



Overview and DBO Sampling Plans

Pacific Arctic Group | October 2016

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Background

- Funding partners: North Pacific Research Board, U.S. Bureau of Ocean Energy Management, North Slope Borough/Shell Baseline Studies Program, U.S. Office of Naval Research Marine Mammals and Biology Program
- In-kind support from U.S. National Oceanic & Atmospheric Administration and University of Alaska Fairbanks
- \$16 million investment 2016-2021



Overarching question

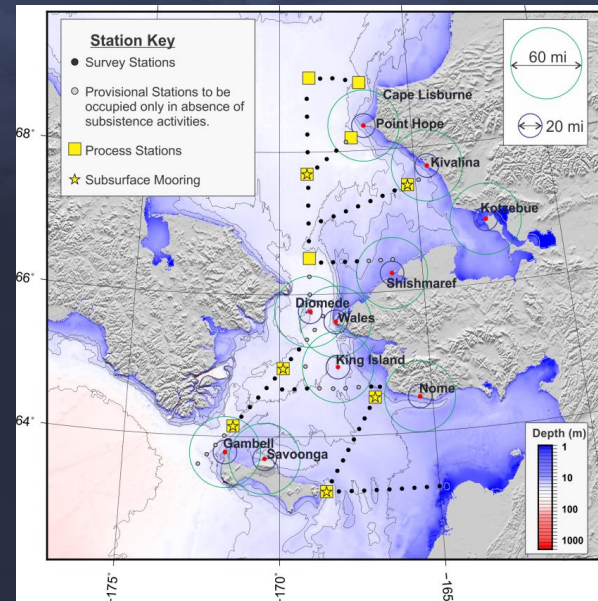
How will reductions in Arctic sea ice and the associated changes in the physical environment influence the flow of energy through the ecosystem in the Chukchi Sea that influence:

- Transport, seasonal composition, distribution, and production of phytoplankton, particulate matter, zooplankton, fishes, benthic invertebrates, seabirds, and marine mammals
- Timing, magnitude and fate of the primary and secondary productivity
- Partitioning/flux of energy between pelagic and benthic realms
- Distribution, condition, and standing stocks of large crustacean zooplankton that serve as the prey base for upper trophic level fishes and seabirds
- Assemblages, distributions, abundances, and condition of larval and early juvenile fishes that influence the recruitment success of later life stages
- Density of marine mammals and seabirds
- Human use of and interaction with the marine environment

Scope

- UAF cruises aboard vessel Sikuliaq in northern Bering and southern Chukchi Seas in June 2017 & 2018

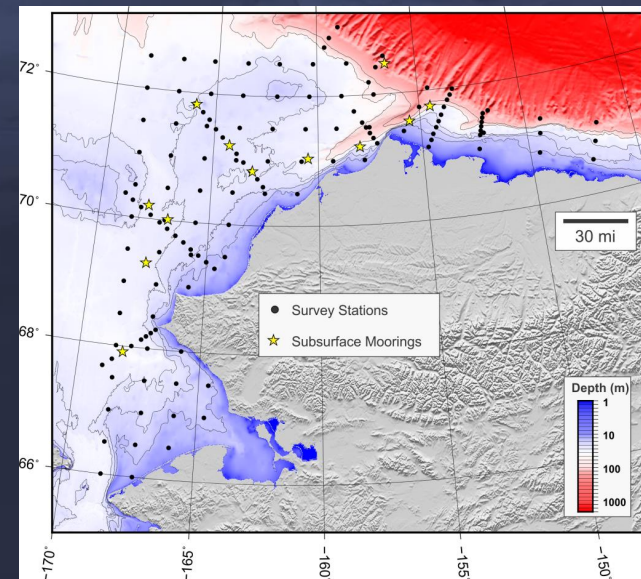
Focus on rate process measurements, physical, chemical, biological oceanography, and fish sampling



Scope

- NOAA cruises aboard chartered fishing vessels in Beaufort & Chukchi Seas in August – early October 2017 & 2019

Focus on factors driving the distribution of fish, especially Arctic & saffron cod, and pink and chum salmon



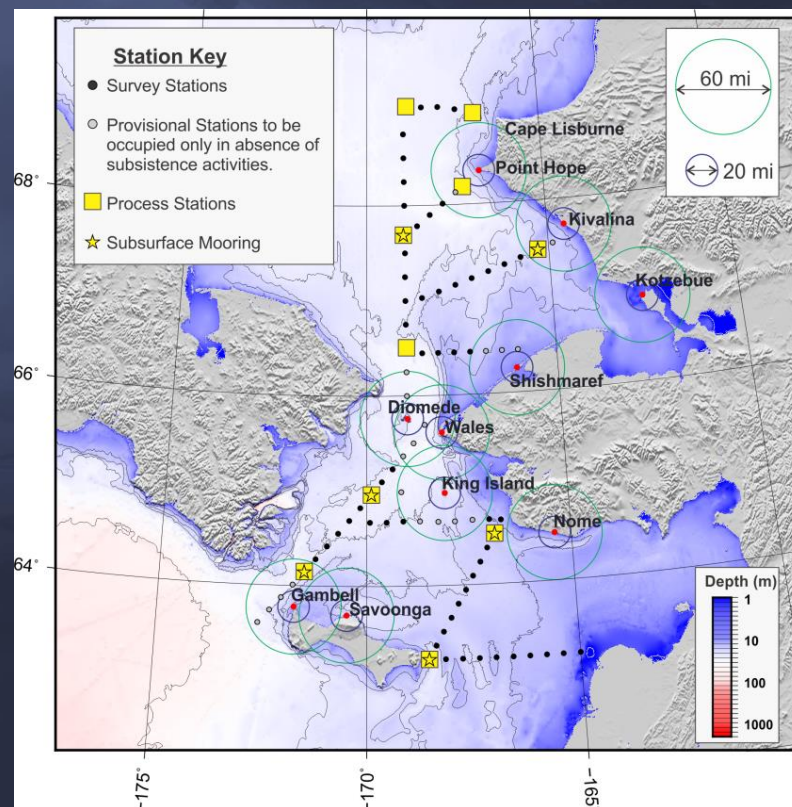
Scope

- Acoustic recorders on moorings in Bering Strait and southern Chukchi Sea
- Social science study on Chukchi Coastal Communities' Understanding of and Responses to Environmental Change

DBO Sampling – UAF

~75 Survey Stations

- CTD: physics, optics, nuts, chl_a
- Fast Repetition Rate Fluorometry: P-II efficiency & quantum yield
- Quantity & quality of sediment organic matter
- Micro/Meta zooplankton composition, abundance, biomass
- Sediment grain size
- Bacterial biomass in sediments
- Abundance, biomass, functional group analysis of benthic meio- & macro-infauna
- $d^{13}C$ and $d^{14}N$ stable isotopes
- Particle size distribution via optics
 - 2.5 - 500 μm & 65 μm - 2.5 cm

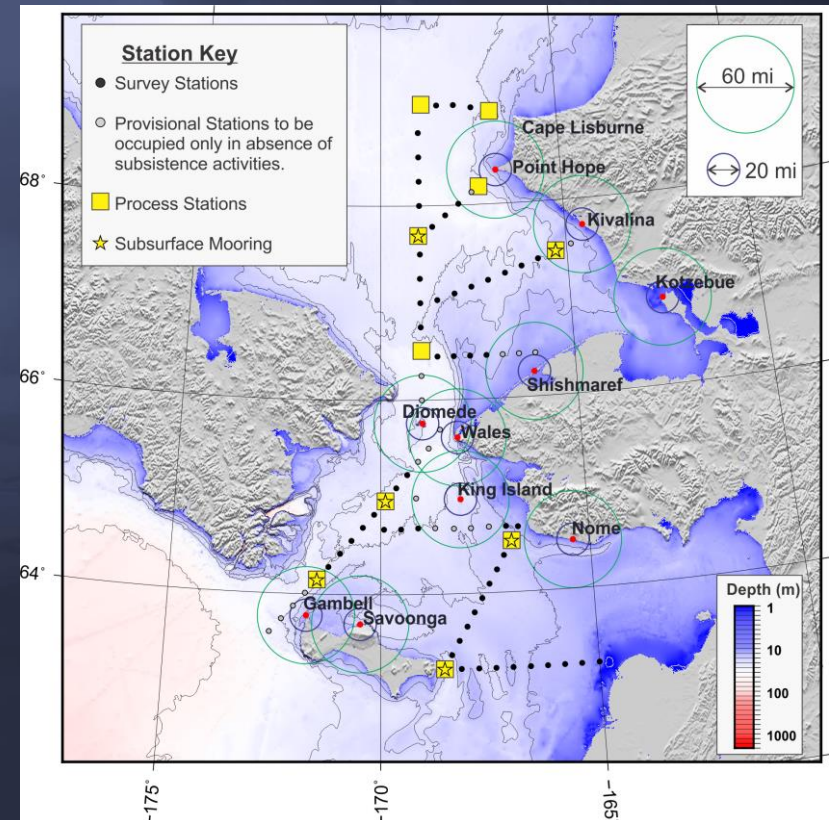


All DBO-2 and DBO-3 stations

DBO Sampling – UAF

10 Process Study Stations

- Service moorings (5)
- $d^{13}C$ Primary Production
- Zooplankton growth, egg production, respiration & fecal pellet production
- Sediment Bioturbation rates (^{234}Th)
- Sediment community oxygen consumption & individual macrofaunal respiration rates
- High resolution particle flux estimates
- $\delta^{13}C_{AA}$ stable isotopes



1-2 stations in each of DBO-2 and DBO-3

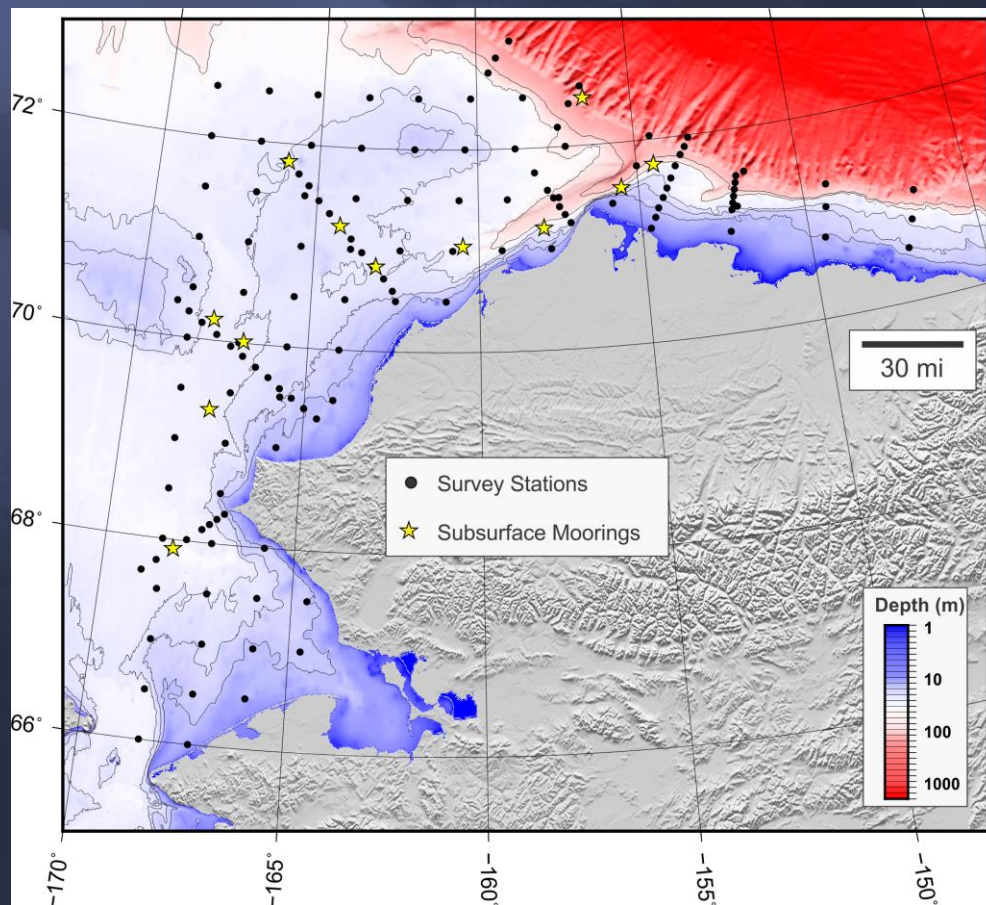
DBO Sampling – NOAA

August/September 2017 & 2019

DBO 3, 5, and 6:
CTD casts: T, S, Oxygen,
Chla fluorescence, turbidity,
PAR

Water Samples: nutrients,
Oxygen, Chla, Primary
Production, phytoplankton
speciation

Plankton tows



Integrated Work Plan

- Integrated Work Plan will be publicly available on our website soon: www.nprb.org/arctic-program.
- Document will describe the scope of the program, including specific hypotheses and cruise plans.
- We hope that members of the scientific community will reference it when developing proposals for new work that would integrate with and leverage our program.



Seeking partners for synthesis

- NPRB will invest in synthesis beginning in 2021
- Seeking partners to co-fund synthesis
- Interested in modeling projects that build from the field program



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