2024-2025 California Current Ecosystem Status Report

Agenda Item F.1
Supplemental CCIEA Team PPT
March 2025

NOAA- California Current IEA team

Core Team: Andrew Leising, Mary Hunsicker, Greg Williams, Nick Tolimieri, Amanda Phillips, Lynn Dewitt, Chris Dailey, Isaac Schroeder, and Chris Harvey

With contributions from > 90 individuals over 23 different agencies/entities

2024-25 CCIEA Ecosystem Status Report Highlights

KEY TAKEAWAYS FROM 2024

- Strong El Niño in winter/spring 2024 gave way to delayed but very strong upwelling and productive coastal conditions
- Abundant winter/spring snowpack for much of the West; most regions exit ‘severe’ drought designation with improving streamflow trends
- Diverse prey communities with regional patches of high productivity

Scan here for interactive infographic!

2024-25 CCIEA Ecosystem Status Report Highlights

Unfavorable Risk and Condition Factors

- Another top-10 marine heatwave (MHW)
- Emerging drought conditions in late 2024; Devastating fires in coastal areas
- HABs impacted marine life, human health, and fisheries
- Increasing trend in humpback whale entanglement reports
- Closure of CA salmon fishery; Declining catches for most sectors, most notably Pacific whiting
- Shifting human wellbeing metrics for fishing reliant communities: OR & WA

Scan here for interactive infographic!

2024-25 CCIEA Ecosystem Status Report Highlights

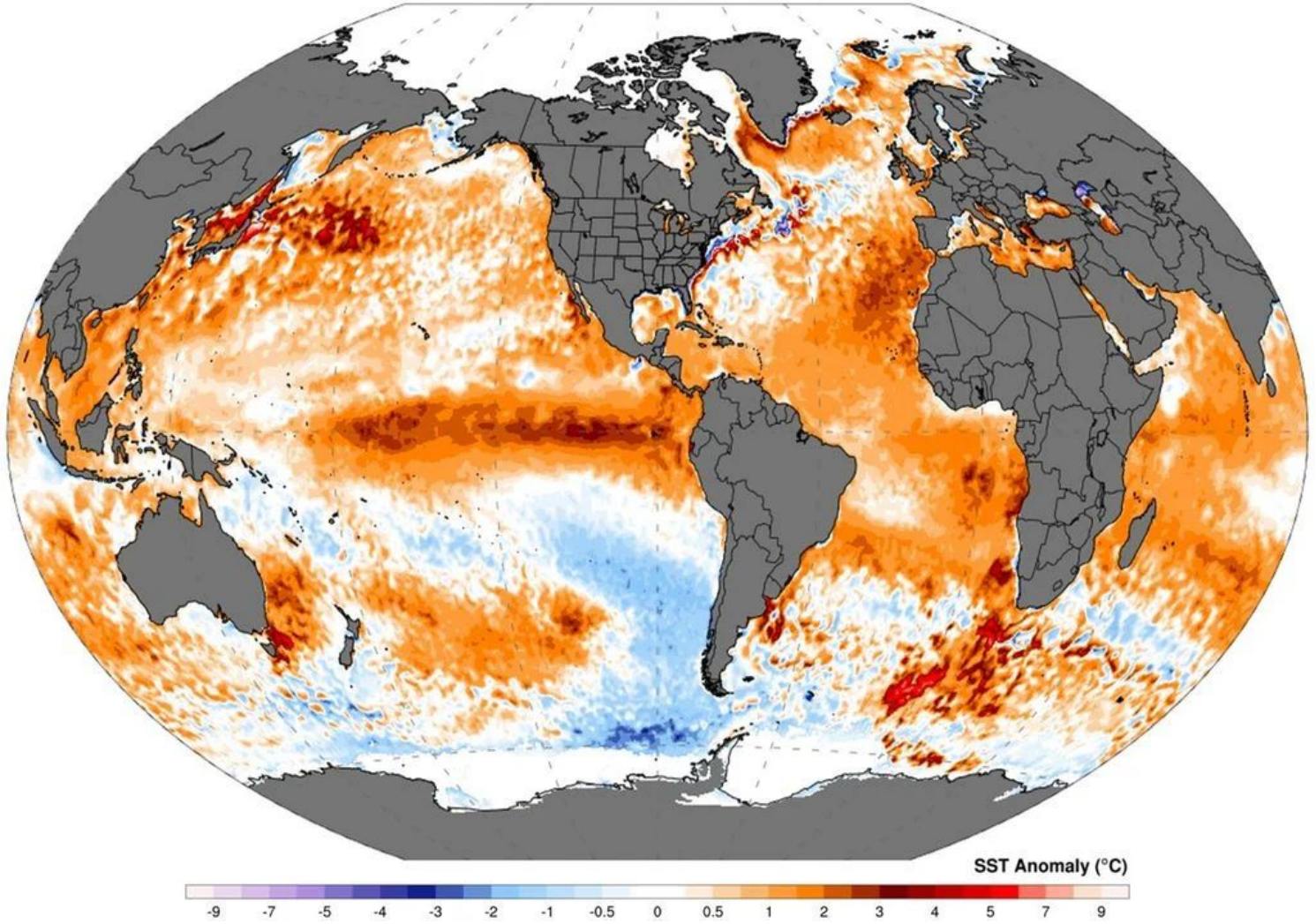
Positive Signals

- Spring upwelling delayed, but resumed with strong, favorable conditions holding MHW offshore
- Zooplankton responded quickly to spring upwelling after El Niño
- Abundant diverse forage, especially anchovies and pelagic juvenile rockfish, in surveys and top predator diets
- Positive outlook for 2025 Columbia Chinook returns; better outmigration conditions for CA salmon smolts
- Revenue increased by 3% from 2023. Crab landings a bright spot in commercial catch

Season by Season: Integrated Overviews

NOAA FISHERIES

Winter 23-24



Strong positive Sea Surface Temperature Anomalies = El Niño!!!

NOAA FISHERIES

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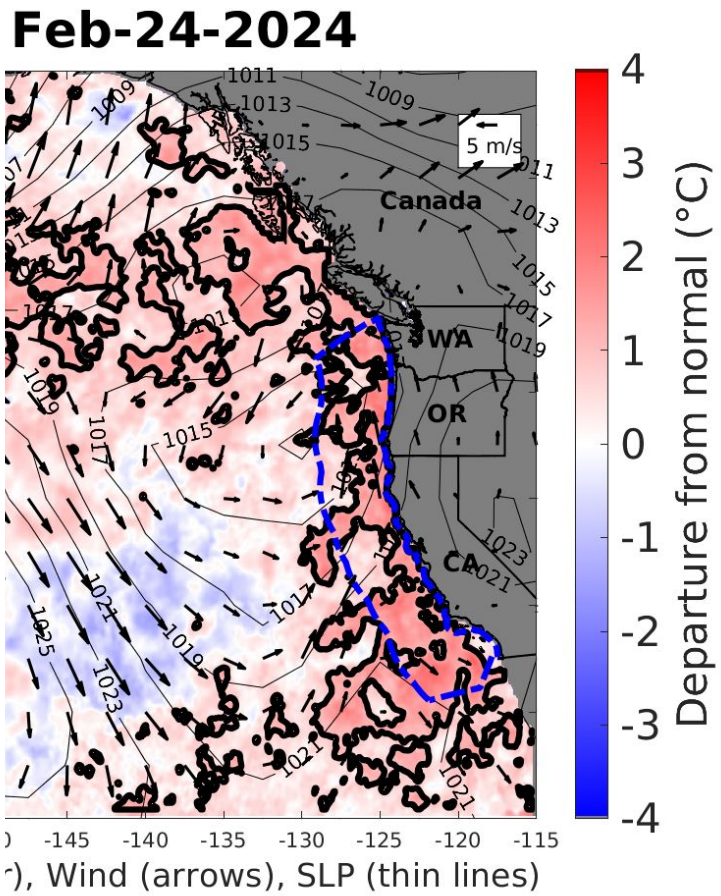
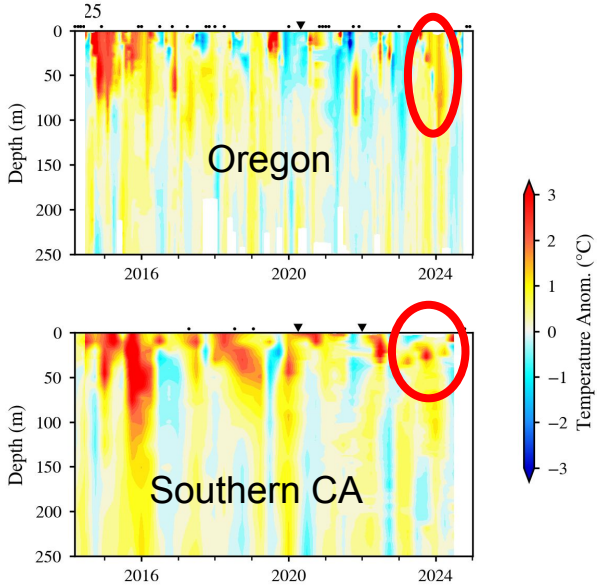


Sea Surface Temperature Anomaly

really warm surface waters

El Niño Impacts



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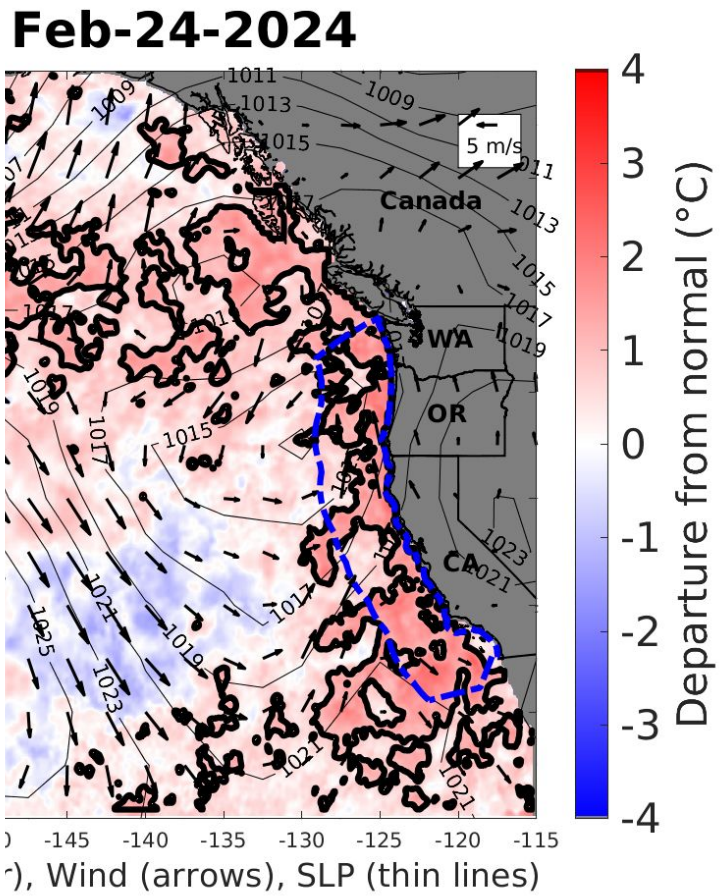

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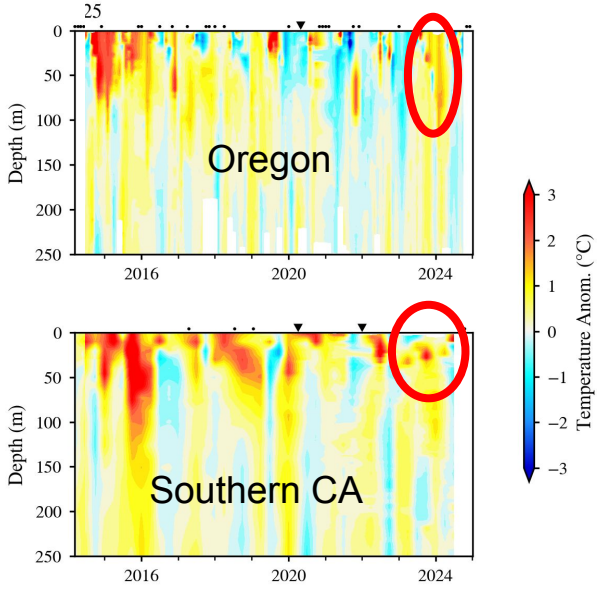
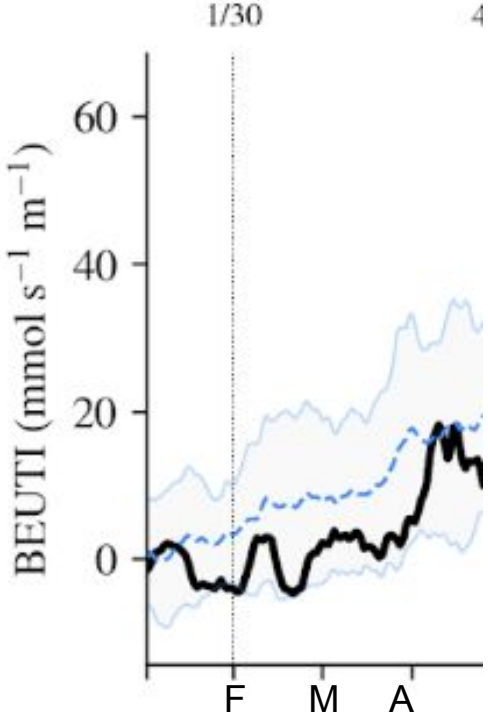


Lower than normal upwelling and nutrient transport



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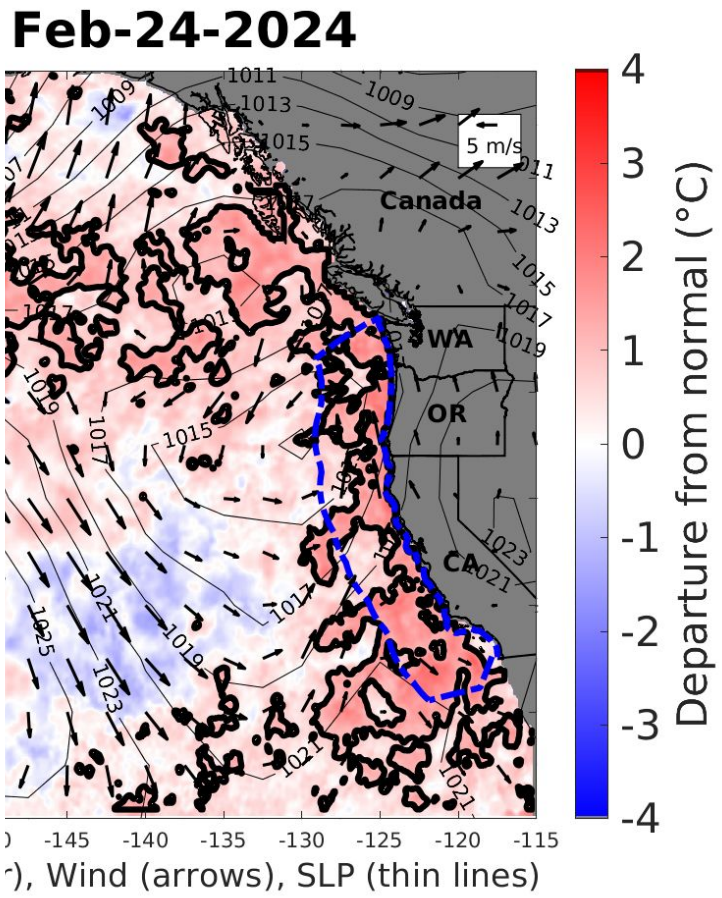

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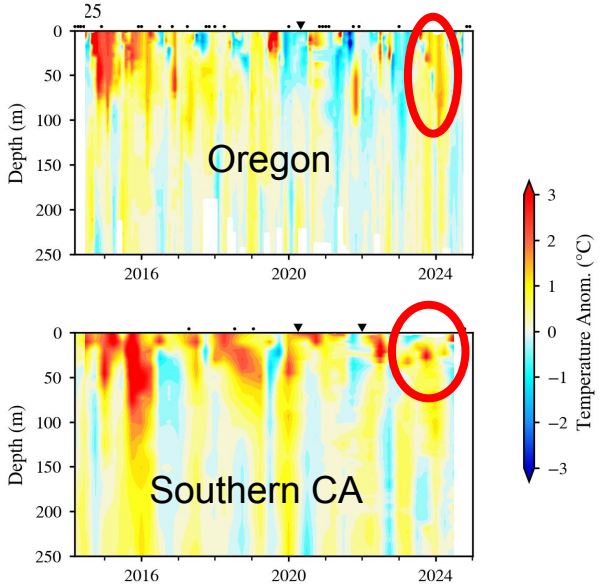

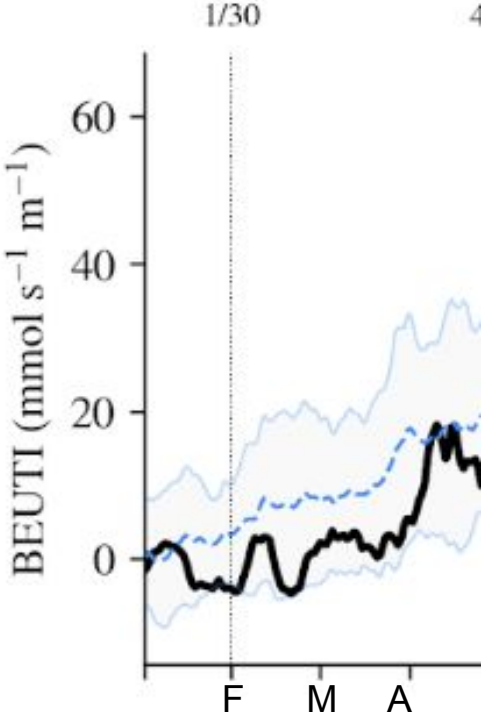

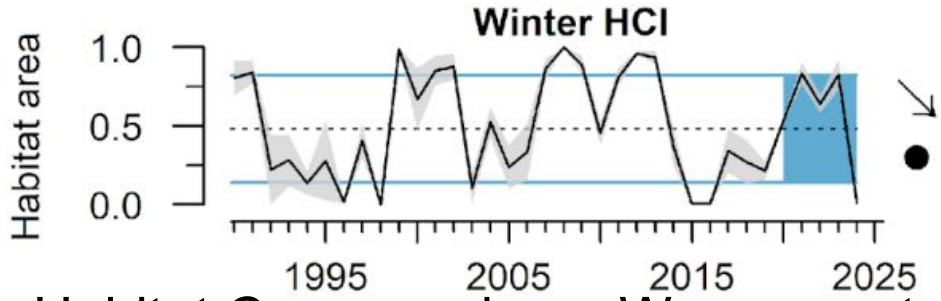

High Habitat Compression = Warm coastal waters

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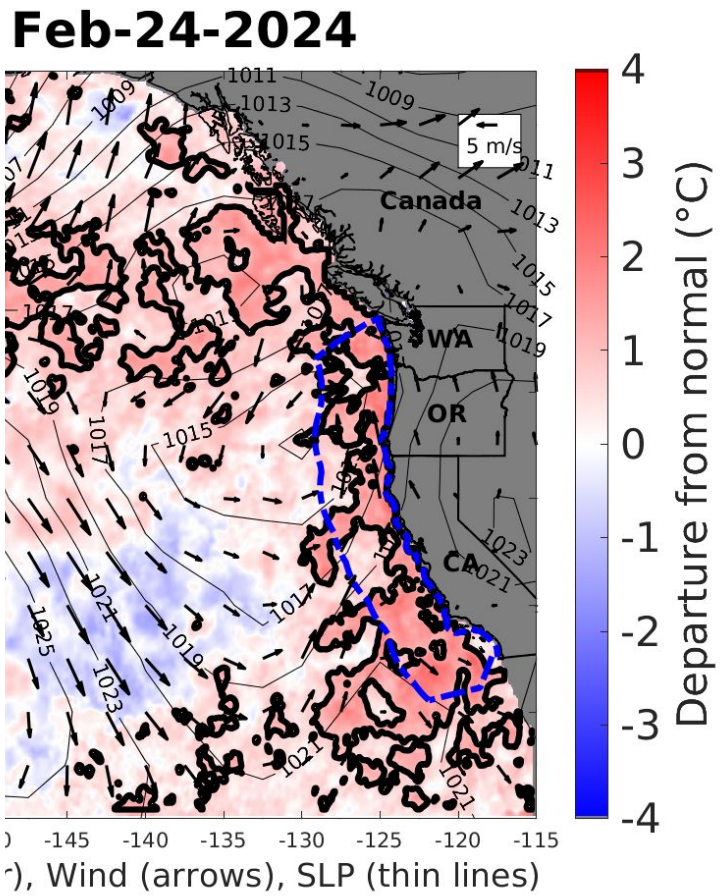

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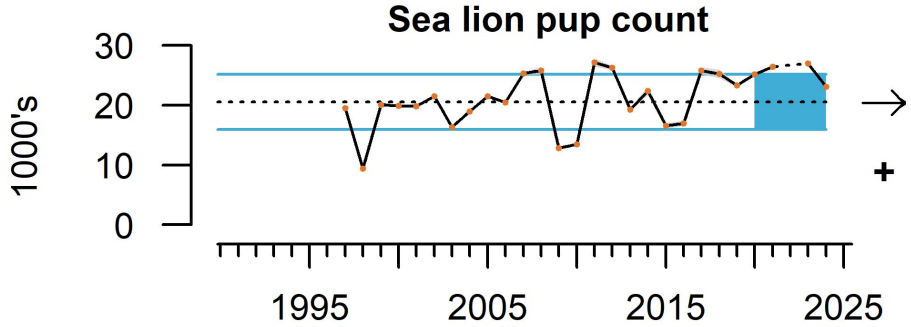
El Niño Impacts

Decreased Sea lion productivity



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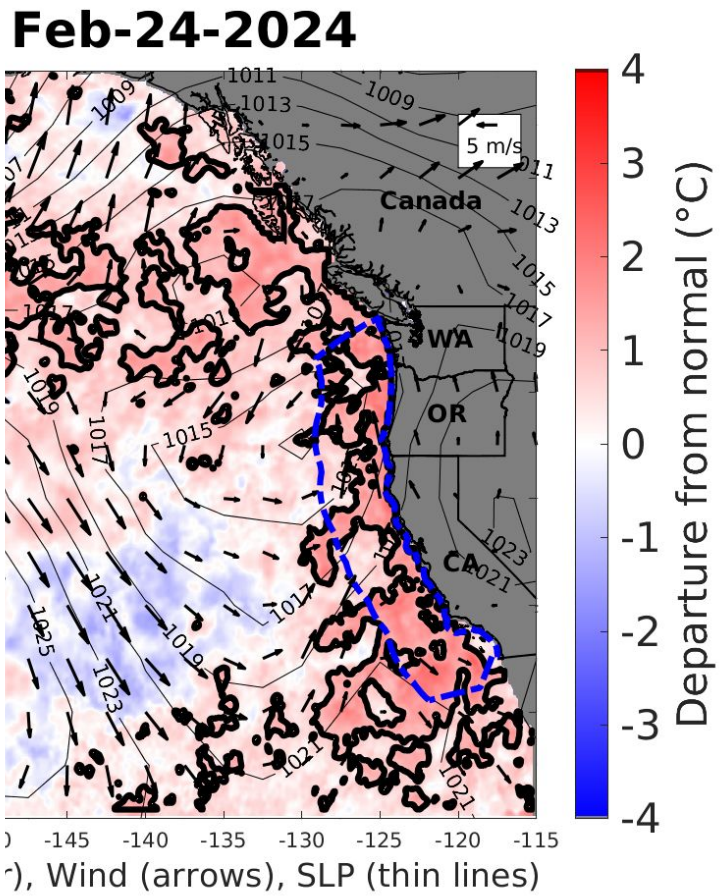

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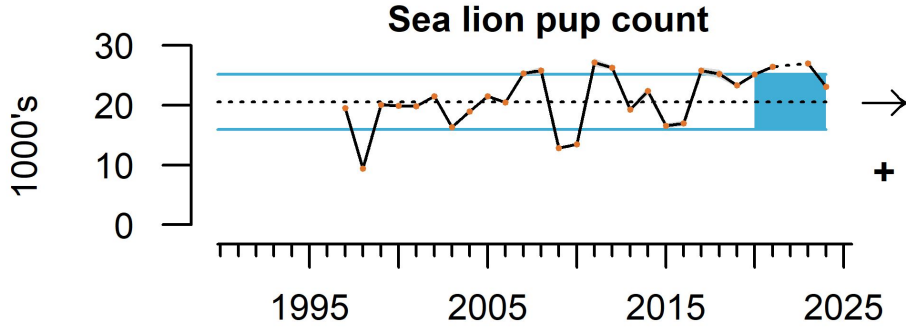
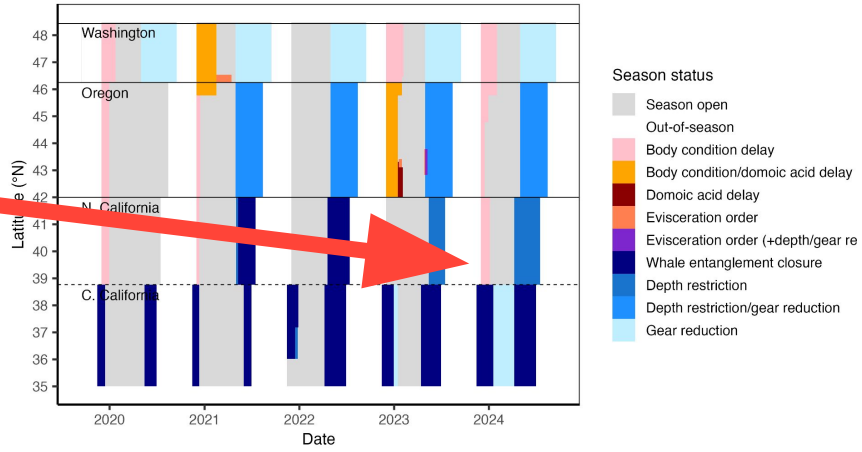


Crab Fishery closures and delays



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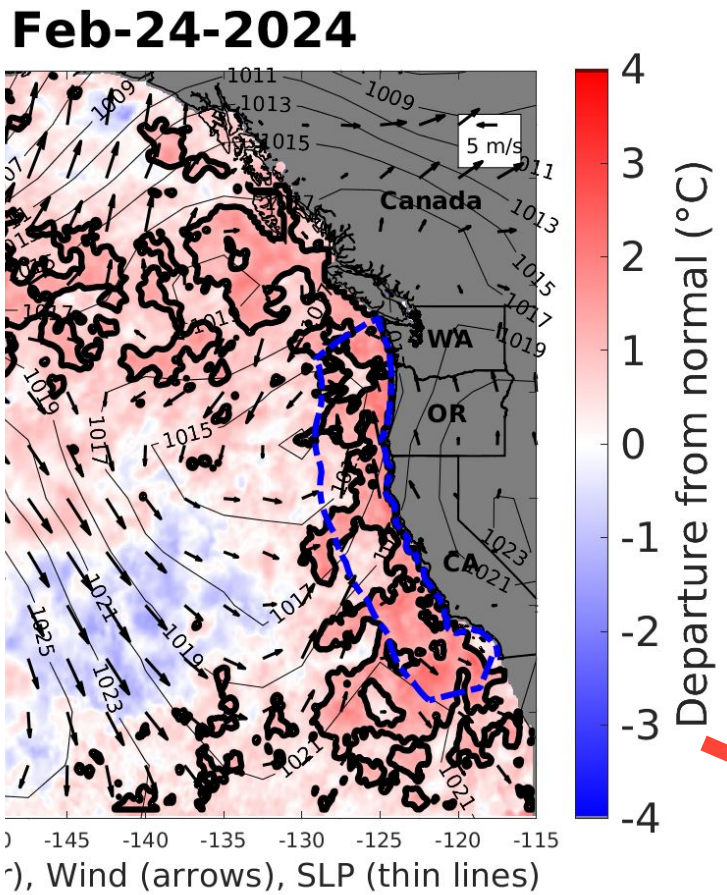
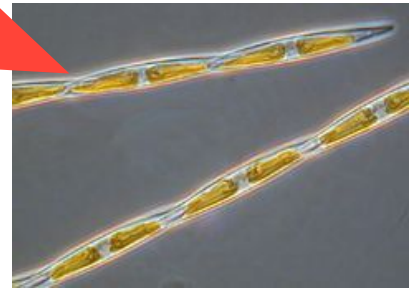


Sea Surface Temperature Anomaly

El Niño Impacts

Harmful Algal Blooms



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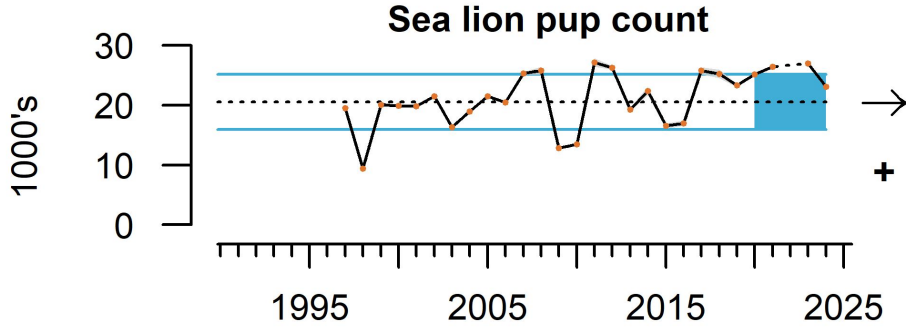

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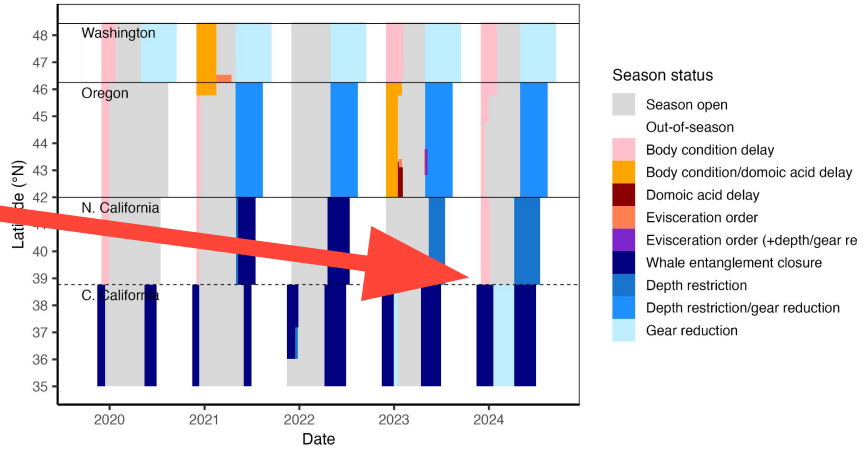

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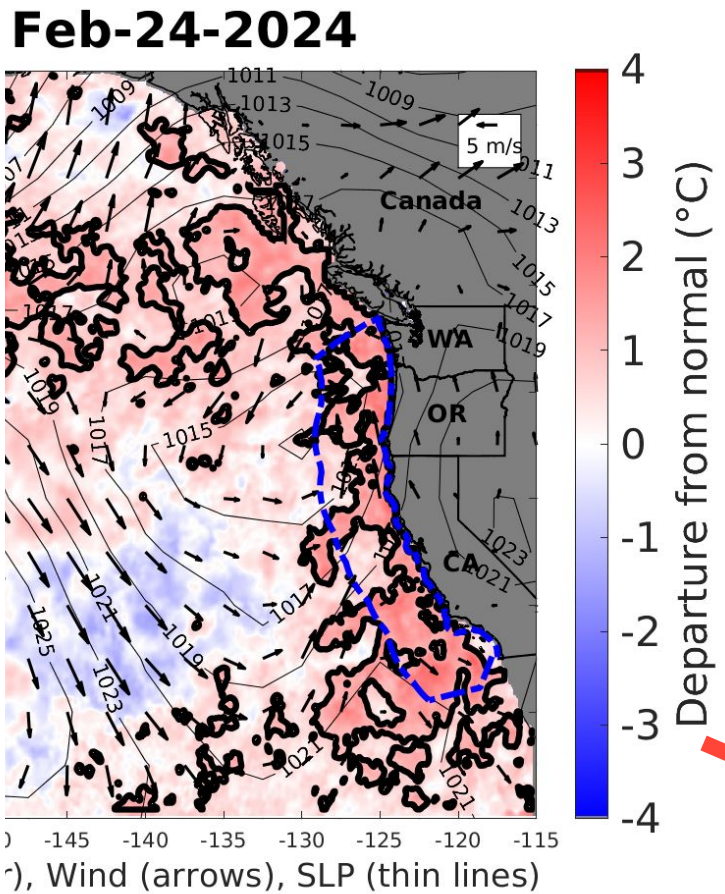

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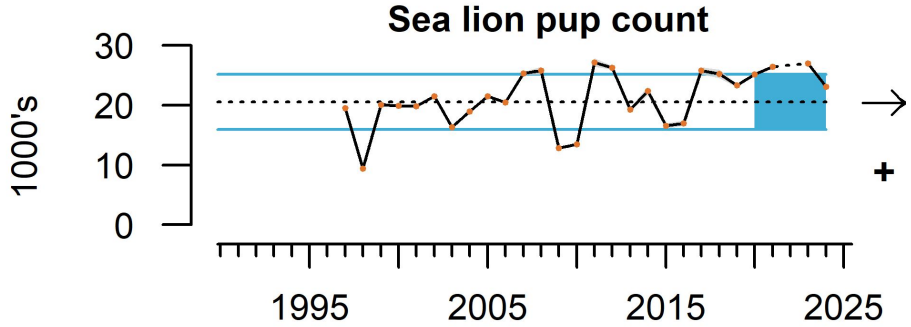

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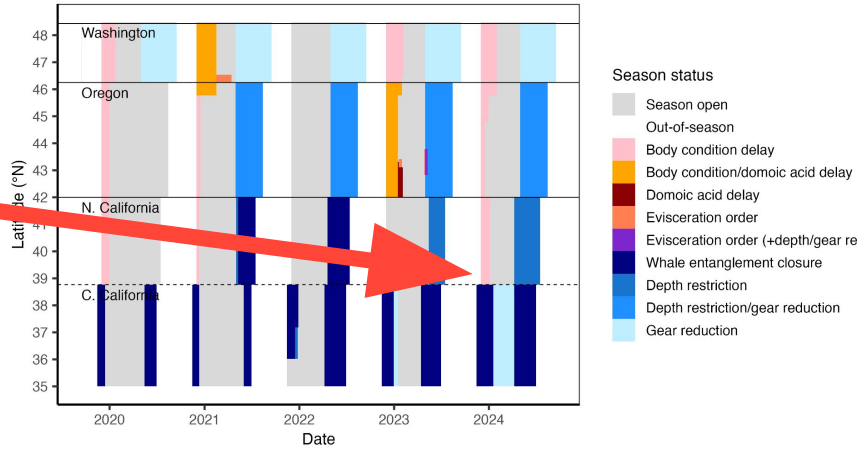

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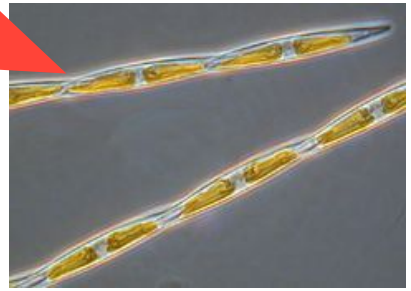

+ low zooplankton levels

Cassin's auklet unusual mortality

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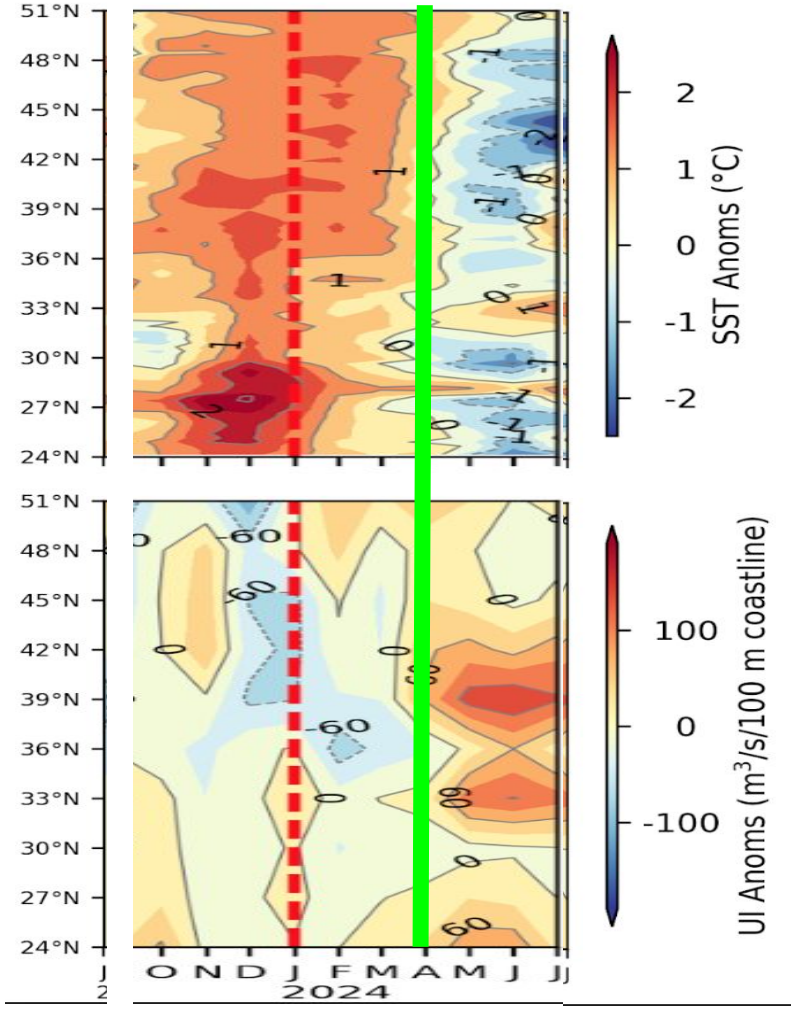
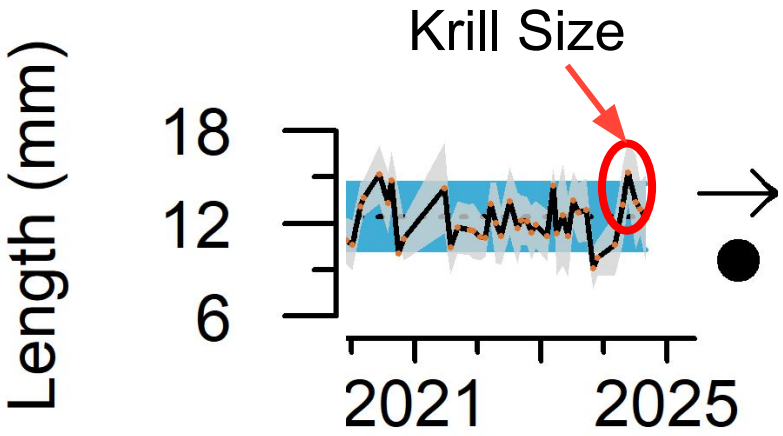
Spring 2024

Strong Upwelling after rapid decay of El Niño



Rapid (positive) biological response



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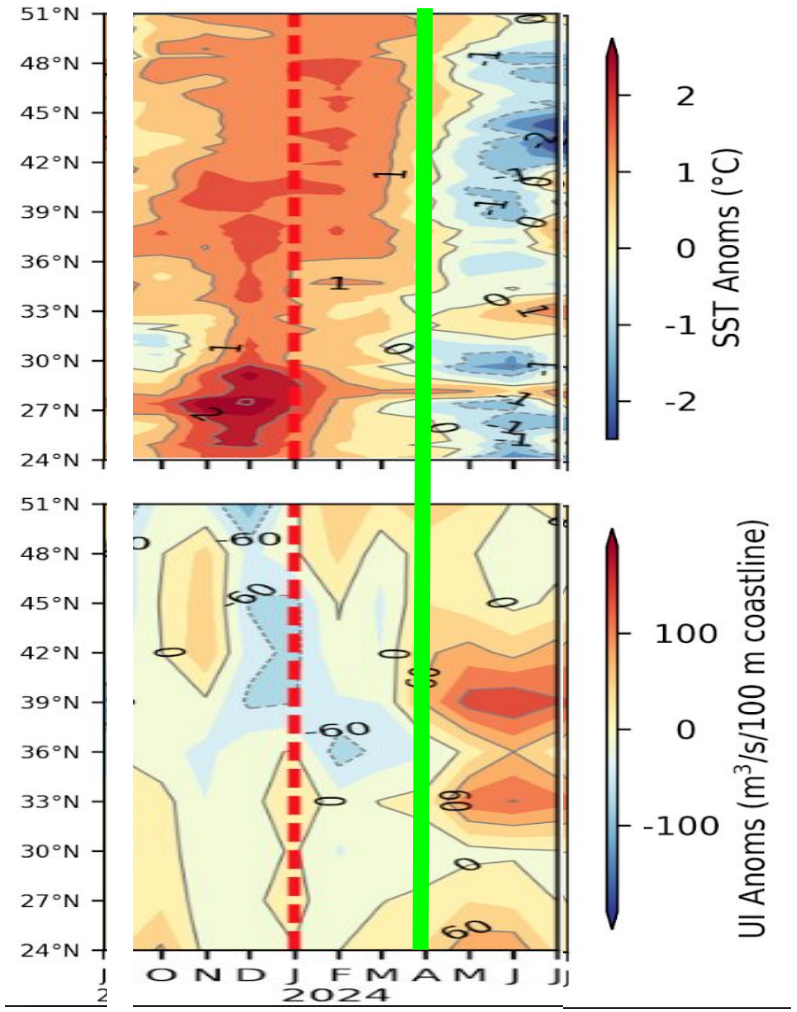

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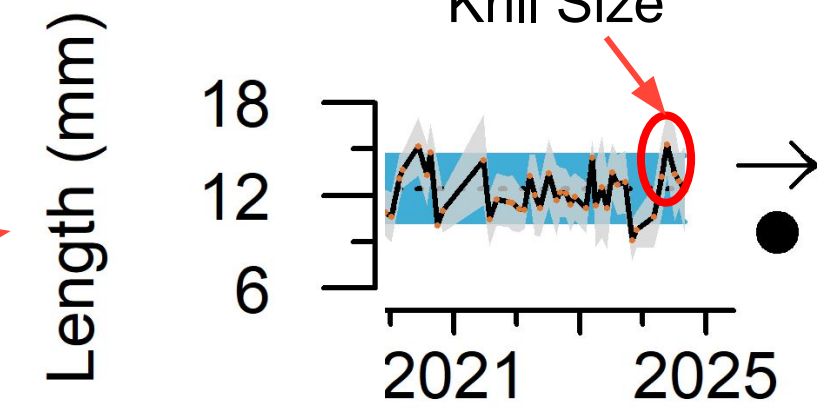

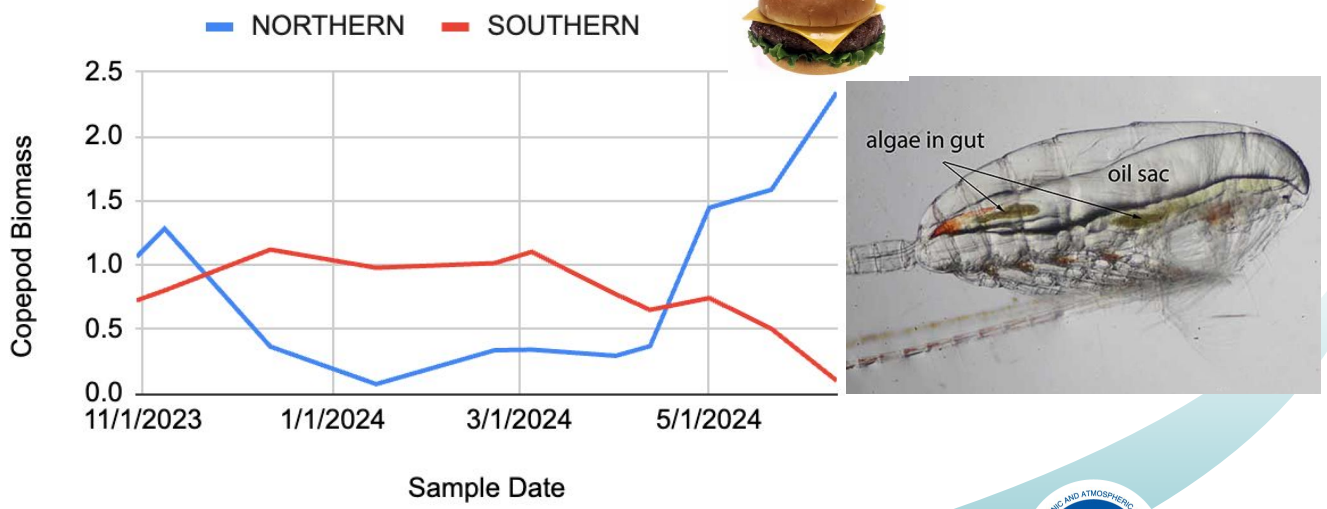

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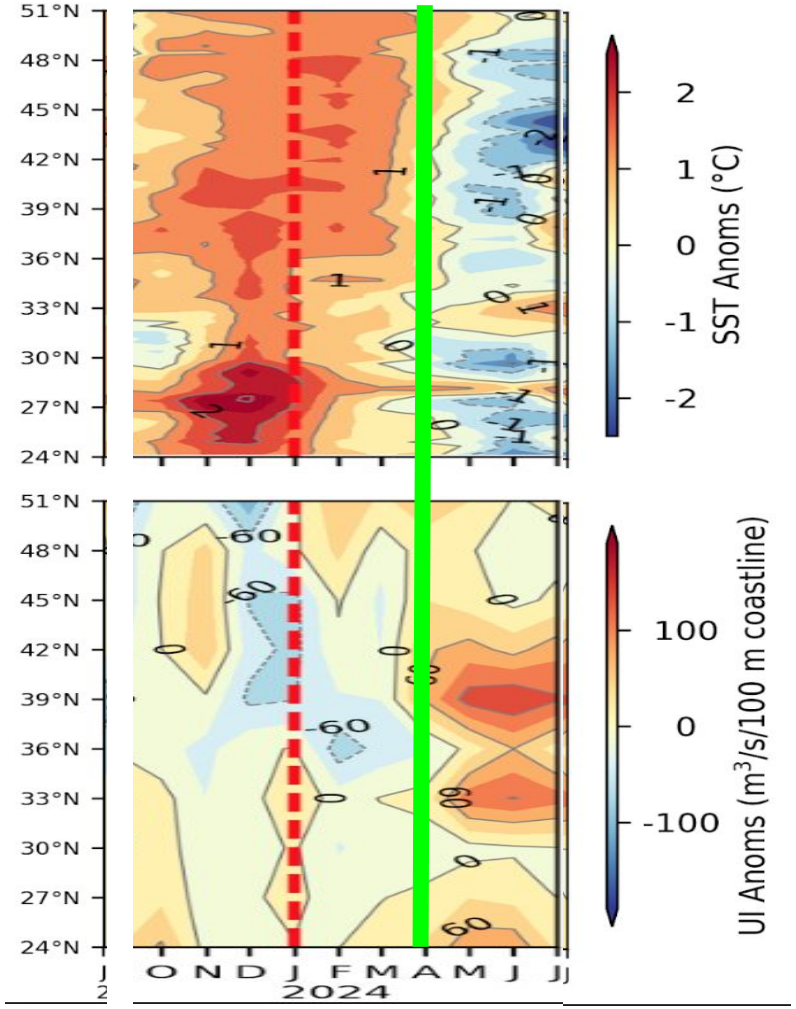

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NOAA FISHERIES

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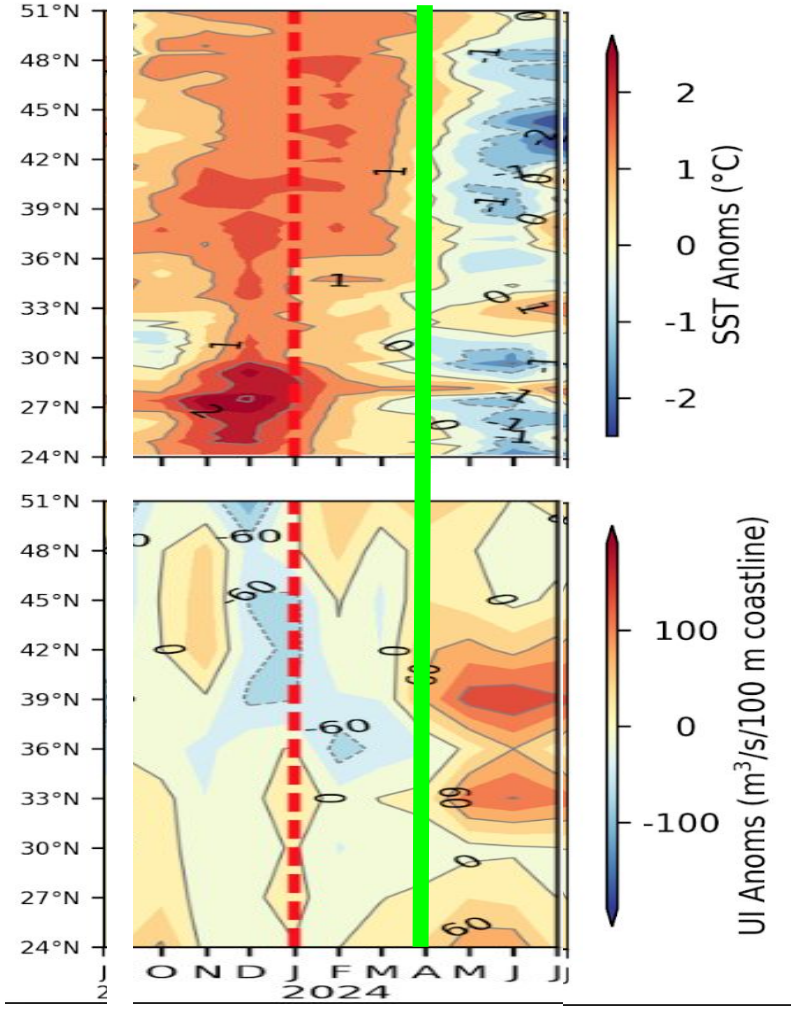

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Zach Urness
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NOAA FISHERIES

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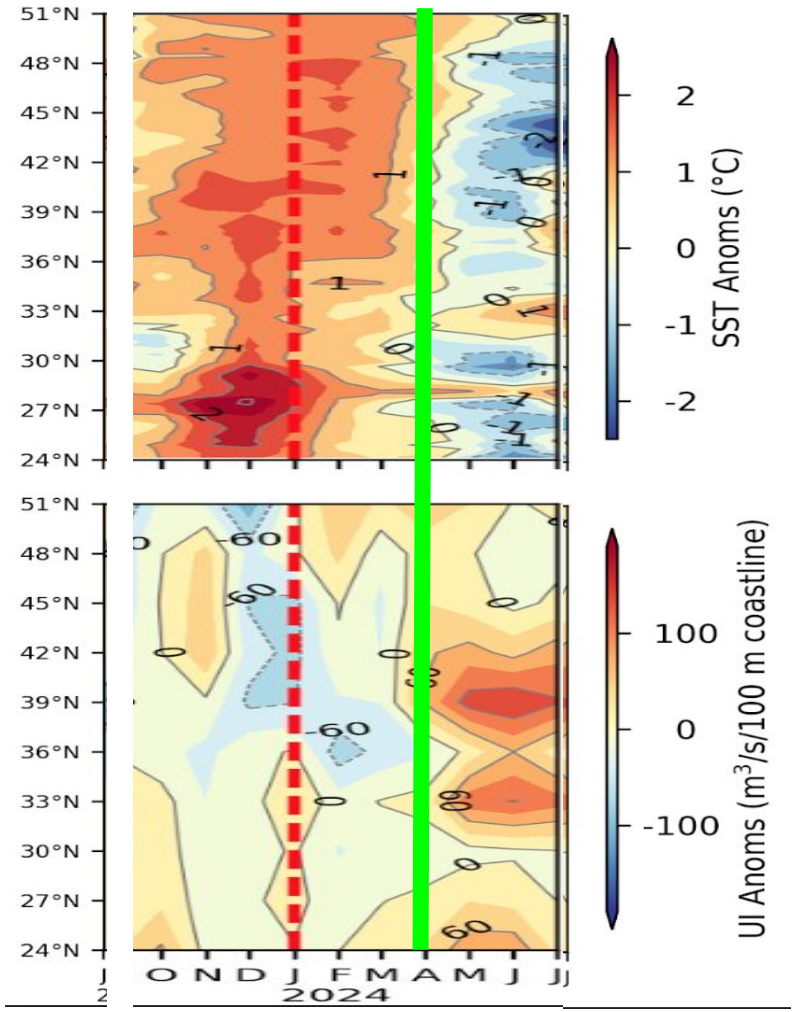

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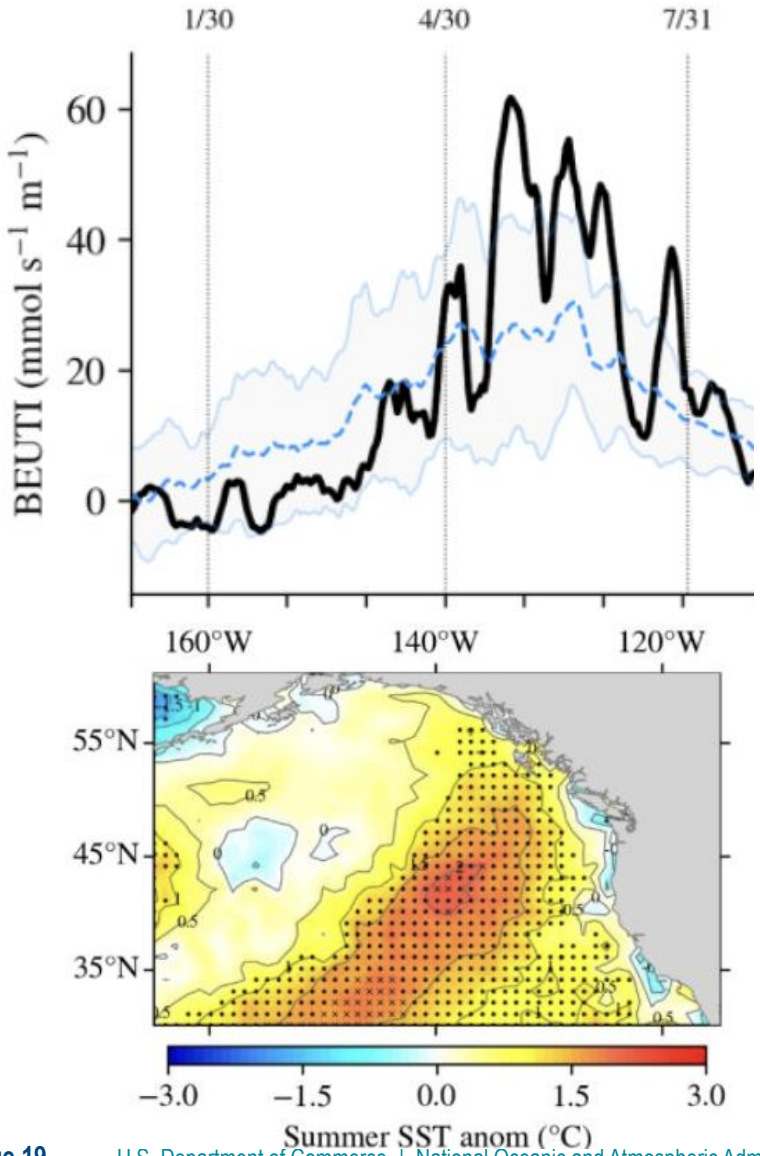
A rescued brown pelican perches on the edge of a pool at the SPCA of Monterey County on May 13, 2024. (Alix Soliman/KQED)

Brown pelican starvation; too much wind, stratification, low prey availability

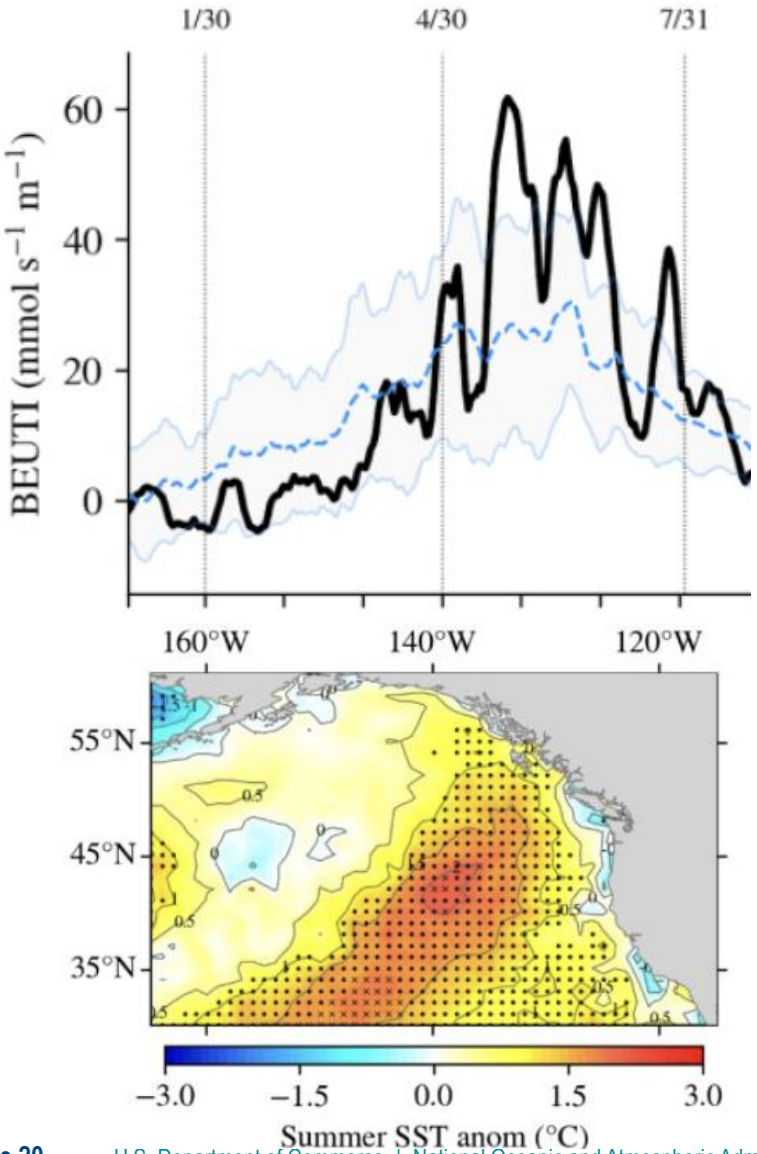
NOAA FISHERIES

Summer 2024



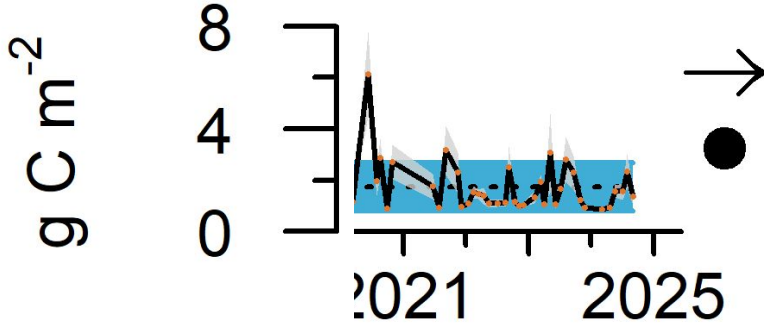
Continued strong upwelling and cool productive coastal waters

Summer 2024

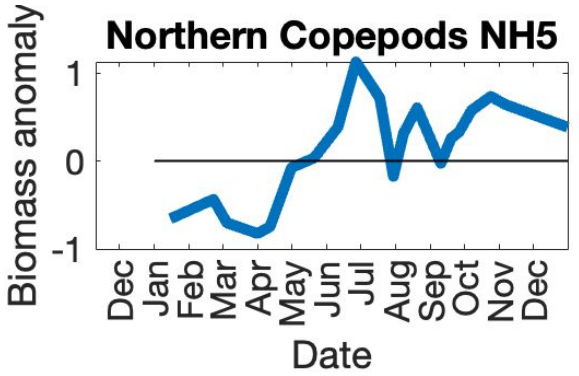


Continued strong upwelling and cool productive coastal waters

Krill Biomass back to Average Levels



“Good” copepods at high abundance



NOAA FISHERIES

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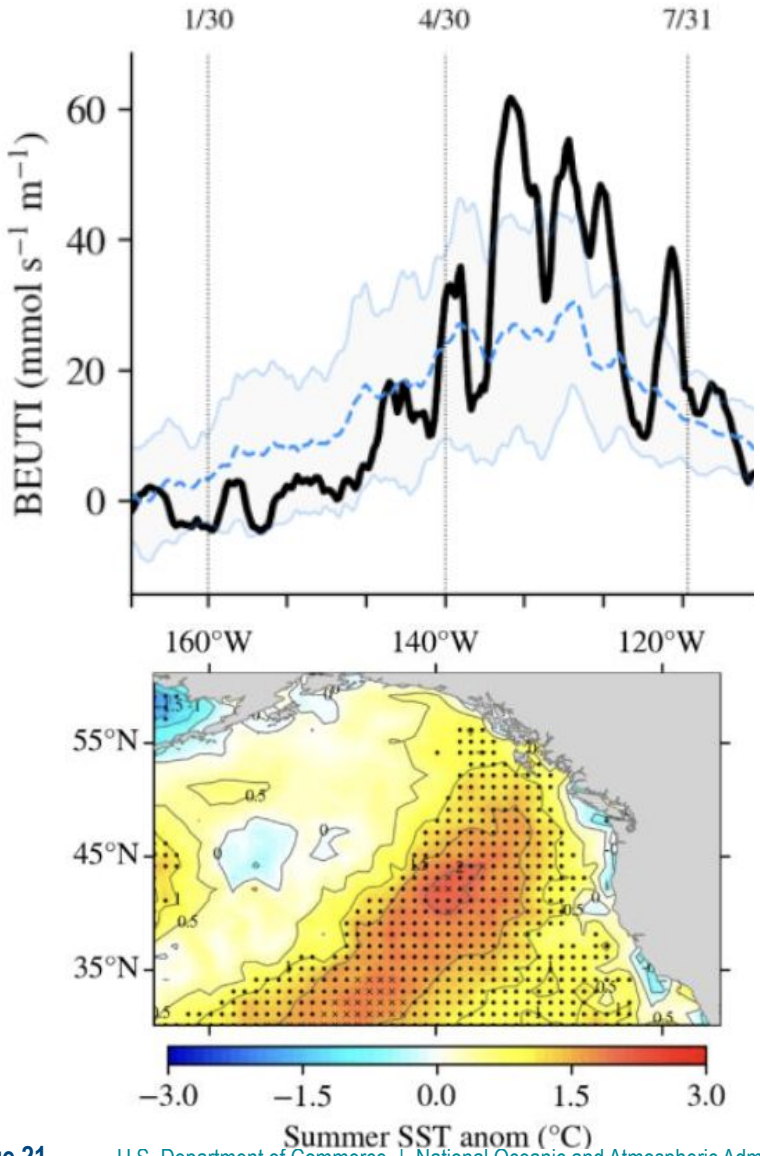

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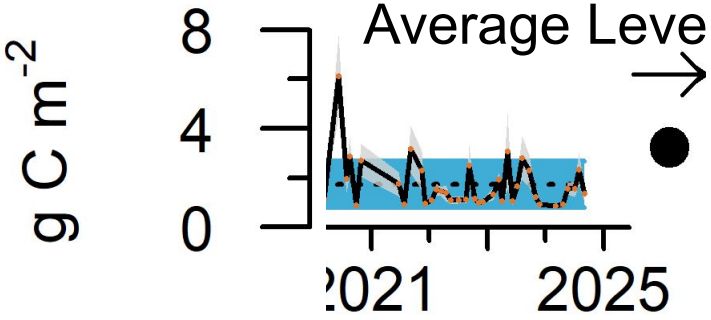

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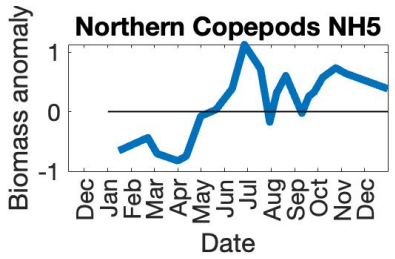
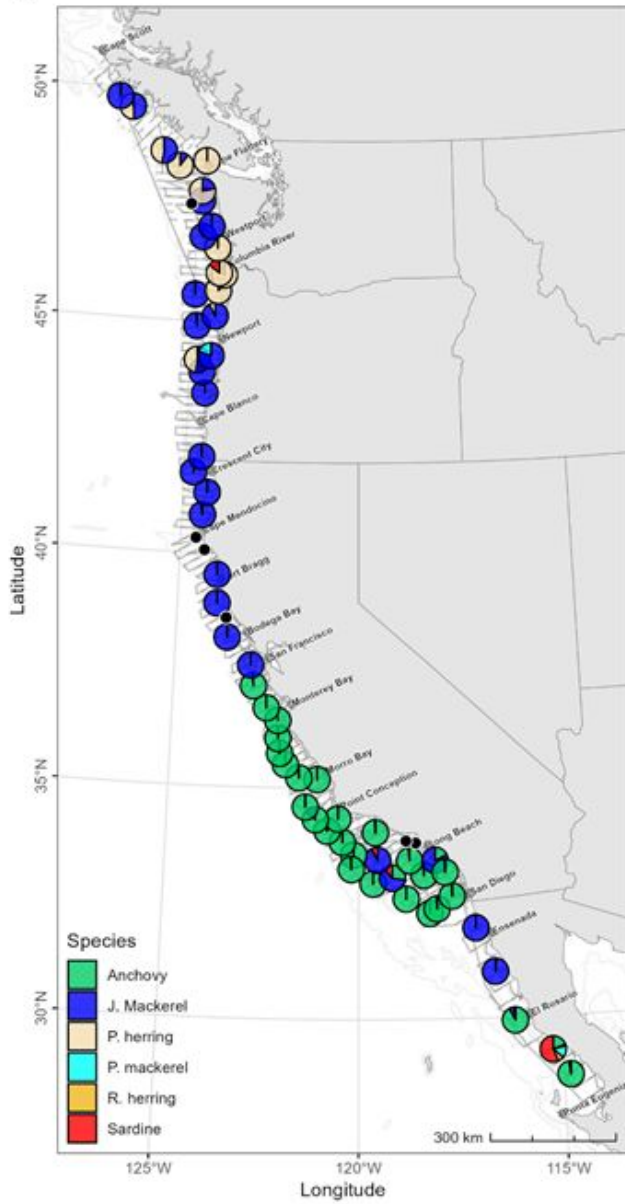


Anchovy, Mackerel, and Herring are present



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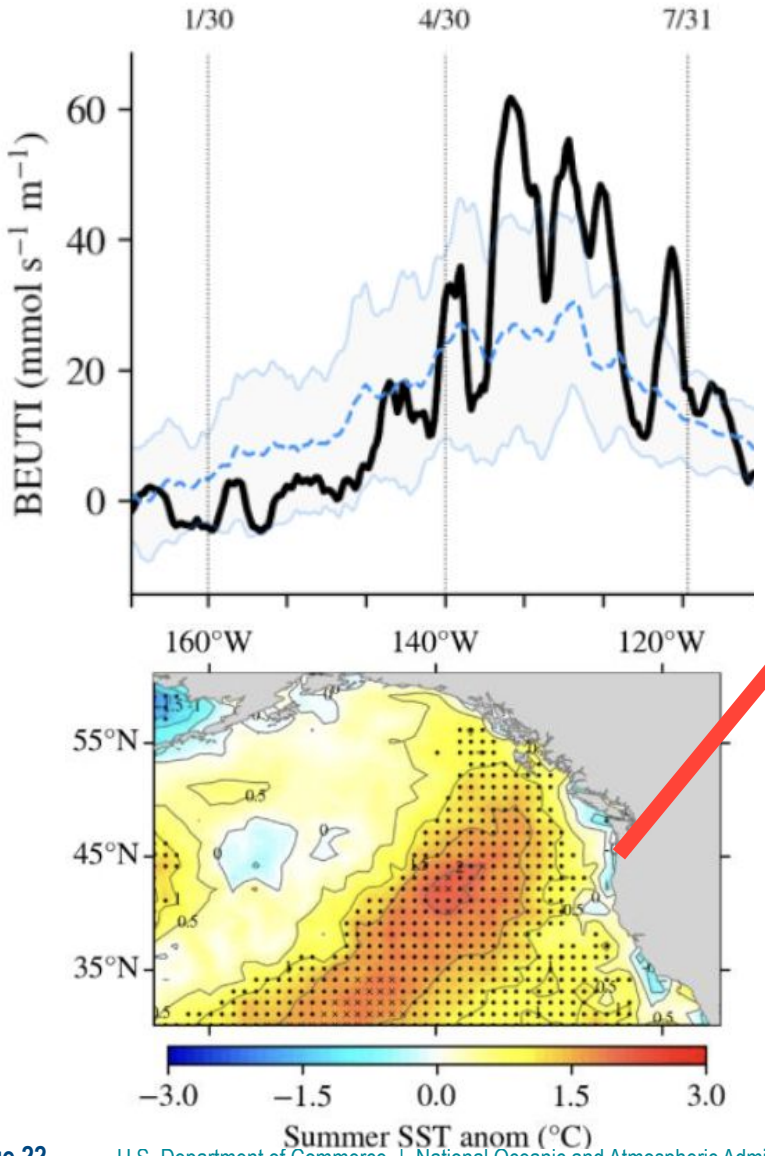
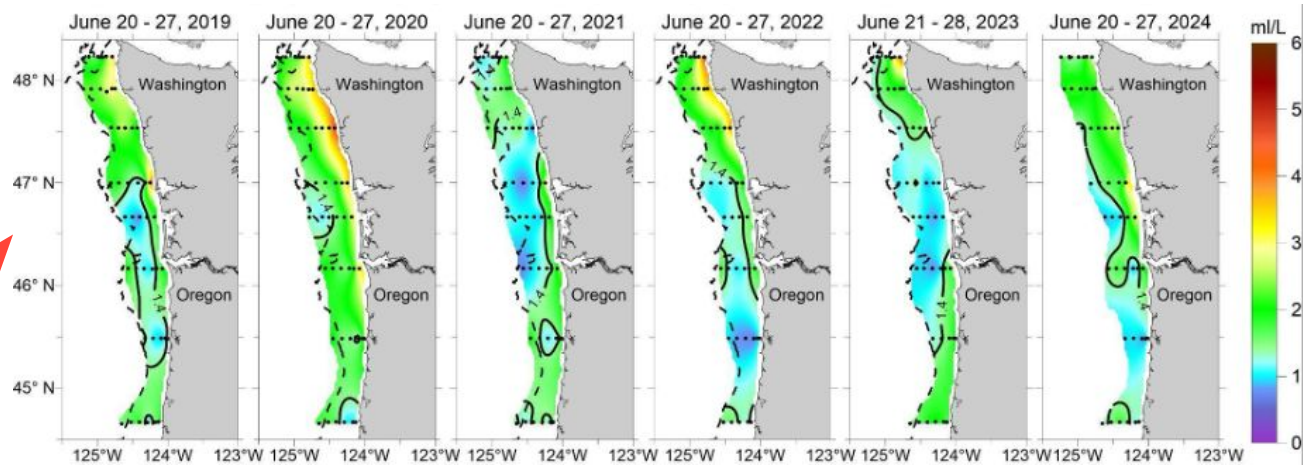


Hypoxia over only small area for short time



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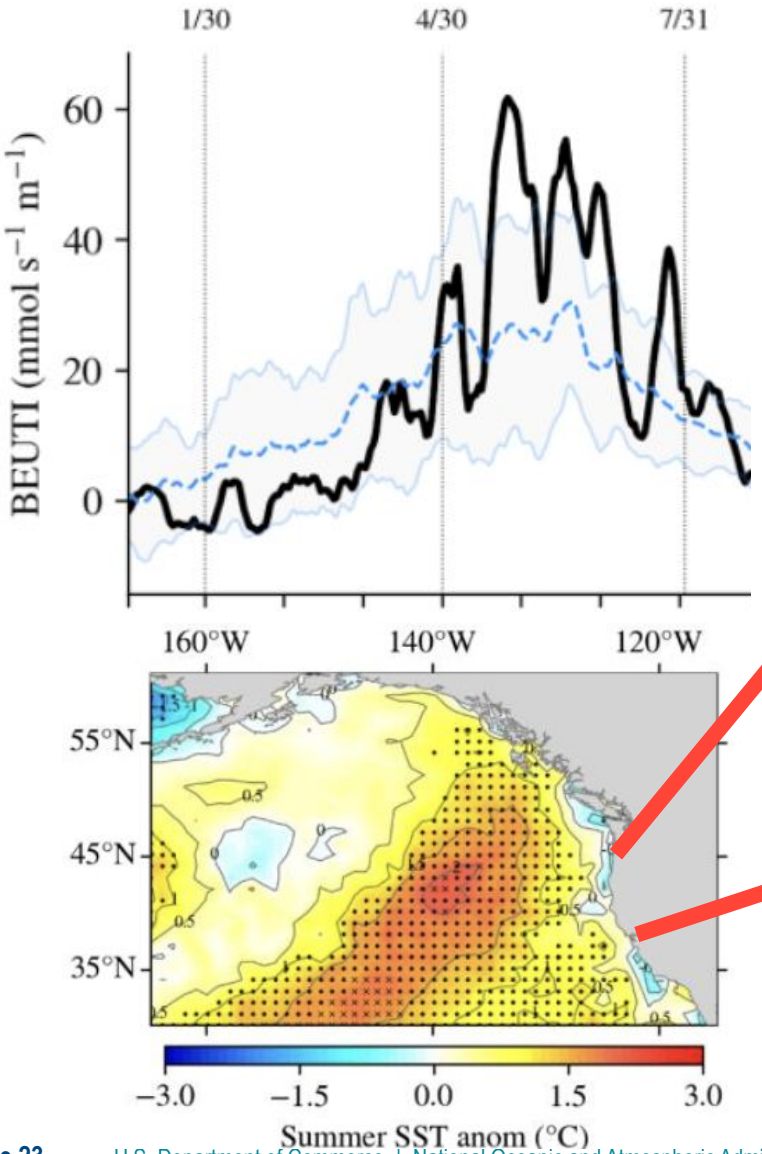

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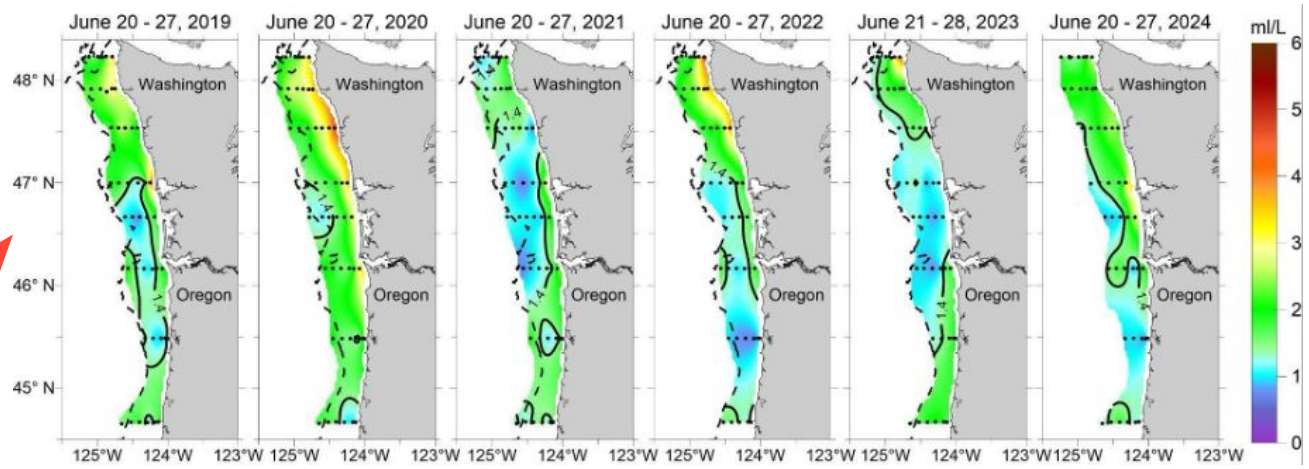


Continued HAB (Harmful algal bloom) activity

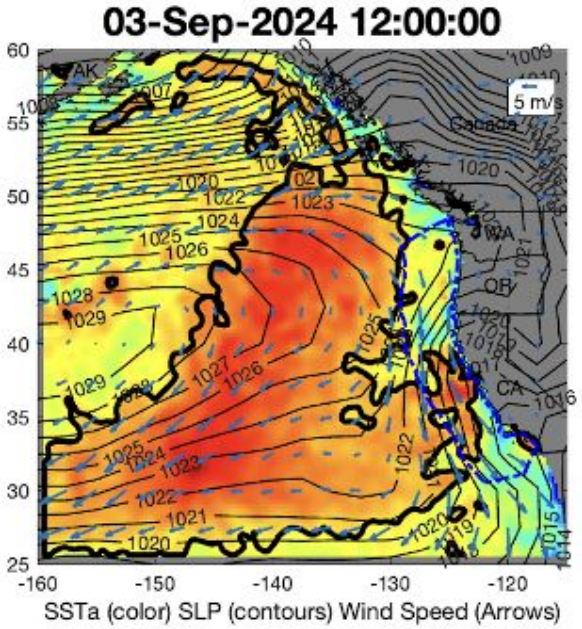
DA closures of Mussels and Razor clams OR and NorCAL

Stranding event of female sea lions and common dolphins in SoCal

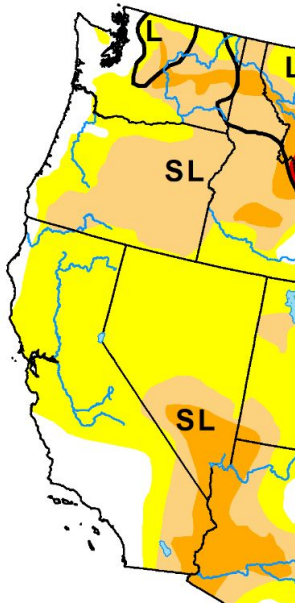
A beached sea lion exhibiting signs of domoic acid poisoning. Photograph: Olga Houtsma/AP

NOAA FISHERIES

Fall 2024



Heatwaves reach the Coast



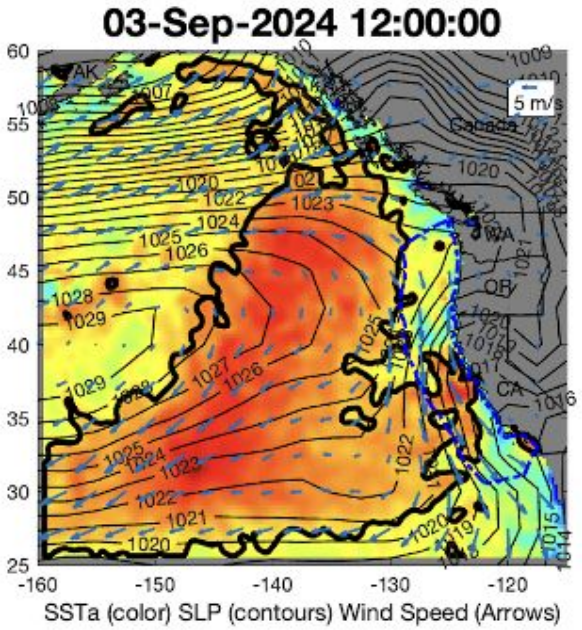
OCT 29 2024

Dry late summer and Fall

Intensity:
- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

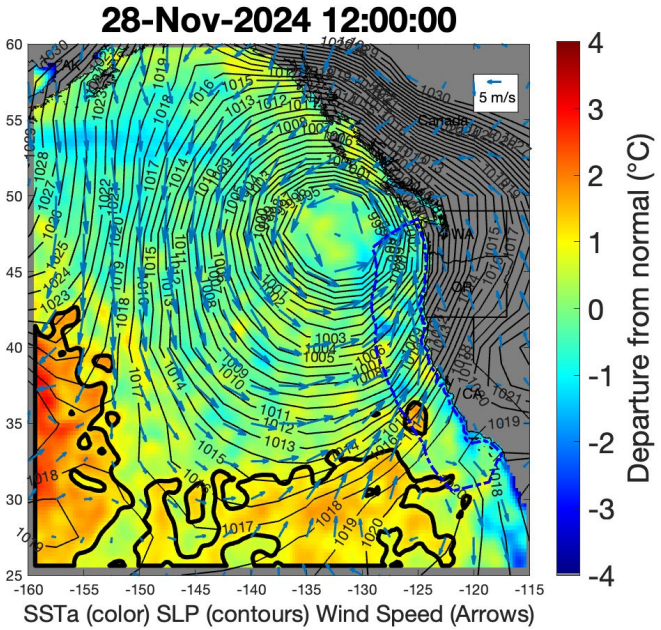
NOAA FISHERIES

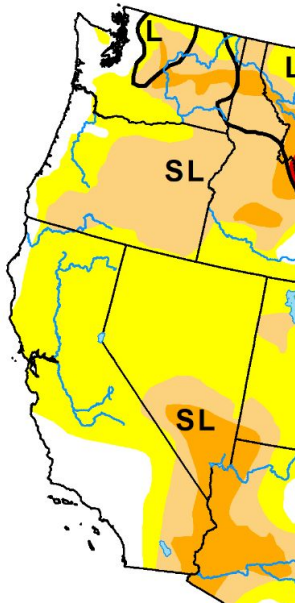
Fall 2024



Heatwaves reach the Coast

Coastal waters cool, MHW recedes to the southwest





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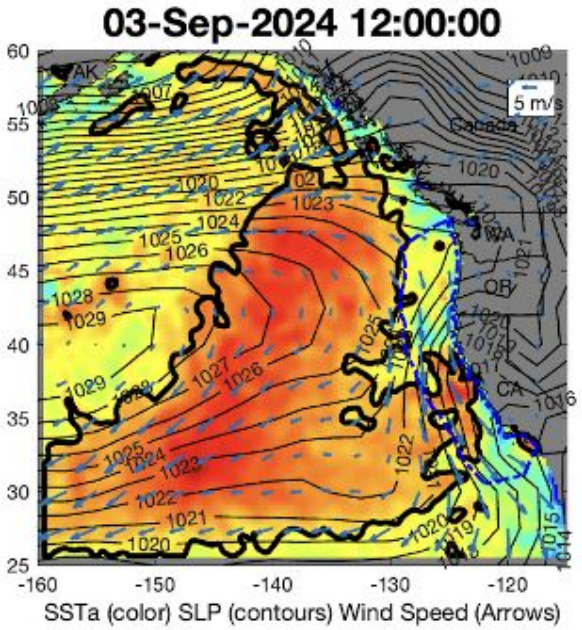
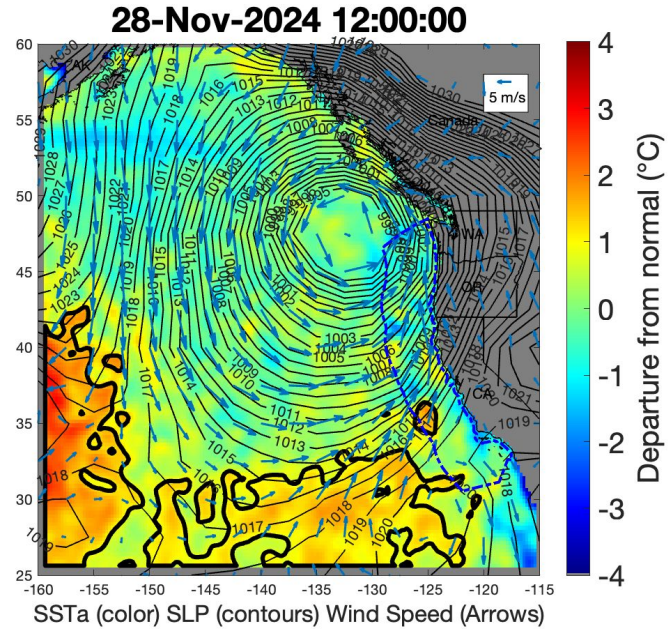
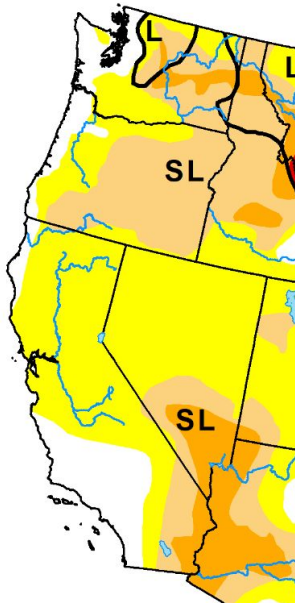


Heatwaves reach the Coast

Coastal waters cool, MHW recedes to the southwest



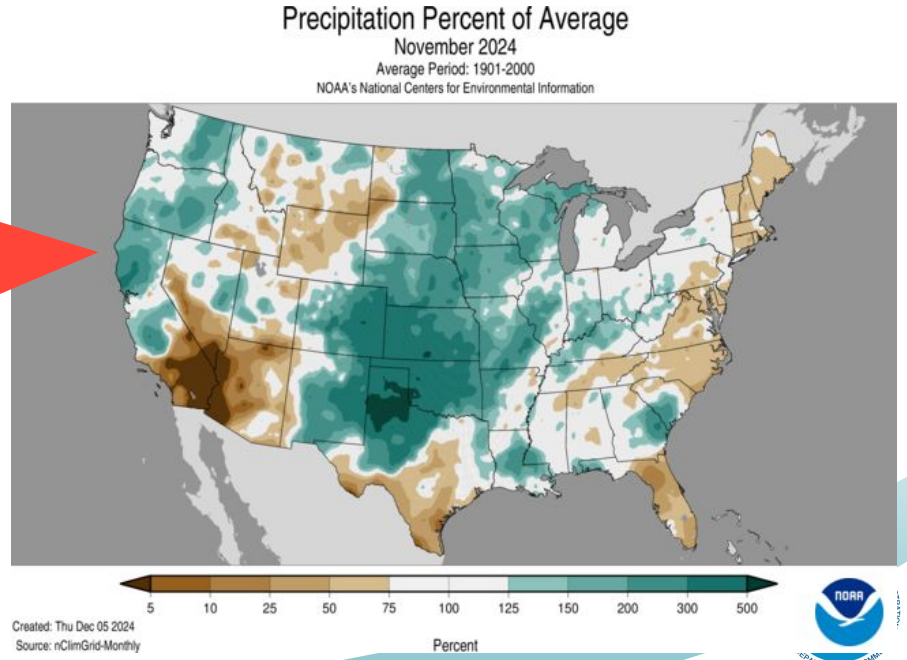


OCT 29 2024

Dry late summer and Fall

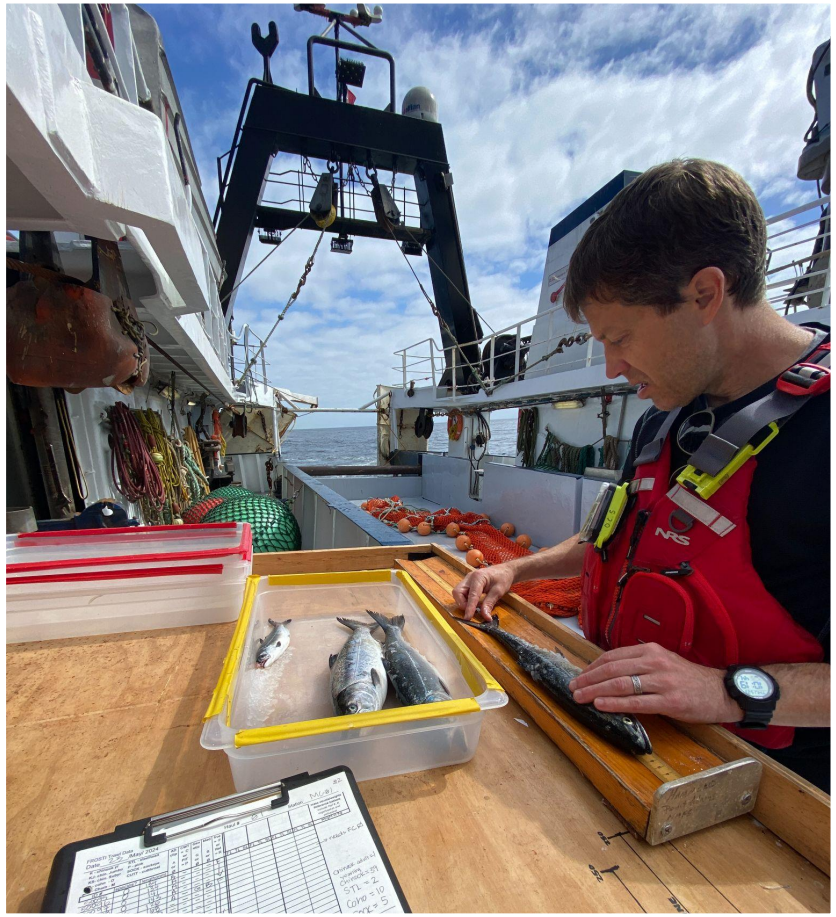
Intensity:
- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

Precip in the PNW, continued drought in the SW



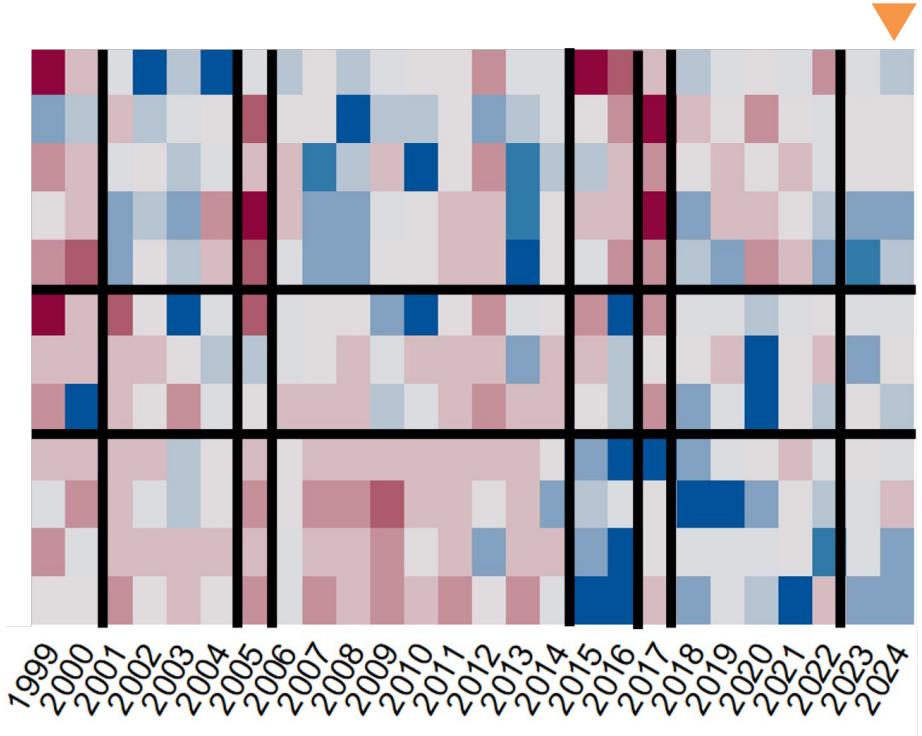
NOAA FISHERIES

Components of Ecological Integrity



NOAA FISHERIES

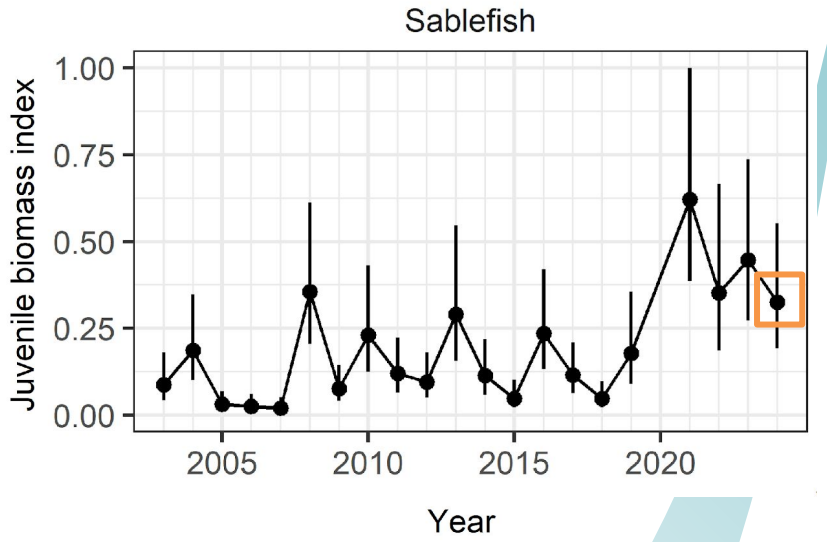
Ecological signals indicate diverse and abundant forage community



CPUE: Blue = abundant, Red = rare, gray = close to average

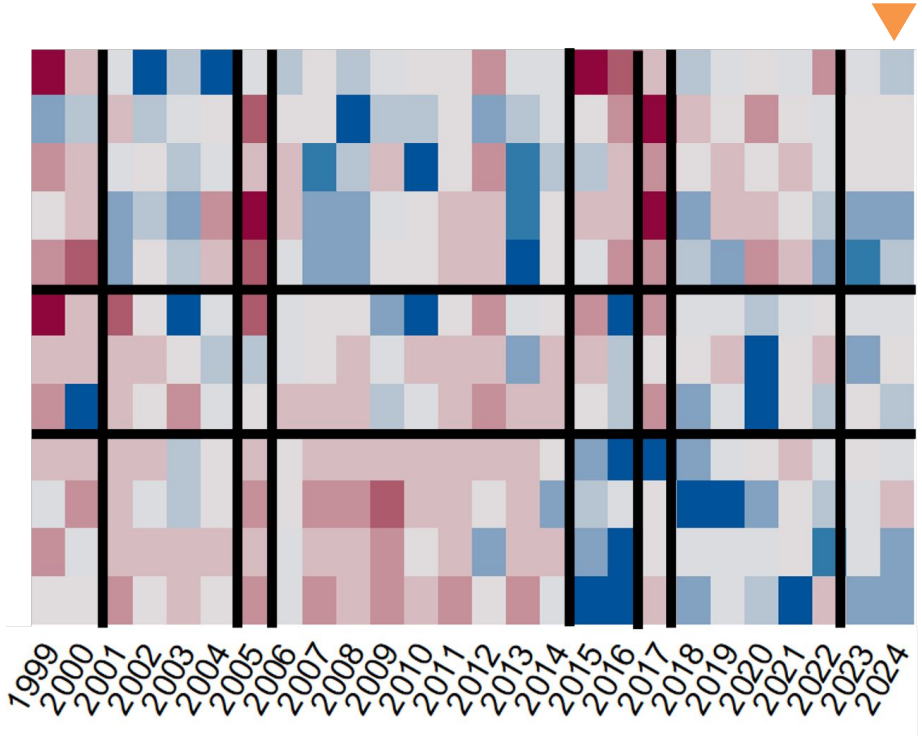
High abundance of juvenile chum, yearling coho & jellies

Near average yearling / subyearling Chinook, juvenile sockeye salmon & YOY sablefish



NOAA FISHERIES

Ecological signals indicate diverse and abundant forage community



CPUE: Blue = abundant, Red = rare, gray = close to average

High abundance of juvenile chum, yearling coho & jellies

Near average yearling / subyearling Chinook, juvenile sockeye salmon & YOY sablefish

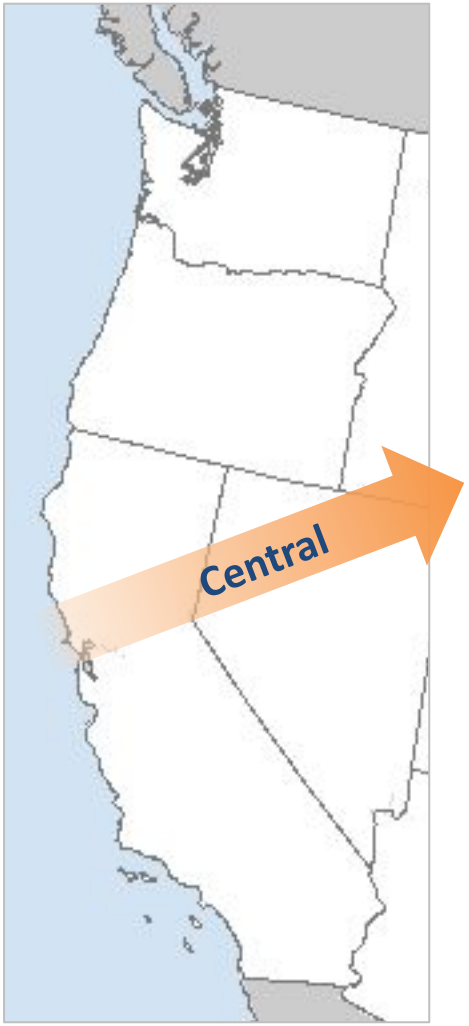
High *prevalence* of juvenile rockfish and juvenile sardine

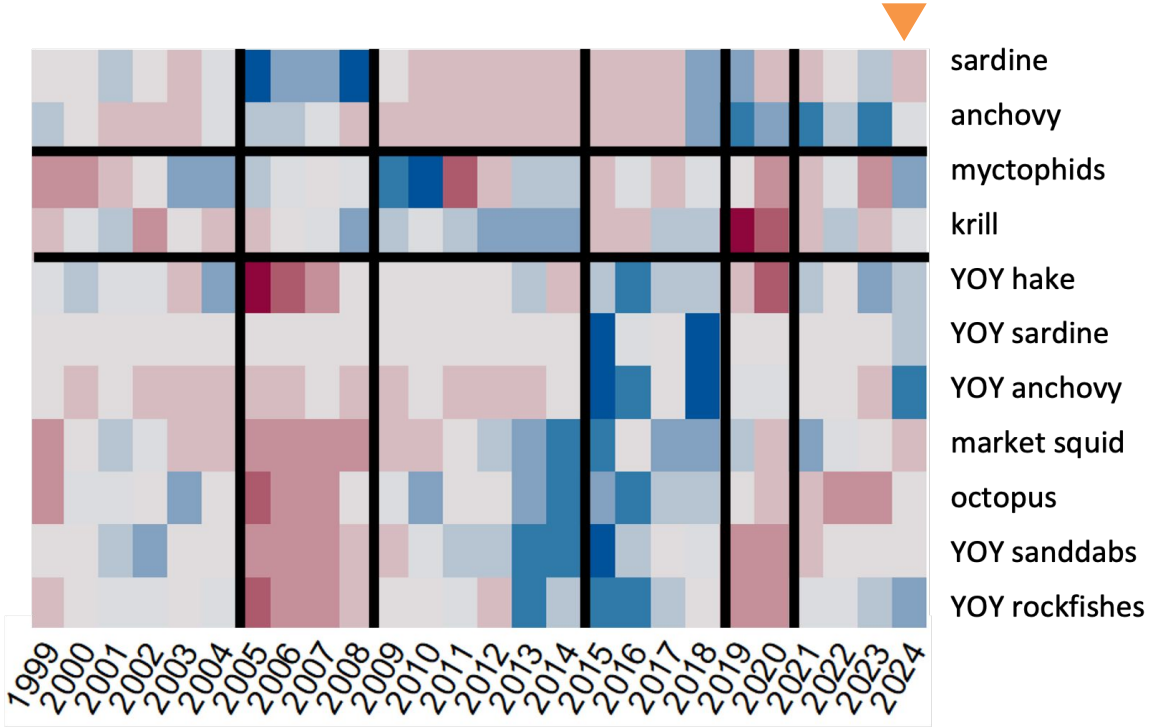
Oregon fishermen observed a high diversity of forage

'Market basket' feeding pattern (Fishermen and Scientists roundtable)

NOAA FISHERIES

Ecological signals indicate diverse and abundant forage community

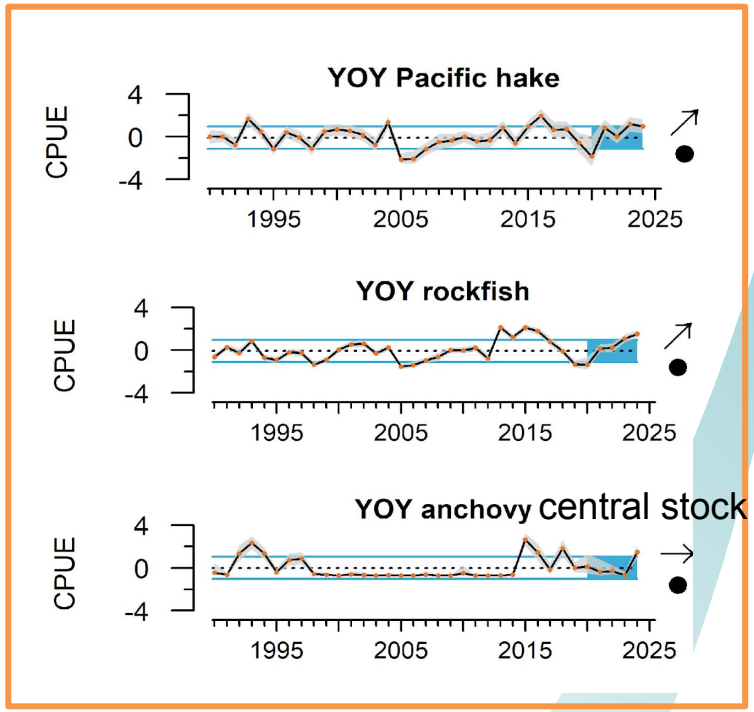




CPUE: Blue = abundant, Red = rare, gray = close to average

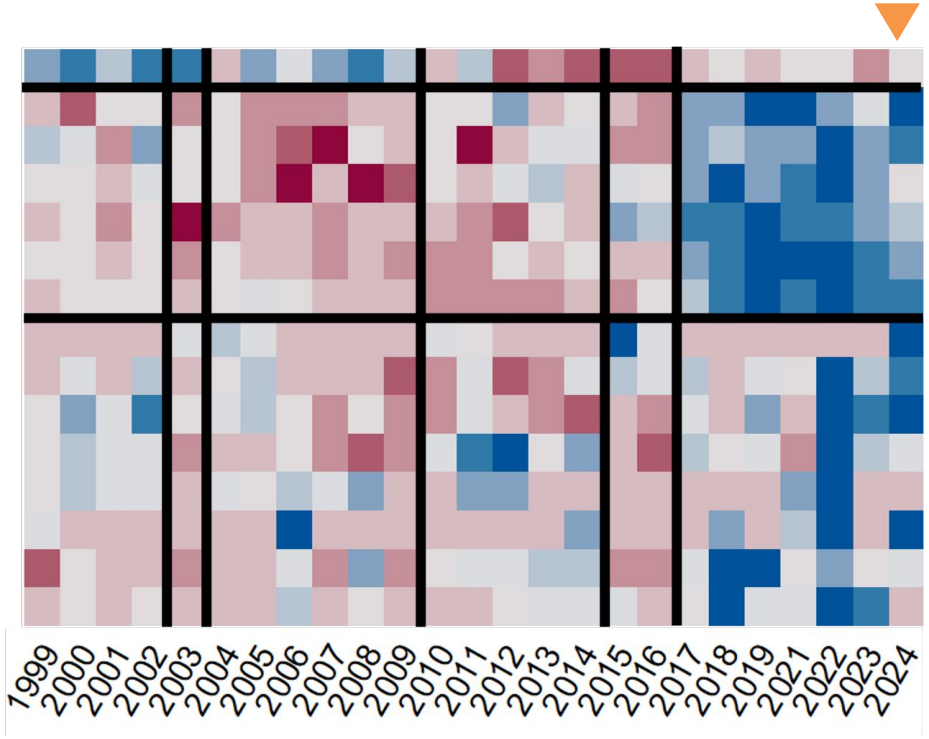
High abundance of juvenile groundfishes, YOY small pelagics, myctophids

Below average adult sardine and market squid



NOAA FISHERIES

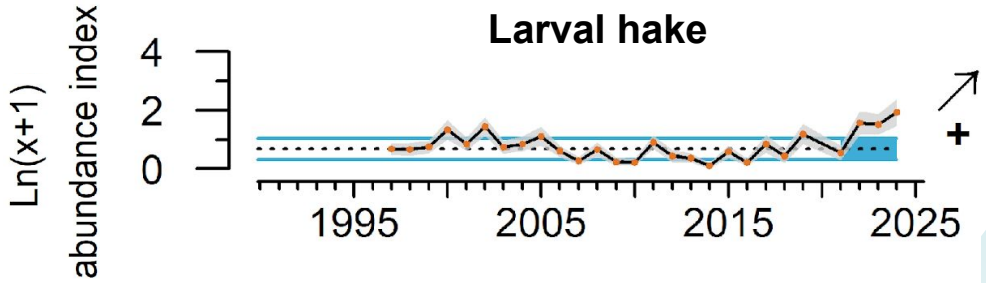
Ecological signals indicate diverse and abundant forage community



CPUE: Blue = abundant, Red = rare, gray = close to average

High abundance of larval groundfishes, larval anchovy & myctophids

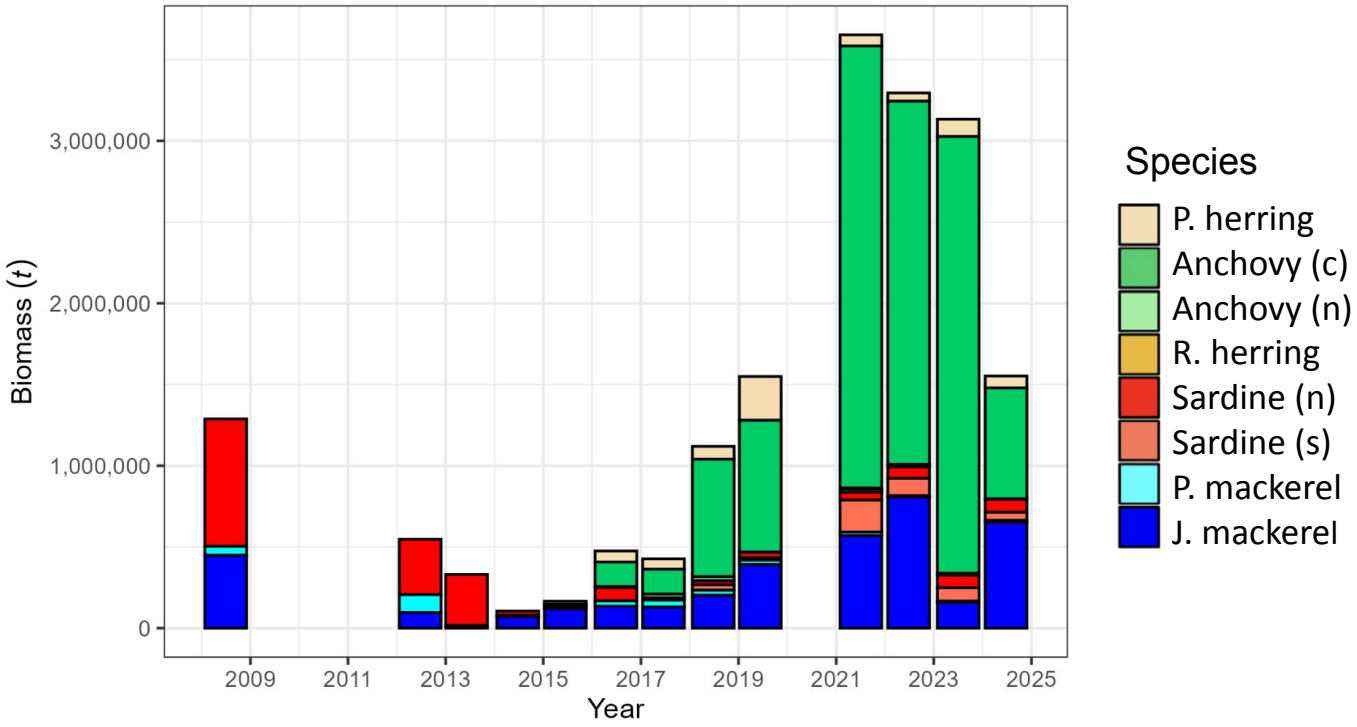
Below average larval sardine & market squid



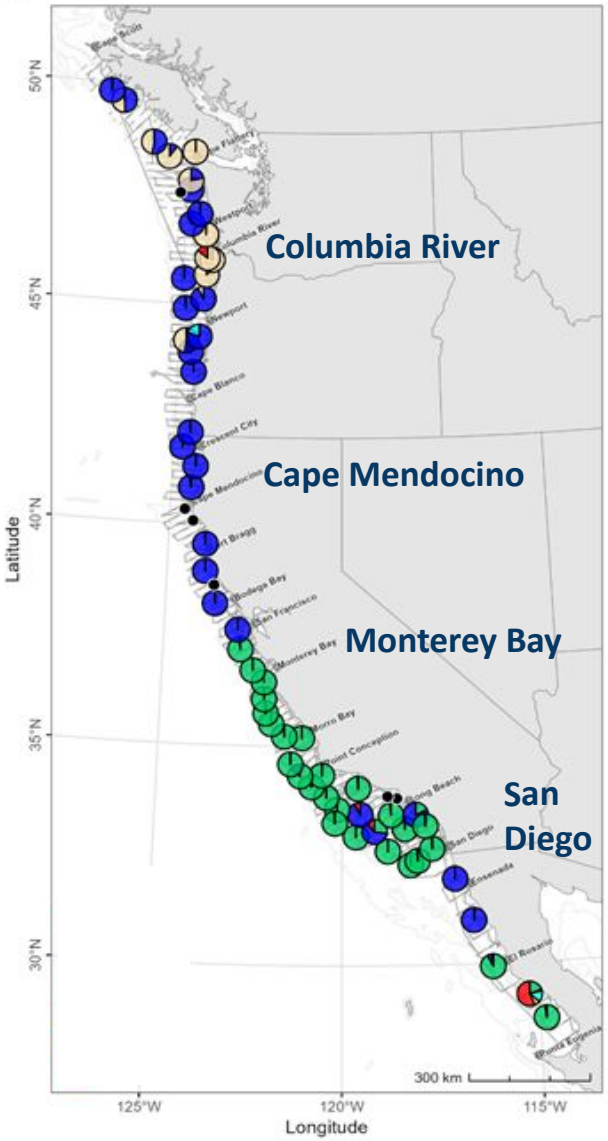
NOAA FISHERIES

Coastwide survey indicates lower adult anchovy biomass in 2024

CPS Biomass

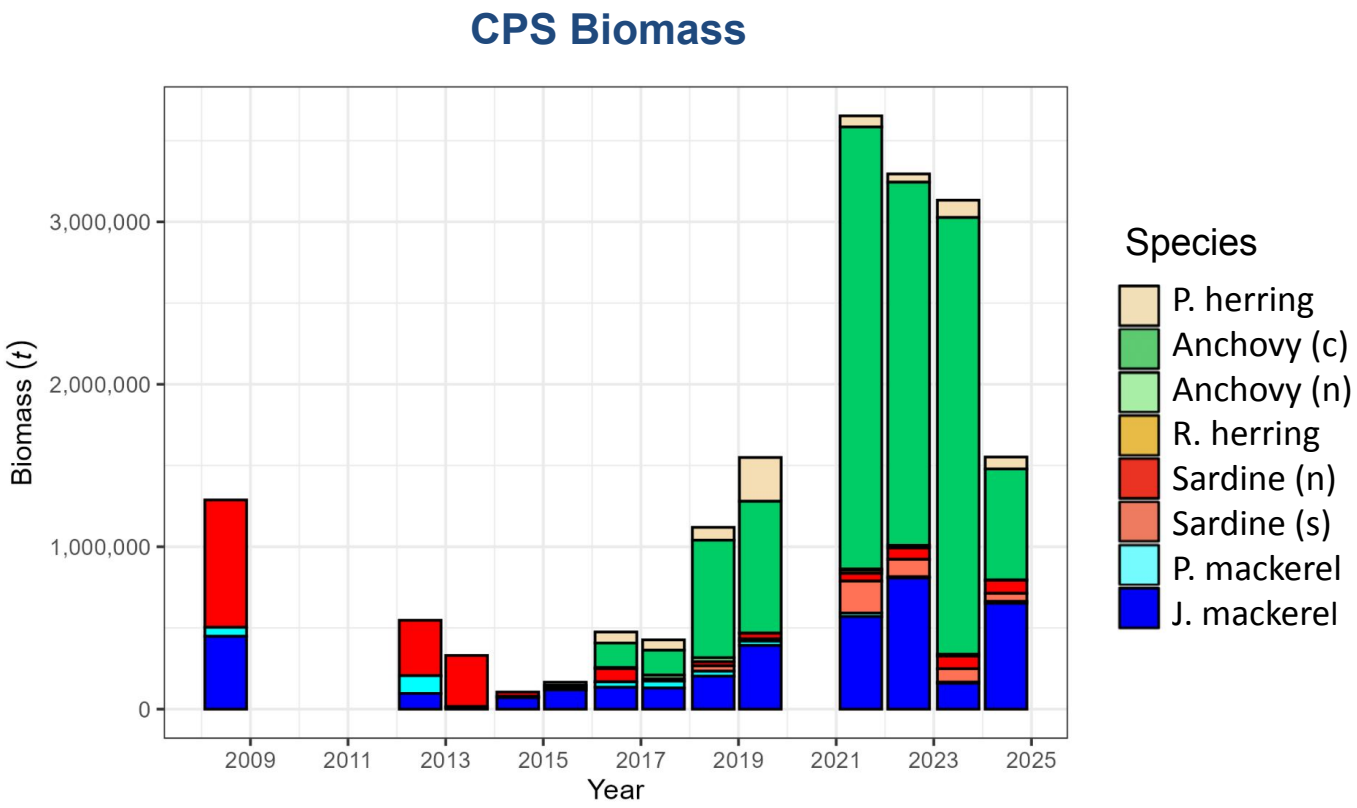


CPS distribution (core)



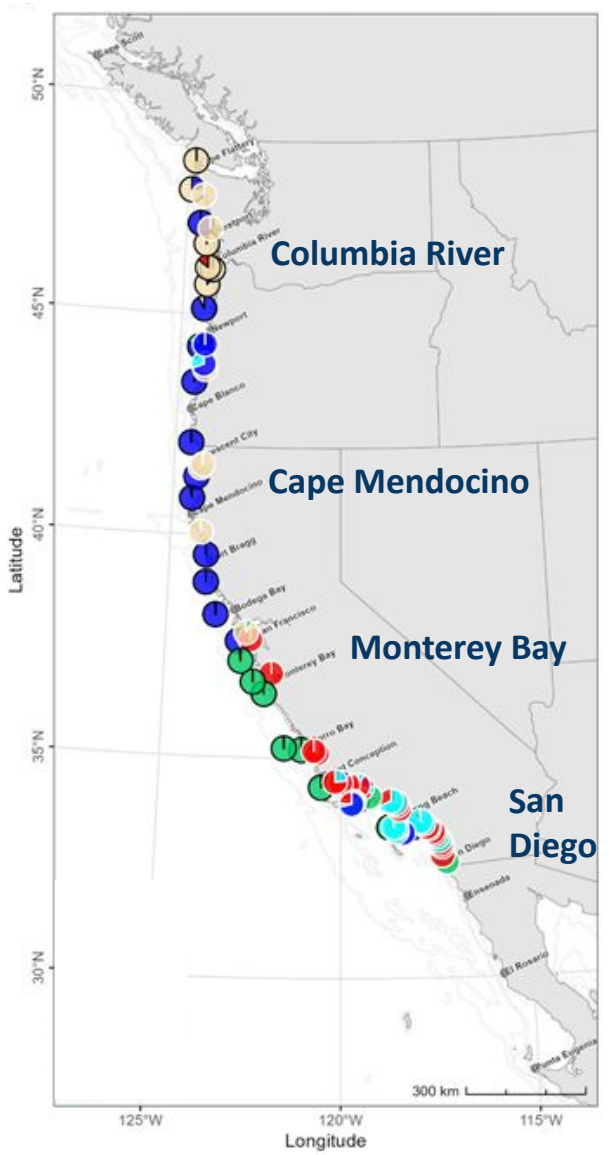
Note: Biomass estimates are preliminary until published, and subject to change

Coastwide survey indicates lower adult anchovy biomass in 2024

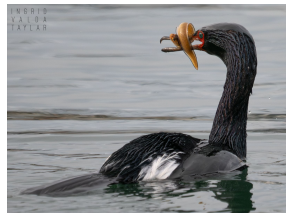


Note: Biomass estimates are preliminary until published, and subject to change

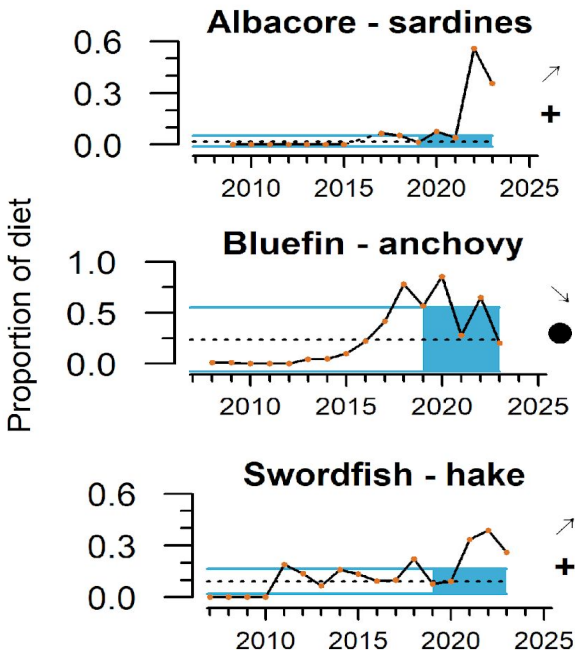
CPS distribution (nearshore)



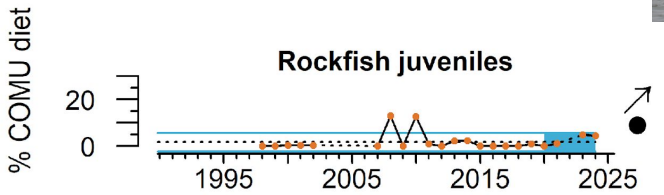
Predators capitalize on diverse and abundant forage



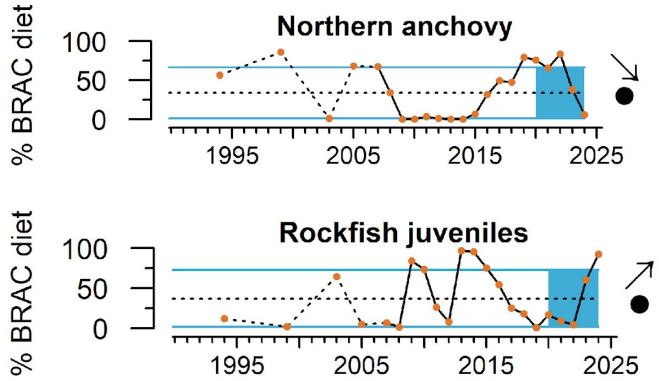
Highly Migratory Species



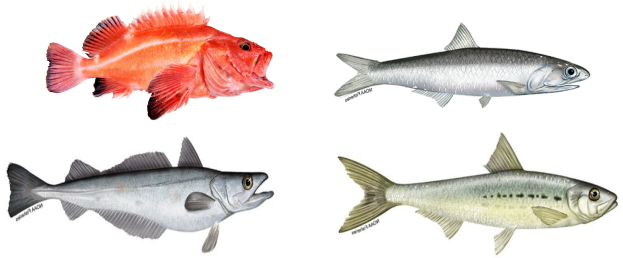
Yaquina Head, OR seabirds



Central CA seabirds

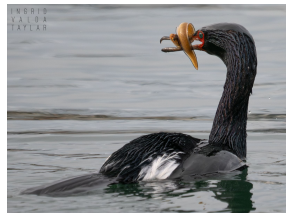


‘Market basket’ feeding pattern

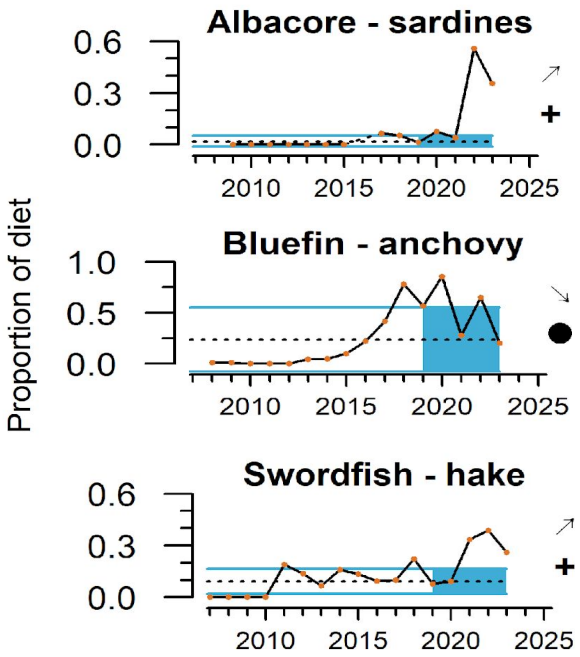


NOAA FISHERIES

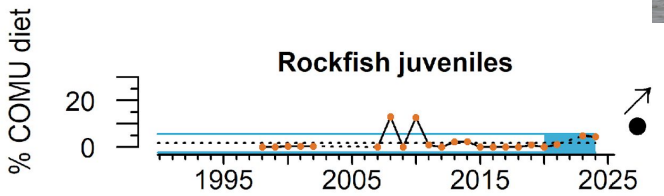
Predators capitalize on diverse and abundant forage



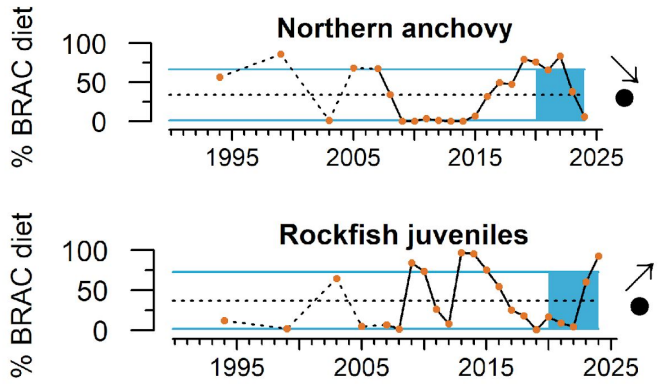
Highly Migratory Species



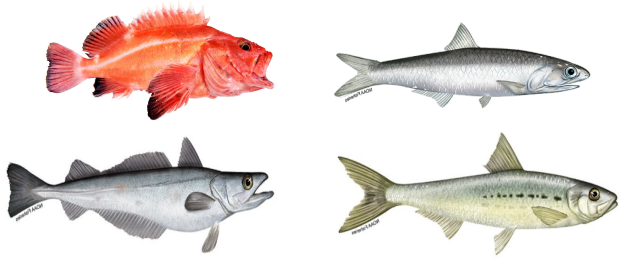
Yaquina Head, OR seabirds



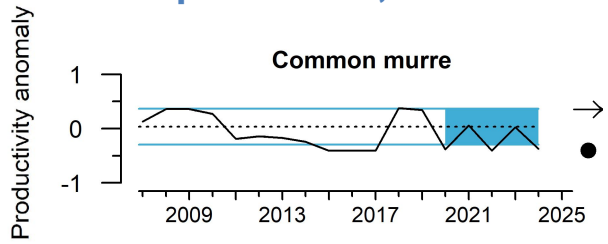
Central CA seabirds



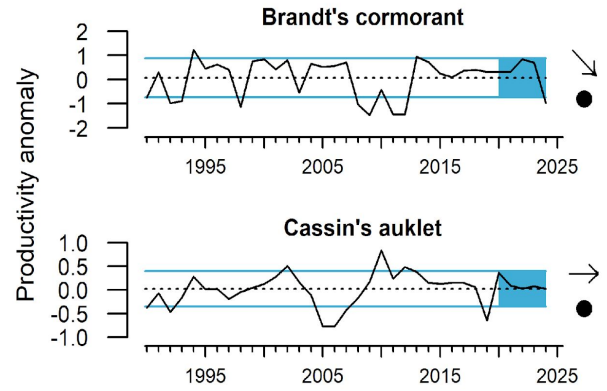
‘Market basket’ feeding pattern



Yaquina Head, OR seabirds

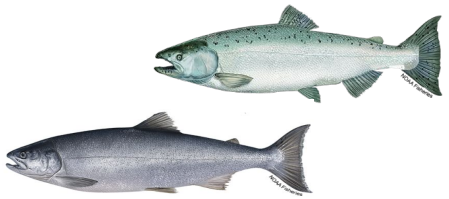


Central CA seabirds



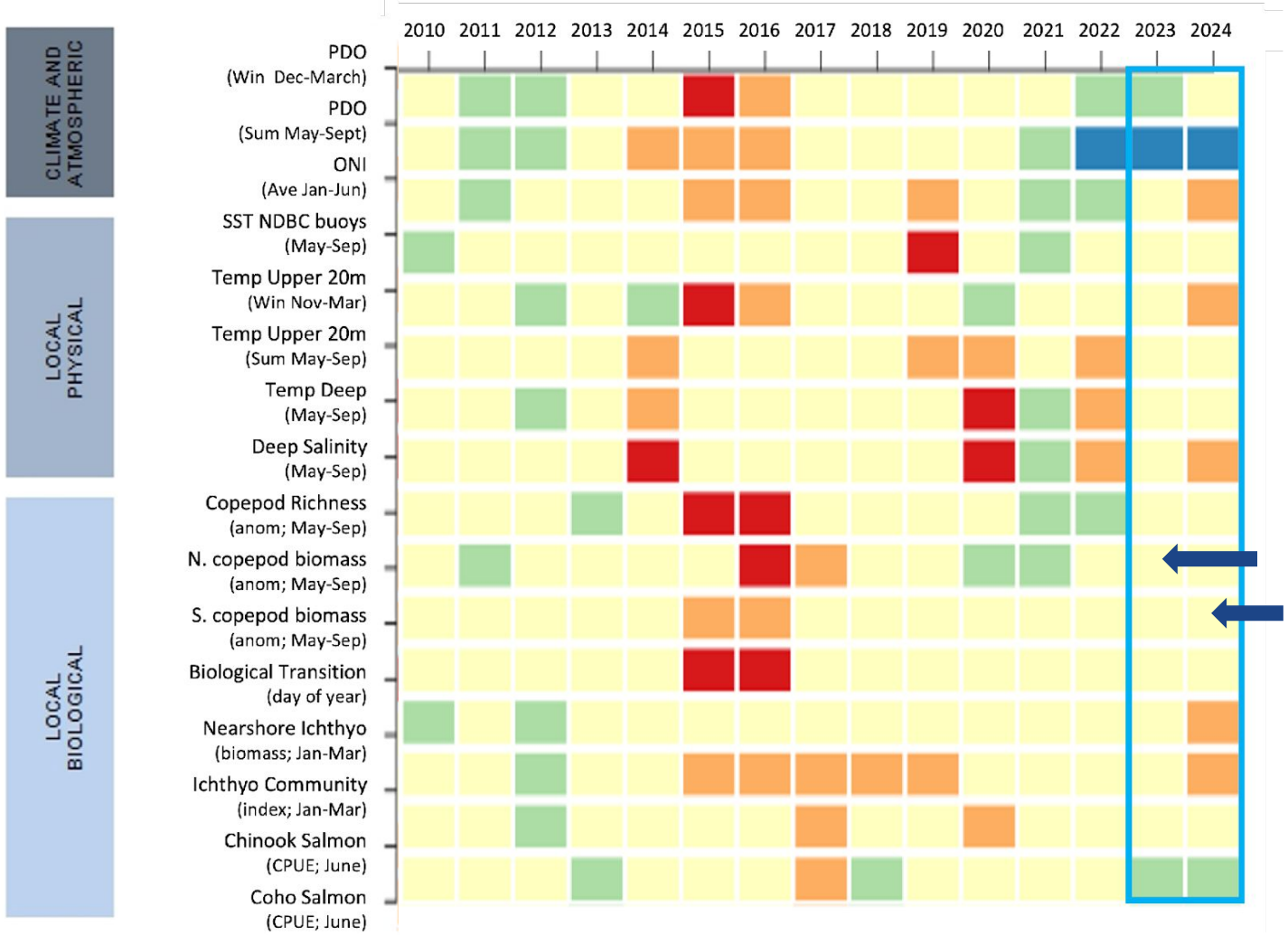
NOAA FISHERIES

Poor to moderate conditions for Chinook and Coho in the north



Northern California Current stoplight table

(Columbia Basin Chinook, Oregon coho)



Most indicators suggest poor to moderate ocean conditions for juvenile salmon

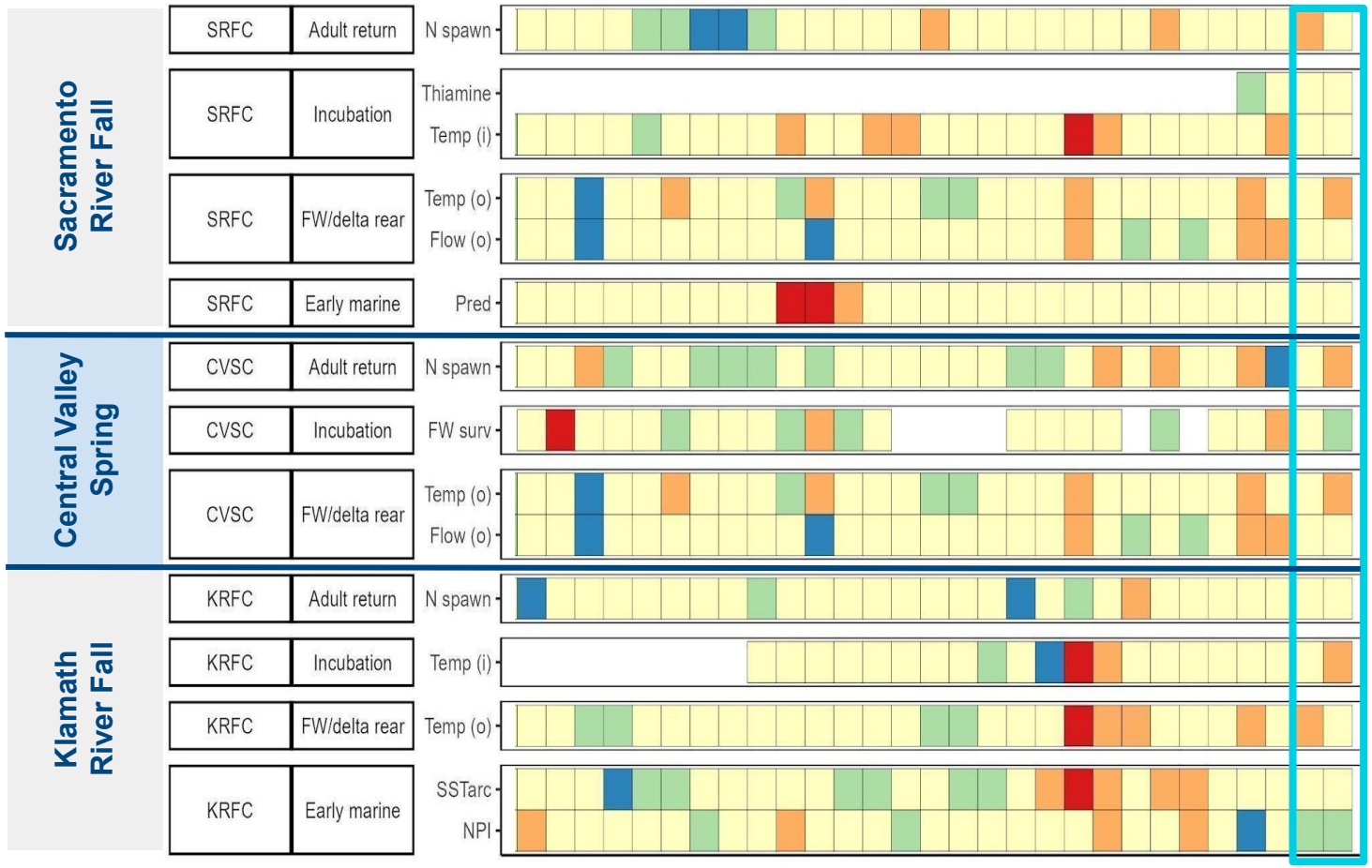
- Conditions -> average survival for returning coho and near average returns for Chinook in 2025
- Outlooks -> predicted counts of Chinook in 2025 are above the 10-year average

Chinook salmon from smolt year 2023 and coho salmon from smolt year 2024 represent dominant adult age classes in 2025

Blue: >2 s.d. above the mean; green: >1 s.d. above the mean; Yellow: ±1 s.d. of the mean; orange: >1 s.d. below the mean; Red: >2 s.d. below the mean.

NOAA FISHERIES

California Chinook salmon returning in 2025 experienced improved habitat conditions



Indicators for recent brood years suggest average habitat conditions for some salmon stocks

- Conditions -> improved habitat conditions for SRFC and CVSC; SST and NPI are favorable for KRFC
- Outlooks -> Moderate returns of SRFC and CVSC in 2025, low returns of KRFC in 2025; slight improvements for all in 2026
- Effects of Klamath dam removals will begin to become apparent in 2027

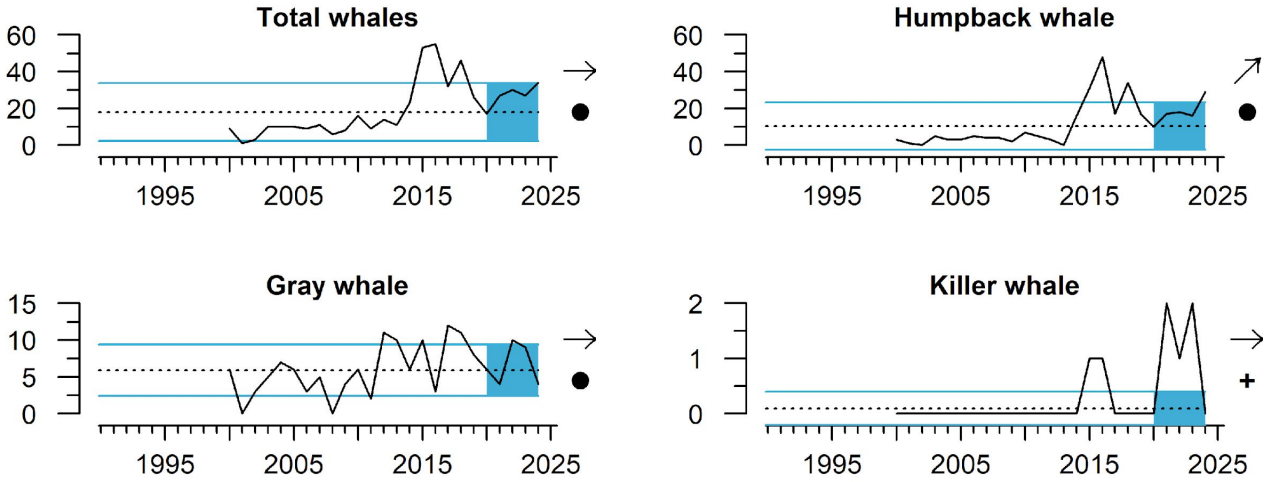
Blue: >2 s.d. above the mean; green: >1 s.d. above the mean; Yellow: ±1 s.d. of the mean; orange: >1 s.d. below the mean; Red: >2 s.d. below the mean.

NOAA FISHERIES

Whale entanglements slightly higher in 2024

Confirmed whale entanglement reports:

- Higher in 2024 than previous year, but lower than peak years
- 2024 data still preliminary

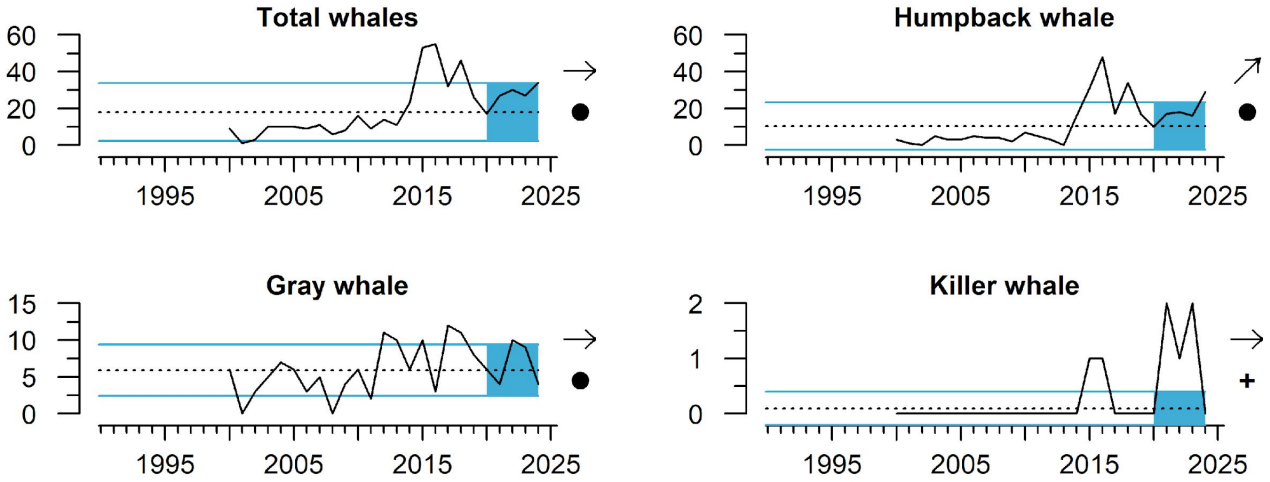


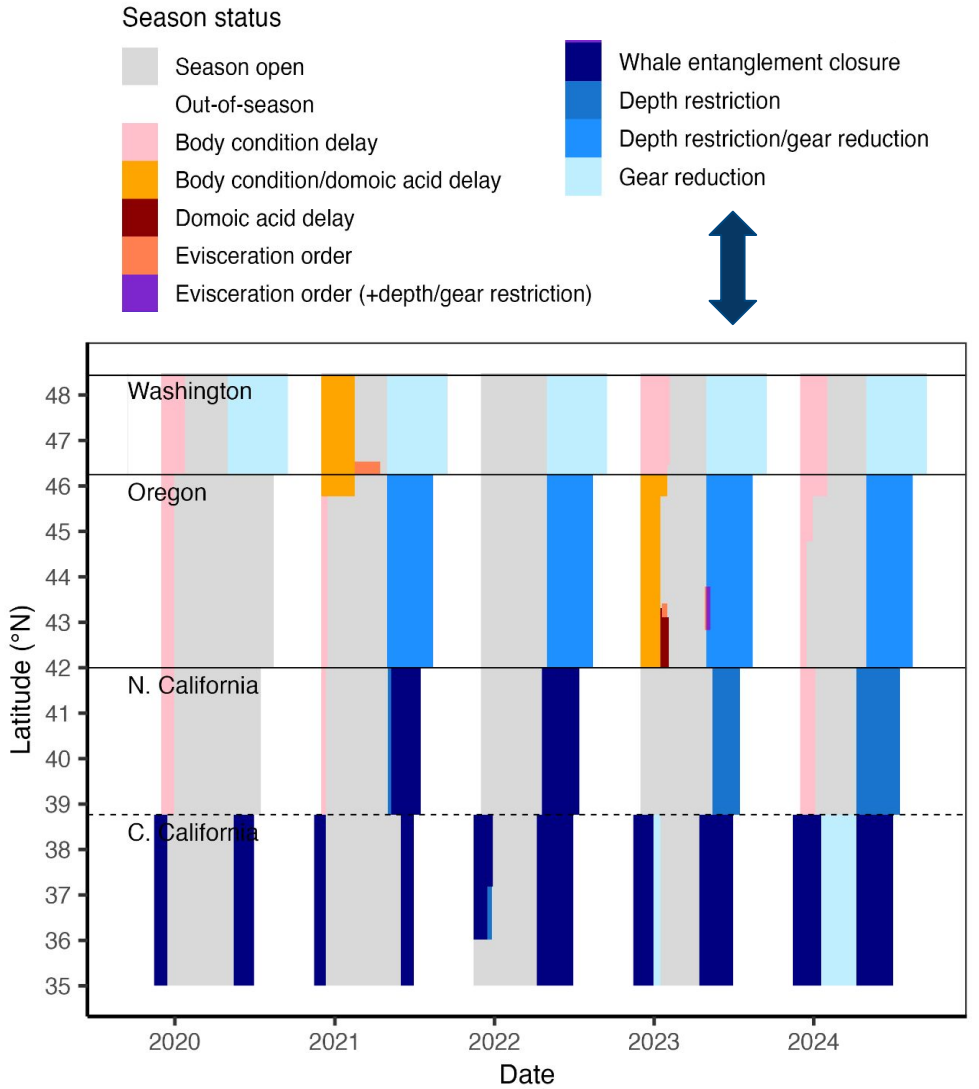
NOAA FISHERIES

Whale entanglement risk restricted the Dungeness crab fishery on west coast

Confirmed whale entanglement reports:

- Higher in 2024 than previous year, but lower than peak years
- 2024 data still preliminary





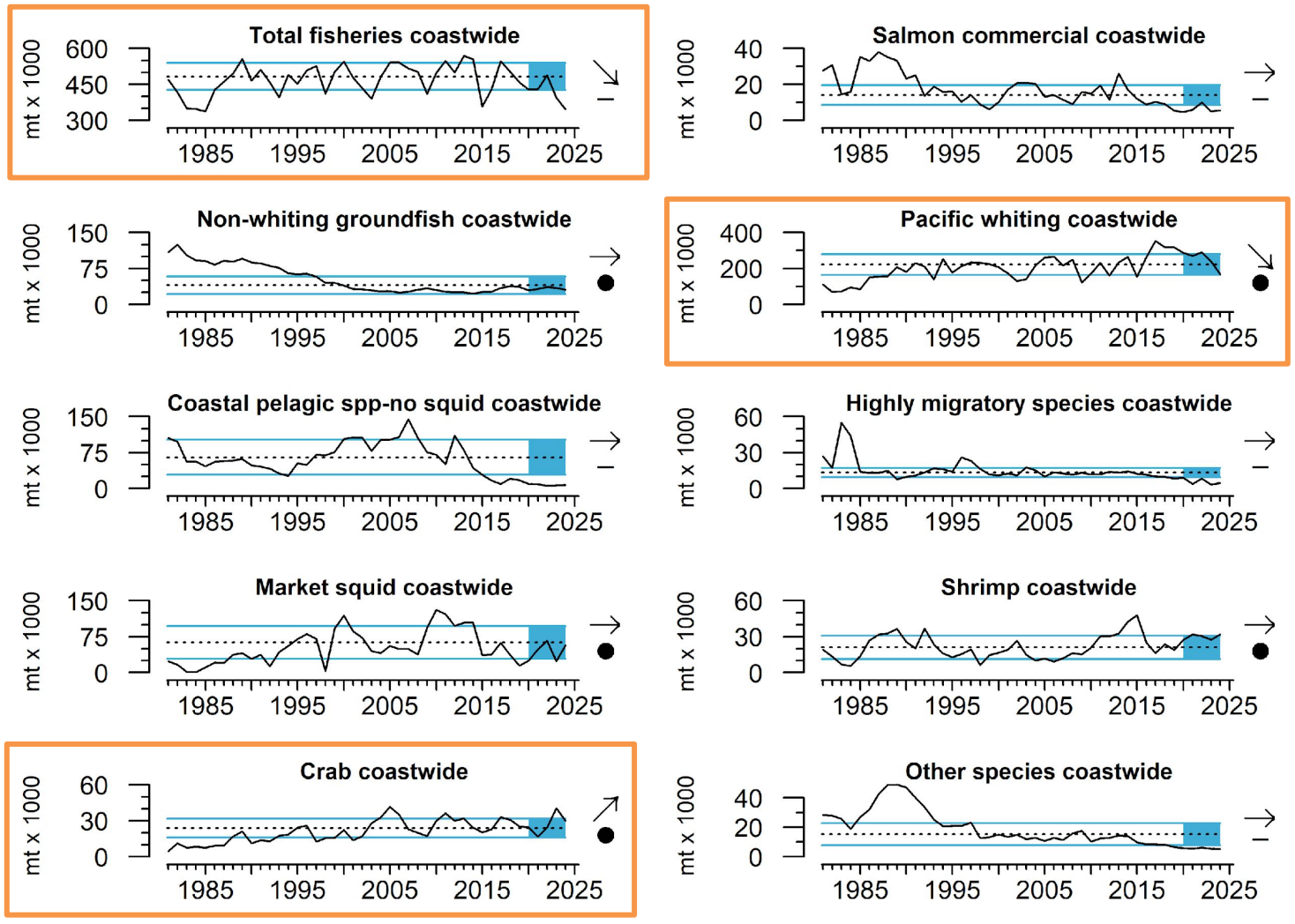
C. Free, S. Moore, V. Trainer 2022

NOAA FISHERIES

Human Activities and Well-Being

NOAA FISHERIES

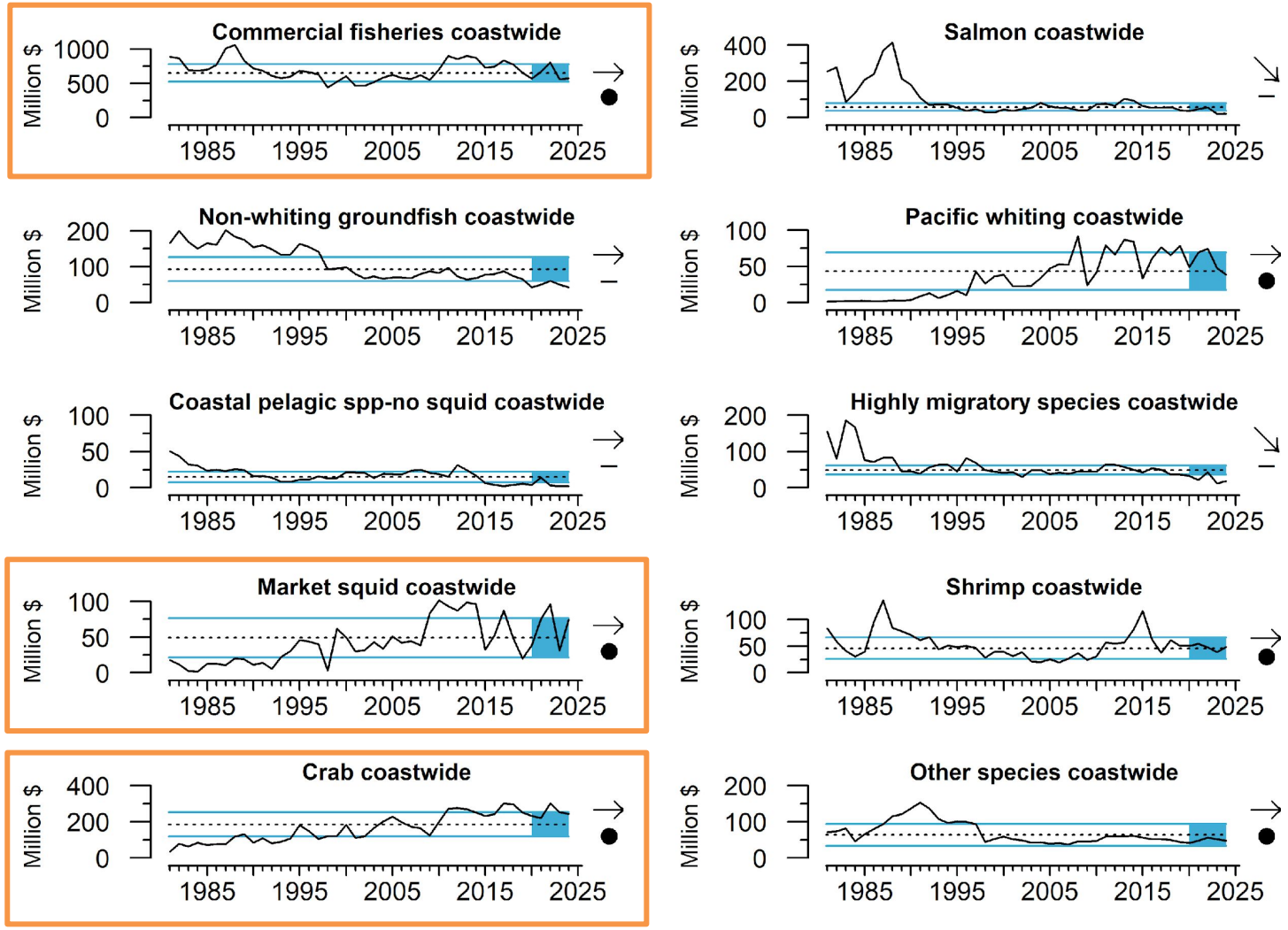
Total fishery landings decreased in 2024, increases in some harvest groups



- Coastwide total landings decreased 12% from 2023 to well below average
- Whiting landings declined by 31% to below average
- CPS and HMS are low
- Salmon fishery was closed in CA in 2023 & 2024
- Landings increased for squid and shrimp, crab landings still high
- Recreational landings are below long-term average (lowest of the time series)

NOAA FISHERIES

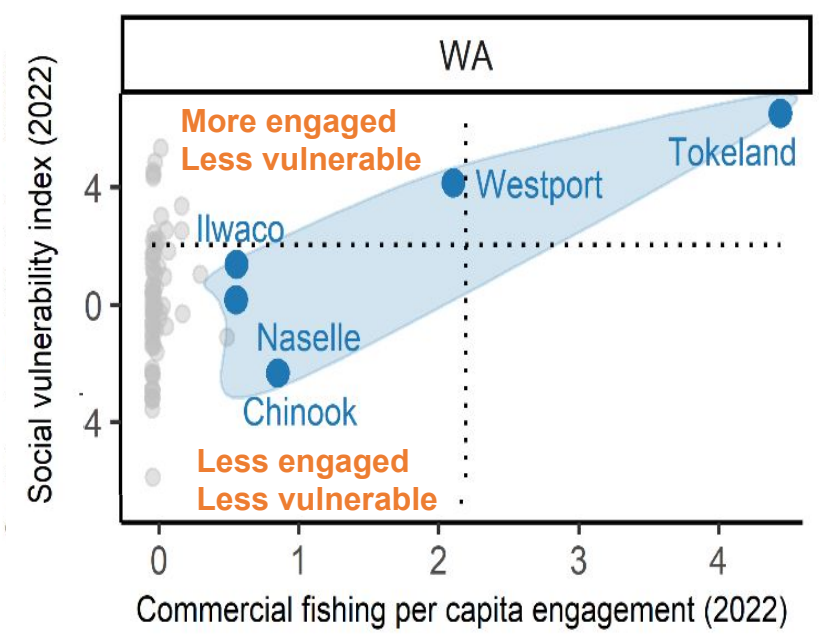
Fishery revenue increased slightly in 2024 for all harvest groups

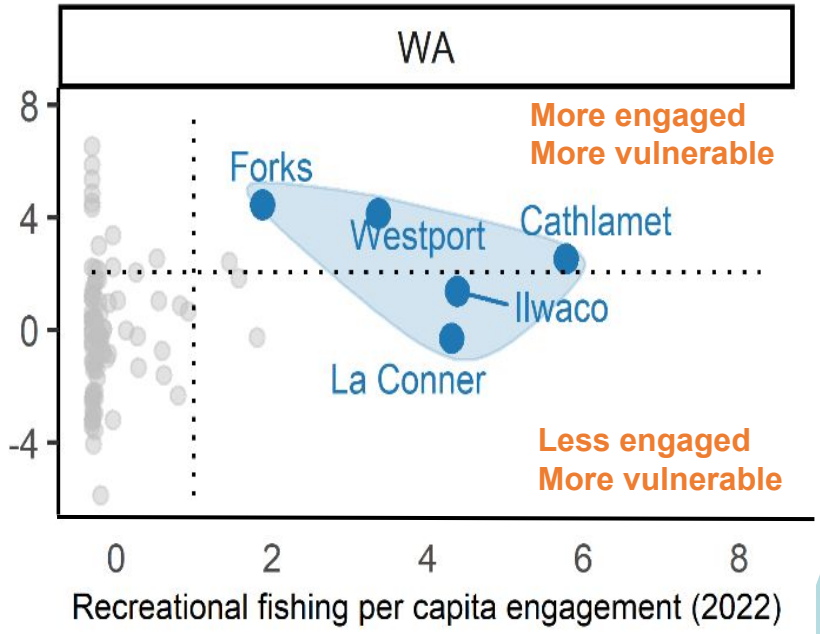


- Total revenue increased by 3% from 2023 (driven by market squid)
- Crab revenue remains high
- Non-whiting groundfish, CPS, HMS, salmon revenue are low

NOAA FISHERIES

Community social vulnerability for commercial and recreational fisheries





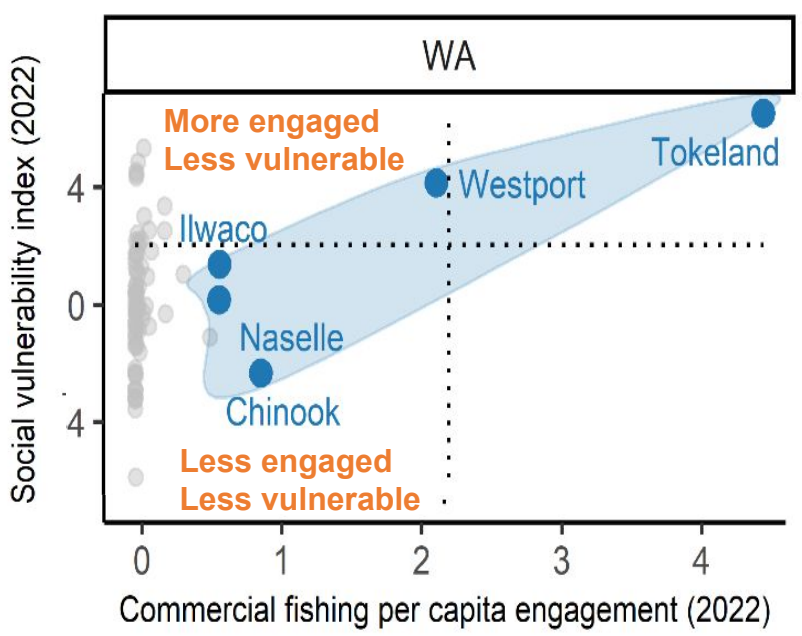
Polygons group the five highest-scoring communities for fishing per capita engagement (previously referred to as 'reliance')

Dotted lines indicate 1 s.d. above the means for all communities

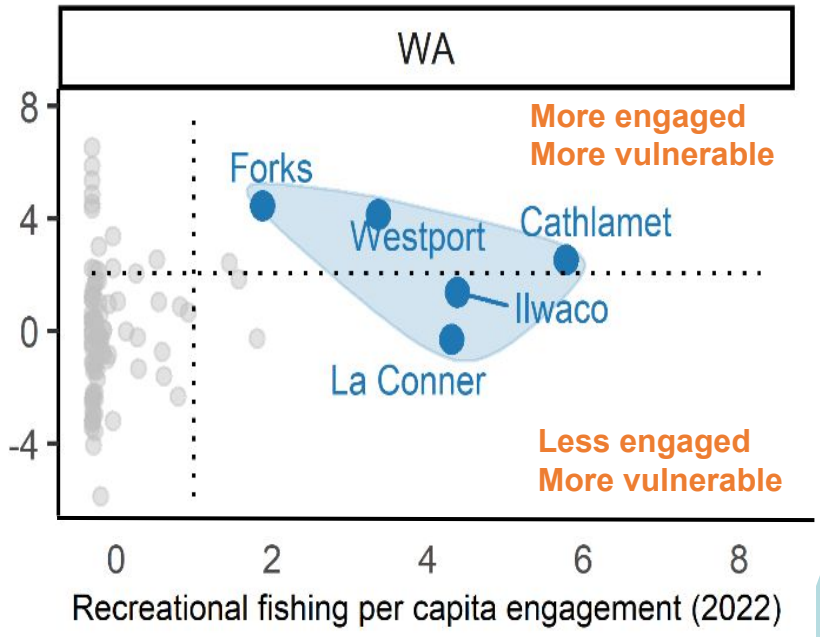
Community social vulnerability for commercial and recreational fisheries

Indices are based on census designated places rather than ports and take into consideration population size

Demographics, personal disruption, poverty, housing characteristics and disruption



Landings, revenues, permits, processing



Guide and charter permits, marinas, recreational retail shops

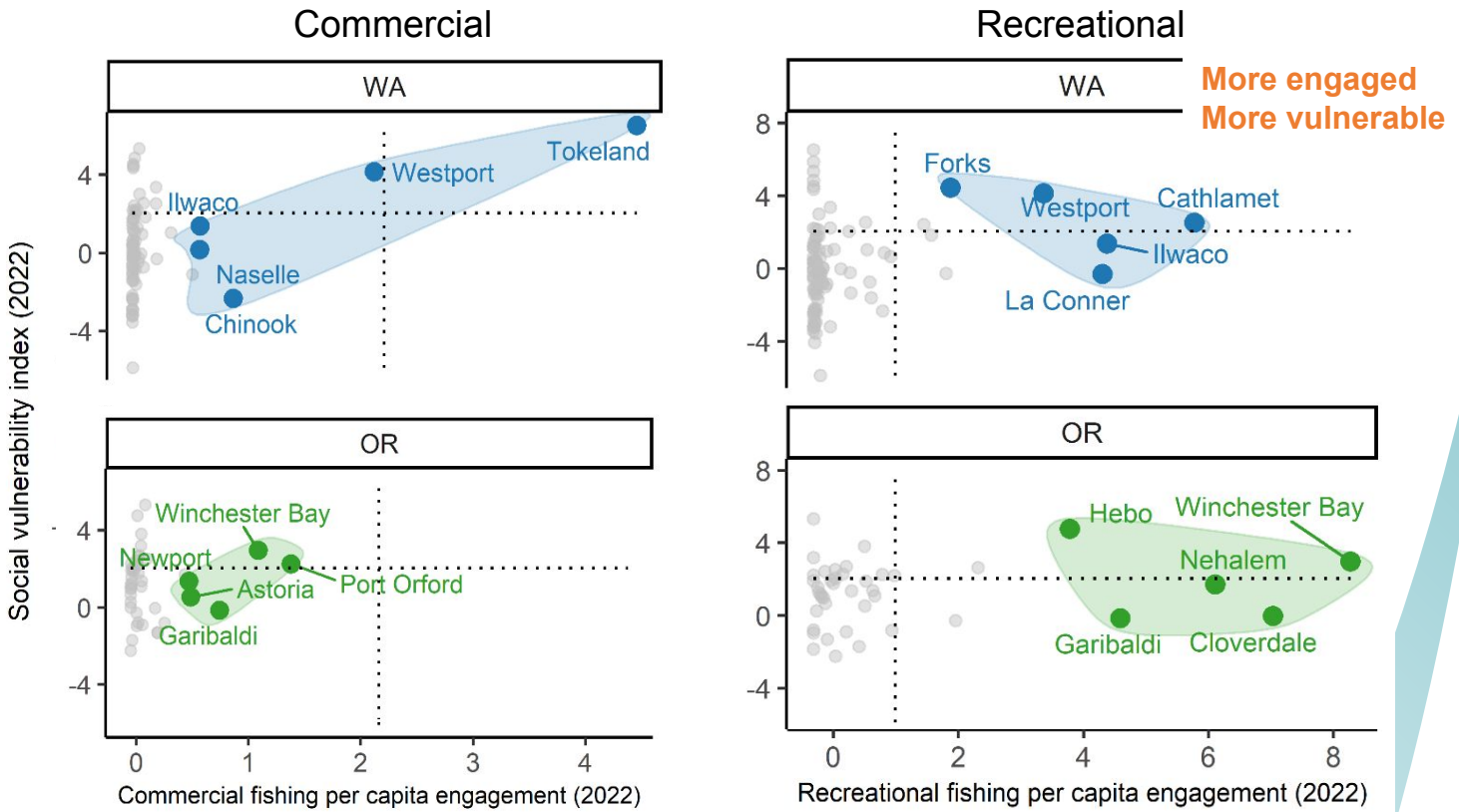
Polygons group the five highest-scoring communities for fishing per capita engagement (previously referred to as 'reliance')

Dotted lines indicate 1 s.d. above the means for all communities

NOAA FISHERIES

Fishing community social vulnerability is higher in Washington and Oregon

- Tokeland, WA and Westport, WA had high *commercial per capita engagement* and high social vulnerability
- Multiple communities with relatively high recreational engagement also had relatively high social vulnerability
- Westport, WA, Winchester Bay, OR and Garibaldi, OR were among the most reliant on both commercial and recreational fishing
- See ESR for changes in social vulnerability between 2021 and 2022 (Appendix P)

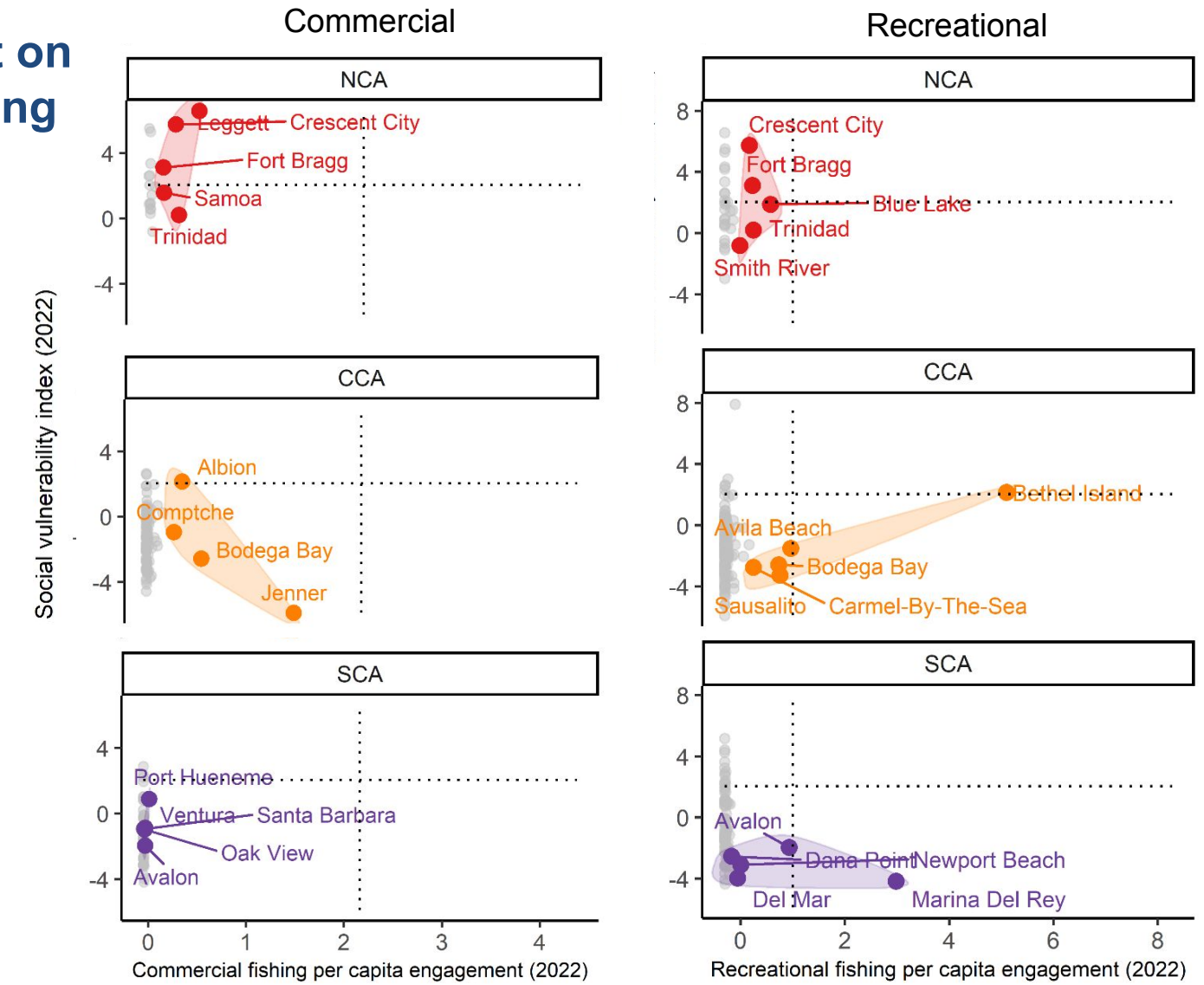


Polygons group the five highest-scoring communities for fishing per capita engagement (previously referred to as 'reliance')

Dotted lines indicate 1 s.d. above the means for all communities

Multiple California communities reliant on both commercial and recreational fishing

- Fishing per capita engagement lower in CA compared to OR and WA
- Bethel Island, CA had high *recreational per capita engagement* and high social vulnerability
- Crescent City, Fort Bragg, Trinidad, Bodega Bay and Avalon were among the most reliant on both commercial and recreational fishing
- See ESR for changes in social vulnerability over time (Appendix P)

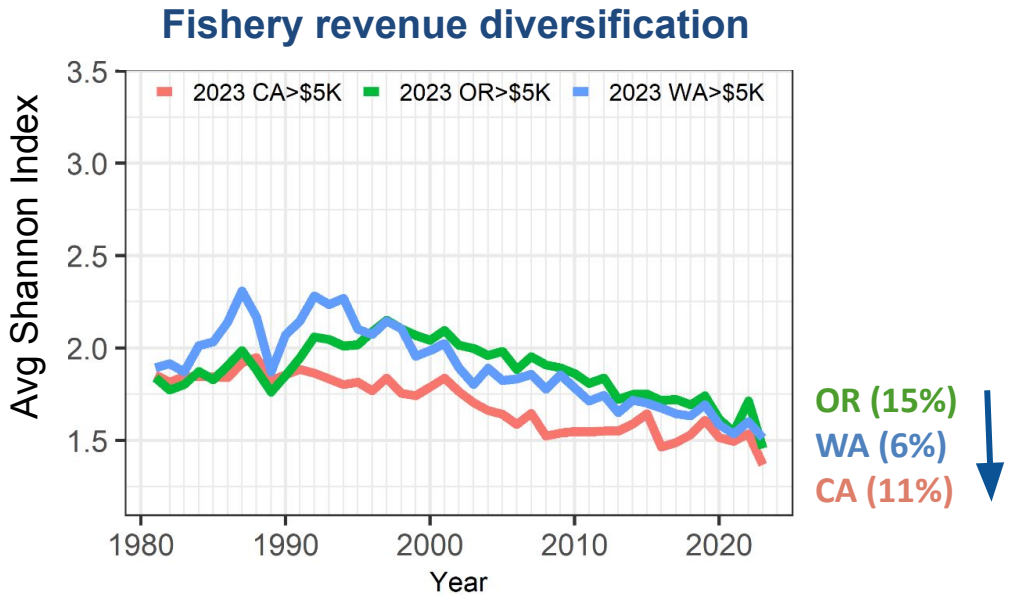


Dotted lines indicate 1 s.d. above the means for all fishing communities

Declines in fishery diversification, increasing risk for vessel owners

Greater diversification of fishing portfolios may increase average revenue and reduce yearly revenue variability; possibly greater resilience to shocks

- In 2023, CA, OR, WA fleets saw decreases in how revenue is spread across species groups

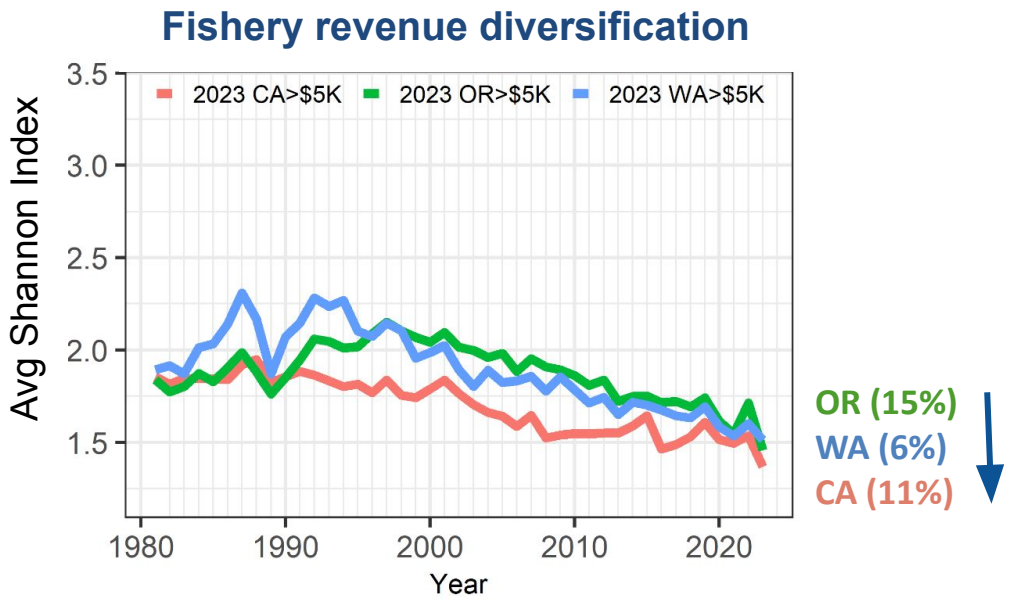


➔ Port-level and temporal diversification (Appendix Q)

Reduction in number of fisheries and less connectivity between fisheries

Greater diversification of fishing portfolios may increase average revenue and reduce yearly revenue variability; possibly greater resilience to shocks

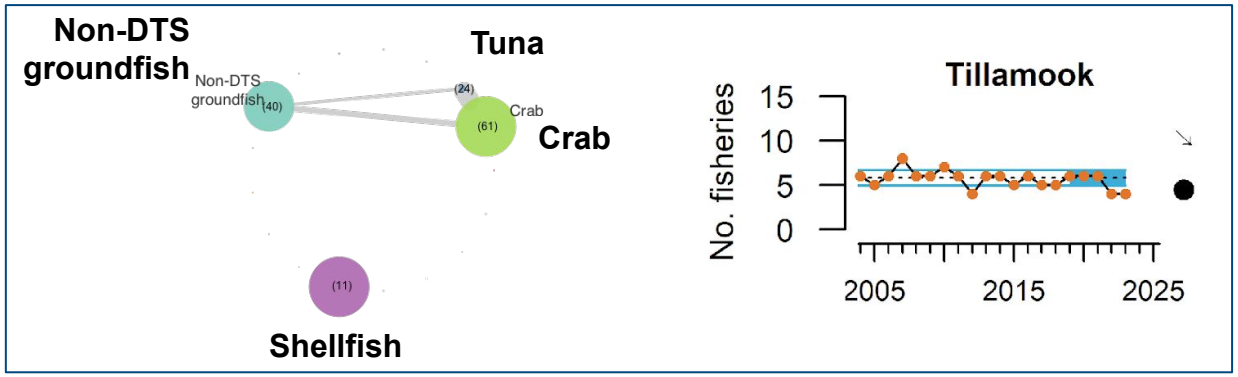
- In 2023, CA, OR, WA fleets saw decreases in how revenue is spread across species groups

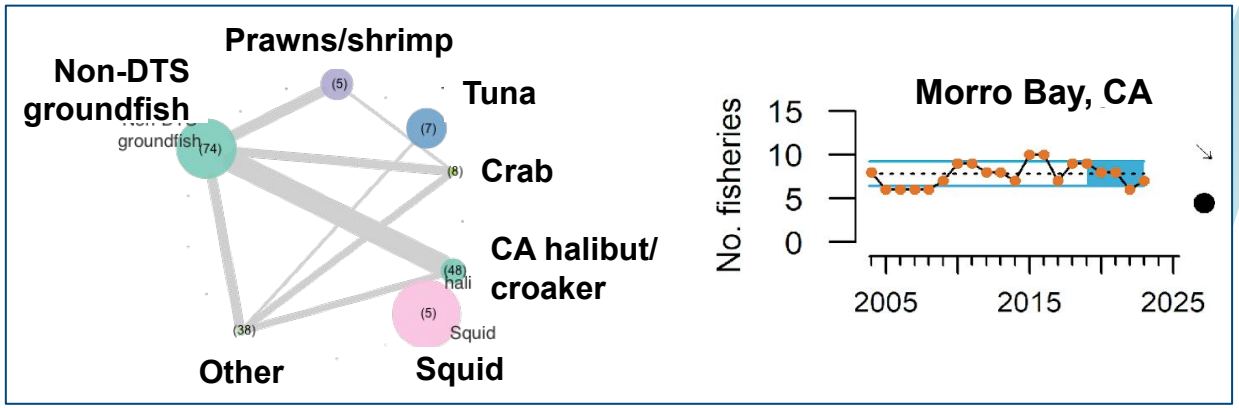


➔ Port-level and temporal diversification (Appendix Q)

Fisheries Participation Networks document changes in the number of fisheries and connectivity between fisheries in IO-PAC port groups

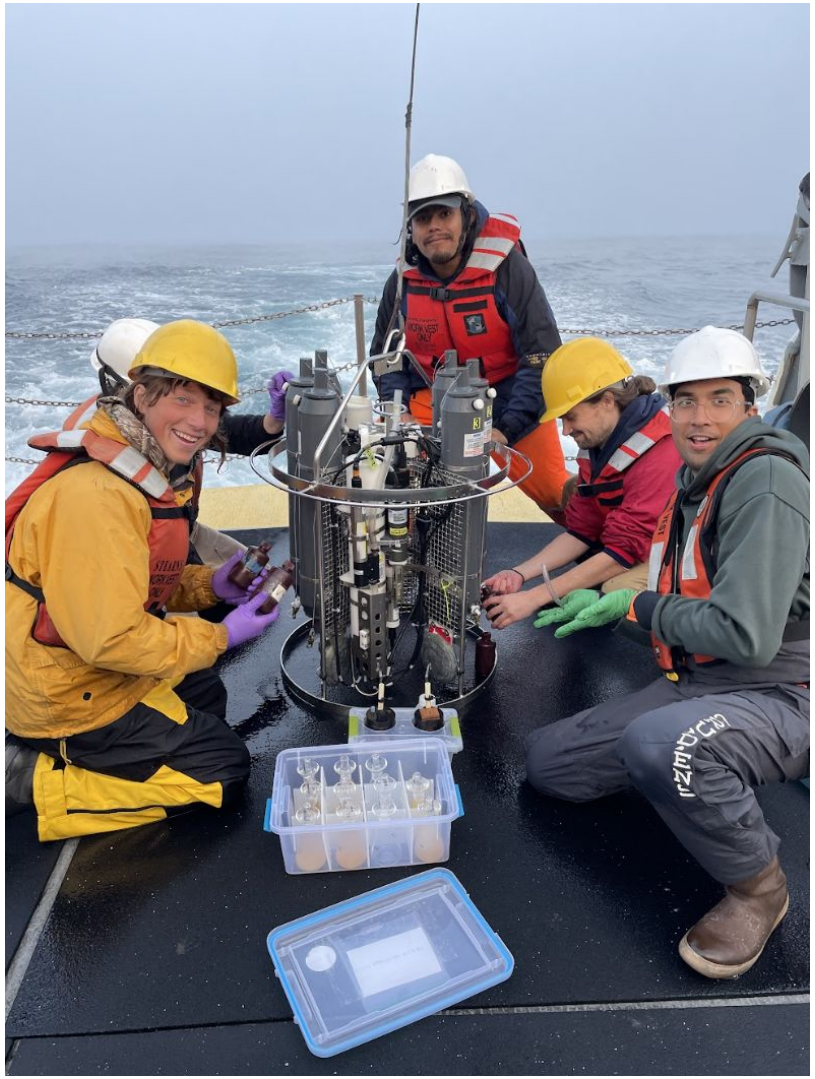
- Multiple ports in OR and CA experienced declines in both, which can reduce their resilience to shocks (Appendix S)





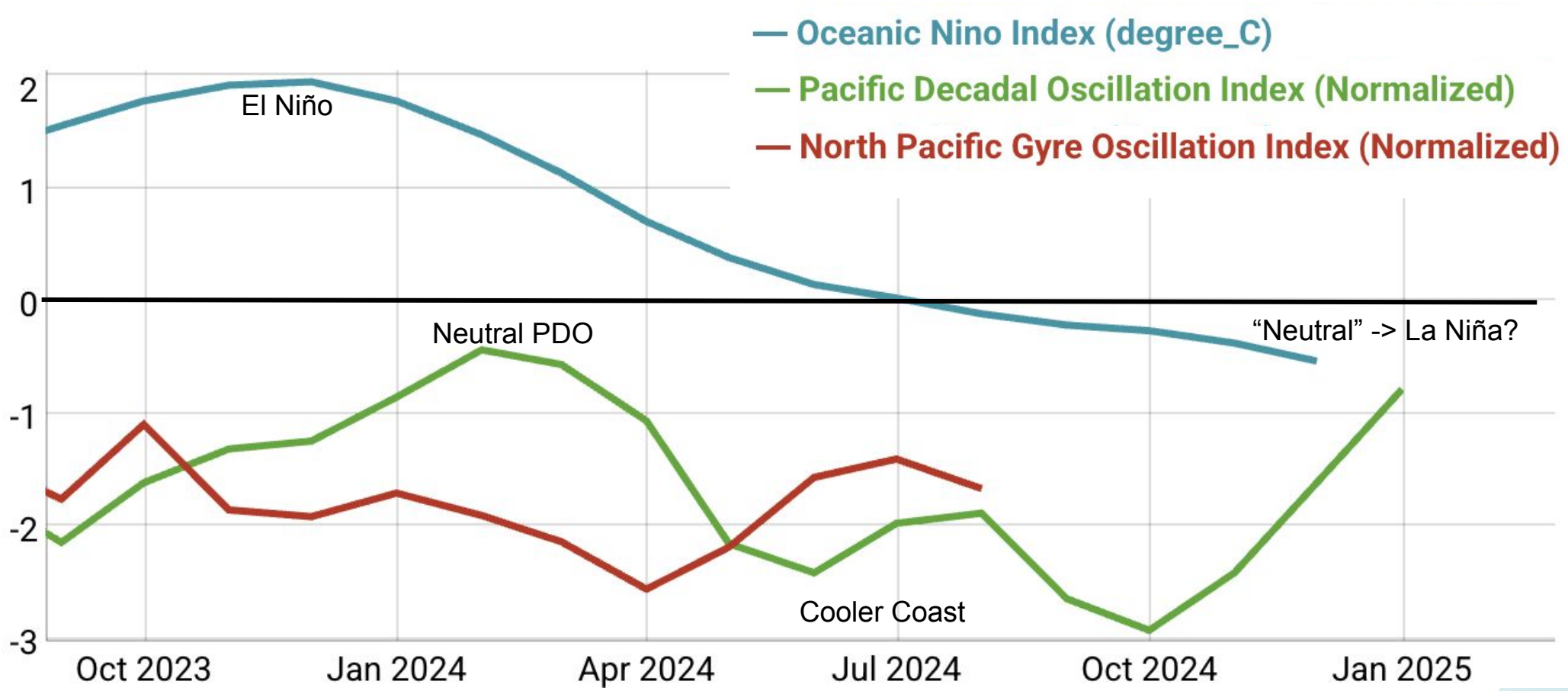
DTS = Dover sole, thornyhead, and sablefish complex

Outlooks for 2025



NOAA FISHERIES

Outlooks for 2025



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Outlooks for 2025

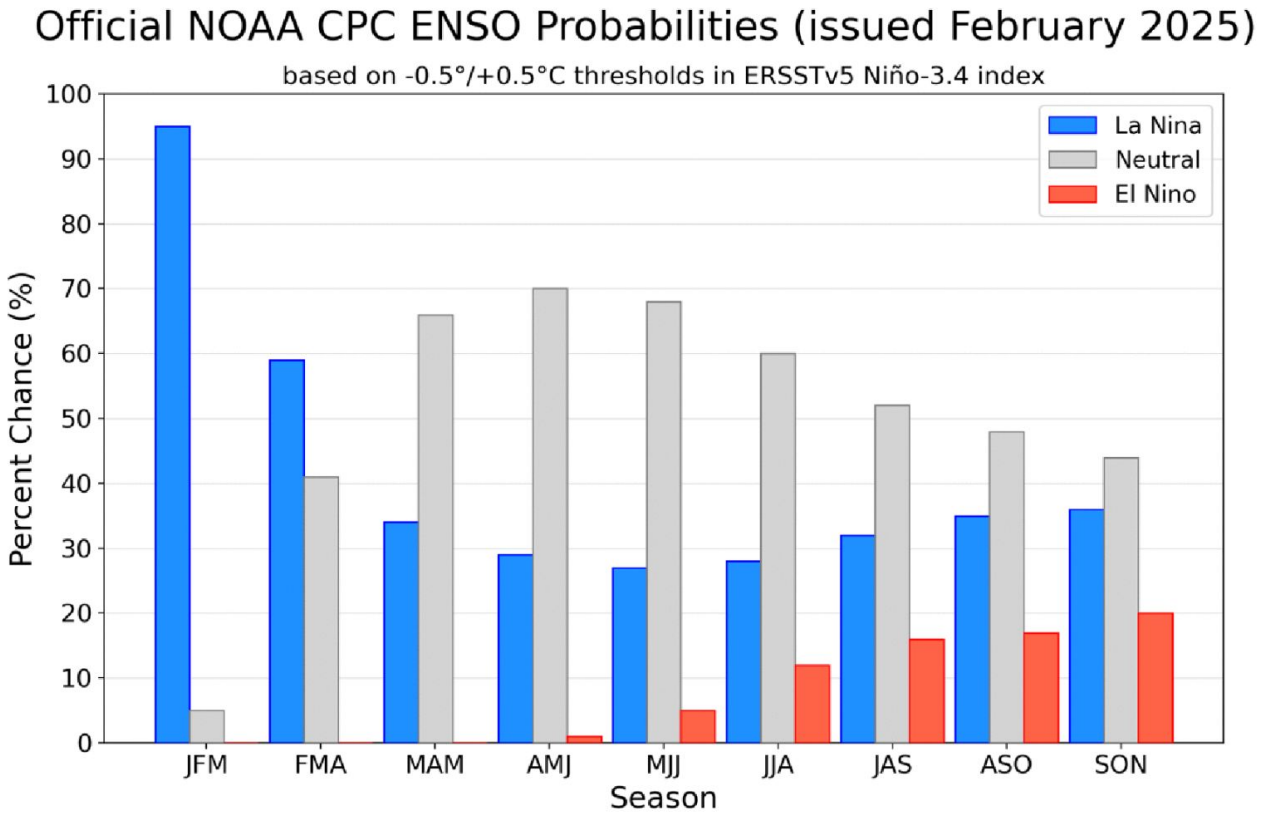
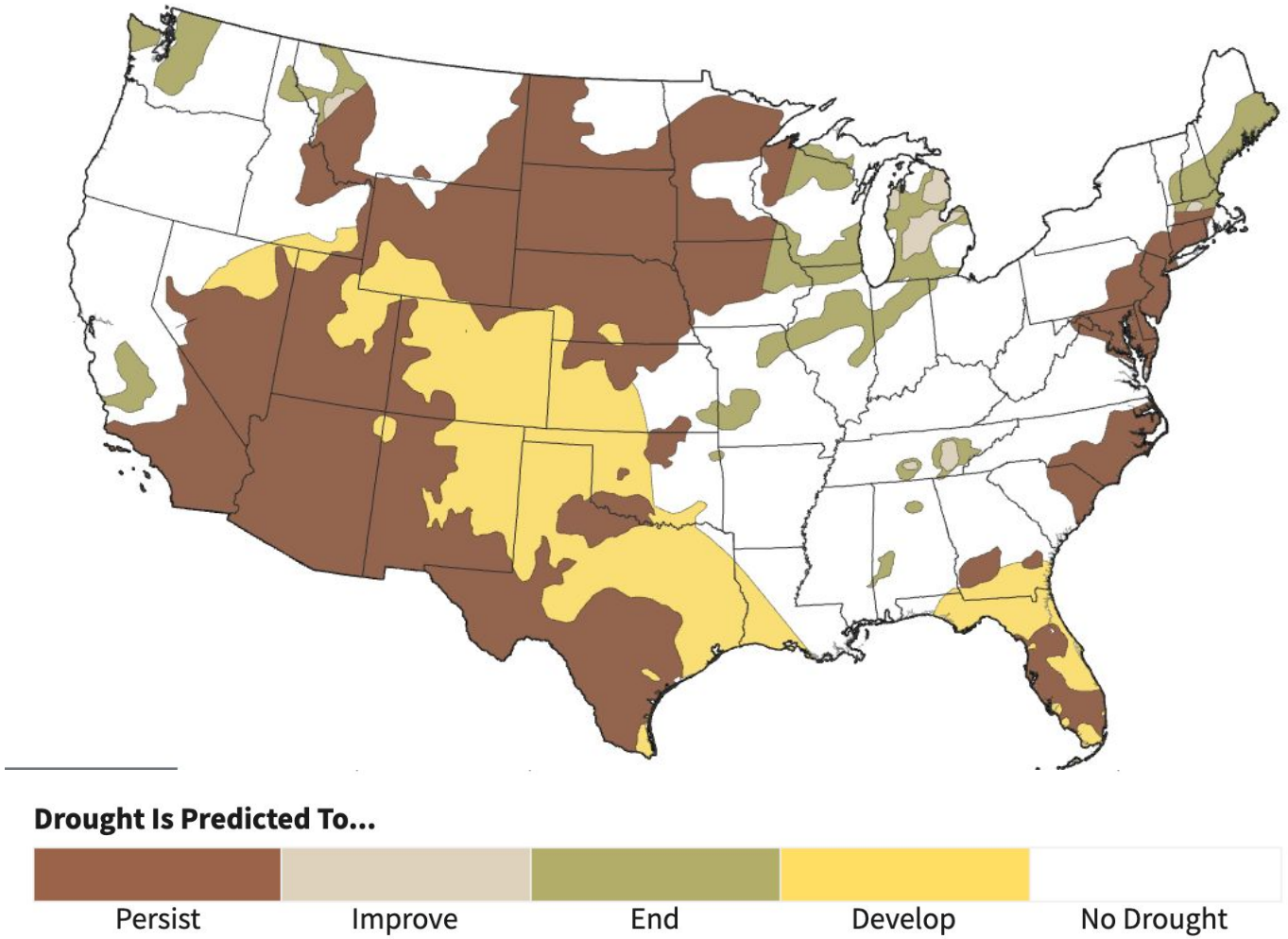


Figure 7. Official ENSO probabilities for the Niño 3.4 sea surface temperature index (5°N-5°S, 120°W-170°W). Figure updated 13 February 2025.

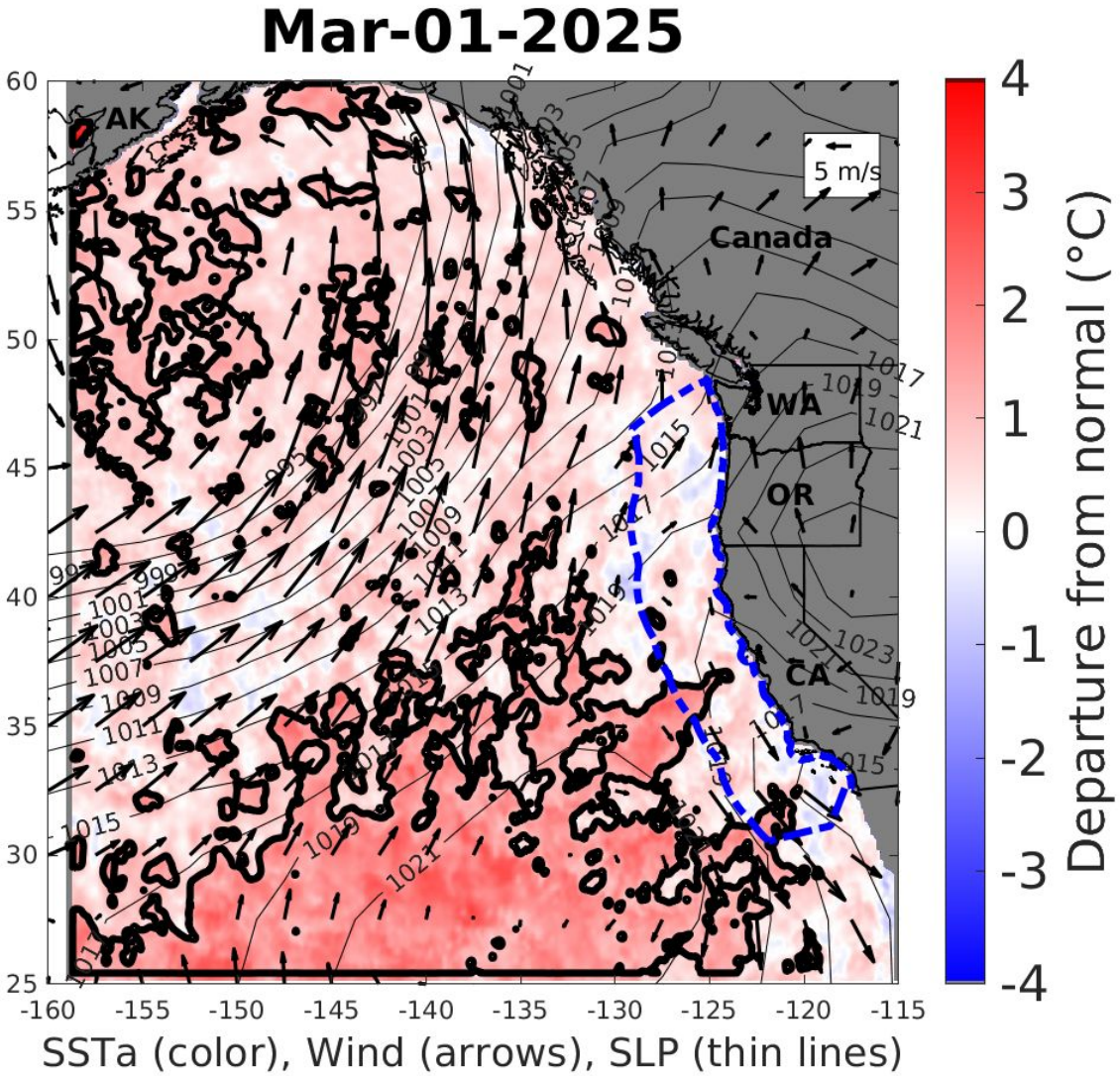
Outlooks for 2025

Seasonal (3-Month) Drought Outlook for March 1-May 31



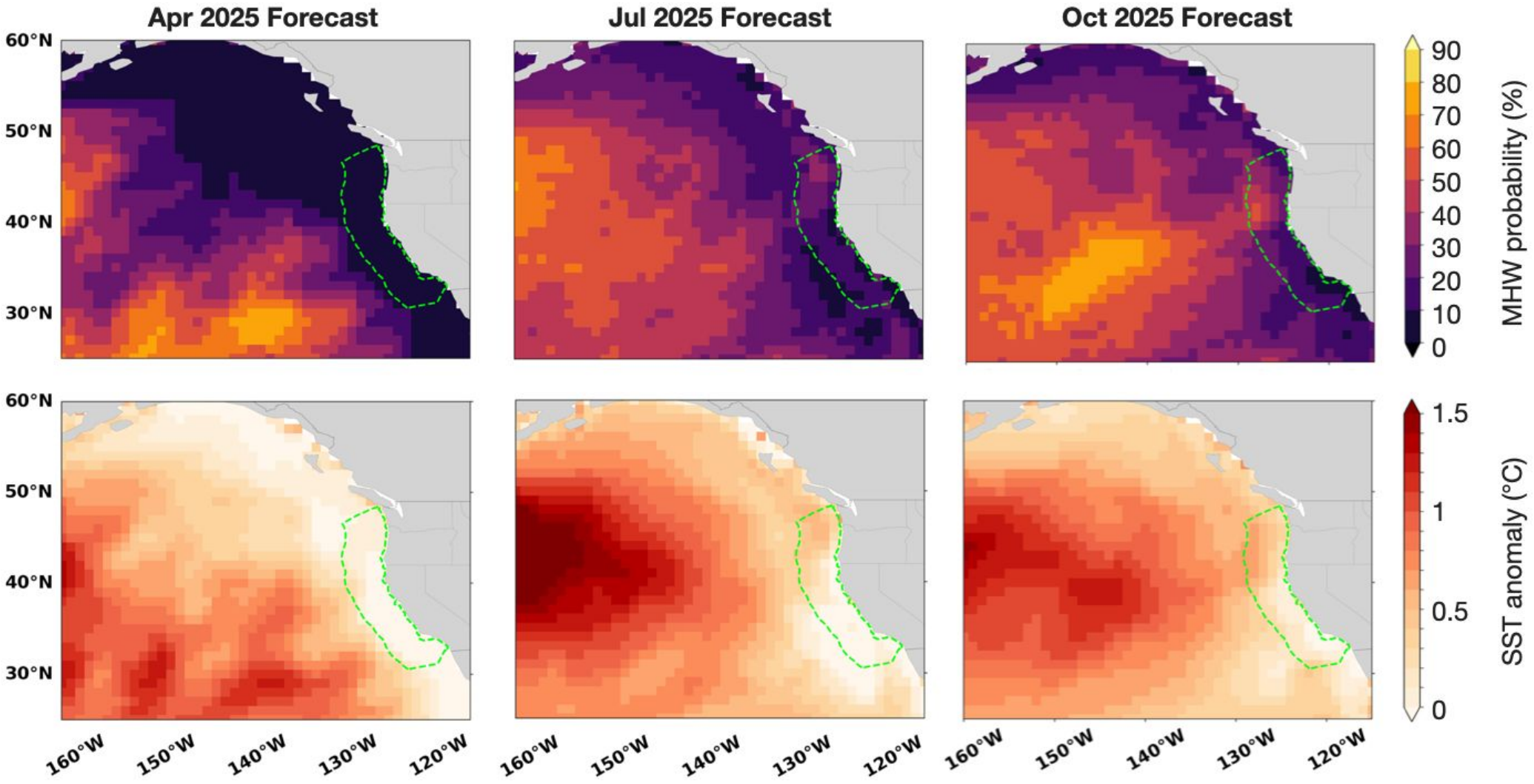
Source: Climate prediction center: Drought.gov

MHW most recent condition



Coastal water temperatures are average, still a lot of warmer than normal water far offshore of Southern California

MHW forecast



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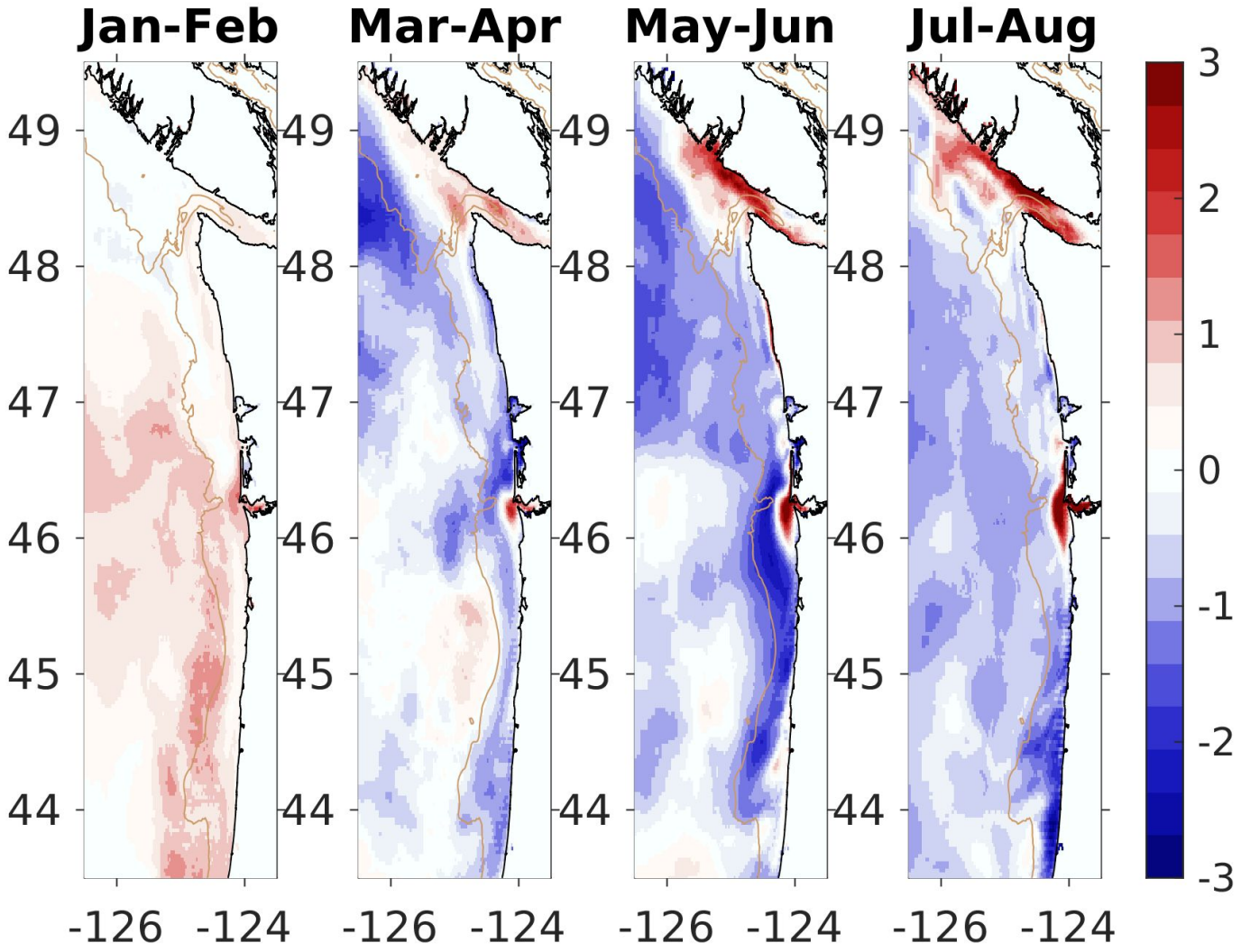
JSCOPE modeling forecast (Siedlecki and Kaplan)



- 10-meter integrated chlorophyll will be slightly *lower* than climatology in spring and summer
- 50% uncertainty by summer due to unknown variability in wind forcing

http://www.nanoos.org/products/j-scope/forecasts.php

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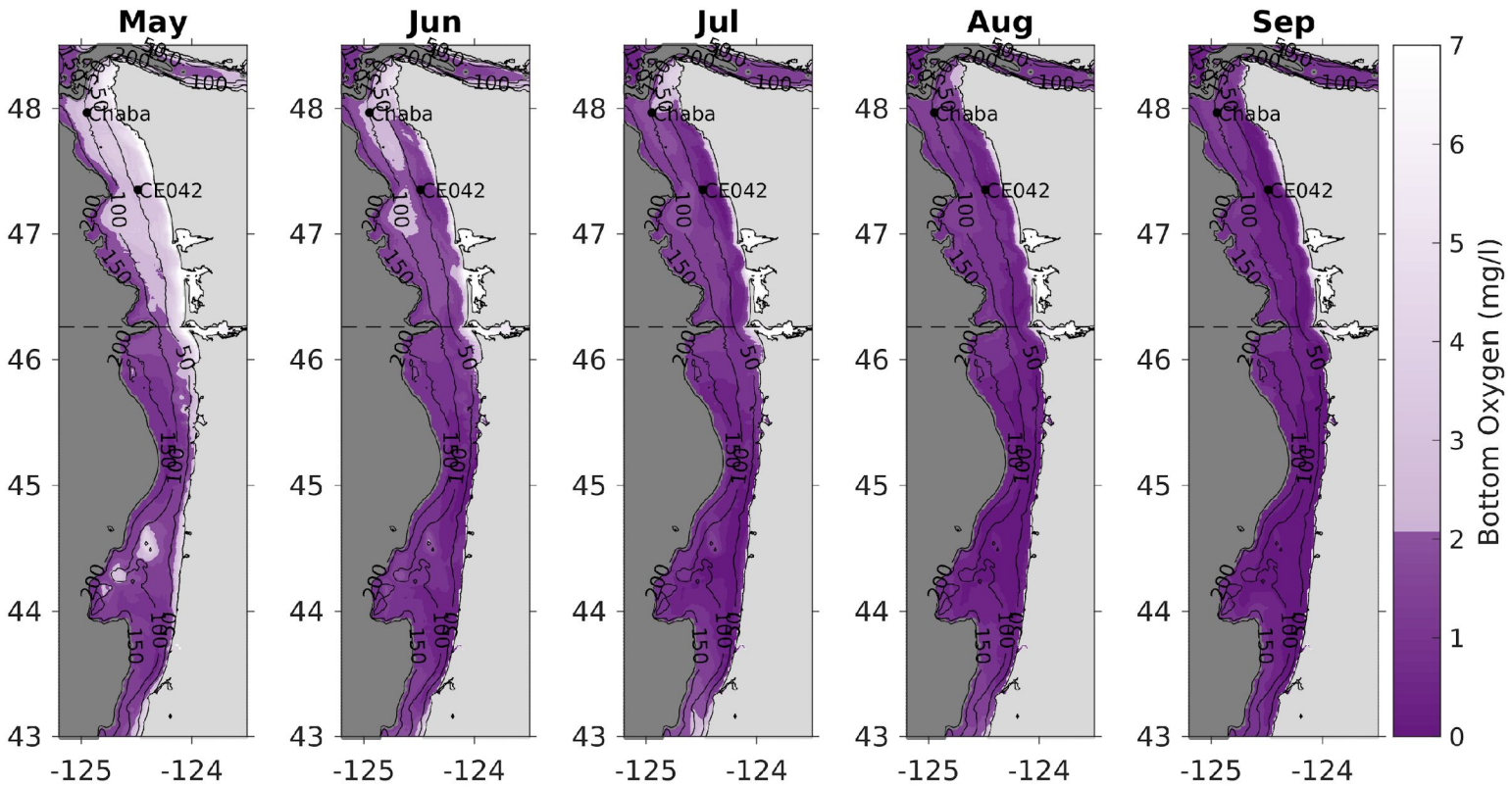
JSCOPE modeling forecast (Siedlecki and Kaplan)



- Bottom oxygen *lower* over both the Washington and Oregon shelves.
- Hypoxia is forecasted earlier (in late May, early June)
- High uncertainty in late summer surrounding this forecast throughout the region.

http://www.nanoos.org/products/j-scope/forecasts.php

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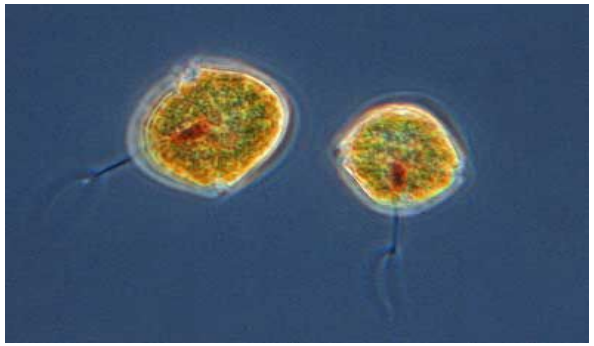
Conclusions

Incoming Brown Pelicans in care for starvation. Photo: Ariana Gastelum – International Bird Rescue

El Niño had some impacts, but muted compared to past events:

- Delayed productivity compensated by strong, consistent upwelling
- HABs -> some delays and closures in fisheries
- Bird and marine mammal impacts



Alexandrium catenella,
courtesy of W. Gurske

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Conclusions

The CCE quickly rebounded after El niño

- Diverse and abundant forage base for predators
- Some species did better than we would have expected
  - Krill size and abundance rebounded
  - Improved habitat and positive outlooks for some salmon
- Some species on the rise
  - Abundant YOY rockfish, YOY anchovy and YOY Pacific hake last few years
  - Crab landings and revenue are high

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Conclusions

Some indicators raise concern:

- MHWs -> large but offshore, sometimes reach coast
  - whale entanglements, seabird mortalities
- Declines of fishery landings, CA salmon fishery closures
- Social vulnerability higher in OR and WA than CA
- Reduction in number of fisheries that vessels participate in, less connectivity between fisheries in IO-PAC ports

Photo credit: Susan Chambers

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Conclusions

Outlooks for 2025

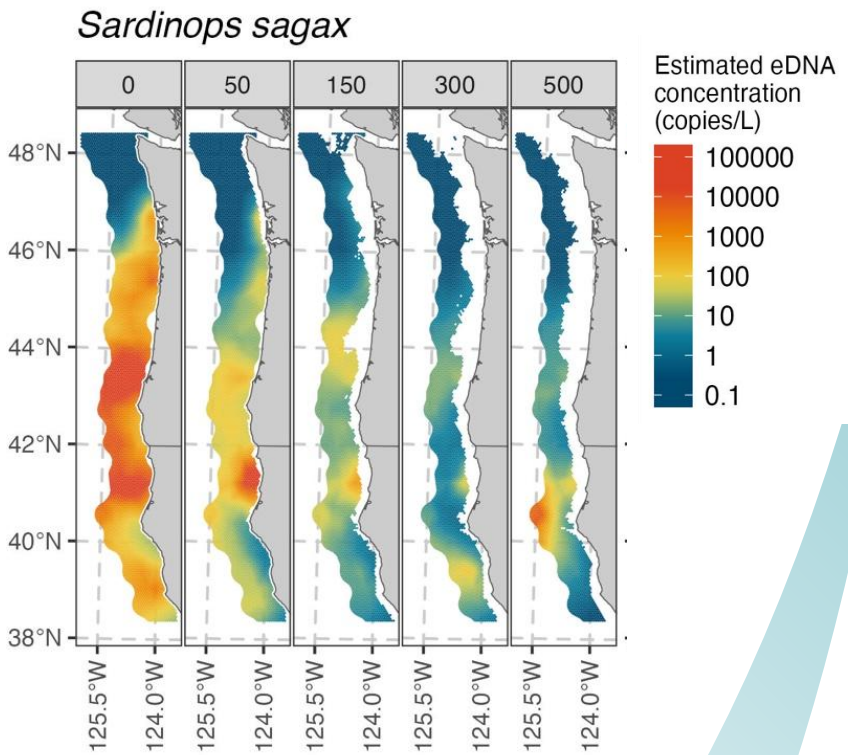
- Drought lessening (Except Southwest)
- MHW likely to remain in the offshore region
    - coastal impacts harder to predict
- Headed into “neutral” ENSO conditions
- Model forecasts suggest lower productivity (and O_2) but are relatively uncertain (~ENSO neutral)

On the horizon

The CCIEA team continually seeks new ways to support climate-ready and ecosystem-based decision making.

Some new ESR-related activities under development include:

- Information on species distributions and abundance derived from eDNA data
- Short reports of ESR indicators tailored to specific stocks (or FMPs) to support risk table development and updates
- Inclusion of fishermen 'on the water' observations in the ESR in partnership with states agencies and Sea Grant (e.g. Fishermen and Scientists Roundtables)



Guri et al. In prep.

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Thank you

NOAA - California Current IEA team

Core Team: Andrew Leising, Mary Hunsicker, Greg Williams, Nick Tolimieri, Amanda Phillips, Lynn Dewitt, Chris Dailey, Isaac Schroeder, and Chris Harvey

Full List of Contributors (it takes a village)

Kelly Andrews, Toby Auth, Tracie Barry, Jack Barth, Kirby Bartlett, Eric Bjorkstedt, Steven Bograd, Anna Bolm, Jerry Borchert, Brian Burke, Megan Cimino, Kelly Corbett, Jeff Cowen, Elizabeth Daly, Lynn deWitt, Meredith Elliott, Blake Feist, Jerome Fiechter, John Field, Jennifer Fisher, Zachary Forster, Chris Free, Matt George, Thomas Good, Christina Grant, Correigh Greene, Chris Harvey, Elliott Hazen, Daniel Holland, Ali Hossain, Matthew Hunter, Lila Isé, Kym Jacobson, Michael Jacox, Jaime Jahncke, Mike Johns, Christy Juhasz, Isaac Kaplan, Stephen Kasperski, William Kennerly, Su Kim, Dan Lawson, Connor Lewis-Smith, Kirsten Lindquist, Jackie Lyndsay, Nate Mantua, Sharon Melin, Monique Messie, Rebecca Miller, Stephanie Moore, Cheryl Morgan, Barbara Muhling, Stuart Munsch, Shannon Murphy, Karma Norman, Rachael Orben, Julia Parrish, Scott Pearson, Stephen Pierce, Antonella Preti, Josiah Renfree, Travis Richards, Roxanne Robertson, Tanya Rogers, Jan Roletto, Dan Rudnick, Lauren Saez, Keith Sakuma, Jameal Samhouri, Jarrod Santora, Isaac Schroeder, Kayleigh Somers, Beckye Stanton, Kevin Stierhoff, William Sydeman, Andrew Thompson, Sarah Ann Thompson, Duy Truong, John Wallace, Amanda Warlick, Peter Warzybok, Brian Wells, Curt Whitmire, Jen Zamon, Samantha Zeman, Vanessa Zubkousky-White, Juan Zwolinski

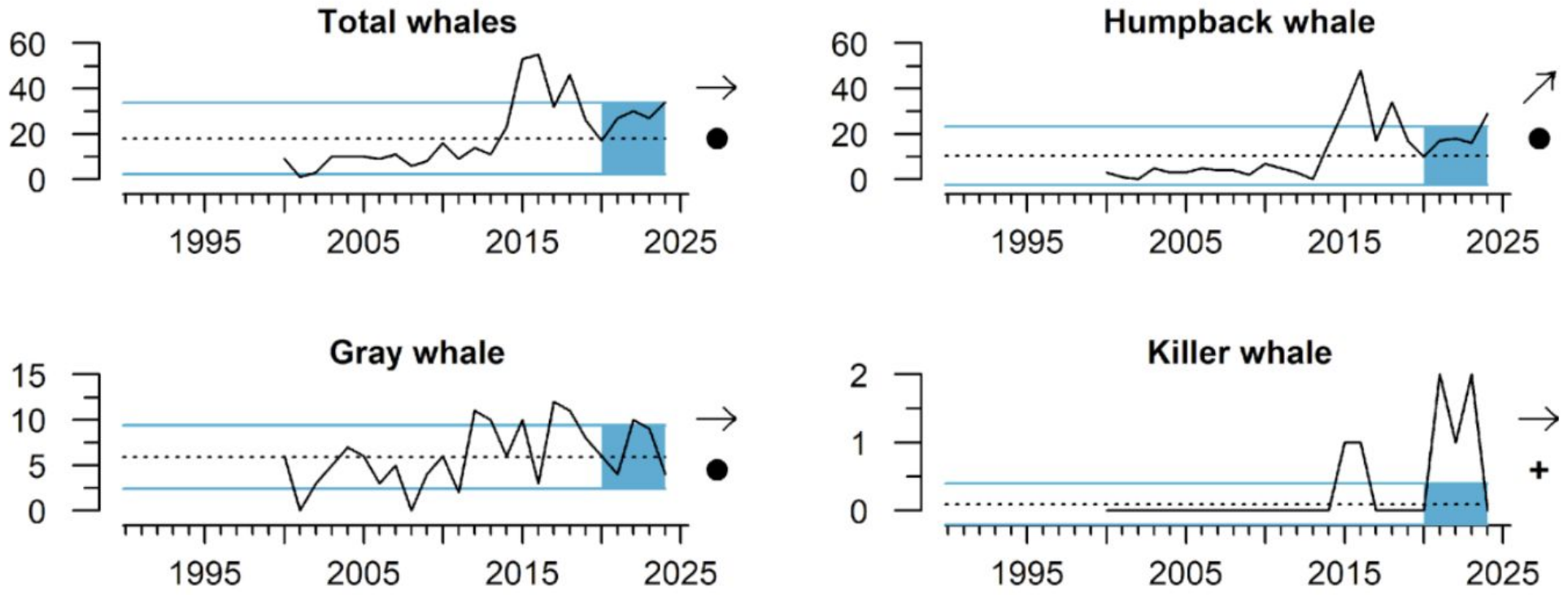
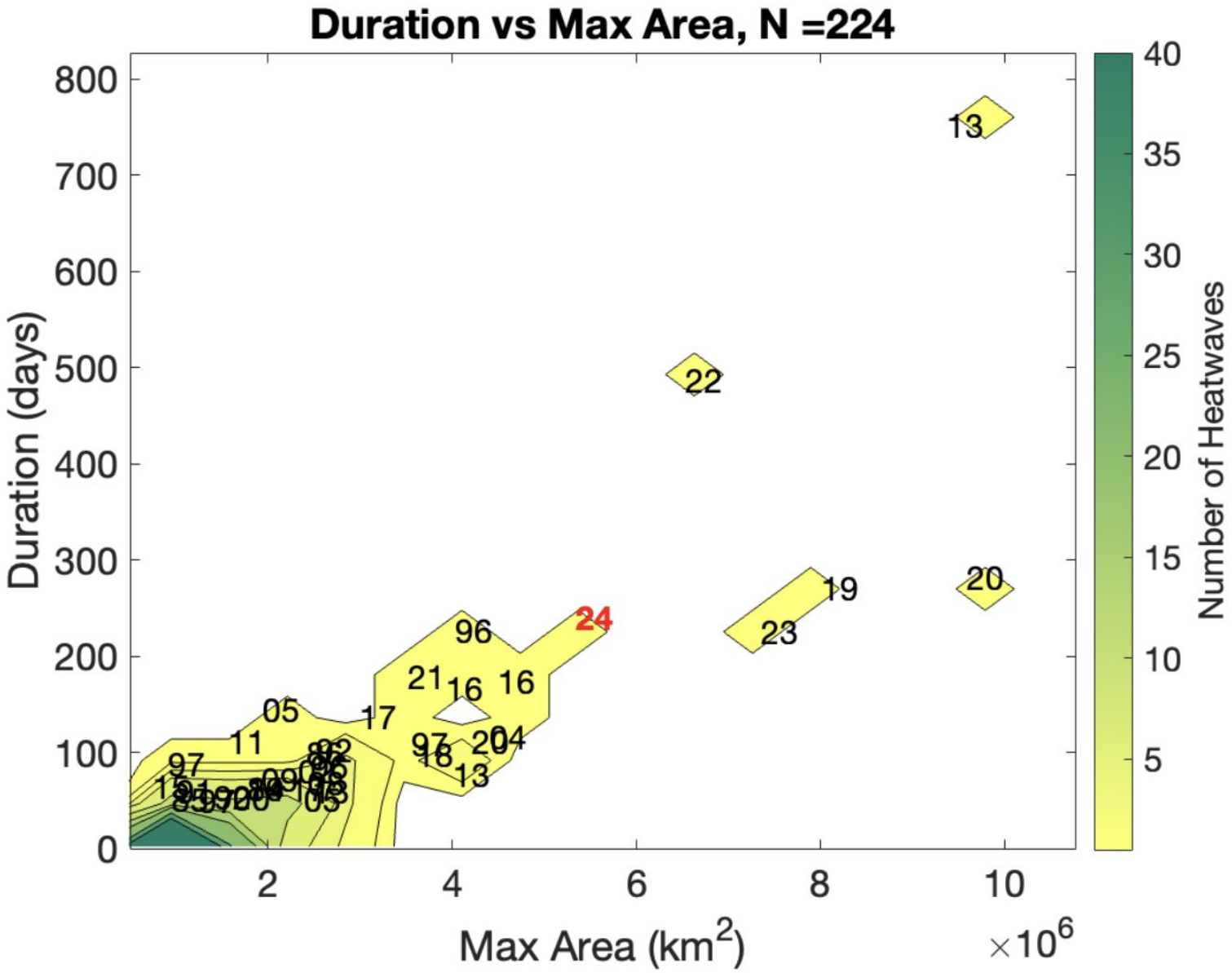


Figure 3.15: Numbers of reported entanglements for selected species (alive and dead) in fishing gear along the West Coast from 2000 - 2024. No killer whale entanglements have been associated with the endangered Southern Resident population. 2024 data are preliminary.



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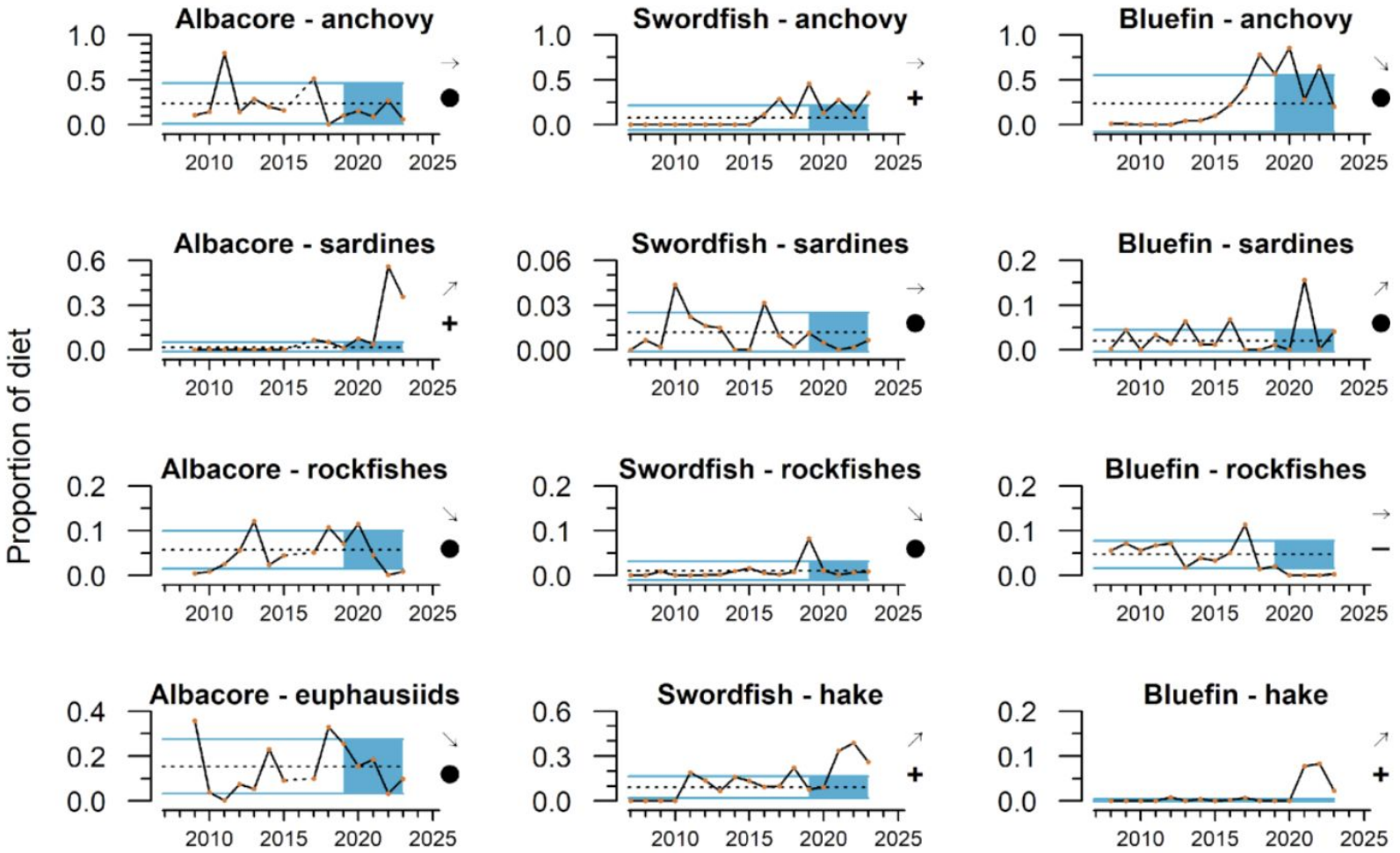
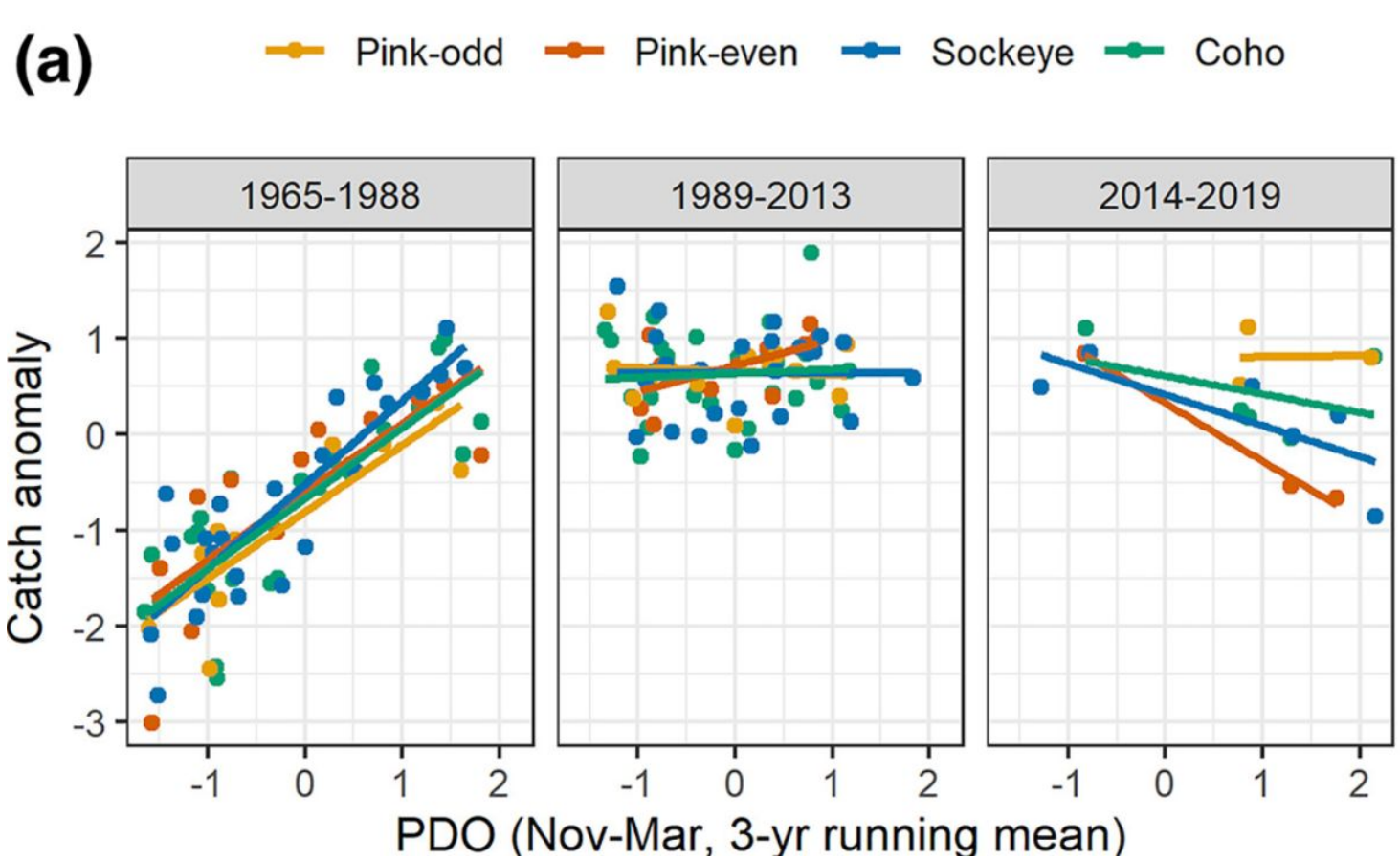
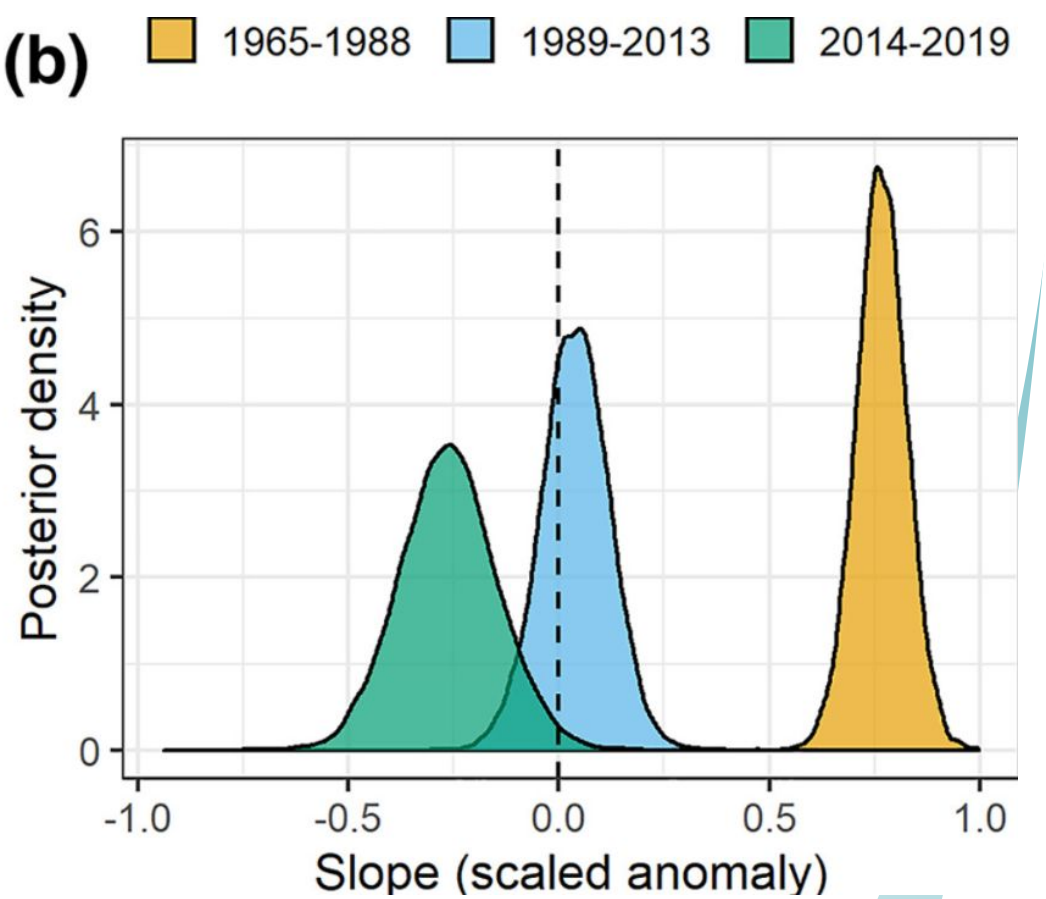


Figure 3.12: Diets of albacore tuna, swordfish, and bluefin tuna sampled from commercial and recreational fisheries in the CCE, 2008 - 2023. Data are proportional contributions of four key prey classes. Lines, colors, and symbols are as in Fig. 2.1.





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