

Kodiak/Aleutians Regional Subsistence Advisory Council

2022 NOAA Research & Ecosystem Update



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*Acknowledge the Tlingit people
upon whose customary lands
that my home and office reside.*



NOAA
FISHERIES

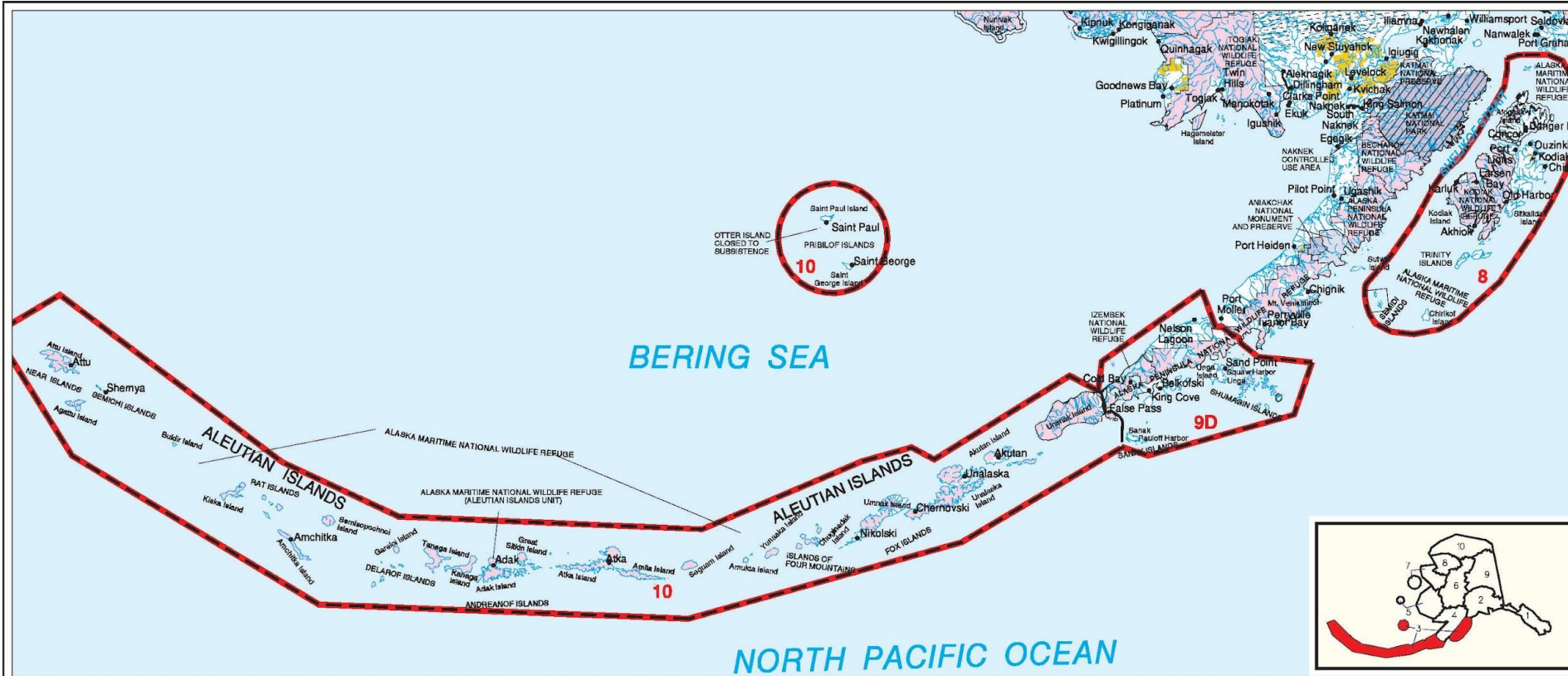
Bering Sea, Aleutian Islands, Gulf of Alaska

Updates by region

- Ocean temperatures & marine heat waves
- Ecosystem conditions
- Levels of concern for Pacific Cod



Kodiak/Aleutian Region

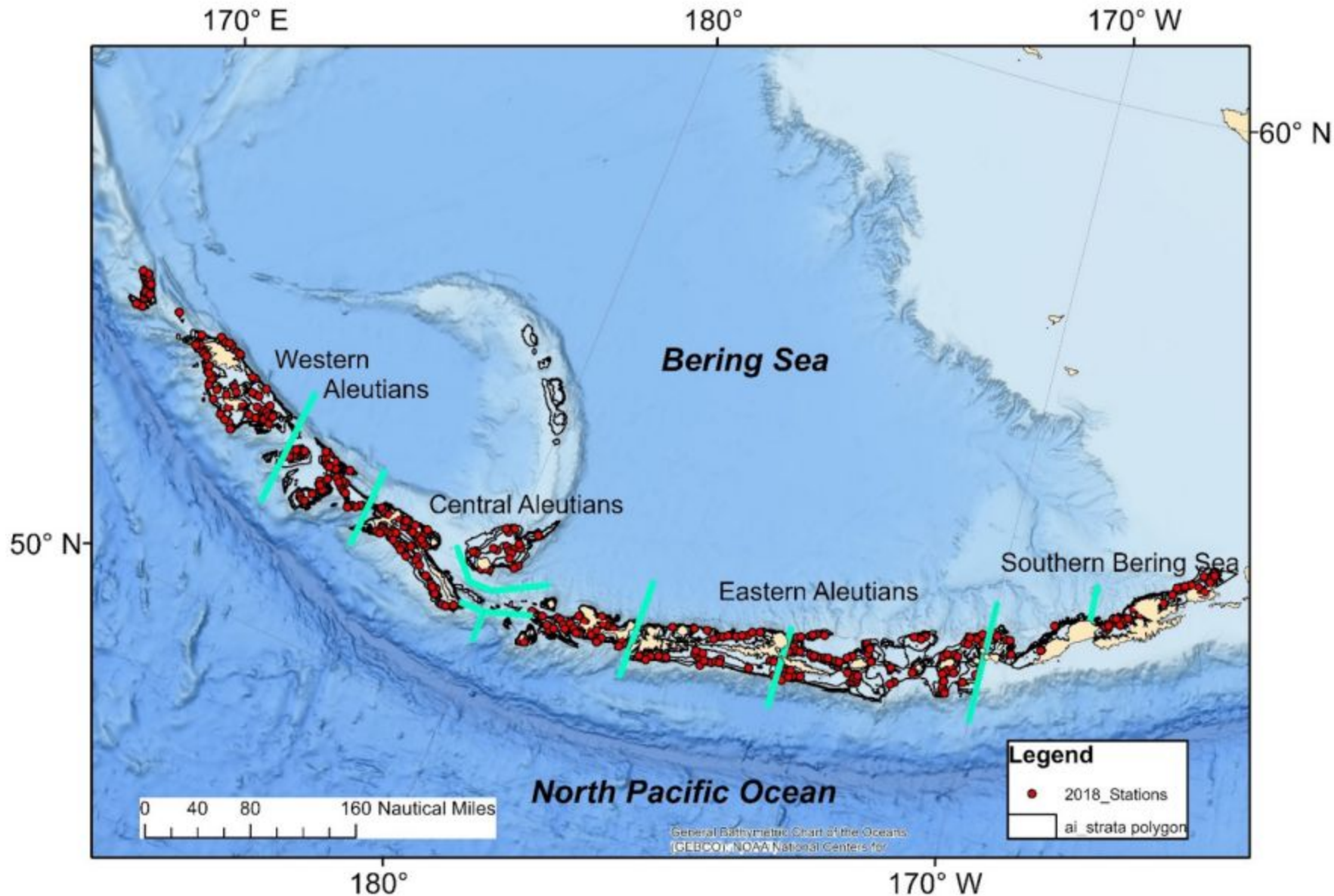


Region 3

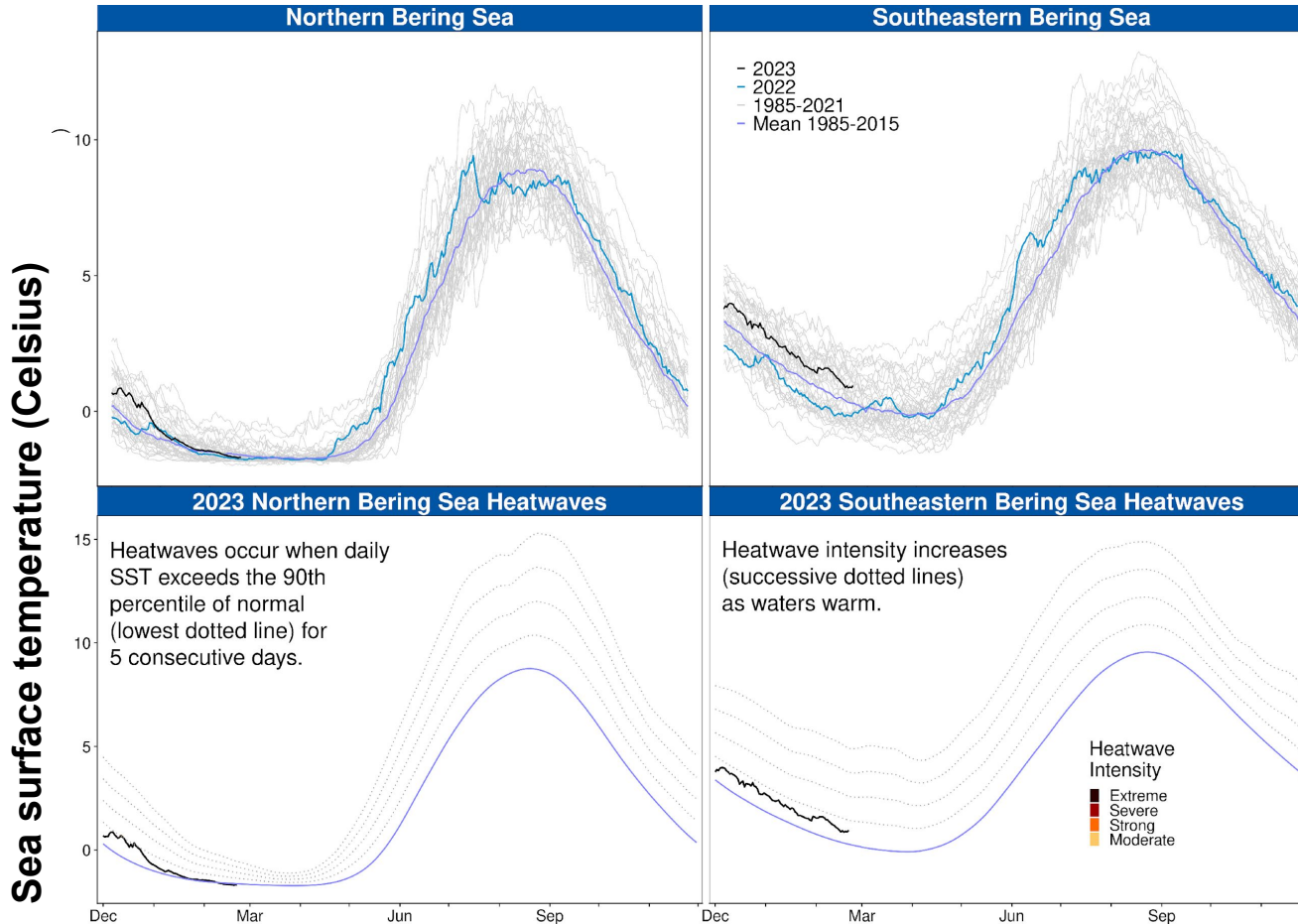
Kodiak / Aleutians

- Federal Public Lands Open to Subsistence Use**
- FWS Administered Land
 - NPS Admin'd Preserve
 - BLM Administered Land
 - Closed to Subsistence
 - Special Management Area
 - Region Boundaries
 - Game Management Unit
 - Federal Boundaries
 - Roads

Aleutian Islands Bottom Trawl Survey



Bering Sea temperatures



NOAA Coral Reef Watch data, courtesy National Environmental Satellite, Data, and Information Service (Updated: 02-21-2023)
 Data are modeled satellite products and periodic discrepancies or gaps may exist across sensors and products.
 Contact: matt.callahan@noaa.gov

<https://shinyfin.psmfc.org/ak-sst-mhw/>

Cooler in 2022 & 2023 slightly above average so far this spring

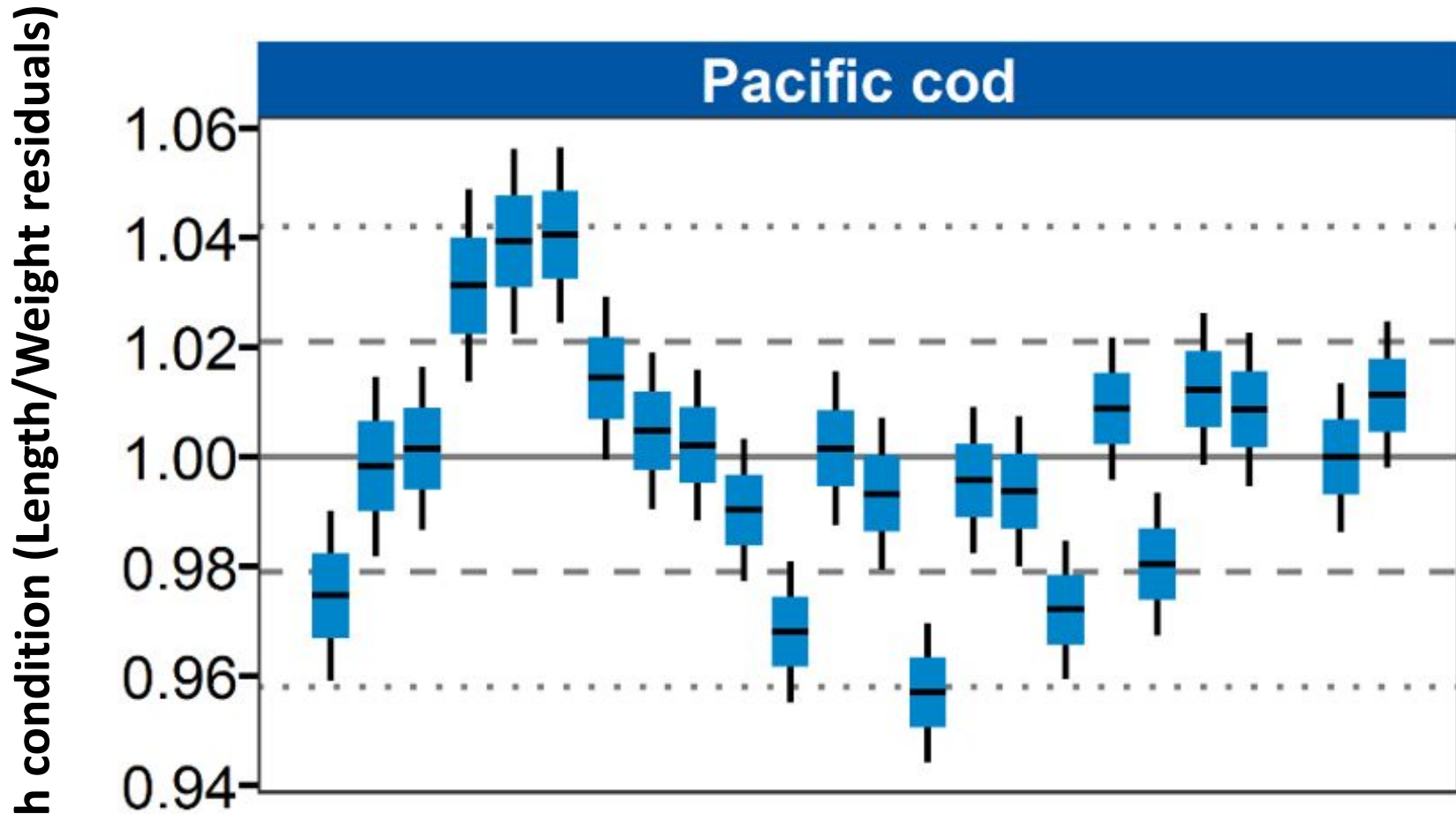
Late summer ecosystem survey

Observations

- Large coccolithophore bloom
- Lower large copepod densities but more euphausiid= food for age-0 P cod:
- More age-0 Pacific cod than usual
- Large catches of age-0 Atka Mackerel near Pribilof Islands

Body condition of adult P cod

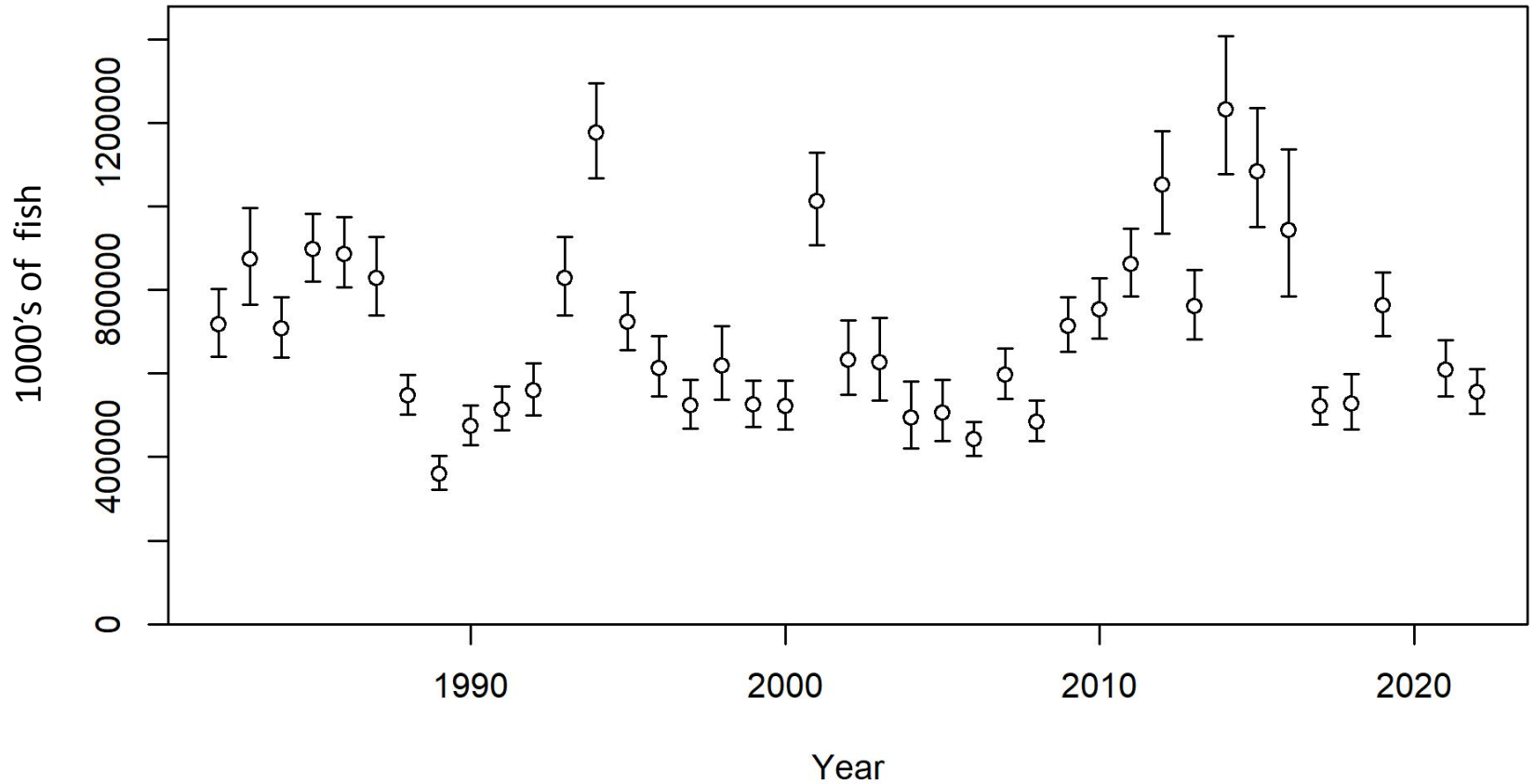
NOAA Bering Sea bottom trawl survey



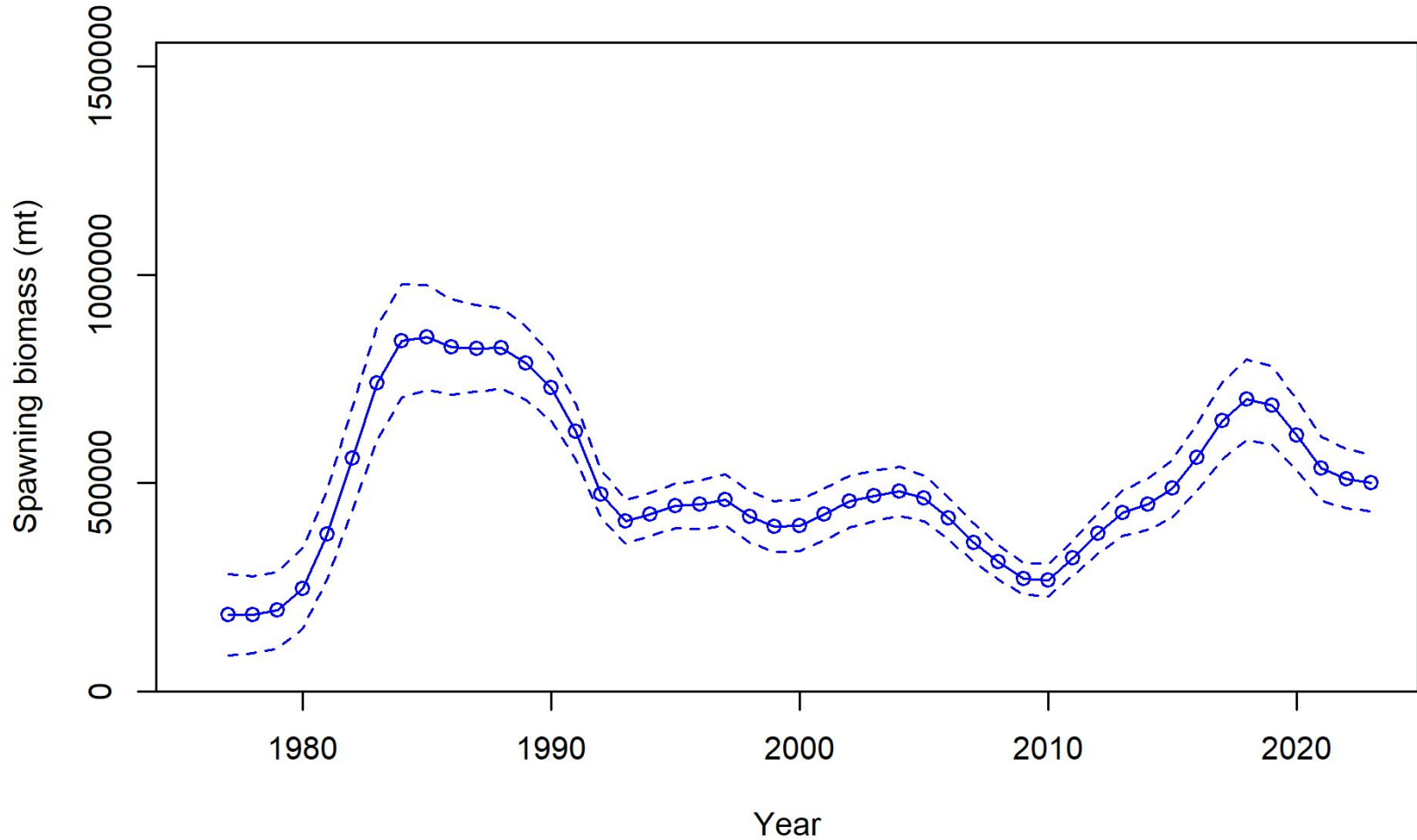
Rohan, Prohaska, and O'Leary

~2022 above average body condition

P cod abundance



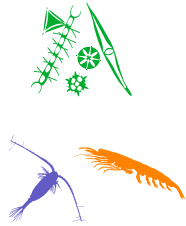
P cod spawning biomass



2022 Bering Sea summary



Sea-ice extent was above average during winter 2021-2022, the 2022 cold pool extent was near average, and no heatwave indicates a return to more average thermal conditions



Average primary productivity; large coccolithophore bloom; late-summer lower abundance of small and large copepods, but relatively higher abundance of euphausiids



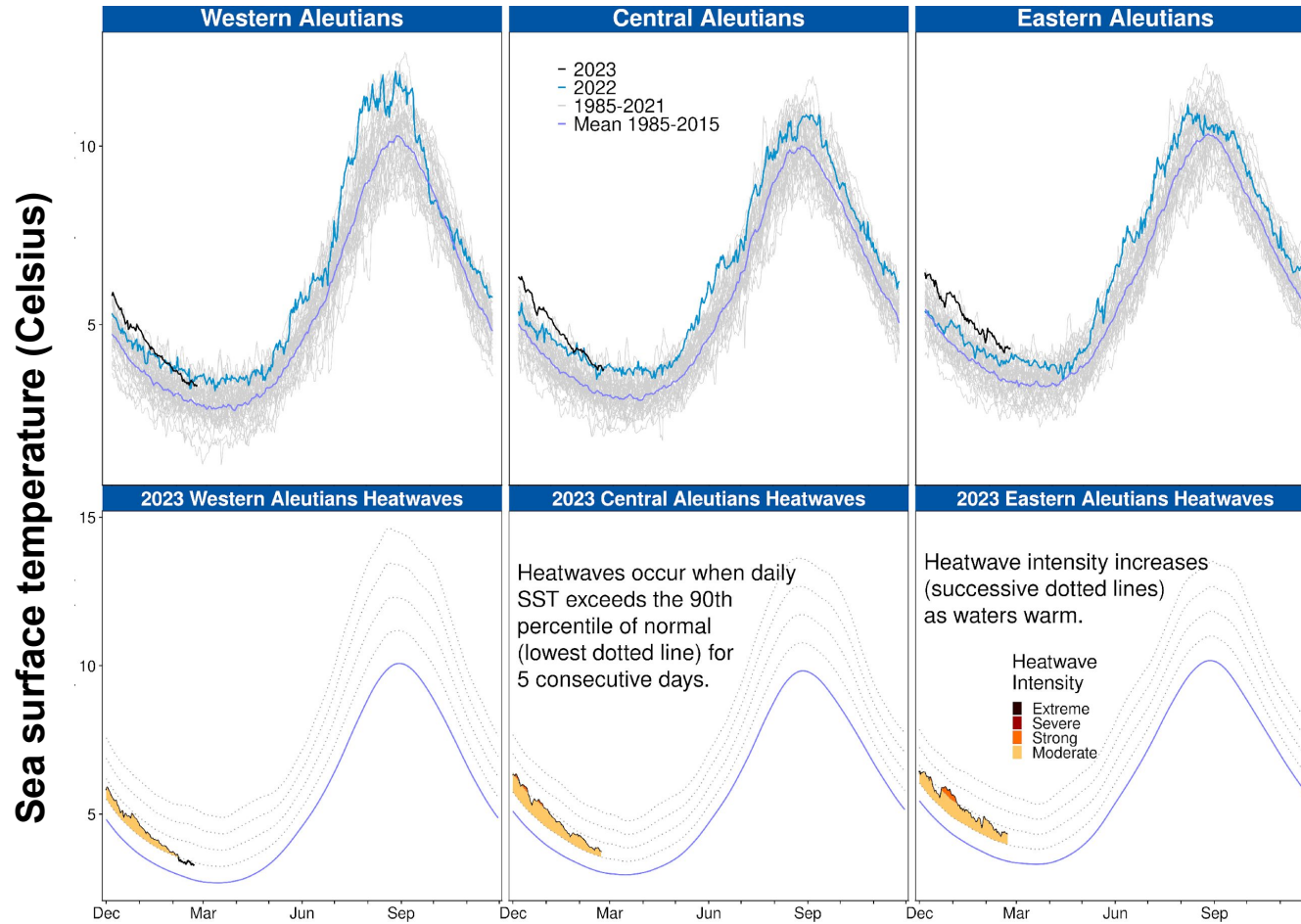
Seabird reproductive success was exceptional at the Pribilof Islands, but was mixed at St. Lawrence Island indicates local availability of zooplankton and forage fish on the southern Bering Sea shelf



Good body condition of P cod and condition improved from 2021 to 2022 (except adult pollock); multispecies model indicates improved conditions for juvenile groundfish survival through 2022 via predation release

Adult P cod abundance remained low.

Aleutian Island temperatures

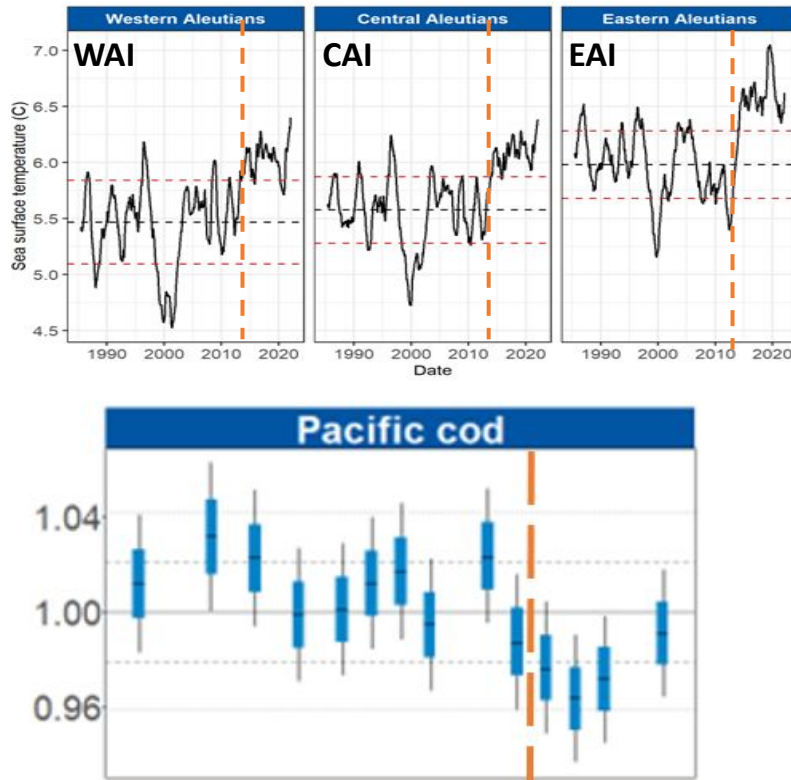


NOAA Coral Reef Watch data, courtesy National Environmental Satellite, Data, and Information Service (Updated: 02-21-2023)
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<https://shinyfin.psmfc.org/ak-sst-mhw/>

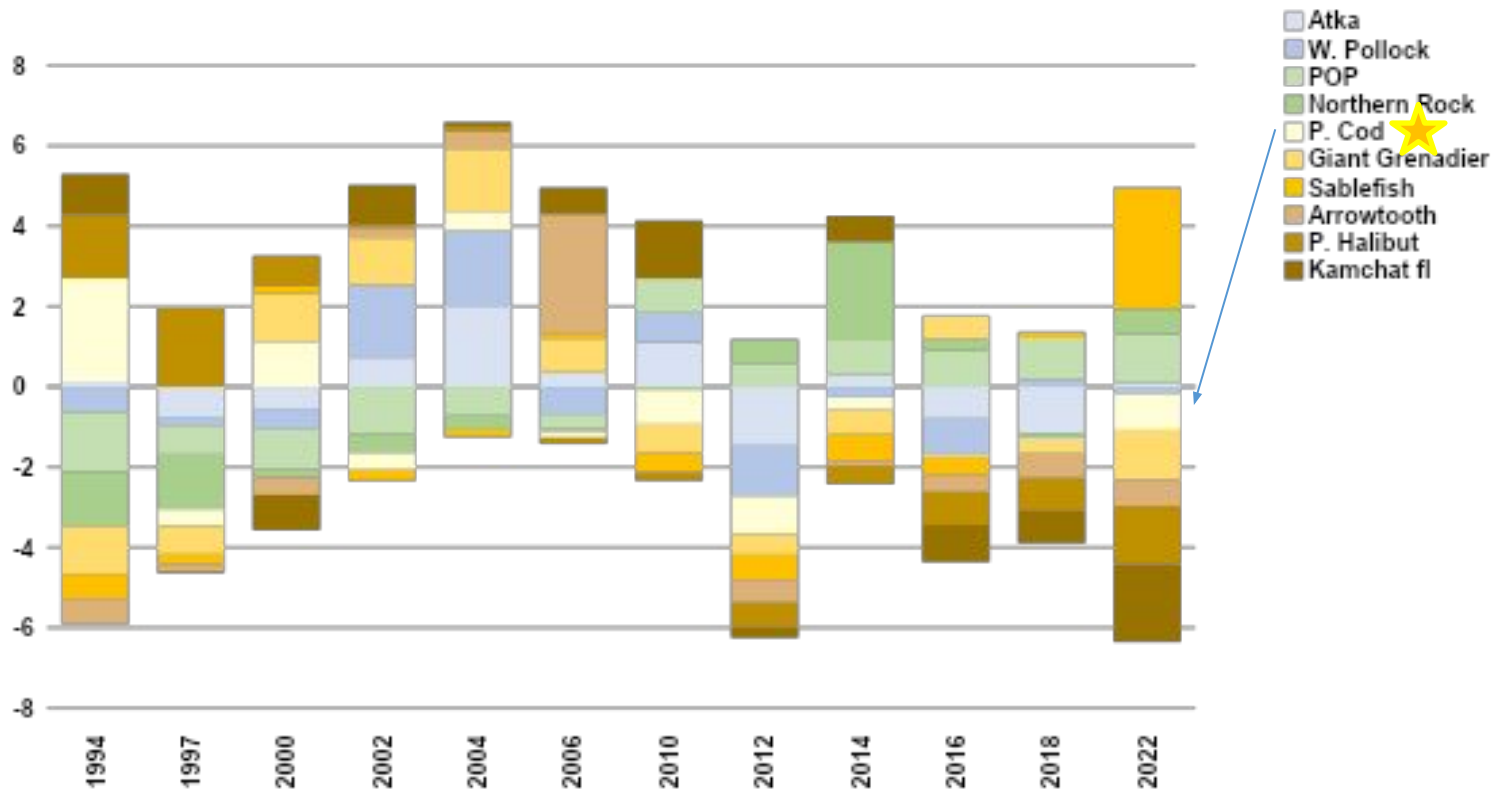
2023 and 2022, 2023 warmer than 2022 & we're having a marine heatwave

Body condition of P cod

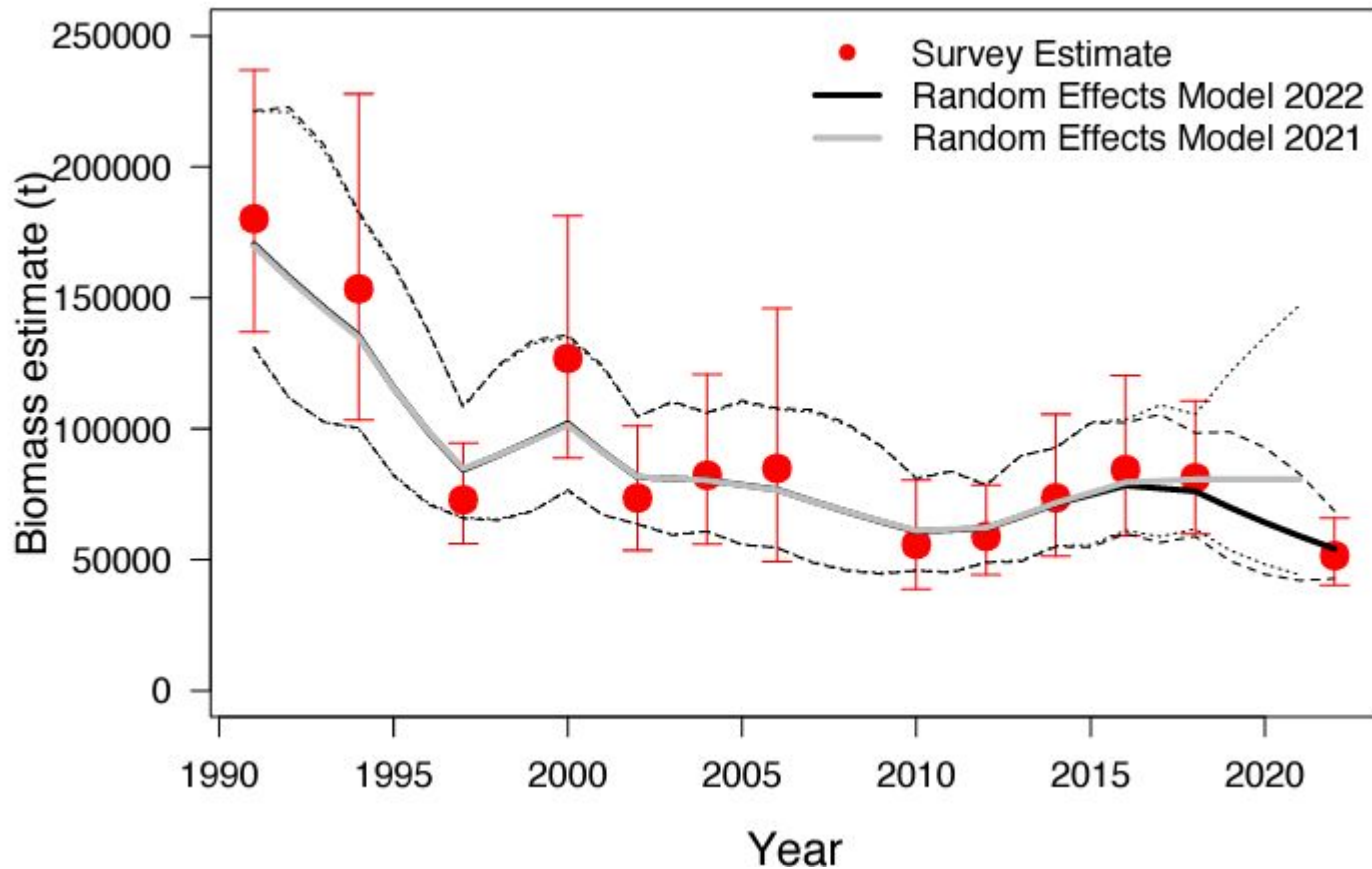


Biomass of P cod

Aleutian Islands bottom trawl survey



Aleutian Islands P cod biomass



2022 Aleutian Island summary



Jan – Aug warm conditions with moderate and at times severe MHW in WAI and CAI, warmer waters top to bottom continue



Lower than average phytoplankton biomass (sat chl-a) and small copepod size, prey for large copepods



Early seabird hatch dates and average or above reproductive success for plankton and fish eating seabirds



Increasing Eastern Kamchatka pink salmon during both low abundance and high abundance years = competition for food

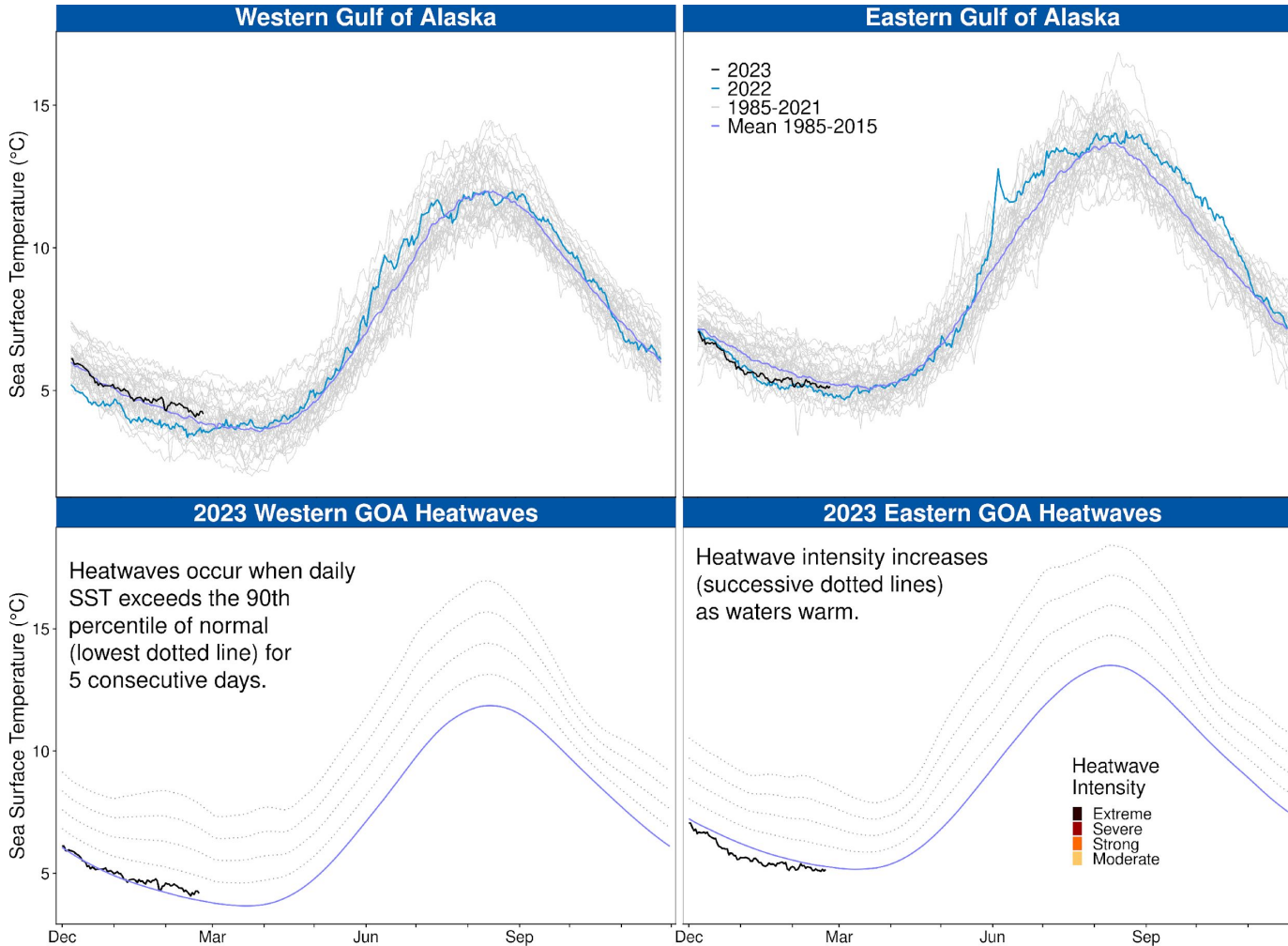
Below average body condition of P cod



Apex predators (Pacific cod, large flatfish) decreasing biomass

Gulf of Alaska temperatures

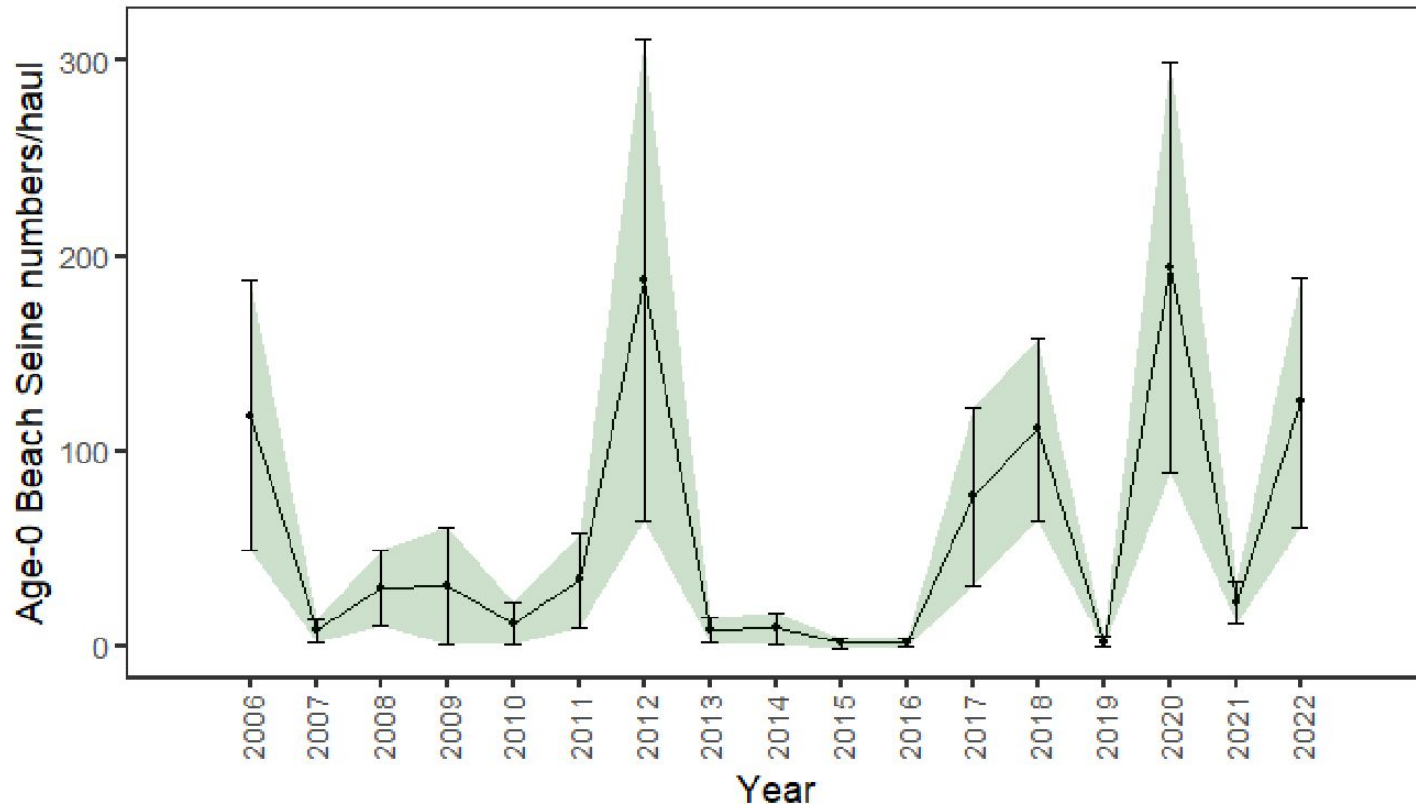
Sea surface temperature (Celsius)



NOAA Coral Reef Watch data, courtesy National Environmental Satellite, Data, and Information Service (Updated: 02-21-2023)
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Age-0 P cod catch per unit effort

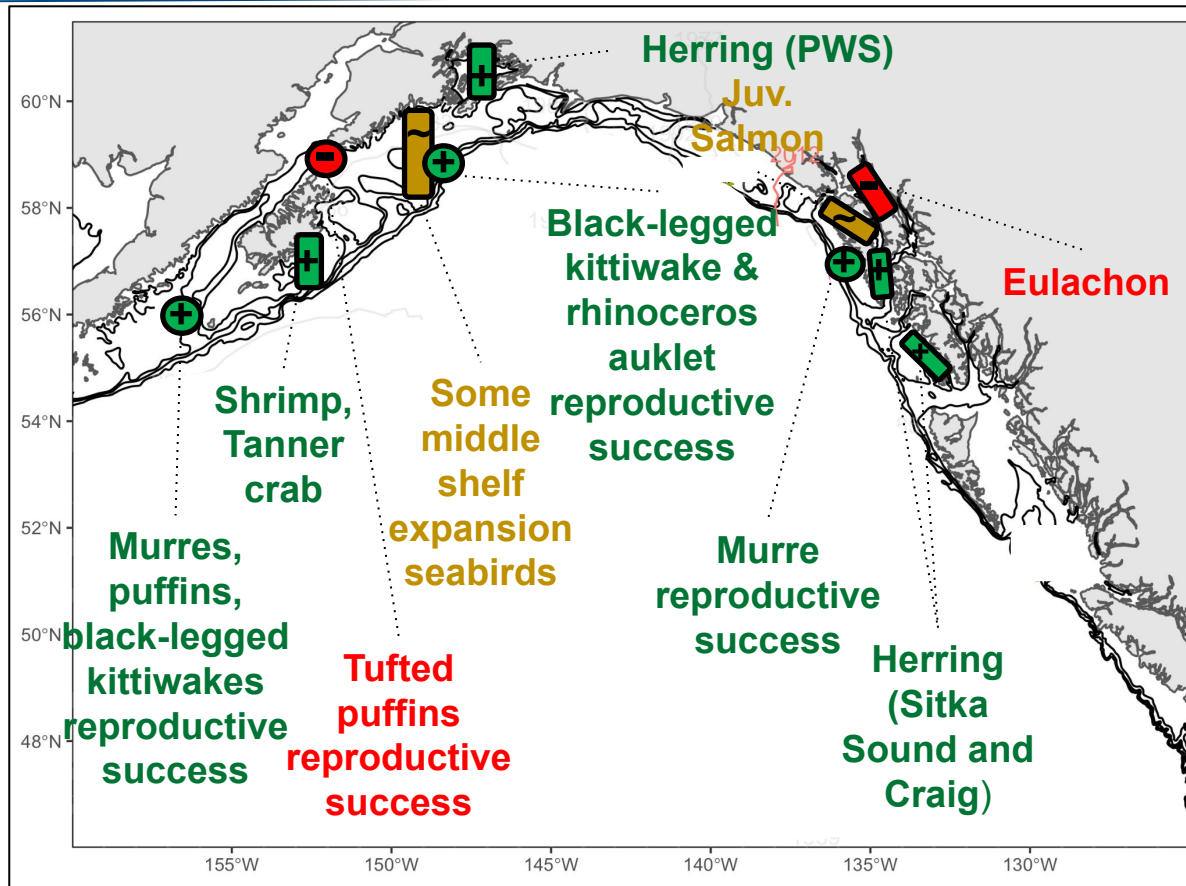
Gulf of Alaska beach seine survey



Litzow, M.A., Malick, M.J., Abookire, A.A., Duffy-Anderson, J., Laurel, B.J., Ressler, P.H., Rogers, L.A. (2021) Climate attribution statistics inform judgments about changing fisheries sustainability. *Scientific Reports* 11, 23924. <https://doi.org/10.1038/s41598-021-03405-6>
Dorn et al 2022

Food for P cod *above average*

B. Drummond, D. Cushing, S. Hatch, K. Hebert, S. Pegau, E. Pochardt, W. Strasburger, C. Worton



- Forage fish prey for pollock, P. cod, Arrowtooth flounder, sablefish, flatfish
- Fish & seabird surveys
- Generally above average across GOA (with exceptions)

Legend

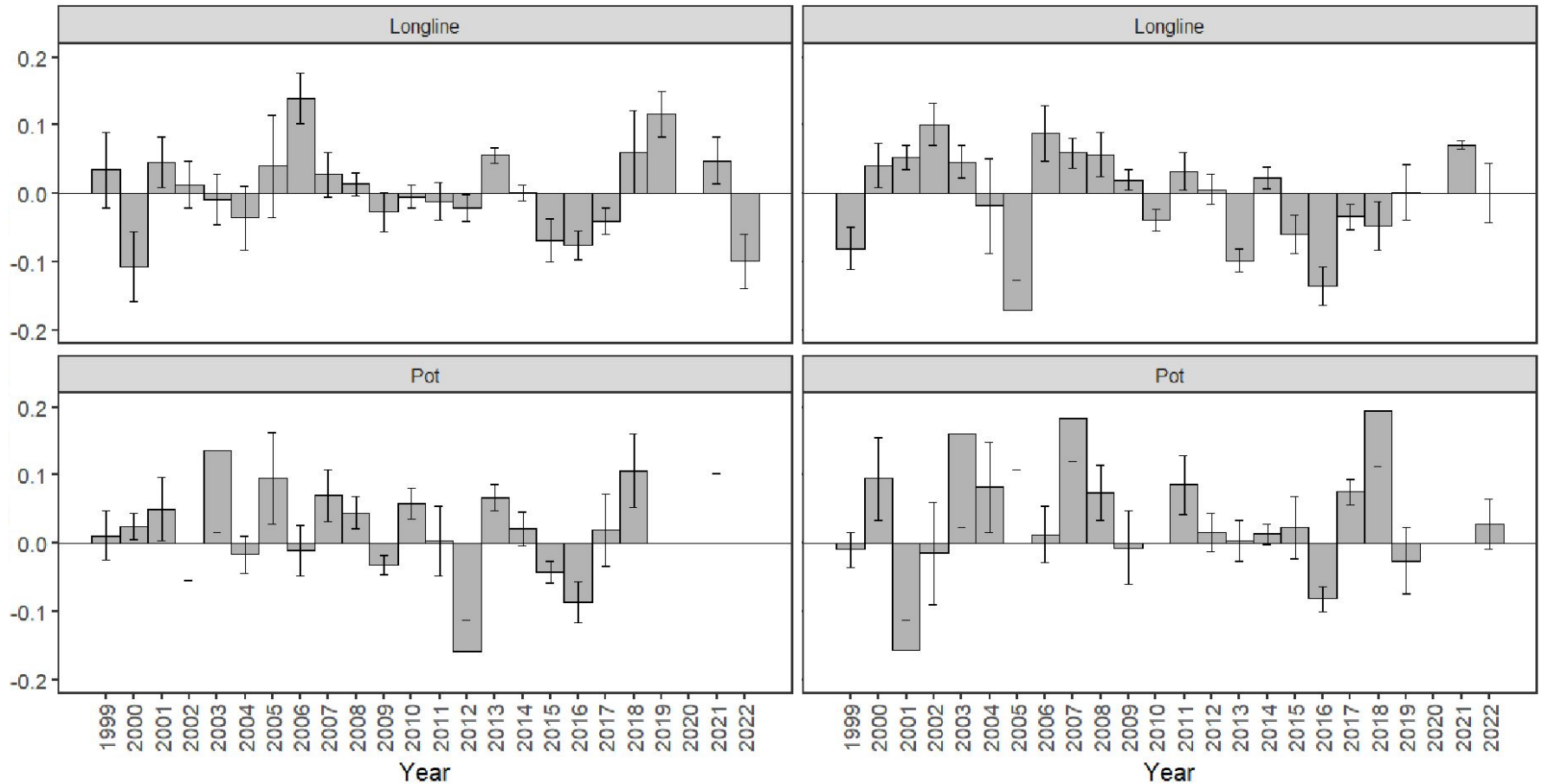
	Surveys
	Seabird survey (Islands)
	Above Average
	Average
	Below Average

Body condition of P cod

Fish condition (Length/Weight residuals)

Central GOA Jan-Apr

Western GOA Jan-Apr



Gulf of Alaska P cod

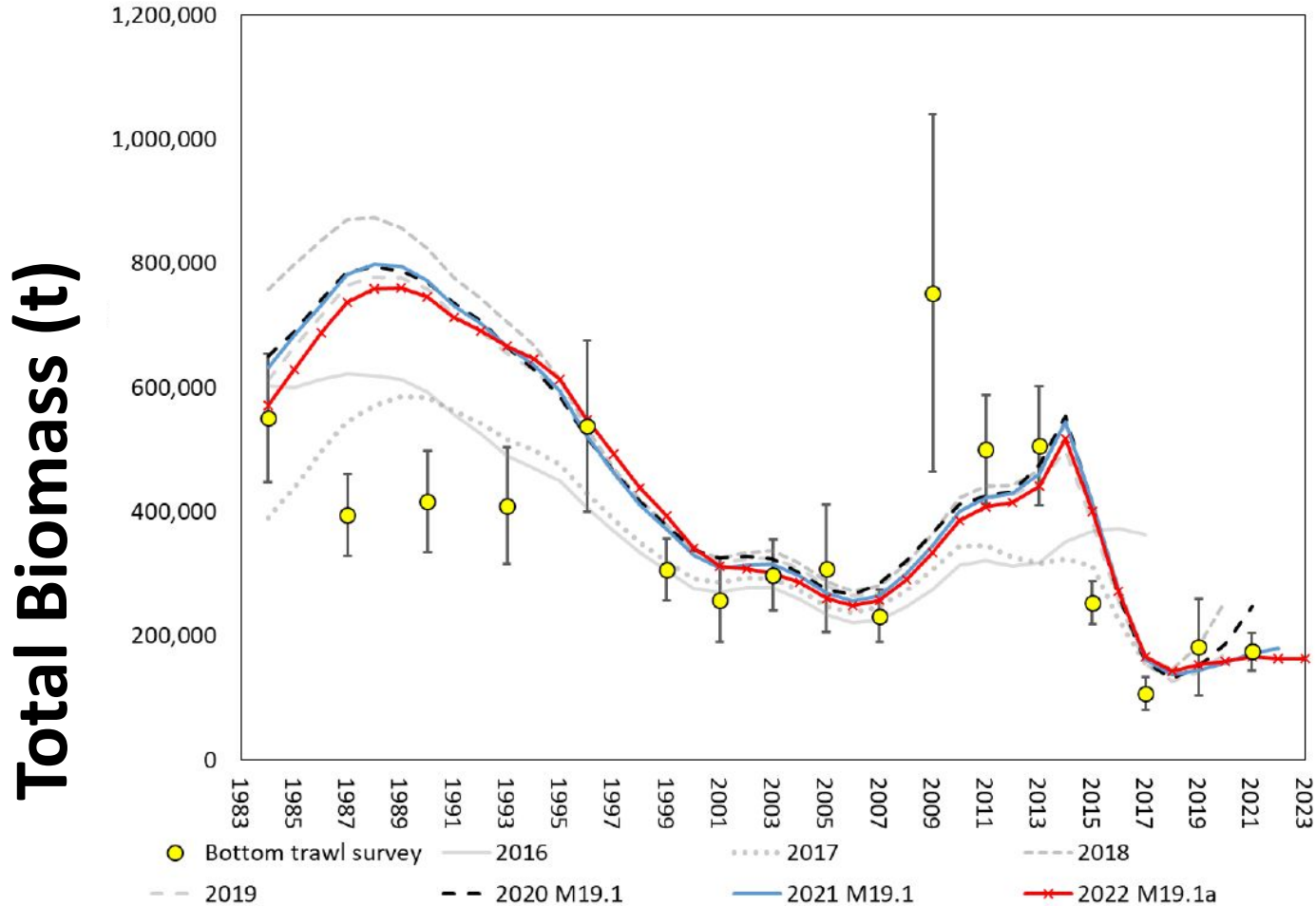


Figure 2.34. Total biomass estimates from 2016 through 2022 stock assessments and NMFS bottom trawl survey biomass estimates with 95% confidence bounds.

2022 Gulf of Alaska summary



No marine heatwave last year or yet this year, BUT warm summer and fall surface & summer depth 2022

Zooplankton densities are average & below average in the western Gulf of Alaska and above average in the eastern Gulf of Alaska



Forage fish abundances were above average indicates local availability of zooplankton



Poor body condition of P cod in the central Gulf of Alaska but good body condition in the western Gulf of Alaska



Adult P cod abundance remained low.

LEVELS OF CONCERN BASED ON ECOSYSTEM STATUS

2022 Risk table scores

Bering Sea

Aleutian Islands

Gulf of Alaska

Level 2

Some indicators showing adverse signals relevant to the stock but the pattern is not consistent across all indicators.

- AI Pacific cod
- Atka mackerel

Level 1

No apparent environmental/ecosystem concerns

- EBS pollock
- EBS Pacific cod
- Yellowfin sole
- Sablefish (statewide)
- Northern rock sole
- Arrowtooth flounder
- Kamchatka flounder
- Greenland turbot
- Sharks (statewide)

Level 1

No apparent environmental/ecosystem concerns

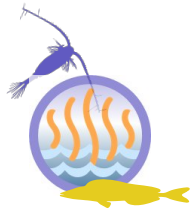
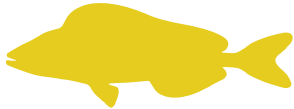
- Pacific ocean perch
- Northern Rockfish
- AI pollock
- Bogoslof pollock
- BSAI Rougheyeye/Blackspotted,
- BSAI Other Rockfish &
- BSAI Shortraker
- Sablefish (statewide)

Level 1

No apparent environmental/ecosystem concerns

- Walleye pollock
- Pacific cod
- Sablefish (statewide)
- Flathead sole*
- Northern rockfish
- Dusky rockfish
- Demersal shelf rockfish*
- Thornyhead rockfish*
- Sharks (statewide)*

Atka mackerel



- Persistent warm conditions
- MHW coincidental with spawning / nesting season
- Increased metabolic demands
- Average body condition, but below average length-weight residuals
- Potential increased competition from POP







































Pacific cod



- Persistent warm conditions
- Lower prey quality resulting in reduced fish condition
- Decreased consumption of Atka as prey due to lower availability of Atka.

Salmon around the Pacific rim

Table 1. Summary of trends in abundance of Pacific salmon from the most recent three to five years. Green up arrows indicate increasing trends, red down arrows indicate decreasing trends and yellow horizontal arrows indicate generally stable trends. 2017-2021

	Pink 	Chum 	Sockeye 	Coho 	Chinook 	Masu 	Steelhead 
Canada						NA	NA
Japan			NA	NA			NA
Russia	 						NA
Korea	NA		NA	NA	NA	NA	NA
USA – AK	 		 			NA	
USA – WA/OR/CA						NA	

Source: NPAFC Newsletter article by Andrew Monro



Thank you

-
- **What do we expect in 2023? Marine heat wave in the Aleutians**
 - **Acknowledgements**
 - **Questions**
 - **Contact: ellen.yasumiishi@noaa.gov**

Additional Information Available

Ecosystem presentations to the Council

https://meetings.npfmc.org/CommentReview/DownloadFile?p=97d00f3f-54e2-4b2d-ae0f-cf07f765ed86.pdf&fileName=2022%20RPA%20Surveys_GFPT_091922_final.pdf

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

AI P cod stock assessment

https://apps-afsc.fisheries.noaa.gov/Plan_Team/2022/AIpcod.pdf

EBS P cod stock assessment report

https://apps-afsc.fisheries.noaa.gov/Plan_Team/2022/EBSpcod.pdf

GOA P cod stock assessment report

https://apps-afsc.fisheries.noaa.gov/Plan_Team/2022/GOApcod.pdf

