Arctic Research Program, Distributed Biological Observatory, and Observations

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Project Overview

ARP and Ecosystem and Fisheries Oceanography Investigations (EcoFOCI) have worked closely together for the last 8 years. EcoFOCI mission:

….. to study the ecosystems of the North Pacific Ocean, Bering Sea and U.S. Arctic to improve understanding of ecosystem dynamics and apply that understanding to the management of living marine resources.

complements the goals of ARP.

shared shiptime  -  maintained long-term observations (moorings)  -
investigate ecosystem structure  -  improved technology  -
provide information to managers, modelers and stakeholders
GOMO Linkages

**Long-term moorings**

- Maintain Observing System: EcoFOCI (funds from ARP and EcoFOCI) maintains NOAA’s Arctic moorings

**Shared shiptime:** ARP and EcoFOCI jointly apply for NOAA shiptime to conduct an Arctic Cruise each year.

**Contributes to the Distributed Biological Observatory:** With support from GOMO/ARP

2022 Arctic Cruise
Working in the US Arctic

- Remote
- Immense
- Ice covered (> 8 mo. per year in the north)
- Complex Ecosystem
- Rapidly changing
Long-term Moorings:

- C1: 10 years
- C2: 12 years
- C3: 8 years
- C4: 8 years
- C5: 7 years
- C12: 8 years
- M8: 18 years

*Temperature, salinity, nutrients, fluorescence, oxygen, PAR, currents, passive acoustics (marine mammals), sea-ice keel depth*
New Technology (supported by ITAE)

Oculus Glider

Pop-up Float (PUF)

Refloatable Ice-Sensing Buoy (RISE)
Major Partnerships

Federal and State
Alaska Fisheries Science Center including the Marine Mammal Lab, Northwest Fisheries Science Center, State of Alaska, NASA, NSF

Universities
University of Washington, Oregon State University, University of Alaska Fairbanks, University of Hawaii, Applied Physics Lab, Bigelow, University of Maryland

International
PICES North Pacific Marine Science Organization
PAG (Pacific Arctic Group)
DBO (Distributed Biological Observatory)
BIOPOLE (Biogeochemical processes and ecosystem function in changing polar systems and their global impacts) 2022 – 2027
Communities

Little Diomede... A large late February storm caused considerable damage on Little Diomede Island. As a result of the storm, the community lost power and ice rubble covered beaches, the helipad, and damaged the water treatment plant.

Photo by Carla Ahkvaluk, February 20

Gambell... Near Gambell, vast stretches of open water extended all the way to Russia until mid-March. During this time, local experts and Sea Ice for Walrus Outlook contributors reported a lack of walrus in the area.

Photo by Clarence Iriquo Jr., February 8

Shishmaref... Freeze-up was unusually late in Shishmaref. Even when the surrounding area appeared to have ice, there was a stretch of open water around the community into mid-January. After the ice finally formed, it repeatedly broke up during storms allowing surf to push large ice chunks onto beaches.

Photo by Sharon Nayokpuk, February 22

Savoonga... After February’s lack of ice, winds shifted abruptly on March 9 bringing sea ice back to Savoonga. Even as ice returned, local resident Aqeif Waqhi/i reported that “it is all broken up... no flat pieces and it is real rough. There are patches of open water... biggest open patch in front of town is maybe as big as a football field.”

Photo by Savoonga IRA, February 14

Subsistence hunters adapt to a warming Alaska with new tools

Whaling commission
Partnership of collecting data
Arctic Waterways Safety Committee

Shishmaref, 2017

Community partnership: Oculus

Oculus Gliders: Drones off Nome's Shores

This summer, NOAA will use gliders deployed from Nome to study the changing oceanography of the northern Bering Sea.
Fishing vessels deploy Pop-up Buoy (May 1 – June 28, 2019)

Popped up under ice floe.

The flow was tracked for almost two months.

Under ice temperature, fluorescence, PAR were collected along with photos.
Heatwaves

From long-term Moorings
Achievements and Impacts

- High-level highlights from previous 5 years: 2017-2021
  True partnership, long-term moorings, understanding currents, whale migrations

- Impact of this program/network: what is the impact to the scientific community, ocean observing enterprising, and the American taxpayer?
  Critical observations, informed models, implication of changing ice, Arctic New Normal, Green Economy