

Ecosystem & Socioeconomic Profile: GOA Pollock Report Card

Kalei Shotwell, November Groundfish Plan Team 2023



Editor: S. Kalei Shotwell

Team: Bridget Ferriss, Cole C. Monnahan, Krista Oke, Lauren Rogers, and Stephani Zador

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Overview

- Appendix 1A in SAFE Report
 - Full/partial ESP in 2019-2020
 - Report Card 2021-2023
- Report Card in 2023
 - Simplified template, current data
 - Ecosystem and socioeconomic indicator assessment and analysis
 - 5 team members, 23 contributors

Appendix 1A. Ecosystem and Socioeconomic Profile of the Walleye Pollock stock in the Gulf of Alaska - Report Card

S. Kalei Shotwell (Editor)

Bridget Ferriss, Cole C. Monnahan, Krista Oke, Lauren Rogers, and Stephani Zador (Team)

November 2023

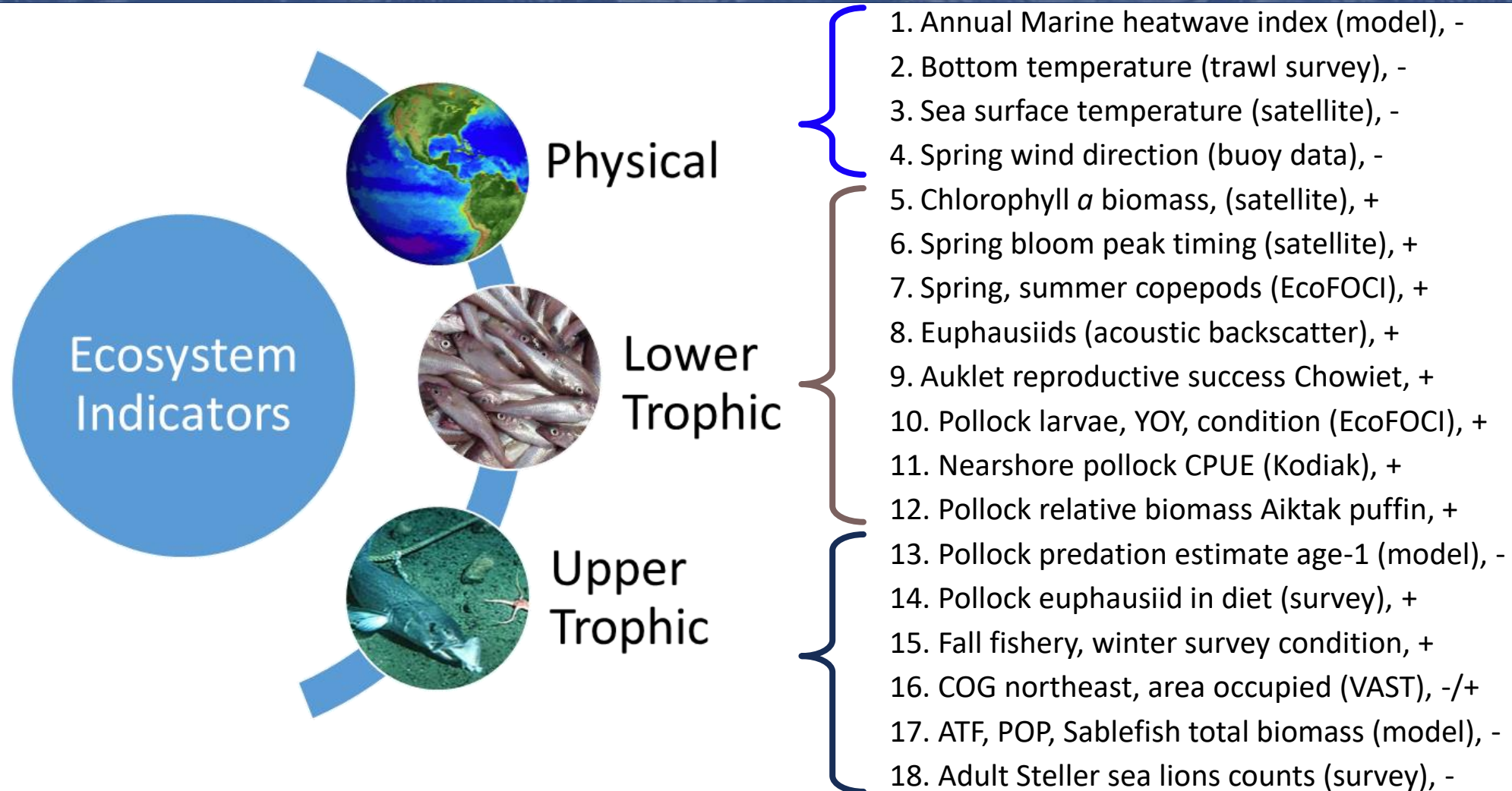


Appendix 1A

With Contributions from:

Anna Ableman, Grant Adams, Kerim Aydin, Steve Barbeau, Cheryl Barnes, Matt Callahan, Curry Cunningham, Brian Garber-Yonts, Dan Goethel, Kirstin Holsman, Peter-John Hulson, David Kimmel, Ben Laurel, Jean Lee, Mike Litzow, Cole Monnahan, Zack Oyafuso, Patrick Ressler, Lauren Rogers, Kalei Shotwell, Margaret Siple, Katie Sweeney, Stephani Zador

Ecosystem Indicators



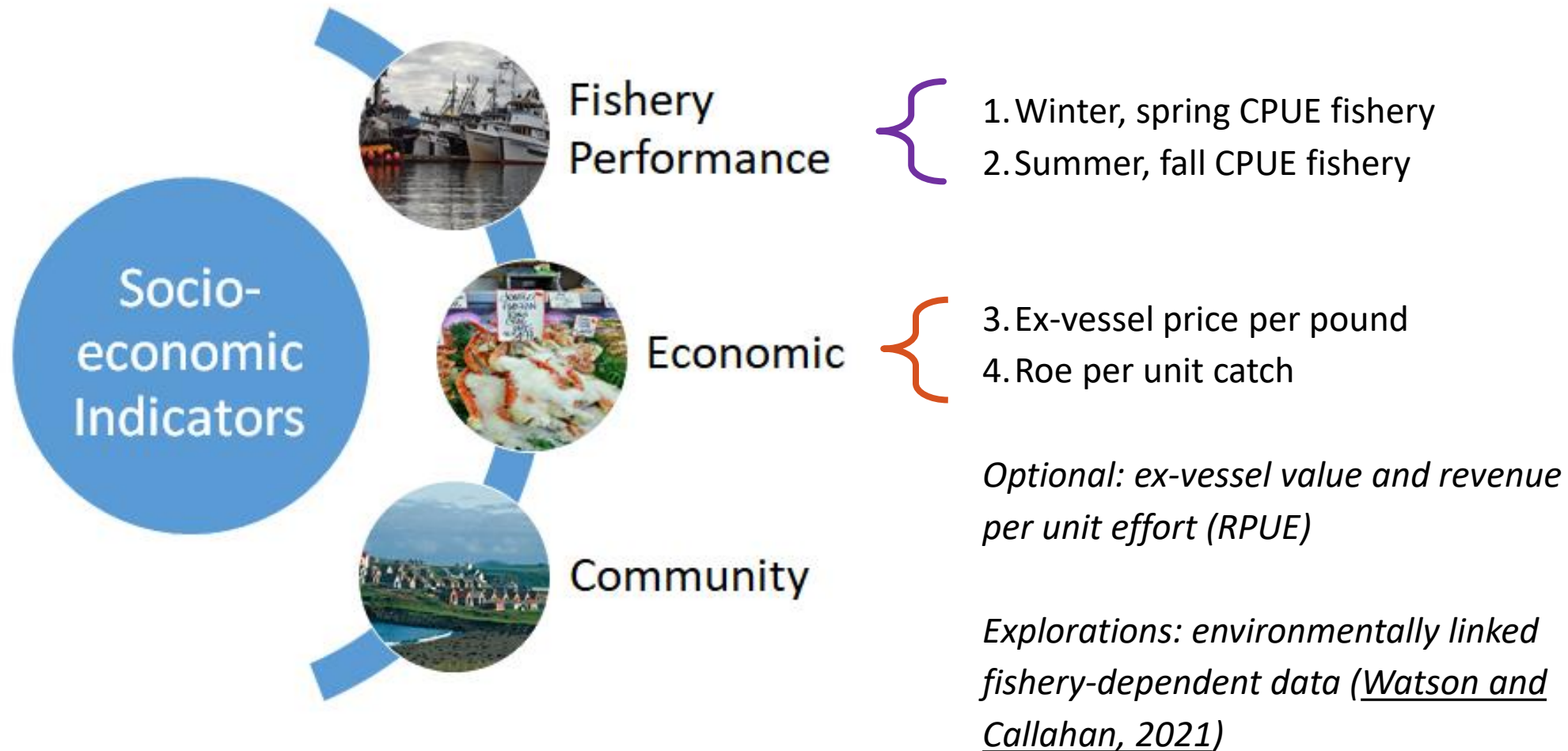
Ecosystem Summary Table

Category	Indicator	2019 Status	2020 Status	2021 Status	2022 Status	2023 Status
Physical	Annual Heatwave GOA Model	high	neutral	neutral	neutral	neutral
	Spring Temperature Surface WCGOA Satellite	high	neutral	neutral	neutral	neutral
	Summer Temperature Bottom GOA Survey	high	NA	neutral	NA	neutral
	Spring Wind Direction Kodiak Buoy	neutral	neutral	neutral	neutral	neutral
Lower Trophic	Spring Chlorophylla Biomass WCGOA Satellite	low	neutral	neutral	neutral	low
	Spring Chlorophylla Peak WCGOA Satellite	high	neutral	neutral	neutral	high
	Spring Small Copepod Abundance Shelikof Survey	high	NA	neutral	NA	neutral
	Summer Large Copepod	neutral	NA	NA	NA	neutral
	Summer Euphausiid Abundance Kodiak Survey	neutral	NA	NA	NA	NA
	Annual Auklet Reproductive Success Chowiet Survey	neutral	NA	neutral	neutral	neutral
	Spring Pollock CPUE Larvae Shelikof Survey	neutral	NA	neutral	NA	neutral
	Summer Pollock CPUE YOY Shelikof Survey	neutral	NA	NA	NA	neutral
	Summer Pollock Condition YOY	low	NA	NA	NA	NA
	Summer Pollock CPUE YOY Nearshore Kodiak Survey	neutral	neutral	neutral	neutral	neutral
	Annual Pollock Relative Biomass Aiktak Survey	neutral	NA	NA	NA	NA
	Summer Pollock MT Consumed Age1 GOA Model	neutral	NA	neutral	NA	NA
Upper Trophic	Summer Pollock Euphausiid Diet	high	NA	neutral	NA	neutral
	Fall Pollock Condition Adult GOA Fishery	neutral	neutral	neutral	neutral	NA
	Winter Pollock Condition Adult GOA Survey	neutral	neutral	neutral	low	neutral
	Summer Pollock Center Gravity	neutral	NA	neutral	NA	low
	Summer Pollock Area Occupied WCGOA Model	neutral	NA	neutral	NA	high
	Annual Arrowtooth Biomass GOA Model	neutral	low	low	NA	NA
	Annual Pacific Ocean Perch Biomass GOA Model	high	high	high	NA	NA
	Annual Sablefish Biomass GOA Model	neutral	high	high	high	NA
Annual Steller Sea Lion Adult GOA Survey	neutral	neutral	neutral	NA	NA	

Ecosystem Considerations

- Cooler below average temperatures at surface and depth, below average marine heatwave events and increased mean southwestern wind direction suggest favorable egg and larval habitat conditions, but sustained April gap winds near Kodiak may have altered advective patterns.
- Mixed lower trophic indicators (lowest chlorophyll a concentration of time series, later spring bloom peak, lower small copepod abundance, higher large copepod abundance, and average planktivore success) suggest adequate larval prey resources.
- Low spring larval abundance and low summer catches of young-of-year (YOY) pollock in the Shelikof survey together with low CPUE of YOY pollock in the nearshore Kodiak survey suggest a weak 2023 year class.
- Percent euphausiids in the diet of juvenile pollock on the bottom trawl survey increased slightly to just above average and condition of fall pollock in the fishery in 2022 and winter pollock in the acoustic survey in 2023 increased but were still below average.
- Center of gravity shifted to the second most southwest position in the time series in 2023 while area occupied increased to the highest value of the times series suggesting a more spread out pollock population in more suitable habitat.
- Biomass estimates of Pacific ocean perch and sablefish continue to be large with a stable but low biomass estimate of arrowtooth flounder as competitors and predators of GOA pollock.

Socioeconomic Indicators



Socioeconomic Summary Table

Category	Indicator	2019 Status	2020 Status	2021 Status	2022 Status	2023 Status
Fishery Performance	Winter Spring Pollock CPUE Adult GOA Fishery	high	neutral	high	neutral	neutral
	Summer Fall Pollock CPUE Adult GOA Fishery	neutral	neutral	neutral	neutral	NA
Economic	Annual Pollock Real Ex-vessel Price Fishery	neutral	neutral	neutral	neutral	NA
	Winter Spring Pollock Roe Per Unit Catch Fishery	neutral	neutral	low	neutral	neutral



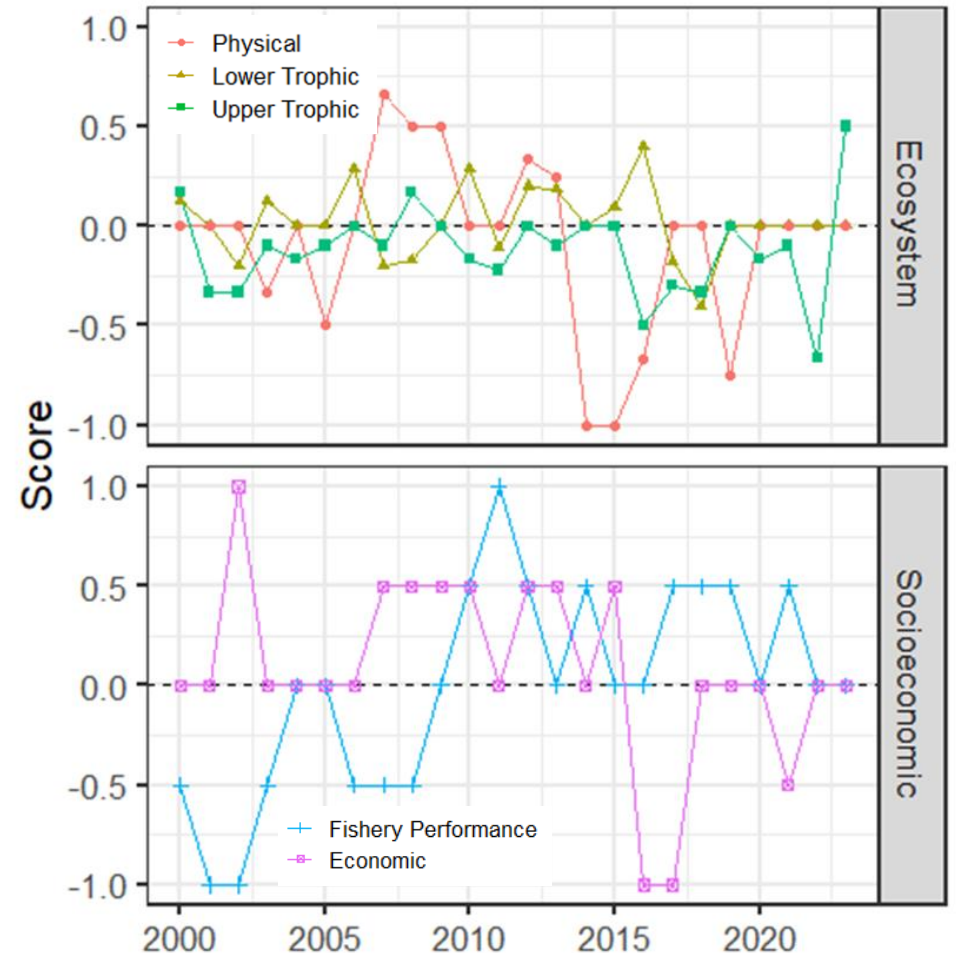
Socioeconomic Considerations

- Fishery CPUE in the winter spring increased and remained above average in 2023 implying pollock were concentrated, so catch rates were higher and roe may be in better condition.
- Ex-vessel price increased to just above average in 2022 and roe-per-unit-catch in the fishery increased to just slightly below the long-term average in 2023



Indicator Analysis - Overall Score

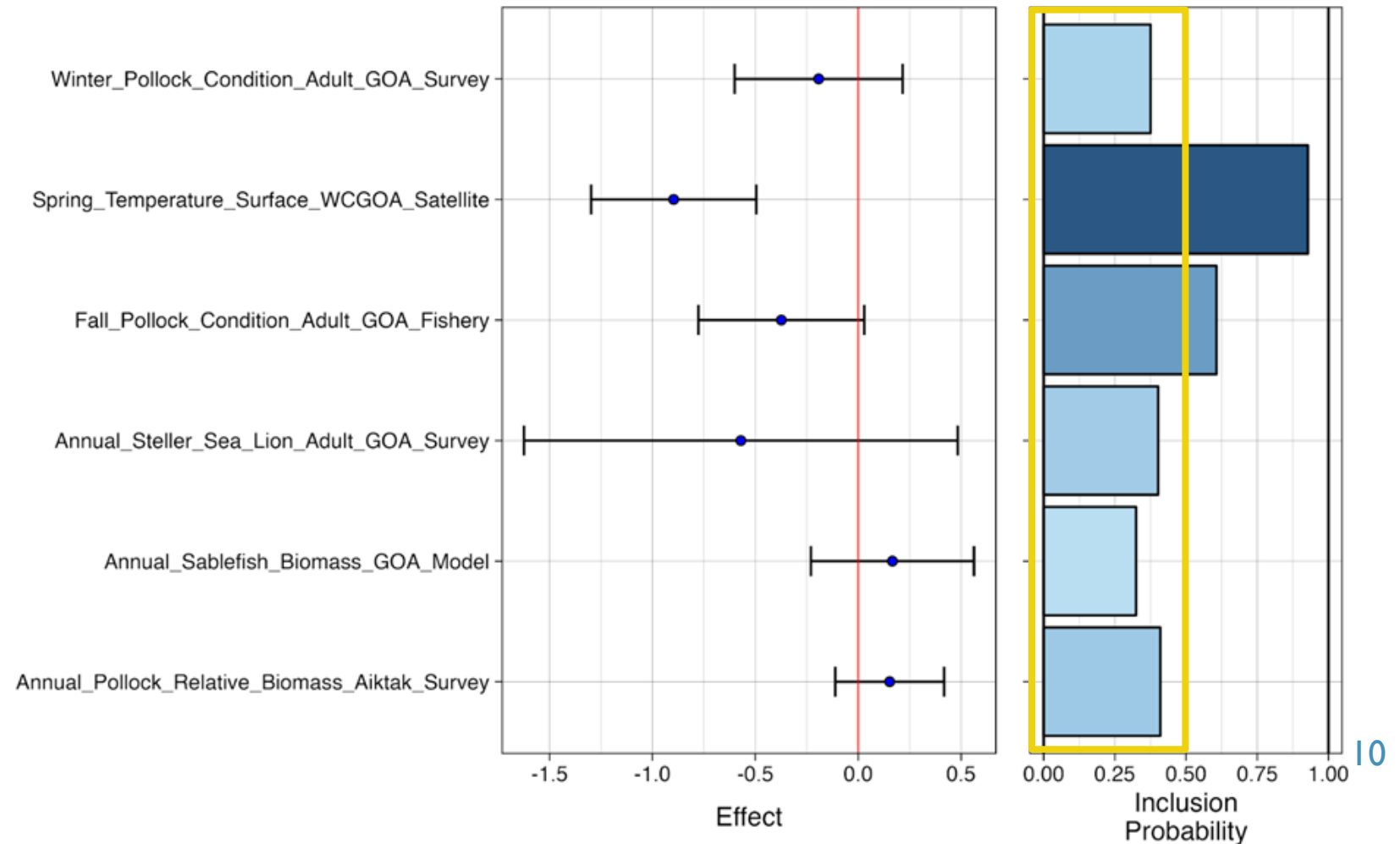
- Ecosystem (18 of 25 total)
 - Physical remained average
 - Lower trophic remained average
 - Upper trophic > to above average
- Socioeconomic (4 of 4 total)
 - Fishery performance remained average
 - Economic remained average



Indicator Analysis - Importance Test

Two indicators with importance > 0.5 , same indicators as last year:

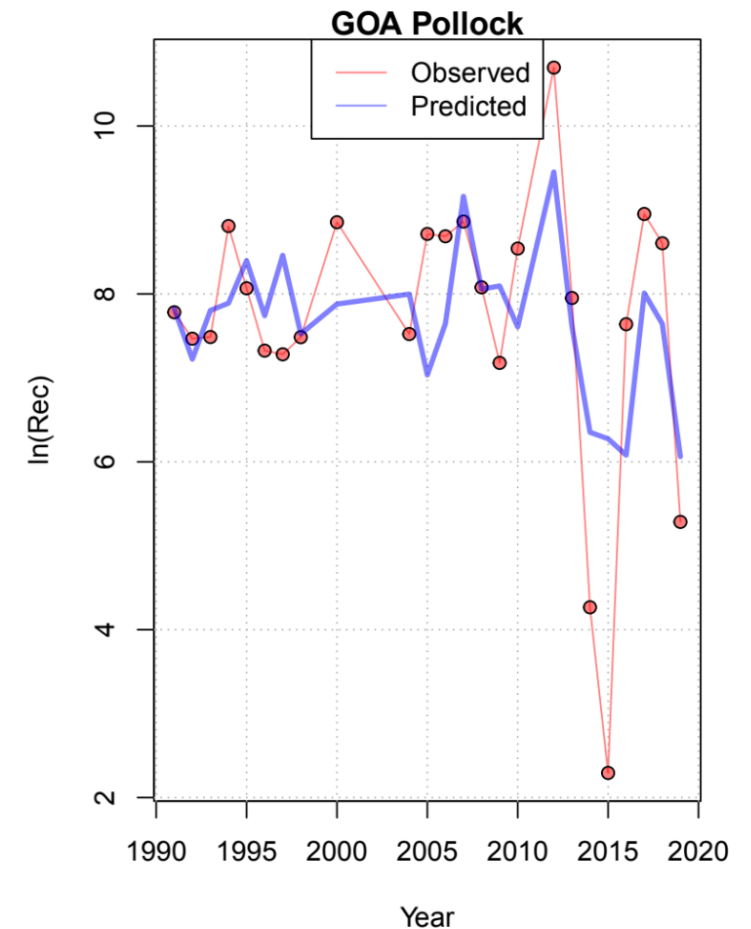
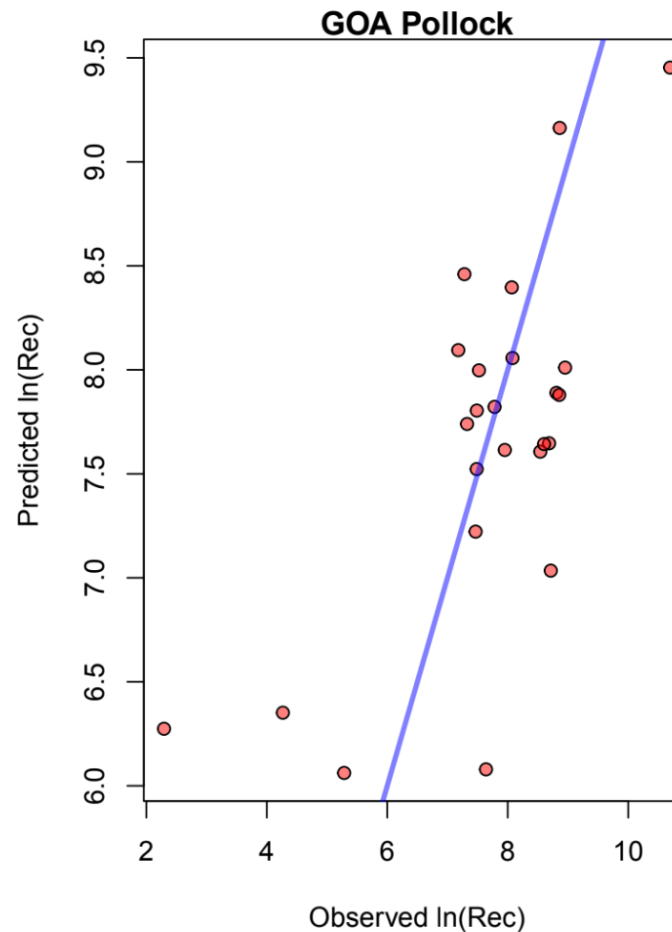
- Spring SST WCGOA
- Fall condition fishery
- 1991-2019 year class (missing some years)



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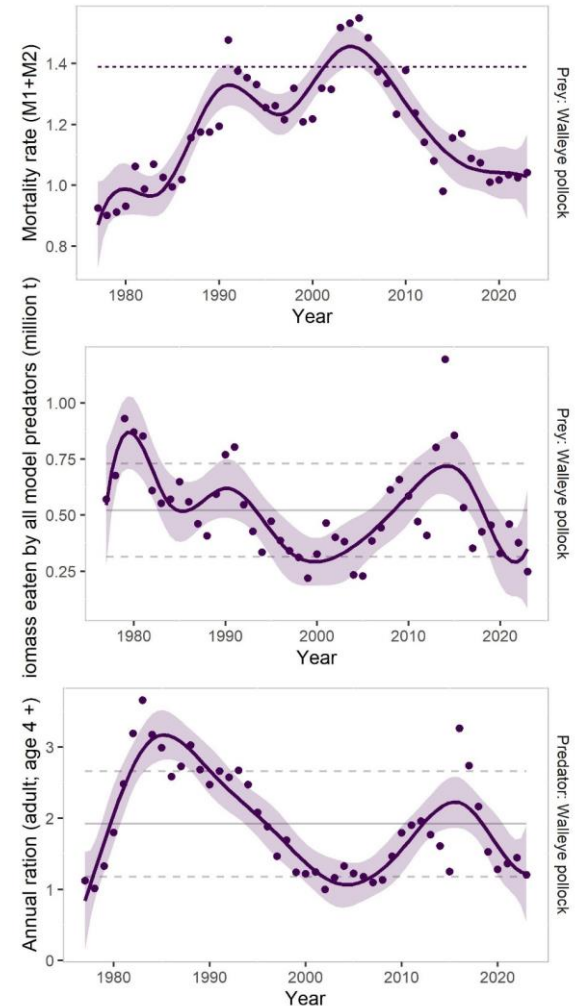
Indicator Analysis - Advanced Test

■ CEATTLE

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

■ Results

- Age-I natural mortality for pollock has steadily decreased since 2005 and remains low likely due to recent declines in arrowtooth flounder
- Total biomass consumed by modelled predators has decreased and near time-series low
- Ration for adult (age 4+) pollock decreased since 2016 and remains low in 2023





Planned ESP Developments

- 1) Request for Indicators (RFI) in 2024, use ESP data gaps and research priorities list, indicators submitted in January, reviewed in February by ESP teams
- 2) Consider how to use the GOA R-CEATTLE model output in the ESP to identify other indicators for monitoring, evaluate predation M or bioenergetics indicators to compare with the bottom trawl condition, compare recruitment indicators with BAS output
- 3) Socioeconomic indicators evaluation with several groups, also part of the National ESP Initiative

Questions?



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Ecosystem & Socioeconomic Profile (ESP)

Highlights - GOA pollock



● Management Summary:

- Cooler and below average surface temps, bottom temps, marine heatwave events, SW wind suggesting favorable egg and larval habitat conditions but sustained April gap winds may have altered advective patterns
- Mixed lower trophic with lowest chlorophyll a , late spring bloom, lower small copepod, higher large copepod, average planktivore success, adequate prey
- Low spring larvae and low summer YOY in Shelikof, low nearshore CPUE in Kodiak, suggests weak 2023 year class
- Condition of fall and winter adult pollock increased but still below average, population moved southwest and spread out, possibly to more suitable habitat
- POP and sablefish biomass large, low arrowtooth as competitors/predators
- Fishery CPUE increased to above average, roe per unit effort increased to just below average, ex-vessel price above average in 2022

● Modeling Summary:

- Two potential covariates for recruitment, spring surface temperature from satellite, fall condition in the fishery, 1991-2019 year class (missing some years)
- CEATTLE model update: age-1 M steady remains below mean, total biomass consumed below average, ration decreased and still below average

