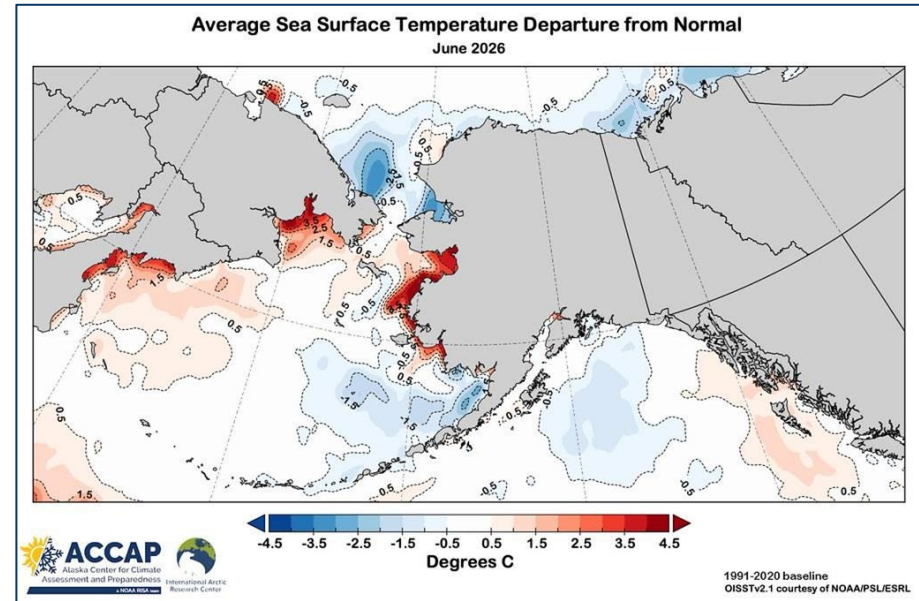


Ecosystem Status Report

Bering Sea, Aleutian Islands, and Gulf of Alaska Climate and Oceanography Update



Bridget Ferriss
Ivonne Ortiz
Elizabeth Siddon



NPFMC Groundfish Plan Team
September 8, 2026

Purpose of Presentation



Early Sharing

To share climate and environmental information early in the assessment and harvest specification process.



No Surprises

Proactively avoid 'surprises' later in the fall season.



Data Support

Support consideration of environmental information in the interpretation of data related to stock assessments.

Outline

1. Alaska-wide conditions

- Sea surface temperature, sea ice, and winds 2025-2026
- SST projections into 2027

2. Large Marine Ecosystem Conditions (2026)

- Eastern Bering Sea
- Aleutian Islands
- Gulf of Alaska



Key Messages



- **North Pacific:** 2026 cooling from Arctic winds to EBS, AI, GOA; high heat content in western and central N. Pacific surface to 200m



- **Eastern Bering Sea (EBS):** Cool ocean conditions from winter 2025 - summer 2026; high sea ice extent in March/April 2026; largest 2°C cold pool since 2012; unclear impacts of El Niño on EBS conditions.



- **Aleutian Islands (AI):** Continued warming with reprieve from marine heatwave conditions in Apr-Jul; potential El Niño impacts, may magnify ongoing trends

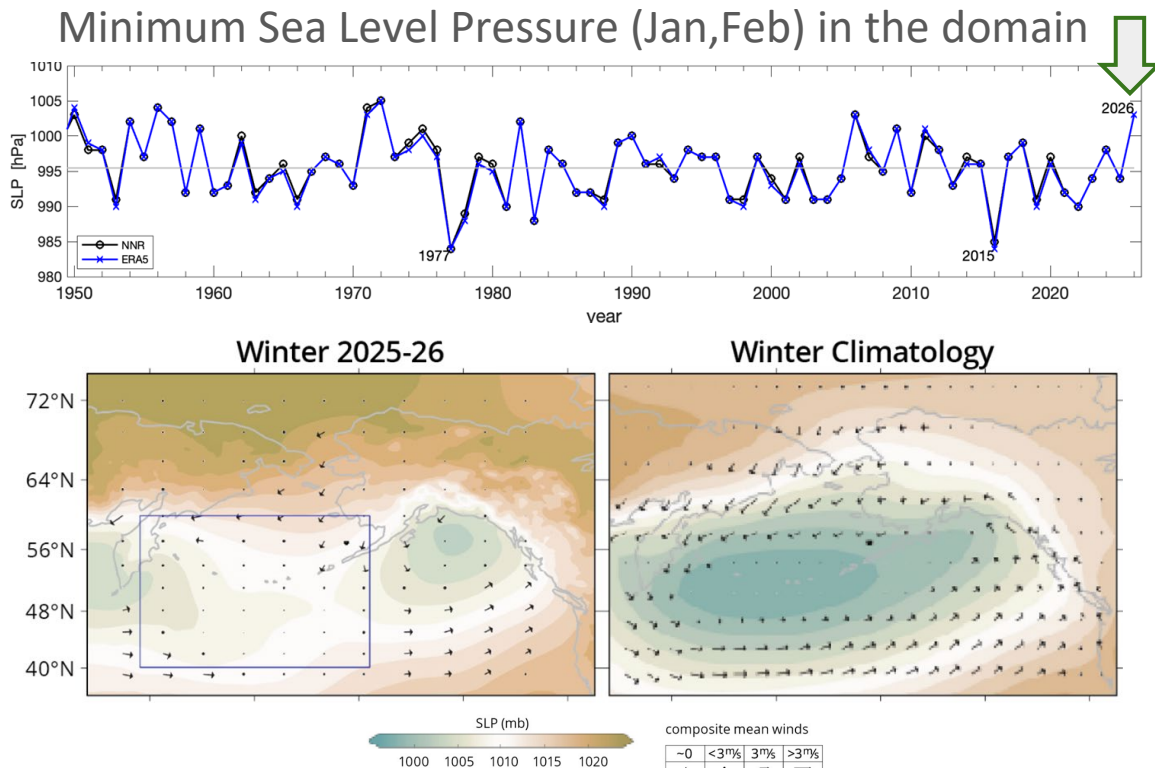


- **Gulf of Alaska (GOA):** Average/cool 2026 ocean temperatures after warm 2025 (except warm SEAK in 2026); reduced surface circulation on shelf; El Niño may bring warmth in late fall 2026 /winter 2027

Very Weak Winter Aleutian Low in 2025/2026

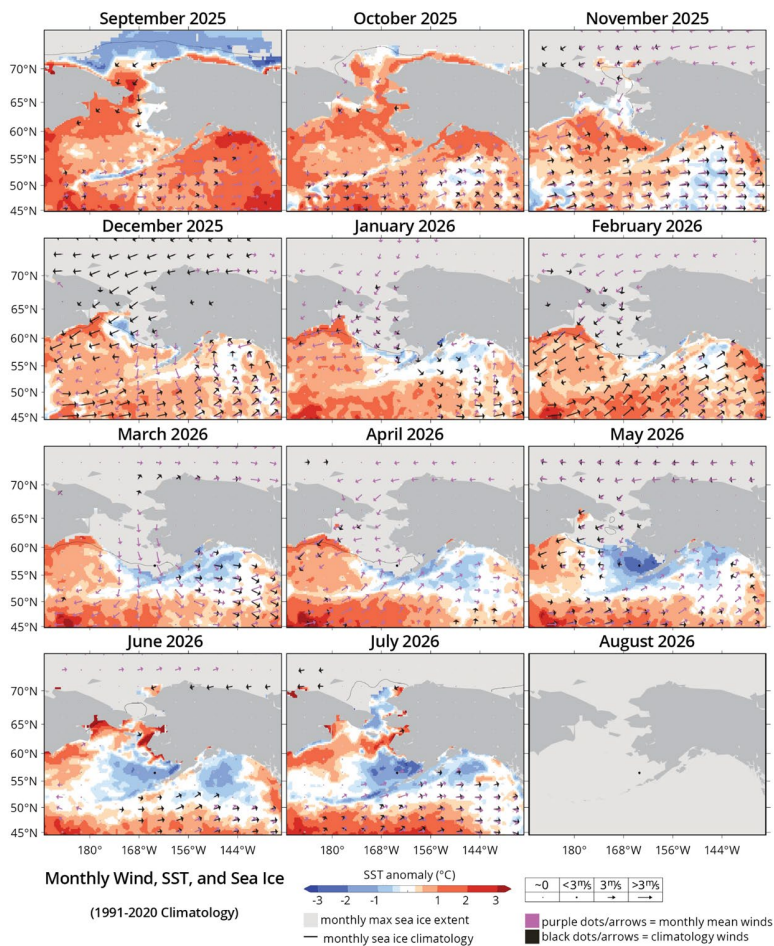
(Wang, Lemagie)

- Weak Aleutian Low in 2025/2026
- Similar to 2006, 1982, early '70s
- Cooler arctic air to EBS, AI, GOA
- Extensive sea ice in EBS



Left: Seasonal SLP and mean winds for winter (Dec 2024–Feb 2025). Right: climatologies of seasonal mean SLP and wind calculated from 1991–2020. Data are from ERA5 Reanalysis available from the Copernicus Climate Change Service.

Alaskan waters cooled & large sea ice extent in 2026



Central/ west N. Pacific

- Warm heat anomalies surface to 200m

Eastern Bering Sea

- March-April winds drove sea-ice south
- SST over southeastern shelf $>2^{\circ}\text{C}$ below average through summer

Aleutian Islands

- Warm winter anomalies
- Apr- Jul reprieve, below heatwave threshold
- Subsurface warmth persists

Gulf of Alaska

- Warm SST in 2025 through Dec
- 2026 SST cooled except SEAK
- Westerly winds & arctic cooler air

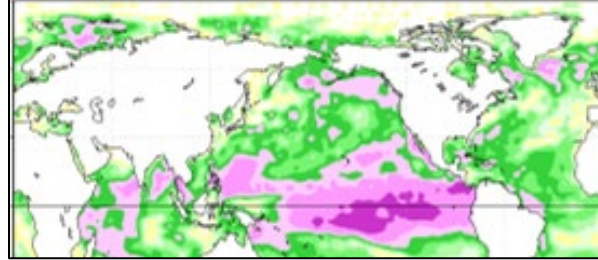
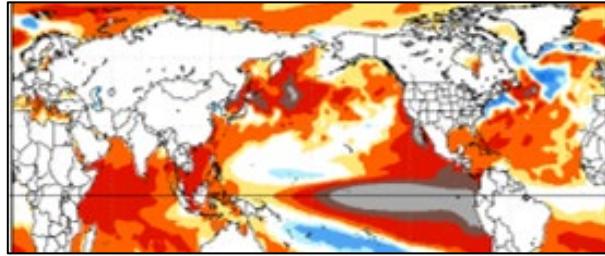
SST Projections from the National Multi-Model Ensemble

SST Anomalies

Model Skill

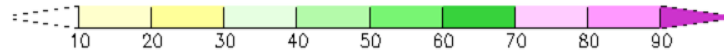
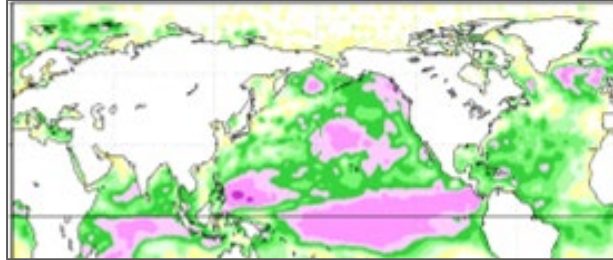
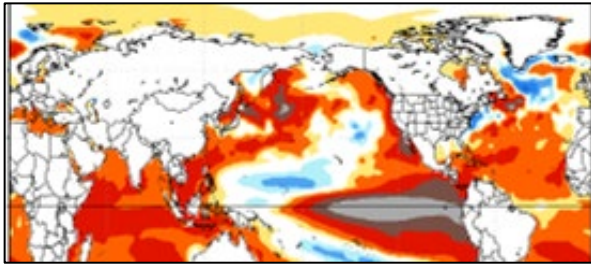
Nov 2026 - Jan 2027

- **Warm SST** anomalies $\geq 2^{\circ}\text{C}$:
 - Western-central North Pacific
 - Western Bering Sea and western Aleutian Islands
 - Progressing along GOA shelf (east - west)



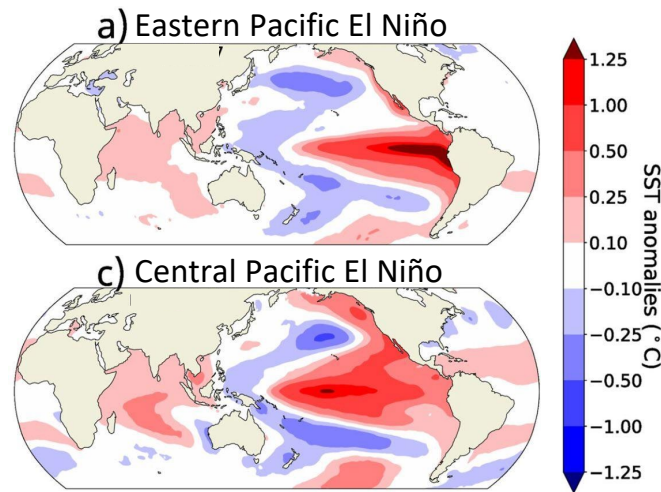
Jan - Mar 2027

- **Neutral SST** anomalies:
 - Eastern & northern Bering Sea shelves
 - Central/ Eastern Aleutian Islands



90% chance of a 'Very Strong' El Niño fall and winter 2026/2027

- 69% chance of being strongest since 1950
- Predicted Eastern Pacific El Niño (but that could change)
- Past 'very strong' El Niño's: 1982/1983, 1997/1998, 2015/2016
- Impact on Alaskan waters is less predictable but expect:
 - GOA: surface warming, incr. circulation, prey limitations on seabirds & marine mammals, groundfish distribution shifts
 - EBS & AI: greater potential for warming if CP El Niño
- EBS, AI, and GOA entering El Niño event from a winter/spring/summer of relatively lower heat content



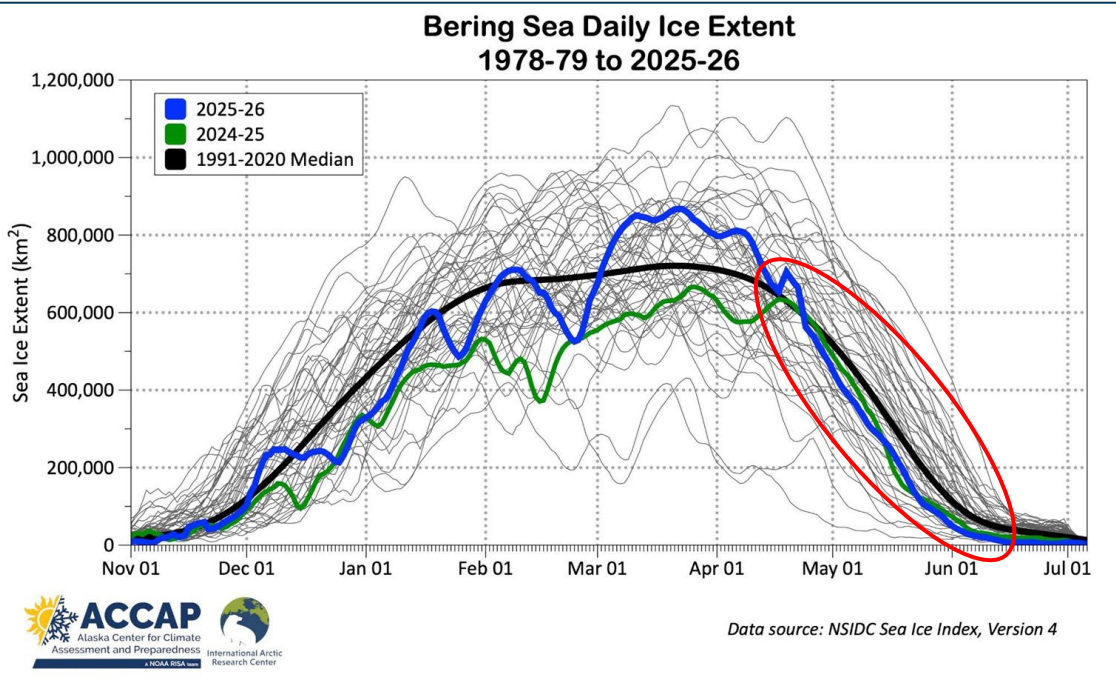
Modeled average SST anomalies during (a) EP El Niño and (c) CP El Niño. Figure 1 [from Gregory et al. 2024](#),

Eastern Bering Sea



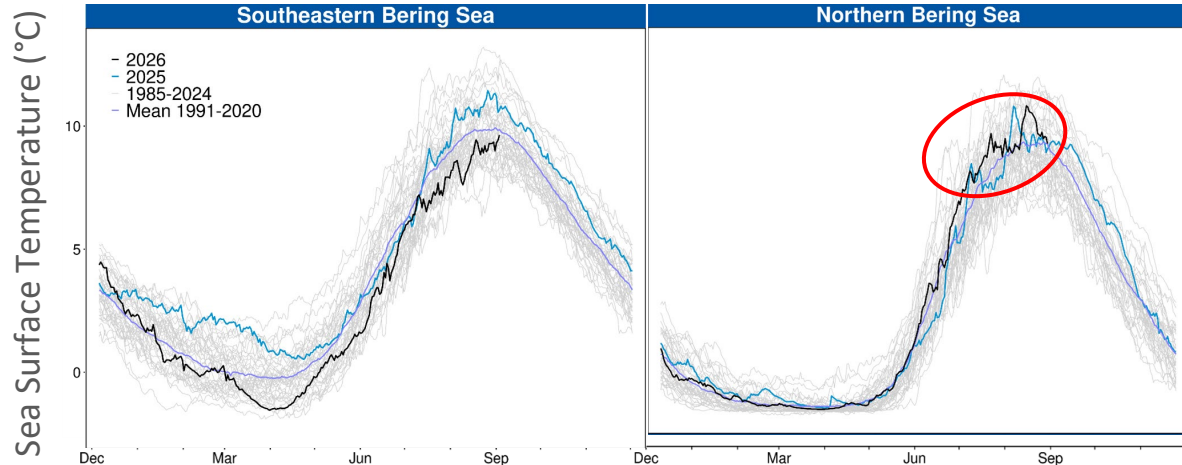
NOAA
FISHERIES

Sea ice extent was below average until early March 2026; March and April high ice extent.



- Sea ice extent was largely below average until early March 2026.
- 6-week period of above average ice extent occurred between March and April (to Aleutian Islands and into Bristol Bay), but the ice was thin.
- Sea ice retreated quickly beginning in mid April and by late April ice extent was below average.

2026 was cold in the south; average/warm in the north



- **Southeastern Bering Sea**

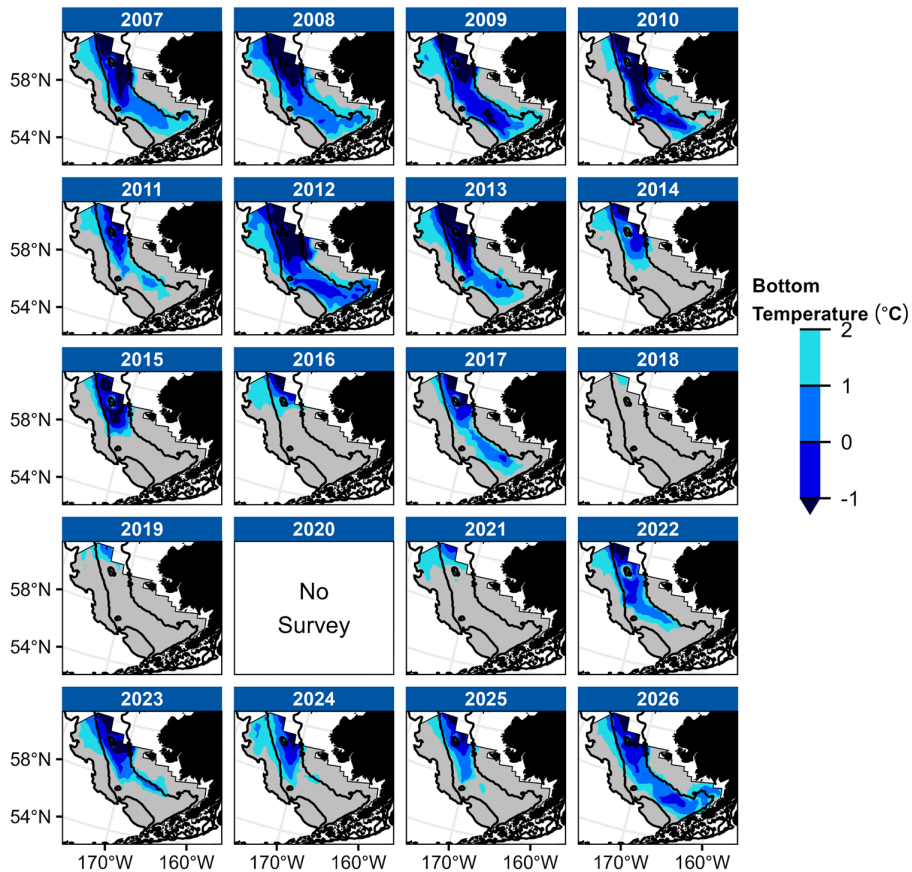
- 2026 colder than 2025, especially Jan-Apr.
- Below average (1991-2020) for most of the year.
- No MHW conditions.
- Bottom trawl survey mean surface and bottom temps were within 1 SD

- **Northern Bering Sea**

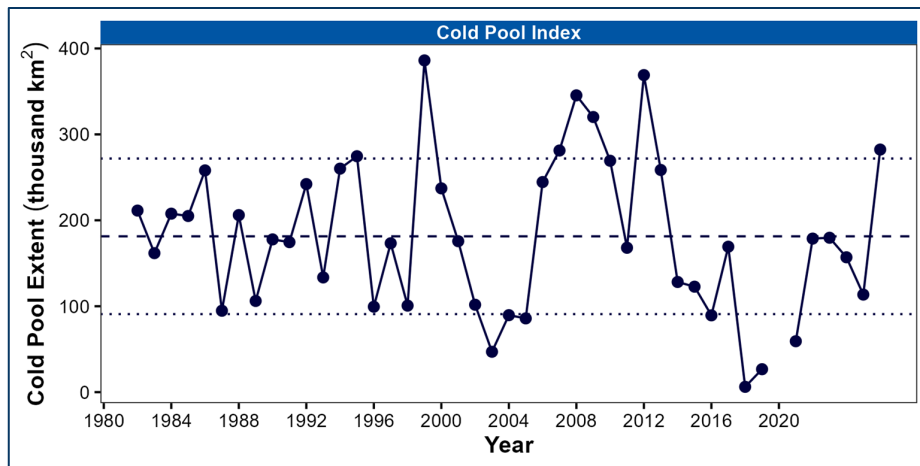
- 2026 near-average Jan-Jun.
- Summer 2026 above average.
- No MHW conditions.

(Callahan, Rohan, Barnett)

SEBS: cold pool extent was above average in 2026



- 2° cold pool largest since 2012
- 0° cold pool largest since 2013

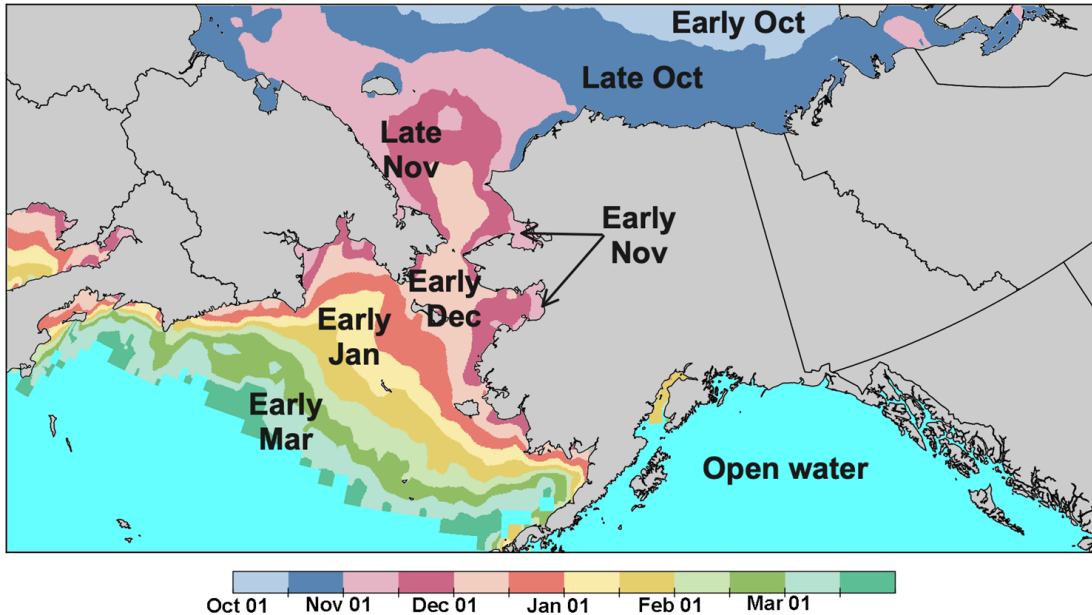


- 2026 bottom temperatures most similar to 1986, 1992, 2006, and 2010.

Later “freeze up” in the north; earlier ice arrival in the south

Date of First Sea Ice Concentration 15 Percent or Greater

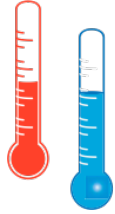
Autumn/Winter 2026-27



Forecast made in late August

Data: NOAA/CPC Exp. Sea Ice Outlook

- Sea ice is ***expected to arrive later*** in the southern Chukchi Sea and northern Bering Sea.
- Sea ice is ***expected to arrive earlier*** near St. Matthews and over the central Bering Sea.



Thermal conditions near-average since 2021; extensive winter 2025/2026 sea ice resulted in cool SSTs that persisted through summer, especially over the SEBS.

Reduced metabolic demands → increased energy storage → higher fish condition (e.g., pollock)



Sea ice is forecast over the southern shelf again in winter 2026/2027.

Sea ice → production of ice algae → increased standing stock of lipid-rich large copepods → increased prey quality for pelagic foragers



El Niño impacts are uncertain for the EBS.

Forecasted neutral conditions (NMME) and high sea ice extent (CPC) prior to entering a potential warming event

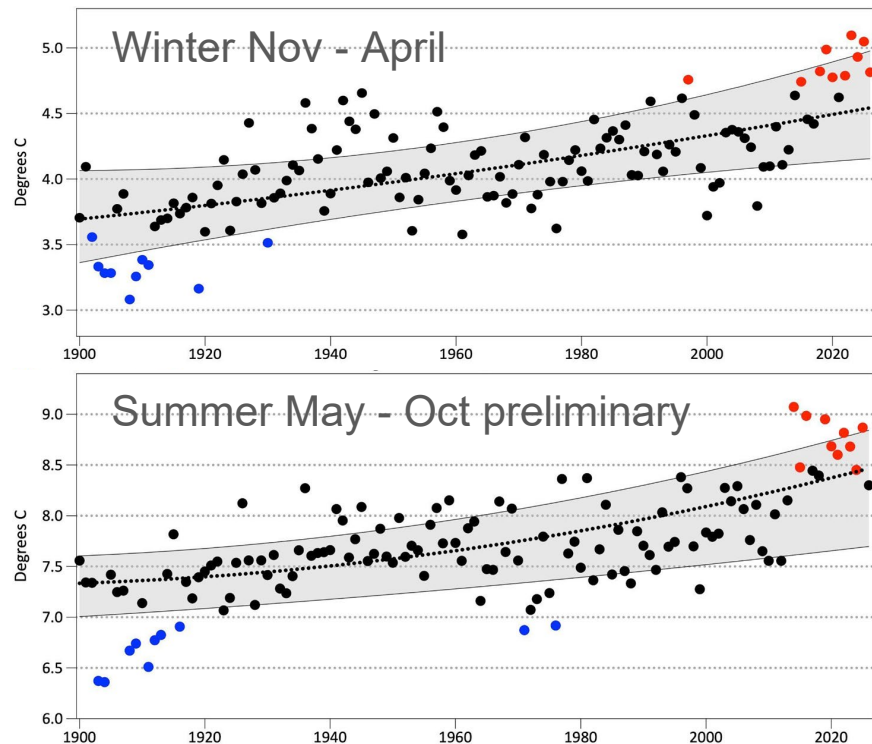
Aleutian Islands



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Cooler 2026 but still warm with reprieve in April/ May - July

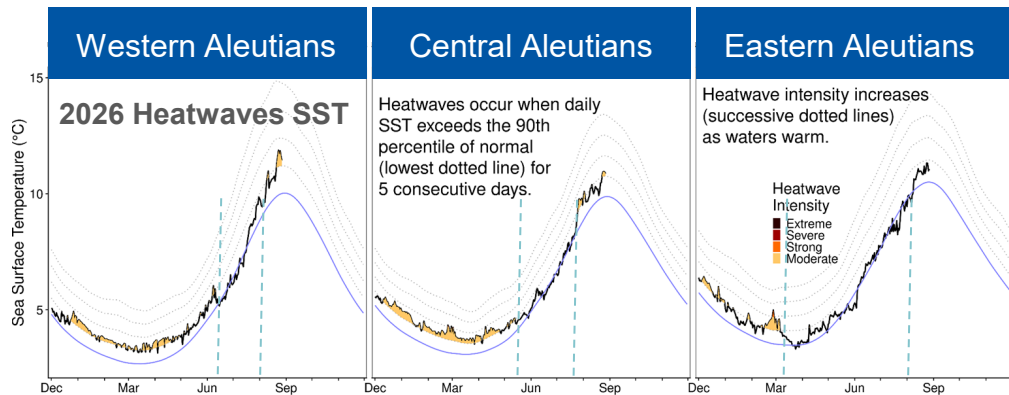
Sea Surface Temperature (SST) ERSST v6



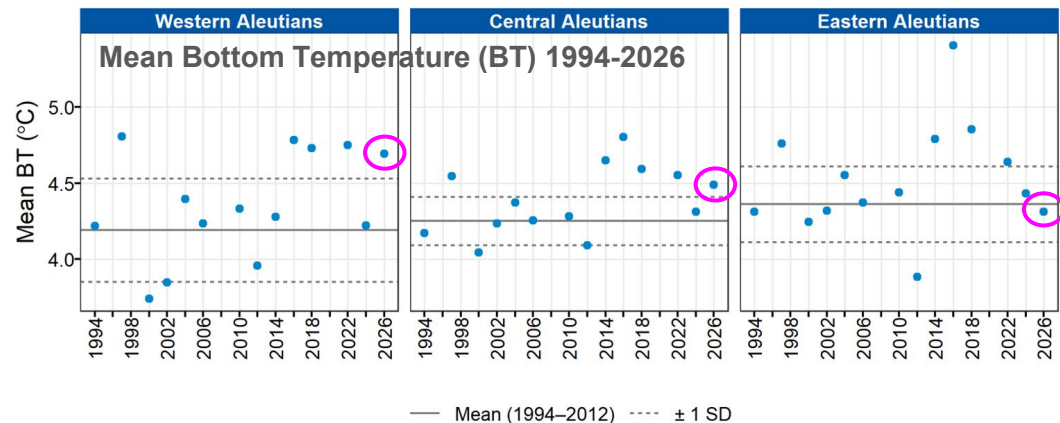
Sustained MHW conditions since 2015

- 2026 Continued winter warming
- Sustained warmth favors earlier phenology, faster growth, and higher energy demand
- Cooler summer with April-July reprieve favors lower energy demand
- August SST back above 1985-2014 average, expect higher May-Oct mean

2026 W-E cooling gradient, higher heat retention towards W

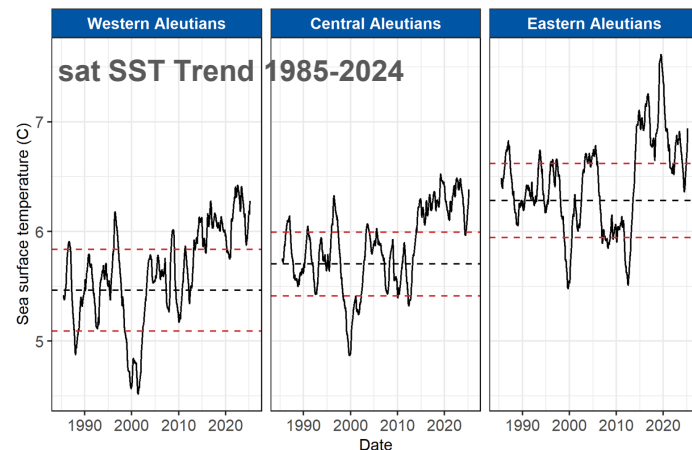
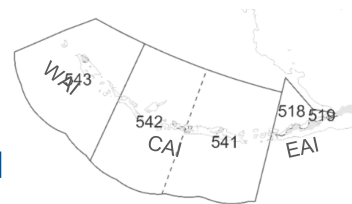


NOAA Coral Reef Watch data, courtesy NOAA Pacific Islands Ocean Observing System (Updated: 08-27-2026)



2026 Temperatures:

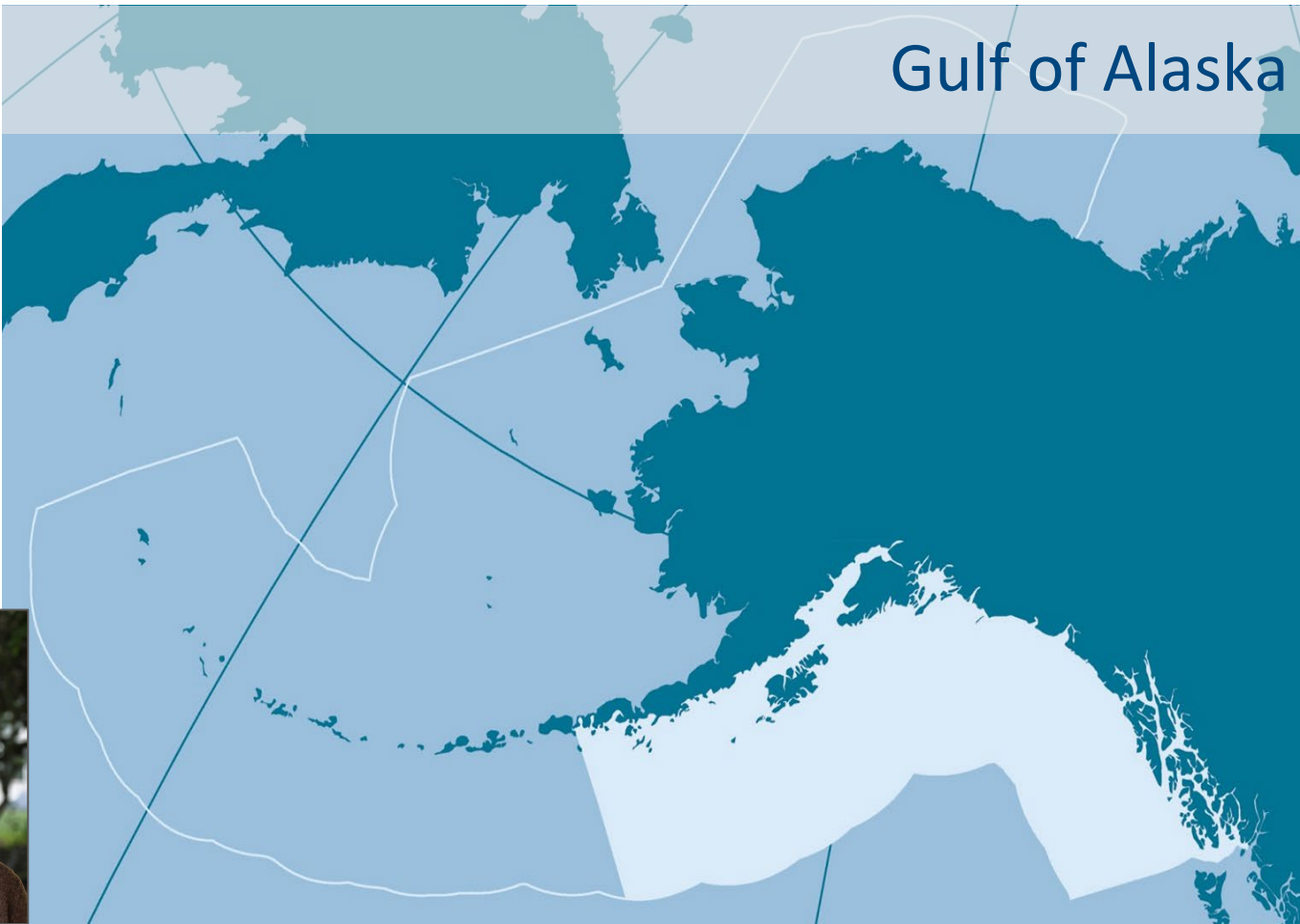
- SST W-E gradient: Shorter reprieve in WAI longer in EAI
- Bot Temp W-E gradient Warmer WAI, cooler EAI



What to expect late fall 2026/ winter 2027

- 2026 similar to 2024 based on MOM6 SST & bottom temperature; 2026 increased flow, nutrients across passes in WAI and EAI (Kearney and Cheng)
 - *2024 cooler summer improved small pollock fish condition - same this year? Higher prey availability?*
- 2027 Warm winter expected regardless of El Niño across AI
 - Warm SST anomalies predicted by NMME in WAI; higher heat retention
 - Highest expected temperatures in EAI, historically warmest SST, BT
 - *Warmer winter impacts: earlier phenology, faster growth, higher energy demand: pollock, cod, Atka mackerel*
- El Niño impact dependent of type: Eastern vs Central Pacific. Warming would exacerbate ongoing trends like winter warming, heat retention
 - *Other ongoing trends: less fish prey impacting piscivorous fish, WAI piscivorous seabirds & Steller sea lions*

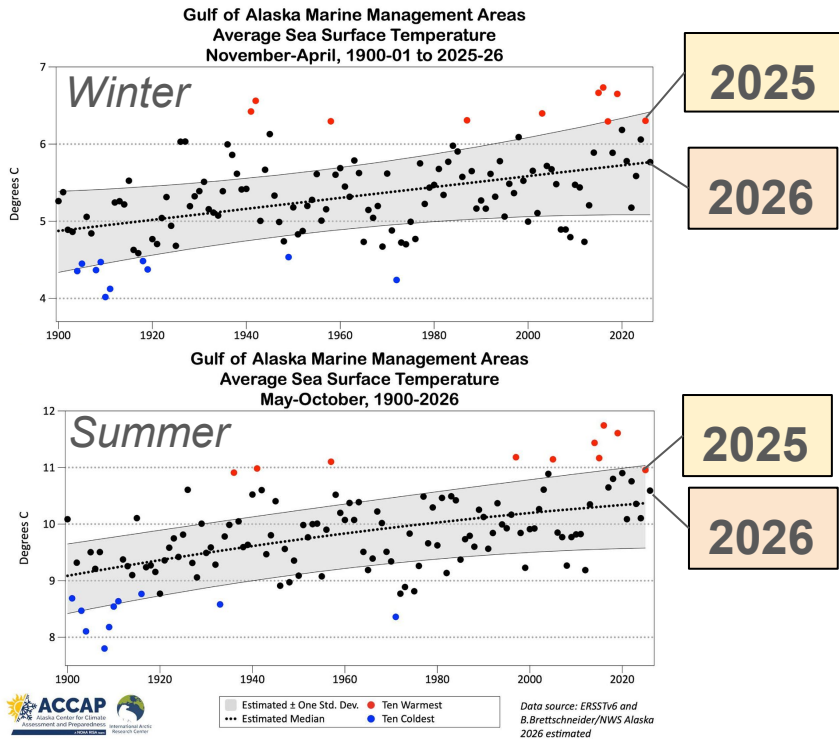
Gulf of Alaska



NOAA
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GOA 2025 warm through Dec then cooled to average in 2026

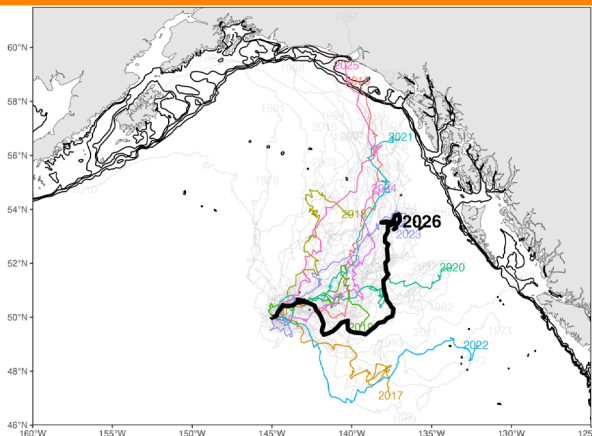
(R. Thoman, M. Callahan, E. Lemagie, D. Jones, K. Kearney)



- 2025 SST warm through Dec.
- 2026 SST & depth cooled to average in WGOA and EGOA
- SEAK remained warm
- 2026 thermal conditions (surface and bottom) similar to 2023 & 2006 (MOM6-NEP analysis)
- *Good for winter/spring shelf spawners, after 2 warm winters (P. cod, W. pollock, N. rocksole)*

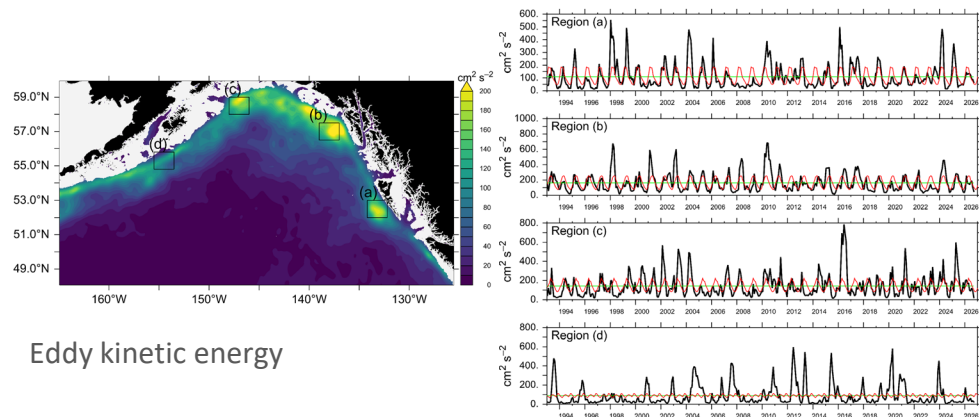
Reduced surface circulation on shelf

(W. Stockhausen, W. Cheng, M. Wang)



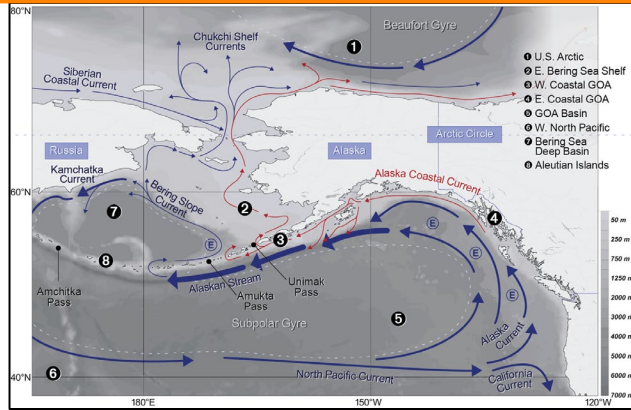
Modeled surface drifter (OSCURS model, Dec '25-Feb '26)

- Weak Aleutian Low led to reduced gyre circulation
- Reduced winter surface transport in eastern GOA
- Average winter eddy strength across GOA



Eddy kinetic energy

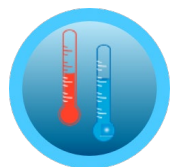
Potential impacts of El Niño in GOA late fall 2026 /winter 2027



- Shelf warm at surface and potentially at depth
- Warmer & wetter
- Increased circulation, shallower mixed layer depth, stronger stratification, reduced nutrient, reduced phytoplankton biomass

Ocean bathymetry and mean currents across the North Pacific and U.S. Arctic. Figure courtesy of Sarah Battle, PMEL.

- Food web disruption: forage fish reduction, seabird mortalities [e.g., *Lehodey et al., 2021, Bailey et al., 2021, Morgan et al., 1999*]
- Groundfish distribution shift (e.g., *Li et al., 2019, Yang et al., 2019*)
- Larval survival incr. (*P. halibut*) or decr. (*P. cod*) [e.g., *Bailey et al. 2002, Laurel et al., 2020*]
- Early spawning (*Sitka herring, pollock*) [e.g., *Kruse et al. 1998, Rogers et al. 2018*]
- More southern species (*market squid, tuna, invasive green crab*) [e.g., *Lehodey et al., 2021*]



Thermal conditions cooler 2026 surface and depth after warm 2025, although SEAK retained heat in 2026.

Benefits winter/spring shelf larval survival of P. cod, W. pollock, N. rocksole



Transport weaker circulation and eddys resulted in weaker along-shelf and cross-shelf transport

Less beneficial to slope spawners (e.g., arrowtooth flounder in west, halibut, some rockfish)



El Niño expect some surface warming in late fall/winter on GOA shelf (EGOA first)

Ecological impacts will depend on intensity and duration

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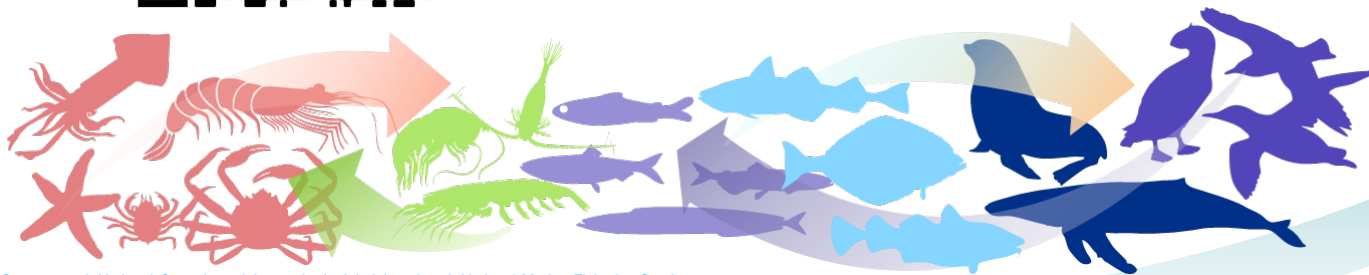
Thank You

Alaska Fisheries Science Center Ecosystem Status Reports

<https://www.fisheries.noaa.gov/alaska/ecosystems/ecosystem-status-reports-gulf-alaska-bering-sea-and-aleutian-islands>



Ivonne.Ortiz@noaa.gov (Aleutian Islands)
Elizabeth.Siddon@noaa.gov (Eastern Bering Sea)
Bridget.Ferriss@noaa.gov (Gulf of Alaska)



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