Gulf of Alaska SAFE report

Report of the
Gulf of Alaska Groundfish
Plan Team meeting
Nov 16th-19th, 2021

GOA Plan Team Members

James Ianelli (co-chair)	AFSC
Chris Lunsford (co-chair)	AFSC
Sara Cleaver	NPFMC
Nat Nichols	ADFG
Jan Rumble	ADFG
Marysia Szymkowiak	AFSC/REFM
Pete Hulson	AFSC/ABL
Sandra Lowe	AFSC/REFM
Paul Spencer	AFSC/REFM
Craig Faunce	AFSC/FMA
Kresimir Williams	AFSC/RACE
Obren Davis	AKRO
Andrew Olson	ADFG

GOA assessment Overview

"On" year for GOA, NMFS bottom trawl survey occurred!

15 "full" assessments reviewed

4 "partial" assessments

Ecosystem Considerations summary

Western Gulf of Alaska 2021 Report Card

- The PDO continued its negative trend in 2021, reflecting cooling sea surface temperatures in the GOA.
- Summer (June-August) 2021 sea surface temperatures in the western GOA were generally lower than 2020, although spring surface temperatures were elevated.
- Mesozooplankton biomass (sampled April-Sept) decreased in 2020, indicating average foraging conditions for planktivorous predators.
- Copepod community size slightly increased in 2020 (sampled April-Sept) indicating there were slightly more large species available (often considered of higher nutritional quality).
- Motile epifauna biomass, observed during 2021 AFSC bottom trawl survey (May-Aug), decreased from 2019 to 2021.
- Trends in capelin, as sampled by rhinoceros auklets at Middleton Island (April-Aug.), continue to be minimal in seabird chick diets in recent years.
- Fish apex predator biomass, observed during 2021 AFSC bottom trawl survey (May-Aug), increased from 2019 to 2021 to within just above 1SD below the long-term mean.
- Black-legged kittiwakes reproductive success in 2021 (June-July) increased from 2020.
- Modelled estimates of western Gulf of Alaska Steller sea lion non-pup counts continued a slightly increasing trend from previous years; however realized counts for non-pups show the lowest values in this area since 2011.

Ecosystem Considerations summary

Eastern Gulf of Alaska 2021 Report Card

- La Nina conditions prevailed in winter 2020/2021 and are predicted for winter 2021/2022.
- Summer (June-Aug.) 2021 sea surface temperatures in the eastern GOA remain within 1SD of the long-term mean.
- Total zooplankton density in in SEAK inside waters (May-Aug) increased from 2020, suggesting improved foraging conditions for planktivorous fish, seabirds, and mammals.
- The overall copepod community size (ratio of large calanoid copepods to total calanoid copepods) decreased due to decreased densities of large copepods and increased densities of small copepods.
- Motile epifauna biomass, observed during 2021 AFSC bottom trawl survey (May-Aug), decreased from 2019 to 2021. Hermit crabs, brittle stars, and other echinoderms are all below their long-term means. Eelpouts have also decreased from 2019 to 2021.
- Estimated total mature herring biomass (age 3+) of Sitka herring in spring 2020 continued to increase to the largest value in the time series (since 1980). The two populations with ocean influence (Sitka Sound and Craig) were elevated while populations in SEAK inner waters and Prince William Sound increased but remained low.
- Fish apex predator biomass, observed during 2021 AFSC bottom trawl survey, trended downward from a high in 2015 to their second lowest value over the time series in 2021. The decrease over this time period has largely been driven by Arrowtooth flounder which are at their lowest value over the time series. Pacific halibut, sablefish, and Pacific cod, have all increased from 2019.
- Growth rates of piscivorous rhinoceros auklet chicks remain below the long-term mean in 2021 (June-July), a pattern since 2015, suggesting that the adults were unable to find sufficient prey to support optimal chick growth.
- Modelled estimates of eastern Gulf of Alaska Steller sea lion non-pup counts continue an increasing trend. However, counts suggest that non-pup have been lower than predicted in 2019 and 2017.

Ecosystem Considerations summary

SAFE introduction also included summaries on

- Regional Action Plan (RAP)
- Climate Integrated Modeling (GOACLIM) project

Overview

- 15 full assessments, 4 partials

Stock	Assessment	Tier
Pollock	Full	3
Pacific cod	Full	3
Sablefish	Full	3
N & S rock sole	Full	3
Shallow water flatfish	Full	5
Rex sole	Full	3
Arrowtooth flounder	Full	3
Pacific ocean perch	Full	3
Shortraker rockfish	Full	5
Other rockfish	Full	4/5/6
Rougheye & blackspotted rockfish	Full	3
Demersal shelf rockfish	Full	4/6
Atka mackerel	Full	6
Octopus	Full	6
Skates	Full	5
Deepwater flatfish (Dover)	*Partial*	*3/6*
Flathead sole	*Partial*	*3*
Northern rockfish	*Partial*	*3*
Dusky rockfish	Partial	3
Thornyhead rockfish	*None*	*5*
Sharks	*None*	*4/5/6*
Forage species (including Squid)	*None*	*eco*

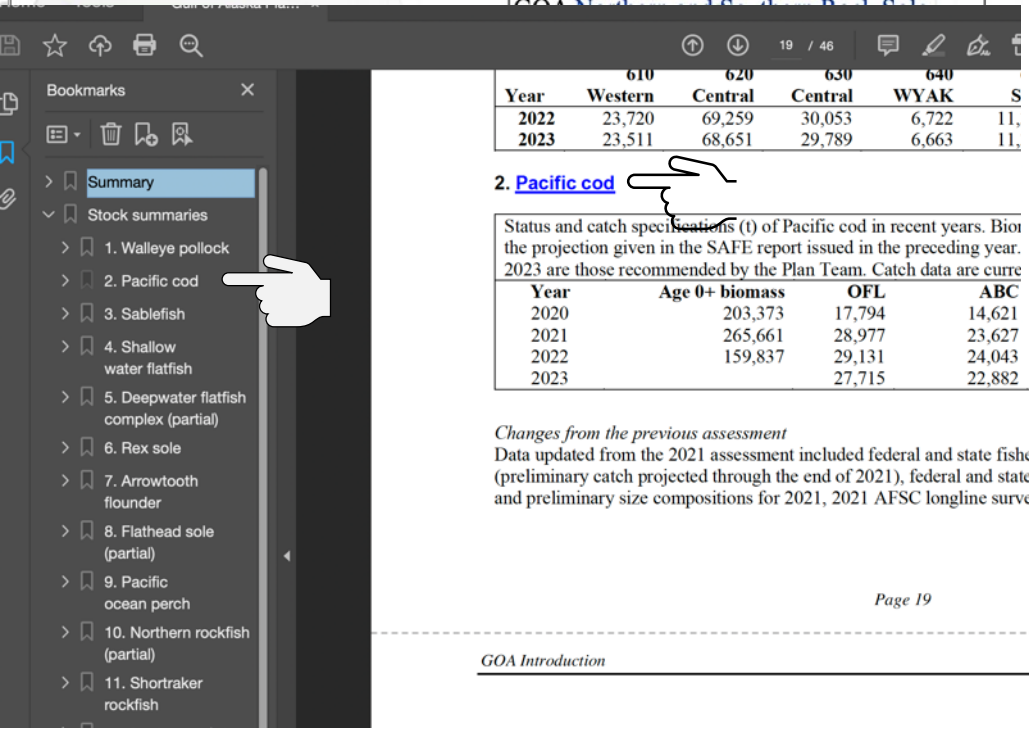
Stock Assessment and Fishery Evaluate (SAFE) for the NPFMC SSC/Council review
Note, links will become live as documents are completed, please "refresh" browsers, also some assessments are in an "off" year.

Ecosystem status reports:
EBS ESR
Aleutian Islands ESR
GOA ESR

Bering Sea and Aleutian Islands (BSAI)	Gulf of Alaska (GOA)
BSAI Introduction (with links to each chapter) **BSAI Entire SAFE (zip file, 120mb)**	**GOA Introduction (with links to each chapter)** **GOA Entire SAFE (zip file, 131mb)**
Eastern Bering Sea Pollock Muti-species model supplement Aleutian Is. Pollock Bogoslof Pollock	GOA Pollock
Eastern Bering Sea Pacific cod Aleutian Is Pacific cod.	GOA Pacific cod
AK Sablefish	AK Sablefish
BSAI Yellowfin Sole	GOA Shallow-water Flatfish

Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Gulf of Alaska

GOA Introduction Contents



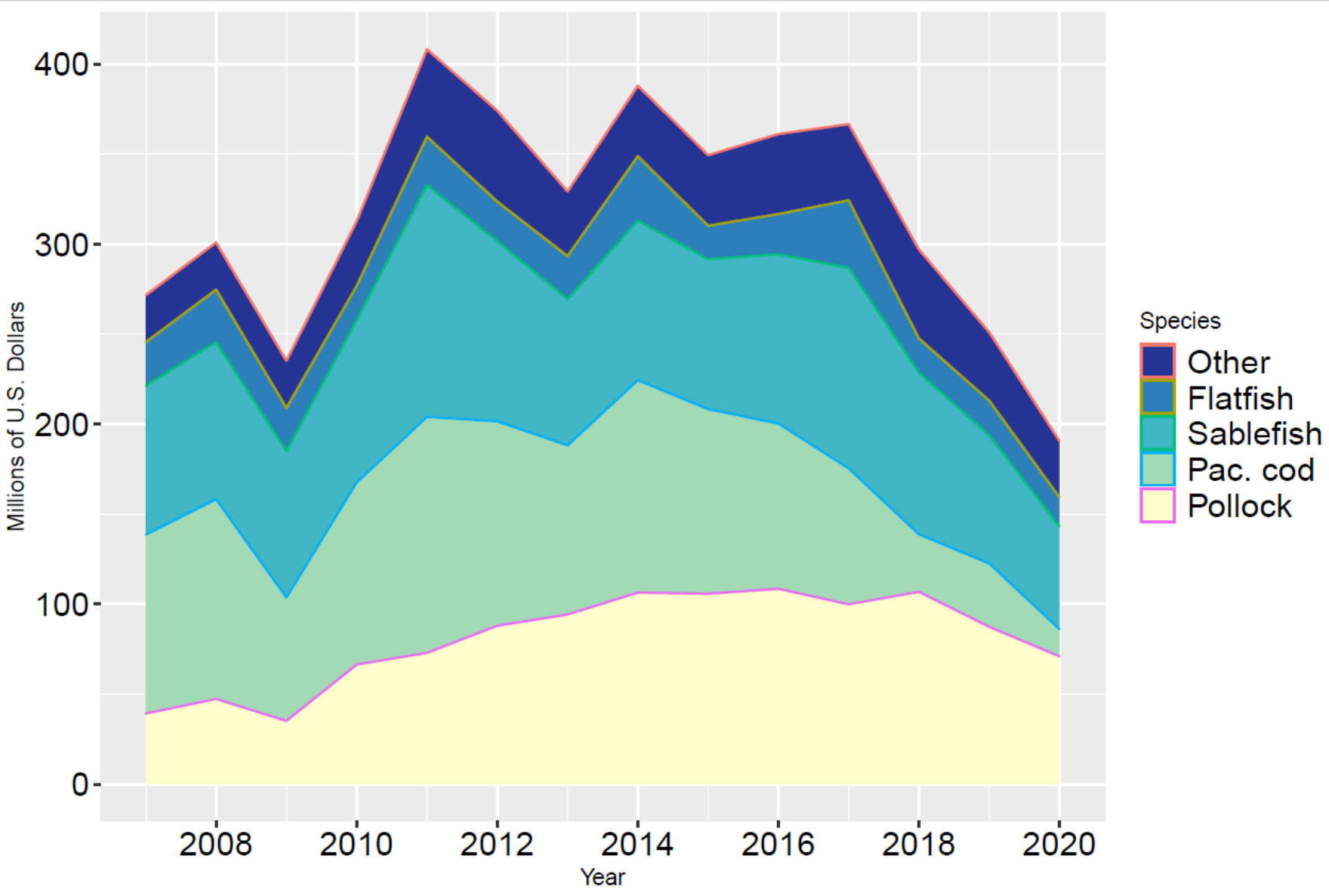
Year	610 Western	620 Central	630 Central	640 WYAK	S
2022	23,720	69,259	30,053	6,722	11,
2023	23,511	68,651	29,789	6,663	11,

2. Pacific cod

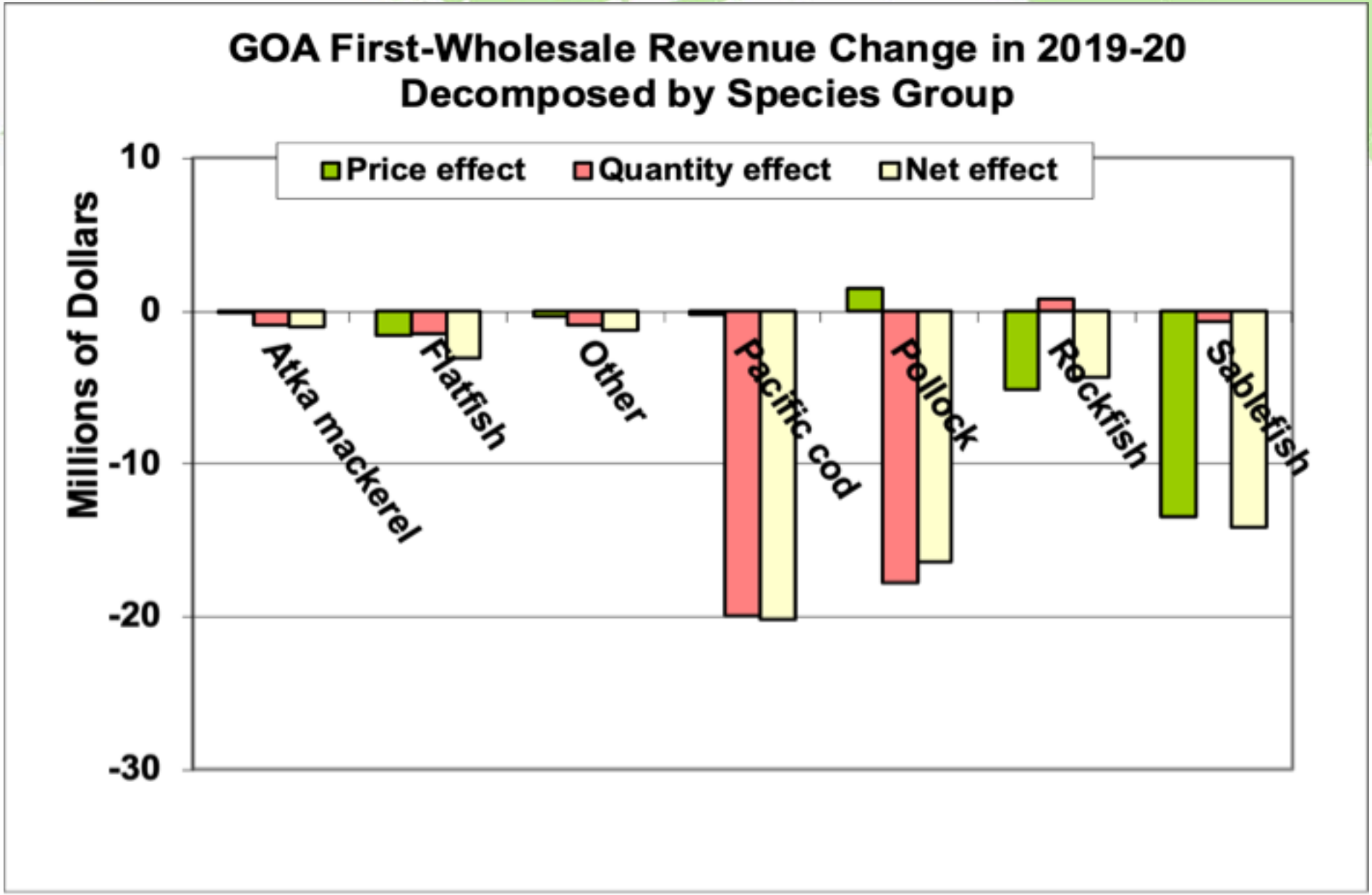
Status and catch specifications (t) of Pacific cod in recent years. Bio
the projection given in the SAFE report issued in the preceding year.
2023 are those recommended by the Plan Team. Catch data are curre

Year	Age 0+ biomass	OFL	ABC
2020	203,373	17,794	14,621
2021	265,661	28,977	23,627
2022	159,837	29,131	24,043
2023		27,715	22,882
		17,321	12,272

Changes from the previous assessment
Data updated from the 2021 assessment included federal and state fishery catch for 2020 and 2021 (preliminary catch projected through the end of 2021), federal and state fishery size composition for 2020 and preliminary size compositions for 2021, 2021 AFSC longline survey abundance index (Relative

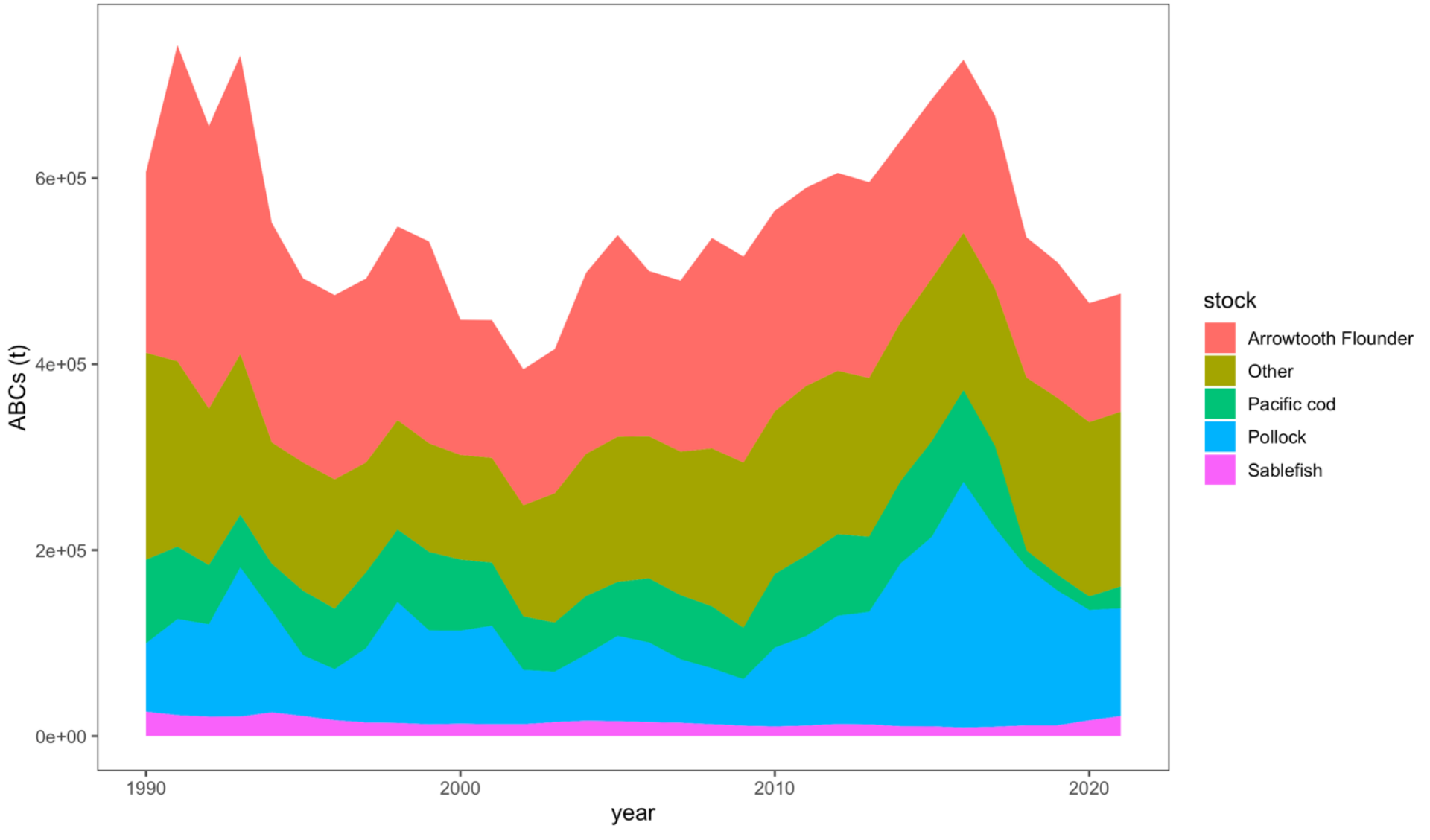


GOA Economic synopsis



Revenue changes (and source)

Gulf of Alaska ABCs by main stocks

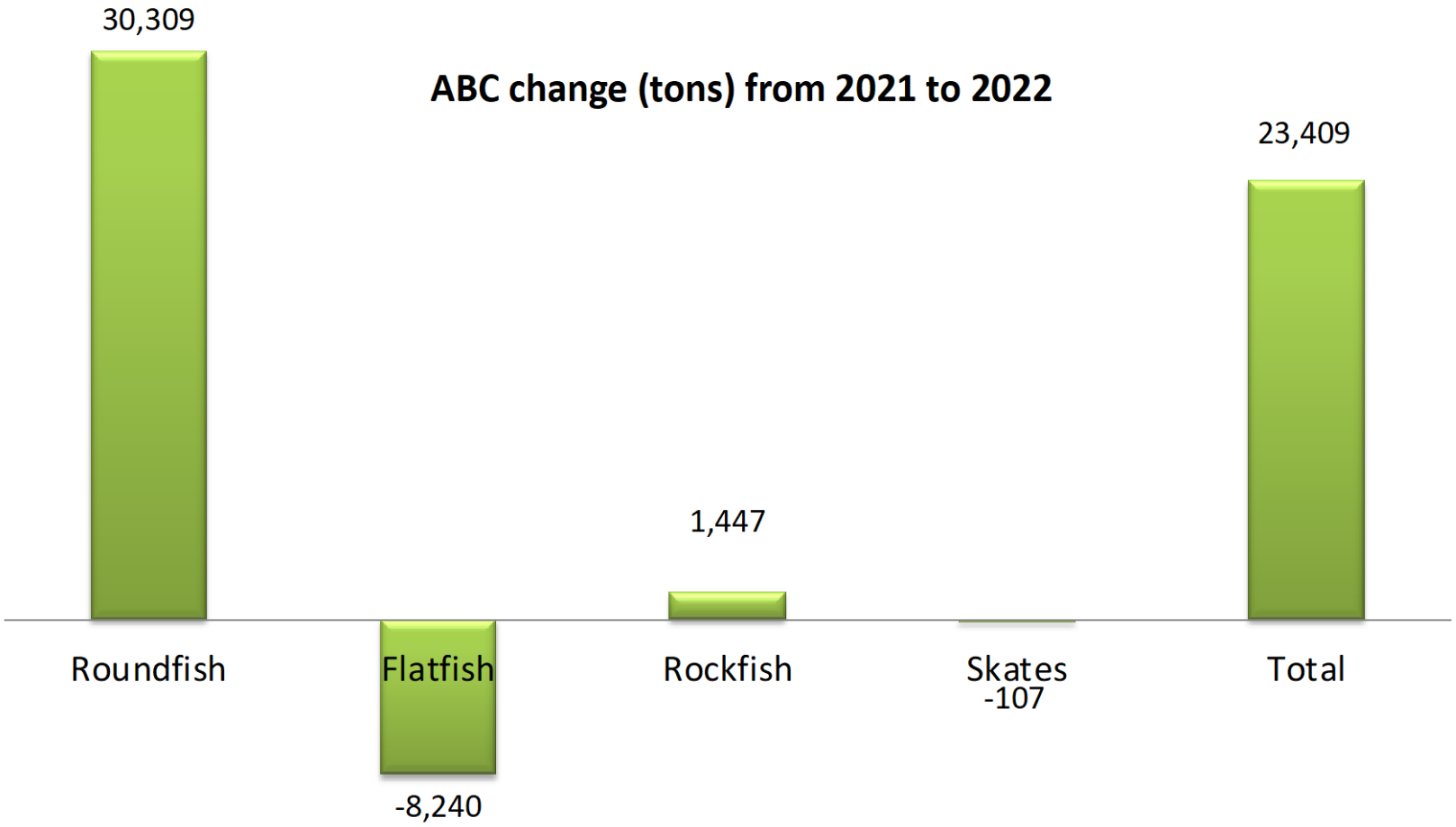


CIE reviews
(**C**enter for **I**ndependent **E**xperts)

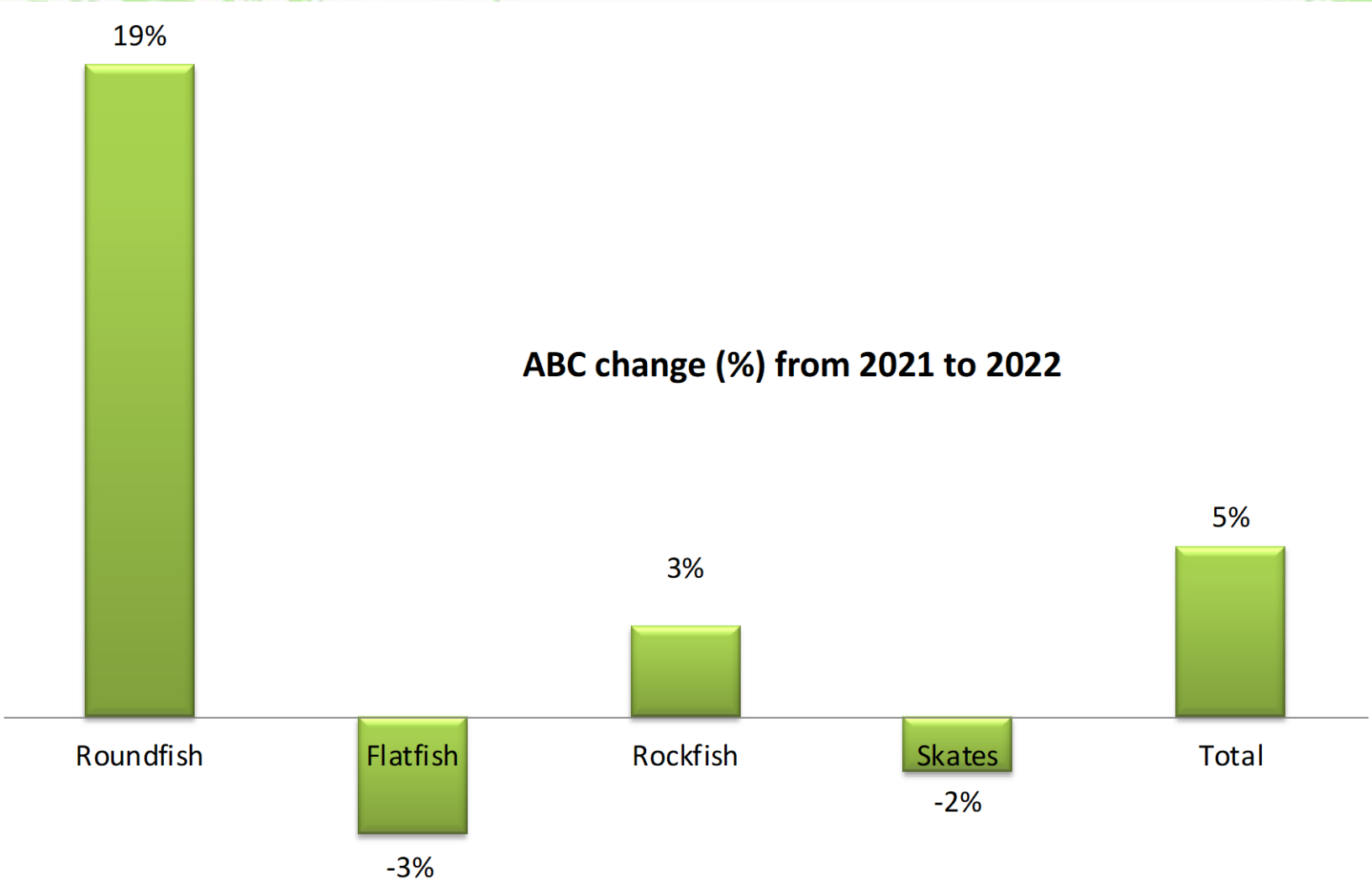
- 2021: two completed rock soles and Pacific ocean perch

- 2022: Likely Tier 4/5 evaluations.

2021-2022 ABC change

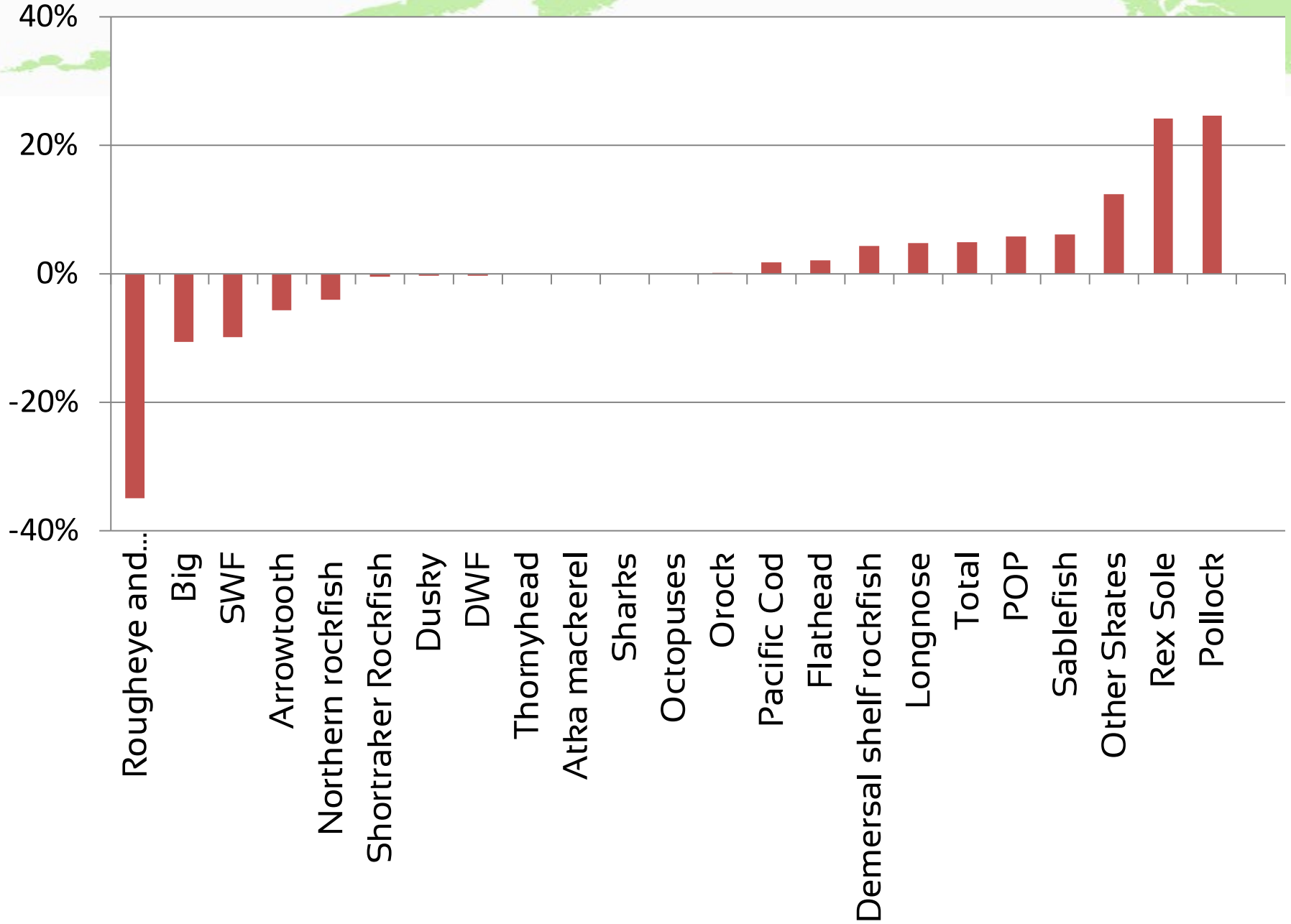


2021-2022 ABC change

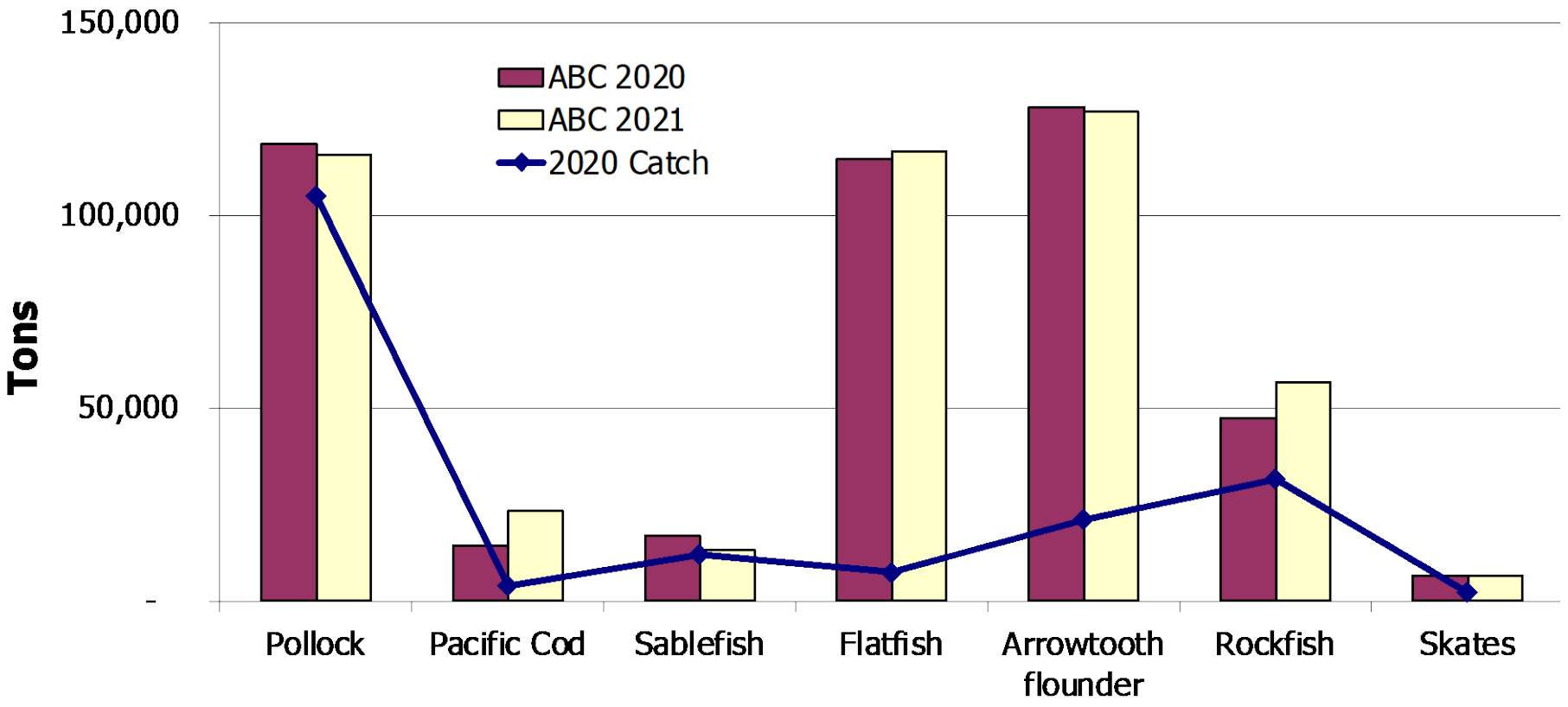


Overall a 5% increase

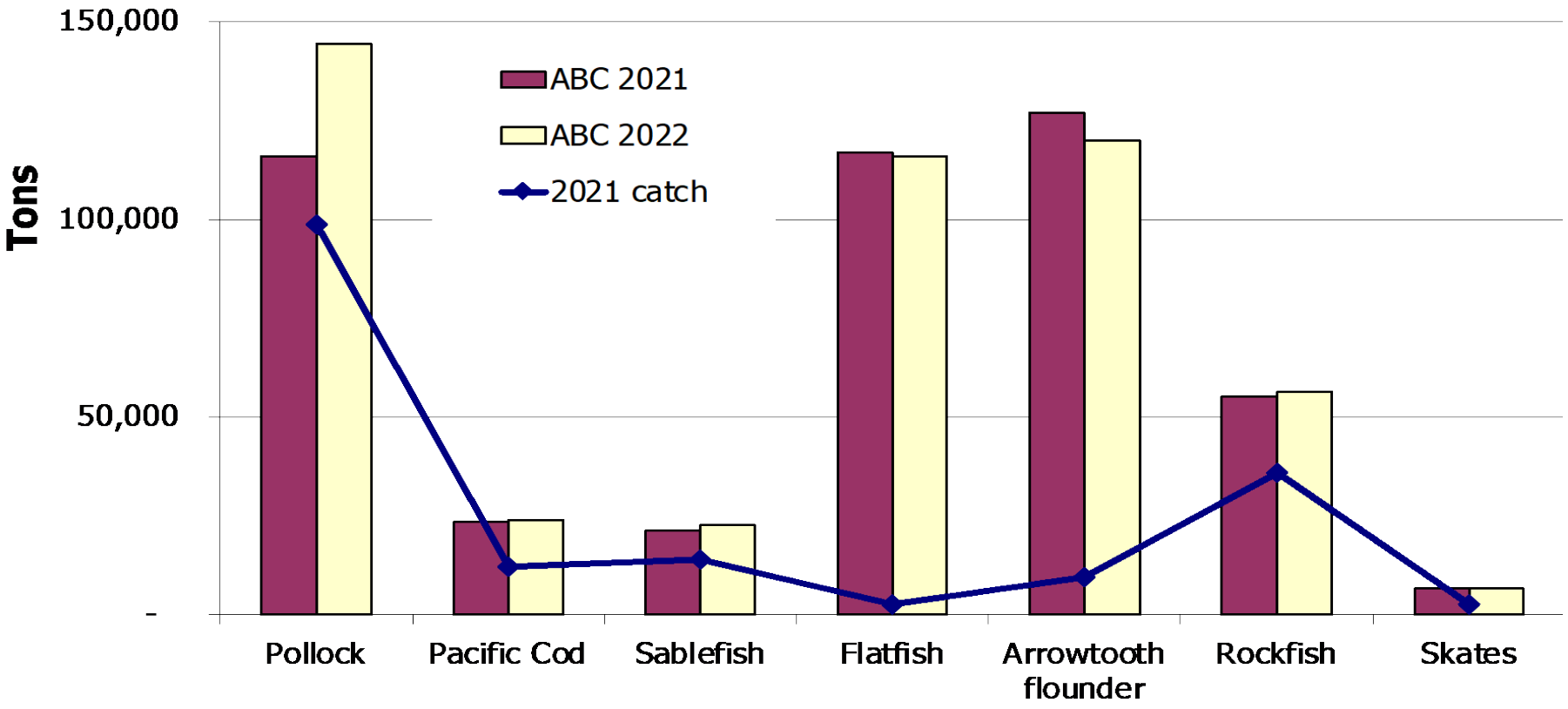
Percentage change in ABC, 2021-2022



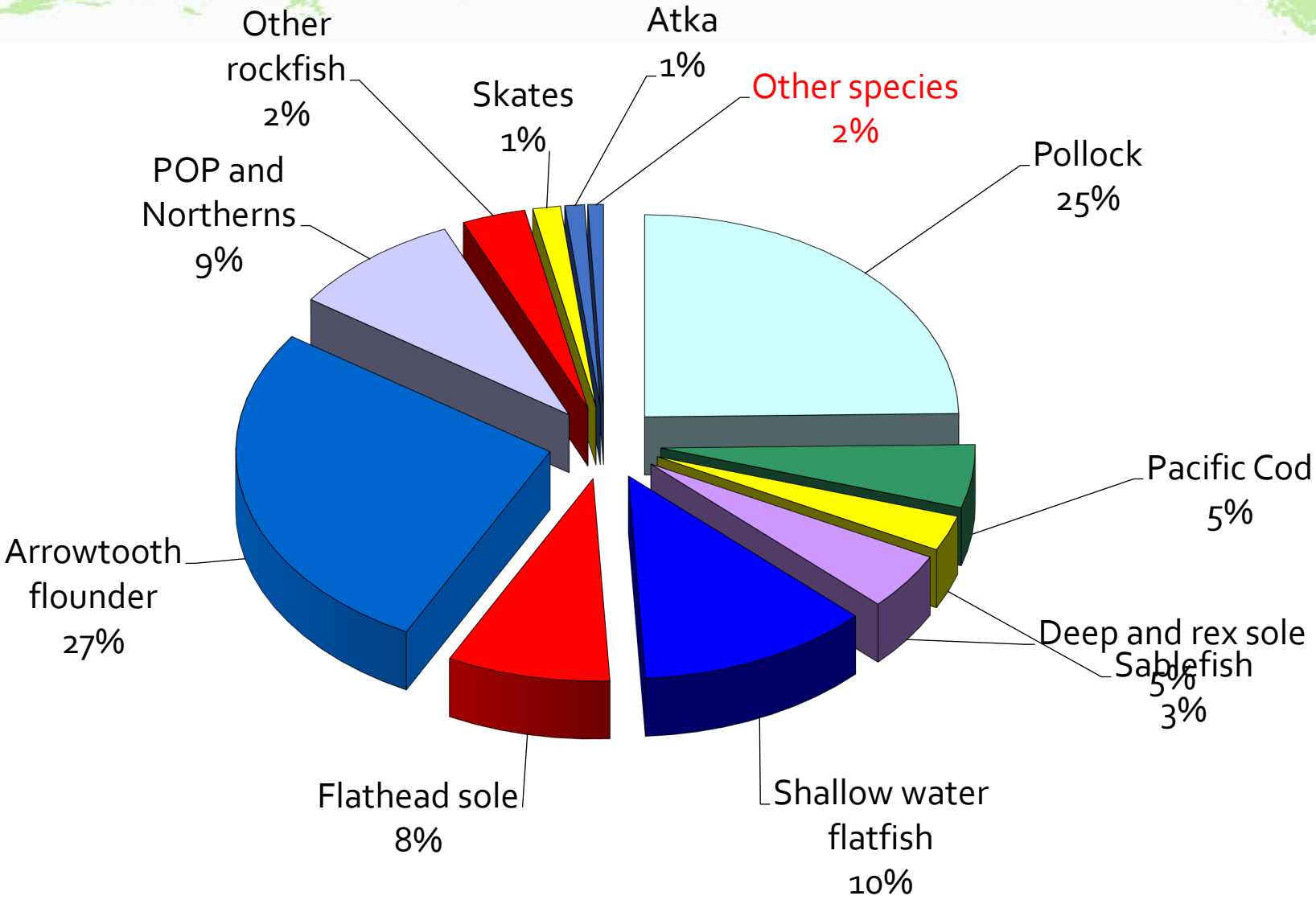
GOA Catch and ABC levels



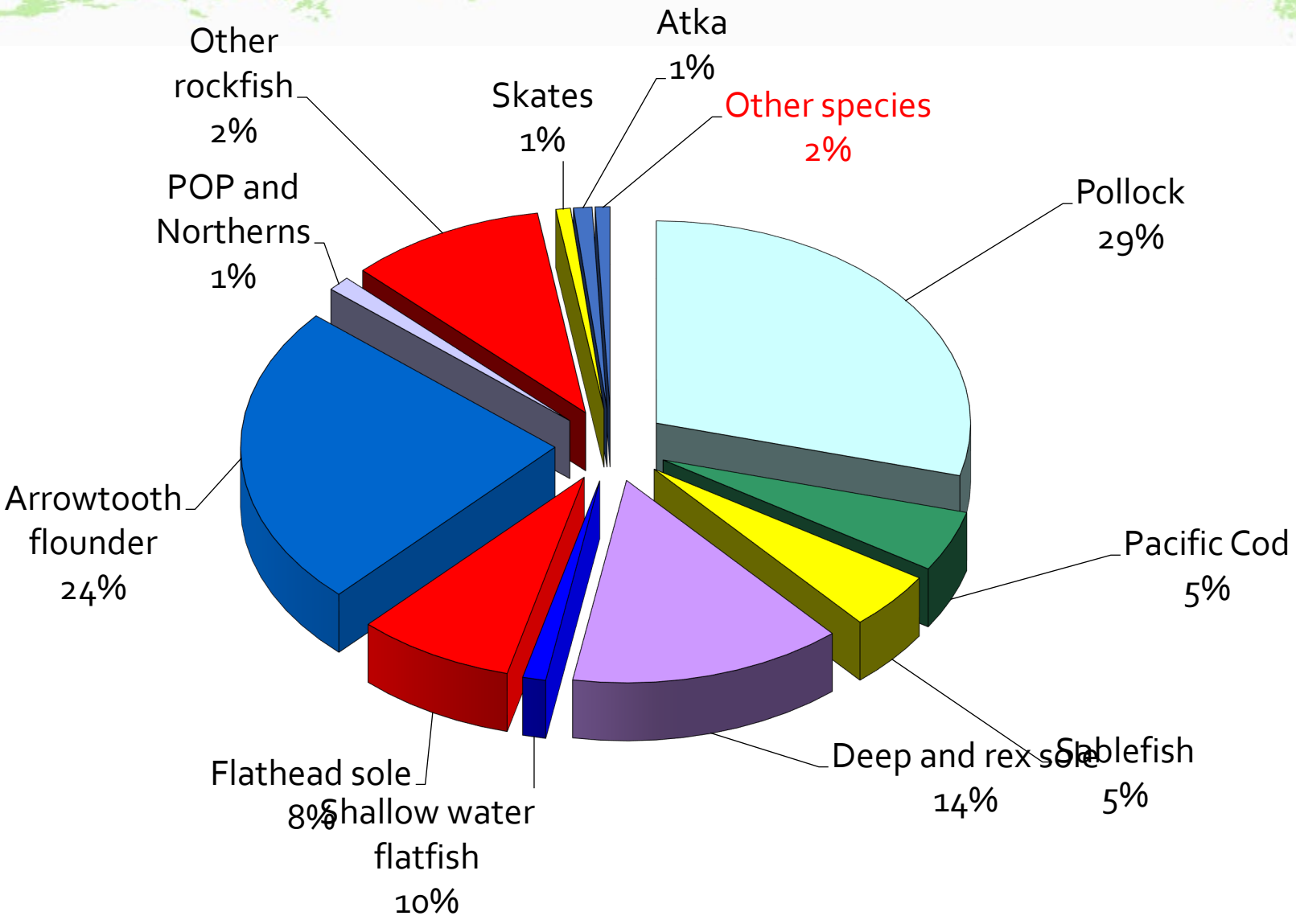
GOA Catch and ABC levels



GOA 2021 ABC's: 469,543 t



GOA 2022 ABC's: 499,446 t



ABC / TAC

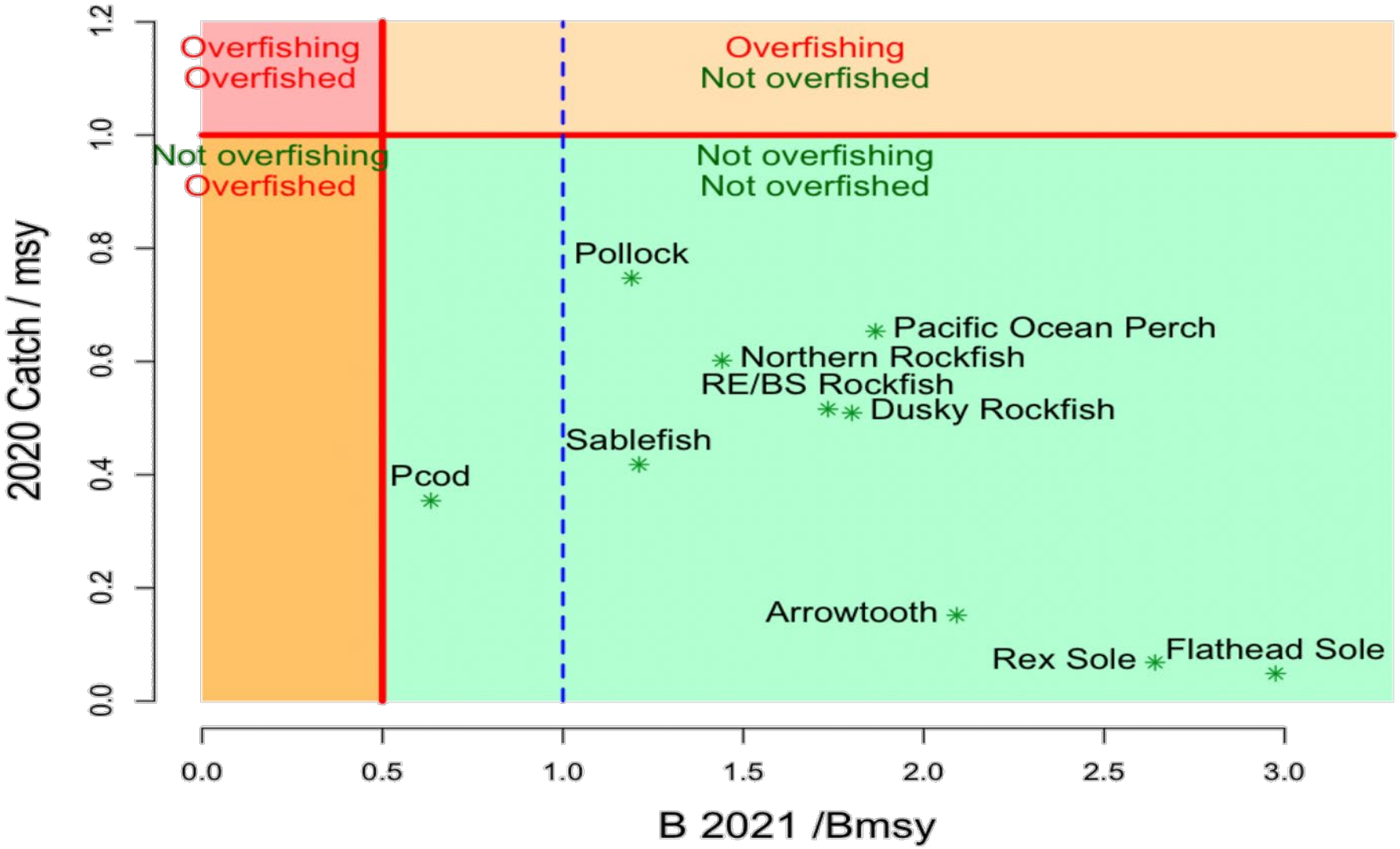
Team recommendations where ABC <maximum permissible:

Table 3. Maximum permissible fishing mortality rates and ABCs as defined in Amendment 56 to the GOA and BSAI Groundfish FMPs, and the Plan Team's 2022 and 2023 recommended fishing mortality rates and ABCs, for those species whose recommendations were below the maximum permissible.

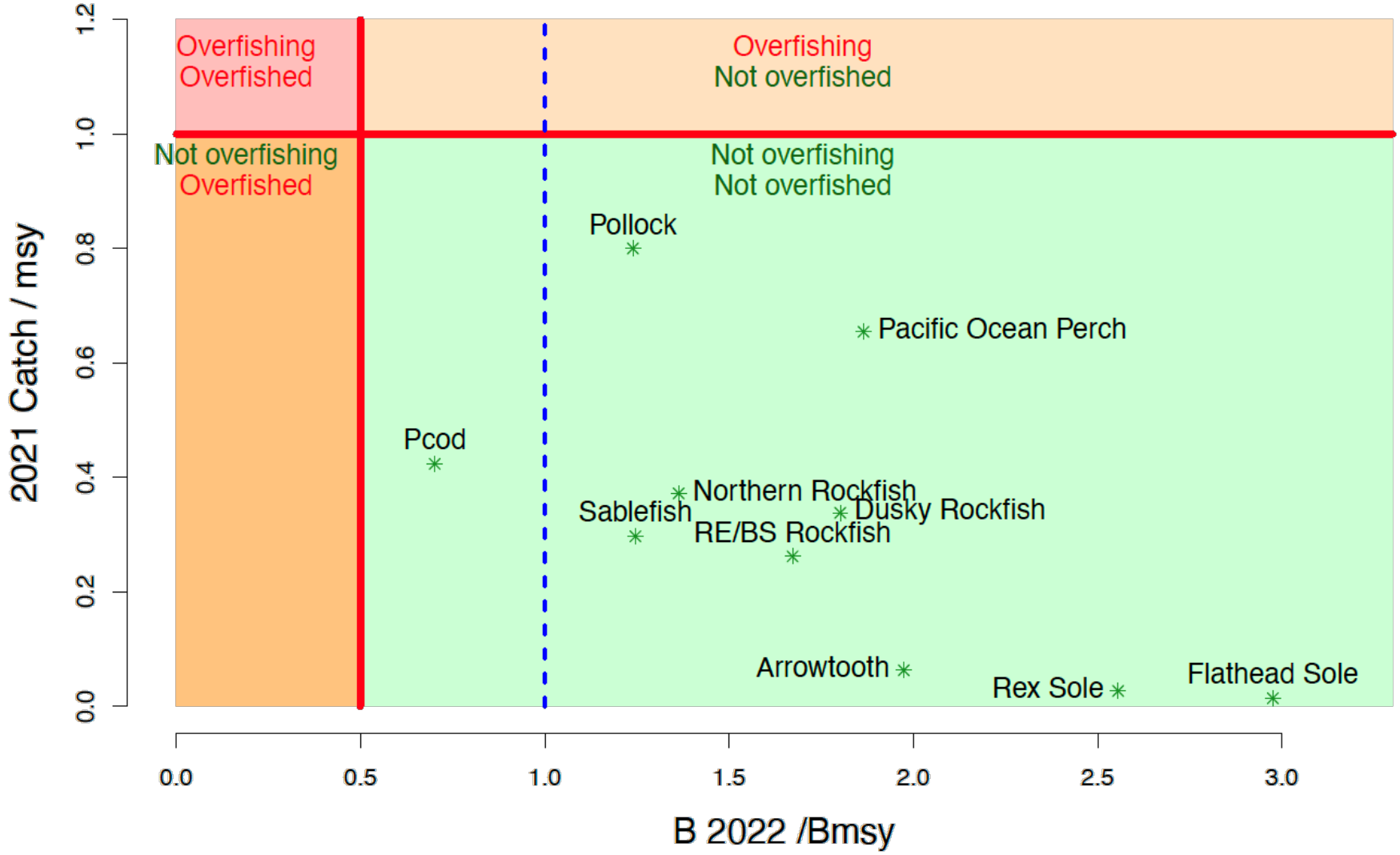
		2022			
Species	Tier	*Max* F_{ABC}	*Max* ABC	F_{ABC}	ABC
Sablefish	3a	0.080	34,863	0.080	34,521
Dusky rockfish	3	0.093	7,069	0.093	5,372
Demersal shelf rockfish	4, 6	0.026	342	0.02	268

Stair-step for dusky rockfish (applied to catch not F so FABC unavailable)

Stock status summary last year



Stock status summary this year



Species overviews

1. 2021 ABC/Catch and recommended changes
2. Highlights
   - New data
   - Analytic approach (changes)
3. Stock status and trend
4. ABC/OFL
   - Tier history and recommendations
   - 2021, 2022 maxABC; recommended ABC

2. Pacific cod

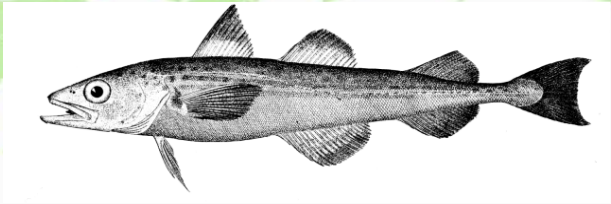
Status and catch specifications (t) of Pacific cod in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2022 and 2023 are those recommended by the Plan Team. Catch data are current through November 6th, 2021.

Year	Age 0+ biomass	OFL	ABC	TAC	Catch
2020	203,373	17,794	14,621	6,431	3,944
2021	265,661	28,977	23,627	17,321	12,272
2022	159,837	29,131	24,043		
2023		27,715	22,882		

Changes from the previous assessment

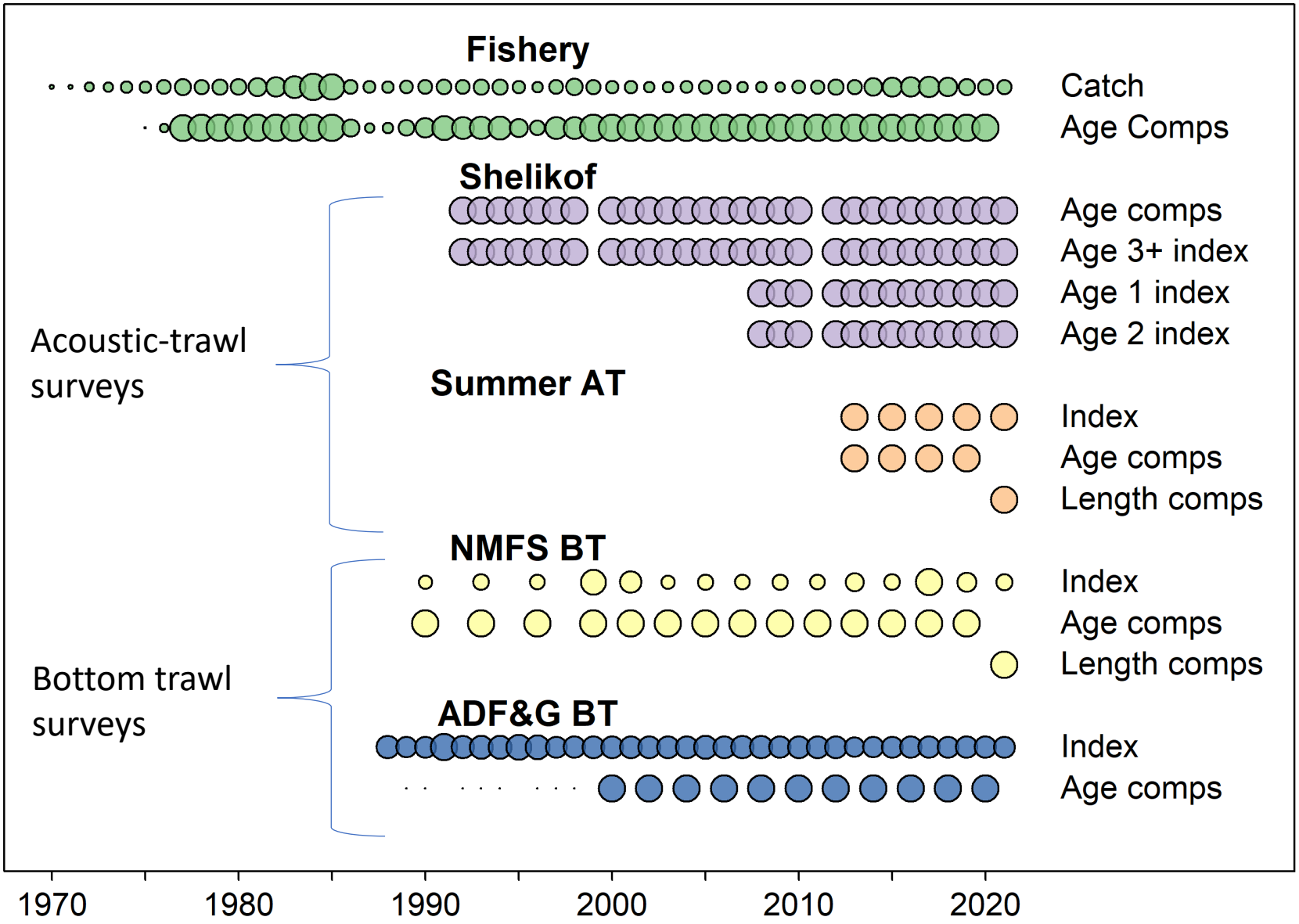
Data updated from the 2021 assessment included federal and state fishery catch for 2020 and 2021 (preliminary catch projected through the end of 2021), federal and state fishery size composition for 2020 and preliminary size compositions for 2021, 2021 AFSC longline survey abundance index (Relative

ABC



Species	2021 catch	ABC 2021	ABC 2022	Change
Pollock	98,769	115,870	144,444	up 28,574 (25%)
Pacific Cod	12,272	23,627	24,043	up 416 (2%)
Sablefish	14,115	21,475	22,794	up 1,319 (6%)
Flatfish	2,717	116,883	115,834	down 1,049 (1%)
Arrowtooth flounder	9,517	126,970	119,779	down 7,191 (6%)
Rockfish	35,882	55,107	56,554	up 1,447 (3%)
Atka mackerel	940	4,700	4,700	same (0%)
Skates	2,609	6,670	6,563	down 107 (2%)
Sharks	1,639	3,755	3,755	same (0%)
Octopus	51	980	980	same (0%)
Total	178,511	476,037	499,446	up 23,409 (5%)

GOA Pollock Data



GOA Pollock

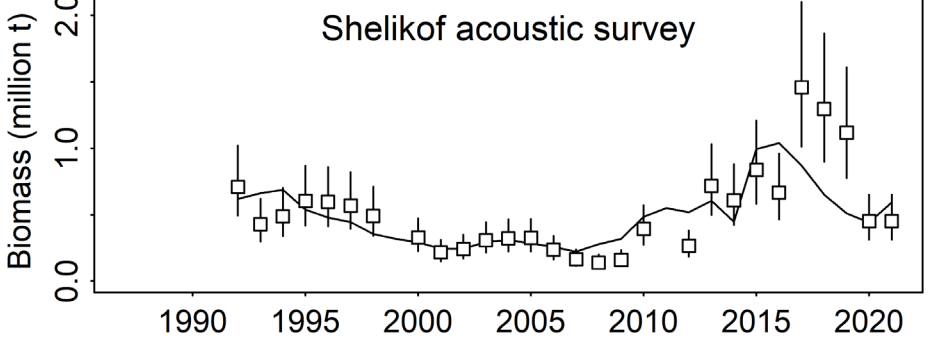
2021 was “on” year for surveys in the GOA

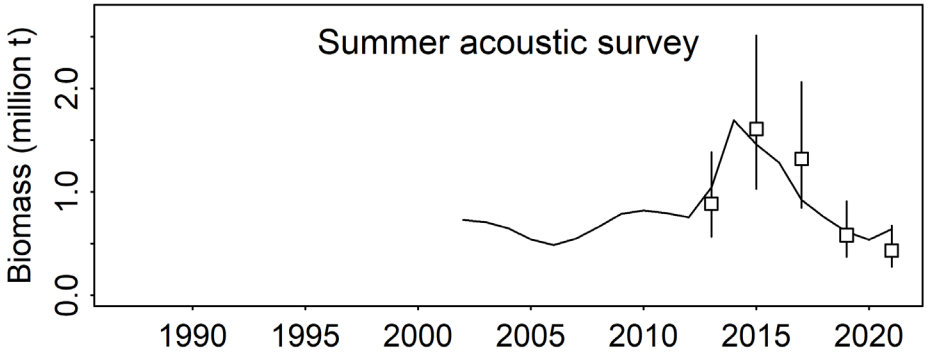
2021 biomass estimates**:**

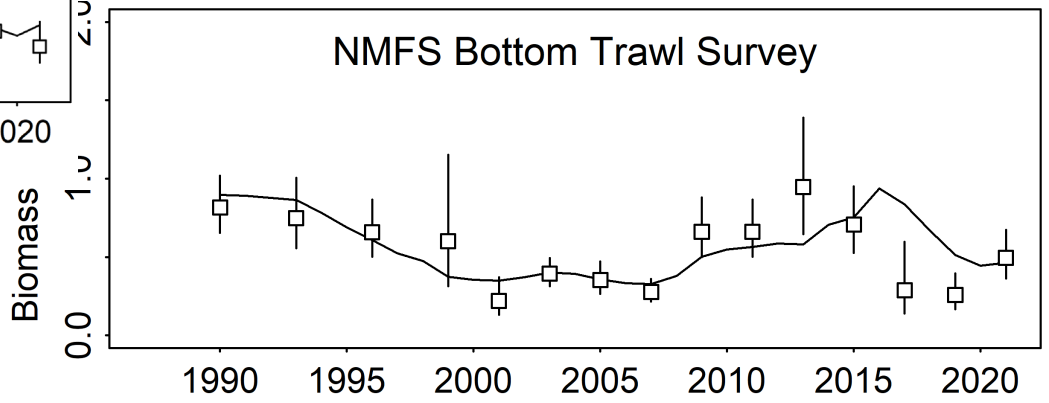
Shelikof acoustic: 527 kt, **15% increase** from 2020.
Summer acoustic: 431 kt, **26% decrease** from 2019

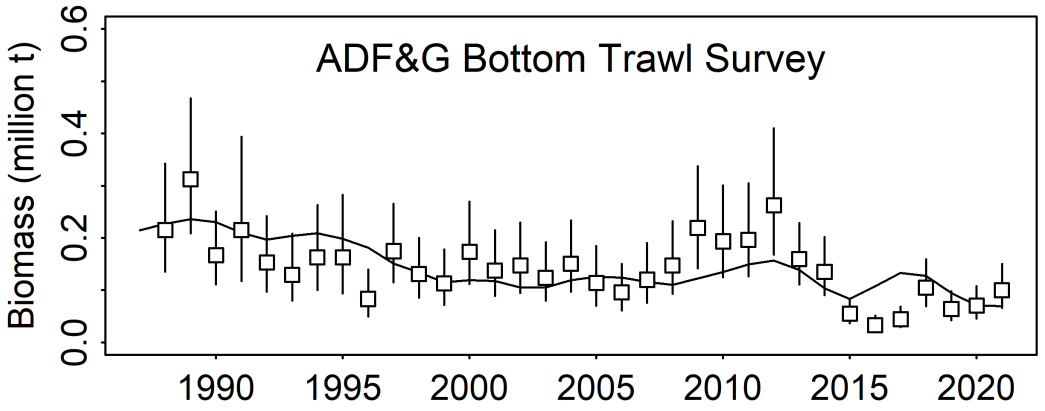
NMFS bottom trawl: 494 kt, **92% increase** from 2019
ADF&G bottom trawl: 65 kt, **9% increase** from 2020

GOA Pollock surveys









1. GOA pollock apportionment

	TAC (t)		Percent	
Area	Season A	Season B	Season A	Season B
610	1,138	22,582	0.9%	17.4%
620	52,313	16,946	40.3%	13.1%
630	8,065	21,988	6.2%	16.9%
640	6,722		5.2%	

Minor change in % season and area apportionment from 2020

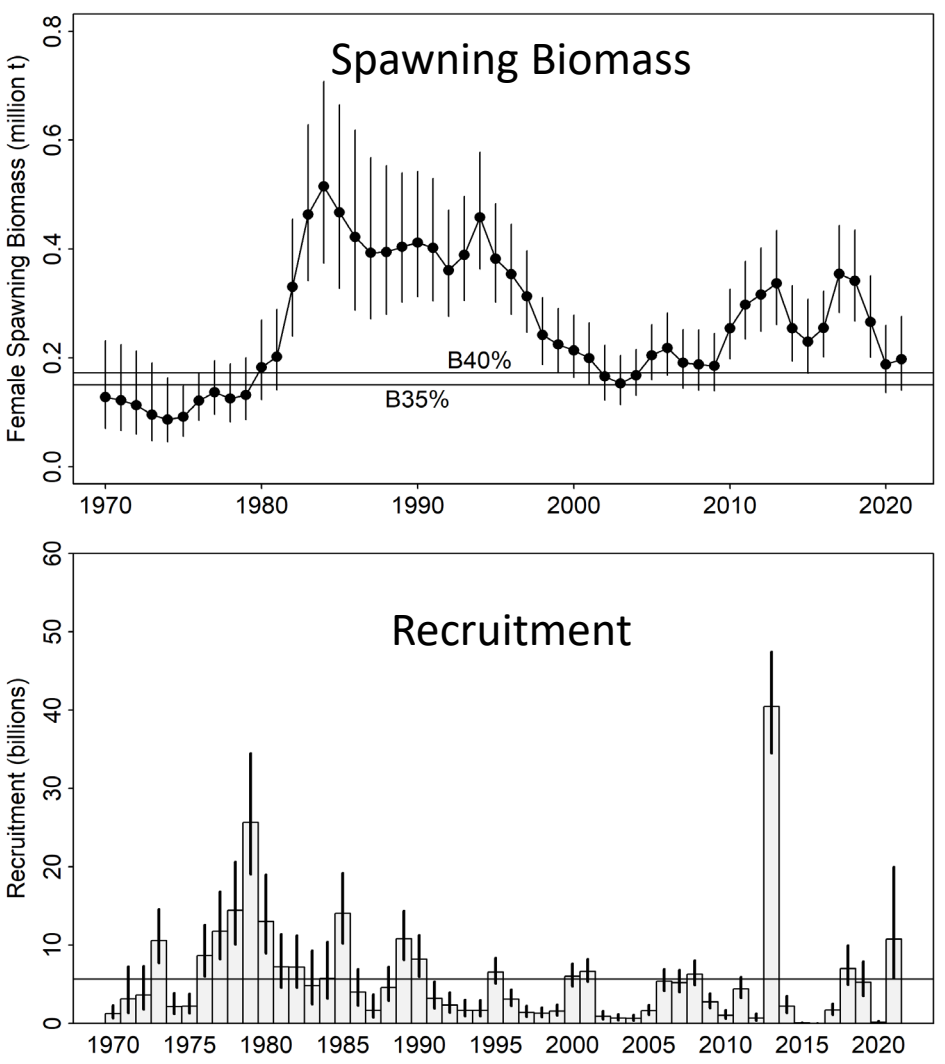
1. GOA pollock overview

Changes to the assessment model
- None

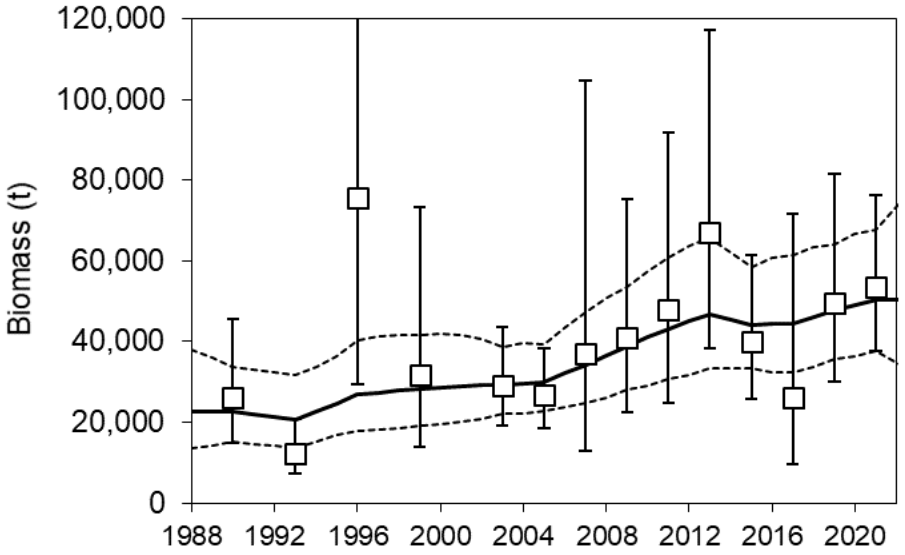
Author's 2022 ABC 133,081 t
- Increase of 26%

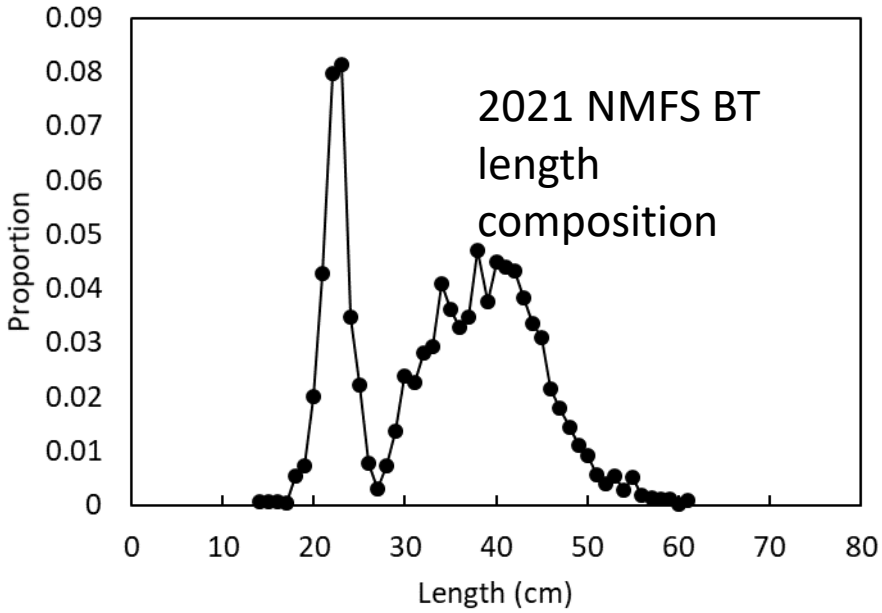
Concerns:
- Conflict in size of 2018 year class
- Weight-age
- Survey catchability assumptions

Positives:
- Return to normal age diversity w/ decline in 2012 cohort
- Indications of abundant 2020 year class
- Environmental conditions favorable



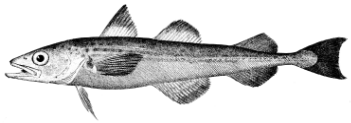
Pollock in SE Alaska (separate ABC)





- Tier 5 model used for East Yakutat and SE.
- RE model fitted to biomass estimates from NMFS BT.
- M=0.3 assumed.
- ABC=11,363 t for 2022 and 2023

Team discussions—GOA pollock



Relative to weight-at-age changes in data

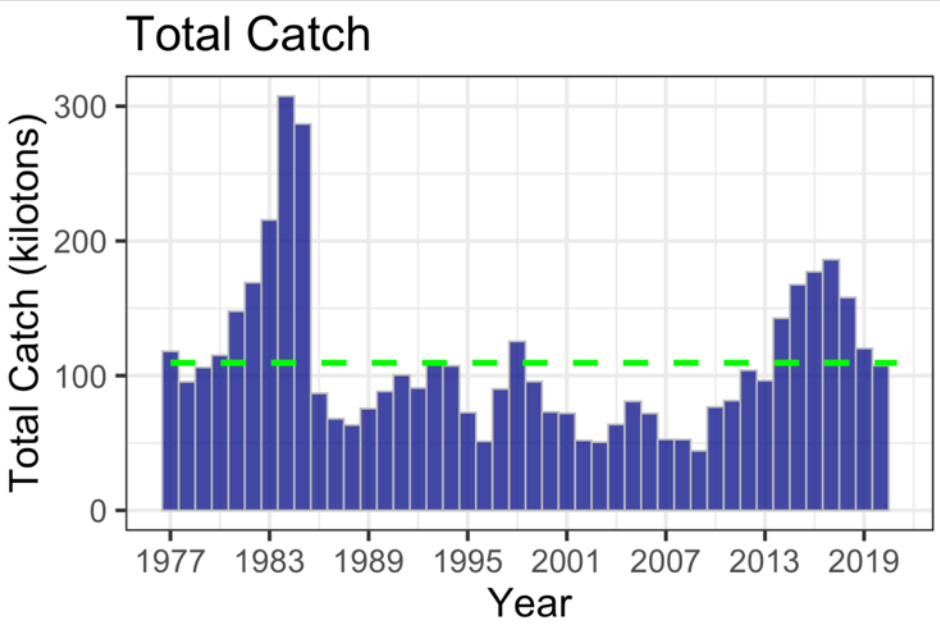
The Team recommends that the methodologies for projecting weight at age from the survey data be investigated, possibly by implementing a random-effects model or a sample weighted mean approach rather than a simple average

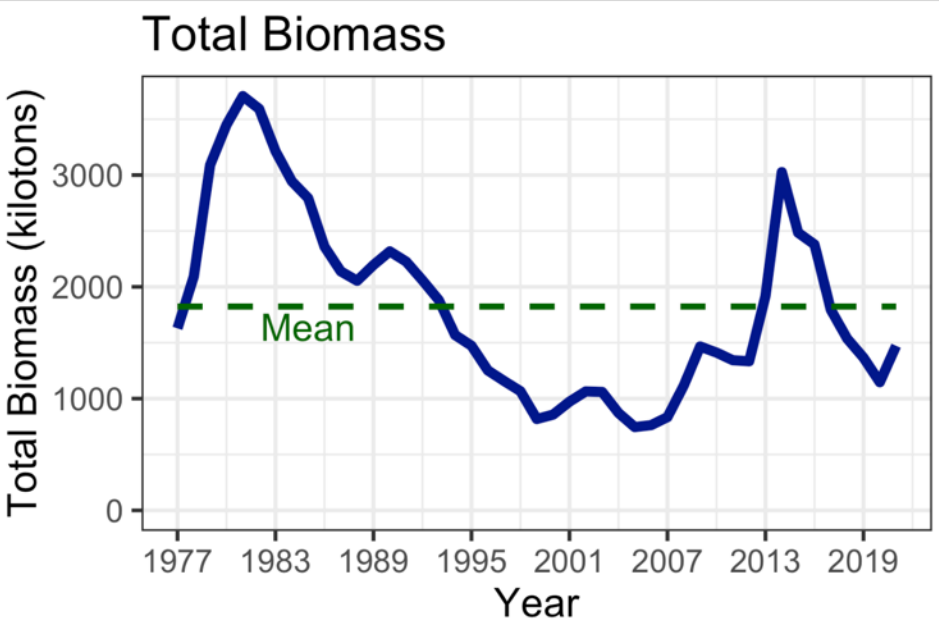
Regarding NMFS Bottom trawl survey catchability:

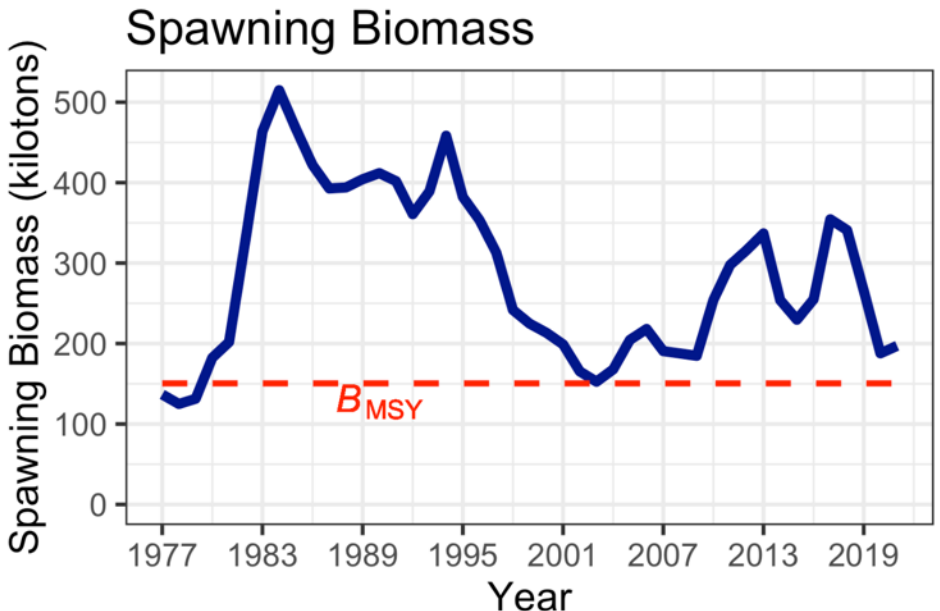
The Team recommends the author further research this issue, including conducting a prior sensitivity analysis and potentially looking at applying priors (if available) for other surveys in the assessment.

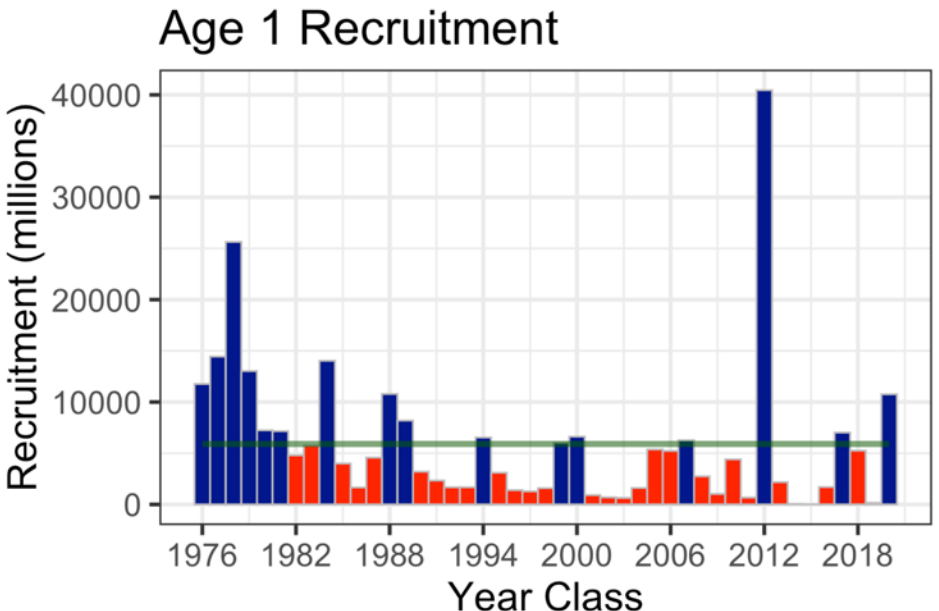
The Team supported the authors' planned research into these topics and agreed their relative priority.

1. GOA pollock

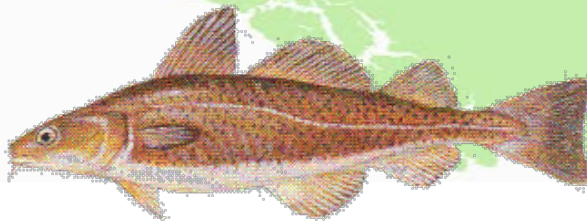








2. GOA Pacific cod



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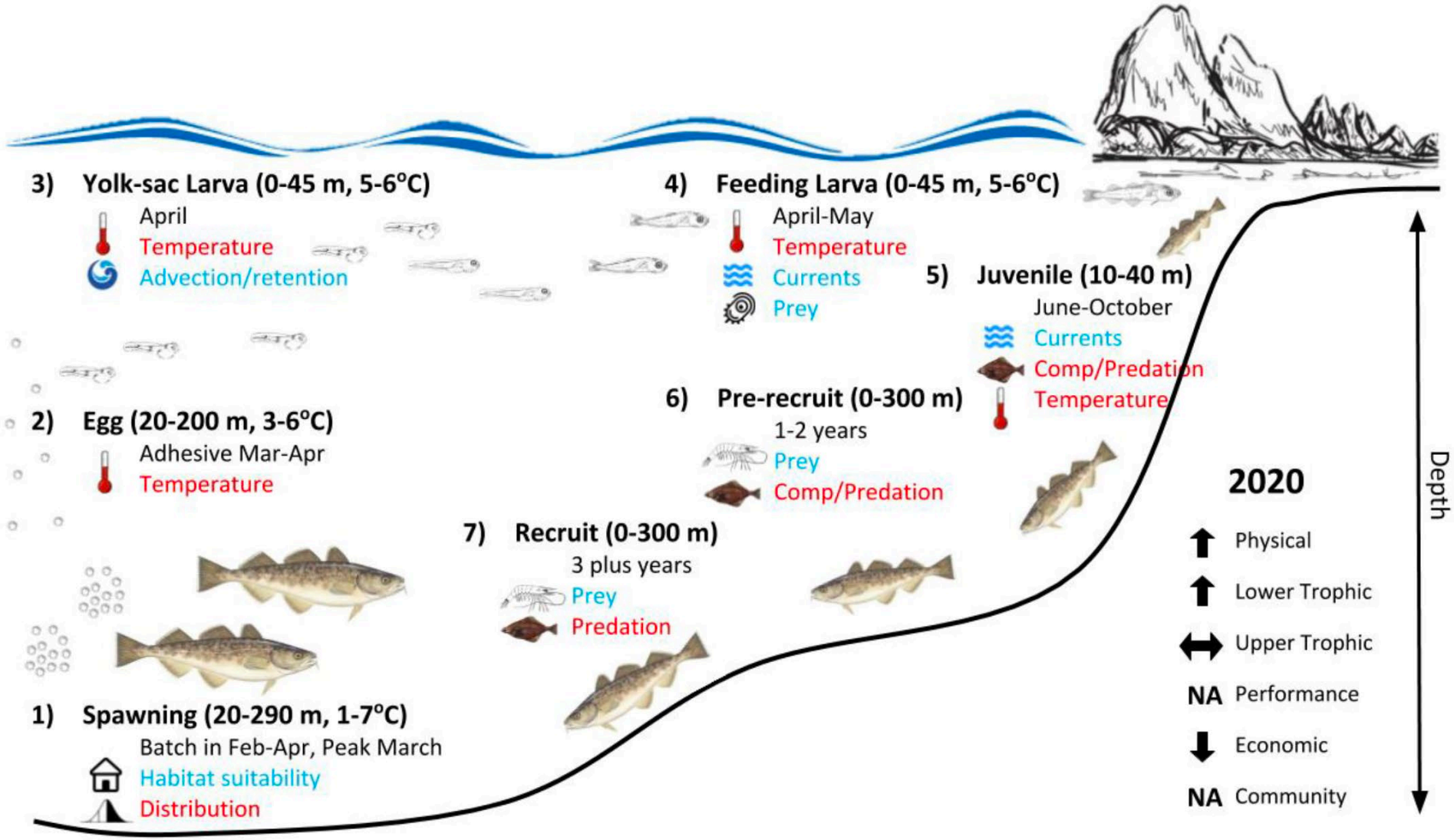
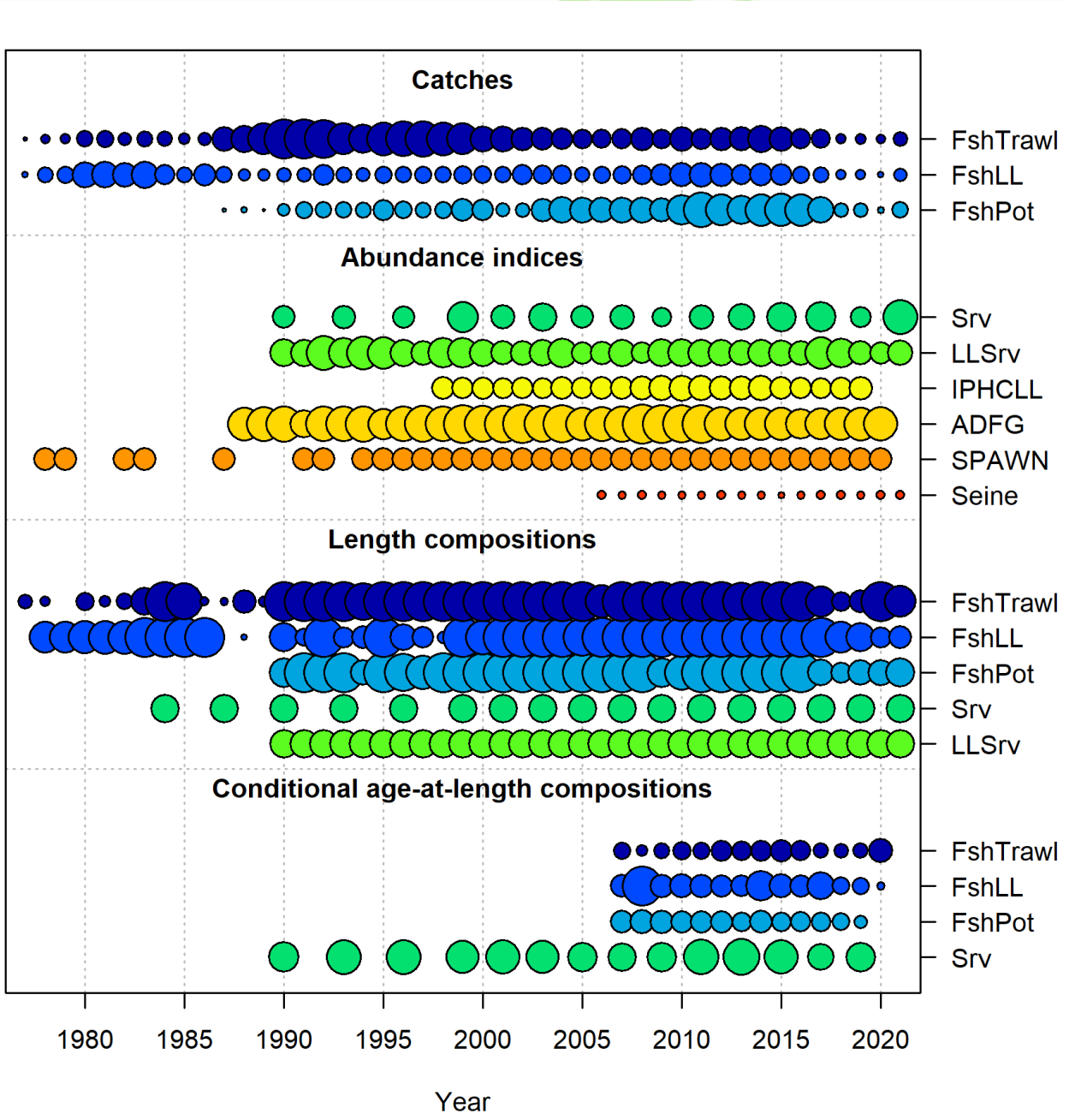
GOA Pacific cod ESP

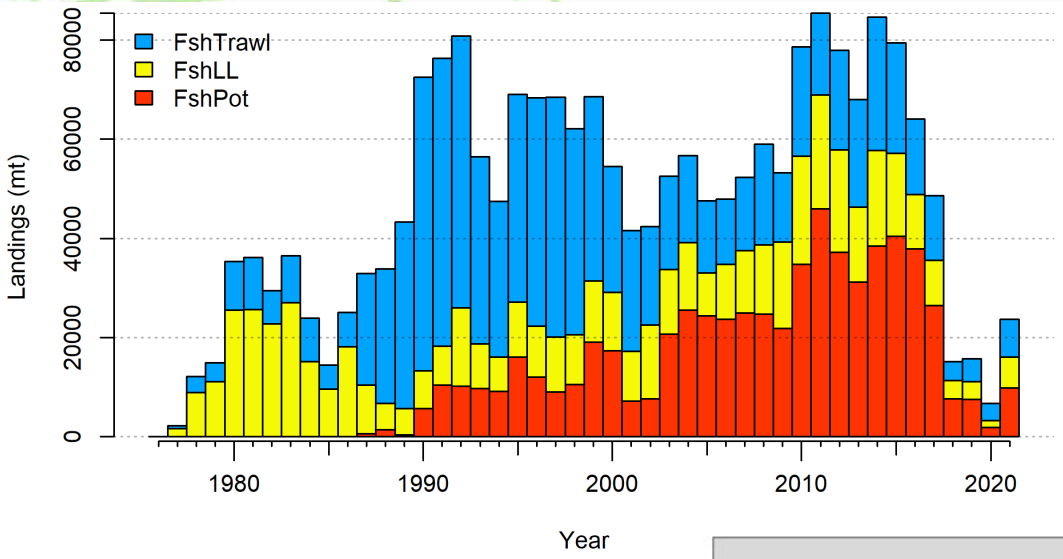


GOA Pacific cod



Data

GOA Pacific cod

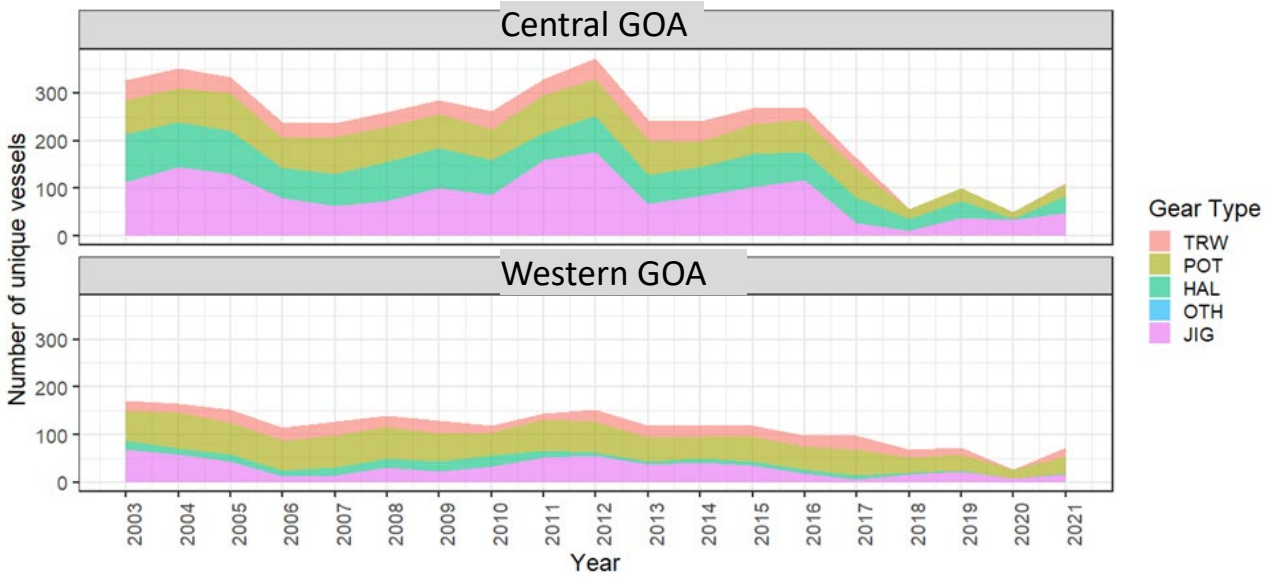


2020 Total catch = 6,233 t

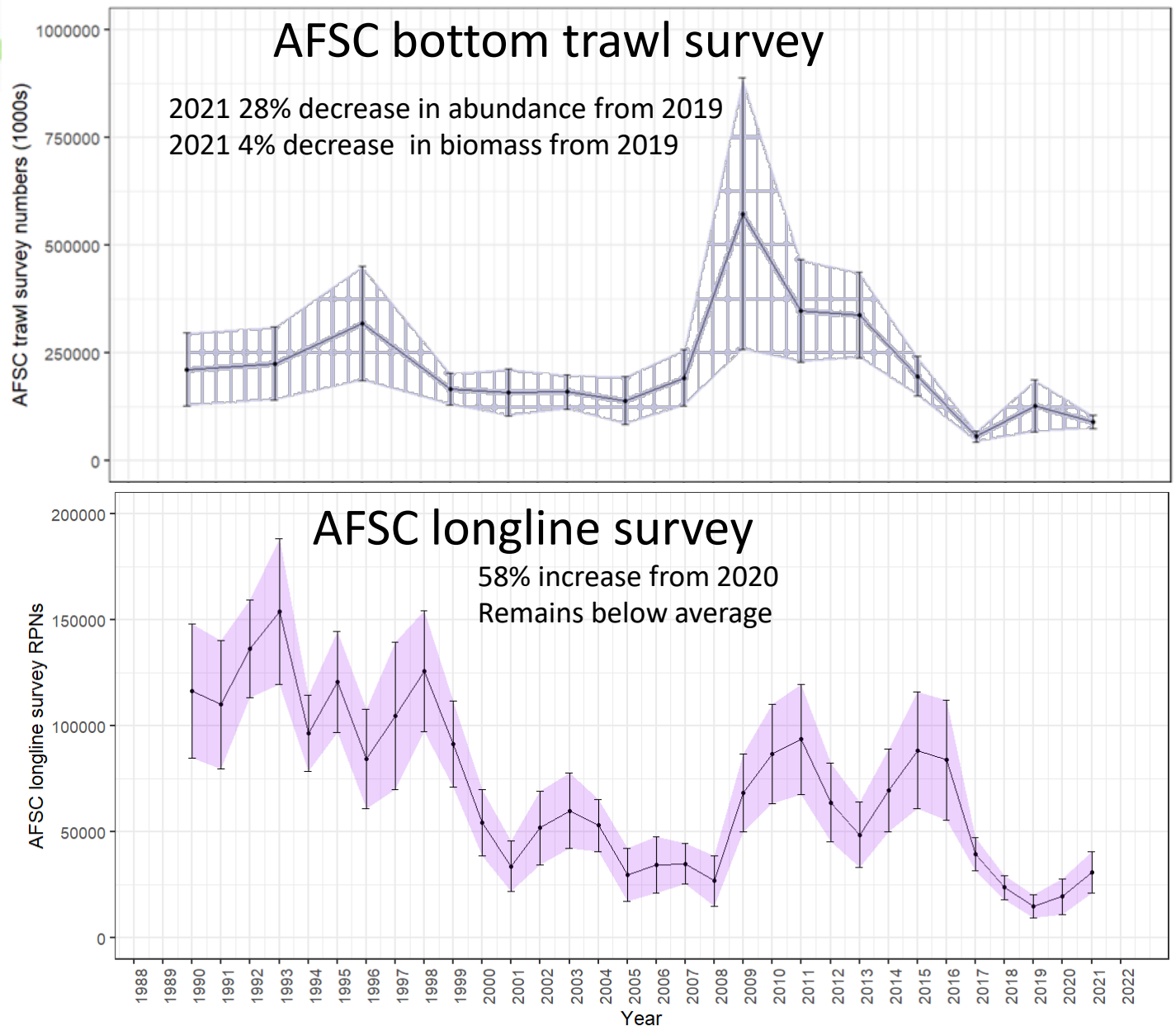
2021 Total Catch = 18,040 t*

*As of Nov 15

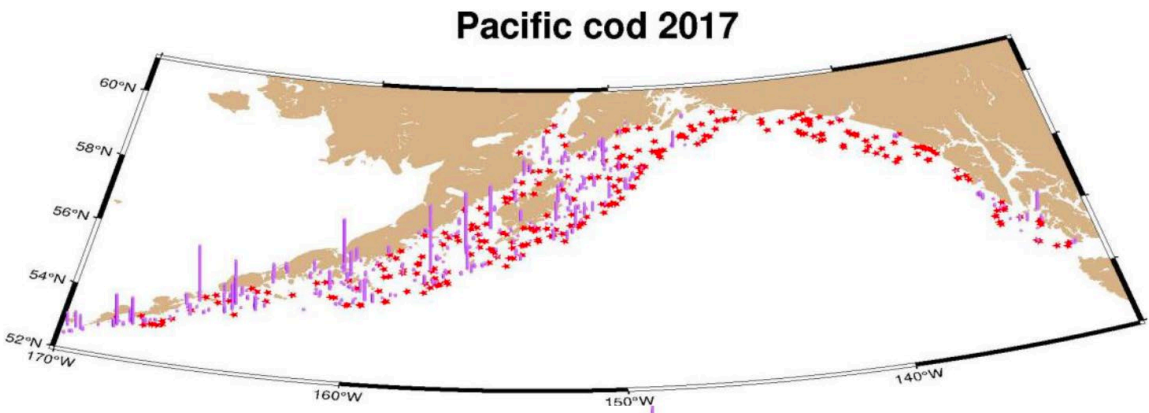
- Overall descending trend in participation
- More vessels targeting cod in 2021 than 2020

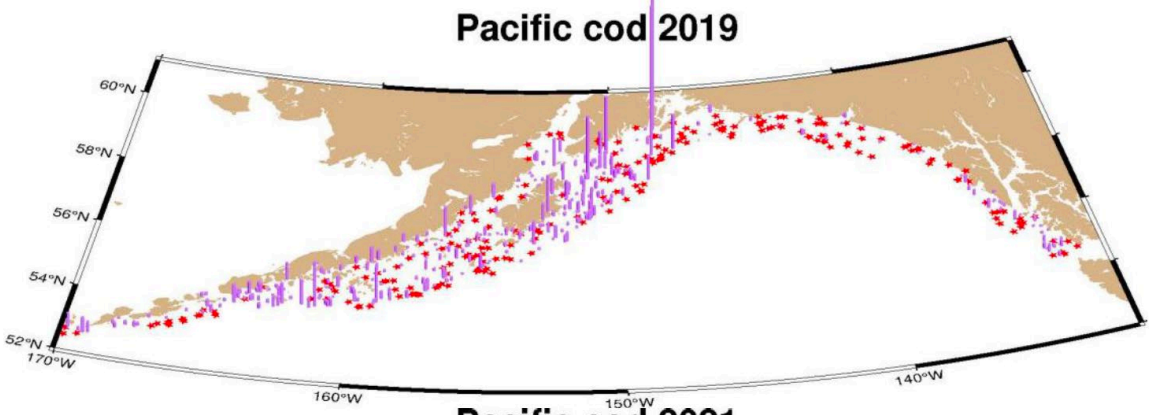


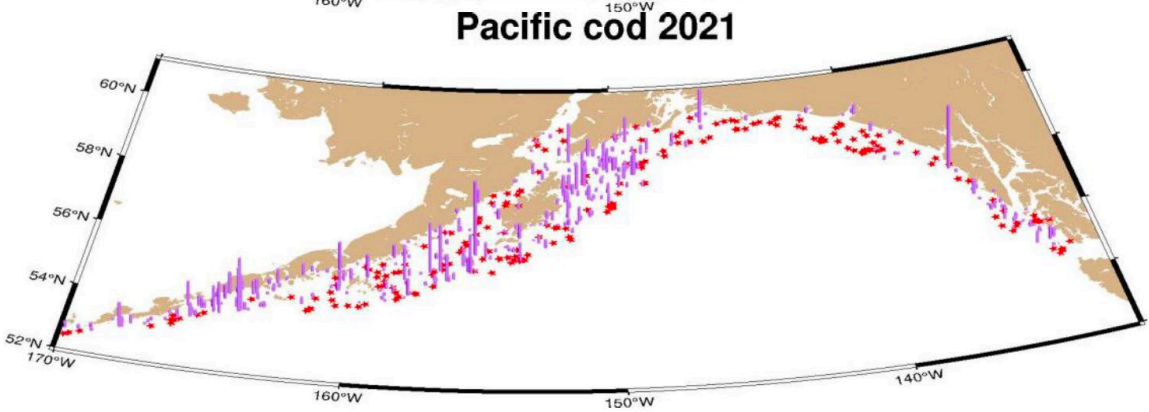
GOA Pacific cod



GOA Pacific cod

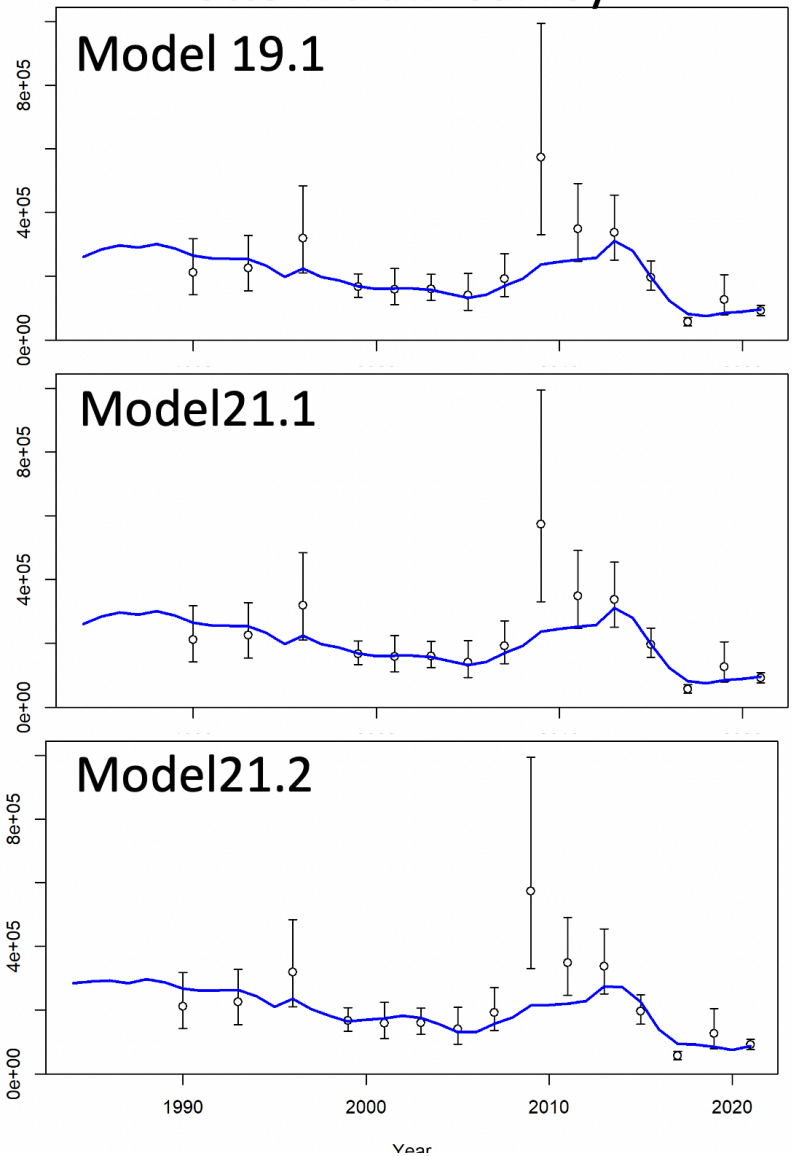




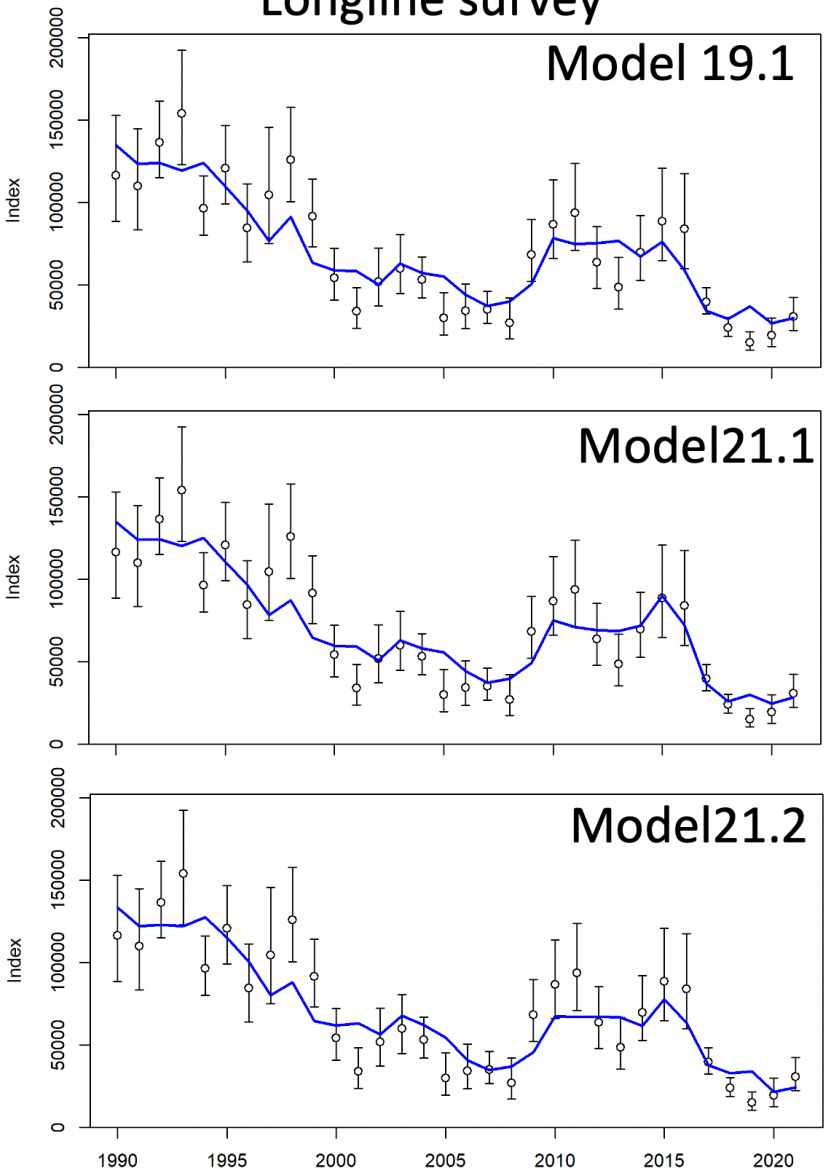


GOA Pacific cod

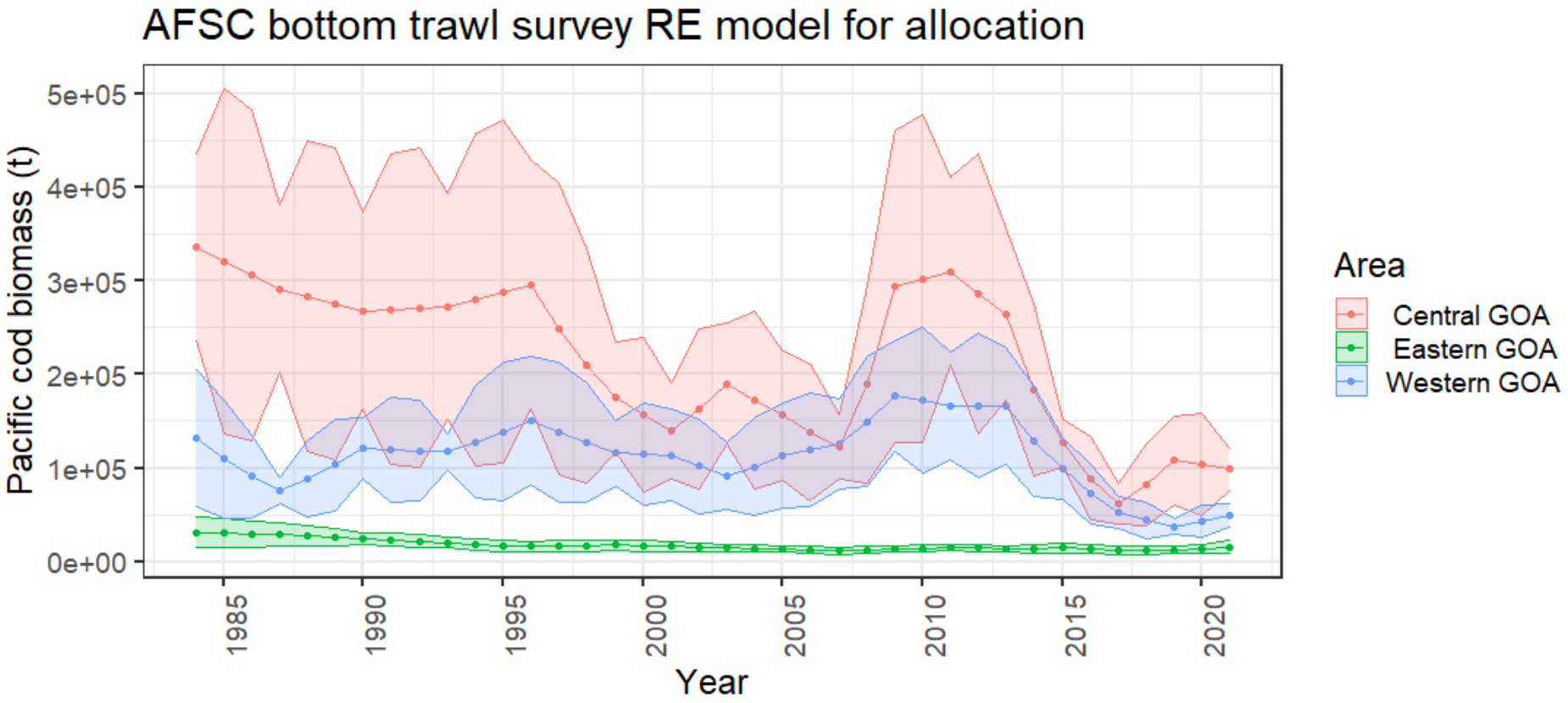
Bottom trawl survey



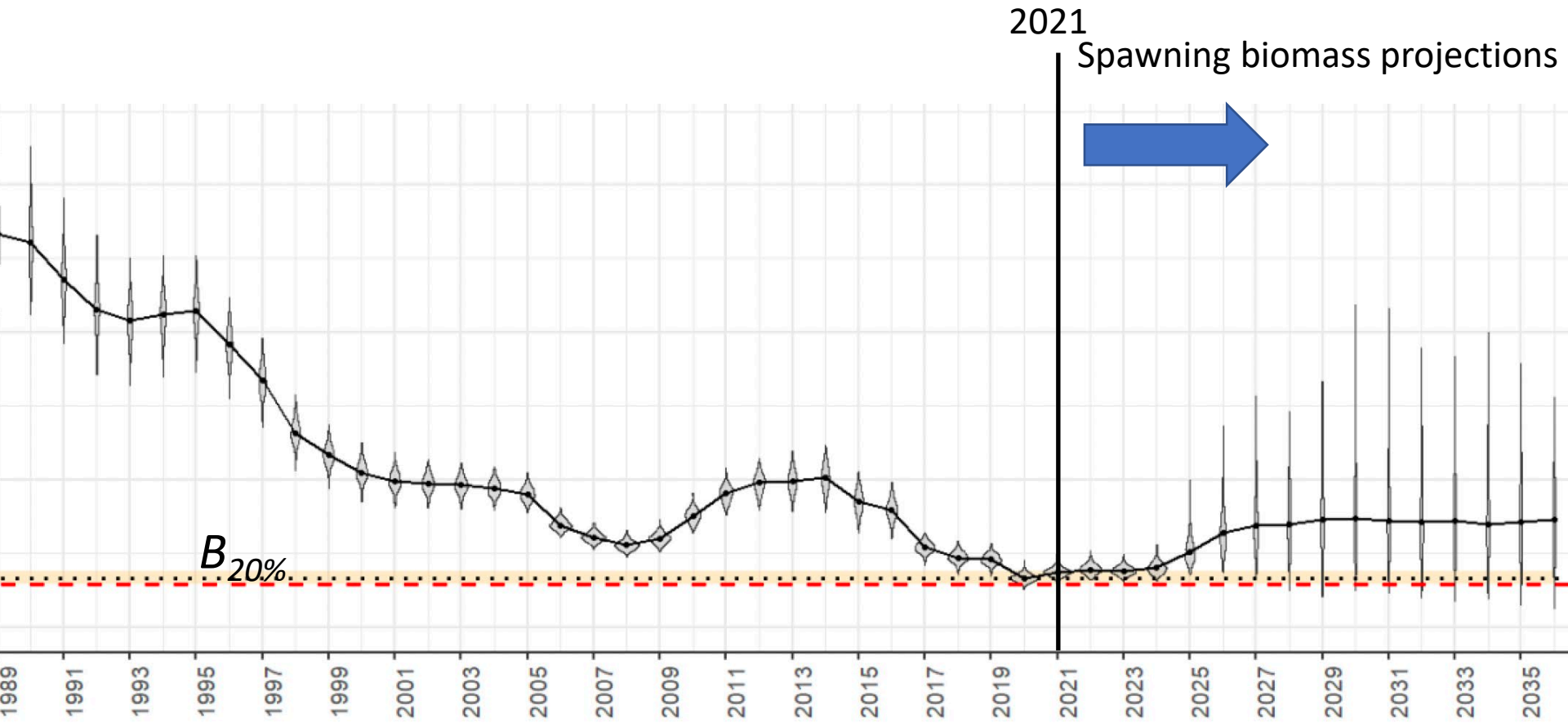
Longline survey



GOA Pacific cod



GOA Pacific cod
Spawning biomass projections



GOA Pacific cod

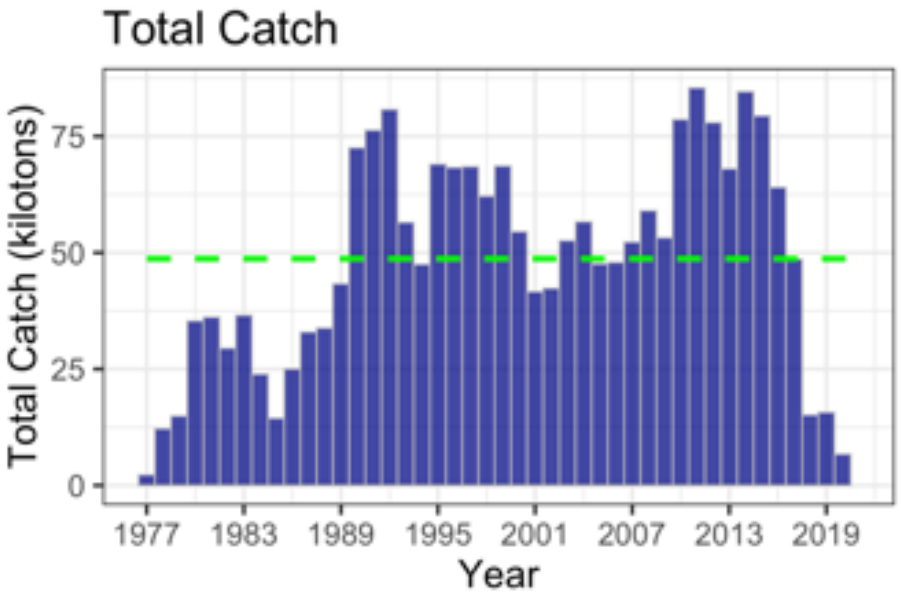
M21.2 Projection A (Mean 1977-2021 conditions projected) Quantity	As estimated or *specified last* year for: 2021	2022	As estimated or *specified this* year for: 2022	2023
M (natural mortality rate)	0.47	0.47	0.48*	0.48*
Tier	3b	3b	3b	3b
Projected total (age 0+) biomass (t)	265,661	312,783	159,837	185,745
Female spawning biomass (t)				
Projected	39,977	50,813	39,873	38,594
$B_{100\%}$	180,111	180,111	162,426	162,426
$B_{40\%}$	72,045	72,045	64,970	64,970
$B_{35\%}$	63,039	63,039	56,849	56,849
F_{OFL}	0.41	0.54	0.54	0.52
$maxF_{ABC}$	0.33	0.43	0.44	0.42
F_{ABC}	0.33	0.43	0.44	0.42
OFL (t)	28,977	46,587	29,131	27,715
maxABC (t)	23,627	38,141	24,043	22,882
ABC (t)	23,627	38,141	24,043	22,882

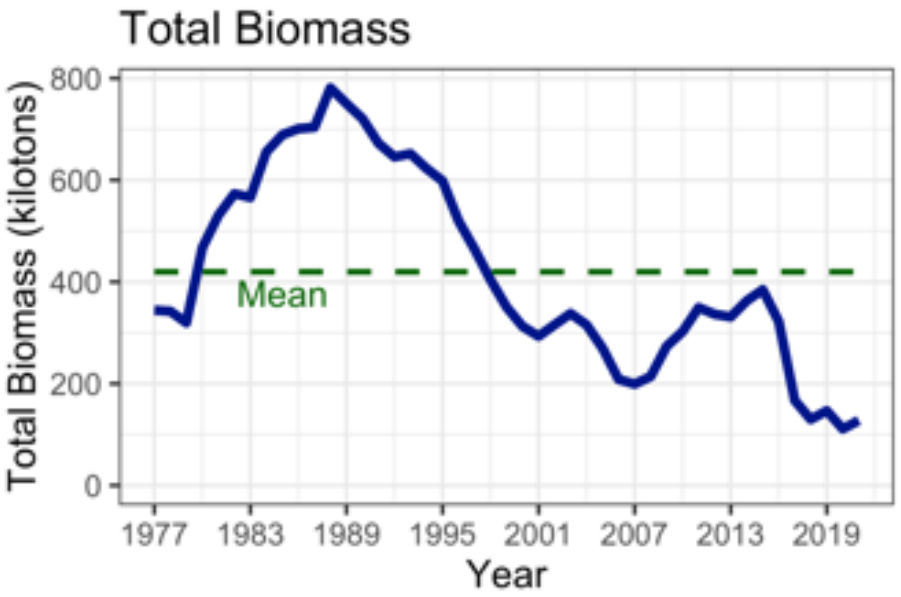
GOA Pacific cod

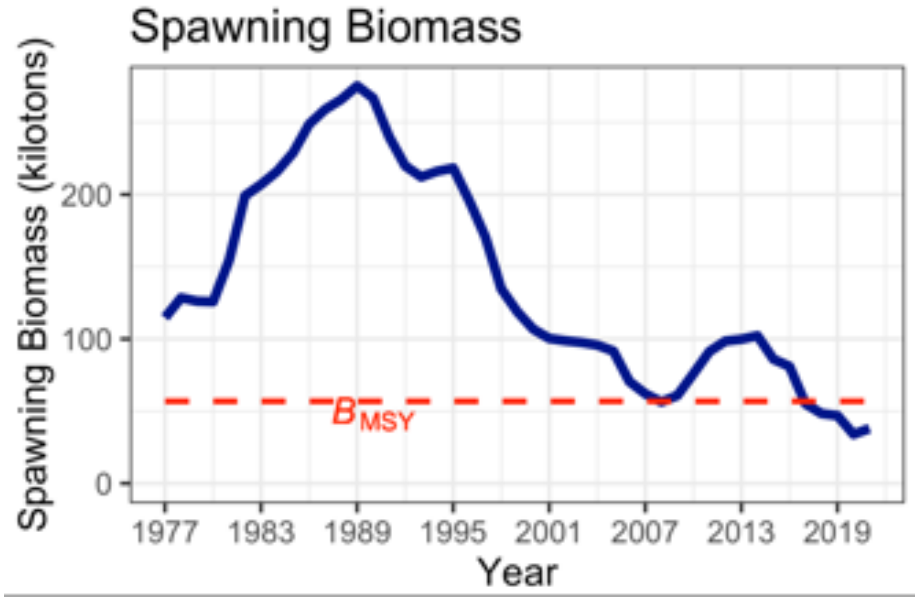
Team agreed with the recommended model with environmental links on:

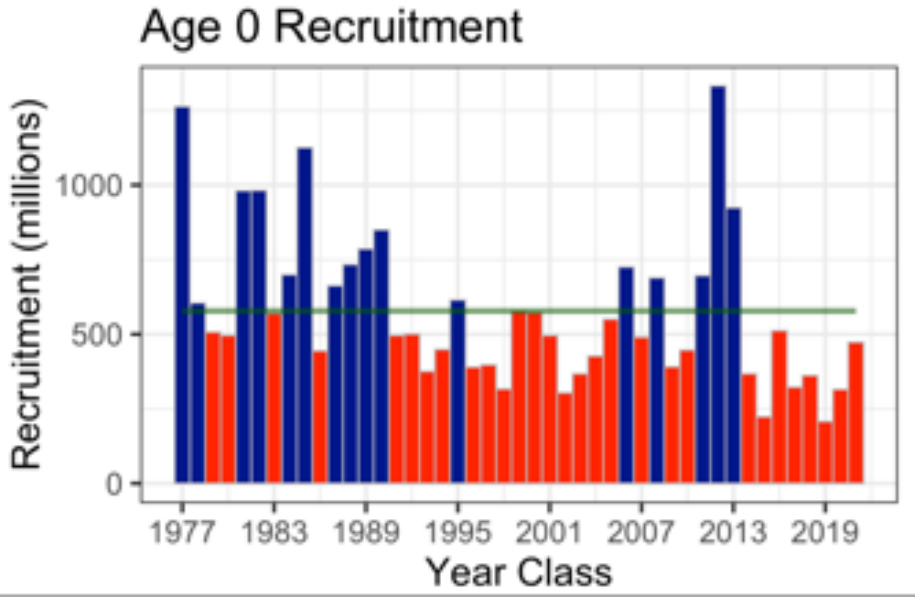
- Growth
- Natural mortality

GOA Pacific cod









3. Sablefish

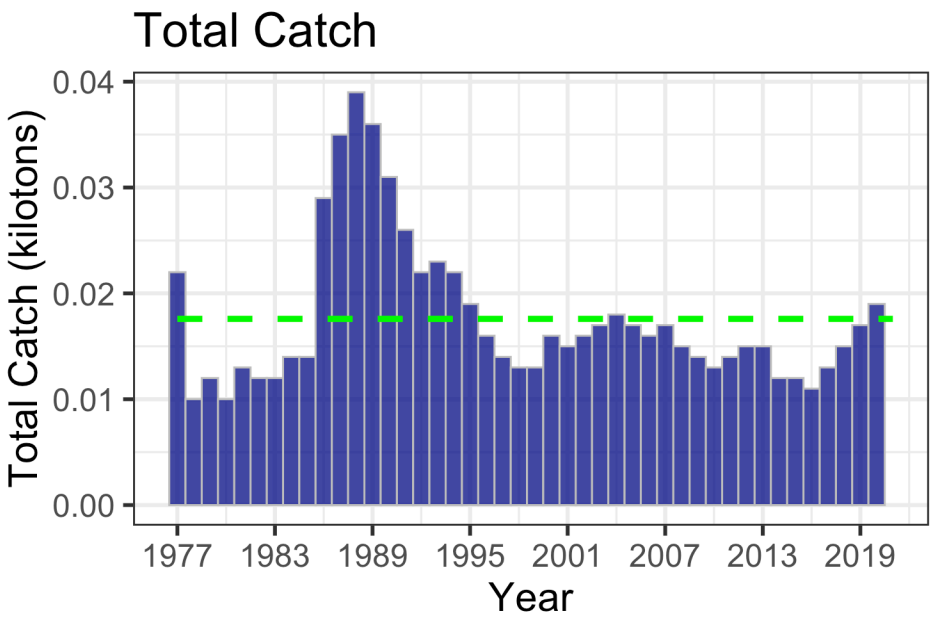
Species	2021 catch	ABC 2021	ABC 2022	Change
Pollock	98,769	115,870	144,444	up 28,574 (25%)
Pacific Cod	12,272	23,627	24,043	up 416 (2%)
Sablefish	14,115	21,475	22,794	up 1,319 (6%)
Flatfish	2,717	116,883	115,834	down 1,049 (1%)
Arrowtooth flounder	9,517	126,970	119,779	down 7,191 (6%)
Rockfish	35,882	55,107	56,554	up 1,447 (3%)
Atka mackerel	940	4,700	4,700	same (0%)
Skates	2,609	6,670	6,563	down 107 (2%)
Sharks	1,639	3,755	3,755	same (0%)
Octopus	51	980	980	same (0%)
Total	178,511	476,037	499,446	up 23,409 (5%)

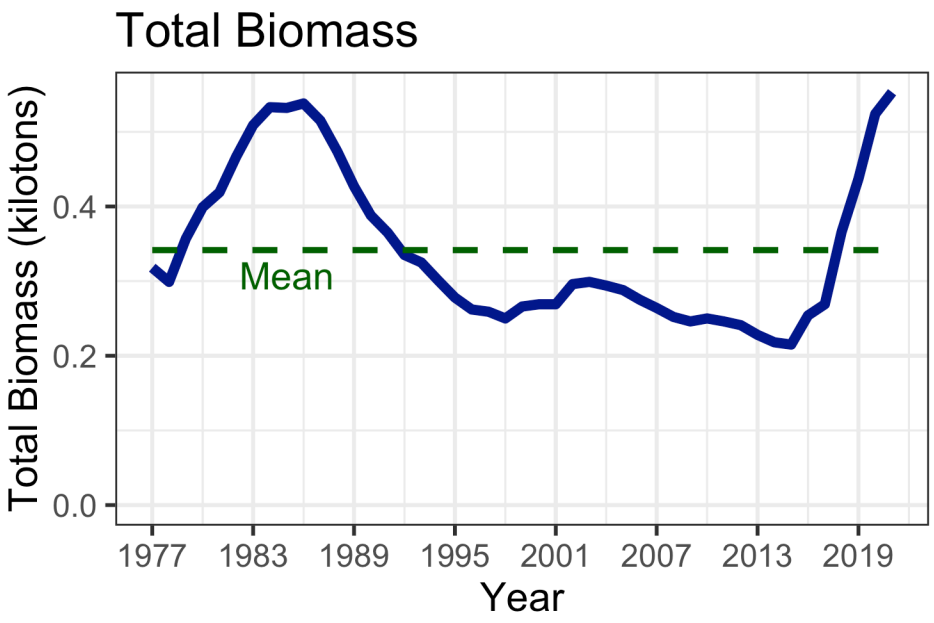
3. Sablefish

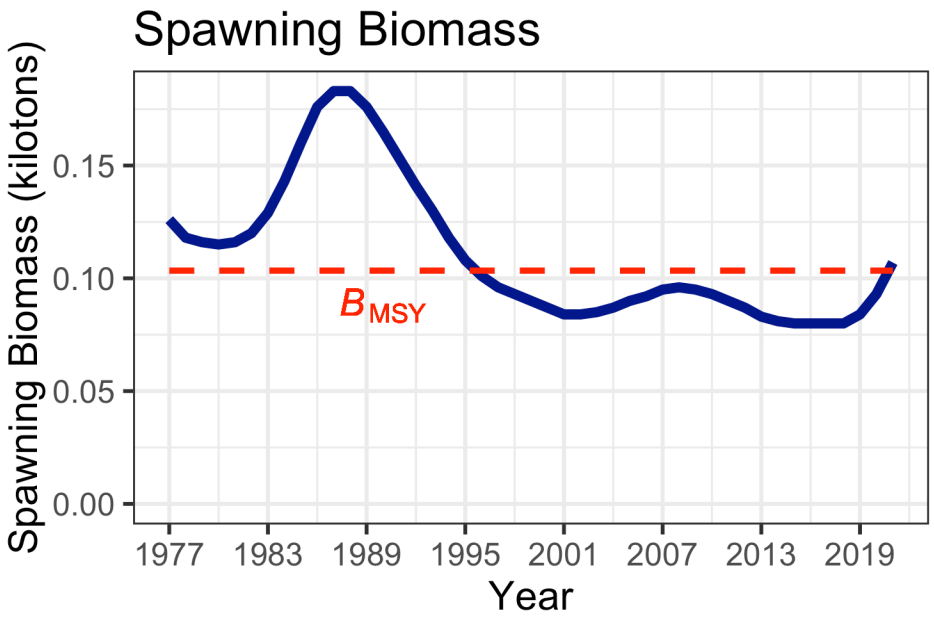
Covered in Joint Team

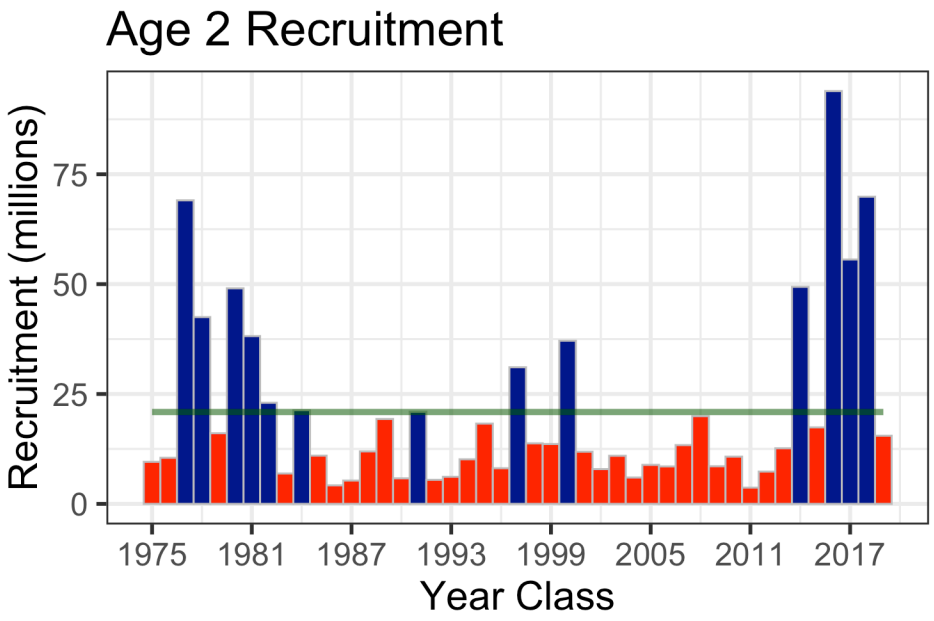
	2022			2023	
Region	**OFL****	**ABC**	**TAC**	**OFL**	**ABC**
W	--	3,727		--	3,951
C	--	9,965		--	9,495
*WYAK	--	3,437		--	3,159
*SEO	--	5,665		--	5,398
GOA	--	**22,794**		--	**22,003**
Alaska-wide	**40,432**	**34,521**		**42,520**	**36,318**

2021 sablefish

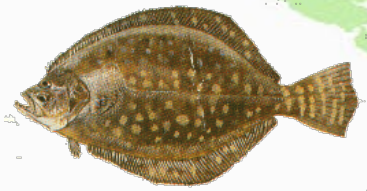








Flatfish ABC Summary



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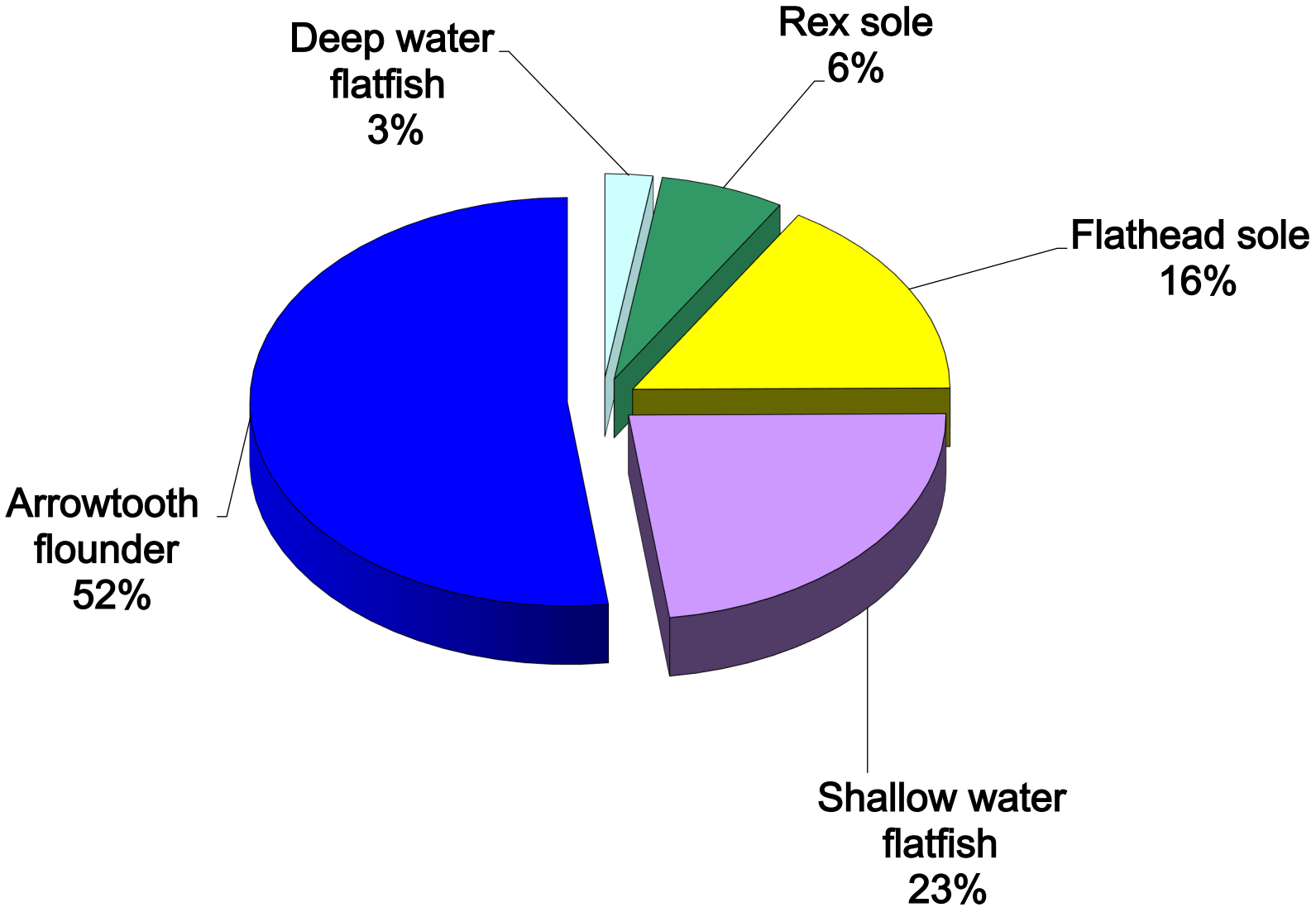
Subtotal (without ATF)	116,883	115,834	down 1,049 (1%)

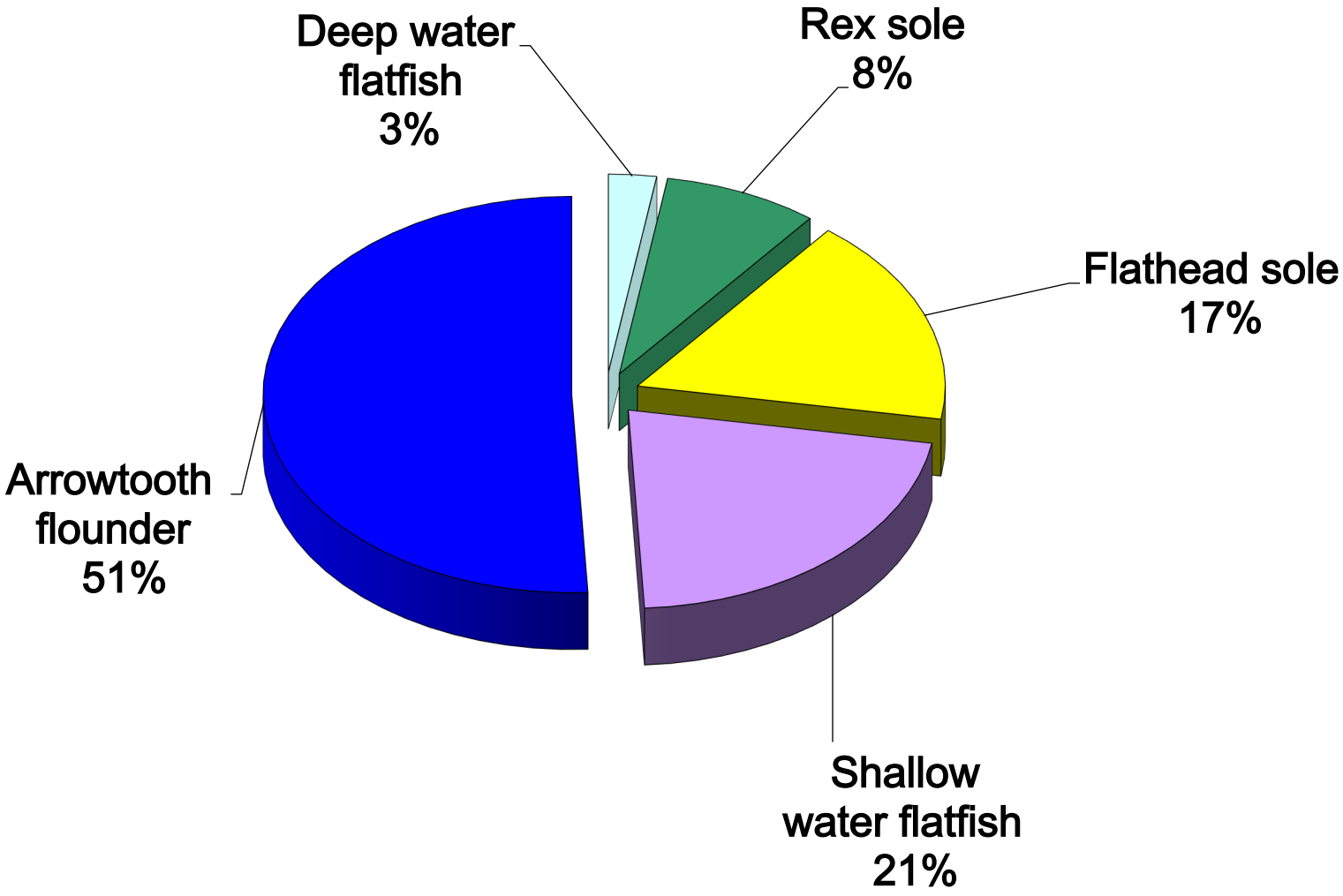
Deep-water ABC from Dover assessment Tier 3 + others Tier 6

Shallow water flats: N and S rock sole Tier 3, others Tier 5

Flatfish 2021 ABC's
243,853 t combined



Flatfish 2022 ABC's
235,613 t combined



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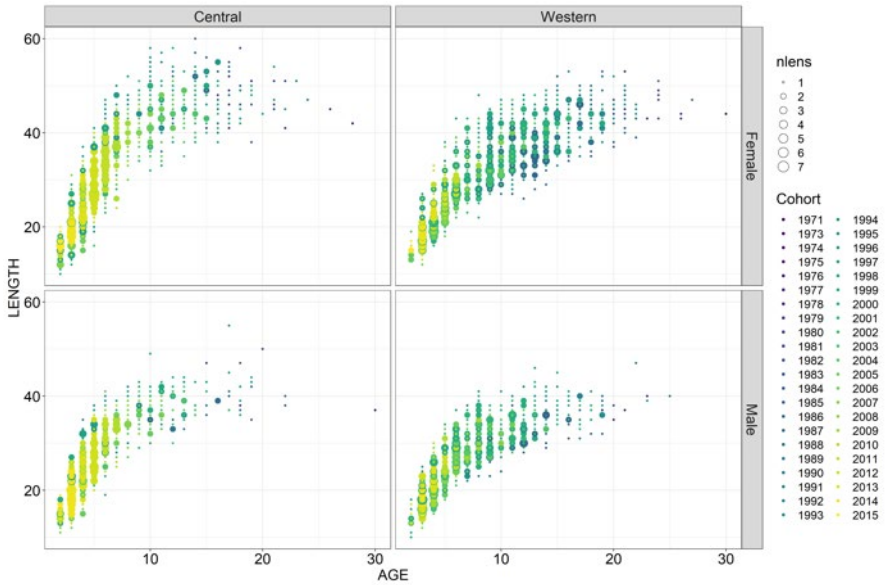
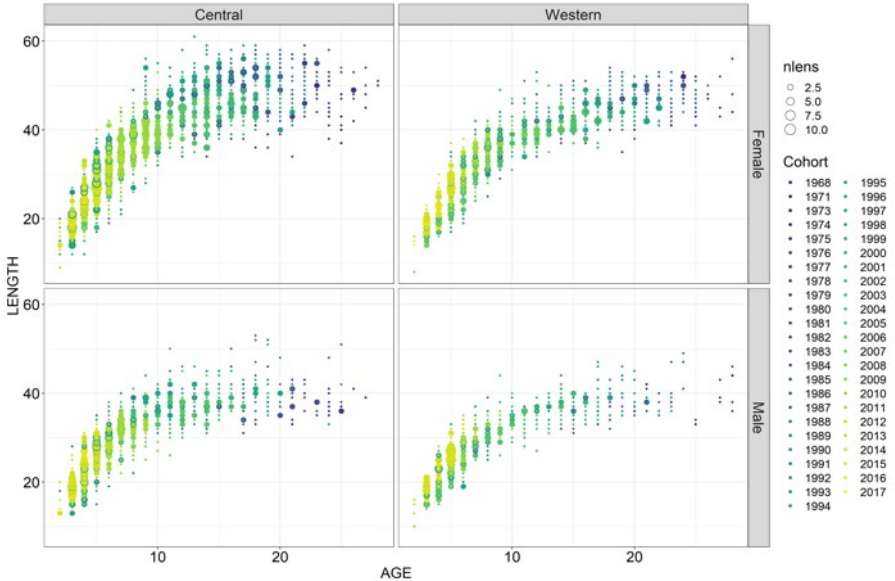
Shallow water flats: N and S rock sole Tier 3, others Tier 5

Rock sole assessments

Northern rock sole



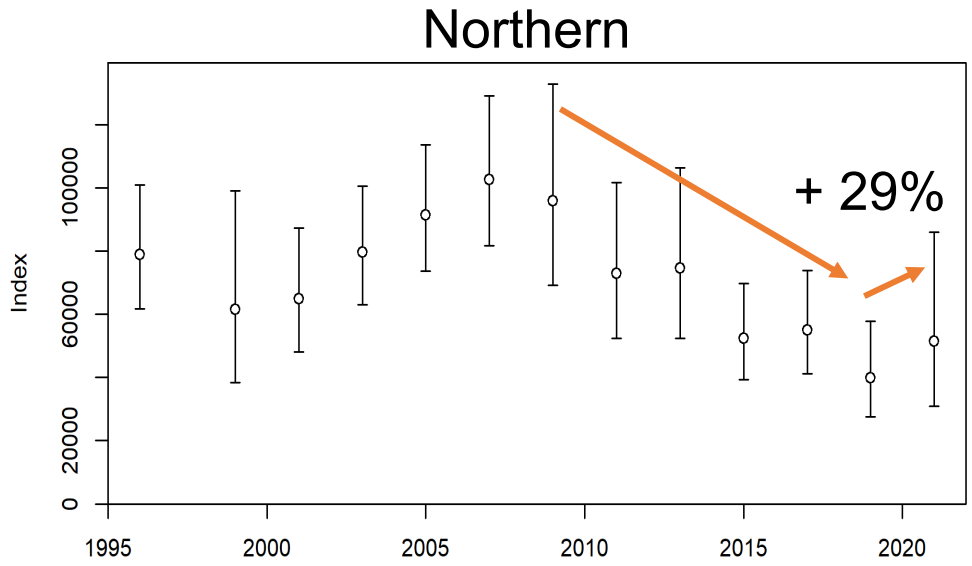
Southern rock sole

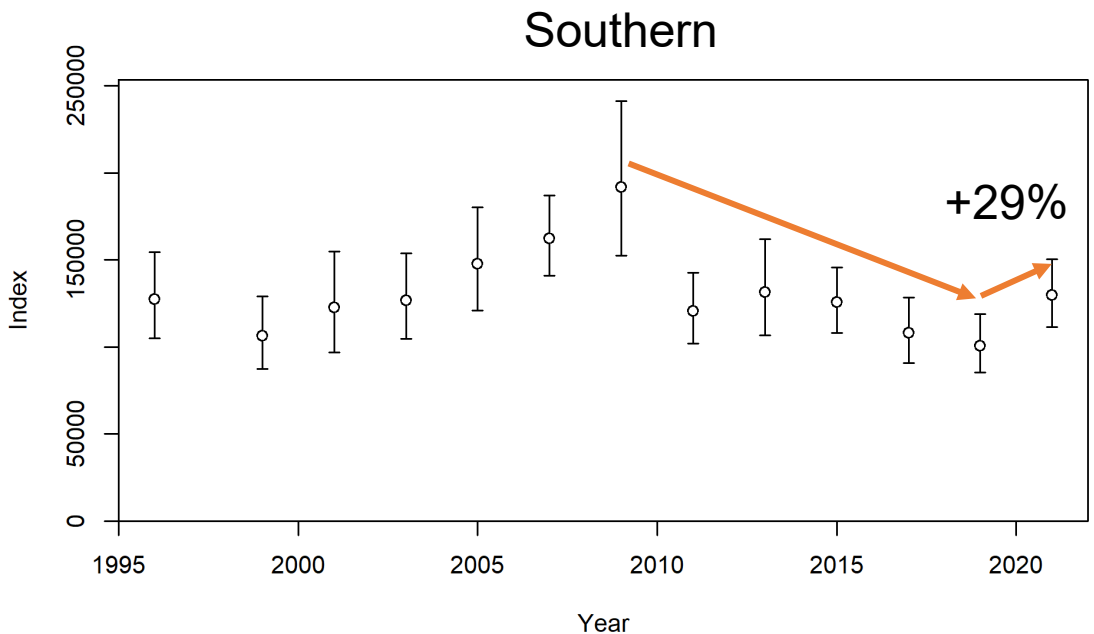


Differences in growth by area

2-area model accounts for differences in growth between central and western GOA

Rock soles survey biomass



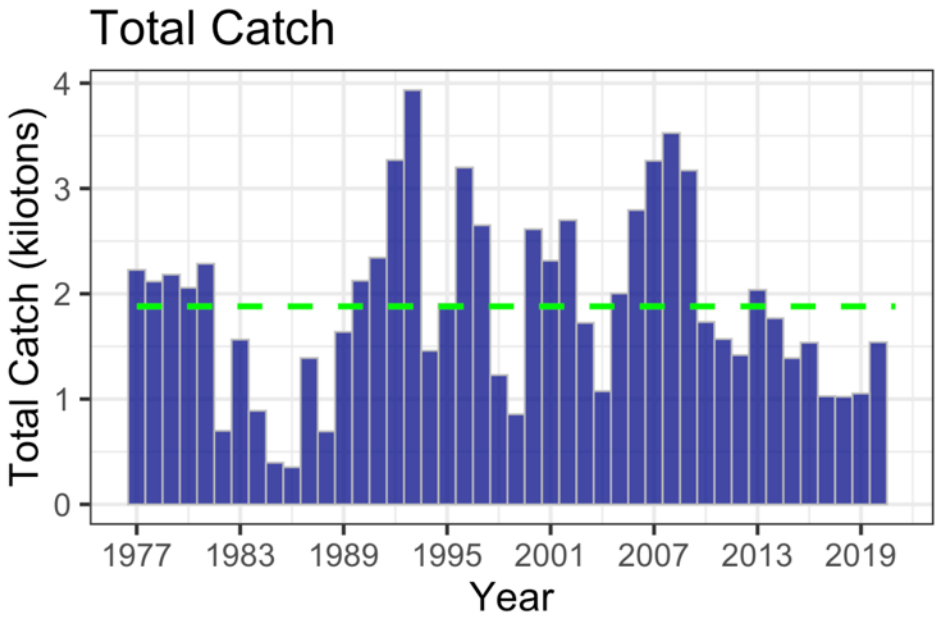


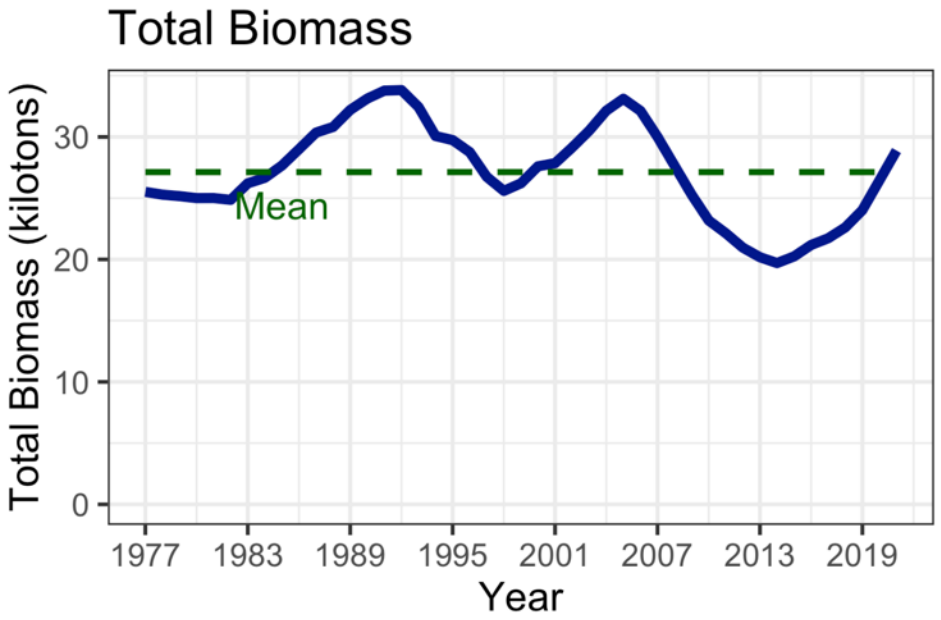
Summary–northern rock sole

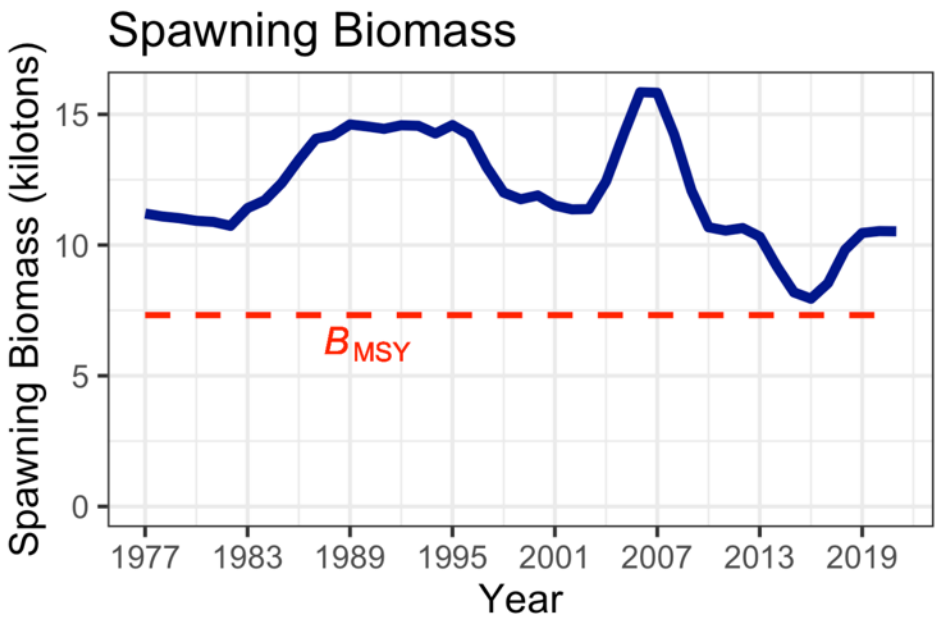
- Overall fits to data were similar among the models
  - Some improvement in the fit to survey biomass by 2-area model
    - Indications of non-stationarity for all models
  - All models underestimate peak of male length distribution from survey
- Retrospective results were similar among models
- Preferred model – Model 21.2
  - Biologically appropriate given difference in growth between central and western GOA
  - Estimated growth of central GOA growth morph better described
    - Majority of catch is from central GOA
    - Important for estimating reference points

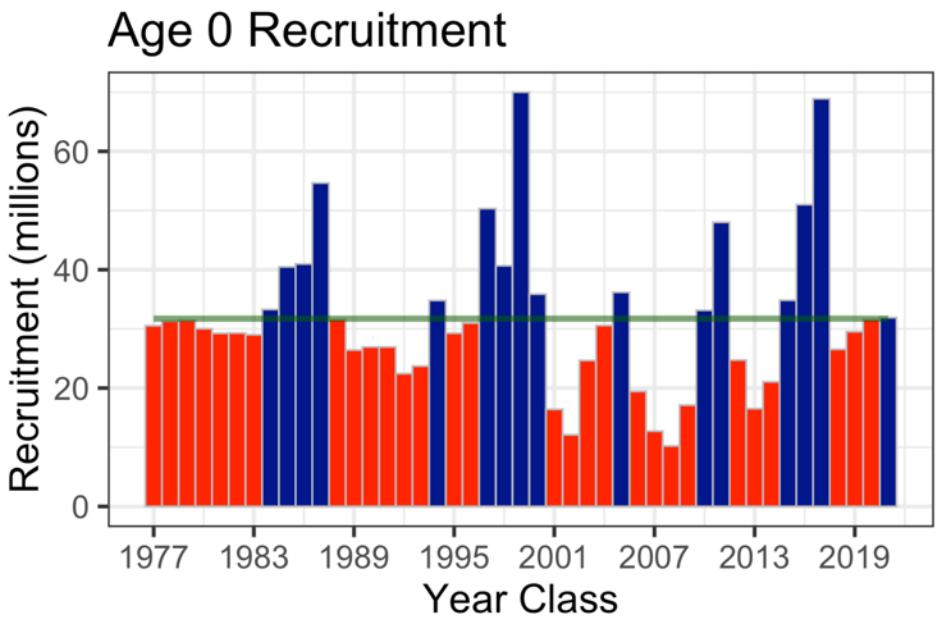
The Team agreed with this choice

Northern rock sole-central GOA

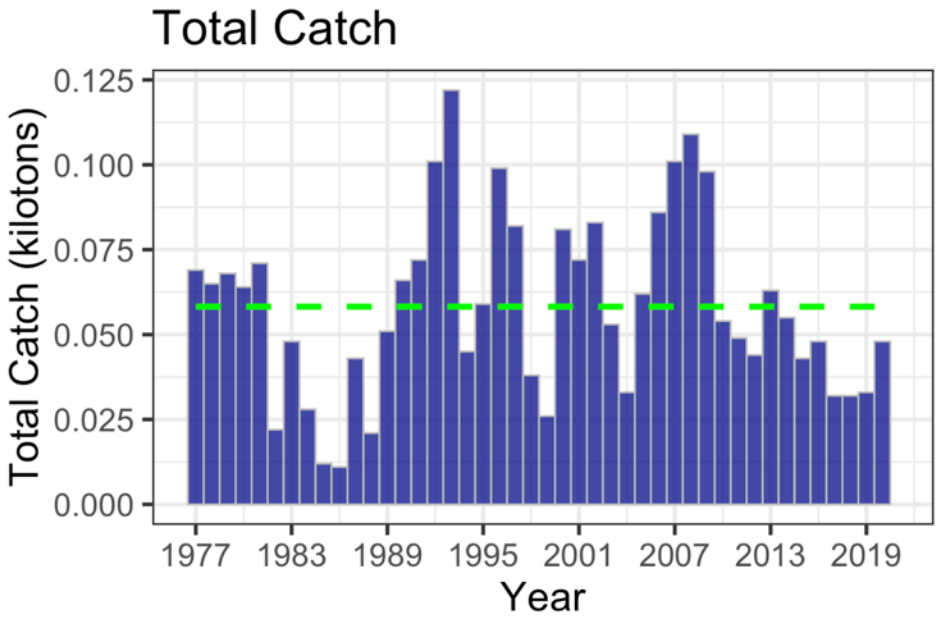


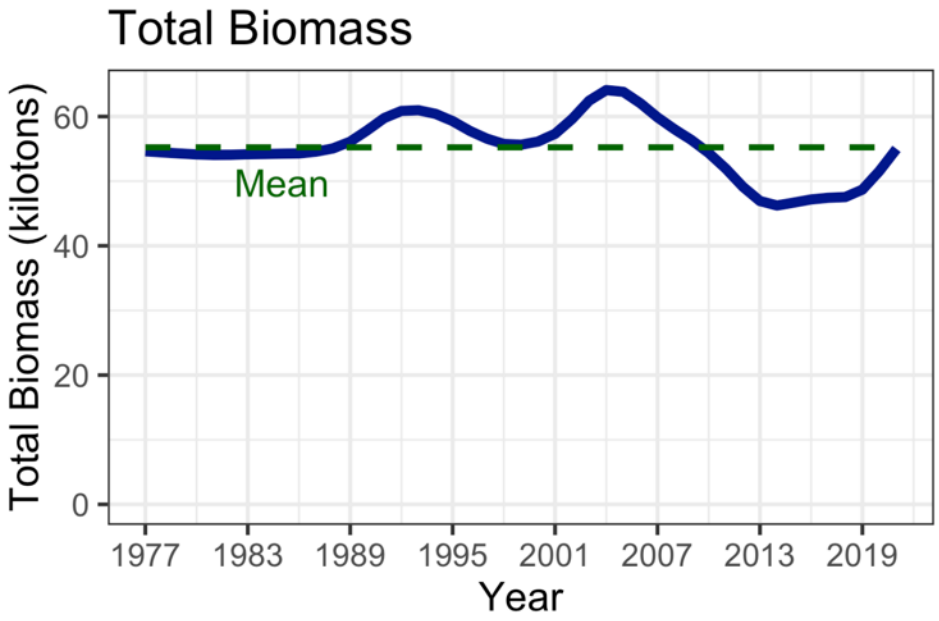


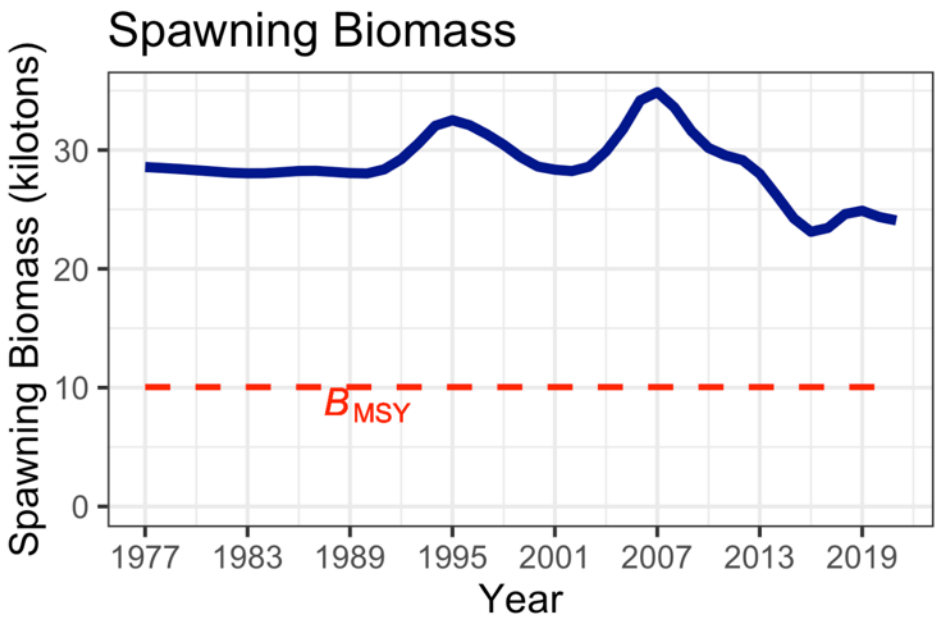


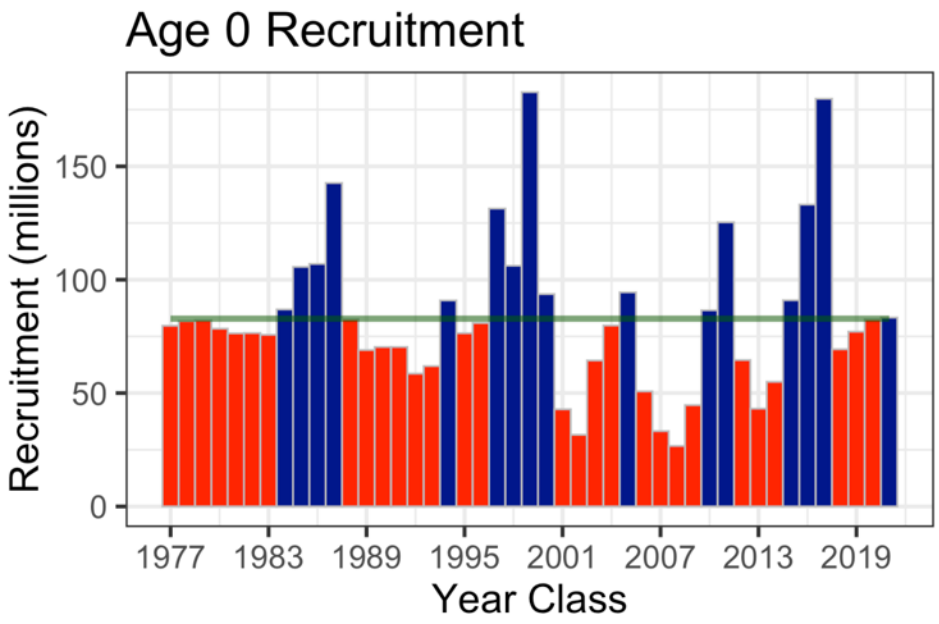


Northern rock sole-western GOA

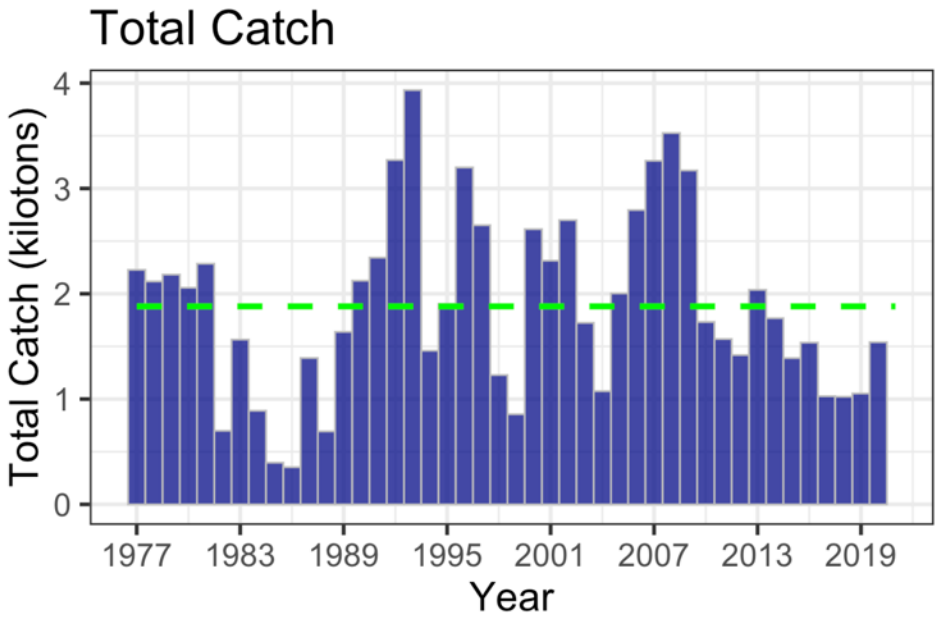


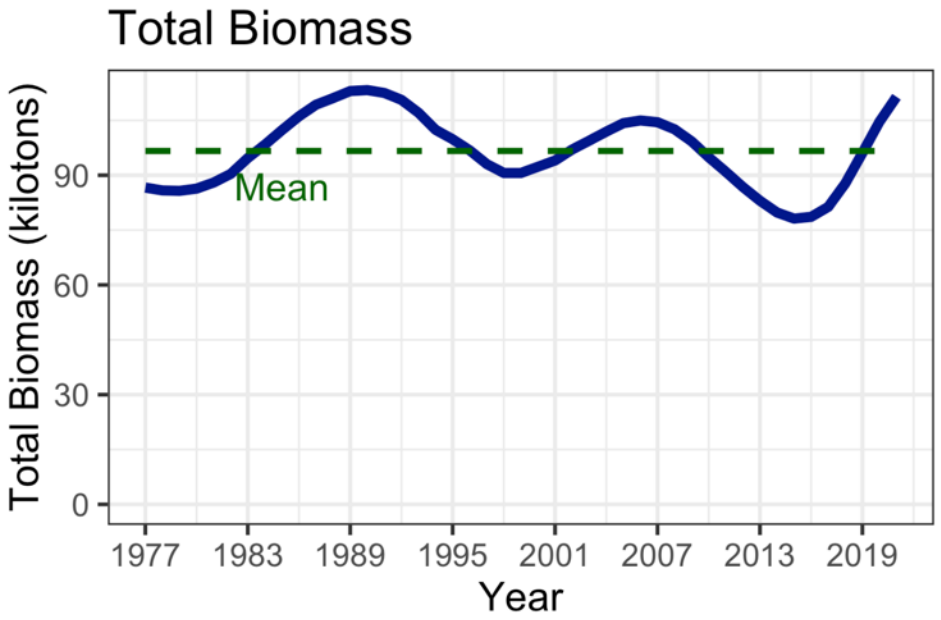


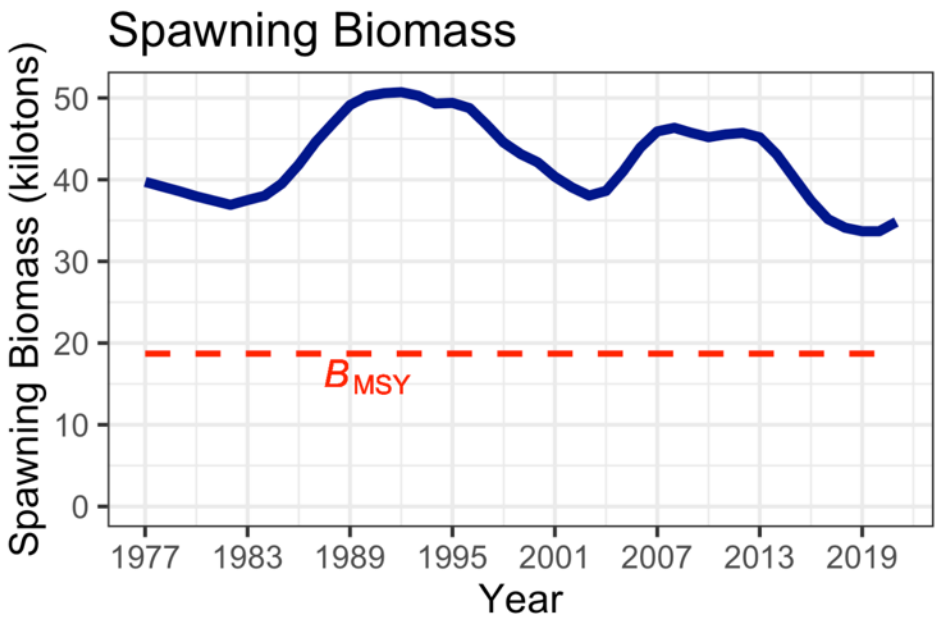


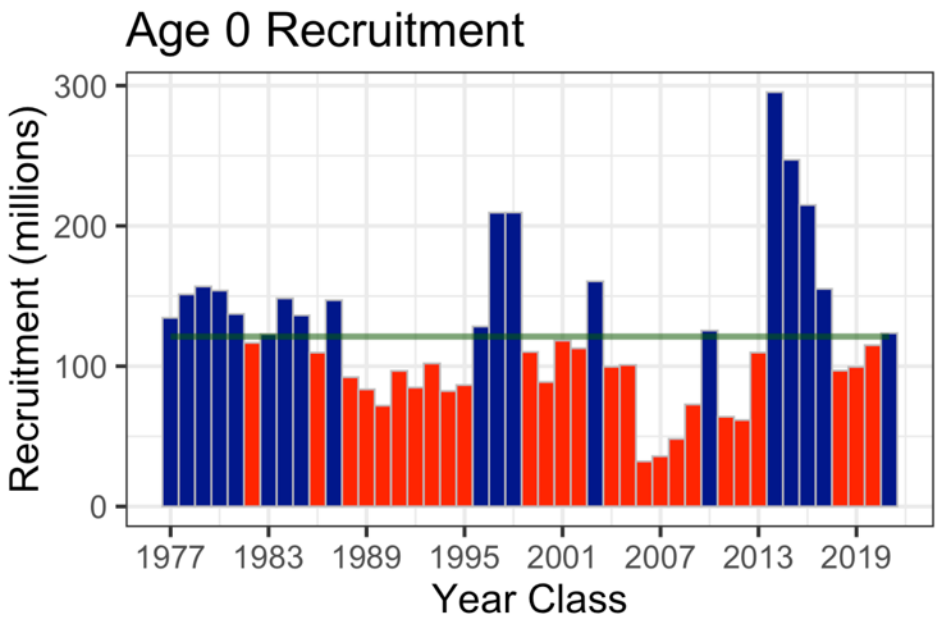


Southern rock sole-central GOA

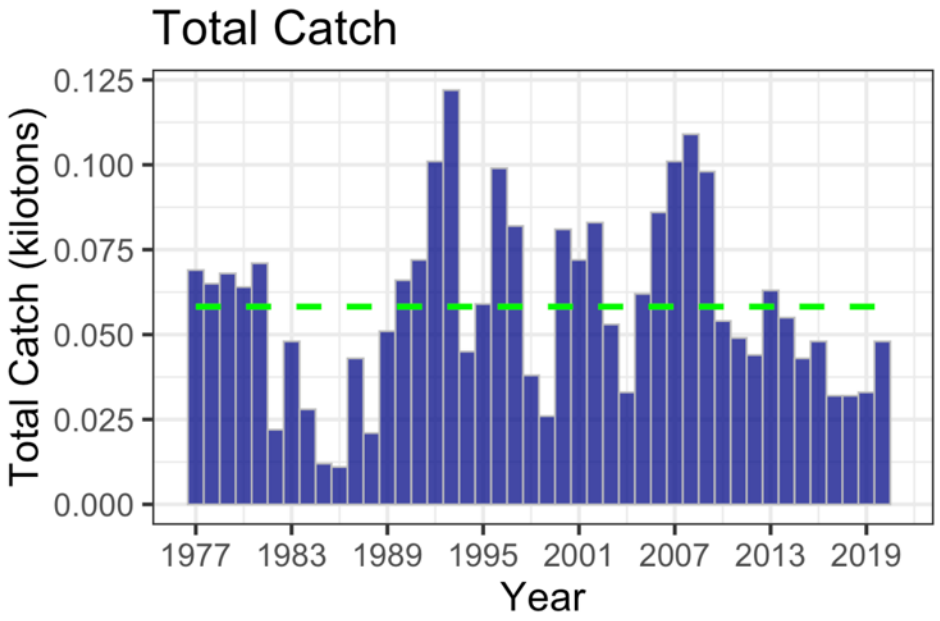


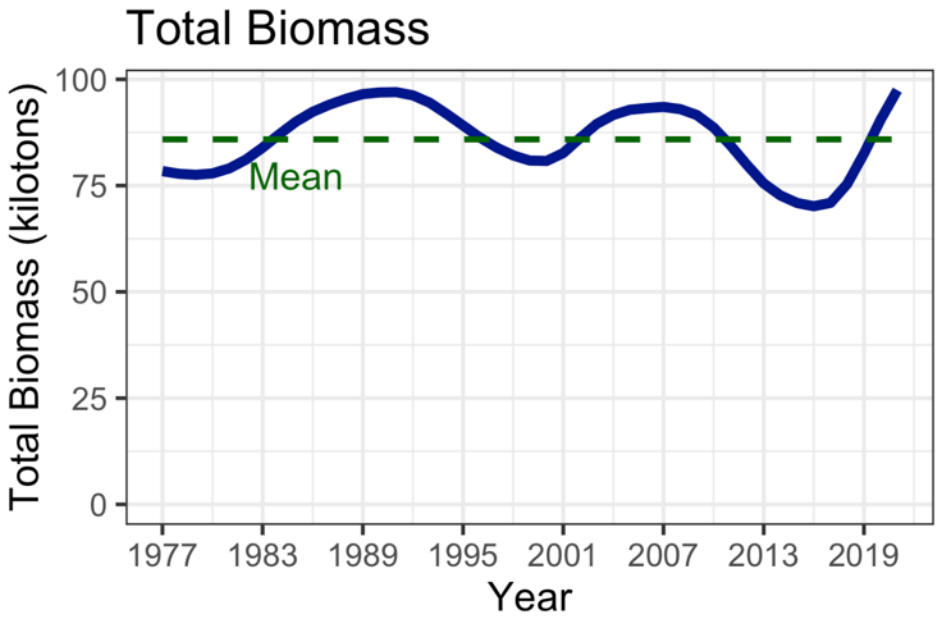


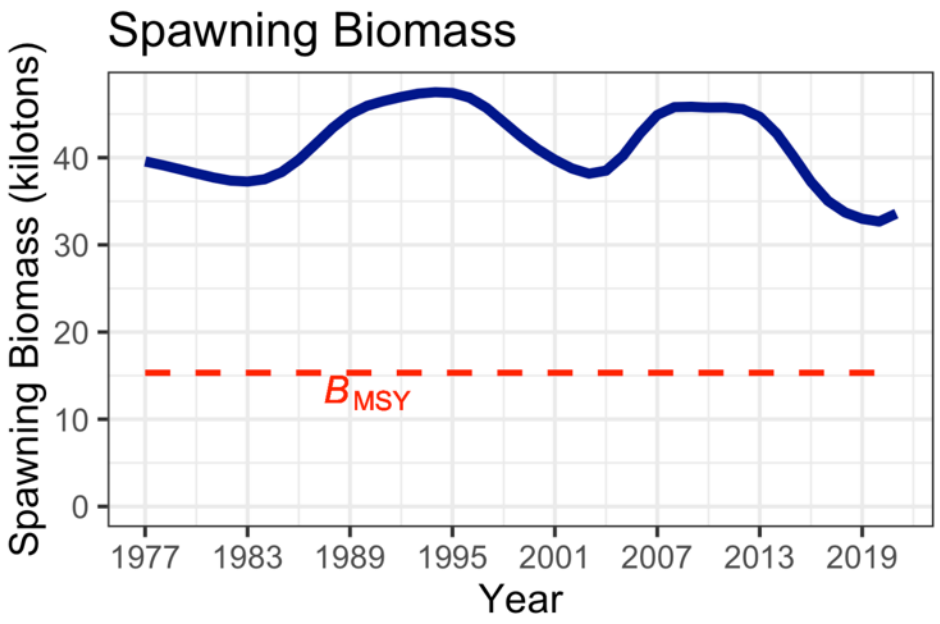


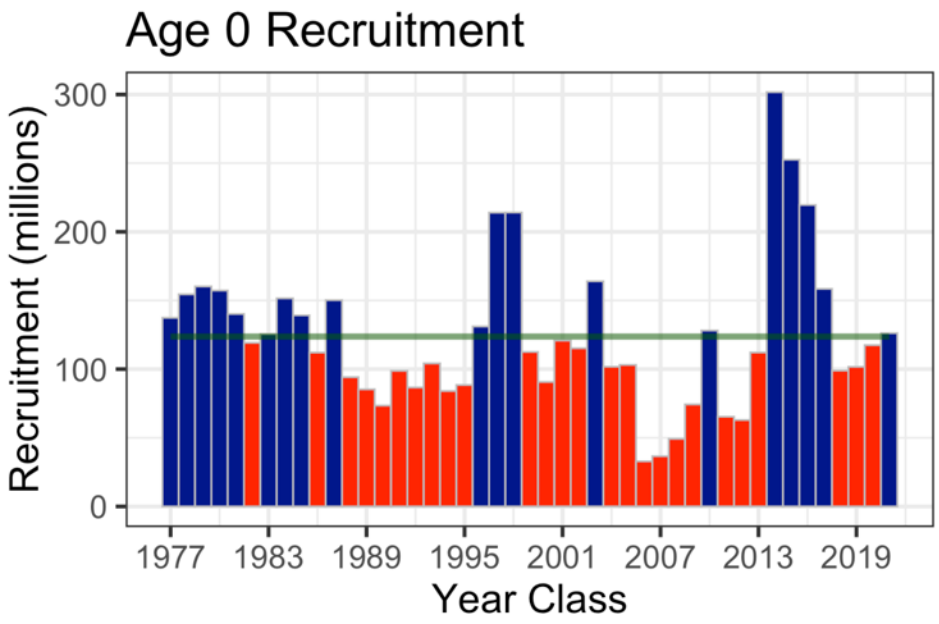


Southern rock sole-western GOA





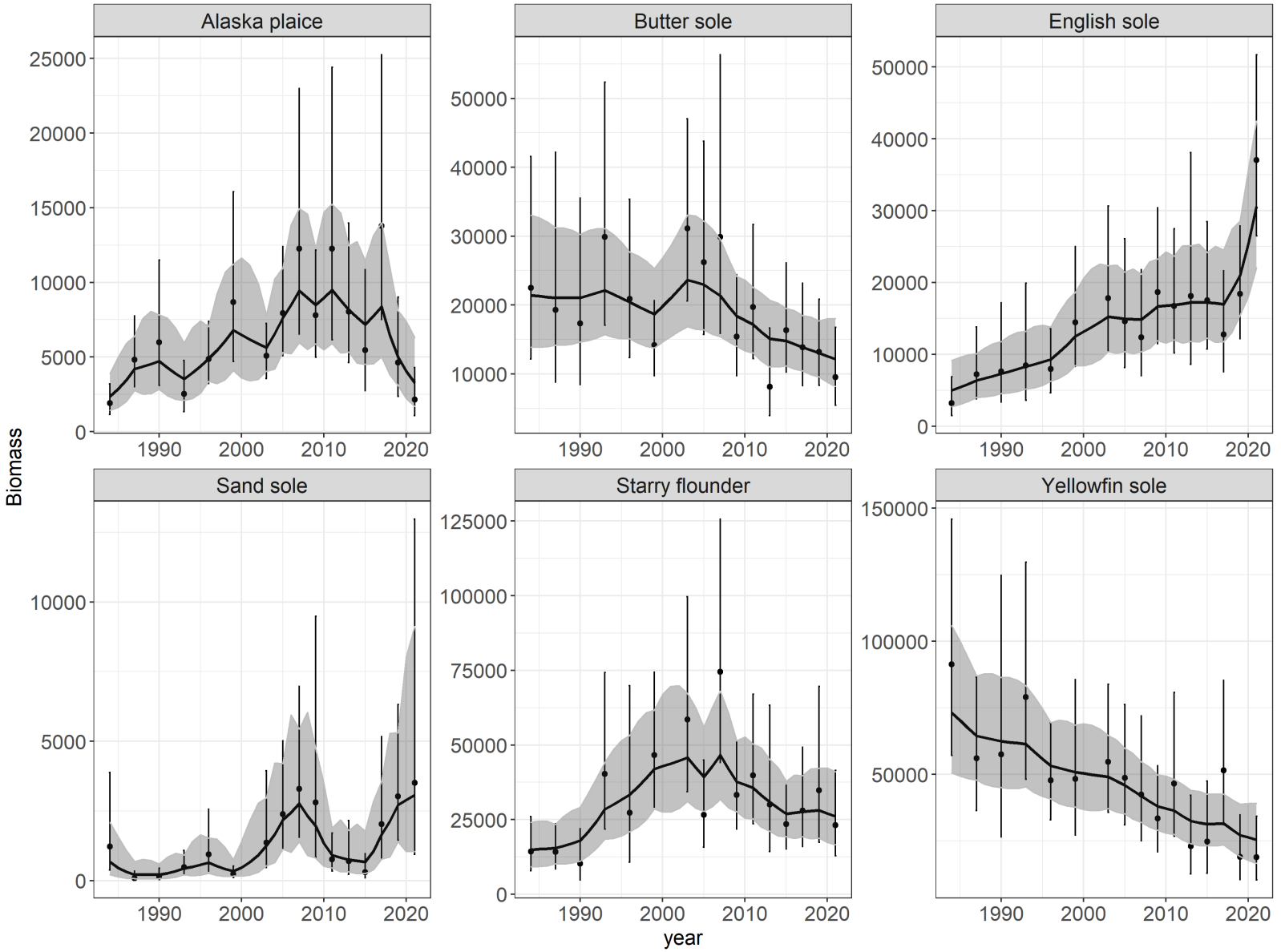




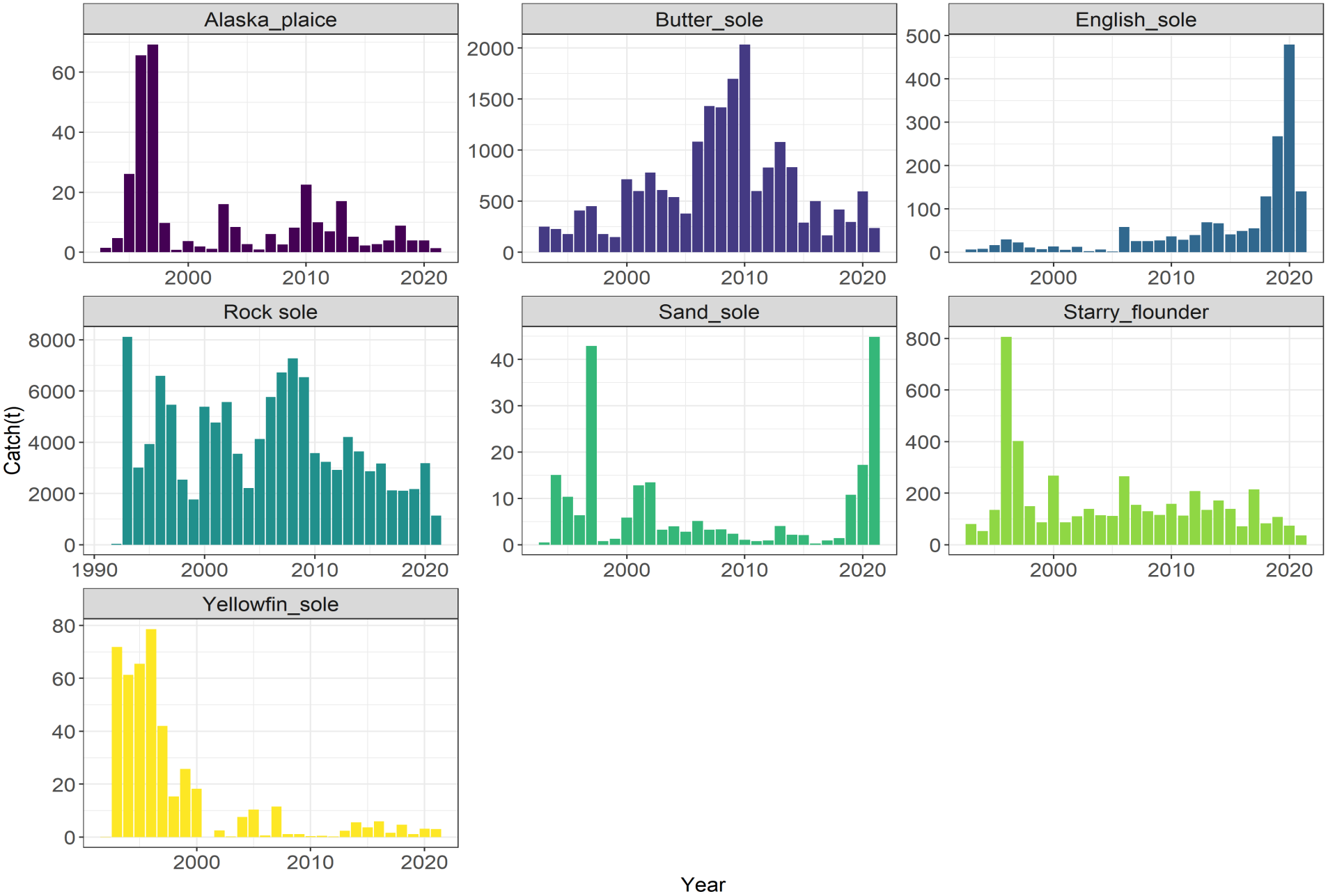
4. Shallow-water flatfish

Full assessment

Many components



4. Shallow-water flatfish catch



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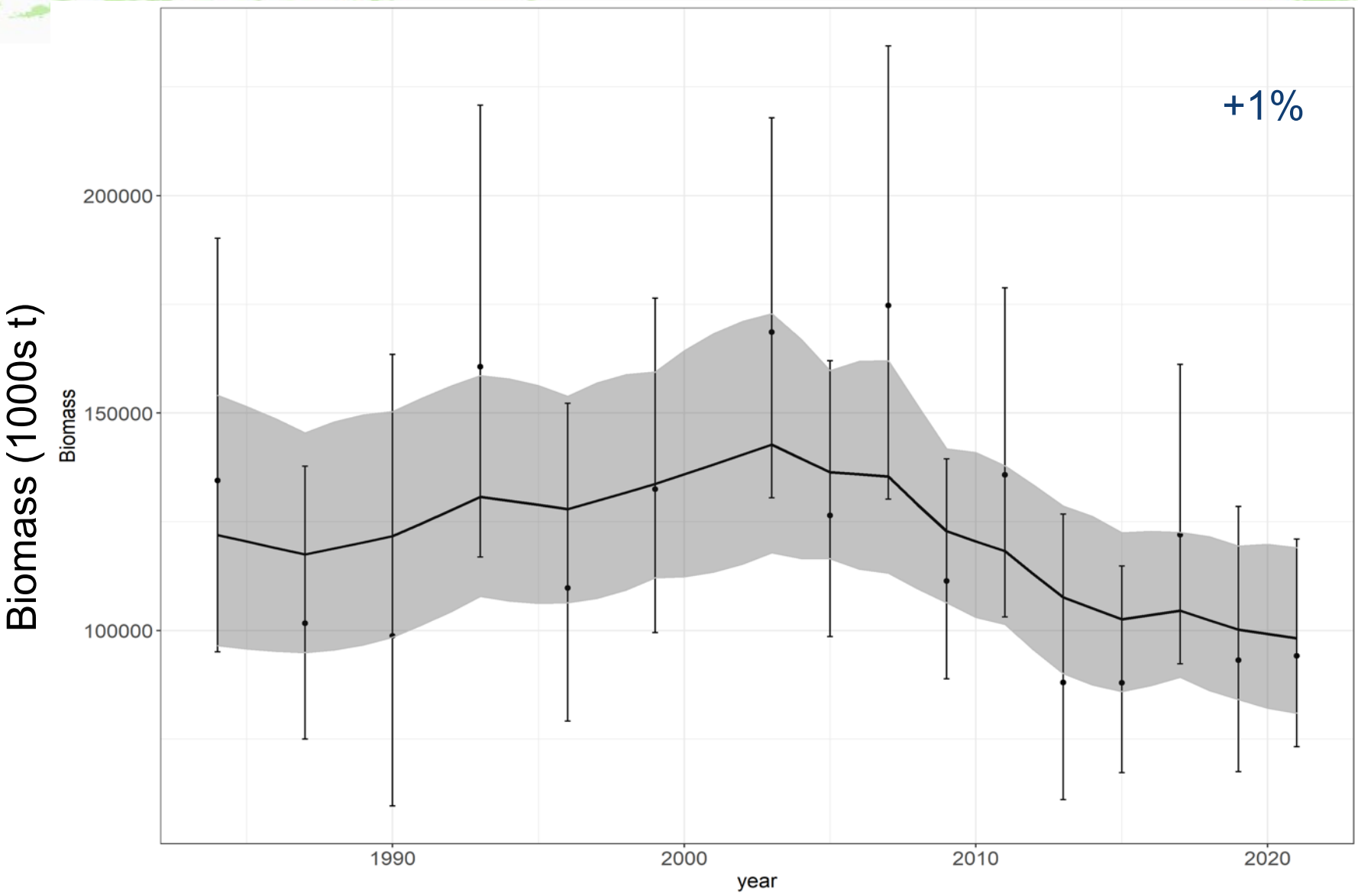
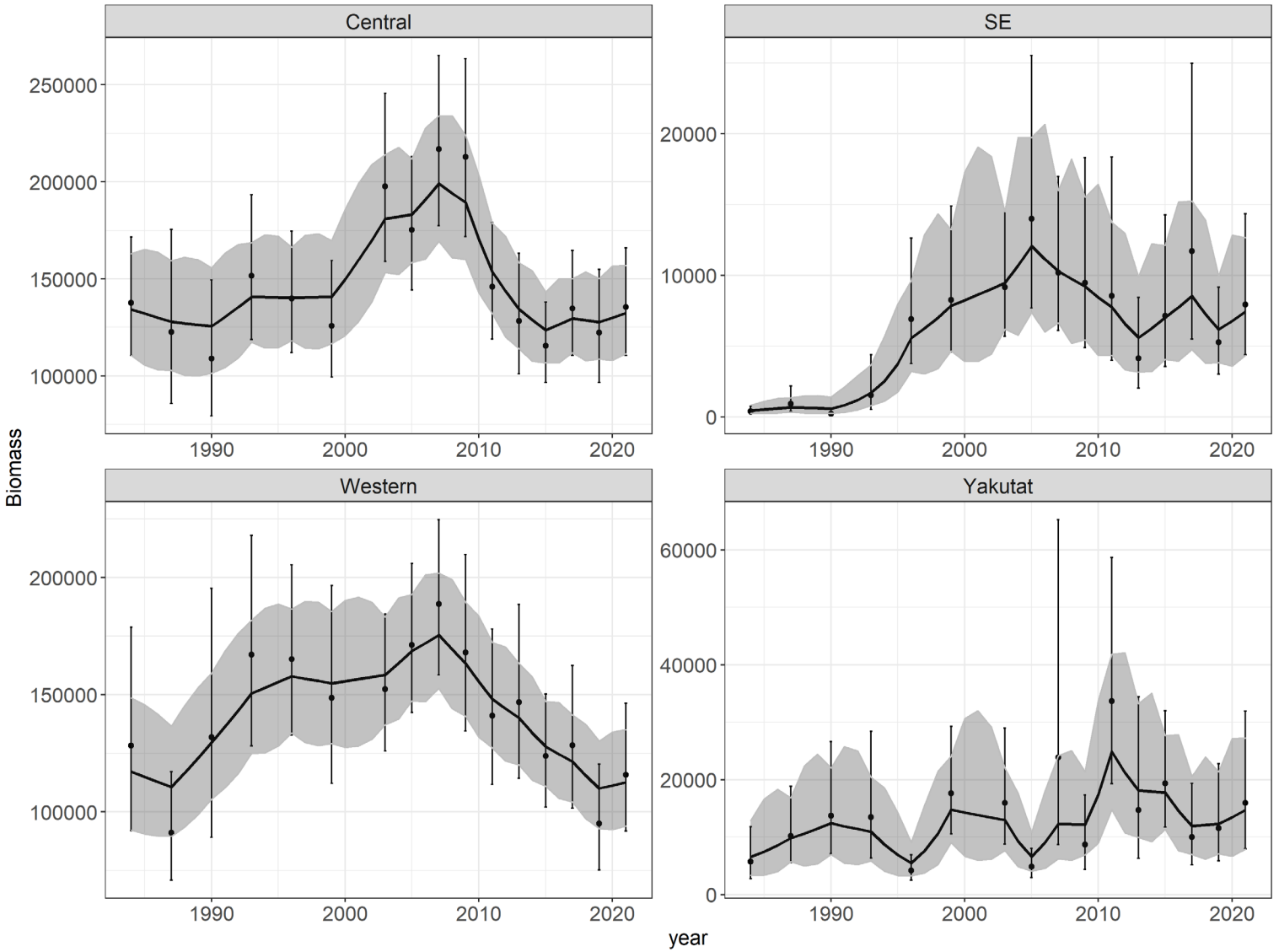


4. Shallow-water flatfish

Apportionments updated



4. Shallow-water flatfish

Plan Team discussions

- Area-specific model for two species of rock soles appropriate
- Other component stocks incidental catch seem consistent with survey trends

Deepwater
Flatfish ABC's

Species	2021 ABC	2022 ABC	Change
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Subtotal (without ATF)	116,883	115,834	down 1,049 (1%)

Next full **Deepwater flatfish assessment due in 2023, only some book-keeping on species inclusions

Projection model run w/ updated catches, minor change in ABC

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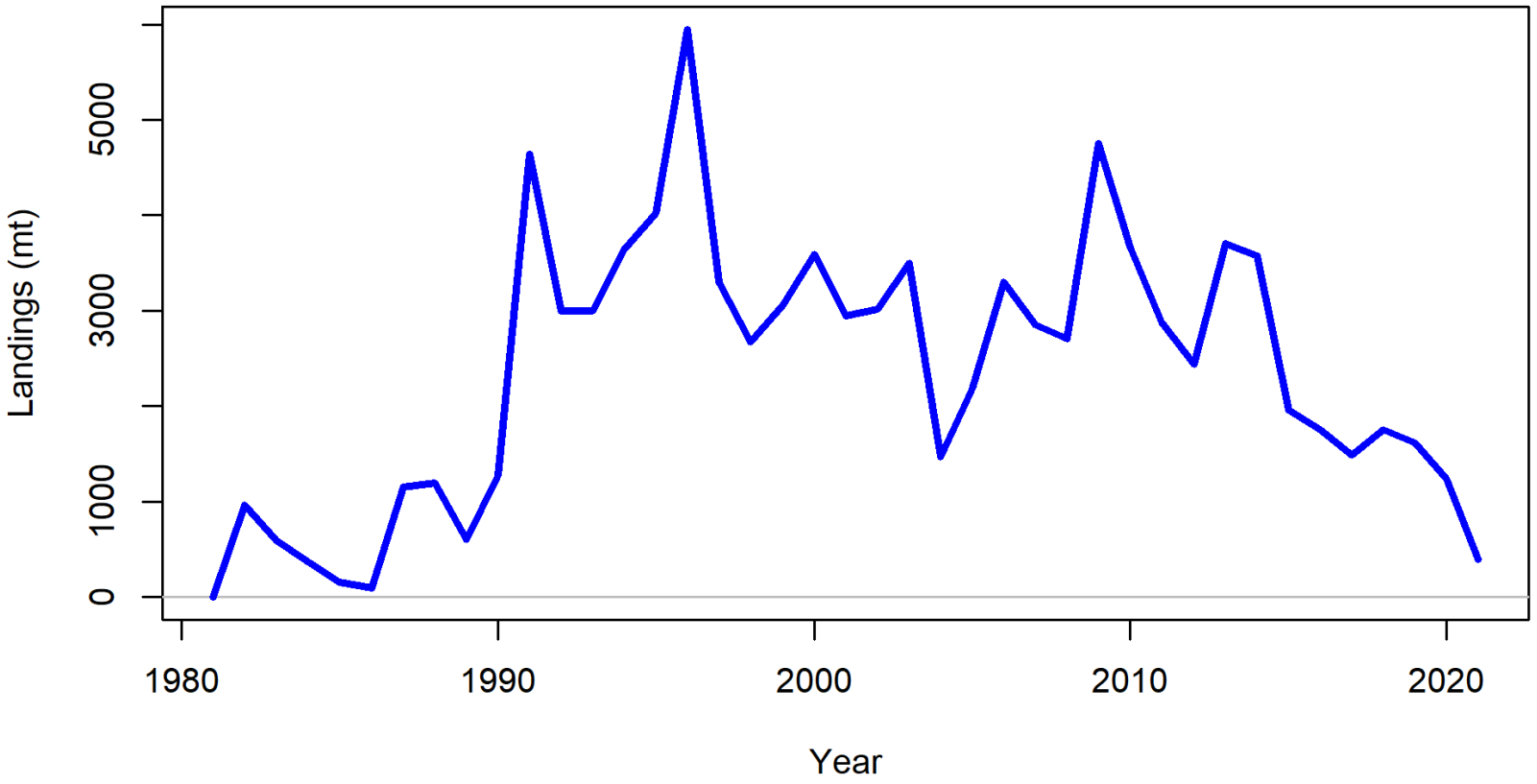
6. GOA Rex sole



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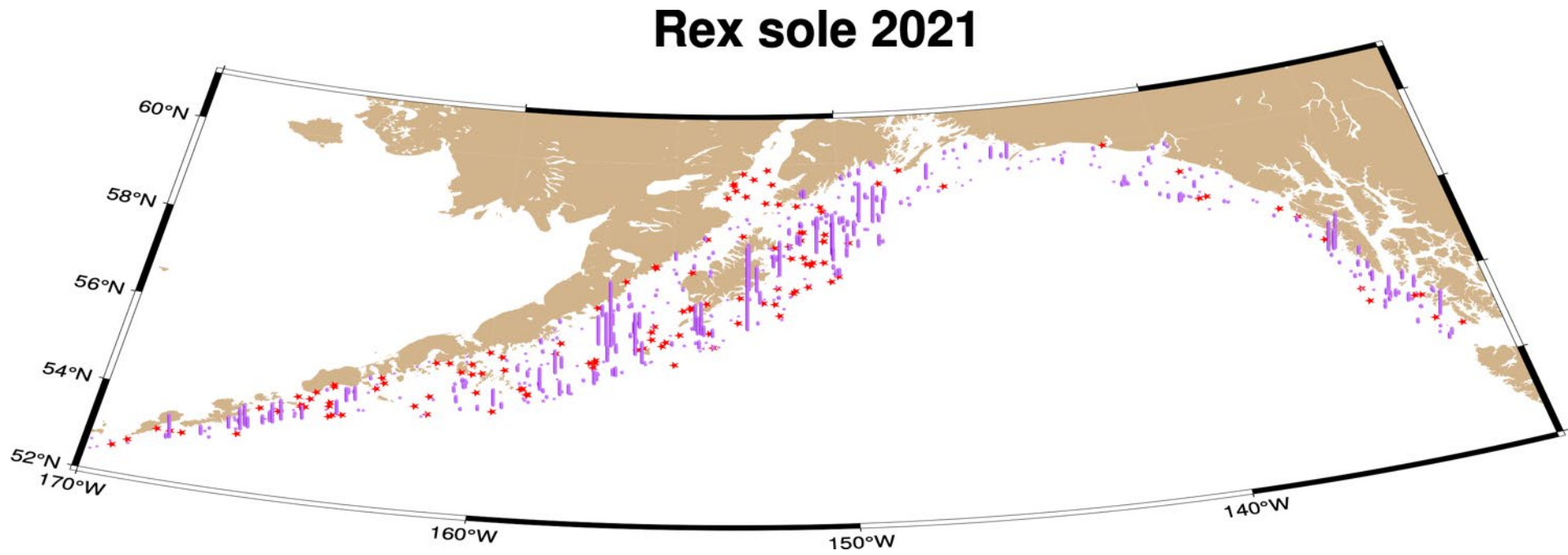
Survey CPUE



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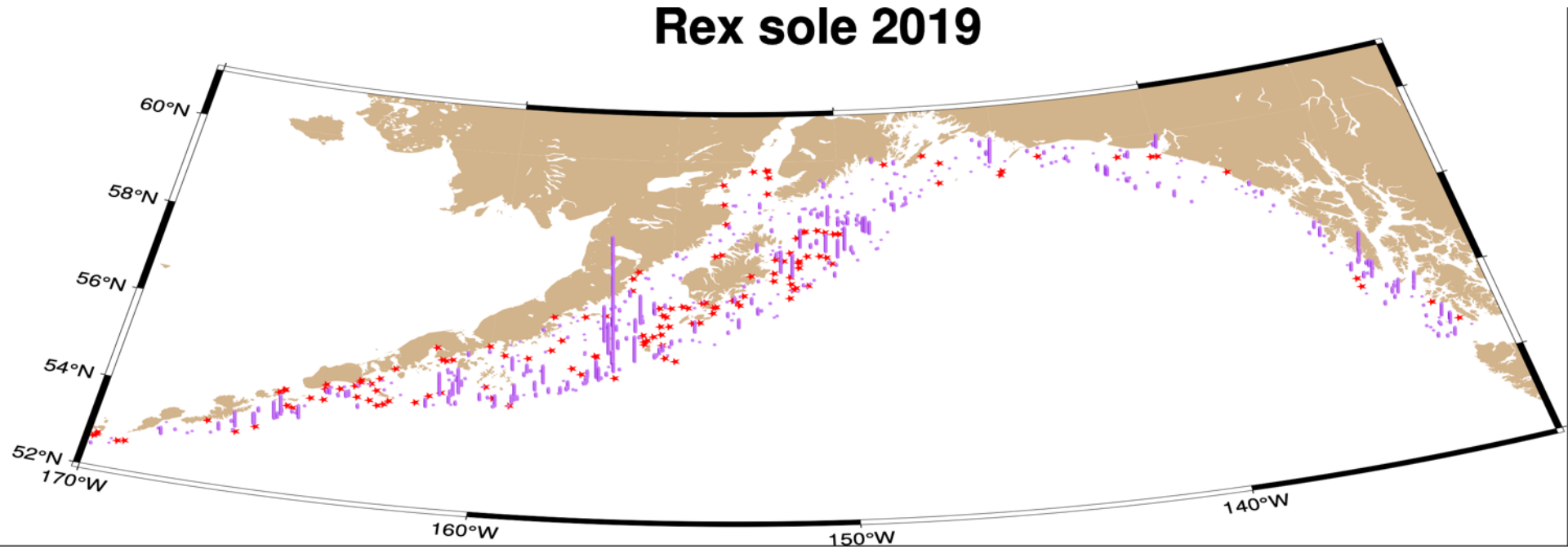

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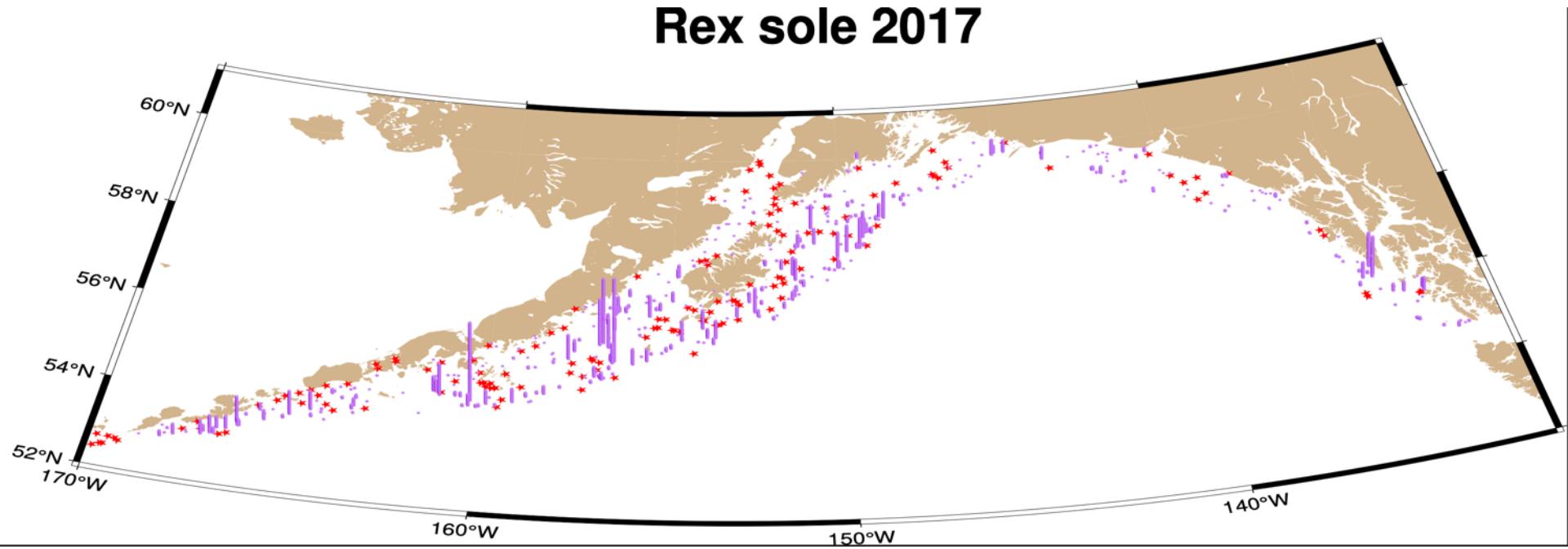
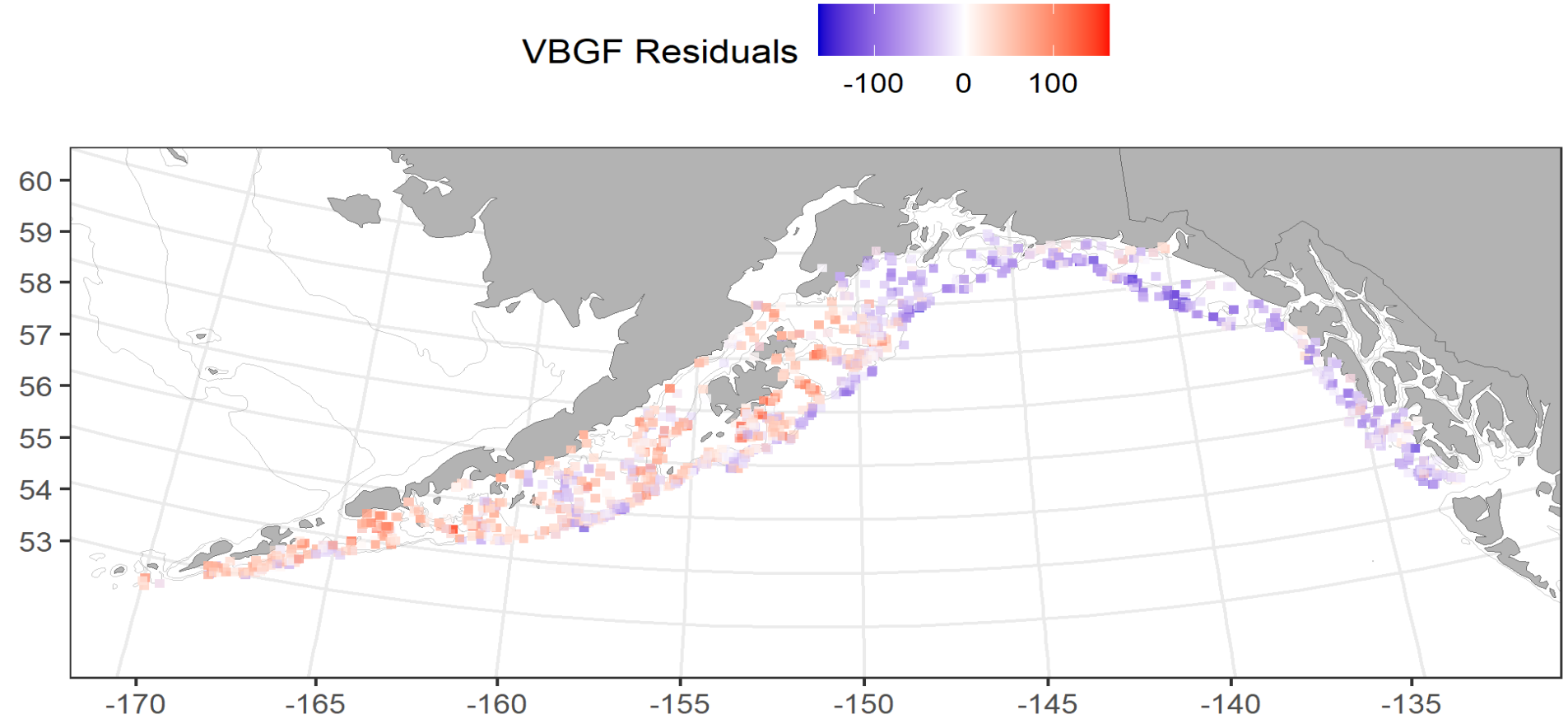


6. GOA Rex sole

Spatial differences in growth rates



6. GOA Rex sole models

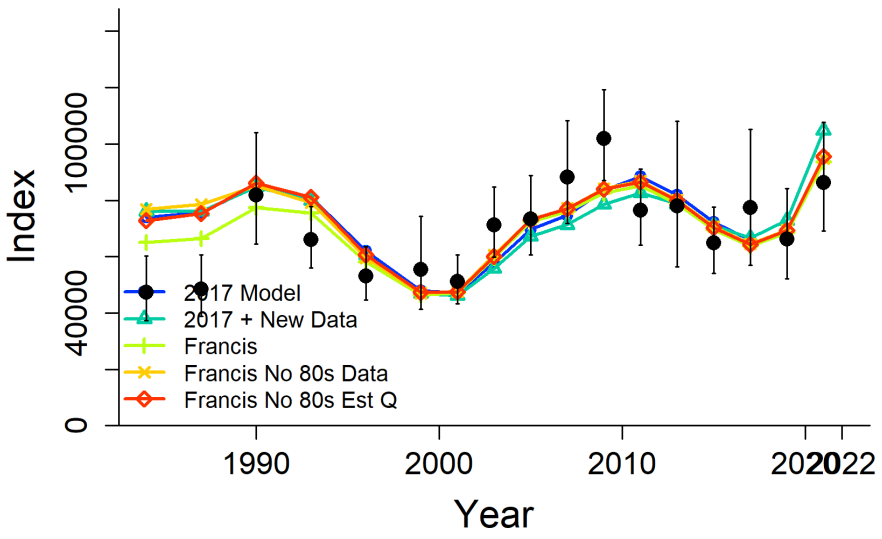
- Two area model; Growth estimated (internally) by area

Model 21 changes

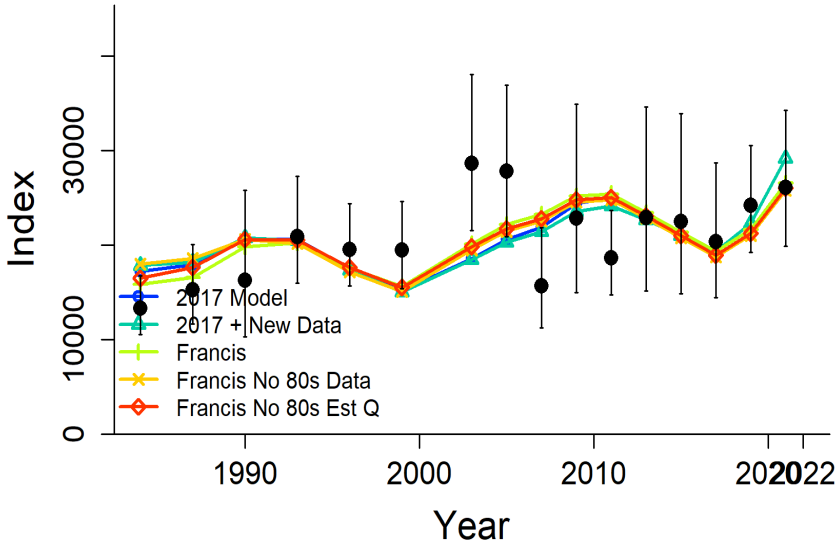
- Francis data weighting
- Omitted 1984 and 1987 survey data
- Survey catchability prior based on survey efficiency studies

Bridging analyses

Western-Central GOA



Eastern GOA



6. GOA Rex sole
Executive summary tables (Model 21.0)

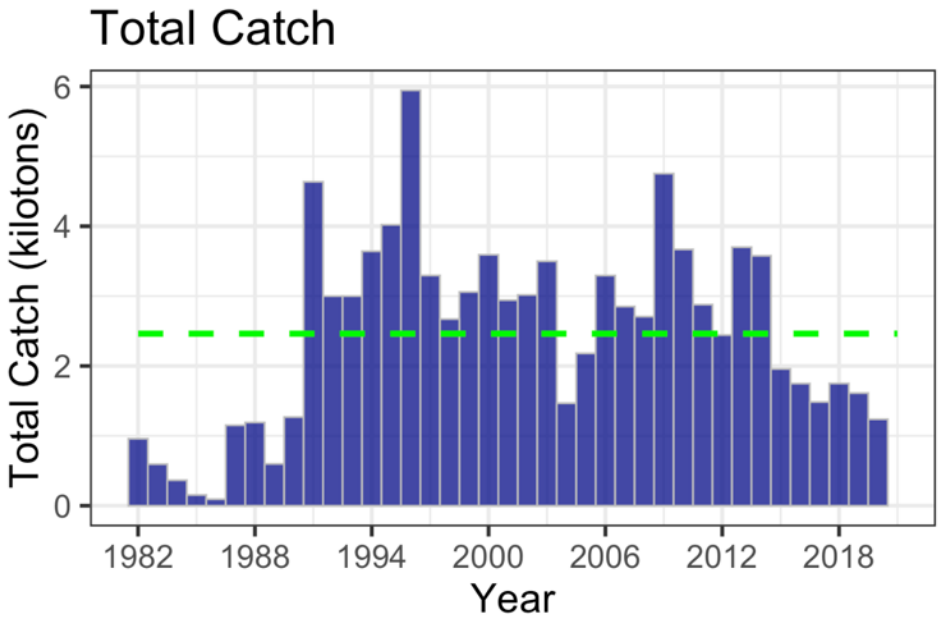
Quantity	As estimated or *specified this* year for:		As estimated or *recommended this* year for:	
	2021	2022	2022*	2023*
M (natural mortality rate)	0.17	0.17	0.17	0.17
Tier	3a	3a	3a	3a
Projected total (3+) biomass (t)	101,244	101,244	124,543	126,939
Female spawning biomass (t)	44,500	44,500	51,713	56,777
$B_{100\%}$	See area-specific tables below		See area-specific tables below	
$B_{40\%}$				
$B_{35\%}$				
F_{OFL}				
$maxF_{ABC}$				
F_{ABC}				
OFL (t)	18,779	18,779	23,302	25,049
maxABC (t)	15,416	15,416	19,141	20,594
ABC (t)	15,416	15,416	19,141	20,594

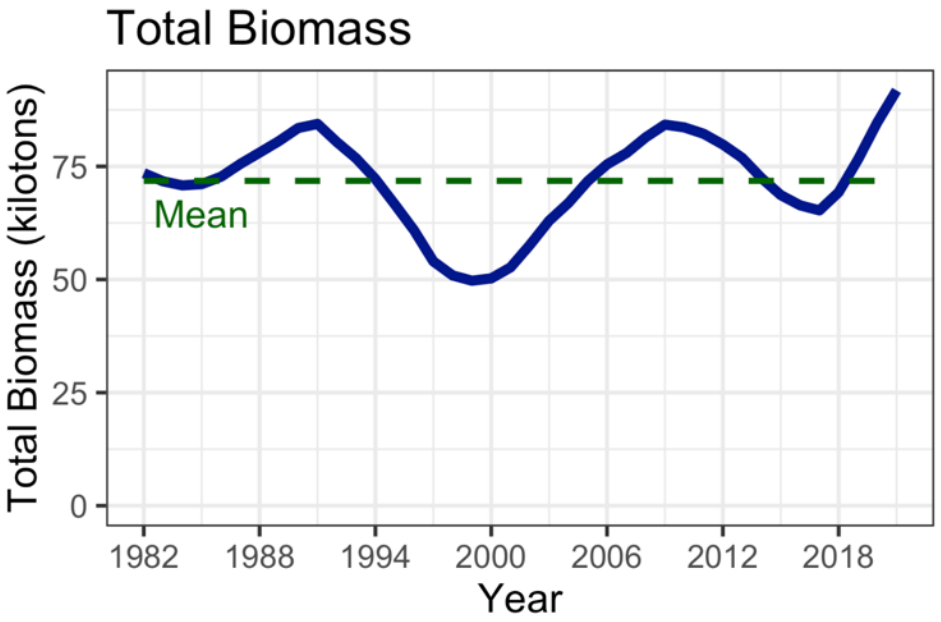
6. GOA Rex sole Plan Team discussion

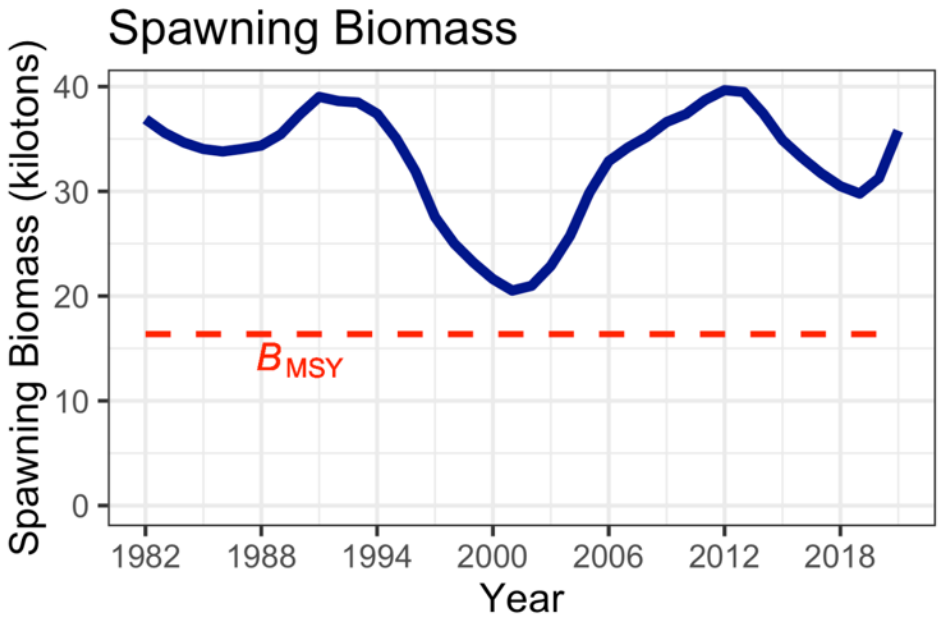
The Team supported Model 21.0

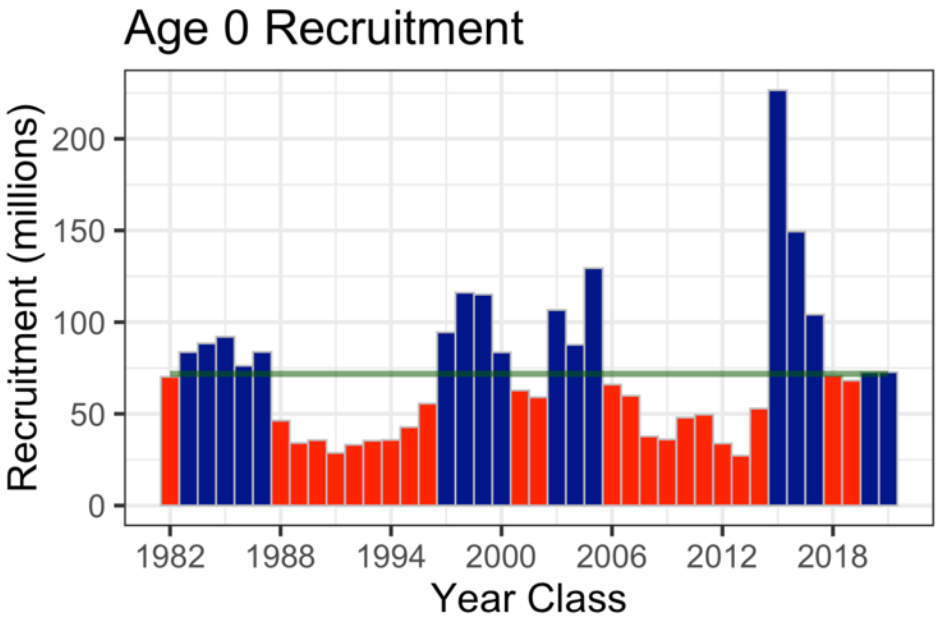
Encouraged pursuing maturity studies, developing an ageing error matrix, and exploring natural mortality rate alternatives.

6. Rex sole


Total Catch
Total Catch (kilotons)
0
2
4
6
1982
1988
1994
2000
2006
2012
2018
Year


Total Biomass
Total Biomass (kilotons)
0
25
50
75
Mean
1982
1988
1994
2000
2006
2012
2018
Year


Spawning Biomass
Spawning Biomass (kilotons)
0
10
20
30
40
B_{MSY}
1982
1988
1994
2000
2006
2012
2018
Year

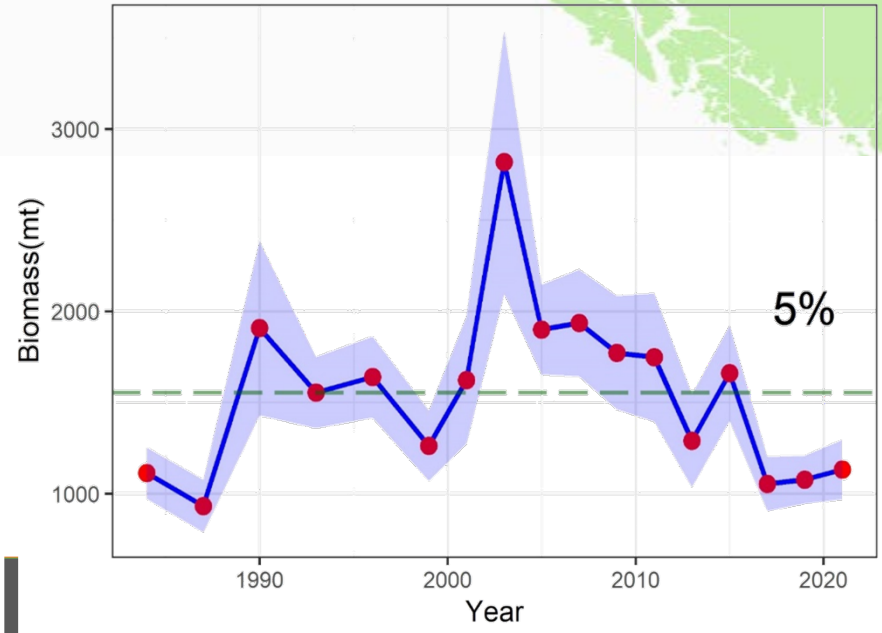

Age 0 Recruitment
Recruitment (millions)
0
50
100
150
200
1982
1988
1994
2000
2006
2012
2018
Year Class

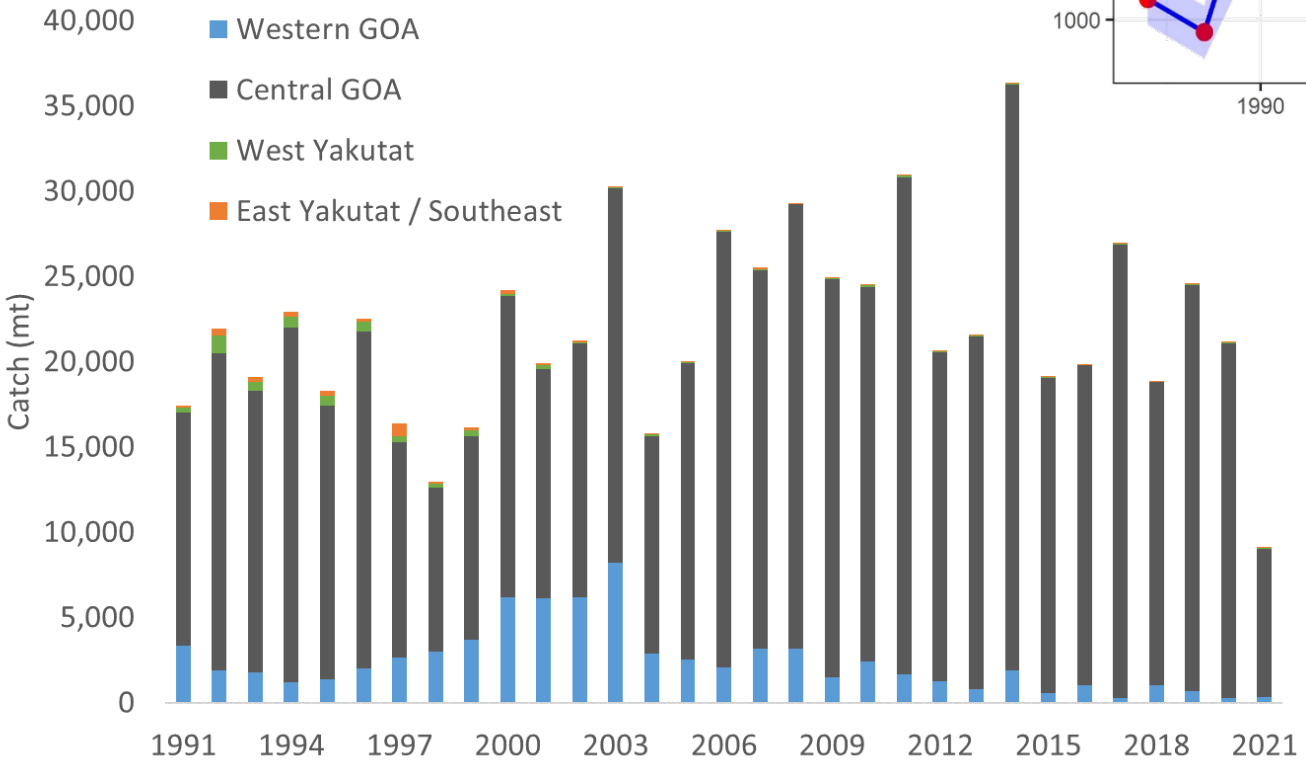
Flatfish ABC's

Species	2021 ABC	2022 ABC	Change
Shallow water flatfish	56,164	50,610	down 5,554 (10%)
Rex sole	15,416	19,141	up 3,725 (24%)
Deep water flatfish	5,926	5,908	down 18 (0%)
Flathead sole	39,377	40,175	up 798 (2%)
Arrowtooth flounder	126,970	119,779	down 7,191 (6%)
Subtotal	243,853	235,613	down 8,240 (3%)
Subtotal (without ATF)	116,883	115,834	down 1,049 (1%)

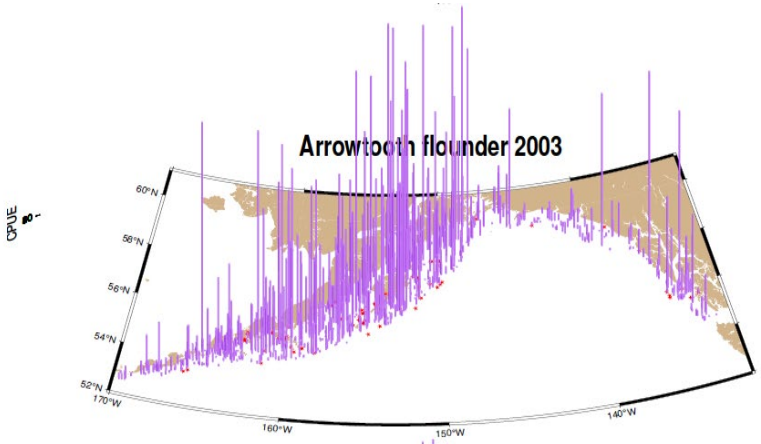
9. Arrowtooth flounder

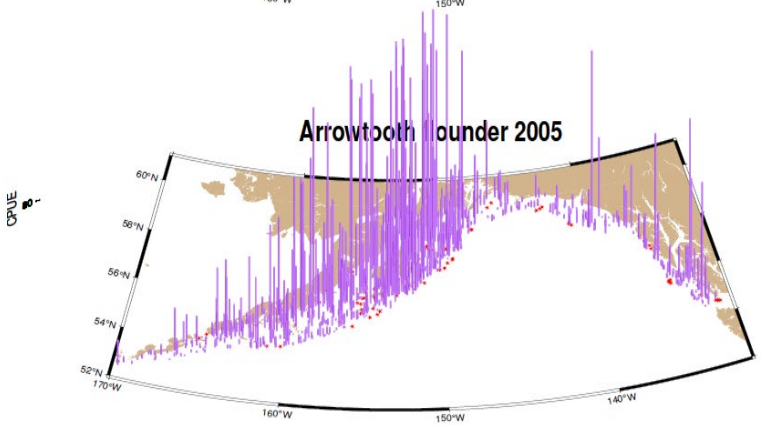
- Full assessment in odd years
  - Tier 3
  - New catch, survey, age/length comps, no model changes

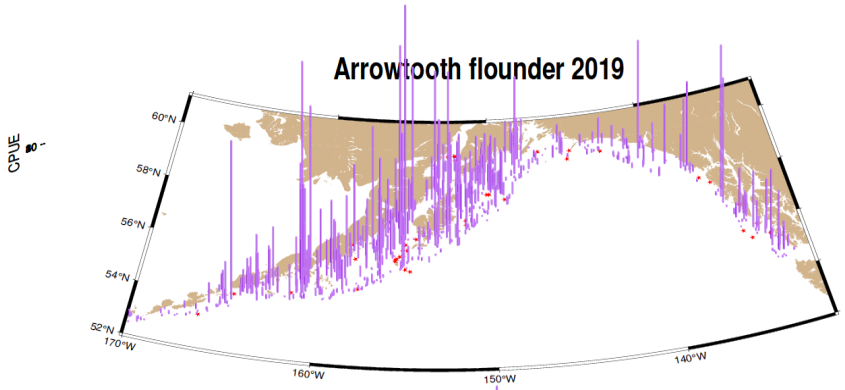


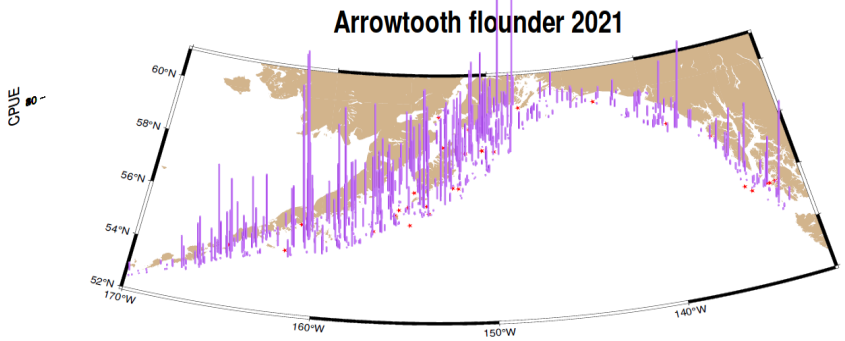


9. Arrowtooth flounder





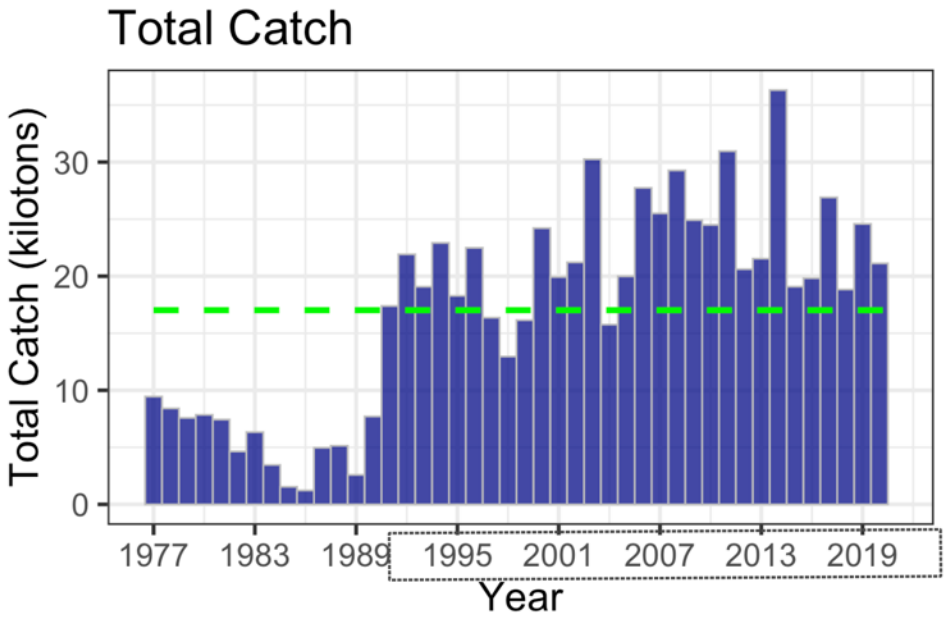


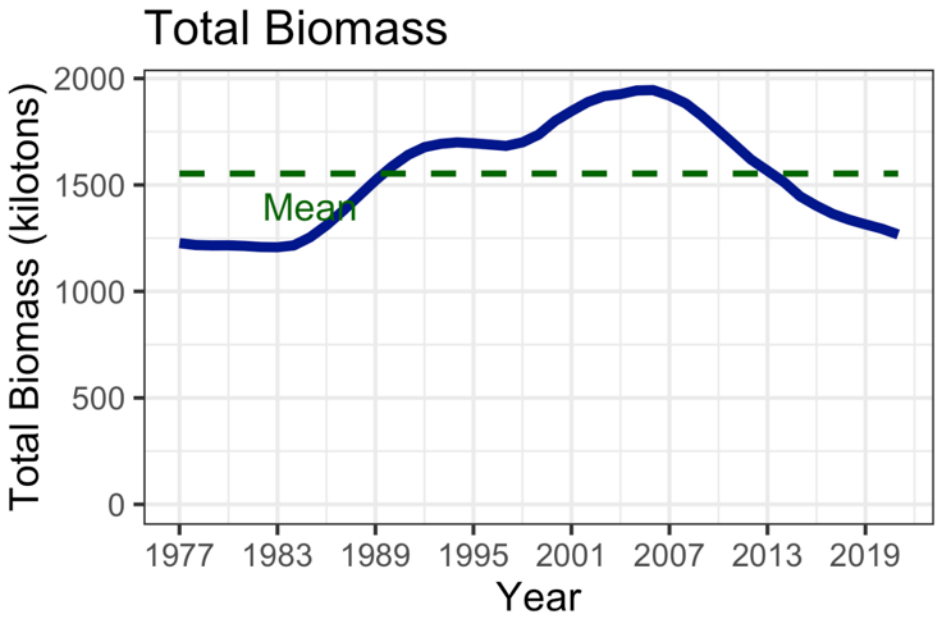


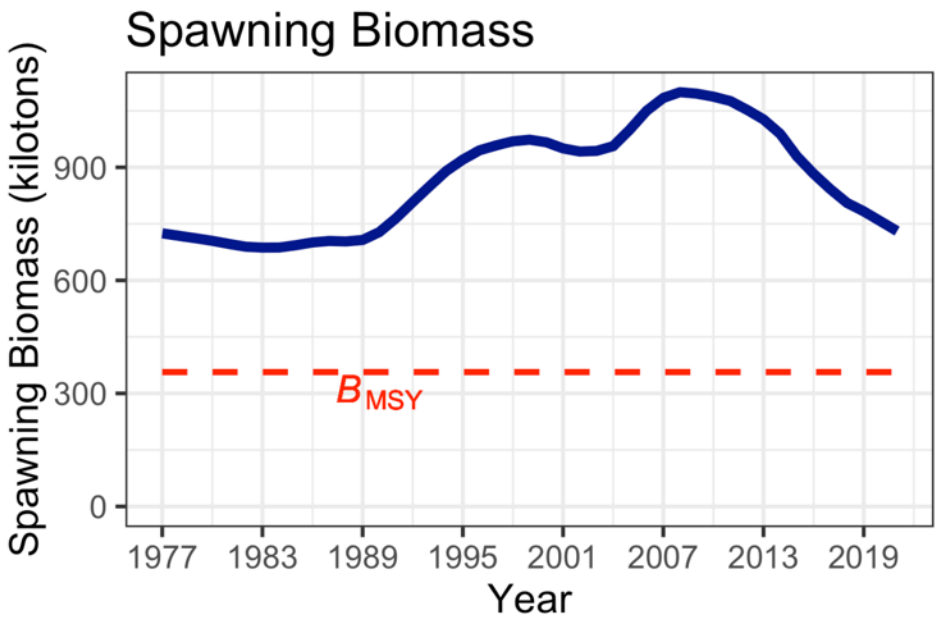
9. Arrowtooth flounder

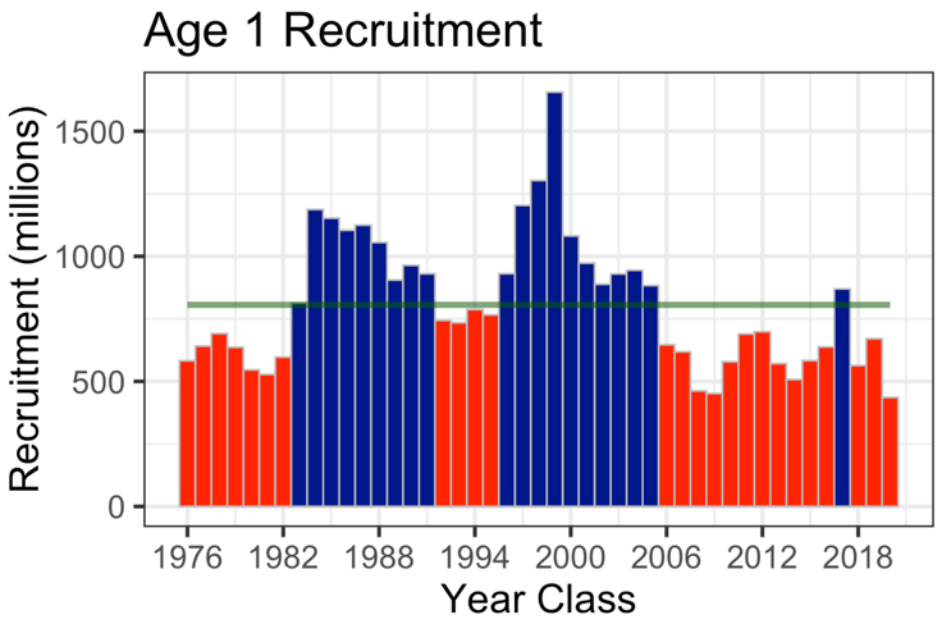
- Plan Team discussions
  - Agreed with recommended ABC/OFL
- Noted research topics:
  - Investigate lack of fit in female survey age and fishery length compositions, (differential female natural mortality)
  - Consider GOA CEATTLE model (G. Adams), include efforts to streamline data pulls and processing between single and multi-species models
  - Re-examine growth assumptions, update age-length conversion matrices, consider alternative surveys and VAST estimates

9. Arrowtooth flounder









Flatfish ABC's

Species	2021 ABC	2022 ABC	Change
Shallow water flatfish	56,164	50,610	down 5,554 (10%)
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Flathead sole	39,377	40,175	up 798 (2%)
Arrowtooth flounder	126,970	119,779	down 7,191 (6%)
Subtotal	243,853	235,613	down 8,240 (3%)
Subtotal (without ATF)	116,883	115,834	down 1,049 (1%)

8. Flathead sole

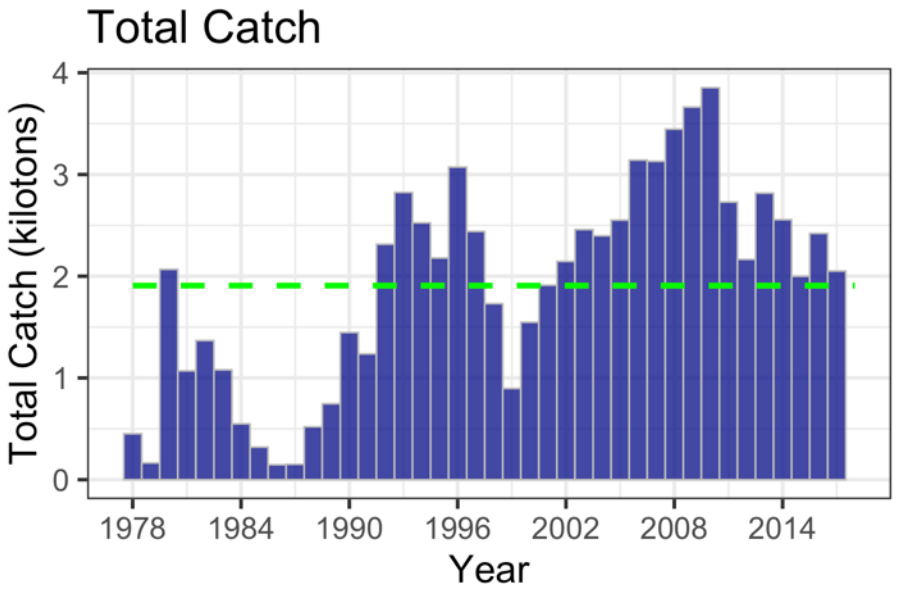
- Partial assessment
- Catches about 1% of survey biomass estimates
- Apportionments updated

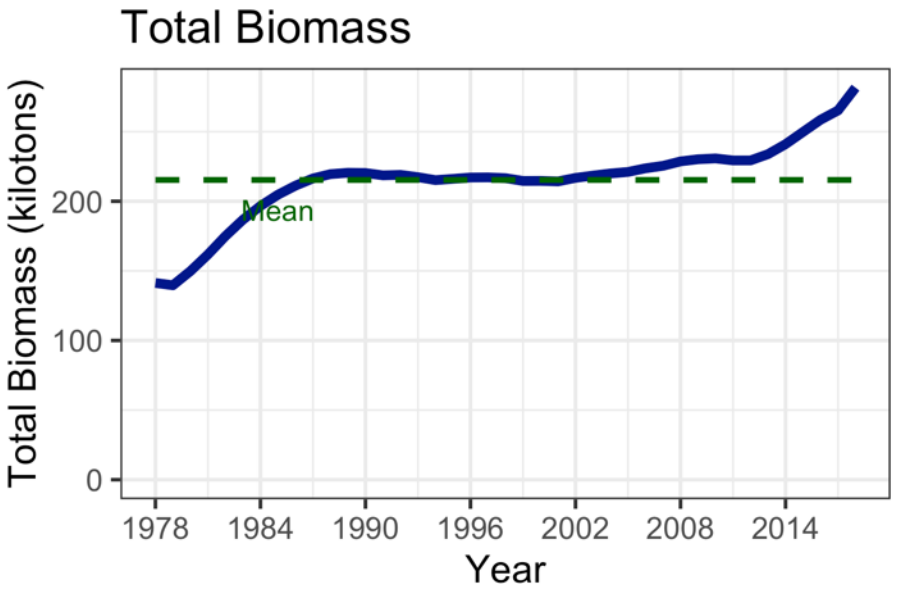
Plan Team Discussion

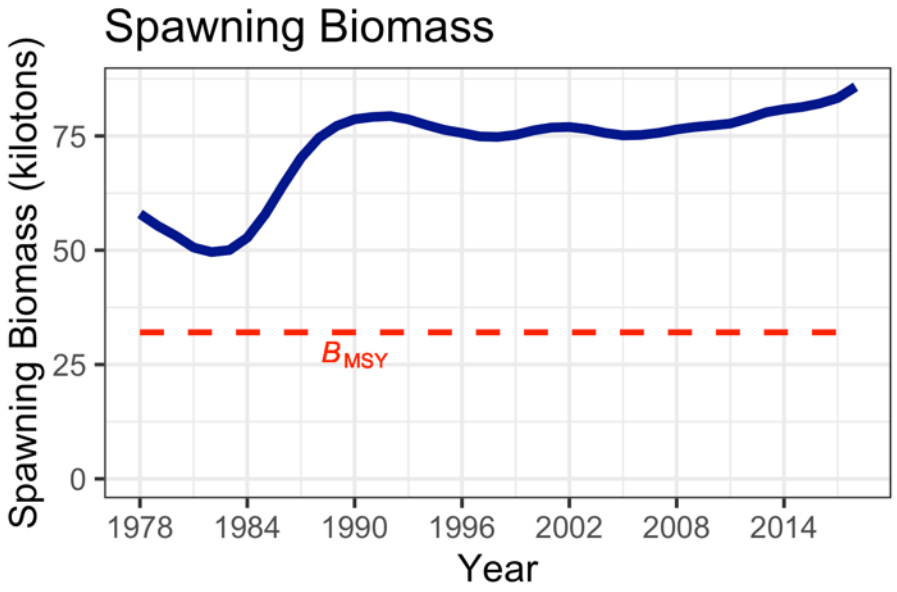
- Apportionment issue: updated during an “on year” and whether appropriate given projections based on less current data
  - Team accepted this year but indicated that generally unnecessary for stocks on an 4-year cycle

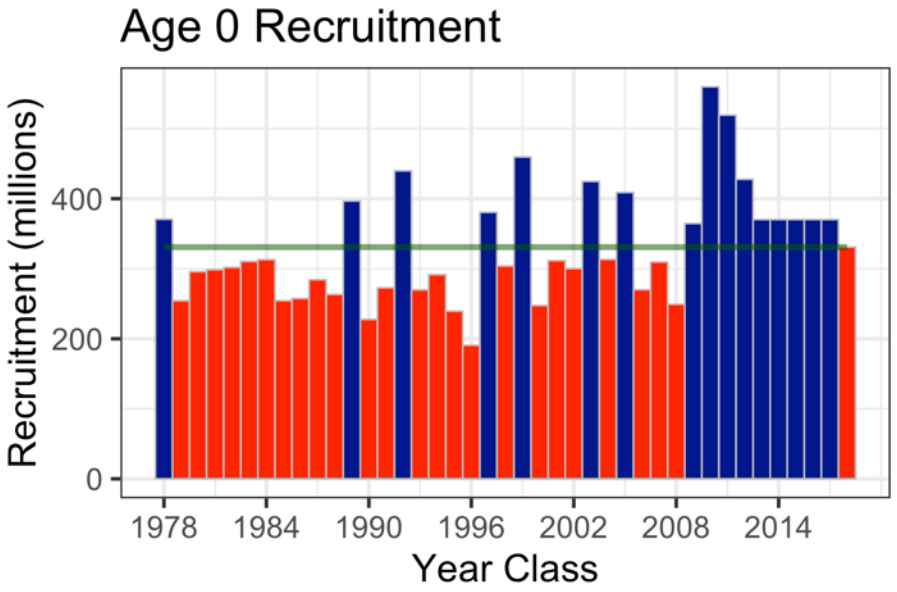
8. Flathead sole

GOA Flathead Sole





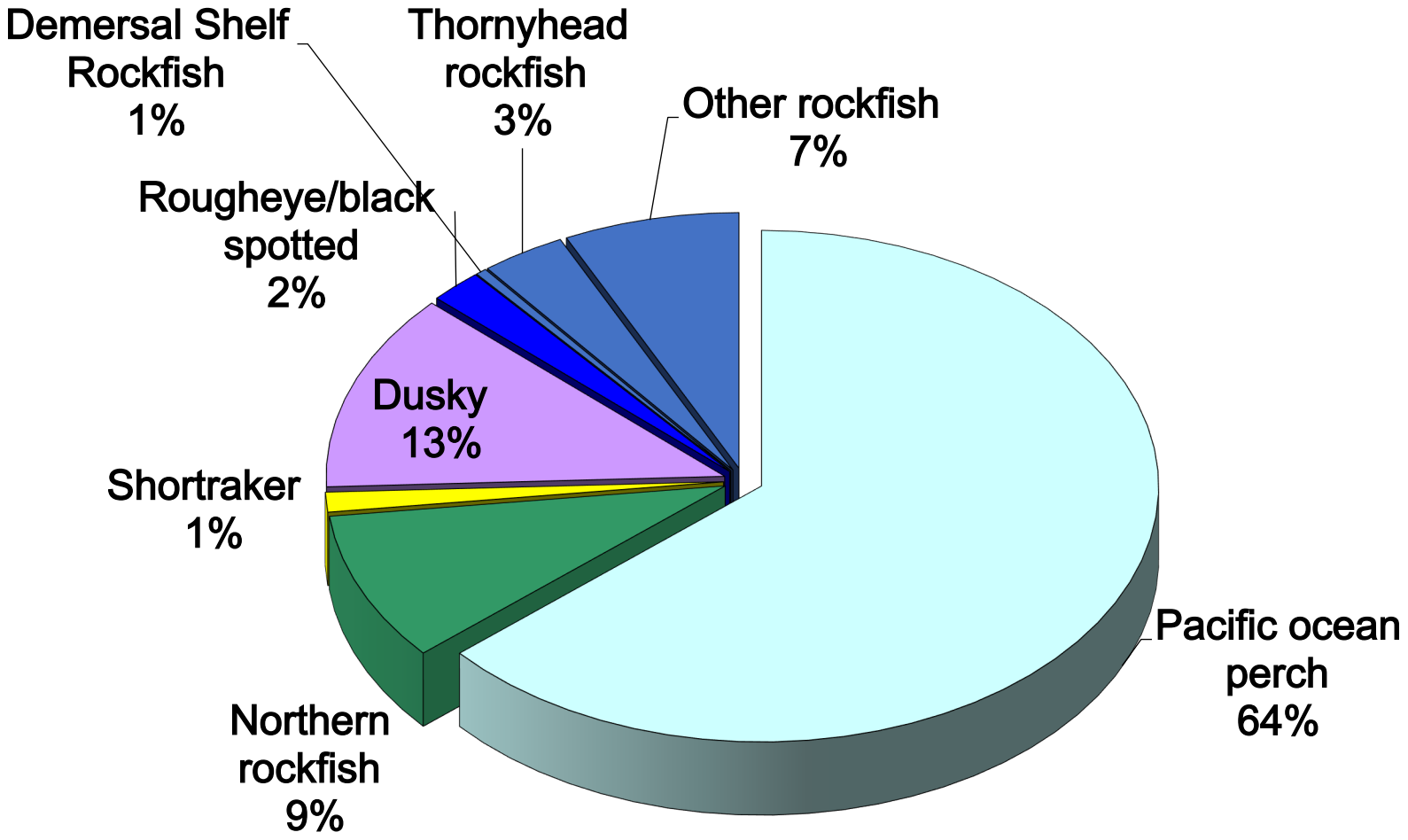




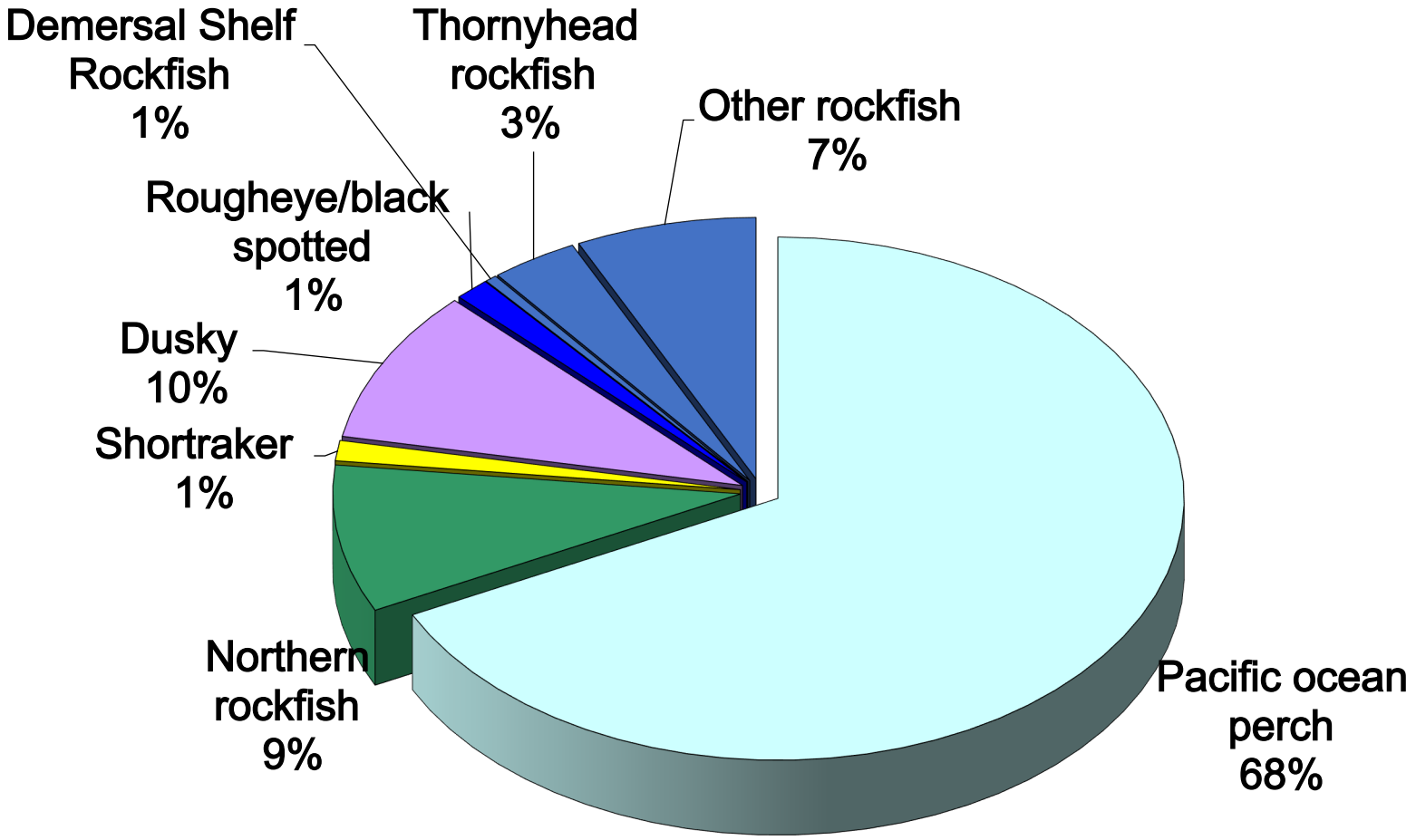
GOA Rockfish

Species	2021 catch	ABC 2021	ABC 2022	Change
Pollock	98,769	115,870	144,444	up 28,574 (25%)
Pacific Cod	12,272	23,627	24,043	up 416 (2%)
Sablefish	14,115	21,475	22,794	up 1,319 (6%)
Flatfish	2,717	116,883	115,834	down 1,049 (1%)
Arrowtooth flounder	9,517	126,970	119,779	down 7,191 (6%)
Rockfish	35,882	55,107	56,554	up 1,447 (3%)
Atka mackerel	940	4,700	4,700	same (0%)
Skates	2,609	6,670	6,563	down 107 (2%)
Sharks	1,639	3,755	3,755	same (0%)
Octopus	51	980	980	same (0%)
Total	178,511	476,037	499,446	up 23,409 (5%)

Rockfish 2021 ABC's
55,107 t total



Rockfish 2022 ABC's
56,554 t total



Rockfish ABC Summary

Species	ABC 2021	ABC 2022	Change
POP	36,177	38,268	up 2,091 (6%)
northern rockfish	5,358	5,146	down 212 (4%)
Shortraker Rockfish	708	705	down 3 (0%)
Dusky	5,389	5,372	down 17 (0%)
Rougheye and Blackspotted Rockfish	1,212	788	down 424 (35%)
Demersal shelf	257	268	up 11 (4%)
Thornyhead	1,953	1,953	same (0%)
Other rock	4,053	4,054	up 1 (0%)
Sub Total	55,107	56,554	up 1,447 (3%)

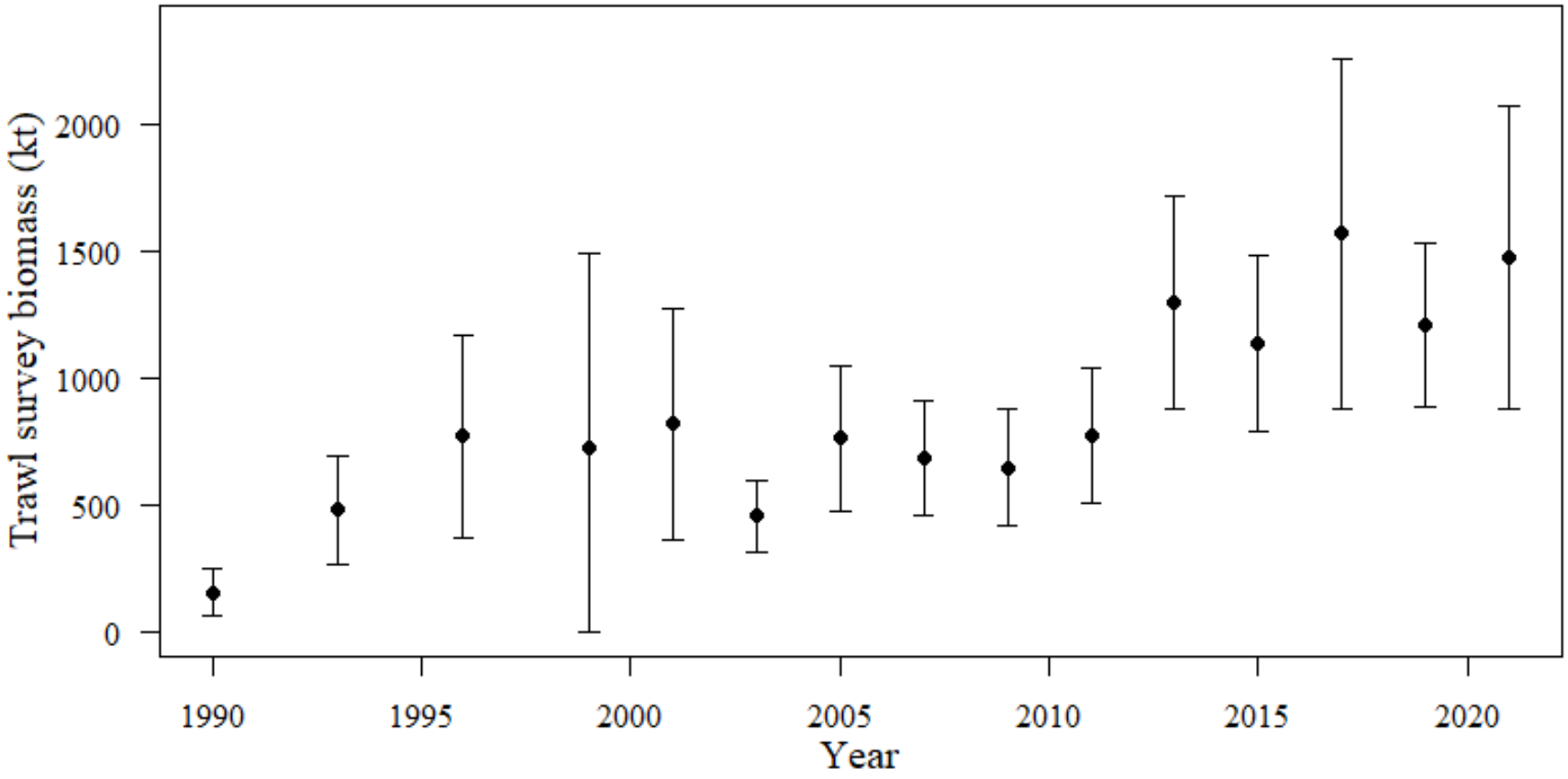
9. Pacific ocean perch

- Full assessment,
- Application of model developed and presented in 2020, and in Sept 2021

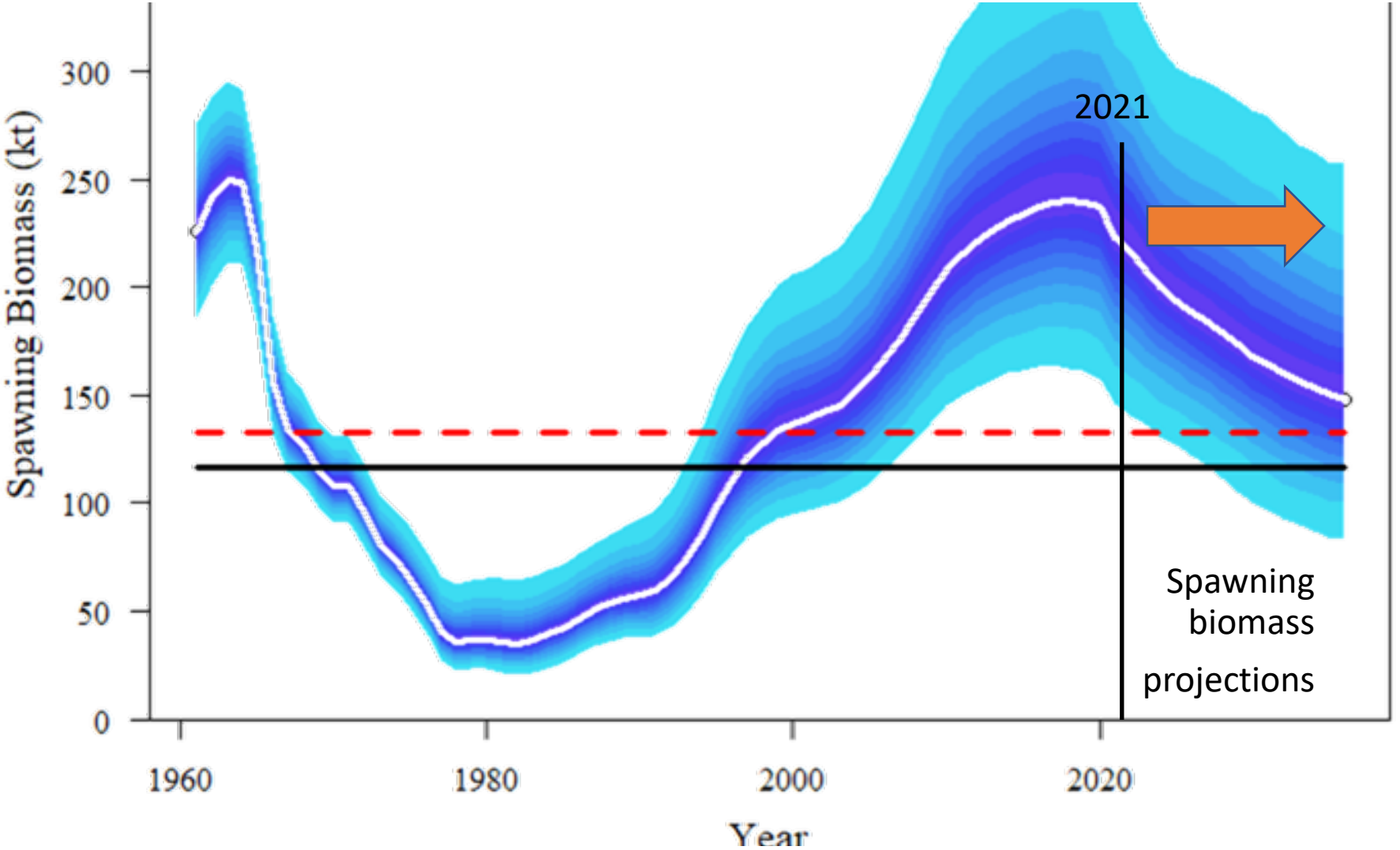
- No change in models (uses 2020 accepted model)

GOA POP
Trawl survey biomass

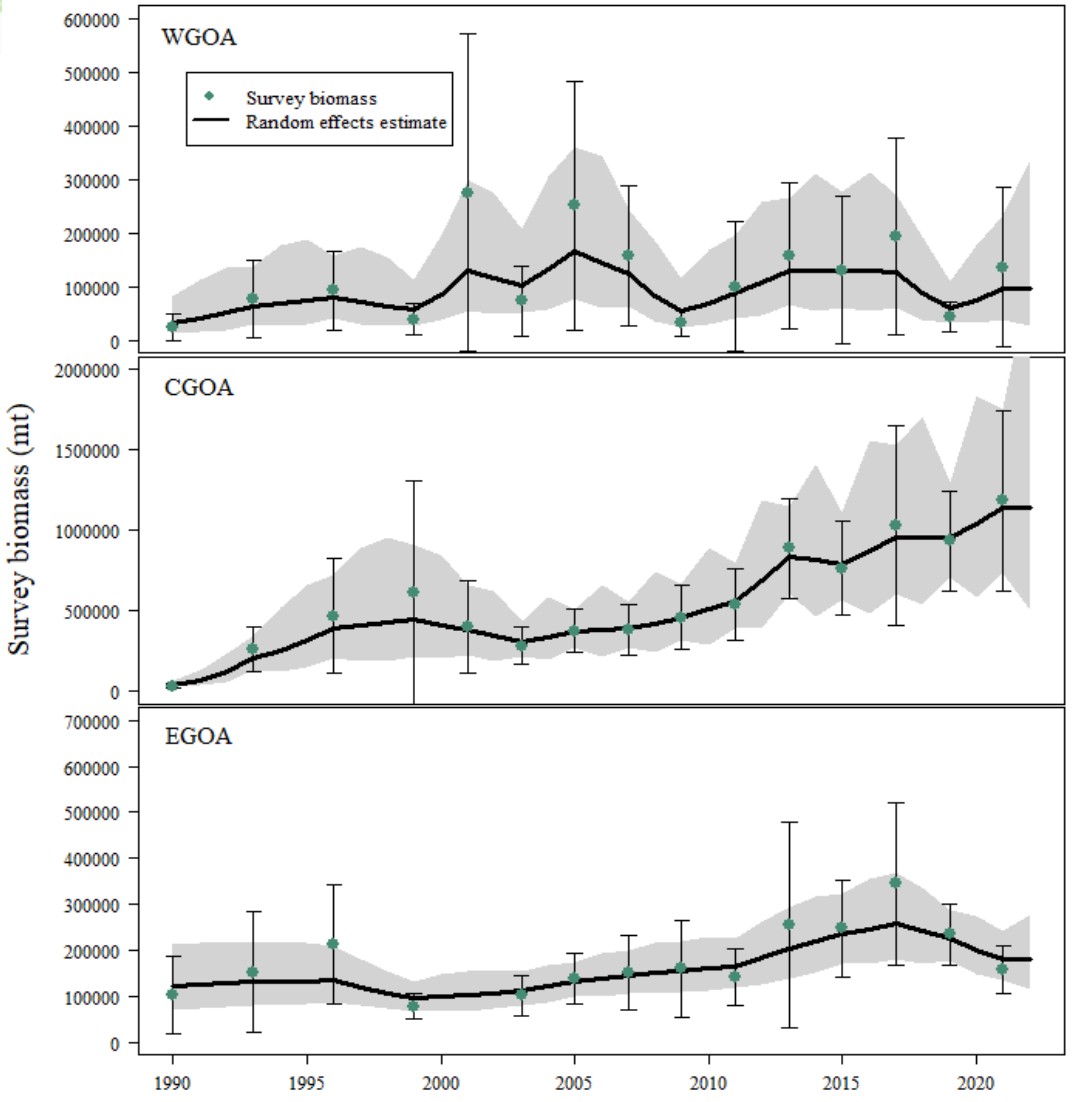
2021 2nd largest in time series (CV=21%)



POP Projections



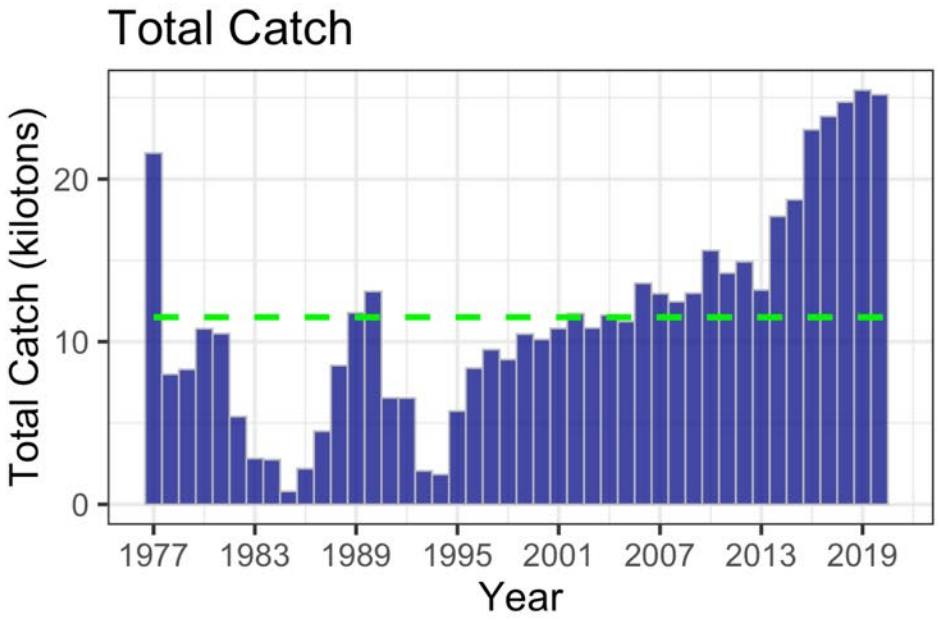
POP Apportionment

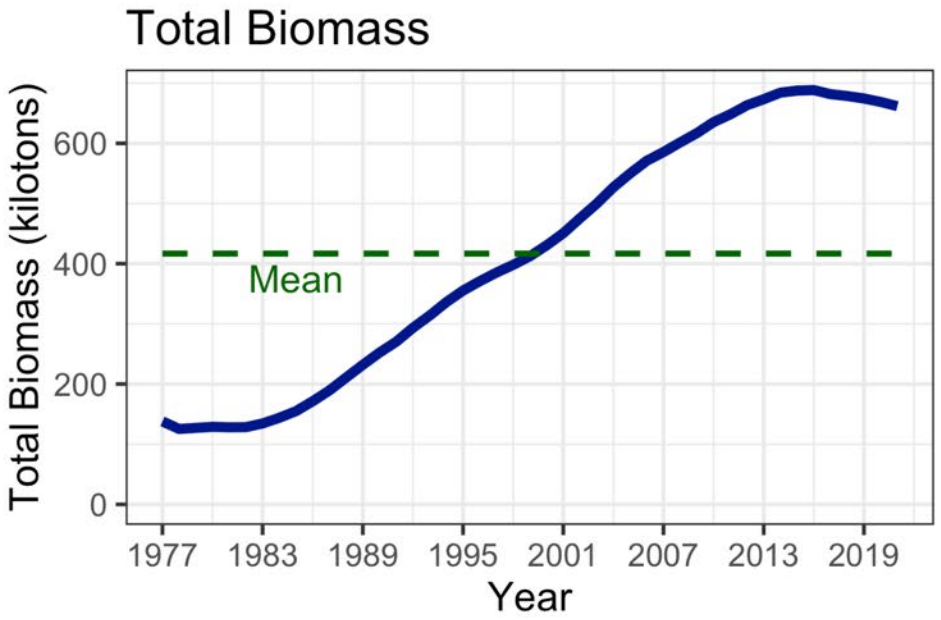


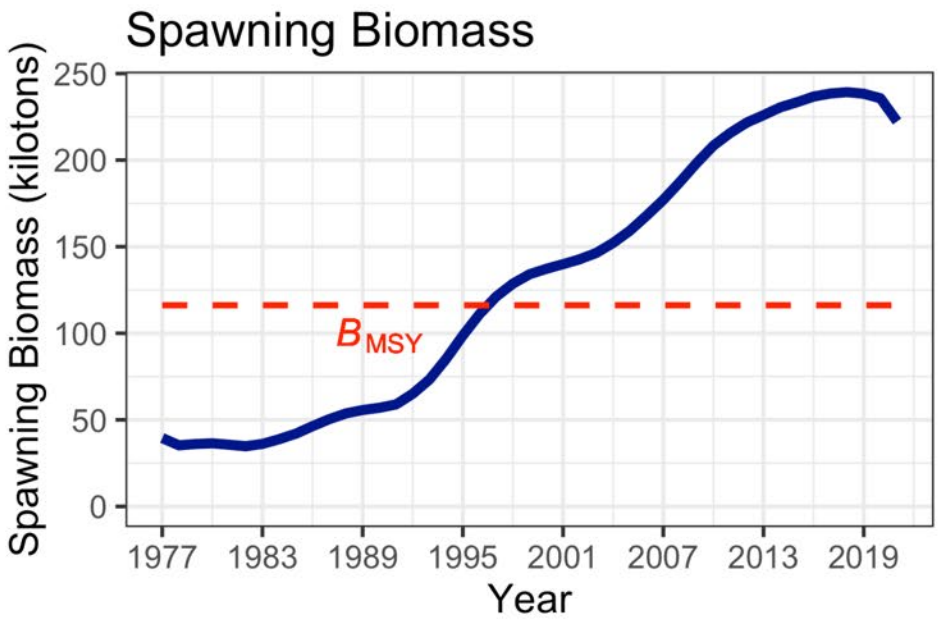
9. Pacific ocean perch

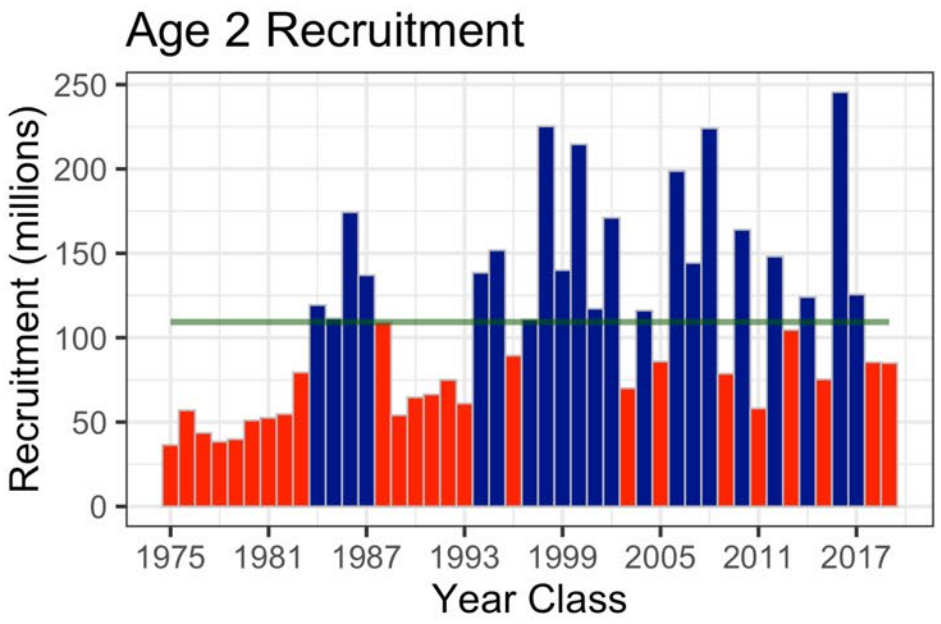
- Plan Team discussion
  - The Model presented was well developed stemming from multiple Plan Team meetings, CIE reviews, and SSC
  - Some risk-table scores of 2, but Team agreed with Author's recommendation (maxABC)
  - As noted by the author, fieldwork on untrawlable area and VAST research on survey index important
  - Further work from CIE well categorized and planned (App. 9b)

9. GOA Pacific ocean perch









Rockfish ABC Summary

Species	ABC 2021	ABC 2022	Change
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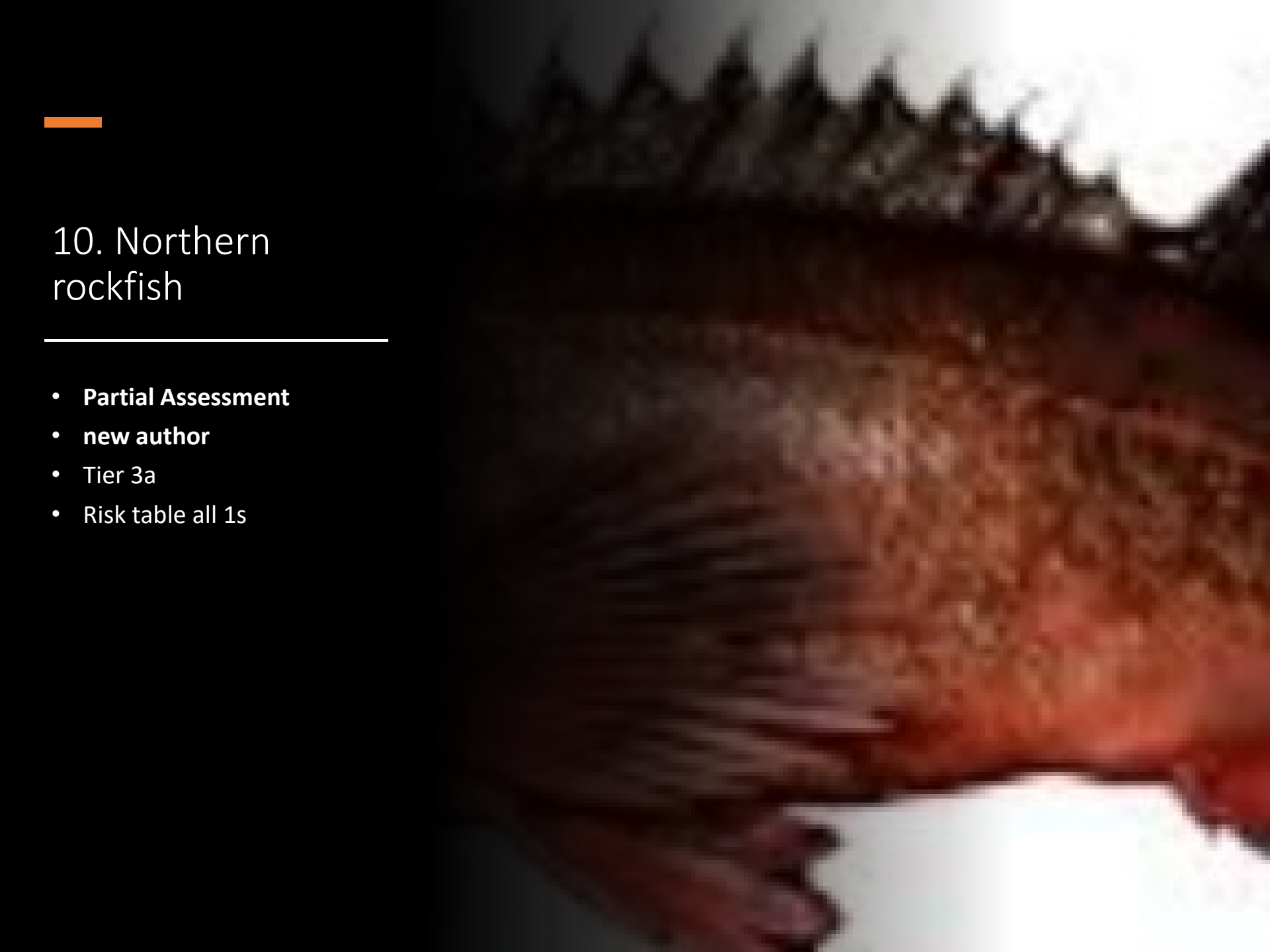
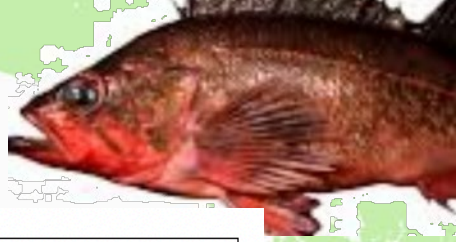
Other rock	4,053	4,054	up 1 (0%)
Sub Total	55,107	56,554	up 1,447 (3%)

10. Northern rockfish

- **Partial Assessment**
- **new author**
- Tier 3a
- Risk table all 1s



10. Northern rockfish



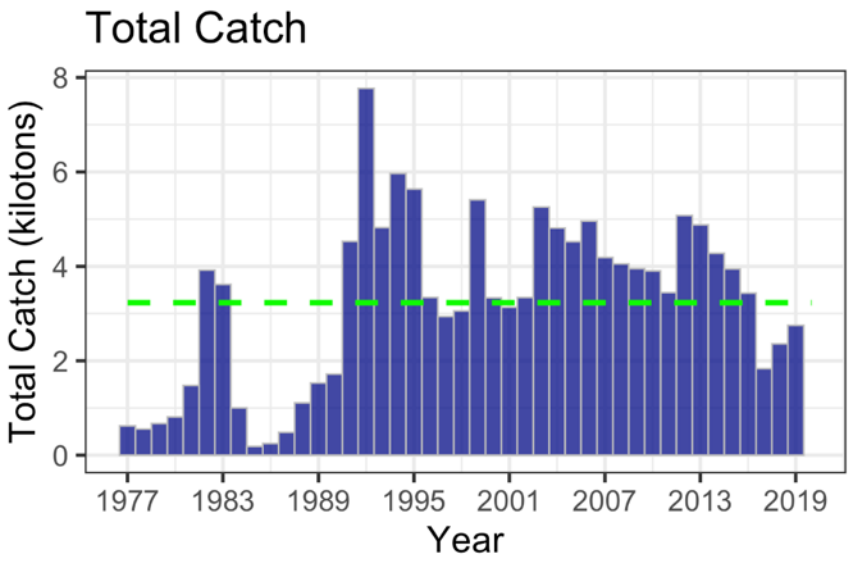
Quantity/Status	As estimated or specified *last* year for: 2021	2022	As estimated or specified *this* year for: 2022*	2023*
M (natural mortality)	0.059	0.059	0.059	0.059
Tier	3a	3a	3a	3a
Projected total (age 2+) biomass (t)	102,715	99,957	100,371	96,045
Projected female spawning biomass (t)	42,791	40,462	40,474	37,408
$B_{100\%}$	84,832	84,832	84,832	84,832
$B_{40\%}$	33,933	33,933	33,933	33,933
$B_{35\%}$	29,691	29,691	29,691	29,691
F_{OFL}	0.073	0.073	0.073	0.073
$maxF_{ABC}$	0.061	0.061	0.061	0.061
F_{ABC}	0.061	0.061	0.061	0.061
OFL	6,396	6,088	**6,143**	5,874
maxABC (t)	5,358	5,100	**5,147**	4,921
ABC (t)	5,358	5,100	**5,147**	4,921
Status	As determined *last* year for: 2019	2020	As determined *this* year for: 2020	2021
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfishing	n/a	No	n/a	No

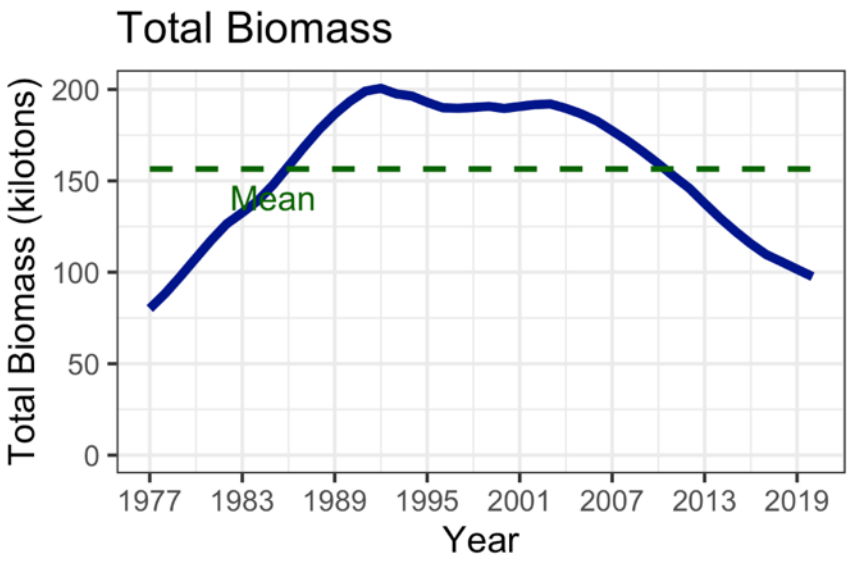
10. Northern rockfish

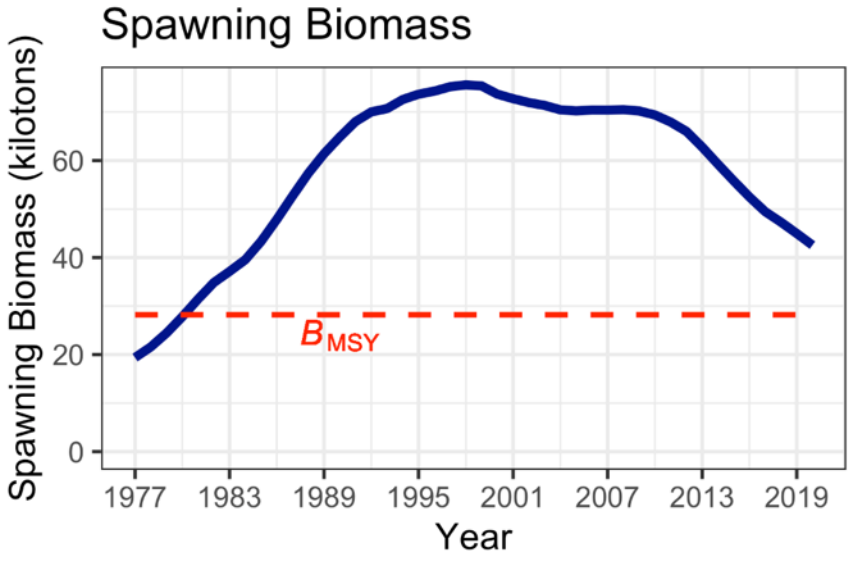
Team noted

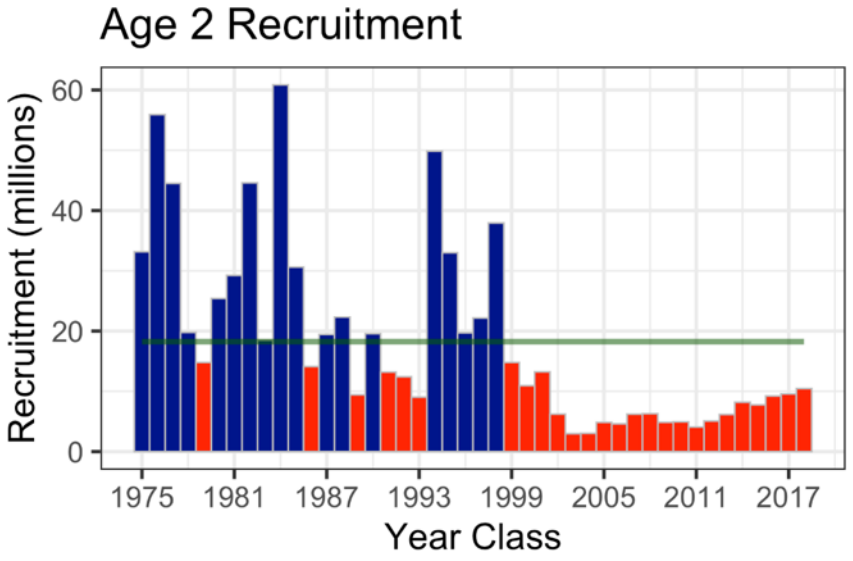
- Continue to evaluate/consider GAP VAST estimates

10. Northern rockfish









Rockfish ABC Summary

Species	ABC 2021	ABC 2022	Change
POP	36,177	38,268	up 2,091 (6%)
northern rockfish	5,358	5,146	down 212 (4%)
Shortraker Rockfish	708	705	down 3 (0%)
Dusky	5,389	5,372	down 17 (0%)
Rougheye and Blackspotted Rockfish	1,212	788	down 424 (35%)
Demersal shelf	257	268	up 11 (4%)
Thornyhead	1,953	1,953	same (0%)
Other rock	4,053	4,054	up 1 (0%)
Sub Total	55,107	56,554	up 1,447 (3%)

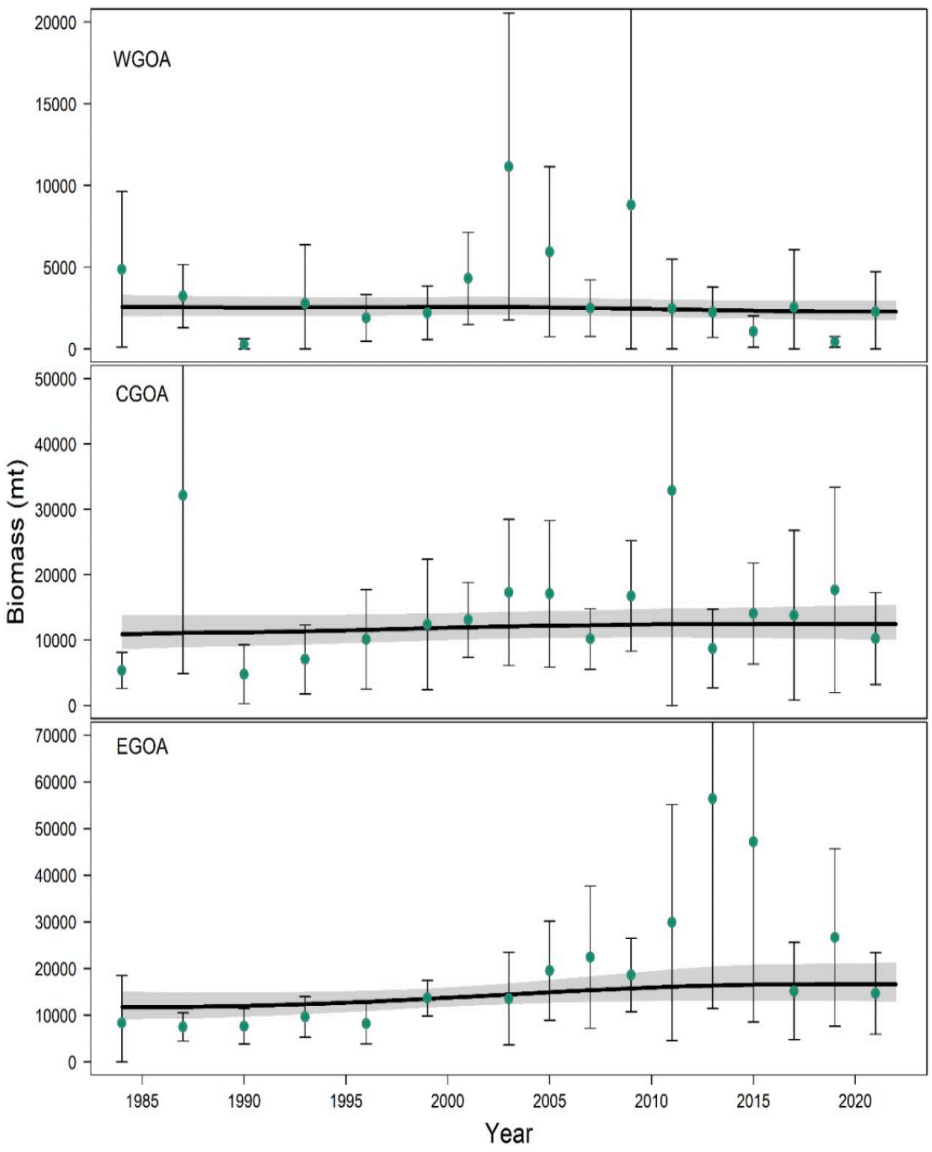
11. GOA Shortraker rockfish

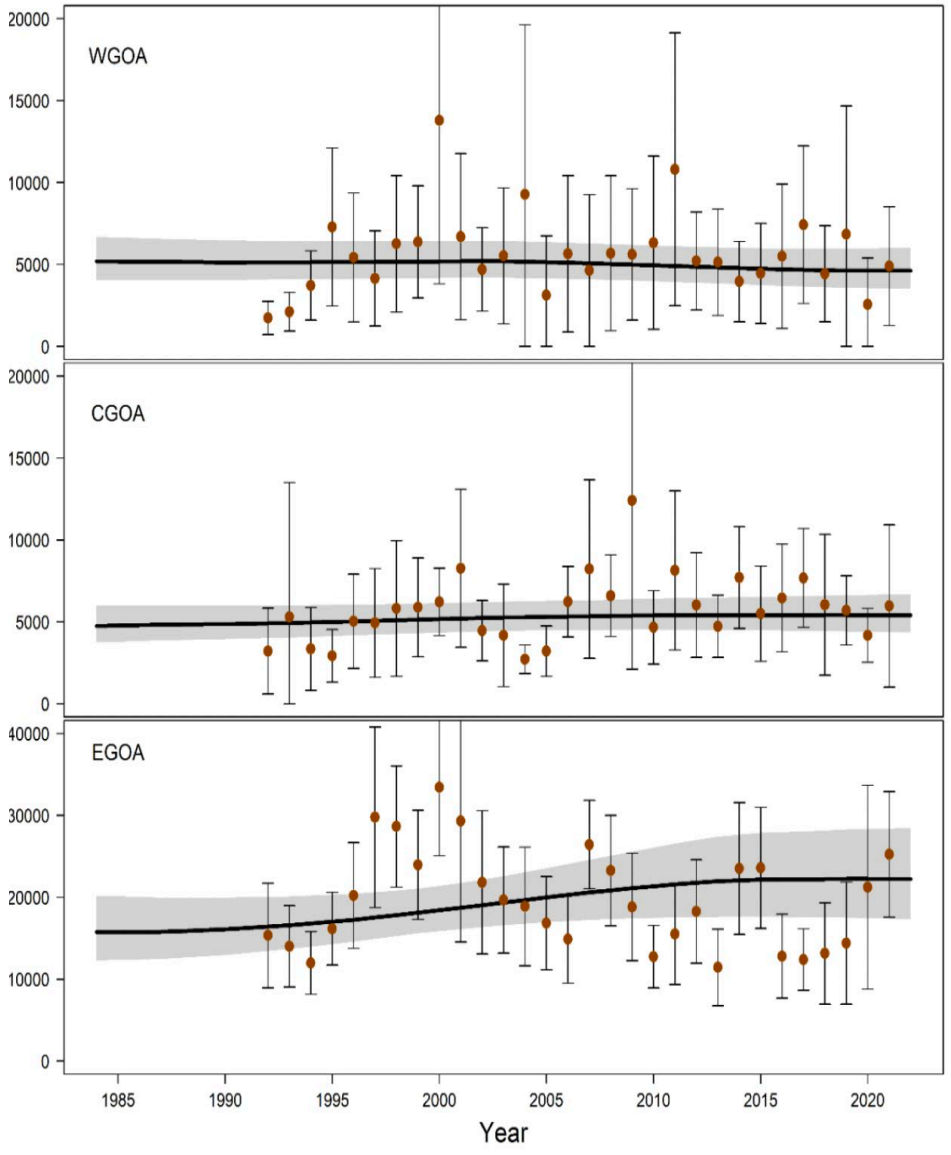
- Tier 5 full assessment

Quantity	As estimated or *specified last* year for: 2021	2022	As estimated or *recommended this* year for: 2022	2023
M (natural mortality rate)	0.03	0.03	0.03	0.03
Tier	5	5	5	5
Biomass (t)	31,465	31,465	31,331	31,331
F_{OFL}	$F=M=0.03$	$F=M=0.03$	$F=M=0.03$	$F=M=0.03$
$maxF_{ABC}$	$0.75M=0.0225$	$0.75M=0.0225$	$0.75M=0.0225$	$0.75M=0.0225$
F_{ABC}	0.0225	0.0225	0.0225	0.0225
OFL (t)	944	944	**940**	940
maxABC (t)	708	708	705	705
ABC (t)	708	708	**705**	705
Status	As determined *last* year for: 2019	2020	As determined *this* year for: 2020	2021
Overfishing	No	n/a	No	n/a

11. GOA Shortraker rockfish

- Tier 5 full assessment





11. GOA Shortraker rockfish

Plan Team discussion

- **The Team recommends that the authors look at alternative natural mortality estimation approaches**

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Demersal shelf	257	268	up 11 (4%)
Thornyhead	1,953	1,953	same (0%)
Other rock	4,053	4,054	up 1 (0%)
Sub Total	55,107	56,554	up 1,447 (3%)

12. GOA dusky rockfish

Quantity/Status	As estimated or specified *last* year for: 2021	2022	As estimated or specified *this* year for: 2022*	2023*
M (natural mortality)	0.07	0.07	0.07	0.07
Tier	3a	3a	3a	3a
Projected total (age 4+) biomass (t)	97,702	98,825	95,682	92,310
Projected female spawning biomass (t)	38,362	37,530	38,371	36,853
$B_{100\%}$	60,855	60,855	60,855	60,855
$B_{40\%}$	24,342	24,342	24,342	24,342
$B_{35\%}$	21,299	21,299	21,299	21,299
F_{OFL}	0.114	0.114	0.114	0.114
$maxF_{ABC}$	0.093	0.093	0.093	0.093
F_{ABC}	0.093	0.093	0.093	0.093
OFL	8,655	8,423	**8,614**	8,146
maxABC (t)	5,389	5,295	**7,069**	6,686
ABC (t)	5,389	5,295	**5,372**	5,181
Status	As determined *last* year for: 2019	2020	As determined *this* year for: 2020	2021
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfishing	n/a	No	n/a	No

*Projections are based on an estimated catch of 2,986 t for 2021, and estimates of 4,725 t and 4,337 t used in place of maximum permissible ABC for 2022 and 2023.

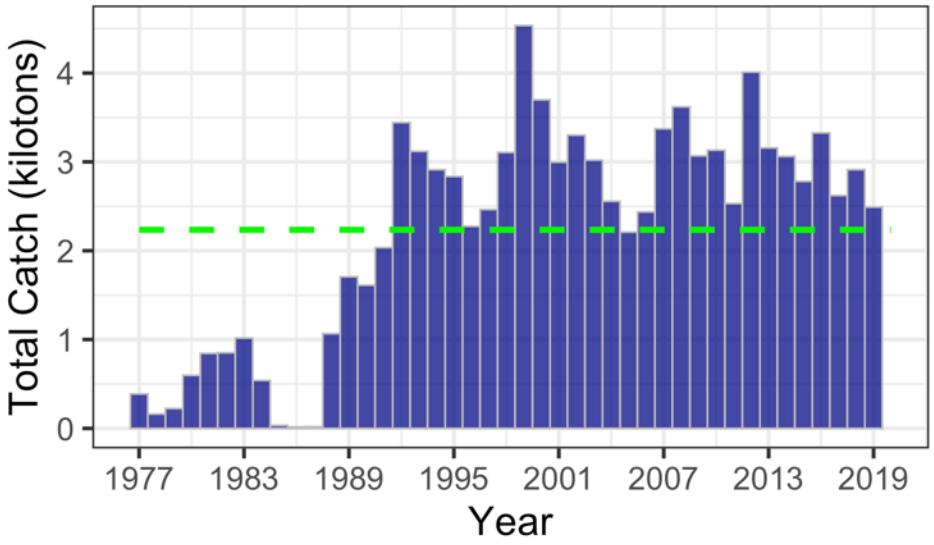
12. GOA dusky rockfish

Plan Team discussions

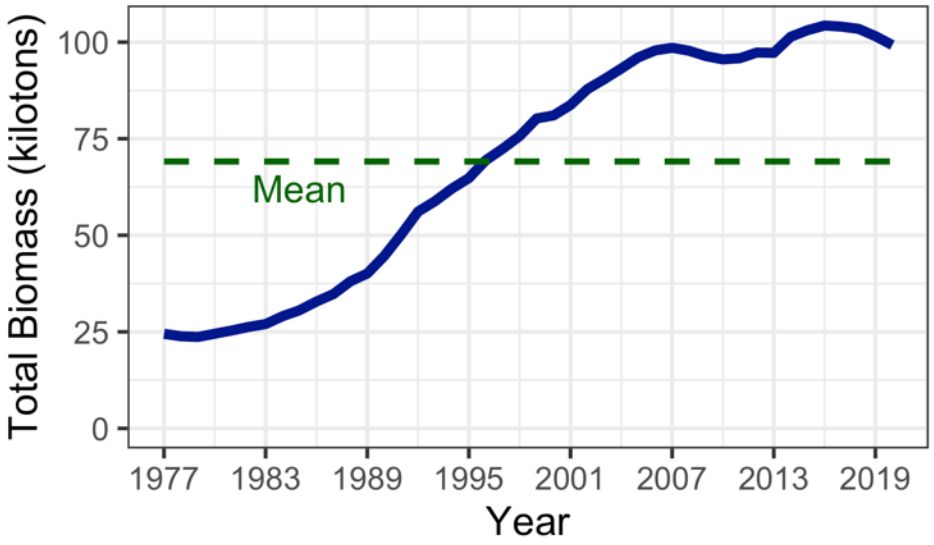
- See comments for VAST / GAP collaborations
- SSC's stair-step approach recommended

GOA Dusky Rockfish

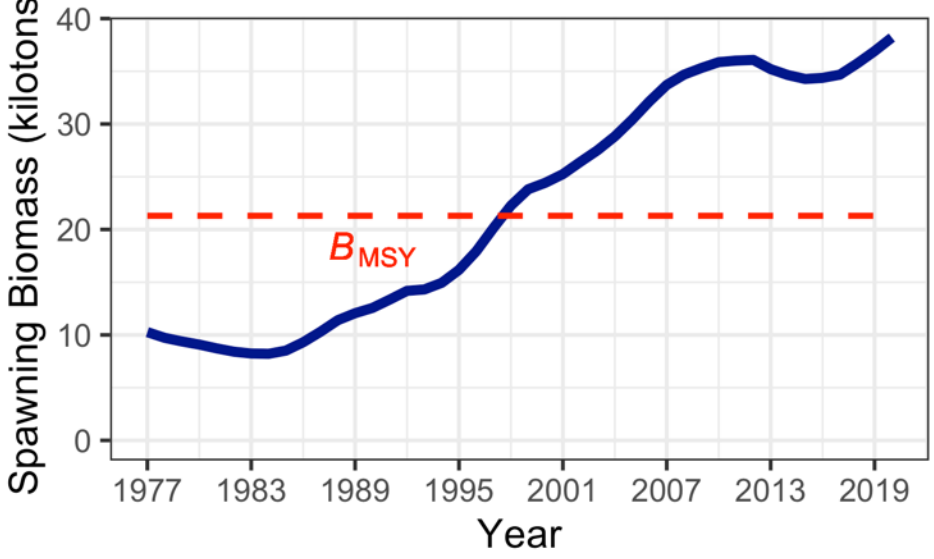
Total Catch



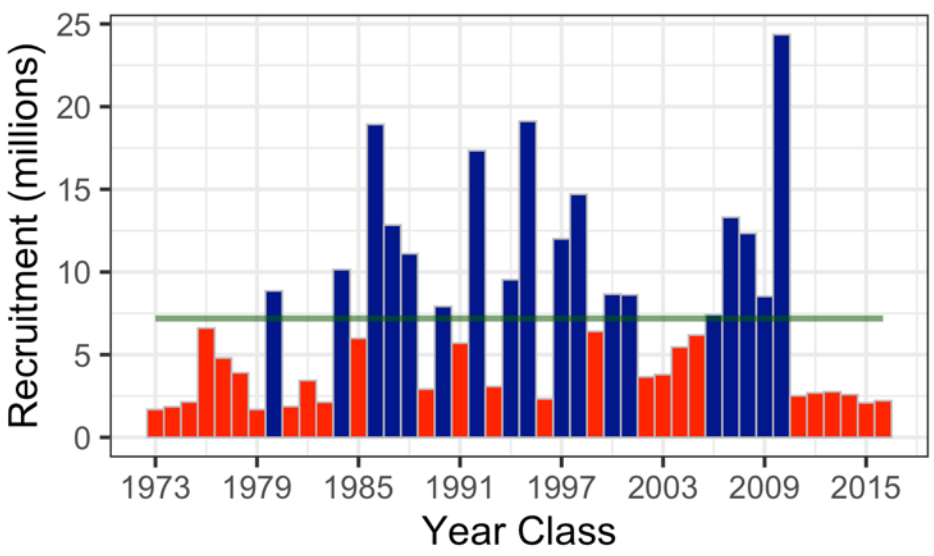
Total Biomass



Spawning Biomass



Age 4 Recruitment



Rockfish ABC Summary

Species	ABC 2021	ABC 2022	Change
POP	36,177	38,268	up 2,091 (6%)
northern rockfish	5,358	5,146	down 212 (4%)
Shortraker Rockfish	708	705	down 3 (0%)
Dusky	5,389	5,372	down 17 (0%)
Rougheye and Blackspotted Rockfish	1,212	788	down 424 (35%)
Demersal shelf	257	268	up 11 (4%)
Thornyhead	1,953	1,953	same (0%)
Other rock	4,053	4,054	up 1 (0%)
Sub Total	55,107	56,554	up 1,447 (3%)

13. GOA Blackspotted/Rougheye Rockfish

Full assessment

- Tier 3 species – 2021 full assessment
  - No model changes since 2015
  - Two surveys (NMFS bottom trawl & NMFS longline)

jane.sullivan@noaa.gov

13. GOA Blackspotted/Rougheye Rockfish

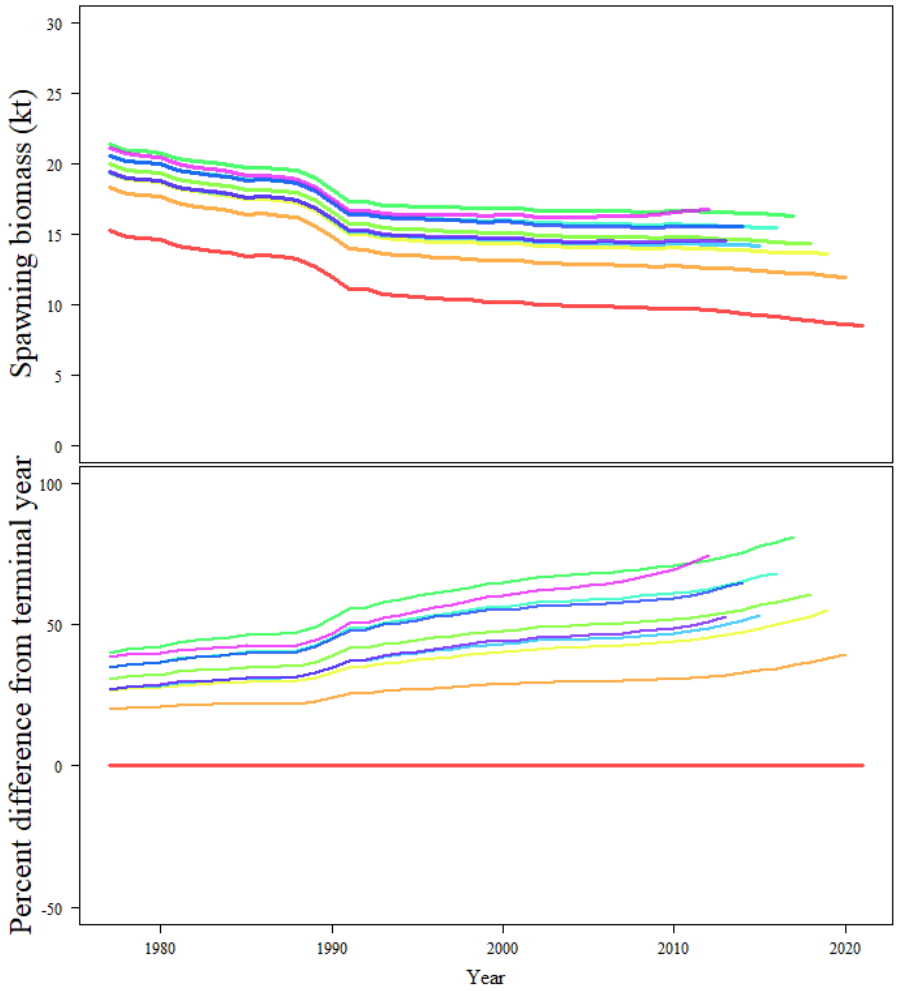
Summary

Declines in both trawl and longline survey indices

Uncertainty in global scaling parameters

Mohn's rho = 0.61 (Risk level 2 for assessment)

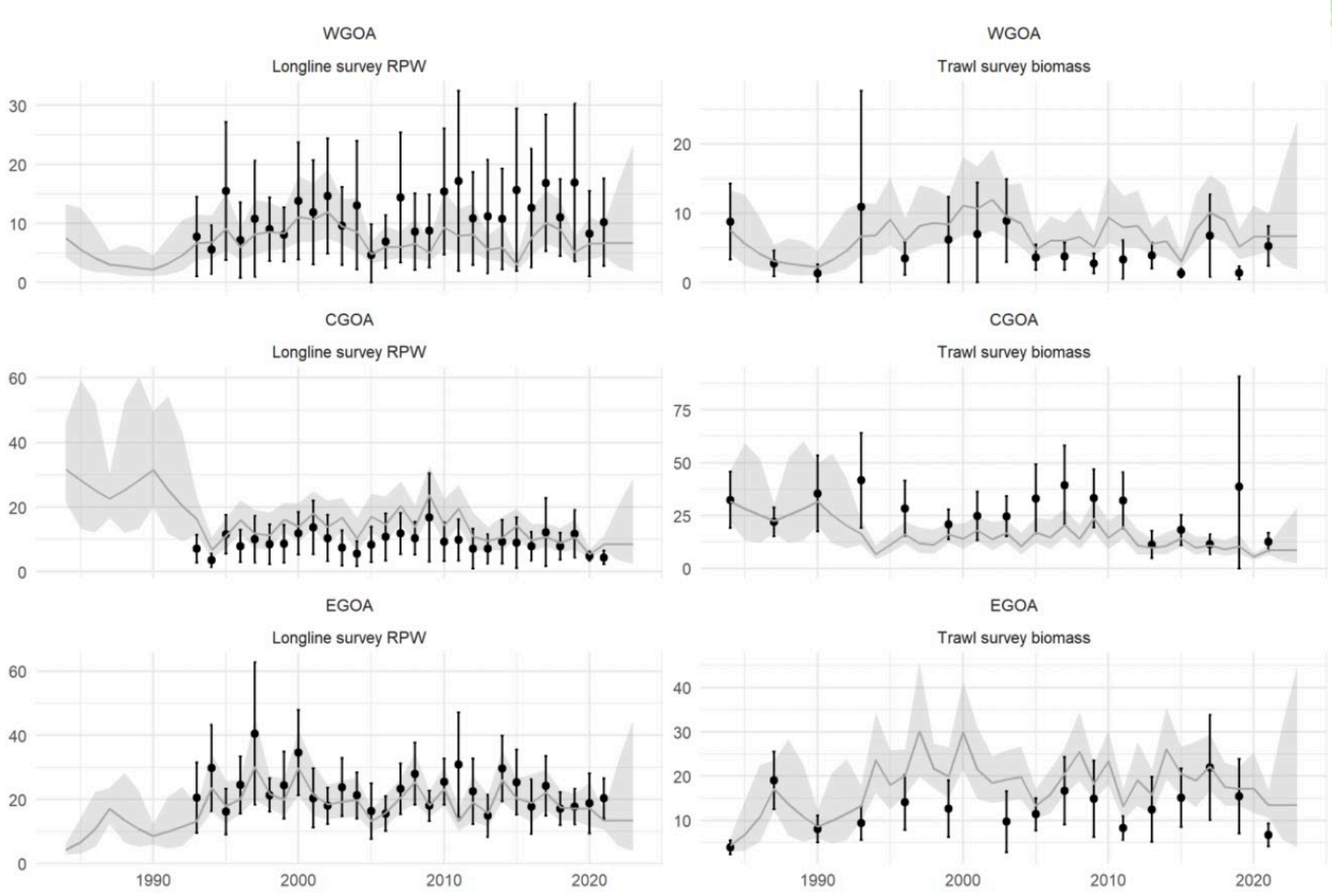
Recommended 2022 max ABC a 35% decrease from 2021



13. GOA Blackspotted/Rougheye Rockfish

Quantity/Status	As estimated or specified *last* year for: 2021	2022	As estimated or recommended *this* year for: 2022	2023
M (natural mortality)	0.036	0.036	0.034	0.034
Tier	3a	3a	3a	3a
Projected total (age 3+) biomass (t)	40,432	40,454	26,060	25,997
Projected female spawning biomass (t)	12,540	12,563	8,648	8,627
$B_{100\%}$	20,658	20,658	14,776	14,776
$B_{40\%}$	8,263	8,263	5,911	5,911
$B_{35\%}$	7,230	7,230	5,172	5,172
F_{OFL}	0.048	0.048	0.046	0.046
$maxF_{ABC}$	0.040	0.040	0.038	0.038
F_{ABC}	0.040	0.040	0.038	0.038
OFL (t)	1,456	1,467	**947**	937
max ABC (t)	1,212	1,221	**788**	781
ABC (t)	1,212	1,221	**788**	781

13. GOA Blackspotted/Rougheye Rockfish



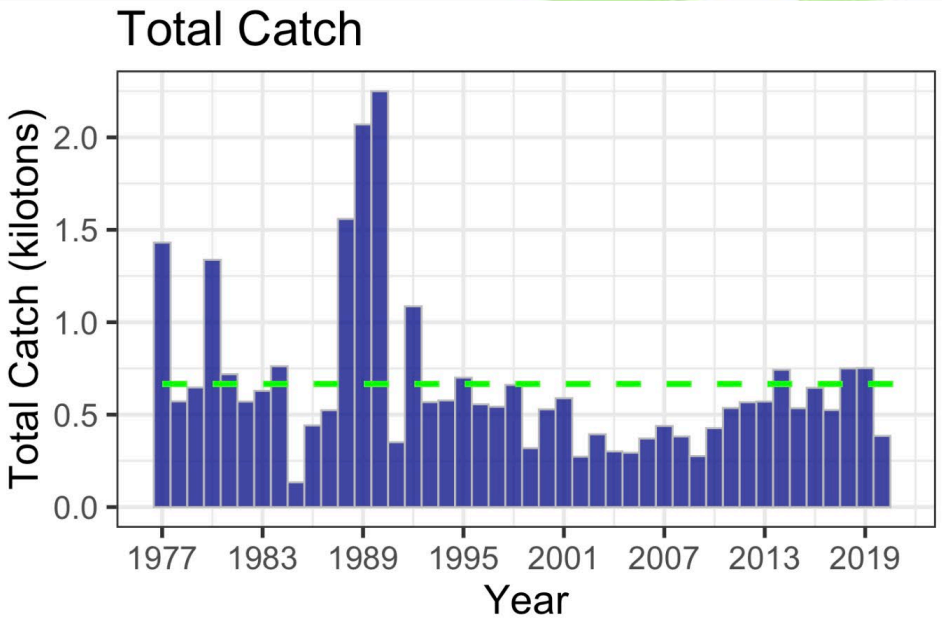
13. GOA Blackspotted/Rougheye Rockfish

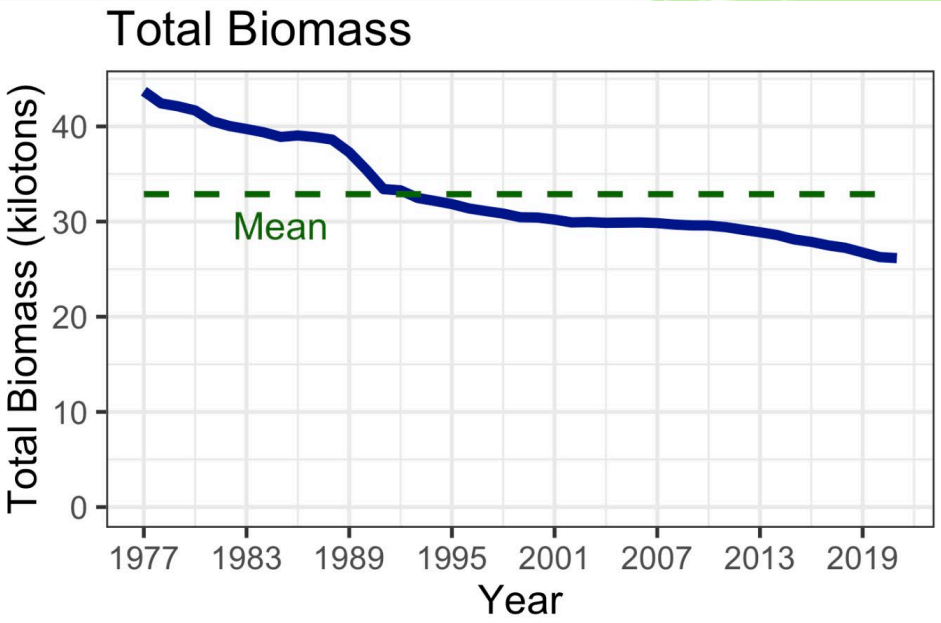
Plan Team discussions

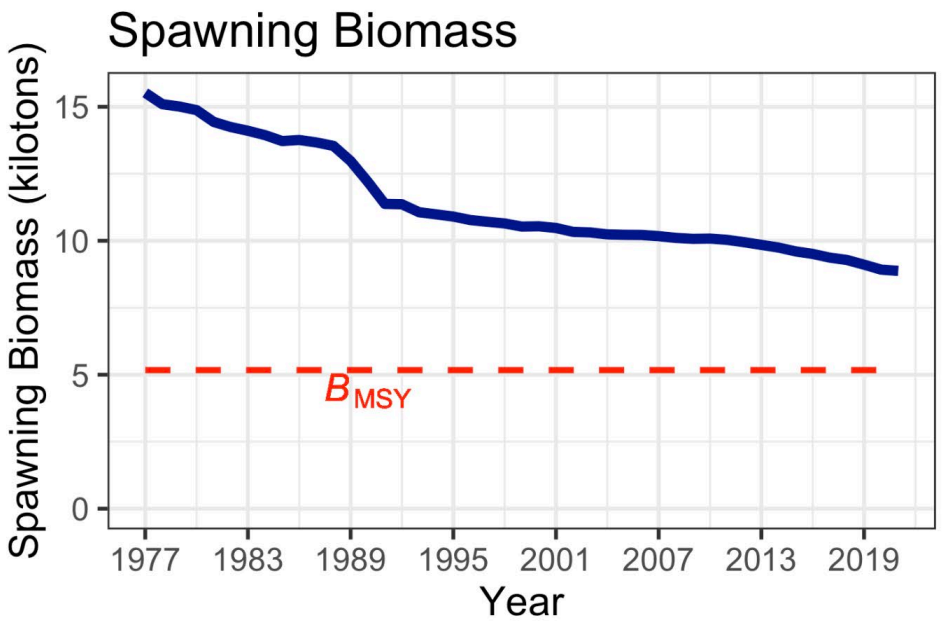
- Team agreed with author-recommended, noting consistency with available data
- The Team noted that the estimated dome shape of the selectivity should be evaluated in the future.
- The Team agreed with the data and model issues raised by the author including:
  - data weighting,
  - trawl survey length data,
  - survey index refinements, and
  - parameterizations for survey catchabilities and selectivities.

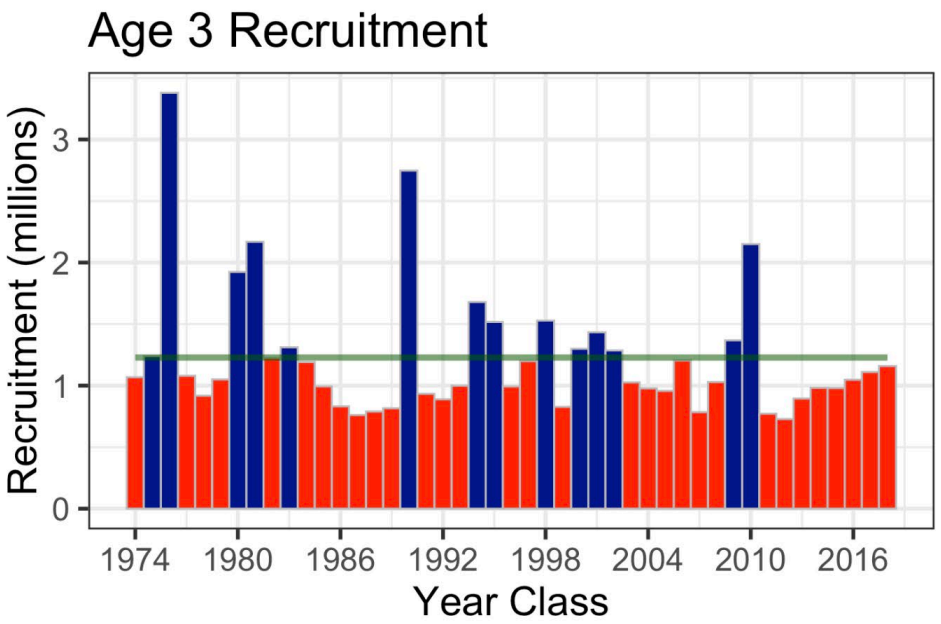
- The Team continued to place a high priority on developing robust **species identification methods** and in estimating composition data.

13. Rougheye/blackspotted rockfish









Rockfish ABC Summary

Species	ABC 2021	ABC 2022	Change
POP	36,177	38,268	up 2,091 (6%)
northern rockfish	5,358	5,146	down 212 (4%)
Shortraker Rockfish	708	705	down 3 (0%)
Dusky	5,389	5,372	down 17 (0%)
Rougheye and Blackspotted Rockfish	1,212	788	down 424 (35%)
Demersal shelf	257	268	up 11 (4%)
Thornyhead	1,953	1,953	same (0%)
Other rock	4,053	4,054	up 1 (0%)
Sub Total	55,107	56,554	up 1,447 (3%)

14. Demersal shelf rockfish

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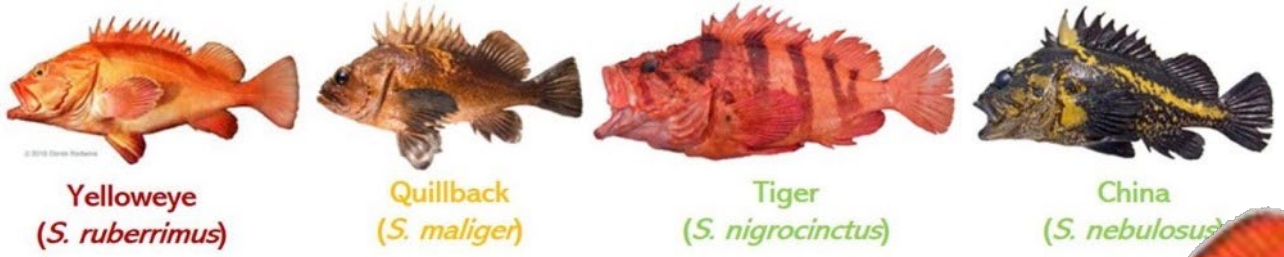
- Full Assessment, Tier 4 (yelloweye) and Tier 6 (6 other species)



Stock Assessment Survey

Four Management Areas:

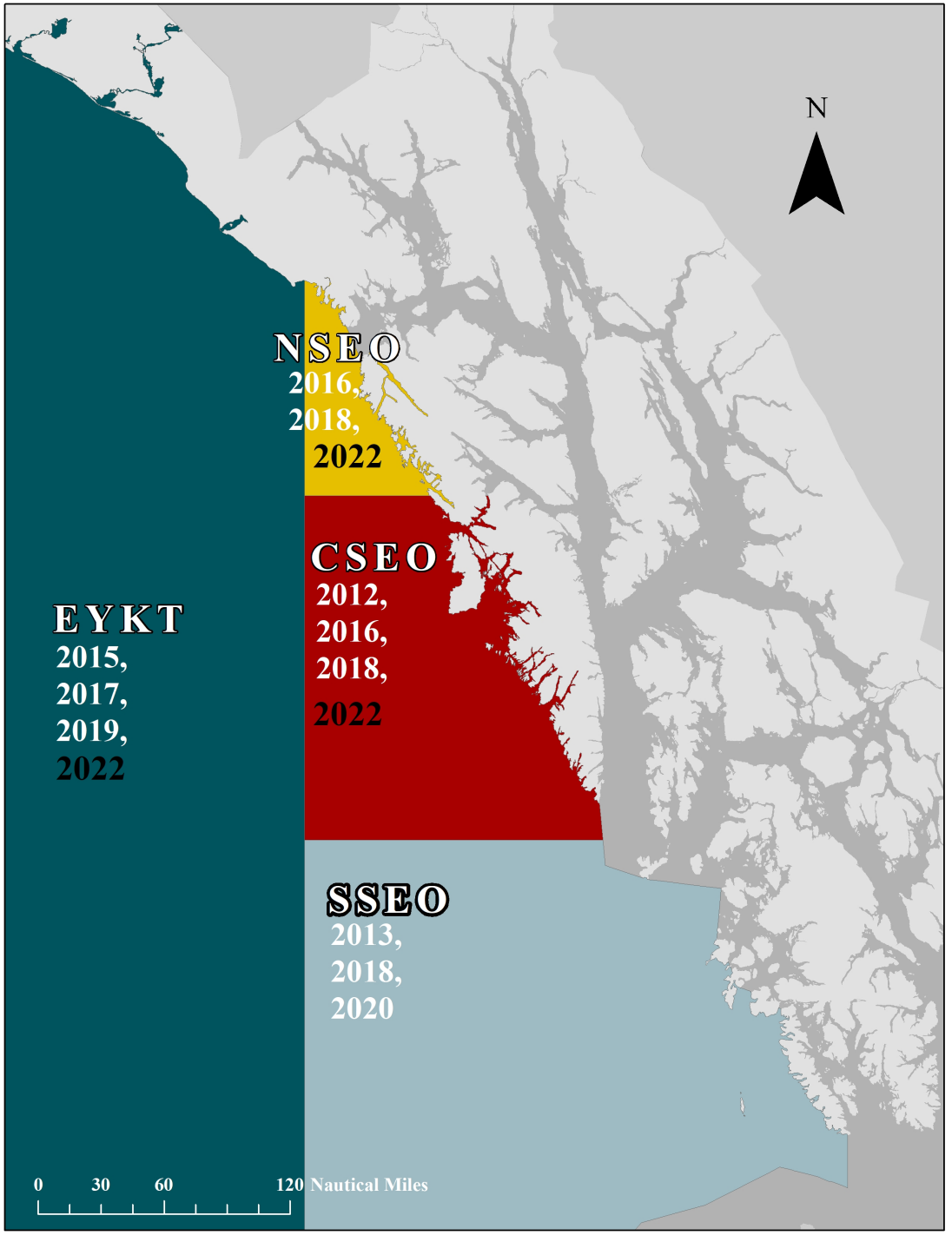
Eastern Yakutat (EYKT)

Northern Southeast Outside (NSEO)

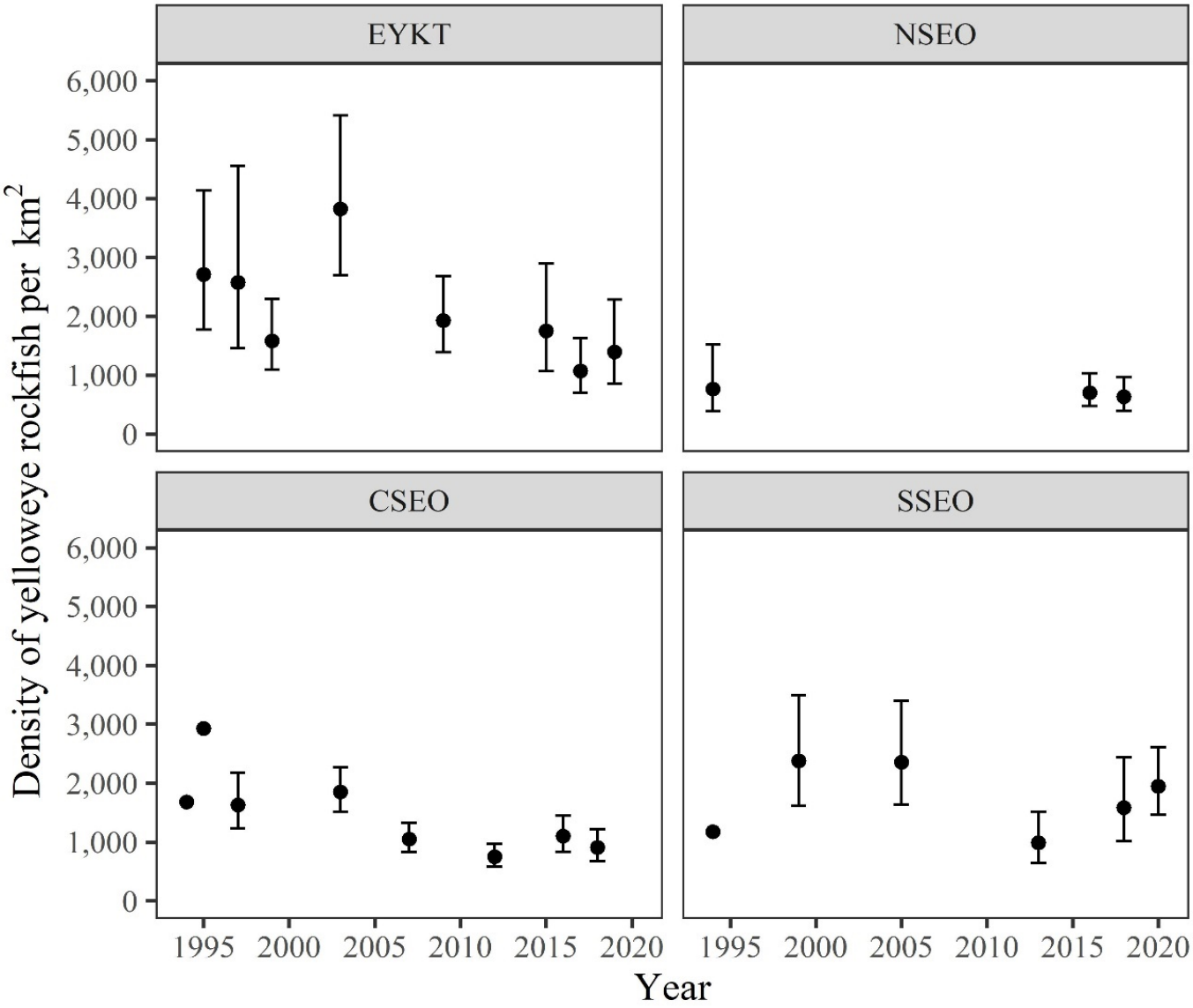
Central Southeast Outside (CSEO)

Southern Southeast Outside (SSEO)

Photo credit: ADF&G



Sub/ROV Density Estimates (95% CI)



14. Demersal shelf rockfish

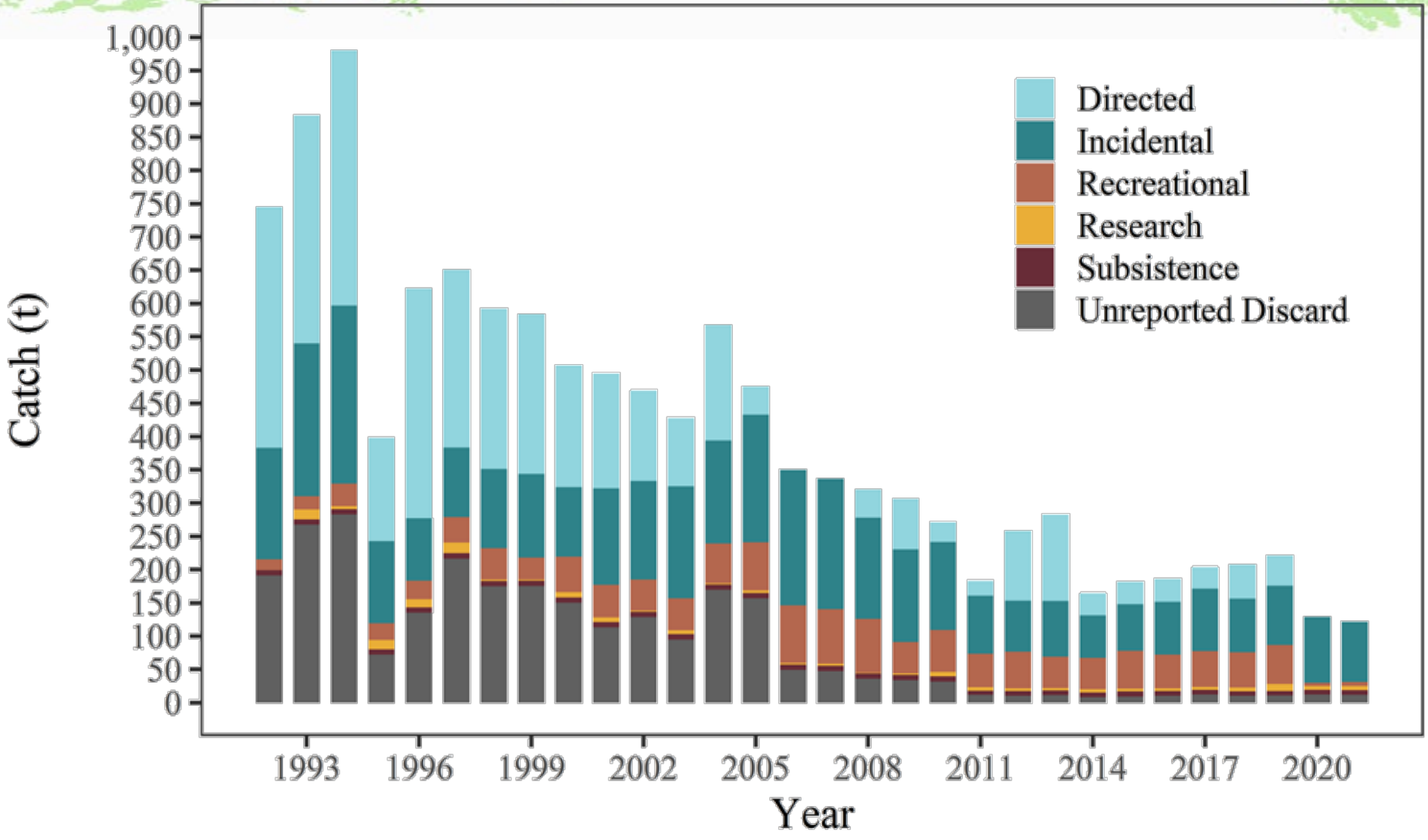
Model Input Data and Methods

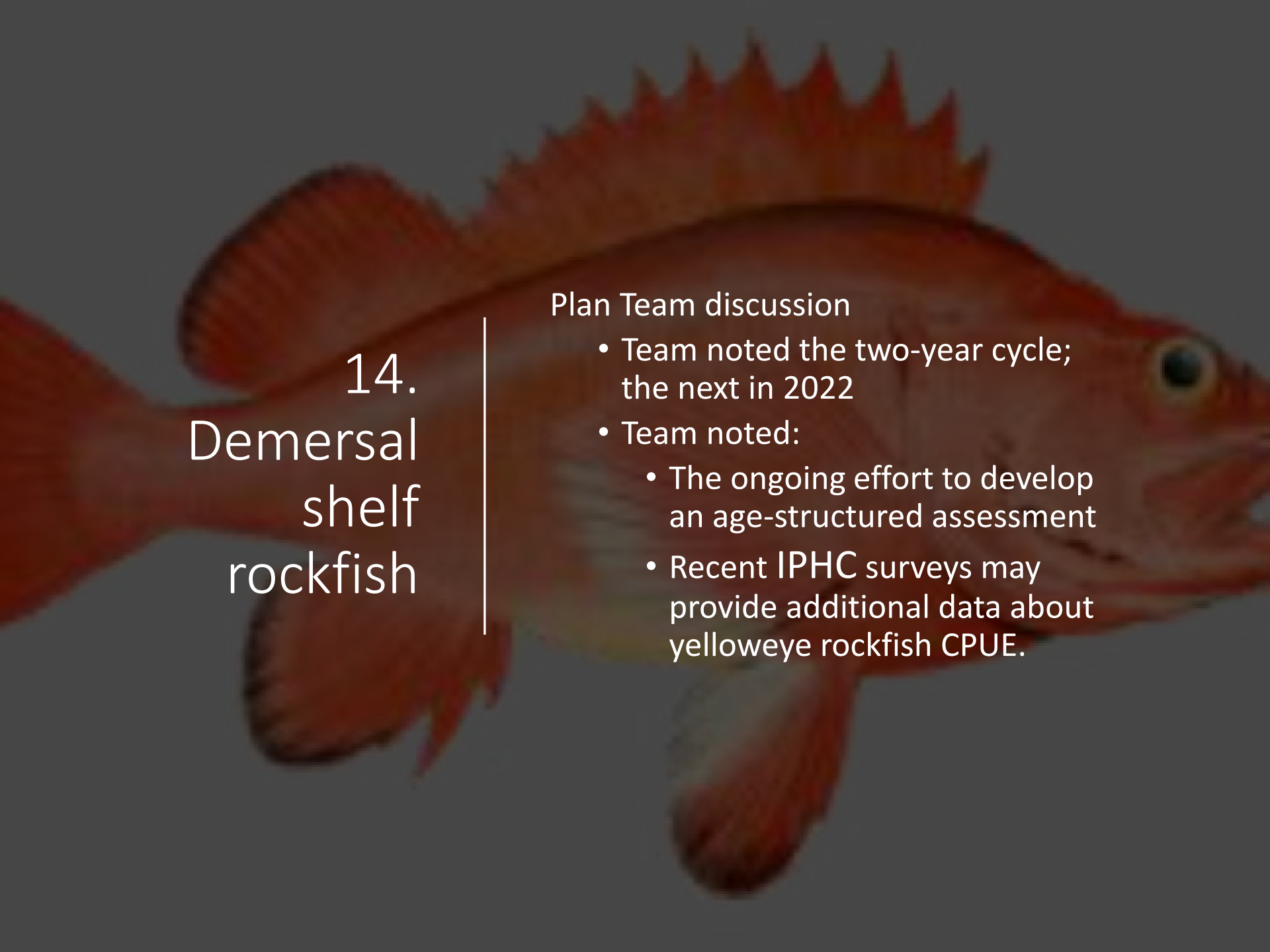
DATA INPUT
Ave weights from port sampling

METHODOLOGY
Tier 4 yelloweye rockfish + Tier 6 other DSR calculations

Quantity	As estimated or *specified last* year for: 2021	2022	As estimated or *recommended this* year for: 2022	2023
M (natural mortality rate)	0.02	0.02	0.02	0.02
Tier	4	4	4	4
Yelloweye Biomass (t)	10,648		12,388	
$F_{OFL}=F_{35\%}$	0.032	0.032	0.032	0.032
$maxF_{ABC}$	0.026	0.026	0.026	0.026
F_{ABC}	0.020	0.020	0.020	0.020
DSR OFL (t)	**405**	**405**	**422**	**422**
DSR max ABC (t)	328	328	342	342
Recommended ABC (t)	**257**	**257**	**268**	**268**
Status	As determined last year for: 2019	2020	As determined this year for: 2020	2021
Overfishing	No	n/a	No	n/a

SEO DSR Catch by Sector





14. Demersal shelf rockfish

Plan Team discussion

- Team noted the two-year cycle; the next in 2022
- Team noted:
  - The ongoing effort to develop an age-structured assessment
  - Recent IPHC surveys may provide additional data about yelloweye rockfish CPUE.

Rockfish ABC Summary

Species	ABC 2021	ABC 2022	Change
POP	36,177	38,268	up 2,091 (6%)
northern rockfish	5,358	5,146	down 212 (4%)
Shortraker Rockfish	708	705	down 3 (0%)
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Demersal shelf	257	268	up 11 (4%)
Thornyhead	1,953	1,953	same (0%)
Other rock	4,053	4,054	up 1 (0%)
Sub Total	55,107	56,554	up 1,447 (3%)

No thornyhead rockfish assessment in 2021

Rockfish ABC Summary

Species	ABC 2021	ABC 2022	Change
POP	36,177	38,268	up 2,091 (6%)
northern rockfish	5,358	5,146	down 212 (4%)
Shortraker Rockfish	708	705	down 3 (0%)
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Sub Total	55,107	56,554	up 1,447 (3%)

16. Other rockfish

Summary

Tier 4: Sharpchin

Tier 5: 17 slope sub-group species

Tier 6: 7 demersal sub-group, 2 slope species

Changes to the input data

- Catch updated through Oct 1, 2021
- NMFS bottom trawl survey data updated
- Updated random effects biomass model
- Reported catch from “unidentified rockfish”

Changes in assessment methodology

- None

Addressed SSC and Plan Team comments

16. Other rockfish

- Exceeded combined Western/Central GOA ABC

Area		2021 OFL	ABC	TAC	Catch
WGOA/CGOA			940	940	1,048
EGOA	WY		369	369	118
	EY/SE		2,744[$]	2,744[#]	36
Total		5,320	4,053	4,053	1,201*

*Catch as of Oct 1, 2021

[#]historically TAC set well below ABC in EY/SE, but not for 2020/2021

[$]Does not include ABC from northern rockfish

16. Other rockfish

Table 16.4: Time series of catch estimates for the Other Rockfish (OR) complex with total allowable catch (TAC), acceptable biological catch (ABC), overfishing level (OFL) and the management category. Catch values presented here show estimated catches for the complex **at that time**, meaning that in 1991 the catches in this table represent all of the species in the Other Slope Rockfish (OSR) group at that time, which includes northern rockfish GOA wide. Data queried through AKFIN on October 1, 2021.

	Gulf of Alaska Region Catch			Total				
Year	Western	Central	Eastern	Catch	TAC	ABC	OFL	Management Group
1991	20	175	83	4,806[a]	10,100	10,100		OSR
1992	76	854	745	9,445[a]	14,060	14,060	28,200	OSR
1993	342	2,423	2,658	5,423	5,383	8,300	9,850	OSR - northerns removed
1994	101	715	797	1,613	2,235	8,300	9,850	OSR
1995	31	883	483	1,397	2,235	7,110	8,395	OSR
1996	19	618	244	881	2,020	7,110	8,395	OSR
1997	68	941	208	1,217	2,170	5,260	7,560	OSR
1998	46	701	114	861	2,170	5,260	7,560	OSR
1999	39	614	135	788	5,270	5,270	7,560	OSR - EGOA northern included
2000	49	363	165	577	4,900	4,900	6,390	OSR
2001	25	318	216	559	1,010	4,900	6,390	OSR
2002	223	481	70	774	990	5,040	6,610	OSR
2003	133	677	249	1,059	990	5,050	6,610	OSR
2004	240	534	106	880	670	3,900	5,150	OSR
2005	64	516	118	698	670	3,900	5,150	OSR
2006	279	603	216	1,098	1,480	4,152	5,394	OSR
2007	249	339	106	695	1,482	4,154	5,394	OSR
2008	250	439	78	768	1,730	4,297	5,624	OSR
2009	403	399	96	899	1,730	4,297	5,624	OSR
2010	366	431	161	958	1,192	3,749	4,881	OSR
2011	303	391	226	920	1,192	3,749	4,881	OSR
2012	255	723	63	1,041	1,080	4,045	5,305	OR - includes widow and yellowtail
2013	192	465	118	775	1,080	4,045	5,305	OR
2014	166	714	90	971	1,811	4,081	5,374	OR[b]
2015	206	839	47	1,092	1,811	4,081	5,374	OR
2016	155	1,018	82	1,255	2,308	5,773	7,424	OR
2017	141	856	81	1,078	2,308	5,773	7,424	OR
2018	49	990	156	1,194	2,305	5,594	7,356	OR
2019	106	577	259	942	2,305	5,594	7,356	OR
2020	99	564	219	882	4,053	4,053	5,320	OR
2021	134	914	153	1,201	4,053	4,053	5,320	OR

16. Other rockfish

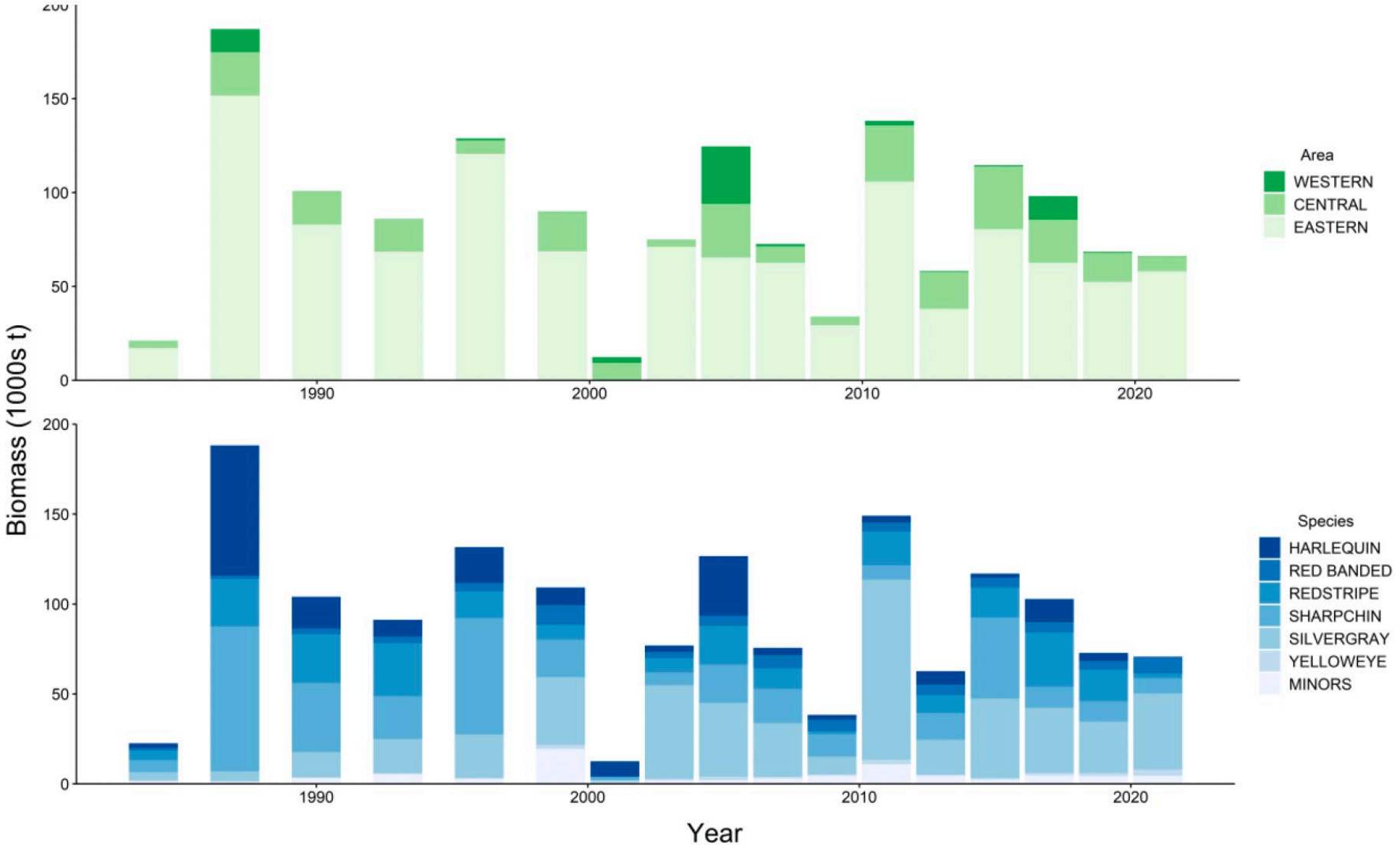


Figure 16.3. Trawl survey biomass estimates for the species in the Other Rockfish complex, by Gulf of Alaska (GOA) regulatory area (top, Western GOA, Central GOA, Eastern GOA) and by species (bottom).

16. Other rockfish

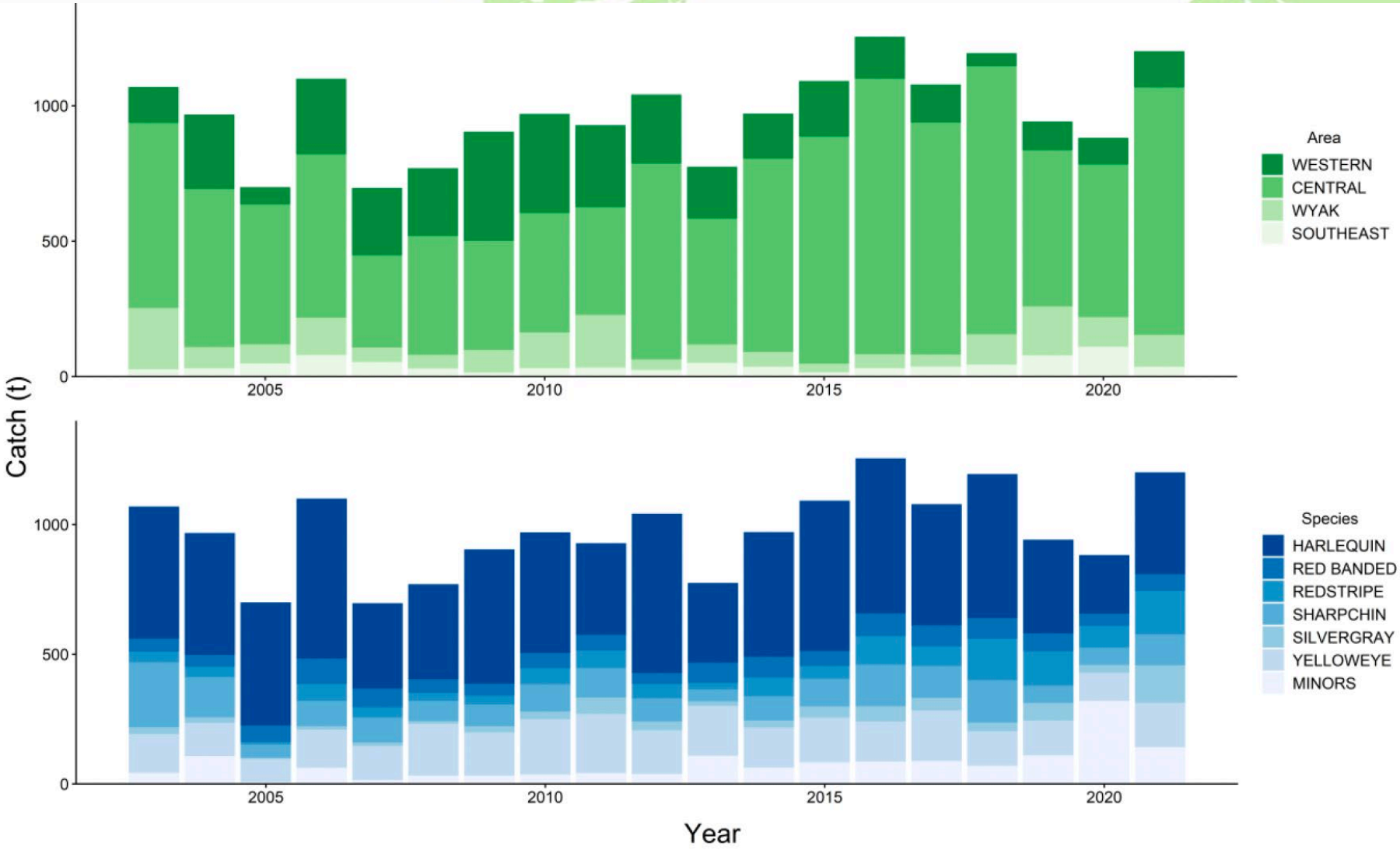


Figure 16.6. Estimated incidental catch (t) of Other Rockfish in Gulf of Alaska (GOA) by area (Western GOA, Central GOA, West Yakutat (West Yak), and East Yakutat/Southeast (Southeast) and species. National Marine Fisheries Service Alaska Regional Office Catch Accounting System (queried through AKFIN on October 1, 2021).

16. Other rockfish

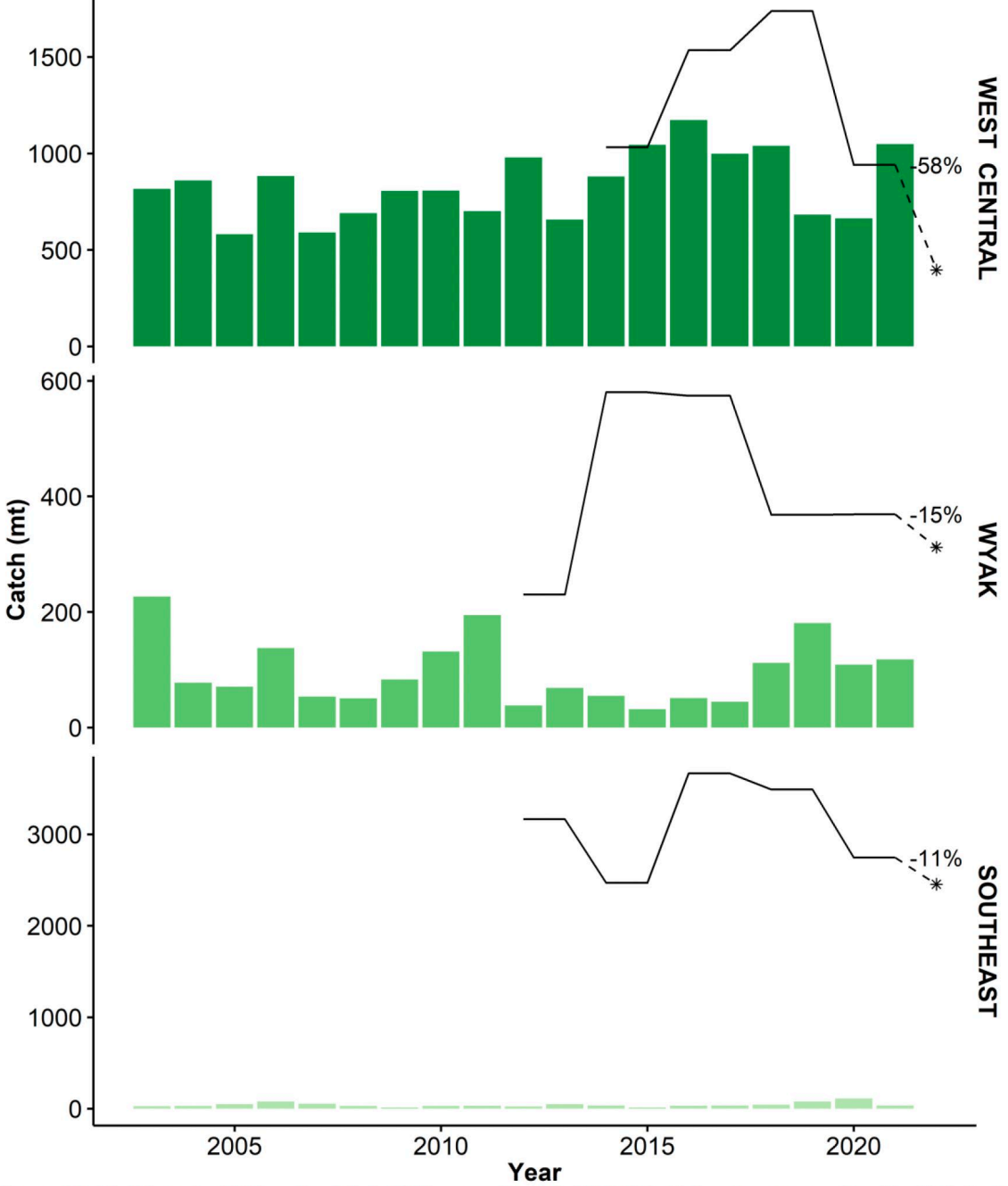


Figure 16.12. Historical Other Rockfish (OR) apportioned ABC (black lines) compared to the historical OR catch (green bars). The ABC for the OR begins in 2012 when this version of the complex was formed. The 2022 recommended apportioned ABCs are shown as black stars and the proportion change

16. Other rockfish

Plan Team summary

- Appreciated the efforts to align *M* with the species mix but result was extreme variability due to survey. The survey has proven to be inaccurate in tracking the species biomass and mix of species…so:
  - **The Team recommended rolling over harvest recommendations from 2021 due to the discrepancy between catch and survey biomass and the estimation of weighted *M* being influenced by a few species that have patchy distributions and survey catchability/availability issues.**
- **The Team recommends the author further explore issues with using the current method of weighted *M* biomass estimates.**
- **The Team continues to support an earlier recommendation that the DSR subgroup be moved into the DSR assessment and make the DSR assessment GOA-wide pending a Council analysis on spatial management implications.**
- The Team is encouraged that a working group is planning on addressing some of these issues and look forward to the outcomes.
- **The Team recommends incorporating 1 t of the northern rockfish ABC apportionment for EGOA to be combined with OR in the WYAK management area and added for management purposes.**

17. Atka mackerel

Species	2021 catch	ABC 2021	ABC 2022	Change
Pollock	98,769	115,870	144,444	up 28,574 (25%)
Pacific Cod	12,272	23,627	24,043	up 416 (2%)
Sablefish	14,115	21,475	22,794	up 1,319 (6%)
Flatfish	2,717	116,883	115,834	down 1,049 (1%)
Arrowtooth flounder	9,517	126,970	119,779	down 7,191 (6%)
Rockfish	35,882	55,107	56,554	up 1,447 (3%)
Atka mackerel	940	4,700	4,700	same (0%)
Skates	2,609	6,670	6,563	down 107 (2%)
Sharks	1,639	3,755	3,755	same (0%)
Octopus	51	980	980	same (0%)
Total	178,511	476,037	499,446	up 23,409 (5%)

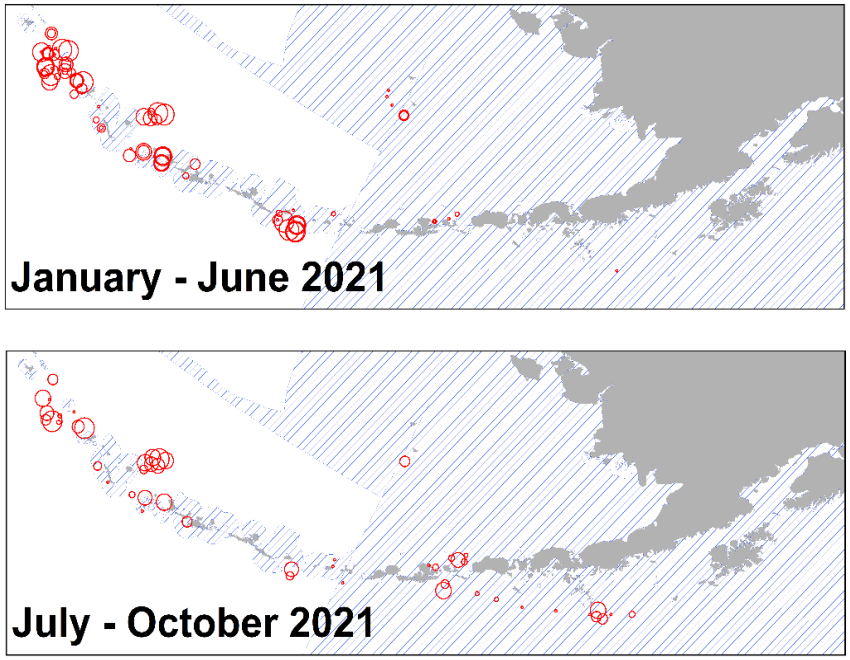
17. GOA Atka mackerel

2020 TAC
• 3,000 t

2020 Catch
• 608 t

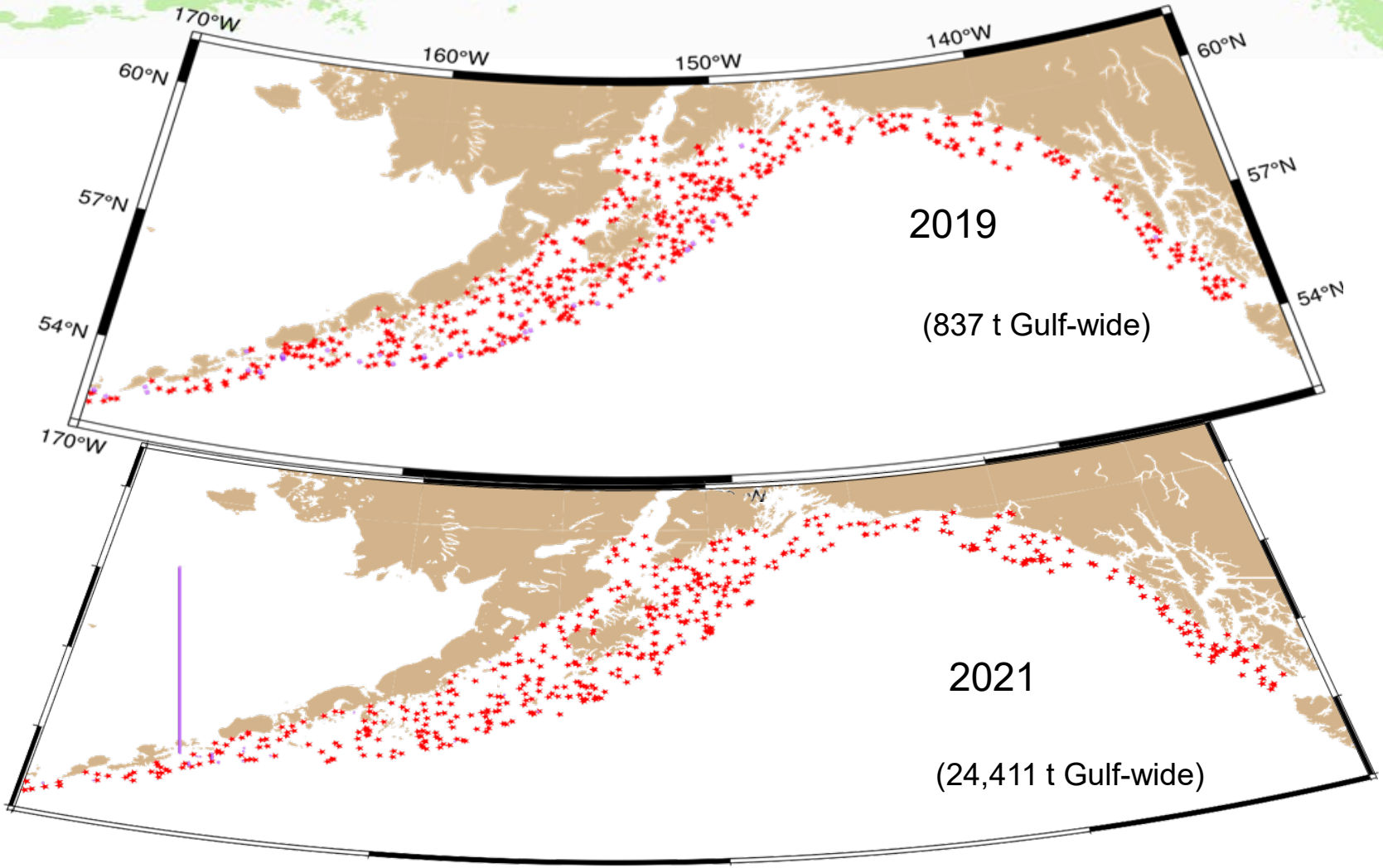
2021 TAC
• 3,000 t

2021 Catch
• 940 t
(11/1/21)



2021 observed catches of Atka mackerel summed for 20 km^2 cells. Shaded areas represent areas closed to directed Atka mackerel fishing (all of GOA).

17. GOA Atka mackerel



Atka mackerel survey CPUE by station for 2019 and 2021.

★ stars represent tows where Atka mackerel were absent, height of bars is proportional to CPUE by weight.

17. GOA Atka mackerel

Quantity	As estimated or *specified last* year for: 2021	2022	As estimated or *recommended this* year for: **2022**	2023
Tier	6	6	**6**	6
OFL (t)	6,200	6,200	**6,200**	6,200
maxABC (t)	4,700	4,700	**4,700**	4,700
ABC (t)	4,700	4,700	**4,700**	4,700
Status	As determined *last* year for: 2017	2018	As determined *this* year for: 2018	2019
Overfishing	n/a	n/a	**n/a**	n/a

18. GOA skates

Species	2021 catch	ABC 2021	ABC 2022	Change
Pollock	98,769	115,870	144,444	up 28,574 (25%)
Pacific Cod	12,272	23,627	24,043	up 416 (2%)
Sablefish	14,115	21,475	22,794	up 1,319 (6%)
Flatfish	2,717	116,883	115,834	down 1,049 (1%)
Arrowtooth flounder	9,517	126,970	119,779	down 7,191 (6%)
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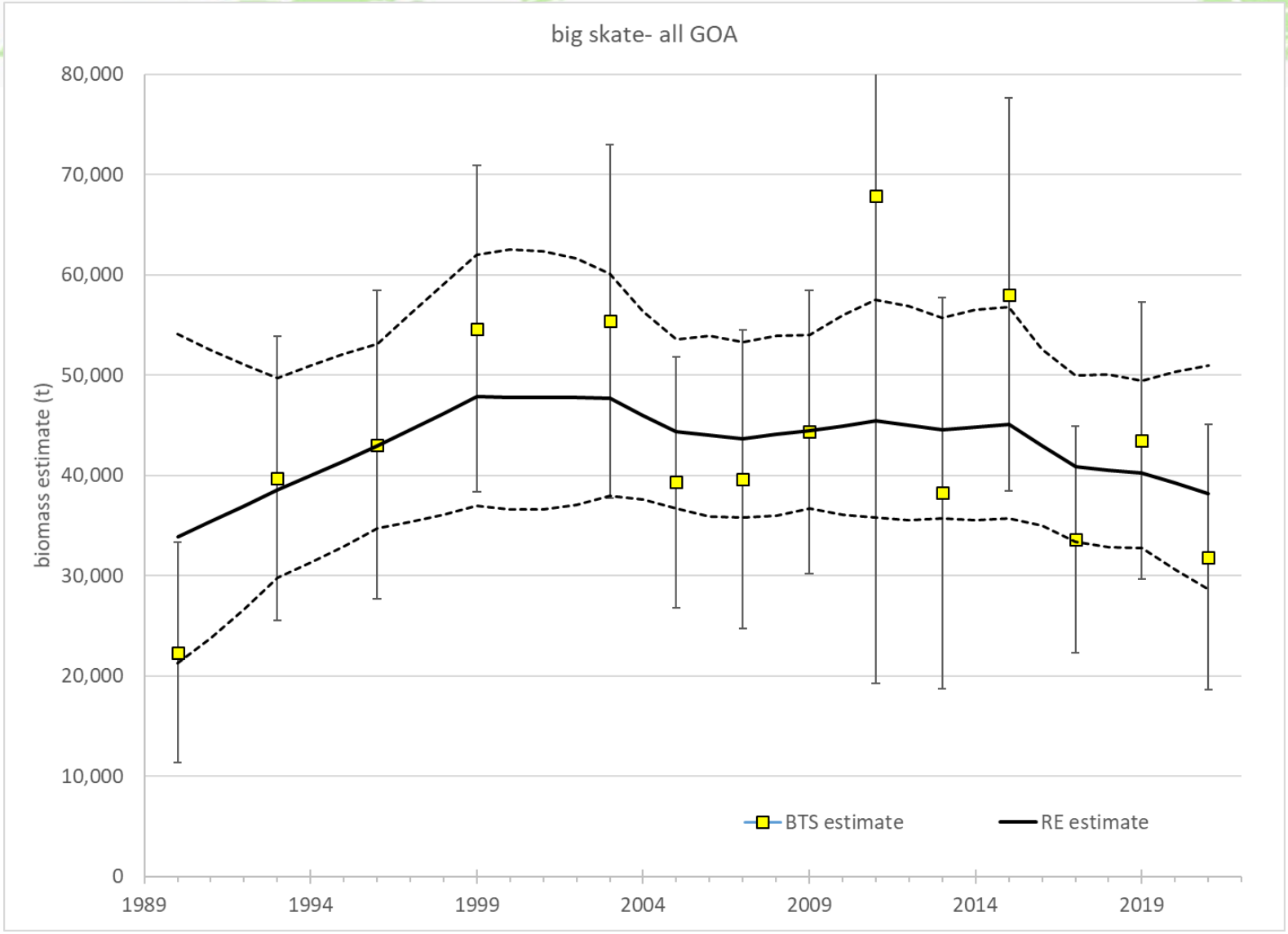
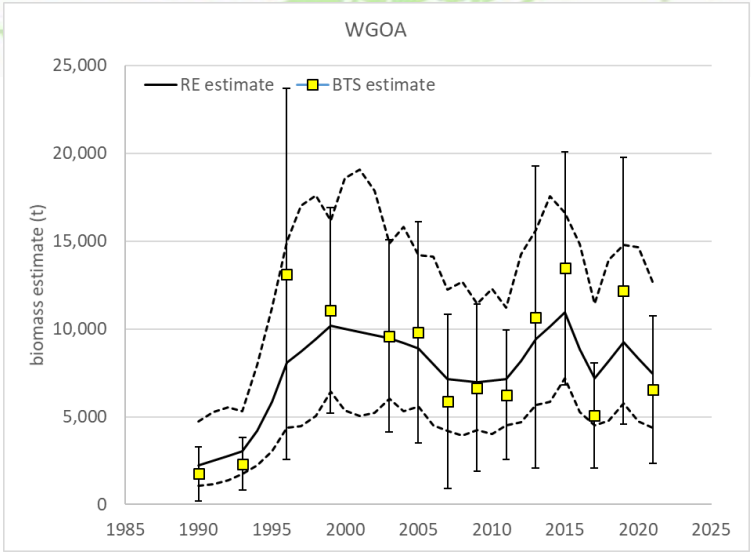
Sharks	1,639	3,755	3,755	same (0%)
Octopus	51	980	980	same (0%)
Total	178,511	476,037	499,446	up 23,409 (5%)

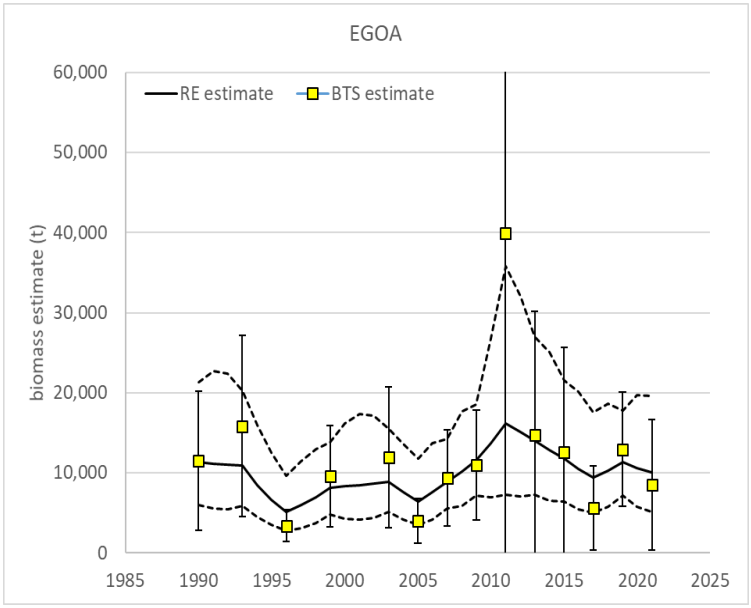
18. GOA Skates

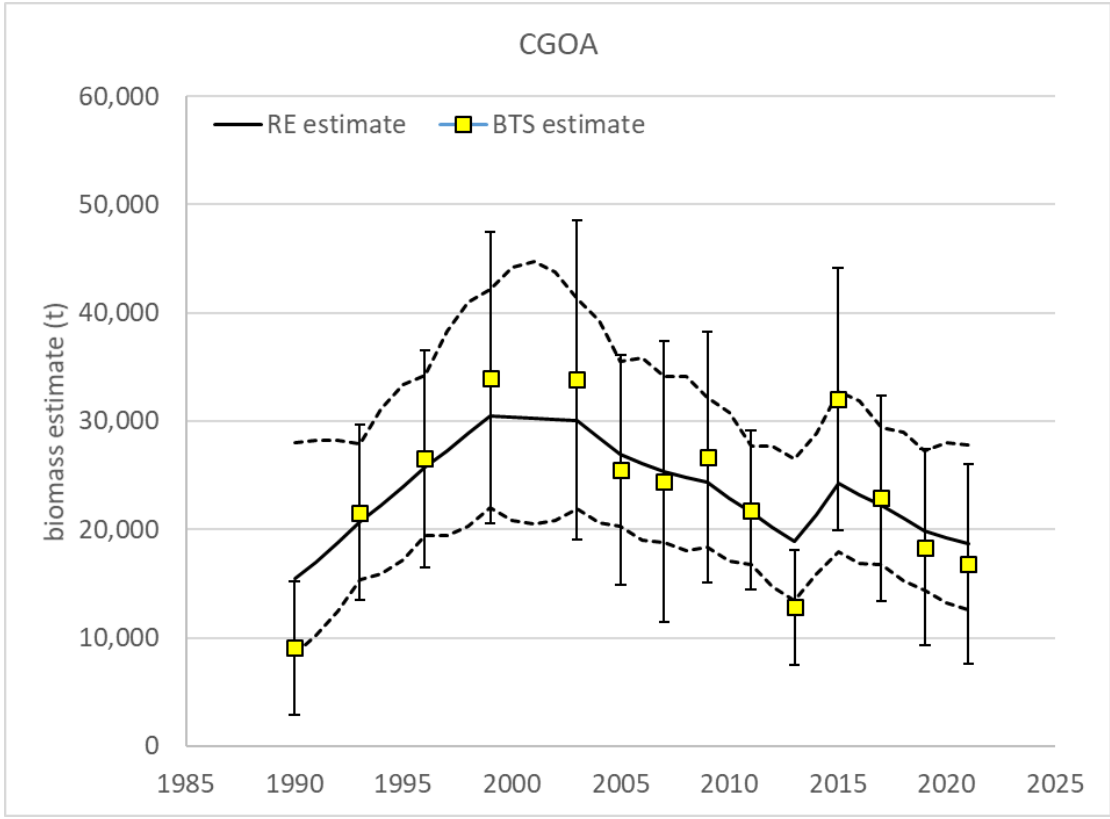
AFSC BTS biomass – big skate



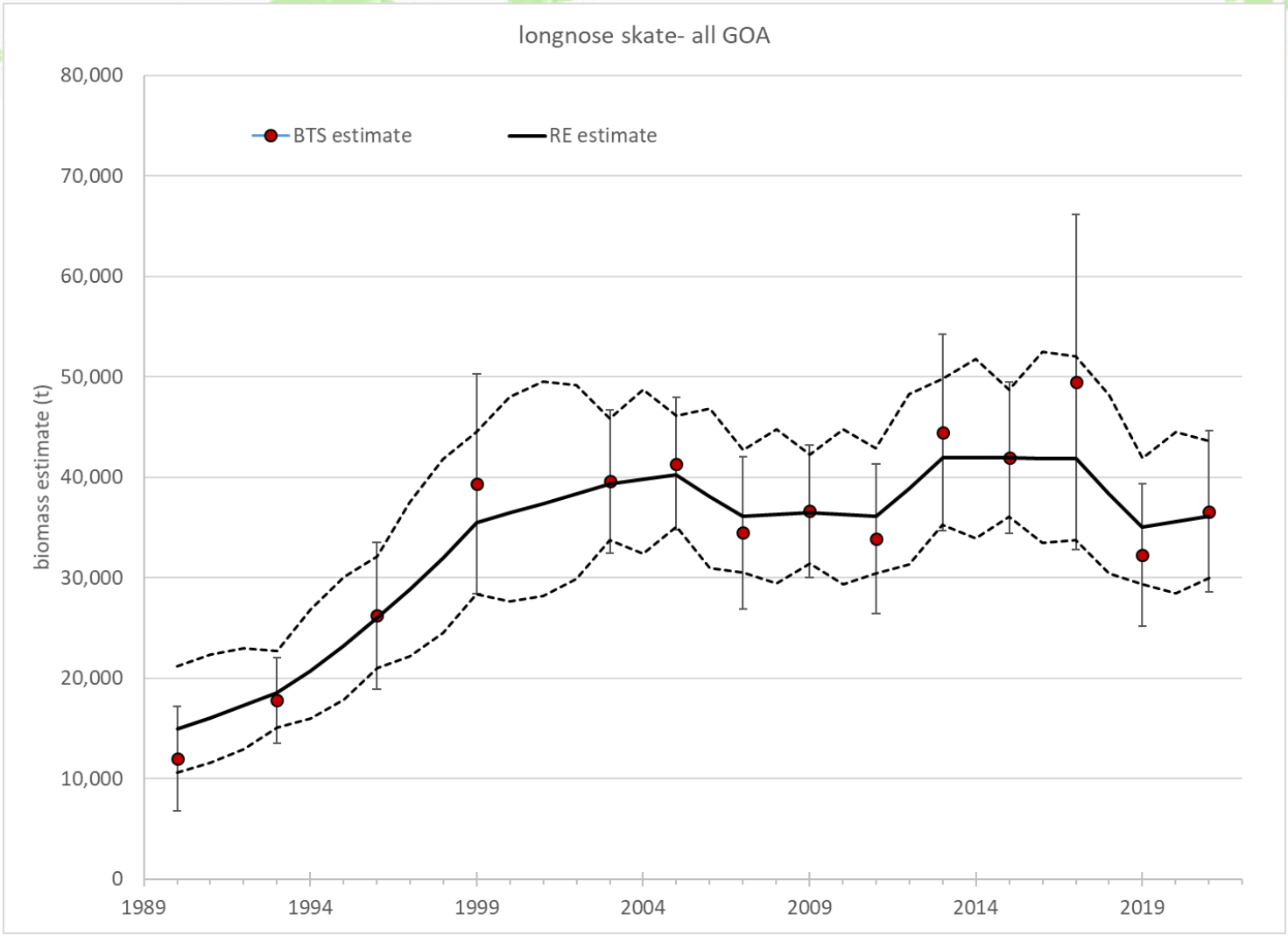
big skate biomass by area



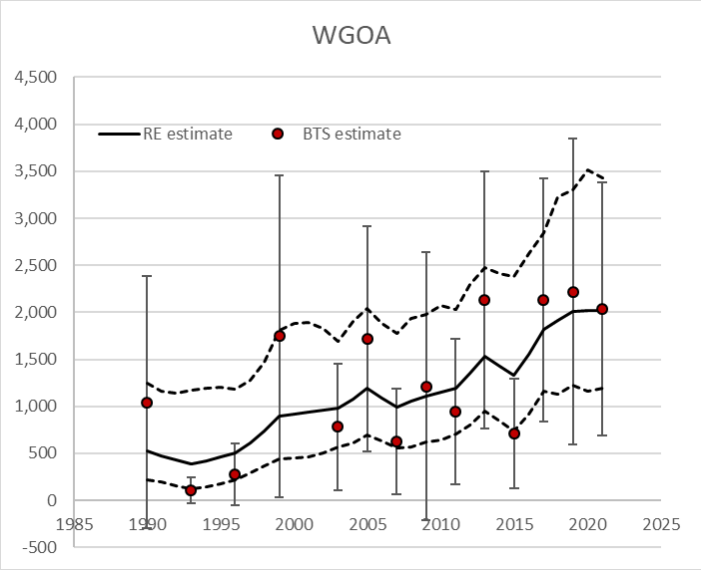


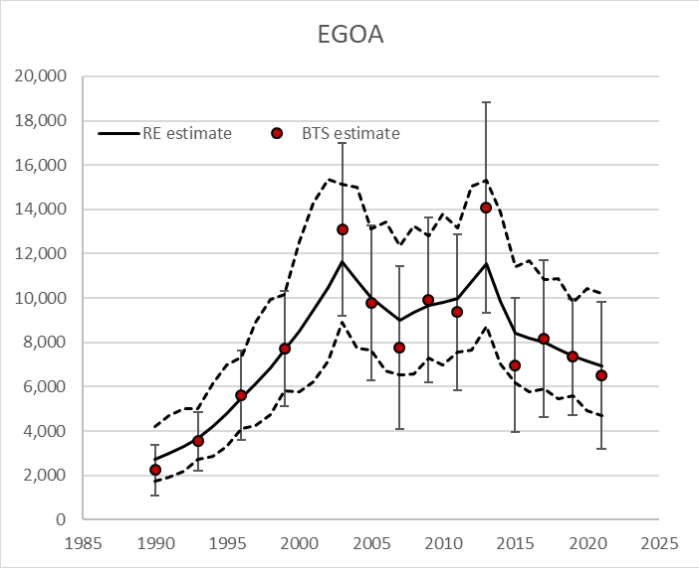


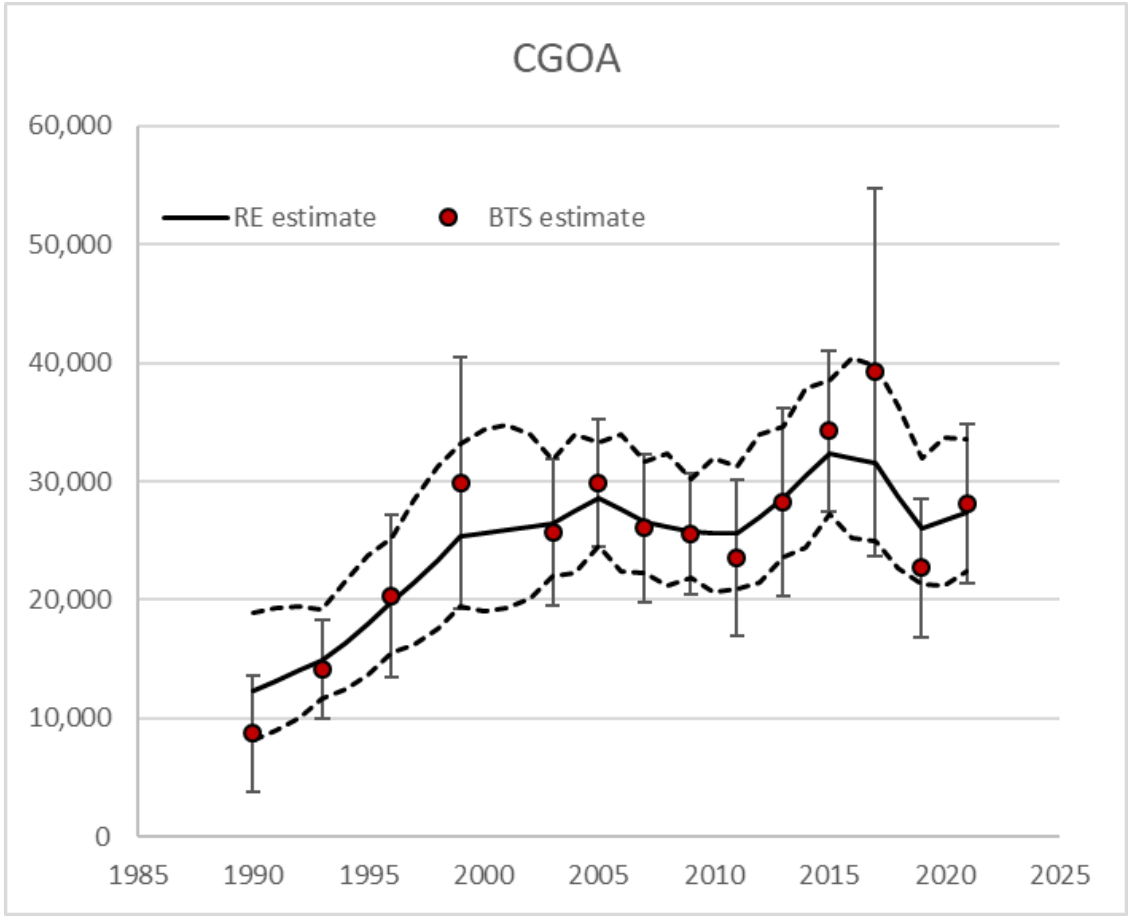
AFSC BTS biomass – longnose skate



longnose skate biomass by area

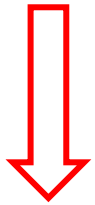






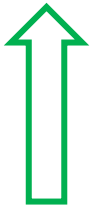
harvest recs – big skate

big skate (*Beringraja binoculata*)					
		As estimated or *specified last full assessment* for		As estimated or *recommended this* year for:	
Quantity		2020	2021	**2022**	2023
M (natural mortality)		0.1	0.1	**0.1**	0.1
Specified/recommended Tier		5	5	**5**	5
Biomass (t)	W	10,109	10,109	**7,882**	7,882
	C	20,798	20,798	**19,756**	19,756
	E	11,861	11,861	**10,581**	10,581
	GOA-wide	42,779	42,779	**38,220**	38,220
F_{OFL} ($F=M$)		0.1	0.1	**0.1**	0.1
$maxF_{ABC}$ ($F=0.75*M$)		0.075	0.075	**0.075**	0.075
F_{ABC}		0.075	0.075	**0.075**	0.075
OFL (t)	GOA-wide	4,278	4,278	**3,822**	**3,822**
Maximum permissible ABC (t)	W	758	758	**591**	591
	C	1,560	1,560	**1,482**	1,482
	E	890	890	**794**	794
Recommended ABC (t)	W	758	758	**591**	591
	C	1,560	1,560	**1,482**	1,482
	E	890	890	**794**	794
		As determined *last* year for:		As determined *this* year for:	
Status		2018	2019	**2020**	2021
Overfishing?		*no*	*na*	**no**	na
(for Tier 5 stocks, data are not available to determine whether the stock is in an overfished condition)					



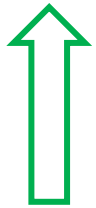
harvest recs – longnose skate

longnose skate (*Raja rhina*)					
Quantity		As estimated or *specified last full assessment* for 2020	2021	As estimated or *recommended this* year for: **2022**	2023
M (natural mortality)		0.1	0.1	**0.1**	0.1
Specified/recommended Tier		5	5	**5**	5
Biomass (t)	W	2,156	2,156	**2,013**	2,013
	C	25,583	25,583	**27,258**	27,258
	E	7,558	7,558	**6,890**	6,890
	GOA-wide	34,487	34,487	**36,162**	36,162
F_{OFL} ($F=M$)		0.1	0.1	**0.1**	0.1
$maxF_{ABC}$ ($F=0.75*M$)		0.075	0.075	**0.075**	0.075
F_{ABC}		0.075	0.075	**0.075**	0.075
OFL (t)	GOA-wide	3,449	3,449	**3,616**	3,616
Maximum permissible ABC (t)	W	158	158	**151**	151
	C	1,875	1,875	**2,044**	2,044
	E	554	554	**517**	517
Recommended ABC (t)	W	158	158	**151**	151
	C	1,875	1,875	**2,044**	2,044
	E	554	554	**517**	517
Status		As determined *last* year for: 2018	2019	As determined *this* year for: **2020**	2021
Overfishing?		*no*	*na*	**no**	na
(for Tier 5 stocks, data are not available to determine whether the stock is in an overfished condition)					



harvest recs – other skate

other skates (*Bathyraja* species)					
Quantity		As estimated or *specified last full assessment* for 2020	2021	As estimated or *recommended this* year for: **2022**	2023
M (natural mortality)		0.1	0.1	**0.1**	0.1
Specified/recommended Tier		5	5	**5**	5
Biomass (t)	GOA-wide	11,662	11,662	13,114	13,114
F_{OFL} (*F=M*)		0.1	0.1	**0.1**	0.1
$maxF_{ABC}$ *(F=0.75*M)*		0.075	0.075	**0.075**	0.075
F_{ABC}		0.075	0.075	**0.075**	0.075
OFL (t)	GOA-wide	1,166	1,166	1,311	1,311
Maximum permissible ABC (t)	GOA-wide	875	875	984	984
Recommended ABC (t)	GOA-wide	875	875	984	984
Status		As determined *last* year for: 2018	2019	As determined *this* year for: **2020**	2021
Overfishing?		*no*	*na*	**no**	na
(for Tier 5 stocks, data are not available to determine whether the stock is in an overfished condition)					



18. Skates

Plan Team discussion

- Some notes about state management in Prince William Sound
- Agreed with recommended ABCs/OFLs
- The Team noted natural mortality review could be worthwhile

19. GOA sharks (no assessment in 2021)

Species	2021 catch	ABC 2021	ABC 2022	Change
Pollock	98,769	115,870	144,444	up 28,574 (25%)
Pacific Cod	12,272	23,627	24,043	up 416 (2%)
Sablefish	14,115	21,475	22,794	up 1,319 (6%)
Flatfish	2,717	116,883	115,834	down 1,049 (1%)
Arrowtooth flounder	9,517	126,970	119,779	down 7,191 (6%)
Rockfish	35,882	55,107	56,554	up 1,447 (3%)
Atka mackerel	940	4,700	4,700	same (0%)
Skates	2,609	6,670	6,563	down 107 (2%)
Sharks	1,639	3,755	3,755	same (0%)
Octopus	51	980	980	same (0%)
Total	178,511	476,037	499,446	up 23,409 (5%)

20. GOA octopus

Species	2021 catch	ABC 2021	ABC 2022	Change
Pollock	98,769	115,870	144,444	up 28,574 (25%)
Pacific Cod	12,272	23,627	24,043	up 416 (2%)
Sablefish	14,115	21,475	22,794	up 1,319 (6%)
Flatfish	2,717	116,883	115,834	down 1,049 (1%)
Arrowtooth flounder	9,517	126,970	119,779	down 7,191 (6%)
Rockfish	35,882	55,107	56,554	up 1,447 (3%)
Atka mackerel	940	4,700	4,700	same (0%)
Skates	2,609	6,670	6,563	down 107 (2%)
Sharks	1,639	3,755	3,755	same (0%)
Octopus	51	980	980	same (0%)
Total	178,511	476,037	499,446	up 23,409 (5%)

20. GOA Octopus

- Tier 6, no change

Harvest Recommendations				
	As estimated or *specified in the last assessment* for:		As estimated or *recommended this* year for:	
Quantity	2020	2021	2022	2023
Tier 6 (max. historical catch) maximum historical catch	1,307	1,307	**1,307**	1,307
OFL (t)	1,307	1,307	**1,307**	1,307
Maximum ABC (t)	980	980	**980**	980
ABC (t)	980	980	**980**	980
	As determined *last* year for:		As determined *this* year for:	
Status	2018	2019	2020	2021
Overfishing	no	n/a	no	n/a

20. GOA Octopus

Plan Team discussion

- Noted different approaches used in BSAI for octopus
- Current Tier 6 appears sufficiently precautionary

Halibut DMRs

Table 5. Proposed 2022 and 2023 Pacific halibut discard mortality rates for vessels fishing in the Gulf of Alaska (percent of Pacific halibut assumed to be dead).

Gear	Sector	Groundfish fishery	Halibut discard mortality rate
Pelagic trawl	Catcher vessel	All	100%
	Catcher/processor	All	100%
Non-pelagic trawl	Catcher vessel	Rockfish Program	66%
	Catcher vessel	All others	69%
	Mothership and catcher/processor	All	83%
Hook-and-line	Catcher/processor	All	15%
	Catcher vessel	All	12%
Pot	Catcher vessel and catcher/processor	All	29%

Halibut PSC apportionment

- While developing proposed groundfish harvest levels, the Council will also review the need to control halibut PSC and will recommend appropriate apportionments of PSC limits to fishery categories as *PSC allowances*.

- *Fishery PSC allowances*

  intended to optimize total groundfish harvest under established PSC limits, taking into consideration anticipated amounts of incidental catch of prohibited species in each fishery category.

GOA GF FMP (3.6.2.1.1) sets specific procedure for modifying halibut PSC limits during annual harvest specifications process

Halibut PSC apportionment

Types of information the Council will consider relevant to seasonal allocation of PSC limits include:

a) Seasonal distribution of prohibited species;

b) Seasonal distribution of target groundfish species relative to prohibited species distribution;

c) Expected prohibited species bycatch needs on a seasonal basis relevant to change in prohibited species biomass and expected catches of target groundfish species;

d) Expected variations in bycatch rates throughout the fishing year;

e) Expected changes in directed groundfish fishing seasons;

f) Expected start of fishing efforts; and

g) Economic effects of establishing seasonal prohibited species apportionments on segments of the target groundfish industry.