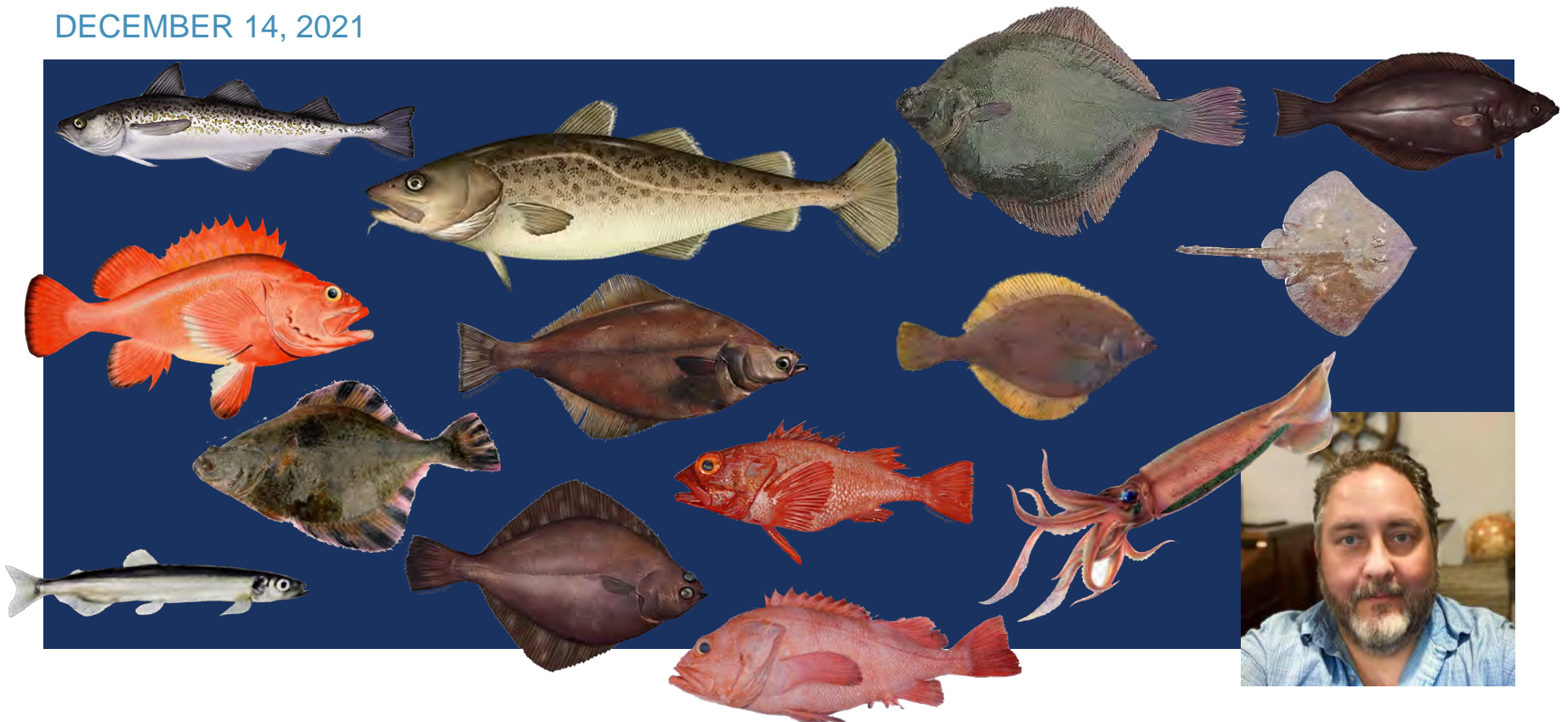




REPORT OF THE NOVEMBER 2021 BSAI GROUNDFISH PLAN TEAM MEETING

STEVE BARBEAUX (CO-CHAIR), GRANT THOMPSON (CO-CHAIR), DIANA STRAM (COORDINATOR)
DECEMBER 14, 2021





BSAI PLAN TEAM MEETING OVERVIEW

- Dates: November 15-19
- Place: Online
- Leaders: Grant Thompson, Steve Barbeaux (co-chairs); Diana Stram (coordinator)
- Participation:
 - Mary Furuness (NMFS AKRO)
 - Alan Haynie (AFSC REFM)
 - Allan Hicks (IPHC)
 - Lisa Hillier (WDFW)
 - Kirstin Holsman (AFSC REFM)
 - Andy Kingham (AFSC FMA)
 - Kalei Shotwell (AFSC ABL)
 - **Phil Joy (ADF&G)**
 - Cindy Tribuzio (AFSC ABL)
 - AFSC and AKRO staff and members of the public





BERING SEA AND ALEUTIAN ISLANDS BIG PICTURE

- Assessments of 17 stocks/complexes (**8 full**, 9 partial; 6 “none”)
 - Compared to 23 last year (21 full, 2 partial; 0 “none”)
- Total of 37 models, including Tier 5/6 methods (down from 53 last year):
 - 25 base models/methods (same as last year)
 - 12 additional models/methods (down from 28 last year)
- The Team agreed with authors’ recommendations regarding preferred models/methods and harvest specifications in all but 1 case
- Change from current base model/method recommended in 4 cases
- Reductions from maxABC recommended in only 2 cases
- Of the 16 stocks/complexes in Tiers 1 or 3, only 4 are in sub-tier “b”
- No stocks/complexes were subjected to overfishing in 2020, and no Tier 1 or 3 stocks/complexes are overfished/approaching as of 2021

3





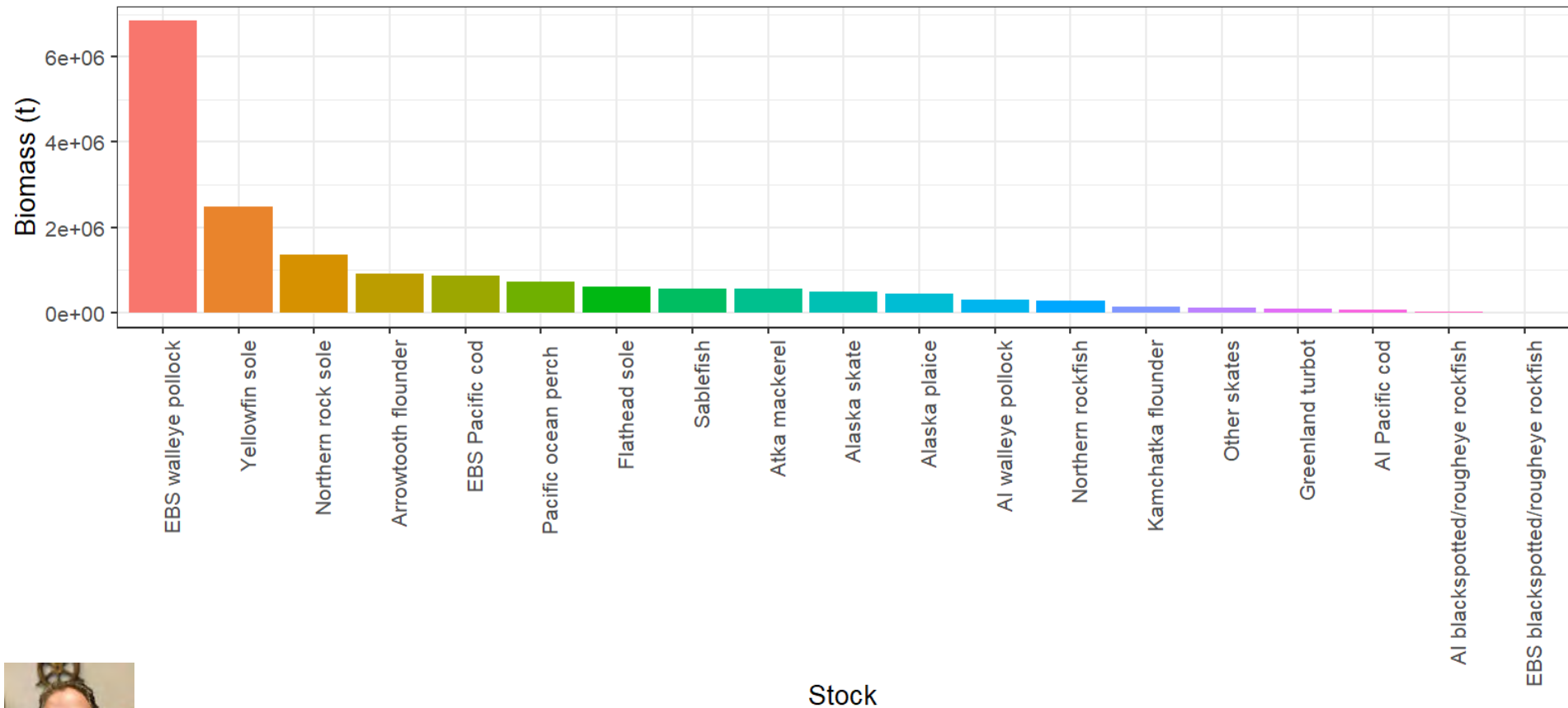
BERING SEA AND ALEUTIAN ISLANDS BIG PICTURE (TINY FONT)

Ch.	Assessment	Lead author	Tier	Type	Numbered models (or Tier 5, 6)	Risk	% Red.
1	EBS pollock	Ianelli	1b	Full	20.0a (base), 20.0b, 20.0c	2.00	11%
1A	AI pollock	Barbeaux	3a	Partial	15.1 (base)	n/a	0
1B	Bogoslof pollock	Ianelli	5	None	Tier 5 RE (base)	n/a	0
2	EBS Pacific cod	Thompson	3b	Full	19.12a (base), 19.12, 21.1, 21.2, ensemble	1.25	0
2A	AI Pacific cod	Spies	3a,5	Full	Tier 5 RE (base) , 19.0, 19.0a, 19.0b	1.75	0
3	Sablefish	Goethel	3a	Full	16.5 (base), 21.12	1.50	0
4	Yellowfin sole	Spies	1a	Full	18.2 (base) , 18.2a, 18.2b	1.75	24%
5	Greenland turbot	Bryan	3a	Partial	16.4a (base)	n/a	0
6	Arrowtooth flounder	Shotwell	3a	Partial	18.9 (base)	n/a	0
7	Kamchatka flounder	Bryan	3a	Partial	16.0b (base)	n/a	0
8	Northern rock sole	McGilliard	1a	Partial	18.3 (base)	n/a	0
9	Flathead sole	Kapur	3a	Partial	18.2c (base)	n/a	0
10	Alaska plaice	Ormseth	3a	Full	11.1 (base)	1.00	0
11	Other flatfish	Monnahan	5	None	Tier 5 RE (base)	n/a	0
12	Pacific ocean perch	Spencer	3a	Partial	16.3a (base)	n/a	0
13	Northern rockfish	Spencer	3a	Full	16.1a (base), 21	1.25	0
14	Blackspot/rougheye	Spencer	3b/5	Partial	AI: 20 (base); EBS: Tier 5 RE (base)	n/a	0
15	Shorthead rockfish	Shotwell	5	None	Tier 5 RE (base)	n/a	0
16	Other rockfish	Sullivan	5	None	Tier 5 RE (base)	n/a	0
17	Atka mackerel	Lowe	3b	Full	16.0b (base)	1.00	0
18	Skates	Ormseth	3a/5	Partial	Alaska: 14.2 (base); others: Tier 5 RE (base)	n/a	0
19	Sharks	Tribuzio	6	None	Tier 6: 16.0 (base)	n/a	0
22	Octopus	Ormseth	6	None	Tier 6: cod consumption (base)	n/a	0



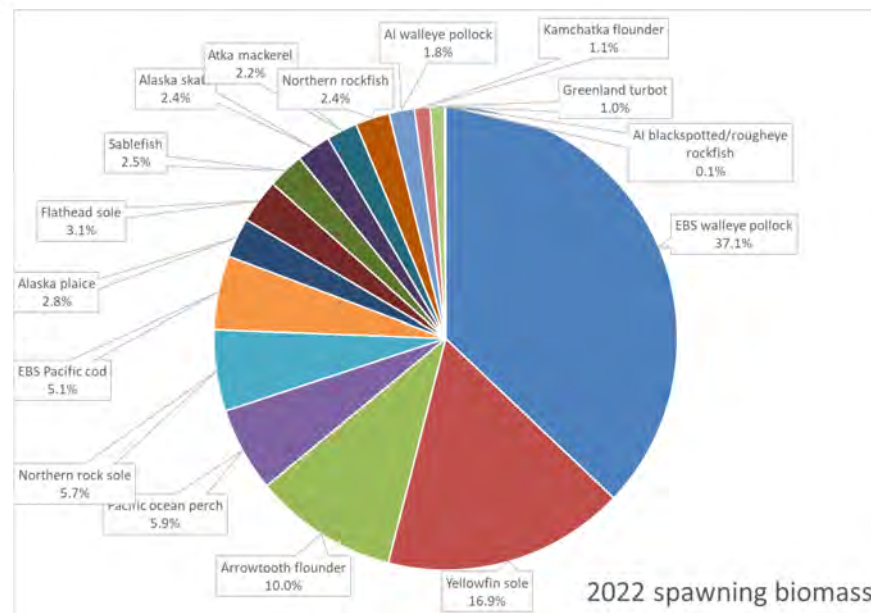
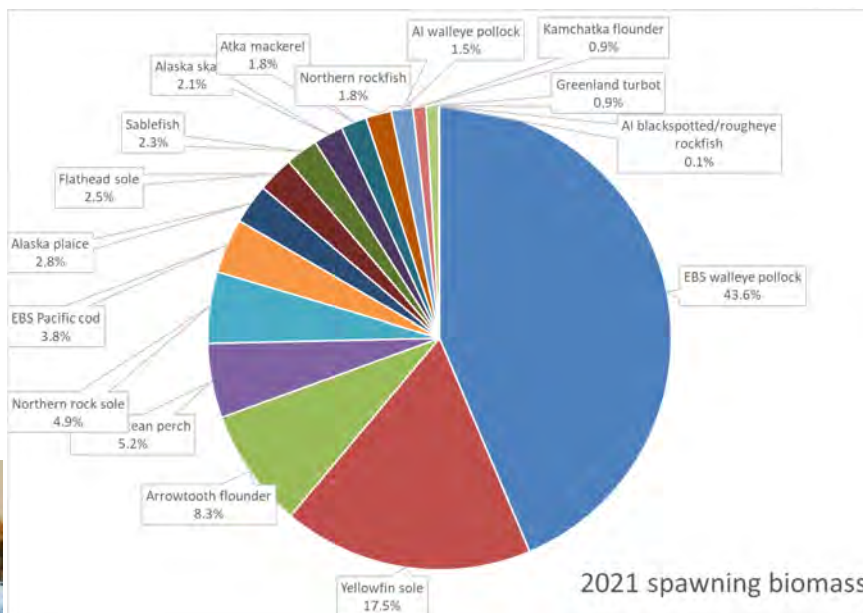
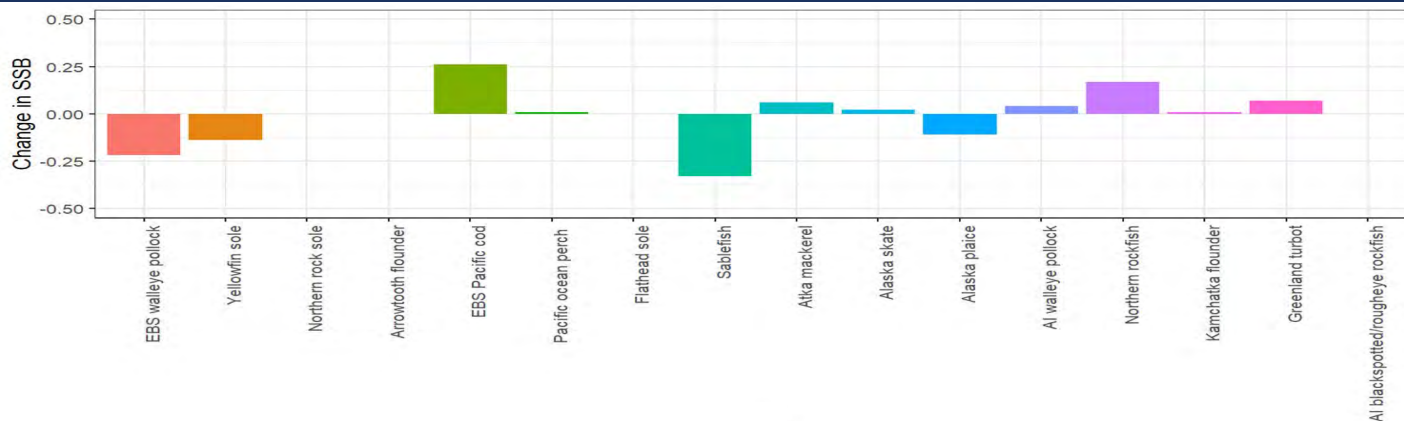


BERING SEA AND ALEUTIAN ISLANDS TOTAL BIOMASS



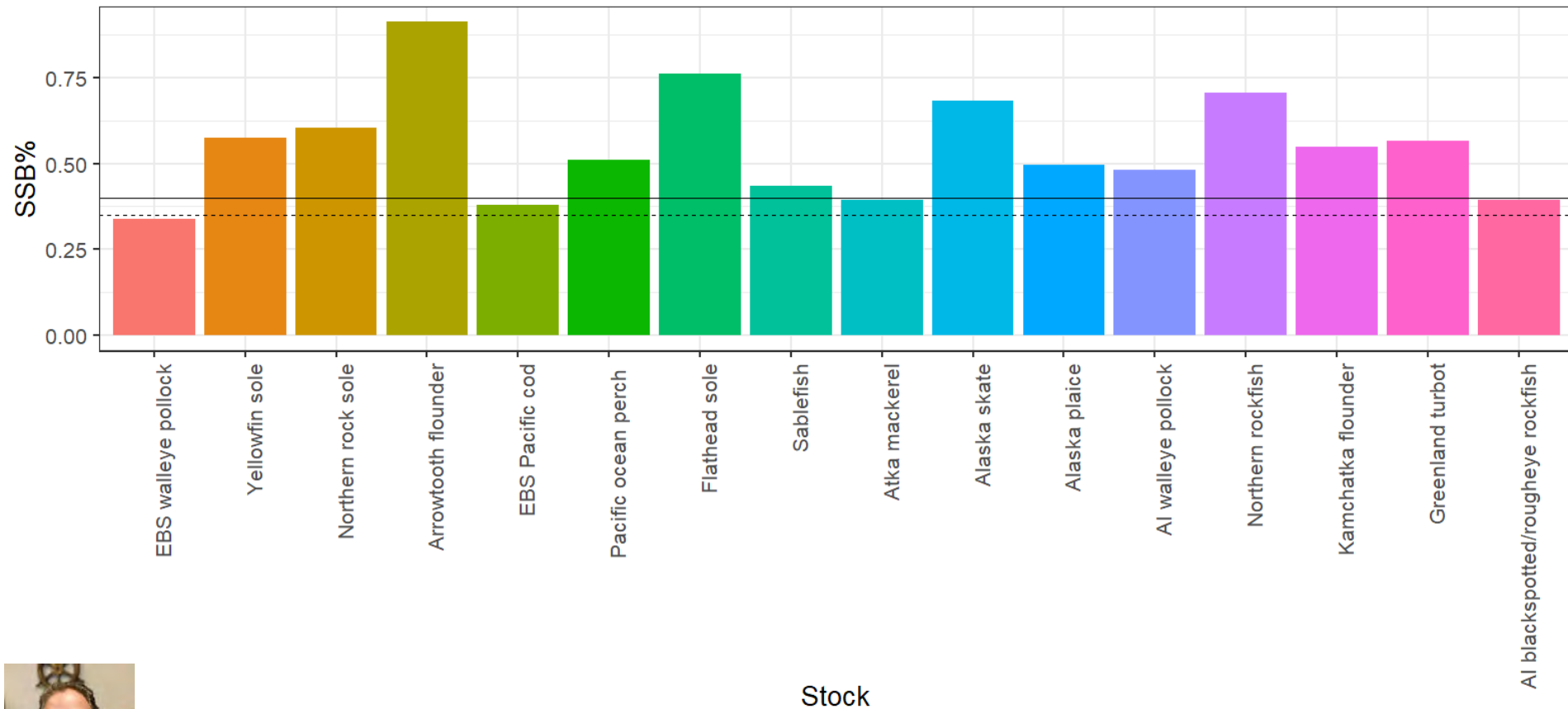


BERING SEA AND ALEUTIAN ISLANDS SPAWNING BIOMASS (TIERS 1 AND 3)



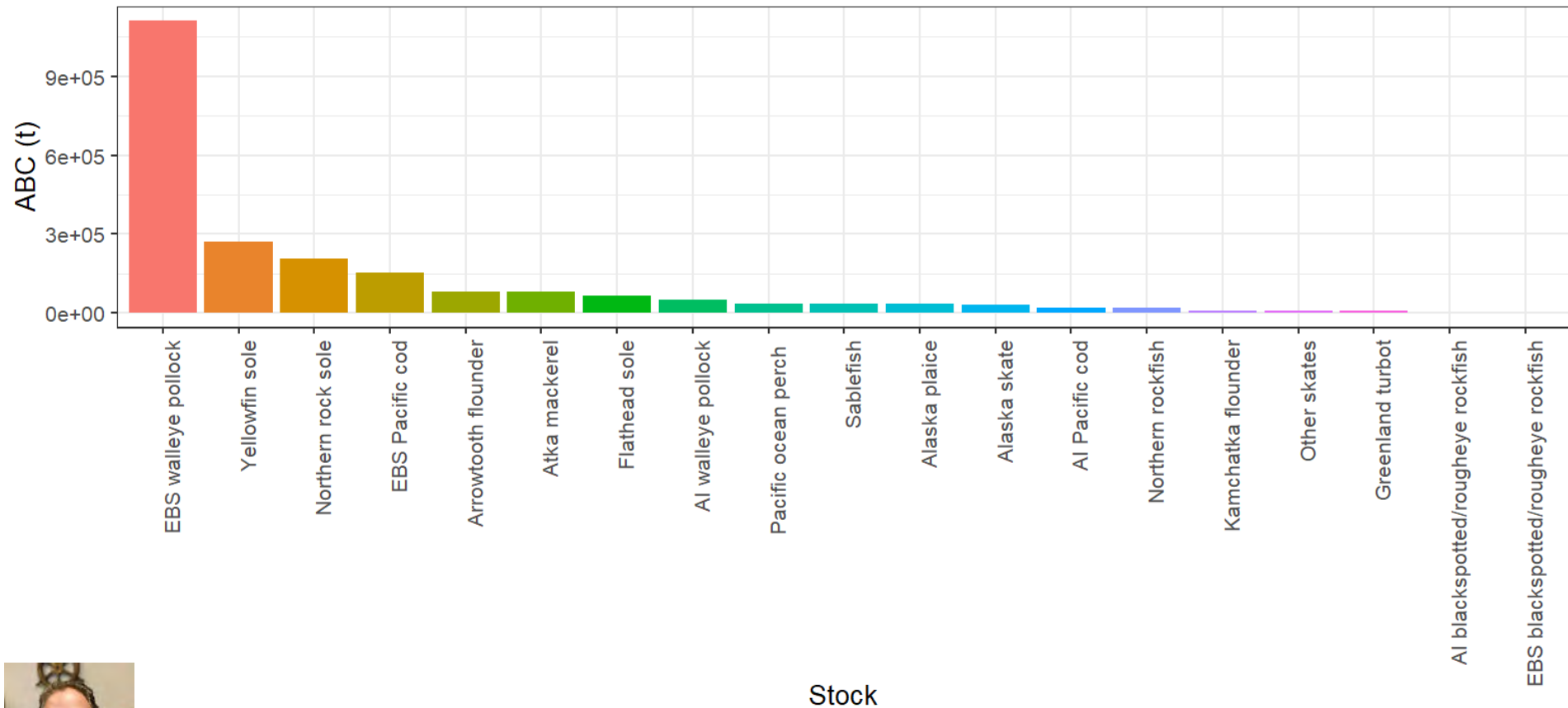


BERING SEA AND ALEUTIAN ISLANDS SPAWNING BIOMASS (TIERS 1 AND 3)



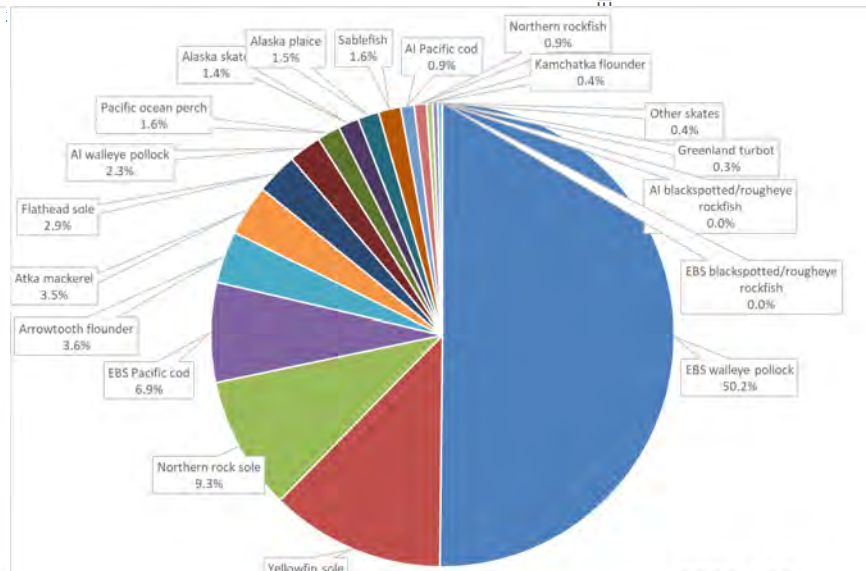
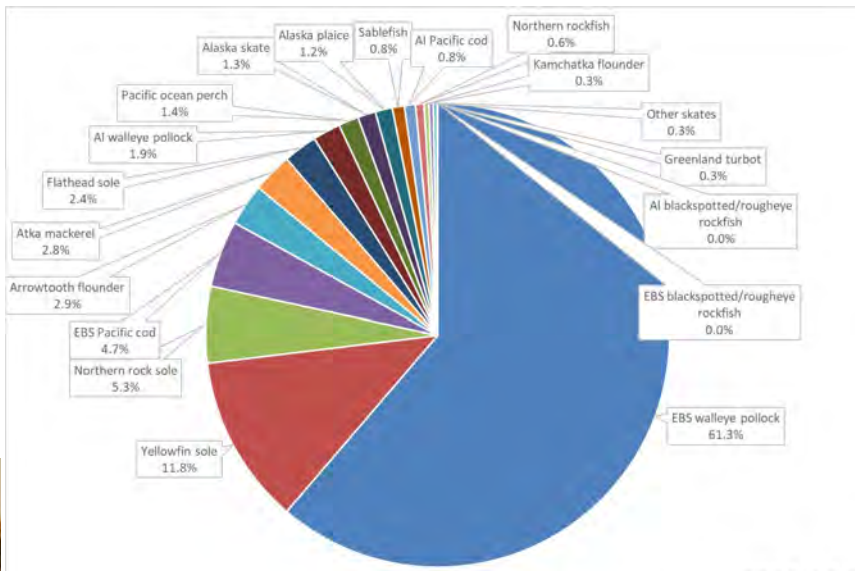
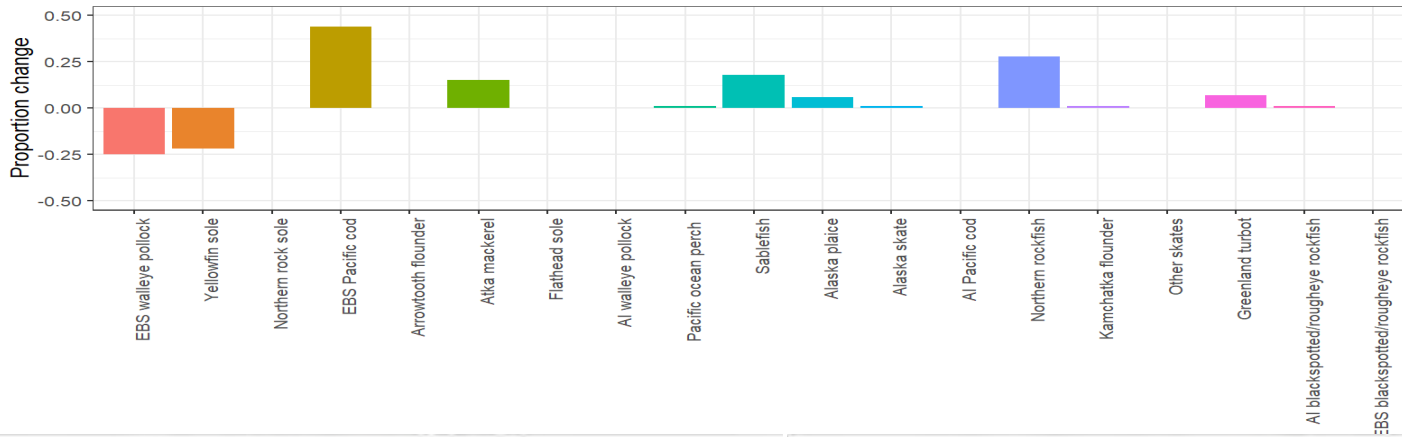


BERING SEA AND ALEUTIAN ISLANDS ALLOWABLE BIOLOGICAL CATCH (ABC)





BERING SEA AND ALEUTIAN ISLANDS CHANGE IN 2022 ABC PROJECTION



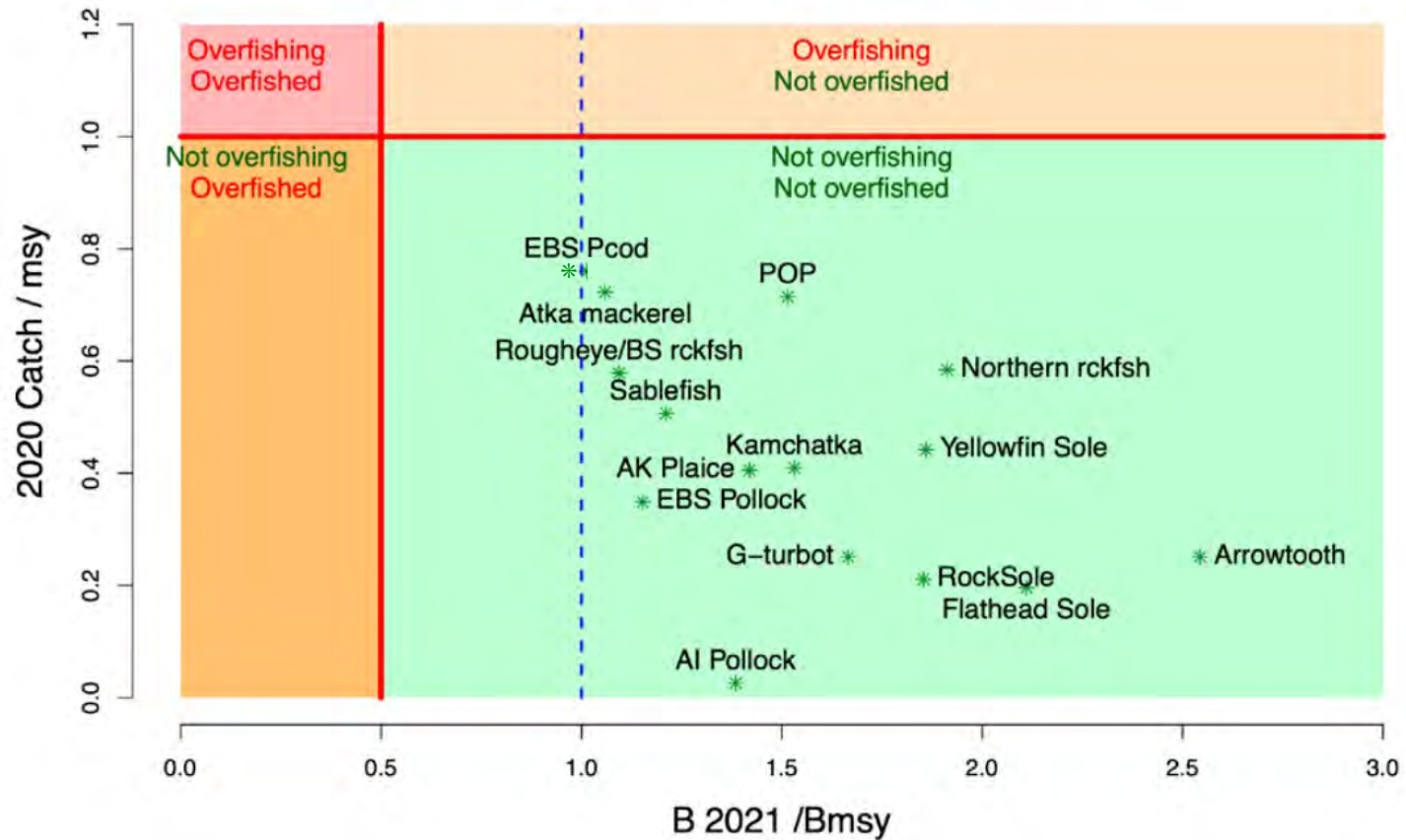
2021 ABC

2022 ABC



BERING SEA AND ALEUTIAN ISLANDS BIG PICTURE – STOCK STATUS

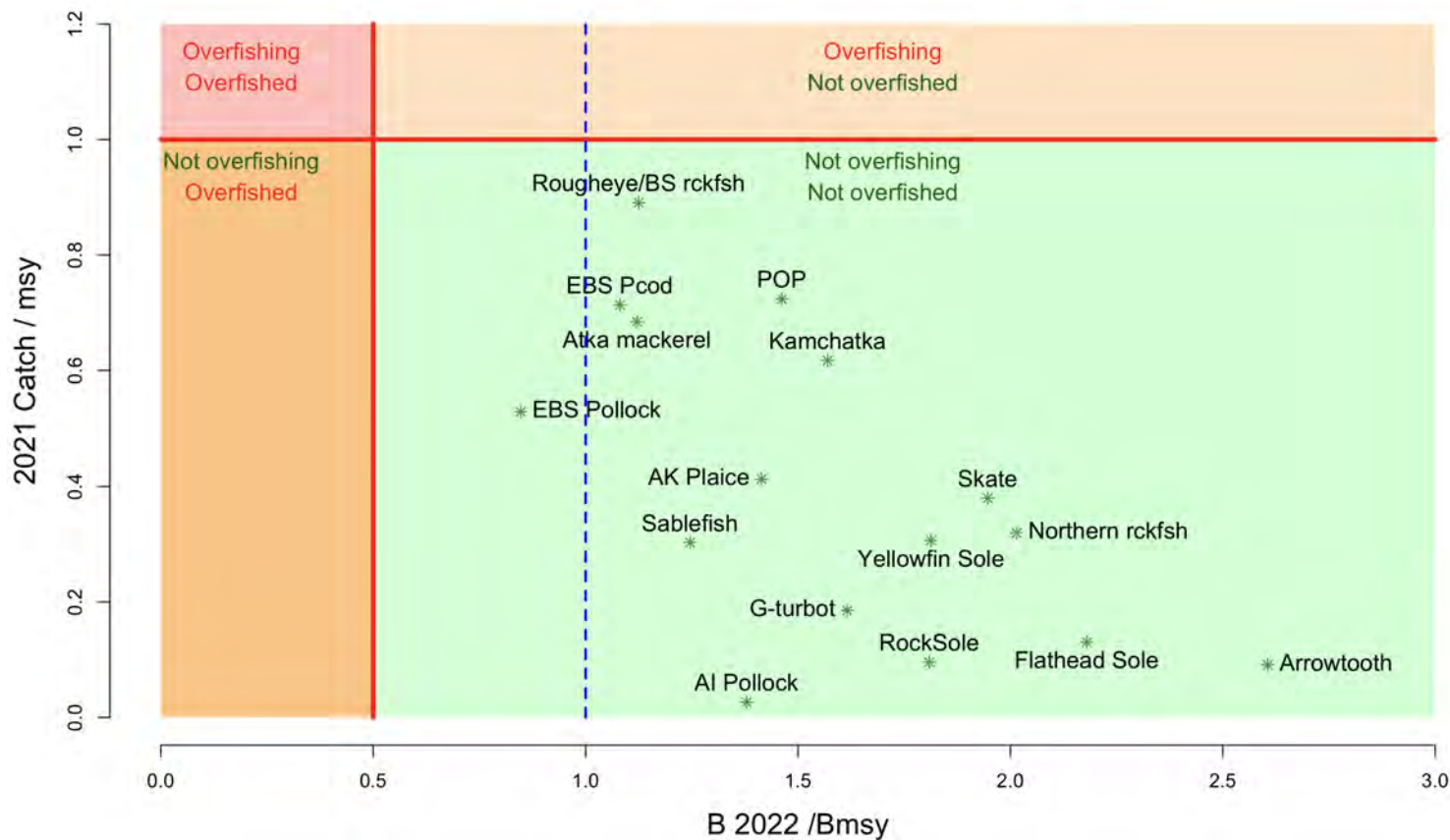
Bering Sea and Aleutian Islands





BERING SEA AND ALEUTIAN ISLANDS BIG PICTURE – STOCK STATUS

Bering Sea and Aleutian Islands

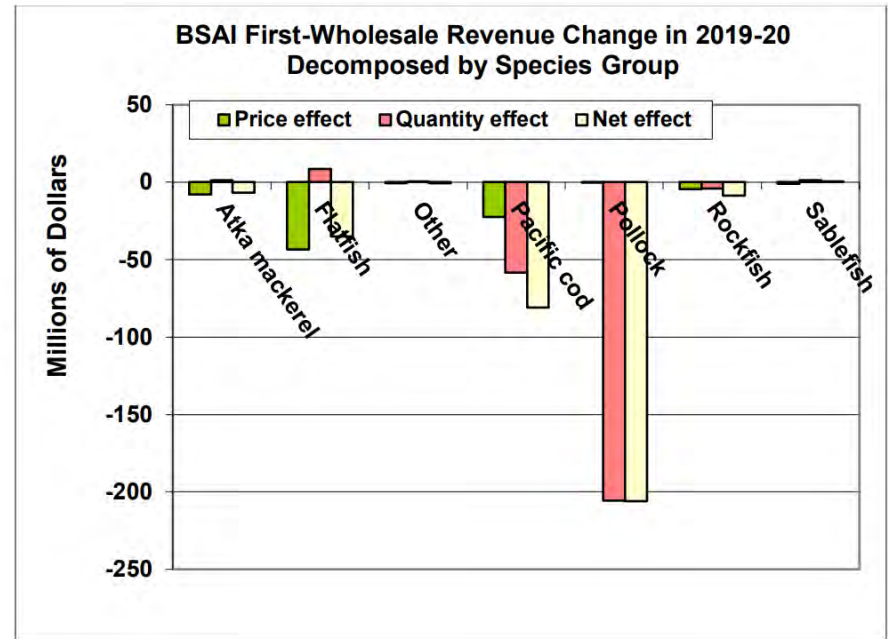
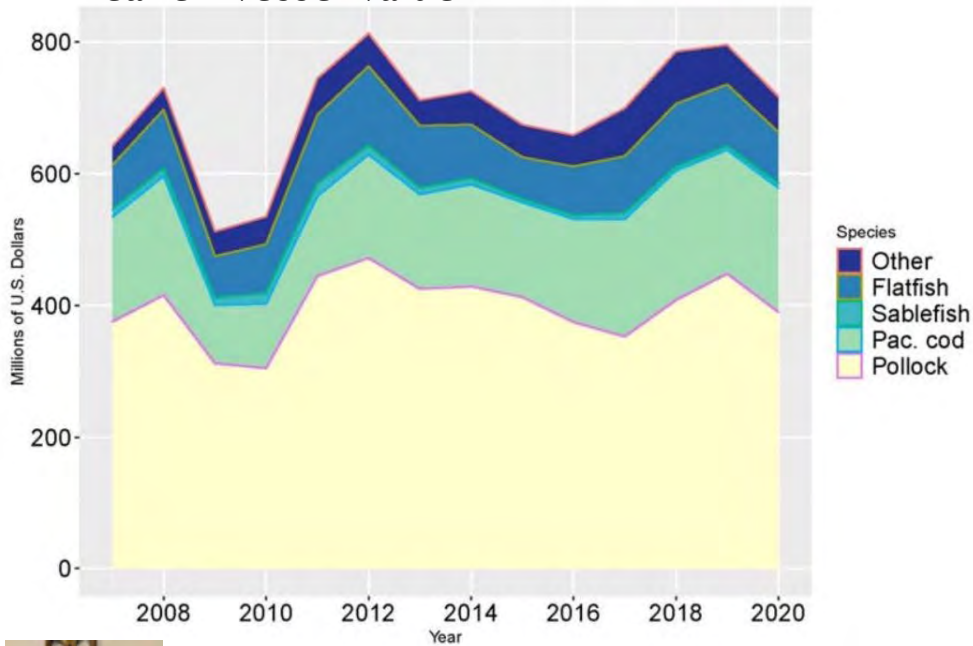




BERING SEA AND ALEUTIAN ISLANDS BIG PICTURE – ECONOMICS

- Overall decrease in value of BSAI harvested species from 2019 to 2020

Real ex-vessel value





REFERENCE POINT COMPARISONS (ALL CHAPTERS)

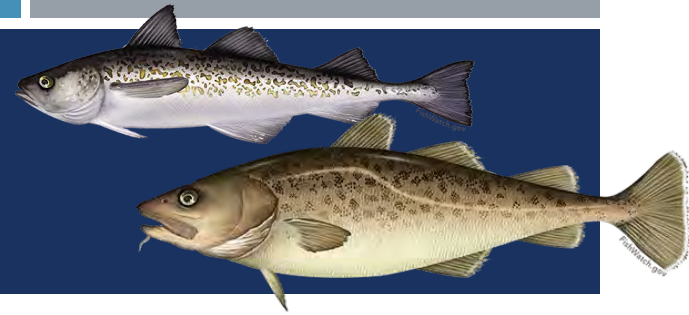
Quantity	Last asmt.	This asmt.	Change
M	0.098	0.100	0.02
2021 tier	3a	n/a	none
2022 tier	3a	3a	none
2021 age+ biomass	753,110	n/a	-0.24
2022 age+ biomass	789,584	574,599	-0.27
2021 spawning biomass	134,401	n/a	-0.04
2022 spawning biomass	191,503	128,789	-0.33
B100%	317,096	295,351	-0.07
B40%	126,389	118,140	-0.07
B35%	110,984	103,373	-0.07
2022 FOFL	0.117	0.094	-0.20
2022 FABC	0.042	0.080	0.90
2021 OFL	60,426	n/a	-0.33
2022 OFL	70,710	40,432	-0.43
2021 ABC	22,237	n/a	0.55
2022 ABC	29,309	34,421	0.17

Except where “quantity” is shaded, “change” represents the relative difference between *this* assessment’s value and *last* assessment’s value for the same quantity.

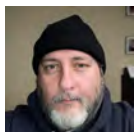
Where “quantity” is shaded, “change” represents the relative difference between *this* assessment’s value for **2022** and *last* assessment’s value for **2021**.



POLLOCK AND PACIFIC COD SUMMARY



Stock	Tier	2022 ABC (t)	2022 OFL (t)	Change from 2021 ABC/OFL	Change from 2022 ABC/OFL
EBS Pollock	1b	1,111,000	1,469,000	-0.32/-0.25	-0.25/-0.38
AI pollock	3a	50,789	61,264	-0.01	0.00
Bogoslof poll. (none)	5	85,109	113,479		
EBS Pacific cod	3b	153,383	183,012	0.24	0.43/0.44
AI Pacific cod	5	20,600	27,400	0.00	0.00





CHAPTER 1

EBS WALLEYE POLLOCK

- New model(s): **yes**; change from base: **yes**; risk > I: **yes**
- Switch to authors' presentation (Team comments will follow)



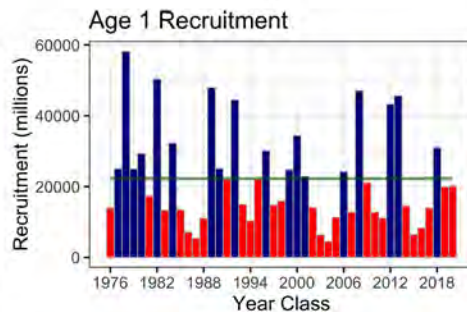
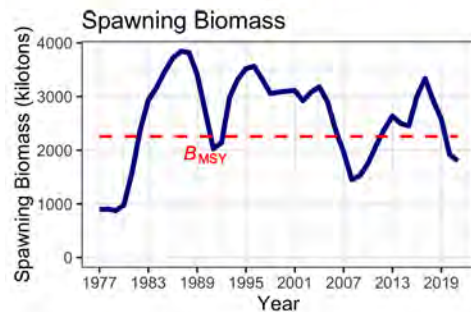
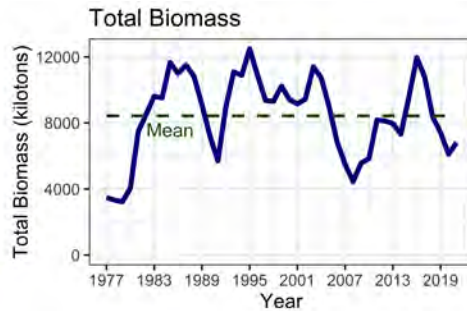
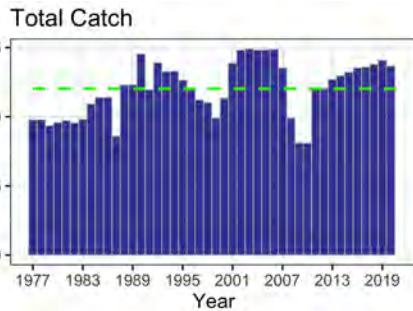


CHAPTER 1

EBS WALLEYE POLLOCK

- ABCs to be reduced by 11% from Tier 1 maxABC in 2022 and 2023, following the Tier 2 maxABC control rule

Quantity	Last asmt.	This asmt.	Change
M	0.30	0.30	0.00
2021 tier	1a	n/a	none
2022 tier	1a	1b	↓
2021 age+ biomass	8,145,000	n/a	-0.16
2022 age+ biomass	7,641,000	6,839,000	-0.10
2021 spawning biomass	2,602,000	n/a	-0.28
2022 spawning biomass	2,406,000	1,881,000	-0.22
B0	5,792,000	5,575,000	-0.04
Bmsy	2,257,000	2,220,000	-0.02
2022 FOFL	0.341	0.392	0.15
2022 FABC	0.214	0.296	0.38
2021 OFL	2,594,000	n/a	-0.43
2022 OFL	2,366,000	1,469,000	-0.38
2021 ABC	1,626,000	n/a	-0.32
2022 ABC	1,484,000	1,111,000	-0.25





CHAPTER 1

EBS POLLOCK RECOMMENDATIONS

EBS pollock genetics

- The Team commends Eleni Petrou, Eleanor Bors, Lorenz Hauser, and Ingrid Spies for their research into the genetics of walleye pollock, and supports efforts to obtain genetic samples from Russian waters for use in future such analyses

Multispecies models

- The Team recommends that authors work to streamline and coordinate the data pulls for single species assessments and CEATTLE in order to better align the data and multi-species model output for future use





CHAPTER 2

EBS PACIFIC COD

- New author: **no**; change from base: **yes**; risk table >1: **yes**
- ESP report card presented this year.
- Model changes/alternatives
 - Four models presented with a single ensemble of all:

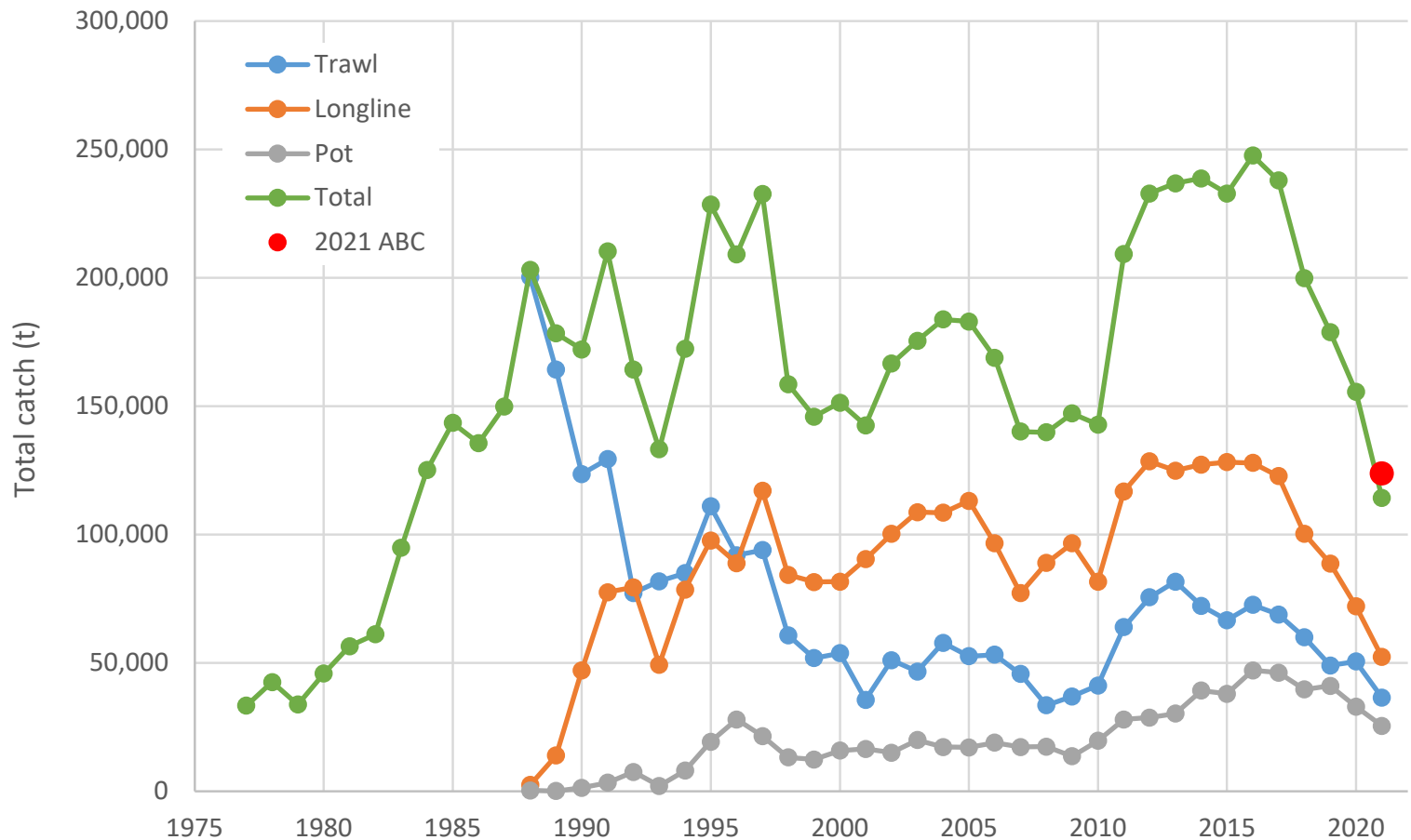
Feature	M19.12a	M19.12	M21.1	M21.2
Feature 1: Allow catchability to vary?	no	yes	no	no
Feature 2: Allow domed survey selectivity?	no	no	yes	no
Feature 3: Use fishery CPUE?	no	no	no	yes
Model weight	0.3158	0.2842	0.2316	0.1684





EBS PACIFIC COD OVERVIEW OF MODELS

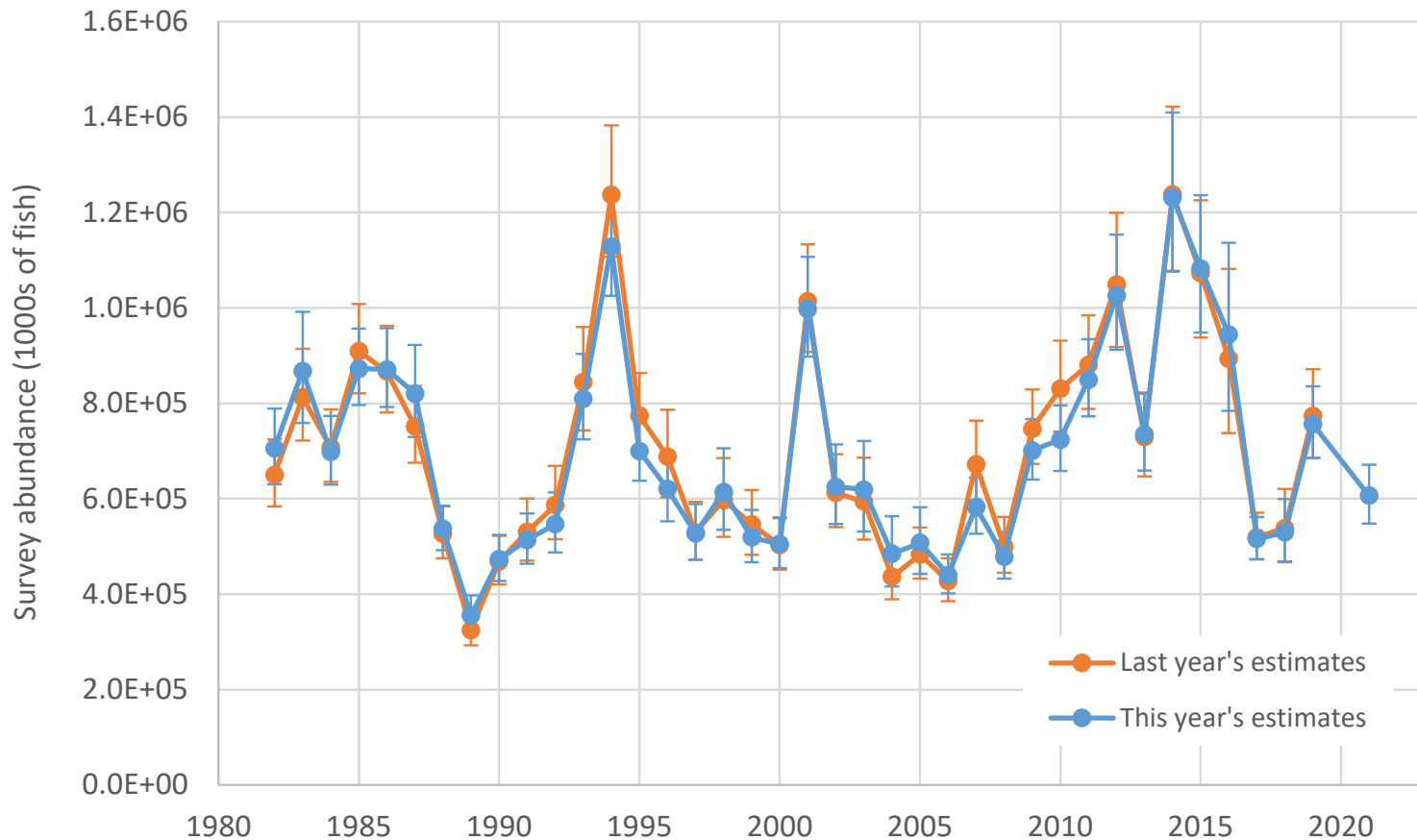
■ Catch time series





EBS PACIFIC COD OVERVIEW OF MODELS

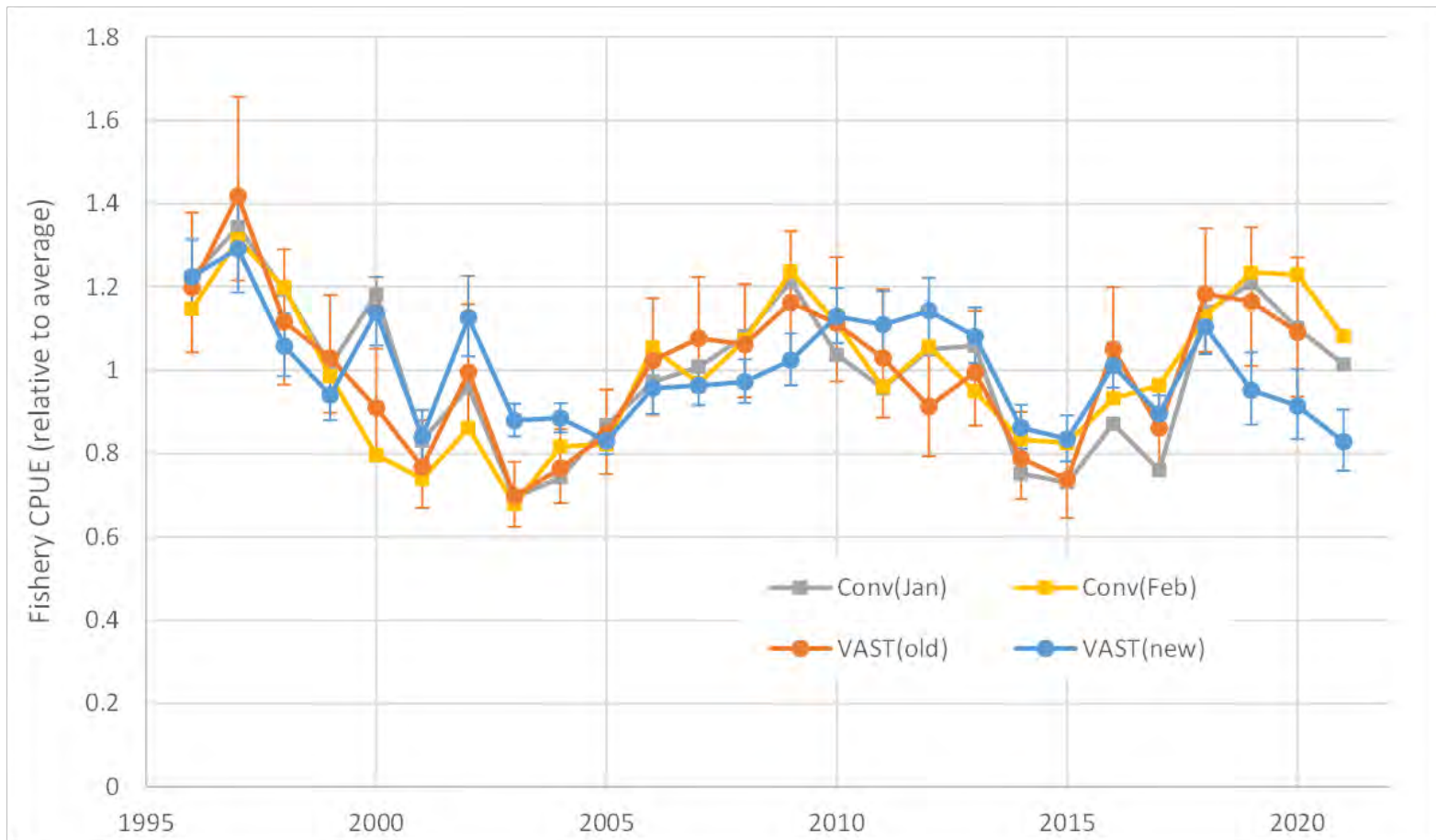
■ Survey abundance (VAST)





EBS PACIFIC COD OVERVIEW OF MODELS

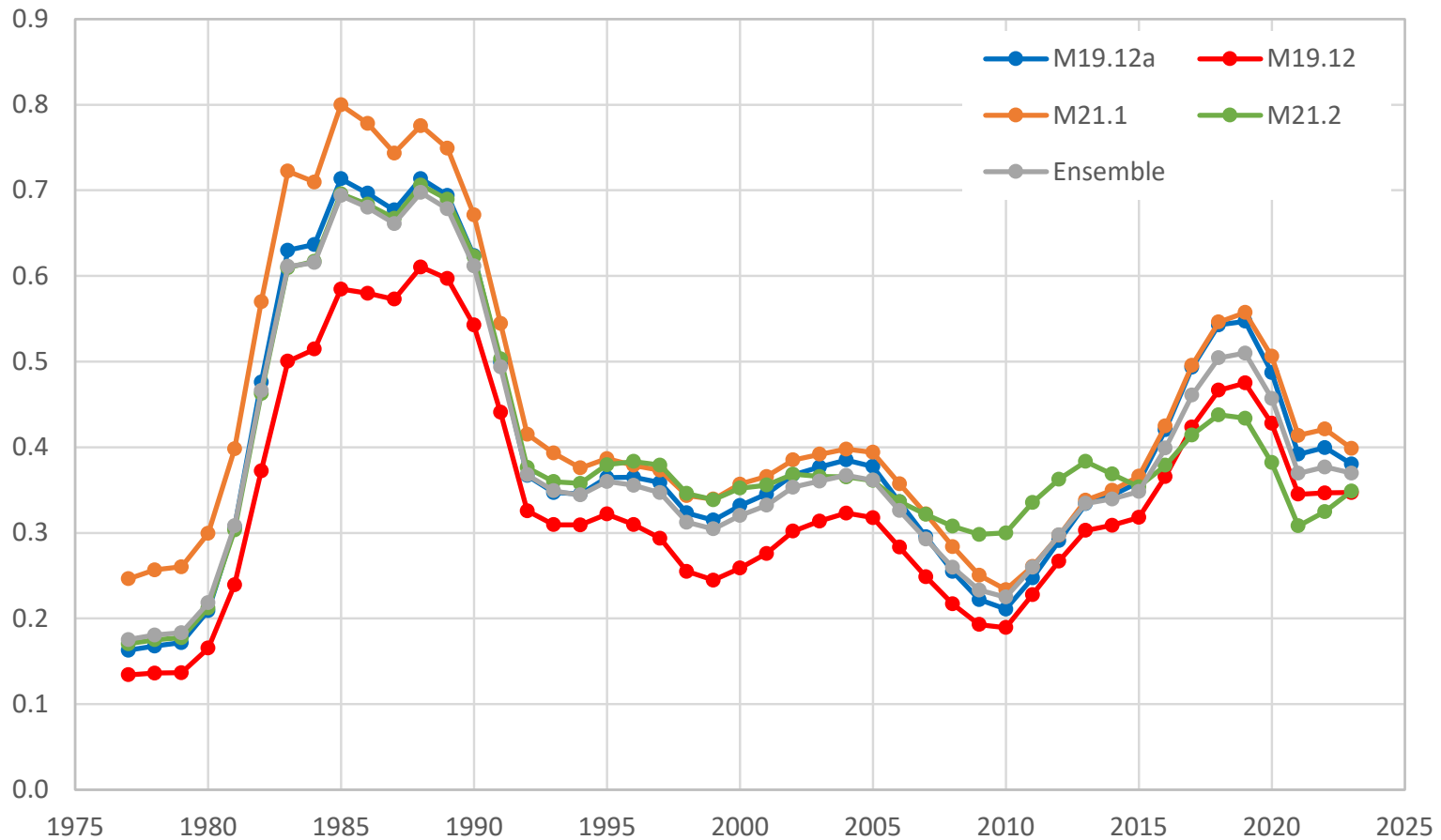
■ CPUE Indices





EBS PACIFIC COD OVERVIEW OF MODELS

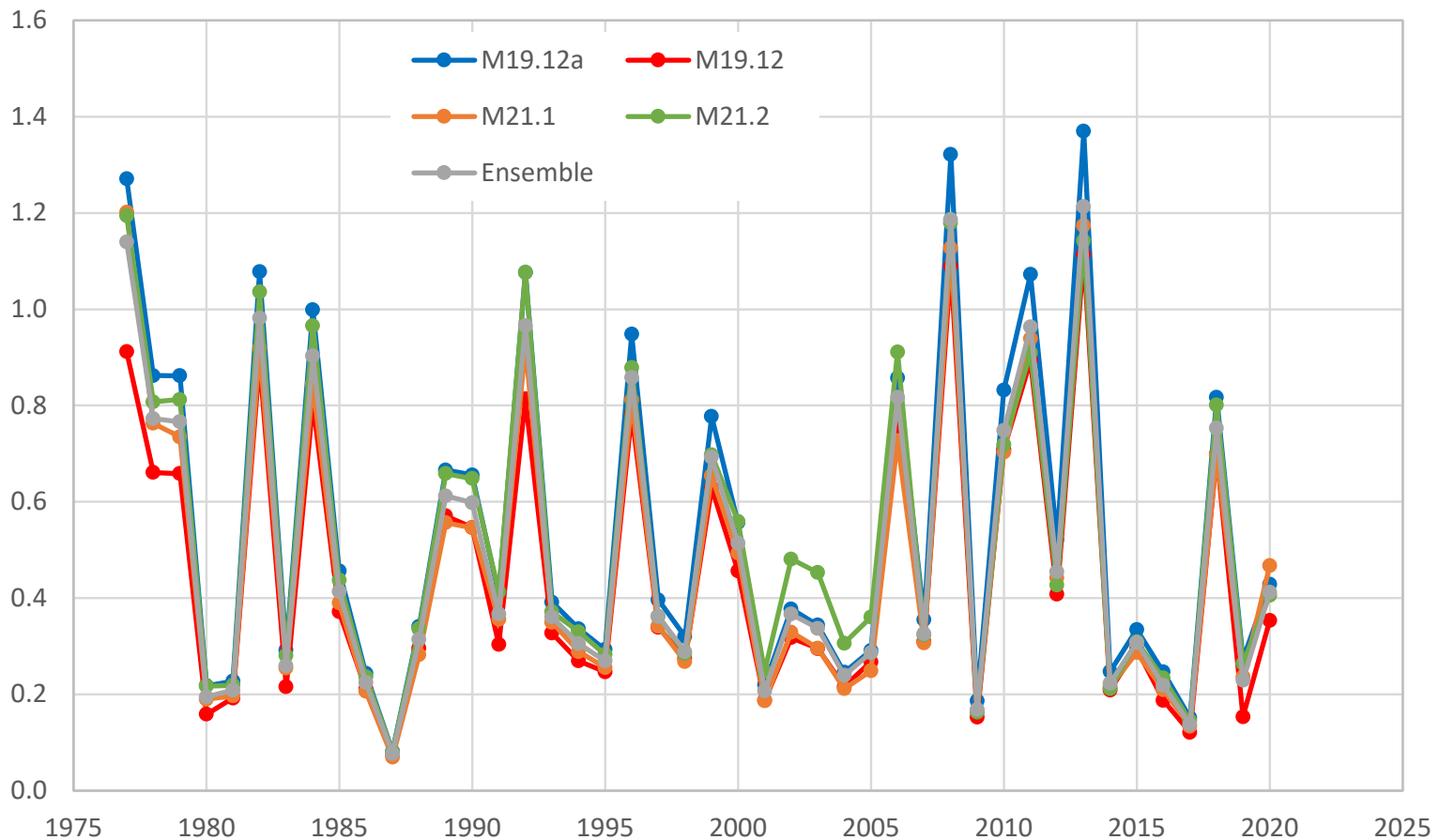
■ Female spawning biomass relative to $B_{100\%}$





EBS PACIFIC COD OVERVIEW OF MODELS

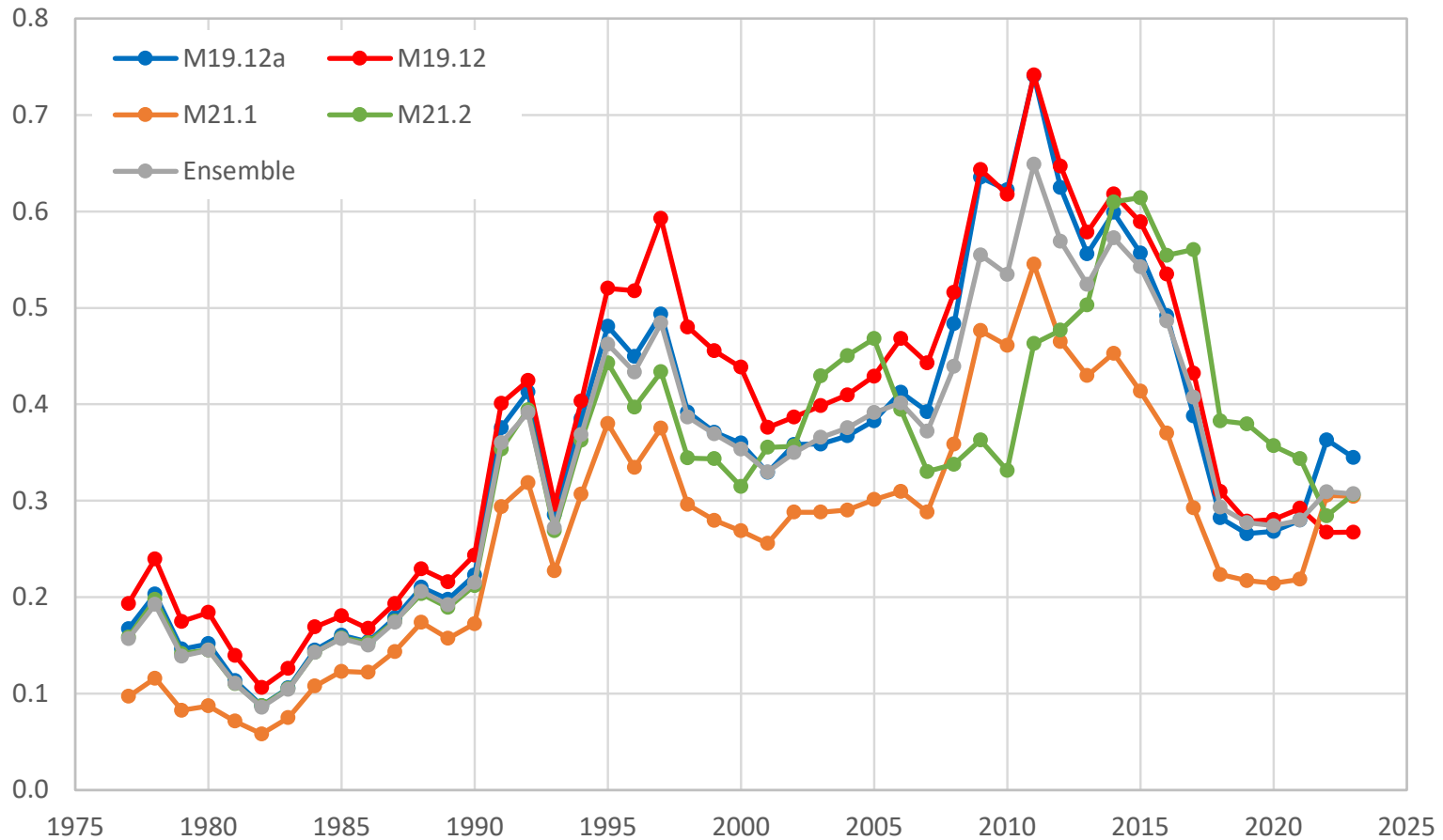
- Age 0 recruitment (billions of fish)





EBS PACIFIC COD OVERVIEW OF MODELS

■ Instantaneous full-selection fishing mortality rate





EBS PACIFIC COD OVERVIEW OF MODELS

- The Team adopted the SSC four model ensemble from September.
- The Team adopted the SSC weighting recommendation.

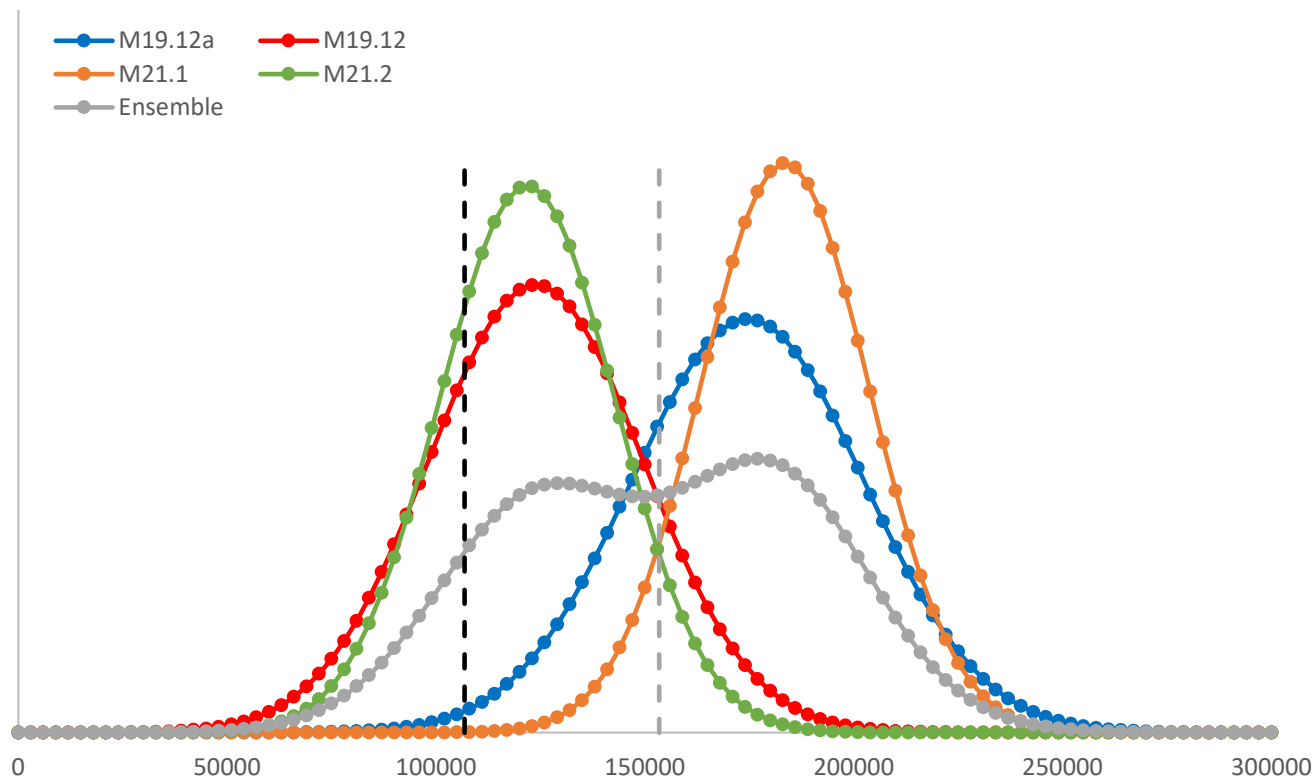
Feature	M19.12a	M19.12	M21.1	M21.2	Ensemble
Feature 1: Allow catchability to vary?	no	yes	no	no	n/a
Feature 2: Allow domed survey selectivity?	no	no	yes	no	n/a
Feature 3: Use fishery CPUE?	no	no	no	yes	n/a
Model weight	0.3158	0.2842	0.2316	0.1684	
Quantity					
$B_{100\%}$	648,370	667,265	774,300	671,275	686,761
2022 Female Spawning Biomass	259,007	231,344	326,101	218,078	259,789
2022 Relative spawning biomass	0.4	0.35	0.42	0.32	0.38
2022 maxABC	174,668	123,899	183,492	121,830	153,383
2022 OFL	208,791	148,656	216,920	146,026	183,012
2022 Pr(maxABC>truOFL)	0.15	0.21	0.08	0.17	0.28





EBS PACIFIC COD OVERVIEW OF MODELS

- 2022 ABC probability density (Hessian approximation)
 - Dashed lines: black = current specification; gray = ensemble mean





EBS PACIFIC COD OVERVIEW OF MODELS

- Change in 2022 ABC relative to 2022 ABC as currently specified:

2022 ABC (recommended)	2022 ABC (specified)	Change
153383	106852	44%

- All models showed increases from the preliminary assessment:

Quantity	Version(s)	M19.12a	M19.12	M21.2	M21.2
2022 ABC	2020 final	106852	91845	n/a	n/a
	2021 preliminary	105613	82924	115920	102594
	2021 final	174668	123899	183492	121830
Relative change	2021 prelim. v. 2020 final	-0.01	-0.10	n/a	n/a
	2021 final v. 2021 prelim.	0.65	0.49	0.58	0.19
	2021 final v. 2021 final	0.63	0.35	n/a	n/a





EBS PACIFIC COD OVERVIEW OF MODELS

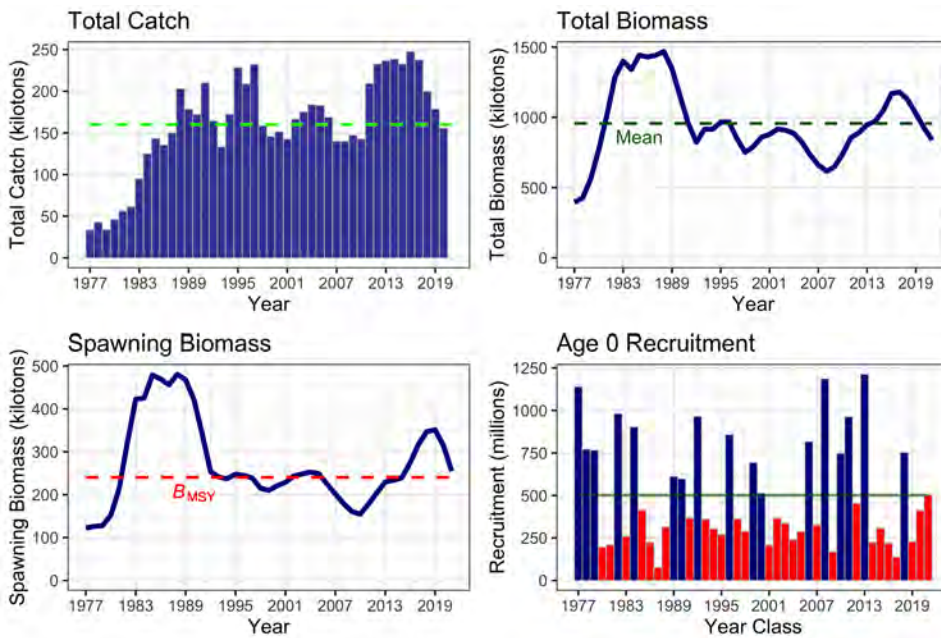
- Appendix 2.4: detailed analysis of the factors causing the increase
- Three changes in the data file (relative to last year's) account for 85% of the increase in projected 2022 ABC:
 - 2021 survey sizecomp data
 - 2021 survey index data
 - Revisions to the historic survey index data
- Within the sloping portion of the harvest control rule, ABC changes much more rapidly than biomass (e.g., as a first approximation, if biomass increases by a factor of X , ABC increases by a factor of X^2)





CHAPTER 2 EBS PACIFIC COD

- Declining spawning biomass trend from 2020, but increase in ABC with change in model fit.



Quantity	Last asmt.	This asmt.	Change
M	0.35	0.34	-0.03
2021 tier	3b	n/a	none
2022 tier	3b	3b	none
2021 age+ biomass	754,000	n/a	0.17
2022 age+ biomass	786,566	879,978	0.12
2021 spawning biomass	228,219	n/a	0.14
2022 spawning biomass	205,906	259,789	0.26
B100%	659,545	686,761	0.04
B40%	263,818	274,704	0.04
B35%	230,841	240,366	0.04
2022 FOFL	0.33	0.38	0.15
2022 FABC	0.27	0.31	0.15
2021 OFL	147,949	n/a	0.24
2022 OFL	128,340	183,012	0.43
2021 ABC	123,805	n/a	0.24
2022 ABC	106,852	153,383	0.44





CHAPTER 2

EBS PACIFIC COD RECOMMENDATIONS

- The Team recommends further consideration of ways to synthesize the EBS Pacific cod ESP and report card to succinctly convey the highlights.
- The Team recommends a more standardized approach continue to be developed within the Team and SSC process for defining appropriate sets of models and weighting of those models for use in management.
- The Team recommends exploring environmental drivers of weight-length residuals, especially in recent years.

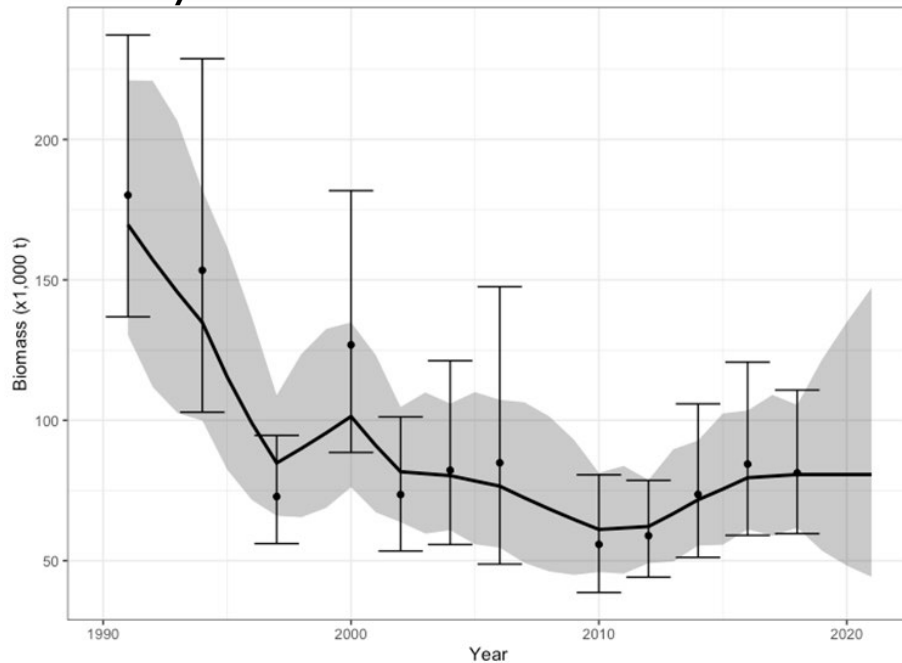




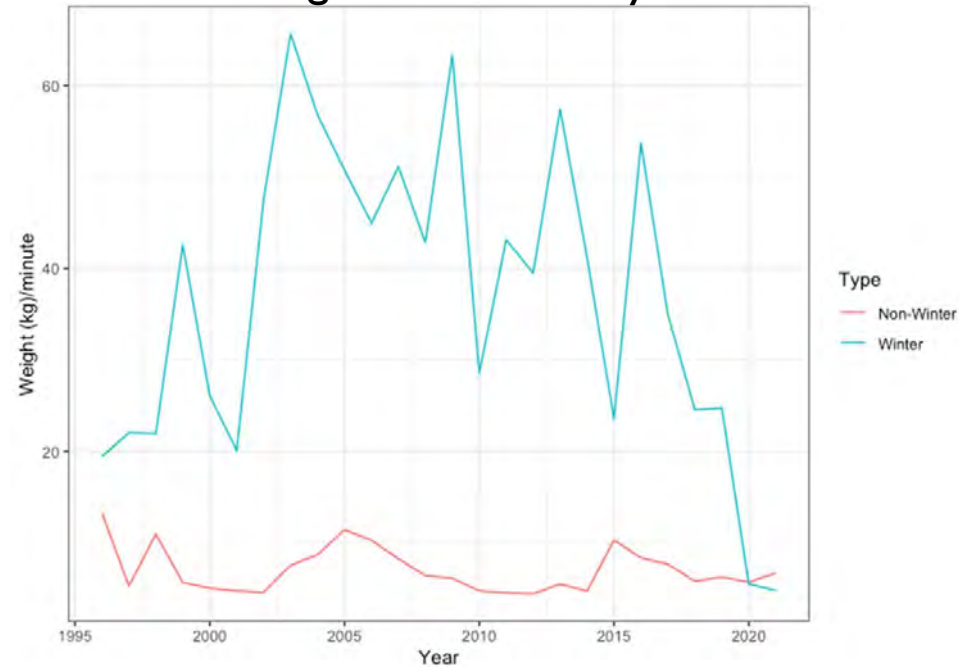
CHAPTER 2A AI PACIFIC COD

- >1 model: **yes**; change from base: **yes (author)**, **no (Team)**; risk>1: **yes**

Survey Biomass and RE model fit



CPUE trawl gear, all vessels by season

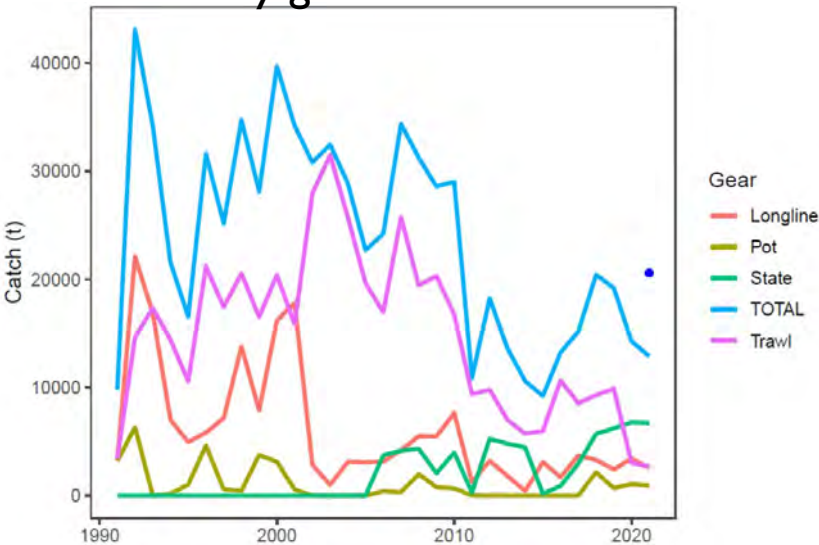




CHAPTER 2A: AI PACIFIC COD

- >1 model: **yes**; change from base: **yes (author)**, **no (Team)**; risk>1: **yes**

Catch by gear



2a. AI Pacific cod				
Quantity	Last asmt.	This asmt.	Change	
M	0.34	0.34	0.00	
2021 tier	5	n/a	none	
2022 tier	5	5	none	
Biomass	80,700	80,700	0.00	
2022 FOFL	0.34	0.34	0.00	
2022 FABC	0.255	0.255	0.00	
2021 OFL	27,400	n/a	0.00	
2022 OFL	27,400	27,400	0.00	
2021 ABC	20,600	n/a	0.00	
2022 ABC	20,600	20,600	0.00	





CHAPTER 2A

AI PACIFIC COD RECOMMENDATIONS

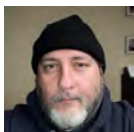
- The Team recommends further examination of fishery CPUE beginning with methods to control for changes in the fisheries and management. Joining current efforts looking at CPUE analyses of other Pacific cod stocks may be beneficial.
- The Team recommends further exploration of age-structured models given that there is likely to be an Aleutian Islands trawl survey in 2022.
- The Team also recommends that authors investigate other sources of fishery-independent data for application in Tier 5, or to fit these within age-structured models.



FLATFISH SUMMARY



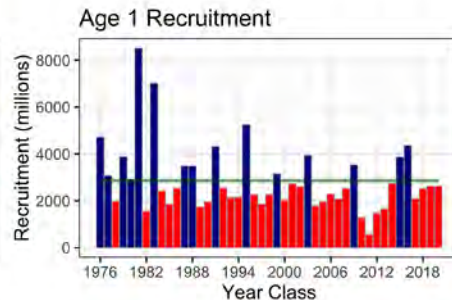
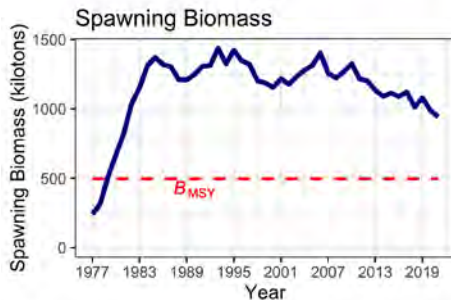
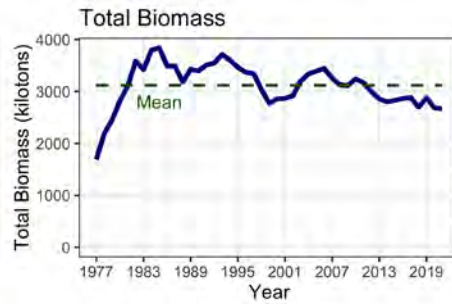
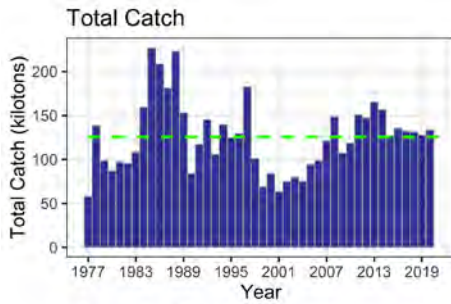
Stock	Tier	2022 ABC (t)	2022 OFL (t)	Change from 2021 ABC/OFL	Change from 2022 ABC/OFL
Yellowfin sole	1a	269,649	377,071	-0.14/0.10	-0.22/0.01
Greenland turbot	3a	6,572	7,687	-0.10	0.07
Arrowtooth flounder	3a	80,389	94,445	0.04	0.00
Kamchatka flounder	3a	9,214	10,903	0.03	0.01
Northern rock sole	1a	206,896	214,084	0.47	0.00
Flathead sole	3a	64,228	77,967	0.03	0.00
Alaska plaice	3a	32,697	39,305	0.03/0.04	0.06
Other flatfish (none)	5	17,189	22,919		





CHAPTER 4 YELLOWFIN SOLE

- New model(s): **yes**; change from base: **no**; risk>1: **yes**
- General slow decline in biomass
- Alternative models with VAST



Quantity	Last asmt.	This asmt.	Change
M (male/female)	0.12/0.135	0.12/0.135	0/0
2021 tier	1a	n/a	none
2022 tier	1a	1a	none
2021 age+ biomass	2,755,870	n/a	-0.10
2022 age+ biomass	3,025,430	2,479,370	-0.18
2021 spawning biomass	1,040,900	n/a	-0.18
2022 spawning biomass	996,044	857,101	-0.14
B0	1,528,700	1,489,190	-0.03
Bmsy	559,704	495,904	-0.11
2022 FOFL	0.124	0.152	0.23
2022 FABC	0.114	0.109	-0.04
2021 OFL	341,571	n/a	0.10
2022 OFL	374,982	377,071	0.01
2021 ABC	313,477	n/a	-0.14
2022 ABC	344,140	269,649	-0.22





CHAPTER 4

YELLOWFIN SOLE RISK TABLE AND REDUCTION FROM MAX ABC

- Author's risk table:

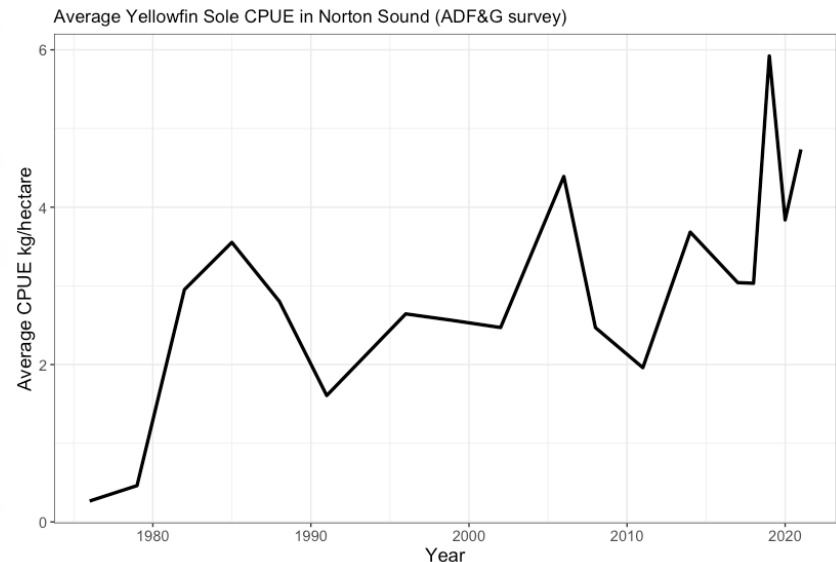
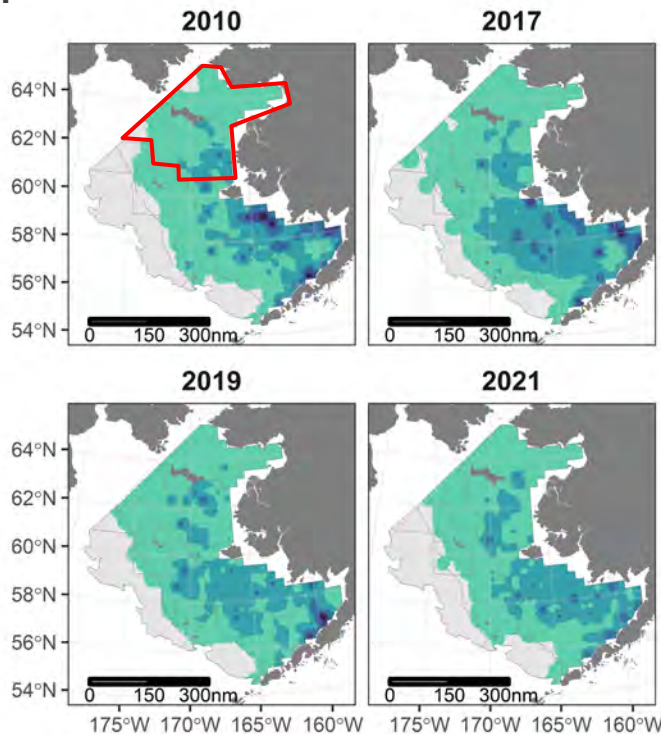
Year	Assess	PopDy	EnvEco	FishPerf
2019	1	1	1	1
2020	1	1	1	1
2021	1	2	2	1

- Population dynamics risk increased because the stock has been in a long-term decline and the 2021 survey estimate is the 3rd lowest
- Environmental/ecosystem risk increased because of thermal exposure and fish condition in the NBS
- Author recommends a 24% reduction from the 2022 Tier 1a maxABC, based on an average of the Tier 1a and Tier 3a maxABCs
- Team did not come to immediate consensus on reduction, after 6:6 vote Team agreed to defer to the author recommendation.



CHAPTER 4 YELLOWFIN SOLE RECOMMENDATIONS

- The Team recommends that the connection between the NBS and EBS portions of the yellowfin sole population be investigated and that alternative models be developed for consideration next year using the combined EBS and NBS VAST estimates for biomass and VAST-derived age composition data.





CHAPTER 4

YELLOWFIN SOLE RECOMMENDATIONS

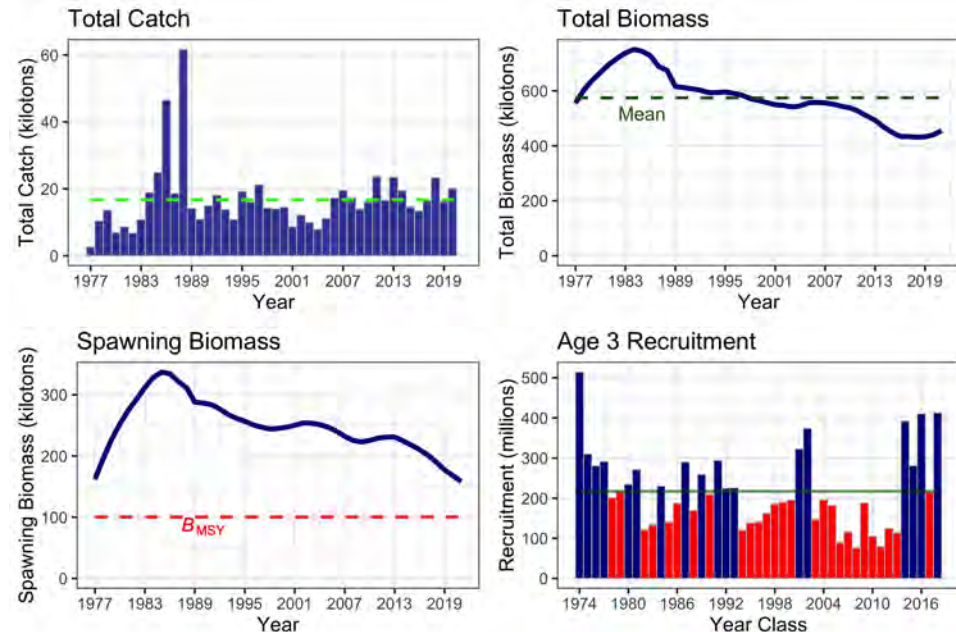
- The Team recommends that differences in length and weight at age for yellowfin sole between the areas (NBS and EBS) be investigated.
- The Team recommends the author investigate impacts of management changes since 2008 in the yellowfin sole fishery on fisheries data and subsequent impacts on estimates derived from these data, including mean length and age, length and weight at age, and selectivity.



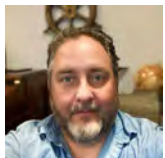
CHAPTER 10 ALASKA PLAICE



- New model(s): **no**; change from base: **no**; risk>1: **no**



Quantity	Last asmt.	This asmt.	Change
M	0.13	0.13	0.00
2021 tier	3a	n/a	none
2022 tier	3a	3a	none
2021 age+ biomass	427,587	n/a	0.04
2022 age+ biomass	430,164	442,946	0.03
2021 spawning biomass	166,528	n/a	-0.15
2022 spawning biomass	160,150	141,838	-0.11
B100%	335,172	286,587	-0.14
B40%	134,069	114,635	-0.14
B35%	117,310	100,306	-0.14
2022 FOFL	0.160	0.170	0.06
2022 FABC	0.132	0.140	0.06
2021 OFL	37,924	n/a	0.04
2022 OFL	36,928	39,305	0.06
2021 ABC	31,657	n/a	0.03
2022 ABC	30,815	32,697	0.06

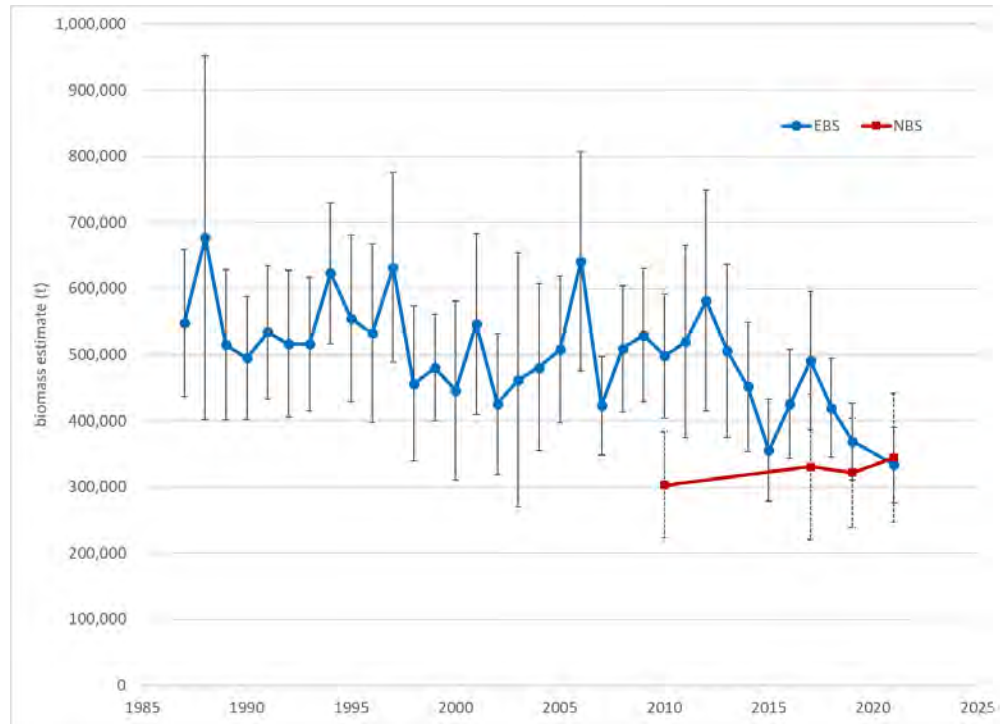
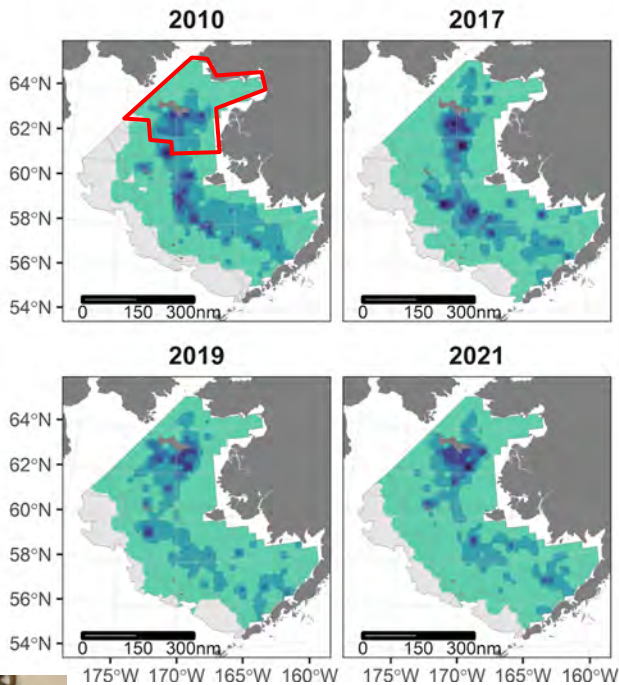


CHAPTER 10

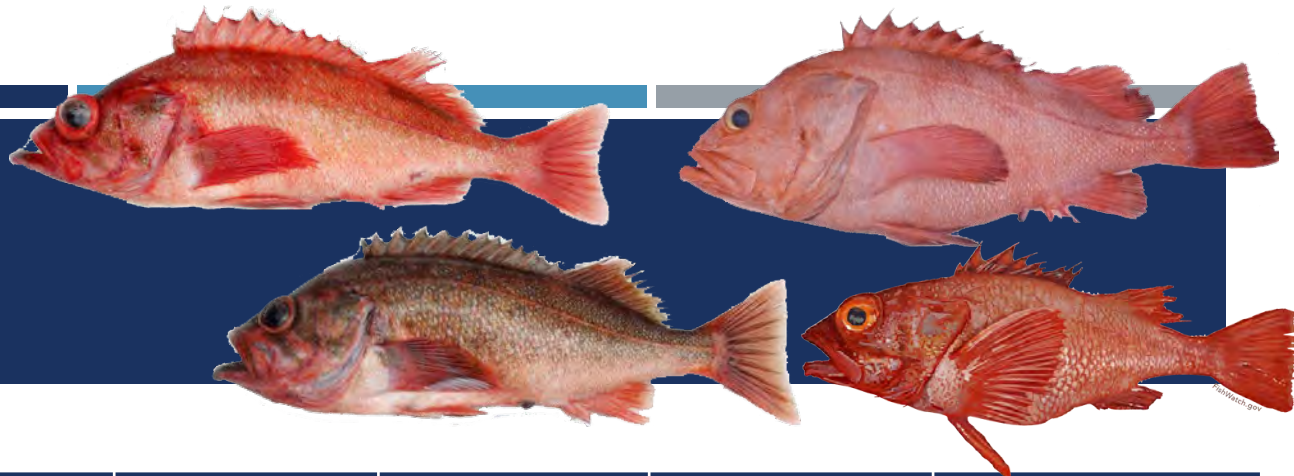
ALASKA PLAICE RECOMMENDATIONS



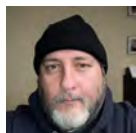
- The Team recommends that authors explore the relationship of the southern part of the stock in the EBS to the northern part of the stock in the NBS and consider developing models that include the NBS data.



ROCKFISH SUMMARY



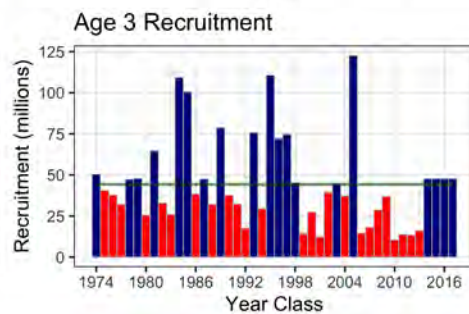
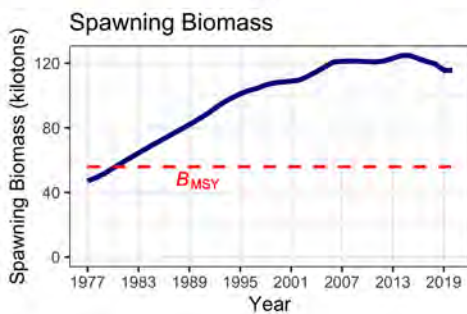
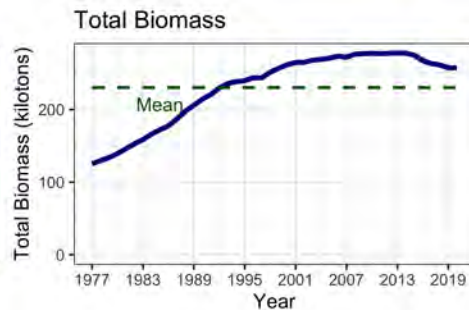
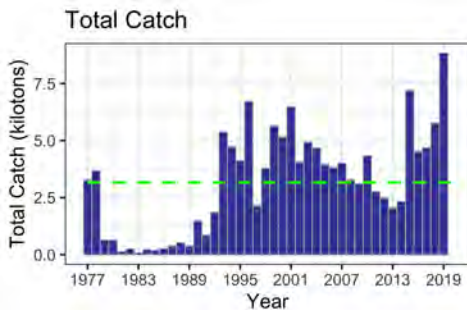
Stock	Tier	2022 ABC (t)	2022 OFL (t)	Change from 2021 ABC/OFL	Change from 2022 ABC/OFL
Pacific ocean perch	3a	35,668	42,605	-0.04	0.01
Northern rockfish	3a	19,217	23,420	0.24	0.28/0.29
Blackspotted/rougheye					
AI	3b	453	531	0.05/0.04	0.01
EBS	5	50	67	0.00	0.00
Shortraker rockfish (none)	5	541	722		
Other rockfish (none)	5	1,313	1,793		





CHAPTER 13 NORTHERN ROCKFISH

- New author: **no**; change from base: **no**; risk table >1: **no**
- Number of tows in 2019-20 targeting stock has doubled



Quantity	Last asmt.	This asmt.	Change
M	0.048	0.054	0.13
2021 tier	3a	n/a	none
2022 tier	3a	3a	none
2021 age+ biomass	244,600	n/a	0.14
2022 age+ biomass	240,022	279,584	0.16
2021 spawning biomass	107,003	n/a	0.13
2022 spawning biomass	103,467	121,126	0.17
B100%	159,850	171,768	0.07
B40%	63,940	68,707	0.07
B35%	55,947	60,119	0.07
2022 FOFL	0.075	0.085	0.13
2022 FABC	0.061	0.069	0.13
2021 OFL	18,917	n/a	0.24
2022 OFL	18,221	23,420	0.29
2021 ABC	15,557	n/a	0.24
2022 ABC	14,984	19,217	0.28



OTHER SUMMARY



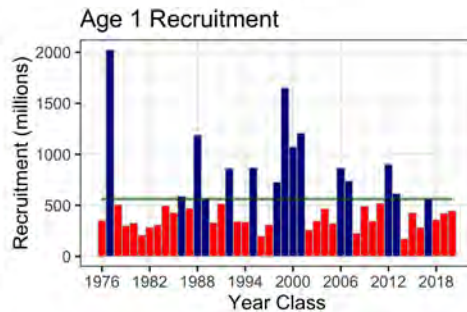
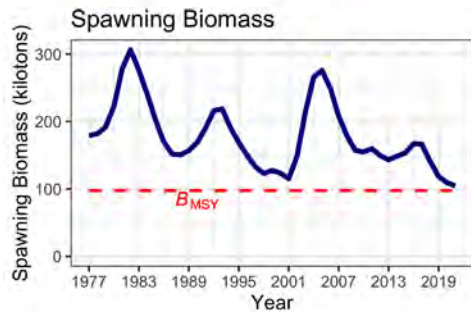
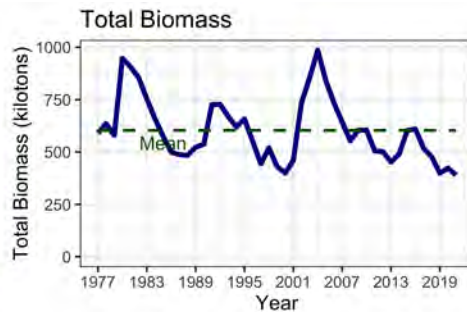
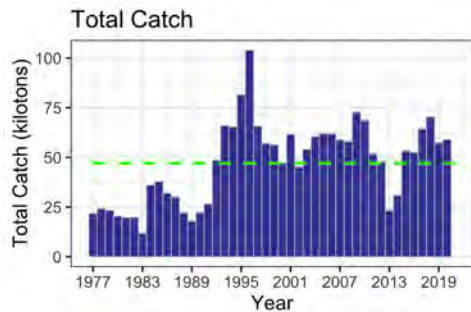
Stock	Tier	2022 ABC (t)	2022 OFL (t)	Change from 2021	Change from 2022
Atka mackerel	3b	78,510	91,870	0.07	0.15
Alaska skate	3a	31,920	37,073	-0.04	0.01
Other skate	5	8,038	10,717	0.00	0.00
Sharks (none)	6	517	689		
Octopus (none)	6	3,576	4,769		





CHAPTER 17 ATKA MACKEREL

- New model(s): **no**; change from base: **no**; risk>1: **no**
- Female spawning biomass in 2022 at 39% of unfished spawning biomass
- Below average recruitment since 2013



Quantity	Last asmt.	This asmt.	Change
M	0.30	0.30	0.00
2021 tier	3b	n/a	none
2022 tier	3b	3b	none
2021 age+ biomass	560,360	n/a	-0.01
2022 age+ biomass	599,690	554,490	-0.08
2021 spawning biomass	107,830	n/a	0.01
2022 spawning biomass	102,950	109,360	0.06
B100%	290,820	278,670	-0.04
B40%	116,330	111,470	-0.04
B35%	101,790	97,540	-0.04
2022 FOFL	0.49	0.65	0.33
2022 FABC	0.41	0.54	0.32
2021 OFL	85,580	n/a	0.07
2022 OFL	79,660	91,870	0.15
2021 ABC	73,590	n/a	0.07
2022 ABC	68,220	78,510	0.15





CHAPTER 17

ATKA MACKEREL RECOMMENDATIONS

- Area apportionment:
 - Except for the 2016 and 2017 assessments, when apportionments were based on the Tier 5 RE model, apportionments of Atka mackerel since the 2001 assessment have been based on a 4-survey weighted average, with weights of 8:12:18:27
 - Because no AI surveys have been conducted since 2018, the relative apportionments remain the same as in 2018-2020

4-Survey Weighted Average (Recommended)

	Survey Year				2022 & 2023	2022	2023
	2012	2014	2016	2018	Apportionment	ABC	ABC
541+SBS	12%	42%	35%	38%	0.35	27,260	25,000
542	39%	28%	30%	7%	0.21	16,880	15,470
543	48%	30%	35%	55%	0.44	34,370	31,520
Weights	8	12	18	27	1.00		
Total ABC						78,510	71,990

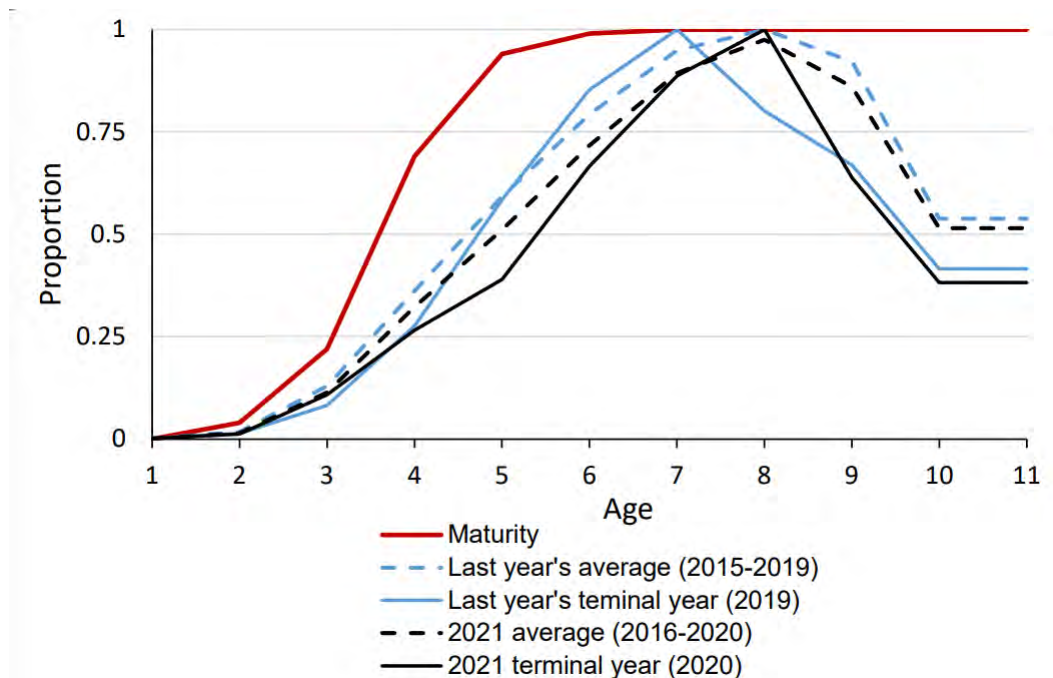




CHAPTER 17

ATKA MACKEREL RECOMMENDATIONS

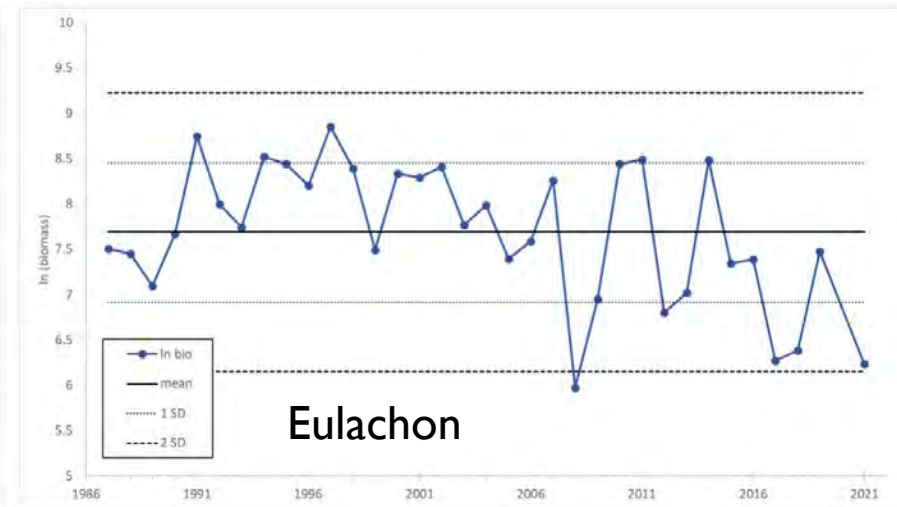
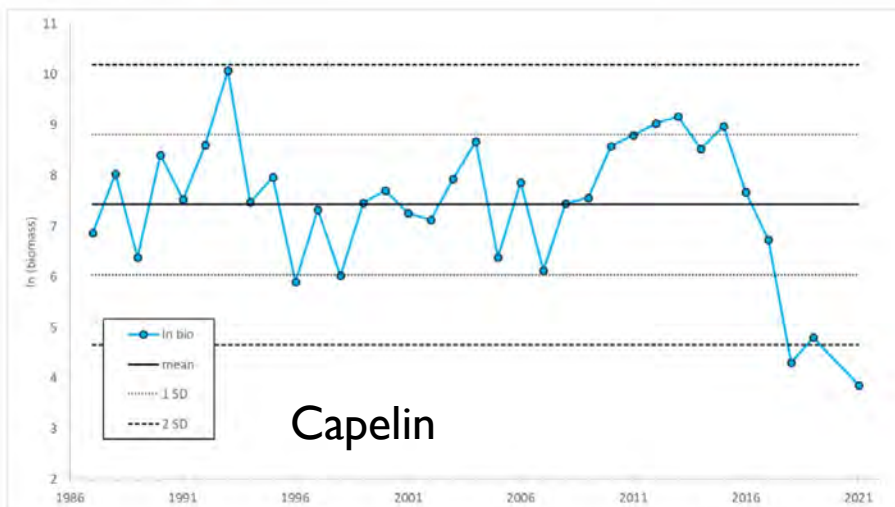
- The Team recommends that the authors continue research into possible reasons for dome-shaped fishery and survey selectivity patterns, including senescence or differential distribution by age.



FORAGE SPECIES

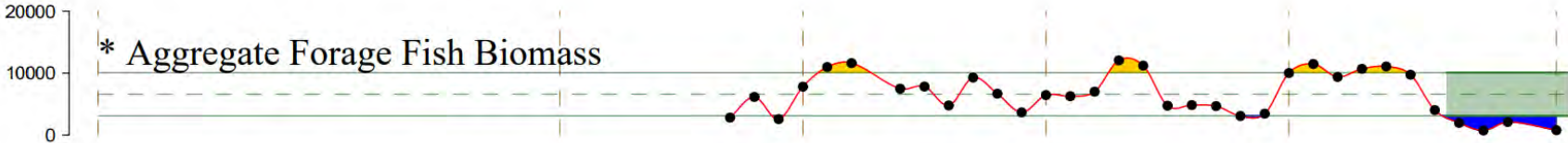


- Capelin, eulachon, and other FMP forage species have decreased greatly in abundance since 2015. This general pattern occurs in the EBS and NBS.
- Herring abundance is relatively high in the eastern Bering Sea shelf bottom trawl survey.
- Prohibited Species catch (PSC) of Pacific herring exceeded the limit, and event discussed in the 2020 ESR; the herring bycatch in 2021 is high relative to previous years but is below the limit.

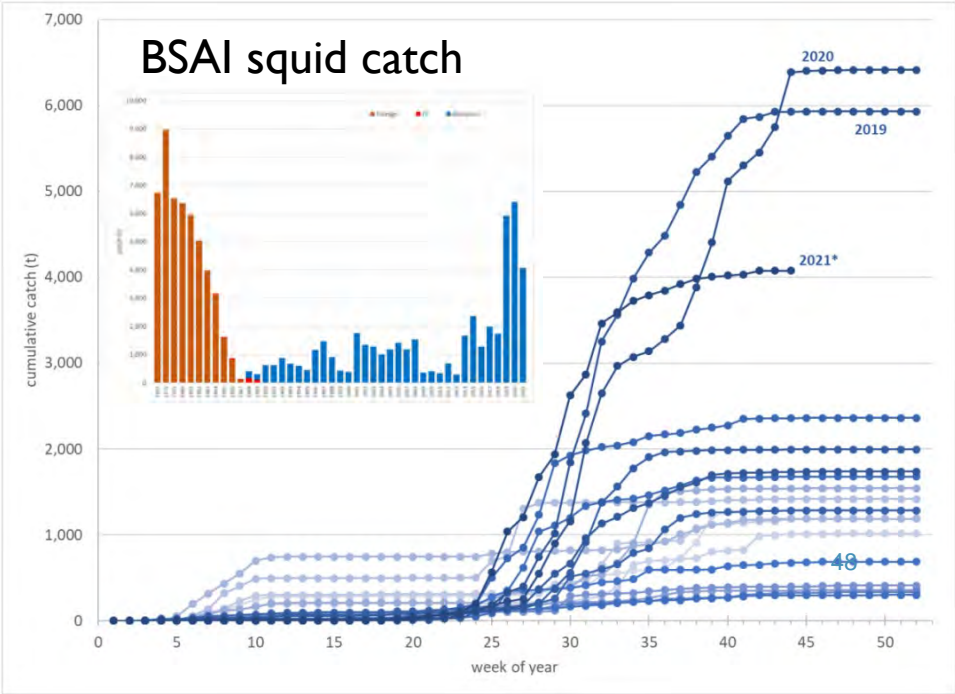




- Aggregate forage index shows a decreasing trend in abundance since 2015



- Squid show increase in catch since moving to ecosystem component in 2019



FORAGE SPECIES RECOMMENDATIONS



- The Team recommends a forage species workshop where scientists, members of the Teams, SSC, and Council staff discuss
 - 1) surveying and population estimation of forage species,
 - 2) importance of forage to different managed species (e.g., evaluate the suite of current food web models),
 - 3) questions about how climate change may impact forage biomass and exploitation rates,
 - 4) how best to report on changing populations, scientific knowledge about forage species, and the dependence of other species on them; including timing, frequency, and scope of the report, and 5) potential resulting management measures from shift in bycatch or spatial distribution of the forage base.
- The Team recommends coordinating with the editors of the ESR to reduce redundancy in reporting between the forage and ESR report and consider a combined forage species report for Alaska rather than the two separate regional reports.





RECOMMENDED HARVEST SPECIFICATIONS

Species	Area	2021		TAC	Catch as of 11/6/2021	Plan Team Final 2022			Plan Team Final 2023	
		OFL	ABC			OFL	ABC	TAC	OFL	ABC
Pollock	EBS	2,594,000	1,828,000	1,375,000	1,373,712	1,489,000	1,111,000		1,704,000	1,289,000
	AI	81,856	51,241	19,000	1,835	81,284	50,752		81,379	50,825
	Bogoslof	113,479	85,109	250	50	113,479	85,109		113,479	85,109
Pacific cod	BS	147,949	123,805	111,380	105,537	183,012	153,383		180,909	151,709
	AI	27,400	20,600	13,796	7,023	27,400	20,600		27,400	20,600
Sablefish	BSAI/GOA	80,428	29,558			40,432	34,521		42,520	36,318
	BS	n/a	3,398	3,398	3,961		5,264			6,529
	AI	n/a	4,717	4,717	1,425		6,463			7,786
Yellowfin sole	BSAI	341,571	313,477	200,000	104,669	377,071	269,649		382,035	274,787
Greenland turbot	BSAI	8,588	7,326	6,025	1,586	7,887	6,572		6,898	5,724
	BS	n/a	6,176	5,125	1,129		5,540			4,825
	AI	n/a	1,150	900	457		1,032			899
Arrowtooth flounder	BSAI	90,873	77,349	15,000	8,286	94,445	80,389		97,944	83,389
Kamchatka flounder	BSAI	10,630	8,982	8,982	6,561	10,903	9,214		11,115	9,393
Northern rock sole	BSAI	145,180	140,308	54,500	13,898	214,084	208,896		280,621	271,199
Flathead sole	BSAI	75,863	62,567	25,000	9,898	77,967	64,288		80,034	65,988
Alaska plaice	BSAI	37,924	31,657	24,500	15,653	39,305	32,897		39,685	32,998
Other flatfish	BSAI	22,919	17,189	6,500	2,510	22,919	17,189		22,919	17,189
	BSAI	44,376	37,173	35,899	32,112	42,605	35,688		40,977	34,322
Pacific Ocean perch	BS	n/a	10,782	10,782	8,679		10,352			9,956
	EAI	n/a	8,419	8,419	7,442		8,083			7,774
	CAI	n/a	6,198	6,198	5,885		5,950			5,722
	WAI	n/a	11,774	10,500	10,107		11,303			10,870
Northern rockfish	BSAI	18,917	15,557	13,000	6,045	23,420	19,217		22,594	18,538
Blackspotted/Rougheye Rockfish	BSAI	576	482	482	513	598	503		615	517
	EBS/EAI	n/a	313	313	211		326			334
	CAI/WAI	n/a	169	169	302		177			183
Shortraker rockfish	BSAI	722	541	500	521	722	541		722	541
Other rockfish	BSAI	1,751	1,313	916	900	1,751	1,313		1,751	1,313
	BS	n/a	919	522	332	n/a	919		n/a	919
	AI	n/a	394	394	568	n/a	394		n/a	394
Atka mackerel	BSAI	85,580	73,590	62,257	58,571	91,870	78,510		84,440	71,990
	EAI/BS	n/a	25,760	25,760	22,598		27,260			25,000
	CAI	n/a	15,450	15,450	15,272		16,880			15,470
	WAI	n/a	32,380	21,047	20,701		34,370			31,520
Skates	BSAI	49,297	41,257	18,000	18,729	47,790	39,956		46,475	38,824
Sharks	BSAI	689	517	200	354	689	517		689	517
Octopuses	BSAI	4,769	3,576	700	161	4,769	3,576		4,769	3,576
Total	BSAI	3,945,315	2,747,727	2,000,000	1,774,309	2,953,182	2,322,082		3,253,770	2,564,366



ACTIONS FOR THE COUNCIL

1. Approve SAFE report
2. TACs and apportionments for 2022-2023 including state waters considerations for P. cod
 - MaxTAC table shows ABC and reductions for GHL leading to maximum amount of P cod that can be set as a recommended TAC
 - GHL = 39% AI ABC; 11% BS (+45t to Area O)
3. Flatfish flexibility ABC reserve for YFS, northern rock sole, flathead sole
 - Once TAC is set, set ABC surplus for each species and whether or not it should be reduced by a discretionary buffer (Table 7)
 - Designate some, all or none of the surplus as ABC reserve
 - NMFS inseason report (B2) provides 2021 flatfish exchanges by A80



ACTIONS FOR THE COUNCIL (CONT)

4. PSC limits:

- Crab PSC in trawl fisheries (Tables 8-11)
- Red King Crab Savings Subarea → closed due to closure of the Bristol Bay RKC fishery in 2021/2022
- Herring: 1% of EBS herring biomass (Table 9)
- Halibut PSC in trawl fisheries
 - Apportionments to target categories and seasons with the BSAI Trawl Limited Access sector (TLAS)
- Halibut PSC in hook and line fisheries
 - Apportionment to sector and season (HAL CP and CV); cod and non-cod



See memo for list of factors to be considered in seasonal apportionments of bycatch allowances

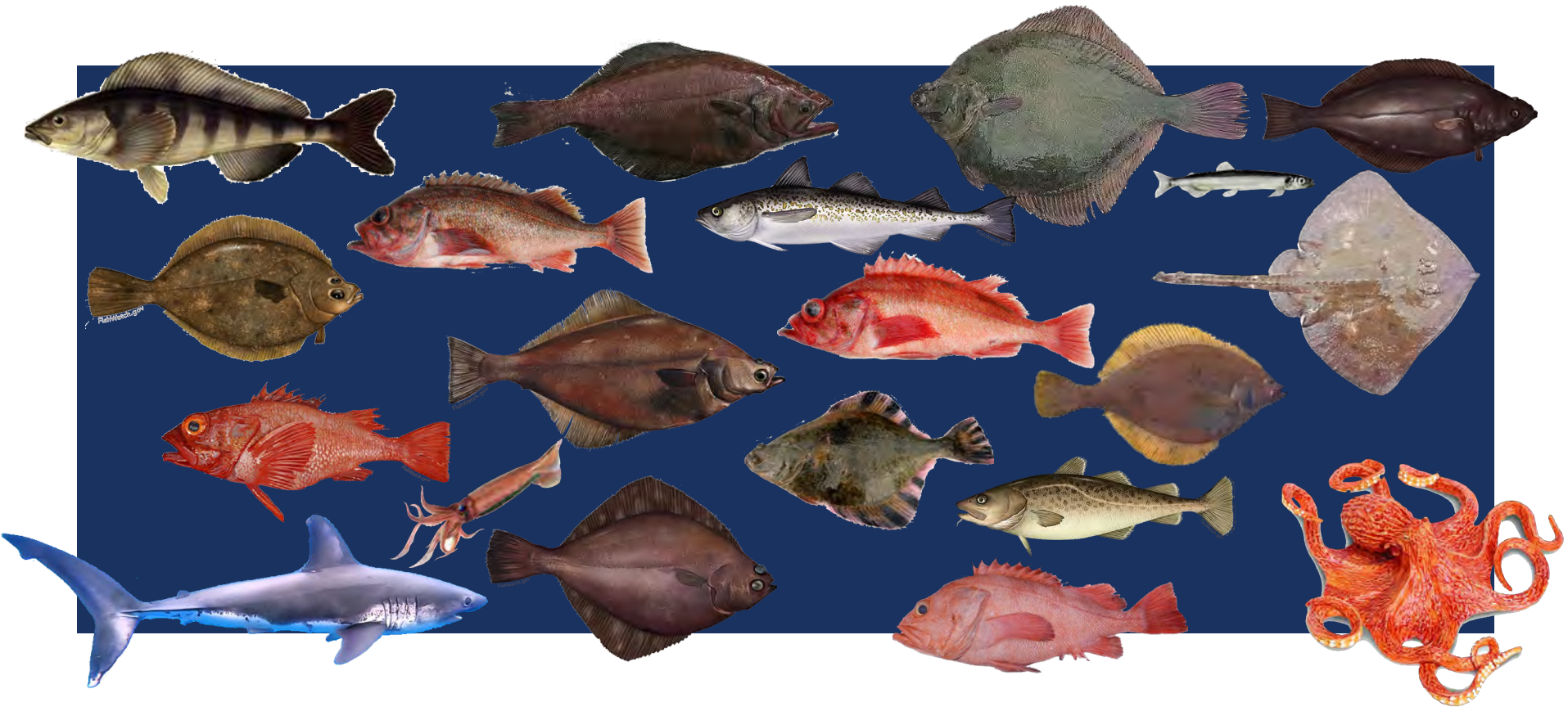
ACTIONS FOR THE COUNCIL (CONT)

5. Adopt Halibut Discard Mortality Rates (DMRs): Table 12

TABLE 12—PROPOSED 2022 AND 2023 PACIFIC HALIBUT DISCARD MORTALITY RATES (DMR) FOR THE BSAI

Gear	Sector	Halibut discard mortality rate (percent)
Pelagic trawl	All	100
Non-pelagic trawl	Mothership and catcher/processor	84
Non-pelagic trawl	Catcher vessel	62
Hook-and-line	Catcher vessel	10
Hook-and-line	Catcher/processor	10
Pot	All	33

THANK YOU





CHANGES IN REFERENCE POINTS (TIERS 1-3)

Quantity	EBS pollock	Al pollock	EBS P. cod	Sablefish	Yellowfin	G. turbot	Arrowtooth	Kamchatka	Rock sole	Flathead	AK plaice	POP	No. rockfish	Al blackspot.	Atka mack.	AK skate
2021 age+ biomass	-0.16	0.05	0.17	-0.24	-0.10	-0.04	0.00	0.00	0.47	0.01	0.04	-0.02	0.14	0.01	-0.01	-0.03
2022 age+ biomass	-0.10	0.00	0.12	-0.27	-0.18	0.06	0.00	0.01	0.00	0.00	0.03	0.00	0.16	0.00	-0.08	0.01
2021 spawning biomass	-0.28	0.00	0.14	-0.04	-0.18	-0.03	0.02	0.03	-0.02	0.03	-0.15	-0.03	0.13	0.03	0.01	-0.01
2022 spawning biomass	-0.22	0.04	0.26	-0.33	-0.14	0.07	0.00	0.01	0.00	0.00	-0.11	0.01	0.17	0.00	0.06	0.02
B0 (T1) or B100% (T3)	-0.04	0.00	0.04	-0.07	-0.03	0.00	0.00	0.00	0.00	0.00	-0.14	0.00	0.07	0.00	-0.04	0.00
B40% (T3 only)		0.00	0.04	-0.07		0.00	0.00	0.00		0.00	-0.14	0.00	0.07	0.00	-0.04	0.00
Bmsy (T1) or B35% (T3)	-0.02	0.00	0.04	-0.07	-0.11	0.00	0.00	0.00	0.00	0.00	-0.14	0.00	0.07	0.00	-0.04	0.00
2022 FOFL	0.15	0.00	0.15	-0.20	0.23	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.13	0.03	0.33	0.00
2022 FABC	0.38	0.00	0.15	0.90	-0.04	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.13	0.03	0.32	0.00
2021 OFL	-0.43	-0.01	0.24	-0.33	0.10	-0.10	0.04	0.03	0.47	0.03	0.04	-0.04	0.24	0.04	0.07	-0.04
2022 OFL	-0.38	0.00	0.43	-0.43	0.01	0.07	0.00	0.01	0.00	0.00	0.06	0.01	0.29	0.01	0.15	0.01
2021 ABC	-0.32	-0.01	0.24	0.55	-0.14	-0.10	0.04	0.03	0.47	0.03	0.03	-0.04	0.24	0.05	0.07	-0.04
2022 ABC	-0.25	0.00	0.44	0.18	-0.22	0.07	0.00	0.01	0.00	0.00	0.06	0.01	0.28	0.01	0.15	0.01



BSAI TEAM GENERIC AND ESR RECOMMENDATIONS

- **In General**

- The Team recommends that the AFSC prioritize research on best practices for specifying the selectivity schedules used in projections for Tier 1-3 stocks in general.

- **ESRs**

- The Team recommends the Ecosystem Status Report team develop calibrated language statements for certainty (uncertainty) to accompany key messages summarized in the Assessment and Report Card sections of each report (when possible).

- **Aleutian Islands**

- The Team recommends that an Integrated Research Project for the Aleutian Islands be initiated in order to help understand climatic, ecological, and social-economic mechanistic linkages in this highly complex region.

BSAI TEAM

POLLOCK AND COD RECOMMENDATIONS

■ EBS pollock



- The Team recommends that authors work to streamline and coordinate the data pulls for single species assessments and CEATTLE in order to better align the data and multi-species model output for future use.

■ EBS Pacific cod



- The Team recommends further consideration of ways to synthesize the EBS Pacific cod ESP and report card to succinctly convey the highlights.
- The Team recommends a more standardized approach continue to be developed within the Team and SSC process for defining appropriate sets of models and weighting of those models for use in management.
- The Team recommends exploring environmental drivers of weight-length residuals, especially in recent years.

■ AI Pacific cod



- The Team recommends further examination of fishery CPUE beginning with methods to control for changes in the fisheries and management. Joining current efforts looking at CPUE analyses of other Pacific cod stocks may be beneficial.
- The Team recommends further exploration of age-structured models given that there is likely to be an Aleutian Islands trawl survey in 2022.

BSAI TEAM FLATFISH RECOMMENDATIONS

■ Yellowfin sole



- The Team recommends that the connection between the NBS and EBS portions of the yellowfin sole population be investigated and that alternative models be developed for consideration next year using the combined EBS and NBS VAST estimates for biomass and VAST-derived age composition data.
- The Team recommends that differences in length and weight at age for yellowfin sole between the two areas be investigated.
- The Team recommends the author investigate impacts of management changes since 2008 in the yellowfin sole fishery on fisheries data and subsequent impacts on estimates derived from these data, including mean length and age, length and weight at age, and selectivity.

■ Alaska plaice



- The Team recommends that authors explore the relationship of the southern part of the stock in the EBS to the northern part of the stock in the NBS and consider developing models that include the NBS data.

■ Atka mackerel



- The Team recommends that the authors continue research into possible reasons for dome-shaped fishery and survey selectivity patterns, including senescence or differential distribution by age.



BSAI TEAM FORAGE SPECIES RECOMMENDATIONS

- The Team recommends a forage species workshop where scientists, members of the Teams, SSC, and Council staff discuss
 - 1) surveying and population estimation of forage species,
 - 2) importance of forage to different managed species (e.g., evaluate the suite of current food web models),
 - 3) questions about how climate change may impact forage biomass and exploitation rates,
 - 4) how best to report on changing populations, scientific knowledge about forage species, and the dependence of other species on them; including timing, frequency, and scope of the report, and
 - 5) potential resulting management measures from shift in bycatch or spatial distribution of the forage base.
- The Team recommends coordinating with the editors of the ESR to reduce redundancy in reporting between the forage and ESR report and consider a combined forage species report for Alaska rather than the two separate regional reports.

