

Ecosystem Status Report: Gulf of Alaska 2024

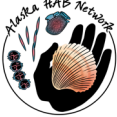


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GOA 2024: Key Messages

1. Long-term trends in oceanography and groundfish community

- Warming through water column, less saline at surface & more at depth
- Groundfish dominated by planktivorous predators; total consumption consistent
- Response to 2014-2016 MHW still observed

2. Winter 2024: moderate El Niño in GOA

- Some oceanographic responses; No ecological shocks

3. Above-average, spatially consistent (where data available) pelagic prey base (zooplankton, forage fish); increased from 2023

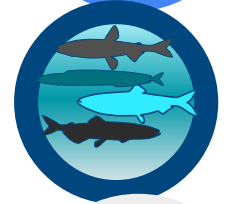
- Potentially good larval & adult feeding conditions for numerous groundfish species

4. Low pink salmon returns

- Coastal shelf environment and potential competition in ocean gyre

5. Looking ahead to 2025 (La Niña)

- Neutral to cooling 2025 SST; 2024 good prey and fall temperature leading into 2025)



GOA Full & Update Assessment Risk Tables: Environmental/ Ecosystem Considerations

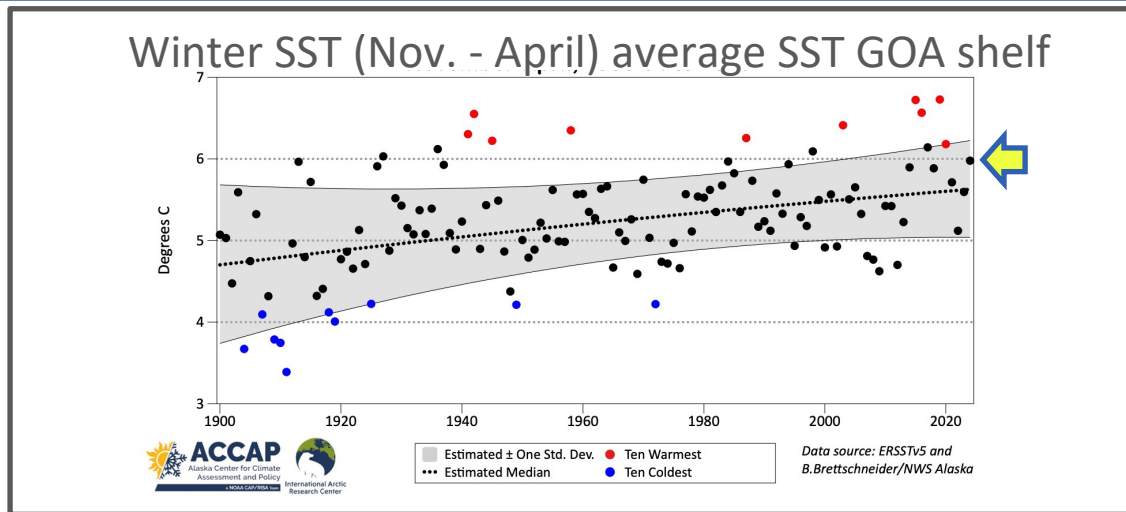
Level 1

*(No apparent environmental/
ecosystem concerns)*

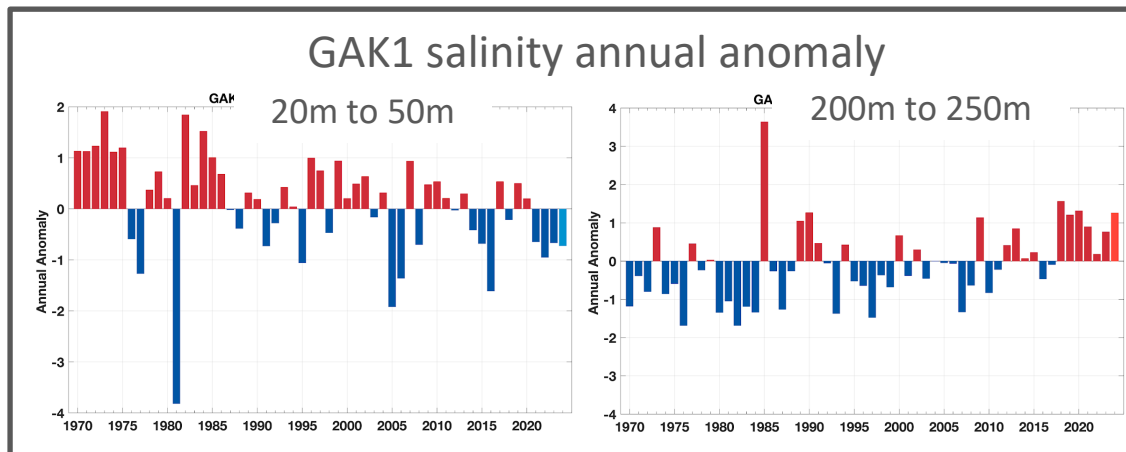
1. Walleye pollock (+ESP)
2. Pacific cod (+ESP)
3. Sablefish (statewide) (+ESP)
4. Dusky rockfish
5. Northern rockfish
6. Demersal shelf rockfish
7. Thornyhead rockfish

Key Message 1. Long-term Trends: Oceanography

1. Warming of GOA shelf surface waters in winter and summer: 2024 warm winter (R. Thoman, S. Danielson)



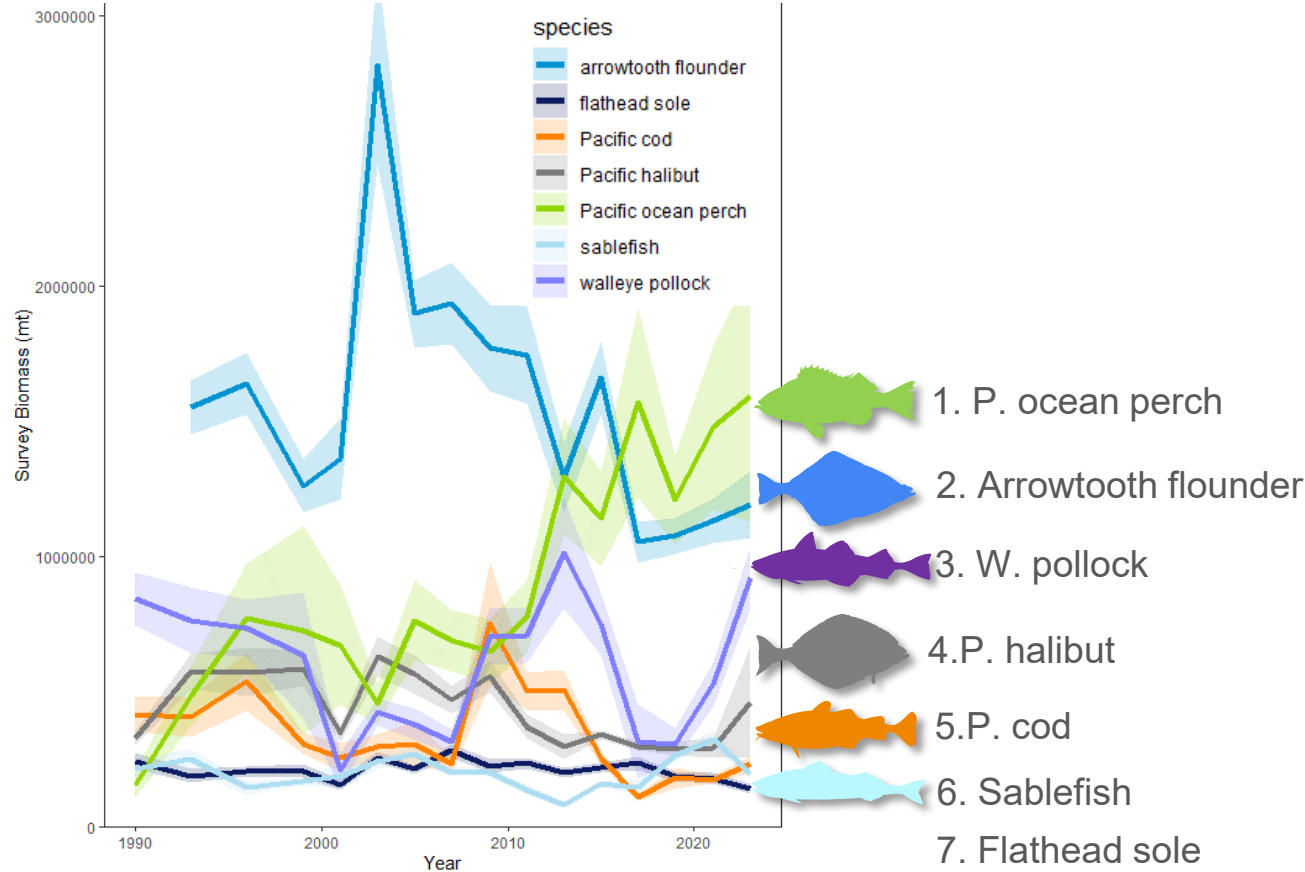
2. Less saline at surface and more saline at depth (GAK1) (S. Danielson)



Key Message 1. Long-term Trends: Shifting Groundfish Community

NOAA bottom trawl survey-estimated biomass (mt) top GOA groundfish species through 2023

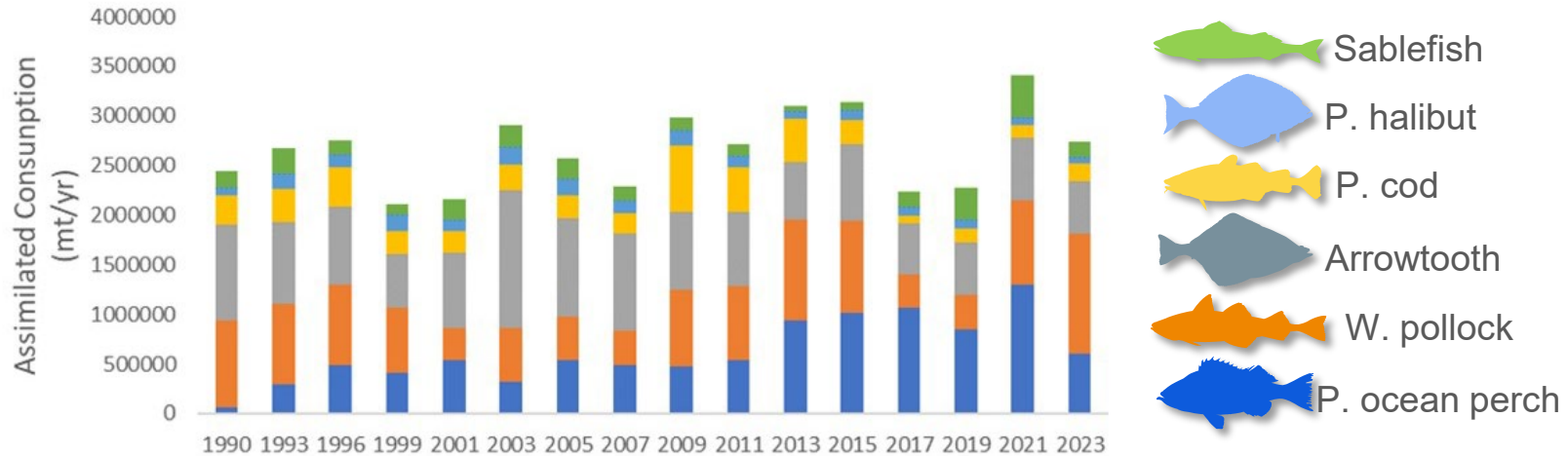
M. Callahan
L. Barnett



- Planktivorous predators (POP, pollock) dominate top groundfish biomass (add pink salmon in odd years)
- POP replaced arrowtooth flounder as most dominant by biomass in 2017

Key Message 1. Long-term Trends: Groundfish carrying capacity?

K. Aydin



- Fairly consistent total consumption by key groundfish over time series

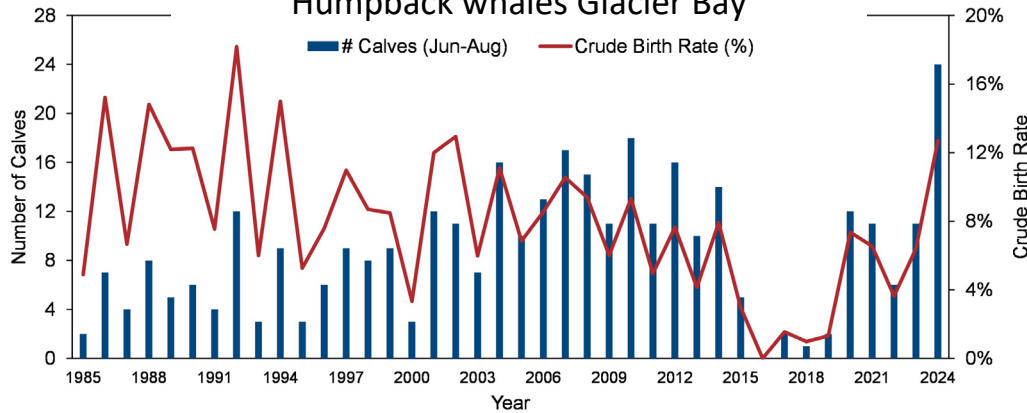
Key prey groups:

- P. ocean perch: mesozooplankton, copepods
- Arrowtooth flounder – pelagic foragers, shrimp, mesozooplankton
- W. pollock: mesozooplankton, pelagic foragers, copepods, shrimp
- P. halibut: Motile epifauna, pelagic foragers
- P. cod: pelagic foragers, motile epifauna, shrimp, infauna
- Sablefish: pelagic foragers, motile epifauna, infauna, mesozooplankton

Key Message 1. Ongoing responses to 2014-2016 MHW

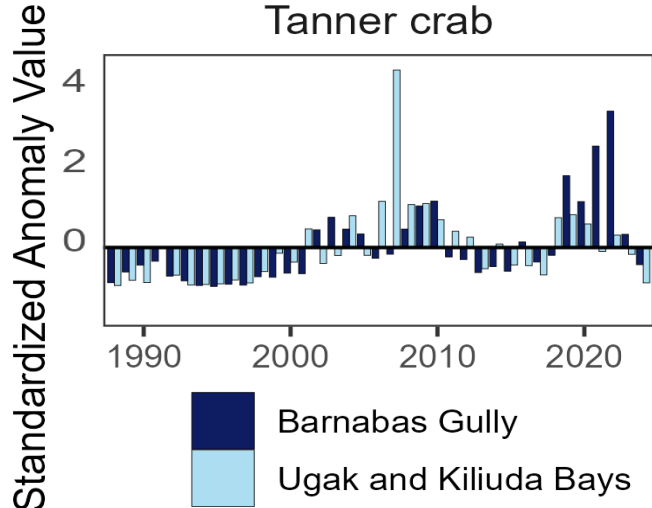
C. Gabriele, J. Neilson, H. Hoffbauer, C. Worton

Humpback whales Glacier Bay



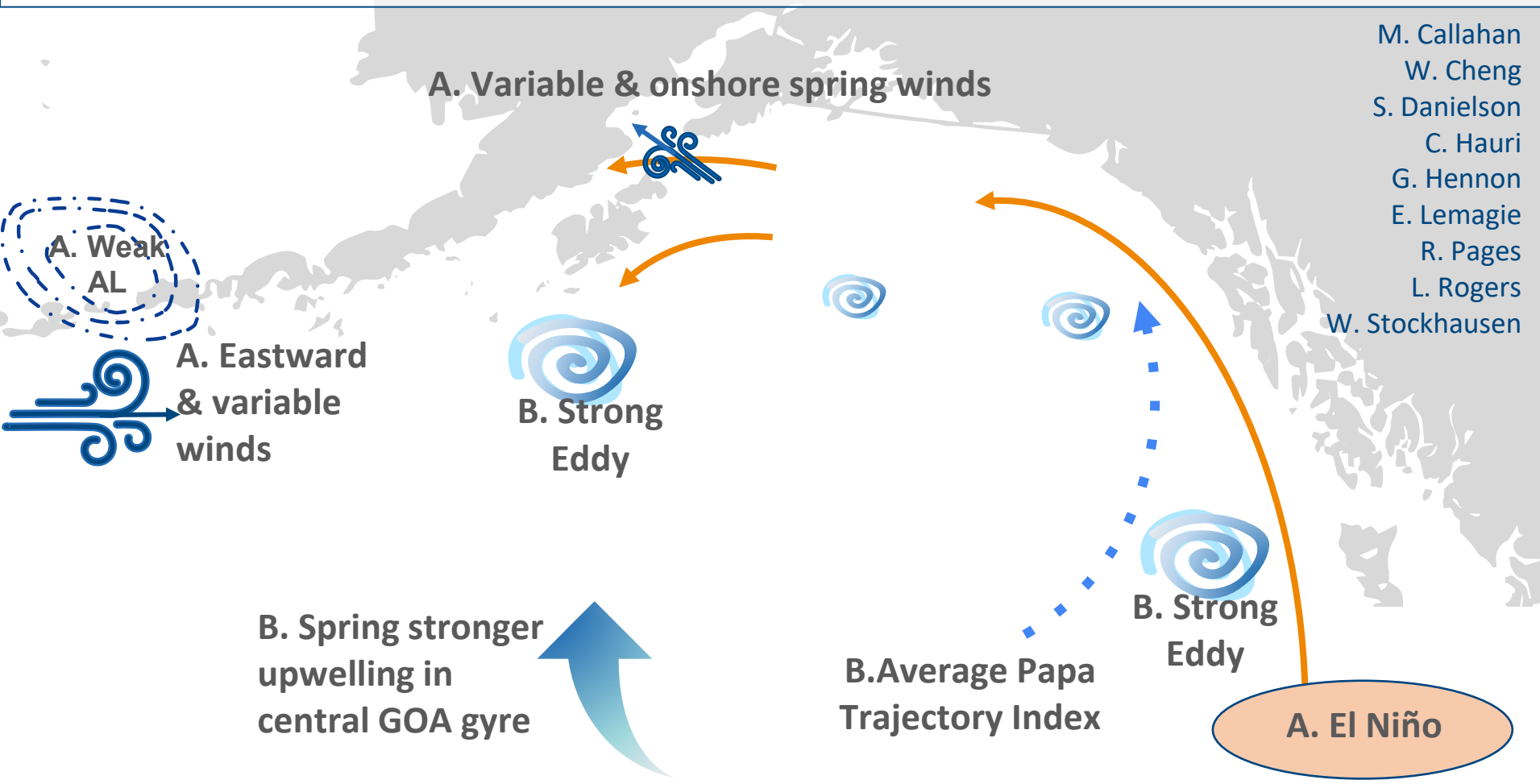
- Humpback whale crude birth rate returned to pre-2014 levels
- Capelin continues to be observed in ecosystem (2nd year)
- Tanner crab declining around Kodiak (2019 large year class)

Tanner crab



Key Message 2. Moderate El Niño in GOA (oceanography) 2024

M. Callahan
W. Cheng
S. Danielson
C. Hauri
G. Hennon
E. Lemagie
R. Pages
L. Rogers
W. Stockhausen



Key Message 2. Moderate El Niño in GOA (ecology) 2024

T. Farrugia, H. Coletti, B. Drummond, S. Whelan

1. Harmful algal blooms: no increase in intensity, frequency, duration (*AK Harmful algal bloom collab.*)
2. Intertidal communities maintained local variability (*NPS*)
3. No large-scale seabird die-offs; seabird productivity was average/above average (*COASST, USFWS, Middleton Isl.*)

➤ Revisiting 2023 predictions of 2024 El Niño potential impacts. Will know more in 2025 but...

Predicted Benefit (*incr. cross shelf transport, favorable EGOA late spring, summer warm SST*)? ✓ **True?**

- Larval/juv. ATF, rex sole, P. halibut, rockfish, sablefish (slope spawned larvae) (*larval transport*)
- Larval rockfish and sablefish (*warm waters*)

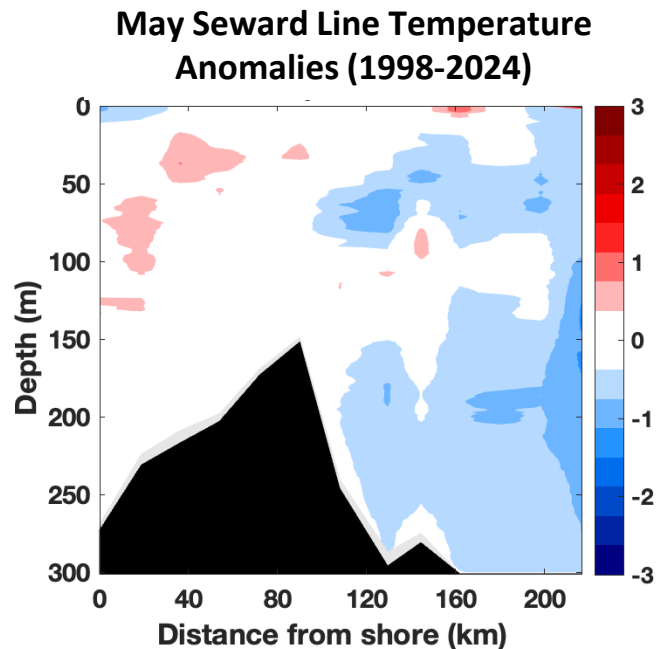
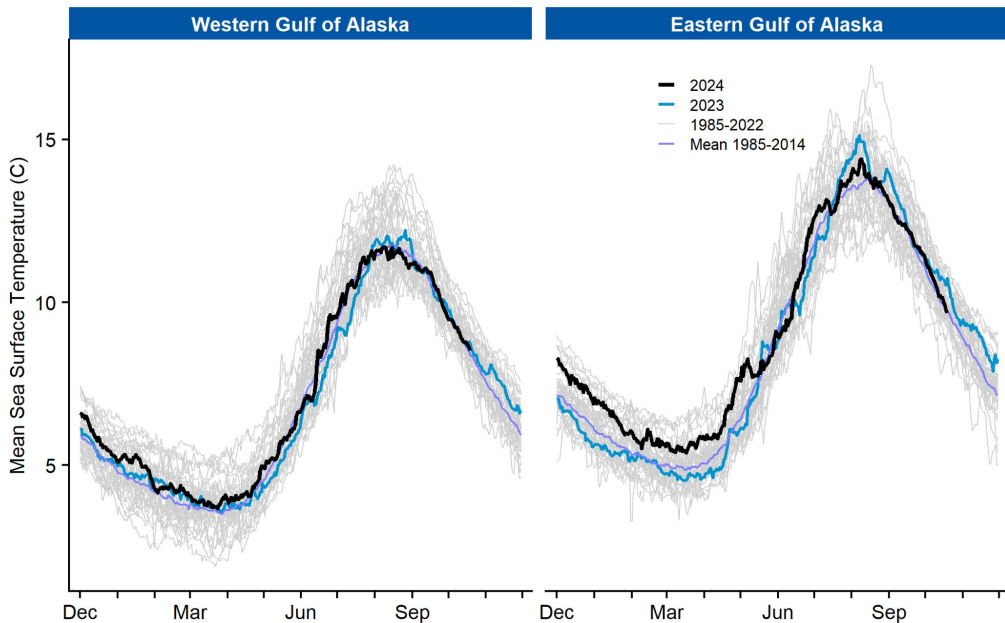
Predicted Vulnerable (*spring SST too high & persists; and reduced zooplankton*)? ✗ **Not true?**

- Larval/juv. P. cod, walleye pollock, and northern rock sole
- Adult walleye pollock, Pacific Ocean perch, dusky & northern rockfish
- Deeper adult habitat could warm if heat event persists

Key Message 2. Temperature 2024- some warmth at surface

E. Lemagie & M. Callahan
S. Danielson et al.

- Sea surface temperature:
- WGOA: warm winter, average spring, summer & fall
- EGOA: warm winter & spring, average warm summer, average fall
- Ocean temperature shelf bottom: average to cooler (winter and spring)



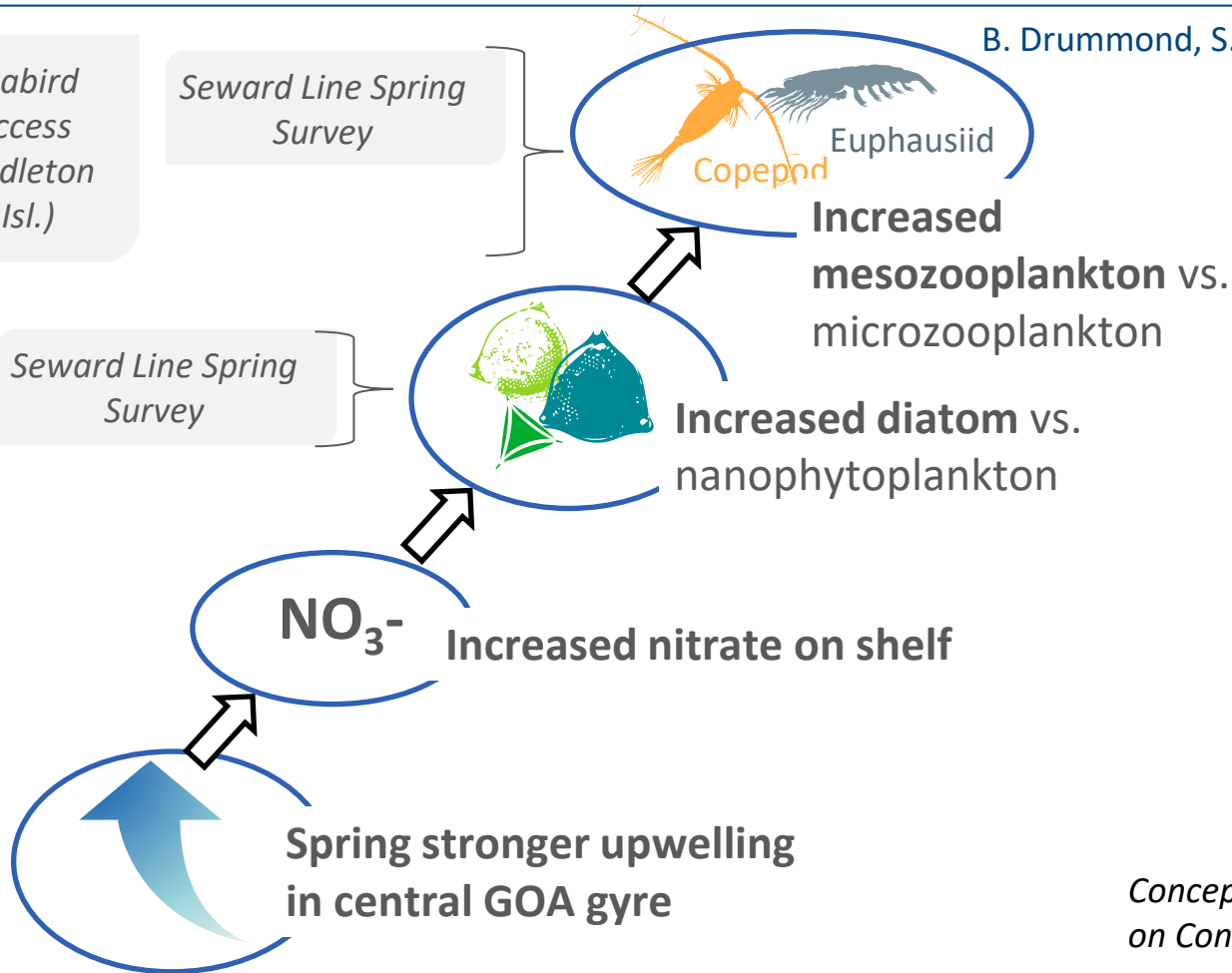
Key Message 3. Above-average productivity 2024: Primary and secondary

Planktivorous seabird reproductive success
(Chowiet Isl., Middleton Isl., St. Lazaria Isl.)

Seward Line Spring Survey

Seward Line Spring Survey

North Gulf of Alaska Oscillation Index



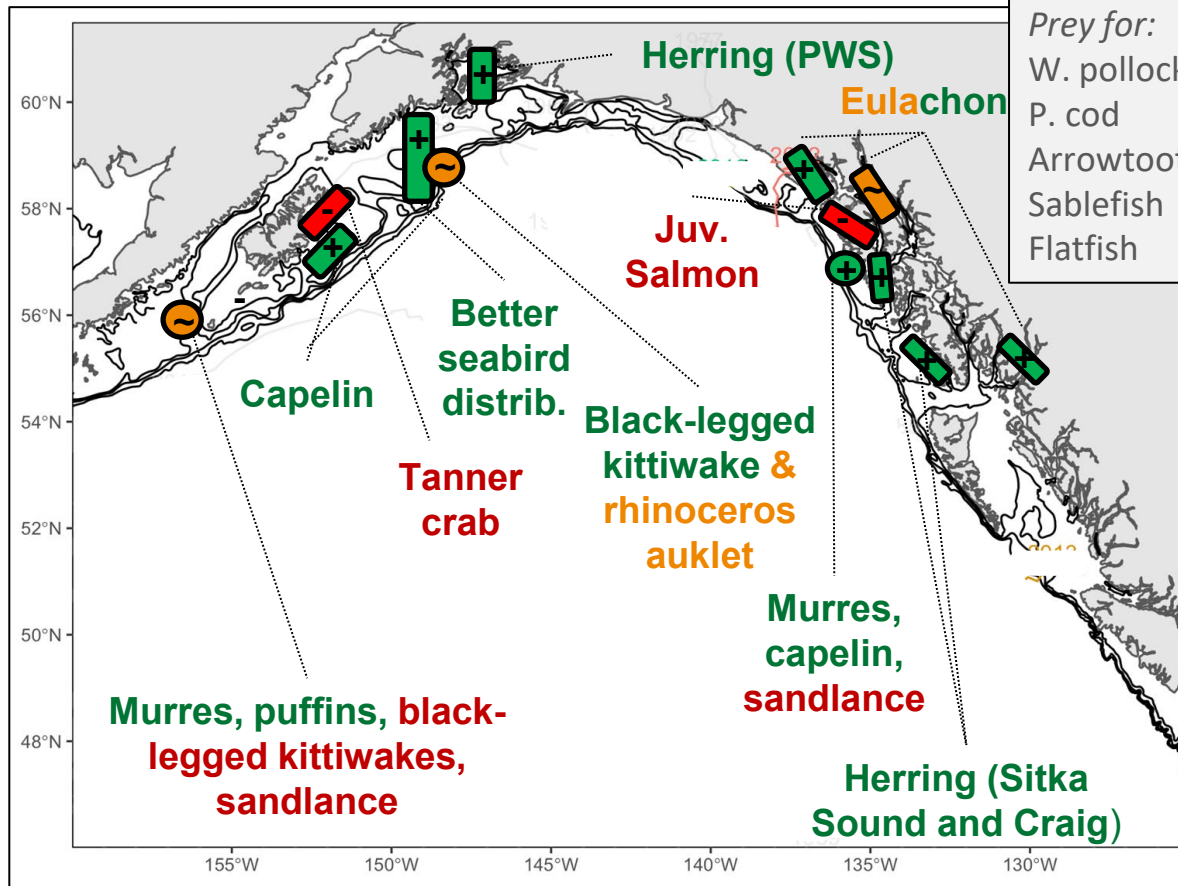
B. Drummond, S. Whelan, M. Arimitsu
G. Hennon
R. Hopcroft
R. Pages, C. Hauri

Prey for:
W. pollock
P. ocean perch
Dusky rockfish
N. rockfish
Juv. groundfish

Conceptual model based
on Conte et al. 2024

Key Message 3. Forage fish average/above-average 2024

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



Prey for:
W. pollock
P. cod
Arrowtooth fl.
Sablefish
Flatfish

- Survey baselines from 1990's/early 2000's to present)
- Average to above average
- Incr.: capelin, herring, some eulachon
- Decr.: sandlance, juv. salmon, Tanner crab

Legend

- █ Surveys
- Seabird Reproductive Success
- + Above Average
- ~ Average
- Below Average

Key Message 4: Low Pink Salmon Returns 2024

A. Whitehouse, E. Fergusson, W. Strasburger

- Some of lowest pink salmon returns since 1985; driven by Prince William Sound

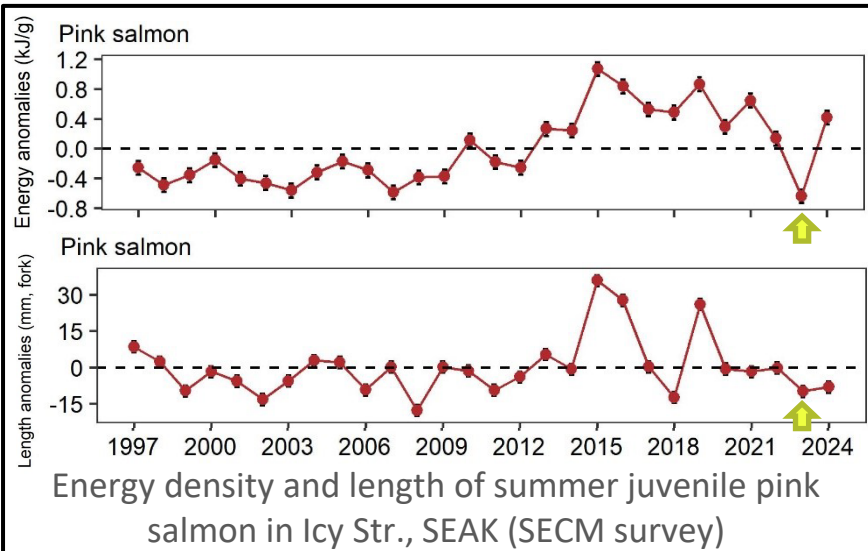
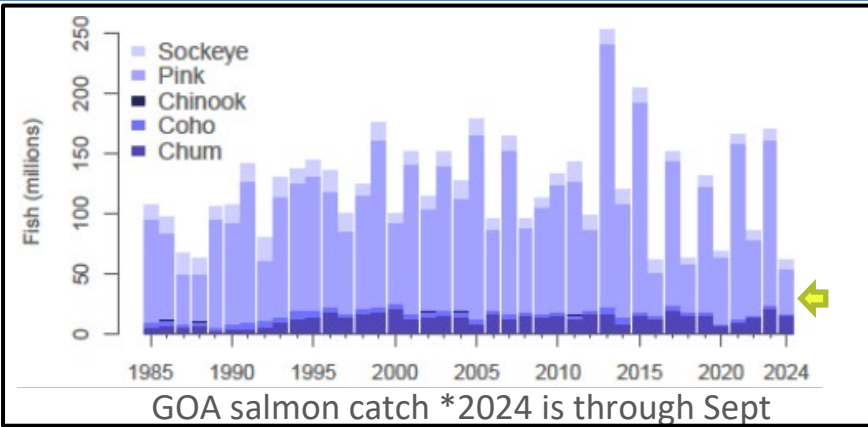
✗ Freshwater (Affected hatchery and wild stocks)

✓ Nearshore (2023)

- Low zooplankton biomass but elevated large copepod biomass
- SEAK juv. pinks were smaller and lower energy density
- SEAK forecast (based on previous year juvenile survey) was more accurate than other AK (based on 2 year previous returns)

? Ocean (2023/2024)

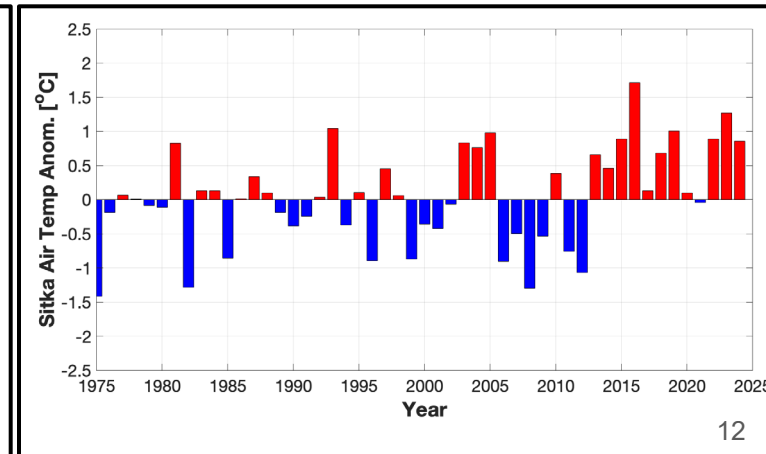
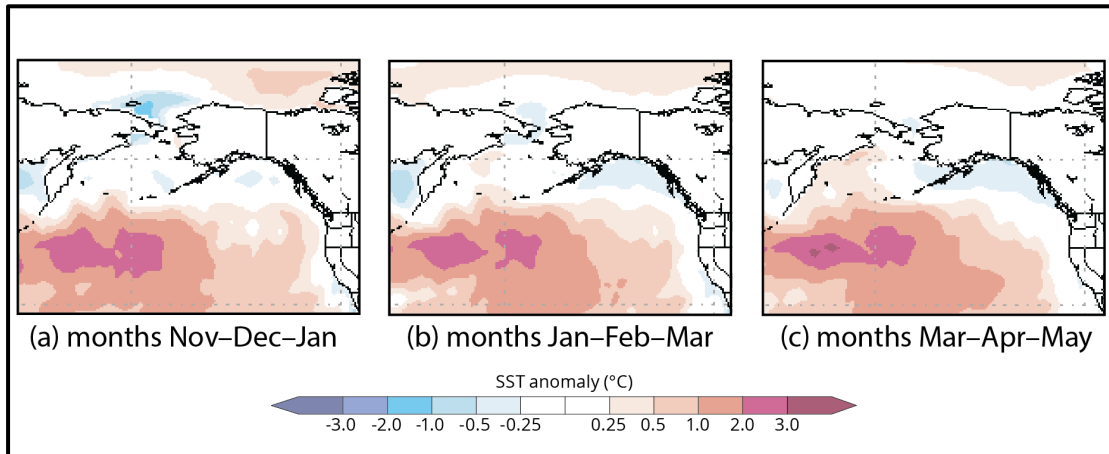
- Competition with hatchery fish and with 2023 large cohort of returning adults (Ruggerone et al., 2023, Connors et al. 2024)



Key Message 5: Looking ahead to 2025 (La Niña): cool-ish SST

E. Lemagie, S. Bell, T. Hennon, S. Danielson

- National Multi-Model Ensemble predict cooler sea surface temperatures in winter/spring 2025 (baseline: 1991-2020)
- Sitka prediction – GAK1 warmer than average but perhaps cooler than could be
- Groundfish entering 2025 from average fall temperatures average to above-average pelagic prey resources



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