developed to account for it in existing empirical models and in a numerical thermal dispersion model of a gulf coast power plant. Solar heating of tidally-driven waters of Gulf origin from the salt marsh was determined to only affect measurements near the salt marsh. In more than 4 feet of water, the temperature effect of solar heating was found to be only 0.65°C at peak. It was determined that since plume measurements are made to the 0.5° contour interval, this effect was not significant. Naturally heated water in the shallows was found to undergo a thermal change almost equal (5.5°C natural vs. 6.1°C plant) to the present plant influence.

Habitat: Salt marsh; Type of Study: Quantitative; Number of Stations: 2; Abiotic Parameters Measured: Temperature, salinity, depth;

(17.00022)

Knight R.L. & W.F. Coggins 1982. Record of estuarine and salt marsh metabolism at Crystal River, Florida, 1977-1981. Final summary report to Florida Power Corporation. Contract GEA-000045. C.L. Montague, principal investigator. 89 p.

The Florida Power Corporation's plant at Crystal River increased temperature, turbidity and salinity of inshore bay ecosystems. Inner Discharge Bay salt marsh systems showed increased metabolism. Plankton metabolism was not

significantly altered.

Study Duration:1977-1981; Habitat:Salt marsh, estuary; Type of Study:Quantitative; Biological Component:Flora; Abiotic Parameters Measured:Salinity, temperature, D.O.;

(17.00023)

Lehman, M. 1974. Oyster reefs at Crystal River and their adaptation to thermal plumes. p. 269-359. In: Crystal River Power Plant Environmental Considerations, Final Rept. to the Interagency Research Advisory Committee. Vol. I. Florida Power Corporation. 417 p.

Measurements of structure and function of oyster reefs in and out of the thermal plume were made to characterize their overall properties of mass, metabolism, and diversity as an ecological unit. Simple models were evaluated and simulated to help understand present ecosystems and to suggest the response and adaptation of the oyster reef with additional power plant effluents. For ecological perspective and for use in impact studies the value of oyster reefs was calculated by estimating their role in the energy budget of the larger estuary.

Study Duration:2-1/2 years; Habitat:Oyster beds; Type of Study:Semi-quantitative; Biological Component:Benthic macroinvertebrates, oysters; Number of Stations:11; Number of Replicates/Station:2; Temporal Frequency:6 times per year; Dominant Taxon/Taxa Studied:*Crassostrea virginica*;

(17.00024)

Lyons, W.G., S.P. Cobb, D.K. Camp, J.A. Mountain, T. Savage, L. Lyons & E.A. Joyce, Jr. 1971. Preliminary inventory of marine invertebrates collected near the electrical generating plant, Crystal River, Florida, in 1969. Fla. Dept. Nat. Resources, Mar. Research Lab., Prof. Pap. Ser.No. 14. 45 p.

Two hundred eighty-six taxa of invertebrates from the estuarine areas near Crystal River, Florida, were reported. The majority of these were molluscs and arthropods. Local distributions of most species were given. Changes in faunal composition between nearshore and offshore stations and between northern and southern stations related to local salinity gradients were discussed. Temperature was not found to be as important as salinity in determining local distribution during the study period. Most species observed have widespread distributions in the western Atlantic with only a few showing more restricted Carolinian or West Indian affinities.

Study Duration:1 year; Habitat:Sand, rock, mud, silt; Type of Study:Qualitative; Biological Component:Marine invertebrates; Type of Sampler:Trawl; Number of Stations:21; Number of Replicates/Station:1; Temporal Frequency:Monthly;

(17.00025)

McMahan, E.A. & D.L. Young 1974. Salt marsh microarthropod populations. p. 241-254. In: Crystal River Power Plant Environmental Considerations, Final Rept. to the Interagency Research Advisory Committee. Florida Power Corporation, Vol. II. 437 p.

Sampling was undertaken to characterize the microarthropod populations inhabiting the various marsh types, evaluate the effects of thermal additions that have altered the type and numbers of insects present, allow estimates of species diversity to be calculated, and possibly provide data for estimating biomass and energy flow of the microarthropod populations. The mean number of microarthropods collected per sample in heated and unheated *Juncus* marshes was not significantly different. On August 13 significantly greater (95% confidence level) numbers of microarthropods were collected per sample from the *Juncus* marshes as compared to those of the *Spartina* marshes. Results of collections within the *Juncus* marsh indicated that the majority of the microarthropods present were herbivores. The percentage of microarthropods in each of the three trophic levels was not found to be statistically different in thermally impacted or control marshes. Spiders (carnivores) were the only group or order found to be statistically different between the *Juncus* marshes; they were more numerous in the control area. Detritivores were the numerically largest trophic level group found in the *Spartina* marshes during August and September. No significant difference was detected in percent composition by trophic level between heated and control marshes during either sampling period. Greater mean numbers of crustaceans (August) and dipterans (September) were present in the thermally-impacted *Spartina* marsh.

Study Duration:1 summer; Habitat:Salt marsh; Type of Study:Quantitative; Biological Component:Microarthropods; Type of Sampler:Vacuum apparatus; Number of Stations:10; Number of Replicates/Station:1; Temporal Frequency:Twice/summer;

(17.00026)

Mahadevan, S. 1983. Proposed revisions to Plan of Study, Crystal River 1, 2 and 3 NPDES 316; Ecological Monitoring Prog., Fla. Power Corp. Submitted to Fla. Power Corp. by Mote Marine Laboratory, Sarasota, FL. 18 p. + 2 appendices.

As part of a review of ecological monitoring program at the Crystal River Power Plant, Florida, a survey of the local infauna and sediments was conducted in December 1982. Sediment granulometry was examined from 111 core samples and benthic macrofauna were identified from stations in 3 habitats: sand, grassbed, and mud. Photographs of each sediment core and a composite species list are presented in the appendices.

Study Duration: 7-9 December 1982; Habitat: Mud, sand, shell, grassbed; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Corer; Sieve Size: 0.5 mm; Number of Stations: 111 (sediments), 3 (infauna); Number of Replicates/Station: 10 (infauna stations);

(17.00027)

Montague, C.L., J.W. Caldwell & R.L. Knight 1981. Post Operational Monitoring Program, Crystal River Units 1, 2, and 3. Annu. Rept. 1980. Vol. 11, Record of Metabolism of Estuarine Ecosystems at Crystal River, Florida. 1977-1980. A tech. rept. submitted to Fla. Power Corp. 309 p.

This report summarizes the benthic community metabolism data from the power plant discharge basin, a control basin, and the marsh ecosystem at Crystal River for 1980 and compares the data to information obtained during the preoperational years (1972-74) and postoperational years (1977-79).

Study Duration: January-December 1980; Habitat: Marshes, seagrass beds, sand; Type of Study: Quantitative; Abiotic Parameters Measured: Temperature, salinity, DO; Dominant Taxon/Taxa Studied: *Juncus*, *Spartina*;

(17.00028)

Oesterling, M.J. 1976. Population structure, dynamics, and movement of the blue crab (*Callinectes sapidus* Rathbun) at Crystal River, Florida. Univ. of Fla. M.S. Thesis. 88 p.

The study conducted was a tag-recapture of the blue crab, *Callinectes sapidus*, at Crystal River, from September 1973 to November 1974. Results showed peaks during winter and summer, while more males were caught than females throughout the study. 8.6% of crabs tagged were recaptured. Most recaptures were within an 8 km radius of the study area, but significant female recaptures occurred in a northerly sequence, suggesting a northerly, alongshore migration. It is stated that spoil dikes may obstruct the migration pathways.

Study Duration: September 1973-November 1974; Type of Study: Quantitative; Biological Component: Fauna, Crustacea; Type of Sampler: Commercial two level crab traps; Number of Stations: 80; Temporal Frequency: Biweekly/weekly; Dominant Taxon/Taxa Studied: *Callinectes sapidus*;

(17.00029)

Phillips, R.C. 1961. The ecology of marine plants of Crystal Bay, Florida. Quart. J. Fla. Acad. Sci. 23(4):328-337.

Forty six taxa of marine algae were collected in Crystal Bay, Florida, during 3 samplings in April and June 1958 and February 1959. Five species of seagrasses and 25 algal epiphytes were found. Algae was most abundant on muddy sand bottoms between oyster reefs and on oyster shells. Variations in algal distribution and biomass were related to physical factors in the bay.

Study Duration: 17 April 1958-16 February 1959; Habitat: Mud, sand, oyster reef; Type of Study: Qualitative; Biological Component: Flora; Type of Sampler: Dredge; Number of Stations: 6; Abiotic Parameters Measured: Water temperature, salinity, water clarity, depth, substrate type; Dominant Taxon/Taxa Studied: *Sargassum pteropleuron*, *Caulerpa prolifera*, *C. paspaloides typica*, *Gracilaria verrucosa*, *Rosenvingea intricata*;

(17.00030)

Smart, A. 1977. Objective 4C: Decapod predation. p. IV 312-316. In: Crystal River Power Plant Environmental Interagency Research Advisory Committee. Florida Power Corporation, St. Petersburg, FL. Vol. IV. 447 p.

Weighted seasonal mean percent predation by decapods were determined and found to increase from fall to summer. The seasonal means were 0.0002% in fall, 0.0065% in winter, 0.024% in spring, and 0.0378% in summer. Percent predation in all areas except one reflected increasing decapod biomass. Highest predation occurred in the summer. One area showed a bimodal distribution with a secondary peak in winter caused by low total zooplankton biomass in that area and a high summer peak.

Type of Study: Quantitative; Biological Component: Decapod fauna;

(17.00031)

Smith, W. 1974. Shallow inshore ecosystem of bottom communities and the effect of thermal plume. In: Crystal River Power Plant: Environ. Considerations, Vol. 1. Fla. Power Corp., St. Petersburg, Fla. p. 1-77-1-158.

The total metabolism of a *Halodule wrightii* seagrass community was measured over a 2 year period to examine the effects of heated discharge from power plants at Crystal River, Florida. Measurements from this study and data from concurrent studies of other biotic components were combined with models and computer simulations to evaluate the effects of present and future power plants.

Habitat: Seagrass bed, mud, oyster reef; Type of Study: Quantitative; Biological Component: Fauna, flora;

(17.00032)

Snedaker, S.C. 1974. Report D. Comparisons of the benthic flora in estuaries adjacent to the Crystal River Power

Generation Facility. p. 377-437. In: Crystal River Power Plant Environmental Considerations. Final Rept. to the Interagency Research Advisory Committee. Florida Power Corporation, St. Petersburg, FL. Vol. III. 437 p.

A biological baseline of quantitative data regarding the standing crops, diversity, seasonality, distribution and occurrence of benthic macrophytes in the estuaries adjacent to the FPC Crystal River power-generating facility was provided for use in future investigations into possible effects, if any, of the present operation on the benthic macrophytes of these estuaries were assessed. The biomass of all macrophytes combined over the entire study area was determined to have an annual mean of 33.5 gm dry weight/m<sup>2</sup>, ranging from zero to as much as 700 gm/m<sup>2</sup>. Seasonally, the standing crop varied from an average low of 30.7 gm/m<sup>2</sup> in the winter to a summer high of 38.68 gm/m<sup>2</sup>. The "intake" and "discharge" estuarine systems were considered as basically separate entities. Five seagrasses were collected in the discharge basins and the control regions. Diversity (mean annual) for all areas sampled was calculated as 4.52 units. The intake estuary averaged 8.64 while the discharge estuarine system was only 2.95.

Habitat: Salt marsh, estuarine; Type of Study: ; Biological Component: Benthic macrophytes; Type of Sampler: Hand-held dredge w/attached mesh bag; Number of Replicates/Station: 50 to 150 samples per season; Temporal Frequency: Seasonally; Dominant Taxon/Taxa Studied: *Halodule beaudettii*, *Ruppia maritima*, *Syringodium filiforme*, *Halophila engelmannii*, *Thalassia testudinum*;

(17.00033)

Steidinger, K.A. & J.F. VanBreedveld 1971. Benthic marine algae from waters adjacent to the Crystal River Electric Power Plant (1969 & 1970). Fla. St. Dept. Nat. Resources, Mar. Research Lab., St. Petersburg, FL. Prof. Pap. Ser. No. 16. 46 p.

One hundred six taxa of marine algae were identified from the site and were broken down as follows: Rhodophyta - 63; Phaeophyta - 24; and Chlorophyta - 19. Reductions in species diversity, as well as incidence of occurrence were noted at the site in 1970; however, deeper waters not exposed to the thermal plume were also affected. The study area was determined to be semi-tropical or warm-temperate, with a primarily seasonal flora. Winter appeared to be the season of lowest species diversity. Several new distribution records were reported.

Study Duration: 2 years; Type of Study: Qualitative; Biological Component: Benthic marine algae; Type of Sampler: 15 foot trynet; Number of Stations: 21; Number of Replicates/Station: 1; Temporal Frequency: Monthly and bimonthly; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Agardhiella tenera*, *Hypnea spinella*, *Champia parvula*, *Gracilaria sp.*, *Sargassum filipendula*, *Caulerpa paspaloides*, *Caulerpa prolifera*;

(17.00034)

Swindler, J.P. 1973. Sedimentology of the low-energy coastal region between the Crystal and Withlacoochee Rivers, Florida west coast. Univ. of Fla. M.S. Thesis, 97 p.

Sediment studies were conducted on areas of the Crystal and Withlacoochee Rivers with analysis being made of grain size and sediment constituents in natural versus dredging spoil areas. Carbonate fraction of coarser than average grain size originate from oyster reefs while finer than average grain size carbonate fraction is supplied by spoil piles. Sedimentation patterns are discussed.

Study Duration: July-December 1972; Type of Study: Quantitative; Type of Sampler: Petersen grab sampler; Number of Stations: 40; Abiotic Parameters Measured: Temperature, salinity, turbidity;

(17.00035)

Van Tine, F. 1974. Comparisons of the benthic flora in estuaries adjacent to the Crystal River Power Generation Facility. In: Crystal River Power Plant: Environ. Considerations. Final Rept. to Interagency Res. Advis. Comm. Florida Power Corp., St. Petersburg, FL. Vol. II p. 377-437.

The effects of thermal discharge from a power plant at Crystal River, Florida on benthic macrophytes were examined by seasonal harvesting from the discharge area and an adjacent control area. The species composition by frequency, biomass ranks by species, and spatial and temporal distributions of macrophytes were presented. Relationships between biotic parameters and physical factors were identified. Analysis of data was incomplete when the report was prepared.

Type of Study: Quantitative; Biological Component: Flora; Dominant Taxon/Taxa Studied: *Diplanthera (Halodule) wrightii*, *Gracilaria compressa*, *Sargassum filipendula*;

(17.00036)

Young, D. 1974. Saltmarsh and the effect of thermal plume. In: Crystal River Power Plant: Environ. Considerations. Final Rept. to the Interagency Res. Advis. Comm. Florida Power Corp., St. Petersburg, FL. Vol. II. p. 1-92.

An annual study of the community structure of a saltmarsh ecosystem was conducted in 2 saltmarshes at Crystal River, Florida, to determine the effects of thermal discharge from a power plant. The standing crop, decomposition rate, primary production, and community metabolism of *Juncus roemerianus* and *Spartina alterniflora* were monitored throughout the year. The thermally impacted marshes were found to use some of the potential energy of the thermal discharge to increase levels of metabolism above those of nearby control marshes.

Study Duration: June 1972-October 1973; Habitat: Saltmarsh; Type of Study: Quantitative; Biological Component: Fauna, flora; Number of Replicates/Station: 9, 5; Temporal Frequency: 4-6 weeks; Abiotic Parameters Measured: Air temperature, insolation, precipitation, tides; Dominant Taxon/Taxa Studied: *Juncus roemerianus*, *Spartina alterniflora*;

(17.00037)

Young, D.L. 1977. 4F. Saltmarshes and thermal additions at Crystal River, Florida, In: Crystal River Power Plant Environmental Considerations, Final Rept. to the Interagency Research Advisory Committee, Vol. II, Florida Power Corporation, St. Petersburg, FL. Vol. II. 437 p.

Results of field measurements in thermally-impacted and adjacent control marshes taken to establish if adaptations and adjustments have been made to existing temperature regimes were presented. Computer simulations of ecosystem response to temperature and supplemental measurements carried out in thermally-impacted marshes at Jacksonville, Florida, were utilized to suggest possible consequences of the operation of Unit 3 on the marsh ecosystem at Crystal River. Plant standing crop characteristics, net production, respiration, total metabolism, decomposition, and selected animal numbers and diversity were examined individually in thermally-impacted and control areas. A synthesis of these results was made utilizing energy flow diagrams to understand the integrated response of all system components at the community level.

Study Duration: 1 year; Habitat: Salt marsh; Type of Study: Quantitative; Biological Component: Benthic invertebrates, marsh flora; Type of Sampler: 0.25 m<sup>2</sup> quadrats; Abiotic Parameters Measured: Temperature (air & water), salinity, tides, precipitation; Dominant Taxon/Taxa Studied: *Juncus*, *Spartina*;

(17.00038)

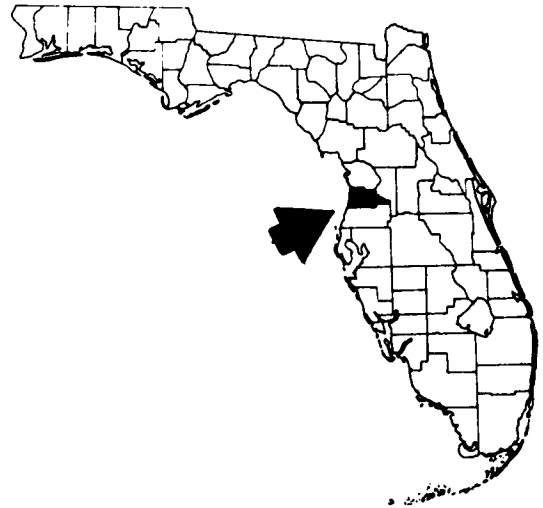
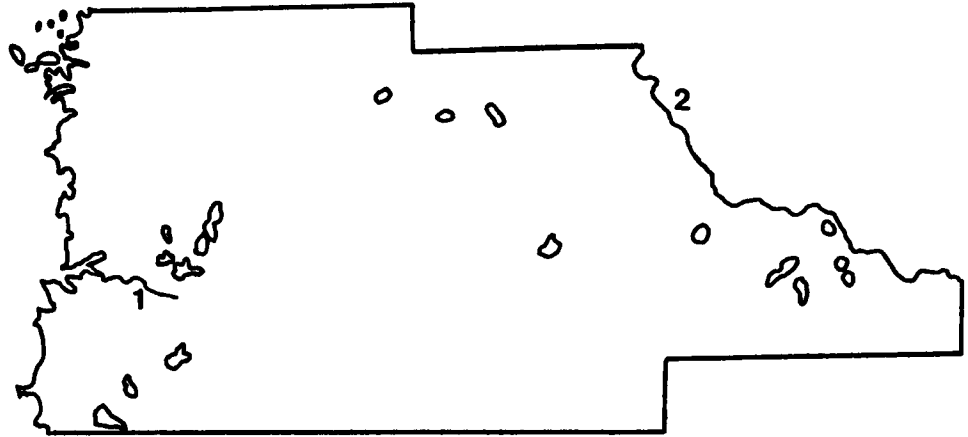
Young, D.L. 1977. Appendix A2. Studies of Florida Gulf Coast salt marshes receiving thermal discharges. p. II 140-158. In: Crystal River Power Plant Environmental Considerations. Final Rept. to the Interagency Research Advisory Committee. Florida Power Corporation, St. Petersburg, FL. Vol. II. 437 p.

Two salt marshes were studied over an annual cycle to document marsh ecosystem response to thermal additions from an electric-generating station. The overall marsh metabolism, including plant production and respiration, and selected animal population numbers were chosen as indicators of the impact of thermal additions. Water temperatures in the thermally-affected marsh averaged 3° to 6°C warmer than in the nearby control marsh. The maximum water temperatures recorded during the summer were 37°C in the thermal marsh and 32°C in the control marsh. The apparent net production calculated from measurements of monthly changes in *Spartina alterniflora* live and dead standing crops, including estimates of decomposition and export during the spring growing season (February-May) was 547 g (dry weight)/m<sup>2</sup> in the thermal marsh compared with 282 g (dry weight)/m<sup>2</sup> in the control marsh. The community metabolism measurements performed with CO<sub>2</sub> gas-analysis equipment in March 1973 resulted in community respiration of 5.71 g C/m<sup>2</sup> day in the thermal marsh and 2.21 g C/m<sup>2</sup> day<sup>-1</sup> in the control marshes. The overall effect of higher water temperature appeared to be higher levels of organic matter turnover and metabolism with a ratio achieved between production and respiration which is similar to control marshes. Population comparisons revealed no significant difference in snail numbers although fiddler crabs appeared to be less numerous in the thermally affected marsh.

Study Duration: 1 year; Habitat: Salt marsh; Type of Study: Quantitative; Biological Component: Flora; Type of Sampler: 0.25 m<sup>2</sup> quadrat; Number of Stations: 11; Number of Replicates/Station: 2; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature; Dominant Taxon/Taxa Studied: *Spartina alterniflora*, *Littorina irrorata*, *Uca* sp.;

See also: 3.00142.

# HERNANDO COUNTY



1. WEEKIWACHEE RIVER
2. WITHLACOOCHEE RIVER

{18.00001}

Dawes, C.J., R.E. Moon & M.A. Davis 1978. The photosynthetic and respiratory rates and tolerances of benthic algae from a mangrove and salt marsh estuary: a comparative study. *Estuar. Coast. Mar. Sci.* 6(2):175-185.

A comparison of photosynthetic and respiratory rates and tolerances of benthic algae was made. Benthic algae of subtropical estuaries were found to be tolerant to a wide range of temperature, light, and salinity, as well as short exposures of fresh water. The intertidal algae showed increasing rates of photosynthesis when monitored submerged and in air. It was suggested that tidal exposure cannot be considered a detrimental stress condition for intertidal algae. Carbon fixation was found to continue during the 4-8 hour period low tide, and rates were sometimes found to exceed those of submerged plants.

Study Duration:Summer 1975; Habitat:Salt marsh and mangroves; Type of Study:Qualitative; Biological Component:Benthic algae; Abiotic Parameters Measured:Temperature, salinity, light;

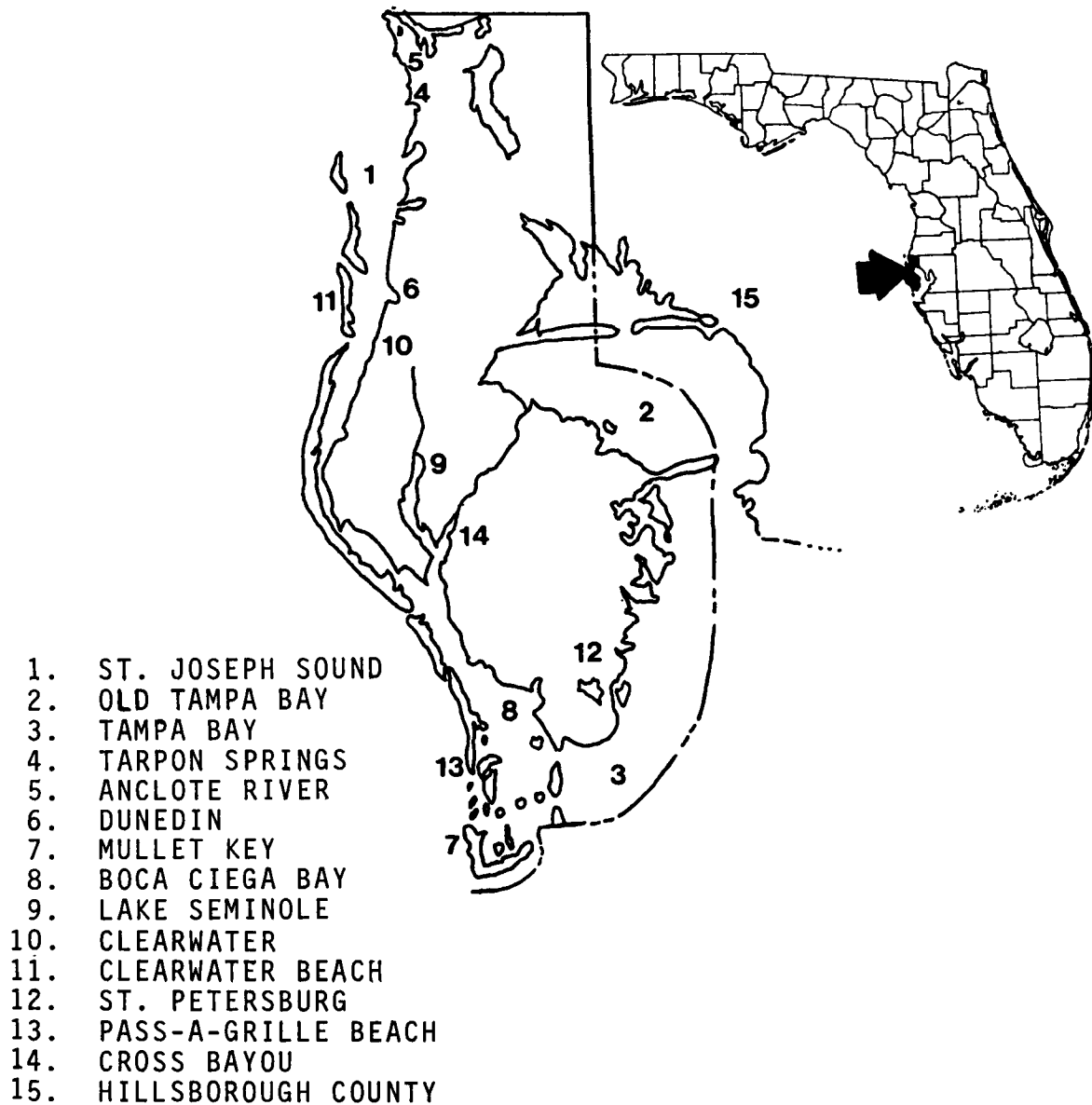
{18.00002}

McIntosh, R. 1978. Low salinity tolerance and the effect of spring water on the distribution of *Bostrychia biaderi* (Rhodophyta, Ceramiales) in a Florida estuary. Univ. So. Fla. M.S. Thesis.

The combined effects of salinity and chemical constituents of spring water on the photosynthesis rates of the red alga, *Bostrychia biaderi* were investigated in Weeki Wachee Estuary, Florida. Calcium, bicarbonate, nitrate, phosphate, and total organics were studied in natural and artificial spring water with salinities of 0, 5, 10, 20, or 30 ppt. Plants grown in seawater diluted with spring water had higher photosynthetic rates with maxima at lower salinities than did plants grown in seawater diluted with distilled water. Changes in the photosynthetic rates were correlated with bicarbonate levels. The diversity of algal flora in Florida west coast estuaries is probably regulated by effluent of freshwater springs.

Type of Study:Quantitative; Biological Component:Flora; Number of Stations:9; Abiotic Parameters Measured:Salinity; Dominant Taxon/Taxa Studied:*Bostrychia biaderi*;

# PINELLAS COUNTY





(19.00001)

Baird, R.C., K.L. Carder, T.L. Hopkins, T.E. Pyle & H.J. Humm 1972. Anclote Environmental Project Report 1971. Univ. So. Florida, Mar. Sci. Instit. Rept. for Florida Power Corp. 251 p.

Geological, physical, water quality, seagrass, algae, bacteriological, benthic invertebrate and fish studies were continued at Anclote Estuary to provide baseline information prior to the operation of a power plant. A checklist of polychaetes, molluscs, and crustaceans collected in the area was provided. Distribution and abundance of pink shrimps and blue crabs were described.

Study Duration:1 year; Habitat:Grassbed, sand; Type of Study:Qualitative and quantitative; Biological Component:Flora and fauna; Type of Sampler:Trawl, Zimmerman plug corer; Number of Stations:17; Temporal Frequency:Twice during the year; Dominant Taxon/Taxa Studied:*Penaeus duorarum*, *Callinectes sapidus*;

(19.00002)

Baird, R.C., K.L. Carder, T.L. Hopkins, T.E. Pyle & H.J. Humm 1973. Anclote Environmental Project 1972. Univ. So. Florida, Mar. Sci. Instit. Rept. for Florida Power Corp. 220 p.

Geological, physical, water quality (phytoplankton and primary productivity), zooplankton, mangroves, benthic algae, seagrass and fish studies were continued at Anclote Estuary to provide pre-operational baseline data for a proposed power plant. Benthic invertebrate data, although collected, were not reported.

Study Duration:1 year; Habitat:Grassbeds, sand; Type of Study:Quantitative and qualitative; Biological Component:Flora; Type of Sampler:Zimmerman plug sampler (2 sizes- 15 cm x 15 cm and 20 cm x 20 cm); Number of Stations:16; Number of Replicates/Station:4 or 5; Temporal Frequency:Once (summer 1972); Dominant Taxon/Taxa Studied:*Thalassia*, *Syringodium*, *Diplanthera* (*Halodule*), *Halophila*;

(19.00003)

Baird, R.C., K.L. Carder, T.L. Hopkins, T.E. Pyle, H.J. Humm, N.J. Blake & L.J. Doyle 1974. Anclote Environmental Project Report 1973. Univ. So. Florida, Mar. Sci. Instit. Rept. for Florida Power Corp. 136 p.

Physical, geological, phytoplankton, benthic algae, selected benthic invertebrate and fish community studies were continued at Anclote Estuary as part of an ongoing environmental monitoring program, prior to the operation of a power station. Macro-epifauna were sampled with randomly placed meter squares. Special emphasis was placed on the study of bay scallop (*Argopecten irradians*) populations in the study area.

Study Duration:1 year; Habitat:Grassbeds, sand; Type of Study:Quantitative; Biological Component:Flora and fauna; Type of Sampler:Quadrats; Number of Stations:16; Number of Replicates/Station:Variable, 1-5; Temporal Frequency:Variable; Dominant Taxon/Taxa Studied:*Argopecten irradians*, *Lytechinus variegatus*, *Styela plicata*, *Thalassia*, *Syringodium*, *Diplanthera* (*Halodule*), *Halophila*;

(19.00004)

Ballantine, D. & H.J. Humm 1975. Benthic algae of the Anclote estuary. I. Epiphytes of seagrass leaves. Fla. Sci. 38(3):150-162.

Sixty six species of benthic algae were identified as epiphytes on the 4 dominant species of seagrasses in the Anclote estuary near Tarpon Springs, Florida: *Thalassia testudinum*, *Syringodium filiforme*, *Diplanthera* (*Halodule*) *wrightii*, and *Halophila engelmannii*. From January to September 1971 field observations and collections were made monthly at 6 representative stations. About 65% of all benthic algae that grow attached in the area occur as seagrass epiphytes. Comparisons with the epiphyte algae of the Miami/ Biscayne Bay area were made and a new form of *Cercenium byssoideum* was described.

Study Duration:January-September 1971; Habitat:Seagrass beds; Type of Study:Quantitative; Biological Component:Flora; Number of Stations:6; Temporal Frequency:Monthly; Abiotic Parameters Measured:Salinity, rainfall, water temperature, current velocity, light penetration; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Syringodium filiforme*, *Diplanthera* (*Halodule*) *wrightii*, *Halophila engelmannii*, *Nyriotrichia subcorymbosa*, *Stictyosiphon subsimplex*, *Cladosiphon occidentalis*;

(19.00005)

Blake, M.J., L.J. Doyle & T.E. Pyle 1974. An ecological study in the vicinity of the P.L. Bartow Power Plant, Tampa Bay, Florida. Final Rept. Univ. So. Florida, Dept. Mar. Sci. 130 p.

An assessment was made as to the status of the marine environment in the area of the operating P.L. Bartow Power Plant. The area covered and degree of temperature rise of the thermal plume was described. Although detectable variations in the sediment were not found, marked differences in the benthic organisms between the intake and the discharge canals were. One hundred four species of polychaetes, molluscs, crustaceans and echinoderms were identified from the transects near the plant intake, and only 60 species were identified from the transects near the plant discharge. The distribution of seagrasses in the area were measured and their destruction was estimated. *Thalassia* transplant studies were attempted, but were unsuccessful for more than 30 days where the mean water temperature was 31°C or higher. Bay

scallops (*Argopecten irradians concentricus*) transplanted from the Anclote Anchorage to the discharge area of the P.L. Bartow Power Plant failed to undergo a normal reproductive cycle and showed greater mortality than for those transplanted to the intake area.

Study Duration:1972-1974; Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Benthic invertebrates & seagrasses; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO, turbidity, nutrients, total suspended load, tides; Dominant Taxon/Taxa Studied:*Prionospio heterobranchia texana*, *Nysella planulata*;

(19.00006)

Blake, M.J., L.J. Doyle & T.E. Pyle. 1975. The macrobenthic community of a thermally altered area of Tampa Bay, Florida. Presented at ERDA Second Thermal Ecol. Symp., Augusta, GA. p. 296-302.

Ecological aspects of the macrobenthic community in the thermally altered vicinity of the P.L. Bartow Power Plant, Tampa Bay were studied from December 1972 to October 1973. Physical and chemical parameters were surveyed. Any seagrasses originally present at the discharge have been nearly destroyed. Transplanted *Thalassia testudinum* were surveyed for only 30 days. Benthic invertebrates included 104 species of polychaetes, crustaceans, echinoderms, and molluscs from the intake area and 60 species from the discharge area. Faunal differences were not attributable to sediment variations.

Study Duration:December 1972-October 1973; Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Faua; Number of Stations:7 transects; Temporal Frequency:Monthly; Abiotic Parameters Measured: DO, temperature, salinity, turbidity, current velocity, tidal levels, sediment characteristics; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Halodule wrightii*;

(19.00007)

Bloom, S.A., J.L. Simon & V.D. Hunter 1972. Animal-sediment relations and community analysis of a Florida estuary. Mar. Biol. 13(1):43-56.

Five species assemblages of the intertidal infauna of Old Tampa Bay were identified. Dominance by one species was found to be the prevalent pattern within the assemblages. The numbers of deposit feeders were found to be inversely correlated to that of the filter feeders, and both trophic types were found to be correlated to the sediment parameters of median grain size, sorting, and skewness. Support was shown for the trophic group - amensalism hypothesis. A view of communities as abstractions from continua was concluded to be more realistic than communities as discrete units.

Study Duration:1968-1969; Habitat:Estuarine; Type of Study:Quantitative; Biological Component:Intertidal infauna; Type of Sampler:Core; Sieve Size:1.0 mm; Number of Stations:9 (3 transects); Number of Replicates/Station:4; Temporal Frequency:March, September, December each year;

(19.00008)

Bros, W.E. 1983. The use of the barnacle shell in the initial phase of development of a marine fouling community in Tampa Bay, Florida. Presented at Benthic Ecol. Meet., Fla. Instit. of Tech., Melbourne.

The importance of barnacles in the development of a subtidal fouling community was investigated in Tampa Bay, Florida. The study revealed the removal of barnacles hinders community development. The barnacle shell, not the barnacle itself, was determined to be the important component for development, promoting subsequent recruitment of semi-sessile and/or motile species. The presence of artificial barnacles, as well as real barnacles, enhanced the rate of community development.

Biological Component:Faua;

(19.00009)

Camp, D.K. 1973. Stomatopod crustacea, Memoirs of the Hourglass Cruises, Vol. III, Pt. II, Fla. Dept. Nat. Resources Mar. Research Lab. 100 p.

Thirteen species of stomatopod crustaceans were collected off Tampa Bay and Sanibel Island. Morphological and meristomatic variations of most species were described. Post larvae and juvenile descriptions were given for some species; data on seasonal recruitment and day or night capture time was provided for some species. Stomach contents analyses from 8 species revealed primarily crustaceans, polychaetes and sediments. Zoogeographic analyses revealed 5 species widely distributed in the Western Atlantic, one reported only from the Gulf of Mexico, 7 West Indian species at the northern limit of their range, and no strictly Carolinian species. Well-defined distributions within the study area were discussed relative to environmental factors, where bottom type appeared to be most important.

Study Duration:August 1965 - November 1967; Habitat:Variable; Type of Study:Qualitative; Biological Component:Stomatopod crustaceans; Type of Sampler:Trynet, box dredge, otter trawl; Number of Stations:10 night, 3 day; Number of Replicates/Station:Variable; Temporal Frequency:Monthly;

(19.00010)

Chen, C.-P. & L.A. Smith 1983. The effect of salinity on oxygen consumption and ammonium excretion in starved *Luidia clathrata* (Say) (Echinodermata: Asteroidea). Fla. Sci. 46(Suppl. 1):21.

Individuals of *Luidia clathrata* collected from Tampa Bay, Florida (28°C, 16 o/oo S) were maintained in the laboratory without food in 2 groups: one group at a salinity of 16 o/oo and another group gradually transferred to 26 o/oo. A portion of the second group was gradually transferred back to 16 o/oo. The oxygen consumption rates of individuals maintained for at least 5 days at 26 o/oo were significantly higher than those maintained at 16 o/oo. The mean rate of ammonium excretion for all groups ranged from 0.06-0.12 ug at N/h/g wet weight.

Study Duration: September 1982; Type of Study: Quantitative; Biological Component: Echinodermata; Abiotic Parameters Measured: Salinity, temperature; Dominant Taxon/Taxa Studied: *Luidia clathrata*;

(19.00011)

Chiou, W. 1976. A study of clay minerals in surface and suspended sediments from the Anclote River and estuary, central Florida. Univ. So. Fla. M.S. Thesis.

Sediment samples from 27 stations in 4 different environments (paludal, fluvial, estuarine, and nearshore marine) in Anclote River basin and Anclote Anchorage were analyzed by x-ray diffraction to determine the clay mineral distribution of the region. The four environments exhibited different clay distribution patterns. Changes in the clay mineral composition within the estuary were related to tidal inflow and river transport.

Study Duration: 18 January-24 May 1975; Habitat: Mud, sand; Type of Study: Quantitative; Type of Sampler: Core; Number of Stations: 27; Abiotic Parameters Measured: Temperature, salinity, pH;

(19.00012)

Churchill, G.J. 1983. The effect of resident populations on colonization. Presented at Benthic Ecol. Meet., Fla. Instit. of Tech., Melbourne.

Containers of azoic sediments were seeded with populations of *Onuphis simoni*, *Scoloplos rubra* and *Tellina lineata* and monitored in situ for 3, 6, 12, or 24 days to examine the influence of resident populations on short term successional trends. Resident species were seeded in high, medium, and low densities (relative to field abundance). The 6 and 12 day samples showed variations in species richness, macrofaunal abundance, and the abundance of component species in response to resident populations. Within treatments, relative abundance of component species, but not species richness, varied with time. The other samples remained to be analyzed.

Type of Study: Quantitative; Biological Component: Fauna; Dominant Taxon/Taxa Studied: *Onuphis simoni*, *Tellina lineata*, *Scoloplos rubra*;

(19.00013)

Dawes, C.J. 1982. Macroalgae of the Tampa Bay estuarine system. Tampa Bay Area Scientific Information Symposium, Tampa, Florida.

Two hundred and twenty one taxa of macroalgae have been identified for Tampa Bay, including 23 blue-green, 68 green, 1 xanthophyte, 30 brown, and 99 red algae. Of these taxa, 69 are primarily tropical, suggesting that the macroalgal flora of Tampa Bay has strong tropical affinities. Intertidal habitats include the substratum surface, bases of mangroves and saltmarsh plants, oyster shells, limestone rubble, pilings, and seawalls. Seagrasses and submerged hard substrata constitute the subtidal habitats. Physiological studies of the intertidal and subtidal macroalgae have demonstrated their broad tolerances to a wide range of salinity (10-50 o/oo), temperature (18-36°C) and light (200 - 2000+ ft-c). Desiccation studies have shown that intertidal species such as the red algae *Bostrychia biaderi* continue photosynthesis at high rates in the air even after 2-3 hours of exposure. Productivity and biomass data for the macroalgae are limited although massive populations of red algae such as *Gracilaria verrucosa* offer the possibility of harvesting for phycocolloid extraction or methane production.

Habitat: Mud, sand, mangrove, shell, seagrass beds, seawall; Type of Study: Quantitative; Biological Component: Flora; Abiotic Parameters Measured: Temperature, salinity, light intensity; Dominant Taxon/Taxa Studied: *Bostrychia biaderi*, *Gracilaria verrucosa*;

(19.00014)

Dawes, C.J., K. Bird, M. Durako, R. Goddard, W. Hoffman & R. McIntosh 1979. Chemical fluctuations due to seasonal and cropping effects on an algal seagrass community. Aquat. Bot. 6(1):79-86.

In February, May, and October benthic algae and *Thalassia testudinum* were collected from caged plots off Tarpon Springs, in order to determine chemical changes in algal and seagrass components seasonally. With highest ash levels in the fall, *T. testudinum* had 30-40% and the algae had 60-70% levels. Protein levels were highest in regrowth plots and in the spring. Most importantly, energy levels were the same throughout the year for both components, demonstrating the importance of algae in seagrass beds.

Study Duration: 9 months; Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Flora; Abiotic Parameters Measured: Ash, protein, percent carbon; Dominant Taxon/Taxa Studied: *Thalassia testudinum*;

(19.00015)

Dawson, C.E., Jr. 1953. A survey of the Tampa Bay area. Fla. Bd. Conserv. Mar. Lab., Tech. Ser. No. 8. 39 p.

The oyster resources and biological and physical conditions of greater Tampa Bay, Florida were surveyed during July and August 1951. Four areas were investigated and the distribution of their oyster stocks determined. Several oyster parasites and predators were identified and qualitatively correlated with oyster distribution. The scarcity of rocky bottom in Tampa Bay was associated with the absence of natural beds below mean low tide. One area of commercial oyster production is identified and other potential areas are recommended for culture programs.

Study Duration: July 1951-May 1952; Habitat: Oyster bars; Type of Study: Quantitative; Biological Component: Mollusca, fauna; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Crassostrea virginica*;

(19.00016)

Derrenbacher, J.A., Jr. & R.R. Lewis, III 1982. Live bottom communities of Tampa Bay. Presented at Tampa Bay Area Scientific Information Symposium, Tampa, Florida.

Live bottom communities in Tampa Bay are composed of two types. The first type, a stenohaline community in lower Tampa Bay, has a diverse composition of the sea whip *Leptogorgia virgulata* Lamarck, the loggerhead sponge *Spherospongia vesparia* (Lamarck), boring sponges *Cliona* spp., tunicates and various algae including *Sargassum filipendula* C. Agardh, occurring together on rock ledges up to 1 m in height. The second type, a euryhaline community on similar ledges in lower Old Tampa Bay, has the same general species composition except for the absence of the loggerhead sponge and *Sargassum filipendula*, apparently in response to the lower and more variable salinities. Other potential areas of live bottom communities are identified.

Type of Study: Review; Biological Component: Fauna and flora; Dominant Taxon/Taxa Studied: *Leptogorgia virgulata*, *Spherospongia vesparia*, *Cliona* spp., *Sargassum filipendula*;

(19.00017)

Detweiller, T. 1974. A preliminary report on natural revegetation rates in disturbed mangrove communities. Proc. First Annu. Conf. on Restor. of Coast. Vegetation in Fla. p. 34.

An undisturbed site as control, a recently disturbed site, and a 3 year old disturbed site were studied for rates of mangrove revegetation in the Tampa Bay area. *Laguncularia racemosa* predominates as the pioneer species. *Avicennia germinans* revegetates at a slower rate. *Rhizophora mangle* is the least common of the three.

Type of Study: Quantitative; Biological Component: Flora; Number of Stations: 3; Dominant Taxon/Taxa Studied: *Laguncularia racemosa*, *Avicennia germinans*, *Rhizophora mangle*;

(19.00018)

Diehl, M.J., III 1978. Effect of nutrition on the excretion rate of soluble nitrogenous products of *Luidia clathrata* (Echinodermata: Asteroidea). Univ. So. Fla. M.S. Thesis.

The excretion rate of sea stars (*Luidia clathrata*) collected from Tampa Bay, Florida, was determined for fed and starved animals. Urea and ammonia excretion rates were measured for sea stars fed *Donax variabilis* and *Penaeus duorarum* or starved. Amino acids were not excreted. Pyloric caecum indices and protein levels of pyloric caeca were monitored. Increased ammonia excretion rates of sea stars on starvation or maintenance diets were attributed to tissue catabolism.

Study Duration: September-November 1977; Type of Study: Quantitative; Biological Component: Echinodermata, fauna; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Luidia clathrata*;

(19.00019)

Doyle, L.J. 1982. Marine geology of Tampa Bay. Tampa Bay Area Scientific Information Symposium, Tampa, Florida.

Tampa Bay is a drowned river-valley complex that was cut into Tertiary limestones and limey sands during lower stands of sea level. At the present high stand, the system is a large, multilobed estuary, mostly less than 6 m deep and containing large areas less than 2 m deep. Surface sediments are mainly quartz sand with up to 40% carbonate content, except for Hillsborough Bay where silts dominate the sediment. Grain size and carbonate content generally decrease from the mouth of the Bay to the head. Carbonatization is slowly occurring through the constant addition of hard parts from benthic invertebrates. The subsurface of the Bay is a complex of depositional environments ranging from estuarine to paludal, to subaerial. Presently little clastic sediment is being added to the system by the small rivers that enter the Bay, but during times of lowering sea level the estuary ceases to exist and the rivers must deliver considerable amounts of clastic sediments well out on the continental margin.

Type of Study: Quantitative; Abiotic Parameters Measured: Depth, carbonate content, grain size;

(19.00020)

Durako, M., R. Medlyn & M. Moffler 1982. Particulate resuspension via metabolically produced gas bubbles from benthic

estuarine communities. *Limnol. Oceanogr.* 27(4):752-756.

Metabolically-produced gas bubbles from interstitial and epibenthic microalgae in seagrass (*Thalassia testudinum*) beds were observed to rise and resuspend absorbed particulate matter. Laboratory culture and in situ measurements in Tampa Bay, Florida yielded similar values for gas production, but particulate mass was higher in the field. The major constituent of the bubbles was photosynthetically-produced oxygen. Resuspended particulate matter was 70-96% inorganic. Organic material consisted of living organisms and detritus. The importance of particulate resuspension in sediment kinetics and nutrient cycles is discussed.

Study Duration: December 1979-February 1980; Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Flora; Dominant Taxon/Taxa Studied: *Thalassia testudinum*;

(19.00021)

Edgren, R.A. 1959. Coquinas (*Donax variabilis*) on a Florida beach. *Ecology* 40(3):498-502.

Fourteen transects of cores were made on Clearwater Beach, Florida, during November 1957, to determine the distribution of coquina clams, *Donax variabilis*. The clams inhabited a zone just seaward of mean high tide to a depth of 1.5 inches. Their distribution of abundance was skewed, approximating a normal curve with the tail extending toward the water. Longshore distribution patterns and the effects of storm erosion are described.

Study Duration: 23-29 November 1957; Habitat: Sand beach; Type of Study: Quantitative; Biological Component: Mollusc fauna; Type of Sampler: Corer; Number of Stations: 14 transects; Temporal Frequency: Daily; Dominant Taxon/Taxa Studied: *Donax variabilis*;

(19.00022)

Ernest, R.G. 1979. Reproductive variability in *Lytechinus variegatus* (Echinodermata: Echinoidea) from different habitats in a Florida west coast estuary. Univ. So. Fla. M.S. Thesis.

Reproductive patterns of the sea urchin, *Lytechinus variegatus*, were examined from monthly collections of urchins from 4 habitats in the Anclote estuary, Florida. The seasonal gametogenic activity of *L. variegatus* is described. Variations in reproductive patterns among subpopulations were attributed to differences in nutrient accumulation, which are controlled by ambient environmental conditions. The annual reproductive cycle of *L. variegatus* is compared to that of distant populations.

Study Duration: November 1974-November 1975; Habitat: Seagrass beds, sand; Type of Study: Quantitative; Biological Component: Echinodermata, fauna; Number of Stations: 4; Temporal Frequency: Monthly; Dominant Taxon/Taxa Studied: *Lytechinus variegatus*;

(19.00023)

Estevez, E.D. 1982. Emergent vegetation of Tampa Bay: A review. Presented at Tampa Bay Area Scientific Information Symposium, Tampa, Florida.

The intertidal plant communities of Tampa Bay are dominated by mangroves and saltmarsh. The mangrove genera *Rhizophora*, *Avicennia*, *Laguncularia*, and *Conocarpus* are present in all parts of the bay. Mangrove growth is greater in south bay than northern areas where freeze damage reduces growth and regeneration. The effects of freezes and rising sea level have obscured typical mangrove zonation patterns. Inland of mangrove forests are salt barrens, coastal and island hammocks, and disturbed or developed land. Productivity estimates for Tampa Bay mangroves differ from those for south Florida. In addition to man-made impacts (mainly dredging and filling), mangroves must endure biotic stresses such as gall-forming fungi, boring insects, and burrowing isopods. Succession in disturbed mangrove areas may lead to renewed mangrove growth or formation of saltmarsh. Saltmarsh occurs upstream of mangroves in the tidally-induced areas of rivers flowing to the bay and on shorelines of upper Old Tampa Bay. The dominant marsh grasses are *Spartina* and *Juncus*. Estimated standing crop, productivity, and habitat value of Tampa Bay saltmarshes have been few, although marsh vegetation has been used extensively in habitat restoration projects.

Habitat: Mangrove forests, saltmarsh; Type of Study: Quantitative; Biological Component: Flora; Dominant Taxon/Taxa Studied: *Rhizophora mangle*, *Avicennia germinans*, *Laguncularia racemosa*, *Spartina alterniflora*, *Juncus roemerianus*;

(19.00024)

Fehring, W.K., C. Giovenco & W. Hoffman 1979. An analysis of three marsh creation projects in Tampa Bay resulting from regulatory requirements for mitigation. In: D.P. Cole (ed.), *Wetlands Restoration and Creation: Proceedings of the Sixth Annu. Conf.*; 16 May, 1979, Tampa, FL. 357 p.

Three wetland creation projects in the Tampa area were examined. The probable success of these projects is discussed in terms of the nature of the responsible organization, ownership of the project site, social acceptance of the project, technique used in planting, and physical factors such as wave energy, elevation, and temperature.

Type of Study: Qualitative; Biological Component: Flora; Dominant Taxon/Taxa Studied: *Spartina*;

(19.00025)

Fiegl, J. 1974. Aspects of the burrowing behavior of *Arenicola cristata* (Annelida; Polychaeta). Univ. So. Fla. M.S. Thesis.

The muscular and behavioral burrowing activity of the polychaete, *Arenicola cristata*, was examined in laboratory experiments. Coelom pressures of the head and proboscis were measured during burrowing and the sequence of longitudinal and circular muscle contractions was determined. Aspects of the digging cycle are described.

Habitat:Mud; Type of Study:Qualitative; Biological Component:Polychaete, fauna; Dominant Taxon/Taxa Studied:*Arenicola cristata*;

(19.00026)

Florida Power Corporation, St. Petersburg, Florida 1983. Anclote units 1 and 2 monitoring program. Final report. In response to:NPDES permit FL0002992.

A two year monitoring program was conducted in the Anclote Anchorage near Tarpon Springs, Florida to determine the effects of thermal effluent from the Florida Power Corporation's Anclote Power Plant on temperature distribution and seagrass growth. Thermal and biological data were collected 12 months before and after the installation of cooling system modifications. A reduction of thermal effects after plant modifications was observed. Thermal discharge had only a limited effect on seagrass abundance.

Study Duration:2 years; Type of Study:Qualitative; Biological component:Flora; Abiotic Parameters Measured:Temperature, salinity, D.O., NH<sub>3</sub>, NO<sub>3</sub>, NO<sub>2</sub>, PO<sub>4</sub>, photosynthetically active radiation; Dominant Taxon/Taxa:*Thalassia testudinum*, *Syringodium filiforme*;

(19.00027)

Ford, E., S. Moore & H.J. Humm 1974. Effect of the Anclote River power plant on seagrass beds in the discharge area. In: Anclote Environmental Project Report, 1974, G.F. Mayer and V. Maynard (eds.). Prepared by Dept. Mar. Sci., Univ. So. Fla. for Fla. Power Corp., St. Petersburg, Fla.

A study was made of the effects of power plant discharge on seagrasses at and around the Anclote River power plant. Many physical aspects of the environments at the 3 stations were studied in conjunction with measures of density of branches, leaf lengths, and leaf growth rates. Differences in seasonal growth and in growth from the three stations were recorded and implications of warm water effluent effects were discussed.

Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Flora; Number of Stations:3; Abiotic Parameters Measured:Sediment character., current dir. & vel., tides, wind, discharge flow, temp., color, sal., light penetration, ammonia, nitrite, nitrate, phosphate; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Syringodium filiforme*, *Diplanthera (Halodule) sp.*;

(19.00028)

Fuss, C.M. & J.A. Kelly, Jr. 1969. Survival and growth of seagrasses transplanted under artificial conditions. Bull. Mar. Sci. 19(2):351-365.

Comparative survival and growth of turtle grass and shoal grass transplanted in aquariums and flow-through seawater tanks were observed. In aquariums, turtle grass survived 7 months and shoal grass 3-1/2 months. In tanks, turtle grass lived through an experimental period of 12 months and produced new leaves, roots, and rhizomes, but only a few shoal grass plants survived.

Study Duration:1 year; Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Benthic flora; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Diplanthera (Halodule) wrightii*;

(19.00029)

Gallagher, S.B. & H.J. Humm 1981. *Vaucheria* (Xanthophyceae: Vaucheriaceae) of the central Florida Gulf coast. Bull. Mar.Sci. 31(1):184-190.

Three species of *Vaucheria* were found to inhabit the intertidal zone of low energy beaches in the greater Tampa Bay area. Two of the species, *V. longicaulis* and *V. litorea*, were newly reported for Florida. All species form dense mats which stabilize fine sediments, appearing by November 1 and disappearing between April 15 and May 15. Their appearance was shown to be initiated by exposure to temperatures of 23°C or less. It is believed that dormant zygotes are produced at the end of each growing season, which survive until the following season. During the warmer months, mat forming blue green algae partially maintain sediments stabilized and accumulated by *Vaucheria* during the cooler months.

Study Duration:1977-1979; Habitat:Intertidal beach; Type of Study:Quantitative; Biological Component:Flora; Number of Stations:14; Temporal Frequency:Bimonthly, or irregularly; Abiotic Parameters Measured:Salinity, water temperature; Dominant Taxon/Taxa Studied:*Vaucheria litorea*, *V. relutina*, *V. longicaulis*;

(19.00030)

Gillespie, L., R.M. Ingle & W.K. Havens, Jr. 1966. Nutritional studies with adult oysters, *Crassostrea virginica* (Gmelin). Fla. Bd. Conserv. Mar. Lab., Tech. Ser. No. 51, 26 p.

Experiments were conducted to assess the nutritional value of several food resources on *Crassostrea virginica*. Soluble glucose was found to be utilized in small amounts by the oysters, but was determined to have limited practical value. No significant growth was attributed to the following food sources: a combination of glucose and hydrolyzed corn protein, 3 microorganism species, dried skimmed milk, dried *Ulva*, and wheat flour. Growth responses were observed in *C. virginica* when fed finely ground corn meal. Results of experiments using corn meal are described.

Study Duration: April-December 1965; Habitat: Oyster bar; Type of Study: Quantitative; Biological Component: Mollusc, fauna; Dominant Taxon/Taxa Studied: *Crassostrea virginica*;

(19.00031)

Hamm, D.C. 1975. Benthic algae of the Anclote River estuary, Tarpon Springs, Florida. Univ. So. Florida, M.S. Thesis.

The seasonality, distribution with respect to substrate, relative abundance, and numbers of species of algae colonizing available substratum in the Anclote estuary was described. A total of 124 taxa, including 18 Cyanophyta, 2 Xanthophyta, 39 Chlorophyta, 15 Phaeophyta, and 50 Rhodophyta were identified from 11 algae habitat categories in the estuary. Range extensions were recorded for 12 species, 6 of which were never previously recorded from the Gulf of Mexico. It was concluded that the Anclote River estuary was one of the best marine environments in North America with respect to its benthic algae.

Habitat: Mud, sand, rock, oyster bars, shell, mangroves, etc.; Biological Component: Benthic algae; Number of Stations: 28; Number of Replicates/Station: 1;

(19.00032)

Hamm, D. & H.J. Hamm 1976. Benthic algae of the Anclote Estuary. II. Bottom dwelling species. Fla. Sci. 39(4):209-229.

A survey of the bottom-dwelling benthic algae was conducted. Some 122 species and 4 varieties of benthic algae were reported from one or more of 10 different substrata, excluding seagrass leaves, or in the drift in the Anclote Estuary.

Study Duration: 1970-1974; Habitat: Rock, mud, grass; Type of Study: Qualitative; Biological Component: Benthic algae; Number of Stations: 28; Number of Replicates/Station: 1;

(19.00033)

Hanni, E. & H.H. Matthews 1977. Benefit-cost study of Pinellas County artificial reefs. Fla. Sea Grant Tech. Pap. No. 1. 44 p.

The costs and potential benefits of artificial reefs were assessed and compared to other modes of disposing of primary raw materials such as tires. Although tires could be buried quite cheaply in land fills, it was suggested that they could be more beneficially used in reef construction, yielding recreational benefits. It was determined that the reef population could reach its sustained level in about 2 years, but could endure for an estimated 1,000 years if the reef was built with tires, and practically forever if built with culvert. Some maintenance was suggested.

Habitat: Artificial reef; Type of Study: Qualitative; Biological Component: Reef flora and fauna;

(19.00034)

Heffernan, J.J. & R.A. Gibson 1982. Seagrass productivity in Tampa Bay: A comparison with subtropical communities. Tampa Bay Area Scientific Information Symposium, Tampa, Florida.

Primary production rates of 3 species of seagrass from Tampa Bay and Indian River, Florida, and the west end of Grand Bahama Island, Bahamas, were compared in October 1981, and February 1982. Productivity estimates for all 3 species were an order of magnitude higher than reported in the literature, with Tampa Bay seagrasses showing the highest productivity rates on both a gravimetric and areal basis. For October, the gravimetric values were 72.6 mgC/g dry wt/hr for *Syringodium filiforme*; 81.2 for *Halodule wrightii*; and 95.0 for *Thalassia testudinum*. *Thalassia* also dominated with an areal productivity rate of 5.2 gC/m<sup>2</sup>/hr, which was 2 times higher than Bahamas grassbeds (2.3). In February, productivity rates for the 3 seagrasses in Tampa Bay were 6.64 mgC/g dry wt/hr (*Thalassia*); 9.6 (*Syringodium*) and 2.98 (*Halodule*). Though *Syringodium* had the highest gravimetric productivity, the large biomass of *Halodule* (26.9 g/m<sup>2</sup> vs. 5.4 for *Syringodium*) made this species the dominant seagrass on an areal basis (100 mgC/m<sup>2</sup>/hr vs. 54 for *Syringodium*). *Thalassia* biomass was low in February (0.41 g/m<sup>2</sup>) and the blades were heavily covered with bryozoans. Comparisons of seagrass epiphytes in February showed Tampa Bay seagrasses had more epiphytic biomass (76% of seagrass weight) than seagrasses in the Indian River (29%) and Bahamas (26%). Productivity of benthic microalgae and phytoplankton were highest in Tampa Bay and lowest in Bahamian waters.

Study Duration: October 1981-February 1982; Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Flora; Temporal Frequency: Twice (Oct. 1981; Feb. 1982); Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Halodule wrightii*, *Syringodium filiforme*;

(19.00035)

Hoenstine, R.W. 1974. A sedimentologic study of Anclote Anchorage with emphasis of littoral current velocities, heavy mineral concentrations, and size analyses. Univ. of Fla. M.S. Thesis. 86 p.

Characteristics of the sediments along Anclote Key, Florida and in the adjacent offshore zone were examined and related to local physical parameters. Sediments were predominantly unimodally distributed, fine grain quartz with less than one percent gravel. The transporting ability of local currents was determined and the sedimentological processes occurring in the area were discussed.

Study Duration: Summer 1971; Habitat: Sand, mud; Type of Study: Quantitative; Abiotic Parameters Measured: Direction, current velocity & direction, sea state, sediment grain size, turbidity, salinity, temperature, wind velocity;

(19.00036)

Hoffman, W.E., M.J. Durako & R.R. Lewis, III 1982. Habitat restoration in Tampa Bay, Florida. Presented at Tampa Bay Area Scientific Information Symposium, Tampa, Florida.

Tampa Bay has suffered substantial loss of emergent and submergent wetland vegetation (44% and 81%, respectively) due to stress with subsequent reduction of habitat. Fourteen habitat restoration projects in Tampa Bay are reviewed. Most projects have been successful, resulting in establishment of approximately 11 hectares of emergent vegetation. Current techniques not yet employed in Tampa Bay, including large scale mangrove seeding, interplanting of *Spartina* and mangroves are discussed briefly. Future research in areas of nursery and propagation methods, identification and development of superior genetic materials, seagrass techniques, and cost efficiency of all plantings are recommended. Future plantings are urged to maximize the restored area's value as a habitat, especially in remote areas for maximum use by local fauna.

Type of Study: Quantitative; Biological Component: Flora; Dominant Taxon/Taxa Studied: *Spartina alterniflora*, *S. patens*, *Juncus*, *Thalassia*, *Uniola*, *Paspalum*;

(19.00037)

Humm, H.J., R.C. Baird, K.L. Carder, T.L. Hopkins & T.E. Pyle 1971. Anclote Environmental Project Annual Report 1970. Univ. So. Florida, Mar. Sci. Instit. Rept. for Florida Power Corp. 172 p.

Geological, physical, water quality, bacteriological, seagrass, algae, benthic invertebrate and fish studies were initiated at Anclote Estuary to provide baseline information prior to the construction and operation of a power generation facility. Species lists for seagrasses and algae of the area were provided. Descriptions of benthic communities as they relate to sand and grass habitats were provided.

Study Duration: 1 year; Habitat: Grassbeds, sand; Type of Study: Quantitative and qualitative; Biological Component: Flora and fauna; Type of Sampler: Trawl, meter square & diver core (10 cm dia. 15 cm depth); Number of Stations: 12; Number of Replicates/Station: 4; Temporal Frequency: Once; Dominant Taxon/Taxa Studied: *Penaeus duorarum*, *Callinectes sapidus*, *Lytechinus variegatus*;

(19.00038)

Hummel, R.L. 1980. Environmental factors affecting *Chione cancellata* (Linne), Leisey Shell Pit, Ruskin, Florida. Fla. Sci. 43(Suppl. 1):43.

Dead shells of *Chione cancellata* from Leisey Shell Pit, Ruskin, Florida were examined to determine the evolutionary effect of temperature, salinity, and substrate on the size and shape of the bivalve. The site consists of fossiliferous sand three feet thick, representing deposition of brackish to high salinity environments under gradual shoaling and restriction of a broad, deep estuary. No evolutionary changes in the bivalve shape were detected. Temperature had no significant effect on distribution or growth. The density of *C. cancellata* was influenced primarily by salinity. Substrate texture affected the size and mortality rate of the bivalve. Areas of fine grained sediments contained populations of smaller-sized *C. cancellata* with high juvenile mortality rates.

Habitat: Shell pit; Type of Study: Quantitative; Biological Component: Mollusc fauna; Dominant Taxon/Taxa Studied: *Chione cancellata*;

(19.00039)

Hunter, C. 1980. Seasonal distribution, reproductive patterns, and host location ability of the Hesionid polychaete *Podarke obscura* Verrill, commensal on the sea urchin *Lytechinus variegatus* (Lamarck). Univ. of So. Fla. M.S. Thesis.

Ten to 62 sea urchins (*Lytechinus variegatus*) were collected monthly from the Gulf of Mexico near St. Petersburg, Florida, between February 1977 and October 1979, and all individuals of the symbiotic polychaete, *Podarke obscura*, removed. Seasonal variations in the number, size, and sexual maturity of *P. obscura* are identified and the life cycle of the polychaete is described. Neither juvenile nor adult *P. obscura* could consistently locate host urchins; possible explanations and implications of this inability are proposed.



Study Duration: February 1977-October 1979; Habitat: Sand, seagrass bed; Type of Study: Quantitative; Biological Component: Polychaete and Echinoderm, fauna; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature; Dominant Taxon/Taxa Studied: *Podarke obscura*, *Lytechinus variegatus*;

(19.00040)

Hutton, R.F., B. Eldred, K.D. Woodburn & R.M. Ingle 1956. The ecology of Boca Ciega Bay with special reference to dredging and filling operations. Fla. St. Bd. Conserv. Mar. Lab., St. Petersburg, Tech. Ser. No. 17, Pt. 1. 87 p.

A study of the ecology of Boca Ciega Bay was conducted. Protected animal habitats, breeding and feeding grounds for marine animals, and sport and commercial fishing were all determined to be constantly decreasing. The decrease was mainly the result of filling and dredging operations being carried out in the Bay. It was concluded that the continuance of dredging and filling operations on the shallow banks along the west coast of Florida where *Thalassia testudinum* grows abundantly could result in harm to the fishing industries and thus jeopardize the economy of the entire state.

Study Duration: 4 months; Habitat: Grassbed, estuarine; Type of Study: Qualitative; Biological Component: Flora, fauna; Type of Sampler: Rectangular dredge & hand collections; Number of Stations: 15; Abiotic Parameters Measured: Temperature, salinity, pH, light, total phosphorus;

(19.00041)

Jordan, W.R. 1978. Sampling a macrobenthic infaunal sand community in a subtropical estuary. Univ. So. Florida, M.S. Thesis.

The effects of using different sampling devices, depths of penetration, and mesh sizes to quantify the mollusc and polychaete assemblages of a benthic infaunal sand community were investigated. Similarity was found to be greater within sampler types than between them (i.e., grabs were more similar to one another than they were to the cores, and vice versa). Fewer significant differences were found between sampling devices when capture efficiency was evaluated in terms of diversity and evenness, rather than on the basis of biomass abundance and species richness. The grab samplers generally underestimated biomass, abundance, and the number of species, due to their shallow penetration. Core samplers were recommended for quantitative benthic studies because: 1) the sample was usually not excessive; 2) they have a high degree of reproducibility; and 3) they penetrate to the same depth over the entire surface area sampled. Sample size was determined to be a compromise between statistical accuracy and practical limitations of time and manpower available. A maximum penetration depth of 10 cm was recommended for quantitative benthic studies. The 0.5 mm sieve was recommended for washing benthic samples.

Habitat: Sand; Type of Study: Technique; Biological Component: Benthic infauna; Type of Sampler: Grabs, cores;

(19.00042)

Kelly, J.A., Jr., C.M. Fuss, Jr. & J.R. Hall 1971. The transplanting and survival of turtle grass, *Thalassia testudinum*, in Boca Ciega Bay, Florida. Fish. Bull. 69(2):273-280.

The transplanting and survival of turtle grass was studied in Boca Ciega Bay, Florida. Turtle grass was transplanted to an unvegetated dredge canal and a hand-cleared portion of a flourishing grassbed. Fourteen methods were tested with the best resulting in 100% success and the others in varying degrees of less success. The best method involved the dipping of short shoots (rhizomes removed) in a solution of plant hormone (Naphthalene acetic acid), and attaching them to construction rods for transplanting. Tampa Bay is near the northern limit of the flowering capability of *Thalassia* and thus this paper was limited to the transplantation of adult plants.

Study Duration: July 1966 - October 1977; Habitat: Grassbeds; Type of Study: Qualitative; Biological Component: Benthic flora; Dominant Taxon/Taxa Studied: *Thalassia testudinum*;

(19.00043)

Kern, J.C. & S.S. Bell 1983. Variation in size-structure of harpacticoid copepods on small spatial scales in Tampa Bay, Florida. Presented at Benthic Ecol. Meet., Fla. Instit. of Tech., Melbourne.

Variations in population size-structure, density, sex ratio, percentage of gravid females, and clutch size were examined for 2 harpacticoid copepod species collected from 2 stations in Tampa Bay, Florida. Only size-structure differed significantly between stations for *Zausodes arenicollis*. *Enhydrosoma* sp. was significantly more abundant at the shallow station than at the deeper one. Samples from a second sampling were still being processed.

Study Duration: 15 July-26 August 1982; Habitat: Sandflat; Type of Study: Quantitative; Biological Component: Crustacea; Type of Sampler: Corer; Number of Stations: 2 (1st sampling), 4 (2nd sampling); Temporal Frequency: Twice; Dominant Taxon/Taxa Studied: *Zausodes arenicollis*, *Enhydrosoma* sp.;

(19.00044)

Lane, J.M. 1977. Bioenergetics of the sand dollar, *Mellita quinquiesperforata*. Univ. of So. Fla. Ph.D. Dissertation.

Energy budgets for individuals and populations of the sand dollar, *Mellita quinquiesperforata*, were determined by measuring all possible sources of energy intake and expenditure. Parameters measured included rates of feeding, glycine uptake, respiration, dissolved organic carbon and ammonia release, and body and gonad growth. Monthly measurements were also made of the biochemical and caloric content of whole animals, gonads, silt-clay portion of sediment ingested, absorption efficiencies, and population dynamics. Data are given for all measurements, and an energy model for body and gonad growth of an individual sand dollar was formulated. Predictions of growth by the model agreed closely with observed values.

Habitat: Sand; Type of Study: Quantitative; Biological Component: Echinoderms; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature, sediment grain size; Dominant Taxon/Taxa Studied: *Mellita quinquiesperforata*;

(19.00045)

Lawrence, J.M. & P.F. Dehn 1979. The biological characteristics of *Luidia clathrata* from Tampa Bay and the shallow waters of the Gulf of Mexico. Fla. Sci. 42:9-13.

The population of the primitive platyasteroid starfish, *Luidia clathrata* (Say) in Tampa Bay differs from those found in the shallow waters of the Gulf of Mexico in lacking regenerating arms, having a better nutritional condition as indicated by higher caecal indices, and having a greater reproductive capacity as indicated by higher gonadal indices. The lack of regenerating arms probably is a result of lower energy water in the bay; the better nutritional condition and reproductive capacity undoubtedly reflects the better food supplies in the bay. For open waters to have localities of equal suitability would require a water depth sufficient to reduce surface water energy and to increase the amount of appropriate infaunal food.

Study Duration: November 1971 & 1972, January 1974, September 1975; Habitat: Sand; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Hand; Number of Stations: 4; Temporal Frequency: Yearly; Dominant Taxon/Taxa Studied: *Luidia clathrata*;

(19.00046)

Levine, I.A. 1980. Biomass and colonization of the benthic marine algae of lower Tampa Bay. Univ. of So. Fla. M.S. Thesis.

The standing crop and annual production of benthic flora along the Sunshine Skyway Bridge over lower Tampa Bay, Florida, were measured from September 1978 to October 1979. Total biomasses of 3 species of seagrass (*Thalassia*, *Syringodium*, *Halodule*), epiphytic algae, and epilithic algae were compared. Seagrass leaf density and lengths were determined. Colonization of benthic algae was investigated by making monthly measurements of biomass of algal growth on artificial substrate.

Study Duration: September 1978-October 1979; Habitat: Seagrass bed, rock; Type of Study: Quantitative; Biological Component: Flora; Temporal Frequency: Monthly; Dominant Taxon/Taxa Studied: *Thalassia*, *Syringodium*, *Halodule*;

(19.00047)

Levine, I.A. 1980. A study of the benthic flora along the Sunshine Skyway, Tampa Bay. Fla. Sci. 43(Suppl. 1):15.

The biomasses of seagrasses and benthic marine algae along the Sunshine Skyway, lower Tampa Bay, Florida were compared in a year long ecological study. The average standing crops of *Halodule*, *Thalassia* and *Syringodium*, and their respective epiphytic algae are reported. Total epilithic algae standing stock, seagrass leaf density, and leaf lengths were also determined.

Study Duration: 1 year; Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Flora; Dominant Taxon/Taxa Studied: *Halodule wrightii*, *Thalassia testudinum*, *Syringodium filiforme*;

(19.00048)

Lewis, C.S. 1976. The seasonal distribution of *Haplocytheridea septipunctata* (Brady) (Ostracoda) in a thermally altered area of Tampa Bay, Florida. Univ. of So. Fla. M.S. Thesis.

Specimens of *Haplocytheridea septipunctata* were collected around the P.L. Bartow power plant in Tampa Bay to determine their distribution and the extent of the influence of the thermally elevated conditions.

Type of Study: Quantitative; Biological Component: Fauna; Dominant Taxon/Taxa Studied: *Haplocytheridea septipunctata*;

(19.00049)

Lewis, R.R., III, M.J. Durako, M.D. Moffler & R.C. Phillips 1982. Seagrass meadows of Tampa Bay -- A review. Tampa Bay Area Scientific Information Symposium, Tampa, Florida.

Seagrass meadows presently cover approximately 5,750 ha of the bottom of Tampa Bay, an 81% reduction from the historical coverage of approximately 30,970 ha. Five species of seagrass are found in the estuary: *Thalassia testudinum* Banks ex König (turtle grass); *Syringodium filiforme* Kützinger (manatee grass); *Halodule wrightii* Ascherson (shoal grass); *Ruppia maritima* Linnaeus (widgeon grass); and *Halophila engelmannii* Aschersson. The dominant species

are turtle grass and shoal grass. The meadows are subdivided into 5 types: 1) ephemeral; 2) healthy fringe perennial; 3) stressed fringe perennial; 4) mid-bay shoal perennial; and 5) colonizing perennial. The general characteristics of these meadow types are discussed, and the habitat values, physiological ecology, and reproductive biology are summarized. Preliminary work in revegetation to restore lost meadows is explained.

Habitat: Seagrass beds; Type of Study: Quantitative; Biological Component: Flora; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Syringodium filiforme*, *Halodule wrightii*, *Ruppia maritima*, *Halophila engelmannii*;

(19.00050)

Lewis, R.R., III & F.M. Dustan 1974. Use of spoil islands in reestablishing mangrove communities in Tampa Bay, Florida. In: Proc. of the Internat. Symp. on Biol. & Management of Mangroves. Vol. II. G. Walsh, S. Snedaker & H. Teas (eds.), p. 766-775.

A study of configurations of spoil islands created from channel dredging in Tampa Bay, Florida was conducted to determine the ideal shape and size of spoil islands for establishing mangrove communities and avifaunal rookeries. Transects of floral communities and counts of avifauna were conducted over an 18 month period to characterize existing spoil island communities. Historical analysis indicated that natural islands in the bay had a longer term stability than man made islands. Stabilization by physical and vegetative methods were suggested for existing and proposed spoil islands.

Study Duration: 18 months; Habitat: Spoil islands; Type of Study: Qualitative; Biological Component: Mangroves; Number of Stations: 17; Temporal Frequency: Weekly; Dominant Taxon/Taxa Studied: *Rhizophora mangle*, *Avicennia germinans*, *Laguncularia racemosa*;

(19.00051)

Lombardo, R. 1981. The influence of sediment type on the burrowing and tube-building behavior of the amphipod *Amphelisca verrilli* Mills. Univ. of So. Fla. M.S. Thesis.

A laboratory and field investigation was conducted to determine the influence of sediment type on substratum selection, burrowing, and tube construction by the amphipod *Amphelisca verrilli*. Comparison of the mean grain size of *A. verrilli* tubes and that of local sediment indicated a grain size preference by *A. verrilli*. Relationships between animal size, tube size, and grain size were examined. Animal length was directly correlated with tube width. Tube length and sediment porosity were also found to be related.

Habitat: Sand, mud; Type of Study: Quantitative; Biological Component: Crustacea, fauna; Abiotic Parameters Measured: Sediment grain size; Dominant Taxon/Taxa Studied: *Amphelisca verrilli*;

(19.00052)

Lowe, E. 1975. Absorption efficiencies, feeding rates and food preferences of *Lytechinus variegatus* (Echinodermata: Echinoidea) for selected marine plants. Univ. of So. Fla. M.S. Thesis.

A feeding study of the sea urchin, *Lytechinus variegatus*, revealed that it consumes primarily substratum and various plant materials, particularly grass blade litter and drift algae. The absorption efficiencies of *L. variegatus* for various organic materials are summarized. The feeding rate of *L. variegatus* was found to be similar to that of other echinoids. It is considered a generalist, selecting foods which are easily available and ingested.

Type of Study: Qualitative; Biological Component: Echinoderm, fauna; Dominant Taxon/Taxa Studied: *Lytechinus variegatus*;

(19.00053)

Mahadevan, S. 1979. A review and evaluation of the 316 Demonstration. (Vol. M-Benthos) by Florida Power Corp. on the Anclote Generating Unit No. 1. EPA, Region 4, Surveillance and Analysis Div., Tech. Rept. Contract No. 68-01-501.

The 316 Demonstration Report (Benthos) prepared by Florida Power Corporation in support of the once-through cooling system at Anclote Power Plant was reviewed and support data re-evaluated. Conclusions by the report's authors on the seagrass, macroalgae, epiphyte, epiphytic diatom and scallop studies were justified and indicate adverse environmental impact at the study site. The applicability and reliability of macrofaunal data (cores and trawls) in discerning 'thermal effects' was questioned on the basis of inadequate methodology. Recommendations included a reduction of thermal discharge and continued ecological monitoring in the area.

Habitat: Sand, grassbed; Biological Component: Benthic flora and fauna;

(19.00054)

Mahadevan, S. 1981. Marine sampling and measurement program off northern Pinellas County - A technical report submitted to the Environmental Protection Agency, Atlanta. 519 p. EPA Report #90419-82-102, September 1982.

This technical report summarized the results of marine sampling and measurement program conducted by Mote Marine Laboratory off northern Pinellas County (Florida) during two periods: May 27 through June 2, 1980 and October 13 through November 4, 1980. The purpose of the study was to collect baseline data for assessing the potential environmental

impact of a proposed offshore sewage outfall in the study area. The program included the collection of physical, meteorological, chemical, biological, and sediment data from a 512 square km area in the eastern Gulf of Mexico. Patchy hard bottom habitats were prevalent throughout the study area. Benthic faunal studies revealed the existence of extremely diverse (538 different taxa), heterogeneous and productive communities. Sediment, hydrography, water quality, phytoplankton, and zooplankton studies were also conducted. The fauna of four artificial reefs was described.

Study Duration: May 27-June 2, 1980, October 13-November 4, 1980; Habitat: Sand; Type of Study: Quantitative; Biological Component: Flora and fauna; Type of Sampler: Core; Sieve Size: 0.5 mm; Number of Stations: 21; Number of Replicates/Station: 8; Abiotic Parameters Measured: Temperature, salinity, DO; Dominant Taxon/Taxa Studied: Nematoda spp., *Branchiostoma caribaeum*, *Acanthohastorius* sp., *Ophelia* sp.;

(19.00055)

Mahadevan, S. & G.W. Patton 1979. A study of sieve (screen mesh opening) size effects on benthic fauna collected from Anclote Anchorage. EPA, Region 4, Surveillance and Analysis Div., Tech. Rept. Contract No. 68-01-5016, 26 p.

Benthic faunal samples were collected from four different habitats in Anclote Sound in order to evaluate the effects of sieve size (0.5 and 1.0 mm sizes) in describing benthic community structure. A total of 217 different taxa were identified from 5,440 organisms collected. Pronounced changes in species composition, faunal density, species richness, species diversity, evenness, and similarity were evident when the smaller sieve size was utilized. Results of the present study were applied to evaluate a previous environmental impact study conducted at the site with a 1.0 mm sieve. The 1.0 mm size was found to be inadequate to describe the community structure at the study site.

Study Duration: 1 day; Habitat: Sand, grassbed; Type of Study: Technique; Biological Component: Benthic macrofauna; Type of Sampler: Core; Sieve Size: 0.5, 1.0 mm; Number of Stations: 4; Number of Replicates/Station: 5; Temporal Frequency: Once; Dominant Taxon/Taxa Studied: *Prionospio heterobranchia*, *Cynadusa compta*, *Aricidea fragilis*, *Amphelisca abdita*, *Amphelisca holbesi*, *Fabricia* sp., *Caecum pulchellum*, *Caecum nitidum*, *Haplocytherida setipunctata*, Nematoda (unid. sp), *Retusa canaliculata*;

(19.00056)

Mayer, G.F. & V. Maynard 1975. Anclote Environmental Project Report 1974. Univ. So. Florida, Mar. Sci. Instit. Rept. for Florida Power Corp. 526 p.

Geological, physical, water quality, phytoplankton, primary productivity, benthic algae, seagrass, ichthyoplankton, bay scallop and fish studies were continued at Anclote Estuary to provide baseline data and data on initial operational effects of a power plant. Preliminary seagrass studies showed that the power plant's heated effluents were stimulating growth during the winter. Bay scallop studies showed that mortality was greater in thermally altered areas.

Study Duration: 1 year; Habitat: Grassbeds, sand; Type of Study: Quantitative; Biological Component: Flora and fauna; Type of Sampler: Quadrats; Number of Stations: 16; Number of Replicates/Station: Variable, 1-5; Temporal Frequency: Variable; Dominant Taxon/Taxa Studied: *Argopecten radians*, *Lytechinus variegatus*, *Styela plicata*, *Thalassia*, *Syringodium*, *Diplanthera* (*Halodule*), *Halophila*;

(19.00057)

McClintock, J. 1980. An optimization study on the feeding behavior of *Luidia clathrata* Say (Echinodermata: Asteroidea). Univ. of So. Fla. M.S. Thesis.

Laboratory experiments were conducted on *Luidia clathrata* to determine its rates of feeding, behavioral responses to changes in prey density, selection for different sizes of prey, and field activity patterns. High rates of location, ingestion, and digestion of prey were observed. Responses to prey size and density were determined. Diurnal patterns in feeding activity of *L. clathrata* in the field are described. The results are explained in terms of optimal feeding theory.

Study Duration: October-November 1979; Type of Study: Quantitative; Biological Component: Echinoderm, fauna; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Luidia clathrata*;

(19.00058)

McClintock, J.B. 1983. Switching behavior in the soft bottom benthic predator *Luidia clathrata* (Say) (Echinodermata: Asteroidea). Presented at Benthic Ecol. Meet., Fla. Instit. of Tech., Melbourne.

The feeding response of *Luidia clathrata* to varying relative frequencies of 2 types of food (agar models containing homogenized tissues of the bivalve, *Doxa variabilis* or the crustacean, *Penaeus duorarum*) was studied in laboratory experiments. Over 12 days of gradually varying the densities of the 2 foods from 4:1 to 1:4 *L. clathrata* consumed disproportionately more of the abundant food at the extreme ratios. Physiological responses are proposed for the observed feeding behavior, which may be important in maintaining density dependent mortality of prey populations.

Study Duration: 12 days; Type of Study: Quantitative; Biological Component: Echinodermata; Dominant Taxon/Taxa Studied: *Luidia clathrata*;

(19.00059)

McLaughlin, P.A. 1976. A new species of *Lightiella* (Crustacea: Cephalocarida) from the west coast of Florida. Bull. Mar. Sci. 26(4):593-599.

A new species of Cephalocarida from the west coast of Florida, *Lightiella floridana*, was described, illustrated and compared with other species of the genus. This species represents the eight Cephalocarid species to be recognized and the first species known to occur in the Gulf of Mexico.

Habitat: Sand, grassbed; Type of Study: Qualitative; Biological Component: Crustacean fauna; Type of Sampler: 15 cm x 15 cm benthic sampler (posthole digger); Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Lightiella floridana*;

(19.00060)

Moffler, M., M. Durako & W. Grey 1981. Observations on the reproductive ecology of *Thalassia testudinum* (Hydrocharitaceae). Aquat. Bot. 10:183-187.

An early fruit stage of *Thalassia testudinum* found in midwinter indicated that this seagrass, previously thought to have a single flowering in spring and summer, may have a second reproductive cycle. Early reproductive bud presence was detected in January 1979, and examination of 309 short shoots revealed that 44% were reproductive. Increased water temperature and short day photoperiod are theorized as primary factors in *Thalassia* floral induction.

Study Duration: January-June 1979; Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Flora; Number of Stations: 1; Number of Replicates/Station: 15; Temporal Frequency: Single collection; Dominant Taxon/Taxa Studied: *Thalassia testudinum*;

(19.00061)

Moore, S.J. 1976. Growth of *Syringodium filiforme* in thermally stressed and unstressed areas of the Anclote River estuary, Tarpon Springs, Florida. Univ. So. Florida, M.S. Thesis.

Growth rates for *Syringodium filiforme* were determined at a thermally affected area and at an area away from the thermal plume of the Anclote power plant. A new procedure was developed for marking *S. filiforme* leaves using a needle and thread technique. Growth rates were higher at the experimental station than at the control station during the cooler months of the year. During the warmer part of the year, growth at the control station was higher than at the experimental station. Water temperature at the experimental station was usually 2.0 to 3.0°C higher, with a maximum of 5.0°C higher than the control. During the summer of 1975, a blue-green alga, *Microcoleus lyxbyaceus*, formed a heavy growth over the seagrass beds at the experimental station, but not at the control station.

Study Duration: 1 year; Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Benthic flora; Number of Stations: 2; Number of Replicates/Station: 2; Temporal Frequency: Weekly to biweekly; Abiotic Parameters Measured: Temperature, salinity, light, nutrients, sedimentation; Dominant Taxon/Taxa Studied: *Syringodium filiforme*;

(19.00062)

Murdoch, J.D. 1976. The importance of substratum characteristics on the ability to burrow of two species of amphipod ophiuroids (Echinodermata). Univ. of So. Fla. M.S. Thesis.

The influence of substratum characteristics on the burrowing speed of two ophiuroid species, *Ophiophragmus filigraneus* and *O. murdumani*, was investigated in laboratory experiments. Sediment from the habitats of the 2 species had different granulometries. The burrowing time of both species was affected by the diameter of the particle of homogeneous samples of glass beads. The burrowing time of *O. murdumani* in mixtures of glass beads was correlated with water content of the substratum. Differences in burrowing rates of the 2 species in natural substrata are explained in terms of variations in arm manipulability, tube foot volume, arm width, and other morphological characteristics.

Study Duration: March-August 1976; Habitat: Mud, sand; Type of Study: Quantitative; Biological Component: Echinoderm, fauna; Number of Stations: 2; Abiotic Parameters Measured: Temperature, salinity, sediment grain size; Dominant Taxon/Taxa Studied: *Ophiophragmus filigraneus*, *O. murdumani*;

(19.00063)

Olson, F.C.W. 1953. Tampa Bay studies, Report No. 1. Oceanogr. Instit. Fla. State Univ., Contrib. No. 19:1-27.

A study was undertaken to look at the corrosion problem in Tampa Bay. The problem was found to be more complex than first believed, and so the study was expanded. Attempts were made to understand the hydrographic and biological conditions in the Bay. This report describes the work conducted to date and some of the data gathered thus far.

(19.00064)

Peters, K. 1981. Reproductive biology and developmental osteology of the Florida blenny, *Chasmodes saburrae* (Perciformes: Blenniidae). Northeast Gulf Sci. 4(2):79-98.

The reproductive biology and life history of the Florida blenny, *Chasmodes saburrae*, were described. Field spawning

occurs from early March until early November, peaking in April/May and September. Nests are usually made in oyster shells and contain about 120 eggs/cm<sup>2</sup>. Average egg diameter is 0.82 mm; eggs hatch in 6 days at 27°C. The planktonic larvae are 3.2-3.7 mm standard length at hatching and settle to the bottom in 21 days in laboratory experiments. Larval development is described.

Study Duration: January-December 1978; Type of Study: Quantitative; Biological Component: Pisces; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Chasmodes saburrae*;

(19.00065)

Phillips, R.C. 1960. Environmental effect on leaves of *Diplanthera* du Petit-Thouars. Bull. Mar. Sci. Gulf Caribb. 10(3):346-353.

*Diplanthera* (*Halodule*) was collected from three tidal zones from various Florida locations. Three growth conditions were found which corresponded to these tidal zones. The first, found in areas exposed both at neap and spring low tides, consisted of dwarf-sized plants. The second, found in areas exposed only at spring low tides, were intermediate in size. The third condition, found in areas never exposed, displayed plants of luxuriant size. Leaf length, leaf width, rhizome thickness, and rhizome internode length were found to be affected by the tidal environment. Two vegetative characters, leaf apex and internal anatomy, have previously been considered to be valid in separating the two species of *Diplanthera*, *D. uniseriis* and *D. wrightii*. The author found that these factors were variable in *D. wrightii* according to the tidal zone in which these plants were found. It is concluded that these two characters are not valid for distinguishing the two species.

Study Duration: September 19, 1958; Habitat: Grassbeds; Type of Study: Qualitative; Biological Component: Flora; Type of Sampler: Hand; Abiotic Parameters Measured: Tidal zonation; Dominant Taxon/Taxa Studied: *Diplanthera* (*Halodule*) *uniseriis*, *Diplanthera* (*Halodule*) *wrightii*;

(19.00066)

Phillips, R.C. 1960. Observations on the ecology and distribution of the Florida seagrasses. Fla. Bd. Conserv. Prof. Pap. Ser. 2, 72 p.

The ecology and distribution of the seagrasses *Thalassia testudinum*, *Diplanthera* (*Halodule*) *wrightii*, *Syringodium filiforme* and *Ruppia maritima* in the Tampa Bay area were studied. Optimum temperatures for all four species range between 20-30°C. Dense *Thalassia* growth seems to be restricted to areas with a salinity over 25 ‰, while *Ruppia* seems to prefer water of less than 25 ‰. The other two species seemed to thrive in moderately brackish water. In all species studied except *Ruppia*, vegetative reproduction appears to be almost exclusively the method of reproduction.

Study Duration: September 1957-April 1959; Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Flora; Type of Sampler: Core; Number of Stations: 9; Temporal Frequency: Monthly; Abiotic Parameters Measured: Turbidity, sediments, temperature, salinity; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Diplanthera* (*Halodule*) *wrightii*, *Syringodium filiforme*, *Ruppia maritima*;

(19.00067)

Phillips, R.C. 1962. Distribution of seagrasses in Tampa Bay, Florida. Fla. State Bd. Conserv. Mar. Lab., Spec. Sci. Rept. No. 6. 12 p.

The seagrasses of Tampa Bay, Florida, were surveyed at 98 stations during autumn 1960. High water turbidity apparently limited the depth of seagrass growth to 6 ft (MLW). Two zones of seagrasses were identified in most areas. Generally, *Ruppia* or *Diplanthera* (*Halodule*) were dominant nearshore (approximately intertidal), while *Syringodium* was abundant in areas below the spring low tide level. Although *Ruppia* and *Diplanthera* (*Halodule*) were often present in the *Syringodium* zone, they were never abundant. *Thalassia* growth was sparse, probably as a result of ambient salinities below its optimum.

Study Duration: Autumn 1960; Habitat: Seagrass bed; Type of Study: Qualitative; Biological Component: Flora; Number of Stations: 98; Abiotic Parameters Measured: Water temp., depth, salinity, water clarity, tide, substrate type; Dominant Taxon/Taxa Studied: *Thalassia*, *Diplanthera* (*Halodule*), *Syringodium*, *Ruppia*;

(19.00068)

Phillips, R.C. & V.G. Springer 1960. Observations on the offshore benthic flora in the Gulf of Mexico off Pinellas County, Florida. Am. Midland Nat. 64(2):362-381.

Collections of marine algae from the limestone reefs 9 to 20 miles offshore Pinellas County in 35 to 60 ft of water were studied. Eleven species were newly reported for the state and 47 species represented northward range extensions from the Dry Tortugas. A somewhat constant relationship between the various algae groups was seen. The factors that might regulate the relationships were reported undetermined.

Study Duration: 1 year; Type of Study: Qualitative; Biological Component: Benthic flora; Type of Sampler: Scuba; Abiotic Parameters Measured: Temperature (surface & bottom); Dominant Taxon/Taxa Studied: *Sargassum filipendula*, *Halimeda*

scabra, *Rhipocephalus phoenix*;

(19.00069)

Proffitt, C.E. 1983. Small area disturbance in two subtidal infaunal communities: are there general effects? Presented at Benthic Ecol. Meet., Fla. Instit. of Tech., Melbourne.

Recolonization of 2 shallow sandy bottom infaunal habitats was studied after artificial small area perturbation. Cumulative area, patch size, and frequency of disturbance were varied in experimental treatments. Recolonization rates varied between communities with total infaunal density and species richness, although recolonization by original resident species was rapid. Multiple disturbances produced more "general changes" than did single disturbances in both habitats.

Habitat:Sand; Type of Study:Quantitative; Biological Component:Fauna;

(19.00070)

Quick, J.A., Jr. (ed.) 1971. A preliminary investigation: The effect of elevated temperature on the American oyster *Crassostrea virginica* (Gmelin). A symposium. Fla. Dept. Nat. Resour. Mar. Res. Lab. Prof. Pap. Ser. No. 15. 190 p.

The effects of constant 35°C temperatures on the survival and well being of *Crassostrea virginica* were investigated in terms of 5 parameters: fluctuations of chemical composition of tissues; seasonal condition; histology; parasitology (particularly *Labyrinthomyxa marina*); and changes in reproductive activity. Oyster mortality at constant 35°C and approximate field salinities were not substantial, but various responses were observed during long term exposures (1-4 weeks) including altered gametogenesis, glycogen decreases, and tissue damage. Use of histology to determine sublethal effects was found to be extremely valuable.

Study Duration:June 1979-May 1970; Type of Study:Quantitative; Biological Component:Oysters; Abiotic Parameters Measured:Temperature, salinity, DO, pH; Dominant Taxon/Taxa Studied:*Crassostrea virginica*;

(19.00071)

Rogers, S.W. 1972. Sediments of a seagrass bed in Anclote Anchorage, Tarpon Springs, Florida. Univ. So. Florida, M.S. Thesis.

Seagrasses were found at all stations sampled between water depths of 0.15 m and 1.37 m. Total biomass figures ranged from 0.6 to 547.1 g/m<sup>2</sup>. *Thalassia testudinum* attained a maximum biomass of 533.0 g/m<sup>2</sup>, *Syringodium filiforme* - 234.6 g/m<sup>2</sup>, and *Diplanthera (Halodule) wrightii* - 535.2 g/m<sup>2</sup>. Sediment characters (percent silt and clay, percent sand, percent gravel, median phi diameter, mean phi diameter, sorting, percent organic carbon, and percent CaCO<sub>3</sub>) were calculated and were correlated to the presence and growth of seagrasses. The Anclote Anchorage was determined to be a recently stable area of uniform fine quartz sand with geographically localized substrates containing large amounts of gravel and silt/clay. Abundant seagrass and benthic fauna populations associated with these sediments were observed.

Study Duration:1 summer; Habitat:Grassbed, sand; Type of Study:Quantitative; Biological Component:Benthic flora; Abiotic Parameters Measured:Sediment characteristics; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Syringodium filiforme*, *Diplanthera (Halodule) wrightii*;

(19.00072)

Ross, F. 1975. Sedimentary structures and animal-sediment relationships: Old Tampa Bay, Florida. Univ. of So. Fla. M.S. Thesis.

Sediment samples from 41 stations in Old Tampa Bay, Florida were analyzed to determine the textural type and distribution, characteristic sedimentary structures and modes of origin, distribution of geologically significant macrofauna, and nature and amount of bioturbation. Four sedimentary facies were identified in Old Tampa Bay based on physical and biogenic characteristics: clean sand, muddy sand, mud, and marginal sand. The tidal circulation and wave types of each facies area are described. A mathematical model was constructed using sediment distribution data to predict circulation patterns in the bay.

Study Duration:January 1974; Habitat:Sand, mud; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:M.E.L. spade corer; Number of Stations:41; Number of Replicates/Station:2; Abiotic Parameters Measured:iediment grain size;

(19.00073)

Saloman, C.H. 1974 . Physical, chemical, and biological characteristics of nearshore zone of Sand Key, Florida, prior to beach restoration. Vols. 1 & 2. Natl. Mar. Fish. Serv. Gulf Coast. Fish. Ctr., Panama City Lab, Pt. IX. 168 p.

An ecological study of the nearshore zone off Sand Key, Florida, was conducted prior to beach restoration. The distributional patterns of the twelve major taxa were found to vary considerably relative to distance from shore, and parallel to the beach. The average number of species and the diversity index gradually increased as distance from shore increased.

Habitat:Sand; Type of Study:Quantitative; Biological Component:Benthic fauna; Sieve Size:0.701 mm; Number of Stations:208; Number of Replicates/Station:4; Temporal Frequency:Monthly;

(19.00074)

Saloman, C.H. 1978. Occurrence of *Lightiella floridana* (Crustacea: Cephalocaridea) from the west coast of Florida. Bull. Mar. Sci. 28(1):210-212.

The occurrence of a Cephalocaridea (*Lightiella floridana*) was reported from the nearshore zone of the Gulf of Mexico. It was previously reported from the protected waters of Anclote Anchorage, Florida, in *Thalassia* sp. beds. Specimens occurred in substrates that were hard, gray shelly sand with the amount of silt and clay less than 1%. Sand-size particles averaged 74%. Total carbon and organic material averaged 6.5% and 22.3%, respectively.

Study Duration:1 year; Habitat:Hard shelly sand; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:1/64 m<sup>2</sup> plug; Sieve Size:0.701 mm; Number of Stations:208; Temporal Frequency: ; Abiotic Parameters Measured:Sediment characteristics; Dominant Taxon/Taxa Studied:*Lightiella floridana*;

(19.00075)

Saloman, C.H. & J.L. Taylor 1969. 1968 Proceedings: Age and growth of large southern quahogs from a Florida estuary. Proc. Natl. Shellfish. Assoc. 59:46-51.

Collections of southern quahogs, *Mercenaria campechiensis*, from an estuary in Boca Ciega Bay resulted in four clams with shell lengths exceeding the previous size record. The largest measured 179 mm in length, and the estimated age of the oldest was 22 years. The rate of growth was determined to be at least three times that of northern quahogs.

Study Duration:2 days; Habitat:Sand, silty sand; Type of Study:Qualitative; Biological Component:Mollusc fauna; Type of Sampler:Rake; Number of Stations:1; Dominant Taxon/Taxa Studied:*Mercenaria campechiensis*, *Thalassia testudinum*, *Halodule (Diplanthera) wrightii*;

(19.00076)

Santos, S.L. 1972. Distribution and abundance of the polychaetous annelids in Lassing Park, St. Petersburg, Florida. Univ. So. Florida, M.S. Thesis.

Samples collected from Lassing Park, St. Petersburg, Florida revealed it to be an area of relative homogeneity even though it was composed of zones of different marine monocots interspersed with sandy areas. The particle size distribution of the sediment remained constant throughout the year. Classification analysis (Czekanowski's coefficient-group average sorting) showed that different faunal assemblages existed in different zones, but that in fact, only one assemblage was present which varied in season and space in densities of the individual species.

Study Duration:10 months; Habitat:Grassbeds, sand; Type of Study:Quantitative; Biological Component:Polychaete fauna; Type of Sampler:PVC core (10 cm depth; 10 cm inside dia.); Sieve Size:0.5 mm; Number of Stations:5; Number of Replicates/Station:2; Temporal Frequency:Every 3 months; Abiotic Parameters Measured:Temperature, salinity, DO, sediment analysis; Dominant Taxon/Taxa Studied:*Onuphis eremita oculata*, *Prionospio heterobranchia*, *Fabricia sabella*, *Capitella capitata*, *Streblospio benedicti*, *Clymenella mucosa*, *Lunbrineris tenuis*, *Heteronastus filiformis*, *Laeonereis culveri*;

(19.00077)

Santos, S.L. & J.L. Simon 1974. Distribution and abundance of the polychaetous annelids in a south Florida estuary. Bull. Mar. Sci. 24(3):669-689.

The abundance and distribution of the polychaetous annelids in Lassing Park estuary were studied. No seasonal differences in particle size distribution of sediment were found. The *Thalassia* zone was found to support the largest number of organisms. It was shown that different assemblages of polychaetes were not associated with different vegetative zones. The densities of the individual species from one area varied by season and by zone.

Study Duration:1 year; Habitat:Grassbeds; Type of Study:Quantitative; Biological Component:Polychaete fauna; Type of Sampler:PVC core; Sieve Size:0.5 mm; Number of Stations:20; Number of Replicates/Station:1; Temporal Frequency:Quarterly; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Onuphis eremita oculata*, *Prionospio heterobranchia*, *Fabricia sabella*, *Capitella capitata*, *Streblospio benedicti*, *Clymenella mucosa*, *Lunbrineris tenuis*, *Heteronastus filiformis*, *Laeonereis culveri*;

(19.00078)

Savage, T. 1971. Effect of maintenance parameters on growth of the stone crab, *Menippe mercenaria* (Say). Fla. Dept. Nat. Resour. Mar. Res. Lab., Spec. Sci. Rept. No. 28. 19 p.

Growth studies of the stone crab, *Menippe mercenaria*, were performed with 12 captive crabs collected from Tampa Bay, Florida. Use of improved diet, higher temperatures, and larger enclosures than a previous growth study resulted in shorter intermolt periods and increased growth rates comparable to those of natural populations.



Study Duration: September 1968-April 1969; Type of Study: Quantitative; Biological Component: Crustacea; Dominant Taxon/Taxa Studied: *Menippe mercenaria*;

(19.00079)

Savage, T. 1971. Mating of the stone crab, *Menippe mercenaria* (Say) (Decapoda; Brachyura). Crustaceana 20(3):315-316.

The mating of a pair of captive stone crabs, *Menippe mercenaria*, is described. The two crabs were found in the hole of a concrete block in the mating position with the male in the superior position, cradling the female with its walking legs; the female, freshly molted, was inverted in the inferior position with its telson curved over the male's carapace. Both crabs were missing one chela, the absence of which did not appear to present either crab from mating successfully. The mating position was maintained for at least 4.5 hr. Another mating pair of stone crabs was observed in the same position in the field.

Study Duration: May 31-July 15, 1970; Habitat: Concrete tank; Type of Study: Qualitative; Biological Component: Crustacea, fauna; Dominant Taxon/Taxa Studied: *Menippe mercenaria*;

(19.00080)

Savage, T. 1978. The 1972 experimental mangrove planting -- an update with comments on continued needs. In: D.P. Cole (ed.), The Restoration of Coastal Vegetation in Florida: Proc. of the Fifth Annu. Conf., May 13, 1978; Tampa, Fla. 255 p.

A series of experiments was initiated in 1969 for the purpose of assessing the use of native mangroves for shoreline stabilization and protection. This report deals with the surviving experimental plants which have been followed over the years. The results are reviewed in terms of current research needs. A number of areas for research are suggested.

Study Duration: 7 years; Type of Study: Qualitative; Biological Component: Flora; Dominant Taxon/Taxa Studied: *Rhizophora mangle*;

(19.00081)

Savage, T. & M.R. McMahan 1968. Growth of early juvenile stone crabs, *Menippe mercenaria* (Say, 1819). Fla. Bd. Conserv. Mar. Res. Lab., Spec. Sci. Rept. No. 21. 17 p.

Eighty stone crabs (*Menippe mercenaria*) ranging in size from 1.40 to 33.28 mm carapace width were collected from Tampa Bay, Florida, from October 1965 to October 1966 and raised under laboratory conditions. Ecdysis, claw development, pleopod development, and regeneration of appendages were observed daily. Carapace width and length, frontal-orbital width, and frontal width were measured at termination of the study in August 1967. Descriptions are given of carapace growth, cheliped development, and molting frequency.

Study Duration: October 1965-August 1967; Type of Study: Qualitative; Biological Component: Crustacea fauna; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Menippe mercenaria*;

(19.00082)

Savage, T. & J.R. Sullivan 1978. Growth and claw regeneration of the stone crab, *Menippe mercenaria*. Fla. Mar. Res. Publ. No. 32. 23 p.

Incremental growth of carapace width and length and major and minor claws was measured for laboratory-maintained and feral stone crabs. Morphometric relationships were derived for male and female carapace width against major and minor claw sizes. All slopes were significantly different at the 95% confidence levels except for carapace width against female major and male minor claw sizes. Incremental growth of feral male crabs was greater than that of feral female crabs for all measurements. Laboratory females averaged more carapace width growth but less claw growth than did laboratory males. Laboratory growth of all parameters was more uniform but incrementally less than corresponding field growth. Sexual maturity and legal size are attained at 10 and 30 months, respectively, according to a hypothetical growth plot constructed from incremental growth of several crabs. Stone crab claw regeneration is pictorially described. Minor claws regenerated to a larger size after one and two molts (73.5% and 96.5% of preautotomized sizes) than did major claws (68.6% and 89.0%). Intermolt interval of laboratory crabs increased with larger carapace width sizes. Claw loss decreased or increased the intermolt duration depending upon whether the claw was removed shortly after a molt or later in the cycle.

Study Duration: December 1969-January 1973; Type of Study: Quantitative; Biological Component: Crustacea, fauna; Dominant Taxon/Taxa Studied: *Menippe mercenaria*;

(19.00083)

Savage, T., J.R. Sullivan & C.E. Kalman 1974. Claw extraction during molting of a stone crab, *Menippe mercenaria* (Decapoda; Brachyura; Xanthidae). Fla. Mar. Res. Publ. No. 4. 5 p.

Observations on the molting behavior of a captive adult stone crab, *Menippe mercenaria*, are reported. Sutural structures on proximal claw segments, which allow extraction of larger diameter distal segments during molting, are

described. In a survey of 24 brachyuran species, most species with subequal diameter (subcylindrical) claws were found to lack these sutural structures. Those with claws having distally larger diameters (subtriangular) possess sutural structures. Exceptions are noted.

Study Duration: June 23, 1972; Type of Study: Qualitative; Dominant Taxon/Taxa Studied: *Menippe mercenaria*;

(19.00084)

Schlieder, R.A. 1980. Effects of desiccation and autospasy on egg hatching success in stone crabs, *Menippe mercenaria*. U.S. Fish Wildl. Serv. Fish. Bull. 77(3): 695-700.

Desiccation of eggs by air exposure of ovigerous female stone crabs reduced larval hatching success in direct relationship to duration of exposure. Experimental claw removal resulted in 34.4% mortality of crabs exposed 2 hrs and 52.9% of crabs exposed 5 hrs. Normal crab autotomic muscular reflex was weakened by desiccation. The compound effects of desiccation with stress from autospasy or claw loss on egg and larval mortality are discussed. Adverse effects on the stone crab fishery by exposure of ovigerous female crabs are noted and protection methods are proposed.

Study Duration: March-September 1977; Type of Study: Quantitative, laboratory; Biological Component: Crustacea, fauna; Abiotic Parameters Measured: Salinity, air & water temp., DO, nitrite & ammonia levels; Dominant Taxon/Taxa Studied: *Menippe mercenaria*;

(19.00085)

Simon, J.L. 1965. Feeding in the annelid *Eteone heteropoda*. Quart. J. Fla. Acad. Sci. 28(4): 370-372.

A series of observations and experiments on the feeding behavior of *Eteone heteropoda*, a small phyllodocid were reported. *Eteone* is an inhabitant of sandy intertidal flats. The observations were made on the flats along the south side of Courtney Campbell Causeway. The experiments indicated that *E. heteropoda* is a carnivore as well as a deposit feeder. *Eteone* was observed to be a deposit feeder while the tide is in and a predator when the tide is out.

Study Duration: 2 months; Habitat: Sandy intertidal flats; Type of Study: Qualitative; Biological Component: Polychaete fauna; Dominant Taxon/Taxa Studied: *Eteone heteropoda*;

(19.00086)

Simon, J.L. & S. Mahadevan 1982. Benthic macroinvertebrates. Presented at Tampa Bay Area Scientific Information Symposium. Tampa, Florida.

Approximately 70 publications on benthic macroinvertebrates from Tampa Bay were reviewed. Subjects of the studies were diverse, including commercially important species (*Penaeus duorarum*, *Crassostrea virginica*, *Menippe mercenaria*), seagrass associated fauna, and large scale benthic infaunal communities. Principal objectives of these investigations included life history studies, studies on recolonization and repopulation, and evaluations of dredge/fill, sewage, phosphoric wastes, and thermal effects. Based on these studies, the following general conclusions were reached: 1) approximately 1,200 infaunal and epifaunal benthic species inhabit Tampa Bay; 2) seasonal fluctuations in the abundance and diversity of benthic macroinvertebrates are pronounced; 3) long term (about 5 yrs) cyclic defaunation occurs regularly; 4) seagrass beds have declined with a subsequent decrease in faunal diversity; 5) opportunistic and "pollution indicator" species are abundant at several locations, particularly in Hillsborough Bay; 6) faunal distribution appears to be controlled by sediment type; 7) species richness increases and abundance decreases on a north to south gradient in the bay. Reasons for this gradient are proposed and directions for future research in the bay are recommended.

Type of Study: Review; Biological Component: Fauna; Dominant Taxon/Taxa Studied: *Crassostrea virginica*, *Penaeus duorarum*, *Menippe mercenaria*;

(19.00087)

Sims, H.W., Jr. 1964. Large quahog clams from Boca Ciega Bay. Quart. J. Fla. Acad. Sci. 27(4): 348.

Four large (149.5, 155.5, 160, 168 mm) southern quahog clams, *Merccenaria campechiensis*, were found at Redington Beach, in upper Boca Ciega Bay. Three of the four clams constitute new size records for the species. The previous maximum size record was a specimen in the U.S. National Museum collection measuring 153 mm. The 168 mm clam weighed 6.5 lbs. The clams were found on a sandbar composed of a mixture of sand, mud, and silt, and sparingly covered with *Thalassia* and *Syringodium*. The ambient water temperature and salinity were 20°C and 32 ‰, respectively.

Study Duration: December 23-29, 1964; Habitat: Sand/mud; Type of Study: Qualitative; Abiotic Parameters Measured: Substrate type, water temperature, salinity; Dominant Taxon/Taxa Studied: *Merccenaria campechiensis*;

(19.00088)

Sims, H.W., Jr. & R.J. Stokes. 1967. A survey of the hard shell clam (*Merccenaria campechiensis*) (Gmelin) population in Tampa Bay, Florida. Fla. Bd. Conserv. Mar. Lab., Spec. Sci. Rept. No. 17. 8 p.

The entire shoreline of Tampa Bay was surveyed in order to locate beds of the hard shell clam, *Merccenaria*

campechiensis. The largest and most productive clam beds were located in lower Boca Ciega Bay south to Mullet Key. Small beds were found on the western shoreline north of St. Petersburg Municipal Piers. The eastern shore from lower Hillsborough Bay to just north of the Skyway Bridge was devoid of clams. No correlation was found between sediment particle size and clam population density.

Study Duration: December 1964-June 1965; Type of Study: Qualitative; Biological Component: Fauna; Type of Sampler: Commercial clam rake; Number of Stations: 100; Abiotic Parameters Measured: Temperature, salinity, water depth; Dominant Taxon/Taxa Studied: *Mercenaria campechiensis*;

(19.00089)

Stahl, L.E. 1970. The marine geology of Tampa Bay. Fla. State Univ. M.S. Thesis.

Sediment samples were collected from a recently dredged channel in lower Tampa Bay, Florida, to determine its stratigraphy and lithology. The geological history of the estuary is summarized. The sources of the sediments and their accumulation rates are given.

Type of Study: Qualitative; Number of Stations: 19; Abiotic Parameters Measured: Sediment grain size;

(19.00090)

Stevely, J.M. 1978. The effects of heated effluent on the infaunal bivalve, *Chione cancellata* (Linne). Univ. of So. Fla. M.S. Thesis.

The distribution of *Chione cancellata* was investigated in the Anclote Estuary, Florida, between November 1973 and December 1975 to assess the effect of thermal effluent from the Anclote River Power Plant. Abundance of *C. cancellata* was higher in seagrass beds than on sandy bottoms and was completely absent near the intake canal. After plant operation began in the summer, *C. cancellata* was eliminated from the plume area, but successful recruitment did occur in the plume area during cooler months. A cage study was also conducted to examine thermal effects on survivorship and reproduction of *C. cancellata*.

Study Duration: November 1973-December 1975; Type of Study: Quantitative; Biological Component: Mollusc, fauna; Abiotic Parameters Measured: Temperature, suspended particulate load; Dominant Taxon/Taxa Studied: *Chione cancellata*;

(19.00091)

Studt, J.F. 1976. Chronic in situ exposure of the bay scallop *Argopecten irradians concentricus* (Say) to a thermal effluent in a Florida Gulf coast estuary. Univ. So. Florida, M.S. Thesis.

Scallops were most abundant at mid-depth in mixed seagrass beds. The density of scallops decreased with increased proximity to the Anclote River and none were found on the seagrass beds east of Anclote Key. Spawning occurred during the late fall and throughout much of the winter. This period was coincident in time with decreasing temperature and phytoplankton production. The muscle was apparently responsible for greater mortality (compared to the ambient station), a reduction in reproductive amplitude and therefore also in larval recruitment potential. Scallops were found to spawn later in the season in Anclote than reported for populations from Beaufort, NC or Woods Hole, MA, and for a longer period than either of the other areas.

Study Duration: 6 months; Habitat: Grassbed; Type of Study: Qualitative; Biological Component: Bay scallop; Type of Sampler: 1 m<sup>2</sup> tubular frames & predator exclusion cages; Number of Stations: 11; Number of Replicates/Station: 10; Abiotic Parameters Measured: Temperature, salinity, total suspended load, chlorophyll 'a'; Dominant Taxon/Taxa Studied: *Argopecten irradians concentricus*;

(19.00092)

Sykes, J.E. 1966. Report of the Bureau of Commercial Fisheries Biological Station, St. Petersburg Beach, Fla., Fiscal Yr. 1965. U.S. Dept. Int. Fish Wildl. Serv., Contrib. No. 25, Circ. 242. 30 p.

Results of the benthic project conducted in Tampa Bay, Boca Ciega Bay and Tierra Verde from June 1963 to the winter of 1964 were reported. Aspects studied include invertebrate taxonomy, analyses of sediment and hydrographic data, and economic evaluation of the estuarine resources in Tampa Bay. Considerable attention was paid to the economic evaluation of the estuarine resources, in order to provide information helpful in curtailing further destruction by dredging and pollution.

Study Duration: 6 months; Habitat: Estuarine; Type of Study: Qualitative; Biological Component: Benthic flora and fauna; Number of Stations: 400 (Tampa Bay), 28 (Boca Ciega Bay); Abiotic Parameters Measured: Temperature, salinity, pH, sediment analysis; Dominant Taxon/Taxa Studied: *Branchiostoma caribaeum*, *Mercenaria campechiensis*, *Macrocallista nimbosa*, *Spisula solidissima similis*;

(19.00093)

Sykes, J.E. 1966. Estuarine research program, Benthic Project, In: Rept. Bur. of Comm. Fish. Biol. Sta., St. Petersburg Beach, FL. Fiscal Yr. 1962-1964. U.S. Dept. Int., Fish Wildl. Serv., Bur. Comm. Fish., Contrib. No. 23, Circ. 239. 26 p.

Aims of the benthic research project for Tampa Bay and Boca Ciega Bay, Florida, established in June 1963 were discussed. An area checklist of marine invertebrates, algae and seagrasses, including quantitative biological and ecological information was to be compiled. Additionally, quantitative determinations of bottom communities, with size and weight estimates of dominant plants and animals per unit of area would be included. Another study would include the relationship of bottom indicator organisms to the sources of pollution in Tampa Bay and to changing hydraulic conditions. Biological surveys that precede and follow major engineering projects (that disturb natural waters and sediments) were to be conducted. Life history and zoogeographic studies were also anticipated.

Study Duration: 2 years; Type of Study: Qualitative; Biological Component: Benthic flora and fauna; Abiotic Parameters Measured: Salinity, pH;

(19.00094)

Sykes, J.E. 1971. Implications of dredging and filling in Boca Ciega Bay, Florida. *Envir. Lett.* 1(2):151-156.

Implications of the dredging which took place in Boca Ciega Bay 15 to 20 years ago were reported. Siltation, development, dead-end canals, phosphorus and nitrogen levels, coliform count, planning, and guidelines were discussed. Two alternative courses of action were suggested for protecting the remaining resource and recreational aspects of the Bay.

Type of Study: Qualitative; Biological Component: Flora and fauna; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Penaeus duorarum*;

(19.00095)

Sykes, J.E. & J.R. Hall 1970. Comparative distribution of mollusks in dredged and undredged portions of an estuary, with a systematic list of species. *Fish. Bull.* 68(2):299-306.

The distribution of molluscs in dredged and undredged portions of an estuary were compared. A much smaller number and variety of species of benthic molluscs were found in the soft sediments of dredged canals than in the predominantly sand and shell sediments of undredged areas. The samples contained an average of 60.5 individuals and 3.8 species in undredged areas, and 1.1 individuals and 0.6 species in dredged canals. One hundred sixty-eight species of molluscs (69 families) were identified from the study.

Study Duration: 1 year; Habitat: Sand, shell, fine sediment; Type of Study: Quantitative; Biological Component: Molluscs; Type of Sampler: Bucket dredge and bottom drag; Sieve Size: 0.701 mm; Number of Stations: 31;

(19.00096)

Taylor, J.L. & C.H. Saloman 1968. Some effects of hydraulic dredging and coastal development in Boca Ciega Bay, Florida. *Fish. Bull.* 67(2):213-241.

Some effects of hydraulic dredging and coastal development on Boca Ciega Bay were discussed. It was estimated that the losses due to the filling of the Bay by hydraulic dredging has reduced Boca Ciega Bay by about 20% since 1950. In terms of annual production, the minimum estimates of loss were 25,841 metric tons of seagrass, 73 metric tons of fishery products and 1,091 metric tons of infauna, exclusive of meiofauna. Secondary losses due to sedimentation, turbidity, and domestic sewage was suggested to add additional inestimable losses.

Study Duration: 9 months; Habitat: Grassbed; Type of Study: Qualitative; Biological Component: Flora and fauna; Type of Sampler: Shovel, bucket dredge, bottom drag; Number of Stations: 10; Temporal Frequency: Quarterly; Abiotic Parameters Measured: Temperature, salinity, DO, pH, water clarity, total phosphorus, chlorophyll 'a';

(19.00097)

Taylor, J.L. & C.H. Saloman 1972. Nereid shell blisters in the southern quahog clam. *Quart. J. Fla. Acad. Sci.* 35(1):21-26.

Shell blisters in Boca Ciega Bay quahogs were discovered in a sample of living clams collected. Incidence of blisters in that period averaged 37% and ranged from 30% (March and October 1969) to 51% (December 1969). The nereid, *Neanthes arenaceodentata*, was described to be a possible threat to hard clam fisheries.

Study Duration: 1 day; Type of Study: Qualitative; Biological Component: Mollusc fauna; Dominant Taxon/Taxa Studied: *Mercenaria campechiensis*, *Neanthes arenaceodentata*, *Neanthes caudata*;

(19.00098)

Taylor, J.L., C.H. Saloman & K.W. Prest, Jr. 1973. Harvest and regrowth of turtle grass (*Thalassia testudinum*) in Tampa Bay, Florida. *Fish. Bull.* 71(1):145-148.

The harvest and regrowth of turtle grass in Boca Ciega Bay was studied. It was found that turtle grass beds could sustain periodic cutting without apparent damage at intervals of about 2 months during the growing season. Leaves harvested in the growing season had an equivalent or greater rate of regrowth and reached the height of uncut plants in about 2

months. For each month the average number of shoots produced by both cut and uncut plants was nearly the same.

Study Duration:1 year, 3 months; Habitat:Grassbeds; Type of Study:Qualitative; Biological Component:Benthic flora; Number of Stations:1; Number of Replicates/Station:1; Temporal Frequency:Monthly & weekly; Dominant Taxon/Taxa Studied:*Thalassia testudinum*;

(19.00099)

Thorhaug, A., M.J. Blake & P. Schroeder 1978. The effect of heated effluents from power plants on seagrass (*Thalassia*) communities quantitatively comparing estuaries in the subtropics to the tropics. Mar. Poll. Bull. 9(7):181-186.

The effects of thermal effluent from power plants on *Thalassia testudinum* grassbeds were studied in 4 seagrass dominated estuaries located in subtropical and tropical environments. The 4 estuaries were Tampa Bay, Florida (central subtropics); Biscayne Bay and Card Sound, Florida (border between subtropics and tropics); and Guayanilla Bay, Puerto Rico (central tropics). Sustained temperatures of 5°C above ambient water in summer denuded *Thalassia* communities in all 4 estuaries. Temperatures +1 to +1.5°C caused minimal damage to seagrass areas. Temperatures between 1.5 and 5°C above summer ambient temperatures had intermediate effects dependent on the latitudinal location of the estuary.

Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Flora; Abiotic Parameters Measured:Temperature; Dominant Taxon/Taxa Studied:*Thalassia testudinum*;

(19.00100)

Thorhaug, A., M.A. Roessler and P.A. McLaughlin 1977. (Revised Jan. 1978) Benthic biology of Anclote Anchorage, Volume IV, part 1, 2, and 3. In: Florida Power Corporation Post-operational Ecological Monitoring Program 1976, Final Report, Anclote Unit No. 1. 625 p.

The effects on the benthos caused by the Anclote Power Plant, adjacent to Tarpon Springs, Florida were studied as part of a requirement for a 316a Demonstration. Definitive data was collected on the seasonal quantitative and qualitative characteristics of the benthic fauna and seagrass/macrophytic algae communities. Specific study components included in the report are: physico-chemical parameters, sediment parameters, benthic fauna, seagrasses, benthic macroalgae, epiphytes, benthic diatoms, blue crab catches, scallop mortality. The annual average temperature of affected stations was determined to not be increased by more than 3° C. This increase was concluded to not have altered annual or monthly invertebrate and fish species abundance estimates nor measures of invertebrate community structure. Seagrass biomass and abundance was, however, significantly affected.

Study Duration:One year; Habitat:Sand, grassbed; Type of Study:Qualitative, quantitative; Biological Component:Benthic flora and fauna; Type of Sampler:Core, trawl, diver meter square, aerial photographs, crab traps, scallop cages; Sieve Size:1.0 mm.; Number of Stations:38; Number Replicates/Station:5 (benthic cores) Temporal Frequency:Monthly (benthic cores) Abiotic Parameters Measured:Temperature, salinity, D.O., conductivity, pH, wind speed, current velocity, water clarity, sediment analysis; Dominant Taxon/Taxa:*Aricidea fragilis*, *Tellina versicolor*, *Cynadusa compta*, *Diastoma varium*, *Nitrella lunata*, *Callinectes sapidus*, *Argopecten irradians concentricus*, *Halodule wrightii*, *Halophila engelmanni*, *Syringodium filiforme*, *Thalassia testudinum*;

(19.00101)

Torpey, J., R.M. Ingle, L. Gillespie & W.K. Havens 1966. Experiments with oyster purification in Florida. Proc. Natl. Shellfish. Assoc. 56(May):43-47.

Twelve experiments on purifying oysters of coliform bacteria, using ultraviolet light as the sterilizing agent, were conducted in a recirculating water tank. Oysters were purified by the depuration unit using low circulation rates at water temperatures of 24 to 26°C. No special cleaning procedure of the bivalves was necessary. In all but one experiment, acceptable bacterial levels of meats were reached within 12 hrs. In 7 tests the bacterial counts of the water dropped to or remained at zero within 4 hrs and in all experiments, within 24 hours. Bacterial levels were not affected by the removal of fecal material.

Study Duration:October 15, 1964-May 18, 1965; Type of Study:Quantitative; Biological Component:Oysters; Abiotic Parameters Measured:Temperature, salinity, pH ;

(19.00102)

Turner, R.L. 1974. Post-metamorphic growth of the arms in *Ophiophragmus filigraneus* from Tampa Bay, Florida (USA). Mar. Biol. 24(3):273-277.

The growth pattern of juveniles of *Ophiophragmus filigraneus* was studied using samples collected in Tampa Bay from August 1972 to August 1973. A growth pattern previously unreported was found. Two non adjacent arms grow faster than the other 3 arms. Possible adaptive mechanisms are avoidance of salinity and temperature avoidance, or earlier descent of the disc into the substratum with continued ability to feed on the surface with the arm tips. Arm lengths gradually equalize.

Study Duration: August 1972-August 1973; Type of Study: Quantitative; Biological Component: Fauna; Dominant Taxon/Taxa Studied: *Ophiophragmus filigraneus*;

(19.00103)

Van Breedveld, J.F. 1966. Preliminary study of seagrass as a potential source of fertilizer. Fla. Bd. Conesrv. Mar. Lab., Spec. Sci. Rept. No. 9. 23 p.

A study was conducted to determine the efficiency of seagrass as a fertilizer. Production of tomatoes and strawberries was higher when seagrasses were used. Other benefits of using seagrass, such as its availability, inexpensiveness, and lack of preparation are cited.

Study Duration: October 1963-May 1964; Type of Study: Quantitative; Biological Component: Flora; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Syringodium filiforme*, *Diplanthera (Halodule) wrightii*, *Ruppia maritima*;

(19.00104)

Van Breedveld, J.F. 1975. Transplanting of seagrasses with emphasis on the importance of substrate. Fla. Dept. Nat. Resources, Mar. Research Lab. Fla. Mar. Res. Publ. No. 17. 26 p.

Past seagrass transplant experiments emphasized the use of anchoring devices rather than the suitability of substrate. *Thalassia testudinum* was determined to need a reduced (anaerobic) environment, while *Halodule wrightii* required an oxidized (aerobic) substrate. *Syringodium filiforme* was found to be able to thrive in either a reduced or oxidized sediment. Transplanting should be done in a clump of 4 to 7 shoots with a few intact rhizome apices; the original substrate should be transferred with the plants. Plantings should be done close together thus offering the roots and rhizomes a favorable environment from the beginning, and allowing them gradually to stabilize the surrounding area. Additionally, at least three rows should be planted in plot formation for increased protection and transplant success.

Study Duration: 1 year; Habitat: Grassbeds; Type of Study: Qualitative; Biological Component: Benthic flora; Type of Sampler: Posthole digger; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Halodule wrightii*, *Syringodium filiforme*;

(19.00105)

Van Vleet, E.S., S.B. Reinhardt 1983. Inputs and Fates of Petroleum Hydrocarbons in a Subtropical Marine Estuary. Environ. Int. 9(1):19-26.

Petroleum hydrocarbons were measured in municipal wastewater, urban stormwater drains, sediments and benthic organisms in and around Tampa Bay. Lower concentrations of hydrocarbons were found in effluents from tertiary and secondary treatment plants in this area than the concentrations reported for treatment plants in temperate regions. Warmer temperatures in this subtropical system may result in increased metabolic rates of microorganisms and more rapid degradation or metabolism of the petroleum hydrocarbons.

Type of Study: Qualitative; Biological Component: Benthic fauna; Abiotic Parameters Measured: Petroleum hydrocarbons;

(19.00106)

Watts, S.A. 1983. Seasonal changes in activity of *Luidia clathrata* (Echinodermata: Asteroidea). Fla. Sci. 46(Suppl. 1):22.

Seasonal variations in activity of *Luidia clathrata* in Tampa Bay, Florida were measured by changes in righting time and prey handling time. Activity was found to be directly related to both temperature and salinity. Activity was maximum in the summer and minimum in the winter. Laboratory activity experiments indicated that *L. clathrata* does not acclimate to temperature. Low activity in late summer and winter may cause a decline in feeding and subsequent nutrient storage, thereby decreasing the reproduction potential of the seastars the following spring.

Study Duration: 15 months; Type of Study: Quantitative; Biological Component: Echinodermata; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Luidia clathrata*;

(19.00107)

Wicks, S.R. 1980. Evidence of nitrogen fixing bacteria on seagrasses. Caribb. J. Sci. 15(3-4):149-152.

Six species of free living, nitrogen-fixing bacteria were found to be abundant on the leaves and rhizomes of 3 seagrass species in Tampa Bay, Florida. *Azobacter agilis* was found on turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*), and shoal grass (*Diplanthera (Halodule) wrightii*). *Rhodospirillum rubrum* was isolated from shoal and turtle grass. *Thiobacillus traufweinii* and 3 anaerobic species were isolated from the rhizomes from all 3 seagrass species. The presence of nitrogen-fixing bacteria on seagrasses indicate that they may contribute to the fixed nitrogen budget of the seagrass community.

Study Duration: June-July 1973; Habitat: Seagrass beds; Type of Study: Qualitative; Biological Component: Bacteria, flora; Number of Stations: 2; Dominant Taxon/Taxa Studied: *Azobacter agilis*, *Rhodospirillum rubrum*, *Thiobacillus traufweinii*, *T. denitrificans*, *Methanobacterium omelianskii*, *Desulfovibrio desulfuricans*;

(19.00108)

Willis, S.A., W.K. Havens & R.M. Ingle 1976. Quality improvement of oyster, *Crassostrea virginica* (Gmelin) using artificial foods. Fla. Mar. Res. Publ. No. 20. 16 p.

Improvement of oysters (*Crassostrea virginica*) condition through use of artificial food in flow-through and recirculating water systems was investigated. Glycogen stores increased from 0.62 to 6.68% in two weeks using finely ground corn meal. Smaller oysters grew more rapidly than did larger ones. Superior water quality was achieved with the flow-through system, and two layers of oysters allowed optimal usage of tank space without restricting water flow. Adaptations in feeding amount, tank cleaning, and dissolved oxygen content were made to compensate for seasonal temperature differences. High quality oysters (11.9% glycogen) were produced during summer conditions using the artificial feeding regime; availability of suitable food, rather than temperature, is the key factor.

Study Duration: September 1971-January 1973; Type of Study: Quantitative; Biological Component: Mollusc, fauna; Abiotic Parameters Measured: Temperature, DO, salinity; Dominant Taxon/Taxa Studied: *Crassostrea virginica*;

(19.00109)

Zuberer, D. 1976. Biological nitrogen fixation: a factor in the establishment of mangrove vegetation. Proc. Third Annu. Conf. on Restoration of Coast. Vegetation in Fla. p. 37-56.

The study of mangroves in Tampa Bay identified the important role nitrogen-fixing bacteria found on mangrove roots, within the rhizospheres, plays in the high productivity of this community. It was found that nitrogen fixation decreased when roots were washed, suggesting something the roots exuded was necessary for the nitrogen fixing bacteria. Both field and laboratory measurements were made of nitrogenase activity rates.

Habitat: Mangrove forests; Type of Study: Quantitative; Biological Component: Flora; Number of Stations: 3; Abiotic Parameters Measured: Nitrate, nitrite, ammonia, orthophosphate, sulfate, pH, salinity, tidal levels; Dominant Taxon/Taxa Studied: *Rhizophora mangle*, *Avicennia germinans*, *Laguncularia racemosa*;

(19.00110)

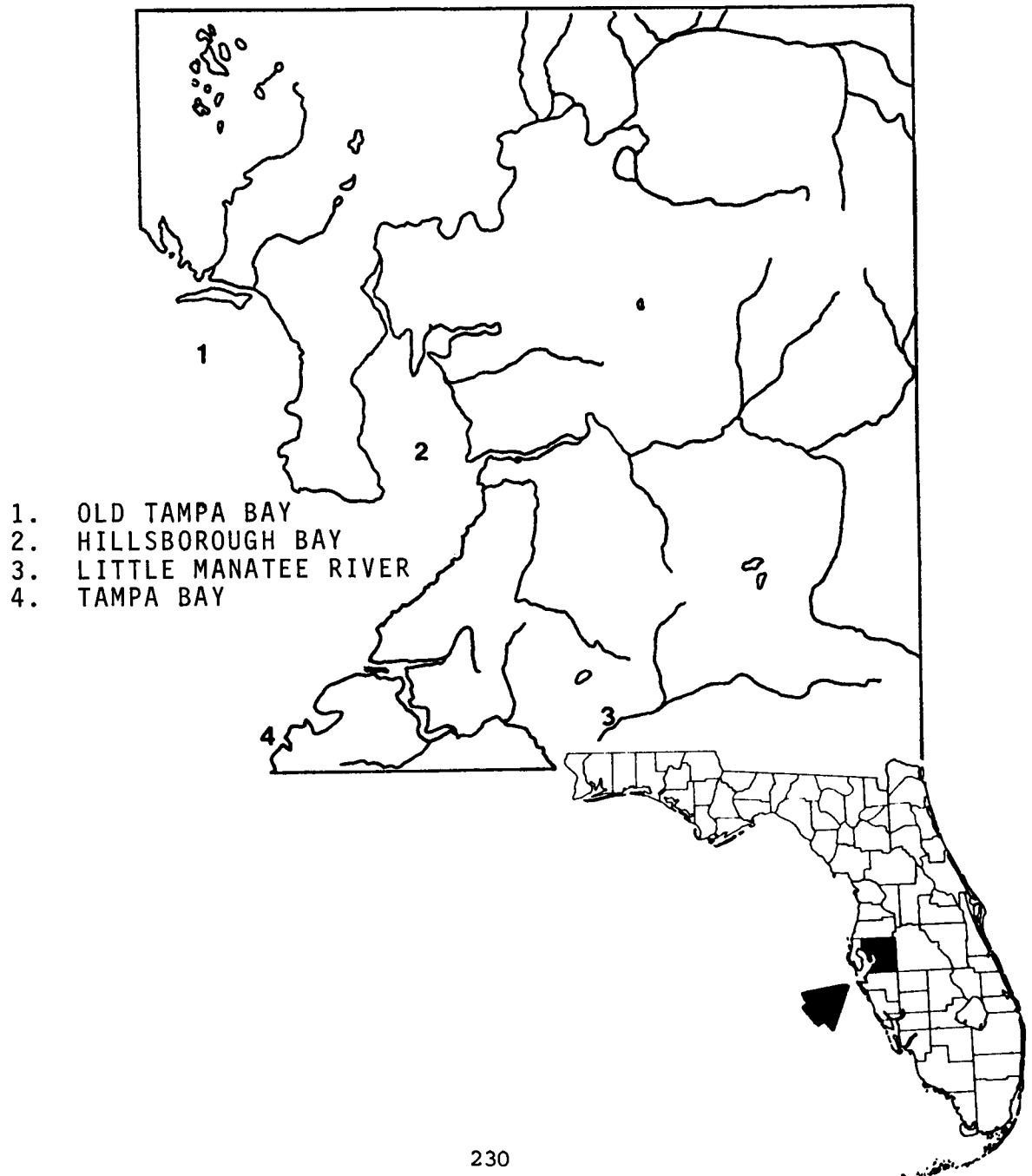
Zuberer, D.A. & W.S. Silver 1978. Biological dinitrogen fixation (acetylene reduction) associated with Florida mangroves. Appl. Environ. Microbiol. 35(3):567-575.

The acetylene reduction technique was used to determine rates of biological dinitrogen fixation in mangrove communities of Tampa Bay, Florida. Plant-free sediments exhibited low rates of acetylene reduction, while plant-associated sediments had slightly higher rates. Increased activity in sediments upon addition of various carbon sources indicated an energy limitation for nitrogenase activity. Acetylene reduction rates were also high in litter from mangrove leaves, seagrass, and *Ulva* spp. Excised roots of 3 Florida mangrove species yielded higher rates of nitrogenase activity. It was concluded that dinitrogen-fixing bacteria of mangrove rhizome systems use root exudates and/or sloughed cell debris as energy sources for dinitrogen fixation.

Habitat: Mangrove forest; Type of Study: Quantitative; Biological Component: Flora; Number of Stations: 3; Dominant Taxon/Taxa Studied: *Rhizophora mangle*, *Avicennia germinans*, *Laguncularia racemosa*;

See also: 1.00071, 3.00054, 3.00060, 3.00115, 3.00134, 3.00141, 4.00068, 10.00011, 12.00079, 20.00082, 20.00096.

# HILLSBOROUGH COUNTY





(20.00001)

Bacescu, M. & Z. Muradian 1977. Species of the genus *Cusella* (Cumacea: Nannastacidae) from the western tropical Atlantic. Trav. Mus. Hist. Nat. Grigore Antipa.

A new species of the genus *Cusella*, *Cusella garrityi* is reported from Tampa Bay. Other Caribbean and Atlantic species are also described.

Type of Study:Qualitative; Biological Component:Cumacean fauna;

(20.00002)

Becker, J.M. & G.W. Hinsch 1982. Structural differences in male and female burrows of *Uca pugilator*. Florida Sci. 45(Suppl. 1):19.

Differences were observed in the burrows used by female and male specimens of *Uca pugilator*. Burrows occupied by males enter at a lesser angle, are longer and have an enlarged chamber at their deepest point. They often have hood structures and adornments at their entrances. The burrows used by females enter almost vertically, are shorter and have no enlarged chambers or entrance adornments. It is suggested that the crabs dig their own burrows and the entrance structures may be important in courtship and reproduction.

Type of Study:Qualitative; Biological Component:Fauna; Dominant Taxon/Taxa Studied:*Uca pugilator*;

(20.00003)

Bell, S.S., D.J. Devlin 1983. Short-term macrofaunal recolonization of sediment and epibenthic habitats in Tampa Bay, Florida. Bull. Mar. Sci. 33(1):102-108.

Macrofaunal recolonization of experimentally defaunated sediments and epibenthic tubecaps was studied in Tampa Bay, Florida, over the time scale of hours and days. In both infaunal and epifaunal systems, adult age classes rapidly colonized experimental treatments. Within 7.5 h after defaunation of sediment patches (100 cm<sup>2</sup>) densities of dominant macrofauna returned to control levels. Demersal trap evidence suggested that benthic crustaceans and adults of the polychaete *Polydora ligni* were present in the water column during our field investigation. Macrobenthic polychaetes and amphipods repopulated defaunated epibenthic structure (*Diopatra cuprea* tube-caps) within 1.8 d by moving through the water column and/or sediments.

Study Duration:2 days; Habitat:Subtidal silty-sand; Type of Study:Qualitative, Quantitative; Biological Component:Fauna; Type of Sampler:Cores; Sieve Size:0.5 mm., 1.0mm; Dominant Taxon/Taxa Studied:*Onuphis* sp. *Magelona pettiboneae*, *Gammarus mucronatus*, *Amphelisca veilli*, *Oxyurostylis smithi*, *Macoma constricta*;

(20.00004)

Bergen, L. & D.T. Wagner-Merner 1977. Comparative survey of fungi and potential pathogenic fungi from selected beaches in the Tampa Bay area. Mycologia 69(2):299-308.

A study of the fungi and potential pathogenic fungi from beaches in the Tampa Bay area resulted in 36 species representing 26 genera. Those beaches used frequently were found to differ in their species composition from those used less frequently by bathers. The data from this study suggest that intertidal areas of maritime habitats might constitute a reservoir of fungal propagules (colony-forming units) of potentially pathogenic fungi. Thraustochytriaceous fungi as well as keratinolytic, cellulytic, and thermotolerant species were present. Dermatophytes were not isolated in the study.

Study Duration:September 26 - July 3, 1973; Habitat:Sandy beach; Type of Study:Qualitative; Biological Component:Fungi; Number of Stations:4; Number of Replicates/Station:5; Temporal Frequency:7 times; Abiotic Parameters Measured:Salinity, BOD; Dominant Taxon/Taxa Studied:*Aspergillus fumigatus*, *A. niger*, *Geotrichum candidum*;

(20.00005)

Conner, W. 1977. Response of a soft bottom ecosystem to physical perturbation. Univ. So. Fla. Ph.D. Dissertation.

To evaluate the effects of shell dredging on a soft bottom ecosystem, both dredged and undisturbed control areas were intensively sampled. The immediate biological effects of dredging were reductions in number of species, densities of invertebrates, and biomass. One year after dredging there was essentially no difference between control and experimental areas in sediment type, densities of invertebrates, species composition, or biomass.

Study Duration:May 1975-April 1976; Habitat:Soft bottoms; Type of Study:Quantitative; Biological Component:Fauna; Number of Stations:3; Temporal Frequency:Every 2 weeks during first 3 months, monthly thereafter;

(20.00006)

Conner, W.G. & J.L. Simon 1979. The effects of oyster shell dredging on an estuarine benthic community. Estuar. Coast. Mar. Sci. 9:749-758.

The extent and nature of the effects on the benthos of physical disruptions associated with dredging fossil oyster shell

was described. Two dredged areas and one undisturbed control area in Tampa Bay, Florida were quantitatively sampled before dredging and for one year after dredging. The immediate effects of dredging on the soft-bottom community were reductions in numbers of species (40% loss), densities of macroinfauna (65% loss), and total biomass of invertebrates (90% loss). During months 6-12 after dredging, the data (Mann-Whitney U Test,  $\alpha=0.05$ ) showed no difference between dredged and control areas in number of species, densities or biomass (with one exception). Community overlap (Czeckanowski's coefficient) between dredged and control areas was reduced directly after dredging, but after 6 months the predredging level of similarity was regained.

Study Duration:1 year; Habitat:Mud, oyster shell; Type of Study:Quantitative; Biological Component:Benthic invertebrates; Type of Sampler:PVC cores; Sieve Size:0.5 mm; Number of Stations:3 ; Number of Replicates/Station:16; Temporal Frequency:Biweekly, then monthly; Abiotic Parameters Measured:Sediment analysis;

(20.00007)

Conservation Consultants, Inc. 1973-74. Studies on the ecology of the Little Manatee River. In: Quarterly Reports to Florida Power and Light Co., Vol. 1, No. 1-4. Unpub. Tech. Rept., Conservation Consultants, Inc., Palmetto, FL.

Background information was gathered on the aquatic ecology of the Little Manatee River and adjacent portions of Tampa Bay prior to the operation of a Florida Power and Light power plant. Common and scientific names of organisms collected were recorded for each quarter. Out of 128 taxa, 30 were new to the study area. Plankton accounted for 21 taxa, while dredging produced 53 taxa, artificial substrates - 37 taxa, trawling - 50 taxa, and seining - 19 taxa. Forty five species of plants were recorded from the vegetation study quadrats.

Study Duration:July 1973; Habitat:Variable; Type of Study:Semi-quantitative ; Biological Component:Flora and fauna; Type of Sampler:Otter trawl, Wildco Petersen dredge, Hester-Dendy sampler, plankton net; Sieve Size:0.584 mm; Number of Stations:8; Number of Replicates/Station:2 or 3; Temporal Frequency:Monthly Abiotic Parameters Measured:Temperature, salinity, DO, pH, turbidity, chlorophyll 'a';

(20.00008)

Conservation Consultants, Inc. 1975. Benthic studies. In: TECO Ecological Surveys of the Big Bend Area - Five Year Data Evaluation. P. 200-255. Unpub. tech. rept., Tampa Electric Company, Tampa, FL.

In both qualitative and quantitative sampling, differences were detected between faunal communities in inshore, thermally affected areas, and offshore in nonthermal Hillsborough Bay stations. The differences were suggested to be caused by sedimentological characteristics of the areas rather than thermal differences. The substrate surrounding the Big Bend facility was found to be highly disturbed (from plant construction) and was characterized by high concentrations of flocculent, fine sediments, sometimes associated with low DO's.

Study Duration:1970-1975; Habitat:Sand, mud; Type of Study:Quantitative and qualitative; Biological Component:Faua; Type of Sampler:Petersen dredge, Ekman dredge, Ponar grab, sediment corer; Sieve Size:0.595 mm; Number of Stations:12 or 6; Number of Replicates/Station:2 or 3; Abiotic Parameters Measured:Temperature, salinity, DO, pH, turbidity, grain size;

(20.00009)

Conservation Consultants, Inc. 1975. Studies on the ecology of the Little Manatee River. Summary Rept. Conservation Consultants, Inc., Palmetto, FL. 145 p.

Studies on the ecology of the Little Manatee River were conducted. It was determined that the extremes observed for temperature, DO, pH, and turbidity were not sufficient to act alone as limiting factors, but that salinity was responsible for the distribution of organisms in the Little Manatee River. Other factors not considered in the study, such as substrate and current velocity, were also suggested to possibly control the distribution of organisms. A complete annotated catalogue of the flora and fauna collected in and along the Little Manatee River as well as a vegetation map and description of plant associations were included.

Study Duration:July 1973 - June 1974; Type of Study:Qualitative and quantitative; Biological Component:Flora and fauna; Type of Sampler:Wildco-Petersen dredge, Hester-Dendy sampler, otter trawl, seine, plankton net; Sieve Size:0.6 mm; Number of Stations:8; Number of Replicates/Station:2; Temporal Frequency:Quarterly; Abiotic Parameters Measured:Temperature, salinity, DO, pH, turbidity;

(20.00(10)

Culter, J.K. 1979. A population study of the inarticulate brachiopod *Glottidia pyramidata* (Stimpson). Univ. So. Florida, M.S. Thesis.

Determinations of population and life history parameters for *Glottidia pyramidata* were made and their evolutionary significance was evaluated. The brachiopod, *Glottidia pyramidata*, a common benthic inhabitant of Tampa Bay was located in the greatest densities subtidally. The sexes were found to be usually separate (with males and females in equal abundance), but hermaphroditic condition was found to occur in slightly less than one percent of reproductive adults. Displaced individuals were found to be able to burrow back into the sediment unless coarse shell material was of particles greater than 2 mm in diameter. Sediment analysis indicated that those sediments with greater than 10%

silt-clay fractions were not preferred habitat. The reproduction, spawning, and dispersal of *Glottidia* was discussed. *Luidia clathrata* (Say), an echinoderm, was identified as an important predator, in addition to the stingray *Dasyatis sabina* (LeSueur) and the stone crab *Hemippe mercenaria* (Say).

Study Duration:1 year; Type of Study:Quantitative and qualitative; Biological Component:Brachiopod fauna; Type of Sampler:PVC cores, gal. plastic jug settlement traps; Sieve Size:0.5 mm; Number of Stations:1; Number of Replicates/Station:25; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature (water & sediment), salinity; Dominant Taxon/Taxa Studied:*Glottidia pyramidata*;

(20.00011)

Culter, J.K. & S. Mahadevan 1977. Benthic studies during September 1976. In: Tampa Electric Co. 28th Quart. Rept. on Big Bend Thermal and Ecological Survey. Contains 25th Quart. Rept. by Conservation Consultants, Inc., R.D. Garrity (ed.). P.310-434.

A total of 15,101 individuals, representing 99 species were collected, identified, enumerated, and weighed. Species saturation curves showed that six Ponar grab replicates at each station were statistically adequate. Three distinct areas at Big Bend could be recognized: discharge, thermal, and nonthermal, based on measurements of abiotic parameters and faunal community analysis. Based on the community type evaluation presented in this study: a) two stations - discharge and inshore thermal transect - showed positive evidence of containing 'stressed' communities; b) nonthermal transect stations were found similar to thermal transect stations.

Study Duration:September 1976; Habitat:Sand, mud; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Ponar grab; Sieve Size:0.5 mm; Number of Stations:6; Number of Replicates/Station:6; Temporal Frequency:Once; Abiotic Parameters Measured:Temperature, salinity, DO, transparency;

(20.00012)

Culter, J.K. & S. Mahadevan 1978. Vertical stratification of benthic estuarine infauna. Paper presented at Fla. Field Biol. 2nd Annu. Meet., Jan. 20-22, 1978.

This study evaluated the popular belief among benthic ecologists that a majority of the benthic infauna live within the top 5 to 10 cm of the substrate. A box core sampler was used to obtain samples at various depth levels of the sediment (0-2 cm; 2-4 cm; 4-6 cm; 6-10 cm; 10-15 cm; and 15-20 cm). Both sand and mud stations were sampled. Both stations exhibited a relatively linear decrease in numbers of species with depth. Six species occurred exclusively at a depth greater than 10 cm for the sand station represented 10.2% of the total species found. Similarly, the mud station had 9 species, or 18.0% of the total, below 10 cm. Faunal density, faunal similarity, and dominance diversity were calculated.

Overall, the results emphasized the need to adequately determine the depth to which benthic infauna penetrates the substrate in significant abundance before attempting to characterize a community at a particular site.

Habitat:Mud, sand; Type of Study:Quantitative; Biological Component:Benthic infauna; Type of Sampler:14 x 15 x 20 cm deep stainless steel diver-operated box core; Sieve Size:0.5 mm; Number of Stations:2; Number of Replicates/Station:6; Temporal Frequency:Once;

(20.00013)

Dauer, D.M. 1974. Repopulation of the polychaete fauna of an intertidal habitat following natural defaunation. Univ. So. Florida, Ph.D. Dissertation.

Repopulation of the polychaete fauna following a massive red tide outbreak conformed to the species equilibrium model of MacArthur and Wilson (1963, 1967). Immigration of species was rapid, with the majority of immigration occurring within the first month of the study. An equilibrium number of species was established in the eleventh month, and remained relatively constant for the remainder of the study. Although species composition was fairly constant, the distribution of individuals among species changed greatly. Adult dispersal was determined to be a significant factor in the establishment of populations. Larval settlement was shown to be more significant in the maintenance than in the establishment of the populations in contrast to the pattern predicted by Thorson (1950, 1955, 1957, 1966).

Study Duration:2 years; Habitat:Sandy; Type of Study:Quantitative; Biological Component:Polychaete fauna; Type of Sampler:PVC core; Sieve Size:0.5 mm; Number of Stations:4; Number of Replicates/Station:5; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, sediment analysis; Dominant Taxon/Taxa Studied:*Apoprionospio pygmaea*, *Magelona pettiboneae*;

(20.00014)

Dauer, D.M. & W.G. Conner 1976. Organic enrichment effects upon benthic polychaete populations. V.J. Sci. 27(2):43.

The effects of organic enrichment upon intertidal benthic polychaete populations of upper Old Tampa Bay, Florida, were examined. An experimental site near a sewage outfall was compared to a physically similar control site by monthly quantitative samples. Species numbers and density values for the experimental site were significantly higher than those of the control site. Species with benthic larval development were responsible for the observed density differences. A massive accumulation of *Ulva lactuca* (and accompanying anaerobic conditions) at the experimental site during the summer months resulted in species numbers and density values significantly lower than the control site. Reestablishment

of the populations was rapid at the experimental site.

Study Duration: August 1974 - July 1975; Type of Study: Quantitative; Biological Component: Polychaete fauna; Number of Stations: 2; Temporal Frequency: Monthly;

(20.00015)

Dauer, D.M. & W.G. Conner 1980. Effects of moderate sewage input on benthic polychaete populations. *Estuar. Coast. Mar. Sci.* 10(3):335-346.

A comparison of polychaete fauna from a tidal sand flat in Tampa Bay exposed to sewage effluent to that of a control site showed that the total number of individuals, total biomass, and average species numbers were significantly greater at the sewage affected site. Individual species showed variable responses to nutrient enrichment with some species having increased densities at the enriched site and others showing no difference. However, all species had greater biomass at the sewage-affected location. Those species with similar densities between sites tended to have the greatest variation in average weight per individual. Benthic productivity, it was concluded, will be most enhanced during moderate nutrient concentration increases in coarser sandy sediment as compared to finer silty sediment.

Study Duration: September 1974-August 1975; Habitat: Sand; Type of Study: Quantitative; Biological Component: Polychaete fauna; Type of Sampler: Core; Sieve Size: 0.5 mm; Number of Stations: 2; Number of Replicates/Station: 10; Temporal Frequency: Monthly; Abiotic Parameters Measured: Sediment type, salinity, biological oxygen demand, total nitrogen & phosphorus; Dominant Taxon/Taxa Studied: *Laeonereis culveri*, *Nereis succinea*, *Heteronastus filiformis*, *Scoloplos foliosus*, *Eteone heteropoda*, *Onuphis* sp.;

(20.00016)

Dauer, D.M. & J.L. Simon 1975. Lateral or along-shore distribution of the polychaetous annelids of an intertidal, sandy habitat. *Mar. Biol.* 31:363-370.

The lateral or along-shore distribution of the polychaetous annelids of a subtropical, sandy intertidal habitat was studied on three transects (covering 2.5 km of shoreline) and sampled quarterly for 2 years. Although the average species number and density of individuals were not significantly different at specific tidal levels, the species composition was highly variable over time. Composition of density dominants was identical along-shore, and down-shore density distribution of selected species was also identical. Analysis by entire transects rather than by individual stations decreased along-shore heterogeneity by 10 to 15%.

Study Duration: 2 years; Habitat: Sand; Type of Study: Quantitative; Biological Component: Polychaete fauna; Type of Sampler: PVC core; Sieve Size: 0.5 mm; Number of Stations: 12; Number of Replicates/Station: 5; Temporal Frequency: Quarterly; Abiotic Parameters Measured: Temperature, salinity, sediment analysis; Dominant Taxon/Taxa Studied: *Magelona pettiboneae*, *Apoprionospio pygmaea*, *Travisia* sp., *Minuspio cirrifer*, *Capitella ambiseta*, *Nereis succinea*, *Capitella capitata*, *Paraprionospio pinnata*, *Glyptis vittata*, *Eteone heteropoda*;

(20.00017)

Dauer, D.M. & J.L. Simon 1976. Repopulation of the polychaete fauna of an intertidal habitat following natural defaunation: species equilibrium. *Oecologia* (Berl.) 22:99-117.

During the summer of 1971, an outbreak of red tide resulted in the defaunation of a previously characterized sandy intertidal habitat. This study reported the recolonization of polychaete fauna in that area. The rates of immigration and extinction showed that repopulation conformed to the species equilibrium model of MacArthur and Wilson. Immigration was found to be rapid with an equilibrium number of species becoming established in the eleventh month. Although the species composition remained fairly constant, the distribution of individuals among species changed greatly.

Study Duration: August 1971 - July 1973; Habitat: Sand; Type of Study: Quantitative; Biological Component: Polychaete fauna; Type of Sampler: PVC core; Sieve Size: 0.5 mm; Number of Stations: 4; Number of Replicates/Station: 5; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature, salinity, sediment characteristics;

(20.00018)

Dauer, D.M. & J.L. Simon 1976. Habitat expansion among polychaetous annelids repopulating a defaunated marine habitat. *Mar. Biol.* 37:169-177.

The colonization of polychaetous annelids in a previously defaunated marine habitat was found to occur most rapidly at the highest tide levels and more slowly at lower tide levels. *Apoprionospio pygmaea* and *Magelona pettiboneae* were density dominants for all but the first month of the study. *Eteone heteropoda*, *Glyptis vittata*, *Nereis succinea*, and *Paraprionospio pinnata* were first year opportunists, appearing early, quickly increasing their populations, and expanding their habitat distributions. *Capitella ambiseta*, *Minuspio cirrifer* and *Travisia* sp. colonized the second year, took longer to significantly increase their densities, and did not show habitat expansion.

Study Duration: 2 years; Type of Study: Quantitative; Biological Component: Polychaete fauna; Type of Sampler: PVC core; Sieve Size: 0.5 mm; Number of Stations: 4; Number of Replicates/Station: 5; Temporal Frequency: Monthly; Dominant Taxon/Taxa Studied: *Apoprionospio pygmaea*, *Magelona pettiboneae*;

(20.00019)

Diehl, W.J. 1982. Effect of salinity on levels of intracellular water in the pyloric caeca and tube feet of *Luidia clathrata* (Say). Florida Sci. 45 (Suppl. 1):20.

Individuals of *Luidia clathrata* were exposed to levels of salinity of 15, 25 and 35 o/oo and extracellular water of the pyloric caeca and tube feet was measured with the use of <sup>14</sup>C-polyethylene glycol. The percentage of extracellular water in the tissue water did not vary with salinity. The volume of intracellular water was observed to change over time at different salinities.

Study Duration:1 week; Type of Study:Qualitative, quantitative; Biological Component:Fauna; Abiotic Parameters Measured:Salinity; Dominant Taxon/Taxa Studied:*Luidia clathrata*;

(20.00020)

Dragovich, A. & J.A. Kelly, Jr. 1964. Ecological observations of macroinvertebrates in Tampa Bay, Florida 1961-1962. Bull. Mar. Sci. Gulf Caribb. 14(1):74-102.

A checklist of macroinvertebrates observed in Tampa Bay, which included 78 genera and 82 species of sponges, annelids, sipunculids, decapod crustaceans, gastropods, pelecypods, cephalopods, echinoderms and ascidians, was presented. The occurrence, distribution, and relation to bottom type of these organisms were discussed. The observed temperature and salinity ranges for most of the organisms were given.

Study Duration:August 1961 - August 1962; Habitat:Grassbed, mud, oyster bed; Type of Study:Qualitative; Biological Component:Macroinvertebrates; Type of Sampler:Shrimp trynet, beach seine; Number of Stations:42; Number of Replicates/Station:1; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Molgula* spp., *Loliguncula brevis*, *Penaeus duorarum*, *Callinectes sapidus*;

(20.00021)

Dyer, J.P., III 1975. The effects of plankton concentration and inorganic particles on the absorption efficiency of the young bay scallop, *Argopecten irradians concentricus* (Say). Univ. So. Florida, M.S. Thesis.

The Conover (1966) ratio method for assimilation efficiency measurement was applied to measurement of absorption efficiency in the bay scallop, a filter-feeding bivalve. The Conover ratio method was utilized in the measurement of phytoplankton concentration and suspended inorganic particulate. The optimal phytoplankton concentration of  $1.88 \times 10^4$  cells/ml, at which absorption efficiency was highest in the bay scallop, was determined. The increase in the total suspended load (TSL) of particles by the addition of inorganic particles decreased the absorption efficiency to a greater extent than a similar increase in the TSL by addition of more phytoplankton.

Study Duration:May, June 1973; Habitat:Grassbed; Type of Study:Semi-quantitative; Biological Component:Mollusc fauna; Type of Sampler:Commercial shrimp trawl; Temporal Frequency:2-3 times per week; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Argopecten irradians concentricus*

(20.00022)

Eldred, B., R.M. Ingle, K.D. Woodburn, R.F. Hutton & M. Jones 1961. Biological observations on the commercial shrimp, *Penaeus duorarum* Burkenroad, in Florida waters. Fla. St. Bd. Conserv., Prof. Pap. Ser. No. 3. 139 p.

Since 1955 the Florida State Board of Conservation has conducted comprehensive studies on the biology of *Penaeus duorarum*. Collected specimens were combined into three size groups: 1) specimens smaller than 50 mm, which include the very small post-larvae and young juveniles; 2) specimens between 50 mm and 79 mm, which include older juveniles and subadults; and 3) specimens 80 mm and larger, which are mostly adults. The average size of the shrimp relative to depth was discussed as was the relation of temperature to distribution, spawning, and population densities. Other biological aspects covered in this report include sex size disparity, rate of sexual development, migration, behaviour, diet, growth, and some parasites of the shrimp.

Study Duration:1957-1958; Habitat:Sand, mud, grassbed; Type of Study:Qualitative; Biological Component:Decapod fauna; Type of Sampler:Trynet, frame trawl; Number of Stations:3 day; 6 night; Number of Replicates/Station:1; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, wind, tide, moonlight; Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(20.00023)

Estevez, E.D. 1974. The role of wood-boring organisms in mangrove restoration. Proc. of the First Ann. Conf. on Restoration of Coast. Vegetation in Fla. p. 32-33.

Mangrove restoration plans need to take into account the activities and distributions of wood boring organisms. Fifteen species of shipworms (Teredinidae) are found in Florida waters but relative to the abundance of other wood borers, shipworms are scarce in west Florida mangroves. The isopod genera *Limnoria* and *Sphaeroma* are wood boring crustaceans found in the waters of Florida. A new form of *Sphaeroma* which is sexually dimorphic and chromatically polymorphic is reported.

Habitat:Mangroves; Type of Study:Qualitative; Biological Component:Fauna; Dominant Taxon/Taxa Studied:*Poecilips rhizophorae*, *Hartesia striata*, *Sphaeroma terebraus*;

(20.00024)

Estevez, E.D. 1978. Ecology of *Sphaeroma terebraus* Bate, a wood-boring isopod in a Florida mangrove forest. Univ. So. Florida, Ph.D. Dissertation.

The dispersion, abundance, life history, and ecology of a marine wood-boring isopod, *Sphaeroma terebraus* Bate, was studied in a mangrove forest. Studies were made of burrow ecology. The following aspects of sphaeromid biology were discussed: a) the duration of boring; b) the role of particulates in nutrition and dispersion; c) the identity and boring ability of dispersing isopods; d) causes of dispersal; e) the effects of sessile species and causes for the avoidance by the hour of once-occupied substratum and f) the relation of physical factors to the impact of borers on single trees and the mangal. The following hypotheses were tested: 1) the dispersion and abundance of borers throughout a mangrove forest are regulated by physical factors; 2) borer ecology within roots is strongly affected by attributes of the individual trees or the activity of borers therein (biotic factors); and 3) dispersal is dependent upon such factors.

Study Duration:1976-1977; Habitat:Mangrove forest; Type of Study:Qualitative; Biological Component:Wood-boring isopods; Abiotic Parameters Measured:Temperature, salinity, DO, particulates, tides; Dominant Taxon/Taxa Studied:*Sphaeroma terebraus*;

(20.00025)

Estevez, E.D. & R.K. Evans 1978. The effects of pruning on reproduction by the red mangrove, *Rhizophora mangle*. In: The Restoration of Coastal Vegetation in Florida: Proc. Fifth Annu. Conf., D.P. Cole (ed.), May 13, 1978. Tampa, Fla. 255 p.

Pruned residential mangrove hedges and mangrove trees grazed by cattle were examined to determine the effects of pruning on reproduction. Trees pruned from below were found to have higher fruit crops, at lower incidences of fruiting, than hedges, suggesting that the thinning of the lower canopy causes less reproductive loss to trees than topping. Pruning guidelines are included.

Type of Study:Quantitative; Biological Component:Flora; Dominant Taxon/Taxa Studied:*Rhizophora mangle*;

(20.00026)

Finucane, J.H. & R.W. Campbell, II 1968. Ecology of American oysters in Old Tampa Bay, Florida. Quart. J. Fla. Acad. Sci. 31(1):37-46.

Information on the spawning, settlement, growth, and survival of the American oyster was reported. Counts as well as peak setting period were derived, and it was found that spatfall was 4 to 5 times greater than reported in 1965. High mortality caused in part by a fungus parasite, *Dermocystidium marinum*, as well as the crown conch, the left-handed whelk, the blue crab, and the stone crab was also observed. The oyster leech, *Stylochus inimicus*, was an additional factor in mortality. The average growth of oysters in Old Tampa Bay appeared to be less than reported in 1952 for Apalachicola Bay.

Study Duration:April 1965 - December 1965; Habitat:Sand, artificial substrate; Type of Study:Qualitative; Biological Component:Mollusc fauna; Type of Sampler:Cement board spat collectors; Number of Stations:6; Number of Replicates/Station:1; Temporal Frequency:Weekly; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Crassostrea virginica*;

(20.00027)

Grey, W.F. & M.D. Moffler 1978. Flowering of the seagrass *Thalassia testudinum* (Hydrocharitaceae) in the Tampa Bay, Florida area. Aquat. Bot. 5:251-259.

Flowering of the seagrass *Thalassia testudinum* occurred at all nine sites studied. Qualitative information was obtained on three distinct floral stages: bud, anthesis, and fruit. Comparison between two sites showed that the frequency of sexual reproduction varied from 35 to 56%. Average densities of reproductive short shoots ranged from 8 to 19 m<sup>-2</sup>. Sex ratios from individual sites indicated general predominance of female over male short shoots, with an average overall ratio of 3:1. Field observations and transect data demonstrated patchiness in the spatial pattern of reproductive short shoots. Limited evidence provided additional information indicating that short shoots on common rhizomes are dioecious.

Study Duration:1 month; Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Benthic flora; Type of Sampler:1 m<sup>2</sup> quadrats; Number of Stations:9; Number of Replicates/Station:1; Temporal Frequency:Single sampling; Dominant Taxon/Taxa Studied:*Thalassia testudinum*;

(20.00028)

Hall, J.R. 1972. Molluscs and benthic environments in two Florida west coast bays. Univ. So. Florida, M.S. Thesis.

The relationships of several environmental parameters (such as sediment, salinity, and depth) with patterns of species occurrence, species richness, species diversity, and feeding types of molluscs were studied.

Study Duration: 2 years; Habitat: Estuarine; Type of Study: Semi-quantitative; Biological Component: Mollusc fauna; Number of Stations: 71 or 14 Tampa Bay; 35 or 14 Hillsborough Bay;

(20.00029)

Hall, J.R. & W.M. Lindall, Jr. 1974. Benthic macroinvertebrates and sediments from upland canals in Tampa Bay, Florida. NOAA, NMFS, Data Rept. 94. 221 p.

Samples taken from the upland canals in Old Tampa Bay contained 139 species and 66,326 specimens of benthic macroinvertebrates. Monthly counts by species, individuals, and total individuals per square meter were presented. A summary of the total number of species and individuals and their monthly range and mean was also presented. Sediment analysis included mean grain size, standard deviation, skewness, kurtosis, and weight percentage of granule, sand, silt, and clay-sized sediment.

Study Duration: 1 year; Type of Study: Quantitative; Biological Component: Benthic fauna; Type of Sampler: 1/64 m<sup>2</sup> metal dredge; Sieve Size: 0.701 mm; Number of Stations: 34; Number of Replicates/Station: 2; Temporal Frequency: Monthly; Abiotic Parameters Measured: Sediment analysis;

(20.00030)

Hall, J.R. & C.H. Saloman 1975. Distribution and abundance of macroinvertebrate species of six phyla in Tampa Bay, Florida 1963-64 and 1969. NOAA, NMFS, Data Rept. 100. 505 p.

The distribution and abundance of macroinvertebrate species in Tampa Bay was studied. Results of the survey were reported as a checklist of species and the distribution of species by station. The following number of species per phylum were recorded: Annelida (179 species of Polychaeta); Mollusca, 295 species; Phoronida (*Phoronis architecta*); Brachiopoda (*Glottidia pyramidata*); Echinodermata, 35 species; and Chordata, (Cephalochordata, *Branchiostoma caribaeum*).

Study Duration: 14 months and 1 year; Type of Study: Quantitative; Biological Component: Benthic fauna; Type of Sampler: Stainless steel dredge & frame net; Sieve Size: 0.701 mm; Number of Stations: 403, 28; Number of Replicates/Station: 1; Dominant Taxon/Taxa Studied: *Glottidia pyramidata*, *Phoronis architecta*, *Branchiostoma caribaeum*;

(20.00031)

Hoffman, W.E. & J.A. Rodgers, Jr. 1980. A cost/benefit analysis of two large coastal plantings in Tampa Bay, Florida. In: D.P. Cole (ed.), Wetland restoration and creation: Proc. of the Seventh Annu. Conf. May 16-17, 1980, Tampa, Fla. 294 p.

Two major coastal vegetation plantings were undertaken on dredge material in Hillsborough Bay, Florida. The cost and manpower requirements of the two plantings are compared. The economic and ecological advantages and disadvantages of labor intensive planting of smooth cordgrass plugs and mangrove transplants are discussed.

Study Duration: 14 months; Type of Study: Quantitative; Biological Component: Flora; Dominant Taxon/Taxa Studied: *Spartina alterniflora*, *Avicennia germinans*, *Laguncularia racemosa*;

(20.00032)

Holsing, N.W. 1974. The measurement of gaseous exchange in thermally stressed and unstressed *Diplanthera wrightii* communities using a modified flow through system. Univ. So. Florida, M.S. Thesis.

The gaseous exchange of thermally stressed and unstressed *Diplanthera* (*Halodule*) communities were measured using a modified flow-through system. No significant difference between the gaseous exchange of the *Diplanthera* communities was found although the communities differed in seagrass biomass and blade length and in the total number of infauna genera. The flow-through system was found to permit the sampled population to remain in constant contact with its environment and essentially undisturbed and therefore increased the accuracy of the oxygen estimates. The syringe sampling method used in conjunction with the flow-through system appeared to work well, and with minor modifications in the fixing technique, precision was found to increase.

Habitat: Sand, shell, grassbed; Type of Study: Semi-quantitative; Biological Component: Flora; Type of Sampler: Flow-through apparatus; Number of Stations: 2; Number of Replicates/Station: 1; Dominant Taxon/Taxa Studied: *Halodule* (*Diplanthera*) *wrightii*;

(20.00033)

Hoover, S.L. & S. Mahadevan 1977. Benthic studies during July 1976. Chapt. IV. In: Tampa Electric Co. 28th Quart. Rept. on Big Bend Thermal and Ecological Surveys. Contains 25th Quart. Rept. by Conservation Consultants, Inc., R.D. Garrity (ed.). p. 211-238. Tampa Electric Company, Tampa, FL.

A total of 14,610 animals were counted, weighed, and identified to 138 different species. Six grab replicates at each station were found to be statistically adequate. Based on temperature proximity to the thermal effluent discharge and faunal characteristics, three different zones were recognized adjacent to the Big Bend Power Plant: the discharge canal zone, the thermal transect, and the nonthermal transect. The discharge canal zone was characterized by an above ambient bottom temperature, low faunal density, low biomass, and a high proportion of pollution indicators. It was suggested that both stations were undergoing thermal effects. However, the dilution pump station underwent the additional stress of bottom scouring. The nonthermal transect was characterized by low faunal density, moderate species richness, and high diversity. Polychaetes comprised over 40% of the fauna at this transect. The nonthermal transect was characterized by high faunal density, high species richness, and low diversity. Overall, a site-by-site ecological evaluation showed positive evidence of "thermal stress" only in the discharge canal.

Study Duration:1 month; Habitat:Sand, mud; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Ponar grab; Sieve Size:0.5 mm; Number of Stations:6; Number of Replicates/Station:6; Temporal Frequency:Single sampling; Abiotic Parameters Measured:Temperature (water & sediment), salinity, DO, transparency; Dominant Taxon/Taxa Studied:*Capitella capitata*, *Nereis succinea*, *Tellina* sp.

(20.00034)

Hsieh, H. & J.L. Simon 1982. Ecological observations on the polychaete *Onuphis simoni* in Tampa Bay, Florida. Florida Sci. 45 (Suppl 1):26.

The polychaete *Onuphis simoni* had higher densities in *Halodule wrightii* grassbeds than in unvegetated areas. The density of young (larvae and juveniles) showed a positive linear relationship with adult density. Larvae are brooded in the parents tube while juveniles build tubes attached to the tube of the mother. Densities were observed to increase exponentially (from 300 to 2000 individuals/m<sup>2</sup>) from 1968 to 1972 at one study site.

Habitat:Grassbed, intertidal zone; Type of Study:Qualitative, quantitative; Biological Component:Faua; Dominant Taxon/Taxa Studied:*Onuphis simoni*, *Halodule wrightii*;

(20.00035)

Jensen, P.R. & R.A. Gibson 1983. Primary production in three subtropical seagrass communities: a comparison of four autotrophic components. Fla. Sci. 46(Suppl. 1):16.

Primary production rates of seagrass, associated epiphytic flora, microbenthic algae, and phytoplankton were compared from seagrass communities in Tampa Bay and Indian River, Florida, and Little Bahama Bank. Phytoplankton were found to be the major annual producers in Tampa Bay and the Indian River (87% and 93%, respectively), whereas annual production in Little Bahama Bank was primarily due to seagrass and their epiphytes (71% total).

Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Flora; Number of Stations:3; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Halodule wrightii*, *Syringodium filiforme*;

(20.00036)

Kelly, J.A., Jr. & A. Dragovich 1967. Occurrence of macrozooplankton in Tampa Bay, Florida, and the adjacent Gulf of Mexico. Fish. Bull. 66(2):209-221.

A year of sampling in Tampa Bay indicated that decapod crustaceans accounted for 87% of the total number of zooplankton collected. The dominant organisms included *Lucifer faxoni*, larval porcellanids, brachyurans, chaetognaths, copepods, larval polychaetes, carideans, appendicularids, larval fish, thalassinids, cladocerans and larval stomatopods. It was determined that low temperature and salinity values were more restrictive than high ones to most of the organisms.

Study Duration:1 year; Habitat:Variable; Type of Study:Quantitative; Biological Component:Macrozooplankton; Type of Sampler:1/2 m nylon plankton net; Sieve Size:1.024 mm; Number of Stations:14; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity;

(20.00037)

Klinger, T.S. 1982. The role of teloreception in the location of potential food items by *Lytechinus variegatus* Lamarck (Echinodermata:Echinoidea). Florida Sci. 45 (Suppl 1):20.

*Lytechinus variegatus* feeds on the seagrass *Thalassia testudinum* and the algae *Gracilaria verrecosa* and *Ulva lactuca*. *L. variegatus* was found to be unable to detect foods at a distance and appears to rely more on chance encounter than teloreception in locating food.

Type of Study:Qualitative; Biological Component:Faua; Dominant Taxon/Taxa Studied:*Lytechinus variegatus*;

(20.00038)

Klinger, T.S. 1983. The effects of hunger and satiation upon feeding behavior of *Lytechinus variegatus* Lamarck (Echinodermata: Echinoidea). Fla. Sci. 46(Suppl. 1): 24.

Feeding studies of different sized *Lytechinus variegatus* from Tampa Bay, Florida revealed that feeding frequency does



not have a significant effect on the feeding rate of large *L. variegatus*. Equal amounts of artificial food (containing *Thalassia testudinum*) are consumed per feeding period by the sea urchins, regardless of the feeding interval (daily, 3 day, or 6 day interval). Small individuals consume significantly less when fed at 3 or 6 day intervals, an effect of starvation. It is suggested that under normal physiological conditions, *L. variegatus* feeds at a constant rate, independent of hunger or satiation.

Type of Study:Quantitative; Biological Component:Echinodermata; Dominant Taxon/Taxa Studied:*Lytechinus variegatus*;

(20.00039)

Kruer, C.R. 1977. A study of the benthic algae of the natural reefs off Tampa Bay, Florida Gulf coast. Univ. So. Florida, M.S. Thesis.

A total of 149 taxa of benthic marine algae including 37 Chlorophyta, 1 Chrysophyta, 18 Phaeophyta, 83 Rhodophyta, and 10 Cyanophyta were collected on or near to rocky outcroppings offshore from Tampa Bay, Florida. Five species and a possible sixth were new distributional records for the Gulf of Mexico, and 8 were range extensions into central west Florida and the eastern Gulf. The species composition, seasonality, and zonation of this flora as well as the effects of grazing on its distribution on the reefs were discussed. Physical factors which may influence the seasonality and distribution of the algae were presented and compared to other areas. The economic value of these reefs to the west coast of Florida was discussed relative to the commercial and recreational fisheries that are dependent upon the reefs.

Study Duration:15 months; Habitat:Reef; Type of Study:Qualitative; Biological Component:Benthic algae; Type of Sampler:Hand-collected (SCUBA); Abiotic Parameters Measured:Temperature, transparency;

(20.00040)

Lawrence, J.M. 1982. Stimulation of the pedicellariae of *Coscinasterias tenuispina* Lamarch (Echinodermata: Asteroidea). Florida Sci. 45(Suppl. 1):20.

Observations were made on the responses of the pedicellariae of *Coscinasterias tenuispina* to tactile stimulation and contact with gastropod extract. Results indicated chemoreceptors are not located in the rosette-spine. Tactile stimulation of the rosette-spine produced an extreme reaction in the sheath and pedicellariae.

Type of Study:Qualitative; Biological Component:Faua; Dominant Taxon/Taxa Studied:*Coscinasterias tenuispina*;

(20.00041)

Lawrence, J.M. 1983. Absorption of nutrients of the coral *Pocillopora damicornis* (L.) by the echinoid *Eucidaris thouarsii* (Val.). Fla. Sci. 46(Suppl. 1): 20-21.

The absorption efficiencies, levels, and rates for the echinoid, *Eucidaris thouarsii*, fed the coral, *Pocillopora damicornis*, are given for carbohydrates, proteins, and lipids. Although the efficiency of digestion absorption of organic constituents of the coral ingested is high, *E. thouarsii* must consume relatively large quantities of the coral to meet its nutritional requirements.

Type of Study:Quantitative; Biological Component:Echinodermata, coral; Dominant Taxon/Taxa Studied:*Eucidaris thouarsii*, *Pocillopora damicornis*;

(20.00042)

Lewis, R.R., III & W.D. Courser 1972. McKay Bay: Past, present and future. Joint Rept. by Save Our Bays, Inc., and the Tampa Audubon Society. 57 p.

Habitat value of McKay Bay was discussed. Lists of birds, fishes, macroinvertebrates, and wetland vegetation that inhabit the Bay were provided. The present ecological status of the Bay in relation to urban runoff and industrial discharges was also discussed. Recommendations for future management and conservation were listed.

Study Duration:Several months; Habitat:Variable; Type of Study:Qualitative and quantitative; Biological Component:Flora and fauna;

(20.00043)

Lewis, R.R., III & C.S. Lewis 1977. Tidal marsh creation on dredged material in Tampa Bay, Florida. p. 45-67. In: Proc. Fourth Annu. Conf. on Restor. of Coast. Vegetation in Fla. Hillsborough Comm. Coll., Envir. Stud. Ctr., Cockroach Bay, in cooperation with the Tampa Port Authority.

Experimental plantings of smooth cordgrass, *Spartina alterniflora*, were undertaken on a 12 year old dredged-material island in Tampa Bay, Florida. Thirty six plants transplanted in September 1976 increased to 267 plants in 10 months. A control area of similar elevation and substrate showed no natural establishment of any intertidal plant species. Fifteen plants grown from Virginia seed and planted in October of 1976 increased to 331 plants by June of 1977. Seed was successfully harvested, germinated, and the plants placed on site during the study. All plants have shown excellent survival and spread. It was concluded that active planting efforts would increase the rate of establishment of *S. alterniflora* in protected dredge material sites in Tampa Bay.

Study Duration:10 months; Habitat:Dredged spoil; Type of Study:Semi-quantitative; Biological Component:Salt marsh; Dominant Taxon/Taxa Studied:*Spartina alterniflora*;

(20.00044)

Lindall, W.N., Jr., W.A. Fable, Jr. & L.A. Collins 1975. Additional studies on the fishes, macroinvertebrates, and hydrological conditions of upland canals in Tampa Bay, Florida. Fish. Bull. 73(1):81-85.

Critically low levels of dissolved oxygen occurred more frequently and over a longer period of time than in a previous year's study. Most affected were the inland portions of the canal system where the number of species declined markedly over the previous year. Impoverishment of fauna on or near the bottom was expected to recur during summer months because of oxygen depletion resulting from a combination of continuing accumulation of decomposing organic sediment, warm water, and little circulation in the dead-end canals.

Study Duration:1 year; Type of Study:Semi-quantitative; Biological Component:Fish and macroinvertebrates; Type of Sampler:Trawl; Number of Stations:4; Abiotic Parameters Measured:Temperature, salinity, DO; Dominant Taxon/Taxa Studied:*Anchoa mitchilli*, *Anchoa hepsetus*, *Bairdiella chrysura*, *Chaetodipterus faber*, *Callinectes sapidus*, *Penaeus duorarum*, *Loliguncula brevis*;

(20.00045)

Lindall, W.N., Jr., J.R. Hall, & C.H. Saloman 1973. Fishes, macroinvertebrates and hydrological conditions of upland canals in Tampa Bay, Florida. Fish. Bull. 71(1):155-163.

Biological and hydrological data from new canals along with comparative data from older upland canals and bay fill canals was presented. In all types of canals, stratified, stagnant water was determined to cause low levels of dissolved oxygen in summer months, resulting in mortality or emigration among resident organisms. Means of alleviating the problem were discussed.

Study Duration:1 year; Habitat:Silt canals; Type of Study:Semi-quantitative; Biological Component:Fish and macroinvertebrates; Type of Sampler:Otter trawl; Number of Stations:4 biological stations; 5 hydrological stations; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO; Dominant Taxon/Taxa Studied:*Anchoa mitchilli*, *Eucinostomus argenteus*, *Leiostomus xanthurus*, *Eucinostomus gula*;

(20.00046)

Lombardo, R. & R.R. Lewis 1982. The grasping appendages of *Caprella penantis* Leach (Amphipoda). Florida Sci. 45 (Suppl 1):19.

Specimens of *Caprella penantis* were collected in Old Tampa Bay, Florida, from a *Leptogorgia virgulata* colony. Scanning electron microscopy was used to examine the grasping appendages, maxillipeds, gnathopods and pereopods. Specific use of each appendage has been described through its ultrastructure.

Habitat:*Leptogorgia* colony; Type of Study:Qualitative; Biological Component:Fauna; Dominant Taxon/Taxa Studied:*Caprella penantis*;

(20.00047)

Lotspeich, R.A. & S. Mahadevan 1977. Benthic studies during November 1976. Chapt. IV. In: Tampa Electric Co. 29th Quart. Rept. on Big Bend Thermal and Ecological Surveys. Contains 26th Quart. Rept. by Conservations Consultants, Inc., R.D. Garrity (ed.). p. 143-205. Tampa Electric Company, Tampa, FL.

A total of 65,088 organisms were counted, weighed, and identified to 224 different species. It was shown that six Petite Ponar grab replicates were adequate to faunally describe each station. Faunal characteristics indicated that the thermal effluent was having a measurable deleterious effect on the two stations in the discharge canal. The differences in the biological parameters between the thermal and nonthermal transects indicated an alteration of the benthic community structure in the thermal transect. It appears that the effect was confined to the three nearshore stations. Faunal characteristics indicated possible community alteration due to the thermal effluent at one station originally thought to be outside the thermal plume. The effects of the thermal effluent outside the discharge canal, though detectable, did not appear to indicate deleterious effects on the benthic fauna.

Study Duration:1 month; Habitat:Sand, mud; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Ponar grab; Sieve Size:0.5 mm; Number of Stations:22; Number of Replicates/Station:6; Temporal Frequency:Once; Abiotic Parameters Measured:Temperature, salinity, DO, transparency; Dominant Taxon/Taxa Studied:Thermal: *Tellina* sp., *Ameliscia vadorum*, *Pseudopolydora* sp., *Tharyx* sp., *Minuspio cirrifer*; Parasterope pollex, *Capitella capitata*, *Streblospio benedicti*, *Stenoninereis martini*, *Capitella capitata*;

(20.00048)

Magley, W.C. 1978. An analysis of heavy metals in the American oyster *Crassostrea virginica*, from four sites in the Tampa Bay region. Fla. St. Univ., M.S. Thesis.

Soft tissues of *Crassostrea virginica* were analyzed for specific heavy metals. The four sites experienced similar ranges in temperature and salinity, but were influenced by different discharges from various industrial processes. Measurements of wet and dry tissue weight, shell weight, shell length, and surface area were used as independent variables in a series of simple linear regressions with each metal. Based upon the  $r^2$  values, no simple linear relationships were apparent. Each site exhibited variable concentrations of heavy metals, and it was found that a more representative mean concentration was achieved with increasing sample sizes. Zinc was the only metal for which significant differences among sites was seen. It was found that high variability within the sites decreased the accuracy of metal measurements within *C. virginica* tissues, thus indicating that its potential for use as an indicator organism for heavy metal pollution is limited.

Study Duration:2 days; Habitat:Oyster beds; Type of Study:Qualitative; Biological Component:Oysters; Type of Sampler:Hand-collected; Number of Stations:4 sites; Abiotic Parameters Measured:Trace metals, temperature, salinity; Dominant Taxon/Taxa Studied:*Crassostrea virginica*;

(20.00049)

Mahadevan, S. 1976. Benthic studies in the Beacon Key area. Chapt. IV (Sec. B). In: Tampa Electric Co. 26th Quart. Rept. on Big Bend Thermal and Ecological Surveys. Contains 23rd Quart. Rept. by Conservation Consultants, Inc., R.D. Garrity (ed.). p. 23-85. Tampa Electric Company, Tampa, FL.

The Beacon Key area was shown to support an abundant and very diverse fauna. A total of 6,097 individuals were counted and 167 species recognized in this study. The area was divided into three biotopes based on physical characteristics and faunal content (inshore, channel, and offshore). The inshore and offshore communities were richer, more diverse, and exhibited greater abundance than the channel community. It was observed that the channel sediments were stabilizing, giving access to increased colonization of benthos. The offshore community was the most abundant and diverse in the study area. In comparison to other studies in Tampa Bay, faunal density was comparable, but species richness and diversity were much higher.

Study Duration:1 month; Habitat:Mud, sand; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Ponar grab (area of 0.0542 m<sup>2</sup>); Sieve Size:0.5 mm; Number of Stations:3; Number of Replicates/Station:6; Temporal Frequency:Once; Abiotic Parameters Measured:Temperature, salinity, DO, sediment type; Dominant Taxon/Taxa Studied:*Ancistrosyllis jonesi*, *Capitella capitata*, *Parahesion luteola*, *Pseudopolydora* sp., *Pseudeurythoe ambigua*, *Sigambra tentaculata*, *Stenothoe* sp., *Cyclaspis longipes*, *Cyclaspis platymerus*, *Cyclaspis* sp., *Oxyrostylis smithi*, *Dynamenella dianae*, *Apanthura magnifica*, *Nuona* sp., *Bagatus* sp.;

(20.00050)

Mahadevan, S. 1976. Benthic Studies. Chapt. IV. In: Tampa Electric Co. 25th Quart. Rept. on Big Bend Thermal and Ecological Surveys. Contains 22nd Quart. Rept. by Conservation Consultants, Inc., R.D. Garrity (ed.). p. 65-259. Tampa Electric Company, Tampa, FL.

A study of the thermal effects on the benthic biota in the vicinity of Tampa Electric Company's Big Bend power plant was conducted. Five Ponar grab replicates were found to be adequate. Faunal density was determined to be higher in thermal than in nonthermal stations. Faunal density was shown to be greater for the July/August period than for the winter sampling period and was also shown to decrease offshore. Median stations in both transects had high faunal densities. Diversity and equitability were greater for the thermal transect and for offshore stations. Diversity and faunal density were inversely correlated for the thermal transect. Based on faunal similarity comparisons, the benthic fauna of the study area was classified as a homogeneous assemblage with extreme patchiness in the distribution of certain taxa. Crustaceans were shown to dominate in nearshore stations, while the polychaete-mollusc component predominated in offshore stations. Diversity, equitability, and density patterns were reversed in the summer when compared to the winter samples (within transects).

Study Duration:2 months; Habitat:Mud, sand; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Ponar grab; Sieve Size:0.5 mm; Number of Stations:6 (2 transects: thermal and nonthermal); Number of Replicates/Station:5; Temporal Frequency:Once; Abiotic Parameters Measured:Temperature, salinity, DO;

(20.00051)

Mahadevan, S. 1977. Benthic studies during February 1977. Chapt. IV. In: Tampa Electric Co. 29th Quart. Rept. on Big Bend Thermal and Ecological Surveys. Contains 26th Quart. Rept. by Conservation Consultants, Inc., R.D. Garrity (ed.). p. 35-390. Tampa Electric Company, Tampa, FL.

Results of the February 1977 benthic studies at Tampa Electric Company's Big Bend power plant were presented. A total of 204 different species were identified, sorted, enumerated, and weighed from 57,332 animals. Extremely oligoic communities were prevalent at a majority of sampling stations. A *Tellina*-dominated community was most prevalent at the study site, followed by *Pseudopolydora*, *Minuspio*, *Tharyx*, and *Streblospio* communities. Patterns of faunal density, biomass, species diversity, and equitability identified a thermally-influenced zone comprising the discharge canal and adjacent station, and the thermal transect and an adjacent station. While stress conditions were evident in the discharge canal and two stations, only slightly altered conditions were evident at the thermal transects. Faunal similarity analyses showed communities responding to sediment type rather than the thermal effluent.

Study Duration:1 month; Habitat:Sand, mud Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Petite ponar grab; Sieve Size:0.5 mm; Number of Stations:22; Number of Replicates/Station:6; Temporal Frequency:Once; Abiotic Parameters Measured:Temperature, salinity, DO, transparency; Dominant Taxon/Taxa Studied:*Tellina*, *Capitella*, *Pseudopolydora*, *Tharyx*, *Minuspio*, *Streblospio*, *Maplocytherida*, *Nereis*, *Corophium*, *Mulinia*, *Paraprionospio*, *Macoma*;

(20.00052)

Mahadevan, S. 1977. Benthic studies during August 1976. Chapt. IV. In: Tampa Electric Co. 28th Quart. Rept. on Big Bend Thermal and Ecological Surveys. Contains 25th Quart. Rept. by Conservation Consultants, Inc., R.D. Garrity (ed.). p. 239-309. Tampa Electric Company, Tampa, FL.

A description of the benthic community at Tampa Electric Company's Big Bend power plant area was presented. A total of 171 species were identified from 41,534 individuals. Because of unique faunal conditions, the discharge canal was suggested to contain a thermally stressed biota. Since differences in fauna exist between thermal and nonthermal transect stations, an altered fauna was suggested to be present in the first four stations of the thermal transect and first nearshore station of the nonthermal transect. Because of the high faunal density and species richness in the thermal transect, a deleterious effect could not be suggested for these "altered" stations. Due to similarity in fauna between these stations and stations adjacent to spoil islands and the intake, the "altered" area was expanded to include these stations. No catastrophic or severe effects on the benthic fauna were evident in Hillsborough Bay due to the thermal effluent.

Study Duration:1 month; Habitat:Sand, mud; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Ponar grab; Sieve Size:0.5 mm; Number of Stations:22; Number of Replicates/Station:6; Temporal Frequency:Once; Abiotic Parameters Measured:Temperature, salinity, DO, transparency; Dominant Taxon/Taxa Studied:*Tellina* sp., *Paraprionospio pinnata*;

(20.00053)

Mahadevan, S. 1978. Recolonization of benthos following a silt spill and subsequent dredging in a waterfront canal. Pap. Pres. Fla. Field Biol. Sec. Annu. Meet., Jan. 20-22, 1978. Tampa, FL.

A study of the recolonization pattern of benthos following a silt spill (and subsequent dredging) in a waterfront canal was conducted. After exhibiting erratic patterns in the initial stages of faunal recolonization, community characteristics recovered to "control" conditions 12 months following the dredging operations. A faunal similarity analysis endorsed the conclusions derived from interpretation of dominant species composition, i.e., a temporary recovery within two months and a complete recovery within 12 months. The canal stations contained a unique community with an abundance of opportunistic species ('r'-selected), and could be classified as a low density/diversity system capable of resisting stress and recuperating quickly.

Study Duration:3 months; Habitat:Sand, silt, clay; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Ponar grab; Sieve Size:0.5 mm; Number of Stations:1; Number of Replicates/Station:6; Temporal Frequency:Every 6 weeks; Dominant Taxon/Taxa Studied:Prior to dredging: *Streblospio benedicti*; following dredging: *Ameliscia abdita*, *Mysella planulata*, *Streblospio benedicti*, *Capitella capitata*;

(20.00054)

Mahadevan, S. & L.H. Byrd 1977. Benthic studies during December 1976. Chapt. IV. In: Tampa Electric Co. (Tampa, FL.) 29th Quart. Rept. on Big Bend Thermal and Ecological Surveys. Contains 26th Quart. Rept. by Conservation Consultants, Inc., R.D. Garrity (ed.). p. 206-234.

A description of the benthic studies at Tampa Electric Company's Big Bend power plant was presented. A total of 137 species were sorted, enumerated, and weighed from 11,401 animals. Through a variety of community characteristics, the discharge canal was suggested to be adversely affected by the thermal effluent. Some alteration of benthic fauna was suggested to have occurred at the thermal transect stations. Neither a catastrophic event nor an adverse condition, however, was reported.

Study Duration:1 month; Habitat:Sand, mud; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Petite ponar grab; Sieve Size:0.5 mm; Number of Stations:6; Number of Replicates/Station:6; Temporal Frequency:Once; Abiotic Parameters Measured:Temperature, salinity, DO, transparency; Dominant Taxon/Taxa Studied:*Tellina* sp., *Pseudopolydora* sp., *Mulinia lateralis*, *Podocerus* sp., *Capitella capitata*, *Nereis succinea*, *Maplocytherida septipunctata*, *Minuspio cirrifer*, *Macoma* sp.;

(20.00055)

Mahadevan, S. & J.K. Culter 1977. A biological study of the Big Bend breakwater structure. Tampa Electric Co. (Tampa, FL.) Spec. Rept. 28 p.

A biological study of the breakwater structure at Tampa Electric Company's Big Bend power plant was presented. A total of 59 species were identified from 58,504 organisms. Major differences in species composition and community structure were neither evident between the two sides of the breakwater nor between the six stations. The community that colonized the breakwater was characterized by *Balanus/Polydora* dominance, extremely oligomictic conditions, dominance of

opportunistic species, high faunal density and biomass, moderate species numbers, and low diversity and equitability. An observed difference in the biomass between the two sides of the breakwater was suggested to be related to greater food availability, rather than the thermal influence. Except for the low abundance of *Nereis succinea*, a suggested thermal pollution indicator, the breakwater was described as colonized by a "natural" and "predictable" fouling community.

Study Duration:1 day; Habitat:Sand, mud; Type of Study:Quantitative; Biological Component:Benthic epifauna; Type of Sampler:Square wooden frame; Sieve Size:0.5 mm; Number of Stations:6; Number of Replicates/Station:3; Temporal Frequency:Once; Dominant Taxon/Taxa Studied:*Balanus sp.*, *Polydora websteri*, *Nereis succinea*, *Crassostrea virginica*, *Aeginella sp.*, *Paracerceis caudata*;

(20.00056)

Mahadevan, S. & J.K. Culter 1978. A continued study of benthic infauna at Big Bend, Tampa Bay (Florida). A Spec. Rept. Submitted to Tampa Electric Co. (Tampa, FL.) by Conservation Consultants, Inc., 91 p.

A description of the April (1977) study of benthic infauna at Tampa Electric Company's Big Bend power plant was presented. A total of 22,369 organisms were sorted, enumerated and weighed to 135 different taxa during this study. Based on dominant species patterns, alteration of the community appeared to have occurred at the stations where thermal influence was detectable. *Nereis succinea*, a thermal pollution indicator, was abundantly represented at both discharge canal stations. Open bay thermal stations were dominated by species that could be considered "opportunistic" in nature. Overall, it was concluded that the discharge canal had been detrimentally affected and that an alteration of fauna was discernable to approximately one mile radius from the discharge pipe.

Study Duration:1 month; Habitat:Sand, mud; Type of Study:Quantitative; Biological Component:Benthic infauna; Type of Sampler:Petite ponar grab; Sieve Size:0.5 mm; Number of Stations:8; Number of Replicates/Station:6; Temporal Frequency:Once; Abiotic Parameters Measured:Temperature, salinity, DO; Dominant Taxon/Taxa Studied:*Nysella planulata*, *Pseudopolydora*, *Nereis succinea*, *Tharyx sp.*, *Mulinia-Mactra* bivalve complex;

(20.00057)

Mahadevan, S. & J.D. Murdoch 1977. A study on the recovery of benthic infauna at Apollo Beach embayment following a silt-spill and subsequent dredging. A Final Rept. Submitted to Envir. Plan. Div., Tampa Electric Co. (Tampa, FL.) by Conservation Consultants, Inc., R.D. Garrity (ed.). 37 p.

A description of the benthic infauna studies at the Apollo Beach embayment was presented. A dredged site, an undredged site, and a control site were sampled following an accidental silt spill. Sampling was conducted once after dredging (clean-up) operations had ceased and once one year later in an attempt to evaluate the effects of silt spill and subsequent dredging. The 1976 sampling revealed that benthic communities at the dredged site were severely stressed. Follow-up sampling in 1977 showed that the dredged site had recovered to "normal" faunal conditions (similar to control site). Although low faunal density and the abundance of a pioneer species, *Streblospio benedicti*, indicated stressed conditions at the undredged (silted) site, these conditions appear to have resulted from natural population turnover patterns of the amphipod species, *Ameliscia vadorum*. Also, *Ameliscia vadorum* was the most dominant species at all three study sites, and therefore, no significant changes in the community are inferred due to the silt spill at the present time. A comparative analysis of silt-affected sites to the control site in April 1977 showed no significant differences in community structure between the sites. Therefore, environmental impact of the silt spill after one year is considered minimal.

Study Duration: April 1976-April 1977; Habitat:Mud, sand; Type of Study:Quantitative; Biological Component:Benthic infauna; Type of Sampler:Petite ponar grab; Sieve Size:0.5 mm; Number of Stations:24; Number of Replicates/Station:1; Temporal Frequency:Once per year; Dominant Taxon/Taxa Studied:*Ameliscia vadorum*, *Streblospio benedicti*;

(20.00058)

Mahadevan, S. & J.J.B. Murdoch 1977. Benthic Studies. Chapt. IV. In: Tampa Electric Co. (Tampa, FL.) 27th Quart. Rept. on Big Bend Thermal and Ecological Survey. Contains 24th Quart. Rept. by Conservation Consultants, Inc., R.D. Garrity (ed.). p. 138-182.

A description of the April, 1976, benthic faunal studies conducted at Tampa Electric Company's Big Bend power plant was presented. A total of 16,976 specimens were counted, weighed, and identified to 138 different species during this study. Three zones (discharge, thermal, nonthermal) were recognized based on temperature, proximity to the thermal effluent discharge, and faunal characteristics. Overall, the discharge canal zone was described as containing a "pioneer" community with very low interspecific competition, therefore reflecting stress conditions induced by the thermal effluent. No evidence was found to indicate that the benthic fauna at the thermal transect was significantly "stressed" by the thermal effluents. Based on the community-type evaluation presented, a possible "stressed" benthic biota was shown to exist, but restricted to a distance of 0.4 km from the outfall.

Study Duration:1 month; Habitat:Mud, sand; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Ponar grab; Sieve Size:0.5 mm; Number of Stations:6; Number of Replicates/Station:6; Temporal Frequency:Once; Abiotic Parameters Measured:Temperature, salinity, DO, transparency; Dominant Taxon/Taxa Studied:*Capitella capitata*, *Corophium sp.*, *Tellina sp.*, *Mulinia lateralis*, *Cyclaspis varians*, *Rudilemboides naglei*, *Parasterope pollex*, *Ninuspio*

cirrifer, *Melita appendiculata*;

(20.00059)

Mahadevan, S., J.K. Culter, D.W. Heatwole 1982. A baseline survey of benthic communities at Big Bend, Tampa Bay (Florida). Annual Report #1. Tampa Electric Company, Tampa, FL. 24 p.

A description of benthic sampling in vicinity of Tampa Electric Company's Big Bend power plant is presented. Specific objectives of the study were to quantitatively describe the temporal fluctuations of benthic communities at Big Bend, correlate sediment parameters to faunal data and collect corroborative water quality data.

Study Duration:1 year; Habitat:Sand, mud, shell; Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Petite ponar grab; Sieve Size:0.5 mm; Number of Stations:5; Number of Replicates/Station:7; Temporal Frequency:Bimonthly; Abiotic Parameters Measured:Temperature, salinity, D.O., turbidity; Dominant Taxon/Taxa Studied:*Pseudopolydora* sp., *Paraprionospio pinnata*, *Spiochaetopterus costarum oculatus*, *Mediomastus californiensis*, *Glyciade solitaria*, *Ampelisca verrilli*, *Odostomia* sp.;

(20.00060)

Mahadevan, S., J.K. Culter, D.W. Heatwole 1983. A baseline survey of benthic communities at Big Bend, Tampa Bay (Florida). Annual Report #2. Tampa Electric Company, Tampa, FL.

A description of benthic sampling in vicinity of Tampa Electric Company's Big Bend power plant is presented. Specific objectives of the study were to quantitatively describe the temporal fluctuations of benthic communities at Big Bend, correlate sediment parameters to faunal data and collect corroborative water quality data.

Study Duration:1 year; Habitat:Sand, mud, shell; Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Petite ponar grab; Sieve Size:0.5 mm.; Number of Stations:5; Number of Replicates/Station:7; Temporal Frequency:Bimonthly; Abiotic Parameters Measured:Temperature, salinity, D.O., turbidity;

(20.00061)

Mahadevan, S., J. Culter, S. Hoover, J. Murdoch, F. Reeves & R. Schulze 1976. A study on the effects of silt-spill and subsequent dredging on benthic infauna at Apollo Beach embayment. A Rept. to Envir. Plan. Div., Tampa Electric Co. (Tampa, FL) R.D. Garrity and W.J. Tiffany, III (eds.). 58 p.

A description of the benthic communities at the dredged and undredged areas affected by a silt spill at Apollo Beach was presented. Twenty-six species that were absent in the dredged and undredged areas were found at the control site. *Capitella capitata*, a pollution indicator species, was found in greater numbers at the undredged site, while *Streblospio benedicti*, a pioneer species, was numerous at the dredged site. Oligomixity was more prevalent at the control and undredged sites. Faunal density and biomass were greatest at the control site and lowest at the dredged site. Species diversity and equitability were very similar (but low) at all three sites. Equitability, however, was highest at the dredged site. Based on a total community analysis, the dredged site was shown to be the most affected area, due to both the spill and subsequent dredging operations.

Study Duration:1 day; Habitat:Silt, sand, organic sediment; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Petite ponar grab; Sieve Size:0.5 mm; Number of Stations:24; Number of Replicates/Station:1; Temporal Frequency:Once; Abiotic Parameters Measured:Temperature (sediment & water), salinity, DO, transparency; Dominant Taxon/Taxa Studied:*Capitella capitata*, *Streblospio benedicti*;

(20.00062)

Mahadevan, S., J.K. Culter and R. Yarbrough 1980. A study of thermal effects on benthic communities of Big Bend, Tampa Bay (Florida). A technical report submitted to Stone and Webster Engineering Corporation, Boston. 154 pages.

A study to evaluate the effects of increased temperature (caused by shut down of a dilution pump) on the benthic communities in the vicinity of Big Bend (Tampa Bay) was conducted during the period May through December 1979. Three periods before shut down of the pump (May-August) and four periods after the shut down of the pump (August-December) were sampled at fourteen stations. Sampling consisted of benthic faunal collections and selected abiotic parameters. Considerable temporal and spatial variation in faunal characteristics was evident in the area. An evaluation of changes in community structure and species composition indicated that the dilution pump shut down may have imparted only short-term adverse effects in the thermal transect (open bay) areas of Big Bend. The discharge canal and the station at the mouth of the discharge canal exhibited faunal conditions indicative of persistent adverse impact (not much different than earlier data from 1976-1977). Hence, cessation of dilution pumping does not appear to alter the composition and structure of benthic communities in the vicinity of Big Bend. However, long-term effects in the area are not clear since a dramatic area-wide change in species composition occurred during December by the sudden influx of large populations of the bivalve, *Mulinia lateralis*.

Study Duration:Approximately seven months (May-December, 1979); Habitat:Sand, mud; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Petite Ponar grab; Sieve Size:0.5 mm; Number of Stations:14; Number of Replicates/Stations:7 (six analyzed); Temporal Frequency:Every six weeks; Abiotic Parameters Measured:Temperature, salinity, D.O., sediment characteristics; Dominant Taxon/Taxa Studied:Thermal- *Mulinia lateralis*, *Nereis succinea*,

*Streblospio benedicti*, non-thermal- *Mediomastus californiensis*, *Paraprionospio pinnata*, *Pseudopolydora* sp., *Glycinde solitaria*, *Ninuspio cirrifera*;

(20.00063)

Mahadevan, S., J.J.B. Murdoch, F.S. Reeves, J.K. Culter, R.A. Lotspeich & J.D. Murdoch 1977. An analysis and summary of studies on the effects of the cooling water system on aquatic fauna: A 316 Demonstration. Chapt. 4 - A study on the effects of thermal discharges on benthic infaunal community structure at Big Bend, Tampa Bay, Florida. Final Rept. of Ecological Surveys of Big Bend Area. Vol. 2, Chapt. 4. 415 p. Tampa Electric Company, Tampa, FL.

An analysis and summary of the benthic infaunal studies at Tampa Electric Company's Big Bend power plant was presented. A suggested pollution indicator species, *Nereis succinea*, was most abundant in the discharge canal stations and the nearshore thermal transect station. Three of the thermal stations contained a greater number of *Capitella capitata*, another pollution indicator species. *Streblospio benedicti*, a suggested "pioneer species", was collected in low numbers at the discharge canal and in extremely high numbers at a station recently dredged. Oligomictic situations were common at most stations and greater in the thermal stations. Species richness was low at the discharge canal, and 3 of the thermal stations. Species diversity (H') was relatively high at the discharge canal and higher in the nonthermal transect than in the thermal transect. Communities responded to sediment differences more than to the thermal plume. Overall, it was concluded that no significant impact had occurred to jeopardize the "protection and propagation of a balanced indigenous" benthic community at the study site.

Study Duration:1 year; Habitat:Sand, mud; Type of Study:Quantitative; Biological Component:Benthic infauna; Type of Sampler:Petite ponar grab; Sieve Size:0.5 mm; Number of Stations:22; Number of Replicates/Station:6; Temporal Frequency:6 weeks; Abiotic Parameters Measured:Temperature, salinity, DO, sediment analysis; Dominant Taxon/Taxa Studied:*Nysella plaulata*, *Ampelisca vadorum*, *Parasterope pollex*, *Mulinia-Mactra* complex, *Haplocytherida septipunctata*, *Pseudopolydora* sp., *Ampelisca verilli*, *Cyclaspis varians*, *Rudilenooides naglei*;

(20.00064)

McClintock, J.B. 1983. The effect of nutritional condition on ingestive conditioning in *Luidia clathrata* (Say) (Echinodermata: Asteroidea). Fla. Sci. 46(Suppl. 1):23:24.

Newly collected individuals of *Luidia clathrata* and individuals starved in the laboratory for 21 days exhibited no preference (as evidenced by contact chemoreception and teloreception) between clam (*Donax variabilis*) and shrimp (*Penaeus duorarum*) foods. Individuals fed a daily diet of either clam or shrimp for 21 days showed a significant preference for the food of their regular diet. Seastars starved for a 3 month period prior to conditioning demonstrated a similar ingestive conditioning response. Starved *L. clathrata* preferred shrimp following starvation periods, indicating that nutritional condition may influence food selection. Telereceptive response times were found to be significantly lower and ingestion rates significantly higher among starved individuals.

Type of Study:Quantitative; Biological Component:Echinodermata; Dominant Taxon/Taxa Studied:*Luidia clathrata*;

(20.00065)

McClintock, J.B., T.S. Klinger & J.M. Lawrence 1982. Extraoral feeding in *Luidia clathrata* Say (Echinodermata: Asteroidea). Florida Sci. 45 (Suppl. 1):19.

Observations were made of individuals of *Luidia clathrata* in Old Tampa Bay, Florida. Of 231 individuals, 32% were found with their cardiac stomachs everted and applied to the substratum. *Luidia* was previously believed to be an intraoral feeder. Organic-rich sediment promotes stomach eversion.

Type of Study:Qualitative; Biological Component:Fauna; Dominant Taxon/Taxa Studied:*Luidia clathrata*;

(20.00066)

Mosura, E.L. & E.D. Estevez 1977. *Rhizophora* litter production and freeze effects in Tampa Bay. In: Proc. of the Fourth Annu. Conf. on Restor. of Coast. Vegetation in Florida. p. 107-112.

A study of litter production by the red mangrove, *Rhizophora mangle*, was conducted in Cockroach Bay, a small secondary bay on Tampa Bay's eastern shore, during August 1976 through April 1977. Extremely high rates of litter production were found for red mangroves at their northern limits. Seedlings accounted for two thirds of the total biomass of summer litter. The small size of adult Tampa Bay trees was believed to be due to increased shedding of plant parts in response to cold stress. Trees which survived extremely low temperatures lost as much as two thirds of their reproductive effort.

Study Duration:August 1976-April 1977; Habitat:Mangrove forest; Type of Study:Quantitative; Biological Component:Flora; Temporal Frequency:Weekly; Abiotic Parameters Measured:Temperature; Dominant Taxon/Taxa Studied:*Rhizophora mangle*;

(20.00067)

Patton, G.L. 1982. A study of the meiofauna of three shallow water habitats in Cockroach Bay, Florida, with special emphasis on recent foraminifera. Univ. of So. Fla. M.S. Thesis.

The abundance of meiofauna in mangrove, seagrass, and two unvegetated sand sites in Cockroach Bay, Florida was determined during July 1980 and January 1981. Nematoda was the most abundant meiofaunal taxa except for one sampling site/season; Foraminifera or Copepoda ranked second in abundance, depending on site and season. Differences in abundances of dominant foraminiferal species among sites was not related to variations in physical parameters. The foram, *Trochammina laevigata*, was significantly correlated with root mat and organic content.

Study Duration: 7 July 1980-15 January 1981; Habitat: Mangrove, seagrass, sand; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Core; Sieve Size: .063 mm; Number of Stations: 4; Number of Replicates/Station: 4; Temporal Frequency: Twice (summer, winter); Dominant Taxon/Taxa Studied: *Trochammina laevigata*;

(20.00068)

Reeves, F.S. & S. Mahadevan 1977. Benthic studies during May 1976. Chapt. IV. In: Tampa Electric Co. 28th Quart. Rept. on Big Bend Thermal and Ecological Survey. Contains 25th Quart. Rept. by Conservation Consultants, Inc., R.D. Garrity (ed.). p. 144-343.

An analysis of benthic samples collected at Tampa Electric Company's Big Bend power plant during May 1976 was presented. Faunal density was determined to be greater in the thermal transect than in the nonthermal transect, however, the nonthermal transect exhibited a greater biomass. The abundance of certain pollution indicator species suggested the existence of stress conditions within the discharge canal. Within both the thermal and nonthermal transects, Amphipoda and Mollusca decreased in number with increasing distance from shore, while Polychaeta tended to increase in numbers. Spatial checks heterogeneity, species diversity, and faunal similarity were also calculated for the benthic data. Those parameters which showed a significant difference ( $p = 0.05$  level) between the thermal and nonthermal transects include: bottom temperature, bottom DO, species diversity and equitability.

Study Duration: 1 month; Habitat: Sand, mud; Type of Study: Quantitative; Biological Component: Benthic fauna; Type of Sampler: Ponar grab; Sieve Size: 0.5 mm; Number of Stations: 22; Number of Replicates/Station: 6; Temporal Frequency: Once; Abiotic Parameters Measured: Temperature, salinity, DO, transparency; Dominant Taxon/Taxa Studied: *Capitella capitata*, *Cyclaspis varians*, *Mulinia lateralis*, *Parasterope pollex*;

(20.00069)

Reeves, F.S. & S. Mahadevan 1978. A comparison of sampling efficiency between the petite Ponar grab and the diver operated hand-core in Tampa Bay, Fla. Paper Presented at Fla. Field Biol. Sec. Annu. Meet., Jan. 20-22, 1978.

A comparison of the sampling efficiency of the petite ponar grab and the diver operated core was presented. When tested for significance ( $p = 0.05$ ) between replicates, the sandy substrate station exhibited differences in faunal density, number of species, diversity and equitability for the two sampling methods, whereas the muddy substrate station showed a difference for number of species only. The smaller sampling size of the diver operated core in conjunction with the biting efficiency differences of the petite ponar in the two substrates could account for the differences in mean values. Community parameters at each station showed very little variation between the petite ponar and diver core samples with the exception of faunal density and biomass. These exceptions could possibly influence interpretation of the benthic data from the area.

Study Duration: 1 month; Habitat: Sand, mud; Type of Study: Technique; Biological Component: Benthic fauna; Type of Sampler: Petite ponar grab, hand operated diver core; Sieve Size: 0.5 mm; Number of Stations: 2; Number of Replicates/Station: 6 (grab); 10 (core); Temporal Frequency: Once;

(20.00070)

Rice, S.A. & J.L. Simon 1980. Intraspecific variation in the pollution indicator polychaete *Polydora ligni* (Spionidae). *Ophelia* 19(1):79-115.

The extent of intraspecific variation in the pollution indicator *Polydora ligni* was assessed on evidence from morphology, reproductive biology, physiological response, and population genetics. Five populations from Florida were compared morphologically and genetically; three of them were also analyzed for differences in reproduction and physiological response; morphological differences were observed between populations with respect to the setae of the fifth setiger and the presence of the nuchal antenna, both important taxonomic characteristics. Significant differences were observed in gametic distribution in mature individuals, egg size, and spermatophore morphology. Interpopulation crosses suggested the possibility of incipient reproductive isolation between some of the populations. Physiological responses, expressed as survival and growth rate, were compared between populations using a central composite factorial design experiment consisting of three levels each of temperature, salinity and dissolved oxygen. Experimental results were analyzed using response surface methodology and revealed highly significant differences in both five-day survival and growth rates between populations. Gene frequencies were determined by use of horizontal starch gel electrophoresis. Standard genetic distance, based upon ten loci, was not significantly different between most populations. However, one population varied from all others at a level corresponding to sibling species. For all populations pooled, 90% of all loci were polymorphic. The study concluded that this cosmopolitan pollution indicator has undergone considerable divergence throughout much of its geographical range and may require separation into discrete species.

Habitat: Mud, oyster rubble; Type of Study: Qualitative; Biological Component: Benthic invertebrates; Type of Sampler: 3 in. PVC core, 0.13 mm mesh plankton net & benthic settling trap; Sieve Size: 0.5 mm; Number of Stations: 4; Abiotic



Parameters Measured:Temperature, salinity, DO; Dominant Taxon/Taxa Studied:*Polydora ligni*;

(20.00071)

Ross, R.W. & T.V. Mayow 1975. Sedimentary structures and animal-sediment relationships in Old Tampa Bay, Florida. Fla. Scientist 38(Suppl. 1):13.

In order to describe potentially preservable physical and biogenic structures produced in Old Tampa Bay, superficial subtidal sediments were studied in terms of: 1) textural type and distribution of sediment being deposited; 2) characteristic sedimentary structures and their modes of origin; 3) distribution of geologically significant macrofauna; and 4) animal-sediment relationships and effects of organisms upon sediments, including intensity of bioturbation. These sedimentary characteristics are potentially useful for deciphering estuarine depositional environments in the rock record. Three laterally gradational sedimentary facies defined on both physical and biological parameters were distinguished in Old Tampa Bay: 1) clean sand facies; 2) muddy sand facies; and 3) mud facies.

Habitat:Sand, mud; Type of Study:Qualitative; Biological Component:Macrofauna;

(20.00072)

Saloman, C.H. 1964. The shrimp *Trachypeneus similis* in Tampa Bay. Quart. J. Fla. Acad. Sci. 27(2):160-164.

A study of the shrimp *Trachypeneus similis* was conducted in Tampa Bay from August 1961 to December 1963. The month of December was determined to be the period of maximum abundance for this species. The record of *T. similis* from Tampa Bay now shows that its distribution probably extends throughout the entire periphery of the Gulf of Mexico.

Study Duration:2 years, 4 months; Habitat:Sand, shell, grassbed; Type of Study:Quantitative; Biological Component:Decapod fauna; Type of Sampler:Trawl, beach seine, push net; Number of Stations:52; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Penaeus duorarum*, *Trachypeneus constrictus*, *Sicyonia typica*, *Trachypeneus similis*;

(20.00073)

Saloman, C.H. 1965. Salt shrimp *Penaeus duorarum* in Tampa Bay, Florida -- biology, fishery economics and changing habitat. U.S. Fish Wildl. Serv. Spec. Sci. Rept. Fish. No. 520. 16 p.

From October 1961 to April 1962, 6.2 million individuals of *Penaeus duorarum*, with a retail value of more than \$155,000 were produced by the fishery. Females outnumbered males by a narrow margin and were of larger average size than males. Shrimp taken from the two major shrimping areas of Tampa Bay were of different sizes. The smallest specimens were caught toward the headwaters of the estuary, in water of relatively low salinity. About 184 more shrimp were retained per boat-hour in lower Tampa Bay than Old Tampa Bay. Dredge and fill operations were concluded to have measurably reduced the amount of available habitat for shrimp and other estuarine dependent species since 1940.

Study Duration:1 year, 6 months; Habitat:Grassbeds; Biological Component:Decapod fauna; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(20.00074)

Saloman, C.H. 1968. Diel and seasonal occurrence of pink shrimp, *Penaeus duorarum*, Burkenroad, in two divergent habitats of Tampa Bay, Florida. U.S. Fish Wildl. Serv. Spec. Sci. Rept. Fish. No. 561. 6 p.

Information on the size and sex of the pink shrimp *Penaeus duorarum* was collected. Catches were larger during darkness and rose as temperature decreased from about 30°C to 14°C. Larger shrimp were caught in darkness than in the daylight throughout the study. Larger shrimp were also caught at the station having lowest salinity and incidence of transmitted light. In dark phases of the moon, greater numbers of shrimp were caught than during light phases. The size of shrimp reached a peak in April and May after an average increase in length of about 1 mm carapace length per month. Female shrimp were larger than males in all samples except two.

Study Duration:17 months; Habitat:Grassbeds; Type of Study:Quantitative; Biological Component:Decapod fauna; Type of Sampler:4.9 m nylon semi-balloon shrimp trawl; Number of Stations:2; Number of Replicates/Station:8; Temporal Frequency:Bimonthly; Abiotic Parameters Measured:Temperature, salinity, light, moon phase; Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(20.00075)

Saloman, C.H. 1971. The shrimp *Leptalpheus forceps* in Old Tampa Bay, Florida. Quart. J. Fla. Acad. Sci. 34(1):66-77.

A documentation of the occurrence of the alpheid shrimp *Leptalpheus forceps* in Old Tampa Bay was presented along with a description of the collection site and the ecological conditions of the habitat. The abundance, size, and reproductive state were also recorded.

Study Duration:1 year; Habitat:Intertidal sediments, salt marsh, oyster bar; Type of Study:Quantitative; Biological Component:Decapod fauna; Type of Sampler:Corer; Sieve Size:0.701 mm; Number of Stations:1; Number of

Replicates/Station:1; Temporal Frequency:Monthly; Abiotic Parameters:Temperature, salinity, DO, pH, turbidity, total Kjeldahl nitrogen, total phosphorous; Dominant Taxon/Taxa Studied:*Leptalpheus forceps*;

(20.00076)

Saloman, C.H. 1973. Range extension of *Penaeus setiferus* (Linnaeus) to Tampa Bay, Florida. Fla. Sci.36(2-4):208-209.

A large male white shrimp was brought to the author for identification. The shrimp measured 34.6 mm carapace length and 161 mm total length. This marked the first occurrence of *Penaeus setiferus* in the Tampa Bay area.

Study Duration:1 day; Habitat:Silt, clay; Type of Study:Qualitative; Biological Component:Shrimp; Type of Sampler:Commercial shrimp trawl; Abiotic Parameters Measured:Salinity, turbidity; Dominant Taxon/Taxa Studied:*Penaeus setiferus*;

(20.00077)

Santos, S.L. 1979. Cyclic disturbance, recolonization and stability in an estuarine soft bottom infaunal macrobenthic community. Univ. So. Florida, Ph.D. Dissertation.

An ecological study of the soft-bottom macrobenthic community was conducted. A portion of the Hillsborough Bay was found to undergo an annual summer defaunation, with recolonization proceeding in the ensuing months. Whether the community was established by adults or juveniles appeared to be taxon-specific. Settlement was determined to be not exclusively performed by one group of species, and most of the species found were capable of colonizing barren sediment. Regardless of which species colonized initially, by the fourth month following defaunation, some members of the core species group attained high densities and numerically dominated the community until the next defaunation.

Study Duration:4 years; Habitat:Sand, silt; Type of Study:Quantitative; Biological Component:Macrobenthic fauna; Type of Sampler:PVC core; Sieve Size:0.5 mm; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO, Eh; Dominant Taxon/Taxa Studied:*Mysella planulata*, *Ameliscia abdita*, *Mulinia lateralis*, *Streblospio benedicti*, *Medionastus californiensis*, *Grandidierella bonnieroides*, *Nereis succinea*, *Paraprionospio pinnata*, *Cyclaspis* sp.;

(20.00078)

Santos, S.L. & S.A. Bloom 1980. Stability in an annually defaunated estuarine soft bottom community. *Oecologia* 46:290-294.

A working definition of stability proposed and data was collected from a soft bottom community in Hillsborough Bay to test it. The community underwent annual natural catastrophic defaunation. Results supported the working definition and described the stability in the community.

Study Duration:February 1975-July 1978; Habitat:Soft bottom, silt/clay = 10.0; Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:PVC core, 7.62 cm dia.; Sieve Size:500 micron; Temporal Frequency:Monthly; Abiotic Parameters Measured:Sediment characteristics;

(20.00079)

Santos, S.L. & S.A. Bloom 1983. Evaluation of succession in an estuarine macrobenthic soft-bottom community near Tampa, Florida. *Int. Revue ges. Hydrobiol.* 68(5):617-632.

Macrobenthos in a subtidal area was sampled monthly for 42 months. During the study period complete defaunation occurred 3 times. Recovery and successional patterns were investigated by quantitative and qualitative normal and inverse classification analysis and by rank-order analysis of the dominant species. No consistent patterns were observed.

Study Duration:42 months; Habitat:Sand bottom; Type of Study:Qualitative, quantitative; Biological Component:Faua; Type of Sampler:PVC cores (diver operated); Sieve size:0.5mm; Number of Stations:1; Number of Replicates/Station:10; Temporal Frequency:Monthly; Abiotic Parameters Measured:D.O., temperature, salinity; Dominant Taxon/Taxa Studied: *Ameliscia abdita*, *Mysella planulata*, *Streblospio benedicti*, *Mulinia lateralis*, *Medionastus californiensis*, *Cyclaspia* sp., *Nereis succinea*, *Grandidierella bonnieroides*;

(20.00080)

Santos, S.L. & J.L. Simon 1980. Marine soft-bottom community establishment following annual defaunation: larval or adult recruitment? *Mar. Ecol. Prog. Ser.* 2:235-241.

Recolonization, following annual summer defaunation of a large areal soft-bottom community in Hillsborough Bay, Tampa, Florida, was investigated to determine whether adult or larval recruitment was primarily responsible for reestablishing the community. Two quantitative sampling designs were employed: 1) samples of the natural bottom were collected one month after each defaunation during 1975, 1976, and 1977 and washed through a 0.5 mm sieve; 2) containers of azoic sediment were placed and collected weekly during a 10 week period immediately following the 1978 defaunation and washed through a 0.25 mm sieve. The weekly samples contained almost all newly settled larvae (99.7%), while the monthly samples contained only 41% newly settled larvae. Whether the community was established by adult or larval settlement appeared to be taxon specific. Polychaetes and molluscs were mostly present as newly metamorphosed larvae. Amphipods, cumaceans and flatworms were initially present as adults. The discrepancies in the results stem from differences in methodologies of

the two designs. The conclusion follows that methodologies must be tailored to the specific question posed, and that in this study, the majority of the initial community was established by larval rather than adult settlement.

Study Duration:3 years; Type of Study:Quantitative; Biological Component:Invertebrates; Type of Sampler:7.62 cm PVC core & plankton net; Sieve Size:0.5 mm; Number of Stations:1; Number of Replicates/Station:10; Temporal Frequency:Monthly, then weekly; Dominant Taxon/Taxa Studied:*Streblospio benedicti*, *Paraprionospio pinnata*, *Polydora ligni*, *Glyptis vittata*;

(20.00081)

Santos, S.L. & J.L. Simon 1980. Response of soft bottom benthos to annual catastrophic disturbance in a south Florida estuary. Mar. Ecol. Prog. Ser. 3:347-355.

Monthly collections of benthic macrofauna from Hillsborough Bay, a secondary embayment of Tampa Bay, Florida, between February 1975 and July 1978, revealed annual summer defaunations of the soft bottom community. The defaunations were attributed to hypoxia. Recolonization during intervening periods was described. The eight numerically dominant species (3 polychaetes; 3 crustaceans; 2 molluscs), which accounted for 95% of the total density during the study period were classified as rapid colonizers (r-strategists).

Study Duration:February 1975-July 1978; Habitat:Mud; Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Corer; Sieve Size:0.5 mm; Number of Stations:1; Number of Replicates/Station:10; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO; Dominant Taxon/Taxa Studied:*Mysella planulata*, *Ampelisca abdita*, *Streblospio benedicti*, *Grandidierella bonneroides*, *Mulinia lateralis*, *Mediomastus californiensis*, *Cyclaspis sp.*, *Nereis succinea*;

(20.00082)

Simon, J.L. 1974. Tampa Bay estuarine system - a synopsis. Fla. Sci. 37(4):217-244.

A summary of the Tampa Bay estuarine system including: 1) Old Tampa Bay; 2) Hillsborough and McKay Bays; 3) Tampa Bay; 4) Boca Ciega Bay; 5) Terra Ciega Bay, was presented. Coliform bacteria counts in Old Tampa Bay and Hillsborough Bay were high enough to limit contact sports and shellfishing. Water quality was being affected by discharges from 55 sewage treatment plants, 90 plus industries, and 100 plus marinas. Primary productivity was determined to be among the highest in the world. A great diversity of marine life was present from both temperate and tropical regions.

Habitat:Estuarine; Type of Study:Review;

(20.00083)

Simon, J.L. 1977. Annual variation in benthic invertebrate populations in stressed and unstressed habitats in Hillsborough Bay, Florida. Fla. Sci. 40 (Suppl. 1):16.

Benthic invertebrate populations were monitored for annual variations in stressed and unstressed portions of Hillsborough Bay. The upper portion of the bay, which has received large quantities of municipal sewage effluent has been characterized by widely fluctuating species numbers, composition, densities, and biomass. The lower, unstressed part of the bay displayed more stable assemblages of a wider variety of epifaunal species.

Study Duration:2 years; Type of Study:Quantitative; Biological Component:Benthic invertebrates; Type of Sampler:PVC core; Sieve Size:0.5 mm; Number of Stations:12;

(20.00084)

Simon, J.L. 1978. Summary: Effects of sewage pollution abatement on environmental quality in Hillsborough Bay, Florida. Sea Grant Rept. R/EM-7.

At the upper Hillsborough Bay stations under the influence of the sewage plant, a predictable depression (total defaunation at some stations) of fauna was observed to have occurred each summer. The starting date and the duration of the defaunation have varied from year to year. For 1976, the die off started in July and continued through October with subsequent recovery. The 1977 faunal depression began in July and continued at least through November. Species numbers, density patterns, and biomass were affected. During the same time periods, the lower unstressed Hillsborough Bay stations showed little if any depression in species numbers, densities or biomass. During both 1975 and 1976, at these cleaner water stations, DO values rarely fell below 4 mg/l, while bottom water temperatures were approximately the same as at the upper Bay stations.

Study Duration:3 years; Type of Study:Qualitative; Biological Component:Benthic fauna; Number of Stations:12; Dominant Taxon/Taxa Studied:Abiotic Parameters Measured:Temperature, salinity, DO;

(20.00085)

Simon, J.L. & D.M. Dauer 1972. A quantitative evaluation of red tide induced mass mortalities of benthic invertebrates in Tampa Bay, Florida. Environ. Lett. 3(4):229-234.

Infaunal invertebrate mortalities accompanying a *Gyrodinium breve* outbreak and fish kill were reported. The results

indicated that the normal pre- red tide assemblage was essentially destroyed. Of the most abundant 22 original species, only 5 remained (the polychaetes *Travisia*, *Scolecopsis*, and *Laonereis*; the brachiopod *Glottidia*). All but *Laonereis* were present in reduced numbers compared to before the outbreak. Subsequent sampling in September indicated that some species were still dying off. It was believed that not all invertebrate infaunal species are equally affected by the red tide toxins or anaerobiosis. Laboratory studies were determined to be needed to confirm the field observations reported and to determine whether the mortality recorded is caused directly by *G. breve* toxins or by the anaerobiosis accompanying the fish kill.

Study Duration:1 month; Habitat:Fine sand; Biological Component:Benthic invertebrates; Dominant Taxon/Taxa Studied:*Branchiostoma caribaeum*, *Acanthohaustorius sp.*, *Diopatra cuprea*, *Nassarius vibex*, *Ophiophragus filograneus*, *Pinnixia sp.*;

(20.00086)

Simon, J.L. & D.M. Dauer 1977. Reestablishment of a benthic community following natural defaunation. Belle W. Baruch Symp. Mar. Sci., 6th, Univ. So. Carolina. 1977. Ecology of marine benthos. p. 139-154.

A general overview of the process of repopulation following a natural defaunation and a comparison of responses shown by different taxa of benthic infauna was presented. The fauna made a rapid recovery in terms of species numbers and composition, returning to much the same assemblage as prior to the red tide outbreak. Polychaetes were the most rapid colonists both in terms of the number of species and number of individuals. Molluscs and amphipods appeared later and also were significantly affected by seasonal patterns of reproduction, and thus dispersal. Only the polychaetes, other crustacea, and the total fauna showed species colonization patterns indicative of equilibrium.

Study Duration:2 years; Habitat:Sand; Biological Component:Benthic fauna; Type of Sampler:PVC core; Sieve Size:0.5 mm; Number of Stations:4; Number of Replicates/Station:5; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, sediment analysis; Dominant Taxon/Taxa Studied:*Polydora ligni*, *Polydora socialis*, *Apanthura agagifera*, *Stylochus sp.*, *Pectinaria gouldii*, *Nereis succinea*, *Eteone heteropoda*, *Paraprionospio pinnata*;

(20.00087)

Simon, J.L. & L.J. Doyle 1974. Report No. 2 - advance inspection of proposed shell dredging "Site 5", In: Environmental impact of oyster shell dredging in Tampa Bay, Florida. St. Fla. Trustees Internal Improv. Trust Fund.

A study of oyster shell dredging in Tampa Bay, Florida, produced a total of 111 species or taxa of benthic invertebrates, including 20 bivalves, 14 gastropods, 40 polychaetes, 22 crustaceans, and 15 miscellaneous taxa. This area was found to be extremely heterogeneous. The mean number of individuals at the four sampling stations was 15,755/m<sup>2</sup>. Biomass determinations (ash-free organic weight in mg/m<sup>2</sup>) were calculated for all specimens collected and partitioned among the major taxonomic categories.

Type of Study:Quantitative; Biological Component:Benthic invertebrates; Type of Sampler:Hand-held core, 12 foot trynet; Sieve Size:0.5 mm; Number of Stations:4 (biological), 13 (sediment), 5 (epifaunal); Number of Replicates/Station:4 (biological), 7 (sediment); Temporal Frequency:Once; Abiotic Parameters Measured:Sediment characteristics;

(20.00088)

Simon, J.L., L.J. Doyle, & W.G. Conner 1976. Environmental impact of oyster shell dredging in Tampa Bay, Florida. Rept. No. 4: Final Rept., Long-term effects of oyster shell dredging in Tampa Bay, Florida. Fla. St. Dept. Envir. Reg.

A study of the impact of oyster shell dredging in Tampa Bay was conducted from February 1975 through April 1976. The two experimental (dredged) sites had significantly fewer species and individuals than the control sites during the first 6 months after dredging. However, during 7-12 months after dredging, no significant differences were evident when compared with the control site. It was suggested therefore, that the number of species and individuals were reduced only during the first 6 months after dredging, and that within less than 12 months, the total number of infaunal invertebrate species had returned to normal levels. The dredged experimental sites had significantly lower biomass (grams organic matter/m<sup>2</sup>) than the undredged control site during the first 6 months after dredging. There were no significant differences after 7 months in biomass at Experimental Site 2, while Experimental Site 1 continued to show lower values. Although biomass data are not as clear cut as those for species numbers or density, the trend is towards recovery from dredging. Similarity analysis showed that the fauna which returned to the dredged areas within 12 months was approximately the same as that at the undisturbed control location, suggesting that the same type of species assemblages returned. Overall, the area disturbed by shell dredging returned to the same species assemblage, had the same number of species, the same density patterns, and the same or a slightly lower biomass than undisturbed bay bottom within less than 12 months.

Study Duration:1 year, 3 months; Habitat:Shell, sand, silty-mud; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:PVC core; Sieve Size:0.5 mm; Number of Stations:3; Number of Replicates/Station:16; Temporal Frequency:Approximately monthly; Abiotic Parameters Measured:DO, turbidity, light, total suspended load;

(20.00089)

Smith, S.J., B. Schuster & M.E. Bros 1983. Comparison of two sampling techniques for fouling community studies. Fla. Sci. 46(Suppl. 1):21.

Quadrat and point sampling methods were compared in their estimations of percent cover and species richness of fouling communities. The quadrat sampling technique was found to determine species richness more accurately than the point sampling method. Species richness was determined for total organisms and for 3 subgroups based on motility: motile, sessile, and semi-sessile. Both methods were compared to a planimetric control for estimates of percent cover for sessile species.

Type of Study:Quantitative (technique); Biological Component:Fauna; Type of Sampler:Settling plates; Number of Stations:15;

(20.00090)

Stancyk, S.E., F.J.S. Maturo, Jr. & R.W. Heard, Jr. 1976. Phoronids from the east coast of the United States. Bull. Mar. Sci. 26(4):576-584.

The presence of *Phoronis architecta* at Seahorse Key and Tampa Bay and of *Phoronis muelleri* at Beaufort were confirmed from collections. An oyster shell containing a colony of the small burrowing *Phoronis ovalis* was collected at Sapelo Island. This was the first record of this species on the east coast of the U.S. A fourth species was also found at Sapelo Island. This species was determined to be quite similar to *Phoronis australis*, which had not been reported from the western Atlantic; however, it was believed that further study may reveal that it is a new species.

Type of Study:Qualitative; Biological Component:Fauna; Dominant Taxon/Taxa Studied:*Phoronis architecta*, *P. muelleri*, *P. ovalis*, *P. australis*;

(20.00091)

Sykes, J.E. 1967. Report of the Bureau of Commercial Fisheries Biological Laboratory, St. Petersburg Beach, Florida. Fiscal Year 1966. U.S. Dept. Interior, Fish Wildl. Serv. Contrib. No. 32, Circ. 257. 18 p.

Progress in estuarine and red tide research programs was described. The application of biological information toward the maintenance and conservation of estuarine zones was stressed. The programs were designed to document the relatively unknown scope of biological productivity in the coastal zones of the eastern Gulf of Mexico, to measure the effect of changes in these zones, and to develop methods of increasing marine resources which can be used by man.

Study Duration:1 year; Type of Study:Qualitative; Biological Component:Benthic flora and fauna; Dominant Taxon/Taxa Studied:*Branchiostoma caribaeum*, *Glottidia pyramidata*;

(20.00092)

Sykes, J.E. 1968. Report to the Bureau of Commercial Fisheries Biological Laboratory, St. Petersburg Beach, Florida. Fiscal Year 1967. U.S. Dept. Interior, Fish Wildl. Ser., Contrib. No. 39, Circ. 290. 17 p.

The major goals of the Laboratory were discussed: to explore the relatively unknown scope of biological productivity in the coastal zone of the eastern Gulf of Mexico; to measure the effect of changes in that zone; and to develop methods of increasing estuarine fishery resources. The report described current research on projects in the estuarine and red tide programs. The projects included studies of sediments and organisms in bay bottoms, plankton crops and fishes residing in and transferring between estuaries and the Gulf of Mexico, toxicity of the red tide organism, and experimental rearing of pompano in an impounded lagoon. A physical, hydrological, biological and sedimentological inventory of Florida estuaries was also in progress. A systematic and ecological study of benthos in Tampa Bay was reported.

Study Duration:1 year; Type of Study:Qualitative; Biological Component:Benthic flora and fauna; Abiotic Parameters Measured:Salinity, pH, nutrients, light; Dominant Taxon/Taxa Studied:*Glottidia pyramidata*, *Branchiostoma floridae*, *Mercenaria campechiensis*, *Mercenaria mercenaria*;

(20.00093)

Sykes, J.E. 1970. Report of the Bureau of Commercial Fisheries Biological Laboratory, St. Petersburg Beach, Florida. Fiscal Year 1969. U.S. Dept. Interior, Fish Wildl. Ser., Contrib. No. 55, Circ. 342. 22 p.

Highlights of research for the 6 year period included analysis and publication of data related to effects of engineering on the estuarine resource and completion of field work on the Florida portion of the cooperative Gulf of Mexico estuarine inventory. In addition, data supplied through testimony to the Florida legislature assisted in the establishment of an aquatic preserve; and after a local hearing in which laboratory data were presented, a municipality disapproved a potentially damaging engineering project.

Study Duration:6 years; Type of Study:Qualitative; Biological Component:Flora and fauna; Abiotic Parameters Measured:Temperature, salinity, DO, pH, nutrients, turbidity;

(20.00094)

Sykes, J.E. & J.H. Finucane 1966. Occurrence in Tampa Bay, Florida of immature species dominant in Gulf of Mexico commercial fisheries. Fish. Bull. 65(2):369-379.

Species inhabiting the Tampa Bay estuary in early life and entering Gulf fisheries as adults were discussed. Twenty three species of major importance in Gulf of Mexico commercial fisheries were found to inhabit Tampa Bay during immaturity. Seasonal and aerial distribution was described for the species common to Tampa Bay biological collections and catches in the Gulf. Although most of these species were distributed throughout the Bay system, Old Tampa Bay harbored greater numbers than any other area. Hillsborough Bay, an area of the system similar to Old Tampa Bay in salinity regime, harbored fewer important species than any other area. Its relatively low production was attributed to the loss of the natural habitat through human alteration. The role of the estuary on producing species important in Gulf fisheries was discussed, and the need for preservation of estuarine nursery areas was stressed.

Study Duration:1 year, 3 months; Habitat:Estuarine; Type of Study:Quantitative; Biological Component:Fishes & marine invertebrates; Type of Sampler:Minnow seines, shrimp trawl, balloon trawl, pushnet, cast net; Number of Stations:8 (seine), 16 (trawl); Number of Replicates/Station:1; Temporal Frequency:Monthly; Abiotic Parameters Measured:Salinity; Dominant Taxon/Taxa Studied:*Crassostrea virginica*, *Callinectes sapidus*, *Mugil cephalus*, *Mugil trichodon*, *Mugil curema*, *Brevoortia patronus*, *Brevoortia smithi*, *Brevoortia gunteri*, *Penaeus aztecus*, *Penaeus setiferus*, *Penaeus duorarum*, *Trachepeneus constrictus*, *Sicyonia laevigata*, *Sicyonia typica*;

(20.00095)

Tampa Bay Regional Planning Council 1978. Area wide water quality, a management plan for the Tampa Bay Region, Executive Summary. Tampa Bay Regional Planning Council. 31 p.

The water quality of the Tampa Bay region was assessed and problems were defined. The point and nonpoint source contributors to the problems were determined and control programs recommended. Management systems, financial support, and socio-economic factors were discussed. Over-enrichment of streams, lakes, and bays from fertilizers and from human and animal wastes was determined still to be Tampa Bay region's most widespread problem. Phosphorus levels in many of the water bodies in the region were in excess of what is normally considered healthy. The presence of excessive quantities of coliform bacteria from human and animal wastes was determined to be another problem. This form of pollution often closes beaches to swimmers and prohibits shellfish harvesting. Contributors to these high levels of coliform bacteria include pet droppings contained in urban stormwater runoff, sewage treatment plant effluents, leaking septic tanks, and runoff from improved pastures. Dissolved oxygen concentrations dropping below necessary levels often resulted in fish kills. Human and animal wastes, grass clippings and leaf litter, and discharges from industries often resulted in decreased levels of dissolved oxygen.

Type of Study:Qualitative; Abiotic Parameters Measured:DO;

(20.00096)

Taylor, J.L. 1964. Benthic Project. p. 5-8, In: Rept. Bur. Comm. Fish. Biol. Sta., St. Petersburg Beach, Fla., Fiscal Year 1962-64. U.S. Dept. Interior, Fish Wildl. Ser., Circ. 239.

The objectives and methods for the Bureau of Commercial Fisheries Benthic Project in Boca Ciega Bay, Tierra Verde and Johns Pass were described. An annotated area checklist of marine invertebrates, algae and seagrass was compiled. Quantitative determinations of bottom communities, with size and weight estimates of dominant plants and animals per unit of area were presented. A study of bottom indicator organisms in relation to the sources of pollution in Tampa Bay and to changing hydrologic conditions was conducted. Life history studies and determinations of the zoogeographic relations of estuarine bottom biota were also described.

Study Duration:1 year; Habitat:Sand, silt, grassbed; Type of Study:Semi-quantitative; Biological Component:Benthic invertebrates; Type of Sampler:Net, dredge, corer; Sieve Size:1 mm; Number of Stations:4 areas, variable no. of stations at each; Abiotic Parameters Measured:Salinity, pH, sediment analysis;

(20.00097)

Taylor, J.L. 1970. Coastal development in Tampa Bay, Florida. Mar. Poll. Bull. 1(10):153-156.

Biological, chemical, and physical aspects of estuaries in the eastern Gulf of Mexico (including Tampa Bay) were studied to determine the effects of environmental factors on fisheries in the Gulf. Sedimentology, hydrology, and primary production and biology (benthos, zooplankton volumes, fish and commercially important crustaceans) data indicated that pollution and development have been most detrimental to resources in Hillsborough Bay and Boca Ciega Bay.

Study Duration:2 years; Habitat:Sand, shell; Type of Study:Qualitative; Biological Component:Flora and fauna; Number of Stations:371; Number of Replicates/Station:1; Abiotic Parameters Measured:Temperature, salinity, DO, pH, turbidity, nutrients; Dominant Taxon/Taxa Studied:*Glottidia pyramidata*, *Branchiostoma caribaeum*, *Phoronis architecta*, *Bittium varium*;

(20.00098)

Taylor, J.L. 1971. Polychaetous annelids and benthic environments in Tampa Bay, Florida. Univ. Florida Ph.D. Dissertation.

A total of 178 species of polychaetes were collected in Tampa Bay, Florida and were divided among 130 genera and 40

families. Two families (Pisyonidae and Trochochaetidae) and 35 species were newly reported for the Gulf of Mexico. The more saline areas of Tampa Bay were found to support the greatest number of individual worms per dredge sample. Areas of low diversity and few polychaetes were limited to Hillsborough Bay (where there is a sewage pollution) and Boca Ciega Bay (where dredge-fill development is widespread). Data on polychaete distribution and abundance indicated that Tampa Bay supported a rich and varied polychaete fauna and that much of the estuary still remains in a nearly natural condition.

Study Duration:6 years; Habitat:Variable; Type of Study:Quantitative; Biological Component:Polychaete fauna; Type of Sampler:Dredge; Sieve Size:0.701 mm; Number of Stations:363; Number of Replicates/Station:1; Abiotic Parameters Measured:Temperature, salinity, DO, pH, turbidity, transparency, nutrients;

(20.00099)

Taylor, J.L. 1979. Benthic data from Tampa Harbor Project. Unpub. Rept. U.S. Army Corps, Jacksonville District, Jacksonville, FL.

Data on the benthos and sediments from three transects within Tampa Bay were presented. A summary of organisms collected and mean grain size were included.

Type of Study:Qualitative; Biological Component:Benthic fauna;

(20.00100)

Taylor, J.L., J.R. Hall, & C.H. Saloman 1970. Mollusks and benthic environments in Hillsborough Bay, Florida. Fish. Bull. 68(2):191-202.

The diversity and abundance of molluscs in Hillsborough Bay were found to be affected by bottom conditions which were influenced in varying degrees by industrial pollution and dredging. Indications were that 42% of the bay bottom was unhealthy (no living molluscs); 36% marginal (had one or more of the 4 mollusc species that were predominant); and 22% healthy (had molluscs well represented by numerous species and large numbers of individuals).

Study Duration:1 month; Habitat:Sand; Type of Study:Quantitative; Biological Component:Benthic molluscs; Type of Sampler:Bucket, dredge & rigid frame net; Sieve Size:0.701 mm; Number of Stations:45; Number of Replicates/Station:1 or 2; Abiotic Parameters Measured:Temperature, salinity, sediment analysis;

(20.00101)

Taylor, J.L. & C.H. Saloman 1966. Benthic Report. p. 4-13, In: Rept. Bur. Comm. Fish. Biol. Sta., St. Petersburg Beach, Fla., Fiscal Year 1965. U.S. Dept. Interior, Fish Wildl. Ser., Bur. Comm. Fish., Circ. 242.

Laboratory studies concerning invertebrate taxonomy, analysis of sediments, hydrographic data and an economic evaluation of the estuarine resource in Tampa Bay were reported. The Benthic Project was divided into the following areas of study: Tampa Bay, invertebrates, Boca Ciega Bay, exposed beaches, Tierra Verde, a clam survey, and a vegetation survey.

Study Duration:1 year; Habitat:Sand, grassbed, silt, shell; Type of Study:Qualitative; Biological Component:Flora and fauna; Type of Sampler:Dredge, net, corer; Number of Stations:3 sites; 473 stations; Number of Replicates/Station:Variable; Temporal Frequency:Quarterly; Abiotic Parameters Measured:Temperature, salinity, pH, sediment analysis;

(20.00102)

Taylor, J.L. & C.H. Saloman 1968. Rearing lugworms for fish bait. Comm. Fish. Rev. p. 61-63.

The idea of rearing the lugworm *Arenicola cristata*, for fish bait was introduced. *A. cristata*, an excellent bait for sport fishes, has characteristics that suit it well for rearing under artificial conditions. Preliminary experiments showed that lugworms could be grown in sediment trays, submerged in a seawater system. In 6 months, 72 worms worth \$3.00 were grown in a tray 39 in. sq. (1m<sup>2</sup>) by 6 in. (15 cm) deep, in a 6 in. layer of sand. At the time of this study, the bait worm business depended on digging for 2 species -- the blood worm and the clam worm. The annual wholesale value of these worms in the United States was \$1.3 million, but both species have biological features that presumably make them poorly suited for aquaculture.

Habitat:Sand; Type of Study:Qualitative; Biological Component:Polychaete fauna; Dominant Taxon/Taxa Studied:*Arenicola cristata*, *Nereis virens*, *Glycera dibranchiata*;

(20.00103)

Thoenke, K.W. 1977. Amphipod life cycles in a west Florida estuary. Am. Zool. 17(4):967.

Size, sex, and degree of maturity were determined for 4 Tampa Bay amphipod species. In ovigerous females, the number of eggs and the stage of development of the brood were examined. *Amphelisca abdita* ovigerous females, averaging 6.6% of the total population, were present year round. Evidence indicated that females produce several broods per year. A similar pattern was shown to exist for *Grandidierella bonnieroides*, which averages 10.1 ovigerous females in the population, and may exist for *Amphelisca verrilli* (9.6%) and *Rudiloboides nagleyi* (15.6%). Temperature was suggested to possibly be important in regulating the life cycle of these species.

Habitat:Estuarine; Type of Study:Qualitative; Biological Component:Marine fauna; Dominant Taxon/Taxa Studied:*Ameliscia abdita*, *Ameliscia verrilli*, *Grandidierella bonnieroides*, *Rudilemboides naglei*;

(20.00104)

Thoenke, K.W. 1979. The life histories and population dynamics of four subtidal amphipods from Tampa Bay, Florida. Univ. So. Florida Ph.D. Dissertation.

The life histories and population dynamics of four Tampa Bay amphipod species were examined. Previous studies along the western Atlantic coast and this study determined water temperature to be an important factor influencing the life span and reproductive period of amphipods. Life span was short and showed some variability for each of the four species. Variability in life span appeared to be related to changes in the water temperature; longer lived generations occurred when water temperatures were lower. Reproduction, densities and ranges for the four species were well suited to the highly stressed environment of Hillsborough Bay. However, while these species did appear to be well adapted to their environment, slight changes above or below their physiological limits had drastic effects on the survival of the population.

Study Duration:2 years; Type of Study:Quantitative; Biological Component:Benthic amphipods; Type of Sampler:Diver collected cores, Ekman grabs; Sieve Size:0.5 mm; Number of Stations:12; Number of Replicates/Station:10 cores, 5 grabs; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO; Dominant Taxon/Taxa Studied:*Ameliscia abdita*, *Ameliscia verrilli*, *Grandidierella bonnieroides*, *Rudilemboides naglei*;

(20.00105)

Ulken, A. 1978. Phycomycetes in the Cockroach Bay, Florida. In: D.P. Cole (ed.). The restoration of coastal vegetation in Florida: Proc. Fifth Annu. Conf. May 13, 1978; Tampa, Fla. 255 p.

From Cockroach Bay, Florida, three different chytrids were isolated, the life cycles of which were observed in unifungal cultures. The chytrids were: *Blyttomyces laevis* Sparrow, *Endochytrium digitatum* Karling, and *Phlyctochytrium* sp. Some of these chytrids possess exoenzymes to attack cattle hair, chitin, and exoskeletons of crabs. They all seem to be saprophytes and to be active in remineralization.

Type of Study:Qualitative; Biological Component:Flora; Number of Stations:4; Dominant Taxon/Taxa Studied:*Blyttomyces laevis*, *Endochytrium digitatum*, *Phlyctochytrium* sp.;

(20.00106)

Upchurch, S.B., E.D. Estevez & R.A. Rea 1976. The distribution and possible effects of removal of sedimentary contaminants offshore of Gardiner, Inc. in Tampa Bay, Florida. Fla. St. Dept. Environ. Reg., 94 p.

A description of the nature and distribution of sedimentary contaminants and a description of the impact of those contaminants on the biota of the area was presented. The area offshore of Gardiner, Inc.'s plant and gypsum disposal area was found to be contaminated by 5 agents: fluorite crusts, gypsum, heated effluent, acid runoff, and radiation. Remedies to the problem of contamination all required abatement of effluent from the plant area and bulkheading of eroding shoreline areas. Recommendations for the future management of the area were made.

Study Duration:1 year; Habitat:Variable; Type of Study:Qualitative; Biological Component:Benthic fauna; Type of Sampler:PVC corer; Sieve Size:0.5 mm; Number of Stations:6; Number of Replicates/Station:3; Temporal Frequency:Every low tide; Abiotic Parameters Measured:Temperature, salinity, DO, pH, turbidity, tides, precipitation, water chemistry; Dominant Taxon/Taxa Studied:*Balanus*, *Littorina*, *Laeonereis culveri*, *Streblospio benedicti*, *Tagelus plebius*, *Polydora ligni*, *Nereis succinea*, *Diopatra cuprea*, *Anygdalum papyrium*;

(20.00107)

Upchurch S.B., E.D. Estevez & R.R. Rea 1974. Geological and ecological effects of contaminated sediment removal near a phosphate processing plant. Final report to Fla. Dept. Env. Regulation, Tallahassee, FL.

The biogeochemistry of sediments in the vicinity of a phosphate chemical processing plant on the east shore of Hillsborough Bay was described. Sediment surfaces were mapped and cores taken for physical, chemical and biological characterization, at selected intertidal areas near the discharge of process and non-process wastewaters. The primary geological effect of discharges was the precipitation of fluorite over an extensive area of bay bottom. This substratum and associated poor water quality were responsible for drastic reductions in the numbers and kinds of benthic invertebrates, compared to other bay areas.

Study Duration:3 months; Habitat:Sandy, intertidal; Type of Study:Quantitative; Biological Component:Benthic infauna; Type of Sampler:3-inch PVC; Sieve Size:0.5 mm; Number of Stations:30; Number of Replicates/Station:10; Temporal Frequency:Once; Abiotic Parameters Measured:Sediments; Dominant Taxa/Taxon Studied:Polychaeta;

(20.00108)

U.S. Army Engineer District, Jacksonville. 1977. Supplement to Final Environmental Impact Statement. Tampa Harbor Project, Florida. Army Corps of Engineers, Jacksonville District, Jacksonville, Florida.



A revised disposal plan to the plan presented in the Final EIS was presented: Adverse environmental effects of the revised disposal plan were anticipated to be primarily due to extending the construction time, thus prolonging turbid conditions, and increasing slightly the expenditure of fuel and man hours of labor. Some additional beach dwelling invertebrates would be destroyed in utilizing the second beach disposal site on Mullet Key.

Type of Study:Qualitative;

(20.00109)

U.S. Army Engineer District, Jacksonville. 1974. Draft Environmental Impact Statement. Tampa Harbor Project, Appendices A-H. Army Corps Engineers, Jacksonville District, Jacksonville, Fla. 219 p.

A detailed description of the proposed Tampa Harbor Project was presented. The total volume of material to be dredged was calculated to be approximately 72 million cubic yards. The proposed disposal plan would place all material from both construction and maintenance in open water areas of Tampa Bay and the Gulf of Mexico and on a beach area on Mullet Key. The beneficial effects include: the creation of 5 emergent horseshoe-shaped islands and ultimate placement of future maintenance dredging material to form a submerged berm. These islands will serve to create bird rookeries and animal sanctuaries following growths of trees, shrubs and aquatic vegetation on the berms. Making cuts through three existing disposal islands in Hillsborough Bay will improve tidal circulation and could possibly improve water quality conditions in the bay. Placement of suitable clean sand and sandy shell on the eroded beach at Mullet Key will have a beneficial impact by increasing the recreational potential for the area. Release to the water column of nutrients trapped in sediments to be dredged in Tampa Bay can serve as a potential temporary food source for benthic fauna, specifically suspension and bottom feeders, in areas near or within the fringes of the turbidity zone and would serve to increase bay productivity. The detrimental effects include the destruction of benthic organisms, temporary increases in turbidity, reduced water quality, and some fish kills in the immediate vicinity of the blasts.

Type of Study:Qualitative; Biological Component:Benthic fauna; Type of Sampler:Bucket dredge, sediment plugs; Abiotic Parameters Measured:Temperature, salinity, DO, pH, conductivity, tides, currents, topography, bottom geology, sediment analysis, water chemistry, pesticides, heavy metals;

(20.00110)

Virnstein, R.W. 1972. Effects of heated effluent on density and diversity of benthic infauna at Big Bend, Tampa Bay, Florida. Univ. So. Florida M.S. Thesis.

The effects of heated effluent was associated with a decrease in species density and diversity, and the disappearance of some species from the heated area. A few individual species showed the greatest changes associated with increased temperature. It was thought that those individual species would be better indicators than total density and diversity for assessing the effects of increased temperature on the community.

Study Duration:16 months; Habitat:Grassbed, mud, sand; Type of Study:Quantitative; Biological Component:Benthic infauna; Type of Sampler:PVC corer; Sieve Size:0.5 mm; Number of Stations:11; Number of Replicates/Station:3; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, sediment analysis; Dominant Taxon/Taxa Studied:Mud: the polychaetes, *Eteone heteropoda*, *Laeonereis culveri*, *Hereis succinea*, *Scoloplos fragilis*, *Aricidea* sp., and *Capitella capitata*, the amphipod, *Ampelisca verrilli*, the isopod, *Xenanthura brevitelson*, and the bivalve *Arastarte triquetra*. Sand: the polychaetes, *Onuphis eremita oculata*, and *Magelona pettiboneae*, the ostracod, *Haploctheridae septipunctata*, and the brachiopod, *Glottidia pyramidata*;

(20.00111)

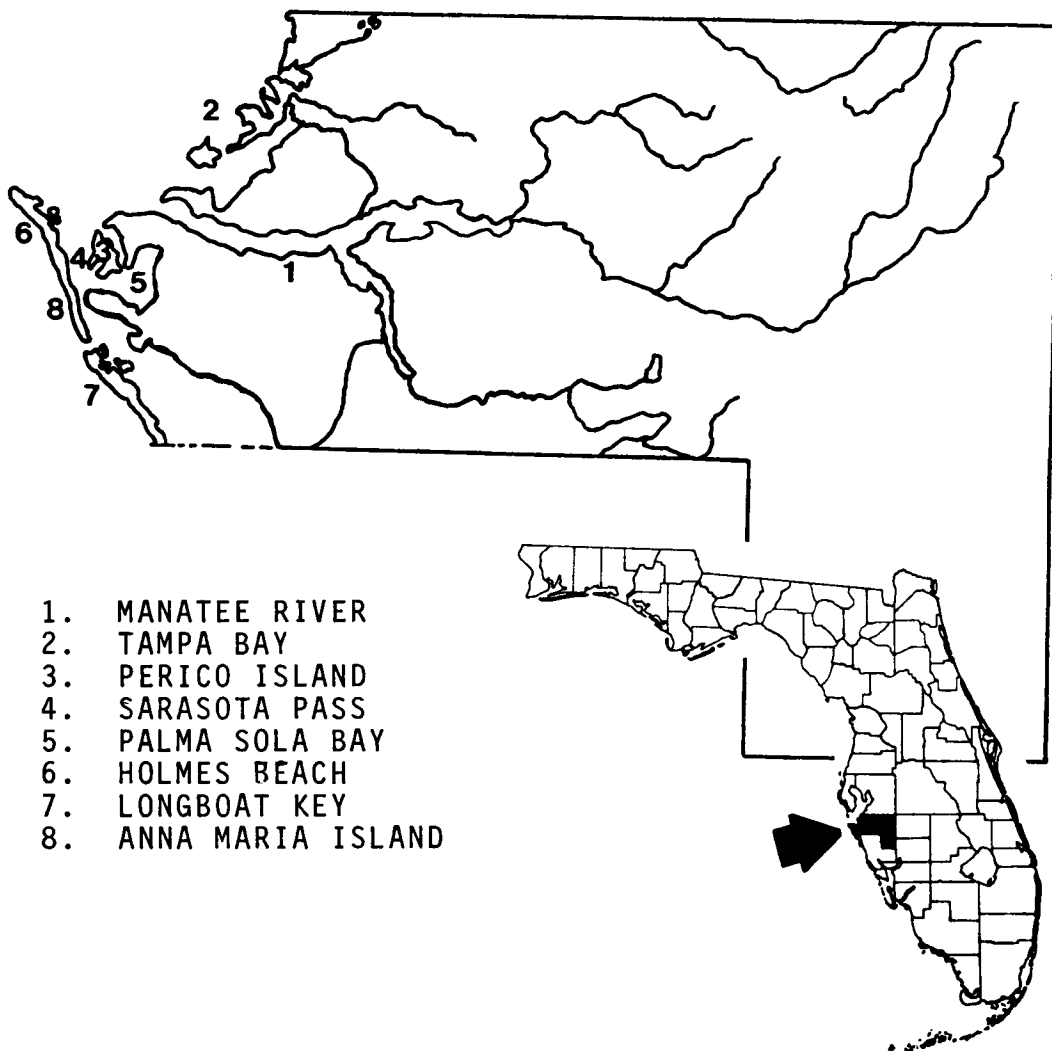
Waste Water Engineers 1979. Report of dredge and disposal area water quality monitoring and shallow water ecosystems monitoring, Tampa Harbor Deepening Project, Florida Section 5, For: U.S. Army Corps of Engineers, Jacksonville District, Jacksonville, Florida, Contract No. DACW17-77-C-0059.

An environmental water quality monitoring program was conducted to monitor the effects of the dredging operations on Section 5 of the Tampa Harbor Deepening Project. The general condition of the bay water was determined to be more dependent on weather conditions than any other factor. The dredging operation had minimal effect on the bay water except in the very shallow areas of the disposal sites. The effects in the shallow areas of the disposal sites were greatly amplified by adverse weather conditions. The grassbeds monitored maintained a healthy state showed little if any effect from the dredging operation. Chemical water quality was affected by several factors other than the dredging operation, such as the passage of ships, bay industries, and surface runoff. Of those influences that could be attributed to the dredging operation, mercury contamination was the most notable, and was presumed to occur when the cutterhead hit a 'pocket' of mercury material on the bay bottom. A review of the chemical data, however, showed that the bay water quickly returned to normal after these incidences, indicating no prolonged effect. Sedimentation was found to be more affected by season than the dredging operation.

Study Duration:17 months; Type of Study:Qualitative; Biological Component:Marine flora; Temporal Frequency: Abiotic Parameters Measured:Water chemistry, turbidity, tides, wind, currents; Dominant Taxon/Taxa Studied:*Ruppia maritima*, *Halodule (Diplanthera) wrightii*, *Syringodium filiforme*;

See also: 1.00071, 3.00054, 3.00115, 3.00134, 3.00141, 12.00079, 19.00036, 19.00038, 19.00069.

# MANATEE COUNTY



(21.00001)

Applied Biology, Inc. 1977. Ecological monitoring at the Manatee Plant, Florida Power and Light Co. (Miami, FL.) Report.

Results of benthic sampling in the vicinity of the Florida Power and Light Co. Manatee Plant in 1975, 1976 and 1977 are reported. Species lists, species density, biomass, diversity, and equitability values are included in the report.

Study Duration:3 years; Type of Study:Quantitative; Biological Component:Macroinvertebrates; Type of Sampler:Grab; Number of Stations:4; Temporal Frequency:Approximately quarterly;

(21.00002)

Conservation Consultants, Inc. 1974. A survey of the ecology of a portion of southern Perico Island, Manatee County, Florida. Conservation Consultants, Inc. (Palmetto, FL) Report.

The characteristic flora and fauna and physical parameters of the spoil and waters of the proposed development site on Perico Island, Manatee County, Florida are described. Surveys were made of flora, amphibians, reptiles, mammals, avifauna, aquatics, and soils. The benthos were found to be rich in invertebrate fauna with a mean of 380 organisms per square foot. The most productive station had 684 organisms per foot<sup>2</sup>. Scattered clumps of turtle grass, often matted with a green alga and with dense colonies of sea anemones were characteristic of all but one station. Fish seined included sheepshead minnow, gulf killifish, and tidewater silverside.

Habitat:Mangrove, grassbed, mud; Type of Study:Quantitative; Biological Component:Benthic invertebrates and fishes; Type of Sampler:Petersen grab, seine; Abiotic Parameters Measured:Temperature, salinity, DO, pH, turbidity;

(21.00003)

Culter, J.K. & S. Mahadevan 1982. Benthic studies of the lower Manatee River. Tech. Rept. submitted to Manatee Co. Materials & Serv. Dept. 46 p. Mote Marine Laboratory, Sarasota, FL.

A total of 184 taxa were identified in a study of benthic macroinfauna from 10 locations in the lower Manatee River, Florida. Species composition, faunal density, species richness, diversity, and equitability were found to vary over a strong salinity gradient. Four zones were identified on the basis of community composition, salinity, and current velocity. The zonation was thought to be regulated by seasonal variations in salinity caused by rainfall and/or dam openings.

Study Duration:18-20 October 1982; Habitat:Sand; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Plug sampler; Sieve Size:0.5 mm; Number of Stations:10; Number of Replicates/Station:6; Abiotic Parameters Measured:Temp., sal., DO, sed. grain size, organic carbon content; Dominant Taxon/Taxa Studied:*Corbicula naviliensis*, *Grandidierella bonnieroides*, *Cyathura polita*, *Mulinia lateralis*, *Exogone lourei*, *E. dispar*, *Fabricia sabella*, *Cirrophorus americanus*;

(21.00004)

Kennedy, K.I. 1975. Worms and dirt: Benthic animals and sediments of a spoil island. New College of the Univ. So. Florida, Environ. Stud. Prog., New College, Sarasota, FL. 29 p.

The long term effects of spoil deposition were determined by observing benthic animal-sediment relationships. No significant differences were found in sediment characteristics for both spoil and nonspoil areas. The stations with greatest plant biomass were also among the highest in number of individuals. The small number of samples taken, and the small sample size at each station were determined to be factors in the high variability found in many of the sample statistics.

Study Duration:1 month; Habitat:Sand, grassbed; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:1/64 m<sup>2</sup> plug, core; Sieve Size:2 mm; 0.5 mm; Number of Stations:12; Number of Replicates/Station:4; Temporal Frequency:Once; Abiotic Parameters Measured:Sediment analysis; Dominant Taxon/Taxa Studied:*Cirripedia spp.*, *Notomastus sp.*, *Lysianassa sp.*, *Amelissa sp.*, *Tellina versicolor*, *Oxyurostylis sp.*;

(21.00005)

Mahadevan, S. & J.K. Culter 1978. An ecological survey of a waterfront canal in Palma Sola Bay, Manatee County, Florida. A report submitted to J. Pratt, 35 p. Conservation Consultants, Inc., Palmetto, FL.

An ecological survey of a waterfront canal in Palma Sola Bay, Manatee County, Florida was conducted. Temperature and salinity were found to exhibit very little spatial variation. Turbidity values were low, and oxygen content was high, suggesting that anoxic, silty and stagnant conditions were absent at the study site. A qualitative survey of the adjoining vegetation revealed that mangroves and Australian pines were the most conspicuous flora. Characterization of benthic communities at the study site revealed that "opportunistic" species predominated, and density, biomass, species richness, diversity and equitability were found to be comparable or greater to other Florida canal systems. A predictive analysis of environmental impact due to the proposed construction of seawall and associated dredge/fill activities suggested that adverse effects on the benthos and water quality in the canal system would be minimal.

Habitat:Silt, sand, shell; Type of Study:Qualitative and quantitative; Biological Component:Benthic fauna and flora;

Type of Sampler: Petite ponar grab; Sieve Size: 0.5 mm; Number of Stations: 6; Number of Replicates/Station: 2; Temporal Frequency: Once; Abiotic Parameters Measured: Temperature, salinity, DO, turbidity; Dominant Taxon/Taxa Studied: *Mediomastus californiensis*, *Streblospio benedicti*;

(21.00006)

Morrill, J.B. 1969. Biological survey of a proposed dredge and fill area in the vicinity of Marina Isle subdivision, Holmes Beach, Florida. New College of the Univ. So. Florida, Envir. Stud. Prog. Rept.

A description of the submerged lands adjacent to the proposed development and proposed borrow area was presented along with a discussion of the relative productivity and ecological value of the submerged lands inside and outside the present city of Holmes Beach bulkhead line. Recommendations for preserving and restoring the marine environment were made. The numbers of macrobenthic invertebrates in lagoon samples were less than those in samples from stations on the grassflats or along the channel, even though the number of different species per sample was nearly the same. The largest number of species and individuals occurred in samples from stands of Manatee grass. The large number of individuals in the samples was due to abundances of one or two species of tubiculous worms.

Study Duration: 1 month; Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Benthic flora and fauna; Type of Sampler: 1/64 m<sup>2</sup> plug sampler; Number of Stations: 17; Number of Replicates/Station: 4; Temporal Frequency: 3 times;

(21.00007)

Morrill, J.B. 1970. Biological survey of a proposed dredge and fill area "Sleepy Lagoon Addition", bordering Bishop's Bayou and Sarasota Bay, Town of Longboat Key, Manatee County, Florida. New College of the Univ. So. Florida, Envir. Stud. Prog. Rept.

A description of the uplands, mangrove forests and submerged lands under consideration for dredging and filling and a discussion of the relative productivity and ecological value of the submerged lands are presented. The dry weight of vegetation per m<sup>2</sup> and the number of macroinvertebrates per 1/16 m<sup>2</sup> were calculated. Recommendations for preserving the marine environment relative to the proposed development are made.

Study Duration: 1 month; Habitat: Sand, mud, oyster bars, grassbed; Type of Study: Quantitative; Biological Component: Benthic flora and fauna; Type of Sampler: 1/64 m<sup>2</sup> plug; Number of Stations: 6; Number of Replicates/Station: 4; Temporal Frequency: twice; Abiotic Parameters Measured: Water clarity;

(21.00008)

Morrill, J.B. 1972-73. New College Environmental Studies Report. New College of the Univ. So. Florida, Envir. Stud. Prog. Rept.

Biological data were compiled for areas near Longboat Key, Florida. A checklist of the macrobenthos collected and grassbed maps are included.

Type of Study: Qualitative; Biological Component: Macrobenthic fauna;

(21.00009)

Morrill, J.B. & J.F. Dequine 1971. Findings and conclusions of a biological survey and ecological study of South Perico Island, Manatee County, Florida, February to May 1969. A revised report to the Curtiss-Wright Corp. New College of the Univ. of So. Fla. Report.

A biological and ecological study of South Perico Island concluded that animal populations composed chiefly of small snails, inedible clams, sand worms and hermit crabs, would be reduced and that no reduction in areas used by migratory waterfowl, sport fishing areas, scallop grassbeds and commercial clam beds would occur. Compensatory benefits to conservation by removal of siltation areas and overall improvement of tidal circulation are discussed.

Study Duration: 9 months; Habitat: Grassbeds, oysters; Type of Study: Qualitative; Biological Component: Fauna and flora; Type of Sampler: Plug; Sieve Size: 1.18 mm; Number of Stations: 17; Number of Replicates/Station: 4; Abiotic Parameters Measured: Temperature, salinity;

(21.00010)

Rice, S.A., G.W. Patton & S. Mahadevan 1981. An ecological study of the effects of offshore dredged material disposal with special reference to hard-bottom habitats in the eastern Gulf of Mexico. Rept. submitted by Mote Marine Laboratory, Sarasota, Florida, to Manatee County Chamber of Commerce, Bradenton, FL. 45 p.

Data was collected to assess the ecological effects of offshore disposal of fine sediments. Diver observations (including photography) and sediment chemistry and grain size analysis data were utilized to discern ecological effects. The study concluded that the disposal operations had imparted a deleterious effect on the hard-bottom communities of the study area.

Study Duration: 1 month; Habitat: Coral, sponge, sand, shell hash, silt; Type of Study: Qualitative; Biological

Component:Flora and fauna; Type of Sampler:Petite ponar grab, photographs, U-W camera; Number of Stations:45; Number of Replicates/Station:2; Abiotic Parameters Measured:Heavy metals, bottom currents; Dominant Taxon/Taxa Studied: Fish- *Epinephelus adscensionis*, *E. morio*, *E. nigritus*, *Nycteroperca phaeus*, *Lutjanus campechanus*, *Archosargus probatocephalus*, Invertebrates- *Menippe mercenaria*, *Panulirus argus*, *Callinectes sp.*;

(21.00011)

U.S. Army Corps of Engineers, Jacksonville District. 1978. Ecological comparison of beaches, offshore borrow sites, and adjacent bottom at Anna Maria Island and Treasure Island, Florida, In: Phase I. General design memorandum on Manatee County Beach Erosion Control Project.

A comparison was made between the sediment of Anna Maria Island beach, the proposed borrow area, and Treasure Island borrow pit. Texture (grain size) and statistical factors that include mean grain size, sorting, skewness, and kurtosis were compared. A statistical comparison of benthic species richness and species diversity between Treasure Island borrow areas and historical regional data was also conducted. In addition a statistical comparison of benthic species richness and species diversity between Anna Maria Island proposed borrow sites and historical regional data was made. Data on existing biological communities at Anna Maria and contour maps of the 4 separate borrow sites at Treasure Island were provided. Four years after dredging, the benthos of the borrow pits at Treasure Island were determined to be in some stage of slow recovery, but faunal density was well below previous data. It was suggested that these dredged holes support a progressively more normal benthic fauna as they fill to the level of surrounding bottom and become covered with sediments that are predominantly sand and shell. Benthos of sites (borrow) off Anna Maria proved to be more diverse than those recorded from stations in any other area at Treasure Island. Both islands were found to support typical Gulf beach invertebrates and were high energy zones. Recommendations on procedures for the proposed beach nourishment were made.

Study Duration:3 days; Habitat:Sand, shell; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:1/64 m<sup>2</sup> plug; Sieve Size:0.7 mm; Number of Stations:10; Number of Replicates/Station:4; Abiotic Parameters Measured:Temperature, salinity, depth, sediment analysis;

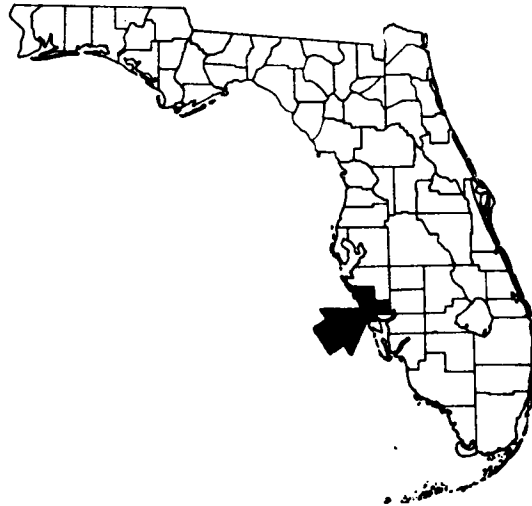
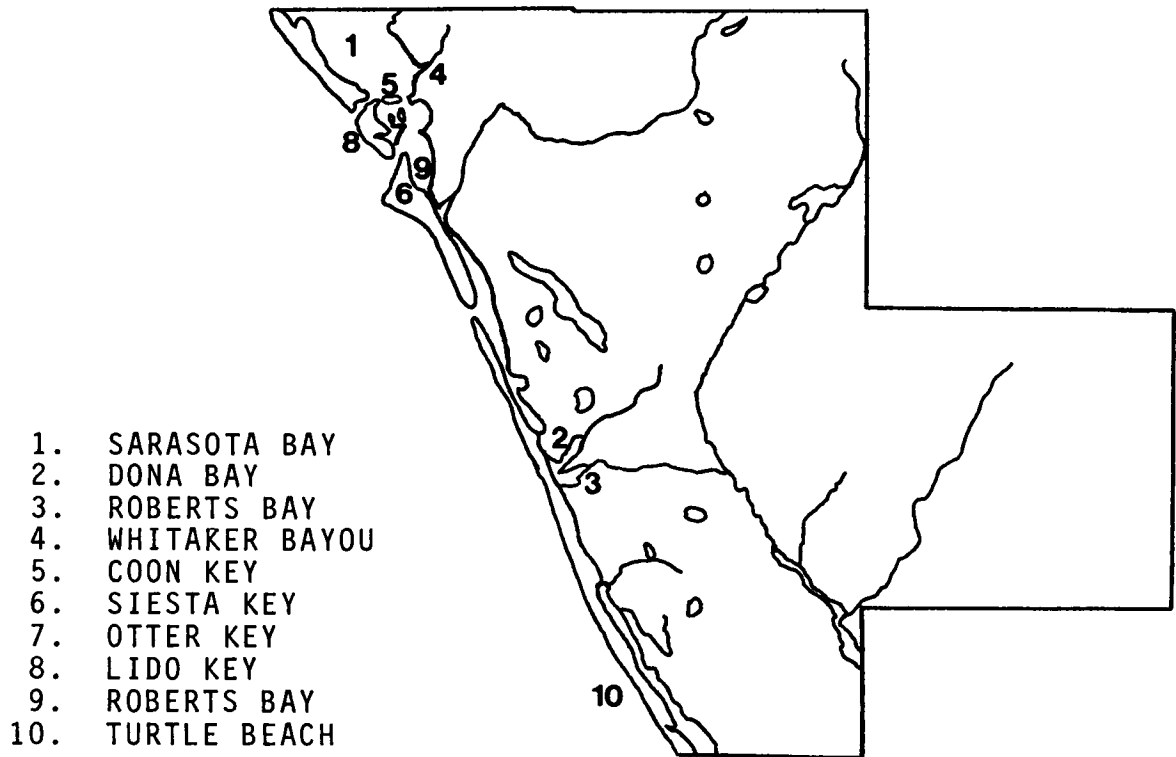
(21.00012)

U.S. Environmental Protection Agency 1981. Tampa Bay Reconnaissance Survey, An appraisal of the benthic environment of three alternative dredged material disposal sites. U.S. EPA. Off. Water Regu. Stan., Washington, D.C. 44 p.

The habitats of 3 alternative dredge material disposal sites in the Gulf of Mexico were studied. All 3 sites contained hard-bottom communities and were similar in their lack of relief. The richest assemblage of benthic organisms was at Site 1; Site 2 had a few locations of high diversity; the rest of Site 2 and Site 3 were low in faunal diversity.

Study Duration:4 days; Habitat:Sand, shell hash, silt, coral; Type of Study:Qualitative ; Biological Component:Fauuna and flora; Type of Sampler:Photography and side scan Sonar recordings; Number of Stations:25; Number of Replicates/Station:2;

# SARASOTA COUNTY



(22.00001)

Calinski, M.D. 1982. The future of lobster farming in Florida. Florida Sci. 45 (Suppl. 1): 31.

Self-contained prototype nursery habitats designed to attract and culture puerulus stage spiny lobsters, *Panulirus argus* were successfully tested on a small scale. Data indicate that settled post larvae attain a size in which they can leave the habitat in 3 months, and that 20% survive this period. Requirements and benefits of lobster farming are discussed.

Type of Study:Qualitative; Biological Component:Faua; Dominant Taxon/Taxa:*Panulirus argus*;

(22.00002)

Clarke, A.R. 1980. Contributions to the life histories of several shrimps from two stations in Sarasota Bay. Bachelors Thesis, New College of the Univ. of So. Fla.

Monthly trawls on two seagrass (*Thalassia testudinum*) flats in Sarasota Bay, Florida yielded 7192 shrimps, representing 17 species. Six species (*Penaeus duorarum*, *Periclinenes longicaudatus*, *Hippolyte* sp., *Tozeuma carolinense*, *Ambidexter symmetricus*, *Palaemonetes pugio*) comprised 97.5% of the total catch. Information on the distribution, abundance, and seasonal characteristics of the shrimp populations is presented.

Study Duration:1978-1979; Habitat:Seagrass beds; Type of Study:Quantitative; Biological Component:Crustacea; Type of Sampler:Otter trawl, still roller frame trawl; Number of Stations:2; Number of Replicates/Station:7 (initially), 4; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO, bottom type; Dominant Taxon/Taxa Studied:*Penaeus duorarum*, *Periclinenes longicaudatus*, *Hippolyte* sp., *Tozeuma carolinense*, *Ambidexter symmetricus*, *Palaemonetes pugio*;

(22.00003)

Conners, E. 1974. The effects of a domestic sewage outfall on the distribution and abundance of marine benthic polychaeta and mollusca, with comments on continua and community structure. New College at Univ. So. Fla., Envir. Stud. Prog., Senior Thesis, 58 p.

The differences existing in the composition of shallow water marine benthic polychaete and molluscan faunas between areas in the vicinity of an outfall of secondary treated domestic sewage and areas beyond the peripheral zone of enrichment were assessed. Fewer species, lower diversities, and dominance by deposit feeders was observed near the sewage outfall. No direct changes in the particle size distribution or organic content of the sediments was attributable to the sewage outfall. The structure of the benthic faunas revealed that there were no functional assemblages of organisms, only statistical nodes abstracted from continuous distributions of individual species.

Study Duration:January, February 1974; Habitat:Sand, grassbeds; Type of Study:Quantitative; Biological Component:Benthic invertebrates; Type of Sampler:1/64 m<sup>2</sup> plug; Sieve Size:2 mm, 1 mm, 0.5 mm; Number of Stations:14; Number of Replicates/Station:5; Temporal Frequency:Once; Abiotic Parameters Measured:Temperature, salinity, DO; Dominant Taxon/Taxa Studied:*Nagelona papillicornis*, *Onuphis eremita*, *Nannalycastis abiuua*, *Parastarte triquetra*;

(22.00004)

DeWitt, T. 1977. Spatial and temporal variation in the structure of a mangrove swamp benthic community. Bachelors Thesis, New College of the Univ. of So. Fla.

A study of benthic macroinvertebrates was conducted in a mangrove forest on Siesta Key, Florida. Samples were collected bimonthly from 5 stations from May 1976 through May 1977. Data were analyzed for faunal similarity as well as distribution, density, diversity, and associations. Seasonal trends in granulometry and water quality parameters were identified. Species lists of polychaetes, molluscs, crustacea, and ophiuroids are included.

Study Duration:May 1976-May 1977; Habitat:Mangrove swamp; Type of Study:Quantitative; Biological Component:Faua and flora; Type of Sampler:Box core; Sieve Size:0.5 mm; 1.4 mm; Number of Stations:5; Number of Replicates/Station:10; Temporal Frequency:Bimonthly; Abiotic Parameters Measured:Water content, organic content, sediment grain size, salinity, DO, temperature; Dominant Taxon/Taxa Studied:*Rhizophora mangle*, *Thalassia testudinum*, *Diopatra cuprea*, *Gracilaria*, *Togelus plebius*, *Branchiostylis americana*, *Heterotamias* sp.;

(22.00005)

DeWitt, T. & J. Everts 1975. A survey of the benthic macroinvertebrates in the Bayside mangrove swamp New College at Univ. So. Fla., Envir. Stud. Rept.

The structure of the macroinvertebrate communities at six stations in a Sarasota Bay mangrove swamp is described. It was determined that where the mangroves were the thickest, the detritus was most abundant. Most of the decomposition was found to take place at the microbial level by bacteria. Some macroinvertebrates aided in the decomposition process, while others preyed upon these decomposers.

Study Duration:March 1975; Habitat:Mangrove; Type of Study:Semiquantitative; Biological Component:Benthic

macroinvertebrates; Type of Sampler:1/64 m<sup>2</sup> plug; Sieve Size:2 mm, 0.5 mm; Number of Stations:6; Number of Replicates/Station:4; Temporal Frequency:Once; Dominant Taxon/Taxa Studied:*Glycera* sp., *G. americana*, *G. dibrachiata*, *Ceratonereis* sp., *Diapatra cuprea*, *Scoepolos robustus*, *Cirriiformia grandis*, *C. filigera*, *Arenicola cristata*, *Brachiosyllis americana*, *Cistinides gouldii*, *Melina maculata*;

(22.00006)

Estevez, E.D. 1983. An ecological reconnaissance of the Grand Canal, Siesta Key, Florida. Prepared for Office of Coastal Zone Management, Sarasota, Co. by Mote Marine Laboratory, Sarasota, Florida. 19 p.

The hydrography and biology of the system of man-made canals on Siesta Key, Florida were analyzed. Studies included bathymetry, sedimentation and benthic fauna. Benthic species were indicative of oxygen depletion and organically rich sediments. Suggestions are made to increase tidal flow in the canals.

Habitat:Mud; Biological Component:Fauna, flora; Type of Sampler:Petite ponar; Sieve Size:0.5 mm; Number of Stations:10 benthic; Number of Replicates/Station:5; Temporal Frequency:Once; Abiotic Parameters Measured:Temperature, salinity, D.O.; Dominant Taxon/Taxa Studied:*Capitella capitata*, *Streblospio benedicti*, *Corophium louisianum*, *Kaliapseudes* sp. A., *Parastarte triquerta*, *Haplopytherida setipunctata*, *Laonereis culveri*;

(22.00007)

Evans, M., T. Brungardt & R. Evans 1978. Shoreline analysis of Sarasota County Bay Systems with regard to revegetation activities. New College of the Univ. of So. Fla., Envir. Stud. Prog., Sarasota County, C.E.T.A. Prog. and Sarasota Bd. Co. Comm., 71 p.

An inventory and evaluation of the estuarine resources of the study area was prepared. Aerial photographs from 1948 to 1974 were used in resource mapping. Methods for growing and transplanting shoreline vegetation were described. A shoreline preference survey showed that respondents preferred natural or vegetated shorelines.

Habitat:Mangrove, grassbed; Type of Study:Qualitative; Biological Component:Flora;

(22.00008)

Evans, R.K. 1977. Techniques and seasonal growth rate of transplanted white mangroves. In: Proc. of the Fourth Annu. Conf. on Restoration of Coast. Vegetation in Fla. p. 77-105.

A transplantation study of the white mangrove, *Laguncularia racemosa*, was conducted on Siesta Key, Florida, from February 1976 through March 1977. Growth rates were found to vary significantly with the months of transplantation. Spring plantings resulted in the highest survival and growth rates of adult plants. Growth rates were greatly influenced by distance from shoreline; plants near the shoreline that were not completely inundated experienced the highest growth rates. Root growth exceeded branch growth in all experiments.

Study Duration:February 1976-March 1977; Habitat:Mangrove forest; Type of Study:Quantitative; Biological Component:Flora; Temporal Frequency:Monthly; Abiotic Parameters Measured:Salinity; Dominant Taxon/Taxa Studied:*Laguncularia racemosa*;

(22.00009)

Mahadevan, S., J.K. Culter, R.H. Blanchet, R.E. Yarbrough, G. McCallum, M.L. Gallo, A. Rule, J. Leverone, D.W. Famiglietti & S. 1981. A preliminary assessment of the effects of treated sewer discharge on the benthic infaunal communities of Whitaker Bayou and adjoining Sarasota Bay (Sarasota, Florida). Rept. Sub. by Mote Marine Lab., Sarasota, Fla. to Coast. Zone Management Dept., Sarasota Co., Florida.

A study of the benthic macroinfauna and sediments was conducted in and near Whitaker Bayou (Sarasota, Florida) to provide a preliminary assessment on the ecological effects of wastewater discharged into Sarasota Bay. Species composition and community parameters such as faunal density, species richness, diversity and equitability indicated that Sarasota Bay soft-bottom benthos were generally similar to adjacent bays and the Gulf. A faunal similarity analysis indicated that open bay communities were homogeneous. Whitaker Bayou benthic infauna was strikingly different than the open bay communities and was characterized by a preponderance of pollution indicator species, low faunal density and extremely low species richness. Adverse effects caused by the discharges are inferred to be limited to Whitaker Bayou.

Study Duration:1 day; Habitat:Soft bottom, mud; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:7.62 cm diameter, 20 cm long PVC core; Number of Stations:8; Number of Replicates/Station:5; Abiotic Parameters Measured:Water temperature, salinity, DO, sediment analysis; Dominant Taxon/Taxa Studied:*Mediomastus californiensis*, *Ampelisca holnesi*, *Axiobella mucosa*, *Microdeutopus*, *Chone dumeri*, *Tharyx annulosus*;

(22.00010)

Lincer, J.L. 1975. The ecological status of Dona and Robert's Bays and its relationship to Cow Pen Slough and other possible perturbations. Mote Marine Laboratory, Sarasota, FL. Final Rept. to Bd. of Co. Comm., Sarasota Co., 264 p.

A study of Dona and Robert's Bays was conducted including the following parameters: hydrography, sedimentology, water chemistry, suspended solids, chlorophyll and plankton, bacteria, aerial infrared and historic photography, pesticides,



benthic invertebrates and plants (with emphasis on marine benthic algae). Species diversity of benthic invertebrates was shown to be directly correlated with salinity fluctuations. Freshwater runoff resulted in extremely low salinities and high suspended solids. The Intracoastal Waterway was also shown to provide an effective salinity buffer due to its contained volumes of seawater. It was determined that turbidity was caused, at least in part, by the lack of benthic seagrasses, which were absent due to wide fluctuations in salinity. The replacement of fringe plants (mangroves) by seawalls has also been a factor in the increased salinity.

Habitat: Sand, mud, grassbed; Type of Study: Semiquantitative; Biological Component: Benthic invertebrates; Type of Sampler: Taylor bucket dredge, plug sampler; Sieve Size: 0.5 mm; Number of Stations: 11; Number of Replicates/Station: 1; Temporal Frequency: Weekly; Abiotic Parameters Measured: Temperature, DO, pH, depth, conductivity, oxidation-reduction potential; Dominant Taxon/Taxa Studied: *Amelisa sp.*, *Spiochaetopterus sp.*, *Macoma tentata*;

(22.00011)

Morrill, J.B. 1968. Report on a biological survey of the tidal flats and shoreline of the Bay Point area. New College of Univ. So. Fla., Envir. Stud. Prog. Rept.

The vegetational patterns of the Bay Shore area indicate that as a result of natural processes, there has been and continues to be stabilization and land building along the shore and filling in of the tidal zone adjacent to the shore. The absence of many typical tidal flat organisms in the cove and along the Bay front may be due to: pollution or enrichment from effluents entering the Grand Canal immediately to the south and Coconut Bayou to the north; freshwater flow into the Cove via drainage ditches; relatively weak tidal flushing and circulatory patterns in the Cove; high turbidity in the inshore waters resulting from the dredged Intracoastal Waterway channel; plus intensive boat traffic in and adjacent to the waterway.

Study Duration: 3 days; Habitat: Grassbed, gravel, sand, mud; Type of Study: Semiquantitative; Biological Component: Macroinvertebrates; Temporal Frequency: Once; Dominant Taxon/Taxa Studied: *Lytechinus variegatus*, *Styela*, *Molgula*, *Amorauceum*, *Dideanua*, *Linulus*, *Cliona*, *Microcliona*, *Arenicola cristata*;

(22.00012)

Morrill, J.B. 1968. Report on a biological survey of the tidal flats and shoreline of Icard Island, Emerald Isles Area, Bowlees Creek, Sarasota Bay, Florida. New College of Univ. So. Fla., Envir. Stud. Prog. Rept.

The intertidal zone within the Manatee County bulkhead line surrounding Icard Island was determined to consist mainly of a sandy mud bottom with the snail *Batillaria minima* being the most abundant macroinvertebrate. In addition, the zone was populated by small oyster bars, scattered clumps of coon oysters and patches of Cuban shoal grass. The greatest numbers of invertebrate species appeared to occur in the turtle grassbeds outside the bulkhead line or in the shoal grassbeds in the lower levels of the intertidal zone. In general, the intertidal zone between the south side of the Island and the oyster reef complex bordering Bowlees Creek and the intertidal zone between the north side of the Island and the oyster bars bordering the channel to the north produced less benthic invertebrates than the shoal grass areas to the west and north of the Island. Turtle grass, occurring mainly outside the bulkhead line and below the mean low water, had a greater dry weight per unit bottom surface area than did the shoal grass that occurred in the intertidal zone. The latter grass displayed a tidal zonation in which the size of the grass patches and the dry weight per unit area were markedly reduced in the higher intertidal areas within the bulkhead line. Fish species which graze on the bottom invertebrates and sessile algae attached to oyster shells were reported. Birds of the area were also listed. A hydrographic survey was conducted.

Study Duration: Approximately 1 month; Habitat: Grassbed, sand, mud, oyster bars; Type of Study: Quantitative; Biological Component: Benthic invertebrates; Type of Sampler: 1/16 m<sup>2</sup> core, seine; Number of Stations: 27; Number of Replicates/Station: 4; Temporal Frequency: Weekly; Abiotic Parameters Measured: Temperature, salinity, DO, pH, transparency; Dominant Taxon/Taxa Studied: *Batillaria minima*, *Nassarius vibex*, *Melongena corona*, *Diplanthera wrightii*, *Thalassia testudinum*;

(22.00013)

Morrill, J.B. 1970. Biological survey of submerged lands in the vicinity of the proposed Watergate Center Boatel, Sarasota Bay, City of Sarasota, Sarasota County, Florida. New College of the Univ. So. Fla., Envir. Stud. Prog. Rept.

A description of the proposed Watergate Center boatel in Sarasota Bay was presented with attention to existing grass flats, tidal currents and seawall communities. It was suggested that the fringe of coon oysters and marine grasses would be eliminated, there would be a considerable growth of bacteria and blue-green algae below the oyster zone, the bottom would become a rich, organic silt, and that development of anaerobic conditions at depths greater than five to seven feet deep would occur. The consequences of developing marinas and recommendations for maintaining and improving the quality of the marine environment in the boatel area were presented.

Study Duration: 2 months; Habitat: Grassbed, sand, rock, seawall; Type of Study: Qualitative; Biological Component: Benthic flora and fauna; Type of Sampler: Aerial photos; Abiotic Parameters Measured: Visibility;

(22.00014)

Morrill, J.B. 1970. New College Environmental Studies Class Project on Otter Key and Devilfish Key, Florida. New College

of the Univ. So. Fla., Envir. Stud. Prog. Rept.

New College (University of South Florida) Environmental Studies Class Project on Otter Key (Sarasota Bay) and Devilfish Key (Charlotte Harbor) presented data on numbers of invertebrate species, species of seagrasses and maps of seagrasses.

Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Flora and fauna;

(22.00015)

Morrill, J.B. 1972,73,74. Bayside field lab: Approaches to a model ecosystem. Student Reports, available only through J.B. Morrill, New College at Univ. So. Fla., Envir. Stud. Prog. New College of the Univ. So. Fla., Envir. Stud. Prog. Rept.

A of compilation student-collected biological data for the Bayside Club, Siesta Key, Sarasota, Florida is presented. Species lists for benthic invertebrates are included.

Study Duration:3 years; Habitat:Mangrove; Type of Study:Qualitative; Biological Component:Benthic fauna; Type of Sampler:1/64 m<sup>2</sup> plug; Sieve Size:2.0 mm; Abiotic Parameters Measured:Temperature (air & water), salinity, DO, pH, nutrients, tides;

(22.00016)

Morrill, J.B. 1972. South Coconut Bayou research project. New College of the Univ. So. Fla., Envir. Stud. Prog. Rept.

A compilation of data collected from Coconut Bayou was presented. Benthic data included species lists and abundances.

Type of Study:Qualitative; Biological Component:Flora and fauna; Abiotic Parameters Measured:Temperature, DO, pH;

(22.00017)

Morrill, J.B. 1974. The submerged and shoreline vegetation of three canal systems, Siesta Key, Florida, preliminary observations and recommendations. Proc. of the First Annu. Conf. on Restoration of Coast. Vegetation in Fla. p. 39.

Three manmade canals in Siesta Key were studied in 1972 for distribution of grasses and water quality. Recommendations for management are: canal design for optimal tidal flushing; pruning of vegetated shorelines; removal of aquatic plants and floating debris; and aeration of bottom waters in dead end canals.

Type of Study:Quantitative; Biological Component:Flora; Abiotic Parameters Measured:Tidal current velocities, water depth & width;

(22.00018)

Morrill, J.B. 1978(79). South Lido Key Studies. New College of the Univ. of So. Florida, Envir. Studies Program Report.

Student collected data on benthic studies in Brushy Bayou, South Lido Key, Florida are presented and include information on seagrass dry weights, current measurements, and grassbed mappings.

Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Benthic flora and fauna; Type of Sampler:1/64 m<sup>2</sup> plug; Sieve Size:2 mm; Number of Stations:2; Number of Replicates/Station:4;

(22.00019)

Morrill, J.B. & C. Blair 1969. A biological and ecological survey of the submerged lands in the proposed Bay Harbor Development, Siesta Key, Florida. New College of the Univ. So. Fla., Envir. Stud. Prog. Rept.

The survey of the submerged lands in the proposed Bay Harbor Development, Sarasota, Florida included descriptions, diagrammatic maps and aerial photographs of the mangrove swamps and submerged lands. Overall, the sandy mud bottom and grass flats in the lagoon were found to have fewer and less diverse macrobenthic invertebrates than similar areas on the tidal flats in Roberts Bay, indicating that the biological productivity of the lagoon is less than the bay. Other than intertidal coon oysters, commercial shellfish were not observed in the lagoon. Blue crabs, killifish and mullet were present. It was concluded that the lagoon's major role in the Bay's economy is to furnish nutrients. Recommendations for preserving and restoring the marine environment relative to the proposed development were presented.

Study Duration:4 months; Habitat:Sand, mud, grassbed; Type of Study:Quantitative; Biological Component:Flora and fauna; Type of Sampler:1/64 m<sup>2</sup> plug; Number of Stations:52; Number of Replicates/Station:4; Temporal Frequency:12 visits/summer; Abiotic Parameters Measured:Temperature, salinity;

(22.00020)

Morrill, J.B. & S. Donaldson 1968. Observations of a seawall community. New College of Univ. of So. Fla., Envir. Stud. Prog. Rept.

Collections and observations of organisms in the fouling community as well as data on currents, substrate, tides, and illumination are reported. Vertical zonation is discussed.

Habitat:Seawall; Type of Study:Qualitative; Biological Component:Fouling organisms;

(22.00021)

Morrill, J.B., C. deNarvaez, R. Foster, F.B. Ayer & E. Connor 1974. Hydrography of the Grand Canal and Heron Lagoon Waterways, Siesta Key, Florida. Rept. by Div. Nat. Sci., New College at Univ. So. Fla., Sarasota, Florida. 47 p.

Information on the history of the two lagoonal sites, the physiography and bathymetry, sources of pollution and hydrography were reported. Of the two canal systems studies, the overall water quality and diversity of marine life was found to be greater in the Heron Lagoon system than in the Grand Canal system. It was determined that the primary cause of "undesirable" water quality conditions (the development of organically rich, soft bottom sediments and their communities of macro and microorganisms) was poor tidal circulation.

Study Duration:2 days; Habitat:Grassbed, sand, mud; Type of Study:Semi-quantitative; Biological Component:Benthic fauna; Type of Sampler:1/64 m<sup>2</sup> plug; Sieve Size:1.5 mm; Number of Stations:8; Number of Replicates/Station:4; Temporal Frequency:Once; Abiotic Parameters Measured:Temperature, salinity, DO, currents, turbidity, Eh, nutrients; Dominant Taxon/Taxa Studied:*Brachiosyllis americana*, *Ceratonereis* sp., *Cirriiformia filopodia*, *Diopatra cuprea*, *Helisoma maculata*, *Onuphis emertii*, *Spiochaetopterus*, *Anomalocardia cuneatus*, *Senele profunda*, Tubicolous amphipod;

(22.00022)

Pierce, R.H. & R.C. Brown 1984. Coprostanol distribution from sewage discharge into Sarasota Bay, Florida. Bull. Environ. Contam. Toxicol. 32:75-79.

Distribution of the fecal sterol, coprostanol, was determined in sediment from forty-one sites throughout Sarasota Bay. This project was part of a water quality study to estimate the impact of sewage effluent discharged from the City of Sarasota's wastewater treatment plant. Coprostanol is one of the principal sterols found in the feces of man and other mammals and has been shown to be a reliable marker of fecal pollution. A contour of coprostanol concentrations in Sarasota Bay showed very high concentrations at the site of the sewage outfall, indicating short-range deposition of sewage-derived particulate matter. Tidal action appeared to be the dominant influence on distribution of sewage derived particulates in the Bay.

Type of Study:Quantitative; Type of Sampler:Petite ponar; Number of Stations:41; Number of Replicates/Station:3; Abiotic Parameters Measured:Coprostanol concentration;

(22.00023)

Price, G.B. 1975. An introduction to the marine flora and fauna of the Sarasota area. Bachelors Thesis, New College of the Univ. of So. Fla.

This general overview of the marine flora and fauna of the Sarasota, Florida area includes sections on the regional geology, coastal morphology, mangrove and beach ecosystems, and the benthic macroinvertebrates of Sarasota Bay. The extent of manmade alterations to the shoreline are cited and species lists of benthic invertebrates and marsh flora are given.

Type of Study:Qualitative; Biological Component:Fauna and flora;

(22.00024)

Rushton, B. & J. Tullai 1977. A case study of an altered neutral estuary: North Siesta Key, Florida. New College of the Univ. So. Fla., Envir. Stud. Prog. Rept.

The first part of this report compared water quality and marine life in the four altered bayous and adjacent bays. The second part investigated the attitudes of the local residents. Geomorphology (soils) history, dredge and fill history, and pollution history were discussed in detail. Mangroves, seagrasses, the benthos and plankton were sampled and studied. Due to small sample sizes, no patterns emerged to demonstrate or deny seasonal flux of individuals or species, however, consistency of species composition over time was demonstrated. No correlation between species and vegetation type or taxonomic group and vegetation type was found. Rarity-abundance trends did appear (a small number of common species and a large number of rare species).

Study Duration:5 months; Habitat:Grassbeds, mangroves; Type of Study:Qualitative and quantitative; Biological Component:Benthic flora and fauna, plankton; Type of Sampler:Steel plug; Sieve Size:1.0 mm; Number of Stations:8; Number of Replicates/Station:4; Temporal Frequency:4 times; Abiotic Parameters Measured:Temperature, salinity, DO, pH, turbidity, climate;

(22.00025)

Sauers, S.C. 1980. Seasonal growth cycles and natural history of two seagrasses (*Halodule wrightii* Aschers, and *Thalassia testudinum* König) in Sarasota Bay, Florida, In: Environmental Status of Sarasota Bay: selected studies, W.J. Tiffany, III (ed.), p. A1-A78. Mote Marine Laboratory, Sarasota, FL. Rept.

Biomass, shoot densities, and leaf areas of the two seagrasses were evaluated on a seasonal basis. Various abiotic

parameters were related to the floral characteristics. Tidal exposure and turbidity were found to be the major abiotic factors that influence growth and distribution. Flowering by *Thalassia* was reported (for the first time) in Sarasota Bay.

Study Duration: March 1979 - March 1980; Habitat: Grassbeds; Type of Study: Quantitative; Biological Component: Seagrasses; Type of Sampler: Post-hole digger; Sieve Size: 1.0 mm; Number of Stations: 3; Number of Replicates/Station: 3 or 5; Abiotic Parameters Measured: Temperature, salinity, depth; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Halodule wrightii*;

(22.00026)

Smith, G.B. 1975. Red tide and its impact on certain reef communities in the mid eastern Gulf of Mexico. *Environ. Lett.* 9(2):141-152.

An investigation was made of the effects of the 1971 red tide on reef communities off Sarasota, Florida. Under appropriate environmental conditions, local extinctions may occur due to the effects of red tide. Some groups recolonize quickly, while others may take several years. Seasonal progression and succession may temporarily result in floral and faunal communities quite different from those prior to the red tide. It is suggested that the periodic occurrence of red tide may prevent the evolution of an equilibrium reef community.

Type of Study: Quantitative; Biological Component: Flora and fauna;

(22.00027)

Stuart, M. & P. Taddio (eds.) 1979. Hydrologic and biological monitoring of lower Sarasota Bay, 1975-1978. Sarasota High School, Sarasota, FL. Advanced Mar. Sci. Rept. No. 1, 134 p.

This study of lower Sarasota Bay includes water quality, zooplankton and grassflat monitoring for the years 1975-1978. The water quality monitoring program provided data defining seasonal variations for a variety of physical and chemical factors. Monthly and annual averages were computed. Since less than one full year of data had been collected, only limited conclusions from the zooplankton data could be drawn. Indications were that the average annual count of individuals was fairly high -- about 60,000 individuals/m<sup>3</sup>. Data indicated that all of the grassflats were productive at some time and probably contribute significantly to the bay food chains. One site appeared most stressed, probably due to frequent anoxia problems.

Study Duration: 3 years; Habitat: Estuarine; Type of Study: Semiquantitative; Biological Component: Zooplankton, fish, invertebrates; Type of Sampler: Roller trawl; Number of Stations: 7; Number of Replicates/Station: 1; Temporal Frequency: Monthly; Temperature (air & water), salinity, DO, pH, CO<sub>2</sub>, turbidity, tides, Abiotic Parameters Measured: rainfall, wind, waves, % cloud cover, nutrients;

(22.00028)

Tiffany, W.J., III 1974. Brushy Bayou and Lido Key study for City of Sarasota. New College of the Univ. So. Fla., Envir. Stud. Prog. Rept.

Macrobenthic data from Brushy Bayou and South Lido Key, Sarasota, Florida were compiled. The species collected of molluscs, sponges, polychaetes, echinoderms, oligochaetes, and bryozoa are listed and enumerated. Recommendations are made for the future management of the area.

Habitat: Grassbeds, mangroves, estuarine; Type of Study: Semiquantitative; Biological Component: Benthic fauna; Number of Stations: 5; Abiotic Parameters Measured: Salinity, DO;

(22.00029)

Tiffany, W.J., III 1974. Checklist of benthic invertebrate communities in Sarasota Bay with special reference to water quality indicator species. Contrib. No. 2, Flower Gardens Ocean Res. Ctr., Mar. Biomed. Instit., Galveston, TX. 123 p.

This study presents a checklist of benthic marine invertebrates in Sarasota and Roberts Bays and characterizes their habitats by sediment types and community structure. Five species of marine benthic invertebrates were established as bioindicators for various unhealthy water quality parameters, and six species were correlated to healthy water conditions. Sarasota Bay proved more stable and healthier than Roberts Bay.

Habitat: Variable; Type of Study: Qualitative; Biological Component: Benthic invertebrates; Type of Sampler: Bucket dredge, 10 cm x 25 cm sediment core; Sieve Size: 2.0 mm; 1.0 mm; 0.5 mm; Number of Stations: 14; Number of Replicates/Station: 1; Abiotic Parameters Measured: Temperature, salinity, DO, pH, turbidity; Dominant Taxon/Taxa Studied: Unhealthy indicators- *Spiochaetopterus costarum oculatus*, *Angelisca* sp., *Nacoma tenta*, *Pagurus longicarpus*, *Helongena corona*, Healthy indicators- *Noetia ponderosa*, *Neopipe perceraria*, *Cliona celata*, *Botryllus schlosseri*, *Didemnum albidum*, *Anarocidium pellucidum*;

(22.00030)

Tiffany, W.J., III & M.G. Heyl 1978. Invertebrate mass mortality induced by a *Gymnodinium breve* red tide in Gulf of Mexico waters at Sarasota, Florida. *J. Envir. Sci. Health A13(9)*: 653-662.

An outbreak of red tide (*Gymnodinium breve*) during September, 1978, resulted in a mass mortality of certain invertebrates at Turtle Beach, Florida. The invertebrate kill was suggested to be due to the effects of the toxic dinoflagellate rather than other factors such as low DO.

Study Duration:1 month; Habitat:Sand, shell; Biological Component:Macroinvertebrate fauna; Abiotic Parameters Measured:DO; Dominant Taxon/Taxa Studied:*Spisula solidissima similis*, *Donax variabilis*, *Emerita talpoida*, *Libinia dubia*;

(22.00031)

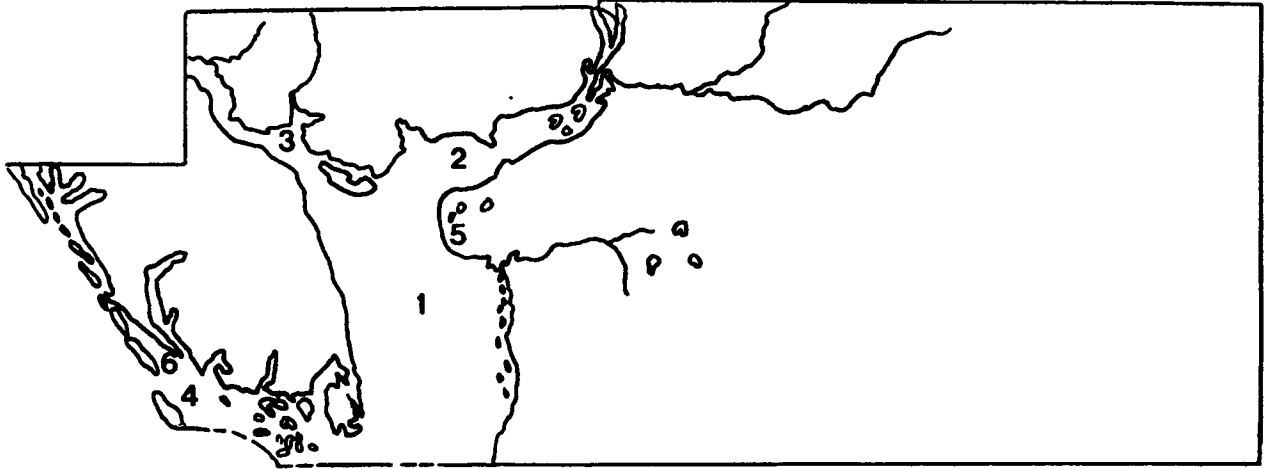
Woodburn, K.D. 1960. Sarasota County Marine Survey. Fla. St. Bd. Conser. Mar. Lab. FSBCML No. 60-15, CS No. 60-1.

An evaluation of marine productivity and seafood potential was made to guide the Sarasota County Commission in conserving present resources and adding aquaculture to the existing economy was described. Thirty two fish species were collected. Small pink shrimp and blue crabs were found at all grass stations. Seagrasses were found to be abundant in the county waters. Oyster predators including crown conchs, Florida horse conchs, and banded tulips were present throughout the study area. Black Bay and Buttonwood Harbor were recommended as potentially good northern hard shell clam growing spots because of suitable salinities, sufficient water depth, favorable sandy mud bottoms, and limited urbanization.

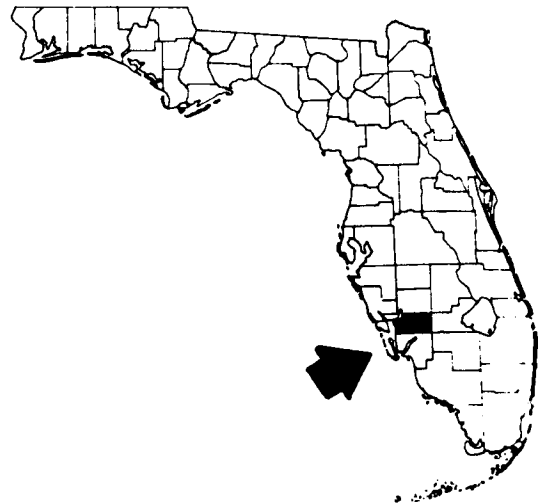
Habitat:Oyster bed, grassbed; Type of Study:Qualitative; Biological Component:Marine flora and fauna; Type of Sampler:Seine, pushnet; Number of Stations:16; Abiotic Parameters Measured:Salinity; Dominant Taxon/Taxa Studied:*Mercenaria campechiensis*, *Mercenaria mercenaria*, *Neolorgana*;

See also: 3.00141, 10.00023.

# CHARLOTTE COUNTY



1. CHARLOTTE HARBOR
2. PEACE RIVER
3. MYAKKA RIVER
4. GASPARILLA SOUND
5. PUNTA GORDA
6. PLACIDA HARBOR



(23.00001)

Brown, R., R. Pierce & S. Murphy 1983. Characterization of hydrocarbons in sediment and organisms from Charlotte Harbor estuary. Fla. Sci. 46(Suppl. 1):47.

Sediments and tissues of marine organisms (oyster, shrimp, crab, mullet, and trout) from Charlotte Harbor, Florida were analyzed for hydrocarbon concentrations and composition. Most of the sampling sites were found to be relatively free from petroleum contamination. However, certain sites such as commercial docks, marinas, and residential development canals exhibited evidence of petrochemical input.

Study Duration: January 1982-December 1982; Habitat: Sand, mud, seagrass, oyster reef; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Petite ponar, vibra-corer; Number of Stations: 48; Temporal Frequency: Summer and winter; Abiotic Parameters Measured: Hydrocarbon concentration;

(23.00002)

Connell Associates, Inc. 1972. Environmental assessment study - Punta Gorda area. Project 1079 - prepared for Punta Gorda Isles, Inc., Punta Gorda, Florida.

A comprehensive survey was conducted to assess the physical, chemical, and biological aspects of Punta Gorda Isles canal system and surrounding area. The dynamic behavior of the canals was determined through a combination of field measurements and computer mathematical modeling. It was concluded that lack of mixing and flushing are not serious problems within the canal system. Chemical characteristics were determined in the canal system and adjacent waters were determined. Biological studies consisted of microbiological measurements, plankton studies, larvae studies, and benthic studies. Large quantities of bacteria were found in the harbor and canal system. These were believed to be derived from overflows of the nearby municipal sewage system. Low diversity indices of the benthos for the harbor were found, and canal systems. A table of benthic animals found at 4 stations was provided.

Study Duration: Summer and fall 1971; Type of Study: Semiquantitative; Biological Component: Benthic invertebrates; Abiotic Parameters Measured: Temperature, salinity, DO, pH, turbidity, nutrients, pesticides, trace elements;

(23.00003)

Environmental Quality Laboratory, Inc. 1979. Hydrobiological monitoring January 1976 through October 1978. Lower Peace River and Charlotte Harbor. Vol. II, as per SW Fla. Water Management Dist. Consumptive Use Permit. Dec. 10, 1975, for the Peace River Reg. Water Treat. Plant. Rept. to Gen. Dev. Utilities, Inc., 332 p.

Volume II contains abiotic and biological data for Charlotte Harbor and the lower Peace River from 1976 to 1978. A roster of species composition and the number of individuals collected and a species list of terrestrial flora observed along the lower Peace River are reported. The natural histories of the following species are described: *Luidia*, *Pectinaria*, *Glottidia*, *Corbicula*, *Polymesoda*, *Grandidierella*, *Corophium*, *Cyathura*, *Edotea*, *Laeonereis*, *Polydora* and *Amphiteis*.

Type of Study: Qualitative; Biological Component: Flora and fauna; Abiotic Parameters Measured: Temperature, salinity, DO, pH, Eh, tides; Dominant Taxon/Taxa Studied: *Luidia*, *Pectinaria*, *Glottidia*, *Corbicula*, *Polymesoda*, *Grandidierella*, *Corophium*, *Cyathura*, *Edotea*, *Laeonereis*, *Polydora* and *Amphiteis*;

(23.00004)

Environmental Quality Laboratory, Inc. 1979. Hydrobiological monitoring January 1976 through October 1978. Lower Peace River and Charlotte Harbor, Vol. I, as per SW Fla. Water Management Dist. Consumptive Use Permit. Dec. 10, 1975, for the Peace River Reg. Water Treat. Plant Rept. to Gen. Dev. Utilities, Inc. 124 p.

The influence of river flow on physical changes and biological productivity were studied. Increased river flow during the wet season was found to result in vertical density stratification of the water column and also in lowered salinity levels in Charlotte Harbor. Vertical stratification was found to reduce mixing with a gradual depletion of dissolved oxygen occurring in the bottom waters. The primary production in the surface layers was determined to be stimulated enrichment with essential nutrients provided in part by photosynthesis in the surface layers. Primary producers were also determined to benefit from reduced predation by mobile predators that are forced by decreased DO and salinity levels to leave the upper harbor. In the fall, when decreased river flow and higher surface winds were noted to cause vertical mixing, mobile predators such as juvenile shrimp, crabs and fish move into the upper harbor to feed upon the abundant benthic food supply.

Study Duration: January 1976 - October 1978; Type of Study: Quantitative; Biological Component: Benthic flora and fauna; Type of Sampler: Ponar grab, core, Hester Dendy; Sieve Size: 0.6 mm; Number of Stations: 23 trawl, 14 grab, 1 core; Number of Replicates/Station: 5 grab; Temporal Frequency: Monthly (trawl), every other month (grab), every 3 months (core); Abiotic Parameters Measured: Temperature, salinity, DO, pH, Eh, river flow, tides;

(23.00005)

Estevez, E.D. 1980. Checklists of estuarine and marine biota from Charlotte Harbor, Florida and adjacent waters: Fauna V, Crustaceans. Mote Marine Lab., Sarasota, FL, Staff Rept. Draft.

A checklist of species reported in published and unpublished studies in or near Charlotte Harbor, Florida is presented.

One hundred eighty one verified species (reported from the Charlotte Harbor Estuarine complex) and 63 probable species (crustaceans found by studies in adjacent estuarine and Gulf waters) were identified. Corrections for synonymy were not made.

Type of Study:Qualitative; Biological Component:Crustaceans;

(23.00006)

Estevez, E.D. 1984. A review of scientific information, Charlotte Harbor Ecosystem Complex. Mote Marine Laboratory review series #3. Report to Southwest Fla. Regional Planning Council. 2 vol.

The original scientific literature of the Charlotte Harbor region and its component estuarine areas was reviewed and organized into a primary reference document. About 1,200 unique references were examined. Areas included the region, Gasprilla Sound, Charlotte Harbor, Pine Island Sound and Matlacha Pass, and San Carlos and Estero Bays. Topics for each area included land use, meteorology, geology, hydrology, water chemistry, and biology. Study needs were identified for future support.

Habitat:All types; Type of Study:Literary review;

(23.00007)

Huang, T.C. & H.G. Goodell 1967. Sediments of Charlotte Harbor, Southwestern Florida. J. Sediment. Petrol. 37(2):449:474.

The sediments of Charlotte Harbor were determined to be composed of essentially two components: terrigenous quartz sand and biogenic carbonate detritals. The mean grain size as well as the percentage of the carbonate detritals was determined to increase seaward. The coarse fractions of the sediments were shown to accumulate at the harbor mouth and in the channels, while the finer aggregates became concentrated in the harbor head and lagoons. Two major tidal circulations were shown to shift the sediments. Multivariate nonlinear regression was used to relate the sediment characteristics to their provenance, transportation and depositional environments.

Study Duration:5 days; Habitat:Mud, sand, gravel; Type of Study:Qualitative; Type of Sampler:LeFonde Dietz grab, Japanese Secchi grab, core; Abiotic Parameters Measured:Sediment characteristics;

(23.00008)

Klinger, T. 1979. A study of sediment preference and its effect on distribution in *Luidia clathrata* Say (Echinodermata: Asteroidea). Univ. of So. Fla. M.S. Thesis.

The influence of sediment grain size, organic content, and infaunal prey density on the distribution of a population of the sea star, *Luidia clathrata*, was investigated in Charlotte Harbor, Florida. The distribution of *L. clathrata* was not significantly affected by substratum variations, presumably due to the homogeneity of sediment characteristics. Laboratory observations revealed a negative response of the sea stars to organic level; however, field populations exhibited no such response, probably due to differences in the relative organic concentrations in the water column.

Study Duration:1 February-6 June 1978; Habitat:Sand, mud; Type of Study:Quantitative; Biological Component:Echinodermata; Type of Sampler:Otter trawl, ponar grab, piston corer; Number of Stations:9; Temporal Frequency:3 times (1 Feb., 5 Apr., 6 Jun.); Abiotic Parameters Measured:Sediment grain size, organic content; Dominant Taxon/Taxa Studied:*Luidia clathrata*;

(23.00009)

Morrill, J.B. & M. Needham 1969. A biological survey of the submerged lands in the proposed Portofino Development. Cape Haze-Placida, Charlotte County, Florida. New College of the Univ. of So. Fla., Envir. Stud. Prog. Rept.

The immediate consequences of the proposed Portofino development include: 1) loss of some existing mangroves; 2) loss of some *Spartina* grass patches and sandy beach; 3) loss of the sandy, mud beach zone; 4) loss of some Cuban shoal weed inside the bulkhead line; and 5) loss of some turtle grass area. Recommendations to minimize damage to the surrounding bottoms and waters are made for the three areas. The presence of a relatively rich mollusc fauna north and to a lesser extent south of the spoil area demonstrates the waters of Placida Harbor are not polluted and that these grassflats continue to function as a fishery resource.

Study Duration:Approximately 4 months; Habitat:Sand, mud, grassbed, mangroves, saltmarsh; Type of Study:Quantitative; Biological Component:Macrobenthic invertebrates, benthic flora; Type of Sampler:1/64 m<sup>2</sup> plug; Number of Stations:19; Number of Replicates/Station:4; Temporal Frequency:6 times; Abiotic Parameters Measured:Salinity; Dominant Taxon/Taxa Studied:*Batillaria minima*, *Melongena corona*, *Cerithium* sp., *Venus campechiensis*;

(23.00010)

Osborne, S.W. 1979. The seasonal distribution of *Luidia clathrata* (Say) in Charlotte Harbor with reference to various physical-chemical parameters. Fla. State Univ. M.S. Thesis.

The distribution of the sea star *Luidia clathrata* in Charlotte Harbor, Florida was determined from monthly



collections at 23 stations during 1976 and 1977. Seasonal variations in the distribution of *L. clathrata* was influenced primarily by sporadic larval settlement during January through August, and by decreased oxygen conditions in late summer associated with increased flow of the Peace River. An annual population of *L. clathrata* was identified in upper Charlotte Harbor. A monthly growth rate of 13.3 mm/30 d indicated an annual breeding cycle.

Study Duration:1976-1977; Habitat:Sand, mud; Type of Study:Quantitative; Biological Component:Echinodermata; Number of Stations:23; Temporal Frequency:Monthly; Abiotic Parameters Measured:Depth, temp., DO, salinity, pH, Eh potential, organic content; Dominant Taxon/Taxa Studied:*Luidia clathrata*;

(23.00011)

Pierce, R.H. & E.S. VanVleet 1983. Charlotte Harbor hydrocarbon study, year-2. Final Report. January 1, 1983-November 15, 1983. Submitted to Florida Department of Natural Resources, St. Petersburg, Florida.

Hydrocarbon content and characterization was obtained for surficial sediment, oysters and water from four areas in Charlotte Harbor, Florida. The areas represent different types of land use activity. The data characterize hydrocarbon contamination around Charlotte Harbor and provide information for predicting the impact of future development.

Study Duration:January 1, 1983 to November 15, 1983 (11 months); Type of Study:Qualitative; Biological Component:Faua; Type of Samplers:Petite ponar; Number of Replicates/Station:3-sediment, 24-oysters; Abiotic Parameters Measured:Hydrocarbons;

(23.00012)

Southwest Florida Water Management District. 1978. Summary of Rept.: Southwest Fla. Water Mngt. Dist. Consumptive Use Permit to Gen. Dev. Utilities, Inc., for Peace River Reg. Water Treatment Plant.

Studies from Boca Grande Pass to the nontidal portion of the Peace River were initiated to collect data concerning the influence of river flow on the ecosystems in Charlotte Harbor. Increased river flow during the wet season was determined to result in vertical salinity stratification of the harbor water column, and also in lowered salinity levels in Charlotte Harbor. Vertical stratification reduced mixing and gradual depletion of DO occurred in bottom waters. Primary production in surface layers was found to be stimulated by enrichment with essential nutrients from increased flows. Benthic infauna flourished on the increased food supply (provided in part by photosynthesis in the surface layers), and benefited from reduced predation. Mobile predators are forced by decreased dissolved oxygen and salinity levels to leave the stratified part of the harbor. In the fall when decreased river flow and higher surface winds cause vertical mixing and increased bottom oxygen, mobile predators, such as juvenile shrimp, crabs, and fish were noted to move into the upper harbor to feed upon the abundant benthic food supply that developed during the preceding period of stratification.

Study Duration:Approximately 2 years; Type of Study:Qualitative; Abiotic Parameters Measured:Salinity, DO;

(23.00013)

Taylor, J.L. 1974. The Charlotte Harbor estuarine system. Fla. Scientist 37(4):205:216.

The Charlotte Harbor estuary was described. It is about 35 by 30 miles at the extremes with more than 200 miles of shoreline and comparatively little contamination. Vegetation includes salt marsh, mangrove and other peninsular Florida Gulf coast communities which are highly productive. Dredging and development had an adverse effect on more than 11,000 acres near Port Charlotte, Punta Gorda, Cape Coral and Fort Myers. Additional acres were closed to shell fishing because of pollution. Further manmade changes have threatened the value of the estuary as a fishing ground and hatchery for commercially valuable marine fishes.

Habitat:Saltmarsh, mangroves; Type of Study:Qualitative; Biological Component:Flora and fauna; Abiotic Parameters Measured:Temperature, salinity, DO, pH, turbidity, nutrients, water chemistry;

(23.00014)

Texas Instruments Inc. 1978. Benthic macroinvertebrates, In: Preliminary biological report for the proposed DeSoto site development. Rept. prepared for Florida Power and Light Co. 586 pages.

A baseline biological study was conducted to develop a comprehensive data base reflecting historical trends and present ecological conditions in the study area. The field sampling program was designed to inventory flora and fauna of the study area and describe spatial and seasonal patterns in their abundances and distribution. Terrestrial as well as aquatic environments were sampled. The waters of the study area were divided into 3 regions: 1) the Peace River (typical flowing freshwater environment); 2) the Peace River estuary; and 3) Charlotte Harbor. The most obvious influence on distribution; composition and abundance of benthic macroinvertebrates in the Peace River stations was riverflow. Density of organisms was reduced during the periods of increased flow, when much of the infauna was dislodged from the substrate. The Peace River estuarine stations demonstrated a readily apparent transitional nature of the benthos. The Charlotte Harbor benthic communities were extremely diverse and complex. No one factor maintained an overall controlling influence on the community dynamics of benthic macroinvertebrates in this area. It did appear, however, that major controlling factors in Charlotte Harbor were salinity and substrate type, while in the Peace River, flow rate was the most influential factor.

Study Duration:10 months; Habitat:Sand, silt, mud; Type of Study:Qualitative ; Biological Component:Benthic macroinvertebrates; Type of Sampler:Ponar grab, benthic trawl, sampling nets; Sieve Size:0.6 mm; Number of Stations:12; Number of Replicates/Station:Variable; Temporal Frequency:Bimonthly; Abiotic Parameters Measured:Temperature, salinity, DO, pH, clarity, turbidity, water chemistry; Dominant Taxon/Taxa Studied:*Corbicula*, *Streblospio*, *Nereis*, *Erichthonius*, *Ameliscia*, *Cyathura*, *Mysidopsis bigeloni*, *Nitrella lunata*, *Glottidia pyramidata*, *Branchiostoma caribaeum*;

(23.00015)

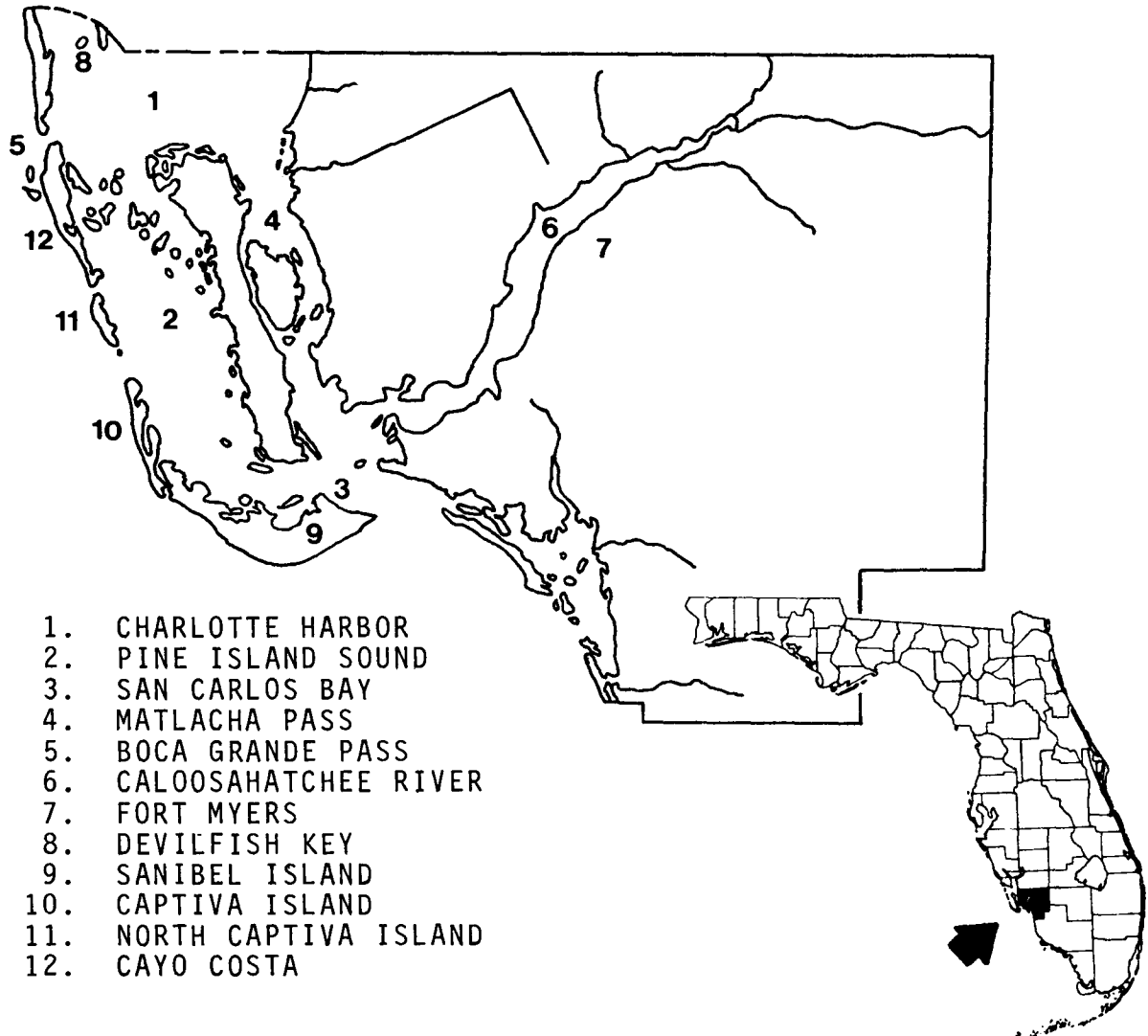
Woodburn, K.D. 1962. Clams and oysters in Charlotte County and vicinity. Fla. Bd. Conserv. Mar. Lab., Publ. No. 62-12. 29 p.

A survey of commercial bivalves was conducted in Charlotte County, Florida during June 1962. Three species of commercial significance inhabit the area: *Crassostrea virginica*, *Rangia cuneata*, *Mercenaria campechiensis*. Forty two hydrographic stations were sampled for temperature, salinity, tidal phase, depth, and bottom type. The distribution, size, and abundance of each of the 3 species is summarized for 18 bodies of water and generally related to the physical parameters measured.

Study Duration:5-21 June 1962; Type of Study:Qualitative; Biological Component:Mollusca; Number of Stations:42; Abiotic Parameters Measured:Temperature, salinity, tide, bottom type, depth; Dominant Taxon/Taxa Studied:*Crassostrea virginica*, *Rangia cuneata*, *Mercenaria campechiensis*;

See also: 1.00041, 3.00054.

# LEE COUNTY



(24.00001)

Applied Biology, Inc. 1976. Ecological parameter monitoring at the Fort Myers Plant. Florida Power and Light Co., Miami, FL. Rept.

Results of benthic sampling in the vicinity of the Florida Power and Light Co. Fort Myers Plant in 1974 and 1975 are reported. A species list and values of density, biomass, diversity, and equitability are provided.

Study Duration:2 years; Type of Study:Quantitative; Biological Component:Macroinvertebrates; Type of Sampler:Grab; Number of Stations:13; Temporal Frequency:Quarterly;

(24.00002)

Byle, W.K. 1975. I-75 North Sound Study. Rept. Submitted by Environmental Services Unlimited.

The biophysical characteristics of the North Sound study area are described. Those portions of the Sound with elevations ranging from -1.2 ft below mean sea level to 3.5 ft below mean sea level and having a fairly firm substrate (as opposed to areas high in silts, clays and/or detritus) were found to support relatively larger populations of benthic organisms than the deeper or shallower areas (regardless of substrate). The distribution and types of species are related to the substrate, which in turn is related to existing water circulation patterns. Most of the North Sound was determined to be comparatively healthy, physically and biologically.

Study Duration:February and March 1975; Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Benthic invertebrates; Type of Sampler:Taylor plug; Sieve Size:2.00 mm, 0.60 mm; Abiotic Parameters Measured:Temperature, salinity, DO, turbidity;

(24.00003)

Costello, T.J. & D.M. Allen 1966. Migrations and geographic distribution of pink shrimp, *Penaeus duorarum*, of the Tortugas and Sanibel grounds, Florida. Fish. Bull. 65(2):449-459.

To study shrimp stocks from Sanibel Island and the Dry Tortugas, 15 mark-recovery experiments in which biological stains were used as the marking agent were conducted. The timing and distribution of shrimp migrations from nursery areas to offshore grounds were determined. The estuarine nursery grounds included Florida Bay and estuaries extending at least as far north as Indian Key on the southwest coast of Florida for the Tortugas shrimp, and from Indian Key north to Pine Island Sound for Sanibel shrimp. The geographic ranges of the Tortugas and Sanibel pink shrimp stocks overlapped in the nursery areas near Indian Key, and in the offshore bottom water between the two trawling grounds. The geographic distributions depicted were suggested to be conservative.

Study Duration:1958-1963; Habitat:Grassbeds; Type of Study:Qualitative; Biological Component:Decapod fauna; Number of Stations:15 release sites; Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(24.00004)

Costello, T.J. & D.M. Allen 1968. Mortality rates in populations of pink shrimp, *Penaeus duorarum*, on the Sanibel and Tortugas Grounds, Florida. U.S. Fish Wildl. Serv., Fish. Bull. 66:491-502.

Estimates of fishing and natural mortalities were obtained from mark-recovery experiments on *Penaeus duorarum* on the Sanibel and Tortugas grounds. In the Sanibel population there was a 6.8% fishing mortality and 14.8% loss from other causes. In the Tortugas population fishing mortality was 13.1% and all other losses were 19.7%. Assumptions used in statistical analyses and validity of estimates are discussed.

Study Duration:1962-1963; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Shrimp trawl; Number of Stations:2; Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(24.00005)

Gunter, G. & G.E. Hall 1965. A biological investigation of the Caloosahatchee Estuary of Florida. Gulf Res. Rept. 2(1):72.

Collections were made at various regular stations from Beautiful Isle to the Sanibel Island outer beach over the salinity range from fresh water to sea water. The numbers, species and sizes of fishes captured in seines and in trawls within the Caloosahatchee Estuary proper and in the outside waters were presented. In general, the invertebrate population did not change greatly within the estuary with high and low inflows of fresh water. Outside the estuary the invertebrate populations declined with high discharge.

Study Duration:3 years; Habitat:Estuarine; Type of Study:Semi-quantitative; Biological Component:Fishes and invertebrates; Type of Sampler:Otter trawl, beach seine; Number of Stations:8 trawl; 8 seine; Number of Replicates/Station:1 to 3; Temporal Frequency:Approximately every 4 months; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Brachidontes*, *Conger*, *Rangia cuneata*, *Menidia*, *Callinectes sapidus*, *Chaetopterus*, *Pagurites ornatus*, *Mellita*, *Lytechinus*, *Echinaster*, *Ophiopsis elegans*, *Molgula occidentalis*;

(24.00006)

Gunter, G., F.G. Smith, & R.H. Williams 1947. Mass mortality of marine animals on the lowest west coast of Florida. Science 105(2723).

The effects of *Gymnodinium* sp. outbreak between the Dry Tortugas and Boca Grande, Florida, during November 1946 to January 1947 were briefly documented. Mass mortalities of fish, turtles, oysters, clams, crabs, shrimp, barnacles, and coquinas were reported. The distribution and abundance of dead animals were estimated. Water quality parameters and plankton composition were monitored in certain areas in an attempt to identify the cause of the mass mortalities.

Study Duration: November 1946-January 1947; Type of Study: Qualitative; Biological Component: Fauna; Abiotic Parameters Measured: Temperature, salinity, DO;

(24.00007)

Herwitz, S.R. 1977. Elements of the Cayo-Costa Island ecosystem, Lee County, Florida. In: Proc. of the Fourth Annu. Conf. on the Restoration of Coast. Vegetation in Fla. p. 152-165.

An aerial photographic study of vegetation patterns on Cayo-Costa Island, Charlotte Harbor, Florida, recognized 12 habitats on the basis of dominant plant associations. Eight habitats were found to represent stages in the two patterns of succession occurring on the island. Extensive ground truthing revealed 309 species of vascular plants: 176 were herbs (58%); 64 shrubs (21%); 34 trees (11%); 20 vines (6%); and 12 epiphytes (4%).

Study Duration: 12 February 1974-April 1977; Habitat: Saltmarsh, mangrove forest, beach; Type of Study: Qualitative; Biological Component: Flora;

(24.00008)

Hicks, D.B., P. Murphy, R. Weldon, W. Loy, D. Revell & T.R. Cavinder 1976. Determining and monitoring the toxicity of Baytex to pink shrimp at Sanibel Island, Florida. June 14-28, 1976. U.S. EPA, Reg. IV, Surveillance and Analysis Div. 34 p.

A pesticide monitoring study was conducted at Sanibel Island consisting of short term static toxicity bioassays and field monitoring for environmental concentrations and toxicity of Baytex in tidal surface waters of the nearshore bay areas and principal canal systems associated with the island. Monitoring was conducted prior to and following an aerial application of the pesticide. The incipient lethal concentration of Baytex to juvenile pink shrimp was found to result in a 100% mortality of juvenile pink shrimp contained in floating cages in the finger fill canal system. It was also found that nearshore aquatic areas were subjected to drift of the pesticide following aerial application.

Study Duration: 14 days; Habitat: Estuarine; Type of Study: Quantitative; Biological Component: Decapod fauna; Type of Sampler: Plankton net, try trawl net, floating cages; Abiotic Parameters Measured: Temperature, salinity, DO; Dominant Taxon/Taxa Studied: *Penaeus duorarum*;

(24.00009)

Kutkuhn, J.H. 1966. Dynamics of a Penaeid shrimp population and management implications. Fish. Bull. 65(2):313-338.

The interaction of population growth and mortality of a stock of pink shrimp was critically analyzed. Estimates of the populations involved were secured through a mark-recapture experiment. It was questioned whether or not the fishery's production could be improved by postponing the start of fishing until the shrimp reach a size greater than 70 headless count designation now generally viewed as a practicable minimum. It was also noted that expected population growth, although relatively high would be insufficient to offset substantial losses due to expected natural mortality. Maximum potential yield in both weight and value can be obtained with the minimum acceptable size regulation that the fishery currently imposes.

Habitat: Grassbeds; Type of Study: Quantitative; Biological Component: Decapod fauna; Type of Sampler: Small mesh trawls, mark & recapture; Number of Stations: 2 areas; Dominant Taxon/Taxa Studied: *Penaeus duorarum*;

(24.00010)

Mikkelsen, P.S. 1978. A comparison of intertidal distribution growth rates, and shell polychromism between two Florida populations of the coquina clam, *Donax variabilis* Say, 1822 (Bivalve: Donacidae). Fla. Instit. of Tech. M.S. Thesis.

Population density, shell coloration, and migratory behavior of *Donax variabilis* were compared in two populations collected from Sanibel Island and Indian Beach, Florida, during the summer of 1976. The influence of certain environmental factors, such as salinity, rainfall, sediment grain size, organic leptopel and wave impact, on population distribution and shell coloration was examined. Differences in population size, distribution, shell color, growth rate, and migratory movements were found between the 2 populations. The adaptive effects of polychromism are discussed.

Study Duration: Summer 1976; Habitat: Sand beach; Type of Study: Quantitative; Biological Component: Mollusca; Number of Stations: 2; Abiotic Parameters Measured: Salinity, rainfall, sediment grain size; Dominant Taxon/Taxa Studied: *Donax variabilis*;

(24.00011)

Neale, M.J. 1980. A sedimentological study of the Gulf coasts of Cayo-Costa and North Captiva Islands, Florida. Fla. State Univ. M.S. Thesis.

Analysis of sediment grain size parameters from 103 sediment samples collected along the Gulf beaches of Cayo-Costa and North Captiva Islands, Florida, indicated local erosion of beach material. Sediment transport to offshore areas was indicated with no continuous longshore transport. The bathymetry and sediment distribution of the study area are described.

Habitat: Beach; Type of Study: Qualitative; Number of Stations: 103; Abiotic Parameters Measured: Sediment grain size;

(24.00012)

Payne, R.G. 1969. A comparative study of population dynamics of the estuarine isopod *Cyathura polita* (Stimpson) from Florida and Georgia. Emory Univ., M.S. Thesis.

A comparative study was made of two latitudinally separated populations of the estuarine isopod *Cyathura polita* to obtain information about the substratum preference of this species and about other factors which affect the densities and distributions of the populations within areas of preferred substratum. Distribution with respect to substratum type was determined for both populations. A new index of the stability of the substratum was used to characterize the types of substrata found in both habitats. Population factors studied included: a) density; b) internal distribution; and c) size class distribution. Routine measurements of physical parameters were made in both locations. In the Fort Myers location, the short term tolerance limit of Cyathurans to high levels of salinity was determined. Both populations of the present study occurred only in stable substratum although the composition of substrata in the two locations was quite different. Both populations exhibited random internal distributions but the Fort Myers population was somewhat denser than the Brunswick population. The size distribution of the Fort Myers population exhibited a decided peak at 17 mm, but no predominance of one size was evident at the Brunswick population. The values of physical parameters of the present study fell within the ranges of values obtained in previous studies of physical parameters in Cyathuran habitats. Biotic factors studied in both habitats included: a) predation; b) incidence of parasitism; c) food; and d) other associated fauna. Relative abundance of food elements, predatory species and other associated fauna were surveyed in each location.

Study Duration: 9 days; Type of Study: Semiquantitative; Biological Component: Isopod fauna; Type of Sampler: Spade; Sieve Size: 1.5 mm; Number of Stations: 2; Number of Replicates/Station: 10 transects each station; Temporal Frequency: Once; Abiotic Parameters Measured: Temperature, salinity, DO, currents; Dominant Taxon/Taxa Studied: *Cyathura polita*;

(24.00013)

Phillips, R.C. & V.G. Springer 1960. A report on the hydrography, marine plants and fishes of the Caloosahatchee River, Lee County, Florida. Fla. Bd. Conserv., Spec. Sci. Rept. No. 5. 34 p.

The marine plants and fishes of the Caloosahatchee River were surveyed in May 1958 and in February 1959. A total of 45 taxa of algae and 6 taxa of aquatic flowering plants were found. Fifty three fish species were collected. In general the fish fauna of the river was poor in numbers and species. Species lists of marine plants and fish are presented.

Type of Study: Qualitative; Biological Component: Flora, fauna; Type of Sampler: Dredge, trawl, seine; Number of Stations: 15; Abiotic Parameters Measured: Temperature, salinity, turbidity;

(24.00014)

Silberman, L.Z. 1979. A sedimentological study of the Gulf beaches of Sanibel and Captiva Islands, Florida. Fla. State Univ. M.S. Thesis.

One hundred and sixty sediment samples collected along the Gulf of Mexico beaches of Captiva and Sanibel Islands, Florida were used to characterize the sediments of the upper and mid beach, swash zone, and offshore bar. Statistical analysis of grain size parameters indicated a net sediment transport to the south and east. Detailed descriptions are given of local sediment distribution and transport processes.

Type of Study: Qualitative; Number of Stations: 10; Abiotic Parameters Measured: Sediment grain size;

(24.00015)

Tiffany, W.J., III 1978. Mass mortality of *Luidia senegalensis* (LaMark, 1816) on Captiva Island, Florida with a note on its occurrence in Florida Gulf coastal waters. Fla. Scientist 41(1):63-64.

A mass mortality of *Luidia senegalensis* occurred on February 18, 1977 on Captiva Island, Florida. The occurrence of the nine armed sea star in Florida Gulf coastal waters was discussed. The cause of the mass mortality was not determined.

Study Duration: 1 day; Habitat: Sandy beach; Type of Study: Qualitative; Biological Component: Benthic invertebrates; Dominant Taxon/Taxa Studied: *Luidia senegalensis*;

(24.00016)

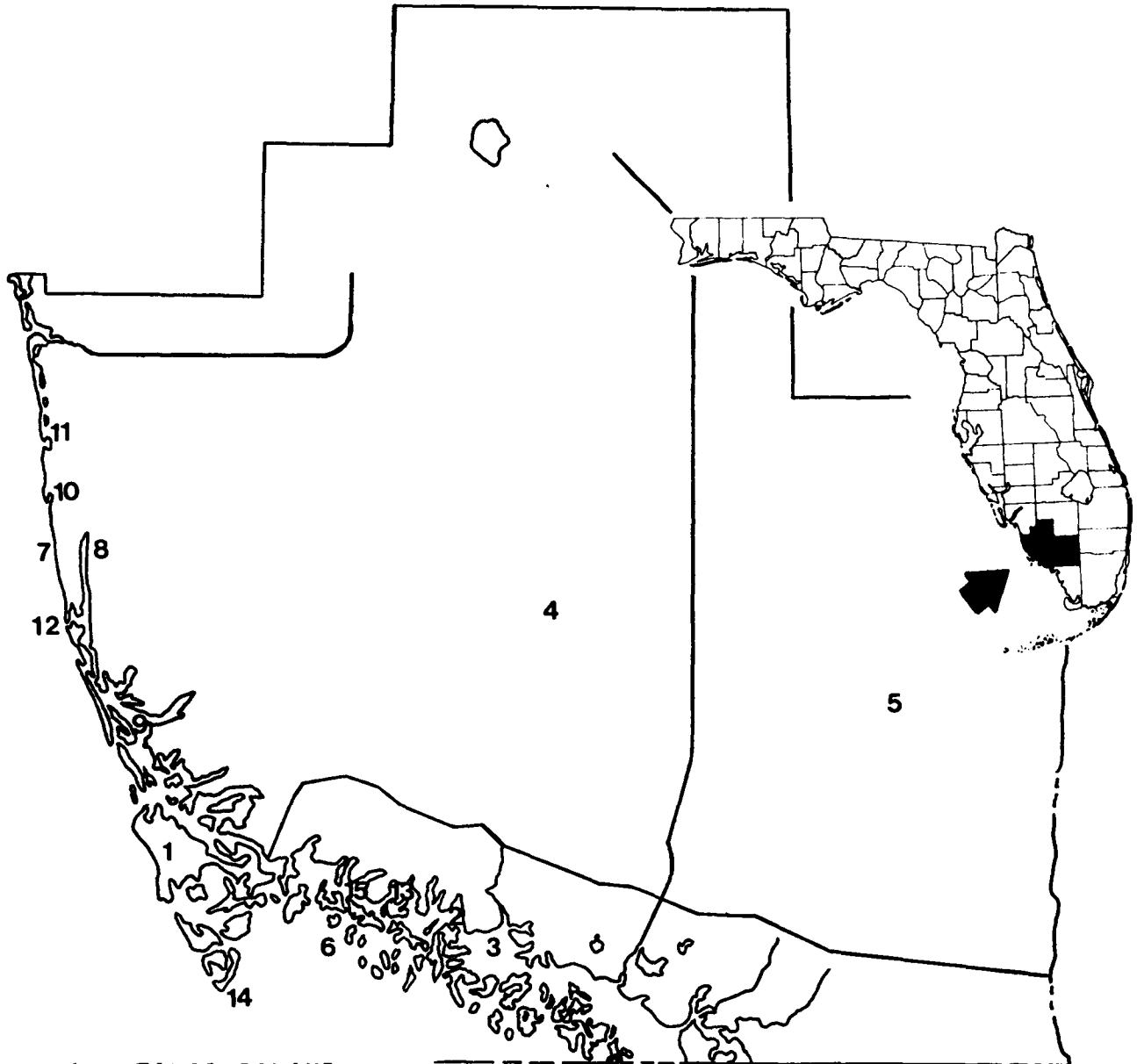
Tsui, P.T.P. & B.W. Breedlove 1978. Use of the multiple-plate sampler in biological monitoring of the aquatic environment. Fla. Scientist 41(2):110-116.

Field studies revealed that the diversity of macroinvertebrates collected by the multiple-plate sampler is time dependent. Pilot studies to determine optimum exposure period were recommended. Comparisons of samples of macroinvertebrates collected by the multiple-plate sampler and the petite ponar grab from both lentic and lotic environments resulted in significant differences.

Type of Study:Technique; Biological Component:Benthic macroinvertebrates; Type of Sampler:Multiple plate sampler, petite ponar grab; Sieve Size:0.6 mm;

See also: 3.00054, 13.00026.

# COLLIER COUNTY



- |                         |                    |
|-------------------------|--------------------|
| 1. MARCO ISLAND         | 9. ROOKERY BAY     |
| 2. FAKA UNION BAY       | 10. DOCTORS BAY    |
| 3. FAKAHATCHEE BAY      | 11. CLAM BAY       |
| 4. FAKAHATCHEE STRAND   | 12. GORDON PASS    |
| 5. BIG CYPRESS SWAMP    | 13. PUMPKIN BAY    |
| 6. TEN THOUSAND ISLANDS | 14. CAPE ROMANO    |
| 7. NAPLES               | 15. BUTTONWOOD BAY |
| 8. NAPLES BAY           |                    |



(25.00001)

Carter, M.R., L.A. Burns, T.R. Cavinder, K.R. Dugger, P.L. Fore, D.B. Hicks, H.L. Revells & T.W. Schmidt 1973. Ecosystem analysis of the Big Cypress Swamp and estuaries. U.S. EPA, Surveillance and Analysis Div., EPA 904/9-74-002, 477 p.

This study examined natural and disturbed ecosystems in the Big Cypress Swamp and the Ten Thousand Islands. A detailed characterization of the study area was made including background data on chemical quality of waters and sediments; pesticide levels in water; sediment; fish and higher animals; and life histories of several freshwater and marine fishes, especially snook. Several detailed studies relating to man-made changes to the environment were conducted including salinity variations in natural versus man-influenced estuaries, and the effects of canals and other drainage on ground and surface waters.

Study Duration:1971-1972; Habitat:Estuarine; Type of Study:Qualitative; Biological Component:Flora and fauna; Abiotic Parameters Measured:Temperature, salinity, nutrients, precipitation, humidity;

(25.00002)

Courtney, C.M. 1975. Mangrove and seawall oyster communities, Marco Island, Florida. Paper presented at Western Soc. of Malacol. - Am. Malacol. Union Joint Meet. June 22-26, 1975.

Mangrove and seawall oyster community studies indicated that oysters settle on seawalls in numbers equal to their natural system counterparts, the mangrove prop root oysters. A large majority of other oyster community inhabitants found man-made systems conducive to their development and survival. A multitude of factors (physical and chemical tolerances, tidal flushing rates, climatology, etc.) accounted for the presence or absence of particular species. Clumped distributions were the rule rather than the exception.

Study Duration:October 1972 - July 1974; Habitat:Mangroves, seawall; Type of Study:Qualitative; Biological Component:Macroinvertebrates; Type of Sampler:1 m<sup>2</sup> frame; Number of Stations:19, 12; Dominant Taxon/Taxa Studied:*Crassostrea virginica*, *Branchiodontes exustus*, *Lithophaga bisulcata*, Unidentified cirratulid, *Sphaeroma terebrans*, *Petrolisthes armatus*, *Eurypanopeus depressus*, *Eurytemora limosum*;

(25.00003)

Evink, G.L. 1973. The role of mangrove ecosystems: biomass and diversity of benthic macroinvertebrates of Faka Union and Fakahatchee Bays, Florida. U.S. Dept. of Interior, Bur. Sport Fish. & Wildl. So. Fla. Envir. Proj. Ecol. Rept. No. D1-SFEP, 74-42.

A comparative study of the benthic macroinvertebrates of Faka Union and Fakahatchee Bays was conducted. The benthic macroinvertebrate biomass data revealed no significant differences between the bays. The analysis of the two bays showed that they have similar species with a small difference in species diversity.

Study Duration:February 1972 - December 1972; Habitat:Grassbed, shell, sand, mud; Type of Study:Quantitative; Biological Component:Benthic macroinvertebrates; Type of Sampler:Venturi suction, core, drop net; Sieve Size:0.85 mm; Number of Stations:37; Number of Replicates/Station:1; Temporal Frequency:3 times;

(25.00004)

Evink, G.L. 1974. Macrobenthos comparisons in mangrove estuaries. In: Biology and Management of Mangroves. G.E. Walsh, S.C. Snedaker & H.J. Teas (eds.). Univ. of Fla., Gainesville. p. 256-285.

Collection and study of macrobenthos was conducted in Fakahatchee and Faka Union Bays during 1972 and 1973. Comparisons of species composition, numbers of individuals, and biomass showed the influences of channelization in the Bays. Species diversity was similar for both bays, but species compositions were dissimilar. The estuarine food web is analyzed and discussed.

Study Duration:February 1972-August 1973; Habitat:Mangrove; Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Venturi suction pump, core; Abiotic Parameters Measured:Climatology, sediment characteristics;

(25.00005)

Hicks, D.B. & L.A. Burns 1974. Mangrove metabolic response to alterations of natural freshwater drainage to southwestern Florida estuaries. In: Biology and Management of Mangroves. G.E. Walsh, S.C. Snedaker & H.J. Teas (eds.). Univ. of Fla. Gainesville. p. 238-255.

The response of mangrove metabolism to alterations of freshwater drainage into estuaries was studied in the Ten Thousand Islands area. Water borne mineral and nutrient transport is dependent on sheet flow of freshwater which has been interrupted by drainage canals recently. Gross primary productivity and diel rates of metabolism were measured. Mangroves responded to a decreasing gradient of freshwater by gross productivity increases, respiration increases, and net productivity decreases.

Habitat:Mangroves; Type of Study:Quantitative; Biological Component:Flora; Number of Stations:2; Abiotic Parameters Measured:Salinity, CO<sub>2</sub>, solar radiation; Dominant Taxon/Taxa Studied:*Rhizophora mangle*, *Avicennia germinans*, *Languncularia racemosa*;

(25.00006)

Holmes, C.W. 1962. Sediments of the Ten Thousand Islands. Fla. State Univ. M.S. Thesis.

The nature of the sediments of the Ten Thousand Islands was studied from samples collected at 8 stations during June 1960. Four physiographic areas were identified: mangrove barrier, coarse quartz sand, fine quartz sand, and a mixture of the 2 sand populations. The location of these areas and the methods of their formation are discussed.

Study Duration: June 1960; Habitat: Sand, mangrove; Type of Study: Quantitative; Number of Stations: 8; Abiotic Parameters Measured: Sediment grain size;

(25.00007)

Hughes, D.A. 1969. Responses to salinity change as the tidal transport mechanism of pink shrimp, *Penaeus duorarum*. Biol. Bull. Mar. Biol. Lab., Woods Hole. 136(1):43-53.

Shrimp taken from Buttonwood estuary, Florida were studied to determine the effect of salinity on postlarvae and juveniles. In the laboratory salinity changes were imposed on both juveniles and postlarvae. With a decreasing salinity, the rheotactic response of juveniles was reversed, and postlarvae sank lower in the water column. Postlarvae demonstrated an ability to perceive and avoid areas of lower salinity.

Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Discovery plankton net; Abiotic Parameters Measured: Tidal flow, salinity, light, current; Dominant Taxon/Taxa Studied: *Penaeus duorarum*;

(25.00008)

Lindall, W.W., Jr., J.R. Hall, W.A. Fable, Jr. &amp; L.A. Collins 1974. Fishes and commercial invertebrates of the nearshore and estuarine zone between Cape Romano and Cape Sable, Florida. NTIS PB235-215.

Quarterly samples of fish and benthic invertebrates were collected from the nearshore and estuarine zone between Cape Romano and Cape Sable, Florida, between May 1971 and February 1972. Six species of commercial invertebrates and 114 species of fish were collected with beach seine and otter trawl from 35 stations located in inland waters and to 10 miles in the Gulf of Mexico. Inshore stations exhibited higher yields than offshore stations. A systematic account of all species is provided.

Study Duration: May 1971-February 1972; Habitat: Seagrass bed, mud, sand, oyster shell; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Otter trawl, seine; Number of Stations: 35; Temporal Frequency: Quarterly; Abiotic Parameters Measured: Salinity, temperature, DO; Dominant Taxon/Taxa Studied: *Anchoa hepsetus*, *A. mitchilli*, *Penaeus duorarum*, *Argopecten gibbus*, *Callinectes sapidus*, *C. ornatus*, *Loliguncula brevis*, *Menippe mercenaria*;

(25.00009)

Lugo, A.E. &amp; S.C. Snedaker 1974. Properties of a mangrove forest in southern Florida. In: The Biology and Management of Mangroves. G.E. Walsh, S.C. Snedaker &amp; H.J. Teas (eds.). Univ. of Fla., Gainesville. p. 170-212.

The ecology of a mangrove forest at Rookery Bay was studied from August 1971 to February 1973. Measurements were made of composition and growth of the vegetation, gas exchange, water flows, and the carbon budget. Many physical and chemical parameters were measured and correlated with the biological results. The forest was divided into 2 vegetation zones, the fringe and basin mangrove zones, according to physiological and morphological differences caused by environmental conditions.

Study Duration: August 1971-February 1973; Habitat: Mangrove; Type of Study: Quantitative; Biological Component: Flora, mangrove; Number of Stations: 5; Abiotic Parameters Measured: Meteorological conditions, light intensity, air & water temp., cond., DO, pH, CO<sub>2</sub>, sal.; Dominant Taxon/Taxa Studied: *Rhizophora mangle*, *Avicennia germinans*, *Laguncularia racemosa*;

(25.00010)

Lugo, A.E., G. Evink, M.M. Brinson, A. Brace &amp; S.C. Snedaker 1975. Diurnal rates of photosynthesis, respiration, and transpiration in mangrove forests of South Florida. In: Tropical Ecological Systems, M.F.B. Golley &amp; E. Medina (eds.). Springer-Verlag, New York: 335-350.

The 4 Florida mangrove species, *Rhizophora mangle*, *Avicennia nitida* (*germinans*), *Laguncularia racemosa*, *Conocarpus erecta* were measured for carbon dioxide exchange and transpiration. Specimens were collected from Rookery Bay. Trees were divided into compartments and studied on a diurnal basis to identify magnitudes and possible zonation of photosynthesis, respiration, and transpiration rates. Results show that, in part, zonation is due to adaptations that take advantage of auxiliary energy sources thereby affecting respiration and transpiration rates.

Study Duration: August 1971-February 1972; Habitat: Mangrove; Type of Study: Quantitative; Abiotic Parameters Measured: CO<sub>2</sub>, water vapor; Dominant Taxon/Taxa Studied: *Rhizophora mangle*, *Avicennia nitida* (*germinans*), *Laguncularia racemosa*, *Conocarpus erecta*;

(25.00011)

Murray, P.J. 1976. The transplantation of the seagrass *Thalassia testudinum* and *Halodule wrightii* into a Marco Island canal system. Res. Prog. Rept. Marco App. Mar. Ecol. Sta. 9 p.

The success of transplanting *Thalassia testudinum* and *Halodule wrightii* in the berm and trough of a modified canal system was monitored. Sprigs were transplanted with only a rhizome fragment attached and not an active apex to determine whether or not the rhizome planted without the apex will grow. Long term results had not yet been evaluated.

Study Duration:1 day; Habitat:Grassbed, sand, silt; Type of Study:Qualitative; Biological Component:Benthic flora; Type of Sampler:1 sq.ft. quadrats; Number of Stations:6; Number of Replicates/Station:24; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO, pH, turbidity, light, color, nutrients; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Halodule wrightii*;

(25.00012)

Olexa, M.T. & T.E. Freeman 1977. Red mangrove: a plant pathological-environmental study. In: Proc. of the Fourth Annu. Conf. on the Restoration of Coast. Vegetation in Fla. p. 138-150.

A survey of the red mangrove, *Rhizophora mangle*, for foliar diseases was conducted along Florida's coastal and inshore marine areas between June 1974 and June 1975. Three species of pathogenic fungi (*Cercospora rhizophorae*, *Anthostomella rhizomorphae*, *Pestalotia disseminata*) were isolated from mangrove leaves. Evidence indicated that fungi promoted early leaf fall. Closer investigation of affected mangroves at five sites in the Ten Thousand Islands area revealed a significant correlation between incidence/severity of foliar disease and certain environmental parameters.

Study Duration:June 1974-June 1975; Habitat:Mangrove forest; Type of Study:Quantitative; Biological Component:Flora; Dominant Taxon/Taxa Studied:*Rhizophora mangle*, *Cercospora rhizophorae*, *Anthostomella rhizomorphae*;

(25.00013)

Richey, J.M. 1961. The sedimentary environments of the beach, swamp, and shoals of Cape Romano, Florida. Fla. State Univ. M.S. Thesis.

Trends in the distribution of sediment types near Cape Romano, Florida, were determined from 130 sediment samples collected during June 1960. The sediment types identified were quartz sand, carbonate shell material, and silt/clay. Relationships between local topography and sediment characteristics were described and 3 sources of sediment supply were identified.

Study Duration:June 1960; Habitat:Sand, silt; Type of Study:Quantitative; Type of Sampler:Petersen grab; Number of Stations:130; Abiotic Parameters Measured:Sediment grain size & composition;

(25.00014)

Rouse, W.L. 1970. Littoral crustacea from southwest Florida. Quart. J. Fla. Acad. Sci. 32(2):127-152.

An annotated checklist of decapods, stomatopods, and isopods is presented from studies of the Everglades marshes.

Type of Study:Quantitative; Biological Component:Fauna;

(25.00015)

Schole, D.W. 1963. Sedimentation in modern coastal swamps, southwestern Florida. Bull. Am. Assoc. Petr. Geo. 47(8):1581-1603.

Fundamental physical, chemical, mineralogical, and biological characteristics of the sediments in the coastal mangrove swamps of the study area were reported. Surface sediments of the Ten Thousand Islands area were mainly calcareous (shelly) or organic rich (peaty) calcareous quartz sands and silts. Deposits in White Water Bay were principally organic rich shell debris. Surface sediments of the two areas differed chiefly because the prominent source of detrital quartz and strong tidal currents which exist in the Ten Thousand Islands were essentially lacking in White Water Bay.

Study Duration:10 months Habitat:Sand, silt, gravel, grassbed; Type of Study:Qualitative; Type of Sampler:Piston coring device, grab; Number of Stations:48; Number of Replicates/Station:1; Abiotic Parameters Measured:Salinity;

(25.00016)

Seaman, W., C.A. Adams & S.C. Snedaker 1973. The role of mangrove ecosystems: biomass determinations in shallow estuaries -- technique evaluation and preliminary data. U.S. Dept. of Interior, Bur. of Sport Fish. & Wildl., So. Fla. Envir. Proj.: Ecol. Rept. No. EI-SFEP-74-41, 25 p.

A new type of portable drop net was developed and used to quantitatively harvest fishes from sample areas in shallow estuaries. The technique was shown to be suitable for sedentary benthic and vegetation inhabiting fishes, including eels, gobies, gerriads, syngnathids and juvenile pinfish, sciaenids, and flatfishes. The technique and preliminary results were evaluated and compared with reports in the literature describing techniques to estimate fish biomass.

Study Duration:1 year; Habitat:Grassbed, oyster bed, mud, algae; Type of Study:Technique; Biological Component:Fish; Type of Sampler:Portable drop net;

(25.00017)

Shier, D.E. 1969. Vermetid reefs and coastal development in the Ten Thousand Islands, Southwest Florida. Geol. Soc. Am. Bull. 80:485-508.

Sediments underlying the Ten Thousand Islands have been deposited over the past 5000 years during a marine transgression. Macrofauna and microfauna were used to interpret the depositional environment for these sediments. With the transgression of marine waters into the area about 3000 years ago, a chain of gastropod (*Vermetus nigricans*) reefs formed along the coastline. During a 6 ft increase in sea level, the reefs have grown larger and more numerous to form a barrier reef which has greatly influenced sedimentation throughout the Ten Thousand Islands. A system of bay bottom sands and silts, tidal pass sands, oyster bars, and mangrove peats has accumulated behind the reef barrier. Wave resistant reef cores, consisting of fused vermetid tubes, were built up as much as 9 ft thick during the period of sea level rise. The ecology of *V. (Thyleodus) nigricans* is discussed.

Habitat:Gastropod reefs; Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Core; Number of Stations:50; Abiotic Parameters Measured:Rainfall, air & water temp., wave energy, tidal range & currents, salinity; Dominant Taxon/Taxa Studied:*Vermetus (Thyleodus) nigricans*;

(25.00018)

Steller, D.L. 1976. Factors affecting the survival of transplanted *Thalassia testudinum*. Proc. of the Third Annu. Conf. on Restoration of Coast. Vegetation in Fla. p. 2-22.

Transplantation of *Thalassia testudinum* around Marco Island from July 1975 through January 1976 showed that minimum temperature and depth played the greatest role in determining percent survival. Transplant plots varied in temperature, depth, current conditions, and sediment types. The transplanting method was deemed unuseful on a large scale because it is too labor intensive and too destructive to the parent grassbeds.

Study Duration:July 1975-January 1976; Habitat:Sand, grassbed; Type of Study:Quantitative; Biological Component:Flora; Number of Stations:10; Abiotic Parameters Measured:Sediment characteristics, temp., depth, current conditions; Dominant Taxon/Taxa Studied:*Thalassia testudinum*;

(25.00019)

U.S. Army Engineer District, Jacksonville, Florida. 1979. Draft Environmental Impact Assessment, On: Permit application for Deltona Corp.'s residential development in wetlands near Marco Island, Florida.

The permit application described was a redesign by the Deltona Corporation in order to obtain alternate lots for property owners impacted by the denial of a previous application in 1976. Implementation of the proposal would result in the loss of a total of 4,029 acres of wetlands comprised of 1,392 acres of highly productive tidal mangroves and 2,637 acres of other mangroves and freshwater marshes. It was estimated that this would reduce local estuarine productivity by about 20%. A prime wading bird habitat would be lost, resulting in a possible decline in their nesting success in a large rookery nearby. The existing freshwater input into portions of the coastal waters may be reduced up to 30%. Alternatives to the proposed plan were suggested to confine the development to upland locations within the immediate vicinity and design changes to reduce the size of the wetlands' development.

Habitat:Mangroves and marsh; Type of Study:Qualitative; Biological Component:Flora and fauna;

(25.00020)

U.S. Dept. of Commerce 1982. Golden Gate/Faka Union Project: Progress Rept. Submitted to U.S. Army Corps of Engineers. 22 p.

A sampling program was designed to assess the effects of excessive freshwater discharge into Faka Union Bay on the spawning and growth of estuarine fishes and macrobenthos. Surface and bottom trawls were taken monthly from 16 stations each in Faka Union Bay, Chokoloskee Bay, and Goodland Bay to collect fishes and crustaceans. Twenty one total sites were sampled monthly with roller trawl in Pumpkin Bay, Faka Union Bay, and Fakahatchee Bay for epibenthic fauna. At the time of this progress report, the first two monthly samples had been collected and data was being analyzed.

Study Duration:July 1982-Present; Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Surface trawl, roller trawl, bottom sampler; Number of Stations:48 mid water, 21 benthic; Temporal Frequency:Monthly; Abiotic Parameters Measured:secchi depth, sediment size distribution, water temp., sal., DO, water transparency, depth, current velocity & direction;

(25.00021)

U.S. Environmental Protection Agency 1975. Field Studies: Parkshore and Clam Bay systems, Naples, Florida. U.S. EPA, Region IV, Surveillance and Analysis Div., Athens, GA.

No dissolved oxygen violations were experienced in either the Parkshore or Clam Bay systems in Naples, Florida during the

November 11-17, 1975 period. Nutrient concentrations in both estuarine systems represented reasonably pollution free levels. Hydrographic studies revealed that the Clam Bay system does not experience the norms of local tidal ranges. Maximum tidal ranges were 2.5 ft in Parkshore and 1.0 ft in Clam Bay. The Clam Bay system does not dewater to the local low water level. Sediment chemical composition revealed little difference between the Parkshore and Seagate systems. Concentrations were in the range of those found in similar canal systems investigated by the EPA.

Study Duration:1 week; Type of Study:Qualitative; Biological Component:Benthic macroinvertebrates, phytoplankton; Type of Sampler:Dip net, grab; Number of Stations:17; Abiotic Parameters Measured:Temperature, salinity, DO, water chemistry;

(25.00022)

U.S. Environmental Protection Agency 1975. An evaluation of physical, chemical and biological aspects of canals and associated waterways at Marco Island, Florida. U.S. EPA, Region IV, Surveillance and Analysis Div., Athens, GA.

Studies at Marco Island described the following detrimental factors of canal systems: poor circulation, dissolved oxygen depletion, and water quality standard violations. Ammonia nitrogen ( $\text{NH}_3$ ) concentrations were elevated indicating anaerobic conditions. The center troughs of canal systems acted as a trap, collecting excessive silt and organics. This build up affected the bottom dwelling biota and water quality. Canals in general were importing carbon in amounts dependent upon each canal's proximity to the major carbon source (mangroves). Macroinvertebrates exhibited a longitudinal decline in numbers and species from the mouth to the landward end of the canal.

Study Duration:1 year; Type of Study:Qualitative and quantitative; Biological Component:Benthic macroinvertebrates, aeroplankton, phytoplankton, ichthyoplankton; Type of Sampler:Ponar grab, dip net, sediment core; Sieve Size:0.6 mm; Number of Stations:9; Abiotic Parameters Measured:Temperature, salinity, DO, water chemistry; Dominant Taxon/Taxa Studied:*Corophium*, *Leptognathia*, *Levins*;

(25.00023)

U.S. Environmental Protection Agency 1977. Field Studies: Parkshore and Clam Bay Systems, Naples, Florida. U.S. EPA, Region IV, Surveillance and Analysis Div., Athens, GA.

An evaluation of hydrographic effects of the connection opened between Clam and Doctors Bays and the effects of over water structures at Parkshore Development on benthic communities in Doctors Bay was presented. No significant differences between sampling stations and habitat (shallow vs deep) for numbers of taxa were found. The finer sediment was determined to be the principal factor affecting community differences at the deep and shallow water stations. Phytoplankton chlorophyll 'a' ( $\text{mg}/\text{m}^3$ ) concentrations were higher in 1975 than in 1977 but were not significantly different. Chlorophyll 'a' concentrations in Doctors Bay, Clam Bay, and in the canal systems were all lower than the average concentration of 17  $\text{mg}/\text{m}^3$  in Gulf inshore waters.

Study Duration:1 week; Type of Study:Qualitative; Biological Component:Benthic invertebrates, phytoplankton; Type of Sampler:Core, 30 mesh nylon bags; Number of Stations:2; Abiotic Parameters Measured:Temperature, salinity, DO, water chemistry;

(25.00024)

Weinstein, M.P., C.M. Courtney & J.C. Kinch 1977. The Marco Island estuary: a summary of physicochemical and biological parameters. Fla. Scientist 40(2):97-124.

Physicochemical and biological parameters of the Marco Island estuary were summarized in this report. Maximum diversity for epibenthic invertebrates and fishes was associated with predominantly coarser substrates. Several species of invertebrates and fishes exhibited distinct seasonality, becoming scarce during the cooler months. Considerable differences in the infaunal communities were found to occur between artificial waterways and natural mangrove tidal creeks and open bays. Less pronounced differences were apparent in the canal fish community which most closely resembles that of the unvegetated open bay area.

Study Duration:4 years; Habitat:Mud, sand, grassbed; Type of Study:Quantitative; Biological Component:Macroinvertebrates and fish; Type of Sampler:Otter trawl, plug; Sieve Size:0.7 mm; Number of Stations:11 and 46; Number of Replicates/Station:7 and 1; Temporal Frequency:Monthly; Abiotic Parameters Measured: Precipitation, temperature, salinity, DO, pH, turbidity, nutrients, chlorophyll 'a'; Dominant Taxon/Taxa Studied:*Penaeus duorarum*, *Periclimenes longicaudatus*, *Periclimenes americanus*, *Lagodon rhomboides*, *Orthopristus chrysoptera*;

(25.00025)

Yokel, B.J. 1975. Rookery Bay land use studies and environmental planning strategies for the development of a mangrove shoreline Study No. 5, Estuarine Biology. Conserv. Found. Off. Water Res. Tech. PB-250-121:112 p.

A quantitative assessment and description of the kinds and numbers of benthic animals that inhabited benthic environments in the Rookery Bay Sanctuary was presented. The relative abundance and distribution of the fish, crustaceans, and molluscs in the major benthic environments were described for use in assessing ecological change in these areas.

Study Duration:2 years; Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Flora and fauna; Type of

Sampler:Otter trawl; Number of Stations:4; Number of Replicates/Station:7; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO, currents; Dominant Taxon/Taxa Studied:*Halodule wrightii*, *Thalassia testudinum*, *Halophila engelmanni*;

(25.00026)

Yokel, B.J. 1975. A comparison of animal abundance and distribution in similar habitats in Rookery Bay, Marco Island and Fakahatchee on the southwest coast of Florida. Preliminary Rept. to the Deltona Corp. (not for general distribution).

The three study area located in Rookery Bay Sanctuary, near Marco Island and in Fakahatchee Bay produced 1,006,640 individual animals of which 55% came from the Marco Island area. When only the major classes of animals in the catch were considered (i.e., crustaceans, fish, and molluscs) the total counts for Fakahatchee and Marco were quite comparable but both exceeded Rookery Bay by a considerable margin. It was thus hypothesized from a consideration of gross catches and physical and geographic factors that Fakahatchee Bay and Marco have more in common than any combination involving Rookery Bay. Total catches by habitat types for crustaceans, fish and molluscs and certain of the more abundant species demonstrated clearly the overwhelming importance of the vegetated bottom as a habitat for animals. Fifty four percent of the total catch of animals were collected in the vegetated habitats. The mud habitat was next with 28% and the sand-silt habitat was third with 18%. By habitat, the vegetated areas had the most "indicator species", mud next, and sand-shell third. From the data it was concluded that using selected groups of species that have shown consistent catch rates between the study areas would allow detection and estimation of environmental change.

Study Duration:1 year; Habitat:Sand, mud, shell, grassbed; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Otter trawl; Number of Stations:10; Number of Replicates/Station:7; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO;

(25.00027)

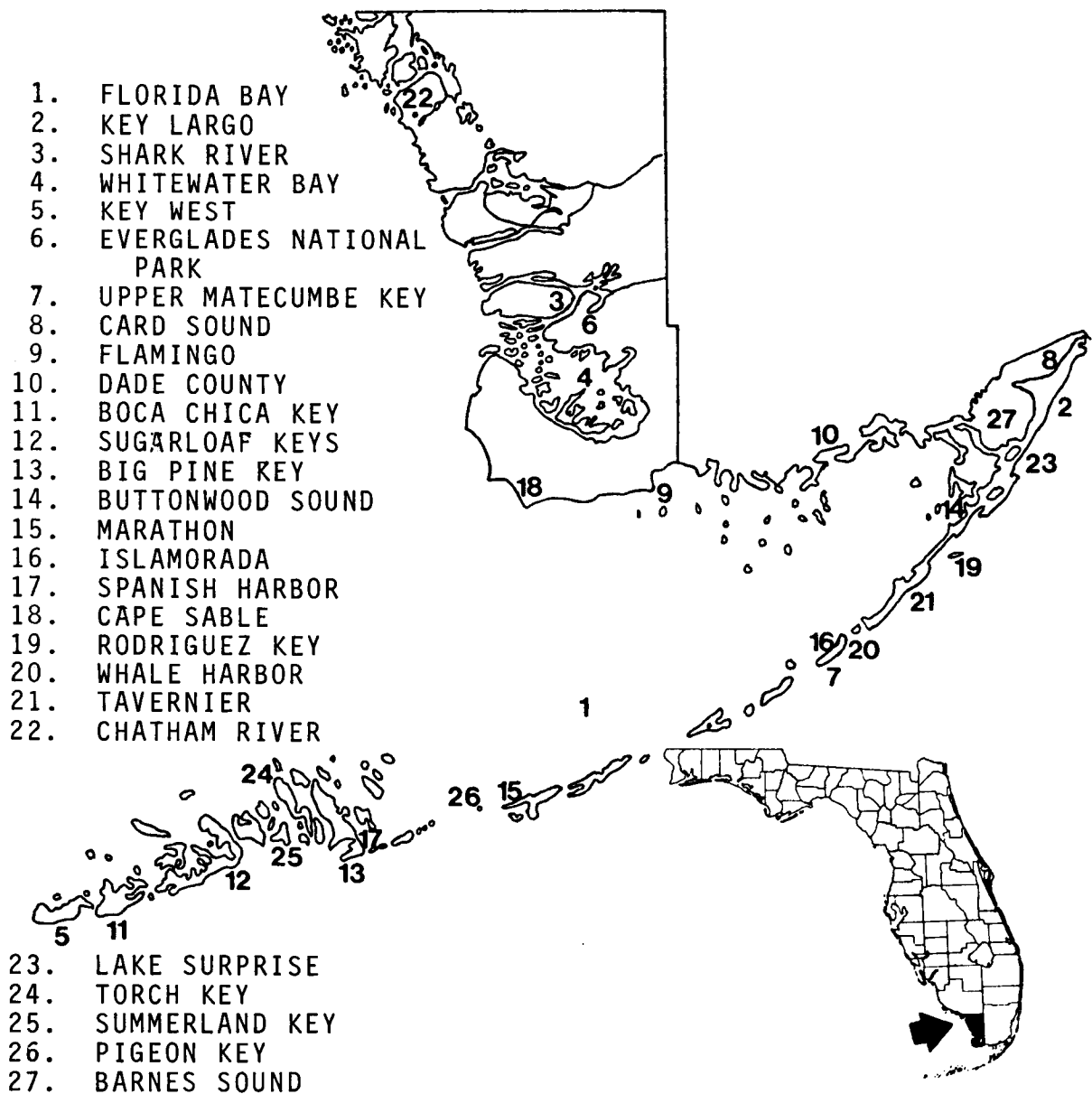
Yokel, B.J. 1979. Appendix E - Biology. In: The Naples Bay Study. Collier County Conservancy Report.

An examination of the physical and chemical conditions in Naples Bay and its associated waterways was made to determine their effect on water quality and biological conditions in this system. Remedies for poor water quality and impoverished biological conditions in existing developed areas were sought. Four measures of community structure were used to measure and compare the areas. These indices included: 1) the total catch or density of benthic animals; 2) the Shannon-Weaver diversity index; 3) recurrent groups of animals from various habitats in the bay; and 4) the total number of species. 96,693 animals belonging to 383 taxa in 15 phyla or classes were collected. Seasonal influence was observed on the total numbers of animals. Peaks in the total catch were observed in July and November. The high catches in July represent a population that was tolerant of low and fluctuating salinities produced by the summer rain and freshwater input. The November catches were highest for the year and came after the wet season where salinity and DO stresses were minimal. A total of 374 samples containing 71,110 small fish belonging to 61 species were studied. The bay anchovy and the yellow fin menhaden were dominant and accounted for 88% of the total fish catch. The plankton study was of 374 samples containing 76,978 fish in 71 species. In Naples Bay, the seasonal abundance pattern for these larval fish was typical of the plankton community that exhibits peaks in spring and fall. The 5 major habitats or areas of study were discussed separately.

Study Duration:1 year; Type of Study:Quantitative; Biological Component:Benthic macrofauna, fish; Type of Sampler:Ekman grab, ponar grab, nylon trawl; Sieve Size:0.6 mm; Number of Stations:38 (grab), 2 (trawl); Number of Replicates/Station:7 (grab), 2 (trawl); Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO, conductivity, sediment analysis; Dominant Taxon/Taxa Studied:*Crassostrea virginica*, *Tellina versicolor*, *Branchiostoma caribaeum*, *Macoma tenta*, *Nolgula sp.*, *Abra aequalis*, *Parvilucina multilineata*, plus other taxa;

For publications on the Everglades see section 4, Southern Florida.  
See also: 3.00142, 4.00039, 12.00079, 13.00025, 27.00111.

# MONROE COUNTY



(26.00001)

Allen, D.M., J.H. Hudson & T.J. Costello 1980. Postlarval shrimp (*Penaeus*) in the Florida Keys: species, size, and seasonal abundance. *Bull. Mar. Sci.* 30(1):21-33.

Postlarval shrimp (*Penaeus duorarum*) were collected monthly from January 1966 to August 1968 at Whale Harbor Channel, Florida Keys. Postlarvae abundance was greatest between April and September, but occurred year round. Maximum postlarval abundance apparently was related to the seasonal increase in water temperature on offshore spawning grounds, and to the annual sea level rise in Florida Bay. The area of origin of postlarvae at Whale Harbor Channel and the location of their subsequent recruitment were identified.

Study Duration: January 1966-August 1968; Type of Study: Quantitative; Biological Component: Crustacea fauna; Type of Sampler: Plankton net; Temporal Frequency: Monthly; Abiotic Parameters Measured: Wind & current direction & velocity, salinity, temperature; Dominant Taxon/Taxa Studied: *Penaeus duorarum*;

(26.00002)

Almasi, M.N. 1978. Ecology and color variation of benthic foraminifera in Barnes Sound, Northeast Florida Bay. Univ. of Miami M.S. Thesis. 144 p.

Sediment and hydrological samples were taken from 30 stations in Barnes Sound, Northeast Florida Bay to study the taxonomy and distribution of benthic foraminifera and the causes of test color differences. Forty two species of foraminifera were represented in the sediment samples. The existence of a reducing condition in portions of Barnes Sound in the presence of sulphate reducing bacteria influences test color, and the color variation reflects the depositional history of the sediment. Therefore, the condition of the foraminiferal tests can be used to determine the rate of sediment reworking and the depositional environment.

Type of Study: Quantitative; Biological Component: Fauna; Number of Stations: 30;

(26.00003)

Antonius, A. 1975. Health problems of the Florida coral reefs. *Fla. Scientist* 38(1):21.

Investigations into the health condition of the coral reefs inside Pennekamp State Park and Hen and Chickens Reef were described in the study. To validate results, data from the barrier reef in British Honduras were used for comparison. A method has been developed which used the percentages of live versus dead coral surface area to quantitatively describe the reef's health. The main state park reefs appear to be only insignificantly inferior in health to the barrier reef; dead corals in both cases remain below 10 percent. The Hen and Chickens Reef was found to be devastated to over 80%. Other reefs outside the state park, not yet surveyed quantitatively, are believed to show various degrees of deterioration.

Study Duration: 1973-1974; Habitat: Coral reef; Biological Component: Coral;

(26.00004)

Bach, C., B. Hazlett & D. Rittschof 1976. Effects of interspecific competition on fitness of the hermit crab *Clibanarius tricolor*. *Ecology* 57(3):579-586.

The effects of interspecific competition on the fitness of *Clibanarius tricolor* was studied. *C. tricolor* was found to overlap strongly in shell utilization with other common species of intertidal hermit crabs found in the Florida Keys. Laboratory observations indicated that *C. tricolor* can dominate *C. antillensis* in shell fights, while *Calcinus tibicen* can dominate *C. tricolor*. In micro areas of sympatry with *C. antillensis*, *C. tricolor*'s shell fit was found to be better. Egg production of *C. tricolor* was the same in areas with or without *C. antillensis*. Sympatry with *Calcinus tibicen* resulted in a poorer shell fit, a smaller mean size of crab, and a disruption of the relationship between clutch size and crab size. The study suggests that the ecological separation which characterizes these species over most of their ranges was an evolutionary response, in part, to the effects of interspecific shell competition.

Study Duration: March 1973; Habitat: Intertidal; Type of Study: Qualitative; Biological Component: Hermit crabs; Number of Stations: 4, 25 m x 1 m quadrats; Dominant Taxon/Taxa Studied: *Clibanarius tricolor*, *Clibanarius antillensis*, *Calcinus tibicen*;

(26.00005)

Basan, P.B. 1973. Aspects of sedimentation and development of a carbonate bank in the Barracuda Keys, South Florida. *J. Sediment. Petrol.* 43(1):42-53.

Factors influencing the accumulation of carbonate sediments into a bank were studied. of factors influencing growth and present configuration. The development of this bank was summarized as follows: preferential accumulation of fine sediment in sink holes, forming coalescing silty banks; contemporaneous colonization of these banks by calcareous algae and marine grasses; entrapment and accumulation of coarse sediment by these marine plants forming a single contiguous sand bank; and continued growth by accretion of sediment over avalanche slopes. It was determined that the bank is probably extending itself into the adjoining lagoon by a process of differential growth. This process is dependent upon



stabilization of one part of the bank, while growth continues in another.

Study Duration:1968-1972; Habitat:Sand-silt, grassbed; Type of Study:Qualitative; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Syringodium filiforme*, *Holothuroidea floridana*, *Halimeda opuntia*, *Penicillia capitatis*, *Udotea sp.*

(26.00006)

Bauer, J.C. 1970. Contributions to the biology of the sea urchin *Diadema antillarum*. Univ. of Miami M.S. Thesis. 62 p.

*Diadema antillarum* was studied in 3 habitats off Southern Florida between March 1968 and February 1969. Test growth rates were investigated. Comparative studies showed that tropical species grew fastest, with the exception of heart urchins. Aggregation increased during the spawning period and was influenced by tidal fluctuations. Gametogenesis and spawning were associated with dropping temperatures. A synchronized spawning pattern from Key West to Bermuda is suggested.

Study Duration:March 1968-February 1969; Habitat:Coral reef, grassbed, sabellarid reef; Type of Study:Quantitative; Biological Component:Faua; Number of Stations:3; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, tidal fluctuation, light; Dominant Taxon/Taxa Studied:*Diadema antillarum*;

(26.00007)

Bauer, J.C. 1976. Growth, aggregation and maturation in the echinoid, *Diadema antillarum*. Bull. Mar. Sci. 26(2):273-277.

A study of growth, aggregation, and reproduction of *Diadema antillarum* was conducted at 3 sites, representing 3 habitats located at Boca Raton, Indian Key, and Key West, Florida. The growth rate of young *D. antillarum* at Boca Raton was found to be 5 times greater than that of adults over the same 6 month period in 1968. Gametogenesis at Indian Key was initiated in the fall of 1968 with decreasing water temperature. Major spawning occurred during a period of low temperature in November 1968 at both Indian Key and Key West. Spawning time was correlated with lunar phases. Aggregation of *D. antillarum* was influenced by reproductive state and tidal fluctuation.

Study Duration:April 1968-July 1969; Habitat:Coral reef, grassbed, sabellarid reef; Type of Study:Quantitative; Biological Component:Echinodermata; Number of Stations:3; Dominant Taxon/Taxa Studied:*Diadema antillarum*;

(26.00008)

Beardsley, G.L., T.J. Costello, G.E. Davis, A.C. Jones & D.C. Simmons 1975. The Florida spiny lobster fishery: a white paper. Fla. Sci. 38(3):144-149.

Management practices were suggested for the Florida spiny lobster fishery to combat declining catch rates, resulting from increasing fishing pressure by commercial and recreational fishermen. A two phase management program was proposed: 1) allocate the resource effectively between commercial and recreational components, institute uniform interstate regulations to protect the resource, and increase the collection of fishery statistics for both commercial and recreational harvests; and 2) establish a management scheme based on additional research to obtain the optimum sustainable yield.

Type of Study:Review; Biological Component:Crustacea fauna; Dominant Taxon/Taxa Studied: *Paralurus argus*;

(26.00009)

Bock, W.D. 1967. A comparison of the monthly variation in foraminiferal biofacies on *Thalassia* and sediment, Big Pine Key area, Florida. Univ. of Miami Ph.D. Dissertation. 291 p.

Eighty one species of benthic foraminifera were found between Big Pine Key and Torch Keys in the lower Florida Keys. Foraminiferal distribution was related to substrate type, which was apparently determined by the distribution of *Thalassia testudinum*. Nine species dominated the grass beds and 11 species were dominant in or on the sediment. Species preferences for sediment type or grass are cited. Population variations appeared to be temperature related in 10 species. No correlations between population changes and temperature or salinity were discovered for the other species. Foraminiferal abundance and distribution were also regulated by interspecific and intraspecific competition.

Habitat:Mud, sand, seagrass bed; Type of Study:Quantitative; Biological Component:Foraminifera and flora; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, sediment grain size; Dominant Taxon/Taxa Studied:*Rosalina floridana*, *Archaias angulatus*, *Sorites marginalis*, *Thalassia testudinum*;

(26.00010)

Bock, W.D. 1968. Two new species of foraminifera from the Florida Keys. Contrib. Cushman Found. Foraminiferal Res. XIX(1):27-29.

One new species belonging to a new genus, *Hemidiscalia palabunda*, and one new species, *Fissurina*, *F. pellucida* are described. Both species were from waters adjacent to Big Pine Key, Florida and both were found living on a substrate

of *Thalassia testudinum* Konig.

Study Duration: June 1964 - May 1965; Habitat: Grassbeds; Type of Study: Qualitative; Biological Component: Foraminiferal fauna; Dominant Taxon/Taxa Studied: *Wenidiscelia palabuada*, *Fissurina pellucida*;

(26.00011)

Booker, F., B. Flynn, A. Thorhaug & P. Shroeder 1983. Red mangrove, *Rhizophora mangle*, restoration at Key Largo: results after seventeen months. Fla. Sci. 46(Suppl. 1):16.

Growth and survival of red mangrove, *Rhizophora mangle*, propagules and seedlings planted on Key Largo, Florida, in July 1981 were measured over an area of approximately 27,712 m<sup>2</sup> in January 1983. The restored mangroves, planted in mitigation for water pipeline construction in the Florida Keys exhibited a survival rate ranging from 52-64%. Mean tree height was 43.3 +/- 9.8 cm, mean number of primary branches was 2.4 +/- 5.5, and mean number of leaf pairs was 10.4 +/- 14.2 (mean +/- std. dev.).

Study Duration: July 1981-January 1983; Habitat: Mangrove swamp; Type of Study: Quantitative; Biological Component: Mangrove; Dominant Taxon/Taxa Studied: *Rhizophora mangle*;

(26.00012)

Buck, P.A. 1983. Colonization and succession on artificial substrates in two canals on Key Largo. Presented at Benthic Ecol. Meet., Fla. Instit. of Tech., Melbourne.

The community structure and colonization of 2 artificial substrates (concrete blocks and mangrove peat blocks) placed in 2 canal systems (one cut from limestone rock and the other from mangrove peat) on Key Largo, Florida were investigated for one year. The blocks were dominated by algae (primarily Chlorophyta and Rhodophyta) and polychaetes. Comparisons between blocks and sites were made for species richness, abundance, and biomass. Communities on the artificial substrates most closely resembled those on the natural substrate that each was intended to imitate. It was concluded that the community structure of a developing biological assemblage was regulated by the substrate type and composition of the surrounding community.

Study Duration: 1 year; Habitat: Mangrove peat, concrete blocks; Type of Study: Quantitative; Biological Component: Fauna, flora; Number of Stations: 2; Dominant Taxon/Taxa Studied: *Acetabularia crenulata*, *Halimeda incrassata*, *Batophora oersted*, *Penicillus* sp.;

(26.00013)

Carter, P.W. & R.M. Mitterer 1978. Amino acid composition of organic matter associated with carbonate and noncarbonate sediments. Geochim. Cosmochim. Acta 42:1231-1238.

Humic substances from carbonate and noncarbonate sediments are composed of 15-36% amino acids by weight. Carbonate sediments possess humic substances consisting primarily of aspartic and glutamic acid; noncarbonate sediment associated humic acids consist mainly of glycine and alanine. Analyses of amino acids from various molecular weight fractions of humic and fulvic acids are discussed. Aspartic acid enriched organic matter appears to be selectively adsorbed by carbonate surfaces but not by noncarbonates.

Habitat: Sand; Type of Study: Quantitative;

(26.00014)

Chace, F.A., Jr. 1969. A new genus and five new species of shrimps (Decapoda, Palaemonidae, Pontonuae) from the western Atlantic. Crustaceana, 16(Pt. 3):251-272.

Descriptions and measurements of a new genus and 5 new shrimp species found off Florida coasts were presented. The newly described species were *Periclinenes crinoidalis*, *Periclinenes meyeri*, *Periclinenes paivai*, *Tuleariocaris neglecta*, and *Lipkebe holthuijsi*. *Lipkebe* was the newly described genus.

Habitat: Sand, gravel; Type of Study: Qualitative; Biological Component: Decapod fauna;

(26.00015)

Chan, E.I. 1977. Oil pollution and tropical littoral communities: biological effects of the 1975 Florida Keys oil spill. Am. Petro. Inst. Publ. #4284:539-542.

An assessment was made of the biological effects of the 1975 Florida Keys oil spill. Floating seagrass was found to serve as a natural sorbent for oil. The seagrass became stranded in the intertidal zone. A soluble component of oil or possibly an organic cleaning solvent leaching from this debris was determined to be the probable cause of a mass mortality of subtidal echinoderms on the rocky platform. Several crab species were eliminated from the rocky shores, mangrove fringes and *Batis* marsh communities for several months. Subtidal pearl oysters suffered extensive mortalities. Death was the result for more than 50% oiling of red mangrove seedling leaves and dwarf black mangrove pneumatophores. Elevated temperatures, exceeding the lethal units for many intertidal organisms were observed in oil covered substrates. Oil persisted in the substrate of rocky shores and mangrove marsh areas for at least one year after

the spill.

Study Duration:1 year; Habitat:Variable, 6(habitats); Type of Study:Semi quantitative; Biological Component:Flora and fauna; Dominant Taxon/Taxa Studied:*Rhizophora mangle*, *Avicennia nitida*(*germinans*), *Pinctada radiata*;

(26.00016)

Chesher, R.H. 1969. Contributions to the biology of *Neoma ventricosa* (Echinoidea: Spatangoida). Bull. Mar. Sci. 19(1):72-110.

A 2 year study of the biology of the echinoid, *Neoma ventricosa* was conducted in Florida (Ft. Lauderdale to Key West), the Bahama Islands, Panama and Columbia. The habitat, behavior, food and feeding, growth, reproduction, predators, parasites, commensals, abnormalities, internal anatomy and substrate relations of *N. ventricosa* were examined.

Study Duration:2 years; Habitat:Coral reefs, seagrass beds, sand; Type of Study:Qualitative; Biological Component:Echinodermata; Dominant Taxon/Taxa Studied:*Neoma ventricosa*;

(26.00017)

Chesher, R.H. (Marine Res. Found., Inc., Key West, Fla.) 1973. Environmental analysis, canals and quarries -- lower Florida Keys. For Charley Toppino & Sons, Inc., Rockland Key, FL 162 p.

Water quality and biological community studies were conducted in man made canals and rock quarries in the lower Florida Keys. Fifteen year old dead-end and open-end canals at Summerland Key Cove were found to have excellent water quality and a diverse and abundant marine flora and fauna. The canal system had been utilized by residents for swimming, fishing, and boating. Four year old, 40 ft deep, rock quarries at Rockland Key, bordering shallow grass flats on the Gulf side exhibited a variety of marine fauna including jack, snapper, grunt, angelfish, barracuda, jewfish, Florida lobster, and stone crabs. It was concluded that, in addition to providing the public with substantially valuable construction fill, the rock quarries were a biological improvement to the area, and that damage (siltation) to the marine surroundings from 8 years of calcite mining was not evident.

Study Duration:March 1972 - March 1973; Habitat:Grassbeds, rock; Type of Study:Qualitative; Biological Component:Flora and fauna; Type of Sampler:Aerial photography observations; Number of Stations:9; Abiotic Parameters Measured:Salinity, pH, turbidity, DO, nutrients;

(26.00018)

Continental Shelf Associates, Inc. 1982. Final Report on Seagrass Revegetation Studies in Monroe County.

A two year study of experimental seagrass revegetation was conducted to examine the feasibility of transplanting seagrass beds damaged or destroyed during construction of 37 bridges in the Florida Keys. Twenty plots of seagrasses consisting of *Thalassia testudinum*, *Halodule wrightii*, and *Syringodium filiforme* were transplanted and monitored along with various physical and chemical parameters. Plugs of one or more of the three species were found to successfully establish seagrass beds.

Study Duration:2 years; Habitat:Grassbed; Biological Component:Seagrasses; Number of Stations:20; Abiotic Parameters Measured:Various physical & chemical parameters; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Halodule wrightii*, *Syringodium filiforme*;

(26.00019)

Davis, W.P. 1966. Observations on the biology of the ophiuroid *Astrophyton auricatum*. Bull. Mar. Sci. 16(3):435-444.

The behavior of the basketstar, *Astrophyton auricatum* was investigated during dives at reefs in the Florida Keys. Some laboratory observations were undertaken to facilitate more detailed study. Habitat, morphology, and feeding behavior are discussed, with emphasis on nocturnal activity. Associated reef organisms and their related behavior are also documented.

Habitat:Coral reef; Type of Study:Qualitative; Biological Component:Faua; Dominant Taxon/Taxa Studied:*Astrophyton auricatum*;

(26.00020)

DeFelice, D. & G. Lynts 1979. Biotic and abiotic parameters affecting diversity in modern and ancient benthic diatom assemblages of Florida. Fla. Sci. 42(Suppl.):44.

A study of benthic diatom communities in Florida Bay showed that diatom diversity is determined by various biotic and abiotic parameters, including substrate, light quality, sediment particle size, and distance from land. In Florida Bay diatoms are common in surface sediment, but absent immediately below the surface horizon; sponge spicules are the only siliceous biogenic component in the sediment. Due to the undersaturation of siliceous material in the water column and at the water sediment interface in Florida Bay, diatoms are believed to dissolve soon after death, allowing rapid recycling and re-utilization of silica.

Type of Study:Quantitative; Biological Component:Diatom; Type of Sampler:Corer; Abiotic Parameters Measured:Substrate type, light, sediment particle size;

(26.00021)

DeFelice, D.R. 1975. Model studies of epiphytic and epipellic diatoms of upper Florida Bay and associated sounds. Duke Univ. M.S. Thesis. 193 p.

The diatom flora of northeastern Florida Bay and adjoining sounds was modeled using factor-vector analysis and species diversity indices. Four distinct floras were identified, two of which were epipellic floras inhabiting the carbonate mud substratum. Of the 162 species identified from 30 stations, 34 were restricted to the epiphytic habitat and 18 species were limited to the epipellic habitat. The epipellic flora was significantly more diverse than the epiphytic flora. Diversity of floras from both habitats increased away from land areas. Factors affecting the distribution of both types of flora are hypothesized.

Study Duration:May 1974; Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Flora; Type of Sampler:Bottom grab; Number of Stations:30; Number of Replicates/Station:3; Abiotic Parameters Measured:Sediment grain size; Dominant Taxon/Taxa Studied:*Cocconeis placentula*, *Nastogloia crucicula*, *N. ovata*, *Nitzschia closterium*, *Cyclotella striata*, *Rhopalodia gibberula*, *Nitzschia panduriformis*, *Amphora acutiuscula*, *A. coffaeiformis*, *Fragilaria crotonensis*;

(26.00022)

DeFelice, D.R. & G.W. Lynts 1978. Benthic marine diatom associations: upper Florida Bay (Florida) and associated sounds. J. Phycol. 14:25-33.

Studies were conducted on the tropical marine diatom flora of Florida Bay. Models of the diatom associations found in upper Florida Bay and adjoining sounds were constructed, and 4 distinct associations were defined. Two associations were epiphytic, occurring on *Thalassia testudinum* and two were epipellic, occurring on carbonate mud substratum. The majority of the 161 species identified were present in both the epiphytic and epipellic assemblages. The epipellic assemblage was found to be significantly more diverse than was the epiphytic assemblage. A general trend of increased diversity away from terrestrial environs, toward more open areas of waters in both the epipelion and epiphyton was noted.

Study Duration:May 1974; Habitat:Grassbed, mud; Type of Study:Qualitative; Biological Component:Benthic diatoms; Sieve Size:0.062 mm; Number of Stations:30; Number of Replicates/Station:3; Temporal Frequency:Once; Abiotic Parameters Measured:Sediment characteristics; Dominant Taxon/Taxa Studied:*Fragilaria crotonensis*, *Cocconeis placentula*, *Cyclotella striata*, *Rhopalodia gibberula*, *Surirella fastuosa*, *Cylindrotheca closterium*;

(26.00023)

DeFelice, D.R. & G.W. Lynts 1980. Epiphytic diatoms as *r*-selectors in Florida Bay, Florida. Fla. Sci. 43 (Suppl.):23.

The benthic diatom *Cocconeis placentula*, an epiphyte on *Thalassia testudinum* grass blades in Florida Bay, was found to have the characteristic life history patterns of the theoretical '*r*-selected' endpoint species. Individuals of the species are small, live in an unpredictable environment, and have high productivity and low equitability. The ephemeral nature of the seagrass bed requires periodic recolonization. Maximum energy in *C. placentula* is delegated for reproduction with the production of many small offspring, such that population increase is controlled solely by the maximum intrinsic rate of natural increase (*r* max).

Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Diatom; Dominant Taxon/Taxa Studied:*Cocconeis placentula*;

(26.00024)

Bobkin, S. 1960. The early life history of the pink shrimp *Penaeus duorarum* Burkenroad from Florida waters. Univ. of Miami M.S. Thesis. 120 p.

Between January and December 1959 plankton samples were taken from Florida Bay and Dry Tortugas areas in order to study the larvae of penaeid shrimp. The first six larval stages were studied in the laboratory where eggs were hatched. Remaining stages were examined from the field samples. Stages described are: egg, five naupliar, three protozoal, three mysis, and two postlarval. Comparison of *Penaeus duorarum* and *P. setiferus* larvae revealed several morphological differences. Also discussed are the commercial importance of shrimp and aspects of penaeid life history.

Study Duration:January-December 1959; Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Plankton net (discovery type); Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(26.00025)

Dustan, P. 1977. Vitality of reef coral populations off Key Largo, Florida: recruitment and mortality. Environ. Geol. 2:51-58.

A study was conducted to gather data to provide information for a predictive statement about the future of reefs in the

Keys area of southern Florida. Physical damage, algal destruction, animal predation, sediment damage, and disease were found to be the 5 major causes of coral mortality. Sediment damage occurs when particles are large and the sedimentation rate is high, and the coral cannot cleanse itself. Furthermore, algae and bacteria that become established on corals can expand over the colony, smothering it. Other examples of destruction were given and aspects of population growth and colonization were discussed.

Habitat: Reef coral; Type of Study: Quantitative; Biological Component: Fauna, coral;

(26.00026)

Earley, C.F. 1967. The sediments of Card Sound, Florida. Fla. State Univ. M.S. Thesis.

The distribution of textural and compositional characteristics of sediment samples from Card Sound, Florida was determined from collections made during the spring and summer of 1966. Comparisons of the sediments from the sound with those of the adjacent shelf revealed considerable differences in sediment composition and grain size. Trends in the distribution of grain size, sorting, and composition are cited for sediments from both the sound and shelf.

Study Duration: Spring and summer 1966; Habitat: Sand, mud; Type of Study: Qualitative; Type of Sampler: Dredge; Abiotic Parameters Measured: Sediment grain size & composition;

(26.00027)

Engstrom, M. 1980. Reproductive cycles of *Holothuria (Halodeima) floridana*, *H. (H.) mexicana* and their hybrids (Echinodermata: Holothuroidea) in southern Florida, USA. Int. J. Invert. Reprod. 2:237-244.

A reproductive study of the holothuroids, *Holothuria (Halodeima) floridana* and *H. (H.) mexicana* was conducted using monthly collections from the Atlantic side of Key Largo, Florida, from November 1968 to October 1969. Gametogenesis in the 2 species and their hybrids was found to occur during spring and summer with spawning occurring in late summer, followed by resorption of unspawned gametes. The simultaneity of the spawning seasons of the 2 species contributed to the occurrence of hybridization.

Study Duration: 2 Nov. 1968-23 Oct. 1969; Type of Study: Quantitative; Biological Component: Echinoderm, fauna; Number of Stations: 1; Temporal Frequency: Monthly; Dominant Taxon/Taxa Studied: *Holothuria (Halodeima) floridana*, *H. (H.) mexicana*;

(26.00028)

Engstrom, M.A. 1970. The reproductive cycles, systematic status, and general biology of *Holothuria (Halodeima) floridana* Pourtales, 1851 and *H. (H.) mexicana* Ludwig, 1875. Univ. of Miami M.S. Thesis. 92 p.

Various aspects of the reproduction system and general biology of *Holothuria (Halodeima) floridana* were studied in specimens obtained from the Key Largo area. Lengths and widths of animals and wet weights and dry weights were measured. Gametogenesis studies showed highest activities in spring and summer with spawning occurring in the fall. Growth rates are slow and sexual maturation takes at least 2 years. The possibility of hybridization occurring between *H. (H.) floridana* and *H. (H.) mexicana* is discussed.

Study Duration: 1 year; Type of Study: Quantitative; Biological Component: Fauna; Temporal Frequency: Monthly; Dominant Taxon/Taxa Studied: *Holothuria (Halodeima) floridana*, *H. (H.) mexicana*;

(26.00029)

Fleece, J.B. 1962. The carbonate geochemistry and sedimentology of the keys of Florida Bay, Florida. Fla. State Univ. M.S. Thesis.

Sediment cores from 5 keys and their associated shoals in Florida Bay, Florida were analyzed for texture and mineralogy. The depositional history of each site is described and comparisons are drawn between the sediment characteristics of the keys and their shoals.

Study Duration: Summer 1960; Habitat: Mud, sand; Type of Study: Qualitative; Type of Sampler: Corer; Number of Stations: 5; Abiotic Parameters Measured: Sediment grain size & composition;

(26.00030)

Fosshagen, A. 1973. A new genus of species of bottom living calanoid (Copepoda) from Florida and Colombia. Sarsia 52:145-154.

The description of a new species, *Epacteriscus rapax*, was presented. This species was considered to belong to a family of its own which shows some similarities with the Arietellidae and Ridgewayiidae. The mouth parts were reduced and specialized. The mandibular blade was unique among calanoids in having a strong coarsely serrated process which is directed ventrally and is probably used for catching or holding prey. The legs were generally unspecialized with no reduction in segmentation except for the fifth legs of the male.

Habitat: Calcareous mud, coral; Type of Study: Qualitative; Biological Component: Calanoid copepods; Type of

Sampler:Ockelmann detritus sled; Sieve Size:0.14 mm; Dominant Taxon/Taxa Studied:*Epacteriscus rapax*;

(26.00031)

Ginsburg, R.M. 1953. Intertidal erosion on the Florida Keys. Bull. Mar. Sci. Gulf Caribb. 3(1):55-69.

Examples of erosion of intertidal calcareous rock in the Florida Keys were described. Physiochemical dissolution of calcium carbonate was only responsible for localized intertidal erosion. Large scale honeycombing of calcareous rock was due primarily to boring and burrowing activities of benthic organisms. A partial list of boring and burrowing organisms, including a family of boring sponges (Clionidae), 3 sipunculans, a barnacle, 2 bivalves, and an echinoid, was given, and their specific effects on erosion were cited.

Habitat:Calcareous rock; Type of Study:Qualitative; Biological Component:Fauna; Dominant Taxon/Taxa Studied:*Arca barbata*, *Mytilus (Brachidontes) exustus*, *Lithotrya dorsalis*, *Echinometra lucunter*, *Acanthopleura granulata*;

(26.00032)

Ginsburg, R.M. 1956. Environmental relationships of grain size and constituent particles in some south Florida carbonate sediments. Bull. Am. Assoc. Petrol. Geol. 40(10):2384-2427.

An analysis was conducted of sediments taken from two areas around the Florida Bay area in an attempt to show that the distribution of sediment producing organisms can be found using grain size and constituents of the calcareous sediments deposited. In one area the physical environment varied so greatly that no distinct distribution of organism could be ascertained. However, in a reef area changes in the environments were gradual, thereby allowing flora and fauna changes to appear in the sediment analysis. The thin sectioning approach used here can also be used to analyze ancient limestones in similar types of studies.

Type of Study:Qualitative; Abiotic Parameters Measured:Sediment characteristics;

(26.00033)

Ginsburg, R.M. (ed.) 1972. South Florida carbonate sediments. Sedimenta II. Comparative Sedimentology Laboratory, Univ. of Miami, Fisher Island Station, Miami Beach, Fla. 72 p.

This publication serves as a field trip guidebook to the Recent carbonate sediments of Florida Bay and Florida Reef Tract. The sedimentation and water circulation patterns, sediment composition, and molluscan fauna of Florida Bay are described. The corals and coralline algae of the reef tract are identified and their ecology and roles in sedimentation are summarized. Rodriguez Bank is used as an illustration of zonation of sediment producing plants and animals. Also covered in the guidebook are spur and groove formation in the reef tract, Pleistocene limestones of the Florida Keys, recent dolomite of Sugarloaf Key, and bathymetry and geology of Pourtales Terrace.

Type of Study:Qualitative; Biological Component:Fauna and flora;

(26.00034)

Ginsburg, R.M. & H.A. Lowenstam 1958. The influence of marine bottom communities on the depositional environment of sediments. J. Geol. 66:310-318.

The effects of benthic fauna on the sediment environment was studied in Florida Bay. The ability of organisms other than reef builders to control or modify their physical environment was described. The organisms cause recognizable differences in sediment and other organisms.

Habitat:Rock, grass, mud, sand; Type of Study:Qualitative; Biological Component:Fauna;

(26.00035)

Goforth, H.W. & J.R. Thomas 1979. Planting of red mangroves (*Rhizophora mangle* L.) for stabilization of marl shorelines in the Florida Keys. In: D.P. Cole (ed.), Wetlands Restoration and Creation: Proc. of Sixth Annu. Conf. May 16, 1979, Tampa, Fla. 357 p.

Three developmental stages of red mangroves (i.e., propagules, seedlings, and small trees) were planted to provide erosion protection along three separate sections of marl shoreline at Key West, Florida. Transplants of small mangrove trees were highly successful on all three shorelines and exhibited the highest survival of the three stages. Degree of exposure to erosion and/or burial proved most important in determining seedling survival.

Study Duration:July 1977-May 1979; Habitat:Marl shorelines; Type of Study:Quantitative; Biological Component:Flora; Number of Stations:3; Temporal Frequency:Monthly; Abiotic Parameters Measured:Tidal height; Dominant Taxon/Taxa Studied:*Rhizophora mangle*;

(26.00036)

Goldberg, M.M. 1971. A note on the feeding behavior of the snapping shrimp *Synalpheus fritzmuelleri* Coutiere. Crustaceana.

The feeding behavior of the snapping shrimp, *Synalpheus fritzauelleri*, was described from specimens inhabiting the base of sea fans (*Gorgonia ventalina*) collected from the Fowey Rocks area of the northern Florida Keys. Use of the chelipeds, shell opening methods, and prey items are discussed.

Study Duration: December 1970; Habitat: Coral reef; Type of Study: Qualitative; Biological Component: Crustacea; Dominant Taxon/Taxa Studied: *Synalpheus fritzauelleri*;

(26.00037)

Gregory, D.R., Jr., R.F. Labisky & C.L. Combs 1982. Reproductive dynamics of the spiny lobster *Pagulus argus* in south Florida. Trans. Am. Fish. Soc. 111:575-584.

The reproductive biology of the spiny lobster *Pagulus argus* was studied in five different habitats in the lower Florida Keys between July 1975 and August 1976. A total of 3,235 females were captured in commercial wooden slat traps. The minimum size of reproductive maturity was 70 mm carapace length (CL). Maximum reproductive activity occurred among females in the 80-85 mm size class. Although reproduction occurred from April to September, it was most prevalent in May and June. The number of reproductively active females was greater in Atlantic habitats than at Gulf sites. Legally protected females (<76.2 mm CL) were responsible for only 14% of the annual egg production; females in the 75-85 mm class contributed 48% of the annual egg production. It is concluded that the minimum size limit be increased to 85 mm CL to protect the portion of the lobster population with the greatest reproductive potential.

Study Duration: July 1975-August 1976; Habitat: Coral reef, sand, grassbed, mud; Type of Study: Quantitative; Biological Component: Crustacea fauna; Type of Sampler: Lobster trap; Number of Stations: 5; Temporal Frequency: Weekly; Dominant Taxon/Taxa Studied: *Pagulus argus*;

(26.00038)

Griffin, G.M. 1974. Case history of a typical dredge-fill project in the northern Florida Keys, effects on water clarity, sedimentation rates and biota. Harbor Branch Found., Inc. Publ. No. 33.

A typical "hard rock" dredge-fill project on the Atlantic side of Key Largo was monitored for 390 days in order to document the amount of suspended sediment produced, its distribution and the effects on water clarity and benthos near the dredge. The area of the plume influence was determined to rarely exceed the limits of an area extending 0.3 nautical miles along shore and 0.33 nautical miles offshore, or 0.1 sq. n.mi. The value of turbidity diapers was discussed and it was concluded that they need to be redesigned to eliminate leaks and that proper positioning is crucial. No detectable influence of the dredge on the seagrasses or other inshore biota near the canal was found, nor were any abnormal changes detected in the reef. Compared to hydraulic dredging, "hard rock" dredging was found to have less impact on water clarity, sedimentation rates and biota, largely because the concentration in the plume was lower. Also, the material being dredged was the rather inert Key Largo limestone which is less apt to contain pesticides, toxic metals, or oxygen-demanding organic debris.

Study Duration: 390 days; Habitat: Limestone rock; Type of Study: Semiquantitative; Biological Component: Flora and fauna; Type of Sampler: Optical transmissometer, sediment trap; Number of Stations: 18 sediment trap stations; Number of Replicates/Station: 2; Temporal Frequency: 23 day intervals; Abiotic Parameters Measured: Water clarity, sedimentation, turbidity;

(26.00039)

Heald, E.J. 1970. The Everglades estuary: an example of seriously reduced inflow of fresh water. Trans. Am. Fish. Soc. 99(4):847-848.

A description of reduced freshwater flow to the estuarine regions of the Everglades National Park caused by drainage and irrigation schemes in the central portion of the state was presented. The net result of the freshwater reduction was a lowering of the water table by as much as 6 feet, a gradual landward intrusion of saltwater, increased salinities in the estuarine bays and lagoons, and a reduction in the capacity of the system to withstand stresses of normal drought. At these extremely high salinities, the dominant producer of the bay, *Thalassia testudinum* is severely limited.

Habitat: Estuarine;

(26.00040)

Hein, F.J. & M.J. Risk 1975. Bioerosion of coral heads: inner patch reefs, Florida reef tract. Bull. Mar. Sci. 25(1):133-138.

Bioerosion of 6 species of massive reef corals from Hens and Chicken Reef, southwest to Tavernier, Florida, was examined by x-ray radiography. Three groups of boring organisms were identified from 8 coral heads: boring sponges, spionid polychaetes, and mytilid bivalves. Sponges and spionids were responsible for reworking from 7.1% to 68.9% of the skeleton volume. Bioerosion was concentrated at the base and around the periphery of the coral heads, decreasing their ability to withstand wave shock. Results were compared with those of other bioerosion studies of coral. Calculated annual rates of bioerosion exceeded estimated rates of skeletogenesis. Sediment production by mytilid bivalves and boring sponges equalled 15% of the volume of the primary skeletal framework.

Habitat: Coral reef; Type of Study: Quantitative; Biological Component: Coral fauna; Number of Stations: 8; Dominant Taxon/Taxa Studied: *Diploria strigosa*, *Montastrea annularis*, *Siderastrea radicans*, *Dichocoenia stokesii*, *Diploria clivosa*, *Manicina areolata*;

(26.00041)

Hendrix, G.V. 1971. A systematic study of the genus *Alpheus* (Crustacea: Decapoda: Alpheidae) in South Florida. Univ. of Miami, Ph.D. Dissertation.

An historical resume of species of *Alpheus* reported from the western Atlantic and a survey of the literature on the family Alpheidae were presented. The family Alpheidae and the genus *Alpheus* were diagnosed and the systematic relationships to other families and genera were discussed. A key to the species of *Alpheus* found in the western Atlantic was also presented. Twelve species of *Alpheus* including one new species were described in detail and illustrated. Five reports of species represented range extensions from the Caribbean.

Habitat: Variable; Type of Study: Qualitative; Biological Component: Decapod fauna; Type of Sampler: Hand net, Scuba;

(26.00042)

Hess, W.E. 1954. An ecological study of some fouling organisms in the Key West area. Univ. of Miami, M.S. Thesis.

An ecological study of some fouling organisms attached to cement sea walls, ship hulls, wooden pilings and glass panels was conducted in the Key West area. Similar species were found on the various substrates, but the pilings and sea wall had a large intertidal fouling biota not found on the continuously submerged panels and ship hulls. The relationship of the major fouling organisms found on the glass panels to the hydrographic conditions was discussed, and the seasonal variations in conditions appeared to be the most important relationship between biology and hydrography. It was deduced from comparisons of the fouling at stations around the U.S. that slowly changing ecological conditions are conducive to attachment by many different species in large quantities.

Study Duration: 1 year; Habitat: Artificial substrates; Type of Study: Qualitative; Biological Component: Fouling organisms; Abiotic Parameters Measured: Temperature, salinity, DO, water clarity, currents;

(26.00043)

Holm, R.F. 1978. The community structure of a tropical marine lagoon. Estuar. Coast. Mar. Sci. 7:329-345.

The community structure of a tropical marine lagoon in the upper Florida Keys was described. The amount of vegetation present and the stability of the sediment was found to modify the abundance and diversity of the benthic macrofauna. The uniqueness of this environment made it possible to examine the changes in species abundance and diversity as a detritus based food web graded into a phytoplankton based food web.

Study Duration: 10 months; Habitat: Variable; Type of Study: Quantitative; Biological Component: Benthic macrofauna; Number of Stations: 120; Number of Replicates/Station: 1; Temporal Frequency: Twice; Abiotic Parameters Measured: Temperature, salinity, pH, currents, tides, sediment analysis;

(26.00044)

Hudson, J.H. 1977. Long-term bioerosion rates on a Florida reef: A new method. Proc. Third Internat. Coral Reef Symp., Univ. of Miami, Miami, Florida.

Paired cores from dead *Montastrea annularis* coral heads were analyzed by x-radiographs and estimation of annual growth increments to determine bioerosion rates. Between 1974 and 1976 the average annual rate of coral removal by boring organisms was 0.67 cm, a 350% increase over the period 1970-1974. The principal boring organisms responsible for primary erosion of the coral heads include 6 sponges: *Siphonodictyon coralliphagum*, *S. sp.*, *Cliona caribbaea*, *C. veruifera*, *C. vastifica*, and *C. sp.*. Secondary erosion is due to the spotlight parrotfish, *Sparisoma viride*, other scarids, and the long-spined sea urchin, *Diadema antillarum*. A 1 meter high coral head could be completely eroded in 150 years or less, according to extrapolation of measured bioerosion rates.

Study Duration: Summer 1974-Summer 1976; Habitat: Coral reef; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Hydraulic drill; Number of Stations: 19; Dominant Taxon/Taxa Studied: *Montastrea annularis*;

(26.00045)

Hudson, J.H. 1981. Growth rates in *Montastrea annularis*: A record of environmental change in Key Largo Coral Reef Marine Sanctuary, Florida. Bull. Mar. Sci. 31(2):444-459.

One hundred forty four massive heads of *Montastrea annularis* from inshore, midshore, and offshore reef areas within the Key Largo Coral Reef Marine Sanctuary, Florida, were sampled by coring to determine annual growth rates. Water temperature, turbidity, and depth appear to be the primary environmental factors regulating growth and survival of *M. annularis*. Maximum growth rates (average 11.2 mm/yr) of *M. annularis* occurred at midshore reef areas where stress banding and skeletal damage due to bioerosion were minimal. *M. annularis* from the offshore fore-reef areas showed the slowest growth rates (6.3 mm/yr) while those from inshore reef areas had a slightly higher rate (8.2 mm/yr). *M. annularis* from both inshore and offshore reef areas exhibited long histories of environmental stress indicated by



stress banding and healed-over "die-off" voids excavated by boring organisms. A decrease in coral growth from 1953 to 1968 at some midshore and inshore reefs coincided with increased dredge and fill operations in the Florida Keys area. A recent slight increase in growth (1973-1978) coincided with a ban on these operations.

Study Duration: August 1978; Habitat: Coral reef; Type of Study: Quantitative; Biological Component: Coral, fauna; Type of Sampler: Hydraulic drill; Number of Stations: 12; Number of Replicates/Station: 12; Dominant Taxon/Taxa Studied: *Montastraea annularis*;

(26.00046)

Hudson, J.H. & D.M. Robbin 1980. Effects of drilling mud on the growth rate of the reef-building coral, *Montastraea annularis*. Proc. Research on Environ. Fate and Effects of Drilling Fluids and Cuttings, Vol. II, Lake Buena Vista, Florida.

To study the effects of drilling mud on the growth of *Montastraea annularis*, eight coral heads were heavily dosed with drilling mud and left with 10 untreated corals on Carysfort Reef, Key Largo, for 6 months to recover and grow. After collection and analysis by x-radiography, growth rates were found to be reduced in treated corals and barium levels in skeletal areas as high as 100 times background concentration. In a second study at East Flower Garden Bank, growth rates of *M. annularis* were found to have declined sharply after 1957, but barium and chromium levels were at or below background concentrations, despite nearby drilling operations in 1974 and 1977.

Study Duration: 6 months (1975); Habitat: Coral reef; Type of Study: Quantitative; Biological Component: Coral, fauna; Dominant Taxon/Taxa Studied: *Montastraea annularis*;

(26.00047)

Hudson, J.H., D.M. Allen & T.J. Costello 1970. The flora and fauna of a basin in central Florida Bay. U.S. Fish. Wildl. Serv. Spec. Sci. Rept. No. 604. 14 p.

Monthly samples collected from a basin of central Florida Bay yielded 196 species of plants and animals between April 1965 and January 1968. Approximately 73% of the organisms were benthic and associated with seagrass beds of *Thalassia testudinum*. A species list is given. The effect of different water masses on the general distribution of fauna and flora in the basin and bay is discussed.

Study Duration: April 1965-January 1968; Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Flora and fauna; Type of Sampler: Sled-mounted suction sampler, sled net; Sieve Size: 5 mm; Temporal Frequency: Monthly; Abiotic Parameters Measured: Salinity, water temperature; Dominant Taxon/Taxa Studied: *Pennaeus duorarum*, *Thalassia testudinum*;

(26.00048)

Hudson, J.H., F.A. Shinn, R.B. Halley & B.H. Lidz 1976. Autopsy of a dead coral reef. Am. Assoc. Pet. Geol. 60(4):683.

During the winter of 1969-70 Hen and Chickens patch reef in the Florida Keys was determined to have suffered 80 to 90% mortality. It was found through x-radiographed slabs, measurement of annual growth rate and observation of abnormalities dating from 1926 to the present that "stress bands" formed during winter months. The stress bands were found to correspond to unusually cold winters. It was concluded that the death of Hen and Chickens patch reef was caused by uncommonly cold water.

Study Duration: 1 winter; Habitat: Coral reef; Type of Study: Qualitative; Biological Component: Coral; Type of Sampler: Core; Dominant Taxon/Taxa Studied: *Montastraea annularis*;

(26.00049)

Humm, H.J. 1964. Epiphytes of the seagrass, *Thalassia testudinum*, in Florida. Bull. Mar. Soc. Gulf & Caribb. 14(2):306-372.

One hundred and thirteen species of algae were reported occurring as epiphytes on the seagrass *Thalassia testudinum*, 92 of which were recorded from the south Florida area. Two groups of epiphytes were recognized: perennial species and the seasonal annuals. Among the former are calcareous *Corallinaceae* which contribute significantly to the sediments of seagrass beds. Among the latter is a group of large plants which may become sufficiently abundant during winter and spring to shade the *Thalassia* significantly. Each species listed was described and a key to the species known to occur as epiphytes on *Thalassia* in south Florida was presented.

Study Duration: Winter and spring, 1 year; Habitat: Grassbed; Type of Study: Qualitative; Biological Component: Epiphytic flora;

(26.00050)

Idyll, C.P. 1950. A new fishery for grooved shrimp in southern Florida. Comm. Fish. Rev. 12(3).

A new shrimp fishery in the Key West to Dry Tortugas (Florida) region was described. The location and extent of the new grounds and the type of bottom was determined, as was the species and size of the shrimp being caught. The volume of the

landings and the number of boats fishing were given.

Study Duration: February 1950; Type of Study: Qualitative; Biological Component: Crustacea; Dominant Taxon/Taxa Studied: *Penaeus duorarum*;

(26.00051)

Jaap, W.C. 1979. Observations on zooxanthellae expulsion at Middle Sambo Reef, Florida Keys. Bull. Mar. Sci. 29(3):414-422.

Large scale discoloration of corals at Middle Sambo Reef, 7.8 km from Boca Chica Key, Monroe County, Florida was investigated on September 26, 1973. The hydrozoan coral *Millepora complanata* displayed the greatest discoloration, though some *Acropora palmata*, *Montastraea annularis* and *Palythoa* sp. colonies were mildly discolored. Discoloration of organisms was generally limited to the reef flat. Affected corals were still viable. High air temperatures and mid day low tides combined with calm weather are believed to have elevated water temperature sufficiently to incur thermal stress, thereby causing expulsion of endosymbiotic algae, *Gymnodinium microdriaticum*, with consequent discoloration of coral hosts. Most polyps regained normal color within 6 weeks. The shallow reef cnidarian communities appear to suffer no permanent effect due to short periods of thermal stress. Similar incidents of coral discoloration are reviewed.

Study Duration: September 26-November 6, 1973; Habitat: Coral reef; Type of Study: Qualitative; Biological Component: Coral, fauna; Abiotic Parameters Measured: Tidal height, air & water temp., wind velocity & direction, solar radiation; Dominant Taxon/Taxa Studied: *Acropora palmata*, *Montastraea annularis*, *Palythoa* sp., *Millepora complanata*;

(26.00052)

Jaap, W.C. & J. Wheaton 1975. Observations on Florida reef corals treated with fish-collecting chemicals. Fla. Mar. Res. Publ. 10. 18 p.

Twenty one species of reef corals (11 Scleractinia, 10 Octocorallia) from Western Sambo Reef, south of Boca Chica Key, Florida were treated with fish collecting chemicals and examined 5 times between August 1973 and June 1974 for deleterious effects. The chemicals used were 100% acetone, a quinaldine/acetone/seawater solution, a commercial rotenone derivative/ seawater solution, and undiluted rotenone derivative. No octocorals were damaged by any of the chemicals. Some individuals of 6 scleractinian species (*Acropora palmata*, *A. cervicornis*, *Siderastrea siderea*, *Diploria strigosa*, *Colpophyllia natans*, *Dichocoenia stokesi*) suffered severe damage by the undiluted rotenone derivative. Little or no damage occurred to other scleractinia from any of the chemicals. The reactions of other reef-dwelling organisms to the chemicals are described.

Study Duration: August 1973-June 1974; Habitat: Coral reef; Type of Study: Qualitative; Biological Component: Fauna; Number of Stations: 2; Temporal Frequency: Quarterly; Abiotic Parameters Measured: Temperature, salinity, DO, pH, solar illumination; Dominant Taxon/Taxa Studied: *Acropora cervicornis*, *A. palmata*, *Siderastrea siderea*, *Diploria strigosa*, *Dichocoenia stokesi*;

(26.00053)

Jones, J.A. 1963. Ecological studies of the southeastern Florida patch reefs. Part I. Diurnal and seasonal changes in the environment. Bull. Mar. Sci. Gulf & Caribb. 13(2):282-307.

The environmental conditions of the patch reefs in southeastern Florida were described. Water temperature was found to vary approximately 0.5 to 1.5°C diurnally, generally in response to air temperature fluctuations and solar radiation. Salinity was determined to be relatively stable at 37 parts per thousand, modified slightly by precipitation and evaporation. Other parameters monitored in this study include dissolved oxygen (90-125%), pH (7.6 to 8.2), plant nutrients, current velocity and direction, incident illumination, cloud cover, extinction coefficients and primary productivity.

Study Duration: 4 months; Habitat: Patch reef, grassbed; Type of Study: Qualitative; Biological Component: Flora and fauna; Number of Stations: 4; Number of Replicates/Station: 1; Temporal Frequency: Hourly; Abiotic Parameters Measured: Temperature, salinity, DO, pH; Dominant Taxon/Taxa Studied: *Acropora palmata*, *Diploria labyrinthiformis*, *Montastraea annularis*, *M. cavernosa*, *Porites porites*, *P. astreoides*, *Siderastrea radians*, *Diploria clivosa*;

(26.00054)

Kerr, S.D., Jr. 1972. Patterns of coastal sedimentation: carbonate muds of Florida Bay. Bull. Am. Assoc. Petrol. Geol. 56(3):632 (Abstract).

The accumulation of carbonate muds into distinct sedimentary patterns within Florida Bay was examined. The physiography of the accumulation was determined by hydrological processes which also regulate local faunal distributions. Characteristics of the most common sedimentary patterns, banks and lakes, were summarized and their historical formations were discussed.

Habitat: Mud; Type of Study: Qualitative;

(26.00055)

Kick, R. 1981. Carbonate sediments from Peterson Key Bank, Florida Bay. Univ. of So. Fla. M.S. Thesis.

A study of carbonate sediments at Peterson Key Bank, Florida Bay, demonstrated that all sediments are of biological origin, produced predominantly by molluscs, *Halimeda*, and Foraminifera. Difference in sediment texture was attributed to the mode of sedimentary breakdown by organisms. These organisms and the type of sediment they produce are summarized. The distribution of sediment type was used to determine the recent history of two channels in the bank.

Habitat: Mud, sand, rock; Type of Study: Quantitative; Biological Component: Mollusca, foraminifera; Type of Sampler: Piston core; Number of Stations: 2; Abiotic Parameters Measured: Depth, sediment grain size; Dominant Taxon/Taxa Studied: *Halimeda*, *Penicillus*;

(26.00056)

Kissling, D.L. 1965. Coral distribution on a shoal in Spanish Harbor, Florida Keys. Bull. Mar. Sci. 15:599-611.

The distribution of several coral species living on a shoal in Spanish Harbor, Florida Keys, was correlated with water depth, vegetative growth, and substrate type. Densities of *Porites porites* and *Manicina areolata*, were higher in unconsolidated sediments with dense vegetation, which help support their free coralla. *Siderastrea radians*, *S. sidera*, *P. asteroides*, and *Favia fragum* inhabited firm substrata necessary for their attachment. *F. fragum* was least tolerant of unconsolidated sediment and preferred depths greater than 1.5 ft, as did *P. asteroides*. Results were compared with those of other similar studies conducted in the Florida reef tract.

Study Duration: July 1964; Habitat: Coral, seagrass bed, rock, sand; Type of Study: Qualitative; Biological Component: Fauna and flora; Number of Stations: 45; Dominant Taxon/Taxa Studied: *Porites porites*, *Manicina areolata*, *Siderastrea radians*, *S. sidera*, *P. asteroides*, *Favia fragum*;

(26.00057)

Kissling, D.L. &amp; G.T. Taylor 1977. Habitat factors for reef-dwelling ophiuroids in the Florida Keys. Proc. Third Internat. Coral Reef Symp. p. 225-231.

A survey of ophiuroid populations on coral reefs in the lower Florida Keys revealed 10 species that exhibit strong habitat preferences. Habitat selection among 7 of the ophiuroid species was determined to be mainly a response to one or more physical habitat factors, possibly related to feeding. The effects of depth, current patterns, and substrates on ophiuroid distribution were determined. The zonation of reef dwelling ophiuroids was coincident with several physiographic habitats.

Habitat: Coral reefs, seagrass bed; Type of Study: Quantitative; Biological Component: Echinodermata; Number of Stations: 70; Number of Replicates/Station: 20; Dominant Taxon/Taxa Studied: *Ophiothrix oerstedii*, *Ophiocnida seabriuscula*, *Ophiocnida pumila*, *O. echinata*, *O. wendti*, *Ophioderna appressum*, *O. reticulata*, *O. impressa*, *Ophiactis quinqueradia*, *Ophiothrix lineata*;

(26.00058)

Larson, D.K. &amp; A.P. Ramus 1984. Distribution of Caridean Shrimp (Decapoda: Natantis; Caridea) in the Shallow Waters of Western Florida Bay. Fla. Sci. 47(Suppl.1) 20.

Caridean shrimp were collected from  $M^2$  quadrats in shallow seagrass habitat bordering mangrove islands of Johnson Key Basin since November 1983. Species richness, distribution and abundance were determined. *Thor floridanus*, *Hippolyte pleurocanthus* and *Palaeonetes intermedius* were the dominants of the six species collected. *Toxema carolinense* were observed to increase at offshore sites dominated by *Thalassia testudinum*. Preliminary results indicate the greatest species richness and peak abundance (as high as 322 shrimp/ $m^2$ ) occur at the *Halodule wrightii* and *Thalassia* transition zone.

Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Caridean shrimp fauna; Dominant taxa: *Thor floridanus*, *Hippolyte pleurocanthus*, *Palaeonetes intermedius*;

(26.00059)

Lewis, R.R. &amp; R.C. Phillips 1980. Experimental seagrass mitigation in the Florida Keys. In: D.P. Cole (ed.) Wetlands restoration and creation. Proc. of the Seventh Annu. Conf., 1980 May 16-17, Tampa, Fla. 294 p.

Plugs and short shoots of *Thalassia testudinum*, *Halodule wrightii* and *Syringodium filiforme* were transplanted at Craig Key and were monitored for two years. In addition, seeds of *Thalassia* were planted in the field and laboratory, and laboratory reared seedlings were moved to the site. Results of the project are presented.

Study Duration: 2 years; Habitat: Grassbed; Type of Study: Quantitative, laboratory; Biological Component: Flora; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Halodule wrightii*, *Syringodium filiforme*;

(26.00060)

Lindberg, S.E. &amp; R.C. Harriss 1974. Mercury-organic matter associations in estuarine sediments and interstitial water.

Envir. Sci. Technol. 8:459-462.

Significant associations between sediment Hg and sediment organic matter and between dissolved interstitial Hg and dissolved organic carbon were presented. Mercury in sediments and interstitial water occurs at higher concentrations in the Everglades than in Mobile Bay, which receives anthropogenic mercury effluents. When normalized to organic content of the sediment or dissolved organic carbon concentration in pore water, higher relative mercury concentrations were shown to occur in Mobile Bay.

Habitat:Variable; Type of Study:Qualitative; Type of Sampler:Piston-fitted polycarbonate tube; Number of Stations:2; Number of Replicates/Station:1; Abiotic Parameters Measured:Salinity, DOC, Hg;

(26.00061)

Little, E.J., Jr. 1977. Observations on recruitment of postlarval spiny lobsters, *Panulirus argus*, to the South Florida coast. Fla. Mar. Res. Publ. No. 29, 35 p.

Data on recruitment taken variously at several localities and an examination of natural fouling communities was summarized. Post larvae were collected during all months, but recruitment peaks were more frequent during spring and fall except in the lower Florida Keys where summer peaks were occasionally noted. Reduced salinity may have been a factor in recruitment decreases due to freshwater runoff. Most larvae were more abundant in nearshore shallow habitats than in deeper channels. It was suggested that the amount of light may exert an inhibitory effect upon recruitment, but that normal changes in temperatures and salinities probably do not greatly affect recruitment magnitude.

Study Duration:2 years; Habitat:Rock, coral, grassbed, sand; Type of Study:Semi-quantitative; Biological Component:Decapod fauna; Type of Sampler:Within habitats and plankton nets; Abiotic Parameters Measured:Temperature, salinity, DO; Dominant Taxon/Taxa Studied:*Panulirus argus*;

(26.00062)

Little, E.J., Jr. & G.R. Milano 1980. Techniques to monitor recruitment of postlarval spiny lobsters, *Panulirus argus*, to the Florida Keys. Fla. Mar. Res. Publ. No. 37, 16 p.

Monitoring recruitment of postlarval spiny lobster in the Florida Keys using floating artificial habitat collectors was most successful on collectors with at least two months accumulation of fouling organisms. Peak monthly settlement varied between new moon and first quarter periods. Sampling of two collectors at 2-3 day intervals was determined to sufficiently indicate peak recruitment and relative abundance at selected stations. Combinations of several sites depicted recruitment trends better than single sampling sites. Significantly greater recruitment of spiny lobsters occurred during spring. Abnormally high recruitment followed a dramatic temperature decrease (to ca. 12.5°C) during January 1977; an unusually low recruitment during June 1978 was unexplained. Other decapod crustaceans associated with the artificial habitats had no obvious effect on spiny lobster settlement.

Study Duration:27 March 1976-13 September 1978; Habitat:Grassbed, sand, rock; Type of Study:Quantitative; Biological Component:Crustacea; Number of Stations:12; Temporal Frequency:Daily or semi-weekly; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Panulirus argus*;

(26.00063)

Lynts, G.W. 1966. Relationship of sediment-size distribution to ecologic factors in Buttonwood Sound, Florida Bay. J. Sediment. Petrol. 36:66-74.

Some ecological factors in Buttonwood Sound were studied in relation to the sediment-size distribution. Physical/chemical factors studied included depth, pH, temperature, salinity and Eh. Statistical analysis show that ecological factors were not linearly related to sediment-size nor amongst themselves. Sediment distribution is largely related to turtle grass occurrence.

Study Duration:August 1962-February 1963; Type of Study:Quantitative; Type of Sampler:48 mm dia. core; Number of Stations:19; Abiotic Parameters Measured:Depth, temperature, salinity, pH, Eh;

(26.00064)

Lynts, G.W. 1971. Distribution and model studies on foraminifera living in Buttonwood Sound, Florida Bay. Miami Geol. Soc. Mem. 1:73-115.

Environmental factors influencing foraminiferal species distribution in Buttonwood Sound, Florida Bay, were investigated using 74 samples from 19 stations. Depth, temperature, salinity, pH, and Eh were measured at the sediment water interface. The foraminiferal standing crop and granulometry of each sample were determined. The distribution of foraminifera was determined to be controlled by a complex interaction of physicochemical and biologic factors, which was only partially revealed by the measured parameters.

Study Duration:14 Aug. 1962- Feb. 1963; Habitat:Mud, sand; Type of Study:Quantitative; Biological Component:Foraminifera; Type of Sampler:Corer; Number of Stations:19; Temporal Frequency:4 times (Aug. 14, 17, 20, 1962; Feb. 1967); Abiotic Parameters Measured:Temp., salinity, depth, pH, Eh, sediment grain size;

(26.00065)

Lyons, W.G., D.G. Barber, S.M. Foster, F.S. Kennedy, Jr. & G.R. Milano 1981. The spiny lobster, *Panulirus argus*, in the middle and upper Florida Keys: Population structure, seasonal dynamics, and reproduction. Fla. Mar. Res. Publ. No. 38, 38 p.

Data on abundance, distribution, size, sex, mating, spawning, molting, incidence of fouling organisms, and injury rates were obtained from 19,180 spiny lobsters captured at 9 stations in the middle and upper Florida Keys fishery area during April 1978 through March 1979. Mean and modal carapace length (CL) were approximately 73 mm, slightly less than legal size (76 mm). Lobster sizes averaged 65.6 mm CL at shallow (3 m) bay stations, increasing gradually to 80.1 mm CL at

inhabited southern Florida Bay stations, then gradually migrated to nearshore oceanside Keys stations; lobsters in year class 3+ moved seaward at onset of maturity or declining water temperature (late fall-early winter). Information on seasonal trends in sizes, numbers, and location of captured lobsters is summarized. Legal sized lobsters comprised 43.7% of total catch, 90% of which were caught at oceanside stations. Data are presented concerning sex ratio, duration of spawning season, location of mating, and size and proportion of spawning females. Little or no fouling organisms were found on most lobsters. Molting individuals averaged only 1% of the total population, with a maximum molting frequency of 2.7% in April. Trends in rates of injuries are explained.

Study Duration: April 1978-March 1979; Type of Study: Quantitative; Biological Component: Crustacea; Type of Sampler: Lobster trap; Number of Stations: 9; Temporal Frequency: Weekly; Abiotic Parameters Measured: Temperature, conductivity; Dominant Taxon/Taxa Studied: *Panulirus argus*;

(26.00066)

Lyons, W.G. & F.S. Kennedy, Jr. 1981. Effects of harvest techniques on sublegal spiny lobsters and on subsequent fishery yield. Proc. Gulf Caribb. Fish. Inst. 33:290-300.

To determine the effect of confining sublegal sized lobsters as attractants in lobster traps for extended durations, a total of 152 preweighed lobsters were caged in 40 traps (16 traps each containing 5 lobsters, 24 traps each containing 3 lobsters) for periods of up to 8 weeks. Two traps with 5 lobsters and 3 traps with 3 lobsters were removed from the field weekly and lobsters were in each of the 8 weekly test groups; average weight reduction was generally greater among those confined at 5 per trap than that of lobsters confined at 3 per trap. Trends of weight loss and mortality over the 8 week period are presented. Factors other than starvation, including handling, exposure, temperature, and predation are analyzed as potential causes of death. The impact on the fishery of using sublegal sized lobsters as bait is examined, and solutions to reduce fishery induced mortality are suggested.

Study Duration: 8 weeks; Type of Study: Quantitative; Biological Component: Spiny lobster; Number of Stations: 40; Temporal Frequency: Weekly; Abiotic Parameters Measured: Temperature (air & water); Dominant Taxon/Taxa Studied: *Panulirus argus*;

(26.00067)

Manker, J.P. 1975. Distribution and concentration of mercury, lead, cobalt, zinc, and chromium in suspended particles and bottom sediments - upper Florida Keys, Florida Bay, and Biscayne Bay. Rice Univ. Ph.D. Dissertation. 114 p.

Sediment samples from 39 stations in the upper Florida Keys, Florida Bay and Biscayne Bay, Florida were collected and analyzed for mercury, lead, cobalt, zinc, and chromium. The highest concentrations of toxic metals were found in the 4 um and suspended particulate fractions, and were correlated with areas of high population/human activity and with the Turkey Point nuclear power plant. Concentrations of lead and mercury in bottom sediments in certain areas were found to be approaching environmentally unacceptable levels. Seagrass and green algal populations were depleted in areas of maximum toxic metal concentrations.

Study Duration: June 1973-June 1974; Habitat: Coral reef, sand, mud; Type of Study: Quantitative; Number of Stations: 39; Abiotic Parameters Measured: Temp., sal., DO, current speed & dir., turbidity, wind speed & dir.;

(26.00068)

Manker, J.P. & G.M. Griffin 1971. Source and mixing of insoluble clay minerals in a shallow water carbonate environment, Florida Bay. J. Sediment. Pet. 41(1):302-306.

Samples collected from Florida Bay and analyzed for sediment characteristics including clay minerals provide information on the depositional environment. Chlorite and smectite are the major components of the clay size insoluble residue. Water currents are different in various areas of the bay and are responsible for differences in distribution and composition of sediments. Molluscs, foraminifera and some green algae but not corals are responsible for some of the calcium carbonate particles in the sediment.

Type of Study: Qualitative; Abiotic Parameters Measured: Sediment characteristics, temperature, salinity;

(26.00069)

Manning, R.B. 1960. Some growth changes in the stone crab, *Hemippe mercenaria* (Say). Quart. J. Fla. Acad. Sci. 23(4):273-277.

Morphological differences between juveniles and adults of *Hemippe mercenaria* were investigated in specimens collected in Florida Bay. In juveniles the orbits are far apart, while in the adult they are close together. Juveniles differ from adults in not showing subdivisions of the submedian frontal lobes and the stridulating organ on the palm. The juveniles' lateral teeth are smoother and rounder, and coloration is dark. Juveniles do not form permanent burrows.

Study Duration:3 years; Type of Study:Quantitative; Biological Component:Fauna; Dominant Taxon/Taxa Studied:*Hemippe mercenaria*, *Eurytium limosum*, *Thalassia testudinum*, *Panopeus herbstii*;

(26.00070)

Marszalek, D.S., G. Babaschoff, Jr., M.R. Noel & D.R. Mowley 1977. Reef distribution in south Florida, p. 223-230, In: D.L. Taylor (ed.), Proc. Third Internat. Coral Reef Symp., Vol. 2, Rosenstiel School of Mar. & Atmos. Sci., Univ. of Miami.

The distribution of reefs in the Florida Keys was determined using aerial photography and extensive ground truthing. Approximately 96 km of outer bank reefs along the shallow shelf edge exist in the Florida Reef Tract; there are more than 6000 patch reefs in the inner lagoon. The majority of reefs occur in the upper Keys seaward of Elliot Key and Key Largo. Patch reefs are very rare in the middle Keys. Outer bank reef and patch reef development increases in the lower Keys between Big Pine Key and Dry Tortugas. Reef distribution was determined to be regulated primarily by factors affecting water exchange between the Reef Tract and coastal lagoons and Florida Bay.

Habitat:Coral reef; Type of Study:Qualitative; Biological Component:Fauna, flora; Dominant Taxon/Taxa Studied:*Acropora palmata*, *Porites*, *Siderastrea*, *Millepora complanata*, *Diadema antillarum*, *Halimeda eburnea*, *Montastrea annularis*;

(26.00071)

Martin, R.E. 1975. Distribution and ecology of the foraminifera of John Pennekamp Coral Reef State Park, Key Largo, Florida, with emphasis upon the effects of turbid water produced by dredging. Univ. of Fla. M.S. Thesis. 205 p.

Studies were conducted on the distribution and ecology of the foraminifera in the reef environments of John Pennekamp Coral Reef State Park. It was found wave and current action cause a seaward decrease in general species diversity, richness, and equitability. Study of the effect of high, dredge induced turbidity showed no significant impact on populations of foraminifera. Also, phototactic testing of turbidity-induced decreases in light intensity showed little effect on photic responses.

Study Duration:March 16-19, 1974; Habitat:Coral reef; Type of Study:Quantitative; Biological Component:Fauna; Sieve Size:1.00 mm - .062 mm; Number of Stations:33; Abiotic Parameters Measured:Sediment, salinity, temperature, DO, water depth; Dominant Taxon/Taxa Studied:*Archaias angulatus*, *Cyclorbiculina compressa*;

(26.00072)

May, J.A. & R.D. Perkins 1979. Endolithic infestation of carbonate substrates below the sediment-water interface. J. Sediment. Petrol. 49(2):357-378.

Carbonate substrates consisting of crushed conch shells and inorganic calcite were planted at and below the sediment-water interface in Florida Bay, Florida, Middle Marsh, North Carolina, and Carrie Bow Cay, Belize, to study endolithic infestation. The endolithic community of substrates beneath the sediment-water interface was less diverse than that at the sediment surface. Endolithic forms and activity are described through electron and light microscopic examinations. (This is the first known evidence of endolithic activity within buried marine sediments.) Endolithic heterotrophs may significantly affect the surrounding macroenvironment within sediments, possibly increasing sediment porosity.

Study Duration:2 years; Habitat:Mud (marsh), coral reef; Type of Study:Qualitative; Biological Component:Fauna and flora; Number of Stations:3;

(26.00073)

McGinty, T.L. 1955. New marine mollusks from Florida. Proc. Acad. Nat. Sci., Philadelphia, CVII:75-97.

Twelve new species of marine mollusks were recovered and described from dredge samples taken from about 1400 stations adjacent to or in the Gulf Stream, from Jupiter to the Key West area in offshore depths varying from shallow water to greater than 150 fathoms. These species include: *Crypturris engosia*, *Daphnella stegeri*, *Nitroa noisei*, *Nitroa olssoni*, *Fusilatrix pauli*, *Eudolium thompsoni*, *Acteon finlayi*, *Bullina exquiseta*, *Scaphander pilsbryi*, *Semele bellastrata donovani*, *Limi locklini*, *Aclistothyra atlantica*.

Study Duration:5 years; Habitat:Variable; Type of Study:Qualitative; Biological Component:Mollusc fauna; Type of Sampler:Dredges; Number of Stations:1400;

(26.00074)

McPherson, B.F. 1969. Studies on the biology of the tropical sea urchin, *Echinometra lucunter* and *Echinometra viridis*. Bull. Mar. Sci. 19(1):194-213.

The growth and reproduction of 2 echinoid species, *Echinometra lucunter* and *E. viridis* were studied at 5 locations in the Florida Keys. Gametogenesis was found to occur during spring and summer, with both species spawning in late summer or early fall. The reproductive cycles of *E. lucunter* from different habitats were similar, although relative gonad growth and test size were greater in individuals from inshore areas than those from offshore patch reefs. Variations in abundance and size of urchins between locations are cited. Feeding habits and behavior of both species are discussed.

Study Duration: January 1965-August 1966; Habitat: Coral reef, seagrass bed, rock; Type of Study: Quantitative; Biological Component: Echinodermata; Number of Stations: 5; Temporal Frequency: Variable; Dominant Taxon/Taxa Studied: *Echinometra lucunter*, *E. viridis*;

(26.00075)

Mitterer, R.M. 1978. Amino acid composition and metal binding capability of the skeletal protein of corals. Bull. Mar. Sci. 28(1):173-180.

Live corals were collected from Bermuda, Jamaica, and the Florida Keys and analyzed for amino acid composition of the skeletons. The protein composition was found to be dominated by aspartic acid. Aspartic acid comprises about 70% of alcyonarian skeletal protein and about 35% of the organic matrix of scleractinians. A binding study indicated the capability of spicules to bind metal ions. Results suggest the calcified organic matrix acts as a template which initiates and controls crystal growth.

Habitat: Coral reef; Type of Study: Qualitative; Biological Component: Fauna; Dominant Taxon/Taxa Studied: *Porites porites*, *Oculina diffusa*, *Agaricia fragilis*, *Acropora palmata*, *A. cervicornis*, *Plexaura fuxuosa*, *Eunicea tourneforti*, *Gorgonia reutalina*, *Pseudoplexaura porosa*, *Plexaurella dichotoma*, *Millepora alcicornis*;

(26.00076)

Mitterer, R.M. & P.W. Carter 1977. Some analytical and experimental data on organic-carbonate interaction. Proc. Third Internat. Coral Reef Symp., Miami, Florida, May 1977.

Differences between the organic matter of carbonate and noncarbonate sediments were investigated in sediment samples from Florida Bay and the Flower Garden Reef, offshore Texas. Results showed that the carbonate fraction as compared to the noncarbonate fraction has: 1) coarser size; 2) less total organic matter; 3) greater proportion of organic matter as amino acids; and 4) a higher aspartic acid content. Organic matter from Florida Bay sediments, which has approximately 40% aspartic acid content, was able to bind calcium, confirming the hypothesis that an aspartic acid-rich proteinaceous fraction is necessary for calcification. Aspartic acid-rich organic matter in carbonate sediments was concluded to play an instrumental role in carbonate geochemistry of marine waters.

Habitat: Sand; Type of Study: Quantitative; Abiotic Parameters Measured: Grain size distribution, amino acid composition, organic carbon, nitrogen, carbonate carbon;

(26.00077)

Montgomery, R.T. 1978. Environmental and ecological studies of the diatom communities associated with the coral reefs of the Florida Keys, Vol. I. Fla. State Univ. Ph.D. Thesis.

The geographic and seasonal variations, and various aspects of the substrates of the benthic diatom floras of reefs in the keys region were investigated. Results of studies on the effects of coral species, complexity of substrate, period of colonization, and area of substrate on diatom community structure are discussed. Similar diatom communities from different substrates varied only in density. There was a direct relationship between diversity and habitat complexity.

Habitat: Sand, coral, grassbed; Type of Study: Quantitative; Biological Component: Flora;

(26.00078)

Montgomery, R.T., W.I. Miller & A.W. Collier 1977. A preliminary investigation of the structure of diatom communities associated with the reef habitats of the Florida Keys. Proc. Third Internat. Coral Reef Symp. 1:357-363.

The structures of benthic diatom communities associated with coral reefs in the Florida Keys were analyzed and compared. The species richness and diversity of diatom floras from the coral sand bottom, adjacent seagrass beds, and different zones of the reef structure were compared at 3 different reefs. Diatom density was high in all substrates. The number of species was directly related to the degree of habitat complexity. Diatom communities from similar substrates exhibited a high degree of similarity. It was suggested that because of the continual replenishment of nutrients by bacterial populations associated with reef surfaces, benthic diatom populations may not be nutrient limited.

Habitat: Coral reef, seagrass beds; Type of Study: Quantitative; Biological Component: Diatoms;

(26.00079)

Nickelsen, G.L. 1976. Composition and distribution of epifauna on prop roots of *Rhizophora mangle* L. in Lake Surprise, Florida. Fla. Atlantic Univ., M.S. Thesis.

A total of 108 species were collected from the prop roots of the red mangrove. Fringe roots hosted greater numbers of species and individuals and a greater abundance of sponges and epiphytes than roots in the interior of the strand. The root community was characterized by three assemblages. The algae-amphipod-tanaidacean assemblage was prominent on fringe roots. The sponge-polychaete assemblage (excluding serpulids) was represented well in both areas, but was more prominent at the fringe. The bare root serpulid assemblage dominated much of the interior. Overall mean diversity (Hs) and equitability (E) were 2.60 and 0.65, respectively. Faunal density was 13,200 ind/m<sup>2</sup> of root surface.

Study Duration: 2 months; Habitat: Mangrove; Type of Study: Semiquantitative; Biological Component: Epifauna; Number of Stations: 6; Number of Replicates/Station: 4; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature, salinity, DO, turbidity, light; Dominant Taxon/Taxa Studied: *Elasmodon pocillianus*, *Erichthonius brasiliensis*, *Syllis* sp., *Vermiliopsis bermudensis*;

(26.00080)

Oremland, R.S. 1975. Methane production in shallow water tropical marine sediments. Appl. Microbiol. 30(4):602-608.

Production of methane in *Thalassia testudinum* and *Syringodium* sp. beds located in Caesar Creek, Florida Keys, was measured. *T. testudinum* beds showed higher methane production than either *Syringodium* sp. beds or two coral reefs. Methane production rates seem to be influenced by a wide range and type of benthic metabolic processes.

Type of Study: Quantitative; Biological Component: Flora, fauna; Abiotic Parameters Measured: Methane; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Syringodium* sp.;

(26.00081)

Phillips, R.C. 1959. Notes on the marine flora of the Marquesas Keys, Florida. Quart. J. Fla. Acad. Sci. 22(3):155-162.

A single sampling of six stations in depths less than 14 ft around the Marquesas Keys was conducted to describe the local marine flora. Dense growths of *Thalassia testudinum* were present at all stations in depths generally less than 7 ft. *Diplanthera wrightii* was found at 3 stations, and sparse patches of *Syringodium filiforme* occurred at 2 stations. *Halimeda* grew in large clumps around the Keys, both inside on mudflats and offshore, at least to the 3 to 7 ft depth at spring low tide. The bottom at the shoreline of the Keys was composed of finely ground *Halimeda* segments. Twenty three species of algae were reported, 12 of which are epiphytic. A species list of the plants is included.

Habitat: Grassbeds; Type of Study: Qualitative; Biological Component: Flora; Number of Stations: 6; Abiotic Parameters Measured: Substrate type, depth; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Syringodium filiforme*, *Diplanthera wrightii*, *Halimeda opuntia triloba*, *Penicillus capitatus*, *Dictyota divaricata*;

(26.00082)

Randall, J.E., R.E. Schroeder & W.A. Starck, II 1964. Notes on the biology of the echinoid *Diadema antillarum*. Carib. J. Sci. 4(2&3):421-433.

Studies on the echinoid, *Diadema antillarum*, in the Florida Keys and Virgin Islands yielded information on the habitats, abundance, growth, spawning and predators of the echinoid. Habitats of *D. antillarum* included rock, coral reef, mangrove roots, seagrass beds, and sand. Abundance of the echinoid averaged 1.2 individuals/m<sup>2</sup> in *Thalassia* beds in the Florida Keys and 13.4/m<sup>2</sup> on a rocky shore in the Virgin Islands. Monthly growth rates of caged specimens in the Virgin Islands are given. *Thalassia* was found to be the primary food source of echinoids in the Florida Keys. Spawning behavior and periodicity of Virgin Islands echinoids are discussed. Predators of *D. antillarum* are listed.

Habitat: Coral reef, rock, mangrove, seagrass beds, sand; Type of Study: Quantitative; Biological Component: Echinodermata; Dominant Taxon/Taxa Studied: *Diadema antillarum*;

(26.00083)

Rice, M.E. 1970. Survey of the Sipuncula of the coral and beach rock communities of the Caribbean Sea. Proc. Int. Symp. Biol. Sipuncula Echiura, p. 35-49.

Additional information on the distributional patterns of 11 rock dwelling species and a review of the available information on several aspects of their biology, including their rock boring activities was presented. Sipunculans inhabiting beach rock and coralline limestone were collected. The habitats of the 11 most abundant species were described, listed, and relative abundance and distribution of each species reviewed. Some general observations were reported on the biology of the most common species, including feeding patterns and possible mechanisms for formation of the burrows.



Habitat:Calcareous rock; Type of Study:Qualitative; Biological Component:Sipuncula fauna; Type of Sampler:Dredge; Number of Stations:36 (7 in Florida); Dominant Taxon/Taxa Studied:*Phascolosoma perlucens*, *P. antillarum*, *Lithacrosiphon gurjanovae*, *Aspidosiphon brocki*, *Paraspidosiphon streenstrupi*, *Paraspidosiphon fischeri*, *Paraspidosiphon spinoscutatus*, *Theniste alutacea*, *Paraspidosiphon speciosus*, *Phascolosoma varians*, *Paraspidosiphon klunzingeri*;

(26.00084)

Rich, E.R. & L.J. Greenfield 1983. Comparison of benthic communities in Key Largo waterways. Presented at Benthic Ecol. Meet., Fla. Instit. of Tech., Melbourne.

The benthic communities of 5 artificial basins (3 cut from limestone and 2 cut from mangrove peat) in upper Key Largo, Florida were studied for up to 8 years. Abiotic parameters of the water column and associated terrestrial environment were monitored and related to variations in benthic fauna and flora. Patterns of community development varied with substrate type. Initial colonization was rapid with first algal production occurring within 6 weeks. Seasonality of macrophytes was evident within the first year. Given adequate exchange with ambient waters, benthic communities approached maturity with the establishment of seagrass within 3 years.

Study Duration:8 years; Habitat:Limestone rock, mangrove peat; Type of Study:Quantitative; Biological Component:Faua, flora; Number of Stations:5;

(26.00085)

Rio Palenque, Inc. 1972. Biological study of the waters of the Key Haven Development. Prepared for Key Haven Associated Enterprises, Inc.

Baseline information on the existing situation in and around the Key Haven development was collected. The existing canal bottoms were determined to be highly productive, despite the fact that they were dead-ended and the circulation was limited to tidal ebb and flow and to wind induced water movement. The shallow open area was less productive than the canals; however, the bands of rocky substratum occupied by *Sargassum* and the sediment filled depression which support *Thalassia* were relatively productive. In general, the shallow shelf area was more productive than the slightly deeper waters to the north and to the east of the Key Haven property. Floral and faunal species lists were presented.

Habitat:Grassbed, rock; Type of Study:Qualitative; Biological Component:Benthic flora and fauna; Type of Sampler:1 m<sup>2</sup> quadrats;

(26.00086)

Robbin, D.M. & J.J. Stipp 1979. Depositional rate of laminated soilsilene crusts, Florida Keys. J. of Sed. Petro. 49(1):0175-0180.

Laminated calcium carbonate crust "calcrete" from Key Largo, Florida was sampled and 5 layers of laminates identified. The layers were radiocarbon dated and ranged from 5680 years B.P. at the bottom to 400 years B.P. at the top. The data indicate the crust developed in the last 5,000-6,000 years. Samples from Big Pine Key produced similar results.

Habitat:Pleistocene coral reef; Type of Study:Qualitative;

(26.00087)

Roberts, H.H., T. Whelan & W.G. Smith 1977. Holocene sedimentation at Cape Sable, South Florida. Sed. Geol. 18:25-60.

A variety of sedimentary environments at Cape Sable were investigated to determine the depositional history and compare the seven types of environments. Radiocarbon dating shows three different dates for the formation of the three capes existing at this time. Cores reveal a carbonate-mud sequence similar to present subtidal sediments. Results of analysis indicate a typical marine carbonate-mineral suite, with numerous molluscs and *Thalassia* roots.

Type of Study:Qualitative; Abiotic Parameters Measured:Sediment characteristics;

(26.00088)

Robertson, P.B. 1963. A survey of the marine rock-boring fauna of southeast Florida. Univ. of Miami, M.S. Thesis. 169 p.

The rock boring fauna as a whole was determined to be typical of the West Indian faunal province and was comparable to that of other tropical regions. The boring sponge *Cliona truitti* was recorded for the first time from southeast Florida. It was extremely common in the intertidal zone. *Cliona caribborea* was shown to be the dominant boring sponge in the back reef environment. The sipunculid genus *Lithacrosiphon* represented by a single species, 4 species of the genus *Aspidosiphon*, and *Phascolosoma dentigerum* were recorded for the first time from Florida waters. The contribution of boring animals to the erosion of intertidal rock was determined to be slightly above the mid-tide level, but considerable in a zone extending for several centimeters above mean low water. Erosion by organisms appeared to be intense on the reef patches. Boring lamellibranchs were not prominent in the intertidal zone, but they were the most conspicuous boring animals in the back reef environment. The burrows of the gastrochaenids reported in this paper were distinctive and may easily be identified as to the species which formed them. The boring mechanisms of the majority of

rock boring animals have yet to be clearly demonstrated.

Habitat: Intertidal rock; Type of Study: Qualitative; Biological Component: Rock-boring fauna; Dominant Taxon/Taxa Studied: *Phascolosoma dentigerum*, *Cliona caribbea*, *Lithotrypa dorsalis*, *Aspidosiphon* sp., *Lithophaga nigra*, *Lithophaga antillarum*;

(26.00089)

Robinson, R.K. & D.E. Dimitriou 1963. The status of the Florida spiny lobster fishery, 1962-1963. Fla. St. Bd. Conserv. Mar. Lab. Tech. Ser. No. 42, 30 p.

A reported decline in the landings of Florida spiny lobsters was investigated. Additionally, the occurrence of phyllosoma larvae from plankton samples collected in Florida Bay and on the Tortugas fishing grounds was noted. It was concluded that the lobster stocks of south Florida were not depleted in the biological sense. It was suggested that the decline in catch per unit effort was a reflection of increasing fishing pressure upon relatively stable stocks. It was observed that some spawning occurred throughout the year. Less than 7 percent of the lobster larvae were identified as *Panulirus*.

Study Duration: 18 months; Type of Study: Qualitative; Biological Component: Decapod fauna; Type of Sampler: Commercial lobster traps; Dominant Taxon/Taxa Studied: *Panulirus argus*, *Panulirus guttatus*, *Panulirus laevis*;

(26.00090)

Rosenfeld, J.K. 1979. Interstitial water and sediment chemistry of two cores from Florida Bay. J. Sed. Petrol. 49(3):989-994.

Mangrove swamp and submerged mud bank cores from Florida Bay were analyzed for differences in interstitial water and sediment chemistry characteristics. Sulfate reduction was observed in the samples. The sulfate concentration profile is atypical of other anoxic environments because sulfate concentrations increase below 20 cm, possibly as a result of a balance between the mixing of the interstitial water with overlying seawater. Also, organic decomposition rates decrease with depth. Profiles of other chemical factors are discussed.

Type of Study: Qualitative; Type of Sampler: 2" core; Number of Stations: 2; Abiotic Parameters Measured: Ammonium, phosphate, alkalinity, sulfate reduction, organic carbon, organic nitrogen, amino acid;

(26.00091)

Rosenfeld, J.K. 1979. Amino acid diagenesis and adsorption in nearshore anoxic sediments. Limnol. Oceanogr. 24(6):1014-1021.

Nearshore anoxic sediments were sampled in Florida Bay, Long Island Sound, and Pettaquamscutt River (Rhode Island) to examine amino acid diagenesis and free amino acid adsorption by sediments. At one meter sediment depth, organic nitrogen and amino acid content were half that of surface values. Both elastic and carbonate sediments utilized equal amounts of acidic and neutral amino acids, in opposition to the preferential utilization of certain amino acids generally observed in deep-sea sediments. Laboratory adsorption experiments were used to explain preferential utilization of free amino acids in clay and carbonate sediments.

Habitat: Sand, mud; Type of Study: Quantitative; Type of Sampler: Corer; Number of Stations: 6;

(26.00092)

Seaman, W., Jr. & D.V. Aska 1974. Conference proceedings: Research and information needs of the Florida spiny lobster fishery. Fla. Sea Grant Prog. SUSF-SG-74-201, 64 p.

Abstracts of individual papers on the major aspects of the lobster fishery -- fishing, industry, statistics, history, economic and biological research -- were presented. Based on this information a summary of the major problems of the lobster fishery and some recommendations were given. The major problems included: theft of traps or trapped lobsters, weak prosecution of law breakers, limited entry of commercial fishermen, and lack of information concerning life histories and the ability of the species to sustain fishing pressures. International concerns focused on national sovereignty and the allocation of the fishery resources of coastal states and on the biological recruitment of lobsters from waters of another country.

Type of Study: Qualitative; Biological Component: Decapod fauna; Dominant Taxon/Taxa Studied: *Panulirus argus*;

(26.00093)

Shinn, E.A. 1963. Spur and groove formation on the Florida Reef tract. J. Sediment. Petrol. 33(2):291-303.

The internal structure of submarine reef spurs (10-12 ft high, <50 ft wide) from two Key Largo coral reefs was investigated by explosive dissection. The spurs were composed mainly of *Acropora palaua* encrusted by *Billepora* and calcareous algae. A theory of spur and groove formation is proposed based on oriented growth of *A. palaua*. On the seaward slope of reefs the branches of *A. palaua* orient in the direction of prevailing seas to withstand wave

thrust. Continued unidirectional growth results in coalescence of individual colonies into fingerlike spurs that project up to 200 ft into oncoming seas. The corals die from crowding when they reach the surface and later become encrusted with *Millepora* and calcareous algae. Coral growth in the grooves between spurs is prevented by moving sand.

Study Duration:1959-1960; Habitat:Coral reef; Type of Study:Qualitative; Biological Component:Cnidaria fauna and flora; Dominant Taxon/Taxa Studied:*Acropora palmata*, *Montastrea annularis*, *Millepora sp.*, *Lithothamnion*, *Porites asteroides*, *P. porites*;

(26.00094)

Shinn, E.A. 1966. Coral growth-rate, an environmental indicator. *J. Paleontol.* 40(2):233-240.

The growth rate of the branching coral, *Acropora cervicornis* transplanted into two areas of Key Largo Dry Rocks reef where they do not normally grow, was measured 12 times between December 1960 and February 1962 and compared to a control group living on a healthy reef. Growth of transplanted corals averaged less than half that of controls, which grew 10 cm/yr. One transplanted group grew as fast as the control group for 2 months, but died after 10 months when water temperature declined to 13.3°C. Seasonal variation in coral growth at all stations generally corresponded to temperature fluctuations. Growth rate was highest when temperatures ranged from 28 to 30°C. This transplanting method is proposed for use in determining growth tolerances of other reef building organisms.

Study Duration:December 1960-February 1962; Habitat:Coral reef; Type of Study:Quantitative; Biological Component:Cnidaria fauna; Number of Stations:3; Temporal Frequency:Monthly; Abiotic Parameters Measured:Water temperature; Dominant Taxon/Taxa Studied:*Acropora cervicornis*;

(26.00095)

Shinn, E.A. 1972. Coral reef recovery in Florida and in the Persian Gulf. *Environ. Conserv. Dept.*, Shell Oil Co., Houston, TX. 9 p.

A long term study (1960-1975) in the Florida Keys showed rapid recovery of coral reefs after large scale destruction by hurricanes. Widespread scattering of live fragments initiated new colonies, promoting rapid recovery. Recovery of reefs from low temperature-induced death in the Persian Gulf was compared with reef recovery from storm destruction in Florida. Rapid *Acropora cervicornis* recovery was due to a high rate of growth (10 cm/yr) and branch formation, confirmed by 10 years of serial underwater photographs. It is suggested that standing crops of restocked or transplanted reefs could be predicted with more precise growth measurements of *A. cervicornis* and other common reef building corals.

Study Duration:1960-1975; Habitat:Coral reef; Type of Study:Quantitative; Biological Component:Cnidaria fauna; Dominant Taxon/Taxa Studied:*Acropora cervicornis*, *Diploria sp.*, *Montastrea annularis*;

(26.00096)

Shinn, E.A. 1980. Geologic history of Grecian Rocks, Key Largo Coral Reef Marine Sanctuary. *Bull. Mar. Sci.* 30(3):646-656.

Seven core holes (8-14 m deep) were drilled across the major ecological zones of Grecian Rocks in Key Largo Coral Reef Marine Sanctuary to determine the internal morphology and age. Coral facies in the Holocene reef were found to correspond closely to facies in the underlying Pleistocene material. The five major ecologic zones and their characteristic coral compositions are described. Cores showed that all zones except the massive coral head zone are thin layers overlying an accumulation of carbonate sand and rubble. Carbon 14-dating indicated that growth of the reef began about 6,000 years before present.

Habitat:Coral reef; Type of Study:Qualitative; Biological Component:Cnidaria fauna; Type of Sampler:Hydraulic drill; Number of Stations:7; Dominant Taxon/Taxa Studied: *Acropora palmata*, *A. cervicornis*, *Millepora sp.*, *Montastraea annularis*, *Diploria strigosa*, *Colpophyllia natans*, *Siderastrea sp.*;

(26.00097)

Shinn, E.A., J.H. Hudson, D.M. Robbin & B. Lidz 1981. Spurs and grooves revisited: construction versus erosion, Looe Key Reef, Florida. Fourth Internat. Coral Reef Symp.

Six core holes drilled into a spur and groove system at Looe Key Reef, Florida, indicated that there was at least 5 meters of underlying carbonate reef sand, the base of which was flat and therefore could not affect the initiation or spacing of spurs and grooves. Only the seaward ends of the spurs were attached to underlying bedrock. *Acropora palmata*, a coral formerly abundant on the reef, composed the interior of the *Millepora* encrusted spurs. It is proposed that the most shallow spurs and grooves in active coral reef areas of the Caribbean are not initiated or regulated by bedrock topography, but are constructional in origin. Spurs and grooves in non-coral reef areas adjacent to shorelines, which have distinctly different spacing are believed have an erosional origin. Spurs and grooves in deeper fore-reef areas off Florida with a morphology similar to that of nearshore systems, therefore, formed from erosion during periods of lower sea level.

Habitat:Coral reef; Type of Study:Quantitative; Biological Component:Cnidaria fauna; Type of Sampler:Drill; Number of

Stations:6; Dominant Taxon/Taxa Studied:*Acropora palmata*, *Millepora sp.*;

(26.00098)

Springer, V.G. & A.J. McErlean 1962. Seasonality of fishes on a south Florida shore. Bull. Mar. Sci. Gulf Caribb. 12:39-60.

Monthly collections on a grassy shore on Matecumbe Key, Florida Keys, were made from March 1960 through February 1961 with a 100 foot bag seine with three-eighths inch mesh. One hundred and six species of fishes were taken. Numbers of species and specimens were greatest during summer and fall. Approximately one third of the species were represented only by young.

Study Duration:March 1960-February 1961; Habitat:Grassbed, sand; Type of Study:Qualitative; Biological Component:Fauna; Type of Sampler:Seine net; Sieve Size:3/8"; Number of Stations:1; Number of Replicates/Station:Variable; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature; Dominant Taxon/Taxa Studied:*Atherinomorox stipes*, *Eucinostomus gula*;

(26.00099)

Staiger, J.C. 1970. The distribution of the benthic fishes found below two hundred meters in the Straits of Florida. Univ. of Miami, Ph.D. Dissertation.

Over 5,200 specimens were collected from below 200 meters in the Straits of Florida and were determined to represent 189 species of 58 families of fishes. Most of these specimens were obtained from 477 bottom trawl stations. Six distributional patterns were found to exist among the Straits of Florida benthic fishes. The occurrence of the species were compared using the Recurrent Groups Analysis method developed by Fager.

Study Duration:1962 - publishing date; Type of Study:Semi-quantitative; Biological Component:Benthic fishes; Type of Sampler:Otter trawl, dredge; Number of Stations:477; Number of Replicates/Station:1;

(26.00100)

Stephenson, T.A. & A. Stephenson 1950. Life between tide marks in North America. 1. The Florida Keys. J. Ecol. 38(2):354-402.

A broad study was made of the physical, chemical, and biological aspects of the intertidal zone in the Florida Keys area. Zonation, ecology, and geographical relations of the common fauna and flora were determined. The intertidal flora and fauna are tropical; distinct from temperate flora and fauna.

Type of Study:Quantitative; Biological Component:Fauna/flora;

(26.00101)

Stockman, K.W., R.N. Ginsburg & E.A. Shinn 1967. The production of lime mud by algae in south Florida. J. Sediment. Petrol. 37(2):633-648.

Comparison of the annual production of fine aragonite mud (<15  $\mu$ ) by post mortem disintegration of algae showed the algae, *Penicillus*, to be a major sediment contributor, accounting for all the fine aragonite mud in the inner Florida Reef Tract and 1/3 of the same material in northeastern Florida Bay. The contribution of 3 other abundant algal species is assessed as well as the significance of mechanical breakdown of skeletons, molluscs, and corals. Transport of fine lime muds from their production sources to areas of accumulation is discussed.

Study Duration:1 year; Habitat:Mud; Type of Study:Quantitative; Biological Component:Flora; Number of Stations:23; Temporal Frequency:Every 20 days; Dominant Taxon/Taxa Studied:*Penicillus*;

(26.00102)

Sweat, D.E. 1968. Growth and tagging studies on *Panulirus argus* (Latreille) in the Florida Keys. Fla. Bd. Conserv. Mar. Res. Lab., Tech. Ser. No. 57. 30 p.

Juvenile spiny lobsters (*Panulirus argus*) were studied in the Florida Keys from March 1966 to August 1968. Various sampling devices and artificial habitats were tested in different locations throughout the Keys to determine the best areas and most efficient techniques for collecting postlarval lobsters. Growth measurements made on 510 postlarval lobsters revealed growth rates similar to those reported from other studies. Plankton samples indicated that metamorphosis of the phyllosome larvae probably occurs offshore, followed by a postlarval migration inshore. Results are reported from a tagging study of 2500 lobsters released near Key West.

Study Duration:March 1966-August 1968; Type of Study:Quantitative; Biological Component:Crustacea fauna; Type of Sampler:Pushnet, vacuum dredge, roller frame trawl, plankton net; Number of Stations:Variable; Temporal Frequency:Variable; Abiotic Parameters Measured:Air & water temperature, salinity, tidal information, wind velocity & direction; Dominant Taxon/Taxa Studied:*Panulirus argus*;

(26.00103)

Tabb, D.C., D.L. Durbrow & R.B. Manning 1962. The ecology of northern Florida Bay and adjacent estuaries. Mar. Lab., Univ. of Miami, Tech. Ser. No. 39, 81 p.

Florida Bay was characterized by turbidity, shallow waters and dominant cover (*Thalassia*). Fauna and flora of the offshore regions were found to be related to the major substratum types. A large influx of fishes and invertebrates into the study area in the late fall, corresponding to lower salinities, was noted. Analysis of bottom sediments provided an estimate of the character of the bottom as a substratum for benthic organisms and gave an indication of the nature of deposition of the various sediment size fractions in relation to currents, wind transport and fresh water source.

Study Duration: Approximately 4 years; Habitat: Sand, shell, soft marsh, gravel; Type of Study: Qualitative; Biological Component: Flora and fauna; Type of Sampler: Trawl net, Van Veen grab, dip net, fish poison; Number of Stations: 40; Number of Replicates/Station: 1; Temporal Frequency: Monthly; Abiotic Parameters Measured: Salinity, DO, pH, tides, wind, transpiration, rainfall; Dominant Taxon/Taxa Studied: *Aronalocaris*, *Macoma*, *Thalassia testudinum*;

(26.00104)

Tabb, D.C. & E.J. Heald (Tropical Bioindustries Dev. Co.) 1974. Environmental survey and commentary on Phase I - Harbor Course Development plan, p. 1-17, Section I, In: Environmental, biological, and hydrological reports to accompany plans for Phase I - Harbor Course Development ... Ocean Reef Club.

A survey of environmental conditions to accompany plans for a proposed expansion of the Ocean Reef Club on Key Largo was conducted. An examination was made of the Dispatch Slough area, and the mangrove communities occupying the Slough were described. A determination was made whether or not these communities are effectively intertidal, irrespective of their elevation in relation to surveyed mean sea level. Additionally, an assessment of the importance of the mangrove communities of the slough as contributors to adjacent biological systems was presented. Comments were given on the impact of the proposed development plan on the slough and adjacent coastal areas.

Habitat: Mangroves; Type of Study: Qualitative; Biological Component: Flora and fauna; Type of Sampler: Aerial infrared photography; Abiotic Parameters Measured: Salinity;

(26.00105)

Tabb, D.C. & A.C. Jones 1962. Effect of Hurricane Donna on the aquatic fauna of North Florida Bay. Trans. Am. Fish. Soc. 91(4):375-378.

A report on the effects of Hurricane Donna on aquatic fauna in North Florida Bay was presented. In December 1960, Hurricane Donna caused heavy mortality among aquatic fauna in North Florida Bay. The depletion of oxygen due to the decomposition of organic material resulted in subsequent mortality. Within 6 weeks, salinities were normal; however, dissolved oxygen concentrations remained unusually low for a longer period. In regions of greatest oxygen depletion, aquatic fauna were scarce for many months. Sport fish catches declined right after the hurricane, but recovered within 1 to several months, depending upon the area. Moreover, juvenile pink shrimp moved from their estuarine nursing grounds into deeper water approximately 60 miles offshore.

Study Duration: 4 months; Habitat: Estuarine; Type of Study: Semiquantitative; Biological Component: Fauna; Abiotic Parameters Measured: Salinity, DO;

(26.00106)

Tabb, D.C. & R.B. Manning 1961. A checklist of the flora and fauna of northern Florida Bay and adjacent brackish waters of the Florida mainland collected during the period July 1957 through September 1960. Bull. Mar. Sci. Gulf & Caribb. 11(4):552-649.

Collections from the marine and brackish water areas of northern Florida Bay and adjacent estuaries resulted in 432 species of plants, invertebrate animals and fish. Notes on their abundance, tolerance to changes in the physical environment, and distribution in relation to habitat were included. Fluctuations in distribution and abundance in a natural environment were studied.

Study Duration: Approximately 3 years; Type of Study: Qualitative; Biological Component: Flora and fauna; Type of Sampler: Otter trawl, Van Veen grab, seine, fish traps, dip net, channel net, push net; Number of Stations: 6; Abiotic Parameters Measured: Temperature, salinity;

(26.00107)

Thomas, L.P. 1961. Distribution and salinity tolerance of the amphiurid brittlestar, *Ophiophragus filigraneus* (Lyman, 1875). Bull. Mar. Sci. 11(1):158-160.

This short note gives the distribution of the amphiurid, *Ophiophragus filigraneus*, in Florida and discusses the ecology of the species. *O. filigraneus* was collected from Whitewater Bay, Florida, at a salinity of 7.7 ‰, a record low for echinoderms. The estuarine domain of echinoderms is reviewed.

Study Duration: Summer 1958; Habitat: Mud, seagrass; Type of Study: Qualitative; Biological Component: Ophiuroid fauna; Type of Sampler: Petersen grab; Abiotic Parameters Measured: Salinity; Dominant Taxon/Taxa Studied: *Ophiophragus*

filigraneus;

(26.00108)

Thomas, L.P. 1964. *Amphiodia atra* (Stimpson) and *Ophionema intricata* Lutken, additions to the shallow water amphurid brittle star fauna of Florida (Echinodermata: Ophiuroidea). Bull. Mar. Sci. Gulf & Caribb. 14(1): 158-167.

*Ophionema intricata* Lutken and *Amphiodia atra* (Stimpson) were reported for the first time from Florida waters. Descriptions and illustrations were presented, and *Amphiodia gyraspis* H.L. Clark and *A. liabata* (Grube) were synonymized with *A. atra*. A discussion of the genus *Amphiodia* was included.

Habitat: Sand, mud; Type of Study: Qualitative; Biological Component: Amphurid fauna;

(26.00109)

Thorhaug, A.L. 1965. Aspects of the developmental morphology and biology of the genus *Penicillus*, a green marine alga. Univ. of Miami M.S. Thesis. 119 p.

*Penicillus* in the Biscayne Bay and Florida Keys region was studied for distributions, relative densities, seasonal variations, and favorable environments. Plants were most abundant in the summer and on sandy or mud bottoms. Space competition was important in determining growth of *Penicillus*, as were depth, current velocity, and predation. Growth occurred through asexual reproduction by vegetative propagation. Morphology and growth were also studied in the lab revealing a growth rate of .7 cm/week and a mean height of 5.7 cm.

Habitat: Sand, mud; Type of Study: Quantitative; Biological Component: Flora; Abiotic Parameters Measured: Depth, current velocity, sediment type; Dominant Taxon/Taxa Studied: *Penicillus*;

(26.00110)

Turnel, R.J. & R.G. Swanson 1976. The development of Rodriguez Bank, a Holocene mudbank in the Florida reef tract. J. Sediment. Petrol. 46(3):497-518.

Rodriguez Bank off Key Largo, Florida consists of unconsolidated calcareous sediments deposited during a period of sea level rise with minimal wave action. Unlike modern coral-algal reefs, the bank has no rigid organic framework, but has accumulated as direct and indirect results of plants. Algae contribute most of the sediment. Four ecologic zones are described and their importance in the reef building is assessed. Although the biotic assemblages and hydrography have changed since its initial development, the bank has become a stable topographic feature.

Habitat: Calcareous sediment; Biological Component: Fauna and flora; Dominant Taxon/Taxa Studied: *Porites divaricata*, *Halimeda opuntia*, *Goniolithon*, *Thalassia testudinum*;

(26.00111)

Turney, W.J. & B.F. Perkins 1972. Molluscan distribution in Florida Bay. Sedimenta III, The Comparative Sedimentology Laboratory. Div. Mar. Geol. and Geophys. Univ. of Miami.

Within Florida Bay 4 subenvironments were designated according to the physical characteristics of salinity and variability of salinity, water circulation, and wind. The fauna of Florida Bay was found to be dominantly molluscan, principally gastropods and bivalves which were represented by about 100 genera and 140 recognized species. A few "index species" and several "consistently common species" defined 4 molluscan suites whose distributions seemed to be controlled by the environmental influences characterizing the 4 subenvironments. Molluscan debris was determined to comprise 58 to 95% of the sediment particles greater than 1/8 mm. It was suggested that the disintegration process is almost entirely organic and affected by crabs, boring sponges, perforating algae, holothurians, worms, and *Thalassia testudinum* roots. Thin-shelled bivalves were observed to break down more rapidly than thick shelled bivalves and gastropods.

Study Duration: 1 year; Habitat: Shell, mud, grassbed; Type of Study: Qualitative; Biological Component: Molluscan fauna; Type of Sampler: Shovel, posthole digger, piston coring device; Sieve Size: 1.0 mm;

(26.00112)

Tyson, R. 1981. Sediments of a Florida Bay basin. Univ. of So. Fla. M.S. Thesis.

Forty four surface sediment samples from a basin in southeastern Florida Bay exhibited variations in texture, mineralogy, and molluscan assemblages. Sediment grain size analysis separated the samples into three major groups. Aragonite averaged approximately 51% in the silt and clay sized fractions. Bivalves were shown to prefer small grain sized sediments. A direct correlation between bivalve and *Thalassia* distribution was associated with the trapping of fine grained sediments by seagrass beds. Epifaunal gastropods exhibited uniform distribution. Correlations among sand, depth, rock fragments, foraminifera, *Cerithium*, *Halimeda*, and calcite content are identified for sand environments; correlations among other variables are also cited for silt subenvironments.

Habitat: Sand, mud; Type of Study: Quantitative; Biological Component: Fauna and flora; Type of Sampler: Hand core, pipe dredge; Abiotic Parameters Measured: Sediment grain size, mineral content; Dominant Taxon/Taxa Studied: *Thalassia*, *Halimeda*, *Cerithium*, *Pseudocyrenia*;

(26.00113)

Voss, G. 1953. Observations on *Octopus hummelincki*. Nautilus 66(3):73.

A single specimen of *Octopus hummelincki* discovered beneath a slab of coral at Long Reef in the Florida Keys was observed on 26 July 1952. The sculpture, coloration, movements, and habitat of the octopus are described.

Study Duration:26 July 1952; Habitat:Coral reef; Type of Study:Qualitative; Biological Component:Mollusca; Dominant Taxon/Taxa Studied:*Octopus hummelincki*;

(26.00114)

Mainwright, S.A. & J.R. Dillon 1969. On the orientation of seafans (Genus *Gorgonia*). Biol. Bull. 136:130-139.

Measurements were made of the orientation (to points of the compass) of the plane of 189 seafans from 5 patches on coral reefs in the upper Florida Keys. Small fans were observed to be randomly oriented, whereas large fans showed a high degree of preferred orientation within each patch. Microscopic examination of the axial skeleton of some large fans revealed progressive changes in orientation that had taken place during growth. A passive mechanism of orientation was suggested. Due to the high velocity and short period of surf and surge and the observed motions of fans on the reef, surf and surge are judged to be the most important components of water movements controlling fan orientation.

Study Duration:2 months; Habitat:Coral reefs; Type of Study:Qualitative; Biological Component:Gorgonian fauna; Number of Stations:5; Number of Replicates/Station:24-48; Temporal Frequency:Once; Dominant Taxon/Taxa Studied:*Gorgonia ventalina*, *Gorgonia flabellum*;

(26.00115)

Walton, A.S., Jr. 1978. Orientation to wave surge by spiny lobsters. Fla. State Univ. M.S. Thesis.

*Panulirus argus* captured in the Florida Keys were tested for their ability to orientate according to wave surge level and direction. In the presence of surge, the paths were straighter and clustered about a single direction. As the surge level increased, however, straightness and clustering differences from control levels increased. Velocity, more than displacement was important in orientation. Walking speed remained constant under differing surge conditions. The possibility of menoreotaxis is discussed.

Type of Study:Quantitative; Biological Component:Faua; Abiotic Parameters Measured:Wave surge level and direction; Dominant Taxon/Taxa Studied:*Panulirus argus*;

(26.00116)

Warner, R.E., C.L. Combs & D.R. Gregory, Jr. 1978. Biological studies of the spiny lobster *Panulirus argus* (Decapoda: Palinuridae) in South Florida. Proc. Gulf Caribb. Fish. Instit. 29: 166-183.

Seasonal movements, reproductive biology, growth rates, population structure, distribution and relative abundance of local adult and subadult lobster populations, especially as these parameters relate to the commercial industry, were evaluated. The south Florida commercial fishery was determined to be stressed heavily in both the Gulf and Atlantic. A reevaluation of the current management program for the lobster resource in south Florida was recommended so as to ensure the perpetuation of the fishery.

Study Duration:2 months; Habitat:Coralline, sand, mud, grassbed; Type of Study:Qualitative; Biological Component:Spiny lobster; Type of Sampler:Commercial wooden slot traps; Number of Stations:5; Number of Replicates/Station:25; Temporal Frequency:Weekly; Dominant Taxon/Taxa Studied:*Panulirus argus*;

(26.00117)

Wickham, D.A. 1967. Observations on the activity patterns in juveniles of the pink shrimp, *Penaeus duorarum*. Bull. Mar. Sci. 17(4):769-786.

Laboratory observations of diel patterns in locomotor and burrowing activity of juvenile *Penaeus duorarum* collected from Buttonwood Canal, Flamingo, Florida were made under constant light intensity, water current, and water level. Activity patterns appeared to be regulated by tidal and lunar periodicities. Experimental variation of light and water levels also affected behavior patterns of juvenile pink shrimp. Activity patterns of *P. duorarum* in the field were concluded to be determined by an interaction of ambient environmental stimuli and rhythmic patterns of abiotic factors.

Type of Study:Qualitative; Biological Component:Crustacea; Abiotic Parameters Measured:Temperature, salinity, DO; Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(26.00118)

Wynne, D.M. 1978. Low temperature effects on behavior in spiny lobsters, *Panulirus argus* (Crustacea: Palinuridae). Fla. State Univ. M.S. Thesis.

With the use of different cooling rates the locomotory and feeding behaviors of *Panulirus argus* from the Florida Keys

were studied. Warm-acclimated lobsters subjected to cooling showed critical minimum temperatures of 12° and 14°C. Cold-acclimated lobsters which were cooled showed a critical minimum temperature of 10°C. It is suggested that *P. argus* cannot withstand thermally variable waters below 12°C and is probably unable to traverse deep water straits with temperatures below 10°C.

Type of Study:Quantitative; Biological Component:Fauna; Abiotic Parameters Measured:Temperature, salinity, photoperiod; Dominant Taxon/Taxa Studied:*Panulirus argus*;

(26.00119)

Zieman, J.C. 1976. The ecological effects of physical damage from motorboats. *Aquat. Bot.* 2:127-139.

A report on the ecological effects of motorboat damage revealed that beds of turtle grass, *Thalassia testudinum*, although highly productive do, not recover rapidly following physical disturbance of the rhizome system. In shallow waters, the most common form of rhizome disturbance was determined to be from the propellers of motorboats. In *Thalassia* beds which were otherwise thriving, tracks resulting from propellers were observed to persist from two to five years. The proportion of fine sediment components was reduced in the sediments from the boat tracks, and the pH and Eh were also reduced in comparison to the surrounding grassbed. Damage of this type was found to most often occur in shallow passes between islands and keys. These areas were also reported to be the slowest to recover due to the rapid tidal currents.

Study Duration:1 month; Habitat:Grassbeds, sediment; Type of Study:Qualitative; Biological Component:Benthic flora; Type of Sampler:Aerial photographs, corer, inverted bottle; Sieve Size:3.0 mm gradually smaller to 0.0625 mm; Number of Stations:8; Number of Replicates/Station:1; Temporal Frequency:Once; Abiotic Parameters Measured:pH, Eh; Dominant Taxon/Taxa Studied:*Thalassia testudinum*;

(26.00120)

Zischke, J.A. 1972. An ecological guide to the shallow water marine communities of Pigeon Key, Florida. St. Olaf College, Northfield, Minnesota.

A concise description of the ecology of the Pigeon Key, Florida area was presented. The geography and geology of the Pigeon Key area were described. The Key Largo limestone derived from these pleistocene reefs was found to vary in composition and may include: large masses of coral skeleton (including species of the genera *Montastrea*, *Diplora*, *Acropora*, and *Siderastrea*), *Halimeda* (a calcareous alga), coralline algae, foraminiferans, bryozoans, sponge spicules, worm tubes, molluscan and coral debris, echinoderm spines, and fecal pellets, all of which are cemented together with calcite. Physical and chemical conditions including atmospheric conditions and surface water conditions were described. A detailed description of the life in the inshore intertidal regions of the Florida Keys was presented in terms of physical structure and plants and animals. The two distinct communities dominating the shallow water subtidal area of the reef flat, *Alcyonaria* sponge community and seagrass community were described as were variations in these communities. Other shallow water communities including mangrove communities and coral reef communities were also discussed. Recommendations for the preservation of the Florida Keys in their present state were made.

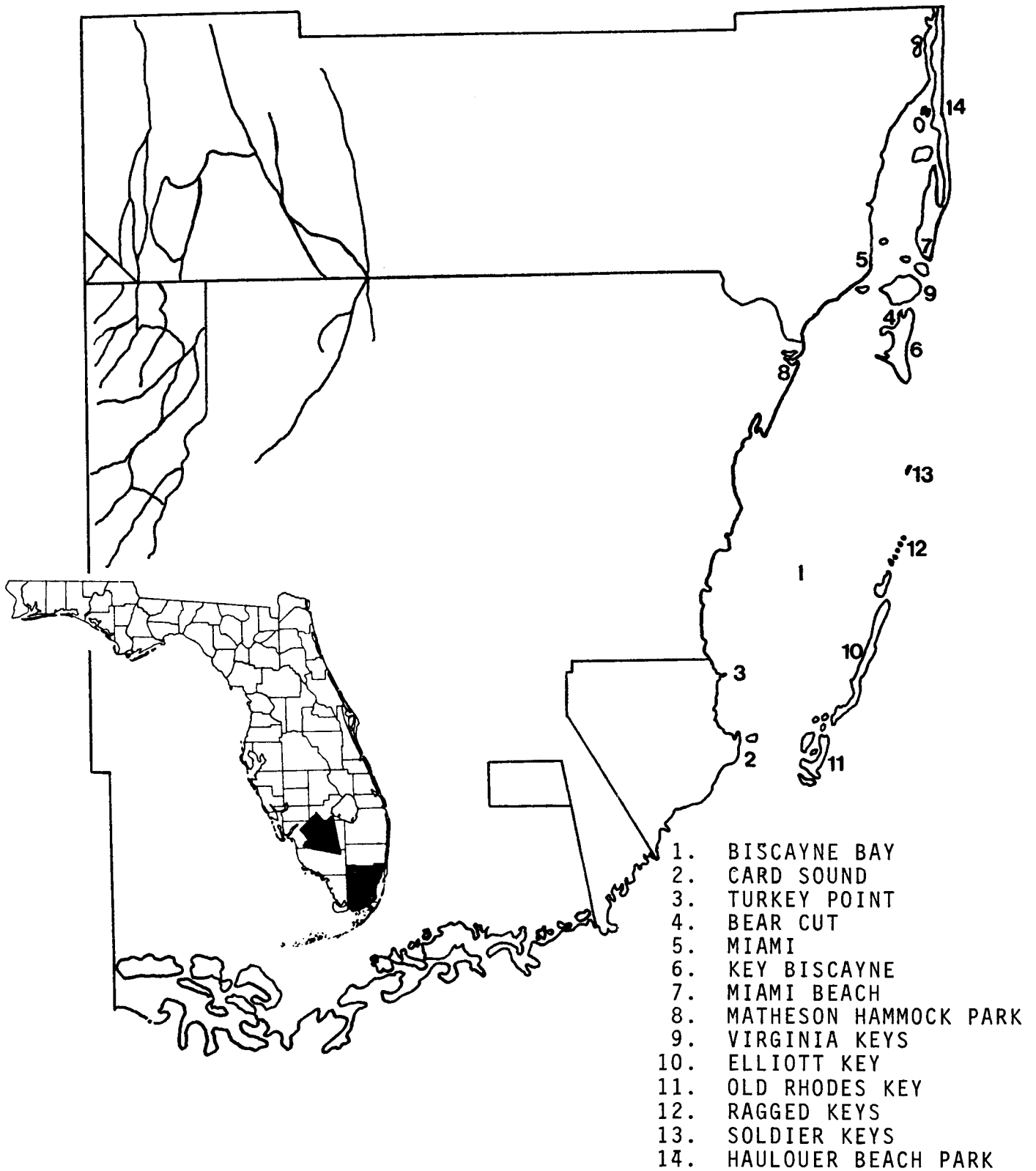
Habitat:Coral reef, limestone rock, grassbed; Type of Study:Qualitative; Biological Component:Flora and fauna;

For publications on the Everglades see section 4, Southern Florida.

See also: 4.00005, 4.00006, 4.00016, 4.00022, 4.00024, 4.00038, 4.00039, 4.00042, 4.00045, 4.00047, 4.00048, 4.00054, 4.00063, 4.00064, 4.00072, 10.00011, 19.00099, 27.00043, 30.00002, 32.00006.



# DADE COUNTY



(27.00001)

Albertson, H.D. 1973. A comparison of the upper lethal temperatures of animals of fifty common species from Biscayne Bay. Univ. of Miami M.S. Thesis. 78 p.

Temperature tolerance experiments were performed on 50 macroinvertebrate species from Biscayne Bay, Florida. The upper lethal temperatures of upper littoral organisms were higher than those of lower littoral organisms. At low salinity values the lethal temperature was reduced, though at extremely low salinities (less than 10 o/oo) the values were inconsistent. Optimal temperatures for growth were observed at 12-13°C below the lethal temperatures of 3 species studied for long term temperature effects.

Type of Study:Quantitative; Biological Component:Faua; Abiotic Parameters Measured:Temperature, salinity;

(27.00002)

Andree, S.W. 1981. Locomotory activity patterns and food items of benthic postlarval spiny lobsters, *Paaulirus argus*. Fla. State Univ. M.S. Thesis. 50 p.

*Paaulirus argus* (spiny lobsters) were studied from September 1980 to June 1981 in Biscayne Bay to determine postlarval locomotory activity, foraging, and diet. Activity started just after sunset, was the highest by midnight and ended before sunrise. The diet was diverse, suggesting that postlarvae are opportunistic, generalist feeders. There was little foraging duration variation seasonally.

Study Duration:September 1980-June 1981; Habitat:Rock rubble; Type of Study:Qualitative; Biological Component:Faua; Number of Stations:1 transect; Abiotic Parameters Measured:Substrate type; Dominant Taxon/Taxa Studied:*Paaulirus argus*;

(27.00003)

Applied Biology, Inc. 1977. Ecological monitoring of selected parameters at the Turkey Point Plant. Florida Power & Light Co., Miami, FL. Rept.

Results of benthic sampling in the vicinity of the Florida Power and Light Co. Turkey Point Plant in 1977 are reported. A species list was compiled and density, biomass, diversity and equitability values are also reported.

Study Duration:April 1977; Type of Study:Quantitative; Biological Component:Macroinvertebrates; Type of Sampler:Grab; Number of Stations:8; Temporal Frequency:Single sampling;

(27.00004)

Bader, R.B. & M.A. Roessler 1972. An ecological study of south Biscayne Bay and Card Sound. Prog. Rept. to U.S. AEC (AT(40-1)-380-43). Rosenstiel School of Mar. & Atmos. Sci., Univ. of Miami, Miami, Fla.

A baseline environmental study of south Biscayne Bay and Card Sound, Florida was conducted from 1968 to 1972, with emphasis on the areas adjacent to Turkey Point and the mouth of the Model Land Company canal. Data were collected concerning the local hydrography, water and sediment chemistry, flora, and planktonic and benthic communities. Environmental parameters such as temperature, radioactivity, salinity, and chemical characteristics were examined in relation to the biology of the organisms. The effect of high temperature on dominant and subdominant species were investigated in the laboratory and field.

Study Duration:1968-1972; Type of Study:Quantitative; Biological Component:Faua, flora;

(27.00005)

Bader, R.G., M.A. Roessler & A. Thorhaug 1970. Thermal pollution of a tropical marine estuary, p. 425-428, In: FAO Tech. Conf. on Mar. Poll. & its Effects on Living Resources & Fishing. Rome, 1970, p. 624.

The results of field and laboratory studies on thermal pollution of the Biscayne Bay tropical marine estuary demonstrated that sustained temperatures above 33°C can cause excessive mortalities in some macroalgae and seagrasses. This, in turn, could eliminate the major food source and shelter for a great number of herbivores and detritus feeders, including the juvenile stages of some commercial species. In addition to immediate losses of fish and invertebrate species, the lack of sufficient bottom vegetation could result in increased erosion of the sediment. This process could have a detrimental effect on productivity, which would further contribute to the deterioration of estuarine areas. The upper thermal limits of selected species of estuarine flora and fauna are discussed.

Study Duration:2 years; Habitat:Estuarine; Type of Study:Qualitative; Biological Component:Benthic flora, invertebrates, fishes; Type of Sampler:Trawl, trap, gill net, slate-settling panels; Number of Stations:Variable - 8, 12, 20, 32; Number of Replicates/Station:Variable; Temporal Frequency:Bimonthly, monthly, quarterly; Abiotic Parameters Measured:Temperature, salinity, DO, copper, iron;

(27.00006)

Beardsley, A.G. & R. Hixon 1974. Large scale transplantation of *Thalassia* in south Florida. In conference on restoration of coastal vegetation in Florida. Proc. of the First Annu. Conf. on Restoration of Coast. Vegetation in

Fla. p. 18-20.

Revegetation by planting *Thalassia testudinum* seeds was studied. Two transects running through 3 zones of regrowth: *Halodule wrightii*, green siphonaceous algae, and bare peat were examined. Growth of blade and root were vigorous with mean blade growth being 16.5 cm. Eighty percent of the plants germinated and remained in position. All plants developed roots.

Type of Study:Quantitative; Biological Component:Flora; Number of Stations:2 transects ; Dominant Taxon/Taxa Studied:*Thalassia testudinum*;

(27.00007)

Berkeley, S.A. 1972. Some factors affecting the abundance and distribution of *Cerithium muscarum* (Say) and *Neopanope packardii* (Kingsley) in south Biscayne Bay, Florida, in the vicinity of Turkey Point. Univ. of Miami M.S. Thesis. 54 p.

Between July 1968 and May 1971 variables affecting the abundance and distribution of *Cerithium muscarum* and *Neopanope packardii* in south Biscayne Bay Florida were investigated. The amount and type of benthic macroalgae present were the major controlling factors, while temperature, dissolved oxygen, and salinity levels were not demonstrated to be limiting variables. High temperatures associated with thermal effluent prevented the growth of macroalgae and reduced the abundance of *Cerithium* and *Neopanope*. Areas heated between 1 and 2°C above ambient temperature showed increased numbers of both species, however.

Study Duration:July 1968-May 1971; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Otter trawl; Number of Stations:20; Number of Replicates/Station:7; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO; Dominant Taxon/Taxa Studied:*Cerithium muscarum*, *Neopanope packardii*;

(27.00008)

Biosystems Research, Inc. 1982. Biscayne Bay benthic sampling program. Annu. Rept. to Dept. of Environ. Resources Mgt., Dade County, Fla. 21 p. + 15 Appendices.

Benthic samples were collected with a petite ponar dredge at 60 sampling sites in Biscayne Bay, Florida during fall 1981 and winter 1982 to assess the status of the local benthic community. Correlation analyses of benthic organisms, seagrass blade count, and various abiotic parameters were conducted. Distributional trends in abundance and diversity of species are cited and questions are posed for further investigation.

Study Duration:November 1981-March 1982; Habitat:Mud, sand, seagrass beds; Type of Study:Quantitative; Biological Component:Fauna and flora; Type of Sampler:Petite ponar, trawl; Sieve Size:0.5 mm; Number of Stations:60 (Phase I), 15 (Phase II); Number of Replicates/Station:1 (Phase I), 5 (Phase II); Temporal Frequency:2 samplings (fall 1981, winter 1982); Abiotic Parameters Measured:Water temperature, salinity, DO, bottom type, water color, secchi depths, wind, current velocity, direction, sediment grain size;

(27.00009)

Booker F., A. Thorhaug, G. Beardsley & B. Flynn 1982. Seagrass species, density and theoretical productivity of Key Biscayne, Florida. Florida Sci. 45 (Suppl. 1):23.

A 648 ha. seagrass bed was sampled by divers every 5 m along 7 transects which ran perpendicularly from the grass line nearshore out to 100 m. Three additional transects were sampled farther offshore. Density and productivity were calculated for *Thalassia testudinum*, *Halodule wrightii* and *Syringodium filiforme*. The density and productivity was less offshore.

Habitat:Grassbed; Type of Study:Qualitative, quantitative; Biological component:Flora; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Halodule wrightii*, *Syringodium filiforme*;

(27.00010)

Borkowski, T.V. 1971. Reproduction and reproductive periodicities of south Floridian Littorinidae (Gastropoda: Prosobranchia). Bull. Mar. Sci. 21:826-840.

Reproductive aspects of some Littorinidae collected from Biscayne Bay to Lake Worth were correlated with various environmental parameters. Planktonic egg capsules and nurse cells are illustrated. Most animals had ripe eggs or sperm between December and April. Tidal wetting, height on the shore, and critical temperatures influenced spawning. Spawning was lunar or semilunar and occurred at tidal levels above MHW. Twelve thousand to 44,000 egg capsules were released depending on the species.

Type of Study:Quantitative; Biological Component:Fauna; Temporal Frequency:Twice weekly; Abiotic Parameters Measured:Temperature, salinity, rainfall, wind, wave action, tide levels; Dominant Taxon/Taxa Studied:*Tectarius auricatus*, *Modiolittorina tuberculata*, *Echinus nodulosus*, *Littorina lineata*, *Littorina lineolata*, *Littorina ziczac*;

(27.00011)

Brook, I.M. 1975. Some aspects of the trophic relationships among the higher consumers in a seagrass community (*Thalassia testudinum* Koenig) in Card Sound, Florida. Univ. of Miami, Ph.D. Dissertation, 133 p.

This study examined the feeding relationships (higher level consumers) of the macrobenthic and cryptic fauna of Card Sound. The area studied had a low biomass of benthic and cryptic fauna (3.35 g dry/m<sup>2</sup>). The principal interaction between the primary consumers was via the polychaetes and peracaridean crustaceans. Based on digestive tract examinations, molluscs were not found to be a preferred food for those animals frequenting the study site. The majority of the fishes captured were determined to be foragers over a wide area. It was felt that the predator population was limited by the small stock of polychaetes and peracaridean crustaceans (1.97 g dry/m<sup>2</sup>). The primary productivity of *Thalassia* in the area was high (3.7 g dry/m<sup>2</sup>/day), but little evidence of grazing or utilization of the detritus by higher consumers was found.

Study Duration: July 1972 - July 1973; Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Benthic flora and fauna; Type of Sampler: Drop net, seine net, Venturi suction dredge; Number of Replicates/Station: Variable; Temporal Frequency: Monthly;

(27.00012)

Brook, I.M. 1977. Trophic relationships in a seagrass community (*Thalassia testudinum*) in Card Sound, Florida. Fish diets in relation to macrobenthic and cryptic faunal abundance. Trans. Am. Fish. Soc. 106(3):201-294.

The trophic interaction between the fishes and the macrobenthic and cryptic fauna in Card Sound was studied. Based on the digestive tract analysis, the principal interaction between the primary consumers of the study area and the higher trophic level predators was found to be via the polychaetes and peracaridean crustaceans. Molluscs which constituted a significant portion of the benthic biomass were not found to be a preferred food. It was suggested that the predator population was probably limited by the small stock of polychaetes and peracaridean crustaceans. The majority of the fishes captured were determined to be foragers over a wide area.

Study Duration: June 1972 - June 1973; Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Benthic fauna, fish; Type of Sampler: Drop net, seine net, Venturi suction dredge; Sieve Size: 1.00 mm; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature, salinity, currents, tides; Dominant Taxon/Taxa Studied: *Floridichthys carpio*;

(27.00013)

Brook, I.M. 1978. Comparative macrofaunal abundance in turtle grass (*Thalassia testudinum*) communities in south Florida characterized by high blade density. Bull. Mar. Sci. 28(1):213-217.

Macrofaunal abundance in turtle grass communities in south Florida was studied. It was determined that taxonomic composition and abundance of macrobenthos can vary significantly in *Thalassia* communities, including those which are geographically close. The presence of a dense stand of *Thalassia* was determined to be only incidental to the faunal composition in nearby areas.

Study Duration: April 1973; Habitat: Grassbed; Type of Study: Qualitative; Biological Component: Benthic flora; Type of Sampler: Suction dredge; Sieve Size: 1 mm; Number of Stations: 5; Number of Replicates/Station: 4; Temporal Frequency: Once; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Thalassia testudinum*;

(27.00014)

Brook, I.M. 1981. Epibenthic and benthic sampling survey of western Biscayne National Park. Final Rept. Part I. NPS Contract No. CXS 280-9-1593. 62 p. + App.

Four benthic communities near the western shoreline of Biscayne Bay, Florida were sampled for two years. Two stations subjected to near oceanic salinities exhibited high diversity and moderate abundance. The vegetated station had significantly higher dominance than the unvegetated site. Two other stations were located in areas of variable salinity created by freshwater discharge from drainage canals. The first station, located in a dense bed of *Nalodula wrightii*, suffered decreased abundance and a dominance shift from amphipods to molluscs after experiencing its first major freshwater inflow. The second site characterized by *Thalassia testudinum*, *Syringodium filiforme*, *N. wrightii*, *Laurencia poitei*, and *Digenia simplex* had consistent similarity patterns during the study period. Abundance also decreased after the onset of freshwater input. Responses of the benthic communities to variations in canal discharge are discussed.

Study Duration: 2 years; Habitat: Seagrass bed, sand; Type of Study: Quantitative; Biological Component: Fauna and flora; Number of Stations: 4; Abiotic Parameters Measured: Salinity; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Nalodula wrightii*, *Syringodium filiforme*, *Laurencia poitei*, *Digenia simplex*;

(27.00015)

Brook, I.M. 1982. The effects of freshwater canal discharge on the stability of two seagrass benthic communities in Biscayne National Park, Florida. Oceanol. Acta. Proc. Internat. Symp. Coastal Lagoons, Bordeaux, France, 8-14 September 1981.

Four benthic communities near the western shoreline of Biscayne Bay, Florida, were sampled for two years. Two stations subjected to near oceanic salinities exhibited high diversity and moderate abundance. The vegetated station had significantly higher dominance than the unvegetated site. Two other stations were located in areas of variable salinity created by freshwater discharge from drainage canals. The first station, located in a dense bed of *Halodule wrightii*, suffered decreased abundance and a dominance shift from amphipods to molluscs after experiencing its first major freshwater inflow. The second site characterized by *Thalassia testudinum*, *Syringodium filiforme*, *H. wrightii*, *Laurencia poitei*, and *Digenia simplex*, had consistent similarity patterns during the study period. Abundance also decreased after the onset of freshwater input. Responses of the benthic communities to variations in canal discharge are discussed.

Study Duration: 2 years; Habitat: Seagrass bed, sand; Type of Study: Quantitative; Biological Component: Fauna and flora; Number of Stations: 4; Abiotic Parameters Measured: Salinity; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Halodule wrightii*, *Syringodium filiforme*, *Laurencia poitei*, *Digenia simplex*;

(27.00016)

Buck, J.D. 1976. Pollution microbiology of Biscayne Bay beaches. Fla. Scientist 39(2):111-120.

Water, sediment, and sand from recreational and other areas in the southern Biscayne Bay region were examined for the presence of both "indicator" and potentially pathogenic bacteria and yeasts. The Miami River was the most significant source of pollution (>10<sup>3</sup> total coliforms/100 ml); however, bathing beaches showed low densities of all microorganisms examined.

Study Duration: September 1972 - November 1972; Habitat: Sandy beach; Type of Study: Quantitative; Biological Component: Bacteria and yeasts; Type of Sampler: Polypropylene bottles and cores; Number of Stations: 15; Number of Replicates/Station: 1; Temporal Frequency: Once; Dominant Taxon/Taxa Studied: *Pseudomonas aeruginosa*;

(27.00017)

Bunt, J.S., C.C. Lee & E. Lee 1972. Primary productivity and related data from tropical and subtropical marine sediments. Mar. Biol. 16(1):28-36.

Oxygen exchange and carbon fixation in calcareous sediments were measured in situ at sites off the east coast of Florida and in the Caribbean Sea. Sediment samples were analyzed for total organic carbon, nitrogen, and photosynthetic pigments, and in some cases, interstitial pH and CO<sub>2</sub> concentration.

Habitat: Sand; Type of Study: Quantitative; Biological Component: Flora; Type of Sampler: Corer;

(27.00018)

Bush, L.F. 1966. Distribution of sand fauna in beaches at Miami, Florida. Bull. Mar. Sci. 16(1):58-75.

A brief survey of the sand fauna of some beaches in Miami was conducted. A method for collecting samples with a hand corer, which provides quantitative samples from exactly known levels of the beach is described. The irregular occurrence of concentrations of copepods, an archiannelid (*Protodrilus* sp.) and some turbellarians were described. Although no general conclusions as to the ecological factors involved in these distributional patterns were reached, the effects of rain, erosion, deposition of sand, and the presence of dead animal tissues were considered as possible factors.

Study Duration: Winter 1963-64; Habitat: Sandy beach; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Core; Number of Stations: 5; Number of Replicates/Station: Variable; Dominant Taxon/Taxa Studied: *Protodrilus* sp.;

(27.00019)

Caillouet, C.W., Jr. & G.L. Beardsley 1971. Notes on size, sex ratio, and spawning of the spiny lobster, *Panulirus guttatus* (Latreille) near Miami Beach, Florida. Bull. Mar. Sci. 21(4):944-951.

Spiny lobsters, *Panulirus guttatus*, were collected from jetties bordering Government Cut, near Miami Beach, Florida, from June to October 1970. Variations in size distribution, sex ratio, and proportion of ovigerous females were determined. Abundance and habitat of *P. guttatus* were compared to those of *P. argus*.

Study Duration: June-October 1970; Habitat: Jetties; Type of Study: Quantitative; Biological Component: Crustacea; Number of Stations: 2; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Panulirus guttatus*;

(27.00020)

Capone, D.G. & B.F. Taylor 1980. Nitrogen fixation in the rhizosphere of *Thalassia testudinum*. Can. J. Microbiol. 26(8):998-1005.

Samples of *Thalassia testudinum* from Soldier Key, Biscayne Bay and the Bahamas were analyzed for N<sub>2</sub> fixation associated with roots, rhizomes, and sediments. N<sub>2</sub> fixation was higher in anaerobic than aerobic tests. The weight of rhizomes plus roots was proportional to nitrogenase activity. Eighty five percent of the activity was in the 0-20 cm depth range. Rates were halved by temperature decrease of 10°C. N<sub>2</sub> fixation rose in the morning but dropped by

midafternoon. Estimated annual rates of  $N_2$  fixation to a depth of 20 cm were 10-50 Kg N per 0.1ha.

Study Duration:1975-1978; Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Flora; Type of Sampler:Core, 3.4 cm; Abiotic Parameters Measured:Temperature, glucose lactate, succinate,  $N_2$ ,  $C_2$ ,  $H_2$ ; Dominant Taxon/Taxa Studied:*Thalassia testudinum*;

(27.00021)

Cheung, T.S. 1969. The environmental and hormonal control of growth and reproduction in the adult female stone crab, *Hexippe aerceanaria* (Say). Biol. Bull. Mar. Biol. Lab., Woods Hole. 136(3):327-346.

Female stone crabs were taken from Biscayne Bay, Florida between April 1965 and November 1967 and studied in the laboratory to determine the relationship between hormonal and seasonal changes on growth and reproduction. Results indicate spawning is affected by seasonal temperature and that summer molting may be inhibited by reproductive activity. Destalking experiments showed a cyclic change in the dominance of molting and spawning responses and a transitional period between the two. Postmolt destalking responses showed that spawning and ovarian development may be controlled by different hormones.

Study Duration:April 1965-November 1967; Type of Study:Quantitative; Biological Component:Crustacea; Abiotic Parameters Measured:Salinity, temperature; Dominant Taxon/Taxa Studied:*Hexippe aerceanaria*;

(27.00022)

Continental Shelf Associates, Inc. 1980. Biological survey of proposed offshore borrow areas north of Haulover Beach Park, Dade County, Florida.

A hardground (reef) area adjacent to a beach nourishment borrow area was mapped and its biota characterized in this study of dredging effects. A literature review and summary of previously documented effects of dredging on hardgrounds is included in the report.

Habitat:Hardground (reef); Type of Study:Mapping & biological characterization;

(27.00023)

Cooksey, K.E., B. Cooksey, P.M. Evans & E.L. Hildebrand 1976. Benthic diatoms as contributors to the carbon cycle in a mangrove community. In: G. Persoone & E. Jaspers (eds.). Proc. of the 10th European Symp. on Mar. Biol., Vol. 2, Institut. for Mar. Sci. Res., Bredeve Belgium. p. 165-178.

A study of the role of benthic diatoms in the organic carbon cycle in a mangrove swamp near Card Sound, Florida revealed that soluble organic matter in sediment pore water increased during the dry season and decreased during the wet season. The biological activity of soluble material extracted from the sediment was measured using the growth yield of 2 euryhaline diatoms as an indicator of the presence of assimilable organic carbon. The extracts generally inhibited growth of the diatoms.

Habitat:Mangrove swamp; Type of Study:Quantitative; Biological Component:Flora; Type of Sampler:Piston corer; Number of Stations:5; Temporal Frequency:Monthly; Dominant Taxon/Taxa Studied:*Aphora coffeaeformis*;

(27.00024)

Cooksey, K.E., E. Hildebrand & B. Cooksey 1977. The role of microorganisms as indicators of changing environmental conditions in mangrove and marsh communities, p. 13, In: Final Rept. (Sec. B) on a Research Proj. in So. Dade Co. Submitted to Florida Power and Light Co.

The role of microorganisms as indicators of changing environmental conditions in mangrove and salt marsh communities in South Dade County was studied. The results containing unpublished data are only available through Florida Power and Light Company.

Study Duration:1973-1976; Habitat:Mangroves, salt marsh; Type of Study:Qualitative; Biological Component:Flora; Type of Sampler:Sediment corer; Abiotic Parameters Measured:Temperature, salinity, dissolved organic carbon; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Cladium jamaicense*, *Juacus roemerianus*, red, white, and black mangroves;

(27.00025)

Curry, R.W. 1975. The concentration and distribution of nitrate-nitrogen and nitrite- nitrogen in the sediments of Biscayne Bay. Univ. of Miami M.S. Thesis. 129 p.

The interstitial water of sediment samples from 14 stations in Biscayne Bay, Florida were analyzed for nitrate and nitrite. Evidence of subsurface nitrification was found in only one area, a littoral area. Concentrations of nitrate-nitrogen, nitrite-nitrogen, and ammonium-nitrogen were determined for each station. The 2 types of redox profiles and color trends found were closely correlated with the horizontal and vertical distribution of the ionic oxides of nitrogen. Typically, sediments with a redox potential less than +200 mv and a dark color would not contain ionic oxides of nitrogen.

Habitat:Mud, sand, seagrass bed; Type of Study:Quantitative; Type of Sampler:Corer; Number of Stations:14; Number of Replicates/Station:2; Abiotic Parameters Measured:Eh, nitrogen content;

(27.00026)

de la Lanza, Guadalupe & Virgilio Arenas 1978. Naturaleza quimica de las hojas y rizomas de los pastos marinos y su ambiente sedimentario. Rev. Biol. Trop. 26 (2):277-289.

The relationship between biodegradation of turtle grass and the surrounding sediments was observed. Analysis of biotic and abiotic material determined chemical composition and proportions. Results showed differences between leaves and rhizomes and a simultaneous decrease in nitrogen and increase of oligoelements in the sediments.

Study Duration:Jan-Apr 1974; Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Flora; No. of Stations:5; Temporal Frequency:Monthly; Abiotic Parameters Measured:Carbon, Nitrogen, proteins, ammonia; Dominant Taxon/Taxa Studied:*Thalassia testudinum*;

(27.00027)

Dennis, R.E. 1981. The role of the seagrass *Syringodium filiforme* and sediment stability on benthic harpacticoid copepods. Fla. State Univ. M.S. Thesis.

The influence of sediment characteristics and seagrass on the composition of harpacticoid copepod communities in *Syringodium filiforme* beds was studied in the Turkey Point area. In the grassbed, harpacticoid zonation results in phytol species occurring on seagrass blades while others are epi or infauna. Seagrass blade removal reduces some species abundances. Juveniles are affected more than adults. The study fails to take into account interactive influences of seagrass biomass and sediment stability.

Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Fauuna; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Syringodium filiforme*;

(27.00028)

Duerr, E.O. 1976. Oxygen consumption studies on the pink shrimp, *Penaeus duorarum*, as a function of activity, size, water temperature, and flow, with notes on starvation and sand substrate effect. Univ. of Miami M.S. Thesis. 119 p.

Measurements of O<sub>2</sub> consumption rates of *Penaeus duorarum* revealed an active rate at night and a resting rate during the day. Water flow, temperature, specimen size, molting rates, growth rates, and death rates were related to O<sub>2</sub> consumption.

Type of Study:Quantitative; Biological Component:Fauuna; Abiotic Parameters Measured:Temperature; Dominant Taxon/Taxa Studied:*Penaeus duorarum*;

(27.00029)

Ebbs, M.K., Jr. 1964. Some errant polychaetous annelids of the coral patches of Margot Fish Shoal (off Elliott Key, Miami, Florida) excluding the Syllidae. Univ. of Miami, M.S. Thesis.

A study of the coral inhabiting polychaetes in the back reef environment of the Florida reef tract was conducted. Ten species representing nine genera and five families were described, and their geographical distributions were given. Descriptions of the peculiarities in the coloration of the relatively rare polynoid *Nereis verruculosa* and in the juvenile anatomy of the euniciform polychaetes *Eunice schenacephala* and *Aglaurides fulgida* were presented. The cryptic polychaete fauna of the coral patches was divided into two components, a boring group of euniciform polychaetes and a crevice dwelling or nestling group that included the scale worms and amphinomids. Both the boring and the coral browsing polychaetes were described to be omnivorous, lacking any extensive specialization in their feeding habits. Most of the species found were reported or inferred to have swimming-crawling larvae stages which could cause them to favor the coral habitat, although many of the species were also found in other habitats.

Habitat:Coral; Type of Study:Qualitative; Biological Component:Coral polychaete fauna; Dominant Taxon/Taxa Studied:*Eunice schenacephala*;

(27.00030)

Edwards, R.E. 1977. The respiration of a shallow water benthic community associated with the seagrass *Halodule wrightii*. Univ. of Miami M.S. Thesis. 85 p.

Measurements were made of floral and faunal respiration rates in a grassbed of *Halodule wrightii*. Total community O<sub>2</sub> consumption was 204.5 ml hr<sup>-1</sup> m<sup>-2</sup>. Seagrass, macrofaunal, meiofaunal and microfaunal component respiration rates were either measured or estimated based upon published figures. Respiration at this site was found to be slightly higher than published estimates of respiration for similar communities.

Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Flora, fauna; Number of Stations:1; Abiotic Parameters Measured:Temperature, salinity, tide levels, DO; Dominant Taxon/Taxa Studied:*Halodule wrightii*;

(27.00031)

Eichler, L.W. 1977. Benthic infaunal assemblages associated with turtle grass (*Thalassia testudinum* König) in Biscayne Bay, Florida. Fla. Atlantic Univ. M.S. Thesis. 67 p.

*Thalassia testudinum* and adjacent open sandy areas were studied in Biscayne Bay to determine the faunal assemblages of each site. Distinct communities were associated with each site. *Thalassia* beds supported a more dense and diverse population due to availability of detrital food matter and protection from predators.

Study Duration: July-December 1976; Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Flora, fauna; Type of Sampler: PVC core; Sieve Size: 1.0 mm; Temporal Frequency: 5 months (2 samplings); Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Cirriiforma filigera*, *Lebhos smithii*, *Janira minuta*, *Exogone dispar*, *Hesionura elongata*, *Xenanthura brevitelson*;

(27.00032)

Eldred, B. 1960. A note on the occurrence of the shrimp, *Penaeus brasiliensis* Latreille, in Biscayne Bay, Florida. Quart. J. Fla. Acad. Sci. 23(2):164-165.

The first record of occurrence of *Penaeus brasiliensis* in Biscayne Bay is documented by three samples collected on December 2, February 2, and July 10, 1960. The presence of juveniles in the third sample indicated that the species is indigenous to the area and not simply transient. *P. brasiliensis* is closely related to *P. duorarum*; characteristics for distinguishing the two species are given.

Study Duration: December 1960-July 1960; Type of Study: Qualitative; Biological Component: Crustacea; Dominant Taxon/Taxa Studied: *Penaeus brasiliensis*, *P. duorarum*, *P. aztecus*;

(27.00033)

Eldred, B., C.R. Futch & R.M. Ingle 1972. Studies of juvenile spiny lobsters, *Panulirus argus*, in Biscayne Bay, Florida. Fla. Dept. Nat. Resour. Mar. Res. Lab., Spec. Sci. Rept. No. 35. 15 p.

A total of 1,464 juvenile spiny lobsters (*Panulirus argus*), ranging from 6 to 75 mm carapace length (CL), were captured in commercial bait trawls from Biscayne Bay, Florida during 1968-1969. Habitats consisted of sand/mud bottoms with dense stands of *Thalassia testudinum*, *Diplanthera (Halodule) wrightii*, *Acetabularia crenulata*, *Laurencia obtusa*, *Penicillus capitatus*, and *Udotea conglutinata*. Only immature lobsters were associated with inshore sand/mud, alga/phanerogam habitat. Small juveniles (6-10 mm CL) were present year round, with recruitment maxima in spring and fall. They grew 5 mm CL per month during their 9 to 10 months in the nursery.

Study Duration: January 1968-December 1969; Habitat: Sand, mud, seagrass bed; Type of Study: Quantitative; Biological Component: Crustacea fauna; Type of Sampler: Shrimp trawl; Temporal Frequency: Monthly; Dominant Taxon/Taxa Studied: *Panulirus argus*;

(27.00034)

Environmental Resources Management, Dade County 1983. Fisheries Assessment study of Biscayne Bay, Florida. Annu. Prog. Rept. to Dept. of Environ. Reg. and Mgt., Dade County, Fla.

An ongoing study to assess fish and crustacea stocks in Biscayne Bay, Florida was initiated in November 1981. Seasonal distribution and abundance of commercial and recreational species were determined and related to habitat type and water quality. The sampling program included surveys of recreational and commercial fisheries and monthly trawl sampling. Distributional trends in diversity and abundance are identified for 10 fish species, 2 shrimp species, blue and stone crabs.

Study Duration: November 1981-October 1982; Type of Study: Quantitative; Biological Component: Fish and crustacea; Type of Sampler: Trawl; Number of Stations: 35; Number of Replicates/Station: 6; Temporal Frequency: Monthly; Dominant Taxon/Taxa Studied: *Lutjanus griseus*, *Haemulon plumieri*, *N. sciurus*, *Lagodon rhomboides*, *Penaeus duorarum*, *Callinectes sapidus*, *Menippe mercenaria*;

(27.00035)

Ewald, J.J. 1969. Observations on the biology of *Tozeuma carolinense* (Decapoda: Hippolytidae) from Florida, with special reference to larval development. Bull. Mar. Sci. 19(3):510-549.

The adult life history and larval development of the caridean shrimp, *Tozeuma carolinense*, were examined from specimens collected at 2 locations in Biscayne Bay, Florida. Larvae were raised under controlled laboratory conditions and detailed descriptions made of their development. Temperature and genetic composition were shown to influence the number of larval intermolts and larval life span. Differences in larval development were found between individuals from the 2 habitats.

Study Duration: Fall 1960-spring 1963; Type of Study: Qualitative; Biological Component: Crustacea; Number of Stations: 2; Dominant Taxon/Taxa Studied: *Tozeuma carolinense*;



(27.00036)

Feigenbaum, D.L. 1973. Parasites of the commercial shrimp *Penaeus vannamei* Boone and *Penaeus brasiliensis* Latreille. Univ. of Miami M.S. Thesis.

Specimens of *Penaeus vannamei* and *P. brasiliensis* were obtained from Mexico and Biscayne Bay in 1972 in order to study parasitic organisms on the shrimp. Juveniles of *P. vannamei* were infected with six different parasites. They were found in the intestines, rectum, stomach filter, gills, and eye stalks. The percent of shrimp infected varied from about 8% to 94% depending on the type of shrimp and parasite and the season. Characteristics of host-parasite relationships and taxonomy of the parasites was analysed.

Study Duration: June 1972-December 1972; Type of Study: Quantitative; Biological Component: Fauna; Dominant Taxon/Taxa Studied: *Penaeus vannamei*, *P. stylirostris*, *P. californiensis*, *P. brevis*;

(27.00037)

Fell, J.W., D.G. Ahearn, S.P. Meyers & F.J. Roth, Jr. 1960. Isolation of yeasts from Biscayne Bay, Florida and adjacent benthic areas. Limn. & Oceanogr. 5(4):366-371.

A survey was made to determine the species occurrence and the distribution and abundance of yeasts present in Biscayne Bay. *Candida tropicalis* and *Rhodotorula mucilaginosa* were most abundant and widely distributed. Similar yeast species were collected from the Bahamas. A culture technique was developed and used. Deep sea collections revealed more oxidative yeasts than collections from Biscayne Bay.

Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Core; Number of Stations: 41; Dominant Taxon/Taxa Studied: *Candida tropicalis*, *Rhodotorula mucilaginosa*;

(27.00038)

Fenchel, A.T. 1970. Studies on the decomposition of organic detritus derived from the turtle grass *Thalassia testudinum*. Limnol. Oceanogr. 15(1):14-20.

Detritus particles from *Thalassia testudinum* were examined to measure the composition of the microbial communities living on the grass. The rate of O<sub>2</sub> consumption and number of organisms on the detritus was proportional to the total surface area. The amphipod *Parhyalella whelpleyi* ingests detritus but only uses the microorganisms living on the particles. The amphipod plays a role in particle breakdown which increases the available surface area and the microbial activity.

Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Fauna; Abiotic Parameters Measured: O<sub>2</sub> consumption, detritus particle size;

(27.00039)

Fenchel, A.T. 1970. Interstitial gastrotrichs in some south Florida beaches. Ophelia 7(2):113-138.

Interstitial gastrotrichs found in sand from beaches in southern Florida were investigated. Eighteen species were found and 6 new species were described. The majority of species eat diatoms. Coarser sands contained a higher diversity of species than fine sands.

Type of Study: Quantitative; Biological Component: Fauna; Abiotic Parameters Measured: Sediment characteristics;

(27.00040)

Florida Power & Light Co. 1979. Turkey Point plant annual non-radiological environmental monitoring report. Environ. Monitor. Rept. No. 13.

Year long monitoring of the environmental effects of the Turkey Point Power Plant are reported. Both biotic and abiotic parameters were measured. Plankton, fish, benthos and macrophyton were monitored and some terrestrial faunal and floral surveys made. Changes in the environment from previous years are discussed.

Study Duration: January 1-December 31, 1979; Type of Study: Quantitative; Biological Component: Fauna, flora; Abiotic Parameters Measured: Temperature, DO, copper, zinc;

(27.00041)

Fraser, T.H. 1967. Contributions to the biology of *Tagelus divisus* (Tellinacea; Pelecypoda) in Biscayne Bay, Florida. Bull. Mar. Sci. 17(1):111-132.

The biology of *Tagelus divisus* was studied over a 22 month period at sites in Biscayne Bay. Shell growth, dry weights, sexual development and size frequencies were examined. Spawning occurs from December through March and the smallest spat are found from April to June. First year growth is fast and slows down during and after the second year. Maturity is reached at a size of 2.0 cm.

Study Duration: 22 months; Type of Study: Quantitative; Type of Sampler: Bucket dredge; Abiotic Parameters

Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Tagelus divisus*;

(27.00042)

Goldstein, S.T. 1976. The distribution and ecology of benthic foraminifera in a south Florida mangrove environment. Univ. of Fla. M.S. Thesis. 111 p.

A study of the ecology and distribution of benthic foraminifera was made in a mangrove and saltmarsh habitat near Turkey Point. Sixty seven species were found, most with calcareous tests. A transect representing an environmental gradient of increasing water depth, salinity, pH and organic carbon was set up in a seaward direction. Each species had a unique distribution along the transect. Diversity, equitability and density increased in a seaward direction. The suborder Textulariina and suborder Miliolina were the two distinct faunal components in the study area.

Study Duration: March 15, 16, 1975, June 30, 1975, Sept. 10, 1975, Jan. 19, 1976; Habitat: Calcareous mud; Type of Study: Quantitative; Biological Component: Fauna; Sieve Size: 1 mm, .125 mm, .074 mm; Number of Stations: 37; Abiotic Parameters Measured: DO, pH, temperature, chlorinity, tides; Dominant Taxon/Taxa Studied: *Archaias angulatus*, suborder Textulariina, suborder Miliolina;

(27.00043)

Greenfield, L.J. 1951. The distribution of marine borers in the Miami area in relation to ecological conditions. Univ. of Miami M.S. Thesis. 81 p.

Ecological conditions under which marine borers live were investigated in Biscayne Bay and the Florida Keys from March 1950 to January 1951. Specimens of *Teredo pedicellata* and *Limnoria* sp. were collected. *T. pedicellata* showed a negative geotactic response, while *L. sp.* showed a negative photic response. Abundance was related to the amount of wood present. Growth peaked in midsummer at a time when plankton is most abundant. Boring activity is influenced by temperature. Seasonality in activity differed between the two species.

Study Duration: March 1950-January 1951; Type of Study: Quantitative; Biological Component: Fauna; Sieve Size: ; Number of Stations: 13; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Teredo pedicellata*, *Limnoria* sp.;

(27.00044)

Greenfield, L.J. 1952. Distribution of marine borers in the Miami area in relation to ecological conditions. Bull. Mar. Sci. Gulf & Caribb. 2(2):448-464.

An ecological study was made on wood borers at Miami from December 1948 to November 1949 and March 1950 to January 1951. Factors studied included monthly attack rate, difference in yearly attack, difference in attack by stations, vertical distribution, growth rate, and hydrographic conditions. The most abundant species was *Teredo (Lyrodus) pedicellata*. DeQuatretages which was active through the year, showed a midsummer growth rate peak, and increased growth and boring rates with increasing temperature. *J. pedicellata* showed negative geotaxis whereas *Limnoria lignorum* showed negative phototaxis. Horizontal distribution is related to the amount of wood in the area.

Study Duration: December 1948-November 1949, March 1950-January 1951; Type of Study: Quantitative; Biological Component: Fauna; Number of Stations: 13; Abiotic Parameters Measured: Temperature, salinity, depth; Dominant Taxon/Taxa Studied: *Teredo (Lyrodus) pedicellata*, *T. navalis*, *Limnoria lignorum*;

(27.00045)

Hatfield, E.B. 1977. Aspects of the population ecology of *Anachis avara* Say (Gastropoda: Prosobranchia) from Bear Cut, Miami, Florida. Univ. of Miami, Ph.D. Dissertation. 183 p.

A population study of the gastropod, *Anachis avara*, was conducted in a shallow water seagrass (*Thalassia testudinum*) bed at Bear Cut, Miami, Florida. Aspects investigated included feeding, growth, longevity, reproduction, abundance, size structure, demography, and productivity. Laboratory feeding experiments indicated that *A. avara* fed on seagrass epibionts, carrion, and organic material from sediment and water. Seasonal growth rates and maximum size data are presented. Spawning occurred in the field from October through May. Results on somatic and gonadal production are summarized. Seasonal variations in abundance and size structure were recorded and mortality rates were calculated.

Study Duration: October 1973-June 1975; Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Mollusca; Dominant Taxon/Taxa Studied: *Anachis avara*;

(27.00046)

Hatfield, E.B. 1979. Food sources for *Anachis avara* (Columbellidae) and a discussion of feeding in the family. Nautilus 93:40-43.

A laboratory feeding study of snails (*Anachis avara*) collected from turtle grass beds in Bear Cut, Miami, Florida was conducted using 4 different food sources: carrion, seagrass epibiota, organics in the sediment, and organics from a flow-through seawater system. Regular length measurements indicated that snail growth was 52% greater in snails fed epibiota than those on a carrion diet. Growth was also recorded for those exposed to sediment or water column organics. It is concluded that *A. avara* feeds primarily on seagrass epibiota in the field.

Study Duration: June 1975; Habitat: Seagrass bed; Type of Study: Qualitative; Biological Component: Mollusca; Dominant Taxon/Taxa Studied: *Anachis avara*;

(27.00047)

Hatfield, E.B. 1980. Natural history and population fluctuation of the gastropod *Anachis avara* in a tropical seagrass habitat, Miami, Florida. Bull. Mar. Sci. 30(3):604-612.

Quarterly sampling of a population of *Anachis avara* at Bear Cut, Miami, Florida from September 1970 to August 1975 revealed similar seasonal fluctuations in size structure. Seasonal recruitment of large numbers of individuals accounted for the majority of the size fluctuation. Periodic variations in mortality were probably the result of predation by mobile species recurrently present at Bear Cut. Tolerance tests of salinity and temperature indicated that *A. avara* was not physiologically stressed at Bear Cut over the study duration. A sudden decrease in abundance of *A. avara* from December 1973 to June 1975 was probably due in part to shoaling of the *Thalassia testudinum* flat.

Study Duration: September 1970-August 1975; Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Mollusc fauna; Type of Sampler: Push net, suction sampler; Sieve Size: 1 mm; Number of Stations: 1; Number of Replicates/Station: 25; Temporal Frequency: Quarterly; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Anachis avara*;

(27.00048)

Herreid, C.F., II 1963. Observations on the feeding behavior of *Cardiosoma guanhumi* (Latreille) in southern Florida. Crustaceana 5(3):176-180.

The feeding behavior of the land crab, *Cardiosoma guanhumi* was reported from the Miami, Florida area. Plant species eaten by *C. guanhumi* were determined. Both light and sound receptors were found to be used to locate food at a distance. The feeding behavior of *C. guanhumi* may apply to congeners elsewhere in tropical regions.

Type of Study: Qualitative; Biological Component: Crustacea; Dominant Taxon/Taxa Studied: *Cardiosoma guanhumi*;

(27.00049)

Hildebrand, E.L. 1977. Mangrove sediments in south Florida: soluble organic carbon and the growth physiology of an epipelagic diatom. Univ. of Miami M.S. Thesis. 171 p.

Concentration, distribution and conditions under which organic matter dissolved in sediment pore water may be utilized by *Aphora* sp. 15 are discussed. Distribution of dissolved organic carbon (DOC) was patchy, varying from 30 to 400 mg liter<sup>-1</sup>. DOC levels increased with distance from shore, were higher in peat than in marl sediments, and were highest in algal mats. At low light intensity organic matter stimulated growth of *Aphora* sp. 15. Also high light and high salinity levels combined with organic matter stimulated growth. Ecological ramifications of the utilization of dissolved organic compounds by *Aphora* sp. 15 are discussed.

Study Duration: January 1974-August 1975; Type of Study: Quantitative; Biological Component: Fauna; Number of Stations: 6; Temporal Frequency: Monthly; Abiotic Parameters Measured: Salinity, temp., organic carbon, sediment characteristics; Dominant Taxon/Taxa Studied: *Aphora* sp. 15;

(27.00050)

Hixon, R.F. 1976. Studies on the abundance of animals captured in artificial habitats in Card Sound, Florida. Univ. of Miami, M.S. Thesis.

Artificial habitats and substrates, were used to evaluate the effects of effluents from the Florida Power and Light power plant at Turkey Point. The abundance of fishes and spiny lobsters, measured from habitat catches was greater in central Card Sound than near shore due to the more diverse natural environment found in Card Sound. Populations of fishes attracted to the habitats were generally low throughout the year in Card Sound. The spiny lobster was both more abundant and of a larger mean size in Card Sound than previously estimated. Although mesh panel catches showed amphipods to be the most abundant invertebrate taxon, they also indicated tanaids, harpacticoid copepods, ostracods, leptostracans, and caecid gastropods are important members of the Card Sound benthic community. Power plant effluents discharged into Card Sound caused with a change in temperature of 2-3°C above ambient, caused some stratification of the Sound during summer. Large amounts of organic debris were carried into the Sound by discharge currents and some erosion occurred in the canal mouth. Favorable conditions were created by effluents near the Card Sound canal for particulate feeders, detritivores, and sessile invertebrate predators. The abundance of two species, the gastropod, *Meioceras nitidus*, and the ostracod, *Cypridina squamosa*, was reduced by effluent effects. Catches of fishes, lobsters, and mesh panel community diversities were not adversely affected by discharges.

Study Duration:1 year; Type of Study:Quantitative; Biological Component:Fish and macroinvertebrates; Type of Sampler:Artificial habitats; Number of Stations:5; Number of Replicates/Station:1; Temporal Frequency:Every 2 weeks, or monthly; Abiotic Parameters Measured:Temperature, salinity, DO, turbidity, currents; Dominant Taxon/Taxa Studied:*Panulirus argus*, *Meiocera nitida*, *Brachidontes exustus*, *Cyprindina squamosa*;

(27.00051)

Hoberg, C.M. 1975. Responses of mature, male blue crabs, *Callinectes sapidus* Rathbun, to laboratory thermal gradients, with notes on mature, female stone crabs, *Menippe mercenaria* (Say). Univ. of Miami M.S. Thesis. 134 p.

Thermal gradient responses observed in the field led to the laboratory study of temperature influences on *Callinectes sapidus* behavior. Crabs were acclimated to ambient summer mean temperatures and subjected to standing and shifting steep gradients over a two day period. Warm acclimated crabs showed a greater preference than slightly cold acclimated crabs for higher temperatures. Blue crabs obtained from Ft. Myers behaved similarly to Biscayne Bay crabs. Comparisons were made with stone crabs.

Type of Study:Quantitative; Biological Component:Fauna; Abiotic Parameters Measured:Temperature; Dominant Taxon/Taxa Studied:*Callinectes sapidus*, *Menippe mercenaria*;

(27.00052)

Hopper, B.E. 1970. Free living marine nematodes from Biscayne Bay, Florida, III. Eurytominae: *Pareurytomina bissonettei* sp. n. from Biscayne Bay and other locations. Proc. Helminthol. Soc. Wash. 37(2):175-178.

*Pareurytomina bissonettei* was newly described from sandy localities in Biscayne Bay, Florida, Baileys Bay, Bermuda and Woods Hole, Massachusetts. It can be distinguished from other species in the genus by the shape and shorter length of its tail. The tail is obtusely conoid in the anterior half, then abruptly tapered and spicate posteriorly. The number of transverse rows of stomatal denticles was found to be variable between specimens. Flattened cervical setae can be regarded as characteristic of the genus *Pareurytomina* Nicoletsky, 1930.

Habitat:Sand; Type of Study:Qualitative; Biological Component:Nematode fauna; Dominant Taxon/Taxa Studied:*Pareurytomina bissonettei*;

(27.00053)

Hopper, B.E. 1972. Free-living marine nematodes from Biscayne Bay, Florida, IV. Cyatholaimidae: On the occurrence of *Narilysia* n. gen. and *Longicyatholaimus* Nicoletsky, 1924 in Biscayne Bay, with a description of *L. longicaudatus* (deMan, 1876) from the type locality. Zoologische 189(1-2):64-88.

*Longicyatholaimus* Nicoletsky, 1924 was redefined on the basis of an examination of *L. longicaudatus* (deMan, 1976), the type species, recollected from the type locality, the Bay of Naples. The genus was diagnosed as having basically 4 longitudinal rows of hypodermal pore complexes with the pore aperture oriented transversely. Twelve new *Narilysia* combinations were proposed. Keys to the species of both genera were presented. The number, type and distribution of the hypodermal pore complexes and the lateral modified punctuations were described to be of taxonomic importance in the separation of species within genera as well as the differentiation of genera. A "caudal X" measurement, the position along the tail which equals one-quarter the anal body diameter and expressed as a percentage of the total tail length was introduced as an initial objective numerical measurement of tail shape. The caudal X for *Narilysia* was determined to range from 24 to 63% and that for *Longicyatholaimus* from 11 to 22%.

Type of Study:Qualitative; Biological Component:Nematode fauna; Dominant Taxon/Taxa Studied:*Longicyatholaimus longicaudatus*, *Narilysia*;

(27.00054)

Hopper, B.E. 1973. Free-living marine nematodes from Biscayne Bay, Florida. IV. Ceramonematidae: Systematics of *Pselionema annulatum* var. *beauforti* Chitwood, 1936, and a note on the production and transport of an egg capsule. Proc. Helminthol. Soc. Wash. 40(2):265-280.

*Pselionema annulatum* var. *beauforti* Chitwood, 1936, was redescribed from specimens collected from Card Sound and Biscayne Bay, Florida. Females were noted to carry their eggs in sacs attached externally at the vulva with embryogenesis occurring within the egg sac. *P. hexalatum* Chitwood, 1936, and *P. rigidum* Chitwood, 1936, were synonymized with *P. annulatum* var. *beauforti*. *Pselionema ornatum* (Timm, 1961) comb. n. was established for *Pterygonema ornatum*. *Pterygonema alatum* Gerlach, 1954, is regarded as genus et species inquirendum. Taxonomic significance is suggested for the number and distribution of caudal setae on the male tail.

Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Nematode fauna; Dominant Taxon/Taxa Studied:*Pselionema annulatum*;

(27.00055)

Hopper, B.E. & R.C. Cefalu 1973. Free-living marine nematodes from Biscayne Bay, Florida. VII. Enoplidae: *Enoplus* species in Biscayne Bay with observations on the culture and bionomics of *E. paralittoralis*, Wieser, 1953. Proc. Helminthol. Soc. Wash. 40(2):275-280.

*Eooplus geninivelatus* sp. n. and *E. paralittoralis*, Wieser, 1953, were described from specimens collected from Biscayne Bay, Florida. The term "triad" was introduced for a group of 3 cervical setae which are of constant occurrence on the lateral line at a short distance behind the cephalic capsuli. At 24°C and 15 o/oo salinity, the life cycle of *E. paralittoralis* was determined to be completed in 19 to 24 days.

Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Nematode fauna; Dominant Taxon/Taxa Studied:*Eooplus geninivelatus*, *E. paralittoralis*;

(27.00056)

Hopper, B.E. & R.C. Cefalu 1973. Free-living marine nematodes from Biscayne Bay, Florida. V. Stilbonematinae: Contributions to the taxonomy and morphology of the genus *Eubostrichus* Greeff and related genera. Trans. Am. Micro. Soc. 92(4):578-591.

Four species of stilbonematid nematodes were recorded from Florida waters, 2 of which were described as new to science; *Eubostrichus dianeae* n. sp. and *Cataheua porosus* n. sp. Cobbs' term, the "porid" was reintroduced in its original context of being "tubular setae serving as outlets for glands ...". Unique cervical and caudal porids were described for males of *Eubostrichus*. The association of the pleiomorphic blue-green algae *Schizothrix calcicola* with *Eubostrichus* species was discussed. It is speculated that the alga's differential growth habits are related to specific substances emanated from the hypodermal gland complexes via the porids (or pores).

Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Nematode fauna; Dominant Taxon/Taxa Studied:*Eubostrichus dianeae*, *E. filiformis*, *E. parasitiferus*, *Cataheua porosus*;

(27.00057)

Hopper, B.E. & S.P. Meyers 1967. Population studies on benthic nematodes within a subtropical seagrass community. Mar. Biol. (1):85-96.

Benthic nematode populations were studied from a subtropical seagrass community on the west shore of Key Biscayne. A high degree of homogeneity was exemplified by the dominance of four species out of approximately 100 nematode taxa collected. The population densities reached a maximum in November-December and again in February-March. Physiographic alterations in the environment were reflected in the species composition. The *Metoncholaimus scissus* population was noted to decline with changes in the seagrass habitat. At the same time the *Terschellingia longicauda* population increased, coinciding with the accumulation of sediment.

Study Duration:14 months; Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Nematode fauna; Sieve Size:0.35, 0.44 mm; Number of Stations:1 (160 samples total); Dominant Taxon/Taxa Studied:*Metoncholaimus scissus*, *Theristus fistulatus*, *Spirinia parasitifera*, *Gnathoponea typica*;

(27.00058)

Hopper, B.E. & S.P. Meyers 1967. Follicolous marine nematodes on turtle grass, *Thalassia testudinum* König, in Biscayne Bay, Florida. Bull. Mar. Sci. 17(2):471-517.

The ecology and taxonomy of follicolous nematodes on turtle grass, *Thalassia testudinum* were studied at 4 sites in Biscayne Bay, Florida. Trends in population abundance and species variation between and within sites were determined and related to abiotic parameters. Although species composition varied between sites, chromadorid nematodes were always dominant and feeding types were uniform. A key to the most common species is given, in addition to descriptions of new species and extensions of habitat ranges.

Study Duration:December 1963-December 1964; Habitat:Grassbed; Type of Study:Quantitative ; Biological Component:Nematoda; Number of Stations:4; Dominant Taxon/Taxa Studied:*Chromadora macrolaimoides*, *Nonhystera* spp., *Hypodontolaimus pilosus*, *Chromadorina epidenos*;

(27.00059)

Humm, H.J. 1976. The benthic algae of Biscayne Bay, In: Biscayne Bay: Past/Present/Future, Papers prepared for Biscayne Bay Symposium 1. Univ. Miami Sea Grant, Spec. Rept. No. 5, p. 71-93.

The many benthic algae habitats in Biscayne Bay have been found to support more than 331 species representing a tropical shallow water year-around flora and a small group of winter-spring species. Collected were 46% red algae; 30% greens; 14% browns; and 1% blue greens. All blue greens known to exist in world oceans were determined to be present in Biscayne Bay. An annotated list of the species was presented.

Study Duration:1938 to time of report; Habitat:Variable; Type of Study:Qualitative; Biological Component:Benthic algae;

(27.00060)

Isham, L.B., H.B. Moore & F.G.W. Smith 1951. Growth rate measurement of shipworms. Bull. Mar. Sci. Gulf & Caribb. 1(2):136-147.

*Teredo pedicellata* specimens from Miami Beach were examined in order to compare burrow length and body weights as indices of seasonal growth. Maximum growth occurred in midsummer with a smaller peak in March. Overcrowding reduced growth rates. This was particularly evident at the midsummer peak.

Study Duration: January 1949-March 1951; Habitat: Wood; Type of Study: Quantitative; Biological Component: Fauna; Number of Stations: 1; Dominant Taxon/Taxa Studied: *Teredo (Lyrodus) pedicellata* Quatrefages, *Bankia fibriatula* Moll and *Ruch, Phyloterdo sp.*;

(27.00061)

Jones, J.A. 1968. Primary productivity by the tropical turtle grass, *Thalassia testudinum* Konig and its epiphytes. Univ. of Miami, Ph.D. Dissertation. 196 p.

Production rates of *Thalassia testudinum* were determined by three methods. Maximum net production and respiration rates are given. Production rates were found to be determined primarily by irradiance and standing crop, whereas respiration rates were regulated by temperature and standing crop. Total annual production by a dense *Thalassia* community equalled approximately 18 kg live plant tissue per square meter. Epiphytic respiration may contribute 25 to 33% of total community metabolism.

Habitat: Seagrass beds; Type of Study: Quantitative; Biological Component: Flora; Abiotic Parameters Measured: Temperature, irradiance, DO; Dominant Taxon/Taxa Studied: *Thalassia testudinum*;

(27.00062)

Josselyn, M.N. 1975. The growth and distribution of two species of *Laurencia*, a red macroalga, in Card Sound, Florida. Univ. of Miami M.S. Thesis. 121 p.

Seasonality of biomass and growth rates were studied in *Laurencia poitei* and *L. obtusa* in Card Sound over a year's period. Twelve stations were sampled quarterly for standing crop and biweekly for growth rates. Biomass increased from September through March and declined in the summer months. Highest growth occurred in spring and fall with water temperatures of 20 to 25°C.

Study Duration: 1 year; Type of Study: Quantitative; Biological Component: Flora; Number of Stations: 12; Temporal Frequency: Biweekly; Dominant Taxon/Taxa Studied: *Laurencia poitei*, *L. obtusa*;

(27.00063)

Josselyn, M.N. 1977. Seasonal changes in the distribution and growth of *Laurencia poitei* (Rhodophyceae, Ceramiales) in a subtropical lagoon. Aquat. Bot. 3: 217-229.

Seasonal variations in the biomass and growth rates of the red alga, *Laurencia poitei*, were investigated in Card Sound, Florida from September 1973. Algal standing crop increased from late September to April and then decreased during the summer. The distribution of *L. poitei* was closely related to water circulation within the Sound. Growth rates at deep water stations were highest during late fall and spring. Maximum growth occurred from 23 to 26°C and at subsurface light intensities of 275-325 g cal/cm<sup>2</sup>/day. Annual production of *L. poitei* was approximately 21 g dry wt/m<sup>2</sup>/year.

Study Duration: September 1973-July 1974; Habitat: Stones, shell, seagrass beds; Type of Study: Quantitative; Biological Component: Flora; Number of Stations: 12; Number of Replicates/Station: 3-12; Temporal Frequency: Quarterly (biomass), biweekly (growth); Abiotic Parameters Measured: Temperature, light intensity; Dominant Taxon/Taxa Studied: *Laurencia poitei*;

(27.00064)

Judge, R.M. & F.W. Curtis, Jr. 1979. Heavy metal distribution in Biscayne Bay, Florida sediments. Fla. Sci. 42(4):242-248.

Forty sediment samples were collected from 35 sites in Biscayne Bay, Florida, and analyzed for cadmium, lead, mercury, and zinc content to test the hypothesis that the north bay is more polluted than the south bay. No significant differences was found in heavy metal concentrations from north and south bay sediments.

Habitat: Sand, mud; Type of Study: Quantitative; Type of Sampler: Ponar dredge; Number of Stations: 35; Number of Replicates/Station: 1 or 2; Abiotic Parameters Measured: Water temperature, heavy metal content;

(27.00065)

Kline, G. 1968. A study of the distribution of the interstitial fauna of three beaches. Univ. of Miami M.S. Thesis. 95 p.

Interstitial fauna was collected and studied from three beaches in the Biscayne Bay area. Measurements of environmental parameters included temperature, time, weather, chlorinity, oxygen, tide position, and sediment structure. In the absence of other limiting factors, interstitial space size determined the quantity and diversity of fauna. Differences in diversity were found between the three beach areas studied.

Habitat:Beach; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Plexiglass core; Number of Stations:18; Abiotic Parameters Measured:Temp., chlorinity, oxygen, time, weather, tide position;

(27.00066)

Krantz, G.E. & J.P. Norris 1976. Culture of pink shrimp *Penaeus duorarum* at the Turkey Point Experimental Mariculture Laboratory. Univ. Miami Sea Grant Tech. Bull. No. 36, 36 p.

Data from over 45 production hatchery culture attempts and from 49 pond "grow-out" studies were analyzed to determine biological and economic feasibility of growing pink shrimp in Florida. Growth of post larval pink shrimp in ponds to a desirable market size required several months more than other species of shrimp and survival in over 22% of the ponds was less than 30%. Growth, individual size, and biomass of the shrimp was evaluated. Cost analysis indicated research areas which could substantially reduce the total market price.

Study Duration:6 years; Type of Study:Technique; Biological Component:Decapod fauna; Dominant Taxon/Taxa Studied:*Penaeus duorarum*, *P. aztecus*, *P. californiensis*, *P. setiferus*;

(27.00067)

Lee, C. & J.L. Bada 1977. Dissolved amino acids in the equatorial Pacific, the Sargasso Sea, and Biscayne Bay. Limnol. Oceanogr. 22:502-510.

Seawater samples from several depths in the Sargasso Sea and equatorial Pacific and from surface stations in Biscayne Bay were analyzed for dissolved free amino acids and dissolved combined amino acids by a ligand-exchange chromatography technique. Enantiomeric ratios of dissolved total amino acids from Atlantic and Pacific samples were also determined. On the basis of these ratios, a bacterial source is postulated for the origin of the dissolved D-amino acids in seawater. The possible contributions from chemical racemization are compared to biological production as a source for these D-amino acids.

Study Duration:February 1975; Type of Study:Quantitative;

(27.00068)

Lenderking, R. 1954. Some recent observations on the biology of *Littorina angulifera* Lam. of Biscayne and Virginia Keys, Florida. Bull. Mar. Sci. Gulf & Caribb. 3(4):273-296.

Reproductive organs and behavior of *Littorina angulifera* were investigated in populations from Biscayne and Virginia Keys. Spawning is linked with rainfall and occurs largely in snails 15 to 26 mm in height. There is a bilunar periodicity to spawning. Pelagic eggs, embryos and veligers are shed successfully up to 760,000 per female per spawning period. Growth rate decelerates after a size of 8 mm is attained.

Type of Study:Quantitative; Biological Component:Fauna; Dominant Taxon/Taxa Studied:*Littorina angulifera*;

(27.00069)

Lewis, J.B., H.B. Moore & W. Babis 1952. The postlarval stages of the spiny lobster, *Panulirus argus*. Bull. Mar. Sci. Gulf. Caribb. 2(1):324-337.

Postlarval stages of the spiny lobster found along the shore at Miami, Florida are identified as *Pagulus argus*. The first 11 postlarval stages are described from animals reared in the laboratory. Length measurements indicate that young lobsters of 17 mm attain an overall length of 50 mm during the first year.

Study Duration:1950-1951; Habitat:Plankton; Type of Study:Qualitative; Biological Component:Fauna; Dominant Taxon/Taxa Studied:*Panulirus argus*;

(27.00070)

Marshall, M. 1945. The moulting without growth of spiny lobsters, *Panulirus argus*, kept in a live car. Trans. Am. Fish. Soc. 75:267.

A tagging study of captive spiny lobsters (*Panulirus argus*) revealed little growth increment (weight or length) between pre and post molting. The lack of growth was attributed to captivity conditions rather than the tagging method. Caution is advised in applying growth rate data obtained from laboratory studies to field populations of *P. argus*.

Type of Study:Quantitative; Biological Component:Crustacea; Temporal Frequency:Weekly; Dominant Taxon/Taxa Studied:*Panulirus argus*;

(27.00071)

McIntyre, A.D. 1971. Observations on the status of subtidal meiofauna research. Smithsonian Contrib. Zool. No. 76, 149-154. p.

The published data on quantitative aspects of subtidal marine meiofauna populations and their ecology was reviewed. The

regional and vertical distribution, seasonal fluctuations, and composition of populations of subtidal meiofauna were considered in the review. It was concluded that geographic and depth range of sampling must be extended, seasonal changes in meiofauna must be studied in more detail, and sampling techniques must be refined.

Habitat:Grassbed, sand, mud; Type of Study:Quantitative; Biological Component:Subtidal meiobenthos; Type of Sampler:Core tube, gravity corer, grab, SCUBA;

(27.00072)

McLaughlin, P. & A. Thorhaug 1978. Restoration of *Thalassia testudinum*: Animal community in a maturing four year old site - Preliminary results. In: D.P. Cole (ed.), The restoration of coastal vegetation in Florida: Proc. of the Fifth Annu. Conf., May 13, 1978, Tampa, Fla.

The fauna of a restored seagrass bed and an undisturbed natural seagrass bed are compared. Marked differences were noted with respect to annelids, isopods, molluscs, and penaeid shrimp. Restored areas versus controls preliminarily showed similar animal abundances and diversities.

Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Corer, trawl; Sieve Size:0.5 mm; Number of Stations:3; Number of Replicates/Station:5 cores; 3 trawls;

(27.00073)

McNulty, J.K. 1961. Ecological effects of sewage pollution in Biscayne Bay, Florida: sediments and the distribution of benthic and fouling macroorganisms. Bull. Mar. Sci. Gulf. Caribb. 11(3):394-447.

Harmful effects, fertilizing effects and indicator organisms of sewage pollution in Biscayne Bay were described. Three stations close to sewage outfalls indicated harmful effects. Fertilizing effects caused many species of attached vegetation and benthic animals to become more abundant. Indicator organisms of both harmful and fertilizing effects were evident. The dominance of tubiculous amphipods on glass panels exposed for one month was the major characteristic of the fouling complex in highly polluted areas.

Habitat:Variable; Type of Study:Quantitative; Biological Component:Benthic and fouling macroorganisms; Type of Sampler:Petersen grab, plastic corer; Sieve Size:0.7 mm; Number of Stations:76; Number of Replicates/Station:3; Abiotic Parameters Measured:Sediment analysis, sediment oxygen demand, DO; Dominant Taxon/Taxa Studied:*Erichthonius brasiliensis*, *Corophium acherusicum*;

(27.00074)

McNulty, J.K. 1970. Effects of abatement of domestic sewage pollution on the benthos, volumes of zooplankton and the fouling organisms of Biscayne Bay, Florida. Stud. Trop. Oceanogr. Miami, 9:107 p. 19 figs.

A comparison of the benthos before and four years after pollution abatement was presented. The pollution consisted of 136 to 227 million liters per day of untreated domestic sewage. At distances of 100 to 740 meters seaward from outfalls, in water depths of one to three meters, hard bottom populations of benthic macroinvertebrates had declined from abnormally large numbers of species and individuals to normal numbers of each, while soft bottom populations had changed qualitatively but not quantitatively. Adjacent to outfalls, populations had increased in numbers of species and numbers of individuals in hard sandy bottoms only. Volumes of zooplankton had decreased to about one-half the preabatement values in poorly flushed waters; elsewhere they remained about the same. Dissolved inorganic phosphate-phosphorus decreased similarly. Abundance of amphipod tubes declined markedly. No evidence of improved commercial and sport fishing followed abatement (probably from persistence of other forms of pollution and dredging).

Study Duration:7 months; Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Benthic fauna, plankton, fouling organisms; Type of Sampler:Petersen grab, Clarke Bumpus sampler, glass panels, 10.2 x 12.7 cm wooden frame; Sieve Size:1.0 mm; Number of Stations:60; Number of Replicates/Station:3; Temporal Frequency:Monthly; Abiotic Parameters Measured:Nutrient analysis; Dominant Taxon/Taxa Studied:*Ophiocephthys lineicola*, *Chione cancellata*;

(27.00075)

McNulty, J.K. & N.M. Lopez 1969. Year round production of ripe gametes by benthic polychaetes in Biscayne Bay, Florida. Bull. Mar. Sci. 19:945-954.

Four of the most abundant benthic polychaetes of Biscayne Bay, Florida contained ripe gametes throughout one year observations. They are *Lubbreckeris inapatiens*, *Laenira grubei*, *Owenia fusiformis*, and *Chaetopterus variopedatus*. The absence of recurring seasonal cycles of abundance of the benthic polychaetes, shown in earlier quantitative work, is interpreted to be the result of steady year round recruitment of young.

Study Duration:November 1965-October 1966; Habitat:Sand, mud; Type of Study:Qualitative; Biological Component:Faua; Type of Sampler:Bucket dredge; Sieve Size:1 mm; Number of Stations:2; Temporal Frequency:Monthly; Dominant Taxon/Taxa Studied:*Lubbreckeris inapatiens*, *Laenira grubei*, *Owenia fusiformis*, *Chaetopterus variopedatus*, *Pista cristata*, *Terebellides stroemii*;



(27.00076)

McMulty, J.K., R.C. Work & H.B. Moore 1962. Some relationships between the infauna of the level bottom and the sediment in South Florida. *Bull. Mar. Sci. Gulf Caribb.* 12:322-332.

Detritus feeders were found to predominate in the finest sediments, and deposit and filter feeders at intermediate grades, but the latter were most abundant at a considerably greater particle size than that found by Sanders in Buzzards Bay. There was a very close correlation between the body size of the deposit feeders and the particle size, regardless of the type of animal concerned.

Study Duration:3 years; Habitat:Sand, fine sediment; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Van Veen grab;

(27.00077)

McPherson, B.F. 1964. Contributions to the biology of the sea urchin *Tripneustes ventricosus*. Univ. of Miami M.S. Thesis. 96 p.

In a 4 year study of the biology of *Tripneustes ventricosus* specimens of the urchin were collected from areas near Miami and Boca Raton. Both tagged and untagged urchins were studied for growth characteristics in the lab before release to test natural factors influencing growth. Many factors affecting growth are discussed and differences in results from the 3 main study areas are analyzed. The effects of tagging are discussed.

Study Duration:4 years; Type of Study:Quantitative; Biological Component:Fauna; Dominant Taxon/Taxa Studied:*Tripneustes ventricosus*;

(27.00078)

McPherson, B.F. 1965. Contributions to the biology of the sea urchin *Tripneustes ventricosus*. *Bull. Mar. Sci.* 15(1):228-244.

The growth of *Tripneustes ventricosus* was studied using three methods: tagging, penning, and size frequency analysis. Young urchins (smaller than 30 mm) were found mainly during summer. Growth was rapid during the first year, with the urchins reaching a mean size of about 75 mm by the following summer. There was no indication of growth in the adult population during the summer. Gonads developed during the fall at a test diameter of about 35 to 45 mm. There was a significant departure from the 1:1 sex ratio in urchins larger than 80 mm. Gonad volume of the population indicated that there were two periods of gonad development during the year, one in winter and one in summer.

Study Duration:November 1962-June 1963; Habitat:Grassbed, coral reef; Type of Study:Qualitative; Biological Component:Fauna; Type of Sampler:Hand; Number of Stations:3; Abiotic Parameters Measured:Temperature; Dominant Taxon/Taxa Studied:*Tripneustes ventricosus*;

(27.00079)

McPherson, B.F. 1968. Feeding and oxygen uptake of the tropical sea urchin, *Eucidaris tribuloides* (Lamarck). *Biol. Bull. Mar. Biol. Lab., Woods Hole* 135(2):308-321.

Food preference, feeding rate, and oxygen consumption were studied in individuals of *Eucidaris tribuloides* collected near Elliot Key, Florida. *E. tribuloides* was found to prefer the boring sponge *Cliona lamia* over turtle grass (*Thalassia testudinum*). The feeding rate of urchins on *C. lamia* was determined. Oxygen uptake was measured relative to nutritive state, sex, gonad index, and size of the urchin. The influence of temperature on oxygen consumption was also investigated and results applied to natural populations.

Habitat:Coral reef; Type of Study:Quantitative; Biological Component:Echinodermata; Dominant Taxon/Taxa Studied:*Eucidaris tribuloides*;

(27.00080)

Meyers, S.P. 1953. Marine fungi in Biscayne Bay, Florida. *Bull. Mar. Sci. Gulf & Caribb.* 2(4):590-601.

A survey was made to determine occurrence and distribution of marine fungi in Biscayne Bay. Results show the presence of fungi over a large area with variations in abundance and types at different locations. Photographic results of the analysis of ascocarps are shown. The role of fungi as primary invaders of wood is discussed.

Type of Study:Quantitative; Biological Component:Flora; Number of Stations:8; Dominant Taxon/Taxa Studied:*Halophobolus* sp.;

(27.00081)

Meyers, S.P. 1954. Marine fungi in Biscayne Bay, Florida. II. Further studies of occurrence and distribution. *Bull. Mar. Sci. Gulf & Caribb.* 3(4):307-327.

Seven different halophilic fungi were found in a survey of marine fungal populations of Biscayne Bay. All were from the class Ascomycetes. Specimens were collected and mycelial growth rates and the mode and rate of ascocarpic production were studied in the laboratory. Field studies showed variations in fungal abundances and densities to be related to differences in biological activity.

Study Duration:18 months; Type of Study:Quantitative; Biological Component:Flora; Number of Stations:15;

(27.00082)

Meyers, S.P. 1966. Variability in growth and reproduction of the marine fungus, *Lulworthia floridana*. Helgol. Wiss. Meeresunters 13:436-443.

Variations in growth and reproduction of the marine ascomycete, *Lulworthia floridana* in Biscayne Bay, Florida, was investigated. Separate isolates of *L. floridana* exhibited dissimilar responses in vegetative and reproductive development, indicating the heterogeneity of this fungal population. *L. floridana* isolates from subtropical water were determined to be different from those prevalent in northern and arctic regions in terms of perithecial development. It is concluded that *L. floridana* will be broken down from a single composite species on the basis of physiological differences.

Study Duration:July-Nov. 1963, April-Dec. 1964; Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Fungus; Dominant Taxon/Taxa Studied:*Lulworthia floridana*;

(27.00083)

Meyers, S.P. & B. Hopper 1967. Studies on marine fungal-nematode associations and plant degradation. Helgol. Wiss. Meeresunters 15:270-281.

The findings of two previous investigations of fungal infestations on *Thalassia testudinum* in Biscayne Bay, Florida are summarized. Three groups of fungi were identified on the basis of relative abundance and frequency of isolation on *Thalassia* leaves. Annual fluctuations in fungal populations were detected, with increases in *Labryinthula* spp. and *Lindra thalassiae* occurring in late spring. Development of both of these fungi were dependent on the physiological state of the host plant. Infestations of separate areas of single leaves as well as among leaves of individual collections exhibited considerable variation.

Habitat:Seagrass bed; Type of Study:Qualitative; Biological Component:Fungus; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Labryinthula* spp., *Lindra thalassiae*, *Hornodendron* sp., *Cephalosporium* sp., *Dendryphiella arenaria*;

(27.00084)

Meyers, S.P., B.E. Hopper & R. Cejalu 1970. Ecological investigations of the marine nematode *Metoncholaius scissus*. Mar. Biol. 6(1):43-47.

A population of the nematode, *Metoncholaius scissus*, was sampled weekly and biweekly from *Thalassia* seagrass meadows in Biscayne Bay, Florida, between September 1967 and September 1968. Densities were found to average more than  $2.68 \times 10^4$  individuals/m<sup>2</sup>. Activity patterns of the nematode were indirectly related to blooms of the benthic diatom, *Pleurosigma balticum*. Analysis of biomass data for *M. scissus* revealed the importance of microsite activity and sensitivity of the species to small changes in the benthic environment.

Study Duration:September 1967-September 1968; Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Nematoda; Type of Sampler:Corer; Temporal Frequency:Weekly, biweekly; Dominant Taxon/Taxa Studied:*Metoncholaius scissus*;

(27.00085)

Meyers, S.P., P.A. Orpurt, J. Simms & L.L. Boral 1965. Thalassiomycetes VII. Observations on fungal infestation of turtle grass. *Thalassia testudinum* Konig. Bull. Mar. Sci. 15(3):548:564.

Seasonal studies on fungal infestation of turtle grass, *Thalassia testudinum* Konig, in Biscayne Bay, Florida revealed a wide range of foliicolous fungi regularly associated with this marine plant. The fungi can be separated into three groups based on relative abundance and frequency of isolation. The dominant group includes *Labryinthula*, *Lindra thalassiae*, *Hornodendron*, *Cephalosporium* and *Dendryphiella arenaria*. The most prevalent algae epiphytes were: greens - *Enteromorpha*, *Cladophora*; reds - *Ceramium*, *Dasia*, *Spyridia*, *Merposiphonia*, *Gracilia*, *Acanthomorpha*, and members of the Corallinaceae. Blue greens and diatoms also were present in abundance. Association of the various fungi with particular gross morphological conditions of the leaves has been tabulated. Considerable variation is observed both in infestation of separate areas of single leaves as well as among leaves of individual collections. Noteworthy differences observed between the foliicolous and lignicolous mycota of estuarine environments are discussed.

Study Duration:1 1/2 years; Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Marine fungus; Number of Stations:4 sites; Temporal Frequency:Monthly or weekly; Dominant Taxon/Taxa Studied:*Labryinthula*, *Lindra thalassiae*, *Hornodendron*, *Cephalosporium*, *Dendryphiella arenaria*;

(27.00086)

Moore, H.B. 1972. An estimate of carbonate production by macrobenthos in some tropical soft bottom communities. Mar. Biol. 17(2):145-148.

Studies of the soft bottom macrobenthos of Biscayne Bay, Florida have provided productivity figures in the form of the ratio of annual somatic production to standing crop for most resident species. In this paper, the values were converted to carbonate productivity ratios, which were used to calculate carbonate production per square meter per year. The values ranged from less than 1 g to nearly 400 g for subtidal communities and approximately 1 kg for one intertidal area.

Habitat:Mud, sand; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Bottom grab;

(27.00087)

Moore, H.B. & B.F. McPherson 1963. Colonization of the Miami area by the barnacle, *Balanus trigonus* Darwin and a note on its occurrence on the test of an echinoid. Bull. Mar. Sci. Gulf & Caribb. 13(3):418-421.

A species of barnacle new to the east coast of the Atlantic Ocean is reported from the Miami Beach area. First evidence of *Balanus trigonus* is from March 1961. *B. trigonus* is greater closer to the surface and is at a maximum in winter or spring. *B. trigonus* is reported to attach to sea urchins, especially *Tripneustes esculentus*.

Type of Study:Quantitative; Biological Component:Fauna; Dominant Taxon/Taxa Studied:*Balanus trigonus*;

(27.00088)

Moore, H. B. & B.F. McPherson 1965. A contribution to the study of the productivity of the urchins *Tripneustes esculentus* and *Lytechinus variegatus*. Bull. Mar. Sci. 15(4):855-871.

The rates of feeding, respiration, and excretion have been determined both summer and winter for the urchins *Tripneustes esculentus* and *Lytechinus variegatus*. Both show an adaptation of the feeding rate to the seasonal temperature. Young individuals feed relatively three times as fast as older ones. Assimilation efficiency was about 50-60 percent in both species and showed no seasonal change. Respiratory rate was higher in summer than winter and higher, relatively, in small individuals. Both summer feeding and respiratory rates were higher in 1964 than in 1963. There was a seasonal variation in rate of excretion in *Lytechinus* but not in *Tripneustes*. Sensitivity of feeding rate to small temperature fluctuations is greater than that of respiration. Depression of feeding rate in summer, in response to fluctuating ambient temperature in the shallow water may account for the observed higher growth rate of both species in cold weather.

Study Duration:1963-1964; Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Fauna; Type of Sampler:Hand; Abiotic Parameters Measured:Temperature; Dominant Taxon/Taxa Studied:*Tripneustes esculentus*, *Lytechinus variegatus*;

(27.00089)

Moore, H.B. & N. Lopez 1975. An additional study of the ecology of *Chione cancellata* L. Bull. Mar. Sci. 25(1):126-130.

An 8 year study of spawning and growth of the bivalve, *Chione cancellata* was conducted at 2 intertidal sites in Biscayne Bay, Florida. Spawning periodicity was found to be irregular, but generally individuals spawn twice a year. Settlement occurs below mean low tide with subsequent migration into the intertidal zone. Growth of *C. cancellata* averaged 15 mm in 1 year, 25 mm in 2 years, and 30 mm in 3 years. At one site, tissue weight was negatively correlated with deviation of temperature from the mean temperature of the current and previous month. Parasitism of *C. cancellata* was also examined.

Study Duration:July 1964-July 1966, 1969-1972; Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Mollusca; Number of Stations:2; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Chione cancellata*;

(27.00090)

Moore, H.B. & N.M. Lopez 1966. The ecology and productivity of *Noira atropos* (Lamarck). Bull. Mar. Sci. 16:648-667.

Studies were done on the ecology of the heart urchin *Noira* in communities at a depth of about 3 m in Biscayne Bay, Florida. *Noira* reaches a length of about 40 mm, 3 years after settlement, and does not grow thereafter. Available energy is then diverted to spawn production. There is a negative correlation between growth and temperature. Spawning is in the spring and early summer and shows some correlation with the phase of the moon. Productivity is 3.61 g dry weight of tissue per square meter per year, of which about one third is in the form of spawn. By comparison, productivity is slightly less in a comparable population of *Echinocardium cordatum* in the Isle of Man.

Study Duration:August 1957-July 1959; Habitat:Mud; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Grab (1.10 m<sup>2</sup>); Temporal Frequency:Quarterly; Abiotic Parameters Measured:Temperature; Dominant Taxon/Taxa Studied:*Noira atropos*;

(27.00091)

Moore, H.B. & N.W. Lopez 1969. The ecology of *Chione cancellata*. Bull. Mar. Sci. 19(1):131-148.

The growth, spawning periodicity, and productivity of the bivalve, *Chione cancellata* in Biscayne Bay, Florida were investigated. *C. cancellata* was found to attain maturity at an age of 1 year and a length of approximately 15 mm. Shell growth was directly related to temperature in immature individuals, but was inversely related in adults. Growth was limited after 4 years. Spawning occurred twice a year, in summer and winter. Annual productivity equalled 53% of the standing crop; half of the productivity was in the form of spawn. The habitat and behavior of *C. cancellata* was described.

Study Duration:1957-58, July 1964-July 1966; Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Mollusca; Type of Sampler:Van Veen grab; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature; Dominant Taxon/Taxa Studied:*Chione cancellata*;

(27.00092)

Moore, H.B. & N.W. Lopez 1970. A contribution to the ecology of the lamellibranch *Dosinia elegans*. Bull. Mar. Sci. 20(4):980-986.

Spawning and reproduction of *Dosinia elegans* were examined in a study of sublittoral soft bottom communities in Biscayne Bay, Florida. Two annual recruitments were found to occur, one in January and the other in October. The first year's growth averaged 15 mm; maximum size ranged from 25-30 mm, equivalent to an age of 2-3 years. The mortality rate was estimated at 80% per year. The biomass of *D. elegans* averaged 102 mg/m<sup>2</sup>, yielding an annual spawn production of 160 mg/m<sup>2</sup>. The growth rate of *D. elegans* was less than that of similar local species but the ratio of annual productivity to standing crop was moderate in comparison to the local species.

Study Duration:November 1963-1967; Habitat:Mud; Type of Study:Quantitative; Biological Component:Mollusca; Type of Sampler:Bucket dredge; Number of Stations:3; Temporal Frequency:Monthly; Dominant Taxon/Taxa Studied:*Dosinia elegans*;

(27.00093)

Moore, H.B. & N.W. Lopez 1970. A contribution to the ecology of the lamellibranch, *Tellina alternata*. Bull. Mar. Sci. 20(4):971-979.

In long term investigations of benthic infaunal populations in Biscayne Bay, the lamellibranch *Tellina alternata* comprised 22% of the total biomass. Spawning occurred twice a year, with the spring brood reaching 23 mm by the first December and 40 mm by the second. The maximum size found was 50 mm, probably representing 3 years of age. Growth rate of *T. alternata* was less prior to sexual maturity than other tropical molluscs but greater than *T. tenuis* in Scotland. After sexual maturity, growth rate of *T. alternata* was less than that of temperate species, which is characteristic of tropical molluscs.

Study Duration:1957-1959, Aug. 1966-March 1968; Habitat:Mud; Type of Study:Quantitative; Biological Component:Mollusca; Type of Sampler:VanVeen grab, bucket dredge; Number of Stations:3; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature; Dominant Taxon/Taxa Studied:*Tellina alternata*;

(27.00094)

Moore, H.B. & N.W. Lopez 1972. Factors controlling variation in the seasonal spawning pattern of *Lytechinus variegatus*. Mar. Biol. 14(4):275-280.

The gonad volume and test diameters of a population of *Lytechinus variegatus* in Biscayne Bay, Florida were measured monthly for 10 years. The size and date when the gonads were full and when they were spent, the spawning pattern, and the spawn output were correlated with water temperature and rainfall. The appearance of a brood of young urchins in successive years was correlated with temperature and rainfall.

Study Duration:1959, 1962-1971; Habitat:Seagrass bed, sand; Type of Study:Quantitative; Biological Component:Echinodermata; Number of Stations:2; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, rainfall; Dominant Taxon/Taxa Studied:*Lytechinus variegatus*;

(27.00095)

Moore, H.B. & N.W. Lopez 1972. A contribution to the ecology of the lamellibranch *Anodontia alba*. Bull. Mar. Sci. 22(2):381-390.

A 4 year study of growth and reproduction of the lamellibranch, *Anodontia alba* was conducted in Biscayne Bay, Florida. Abundance of *A. alba* fluctuated greatly; it was sometimes the dominant species among the intertidal fauna. Spawning was found to occur year round with 2 peak periods. Most growth occurred in the first year, when an average length of 30 mm was attained. The ratio of annual productivity (somatic and gonadal) to standing crop was 1.81:1.

Study Duration:1965-1968; Habitat:Mud, sand; Type of Study:Quantitative; Biological Component:Mollusca; Sieve Size:2.5 mm; Number of Stations:1; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature; Dominant Taxon/Taxa Studied:*Anodonta alba*;

(27.00096)

Moore, H.B., H.D. Albertson & S.M. Miller 1974. Long-term changes in the settlement of barnacles in the Miami area. Bull. Mar. Sci. 24(1):86-100.

Barnacle settlement rates on test panels was described. The effects of various environmental factors such as water temperature, river discharge, sewage pollution and hurricanes upon the barnacle population of the test panels were also discussed. Changes in the species composition due to the emigration of two species of barnacles new to the Miami area were documented. Barnacle settlement in relation to other fouling organisms found on the panels was discussed.

Study Duration:27 years; Type of Study:Semi-quantitative; Biological Component:Barnacle fauna; Type of Sampler:Plastic test panels; Temporal Frequency:Daily and monthly; Abiotic Parameters Measured:Temperature, river discharge, sewage pollution; Dominant Taxon/Taxa Studied:*Balanus trigonus*, *B. reticulatus*, *B. eburneus*, *B. amphitrite*, *B. improvisus*;

(27.00097)

Noe, C.D. 1967. Contributions to the life history of the stone crab *Menippe mercenaria* Say with emphasis on the reproductive cycle. Univ. of Miami M.S. Thesis. 55 p.

Specimens of *Menippe mercenaria* were collected from grassflats near Key Biscayne from May 1965 to June 1966 to study spawning and growth cycles. Fecundity results revealed an annual egg production of 2 to 2 1/2 million eggs per female. Spawning was highest from July through September. Sex ratios varied greatly over the 13 months of study, which is probably due to changes in relative activity, not abundances. Temperature and salinity influence molting and spawning cycles, with peak molting occurring at lowest spawning.

Study Duration:May 1965-June 1966; Habitat:Grassflat; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Commercial stone crab trap; Abiotic Parameters Measured:Salinity, temperature, depth; Dominant Taxon/Taxa Studied:*Menippe mercenaria*, *Thalassia testudinum*;

(27.00098)

Mugent, R.S., Jr. 1970. The effects of thermal effluent on some of the macrofauna of a subtropical estuary. Univ. Miami, Sea Grant Prog., Sea Grant Tech. Bull. No. 1, 198 p.

A study on the effects of thermal effluent from the Turkey Point power plant on the macrofauna of the area was conducted. Decreases in many fish species and other evidence indicate the power plant had detrimental effects.

Study Duration:1 year; Habitat:Mud, grassbed, rock; Type of Study:Quantitative; Biological Component:Macrofauna; Type of Sampler:Gillnet, hoop net, traps, fouling ponds; Number of Stations:19; Number of Replicates/Station:Variable; Temporal Frequency:Variable; Abiotic Parameters Measured:Temperature, salinity, DO, inorganic phosphate;

(27.00099)

O'Gower, A.M. & J.W. Macasey 1967. Animal communities associated with *Thalassia*, *Diplanthera* (Halodule), and sandbeds in Biscayne Bay. Analysis of communities in relation to water movement. Bull. Mar. Sci. 17:175-210.

Macrofaunal assemblages associated with *Diplanthera* (Halodule), *Thalassia*, and sandbeds were sampled from shallow, subtidal zones at Key Biscayne and Virginia Key, Florida, and their community structures compared. Quantitative trends in faunal densities, community similarity, and diversity were analyzed, and associations with environmental factors such as substrate type, vegetative cover, tidal flow, and dissolved oxygen content determined.

Study Duration:May-June 1965; Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Fauna and flora; Type of Sampler:Box core; Sieve Size:3 mm; Number of Stations:6; Number of Replicates/Station:50; Abiotic Parameters Measured:Sediment grain size, water movement; Dominant Taxon/Taxa Studied:*Thalassia*, *Diplanthera* (Halodule), *Onuphis magna*, *Loimia medusa*, *Clymenella aucosa*, *Phascolion* sp., *Codakia orbicularis*, *Batillaria minima*;

(27.00100)

Opreko, D.M. 1973. Abundance and distribution of shallow water gorgonians in the area of Miami, Florida. Bull. Mar. Sci. 22(3):535-558.

The composition of the gorgonian fauna in the Miami area was examined. Collections totaling 2,550 specimens were analyzed as to number of species, number of colonies of each species, relative abundance of various taxonomic groups, and average height and weight of each species. Species were categorized according to patterns of distribution, and the ecological factors limiting the distribution of species were examined. The scleraxions had the most restricted distribution and the gorgoniid holoxonians occurred in the widest range of habitats. The plexaurids showed the greatest species diversity and the greatest intraspecific ecological variability. The gorgonids, however, had a greater distributional range and were individually more adapted to distinct habitats. The gorgonids showed special adaptations to fluctuating environmental conditions and modified growth forms to meet the demands of the environment. Most species

of shallow-water gorgonians appeared to show some degree of habitat preference. Inshore species were often found in reef areas, but reef species were rarely found in areas where temperature, salinity and sedimentation were variable.

Study Duration:1 month; Habitat:Coral reef; Type of Study:Semi-quantitative; Biological Component:Gorgonian fauna; Number of Stations:3; Temporal Frequency:Once; Abiotic Parameters Measured:Temperature, salinity, light, current velocity, sedimentation; Dominant Taxon/Taxa Studied:*Pseudopterogorgia acerosa*, *Briareum abestiaum*;

(27.00101)

Opreko, D.M. 1974. Recolonization and regrowth of a population of the gorgonian *Plexaura homowalla*. Stud. Trop. Oceanogr. Miami 12:101-110.

The size and structure of a population of the gorgonian *Plexaura homowalla* at a small patch reef near Miami, Florida were investigated. The population density, standing crop, and colony size of *P. homowalla* were determined. The growth rate of individual colonies and rate of recruitment for populations on cleared and uncleared reef areas were estimated. Age of individual colonies appeared to be closely correlated with the number of concentric rings on the basal part of the axis.

Study Duration:August 1962-August 1967; Habitat:Coral reef; Type of Study:Quantitative; Biological Component:Cnidaria; Temporal Frequency:3 times; Dominant Taxon/Taxa Studied:*Plexaura homowalla*;

(27.00102)

Opreko, L. & R. Thomas 1975. Observations on *Octopus joubini*: some aspects of the reproductive biology and growth. Mar. Biol. 31:51-61.

The brooding behavior of 10 laboratory reared female *Octopus joubini* was studied. Observations on egg laying, care of the eggs, feeding during brooding, and survival of the female after egg laying were made. The duration and frequency of hatching and the correlation of hatching duration to water temperature were determined. The growth rate of newly hatched octopuses fed *Uca* spp. was measured from hatching to 4 months of age. Food preferences of *O. joubini* were also investigated.

Type of Study:Quantitative; Biological Component:Mollusca; Dominant Taxon/Taxa Studied:*Octopus joubini*;

(27.00103)

Orenland, R.S. & B.F. Taylor 1978. Sulfate reduction and methanogenesis in marine sediments. Geochim. Cosmochim. Acta. 42(2):209-214.

Sediment samples collected from a *Thalassia testudinum* bed in Biscayne Bay, Florida were incubated in the laboratory and methanogenesis and sulfate reduction were monitored. Methanogenesis and sulfate reduction occurred simultaneously in sediments incubated under  $H_2$ , indicating that the two processes are not mutually exclusive. Sediments incubated under  $H_2$  developed negative pressure due to the oxidation of  $H_2$  by sulfate respiring bacteria.  $H_2$  was also found to stimulate methanogenesis, but sulfate respiring bacteria out-competed methanogenic bacteria for  $H_2$ .

Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Bacteria; Type of Sampler: Suction corer;

(27.00104)

Orpurt, P.A. & L.L. Boral 1964. The flowers, fruits, and seeds of *Thalassia testudinum* Konig. Bull. Mar. Sci. Gulf & Caribb. 14(2):296-302.

The flowers of turtle grass, *Thalassia testudinum* Konig, were redescribed from specimens collected in Biscayne Bay, Florida. An account was given of fruit development and structure. Anatomy of the seed and germination of this plant were described for the first time.

Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Seagrass;

(27.00105)

Orpurt, P.A., S.P. Meyers, L.L. Boral and J. Sims 1964. *Thalassiomycetes* V. A new species of *Lindra* from turtle grass *Thalassia testudinum* Konig. Bull. Mar. Sci. Gulf & Caribb. 14(3):405-417.

*Lindra thalassiae* n. sp., a scolecosporous pyrenomyces, was isolated in considerable abundance from necrotic leaves of turtle grass, *Thalassia testudinum* Konig. This was the first isolation of a fungus from this marine flowering plant. Spore germination tests indicated suitable adaptation of the fungus to a euryhaline environment. The significance of *L. thalassiae* in degradation of turtle grass was suggested by field and laboratory studies.

Study Duration:1 season (spring 1963); Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Fungal flora;

(27.00106)

Pearson, J.F.W. 1936. Studies of the life zones of marine waters adjacent to Miami. I. The distribution of the Ophiuroidea. Proc. Fla. Acad. Sci. 1:66-72.

A general survey of the distribution of ophiuroids was conducted in Biscayne Bay and the upper Florida Keys. Five zones were identified and their habitats described. The ophiuroid species of each zone and their general abundances were noted.

Habitat: Sand, mud, seagrass bed, coral; Type of Study: Qualitative; Biological Component: Echinodermata; Number of Stations: 55; Dominant Taxon/Taxa Studied: *Ophiothrix oerstedii*, *Ophiophragus filograneus*;

(27.00107)

Pellenbarg, R.E. 1973. Trace metal distribution in the carbonate sediments of certain subtropical areas: Card Sound, Florida; Turkey Point, Florida; and Mangrove Lake, Bermuda. Univ. of Miami M.S. Thesis. 201 p.

Carbonate sediments from Card Sound and Turkey Point were analyzed for trace metals. These sediments had lower concentrations of trace metals than other sediments from common sedimentary areas. A new analytical technique is described. Most metals appeared to come from the ocean, though a local power plant is a significant source. Water circulation and transport processes seem to play a role in determining concentrations and distributions of metals.

Type of Study: Qualitative; Abiotic Parameters Measured: Trace metals- cadmium, cobalt, iron, copper, lead, nickel, silver, vanadium, zinc, calcium;

(27.00108)

Penhale, P.A. & J.M. Sprogis 1976. The role of epiphytes in seagrass systems, In: Biscayne Bay: past/present/ future. Papers prepared for Biscayne Bay Symposium. Univ. Miami Sea Grant, Spec. Rept. No. 5, p. 65-69.

The role of epiphytic microalgae in seagrass systems in Biscayne Bay was studied. The productivity rates of the many species of epiphytes were found to be high. It was reported that the epiphytes serve as a food source for several organisms and that nitrogen-fixing epiphytes are involved in nutrient cycling in the seagrass community. Epiphytes were found to be potentially useful as indicators of pollution.

Habitat: Grassbed; Type of Study: Qualitative; Biological Component: Microalgae;

(27.00109)

Penzias, L.P. 1969. *Tellina martinicensis* (Mollusca: Bivalvia): biology and productivity. Bull. Mar. Sci. 19(3):568-599.

Growth, spawning periodicity, and productivity of the bivalve, *Tellina martinicensis* in Biscayne Bay, Florida were studied for 4 years. Results revealed that *T. martinicensis* has a life span of 2 years and a maximum length of 12 mm. Spawning occurs during winter and spring, with successful spatfall occurring during periods of above average temperature. Values of productivity and standing crop were determined.

Study Duration: Nov. 1963-Dec. 1967; Habitat: Sand, mud; Type of Study: Quantitative; Biological Component: Mollusca; Type of Sampler: Bucket dredge; Sieve Size: 1.6, 3.2, 6.3 mm; Number of Stations: 2; Number of Replicates/Station: 30; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Tellina martinicensis*;

(27.00110)

Pettit, G.A. 1977. Shallow-water caprellidae (Crustacea: Amphipoda) of the southeastern Florida coast. Fla. Atlantic Univ., M.S. Thesis.

Eleven species of caprellids (skeleton shrimp) were collected along the southeastern coast of Florida. These included: *Caprella danilevskii*, *C. equilibra*, *C. penantis*, *C. scaura*, *Fallositella biscaynensis*, *Maewiaegina minuta*, *Luconacia incerta*, *Paracaprella pusilla*, *P. tenuis* and *Phtisica marina*. Descriptions, figures, and host associations were presented for each species. Many characteristic caprellid species from the Carolinian Province were collected in the study area. The eleven species were new records for each study site, except five species at the Miami site and two at the Fort Lauderdale site.

Habitat: Sand, limestone outcroppings; Type of Study: Qualitative; Biological Component: Amphipod fauna; Number of Stations: 8; Abiotic Parameters Measured: Temperature, salinity;

(27.00111)

Pool, D.J., A.E. Lugo & S.C. Snedaker 1974. Litter production in mangrove forests of southern Florida and Puerto Rico. In: The Biology and Management of Mangroves. G.E. Walsh, S.C. Snedaker & H.J. Teas (eds.). Univ. of Fla., Gainesville. p. 213-237.

Six types of mangrove forests were studied to determine litter production in different geographic areas and forest types; Litter was collected, dried, and weighed revealing a range from 0.2 g/m<sup>2</sup>/day to 3.6 g/m<sup>2</sup>/day. Litter fall was highest in wet seasons and wind storms. Leaf litter turnover rates were measured. Composition of the

litter was 63-86% leaves, 3-15% wood, and 8-21% miscellaneous. The importance of litter in nutrient cycling is discussed.

Habitat: Mangroves; Type of Study: Quantitative; Biological Component: Flora; Number of Stations: 18; Dominant Taxon/Taxa Studied: *Rhizophora mangle*, *Avicennia germinans*, *Laguncularia racemosa*;

(27.00112)

Powles, H. 1978. Observations on benthic larvae of *Pareques* (Pisces: Sciaenidae) from Florida and Columbia. *Copeia* 1:169-172.

A description of three larval specimens of *Pareques*, representing two species was presented. Included also were observations on the habitat and behavior of the young fishes.

Habitat: Sand, coral, algae, rock; Type of Study: Qualitative; Biological Component: Fish; Dominant Taxon/Taxa Studied: *Pareques acuminatus*, *Pareques umbrosus*;

(27.00113)

Reark, J.B. 1974. A history of the colonization of mangroves on a tract of land on Biscayne Bay, Florida. In: Proc. Internat. Symp. on Biol. and Mgt. of Mangroves. Vol. II. G. Walsh, S. Snedaker & H. Teas. p. 776-804.

The historical effects of anthropological and natural phenomena on a 200 ha mangrove swamp on Biscayne Bay, Florida were studied. The impacts included drainage from the Everglades, early agricultural and real estate development, mosquito control ditches, and hurricanes. An increase in salinity was the primary effect, which allowed colonization of a former freshwater marsh by the mangroves, *Rhizophora* and *Laguncularia*. Physiographic, climatic, and hurricane data are presented, and erosion and salinization are discussed and mapped. The existing floral community is described from transects and aerial photographs.

Habitat: Mangrove forest; Type of Study: Qualitative; Biological Component: Mangroves; Abiotic Parameters Measured: Sal., sediment type, air temp., rainfall, wind vel., tide; Dominant Taxon/Taxa Studied: *Rhizophora mangle*, *Laguncularia racemosa*;

(27.00114)

Reyes-Vasquez, G. 1965. Studies on the diatom flora living on *Thalassia testudinum* König in Biscayne Bay. Univ. of Miami M.S. Thesis. 81 p.

*Thalassia testudinum* blades were collected in Biscayne Bay and the diatom flora found living on them examined. Forty two species of diatoms are described and the effect of salinity, temperature, and other seasonal parameters on distribution are discussed. It appears that characteristics of the sediments determine the periphyton living in estuary areas. A new species of the genus *Cocconeis* may have been discovered. The role of diatoms living on *Thalassia testudinum* is discussed.

Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Flora; Abiotic Parameters Measured: Temperature, salinity;

(27.00115)

Reyes-Vasquez, G. 1970. Studies on the diatom flora living on *Thalassia testudinum* König in Biscayne Bay, Florida. *Bull. Mar. Sci.* 20(1):105-134.

The diatom flora epiphytic on *Thalassia testudinum* in Biscayne Bay, Florida were studied from November 1964 to July 1965. Forty two species of pennate diatoms from 20 genera were identified, including one new species. The temperature and salinity ranges of each species were determined. Neither parameter appeared to influence the distribution or succession of the epiphytic diatoms. Sediment characteristics and the presence of other organisms were shown to affect diatom distribution in *Thalassia* beds.

Study Duration: November 1964-July 1965; Habitat: Seagrass bed; Type of Study: Qualitative; Biological Component: Flora; Number of Stations: 5; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Licophora abbreviata*, *L. renulus*, *L. grandis*;

(27.00116)

Rice, K.J. 1978. Structure and function of a tropical, subtidal sandbar community. Univ. of Miami M.S. Thesis. 116 p.

The benthos of a sandbar off Miami was studied from October 1976 to September 1977. Abundances and bioass varied seasonally and spatially. Macrofaunal diversity variation was correlated with the abundance of *Tivela floridana*. Bivalve seasonal variations in abundance were much greater than the polychaetes. Other investigations included studies of survivorship, respiration, standing stock of chlorophyll 'a', and the effect of carbonate particles on sediment porosity and permeability. The sandbar exhibited characteristics hypothesized to exist within a physically controlled or immature ecosystem.



Study Duration: Oct. 1976-Sept. 1977; Habitat: Sandbar; Temporal Frequency: Monthly; Abiotic Parameters Measured: Sediment characteristics, chlorophyll 'a'; Dominant Taxon/Taxa Studied: *Tivela floridana*, *Parvilucina blanda*;

(27.00117)

Roessler, M.A. 1971. Environmental changes associated with a Florida power plant. Mar. Poll. Bull. 2(6):87-90.

Damage to the biota of Biscayne Bay by the heated effluent of a power plant was demonstrated quantitatively and qualitatively. Algae and seagrasses were killed and replaced by blue-green filamentous algae mats. Partial recovery of plants seasonally was noted, but *Thalassia* was replaced by *Diplanthera* (Halodule). Areas in which the normal algae and seagrass communities were damaged or destroyed had fewer kinds and smaller quantities of animals. *Thalassia* and algae provided a source of detritus which caused increased abundance of a few species of molluscs and crustaceans. The area in which these changes occurred were closely associated with the temperature changes. Since there was a partial recovery of the biota in winter when the effects of water currents and chemical pollutants were still present, it was believed that increased temperature is the major cause of damage. Sustained temperatures above 33°C appeared to be dangerous to the biota. This temperature also appeared to be critical for algae, shrimp larvae, crab larvae, and fish eggs examined in the laboratory.

Habitat: Grassbed, sand, mud; Type of Study: Qualitative and quantitative; Biological Component: Flora and fauna; Type of Sampler: Plant grids, otter trawl; Number of Stations: 14 (flora), 28 (fauna); Number of Replicates/Station: 1 (flora), 7 (fauna); Temporal Frequency: Once (flora), monthly (fauna); Abiotic Parameters Measured: Temperature, DO, currents, turbidity, iron, copper;

(27.00118)

Roessler, M.A. 1977. Thermal additions in a tropical marine lagoon, p. 79-87, In: M. Marois (ed.), Proc. of the World Conf. Toward a Plan of Actions for Mankind, Vol. 3, Biological Balance and Thermal Modifications.

A summarization of a study of the effects of thermal additions on the ecology of South Biscayne Bay and Card Sound was presented. An area of about 200 ha of productive shallow bay bottom was at least seasonally affected by a heated discharge from fossil fuel steam electric generators. The construction of two nuclear units threatened to increase the area of damage. In addition to the effect on benthic organisms, entrainment and impingement of marine organisms were considered significant. Consequently, various federal agencies advised Florida Power and Light to seek alternate cooling methods. A closed radiator canal system was built landward of the fringing mangroves and appeared to be performing its function as a closed cycle cooling system. Damaged areas in Biscayne Bay were determined to be recovering and the volume of new water needed for cooling was reduced, so entrainment was also reduced.

Study Duration: 3 years; Habitat: Estuarine; Abiotic Parameters Measured: Temperature, salinity, DO, circulation, nutrients, metals; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Penaeus duorarum*, *Callinectes sapidus*;

(27.00119)

Roessler, M.A. & G.L. Beardsley 1974. Biscayne Bay: its environment and problems. Fla. Scientist 37(4):186-204.

A review of Biscayne Bay ecology was conducted. Tides were determined to be semidiurnal and varied from about 2.5 ft amplitude at inlets to 0.5 ft in the interior basins. Primary production in the south was mainly from seagrasses and algae, while in the north, phytoplankton was more important. Diverse invertebrate and fish populations were noted, but few species were extremely abundant. Activities such as dredge and fill, sewage pollution, causeway construction and shoreline modifications have altered circulation and nutrient cycles, with the greatest impact observed near Miami.

Type of Study: Qualitative; Biological Component: Flora and fauna; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Diplanthera wrightii* (Halodule), *Juncus laurencia*;

(27.00120)

Roessler, M.A., G.L. Beardsley, R. Rehner & J. Garcia 1975. Effects of thermal effluents on the fishes and benthic invertebrates of Biscayne Bay, Card Sound, Florida. Univ. Miami Rosenstiel School Mar. Atmos. Sci. UM-RSMAS No. 75027.

Maximum summer temperatures of 32°C were found to cause harmful changes in the environment which are reversible in the winter, while temperatures above 33°C caused damage which did not recover during the cooler months. Intermittent flow of discharge water was not as damaging as constant flow. Card Sound was occupied by a sponge-brittle star community but many organisms were common to both the Sound and Biscayne Bay. The discharge into Card Sound lasted about one year and temperatures in excess of 33°C were uncommon. Only a few indicator species showed stress and higher abundance of others offset their decrease. Generally no lasting damage occurred in Card Sound.

Study Duration: 3 1/2 years; Habitat: Grassbed, sand, mud; Type of Study: Qualitative; Biological Component: Benthic invertebrates and fishes; Type of Sampler: Otter trawl; Number of Stations: 51; Number of Replicates/Station: 7; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature, salinity, DO;

(27.00121)

Roessler, M.A., D.C. Tabb, R.G. Rehner & J. Garcia 1974. Study of effects of thermal pollution in Biscayne Bay, Florida. EPA, Res. & Dev. EPA-660/3-74-014. 145 p.

Field studies on the effects of thermal additions from the Florida Power and Light Company's discharge at Turkey Point were conducted to determine the effects of this effluent on the macroinvertebrates and fishes of the area. The experimental results suggest that maximum summer temperatures of 32°C cause detrimental changes in the environment which are reversible in the winter, while temperatures above 33°C cause damage which is irreversible during the cooler months. Intermittent flow of discharge water was not as damaging as constant flow. Card Sound appeared to be as productive as Biscayne Bay and temperatures exceeding 33°C also were found to cause damage in Card Sound.

Study Duration: 4 years; Habitat: Grassbed, sand, mud; Type of Study: Qualitative; Biological Component: Macroinvertebrates and fishes; Type of Sampler: Otter trawl; Number of Stations: 20; Number of Replicates/Station: 7; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature

(27.00122)

Rona, U.C. 1977. Remote sensing of turbidity in Biscayne Bay, Florida. Fla. Scientist 40(2):174-178.

This report describes the utility of the multispectral scanner (MSS) from the N.A.S.A. LANDSAT Satellite in detecting and monitoring both man-made and natural suspended sediment. MSS data were used to observe turbidity derived from dredging in Government Cut and from a carbonate bank in Biscayne Bay under variable tidal conditions. The technique employed provides repetitive synoptic data over large areas and greatly reduces the volume of 'in situ' measurements required to accurately describe turbidity in a nearshore environment.

Type of Study: Technique; Type of Sampler: Multi spectral scanner (MSS); Abiotic Parameters Measured: Turbidity;

(27.00123)

Rosenberg, R. 1975. Stressed tropical benthic faunal communities off Miami, Florida. Ophelia 14:93-112.

An investigation of the benthic faunal communities in Biscayne Bay was conducted. The results were compared to an earlier (1957-1959) investigation in the same area. Changes were found to have occurred in the number of species, abundance, biomass, diversity and spatial dispersion. Low specialization in many species and a low diversity indicated that the communities were disturbed. The reasons for these changes were suggested to be occasionally low winter temperatures, high turbidity and influence by man.

Study Duration: 1 month; Type of Study: Quantitative; Biological Component: Benthic fauna; Type of Sampler: 0.05 m<sup>2</sup> modified box sampler; Sieve Size: 1.0 mm; Number of Stations: 4; Number of Replicates/Station: 8; Temporal Frequency: Once; Abiotic Parameters Measured: Temperature, salinity, turbidity; Dominant Taxon/Taxa Studied: *Lunbrineris tenuis*, *Owenia fusiformis*, *Pista cristata*, *Myriochele* sp., *Tellina martinicensis*;

(27.00124)

Rudolph, H.D., R. Waleky & D.R. Deis 1983. The polychaetus annelids of Biscayne Bay, Dade County, Florida. Presented at Benthic Ecol. Meet., Fla. Instit. of Tech., Melbourne.

The distribution and abundance of polychaetes were determined from samples collected at 60 stations in Biscayne Bay, Florida, as part of the Biscayne Bay Restoration and Enhancement Program. More than 260 polychaete species were identified and their distribution and abundance related to macrophyte coverage, water quality, and sediment parameters.

Study Duration: 1981-1982; Habitat: Seagrass bed, coral, mud, sand; Type of Study: Quantitative; Biological Component: Polychaeta; Number of Stations: 60;

(27.00125)

Russell, M.A.C. 1981. Ingestion and assimilation of coral mucus particles by gorgonian soft corals. Univ. of Miami M.S. Thesis. 44 p.

The possibility that coral mucus serves as an energy source for the reef community was studied. The utilization of detrital mucus by *Pseudoplexaura porosa* was examined using radioisotope labelling. Results showed that *P. porosa* utilized mucus particles which suggests that mucus is a nutritional resource.

Type of Study: Quantitative ; Biological Component: Fauna; Dominant Taxon/Taxa Studied: *Pseudoplexaura porosa*;

(27.00126)

Schmahl, G.P. & J.T. Tilman 1980. An initial characterization of macroinvertebrate populations associated with patch reefs of Biscayne National Monument. Fla. Sci. 43 (Suppl. 1): 23.

Benthic macroinvertebrates, excluding corals, on patch reefs of Biscayne National Monument were studied in an assessment of the impact of recreational use on the reefs. Eight reefs were sampled semiannually beginning in the summer of 1978 with 25-40 one m<sup>2</sup> quadrats along a transect. Invertebrate populations were found to be highly variable both spatially and temporally. Density values ranged from 4.8 to 27.0 mean # individuals/m<sup>2</sup>. Shannon-Weaver diversity indices ranged from 2.26 to 3.22. Molluscs had the highest diversity; sponges exhibited the highest density. A long term monitoring program of invertebrate populations is planned.

Study Duration: Summer 1978-February 1980; Habitat: Patch reef; Type of Study: Quantitative; Biological Component: Fauna; Number of Stations: 8; Number of Replicates/Station: 25-40; Temporal Frequency: Semiannually;

(27.00127)

Singletary, R.L. 1970. The biology and ecology of *Amphioplus coniertodes*, *Ophionephthys limicola*, and *Micropholis gracillima* (Ophiuroidea: Amphiuridae). Univ. of Miami Ph.D. Dissertation. 136 p.

An ecological study was conducted of 3 brittlestar species in a soft bottom community in Biscayne Bay, Florida. Ophiuroid density, sediment preference, breeding and larval settlement seasons, growth and mortality rates, and feeding pattern were determined for each species. The 3 species comprise about 35% of the standing crop of the community. Upper and lower critical temperatures for survival were also determined for each species.

Habitat: Mud, sand, seagrass bed; Type of Study: Quantitative; Biological Component: Echinodermata; Abiotic Parameters Measured: Temperature, sediment grain size; Dominant Taxon/Taxa Studied: *Amphioplus coniertodes*, *Ophionephthys limicola*, *Micropholis gracillima*;

(27.00128)

Singletary, R.L. 1971. Thermal tolerance of ten shallow water ophiuroids in Biscayne Bay, Florida. Bull. Mar. Sci. 21(4):938-943.

Ten ophiuroid species from Biscayne Bay, Florida, were found to have upper instantaneous lethal temperatures between 37.5°C and 40.5°C. Three amphiurids, *Amphioplus coniertodes*, *Ophionephthys limicola*, and *Micropholis gracillima*, were determined to have lower instantaneous lethal temperatures between -2°C and 0°C. Critical survival temperatures for the 3 species were 10°C and 33-35°C, indicating that within Biscayne Bay they live within 4-6°C of their upper critical temperature in summer and within 10°C of their lower critical temperature in winter.

Study Duration: Winter-summer 1969; Habitat: Mud, calcareous algae; Type of Study: Quantitative; Biological Component: Echinoderm fauna; Abiotic Parameters Measured: Temperature; Dominant Taxon/Taxa Studied: *Amphioplus coniertodes*, *Ophionephthys limicola*, *Micropholis gracillima*;

(27.00129)

Singletary, R.L. & H.B. Moore 1974. A redescription of the *Amphioplus coniertodes* - *Ophionephthys limicola* community of Biscayne Bay, Florida. Bull. Mar. Sci. 24(3):690-699.

A benthic faunal community dominated by the ophiuroids, *Amphioplus coniertodes* and *Ophionephthys limicola*, in Biscayne Bay, Florida, was redescribed on the basis of new data since its original description by McNulty, Work, and Moore in 1962. Variations in abundance and distribution of the characteristic species between 1956 and 1969 were summarized. Another brittlestar, *Micropholis gracillima*, was identified as a new characteristic species. Species diversity was found to be intermediate between two similar communities in Massachusetts and Jamaica. Species composition in the community was not related to ophiuroid predation.

Habitat: Mud; Type of Study: Quantitative; Biological Component: Fauna; Dominant Taxon/Taxa Studied: *Amphioplus coniertodes*, *Ophionephthys limicola*;

(27.00131)

Smith, F.G.W., R.H. Williams & C.C. Davis 1950. An ecological survey of the subtropical inshore waters adjacent to Miami. Ecology 31:119-156.

Quantitative information on the chemical, physical, and biological conditions in the Miami area was gathered over a year's period. Methods of studying fouling organisms, plankton, and physical and chemical conditions are discussed. Overall, the data show the large part played by land drainage and sewage on animal growth, low nutrient content of inshore waters, and the presence of a winter and summer growth peak. Specific results are discussed and compared with results of other studies.

Study Duration: 1 year; Type of Study: Quantitative; Biological Component: Flora/fauna; Number of Stations: 11; Abiotic Parameters Measured: Temperature, salinity, DO, phosphate-phosphorus, nitrite-nitrogen;

(27.00132)

Smith, R.L. 1973. Abundance and diversity of sponges and growth rates of *Spongia graminea* in Card Sound, Florida. Univ. Miami, M.S. Thesis.

Approximately 60% of the sponges collected in Card Sound for the study were not attached. Sponge communities in the center of Card Sound were found to have significantly greater species richness and evenness than communities on the eastern and western edges of the Sound. Species richness and evenness varied little with time. The four most common sponges were significantly more abundant at the center of Card Sound than at its edge. Of these four species, only *Ircinia fasciculata* showed variation in abundance with season. Thermal effluents from the Card Sound canal increased

the general diversity, but not the evenness, of sponge communities at the canal mouth and 1.3 km offshore. Diversity and abundance of sponge communities in Card Sound was limited by lack of suitable substrate for attachment and lack of nutrients to feed the bacteria which were believed to be the major food source of sponges. Growth rates and limiting factors of *Spongia graminea* were discussed.

Type of Study:Semiquantitative; Biological Component:Sponges; Dominant Taxon/Taxa Studied:*Iricinia fasciculata*, *Haliciona molitba*, *Geodia gibberosa*, *Tedania ignis*;

(27.00133)

Snedaker, S.C. & I.M. Brook 1976. Ecology and the food web of Biscayne Bay, In: Biscayne Bay: past/present/ future. Papers prepared for Biscayne Bay Symposium 1. Univ. Miami Sea Grant Spec. Rept. No. 5, p. 227-233.

A review concerning the ecology and food web relationships in Biscayne Bay revealed that relatively few studies describe the interactions between organisms and their environment. Biscayne Bay was described to be highly productive, with 43.8% of the bay bottom being covered with nutrient contributing seagrasses. Other forms of primary production, as well as the detrital input from the fringing mangroves, contribute to a broad base for higher level consumers such as game fishes, commercial crustacean species, including the stone crab (*Menippe mercearia*) and pink shrimp (*Penaeus spp.*).

Habitat:Grassbed, sand, mud; Type of Study:Qualitative; Biological Component:Flora and fauna; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Halodule (Diplanthera) wrightii*;

(27.00134)

Sprogis, J.M. 1975. Changes in benthic diatom assemblages within the thermal effluent at Turkey Point, South Biscayne Bay, Florida. Univ. Miami, M.S. Thesis.

As part of a comprehensive investigation started in 1968, on the influence of thermal effluent waters on Biscayne Bay, Florida, a comparative study of the community structure of diatom assemblages on glass slides relative to a thermal gradient was undertaken. A species list of 87 warm, brackish water diatoms with accompanying data on temperature, salinity, and dissolved oxygen was compiled. The seasonal distributions for these species were analyzed. That the more abundant species alone could not be relied upon as water quality indicators. Diatom diversity showed an inverse relation with increased temperature. Diversity was lowest at temperatures exceeding 32°C. Chlorophyll 'a' concentrations increased linearly with the average increase of temperature above "ambient" for each station.

Biological Component:Benthic diatoms; Abiotic Parameters Measured:Temperature, salinity, DO;

(27.00135)

Stock, J.H. 1970. *Edeis flaccida* Calman, 1932, in Florida: A pycnogonid new to the Atlantic Ocean. Entomol. Ber. (Berlin) 30(1.1.):3-4.

A record of *Edeis flaccida* from Virginia Key and Key Biscayne was presented. The record of a second species of *Edeis* (*Edeis flaccida*) constituted an addition to the fauna of the United States and to the whole Atlantic Ocean. All previous records of *E. flaccida* were from the Indo-West Pacific region.

Type of Study:Qualitative; Biological Component:Faua; Dominant Taxon/Taxa Studied:*Edeis flaccida*;

(27.00136)

Teas, H. 1974. Mangrove planting in south Florida. Proc. of the First Annu. Conf. on Restoration of Coast. Vegetation in Fla. p. 27-28.

Hand planting of all three Florida mangrove species occurred in a variety of locations. Substrate, fertilizer, light levels, nutrient cycling and herbicide sensitivity tests were made with experimental plantings. Aerial planting of *R. mangle* showed that mangrove propagules could be planted from helicopter.

Type of Study:Quantitative; Biological Component:Flora; Abiotic Parameters Measured:Nutrient cycling, herbicides; Dominant Taxon/Taxa Studied:*Rhizophora mangle*, *Laguncularia racemosa*, *Avicennia germinans*;

(27.00137)

Teas, H.J. & W. Jurgens 1978. Aerial planting of *Rhizophora mangle* propagules in Florida. In: D.P. Cole (ed.), The Restoration of Coastal Vegetation in Florida: Proc. of the Fifth Annu. Conf., 1978 May 13, Tampa, Fla. 255 p.

Methods were tested for planting *Rhizophora mangle* propagules from the air. Several types of weighted propagule 'missiles' were developed that would reliably orient in the air during fall and implant the propagule satisfactorily in a range of moist substrates. The best type of propagule missile is simple to manufacture and is suitable for aerial planting from a helicopter or slow-flying fixed-wing aircraft.

Type of Study:Qualitative; Biological Component:Flora; Dominant Taxon/Taxa Studied:*Rhizophora mangle*;

(27.00138)

Thomas, L.P., D.R. Moore & R.C. Work 1961. Effects of Hurricane Donna on the turtle grass beds of Biscayne Bay, Florida. Bull. Mar. Sci. Gulf & Caribb. 11(2):191-197.

The dry weight of *Thalassia testudinum* washed ashore Biscayne Bay during Hurricane Donna of 1960 was estimated. Destructive agents other than wind were discussed. Although a great deal of *Thalassia* was washed ashore, damage to the *Thalassia* beds was considered light and a rapid growth rate contributed to an early recovery from storm damage.

Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Benthic flora; Number of Stations:1; Number of Replicates/Station:1; Temporal Frequency:Twice weekly; Dominant Taxon/Taxa Studied:*Thalassia testudinum*;

(27.00139)

Thorhaug, A. 1974. Transplantation of the seagrass *Thalassia testudinum* Konig. Aquaculture 4(1974):177-183.

Field transplantations of *Thalassia testudinum* revealed that planting by seed can be feasible with low mortality over fairly large distances with low mortality. Seeds appeared to germinate very rapidly and to grow vigorously in the first eight months. Although young blades were narrow, they reached heights of 30 cm in several months. Rhizome growth was slow during the first 2 months, but from 4 to 8 months it was vigorous. Laboratory results indicated that although *Thalassia* can be grown in the laboratory, a great deal of care must be taken to avoid disease.

Study Duration:5 years; Habitat:Grassbed; Type of Study:Qualitative; Biological Component:Marine flora; Dominant Taxon/Taxa Studied:*Thalassia testudinum*;

(27.00140)

Thorhaug, A. 1974. An ecological study of south Biscayne Bay and Card Sound, the *Thalassia microcosa*. U.S. Atomic Energy Comm. Annu. Rept. AN-40-1-4493, 182 p.

This report summarized the research conducted from 1973 to 1974 on the distribution, abundance, growth, productivity and reproductive patterns of the seagrasses and macroalgae communities in Card Sound and Turkey Point, Florida. The primary change occurred in the study area when the self-circulating cooling canal system was completed at the Turkey Point facility. The result was that no effluent was discharged into Card Sound as had been done on an intermittent basis during 1971 and 1972. Also, the regrowth of seagrasses and algae communities at Turkey Point was monitored at seven stations during the study period as a continuation of previous work. Results of a *Thalassia testudinum* transplant were reported. The combined salinity and temperature tolerances of *Thalassia* seedlings and the effects of concentrations of growth promoting hormone on root development of the seeds were also examined.

Study Duration:1 year; Habitat:Grassbeds; Type of Study:Qualitative and quantitative; Biological Component:Marine flora; Type of Sampler:Variable; Number of Stations:Variable; Number of Replicates/Station:Variable; Temporal Frequency:Variable; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Thalassia testudinum*;

(27.00141)

Thorhaug, A. 1976. The vascular plants of Biscayne Bay, In: Biscayne Bay: past/present/future, Paper prepared for Biscayne Bay Symposium 1. Univ. Miami Sea Grant, Spec. Rept. No. 5, p. 95-112.

Three vascular plants were collected in Biscayne Bay and were reported to serve: 1) food source; 2) shelter and protection, (especially for nursery forms and the laying of eggs); 3) sediment stabilizer, (which helps preserve water clarity and prevent sediment erosion); and 4) an important chemical sink in the cycling of elements. Spatial distribution, temporal distribution, productivity, chemical cycling, sediment-grass relationships, physiological aspects (salinity tolerances, temperature tolerances, and uptake studies), successional patterns, restoration of seagrasses, pollution effects, and long-term investigations for understanding the dynamics of seagrass processes were described.

Habitat:Sand, grassbed; Type of Study:Qualitative; Biological Component:Benthic flora; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Halodule wrightii*, *Syringodium filiforme*;

(27.00142)

Thorhaug, A. 1979. The flowering and fruiting of restored *Thalassia testudinum* beds: A preliminary note. Aquat. Bot. 6(2):189-192.

This is a report on the results to date of a transplanting experiment using *Thalassia testudinum* in Biscayne Bay. Initial seeding was done in August 1973 and by 1977 abundance values in restored vs. control beds were statistically equivalent. Flowering occurred in April 1977 and fruiting in August 1977, which was the first record of time to sexual maturity for *T. testudinum*. Also, it is reported here for the first time that a restored bed of *T. testudinum* reseeded the recipient area into which it was transplanted.

Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Flora; Number of Stations:1; Dominant Taxon/Taxa Studied:*Thalassia testudinum*;

(27.00143)

Thorhaug, A. 1979. Growth of *Thalassia* restored by seedlings in a multiply-impacted estuary. Proc. 6th Annu. Conf. Wetlands Restor. Creation.

The growth characteristics of the seedlings of *Thalassia testudinum* were studied as they responded to various substrates within short time periods after planting. The results revealed that the recovery rate of *Thalassia* seedlings planted in an average highly impacted site and in an optimum site within an impacted estuary was vigorous after short time periods. After 2 months' growth, there was no statistical difference between the blade length of *Thalassia* seedlings at the more impacted sites in north Biscayne Bay and the 2 months' seedling growth at the south Biscayne Bay Turkey Point site planted 4 years previously. There was no statistical difference between the root length and number, or rhizome appearance between the two impacted sites and north Biscayne Bay. After 6 months, growth was vigorous at the impacted sites, and there was no statistical difference in blade length between these sites. There were statistically significant differences between blade length at each of the sites versus length at Turkey Point. Root length was not statistically different between the two impacted sites, however, root number and rhizome development and length was statistically different between the Turkey Point planting and the two impacted sites. This would indicate that some differential growth is associated with water and sediment quality.

Study Duration: 6 months; Habitat: Fine silt, grassbed; Type of Study: Qualitative; Biological Component: Benthic flora; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Halodule wrightii*, *Syringodium filiforme*;

(27.00144)

Thorhaug, A. 1979. Mitigation of estuarine fisheries nurseries: seagrass restoration. The Mitigation Symp. : A Natl. Workshop on Mitigating Losses of Fish and Wildl. Habitats, Ft. Collins, CO.

Large scale damage to subtropical seagrass beds in Biscayne Bay, Florida, were successfully mitigated by extensive transplanting of *Thalassia testudinum*. The method of planting and its advantages (rapid regrowth, large faunal population recolonization, and cost effectiveness over plugging) are described. Other more large scale seagrass mitigation efforts are discussed.

Habitat: Seagrass bed; Type of Study: Qualitative; Biological Component: Flora; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Halodule wrightii*;

(27.00145)

Thorhaug, A. 1980. Growth of *Thalassia* restored by seedlings in a multiply-impacted estuary. In: D.P. Cole (ed.) Wetlands Restoration and Creation: Proc. of the Seventh Annu. Conf., 1980 May 16-17, Tampa, Fla. 294 p.

Two sites in north Biscayne Bay, Florida, were planted with *Thalassia* seedlings. Six months later, vigorous growth was noted at both sites. There were no significant differences in either blade length or root length between these sites. Statistically significant differences in root number and rhizome development and length between these two sites and a site in south Biscayne Bay were noted, indicating that some differential growth is associated with water and/or sediment quality.

Study Duration: 6 months; Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Flora; Dominant Taxon/Taxa Studied: *Thalassia testudinum*;

(27.00146)

Thorhaug, A.L. & S.D. Bach 1973. Productivity of a red and green macroalgae in a south Florida estuary before and after opening of a thermal effluent canal. J. Phycol. 9(Suppl.):10.

In February, 1972, a thermal effluent canal was opened directly into Card Sound, Florida, a shallow slowly circulating tidal estuary. The original solitary canal flowed 6 miles south from the Florida Power and Light Co.'s Turkey Point electrical generating plant and intermittently allowed 2700 ft<sup>3</sup>/min heated effluent to flow into the Sound until March 1973, when a self circulating system of canals cooled the condensers of the power generators, and no effluent was allowed to enter the nearby estuaries. During the period of effluent discharge, the maximum temperature rise was about 1°C over ambient in an area of about one acre directly in front of the canal mouth. This same area was covered to about 30 cm depth with suspended matter from the canal. A two year study at 16 stations in Card Sound has revealed no significant changes in the normal seasonal pattern of productivity and standing crops of four major calcareous macroalgae except in the area of deposition of suspended matter directly in front of the canal mouth where the plants were apparently smothered. Standing crops of other green algae showed a similar pattern. The distribution of the red algae macrophyte association was affected by the increased flow rate since this group, predominantly *Laurencia pottlei*, forms large rolling mats that are subject to influence by currents.

Study Duration: 2 years; Habitat: Estuarine; Type of Study: Qualitative; Biological Component: Macroalgae; Dominant Taxon/Taxa Studied: *Penicillus*, *Halimeda*, *Udotea*, *Rhipocephalus*, *Laurencia pottlei*;

(27.00147)

Thorhaug, A. & M.A. Roessler 1977. Seagrass community dynamics in a subtropical estuarine lagoon. Aquaculture 12:253-277.

Temporal and spatial distribution of major plant and animal species in Biscayne Bay were investigated. The major plant species, and the standing crop and production of the plant material were determined. The major animal species were not equally distributed; in the nearshore turtle grass community, species of *Pagurus*, *Neopanope*, *Hippolyte*, *Cerithium*, *Bulla*, *Prunum* and *Modulus* were dominant. In mid-bay where patchy turtle grass plus green algae occurred, *Thor* and *Chondrilla* were dominant. Near the fringing islands where tidal flow caused more oceanic conditions, the community was dominated by sponges, urchins and corals.

Study Duration: 4 years (Card Sound), 1 year (Turkey Point); Habitat: Estuarine, grassbeds; Type of Study: Quantitative; Biological Component: Benthic flora and fauna; Type of Sampler: 0.04 m<sup>2</sup> frame and 0.025 m<sup>2</sup> frame; Number of Stations: 16 (Card Sound), 8 (Turkey Point); Number of Replicates/Station: 1; Temporal Frequency: Biweekly; Abiotic Parameters Measured: Temperature, DO, turbidity, currents, nutrients; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Laurencia poitei*, *Penicillus capitatus*, *Halimeda incrassata*;

(27.00148)

Thorhaug, A., M.A. Roessler & D.C. Tabb 1976. Man's impact on the biology of Biscayne Bay, In: Biscayne Bay: past/present/ future. Papers presented for Biscayne Bay Symposium 1. Univ. Miami Sea Grant Spec. Rept., No. 5, p. 301-315.

The diverse means by which man has affected the biology of Biscayne Bay were discussed. Drainage patterns to the Bay have been altered leading to increased point-source drainage. Shoreline vegetation and vegetation at the mouths of canals have been altered. Canals create new niches for marine organisms and microbial populations. Dredge and fill operations have had direct and indirect effects on the biota of Biscayne Bay. Sewage pollution and the human pathogens associated with it, heated effluents, pesticides, heavy metals, and petroleum products are all factors potentially affecting Biscayne Bay.

Type of Study: Qualitative; Biological Component: Marine flora and fauna;

(27.00149)

Thorhaug, A., D. Segar & M.A. Roessler 1973. Impact of a power plant on a subtropical estuarine environment. Mar. Poll. Bull. 4(11):166-169.

The development of electricity generating stations around Biscayne Bay, Florida has resulted in a considerable discharge of cooling water into this subtropical sea. The impact of this on the biology of the area has been studied for the last four years by a team of scientists; this report summarized their general conclusions. Areas discussed include circulation, minerals, vegetation, and impact on animals.

Study Duration: 4 years; Habitat: Estuarine; Type of Study: Qualitative; Biological Component: Benthic flora and fauna;

(27.00150)

University of Miami Marine Laboratory 1958. Investigation of possible effects on the marine environment of dredging and filling the Ragged Keys. Rept. to Fla. St. Bd. Conserv.

Checklists of fishes, marine invertebrates, algae and marine flora were given for the Ragged Keys vicinity. The Ragged Keys and the marine environment immediately adjacent to them were found to support a rich and varied group of plants and animals. Currents were believed to have, by their sorting of the substrate, created many ecological niches not usually found inside the outer reef. The reported possible effects of dredging and filling include: the destruction of channels now extensively utilized by boats; a shift of currents to the north and south around the fill, causing scouring and redistribution of bottom material beyond the immediate dredge and fill zone; conditions of greater extremes in salinity and temperatures than now prevail in one region of Biscayne Bay; and an overall destruction of the marine environment.

Habitat: Sand, rock, coral, mud, shell, grassbed; Type of Study: Qualitative; Biological Component: Marine flora and fauna; Abiotic Parameters Measured: Temperature, salinity;

(27.00151)

VanArman, P. 1977. The larval development of *Hippolyte zostericola* (Smith) and *H. curacaoensis* Schmitt (Decapoda: Hippolytidae) from Biscayne Bay, Florida. Fla. Atlantic Univ. M.S. Thesis. 162 p.

Ovigerous female shrimp were collected from grassbeds in Biscayne Bay, Florida and their eggs hatched in the laboratory. Developmental stages of *Hippolyte zostericola* were followed through six stages to postlarva. *H. curacaoensis* was followed through 8 stages to postlarva. The stages are described and drawn. Morphological differences between the 2 species' larval stages are shown.

Habitat: Grassbed; Type of Study: Qualitative; Biological Component: Fauna; Type of Sampler: Dip net; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Hippolyte zostericola*, *H. curacaoensis*;

(27.00152)

Voss, G. 1956. Protective coloration and habitat of the shrimp *Tozeuma carolinensis* Kingsley (Caridea: Hippolytidae).

Bull. Mar. Sci. Gulf & Caribb. 6(4):359-363.

Discovery in 1955 of *Tozeuma carolinensis* on colonies of alcyonarians, an unknown association, led to investigations of feeding behavior and anatomy studies. Pereiopods and uropods were used to cling to branches. Coloration was light green when on a grassy substrate but was bluish purple when inhabiting the alcyonarians. Illustrations are made for both sexes. Adaptive significance of this life style and anatomy are discussed.

Type of Study:Quantitative; Biological Component:Faua; Dominant Taxon/Taxa Studied:*Tozeuma carolinensis*, *Autillogorgia acerosa*;

(27.00153)

Voss, G.L. 1976. The invertebrates of Biscayne Bay, In: Biscayne Bay: past/present/ future, Paper Prepared for Biscayne Bay Symposium 1. Univ. Miami Sea Grant, Spec. Rept. No. 5, p. 173-179.

The effects of pesticides, dredge and fill, bulkheading, and sewage and industrial pollution were discussed. The marine invertebrates of Biscayne Bay were determined to be living under stress over most parts of the bay, and many populations have been decimated through shoreline changes, reduced flushing, seagrass destruction, and various forms of pollution. Comparisons between life on natural rocky shores, in rip-rap and on vertical bulkheads revealed that the latter is the least desirable as a man-made structure. Removal of the seagrass has reduced invertebrate numbers in the bay.

Habitat:Rock, mud, seagrasses, mangroves; Type of Study:Qualitative; Biological Component:Invertebrate fauna, benthic flora;

(27.00154)

Voss, G.L. & N.A. Voss 1955. An ecological survey of Soldier Key, Biscayne Bay, Florida. Bull. Mar. Sci. Gulf & Caribb. 5(3):23-229.

The macroscopic intertidal and shallow water invertebrate and algae life of Soldier Key, a small island off the southeast coast of Florida, was described and certain zones of the shallow water were classified according to the most numerous inhabitants. These included, proceeding from the shore seaward, the *Echinometra* zone, the *Porites*-coralline zone, the *Thalassia* zone and the alcyonaria zone. These zones were believed to be characteristic of the other islands of the Florida Keys. The plants and invertebrates common to these zones were listed and some of their relationships discussed. All of the known animals and plants of the intertidal and shallow water of Soldier Key were listed along with their respective zonations.

Habitat:Grassbed, rock, coral, sponge; Type of Study:Qualitative; Biological Component:Invertebrate fauna and algal flora; Abiotic Parameters Measured:Temperature, salinity, DO, nutrients; Dominant Taxon/Taxa Studied:*Battillaria sinina*, *Thalassia testudinum*;

(27.00155)

Voss, G.L. & N.A. Voss 1965. An ecological survey of Soldier Key, Biscayne Bay, Florida. Bull. Mar. Sci. 5 (3):203-229.

The intertidal invertebrates and algae of Soldier Key were investigated and several zones described according to the most numerous inhabitants. Proceeding from the shore seaward, these zones are the *Echinometra* zone, the *Porites*-coralline zone, the *Thalassia* zone, and the alcyonaria zone. Plants and animals common to the zones are listed and some of their relationships described.

Habitat:Grassbed, coral reef, sand; Type of Study:Qualitative; Biological Component:Flora, fauna; Abiotic Parameters Measured:Temperature, salinity, D.O., phosphate, phosphorus, nitrate, nitrogen; Dominant Taxon/Taxa Studied:*Echinometra*, *Porites*, *Thalassia*, alcyonaria;

(27.00156)

Wanless, H.R. 1969. Sediments of Biscayne Bay: Distribution and depositional history. Univ. of Miami, Inst. Mar. Sci. Tech. Rept. 69-2, 260 p.

The geology and sedimentary environments of Biscayne Bay, Card Sound and Barnes Sound, Florida are described. Sedimentation that has occurred during the past 6000 years of sea level rise has been controlled by sediment supply, tidal currents, wind driven circulation, and bedrock topography through its influence on wave energy. Six major recent sediment regimes were described on the basis of sediment type, sediment body geometry, and depositional controls.

Type of Study:Qualitative;

(27.00157)

Wanless, H.R. 1976. Geologic setting and recent sediments of the Biscayne Bay region, Florida. p. 1-31, In: A. Thorhaug & A. Volker (eds.), Biscayne Bay: Past/present/future, Symp. 1. Spec. Rept. No. 5. Info. Serv., Univ. of Miami Sea Grant Prog.

The geology and sedimentary environments of Biscayne Bay, Card Sound and Barnes Sound, Florida are described.



Sedimentation that has occurred during the past 6000 years of sea level rise has been controlled by sediment supply, tidal currents, wind driven circulation, and bedrock topography through its influence on wave energy. Six major recent sediment regimes are described on the basis of sediment type, sediment body geometry, and depositional controls.

Type of Study:Qualitative;

(27.00158)

Wanless, H.R. 1976. Man's impact on sedimentary environments and processes, In: Biscayne Bay: past/present/future. Papers prepared for Biscayne Bay Symposium I. Univ. Miami Sea Grant, Spec. Rept. No. 5, p. 287-299.

Man's impact on the sedimentary dynamics of Biscayne Bay was determined to primarily consist of 5 factors: creation of artificial cuts across Miami Beach; obstruction and modification to the natural sediment movement on the ocean beaches; dredge and fill projects for waterways and land fill; construction of drainage canals across marginal freshwater marshes; and the causing of increased turbidity. The conversion of large portions of the northern bay bottom from a seagrass stabilized shelly mud to a mobile soft to flocculant ooze bottom, and the destruction of a major percentage of the turbidity and energy absorbing mangrove swamp shoreline along northern Biscayne Bay were noted as being especially serious problems.

Type of Study:Qualitative;

(27.00159)

Wanless, H.R. 1977. Sediments of Biscayne Bay - distribution and depositional history. p. 146-151, In: H.G. Molter (ed.), Field guide to some carbonate rock environments, Florida Keys and Western Bahamas. Kendall/Hout Publ., Dubuque, IA.

The sedimentary environments of Biscayne Bay, Card Sound, and Barnes Sound, Florida are described in a brief section of this field guide. The geologic history of the region is summarized and 6 major recent sediment regimes, based on sediment type, sediment body geometry, and depositional controls are described.

Type of Study:Qualitative;

(27.00160)

Wanless, H.R. 1981. Fining upwards sedimentary sequences generated in seagrass beds. J. Sed. Petrol. 51(2):445-454.

Fining-upwards sedimentary sequences in shallow water carbonate environments of southeast Florida are generated by seagrass beds of *Thalassia testudinum*. A variable size lenticular fining-upwards sequence is produced from seaward-migrating storm blowouts in seagrass beds. The four vertical zones of a complete fining-upwards sequence are summarized. As seagrasses restabilize the upper portion of the blowout, bedload transport is decreased and settled storm suspensions are preserved. The grass stabilized zone is characterized by the molluscs, *Chione cancellata* and *Codakia orbicularis*. The characteristic mollusc assemblage and the preserved textural sediment sequence are unique among fining-upwards sequences.

Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Fauuna, Flora; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Chione cancellata*, *Codakia orbicularis*;

(27.00161)

Wanless, H.R. 1983. Sources of turbidity in Biscayne Bay, Florida. Annu. Prog. Rept. to Dept. of Environ. Reg. & Mgt., Dade County, Fla. 227 p.

Monthly sediment samples were collected from 60 benthic stations and 39 suspended sediment stations in Biscayne Bay, Florida, between March and November 1982 in a study of turbidity sources. Bottom types, surficial sediment sequences and fine sources are identified as well as historical trends in sedimentation. Monthly data are presented on suspended sediment and benthic sediment analyses. Progress on the use of remote sensing and evaluating substrate stabilization and turbidity inhibitors is cited.

Study Duration:3 March 1982-12 November 1982; Habitat:Mud, sand, seagrass bed, rock; Type of Study:Quantitative; Type of Sampler:Core; Number of Stations:60 benthic, 39 suspended sediment; Temporal Frequency:Monthly; Abiotic Parameters Measured:Sediment grain size, temp., salinity, tide, wind velocity;

(27.00162)

Weiss, C.M. 1948. The seasonal occurrence of sedentary marine organisms in Biscayne Bay, Florida. Ecology 29(2):153-172.

The sedentary organisms recorded from Biscayne Bay exhibited pronounced seasonal fluctuations in abundance. Several of the organisms demonstrated year to year variation in numbers. The fouling complex in this area was shown to be dominated by barnacles in the early succession and by the colonial spreading forms, tunicates and encrusting bryozoans in the later stages. The ecological factors which contributed to the character and abundance of fouling at three sites were described.

Study Duration:4 years; Habitat:Variable; Type of Study:Quantitative; Biological Component:Fauuna; Type of

Sampler: Window glass with anti-fouling paint on 1 side; Number of Stations: 3; Number of Replicates/Station: 1; Temporal Frequency: Every 2 weeks; Abiotic Parameters Measured: Temperature, salinity, rainfall; Dominant Taxon/Taxa Studied: *Balanus improvisus*, *Balanus amphitrite*, *Balanus eburneus*;

(27.00163)

Wickham, D.H. 1966. Observations of the patterns of persistent activity in juvenile pink shrimp, *Penaeus duorarum* Burkenroad. Univ. of Miami M.S. Thesis. 52 p.

The behavior of pink shrimp, *Penaeus duorarum* was examined to determine factors controlling activity levels, and periods. Most activity occurred during 2 nocturnal periods which seemed to be regulated by tidal rhythms. Rhythms were maintained under varying conditions but it could not be determined whether hydrostatic pressure, light intensity, or current is the entraining factor. Adaptive significance and the importance of considering several environmental factors in the control of a behavior pattern are discussed.

Type of Study: Quantitative; Biological Component: Fauna; Abiotic Parameters Measured: Light intensity, current, hydrostatic pressure;

(27.00164)

Wiman, S.K. & M.G. McKendree 1975. Distribution of *Halimeda* plants and sediments on and around a patch reef near Old Rhodes Key, Florida. J. Sed. Petrol. 45(2):415-421.

Examination of sedimentation at Old Rhodes Key revealed the role played by species of *Halimeda* in calcium carbonate sedimentation. Seven species of *Halimeda* were found at the reef. Sedimentation is dependent on morphological characteristics, life cycles, and reproduction rates. *Halimeda* also influences sedimentation by acting as a substrate for other sediment-contributing organisms, by binding sediments in the substrate and by reducing current velocities.

Habitat: Coral reef; Type of Study: Quantitative; Biological Component: Flora; Abiotic Parameters Measured: Sediment characteristics; Dominant Taxon/Taxa Studied: *Halimeda discoidea*, *H. goreavii*, *H. opuntia*, *H. tuna*, *H. incrassata*, *H. lacrimosa*, *H. mobile*;

(27.00165)

Wood, E.J.F. & J.C. Zieman 1969. The effects of temperature on estuarine plant communities. Chesapeake Sci. 10(3-4):172-174.

Thermal pollution studies in progress in Biscayne Bay, Florida were reviewed. The effects of heated effluent from a power plant on *Thalassia* grassbeds and associated macroalgae were investigated by examining a transect along the plume and a control transect. At 450 yds from the discharge point, no healthy attached blades of *Thalassia* were found (91% dead, 9% unhealthy). At 900 yds, 32% of the attached blades were healthy, 20% were unhealthy, and 48% were dead. In the control area, 65% of blades were healthy, 12% unhealthy and 23% were dead. The thermal effects on 6 species of macroalgae are also summarized.

Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Flora; Abiotic Parameters Measured: Temperature; Dominant Taxon/Taxa Studied: *Thalassia testudinum*, *Laurencia*, *Fucus*, *Laminaria*, *Macrocystis*, *Halimeda*, *Acetabularia*;

(27.00166)

Wright, P.B. & H.B. Moore 1970. A contribution to the ecology of *Cyclinella tenuis* (Mollusca: Bivalvia). Bull. Mar. Sci. 20(3):793-801.

A study of growth and reproduction of the bivalve, *Cyclinella tenuis*, was conducted using monthly samplings from 2 sublittoral muddy areas in Biscayne Bay, Florida. Breeding was found to occur nearly year round with 3 major spawning periods. Growth patterns could not be determined from size frequency analyses. Spawning success and subsequent population density were related to summer salinities. Temporal variations in the population of *C. tenuis* paralleled those of *Dosinia elegans* and *Tellina martinicensis*, but were independent of *T. alternata*.

Study Duration: Jan. 1964-March 1967; Habitat: Mud; Type of Study: Quantitative; Biological Component: Mollusca; Type of Sampler: Bucket dredge; Sieve Size: 1.6, 3.2, 6.3 mm; Number of Stations: 2; Number of Replicates/Station: 30; Temporal Frequency: Monthly; Abiotic Parameters Measured: Salinity; Dominant Taxon/Taxa Studied: *Cyclinella tenuis*;

(27.00167)

Zieman, J. 1975. Seasonal variation of turtle grass, *Thalassia testudinum* König with reference to temperature and salinity effects. Aquat. Bot. 1:107-123.

Seasonal variations in the growth of turtle grass, *Thalassia testudinum*, were demonstrated in Biscayne Bay, Florida, and related to temperature and salinity conditions. Measurements of productivity, standing crop, leaf length, blade density and other biotic parameters were maximum during summer months. Temperature and salinity optima for *Thalassia* were determined to be 30°C and 30 o/oo, respectively. Minimum growth values occurred during periods of seasonally low temperatures or high temperatures in combination with lowered salinity. The slow response of *Thalassia testudinum* to environmental stress was attributed to stored starch reserves in the extensive rhizome system.

Study Duration:1969-1970; Habitat:Seagrass beds; Type of Study:Quantitative; Biological Component:Seagrass bed; Number of Stations:5; Temporal Frequency:2-3 week intervals; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Thalassia testudinum*;

(27.00168)

Zieman, J.C. 1968. A study of the growth and decomposition of the seagrass, *Thalassia testudinum*. Univ. Miami, M.S. Thesis.

A technique for studying the comparative blade dynamics of a *Thalassia testudinum* community was described. The patterns of the new blades were similar in both communities. A marked decline in the new blades produced was noted in May and this was believed to be linked with the output of flowers or fruit. The net change in numbers of the blades and average growth rates for the communities were presented, and a technique was described that measured the amount of leaf material produced. The growth pattern of blades on a branch was demonstrated and the respective growth rates of the individual blades on the branch were given. The length of time required for a branch to put out a new blade was 14-16 days. The increase of blade width with increasing distance from the rhizome meristem was observed. A correlation between the average growth rate of the community and the average blade width of the community was demonstrated. Most of the blade growth was basal, but elongation continues some distance from the blade meristem. A description of the decomposition of blades of *Thalassia* was reported in addition to the decay rates. It was demonstrated that predrying has an accelerating effect on the decay rates. *Thalassia* was calculated to have a faster decay rate than *Spartina* thus being made available to detritus feeders at a faster rate.

Habitat:Grassbed; Type of Study:Semi-quantitative; Biological Component:Benthic flora; Dominant Taxon/Taxa Studied:*Thalassia testudinum*;

(27.00169)

Zieman, J.C. 1972. Origin of circular beds of *Thalassia* (Spermatophyta: Hydrocharitaceae) in south Biscayne Bay, Florida, and their relationship to mangrove hammocks. Bull. Mar. Sci. 22(3):559-574.

Aerial photographs of a mangrove shoreline and an adjacent offshore area in southwestern Biscayne Bay, Florida revealed numerous circular to teardrop shaped areas. The circular areas onshore and offshore were found to be mangrove hammocks and seagrass (*Thalassia testudinum*) beds, respectively. Both occurred over depressions in the bedrock which were filled with mangrove peat. The depth and pH of the peats were determined. Seagrass density and blade length were related to sediment depth. From dating of mangrove peat beneath *Thalassia* beds, it was hypothesized that the mangrove shoreline receded with a rise in sea level and the planed off hammocks were colonized by beds of *Thalassia*.

Habitat:Seagrass beds; Type of Study:Qualitative; Biological Component:Flora; Type of Sampler:Corer; Number of Stations:2; Abiotic Parameters Measured:Sediment type, pH; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Halodule wrightii*, *Penicillus capitatus*, *Halimeda incrassata*, *Laurencia* sp., *Batophora oerstedii*, *Rhizophora mangle*;

(27.00170)

Zieman, J.C., Jr. 1970. The effects of a thermal effluent stress on the seagrass and macroalgae in the vicinity of Turkey Point, Biscayne Bay, Florida. Univ. Miami, Ph.D. Dissertation.

The macrophyte communities of Turkey Point and the effects of thermal effluent on them were described. The effects of added stress on the environment due to the increased heat load of the Florida Power and Light nuclear generators were predicted. The effluent was found to produce measurable effects in offshore waters. The modification of the salinity was minimal, however the modification of the temperature was extensive. These raised temperatures and their interaction with salinity were related to the seasonal variations in species numbers, algae species diversity, and *Thalassia testudinum* standing crops. At higher temperatures, it was determined that the plants responded primarily to the salinity fluctuations. Fifty to sixty acres off the effluent canal mouth were barren of nearly all plant life and an additional 70 to 75 acres were destroyed. An additional 160-170 acres showed damage to the algae communities.

Study Duration:1 1/2 years; Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Flora; Abiotic Parameters Measured:Temperature, salinity, DO, water chemistry; Dominant Taxon/Taxa Studied:*Thalassia testudinum*, *Halodule (Diplanthera) wrightii*, *Penicillus capitatus*, *Halimeda incrassata*, *Udotea coagulata*, *Rhipocephalus phoenix*, *Sargassum pteropleuron*, *Suaeda paspaloides*;

(27.00171)

Zieman, J.C. & E.J. Ferguson Wood 1975. Effects of thermal pollution on tropical-type estuaries, with emphasis on Biscayne Bay, Florida. In: Tropical Marine Pollution, E.J. Ferguson Wood & R.E. Johannes (eds.). Elsevier Sci. Publ. Co., NY. p. 75-98.

This review of thermal pollution effects in tropical estuarine regions denotes the increased potential for damage due to tropical organisms living closer than temperate species to their upper thermal limits. Thermal pollution is considered in terms of the type of estuary and the thermal biology of tropical organisms. A study of thermal pollution in Biscayne Bay, Florida is examined and data presented. Recommendations are made for future construction of water cooled power

GEOG. CLASSIFICATION: Dade

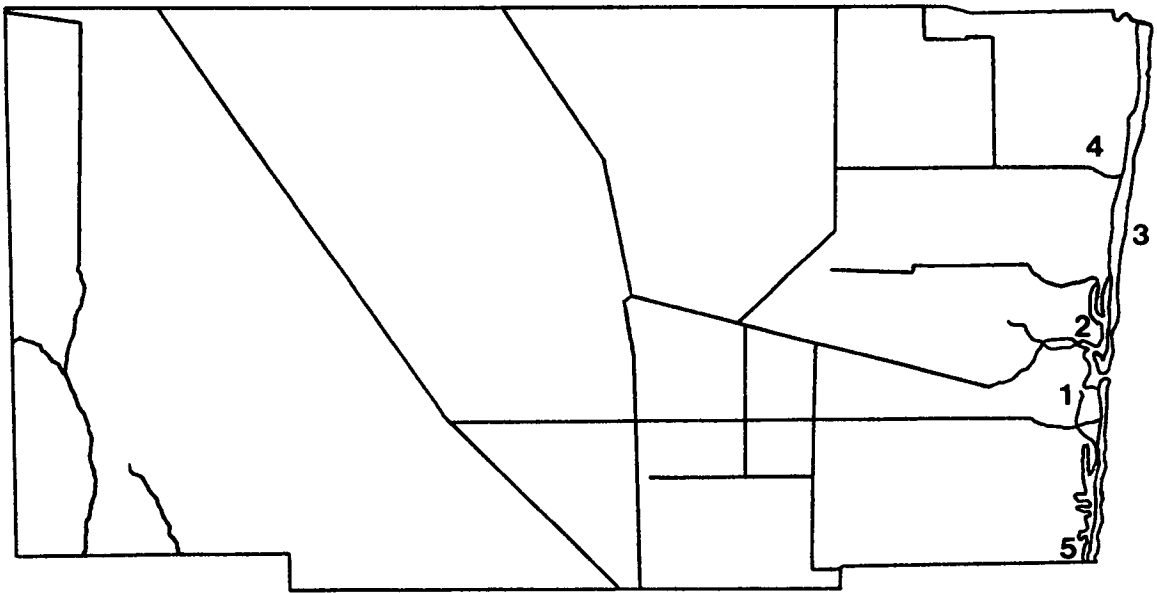
plants.

Habitat: Seagrass bed; Type of Study: Review; Biological Component: Fauna and flora; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Thalassia*, *Halimeda incrassata*, *Laurencia sp.*, *Digenia simplex*, *Penicillus capitatus*, *Siderastrea sp.*, *Nenippe mercenaria*, *Chione cancellata*;

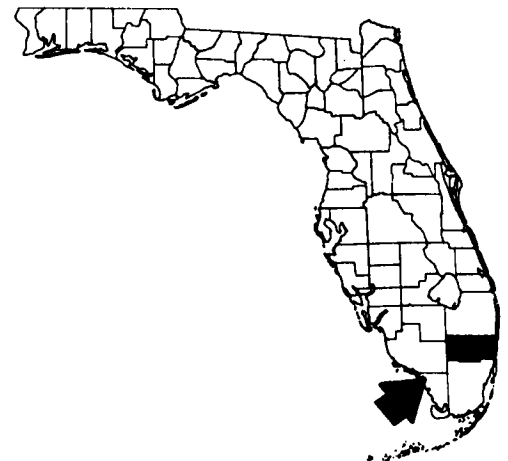
For publications on the Everglades see section 4, Southern Florida.

See also: 1.00071, 4.00005, 4.00006, 4.00039, 4.00042, 4.00047, 4.00073, 10.00010, 12.00079, 26.00016, 26.00067, 26.00073, 26.00092, 26.00109.

# BROWARD COUNTY



1. PORT EVERGLADES
2. FORT LAUDERDALE
3. LAUDERDALE-BY-THE-SEA
4. POMPANO BEACH
5. HALLANDALE



(28.00001)

Applied Biology, Inc. 1976. Ecological parameter monitoring at the Lauderdale Plant. Florida Power and Light Co. Rept.

Benthic sampling was conducted in the vicinity of the Florida Power and Light Co. Lauderdale Plant in 1974 and 1975. Species lists were compiled and biomass values determined.

Study Duration:2 years; Type of Study:Quantitative; Biological Component:Macroinvertebrate fauna; Type of Sampler:Grab; Number of Stations:17; Temporal Frequency:Quarterly;

(28.00002)

Applied Biology, Inc. 1976. Ecological parameter monitoring at the Port Everglades Plant. Florida Power and Light Co. Rept.

A summary of benthic macroinvertebrate data from five stations in the vicinity of the Florida Power and Light Co. Port Everglades Plant for 1975 is presented. Density, diversity, biomass, and equitability values are also provided.

Study Duration:1 year; Type of Study:Quantitative; Biological Component:Macroinvertebrate fauna; Type of Sampler:Grab; Number of Stations:5; Temporal Frequency:Quarterly;

(28.00003)

Continental Associates, Inc. 1981. Environmental monitoring associated with the Port Everglades harbor deepening project of 1980.

A one year ecological monitoring study of hard bottom communities adjacent to Port Everglades, Florida, was conducted before, during, and after major dredging operations in the entrance channel. Current measurements indicated a net northward transport with considerable oscillations of water movement between north and south. Annual water temperature fluctuations from 20° to 29°C were within the normal range. A sharp increase in filamentous algal growth was noted following a mid summer decrease in water temperature. The mean annual sedimentation rate for the hard bottom areas was 75.7 mg/cm<sup>2</sup>/day. No increase in sedimentation or damage to the biological assemblages due to dredging operations was detected, although hard coral growth appeared to be severely limited by the area's environmental characteristics.

Study Duration:1 year; Habitat:Hard bottom; Type of Study:Quantitative; Biological Component:Fauna and flora; Abiotic Parameters Measured:Currents, water temperature, sedimentation rate;

(28.00004)

Courtenay, W.R., D.J. Herrema, M.J. Thompson, W.P. Azzinaro & J. VanMontfrans 1973. Ecological monitoring of two beach nourishment projects in Shore Beach 40(2): 8-13.

Ecological monitoring was conducted at two beach nourishment sites. Sedimentation (including excessive turbidity) and direct physical destruction were determined to be the two primary ways that beach restoration and nourishment projects could adversely affect marine organisms. Sedimentation was found to result in a reduction in species diversity and in turn a degradation of the ecological health of marine communities. This weakening of natural populations could permit certain species, not otherwise affected to become more sensitive to other environmental stresses.

Study Duration:August 3, 1970 - July 29, 1972; Habitat:Coral reef, sandy beach; Type of Study:Qualitative; Biological Component:Fish, invertebrates;

(28.00005)

DePalma, J.R. 1963. Marine fouling and boring organisms off Fort Lauderdale, Florida. Informal Manu. Rept. No. 0-70-62, Sponsored by NAVOCEANA and the U.S. Naval Ordnance Laboratory, 28 p.

Growth of marine fouling organisms was observed on test panels exposed at this site and the performance of copperbase antifouling paint under natural conditions was evaluated. Fouling growth occurred throughout the year, with individual species showing peaks of intensity. Organisms attached throughout the water column, and maximum density of attachment occurred at 27 m and generally decreased with depth.

Study Duration:September 1961 - September 1962; Habitat:Artificial substrate; Type of Study:Quantitative; Biological Component:Fouling organisms; Type of Sampler:Asbestos board & white pipe attached back to back; Number of Stations:7; Number of Replicates/Station:14; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, currents; Dominant Taxon/Taxa Studied:Hydroids, barnacles & tube worms;

(28.00006)

Hazen & Sawyer, Engineers 1977. Effluent disposal facilities plan and environmental assessment. Vol. 1 & Appendix, City of Fort Lauderdale Proj. 4805.

A general faunal survey including aquatic resources was conducted in the Fort Lauderdale project area. It was concluded that at least 240 species of estuarine invertebrates were likely to occur in this area. A partial taxonomic list of estuarine invertebrates representative of the southeast Florida coast was presented.

Habitat:Estuarine; Type of Study:Qualitative; Biological Component:Invertebrate fauna;

(28.00007)

Marsh, G.A., W.R. Courtenay, D. Turbeville & L. McCarthy 1978. Environmental assessment of nearshore borrow areas in Broward County, Florida. Fla. Sea Grant Prog., Prelim. Rept. 30 p.

An assessment of the density and diversity of benthic invertebrate populations in a borrow area created off Hillsborough Beach, Florida in 1972 was presented and compared to data from nearby undisturbed bottoms. A total of 159 benthic species were collected from 2,483 individuals consisting primarily of Mollusca, Polychaeta, and Crustacea. Species richness and faunal abundance within the borrow area were considerably higher than at the control stations. Several species were conspicuously more abundant at some stations than others. Most of those species were concentrated at one or both stations within the borrow area.

Study Duration:2 days; Habitat:Sand; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:PVC core (inside dia. 7.9 cm); Sieve Size:1.0 mm; Number of Stations:6; Number of Replicates/Station:24; Temporal Frequency:Once; Abiotic Parameters Measured:Sediment analysis; Dominant Taxon/Taxa Studied:*Lumbrineris* sp., *Ervilia concentrica*, *Ervilia subcancellata*, *Pitar fulminata*;

(28.00008)

Raymond, W.F. 1972. A geologic investigation of the offshore sands and reefs of Broward County, Florida. Fla. State Univ. M.S. Thesis.

Samples were collected from offshore terraces, reefs, and sand deposits along a 24 mile section of the southwest Florida continental shelf and analyzed for texture and composition. The coral/algal barrier reefs and coquina bedrock ridges are interspersed by sand composed of terrigenous quartz, carbonate shell hash, and marine skeletal fragments. Sources and movements of the sediments are described.

Habitat:Coral, rock, sand; Type of Study:Qualitative; Abiotic Parameters Measured:Sediment grain size & composition;

(08.00009)

Thompson, M.J. 1974. Burrowing and burrow-associated behavior in the dusky jawfish, *Opistognathus whitehursti*. Fla. Atlantic Univ. M.S. Thesis. 81 p.

Dusky jawfish were observed at 2 sites off Broward County, Florida between March 1972 and January 1974 to study burrowing behavior. Three types of burrows were examined, each type found to be dependent upon substrate conditions and the availability of reinforcement material at the site. Burrow construction methods and completion time are presented. Territorial and defensive behaviors are also described.

Study Duration:March 1972-January 1974; Habitat:Patch reef; Type of Study:Qualitative; Biological Component:Fauna; Number of Stations:2; Dominant Taxon/Taxa Studied:*Opistognathus whitehursti*;

(28.00010)

Williams, M.L. 1975. Meiofauna of the beach-to-reef zone on the southeast Florida coast. Fla. Atlantic Univ., M.S. Thesis.

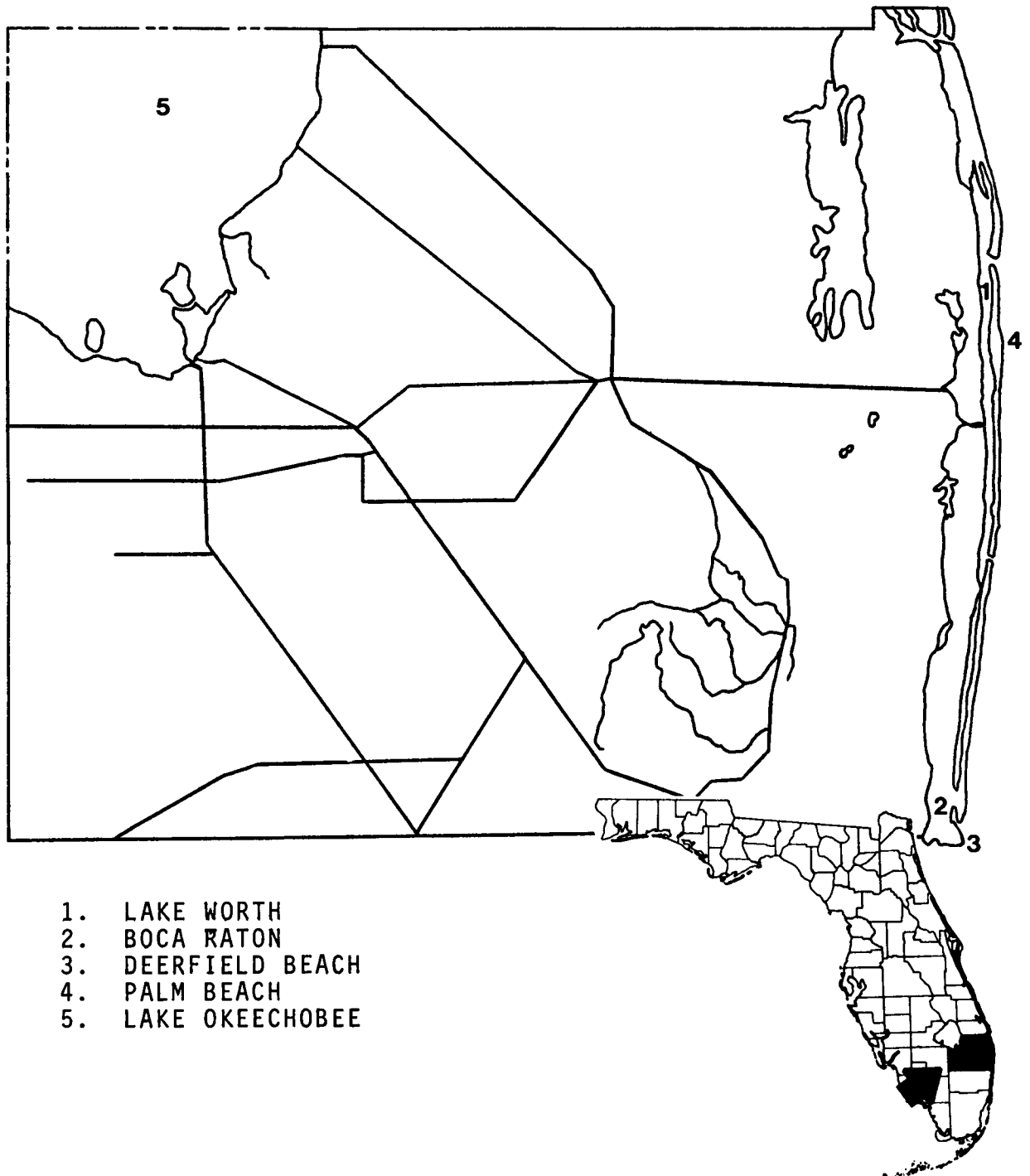
The composition, abundance, and horizontal and vertical distribution of meiofauna in adjacent carbonate and noncarbonate habitats on the southeast Florida coast were studied. Densities for the carbonate and noncarbonate transects were given.

On both transects, densities were higher in summer and lower in winter; seasonal changes were attributed to both temperature and sediment changes. Over 50% of the meiofauna were found in the top 2 cm and over 90% in the top 7 cm of substrate. Penetration was deeper in the noncarbonate sediments than in the carbonate sediments. Nematodes and harpacticoid copepods dominated most stations year round. Subtidal stations on the carbonate substrate displayed greater meiofaunal diversity than did those in the noncarbonate substrate. The subtidal carbonate habitats had greater densities than most previously studied noncarbonate habitats. The correlation of meiofaunal density with five sediment parameters was discussed.

Study Duration:1 year; Habitat:Sand, mud; Type of Study:Quantitative; Biological Component:Meiofauna; Type of Sampler:3.8 cm dia., 15 cm long plexiglass corer; Sieve Size:0.063 mm; Number of Stations:8; Number of Replicates/Station:7; Temporal Frequency:Every 6 months; Abiotic Parameters Measured:Sediment temperature, sediment analysis;

See also: 1.00041, 26.00016, 26.00073, 27.00010, 29.00012, 33.00002.

# PALM BEACH COUNTY





(29.00001)

Applied Biology, Inc. 1976. Ecological parameter monitoring at the Riviera Plant. Florida Power and Light Co. Rept.

Results of benthic sampling in the vicinity of the Florida Power and Light Co. Riviera Plant in 1975 are reported. A species list was compiled, and density, diversity, and equitability values provided.

Study Duration:1 year; Type of Study:Quantitative; Biological Component:Macroinvertebrate fauna; Type of Sampler:Grab; Number of Stations:2; Temporal Frequency:Quarterly;

(29.00002)

Avent, R.M. & F.G. Stanton 1975. Submersible reconnaissance and research program. Harbor Branch Found., Inc. Annu. Rept. 92 p.

A general scientific program on benthic current patterns, sediments and epifaunal distribution was conducted through the use of the *Johanson-Sea-Link* submersible. Observations of living forms in nature were made under accurately known conditions at desired locations. The counting of fragile and elusive organisms was also accomplished. Descriptions of the following species were taken from verbal records and photographic analysis: *Portunus gibbesi*, *P. spinimanus*, *Rochinia* sp. (crassa), *Caulolatilus cyanops*.

Study Duration:May 19 - October 15, 1975; Habitat:Variable; Type of Study:Qualitative; Biological Component:Fauna and flora; Type of Sampler:Submersible *Johanson-Sea-Link*; Number of Stations:8 transects; Abiotic Parameters Measured:Temperature, currents; Dominant Taxon/Taxa Studied:*Portunus gibbesi*, *Portunus spinimanus*, *Rochinia* sp. (crassa), *Caulolatilus cyanops*;

(29.00003)

Bane, L. 1979. A seasonal study of sessile marine fouling organisms in northern Lake Worth, Florida. Fla. Atlantic Univ. M.S. Thesis. 68 p.

Seasonal recruitment patterns and development of a fouling community on gelcoat-covered fiberglass plates were investigated at 3 sites in northern Lake Worth, Florida, from September 1976 to September 1977. Species abundance was higher at 2 stations which had relatively stable levels of salinity, temperature, and dissolved oxygen than at the third station, which was subject to more variable abiotic conditions. All stations exhibited maximum settlement and growth in the spring and early summer. Three species were found to settle only on plates that had been previously colonized.

Study Duration:September 1976-September 1977; Type of Study:Quantitative; Biological Component:Fauna, flora; Number of Stations:3; Temporal Frequency:Monthly; Abiotic Parameters Measured:Salinity, temperature, DO;

(29.00004)

Craig, A.K. 1968. Beach rock destruction by marine gastropods at Boca Raton, Florida. Am. Zool. 8(4):800.

The role of marine gastropods in the erosion of beach rock and related littoral carbonate substrates of selected test sites was discussed. Some preliminary relationships were noted and calculations of substrate destruction capability were estimated on an annual basis. Results suggested that a theoretical steady-state destructive potential was greater than recognized but actual destruction was minor compared to drastic destruction by wave abrasion. Mapping techniques appropriate to the observation of small slow moving animals were devised. Attempts were made to determine the actual mechanism for rock removal by removing presoftered algae covered rock so that a fresh surface was affected by increased solution activity.

Habitat:Rock; Type of Study:Qualitative; Biological Component:Marine gastropods; Dominant Taxon/Taxa Studied:*Siphonaria pectinata*, *Acanthopleura granulata*, *Littorina ziczac*, *Merita piloronta*;

(29.00005)

Deis, D.R. 1978. The effects of a waste water outfall on benthic macroinvertebrates in Lake Worth (Palm Beach County), Florida. Fla. Atlantic Univ., M.S. Thesis.

The effects of sewage outfall on benthic invertebrates was studied in Lake Worth, a part of the Intracoastal Waterway System. Three thousand seventy three specimens comprising 134 taxa were collected. Abundances and percent composition of the dominant species at each station for each sampling period were tabulated. The capitellids generally dominated at the stations near the outfall. The stations more distant from the outfall showed lower degrees of dominance and less seasonal fluctuation of species. Lake Worth was found to be slightly more diverse than most polluted estuarine areas and was termed "mildly polluted". The stations most distant from the sewage outfall were suggested to be indicative of background conditions. The value of *Capitella capitata* as a pollution indicator was confirmed, since it reached its highest density at the stations closest to the outfall.

Study Duration:February 3, 1977 - July 6, 1977; Habitat:Sandy, silt; Type of Study:Quantitative; Biological Component:Macrobenthic fauna; Type of Sampler:Modified Petersen grab; Sieve Size:1.0 mm; Number of Stations:6; Number of Replicates/Station:3; Abiotic Parameters Measured:Temperature, salinity, DO, pH, turbidity, clarity, sediment characteristics; Dominant Taxon/Taxa Studied:*Capitella capitata*, *Streblospio benedicti*;

(29.00006)

Deis, D.R., R. Majesky & H.D. Rudolph 1983. The benthic macroinvertebrates of Lake Worth, Palm Beach County, Florida. Presented at Benthic Ecol. Meet., Fla. Instit. of Tech., Melbourne.

The distribution and community structure of benthic macroinvertebrates in Lake Worth, Florida, were determined from 2 collections (16 April and 6 August 1982) at 14 stations and correlated with abiotic parameters. The results were compared with those of similar studies conducted in the same area in 1972. The effect of long term variations within Lake Worth on changes in the benthic community were examined.

Study Duration: 16 April-6 August 1982; Type of Study: Quantitative; Biological Component: Fauna; Number of Stations: 14; Temporal Frequency: Twice;

(29.00007)

Goldberg, M. 1973. Ecological aspects of salinity and temperature tolerances of some reef-dwelling gorgonians from Florida. *Caribb. J. Sci.* 13(3-4):173-177.

Optimal, marginal, and terminal extremes for salinity and temperature were determined for each of 6 species of reef-dwelling gorgonians. Comparisons were made with scleractinian tolerances, and it was concluded that although both groups had similar temperature ranges, gorgonians were somewhat more stenohaline. Examples of ecological restriction by thermal and saline extremes were discussed.

Habitat: Coral reef; Type of Study: Qualitative; Biological Component: Gorgonians; Type of Sampler: Hand sampler; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Eunicea calyculata* forma *calyculata*, *Plexaura flexuosa*, *Muricea muricata*, *Gorgonia ventalina*, *Pseudopterogorgia americana*, *Pseudopterogorgia rigada*;

(29.00008)

Goldberg, W.M. 1970. Some aspects of the ecology of the reefs off Palm Beach County, Florida, with emphasis on the Gorgonacea and their bathymetric distribution. Fla. Atlantic Univ., M.S. Thesis.

An investigation of gorgonian populations was made from the three reef terraces located off southern Palm Beach County, Florida. Temperature tolerance tests indicated that the gorgonians were somewhat eurythermal. It was assumed that temperature did not limit gorgonian distribution. It was likewise concluded that salinity does not affect the bathymetric distribution of these animals. Current data revealed that strong bottom currents were rare and thus could not affect the distribution of gorgonian populations significantly. Current was, however, responsible for the orientation of some species. Turbidity was also discounted as a factor in the distribution of gorgonians.

Study Duration: Summer, 1969; Habitat: Reef; Type of Study: Qualitative; Biological Component: Gorgonians; Type of Sampler: Photography; Number of Stations: 3; Number of Replicates/Station: 40 quadrats; Temporal Frequency: Once; Abiotic Parameters Measured: Temperature, salinity, DO, turbidity, current, light; Dominant Taxon/Taxa Studied: *Cliligorgia schraumi*;

(29.00009)

Goldberg, M.M. 1973. The ecology of the coral octocoral communities of the southeast Florida coast: geomorphology, species composition, and zonation. *Bull. Mar. Sci.* 23(3):465-488.

Three parallel submarine terraces found along the southeast coast of Florida, stretching from Miami through Palm Beach County were described. The central portion of this area near southern Palm Beach County was analyzed with respect to geomorphology, community composition, and zonation from the low-tide mark to a depth of 30 m. Twenty seven species of scleractinian corals and 39 species of gorgonians were found here and defined a typical coral reef community farther north than had been previously acknowledged. Gorgonian diversity was maximal at a depth of 15-20 m, while scleractinians were most diverse in shallower water. Studies of gorgonian biomass indicated a trend toward large numbers of small individuals in low-diversity environments. A mean density of 25.1 colonies/m<sup>2</sup> gave these reefs the highest concentration of gorgonians yet recorded in the Caribbean region.

Habitat: Coral reef; Type of Study: Quantitative; Biological Component: Coral; Number of Stations: 2 reefs, 6 stations; Number of Replicates/Station: 10; Temporal Frequency: Once; Abiotic Parameters Measured: Temperature; Dominant Taxon/Taxa Studied: Scleractinians, *Oculina diffusa*, *Solenastrea hyades*, *Dichocoenia stokesii*, *Montastrea cavernosa*;

(29.00010)

Moore, D.R. 1962. Notes on the distribution of the spiny lobster *Panulirus* in Florida and the Gulf of Mexico. *Crustaceana* 3(4):318-319.

Observations of many *Panulirus* living in caves and holes in the rocky reefs of the east coast, (primarily Palm Beach and also Hobe Sound) were reported. The common species is *P. argus* and it is abundant throughout the year. *P. guttatus*, quite rare, was never found living in areas occupied by *P. argus*. Although only occasionally seen, it was present year round. *P. laevis*, not seen until April 1949, became almost as common as *P. argus* but after the 1949 invasion no more specimens were found. *Panulirus* is not fished commercially in the Palm Beach

area. Records show *P. argus* as far north as North Carolina, but there are no records for the northern Gulf of Mexico. It is suggested that there are considerable numbers of *P. argus* on suitable rocky bottom in the northern Gulf of Mexico, but in water too deep and too far offshore to be fished commercially.

Study Duration:6 years; Habitat:Rocky reef, caves, holes; Type of Study:Qualitative; Biological Component:Decapod fauna; Dominant Taxon/Taxa Studied:*Panulirus argus*, *Panulirus guttatus*, *Panulirus laeviscauda*;

(29.00011)

Reed, J.K. 1977. Benthic macrofaunal associations in Lake Worth, Florida. Fla. Scientist 40 (Supl. 1):11.

The distribution and structure of benthic macrofauna in relation to sediment types and sources of pollution were studied. Sand and silty sand stations were found to have the highest diversity and species richness values. The mud and outfall stations exhibited low diversity and species richness values that were similar to values reported for pollution-stressed areas in other studies.

Habitat:Sandy, silty sand, mud; Type of Study:Quantitative; Biological Component:Macrofauna; Number of Stations:11; Temporal Frequency:Bimonthly;

(29.00012)

Stanaland, B.E. 1977. The effects of overhanging ledges on the macroinvertebrate benthos of a subtidal sandy bottom. Fla. Atlantic Univ., M.S. Thesis.

Sixty five species comprising 3,820 individuals were collected during the study. All samples were dominated by relatively few species with Bivalve sp. A being the most abundant species collected (48% of the entire collection). Species composition was very similar in the two areas. *Microcerberus virabilis* was the only abundant species occurring exclusively in one area (open sand). Densities were 50% greater in open sand areas than in underledge areas, apparently due to the reduction of current under the ledges and therefore the reduction of suspended particulate nutrients. Species richness decreased in open sand areas during February, but remained relatively constant under ledges throughout the study. This was attributed to sand shifts in open sand areas caused by rougher winter sea conditions.

Study Duration:2 months; Habitat:Sand; Type of Study:Qualitative; Biological Component:Benthic macroinvertebrates; Type of Sampler:Rectangular aluminum scoop; Sieve Size:0.5 mm; Number of Stations:12; Number of Replicates/Station:3; Temporal Frequency:Once per month; Abiotic Parameters Measured:Temperature, salinity, DO, sediment analysis; Dominant Taxon/Taxa Studied:*Microcerberus virabilis*, Bivalve sp. A;

(29.00013)

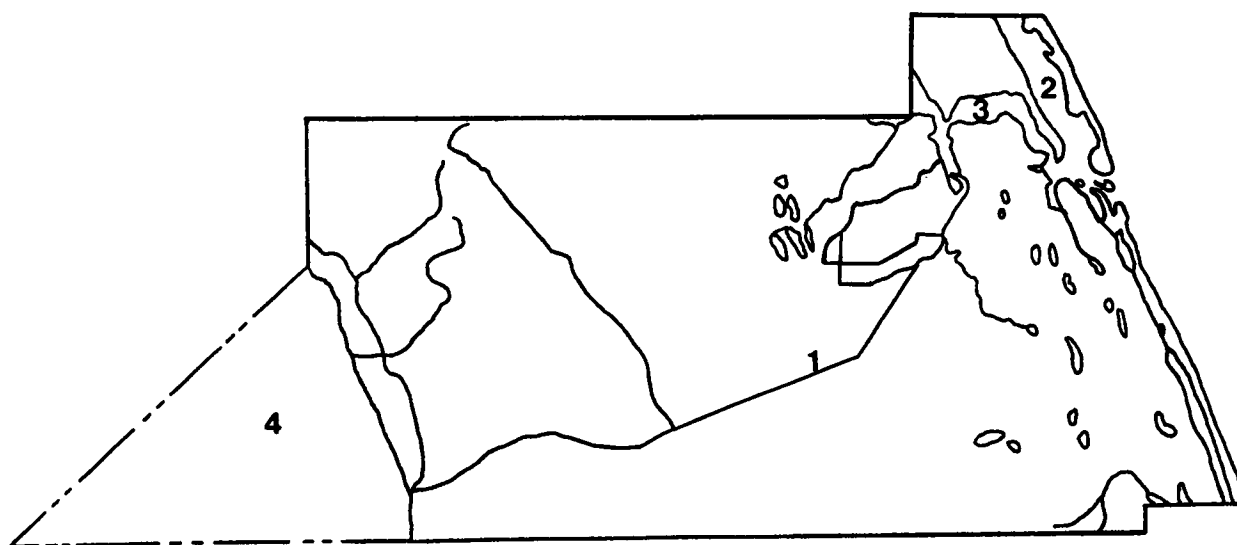
Webb, A.D. 1976. The benthic ecology of the Intracoastal Waterway and adjacent canal systems at Boca Raton, Florida. Fla. Atlantic Univ., M.S. Thesis.

Benthic samples taken in the intracoastal water and adjacent finger canals at Boca Raton, Florida provided data on the distribution and structure of these communities in relation to station location and sediment type. Three station assemblages were designated based on faunal similarities. Highest diversity and species richness values were found at intracoastal waterway stations; these stations were characterized by sediments with relatively high sand and low organic percentages. Stations located within finger canals were characterized by sediments with high silt-clay fractions, high organic percentages, and low numbers of species and individuals.

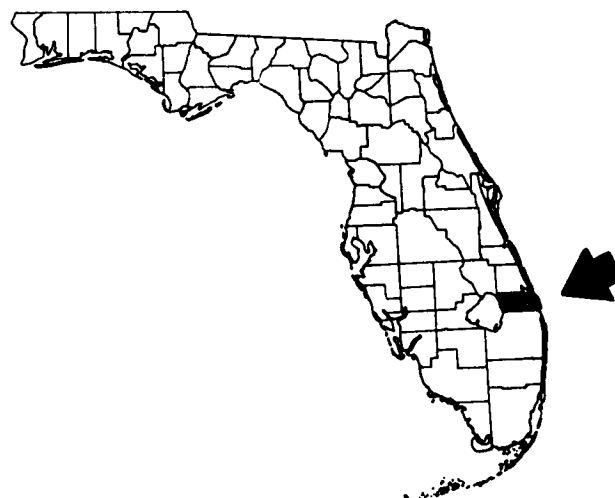
Study Duration:3 months; Habitat:Sand; Type of Study:Quantitative; Biological Component:Macroinvertebrate fauna; Type of Sampler:Petersen grab; Sieve Size:1.0 mm; Number of Stations:23; Number of Replicates/Station:2; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, DO, turbidity, depth, sediment analysis; Dominant Taxon/Taxa Studied:*Ameliscia abdita*, *Grandidierella bonnieroides*, *Paraprionospio pinnata*, *Streblospio benedicti*, *Mulinia lateralis*;

See also: 1.00041, 26.00006, 26.00007, 26.00073, 27.00010, 27.00077, 27.00078, 28.00010.

# MARTIN COUNTY



1. ST. LUCIE CANAL
2. INDIAN RIVER
3. ST. LUCIE RIVER
4. LAKE OKEECHOBEE



(30.00001)

Gunter, G. & G.E. Hall 1963. Biological investigations of the St. Lucie estuary (Florida) in connection with Lake Okeechobee discharge through the St. Lucie Canal. Gulf Res. Rept. 1(5):189-307.

The population of fishes in the three branches of the St. Lucie estuary were sampled. Eighty three species from 24,783 specimens of predominantly marine fishes were collected. Thirty six species from 2,000 specimens of invertebrates were sampled. The outflow of water through the St. Lucie Lock and Dam was found to enhance the reproduction of commercial estuarine forms and increase the total production and fertility of the area. A great many of the common sport fishes were found in the area even when the salinities were quite low.

Study Duration:2 years; Habitat:Estuarine; Type of Study:Semi quantitative; Biological Components:Fish and invertebrates; Type of Sampler:Trawl and seine nets; Number of Stations:7 trawl, 6 seine; Number of Replicates/Station:1 or 2; Temporal Frequency:Approximately quarterly; Abiotic Parameters Measured:Temperature (air & water), salinity, turbidity, freshwater discharge;

(30.00002)

Ingle, R.M. & R. Witham 1968. Biological considerations in spiny lobster culture. Proc. Gulf Caribb. Fish. Inst. 21:158-162.

The life history of the Florida spiny lobster, *Panulirus argus*, and its potential for mariculture are reviewed. Attempts to culture postlarvae in artificial habitats in St. Lucie estuary and at Key West, Florida attained inconsistent results. Cultivation methods and possible problems are discussed.

Type of Study:Qualitative; Biological Component:Crustacea; Dominant Taxon/Taxa Studied:*Panulirus argus*;

(30.00003)

Phillips, R.C. 1961. Seasonal aspect of the marine algal flora of St. Lucie inlet and adjacent Indian River, Florida. Quart. J. Fla. Acad. Sci. 24(2):135-147.

A total of 123 taxa of marine algae were found in a survey of Indian River and St. Lucie Inlet, Florida, conducted between September 1957 and March 1959. Four collections (2 spring; 2 autumn) were made at 10 stations. *Diplanthera* (*Halodule*), *Syringodium*, and *Sargassum* were dominant hosts of algal epiphytes. Seasonal variations in species abundance were correlated with water temperature. A plant species list is included.

Study Duration:28 Sept. 1957-12 Mar. 1959; Habitat:Seagrass bed, mud, sand; Type of Study:Qualitative; Biological Component:Flora; Sieve Size: ; Number of Stations:10; Temporal Frequency:Semiannually; Abiotic Parameters Measured:Water temp., depth, current velocity, substrate type; Dominant Taxon/Taxa Studied:*Diplanthera* (*Halodule*), *Syringodium*, *Sargassum*, *Enteromorpha*, *Gracilaria*;

(30.00004)

Phillips, R.C. & R.M. Ingle 1960. Report on the marine plants, bottom types, and hydrography of the St. Lucie estuary and adjacent Indian River, Florida. Fla. Bd. Conserv. Mar. Lab., Spec. Rept. No. 4. 75 p.

A study of the seagrasses and algae of the St. Lucie River area was conducted between September 1957 and March 1959 to determine the effects of freshwater input from St. Lucie canal. A total of 144 taxa of marine plants, including 5 species of seagrass, were collected during 4 samplings. A species list, which includes the collection site, relative abundance, and date of collection is given. The temporal and spatial variations in abundance of plants are related to various physical parameters, predominantly salinity and turbidity.

Study Duration:28 Sept. 1957-12 Mar. 1959; Habitat:Seagrass beds, mud, sand; Type of Study:Quantitative; Biological Component:Flora; Type of Sampler:Dredge, core; Number of Stations:27; Temporal Frequency:Semiannually (Oct. & Mar.); Abiotic Parameters Measured:Temp., sal., bottom type, turbidity (secchi reading), tidal dir., moon phase, wind vel. & dir.; Dominant Taxon/Taxa Studied:*Syringodium filiforme*, *Diplanthera* (*Halodule*) *wrightii*, *Gracilaria verrucosa*, *Ruppia*;

(30.00005)

Wang, T.C., J.P. Krivan, Jr. & R.S. Johnson 1979. Residues of polychlorinated biphenyls and DDT in water and sediment of the St. Lucie estuary, Florida. Pestic. Monitor. J. 13(2):69-71.

Sediment samples from 6 stations in the St. Lucie estuary were analyzed for DDT and PCB residues on 3 dates in the summer of 1977. DDT levels increased after Lake Okeechobee water was discharged through St. Lucie Canal into the area, with maximum concentrations measured in the Palm City area. Sediment samples from the junction of the Indian and St. Lucie Rivers had undetectable levels of DDT and PCB.

Study Duration:14 June-8 July 1977; Type of Study:Quantitative; Type of Sampler:Corer; Number of Stations:6; Number of Replicates/Station:3; Temporal Frequency:3 times (June 14, June 21, July 8); Abiotic Parameters Measured:DDT and PCB levels;

(30.00006)

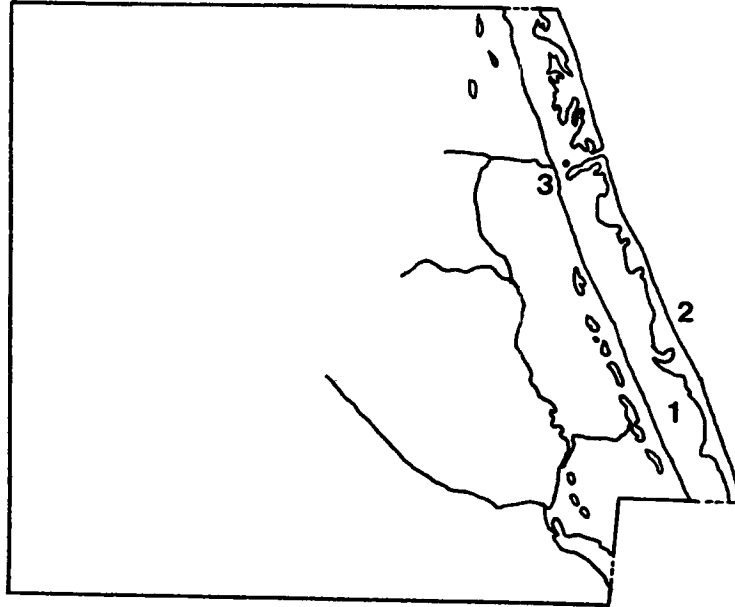
Witham, R., R.M. Ingle & E.A. Joyce, Jr. 1968. Physiological and ecological studies of *Panulirus argus* from the St. Lucie estuary. Fla. Bd. Conserv. Mar. Lab., Tech. Ser. No. 53. 31 p.

Postlarval spiny lobsters (*Panulirus argus*) were captured with artificial habitats in St. Lucie Estuary over a 2 year period. A monthly influx of postlarval lobsters was found except in the summer of 1966 when salinity declined drastically. In salinity tolerance tests, high mortalities were found at salinities less than 19 o/oo. No phyllosome larvae were found in plankton samples of the Indian River area. Growth measurements indicated that the size of individuals raised under the same conditions cannot be directly correlated with age.

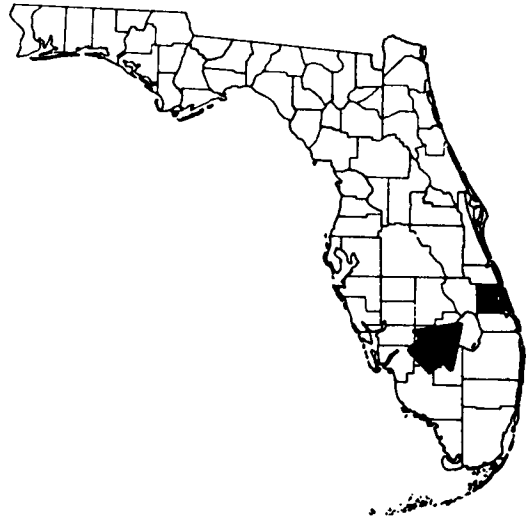
Study Duration: June 1963-October 1967; Habitat: Rock, outcrops, patch reefs; Type of Study: Quantitative; Biological Component: Crustacea fauna; Type of Sampler: Witham habitat, half drum trap, plankton net; Number of Stations: 6; Temporal Frequency: Biweekly; Abiotic Parameters Measured: Salinity, temperature; Dominant Taxon/Taxa Studied: *Panulirus argus*;

See also section 6, Indian River Region.

# ST. LUCIE COUNTY



1. INDIAN RIVER
2. HUTCHINSON ISLAND
3. FORT PIERCE



(31.00001)

Applied Biology, Inc. 1977. Ecological monitoring at the Florida Power and Light Co. St. Lucie Plant. Florida Power & Light Co. (Miami, FL) Annu. Rept. Vol. 1.

Results of benthic sampling in the vicinity of the Florida Power and Light Co. St. Lucie Plant in 1976 and 1977 are reported. Species lists were compiled and faunal density, biomass and equitability values reported.

Study Duration: 2 years; Type of Study: Quantitative; Biological Component: Macroinvertebrates; Type of Sampler: Grab; Number of Stations: 6; Temporal Frequency: Quarterly;

(31.00002)

Buzas, M.A. 1978. Community unity? Patterns in molluscs and foraminifera, p. 173-190, In: M.L. Wiley (ed.), Estuarine Interactions. Academic Press, New York. 603 p.

Patterns of density of molluscs and foraminifera in seagrass habitats in Jamaica and Link Port, Florida were analyzed for different habitats, periodicity, and effects of predator exclusion cages. Only Florida data is summarized here. Of five species of gastropods analyzed, only one showed a significant difference inside vs. outside the cage, with higher densities inside. The densities of four gastropod species exhibited significant differences with time. The densities of total bivalves were significantly higher inside the cage and differed significantly with time. The densities of all taxa of foraminifera showed no significant difference between inside and outside the cage, but differed with time. The results suggested that only the cage with 1 mm openings provided an effective enclosure from foraminiferal predators. The results also suggested a slight response of the dominant members of the macro and meiofauna to abiotic and biotic variables.

Study Duration: December 1975 - June 1976; Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Molluscs, foraminifera; Type of Sampler: Predator exclusion cages; Temporal Frequency: Monthly;

(31.00003)

Buzas, M.A. 1978. Foraminifera as prey for benthic deposit feeders: results of predator exclusion experiments. J. Mar. Res. 36(4):617-625.

To assess the importance of predation on foraminifera, a meiofaunal enclosure with openings of 1 mm containing 30 liters of azoic sand was placed in a subtidal flat. Replicate samples were taken inside and outside the cage. Foraminiferal densities were significantly higher inside the cage in the absence of macrofaunal predators. A cage with 12 mm openings constructed for a macrofaunal enclosure experiment was placed over the natural substrate to estimate the importance of larger predators. A control area with no cage was established nearby. Foraminiferal densities inside vs. outside the cage were not significantly different. Examination of gut contents of macrofaunal animals indicated that a wide variety of deposit feeders ingest foraminifera. Foraminiferal biomass inside meiofaunal cages in April and May for both years were estimated to be 3 to 12 g/m<sup>2</sup> higher than outside the cages. These experiments indicated that foraminiferal densities were substantially reduced by predation and, therefore, foraminifera probably represented an important benthic food source.

Study Duration: February, April - June 1976; Habitat: Estuarine; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Core, predator exclusion cages; Sieve Size: 0.063 mm; Number of Stations: 2; Number of Replicates/Station: 4; Temporal Frequency: Monthly for 4 months; Dominant Taxon/Taxa Studied: *Ammonia beccarii*, *Elphidium mexicanus*;

(31.00004)

Buzas, M.A. & K. Krapf 1976. Studies of the Foraminifera of the Indian River Region. Chapt. 10, In: Harbor Branch Consortium, Indian River Coastal Zone Study 1975-1976. Annu. Rept. 1.

A vertical distribution study of sediment to a depth of 10 cm revealed foraminifera abundant to a depth of 6-7 cm. The total numbers of living foraminifera and of individuals of two of the dominant species exhibited significant differences between depths but not between replicate samples. An enclosure study revealed significant differences in numbers of foraminifera over time and between inside and outside the enclosure. Densities inside were the highest recorded in the literature. The total numbers of specimens both inside and outside the enclosure peaked after two months and declined during the final two months. The differences between inside and outside the enclosure suggested that predation regulated foraminifera densities; the synchronous periodicity of populations inside and outside suggested an overall influence of environmental variables.

Study Duration: 1975-1976; Habitat: Silty sand; Type of Study: Quantitative; Biological Component: Benthic foraminifera; Type of Sampler: Cores, predator exclusion cages; Sieve Size: 0.063 mm; Number of Stations: 1; Number of Replicates/Station: 4; Temporal Frequency: Monthly; Dominant Taxon/Taxa Studied: *Ammonia beccarii*, *Elphidium mexicanus*, *Quinqueloculina* sp.;

(31.00005)

Camp, D.K., N.H. Whiting & R.E. Martin 1977. Nearshore marine ecology at Hutchinson Island, Florida: 1971-1974. V. Arthropods. Fla. Mar. Res. Publ. No. 25. 63 p.



Five nearshore stations (7-11 m depth) off Hutchinson Island, Florida were sampled bimonthly during daylight from September 1971 to July 1973 with a shipek benthic grab (0.04 m<sup>2</sup>) and otter trawl. During August 1973 to July 1974, 3 of the stations were sampled monthly with an otter trawl during daylight and at night. The sampled area consisted of 3 nearshore zones: shallow beach terrace; crest of a shallow offshore shoal; and a deeper trough between them. Over 170 arthropod species were collected. High species turnover was indicated in both grab and trawl samples, with no species being captured in more than 6 sampling periods in the first two years. In the third year only the barnacle *Balanus venustus* and the swimming crab *Portunus spinimanus* were taken more than 6 times. The dominant species in each of the 3 offshore zones are named. Number of species, density, and diversity values for each station and their seasonal fluctuations are given. Sediment grain size and composition are theorized as important controlling factors in species composition and diversity. Common surf zone organisms collected with beach seine at 3 stations included the crabs *Arenaeus cribrarius* and *Emerita talpoida*. A single sampling of an intertidal worm (*Phragmatopoma lapidosa*) reef yielded 36 arthropod species, 25 of which were unique to that habitat.

Study Duration: September 1971-July 1974; Habitat: Sand; Type of Study: Quantitative; Biological Components: Arthropoda; Type of Sampler: Shipek 850 benthic grab (0.04 m<sup>2</sup>), semiballoon otter trawl; Sieve Size: 0.71 mm; Number of Stations: 8; Number of Replicates/Station: 5 (5 station), 3 (3 stations); Temporal Frequency: Bimonthly, monthly; Dominant Taxon/Taxa Studied: *Pachygrapsus transversus*, *Menippe nodifrons*, *Phragmatopoma lapidosa*, *Pachycheles monilifer*, *Erydice littoralis*, *Arenaeus cribrarius*, *Emerita talpoida*, *Balanus venustus*, *Portunus spinimanus*, *Paguristes huxii*, *Trachypneus constrictus*, *Portunus gibbesii*, *Liljeborgia* sp., *Maera* sp., *Tiron* sp., *Chiridotea arenicola*, *Trichophoxus* sp., *Acanthohaustorius* sp., *Protohaustorius* sp.;

(31.00006)

Carle, K.J. & P.A. Hastings 1982. Selection of meiofaunal prey by the darter goby, *Gobionellus boleosoma* (Gobiidae). Estuaries 5(4):316-318.

The darter goby, *Gobionellus boleosoma* sieves meiofaunal organisms from ingested sediment bites. Gut contents of darter gobies were compared with available food items as determined from core analysis. Copepods, the most numerous item in guts, and ostracods were significantly selected for ingestion by the gobies. Nematodes occurred in the same relative numbers in guts as in cores. Foraminifera, the most numerous item in cores, were significantly selected against.

Study Duration: June 1978-May 1979; Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Core; Sieve Size: 1 mm, 62 um; Number of Stations: 1; Number of Replicates/Station: 4; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature, salinity; Dominant Taxon/Taxa Studied: *Gobionellus boleosoma*, *Nematoda*, *Copepoda*, *Ostracoda*, *Foraminifera*;

(31.00007)

Continental Shelf Associates, Inc. 1974. Aquatic Environmental Survey - Port St. Lucie, Florida.

An aquatic environmental baseline survey of the river basin area associated with Port St. Lucie, Florida was conducted. The sampling program included intensive investigation of water quality, benthos assessment, bathymetry, hydrology, dye tracer studies, and various physical parameters to provide baseline data for future development.

Type of Study: Quantitative; Abiotic Parameters Measured: Water quality, bathymetry, hydrology, other physical parameters;

(31.00008)

Futch, C.R. & S.E. Dwinell 1977. Nearshore marine ecology at Hutchinson Island, Florida: 1971-1974. IV. Lancelets and fishes. Fla. Mar. Res. Publ. No. 24, 23 p.

Grab samples produced 645 lancelets. The maximum recorded abundance was 1,750/m<sup>2</sup>. Spawning occurred from February to March and again from June through August. The lancelets that spawned in February or March either did not survive or migrated to unsampled areas. Growth was about 2.5-3.0 mm/ month during the first year of life and slower thereafter. Maximum life span of lancelets in the study area was about 2 years. Distribution and abundance of lancelets among the five stations was found to be more related to sediment composition and texture than to any other ecological factor considered. Most lancelets settled and grew to maturity in sediments of primarily coarse sand with little or no silt. Trawl and beach seine samples produced 75 species of fishes (covering the surf zone and sand-shell bottom zone). A preliminary list of reef fishes captured in previous unrelated work was given.

Study Duration: 1971-1974; Habitat: Sand; Type of Study: Quantitative; Biological Component: Lancelets, fish; Type of Sampler: Shipek grab, seine, trawl; Sieve Size: 0.71 mm; Number of Stations: 5 offshore, 3 beach; Number of Replicates/Station: 5 grab; Temporal Frequency: Monthly, bimonthly; Dominant Taxon/Taxa Studied: *Brachiostoma virginiae*, *Trachinotus carolinus*, *Nenticirrhus littoralis*, *Umbra coroides*, *T. falcatus*, *T. goodei*;

(31.00009)

Gallagher, R.M. 1977. Nearshore marine ecology at Hutchinson Island, Florida: 1971-1974. II. Sediments. Fla. Mar. Res. Publ. No. 23, p. 6-24.

A major phase of the baseline study of the nuclear powered electricity generating plant on Hutchinson Island was directed toward providing information on the benthic macroinvertebrates of the area. Grain size distribution, sorting, and mineral composition of representative sediments at the sites were included in the benthic study. Statistical analysis indicated that 4 sediment types were present within 3 zones (outer beach terrace, trough, and shoal). Sediment volume data were used to analyze Shipek grab reliability and efficiency. Reliability results indicated grab performance was dependent on sediment texture and was optimal over a narrow range of medium and coarse sands. Digging efficiency was also related to sediment texture.

Study Duration:1971-1974; Habitat:Shell; Type of Study:Quantitative; Biological Component:Benthic macroinvertebrates; Type of Sampler:Shipek grab; Sieve Size:2.0-0.064 mm; Number of Stations:5; Temporal Frequency:Monthly and bimonthly; Sediment characteristics, temperature, salinity, DO, total suspended loads; Abiotic Parameters Measured:nutrients;

(31.00010)

Gallagher, R.M. & M.L. Hollinger 1977. Nearshore marine ecology at Hutchinson Island, Florida: 1971-1974. I. Rationale and methods. Fla. Mar. Res. Publ. No. 23. p. 1-5.

A 3 year environmental baseline study was conducted in the Atlantic Ocean off Hutchinson Island at the site location of Florida Power and Light Company's nuclear powered electricity generating plant prior to plant operation. Various samples were taken either monthly or bimonthly at 5 nearshore stations (<3 km from beach) and 3 beach seine stations. Continuous meteorological and seawater temperature data was collected. At nearshore stations the following physical-chemical parameters were measured: salinity, temperature, dissolved oxygen, submarine photometry, chlorophyll 'a', total suspended loads (organic and inorganic fractions), total organic carbon, nutrients (NO<sub>3</sub>-N, NO<sub>2</sub>-N, NH<sub>3</sub>-N, SiO<sub>2</sub>-Si, PO<sub>4</sub>-P), phaeopigments, and sediment structures. Nearshore benthos were collected with a benthic grab and semiballoon otter trawl. Surf zone fauna was seined and plankton samples were taken with a 0.5 m conical net. Intertidal worm reefs were sampled qualitatively.

Study Duration:1971-1975; Type of Study:Quantitative; Biological Component:Faua and flora; Type of Sampler:8 liter Niskin, 0.5 m dia. 202 um conical plankton net, Shipek 850 benthic grab (0.04 m<sup>2</sup>), semiballoon otter trawl; Sieve Size:0.71 mm; Number of Stations:8; Temporal Frequency:Bimonthly (benthic & beach seine), monthly (abiotic & plankton); Abiotic Parameters Measured:Salinity, temp., DO, photometric measurements, chl 'a', organic & inorganic fractions, nutrients, sediment structure, total organic carbon, phaeopigments;

(31.00011)

Hoskin, C.M. 1983. Sediment in seagrasses near Link Port, Indian River, Florida. Florida Sci. 46(3/4):153-161.

*Thalassia*, *Halodule*, *Syringodium*, and bare sand areas in grass beds were sampled in the summers of 1979 and 1980. Sediments in bare sand areas were similar in grain size to seagrass areas. However, *Thalassia* beds contained a higher silt fraction than bare areas. Sediment characteristics in each area are described.

Habitat:Seagrasses; Type of Study:Qualitative; Biological Component:Flora; Type of Sampler:PVC corer, plastic sediment traps; Number of Stations:34; Temporal Frequency:8, 5, and 3 days (sediment traps); Abiotic Parameters Measured:Sediment characteristics; Dominant Taxon/Taxa Studied:*Thalassia*, *Halodule*, *Syringodium*;

(31.00012)

Howard, R.K. 1983. Short term turnover of epifauna in small patches of seagrass beds within the Indian River, Florida. Presented at Benthic Ecol. Meet., Fla. Instit. of Tech., Melbourne.

Turnover rates of seagrass associated epifauna in the Indian River, Florida, were determined by use of an in situ dye marking technique. The mobility of most taxa were found to be high, but greatly variable. Within 3-6 hours more than half the individuals of some crustacean species had vacated 0.64 m<sup>2</sup> areas of seagrass. A mean of 12% of the dominant crustaceans and 57% of the gastropods were still present after 24 hours. Observed abundance patterns of epifauna are discussed in view of the results.

Habitat:Seagrass beds; Type of Study:Quantitative; Biological Component:Faua;

(31.00013)

Johnson, R.O. 1982. The effects of dredging on offshore benthic macrofauna south of the inlet at Fort Pierce, Florida. Fla. Instit. of Tech., M.S. Thesis. 137 p.

The effects of offshore dredging at Ft. Pierce inlet, Florida on benthic macrofaunal communities was investigated between November 1981 and August 1982. Four transects (2 dredged sites; 2 control sites) were sampled tri-monthly with a Smith-McIntyre grab to determine species number, evenness, diversity, and species composition. Temperature, salinity, turbidity, and dissolved oxygen were monitored at all stations. Comparison of benthic communities at dredged and control sites revealed that diversity, species richness and evenness, and abundance, all returned to pre-dredge levels after 12 months.

Study Duration:18 Nov. 1980-4 Aug. 1981; Habitat:Sand; Type of Study:Quantitative; Biological Component:Faua; Type of Sampler:Smith-McIntyre grab; Sieve Size:0.505 mm; Number of Stations:17; Number of Replicates/Station:3; Temporal

Frequency: Trimonthly; Abiotic Parameters Measured: Temp., salinity, DO, sediment grain size; Dominant Taxon/Taxa Studied: *Crassinella martinicensis*, *Acanthohaustorius shoemakeri*, *Ophiophragmus murdumani*, *Barbaria candida*, *Tellina* sp.;

(31.00014)

Lackey, J.B. 1971. Florida Power and Light Company - Hutchinson Island Plant - Environmental Rept. Vol. 1. Docket No. 50-335.

The study area was found to support abundant and diverse plankton and benthic populations, an enormous biomass of Manatee grass, and several species of macroscopic algae. The sediment-water interface was observed to be densely populated.

Study Duration: 1 year; Habitat: Rock, sand, silt; Type of Study: Qualitative; Biological Component: Benthic flora and fauna, plankton; Number of Stations: Variable for each test; Abiotic Parameters Measured: Temperature, salinity, turbidity, color, nitrate, phosphate;

(31.00015)

Moffler, M.D. & J.F. vanBreedveld 1979. Nearshore marine ecology at Hutchinson Island, Florida: 1971-1974. X. A species list of marine benthic macroalgae collected off Hutchinson Island, Florida. Fla. Mar. Res. Publ. No. 34. p. 118-122.

Marine algae were collected bimonthly from 5 stations with otter trawl and benthic grab between September 1971 and August 1974 in a nearshore coastal environment adjacent to a nuclear powered generating plant under construction on Hutchinson Island, Florida. Specimens representing 119 species (58 genera); including 79 Rhodophyta, 21 Phaeophyta, and 19 Chlorophyta, were identified. All species of benthic algae are not necessarily indigenous to the Hutchinson Island sampling stations because most were collected in drift.

Study Duration: September 1971-August 1974; Habitat: Nearshore coastal; Type of Study: Quantitative; Biological Component: Flora; Type of Sampler: Shipek 850 benthic grab (0.04 m<sup>2</sup>), semiballoon otter trawl; Number of Stations: 5; Temporal Frequency: Bimonthly; Dominant Taxon/Taxa Studied: *Bostrychia*, *Ceramium*, *Giffordia*, *Enteromorpha*, *Dictyota*, *Eucheuma*, *Gracilaria*, *Halymenia*, *Sargassum*, *Composopogon caeruleus*;

(31.00016)

Mook, D. 1976. Fouling studies, Chapter 9, In: Harbor Branch Consortium Indian River Coastal Zone Study. 1975-1976. Annu. Rept. 1.

A review of the fouling studies in the Indian River region was presented. The majority of fouling invertebrates on the Indian River were inventoried. The seasonality of settlement was described for many animals. The growth and settlement of some fouling animals were found to be inhibited in seagrass beds, and experiments are underway to determine the reason for this apparent inhibition. Preliminary experiments have shown that non-selective artificial predation increased species diversity but not the ranking of chief species, and that selective natural predation did not change species diversity, but did alter the rank order of dominant species. More comprehensive experiments are being conducted on effects of predation.

Study Duration: 2 years; Habitat: Artificial habitats; Type of Study: Qualitative; Biological Component: Fouling invertebrates; Type of Sampler: Artificial substrates, predator exclusion nets; Number of Stations: 2 sets of tiles; Number of Replicates/Station: 5 tiles per set;

(31.00017)

Ryther, J.H., J.C. Goldman, C.E. Gifford, J.E. Huguenin, A.S. Wing, J.P. Clarner, L.D. Williams & B.E. LaPoint 1975. Physical models of integrated waste recycling marine polyculture systems. *Aquaculture* 5:163-177.

Domestic waste water effluent from secondary sewage treatment mixed with sea water was used as a source of nutrients for growing unicellular algae were fed to oysters, clams, and other bivalve molluscs in a combined tertiary sewage treatment-marine aquaculture system. Solid wastes of the shellfish were then fed upon by polychaete worms, amphipods, and other small invertebrates which serve as food for flounder, lobsters, and other commercial fisheries. Dissolved wastes excreted by the shellfish and other animals and any nutrients not initially removed by unicellular algae were removed by various species of red seaweeds as a final step, producing a final effluent virtually free of inorganic nitrogen and incapable of supporting further growth of marine life or of contributing to eutrophication of the receiving waters. Experiments of the above food chains and a detailed account of the nitrogen mass balance through all of the components was discussed.

Type of Study: Qualitative; Biological Component: Benthic flora and fauna;

(31.00018)

Short, F.T. & C. Zimmerman 1983. The day/night cycle of a seagrass environment. Presented at Benthic Ecol. Meet., Fla. Instit. of Tech., Melbourne.

Two 24 hour studies were conducted in October 1982 to examine the environmental cycles within a *Halodule wrightii* bed maintained in a controlled culture system. One experiment used a constant input of nutrient depleted water; the other

had no water exchange. Water temperature, dissolved oxygen, and pH exhibited sinusoidal type responses, lagging the similar solar input. A reduced diurnal response was observed for nitrate, phosphate, Eh, pH, and temperature in the sediments between 5-10 cm depth.

Study Duration: October 1982 (2, 24-hr periods); Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Flora; Abiotic Parameters Measured: DO, pH, temp., solar input, Eh, nitrate & phosphate content; Dominant Taxon/Taxa Studied: *Halodule wrightii*;

(31.00019)

Stoner, A.W. 1980. Perception and choice of substratum by epifaunal amphipods associated with seagrasses. Mar. Ecol. Prog. Ser. 3:105-111.

Three seagrass associated amphipods, *Cyadusa compta*, *Grandidierella bonneroides*, and *Nelita elongata* were found to be capable of detecting small differences in seagrass density and to actively select areas of high blade density in laboratory experiments. When offered different seagrass species (*Thalassia testudinum*, *Halodule wrightii*, *Syringodium filiforme*) with equal blade biomass, the amphipods selected *H. wrightii* due to its high ratio of surface area to biomass. All 3 amphipods were randomly distributed among the seagrass species when presented with equal surface area, confirming the hypothesis that surface area is the important habitat characteristic. It was concluded that blade surface area of macrophytes provides the best estimate of habitat complexity.

Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Crustacea, flora; Type of Sampler: Minnow traps; Dominant Taxon/Taxa Studied: *Cyadusa compta*, *Grandidierella bonneroides*, *Nelita elongata*;

(31.00020)

Thompson, M.J. 1978. Species composition and distribution of seagrass beds in the Indian River Lagoon, Florida. Fla. Scientist 41(2):90-96.

The distribution and composition of seagrass beds in the Indian River Lagoon were studied. Six species of seagrasses were found to occur in this area, with *Syringodium filiforme* exhibiting a distinct distribution pattern. Drift algae accumulations, difficult to distinguish from grassbeds by aerial photoanalysis alone, were extensive in some locations and appeared to play an important role in the River's total ecosystem. It was determined that no major seagrass bed losses have been experienced over the last thirty years.

Study Duration: May-August 1976; Habitat: Grassbeds; Type of Study: Qualitative; Biological Component: Benthic flora - seagrasses; Type of Sampler: Aerial photography, satellite imagery; Number of Stations: 53; Number of Replicates/Station: 4; Temporal Frequency: Once; Dominant Taxon/Taxa Studied: *Syringodium filiforme*, *Thalassia testudinum*, *Halodule wrightii*, *Ruppia maritima*, *Halophila engelmannii*;

(31.00021)

Virnstein, R.W. & C. Curran 1983. Epifauna of artificial seagrass: colonization patterns in time and space. Presented at Benthic Ecol. Meet., Fla. Instit. of Tech., Melbourne.

Community development of mobile epifauna was monitored on artificial seagrass clumps, which were readily colonized by a faunal assemblage similar to that found on natural seagrasses. The gastropod *Bittium varium* and the amphipod *Cyadusa compta*, were the dominant colonizers. Numbers of individuals and species stabilized within 4-8 days. With increasing distance from the seagrass bed, gastropod density decreased, but crustacean density increased. It was concluded that seagrass-associated epifaunal communities may exhibit a high degree of small scale inconstancy.

Study Duration: 16 days; Habitat: Seagrass bed, muddy sand; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: 0.1 m<sup>2</sup> corer; Sieve Size: 0.5 mm; Temporal Frequency: Daily; Dominant Taxon/Taxa Studied: *Bittium varium*, *Cyadusa compta*, *Nargeria rapax*, *Cerithium ouiscarua*;

(31.00022)

Worth, D.F. & M.L. Hollinger 1977. Nearshore marine ecology at Hutchinson Island, Florida: 1971-1974. III. Physical and chemical environment. Fla. Mar. Res. Publ. No. 23, p. 25-85.

Physiochemical parameters were compared within and among station localities at Hutchinson Island, Florida. The tidal exchange between estuarine (Indian River) and coastal water masses was the greatest source of variation in physiochemical spatial structure. Station differences in chlorophyll 'a' biomass and inorganic nutrient species concentrations were attributed to the relative contributions of estuarine water within station localities. Intrusion of Gulf Stream water observed during summer months produced large surface to bottom variations in temperature and salinity. The occurrence of these intrusions was correlated with meteorological events. Diel comparisons of variations in physiochemical parameters were not found to be significant.

Study Duration: 3 years; Type of Study: Quantitative; Type of Sampler: Water sampler; Number of Stations: 5; Number of Replicates/Station: 1; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature, salinity, DO, currents, nutrients, light, water chemistry;

(31.00023)

Zimmerman, C.F. 1980. Sediment size analysis of sediments collected from *Halodule wrightii* seagrass beds. Harbor Branch Found., Inc., Tech. Rept. No. 32. 29 p.

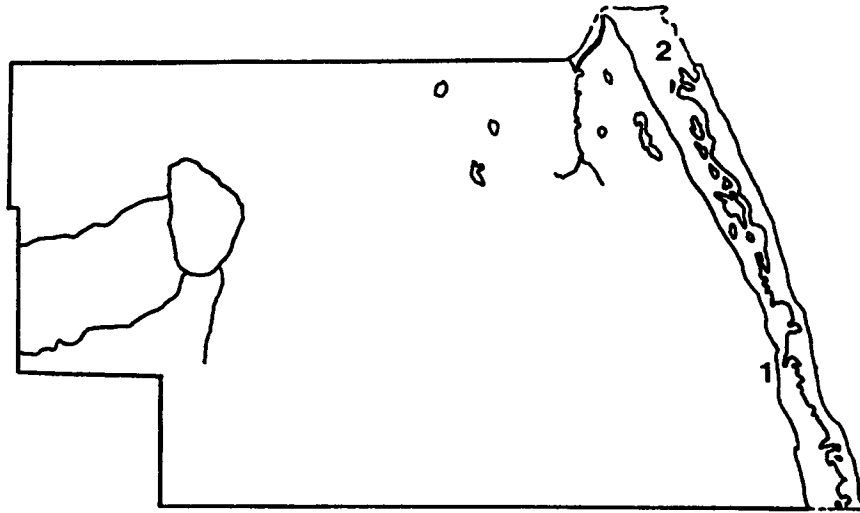
Six sediment cores were collected at various depths from a *Halodule wrightii* grassbed in the Indian River, Florida and analyzed for grain size. The upper 15 cm of the sediment was relatively uniform with 95-98% sand. Below 15 cm sediments were more heterogeneous, with layers of sand and clay/sand.

Study Duration: June 1977; Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Flora; Type of Sampler: Corer; Number of Stations: 1; Number of Replicates/Station: 6; Abiotic Parameters Measured: Sediment grain size; Dominant Taxon/Taxa Studied: *Halodule wrightii*;

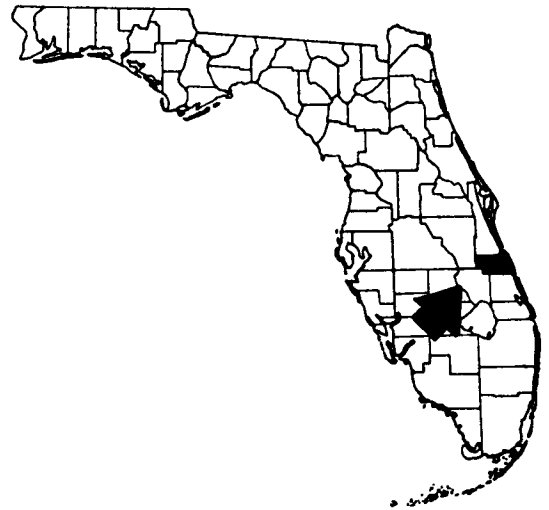
See also section 6, Indian River Region.

See also: 5.00034, 20.00070.

# INDIAN RIVER COUNTY



- 1. VERO BEACH
- 2. INDIAN RIVER



(32.00001)

Banner, A. 1977. Revegetation and maturation of restored shoreline in the Indian River, Florida, In: Proceedings of the 4th Annu. Conf. on Restor. of Coast. Vegetation in Fla. Hillsborough Comm. Coll. Envir. Stud. Ctr. at Cockroach Bay in cooperation with the Tampa Port Authority.

The shoreline of a heavily disturbed property along the Indian River was restored early in 1976. The original peaty substrate had been disposed of; barren quartz sand was substituted, at a slope, in front of a vertical seawall located landward of the original mean high water line. Segments of the 200 m long shoreline were planted with newly extracted plugs of salt marsh cordgrass, juvenile black, white, or red mangroves, or left as controls for natural revegetation. Photographic and written records were made of the growth of the vegetation and of the maturation of the sediments. The findings are directly applicable to subsequent restoration required by governmental agencies. Benthic grab samples were taken at about mean sea level at the north end, center, and south ends of the project, also at undisturbed areas just to the south of the project. Samples from the project actually hosted greater densities of invertebrates than did natural areas to the north and south. Species composition was similar (polychaete worms, bivalve and gastropod molluscs and amphipod crustaceans) for all areas.

Study Duration:1976-1977; Habitat:Grassbed, salt marsh; Type of Study:Qualitative; Biological Component:Benthic flora and invertebrates; Type of Sampler:Grab; Dominant Taxon/Taxa Studied:*Spartina alterniflora*, *Avicennia nitida*, *Rhizophora mangle*, *Laguncularia racemosa*;

(32.00002)

Gore, R.H. 1973. Studies on decapod crustacea from the Indian River region of Florida. II. *Megalobrachium soriatum* (Say 1818): The larvae development under laboratory culture (crustacea; decapoda; porcellanidae). Bull. Mar. Sci. 23(4):837-856.

Ecological studies from the Indian River region determined that *Megalobrachium soriatum* hatches as a prezoal stage of less than 1 day's duration, and then molts through two subsequent zoal stages of about 6 days' duration each, before attaining megalopal stage. Although megalopa remained as such for up to 8 days, none molted to first crab stage. The zoea and megalopa of *M. soriatum* shared many features with two other species of *Megalobrachium* and exhibited features of some species of *Pisidia* which is part of the *Porcellana* group of larvae.

Type of Study:Qualitative; Biological Component:Decapod fauna; Abiotic Parameters Measured:Temperature; Dominant Taxon/Taxa Studied:*Megalobrachium soriatum*;

(32.00003)

Grizzle, R.E. 1979. A preliminary investigation of the effects of enrichment on the macrobenthos in an east central Florida lagoon. Fla. Scientist 42(1):33-42.

A preliminary investigation of the macrobenthos in an enriched (secondary sewage effluents and urban runoff) lagoon and in other less enriched parts of the same system was conducted. The nutrient enriched stations showed greater temporal variability than did the controls in almost all macrobenthic parameters measured. They also showed decreased species numbers and diversity values and a predominance of opportunistic species.

Study Duration:1 year; Habitat:Variable; Type of Study:Quantitative; Biological Component:Benthic fauna; Type of Sampler:Petersen grab; Sieve Size:0.42 mm; Number of Stations:6, 2 control; Number of Replicates/Station:3-5; Temporal Frequency:Twice per year; Abiotic Parameters Measured:Temperature, salinity, DO, BOD, sediment characteristics; Dominant Taxon/Taxa Studied:*Ampelisca abdita*, *Capitella capitata*, *Polydora ligni*, *Streblospio benedicti*, *Grandidierella bonnieroides*, *Leptochelia rapax*;

(32.00004)

Haeger, J.S. & W.L. Bidlingmayer 1974. Sixteen years of growing mangroves and transplanting other desirable plants of the coastal sand dunes of Florida's lower Atlantic east coast. Proc. of the First Annu. Conf. on Restoration of Coast. Vegetation in Fla. p. 29-30.

Natural seedlings of *Avicennia germinans* and *Loguncularia racemosa* were planted in 1968 on newly constructed sand dikes of Vero Beach. After 16 years, average diameter of tree base was 8-10". Both black and white mangroves could be grown away from the waterline, while red mangroves grow only where organic mulching is present. Nitrogen is the limiting factor to growth. A list of plants that hold beach dunes and drifting sand is given.

Habitat:Sand dunes; Type of Study:Qualitative; Biological Component:Flora; Dominant Taxon/Taxa Studied:*Avicennia germinans*, *Loguncularia racemosa*;

(32.00005)

Juett, L., C.J. Miller, S.J. Moore & E.S. Ford 1976. Summer marine algae at Vero Beach, Florida. Fla. Scientist 39(2):76-80.

The marine algae associated with a sublittoral reef at Vero Beach, Florida were investigated over a 2 month period during the summer of 1974. Habitat descriptions, zonation patterns, and floristic information were based upon field

GEOG. CLASSIFICATION: Indian River

32.00006

observations and laboratory determinations. One hundred nine species were reported, including 15 Cyanophyta, 19 Chlorophyta, 13 Phaeophyta, and 62 Rhodophyta. *Gelidiopsis gracilis* was newly recorded for Florida waters.

Study Duration:2 months; Habitat:Sand, rock, coral, shell, worm tubes; Type of Study:Qualitative; Biological Component:Flora; Type of Sampler:Scuba; Number of Stations:3 transects; Number of Replicates/Station:8; Temporal Frequency:3 times;

(32.00006)

Kontrovitz, M. 1966. A study of some ostracodes of the Vaca Key, Florida Bay area. Univ. Fla. M.S. Thesis.

Sediment analysis and ostracode population studies were conducted. The texture of the sediments was not reliably correlated to the population characteristics. Marine grass was determined to have little relationship to the population compositions in the study area. Ostracods are of limited value as environmental indicators.

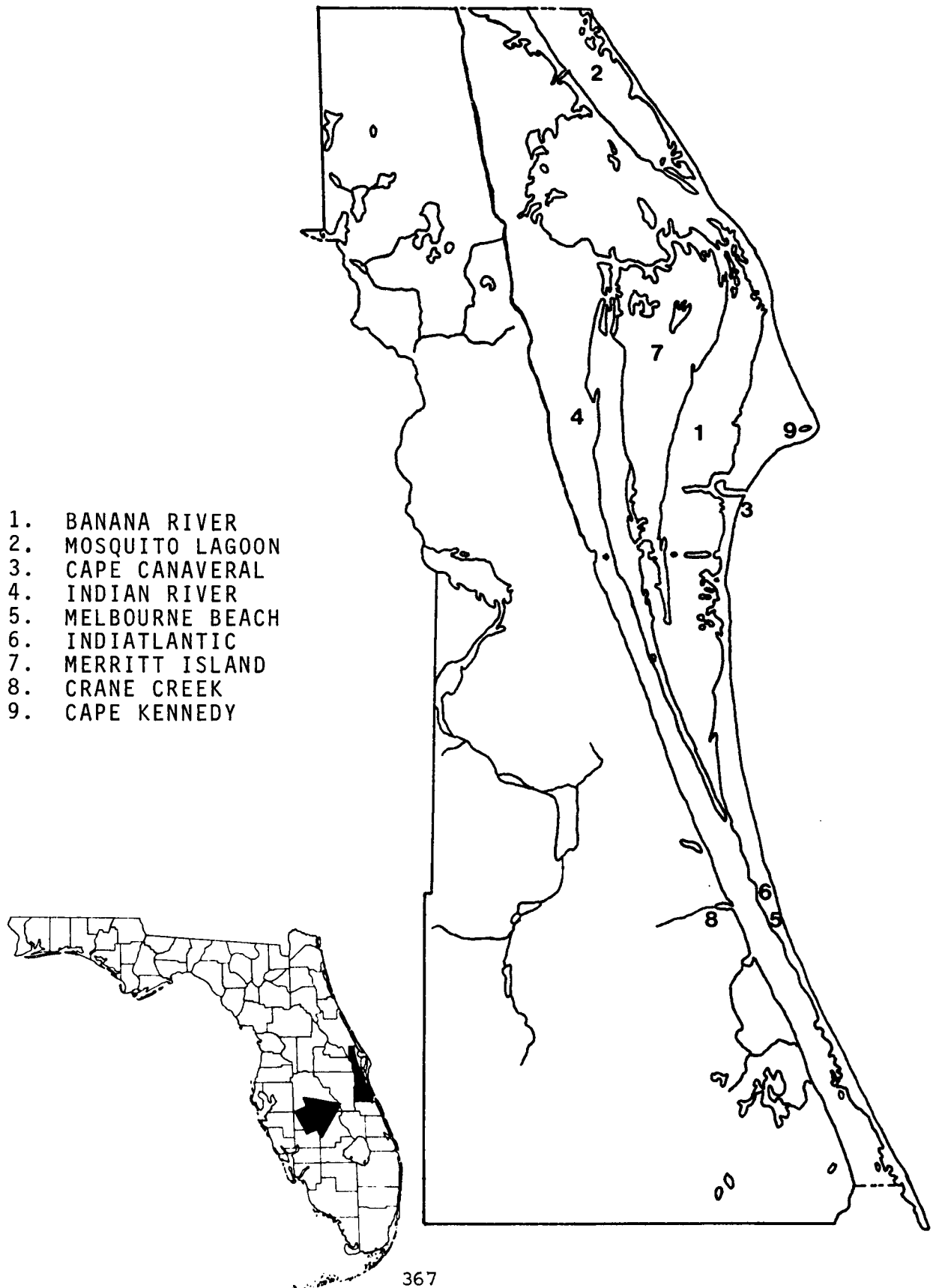
Type of Study:Qualitative; Biological Component:Ostracod fauna;

See also section 6, Indian River Region.

See also: 6.00001, 6.00002.



# BREVARD COUNTY



(33.00001)

Allen, D.M. 1979. Biological aspects of the calico scallop, *Argopecten gibbus*, determined by spat monitoring. *Nautilus* 93(4):107-119.

Calico scallops (*Argopecten gibbus*) were collected using artificial spat traps at 5 stations (9-24 m depth) on the Cape Canaveral grounds from March 1970 to October 1971. Larvae were distributed throughout the water column, but were least abundant near the surface. Spat were present year round but were most abundant during spring (March-May). Setting sizes and growth rates are estimated. Numerous invertebrates were also collected in the traps, but calico scallops were generally dominant. Recommendations are made for future spat monitoring.

Study Duration: March 1970-October 1971; Type of Study: Quantitative; Biological Component: Mollusca fauna; Number of Stations: 5; Abiotic Parameters Measured: Water temperature; Dominant Taxon/Taxa Studied: *Argopecten gibbus*;

(33.00002)

Applied Biology, Inc. 1976. Ecological parameter monitoring at the Canaveral Plant. Florida Power and Light Co. Rept.

Benthic sampling was conducted in the vicinity of the Florida Power and Light Co. Canaveral Plant in 1975. Density, diversity, equitability, and standing crop biomass values were determined and a species list compiled.

Study Duration: 1975; Type of Study: Quantitative; Biological Component: Macroinvertebrates; Type of Sampler: Grab; Number of Stations: 8; Temporal Frequency: Quarterly;

(33.00003)

Applied Biology, Inc. 1980. Biological and environmental studies at the Florida Power & Light Co. Cape Canaveral Plant and the Orlando Utilities Commission Indian River Plant. Prep. by Allied Biol., Inc. & Ray L. Lyerly & Assoc.

An extensive study was made of biotic and abiotic factors of the environments at the Florida Power and Light Company Cape Canaveral Plant and the Orlando Utilities Commission Indian River plant. Biota studied include fish and shellfish, benthos, vegetation, and manatees. Some of the abiotic parameters studied include temperature, current velocity, meteorology, bathymetry, salinity, and hydrography. Improved operation of the plants and a reduction of harmful environmental effects are discussed.

Type of Study: Quantitative; Biological Component: Fauna, flora;

(33.00004)

Bates, P.P. 1977. A base level study of select organochloride pesticides and polychlorinated biphenyls in quahog clams (*Mercenaria mercenaria*), sediments and soil taken from Brevard County, Florida. Fla. Inst. Tech. M.S. Thesis, 59 p.

A study of selected organochloride pesticides and polychlorinated biphenyls in quahog clams and sediment from the Indian River was conducted. Although pesticide levels were low in clams taken from the Indian River, levels were higher in those taken from the more populated Melbourne area. The pesticide DDT and its metabolites were found at both clam sites even though its use had been discontinued for over 5 years. Aldrin (last used over a year ago) was found in measurable amounts at both clam sites. Levels of alpha and gamma BHC found in the sediment samples collected near NASA, Kennedy Space Center, were low. It was concluded that although only present at low levels, persistent chlorinated hydrocarbon pollutants are widely distributed in the Brevard County area.

Study Duration: June-November 1976; Habitat: Variable; Type of Study: Quantitative; Biological Component: Quahog clams; Type of Sampler: Hand collected and cores; Abiotic Parameters Measured: Sediment analysis, pesticide analysis; Dominant Taxon/Taxa Studied: *Mercenaria mercenaria*;

(33.00005)

Beazley, R.W. 1969. A study of the distribution of cultivate bacteria in lagoonal water and sediments. Fla. Instit. of Tech. M.S. Thesis.

Bacterial populations of marine sediments surrounding the Kennedy Space Center, Florida were investigated. Bacteria were most abundant in areas of restricted water movement, where sediments had high concentrations of hydrogen sulfide. Bacteria cultures from these sediments produced gram-positive, spore-forming, rod-shaped anaerobes which created sulfide. The relationship between bacterial abundance and hydrogen sulfide product on is discussed.

Type of Study: Quantitative;

(33.00006)

Beazley, R.W., T.A. Mevin & J.A. Lasater 1974. Haloduric anaerobes in the sulfide muds of a saline lagoon. *B. Env. Contam. Tox.* 12(3):346-355.

Lagoonal waters around the Kennedy Space Center were surveyed for areas of high bacteria populations. These areas were studied to determine the dominant types of bacteria. In particular haloduric bacteria and their role as sulfide producers from different levels in the water column and sediments were examined.

Type of Study:Quantitative; Biological Component:Faua; Abiotic Parameters Measured:Sulfide; Dominant Taxon/Taxa Studied:*Clostridium perfringens*;

(33.00007)

Brown, B. 1976. A new species of *Aricidea* (Polychaeta: Paraonidae) from Florida. Proc. Biol. Soc. Wash. 89(37):433-438.

A new species of the genus *Aricidea* (Paraonidae) from the Indian River lagoon is described. Additional specimens were collected from the west coast of Florida.

Biological Component:Polychaetes;

(33.00008)

Bullis, H.R., Jr. & R. Cummins, Jr. 1961. An interim report of the Cape Canaveral calico scallop bed. Comm. Fish. Rev. 23(10):1-8.

Annual production of the calico scallop bed off Cape Canaveral, Florida was investigated by 526 dredge hauls made in depths from 42 to 390 ft between May 1960 and February 1961. Data on depth distribution, catch rates, size distribution, and meat yield were presented. No seasonal or geographic trends in catch rate were found. Variations in yield were localized and correlated closely with the physiological condition of the scallops.

Study Duration:May 1960-February 1961; Type of Study:Quantitative; Biological Component:Mollusca; Type of Sampler:Scallop dredge; Dominant Taxon/Taxa Studied:*Pecten (Argopecten) gibbus*;

(33.00009)

Campbell, R.L. 1968. Nitrogen fixation in the North Indian River and its relation to existing levels of nitrogenous compounds. Fla. Instit. of Tech. M.S. Thesis.

Examination of sediments and water column of the North Indian River for levels of nitrite, nitrate, ammonia, and organic nitrogen revealed that concentrations of nitrate and nitrite were below minimum detectable levels. Ammonia concentrations in the sediment ranged from 0.21 to 2.36 mg/g, but were below detectable limits (280 ug/l) in water samples. Nitrogen fixation rates were summarized for samples from the water, sediment, and a blue-green alga epiphytic on *Syringodium filiforme*. Ammonia levels were negatively correlated with ethylene production in sandy shallow sediments and grassy deep sediments. Statistically significant relationships between deep and shallow sediments in grassy and sandy areas indicated the presence of two distinct populations of nitrogen fixers.

Habitat:Seagrass bed, sand; Type of Study:Quantitative; Abiotic Parameters Measured:Nitrite, nitrate, ammonia, organic nitrogen;

(33.00010)

Chynoweth, L.A. 1975. Net primary production of *Spartina* and species diversity of associated macroinvertebrates of a semi-impounded salt marsh. NASA Tech. Rept. No. 1, Grant No. NGR 10-019-009.

Studies on vascular plants and associated macroinvertebrates were conducted on a Merrit Island salt marsh to describe its structure and function. Estimates were made of standing crop biomass, net primary production, caloric content of plants, and species diversity of macroinvertebrates. Seventy nine families, representing 18 invertebrate orders were collected. In soil samples, saprovores groups were found to be predominant. Predator populations closely followed and mimicked fluctuations in saprovores numbers for some *Spartina-Distichilis* area populations. Overall, species diversity of foliage invertebrates from the *Distichilis-Sesuvium* area were less variable than for the *Spartina-Distichilis* area. Estimates of net primary production ranged from 707.85 to 1,521.29 g/m<sup>2</sup>/yr<sup>-1</sup> for *Spartina bakeri*, 191.36 to 569.65 g/m<sup>2</sup>/yr<sup>-1</sup> for *Sesuvium portulacastrum* and 234.77 to 1,506.07 g/m<sup>2</sup>/yr<sup>-1</sup> for *Distichilis spicata*. The caloric content of the marsh plants was found to vary seasonally. The living standing crop biomass reached a maximum once or twice during the study period, depending on the species. The flowering of the plants was observed to overlap to a degree.

Study Duration:February 1974 - January 1975; Habitat:Salt marsh; Type of Study:Quantitative; Biological Component:Flora and macroinvertebrates; Type of Sampler:Plastic cylinder enclosing suction sampler, fastened to insect collection net; Sieve Size:0.42 mm; Number of Stations:2; Number of Replicates/Station:5; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity, pH, precipitation; Dominant Taxon/Taxa Studied:SPD area dominated by *Spartina* and *Distichilis*, DS area dominated by *Distichilis* and *Sesuvium*;

(33.00011)

Clark, K.B. 1975. Benthic community structure and function. Ch. 2, 58 p., In: An ecological study of the lagoons surrounding the John F. Kennedy Space Center, Brevard County, Florida. Apr. 1972 - Sept. 1975. Final Rept. to NASA, FIT NGR 10-015-008.

Analysis of the benthic community of the North Indian River showed that the system is controlled by the annual production

cycle of seagrasses. A detrital surge was found to follow peak seagrass biomass (September) by 2 months (November). Many invertebrate populations were synchronized with this surge. Maximum seagrass density (ca. 500 g/m<sup>2</sup>) was found to occur between 40 and 60 cm, in the transition zone between *Syringodium* and *Diplanthera*. Production was lower (2-400 mg C/m<sup>2</sup>/day) than other reported seagrass systems, possibly due to carbonate limitation. Dredging and filling operations have been the major disturbances to this ecosystem, and have substantially reduced benthic invertebrate populations near causeways, urban shores, and the intracoastal waterway.

Study Duration: April 1972 - September 1975; Type of Study: Quantitative; Biological Component: Benthic invertebrates; Type of Sampler: Ponar grab; Sieve Size: 0.4 mm; Number of Stations: Variable each year; Number of Replicates/Station: 5; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature, salinity, DO, pH, light, nutrients, Eh potential, sediment analysis; Dominant Taxon/Taxa Studied: *Cylinodroleberis variae*, *Sarsiella americana*;

(33.00012)

Commercial Fisheries Review 1968. "Oregon" checks Florida's scallops grounds. Comm. Fish. Rev. 30(12):39-40.

Catch data were presented on the calico scallop grounds off Cape Kennedy from exploration dredging by the R/V Oregon. Information was provided on catch sizes and meat counts from 116 stations.

Study Duration: 8-25 Oct. 1968; Type of Study: Qualitative; Biological Component: Mollusca; Type of Sampler: Tumbler dredge; Number of Stations: 116; Dominant Taxon/Taxa Studied: *Pecten* (*Argopecten*) *gibbus*;

(33.00013)

Eiseman, N.J. & E.E. Gallaher 1980. A probabilistic model of seagrass variation in a Florida coastal lagoon. Fla. Sci. 43(Suppl. 1):8.

Five replicate samples of the seagrasses *Halodule wrightii* and *Syringodium filiforme* were taken monthly at 5 stations in the Indian River lagoon, Florida. Shoot density and biomass of photosynthetic and nonphotosynthetic tissue were determined for each species and analyzed for location effects. The probability functions generated were used to analyze and simulate temporal variation in these seagrass species.

Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Flora; Number of Stations: 5; Number of Replicates/Station: 5; Temporal Frequency: Monthly; Dominant Taxon/Taxa Studied: *Halodule wrightii*, *Syringodium filiforme*;

(33.00014)

Futch, C.F. 1967. A survey of the oyster resources of Brevard County, Florida. Fla. Bd. Conserv., Spec. Sci. Rept. No. 18, 6 p.

The Brevard County estuary was surveyed to determine the present distribution of oysters and to recommend areas suitable for oyster culture. The section of the estuary extending from the Eau Gallie bridge to Sebastian Creek was found to be suitable for oyster cultivation and to be capable of supporting an extremely productive oyster fishery.

Study Duration: January 1967; Type of Study: Qualitative; Biological Component: Fauna; Number of Stations: 19; Abiotic Parameters Measured: Salinity, temperature;

(33.00015)

Gilbert, S. & K.B. Clark 1981. Seasonal variation in standing crop of the seagrass *Syringodium filiforme* and associated macrophytes in the Northern Indian River, Florida. Estuaries 4(3):223-225.

Standing crop (dry weight biomass) of *Syringodium filiforme* was measured on a monthly basis at a study quadrat in the Indian River, a mesohaline lagoon. Minimum standing crop occurred during February through April and maximum occurred in September. Burrowing activities of the horseshoe crab, *Limulus polyphemus* and thermal stresses on *S. filiforme* were attributed as causes for the sizeable sandy patches within Indian River grassbeds.

Study Duration: November 1974-October 1975; Habitat: Seagrass beds; Type of Study: Quantitative; Biological Component: Benthic flora; Type of Sampler: 15 cm core; Sieve Size: 4.0 mm; Number of Stations: 25; Number of Replicates/Station: 1; Abiotic Parameters Measured: Temperature, salinity;

(33.00016)

Gilbert, S.S. 1976. Seasonal variation in standing crop of benthic vegetation in the north Indian River. Fla. Instit. of Tech. M.S. Thesis.

Seasonal variation of seagrass beds in the north Indian River, Florida was determined by monthly measurements of standing crop. Minimum biomass of dominant seagrasses occurred in mid to late winter and peaked in late summer. Organic carbon in the sediment increased following the annual decay of seagrasses with a subsequent increase in benthic deposit feeders. Macrophyte production was closely correlated with water temperature. Zonation patterns, determined by transects, showed a domination by *Halodule wrightii* from shore to a depth of 50 cm. *Syringodium filiforme* dominated from 50 cm to 2.6 m. Depth of occurrence was apparently regulated by competitive interaction and light penetration.

Study Duration:1 year; Habitat:Seagrass bed; Type of Study:Quantitative; Biological Component:Flora; Type of Sampler:Core; Number of Stations:1; Number of Replicates/Station:25; Temporal Frequency:Monthly; Abiotic Parameters Measured:Water temp., depth, DO, water transparency; Dominant Taxon/Taxa Studied:*Syringodium filiforme*, *Halodule wrightii*;

(33.00017)

Hettler, K.A. 1978. A preliminary survey of the fouling invertebrates of the Banana River. Fla. Instit. of Tech. M.S. Thesis.

The fouling community of Banana River, Florida was monitored monthly from June to December 1977, by examining the settlement of sessile organisms onto Indian quarry tiles. Barnacles had the highest percentage of cover with up to 84% of the tile surface. Seasonal breeding periods were not simultaneous for any 2 species.

Study Duration:June-December 1977; Habitat:Hard bottom; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Settling tile; Temporal Frequency:Monthly;

(33.00018)

Leed, J.A. & T.V. Belanger 1981. Selected trace metals in the upper St. Johns River, Florida and their land use relationships. Fla. Sci. 44(3):136-150.

Iron, copper, and zinc were monitored in the water, sediments, and 4 species of fish of the upper St. Johns River, Florida. Surface water concentrations of total iron commonly exceeded 300 ug/l, the standard established by the FDER for waters intended for public consumption. Total iron levels in the upper St. Johns River are regulated by a series of interacting natural processes such as the iron phosphate cycle, input from nonartesian groundwater or bank seepage, complexation with dissolved organic compounds; increased land runoff during periods of high flow; and resuspension of bottom sediments during periods of increased discharge or wind mixing. In addition, groundwater inputs in the headwaters region due to agricultural irrigation practices have significantly increased its trace metal content. Elevated trace metal levels were also found in sediments and fish tissue in the river. Results of multiple regression analyses indicate that as the extent of urban activity increases in undeveloped watersheds of the upper St. Johns River, total copper and total zinc concentrations in the surface waters of the watershed can also be expected to increase.

Study Duration:April-September 1978; Habitat:Freshwater marsh; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Core; Number of Stations:42; Temporal Frequency:Periodic; Dominant Taxon/Taxa Studied:*Micropterus salmoides*, *Lepomis macrochirus*, *Pomoxis nigromaculatus*, *Erimyzon succetta*;

(33.00019)

Levy, K.D. 1979. The response of the macrobenthos of Turkey Creek, Florida to salinity and other abiotic factors. Fla. Instit. of Tech. M.S. Thesis. 63 p.

The effects of salinity, sediment type, and temperature on the structure and composition of a macrobenthic community in Turkey Creek, Florida were studied between January and October 1978. Sixty one taxa were identified from trimonthly samples collected at 5 stations. Polychaetes were dominant in numbers of species and individuals. Spatial and temporal variations in the distribution of benthic macroinvertebrates were found to be primarily determined by salinity. Variations in sediment grain size played a secondary role in determining community distribution. Trends in species diversity and richness throughout the study area were cited.

Study Duration:January-October 1978; Habitat:Mud; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Posthole digger; Sieve Size:0.5 mm; Number of Stations:5; Number of Replicates/Station:3; Temporal Frequency:Quarterly; Abiotic Parameters Measured:Water temperature, salinity, DO, sediment grain size; Dominant Taxon/Taxa Studied:*Streblospio benedicti*, *Capitella sp.*, *Hydrobia spp.*, *Parasterope pollex*;

(33.00020)

Meon, M.P., G.S. Ghuman & C.O. Emeh 1979. Trace element release from estuarine sediments of South Mosquito Lagoon near Kennedy Space Center, Florida. Water Air Soil Pollut. 12(3):295-306.

The concentrations of 4 trace metals, Zn, Mn, Cd, and Cu in sediment samples from 8 sites in South Mosquito Lagoon, Florida were determined using flame atomic adsorption. Four extraction techniques were used. Using acetate extraction, seasonal variations in trace metal concentrations in the sediments were similar to that of concentrations in the water. A mechanism for the release of trace metals from estuarine sediments into the water column is discussed.

Study Duration:10 months; Type of Study:Quantitative; Number of Stations:8; Temporal Frequency:Bimonthly; Abiotic Parameters Measured:Heavy metal concentration, pH;

(33.00021)

Miller, G.C., D.M. Allen & T.J. Costello 1979. Maturation of the calico scallop, *Argopecten gibbus*, determined by ovarian color changes. Northeast Gulf Sci. 3(2):96-103.

Stages of ovarian development of the calico scallop, *Argopecten gibbus* collected from May 1970 to October 1971 on the Cape Canaveral grounds were described by color and sequence of development. Seven stages were recognized and graded from immature to ripe to spent. Ripe scallops occurred mainly from January to May with large scallops spent or developing in August. Spawning occurred from November to July and was intense from January to May. The spawning pattern varied between years.

Study Duration: May 1970-October 1971; Type of Study: Qualitative; Biological Component: Mollusc fauna; Type of Sampler: Otter trawl; Dominant Taxon/Taxa Studied: *Argopecten gibbus*;

(33.00022)

Miller, G.C., D.M. Allen & T.J. Costello 1981. Spawning of the calico scallop *Argopecten gibbus* in relation to season and temperature. J. Shellfish Res. 1(1):17-21.

Calico shrimp, *Argopecten gibbus*, off Cape Canaveral, Florida spawned between November and June (1970-1971) with the most intense spawning occurring from January to May when bottom temperatures were less than 22.5°C. When bottom temperatures were above 22.5°C (June-October), spawning intensity was low. Most spawning occurred when bottom temperatures ranged from about 15° to 22.5°C. Spawning appeared to be initiated when cold water moved into the scallop zone (18-55 m) from inshore or offshore. The nature and location of cold water intrusions into areas of abundant calico scallops is discussed.

Study Duration: May 1970-October 1971; Type of Study: Quantitative; Biological Component: Mollusc fauna; Abiotic Parameters Measured: Water temperature; Dominant Taxon/Taxa Studied: *Argopecten gibbus*;

(33.00023)

Mook, D. 1977. Studies on fouling invertebrates in the Indian River, Florida 2: Effect of *Modulus modulus* (Prosobranchia: Modulidae). The Nautilus 91(4):134-136.

The build up of fouling invertebrates on tiles placed among seagrass blades was determined to be considerably less than on tiles placed in adjacent areas devoid of seagrass. Snail counts and the results of caging experiments suggested that the grazing action of *Modulus modulus* may retard the buildup of fouling organisms on surfaces within the grassbeds.

Study Duration: 2 months; Habitat: Grassbed; Type of Study: Quantitative; Biological Component: Fouling invertebrates; Type of Sampler: Artificial substrates; Number of Stations: 1; Number of Replicates/Station: 5; Temporal Frequency: Once; Dominant Taxon/Taxa Studied: *Balanus eburneus*, *Balanus amphitrite*, *Spirorbis* sp.;

(33.00024)

Nelson, W.G. 1981. Experimental studies of decapod and fish predation on seagrass macrobenthos. Mar. Ecol. Prog. Ser. 5(2):141-150.

Predation experiments on seagrass macrobenthos conducted under laboratory and field conditions in the Indian River Lagoon, Florida, produced similar results. Macrofaunal abundances were not greatly affected by the fish *Lagodon rhomboides* or the crab *Callinectes sapidus*, however, the shrimp *Palaemonetes intermedius* and *Penaeus duorarum* caused significant decreases in macrobenthic densities. The effect of decapod crustaceans in regulating densities of seagrass macrobenthos is discussed.

Study Duration: November 1978-July 1979; Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: Core; Sieve Size: 1 mm; Dominant Taxon/Taxa Studied: *Lagodon rhomboides*, *Palaemonetes intermedius*, *Penaeus duorarum*, *Callinectes sapidus*;

(33.00025)

Nelson, W.G., K.D. Cairns & R.W. Virnstein 1982. Seasonality and spatial patterns of seagrass associated amphipods of the Indian River lagoon, Florida. Bull. Mar. Sci. 32(1):121-129.

A total of 15 amphipod species was collected from *Halodule wrightii* seagrass beds at 5 sites in the Indian River lagoon from 1974 to 1978. The overall mean density for all stations was 807 individuals/m<sup>2</sup>. Seasonal abundance and diversity patterns were variable, but amphipods were generally more abundant in November-May than in June-October. These seasonal patterns appear to be regulated by seasonality of fish and decapod predation, and not by seasonality of seagrass biomass. Amphipod densities generally decreased from northern to southern sample locations and were lower near ocean inlets. In both cases, low amphipod density can be traced to increased abundance of predators.

Study Duration: June 1974-April 1978; Habitat: Seagrass beds; Type of Study: Quantitative; Biological Component: Crustacea; Type of Sampler: Posthole type corer; Sieve Size: 1 mm; Number of Stations: 5; Number of Replicates/Station: 5; Temporal Frequency: Monthly, bimonthly; Abiotic Parameters Measured: Water temp., salinity, water depth; Dominant Taxon/Taxa Studied: *Cymadusa coxpta*, *Grandidierella bonnieroides*, *Corophium ellisi*, *Corophium lacustre*, *Amphelisca abdita*, *Amphithoe longimana*, *Melita elongata*, *Gammarus mucronatus*;

(33.00026)

Nelson, W.G. & J.F. Gorzelany 1982. Biological and physical monitoring of beach erosion control, Proj.

Indiatlantic/Melbourne Beach. Part II. Biol. Monitor. A rept. prepared for the U.S. Army Corps of Engineers, Jacksonville Dist. DACW17-80- C-0069. 19 p. + app.

Quarterly benthic samples were collected at 5 sites in the nearshore zone at Indiatlantic and Melbourne Beach, Florida to monitor the effects of a beach nourishment project on the benthic fauna. At each site, 5 stations were sampled along transects perpendicular to the beach. The beach-surf zone was dominated by 2 species of bivalve. Diversity and abundance increased in a seaward direction at all sites. This pattern was not affected by beach nourishment. Decreases in abundance following beach nourishment were believed to be due to natural seasonal factors. No evidence was found of negative effects on abundance or number of species due to beach nourishment, even at the 2 inshore stations which exclusively received the nourishment sand.

Study Duration:Nov. 1980-Nov. 1981; Habitat:Sand beach; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Corer; Sieve Size:0.505 mm; Number of Stations:5; Number of Replicates/Station:3; Temporal Frequency:Quarterly; Dominant Taxon/Taxa Studied:*Donax parvula*, *D. variabilis*, *Haploscoloplos fragilis*, *Parahaustorius longierus*, *Bathyporeia parkeri*, *Enerita talpoida*;

(33.00027)

Provancha, J.A. & R.M. Millard 1984. Seagrass Bed Distribution and Composition at Kennedy Space Center, Brevard County, Florida. Fla. Sci.47(Suppl.1): 23.

Seagrass bed distribution in the estuarine waters at Kennedy Space Center were studied and mapped during 1983. Infrared aerials, ground truthing, and 23 permanent transects were employed to quantify species composition, percent coverage and sediment texture. *Halodule wrightii* is the dominant species followed by *Syringodium filiforme*, *Ruppia maritima* and *Halophila engelmannii*.

Habitat:Grassbed; Type of Study:Quantitative; Biological Component:Flora; Dominant Taxon/Taxa Studied:*Halodule wrightii*, *Syringodium filiforme*, *Ruppia maritima*, *Halophila engelmannii*;

(33.00028)

Reish, D.J. & M.I. Hallisey 1983. A checklist of the benthic macroinvertebrates of Kennedy Space Center, Florida. Florida Sci. 46(3/4):306-313.

Benthic macroinvertebrates were sampled in brackish lagoons surrounding Launch Complex 39 A of the Kennedy Space Center. Sampling was also conducted in an area of the Banana River to monitor recovery after dredging. One hundred and twenty-two species were collected from both studies: 67 species from the lagoons and 108 species from the Banana River; 53 species were common to both areas. A species list indicating presence or absence in each area was compiled.

Study Duration:December 1979 to March 1981 at LC 39 A, December 1979 to December 1980 at Banana River; Type of Study:Qualitative; Biological Component:Benthic fauna; Type of Sampler:Eckman grab; Sieve Size:0.5 mm. Number of Stations:14; Number of Replicates/Station:3; Temporal Frequency:Quarterly; Dominant Taxon/Taxa Studied:Benthic macroinvertebrates;

(33.00029)

Roe, R.B., R. Cummins, Jr. & H.R. Bullis, Jr. 1971. Calico scallop distribution, abundance, and yield off eastern Florida, 1967-1968. U.S. Fish & Wildl. Serv., Fish. Bull. 69:399-409.

The calico scallop (*Argopecten gibbus*) populations of the Cape Kennedy grounds off eastern Florida were surveyed by scallop dredge from August 1967 to December 1968. Data on life history, distribution, abundance, yield, and annual variation in geographical and depth distribution were collected. Analysis of distribution and abundance of spat set at midsummer allows predictions for a fall fishery season, which is recommended by high catch rates between September and December.

Study Duration:August 1967-December 1968; Type of Study:Quantitative; Biological Component:Mollusc fauna; Type of Sampler:Scallop dredge; Number of Stations:4 transects; Temporal Frequency:Monthly or bimonthly; Dominant Taxon/Taxa Studied:*Argopecten gibbus*;

(33.00030)

Takayanagi, K. 1978. Heavy metals in anoxic and oxic sediments of the Indian River near Melbourne, Florida. Fla. Instit. of Tech. M.S. Thesis.

Heavy metal concentrations were measured in oxic and anoxic sediments from Indian River, Florida. Concentrations of copper, iron, manganese, lead, and zinc were much higher in anoxic sediments than in oxic sediments, although all values were lower than those found in similar studies. The ratio of metal concentrations in the sediments (except for zinc) were almost identical to that of igneous rocks, suggesting that the area is relatively heavy metal free.

Habitat:Mud, sand; Type of Study:Quantitative; Abiotic Parameters Measured:Heavy metal concentrations;

(33.00031)

Turner, R.L. & C.E. Meyer 1980. Salinity tolerance of the brackish echinoderm *Ophiophragmus filograneus*

(Ophiuroidea). Mar. Ecol. Prog. Ser. 2(3):249-256.

The infaunal brittlestar, *Ophiophragnus filigraneus*, was shown to completely acclimate to salinities of 17-38 ppt within 21 days after continuous acute exposure in laboratory experiments. Using burrowing time as an activity criterion, a well established population of *O. filigraneus* in the Indian River lagoon, Florida, was found to acclimatize to a natural decline in salinity 9 ppt during August 1978. It was proposed that the salinity tolerance of *O. filigraneus* allows it to survive in the estuarine bays and lagoons of Florida, to which it is endemic.

Study Duration: April-September 1978; Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Echinodermata; Abiotic Parameters Measured: Salinity; Dominant Taxon/Taxa Studied: *Ophiophragnus filigraneus*;

(33.00032)

Virnstein, R.W., P.S. Mikkelsen, K.D. Cairns & M.A. Capons 1980. Seagrass beds versus sand bottoms: the trophic importance of their associated benthic invertebrates. Fla. Sci.

Density of macrobenthic invertebrates was 3 times greater in seagrass beds in Indian River lagoon, Florida than in nearby unvegetated sediments. Seagrass beds had 13 times more abundant epifauna than sand areas, presumably due to epifauna dependence on seagrass for food, habitat, nursery area, and protection from predators. To determine the importance of associated macrobenthos to the local food web and the effect of small decapod predators, four 3 mm mesh cages were erected each within a larger 12 mm mesh cage, 2 in seagrass and 2 in sand. After 2 months, decapod density increased within the inner cages, while macrobenthos abundance decreased. Problems associated with predator exclusion or enclosure experiments are cited and the trophic pathways of seagrass meadows and sand bottom communities are discussed.

Study Duration: 2 months; Habitat: Seagrass bed and sand; Type of Study: Quantitative; Biological Component: Fauna; Sieve Size: 0.5 mm; Number of Stations: 4;

(33.00033)

Walker, R.E. 1976. Chemical and physical characteristics of the sediments in Turkey Creek, Palm Bay, Florida. Fla. Instit. of Tech. M.S. Thesis.

Sediment cores from 10 stations in Turkey Creek, Palm Bay, Florida, were analyzed for organic carbon, kjeldahl nitrogen, phosphorus, water content, and grain size. Depth profiles of parameter concentrations demonstrate environmental fluctuations over time. Phosphorus, organic carbon, and water content exhibited similar linear relationships with depth. Nutrient concentrations resembled those of adjacent Indian River and several eutrophic Wisconsin lakes.

Type of Study: Quantitative; Type of Sampler: Corer; Number of Stations: 10; Abiotic Parameters Measured: Organic carbon, kjeldahl nitrogen, phosphorus, pore water, grain size;

(33.00034)

Wiederhold, C.M. 1976. Annual cycles in macrofaunal benthic invertebrates in the northern Indian River, Florida. Fla. Instit. of Tech., M.S. Thesis.

Seasonal variations in a benthic macrofaunal community were studied at 5 sites in northern Indian River, Florida. The relationships of physical and biological parameters to species density and size, seagrass biomass, and sediment characteristics were determined. Variations in faunal populations were correlated with seasonal fluctuations in salinity, temperature, and grassbed density. The production of detrital material from seagrass decay appeared to be the major limiting factor as a food source for the benthic invertebrates.

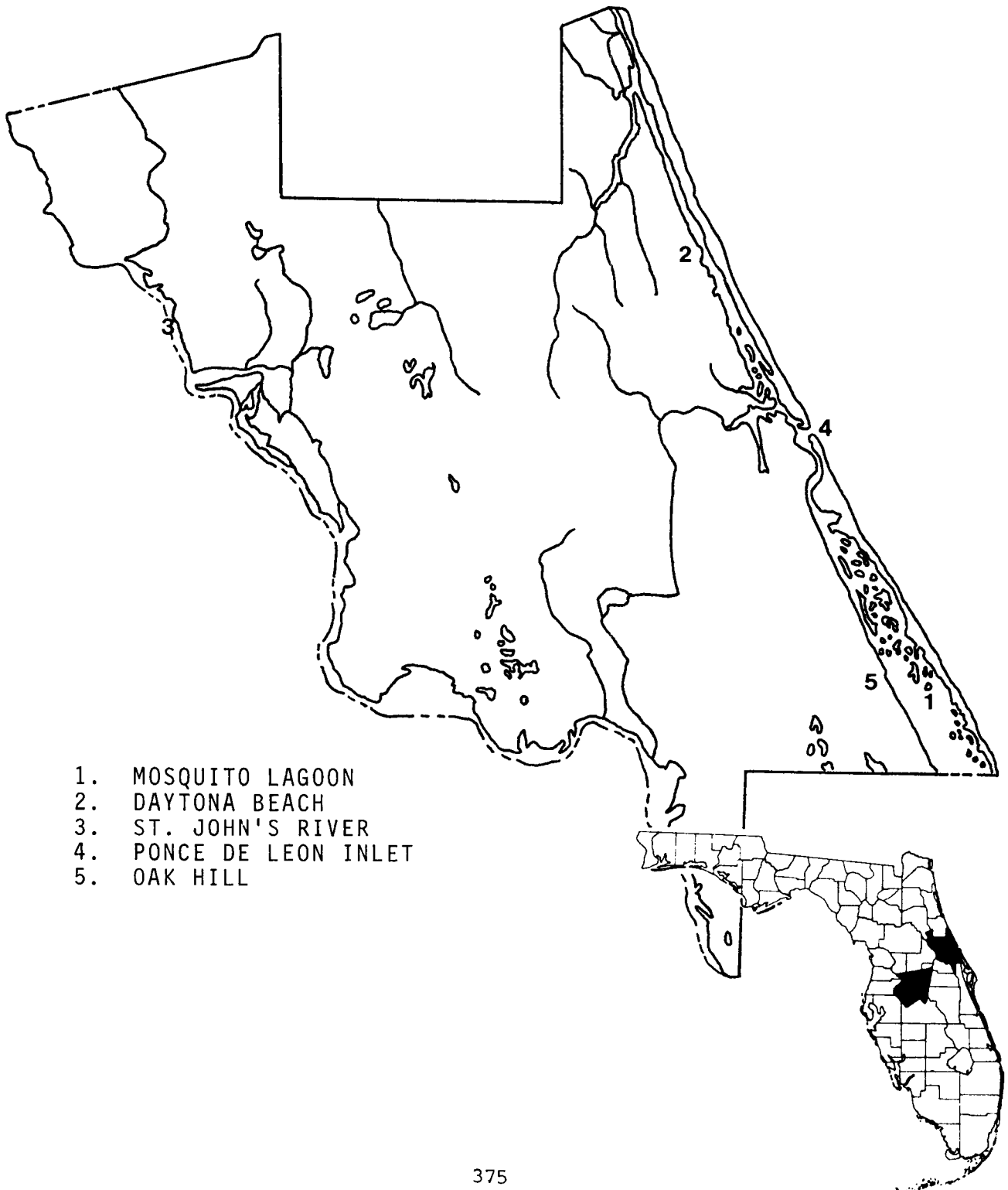
Habitat: Seagrass bed; Type of Study: Quantitative; Biological Component: Fauna; Type of Sampler: 15.25 cm dia. corer; Number of Stations: 5; Temporal Frequency: Monthly; Abiotic Parameters Measured: Temperature, salinity;

See also section 6, Indian River Region.

See also: 5.00037, 6.00001, 6.00002, 11.00006, 24.00010.



# VOLUSIA COUNTY



(34.00001)

Beeman, S. 1977. A biological assessment of an area of tidal wetlands near Ponce Inlet, Florida. Fla. Dept. Environ. Reg. Rept.

A biological assessment of an area of tidal wetlands near Ponce Inlet was conducted as part of the DER permitting procedure for a proposal to construct a major port-marina facility. The proposal called for the dredging of 423,000 cu.yd. of sand, clay and shell, and for the placement of 150,000 cu.yd. of fill within the subject mangrove marsh. Quantitative benthic sampling indicated that the New Smyrna Beach Power Generating Station effluent had not significantly stressed the area. The proposed dredge and fill activities were expected to affect the estuary surrounding the site by causing changes in DO content, suspended pollutants, and increasing siltation. The long range detrimental effects of the proposed marina complex were predicted.

Study Duration: May 1974 - April 1977; Habitat: Saltmarsh, mangroves; Type of Study: Quantitative; Biological Component: Marine benthic fauna; Type of Sampler: Petite ponar dredge, gill net, bag seine, dragnet; Number of Stations: 3; Number of Replicates/Station: Variable; Temporal Frequency: Monthly;

(34.00002)

Kreuger, A., B. Johnson, M. Fields, D. Deeds 1971. Mercury and lead determinations in the estuarine waters of southeastern Volusia County, Florida. Fla. Scientist 34(Suppl. 1):14.

River water (southern Halifax and northern Indian Rivers), fish livers, and whole invertebrate animals were tested for mercury and lead by measuring a dithizone complex spectrophotometrically. These preliminary studies suggest patterns in the distribution of mercury and lead in these estuarine waters and helped establish base levels against which future measurements can be compared.

Habitat: Estuarine; Type of Study: Semiquantitative; Biological Component: Flora, fauna; Abiotic Parameters Measured: Mercury and lead concentrations;

(34.00003)

Richard, B.R. & W.F. Clapp 1944. A preliminary report on the fouling characteristics of Ponce de Leon Tidal Inlet, Daytona Beach, Florida. J. Mar. Res. 5:189-195.

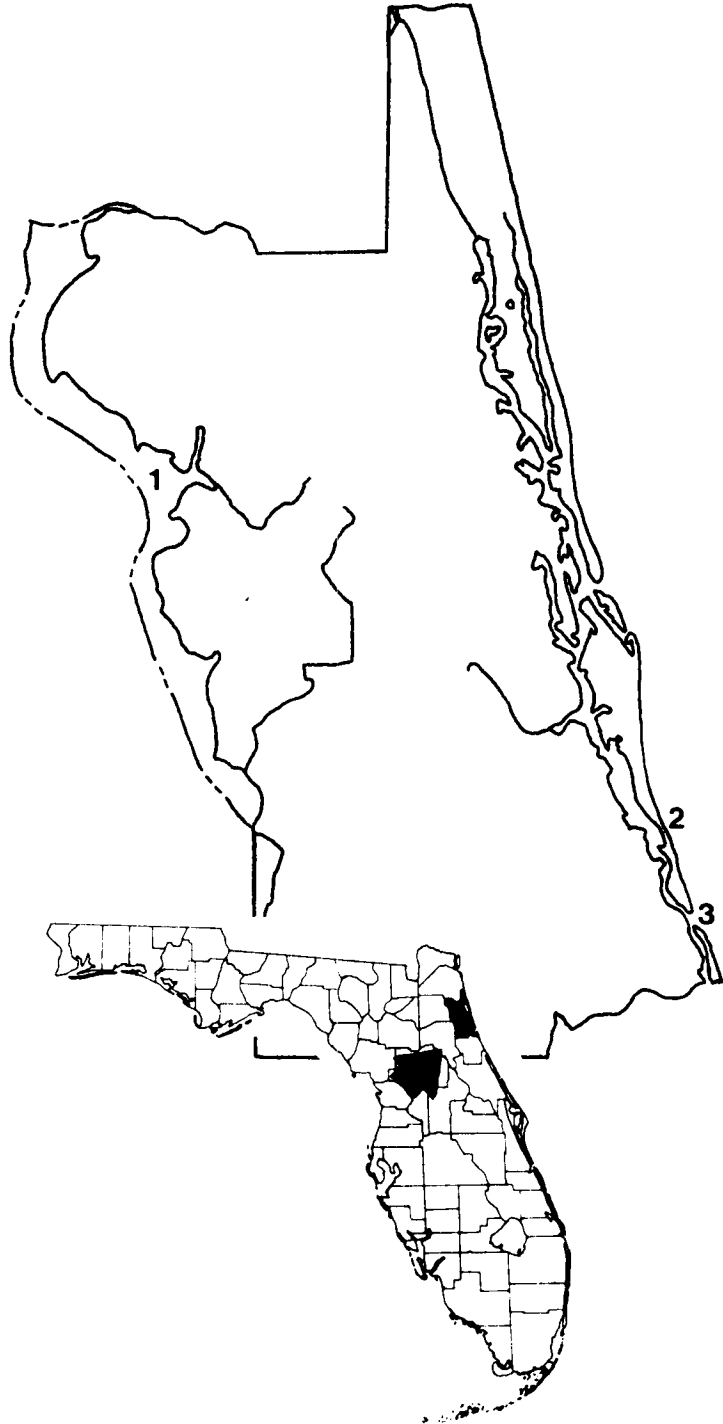
A fouling survey conducted at Ponce de Leon Inlet, Daytona Beach, Florida, revealed the presence of 3 species of *Balanus*, 6 bryozoan species, and 3 species each of mollusks, annelids, and hydroids. Three types of boring organisms were found; the dominant borer, *Bankia gouldi*, was also the most destructive. Seasonal variations in species abundance were identified, although fouling conditions exist year round.

Study Duration: 1 January 1942-31 December 1942; Habitat: Wood blocks; Type of Study: Quantitative; Biological Component: Fauna; Temporal Frequency: Monthly; Abiotic Parameters Measured: Wind velocity, rainfall, sunlight, relative humidity, current velocity, tidal range, water temperature; Dominant Taxon/Taxa Studied: *Bugula*, *Balanus*, *Bankia gouldi*;

See also section 6, Indian River Region.

# ST. JOHNS COUNTY

1. ST. JOHNS RIVER
2. CRESCENT BEACH
3. MATANZAS INLET



(35.00001)

Burgess, G.H. & R. Franz 1978. Zoogeography of the aquatic fauna of the St. Johns River system with comments on adjacent peninsular faunas. *Am. Midl. Nat.* 100(1):160-170.

The Florida peninsula has been subjected to periodic marine inundations and regressions since the oligocene. Freshwater organisms presently found in the St. Johns River system were determined to be derived from stocks that remained on offshore islands during the "Nicomico" (+ 100 ft) high stand, or from immigrants that subsequently entered the Oklawaha River from a Santa Fe River region refugium as sea levels dropped. A number of marine derived organisms, presumed to be of peninsular origin, were suggested to have survived on or invaded offshore islands during high sea levels.

Type of Study:Qualitative; Biological Component:Aquatic fauna;

(35.00002)

Burnson, T.Q. 1972. Sedimentological study of Matanzas Inlet, Florida, and adjacent areas. Univ. of Fla. M.S. Thesis.

The sediment grain size and composition was determined for the substratum of the Matanzas Inlet, Florida, area. Sediments were mostly well sorted, medium to fine sand. Spatial variations in calcium carbonate content and particle size are summarized. Clay mineral composition and distribution is given. Physiographic change in the inlet are described.

Type of Study:Quantitative; Type of Sampler:Grab sampler, tripod mounted coring device; Abiotic Parameters Measured:Sediment grain size, current velocity, depth, calcium carbonate content, clay mineral content;

(35.00003)

Kreitman, M.E. 1977. Population genetics of the mud snail *Massarius obsoletus* (Say). Univ. of Fla. M.S. Thesis.

Three populations of the mud snail, *Massarius obsoletus*, in the St. Johns River were surveyed for electrophoretically detectable genetic variation. In spite of differences in environmental parameters between habitats, gene frequencies were found to be uniform among the populations. Selection, it seems, has favored the development of single species enzymes capable of allowing survival over the full range of environmental variability. Results indicate that these populations are inbred.

Habitat:Mud; Type of Study:Quantitative; Biological Component:Faua; Dominant Taxon/Taxa Studied:*Massarius obsoletus*;

(35.00004)

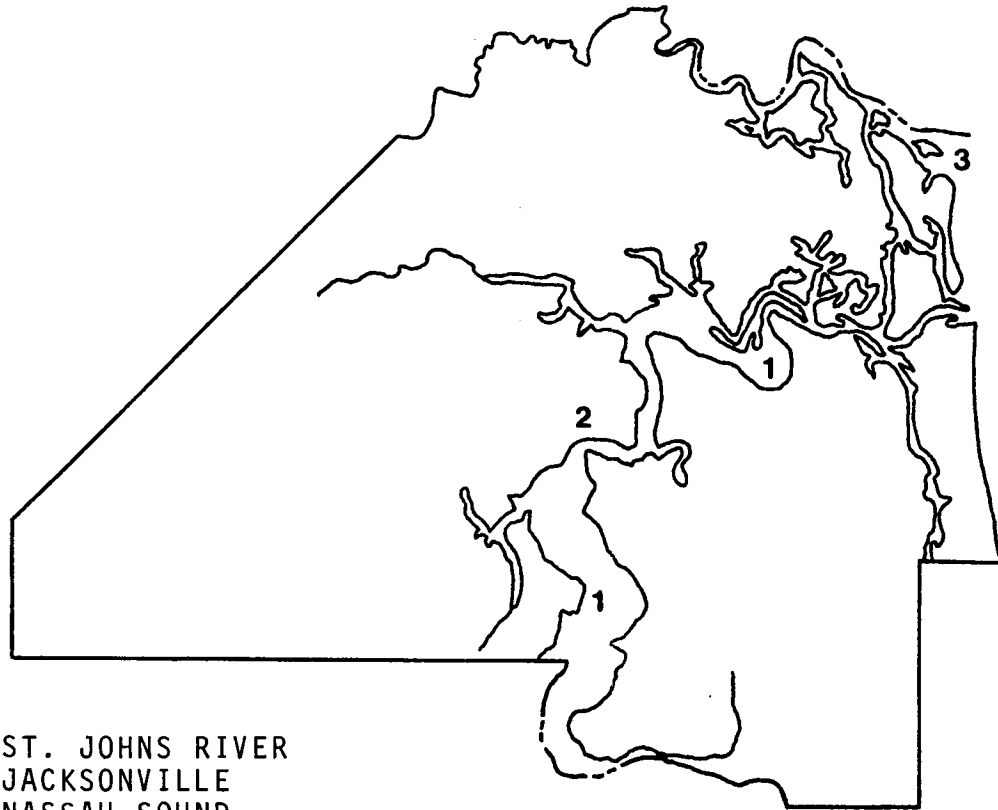
Simon, C.M. 1974. Natural selection in the intertidal environment: population genetics and ecology of the barnacle, *Balanus amphitrite amphitrite*. Univ. of Fla. M.S. Thesis. 114 p.

Sampling was conducted on populations of the barnacle, *Balanus amphitrite amphitrite* from the Crescent Beach area. Allele and genotype frequencies were calculated for samples of high and low intertidal groups, large and small barnacles and for total samples. The frequency variations over the year could be correlated with intertidal height and salinity changes but not temperature. Young individuals responded to environmental gradients more readily than older ones.

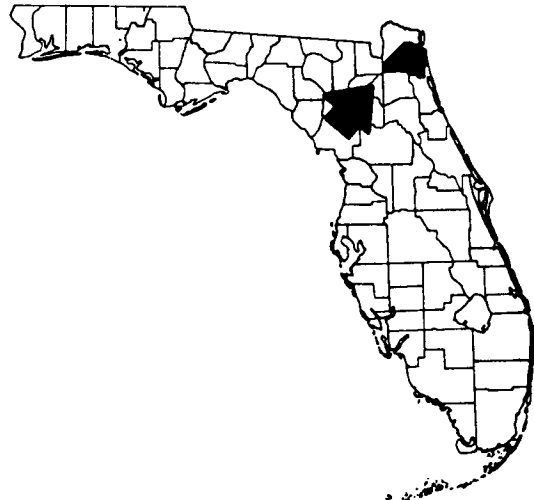
Type of Study:Quantitative; Biological Component:Faua; Abiotic Parameters Measured:Salinity, temperature, tidal heights; Dominant Taxon/Taxa Studied:*Balanus amphitrite amphitrite*;

See also section 6, Indian River Region.

# DUVAL COUNTY



- 1. ST. JOHNS RIVER
- 2. JACKSONVILLE
- 3. NASSAU SOUND



(36.00001)

Carr, W.E.S. & J.T. Giesel 1975. Impact of thermal effluent from a steam-electric station on a marshland nursery area during the hot season. Fish. Bull. 73(1):67-80.

Elevated water temperature resulting from the discharge of condenser cooling water by the two units of the Northside Generating Station has a detrimental effect on the capacity of the two marshland creeks to serve as a nursery area for juvenile fishes during the hot season. Both the density of fishes and the species composition differed markedly in the ambient temperature creek and the two creeks receiving thermal effluent.

Study Duration:1 year; Habitat:Mud, sand-mud, marshgrasses; Type of Study:Quantitative; Biological Component:Fauna; Type of Sampler:Bag seine, core sampler; Number of Stations:9; Number of Replicates/Station:1; Abiotic Parameters Measured:Temperature; Dominant Taxon/Taxa Studied:*Mugil curema*, *M. cephalus*, *Menidia beryllina*, *Leiostomus xanthurus*, *Brevoortia tyrannus*, *Bairdiella chrysura*, *Opisthonema oglinus*;

(36.00002)

Jacksonville Electric Authority / Florida Power and Light 1981. Site certification application environmental document, for Jacksonville Electric Authority, St. Johns River Power Park Units 1 & 2, 1985-1987. Prepared by EnviroSphere, Inc., Norcross, GA.

The effects of construction and operation of Units 1 & 2 of the St. Johns River Power Park are assessed. Appendices provide data on extensive terrestrial and aquatic studies. Benthic studies included macroinvertebrates, fouling organisms and sediments.

Study Duration:(Benthic) 1979-80; Type of Study:Quantitative; Biological Component:Fauna, flora; Type of Sampler:(Benthic invertebrates) Ponar; Temporal Frequency:(Benthic) Quarterly;

(36.00003)

Rehm, A.E., F.C. Tone & J.B. Kirkwood 1975. Final Rept. on biological assessment of water and marsh areas of the St. Johns River. Batelle Columbus Laboratories, William F. Clapp Laboratories, Inc. Rept. #14591. 184 p.

Baseline information on the biota in the St. Johns River estuary was collected and a determination of the effects of 3 electric generating stations on the biota was presented. The effects of the power plants at each of the 3 sites were discussed in terms of heated water, impingement and entrainment. Analysis of the fish data (76 species captured) indicated that the St. Johns River estuary functions primarily as a nursery area for drums, with the Atlantic croaker and star drum being the most abundant. The macrozooplankton populations were found to consist mainly of mysids, crab zoea, fish eggs and fish larvae. It was determined that a well developed benthic community did not exist; abundance and diversity were low.

Study Duration:1 year; Habitat:Mud, sand, saltmarsh; Type of Study:Quantitative; Biological Component:Marine benthos, macrozooplankton, fishes, marsh flora; Impingement screens, plankton net, otter trawl, gillnet, petite ponar grab, Type of Sampler:1/16 m<sup>2</sup> quadrat; Sieve Size:1.0 mm; Number of Stations:3; Number of Replicates/Station:5 (petite ponar grab); Temporal Frequency:Monthly or quarterly; Abiotic Parameters Measured:Temperature, salinity, DO, pH;

(36.00004)

Tagatz, M.E. 1968. Biology of the blue crab, *Callinectes sapidus* Rathbun, in the St. Johns River, Florida. Fish. Bull. 67(1):17-33.

A description of the biological characteristics of *Callinectes sapidus* in the St. Johns River was presented. Blue crabs commonly mated from March to July and from October to December in the St. Johns River. The proportion of males and females that matured at a small size was larger in saltwater than in freshwater. Blue crabs spawned in the first 30 km of river above the mouth and the eggs hatched in the ocean within 6 km of shore. Spawning began as early as February and continued through October. Some blue crabs of both sexes migrated from the St. Johns River to the Intracoastal Waterway, to 4 other rivers, and to the ocean. Many females tagged in the ocean were recaptured in inland waters throughout the year. During the spawning season some reentered the St. Johns River for a second spawning within 15 days after their eggs hatched. Blue crabs 5 to 200 mm wide fed principally upon molluscs (primarily clams and mussels), fish, and crustaceans (amphipods and crabs). They ate the same type of food regardless of crab size, area, and season.

Study Duration:2 years; Type of Study:Qualitative; Biological Component:Decapod fauna; Type of Sampler:Trawl, Clark Bumpus sampler; Number of Stations:Variable; Number of Replicates/Station:Variable; Temporal Frequency:Monthly; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Callinectes sapidus*;

(36.00005)

Tagatz, M.E. 1969. Growth of juvenile blue crabs, *Callinectes sapidus* Rathbun, in the St. Johns River, Florida. Fish. Bull. 67(2):281-288.

Molt intervals of the blue crab *Callinectes sapidus* were similar at fresh and salt water sites, but the average growth was determined to be generally more per molt in salt water. From April to mid-November the mean molt interval was 11 days for crabs 20 to 29 mm wide; it increased to 41 days for crabs 130 to 139 mm wide. Frequency of molting decreased

GEOG. CLASSIFICATION: Duval

36.00006

in winter, but most juveniles 20 to 59 mm wide molted 2 or 3 times. Growth increments per molt varied from 7.8 to 50%. Mean growth increments, by 10 mm width groups, was 20.9 to 34.2%. Estimates indicated that most blue crabs in the St. Johns River reach harvestable size (width of 120 mm) within one year after hatching.

Study Duration:2 years; Type of Study:Qualitative; Biological Component:Decapod fauna; Type of Sampler:50 compartment floats ; Sieve Size: Number of Stations:2; Number of Replicates/Station:4 floats ; Abiotic Parameters Measured:Temperature, salinity; Dominant Taxon/Taxa Studied:*Callinectes sapidus*

(36.00006)

U.S. EPA, Region IV 1982. Environmental Impact Statement, Jacksonville Electric Authority St. Johns River Power Park. NPDES Appl. No. FL0037869. Final Rept.

The impacts of constructing a 1,200 megawatt coal-fired steam electric generating station near the mouth of the St. Johns River were investigated. Analysis was made of impacts to both natural and man made environments, including land, air, aquatic, and marine and sound pollution sources. Alternatives to the project and mitigation procedures are evaluated.

Type of Study:Quantitative; Biological Component:Faua, flora;

PART B

AUTHOR INDEX

Key:

Beardsley, G.L., Jr. (04.00003)1967



Author(s)



Reference Number

Section Number

(See page 12, Table of Contents)



Year





Abele, L.G. (03.00001)1970 (03.00002)1974.  
 Adams, C.A., G.L. Evink, M.J. Oesterling, W. Seaman & R. Van Tine (17.00001)1977.  
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 Lewis, R.R., III & W.D. Courser (20.00042)1972.  
 Lewis, R.R., III, M.J. Durako, M.D. Moffler & R.C. Phillips (19.00049)1982.  
 Lewis, R.R., III & F.M. Dustan (19.00050)1974.  
 Lewis, R.R., III & C.S. Lewis (20.00043)1977.  
 Lewis, T.C. (13.00022)1982.  
 Lincer, J.L. (22.00010)1975.  
 Lindall, W.N., Jr., W.A. Fable, Jr. & L.A. Collins (20.00044)1975.  
 Lindall, W.N., Jr., J.R. Hall, W.A. Fable, Jr. & L.A. Collins (25.00008)1974.  
 Lindall, W.N., Jr., J.R. Hall, & C.H. Saloman (20.00045)1973.  
 Lindall, W.N., Jr. & C.N. Saloman (03.00100)1977.  
 Lindberg, S.E. (04.00037)1974.  
 Lindberg, S.E. & R.C. Harriess (26.00060)1974.  
 Lindberg, W.J. (03.00101)1980.  
 Lindner, M.J. (02.00013)1966.  
 Little, E.J. & J.A. Quick, Jr. (07.00009)1976.  
 Little, E.J., Jr. (13.00023)1958 (07.00010)1973 (26.00061)1977.  
 Little, E.J., Jr. & G.R. Milano (26.00062)1980.  
 Livingston, R.J. (14.00007)1975 (12.00035)1976 (07.00011)1977 (08.00002)1977 (08.00002)1977 (12.00036)1977 (12.00037)1980.  
 Livingston, R.J., C.R. Cripe, R.A. Laughlin & F.G. Lewis, III (12.00039)1976.  
 Livingston, R.J. & J. Duncan (12.00038)1979.  
 Livingston, R.J., R.L. Iverson, R.H. Eastabrook, V.E. Keys & J. Taylor, Jr. (12.00040)1975.  
 Livingston, R.J., R.L. Iverson & D.C. White (12.00041)1976.  
 Livingston, R.J., G.J. Kobylinski, F.G. Lewis, III & P.F. Sheridan (12.00042)1976.  
 Livingston, R.J., R.S. Lloyd & M.S. Zimmerman (13.00024)1976.  
 Livingston, R.J., P.F. Sheridan, G.G. Kobylinski, F.G. Lewis, III (08.00003)1976 (08.00003)1976.  
 Livingston, R.J., P.S. Sheridan, B.G. McLane, F.G. Lewis, III & G.G. Kobylinski (12.00043)1977.  
 Livingston, R.J., M.P. Thompson & D.A. Meeter (12.00044)1978.  
 Lochen, T.J. (03.00102)1972.  
 Lombardo, R. (19.00051)1981.  
 Lombardo, R. & R.R. Lewis (20.00046)1982.  
 Lotspeich, R.A. & S. Mahadevan (20.00047)1977.  
 Lowe, E. (19.00052)1975.  
 Lugo, A.E., G. Evink, M.M. Brinson, A. Brace & S.C. Snedaker (25.00010)1975.  
 Lugo, A.E. & S.C. Snedaker (25.00009)1974.  
 Lund, J.L. (06.00037)1976.  
 Lynts, G.W. (26.00063)1966 (26.00064)1971.  
 Lyons, W.G. (03.00103)1970 (03.00104)1972 (03.00105)1976 (03.00106)1980 (04.00038)1981.  
 Lyons, W.G., D.G. Barber, S.M. Foster, F.S. Kennedy, Jr. & G.R. Milano (26.00065)1981.  
 Lyons, W.G. & S.B. Collard (03.00107)1974.  
 Lyons, W.G., S.P. Cobb, D.K. Camp, J.A. Mountain, T. Savage, L. Lyons & E.A. Joyce, Jr. (17.00024)1971.  
 Lyons, W.G. & F.S. Kennedy, Jr. (26.00066)1981.  
 Lytle, J.S. & T.F. Lytle (03.00108)1977 (03.00109)1977.  
 Lytle, J.S., T.F. Lytle, J.N. Gearing & P.J. Gearing (03.00110)1979.  
 Maden, C.B. (16.00012)1978.  
 Magley, W.C. (20.00048)1978.  
 Mahadevan, S. (20.00049)1976 (20.00050)1976 (20.00052)1977 (20.00051)1977 (20.00053)1978 (19.00053)1979 (19.00054)1981 (17.00026)1983.  
 Mahadevan, S. & L.H. Byrd (20.00054)1977.  
 Mahadevan, S. & J.K. Culter (20.00055)1977 (20.00056)1978 (21.00005)1978.  
 Mahadevan, S., J.K. Culter, D.W. Heatwole (20.00059)1982 (20.00060)1983.  
 Mahadevan, S., J. Culter, S. Hoover, J. Murdoch, F. Reeves & R. Schulze (20.00061)1976.  
 Mahadevan, S., J.K. Culter, J.R. Leverone, E.D. Estevez, W.L. Dovel & G.S. Comp (03.00111)1982.  
 Mahadevan, S., J.K. Culter and R. Yarbrough (20.00062)1980.  
 Mahadevan, S. & J.D. Murdoch (20.00057)1977.  
 Mahadevan, S. & J.J.B. Murdoch (20.00058)1977.  
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 Mahadevan, S. & G.W. Patton (19.00055)1979.  
 Mahoney, B.M.S. (12.00045)1981 (12.00046)1982.  
 Mahoney, B.M.S. & R.J. Livingston (12.00047)1982.  
 Mahood, R.K. et al. (05.00030)1970.  
 Main, K.L. (13.00025)1983.  
 Manker, J.P. (26.00067)1975.  
 Manker, J.P. & G.M. Griffin (26.00068)1971.  
 Manning, R.B. (26.00069)1960.  
 Manning, R.B. & H.E. Kumpf (04.00039)1959.  
 Marmelstein, A.D., P.W. Morgan & W.E. Pequegnat (10.00010)1968.  
 Marsh, G.A., W.R. Courtenay, D. Turbeville & L. McCarthy (28.00007)1978.  
 Marshall, H.L. (16.00013)1966.  
 Marshall, M.J. (16.00014)1977.  
 Marshall, W. (27.00070)1945.  
 Marszalek, D.S., G. Babaschoff, Jr., M.R. Noel & D.R. Movley (26.00070)1977.  
 Martin, R.E. (26.00071)1975.  
 Mathis, J.M. (04.00040)1973.  
 May, J.A. & R.D. Perkins (26.00072)1979.  
 Mayer, G.F. & V. Maynard (19.00056)1975.  
 McCaffrey, P.M. (03.00112)1977.  
 McClintock, J. (19.00057)1980.  
 McClintock, J.B. (01.00057)1983 (19.00058)1983 (20.00064)1983.

McClintock, J.B., T.S. Klinger & J.M. Lawrence  
(20.00065)1982.

McCormick, R. (03.00113)1979.

McCoy, E. & S. Bell (03.00114)1982.

McCoy, E.D. & S.S. Bell (03.00115)1982.

McCoy, E.D., S.S. Bell & K. Walters  
(03.00116)1983.

McGinty, T.L. (26.00073)1955.

McIntosh, R. (18.00002)1978.

McIntyre, A.D. (27.00071)1971.

McKeever, M.M. (04.00041)1975.

McKenney, C.L., Jr. & J.D. Costlow, Jr.  
(05.00031)1982.

McLane, B.G., P.F. Sheridan & R.J. Livingston  
(12.00048)1976.

McLaughlin, P.A. (19.00059)1976.

McLaughlin, P. & A. Thorhaug (27.00072)1978.

McLean, R.B. (12.00049)1975.

McMahan, E.A. & D.L. Young (17.00025)1974.

McNulty, J.K. (27.00074)1970 (27.00073)1961.

McNulty, J.K., R.C. Work & H.B. Moore  
(04.00042)1962 (27.00076)1962 (27.00076)1962.

McNulty, J.K., W.N. Lindall, Jr. & E.A. Anthony  
(13.00026)1974.

McNulty, J.K., W.N. Lindall, Jr. & J.E. Sykes  
(03.00117)1972.

McNulty, J.K. & W.N. Lopez (27.00075)1969.

McPherson, B.F. (27.00077)1964 (27.00078)1965  
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McSweeney, E.S. (04.00044)1968.

Meeter, D.A. & R.J. Livingston (12.00050)1978.

Meisburger, E.P. and M.E. Field. (05.00033)1976.

Menon, M.P., G.S. Ghuman & C.O. Eneh  
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Menzel, R.W. (03.00118)1956 (12.00051)1957  
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Menzel, R.W., Ed. (13.00027)1971.

Menzel, R.W., E.W. Cake, M.L. Haines, R.E. Martin  
& L.A. Olsen (12.00055)1976.

Menzel, R.W., M.C. Hulings & R.R. Hathaway  
(12.00056)1958 (12.00057)1966.

Menzel, R.W. & F.E. Nichy (12.00054)1958.

Menzel, W. (01.00059)1976 (11.00009)1976.

Menzies, R.J. & R.Y. George (12.00058)1972.

Merrill, A.S. & H.S. Tubiash (01.00060)1970.

Merz, R.A. (16.00015)1979.

Messing, C.G. (04.00045)1975 (04.00046)1979.

Meyers, S.P. (27.00080)1953 (27.00081)1954  
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Meyers, S.P. & B. Hopper (27.00083)1967.

Meyers, S.P., B.E. Hopper & R. Cejalu  
(27.00084)1970.

Meyers, S.P., P.A. Orpurt, J. Simms & L.L. Boral  
(27.00085)1965.

Mikkelsen, P.S. (24.00010)1978 (01.00061)1980.

Miller, G.C., D.M. Allen & T.J. Costello  
(33.00021)1979 (33.00022)1981.

Miller, R.W. (12.00059)1972.

Mills, C.E. (03.00119)1976.

Mitchell, V. and J. Minstead (08.00004)1974.

Mitchell-Tapping, H.J. (01.00062)1981.

Mitterer, R.M. (26.00075)1978.

Mitterer, R.M. & P.W. Carter (26.00076)1977.

Moffler, M., M. Durako & W. Grey (19.00060)1981.

Moffler, M.D. (10.00011)1976.

Moffler, M.D. & J.F. vanBreedveld (31.00015)1979.

Montague, C.L., J.W. Caldwell & R.L. Knight  
(17.00027)1981.

Montgomery, J.R., C. Zimmermann, G. Peterson & M.  
Price (06.00038)1983.

Montgomery, R.T. (26.00077)1978.

Montgomery, R.T., W.I. Miller & A.W. Collier  
(26.00078)1977.

Mook, D. (06.00039)1976 (31.00016)1976  
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Mook, D.H. (06.00042)1981.

Moon, R.E., T.N. Krumrei & D.F. Martin  
(03.00120)1980.

Moore, D.K. & H.R. Bullis (03.00121)1960.

Moore, D.R. (29.00010)1962 (03.00122)1962  
(01.00063)1963 (01.00064)1964 (03.00123)1965  
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Moore, H.B. (27.00086)1972.

Moore, H.B., H.D. Albertson & S.M. Miller  
(27.00096)1974.

Moore, H.B., T. Jetare, J.C. Bauer & J.A. Jones  
(04.00047)1963.

Moore, H.B. & M. Lopez (27.00089)1975.

Moore, H.B. & W.N. Lopez (27.00090)1966  
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Moore, H.B. & B.F. McPherson (27.00088)1965  
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Moore, S.J. (19.00061)1976.

Morrill, J.B. & C. Blair (22.00019)1969.

Morrill, J.B., C. deNarvaez, R. Foster, F.B. Ayer  
& E. Connor (22.00020)1974.

Morrill, J.B. & J.F. Bequine (21.00009)1971.

Morrill, J.B. & S. Donaldson (22.00021)1968.

Morrill, J.B. & M. Needham (23.00009)1969.

Morrill, J.B. (22.00011)1968 (22.00012)1968  
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Morrison, S.J. (12.00060)1980.

Moshiri, G.A. & M.G. Crumpton (07.00012)1978.

Mosura, E.L. & E.D. Estevez (20.00066)1977.

Moulton, M.P. (01.00065)1971.

Mullins, A.T. (12.00061)1959.

Mullins, H.T., A.C. Neumann, R.J. Wilber, A.C.  
Hine & S.J. Chinburg (04.00048)1980.

Murdoch, J.D. (19.00062)1976.

Murray, P.J. (25.00011)1976.

Myers, G.J. (11.00010)1979.

Nagvi, S.M.Z. (12.00062)1966.

Nall, L.E. (03.00125)1979.

Neale, M.J. (24.00011)1980.



- Nelson, W.G. (01.00066)1980 (06.00043)1981 (33.00024)1981.
- Nelson, W.G., K.D. Cairns & R.W. Virnstein (33.00025)1982.
- Nelson, W.G. & J.F. Gorzelany (33.00026)1982.
- Nettles, N.S. (03.00126)1976.
- Newell, S.Y. (04.00049)1974.
- Nichy, F.E. & R.W. Menzel (12.00063)1960.
- Nickels, J.S., R.J. Bobbie, R.F. Martz, G.A. Smith, D.C. White & M.L. Richards (10.00012)1981.
- Nickelsen, G.L. (26.00079)1976.
- Nicol, D. (01.00067)1977.
- Nimmo, D.R., J. Forester, P.T. Heitmuller, & G.H. Cook (07.00013)1974.
- Noe, C.D. (27.00097)1967.
- Nugent, R.S., Jr. (27.00098)1970.
- O'Bower, A.M. & J.W. Macasey (27.00099)1967.
- Odum, W.E. (04.00050)1969.
- Odum, W.E. & E.J. Heald (03.00127)1972.
- Odum, W.E., C.C. McIvor, & T.J. Smith, III (01.00068)1982.
- Oesterling, M.J. (03.00128)1976 (17.00028)1976.
- Oesterling, M.L. & G.L. Evink (12.00064)1977.
- Oglesby, L.C. (13.00028)1960.
- Olexa, M.T. & T.E. Freeman (25.00012)1977.
- Olinger, L.W., R.G. Rogers, P.L. Fore, R.L. Todd, B.L. Mullins, F.T. Bisterfeld & L.A. Wise, II. (07.00014)1975.
- Olsen, L.A. (12.00065)1973 (12.00066)1976.
- Olson, F.C.W. (19.00063)1953.
- Opresko, D.M. (27.00100)1973 (27.00101)1974.
- Opresko, L. & R. Thomas (27.00102)1975.
- Oremland, R.S. (26.00080)1975 (01.00069)1976.
- Orenland, R.S. & B.F. Taylor (27.00103)1978.
- Orpurt, P.A. & L.L. Boral (27.00104)1964.
- Orpurt, P.A., S.P. Meyers, L.L. Boral and J. Sims (27.00105)1964.
- Osborne, M.M. (11.00011)1979.
- Osborne, S.W. (23.00010)1979.
- Paige, J.A. (16.00016)1973.
- Palacas, J.G., A.H. Love, & P.M. Gerrild (09.00005)1972.
- Parker, M.M. (07.00015)1968.
- Parker, P.L. (03.00129)1981.
- Pastula, E.J., Jr. (09.00006)1967.
- Patton, G.L. (20.00067)1982.
- Pawson, D.L., J.E. Miller & C.M. Hoskin (05.00034)1981.
- Payne, R.G. (24.00012)1969.
- Pearse, A.S. (03.00130)1908.
- Pearson, J.F.W. (27.00106)1936.
- Pellenbarg, R.E. (27.00107)1973.
- Penhale, P.A. & J.M. Sprogis (27.00108)1976.
- Penzias, L.P. (27.00109)1969.
- Pequegnat, W.D., R.S. Gaille, & L.H. Pequegnat (10.00014)1967.
- Pequegnat, W.D. & L.H. Pequegnat (10.00013)1968.
- Pequegnat, W.E., L.H. Pequegnat, J.A. Kleypas, B.M. James, E.A. Kennedy (03.00131)1983.
- (03.00132)1983.
- Perkins, T.H. & T. Savage (01.00070)1975.
- Peters, K. (19.00064)1981.
- Pettibone, M.H. (05.00035)1977.
- Pettit, G.A. (27.00110)1977.
- Phifer, C.B., Jr. (03.00133)1976.
- Phillips, R.C. (26.00081)1959 (03.00134)1960 (19.00065)1960 (19.00066)1960 (17.00029)1961 (30.00003)1961 (19.00067)1962 (11.00012)1977.
- Phillips, R.C. & R.M. Ingle (30.00004)1960.
- Phillips, R.C., C. McMillan & K.W. Bridges (01.00071)1981.
- Phillips, R.C. & V.G. Springer (19.00068)1960 (24.00013)1960.
- Phillips, R.C., M.K. Vincent & R.T. Huffman (11.00013)1978.
- Pierce, E.L. (01.00072)1965.
- Pierce, R.H. & R.C. Brown (03.00135)1983 (22.00022)1984.
- Pierce, R.H. & E.S. VanVleet (23.00011)1983.
- Pillsbry, H.A. & A.A. Olsson (04.00051)1953.
- Pilotte, J.O., J.W. Winchester, & R.C. Glassen (07.00016)1978.
- Pilsbry, H.A. & T.L. McGinty (01.00073)1949 (01.00074)1950.
- Pool, D.J., A.E. Lugo & S.C. Snedaker (27.00111)1974.
- Pool, D.J., S.C. Snedaker & A.E. Lugo (04.00052)1977.
- Powles, H. (27.00112)1978.
- Presley, B.J., M.C. Dobson, R.F. Shokes & J.H. Trefry (03.00136)1977.
- Price, G.B. (22.00023)1975.
- Proffitt, C.E. (19.00069)1983.
- Provancha, J.A. & R.M. Willard (33.00027)1984.
- Provenzano, A.J., Jr. (01.00075)1958.
- Purcell, B.H. (12.00068)1977.
- Purcell, B. & R.J. Livingston (12.00067)1976.
- Quick, J.A., Jr. (01.00076)1972.
- Quick, J.A., Jr. (ed.) (19.00070)1971.
- Quick, J.A., Jr. & J.G. Mackin (01.00077)1971.
- Quinn, B.G. (04.00053)1965.
- Quinn, J.F., Jr. (04.00054)1977.
- Radwin, G.E. (10.00015)1964.
- Radwin, G.E. & R.W. Wells (01.00078)1968.
- Randall, J.E., R.E. Schroeder & W.A. Starck, II (26.00082)1964.
- Ravenel, W.S. (12.00069)1980.
- Ravenel, W.S. & D. Thistle (12.00070) 1981.
- Raymond, M.F. (28.00008)1972.
- Reark, J.B. (27.00113)1974.
- Reed, J.K. (29.00011)1977 (05.00036)1980.
- Reed, J.K. & R.G. Gilmore (05.00037)1981.
- Reed, J.K., R.H. Gore, L.E. Scotto & K.A. Wilson (06.00044)1982.
- Reed, T.L. (05.00038)1976.
- Reeves, F.S. & S. Mahadevan (20.00068)1977 (20.00069)1978.
- Reha, A. (01.00079)1974.

Rehm, A.E., F.C. Tone & J.B. Kirkwood  
(36.00003)1975.

Reidenauer, J.A. (12.00071)1981.

Reidenauer, J.A. & D. Thistle (13.00029)1983.

Reinschmidt, D.C. (01.00080)1969.

Reish, D.J. & M.I. Hallisey (33.00028)1983.

Rey, J.R. (03.00137)1978 (01.00081)1979.

Reyes-Vasquez, G. (27.00114)1965 (27.00115)1970.

Rheinhardt, J.M. & H.C. Aldrich (01.00082)1982.

Ribelin, B.W. (03.00138)1978.

Rice, J.D., R.P. Trocine & G.M. Wells  
(06.00045)1983.

Rice, K.J. (27.00116)1978.

Rice, M.E. (26.00083)1970.

Rice, M.E., J. Piraino & H.F. Reichardt  
(06.00046)1983.

Rice, S.A., G.W. Patton & S. Mahadevan  
(21.00010)1981.

Rice, S.A. & J.L. Simon (20.00070)1980.

Rich, E.R. & L.J. Greenfield (26.00084)1983.

Richard, B.R. & W.F. Clapp (34.00003)1944.

Richey, J.M. (25.00013)1961.

Rio Palenque, Inc. (26.00085)1972.

Robbin, D.M. & J.J. Stipp (26.00086)1979.

Roberts, H.H., L.J. Rouse, Jr., N.D. Walker & J.H. Hudson (04.00055)1982.

Roberts, H.H., T. Whelan & W.G. Smith  
(26.00087)1977.

Roberts, M.H., Jr. (05.00039)1974.

Roberts, T.W. (06.00047)1974.

Robertson, P.B. (26.00088)1963.

Robinson, R.K. & D.E. Dimitriou (26.00089)1963.

Roe, R.B., R. Cummins, Jr. & H.R. Bullis, Jr.  
(33.00029)1971.

Roessler, M.A. (27.00117)1971 (27.00118)1977.

Roessler, M.A. & G.L. Beardsley (27.00119)1974.

Roessler, M.A., G.L. Beardsley, R. Rehrer & J. Garcia (27.00120)1975.

Roessler, M.A. & R.G. Rehrer (04.00056)1971.

Roessler, M.A., D.C. Tabb, R.G. Rehner & J. Garcia  
(27.00121)1974.

Rogers, R.G. (07.00017)1974.

Rogers, S.W. (19.00071)1972.

Rona, D.C. (27.00122)1977.

Rosenberg, R. (27.00123)1975.

Rosenfeld, J.K. (26.00090)1979 (26.00091)1979.

Ross, F. (19.00072)1975.

Ross, R.W. & T.V. Mayon (20.00071)1975.

Rouse, W.L. (25.00014)1970.

Rowe, G.T. & D.W. Menzel (03.00139)1971.

Rowe, G.T., P.T. Polloni & S.G. Hower  
(01.00083)1974.

Rubinstein, M.I. (08.00005)1976 (08.00005)1976  
(07.00018)1979.

Rubinstein, M.I., C.M. D'Asaro, C. Sommers & F.G. Wilkes (07.00019)1980.

Rubinstein, M.I., F.G. Wilkes & C.M. D'Asaro  
(07.00020)1979.

Ruddell, J.M. (12.00072)1976.

Rudloe, A.E. (01.00084)1978.

Rudolph, H.D., R. Walesky & D.R. Deis  
(27.00124)1983.

Rushton, B. & J. Tullai (22.00024)1977.

Russell, M.A.C. (27.00125)1981.

Ryther, J.H., J.C. Goldman, C.E. Gifford, J.E. Huguenin, A.S. Wing, J.P. Clarner, L.D. Williams & B.E. LaPoint (31.00017)1975.

Salituri, J. (06.00048)1975.

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Santos, S.L. & J.L. Simon (19.00077)1974  
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Schmahl, G.P. & J.T. Tilmant (27.00126)1980.

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Schole, D.W. (25.00015)1963.

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Seaman, W., C.A. Adams & S.C. Snedaker  
(25.00016)1973.

Seaman, W., Jr. & D.V. Aska (26.00092)1974.

Sell, M.G., Jr. (04.00062)1977.

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Sherman, K.M., J.A. Reidenauer, D. Thistle & D. Meeter (13.00030)1983.

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- (26.00097)1981.
- Shinn, E.A., J.H. Hudson, R.B. Halley & B. Lidz (04.00063)1977.
- Shipp, R.L. & S.A. Bortone (03.00145)1978.
- Shipp, R.L. & T.S. Hopkins (03.00146)1978.
- Shoemaker, C.R. (01.00088)1933.
- Shokes, R.F., N. Hansen, A. Abusamara, J. Reed (03.00147)1978.
- Shokes, R.F., R.R. Sims, Jr., N. Hansen, A. Abusamara, J. Reed (03.00148)1978.
- Short, F.T. & C. Zimmerman (31.00018)1983.
- Silberman, L.Z. (24.00014)1979.
- Simon, C.M. (35.00004)1974.
- Simon, J.L. (19.00085)1965 (20.00082)1974 (20.00083)1977 (20.00084)1978.
- Simon, J.L. & D.M. Dauer (20.00085)1972 (20.00086)1977.
- Simon, J.L. & L.J. Doyle (20.00087)1974.
- Simon, J.L., L.J. Doyle, & W.G. Conner (20.00088)1976.
- Simon, J.L. & S. Mahadevan (19.00086)1982.
- Sims, H.W., Jr. (19.00087)1964 (01.00089)1966.
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- Sinclair, M.E. (12.00078)1972.
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- Singletary, R.L. & H.B. Moore (27.00129)1974.
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- Smart, A. (17.00030)1977.
- Smith, F.G.W. (03.00149)1954 (03.00150)1954 (03.00151)1954 (01.00090)1958.
- Smith, F.G.W., R.H. Williams & C.C. Davis (27.00131)1950.
- Smith, G. (03.00152)1978.
- Smith, G.B. (22.00026)1975 (03.00153)1976.
- Smith, R.L. (27.00132)1973.
- Smith, S.J., B. Schuster & W.E. Bros (20.00089)1983.
- Smith, W. (17.00031)1974.
- Snedaker, S.C. (17.00032)1974.
- Snedaker, S.C. & I.M. Brook (27.00133)1976.
- Socci, A. & M.G. Dinkelman (03.00154) 1981.
- Soto, L.A. (03.00155)1972 (04.00064)1978.
- Southwest Florida Water Management District. (23.00012)1978.
- Spring, K.D. (05.00040)1981.
- Springer, V.G. & A.J. McErlean (26.00098)1962.
- Sprogis, J.M. (27.00134)1975.
- Stahl, L.E. (19.00089)1970.
- Staiger, J.C. (26.00099)1970.
- Stalter, R. (05.00041)1976.
- Stanaland, B.E. (29.00012)1977.
- Stancyk, S.E. (16.00017)1970 (16.00018)1974.
- Stancyk, S.E., F.J.S. Maturo, Jr. & R.W. Heard, Jr. (20.00090)1976.
- Stauble, D.K. (11.00014)1971.
- Steidinger, K.A. & J.F. VanBreedveld (17.00033)1971.
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- Stevely, J.M. (19.00090)1978.
- Stock, J.H. (27.00135)1970.
- Stockman, K.W., R.N. Ginsburg & E.A. Shinn (26.00101)1967.
- Stokes, R.J., E.A. Joyce, Jr. & R.M. Ingle (11.00015)1968.
- Stone, R.B. (01.00092)1974.
- Stoner, A.W. (13.00031)1979 (13.00032)1979 (13.00033)1980 (13.00034)1980 (31.00019)1980.
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- Stuart, M. & P. Taddio (eds.) (22.00027)1979.
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- Subrahmanyam, C.B. & C.L. Coultas (13.00036)1980.
- Subrahmanyam, C.B. & S.H. Drake (13.00037)1975.
- Subrahmanyam, C.B. & W.L. Kruczynski (13.00038)1978.
- Subrahmanyam, C.B., W.L. Kruczynski, and S. H. Drake (13.00039)1976.
- Sugiri, G.K.A. (02.00014)1971.
- Sullivan, J.R. (04.00067)1979.
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- Sykes, J.E. (19.00092)1966 (19.00093)1966 (20.00091)1967 (20.00092)1968 (20.00093)1970 (19.00094)1971 (04.00068)1972.
- Sykes, J.E. & J.H. Finucane (20.00094)1966.
- Sykes, J.E. & J.R. Hall (19.00095)1970.
- Tabb, D.C., D.L. Dubrow & A.E. Jones (04.00069)1962.
- Tabb, D.C., D.L. Dubrow & R.B. Manning (26.00103)1962.
- Tabb, D.C. & E.J. Heald (Tropical Bioindustries Dev. Co.) (26.00104)1974.
- Tabb, D.C. & A.C. Jones (26.00105)1962.
- Tabb, D.C. & R.B. Manning (26.00106)1961.
- Tagatz, M.E. (36.00004)1968 (36.00005)1969.
- Tagatz, M.E., R.W. Borthwick, G.H. Cook, & D.L. Coppage (07.00030)1974.
- Tagatz, M.E., P.W. Borthwick & J. Forester (07.00031)1975.
- Tagatz, M.E., M.R. Gregory, & G.R. Plaia (07.00032)1982.
- Tagatz, M.E. & J.M. Ivey (07.00022)1981.
- Tagatz, M.E., J.M. Ivey, M.R. Gregory & J.L. Oglesby (07.00024)1981.
- Tagatz, M.E., J.M. Ivey, J.C. Moore & M. Tobia (07.00028)1977.
- Tagatz, M.E., J.M. Ivey, & J.L. Oglesby (07.00027)1979 (07.00026)1979 (08.00006)1978.
- Tagatz, M.E., J.M. Ivey & M. Tobia (07.00029)1978.
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 Mainright, S.C. & T.H. Perkins (04.00074)1982.  
 Mainwright, S.A. & J.R. Dillon (26.00114)1969.  
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Walker, R.E. (33.00033)1976.  
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 Waste Water Engineers (20.00111)1979.  
 Watts, S.A. (19.00106)1983.  
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 Wells, F.E., Jr. (12.00085)1969 (12.00086)1970.  
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 Wells, H.W. & J.T. Tomlinson (12.00087)1966.  
 Werner, W.E., Jr. (01.00105)1967.  
 White, D., R.J. Livingston et al.  
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 White, D.C., R.J. Bobbie, S.J. Morrison, D.K.  
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 (12.00090)1977.  
 White, D.C., R.H. Findlay, S.D. Fazio, R.J.  
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 Willis, C. & J. Carlton (01.00107)1974.  
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 Woodburn, K.D., B. Eldred, E. Clark, R.F. Hutton &  
 R.M. Ingle (03.00182)1957.  
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 Yarbo, L.A., P.R. Carlson, C.F. Zimmerman & J.R.  
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 Miller, M.W. Young & D. Mook (06.00068)1974.  
 Young, D.K., M.A. Buzas & M.W. Young  
 (06.00070)1976.  
 Young, D.K., K.D. Cairns, M.A. Middleton, J.E.  
 Miller & M.W. Young (06.00069)1976.  
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 Zieman, J. (27.00167)1975.  
 Zieman, J.C. (27.00168)1968 (27.00169)1972  
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 Zieman, J.C., Jr. (27.00170)1970.  
 Zieman, J.C. & E.J. Ferguson Wood (27.00171)1975.  
 Zimmerman, C.F. (31.00023)1980.  
 Zimmerman, C.F., T.D. French & J.R. Montgomery  
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 Zimmerman, M.S. & R.J. Livingston (13.00043)1976  
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 Zimmerman, R.J., R.A. Gibson & J.B. Harrington  
 (06.00072)1979.  
 Zischke, J.A. (26.00120)1972.  
 Zuberer, D. (19.00109)1976.  
 Zuberer, D.A. & W.S. Silver (19.00110)1978.

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Key :

5. TYPE OF SAMPLER ←———— Category

AERIAL PHOTOS: 22.00013,

BALLOON TRAWL: 20.00094,

BOXCORE: 22.00004,

Reference Number

Section Number  
(See page 12, Table of Contents.)

### Key Word

# 1. STUDY DURATION

- - - - -

1 DAY: 06.00038, 19.00055, 19.00097, 20.00076, 20.00055,  
20.00061, 22.00009, 24.00015, 25.00011,  
2 DAYS: 12.00072, 19.00075, 20.00003, 20.00048, 22.00021,  
28.00007,  
3 DAYS: 07.00018, 21.00011, 22.00011,  
4 DAYS: 21.00012,  
5 DAYS: 04.00021, 23.00007,  
1 WEEK: 03.00098, 04.00075, 20.00019, 25.00021, 25.00023,  
8 DAYS: 11.00012,  
9 DAYS: 24.00012,  
12 DAYS: 19.00058,  
2 WEEKS: 12.00017, 24.00008,  
16 DAYS: 31.00021,  
18 DAYS: 10.00008,  
3 WEEKS: 06.00043, 12.00089,  
1 MONTH: 06.00029, 06.00049, 10.00018, 12.00095, 20.00027,  
20.00033, 20.00047, 20.00049, 20.00051, 20.00052,  
20.00054, 20.00056, 20.00058, 20.00068, 20.00069,  
20.00085, 20.00100, 21.00004, 21.00006, 21.00007,  
21.00010, 22.00012, 22.00030, 26.00119, 27.00100,  
27.00123,  
1-1/2 MONTHS: 03.00099, 08.00002, 08.00007, 12.00090,  
2 MONTHS: 07.00025, 07.00033, 12.00040, 13.00001, 13.00014,  
19.00085, 20.00050, 22.00013, 26.00066, 26.00079,  
26.00114, 26.00116, 29.00012, 32.00005, 33.00023,  
33.00032,  
9 WEEKS: 07.00028  
10 WEEKS: 06.00047, 07.00023, 07.00026,  
SEVERAL MONTHS: 20.00042,  
3 MONTHS: 03.00095, 07.00013, 07.00029, 07.00034, 07.00035,  
08.00004, 08.00006, 12.00011, 12.00053, 12.00094,  
19.00097, 20.00053, 20.00107, 29.00013,  
1 WINTER: 26.00048,  
1 SUMMER: 17.00025, 19.00071,  
4 MONTHS: 07.00004, 07.00005, 07.00006, 11.00015, 19.00040,  
22.00019, 23.00009, 26.00053, 26.00105,  
5 MONTHS: 06.00070, 22.00024,  
6 MONTHS: 06.00066, 08.00005, 10.00011, 12.00062, 13.00010,  
19.00091, 19.00092, 26.00046, 27.00143, 27.00145,  
2 WINTERS: 12.00019,  
7 MONTHS: 12.00013, 12.00054, 12.00063, 12.00081, 27.00074,  
8 MONTHS: 06.00033,  
9 MONTHS: 19.00014, 19.00096, 21.00009,  
10 MONTHS: 17.00020, 19.00076, 20.00043, 23.00014, 25.00015,  
26.00043, 33.00020,  
1 YEAR: 01.00002, 01.00006, 01.00043, 01.00054, 03.00128,  
03.00155, 04.00006, 04.00060, 04.00068, 06.00008,  
06.00010, 06.00015, 06.00017, 06.00024, 06.00027,  
06.00037, 06.00039, 06.00061, 06.00062, 06.00064,  
06.00068, 06.00069, 07.00007, 07.00010, 07.00031,  
08.00001, 10.00010, 10.00016, 11.00005, 12.00009,  
12.00016, 12.00019, 12.00064, 12.00067, 12.00073,  
12.00077, 13.00019, 13.00026, 13.00032, 13.00037,  
13.00039, 14.00005, 17.00019, 17.00024, 17.00036,  
17.00038, 19.00001, 19.00002, 19.00003, 19.00028,  
19.00037, 19.00047, 19.00056, 19.00061, 19.00068,  
19.00074, 19.00077, 19.00095, 19.00097, 19.00100,

19.00104, 20.00006, 20.00010, 20.00029, 20.00036,  
20.00044, 20.00045, 20.00059, 20.00060, 20.00063,  
20.00075, 20.00091, 20.00092, 20.00096, 20.00101,  
20.00106, 25.00016, 25.00022, 25.00026, 25.00027,  
26.00012, 26.00015, 26.00028, 26.00042, 26.00049,  
26.00101, 26.00111, 27.00050, 27.00062, 27.00098,  
27.00131, 27.00140, 27.00147, 28.00002, 28.00003,  
28.00010, 29.00001, 31.00014, 32.00003, 33.00016,  
36.00001, 36.00003,  
1 - 5 YEARS: 04.00046  
5 SEASONS: 01.00021  
390 DAYS: 26.00038,  
13 MONTHS: 03.00073, 11.00013,  
14 MONTHS: 12.00030, 12.00031, 14.00009, 14.00010, 20.00031,  
27.00057,  
15 MONTHS: 13.00034, 19.00106, 20.00039, 20.00088, 20.00094,  
16 MONTHS: 20.00110,  
17 MONTHS: 04.00057, 05.00025, 20.00074, 20.00111,  
1 1/2 YEARS: 04.00076, 13.00024, 17.00023, 19.00050,  
22.00073, 26.00089, 27.00081, 27.00085,  
27.00170,  
21 MONTHS: 02.00012,  
22 MONTHS: 27.00041,  
2 YEARS: 03.00066, 03.00127, 03.00158, 04.00005, 04.00015,  
04.00029, 05.00022, 05.00027, 05.00034, 06.00020,  
06.00025, 06.00060, 07.00014, 10.00009, 10.00013,  
10.00014, 12.00043, 12.00055, 12.00056, 12.00057,  
13.00023, 14.00007, 17.00033, 19.00026, 19.00093,  
20.00013, 20.00016, 20.00018, 20.00028, 20.00083,  
20.00086, 20.00097, 20.00104, 23.00012, 24.00001,  
25.00025, 26.00016, 26.00018, 26.00059, 26.00061,  
26.00072, 27.00005, 27.00014, 27.00015, 27.00146,  
28.00001, 30.00001, 31.00001, 31.00016, 36.00004,  
36.00005,  
25 MONTHS: 06.00067,  
27 MONTHS: 03.00112,  
28 MONTHS: 03.00051, 03.00103, 03.00163, 20.00072,  
2-1/2 YEARS: 04.00033, 06.00030,  
14 MONTHS AND 1 YEAR: 20.00030,  
3 YEARS: 02.00001, 03.00174, 04.00062, 07.00011, 07.00035,  
12.00042, 12.00094, 20.00080, 20.00084, 21.00001,  
22.00015, 24.00005, 26.00069, 26.00106, 27.00076,  
27.00118, 31.00022,  
3-1/3 YEARS: 04.00059,  
3-1/2 YEARS: 01.00045, 03.00016, 03.00076, 03.00078,  
03.00171, 12.00052, 20.00079, 27.00120,  
4 YEARS: 01.00072, 03.00056, 03.00057, 12.00044, 12.00050,  
12.00093, 20.00077, 25.00024, 26.00103, 27.00077,  
27.00121, 27.00147, 27.00149, 27.00162,  
5 YEARS: 01.00076, 01.00077, 03.00178, 04.00069, 08.00003,  
12.00041, 12.00048, 26.00073, 27.00139,  
6 YEARS: 12.00046, 20.00093, 20.00098, 27.00066, 29.00010,  
7 YEARS: 07.00037, 11.00009, 14.00011, 19.00080,  
8 YEARS: 12.00036, 26.00084,  
9 YEARS: 03.00131, 03.00132,  
10 YEARS: 01.00094,  
22 YEARS: 12.00092,  
27 YEARS: 27.00096,

1915 SUMMER - 1916 SUMMER: 02.00002,  
 1937-1961: 04.00047,  
 1938-1976: 27.00059,  
 1940-1975: 04.00001,  
 1942 JANUARY 1 - DECEMBER 31: 34.00003,  
 1945-1949: 05.00015,  
 1946 NOVEMBER - 1947 AUGUST: 03.00071,  
 1946 NOVEMBER - 1947 JANUARY: 24.00006,  
 1947 SEPTEMBER - 1953 AUGUST: 16.00008,  
 1947 DECEMBER 7 - 1948 OCTOBER: 03.00052,  
 1948 DECEMBER - 1949 NOVEMBER: 27.00044,  
 1949 JANUARY - 1951 MARCH: 27.00060,  
 1949 FEBRUARY 10 - 1950 SPRING: 12.00021,  
 1949 FEBRUARY - 1950 JULY: 12.00023, 12.00024,  
 1949 FEBRUARY - 1953 AUGUST: 12.00027,  
 1949 MAY - 1951 AUGUST: 12.00026,  
 1949 OCTOBER: 12.00020,  
 1950-1951: 12.00010, 27.00069,  
 1950-1956: 03.00173,  
 1950 FEBRUARY 17 - 1951 FEBRUARY 11: 16.00019,  
 1950 FEBRUARY: 26.00050,  
 1950 MARCH - 1951 JANUARY: 27.00043, 27.00044,  
 1951 JULY - 1952 MAY: 19.00014,  
 1951 AUGUST - 1952 AUGUST: 17.00016,  
 1952 JUNE - APRIL 1953: 12.00084,  
 1952 JULY 26: 26.00113,  
 1953 JUNE - SEPTEMBER: 05.00016,  
 1954 APRIL - 1958 SEPTEMBER: 11.00002,  
 1955-1957: 03.0015,  
 1955-1958: 03.00159,  
 1955 MARCH - 1956 SEPTEMBER: 12.00022,  
 1956 & 1957: 03.00010,  
 1956-1958: 05.00008,  
 1956-1960: 05.00007,  
 1956 MARCH 17 - APRIL 8: 13.00008,  
 1956 JULY - 1957 JULY: 03.00085,  
 1956 DECEMBER - 1957 DECEMBER: 02.00004,  
 1957-1958: 20.00022, 27.00091,  
 1957-1959: 27.00093,  
 1957-1960: 01.00018,  
 1957 SPRING: 12.00061,  
 1957 JULY - 1958 JUNE: 02.00011,  
 1957 AUGUST - 1959 JULY: 27.00090,  
 1957 SEPTEMBER 28 - 1959 MARCH 12: 30.00003, 30.00004,  
 1957 SEPTEMBER - 1959 APRIL: 03.00134,  
 1957 NOVEMBER - 1958 OCTOBER: 02.00007,  
 1957 NOVEMBER 18 - 1958 OCTOBER 18: 02.00010,  
 1957 NOVEMBER 23-29: 19.00021,  
 1958-1963: 24.00003,  
 1958-1964: 04.00002,  
 1958-1967: 05.00001,  
 1958 APRIL 17 - FEBRUARY 16 1959: 17.00029,  
 1958 AUGUST: 02.00008,  
 1958 SUMMER: 26.00107,  
 1958 SEPTEMBER: 19.00065,  
 1959: 12.00003, 27.00094,  
 1959-1960: 26.00093,  
 1959 JANUARY - DECEMBER: 26.00024,

1959 JULY 15-22: 12.00001,  
 1959 AUGUST - SEPTEMBER: 03.00094,  
 1959 AUGUST - 1960 FEBRUARY: 12.00028, 12.00029,  
 1959 DECEMBER - 1960 JULY: 27.00032,  
 1960-1966: 05.00017,  
 1960-1975: 26.00095,  
 1960 FEBRUARY 1 - DECEMBER 15: 10.00025,  
 1960 MARCH - 1961 FEBRUARY: 26.00098,  
 1960 SUMMER: 26.00029,  
 1960 MAY - 1961 FEBRUARY: 33.00008,  
 1960 JUNE: 25.00006, 25.00013,  
 1960 JULY - NOVEMBER: 27.00082,  
 1960 AUTUMN: 19.00067,  
 1960 FALL - 1963 SPRING: 27.00035,  
 1960 NOVEMBER - 1961 JUNE: 01.00109,  
 1961-1963: 07.00002,  
 1961 AUGUST - 1962 AUGUST: 20.00020,  
 1961 SEPTEMBER - 1962 SEPTEMBER: 28.00005,  
 1961 OCTOBER - 1963 JUNE: 03.00060,  
 1962: 04.00042, 26.00099,  
 1962-1963: 24.00004,  
 1962-1971: 27.00094,  
 1962-1972: 04.00064,  
 1962 MAY - 1972 MAY: 04.00016,  
 1962 JUNE 5-21: 23.00015,  
 1962 AUGUST 2-5: 01.00049,  
 1962 AUGUST 14 - 1963 FEBRUARY: 26.00063, 26.00064,  
 1962 AUGUST-1967 AUGUST: 27.00101,  
 1962 NOVEMBER - 1963 JUNE: 27.00078,  
 1963: 04.00058, 04.00072,  
 1963-1964: 27.00088,  
 1963-1964 WINTER: 27.00018,  
 1963-1967: 27.00092,  
 1963 SPRING (1 SEASON): 27.00105,  
 1963 SUMMER: 04.00053,  
 1963 JUNE - 1967 OCTOBER: 30.00006,  
 1963 OCTOBER - 1964 MAY: 19.00103,  
 1963 NOVEMBER - 1967 DECEMBER: 27.00109,  
 1963 DECEMBER-1964 DECEMBER: 27.00058,  
 1964-1965: 04.00003,  
 1964-1968: 04.00019,  
 1964-1975: 01.00099,  
 1964 JANUARY - 1967 MARCH: 27.00166,  
 1964 APRIL - DECEMBER: 27.00082,  
 1964 MAY 18 - OCTOBER 15 1965: 19.00101,  
 1964 JUNE - 1965 MAY: 26.00010,  
 1964 JUNE - 1965 JUNE: 04.00004,  
 1964 JULY: 26.00056,  
 1964 JULY - 1966 JULY: 27.00089, 27.00091,  
 1964 NOVEMBER - 1965 JULY: 27.00115,  
 1964 DECEMBER - 1965 JUNE: 19.00088,  
 1964 DECEMBER 23 - 29: 19.00087,  
 1965-1966: 04.00043, 05.00032,  
 1965-1968: 27.00095,  
 1965-1972: 03.00027,  
 1965 JANUARY - 1966 AUGUST: 26.00074,  
 1965 APRIL - DECEMBER: 19.00030, 20.00026,  
 1965 APRIL - 1968 JANUARY: 26.00047,



1965 MAY - JUNE: 27.00099,  
 1965 MAY - 1966 JUNE: 27.00097,  
 1965 JUNE: 09.00001,  
 1965 JUNE - 1966 JUNE: 12.00076,  
 1965 JULY - 1967 DECEMBER: 04.00056,  
 1965 AUGUST - 1967 NOVEMBER: 03.00036, 03.00062, 19.00009,  
 27.00021,  
 1965 OCTOBER - 1967 AUGUST: 19.00081,  
 1965 NOVEMBER - 1966 FEBRUARY: 04.00025,  
 1966 JANUARY - 1968 AUGUST: 26.00001,  
 1966 MARCH - 1968 AUGUST: 26.00102,  
 1966 SPRING AND SUMMER: 26.00026,  
 1966 JULY - 1977 OCTOBER: 19.00042,  
 1966 AUGUST- 1968 MARCH: 27.00093,  
 1967&1968: 04.00012,  
 1967-1968: 04.00011, 04.00013, 04.00017, 04.00026, 04.00050,  
 1967-1972: 03.00002,  
 1967 JANUARY: 33.00014,  
 1967 FEBRUARY - JUNE: 11.00007,  
 1967 SPRING: 07.00015,  
 1967 MAY & JUNE: 16.00005,  
 1967 AUGUST - 1969 AUGUST: 05.00005,  
 1967 AUGUST 29 - SEPTEMBER 22: 05.00012,  
 1967 AUGUST - 1968 DECEMBER: 33.00029,  
 1967 SEPTEMBER - 1968 JUNE: 16.00005,  
 1967 SEPTEMBER - 1968 SEPTEMBER: 27.00084,  
 1967 NOVEMBER 1-15: 03.00008,  
 1968-1969: 19.00007,  
 1968-1970: 27.00167,  
 1968-1971 (SUMMERS): 15.00002,  
 1968-1972: 26.00005, 27.00004,  
 1968 JANUARY - 1969 DECEMBER: 27.00033,  
 1968 MARCH - 1969 FEBRUARY: 26.00006,  
 1968 APRIL - 1969 JULY: 16.00009, 26.00007,  
 1968 JUNE - 1971 JANUARY: 03.00074, 09.00002,  
 1968 JULY - 1971 MAY: 27.00007,  
 1968 SEPTEMBER - APRIL 1969: 19.00078,  
 1968 OCTOBER 8 - 25: 33.00012,  
 1968 NOVEMBER 2 - 1969 OCTOBER 23: 26.00027,  
 1968 DECEMBER - 1969 SEPTEMBER: 03.00034,  
 1968 DECEMBER - 1969 NOVEMBER: 04.00018,  
 1969-1972: 27.00089,  
 1969 JANUARY - 1969 OCTOBER: 10.00001, 10.00002,  
 1969 MARCH - AUGUST: 10.00003,  
 1969 SUMMER: 29.00008,  
 1969 JULY - 1970 MAY: 03.00180,  
 1969 JULY - 1970 JULY: 01.00065,  
 1969 SEPTEMBER - 1970 APRIL: 16.00017,  
 1969 NOVEMBER 23 - 1970 APRIL 30: 03.00093,  
 1969 DECEMBER - 1973 JANUARY: 19.00082,  
 1969 WINTER - SUMMER: 27.00128,  
 1970-1974: 19.00032,  
 1970-1975: 20.00008,  
 1970 MARCH - 1971 OCTOBER: 33.00001,  
 1970 APRIL: 05.00011,  
 1970 MAY: 01.00038,  
 1970 MAY - 1972 OCTOBER: 03.00153,  
 1970 MAY - 1979 JUNE: 19.00070,  
 1970 MAY 31 - JULY 15: 19.00079,

1970 MAY - 1976 AUGUST: 03.00152,  
 1970 MAY - OCTOBER: 33.00021, 33.00022,  
 1970 JUNE - OCTOBER: 27.00019,  
 1970 JUNE - 1971 JULY: 16.00001,  
 1970 JULY - 1971 JANUARY: 17.00006,  
 1970 AUGUST 3 - 1970 JULY 29: 28.00004,  
 1970 SEPTEMBER - 1971 JUNE: 16.00010,  
 1970 SEPTEMBER - 1971 OCTOBER: 03.00141,  
 1970 SEPTEMBER - 1975 AUGUST: 27.00047,  
 1970 OCTOBER 23 - 1971 AUGUST 25: 17.00010,  
 1970 NOVEMBER 16-19: 11.00014,  
 1970 NOVEMBER - 1974 APRIL: 03.00142,  
 1970 DECEMBER: 26.00036,  
 1971 SUMMER: 19.00035,  
 1971 & 1972: 03.00033,  
 1971-1972: 25.00001,  
 1971-1974: 16.00011, 31.00008, 31.00009,  
 1971-1975: 31.00010,  
 1971 JANUARY - SEPTEMBER: 19.00004,  
 1971 MARCH - 1972 JANUARY: 01.00079,  
 1971 MAY -1972 FEBRUARY: 25.00008,  
 1971 JUNE - 1979 MAY: 13.00035,  
 1971 JULY - DECEMBER: 11.00004,  
 1971 JULY - 1972 DECEMBER: 14.00006,  
 1971 AUGUST - OCTOBER: 15.00001,  
 1971 AUGUST -1972 FEBRUARY: 25.00010,  
 1971 AUGUST -1973 FEBRUARY: 25.00009,  
 1971 AUGUST - 1973 JULY: 20.00017,  
 1971 SUMMER AND FALL: 23.00002,  
 1971 SEPTEMBER: 01.00038, 03.00102,  
 1971 SEPTEMBER - 1973 JANUARY: 19.00108,  
 1971 SEPTEMBER - 1974 JULY: 31.00005,  
 1971 SEPTEMBER - 1974 AUGUST: 31.00015,  
 1971 OCTOBER - 1972 AUGUST: 04.00040,  
 1971 NOVEMBER - DECEMBER 1974: 06.00022,  
 1971 & 1972 NOVEMBER: 19.00045,  
 1972-1974: 03.00169, 19.00005,  
 1972 FEBRUARY - 1973 APRIL: 13.00043,  
 1972 FEBRUARY - DECEMBER: 25.00003,  
 1972 MARCH - 1973 APRIL: 14.00008, 14.00012,  
 1972 FEBRUARY - 1974 JUNE: 16.00018,  
 1972 FEBRUARY - 1973 AUGUST: 25.00004,  
 1972 MARCH - MARCH 1973: 26.00017,  
 1972 MARCH - 1974 JANUARY: 28.00009,  
 1972 APRIL - 1973 JULY: 07.00009,  
 1972 APRIL - 1975 SEPTEMBER: 33.00011,  
 1972 JUNE 23: 19.00083,  
 1972 JUNE - 1972 DECEMBER: 27.00036,  
 1972 JUNE - 1973 JUNE: 27.00012,  
 1972 JUNE - 1973 OCTOBER: 17.00036,  
 1972 JUNE - 1975 MAY: 05.00024,  
 1972 JULY - 1972 MARCH: 17.00018,  
 1972 JULY - 1973 JULY: 27.00011,  
 1972 JULY - 1974 JULY: 14.00001,  
 1972 JULY - 1974 AUGUST: 13.00036,  
 1972 JULY - DECEMBER: 17.00034,  
 1972 AUGUST - 1973 AUGUST: 19.00102,  
 1972 SEPTEMBER - 1972 NOVEMBER: 27.00016,  
 1972 SEPTEMBER - 1973 AUGUST: 10.00004,

1972 OCTOBER - 1974 JULY: 25.00002,  
 1972 DECEMBER - 1973 OCTOBER: 19.00006,  
 1973: 27.00013,  
 1973-1974: 26.00003,  
 1973-1976: 27.00024,  
 1973-1981: 13.00006,  
 1973 JANUARY - 1974 SEPTEMBER: 05.00008,  
 1973 JANUARY - 1974 DECEMBER: 01.00016, 05.00028,  
 1973 JANUARY - 1975 MAY: 05.00020,  
 1973 APRIL - MAY: 01.00014,  
 1973 APRIL - JUNE: 03.00185,  
 1973 APRIL - DECEMBER: 12.00004,  
 1973 JANUARY - 1974 JULY: 13.00013,  
 1973 MARCH: 26.00004,  
 1973 MAY, JUNE: 20.00021,  
 1973 JUNE - 1974 JUNE: 26.00067,  
 1973 JUNE - JULY: 19.00107,  
 1973 JULY: 20.00007,  
 1973 JULY - JUNE 1974: 20.00009,  
 1973 SUMMER: 06.00052,  
 1973 AUGUST - 1974 JUNE: 26.00052,  
 1973 SEPTEMBER 26 - 1973 JULY 3: 20.00004,  
 1973 SEPTEMBER 26 - NOVEMBER 6: 26.00051,  
 1973 SEPTEMBER - 1974 SEPTEMBER: 17.00002,  
 1973 SEPTEMBER - 1974 NOVEMBER: 17.00028,  
 1973 SEPTEMBER - 1974 JULY: 27.00063,  
 1973 OCTOBER - 1974 APRIL: 13.00009,  
 1973 OCTOBER - 1975 JUNE: 27.00045,  
 1973 WINTER - 1974 SUMMER: 17.00017,  
 1973 NOVEMBER - 1974 SEPTEMBER: 05.00004, 17.00002,  
 1973 NOVEMBER - 1975 DECEMBER: 19.00090,  
 1973 DECEMBER - 1974 SEPTEMBER: 17.00015,  
 1974 & 1975: 03.00058, 03.00136, 03.00176, 03.00177,  
 1974-1975: 06.00011,  
 1974-1977: 10.00021,  
 1974-1976: 03.00108,  
 1974-1977: 03.00049,  
 1974-1978: 03.00080, 03.00179,  
 1974 JANUARY: 19.00045, 19.00072,  
 1974 JANUARY - 1975 AUGUST: 27.00049,  
 1974 JANUARY - 1975 JANUARY: 03.00105,  
 1974 JANUARY - FEBRUARY: 22.00003,  
 1974 JANUARY- APRIL: 27.00026,  
 1974 MARCH 16-19: 26.00071,  
 1974 APRIL - 1975 APRIL: 11.00010,  
 1974 MAY: 26.00021, 26.00022,  
 1974 MAY - 1977 APRIL: 34.00001,  
 1974 MAY - JUNE: 03.00065,  
 1974 MAY - JULY: 03.00003,  
 1974 SUMMER - 1976 SUMMER: 26.00044,  
 1974 SUMMER - 1978 WINTER: 03.00055,  
 1974 JUNE: 03.00059,  
 1974 JUNE - 1974 AUGUST: 10.00020,  
 1974 JUNE - JUNE 1975: 25.00012,  
 1974 JUNE - 1978 APRIL: 33.00025,  
 1974 JULY - 1975 AUGUST: 13.00015,  
 1974 AUGUST - 1975 JULY: 10.00019,  
 1974 AUGUST - 1977 MARCH: 10.00022,  
 1974 AUGUST - 1975 JULY: 20.00014,

1974 SEPTEMBER - 1975 AUGUST: 13.00018, 20.00015,  
 1974 NOVEMBER - 1975 OCTOBER: 12.00066, 33.00015,  
 1974 NOVEMBER - 1975 NOVEMBER: 12.00012, 19.00022,  
 1974 DECEMBER - 1975 MARCH: 07.00012  
 1974 FEBRUARY - 1975 JANUARY: 33.00010,  
 1974 FEBRUARY 12 - 1977 APRIL: 24.00007,  
 1975: 03.00084, 05.00019, 33.00002,  
 1975-1976: 03.00004, 03.00014, 03.00018, 03.00020, 03.00045,  
 03.00079, 03.00096, 03.00097, 03.00124, 03.00170,  
 31.00004,  
 1975-1977: 06.00005,  
 1975-1978: 27.00020,  
 1975 JANUARY - MAY: 19.00011,  
 1975 FEBRUARY: 27.00067,  
 1975 FEBRUARY AND MARCH: 24.00002,  
 1975 FEBRUARY - MAY: 06.00048,  
 1975 FEBRUARY 11 - 1977 NOVEMBER: 05.00045,  
 1975 FEBRUARY - 1978 JULY: 20.00078, 20.00081,  
 1975 MARCH: 22.00005,  
 1975 MARCH - SEPTEMBER: 03.00126,  
 1975 - 1976 MARCH: 03.00070,  
 1975 MARCH - 1977 DECEMBER: 05.00037,  
 1975 MARCH - 1978 FEBRUARY: 12.00038,  
 1975 MARCH 15 - 1976 JANUARY 19: 27.00042,  
 1975 MAY - APRIL 1976: 20.00005,  
 1975 MAY - SEPTEMBER: 03.00125,  
 1975 MAY 19 - OCTOBER 15: 29.00002,  
 1975 SPRING - 1976 WINTER: 03.00013,  
 1975 SUMMER: 18.00001,  
 1975 JUNE: 27.00046,  
 1975 JUNE - 1976 JANUARY: 03.00109, 03.00110,  
 1975 JUNE - 1976 MARCH: 03.00082,  
 1975 JUNE - 1976 JUNE: 01.00066,  
 1975 JUNE - 1976 JULY: 03.00081,  
 1975 JUNE - 1977 OCTOBER: 03.00077,  
 1975 JUNE - 1978 FEBRUARY: 03.00092,  
 1975 JULY: 02.00005,  
 1975 JULY - 1976 AUGUST: 26.00037,  
 1975 JULY - JANUARY 1976: 25.00018,  
 1975 AUGUST - 1976 MARCH: 16.00021,  
 1975 SEPTEMBER: 19.00045,  
 1975 SEPTEMBER - 1976 AUGUST: 13.00041,  
 1975 OCTOBER - 1976 JUNE: 06.00051,  
 1975 OCTOBER - 1976 OCTOBER: 05.00003,  
 1975 OCTOBER - 1977 OCTOBER: 04.00067,  
 1975 NOVEMBER - 1976 OCTOBER: 12.00068, 27.00075,  
 1975 DECEMBER - 1976 JUNE: 31.00002,  
 1975 DECEMBER - 1979 APRIL: 05.00036,  
 1976: 02.00006,  
 1976-1977: 20.00024, 23.00010, 32.00001,  
 1976-1978: 03.00067,  
 1976 JANUARY - OCTOBER 1978: 23.00004,  
 1976 FEBRUARY - 1977 NOVEMBER: 13.00022,  
 1976 FEBRUARY - MARCH 1977: 22.00008,  
 1976 FEBRUARY - 1979 MAY: 01.00071,  
 1976 MARCH: 03.00138,  
 1976 MARCH 27 - 1978 SEPTEMBER 13: 26.00062,  
 1976 MARCH - AUGUST: 19.00062,  
 1976 MARCH - 1979 AUGUST: 06.00003,

1976 APRIL - SEPTEMBER: 01.00061, 31.00003,  
 1976 APRIL - 1977 MARCH: 06.00036,  
 1976 APRIL - 1977 APRIL: 20.00057,  
 1976 MAY 10 - 1976 JULY 12: 07.00001,  
 1976 MAY - 1977 MAY: 22.00004,  
 1976 MAY - AUGUST: 31.00020,  
 1976 JUNE - 1977 MAY: 06.00046,  
 1976 JUNE - NOVEMBER: 33.00004,  
 1976 JULY - DECEMBER: 27.00031,  
 1976 AUGUST - 1977 APRIL: 20.00066,  
 1976 AUGUST - 1978 JUNE: 07.00003,  
 1976 SUMMER: 01.00012, 24.00010,  
 1976 SUMMER - 1978 WINTER: 03.00147,  
 1976 SEPTEMBER - 1977 SEPTEMBER: 29.00003,  
 1976 SEPTEMBER: 06.00044, 20.00011,  
 1976 OCTOBER - 1977 SEPTEMBER: 27.00116,  
 1976 NOVEMBER - 1978 OCTOBER: 06.00042,  
 1976 DECEMBER - 1977 NOVEMBER: 13.00033,  
 1977: 17.00011,  
 1977-1978: 03.00011, 03.00015, 03.00019, 03.00044, 03.00068,  
 03.00145, 03.00148, 03.00166,  
 1977-1979: 19.00029,  
 1977-1981: 17.00005, 17.00022,  
 1977 JANUARY: 04.00055,  
 1977 JANUARY - MAY: 06.00002,  
 1977 JANUARY - 1977 DECEMBER: 16.00012,  
 1977 FEBRUARY 3 - JULY 6: 29.00005,  
 1977 FEBRUARY - 1978 JANUARY: 16.00022,  
 1977 FEBRUARY - 1978 FEBRUARY: 03.00026,  
 1977 FEBRUARY - 1979 OCTOBER: 19.00039,  
 1977 SPRING - NOVEMBER: 05.00043,  
 1977 MARCH - SEPTEMBER: 19.00084,  
 1977 APRIL - SEPTEMBER: 13.00031,  
 1977 APRIL: 27.00003,  
 1977 SUMMER - 1978 WINTER: 03.00090,  
 1977 JUNE: 05.00023, 31.00023,  
 1977 JUNE - DECEMBER: 33.00017,  
 1977 JUNE 14 - JULY 8: 30.00005,  
 1977 JULY - 1978 JULY: 17.00007,  
 1977 JULY - MAY 1979: 26.00035,  
 1977 AUGUST - OCTOBER: 12.00088,  
 1977 SEPTEMBER - NOVEMBER: 19.00018,  
 1977 OCTOBER - 1978 SEPTEMBER: 13.00001,  
 1977 OCTOBER - 1980 DECEMBER: 06.00014,  
 1977 DECEMBER - 1978 DECEMBER: 06.00028,  
 1978: 17.00008, 17.00012,  
 1978-1979: 22.00002,  
 1978 JANUARY - DECEMBER: 19.00064,  
 1978 JANUARY 7-31: 03.00050,  
 1978 JANUARY - OCTOBER: 33.00019,  
 1978 FEBRUARY 1 - 1978 JUNE 6: 23.00008,  
 1978 APRIL - 1978 JUNE: 06.00059,  
 1978 APRIL - NOVEMBER: 03.00075,  
 1978 APRIL 3: 13.00021,  
 1978 APRIL - SEPTEMBER: 33.00018, 33.00031,  
 1978 APRIL - 1978 DECEMBER: 07.00019  
 1978 APRIL - 1979 MARCH: 26.00065,  
 1978 SUMMER - 1980 JANUARY: 27.00126,  
 1978 JUNE: 03.00146,

1978 JUNE - 1978 AUGUST: 11.00001,  
 1978 JUNE - 1979 SEPTEMBER: 12.00070,  
 1978 JULY 31 - 1978 SEPTEMBER: 07.00027  
 1978 JULY - 1980 DECEMBER : 12.00046,  
 1978 AUGUST - 1978 SEPTEMBER: 11.00011,  
 1978 AUGUST: 26.00045,  
 1978 NOVEMBER - 1979 JULY: 33.00024,  
 1978 SEPTEMBER - 1979 OCTOBER: 19.00046,  
 1978 NOVEMBER - 1980 JANUARY: 06.00071,  
 1978 NOVEMBER - 1980 MAY: 06.00053,  
 1979: 04.00014,  
 1979-1980: 36.00002,  
 1979 DECEMBER - 1980 FEBRUARY: 19.00020,  
 1979 JANUARY 1 - DECEMBER 31: 27.00040,  
 1979 JANUARY - DECEMBER: 17.00009, 17.00013,  
 1979 JANUARY - JUNE: 19.00060,  
 1979 MARCH: 03.00120,  
 1979 MARCH - 1980 MARCH: 22.00025,  
 1979 APRIL - OCTOBER: 06.00013,  
 1979 MAY - DECEMBER: 20.00062,  
 1979 JUNE - 1980 APRIL: 05.00040,  
 1979 JULY 11 - 1981 MAY 19: 06.00055,  
 1979 AUGUST - OCTOBER: 12.00071,  
 1979 OCTOBER - NOVEMBER: 19.00057,  
 1979 DECEMBER - 1981 MARCH: 33.00026,  
 1980-1981: 03.00167, 03.00183, 03.00184,  
 1980 JANUARY - DECEMBER: 17.00013, 17.00026,  
 1980 SPRING: 06.00040,  
 1980 MARCH 19 - APRIL 9, 1980: 06.00058,  
 1980 MAY 27 - JUNE 2: 19.00054,  
 1980 JUNE 16 - 1980 AUGUST 11: 07.00032,  
 1980 JUNE 16 - 1980 NOVEMBER 4: 07.00022  
 1980 JULY 7 - 1981 JANUARY 15: 20.00067,  
 1980 SEPTEMBER - 1981 JUNE: 27.00002,  
 1980 OCTOBER 13 - NOVEMBER 4: 19.00054,  
 1980 OCTOBER 18-20: 21.00003,  
 1980 NOVEMBER 18 - 1981 AUGUST 4: 31.00013,  
 1980 NOVEMBER - 1981 NOVEMBER: 33.00026,  
 1980 FALL & 1981 SPRING: 03.00111,  
 1981-1982: 27.00124,  
 1981 JANUARY - DECEMBER: 17.00004,  
 1981 JULY - 1983 JANUARY: 26.00011,  
 1981 OCTOBER - 1982 FEBRUARY: 19.00034,  
 1981 NOVEMBER - 1982 MARCH: 27.00008,  
 1981 NOVEMBER - 1982 OCTOBER: 27.00034,  
 1981 DECEMBER 7-9: 13.00005,  
 1982 JANUARY - 1982 DECEMBER: 23.00001,  
 1982 MARCH 3 - 1982 NOVEMBER 12: 27.00161,  
 1982 APRIL 16 - AUGUST 6: 29.00006,  
 1982 JULY 15 - AUGUST 26: 19.00043,  
 1982 JULY - : 25.00020,  
 1982 SEPTEMBER: 19.00010,  
 1982 OCTOBER: 31.00018,  
 1982 DECEMBER 7-9: 17.00026,  
 1983 JANUARY 1 - 1983 NOVEMBER 15: 23.00011,

## 2. HABITAT

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ALGAE: 03.00158, 03.00049, 04.00012, 25.00016, 27.00112,  
AQUARIA: 06.00047, 07.00004, 07.00013, 07.00023, 07.00025, 07.00026, 07.00028, 07.00029, 08.00005, 08.00006, 08.00007,  
10.00010,  
ARTIFICIAL REEF(S): 01.00092, 19.00033,  
ARTIFICIAL SUBSTRATE: 06.00019, 06.00026, 20.00026, 26.00042, 28.00005, 31.00016,  
BEACH(ES): 01.00022, 01.00061, 05.00045, 06.00012, 24.00007, 24.00010, 24.00011, 24.00015, 27.00065, 28.00004, 33.00026,  
10.00005, 12.00009, 19.00029, 20.00004,  
CALCAREOUS ALGAE: 27.00128,  
CALCAREOUS ROCK: 26.00031, 26.00083,  
CALCAREOUS SEDIMENT: 03.00010, 26.00030, 26.00110,  
CANAL(S): 01.00041, 20.00045,  
CARBONATE SEDIMENTS: 04.00065,  
CAVES: 29.00010,  
CLAY: 05.00014, 05.00025, 12.00040, 12.00055, 20.00053, 20.00076, 20.00078,  
COARSE SEDIMENT: 03.00168, 12.00075,  
CONCRETE BLOCKS: 26.00012,  
CONCRETE TANK: 19.00079,  
02.00005, 03.00002, 03.00033, 03.00052, 05.00025, 21.00010, 21.00012,  
26.00003, 26.00030, 26.00056, 26.00061,  
CONTINENTAL SHELF: 03.00003, 03.00004, 03.00183, 03.00184,  
CORAL REEF(S): 01.00062, 02.00003, 02.00005, 02.00006, 03.00002, 03.00023, 03.00024, 03.00026, 03.00033, 03.00052,  
03.00070, 03.00081, 03.00082, 03.00105, 03.00121, 03.00152, 03.00168, 04.00005, 04.00020, 04.00022, 04.00055,  
04.00063, 05.00004, 05.00025, 05.00034, 05.00036, 06.00022, 06.00044, 21.00010, 21.00012, 26.00003, 26.00006,  
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26.00114, 26.00116, 26.00120, 27.00029, 27.00078, 27.00079, 27.00100, 27.00101, 27.00106, 27.00112, 27.00124,  
27.00150, 27.00154, 27.00155, 27.00164, 28.00004, 28.00008, 29.00007, 29.00009, 32.00005,  
DEEP SEA (BELOW 350 M): 03.00021,  
DIATOM DETRITUS: 12.00006,  
DREDGED SPOIL: 20.00043,  
ESTUARINE: 01.00095, 01.00100, 01.00108, 03.00001, 03.00100, 03.00117, 03.00127, 04.00027, 04.00033, 04.00061, 04.00069,  
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FOULING TILES: 06.00040,  
GASTROPOD REEFS: 25.00017,  
GRAVEL: 05.00045, 13.00027, 22.00011, 23.00007, 25.00015, 26.00014, 26.00103,  
HARD (=LIVE) BOTTOM: 03.00033, 03.00038, 03.00039, 03.00042, 03.00043, 03.00050, 03.00146, 03.00183, 03.00184, 04.00043,  
05.00032, 05.00045, 12.00076, 12.00078, 19.00074, 26.00038, 26.00053, 26.00084, 26.00120, 27.00022, 27.00110, 28.00003,  
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HOLES: 29.00010,  
INTERTIDAL: 05.00029, 06.00033, 10.00023, 12.00032, 12.00062, 20.00034, 20.00075, 20.00107, 26.00004, 26.00088,  
JETTY (-IES): 03.00074, 03.00178, 04.00008, 09.00002, 27.00019,  
LABORATORY-SIMULATED ESTUARY: 07.00031  
LEPTOGORGIA COLONY: 20.00046,  
MANGROVE PEAT: 26.00012, 26.00084,  
MANGROVE(S): 01.00014, 01.00016, 01.00020, 01.00021, 01.00026, 01.00079, 01.00085, 03.00002, 03.00063, 03.00087, 03.00127,  
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MARL SHORELINES: 26.00035,  
MUD: 01.00027, 01.00038, 01.00045, 01.00087, 03.00001, 03.00002, 03.00012, 03.00013, 03.00019, 03.00034, 03.00052, 03.00055,  
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 MUDFLATS: 08.00003, 08.00004, 12.00044, 13.00005, 13.00010, 14.00006,  
 OYSTER (BARS) (BED) (REEF): 01.00076, 01.00077, 03.00107, 03.00142, 06.00049, 07.00002, 07.00010, 07.00037, 12.00026, 12.00056,  
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 REEF(S): 01.00017, 01.00025, 01.00036, 01.00054, 03.00153, 05.00032, 07.00009, 12.00020, 12.00021, 12.00023, 12.00024,  
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 ROCK: 01.00038, 02.00005, 03.00002, 03.00033, 03.00052, 04.00008, 04.00009, 04.00020, 04.00024, 05.00004, 05.00025, 05.00043,  
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 SABELLARIID WORM REEF(S): 05.00022, 06.00025, 06.00027, 06.00031, 06.00026, 26.00006, 26.00007,  
 SALTMARSH: 01.00016, 01.00019, 01.00020, 03.00002, 03.00095, 03.00137, 03.00138, 03.00178, 04.00026, 05.00041, 06.00012,  
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 SAND DUNE: 01.00016, 01.00022, 32.00004,  
 SAND(Y): 01.00011, 01.00012, 01.00027, 01.00029, 01.00038, 01.00045, 01.00061, 01.00072, 01.00101, 02.00005, 03.00001,  
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 SPONGE: 05.00025, 16.00001, 21.00010,  
 TIDAL CREEK: 08.00001,  
 VARIABLE: 01.00009, 01.00028, 01.00037, 01.00039, 01.00053, 03.00027, 03.00059, 03.00103, 03.00104, 04.00001, 04.00002,  
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 WORM TUBES: 32.00005,

### 3. TYPE OF STUDY

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MAPPING & BIOLOGICAL CHARACTERIZATION: 03.00038, 03.00040, 03.00042, 03.00043, 06.00009, 27.00022,

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#### 4. BIOLOGICAL COMPONENT

ALGAE: 01.00024, 01.00026, 03.00033, 03.00051, 04.00021, 04.00036, 06.00011, 18.00001, 19.00031, 19.00032, 20.00039,  
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 AMPHIPODA: 01.00088, 03.00028, 03.00130, 14.00002, 20.00104, 27.00110,  
 ANTHURID: 13.00014,  
 ARENICOLUS FUNGI: 03.00174,  
 ARTHROPODA: 03.00076, 17.00025, 31.00005,  
 BACTERIA: 01.00069, 19.00107, 27.00016, 27.00103,  
 BARNACLES: 03.00178, 27.00096,  
 BENTHIC FAUNA: 01.00045, 01.00083, 01.00098, 01.00091, 01.00108, 03.00006, 03.00025, 03.00037, 03.00059, 03.00063, 03.00107,  
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 27.00150, 27.00153, 27.00168, 29.00005, 29.00011, 31.00014, 31.00017, 31.00020, 32.00001, 33.00015,  
 BRACHIOPOD FAUNA: 20.00010,  
 BRYOZOAN FAUNA: 06.00062,  
 CALANOID COPEPODS: 26.00030,  
 CARIDEAN SHRIMP: 26.00058,  
 CNIDARIA: 03.00119, 04.00022, 04.00055, 04.00063, 26.00093, 26.00094, 26.00095, 26.00097, 27.00101,  
 COELENTERATA: 01.00087,  
 CONDRICHTYS: 05.00037,  
 CORAL POLYCHAETE FAUNA: 05.00020, 27.00029,  
 CORAL: 01.00017, 01.00036, 02.00003, 02.00005, 03.00026, 03.00070, 04.00036, 05.00036, 20.00041, 26.00025, 26.00040,  
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 CRUSTACEA: 01.00007, 01.00012, 01.00019, 01.00023, 01.00026, 01.00030, 01.00031, 01.00035, 01.00047, 01.00049, 01.00050,  
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 DECAPODA: 01.00009, 01.00051, 01.00053, 01.00075, 01.00094, 02.00001, 02.00012, 02.00007, 03.00001, 03.00002, 03.00035,  
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 DEMERSAL FISHES: 03.00021, 03.00068, 26.00099,  
 DIATOM(S): 04.00029, 26.00020, 26.00022, 26.00023, 26.00078, 27.00134,  
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 FORAMINIFERA: 01.00008, 01.00024, 03.00018, 03.00019, 04.00065, 04.00066, 09.00006, 12.00032, 26.00009, 26.00010, 26.00055,  
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 FOULING ORGANISMS: 06.00039, 06.00040, 22.00020, 26.00042, 27.00074, 28.00005, 31.00016, 33.00023,  
 FUNGAL OYSTER PARASITE(S): 01.00076, 01.00077,  
 FUNGI: 20.00004, 27.00082, 27.00083, 27.00085, 27.00105,  
 GORGONIAN(S): 03.00029, 26.00114, 27.00100, 29.00007, 29.00008,  
 HARPACTICOID COPEPODS: 13.00040,  
 INVERTEBRATES: 03.00127, 04.00075, 07.00011, 07.00035, 08.00004, 12.00050, 12.00058, 12.00062, 12.00094, 14.00004, 17.00024,  
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 30.00001, 33.00002, 33.00010,  
 ISOPOD(A): 24.00012,  
 LANCELETS: 01.00072, 31.00008,  
 LEPTOSTRACANS: 04.00012,  
 MANGROVE(S): 04.00040, 19.00050, 25.00009, 26.00011, 27.00113,  
 MEIOFAUNA: 03.00045, 03.00090, 12.00072, 27.00007, 28.00010,  
 MOLLUSC(A): 01.00001, 01.00002, 01.00010, 01.00018, 01.00032, 01.00037, 01.00044, 01.00058, 01.00059, 01.00060, 01.00064,  
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 NEMATOD(A): 01.00086, 07.00001, 13.00030, 16.00004, 27.00052, 27.00053, 27.00054, 27.00055, 27.00056, 27.00057,  
 27.00058, 27.00084,  
 OPHIUROIDS: 26.00107,  
 OSTRACOD(A): 03.00010, 06.00035, 32.00006,  
 OYSTER(S) (BED): 01.00048, 01.00051, 01.00100, 03.00118, 07.00037, 12.00092, 12.00093, 12.00094, 15.00002, 17.00023,  
 19.00070, 19.00101, 20.00048,  
 POLYCHAETE(S): 01.00054, 01.00070, 03.00080, 03.00091, 03.00096, 03.00170, 03.00171, 05.00035, 07.00018, 08.00005, 11.00011,  
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 PORIFERA: 01.00093, 03.00052, 03.00157, 03.00158, 12.00014, 13.00023, 27.00132, 27.00154,  
 PROTOZOA: 01.00042, 12.00006,  
 QUAGGA CLAMS: 12.00015, 12.00052, 12.00055, 14.00015,  
 ROCK BORERS: 26.00088,  
 SALT MARSH: 17.00037, 20.00043,  
 SCALLOP: 16.00007, 16.00018, 16.00022, 19.00091,  
 SEDIMENT MICROBES: 03.00097,  
 SIPUNCULA: 05.00014, 26.00083,  
 STOMATOPOD(S): 03.00031, 06.00021, 06.00022, 06.00025, 06.00026, 19.00009,  
 SUNRAY VENUS CLAMS: 03.00030, 11.00015,  
 YEASTS: 27.00016,

# 5. TYPE OF SAMPLER

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AERIAL PHOTOGRAPHY: 04.00001, 06.00010, 19.00100, 26.00017,  
26.00104, 26.00119, 22.00013, 31.00020,  
ALUMINUM BOX: 17.00012,  
ANCHOR DREDGE: 01.00083, 03.00016, 03.00049,  
03.00076, 03.00078, 03.00139,  
ANGLING: 03.00127, 09.00002,  
ARTIFICIAL HABITATS: 27.00050,  
ARTIFICIAL SUBSTRATES: 01.00028, 06.00039, 06.00068,  
10.00013, 10.00014, 31.00016, 33.00023,  
ASBESTOS BOARD/WHITE PIPE: 28.00005,  
BAG SEINE: 03.00127, 04.00060, 17.00010,  
BALLOON TRAWL: 06.00020, 20.00094,  
BASKET(S): 04.00062,  
BEACH SEINE: 12.00043, 20.00072, 24.00005,  
BEAM TRAWL: 04.00054, 16.00005, 16.00009, 16.00019,  
BENTHIC SETTLING TRAP: 20.00070,  
BIOLOGICAL SAMPLER: 03.00039, 03.00042, 03.00043,  
BLAKE TRAWL: 03.00139, 04.00072, 06.00020, 06.00022,  
06.00026,  
BLOCK NET: 17.00020,  
BOTTOM DRAG: 19.00095, 19.00096,  
BOTTOM DREDGE: 04.00072,  
BOTTOM GRAB: 05.00014, 26.00021, 27.00086,  
BOTTOM SAMPLER: 25.00020,  
BOTTOM SCRAPER: 01.00042,  
BOX DREDGE: 03.00163, 04.00021, 06.00020, 06.00022,  
06.00026, 16.00006, 19.00009,  
BOX SAMPLER (MODIFIED) 0.05 M2: 27.00123,  
BOXCORE SUB-SAMPLE(2 CC GLASS TUBE): 03.00097,  
BOXCORE SUB-SAMPLE(2.5 CM DIA. CORE): 03.00018, 03.00019,  
03.00045,  
BOXCORE SUB-SAMPLE(5.5 CM DIA. CORE): 03.00124,  
BOXCORE: 03.00003, 03.00004, 03.00012, 03.00013, 03.00014,  
03.00016, 03.00047, 03.00049, 03.00055, 03.00057, 03.00058,  
03.00065, 03.00076, 03.00078, 03.00084, 03.00090, 03.00096,  
03.00108, 03.00109, 03.00111, 03.00136, 03.00166, 03.00167,  
03.00170, 03.00171, 03.00176, 03.00177, 03.00183, 05.00023,  
06.00035, 06.00055, 20.00012, 22.00004, 27.00099,  
BUCKET DREDGE: 03.00034, 11.00014, 19.00095, 19.00096,  
20.00109, 20.00029, 27.00041, 27.00075, 27.00092,  
27.00093, 27.00109, 27.00166,  
BUCKET: 20.00100,  
BULLY NET(S): 05.00015,  
CAMERA: 03.00003, 03.00038, 03.00039, 03.00040, 03.00041,  
03.00042, 03.00043, 03.00079, 03.00111, 03.00183,  
21.00010, 21.00012, 29.00008,  
CAMPBELL GRAB: 09.00001,  
CAPETOWN DREDGE: 03.00020, 03.00079, 03.00179, 03.00185,  
CAST (=THROW) NET: 03.00127, 06.00014, 17.00010, 20.00094,  
CEMENT BOARD SPAT COLLECTORS: 20.00026,  
CHANNEL NET: 04.00058, 04.00069, 26.00106,  
CIRCULAR NET: 12.00068,  
CLAM DREDGE: 05.00007,  
CLAM RAKE: 12.00066, 19.00088,  
CLAMSHELL GRAB: 09.00005,  
CLARKE BUMPUS SAMPLER: 27.00074, 36.00004,  
COMMERCIAL 2 LEVEL CRAB TRAPS: 17.00028,

COMMERCIAL SHRIMP TRAWL: 01.00053, 02.00012, 16.00010,  
20.00021, 20.00076, 24.00004, 27.00033,  
COMMERCIAL STONE CRAB TRAP: 27.00097,  
COMPARTMENT FLOATS: 36.00005,  
CONICAL NETS: 04.00004,  
CORE(S): 01.00042, 01.00061, 01.00066, 03.00010, 03.00034,  
03.00063, 03.00073, 04.00037, 04.00048, 04.00074, 05.00019,  
05.00033, 05.00040, 06.00005, 06.00037, 06.00043, 06.00046,  
06.00066, 06.00067, 07.00007, 07.00016, 07.00021, 08.00008,  
10.00005, 10.00016, 10.00025, 11.00011, 11.00013, 12.00007,  
12.00043, 12.00047, 12.00048, 12.00069, 12.00070, 12.00071,  
12.00072, 13.00005, 13.00021, 13.00033, 13.00038, 16.00002,  
16.00012, 17.00004, 17.00005, 17.00006, 17.00011, 17.00012,  
17.00017, 17.00026, 19.00007, 19.00011, 19.00021, 19.00041,  
19.00043, 19.00054, 19.00055, 19.00076, 19.00077, 19.00100,  
20.00003, 20.00006, 20.00008, 20.00010, 20.00013, 20.00015,  
20.00016, 20.00017, 20.00018, 20.00067, 20.00069, 20.00070,  
20.00075, 20.00077, 20.00078, 20.00079, 20.00080, 20.00081,  
20.00083, 20.00086, 20.00087, 20.00088, 20.00096, 20.00101,  
20.00106, 20.00107, 20.00110, 22.00009, 22.00012, 23.00004,  
23.00007, 25.00003, 25.00004, 25.00015, 25.00017, 25.00022,  
25.00023, 26.00020, 26.00029, 26.00048, 26.00060, 26.00063,  
26.00064, 26.00090, 26.00091, 26.00111, 26.00112, 26.00119,  
27.00018, 27.00020, 27.00023, 27.00024, 27.00025, 27.00031,  
27.00037, 27.00065, 27.00071, 27.00072, 27.00073, 27.00084,  
27.00161, 27.00169, 28.00007, 28.00010, 30.00004, 30.00005,  
31.00003, 31.00004, 31.00006, 31.00011, 31.00021, 31.00023,  
33.00004, 33.00015, 33.00016, 33.00018, 33.00024, 33.00026,  
33.00033, 33.00034, 36.00001,  
COVERED SCOOP: 07.00002,  
CRAB TRAPS: 04.00005, 04.00006, 17.00002, 19.00100,  
CRABPOTS: 12.00053,  
CUBES: 07.00036,  
CULTCH TRAYS: 12.00026,  
CUSTOM DEVICE: 33.00010,  
DETRITUS: 12.00043,  
DIETZ-LAFONDE SAMPLER: 03.00034,  
DIGGING: 03.00125,  
DIP NET: 01.00043, 03.00127, 04.00016, 12.00040, 14.00002,  
14.00007, 16.00005, 25.00021, 25.00022, 26.00103, 26.00106,  
27.00151,  
DIVER CORE: 03.00135, 08.00004, 19.00037, 20.00104,  
DIVER METER SQUARE: 19.00100,  
DIVING (=DIVER): 03.00079,  
DRAG NET: 34.00001,  
DREDGE TRAWL: 10.00009,  
DREDGE(S): 01.00070, 03.00011, 03.00021, 03.00036, 03.00051,  
03.00059, 03.00060, 03.00067, 03.00103, 03.00110, 03.00134,  
03.00145, 03.00169, 04.00016, 04.00051, 04.00054, 05.00004,  
05.00014, 05.00036, 12.00043, 12.00068, 16.00015, 17.00005,  
17.00029, 20.00096, 20.00098, 20.00100, 20.00101, 24.00013,  
26.00026, 26.00073, 26.00083, 26.00099, 30.00004,  
DRILL: 04.00063,  
DROP NET: 06.00017, 06.00024, 06.00027, 06.00036, 17.00017,  
25.00003, 25.00016, 27.00011, 27.00012,  
EKMAN DREDGE: 01.00028, 04.00076, 07.00002, 20.00008,  
EKMAN GRAB: 01.00043, 08.00004, 20.00104, 25.00027, 33.00026,  
EPIBENTHIC CRAB: 13.00006,  
FISH TRAP: 09.00002,

FISH TRAWL(S): 05.00007,  
 FLAT TRAWL: 06.00020,  
 FLOATING CAGES: 24.00008,  
 FLOW-THROUGH APPARATUS: 20.00032,  
 FOULING PONDS: 27.00098,  
 FRAME: 17.00011, 19.00091, 25.00002, 27.00147,  
 FRAME NET: 20.00030,  
 FRAME TRAWL: 04.00057, 20.00022,  
 GEORGES BANK TYPE SCALLOP DREDGE: 01.00018, 05.00017,  
 GILL NET: 06.00014, 14.00007, 34.00001, 36.00003,  
 GRAB: 03.00059, 04.00042, 21.00001, 24.00001, 25.00015,  
 25.00021, 27.00003, 27.00071, 27.00090, 28.00001, 28.00002,  
 29.00001, 31.00001, 32.00001, 33.00002, 35.00002,  
 GRID: 06.00060,  
 GRIDS(PLANT): 27.00117,  
 HAND COLLECTION(S): 03.00033, 12.00012, 13.00015, 19.00040,  
 19.00045, 19.00065, 20.00048, 27.00078, 27.00088, 29.00007,  
 33.00004,  
 HAND HELD DREDGE: 17.00015, 17.00032,  
 HAND NET: 04.00011, 04.00013, 09.00002, 26.00041,  
 HEART TRAP: 06.00014,  
 HESTER-DENDY SAMPLER: 20.00007, 20.00009, 23.00004,  
 HOOP: 04.00062, 07.00011, 12.00067, 14.00010, 14.00011,  
 27.00098,  
 HYDRAULIC CLAM DREDGE: 01.00038,  
 HYDRAULIC DRILL: 26.00044, 26.00045, 26.00096, 26.00097,  
 IMPINGMENT SCREENS: 36.00003,  
 INVERTED BOTTLE: 26.00119,  
 IRON FRAME W/ATTACHED BAG NET: 04.00075,  
 ISAACS-KIDD MIDWATER TRAWL: 04.00016, 04.00072, 06.00026,  
 JAPANESE SECCHI GRAB: 23.00007,  
 KEMMERER: 12.00044,  
 KULLENBERG GRAVITY CORER: 03.00102,  
 LAFONDE DIETZ: 07.00008, 07.00015, 23.00007,  
 LAMPARA NET: 05.00007,  
 LIFT NET: 03.00127,  
 LITTER BASKETS: 12.00088,  
 LOBSTER TRAP: 05.00015, 26.00037, 26.00065, 26.00089, 26.00116,  
 LONGLINE(S): 05.00007,  
 MARK & RECAPTURE: 24.00009,  
 MASONITE: 12.00094,  
 MESH NYLON BAGS (30): 25.00023,  
 MESH: 13.00002, 17.00003,  
 METAL SAND DREDGE: 01.00072, 20.00029,  
 METER SQUARE: 19.00037,  
 METHANE: 26.00080,  
 MINNOW SEINE: 20.00094,  
 MULTI SPECTRAL SCANNER (MSS): 27.00122,  
 MULTIPLE SEDIMENT TRAY: 06.00019,  
 MULTIPLE PLATE SAMPLER: 24.00016,  
 MUSLIN NET: 03.00137,  
 NANTUCKET CLAM DREDGE: 03.00066, 03.00093, 11.00007,  
 11.00008, 11.00009, 11.00015,  
 NET(S): 03.00004, 20.00096, 20.00101, 27.00005,  
 NIGHT LIGHT: 04.00016,  
 NISKIN SAMPLER(S): 03.00003, 03.00004, 31.00010,  
 NORTH CAROLINA TYPE SCALLOP TRAWL: 05.00012,  
 NYLON PLANKTON NET: 20.00036,  
 NYLON TRAWL: 25.00027,

OCKELMANN DETRITUS SLEDGE: 03.00127, 04.00011, 04.00012,  
 04.00013, 26.00030,  
 OPTICAL TRANSMISSOMETER: 26.00038,  
 ORANGE PEEL DREDGE: 03.00010,  
 OTTER TRAWL: 02.00010, 02.00011, 03.00036, 03.00048,  
 03.00111, 03.00125, 03.00163, 03.00185, 04.00016, 04.00021,  
 04.00025, 04.00045, 04.00054, 04.00059, 04.00072, 05.00028,  
 06.00020, 06.00022, 06.00026, 07.00002, 07.00010, 08.00008,  
 12.00013, 12.00022, 08.00003, 12.00038, 12.00039, 12.00040,  
 12.00042, 12.00043, 12.00050, 12.00084, 12.00044, 13.00010,  
 13.00035, 13.00043, 14.00003, 14.00006, 14.00007, 14.00008,  
 14.00009, 19.00009, 20.00007, 20.00009, 20.00045, 22.00002,  
 23.00008, 24.00005, 25.00008, 25.00024, 25.00025, 25.00026,  
 26.00099, 26.00106, 27.00007, 27.00117, 27.00120, 27.00121,  
 33.00021, 36.00003,  
 OYSTER TONGS: 01.00076, 01.00077,  
 PANELS: 27.00074,  
 PETERSEN (BOTTOM) GRAB: 01.00043, 03.00034, 03.00085,  
 12.00081, 17.00034, 20.00008, 21.00002, 25.00013, 26.00107,  
 27.00073, 27.00074, 29.00005, 29.00013, 32.00003,  
 PHLEGER GRAVITY: 09.00005,  
 PIERCE DREDGE: 03.00185,  
 PIPE DREDGE: 06.00020, 06.00022, 06.00026, 26.00112,  
 PLANKTON NET (1 M): 01.00049, 03.00060, 03.00127, 03.00122,  
 03.00180, 04.00016, 04.00032, 04.00056, 07.00007, 12.00043,  
 13.00002, 13.00026, 16.00005, 17.00003, 17.00011, 17.00012,  
 20.00007, 20.00009, 20.00070, 20.00080, 24.00008, 25.00007,  
 26.00001, 26.00024, 26.00061, 26.00102, 30.00006, 31.00010,  
 36.00003,  
 PLASTIC MILKJUG (50 G): 06.00047,  
 PLASTIC TEST PANELS: 27.00096,  
 PLEXIGLASS DOME: 10.00008,  
 PLUG(S): 03.00004, 06.00010, 06.00011, 10.00005, 10.00022,  
 16.00006, 19.00074, 20.00109, 21.00003, 21.00004, 21.00006,  
 21.00007, 21.00009, 21.00011, 22.00003, 22.00005, 22.00010,  
 22.00015, 22.00018, 22.00019, 22.00021, 22.00024, 23.00009,  
 25.00024,  
 POISON: 26.00103,  
 POLYPROPYLENE BOTTLES: 27.00016,  
 PONAR GRAB: 01.00028, 05.00038, 06.00052, 07.00014, 07.00035,  
 20.00008, 20.00011, 20.00033, 20.00047, 20.00049, 20.00050,  
 20.00051, 20.00052, 20.00053, 20.00054, 20.00056, 20.00057,  
 20.00058, 20.00059, 20.00060, 20.00061, 20.00062, 20.00063,  
 20.00068, 20.00069, 21.00005, 21.00010, 22.00006, 22.00022,  
 23.00001, 23.00004, 23.00008, 23.00011, 23.00014, 24.00016,  
 25.00022, 25.00027, 27.00008, 27.00064, 33.00011, 34.00001,  
 36.00002, 36.00003,  
 POSTHOLE DIGGER: 06.00012, 06.00013, 06.00059, 06.00068,  
 06.00069, 19.00059, 19.00104, 22.00025, 26.00111,  
 33.00019, 33.00025,  
 PREDATOR EXCLUSION CAGES: 06.00056, 06.00057, 06.00069,  
 06.00070, 12.00052, 12.00054, 12.00056, 12.00063, 14.00015,  
 19.00091, 31.00002, 31.00003, 31.00004, 31.00016,  
 PUSH NET: 01.00045, 11.00010, 12.00004, 16.00005, 20.00072,  
 20.00094, 22.00031, 26.00102, 26.00106, 27.00047,  
 QUADRAT(S): 04.00047, 06.00011, 12.00019, 17.00005, 17.00037,  
 17.00038, 19.00003, 19.00056, 20.00027, 25.00011, 26.00085,  
 36.00003,  
 QUARRY TILES: 06.00064,

RAKE: 19.00075,  
 RECTANGULAR DREDGE: 19.00040,  
 RIGID FRAME NET: 20.00100,  
 ROCK DREDGE: 04.00072,  
 ROLLER BEAM TRAWL: 03.00127,  
 ROLLER FRAME TRAWL: 04.00002, 04.00018, 04.00069,  
     22.00002, 22.00027, 26.00102,  
 SAMPLING NETS: 23.00014,  
 SCALLOP CAGES: 19.00100,  
 SCALLOP DREDGE: 01.00076, 01.00077, 01.00094, 03.00185,  
     04.00072, 05.00007, 06.00026, 12.00084, 16.00009,  
     33.00008, 33.00029,  
 SCOOP: 29.00012,  
 SCUBA DIVER MONITORED DREDGE: 11.00004,  
 SCUBA: 03.00033, 03.00110, 10.00009, 19.00068, 20.00039,  
     22.00031, 24.00013, 25.00008, 26.00041, 27.00071, 32.00005,  
 SEDIMENT TRAP: 20.00010, 26.00038, 31.00011,  
 SEINE: 04.00059, 05.00007, 06.00014, 06.00022, 06.00036,  
     08.00007, 08.00008, 12.00040, 12.00043, 12.00084, 12.00004,  
     13.00026, 13.00036, 13.00037, 14.00007, 16.00010, 20.00009,  
     21.00002, 22.00012, 26.00098, 26.00106, 27.00011, 27.00012,  
     30.00001, 31.00008, 34.00001, 36.00001,  
 SEMIBALLOON TRAWL (9.1 M): 03.00020, 03.00079, 03.00179,  
     04.00060, 20.00074, 31.00005, 31.00010, 31.00015,  
 SETTLING PLATES: 20.00089,  
 SETTLING TILE: 33.00017,  
 SHIPEK GRAB: 03.00012, 03.00120, 31.00005, 31.00008,  
     31.00009, 31.00010, 31.00015,  
 SHOVEL: 04.00071, 19.00096, 24.00012, 26.00111,  
 SHRIMP NET(S): 02.00013,  
 SHRIMP TRAWL: 03.00050, 05.00007, 05.00008, 20.00094,  
 SHRIMP TRYNET: 20.00020,  
 SIDE SCAN SONAR: 21.00012,  
 SLATE-SETTING PANELS: 27.00005,  
 SLED NET: 26.00047,  
 SLED-MOUNTED SUCTION SAMPLER: 26.00047,  
 SMITH-MCINTYRE (GRAB): 06.00012, 06.00068, 31.00013,  
 SOFT SHELL ESCALATOR CLAM DREDGE: 01.00038, 03.00066,  
     16.00006,  
 SPADE CORER: 19.00072,  
 SPEAR: 09.00002,  
 SQUARE WOODEN FRAME: 20.00055,  
 STAINLESS STEEL DREDGE: 20.00030,  
 STAINLESS STEEL PLUG: 10.00018, 10.00019,  
 SUBMERSIBLE: 05.00003, 05.00004, 05.00034, 05.00036, 29.00002,  
 SUCTION CORERS: 07.00021, 27.00103,  
 SUCTION DREDGE: 13.00019,  
 SUCTION SAMPLER: 27.00047,  
 SYRINGE (MODIFIED): 06.00038,  
 TAG AND RECOVERY: 02.00012,  
 TAYLOR BUCKET DREDGE: 22.00010,  
 TAYLOR PLUG: 24.00002,  
 TRAMMEL NET: 03.00127, 12.00043, 14.00007,  
 TRAPS: 03.00103, 03.00127, 03.00142, 13.00036, 13.00039,  
     26.00106, 27.00005, 30.00006, 31.00019,  
 TRAWL(S): 01.00070, 01.00094, 02.00004, 02.00015, 03.00011,  
     03.00049, 03.00053, 03.00067, 03.00078, 03.00103, 03.00110,  
     03.00112, 03.00121, 03.00145, 03.00163, 03.00173, 03.00183,  
     04.00064, 05.00014, 05.00024, 05.00036, 12.00033, 12.00034,  
     12.00035, 13.00026, 13.00031, 14.00002, 14.00005, 16.00017,  
     17.00024, 19.00001, 19.00037, 19.00100, 20.00044, 20.00072,  
     23.00014, 24.00009, 24.00013, 25.00020, 26.00103, 27.00005,  
     27.00008, 27.00034, 30.00001, 31.00008, 36.00004,  
 TRIP NET: 03.00036,  
 TRIPOD-MOUNTED CORER: 35.00002,  
 TRYNET: 03.00051, 03.00060, 03.00163, 03.00185, 04.00045,  
     05.00025, 16.00006, 16.00009, 17.00019, 19.00009, 17.00033,  
     20.00022, 20.00087, 24.00008,  
 TUMBLER DREDGE: 01.00094, 11.00006, 33.00012,  
 TURTOX NET (1 FT DIA.): 01.00049,  
 UNDERWATER TELEVISION: 03.00038, 03.00039, 03.00040,  
     03.00041, 03.00042, 03.00043, 03.00183,  
 VACUUM DREDGE: 26.00102,  
 VACUUM APPARATUS: 17.00025,  
 VAN VEEN GRAB: 01.00083, 03.00127, 07.00014, 12.00028,  
     12.00081, 26.00103, 26.00106, 27.00076, 27.00091, 27.00093,  
 VARIABLE: 27.00140,  
 VENTURI SUCTION (PUMP) DREDGE: 17.00004, 17.00011, 17.00012,  
     17.00017, 25.00003, 25.00004, 27.00011, 27.00012, 27.00013,  
 VERTICAL SEDIMENTARY CORE: 12.00091,  
 VIBRA-CORER: 05.00021, 23.00001,  
 WATER SAMPLER: 31.00022,  
 WEIGHTED LEAF BASKETS: 12.00090,  
 WILCOX PETERSEN DREDGE: 20.00007, 20.00009,  
 WINDOW GLASS WITH ANTI-FOULING PAINT ON 1 SIDE: 27.00162,  
 WING NET(S): 04.00002, 04.00003, 04.00033, 04.00058,  
     04.00069, 10.00004,  
 WIRE CAGES: 12.00055,  
 WITHAM HABITATS: 26.00061, 30.00006,  
 WOOD PANELS ATTACHED TO CEMENT BLOCKS: 06.00061,  
 WOODEN FRAME: 27.00074,  
 ZIMMERMAN PLUG CORER: 19.00001, 19.00002,

## 6. SIEVE SIZE

0.044 MM: 05.00023,  
 0.060 MM: 03.00094,  
 0.062 MM: 26.00022, 26.00071, 31.00006,  
 0.063 MM: 03.00018, 03.00019, 03.00045, 03.00090, 04.00042,  
 06.00003, 06.00005, 12.00072, 20.00067, 26.00119, 28.00010,  
 31.00003, 31.00004,  
 0.064 - 2.0 MM: 31.00009,  
 0.074 MM: 27.00042,  
 0.100 MM: 06.00069, 19.00007,  
 0.125 MM: 04.00042, 27.00042,  
 0.14 MM: 04.00011, 04.00013, 26.00030,  
 0.2 MM: 17.00004, 17.00013, 17.00014,  
 0.25 MM: 03.00010, 03.00124, 04.00011, 04.00013, 04.00042,  
 0.297 MM: 12.00088,  
 0.35 MM: 27.00057,  
 0.4 MM: 33.00011,  
 0.42 MM: 01.00083, 03.00139, 32.00003, 33.00010,  
 0.44 MM: 27.00057,  
 0.5 MM: 03.00010, 03.00014, 03.00016, 03.00047, 03.00049,  
 03.00076, 03.00090, 03.00096, 03.00111, 03.00170, 03.00183,  
 04.00011, 04.00013, 04.00042, 04.00075, 05.00023, 06.00035,  
 06.00057, 06.00059, 06.00068, 12.00043, 12.00047, 12.00048,  
 12.00081, 13.00005, 13.00021, 13.00033, 13.00038, 16.00002,  
 17.00004, 17.00011, 17.00012, 17.00013, 17.00014, 17.00026,  
 19.00054, 19.00055, 19.00076, 19.00077, 20.00003, 20.00006,  
 20.00010, 20.00011, 20.00012, 20.00013, 20.00015, 20.00016,  
 20.00017, 20.00018, 20.00033, 20.00047, 20.00049, 20.00050,  
 20.00051, 20.00052, 20.00053, 20.00054, 20.00055, 20.00056,  
 20.00057, 20.00058, 20.00059, 20.00060, 20.00061, 20.00062,  
 20.00063, 20.00068, 20.00069, 20.00070, 20.00077, 20.00078,  
 20.00079, 20.00080, 20.00081, 20.00083, 20.00086, 20.00087,  
 20.00088, 20.00104, 20.00106, 20.00107, 20.00110, 21.00003,  
 21.00005, 22.00003, 22.00004, 22.00005, 22.00006, 22.00010,  
 22.00029, 27.00008, 27.00072, 29.00012, 31.00021, 33.00019,  
 33.00026, 33.00032,  
 0.505 MM: 31.00013, 33.00026,  
 0.584 MM: 20.00007,  
 0.595 MM: 20.00008,

0.6 MM: 01.00028, 01.00043, 04.00076, 20.00009, 23.00004,  
 23.00014, 24.00016, 25.00022, 25.00027,  
 0.62 MM: 12.00070,  
 0.7 MM: 21.00011, 25.00024, 27.00073,  
 0.701 MM: 10.00018, 10.00019, 10.00022, 19.00073, 19.00074,  
 19.00095, 20.00029, 20.00030, 20.00075, 20.00098, 20.00100,  
 0.71 MM: 31.00005, 31.00008, 31.00010,  
 0.85 MM: 25.00003,  
 1.0 MM: 01.00066, 03.00010, 03.00047, 03.00111, 03.00183,  
 04.00042, 04.00074, 05.00014, 06.00010, 06.00011, 06.00035,  
 06.00043, 06.00046, 06.00066, 06.00067, 06.00068, 07.00004,  
 07.00005, 07.00014, 07.00022, 07.00023, 07.00024, 07.00025,  
 07.00026, 07.00027, 07.00028, 07.00029, 07.00032, 11.00011,  
 13.00013, 13.00021, 13.00036, 19.00055, 19.00100, 20.00003,  
 20.00096, 22.00003, 22.00024, 22.00025, 22.00029, 26.00071,  
 26.00111, 27.00012, 27.00013, 27.00031, 27.00042, 27.00047,  
 27.00074, 27.00075, 27.00123, 28.00007, 29.00005, 29.00013,  
 31.00006, 33.00024, 33.00025, 36.00003,  
 1.024 MM: 20.00036,  
 1.18 MM: 21.00009,  
 1.2 MM: 01.00061,  
 1.4 MM: 22.00004,  
 1.5 MM: 12.00019, 13.00019, 22.00021, 24.00012,  
 1.6 MM: 27.00109, 27.00166,  
 1.7 MM: 16.00022,  
 2.0 MM: 04.00042, 06.00046, 08.00004, 21.00004, 22.00003,  
 22.00005, 22.00015, 22.00018, 22.00029, 24.00002,  
 2.5 MM: 01.00045, 27.00095,  
 2.8 MM: 06.00046,  
 3.0 MM: 26.00119, 27.00099,  
 3.2 MM: 06.00024, 06.00036, 27.00109, 27.00166,  
 4.0 MM: 06.00013, 33.00015,  
 5.0 MM: 10.00005, 26.00047,  
 6.0 MM: 14.00003, 14.00006,  
 6.3 MM: 13.00006, 27.00109, 27.00166,  
 9.5 MM: 03.00020,  
 9.52 MM (3/8 IN): 26.00098,  
 12.7 MM: 03.00020,



# 7. NUMBER OF STATIONS

1: 03.00077, 03.00121, 03.00168, 04.00031, 04.00058,  
1: 05.00027, 06.00013, 06.00027, 06.00038, 06.00039,  
1: 06.00046, 06.00067, 07.00012, 07.00031, 12.00004,  
1: 12.00012, 12.00004, 13.00019, 13.00021, 13.00025,  
1: 16.00022, 19.00060, 19.00075, 19.00097, 20.00010,  
1: 20.00053, 20.00075, 20.00079, 20.00080, 20.00081,  
1: 23.00004, 26.00027, 26.00098, 27.00030, 27.00047,  
1: 27.00057, 27.00060, 27.00095, 27.00138, 27.00142,  
1: 31.00004, 31.00006, 31.00023, 33.00016, 33.00023,  
2: 17.00007, 17.00011, 17.00012, 17.00020, 17.00021,  
2: 19.00043, 19.00061, 19.00062, 19.00107, 27.00019,  
2: 27.00035, 27.00075, 27.00089, 27.00094, 27.00109,  
2: 27.00166, 27.00169, 03.00009, 03.00075, 03.00105,  
2: 04.00011, 04.00033, 04.00037, 04.00056, 05.00004,  
2: 06.00001, 06.00003, 06.00014, 06.00032, 06.00044,  
2: 06.00047, 07.00035, 09.00002, 10.00004, 11.00001,  
2: 11.00012, 11.00013, 12.00006, 12.00055, 12.00067,  
2: 12.00068, 12.00070, 12.00088, 13.00042, 16.00012,  
2: 20.00012, 20.00014, 20.00015, 20.00032, 20.00069,  
2: 20.00074, 22.00002, 24.00004, 24.00010, 24.00012,  
2: 25.00005, 25.00023, 25.00027, 26.00012, 26.00052,  
2: 26.00055, 26.00060, 26.00090, 28.00009, 29.00001,  
2: 31.00003, 31.00016, 33.00010, 36.00005,  
3: 04.00075, 05.00022, 06.00030, 06.00066, 06.00069,  
3: 06.00070, 07.00037, 10.00008, 10.00014, 12.00013,  
3: 12.00033, 12.00037, 12.00038, 12.00057, 12.00063,  
3: 13.00005, 13.00018, 13.00037, 16.00003, 16.00018,  
3: 16.00019, 17.00026, 19.00017, 19.00027, 19.00109,  
3: 19.00010, 20.00005, 20.00006, 20.00022, 20.00035,  
3: 20.00049, 20.00088, 22.00025, 26.00006, 26.00007,  
3: 26.00035, 26.00072, 26.00094, 27.00072, 27.00078,  
3: 27.00092, 27.00093, 27.00100, 27.00162, 29.00003,  
3: 29.00008, 31.00008, 34.00001, 36.00003,  
4: 01.00041, 01.00045, 01.00079, 03.00026, 03.00174,  
4: 04.00060, 05.00022, 05.00044, 06.00037, 06.00059,  
4: 07.00006, 08.00001, 12.00010, 12.00049, 12.00072,  
4: 12.00081, 13.00002, 13.00006, 13.00013, 13.00031,  
4: 13.00032, 13.00033, 13.00034, 13.00038, 16.00002,  
4: 16.00005, 19.00022, 19.00043, 19.00045, 19.00055,  
4: 20.00004, 20.00013, 20.00017, 20.00018, 20.00044,  
4: 20.00045, 20.00048, 20.00067, 20.00070, 20.00086,  
4: 20.00087, 20.00105, 21.00001, 25.00025, 26.00004,  
4: 26.00053, 27.00014, 27.00015, 27.00058, 27.00085,  
4: 27.00123, 33.00032,  
5: 01.00071, 01.00108, 03.00033, 03.00141, 04.00004,  
5: 06.00010, 06.00028, 06.00055, 06.00064, 07.00010,  
5: 12.00046, 12.00047, 12.00081, 13.00026, 13.00041,  
5: 16.00017, 19.00055, 19.00076, 20.00004, 20.00045,  
5: 20.00059, 20.00060, 20.00087, 22.00004, 22.00028,  
5: 25.00009, 26.00029, 26.00037, 26.00074, 26.00084,  
5: 26.00114, 26.00116, 27.00013, 27.00023, 27.00026,  
5: 27.00050, 27.00115, 27.00167, 28.00002, 31.00008,  
5: 31.00009, 31.00015, 31.00022, 33.00001, 33.00013,  
5: 33.00019, 33.00026, 33.00034,  
6: 01.00014, 01.00081, 03.00070, 03.00082, 04.00063,  
6: 05.00005, 06.00024, 06.00036, 07.00002, 07.00014,  
6: 07.00035, 10.00021, 12.00035, 12.00042, 12.00062,

6: 12.00077, 13.00015, 13.00039, 17.00018, 17.00029,  
6: 19.00004, 20.00008, 20.00011, 20.00022, 20.00026,  
6: 20.00033, 20.00050, 20.00054, 20.00055, 20.00058,  
6: 20.00106, 21.00005, 21.00007, 22.00005, 25.00011,  
6: 26.00079, 26.00081, 26.00091, 26.00097, 26.00106,  
6: 27.00049, 27.00099, 28.00007, 29.00005, 29.00009,  
6: 30.00001, 30.00005, 30.00006, 31.00001, 32.00003,  
7: 03.00059, 03.00138, 03.00148, 05.00024, 05.00032,  
7: 09.00001, 14.00001, 14.00010, 16.00021, 22.00027,  
7: 26.00083, 26.00096, 27.00018, 28.00005, 30.00001,  
8: 01.00061, 04.00018, 04.00060, 04.00073, 06.00011,  
8: 06.00061, 07.00017, 07.00036, 10.00019, 11.00011,  
8: 12.00048, 14.00003, 16.00016, 20.00007, 20.00009,  
8: 20.00056, 20.00094, 22.00009, 22.00021, 22.00024,  
8: 24.00005, 25.00006, 26.00040, 26.00119, 27.00003,  
8: 27.00065, 27.00080, 27.00110, 27.00126, 27.00147,  
8: 28.00010, 31.00005, 31.00010, 33.00002, 33.00020,  
9: 03.00027, 03.00134, 04.00071, 10.00018, 12.00021,  
9: 12.00027, 17.00005, 17.00012, 18.00002, 19.00007,  
9: 20.00027, 23.00008, 25.00022, 26.00017, 26.00065,  
9: 36.00001,  
10: 03.00036, 03.00051, 03.00062, 03.00103, 03.00128,  
10: 03.00135, 03.00163, 05.00045, 06.00020, 12.00003,  
10: 12.00031, 12.00050, 16.00004, 17.00025, 19.00009,  
10: 19.00096, 21.00003, 21.00011, 22.00006, 24.00014,  
10: 25.00018, 25.00026, 30.00003, 33.00033,  
11: 07.00007, 17.00023, 17.00038, 19.00091, 20.00110,  
11: 22.00010, 25.00024, 27.00131, 29.00011,  
12: 01.00066, 02.00010, 03.00013, 03.00059, 04.00076,  
12: 05.00023, 05.00041, 06.00005, 07.00014, 12.00053,  
12: 17.00004, 17.00005, 17.00005, 17.00012, 17.00013,  
12: 17.00014, 19.00037, 20.00008, 20.00016, 20.00083,  
12: 20.00084, 20.00104, 21.00004, 23.00014, 25.00002,  
12: 26.00045, 26.00062, 27.00062, 27.00063, 29.00012,  
13: 03.00060, 06.00053, 08.00004, 08.00008, 12.00001,  
13: 12.00023, 12.00024, 20.00087, 24.00001, 27.00043,  
13: 27.00044,  
14: 03.00146, 05.00038, 07.00007, 10.00013, 12.00022,  
14: 13.00010, 13.00024, 13.00035, 13.00036, 13.00043,  
14: 14.00005, 14.00008, 14.00009, 14.00011, 14.00012,  
14: 19.00029, 20.00028, 20.00036, 20.00062, 22.00003,  
14: 22.00029, 23.00004, 27.00025, 27.00117, 29.00006,  
14: 33.00026,  
15: 03.00111, 03.00120, 03.00167, 03.00183, 05.00025,  
15: 15.00002, 19.00040, 20.00089, 24.00003, 24.00013,  
15: 27.00008, 27.00016, 27.00081,  
16: 04.00013, 14.00001, 19.00003, 19.00056, 20.00094,  
16: 22.00031, 27.00147,  
17: 01.00016, 03.00126, 07.00011, 07.00016, 12.00091,  
17: 19.00001, 19.00050, 21.00006, 21.00009, 25.00021,  
17: 28.00001, 31.00013,  
18: 03.00020, 03.00079, 03.00170, 05.00040, 07.00035,  
18: 12.00044, 26.00038, 27.00111,  
19: 04.00021, 19.00089, 23.00009, 25.00002, 26.00044,  
19: 26.00063, 26.00064, 27.00098, 33.00014,  
20: 05.00030, 06.00068, 11.00004, 12.00036, 17.00016,  
20: 19.00077, 26.00018, 27.00007, 27.00121,

21: 06.00062, 17.00019, 17.00024, 17.00033, 19.00054,  
 21: 25.00020,  
 22: 01.00049, 01.00083, 03.00015, 03.00145, 20.00047,  
 22: 20.00051, 20.00052, 20.00063, 20.00068,  
 23: 03.00139, 23.00004, 23.00010, 26.00101, 29.00013,  
 24: 20.00057, 20.00061,  
 25: 09.00004, 21.00012, 33.00015,  
 26: 04.00015,  
 27: 03.00096, 19.00011, 22.00012, 30.00004,  
 28: 12.00039, 19.00031, 19.00032, 19.00092, 20.00030,  
 28: 27.00117,  
 30: 05.00025, 20.00107, 25.00017, 26.00002, 26.00021,  
 30: 26.00022,  
 31: 19.00095,  
 33: 26.00071,  
 34: 12.00083, 14.00007, 20.00029, 31.00011,  
 35: 03.00153, 20.00028, 25.00008, 27.00034, 27.00064,  
 36: 03.00090, 03.00110, 03.00175, 07.00001, 26.00083,  
 37: 25.00003, 27.00042,  
 38: 03.00052, 12.00061, 19.00100, 25.00027,  
 39: 26.00067, 27.00161,  
 40: 17.00034, 26.00066, 26.00103,  
 41: 10.00002, 19.00072, 22.00022, 27.00037,  
 42: 03.00010, 03.00084, 03.00136, 20.00020, 23.00015,  
 42: 33.00018,  
 43: 03.00003,  
 45: 03.00004, 03.00014, 03.00018, 03.00045, 03.00058,  
 45: 03.00097, 03.00108, 03.00109, 03.00124, 10.00016,  
 45: 20.00100, 21.00010, 26.00056,  
 46: 25.00024,  
 47: 03.00044, 10.00005,  
 48: 03.00166, 12.00094, 17.00002, 23.00001, 25.00015,  
 48: 25.00020,  
 50: 03.00005,  
 51: 27.00120,  
 52: 03.00147, 20.00072, 22.00019,  
 53: 31.00020,  
 54: 03.00019,  
 55: 10.00022, 27.00106,  
 56: 01.00108,  
 57: 03.00185,  
 58: 03.00102,  
 60: 01.00011, 03.00065, 27.00008, 27.00074, 27.00124,  
 60: 27.00161,  
 65: 03.00003,  
 70: 26.00057,  
 71: 20.00028,  
 73: 04.00012,  
 76: 27.00073,  
 80: 17.00028,  
 85: 03.00055,  
 88: 03.00156,  
 91: 01.00077,  
 97: 03.00158,  
 98: 19.00067,  
 100: 03.00063, 04.00001, 19.00088,  
 102: 09.00005,  
 103: 24.00011,  
 107: 01.00037, 03.00016, 03.00049, 03.00076, 03.00078,

107: 03.00092, 03.00171,  
 108: 03.00176,  
 111: 17.00026,  
 115: 04.00072,  
 116: 19.00002, 33.00012,  
 120: 01.00076, 26.00043,  
 130: 25.00013,  
 144: 11.00014,  
 146: 07.00015,  
 149: 10.00020,  
 159: 10.00006,  
 165: 03.00085,  
 167: 05.00028,  
 170: 16.00006,  
 178: 03.00093,  
 180: 04.00042,  
 192: 01.00038,  
 198: 04.00016,  
 200: 05.00033,  
 208: 19.00073, 19.00074,  
 214: 07.00008,  
 221: 03.00008,  
 225: 03.00034,  
 310: 10.00007,  
 314: 09.00001,  
 338: 03.00050,  
 363: 20.00098,  
 371: 20.00097,  
 400: 19.00092,  
 403: 20.00030,  
 473: 20.00101,  
 477: 26.00099,  
 500+: 05.00014,  
 654: 01.00038,  
 846: 03.00066,  
 1181: 01.00094,  
 1400: 26.00073,  
 VARIABLE (PER LOCATION) (PER INTERVAL):  
 01.00028, 04.00062, 06.00026, 12.00043, 14.00001, 20.00096,  
 26.00102, 27.00005, 27.00140, 31.00014, 33.00011, 36.00004,  
 1 TRANSECT: 27.00002,  
 2 AREAS: 17.00017, 24.00009,  
 2 REEFS: 29.00009,  
 2 TRANSECTS: 02.00005, 12.00069, 27.00006,  
 3 SITES: 20.00101,  
 3 TRANSECTS: 12.00071, 19.00007, 32.00005,  
 4 AREAS: 20.00096,  
 4 TRANSECTS: 33.00029,  
 5 AREAS: 01.00043,  
 6 TRANSECTS: 14.00008,  
 7 TRANSECTS: 19.00006,  
 8 TRANSECTS: 29.00002,  
 12 TRANSECTS: 05.00002, 05.00003, 05.00034,  
 14 TRANSECTS: 19.00021,  
 15 TRANSECTS: 05.00011,  
 17 TRANSECTS: 17.00013, 17.00014,

# 8. NUMBER OF REPLICATES/STATION

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1: 01.00038, 01.00045, 01.00083, 01.00094, 03.00045,  
 1: 03.00051, 03.00066, 03.00097, 03.00124, 03.00163,  
 1: 03.00174, 04.00021, 04.00060, 05.00022, 05.00025,  
 1: 05.00027, 05.00028, 06.00027, 06.00061, 07.00012,  
 1: 07.00037, 10.00004, 10.00007, 12.00031, 12.00042,  
 1: 12.00044, 12.00063, 13.00026, 13.00037, 13.00039,  
 1: 13.00043, 14.00011, 16.00006, 17.00004, 17.00011,  
 1: 17.00013, 17.00014, 17.00019, 17.00024, 17.00025,  
 1: 17.00033, 19.00031, 19.00032, 19.00077, 20.00020,  
 1: 20.00022, 20.00026, 20.00027, 20.00030, 20.00032,  
 1: 20.00057, 20.00061, 20.00075, 20.00094, 20.00097,  
 1: 20.00098, 20.00100, 22.00010, 22.00027, 22.00029,  
 1: 25.00003, 25.00015, 25.00024, 26.00043, 26.00053,  
 1: 26.00060, 26.00099, 26.00103, 26.00119, 27.00008,  
 1: 27.00016, 27.00050, 27.00138, 27.00147, 27.00162,  
 1: 31.00022, 33.00015, 36.00001,  
 2: 03.00018, 03.00019, 04.00011, 04.00060, 06.00013,  
 2: 06.00020, 06.00053, 07.00016, 11.00013, 12.00035,  
 2: 12.00042, 12.00057, 12.00081, 13.00010, 13.00042,  
 2: 13.00043, 14.00009, 17.00005, 17.00023, 17.00038,  
 2: 19.00061, 19.00072, 19.00076, 20.00009, 20.00029,  
 2: 20.00100, 21.00005, 21.00010, 21.00012, 25.00027,  
 2: 26.00038, 27.00025, 29.00013,  
 3: 03.00135, 03.00168, 04.00004, 04.00075, 05.00044,  
 3: 11.00011, 12.00042, 13.00038, 16.00012, 17.00007,  
 3: 20.00055, 20.00106, 20.00110, 22.00022, 23.00011,  
 3: 26.00021, 26.00022, 27.00072, 27.00073, 27.00074,  
 3: 29.00005, 29.00012, 30.00005, 31.00013, 33.00019,  
 3: 33.00026, 33.00026,  
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 4: 07.00031, 10.00014, 10.00016, 10.00019, 10.00022,  
 4: 12.00055, 12.00088, 16.00002, 19.00007, 19.00037,  
 4: 19.00073, 20.00067, 20.00087, 21.00004, 21.00006,  
 4: 21.00007, 21.00009, 21.00011, 22.00002, 22.00005,  
 4: 22.00012, 22.00018, 22.00019, 22.00021, 22.00024,  
 4: 23.00009, 26.00079, 27.00013, 31.00003, 31.00004,  
 4: 31.00006, 31.00020, 36.00005,  
 5: 03.00111, 03.00183, 06.00024, 06.00036, 06.00039,  
 5: 06.00047, 06.00064, 06.00066, 08.00004, 10.00005,  
 5: 12.00070, 13.00002, 15.00002, 19.00002, 17.00005,  
 5: 17.00011, 17.00018, 17.00013, 17.00014, 17.00036,  
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 5: 22.00009, 23.00004, 27.00008, 27.00072, 31.00008,  
 5: 31.00016, 33.00010, 33.00011, 33.00013, 33.00023,  
 5: 33.00025, 36.00003,  
 6: 03.00090, 07.00001, 10.00008, 20.00011, 20.00012,  
 6: 20.00033, 20.00047, 20.00049, 20.00051, 20.00052,  
 6: 20.00053, 20.00054, 20.00056, 20.00058, 20.00063,  
 6: 20.00068, 20.00069, 21.00003, 27.00034, 31.00023,  
 7: 01.00041, 04.00018, 04.00025, 12.00013, 12.00033,  
 7: 12.00034, 12.00038, 12.00039, 12.00050, 13.00035,  
 7: 14.00003, 20.00059, 20.00060, 20.00062, 20.00087,  
 7: 22.00002, 25.00024, 25.00025, 25.00026, 25.00027,  
 7: 27.00007, 27.00120, 28.00010,

8: 10.00018, 12.00067, 13.00006, 19.00054, 20.00074,  
 8: 27.00121, 27.00123, 32.00005,  
 9: 03.00014, 03.00096, 03.00170, 07.00002, 17.00036,  
 10: 01.00066, 04.00013, 04.00076, 06.00011, 07.00006,  
 10: 12.00003, 12.00012, 12.00047, 12.00048, 17.00025,  
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 10: 20.00081, 20.00104, 20.00107, 22.00004, 29.00009,  
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 12: 01.00077, 13.00033, 26.00045,  
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 15: 05.00023, 19.00060,  
 16: 04.00042, 12.00072, 13.00019, 13.00024, 20.00006,  
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 25: 20.00010, 26.00116, 27.00047, 33.00016,  
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 50: 27.00099,  
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VARIABLE: 01.00028, 03.00079, 04.00062, 06.00026, 07.00011,  
 11.00012, 12.00043, 12.00053, 13.00036, 14.00007, 14.00010,  
 17.00012, 17.00032, 19.00003, 19.00009, 19.00056, 20.00101,  
 23.00014, 26.00098, 27.00005, 27.00011, 27.00018, 27.00098,  
 27.00140, 31.00005, 32.00003, 34.00001, 36.00004,  
 1 OR MORE: 01.00076, 03.00020, 03.00026, 03.00166, 03.00167,  
 14.00008, 14.00012, 30.00001,  
 1-3: 24.00005,  
 1-5: 19.00003, 19.00056,  
 2-3: 06.00038, 20.00007, 20.00008,  
 2-16: 03.00055, 06.00005,  
 3-4: 06.00046,  
 3-5: 17.00005, 22.00025,  
 3-12: 27.00063,  
 5-20: 06.00053,  
 10 TRANSECTS EACH STATION: 24.00012,  
 24-48: 26.00114,  
 25-40: 27.00126,  
 40 QUADRATS: 29.00008,

# 9. TEMPORAL FREQUENCY

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ONCE: 01.00038, 03.00003, 03.00063, 03.00066, 03.00084,  
 04.00021, 04.00075, 07.00010, 10.00008, 11.00011,  
 11.00013, 15.00002, 16.00006, 19.00002, 19.00037,  
 19.00055, 19.00060, 20.00011, 20.00012, 20.00027,  
 20.00033, 20.00047, 20.00049, 20.00050, 20.00051,  
 20.00052, 20.00054, 20.00055, 20.00056, 20.00058,  
 20.00061, 20.00068, 20.00069, 20.00087, 20.00107,  
 21.00004, 21.00005, 22.00003, 22.00005, 22.00006,  
 22.00011, 22.00021, 24.00012, 26.00022, 26.00114,  
 26.00119, 27.00003, 27.00013, 27.00016, 27.00016,  
 27.00100, 27.00117, 27.00123, 28.00007, 29.00008,  
 29.00009, 31.00020, 33.00023,

TWICE: 03.00070, 03.00111, 03.00183, 07.00006, 11.00012,  
12.00072, 17.00011, 17.00012, 19.00001, 19.00034,  
19.00043, 20.00005, 20.00067, 21.00007, 26.00043,  
27.00008, 29.00006,

THREE TIMES: 03.00010, 03.00014, 03.00015, 03.00018,  
03.00020, 03.00045, 03.00079, 03.00081, 03.00090,  
03.00096, 03.00097, 03.00124, 03.00148, 03.00170,  
21.00006, 23.00008, 25.00003, 27.00101, 30.00005,  
32.00005,

FOUR TIMES: 03.00019, 03.00068, 03.00145, 17.00011,  
17.00012, 26.00064,

FIVE TIMES: 03.00033, 03.00174,

SIX TIMES: 23.00009,

SEVEN TIMES: 20.00004,

EIGHT TIMES: 03.00016, 03.00076, 03.00078, 03.00171,

TWELVE TIMES: 22.00019,

HOURLY: 26.00053,

3 HRS: 06.00038,

LOW TIDES: 20.00106,

DAILY: 06.00036, 10.00018, 12.00017, 12.00022, 19.00021,  
26.00062, 27.00096, 31.00021,

2-3 TIMES PER WEEK: 20.00021,

TWICE WEEKLY: 12.00004, 26.00062, 27.00010, 27.00138,  
27.00147,

WEEKLY: 02.00010, 06.00030, 07.00026, 10.00001, 10.00002,  
12.00003, 12.00022, 12.00024, 12.00027, 12.00043,  
12.00063, 13.00022, 16.00009, 17.00002, 17.00006,  
17.00028, 19.00050, 19.00097, 20.00026, 20.00066,  
20.00080, 22.00010, 22.00012, 26.00037, 26.00065,  
26.00066, 26.00116, 27.00070, 27.00084, 27.00085,

13 TO 15 TIMES PER YEAR: 07.00007

WEEKLY/BIWEEKLY: 03.00075,

WEEKLY TO BIWEEKLY: 19.00061,

THREE TIMES PER MONTH: 04.00004,

BIWEEKLY: 06.00029, 06.00047, 10.00004, 10.00013, 10.00014,  
12.00013, 12.00027, 13.00022, 14.00007, 14.00015,  
16.00005, 16.00019, 17.00003, 17.00028, 20.00006,  
27.00050, 27.00062, 27.00063, 27.00162, 30.00006,

TWO TIMES PER MONTH: 04.00033,

2-3 WEEK INTERVALS: 27.00167,

20 DAY INTERVALS: 26.00101,

23 DAY INTERVALS: 26.00038,

FOUR WEEK INTERVALS: 06.00039,

MONTHLY/SEMI-MONTHLY: 11.00010,

MONTHLY: 01.00045, 01.00061, 01.00071, 01.00076, 01.00077,  
02.00004, 03.00036, 03.00051, 03.00060, 03.00103, 03.00134,  
03.00138, 03.00163, 04.00014, 04.00015, 04.00018, 04.00025,  
04.00026, 04.00060, 05.00022, 05.00024, 05.00025, 05.00027,  
05.00028, 05.00032, 06.00011, 06.00014, 06.00017, 06.00024,  
06.00027, 06.00028, 06.00032, 06.00036, 06.00037, 06.00046,  
06.00059, 06.00064, 06.00066, 06.00067, 07.00011, 07.00037,  
09.00002, 10.00007, 10.00016, 10.00019, 12.00012, 12.00019,  
12.00033, 12.00034, 12.00035, 12.00038, 12.00039, 12.00042,  
12.00043, 12.00044, 12.00047, 12.00048, 12.00050, 12.00056,  
12.00057, 12.00067, 12.00068, 12.00069, 12.00070, 12.00077,  
12.00088, 13.00002, 13.00006, 13.00009, 13.00010, 13.00013,  
13.00015, 13.00019, 13.00022, 13.00026, 13.00031, 13.00033,  
13.00035, 13.00036, 13.00037, 13.00038, 13.00039, 13.00041,

13.00043, 14.00003, 14.00006, 14.00007, 14.00008, 14.00009,  
14.00010, 14.00011, 14.00012, 16.00008, 16.00018, 16.00022,  
17.00007, 17.00019, 17.00020, 17.00024, 17.00033, 17.00038,  
19.00004, 19.00005, 19.00006, 19.00009, 19.00022, 19.00039,  
19.00044, 19.00046, 19.00073, 19.00097, 19.00100, 20.00005,  
20.00006, 20.00007, 20.00010, 20.00013, 20.00014, 20.00015,  
20.00017, 20.00018, 20.00020, 20.00022, 20.00029, 20.00036,  
20.00045, 20.00075, 20.00077, 20.00078, 20.00079, 20.00080,  
20.00081, 20.00086, 20.00088, 20.00094, 20.00104, 20.00110,  
22.00002, 22.00008, 22.00027, 23.00004, 23.00010, 25.00011,  
25.00020, 25.00024, 25.00025, 25.00026, 26.00001, 26.00006,  
26.00008, 26.00027, 26.00028, 26.00035, 26.00047, 26.00079,  
26.00094, 26.00098, 26.00103, 27.00005, 27.00007, 27.00011,  
27.00012, 27.00023, 27.00026, 27.00033, 27.00034, 27.00049,  
27.00050, 27.00074, 27.00075, 27.00085, 27.00089, 27.00091,  
27.00092, 27.00093, 27.00094, 27.00095, 27.00096, 27.00109,  
27.00116, 27.00117, 27.00120, 27.00121, 27.00161, 27.00166,  
28.00005, 29.00003, 29.00012, 29.00013, 31.00002, 31.00003,  
31.00004, 31.00005, 31.00006, 31.00008, 31.00009, 31.00010,  
31.00022, 33.00010, 33.00011, 33.00013, 33.00016, 33.00017,  
33.00025, 33.00029, 33.00034, 34.00001, 34.00003, 36.00003,  
36.00004,

4-6 WEEKS: 17.00036,

EVERY FIVE WEEKS: 06.00010, 06.00070,

NINE TIMES/YR: 16.00012,

SIX WEEKS: 12.00026, 20.00053, 20.00062, 20.00063,

BIMONTHLY: 01.00079, 03.00142, 05.00027, 06.00028, 06.00044,  
06.00061, 06.00064, 06.00067, 06.00069, 07.00012, 09.00002,  
10.00025, 12.00081, 12.00088, 13.00018, 17.00018, 17.00023,  
17.00033, 19.00029, 20.00059, 20.00060, 20.00074, 22.00004,  
23.00004, 23.00014, 27.00005, 29.00011, 31.00005, 31.00008,  
31.00009, 31.00010, 31.00015, 33.00020, 33.00025, 33.00029,  
TRIMONTHLY: 06.00044, 23.00004, 31.00013,

QUARTERLY: 01.00016, 07.00031, 17.00004, 17.00005, 17.00013,  
17.00014, 17.00017, 19.00076, 19.00077, 19.00096, 20.00009,  
20.00016, 20.00101, 21.00001, 24.00001, 24.00005, 25.00008,  
26.00052, 27.00005, 27.00047, 27.00063, 27.00090, 28.00001,  
28.00002, 29.00001, 30.00001, 31.00001, 33.00002, 33.00019,  
33.00026, 33.00026, 36.00002, 36.00003,

SEASONALLY: 02.00009, 03.00013, 03.00055, 03.00169,  
07.00002, 17.00032, 23.00001,

TWICE PER DRY SEASON: 04.00076,

TWICE/SUMMER: 17.00025,

THREE TIMES/YR: 19.00007,

5 MONTHS: 27.00031,

SEMIANNUALLY: 03.00147, 27.00126, 28.00010, 30.00003,  
30.00004, 32.00003,

YEARLY (ANNUALLY): 03.00077, 10.00013, 19.00045, 20.00057,

VARIABLE: 01.00028, 04.00005, 04.00042, 04.00062, 06.00013,  
06.00026, 08.00004, 10.00013, 12.00053, 19.00003, 19.00029,  
26.00074, 26.00102, 27.00098, 27.00140, 31.00011,

# 10. ABIOTIC PARAMETERS MEASURED

AIR TEMPERATURE: 04.00055, 10.00002, 12.00019, 12.00081,  
 12.00004, 13.00008, 13.00036, 13.00037, 17.00036, 17.00037,  
 19.00084, 22.00015, 22.00027, 26.00051, 26.00066, 26.00102,  
 30.00001,  
 ALKALINITY: 03.00061, 13.00041, 26.00090,  
 AMINO ACID COMPOSITION: 26.00076, 26.00090,  
 AMMONIA: 01.00080, 06.00006, 06.00030, 06.00038, 06.00063,  
 07.00007, 19.00026, 19.00027, 19.00084, 19.00109, 26.00090,  
 27.00026, 33.00009,  
 ARBOCLOR 1254: 07.00004  
 ASH: 19.00014,  
 ATP: 03.00003, 03.00004, 03.00044,  
 BIOCHEMICAL OXYGEN DEMAND (BOD): 01.00043, 04.00076, 07.00032,  
 20.00004, 20.00015, 32.00003,  
 BITUMEN CONTENT: 09.00005,  
 BOTTOM GEOLOGY: 20.00109,  
 BOTTOM SLOPE: 01.00094,  
 BOTTOM TOPOGRAPHY (BATHYMETRY): 01.00084, 03.00102, 05.00014,  
 20.00109, 31.00007,  
 BOTTOM TYPE: 03.00085, 05.00007, 17.00017, 22.00002,  
 23.00015, 27.00008, 30.00004,  
 C14-UPTAKE: 12.00004,  
 CARBON DIOXIDE (CO2): 03.00063, 17.00019, 22.00027, 25.00005,  
 25.00009, 25.00010,  
 CARBON: 03.00003, 03.00004, 04.00041, 06.00072, 16.00012,  
 19.00019, 27.00020,  
 CARBONATE CARBON: 26.00076,  
 CARBONATE (CONTENT): 03.00057, 03.00090, 03.00069, 03.00109,  
 03.00181, 06.00002, 17.00015, 35.00002,  
 CATION EXCHANGE CAPABILITY: 13.00042,  
 CHLORIDE: 06.00006,  
 CHLORINITY: 05.00041, 27.00042, 27.00065,  
 CHLOROPHYLL: 03.00003, 03.00004, 03.00183, 12.00040,  
 12.00044, 12.00050, 14.00001, 19.00091, 19.00096,  
 20.00007, 25.00024, 27.00116, 31.00010,  
 CIRCULATION: 27.00118,  
 CLARITY: 01.00038, 01.00094, 03.00036, 03.00051, 03.00093,  
 04.00023, 10.00009, 16.00006, 21.00007, 23.00014, 29.00005,  
 CLAY MINERALOGY: 03.00057, 03.00181, 35.00002,  
 CLIMATE: 07.00034, 12.00042, 22.00024, 25.00004,  
 CLOUD COVER: 04.00060, 22.00027,  
 COLIFORM COUNT: 07.00033,  
 COLOR: 01.00094, 07.00011, 12.00041, 12.00042, 12.00043,  
 12.00047, 12.00050, 13.00035, 13.00043, 14.00001, 14.00007,  
 14.00008, 14.00009, 14.00010, 14.00011, 19.00027, 25.00011,  
 31.00014,  
 CONDUCTIVITY: 05.00041, 07.00035, 19.00100, 20.00109,  
 22.00010, 25.00027, 26.00065,  
 COPPER: 06.00053, 27.00005, 27.00040, 27.00117,  
 COPROSTANOL CONCENTRATION: 22.00022,  
 CURRENT DIRECTION: 03.00156, 05.00037, 19.00035, 27.00008,  
 CURRENT VELOCITY: 03.00157, 04.00003, 04.00004, 04.00032,  
 04.00033, 04.00056, 05.00002, 05.00037, 05.00045, 19.00004,  
 19.00006, 19.00027, 27.00008, 27.00100, 30.00003, 34.00003,  
 35.00002,  
 CURRENTS: 01.00094, 03.00059, 03.00085, 03.00158, 05.00003,  
 05.00014, 05.00038, 06.00044, 09.00001, 10.00009, 10.00013,

12.00027, 12.00041, 19.00035, 19.00100, 20.00109, 20.00111,  
 21.00010, 22.00021, 24.00012, 25.00007, 25.00017, 25.00018,  
 25.00020, 25.00025, 26.00001, 26.00042, 26.00043, 26.00067,  
 26.00109, 27.00012, 27.00050, 27.00117, 27.00147, 27.00163,  
 28.00003, 28.00005, 29.00002, 29.00008, 31.00022,  
 DDT: 16.00011,  
 DEPTH: 01.00038, 01.00042, 01.00084, 01.00105, 03.00013,  
 03.00069, 03.00090, 03.00093, 03.00106, 03.00134, 03.00157,  
 03.00158, 04.00003, 04.00004, 04.00023, 04.00064, 05.00007,  
 05.00027, 05.00038, 05.00040, 06.00002, 06.00035, 06.00037,  
 06.00045, 06.00046, 06.00064, 10.00015, 12.00032, 12.00090,  
 13.00006, 13.00034, 13.00036, 13.00037, 17.00007, 17.00017,  
 17.00021, 17.00029, 19.00088, 19.00019, 19.00067, 21.00011,  
 22.00010, 22.00017, 22.00025, 23.00010, 23.00015, 25.00018,  
 25.00020, 26.00055, 26.00063, 26.00064, 26.00071, 26.00081,  
 26.00109, 27.00044, 27.00097, 29.00013, 30.00003, 33.00016,  
 33.00025, 35.00002,  
 DETRITUS PARTICLE SIZE: 27.00038,  
 DISCHARGE FLOW: 19.00027,  
 DISSOLVED ORGANIC CARBON: 26.00060, 27.00024, 27.00049,  
 DISSOLVED OXYGEN: 01.00043, 03.00003, 03.00004, 03.00014,  
 03.00018, 03.00019, 03.00020, 03.00045, 03.00052, 03.00059,  
 03.00061, 03.00063, 03.00071, 03.00079, 03.00096, 03.00124,  
 03.00170, 03.00183, 04.00059, 04.00060, 04.00075, 04.00076,  
 05.00030, 06.00002, 06.00013, 06.00014, 06.00032, 06.00052,  
 06.00053, 07.00007, 07.00009, 07.00011, 07.00012, 07.00020,  
 07.00033, 07.00035, 08.00003, 10.00004, 10.00005, 10.00008,  
 12.00013, 12.00033, 12.00034, 12.00035, 12.00036, 12.00038,  
 12.00041, 12.00042, 12.00043, 12.00044, 12.00047, 12.00050,  
 12.00068, 12.00081, 12.00088, 12.00089, 12.00090, 13.00001,  
 12.00004, 13.00013, 13.00021, 13.00034, 13.00036, 13.00039,  
 13.00041, 14.00007, 14.00010, 17.00004, 17.00005, 17.00006,  
 17.00008, 17.00009, 17.00011, 17.00012, 17.00019, 17.00022,  
 17.00026, 19.00005, 19.00006, 19.00026, 19.00054, 19.00070,  
 19.00076, 19.00084, 19.00096, 19.00108, 20.00007, 20.00008,  
 20.00009, 20.00011, 20.00024, 20.00033, 20.00044, 20.00045,  
 20.00047, 20.00049, 20.00050, 20.00051, 20.00052, 20.00054,  
 20.00056, 20.00058, 20.00059, 20.00060, 20.00061, 20.00062,  
 20.00063, 20.00068, 20.00070, 20.00075, 20.00077, 20.00079,  
 20.00081, 20.00084, 20.00088, 20.00093, 20.00095, 20.00097,  
 20.00098, 20.00104, 20.00106, 20.00109, 21.00002, 21.00003,  
 21.00005, 22.00002, 22.00004, 22.00006, 22.00009, 22.00010,  
 22.00012, 22.00015, 22.00016, 22.00021, 22.00024, 22.00027,  
 22.00028, 22.00029, 22.00030, 23.00001, 23.00003, 23.00004,  
 23.00010, 23.00012, 23.00013, 23.00014, 24.00002, 24.00006,  
 24.00008, 25.00008, 25.00009, 25.00011, 25.00020, 25.00021,  
 25.00022, 25.00023, 25.00024, 25.00025, 25.00026, 25.00027,  
 26.00017, 26.00042, 26.00052, 26.00053, 26.00061, 26.00067,  
 26.00071, 26.00079, 26.00103, 26.00105, 26.00117, 27.00005,  
 27.00007, 27.00008, 27.00030, 27.00040, 27.00042, 27.00050,  
 27.00061, 27.00073, 27.00098, 27.00117, 27.00118, 27.00120,  
 27.00131, 27.00134, 27.00147, 27.00154, 27.00155, 27.00170,  
 29.00003, 29.00005, 29.00008, 29.00012, 29.00013, 31.00009,  
 31.00010, 31.00013, 31.00018, 31.00022, 32.00003, 33.00011,  
 33.00016, 33.00019, 36.00003,  
 DISTANCE TO NEAREST LAND MASS: 01.00081,  
 DRP: 06.00038,

EH (REDOX POTENTIAL): 04.00037, 06.00013, 06.00038, 06.00052,  
 07.00012, 07.00020, 09.00001, 20.00077, 22.00010, 22.00021,  
 23.00003, 23.00004, 23.00010, 26.00063, 26.00064, 26.00119,  
 31.00018, 33.00011,  
 ETHION: 06.00050,  
 EXCHANGEABLE CATIONS: 13.00042,  
 EXPOSURE TO HEATED EFFLUENT: 17.00003,  
 FATTY ACIDS: 13.00005,  
 FLOW VELOCITY: 04.00076,  
 FRESHWATER DISCHARGE: 30.00001,  
 GLUCOSE LACTATE: 27.00020,  
 H2: 27.00020,  
 HEAVY METALS (CONCENTRATIONS): 03.00165, 03.00166, 04.00040,  
 20.00109, 21.00010, 33.00020, 33.00030, 34.00002,  
 HERBICIDES: 27.00136,  
 HUMIDITY: 25.00001,  
 HYDROCARBONS: 01.00041, 03.00003, 03.00004, 03.00065,  
 03.00108, 03.00109, 03.00135, 19.00105, 23.00001, 23.00011,  
 HYDROGEN SULFIDE: 06.00050,  
 HYDROLOGY: 31.00007,  
 HYDROSTATIC PRESSURE: 01.00005, 01.00006, 27.00163,  
 INORGANIC NUTRIENT CONCENTRATIONS: 03.00061,  
 INORGANICS: 31.00010,  
 INSECTICIDE: 07.00026,  
 INSULATION: 17.00036,  
 IRON: 06.00006, 27.00005,  
 IRRADIANCE: 27.00061,  
 LIGHT INTENSITY: 12.00089, 19.00013, 27.00063, 27.00163,  
 LIGHT PENETRATION: 03.00183, 12.00038, 12.00088, 13.00001,  
 13.00041, 16.00021, 17.00008, 19.00004, 19.00027,  
 LIGHT: 03.00059, 04.00021, 06.00044, 06.00045, 10.00008,  
 12.00044, 13.00009, 14.00007, 18.00001, 19.00040, 19.00061,  
 20.00074, 20.00088, 20.00092, 25.00007, 25.00009, 25.00011,  
 26.00079, 27.00100, 29.00008, 31.00010, 31.00018, 31.00022,  
 33.00011,  
 LIPID CONTENT: 13.00005,  
 MECHANICAL DAMAGE: 17.00003,  
 MERCURY (CONTENT): 04.00037, 05.00031, 26.00060,  
 METAL(S): 01.00043, 03.00059, 03.00068, 03.00136, 03.00147,  
 03.00148, 07.00016, 27.00064, 27.00118,  
 MICRONUTRIENTS: 06.00032,  
 MINERAL CONTENT: 26.00112,  
 MIREX: 16.00011,  
 MOON LIGHT: 20.00022,  
 MOON PHASE: 04.00033, 20.00074, 30.00004,  
 NITROGEN AND NON-AMMONIA COMPOUNDS: 06.00030, 06.00038,  
 07.00007, 13.00036, 13.00042, 19.00026, 19.00027, 19.00084,  
 19.00109, 19.00109, 20.00015, 20.00075, 26.00076, 26.00090,  
 27.00020, 27.00025, 27.00026, 27.00131, 27.00155, 31.00014,  
 31.00018, 33.00009, 33.00033,  
 NUTRIENT CYCLING: 27.00136,  
 NUTRIENTS: 01.00043, 03.00003, 03.00004, 03.00059, 03.00063,  
 03.00107, 03.00158, 03.00183, 07.00033, 12.00031, 12.00038,  
 12.00040, 12.00050, 14.00001, 19.00005, 19.00061, 20.00092,  
 20.00093, 20.00097, 20.00098, 22.00015, 22.00021, 22.00027,  
 23.00002, 23.00013, 25.00001, 25.00011, 25.00024, 26.00017,  
 27.00074, 27.00118, 27.00147, 27.00154, 31.00009, 31.00022,  
 33.00011,

ORGANIC CARBON: 01.00043, 03.00055, 03.00057, 03.00090,  
 03.00139, 04.00076, 06.00002, 07.00007, 07.00005, 12.00030,  
 13.00036, 13.00042, 19.00014, 21.00003, 26.00076, 26.00090,  
 31.00010, 33.00033,  
 ORGANIC CONTENT: 04.00037, 11.00001, 12.00069, 12.00070,  
 16.00002, 17.00015, 22.00004, 23.00008, 23.00010, 31.00010,  
 OXYGEN RELATIONSHIPS: 07.00036,  
 OXYGEN: 01.00080, 03.00048, 27.00038, 27.00065,  
 PARTICULATES: 20.00024,  
 PCB(S): 07.00004, 07.00029,  
 PERCENT CLOUD COVER: 17.00008, 17.00011, 17.00012,  
 PESTICIDES: 01.00043, 03.00027, 03.00059, 07.00011,  
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 PHOSPHORUS AND COMPOUNDS: 03.00052, 06.00006, 06.00030,  
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 PHOTOPERIOD: 26.00118,  
 PHOTOSYNTHETICALLY ACTIVE: 19.00026,  
 PORE WATER: 33.00033,  
 PRESSURE: 12.00058,  
 PROTEIN: 04.00041, 19.00014, 27.00026,  
 RAINFALL (PRECIPITATION): 04.00059, 04.00060, 08.00003,  
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 REDUCTION POTENTIAL: 27.00025,  
 RELATIVE HUMIDITY: 10.00002, 12.00066, 13.00009, 34.00003,  
 RIVER DISCHARGE: 27.00096,  
 RIVERFLOW: 12.00035, 12.00042, 12.00044, 12.00046, 12.00050,  
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 SALINITY: 01.00002, 01.00010, 01.00012, 01.00014, 01.00026,  
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SATELLITE IMAGERY: 31.00020,  
SEA STATE: 19.00035,  
SECCHI (DISK/DEPTH): 03.00085, 12.00033, 12.00034, 12.00047,  
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SEDIMENT (CHARACTERISTICS): 01.00012, 01.00016, 01.00062,  
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SEDIMENT GRAIN SIZE: 03.00013, 03.00034, 03.00055, 03.00056,  
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SEDIMENT OXYGEN DEMAND: 10.00008, 27.00073,  
SEDIMENT TEMPERATURE: 20.00010, 20.00033, 20.00061, 28.00010,  
SEDIMENTATION RATES: 06.00044, 19.00061, 26.00038, 27.00100,  
28.00003,  
SEVIN: 07.00026,

SEWAGE POLLUTION: 27.00096,  
 SILICATE: 06.00030, 06.00063,  
 SOIL CARBON CONTENT: 13.00009,  
 SOIL TO WATER SUSPENSION: 13.00036,  
 SOLAR INSOLATION: 06.00058,  
 SOLAR RADIATION: 25.00005,  
 SOLUBLE ORGANIC CARBON: 04.00029,  
 SUBSTRATE CHARACTERISTICS (TYPE): 01.00033, 01.00042,  
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 SULFUR (COMPOUNDS): 03.00073, 05.00005, 06.00001, 06.00006,  
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 SUNLIGHT: 01.00013, 01.00024, 26.00020, 26.00051, 26.00052,  
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 SUSPENDED SOLIDS: 11.00013, 19.00090,  
 TEMPERATURE: 01.00002, 01.00006, 01.00013, 01.00038,  
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 33.00019, 33.00022, 33.00025, 33.00034, 34.00003, 35.00004,  
 36.00001, 36.00003, 36.00004, 36.00005,  
 TIDE(S): 01.00012, 01.00016, 01.00033, 01.00045, 01.00079,  
 03.00002, 03.00134, 03.00138, 04.00073, 06.00066, 07.00014,  
 10.00006, 10.00015, 12.00004, 12.00041, 12.00050, 13.00011,  
 16.00019, 17.00007, 17.00017, 17.00036, 17.00037, 19.00005,  
 19.00006, 19.00027, 19.00065, 19.00067, 19.00109, 20.00022,  
 20.00106, 20.00109, 20.00111, 22.00015, 22.00017, 22.00027,  
 23.00003, 23.00004, 23.00015, 25.00007, 25.00017, 26.00006,  
 26.00035, 26.00043, 26.00051, 26.00102, 26.00103, 27.00010,  
 27.00012, 27.00042, 27.00065, 27.00113, 30.00004, 34.00003,  
 35.00004,  
 TOTAL HARDNESS: 13.00041,  
 TOTAL SUSPENDED (SEDIMENT) LOAD (TSS): 19.00005, 19.00091,  
 20.00088, 31.00009,  
 TRACE ELEMENTS: 23.00002,  
 TRACE METAL UPTAKE: 01.00097,  
 TRACE METALS (CONTENT): 03.00167, 03.00181, 03.00183,  
 03.00003, 03.00004, 03.00055, 20.00048, 27.00107, 27.00117,



TRANSECT SLOPE: 13.00009,  
 TRANSPARENCY: 10.00009, 20.00011, 20.00033, 20.00039,  
 20.00047, 20.00051, 20.00052, 20.00054, 20.00058, 20.00061,  
 20.00068, 20.00098, 22.00012, 25.00020, 33.00016,  
 TRANSPIRATION: 26.00103,  
 TURBIDITY: 03.00169, 04.00059, 04.00060, 04.00075, 05.00030,  
 05.00045, 08.00003, 10.00004, 11.00013, 12.00033, 12.00034,  
 12.00038, 12.00040, 12.00042, 12.00043, 12.00047, 12.00050,  
 12.00088, 13.00010, 13.00034, 13.00035, 13.00043, 14.00001,  
 14.00007, 14.00008, 14.00009, 14.00010, 14.00011, 14.00012,  
 17.00034, 19.00006, 19.00035, 20.00007, 20.00008, 20.00009,  
 20.00059, 20.00060, 20.00075, 20.00076, 20.00088, 20.00093,  
 20.00097, 20.00098, 20.00106, 20.00111, 21.00002, 21.00005,  
 22.00021, 22.00024, 22.00027, 22.00029, 23.00001, 23.00013,  
 23.00014, 24.00002, 24.00013, 25.00011, 25.00024, 26.00038,  
 26.00067, 26.00079, 27.00050, 27.00117, 27.00122, 27.00123,  
 27.00147, 29.00005, 29.00008, 29.00013, 30.00001, 30.00004,  
 31.00014,  
 VISIBILITY: 05.00037, 08.00002, 12.00076, 22.00013,  
 WATER CHEMISTRY: 04.00076, 07.00037, 12.00044, 20.00106,  
 20.00109, 20.00111, 23.00013, 23.00014, 25.00021, 25.00022,  
 25.00023, 27.00170, 31.00007, 31.00022,  
 WATER CLARITY: 09.00002 13.00010, 17.00029, 19.00067,  
 19.00096, 19.00100, 26.00038, 26.00042,  
 WATER COLOR: 08.00003, 12.00013, 12.00038, 12.00088,  
 13.00006, 27.00008,  
 WATER VAPOR: 25.00010,  
 WAVE ACTION: 01.00033, 22.00027, 27.00010,  
 WAVE ENERGY: 01.00016, 25.00017,  
 WAVE SURGE: 01.00084, 26.00115,  
 WEATHER: 03.00183, 07.00014, 25.00009,  
 WIND DIRECTION: 04.00060, 13.00011, 26.00001, 26.00051,  
 26.00067, 26.00102, 30.00004,  
 WIND VELOCITY (SPEED): 04.00055, 04.00060, 13.00011,  
 19.00035, 19.00100, 26.00001, 26.00051, 26.00067, 26.00102,  
 27.00161, 30.00004, 34.00003,  
 WIND: 04.00059, 12.00050, 14.00001, 17.00007, 19.00027,  
 20.00022, 20.00111, 22.00027, 27.00008, 27.00010,  
 ZINC: 27.00040,

# 11.DOMINANT TAXON/TAXA STUDIED:

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ABRA: 03.00014, 25.00027,  
ACANTHODASYS: 03.00045,  
ACANTHODASTORIUS: 07.00032,  
10.00005, 10.00016, 19.00054,  
20.00085, 31.00005, 31.00013,  
ACANTHOPHORA: 06.00036,  
ACANTHOPLEURA: 26.00031,  
29.00004,  
ACARTIA: 03.00098, 17.00003,  
ACETABULARIA: 26.00012,  
27.00165,  
ACETES: 05.00026,  
ACHIRUS: 03.00163,  
ACOUTHOBOTHRIUM: 01.00011,  
ACROCHETIUM: 06.00010,  
ACROPORA: 01.00017, 02.00005,  
02.00006, 04.00055, 04.00063,  
26.00051, 26.00052, 26.00053,  
26.00070, 26.00075, 26.00093,  
26.00094, 26.00095, 26.00096,  
26.00097,  
ACROSTICHUM: 04.00019,  
ACTECCINA: 07.00022, 07.00025,  
07.00027, 07.00032,  
ACTINIA: 06.00033,  
AEDICIRA: 03.00096,  
AEGINELLA: 20.00055,  
AEQUIPECTEN (=ARGOPECTEN):  
03.00011, 03.00015, 03.00032,  
03.00067, 03.00079, 10.00015,  
12.00073, 12.00074, 19.00056,  
19.00091, 19.00100,  
AETEA: 05.00045,  
AGARDHIELLA: 17.00033,  
AGARICIA: 26.00075,  
AGLAPHANUS: 03.00096,  
AGLAPHENIA: 03.00081,  
AIPTASIA: 06.00033, 07.00025,  
ALCYONARIA: 27.00155,  
ALIGENA: 03.00168,  
ALPHEUS: 01.00087, 06.00027,  
06.00031, 10.00009, 17.00013,  
17.00014,  
ALVANIA: 03.00124,  
AMBIDEXTER: 10.00017, 22.00002,  
AMARUCIUM: 22.00011,  
22.00029,  
AMMONIA: 01.00008, 03.00018,  
06.00003, 09.00006, 31.00003,  
31.00004,  
AMPHOPHILLA: 12.00030,  
AMPELISCA: 03.00130, 12.00043,  
12.00048, 13.00033, 13.00034,  
19.00051, 19.00055, 20.00003,  
20.00047, 20.00053, 20.00057,  
20.00059, 20.00063, 20.00077,  
20.00079, 20.00081, 20.00103,  
20.00104, 20.00110, 21.00004,  
22.00009, 22.00010, 22.00029,  
23.00014, 29.00013, 32.00003,  
33.00025,  
AMPHARETE: 03.00096, 03.00111,  
03.00183,  
AMPHICTEIS: 12.00043,  
12.00048, 23.00003,  
AMPHIOPLUS: 04.00042,  
16.00017, 27.00127, 27.00128,  
27.00129,  
AMPHIOXUS: 08.00004,  
AMPHIPHOLIS: 12.00081,  
AMPHIROA: 03.00033,  
AMPHISTEGINA: 03.00019,  
AMPHITHALAMUS: 01.00073,  
AMPHORA: 04.00029, 26.00021,  
27.00023, 27.00049,  
AMPITHOE: 33.00025,  
AMUSIUM: 03.00032,  
AMYGDALUM: 20.00106,  
ANACHIS: 13.00006, 27.00045,  
27.00046, 27.00047,  
ANCANTHOPHORA: 06.00011,  
ANCHOA: 04.00059, 04.00060,  
06.00014, 08.00003, 12.00013,  
12.00035, 12.00038, 12.00042,  
12.00044, 13.00002, 13.00037,  
14.00007, 20.00044, 20.00045,  
25.00008,  
ANCISTROSYLLIS: 20.00049,  
ANCYLOPSETTA: 03.00163,  
ANNELIDS: 07.00026,  
ANODONTIA: 27.00095,  
ANOMALOCARDIA: 22.00021,  
26.00103,  
ANTHERINOMORUS: 04.00059,  
ANTHOSTOMELLA: 25.00012,  
APANTHURA: 13.00014, 20.00049,  
20.00086,  
APLYSIA: 16.00009,  
APODOSIS: 01.00073,  
APOGON: 03.00145,  
APOPRIONOSPID: 20.00013,  
20.00016, 20.00018,  
ARATUS: 04.00077,  
ARBACIA: 03.00009, 03.00079,  
ARCA: 03.00168, 12.00075,  
12.00076, 26.00031,  
ARCHAIS: 01.00024, 04.00065,  
26.00009, 26.00071, 27.00042,  
ARENAEUS: 10.00009, 31.00005,  
ARENICOLA: 07.00018, 07.00019,  
07.00020, 08.00005, 19.00025,  
20.00102, 22.00005, 22.00011,  
ARGERIA: 31.00021,  
ARGOPECTEN: 01.00018,  
01.00057, 05.00012, 05.00013,  
05.00017, 11.00002, 11.00006,

19.00003, 20.00021, 25.00008,  
33.00001, 33.00008, 33.00012,  
33.00021, 33.00022, 33.00029,  
ARICIDEA: 12.00048, 13.00033,  
13.00038, 17.00004, 17.00005,  
17.00013, 17.00014, 19.00055,  
19.00100, 20.00110,  
ARMANDIA: 07.00023, 07.00025,  
ASPERGILLUS: 20.00004,  
ASPIDOSIPHON: 26.00083,  
26.00088,  
ASTERIGENA: 03.00019,  
ASTEROPTERON: 06.00035,  
ASTRAEA: 03.00168,  
ASTRAPOGON: 03.00145,  
ASTROPHYTON: 26.00019,  
ATHERINOMORUS: 26.00098,  
AURILA: 03.00085,  
AUTILLDORGBIA: 27.00152,  
AVICENNIA: 01.00014, 01.00016,  
01.00021, 01.00033, 01.00068,  
01.00085, 01.00107, 03.00087,  
03.00141, 04.00035, 04.00062,  
06.00012, 06.00014, 19.00017,  
19.00023, 19.00050, 19.00109,  
19.00110, 20.00031, 25.00005,  
25.00009, 25.00010, 26.00015,  
27.00024, 27.00111, 27.00136,  
32.00001, 32.00004,  
AVIGENNA: 01.00008,  
AXIDOTHELLA: 12.00091,  
22.00009,  
AZOBACTER: 19.00107,  
BAGATUS: 20.00049,  
BAIRDIELLA: 04.00059,  
13.00003, 17.00019, 20.00044,  
36.00001,  
BALANUS: 01.00055, 01.00105,  
02.00008, 06.00039, 06.00040,  
06.00053, 07.00029, 12.00095,  
20.00055, 20.00106, 27.00087,  
27.00096, 27.00162, 31.00005,  
33.00023, 34.00003, 35.00004,  
BANKIA: 27.00060, 34.00003,  
BARBATIA: 03.00168, 31.00013,  
BARNACLES: 28.00005,  
BARTHOLMEA: 03.00081,  
BATHYPOREIA: 33.00026,  
BATHYPSAMMIA: 04.00022,  
BATILLARIA: 06.00002,  
22.00012, 23.00009, 27.00099,  
27.00154,  
BATHIS: 04.00035, 06.00014,  
BATOPHORA: 26.00012, 27.00169,  
BEANIA: 05.00045,  
BEBRYCE: 03.00079,  
BENTHOGENNEMA: 03.00077,  
BITTIUM: 20.00097, 31.00021,  
BLYTTIDMYCES: 20.00105,  
BORRICHIA: 05.00041,  
BOSTRYCHIA: 18.00002,  
19.00013, 31.00015,  
BOTHUS: 03.00163,  
BOTRYLUS: 22.00029,  
BOTRYOCLADIA: 03.00033,  
BOUSANVILLIA: 12.00095,  
BOWMANEILLA: 10.00005,  
BRACHIDONTES: 17.00004,  
17.00005, 17.00013, 17.00014,  
24.00005, 25.00002, 27.00050,  
BRACHIOSYCHIS: 22.00004,  
22.00005, 22.00021,  
BRACHYCYTHARA: 03.00104,  
BRAINIA: 13.00038,  
BRANCHIOSTOMA: 01.00072,  
07.00022, 07.00032, 10.00016,  
19.00054, 19.00092, 20.00030,  
20.00085, 20.00091, 20.00092,  
20.00097, 23.00014, 25.00027,  
31.00008,  
BREVORTIA: 08.00003,  
20.00094, 36.00001,  
BRIAREUM: 27.00100,  
BRIZALINA: 01.00008, 03.00018,  
BRYOZDANS: 06.00062,  
BUGULA: 06.00040, 12.00095,  
34.00003,  
BUNDOSOMA: 06.00033,  
BUSYCON: 12.00054, 16.00014,  
CAECUM: 03.00124, 03.00168,  
19.00055,  
CALCINUS: 10.00009, 26.00004,  
CALLIACTIS: 12.00049,  
CALLIANASSA: 01.00087,  
12.00084,  
CALLINETES: 01.00030,  
01.00040, 03.00095, 03.00128,  
04.00077, 05.00030, 06.00018,  
06.00023, 06.00043, 06.00053,  
06.00057, 07.00011, 07.00030,  
07.00031, 10.00009, 12.00011,  
12.00013, 12.00033, 12.00034,  
12.00035, 12.00038, 12.00039,  
12.00040, 12.00047, 12.00053,  
12.00054, 12.00064, 12.00088,  
13.00036, 16.00010, 16.00011,  
17.00002, 17.00028, 19.00001,  
19.00037, 19.00100, 20.00020,  
20.00044, 20.00094, 21.00010,  
24.00005, 25.00008, 27.00034,  
27.00051, 27.00118, 33.00024,  
36.00004, 36.00005,  
CALLIOSTOMA: 03.00168,  
CANDIDA: 27.00037,  
CANTHARUS: 10.00015,  
CAPITELLA: 06.00067, 07.00005,  
07.00022, 07.00024, 07.00032,  
17.00004, 19.00076, 19.00077,

20.00016, 20.00033, 20.00047,	CLADIUM: 27.00024,	CRYPTOPEDIA: 06.00020,	26.00096,
20.00049, 20.00051, 20.00053,	CLADOCORA: 03.00079,	CTHAMALUS: 12.00095,	DISCIAS: 06.00019,
20.00054, 20.00058, 20.00061,	CLADOPHORA: 06.00010,	CUSHMANIDEA: 03.00085,	DISPID: 10.00016,
20.00068, 20.00110, 22.00006,	CLADOSIPHON: 19.00004,	CYATHURA: 13.00013, 21.00003,	DISTICHLIS: 01.00033,
29.00005, 32.00003, 33.00019,	CLIBANARIUS: 03.00119,	23.00003, 23.00014, 24.00012,	05.00041, 07.00003, 12.00030,
CAPRELLA: 03.00028, 20.00046,	12.00049, 26.00004,	CYCLASPIS: 20.00049, 20.00058,	13.00015, 13.00018, 33.00010,
CARCHARODORYNCHUS: 03.00045,	CLIONA: 13.00023, 19.00016,	20.00063, 20.00068, 20.00077,	DONAX: 01.00032, 01.00061,
CARDISOMA: 01.00035, 01.00087,	22.00011, 22.00029, 26.00088,	20.00079, 20.00081,	05.00040, 10.00016, 10.00018,
27.00048,	CLOSTRIDIUM: 33.00006,	CYCLINELLA: 27.00166,	10.00019, 10.00023, 10.00024,
CARDITOPSIS: 03.00168,	CLYMENELLA: 06.00064,	CYCLOPSETTA: 03.00163,	19.00021, 22.00030, 24.00010,
CASSIDULINA: 03.00018,	06.00066, 06.00067, 12.00091,	CYCLORBICULINA: 01.00024,	33.00026,
CATANEMA: 27.00056,	19.00076, 19.00077, 27.00099,	26.00071,	DOSINIA: 27.00092,
CAULERPA: 03.00079, 03.00110,	CLYPEASTER: 03.00011,	CYCLOTELLA: 26.00021,	DYNAMENELLA: 20.00049,
16.00006, 17.00029, 17.00033,	03.00067, 03.00146,	26.00022,	ECHINASTER: 01.00057,
27.00170,	COCONEIS: 26.00021, 26.00022,	CYLINDROLEBERIS: 33.00011,	01.00104, 03.00009, 03.00080,
CAULOLATILUS: 29.00002,	26.00023,	CYLINDROTHECA: 26.00022,	03.00143, 24.00005,
CENTROPRIESTES: 03.00050,	COCHLODINIUM: 06.00008,	CYMADUSA: 06.00064, 06.00067,	ECHINUS: 04.00008, 04.00009,
03.00145,	CODAKIA: 27.00099, 27.00160,	06.00072, 19.00055, 19.00100,	05.00005, 27.00010,
CEPHALO: 27.00085,	CODIUM: 03.00033, 03.00110,	31.00019, 31.00021, 33.00025,	ECHINOSOMA: 13.00040,
CEPHALOSPORIUM: 27.00083,	COELARTHUR: 03.00033,	CYMODOCCEUM: 06.00007,	ECHINOSTOMUS: 20.00045,
CERAMUM: 06.00010, 31.00015,	COELOSPHAERA: 13.00023,	CYNOSCIUM: 08.00003, 12.00035,	EDOTEA: 23.00003,
CERATONEREIS: 22.00005,	COLPOPHYLLIA: 26.00096,	12.00038, 12.00042,	ELASMOPUS: 13.00033, 26.00079,
CERCOSPORA: 25.00012,	COMPOSOPOGON: 31.00015,	CYPREDEIS: 03.00085,	ELPHIDIUM: 01.00008, 06.00003,
CERITHIDEA: 13.00009,	CONDYLACTIS: 03.00081,	CYPRINDINA: 27.00050,	09.00006, 31.00003, 31.00004,
13.00039,	CONGERIA: 24.00005,	CYPRINODON: 06.00014,	EMERITA: 05.00040, 10.00016,
CERITHIOPSIS: 03.00168,	CONOCARPUS: 01.00016,	07.00030, 07.00031, 12.00013,	10.00018, 10.00019, 12.00019,
CERITHIUM: 01.00044, 01.00045,	01.00021, 01.00068, 03.00087,	CYETHERETTA: 03.00085,	22.00030, 31.00005, 33.00026,
03.00081, 03.00105, 03.00168,	06.00012, 25.00010,	DASYATIS: 03.00145, 04.00059,	ENCORE: 03.00011, 03.00067,
04.00020, 06.00002, 06.00037,	CORALLIOPHILA: 01.00073,	04.00060, 05.00037, 06.00055,	06.00060,
23.00009, 26.00112, 27.00007,	CORBICULA: 21.00003, 23.00003,	12.00017, 12.00071, 13.00022,	ENDEIS: 27.00135,
31.00021,	23.00014,	DENDRYPHIELLA: 27.00083,	ENDOCYTRIUM: 20.00105,
CERODRILLIA: 03.00104,	COROLLOSPORA: 03.00174,	27.00085,	ENHYDROSOMA: 12.00069,
CHAETODIPTERUS: 20.00044,	COROPHIUM: 06.00040, 07.00004,	DESULFOVIBRIO: 19.00107,	12.00070, 13.00040, 19.00043,
CHAETODON: 03.00145,	07.00022, 07.00025, 07.00026,	DIADENA: 04.00053, 26.00006,	ENOPLUS: 27.00055,
CHAETOPTERUS: 24.00005,	07.00032, 07.00035, 12.00088,	26.00007, 26.00070, 26.00082,	ENSIS: 07.00024, 07.00026,
27.00075,	20.00051, 22.00006, 23.00003,	DIASTOMA: 06.00067, 07.00005,	07.00029,
CHAMPIA: 03.00033, 17.00033,	25.00022, 27.00073, 33.00025,	19.00100,	ENTEROMORPHA: 03.00134,
CHASMODES: 19.00064,	COSCINASTERIAS: 03.00079,	DICHOCCENIA: 03.00070,	30.00003, 31.00015,
CHILOGUENBELINA: 05.00019,	20.00040,	26.00040, 26.00052, 29.00009,	EPACTERISCUS: 26.00030,
CHIONE: 19.00038, 19.00090,	CRASSINELLA: 03.00124,	DICRONTEIDIPES: 12.00048,	EPINEBALIA: 04.00012,
27.00074, 27.00089, 27.00091,	03.00168, 31.00013,	DICTYOTA: 01.00082, 03.00110,	EPINEPHELUS: 03.00145,
27.00160, 27.00171,	CRASSOSTREA: 01.00037,	06.00011, 06.00036, 26.00081,	21.00010,
CHIRIDOTEA: 31.00005,	01.00048, 01.00058, 01.00060,	31.00015,	EPIPHYTES: 06.00030,
CHLAMYS: 03.00079,	01.00076, 01.00077, 03.00027,	DIDEMNUM: 22.00011, 22.00029,	EPIPSAMMIC DIATOMS: 03.00073,
CHONDRIA: 06.00036,	03.00075, 03.00118, 06.00049,	DIGENIA: 01.00106, 13.00024,	ERICHSONELLA: 06.00064,
CHONE: 22.00009,	07.00009, 07.00011, 07.00019,	14.00010, 14.00011, 14.00012,	ERICHTHONIUS: 23.00014,
CHRIODORUS: 04.00059,	07.00020, 07.00037, 12.00011,	27.00014, 27.00015, 27.00171,	26.00079, 27.00073,
CHROMADORA: 27.00058,	12.00020, 12.00021, 12.00023,	DIDOGORGIA: 03.00079,	ERIMYZON: 33.00018,
CHROMADORINA: 27.00058,	12.00024, 12.00025, 12.00027,	DIOPATRA: 12.00018, 14.00006,	ERVILIA: 10.00016, 28.00007,
CIBICIDES: 01.00008, 03.00018,	12.00040, 12.00056, 12.00057,	20.00085, 20.00106, 22.00004,	ETEONE: 13.00038, 19.00085,
03.00019,	12.00063, 12.00092, 12.00093,	22.00005, 22.00021,	20.00015, 20.00016, 20.00086,
CIRRATULIDS: 25.00002,	12.00094, 13.00008, 15.00002,	DIPLANTHERA: 12.00040,	20.00110,
CIRRATULUS: 22.00021,	16.00008, 16.00013, 16.00014,	16.00020, 17.00035, 19.00002,	ETROPUS: 03.00163,
CIRRIFORMIA: 22.00005,	17.00005, 17.00016, 17.00023,	19.00004, 19.00027, 19.00028,	EUBOSTRICHUS: 27.00056,
22.00021, 27.00031,	19.00015, 19.00030, 19.00070,	DIPLECTRUM: 03.00050,	EUCIDARUS: 04.00043, 05.00032,
CIRRIPEDIA: 21.00004,	19.00086, 19.00108, 20.00026,	19.00003,	20.00041, 27.00079,
CISTENIDES (= PECTINARIA):	20.00048, 20.00055, 20.00094,	DIPLDASYS: 03.00045,	EUCINOSTOMUS: 03.00145,
07.00024, 07.00032, 22.00005,	23.00015, 25.00002, 25.00027,	DIPLODIA: 02.00006, 26.00040,	04.00059, 04.00060, 13.00037,
CITHARICHTHYS: 03.00163,	CREPIDULA: 17.00013, 17.00014,	26.00052, 26.00053, 26.00095,	17.00020, 20.00045, 26.00098,

EUNICIA: 02.00003, 26.00075, 27.00029, 29.00007,  
 EUPLEURA: 01.00078,  
 EURYDICE: 31.00005,  
 EURYPANOEUS: 17.00013, 17.00014, 25.00002,  
 EURYPON: 13.00023,  
 EURYTIIUM: 04.00077, 26.00069, 25.00002,  
 EUTERPINA: 17.00003,  
 EUTETRAHYNCUS: 01.00011,  
 EVERMANNICTHYS: 03.00145,  
 EXOSONE: 06.00064, 12.00017, 21.00003, 27.00031,  
 FABRICIA: 03.00111, 03.00183, 17.00013, 17.00014, 19.00055, 19.00076, 19.00077, 21.00003,  
 FABRICIOLA: 06.00064,  
 FASCIOLARIA: 04.00020, 16.00014, 18.00085, 12.00086,  
 FAUCHEA: 03.00033,  
 FAVIA: 26.00056,  
 FINELLA: 03.00124,  
 FISSURINA: 26.00010,  
 FLORIDICTHYS: 04.00059, 04.00060, 27.00012,  
 FRAGILARIA: 26.00021, 26.00022,  
 FRAGILIDIUM: 06.00008,  
 FUCUS: 27.00165,  
 FUNDULUS: 06.00014, 12.00011, 17.00020,  
 FURSENKOINA: 01.00008,  
 GAMBUSIA: 06.00014,  
 GAMMARUS: 01.00066, 06.00072, 07.00035, 20.00003, 33.00025,  
 GASTROPSETTA: 03.00163,  
 GENNADAS: 03.00077,  
 GEDIA: 03.00158, 27.00132,  
 GEDTRICHUM: 20.00004,  
 GIFFORDIA: 06.00010, 31.00015,  
 GLABRANOMALINA: 05.00019,  
 GLOBOROTALIA: 05.00019,  
 GLOTTIDIA: 20.00010, 20.00030, 20.00091, 20.00092, 20.00097, 20.00110, 23.00003, 23.00014,  
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 GLYCINDE: 20.00059, 20.00062,  
 GUBIONELLUS: 31.00006,  
 GUBIOSOMA: 03.00145, 06.00036, 13.00002,  
 GOMPHIONEMA: 27.00057,  
 GOMPHOSPHAERIA: 03.00120,  
 GONIASTER: 03.00079,  
 GONIDLITHON: 26.00110,  
 GONODACTYLUS: 06.00022,  
 GONYAULAX: 03.00175, 06.00008,  
 GORGONIA: 26.00075, 26.00114, 29.00007,  
 GOULDII: 03.00124,  
 GRACILARIA: 01.00106, 03.00079, 03.00110, 03.00134, 12.00008, 14.00011, 14.00012, 17.00029, 17.00033, 17.00035, 19.00013, 22.00004, 30.00003, 30.00004, 31.00015,  
 GRANDIDIERELLA: 06.00066, 06.00067, 06.00072, 12.00043, 12.00048, 12.00088, 20.00077, 20.00079, 20.00081, 20.00103, 20.00104, 21.00003, 23.00003, 29.00013, 31.00019, 32.00003, 33.00025,  
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 GREGARIELLA: 03.00168,  
 GYMNAHIRIS: 03.00163,  
 GYMNODORVILLEA: 04.00074,  
 GYPTIS: 20.00016, 20.00080,  
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 HALECTINOSOMA: 13.00040,  
 HALICLONA: 27.00132,  
 HALIMEDA: 03.00033, 03.00034, 03.00110, 13.00043, 14.00008, 14.00009, 14.00010, 14.00012, 19.00068, 26.00005, 26.00012, 26.00055, 26.00075, 26.00081, 26.00110, 27.00146, 27.00147, 27.00164, 27.00165, 27.00169, 27.00170, 27.00171,  
 HALIPECTUS: 16.00004,  
 HALODULE: 01.00091, 03.00072, 03.00086, 03.00169, 06.00010, 06.00013, 06.00028, 06.00030, 06.00036, 06.00037, 06.00038, 06.00066, 06.00071, 07.00017, 11.00001, 11.00003, 11.00011, 11.00013, 13.00003, 13.00010, 13.00034, 14.00001, 14.00008, 14.00012, 15.00001, 17.00004, 17.00005, 17.00013, 17.00014, 17.00032, 19.00006, 19.00034, 19.00047, 19.00049, 19.00056, 19.00064, 19.00065, 19.00067, 19.00071, 19.00075, 19.00100, 19.00103, 19.00104, 20.00032, 20.00034, 20.00035, 20.00111, 22.00025, 25.00011, 25.00025, 26.00018, 26.00059, 26.00081, 27.00099, 27.00119, 27.00133, 27.00141, 27.00143, 27.00144, 27.00169, 27.00170, 30.00003, 30.00004, 31.00011, 31.00018, 31.00020, 31.00023, 33.00013, 33.00016, 33.00026,  
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 HETEROCRYPTA: 06.00020,  
 HETEROMASTUS: 12.00043, 12.00048, 19.00076, 19.00077, 20.00015,  
 HETEROSQUILLA: 06.00021,  
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 HIPPIDOCAMPUS: 16.00019,  
 HIPPIOSPONGIA: 03.00052, 03.00151, 03.00158,  
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 HOLOCENTRUS: 03.00145,  
 HOLOPLOCANIA: 13.00023,  
 HOLOTHURIA (HALODEIMA): 05.00034, 26.00027, 26.00028,  
 HOMAXINELLA: 03.00158,  
 HOMOTREMA: 04.00065,  
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 HYPANIDOLA: 05.00035,  
 HYPNEA: 01.00106, 03.00134, 06.00011, 06.00036, 17.00033,  
 HYPODONTOLAIMUS: 27.00058,  
 HYPOPECTRUS: 03.00145,  
 HYPSELODORIS: 16.00016,  
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 ISCHNOCHITON: 03.00168,  
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 LAMINARIA: 27.00165,  
 LAONERIS: 22.00006,  
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SECTION C-5  
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SECTION C-5  
METHODS: DATA ANALYSES, STATISTICS AND MODELS

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PART D

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The following references consist of those works believed to be of value for use in the identification of benthic fauna and flora from the southeastern United States and Gulf of Mexico. The lists are arranged by major groups to facilitate location of references of interest to the reader. Items listed under "General" may be of use for many different phyla and should be consulted in addition to the titles under the specific headings.

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