

Ecosystem & Socioeconomic Profile: EBS Pacific Cod Report Card

Kalei Shotwell and Russel Dame, November Groundfish Plan Team 2024

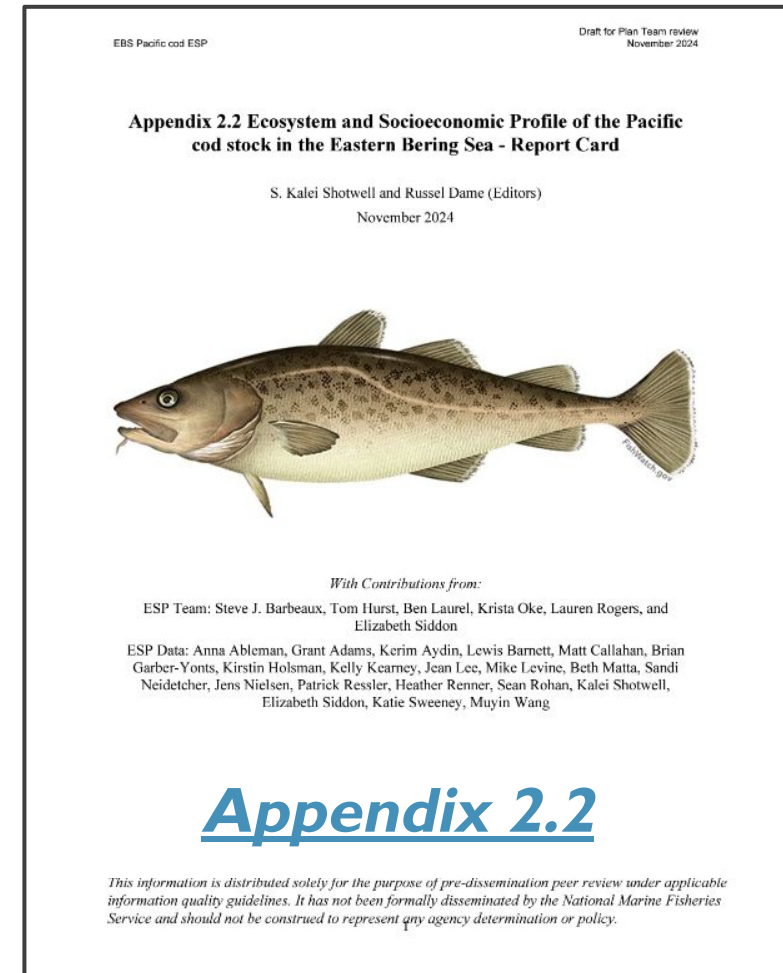


ESP Team and Contributors: Anna Ableman, Grant Adams, Kerim Aydin, Steven Barbeaux, Lewis Barnett, Matt Callahan, Curry Cunningham, Brian Garber-Yonts, Kirstin Holsman, Tom Hurst, Kelly Kearney, Ben Laurel, Jean Lee, Mike Levine, Beth Matta, Sandi Neidetcher, Jens Nielsen, Krista Oke, Patrick Ressler, Heather Renner, Lauren Rogers, Sean Rohan, Elizabeth Siddon, Katie Sweeney, Muyin Wang

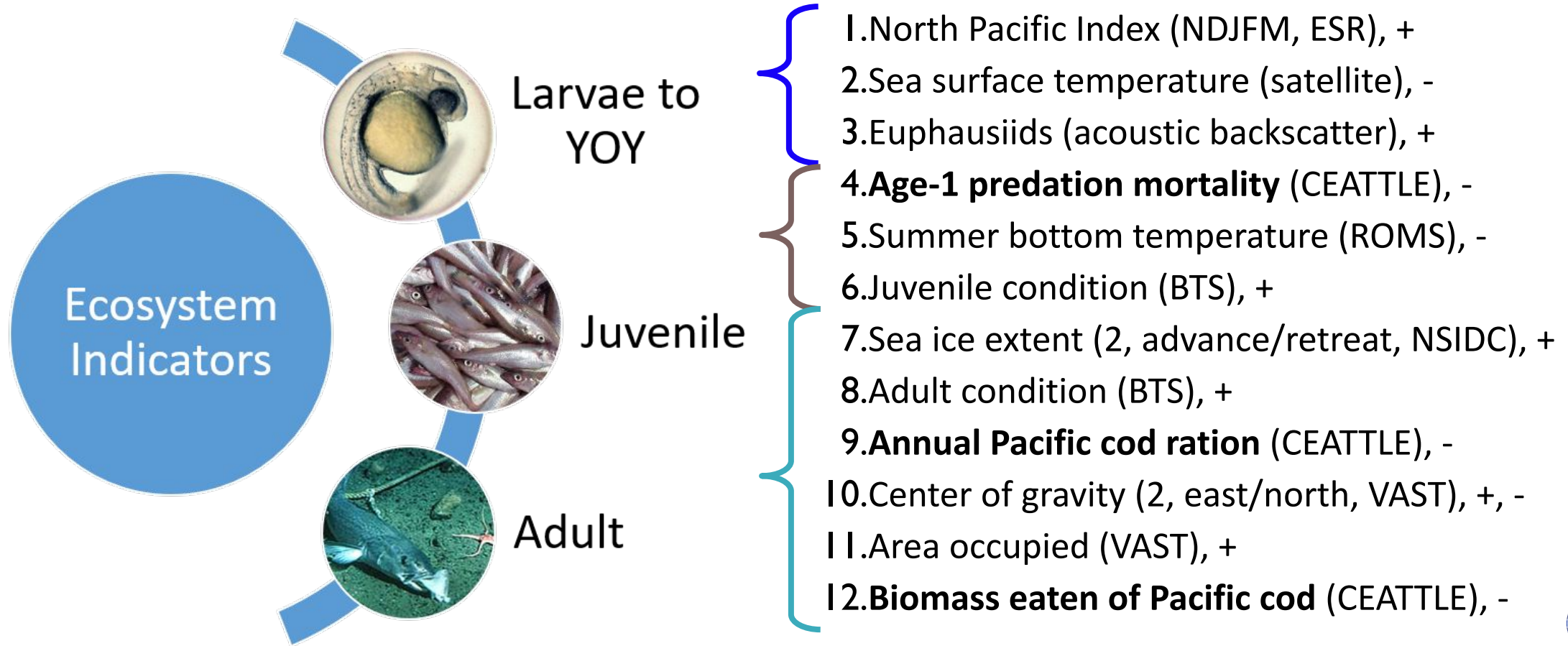


Overview

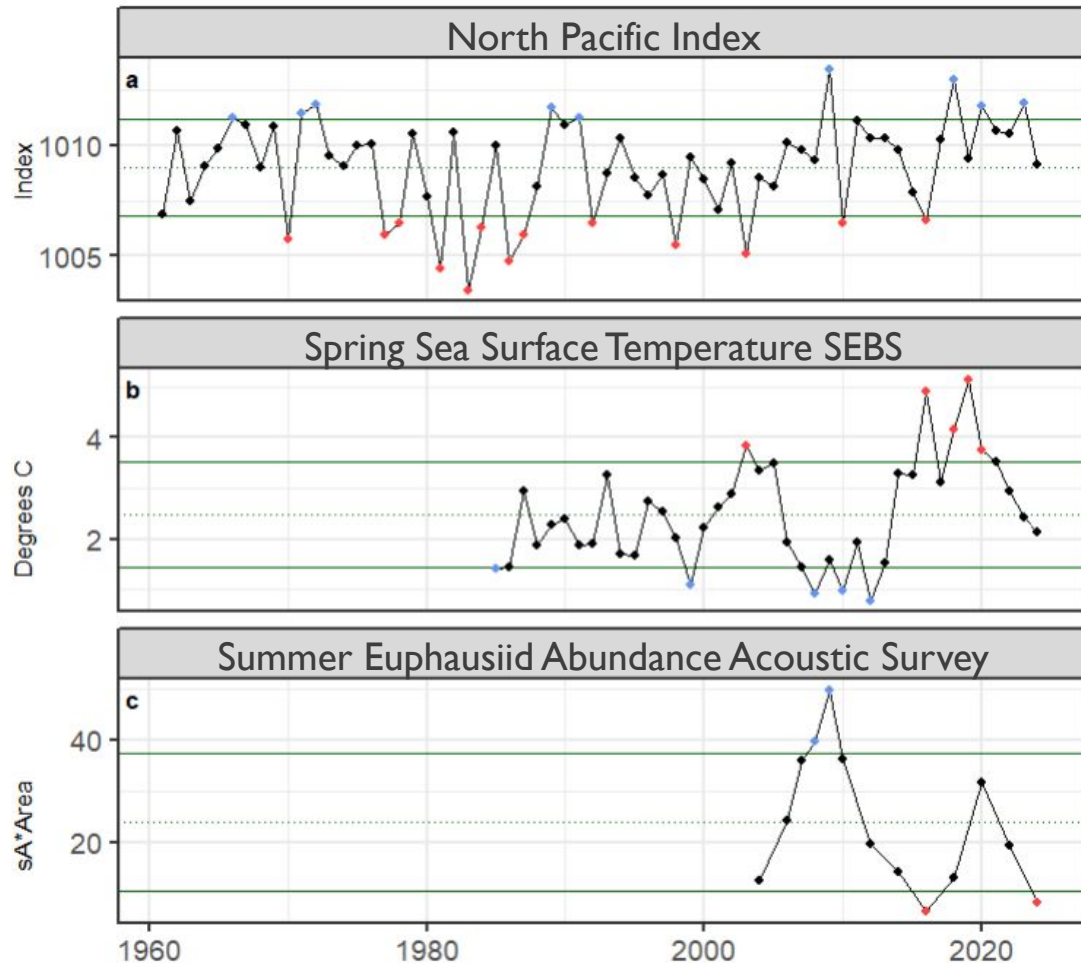
- Appendix 2.2 in SAFE Report
 - Draft and full ESP in 2020-2021
 - Report Cards in 2021-2024
- Report Card in 2024
 - Updated organization, new categories for ecosystem, new, modified, and removed indicators
 - CEATTLE model and indicators updated to 2024 results



Ecosystem Indicators

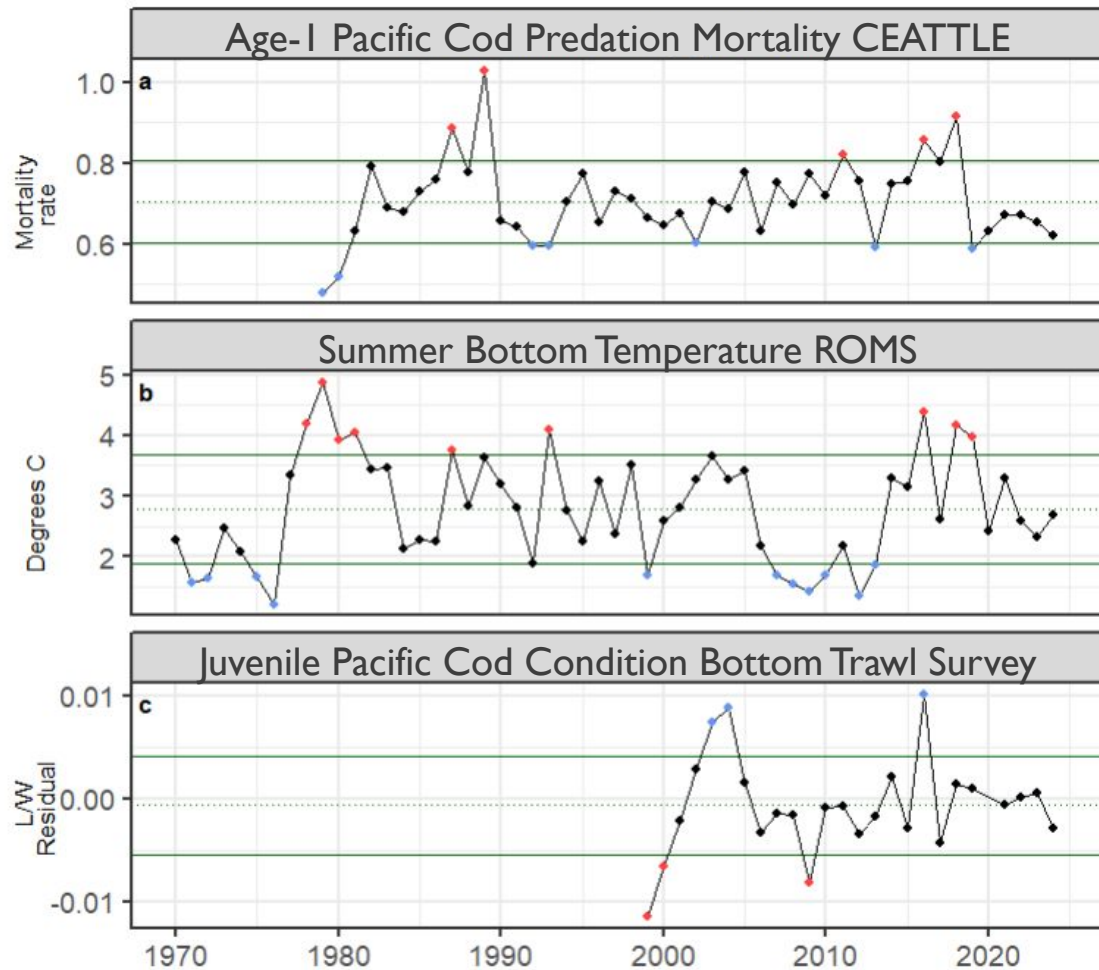


Larval Indicators



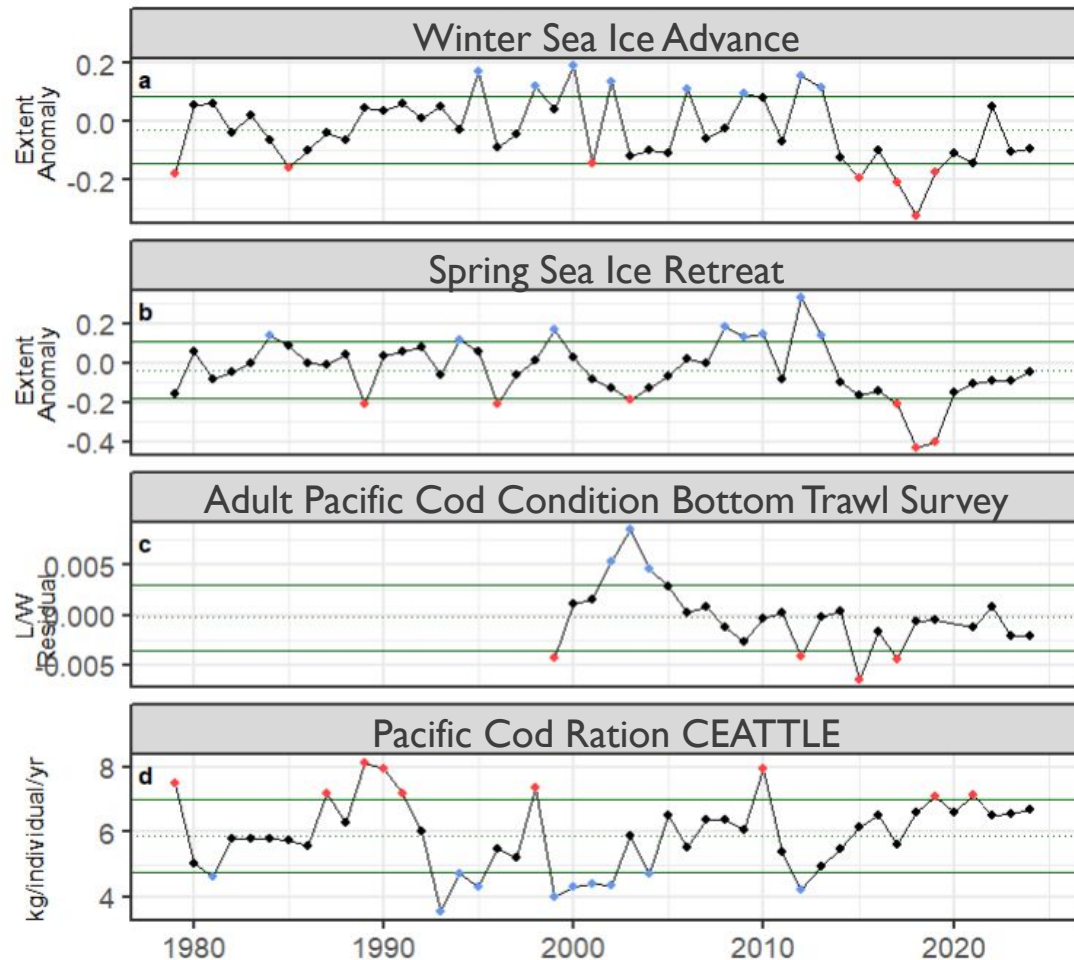
- The North Pacific Index returned to near average signifying moderate atmospheric conditions of a normal Aleutian Low, neither stormy or calm
- Spring surface temperature continues to decrease to cool conditions and is now slightly below average but there was a sharp decline to low for the euphausiid abundance from the summer acoustic surveys

Juvenile Indicators



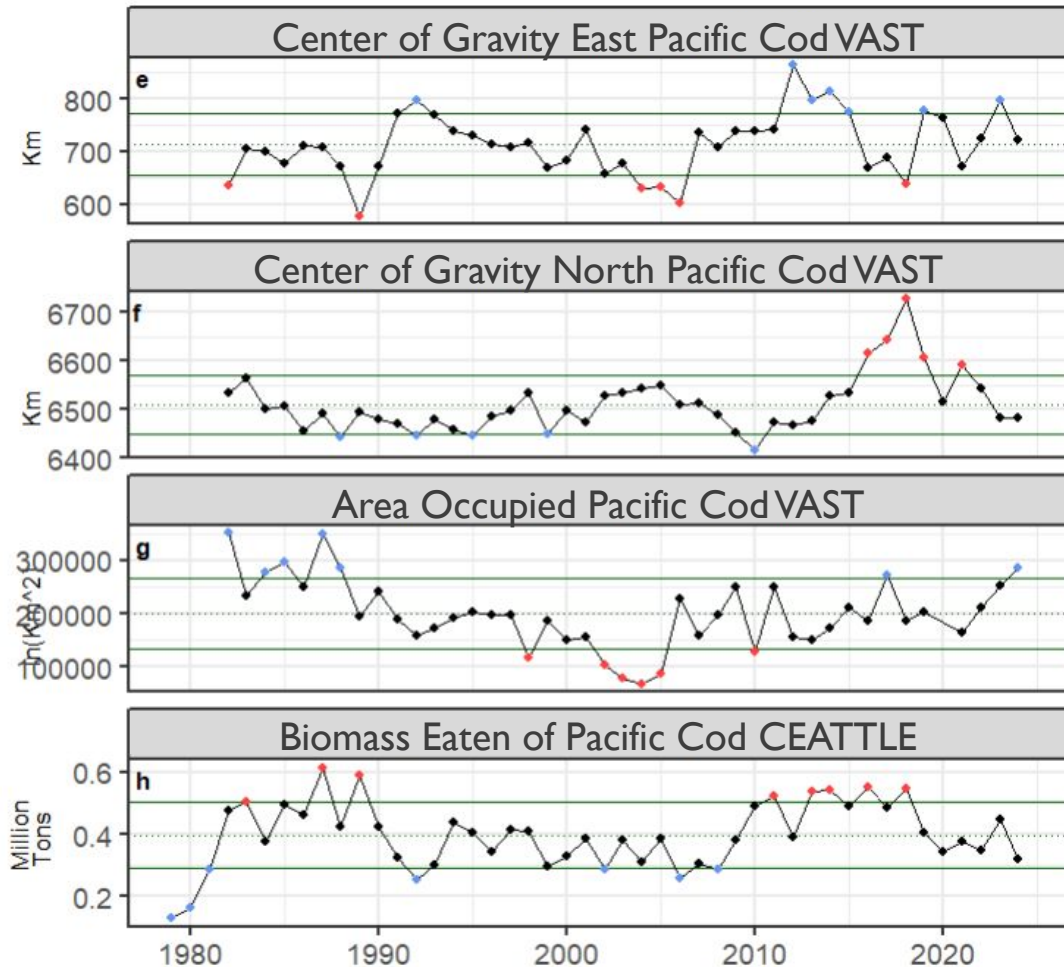
- Evidence of time-varying total mortality for age-1 Pacific cod multispecies model, 2024 below average
- Bottom temperatures from the ROMS hindcast highly correlated with surface but cool faster than surface throughout the recent cooling trend since 2020 and are now slightly below average
- Juvenile Pacific cod condition < to below average, could signify poor feeding conditions potentially related to expanding area occupied since 2021

Adult Indicators



- Winter sea-ice extent during the advance season remains below average, while ice extent during the spring retreat season has increased since 2020 and is now near average, implications on spawn timing
- Annual predation demand (ration) trending upward for the past decade, implying higher energetic needs throughout the warm years, partially explain the average to below average adult condition since 2007

Adult Indicators



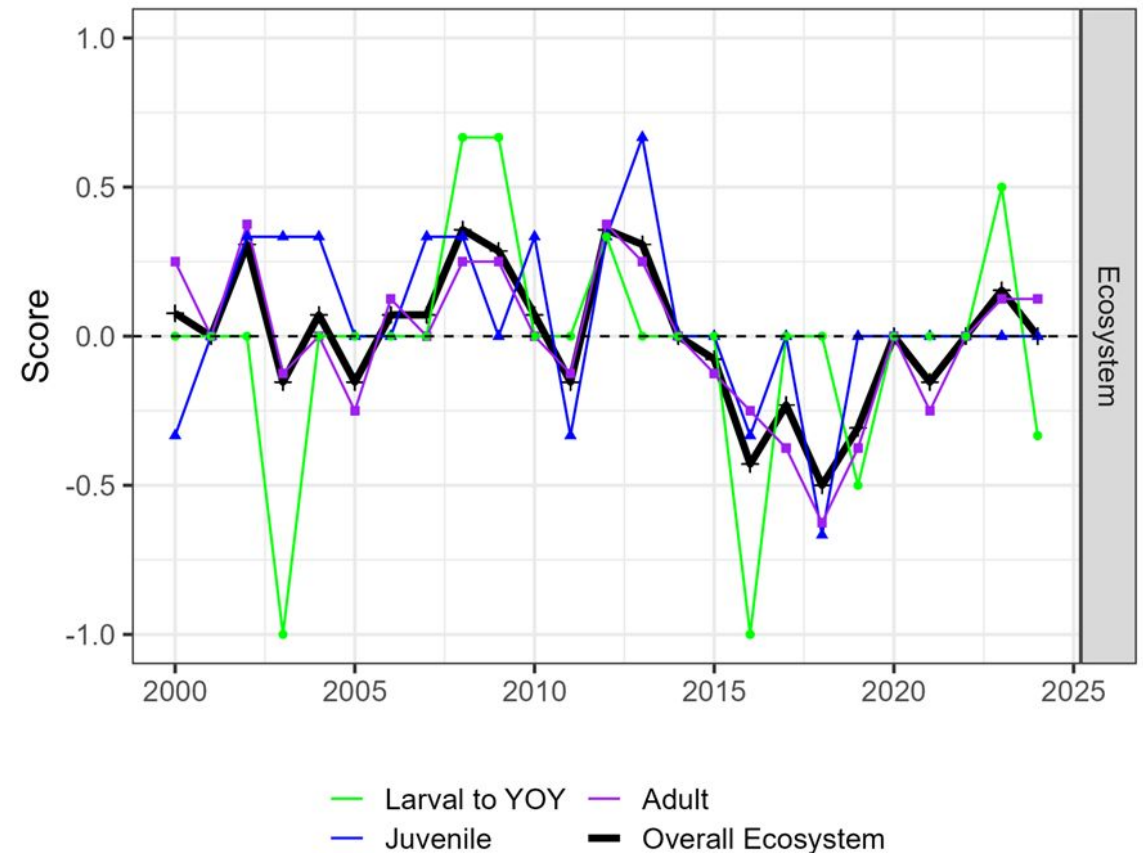
- Center of gravity estimates suggest the Pacific cod population has moved southwest from 2023, with above average area occupied, ~2011
- Declines in total predator biomass contribute to net decrease in total biomass eaten of Pacific cod from 2019-2024 relative to the previous decade and may indicate favorable top-down conditions for juvenile groundfish survival

Ecosystem Summary Table

Indicator category	Indicator	2020 Status	2021 Status	2022 Status	2023 Status	2024 Status
Larval_YOY	Winter Spring North Pacific Index Model	high	neutral	neutral	high	neutral
	Spring Summer Temperature Surface SEBS Satellite	high	neutral	neutral	neutral	neutral
	Summer Euphausiid Abundance EBS Survey	neutral	NA	neutral	NA	low
Juvenile	Pacific Cod Predation Mortality Age1 EBS Model	neutral	neutral	neutral	neutral	neutral
	* Summer Temperature Bottom SEBS Model	neutral	neutral	neutral	neutral	neutral
	Summer Pacific Cod Condition Juvenile EBS Survey	NA	neutral	neutral	neutral	neutral
Adult	Winter Sea Ice Advance BS Satellite NSIDC	neutral	neutral	neutral	neutral	neutral
	Spring Sea Ice Retreat BS Satellite	neutral	neutral	neutral	neutral	neutral
	Summer Pacific Cod Condition Adult EBS Survey	NA	neutral	neutral	neutral	neutral
	Annual Ration Pacific Cod EBS Model	neutral	high	neutral	neutral	neutral
	Summer Pacific Cod Center Gravity East EBS Model	neutral	neutral	neutral	high	neutral
	Summer Pacific Cod Center Gravity North EBS Model	neutral	high	neutral	neutral	neutral
	Summer Pacific Cod Area Occupied EBS Model	NA	neutral	neutral	neutral	high
	Annual Biomass Consumed Pacific Cod EBS Model	neutral	neutral	neutral	neutral	neutral

Indicator Monitoring Analysis: Traffic Light

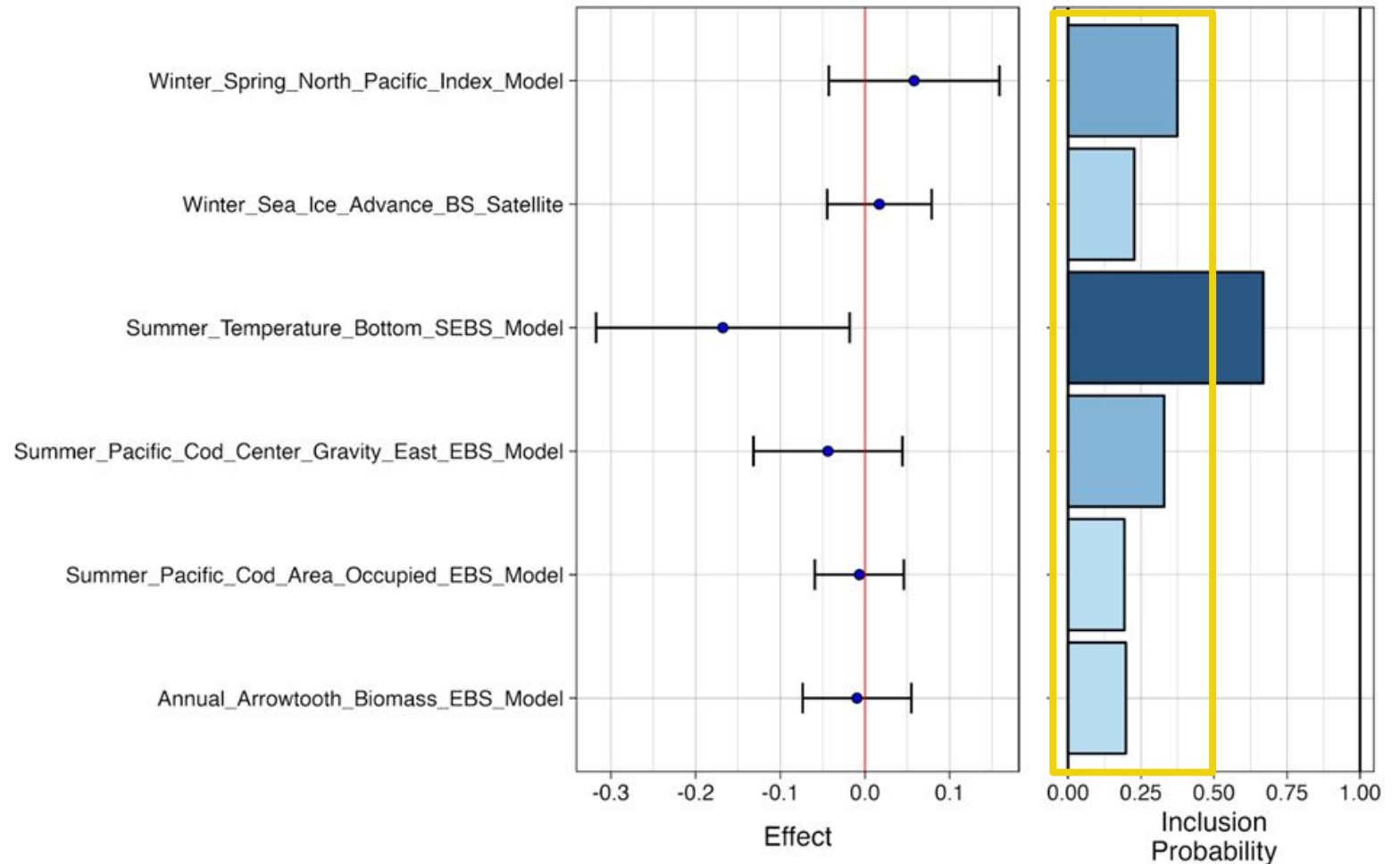
- Overall
 - 14 of 14 indicators updated
 - Decrease from above average to average
- Category
 - Larval to YOY < from above average to below average
 - Juvenile remained average
 - Adult remained above average



Indicator Monitoring Analysis: Importance

One indicator with importance > 0.5 , same:

- Summer bottom temperature SEBS from ROMS
- 1985-2019 year class



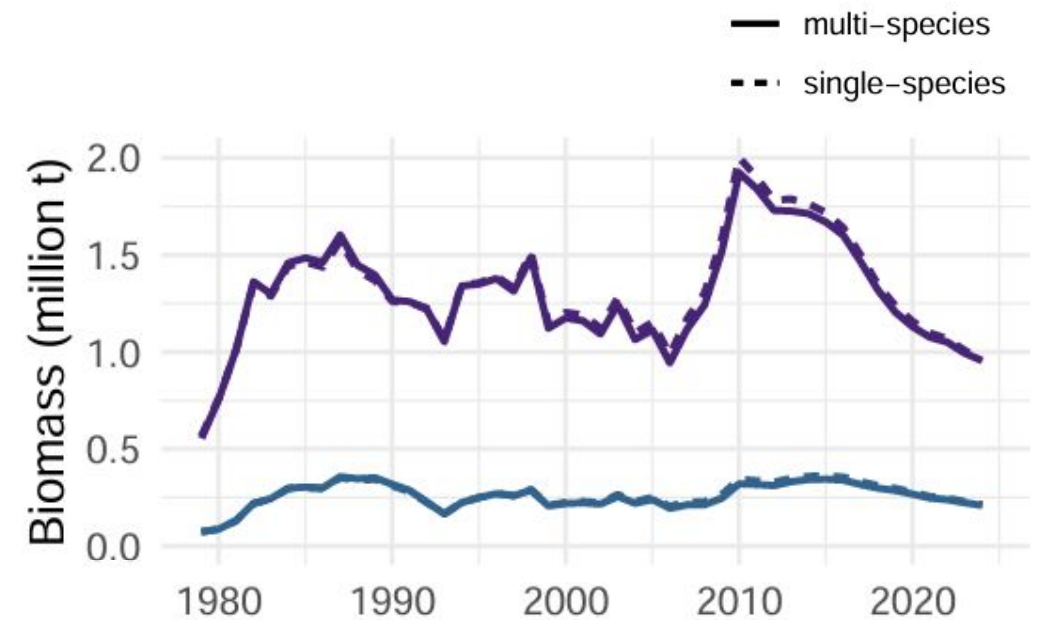
Indicator Monitoring Analysis: Advanced

- CEATTLE

- Multi-species model of Pacific cod, pollock, arrowtooth, total M trends
- Based in part on most recent stock assessment model, 1979-present

- Results

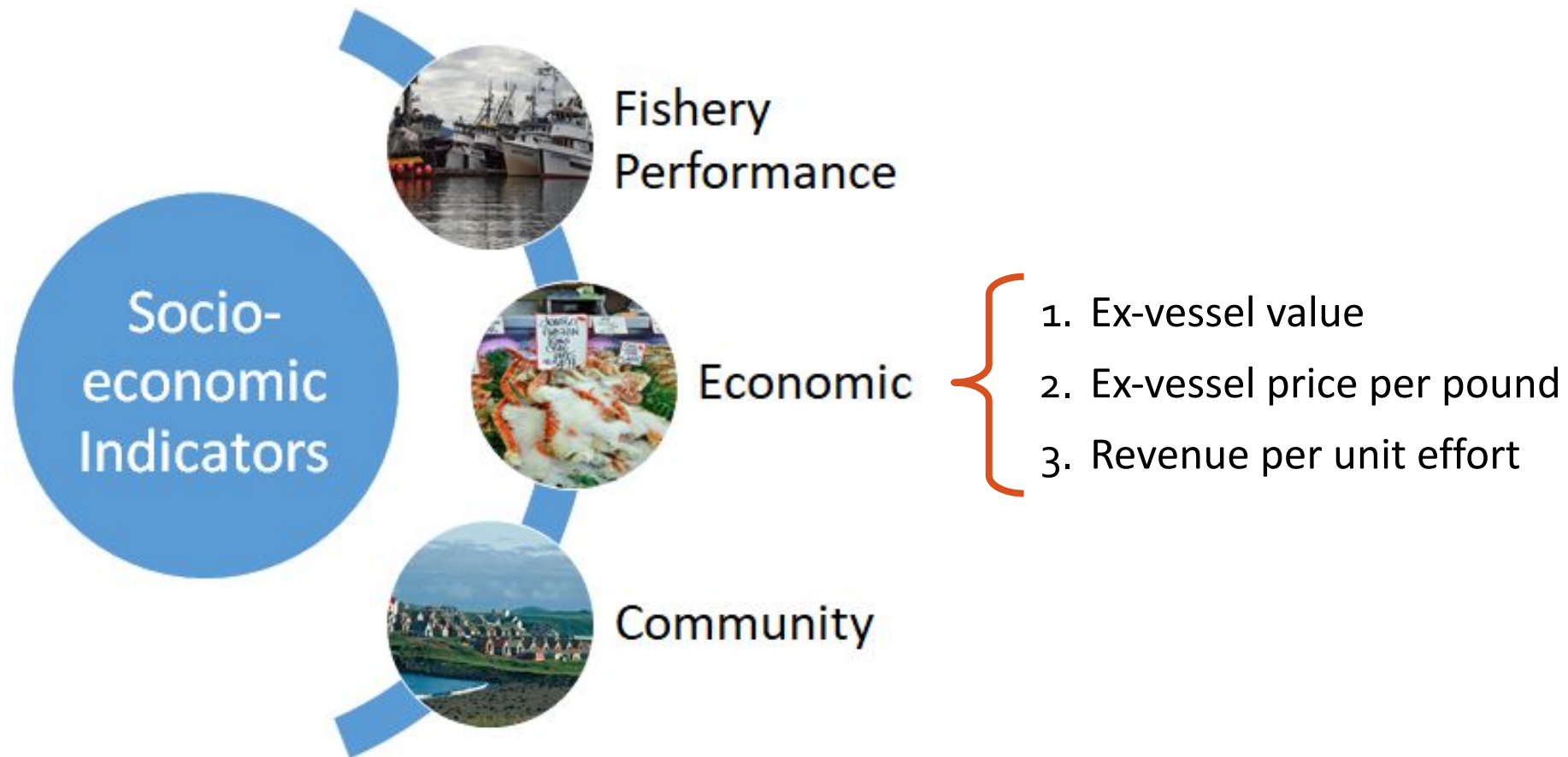
- Very similar trend between the single- and multi-species mode, allows for further evaluating the role of cannibalism



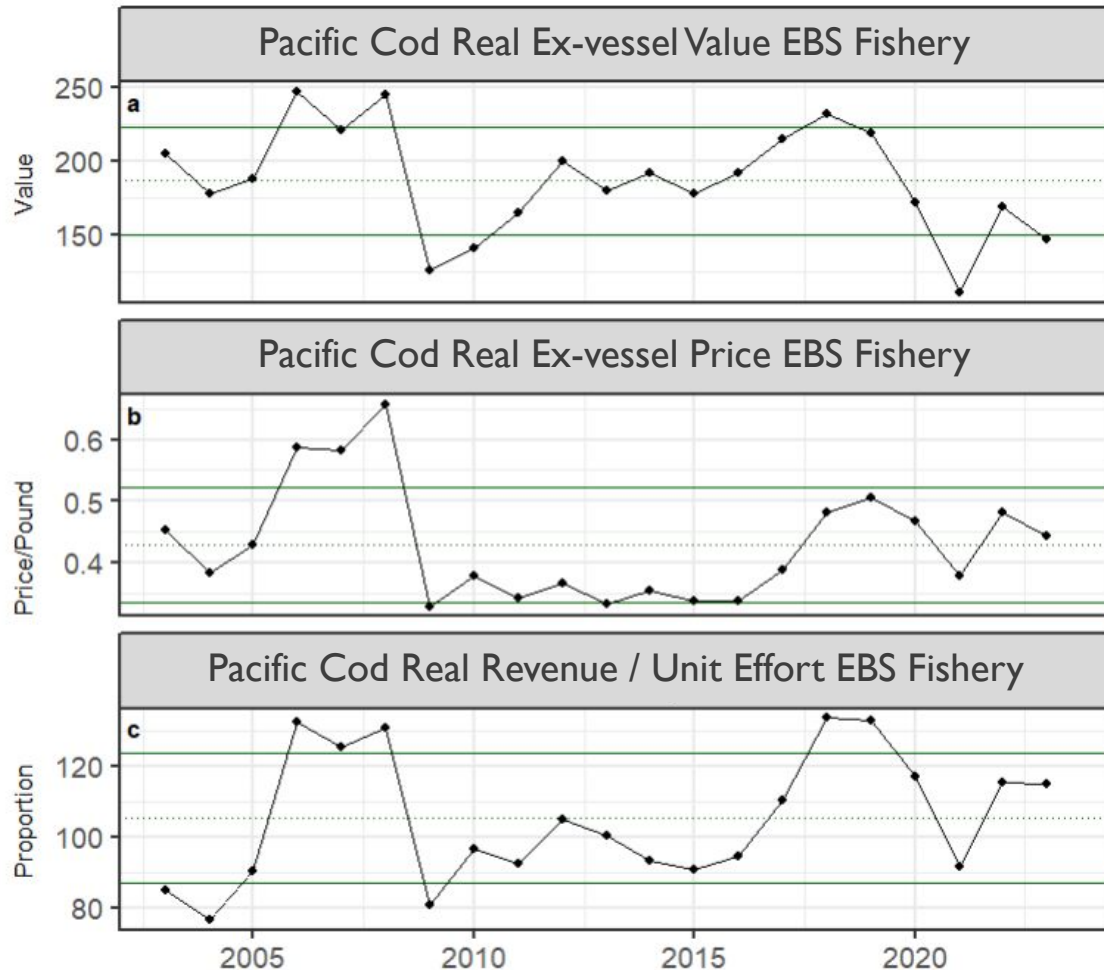
[Holsman et al., 2024](#)



Socioeconomic Indicators



Economic Indicators



- Ex-vessel value decreased in 2023, remaining below the historical average and slightly below one-standard deviation of the historical range.
- The average ex-vessel price per pound declined slightly in 2023, but remained above the historical mean for five of the past six years and within one-standard deviation of the historical range.
- Revenue-per-unit-effort was stable in 2023, remaining above the historical average and within one standard deviation of the historical range

Summary



Ecosystem (ABC Information):

- NPI average signals moderate conditions, surface temperatures cooling
- Low euphausiid prey, low juvenile condition
- Sea-ice extent below average, population shifts SW, expanding
- Above average bioenergetic demand, below avg adult condition, below avg biomass consumed

Socioeconomic (TAC Information):

- Low ex-vessel value, price decreased but continues to be above average
- Revenue/unit effort stable and above average





Planned ESP Developments

- 1) Request for Indicators (RFI) in 2025, use ESP data gaps and research priorities list, indicators submitted in February
- 2) Data modernization project begins in early 2025 to expand the ESP data management system (hosted by AKFIN) and streamline the AK-ESP R package for multiple templates (e.g., one-pager)
- 3) National ESP workshops to identify support systems that will work toward operationalizing ESPs

Questions?



Contact:

Kalei Shotwell, AFSC
Russel Dame, AFSC

kalei.shotwell@noaa.gov
russel.a.dame@noaa.gov