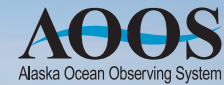


INTERAGENCY ARCTIC RESEARCH POLICY COMMITTEE

Environmental Intelligence Collaboration Team

2021 Post-Season Report

SIKULIAQ



Introduction

The Interagency Arctic Research Policy Committee's (IARPC's) Environmental Intelligence Collaboration Team (EICT) was a new team created as part of the Arctic Research Plan 2017-2021 to support decision-making in the face of unprecedented change in the Arctic as well as frameworks for generating Environmental Intelligence: integrated environmental knowledge that is timely, reliable and suitable for the decisions at hand.

In the winter of 2018, the Bering and Chukchi Sea ecosystems and communities faced unprecedented changes with warm, open winter waters, unexplained seabird and marine mammal die-offs, and the potential for new harmful algal bloom (HAB) events. IARPC's EICT convened a planning meeting of science leads from federal research cruises planned for the Arctic to share their research plans and identify opportunities for additional collaborations to respond to the HAB concern. The meeting was followed up with a session in the fall to share research findings and lessons learned and explore additional opportunities for collaboration.

Similar collaboration sessions were held in 2019 and 2020, although many of the cruises in 2020 were cancelled or truncated due to covid-19 travel restrictions. A full schedule of research cruises again was held in 2021, with the spring planning and the fall post-season webinars held.

The planning webinars also led to development of an Arctic Research Cruise spreadsheet that detailed planned cruises, their science leads, anticipated geographic locations, and other information, that was regularly updated before and during the field season and broadly distributed via the IARPC Collaboration and Alaska Ocean Observing System websites, as well as direct email to Tribes, coastal communities and other interested parties in the Bering and Chukchi Sea regions.

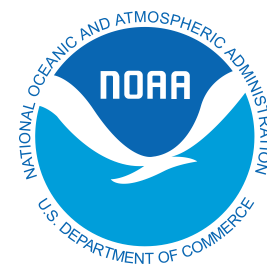
The current EICT co-leads anticipate these activities will continue as part of the next Arctic Research Plan, although the EICT itself will be disbanding in 2022. This report is a short summary and highlights of the 2021 season.



Molly McCammon
Alaska Ocean
Observing System



Roberto Delgado
National Science
Foundation



Candace Nachman
National Oceanic and
Atmospheric Administration

Research Cruises in 2021

Despite the continuing covid-19 pandemic, many research and observing activities occurred during 2021 including cruises at sea, aerial surveys, and land-based surveys. The following sections describe the activities of federally funded scientists and non-federally supported researchers, including international ships, in the Bering, Chukchi and Beaufort Seas in 2021. This is not meant to be comprehensive; there were other activities undertaken by state agencies, the private sector, Tribes, and other federal agencies (e.g., activities of the USFWS *Tiglox*). The activities described in this report were the ones highlighted during IARPC webinars and the research cruise spreadsheet.

In general, temperatures and sea ice conditions in 2021 were closer to “normal” however the cold pool was seen only in the northwestern part of the Northern Bering Sea. Overall, even with more “normal” temperatures, lingering ecosystem effects of the recent warmer years are still being seen, such as the significant decreases in Bristol Bay red king crab and Bering Sea snow crab (for example, see Northern & Eastern Bering Sea Bottom Trawl Groundfish Surveys, page 4).



Brendan Smith, NPRB

NOAA/ALASKA FISHERIES SCIENCE CENTER ACTIVITIES

Polar Bears & Ice Seals

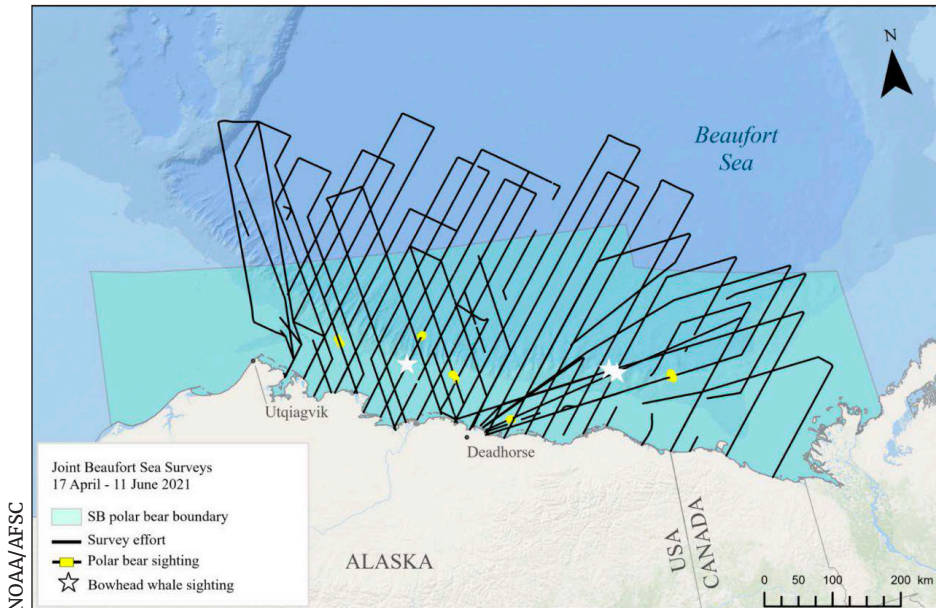
A joint survey was conducted by NOAA-USFWS to estimate abundance and distribution of ringed seals, bearded seals, and polar bears. Aerial surveys were flown between April 17-June 11 from Utqiagvik to past the Canadian border. During the survey, trials were conducted to measure the response of the animals to the aircraft. Over 900,000 sets of color, thermal and ultraviolet images were collected using automated in-flight detection and classification of species.

Contact: Erin.Moreland@noaa.gov

Moorings & Ecosystem Observations

An Ecosystems & Fisheries-Oceanography Coordinated Investigations (EcoFOCI) cruise in the eastern Bering Sea was conducted from May 1-20 to recover & redeploy moorings. Additionally, an underwater plankton camera was tested and over 900,000 images were collected. Passive acoustic equipment on the vessel detected fin, killer, humpback and bowhead whales and ribbon and bearded seals. Samples were also collected for HABs and crab larvae to assess crab production.

Contacts: Phyllis.Stabeno@noaa.gov, Catherine.Berchok@noaa.gov, Janet.Duffy-Anderson@noaa.gov



Survey tracks from Joint NOAA-USFWS Beaufort Sea Surveys.



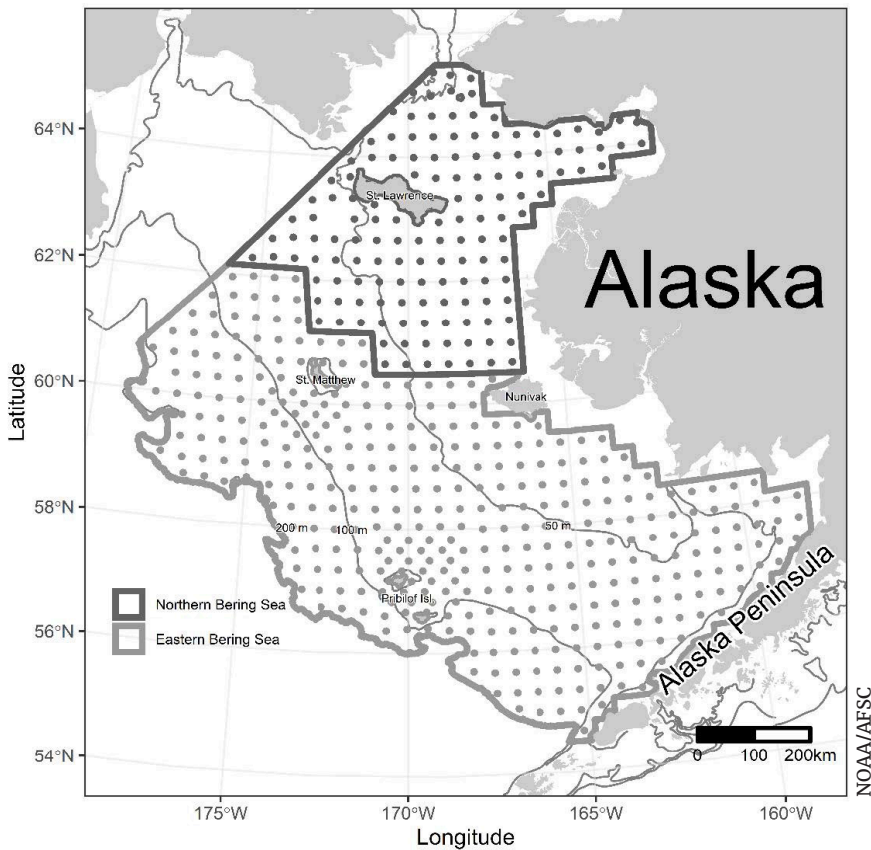
Sampling and mooring locations of EcoFOCI cruise.

NOAA/ALASKA FISHERIES SCIENCE CENTER ACTIVITIES

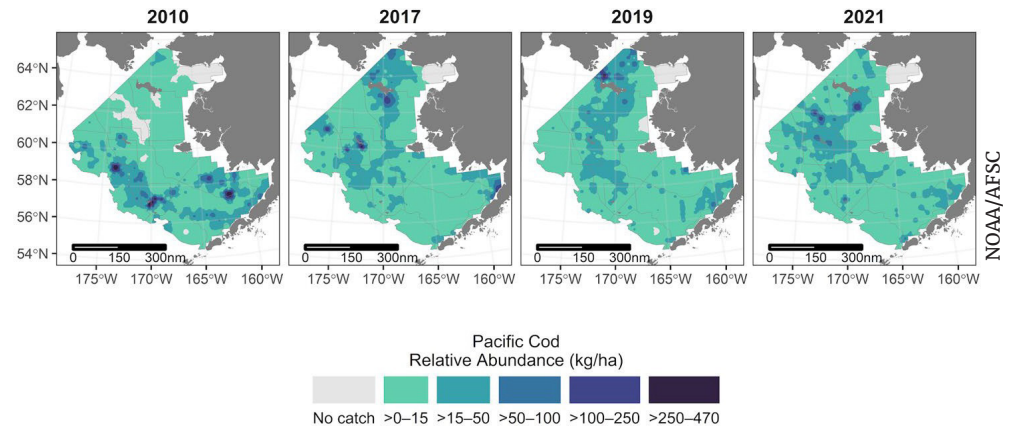
Northern & Eastern Bering Sea Bottom Trawl Groundfish Surveys

The Northern and Eastern Bering Sea Bottom Trawl Groundfish Surveys were conducted May 31-August 16. The surveys looked at the near-bottom dwelling community (groundfish, crabs, and other organisms) for ecosystem monitoring and stock assessment of commercially and ecologically important species.

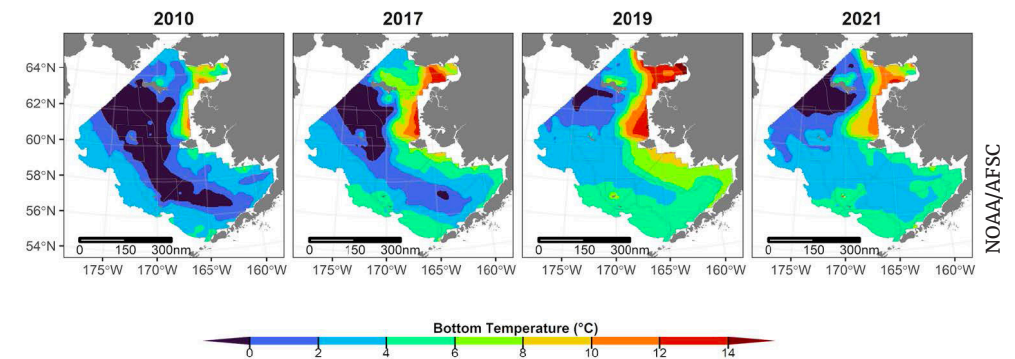
Contact: Lyle.Britt@noaa.gov ; also see the presentation in the [UAF Alaska Sea Grant Strait Science series](#)



Northern and Eastern Bering Sea survey locations.



Pacific cod distributions during the Northern and Eastern Bering Sea surveys.



Bottom temperatures during the Northern and Eastern Bering Sea surveys.

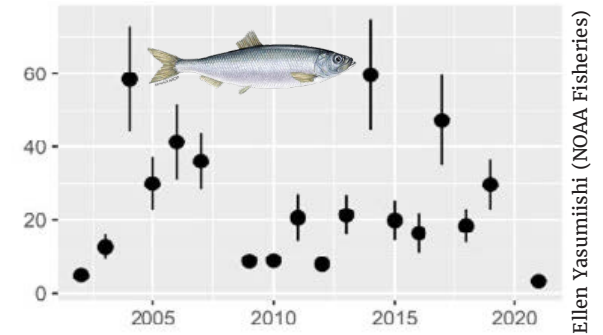
NOAA/ALASKA FISHERIES SCIENCE CENTER ACTIVITIES

Northern Bering Sea Surface Trawl Ecosystem Survey

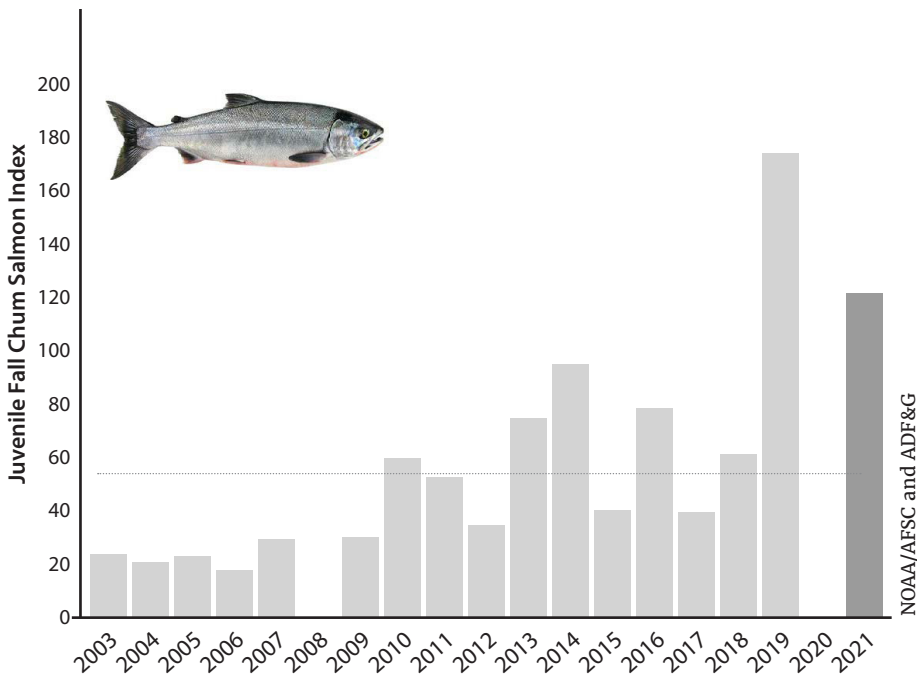
The Northern Bering Sea Surface Trawl Ecosystem Survey was conducted from August 27 - September 19 to collect data on phytoplankton, zooplankton, fish, seabirds, marine mammals and HABs.

Contacts:

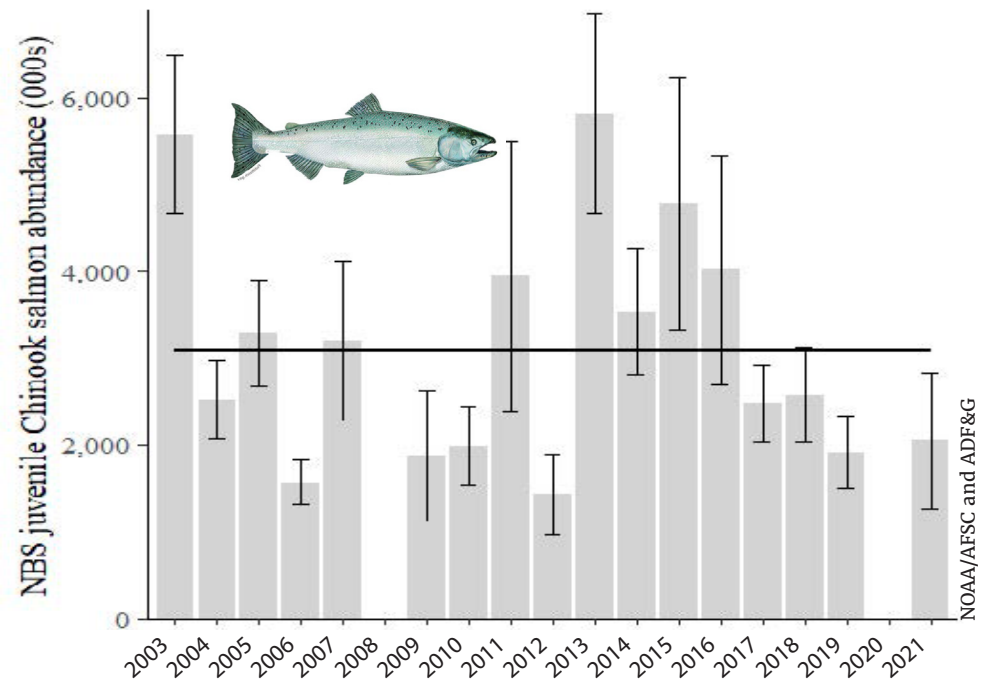
AFSC: Jim.Murphy@noaa.gov, Dan.Cooper@noaa.gov, Ed.Farley@noaa.gov
 ADFG: Sabrina.Garcia@Alaska.gov, Kathrine.Howard@Alaska.gov
 USFWS: Kathy_Kuletz@USFWS.gov



Biomass estimates of Pacific herring.



Abundance of juvenile chum salmon from the Northern Bering Sea, 2003-2021.



Abundance of juvenile Chinook salmon from the Northern Bering Sea, 2003-2021.

UNITED STATES GEOLOGICAL SURVEY (USGS)

Polar Bears

Helicopter flights were conducted March 5-April 15 from Utqiagvik, Point Lonely and Deadhorse to biopsy dart polar bears for genetic samples. These will be used in a population estimate of the southern Beaufort Sea subpopulation. This work will continue into 2022, which is the final year of sampling. This is a joint US-Canada project. The US work is a collaboration between USGS and North Slope Borough.

Contact: Todd Atwood; tatwood@usgs.gov



Mike Lockhart, USGS

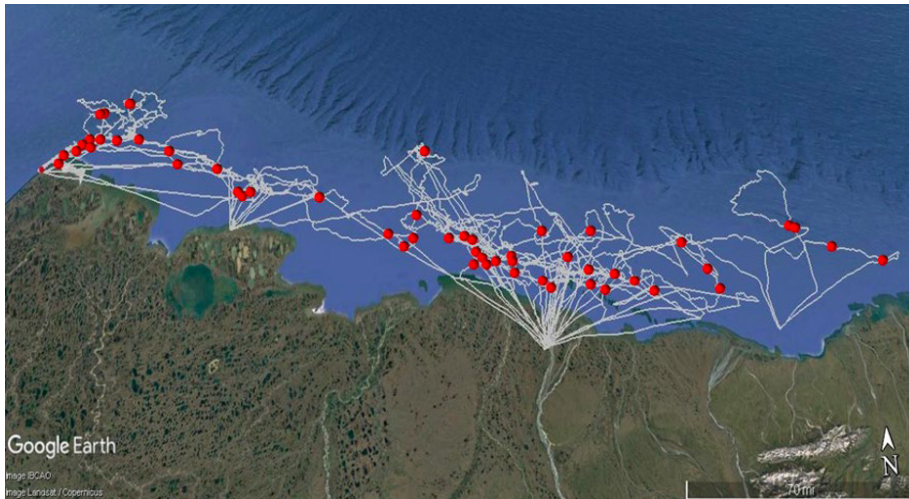
Caribou

Helicopter surveys for caribou fecal material were conducted in the 1002 Area of the Arctic National Wildlife Refuge on the following dates: 21 May-1 June, 14-15 June, and 28-29 June. The surveys were based out of Galbraith Lake and Kavik Camp for a joint study between UGGS, the Yukon Government, USFWS, ADF&G, and Parks Canada. Fecal samples were collected from calving and post-calving Porcupine caribou for a study on diet and habitat use.

Contact: Heather Johnson; heatherjohnson@usgs.gov



USFWS



USGS

2021 helicopter flight lines and biopsy locations of USGS polar bear survey.

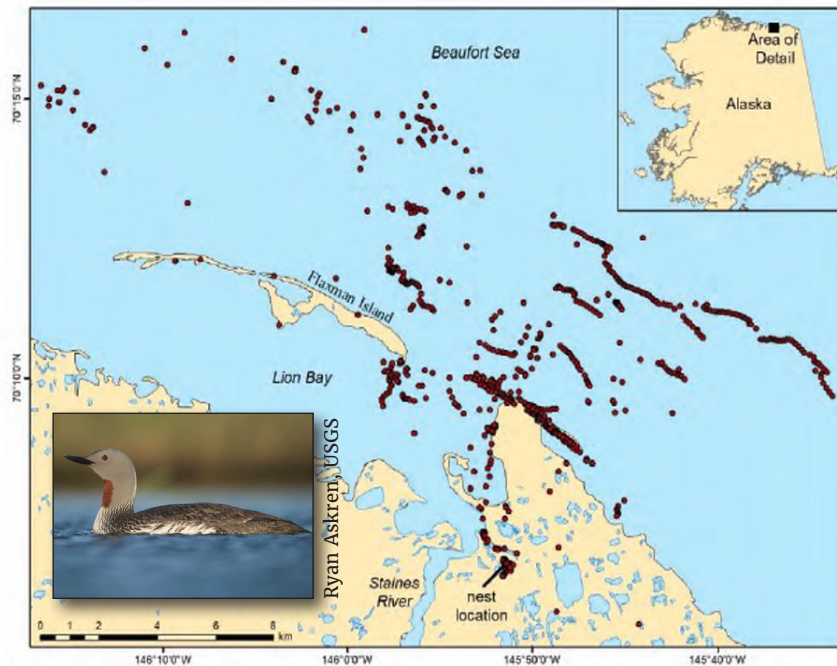
Post-calving migration of Porcupine caribou herd.

UNITED STATES GEOLOGICAL SURVEY (USGS)

Loons

Red-throated loon - From June 21 - July 10 on the Canning and Sagavanirktok River Deltas, USGS conducted helicopter-based nest surveys, collected diet samples, and tagged loons with GPS transmitters to obtain movement data. This information is for a USGS and BOEM study on the drivers of declines in numbers of red-throated loons on the North Slope. The GPS locations of loons will help determine habitat use and the fish species in their diet. Follow-up helicopter flights were conducted in the same areas on August 19th to retrieve instruments and determine loon breeding success. Additional fish research by USGS is looking at the shift in forage fish composition over time.

Contact: Brian Uher-Koch, buher-koch@usgs.gov



GPS locations of one adult red-throated loon. More info [here](#).

Geese



Ryan Askren, USGS

Greater white-fronted goose.



Ryan Askren, USGS

Snow geese and black brant fight over nesting territories.

White-fronted geese - Helicopter-based work was conducted July 7-14 by USGS in the National Petroleum Reserve – Alaska for a USGS-USFWS collaborative study on population trends of greater white-fronted geese. During this work, about 1,000 geese were banded in the Teshekpuk Lake area. Band recovery data will help to improve an understanding of the population trends for this species across North America.

Snow Geese and Black Brant - Helicopter-based work was conducted by USGS from July 26-August 2 on the Colville River to study the growth of the snow goose population in Northern Alaska and the possible impacts to other species and habitats on the delta. During this work, about 1,000 snow geese and black brant were banded. This is an annual project since 2010 and band recovery data is used to improve an understanding of the population trends for snow geese and black brant in Alaska. Helicopters were also used from July 7 – 14 in the National Petroleum Reserve Alaska, as part of a pilot study to investigate the effects of helicopter traffic on the behavior of molting black brant. This work will continue in 2022, and will be used to develop strategies for reducing the effects of helicopter disturbance on molting waterfowl in Arctic Alaska.

Contact: John Pearce, jpearce@usgs.gov

NATIONAL SCIENCE FOUNDATION SUPPORTED CRUISES

MULTIPLE NSF-FUNDED CRUISES OCCURRED IN 2021

May 20-June 14

The “Mercury Air-Sea Exchange in the Arctic” cruise aboard R/V *Sikuliaq* conducted measurements of mercury air-sea exchange in open water in the Bering Sea and under sea ice in the Chukchi Sea. A UAF/Alaska Sea Grant “Strait Science” presentation is available to watch [here](#).

PI: [Rob Mason \(UConn-Avery Point\)](#)



Location of the Mercury Air-Sea Exchange cruise in 2021. This cruise ended in Seward, AK.

July 5-25 -- (CCGC *Sir Wilfred Laurier*)

A joint “Distributed Biological Observatory (DBO) and Canada’s 3 Oceans (C3O)” cruise supported by NSF and the Department of Fisheries and Oceans Canada was conducted from Victoria, B.C. to Utqiagvik, AK (where the US team disembarked). Activities included oceanographic sampling (CTD, nutrients, chlorophyll, eDNA, HABs), benthic sampling for abundance, biomass and population structure of benthic species, and sediment sampling for carbon/nitrogen, chlorophyll, sediment size and HABs.

US PI: Jackie Grebmeier (UMD-CBL); jgrebmei@umces.edu



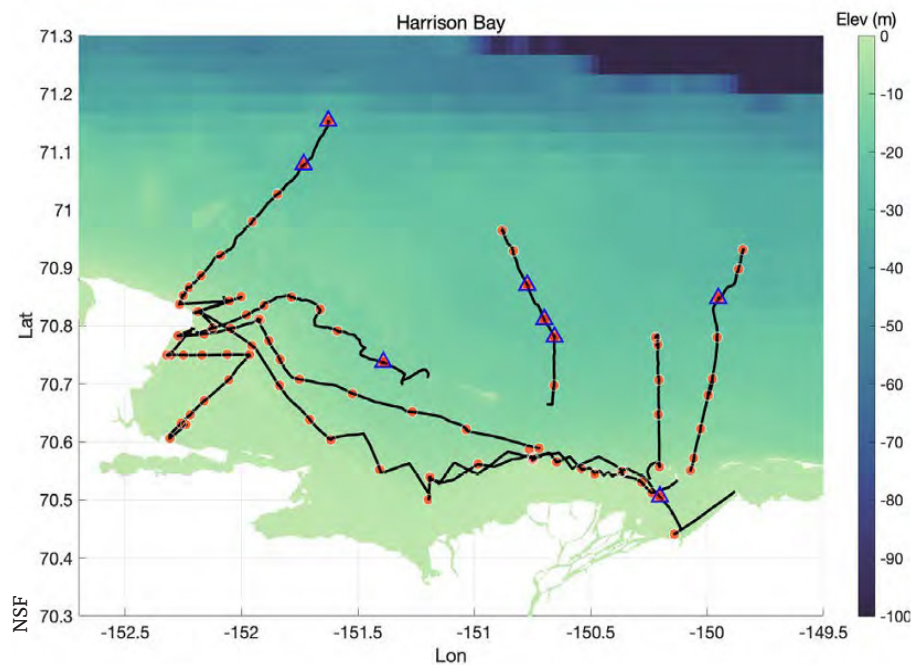
Canada-US Arctic Transect: Distributed Biological Observatory 2021.

NATIONAL SCIENCE FOUNDATION SUPPORTED CRUISES

July 26 - August 9 (R/V *Ukpik*)

The “Beaufort Shelf Sediments” cruise left from Prudhoe Bay and traveled to Harrison Bay and back to Prudhoe. Activities included collecting sediment cores, oceanographic sampling (CTD, etc.) in and near Harrison Bay to assess the transport of materials from source to sink in response to coastal erosion and related processes. The cruise encountered offshore ice throughout the survey. More information [here](#).

PI: [Emily Eidam \(UNC-CH\)](#)

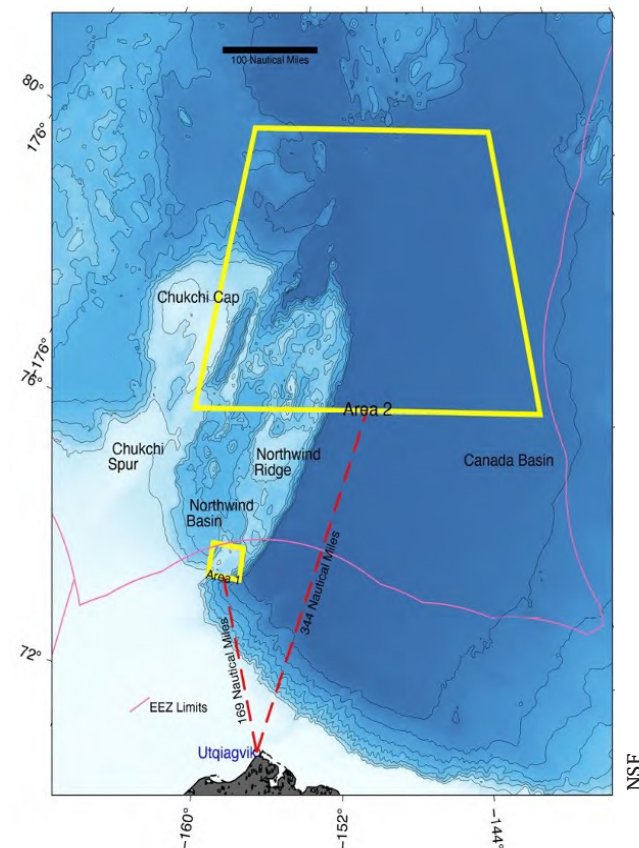


Survey map from the Beaufort Shelf Sediments cruise in 2021.

August 10 - September 30

The “Chukchi Edges II” marine geophysical survey cruise aboard the R/V *Sikuliaq* took place in the Canada Basin far north of Utqiagvik to better understand the geologic history of the Canada Basin. Extensive sea ice was encountered throughout this cruise.

PI: [Bernard Coakley \(UAF\)](#).



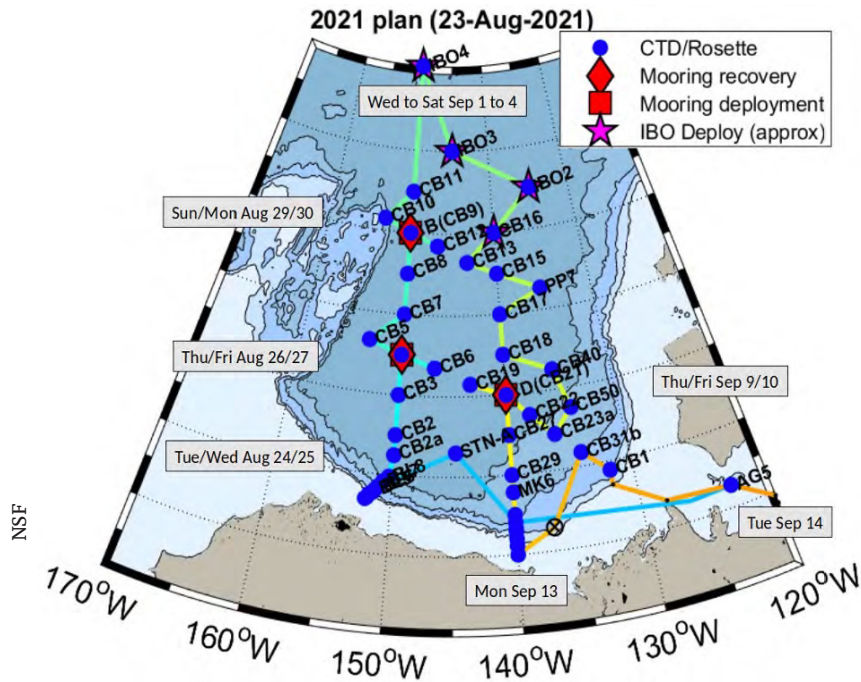
Location of the Chukchi Edges II cruise.

NATIONAL SCIENCE FOUNDATION SUPPORTED CRUISES

August 19 - September 16

The Joint Ocean Ice Study/Beaufort Gyre Observing System (JOIS/ BGOS) NSF-DFO joint cruise on the CCGS *Louis S. St-Laurent* (Department of Fisheries and Oceans, Canada) was conducted in the Beaufort Sea. Activities included CTD/rosette deployments, mooring recovery and redeployment, and ice based observatories (IBO; defined as the deployment of multiple platforms at one location (e.g., Ice-Tethered Profiler (ITP) buoys, Tethered Ocean Profilers (TOP), Seasonal Ice Mass Balance Buoy (SIMB), or Arctic Ocean Flux Buoy (AOFB)).

US PI: [Mary-Louise Timmermans \(Yale University\)](#)

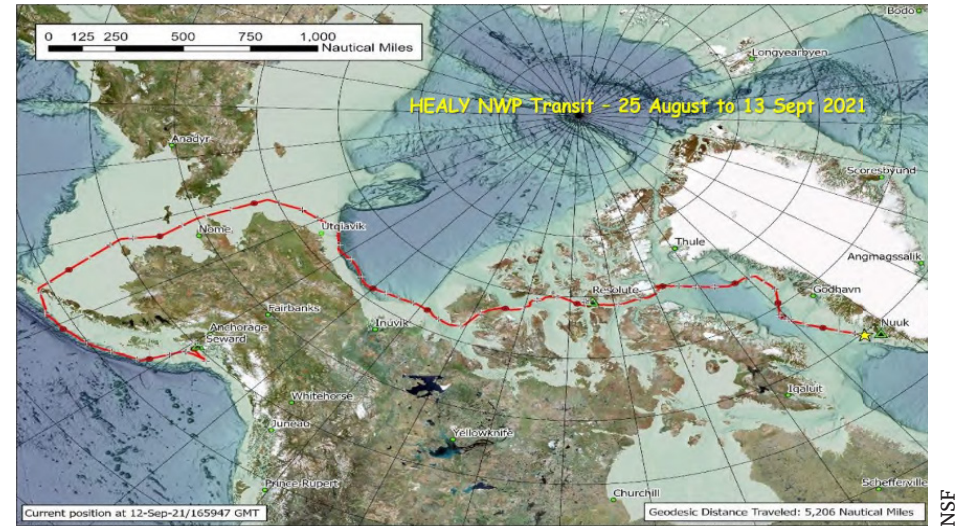


US-Canada Joint Ocean Ice Study / Beaufort Gyre Exploration Project 2021.

August 25-September 13

The USCGC *Healy* transited through the NW Passage from Seward to Nuuk, Greenland. Afterwards, from September 13-October 14 the *Healy* traveled from Nuuk to Boston, MA. Opportunistic scientific work included oceanographic sampling (CTDs), bathymetric surveys, and glider deployments.

Chief Scientists: [Larry Mayer \(UNH\)](#) for the NWP transit and [Bob Pickart \(WHOI\)](#) for the cruise in Baffin Bay.



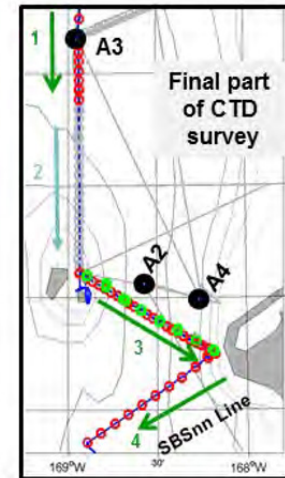
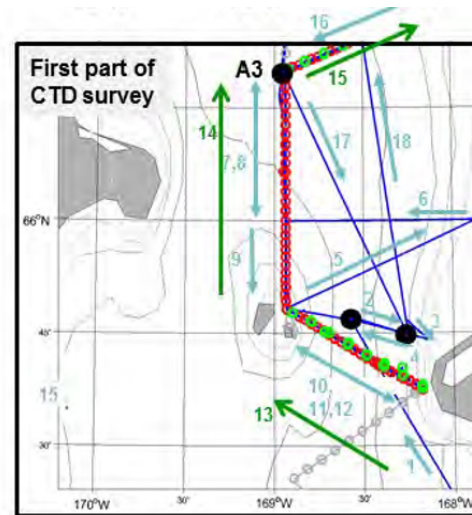
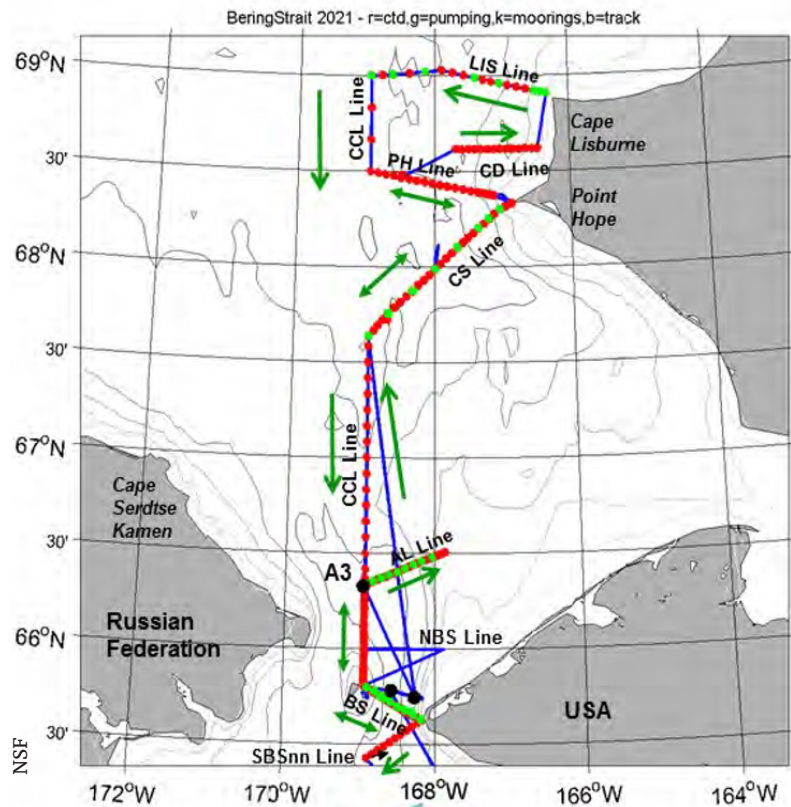
USCGC *Healy* NW Passage Transit.

NATIONAL SCIENCE FOUNDATION SUPPORTED CRUISES

July 7-17 (R/V *Norseman*)

The Bering Strait AON (Arctic Observing Network) cruise was conducted in July in the Bering Strait and southern Chukchi to recover and redeploy moorings, oceanographic sampling (CTD casts), collect water samples for nutrients & trace metals, a deployment of a glider. [Website](#).

PI: [Rebecca Woodgate \(UW\)](#), Glider PI: Hank Statscewich, hstatscewich@alaska.edu



Bering Strait AON Cruise Map.

NATIONAL SCIENCE FOUNDATION SUPPORTED CRUISES

November 7-16, 2021

DBO Fall Cruise: Nome-Nome, Alaska; RV *Sikuliaq*

The goal of the cruise on the R/V *Sikuliaq* was to evaluate ecosystem status and change with standard physical, chemical and biological measurements at time series stations as part of the Distributed Biological Observatory (DBO) and to deploy/retrieve the Chukchi Environmental Observatory (CEO) moorings and multiple NOAA moorings in the region. Projects represented on this research cruise included the DBO, CEO, the Arctic Marine Biodiversity Observing Network (AMBON), NOAA's Ecosystems and Fisheries Oceanography (EcoFOCI) and the NOAA Marine Mammal Lab (MML). Figure 1 indicates the cruise track and sea ice conditions during the cruise and Figure 2 shows the cruise sampling locations.

US PIs: [Jackie Grebmeier](#) (CBL/UMCES) and [Seth Danielson](#) (UAF)

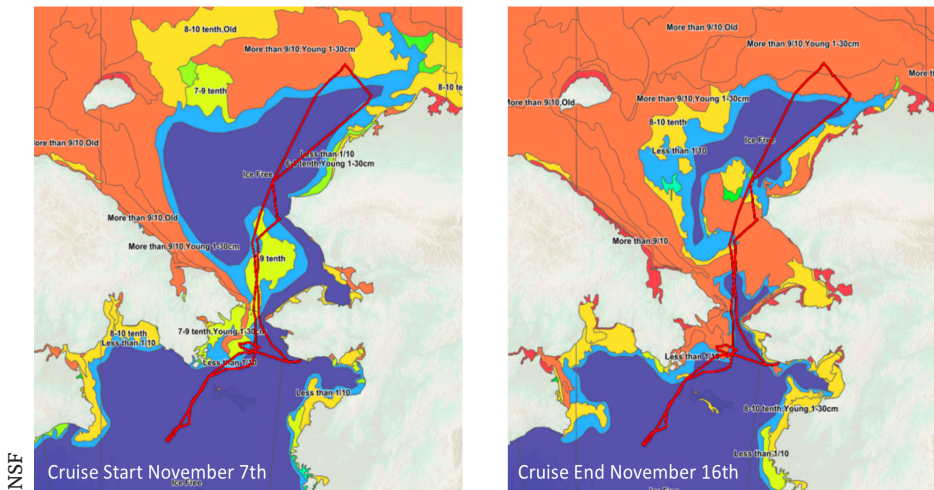


Figure 1. Sea ice coverage during the SKQ2021-15S cruise. The red line indicates the vessel cruise track to occupy the DBO1-4 regions in the northern Bering and Chukchi Seas.

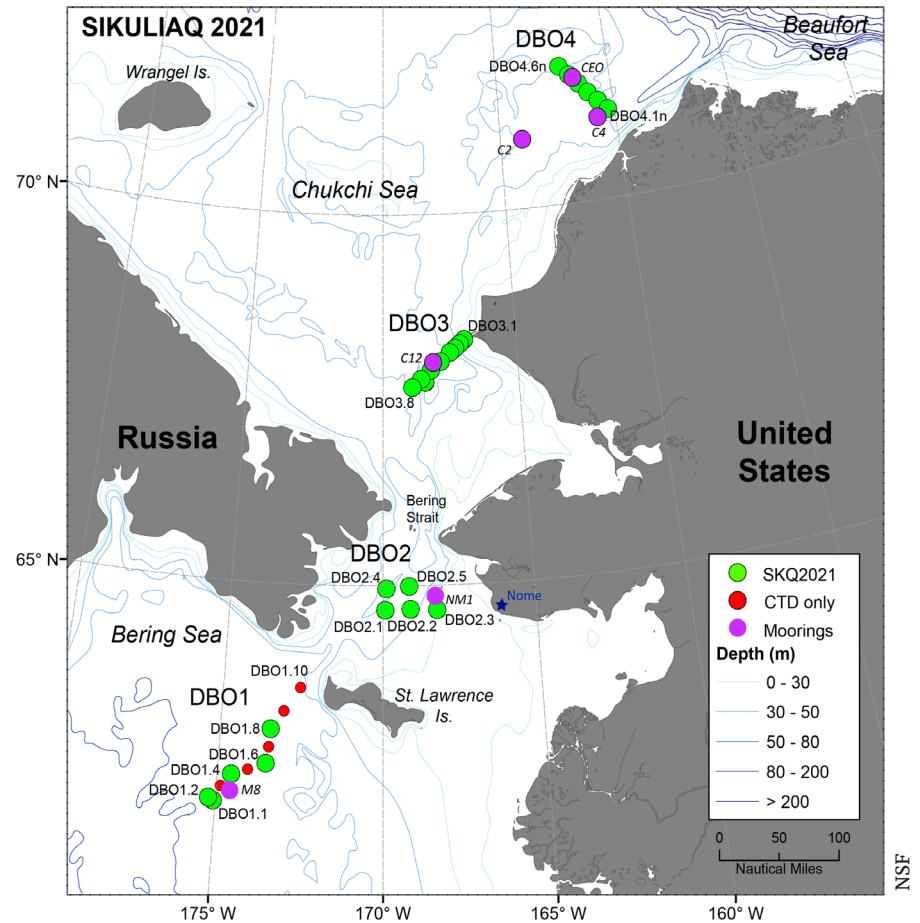
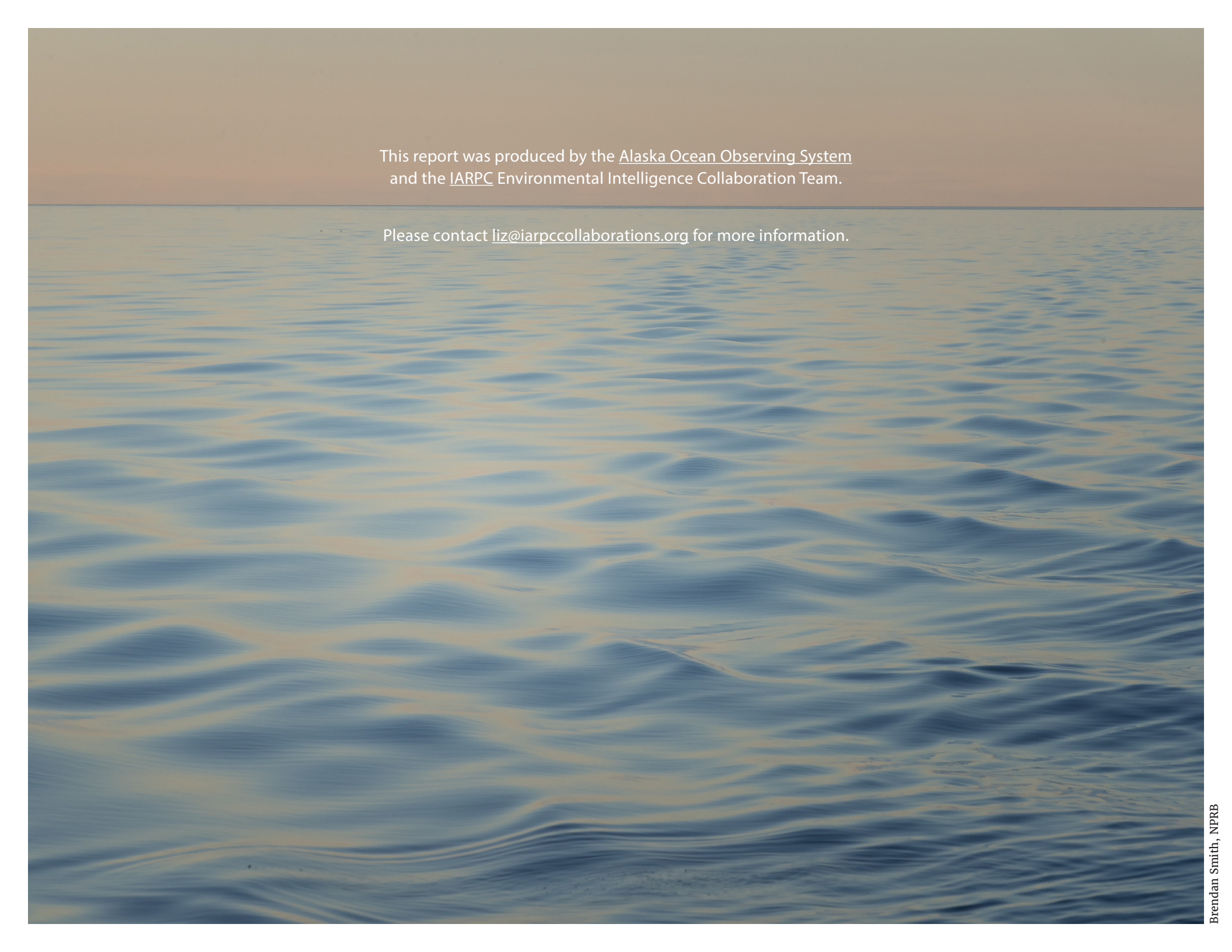


Figure 2. Schematic of cruise SKQ2021-15S station locations for standard DBO time series physical, chemical and biological measurements, along with mooring locations, November 7-16, 2021, Nome-to-Nome, Alaska



This report was produced by the [Alaska Ocean Observing System](#)
and the [IARPC](#) Environmental Intelligence Collaboration Team.

Please contact liz@iarpccollaborations.org for more information.