

## Environmental Studies Program: Studies Development Plan | FY 2026–2027

Field	Study Information
Title	Comprehensive Synthesis of the Physical Oceanography of the U.S. Arctic 2005–2025 (AK-26-03)
Administered by	Alaska Regional Office
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Procurement Type(s)	Contract, Cooperative Agreement
Conducting Organization(s)	TBD
Total BOEM Cost	TBD
Performance Period	FY 2026–2028
Final Report Due	TBD
Date Revised	May 27, 2025
Problem	In the last decade and a half, a substantial volume of physical oceanography data was collected and analyzed across several large oceanographic programs in the northern Bering, Chukchi, and U.S. and Canadian Beaufort seas. This site- or region-specific information is not synthesized across the Arctic region adjacent to the U.S. to utilize in NEPA analyses for oil, gas, and critical mineral leasing and development in a rapidly changing Arctic.
Intervention	This study will synthesize relevant oceanographic peer-reviewed journal articles and reports to develop a synthesis document that is readily accessible to BOEM's analysts and the public.
Comparison	The synthesis will provide an enhanced understanding of the physical oceanography, noting trends, and providing recommendations for addressing physical oceanographic information needs most relevant for the U.S. Arctic.
Outcome	A synthesis and description of physical oceanography in the U.S. Arctic with topical recommendations for further study, identifying information needs to ensure that first-order ocean physics are understood and provide data to validate ocean hindcast models before approving them for use in Oil Spill Risk Analysis
Context	Beaufort Sea, Chukchi Sea, Northern Bering Sea

**BOEM Information Need(s):** This study will provide BOEM, other Federal agencies, and industry analysts with a current synthesis and description of the physical oceanography of the U.S. Arctic. A concise synthesis describing the physical oceanography and outlining information needs in a rapidly changing Arctic, would support BOEM's mission with respect to leasing, exploration, and development. It would inform NEPA documents and guide future ESP study profile development.

**Background:** Current regulations from the Council for Environmental Quality implement page limits for environmental impact statements and promote incorporation by reference. An important component of environmental analysis in NEPA documents is the description of the affected physical oceanographic environment. Site-specific or region-specific oceanographic programs are not comprehensively

synthesized across the broad Arctic region adjacent to the U.S. Such a synthesis could be incorporated by reference in NEPA documents or provide readily available context for a rapidly changing Arctic baseline (Timmermans and Marshall, 2020).

Topical study recommendations are used to focus study profile development. MBC Applied Environmental Sciences (2003) conducted a workshop with experts in Arctic oceanography that reviewed the physical oceanography of the Beaufort Sea and Weingartner et al. (2010) developed topical study recommendations. For nearly a decade those recommendations were developed into study profiles resulting in a wealth of observational programs and scientific literature that focused on the most relevant information needs to BOEM (Lin et al. 2020, Weingartner et al. 2017).

Objective(s): The goal of this study is to improve understanding of physical processes and boundary influences in the U.S. Arctic. Specific objectives include:

- Synthesize information from various physical oceanographic studies in the northern Bering, Chukchi, and Beaufort seas from 2005–2025.
- Develop a series of topical recommendations for addressing information needs in a rapidly changing Arctic.
- Identify additional data sets needed to facilitate the evaluation of regional ocean-ice coupled circulation models.

Methods: Researchers will work with Subject Matter Experts (SMEs) from academia, state and federal agencies, and non-governmental organizations to obtain data and review pertinent literature (e.g., peer reviewed literature and reports). Information that addresses the aforementioned objectives in peer-reviewed literature, reports, and summary documents will be synthesized into concise statements that can be easily and readily used or referenced in future environmental analyses, study profiles, and statements of work to describe the existing environment, identify observational information needs, or to enhance model development, skill assessment, or validation and verification. The report will include recommendations for future efforts to address ongoing information needs. These efforts will focus on a mix of field (observational) and idealized model studies.

Specific Research Question(s):

1. What additional insights can be gained through synthesis and integration of available U.S. Arctic oceanographic data and information?
2. What physical processes need further elucidation to better understand first order oceanic physics in a changing Arctic?
3. What is the current range of observing or idealized modeling approaches and how can new technologies further address identified information needs?
4. What additional observational datasets will enhance the verification and validation of model results?

Current Status: N/A

Publications Completed: N/A

Affiliated WWW Sites: N/A

## References:

- Lin P, Pickart RS, Fissel D, Ross E, Kasper J, Bahr F, Torres DJ, O'Brien J, Borg K, Melling H, et al. 2020. Circulation in the vicinity of Mackenzie Canyon from a Year-Long Mooring Array. *Progress in Oceanography*. 187:102396. <https://doi.org/10.1016/j.pocean.2020.102396>
- MBC Applied Environmental Sciences. 2003. Physical oceanography of the Beaufort Sea Workshop recommendations. Anchorage (AK): U.S. Department of the Interior, Mineral Management Service. 48 p. Report No.: OCS Study MMS 2003-045.
- Timmermans ML, Marshall J. 2020. Understanding Arctic Ocean circulation: a review of ocean dynamics in a changing climate. *Journal of Geophysical Research: Oceans*. 125(4):e2018JC014378. <https://doi.org/10.1029/2018JC014378>.
- Weingartner TJ, Danielson SL, Potter RA, Trefry JH, Mahoney A, Savoie M, Irvine C, Sousa L. 2017. Circulation and water properties in the landfast ice zone of the Alaskan Beaufort Sea. *Continental Shelf Research*. 148:185–198. <https://doi.org/10.1016/j.csr.2017.09.001>.
- Weingartner TJ, Pickart RS, Johnson MA. 2010. Recommended physical oceanography studies in the Alaskan Beaufort Sea. U.S. Department of the Interior, Mineral Management Service. 98 p. Report No.: 2010-018. <https://espis.boem.gov/final%20reports/4921.pdf>.