

Alaska Marine Conditions 2023

(based on partial NOAA AFSC Ecosystem Status Reports)

Pacific Salmon Commission Sept 19, 2023

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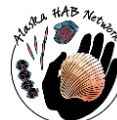
Ecosystem Status Report: Gulf of Alaska 2022



Bridget Ferriss & Stephani Zador

With contributions from:

Anna Abelman, Grant Adams, Opik Ahkinga, Don Anderson, Mayumi Arimitsu, Kelia Axler, Brenda Ballachey, Steve Barbeaux, Sonia Batten, James Bodkin, Nick Bond, Brian Brettschneider, Matt W. Callahan, Rob Campbell, Reuben Cash, Louisa Castrodale, Wei Cheng, Heather Coletti, Bryan Cormack, Juliana Cornett, Deana Crouser, Daniel Cushing, Seth Danielson, Tammy Davis, Thomas Dean, Alison Deary, Martin Dorn, Sherri Dressel, Brie Drummond, Kathleen Easley, Anne Marie Eich, Grace Ellwanger, Daniel Esler, Stacie Evans, Evangeline Fachon, Thomas Farrugia, Emily Fergusson, Christine Gabriele, Sarah Gaichas, Jeanette Gann, Tom Gelatt, Andrew Gray, Colleen Harpold, Scott Hatch, Kyle Hebert, Steve Heintz, Hanna Hellen, Jordan Hollarsmith, Kirstin Holsman, Dom Hondolero, Russell Hopcroft, Peter Hulson, Jim Ianelli, Katrin Iken, Timothy Jones, Robert Kaler, Mandy Keogh, Steve Kibler, David Kimmel, Kim Kloecker, Brenda Konar, Elizabeth Labunski, Ned Laman, Kari Lanphier, Kathi Lefebvre, Emily Lemagie, Mandy Lindeberg, Jackie Lindsey, Julie Matweyou, Jasmine Maurer, Lauren E. McCaslin, Cole Monnahan, Daniel Monson, John Moran, Jennifer Morella, Jamal Moss, Franz Mueter, Jim Murphy, Janet Neilson, Jens Nielsen, John Olson, Clare Ostle, Veronica Padula, Emma Pate, W. Scott Pegau, Noel Pelland, John Piatt, Cody Pinger, Andrew Piston, Meredith Pochardt, Chandra Poe, André Punt, Heather Renner, Sarah Rheinsmith, Brian Robinson, Lauren Rogers, Natalie Rouse, Joshua Russell, Kate Savage, Kalei Shotwell, Kevin Siwicke, Scott Smeltz, Matthew Smith, Ingrid Spies, Ian Stewart, William Stockhausen, Janice Straley, Wesley Strasburger, Suzanne Strom, Robert Suryan, Katie Sweeney, Rick Thoman, Cathy Tide, Sarah Traiger, Caroline van Hemert, Scott Vulstek, Andy Wall, Benjamin Weitzman, Shannon Whelan, George A. Whitehouse, Carrie Worton, Bruce Wright, Stephani Zador, Joshua Zahner, Molly Zaleski



Ecosystem Status Report: Eastern Bering Sea 2022

Elizabeth Siddon



BERING SEA FISHERMEN'S ASSOCIATION



KUSKOKWIM RIVER INTER-TRIBAL FISH COMMISSION



NORTH PACIFIC FISHERY MANAGEMENT COUNCIL

With contributions from:

Anna Abelman, Grant Adams, Opik Ahkinga, Don Anderson, Alex Andrews, Kerim Aydin, Steve Barbeaux, Cheryl Barnes, Lewis Barnett, Jenna Barrett, Sonia Batten, Shaun W. Bell, Nick Bond, Emily Bowers, Caroline Brown, Thaddaeus Buser, Matt Callahan, Louisa Castrodale, Patricia Chambers, Patrick Charapata, Wei Cheng, Daniel Cooper, Bryan Cormack, Jessica Cross, Deana Crouser, Curry J. Cunningham, Seth Danielson, Alison Deary, Andrew Dimond, Lauren Divine, Sherri Dressel, Kathleen Easley, Anne Marie Eich, Lisa Eisner, Jack Erickson, Evangeline Fachon, Ed Farley, Thomas Farrugia, Sarah Gaichas, Jeanette C. Gann, Sabrina Garcia, Jordan Head, Ron Heintz, Hanna Hellen, Tyler Hennon, Albert Hermann, Kirstin K. Holsman, Kathrine Howard, Tom Hurst, Jim Ianelli, Phil Joy, Kelly Kearney, Esther Kennedy, Mandy Keogh, David Kimmel, Jesse Lamb, Geoffrey M. Lang, Ben Laurel, Elizabeth Lee, Kathi Lefebvre, Emily Lemagie, Aaron Lestenkof, W. Christopher Long, Sara Miller, Calvin W. Mordy, Franz Mueter, James Murphy, Jens M. Nielsen, Cecilia O'Leary, Ivonne Ortiz, Clare Ostle, Jim Overland, Veronica Padula, Emma Pate, Noel Pelland, Robert Pickart, Darren Pilcher, Cody Pinger, Steven Porter, Bianca Prohaska, Patrick Ressler, Sarah Rheinsmith, Jon Richar, Sean Rohan, Natalie Rouse, Kate Savage, Terese Schomogyi, Gay Sheffield, Kalei Shotwell, Elizabeth Siddon, Scott Smeltz, Joseph Spaeder, Adam Spear, Ingrid Spies, Phyllis Stabeno, Wesley Strasburger, Robert Suryan, Rick Thoman, Cathy Tide, Rod Towell, Stacy Vega, Vanessa von Biela, Muyin Wang, Jordan Watson, George A. Whitehouse, Kevin Whitworth, Megan Williams, Ellen Yasumiishi, and Molly Zaleski



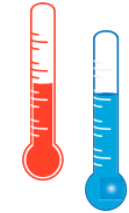
2023 Key Messages



- **N. Pacific:** 2023 cool to average La Niña SST conditions transitioning to warming with El Niño



- **Eastern Bering Sea (EBS):**
 - Oceanography '23: Continued period of average SST & oceanographic conditions over the shelf.
 - Ecological: '22 mixed but ave pelagic prey availability (zooplankton, forage fish); 2023...



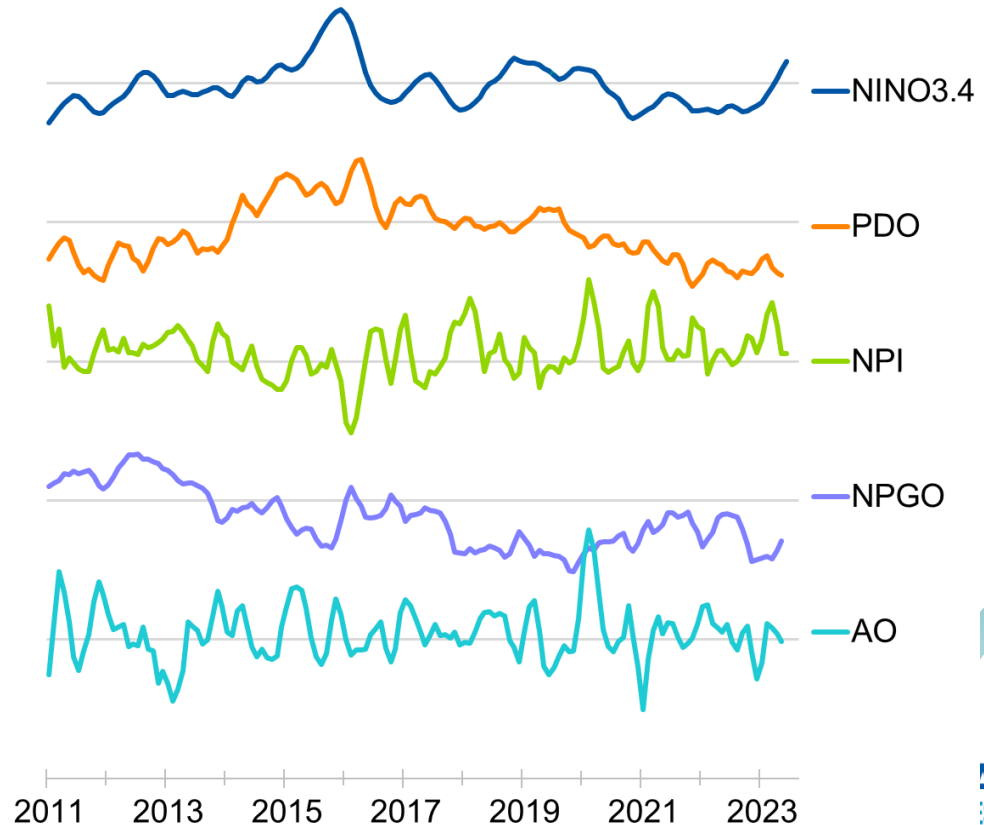
- **Gulf of Alaska (GOA):**
 - Oceanography '23: Continued multi-year period of average SST, low-average transport/mixing; El Niño
 - Ecological conditions '22: above ave pelagic prey availability; 2023...



- **NINO3.4** negative (La Niña) spring 2020-winter 2023; positive starting summer (El Niño)
- **PDO** negative since winter 2019/2020
- **NPI** strongly positive winter 22/23 (weak AL); near-neutral in summer 2023
- **NPGO** decline since 2012; neg. since 2017; moderate end of 2022 then decline in 2023
- **AO** mostly positive since the spring of 2021; neg. end of 2022; pos. 2023.

North Pacific Climate Indices

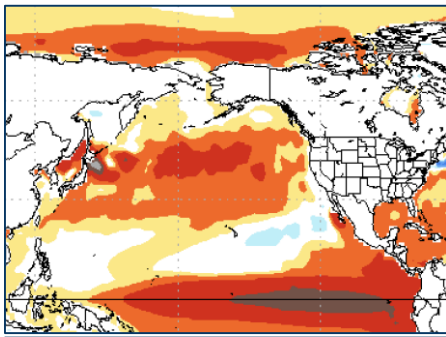
N. Bond (UW)



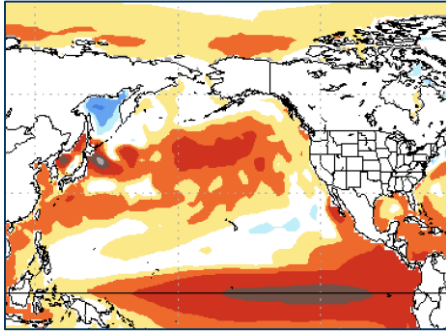
SST Projections from the National Multi-Model Ensemble

N. Bond

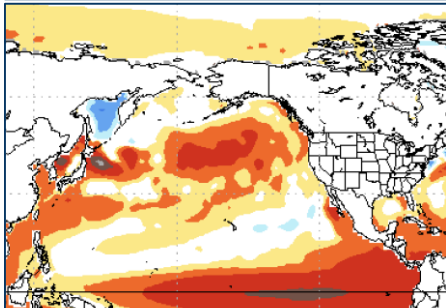
Oct - Dec
2023



Dec 23 -
Feb 24



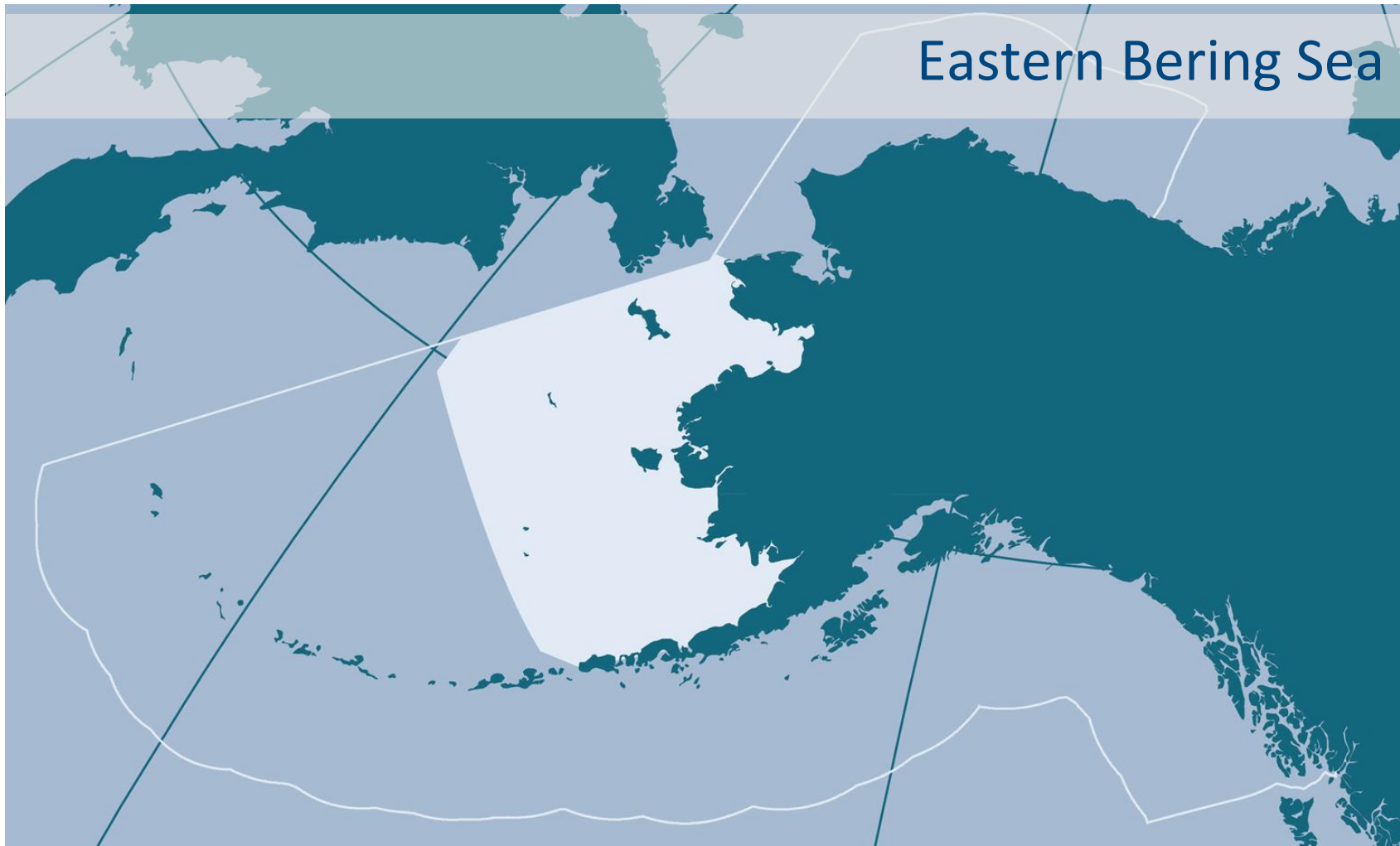
Feb -
April
2024



- **Oct-Dec'23:** El Niño in tropical Pacific. Modest warming for W. Aleutian Islands, SE Bering Sea shelf, and E Gulf of Alaska.
- **Dec-Feb'24:** Similar to fall. Tropical Pacific has SST anomalies $>2^{\circ}\text{C}$, strong El Niño.
- **Feb-Apr'24:** Warming along PNW coast and EGOA. Sea ice could extend south of 60°N and as far south as Bristol Bay.

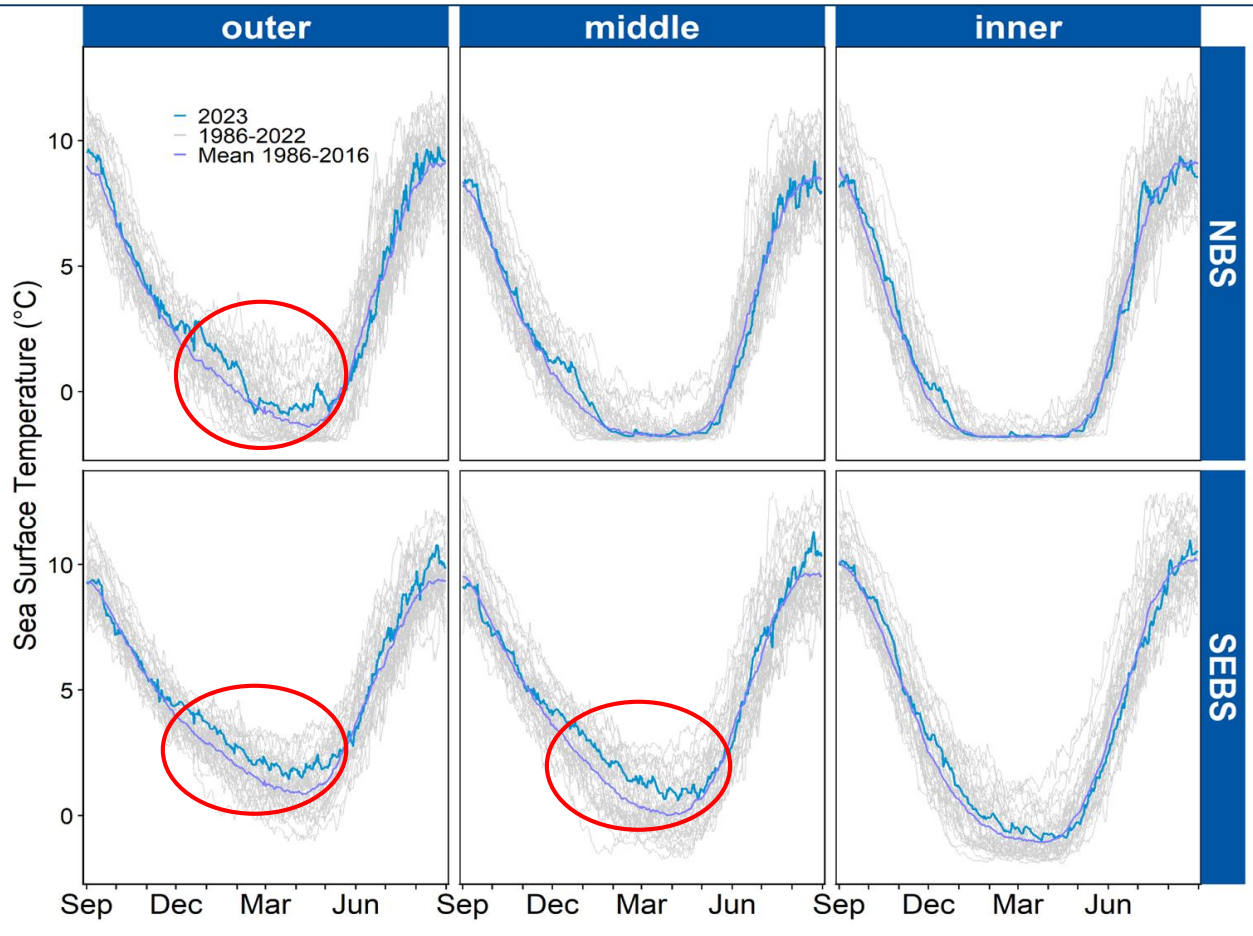
Baseline: 1991-2020

Eastern Bering Sea



2023 Sea Surface Temperature

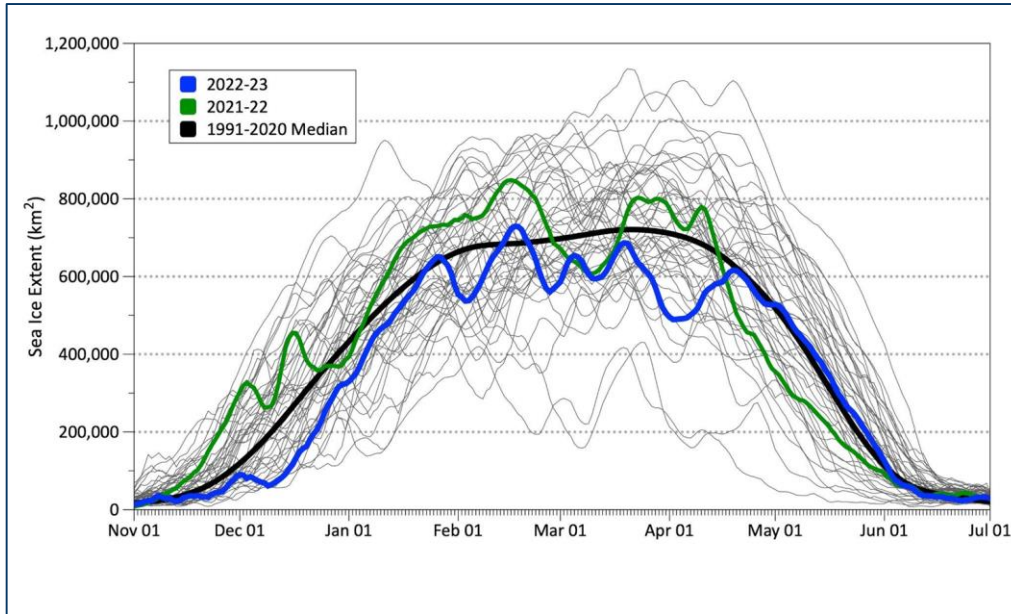
E. Lemagie & M. Callahan



- SSTs were similar to the long-term mean in fall 2022 and spring/summer 2023
- SSTs were slightly above the long-term mean in winter 2022/2023, especially in the outer domain and southern middle domain
- MHW have been brief and infrequent since 2021

2023 Sea Ice

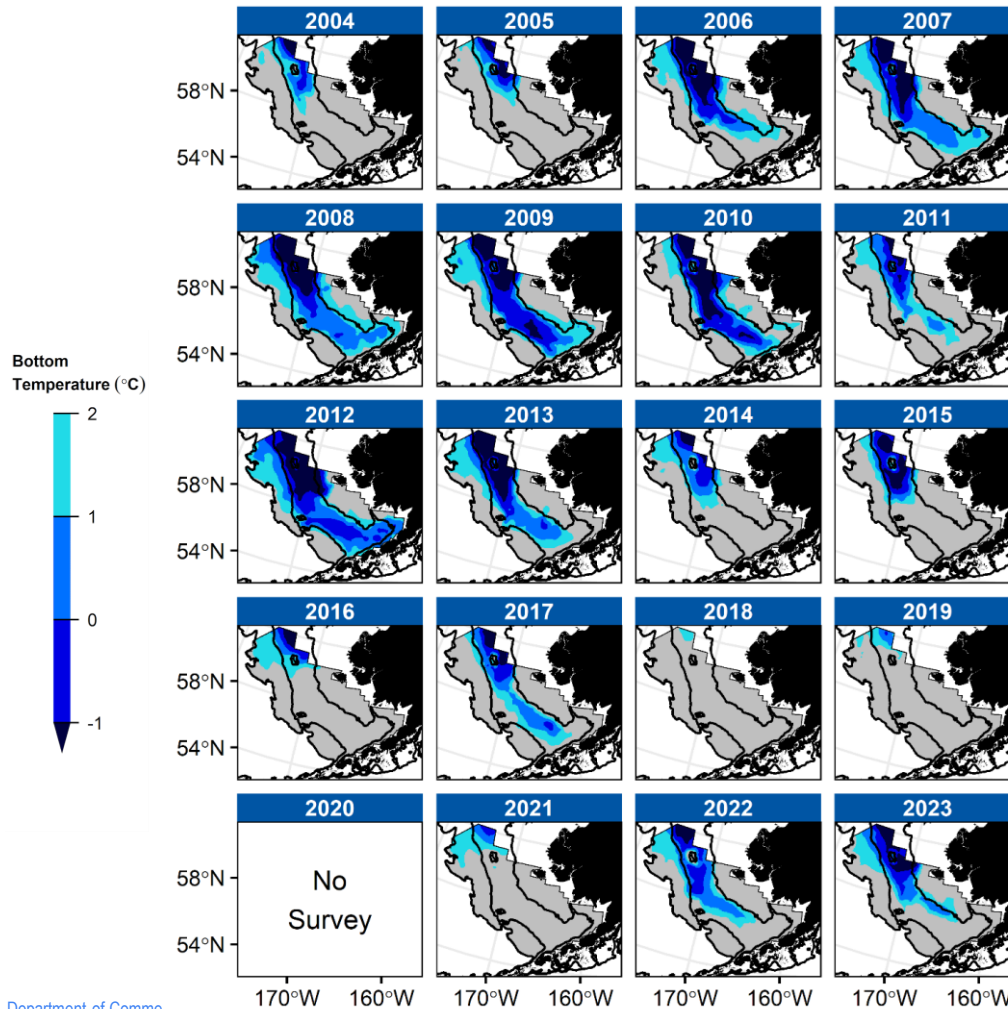
R. Thoman (UAF)



- Ice phenology shifted ~1 month later than 2021/2022
- Delayed sea ice growth in Nov & Dec:
 - Stormy weather
 - Slow freeze-up in the Chukchi
 - Impact of Merbok
- Ice melt-out in spring was slowed by cold April temperatures
- Maximum ice extent occurred February 17; sea ice did not reach St. Paul Island (9th year in past decade)

2023 Cold Pool

Rohan & Barnett



- Average cold pool extent
 - Slightly larger than 2022
- Footprint of the cold pool was similar to 2011, 2017, and 2022
- Cold tongue along the inner front was shifted inshore

2023 Eastern Bering Sea

E. Siddon

Sea Surface Temperature (SST)

- SEBS and NBS had average SSTs 2023 (warm winter)
- MHWs have been infrequent and brief since 2021

Continued average conditions over the EBS shelf

Sea ice

- Ice season shifted ~1 month later (delayed freeze-up and later melt-out)
- Ice thickness was above average north of St. Matthew Island, below average south of St. Matthew Island

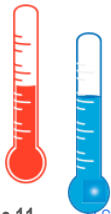
Sea ice impacts stratification, production of ice algae, and the cold pool

Cold pool

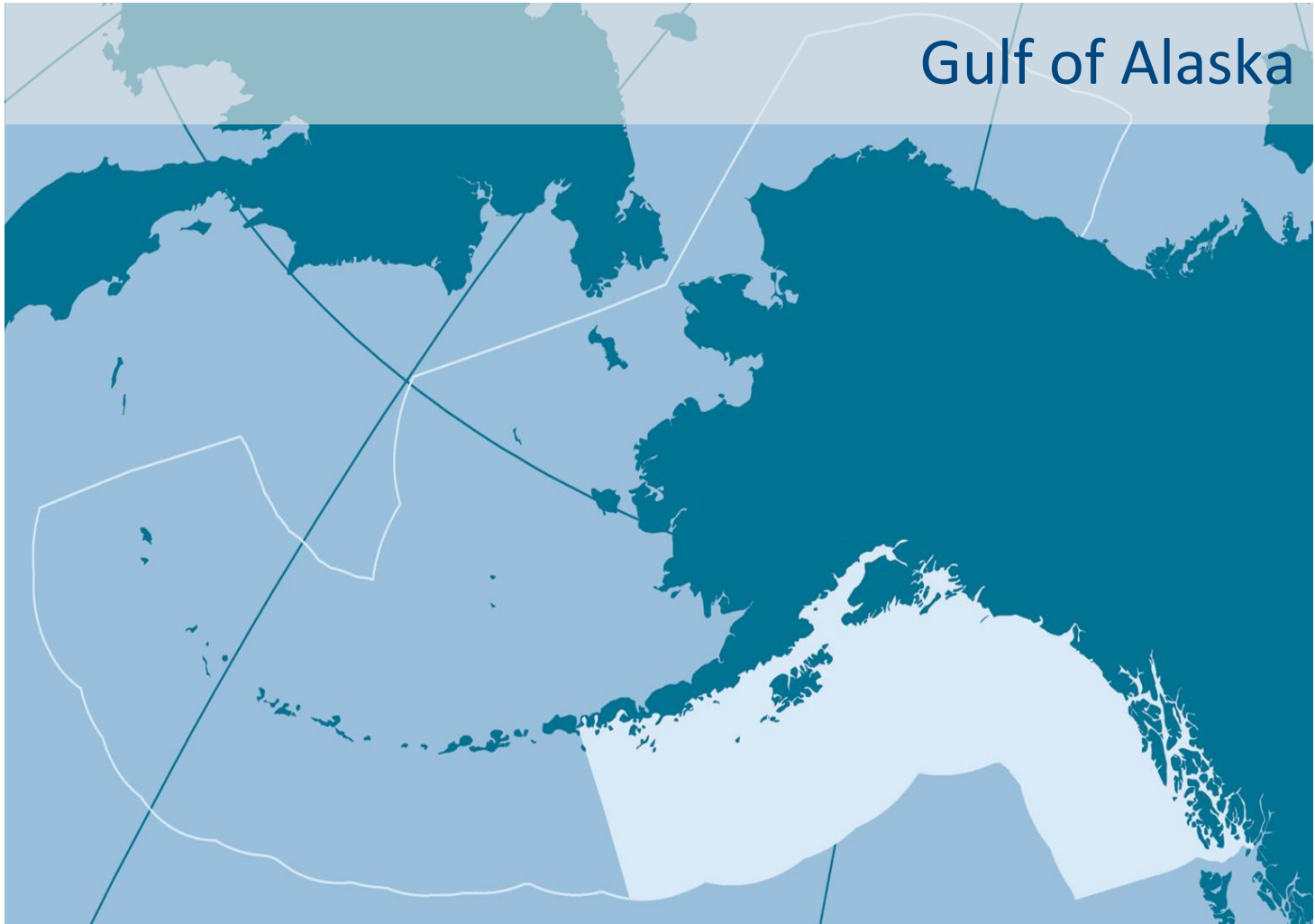
- 2023 cold pool extent was average; spatially resembles 2011, 2017, & 2022

Cold pool extent impacts distribution and movement of fish and crab stocks

Ecological conditions...



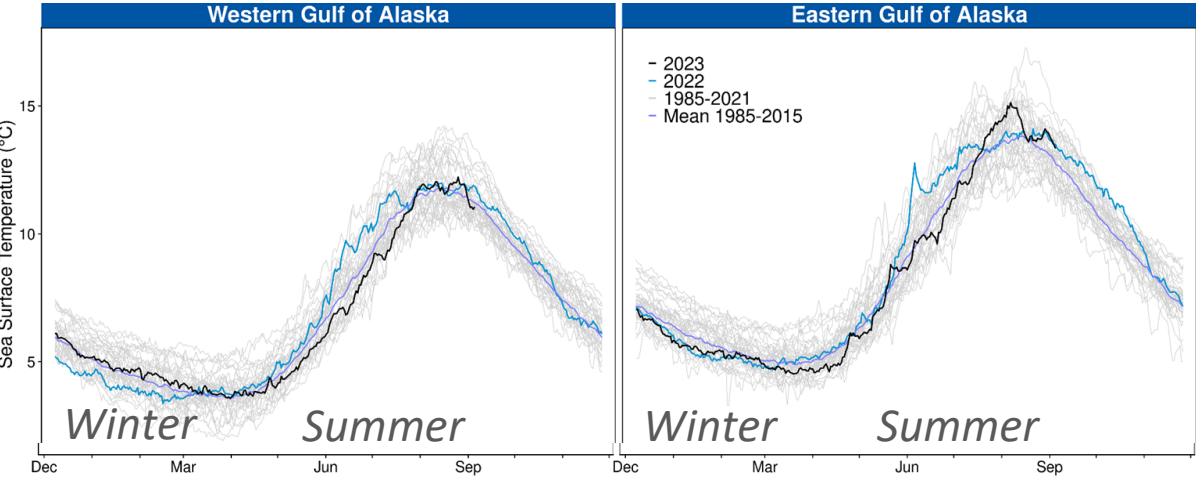
Gulf of Alaska



2023 GOA SST & Marine Heatwaves

E. Lemagie, M. Callahan

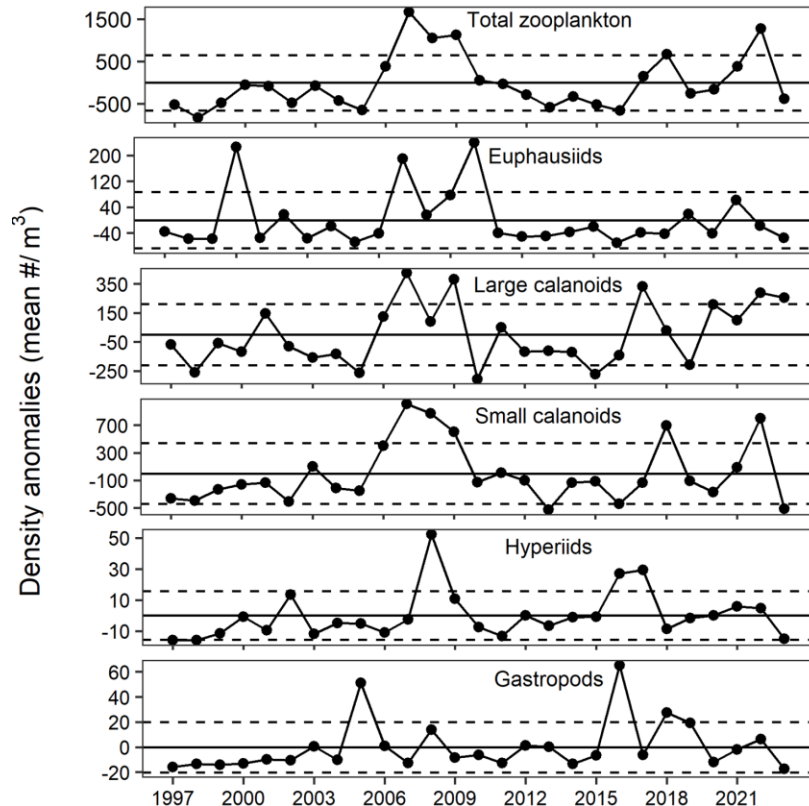
- 2023 SST (black) generally average winter, spring, summer with warm July/August (EGOA) (1985-2015 baseline)
- EGOA MHW (July/August) covered ~50% area at peak
- 4th consecutive year of no persistent MHW conditions



2023 Zooplankton in Icy Strait, Southeast Alaska

E. Fergusson, W. Strasburger

SE Coastal Monitoring funded by Pacific Salmon Commission Northern Fund

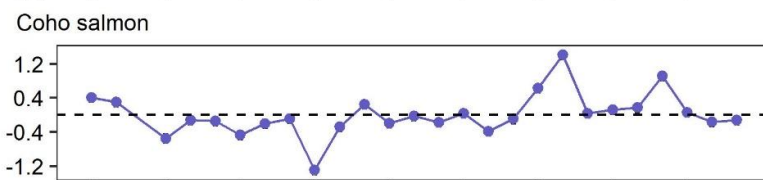
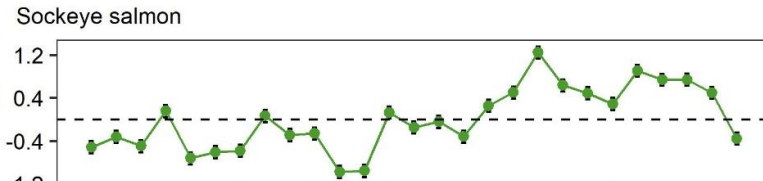
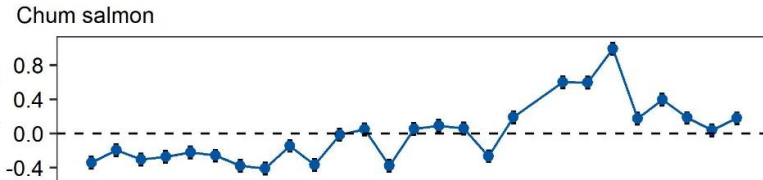
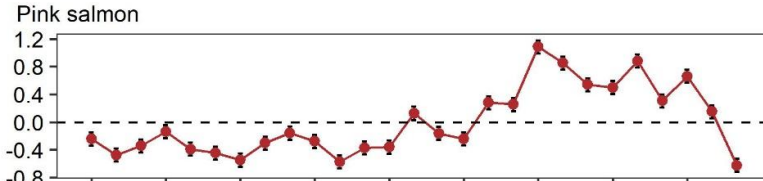
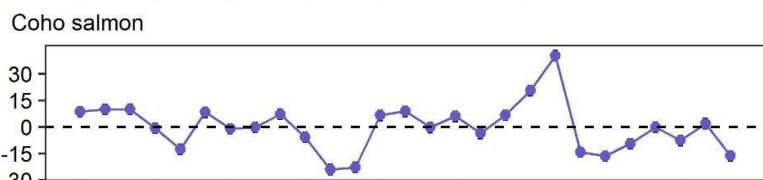
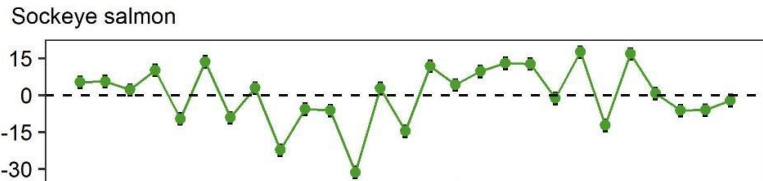
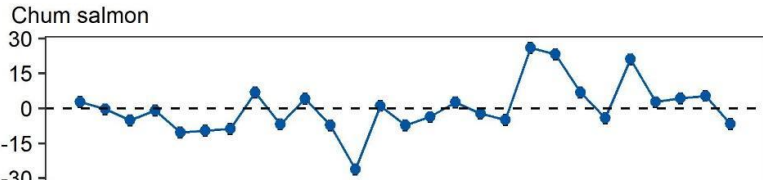
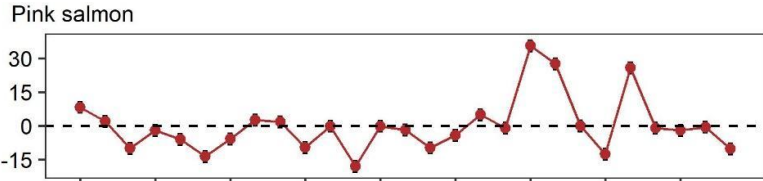


- July survey, inside waters SE Alaska
- Total zooplankton biomass decreased below long-term mean (1997-2022)
- All declined from 2022 except large calanoid copepods

2023 Juvenile Salmon Length & Condition in Icy Strait, Southeast Alaska

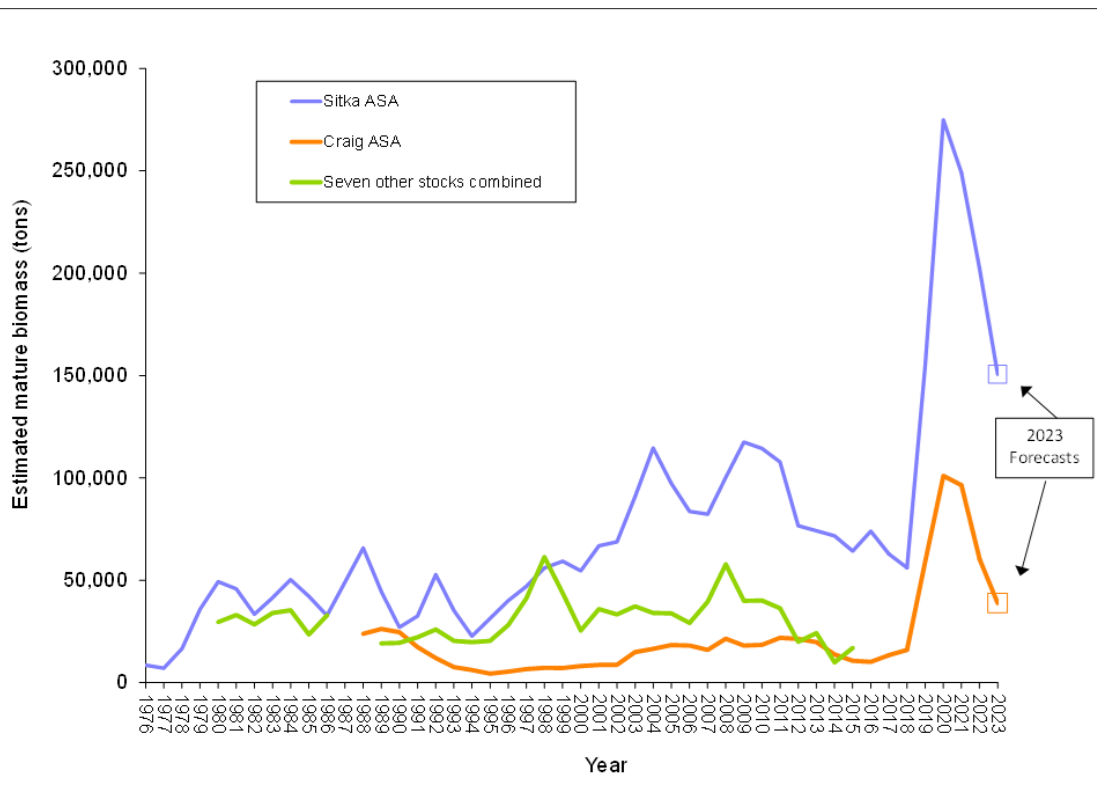
E. Fergusson, W. Strasburger

SE Coastal Monitoring funded by Pacific Salmon Commission Northern Fund



2023 Herring Biomass, Southeast Alaska

K. Hebert, S. Dressel (ADFG)



- Est. biomass herring stocks in SE Alaska
- Relatively high but decline after 2019 peak (driven by large 2016 year class)
- Potentially large 2020 year class
- Prince William Sound herring biomass continued slight increase since 2019

Gulf of Alaska 2023

Continued multi-year period of similar ocean conditions *(El Niño)

Sea Surface Temperature

- 2023: Cool to average SST across GOA shelf, warm July/Aug in EGOA
- 4th consecutive year of no persistent MHW conditions (but brief summer warming in EGOA)
- Forecast moderate warming winter 2023/2024

Ecological Conditions

- Lower total zooplankton biomass (but elevated large copepods) (SE Alaska)
- Herring reduced since 2019 but still elevated (SE Alaska)
- ??



NOAA
FISHERIES

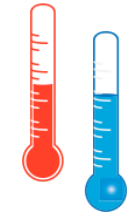
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Alaska Fisheries Science Center Ecosystem Status Reports

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



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