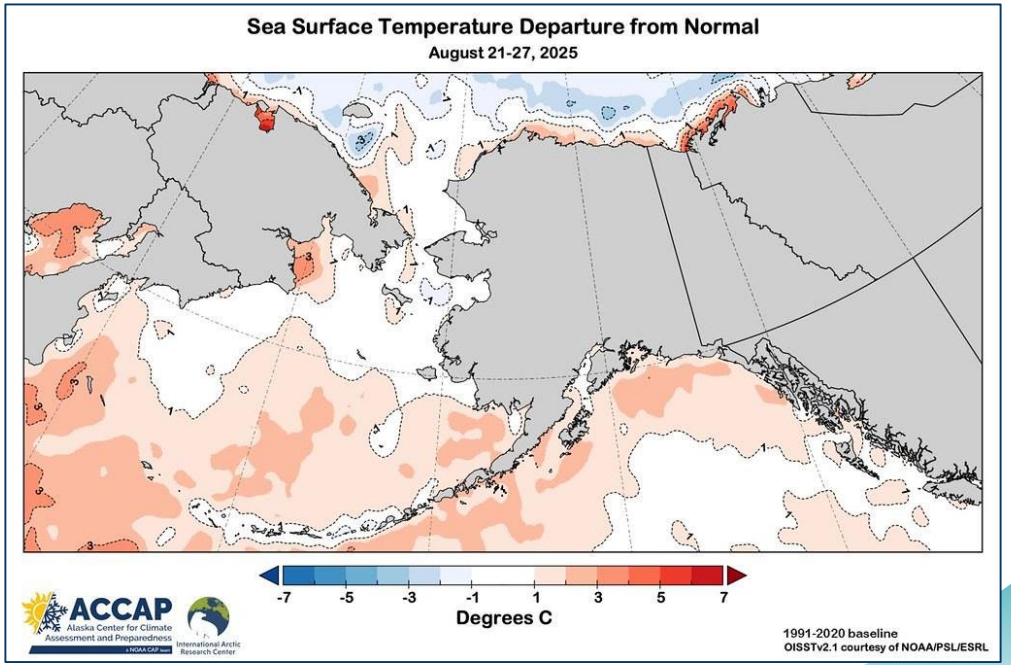
Ecosystem Status Report

Elizabeth Siddon

Scientific & Statistical Committee
September 29, 2025



NOAA FISHERIES

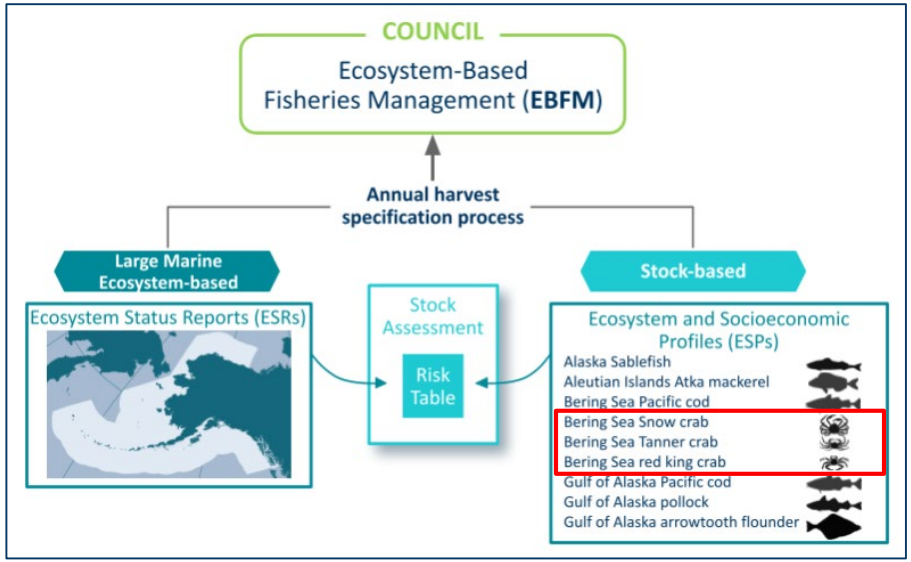
Outline

- ESRs and ESPs are complementary
- Alaska-wide climate overview
- 2025 highlights for groundfish
  - Gulf of Alaska
  - Aleutian Islands
  - Eastern Bering Sea
- EBS crab-relevant ecosystem indicators

Ecosystem Status Reports (ESRs) & Ecosystem and Socioeconomic Profiles (ESPs)

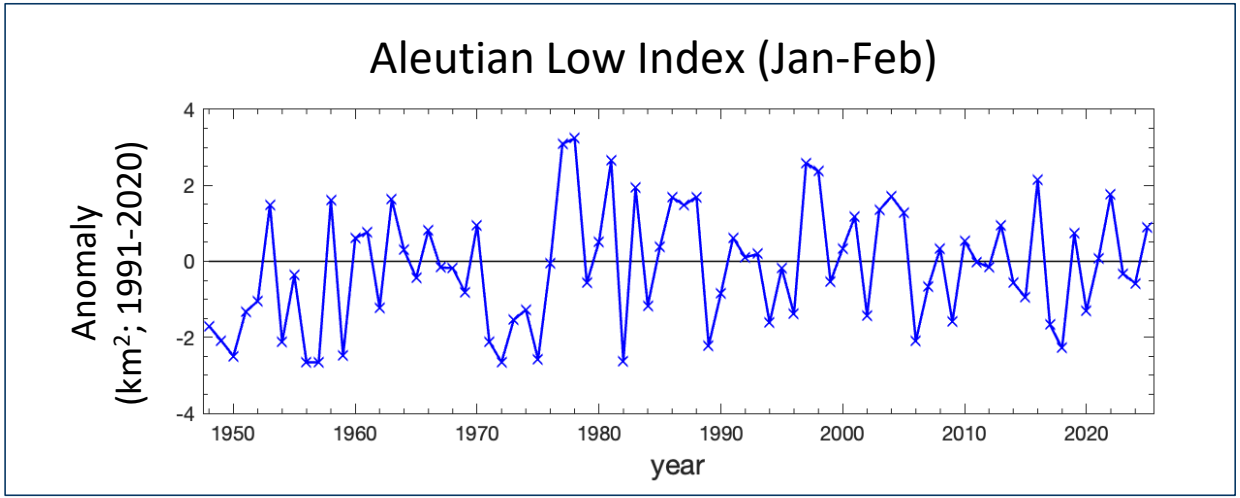
Both ESRs and ESPs allow for incorporating ecosystem information into management decisions. They inform the SSC's ABC and OFL recommendations, as well as final TAC determination.

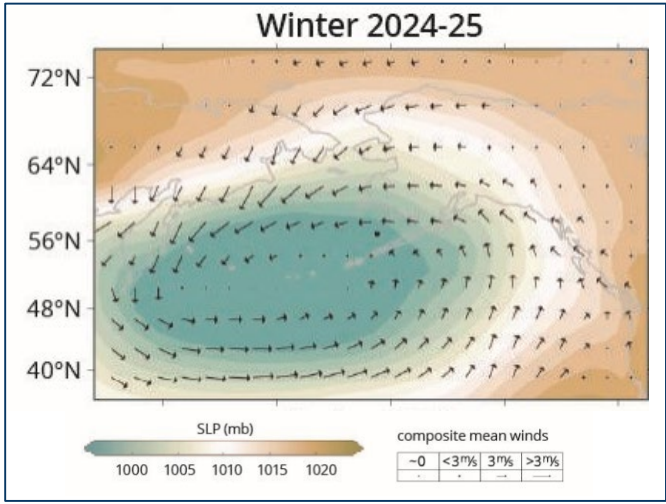
- ESRs provide Large Marine Ecosystem scale status and trends
- ESRs provide contextual assessments that reflect ecosystem components ranging from physical oceanography up through the food web



- ESPs are stock-specific and appended to stock assessments
- ESPs identify key ecosystem and socioeconomic indicators relevant to the stock assessment model

Strong Winter Aleutian Low

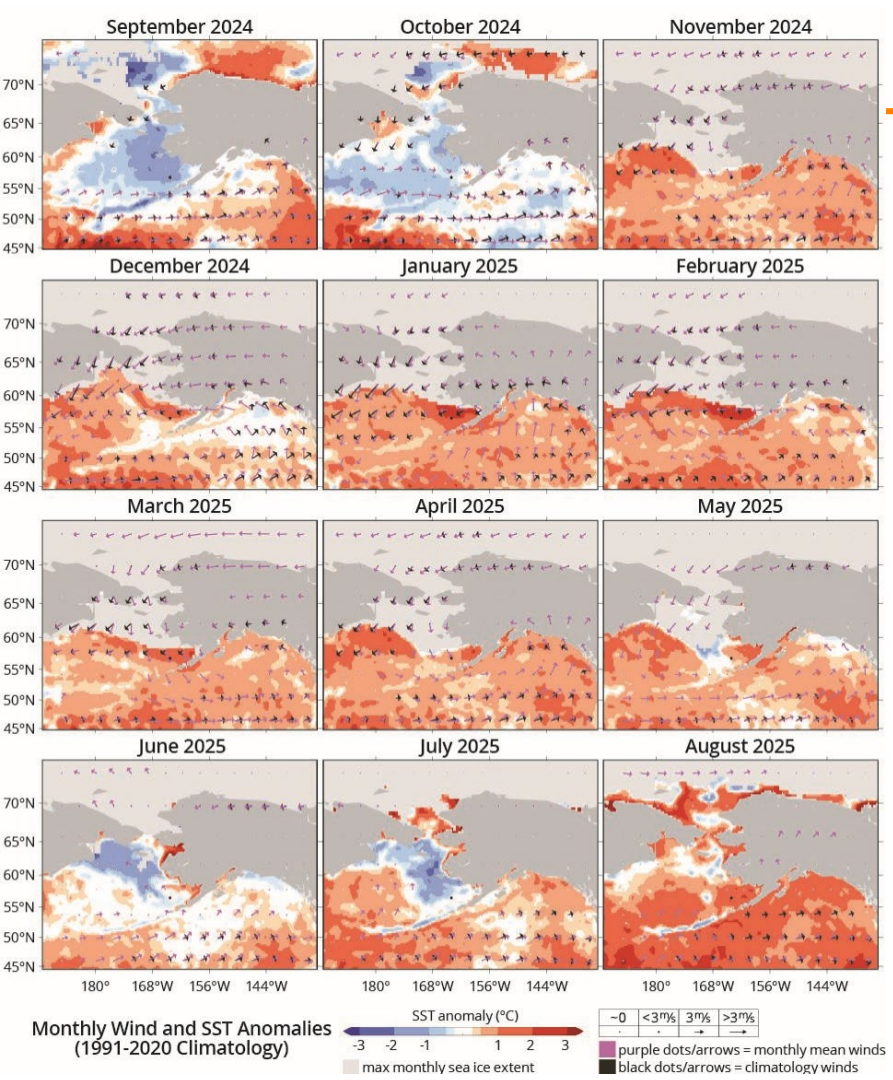




Winter (2024/2025) conditions across the North Pacific were

warm and stormy, with less sea ice in the Bering Sea

(Wang)



Winter: Strong Winds and Warm Oceans

The winter Aleutian Low created strong winds and warm oceans across regions:

Gulf of Alaska

- Strong gyre circulation
- Brought warm water onto the shelf

Aleutian Islands

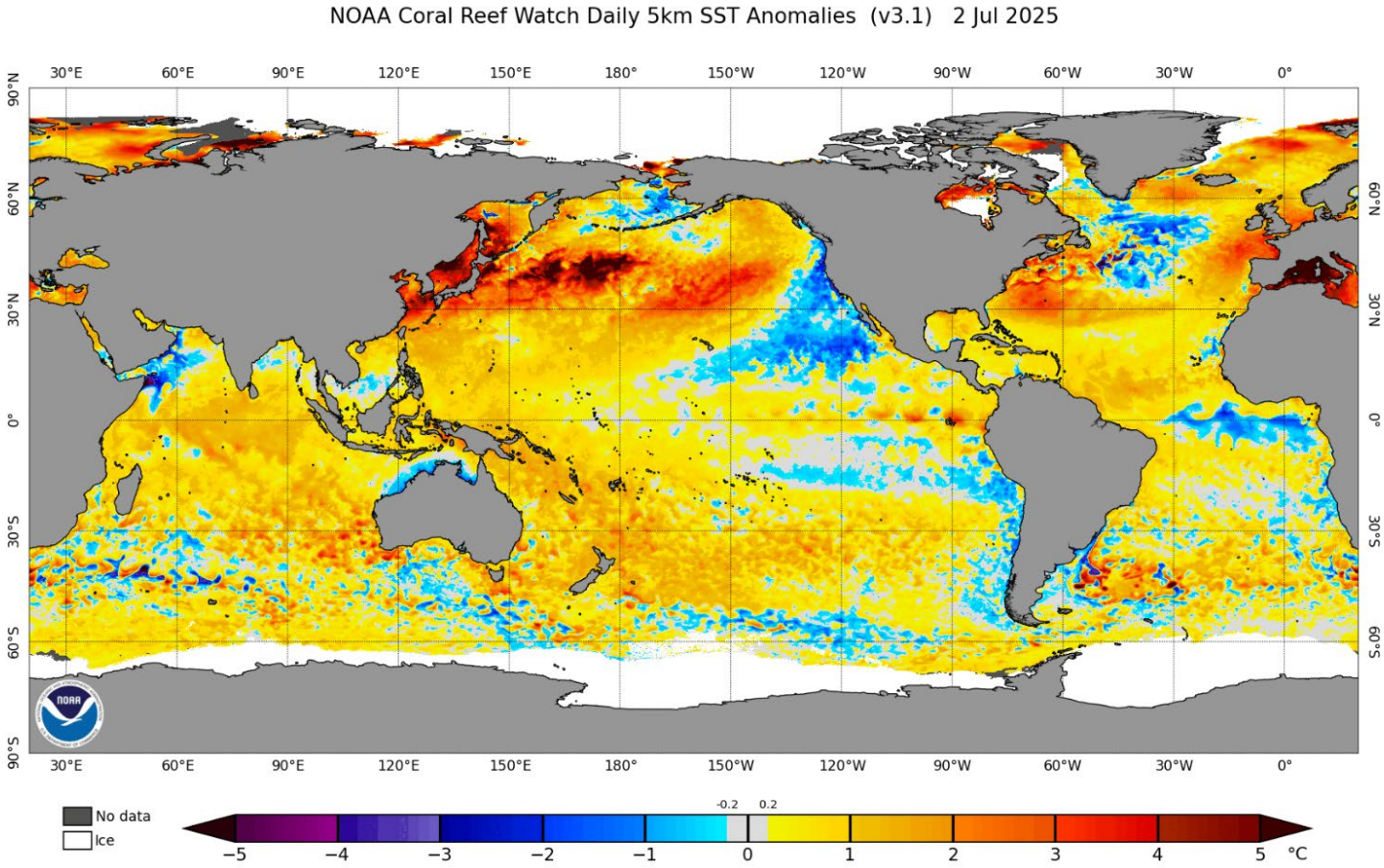
- Strong Alaska Coastal Current and AK Stream
- Strong eddies increased transport through eastern and western passes

Eastern Bering Sea

- Warm waters over the shelf
- Prevented sea ice expansion until late spring

(Lemagie)

Warmth Builds at End of Summer (June 27 - Sept 24)

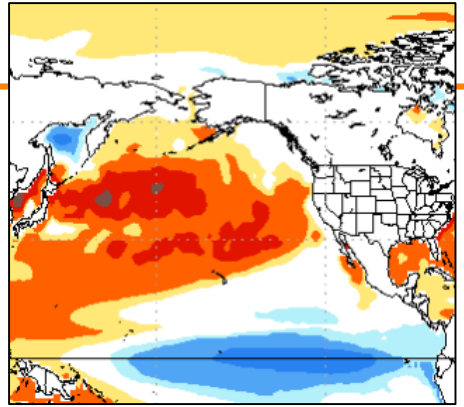


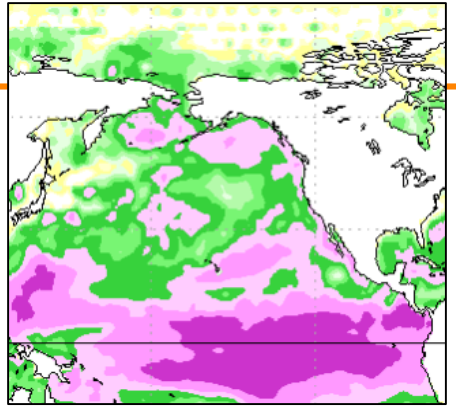
National Multi-Model Ensemble

SST Projections

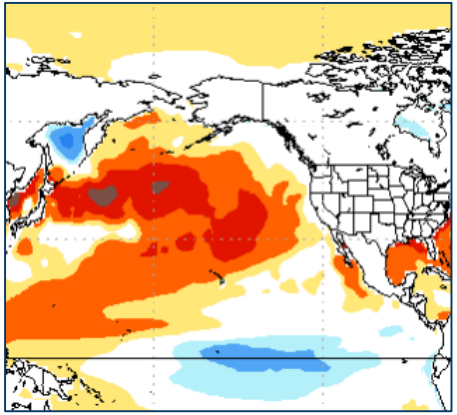
Skill plots

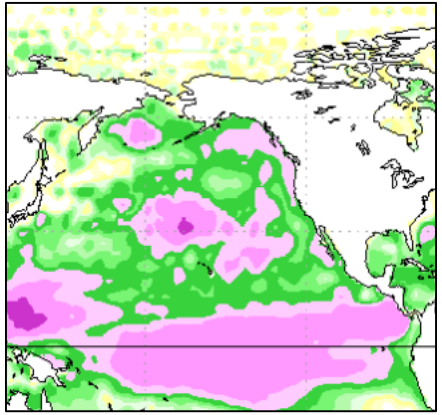
Nov 2025 - Jan 2026

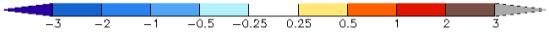


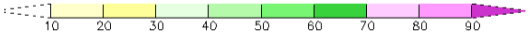


Jan - Mar 2026









- **Transition to La Niña** 71% chance through December 2025
  - Regional dynamics may differ
- ***Warm SST*** anomalies:
  - Western-central N. Pacific
  - Aleutian Islands
  - Southern Bering Sea
- ***Neutral SST*** anomalies:
  - Coastal Gulf of Alaska
  - Northern Bering Sea
  - Coastal U.S. Arctic

Full **ESR Climate Update** presentation to the September 2025 Groundfish Plan Teams is available at:

ESR Climate Update

- Alaska-wide: slides 4-7
- GOA: slide 8-13
- Aleutian Islands: slides 14-17
- EBS: slides 18-27

2025 GOA Preview

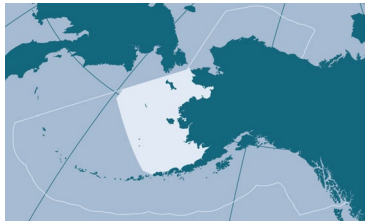
Bridget Ferriss

- **2025 Gulf of Alaska was warm (surface, depth, shelf, gyre) with some temperature and ecological similarities to 2014 and 2019 (marine heatwave years)**
- **Ecological signals of a warmer year**: e.g., shift to smaller plankton species, fish from the south (tuna!), larval groundfish dynamics
- **How long will warm conditions persist**? La Niña forecast in 2026 winter (historically cooling pressure) but cooling didn't happen with 2025 La Niña. Potential implications for 2026 adult groundfish

2025 AI Preview

Ivonne Ortiz

- **2024 SSTs cooler, but still above average**
  2025 back to year-round warm SSTs (~2023, 2021)
- **Strong AK currents> stronger transport> increased nutrients**
- **Trophic cascade?** Increased nutrients & relatively low Eastern Kamchatka pink salmon could favor phytoplankton > zooplankton > planktivores
- **How warm will the winter be?** Predicted warm winter for 2024-25 borne out by observations: 2nd warmest winter since 1900. Current prediction for winter 2025-26 is warmer

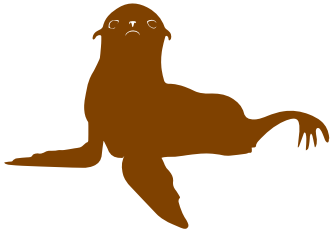


2025 EBS Preview

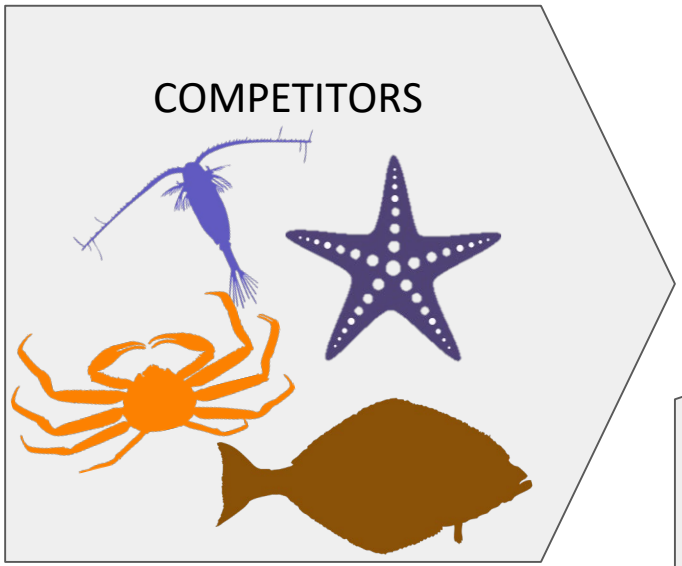
Elizabeth Siddon

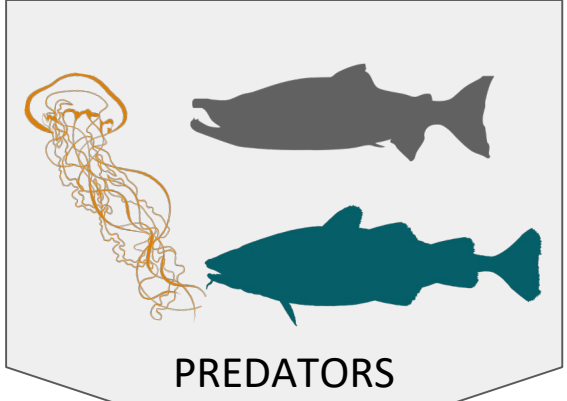
- 2025 was warmer than 2024, especially over the southern shelf
  - Heat content in the south prevented sea ice expansion

- 2025 groundfish condition
  - SEBS: marked increases from 2024 across species
    - Pollock, Pacific cod, yellowfin sole, and arrowtooth flounder
  - NBS: low to average condition across species
    - Pollock (>250 mm) highest condition observed



- Saxitoxin poisoning of Northern fur seals at St. George Island


COMPETITORS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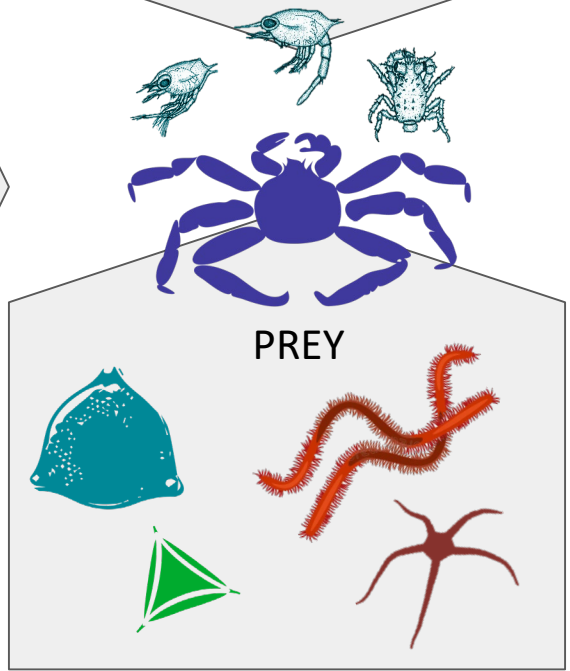
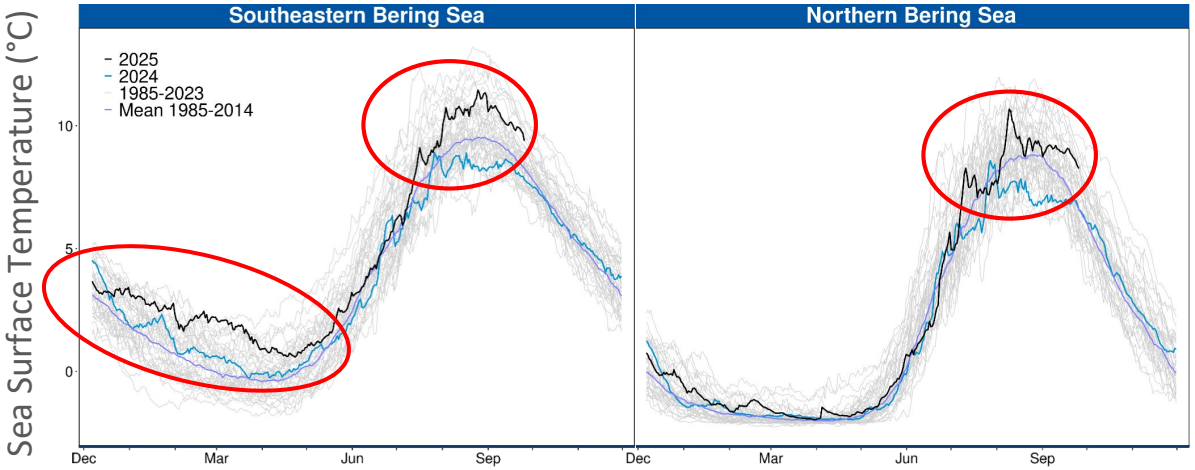

PREY


H
ENVIRONMENTAL
PROCESSES

Surface temperatures were warmer in 2025 than 2024, especially in the south

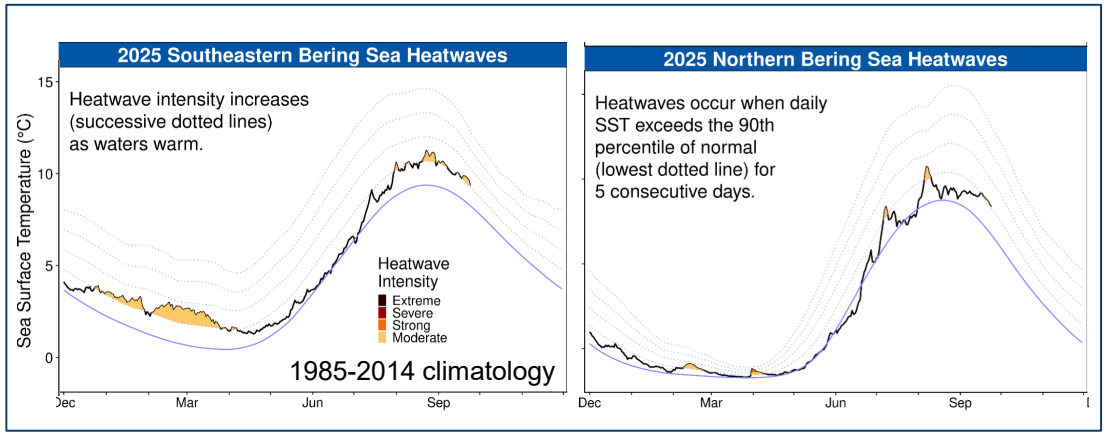


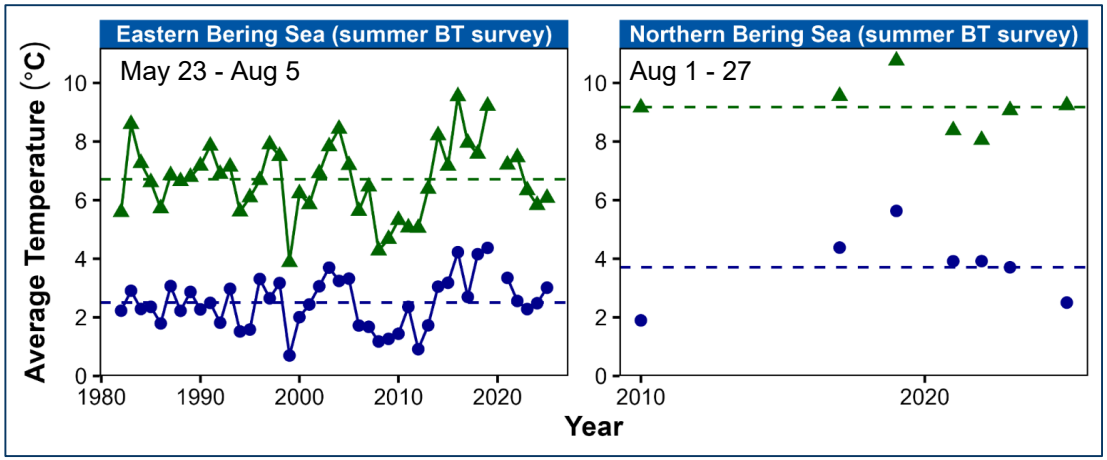
- **Southeastern Bering Sea**
  - 2025 warmer than 2024
  - Late spring reprieve
- **Northern Bering Sea**
  - August to present 2025 warmer than 2024

Alaska Marine Heatwave tracker

(Callahan)

Winter warmth, late spring reprieve, warmth returned in August



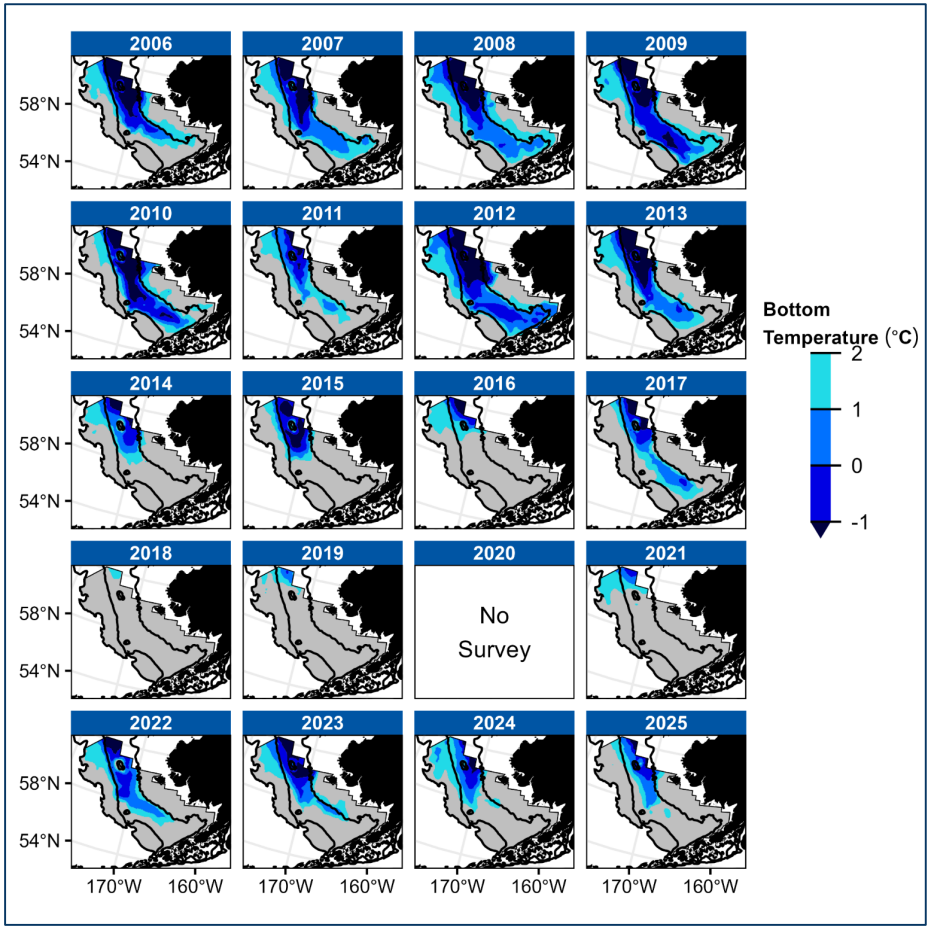


- **Southeastern Bering Sea**
  - Winter-spring MHW
- **Northern Bering Sea**
  - Brief and infrequent MHWs

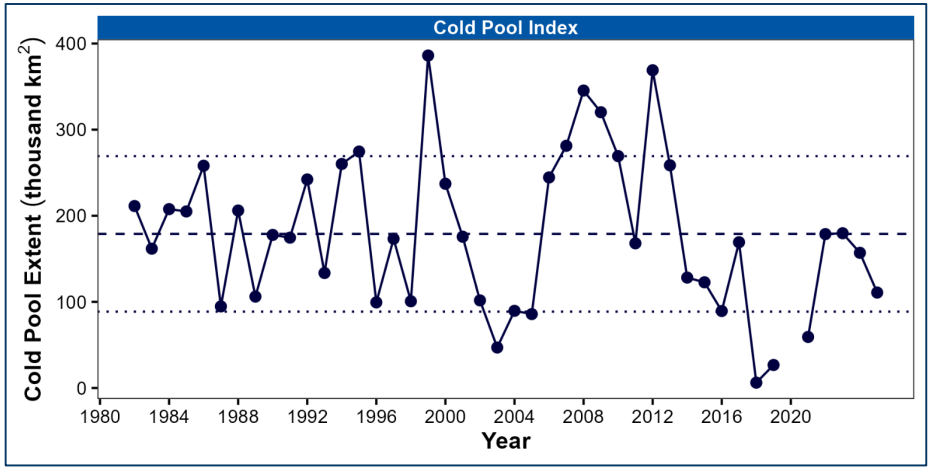
- **SEBS survey** occurred when SSTs were cooler
- **NBS survey**: SSTs had warmed to average

(Callahan, Rohan)

SEBS: cold pool extent was below average in 2025

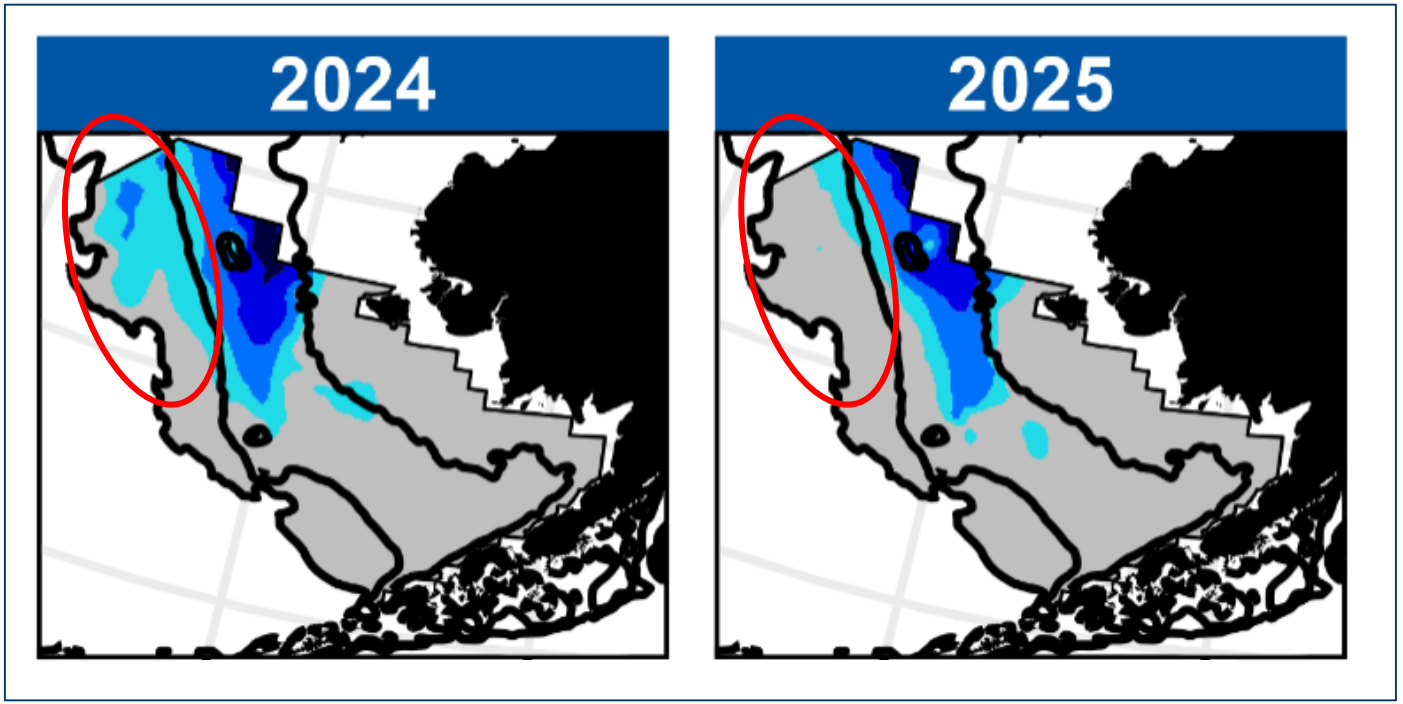


- A 29% decrease from 2024



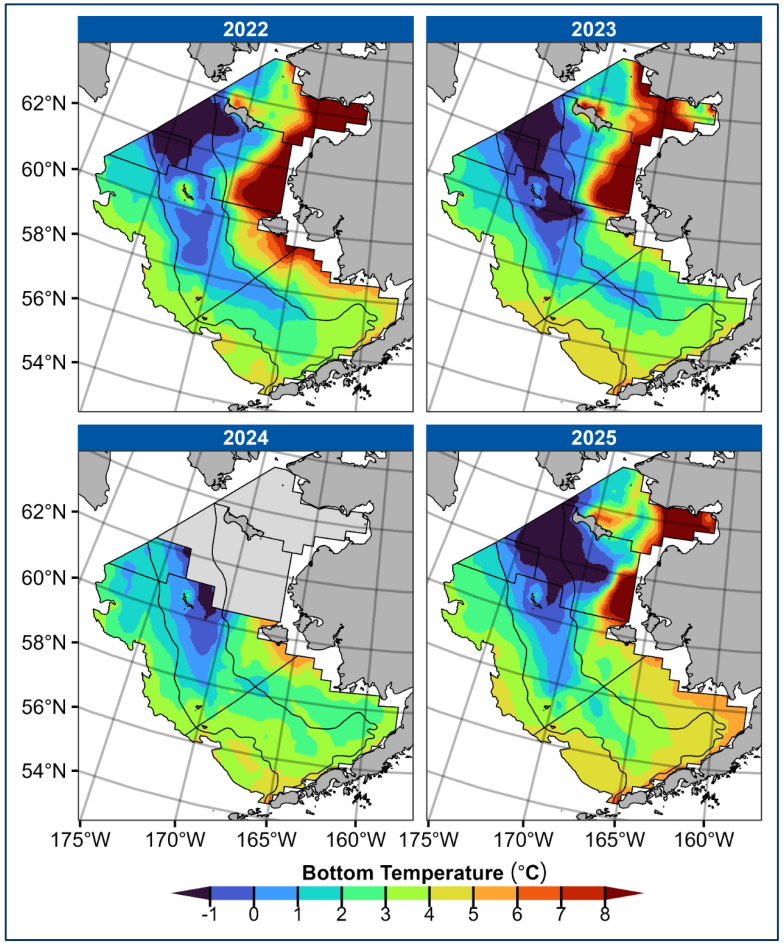
(Rohan)

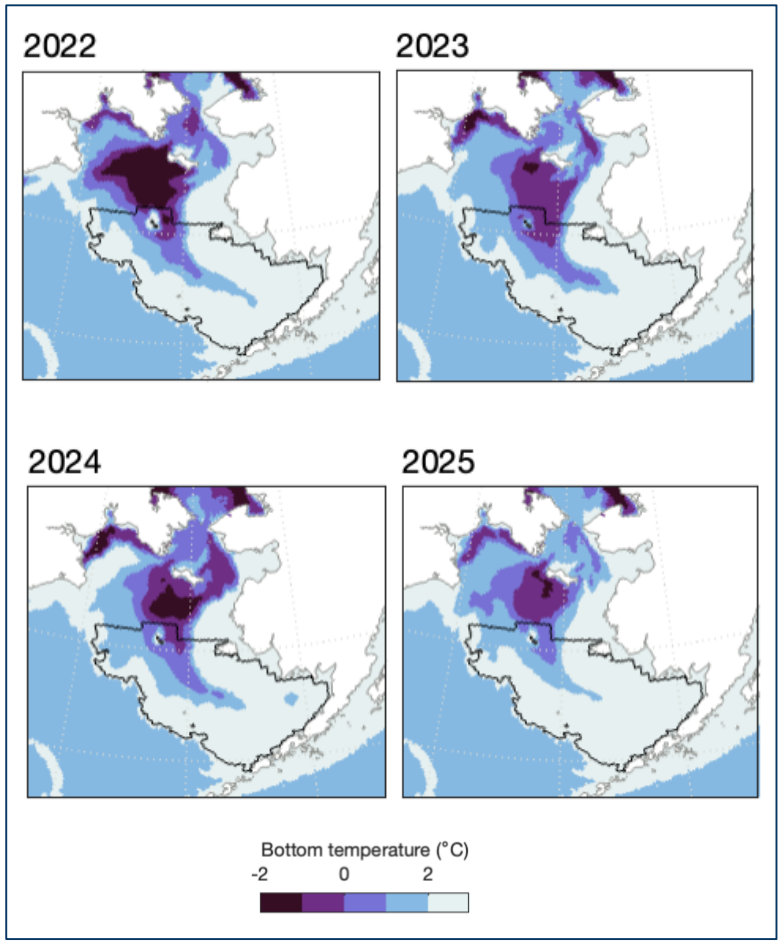
SEBS: cold pool was confined to the middle shelf



(Rohan)

NBS: 2025 bottom temperatures coldest observed since 2017

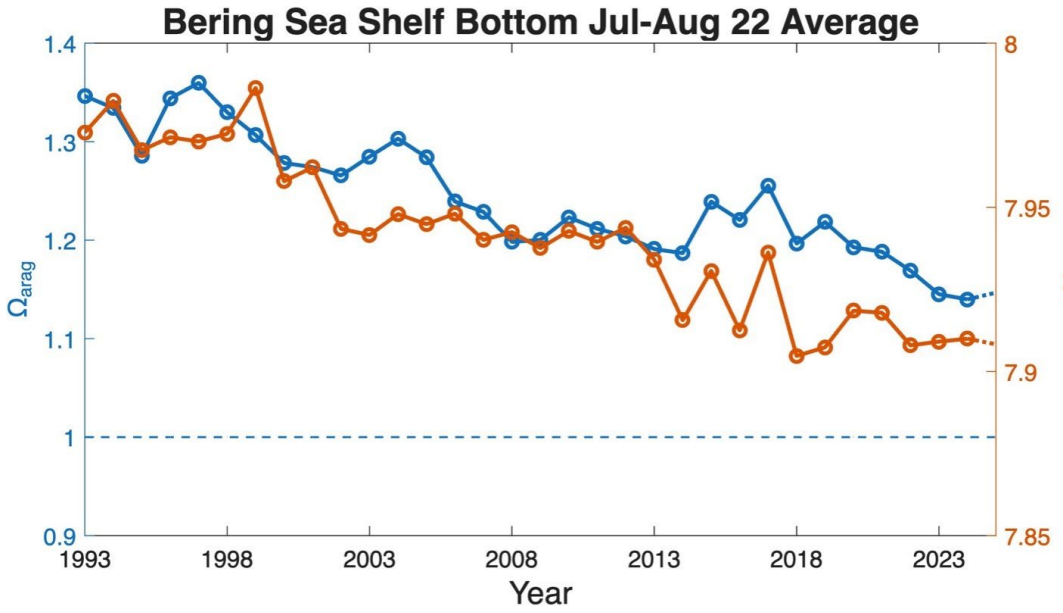


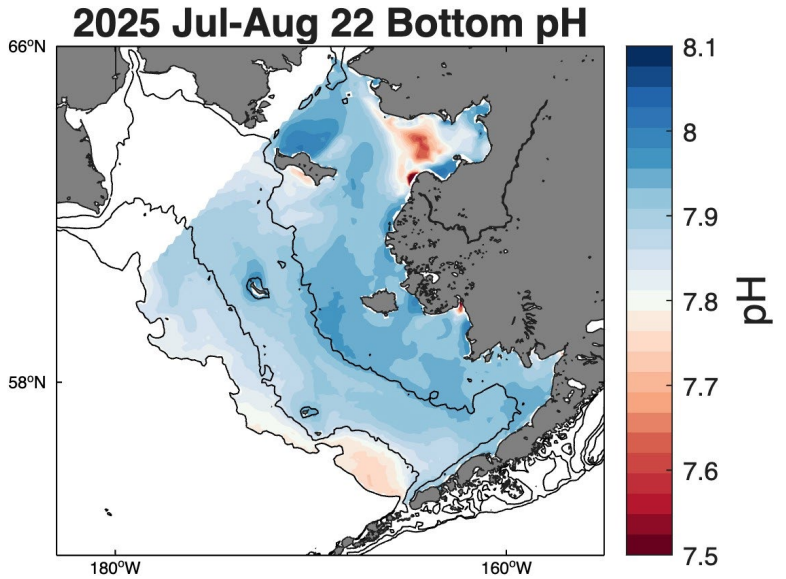


(Rohan, Kearney)

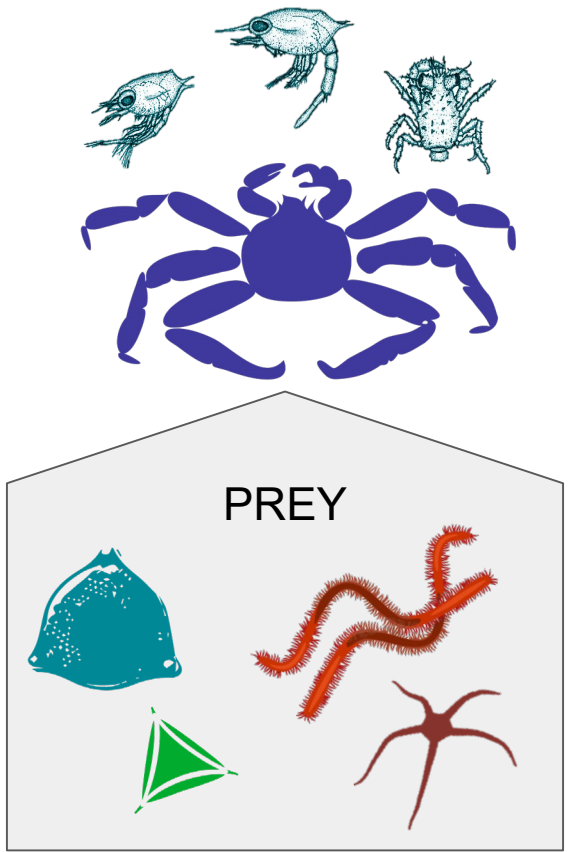
Corrosive bottom waters could impact growth & survival.
Red king crab may be more impacted; snow crab appear resilient to OA.

- Summer 2025 bottom pH slightly lower than 2024
- Inner and middle domain and Bristol Bay relatively well buffered (pH>7.8)
- Slope waters, southeastern outer shelf, and Norton Sound pH<7.8

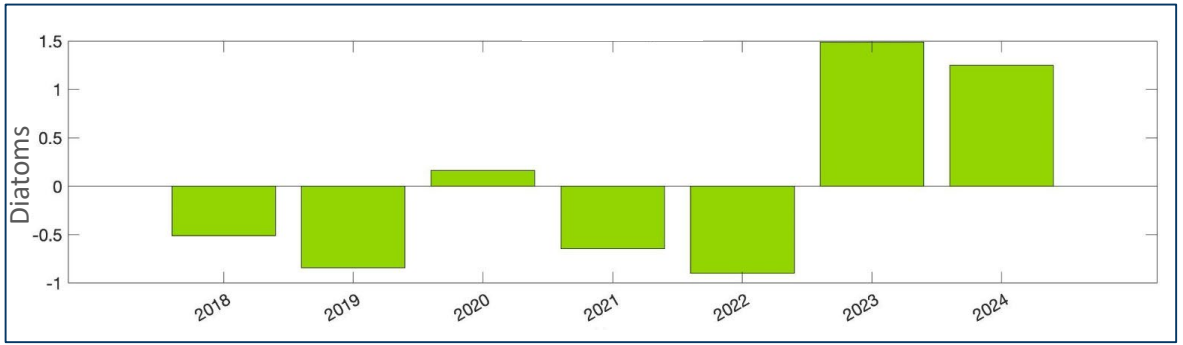


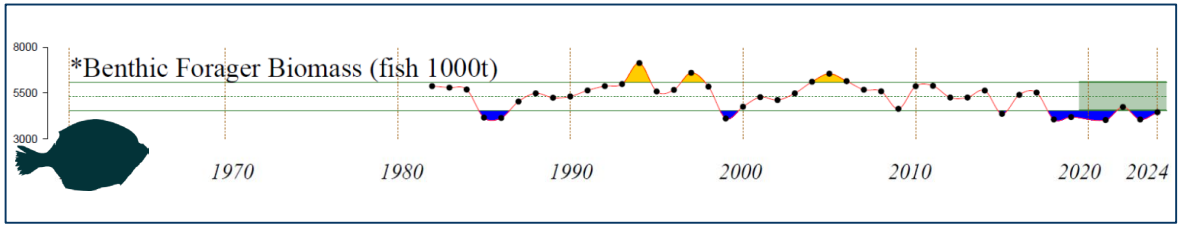


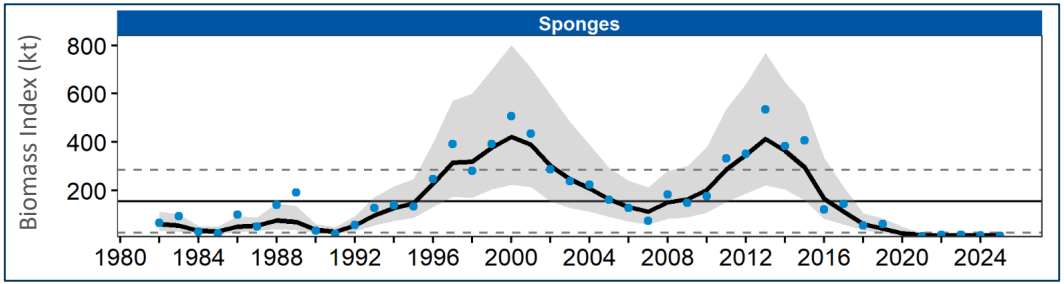
(Pilcher & Monacci)


PREY

Pelagic stage: *above-average feeding conditions in 2023 and 2024*
Benthic stage: *continued low availability of prey in 2024 and 2025*



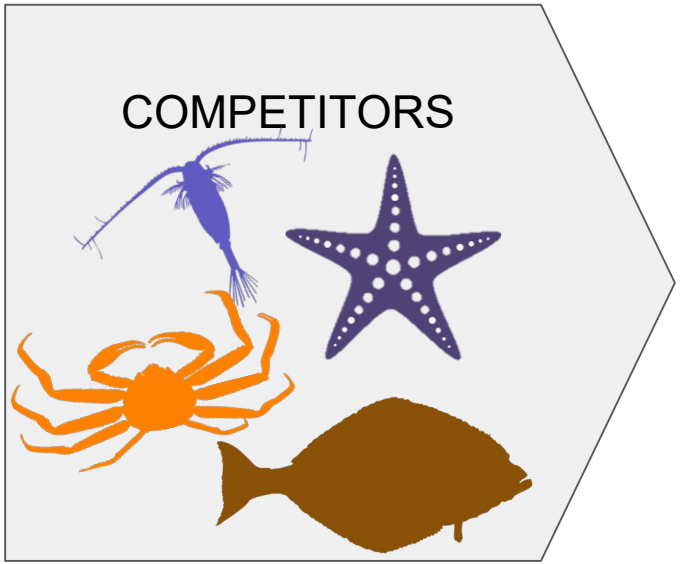


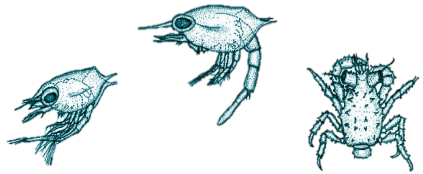


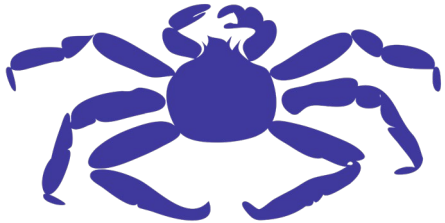
- Diatom abundance anomalies were positive in 2023 and 2024
- Benthic foragers increased from 2023 to 2024, but remain below the long term mean
- Sponges continued to be very low in 2025 in the SEBS

(Ostle, Whitehouse, Buser)

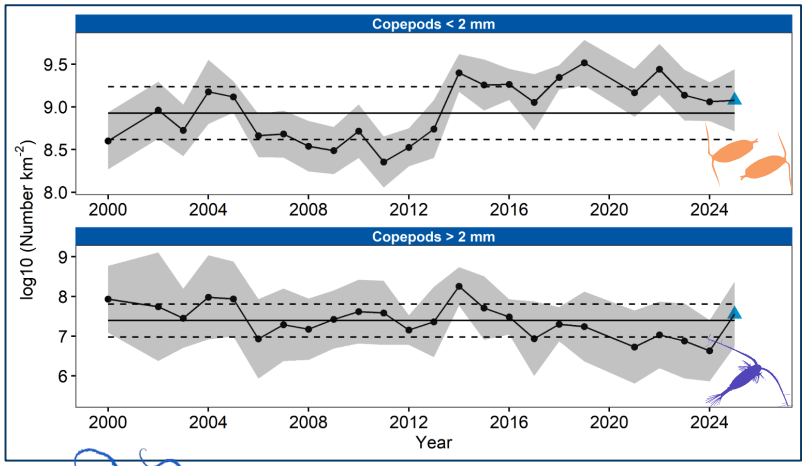
COMPETITORS





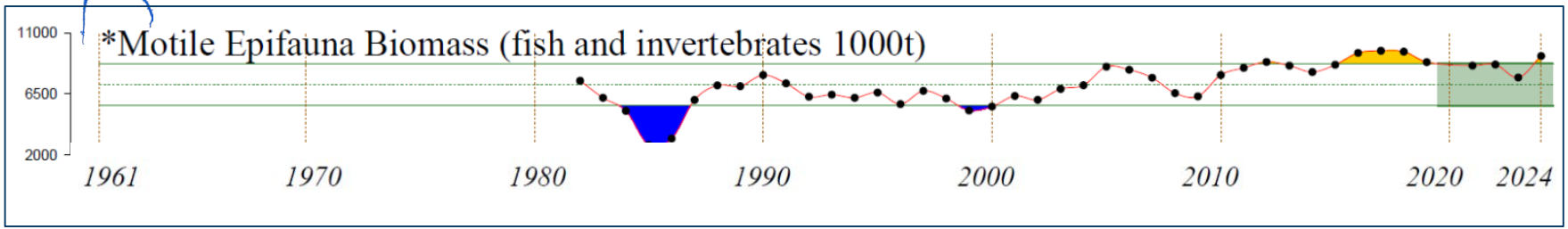


Pelagic stage: *average competitive pressure in spring 2025*
Benthic stage: *continued high competitive pressure in 2024*

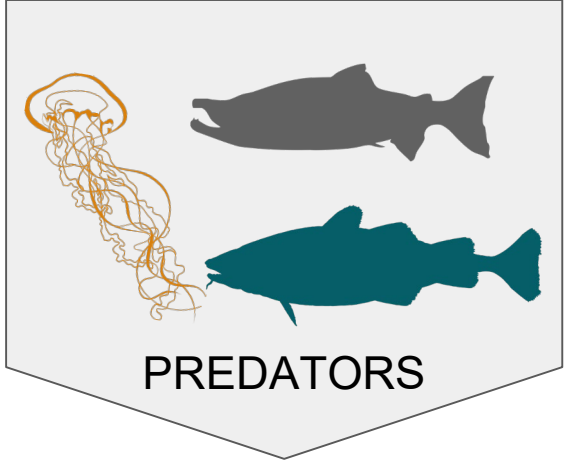


- Southeastern Bering Sea (SPRING):
  - Small copepods were above average
  - Large copepods were abundant near Unimak Pass and decreased to the north

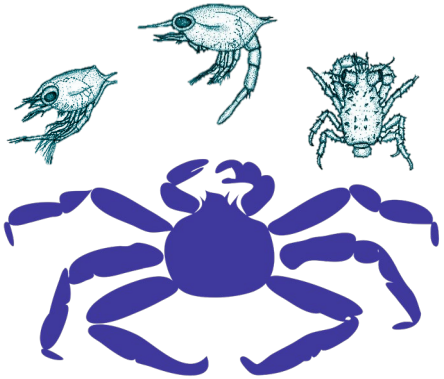
- Motile epifauna increased in 2024 and remained above the long term mean
  - Echinoderm biomass above average
  - Crab biomass below average



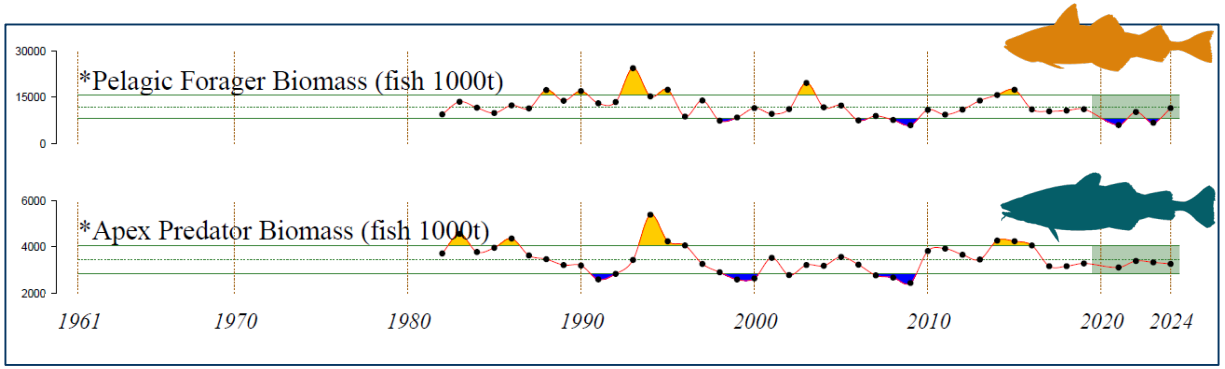
(Kimmel, Whitehouse)

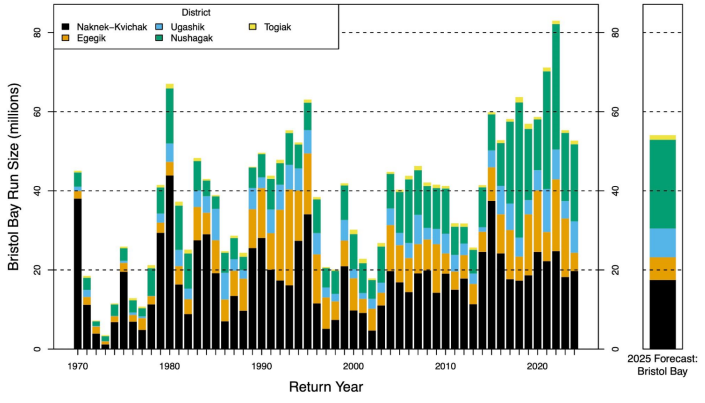


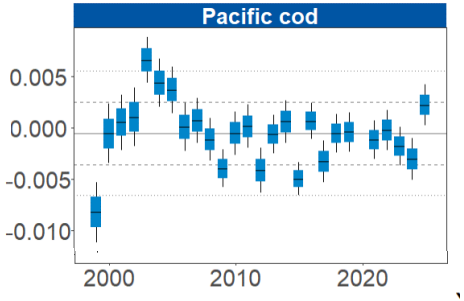
PREDATORS



Indicators of pelagic and benthic stage predation pressure are *mixed in 2024 and 2025*





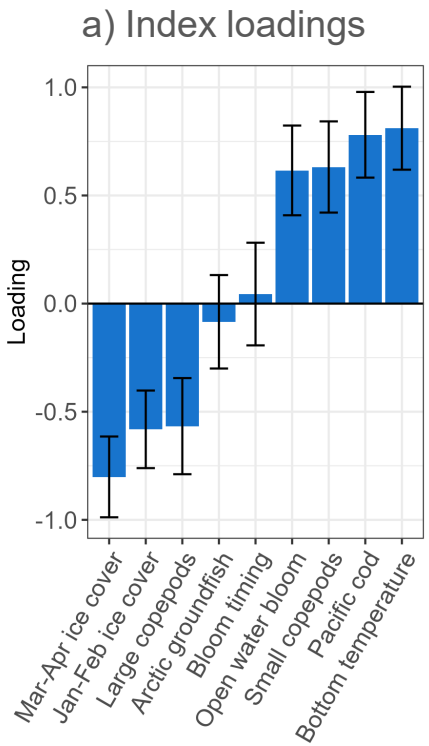


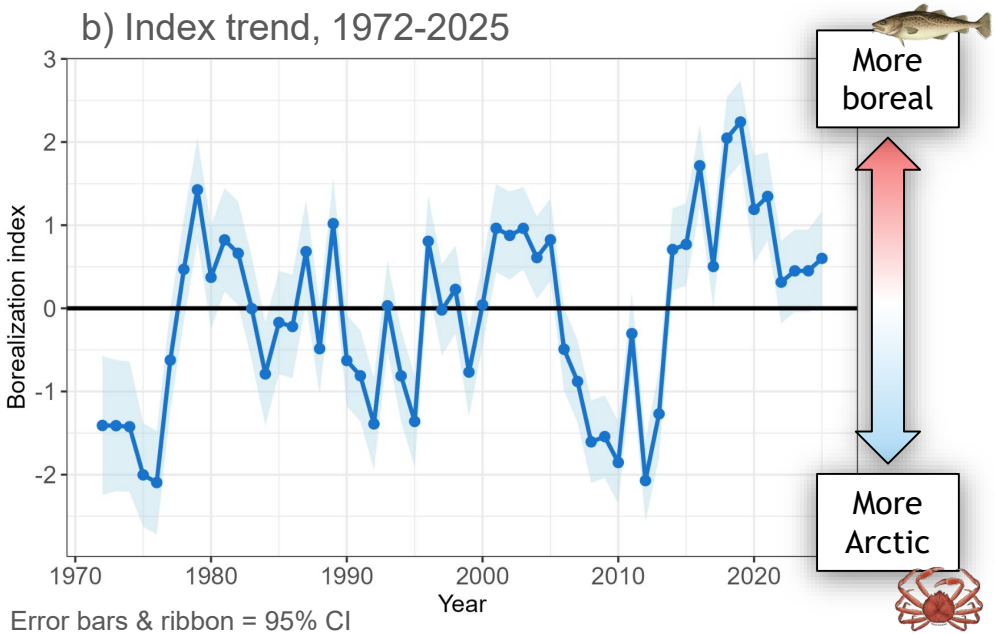
- 2024: Pelagic foragers increased to the mean
- 2024: Jellyfish were above average in the NBS; average in the SEBS
- 2025: Bristol Bay sockeye salmon forecast is below the 10-year average
- 2024: Apex predator biomass remained at the mean
- 2025: Pacific cod condition increased; highest since 2005

(Whitehouse, Cunningham, Prohaska & Rohan)

The borealization index in 2025 was 0.6, indicating a more boreal system

- Calculated for core snow crab range
- DFA summary of 9 physical & biological time series expected to track the Arctic to boreal transition
- Outperforms bottom temperature for predicting annual snow crab abundance
- 2022-2025 values at time series mean

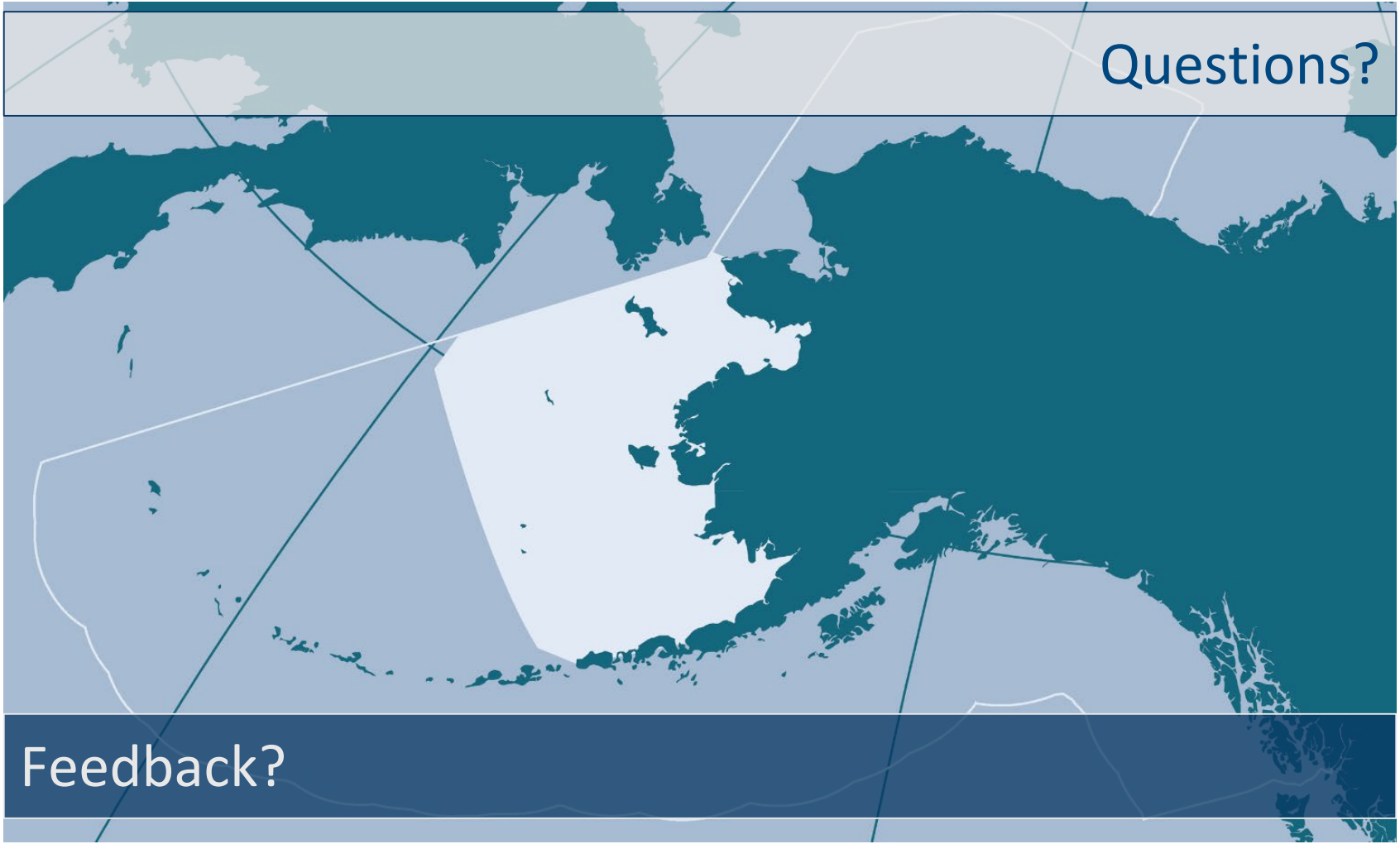




(Ryznar, Litzow, Fedewa, Nielsen, Kimmel)

Summary

ENVIRONMENTAL	• Positive ALPS: winter 2024/2025 was warm, stormy, and had less sea ice • Warm winter, late spring reprieve, warm August	• Positive ALPS: warm, stormy, and less sea ice • Warm winter, late spring reprieve, warm August • Below average cold pool (-29% from 2024) • 2025 bottom pH slightly lower than 2024
PREY	• Diatom abundance anomalies were positive in 2023 and 2024	• *Indirect* evidence indicates continued low availability of prey in 2024 • Sponges remained low in 2025
COMPETITORS	• Average competitive pressure from zooplankton in spring 2025	• Continued high competitive pressure in 2024
PREDATORS	• Pelagic foragers increased in 2024 • Jellies average in SEBS; above average in NBS in 2024 • 2025 Bristol Bay sockeye salmon below the 10-year average	• Predators of benthic crab remained at their long-term mean in 2024 • Pacific cod condition increased in 2025


Questions?
Feedback?

Full **ESR** presentation to the September 2025 Crab Plan Teams is available at:

ESR Crab Plan Team