Ecosystem & Socioeconomic Profile (ESP): Gulf of Alaska (GOA) Pollock



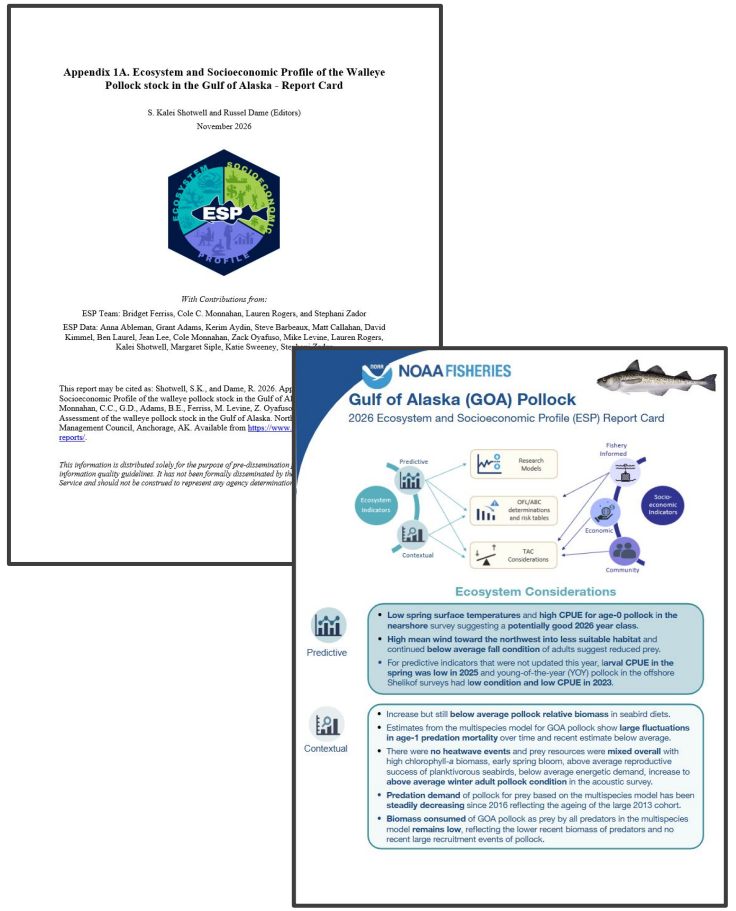
Kalei Shotwell & Russel Dame,
November 2026 Groundfish Plan Team

ESP Team and Contributors:

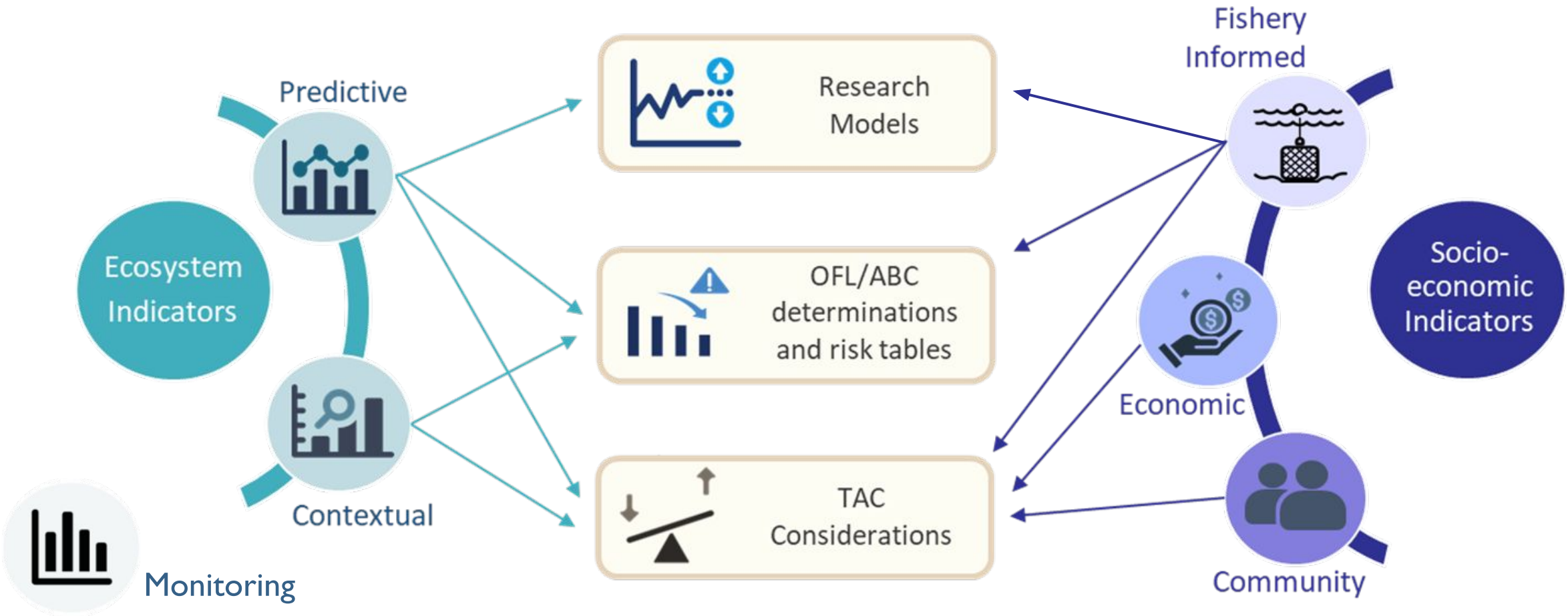
Anna Ableman
Grant Adams
Kerim Aydin
Steven Barbeaux
Matt Callahan
Bridget Ferriss
David Kimmel
Ben Laurel
Jean Lee
Mike Levine
Cole Monnahan
Zack Oyafuso
Lauren Rogers
Margaret Siple
Katie Sweeney
Stephani Zador

Overview

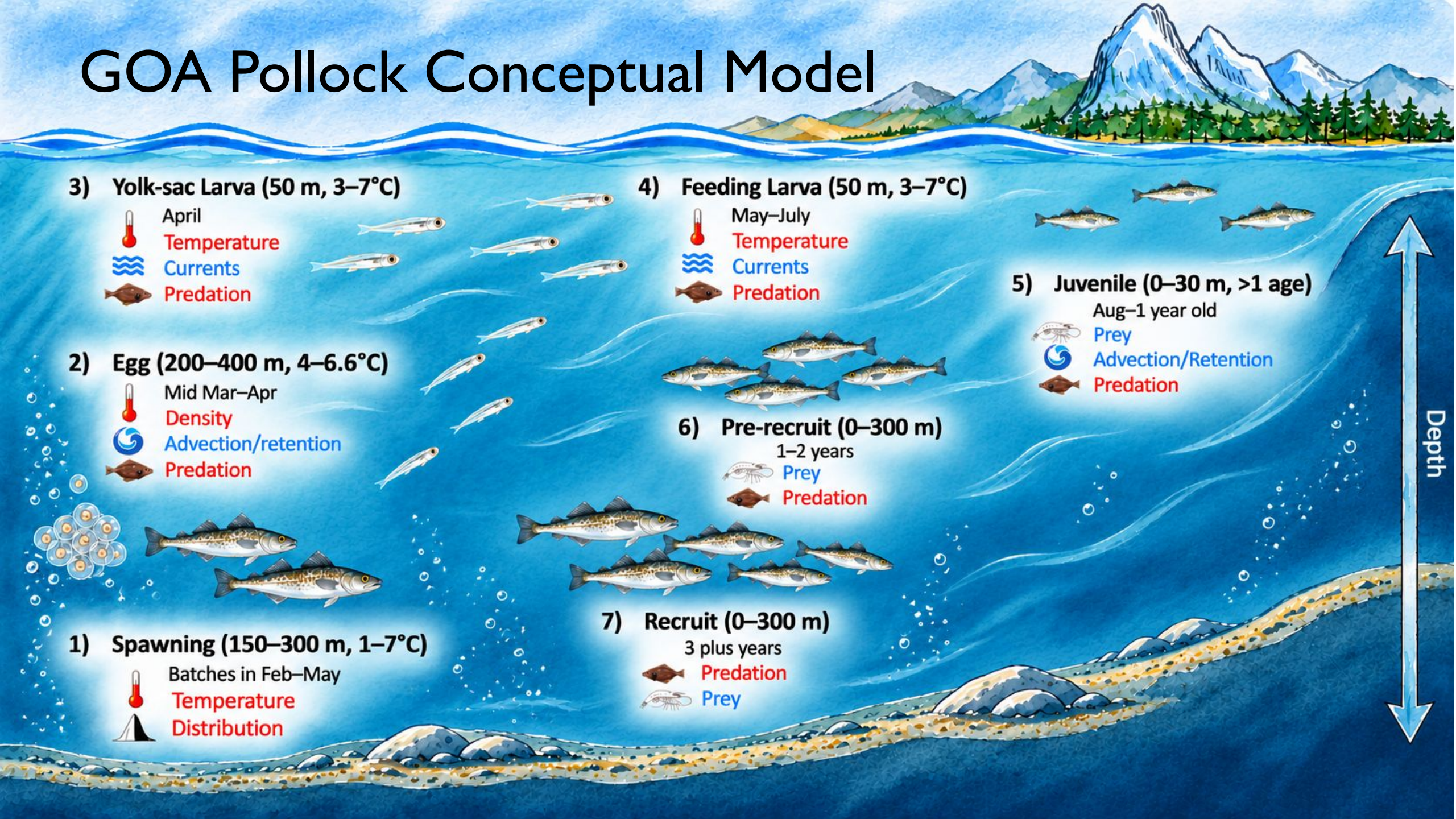
- Initiated in 2019 due to GOAIERP, ESP Team develops hypotheses
- Appendix 1A GOA Pollock SAFE
- Dynamic structural equation model (DSEM) analysis for ecosystem indicators (Monnahan et al. 2026)
- Summary of indicator status/trends
- Future plans



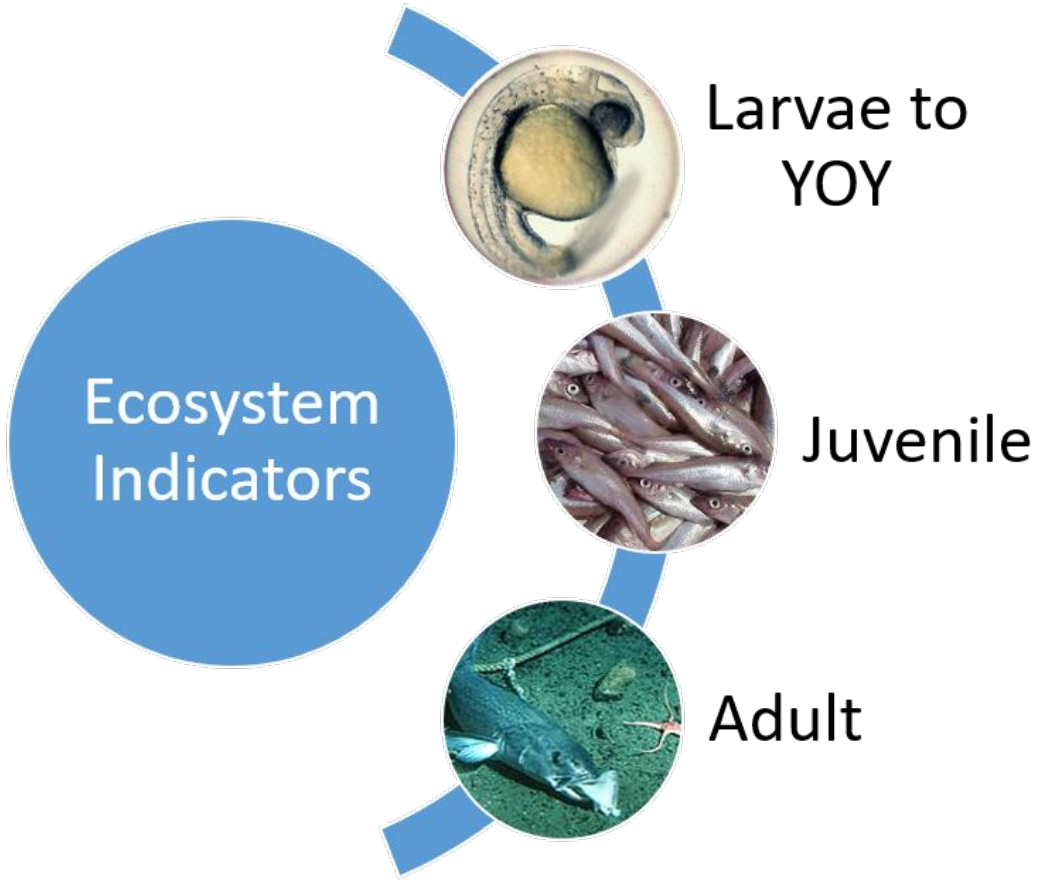
Indicator Pathways to Decisions



GOA Pollock Conceptual Model



Ecosystem Indicators

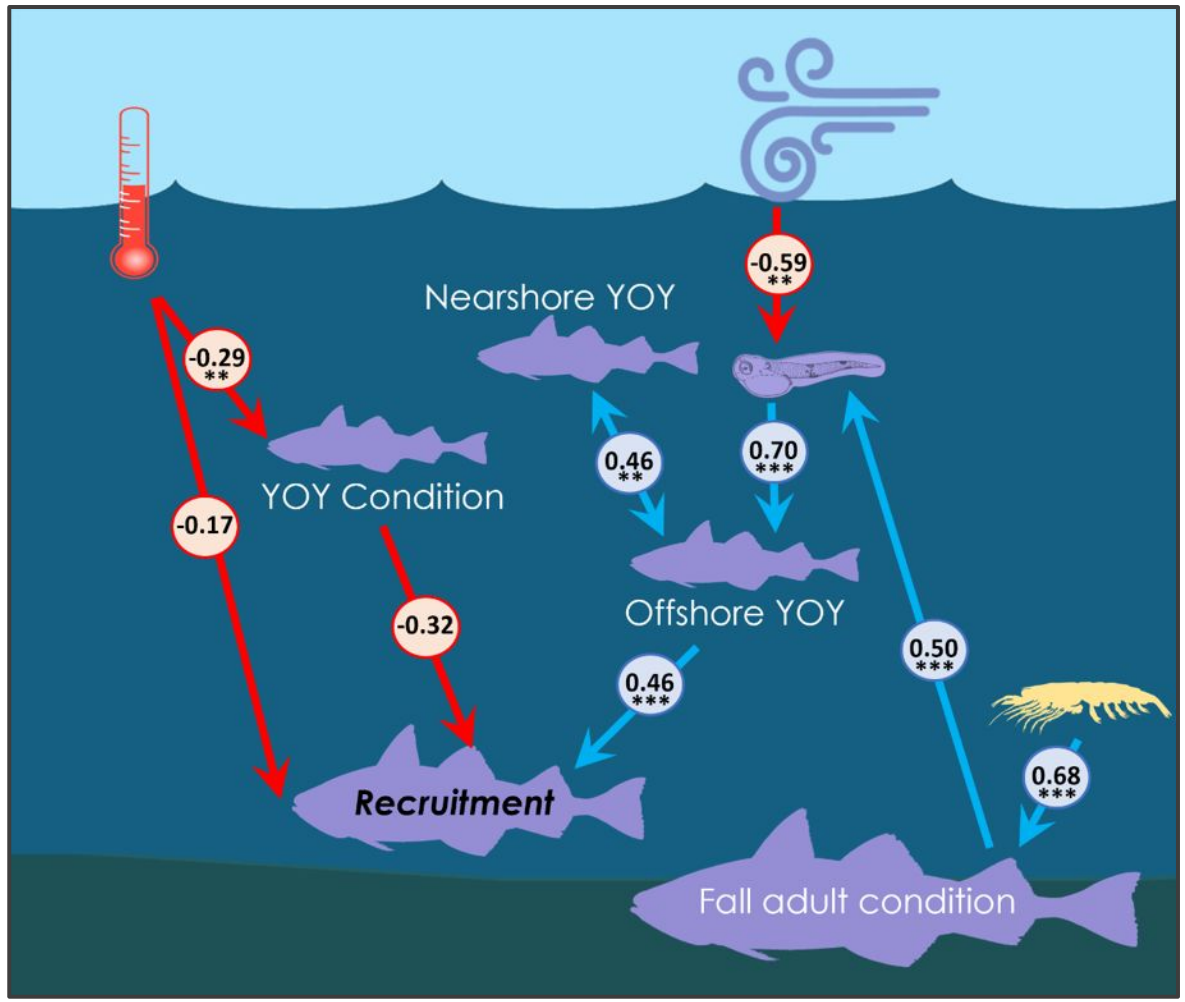


1. Annual Marine heatwave index (model), -
2. **Sea surface temperature** (satellite), -
3. **Spring wind N/S direction** (buoy data), -
4. Chlorophyll-a biomass, spring bloom (2, satellite), +/-
5. Spring, **summer copepods** (2, EcoFOCI), +
6. **Summer euphausiids** (MACE), +
7. Auklet reproductive success Chowiet, +
8. **Pollock larvae, YOY, condition** (3, EcoFOCI), +
9. **Nearshore pollock CPUE** (Kodiak), +
10. Pollock relative biomass Aiktak puffin, +
11. Age-1 natural mortality (Rceattle), -
12. **Pollock euphausiid in diet** (survey), +
13. Bottom temperature (trawl survey), -
14. **Fall fishery,** winter survey **condition**, +
15. Annual pollock ration, biomass eaten (Rceattle), -
16. COG north, east, area occupied (VAST), -/+
17. POP, Sablefish total biomass (model), -
18. Adult Steller sea lions counts (survey), -

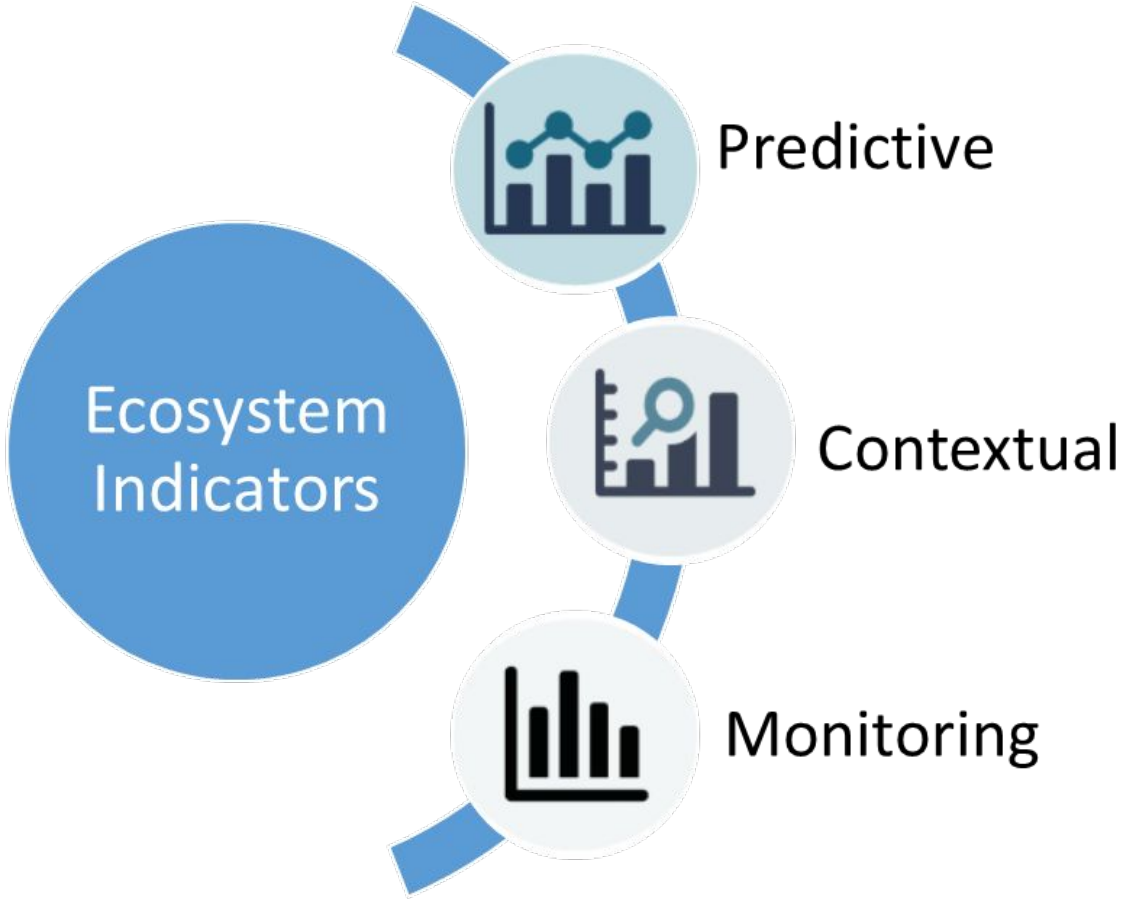
Indicator Analysis - DSEM (Monnahan et al. 2026)

Set of Directed Acyclic Graphs (DAGs) from Champagnat et al., 2026:

- Multiple diagnostics explored, selected moderate DAG as best
- Eight ESP indicators
- All but one relationship consistent with ESP Team hypotheses



Ecosystem Indicator Categorization

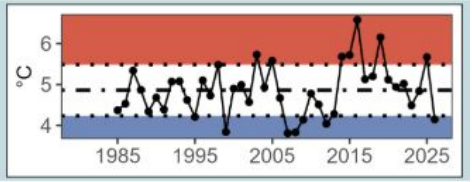
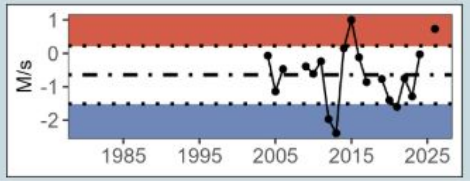
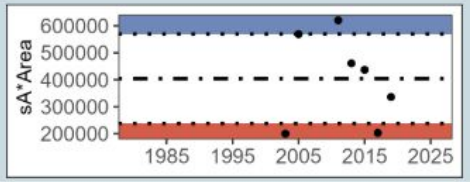
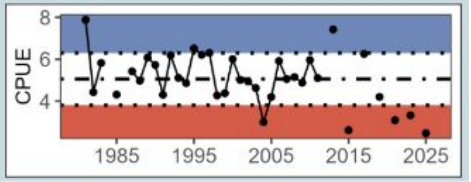
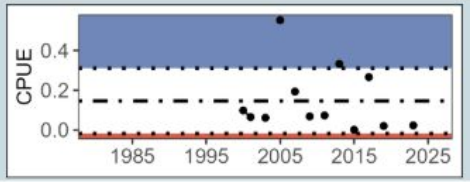


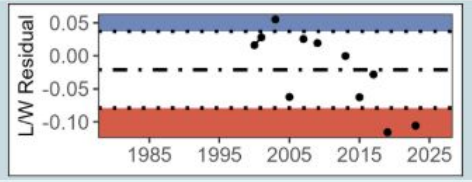
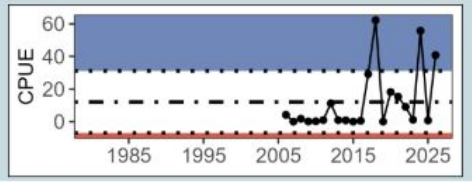
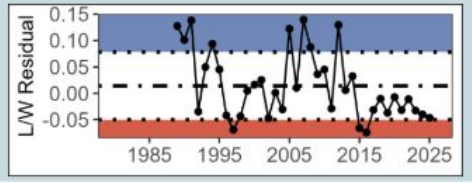
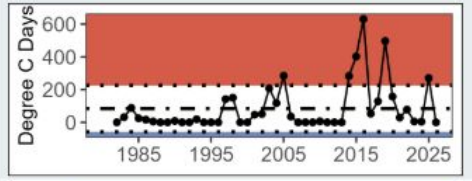
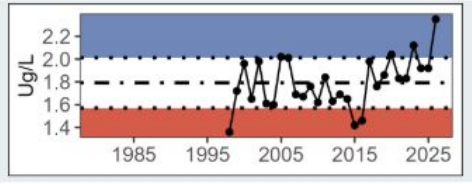
1. **Sea surface temperature** (satellite), -
2. **Spring wind N/S direction** (buoy data), -
3. **Summer euphausiids** (MACE), +
4. **Pollock larvae, YOY, condition** (3, EcoFOCI), +
5. **Nearshore pollock CPUE** (Kodiak), +
6. **Fall fishery condition**, +
7. Annual Marine heatwave index (model), -
8. Chlorophyll-a biomass, spring bloom (2, satellite), +/-
9. Spring, summer copepods (2, EcoFOCI), +
10. Auklet reproductive success Chowiet, +
11. Pollock relative biomass Aiktak puffin, +
12. Age-1 natural mortality (Rceattle), -
13. Pollock euphausiid in diet (survey), +
14. Bottom temperature (trawl survey), -
15. Winter survey condition (MACE), +
16. Annual pollock ration, biomass eaten (Rceattle), -
17. COG north, east, area occupied (VAST), -/+
18. POP, Sablefish total biomass (model), -
19. Adult Steller sea lions counts (survey), -

GOA Pollock Report Card



Predictive

Indicator	Status	Trend
Spring Sea Surface Temperature in WCGOA	Below long-term mean	
Spring Wind Direction	Above long-term mean	
Summer to Fall YOY Prey	Near long-term mean	
Spring Pollock Larvae CPUE	Below long-term mean	
Pollock YOY CPUE Offshore in Shelikof	Near long-term mean	

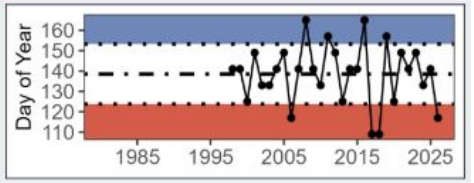
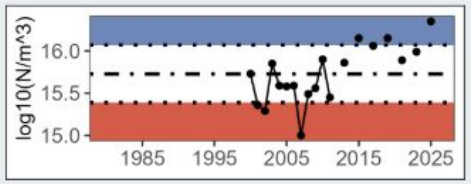
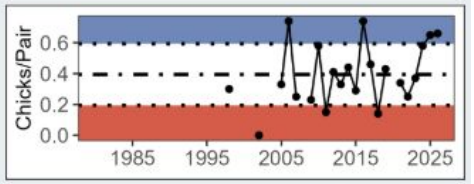
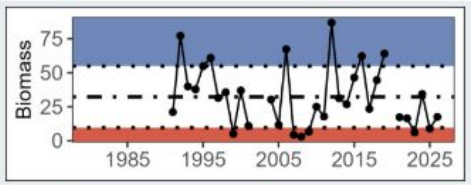
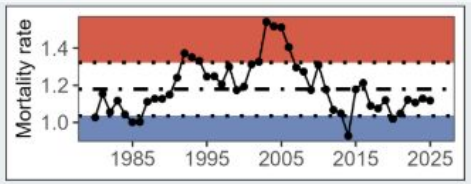
Indicator	Status	Trend
Pollock YOY Condition in Shelikof	Below long-term mean	
Pollock YOY CPUE Nearshore in Kodiak	Above long-term mean	
Adult Fall Pollock Condition in the Fishery	Near long-term mean	
Heatwave in CGOA	Near long-term mean	
Chlorophyll-*a* Biomass in WCGOA	Above long-term mean	

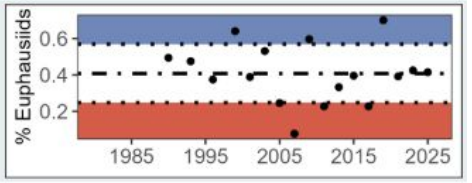
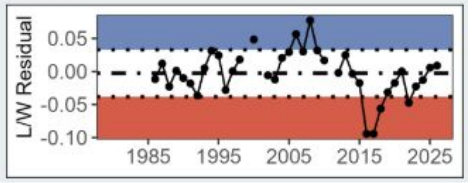
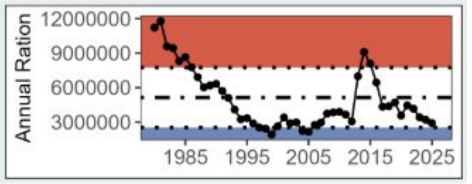
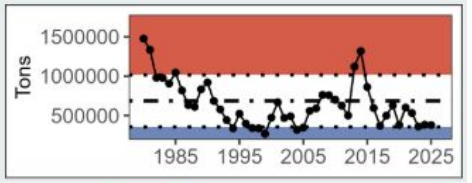
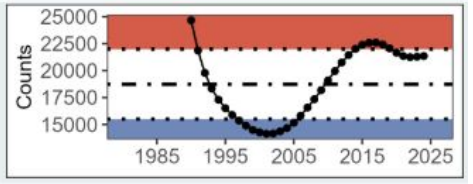
Contextual

GOA Pollock Report Card



Contextual

Indicator	Status	Trend
Peak Timing of Spring Bloom in WCGOA	Below long-term mean	
Spring Larval Prey	Above long-term mean	
Auklet Reproductive Success in Chowiet	Above long-term mean	
Pollock Relative Biomass in Aiktak	Near long-term mean	
Predation Mortality Age-1 Pollock	Near long-term mean	

Indicator	Status	Trend
Proportion Euphausiid in Juvenile Pollock	Near long-term mean	
Winter Pollock Adult Condition	Near long-term mean	
Pollock Ration in GOA	Near long-term mean	
GOA Pollock Biomass Consumed	Near long-term mean	
Steller Sea Lion Adults	Near long-term mean	

GOA Pollock Report Card



Ecosystem Considerations

Predictive

- **Low spring surface temperatures** and **high CPUE for age-0 pollock in the nearshore** survey suggesting a **potentially good 2026 year class**.
- **High mean wind toward the northwest into less suitable habitat** and continued **below average fall condition** of adults suggest reduced prey.
- For predictive indicators that were not updated this year, l**arval CPUE in the spring was low in 2025** and young-of-the-year (YOY) pollock in the offshore Shelikof surveys had l**ow condition and low CPUE in 2023**.

GOA Pollock Report Card



Contextual

Ecosystem Considerations

- Increase but still **below average pollock relative biomass** in seabird diets.
- Estimates from the multispecies model for GOA pollock show **large fluctuations in age-1 predation mortality** over time and recent estimate below average.
- There were **no heatwave events** and prey resources were **mixed overall** with high chlorophyll-*a* biomass, early spring bloom, above average reproductive success of planktivorous seabirds, below average energetic demand, increase to **above average winter adult pollock condition** in the acoustic survey.
- **Predation demand** of pollock for prey based on the multispecies model has been **steadily decreasing** since 2016 reflecting the ageing of the large 2013 cohort.
- **Biomass consumed** of GOA pollock as prey by all predators in the multispecies model **remains low**, reflecting the lower recent biomass of predators and no recent large recruitment events of pollock.

Socioeconomic Indicators



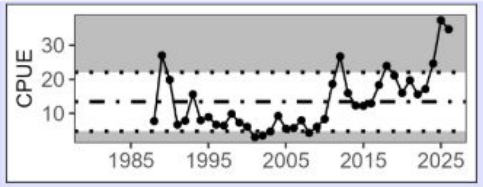
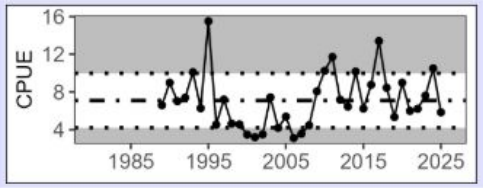
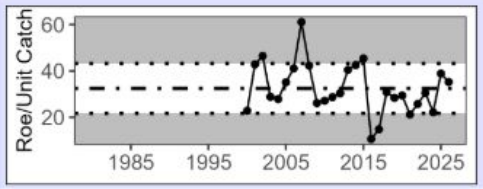
1. Winter, spring CPUE fishery
2. Summer, fall CPUE fishery

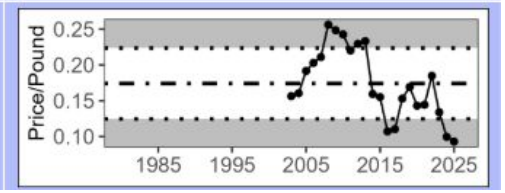
3. Ex-vessel price per pound
4. Roe per unit catch

GOA Pollock Report Card



Fishery Informed

Indicator	2025 Status	Trend
Winter-Spring Pollock CPUE in Fishery	Above long-term mean	
Summer-Fall Pollock CPUE in Fishery	Near long-term mean	
Pollock Roe-Per-Unit-Catch	Near long-term mean	

Indicator	2025 Status	Trend
Pollock Real Ex-Vessel Price	Below long-term mean	

Economic

GOA Pollock Report Card



Socioeconomic Considerations

Fishery Informed

- **Fishery CPUE in the winter-spring was very high** while fishery CPUE in the **summer-fall decreased from high to below average**, representing a decoupling of the two fishery seasons
- **Roe-per-unit-catch in the fishery decreased** in 2026, but remains above the historical average and within one-standard deviation of the historical range..

Economic

- The average annual ex-vessel price per pound declined from 2022 levels falling below one-standard deviation in 2024 and 2025 and remained below the historical average for the ninth year in the last decade.



Planned ESP Developments

1) Request for information in 2027, use ESP data gaps and research priorities list, contact leads of current research projects for input on updating indicators, ESP team review of mechanism table and DAGs.

2) Explore DAGs for other priority population parameters of interest such as growth or mortality in future iterations

3) National ESP workshops and training to identify support systems that will work toward improving and operationalizing ESPs

Questions?



Contact:

Kalei Shotwell, AFSC
Russel Dame, AFSC

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