

Ecosystem & Socioeconomic Profile Update & Socioeconomic Indicators

Kalei Shotwell, Russel Dame



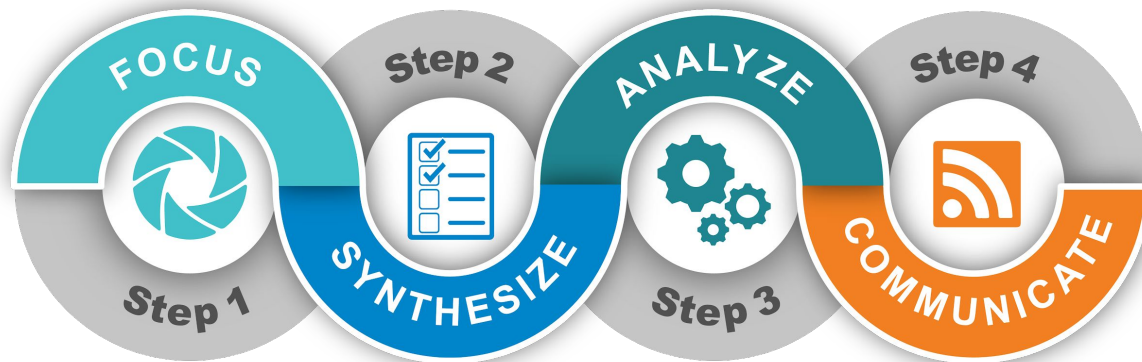
Sablefish and Arrowtooth ESP Contributors: Anna Abelman, Grant Adams, Matt Callahan, Wei Cheng, Brian Garber-Yonts, Abigail Harley, Anna Henry, Dana Hanselman, Abby Jahn, Jean Lee, Jodi Pirtle, Lauren Rogers, Sean Rohan, Joletta Silva, Mason Smith, Kally Spalinger, Paul von Szalay, Sarah Wise, Steve Whitney, Mallarie Yeager

September 2024, Presentation to the Groundfish Plan Team

ESP Definition

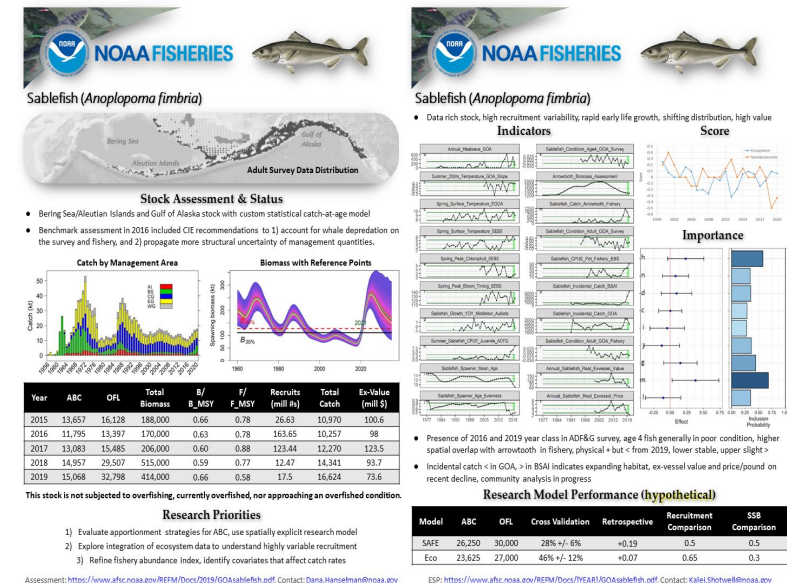
Process

Important ecosystem and socioeconomic indicators are identified and analyzed at the stock level



Product

Supplemental report that synthesizes the results of the indicator analysis and communicates drivers of stock dynamics



ESP Decisions

Qualitative

additional context

- Risk Tables
- Rebuilding Plans
- TAC Discussions
- Survey Planning
- Research Priorities
- Request for Proposals

Quantitative

assumptions

- Mechanistic linkages
- Consistency with stock life history
- Biological realism

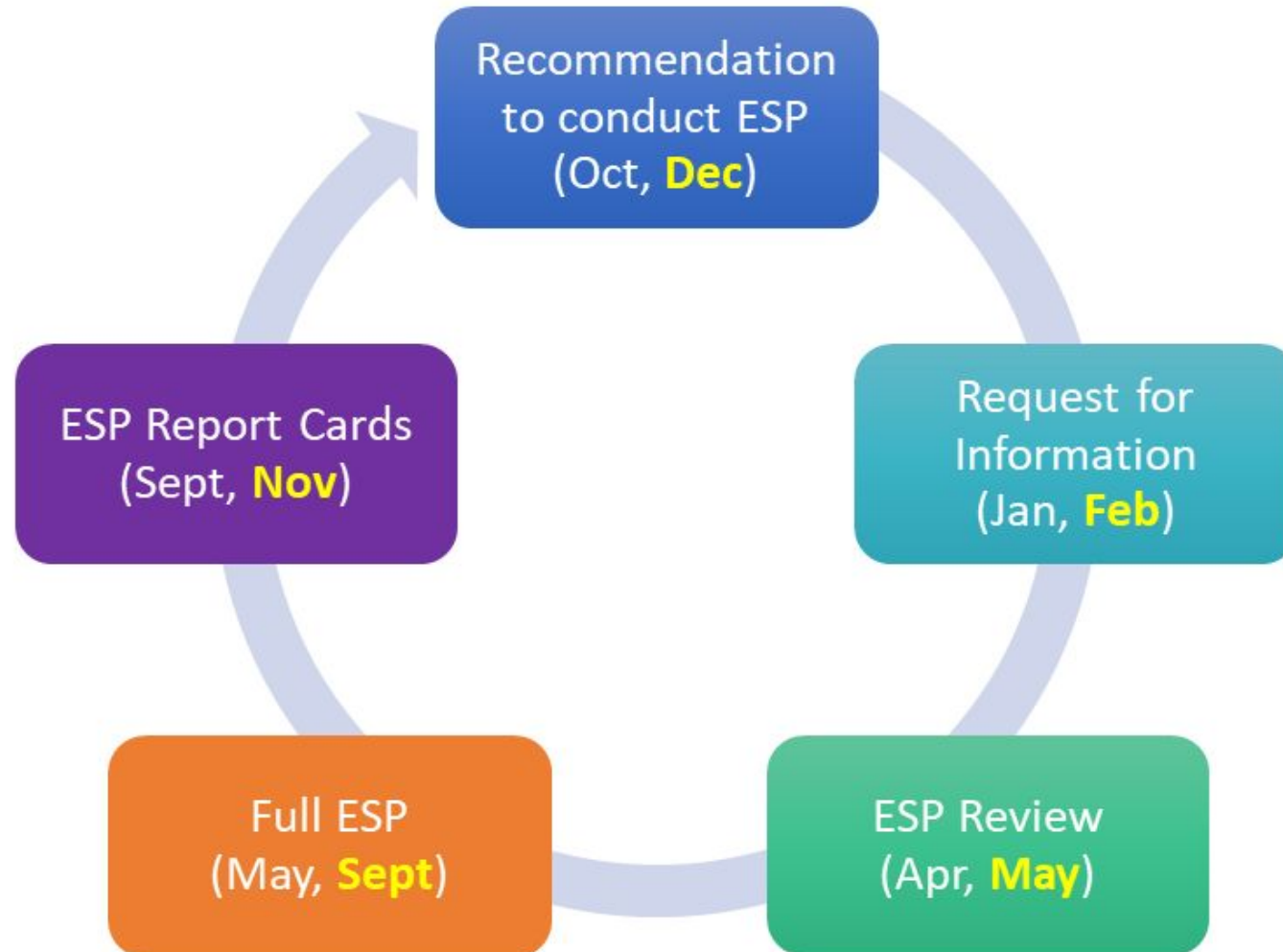
choices

- Inform data conditioning
- Time blocks
- Parameter values consistent with existing info

covariates

- Indicator time series directly included in model (e.g. Woods Hole Assessment Model)

General Timeline





Update

Timeline

Changes to Request For Indicators (RFI) and delivery of ESP statistical products

Capacity

New causal maps for ecosystem-linked models, creating general ESP report cards for all stocks,

National

Coordination project, data modernization, developing socioeconomic indicators (Dame)

Request For Information (RFI)

- Main elements
 - Description and process timing
 - List of requests representing data gaps and research priorities by stock
 - Instructions for contributions, information review, roles and responsibilities
- Coordination
 - Work with Crab ESP team to organize crab RFI similarly, earlier timing
 - Work with ESR team to identify overlap areas and streamline contributions

Request for Information (RFI): Ecosystem and Socioeconomic Profile (ESP) of the Groundfish stocks in Alaska

Groundfish ESP Teams
2025

Stepwise plan and cycle for review of information submissions in response to this RFI:

Request Opening	February 3, 2025
Request Closing	February 28, 2025
Review of Submitted Information	March 10-21, 2025
Notification of Selected Information	March 28, 2025

Please contact Kalei Shotwell (kalei.shotwell@noaa.gov) if you have any questions about this Request for Information (RFI).



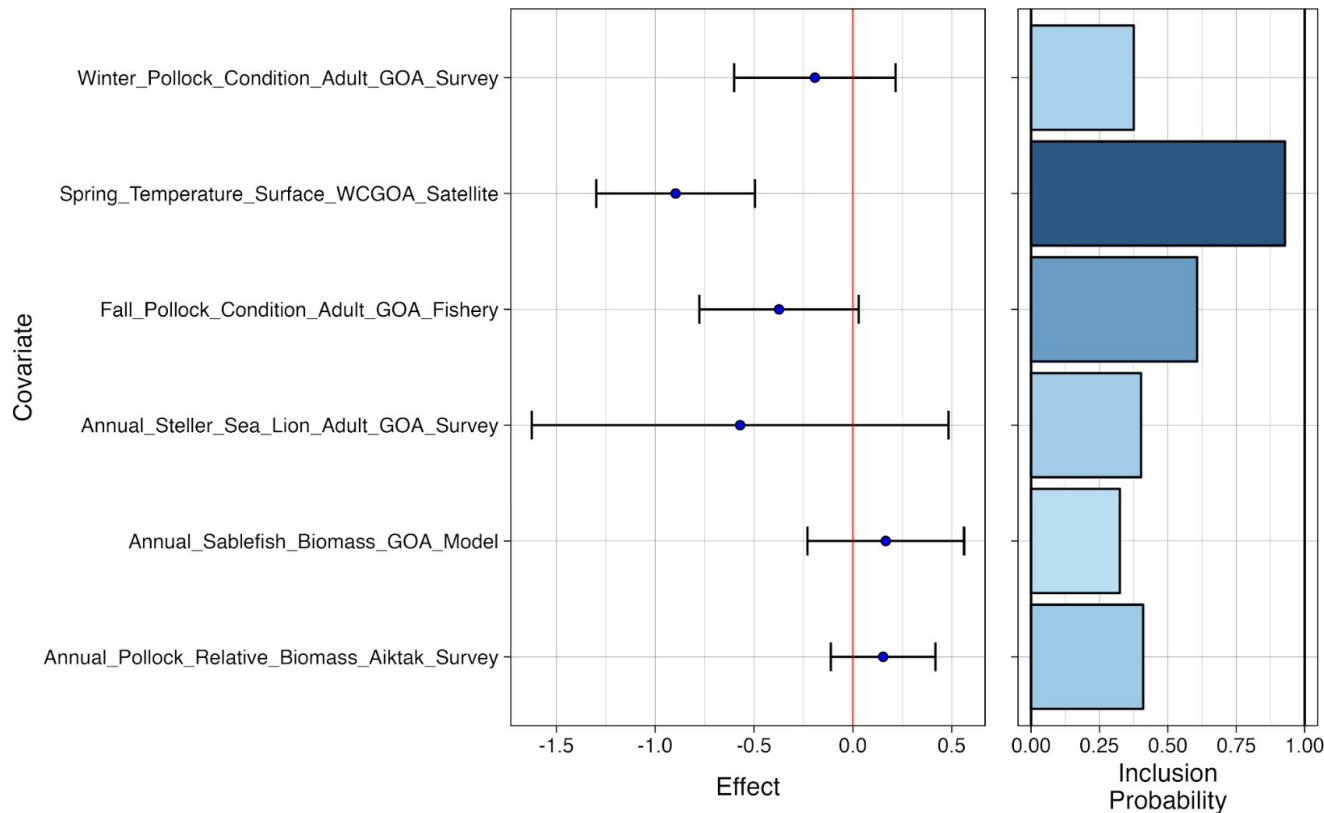
Importance Methods Project - Transition Year 2024

- Evaluating statistical methods for sablefish (Oke et al., *in review*)
 - Bayesian adaptive sampling (BAS)
 - Boosted regression trees (BRT)
 - General additive models (GAMs)
 - Dynamic factor analysis (DFA) + robust regression
 - Dynamic structural equation modeling (DSEM, [Thorson et al., 2024](#))*
- Apply some of these methods on stocks with full ESPs
- Results presented at PEEC meeting for assessment authors



Importance Example - GOA Pollock

May Importance Result



November Report Card

Indicator	2019 Status	2020 Status	2021 Status	2022 Status	2023 Status
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
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
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 Shelikof Survey	low	NA	NA	NA	NA
Summer Pollock CPUE YOY Nearshore Kodiak Survey	neutral	neutral	neutral	neutral	neutral
Summer Pollock Euphausiid Diet Juvenile GOA Survey	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

0.88

0.62

Note: only for ecosystem indicators



Update

Timeline

Changes to Request For Indicators (RFI) and delivery of ESP statistical products

Capacity

New causal maps for ecosystem-linked models, creating general ESP report cards for all stocks,

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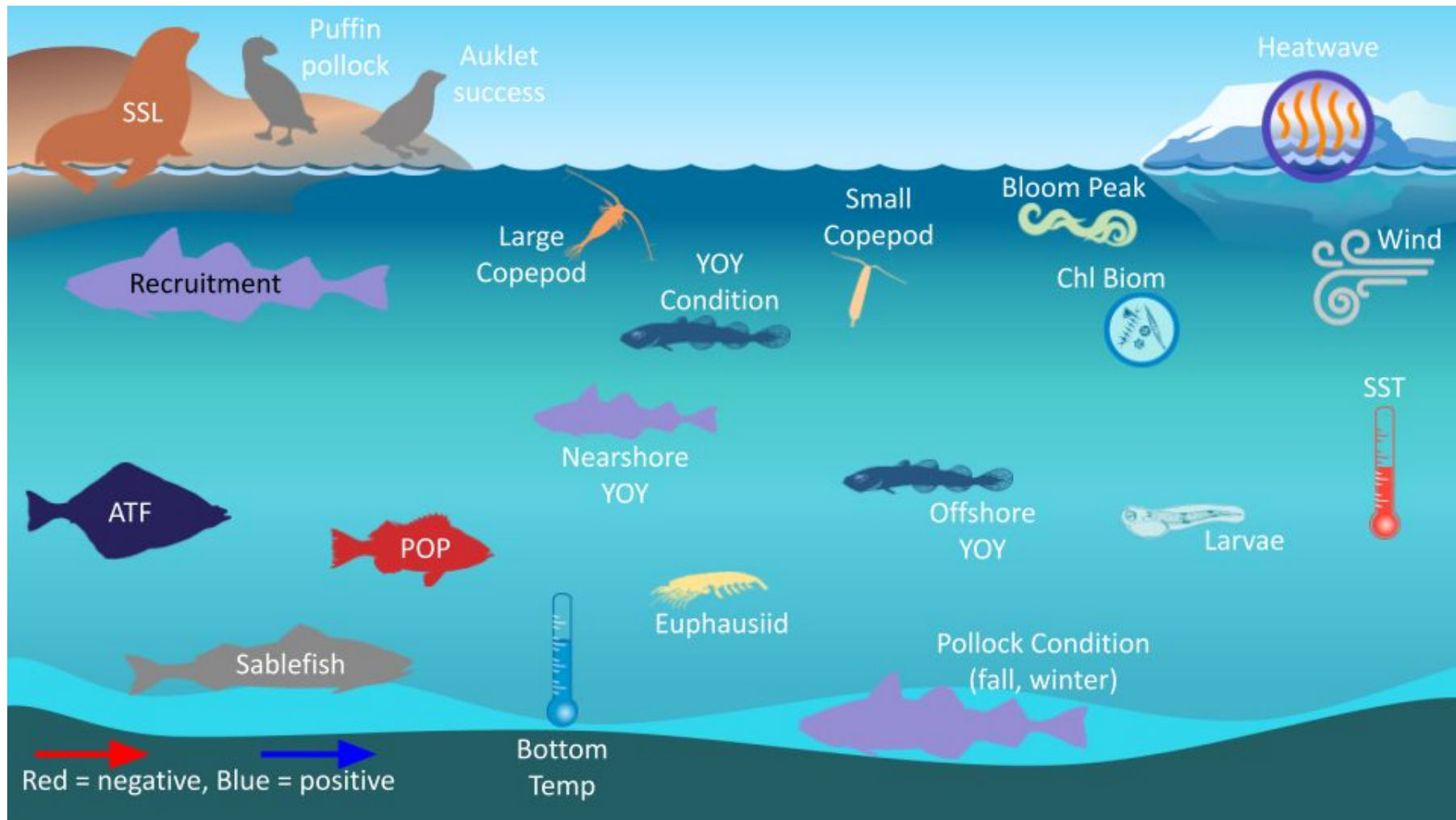
Coordination project, data modernization, developing socioeconomic indicators (Dame)

Ecosystem-linked Assessment Project

- Integrating DSEM in GOA pollock model (Champagnat et al., *in prep*)
 - Concerns regarding recruitment and growth in risk table
 - BAS consistently showing high importance for couple indicators
 - Start with ESP indicator suite, develop a simple causal map
 - Evaluating sign and coefficient value through dynamic structural equation modeling (DSEM) that is running within GOA pollock assessment model
- Iterative process to determine indicators in causal model
- Can use modeling framework to test mechanisms in ESP



PEEC Activity - GOA Pollock Causal Map



ESP Review Process

Step 1

3. Assessment of the Sablefish Stock in Alaska
David B. Coakley, Dana M. Henderson, Cary J. Halperin, Karl H. Tenfjord, S. Kobi Shorwell, Kim D. Lohrey, Patrick W. Minchin, Kevin A. Swadlow, and Chris K. Luedford
November 2020

Executive Summary
Summary of Changes to the Assessment
Relative to last year's assessment, we have not made any major changes to the current assessment except for inclusion of new data. The changes are summarized below.

Changes to the Input Data
New data included in the assessment model were relative abundance and length data from the 2020 trawl survey, relative abundance and length data from the boat gear fishery for 2019, length data from the trawl fishery for 2019, age data from the length survey and boat gear fishery for 2019, updated catch for 2018, and projected 2019–2022 catches. Estimates of fall and spring relative abundance in the fishery were updated and projected for 2020–2022. In 2020, there was not a NMFS Hall of Alaska boat survey.

Changes to the Assessment Methodology
There were no changes to the assessment methodology. However, there is an authors' recommended ABC that is lower than the previous year's ABC based on the risk table approach utilized previously and updated relative abundance.

Each of the reports have been updated with relevant new information and analysis. In particular, the Executive and Assessment Profile (EAP), Appendix 3C, has been updated with new data for 2020. The catch assessment approach (CA) has been evaluated and updated to reflect requested changes to the opening model and assessment changes based on SSC and FJ comments over the last year. There is one additional appendix characterizing beyond of catch objectives in the report (Appendix 3E).

Summary of Results

The length of 2020 fish is 28.15 cm, the mean length for 2020 is 28.15 cm, the mean length for 2020 is 28.15 cm, the mean length for 2020 is 28.15 cm.

- SAFE (Fall)**
- Plan Team
 - Dec Council
 - Request ESP

Step 2

Request for Information (RFI): Ecosystem and Socioeconomic Profile (ESP) of the Groundfish stocks in Alaska

Groundfish ESP Team
2020

Stepwise plan and cycle for review of information submissions in response to this RFI

Request Opening	February 3, 2020
Request Closing	February 28, 2020
Review of Submissions	
Final Decision	

Please read Request for Information

- RFI (Spring)**
- Submissions
 - Team Review
 - Decision

Step 3

Appendix 3C: Ecosystem and Socioeconomic Profile of the Sablefish stock in Alaska

S. Kobi Shorwell, David Coakley, Alison Dwyer, Cary Tenfjord, Karl Tenfjord, Dana Henderson, Chris Luedford, Kevin Swadlow, and Jane Sullivan
November 2020

With Contributions from:
Mayra Avila, Steve Barbano, Cary Coakley, Jess Nelson, Chris Onda, Patrick Rensler, Vicki Swadlow, Cary Tenfjord, Kim Tenfjord, Keith Swadlow, Jordan Swadlow, Sarah

- ESP Full**
- Mechanisms
 - Indicators
 - Sept Final

Step 4

NOAA FISHERIES
Sablefish (*Anoplopoma fimbria*)

• Data rich stock, high recruitment variability, rapid early life growth, shifting distribution, high value

Indicators

Score

Importance

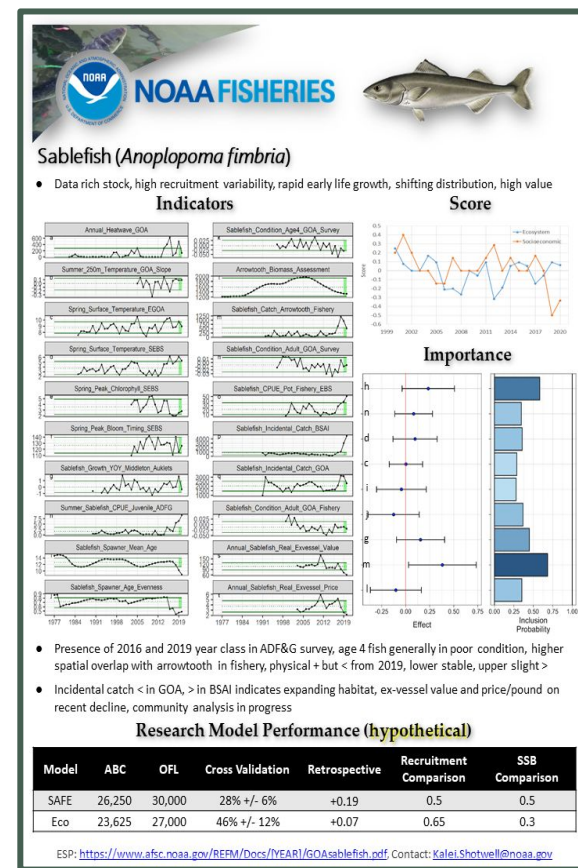
• Presence of 2016 and 2019 year class in AGFBG survey; age 4 fish generally in poor condition, higher spatial overlap with groundfish in fishery; historical built < from 2020; lower stable, lower stable < recent decline

- ESP Card**
- Current Yr
 - Nov PT
 - Dec Council

Introducing ESP Mini

- Create indicator suite
 - Review ESR, EFH, any synthesis papers
 - Request stock-specific indicators in RFI
 - Create indicators from products applicable to many stocks (e.g., satellite, modeled)
- Create report card
 - Upload indicators to ESP data management, can be manual or AKFIN sourced
 - AKESP R package for standard graphics and ESP reporting templates
- Useful for risk table evaluation ([example](#))

Short Communication

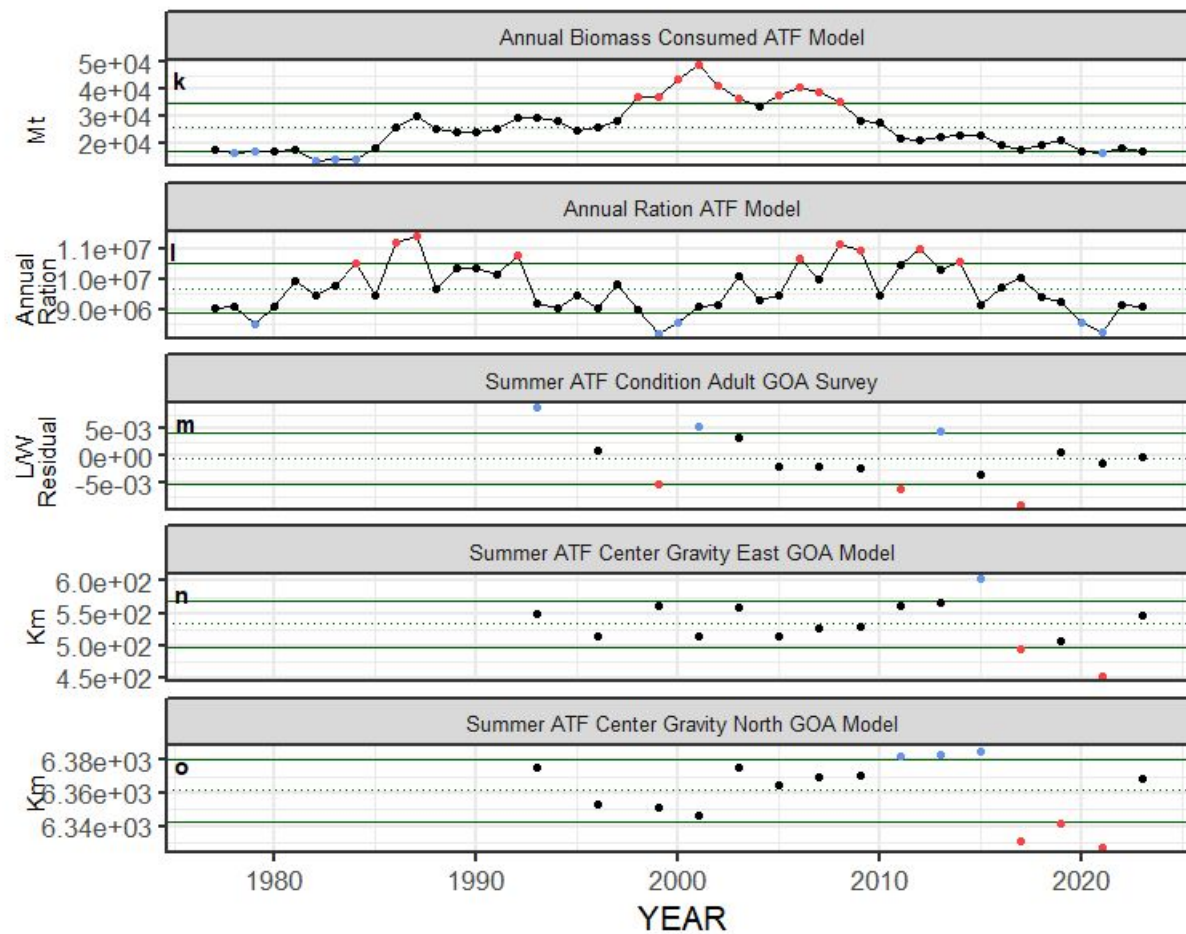
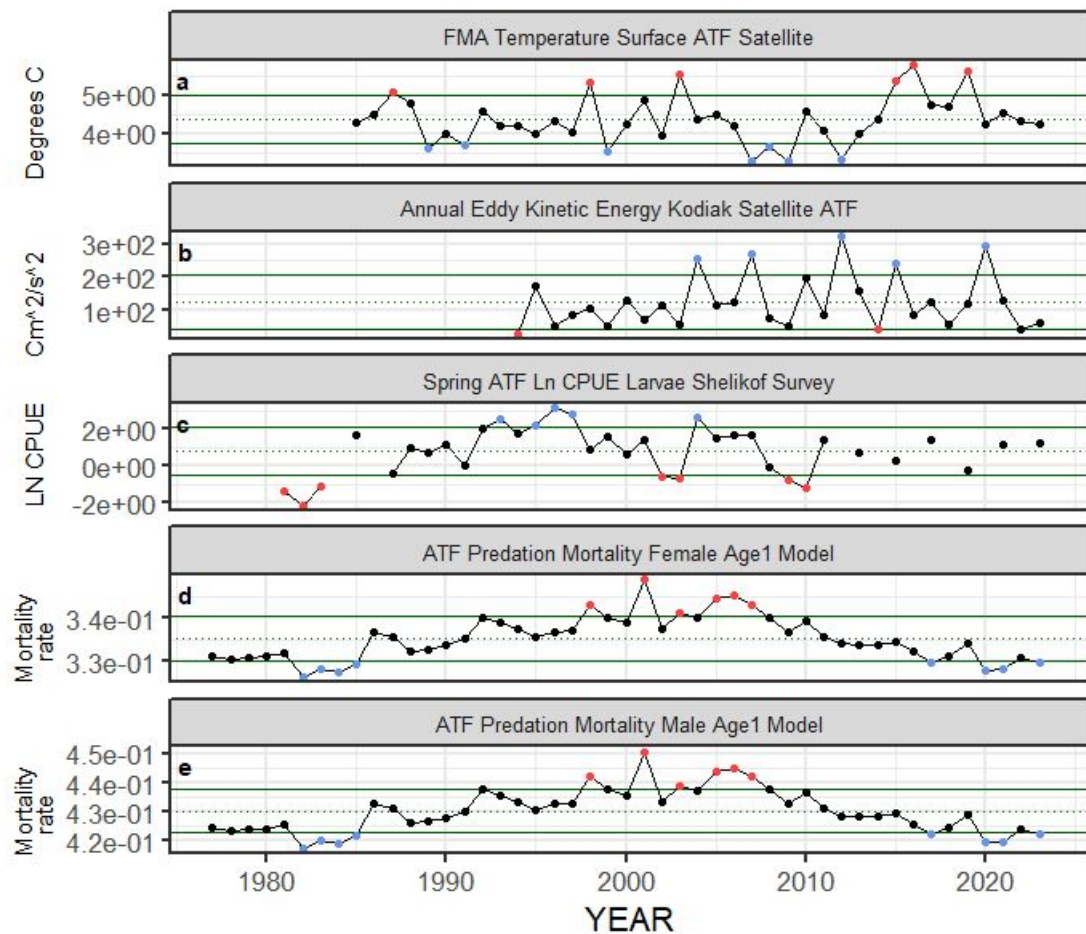


Example - GOA Arrowtooth Flounder (ATF)

1. **SAFE Recommendation:** investigate low recruitment with ESP
2. **Request and Review:** 2 synthesis papers, maps of EFH 5-yr review, GOA ESR, GOA ESPs, and inseason management report, identified 19 indicators and requested them directly from contributors
3. **ESP Data Management:** uploaded individual contributions from GOA ESR, GOA ESPs, and inseason, some can be automated
4. **ESP Report:** connect to webservice and use ESP report card template to get set of standardized tables and figures



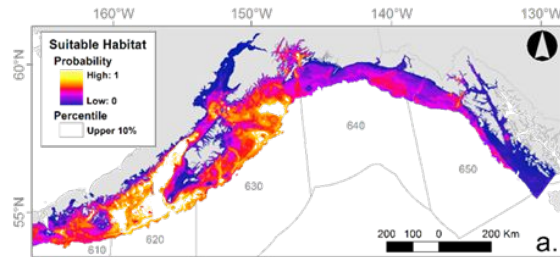
Indicator Time Series



Informed Indicators

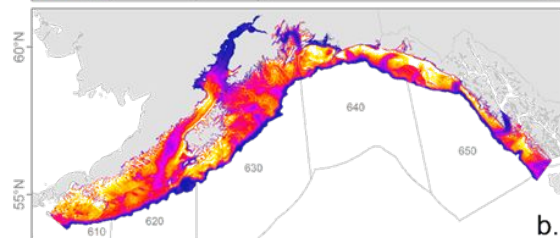
Shotwell et al., 2022

Larval



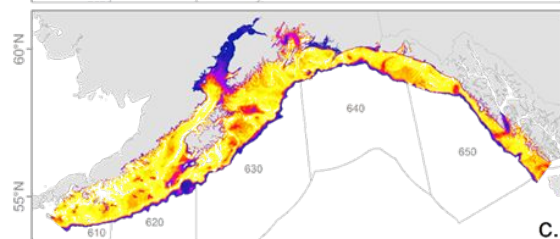
ATF Larval filters

Early Juvenile



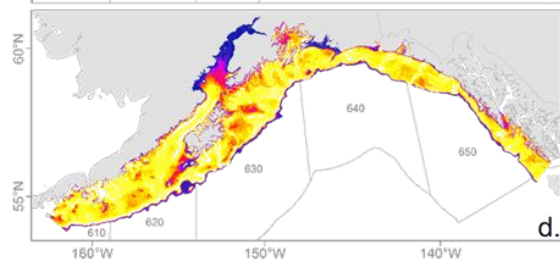
Depth: 150-900m

Late Juvenile

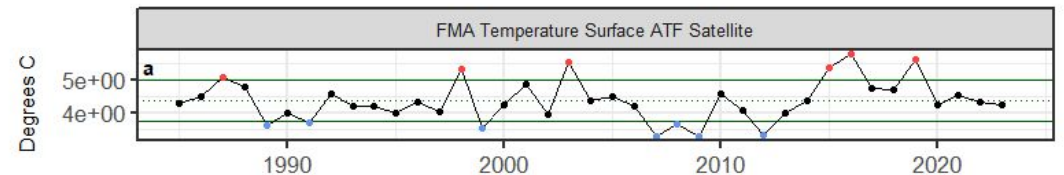
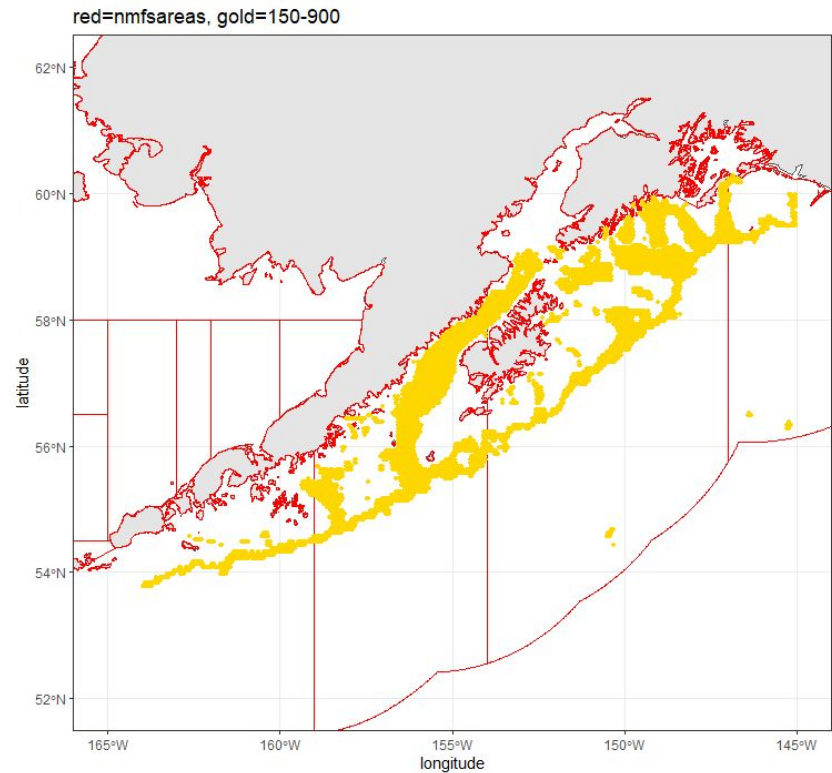


Area: 620,630

Adult



Season: Feb-April

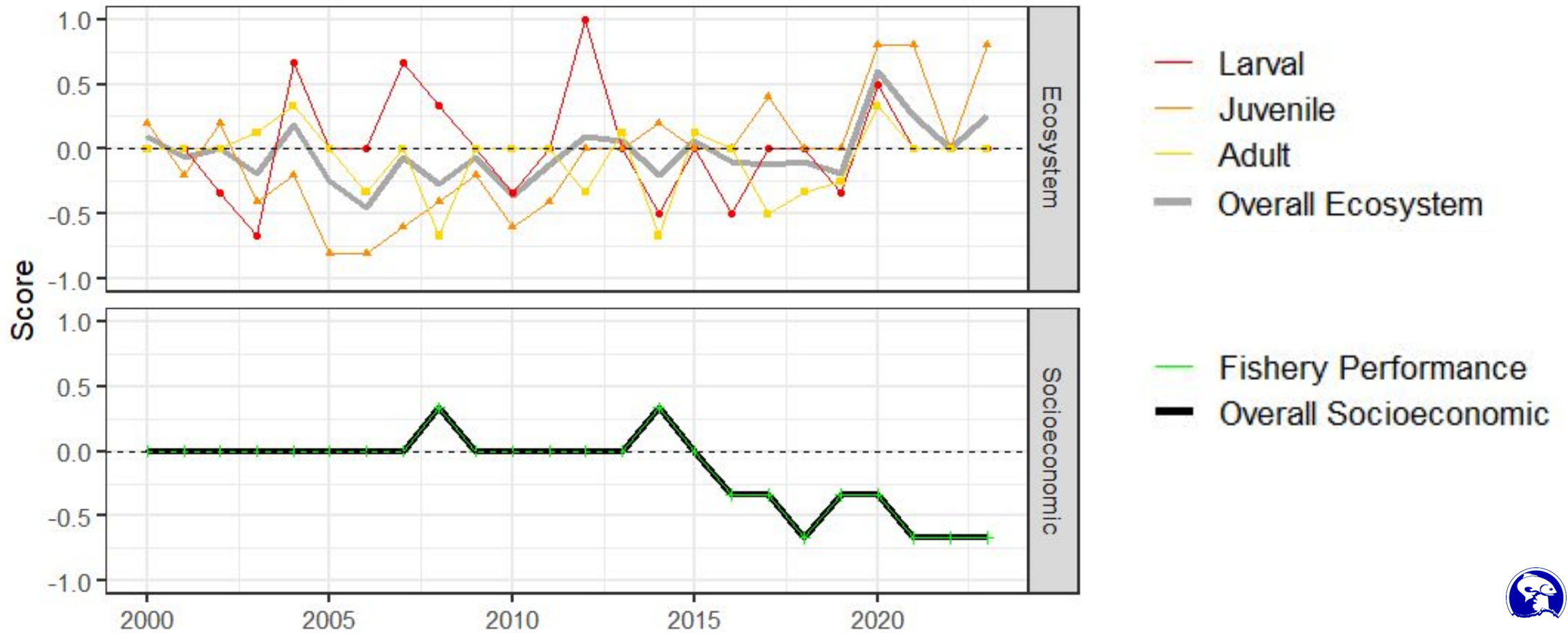


Traffic Light Table

Indicator category	Indicator	2019 Status	2020 Status	2021 Status	2022 Status	2023 Status
Larval	FMA Temperature Surface ATF Satellite	high	neutral	neutral	neutral	neutral
	Annual Eddy Kinetic Energy Kodiak Satellite ATF	neutral	high	neutral	neutral	neutral
	Spring ATF Ln CPUE Larvae Shelikof Survey	neutral	NA	neutral	NA	neutral
Juvenile	ATF Predation Mortality Female Age1 Model	neutral	low	low	neutral	low
	ATF Predation Mortality Male Age1 Model	neutral	low	low	neutral	low
	ATF Predation Mortality Female Age2 Model	neutral	low	low	neutral	low
	ATF Predation Mortality Male Age2 Model	neutral	low	low	neutral	low
	Summer ATF Size Small ADFG Survey	neutral	neutral	neutral	neutral	neutral
Adult	Summer ATF CPUE ADFG Survey	neutral	neutral	neutral	neutral	neutral
	Summer Temperature Bottom GOA Survey ATF	high	NA	neutral	NA	neutral
	Annual Biomass Consumed ATF Model	neutral	neutral	low	neutral	neutral
	Annual Ration ATF Model	neutral	low	low	neutral	neutral
	Summer ATF Condition Adult GOA Survey	neutral	NA	neutral	NA	neutral
	Summer ATF Center Gravity East GOA Model	neutral	NA	low	NA	neutral
	Summer ATF Center Gravity North GOA Model	low	NA	low	NA	neutral
Summer ATF Area Occupied GOA Model	neutral	NA	neutral	NA	neutral	

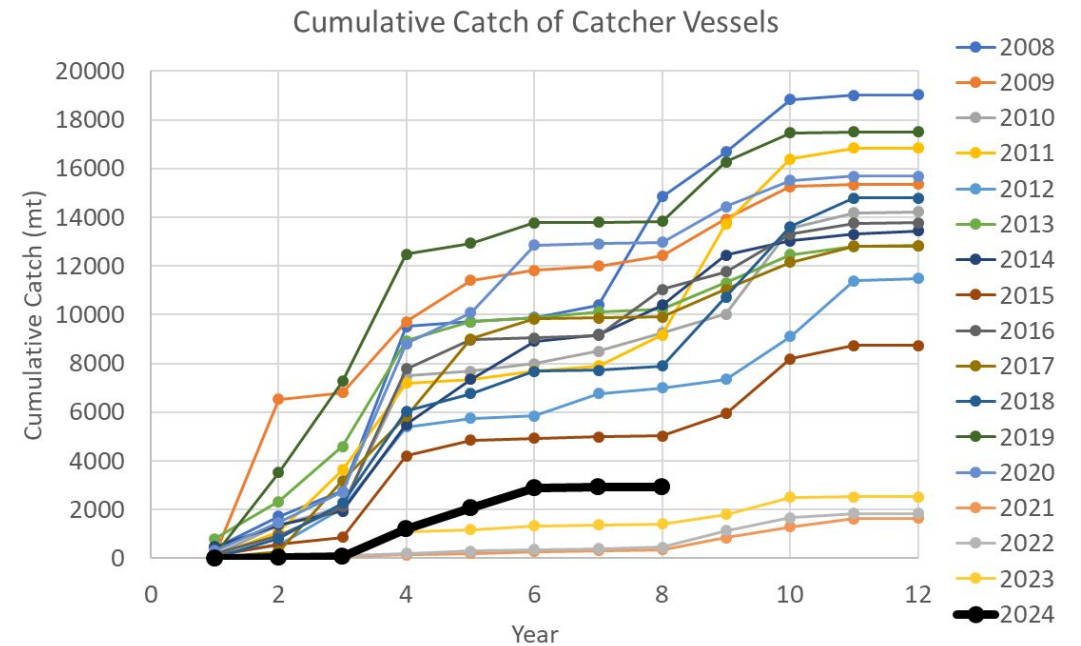
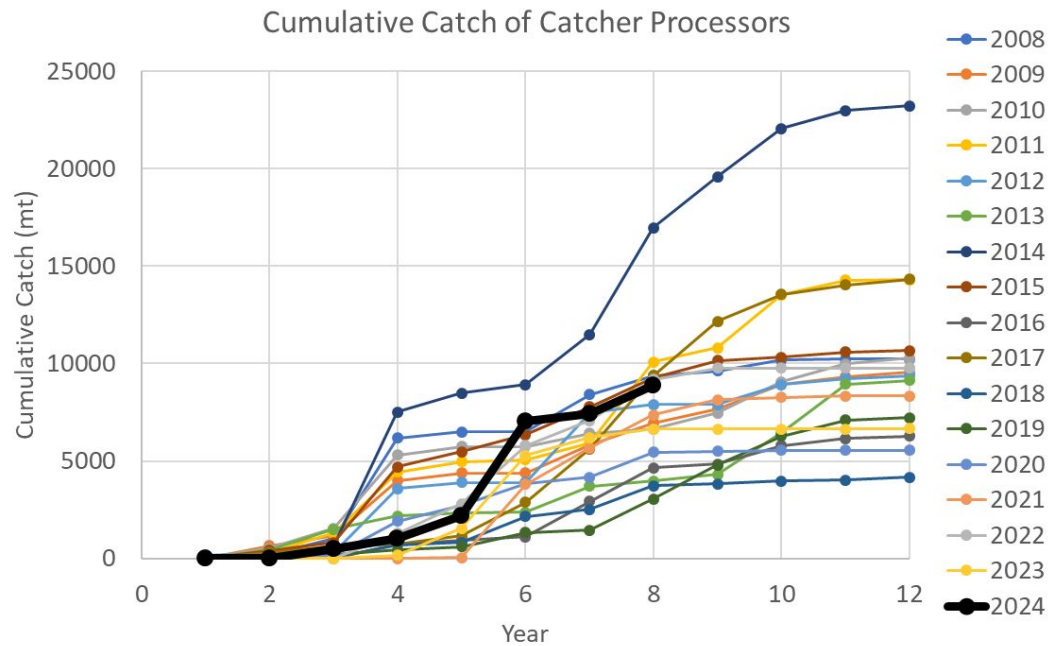


Indicator Analysis - Traffic Light Score



Socioeconomic Indicators

Indicator category	Indicator	2019 Status	2020 Status	2021 Status	2022 Status	2023 Status
Fishery Performance	Annual ATF Catch CV GOA Fishery	neutral	neutral	low	low	low
	Annual ATF Catch CP GOA Fishery	neutral	neutral	neutral	neutral	neutral
	Annual ATF Incidental Catch GOA Fishery	low	low	low	low	low





Update

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Changes to Request For Indicators (RFI) and delivery of ESP statistical products

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Coordination project, data modernization, developing socioeconomic indicators (Dame)

National ESP History



Alaska ESPs (17 stocks requested, 7 complete)



Pacific Islands ESPs (2 stocks requested, 1 complete)



Northeast ESPs (7 stocks requested, 3 complete)



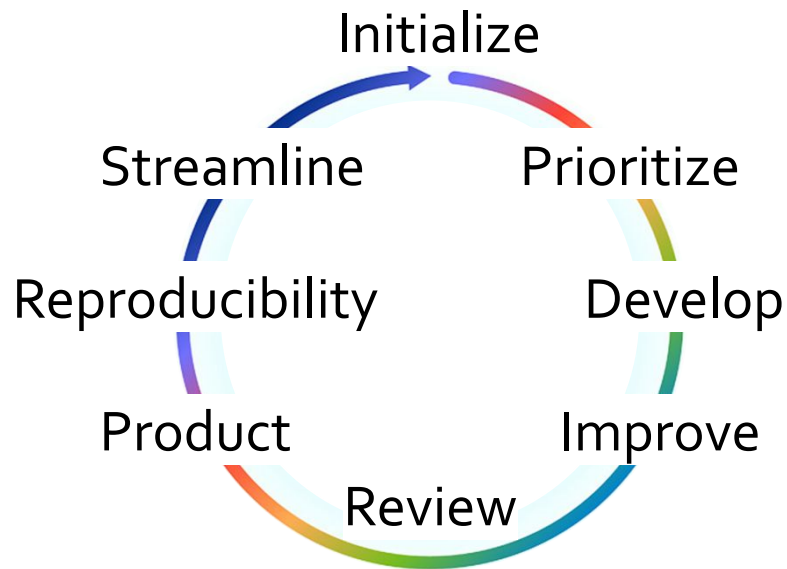
Northwest/Southwest (ESP-like reports)



Southeast (ESP-like report card)



National Initiative



National ESP Coordination Project

- Team
 - 12 representatives from NMFS science centers and regional offices
 - 6 representatives from NMFS Office of Science and Technology and Office of Sustainable Fisheries
- Purpose and Activities
 - Improve communication, share across science centers, create efficiencies
 - National ESP webpage, step-by-step guide, coordinated [share workshops](#), co-creating activities, tracking, and reporting



IRA/FIS Data Modernization Project

- Expanding AKFIN data management and AK-ESP R package
 - Build out automated datasets to EEZ, create web services
 - Code cleanup, develop report templates for multiple area uses
- Case study - Northeast
 - Coordinated with NE - ERDDAP
 - Planning session with data managers and AKFIN in July 2024
 - Planning session with data managers and code developers in 2025

The image shows two overlapping screenshots. The background is a screenshot of the 'AFSC Data Management' web application. The top navigation bar is blue with 'AFSC Data Management', 'Help', 'KSHOTWELL', and 'Log Out'. The main content area is titled 'Administration \ Ecosystem and Socioeconomic Profiles Administration'. It features three circular gauges: 'Targets Approved' (17), 'Under Review' (21), and 'Targets Empty' (5). Below these is a bar chart with a single blue bar labeled 'Unknown' reaching a value of approximately 17. The foreground is a screenshot of the 'Alaska ESP templates' README for version 0.0.1. It includes a title, a purpose statement, and sections for 'Create figures' and 'Create ESP templates and reports'. A GitHub Octocat logo is visible in the bottom right of the README. The README footer states 'Developed by Abigail Tyrell.' and 'Made with pkgdown 1.6.1, using preferably template.'

Feedback on Socioeconomics in ESPs

- Alaska SSC Minutes ([2022](#), [2023](#)) and NPFMC [Motion](#)
 - SSC has consistently provided feedback on socioeconomics in ESPs particularly to coordinating multiple products, suggested workshop
 - “The Council recommends NOAA and Council staff review available data and recommend species-level socio-economic indicators appropriate for the Ecosystem and Socioeconomic Profiles (ESPs)...”
- National ESP share workshops
 - Less emphasis on socioeconomics in ESPs (little "s"), low engagement
 - Uncertainty in how to choose or use socioeconomic indicators to best support fisheries management decisions



2024 Progress

- Alaska
 - Several meetings with Council staff to discuss AFSC staff capacity to produce socioeconomic indicators for ESPs
 - Plan to add a few new socioeconomic indicators for the sablefish ESP (next talk by Rusty), incorporate PT/SSC/Council feedback
- National ESP Project
 - Review existing socioeconomic indicators in ESP/ESR and propose existing and/or develop new stock- or ecosystem-level indicators for ESP/ESR
 - Discussion session at ESP Share Workshop on resolution, temporal scale, and type of socioeconomic indicators and initiate guidance document



Proposed Socioeconomic Indicators for Sablefish

- In response to the SSC's request for additional socioeconomic information in the Alaska sablefish ESP
 - Improves coordination of socioeconomic information in Council decision-information sources
- Provides socioeconomic information that meets BSIA threshold at time of TAC setting
- We developed four new socioeconomic indicators for the sablefish fishery
 1. Historical and inseason sablefish prices and landings by size
 2. Total Allowable Catch (TAC) utilization by region
 3. Total sablefish revenue share of active vessels
 4. Regional quotients by value and landings



Indicator #1: Inseason Pricing and Quantity Sold by Size

- Reports the total landings (in pounds), the proportion of total landings by size category, and the annual size-specific average price per pound.
- Data Sources
 - Alaska Regional Office inseason eLandings data
 - Catcher-processor fleet does not size sablefish
 - Considers fish tickets for the fixed gear fleet
 - Limited size information is available for the trawl fleet
 - Trends in price between inseason eLandings , COAR, and CFEC display very similar trends
 - COAR and CFEC consider post-season adjustments
 - Do not differentiate by size category

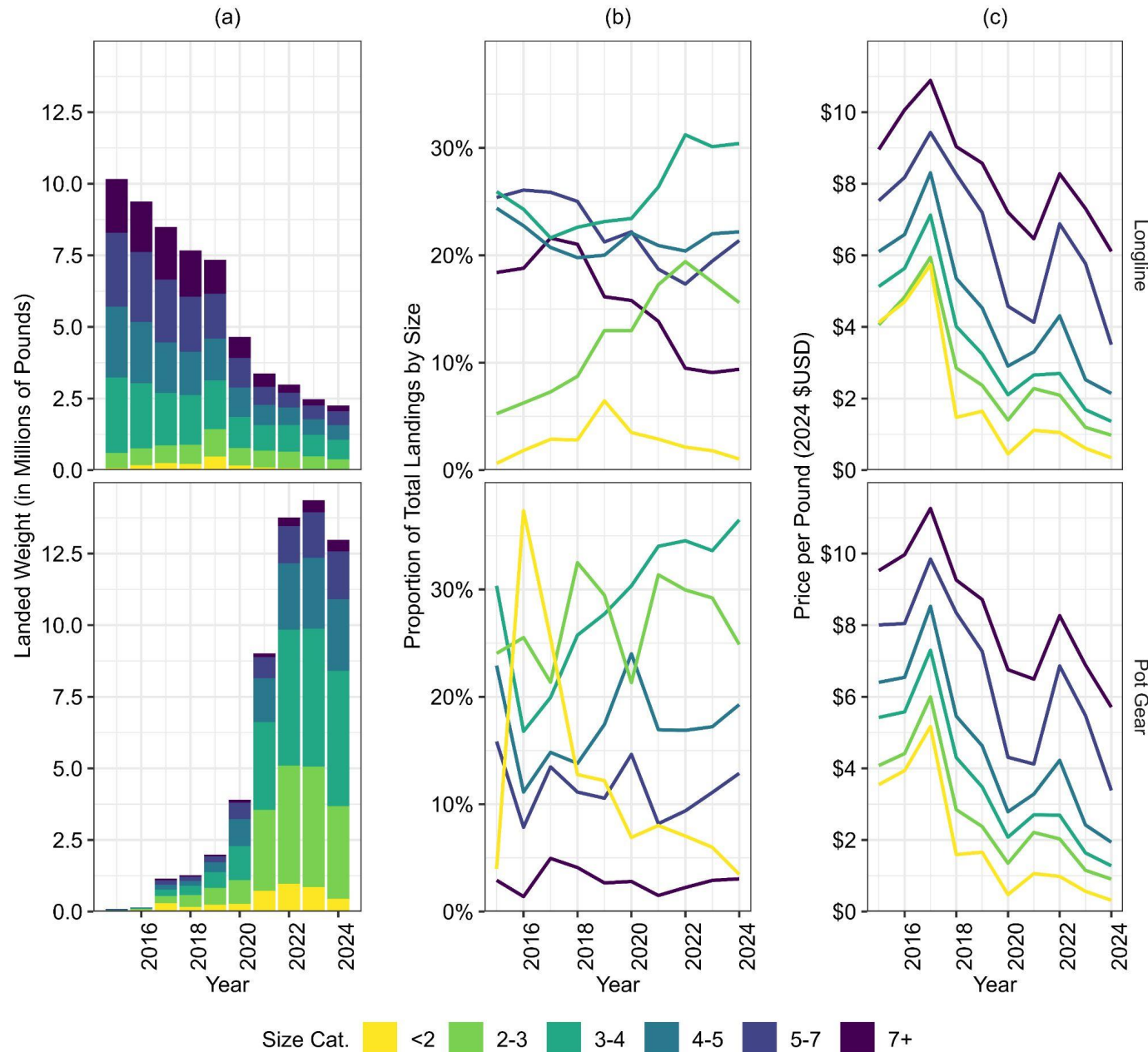


Indicator #1: Inseason Pricing and Quantity Sold by Size

- Methods
 - Size categories are very similar between processing facilities but quality grades are not
 - ~97% of all reports that listed size categories could be binned
 - Quality ranged between letters (“a” to “f”), symbols (+,-), and numbers (#1 to #3)
 - Price per-pound is based on the average among all quality grades
 - Consider historical data between January 1 and September 30
 - Compared full- and partial-year historical data
 - Less than a 5% absolute difference



Indicator #1: Inseason Pricing and Quantity Sold by Size



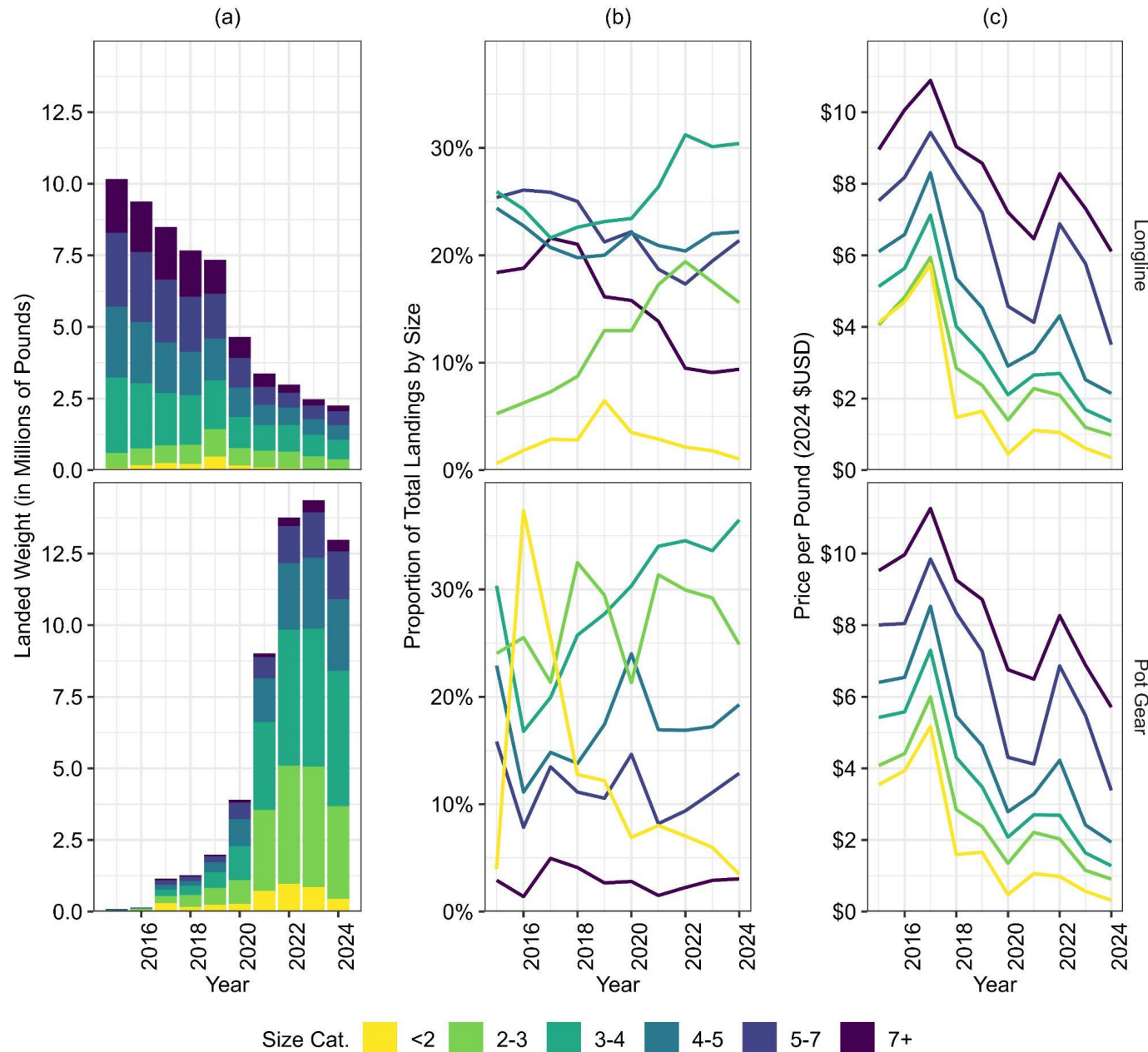
Interpretation: Comparison of total landings, proportion of total landings by size, and price per pound by size for the fixed gear fishery differentiated by gear-type

Decrease in the proportion of sablefish <2 lbs and >7 lbs size categories

Increase in the proportion of sablefish in the 2 to 3 lb and 3 to 4 lb size categories



Indicator #1: Inseason Pricing and Quantity Sold by Size



Price declines are similar between the 5-7 lb and >7 lb and between all other size categories

SSC/Council Use: Provides information on fishery performance and market conditions for the fixed gear fishery

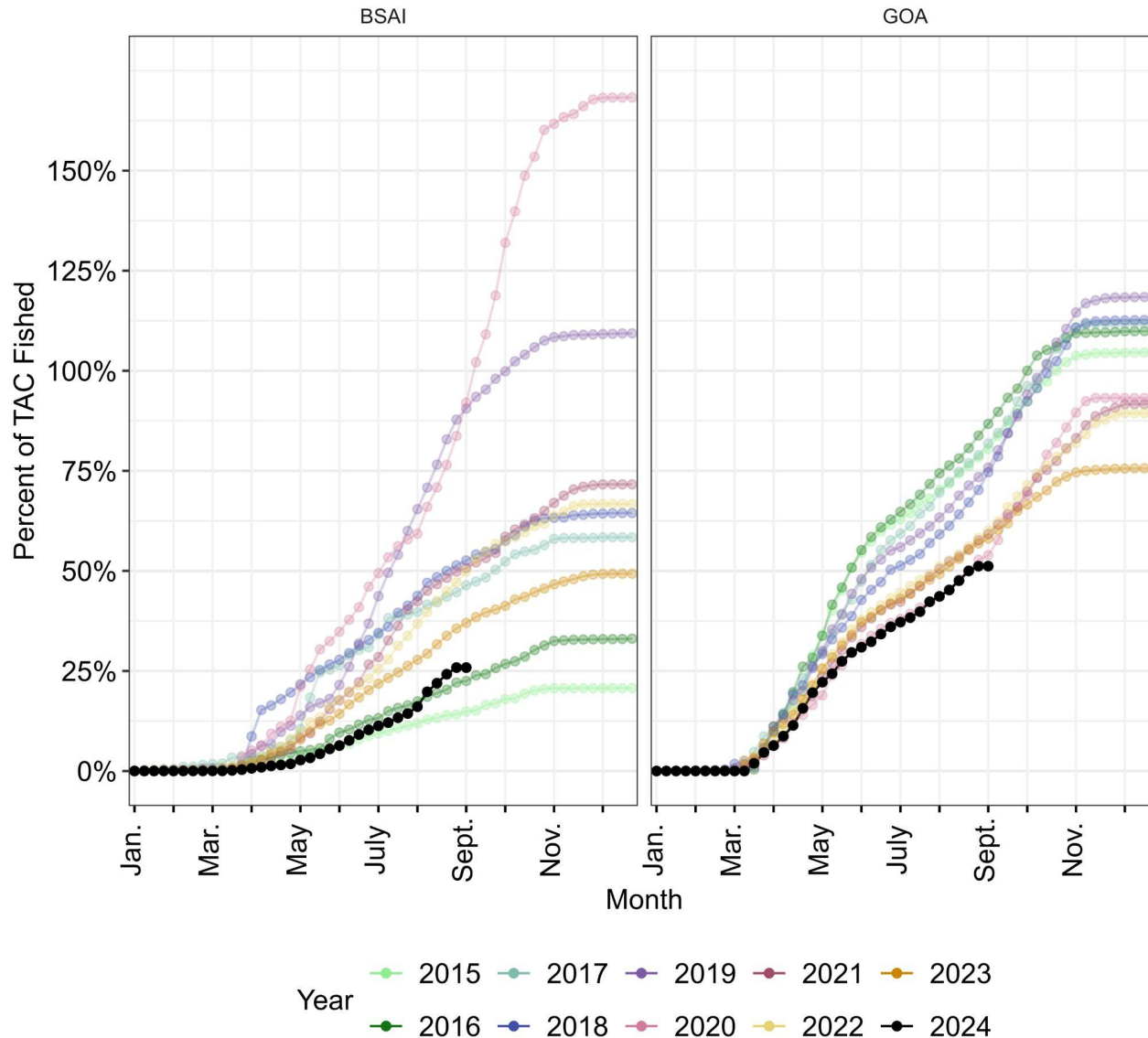


Indicator #2: Percentage of Total Allowable Catch Harvested by Active Vessels

- Reports the cumulative TAC utilization (as a percent) for the BSAI and GOA
- Data Sources
 - Catch Accounting System (CAS)
- Methods
 - Report weekly TAC utilization through September (full-year for historical TAC utilizations)
 - Divide the cumulative sum of weekly sablefish landings by region-specific TAC levels
 - More detailed sector-level TAC utilization presented by the AKR in December



Indicator #2: Percentage of Total Allowable Catch Harvested by Active Vessels



Interpretation: The historical and inseason percentage of TAC utilization by week for the BSAI and GOA

SSC/Council Use: Determine which region may be most sensitive to changes in TAC regulations

Note: Data on landings used for TAC utilization includes catch and discards



Indicator #3: Total Revenue Share by Sector and Gear Type

- Reports the historical (2010-2023) proportion of total region-specific sablefish revenue by catcher vessels and catch processors and gear-type
- Data
 - Commercial Operator's Annual Report (COAR)
 - Catch Accounting System (CAS)
- Methods
 - Divide the sector- and gear-specific sablefish revenue by the total sablefish revenue associated with each region



Indicator #3: Total Sablefish Revenue Share by Sector and Gear Type



Interpretation: The temporal change in the proportion of total sablefish revenue within each sector/gear-type by region

SSC/Council Use: Provide insight in setting TAC in consideration of economic and social factors

Note: Data pre-2017 for slinky pots in GOA is excluded due to confidentiality



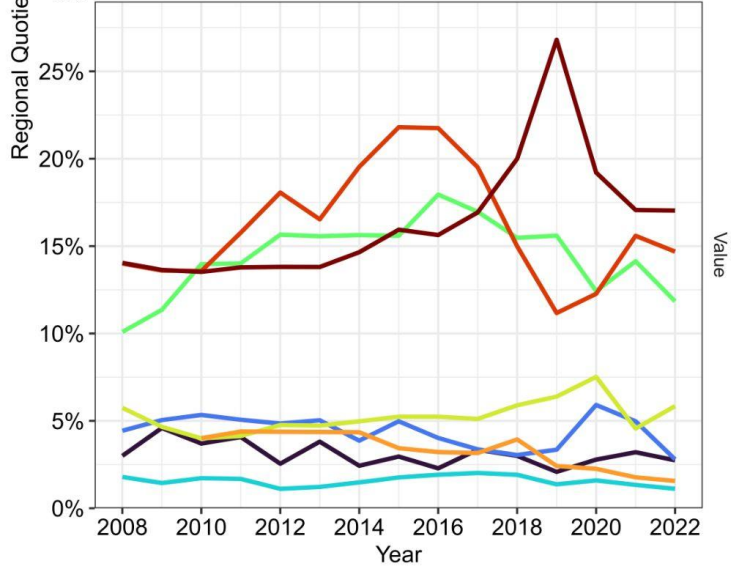
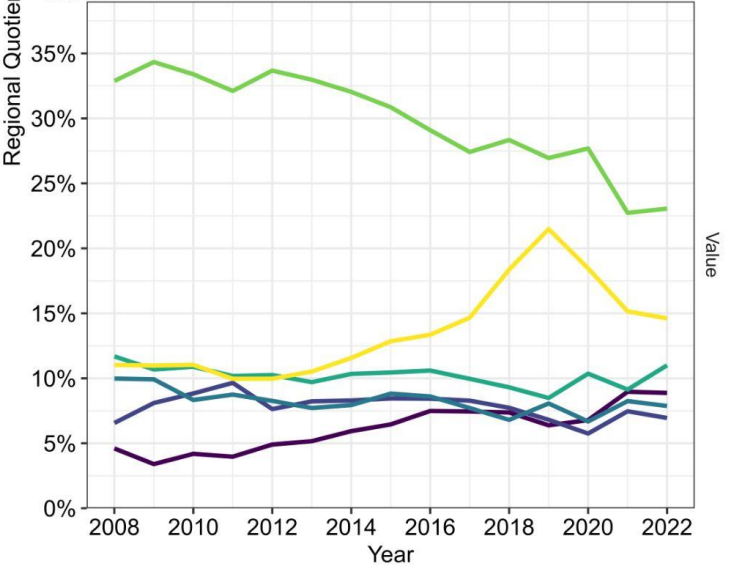
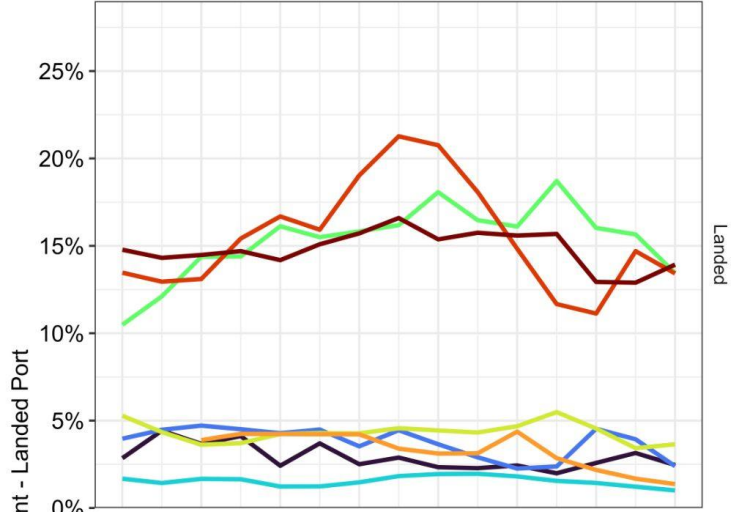
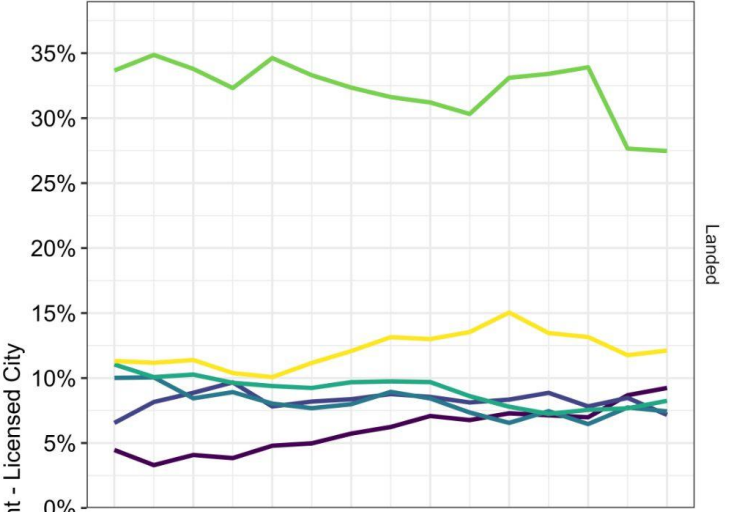
Indicator #4: Regional Quotient

- Reports the historical (2008-2023) involvement of communities (based on vessel owner registration residence and landings port) based on landings and value
- Data
 - Commercial Operator's Annual Report (COAR)
 - Catch Accounting System (CAS)
- Methods
 - Divide the community-specific sablefish landings (value) by total landings (value) among all communities



Regional Quotient by Vessel Owner Registration Location

Regional Quotient by Landings Port



- Communities
- HOMER
 - KODIAK
 - OTHER WASHINGTON
 - PETERSBURG
 - SEATTLE MSA
 - SITKA

- Communities
- CORDOVA
 - JUNEAU
 - KETCHIKAN
 - KODIAK
 - PETERSBURG
 - SAND POINT
 - SEWARD
 - SITKA

Interpretation:
Community-specific landings (revenue) as a proportion of total landings (revenue)

SSC/Council Use: Determine potential community impacts from changes in TAC/other regulations and the importance of sablefish for communities





Discussion

- 1) Do the new schedules for Request For Information (RFI) and statistical importance products seem reasonable?
- 2) Does the ESP Mini seem useful for initiating recommended ESPs? Any feedback on this format?
- 3) Are there any thoughts or concerns on the proposed sablefish socioeconomic indicators? Additional ideas?

Thank You!



Contact:

Kalei Shotwell, AFSC
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ESP Summary

Stock	Year initiated	Full ESP	Partial update	Report card*
Sablefish	2017	2017 - <u>2019</u>	<u>2020</u>	<u>2021</u> , <u>2022</u> , <u>2023</u>
Gulf of Alaska Pollock	2019	<u>2019</u>	<u>2020</u>	<u>2021</u> , <u>2022</u> , <u>2023</u>
EBS Pacific Cod	2020	<u>2021</u>		<u>2021</u> , <u>2022</u> , <u>2023</u>
GOA Pacific Cod	2020	<u>2021</u>		<u>2021</u> , <u>2022</u> , <u>2023</u>
St Matthew Blue King Crab	2019	<u>2019</u>	<u>2020</u>	<u>2022</u>
Bristol Bay Red King Crab	2020	<u>2020</u>		<u>2021</u> , <u>2022</u> , <u>2023</u>
Bering Sea Snow Crab	2021	<u>2022</u>		<u>2023</u>

