Ecosystem Socioeconomic Profile (ESP)

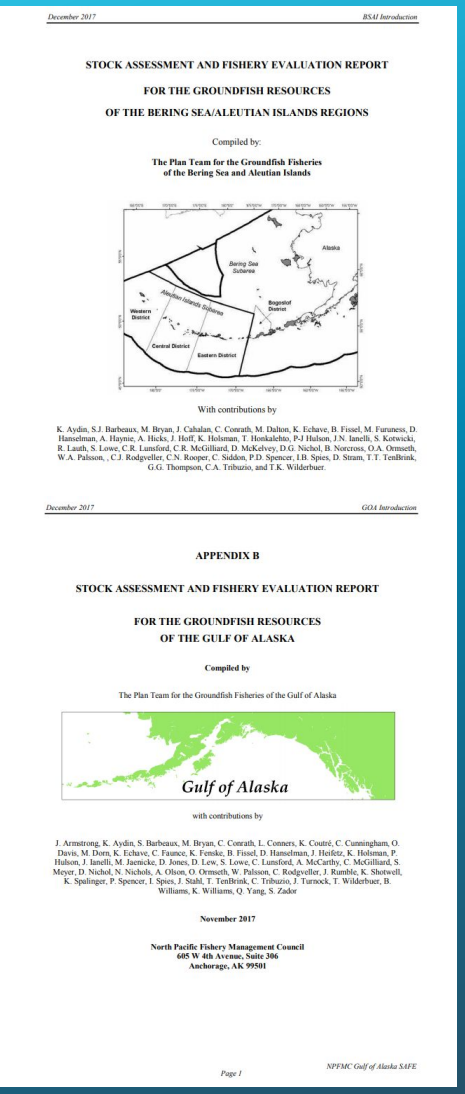
Introduction

ESP Definition: A standardized framework that facilitates the integration of ecosystem and socioeconomic factors within the stock assessment process and acts as a proving ground for use in management advice.

NOAA FISHERIES

Alaska Fisheries Science Center
Kalei.Shotwell@noaa.gov

Communication Gap



December 2017 BSAI Introduction

STOCK ASSESSMENT AND FISHERY EVALUATION REPORT

FOR THE GROUNDFISH RESOURCES

OF THE BERING SEA/ALEUTIAN ISLANDS REGIONS

Compiled by:

The Plan Team for the Groundfish Fisheries of the Bering Sea and Aleutian Islands

With contributions by

K. Aydin, S.J. Barbeaux, M. Bryan, J. Cahalan, C. Conrath, M. Dalton, K. Echave, B. Fissel, M. Furuness, D. Hanselman, A. Haynie, A. Hicks, J. Hoff, K. Holsman, T. Honkalehto, P-J Hulson, J.N. Ianelli, S. Kotwicki, R. Lauth, S. Lowe, C.R. Lunsford, C.R. McGilliard, D. McKelvey, D.G. Nichol, B. Norcross, O.A. Ormseth, W.A. Palsson, , C.J. Rodgveller, C.N. Rooper, C. Siddon, P.D. Spencer, I.B. Spies, D. Stram, T.T. TenBrink, G.G. Thompson, C.A. Tribuzio, and T.K. Wilderbuer.

December 2017 GOA Introduction

APPENDIX B

STOCK ASSESSMENT AND FISHERY EVALUATION REPORT

FOR THE GROUNDFISH RESOURCES OF THE GULF OF ALASKA

Compiled by

The Plan Team for the Groundfish Fisheries of the Gulf of Alaska

Gulf of Alaska

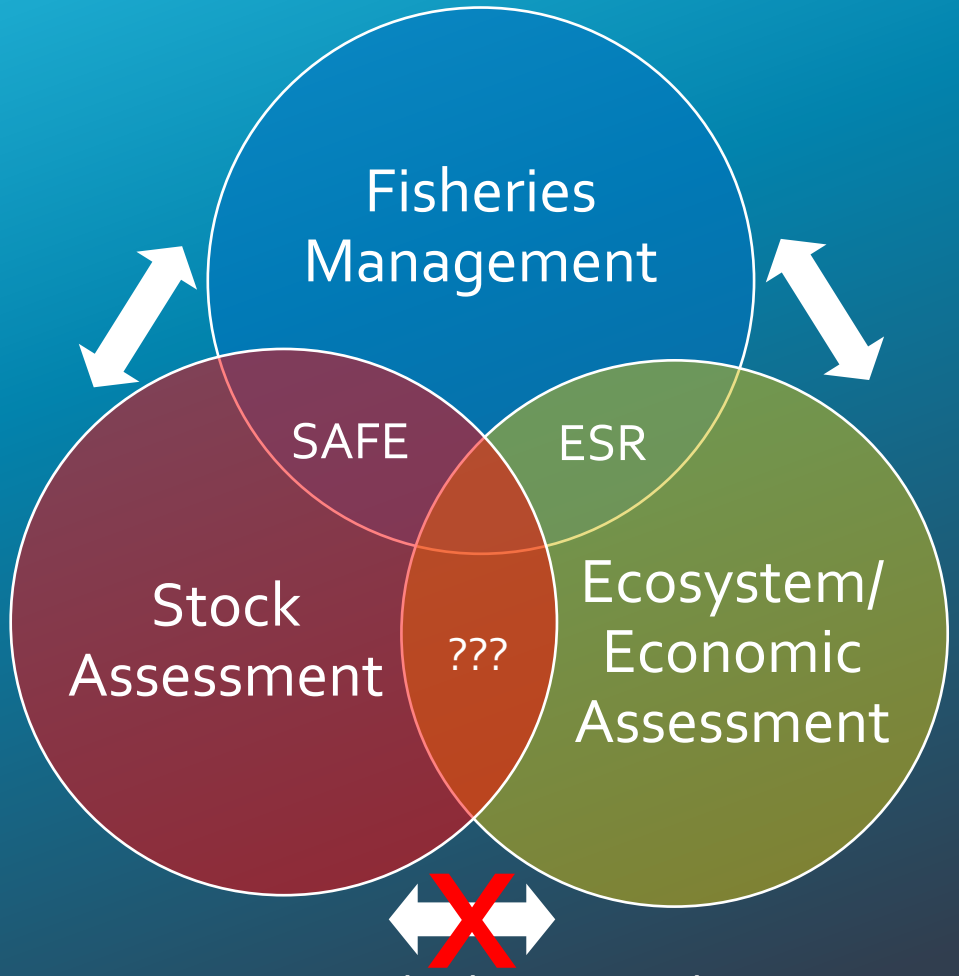
with contributions by

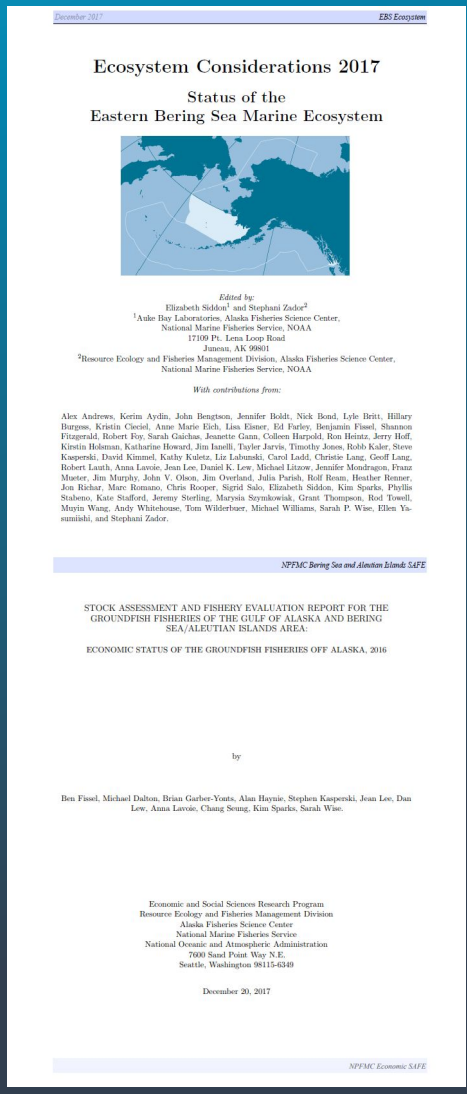
J. Armstrong, K. Aydin, S. Barbeaux, M. Bryan, C. Conrath, L. Conners, K. Coutré, C. Cunningham, O. Davis, M. Dorn, K. Echave, C. Faunce, K. Fenske, B. Fissel, D. Hanselman, J. Heifetz, K. Holsman, P. Hulson, J. Ianelli, M. Jaenicke, D. Jones, D. Lew, S. Lowe, C. Lunsford, A. McCarthy, C. McGilliard, S. Meyer, D. Nichol, N. Nichols, A. Olson, O. Ormseth, W. Palsson, C. Rodgveller, J. Rumble, K. Shotwell, K. Spalinger, P. Spencer, I. Spies, J. Stahl, T. TenBrink, C. Tribuzio, J. Turnock, T. Wilderbuer, B. Williams, K. Williams, Q. Yang, S. Zador

November 2017

North Pacific Fishery Management Council
605 W 4th Avenue, Suite 306
Anchorage, AK 99501

Page 1 NPFMC Gulf of Alaska SAFE





December 2017 EBS Ecosystem

Ecosystem Considerations 2017

Status of the Eastern Bering Sea Marine Ecosystem

Edited by:
Elizabeth Siddon[1] and Stephani Zador[2]
[1]Auke Bay Laboratories, Alaska Fisheries Science Center, National Marine Fisheries Service, NOAA
17109 Pt. Lena Loop Road
Juneau, AK 99801
[2]Resource Ecology and Fisheries Management Division, Alaska Fisheries Science Center, National Marine Fisheries Service, NOAA

With contributions from:

Alex Andrews, Kerim Aydin, John Bengtson, Jennifer Boldt, Nick Bond, Lyle Britt, Hillary Burgess, Kristin Cieciel, Anne Marie Eich, Lisa Eisner, Ed Farley, Benjamin Fissel, Shannon Fitzgerald, Robert Foy, Sarah Gaichas, Jeanette Gann, Colleen Harpold, Ron Heintz, Jerry Hoff, Kirstin Holsman, Katharine Howard, Jim Ianelli, Tayler Jarvis, Timothy Jones, Robb Kaler, Steve Kasperski, David Kimmel, Kathy Kuletz, Liz Labunski, Carol Ladd, Christie Lang, Geoff Lang, Robert Lauth, Anna Lavoie, Jean Lee, Daniel K. Lew, Michael Litzow, Jennifer Mondragon, Franz Mueter, Jim Murphy, John V. Olson, Jim Overland, Julia Parish, Rolf Ream, Heather Renner, Jon Richar, Marc Romano, Chris Rooper, Sigrid Salo, Elizabeth Siddon, Kim Sparks, Phyllis Stabeno, Kate Stafford, Jeremy Sterling, Maryou Szymkowiak, Grant Thompson, Rod Towell, Muyin Wang, Andy Whitehouse, Tom Wilderbuer, Michael Williams, Sarah P. Wise, Ellen Yasumiishi, and Stephani Zador.

NPFMC Bering Sea and Aleutian Islands SAFE

STOCK ASSESSMENT AND FISHERY EVALUATION REPORT FOR THE GROUNDFISH FISHERIES OF THE GULF OF ALASKA AND BERING SEA/ALEUTIAN ISLANDS AREA:

ECONOMIC STATUS OF THE GROUNDFISH FISHERIES OFF ALASKA, 2016

by

Ben Fissel, Michael Dalton, Brian Garber-Yonts, Alan Haynie, Stephen Kasperski, Jean Lee, Dan Lew, Anna Lavoie, Chang Seung, Kim Sparks, Sarah Wise.

Economic and Social Sciences Research Program
Resource Ecology and Fisheries Management Division
Alaska Fisheries Science Center
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
7600 Sand Point Way N.E.
Seattle, Washington 98115-6349

December 20, 2017

NPFMC Economic SAFE

ESP Progression

Groundfish Plan Team

Scientific and Statistical Committee

Crab Plan Team

Council

Shotwell et al., In Review (RPTS, Coastal Mngt)

ESP Process

Focus

- National Initiatives
- Regional Priorities

Grade

- Descriptive Metrics
- Processes and Mechanisms

Analyze

- Indicator Suite
- Monitor and Test

Report

- Standard Templates
- Timely Update

ESP Product

Appendix in SAFE report

1) 4 main sections: introduction, metrics assessment, indicators assessment, and conclusions
2) Lead stock assessment author reviews ESP and determines use

Appendix xx. Ecosystem and Socioeconomic Profile of the Myfish stock in the Myarea

[List of authors who wrote the ESP assessment]

Draft 2019

[Picture of stock, if desired]

With Contributions from:

[List of names who contributed data to the ESP]

Executive Summary

Short description of national initiative and regional recommendations to produce ESP

Short description of ESP process type (e.g., general, stage-based)

Ecosystem Considerations

- Summary conclusions from metric assessment
- Summary conclusions from indicator assessment

Socioeconomic Considerations

- Summary conclusions from metric assessment
- Summary conclusions from indicator assessment

Introduction

Summary of regional ecosystem considerations priorities

Description of four-step ESP process and reference, include metric and indicator definition

Metrics = quantitative stock-specific measures that identify vulnerability or resilience of the stock with respect to biological or socioeconomic processes. Where possible, evaluating these metrics by life history stage can highlight potential bottlenecks and lead to mechanistic understanding of ecosystem or socioeconomic pressures on the stock.

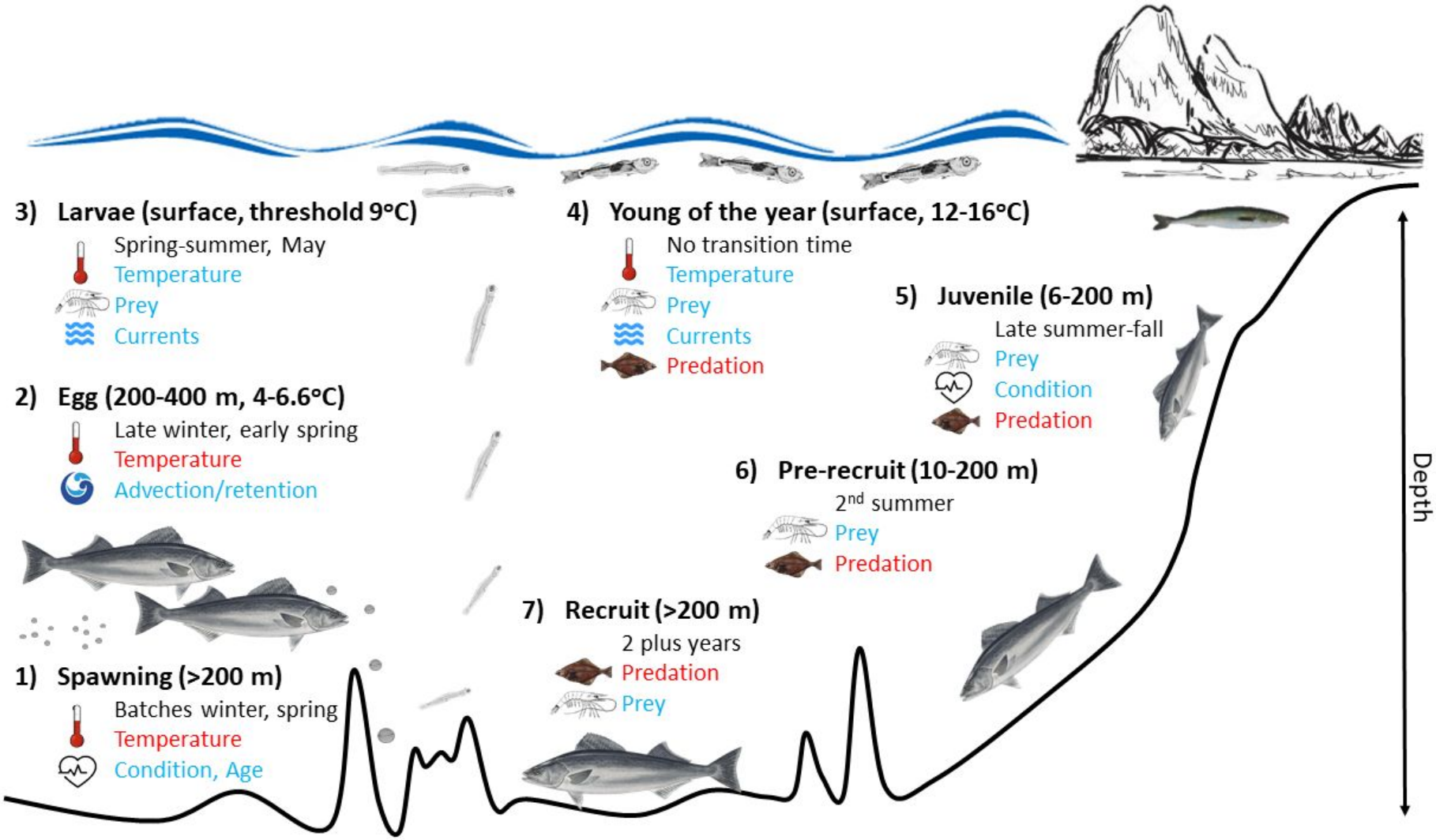
Indicator = time-series data that represent the critical processes identified by metrics and useful for stock assessment (regularly updated, reliable, consistent, and long-term).

Justification

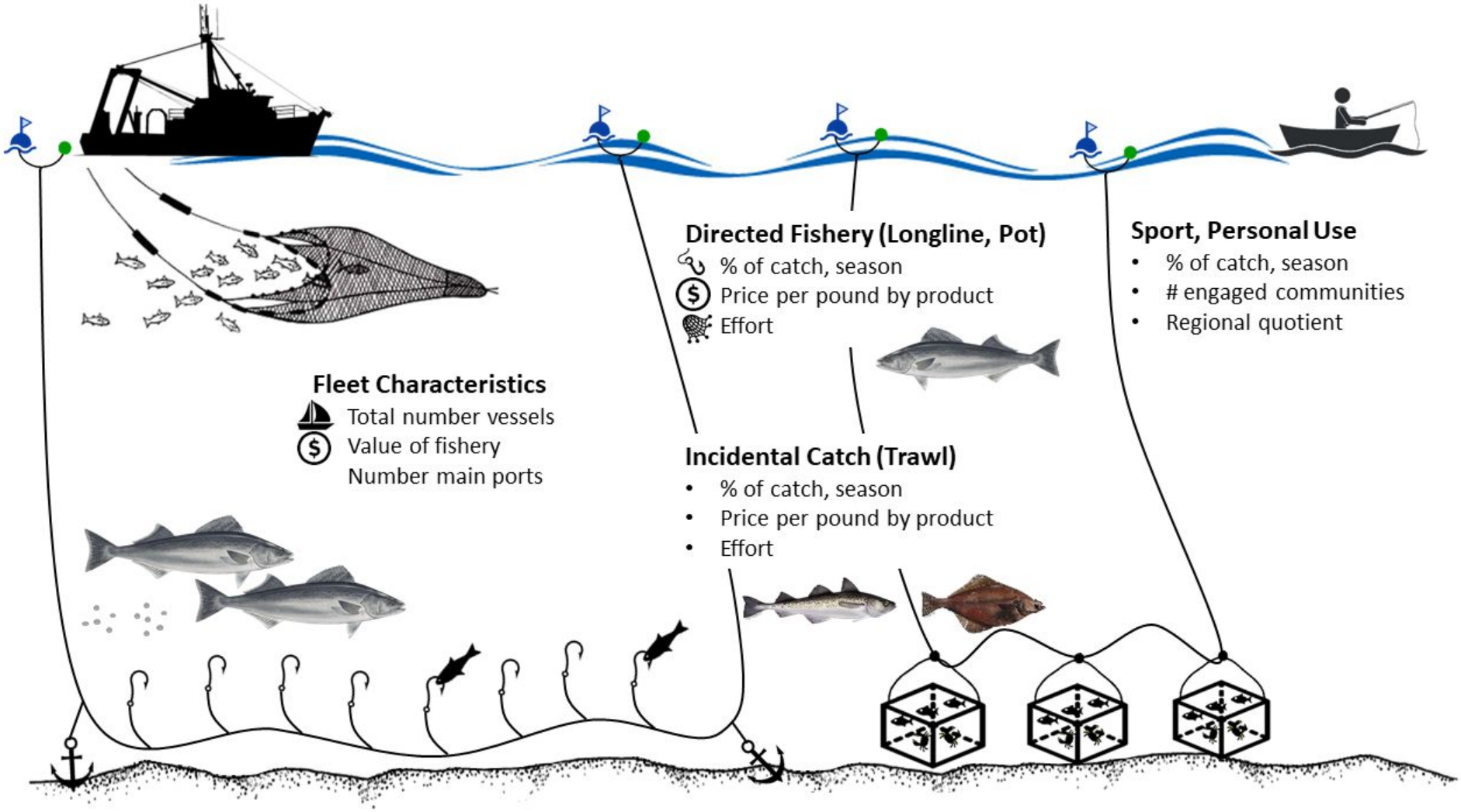
Scores in relevant national initiatives, stock assessment classification results

Stock-specific regional research priorities (e.g., annual guidance memo, strategic plans, etc.)

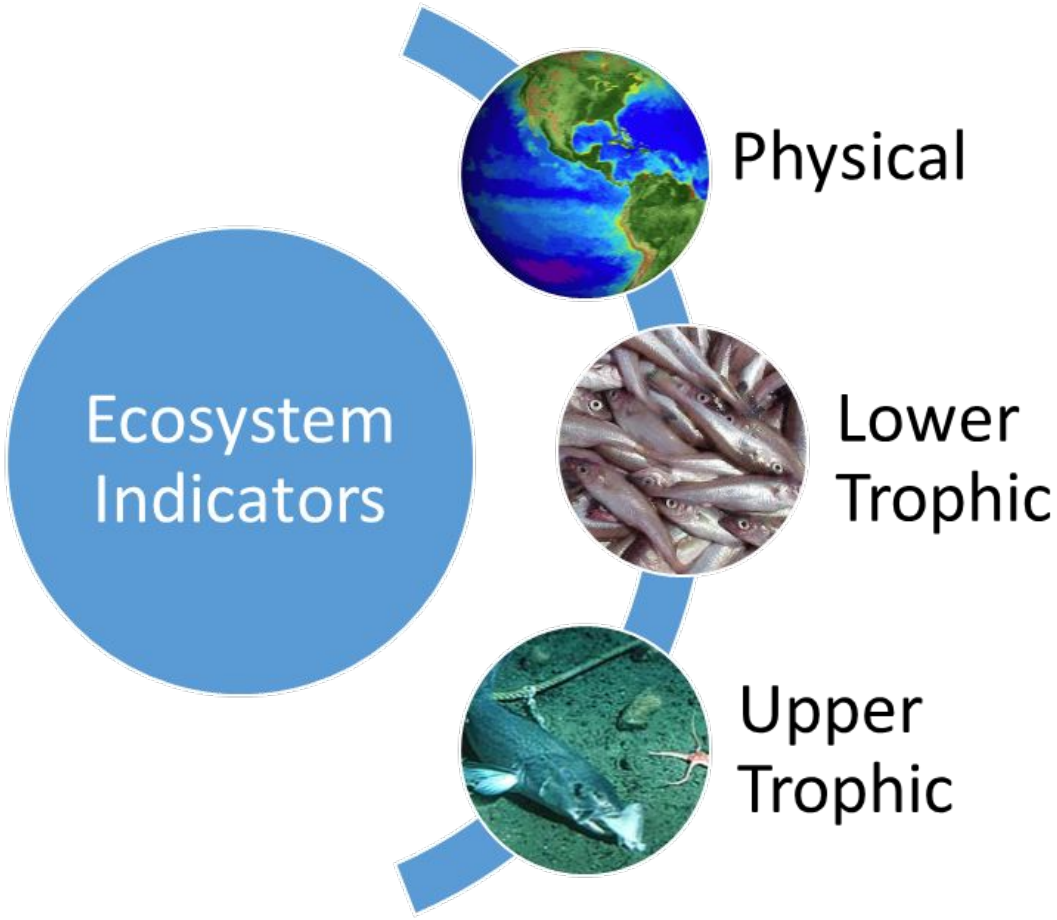
Ecosystem Processes



Socioeconomic Processes

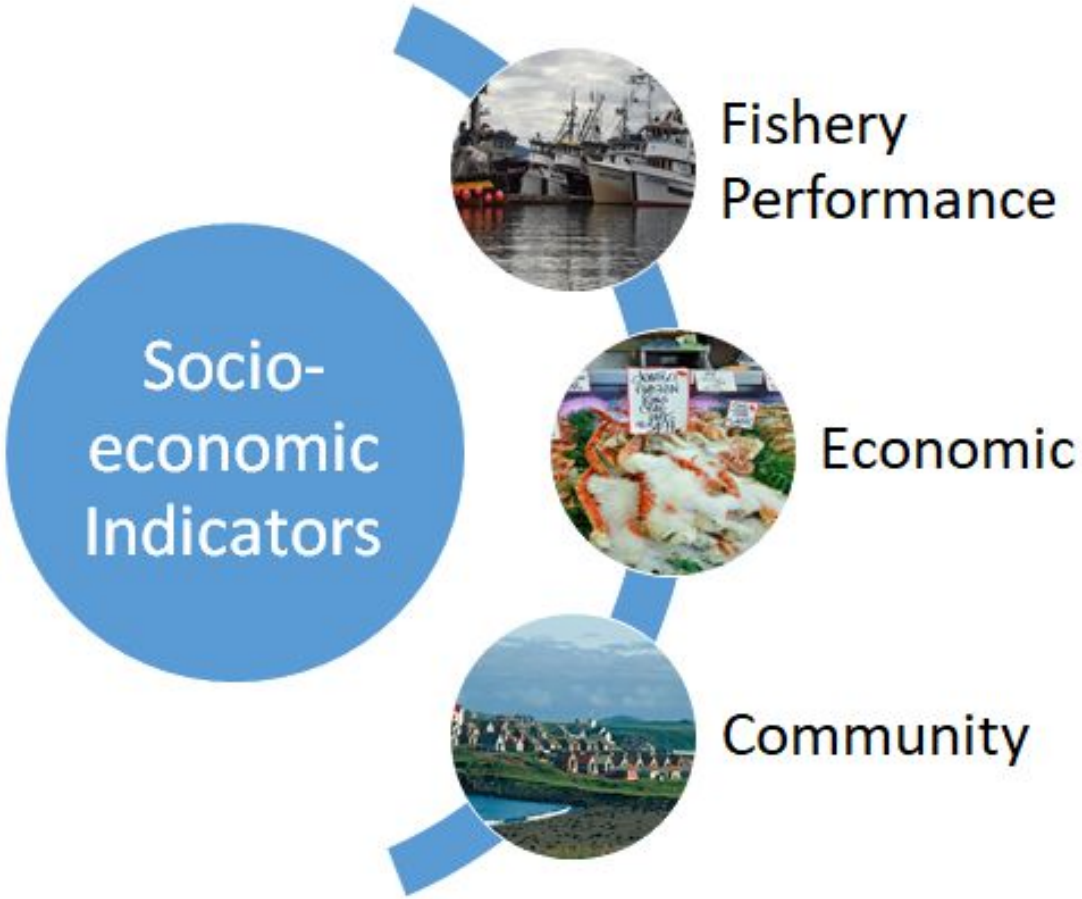


Current Ecosystem Indicators



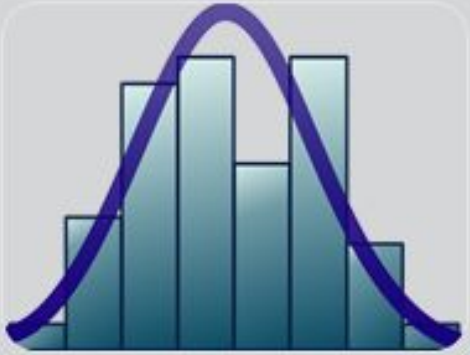
1. Marine heatwave index
2. Bottom temperature (LL, BT, ROMS)
3. SST, wind stress, sea-ice (satellite)
4. Corrosivity index (ROMS-NPZ)
5. Production (chlorophyll *a*, satellite)
6. Small/Large copepods (CPR, survey)
7. Euphausiids (acoustic backscatter)
8. Seabird reproductive success
9. Larval fish abundance, condition
10. YOY biomass, growth seabird diets
11. Juvenile CPUE, condition (survey)
12. Juvenile predation mortality (model)
13. Proportion euphausiid in fish diet
14. Adult condition (survey, fishery)
15. Center of gravity, area occupied (VAST)
16. Predator biomass (ATF, Pacific cod)
17. Steller sea lion non-pup estimates

Current Socioeconomic Indicators



1. CPUE by season, gear
2. Effort (#vessels, #processors)
3. Bycatch by gear, region
4. Ex-vessel value, revenue share
5. Ex-vessel price per pound
6. Price by size class
7. Roe per-unit-catch
8. Fish condition in the fishery
9. TAC utilization (percent)
10. Processors active in fishery
11. Processing employment
12. Local, Regional Quotient

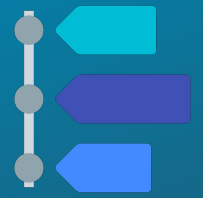
Indicator Analysis Stages

Beginning	Intermediate	Advanced
		
Traffic Light • Historical simple score (SSC) • Current year trends relative to mean of series • Evaluate whole suite utility	**Importance** • Regression R^2 • Direction, magnitude, uncertainty, inclusion weight • Prediction performance	**Ecosystem Model Run** • Comparison w/ operational • Retrospective • Prediction performance • Terminal SSB

Recommendations

- Ecosystem and Socioeconomic Summary
  - Main takeaways from the metric and indicator assessment for both the ecosystem and socioeconomics
  - Test results from indicator analysis stages 1-3
- Data Gaps and Research Priorities
  - Includes caveats of current indicators, discussion of needed indicators or improvements
  - Statement of ecosystem and socioeconomic research priorities for the ESP

AFSC ESP Workshops

Data (2019)	ESP Process 	Collect 	Coordinate 	Create 
Model (2020)	Review 	Discuss 	Perform 	Improve 
Advice (2021)	Review 	Forecast 	Evaluate 	Provide 

ESP Teams & Reports

- ESP Teams
  - Consist of facilitator, stock assessment author, status report representative and subject matter experts
  - Sablefish, GOA pollock, Pacific cod, Crab, Data-limited
- ESP Reports
  - Full template completed when ESP first initiated, ~5 years
  - Partial template is reduced and based on SAFE format, potentially initiated for a "red flag" response
  - Report card template is simple and for updating annually

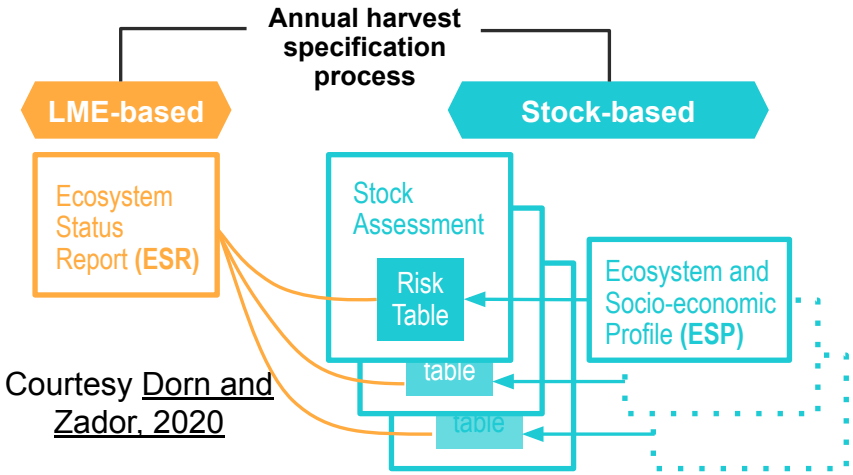
Report Summary

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

Note: Report cards are produced annually unless no SAFE

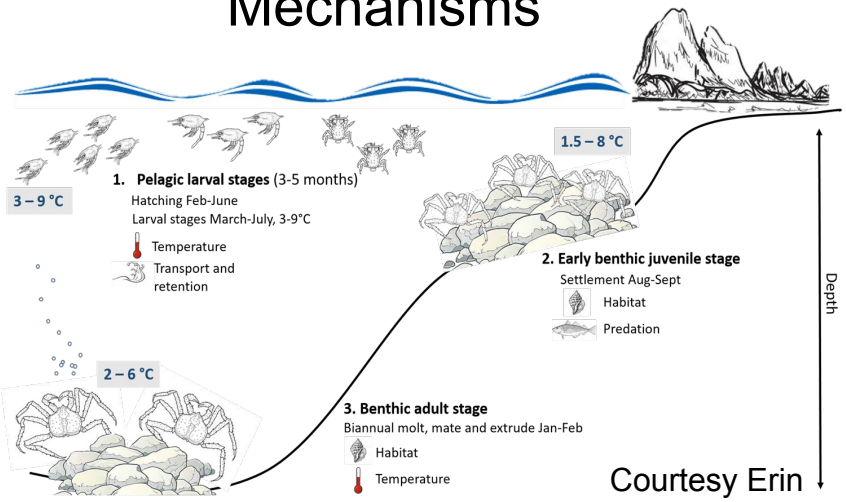
Management Decisions

Context



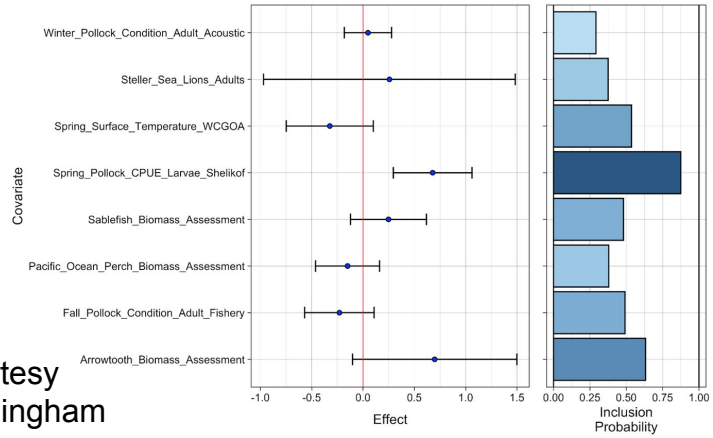
Courtesy Dorn and Zador, 2020

Mechanisms



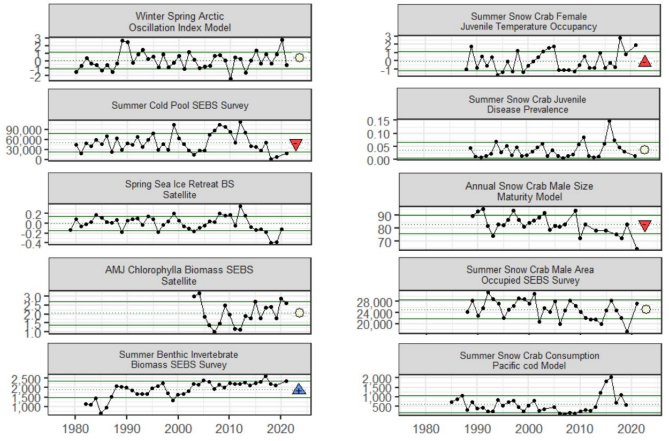
Courtesy Erin Fedewa

Models



Courtesy C. Cunningham

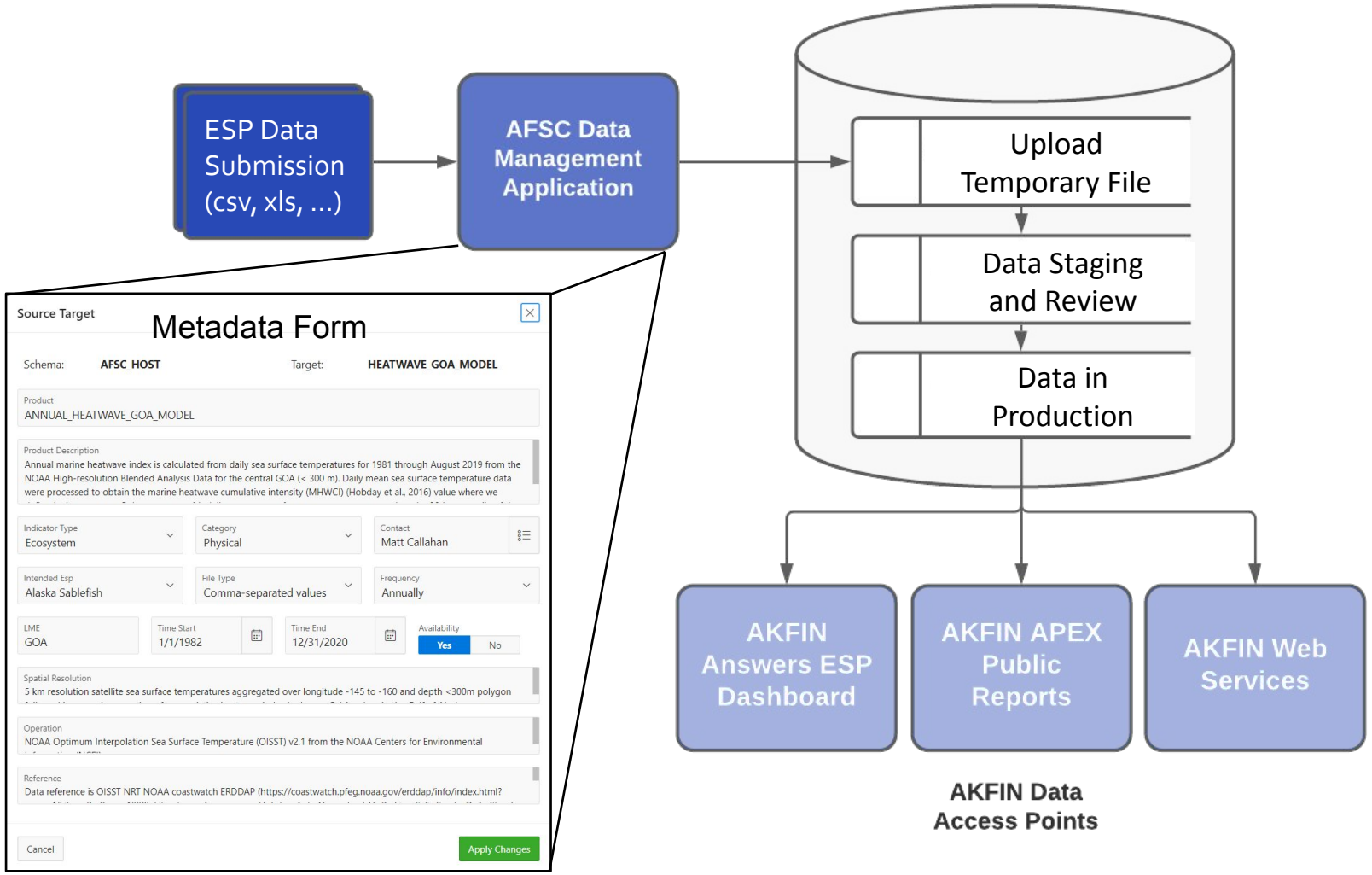
Planning



Coordination with ESRs

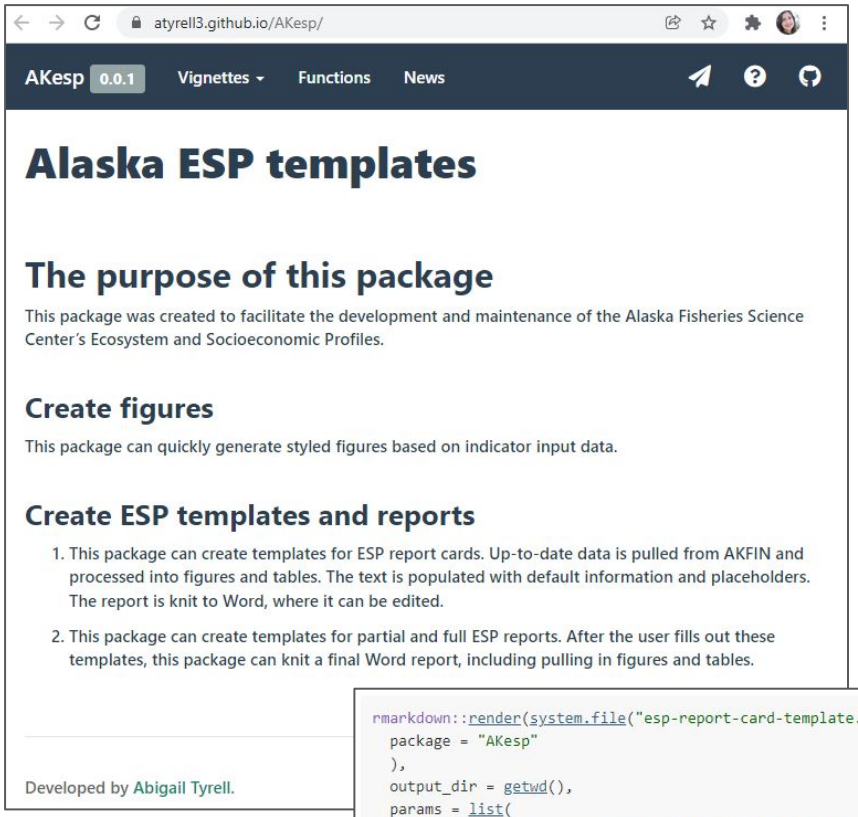
Requests	Indicator contribution requests are aligned and streamlined through data management tool
Meetings	Indicator development and risk table discussions are coordinated, transparent, and efficient
Reporting	Templates are reproducible and redundancy is minimized through communication on report scope

Submissions



Reproducibility

ESPs should be designed to take future needs into account and maximize reproducibility




```
rmarkdown::render(system.file("esp-report-card-template.Rmd",
  package = "AKesp"
  ),
  output_dir = getwd(),
  params = list(
    esp_data = AKesp::get_esp_data("Alaska Sablefish"),
    fish = "Sablefish",
    region = "Alaska",
    stock_image = here::here("inst/images/noaa.jpg"),
    con_model_path = here::here("inst/images/noaa.jpg"),
    bayes_path = here::here("inst/images/noaa.jpg")
  )
)
```

Indicator category	Indicator	2017 Status	2018 Status	2019 Status	2020 Status	2021 Status
Lower Trophic	Spring Chlorophyll a Biomass EGOA Satellite	neutral	neutral	neutral	low	neutral
	Spring Chlorophyll a Biomass SEBS Satellite	low	neutral	low	neutral	neutral
	Spring Chlorophyll a Peak EGOA Satellite	neutral	low	neutral	low	
	Spring Chlorophyll a Peak SEBS Satellite	low	high	neutral	neutral	
	Annual Copepod Community Size EGOA Survey	neutral	low	low	neutral	
	Annual Copepod Community Size WGOA Survey	neutral	low	high	neutral	
	Summer Euphausiid Abundance Kodiak Survey	low	NA	neutral	NA	NA
	Annual Sablefish Growth YOY Middleton Survey	neutral	neutral	high	neutral	neutral

```
AKesp::esp_traffic_tab_long(
  data = dat,
  year = 2016:2020
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```

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AKesp::esp_traffic_long(
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  out = "ggplot",
  silent = TRUE
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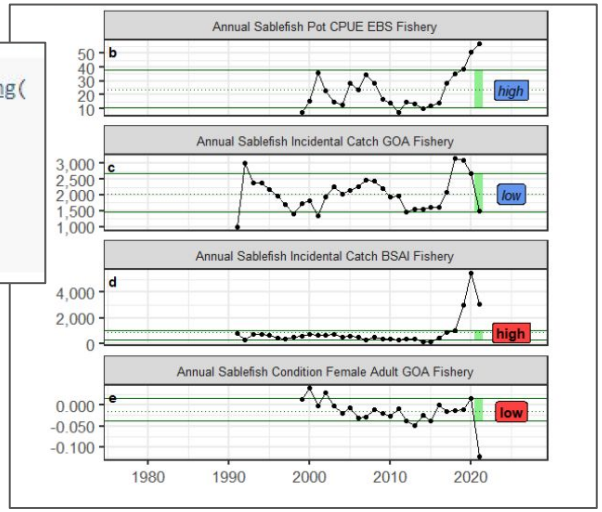
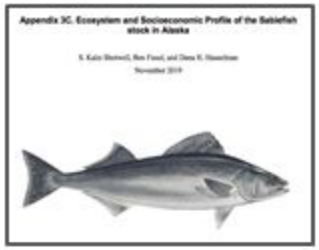
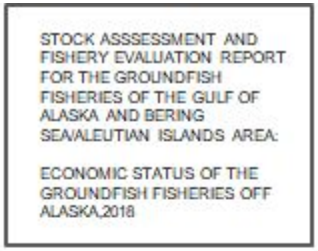
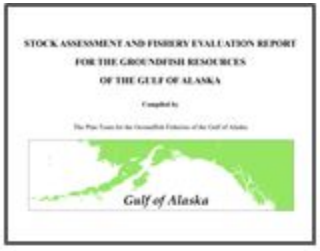


Slides from Abigail Tyrell

Coordinated Reporting



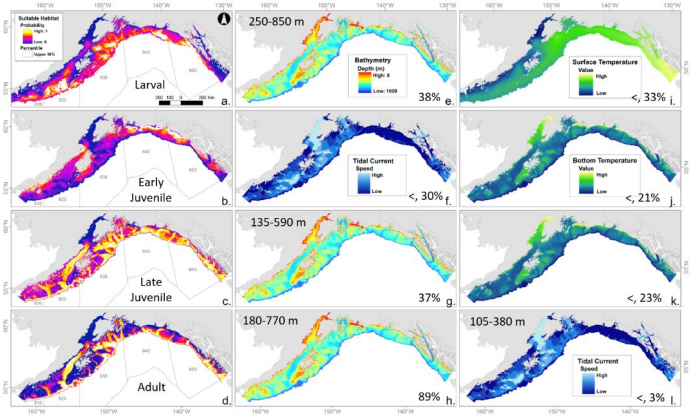




Report	ESR	ESP	Economic SAFE	SAFE Chapters
Spatial	Large Marine Ecosystem	Stock-Specific	FMP	Stock-Specific
Temporal	Annual	Annual	Annual	Annual
Ecological Community	Mixed	Stock-specific		Stock-specific
Socio-Econ Community	Mixed	Fishery specific	Place/Practice	Fishery specific
Intent	Summary	Assessment	Summary	Assessment

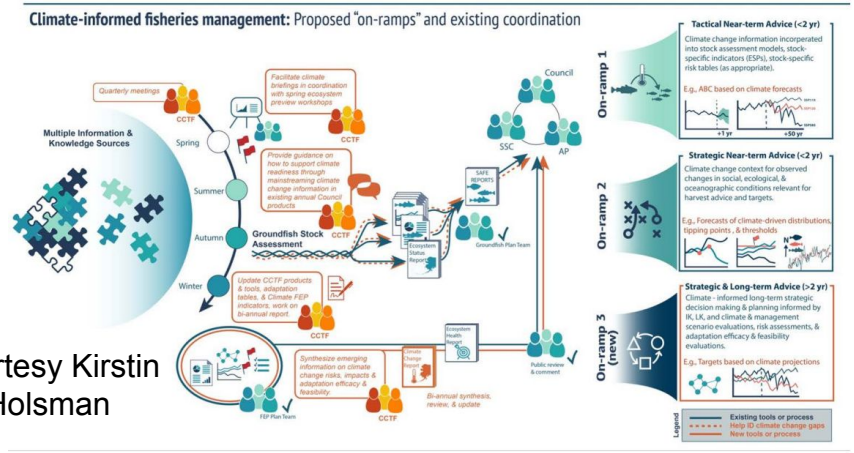
Climate and EBFM

EFH Research Plan



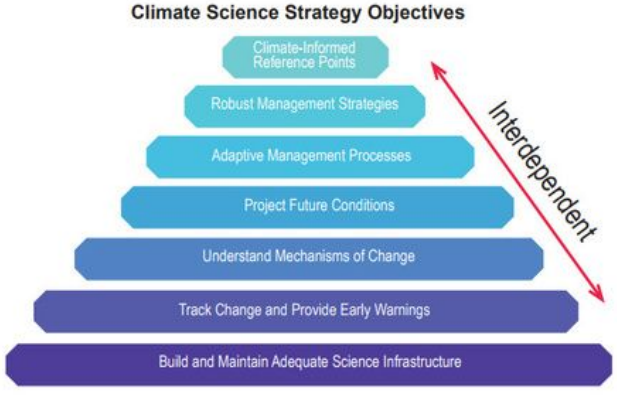
Courtesy Jodi Pirtle

CLIMs and CCTF



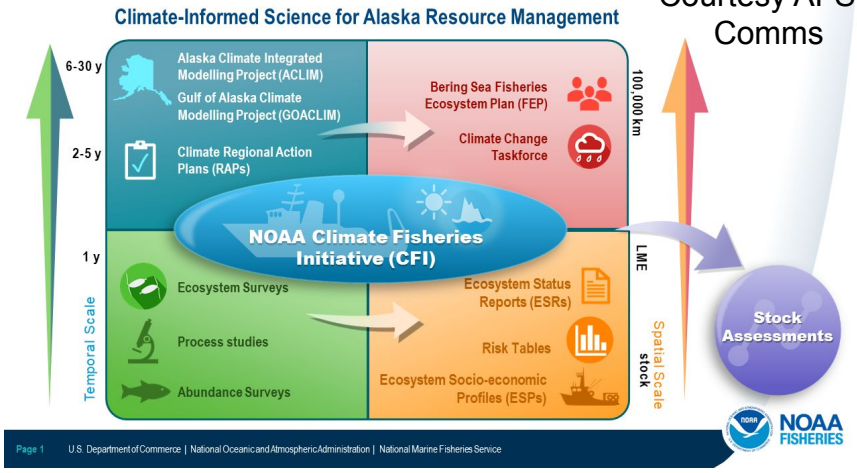
Courtesy Kirstin Holsman

EBS and GOA RAPs

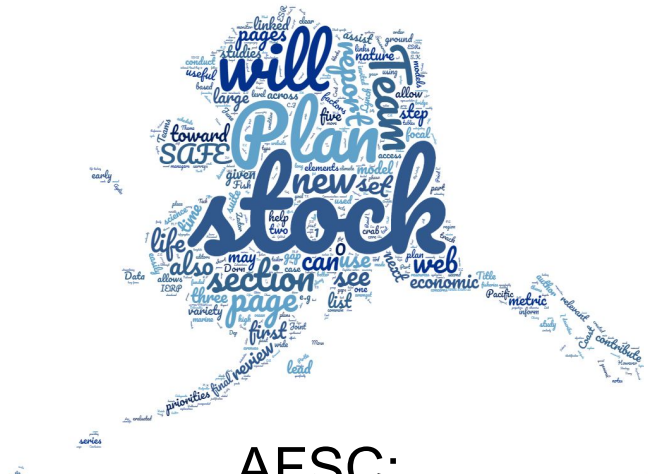


NOAA Initiatives

Courtesy AFSC Comms



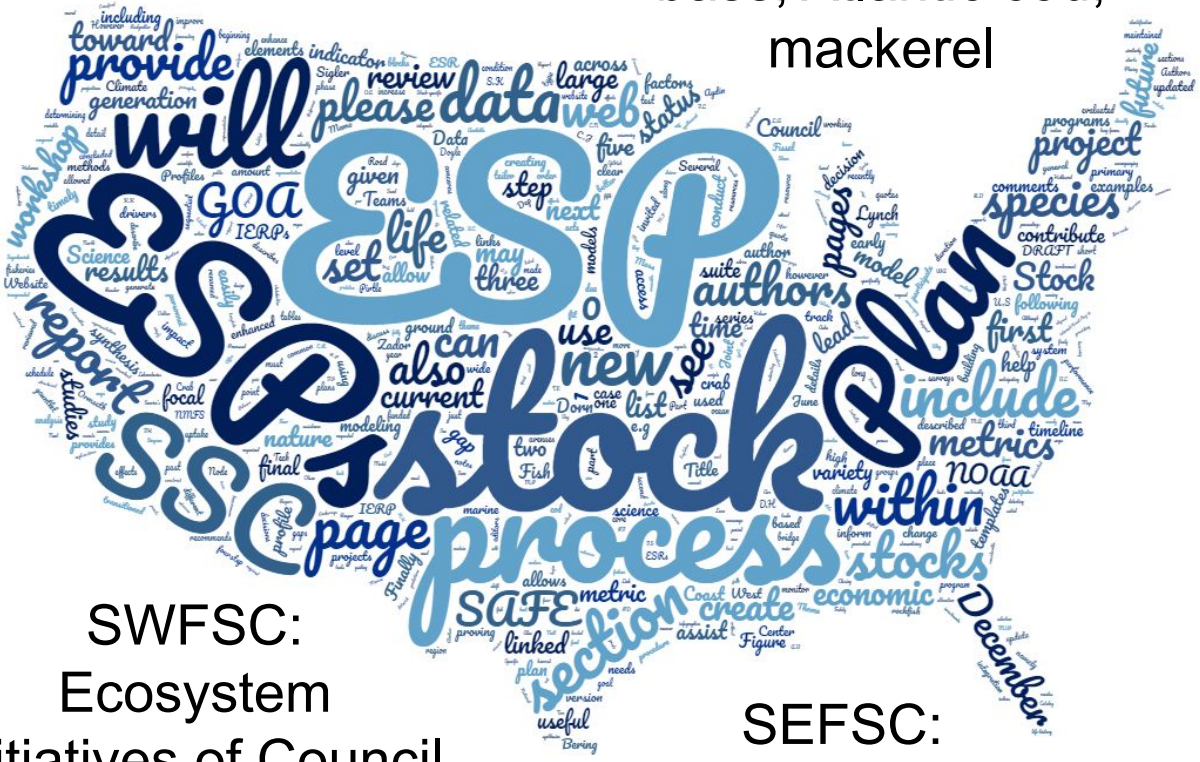
National ESP Initiative



AFSC:
sablefish, pollock, Pacific cod, king crab, snow crab

NWFSC:
~sablefish

NEFSC:
bluefish, black sea bass, Atlantic cod, mackerel



PIFSC:
uku

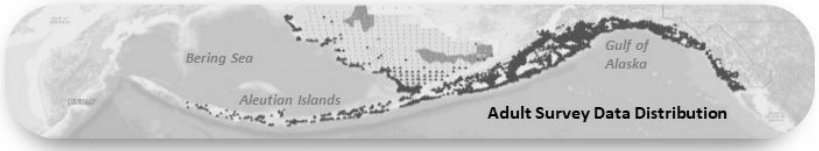
SWFSC:
Ecosystem Initiatives of Council

SEFSC:
~gray snapper

Rapid Communication

NOAA FISHERIES

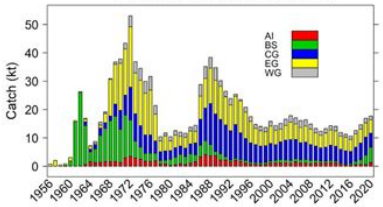
Sablefish (*Anoplopoma fimbria*)



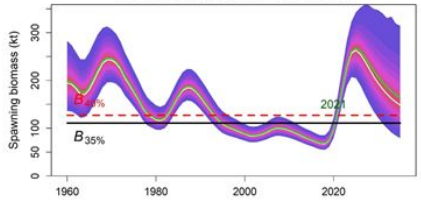
Stock Assessment & Status

- Bering Sea/Aleutian Islands and Gulf of Alaska stock with custom statistical catch-at-age model
- Benchmark assessment in 2016 included CIE recommendations to 1) account for whale depredation on the survey and fishery, and 2) propagate more structural uncertainty of management quantities.

Catch by Management Area



Biomass with Reference Points



Year	ABC	OFL	Total Biomass	B/ B_MSY	F/ F_MSY	Recruits (mill #s)	Total Catch	Ex-Value (mill $)
2015	13,657	16,128	188,000	0.66	0.78	26.63	10,970	100.6
2016	11,795	13,397	170,000	0.63	0.78	163.65	10,257	98
2017	13,083	15,485	206,000	0.60	0.88	123.44	12,270	123.5
2018	14,957	29,507	515,000	0.59	0.77	12.47	14,341	93.7
2019	15,068	32,798	414,000	0.66	0.58	17.5	16,624	73.6

This stock is not subjected to overfishing, currently overfished, nor approaching an overfished condition.

Research Priorities

1) Evaluate apportionment strategies for ABC, use spatially explicit research model
2) Explore integration of ecosystem data to understand highly variable recruitment
3) Refine fishery abundance index, identify covariates that affect catch rates

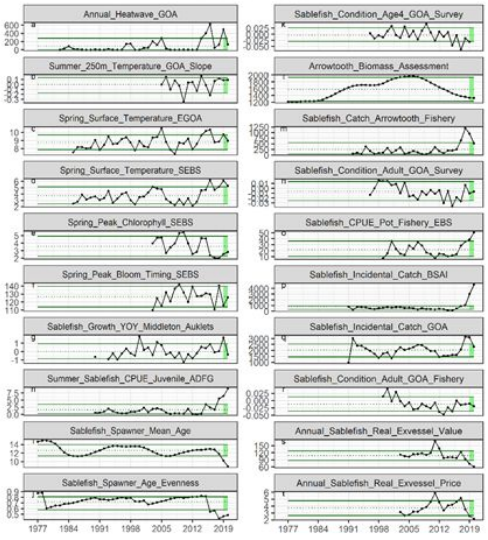
Assessment: https://www.afsc.noaa.gov/REFM/Docs/2019/GOAsablefish.pdf, Contact: Dana.Hanselman@noaa.gov

NOAA FISHERIES

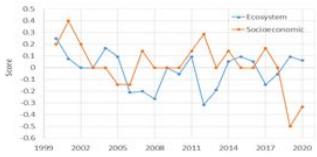
Sablefish (*Anoplopoma fimbria*)

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

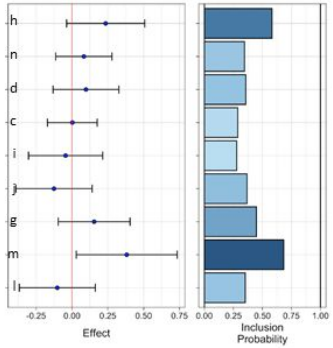
Indicators



Score



Importance



- Presence of 2016 and 2019 year class in ADF&G survey, age 4 fish generally in poor condition, higher spatial overlap with arrowtooth in fishery, physical + but < from 2019, lower stable, upper slight >
- Incidental catch < in GOA, > in BSAI indicates expanding habitat, ex-vessel value and price/pound on recent decline, community analysis in progress

Research Model Performance (hypothetical)

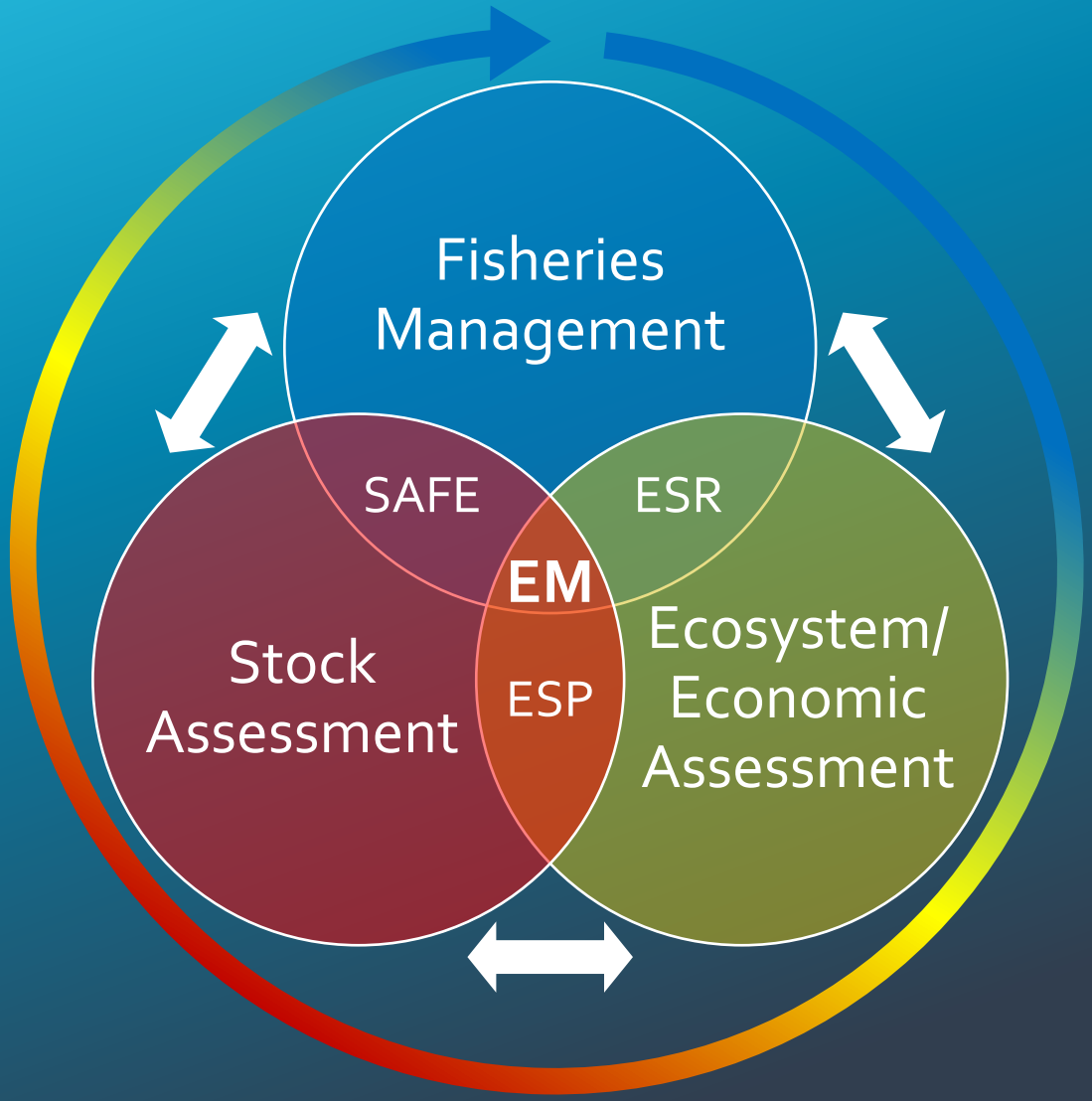
Model	ABC	OFL	Cross Validation	Retrospective	Recruitment Comparison	SSB Comparison
SAFE	26,250	30,000	28% +/- 6%	+0.19	0.5	0.5
Eco	23,625	27,000	46% +/- 12%	+0.07	0.65	0.3

ESP: https://www.afsc.noaa.gov/REFM/Docs/[YEAR]/GOAsablefish.pdf, Contact: Kalei.Shotwell@noaa.gov

Future of ESPs

- Climate and EBFM
  - Expand products to be "climate ready"
  - Integrate other EBFM products
- National ESP Initiative
  - Training workshops, shareout forums
  - First workshop July 2022, next likely summer '23
  - Define metrics to track EBFM progress
- Rapid Communication
  - Github repository for these in progress
  - Drafting a paper with regional examples

Communication Loop



Questions?

Contact:

Kalei Shotwell, AFSC
Kalei.Shotwell@noaa.gov

Resources:

Alaska ESP Examples
In-depth ESP Talk
ESP Introduction Manuscript
(In Review)
Please contact for draft