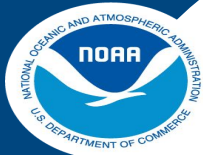


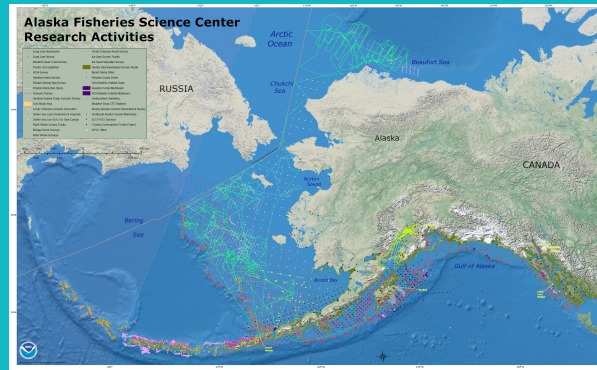
# SSC Discussion Part 2



**NOAA**  
**FISHERIES**

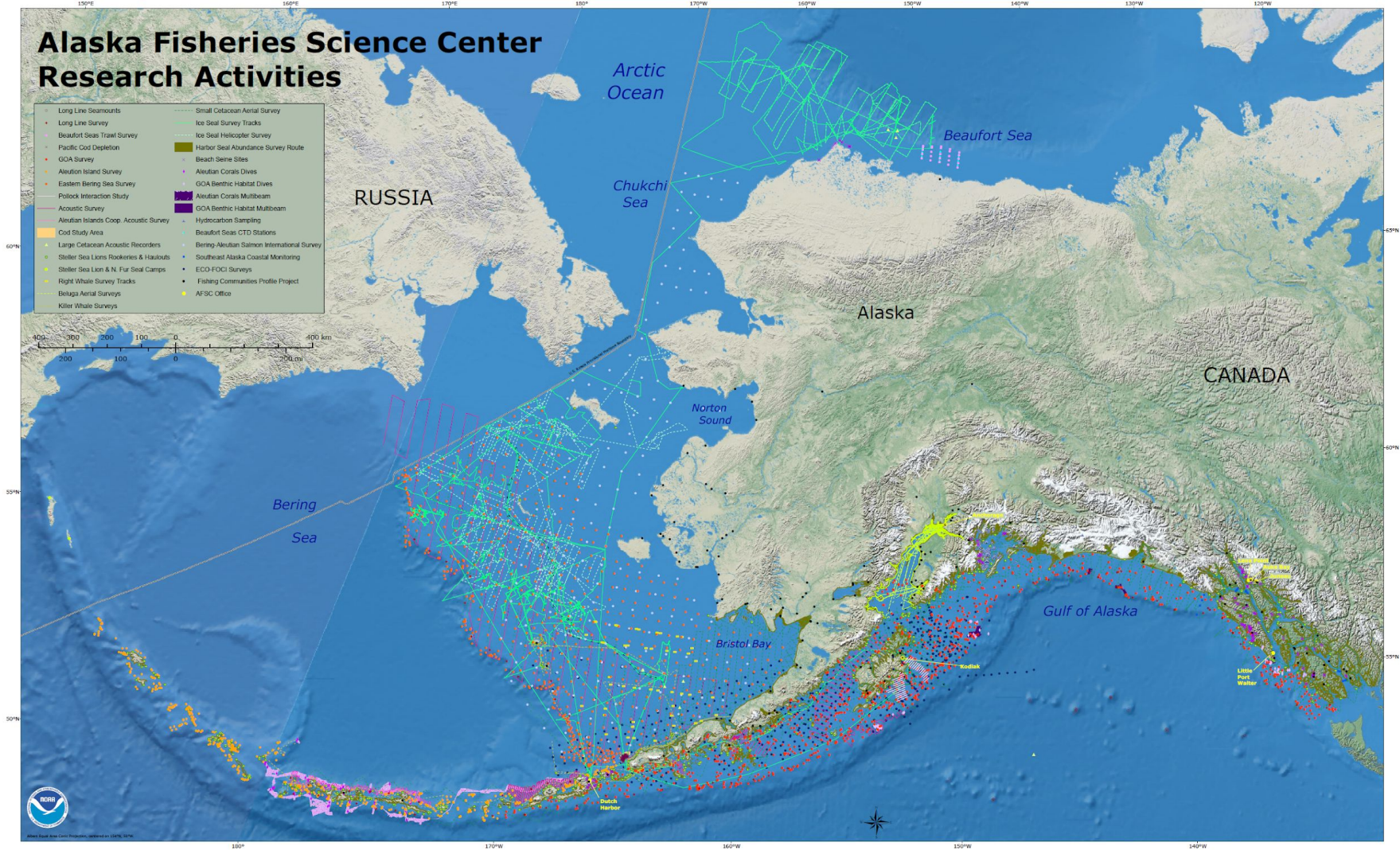
# Alaska resource surveys:

## SSC Discussion



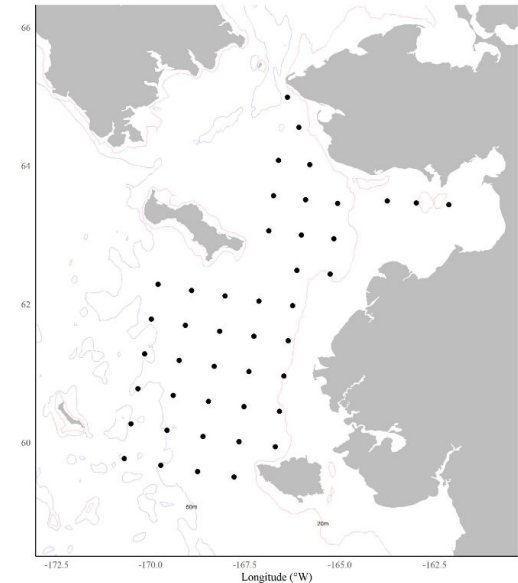
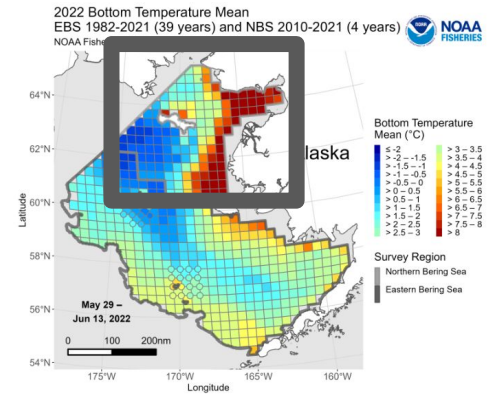
# Alaska Fisheries Science Center Research Activities

- |  |   |
|--|---|
| ● Long Line Seamounts                    | ● Small Cetacean Aerial Survey                |
| ● Long Line Survey                       | ● Ice Seal Survey Tracks                      |
| ● Beaufort Seas Trawl Survey             | ● Ice Seal Helicopter Survey                  |
| ● Pacific Cod Depletion                  | ● Harbor Seal Abundance Survey Route          |
| ● GOA Survey                             | ● Beach Seine Sites                           |
| ● Aleutian Island Survey                 | ● Aleutian Corals Dives                       |
| ● Eastern Bering Sea Survey              | ● GOA Benthic Habitat Dives                   |
| ● Pollock Interaction Study              | ● Aleutian Corals Multibeam                   |
| ● Acoustic Survey                        | ● GOA Benthic Habitat Multibeam               |
| ● Aleutian Islands Coop. Acoustic Survey | ● Hydrocarbon Sampling                        |
| ● Cod Study Area                         | ● Beaufort Seas CTD Stations                  |
| ● Large Cetacean Acoustic Recorders      | ● Bering-Aleutian Salmon International Survey |
| ● Steller Sea Lions Rookeries & Haulouts | ● Southeast Alaska Coastal Monitoring         |
| ● Steller Sea Lion & N. Fur Seal Camps   | ● ECO-FOCI Surveys                            |
| ● Right Whale Survey Tracks              | ● Fishing Communities Profile Project         |
| ● Beluga Aerial Surveys                  | ● AFSC Office                                 |
| ● Killer Whale Surveys                   |   |

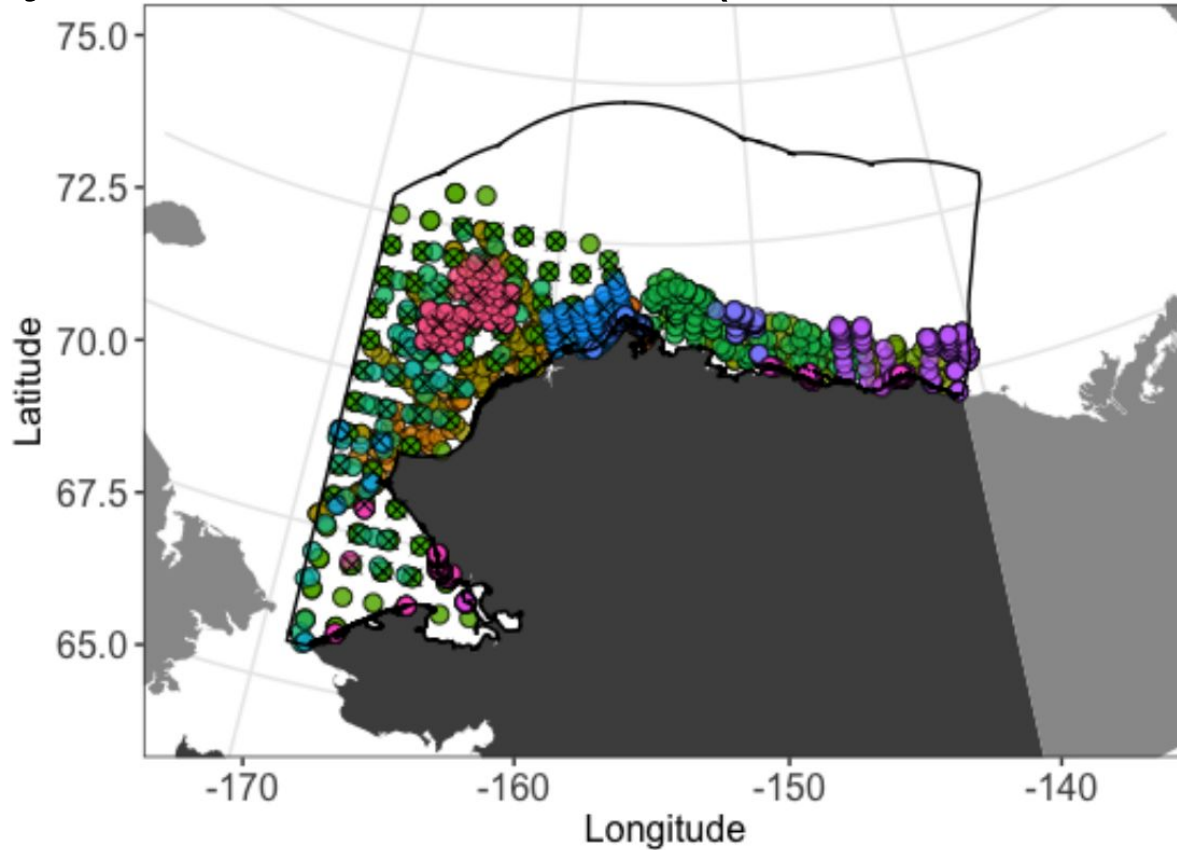


# “Core” surveys in the NBS

- NBS bottom trawl survey (AFSC: 2010, 2017 - 2019, 2021-2022...)
  - Intended to remain annual
  - Used in some assessment models
- NBS ecosystem and salmon survey (AFSC & ADFG: 2002-2022...)
  - Oceanography, salmon, forage fish, recent benthic work
  - Used in salmon forecasts, ESRs, and ESPs
- DBO moorings
  - Oceanography
- Other?



# Surveys from 2000 - 2018 (Marsh et al. C4)



# Motivation for more surveys

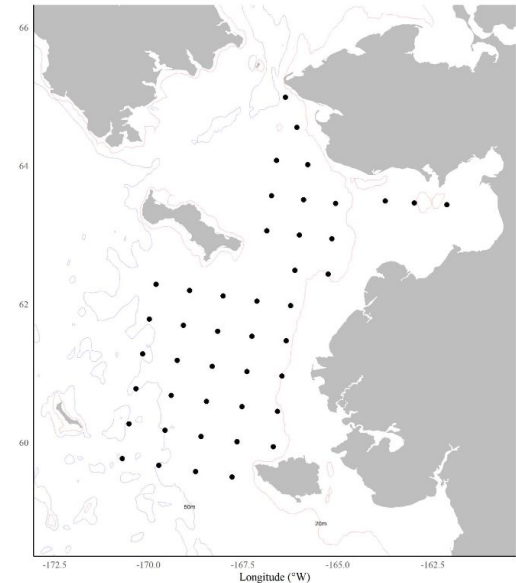
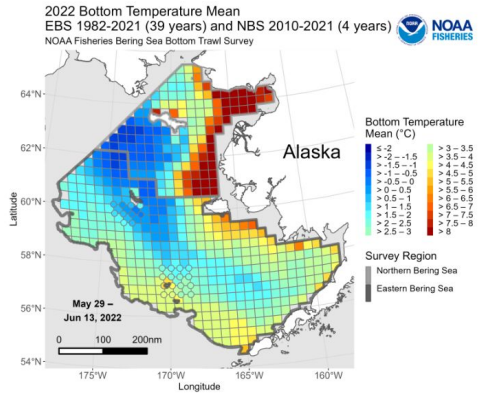
- Potential for Arctic fisheries as valuable species move north
  - Monitor proportion of EBS/NBS stocks moving out of or into FMP areas
- Establish an ecosystem baseline and validate models (i.e., ACLIM/MOM6)
- Study effects of increasing non-fisheries use and development
  - Oil and gas development
  - Shipping

# Resources are finite (Discussion points)

- Do we sacrifice a year of a different area to bottom trawl surveys in the Chukchi?
  - We currently survey GOA biennially, would we have caught the P Cod crash earlier?
  - We skipped the 2020 EBS survey, we got a big snow crab surprise but everything else mostly worked...
    - 2020 data might have given us more information on timing and the cause, but it would not have prevented the crash
- Do we shift ecosystem survey effort into the Chukchi?
  - Ecosystem surveys of FMP areas have already been thinned
  - Is frequent monitoring the Chukchi more important than work in GOA or EBS?
- Maintain core surveys and seek additional resources
  - Where would that come from?

# Biological Info (Discussion points)

- Should we be tracking (learning about) movement of many other species (not just P cod) to help prioritize research?
  - If so, which ones?
- Do biological parameters (eg, overwintering survival of larvae, growth, maturity, etc.) change as a function of location (area) and/or temperature?





# Other ecosystem

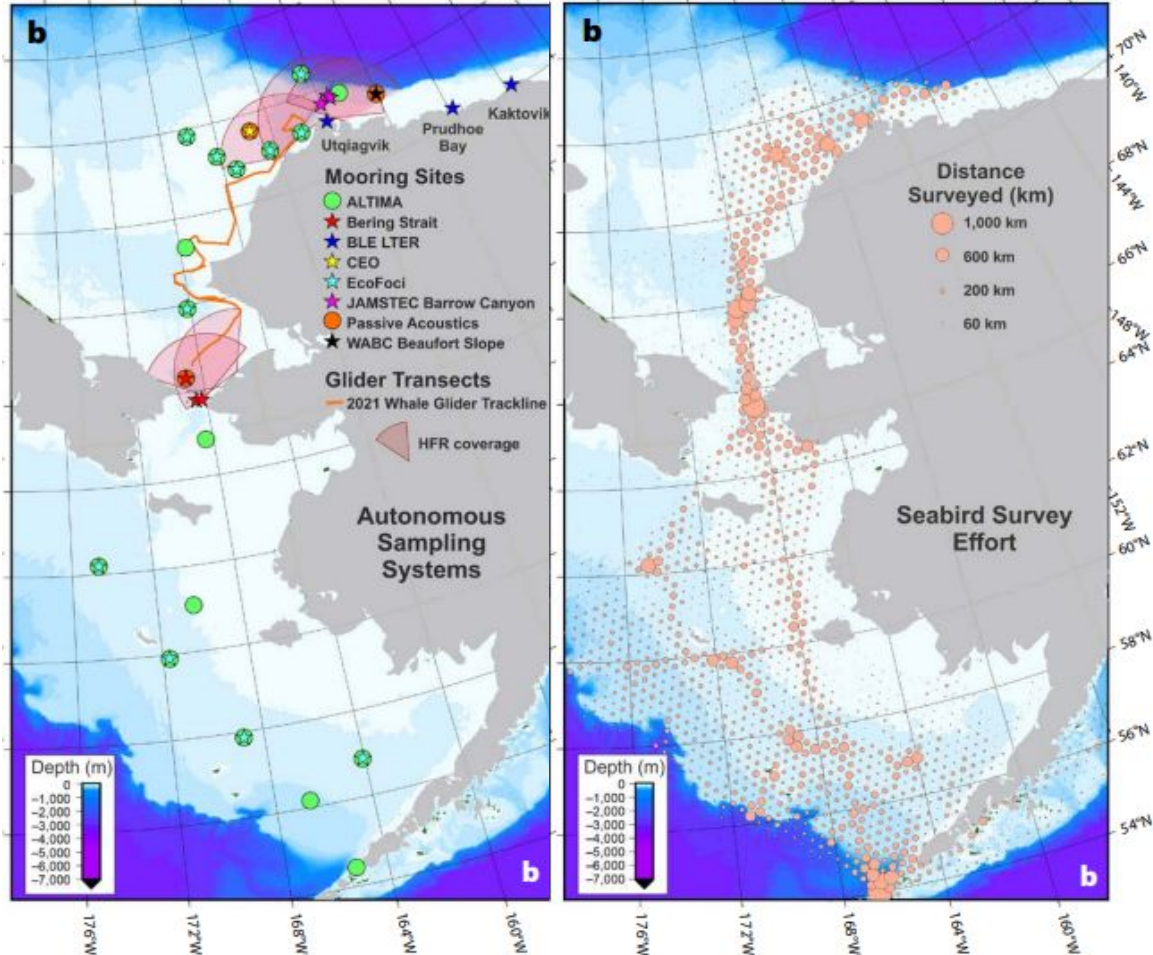
## Monitoring

Abundance, distribution,

[left] Autonomous measurements: mooring sites (symbols), high frequency radar coverage (shaded arcs), and a 2021 passive acoustic glider track (orange line). Circles denote passive acoustic recorders, and stars denote multidisciplinary oceanographic moorings. Not shown: Saildrone tracklines that criss-cross the US Bering/ Chukchi shelves.

[right] Vessel based seabird survey effort (30 km grid cells) from 2006 to 2020 showing total kilometers of survey transect per grid cell

(Danielson et al. 2022)



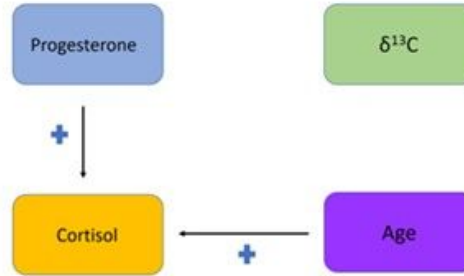
# Other ecosystem

## Not just abundance & distribution

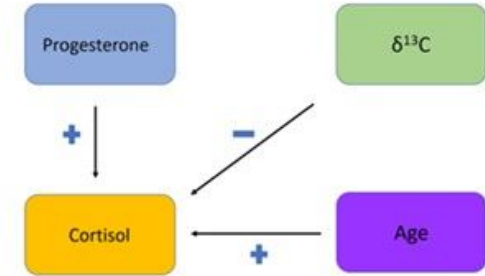
Complex dynamics between reproduction, stress, and prey resources (Crain et. al 2021)

*“This negative relationship between cortisol and  $\delta^{13}\text{C}$  in bearded seals suggests a shift to higher prey diversity, possibly due to changes in sea ice in the Pacific Arctic evident post 1998.”*

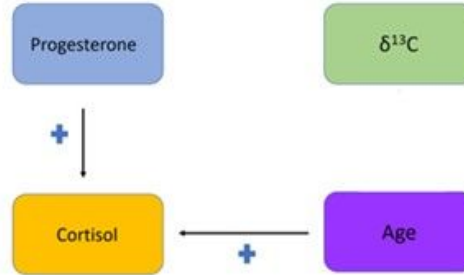
Bearded seals, pre-1968



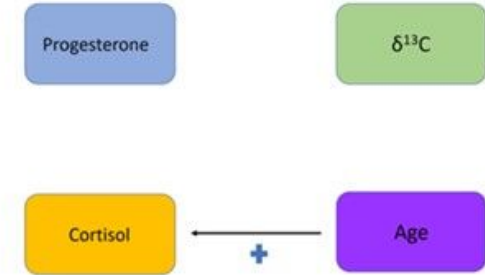
Bearded seals, post-1998



Ringed seals, pre-1968

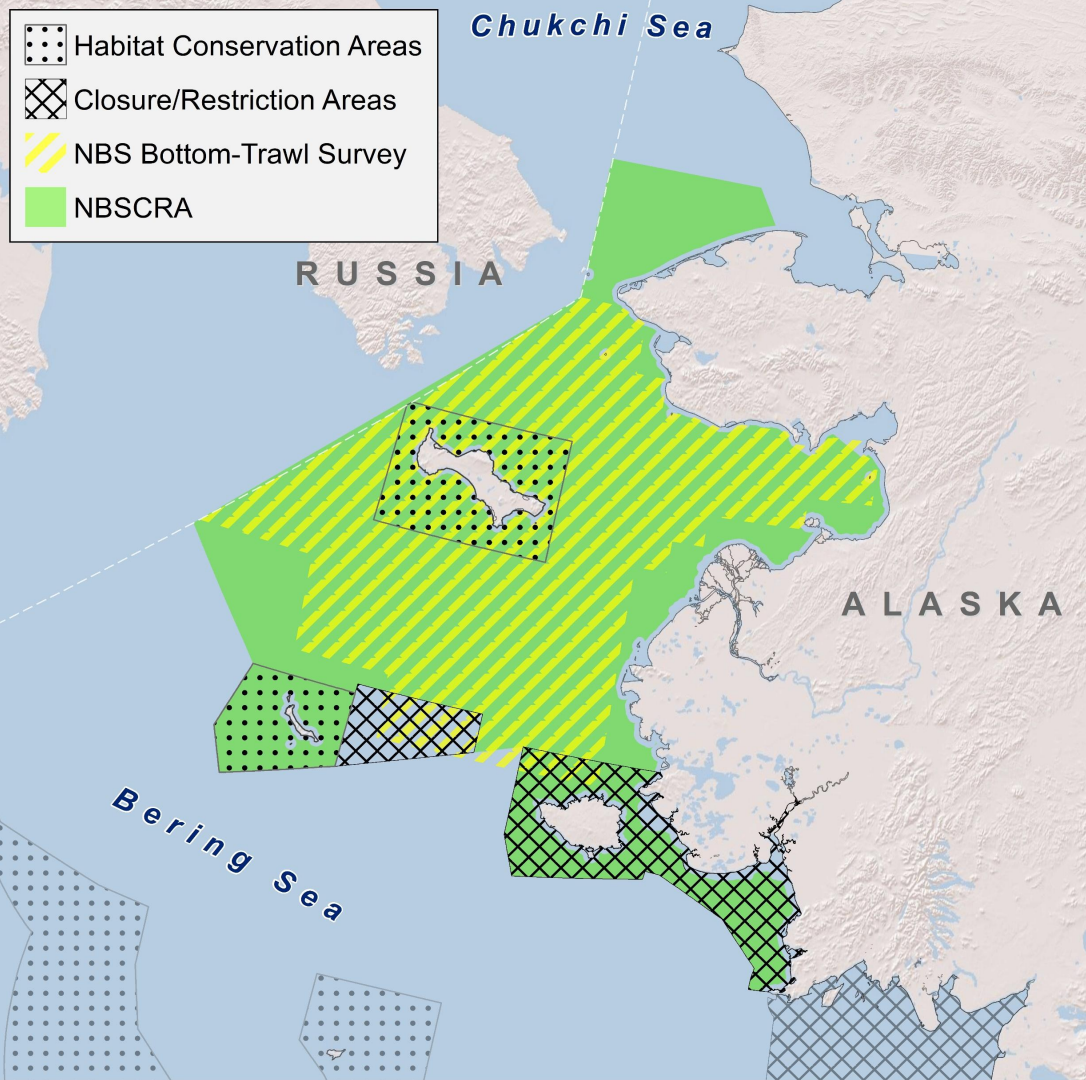


Ringed seals, post-1998

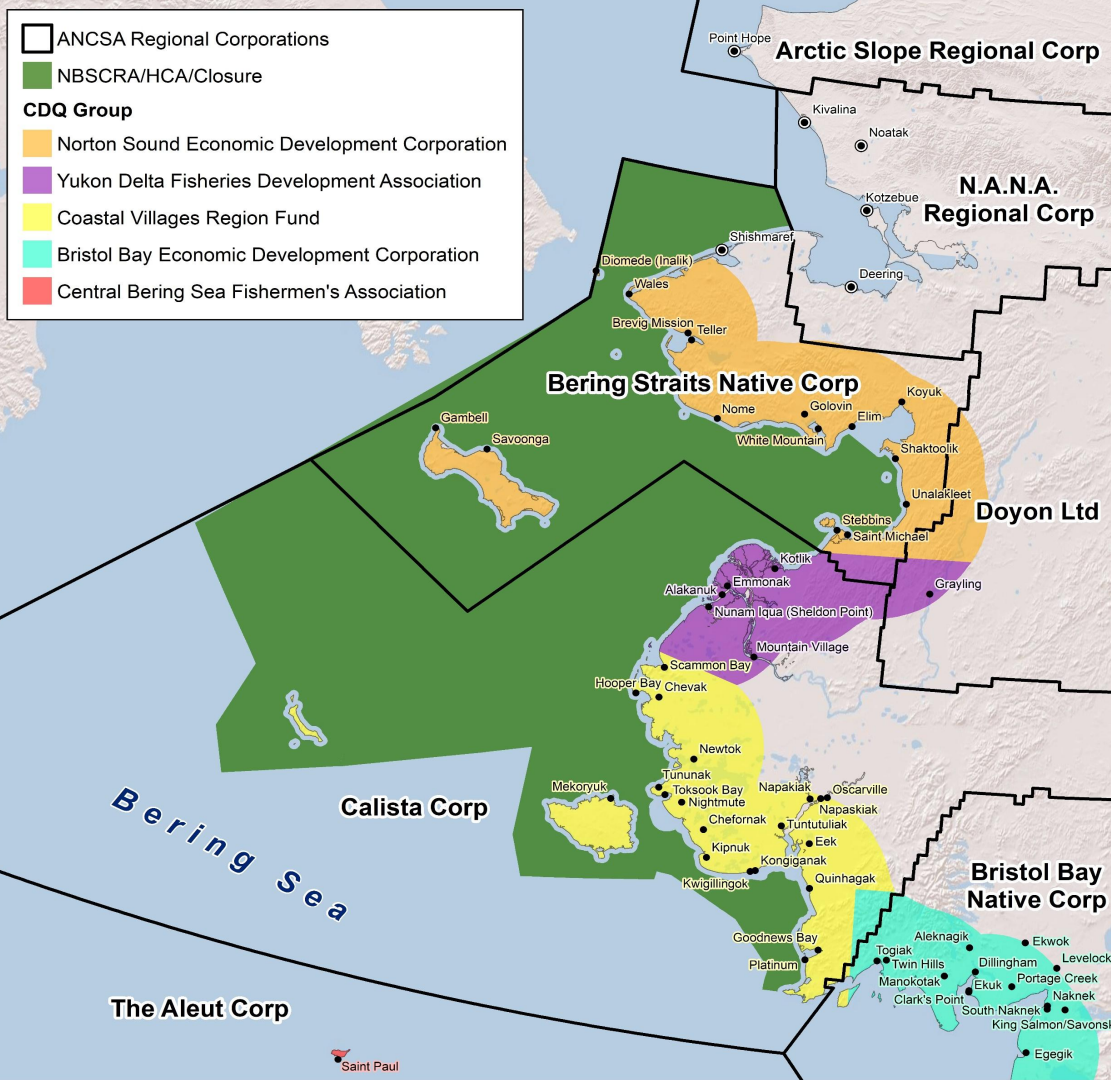


# Other ecosystem (Discussion Points)

- What types of data collections should we consider with respect to prey availability/competition for upper trophic levels?
  - We currently have several approaches to monitoring abundance and distribution
  - Less information (or less coordination) on food-web interactions and drivers
  - Are there physical oceanographic features/drivers we are overlooking?
- What frequency of data collection is needed for long-lived, generalist species?
  - Seasonal/spatial biases?
  - Outdated baselines need updating?
  - Which species?
  - Direct and indirect fisheries interactions?
- How can we best coordinate across knowledge holders?
  - Focus on ecosystem roles



NBS Climate Resilience Area, NBS Habitat Conservation Areas, NBS Closure and Gear Restriction Areas, and NBS Bottom Trawl Survey Area (also encompasses NBS Research Area).



ANCSA Regional Corporations, CDQ regions, CDQ communities, and other select communities in proximity to combined NBS HCAs, closure and gear restriction areas, climate resilience area, and research and survey areas

# Sources of Knowledge (Discussion points)

- Sources of knowledge
  - Indigenous community knowledge, including TK
  - Industry knowledge, including LK
  - Agency knowledge
  - Other knowledge bases
- Challenge: Systematic entry of products of diverse knowledge systems into ongoing NPFMC/NMFS management processes
  - Research priorities
  - Integration into decision-informing, regularly produced status reports and analytic products

