



Integrated Ecosystem Research Program (IERP)

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IERP Background

The Integrated Ecosystem Research Program supports multi-disciplinary collaboration to improve understanding of the complex interactions among the physical, chemical, biological, and social processes that influence the structure and function of Alaska's marine ecosystems.

The program promotes cooperation and exchange across disciplines (e.g., oceanography, fisheries, social science) and integration among components of the ecosystem (e.g., physics, chemistry, production, fishes and invertebrates, marine birds and mammals, humans).

IERP research is intended to identify and characterize important ecosystem attributes and processes to improve our ability to forecast and respond to environmental change.

IERP structure

Each of NPRB's multi-year Integrated Ecosystem Research Programs is implemented in three distinct phases: assessment; research implementation; and synthesis.

Assessment Phase

Assess research needs, synthesize known information, and define research priorities

Research Implementation Phase – Main Program

Conduct field research, data collection, analysis, and integration of research results

Synthesis Phase

Leverage research results, exploit opportunistic data, build new collaborations, apply results to inform resource management



www.nprb.org/arctic-program

2016-2021
\$18.6 M USD





Arctic IERP Funding Sources

- North Pacific Research Board
- Collaborative Alaskan Arctic Studies Program (Formerly the North Slope Borough/Shell Baseline Studies Program)
- U.S. Bureau of Ocean Energy Management
- Office of Naval Research Marine Mammals & Biology Program

In-Kind Research & Logistics Support:

- U.S. National Oceanic & Atmospheric Administration (NOAA) Alaska Fisheries Science Center and Pacific Marine Environmental Laboratory
- University of Alaska Fairbanks
- U.S. Fish & Wildlife Service
- U.S. National Science Foundation

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Arctic IERP Synthesis 2022-2025



Zimmerman

Two Synthesis Projects

Pelagic-Benthic Decoupling? Ecosystem Restructuring in the Northern Bering and Chukchi Seas (2022-2025)

Logerwell et al.

Seas the Change: A Sea-Scale Effort to Assess Sensitivity to Change in Nutrients and Ecosystems within the Pacific Arctic (2022-2024)

Kelly et al.

Funding Partner: U.S. National Oceanic & Atmospheric Administration, Oceanic & Atmospheric Research (OAR) Arctic Research Program

Pelagic-Benthic Decoupling?

- A key feature of Arctic ecosystems has been strong pelagic-benthic coupling
- It has been hypothesized that ocean warming and loss of sea ice will result in a weakening of this coupling
- Our project addresses the following overarching questions:
 - Has there been and will there continue to be a restructuring of the Northern Bering-Chukchi seas (NBS-CS) ecosystem resulting from a decrease in pelagic-benthic coupling?
 - Has trophic transfer to subsistence resources and commercial groundfish and crab declined or increased?
 - What are the spatial patterns of temporal change?

Pelagic-Benthic Decoupling?

- To address these questions we have formed an interdisciplinary team of leading experts in the fields of Pacific Arctic oceanography, phytoplankton, zooplankton, pelagic fish, benthic epifauna, benthic infauna, benthic fish, marine mammals and seabirds, and spatio-temporal modeling.
- These experts will synthesize data from 2000-2021 covering the NBS-CS to answer focal questions specific to each discipline.

Pelagic-Benthic Decoupling?

- The experts will also provide variables for models to address three ecological and management endpoints, specifically:
 - Survey optimization (e.g., evaluating sampling scenarios that could efficiently reduce uncertainty in future expeditions)
 - Marine spatial information (e.g., identifying changes in resource densities for key subsistence populations in the historical hunting areas of Alaska Native communities)
 - Ecological outcomes (e.g., identifying whether benthic and/or pelagic biogeographic provinces are shifting)

Seas the Change

- We aim to synthesize existing hydrodynamic, nutrient, and pelagic productivity data to make a mechanistically consistent baseline for Pacific Arctic ecosystems.
- Our goal is to ask how and why nutrient availability and utilization are changing and to do so within a quantitative framework.
- Our project will do so using several complementary modeling paradigms including statistical-regressive models and coupled numerical models.

Seas the Change

- We want to address these specific questions about nutrients so that we (i.e., community) can start pivoting from primarily monitoring towards future process-based studies of the Arctic.
- Empower the broader Alaskan community by engaging with them about what earth models are (simplified hypothesis of the world) and how we use them. Demystify models.

Future IERP – Opportunities for Collaboration

A Future IERP will focus on the Northern Bering Sea

The Board's stated areas of interest: "how shifts in environmental conditions and processes may influence species of commercial, ecological, and subsistence importance, and implications for state and federal fisheries management and communities that depend on these resources".

Future IERP – Opportunities for Collaboration

NPRB is seeking partners to co-fund the future Northern Bering Sea IERP.

NPRB is interested in learning about opportunities to coordinate and collaborate with international institutions.

The program is in the early stages of development and the timeline is not yet determined. Field work is anticipated during 2027-2029.

Future IERP – Opportunities for Collaboration

To express interest in partnership and collaboration, please contact:

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