OCS Study
BOEM 2020-023

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Final Report

US Department of the Interior
Bureau of Ocean Energy Management
Office of Renewable Energy Programs (Sterling, VA)

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DISCLAIMER

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ABOUT THE COVER

Narragansett Indian Tribal member and University of Rhode Island undergraduate student project specialist, Chali Machado, examines a tree-stump and its surrounding root-mat preserved in their original growth positions in the exposed surface of a submerged paleocultural landscape dating from Cal BP 6555 to 6410, identified by URI-GSO during 2016 project field investigations conducted off of West Beach, Block Island, Rhode Island. Photograph by David S. Robinson, URI-GSO.

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Contents

List of Figures

Abbreviations and Acronyms

AMI	Area of Mutual Interest
BOEM	Bureau of Ocean Energy Management
CRMC	Coastal Resource Management Council [Rhode Island]
DOI	Department of the Interior
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NITHPO	Narrangansett Indian Tribal Historic Preservation Office
NROC	Northeast Regional Ocean Council
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
RI SHPO	Rhode Island State Historic Preservation Office
RIHPHC	Rhode Island Historical Preservation and Heritage Commission
THPO	Tribal Historic Preservation Office
URI	University of Rhode Island
URI-GSO	University of Rhode Island Graduate School of Oceanography
USET	United South and Eastern Tribes

1 Introduction

1.1 Project Description and Goals

This Final Report provides a summary description of the multi-year study entitled “Developing Protocols for Reconstructing Submerged Paleocultural Landscapes and Identifying Ancient Native American Archaeological Sites in Submerged Environments” (hereafter "the Submerged Paleocultural Landscapes Project,” “the project,” or “the study”). The project was conducted by the University of Rhode Island’s (URI’s) Graduate School of Oceanography (URI-GSO) and its research partners, the Rhode Island Coastal Resource Management Council (CRMC) and the Narragansett Indian Tribal Historic Preservation Office (NITHPO), over a seven-year period between 2012 and 2019, and involved the multidisciplinary investigation of five nearshore and offshore areas in Rhode Island waters (Figure 1).

The study was performed with funding from and in collaboration with the United States Department of the Interior’s (DOI) Bureau of Ocean Energy Management (BOEM) as part of a cooperative agreement between URI-GSO and BOEM. At the time of this project, BOEM’s statutory authority did not allow it to enter into cooperative agreements directly with Tribes, so BOEM, instead, worked with Tribes through a third party, such as URI-GSO. The Outer Continental Shelf Lands Act allows BOEM to enter into cooperative agreements with “Affected States.” Because Rhode Island is an affected coastal state, BOEM entered into a cooperative agreement with URI, a state institution. The project was particularly suited for synergistic interaction of multiple facets of expertise and knowledge between BOEM, URI-GSO, and NITHPO.

The Outer Continental Shelf (OCS) of the United States is increasingly becoming the focus of conventional and renewable energy development to meet the nation’s energy needs. Consideration of the effects this development may have on submerged historic properties, including Native American (Tribal[1]) cultural sites submerged by post-glacial sea level rise and now underwater on the continental shelf, is a legislatively mandated responsibility under multiple laws and statutes[2] for Federal agencies, including BOEM, during their review and permitting of these offshore activities. It is also a significant concern for individual states, Tribes, other regulatory agencies, stakeholders, and researchers that participate in the environmental review and consultation processes for offshore development projects.

This project was not related to any specific consultation or intended to serve any regulatory function, but was instead a research project, the purpose of which was to generate new information and knowledge designed to assist the State of Rhode Island, southern New England Tribes, and BOEM in future planning and decision making. The project’s overall goals were to:

1. Enhance and refine the scientific understanding of submerged paleolandscape preservation and distribution on the Rhode Island OCS with particular focus on areas of Tribal significance.
2. Contribute to the development of a clearly-defined, standardized methodology to identify submerged areas with cultural significance to contemporary Tribal people.

[1] In this document, the term “Tribal” or “Tribe” is used to represent *all* Native American indigenous communities, regardless of recognition status. Indigenous groups' interests in ancestral territory and resources, and the validity of their traditional knowledge and cultural practices, is not dependent on Federal or state recognition status.

[2] Outer Continental Shelf Lands Act (OCSLA); National Environmental Policy Act (NEPA); National Historic Preservation Act (NHPA)

3. Assist with the development of effective, culturally sensitive collaboration and consultation between Federal and state agencies, researchers, and Tribes who work together as part of the National Historic Preservation Act (NHPA) Section 106 compliance process.

1.2 Project Scope

Project goals were met by completing eight interrelated tasks and deliverables, inclusive of this Final Report. Project tasks were completed in collaboration with URI-GSO's project partners, as well as with the input and assistance of representatives from multiple federally and state-recognized Tribes, Federal and state agencies, industry, and regional and international academic instutions (see Acknowledgments at the beginning of this report). Each task required a unique approach and workflow, and resulted in a detailed written, digital, or video deliverable. This report provides only a brief summary of each task, and the reader is referred to the full deliverable (referenced in parentheses below) for the complete results and discussion.

The tasks and deliverables completed for the project included the following:

- Meetings, workshops, and an initial project workshop report (Coastal Mapping Laboratory 2015)
- Literature synthesis and reference database
- Field investigations, assessment of field methodology and a field report (Cacciopolli et al. 2018)
- Best practices report (Robinson et al. 2018)
- Geoarchaeological modeling report (Robinson et al. 2020)
- Geospatial data transfer (Gibson 2019)
- Documentary film (DeCiccio 2019)
- Final Report (this report)

2 Summary of Project Tasks and Deliverables

2.1 Project Meetings and Workshops, and Initial Project Workshop Report

Participation in multiple meetings and workshops was an integral element of the project scope and occurred throughout the project. The overall goal of these meetings and workshops was to initiate and support a multi-year discussion and exchange of ideas between the project partners and the broader academic, agency, industry, and Tribal communities. These meetings helped inform all project research, field investigations, and the development of the project best practices and geoarchaeological model.

The project began with an all-day Post-Award Meeting held at BOEM's Atlantic OCS Regional Office in Herndon, Virginia on September 20, 2012. The main purpose of the meeting was to kick-off the project, introduce project partner leads and BOEM project staff, and discuss expectations and any questions regarding the project's scope, deliverables, and timeline. Detailed minutes documenting the meeting were prepared by URI-GSO and submitted to BOEM as the first project deliverable (Robinson 2012).

The 2012 Post-Award Meeting was followed by a three-day initial project workshop held between April 8–10, 2013. A total of 55 representatives from four different countries, eight different Federal- and state-recognized Tribes (representing a region extending from Maine to Delaware), five Federal agencies, eight state agencies, six universities, two museums, and four consulting firms participated in the workshop. The goals of the initial project workshop were to:

- Review and recommend best practices that would help inform the development of Tribally sensitive, science-based guidelines for identifying, avoiding, or mitigating adverse effects to submerged paleocultural sites on the OCS. Of particular importance was the synthesis and incorporation of Tribal, agency, academic, and industry perspectives into these best practices.

- Identify appropriate techniques and steps that would foster open communication and meaningful interaction among all parties throughout the project.

- Develop a common understanding and language for the cultural and scientific aspects of the project.

- Provide an overall understanding of the origins, goals, objectives, and tasks for the project.

- Promote open and respectful dialog with participating Tribes.

The first two days of the workshop were held at URI-GSO Narragansett Bay Campus in Narragansett, Rhode Island. Each of these days was divided into moderated, subject-specific sessions in which invited speakers gave short oral presentations, which were followed by open discussion between all attendees of the material presented. Topics discussed included: “How Do You See Things?”; Origin and Significance of [the project’s] Research Initiative; Our Current State of Knowledge; Integrating Tribal Values and Information; Critical Aspects of the Submerged Paleocultural Landscapes Initiative; The Impact of Sea Level Rise and Marine Transgression on Submerged Paleolandscapes; Evidence-Based Reconstructions of Submerged Cultural Landscapes and Predictive Modeling; and the Nature and Excavation of Submerged Settlements. Blank posters with a variety of different subject headings, such as “Best Practices for Integrating Tribal/Non-Tribal Oral Histories Into Predictive Modeling,” “General Concerns/Issues,” and “Opportunities,” were affixed to the walls of the workshop room. Participants were provided with blank “Post-It” notes, encouraged to document anonomously their thoughts and concerns, and asked to attach the notes to the approprate poster at any time during the conference. An on-site reception for all conference participants was held at the conclusion of Day 1 to facilitate additional interaction and informal discussion. The completed posters and Post-It note comments were revisited during Day 2, which focused on a discussion of perspectives and expectations for the project and the initial development of best practices for paleoenvironmental reconstruction, predictive modeling of site locations, integration of Tribal oral histories and non-Tribal science into predictive modeling, identification of submerged paleolandscapes, and submerged settlement site identification and excavation. Day 3 of the workshop was held at the Narragansett Indian Tribe’s Longhouse in Charlestown, Rhode Island, and consisted of concluding two Open Forum sessions. The first session was limited to Tribal attendees. The second session was opened to include Tribal attendees and project partners from URI-GSO and BOEM.

The primary outcomes of the initial project workshop were the initation of truly collaborative and respectful dialog between the academic, agency, industry, and Tribal communities, and the opportunity to begin working together towards a common goal. Although meaningful, positive progress was made

towards achieving the workshop's goals, the dialog that occurred throughout the workshop sessions indicated that it was premature to expect that those goals could be fully realized during just three days of interaction. Although participants clearly needed more time to process cognitively, symbolically, and spiritually the content and meaning of the workshop's discussions, all said that they appreciated the opportunity to be part of such a necessary and exciting dialog, and that the workshop had been a meaningful experience on both personal and professional levels. Individuals who attended the workshop commented that they thought it was an important starting point towards establishing open lines of communication, building trust and respect, establishing common goals, and developing transparent and mutually agreed upon best practice protocols for identifying submerged paleocultural landscapes. Knowledge gained during the initial workshop was utilized by the project partners in the study's subsequent research and collaborative efforts, especially in the development of the project's best practices and geoarchaeological modeling documents. A detailed description of the workshop and its recommendations is presented in the Summary Report of the Initial Project Workshop prepared by URI-GSO and submitted to BOEM in 2015 as a project deliverable (for more information, see Coastal Mapping Laboratory 2015).

An Inter-Tribal Interim Project Workshop was held at the Narragansett Indian Tribe Longhouse on September 17, 2015, to update the southern New England region's Tribes on the project's progress and to request comments and input on how best to ask for and integrate Tribal knowledge and oral histories into the project's predictive modeling process for identifying areas of the OCS with variable potentials for containing submerged ancient Native American sites. This meeting resulted in several important insights concerning ancient Tribal oral histories and traditional ocean knowledge that were later incorporated into the project's best practices and modeling documents.

Additional important project-related meetings included multiple presentations given by the URI-GSO and NITHPO project leads, with periodic participation by the BOEM project lead, during the United South and Eastern Tribes (USET) Culture and Heritage Committee meetings between 2014 and 2018. USET is a nationally prominent and respected inter-Tribal organization with 27 federally recognized Tribal Nation members whose broad policy platform, annual meetings, and initiatives influence the most important and critical issues facing all of Indian Country. The purpose of presenting to USET was to initiate dialog about the project and its goals and to seek input and advice from a broader Tribal community. Project partners from URI-GSO and NITHPO introduced the project to the USET Culture and Heritage Committee in June 2014 at their Semi-Annual Meeting in Bar Harbor, Maine. Subsequent updates on the project were given periodically by the project partners at USET's Impact Week Meetings in Washington, DC. The final project update to the USET Culture and Heritage Committee was on February 6, 2018, summarizing the project's best practices document (Robinson et al. 2018) and presenting for discussion URI-GSO's recommendations for near-term, intermediate-term, and long-term next steps for moving forward with the implementation of these best practices.

2.2 Literature Review and Synthesis, and Reference Database

This task was completed early in the project (2013) and entailed the performance of a detailed review and synthesis of available relevant marine archaeological, geological, and geophysical survey data and literature. This information was then compiled into a reference database that provided background information supporting the performance of subsequent project research tasks. The deliverable generated by this task and provided to BOEM consisted of two parts: 1) a bibliographic listing of written resources directly applicable to this project (i.e., scientific journal articles, books, technical reports, papers, etc.); and 2) a geospatial compilation and mapping of legacy data from previous marine surveys, within and in the vicinity of the project study areas and the surrounding southern New England region, that were available publically from online databases, through collaboration with our colleagues, or by accessing an archive at the URI-GSO. The written resources in the bibliography were organized by subject. Topics

covered in the compiled references included paleolandscape reconstruction and mapping, predictive modeling, marine geology and marine processes specific to Rhode Island and southern New England, and previous archaeological research. The marine geological survey database focused on previously recorded bathymetry, sidescan sonar, subbottom profiles, vibracores, and sea floor surficial geologic interpretations in the study areas. Accompanying the reference database in this task's deliverable were five maps (organized by data type) that illustrated the geographic location and extent of previously collected data relevant to the project. All of the maps were created using ESRI's ArcInfo Desktop software. Supporting data layers in each map were organized in geodatabases, which facilitated their delivery in a digital format to BOEM. Because these maps were designed to summarize the location of previously collected data rather than contain the data itself, hyperlinks were included in the digital ArcInfo documents, so that users can "mouseover" the data of interest on the map and connect directly to the online data source for additional information and download options.

2.3 Field Investigations and Report

Field investigations were conducted for the project between 2013 and 2016 in four of the project's five study areas illustrated in Figure 1: 1) Gorton Pond, a glacially formed kettle pond in central Rhode Island; 2) Cedar Tree Beach/Greenwich Bay, a protected coastal/nearshore shallow embayment location in central Narragansett Bay; 3) Block Island/West Beach, a coastal/nearshore island location approximately 19 km offshore; and 4) the "Mud Hole," an area south of Narragansett Bay in the open ocean waters Rhode Island Sound. Although these areas (and the fifth study area, the Rhode Island and Massachussetts Area of Mutual Interest (AMI) for commercial wind development) are separated by tens of kilometers, they share the same regional geologic and paleocultural history, which is key to identifying and characterizing preserved paleocultural landscapes. The distinction between terrestrial and submerged environments is obvious in the contemporary landscape, but ancestral Tribal peoples who occupied this area interacted with a landscape that was very different from contemporary conditions, due to the effects of deglaciation and post-glacial sea level rise.

Project field investigations performed each year by the project partners were conducted following a Work Plan approved by BOEM and NITHPO, under a Phase I Intensive Archaeological Survey Permit issued to project co-Principal Investigator, David Robinson (URI-GSO), by the Rhode Island State Historic Preservation Office (RI SHPO) (i.e., the Rhode Island State Historical Preservation and Heritage Commission [RIHPHC]) (RI Permit No. 12-25). Fieldwork was also performed with authorization from the RI CRMC (RI CRMC Authorization No. 2013-08-038). Field investigations conducted for the project consisted of marine geophysical/remote sensing survey, marine geotechnical sediment sampling, and marine geoarchaeological investigations. The overall goals of these geological and geoarchaeological investigations were the following:

- Assess the extent to which relict paleolandsapes survived post-glacial sea level rise in the study areas and whether or not they contained paleocultural deposits

- Understand the geologic processes associated with paleocultural landscape preservation

- Identify environmental proxies associated with preserved paleocultural landscapes that could be used to develop predictive models regarding the archaeological sensitivity of the seafloor

- Test the efficacy of existing and new survey equipment and methods for identifying and characterizing paleocultural landscapes

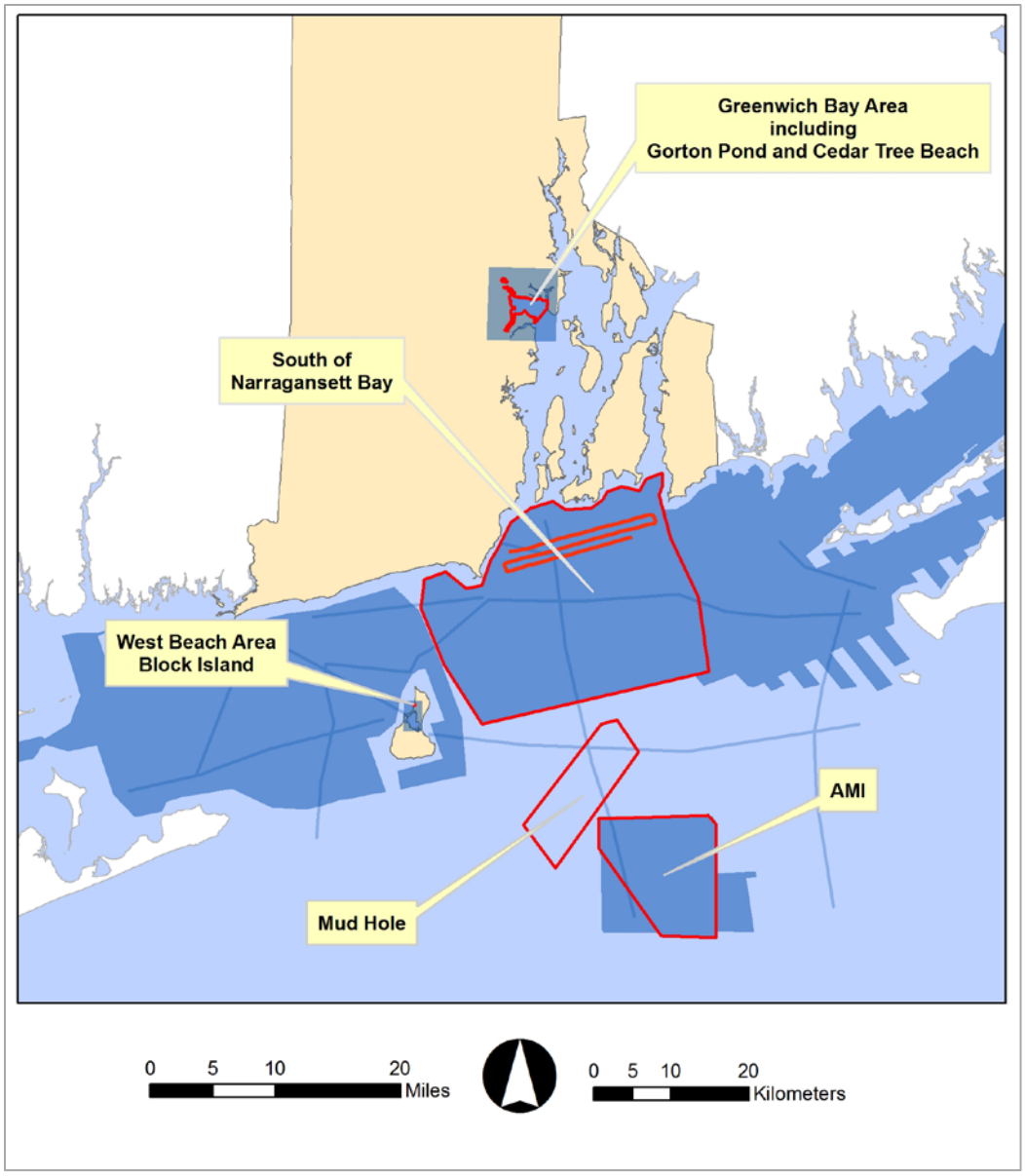

Figure 1. Study area locations.
Legacy data areas are shown with dark blue shading. Newly acquired data, or legacy data reinterpreted for the project, are outlined in red and identified with yellow call-out boxes.

Field investigations took into account comments and recommendations voiced by Tribal participants during the project's initial workshop, described above. As such, the work progressed in phases from the least-to-most invasive investigation techniques with an overall goal of minimizing the disturbance to the seafloor as much as possible during the performance of all phases of the field investigations.

The project field report prepared and submitted to BOEM as a project deliverable (Caccioppoli et al. 2018) summarized the field operations at each study area in detail and provided an assessment of the field methodology and data acquisition procedures at each location. Descriptions of the project's field

investigations were organized chronologically by year and by study area location and are briefly summarized below.

2.3.1 2013 Field Investigations

Field investigations in 2013 focused on Gorton Pond and Cedar Tree Beach/Greenwich Bay study areas and included the following activities:

- Sediment coring (Gorton Pond) to obtain samples for radiocarbon dating and paleoenvironmental characterization.

- Gradiometric remote sensing and visual sediment probing to

    1. Test the hypotheses that: a) an element of the paleolandscape is preserved submerged and buried off of Cedar Tree Beach; and b) that this paleolandscape may have been utilized by pre-contact period inhabitants and, therefore, could be a source of some of the pre-contact period stone artifacts appearing in Cedar Tree Beach's swash zone.
    2. Test and evaluate the combination of close-interval (i.e., 1-m track line spacing) gradiometric survey and visual sediment probing, for identifying submerged paleocultural landscapes; and educate Tribal research partners in the application and use of geophysical survey equipment and non-disturbance marine remote sensing survey methods.

2.3.4 2014 Field Investigations

Field investigations in 2014 focused on Cedar Tree Beach/Greenwich Bay study area and included the following activities:

- Sediment coring in the shallow waters off of Cedar Tree Beach.

- Geoarchaeological subsurface sampling/excavation of two 1-x-1 m test units at locations identified by the previous year's gradiometric or visual sediment probing surveys as having magnetic anomalies potentially associated with a paleocultural hearth feature or stratigraphy suggestive of intact stratified paleolandsurfaces.

2.3.5 2015 Field Investigations

Field investigations in 2015 focused on the Block Island/West Beach and Mud Hole study areas and included the following activities:

- Sediment coring conducted in Block Island's Wash Pond (a small coastal pond adjacent to West Beach) and in the Mud Hole study area. Coring in the Mud Hole study area was conducted from URI's scientific research vessel *Endeavor* as Cruise EN-565. The project's academic, Federal government, and Tribal scientists working together on board URI's R/V *Endeavor* gained first-hand experience collaborating and performing marine geoarchaeological field research (obtaining non-disturbance remote sensing data and selective vibracore sediment samples) for the project on a large scientific research vessel in the offshore environment. A real-time digital audio-visual connection between the ship and shore-based members of the project team, interested Tribal members, and members of the general public was provided and maintained by the URI-GSO's

Inner Space Center, allowing a diverse segment of the public access to project activities occurring at sea in real-time.

- Non-disturbance/minimal disturbance intertidal and subtidal visual reconnaissance archaeological walk-over and diver surveys of the waters off of West Beach in areas with exposed organic peat/paleolandsurface deposits to map their extent and assess their paleocultural archaeological sensitivity.

2.3.6 2016 Field Investigations

Field investigations in 2016 focused on Block Island/West Beach and an area south of Narragansett Bay and included the following activities:

- Geophysical remote sensing survey (sidescan sonar and CHIRP subbottom profiler) of the West Beach/Block Island study area and a portion of Block Island's Great Salt Pond, and subbottom profiler survey and sediment coring operations conducted south of Narragansett Bay as part of URI's scientific research vessel *Endeavor* as Cruise EN-580. Participation in a BOEM-, Northeast Regional Ocean Council- (NROC-), and Rhode Island Endeavor Program-supported offshore educational and capacity-building cruise proposed and organized by the URI-GSO team with academic (local and international), Federal government and regional Tribal participants. The purpose of the cruise was to provide experience and training in marine geoarchaeological method and theory, technologies, and scientific practices, as well as to create opportunities for in-depth discussions and honest and open conversations about some of the difficulties and concerns associated with agencies, Tribes, and academic researchers working together. Possible future directions for continuing and supporting collaborative and community-based Tribal ocean science and research were also discussed. Real-time digital audio-visual connectivity between the ship and shore-based members of the project team, interested Tribal members, and members of the general public was, once again, provided and maintained by the URI-GSO's Inner Space Center.

- Continuation of non-disturbance/minimal disturbance visual reconnaissance archaeological diver surveys of the waters off of West Beach in areas with exposed organic peat/paleolandsurface deposits to map their extent and assess their paleocultural archaeological sensitivity.

2.4 Best Practices Report

A best practices report (Robinson et al. 2018) was produced as one of the primary deliverables for the project. The purpose of the best practices document was to serve as an initial guide for improving the effectiveness and appropriateness of Tribal engagement and geoarchaeological research. These topical areas form the bases for successful government-to-government consultation associated with Federal project review and effective identification and protection of submerged historic properties. Respectful engagement and collaborative relationships are the foundation for mutually beneficial and successful consultation. What appears to have been largely absent from most previous Federal agency guidance documents has been recommended procedures about how to establish and develop these relationships before engaging in consultation. Consultation cannot be expected to function optimally without an established basis of respectful and effective communication, trusting and mutually beneficial relationships, and shared capacities among the involved groups to become and remained engaged as collaborative partners. The best practices document addressed these underlying issues and provided new insights regarding relationships with Tribal communities from the perspective of people working within the various existing regulatory and developmental collaborative relationship frameworks. It was intended

to provide recommendations concerning the actual steps that are required to achieve the stated goals of Federal and state agency assessment and identification guidance documents. The document was not intended to provide new standards to be implemented during consultation. Instead, the best practices were intended to be informational, and to support Federal and state agencies, Tribal communities, and researchers.

The best practices report recommended additional development in three key areas is required to optimize successful consultation between agencies, Tribes, and researchers: a) communication; b) relationship building; and c) capacity-building. Improvement in each of these areas is essential to the identification and protection of submerged paleocultural landscapes in the offshore development project review process. Areas of the OCS considered for federally permitted offshore activities should be characterized prior to disturbance in a phased scientific process: a) a thorough desktop study resulting in a geospatial synthesis of existing geoarchaeological information in the study area; b) an examination of sea level rise models and the development of multiple paleoshoreline reconstructions based on each model; c) a detailed reconstruction of the complete subsurface stratigraphy of the study area on a regional scale, and identification of stratigraphic facies potentially associated with human habitation; d) paleoenvironmental reconstructions of the study area for the time period of hypothesized habitation of the area; and e) assessment of the paleocultural sensitivity of preserved paleolandscapes in the study area. Although the project's recommended best practices were created within a Rhode Island geographic research context, they were intended to be broadly applicable to multiple geographic areas and should be seen as dynamic recommendations that require periodic updating as new information, technologies, ideas, and priorities become available and evolve over time.

The best practices report highlighted multiple areas that require additional development in order to support future multicultural collaborative research and marine spatial planning in submerged environments. The three key areas for which immediate action could be implemented, along with recommended next steps for beginning to address them (in bullets) include the following:

1. **Develop a standardized methodology for identifying areas of paleolandscape *preservation* in submerged environments, instead of attempting to use predictive models to simply locate areas with the highest potential for containing submerged archaeological *sites*.**

Applying traditional archaeological predictive modeling approaches currently used on land to the OCS is problematic due to the limited amount of pre-existing geologic and paleoenvironmental data that is available and, with a few exceptions, the near total absence of detailed archaeological data for the submerged environment. In addition, developing models of paleocultural sensitivity in submerged environments requires almost total dependence on geophysical remote sensing and geotechnical sediment sampling equipment, making it extremely challenging to conduct the highly detailed level of archaeological site identification and evaluation that is necessary for testing predictive models. The most important question currently to be answered about the paleocultural sensitivity of submerged environments is not "Where and how did ancestral peoples interact with currently submerged paleolandscapes," which traditional predictive models might assist with, but instead, "Are any paleolandscapes actually preserved in the area of interest?" If preserved paleolandscapes are located, then additional investigations to assess the extent of preservation, the type of oceanographic processes that resulted in their preservation, and the paleoenvironmental characteristics of the preserved landscape must be conducted before any assessment of paleocultural sensitivity can be initiated.

In addition to the current lack of geologic, geophysical, and cultural data available for submerged environments, researchers and Tribal representatives who attended this project's initial workshop emphasized that the results of predictive models should not be used as the primary method for

decision making to identify geographic areas of cultural importance (Coastal Mapping Laboratory 2015). For these reasons, research in the near future should focus on addressing data gaps in the submerged environment to understand the extent and type of submerged paleolandscape *preservation*, rather than on applying predictive models to poorly defined submerged environments in an effort to identify archaeological sites.

- Until additional data becomes available, and the capacity of agencies, Tribes, and researchers to share information respectfully and collaboratively improves, adopting a more holistic, Tribal Cultural Landscape approach to the site identification process (Ball et al. 2015) should be investigated and considered. This approach views preserved relict landforms, not "sites," as places of cultural importance.

- Investigate alternative methods to traditional archaeological predictive modeling to assess areas of cultural importance in submerged environments. Begin with a thorough literature search across multiple disciplines about the types of models that may be of assistance, and then develop pilot studies to test the models for assessment of paleocultural sensitivity in submerged environments.

- Develop a comprehensive, publicly available, digital geospatial database of geologic, geophysical, and archaeological information available for the OCS and other submerged environments of interest. Include a compilation of the sea level change models available for each area and contact information for researchers with demonstrated expertise in the geology, geophysics, and archaeology of each geographic area. Include contact information for Tribal representatives and links to information about Tribal history, practices, and cultural priorities for each area. Consider providing funding opportunities for agencies, local researchers, and Tribes to work together to develop this database.

2. Increase the capacity of Tribal communities, agencies, and academic researchers to work together in a mutually respectful and beneficial manner.

The identification and protection of submerged paleocultural landscapes benefit from an approach that is multidisciplinary and multicultural in nature. Applying the diverse perspectives, information, ideas, and knowledge of engaged partners from the agency, scientific, and Tribal communities to the research and management problems associated with submerged paleocultural landscapes identification and protection offers the best opportunity for the most comprehensive and mutually agreeable solutions. Successful collaboration requires each partner to have established baseline capacities necessary for working together. Groups that have adequate staff (with the necessary interest, experience, knowledge, training, and skills), facilities and infrastructure, and sustainable sources of funding will be most able to implement best practices and be optimally positioned to take advantage of opportunities to collaborate or consult. Consequently, building capacity across these communities must be seen as a priority.

- Identify one or more staff members who want and are qualified to serve as the group's lead for developing and maintaining increased capacity for engaging in collaborative relationships with other groups. This and/or these individual(s) should have demonstrated prior experience, success, and a genuine commitment to facilitating collaboration with diverse groups.

- Initiate regular in-person meetings between the identified staff member(s) representing each group to provide enhanced capacity for relationship building. Meetings should be held at least

twice a year (or as often as mutually agreed upon), with each meeting organized and led by one of the groups, following a rotation that changes with each meeting. The purpose of the initial meeting would be to: a) present and discuss key recommendations of this best practices document; b) to review and reach a consensus regarding baseline requirements for effective, respectful oral and written communications; and c) discuss development of a mandatory, cultural sensitivity training program for all individuals involved in these meetings and the establishment of collaborative relationships between the groups. The training program is to be created by Tribal and non-Tribal group members and include education about the world-view, professional and personal responsibilities, goals, and concerns associated with each group that is participating in the collaborative relationship.

- Develop a Tribal ocean research consortium comprised of multiple Tribal communities united in their desire to build capacity to become active Tribal participants in the ocean sciences and to engage Federal and state agencies, universities, and other research groups in seeking funding opportunities.

3. Build personal relationships among individual members of the Tribal, agency, and research groups.

The development of sustainable, long-term, respectful, and trusting relationships among the agency, Tribal, and research groups is required to foster collaborative, mutually beneficial decision making. The importance of this type of relationship between these groups is acknowledged by all, but the challenges associated with attaining them remain significant. It is necessary to recognize that each group is composed of individuals whose personal commitment is tied to an emotional aspect that frequently controls his or her feelings about the other groups, and, ultimately, defines the nature of the relationships. A personal commitment to multicultural relationship building is required for all individuals involved in collaborative activities.

- Seek opportunities to develop personal relationships with individuals from diverse groups in casual situations outside of the work environment. Informal interaction in one-on-one or small group settings provides an opportunity for a foundation of care, trust, and understanding between individuals and groups to develop, and can be a powerful way to address and eliminate stereotypes and prevent conflicts.

- Non-Tribal individuals should consider attending local Tribal cultural events, such as powwows, musical performances, or public ceremonies, and, upon invitation, visiting nearby Tribal lands to see, experience, learn, and gain a deeper appreciation and understanding about traditional Tribal sciences, practices, ceremonies, and beliefs, as well as places in the landscape that are of importance to Tribal communities.

- Tribal individuals should consider attending “open campus” days at nearby research institution(s), or attending public lectures at local libraries, to gain additional insight into the scientific research process and projects underway in their local area. In addition, many local conservation groups, agencies, colleges, and universities offer opportunities to become “citizen scientists” by welcoming individuals of all ages and backgrounds to assist with data collection and interpretation for environmental monitoring projects. These experiences provide important opportunities for sharing diverse perspectives in a casual, friendly environment.

For a more detailed description of the project’s recommended best practices, see Robinson et al. 2018.

2.5 Geoarchaeological Modeling Report

The geoarchaeological modeling report (Robinson et al. 2020) was another of the primary deliverables for the project. Geoarchaeological modeling is based on the generally accepted theories that there is an association between past human activities and different types of paleolandforms and paleoenvironments, which results in a material culture expression sometimes preserved within the present landscape in a predictable manner. This association has been used with some success in terrestrial contexts onshore to develop models that predict where cultural materials may be located (Kvamme 2006; Verhagen 2012). One of the objectives of the project was to examine whether geoarchaeological modeling could be applied effectively in the submerged environment to assist in making informed cultural resource management decisions for the OCS.

Initially, BOEM's scope for the project included the development of a predictive model for the Rhode Island OCS based on information compiled from a three-day workshop convened at the start of the project (Coastal Mapping Laboratory 2015). Although the workshop was an excellent venue for individuals from diverse backgrounds to interact and share information, it revealed significant gaps in the available geoarchaeological data and accessible Tribal oral tradition information considered necessary for completing the project's modeling effort as scoped. It also revealed that developing a standardized methodology for modeling was a more complex and challenging task than originally anticipated. Additionally, the workshop clarified that mutually beneficial and culturally sensitive relationships between the diverse groups engaged in the project needed further development before effective collaboration could take place. These challenges could not be fully addressed within the context of a three-day workshop.

In response to the results of the workshop, the project's modeling process was altered and organized into the following six sequential steps:

1. Conduct a thorough literature review to understand the current state of knowledge regarding the use of archaeological predictive models in submerged environments.

2. Conduct a detailed Desktop Study to synthesize the current state of geoarchaeological knowledge in the study area into geospatial format.

3. Develop a modeling process that can be applied to any geographic area to assist with locating and characterizing preserved paleocultural landscapes.

4. Develop regional sea level change and stratigraphic models to assist with locating and characterizing preserved paleolandscapes or paleolandscape fragments on the Rhode Island OCS.

5. Apply the modeling process and model (developed in steps 3 and 4 above) to the project study area by conducting geoarchaeological investigations in five diverse case study areas.

6. Develop recommendations about the use of predictive models in submerged environments, specifically with respect to identifying paleocultural landscapes of Tribal significance.

The geoarchaeological modeling document produced for the project presented the results of the tasks outlined above. Section 1 of the report provided the context for the project's modeling task. Section 2 provided a synthesis of the key geoarchaeological modeling concepts that are necessary to understand the potential applicability of terrestrial modeling to the submerged environments. Section 3 presented a process for submerged study area characterization that can be applied to a variety of geographic areas, and used when diverse types, amounts, and resolution of data are available. Section 4 compiled the results

of the project's literature search task (summarized above) that served as a comprehensive desktop study conducted for the overall project area as the basis for the modeling tasks included in the geoarchaeological modeling report. Sections 5 and 6 of the report presented two regional models for the study area based on the data obtained through the project's literature search/desktop study. Section 7 summarized the results of archaeological and/or geological investigations of the project's five study areas, which served as case study areas, and discussed the implications of these studies for geoarchaeological modeling of submerged environments. The final section of the report included conclusions and recommended next steps to further refine the concepts presented in the report.

For a detailed description of the project's geoarchaeological modeling methods, the resulting regional stratigraphic model, and recommendations for applying predictive models to submerged environments, see Robinson et al. 2020.

2.6 Spatial Data Transfer

A majority of data reviewed and collected during the project was transferred to BOEM as a geospatial dataset prepared by URI-GSO (Gibson 2019) using ESRI's ArcInfo software as the visualization portal. In situations where data could not be converted to ArcGIS format, such as sediment core photographs, hyperlinks to PDF or JPG files were provided within the ArcGIS framework, so that all data was associated with the geographic location from which it was collected. Raw, unprocessed data was not included in the geospatial data synthesis and was instead archived at the URI-GSO. Data was compiled in a digital geospatial format using ESRI's ArcGIS Desktop software, specifically the "ArcMap" and "ArcCatalog" applications. This software was selected because it is widely used in a variety of organizations and research disciplines, and provides a standardized, transferable platform to compile and visualize diverse types of data.

The project's spatial data transfer deliverable consisted of two general categories of digital information:

1. **Legacy data**: Geophysical, geological, and archaeological data that were recorded by various individuals and organizations prior to the initiation of the project and were available publicly or through collaboration with the project team's colleagues. These data formed the basis of a thorough "desktop study" that was conducted at the beginning of the project in order to synthesize the current state of knowledge in the study area and to guide additional data acquisition. The legacy data included in the spatial data set did not represent an exhaustive synthesis of all data available for the study areas. Instead, the project team reviewed available data and included in the data synthesis only those data sets that were considered most useful and of high enough quality to provide an initial geologic, geophysical, and/or archaeological characterization of the project area. A detailed discussion of the desktop study data was provided in the geoarchaeological modeling report deliverable (Robinson et al. 2020).

2. **Project data**: New geophysical, geological, and archaeological data that were collected during the course of the project's field investigations that were performed in four of its five study areas. A detailed discussion of data collection methods is provided in the project's Field Report 2013–2016 deliverable (Caccioppoli et al. 2018), and the results and conclusions from the analysis of this data are presented in the project's geoarchaeological modeling report deliverable (Robinson et al. 2020).

Legacy data leveraged for the project were collected between approximately 1975–2012 in Narragansett Bay, Rhode Island, and in state and Federal waters offshore of southern New England. The geographic extent of legacy data included the Greenwich Bay area in west central Narragansett Bay and the area extending from the shoreline of southeastern Connecticut, southern Rhode Island, and southwestern

Massachusetts out onto the continental shelf approximately 45 km. New data acquired as part of the project were collected between 2012–2017 at five locations. The specific temporal extent of each data layer was included with its associated metadata.

Most project data was organized into the following seven geodatabases:

1. **Archaeological survey data:** Legacy and project archaeological data in point, polyline, and raster formats that pertain to the Cedar Tree Beach (Greenwich Bay) and West Beach (Block Island) study areas. Hyperlinks to supporting material, such as photographs of underwater features, were included when available.

2. **Sediment cores:** Point locations of legacy and project sediment cores examined for the project, with hyperlinks (when available) to basic core information. Hyperlinks were provided to core photographs and geotechnical data when available.

3. **Regional geology and archaeology study areas:** Polygons showing the approximate geographic locations of legacy geological or archaeological investigations conducted prior to the initiation of the Submerged Paleocultural Landscapes Project. These data were part of the literature search/desktop study task conducted at the beginning of the project and provided information about the regional and local geological and archaeological state of knowledge. Hyperlinks to the associated reports were provided, when available.

4. **Subbottom tracklines:** Polygons and polylines showing the location of legacy and project seismic reflection track lines pertaining to the study. Polylines included clickable hyperlinks to JPG images of the associated seismic reflection profiles. For some legacy datasets, the project team did not investigate each seismic reflection profile individually, but relied on the associated publication to provide a general geophysical characterization of the area in question. In these cases, a polygon of the study area was provided with a hyperlink where individual seismic reflection profiles could be accessed, if desired.

5. **Sidescan sonar data:** Raster files of processed legacy and project sidescan sonar mosaics.

6. **Bathymetry:** Full coverage, seamless bathymetric rasters for legacy and project study areas at various resolutions.

7. **Basemaps:** Polygons representing state outlines, the project study areas, NOAA navigational charts, orthophotographs of the Cedar Tree Beach (Greenwich Bay) and West Beach (Block Island) study areas, and various feature outlines that formed the bases for project maps.

In addition to the ArcGIS databases described above, additional supporting data transferred to BOEM was organized into standard Microsoft Windows folders described below. Files in these folders provided source information for the hyperlinks available in the ArcGIS project. These files could also be viewed as "standalone" files using a PDF reader or a standard image viewer.

1. **Archaeology Regional Background**: Publications providing archaeological context for the project study areas.

2. **Core Summary Images**: PDF images of cores and core descriptions, when available.

3. **Explanatory Report:** A Microsoft Word file representing the explanatory report that accompanies the digital dataset.

4. **ArcMap Project:** The ArcMap *.mxd file used to produce Figure 1 in the explanatory report.

5. **Miscellaneous Hyperlink Files**: Publications in PDF format that provided regional geological context for the project.

6. **Subbottom Images**: JPG images of seismic reflection profiles. Profiles were standardized so that the northerly or westerly direction was at the left of the image, and the southerly or easterly direction was at the right of the image.

7. **Visual Sediment Probe Images:** Imagery from the archaeological investigation at Cedar Tree Beach, Greenwich Bay.

8. **West Beach Archaeo:** Imagery, descriptions, and Accelerator Mass Spectrometry dates from the archaeological investigations at West Beach, Block Island.

The ArcMap project included with the spatial data transfer deliverable contained “hyperlinks” to supplement many data layers. A hyperlink is a data layer that is not immediately visible in the ArcGIS project but can be accessed by clicking on an ArcMap feature, such as a point, polygon, or line. For example, subbottom tracklines are easily visualized in ArcMap, but the seismic reflection images associated with each trackline cannot be visualized with a 2-D map. With hyperlinks enabled, clicking on a trackline of interest opens the associated seismic reflection image in a separate viewing window.

The literature review/desktop study task that was conducted early in the project to provide regional geological and archaeological contexts for the project’s study areas identified several publications that provided particularly useful overviews. Approximate geographic boundaries for the data in these publications were included in the spatial data transfer’s ArcMap project under a group layer entitled “Regional Geology & Archaeology Study Areas.” Hyperlinks from the geographic boundaries layers to the associated publication were provided. In some cases, the hyperlinked publication provided links to additional downloadable data.

All ArcGIS data layers included in the spatial data transfer contained appropriate metadata in standardized FGDC CSDGM format, accessible through the “Description” tab in ArcCatalog. Metadata associated with project data was created with ArcCatalog’s metadata editor tools. Legacy data were obtained from a variety of sources. The amount and type of metadata associated with the original data sources varied considerably. If digital metadata from the original source organization was available, then it was appended to its associated ArcMap layer as originally written. If digital metadata was not available, it was created with the ArcCatalog metadata editor tools using information provided in the publication associated with the dataset.

2.7 Documentary Film

An approximately 30-minute long, close-captioned documentary film on the project (DeCiccio 2019), suitable for a general audience and intended as an educational and public outreach tool, was prepared by URI-GSO’s Inner Space Center filmmaker, Alex DeCiccio, and submitted in June 2019 as one of the final deliverables of the project. Entitled “The Submerged Paleocultural Landscapes Project: A Collaborative Approach for Identifying Ancient Native Sites on the Continental Shelf,” the film presents a multi-vocal narrative description of the project as a unique collaboration between diverse project research partners and outlines its goals and objectives, study areas, research methods, and findings. The film features still photographs and video recorded in the field, in the labratories at URI-GSO, and during workshops and meetings over the course of the project.

3 Conclusions and Recommended Next Steps

3.1 Overview

Overall, the Submerged Paleocultural Landscapes Project was a positive experience that created new relationships, strengthened existing ones, or, in some cases, clarified areas in need of improvement. It also better defined and enhanced the capacity for diverse groups to work together in this type of collaborative research. The project was not without its frustrations and negative experiences, as areas of concern and conflict, ignorance and misunderstanding, and deficits in the current capacities of agencies, Tribes, and researchers to work together towards a common goal were revealed. However, identifying and acknowledging these challenges is a positive first step towards improving current and future collaborations. The Submerged Paleocultural Landscapes Project provided a unique opportunity for diverse groups to assess their priorities and capacities, share perspectives, and move forward together when responding to needs, opportunities, and challenges related to the identification and protection of paleocultural sites in submerged environments.

From a scientific research perspective, the Submerged Paleolandscapes Project provided an important opportunity to evaluate existing geological and archaeological survey guidelines for characterizing and identifying culturally sensitive areas in submerged environments. Three paleocultural sites were identified embedded within preserved paleolandscapes in shallow (1 to 4 m deep) and nearshore (10 to 30 m) Rhode Island waters of the relatively protected Greenwich Bay, and the more exposed West Beach on Block Island. Glaciolacustrine sediments were also located in cores obtained at the Mud Hole study area, suggesting that a third paleolandscape may be preserved in deeper, higher-energy, offshore waters on the OCS. Analysis and interpretation of data obtained during field surveys in these project study areas contributed to a more comprehensive understanding of the potential paleocultural sensitivity of offshore areas on the Rhode Island OCS. In addition, the applicability of archaeological predictive models for submerged environments was examined in detail, and a unique modeling process and regional stratigraphic modeling approach was presented that can be applied to any geographic area. Lessons learned from this research will contribute to the improvement and standardization of the current methods used to survey, interpret, and characterize submerged environments, regardless of project scope or geographic area.

3.2 Next Steps for Developing Effective and Culturally Sensitive Consultation

Recommended next steps are based on the research that was done over the course of the project and from multiple conversations in late 2018 and early 2019 with members of the Tribal Historic Preservation staff from the Mashpee Wampanoag, Mohegan, and Wampanoag Tribe of Gay Head (Aquinnah) during and after a Udall Foundation “Tribal Marine Planning Training Workshop” held at the Mashantucket Pequot Museum and Research Center, Mashantucket, CT, on July 19, 2018. Topics covered at that workshop in several presentations included the following:

- Effective Tribal Consultation Strategies (James Charles, Volya Innovative Solutions).
- Submerged Paleocultural Landscapes Archaeology (David Robinson, URI-GSO).
- Multi-Stakeholder Collaboration & Consensus-Building (Lauren Nutter, Udall Foundation).

Conversations that occurred in the months after the meeting with the above-referenced Tribes resulted in the compilation of a list of Tribal concerns that were shared with BOEM in February 2019. Although addressing all of these concerns is considered important as next steps, extensive offshore wind farm development currently planned for the southern New England OCS, which has the potential to adversely affect as-yet identified submerged paleocultural landscapes of Tribal cultural significance, has increased the need to consider those concerns that have more immediate consequences and can be addressed relatively quickly. As a result, the Tribal concerns and possible next steps for addressing them presented here are divided into two general categories: near-term and long-term. Near-term concerns are those that are seen as currently pressing, but addressable within an approximately one-year timeframe. Long-term concerns are those that are equally important, but will likely require more than a year to address and/or a long-term or perpetual commitment by BOEM and the Tribes to work on and update regularly.

3.2.1 General Observations

- Tribal Historic Preservation Offices (THPOs) are working at maximum capacity with insufficient staff, resources, and funding. THPOs engaged in implementing "Next Step" ideas would need external funding to assist them in covering additional costs associated with staff time, travel, and other related expenses to participate.

- All of the southern New England region's Tribes need to be equal participants and included in future discussions and planning of any project focusing on implementing next step ideas. Situations with one Tribe serving as a project lead or liaison for the other Tribes is considered a non-optimal approach that probably should be avoided.

- Universities are not well suited to coordinate and manage project sub-awards to Tribes.

- Although avoidance of impacts to identified submerged paleocultural landscapes is preferred, identification of these culturally significant areas is a pre-requisite for their avoidance.

- The Submerged Paleocultural Landscapes Project began a process of developing approaches to identify submerged paleolandscapes that may be culturally sensitive. The approaches include 1) developing initial best practices for engaging Tribal communities and research methodologies for assessing and identifying submerged paleocultural landscapes; and 2) developing a preliminary stratigraphic model designed to identify submerged paleolandscapes that could be culturally sensitive. These best practices and methodologies require implementation and testing with Tribal input before they can be adopted and used to inform BOEM's future management decisions in offshore development project review and consultation processes.

3.2.2 Near-Term Next Steps

3.2.2.1 Tribal Concerns

- Tribes feel that their concerns regarding potential impacts from proposed offshore development projects are not being heard or listened to and that they are not being adequately engaged by agencies, developers, and consultants as early and as regularly as needed during the planning and research done as part of the environmental review of offshore development projects. This situation has led to a sense of being "steamrolled" during the environmental review processes associated with offshore development projects.

- Agencies, developers, and consultants do not seem to comprehend or understand the cultural linkages Tribes have to the marine environment's flora and fauna that make Tribal review of and comment on impacts to them a necessary element of the Tribal review of offshore development projects.

- THPOs have less experience with offshore development projects and the associated marine environment than they do with terrestrial development projects proposed for the onshore environment. This requires THPOs to learn on-the-fly during project review the technically complex aspects of marine geoarchaeological theories, methods and results, while also adhering to tight project environmental review schedules and timelines. This challenge is compounded by insufficient staffing and Federal financial support of THPOs.

- Marine geoarchaeological investigation of the seafloor to identify submerged paleocultural landscapes is a relatively new subdiscipline the methodologies for which are still being developed and standardized. This situation makes it difficult for the THPOs to discern what constitutes an adequate or effective effort.

- Knowledge about the locations, nature, and extent of preservation of submerged paleocultural landscapes off the coast of southern New England is almost non-existent. Much more must be learned about what may be preserved in order to know what may or may not be impacted.

3.2.2.2 Recommendations for Addressing Near-Term Tribal Concerns

- Conduct a relationship building workshop co-led by a mediation professional that also includes cross-cultural education opportunities for experiential mutual learning and relationship building between BOEM and the Tribes. Work towards a commitment between BOEM and the Tribes to hold regular meetings in the future. Prior to the workshop, obtain from the Tribes clarification and specific examples about how they feel concerns are not being heard and what they feel would constitute acceptable engagement.

- Conduct a technical workshop and on-site or webinar-based trainings to present and answer questions about the basic and essential technical aspects of the geoarchaeological sciences required for the informed review of offshore environmental survey documents. Include in the presentations, as well, clear and concise explanations of: a) what is known; b) what is not yet known; c) what is hypothesized; and d) a discussion of ideas for integrating Tribal and non-Tribal sciences to advance methods in assessing cultural sensitivity and identifying and preserving cultural sites. Additional technical workshop/webinar topics could also include the following:

    - Identifying differences (goals, equipment, limitations, etc.) between terrestrial and marine projects

    - Key marine geology and archaeology principles

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    - An overview of southern New England’s regional offshore stratigraphy

    - An overview of the equipment used for offshore surveying, with discussion about why it is used

- What constitutes an adequate vs. an inadequate survey
- Key items to look for in geological and archaeological interpretations
- What the best method we have right now to identify preserved paleolandscapes
- A review of BOEM's current G&G/archaeological survey guidelines.

- Include as part of the technical workshop/webinars the following goals:
  - Exploration and definition of the information the Tribes see as critical to include in a streamlined reporting format and what they define as "streamlined"
  - Identification of what type/format of GIS application it is that the Tribes are interested in and have working experience

- Incorporate an overview and review of existing publicly available marine geological data into any technical training. This is the first step required to test URI-GSO's preliminary stratigraphic model, which is designed to identify areas of the OCS that contain preserved elements of the submerged paleolandscape, developed as part of the Submerged Paleocultural Landscapes Project. The Submerged Paleocultural Landscapes Project determined that a best practices approach to identifying paleocultural landscapes is to focus on a thorough understanding of regional geology in the study area.

3.2.3 Long-Term Next Steps

Long-term refers to steps requiring more than one year to address, or a perpetual commitment.

3.2.3.1 Tribal Concerns

- Offshore wind energy infrastructure installation, operation, and decommissioning off the southern New England Coast presents a host of unique environmental impacts whose nature and extent are not yet fully understood. Project review schedules do not seem to reflect this reality and the need to proceed more cautiously and carefully to identify, understand, and establish a baseline of what are the impacts.

- Review of offshore developers' resource reports could be enhanced and expedited if a) the information and reports were presented in a more streamlined format using GIS-based technologies; and b) there was a single online source location for warehousing ongoing and legacy project survey data that could then be made available to Tribes for their easy access and use in their analysis of broadscale relationships/patterning between what is found in the offshore data and assessment of the cultural sensitivity of offshore areas. It would be beneficial to have a single regional site location for the physical storage and long-term curation of sediment cores collected for offshore development projects that would be accessible as a reference collection for Tribes and researchers.

- Training (in marine survey and GIS use), software, and equipment for data review, interpretation, and understanding is needed.

- Training (water safety & survival, diving, etc.) and infrastructure (small ocean-going vessels, survival suits, diving equipment) are needed for on-site work (inspections and monitoring).

3.2.3.3 Recommendations for Addressing Long-Term Tribal Concerns

- Review previous, current, and planned studies and seek to address concerns about environmental impacts through proposals for new studies. Include the testing of the URI-GSO paleocultural landscape locational model and the assessment of cultural impacts as one of these new studies.

- Consider options regarding utilization of existing online GIS platforms (e.g., adding an additional data layer to the NROC data portal, adding the offshore zone to individual states' online GIS archaeological site databases, and working with ArcGIS Online for convenient web-based GIS data sharing, etc.). Discuss with BOEM the concept of developing or utilizing an existing national sediment core archive that is divided up into regional repositories.

- Pursue opportunities for and obtain external funding for training in marine survey, ArcGIS, water safety, and diving, as well as and for obtaining necessary marine-related infrastructure.

3.3 Next Steps for Improving the Scientific Research Methodology Used to Characterize Submerged Paleocultural Landscapes

3.3.1 Researcher Concerns

- The current focus on offshore wind development on the southern New England OCS has resulted in several projects undergoing the permitting process simultaneously. Although potential development sites are characterized and assessed using BOEM's overall geoarchaeological survey guidelines, the extent of the pre-survey desktop study and survey design and data interpretation may vary significantly depending on the consultant(s) hired by the developer. This approach may result in potential development sites that are near or adjacent to each other being characterized differently, or with varying amounts of detail, when in reality they are the product of the same regional geologic processes.

- Geoarchaeological consultants engaged by the developer may be experts in geographic areas that have much different geologic histories and facies than those that characterize the potential development site. In addition, consultants may not have in-depth local knowledge of the most relevant geological and geophysical research that pertains to the study area. This situation may result in an incomplete or inaccurate site characterization and assessment.

- The current understanding of where submerged paleocultural landscapes may be located and why they are (or are not) preserved is still being developed and lacks a standardized approach. Consequently, the method for identifying preserved paleolandscapes that may be culturally sensitive varies according to the organization and individuals conducting the assessment.

- Assessing the cultural sensitivity of submerged paleolandscapes is an extremely complex process that requires an in-depth knowledge of specialized, interrelated archaeological, cultural/ethnohistorical, and geological concepts. Archaeologists and geologists should combine their expertise and work together during the site characterization and assessment that are parts of the project permitting process.

- Assessment of paleocultural sensitivity often focuses on identifying a single geologic feature, such as paleochannels, which are sometimes documented in project seismic survey data. Focusing only on a subset of a more complex landscape that could be present may underrepresent the paleocultural sensitivity of a potential offshore energy development area.

- The complete archaeological and geological survey results used for site characterization reports are often not released to interested parties, and/or key findings are redacted before release. This practice discourages beneficial external review and input on the scientific data, and may give the impression that the developer is trying to minimize the potential paleocultural sensitivity of the study area.

3.3.2 Recommendations for Addressing Researcher Concerns

- Conduct additional geoarchaeological research to validate the regional stratigraphic model developed as part of the Submerged Paleocultural Landscapes Project. This model was designed to identify preserved submerged paleolandscapes that could have Tribal significance based on a thorough understanding of the regional geology of any study area. The model requires additional testing, but, if validated, it could streamline the offshore wind permitting process by

    1. **Providing a standardized method for interpreting geological/geophysical data across multiple study areas on the OCS based on the best available data.**

    2. **Quickly flagging areas that are most likely to need additional intensive geophysical, geological, and/or archaeological investigation.**

    3. **Reducing the level effort required for paleocultural archaeological sensitivity assessments** by utilizing a confirmed regional model developed by regional experts working in collaboration with regional Tribes, and based on a synthesis of best available data.

- Develop a nationwide network of marine geologists who are local experts in the geologic history and marine stratigraphy of the OCS in each region where offshore development is planned. Require that the geophysical and geological site characterization reports produced for the development project's permitting process are reviewed by the geologist who is most knowledgeable about the area being reviewed for permitting and development. Provide this individual with the authority to request revisions to the report interpretations.

- Require multidisciplinary data review and discussions between the geologists and archaeologists involved involved the site characterization process.

- Avoid assessing paleocultural sensitivity based on one geologic feature, such as paleochannels. Instead, modify BOEM's current site characterization process to require a thorough

reconstruction of the entire subsurface stratigraphic section (from acoustic basement upwards to the sea floor) at the potential development site. Require that the geologic environment and processes for each identified acoustic unit be described in detail, including an assessment of the depositional environment and age associated with each facies.

- Develop a process where interested stakeholders may provide input to survey designs prior to initiation of site survey work. Upon completion of the survey and data analysis, allow stakeholders to obtain access to the site characterization reports earlier in the permitting process and encourage stakeholder input.

- Collaborate with regional experts to develop publicly available, geospatial databases and literature bibliographies of the most accurate and pertinent geoarchaeological data in each region targeted for offshore development. Development of these databases would streamline the desktop study process for offshore project proponents, and ensure that the best data is being used as the basis for new survey designs and data interpretations.

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