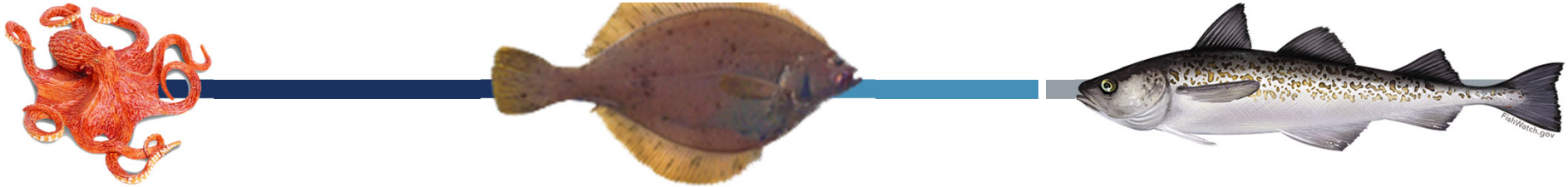
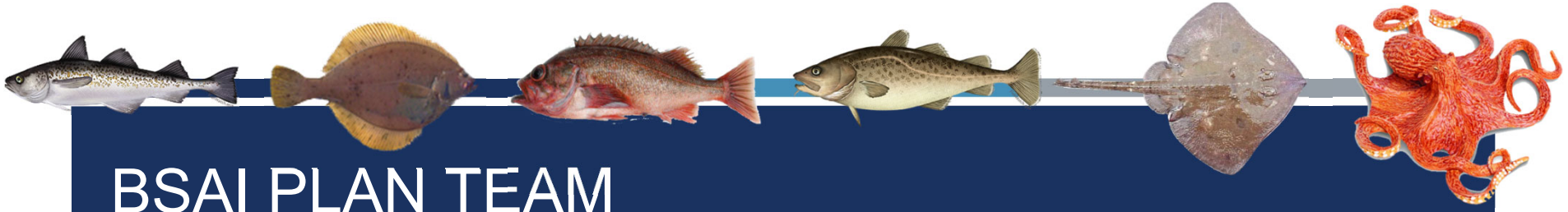


REPORT OF THE NOVEMBER 2023 BSAI GROUNDFISH PLAN TEAM MEETING

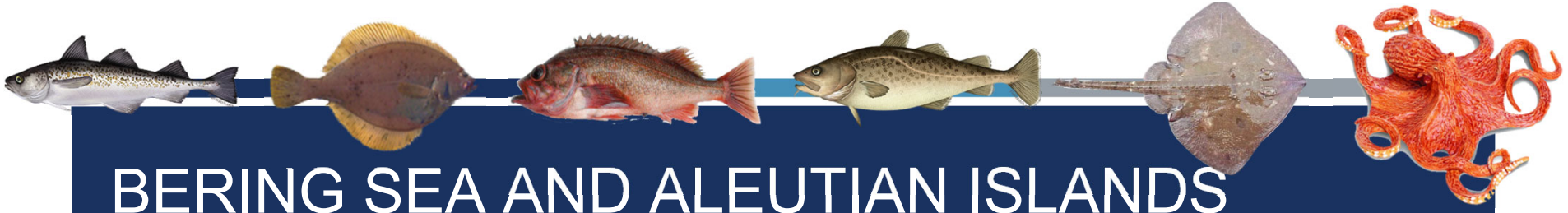
STEVE BARBEAUX (CO-CHAIR), KALEI SHOTWELL (CO-CHAIR), CINDY TRIBUZIO (VICE-CHAIR). DIANA STRAM (COORDINATOR)

DECEMBER 6, 2023



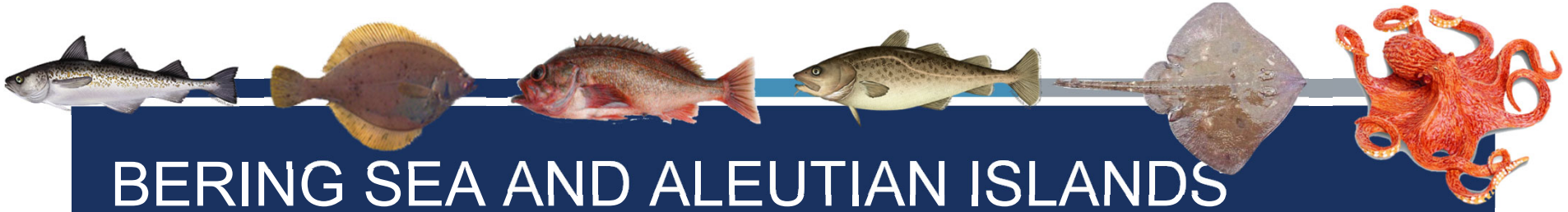
BSAI PLAN TEAM MEETING OVERVIEW

- Dates: November 13-17
- Place: AFSC Seattle
- Leaders: Steve Barbeaux, Kalei Shotwell (co-chairs); Cindy Tribuzio (vice-chair); Diana Stram (coordinator)
- Participation:
  - Steven Whitney (NMFS AKRO)
  - Allan Hicks (IPHC)
  - Lisa Hillier (WDFW)
  - Kirstin Holsman (AFSC REFM)
  - Phil Joy (ADF&G)
  - Andy Kingham (AFSC FMA)
  - Beth Matta (AFSC REFM)
  - Andy Seitz (UAF)
  - Jane Sullivan (AFSC)
  - Lucas De Filippo (AFSC ABL)
  - AFSC and AKRO staff and members of the public



BERING SEA AND ALEUTIAN ISLANDS BIG PICTURE

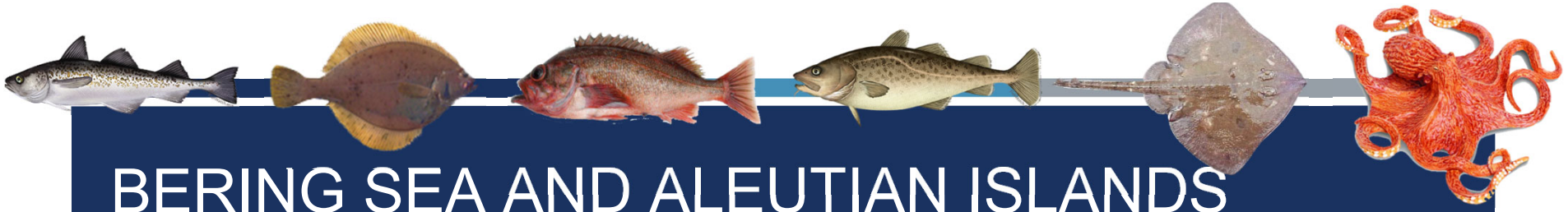
- Assessments of 26 stocks/complexes – (3 **Full**, 5 Update; 10 Harvest projection; 5 Catch report; 2 Ecosystem report; 1 “none”)
- Total of 23 models, including Tier 5/6 methods:
  - 8 base models/methods
  - 15 additional models/methods
- The Team agreed with authors’ recommendations regarding preferred models/methods and harvest specifications in all but one stock (AI Pacific cod)
- 2 new reductions from maximum permissible ABC recommended (5 total)
- Of the 15 stocks/complexes in Tiers 1 or 3, only 1 is in sub-tier “b”
- No stocks/complexes were subjected to overfishing in 2022, and no Tier 1 or 3 stocks/complexes are overfished/approaching as of 2023
- 19 Team recommendations



BERING SEA AND ALEUTIAN ISLANDS BIG PICTURE (TINY FONT)

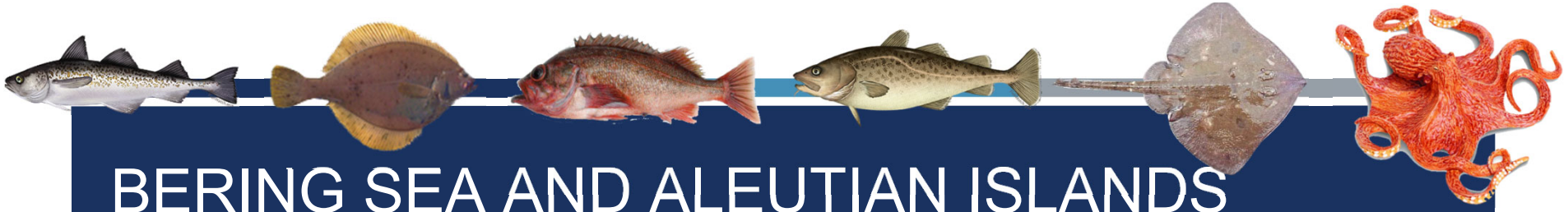
Chapter	Assessment	Author	Tier	Type	Risk*	% Reduction
1	Eastern Bering Sea pollock	Ianelli	1a	**Full**	1,1,2,1	18%
1A	Aleutian Islands pollock	Barbeaux	3a	H-Proj		
1B	Bogoslof Island pollock	Ianelli	5	C-Rep		
2	Eastern Bering Sea Pacific cod	Barbeaux	3b	**Full**	1,1,1,1	
2A	Aleutian Islands Pacific cod	Spies	5	**Full**	1,2,2,1	8%
3	Sablefish	Goethel	3a	**Update**	1,1,1,1	
4	Yellowfin sole	Spies/Bryan	1a	**Update**	1,2,2,1	
5	Greenland turbot	Bryan	3a	H-Proj		
6	Arrowtooth flounder	Shotwell	3a	H-Proj		
7	Kamchatka flounder	Bryan	3a	H-Proj		
8	Northern rock sole	McGilliard	1a	H-Proj		36%
9	Flathead sole	Kapur	3a	H-Proj		
10	Alaska plaice	Cronin-Fine	3a	C-Rep		
11	Other flatfish	Monnahan	5	H-Proj		
12	Pacific ocean perch	Spencer	3a	H-Proj		
13	Northern rockfish	Spencer	3a	**Update**	2,2,1,1	
14	Rougheye & blackspotted rockfish	Spencer	3a/5	H-Proj		12%
15	Shortraker rockfish	Shotwell	5	C-Rep		
16	Other rockfish	Sullivan	5	C-Rep		
17	Atka mackerel	Sullivan/Lowe	3a	H-Proj		
18	Skates	Tribuzio	3a/5	**Update**	(2,1),1,1,1	
19	Sharks	Tribuzio	6	C-Rep		13%
22	Octopus	Cronin-Fine	6	**Update**	1,1,1,1	
Appendix 1	Forage Species (including Squid)	Szulwaski	eco	**E-Rep**		
Appendix 2	Sculpins	Spies	eco	**E-Rep**		

* Assessment, Pop Dy., Environment, Fishery

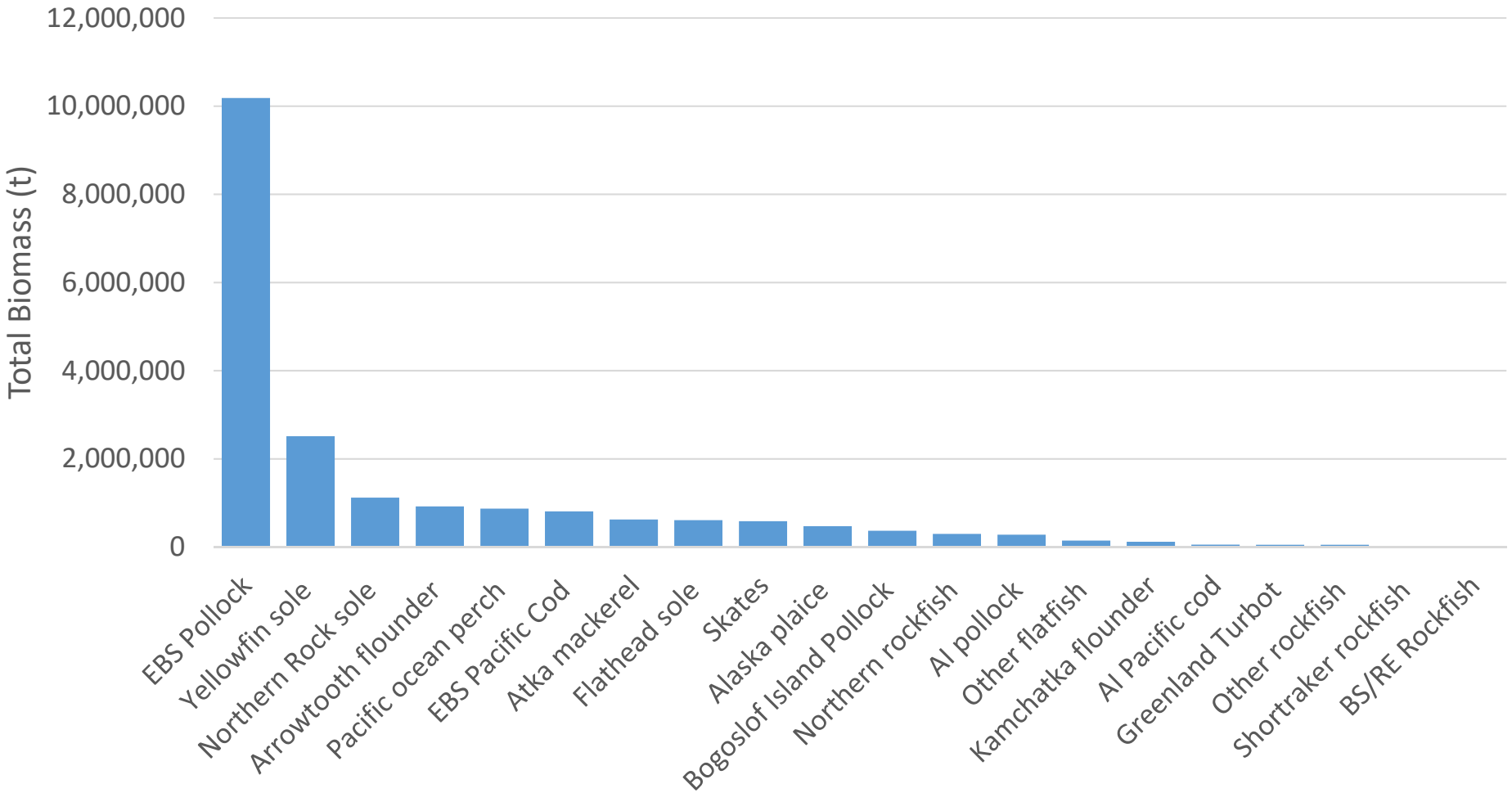


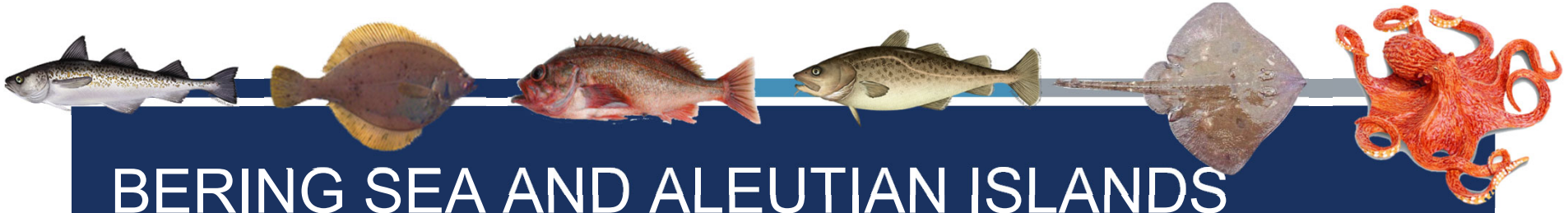
BERING SEA AND ALEUTIAN ISLANDS RISK TABLE AND REDUCTIONS

- New three level rating system with no categories or stocks with extreme concern
- Two of the five recommendations for reduction from maximum permissible ABC were from this year's deliberations.
- Three of the five reductions were carried over from 2022 determinations.

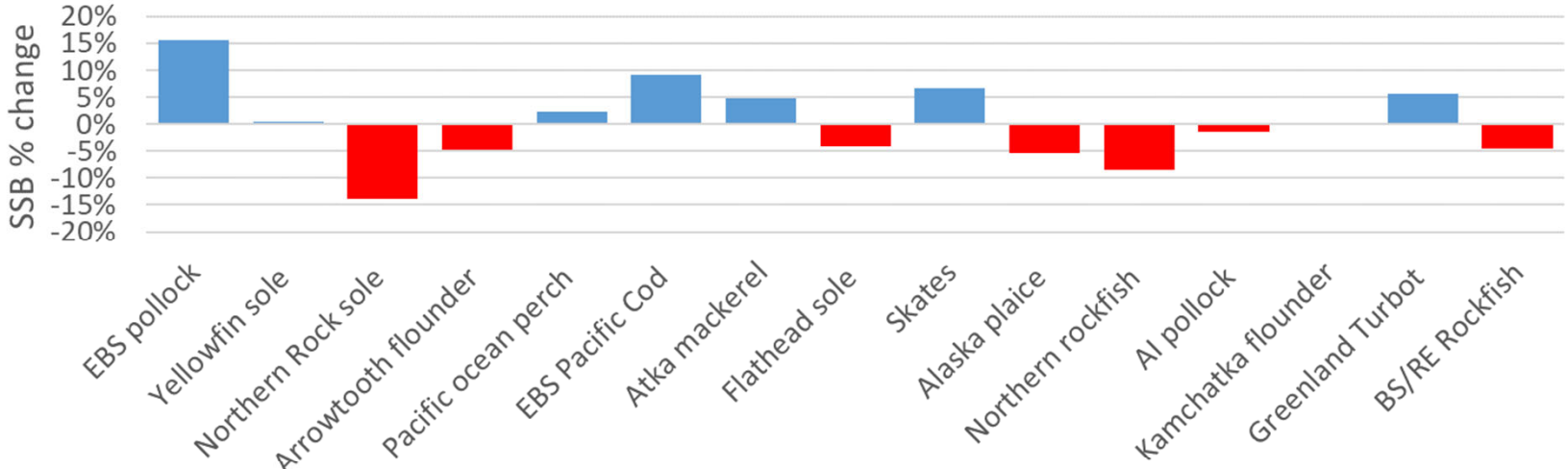


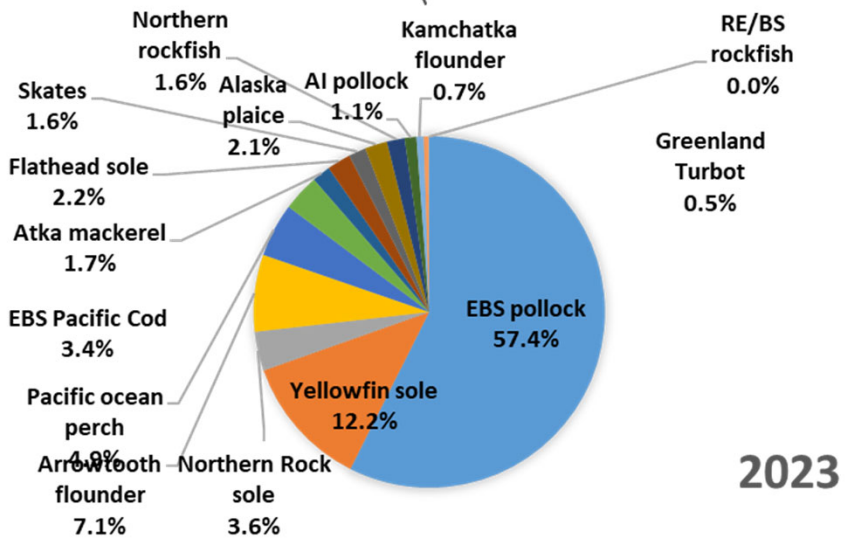
BERING SEA AND ALEUTIAN ISLANDS TOTAL BIOMASS (TIER 1, 3, AND 5)



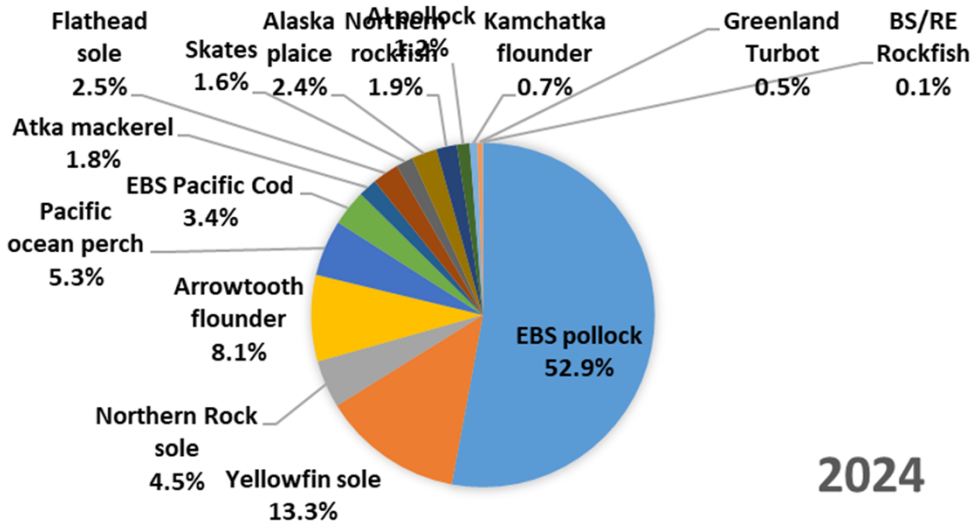


BERING SEA AND ALEUTIAN ISLANDS SPAWNING BIOMASS (TIERS 1 AND 3)



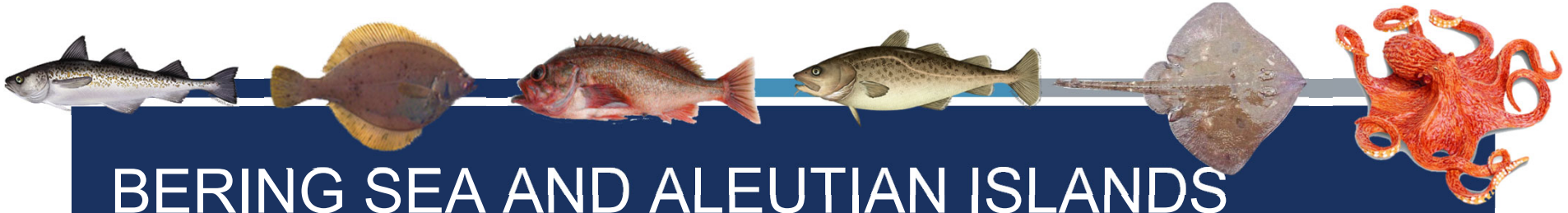


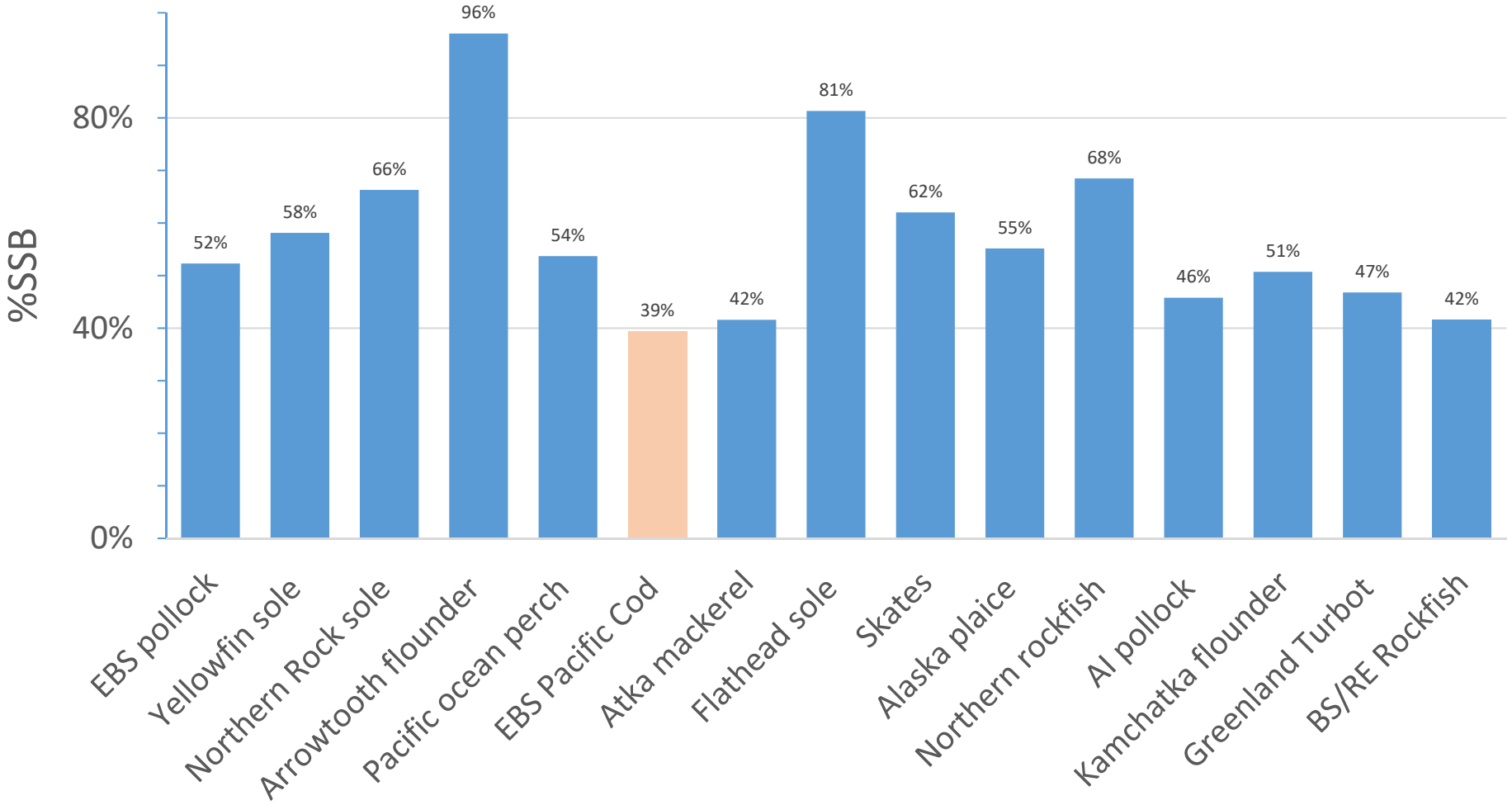
2023

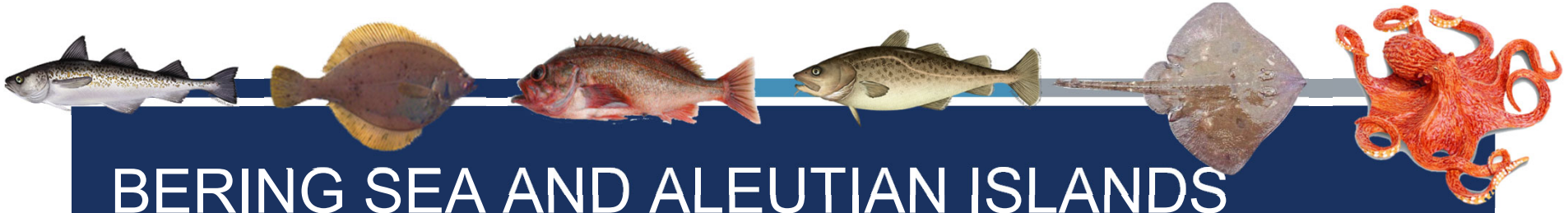


2024

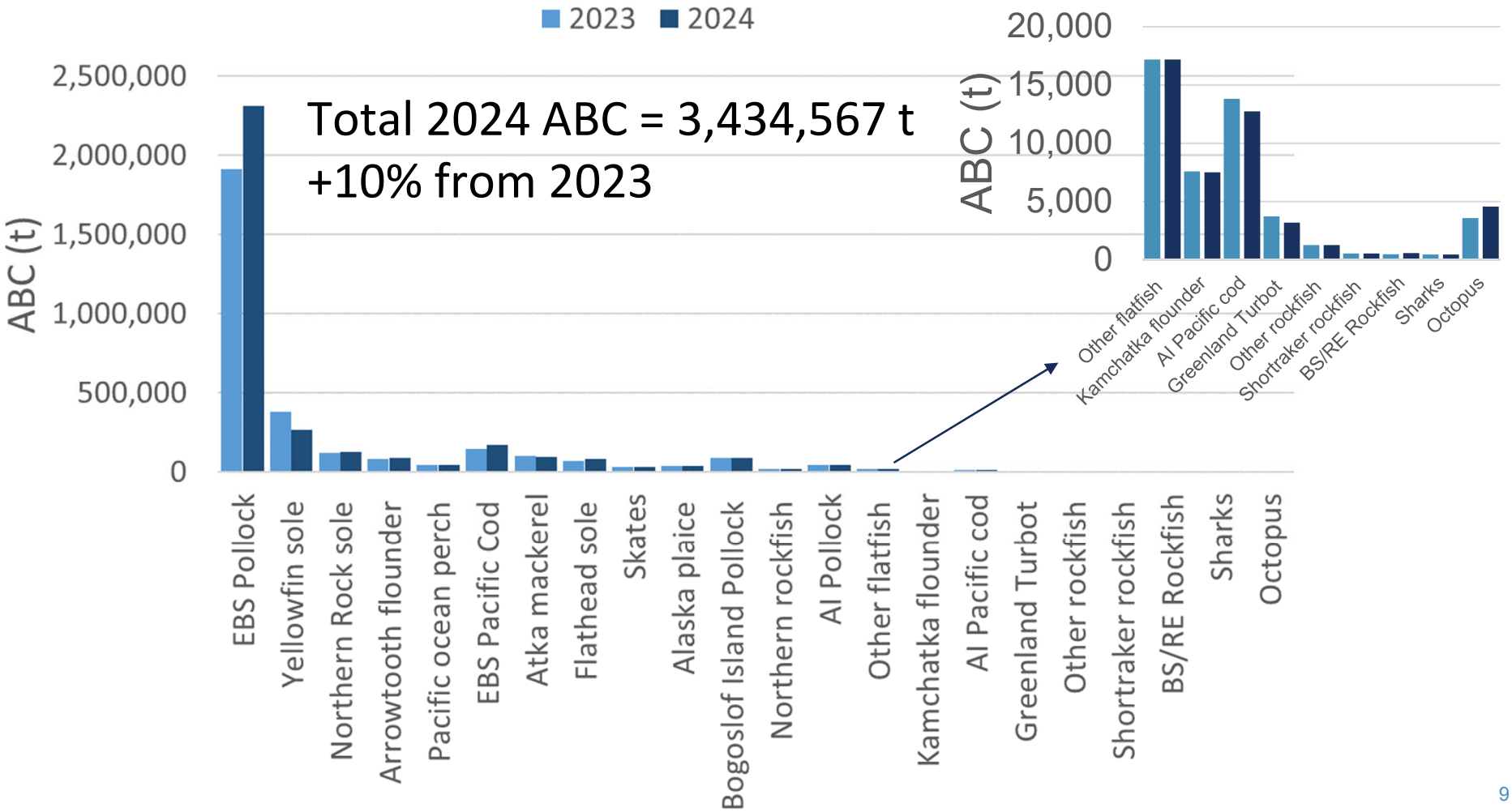
BERING SEA AND ALEUTIAN ISLANDS SPAWNING BIOMASS (TIERS 1 AND 3)

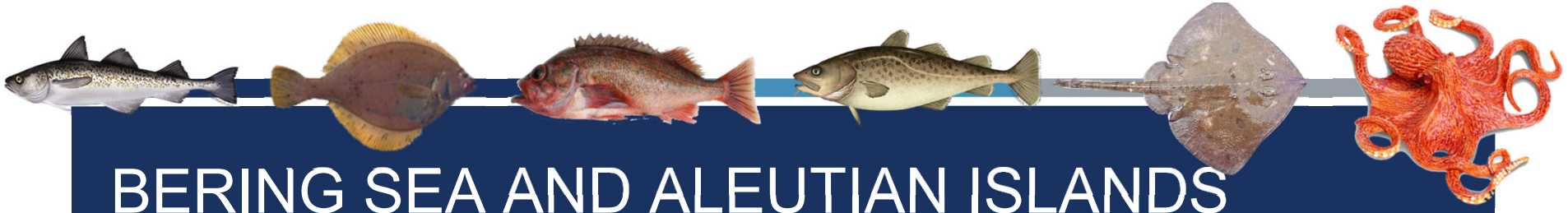




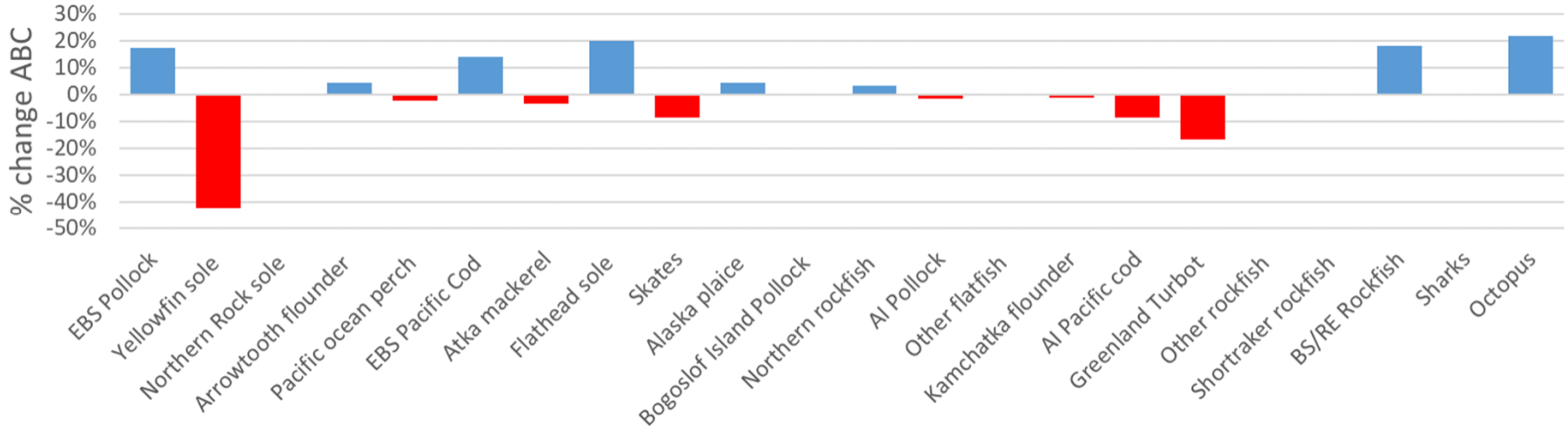


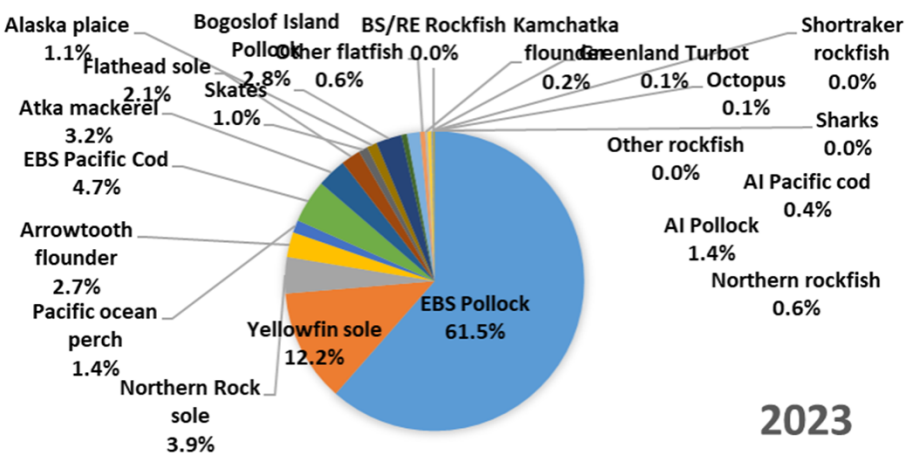
BERING SEA AND ALEUTIAN ISLANDS ALLOWABLE BIOLOGICAL CATCH (ABC)

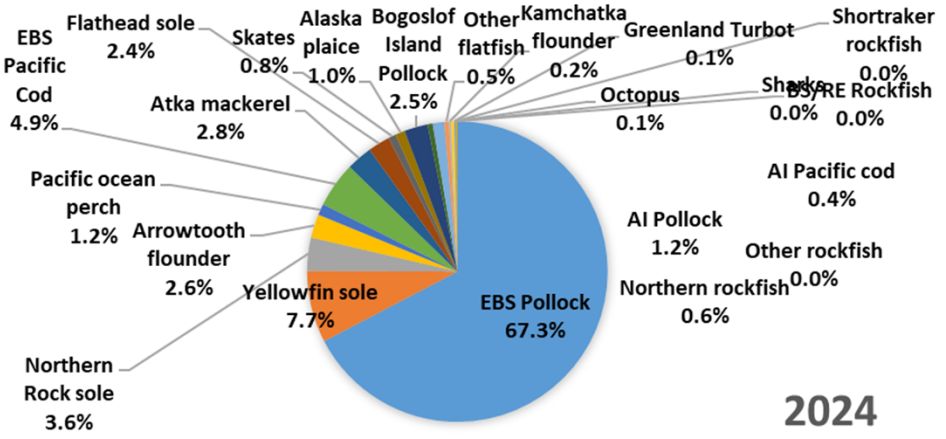




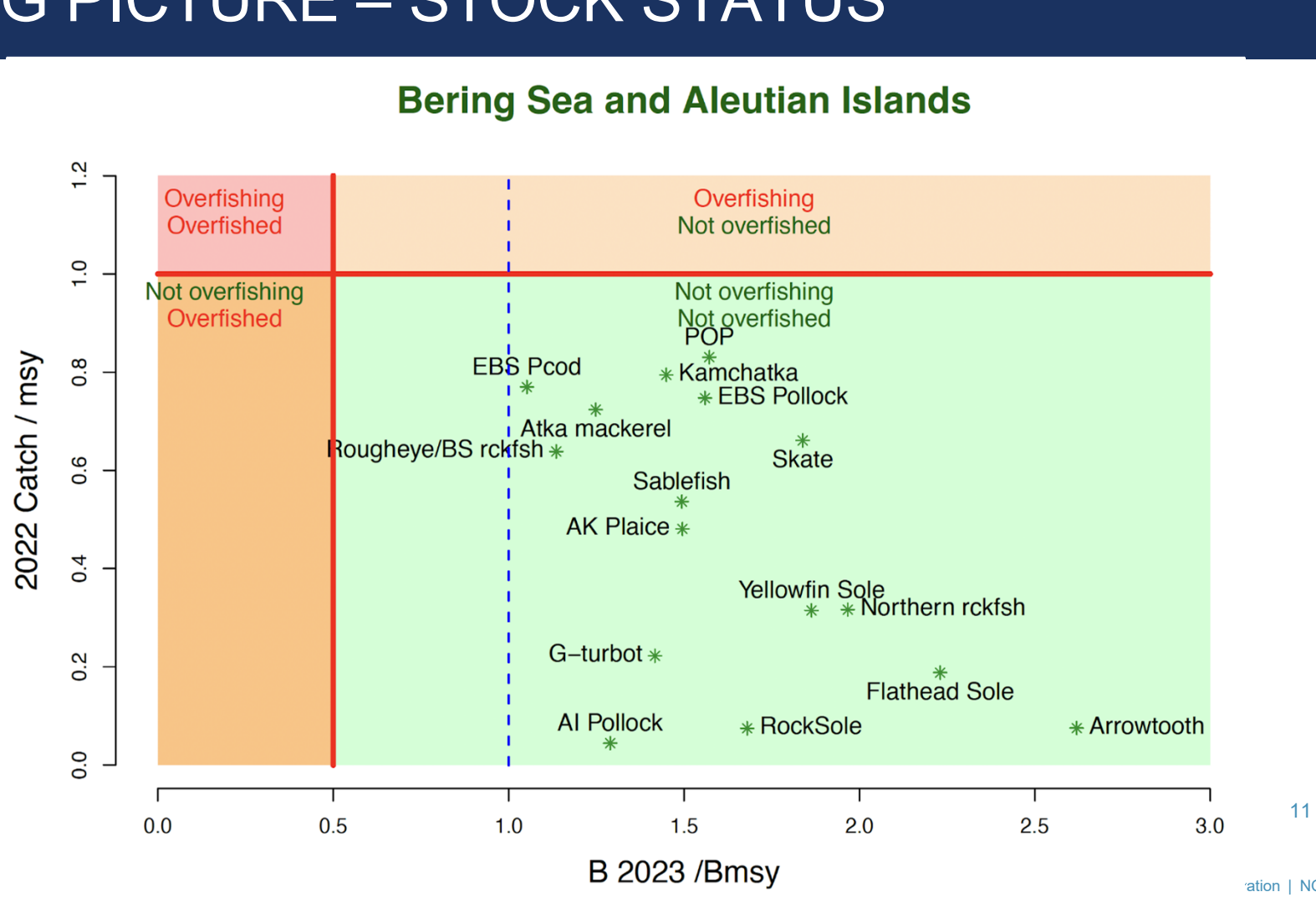
BERING SEA AND ALEUTIAN ISLANDS CHANGE IN 2023 ABC *PROJECTION*



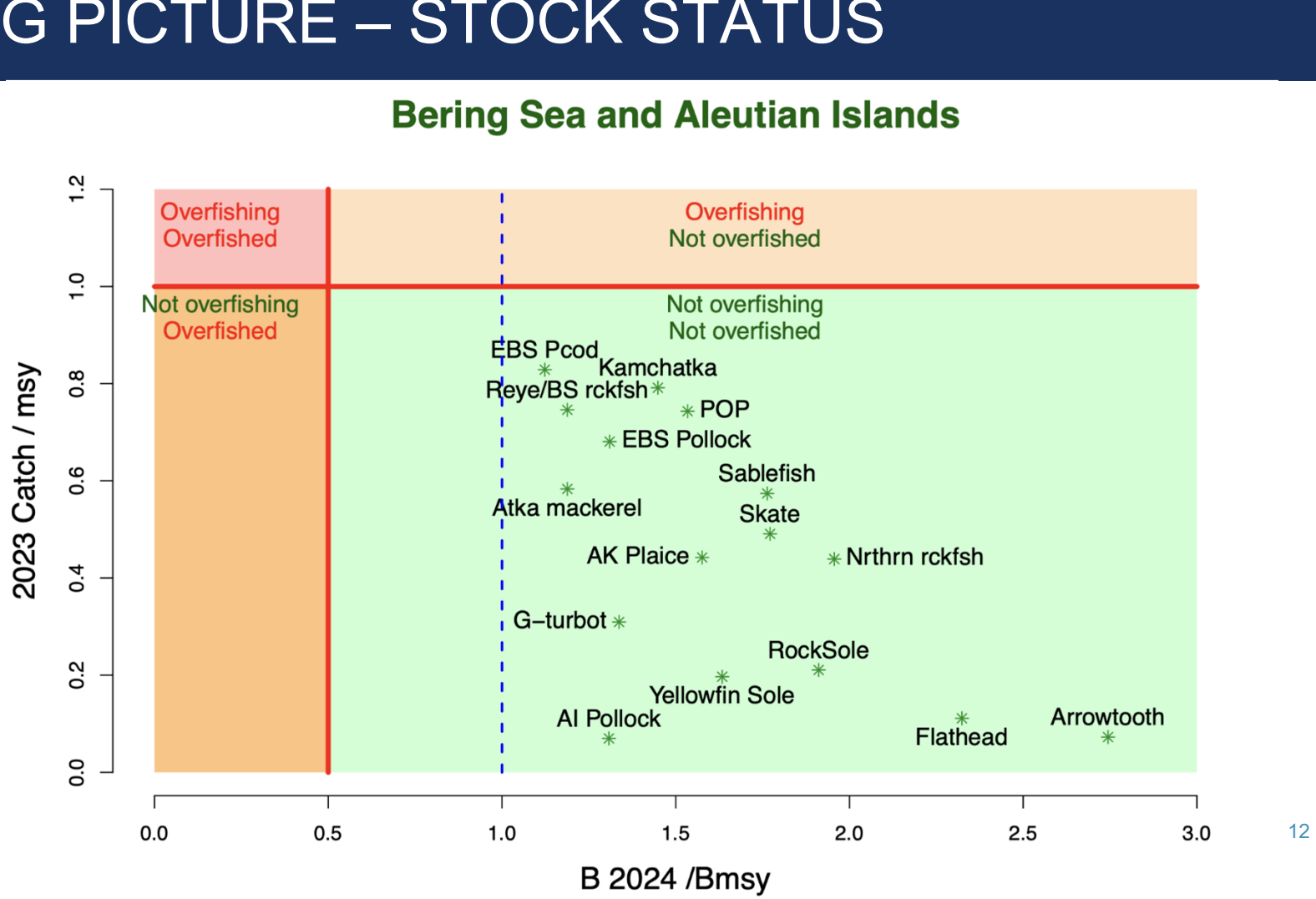




BERING SEA AND ALEUTIAN ISLANDS BIG PICTURE – STOCK STATUS



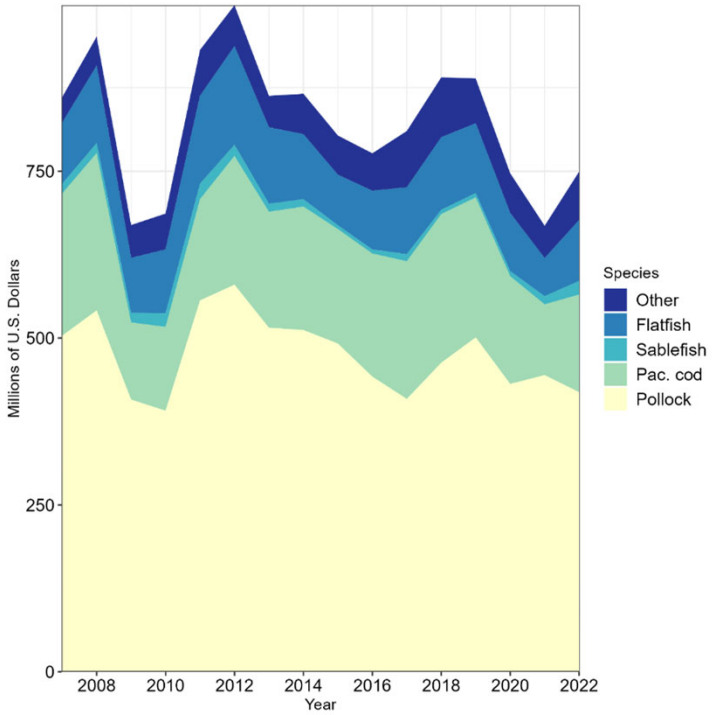
BERING SEA AND ALEUTIAN ISLANDS
BIG PICTURE – STOCK STATUS

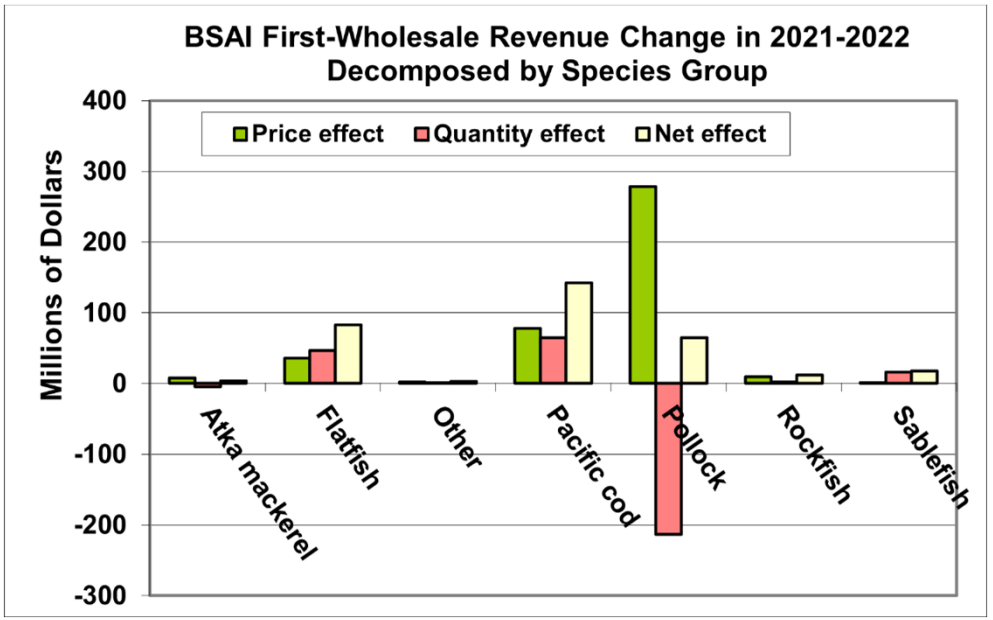


BERING SEA AND ALEUTIAN ISLANDS BIG PICTURE – ECONOMICS

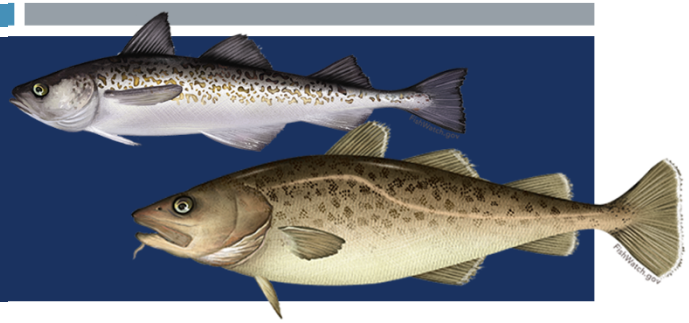
- Increase in value of BSAI harvested species from 2021 to 2022

Real ex-vessel value





POLLOCK AND PACIFIC COD SUMMARY

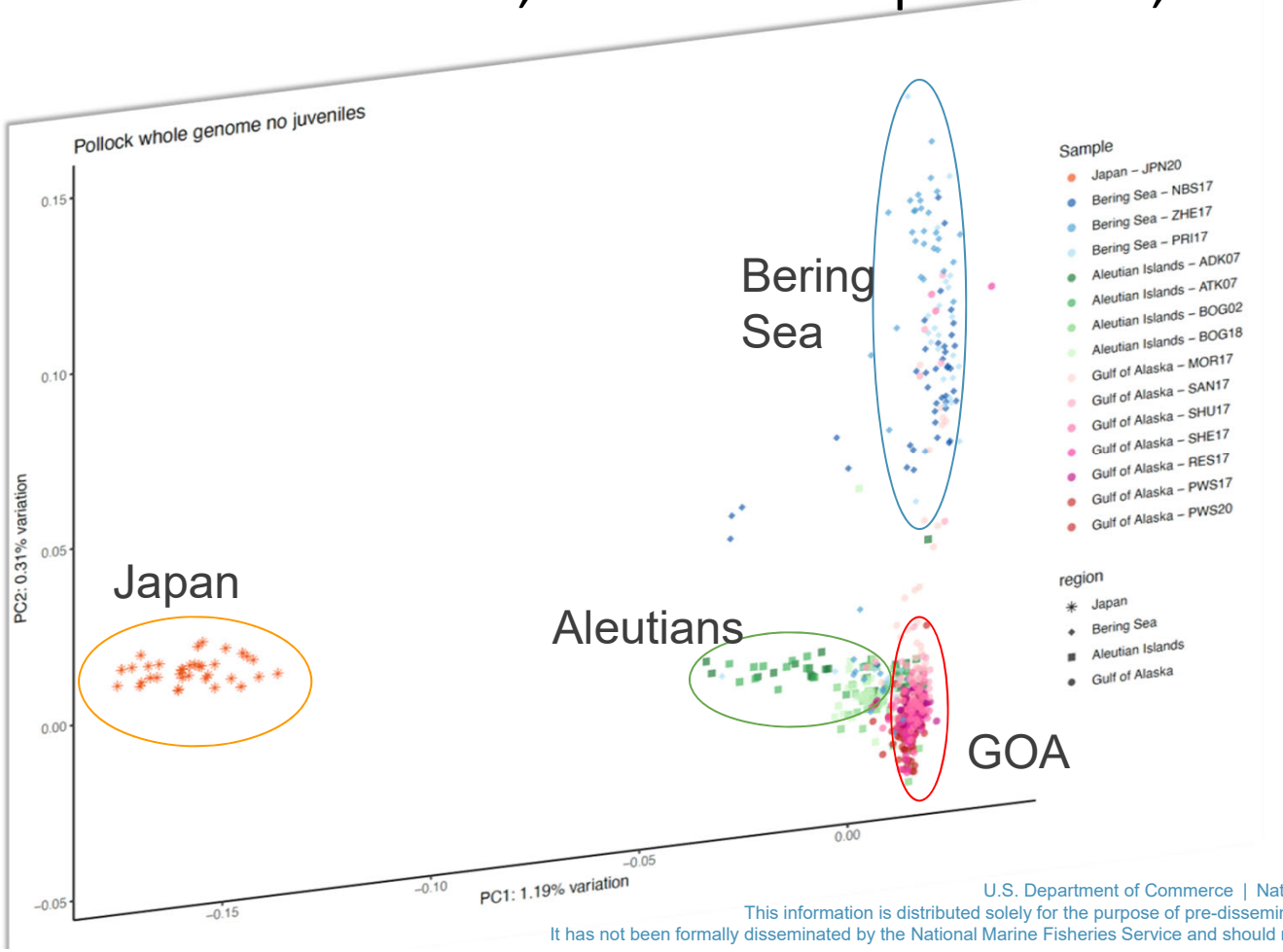


Stock	Tier	2024 ABC (t)	2024 OFL (t)	Change from 2023 ABC
EBS Pollock (Full)	1a	**2,313,000*(18%)**	3,162,000	21%
AI Pollock (H-Proj)	3a	42,654	51,516	-2%
Bogoslof Poll. (C-Rep)	5	86,360	115,146	0%
EBS Pacific cod (Full)	3b	167,952	200,995	16%
AI Pacific cod (Full)	5	**12,732*(8%)**	18,416	-8%

***xx% Reduced from maximum permissible ABC**

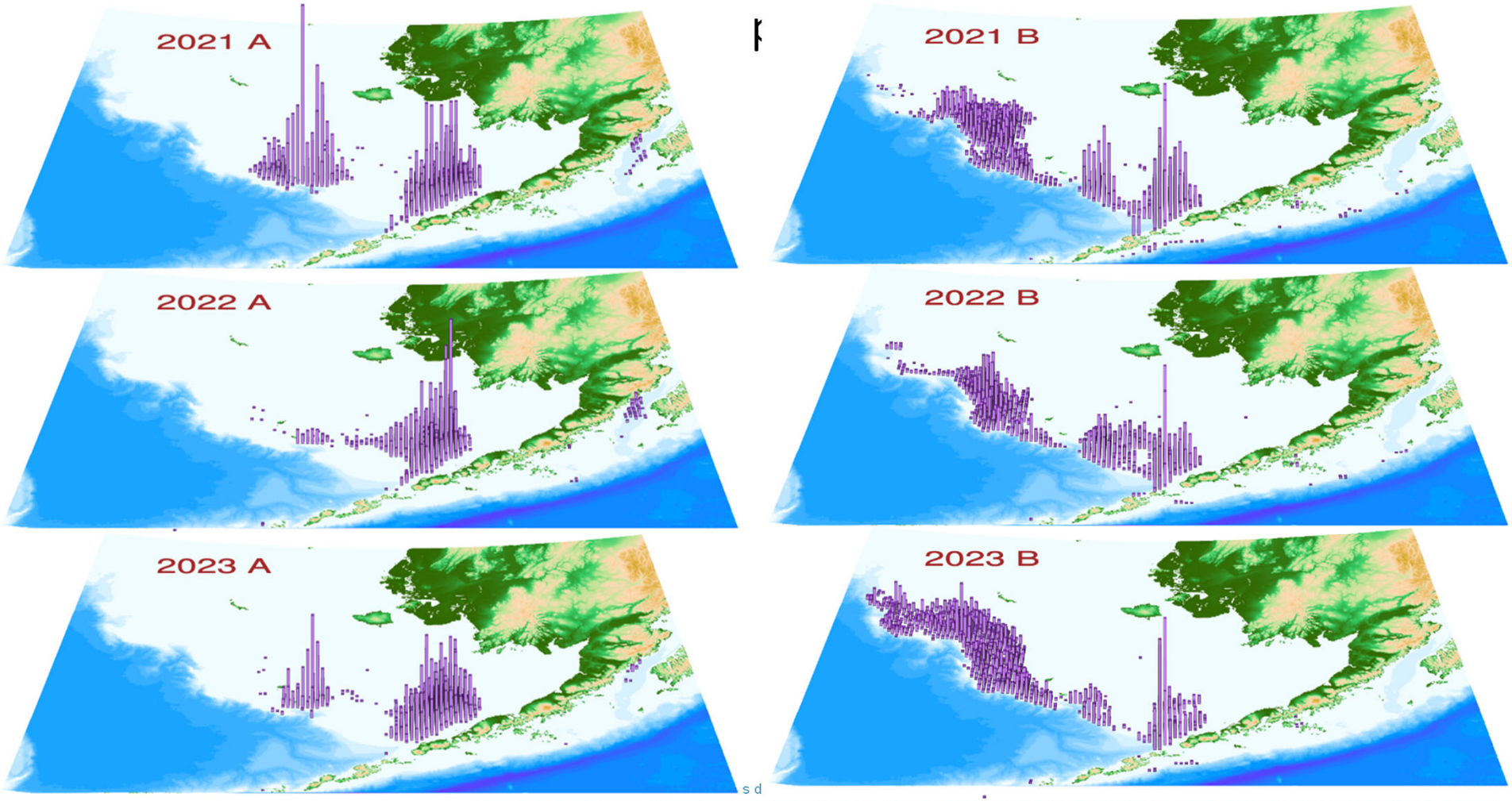
CHAPTER 1
EBS WALLEYE POLLOCK

- Full Assessment; 1 new model presented; risk table (1,1,2,1)



Pollock Genetics

CHAPTER 1
EBS WALLEYE POLLOCK



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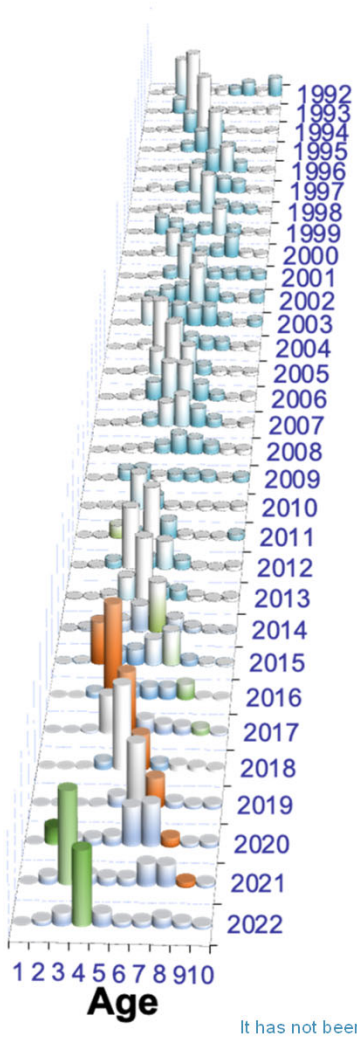
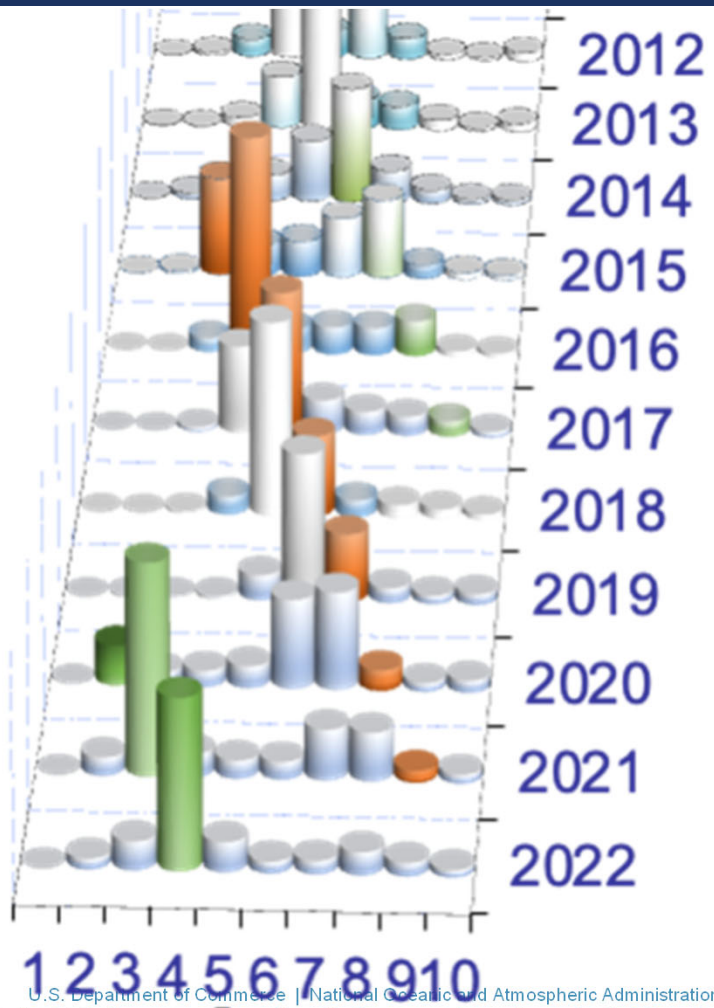
CHAPTER 1
EBS WALLEYE POLLOCK

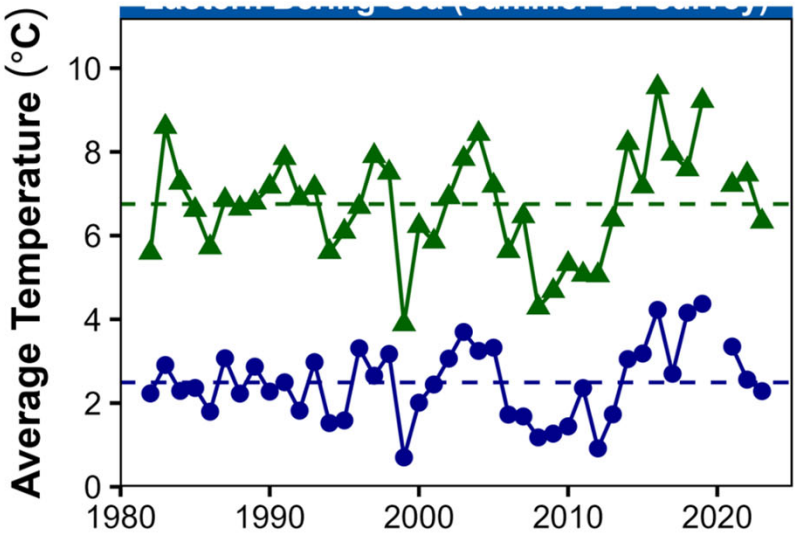
Fishery catch-at-age

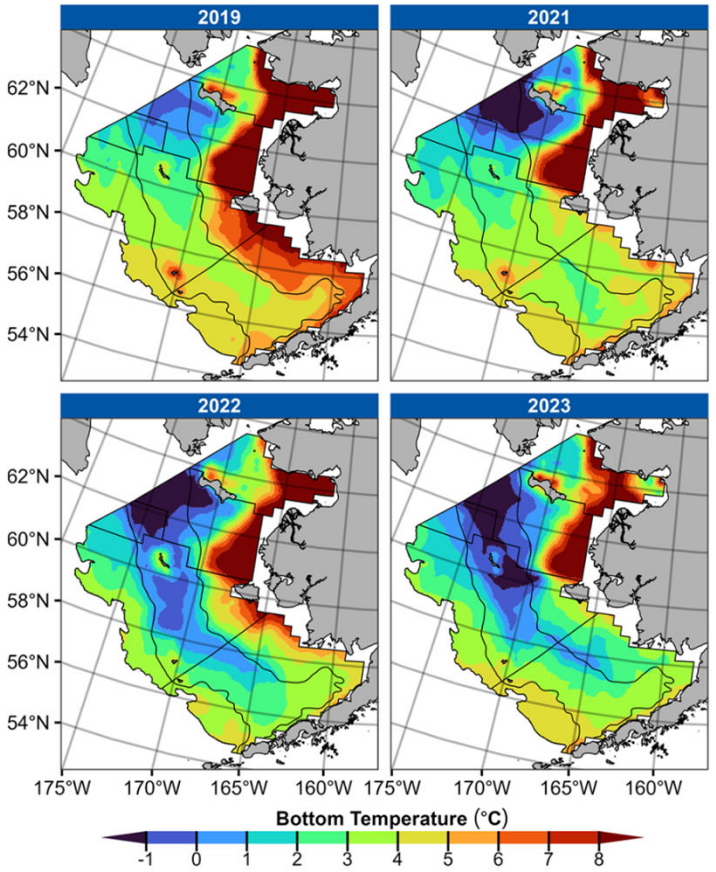




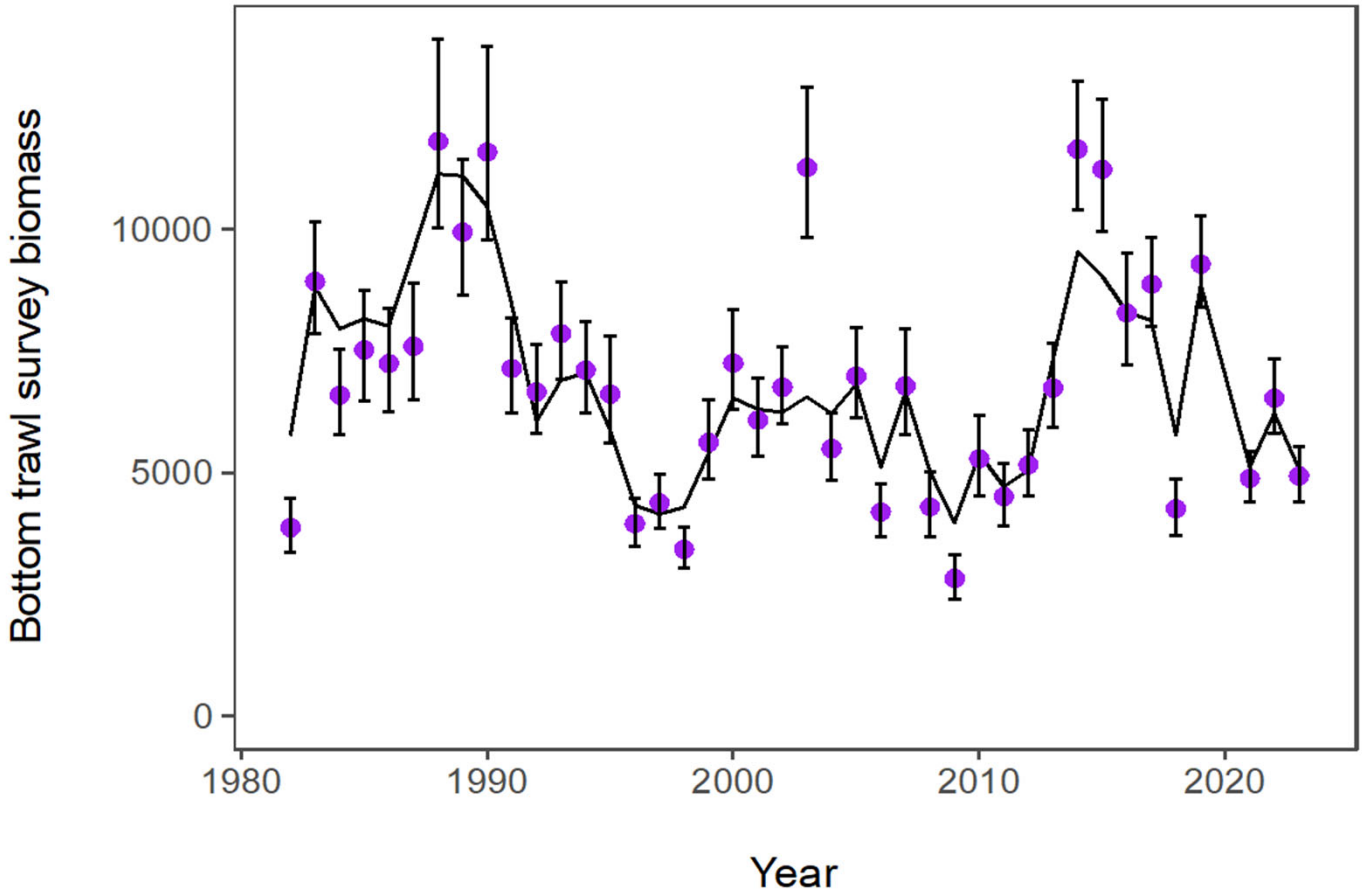
CHAPTER 1
EBS WALLEYE POLLOCK

Bottom trawl survey Temperatures



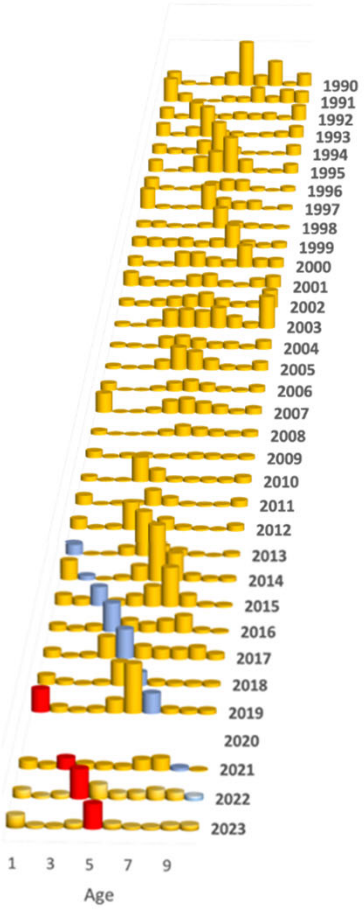


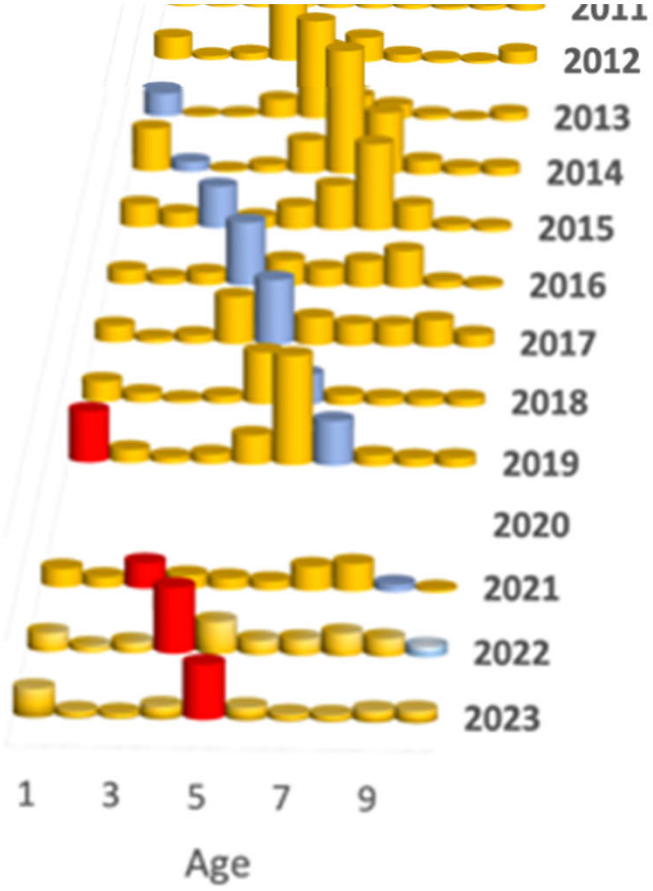
CHAPTER 1
EBS WALLEYE POLLOCK



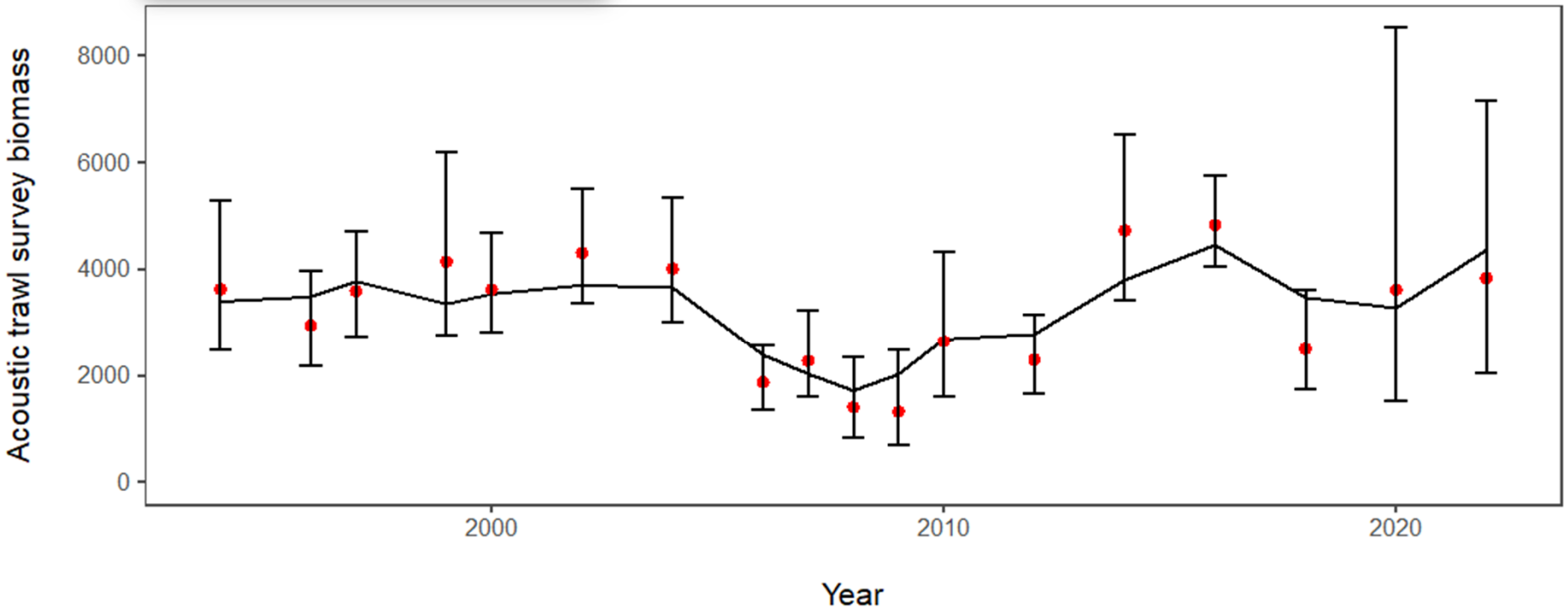
CHAPTER 1
EBS WALLEYE POLLOCK

Bottom trawl survey abundance at age

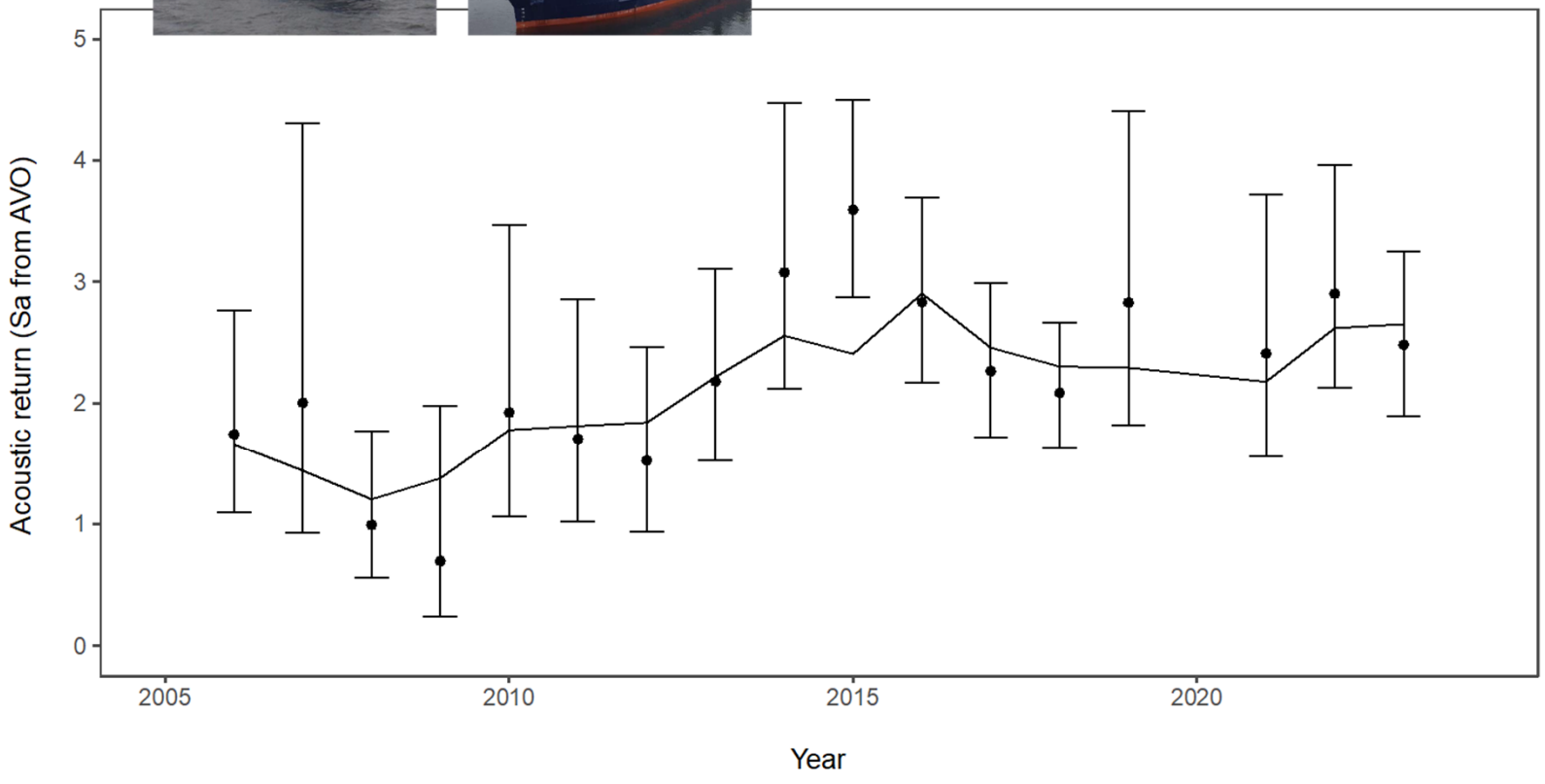




CHAPTER 1
EBS WALLEYE POLLOCK



CHAPTER 1
EBS WALLEYE POLLOCK



OAA Fisheries
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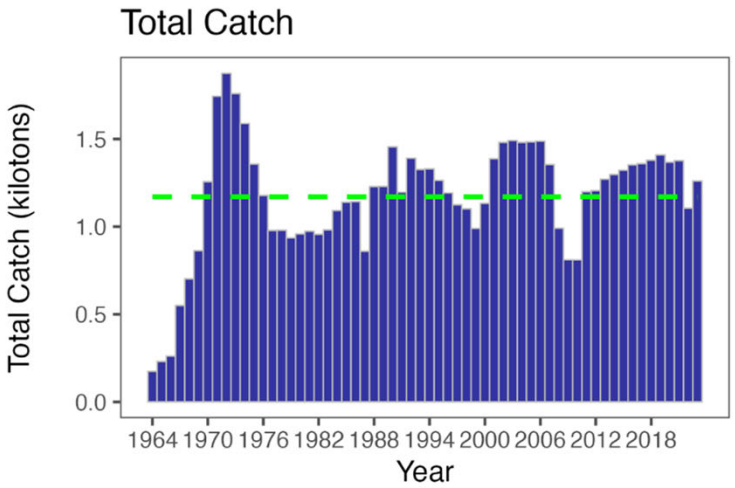
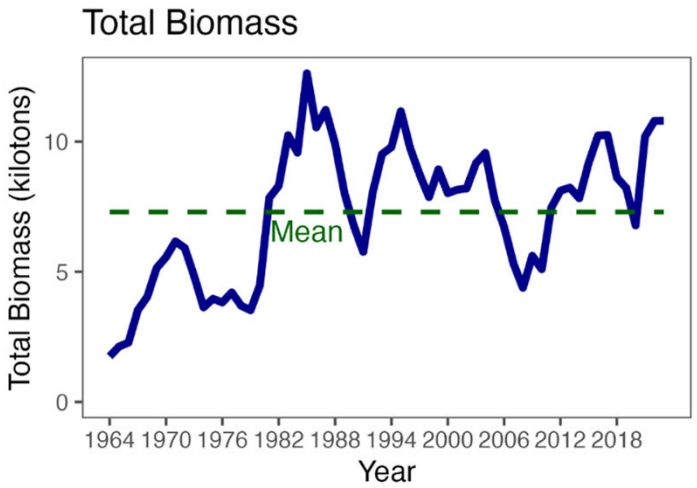
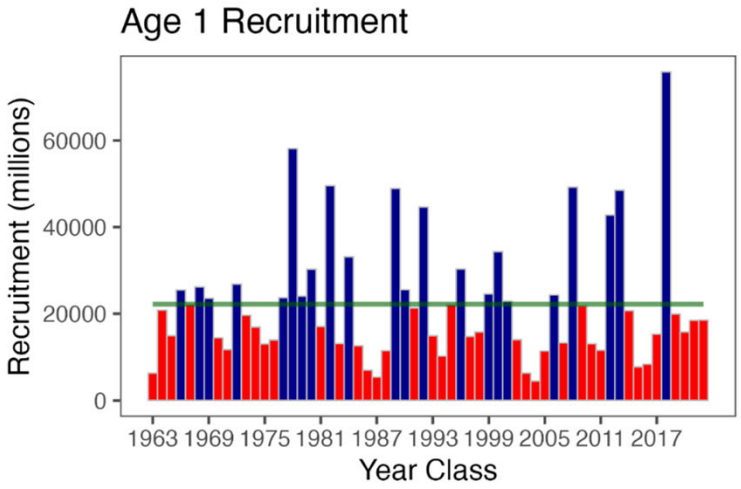
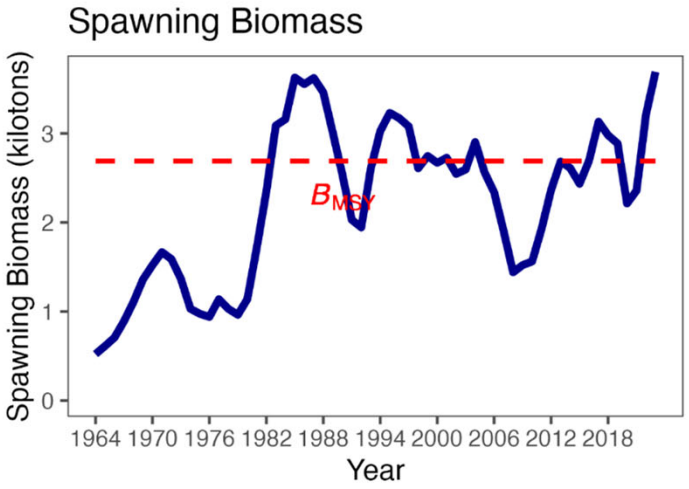
CHAPTER 1
EBS WALLEYE POLLOCK









CHAPTER 1
EBS WALLEYE POLLOCK

- Full Assessment; 1 new model presented; risk table (1,1,2,1)

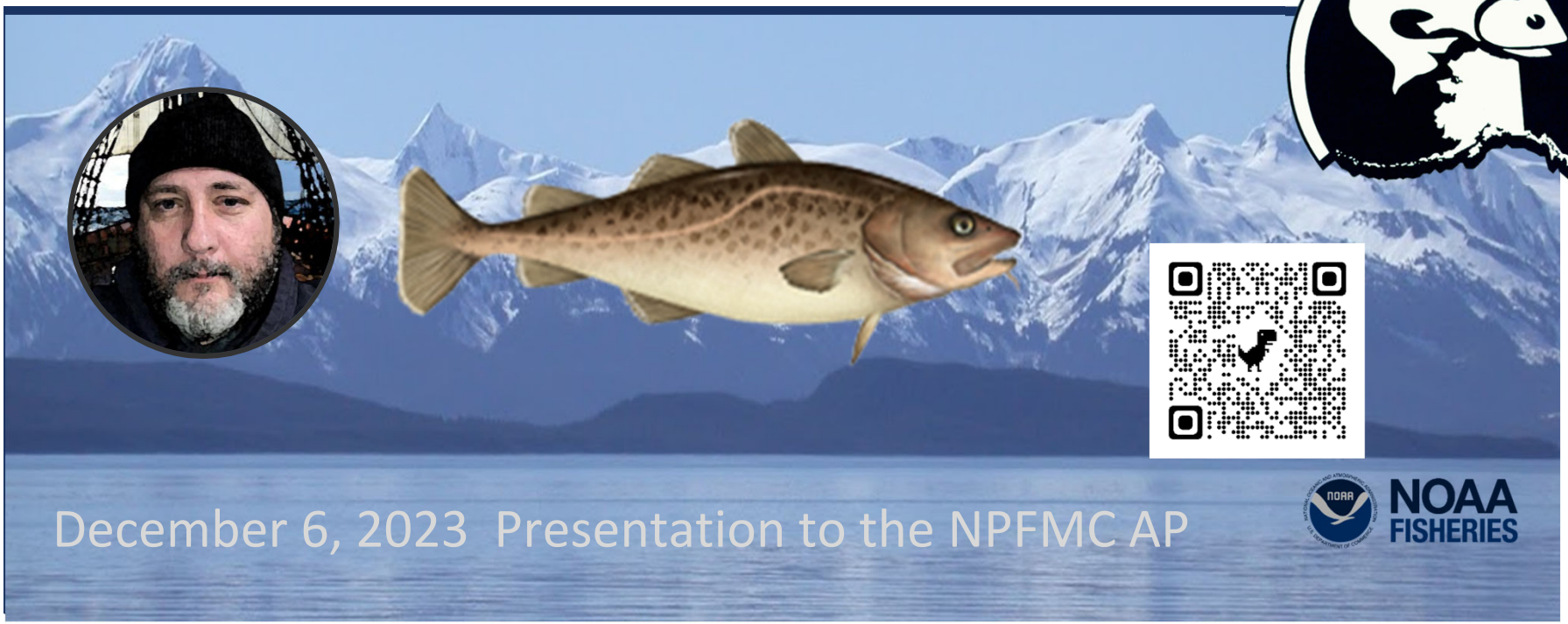
- Team agreed with author's recommendation on assessment model and reduction from maximum permissible ABC

- ABCs to be reduced by 18% from Tier 1 maximum permissible ABC based on risk table assessment
  - Multiple indicators of primary and secondary productivity show adverse signals borne out in continued declining trends in juvenile and adult fish condition.

Quantity	Last asmt.	This asmt.	Change
M	0.3	0.3	0%
2023 Tier	1a		
2024 Tier	1a	1a	
2023 age+ biomass	12,389,000		-18%
2024 age+ biomass	11,445,000	10,184,000	-11%
2023 spawning biomass	4,171,000		-16%
2024 spawning biomass	3,944,000	3,518,000	-11%
B_0	6,653,000	6,728,000	1%
B_{msy}	2,674,000	2,689,000	1%
2024 F_{OFL}	0.491	0.422	-14%
2024 F_{ABC}	0.365	0.365	0%
2023 OFL	3,381,000		-6%
2024 OFL	4,639,000	3,162,000	-32%
2023 ABC	1,910,000		21%
2024 ABC	2,275,000	2,313,000	2%

Chapter 2: Assessment of the Pacific Cod Stock in the Eastern Bering Sea

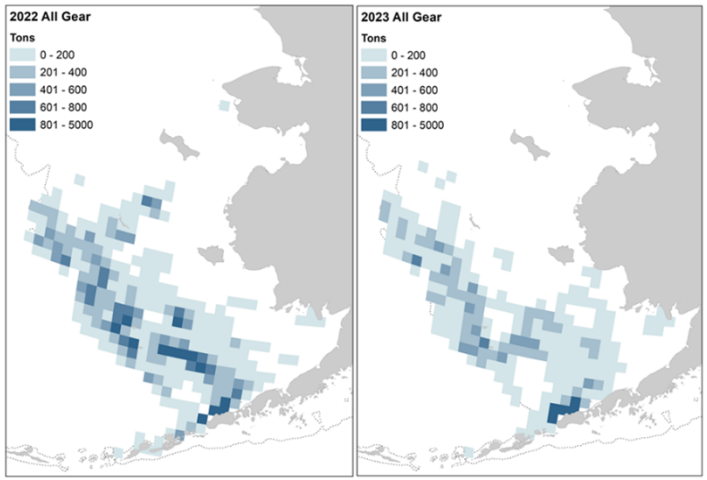
Steven J. Barbeaux, Lewis Barnett, Madison Hall, Pete Hulson, Julie Nielsen, S. Kalei Shotwell, Elizabeth Siddon, Ingrid Spies, and James Thorson

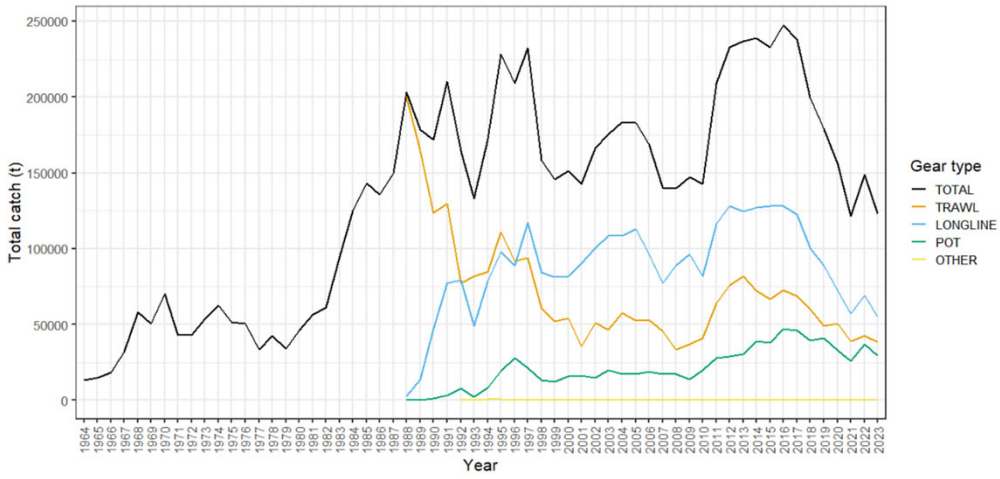


https://afsc-assessments.github.io/EBS_PCOD/2023_ASSESSMENT/NOVEMBER_MODELS/

Fishery data

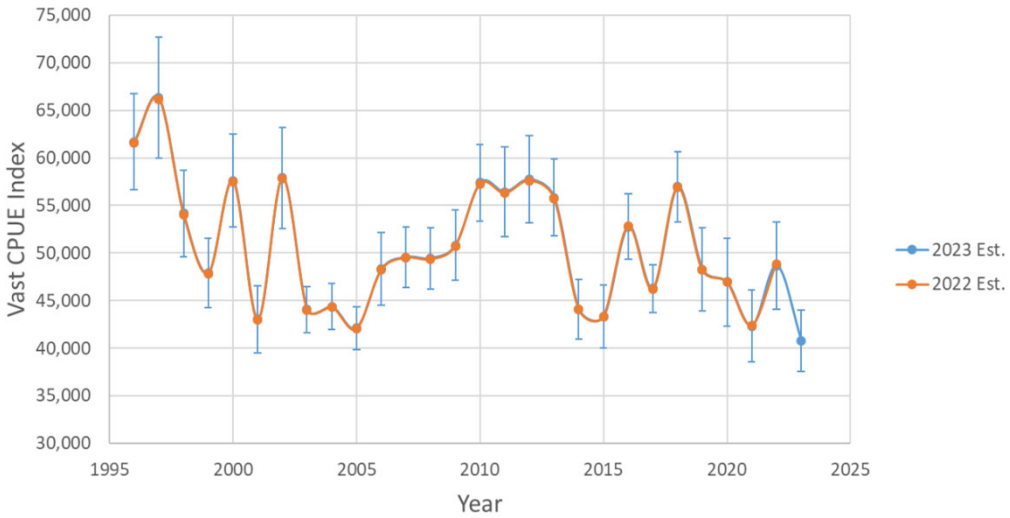
- 2023 ABC is 144,834 t and catch as of Dec. 5 = 139,528 t
  - Longline is the highest proportion
  - Continued southward shift in fishery
  - Little observed fishing north of St. Matthew Island in 2023

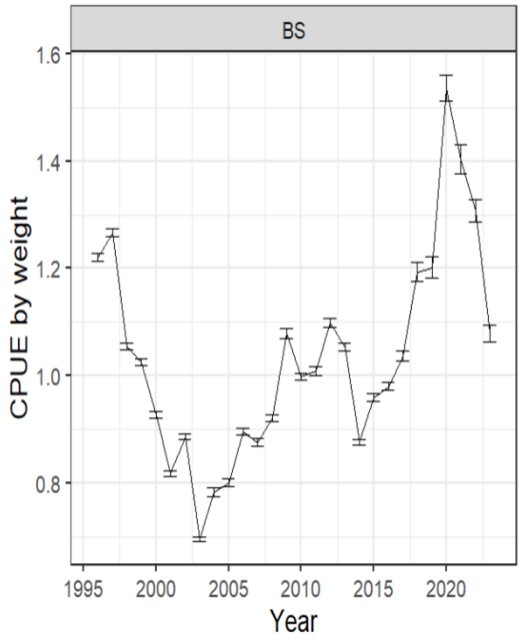




CPUE indices

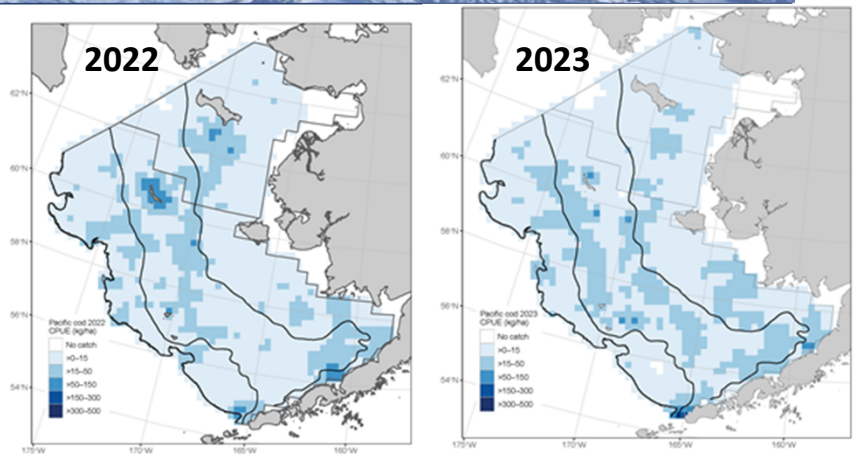
- VAST longline winter CPUE index
  - Downward trend overall with 16% drop from 2022
- All gear naïve CPUE index
  - Downward trend to near average since all-time high in 2020

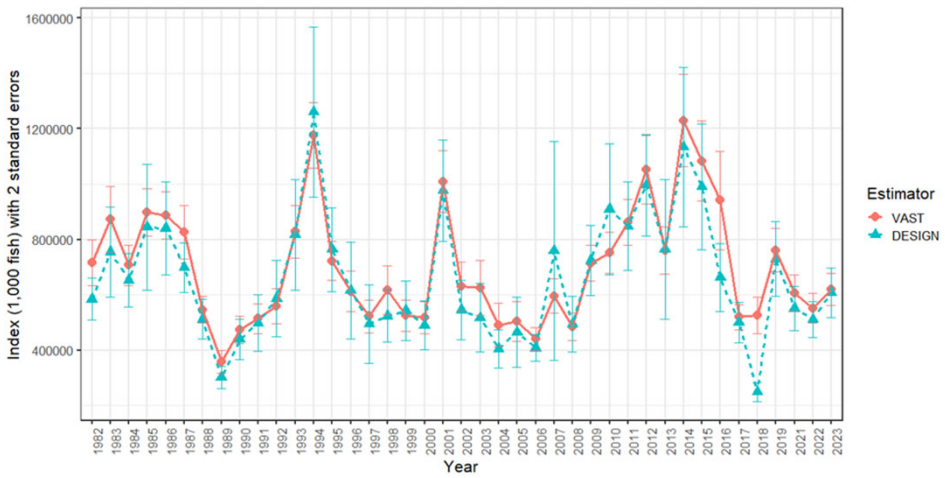


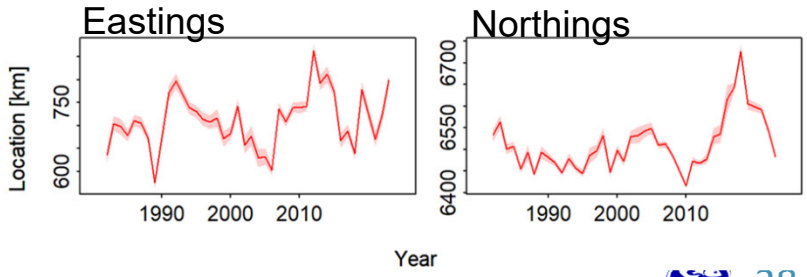


Bottom trawl survey

- Increase in abundance (+12%)
- Small decline in biomass (-4%)
- Southeastern shift in distribution

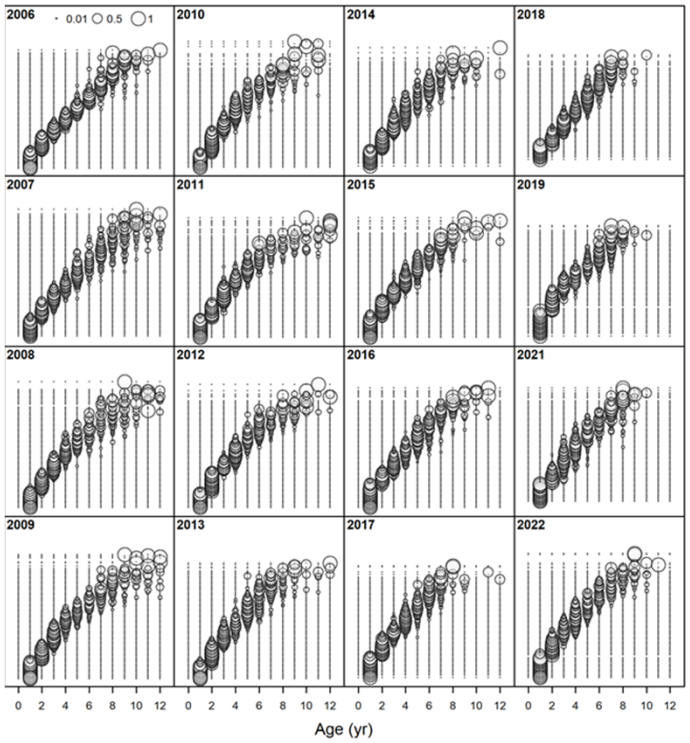


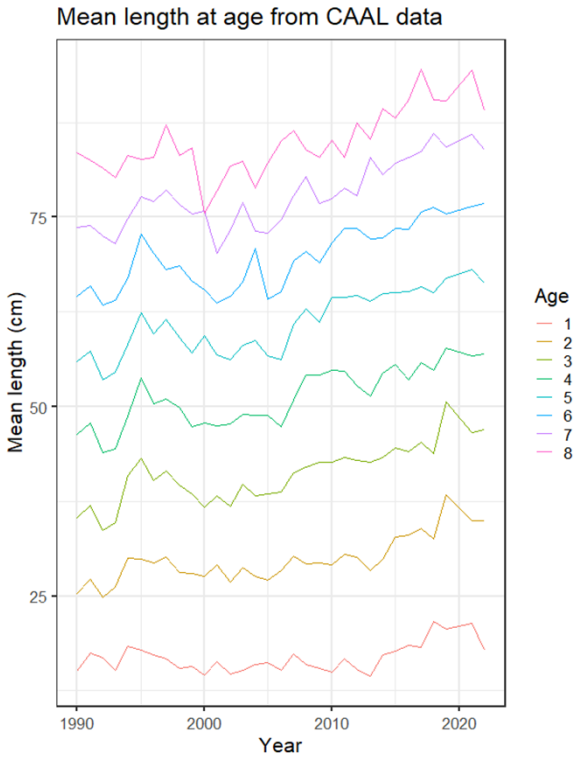




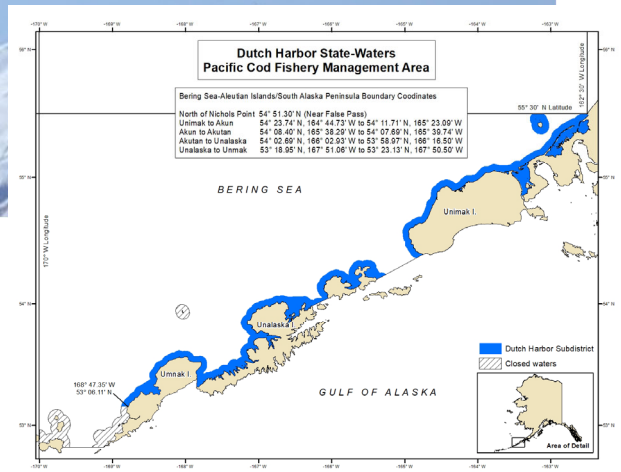
Bottom trawl survey CAAL

- Demonstrates change in aging post-2007, and
- Increasing growth trend since 2008

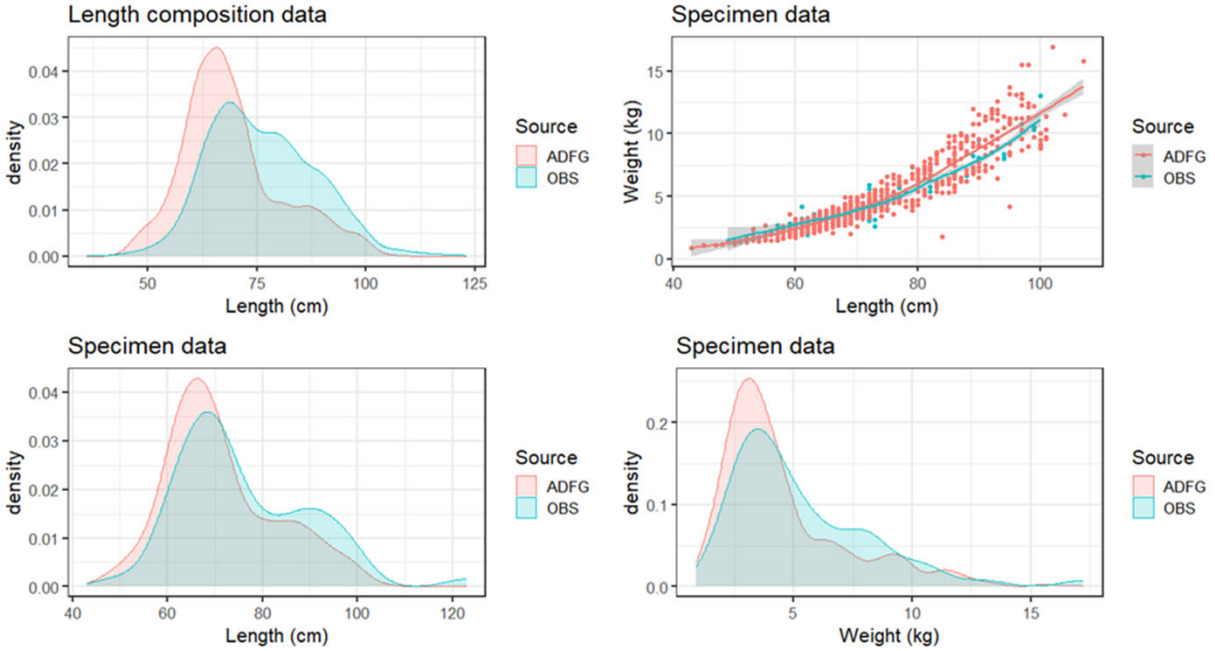




Area O state fishery

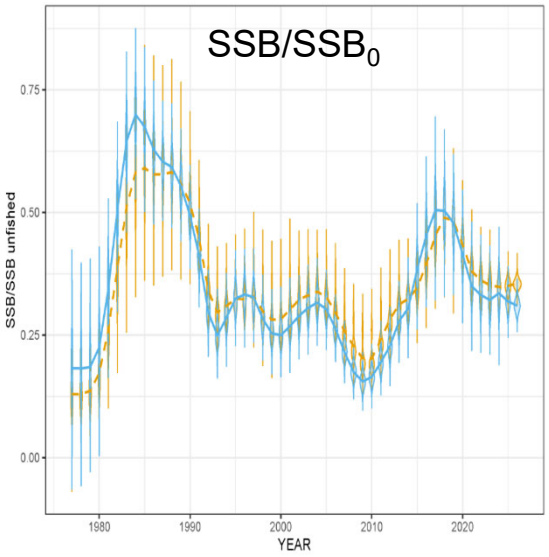


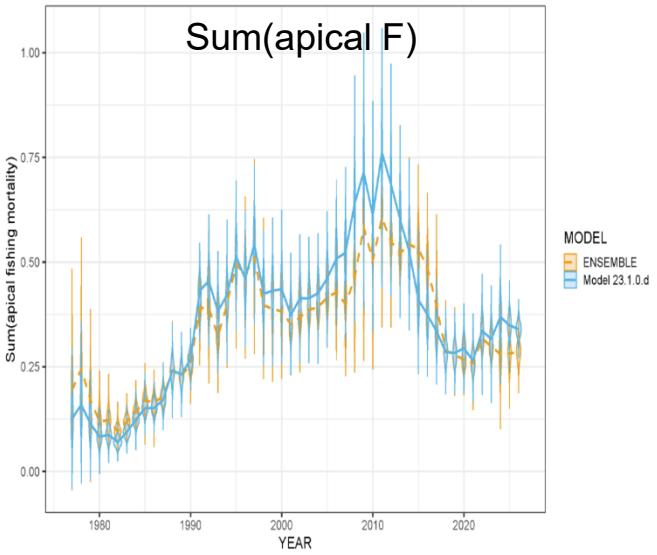
- GHL = 12% of BSAI ABC, 98% harvested so far in 2023 (pot and jig)
- ADF&G port sampling provided data on length and weight of cod catch in Feb-Apr
- Higher proportion of smaller fish in Dutch Harbor Subdistrict (DHS)



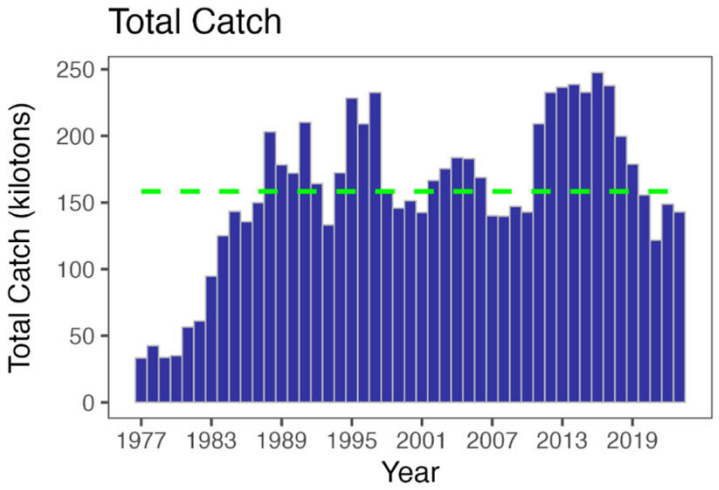
Model 23.1.0.d Timeseries

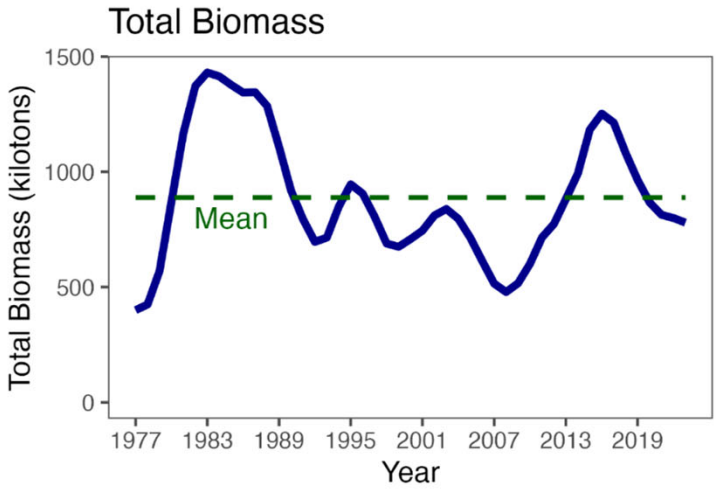
- SSB - Similar trends to 2022 ensemble
  - Higher peaks and lower troughs
- R - Same peaks and valleys to 2022 ensemble
  - Strong 2018 year class w/ low surrounding year classes
- F - Similar to 2022 ensemble but some key differences
  - Higher F 1991-2015
  - Lower F 2016-2021

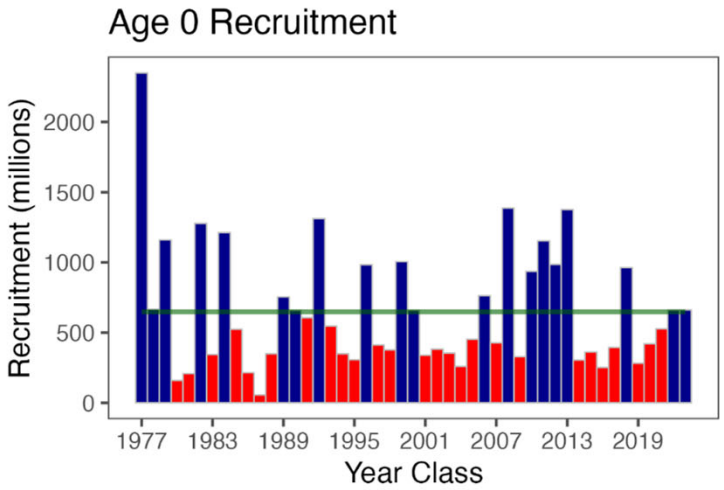


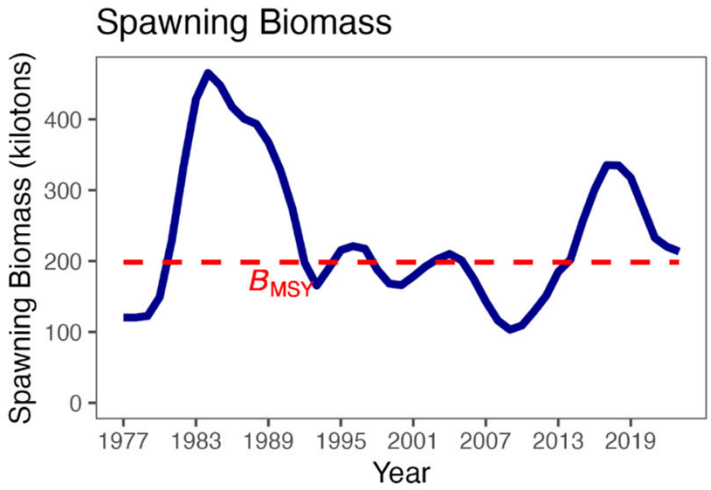


CHAPTER 2
EBS PACIFIC COD









CHAPTER 2
EBS PACIFIC COD

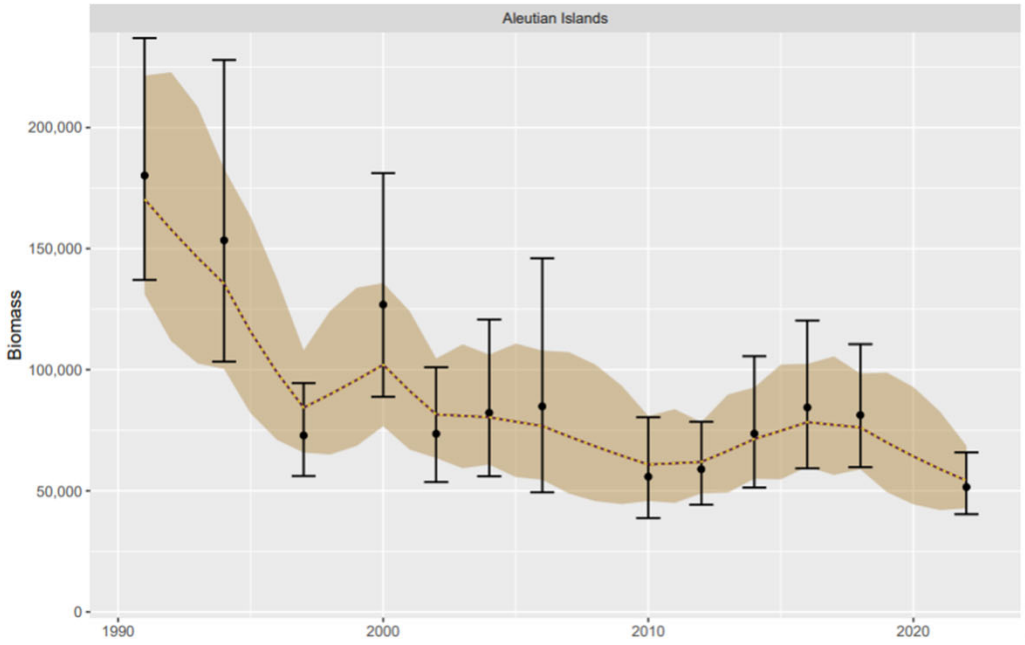
- Full Assessment; 3 new models presented; risk table (1,1,1,1)

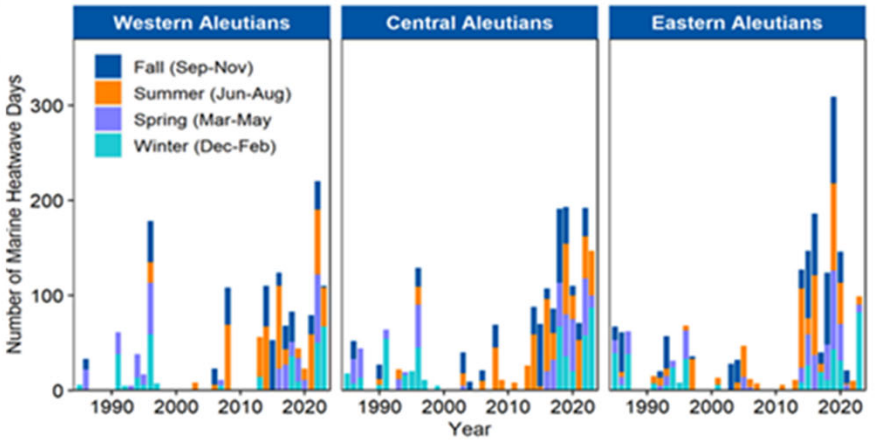
- Move from ensemble to single model approach
- Team agreed with author's recommendation of using Model 23.1.0.d
- No reduction from maxABC

Quantity	Last asmt.	This asmt.	Change
M	0.34	0.3866	14%
2023 Tier	3b		
2024 Tier	3b	3b	
2023 age+ biomass	844,578		-4%
2024 age+ biomass	831,566	808,203	-3%
2023 spawning biomass	245,594		-9%
2024 spawning biomass	242,911	223,107	-8%
B_0	668,477	567,465	-15%
2024 F_{OFL}	0.35	0.46	31%
2024 F_{ABC}	0.29	0.37	28%
2023 OFL	172,495		17%
2024 OFL	166,814	200,995	20%
2023 ABC	144,834		16%
2024 ABC	140,159	167,952	20%

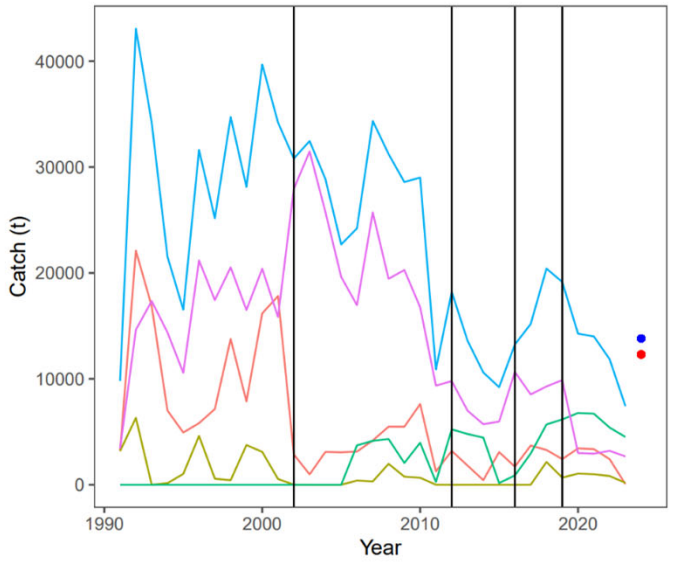
CHAPTER 2A
ALEUTIAN ISLANDS PACIFIC COD

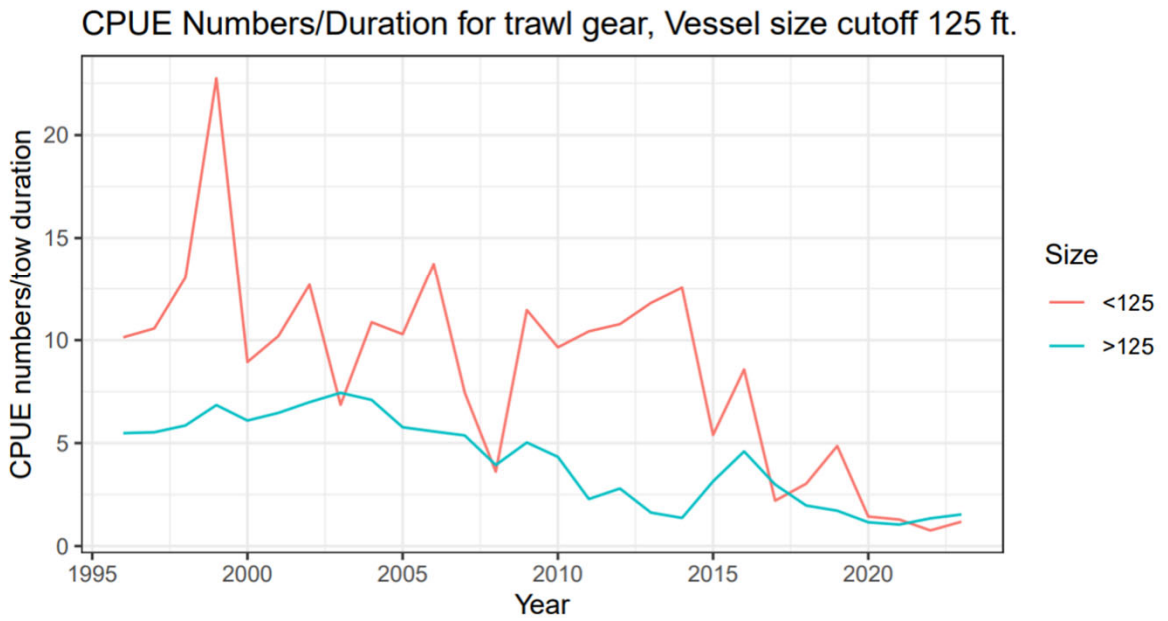
- Full Assessment; 3 new models presented; risk table (1,2,2,1)





CHAPTER 2A
ALEUTIAN ISLANDS PACIFIC COD





CHAPTER 2A: AI PACIFIC COD

- Tier 5; Full Assessment, 3 new models; risk table (1,2,2,1)

- The Team did not recommend the author's Tier 3 model, but recommended management continue under Tier 5 model.
- Due to risk table concerns the Team recommended an 8% reduction from maximum ABC.

Quantity	Last asmt.	This asmt.	Change
M	0.34	0.34	0
2023 tier	5		
2024 tier	5	5	0
Biomass	54,165	54,165	0%
2024 F_{OFL}	0.34	0.34	0%
2024 F_{ABC}	0.255	0.255	0%
2023 OFL	18,416		0%
2024 OFL	18,416	18,416	0%
2023 ABC	13,812		-8%
2024 ABC	13,812	12,732	-8%

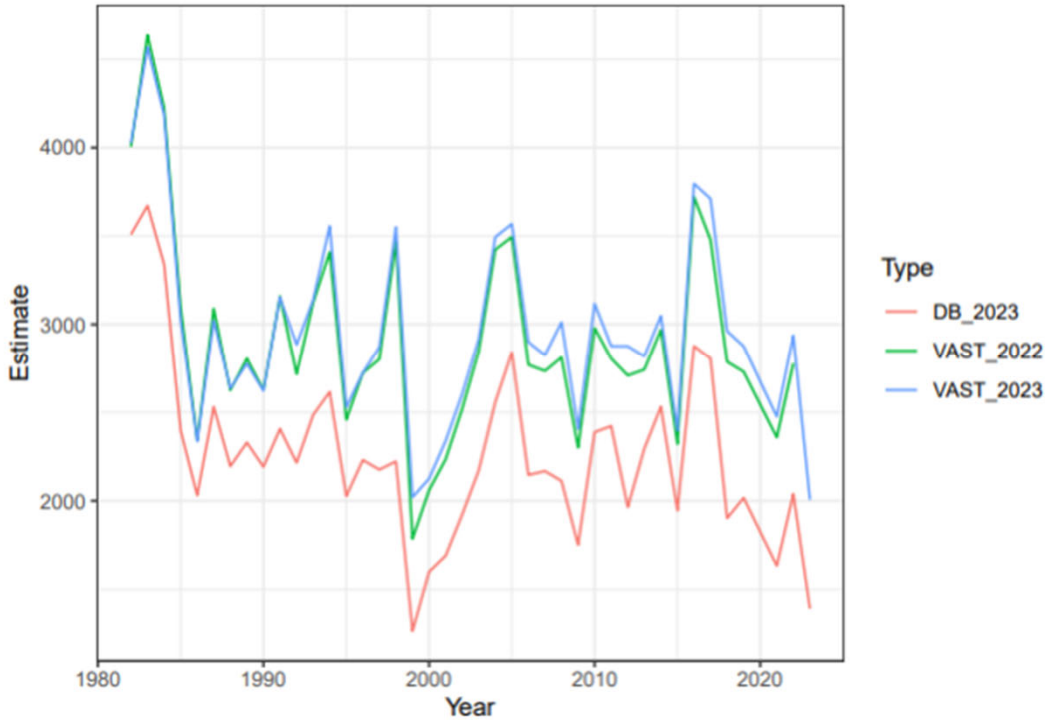
FLATFISH SUMMARY

Stock	Tier	2024 ABC (t)	2024 OFL (t)	Change from 2023 ABC
Yellowfin sole (Update)	1a	265,913	305,298	-30%
Greenland turb. (H-Proj)*	3a	3,188	3,705	-19%
Arrowtooth fl (H-Proj)	3a	87,690	103,280	5%
Kamchatka fl. (H-Proj)	3a	7,498	8,850	-1%
Northern rsole (H-Proj)	1a	122,091*(36%)	197,828	<1%
Flathead sole (H-Proj)	3a	67,289	81,605	3%
Alaska plaice (H-Proj)	3a	35,494	42,695	5%
Other flatfish (C-Rep)	5	17,189	22,919	0%

*** Team recommendation made even though it was a harvest projection year**

CHAPTER 4
YELLOWFIN SOLE

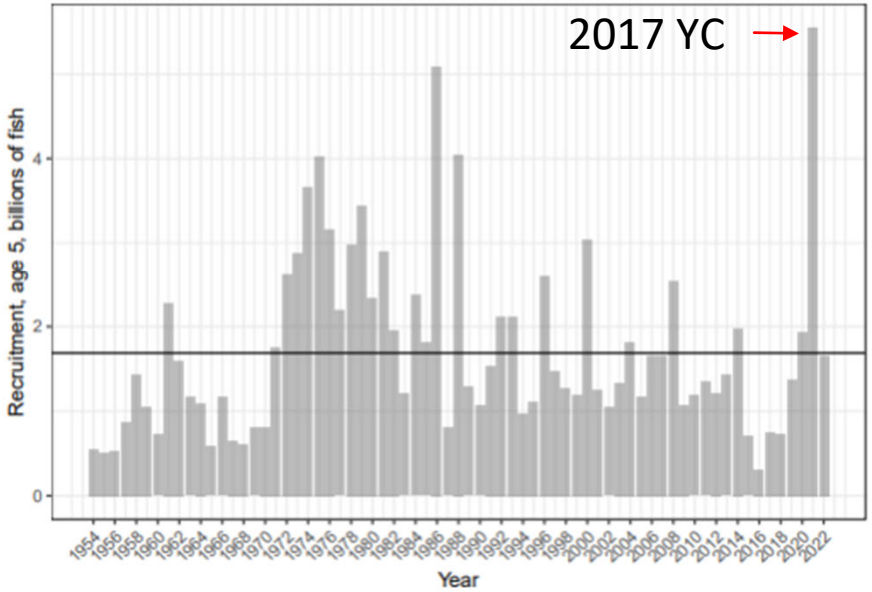
- Tier 1a; Update Assessment, 2 new models; risk table (1,2,2,1)
  - Large decrease (-46%) in 2023 bottom trawl survey biomass estimate



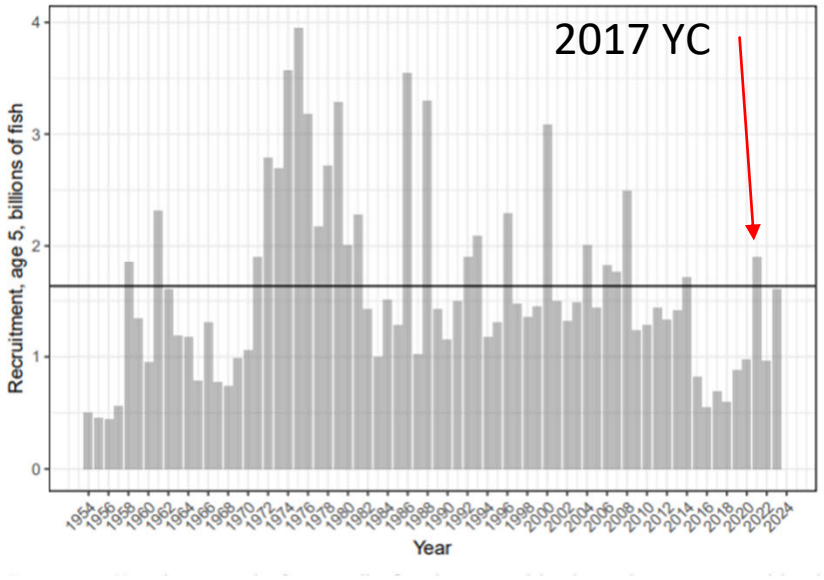
CHAPTER 4
YELLOWFIN SOLE

- Tier 1a; Update Assessment, 2 new models; risk table (1,2,2,1)
  - Substantial reduction in 2017 and surrounding year classed from previous assessment

Age 5 recruitment for Model 22.1 in 2022

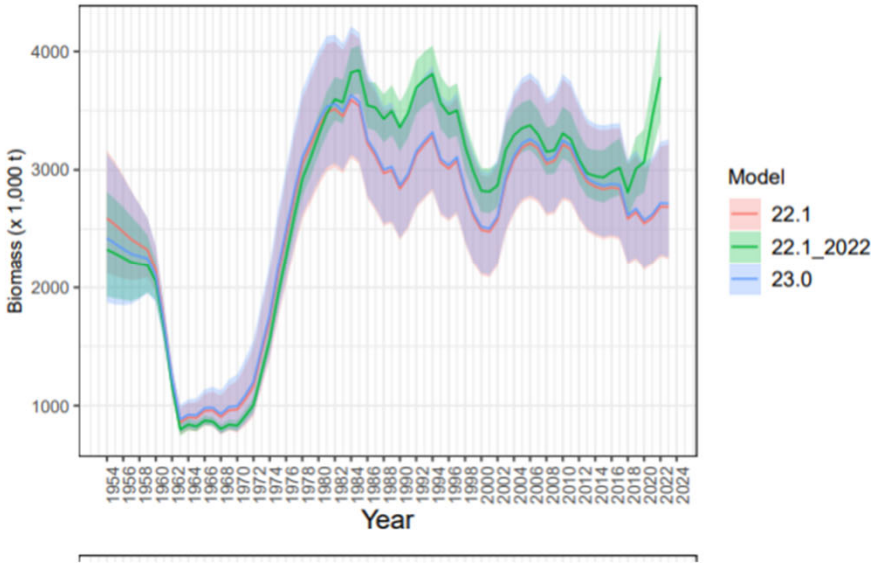


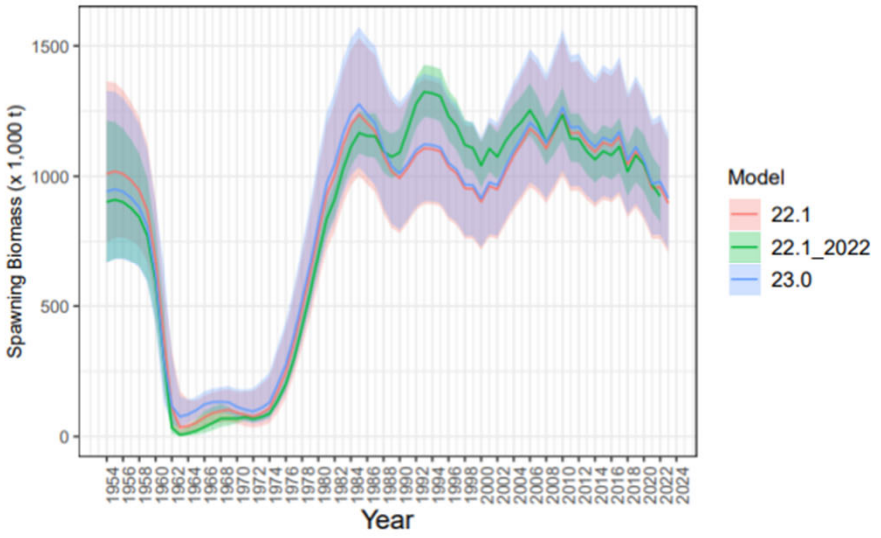
Age 5 recruitment for Model 23.0 in 2023



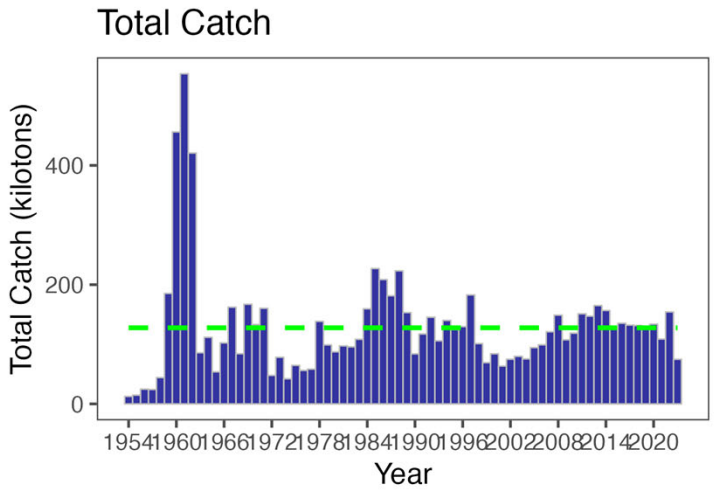
CHAPTER 4
YELLOWFIN SOLE

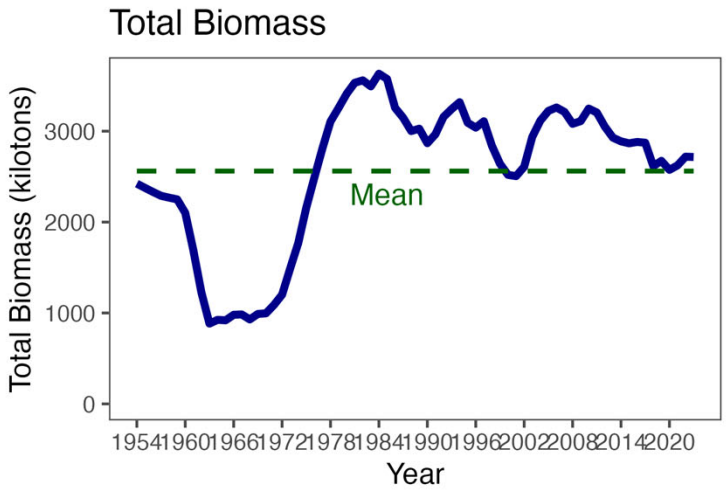
- Tier 1a; Update Assessment, 2 new models; risk table (1,2,2,1)
  - Large reduction in total biomass (-62%) from 2022
  - Similar female spawning biomass (-2%)

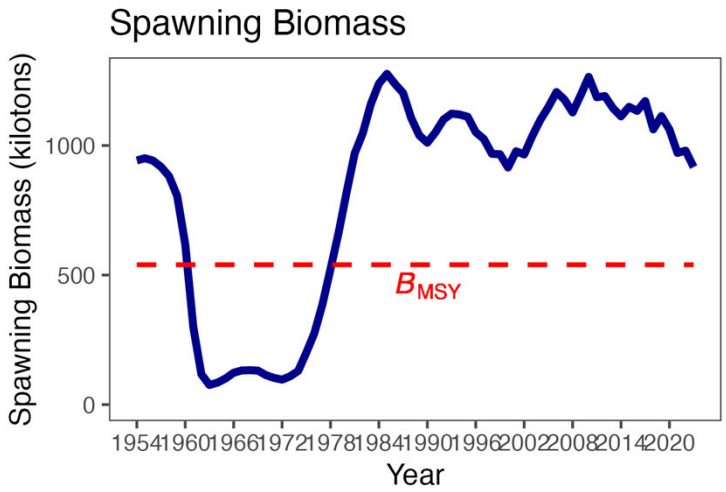




CHAPTER 4
YELLOWFIN SOLE







CHAPTER 4
YELLOWFIN SOLE

- Tier 1a; Update Assessment, 2 new models; risk table (1,2,2,1)
  - Fishery catches a large portion of younger/immature fish.
  - Yellowfin sole females are 82% selected to the fishery by age 10 whereas they have been found to be only 40% mature at this age
  - Large reduction in OFL and ABC, but still well above catch.

Quantity	Last asmt.	This asmt.	Change
M	0.12/0.125	0.12/0.137	
2023 Tier	1a		
2024 Tier	1a	1a	
2023 age 6+ biomass	3,321,640		-24%
2024 age 6+ biomass	4,062,230	2,512,810	-38%
2023 spawning biomass	885,444		0%
2024 spawning biomass	897,062	881,640	-2%
B_0	1,407,000	1,516,980	8%
B_{msy}	475,199	539,657	14%
2024 F_{OFL}	0.122	0.121	-1%
2024 F_{ABC}	0.114	0.106	-7%
2023 OFL	404,882		-25%
2024 OFL	495,155	305,298	-38%
2023 ABC	378,499		-30%
2024 ABC	462,890	265,913	-43%

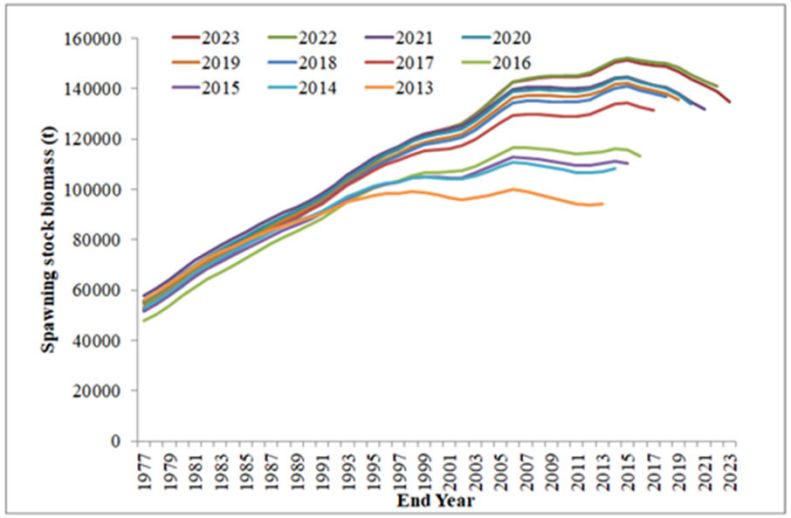
ROCKFISH SUMMARY

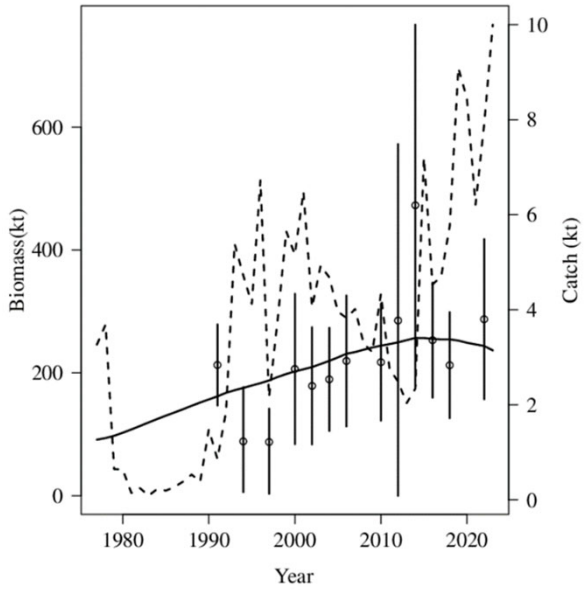
Stock	Tier	2024 ABC (t)	2024 OFL (t)	Change from 2023 ABC
Pacific ocean perch (H-Proj)	3a	41,096	49,010	-2%
Northern rockfish (Update)	3a	19,274	23,556	3%
Blackspotted/rougheye (H-Proj)	3b/5	511*(12%)	684	9%
Shortraker rockfish (C-Rep)	5	530	706	0%
Other rockfish (C-Rep)	5	1,260	1,680	0%

***xx% Reduced from maximum permissible ABC**

CHAPTER 13
NORTHERN ROCKFISH

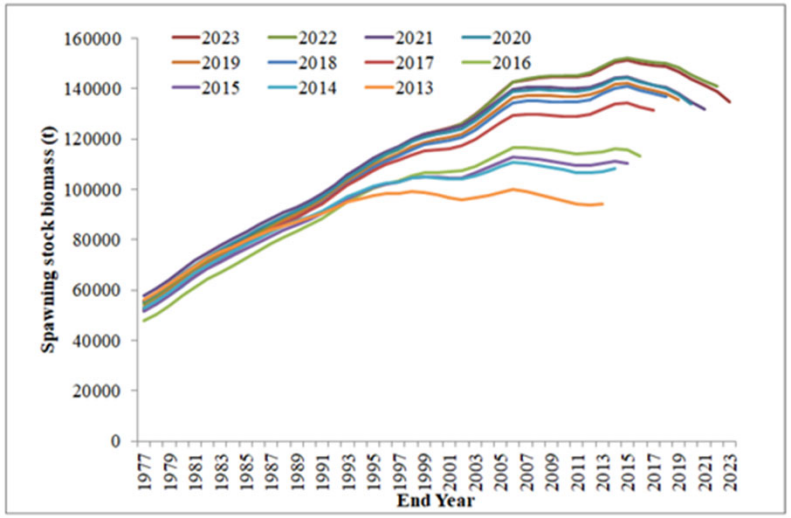
- Tier 3a; Update Assessment; Risk (2,2,1,1)
  - Same model, data update
    - Negative retrospective pattern (Mohn's rho = -0.16)
  - Fishery
    - Continued development of target fishery
    - Rapidly increasing catches

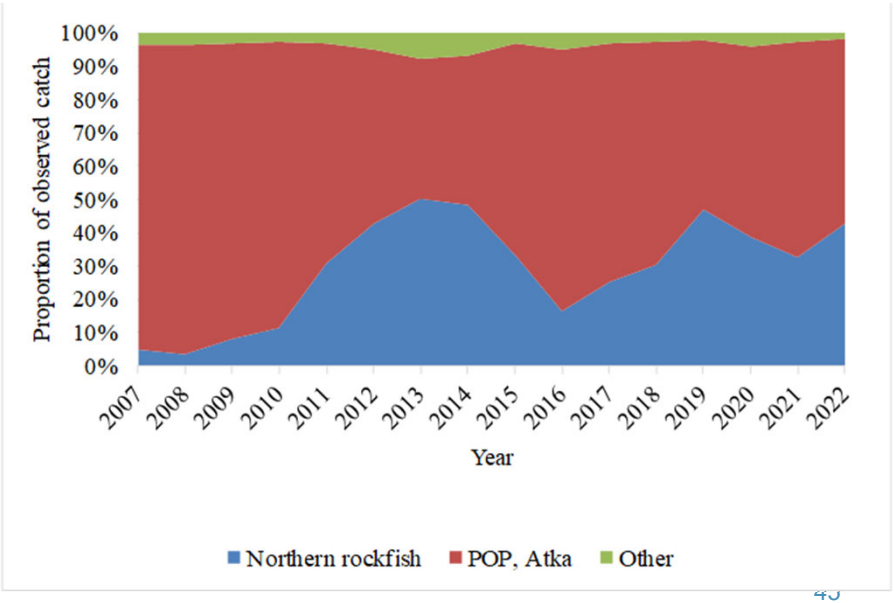




CHAPTER 13
NORTHERN ROCKFISH

- Tier 3a; Update Assessment; Risk (2,2,1,1)
  - Same model, data update
    - Negative retrospective pattern (Mohn's rho = -0.16)
  - Fishery
    - Continued development of target fishery
    - Rapidly increasing catches

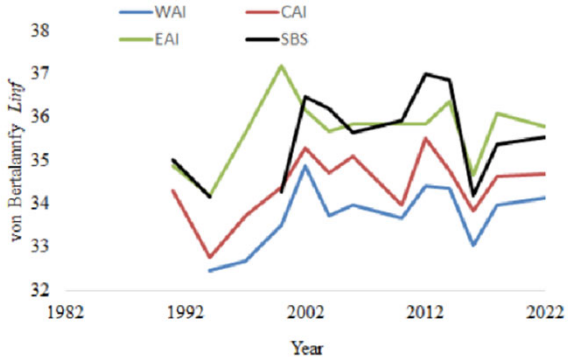


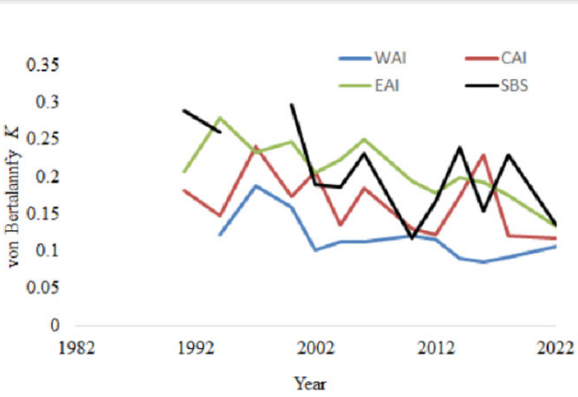


CHAPTER 13
NORTHERN ROCKFISH

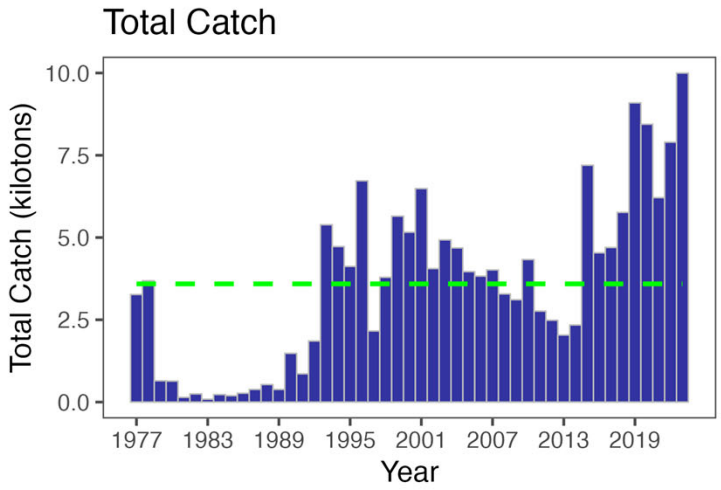
- Tier 3a; Update Assessment; Risk (2,2,1,1)

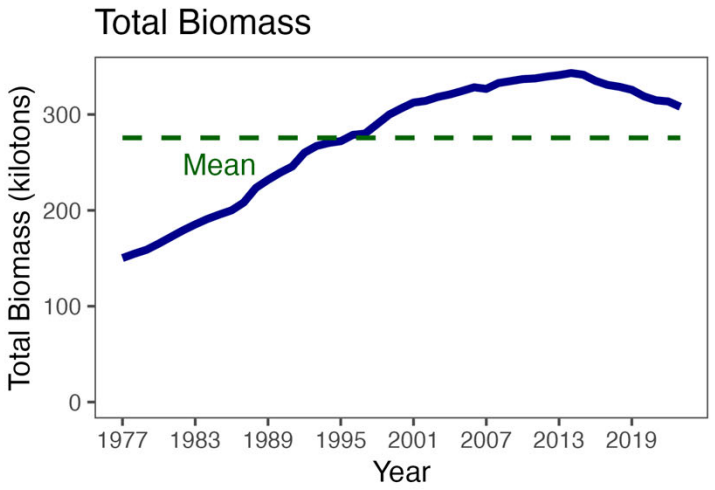
- Stock Structure
  - Update of stock structure information requested by SSC
  - Spatial patterns in growth, and spatial genetic structure (Larson September PT presentation)
- Management
  - Mismatch between spatial scale of management and spatial population structure
- Risk table
  - Catch << ABC. Do not recommend reductions from maxABC, but monitor stock and fishery

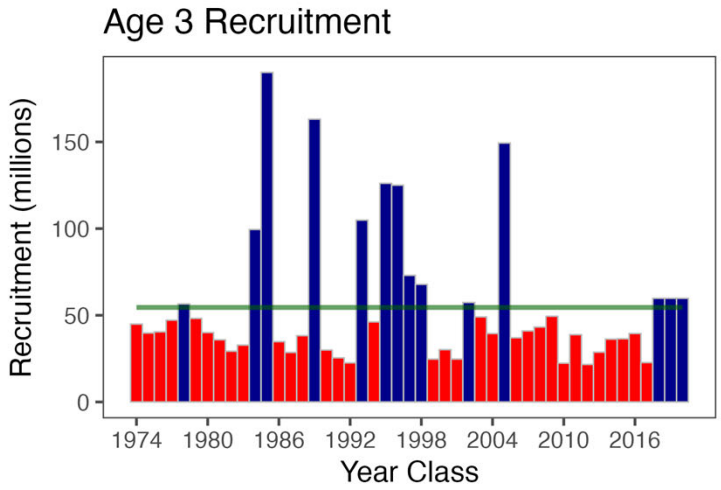


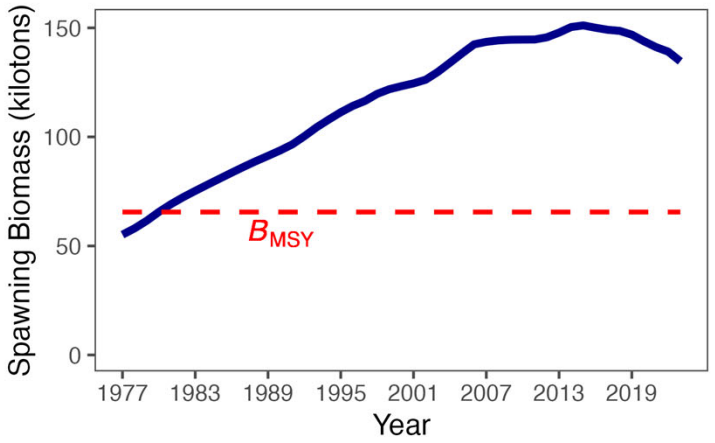


CHAPTER 13
NORTHERN ROCKFISH







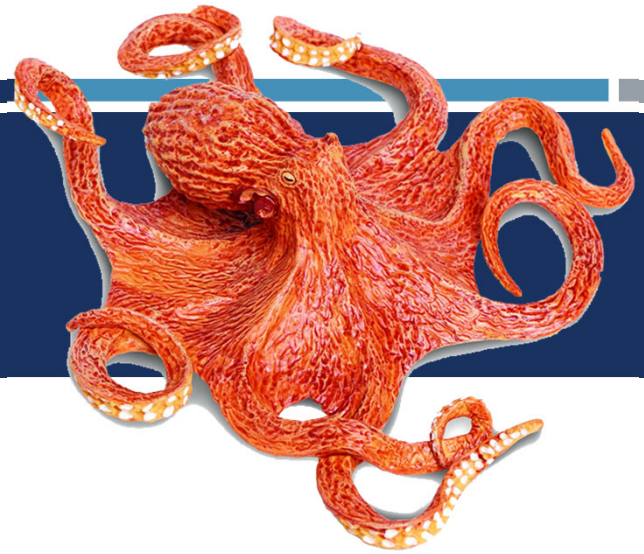


CHAPTER 13
NORTHERN ROCKFISH

- Tier 3a; Update Assessment; Risk (2,2,1,1)
- Team agreed with author's recommendation and stayed with base model
- No additional recommendations

Quantity	Last asmt.	This asmt.	Change
M	0.054	0.052	-4%
2023 Tier	3a		
2024 Tier	3a	3a	
2023 age+ biomass	277,133		7%
2024 age+ biomass	273,414	297,189	9%
2023 spawning biomass	118,251		8%
2024 spawning biomass	115,209	128,229	11%
B_0	171,768	187,268	9%
2024 F_{OFL}	0.085	0.086	1%
2024 F_{ABC}	0.069	0.070	1%
2023 OFL	22,776		3%
2024 OFL	22,105	23,556	7%
2023 ABC	18,687		3%
2024 ABC	18,135	19,274	6%

OTHER SUMMARY

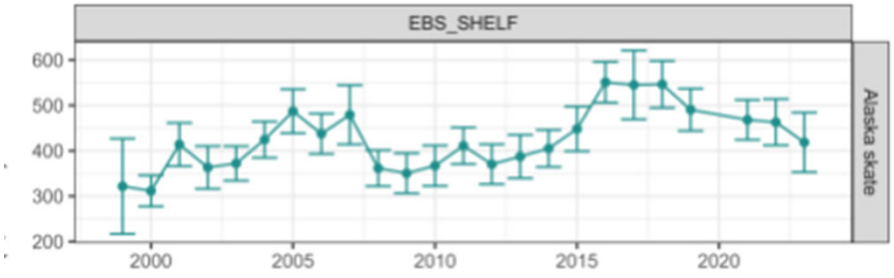


Stock	Tier	2024 ABC (t)	2024 OFL (t)	Change from 2023 ABC
Atka mackerel (H-Rep)	3a	95,358	111,684	-3%
Skates (Update)	3a/5	37,808	45,574	-2%
Sharks (C-Rep)	6	450*(13%)	689	0%
Octopus (Update)	6	4,560	6,080	28%

***xx% Reduced from maximum permissible ABC**

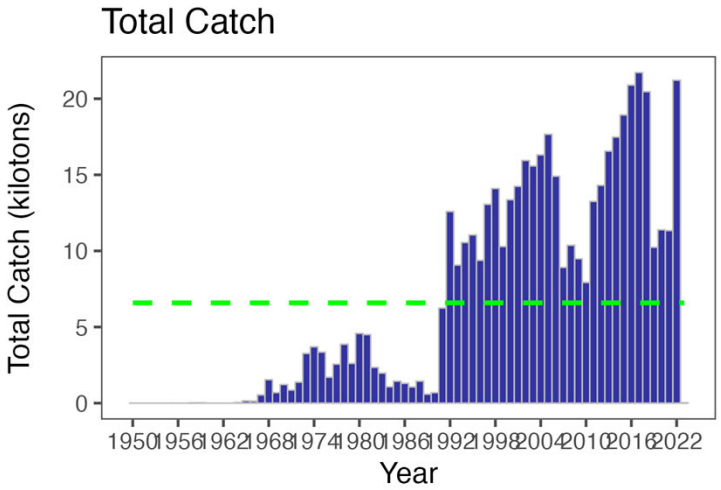
CHAPTER 18
SKATES

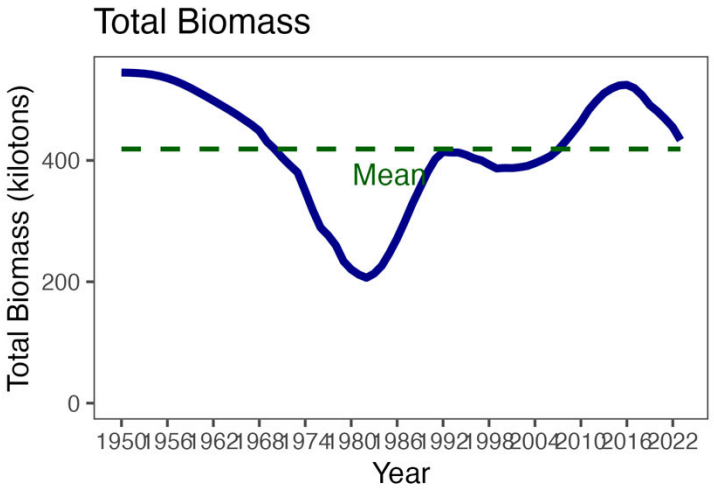
- Tier 3a and 5; Update Assessment, risk table ((2,1),1,1,1)
- Alaska Skate Tier 3a
  - Update to catch and survey data
  - Migration from older version of stock synthesis

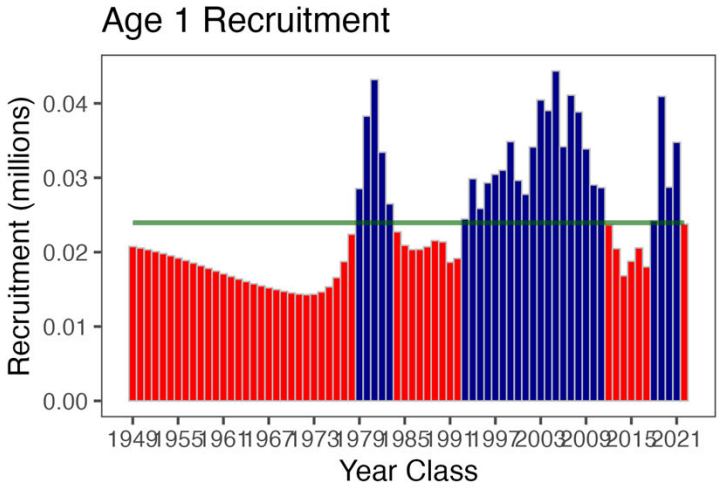


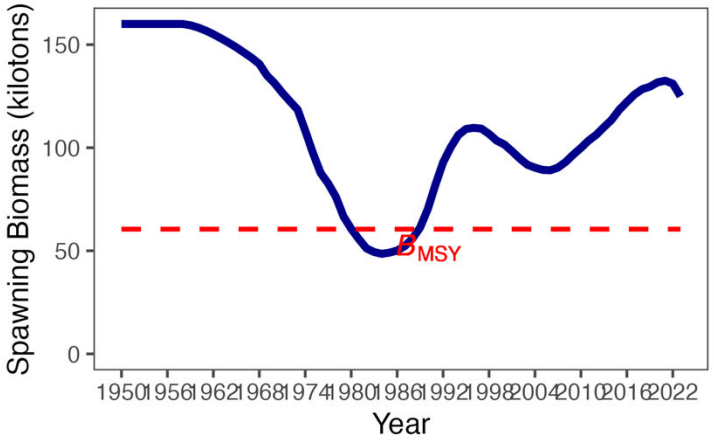
Quantity	Last asmt.	This asmt.	Change
M	0.13	0.13	0%
2023 Tier	3a		
2024 Tier	3a	3a	
2023 age+ biomass	473,527		-4%
2024 age+ biomass	450,679	455,367	1%
2023 spawning biomass	114,804		-7%
2024 spawning biomass	105,595	107,197	2%
B_0	178,425	172,881	-3%
2024 F_{OFL}	0.092	0.093	1%
2024 F_{ABC}	0.079	0.080	1%
2023 OFL	35,503		-9%
2024 OFL	33,451	32,429	-3%
2023 ABC	30,567		-9%
2024 ABC	28,799	27,950	-3%

CHAPTER 18
SKATES



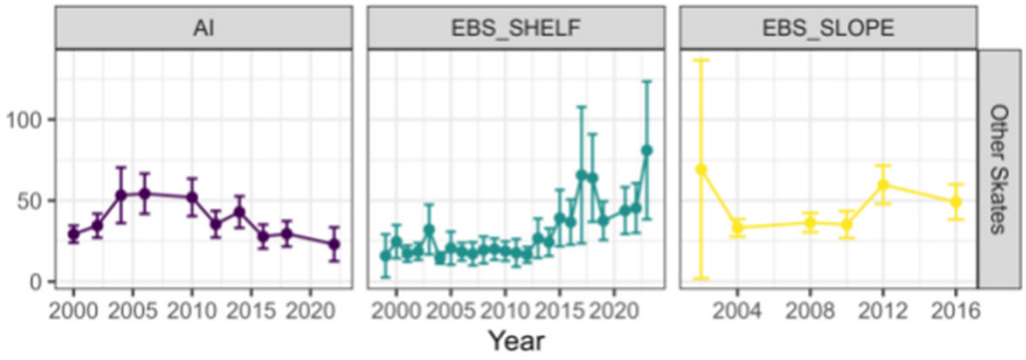






CHAPTER 18
SKATES

- Tier 3a and 5; Update Assessment, risk table ((2,1),1,1,1)
- Other Skates Tier 5
  - Update to survey biomass estimates
  - New REMA model run

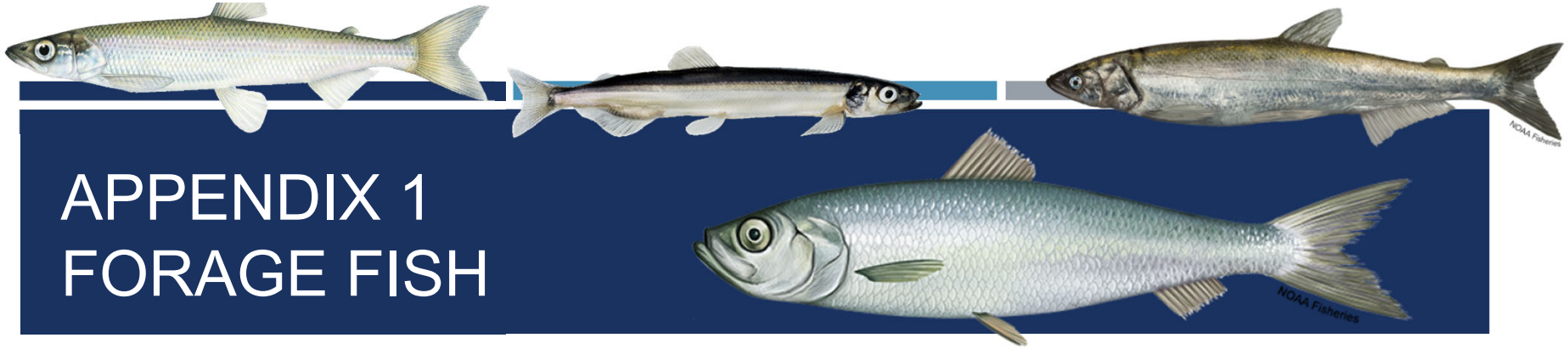


Quantity	Last asmt.	This asmt.	Change
M	0.1	0.1	0%
2023 Tier	5		
2024 Tier	5	5	
2023 age+ biomass	107,174		23%
2024 age+ biomass	107,174	131,446	23%
2024 F_{OFL}	0.1	0.1	0%
2024 F_{ABC}	0.075	0.075	0%
2023 OFL	10,717		23%
2024 OFL	10,717	13,145	23%
2023 ABC	8,038		23%
2024 ABC	8,038	9,858	23%

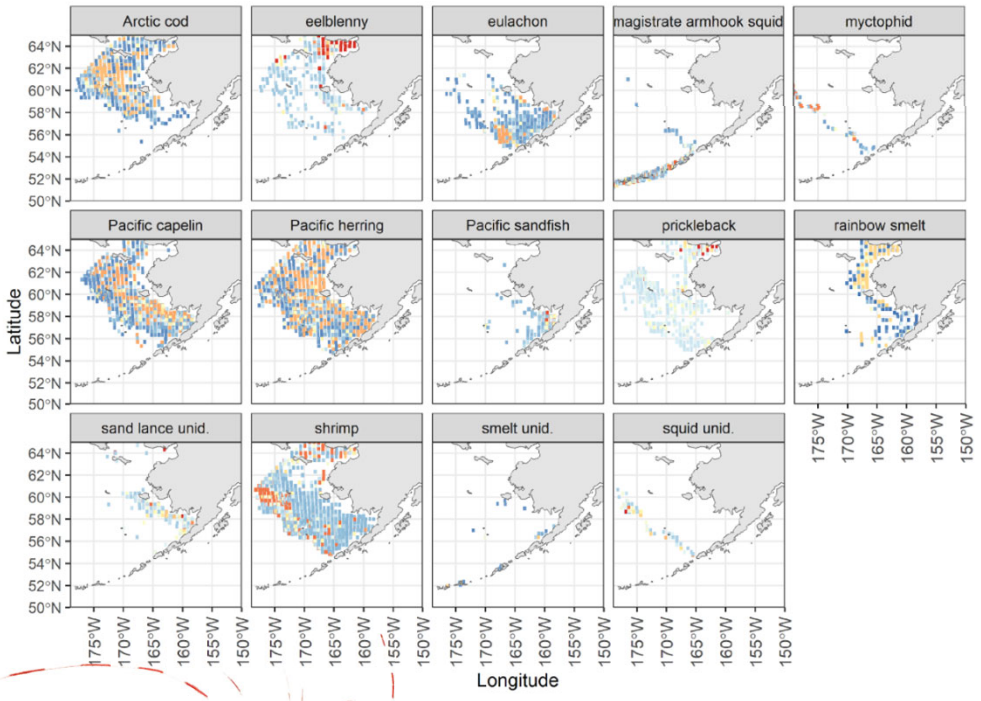
CHAPTER 22
OCTOPUS

- Tier 6; Update assessment; risk table (1,1,1,1)
- Tier 6 based on Consumption model
  - Updated Pacific cod stomach samples
  - No model changes

Quantity	Last asmt.	This asmt.	Change
2023 Tier	6		
2024 Tier	6	6	
2023 OFL	4,769		27%
2024 OFL	4,769	6,080	27%
2023 ABC	3,576		28%
2024 ABC	3,576	4,560	28%



APPENDIX 1
FORAGE FISH



Bottom trawl survey

- Capelin and eulachon **down**.
- Herring and shrimp **up**.
- BASIS survey **down**.

Fisheries

- Squid and herring catches **up**.
- All other catches **down**.

Future

- Spatiotemporal models + environmental linkages
- Synthetic indices of forage

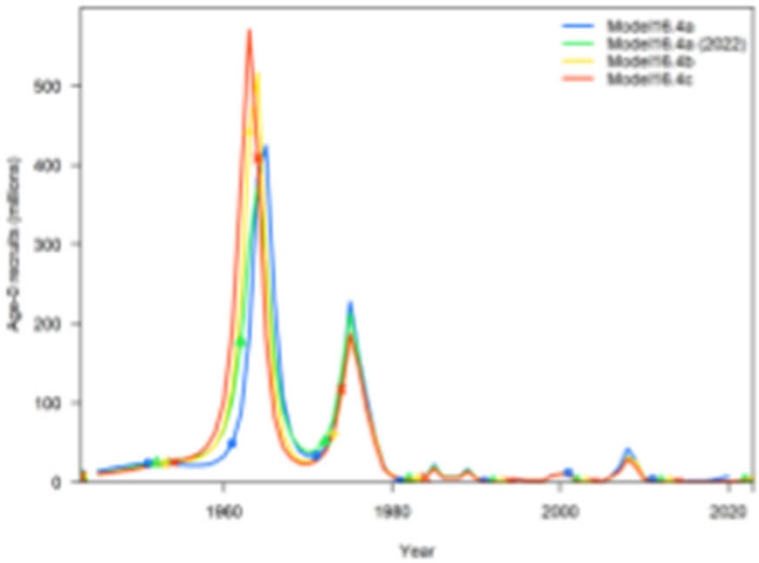
HARVEST PROJECTION SUMMARY

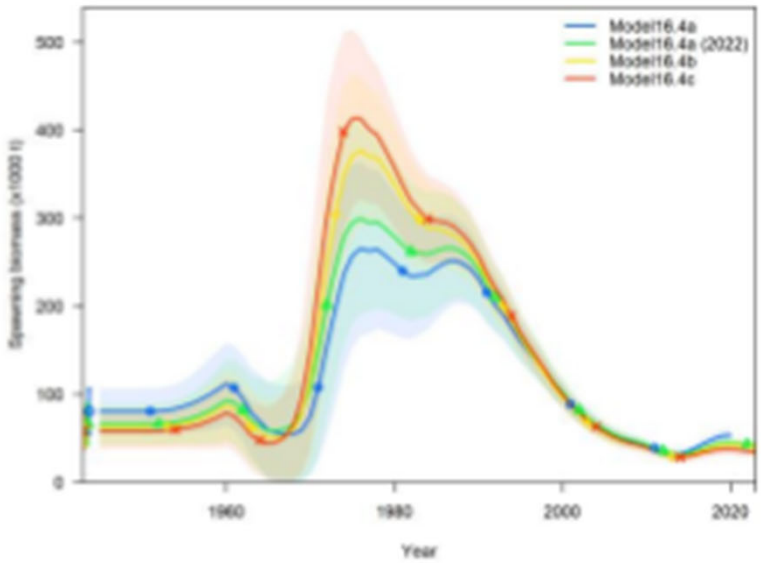
Stock	Tier	2024 ABC (t)	2024 OFL (t)	Change from 2023 ABC
AI pollock (H-Proj)	3a	42,654	51,516	-2%
Greenland turb. (H-Proj)*	3a	3,188	3,705	-19%
Arrowtooth fl (H-Proj)	3a	87,690	103,280	5%
Kamchatka fl. (H-Proj)	3a	7,498	8,850	-1%
Northern rsole (H-Proj)	1a	122,091*(36%)	197,828	<1%
Flathead sole (H-Proj)	3a	67,289	81,605	3%
Alaska plaice (H-Proj)	3a	35,494	42,695	5%
Pacific ocean perch (H-Proj)	3a	41,096	49,010	-2%
Blackspotted/rougheye (H-Proj)	3b/5	511*(12%)	684	9%
Atka mackerel (H-Proj)	3a	95,358	111,684	-3%

*** Team recommendation made even though it was a harvest projection year**

CHAPTER 4
GREENLAND TURBOT RECOMMENDATIONS

- **Greenland Turbot (Harvest Projection)**
  - The Team was concerned about the status of Greenland turbot and recommended an operational full assessment due to concerns with continued long term declines in survey indices as well as the inability of the model to fit the indices.



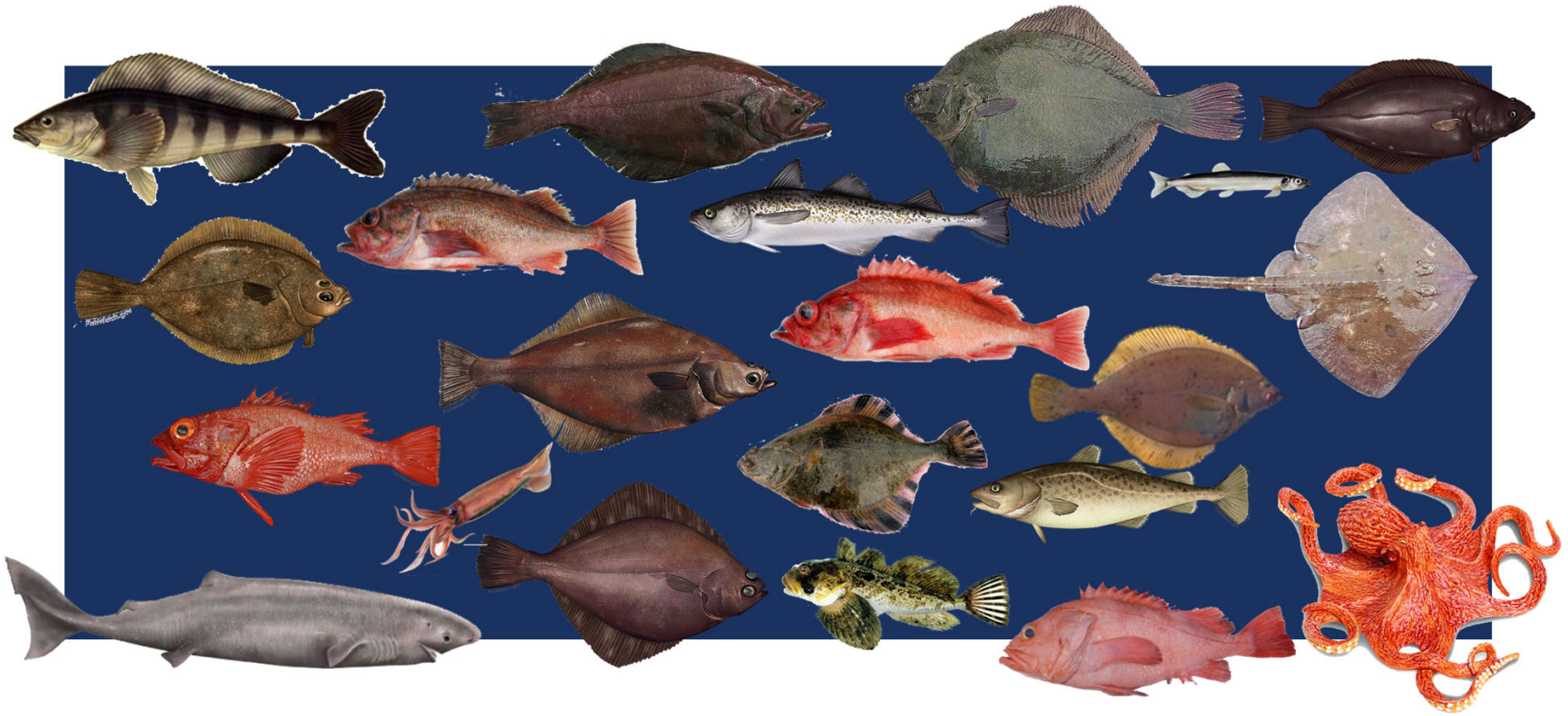


CATCH REPORT SUMMARY

Stock	Tier	2024 ABC (t)	2024 OFL (t)	Change from 2023 ABC
Bogoslof poll. (C-Rep)	5	86,360	115,1460	0%
Other flatfish (C-Rep)	5	17,189	22,919	0%
Shortraker rockfish (C-Rep)	5	530	706	0%
Other rockfish (C-Rep)	5	1,260	1,680	0%
Sharks (C-Rep)	6	450*(13%)	689	0%

***xx% Reduced from maximum permissible ABC**

THANK YOU



BSAI TEAM
GENERAL RECOMMENDATIONS

- The Team recommended that a bullet point be added in harvest projection presentations to explain reductions or changes in max ABC when it occurs.

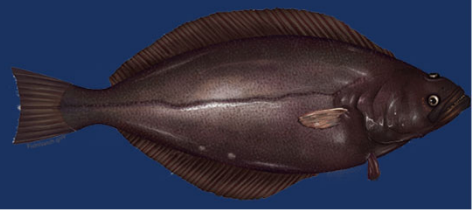
- The Team recommended that as a best practice that appendices be linked in the front of the document (as with the sablefish assessment) to allow for an easier review of the appendices.

BSAI TEAM POLLOCK RECOMMENDATIONS

- **EBS Pollock**
  - The Team recommended continuing to evaluate projection bias due to selectivity assumptions, and the examination of new methods that may reduce that bias.
  - The Team recommended that the authors clearly state where MLE estimates are being used and where MCMC estimates are being used.
  - The Team recommended using posterior distributions from the MCMC to determine probabilities in the risk table and expanding the risk table to at least include the recommended ABC.
- **EBS Multi-species Model**
  - Kirstin intends to communicate with authors earlier in next year's assessment cycle to help facilitate risk assessment, which is further recommended by the Team.

BSAI TEAM
PACIFIC COD RECOMMENDATIONS

- **Pacific cod - EBS**
  - The Team recommended expanding the discussion of uncertainty around M in the risk table. For example, the interplay between M and q, and what may elevate the risk to a level 2 categorization.
- **Pacific cod - Aleutian Islands**
  - The Team recommended that authors refrain from reusing model names previously reviewed and provide unique model names for any new model configurations up for review by the Team.
  - The Team recommended that the authors investigate length-weight data and look for changes over time.
  - The Team also recommended that a sensitivity analysis on M similar to what was provided in the eastern Bering sea Pacific cod assessment be presented given the high uncertainty in that value.
  - The Team recommended that the authors conduct a sensitivity analysis and provide the probability of being under $B_{20\%}$ given the three projection scenarios similar to what was provided in the Bering Sea Pacific cod stock assessment.



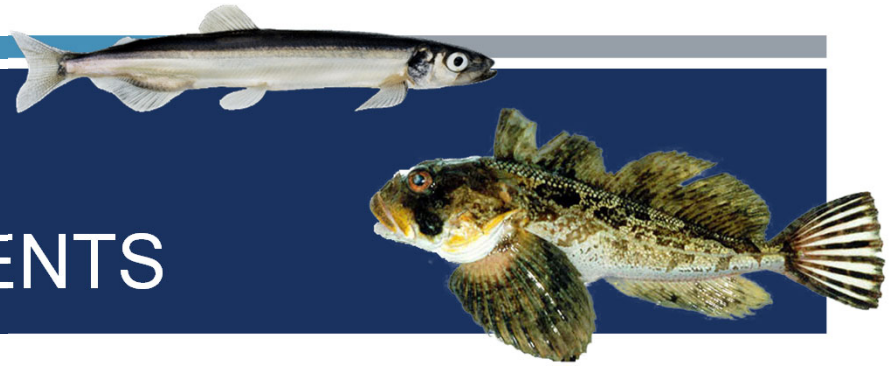
BSAI TEAM
FLATFISH RECOMMENDATIONS

- **Yellowfin sole**
  - The Team recommended that the author conduct a model sensitivity analysis to evaluate the current approach used for natural mortality and the effect it has on model performance and results. including estimating female natural mortality of the current approach to using natural mortality that is estimated for males and fixed for females.
- **Greenland Turbot**
  - The Team was concerned about the status of Greenland turbot and recommended an operational full assessment due to concerns with continued long term declines in survey indices as well as the inability of the model to fit the indices.

BSAI TEAM
OTHER FISHES RECOMMENDATIONS

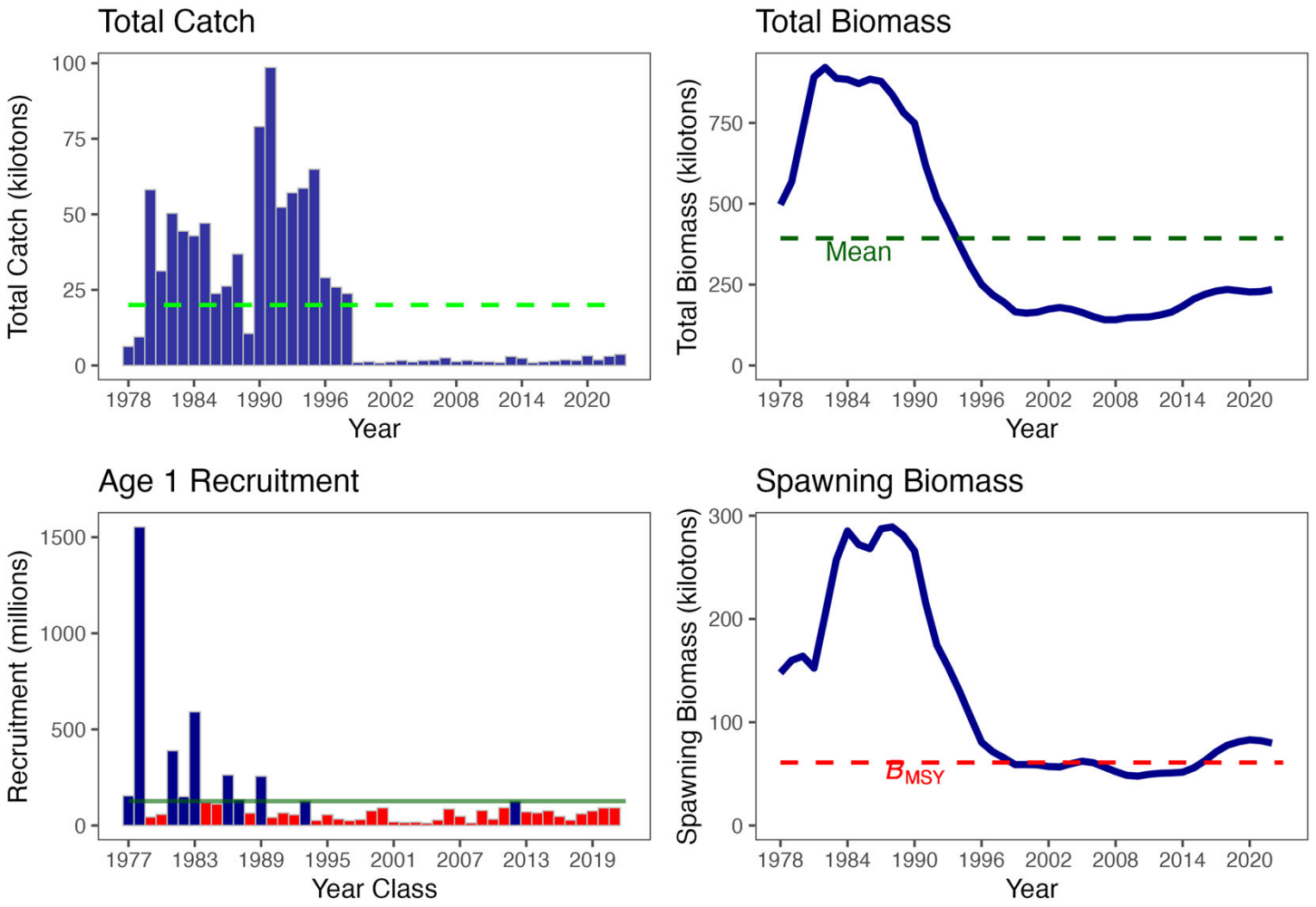
- **Skates**
  - The Team recommends the authors examine using a catchability that is tuned to temperature.
  - The Team applauded the authors' approach to not change the methodology for this first assessment cycle after the change in authorship, and gave the authors leeway to explore the data and assessment methodology in more detail to come up with the improvements that should be incorporated into the model for the next assessment cycle. The Team recommended this approach be used as the model for how authorship transfers be conducted going forward.
- **Octopus**
  - The Team recommends that the next assessment contain a link to the original consumption methodology employed in the 2012 analysis.

BSAI TEAM ECOSYSTEM COMPONENTS

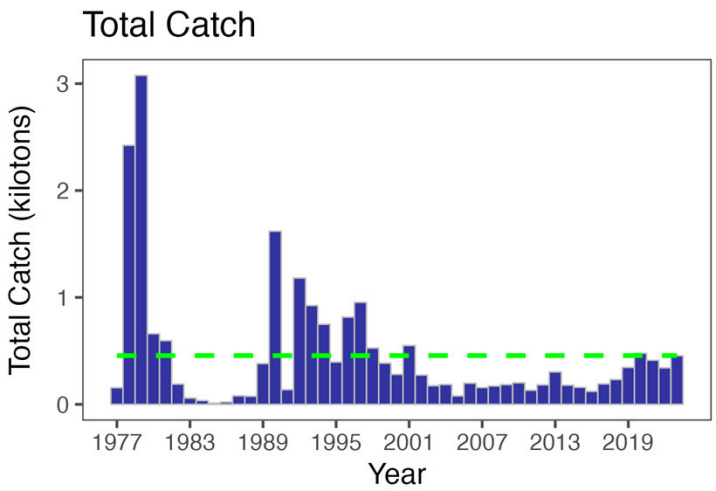


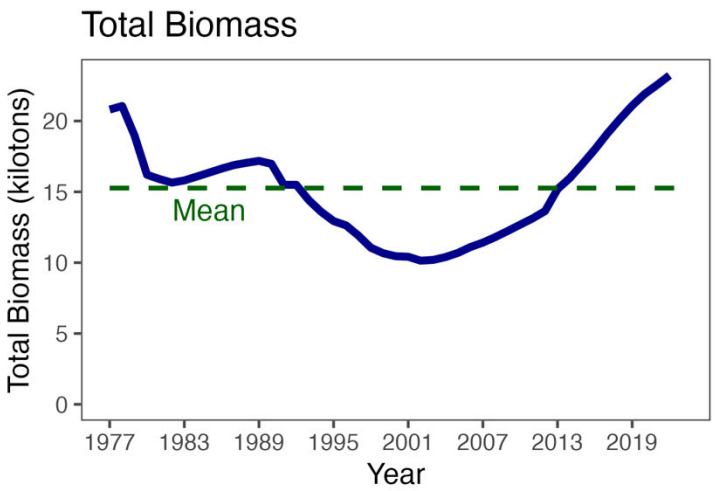
- **Forage Species**
  - The Team recommended providing some indication on future plots of reference levels across years to show consistent comparative information across years and trends.
  - The Team recommended working in collaboration with the ESR team and to consider how to contribute forage information to other initiatives such as ESP and ESR as time allows including the consideration of what is the best index of forage and how and where it can be reported on an annual basis.

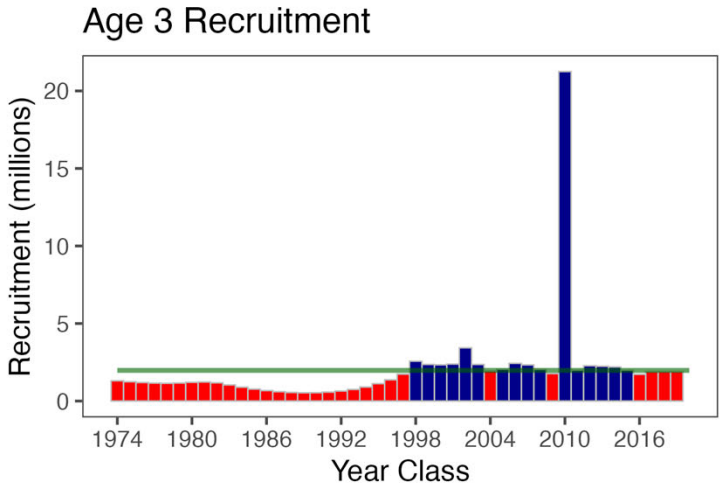
Aleutian Islands pollock

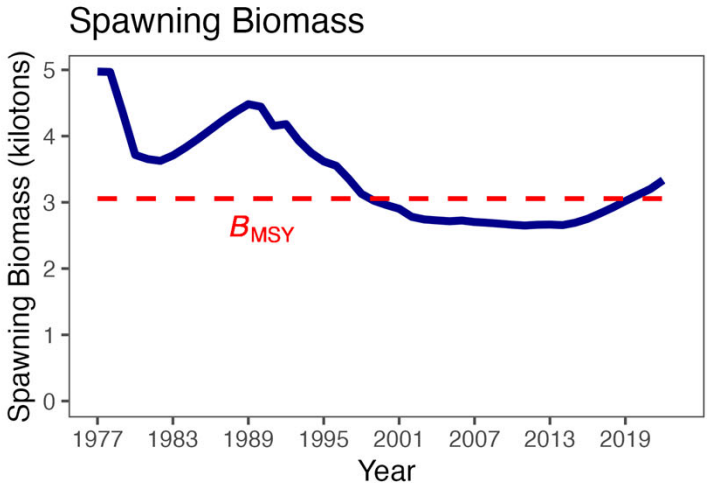


Blackspotted/Rougheye Rockfish

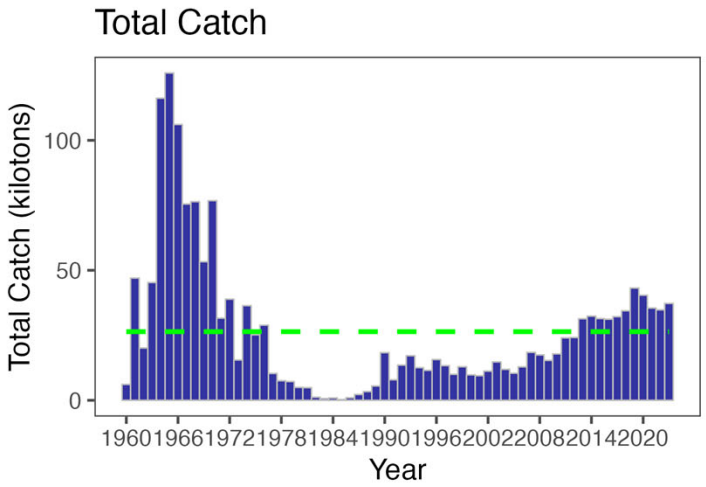


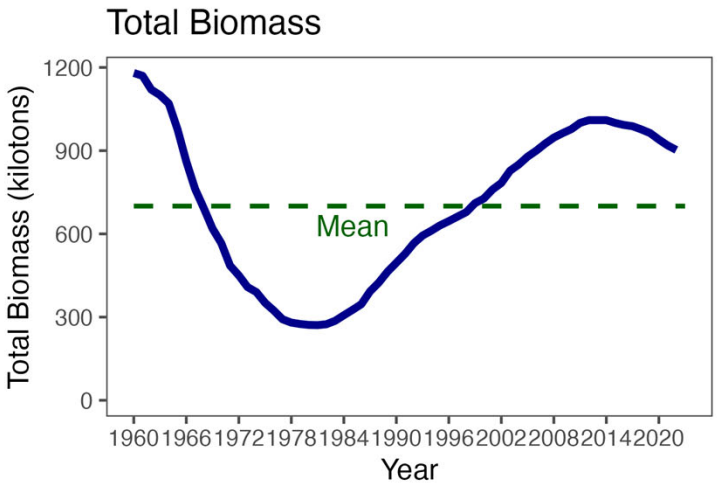


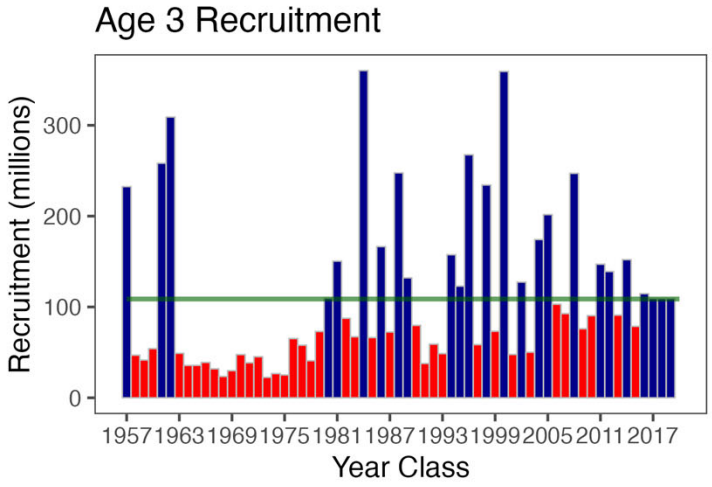


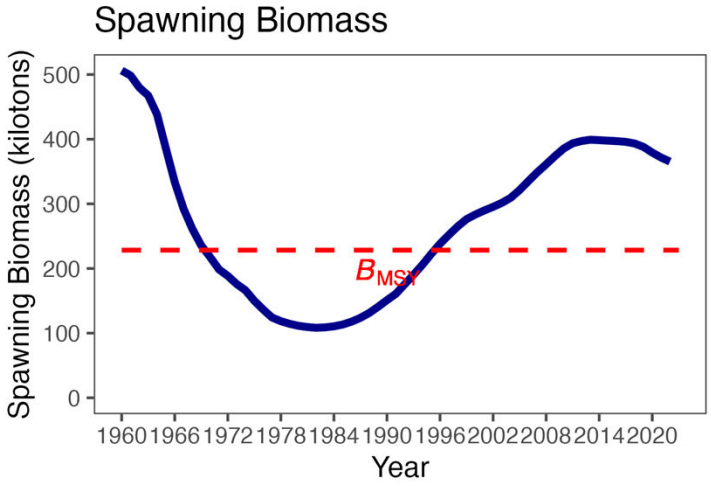


Pacific ocean perch

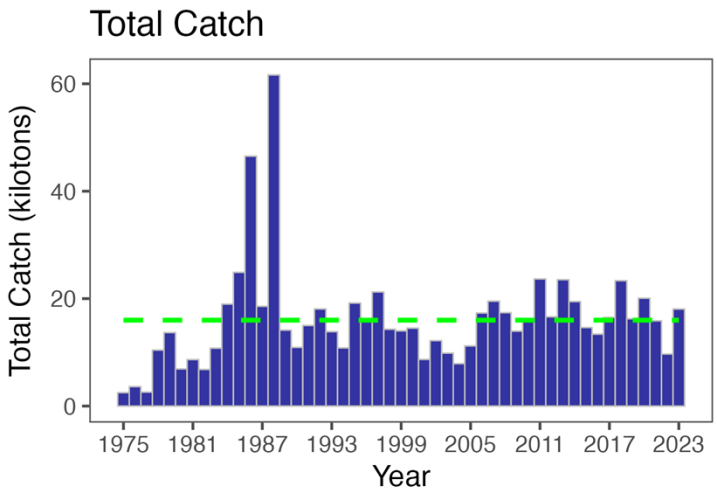


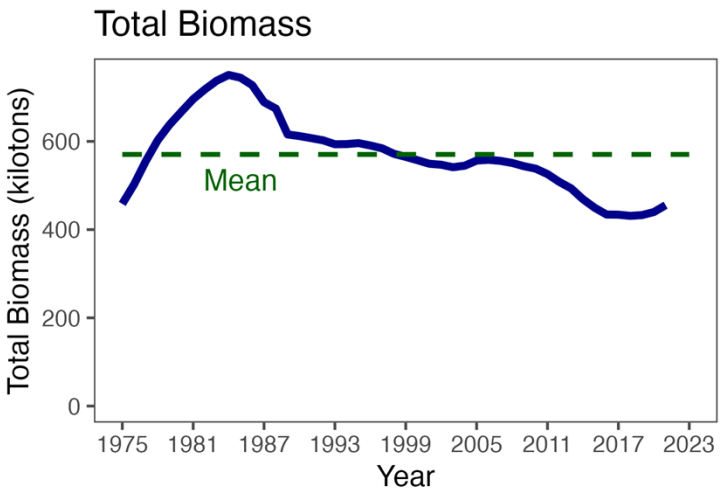


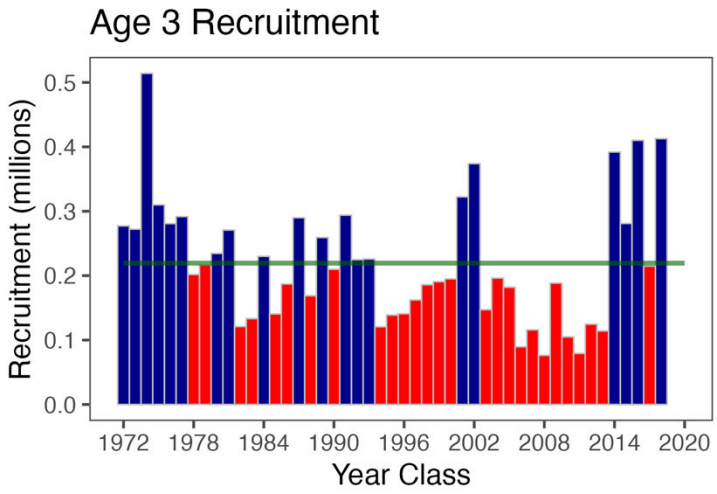


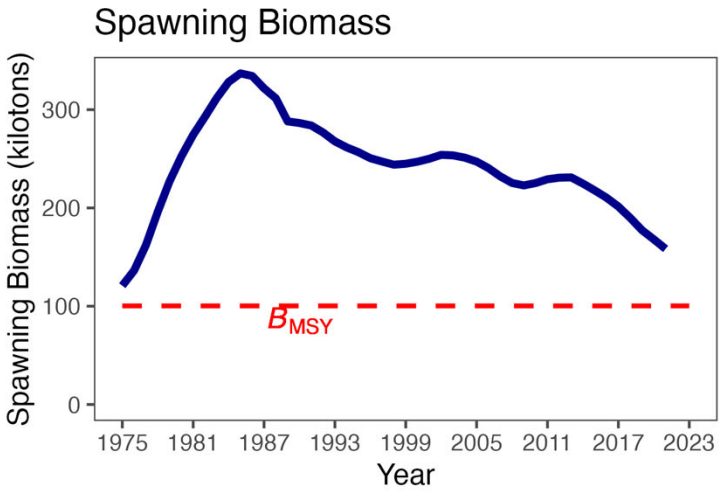


Alaska Plaice

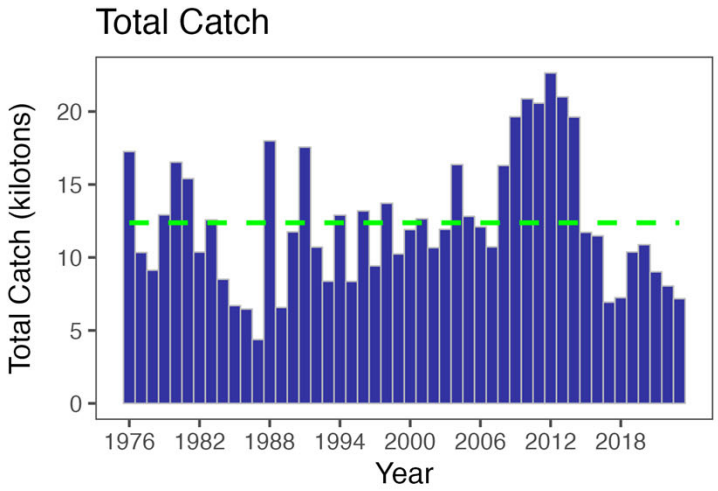


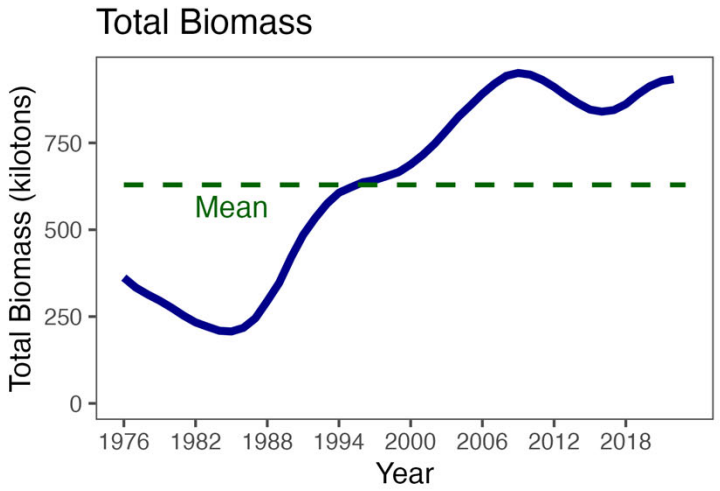


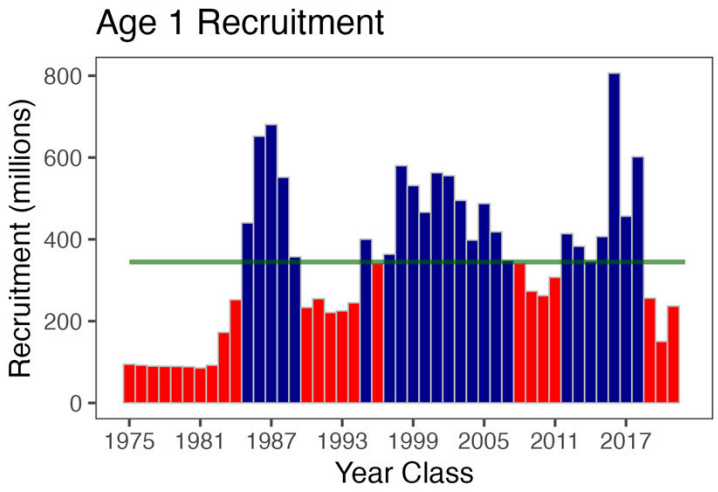


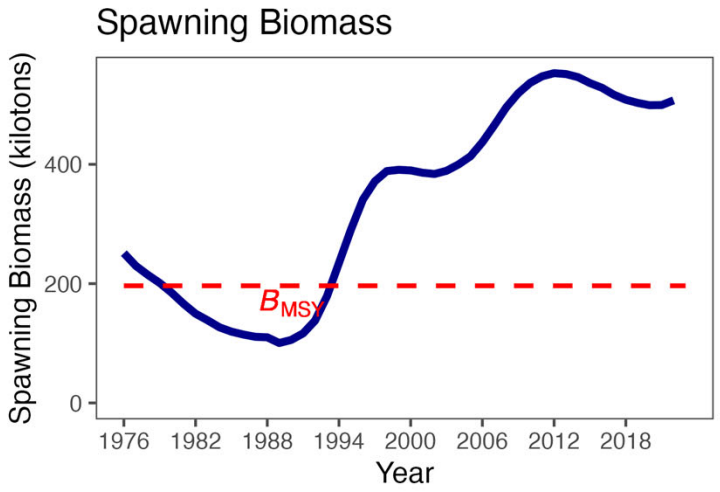


Arrowtooth Flounder

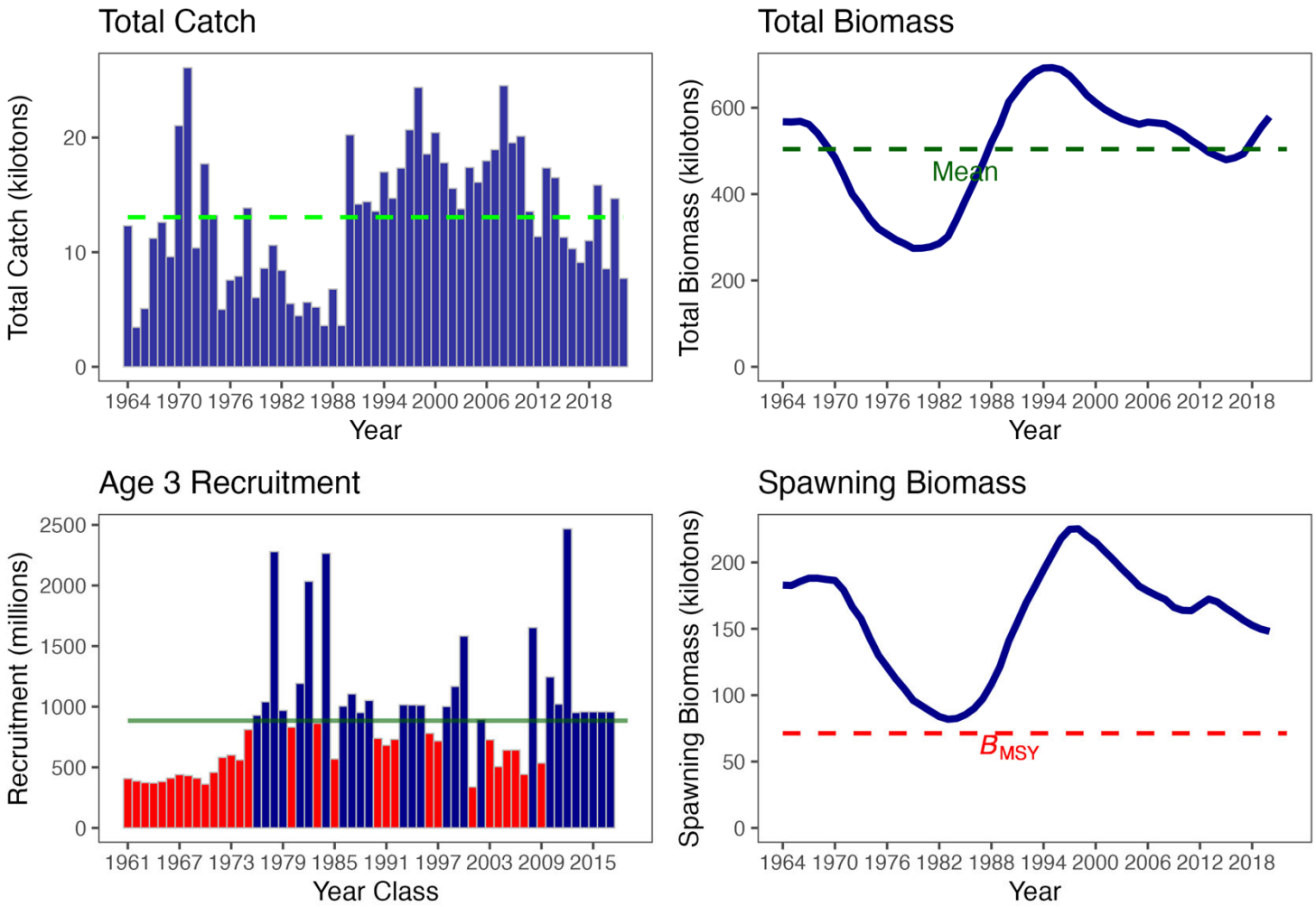




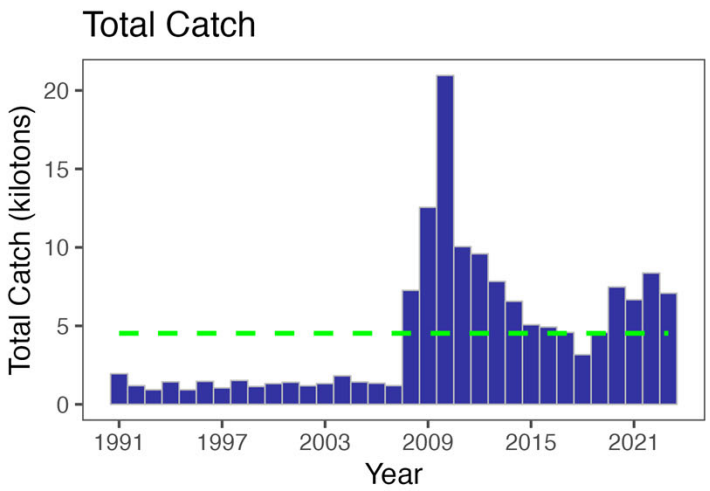


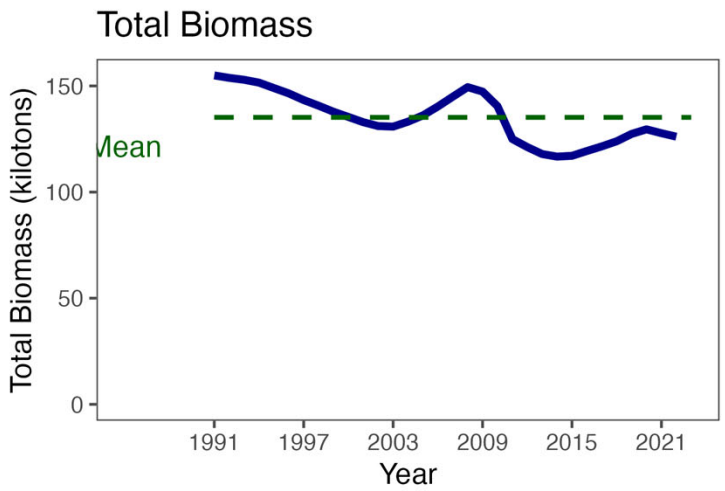


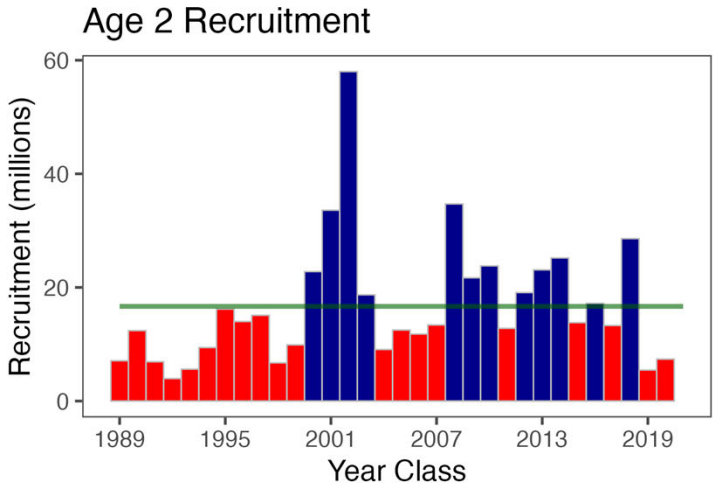
Flathead sole

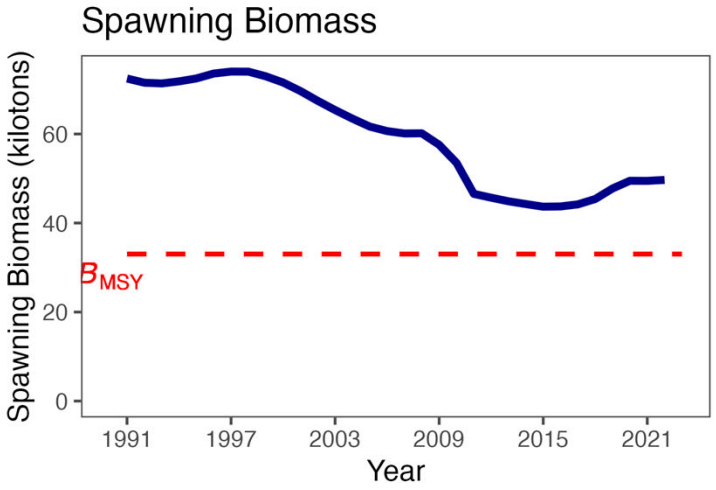


Kamchatka flounder

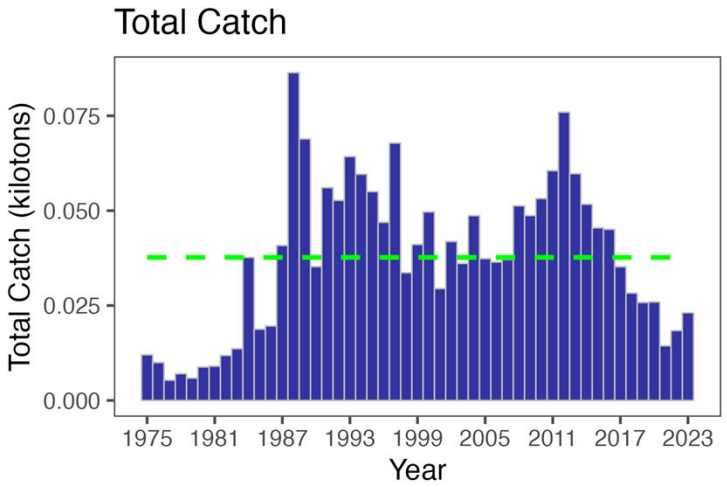


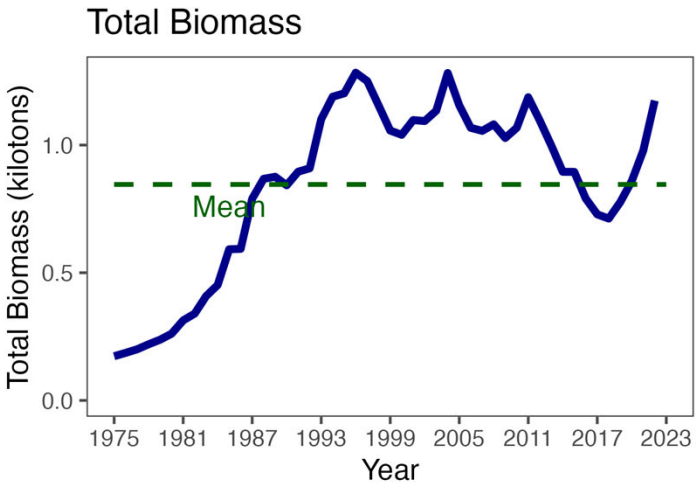


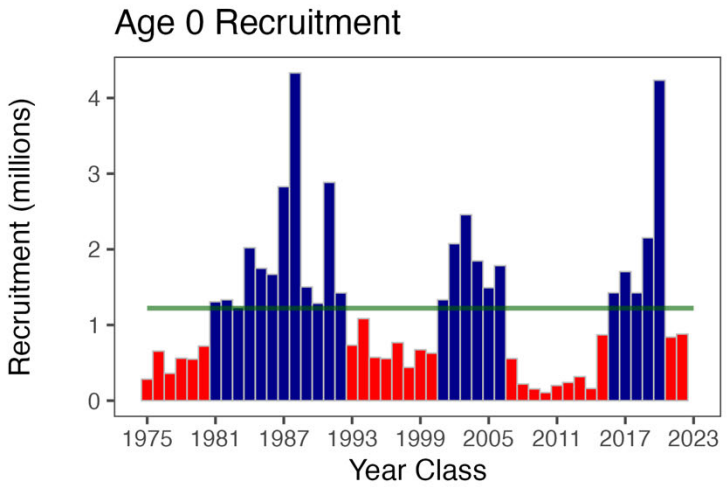


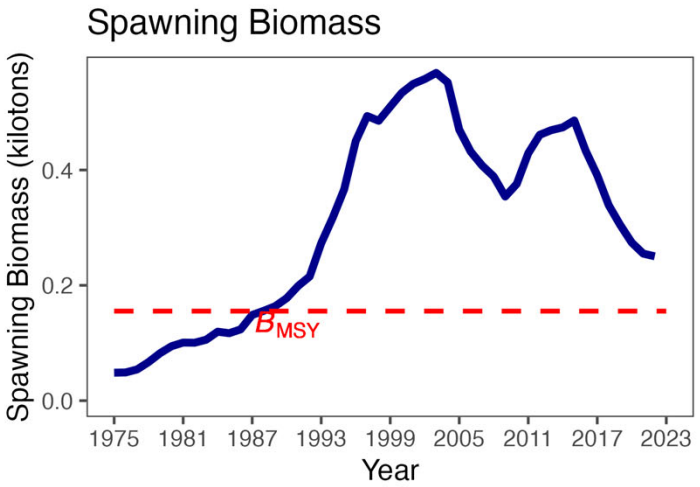


Northern rocksole

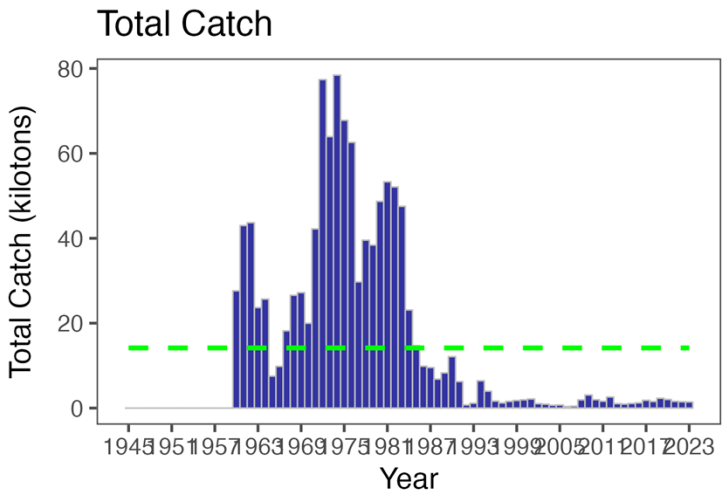


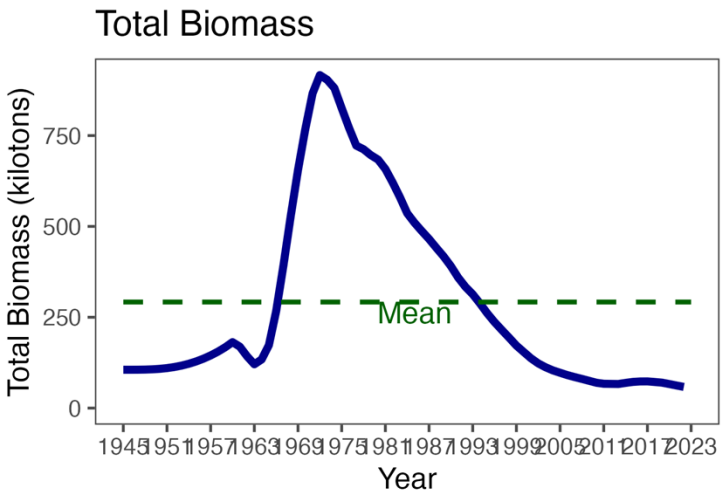


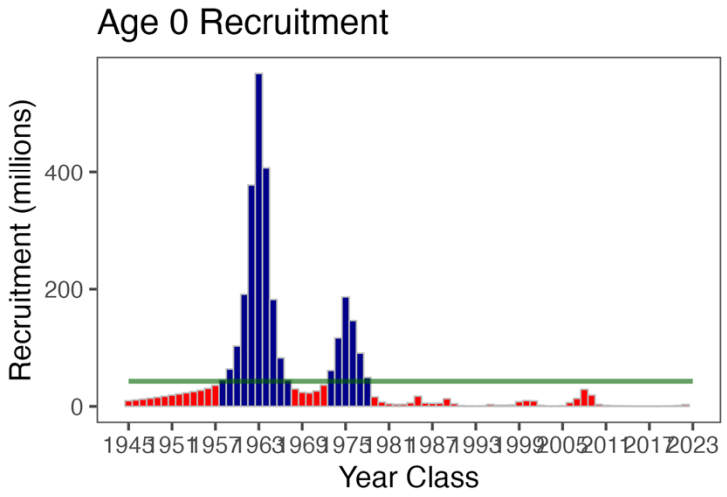


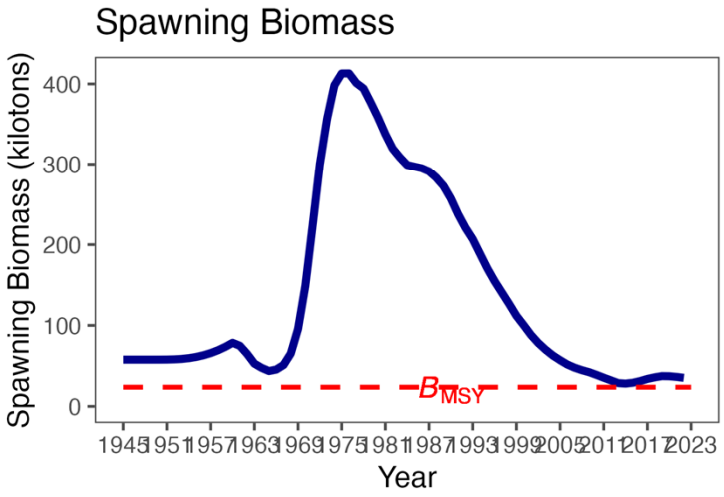


Greenland Turbot









Atka Mackerel