

Ecosystem Socioeconomic Profile (ESP)

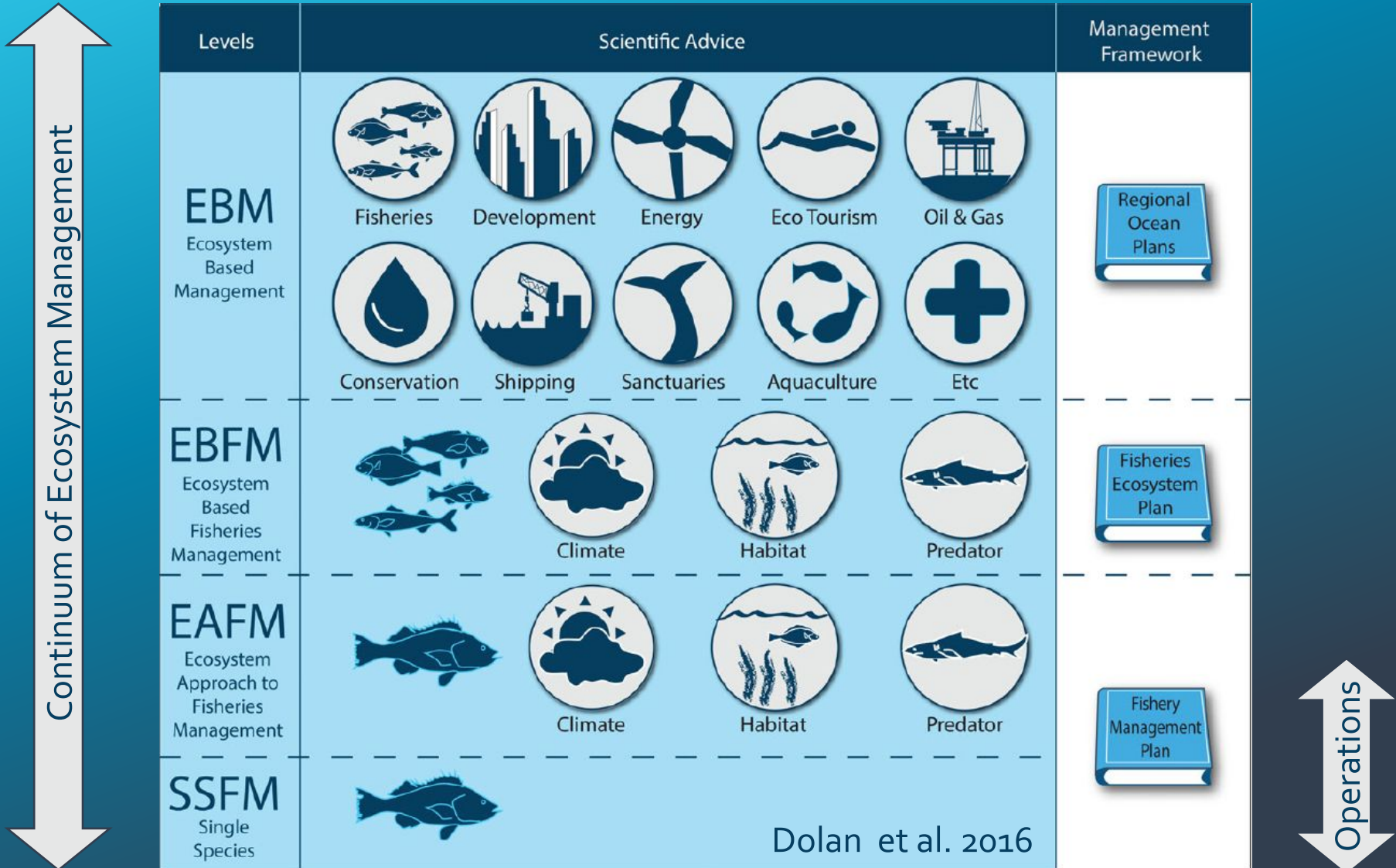
Definition: A standardized framework that facilitates the integration of ecosystem and socioeconomic factors within the stock assessment process and acts as a proving ground for use in management advice.



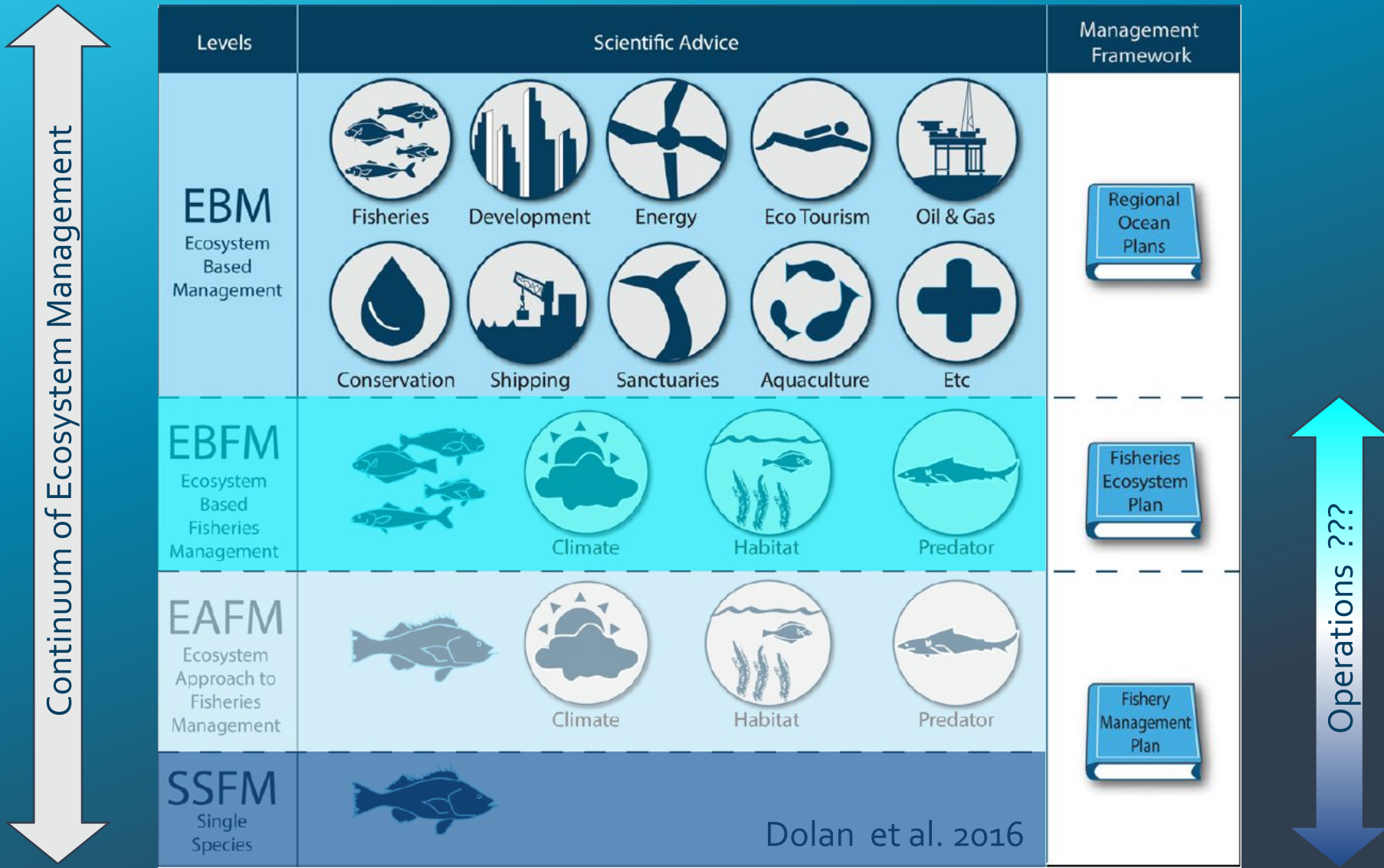
NOAA
FISHERIES

Kalei Shotwell, NOAA-AFSC
Kalei.Shotwell@noaa.gov

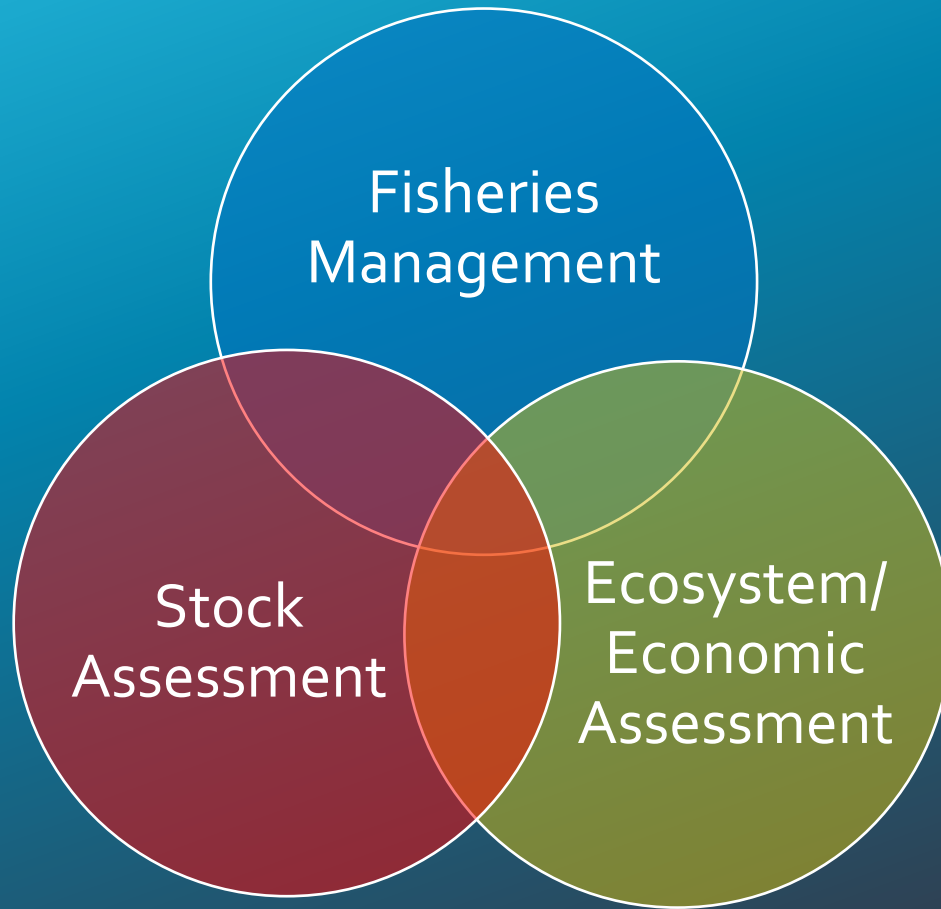
Ecosystem Management (EM)



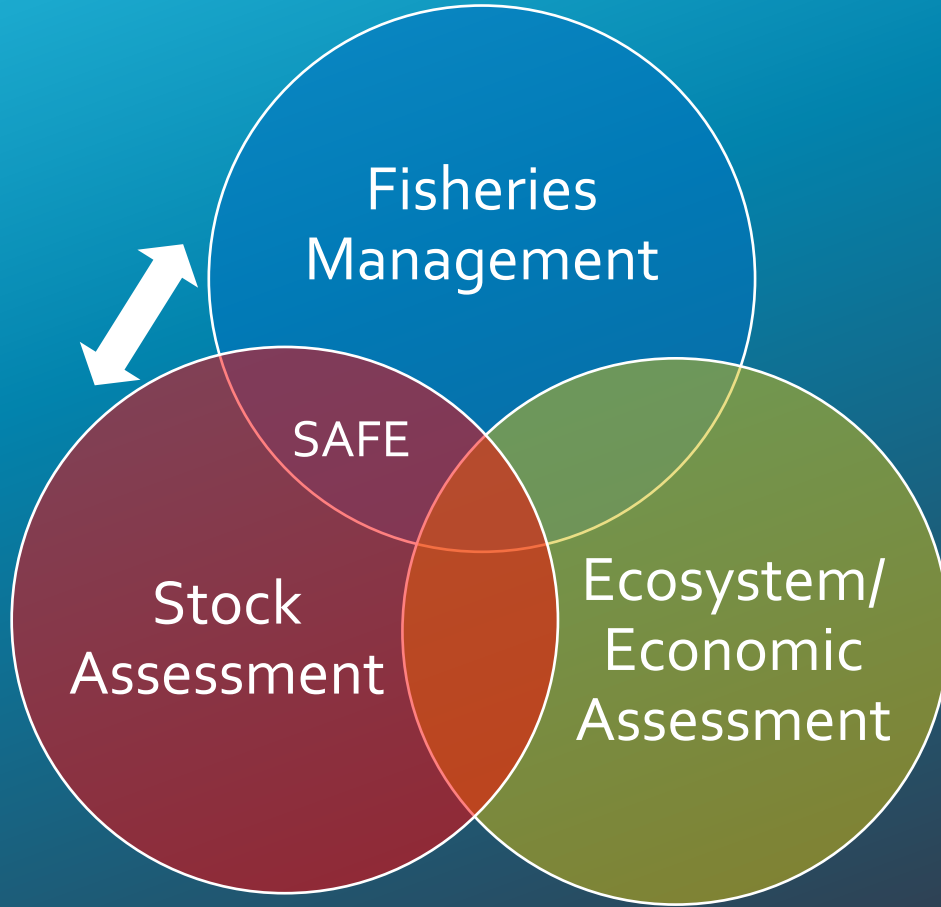
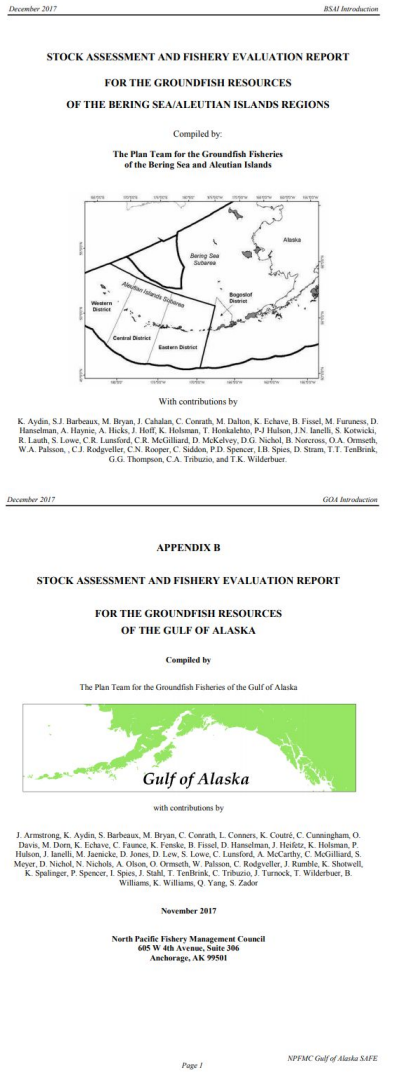
Ecosystem Management (EM)



Communication Gap



Communication Gap

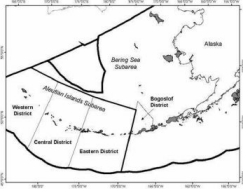


Communication Gap

December 2017 BSA Introduction

**STOCK ASSESSMENT AND FISHERY EVALUATION REPORT
FOR THE GROUND FISH 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. Aydın, S.J. Barbeau, M. Bryan, J. Cahalan, C. Conrath, M. Dahm, K. Echave, B. Fissel, M. Francisco, D. Hanselman, A. Haynes, A. Hicks, J. Hoff, K. Holman, T. Hockaday, P.J. Hulson, J.N. Jancich, S. Kotetski, R. Laub, S. Lowe, C.R. Lumsford, C.R. McMillan, D. McKeever, D.G. Nichol, B. Norcross, O.A. Ormseth, W.A. Pabison, C.J. Rodgloff, C.N. Rooper, C. Saldan, P.D. Spencer, H.B. Spies, D. Stumm, T.T. Tenbrink, G.G. Thompson, C.A. Tribuzio, and T.K. Wilderbuer.

December 2017 GSA Introduction

**APPENDIX B
STOCK ASSESSMENT AND FISHERY EVALUATION REPORT
FOR THE GROUND FISH RESOURCES
OF THE GULF OF ALASKA**

Compiled by:
The Plan Team for the Groundfish Fisheries of the Gulf of Alaska

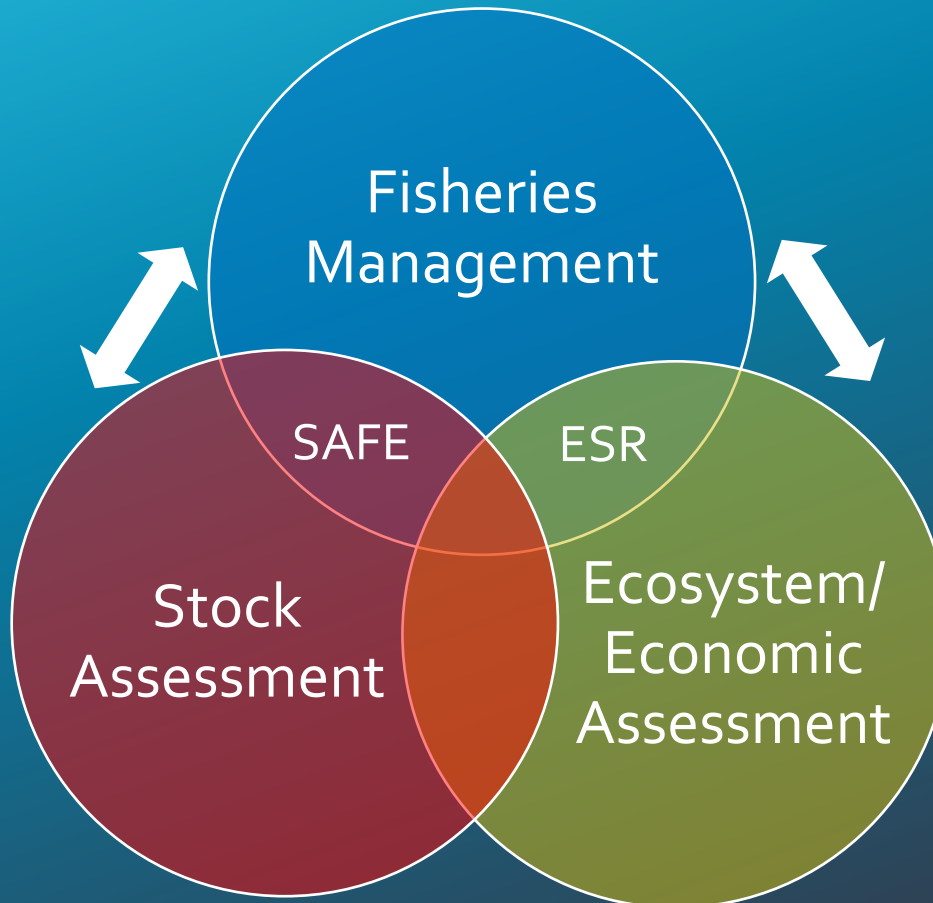


with contributions by:
J. Armitage, K. Aydın, S. Barbeau, M. Bryan, C. Conrath, L. Conners, K. Couté, C. Cunningham, O. Davis, M. Dorn, K. Echave, C. Faunce, K. Fenske, B. Fissel, D. Hanselman, J. Hoff, K. Holman, P. Hulson, J. Jancich, M. Juenke, D. Jones, D. Lewis, S. Lowe, C. Lumsford, A. McCarthy, C. McMillan, S. Meyer, D. Nichol, N. Nishida, A. Olson, O. Ormseth, W. Pabison, C. Rodgloff, J. Runkle, K. Sherwell, K. Spillinger, 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 206
Anchorage, AK 99501

Page 1 NPFMC Gulf of Alaska SAFE



December 2017 ESR Ecosystem

**Ecosystem Considerations 2017
Status of the
Eastern Bering Sea Marine Ecosystem**



Edited by:
Elizabeth Siddon¹ and Stephani Zador²
¹Avalon Laboratories, Alaska Fisheries Science Center,
National Marine Fisheries Service, NOAA
17109 Pt. Lena Loop Road
Janaoak, AK 99601
²Resource Ecology and Fisheries Management Division, Alaska Fisheries Science Center,
National Marine Fisheries Service, NOAA

With contributions from:
Alex Andrews, Kerim Aydın, John Bengtson, Jennifer Bobik, Nick Bond, Lyle Britz, Hillary Burgess, Kristin Ciesiel, Anne Marie Eick, Lisa Eisner, Ed Farber, Benjamin Fissel, Shannon Fitzgerald, Robert Foy, Sarah Gaichas, Juanita Gann, Colleen Harpold, Ron Heintz, Jerry Hoff, Kristin Holman, Kathleen Howard, Jim Jancich, Taylor Jarvis, Timothy Jones, Robb Kalor, Steve Kaspenki, David Kimmel, Kathy Kolata, Liz Lohauski, Carol Laska, Christie Lang, Geoff Lang, Robert Laub, Anna Lavoie, Jean Lee, Daniel K. Lew, Michael Litzow, Jennifer Mondragon, Pratz Myster, Jim Murphy, John V. Olson, Jim Overland, Julia Parish, Holl Rosen, Heather Romer, Jon Rukar, Marc Romano, Chris Rooper, Sarah Sala, Elizabeth Siddon, Kim Sparks, Piyalis Stabenos, Kate Stafford, Jeremy Sterling, Marysia Szymkowiak, Grant Thompson, Rod Towell, Mijun Wang, Andy Whitehouse, Tom Wilderbuer, Michael Williams, Sarah P. Wise, Ellen Yasminksi, and Stephani Zador.

NPFMC Bering Sea and Aleutian Islands SAFE

STOCK ASSESSMENT AND FISHERY EVALUATION REPORT FOR THE
GROUND FISH FISHERIES OF THE GULF OF ALASKA AND BERING
SEA/ALEUTIAN ISLANDS AREA.

ECONOMIC STATUS OF THE GROUND FISH FISHERIES OFF ALASKA, 2016

by

Ben Fissel, Michael Dahm, Brian Garber-Younts, Alan Haynie, Stephen Kaspenki, Jean Lee, Dan
Lee, Anna Lavoie, Chang Seung, Kim Sparks, Sarah Wise.

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 98115-4349

December 20, 2017

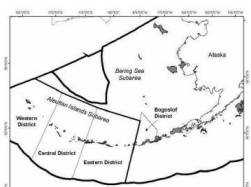
NPFMC Economic SAFE

Communication Gap

December 2017 BSA Introduction

**STOCK ASSESSMENT AND FISHERY EVALUATION REPORT
FOR THE GROUND FISH RESOURCES
OF THE BERING SEA/ALEUTIAN ISLANDS REGIONS**

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

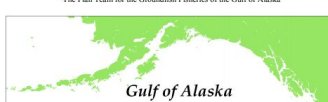


With contributions by:
K. Aydın, S.J. Barbeau, M. Bryan, J. Cahalan, C. Conrath, M. Dalton, K. Echave, B. Fissel, M. Francisco, D. Hanselman, A. Haynes, A. Hicks, J. Hoff, K. Holman, T. Hockaday, P.J. Hulson, J.N. Jancich, S. Kotarski, R. Laub, S. Lowe, C.R. Lumsford, C.R. McMillan, D. McKeever, D.G. Nichol, B. Norcross, O.A. Ormseth, W.A. Pabson, C.J. Rodgwell, C.N. Rooper, C. Saldon, P.D. Spencer, H.B. Spies, D. Stumm, T.T. Tenbrink, G.G. Thompson, C.A. Tribuzio, and T.K. Wilderbuhr.

December 2017 GSA Introduction

**APPENDIX B
STOCK ASSESSMENT AND FISHERY EVALUATION REPORT
FOR THE GROUND FISH RESOURCES
OF THE GULF OF ALASKA**

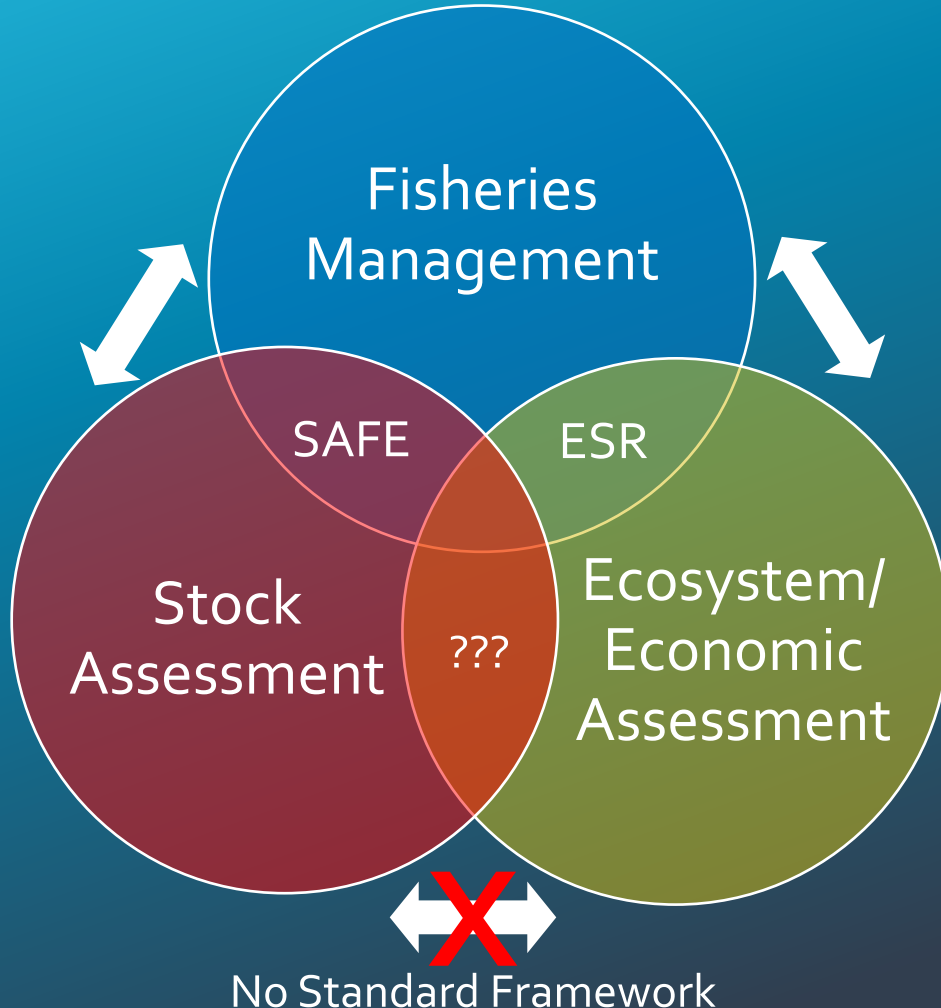
Compiled by:
The Plan Team for the Groundfish Fisheries of the Gulf of Alaska



with contributions by:
J. Armstrong, K. Aydın, S. Barbeau, 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. Holitz, K. Holman, P. Hulson, J. Jancich, M. Juenke, D. Jones, D. Lewis, S. Lowe, C. Lumsford, A. McCarthy, C. McMillan, S. Meyer, D. Nichol, N. Nishida, A. Olson, O. Ormseth, W. Pabson, C. Rodgwell, J. Runkle, K. Sherwell, K. Spillinger, P. Spencer, I. Spies, J. Stahl, T. Tenbrink, C. Tribuzio, J. Turnock, T. Wilderbuhr, B. Williams, K. Williams, Q. Yang, S. Zador


November 2017
North Pacific Fishery Management Council
605 W 4th Avenue, Suite 206
Anchorage, AK 99501

Page 1 NPFMC Gulf of Alaska SAFE



December 2017 ERS Ecosystem

**Ecosystem Considerations 2017
Status of the
Eastern Bering Sea Marine Ecosystem**



Edited by:
Elizabeth Siddon¹ and Stephani Zador²
¹Avalon Bay Laboratories, Alaska Fisheries Science Center,
National Marine Fisheries Service, NOAA
17109 Pt. Lena Loop Road
Jalisco, AK 99601
²Resource Ecology and Fisheries Management Division, Alaska Fisheries Science Center,
National Marine Fisheries Service, NOAA

With contributions from:
Alex Andrews, Kerim Aydın, John Bengtson, Jennifer Bobik, Nick Bond, Lyle Britz, Hillary Burgess, Kristin Ciesiel, Anne Marie Eick, Lisa Eisner, Ed Farber, Benjamin Fissel, Shannon Fitzgerald, Robert Foy, Sarah Gaichas, Jaanette Gaun, Colleen Harpold, Ron Heintz, Jerry Hoff, Kristin Holman, Kathleen Howard, Jim Jancich, Taylor Jarvis, Timothy Jones, Robb Kalor, Steve Kaspenki, David Kimmel, Kathy Kolata, Liz Lohauski, Carol Laska, Christie Lang, Geoff Lang, Robert Laub, Anna Lavoie, Jean Lee, Daniel K. Lew, Michael Litzow, Jennifer Mondragon, Pratz Myster, Jim Murphy, John V. Olson, Jim Overland, Julia Parish, Holl Rosen, Heather Romer, Jon Rukar, Marc Romano, Chris Rooper, Sarah Sala, Elizabeth Siddon, Kim Sparks, Piyalis Stabenro, Kate Stafford, Jeremy Sterling, Marysia Szymkowiak, Grant Thompson, Rod Towell, Mighty Wang, Andy Whitehouse, Tom Wilderbuhr, Michael Williams, Sarah P. Wise, Ellen Yasminksi, and Stephani Zador.

NPFMC Bering Sea and Aleutian Islands SAFE

**STOCK ASSESSMENT AND FISHERY EVALUATION REPORT FOR THE
GROUND FISH FISHERIES OF THE GULF OF ALASKA AND BERING
SEA/ALEUTIAN ISLANDS AREA.**

ECONOMIC STATUS OF THE GROUND FISH FISHERIES OFF ALASKA, 2016

by

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

Resource Ecology and Fisheries Management Division
Alaska Fisheries Science Center
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
7000 Sand Point Way N.E.
Seattle, Washington 98115-6349

December 20, 2017 NPFMC Economic SAFE

ESP Process

Grade

- Descriptive Metrics
- Processes and Mechanisms

Report

- Standard Templates
- Timely Update

STEP 1



Focus

- National Initiatives
- Regional Priorities

STEP 2



STEP 3



Analyze

- Indicator Suite
- Monitor and Test

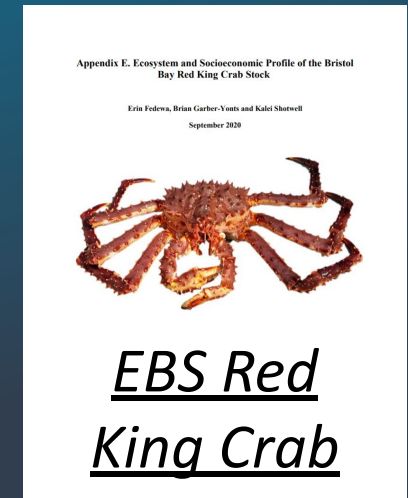
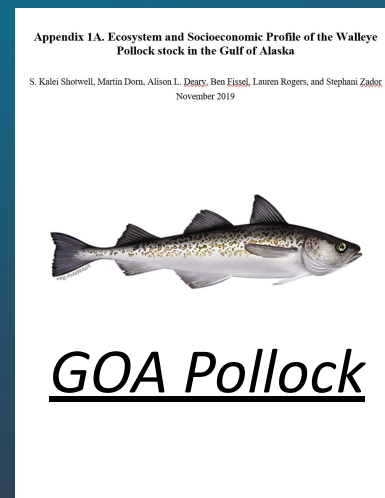
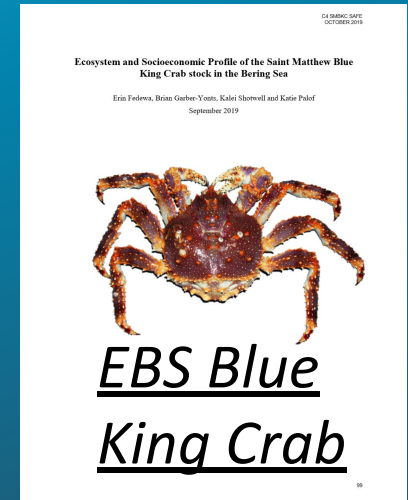
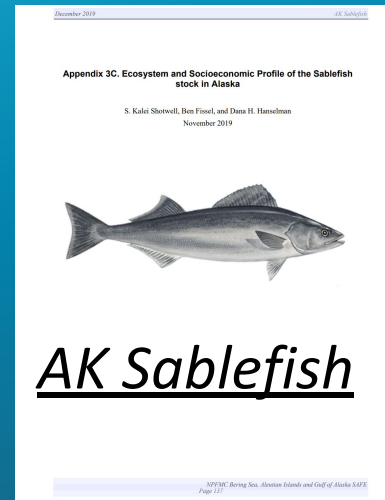
STEP 4



ESP Product

Appendix in SAFE report

- 1) Intro: justification, data
- 2) Metrics assessment: baseline, processes
- 3) Indicators assessment: time series, analyses
- 4) Recommendations: assessment summary, data gaps, future priorities



Justification & Data

- Research Priorities
- National Initiatives
 - Prioritization (stock, habitat)
 - Vulnerability (PSA, CVA)
 - Classification (current and target data categories)
- Data Summary
 - Table of data sources
 - References and contacts

Category	Current	Target	Gap
Catch	5	5	0
Size/Age	5	5	0
Abundance	4	5	1
Life History	5	5	0
Ecosystem	2	4	2

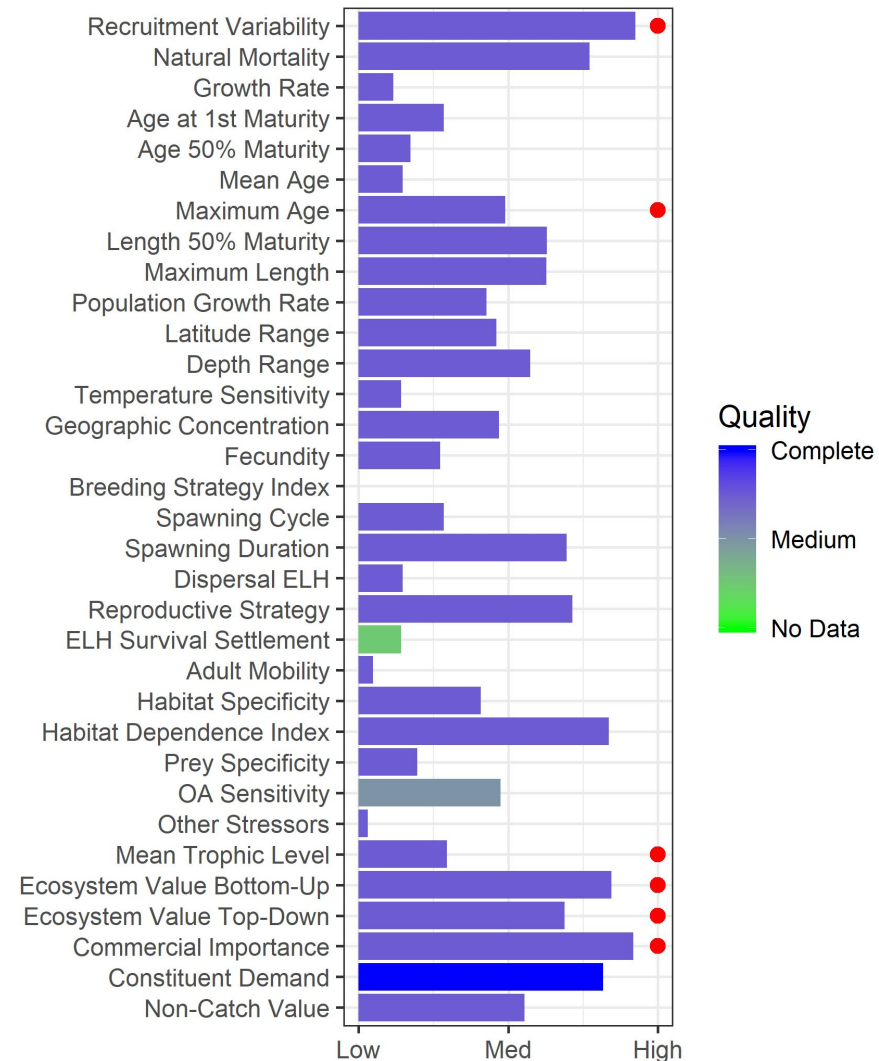
Metrics Assessment

- **Baseline Metrics**

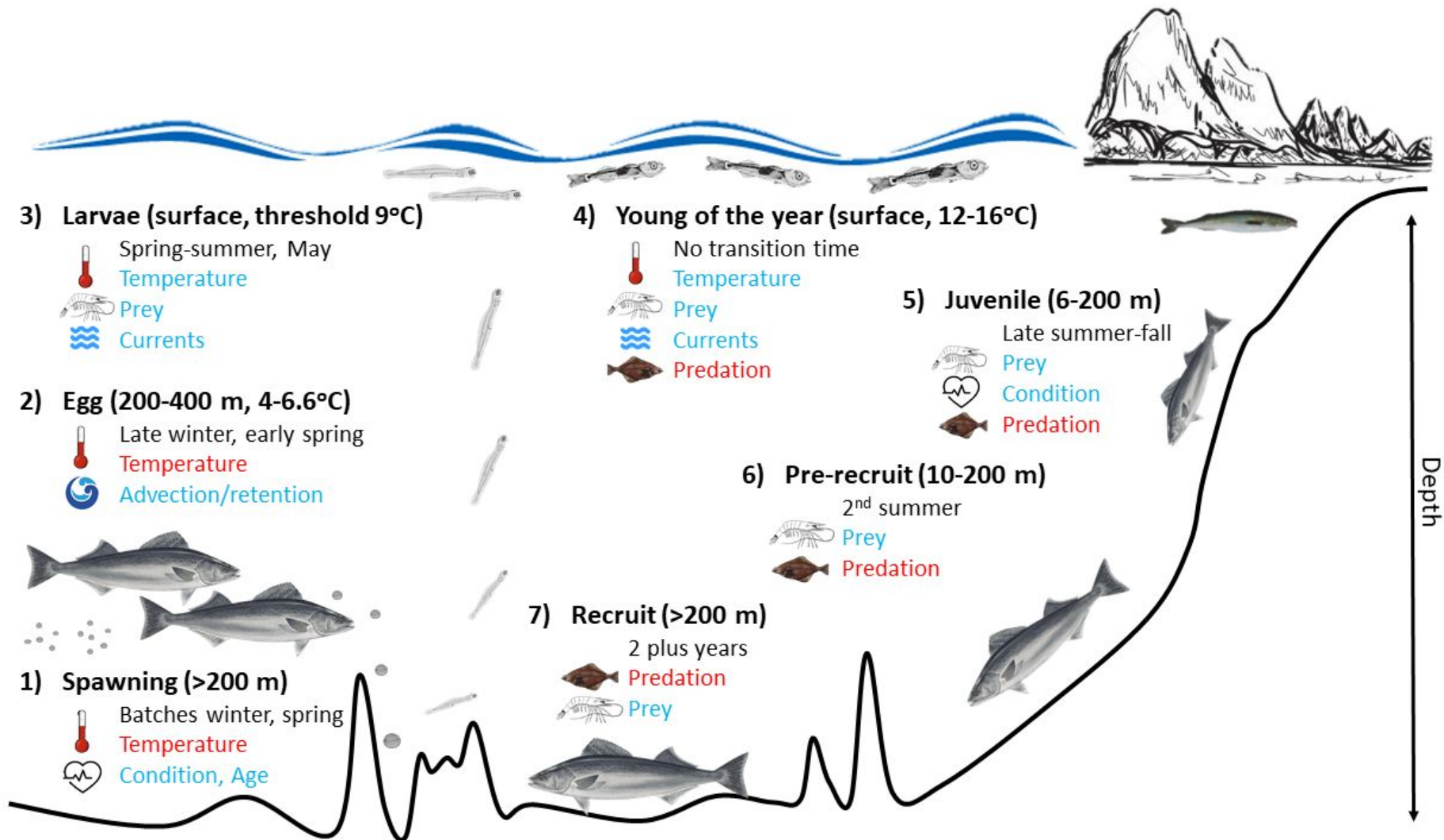
- Standard measures of stock attributes, ~ physical exam

- **Processes**

- Ecosystem section provides info by life history stage to identify bottlenecks and mechanisms
- Socioeconomic section provides info on fishery performance, econ, community engagement



Ecosystem Processes



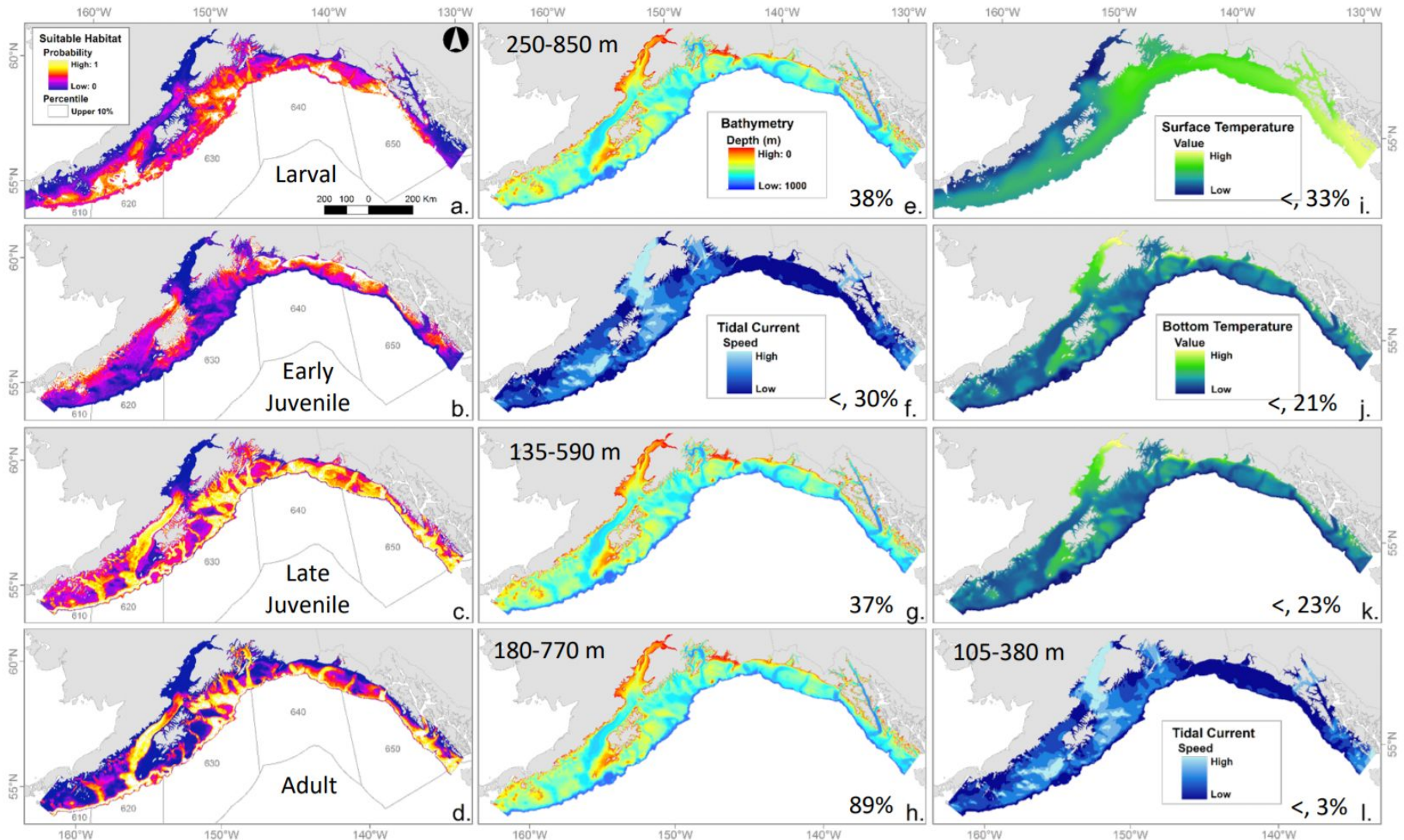
Life History Table

Stage		Habitat & Distribution	Phenology	Age, Length, Growth	Energetics	Diet	Predators/Competitors
Adult	Recruit	Shelf edge, slope, gullies (>200 m), GOA to Bering, benthic ⁽¹⁸⁾	First recruit to survey and fishery age 2, high movement (10-88%) ⁽¹⁸⁾	Max: 73yrs ^(18,19,28) , 134♀/138♂ cm Average: 12 yrs L _{inf} =80♀/68♂ cm, K=0.22♀/0.29♂	Low conversion efficiency, low metabolic rate ⁽²¹⁾	Opportunistic, euphausiids, pol/cod, capelin, herring, squid, jelly ^(12,18,REEM)	P: Sperm whales, orca, fisheries, C: slope groundfish ⁽¹⁸⁾
	Spawning	Shelf break ⁽¹⁾ , deep water pelagic	Winter-spring, batch spawner, peak March, 25 wks, high production ^(1,26,17)	1 st mature: 5.5 yr 50%: 6.6 yr/65cm ♀, 5 yr/57 cm ♂ ^(17,18) , females > males	Oviparous, high fecundity (120-1000·10 ³) eggs, Skip-spawning ^(1,17,18)	Opportunistic, euphausiids, pol/cod, capelin, herring, squid, jelly ^(12,18,REEM)	P: Sperm whales, orca, fisheries, C: slope groundfish ⁽¹⁸⁾
Offshore to Nearshore Pelagic	Egg	Slope (>200-400 m), sink to deeper depths, negatively buoyant ⁽¹⁾	Late winter to early spring, 10 wks peak egg to peak larvae ⁽¹⁷⁾	Egg size: 1.8-2.2 mm, large egg size ^(17,RACE)	Max survival to hatch, 34-35ppt, 4-6.6°C (lab) ⁽²²⁾	Yolk ^(RACE)	
	Larvae	Slope (>200-600 m) (hatch to yolk-sac), epipelagic over shelf and slope, 160 km offshore ^(1,2,7,17)	Late spring and summer, peak end May, 12 wks, epipelagic ^(7,16,17,19)	10-80 mm SL ^(1,7,16) , 1.2 mm/day, develop as obligate neuston ^(7,10,16)	Growth threshold 22°C, optimum 12-16°C (lab) ⁽⁹⁾	copepod nauplii, nauplii, small copepods, small and large copepods ^(1,29)	C: larval cottids, hexagrammids, wrymouths, non-obligate neustonic taxa ⁽⁷⁾
	YOY	Shelf ⁽¹⁾ , neuston and near surface (upper 10-20 cm of water column) ^(1,10,17)	No marked transition time to stage, move to nearshore ^(1,19)	60-230 mm FL (120 mm avg, neustonic), rapid growth, 1.2 mm/day ⁽¹⁰⁾	Upper thermal limit near upper limit survival ⁽⁹⁾ , absence lipid regulation ⁽²³⁾	Euphausiids, pelagic tunicates, other crustaceans, larval fish ^(1,10)	P: Coho and chinook salmon ⁽³¹⁾ , seabirds, C: active inshore migration ⁽¹⁾
Nearshore Settlement	Juvenile	Nearshore (6-214 m), inlet, bay, fjord, strait, mixed mud, soft, proximity to rock ^(3,4,6)	Late summer-fall, diel pelagic feeding excursions ^(4,30)	300-400 mm after second summer, age 2+ yrs ⁽²⁵⁾		Herring, smelts, salmon remains, jellies ⁽³⁰⁾	P: Salmon, halibut ^(12,31) , seabirds, C: macroalgae, sponge, anemone, whip, basket star, eelgrass, shelf groundfish ^(3, 12,15)
	Pre-Recruit	Nearshore, shelf (10-207 m), inlet, bay, fjord, strait, mixed mud, soft, proximity to rock ^(3,4,6,8)	Offshore movement begins after 2 nd summer ⁽²⁵⁾	<600 mm FL ⁽⁵⁾ , age 2+ yrs ⁽¹⁰⁾		Euphausiids, shrimp, pollock, other fish, other crustaceans, cephalopods, jellies, salmon ^(12,13,14)	P: Salmon, halibut ^(12,31) , seabirds, C: sponge, whip, sea pen, coral, basket star, anemone, shelf groundfish ^(3,12)

Life History Table

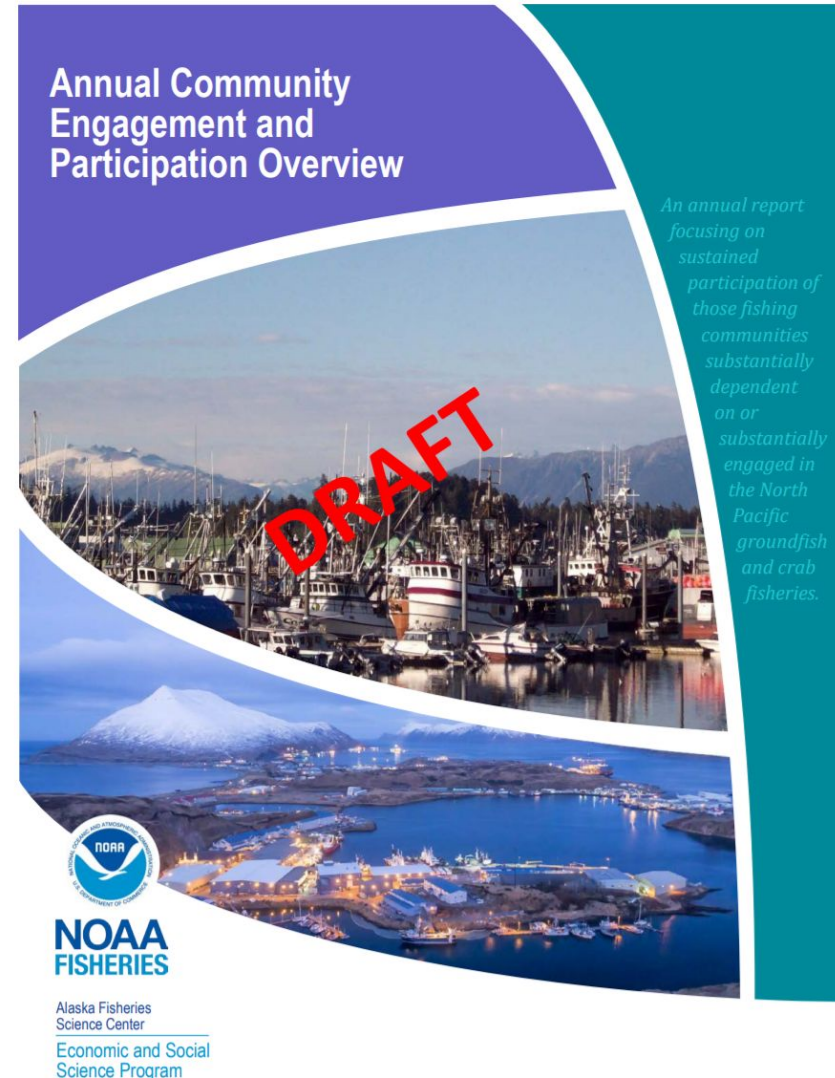
	Stage	Processes Affecting Survival	Relationship to Sablefish
Adult	Recruit	<ol style="list-style-type: none"> 1. Abundance of predators/competitors in preferred slope habitat 2. Bottom temperature 	Increases in main predators of sablefish would be negative but minor predators or competitors may indicate sablefish biomass increase. Increases in bottom temperature may impact spawning habitat.
	Spawning	<ol style="list-style-type: none"> 1. Large-scale offshore thermal environment winter before spawning⁽²⁰⁾ 2. Condition, age of female <u>spawners</u> 	Stability of offshore thermal environment may be necessary for spawning and provide buffer. Poor body condition or earlier age of female <u>spawners</u> may result in lowered productivity, more variable spawn timing or skip spawning, and mismatch with spring bloom.
Offshore to Nearshore Pelagic	Egg	<ol style="list-style-type: none"> 1. Bottom temperatures 2. Advection/retention 3. Oxygen minimum zone 	Increases in bottom temperature and advection would be negative for egg stage resulting in early hatching or dispersal from preferred habitat. Shoaling of the oxygen minimum zone may also adversely impact survival to hatch.
	Larvae	<ol style="list-style-type: none"> 1. Surface temperature in <u>neuston</u> 2. Match with spring bloom⁽¹⁷⁾, abundant prey 3. Currents that facilitate nearshore transport⁽¹⁾ 	Increases in temperature and zooplankton prey may be positive for sablefish that can utilize multiple prey types and have a high growth potential at warmer temperatures. Increases in nearshore transport to preferred habitat would be positive for sablefish during settlement transition.
	YOY	<ol style="list-style-type: none"> 1. Surface temperature in <u>neuston</u> 2. Spring/summer abundance of zooplankton prey⁽¹¹⁾ 3. Currents that transport onto shelf⁽¹⁾ 4. Predation 	Increases in temperature and zooplankton prey may be positive for sablefish similar to the larval stage. Increases in nearshore transport would assist with settlement to preferred habitat and increases in predation would be negative for sablefish although this is not an abundant species and not a common prey item.
Nearshore Settlement	Juvenile	<ol style="list-style-type: none"> 1. Summer/fall abundance of zooplankton prey ⁽¹¹⁾ 2. Bottom temperature in nearshore 3. Predation 	Increases in preferred zooplankton prey would be positive for sablefish condition as they prepare to overwinter in the nearshore and higher bottom temperatures may assist with energetic costs of settlement. Predation would be negative for sablefish, although sablefish is not a primary prey item for most stocks.
	Pre-Recruit	<ol style="list-style-type: none"> 1. Abundance of predators/competitors during transition from nearshore to offshore habitat 2. Top-down predation increase on age 2+ 	Increases in encounter of main competitors and predators of juvenile sablefish would be negative but minor predators or competitors may indicate sablefish biomass increase. Increases in main predator of sablefish would be negative but minor predators such as seabirds may indicate sablefish biomass increase.

Ecosystem Processes - EFH

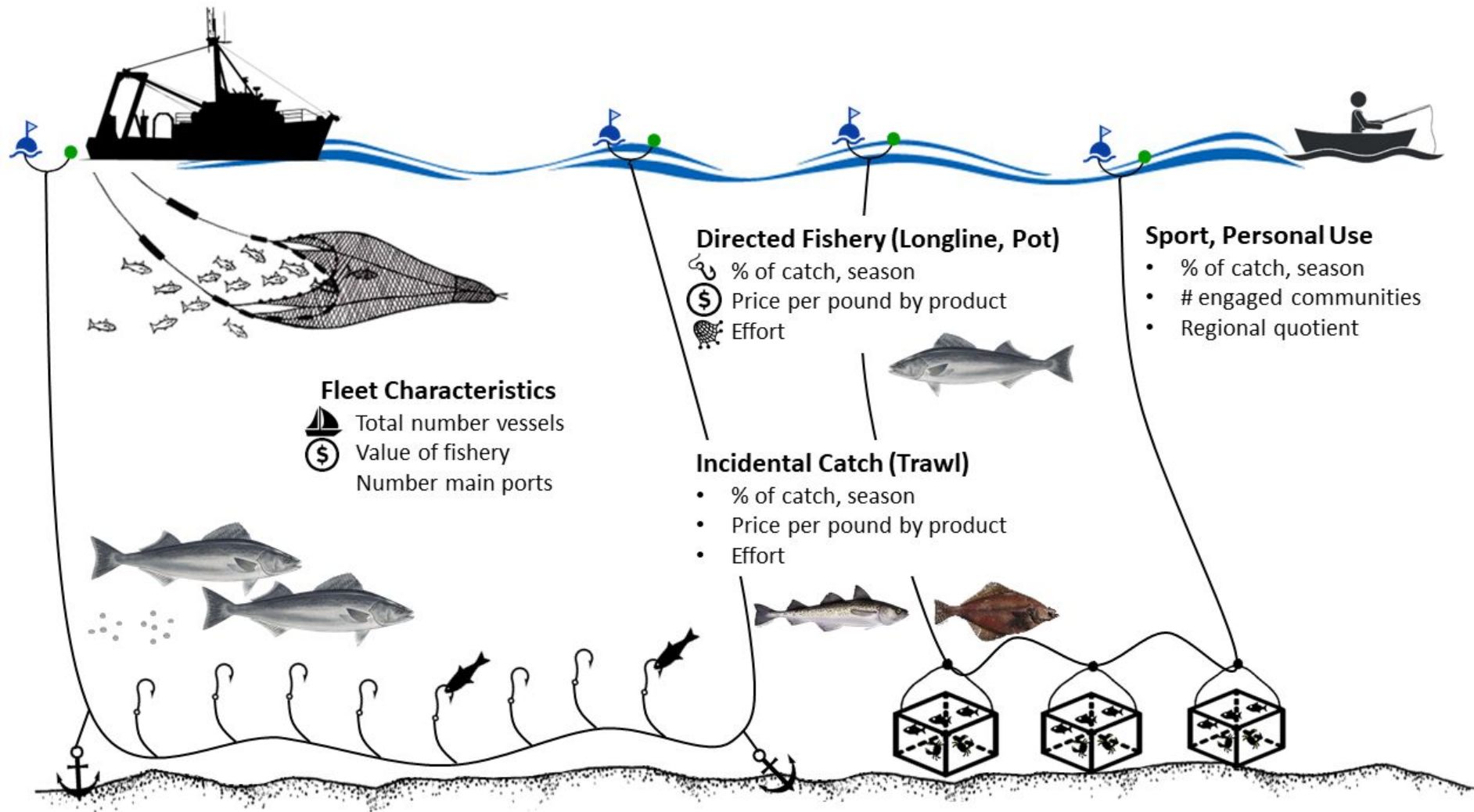


Socioeconomic Processes

- Economic Performance
 - Paired down version of economic performance report (~15 produced)
 - Highlight fishery status with 5yr summary tables
- Community engagement
 - Based on ACEPO report
 - Discusses communities dependent on stock



Socioeconomic Processes



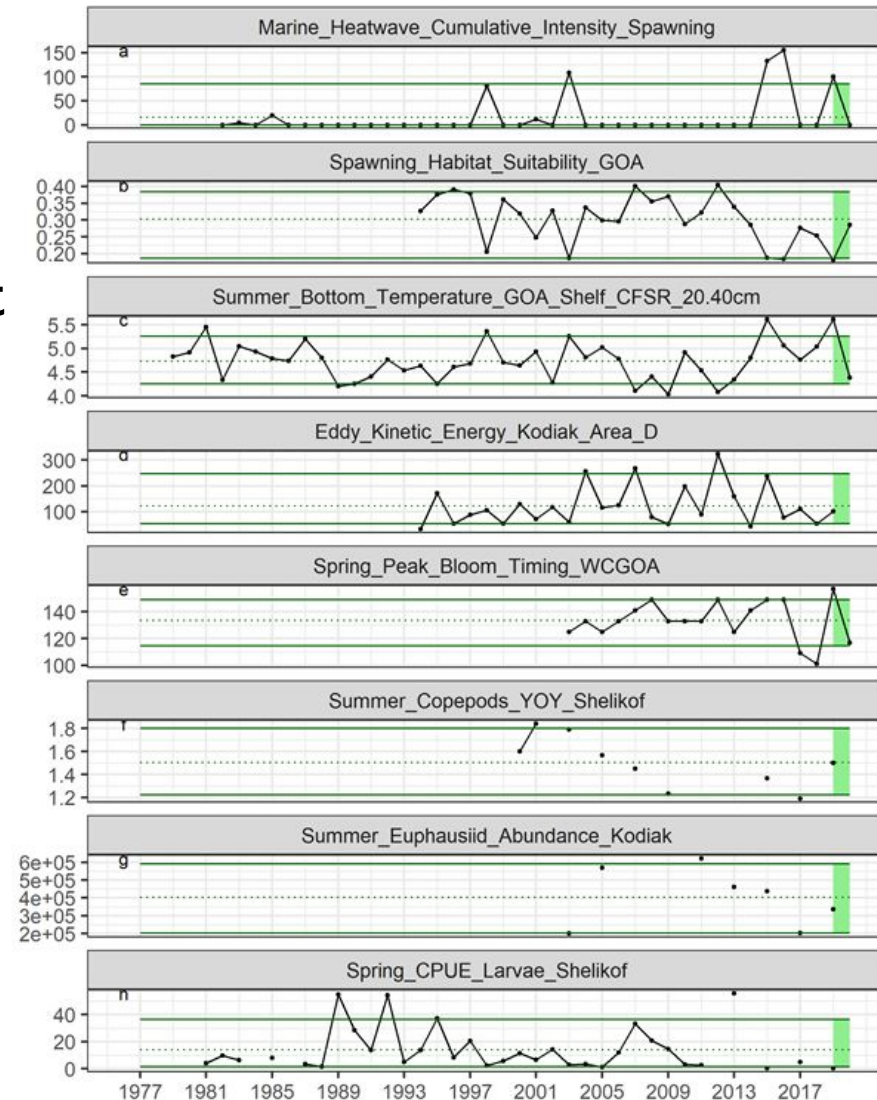
Indicators Assessment

- Indicator Suite

- Time series proxies for critical processes in metrics assessment
- Accessible, Consistent, Timely

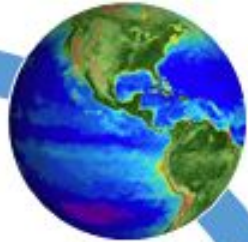
- Indicator Analysis

- 3 stages: traffic light simple scoring, importance methods, research ecosystem model
- Use results to provide context for management advice



Current ESP Indicators

Ecosystem Indicators



Physics
Phytoplankton



Zooplankton



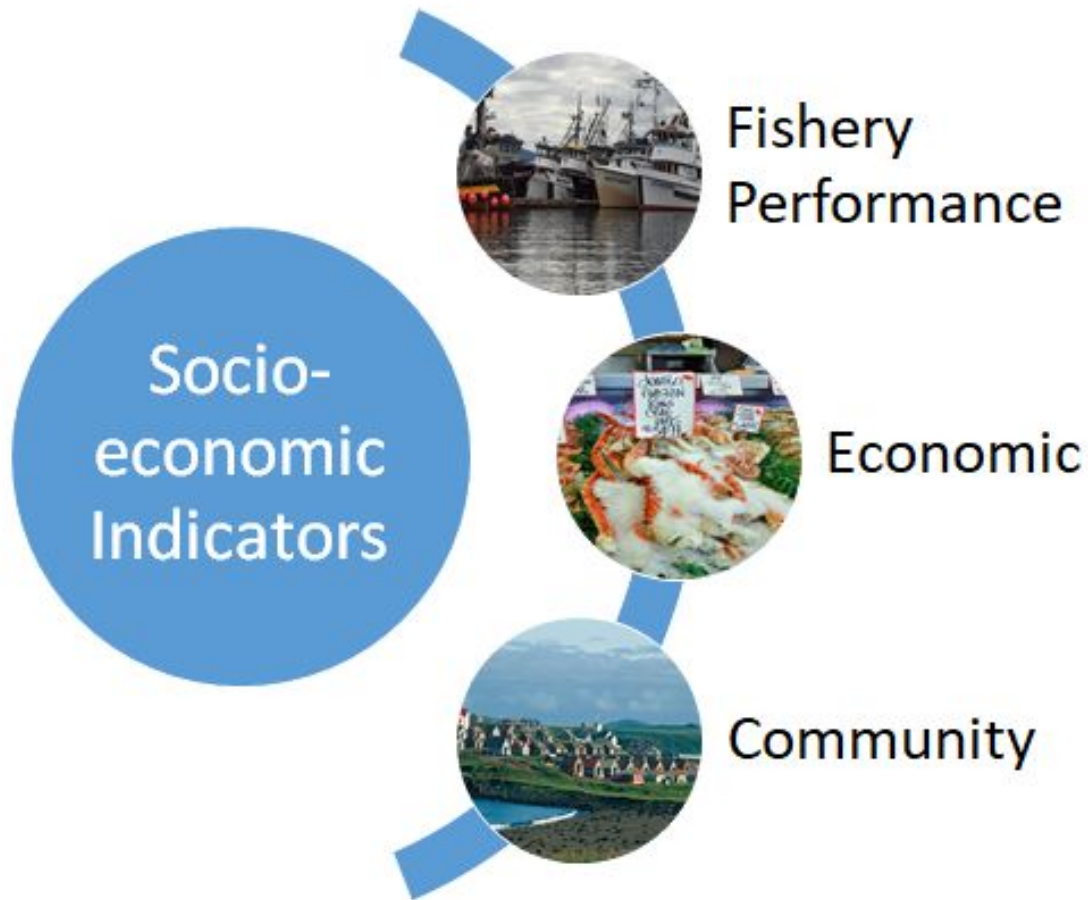
Eggs,
Larvae,
Young of year



Juveniles,
Adults

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



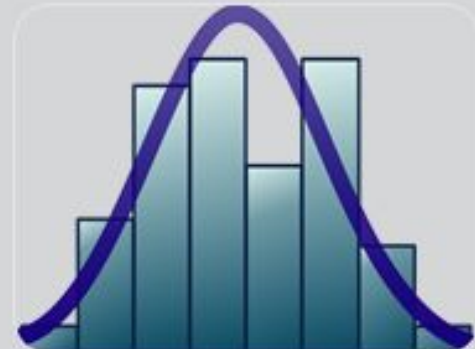
Traffic Light

- 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

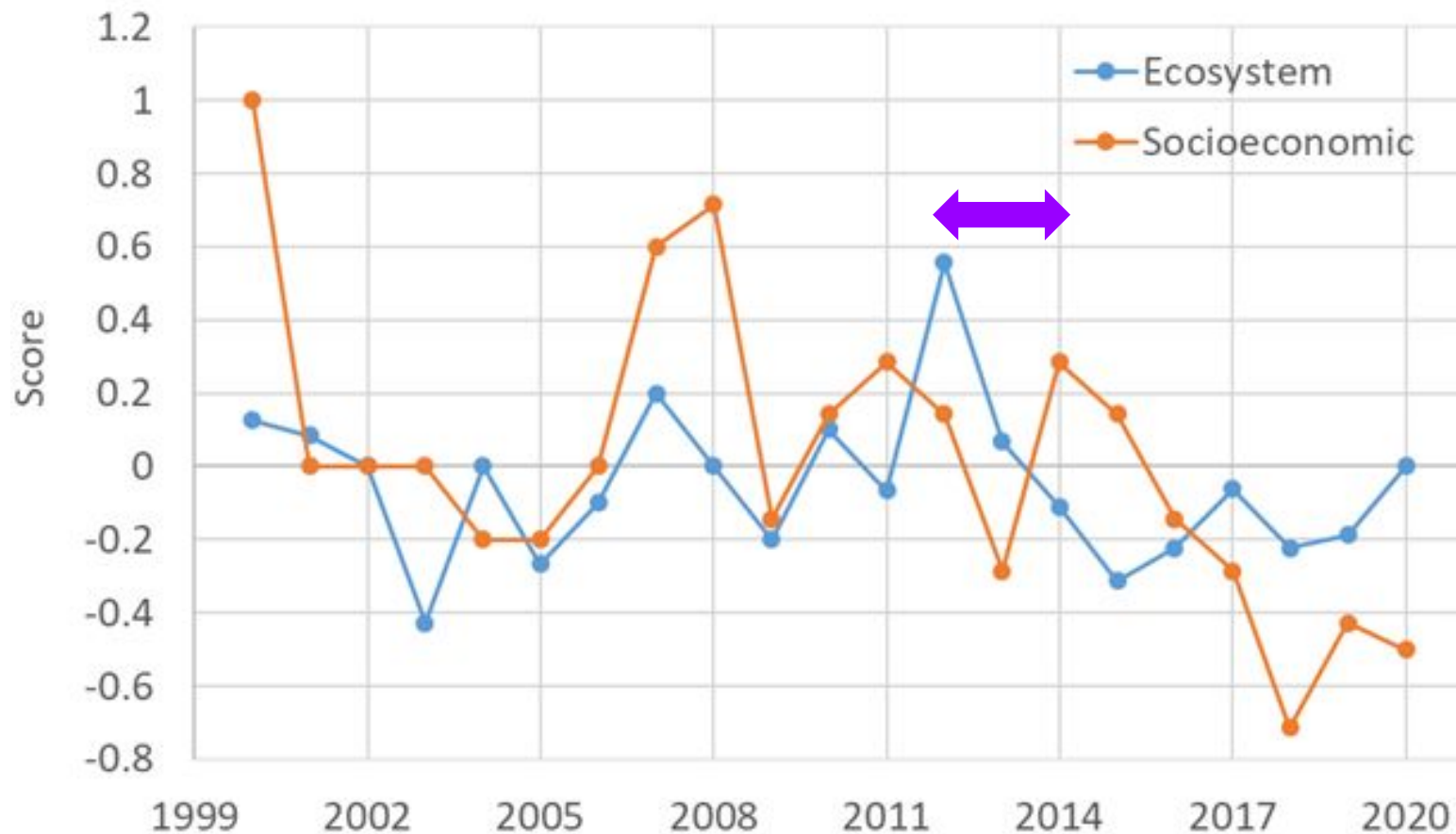


Ecosystem Model Run

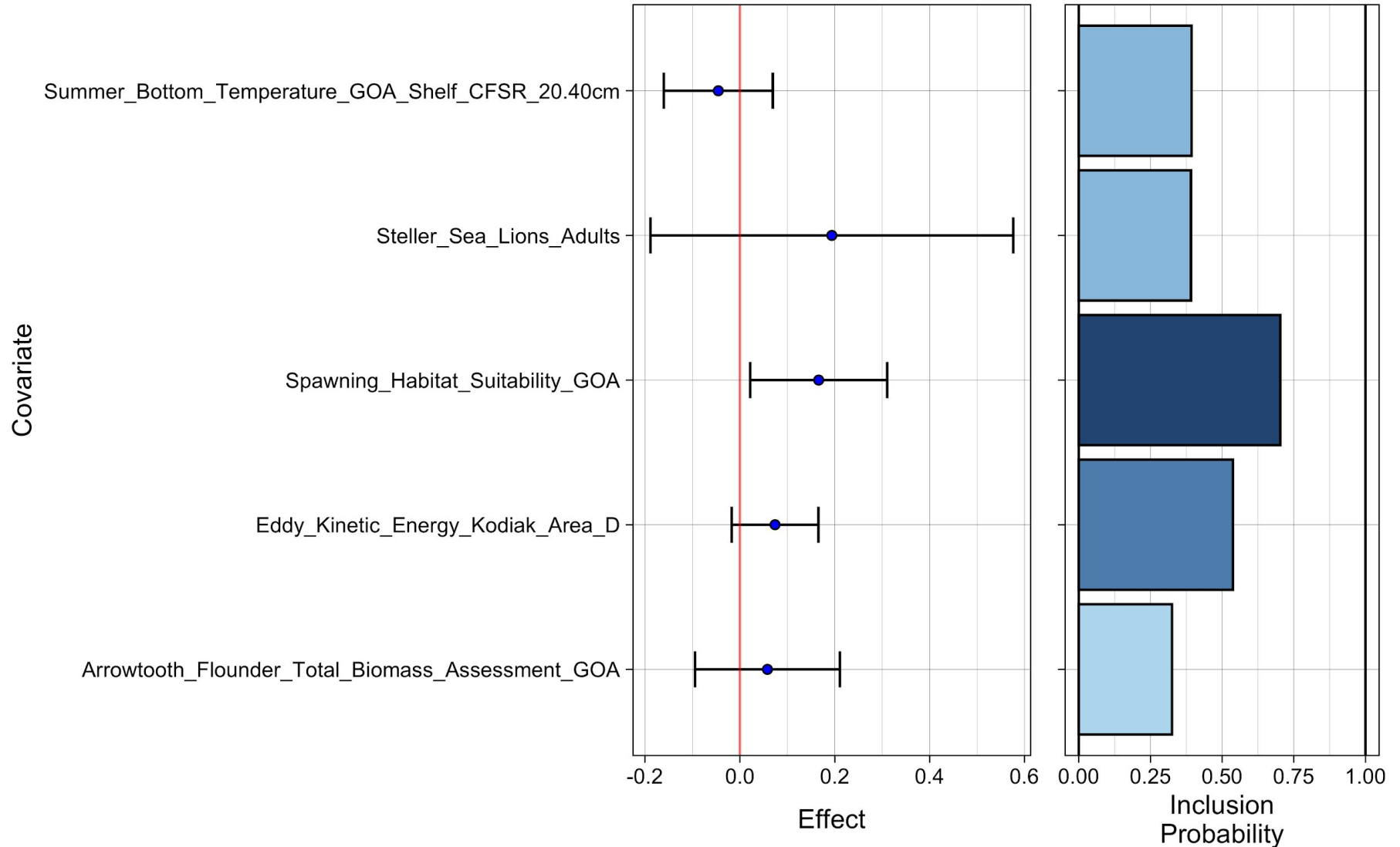
- Comparison w/ operational
- Retrospective
- Prediction performance
- Terminal SSB

Stage 1 Historical Score

Overall Stage 1 Score for GOA Pacific Cod



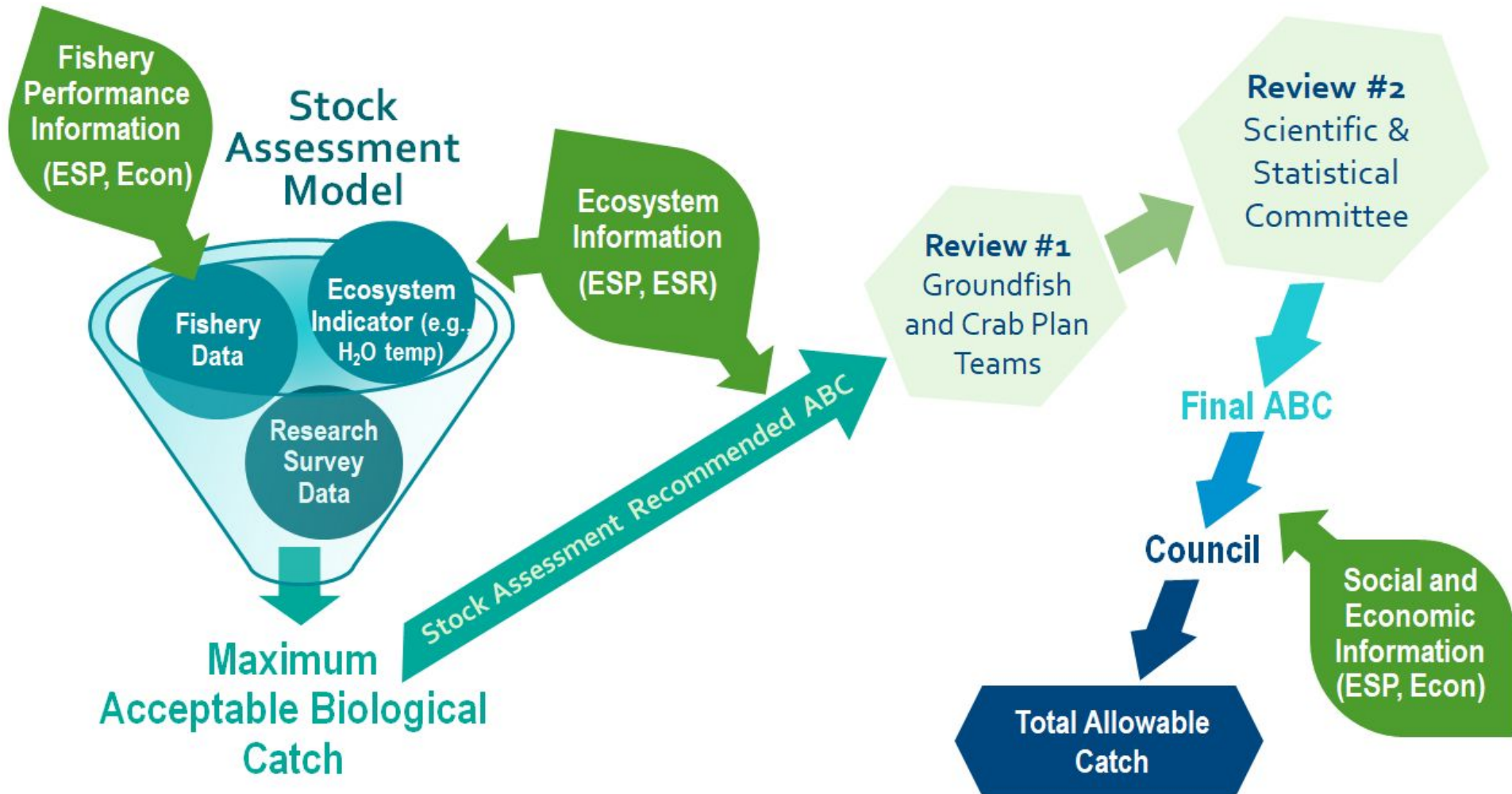
Stage 2 Importance



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

Management Process



ESP in Management

Risk

ESP summary used in contextual manner to identify additional uncertainty not in model

Rebuilding

Indicator suite used to define regime for rebuilding plans

Readiness

ESP provides an on-ramp for indicators and an early warning system for extreme change

ESP Developments

- ESP Workshops, 2019-2021

- Three workshops funded by AFSC regional work plan
- Used to develop and implement ESPs for the AFSC
- Allow for program awareness, innovation, collaboration

- ESP Coordination

- New data accessibility option from ESP workshops
- Five ESP teams initiated since 2019, cross program reps
- Full and partial reporting templates, new report card
- Working group to coordinate EBFM activities at the AFSC

Workshop Organization

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

Data Workshop

Pacific Marine Environmental Laboratory EcoFOCI

Lead: Phyllis Sabote

Sharon Bell, Nick Boud, Neal Colwell, Carol Lusk, Geoff Lohs, Cathy Munk, Peter Probst, Peggy Sabinas, Dana Steiner

PMEL EcoFOCI ISEA UNIVERSITY OF WASHINGTON

Ecosystems & Fisheries-Oceanography Coordinated Investigations (EcoFOCI)

Or within AFSC: the Recruitment Processes Program

Supervisors: Janet Duffy-Anderson (PM), Libby Lagerwell

Employees: Ali Deary, Lauren Rogers, Dave Kimmel, Matt Wilson, Steve Porter, Adam Spear, Melanie Pannun, Morgan Bailey, Dan Coopers, Colleen Harpold, Jose Lamb, Kathy Mier, Kimberly Bahl, Annche Dougherty

Post-doctoral Researchers: Esther Goldstein, Jens Nielsen

Ecosystem Monitoring and Assessment (EMA)

Auke Bay Labs Division

Supervisors: Ed Farley (PM), Andy Gray (RO)

Employees: Alex Andrews, Andrew Diamond, Charlie Waters, Elizabeth Suddon, Ellen Yamamoto, Kristin Cecrell, Lisa Eganer, Jenna Moss, Jennifer Kama, Jim Murphy, John Elser, Jordan Watson, Scott Voloshak, West Strasburger

Recruitment, Energetics, and Coastal Assessment (RECA)

Supervisors: Todd Miller, Mandy Lindeberg (acting)

Employees: Emily Ferguson, Corey Fugate, Larry Holland, Jacob Masello, Michele Masuda, Katharine Miller, John Moran, Matthew Rogers, Fletcher Sewal, Rob Suryan, Johanna Vollerweider

Science Support: Bryan Comack, Taylor Jarvis, Darcie Neff, Halia Schultz, Ashwin Sreenivasan, Courtney Weiss, Spender Lunda

The FBEP science team in Newport, OR

Supervisors: Todd Miller, Mandy Lindeberg (acting)

Employees: Emily Ferguson, Corey Fugate, Larry Holland, Jacob Masello, Michele Masuda, Katharine Miller, John Moran, Matthew Rogers, Fletcher Sewal, Rob Suryan, Johanna Vollerweider

Midwater Assessment and Conservation Engineering (MACE)

Supervisors: Chris Wilson, Patrick Resler

Employees: Alex De Roberto, Scott Furnish, Taina Honkaniemi, Darin Jones, Nathan Kniffenburger, Mimi Levine, Aisling McCarthy, Denise Madueve, Sarah Stennessen, Rick Towler, Kresimir Williams, Noelle Yochum

Shellfish Assessment Program

Former supervisor: Robert Foy

NOAA employees: Dan Urban, Leah Zacher, Pam Jensen, Allie Conrad, Jennifer Gardner, Erin Fedawa, Jon Richar and Chris Long

Contractors: Connor Cleary, Swigard Duesterloh and Kelly Champagne

Groundfish Assessment Program

Program Lead: Stan Koticki

Supervisors: Bob Lauth, Wayne Palston

Employees: Lewis Barnett, Lyle Bell, Jason Corner, Christina Corson, Elizabeth Dawson, Rebecca Inman, Jerry Huff, Steve Inman, Eliana Jorgensen, Heather Kenney, Neil Lumen, Rick MacCrimmon, Peter Munro, Dan Orson, Jay Orson, Steve Orson, Nancy Robertson, Steve Rooney, Kathryn Sobolewski, Dana Swanson, Alison Vigen, Paul Von Steiner, Cynthia Young, Marc Zimmerman

Age and Growth Program

Supervisors: Tom Heber and Debra Arndt

Employees: Irina Benson, John Brogan, Chris Churski, Betty Goetz, Charles Halvorsen, Craig Kestelbe, Beth Matta, Dustin Nadjokic, Sandi Nedelcher, Julie Pearce, Charlie Platon, Jon Short, Kai Stone, Todd Terribin

ESRP Workshop May 2019

Presented by Beth Matta

AFSC Age and Growth Program

REEM: Resource Ecology and Ecosystem Modeling Program

Products

- Adult groundfish food habits data and indices POC: K. Aydin
- Model-based estimates of predation POC: K. Aydin, K. Halvorsen

NOAA FISHERIES

Fisheries data collection by the AFSC

NOAA Fisheries Alaska Fisheries Science Center

May 19 2019 Seattle, WA

CEMELI, Franika for AFSC Workshop on Ecosystem Modeling Alaska Fisheries Science Center

Status of Stocks and Multispecies Assessment (SSMA)

Supervisors: Anne Hedrow, Sandra Lovie

Employees: Steve Barbano, Meghan Bryan, Martin Dunn, Jen Inaudi, Corey McClelland, Greg Ormrod, Ingrid Sines, Paul Spencer, Buck Stockham, Cody Szwabki, Grant Thompson

Non-afsc contractors: A. Havron, C. Mounlan, C. Turpey, M. Torre, T. W. Anderson

Marine Ecology and Stock Assessment (MESA)

Division: Auke Bay Laboratories

Supervisors: Chris Lunzford, Pat Malachuk

Employees: Katy Echavez, Kari Fencko, Dana Hanselman, Pete Halson, Cara Rodeheffer, Aalen Showell, Kevin Strickus, Emily Trishuro

The ESSRP team

Michael Cahan, Ben Fossil, Brian Gardner-Harris, Alan Hayne, Elise Kasperka, Dan Law, Chang Saeng, Margus Szyrnkowiak, Sarah Wain, Alan Chen, Sabrina Demaree, Madeline Harsh, Alan Lee, Melissa Rhoades-Hesse, Kim Sparks

Seabird Data: Possible Contributions

William Sydeman, Mayumi Arimitsu, Heather Renner, Sarah Ann Thompson, John Platt, Scott Hatch, Rob Suryan, Stephani Zador

USGS science.kiva.usgs.gov

NOAA FISHERIES

Regional Office Fisheries Data

Presented by Anne Marie Eich Sustainable Fisheries Division

<https://www.fisheries.noaa.gov/about/alaska-regional-office>

Westward Region Large-Mesh Bottom Trawl Surveys

Kelly Spahrer 353 Research Court Kodiak, AK 99615 kelly.spahrer@afsc.noaa.gov

The IPHC Fishery Independent Setline Survey

International Pacific Halibut Commission (<https://www.iphc.int/>)

Essential Fish Habitat Species Distribution Models and Ecosystem Socioeconomic Profiles

Jodi Pirtle Alaska Fisheries Science Center Habitat Conservation Division Juneau, Alaska jodi.pirtle@noaa.gov

ESRP Workshop NOAA AFSC May 31, 2019

Habitat and Ecosystem Process Research program

James Thorson

Core team: Mike Cameron, Phil Ganz, Tom Hurst, Mandy Lindeberg, Beth Matta

NOAA FISHERIES Alaska Fisheries Science Center

Model Workshop

Oceanographic models

Ecotone and Stock Assessment
Personal U.S. Fisheries Assessment
Kelly Kearney & Darren Piner
University of Washington, IAD
NOAA AFS, NOAA FIC
March 11, 2020

**Applications of Individual-based models (IBMs):
Early life stage survival & recruitment**

Esther Goldstein & Buck Stockhausen
EcoFOCI & REFM
AFSC, Seattle

Workshop 2020
NOAA FISHERIES | ALASKA FISHERIES SCIENCE CENTER

REEM: Resource Ecology and Ecosystem Modeling Program

Products

- Adult groundfish food habits data and indices
- Model-based estimates of consumption and predation

**Species Distribution Modeling (SDM)
to Describe
Essential Fish Habitat (EFH)
in Alaska**

NOAA FISHERIES SERVICE
11 March, 2020
Seattle, WA

Ned Laman, Jodi Pirie, Jeremy Harris, Chris Rooper,
Thomas Horn, and Christina Conrath

National Marine Fisheries Service (NMFS)
Alaska Fisheries Science Center (AFSC)
Regional Assessment and Conservation Engineering Division (RACE)
Groundfish Assessment Program (GAP)

**Species Distribution Models:
Temporal Changes in Spatial Indicators**

Lewis Barnett and Jim Thorson
ESP Workshop
3/11/2020

lewis.barnett@noaa.gov
james.thorson@noaa.gov

**Biological metrics for ESPs: early life history
considerations and applications**

NOAA FISHERIES

Ben Lauri, Alison Deery, Lauren Rogers,
Linda Cooper, Tom Kurtz

**Using ecosystem data and
mechanistic understanding to
inform management**

Lauren Rogers
RACE/EcoFOCI

With contributions from:
Eben Yasumishi, Lisa Einar, Ben Laurel, Dan Cooper, Susanna McDermott

ESP Workshop
March 11, 2020

EcoFOCI

**Socioeconomic Aspects
in Stock Assessments Workshop
(SEASAW):
Past, Present, and Future**

NOAA FISHERIES
Alaska Fisheries
Science Center
Seattle, WA

Alan C. Haynie
ESP
AFSC, March 10, 2020

Disclaimer:
This is the opinion of the authors and
not NOAA, DOC, or the Nation.

**A Conceptual Model for
Social and Economic Indicators**

ESP Workshop
March 11th 2020

Ben Fissel
AFSC – ESSRP

**Sablefish Case Study:
Fleet Performance
Indicator**

Marysia Szymkowiak
NMFS Alaska Fisheries Science Center
Presentation for ESP 2020

Indicator Analysis Stages

- Simple scoring of indicator suite in addition to traffic light (SSC)
- Importance methods to weight indicators by relevance to process
- Summary output of research ecosystem model

**Methods for Estimating Indicator
Importance**

NOAA FISHERIES

Curry Cunningham
University of Alaska Fairbanks
College of Fisheries and Ocean Sciences
Kalei Shotwell
NOAA AFSC

CFOS

**Enhanced Stock
Assessment Models**

Meaghan Bryan and Carey McGilliard

**CEATTLE:
Climate enhanced Age-based model
with Temperature specific Trophic
linkages & Energetics**

Kerstin Holman
kerstin.holman@noaa.gov

CEATTLE development team (alphabetical):
Grant Adams, Kerin Aydin, Steve Bartheaux,
Martin Dorn, Jim Iannelli, André Punt, Kalei Shotwell, Ingrid Spies, Grant Thompson

Multi-area models

Kari Fenske, Nick Tolimieri, Dana Hanselman, Kalei Shotwell

ESP workshop, March 2020

Discussion sessions were limited due to COVID-19

Model Discussion Workshop

GATE 1: ESP



GATE 2: Model



In Model



Management
Advice



In ESP

Workshop #3

ESP Data

- ESP Data List from 2019 Workshop
 - 130 plus indicators entered from many programs
 - Lots of potential datasets that do not have a home
 - Some indicators listed that are subsets of ESR indicators
- ESP Dashboard on AKFIN
 - Same location as stock assessment dashboard, new tab
 - Allows for increased visibility for these potential datasets
 - Funded through AFSC Regional Work Plan and FIS

ESP Dashboard



ESP Data

This page contains data of interest to generate Ecosystem and Socioeconomic Profiles (ESP's) for groundfish and crab stocks of Alaska.

Ecosystem

Oceanographic

MUR Temperature

[Open](#) Queries for downloading Multi-Resolution sea surface temperature by station and management areas.

CRW Temperature

[Open](#) Queries for downloading Coral Reef Watch, sea surface temperature, anomaly and marine heatwave by station and management area.

BASIS Ocean - Chlorophyll

[Open](#) A query of the BASIS OCEAN database that summarizes average chlorophyll pivoted by CTD filter size.

BASIS Ocean - Surface Nutrients

Socioeconomics

Fishery Performance

CPUE

[Open](#) Queries for downloading catch-per-unit-effort from fishery dependent sources.

Effort

[Open](#) Queries for downloading effort from fishery dependent sources.

Condition

[Open](#) Queries for downloading fish condition by sector.

Economics

Value

[Open](#) Queries for downloading price, revenue, and value by sector.

Exploratory

Surveys

BASIS Fish Catch All 0

[Open](#) A query of the BASIS FISH database that includes all stations sampled for a given year for all species juvenile catch records. The empty records are then filled in for all species with 0 catches. Catch includes fish from all life history stages.

BASIS Fish and Ocean

[Open](#) A combination of the BASIS FISH and OCEAN databases that reports on catch with average temperature and salinity along with average nutrients for the first 10 depths. Pivoted by all species.

Laboratory

RECA Energetics

ESP Teams & Reports

- ESP Teams

- Consist of subject matter experts from AFSC programs
- Contain a representative from status reporting teams
- Sablefish, GOA pollock, Pacific cod, Crab, Data-limited

- ESP Reports

- Full template completed when ESP first initiated, ~5 years
- Partial template based on SAFE format, annual
- New report card template for updating in fall

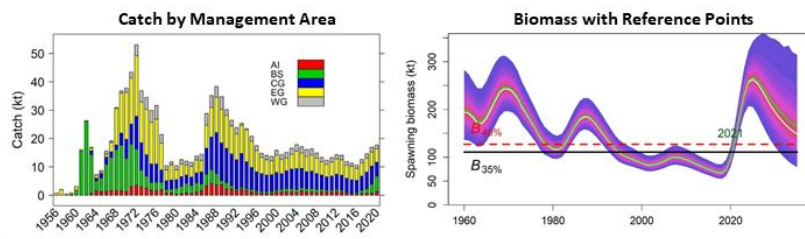
Report Card Template



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.

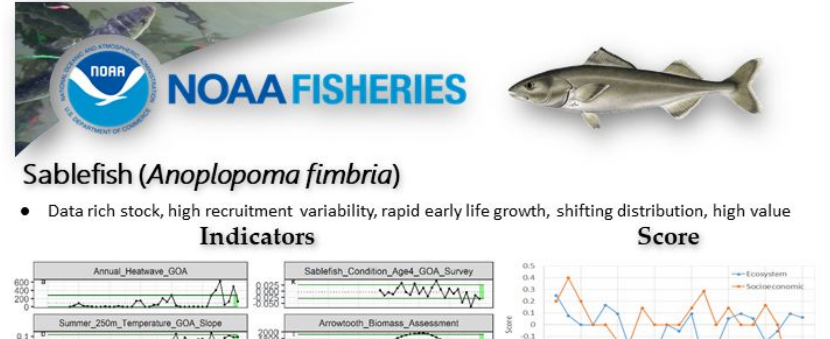


Year	ABC	OFL	Total Biomass	B/ B_MSY	F/ F_MSY	Recruits (mill #s)	Total Catch	Ex-Value (mill \$)
2015	13,657	16,128	188,000	0.66	0.78	26.63	10,970	100.6
2016	11,795	13,397	170,000	0.63	0.78	163.65	10,257	98
2017	13,083	15,485	206,000	0.60	0.88	123.44	12,270	123.5
2018	14,957	29,507	515,000	0.59	0.77	12.47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

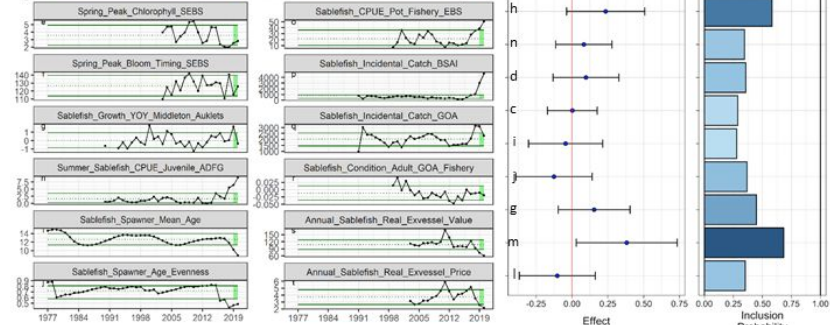
Research Priorities

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



Sablefish (*Anoplopoma fimbria*)

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

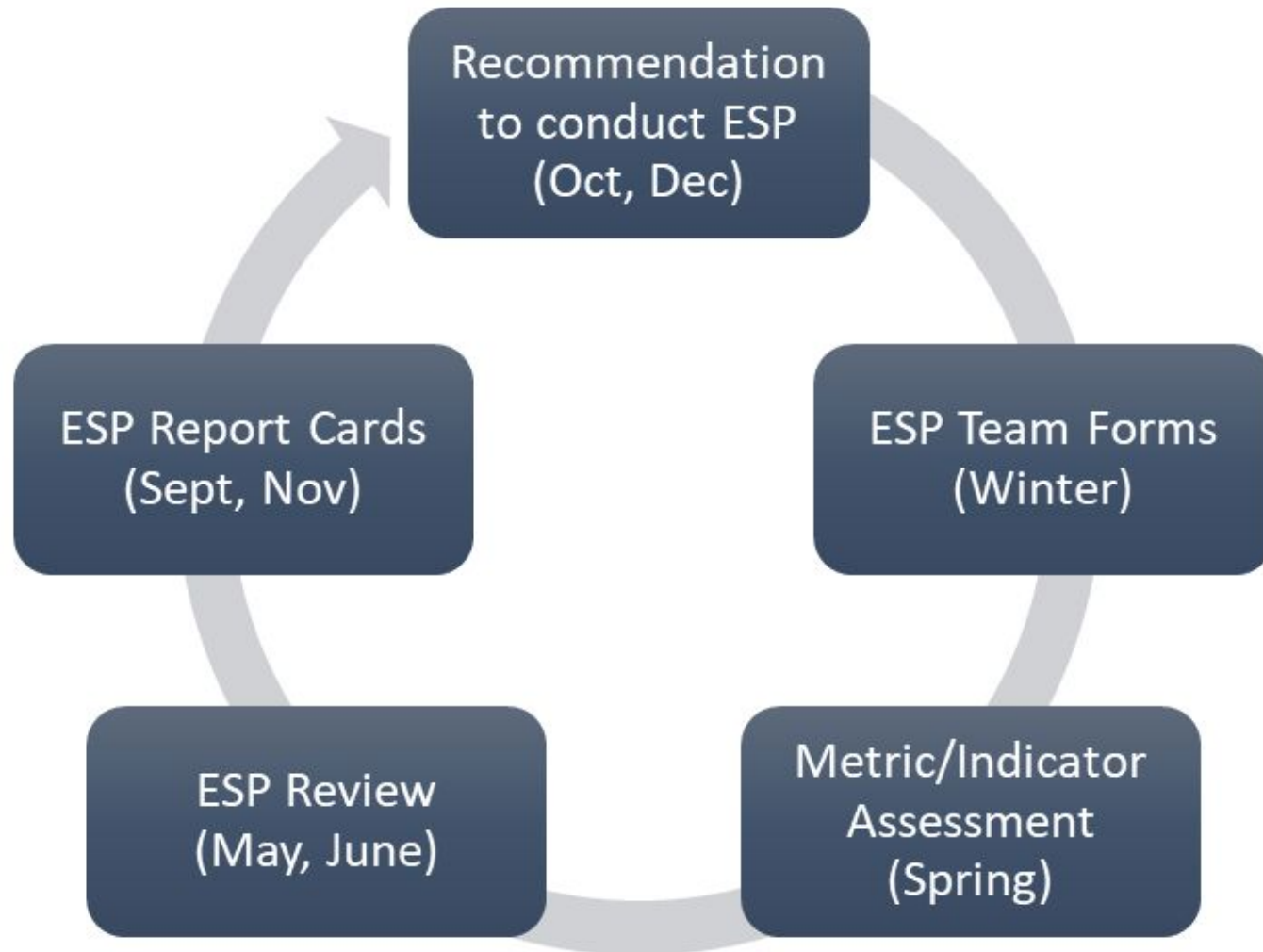


- Presence of 2016 and 2019 year class in ADF&G survey, age 4 fish generally in poor condition, higher spatial overlap with arrowtooth in fishery, physical + but < from 2019, lower stable, upper slight >
- Incidental catch < in GOA, > in BSAI indicates expanding habitat, ex-vessel value and price/pound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

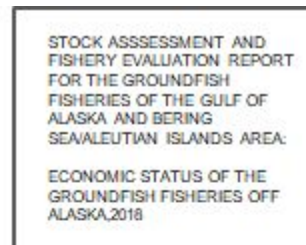
Research Model Performance (hypothetical)






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 Timeline

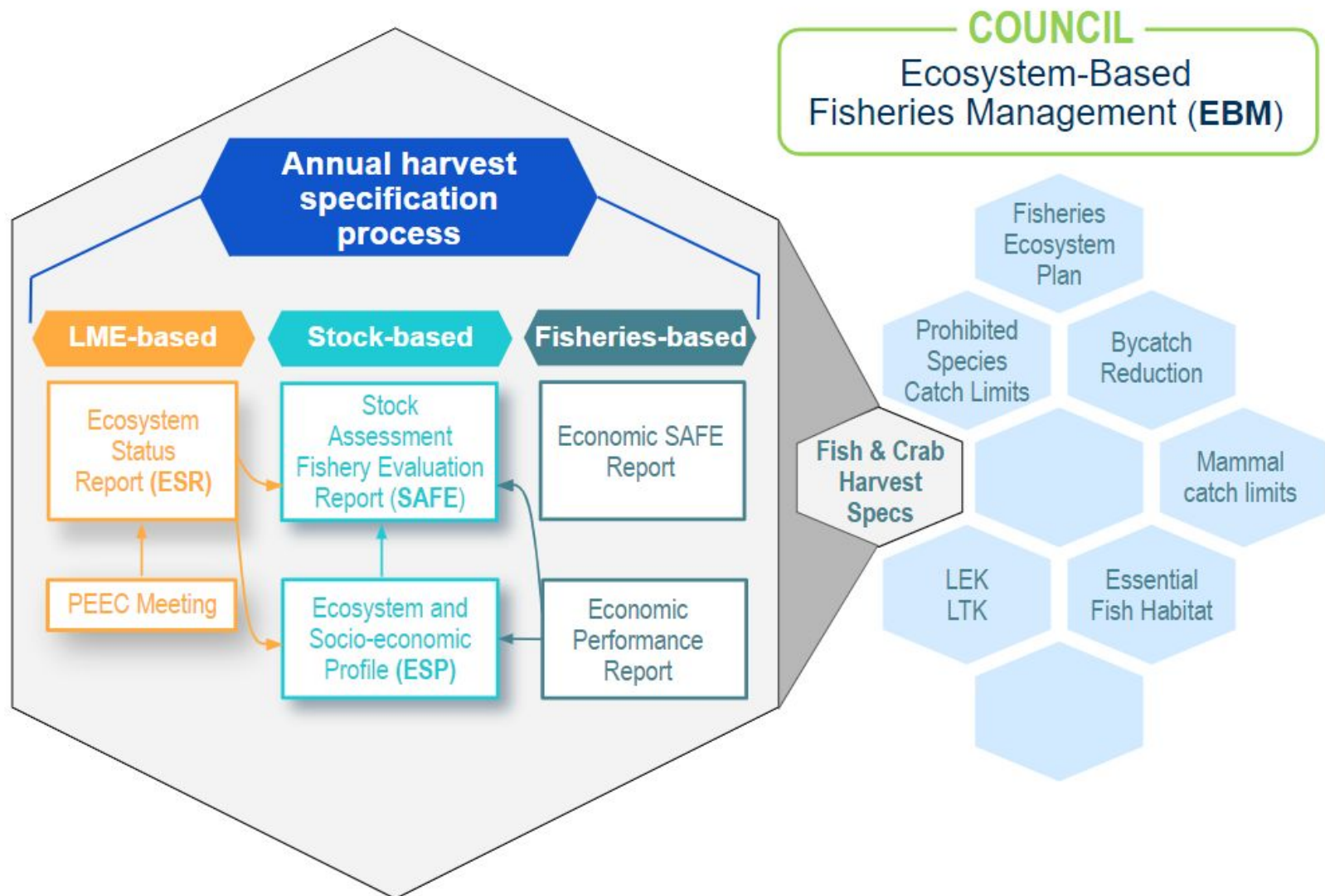


Coordinated Reporting



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

Coordinated Communication



Next Steps

- 2021 Plans

- Advice Workshop, March 15-17, 2021
- ESP review ESPs: May PEEC & CPT, June SSC
- 4 partial ESPs, 4 new ESPs, 8 report cards

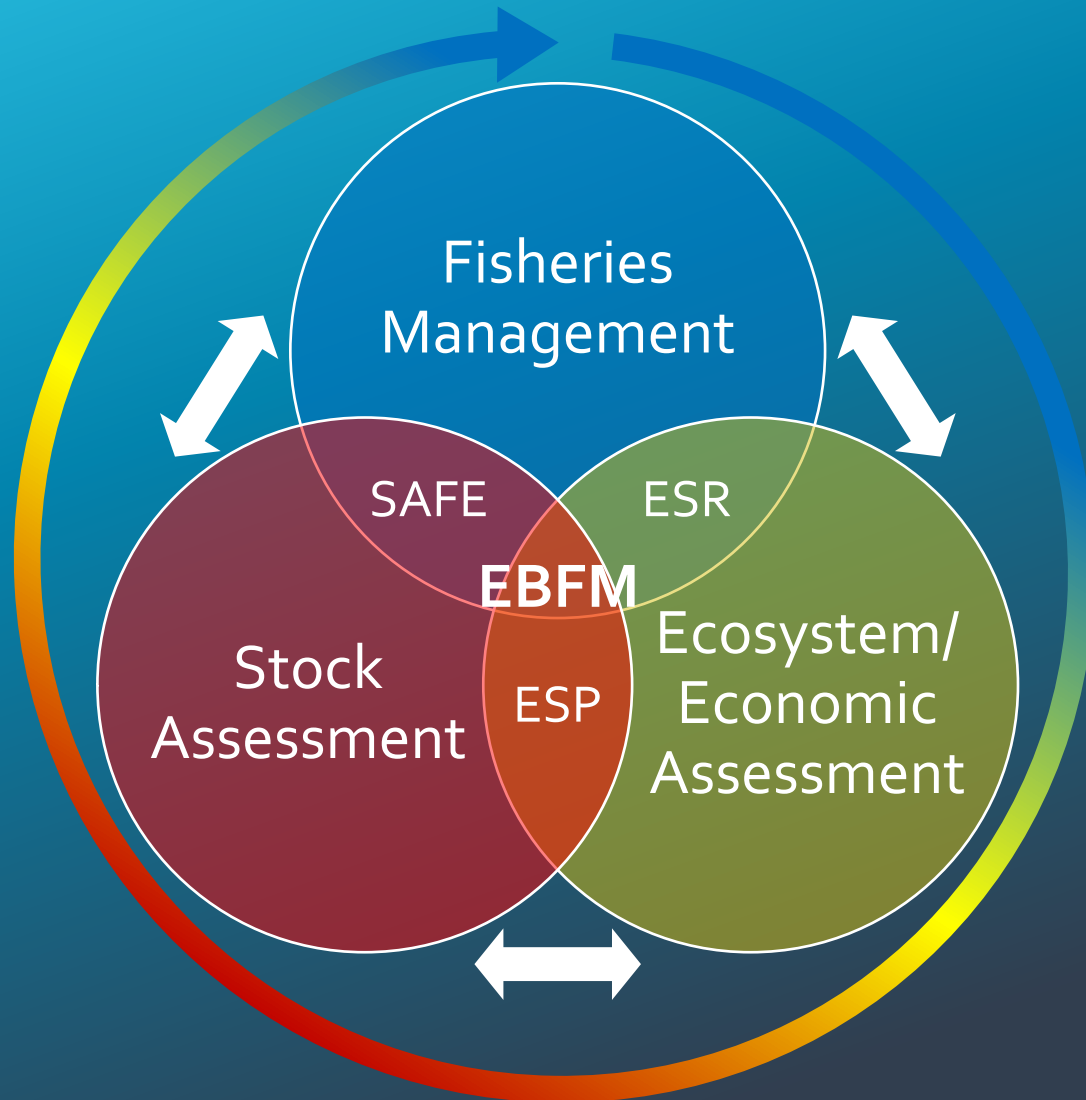
- Coordination

- Continue developing dashboard on AKFIN
- Standard indicator suite (EFH, ESR), automation

- Manuscripts

- ESP introduction (*In Review*), workshop summary

Communication Loop





Questions?

Contact:

Kalei Shotwell, NOAA-AFSC
Kalei.Shotwell@noaa.gov