

C5 Gulf of Alaska Groundfish Harvest Specifications (SAFE report)

Report of the
Gulf of Alaska Groundfish
Plan Team meeting
Nov 14th-18th, 2022

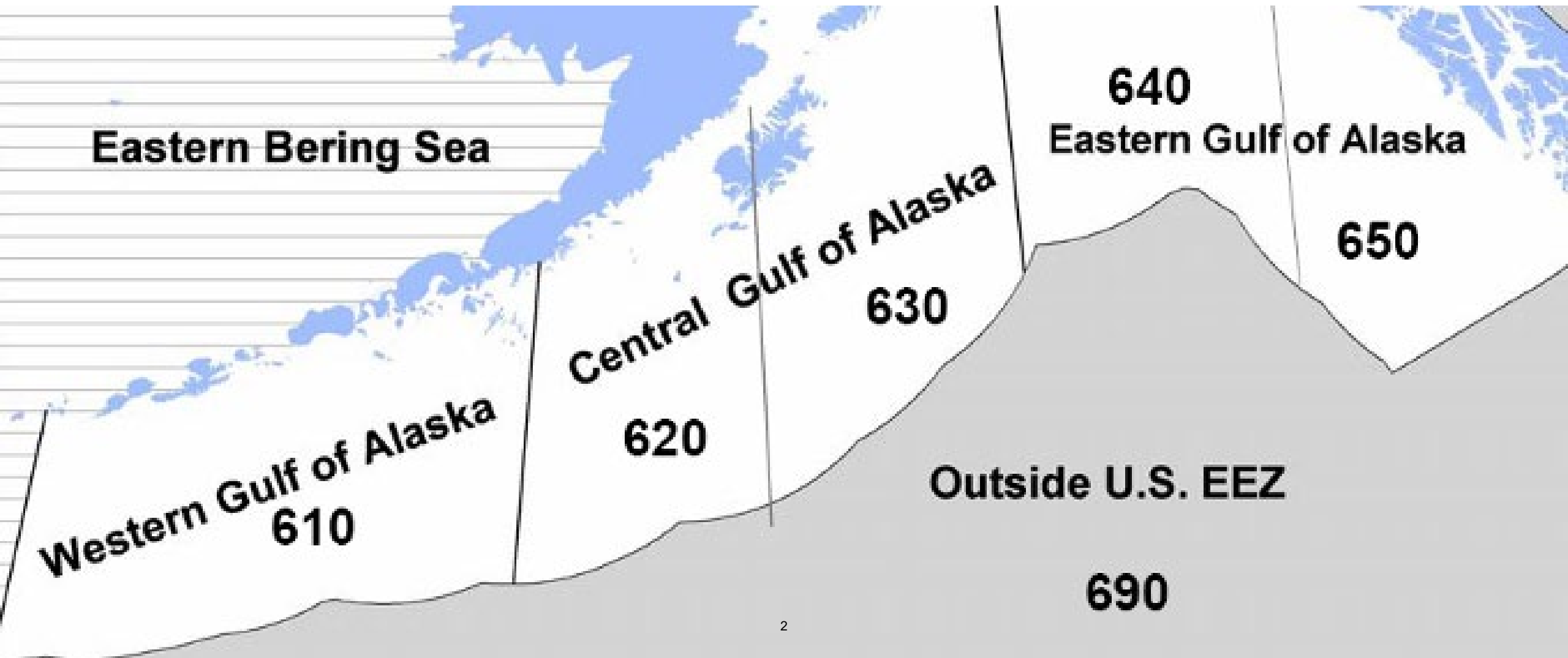
GOA Plan Team Members

James Ianelli (co-chair)	AFSC/REFM
Chris Lunsford (co-chair)	AFSC/ABL
Sara Cleaver	NPFMC
Nat Nichols	ADFG
Jan Rumble	ADFG
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Obren Davis	AKRO
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GOA Assessment Overview

“Off” year for GOA, 10 “full” assessments, 7 “partials”



Stock Assessment schedule for the Gulf of Alaska

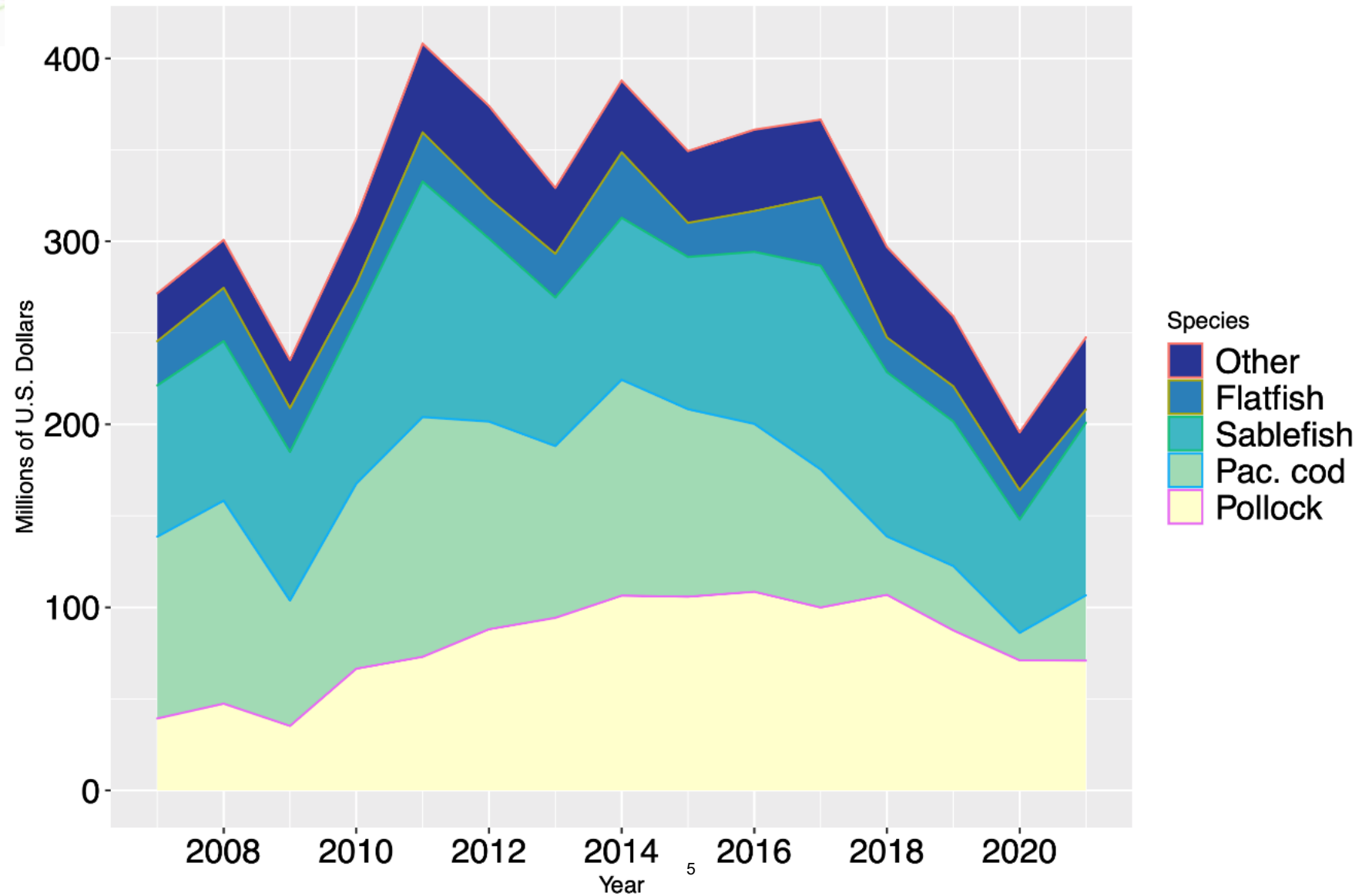
Stock	Assessment	Tier	Frequency (yrs)	Full assessment year due
Pollock	Full	3	1	2023
Pacific cod	Full	3	1	2023
Sablefish	Full	3	1	2023
<i>Shallow water flats N. & S. rock sole</i>	<i>Partial</i>	3	4	2025
<i>Shallow water flats balance</i>	<i>Partial</i>	5	4	2025
<i>Deepwater flatfish (Dover)</i>	<i>Partial</i>	3/6	4	2023
<i>Rex sole</i>	<i>Partial</i>	3	4	2025
<i>Arrowtooth flounder</i>	<i>Partial</i>	3	2	2023
Flathead sole	Full	3	4	2025
<i>Pacific ocean perch</i>	<i>Partial</i>	3	2	2023
Northern rockfish	Full	3	2	2024
Shortraker rockfish	None	5	2	2023
Other rockfish	None	4/5/6	2	2023
<i>Rougheye & blackspotted rockfish</i>	<i>Partial</i>	3	2	2023
Dusky rockfish	Full	3	2	2024
Demersal shelf rockfish	Full	4/6	2	2024
Thornyheads	Full	5	2	2024
Atka mackerel	None	6	2	2023
Octopus	None	6	2	2023
Skates	None	5	2	2023
Sharks	Full	6	2	2024
Sculpins	None	cco	4	2023
Forage species (including Squid)	Report	cco	2	2024
Grenadiers (BSAI/GOA)	³ None	cco	4	2024

GOA SAFE report overview

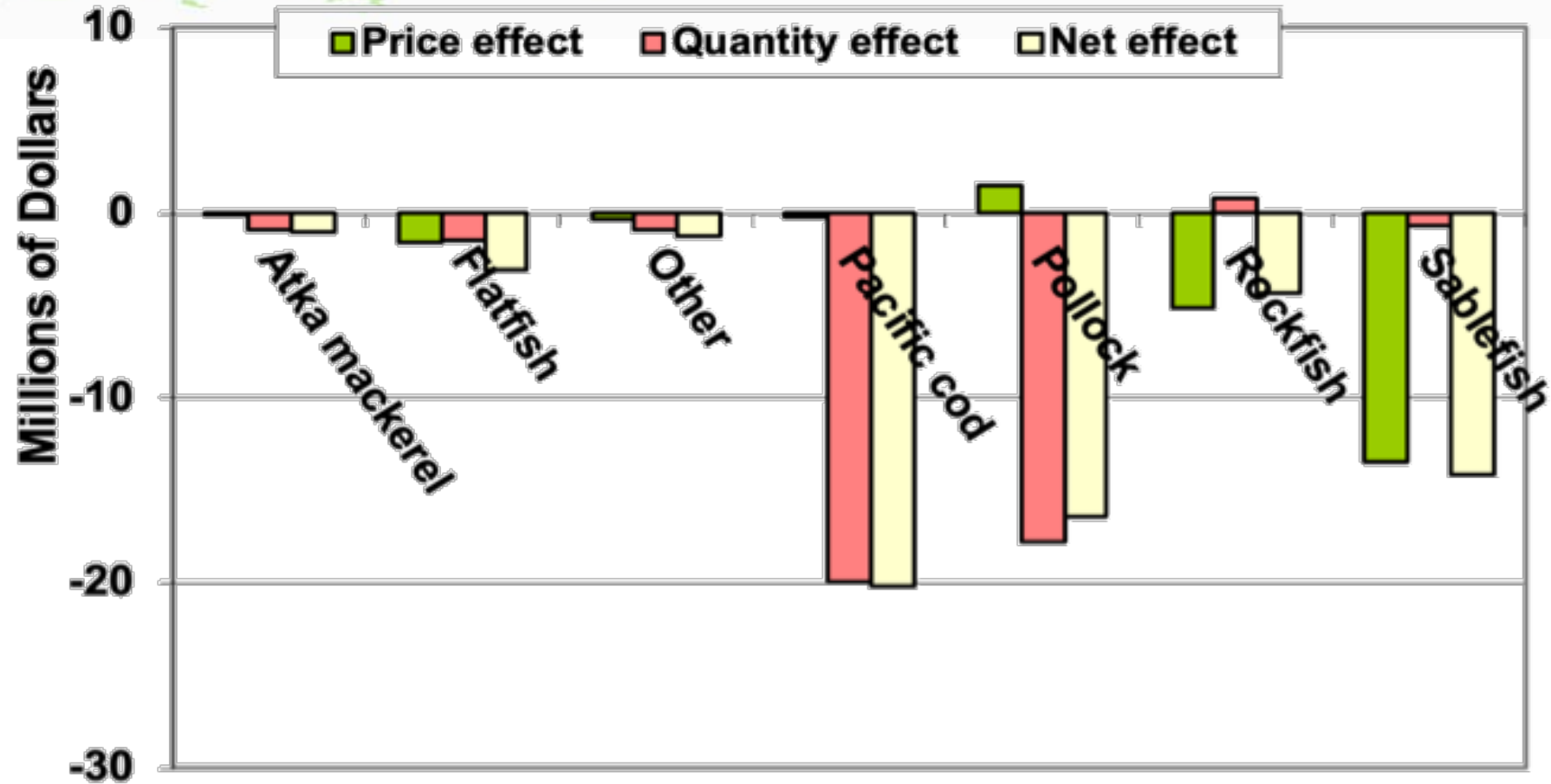
- 10 full assessments
- 7 partials

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

GOA Economic synopsis: Real gross product value of groundfish catch in GOA

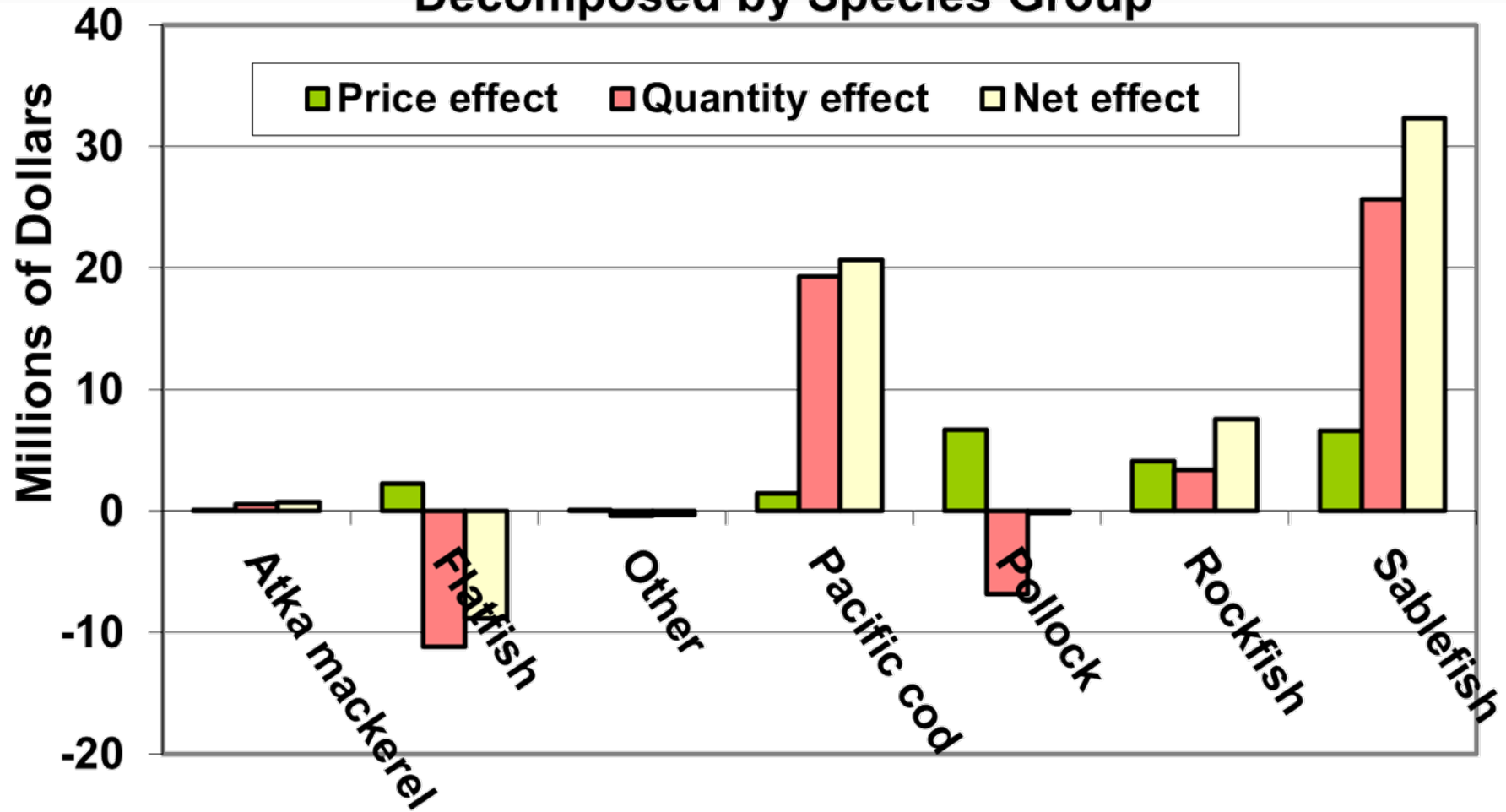


GOA First-Wholesale Revenue Change in 2019-20 Decomposed by Species Group



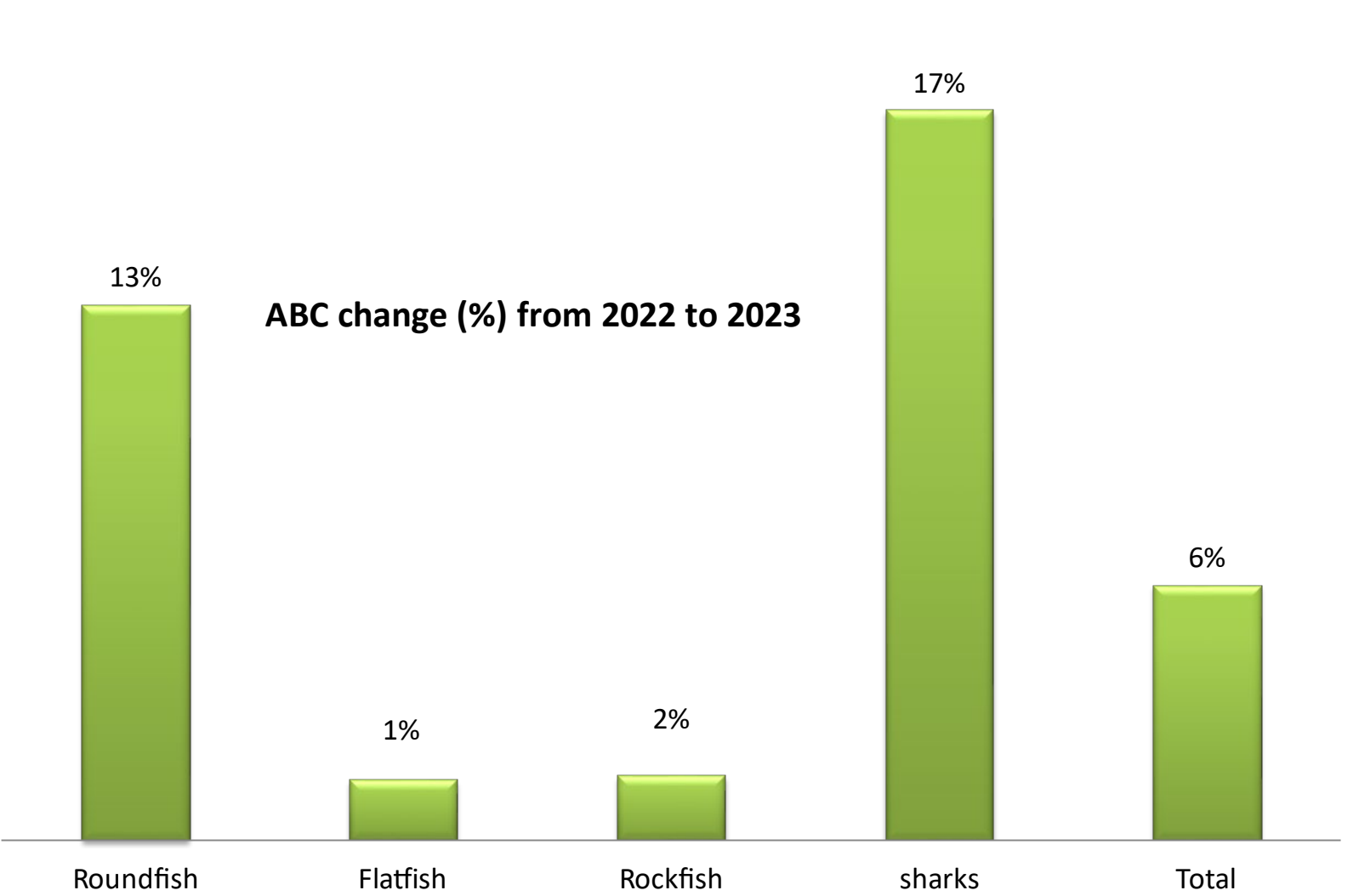
Revenue changes (and source)

GOA First-Wholesale Revenue Change in 2020-21 Decomposed by Species Group



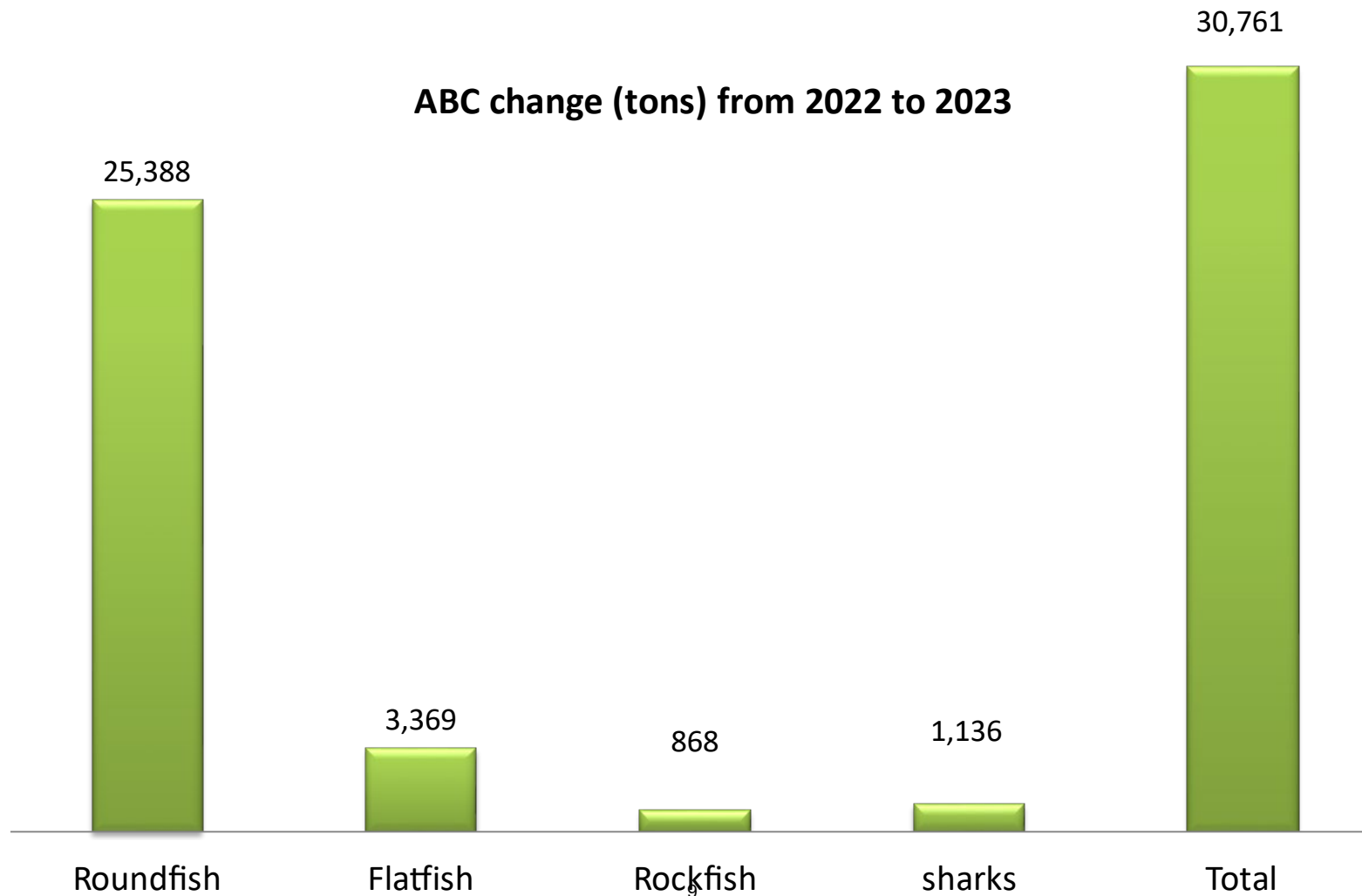
Revenue changes (and source)

2022-2023 ABC change

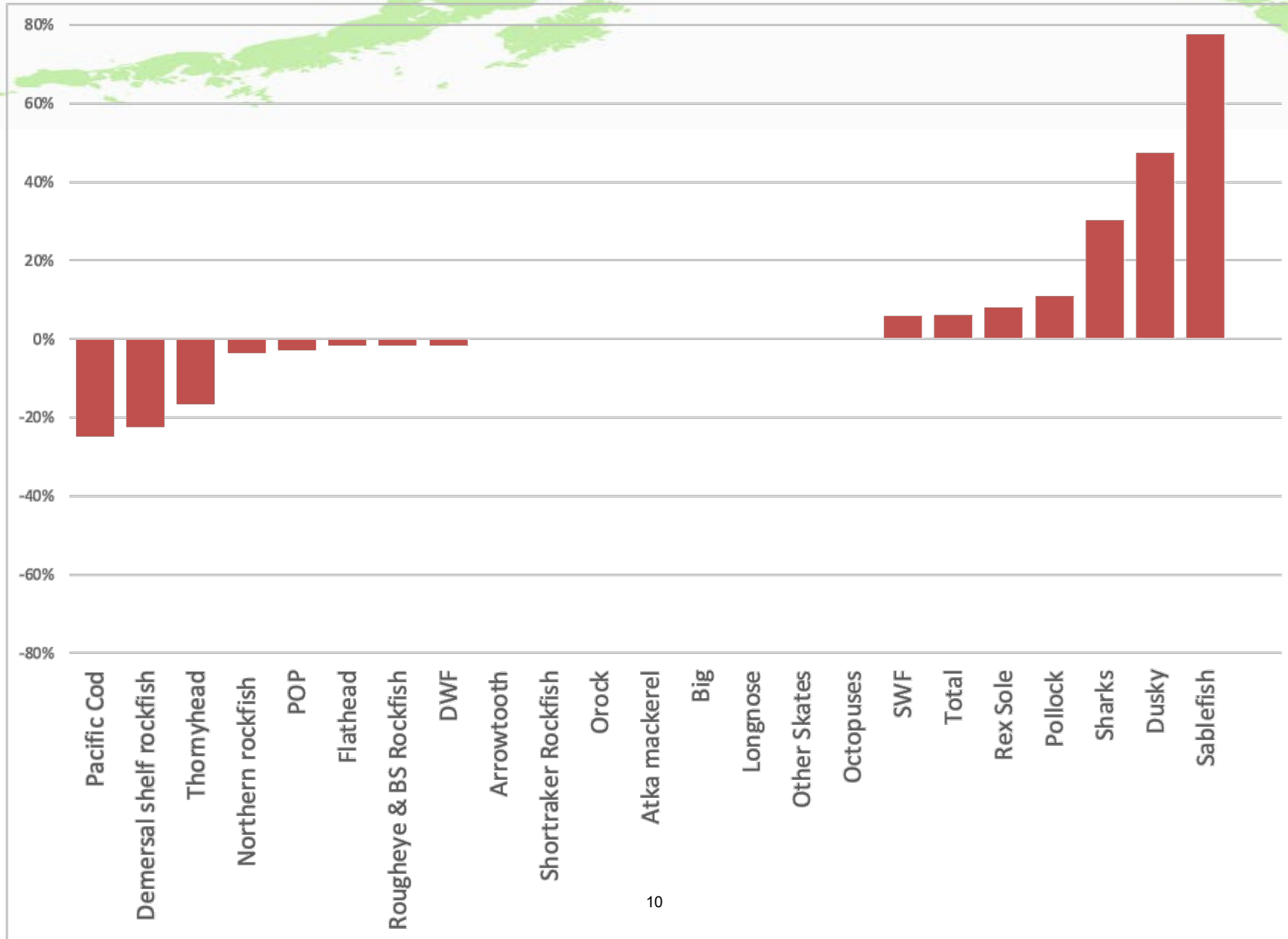


Overall a 6% increase

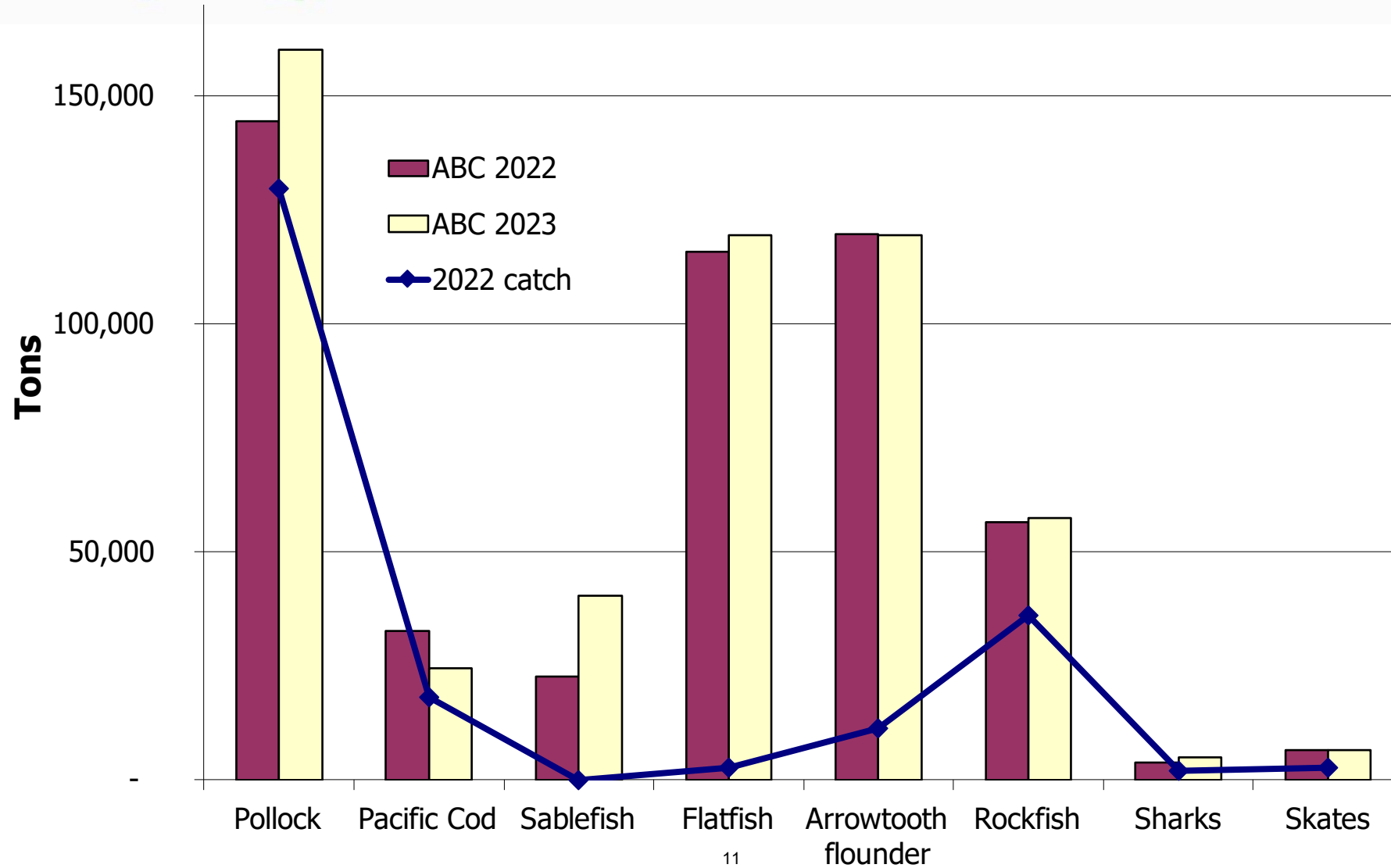
2022-2023 ABC change



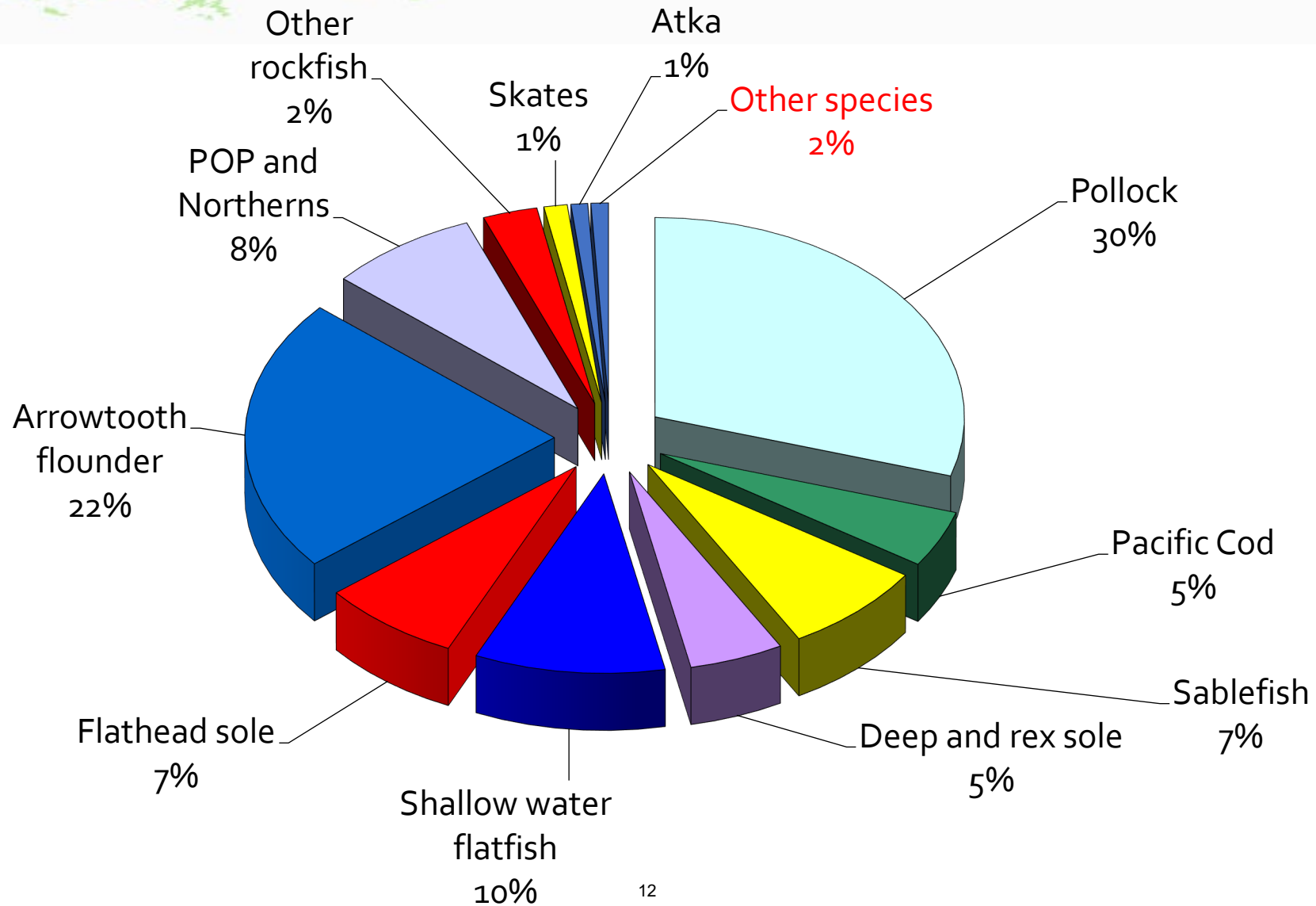
Percentage change in ABC, 2022-2023



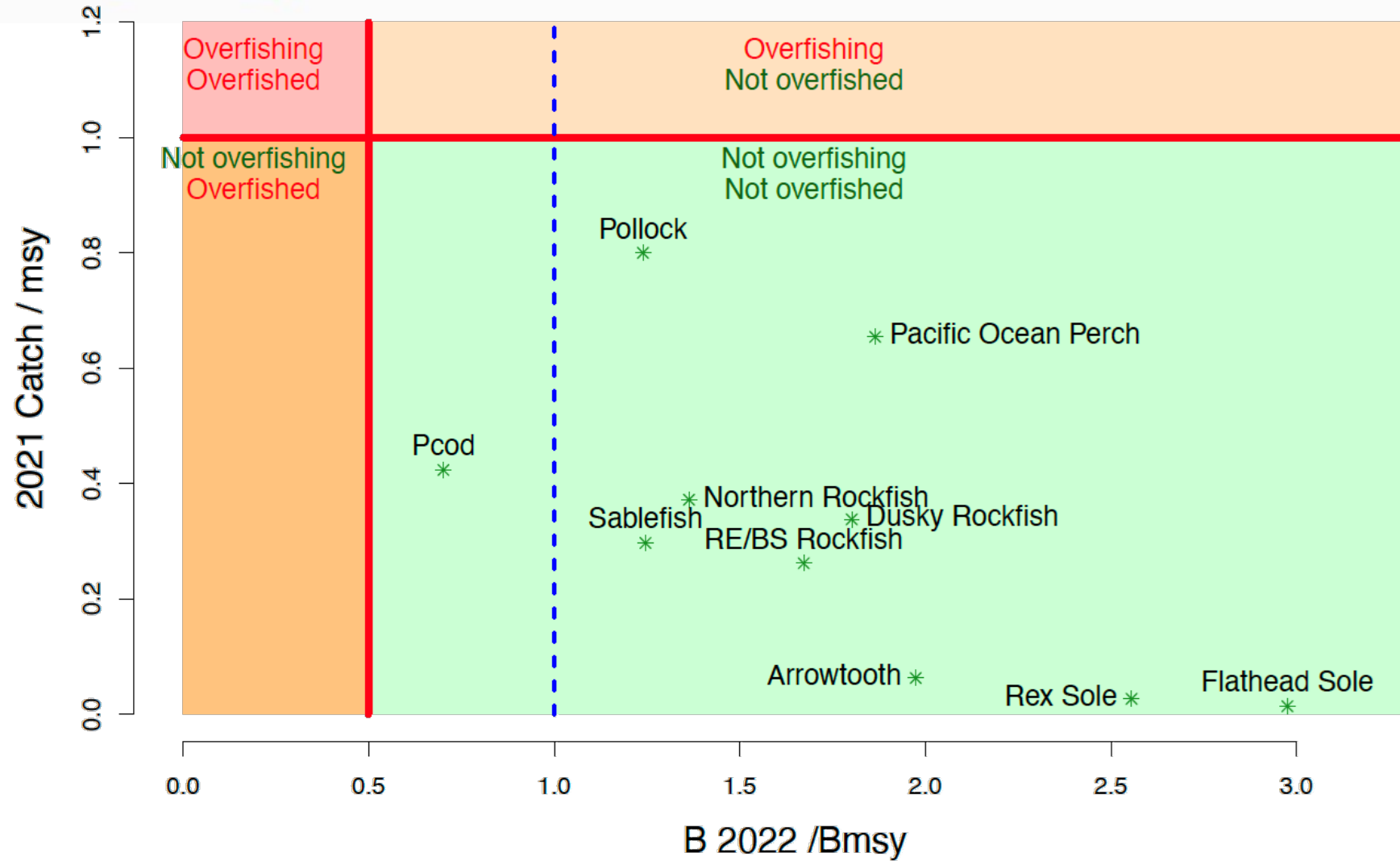
GOA Catch and ABC levels



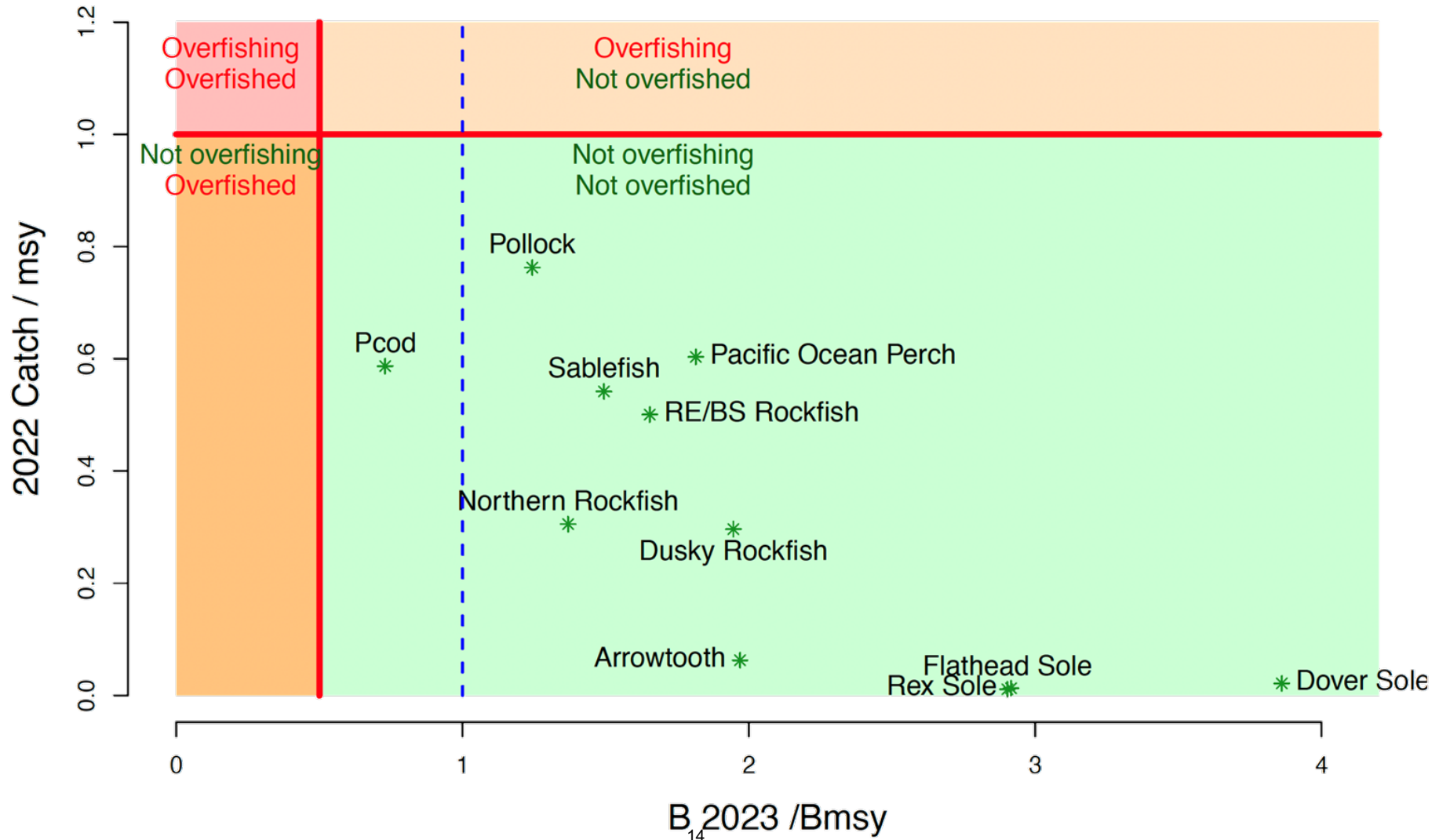
GOA 2023 ABC's: 539,072 t



Stock status summary **last** year



Stock status summary **this** year



Partial assessments in 2022

Stocks

- Pacific ocean perch
- blackspotted/rougheye
- arrowtooth flounder
- rex sole
- shallow water flatfish
(+N & S rock sole)
- deep water flatfish

Each stock was presented as one slide in a draft template approach

Team recommended having:

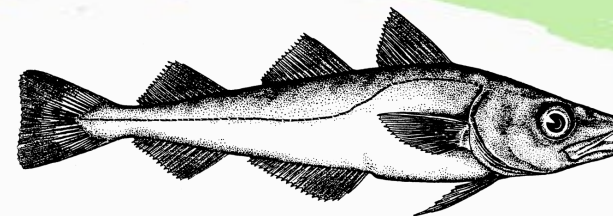
- Summary table for the stock or complex.
- Schedules
(survey, next assessment)
- Next year's spawning stock biomass and trend for tier 1-3 stocks
- Any unusual trends are occurring in the fishery

Species overviews

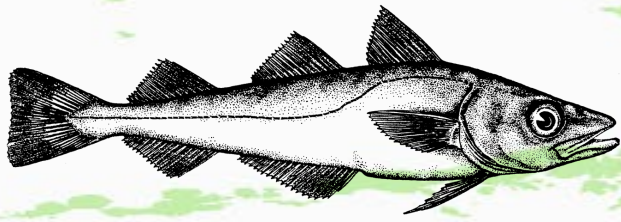
1. 2022 ABC/Catch and recommended changes
2. Highlights
 - New data
 - Analytic approach (changes)
3. Stock status and trend
4. ABC/OFL
 - Tier history and recommendations
 - 2023, 2024 maxABC; recommended ABC

No recommendations below maxABC for 2023 or 2024.

1. GOA Pollock (Full assessment)



Species	2022 catch	ABC 2022	ABC 2023	Change
Pollock	129,876	144,444	160,301	up 15,857 (11%)
Pacific Cod	18,275	32,811	24,634	down 8,177 (25%)
Sablefish	17,531	22,794	40,502	up 17,708 (78%)
Flatfish	2,673	115,834	119,497	up 3,663 (3%)
Arrowtooth flounder	11,456	119,779	119,485	down 294 (0%)
Rockfish	36,055	56,651	57,519	up 868 (2%)
Atka mackerel	880	4,700	4,700	same (0%)
Skates	2,706	6,563	6,563	same (0%)
Sharks	2,112	3,755	4,891	up 1,136 (30%)
Octopus	111	980	980	same (0%)
Total	221,675	508,311	539,072	up 30,761 (6%)



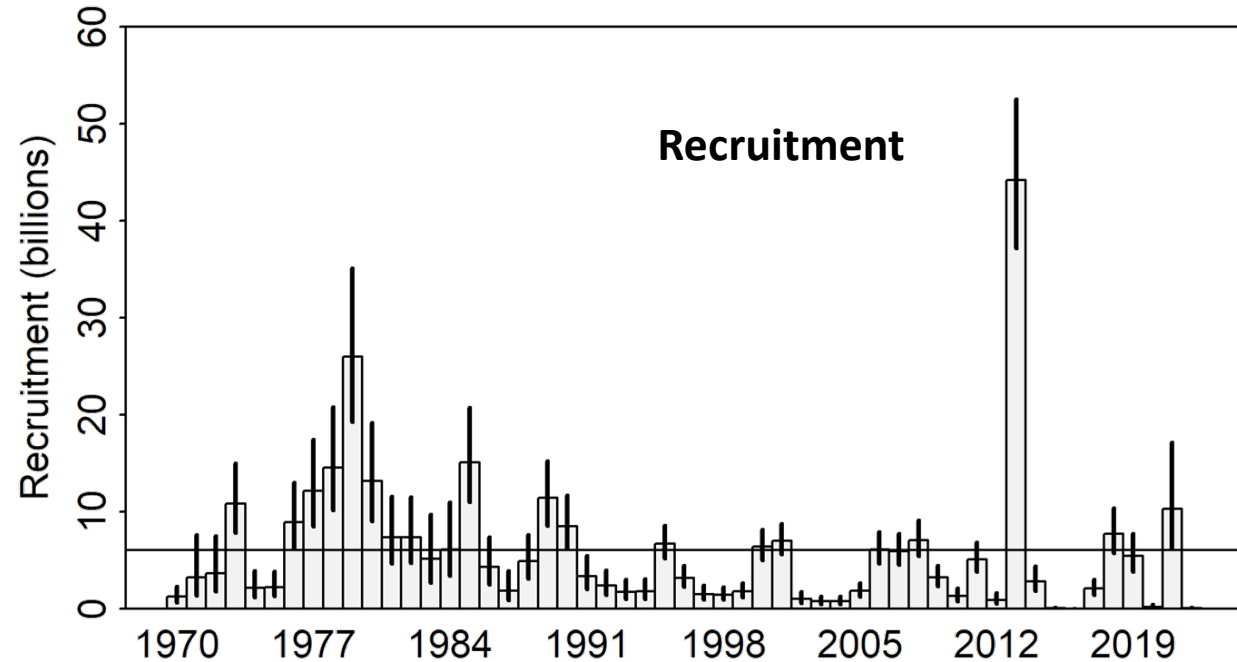
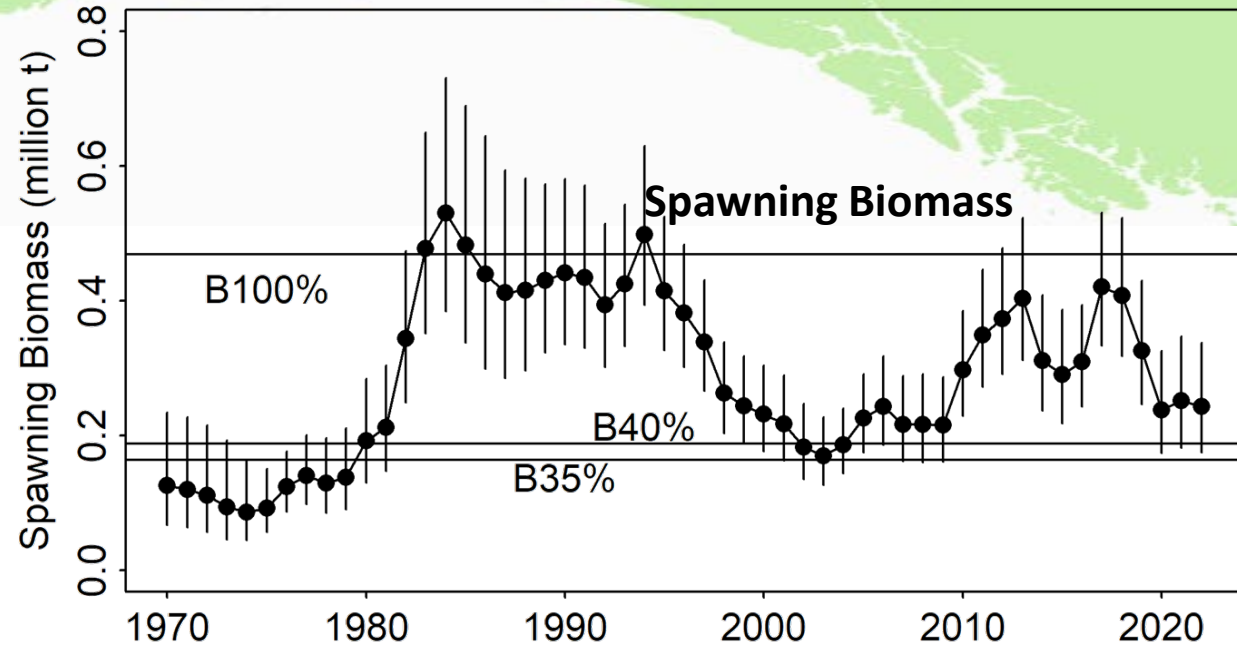
GOA Pollock

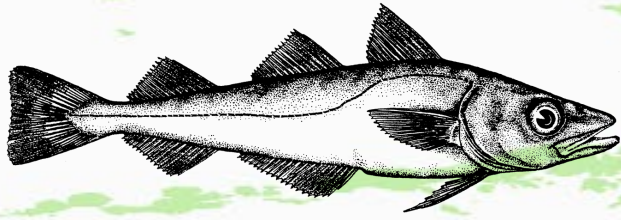
Model Changes

- Summer acoustic selectivity estimated
- $\sigma_R=1.3$ (model 19.1a)

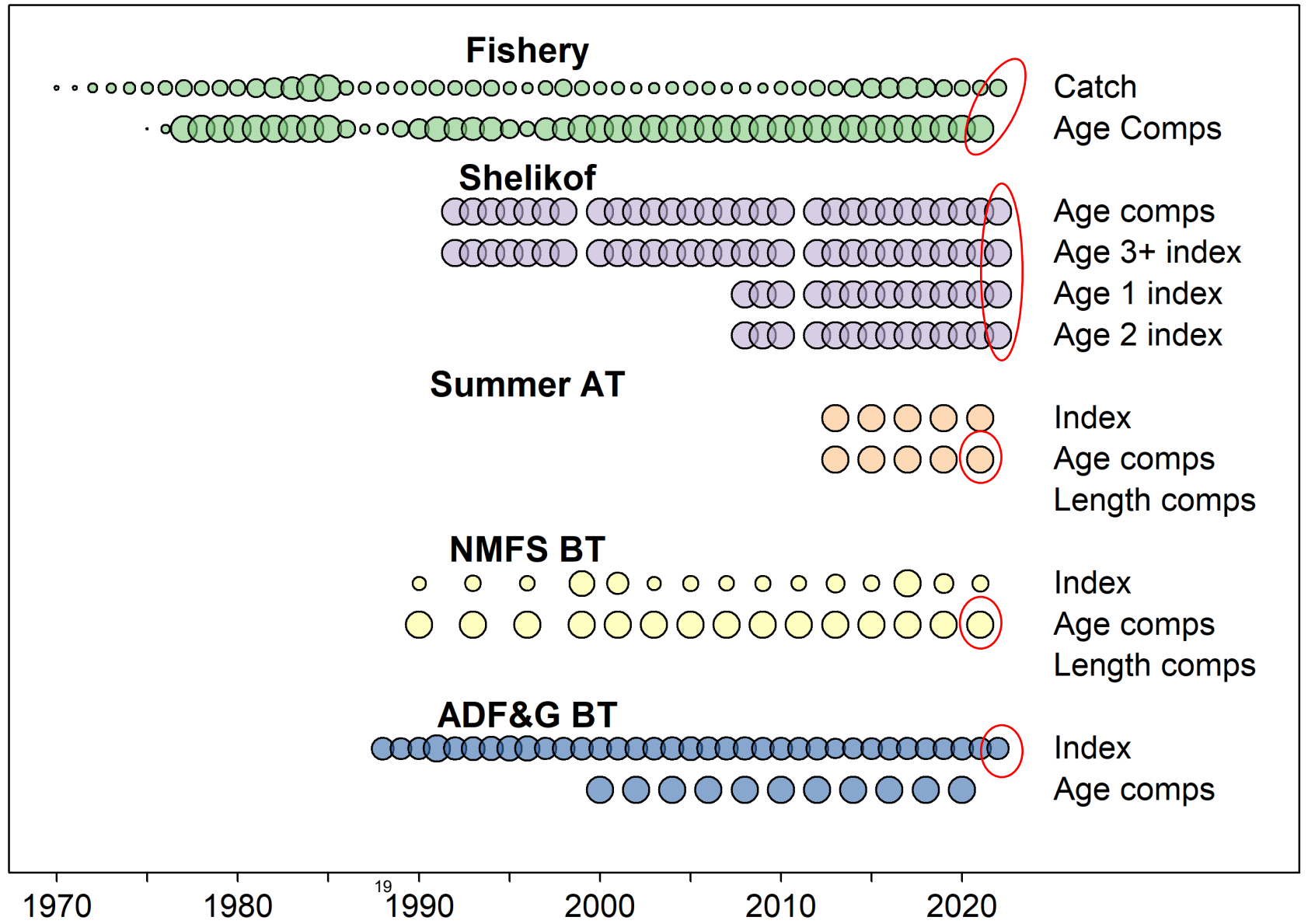
Summary

- Return to normal age diversity w/ decline in 2012 cohort
- Above-average 2017, 2018, 2020 cohorts
- 12% Increase in 2023 ABC: **148,937 t**

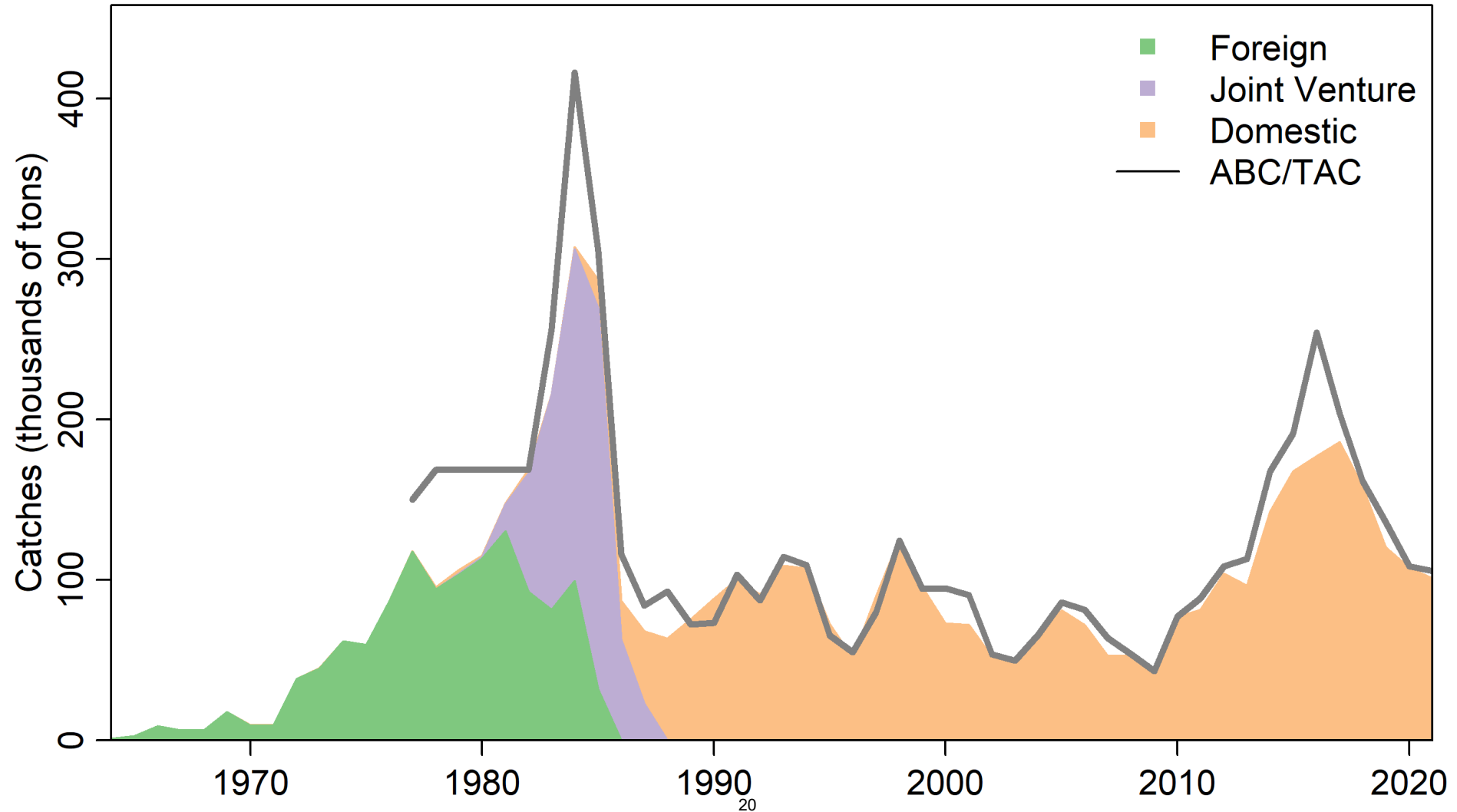
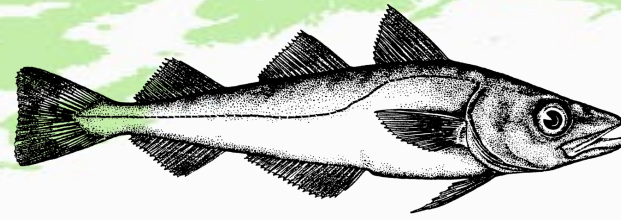




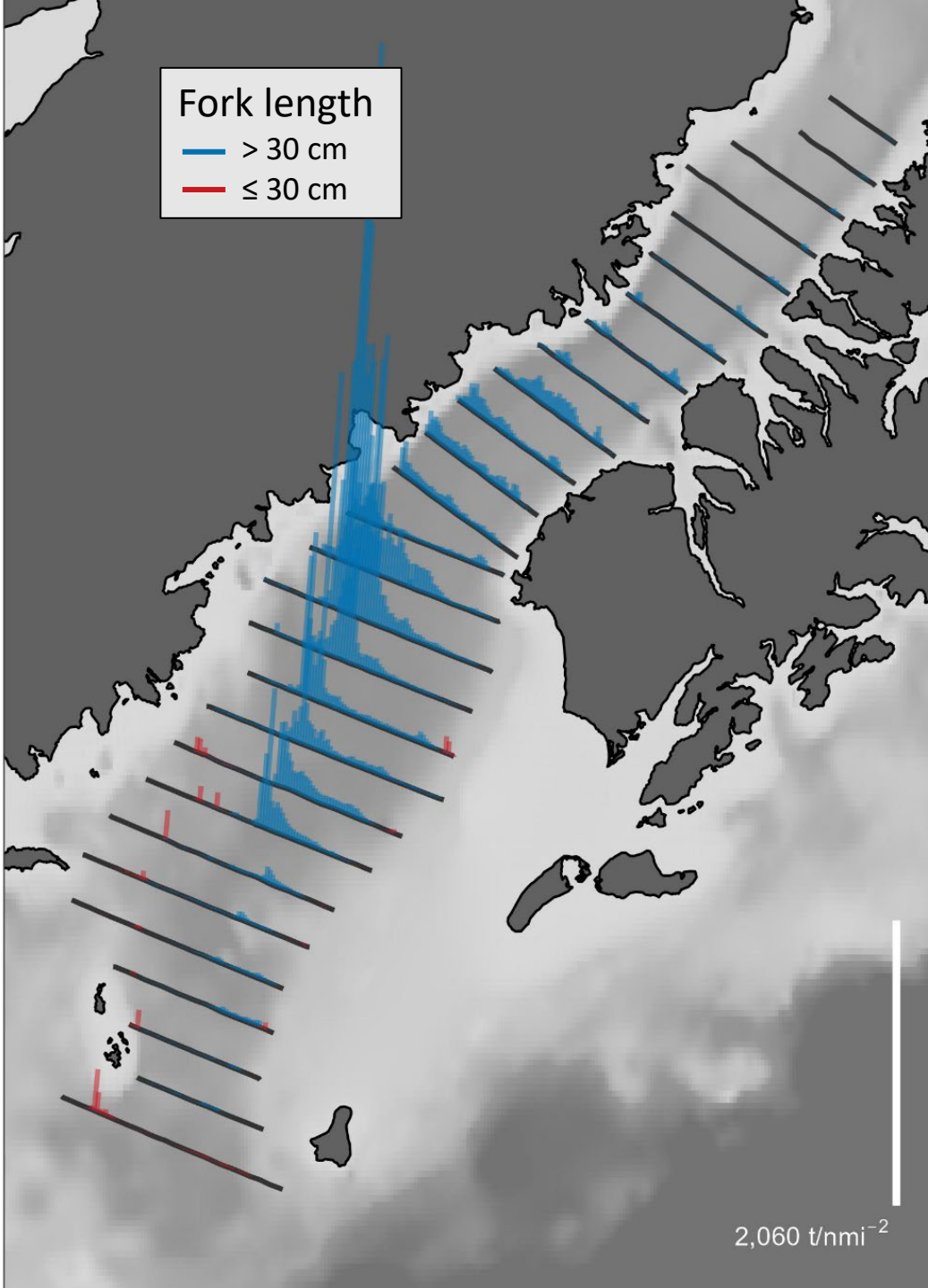
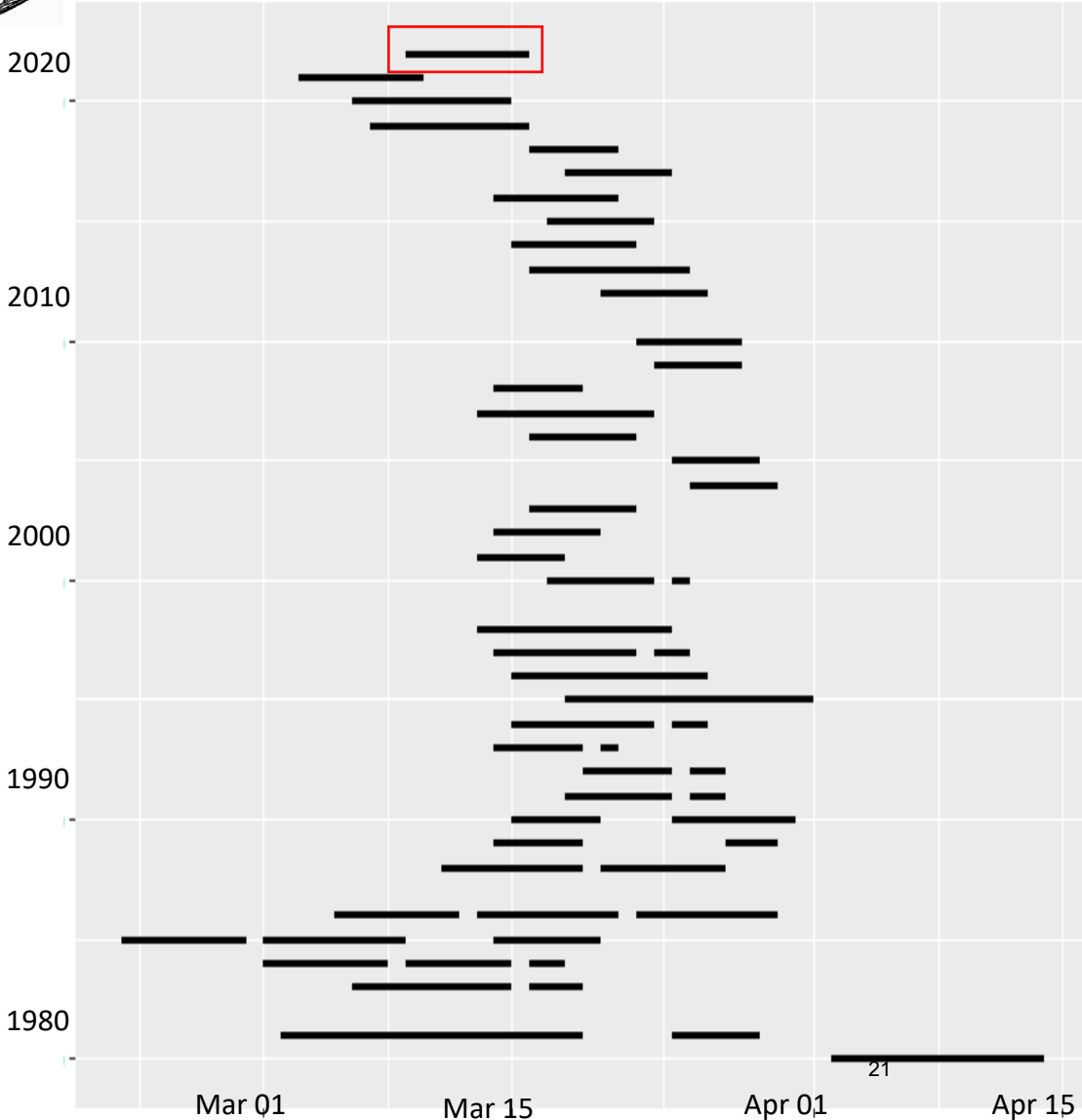
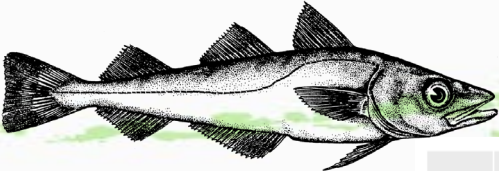
GOA Pollock: Data



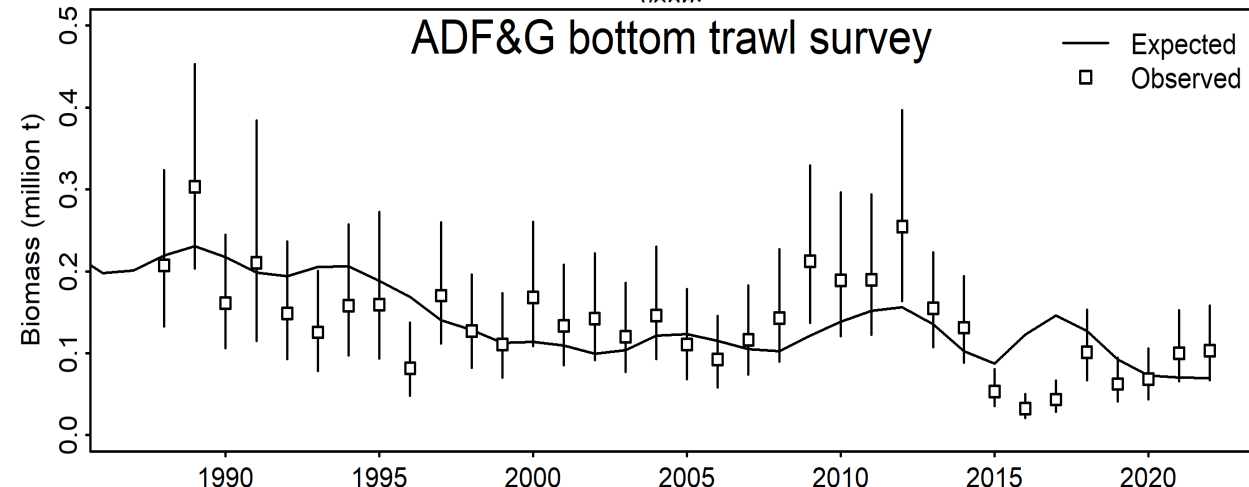
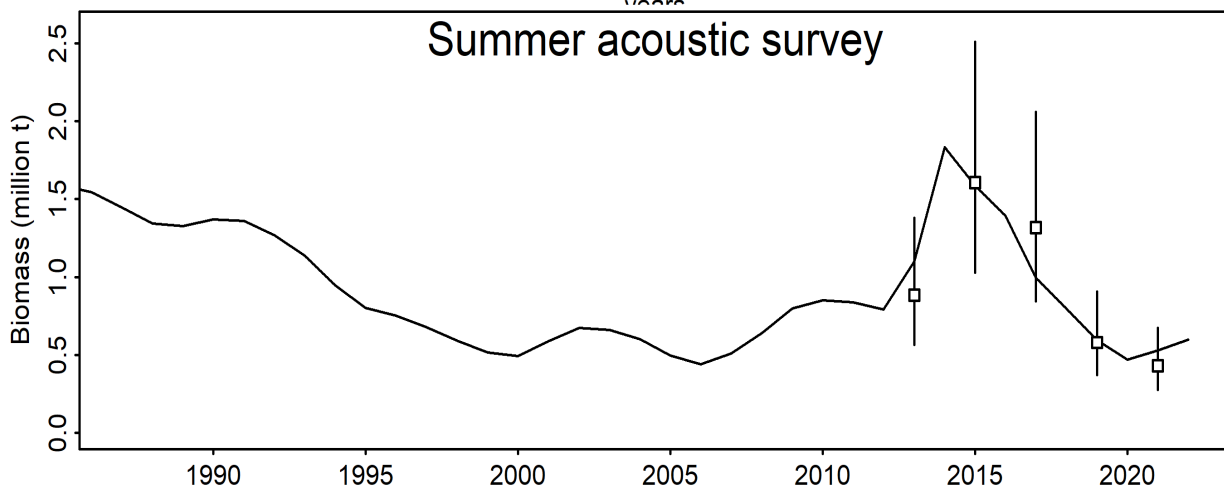
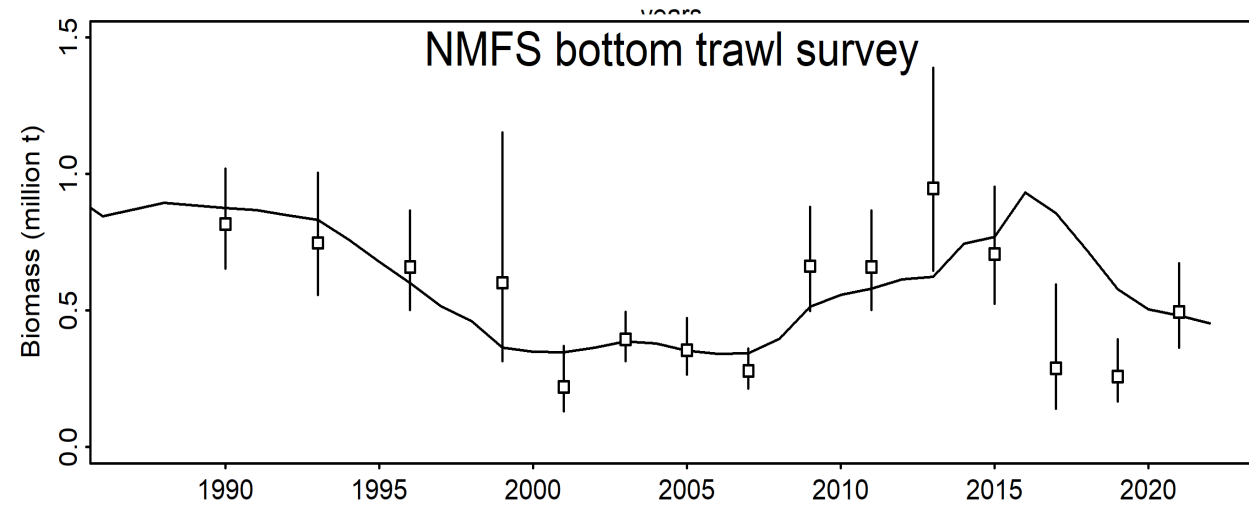
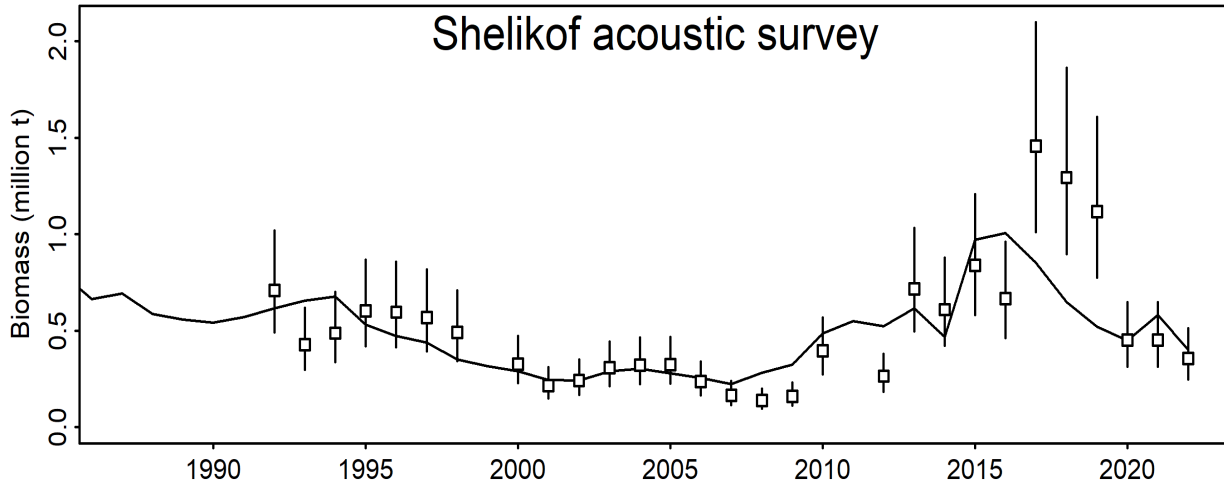
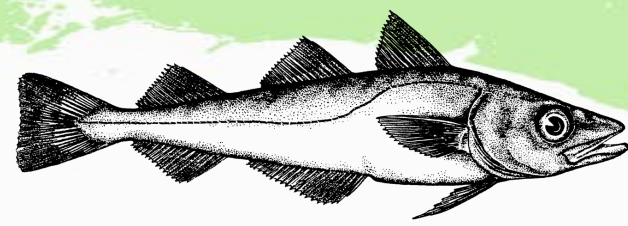
GOA Pollock: Catch



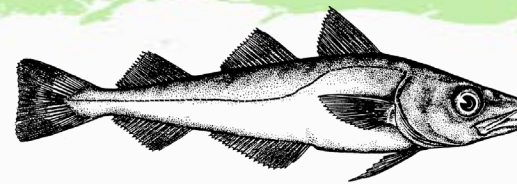
GOA Pollock: 2022 Shelikof Strait pollock AT survey



GOA Pollock: Fits to indices



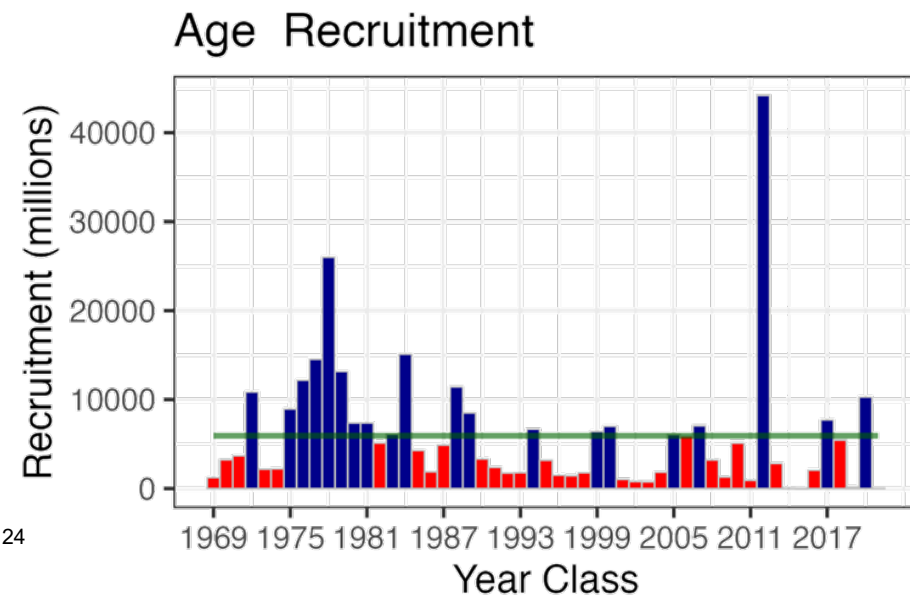
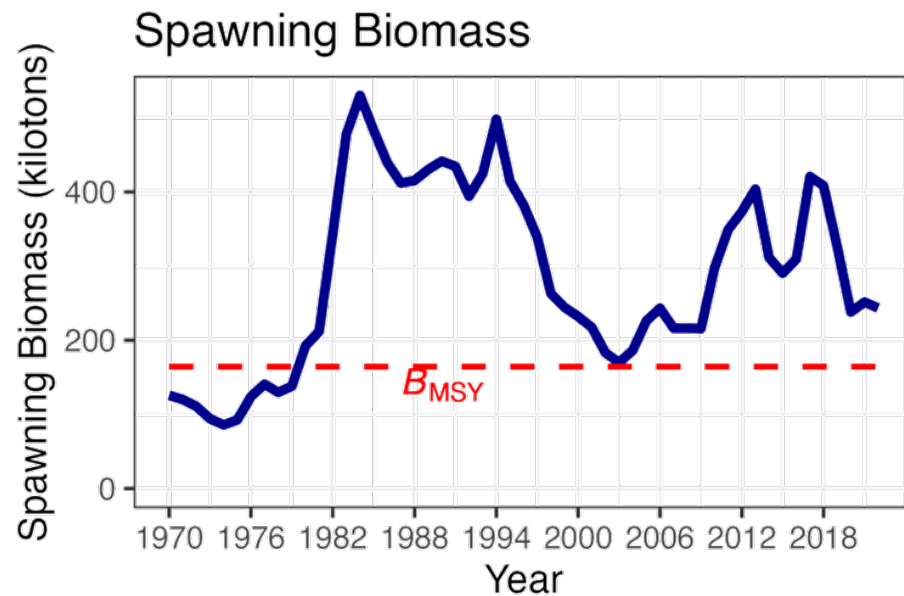
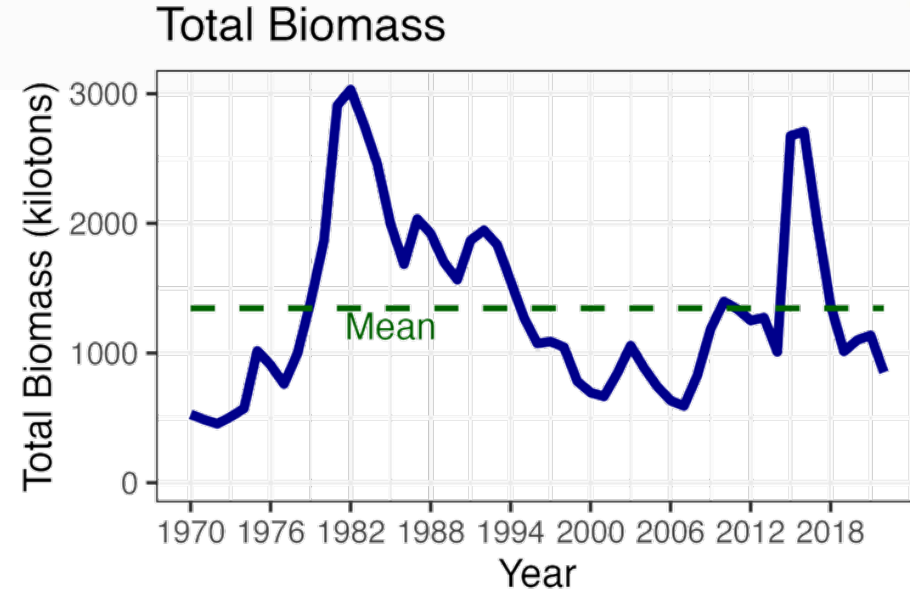
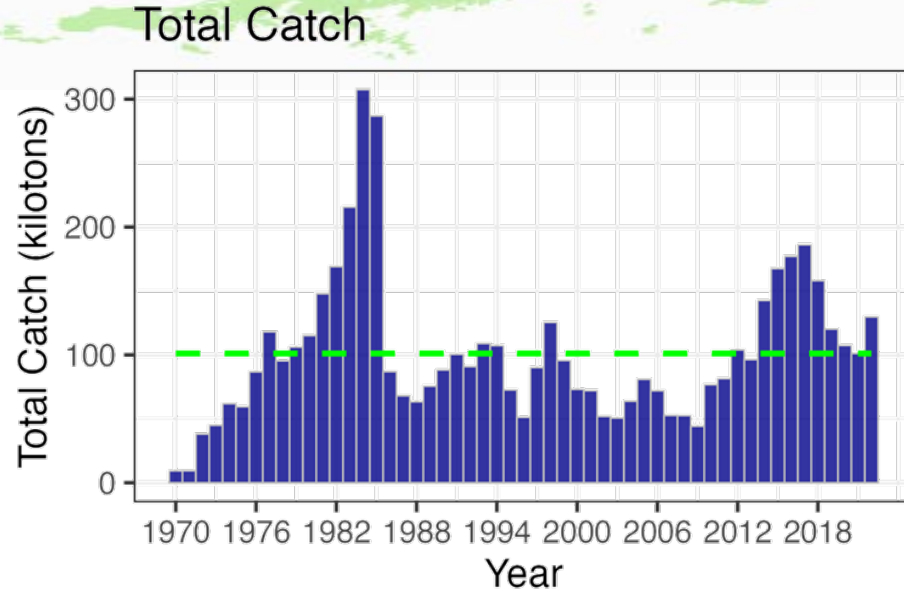
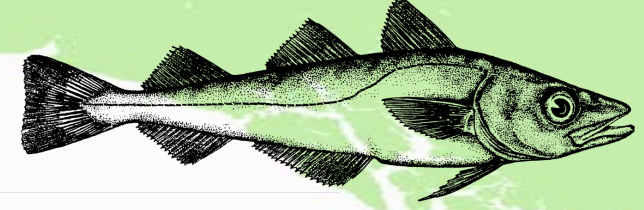
GOA Pollock: Apportionment



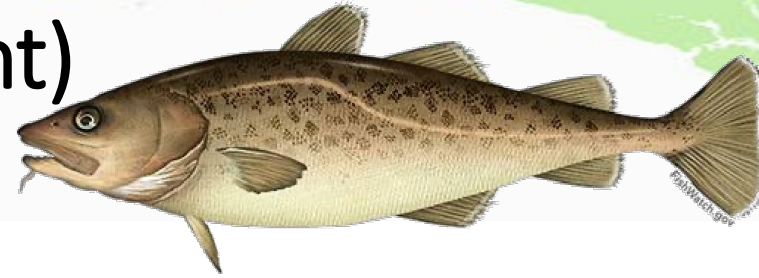
Final 2023 apportionment
if TAC=148,937 t

Area	TAC (t)		Percent	
	Season A	Season B	Season A	Season B
610	1,685	25,272	1.2%	17.4%
620	58,039	18,965	40.0%	13.1%
630	9,121	24,608	6.3%	16.9%
640		7,523		5.2%

GOA Pollock: Overview

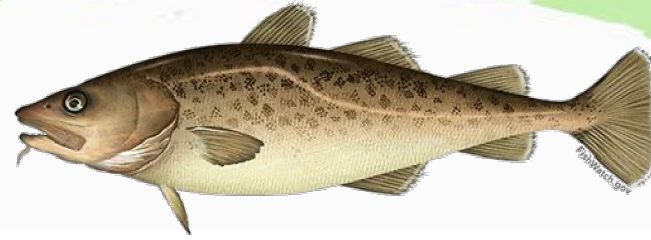


2. GOA Pacific cod (Full assessment)



Species	2022 catch	ABC 2022	ABC 2023	Change
Pollock	129,876	144,444	160,301	up 15,857 (11%)
Pacific Cod	18,275	32,811	24,634	down 8,177 (25%)
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Arrowtooth flounder	11,456	119,779	119,485	down 294 (0%)
Rockfish	36,055	56,651	57,519	up 868 (2%)
Atka mackerel	880	4,700	4,700	same (0%)
Skates	2,706	6,563	6,563	same (0%)
Sharks	2,112	3,755	4,891	up 1,136 (30%)
Octopus	111	980	980	same (0%)
Total	221,675	508,311	539,072	up 30,761 (6%)

GOA Pacific cod: Overview

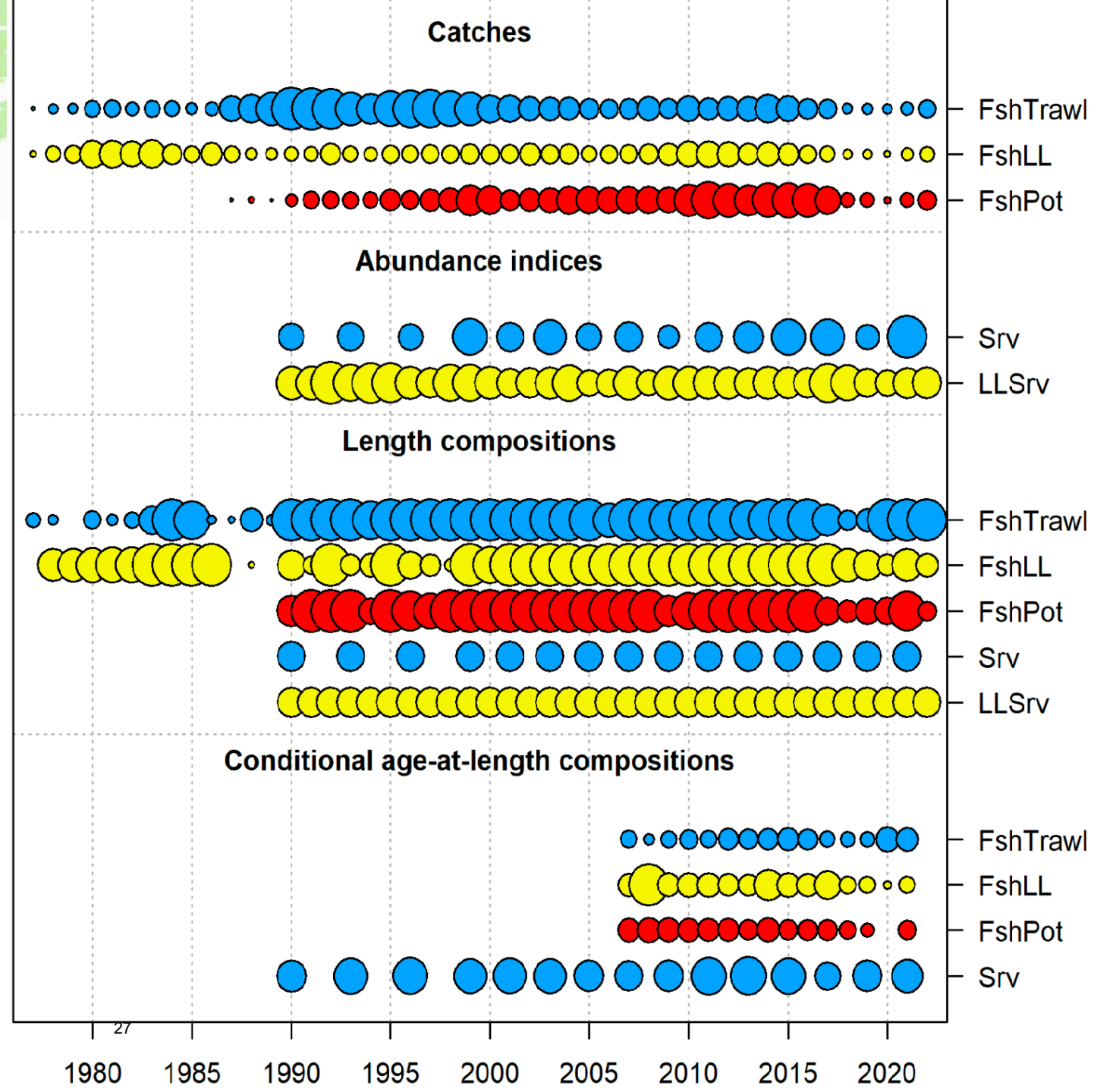
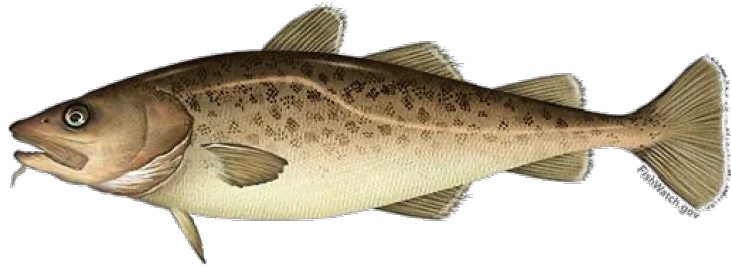


2023 projected spawning biomass to be at *B25.5%*

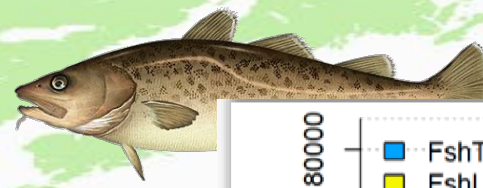
Same model as in 2022, with updated data since 2022

- State catch from 1997-2002 added

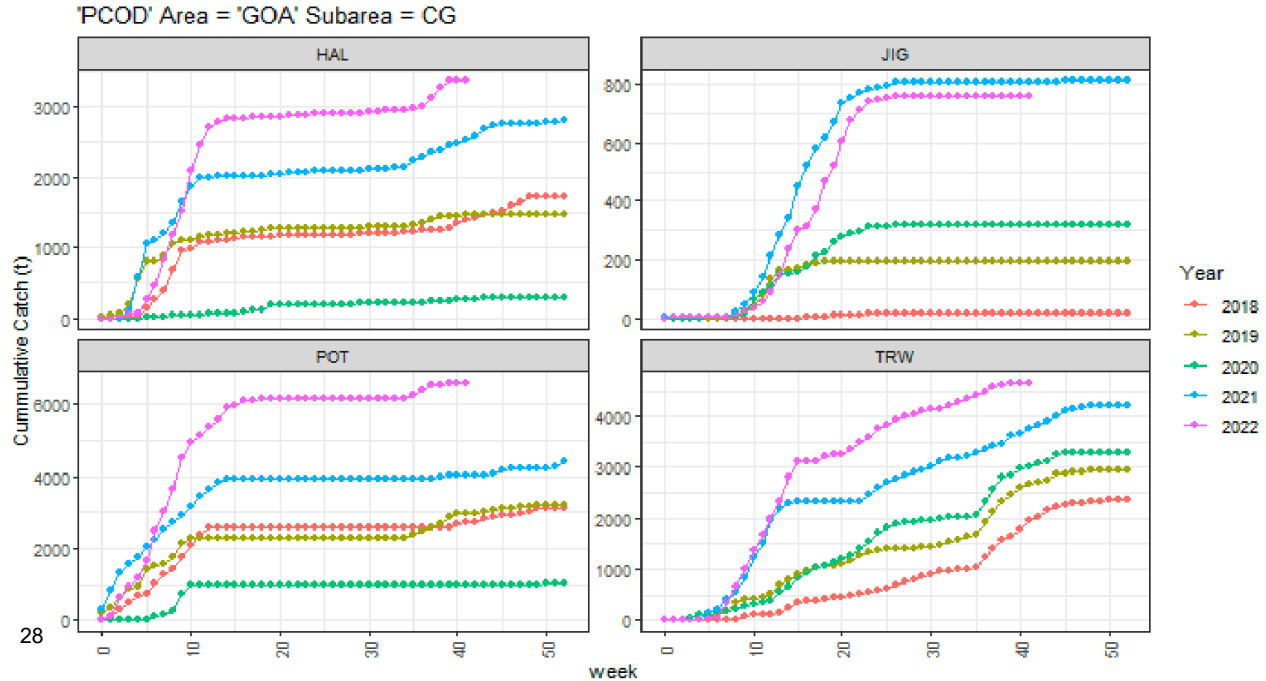
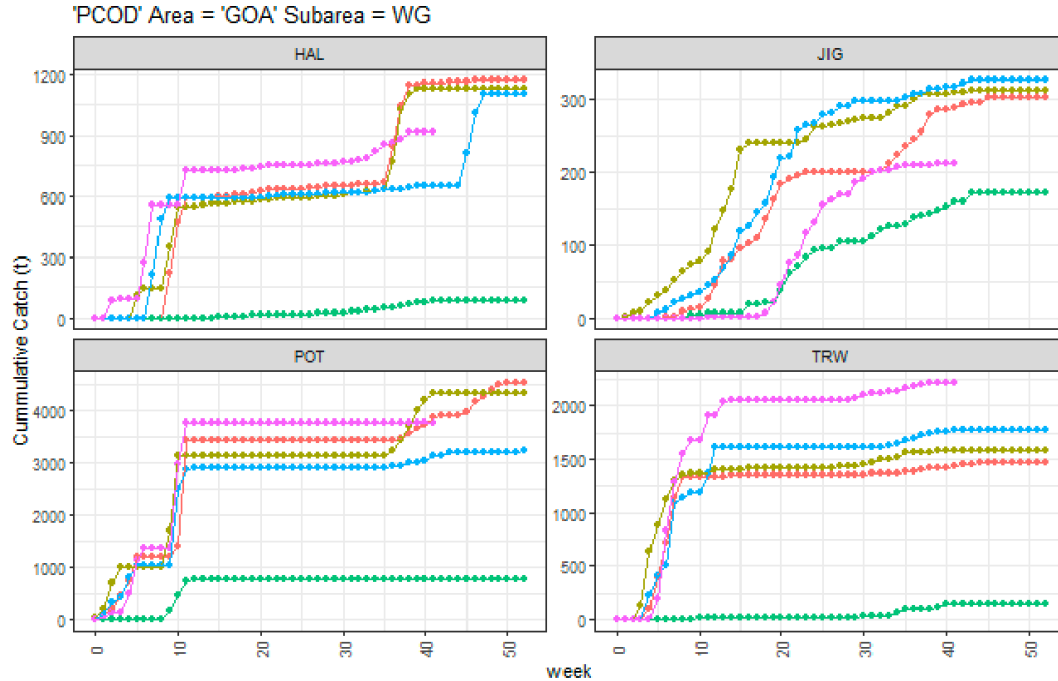
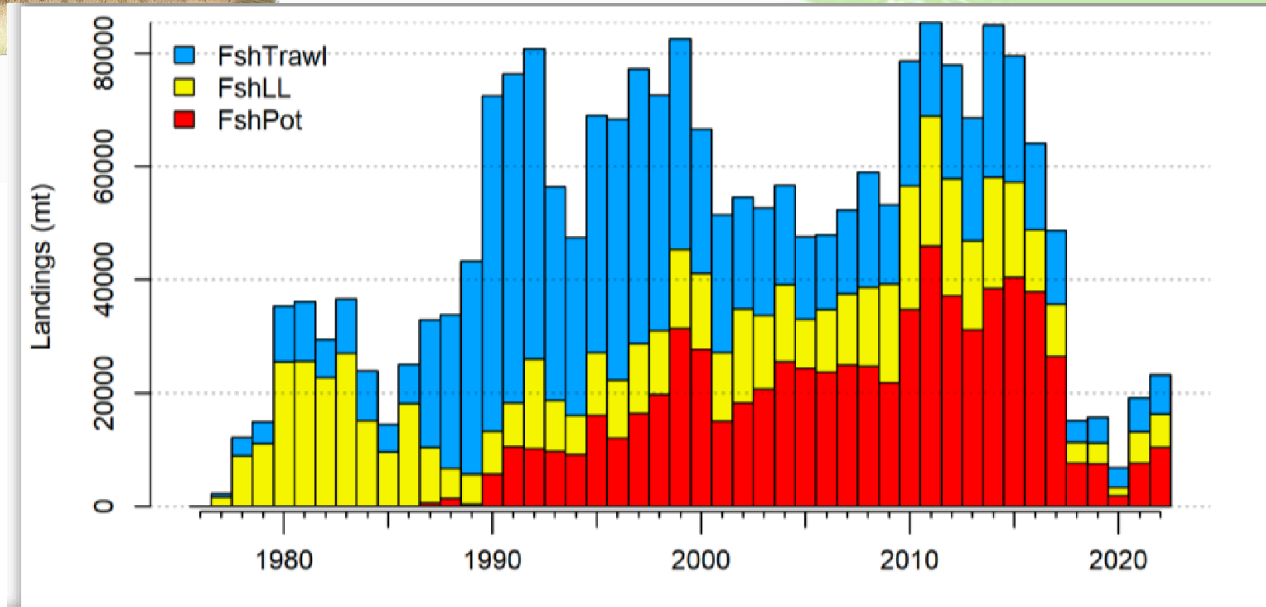
GOA Pacific cod: Data



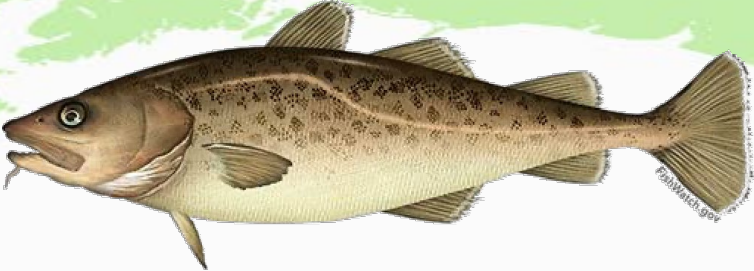
GOA Pacific cod: Catch



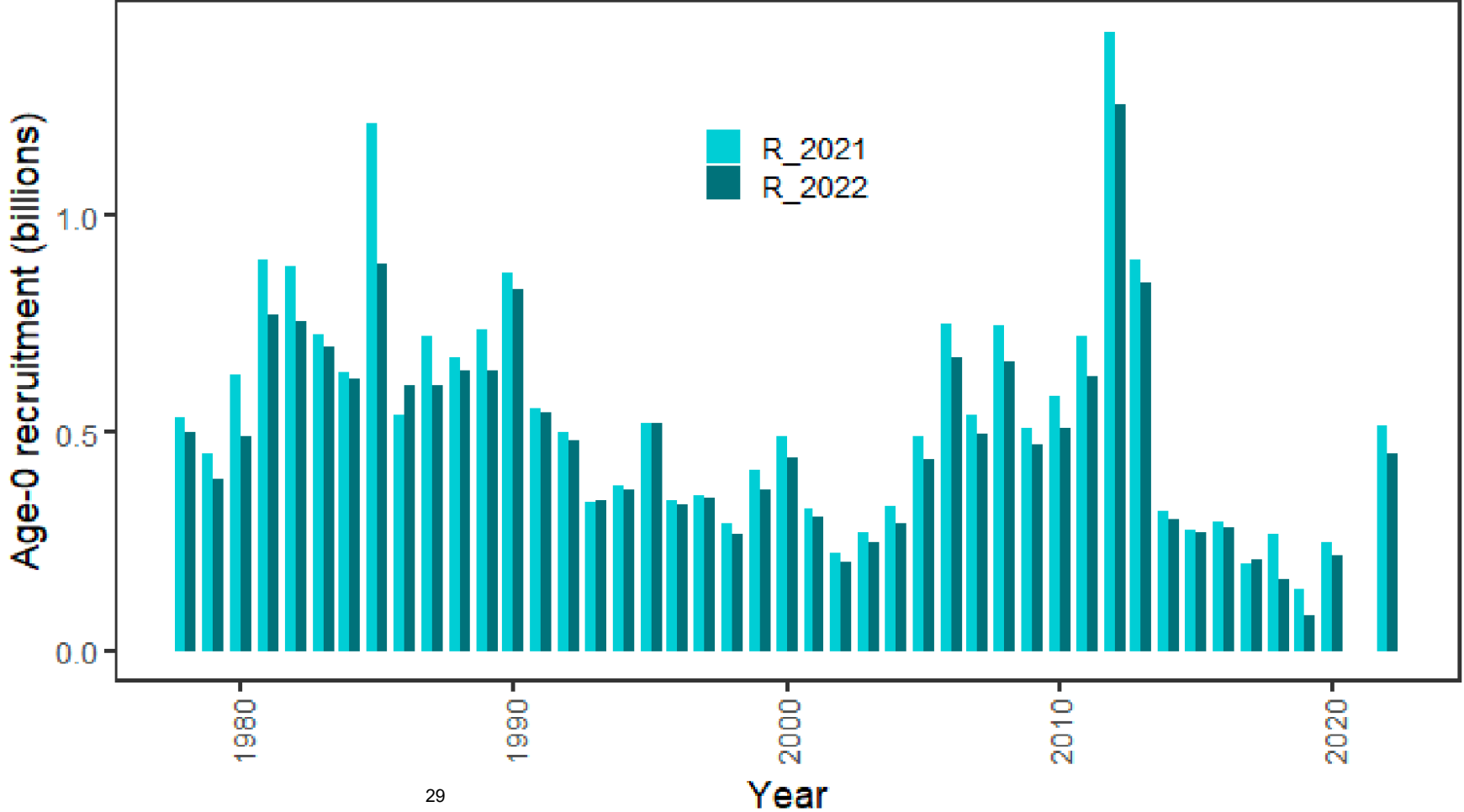
- Increased since 2021
- Pot majority > Trawl > LL
- CG greatest increase compared to last year



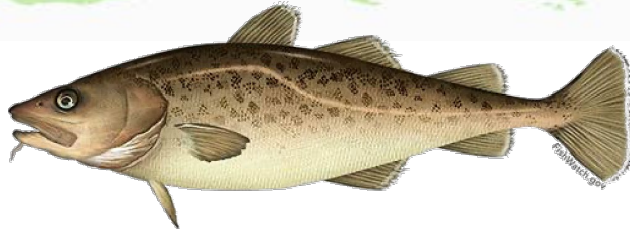
GOA Pacific cod



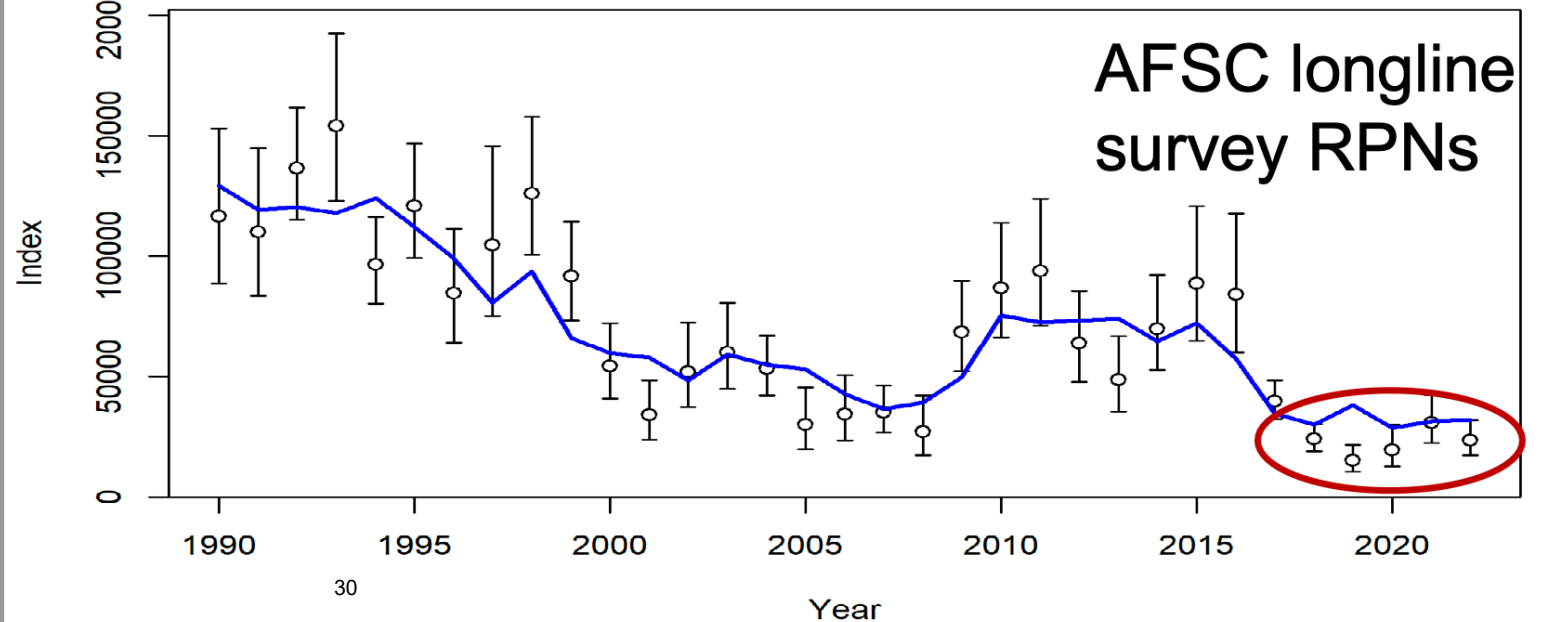
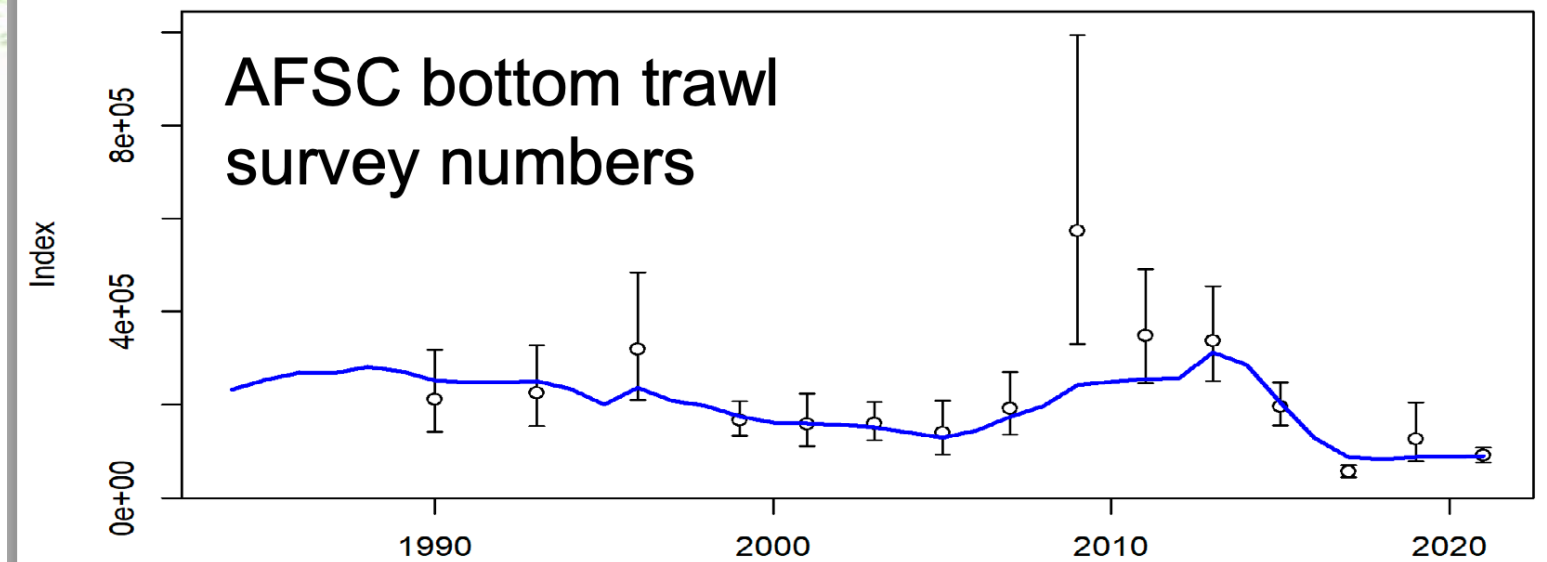
Population scale shifted downwards from 2021 assessment



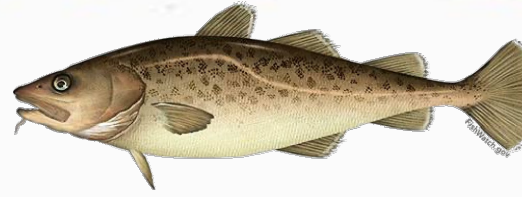
GOA Pacific cod



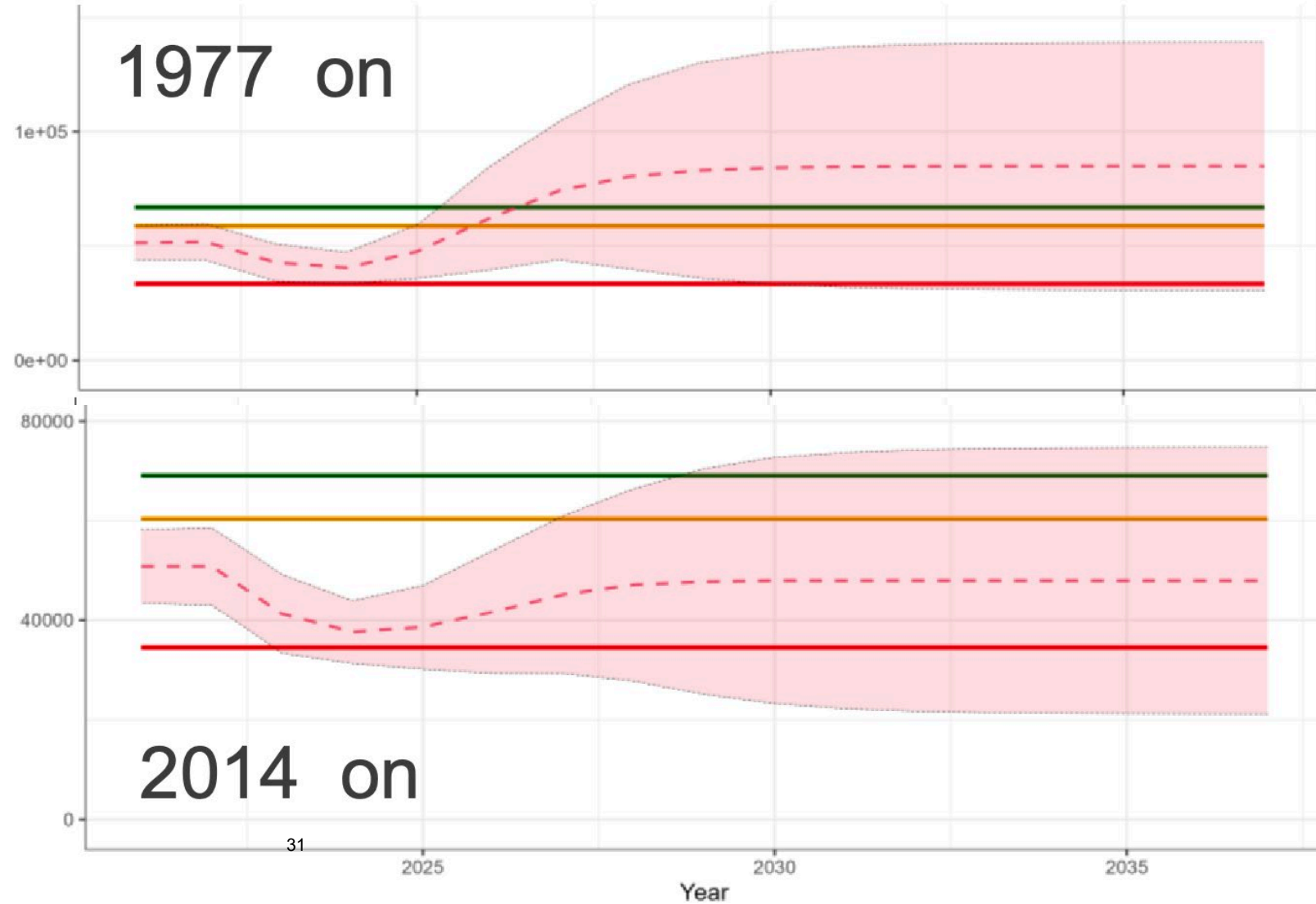
- Continuing to fit 2021 trawl survey precisely
- Expecting larger RPN from longline survey in 4 of last 5 years



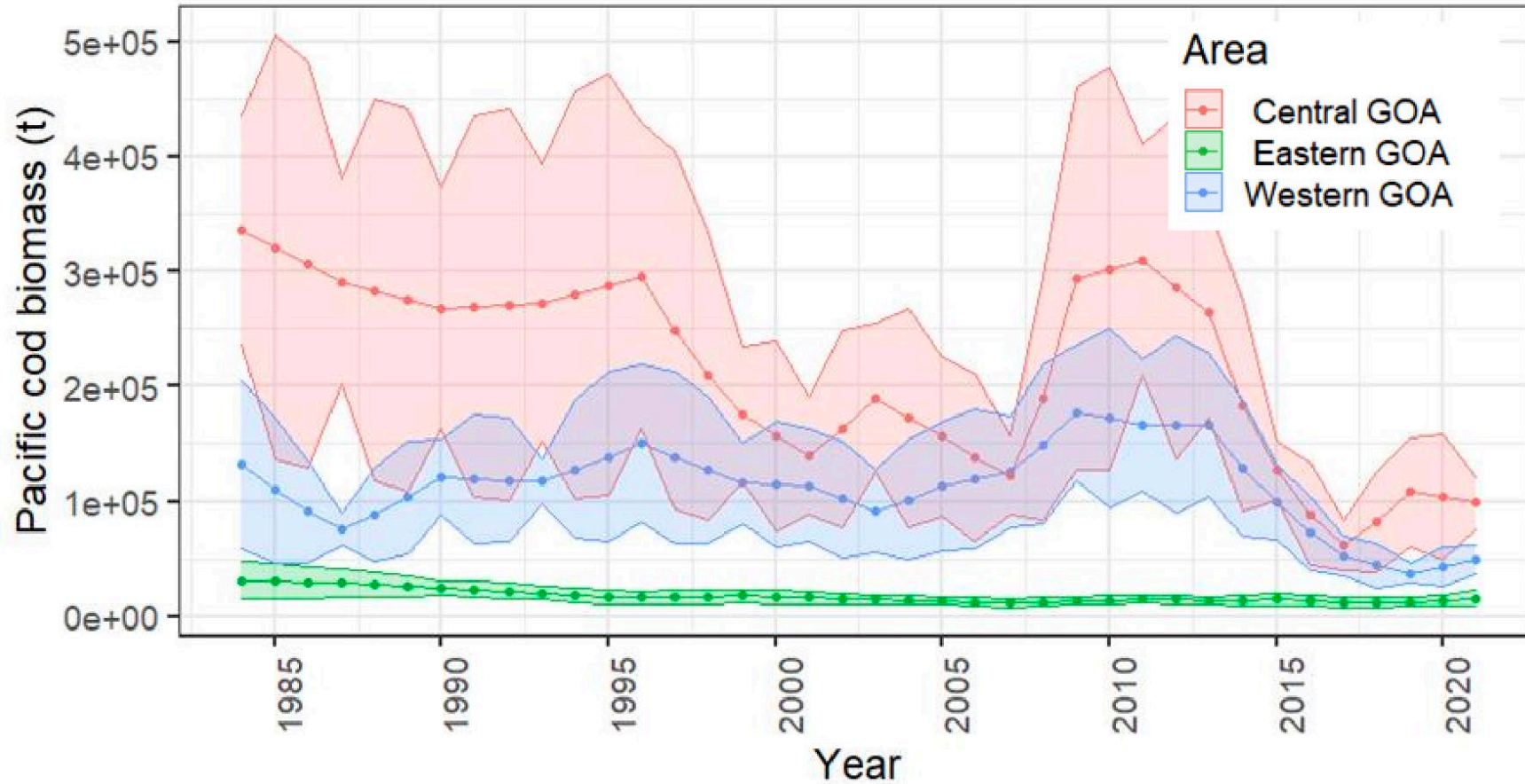
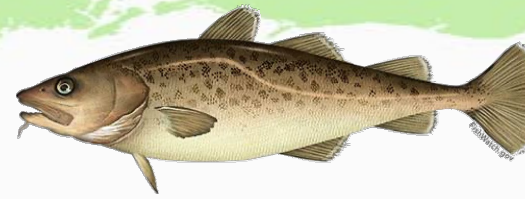
GOA Pacific cod



Projection impact of recruitment series

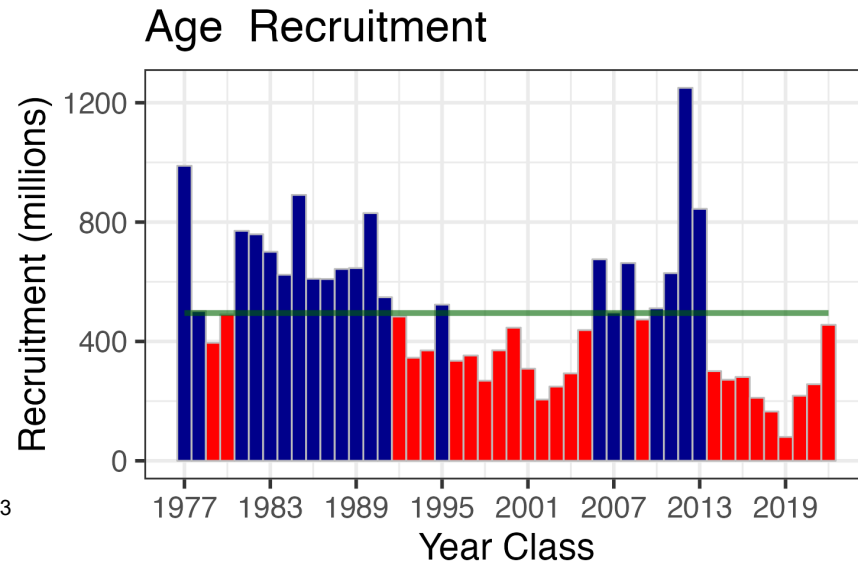
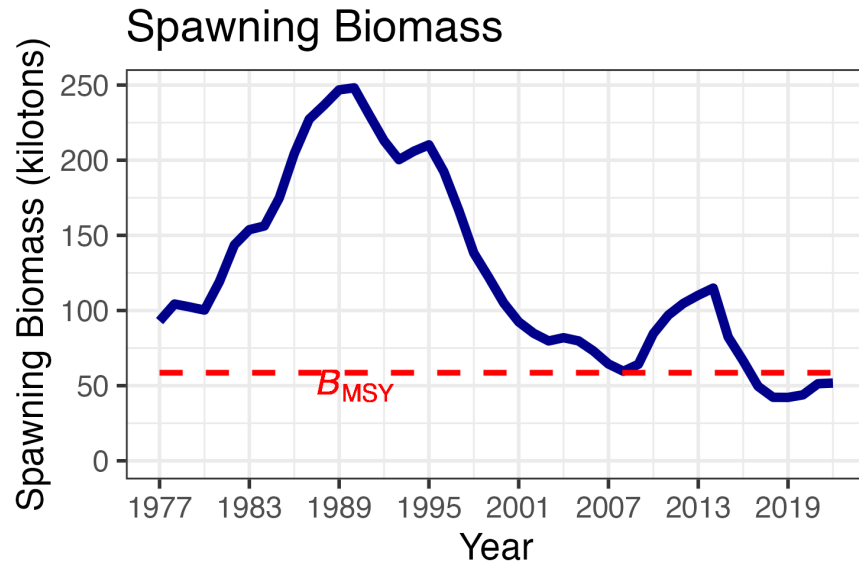
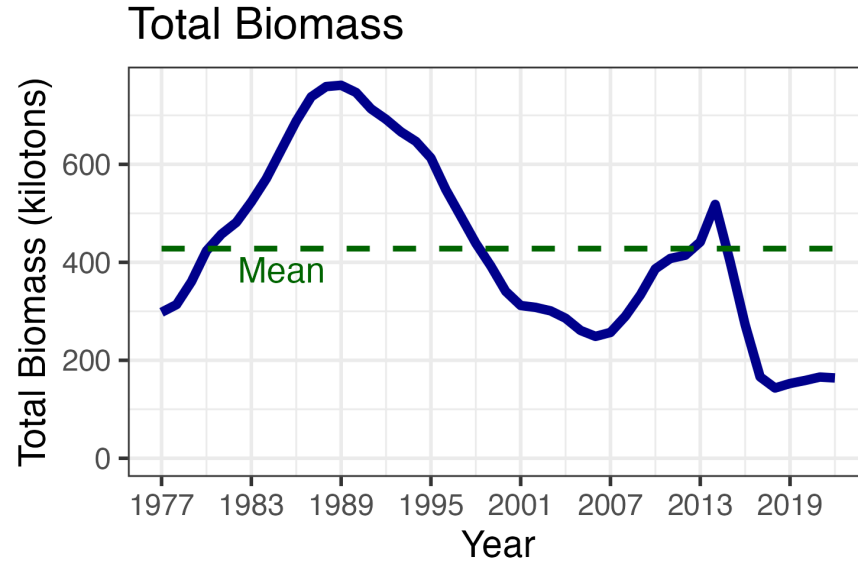
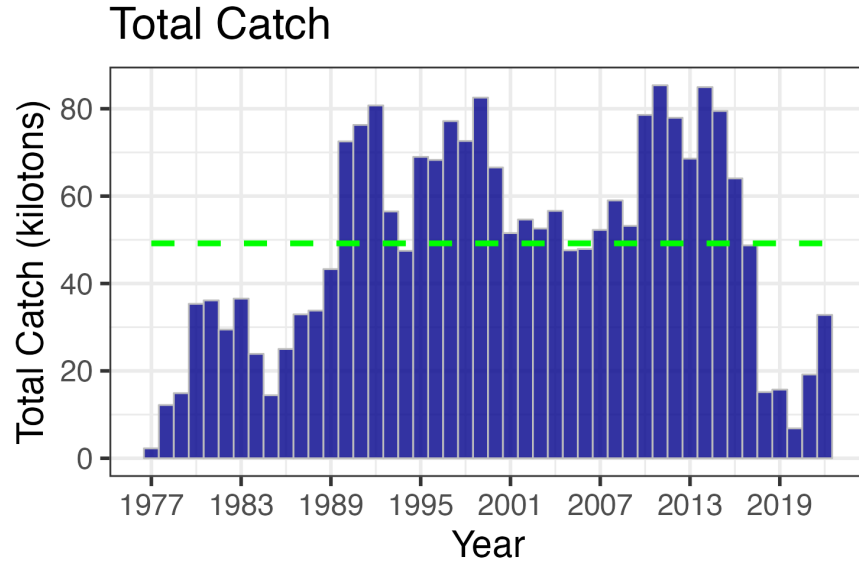
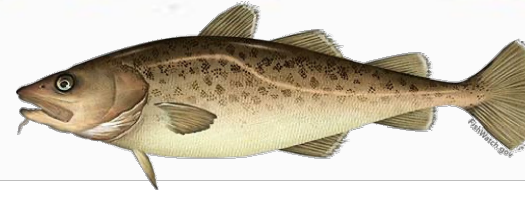


GOA Pacific cod: Apportionment



	Western	Central	Eastern	Total
Random effects area apportionment	30.3%	60.2%	9.5%	100%
2023 ABC	7,464	14,830	2,340	24,634
2024 ABC	6,873	13,655	2,155	22,683

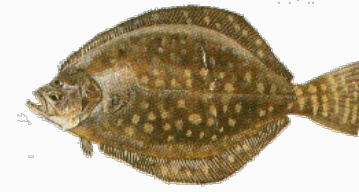
GOA Pacific cod: Overview



3. Sablefish: Covered in Joint Team

Method	Area						ABC
	AI	BS	WG	CG	WY*	EY*	
<i>2022 ABC⁺</i>	6,486	5,305	3,821	10,008	3,179	6,064	34,863
<i>Status Quo (Fixed at Current)**</i>	7,650	6,231	4,411	11,795	4,069	6,705	40,861
<i>Fixed***</i>	5,392	3,987	4,408	13,939	4,689	8,446	40,861
<i>25% Stair Step</i>	6,558	5,475	4,450	12,616	4,116	7,646	40,861
<i>50% Stair Step</i>	7,725	6,963	4,492	11,294	3,543	6,844	40,861
<i>75% Stair Step****</i>	8,892	8,450	4,533	9,972	2,970	6,044	40,861
<i>5-year Survey Avg.[^]</i>	10,058	9,938	4,575	8,650	2,397	5,243	40,861
<i>2024 ABC^{\$}</i>	10,308	10,185	4,688	8,865	2,457	5,373	41,876

Flatfish ABC Summary



Species	2022 catch	ABC 2022	ABC 2023	Change
Pollock	129,876	144,444	160,301	up 15,857 (11%)
Pacific Cod	18,275	32,811	24,634	down 8,177 (25%)
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Total	221,675	508,311	539,072	up 30,761 (6%)

Flatfish ABC's

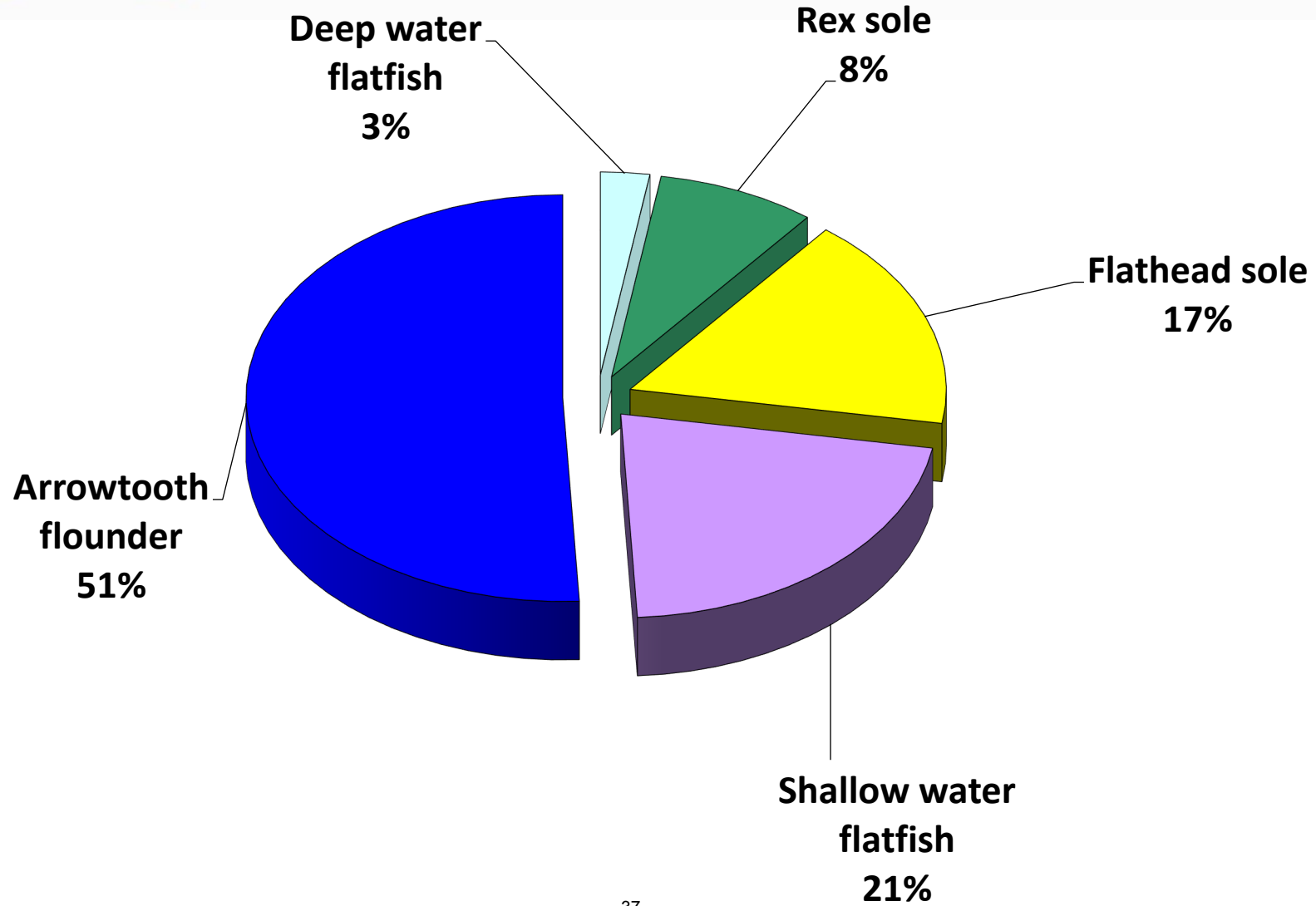
Species	2022 ABC	2023 ABC	Change
Shallow water flatfish	50,610	53,537	up 2,927 (6%)
Rex sole	19,141	20,664	up 1,523 (8%)
Deep water flatfish	5,908	5,816	down 92 (2%)
Flathead sole	40,175	39,480	down 695 (2%)
Arrowtooth flounder	119,779	119,485	down 294 (0%)
Subtotal	235,613	238,982	up 3,369 (1%)
Subtotal (without ATF)	115,834	119,497	up 3,663 (3%)

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

Shallow water flats: N and S rock sole ³⁸ Tier 3, others Tier 5

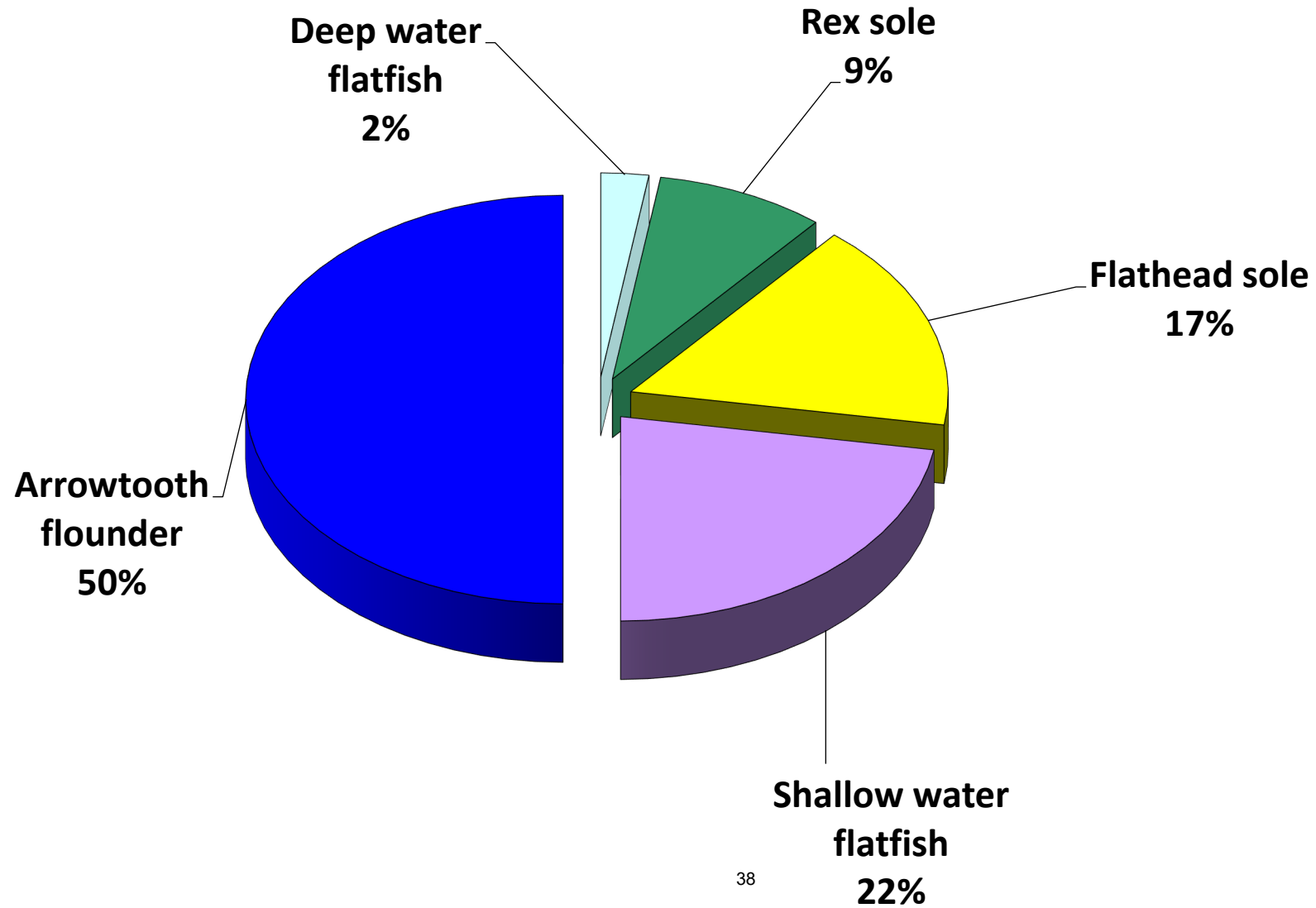
Flatfish 2022 ABC's

235,613 t combined



Flatfish 2023 ABC's

238,982 t combined



Flatfish ABC's

Species	2022 ABC	2023 ABC	Change
Shallow water flatfish	50,610	53,537	up 2,927 (6%)
Rex sole	19,141	20,664	up 1,523 (8%)
Deep water flatfish	5,908	5,816	down 92 (2%)
Flathead sole	40,175	39,480	down 695 (2%)
Arrowtooth flounder	119,779	119,485	down 294 (0%)
Subtotal	235,613	238,982	up 3,369 (1%)
Subtotal (without ATF)	115,834	119,497	up 3,663 (3%)

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

4. Shallow-water flatfish: Catch

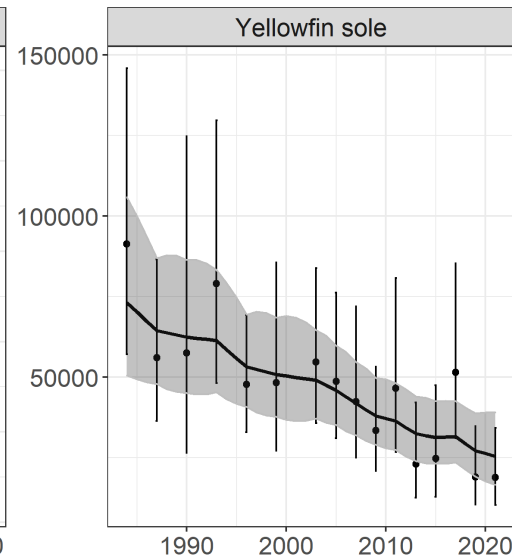
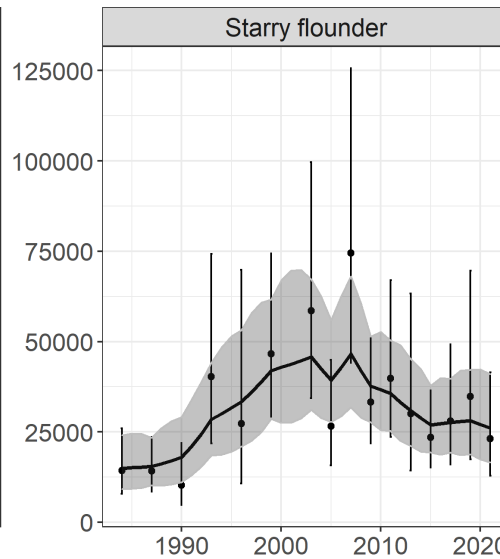
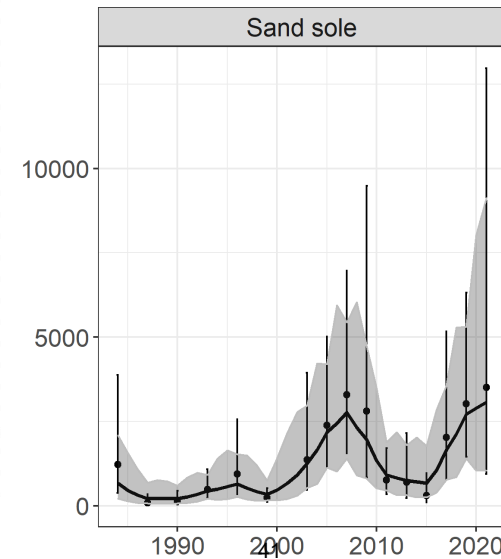
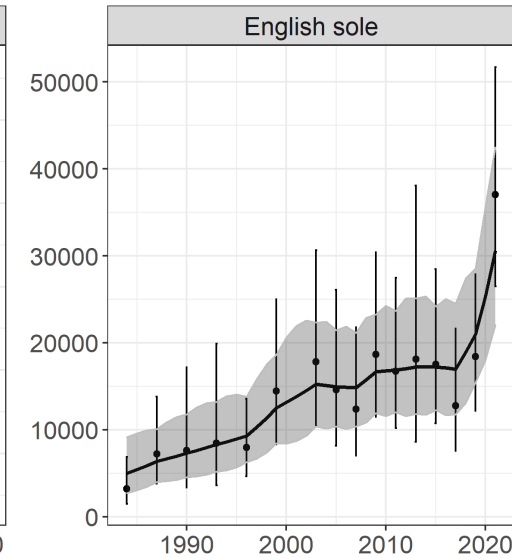
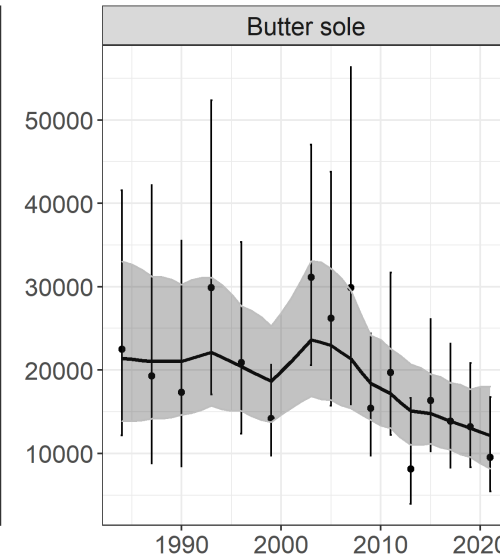
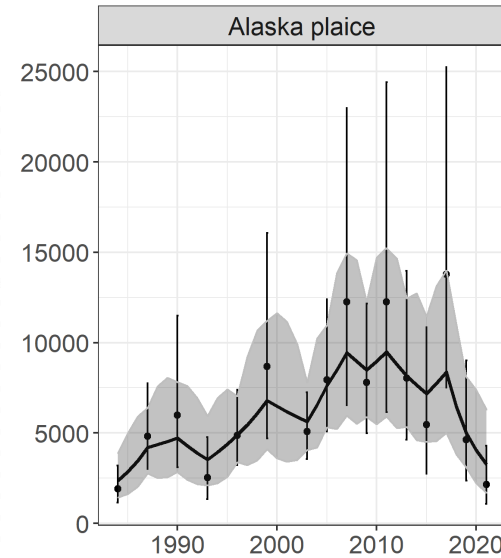


Shallow-water flatfish

Partial assessment

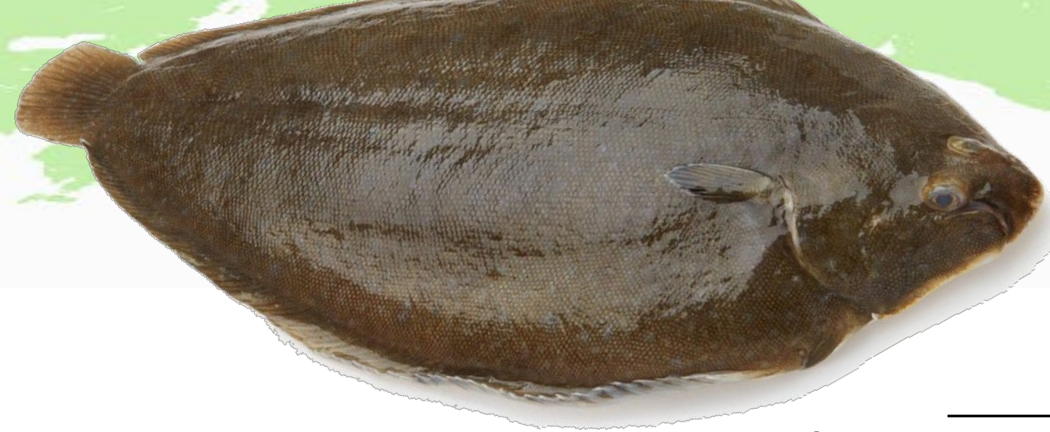
Many components

Quantity/Status	As estimated or specified last year for:		As estimated or recommended this year for:	
	2022	2023	2023	2024
M (natural mortality)	0.2*	0.2*	0.2*	0.2*
Tier	3a, 5	3a, 5	3a, 5	3a, 5
Biomass (t)	442,423	449,250	449,607	452,916
F _{OFL}		*	*	*
maxF _{ABC}		*	*	*
F _{ABC}		*	*	*
OFL (t)	62,273	65,676	65,736	68,015
maxABC (t)	50,610	53,486	53,537	55,474
ABC (t)	50,610	53,486	53,537	55,474
Status	As determined last year for:		As determined this year for:	
	2020	2021	2021	2022
Overfishing	No	n/a	No	n/a



year

Flatfish ABC's



Species	2022 ABC	2023 ABC	Change
Shallow water flatfish	50,610	53,537	up 2,927 (6%)
Rex sole	19,141	20,664	up 1,523 (8%)
Deep water flatfish	5,908	5,816	down 92 (2%)
Flathead sole	40,175	39,480	down 695 (2%)
Arrowtooth flounder	119,779	119,485	down 294 (0%)
Subtotal	235,613	238,982	up 3,369 (1%)
Subtotal (without ATF)	115,834	119,497	up 3,663 (3%)

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

Flatfish ABC's

Species	2022 ABC	2023 ABC	Change
Shallow water flatfish	50,610	53,537	up 2,927 (6%)
Rex sole	19,141	20,664	up 1,523 (8%)
Deep water flatfish	5,908	5,816	down 92 (2%)
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Subtotal (without ATF)	115,834	119,497	up 3,663 (3%)

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

Flatfish ABC's

Species	2022 ABC	2023 ABC	Change
Shallow water flatfish	50,610	53,537	up 2,927 (6%)
Rex sole	19,141	20,664	up 1,523 (8%)
Deep water flatfish	5,908	5,816	down 92 (2%)
Flathead sole	40,175	39,480	down 695 (2%)
Arrowtooth flounder	119,779	119,485	down 294 (0%)
Subtotal	235,613	238,982	up 3,369 (1%)
Subtotal (without ATF)	115,834	119,497	up 3,663 (3%)

Arrowtooth flounder (partial assessment)

Full assessment in
odd years

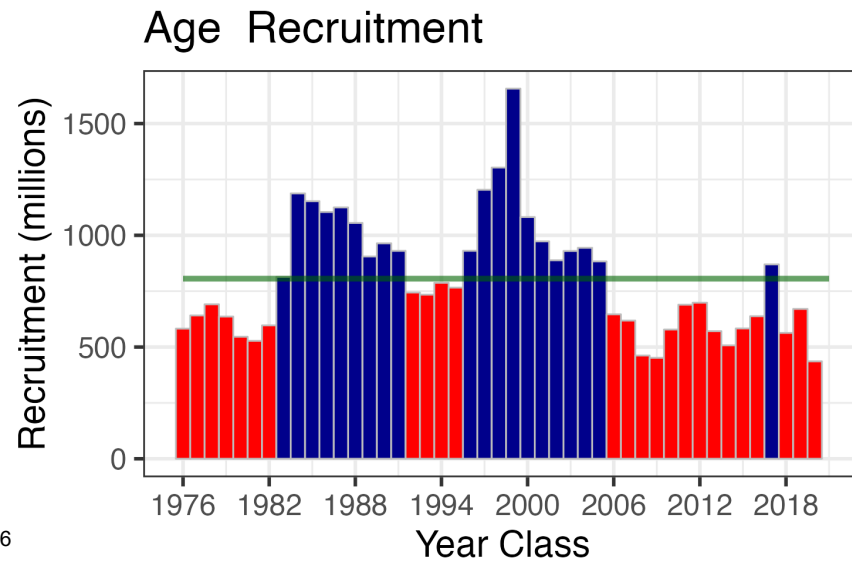
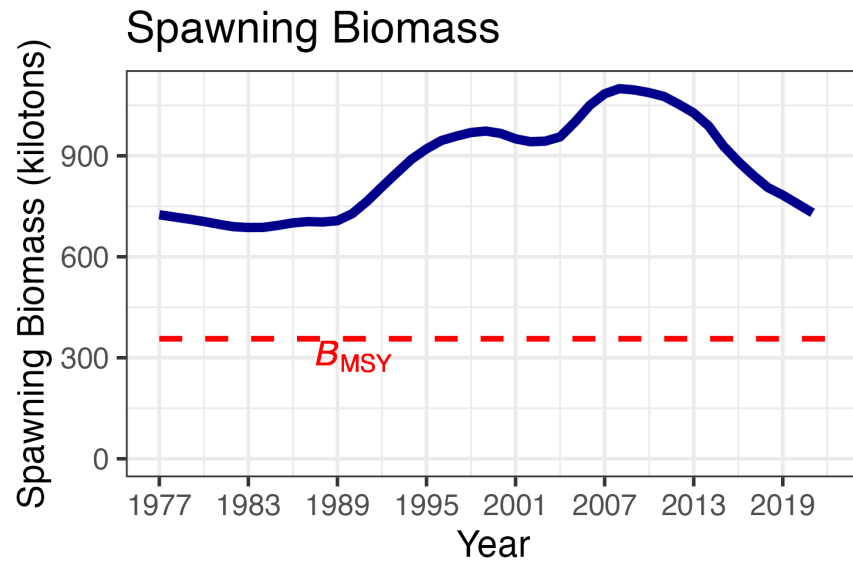
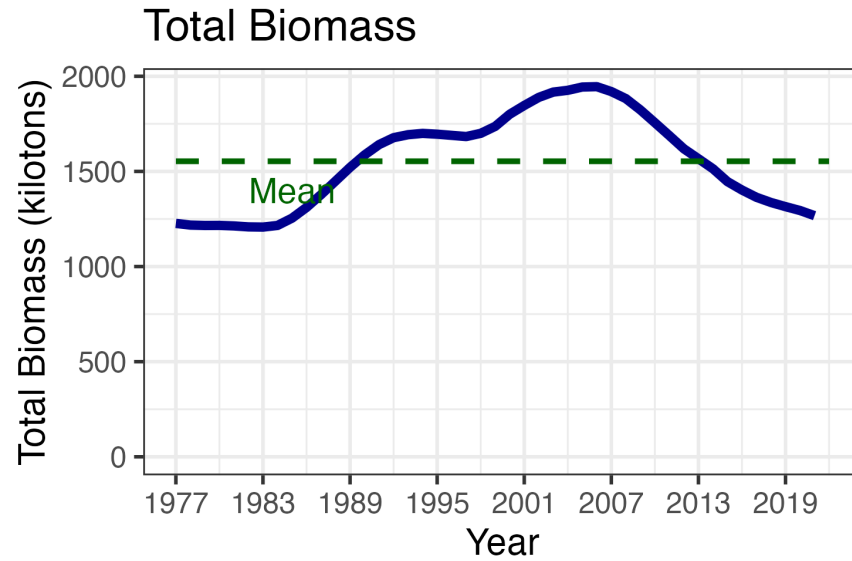
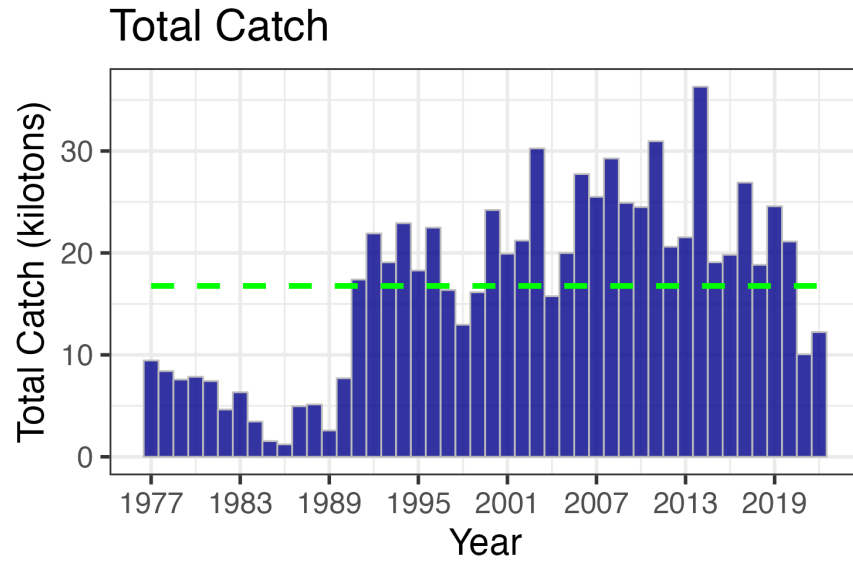
- Tier 3

Quantity	As estimated or <i>specified last year for:</i>		<i>*As estimated or recommended this year for:</i>	
	2022	2023	2023	2024
<i>M</i> (natural mortality rate)**	0.35, 0.2	0.35, 0.2	0.35, 0.2	0.35, 0.2
Tier	3a	3a	3a	3a
Projected total (age 1+) biomass (t)	1,268,140	1,270,850	1,265,950	1,269,510
Projected Female spawning	703,853	691,941	702,074	690,799
<i>B</i> _{100%}	1,018,700	1,018,700	1,018,700	1,018,700
<i>B</i> _{40%}	407,478	407,478	407,478	407,478
<i>B</i> _{35%}	356,544	356,544	356,544	356,544
<i>F</i> _{OFL}	0.225	0.225	0.225	0.225
<i>maxF</i> _{ABC}	0.185	0.185	0.185	0.185
<i>F</i> _{ABC}	0.185	0.185	0.185	0.185
OFL (t)	143,100	141,231	142,749	141,008
maxABC (t)	119,779	118,201	119,485	118,014
ABC (t)	119,779	118,201	119,485	118,014
Status	As determined <i>last year for:</i>		As determined <i>this year for:</i>	
	2020	2021	2021	2022
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

*Projections are based on estimated catches of 12,233 t for 2022, 16,382 t for 2023, and 14,292 t for 2024.

**Natural mortality rate is 0.35 for males, 0.2 for females.

Arrowtooth flounder: Overview



Flatfish ABC's

Species	2022 ABC	2023 ABC	Change
Shallow water flatfish	50,610	53,537	up 2,927 (6%)
Rex sole	19,141	20,664	up 1,523 (8%)
Deep water flatfish	5,908	5,816	down 92 (2%)
Flathead sole	40,175	39,480	down 695 (2%)
Arrowtooth flounder	119,779	119,485	down 294 (0%)
Subtotal	235,613	238,982	up 3,369 (1%)
Subtotal (without ATF)	115,834	119,497	up 3,663 (3%)

Flathead sole (full assessment)

- Thanks Maia Kapur!

Tier 3a

Area GOA (mostly Central and Western)

Status Not overfished/no overfishing

Changes

Model structure:

none

Update:

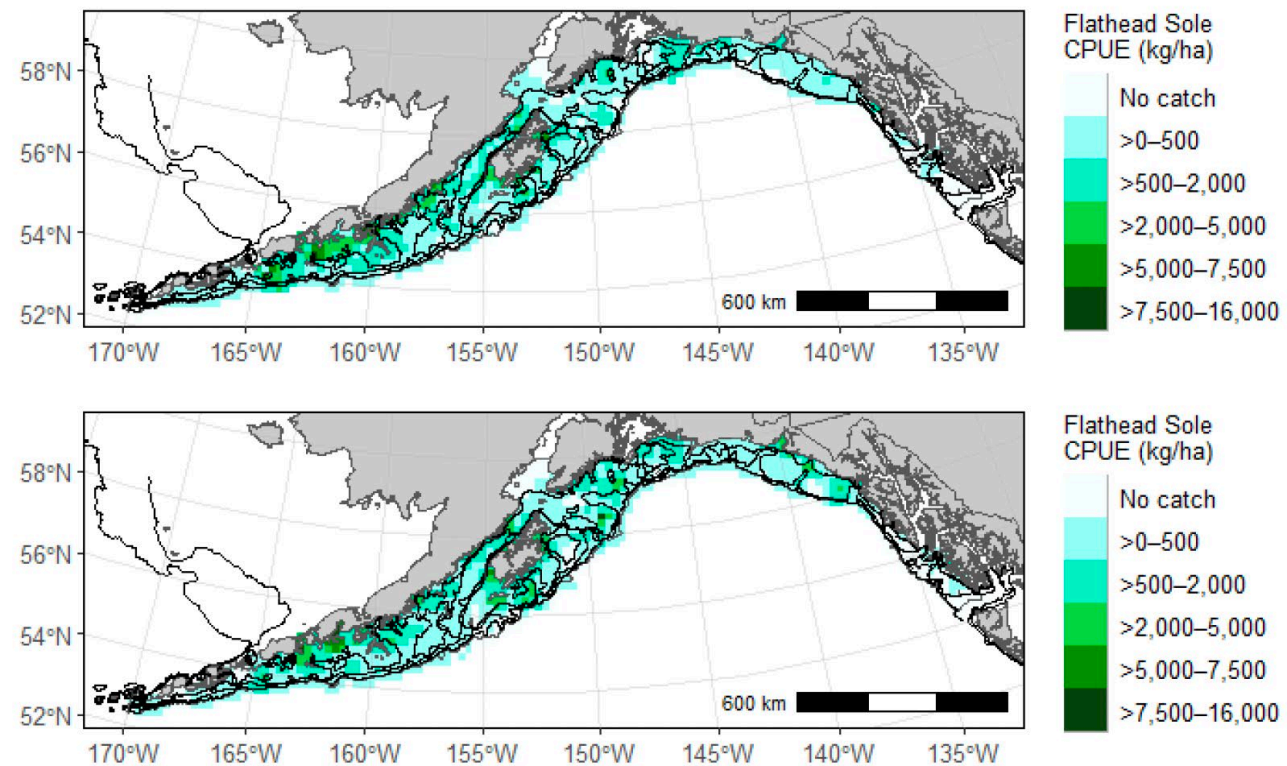
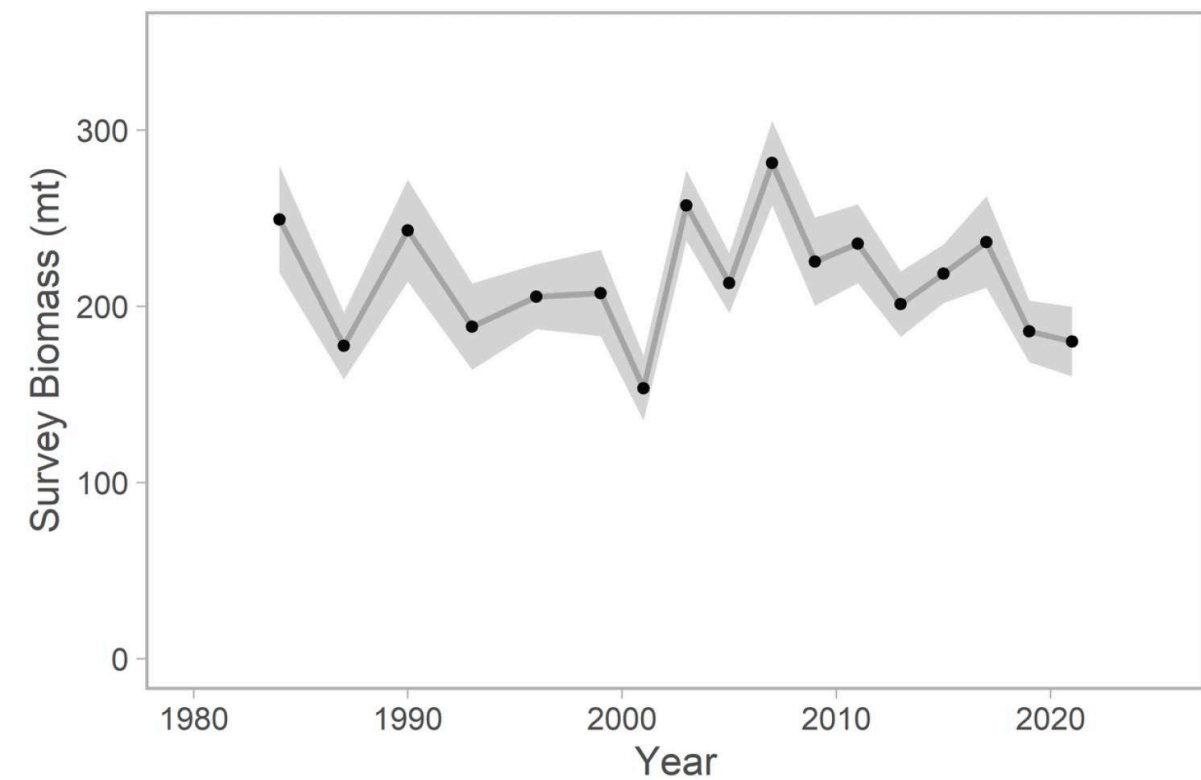
input data

ageing error matrix

software platform

Source	Data	Years
U.S. trawl fishery	Catch biomass	1977-2022
	Catch length composition	1982, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022
GOA bottom trawl survey	Survey biomass	1984-1999 (triennial), 2001-2021 (biennial)
	Survey length composition	1984-1999 (triennial), 2001-2021 (biennial)
	Survey age composition, conditioned on length	1990, 1993, 1996, 1999, 2001, 2003, 2005, 2007, 2009, 2011, 2013, 2015, 2017, 2019, 2021

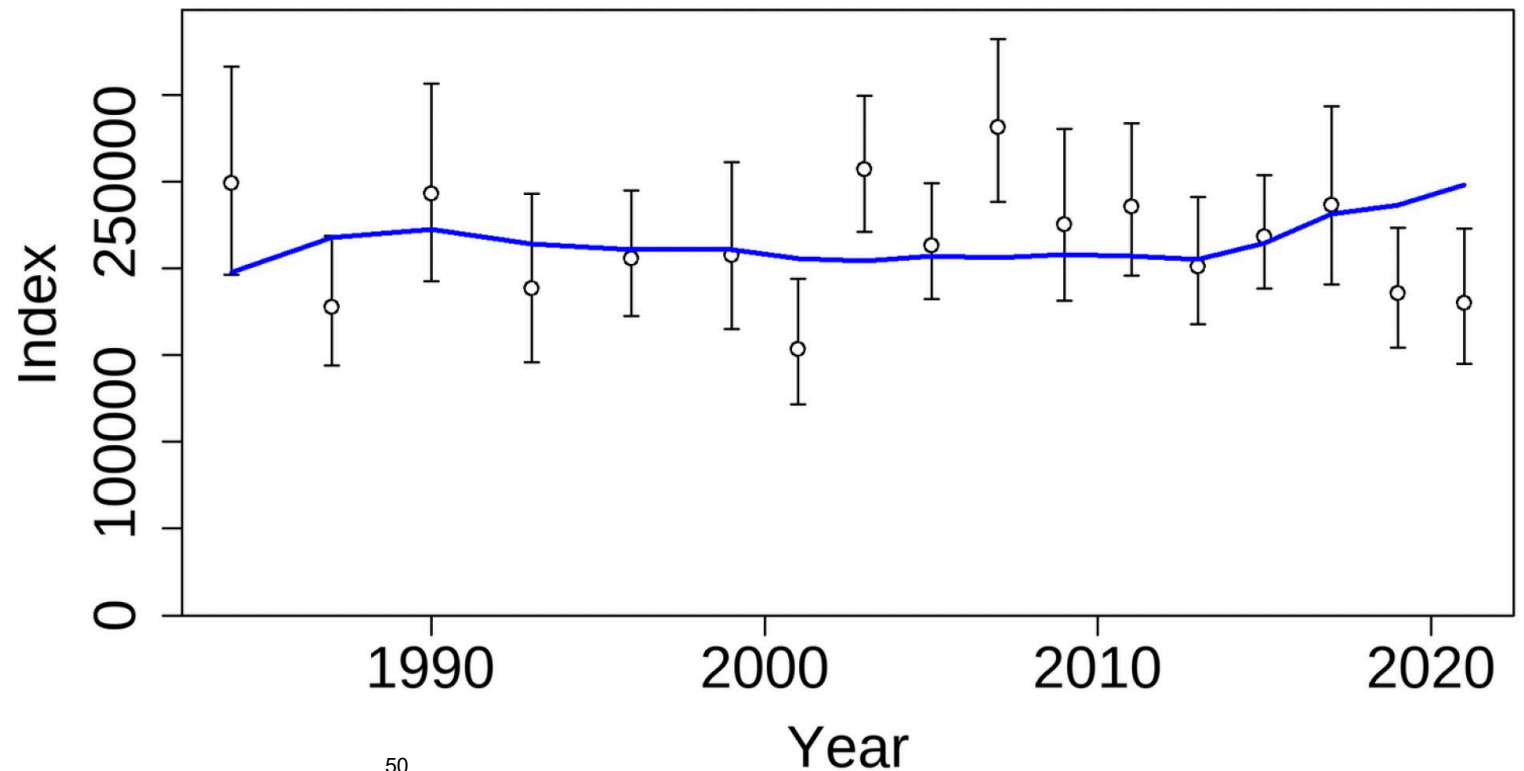
Flathead sole: Bottom trawl survey data



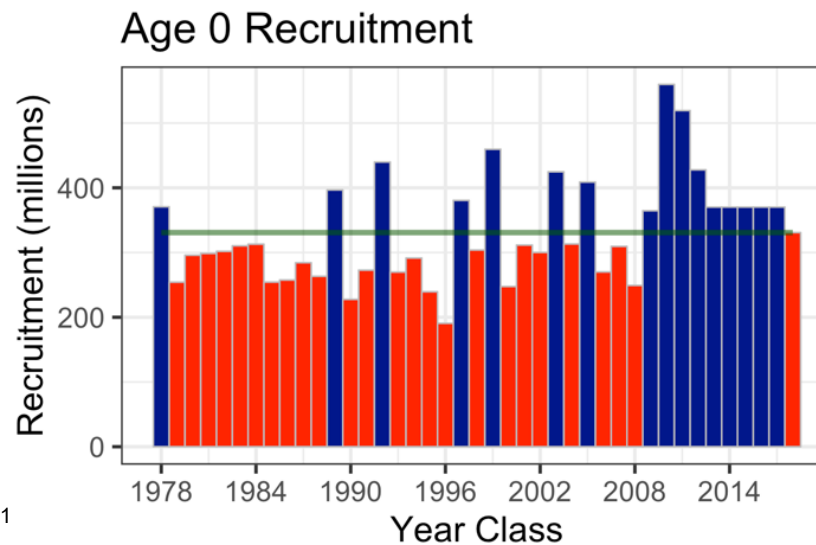
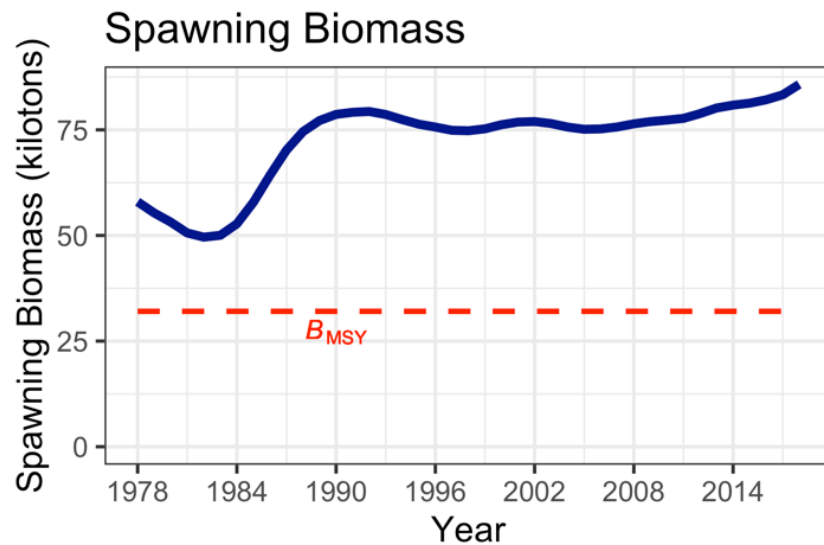
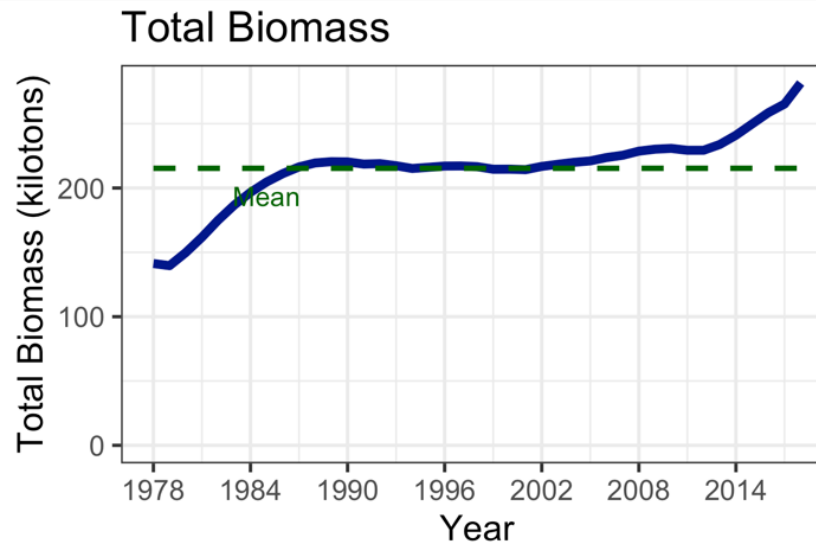
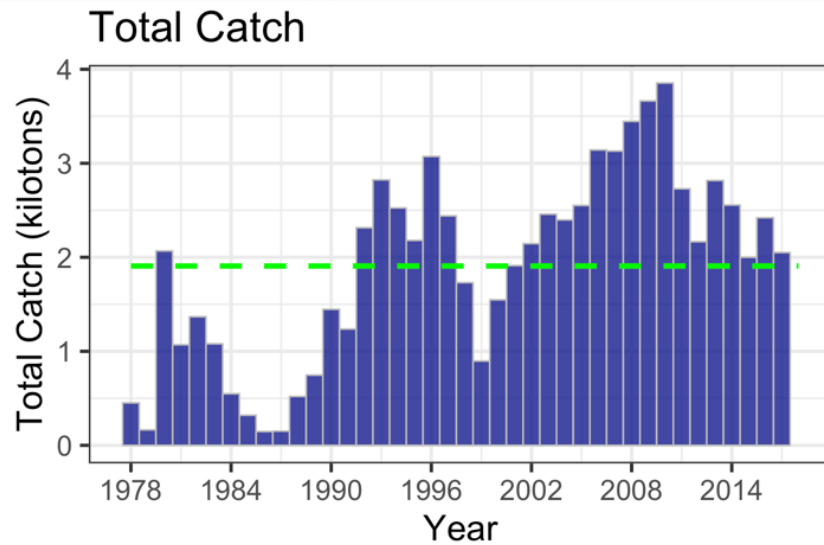
Flathead sole

Model Fit: Survey Biomass

- Bottom-trawl survey data



Flathead sole: Overview

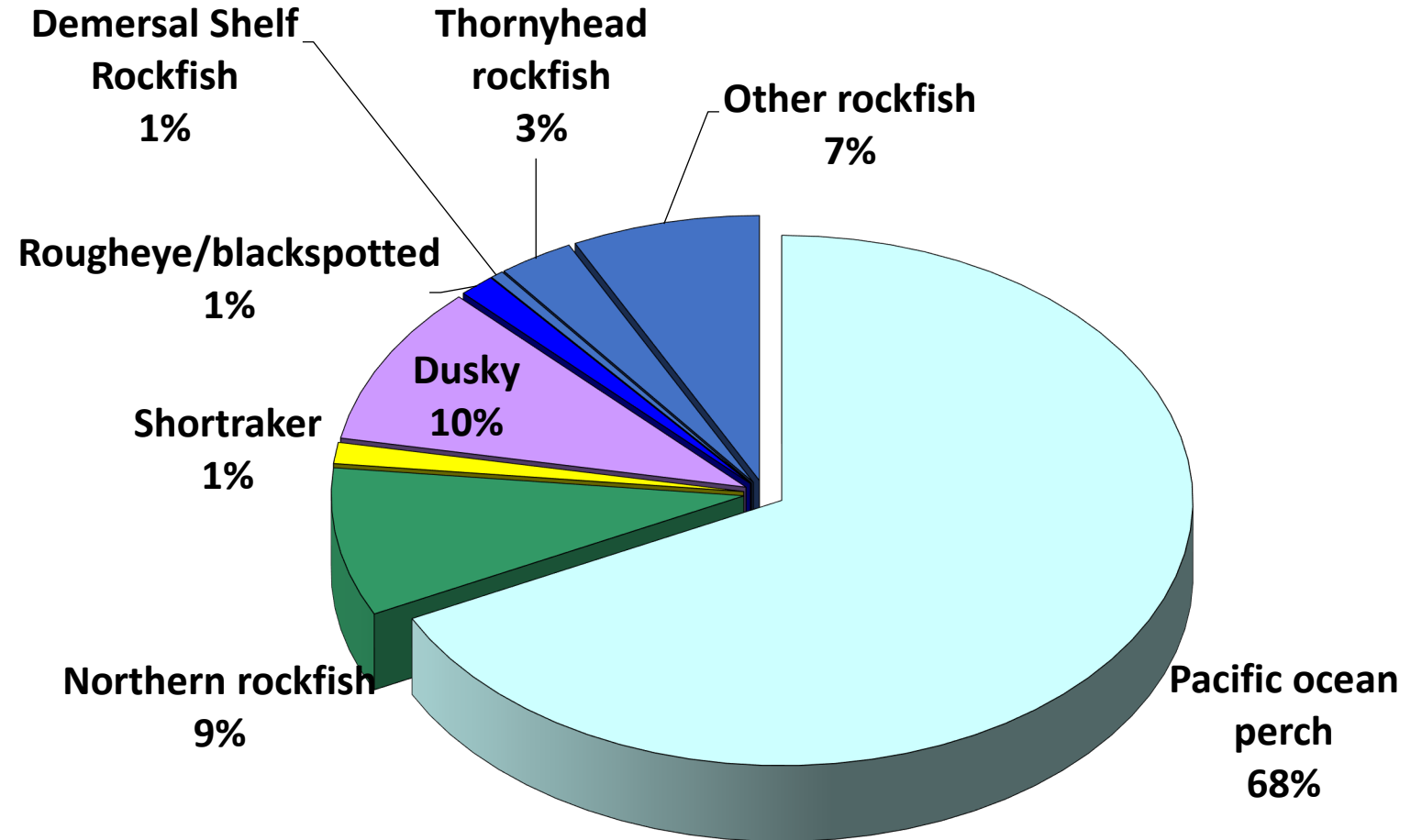


GOA Rockfish

Species	2022 catch	ABC 2022	ABC 2023	Change
Pollock	129,876	144,444	160,301	up 15,857 (11%)
Pacific Cod	18,275	32,811	24,634	down 8,177 (25%)
Sablefish	17,531	22,794	40,502	up 17,708 (78%)
Flatfish	2,673	115,834	119,497	up 3,663 (3%)
Arrowtooth flounder	11,456	119,779	119,485	down 294 (0%)
Rockfish	36,055	56,651	57,519	up 868 (2%)
Atka mackerel	880	4,700	4,700	same (0%)
Skates	2,706	6,563	6,563	same (0%)
Sharks	2,112	3,755	4,891	up 1,136 (30%)
Octopus	111	980	980	same (0%)
Total	221,675	508,311	539,072	up 30,761 (6%)

Rockfish 2023 ABC's

57,519 t total



Rockfish ABC Summary

Species	ABC 2022	ABC 2023	Change
POP	38,268	37,193	down 1,075 (3%)
northern rockfish	5,146	4,964	down 182 (4%)
Shortraker Rockfish	705	705	same (0%)
Dusky	5,372	7,917	up 2,545 (47%)
Rougheye and Blackspotted Rockfish	788	775	down 13 (2%)
Demersal shelf rockf	365	283	down 82 (22%)
Thornyhead	1,953	1,628	down 325 (17%)
Other rock	4,054	4,054	same (0%)
Sub Total	56,651	57,519	up 868 (2%)

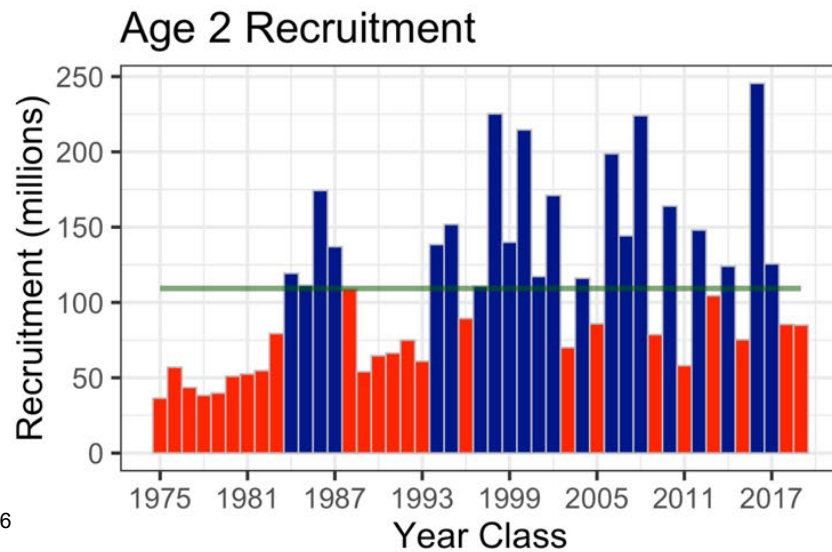
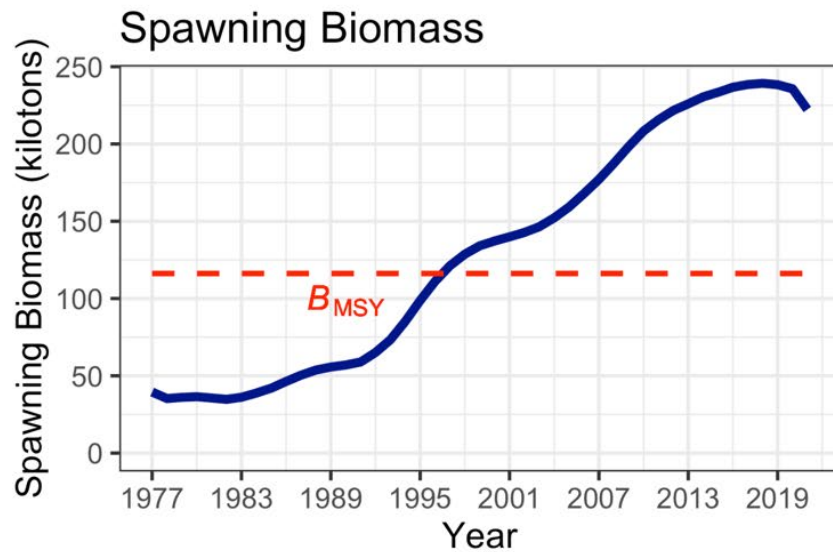
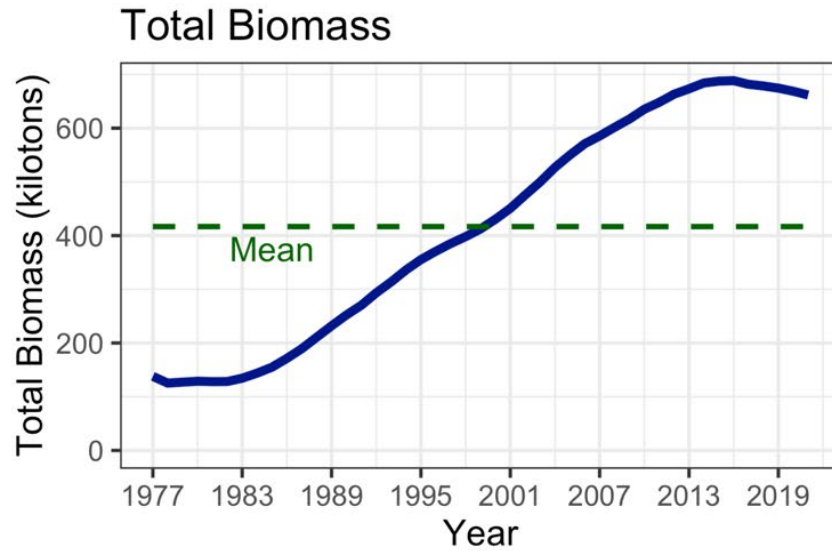
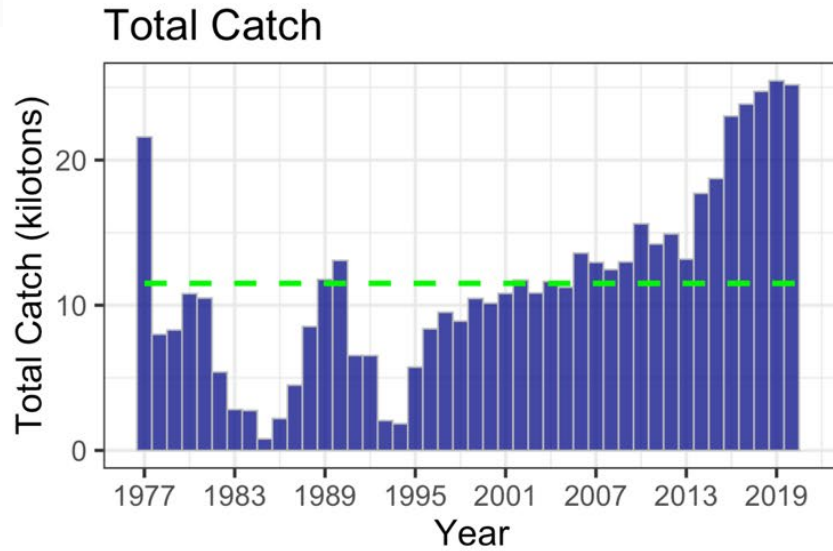
Pacific ocean perch (partial assessment)

Area Apportionment	Western	Central	Eastern	Total	Western/Central/W. Yakutat (W/C/WY)		E. Yakutat/Southeast (SEO)	Total
	6.8%	80.5%	12.7%	100%				
2023 Area ABC (t)	2,529	29,940	4,724	37,193	2023 Area OFL (t)	40,308	3,994	44,302
2024 Area ABC (t)	2,461	29,138	4,597	36,196	2024 Area OFL (t)	39,229	3,888	43,117

Quantity	As estimated or specified <i>last</i> year for:		As estimated or recommended <i>this</i> year for:	
	2022	2023	2023*	2024*
<i>M</i> (natural mortality)	0.075	0.075	0.075	0.075
Tier	3a	3a	3a	3a
Projected total (age 2+) biomass (t)	650,832	634,907	636,129	621,249
Projected Female spawning biomass	216,635	210,257	210,795	205,713
<i>B</i> _{100%}	331,917	331,917	331,917	331,917
<i>B</i> _{40%}	132,767	132,767	132,767	132,767
<i>B</i> _{35%}	116,171	116,171	116,171	116,171
<i>F</i> _{OFL}	0.120	0.120	0.120	0.120
<i>maxF</i> _{ABC}	0.100	0.100	0.100	0.100
<i>F</i> _{ABC}	0.100	0.100	0.100	0.100
OFL (t)	45,580	44,196	44,302	43,117
maxABC (t)	38,268	37,104	37,193	36,196
ABC (t)	38,268	37,104	37,193	36,196
Status	As determined <i>last</i> year for:		As determined <i>this</i> year for:	
	2020	2021	2021	2022
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

*Projections are based on an estimated catch of 30,556 t for 2022 and estimates of 30,960 t and 29,748 t used in place of maximum permissible ABC for 2023 and 2024.

Pacific ocean perch: Overview



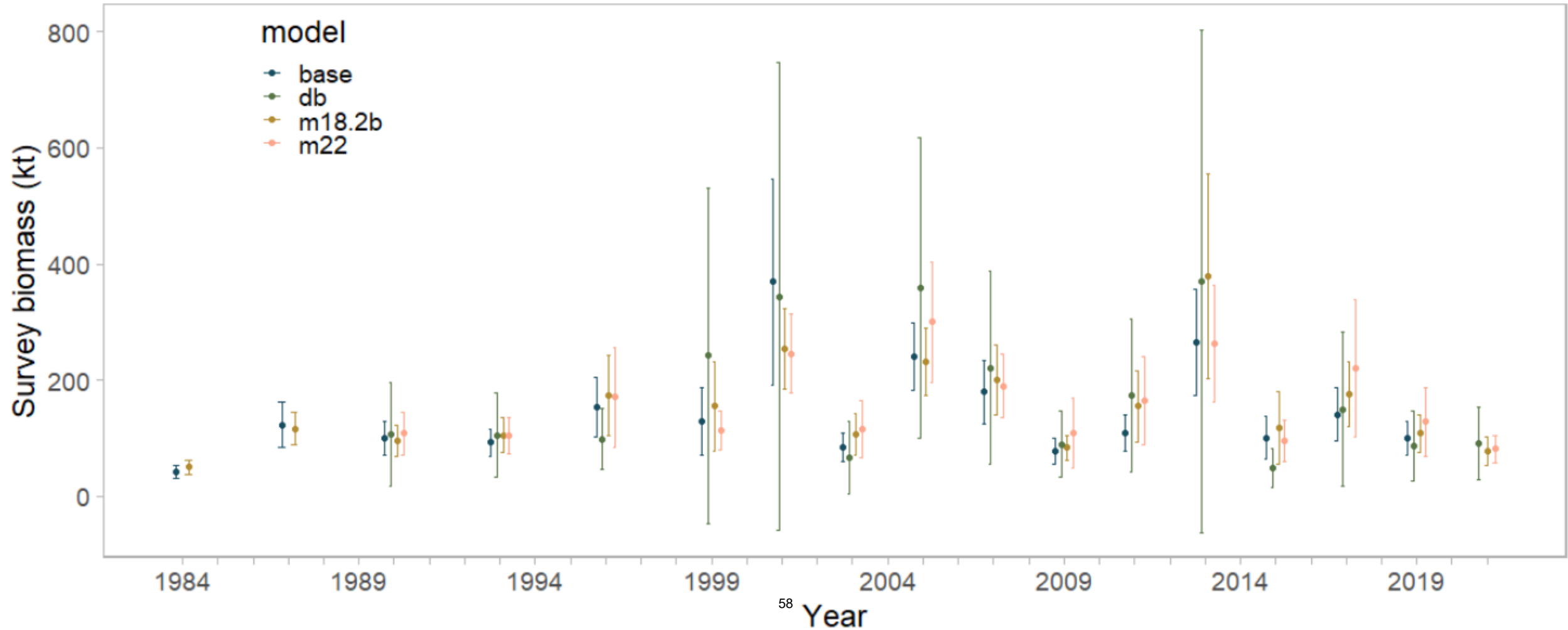
Rockfish ABC Summary

Species	ABC 2022	ABC 2023	Change
POP	38,268	37,193	down 1,075 (3%)
northern rockfish	5,146	4,964	down 182 (4%)
Shortraker Rockfish	705	705	same (0%)
Dusky	5,372	7,917	up 2,545 (47%)
Rougeye and Blackspotted Rockfish	788	775	down 13 (2%)
Demersal shelf rockf	365	283	down 82 (22%)
Thornyhead	1,953	1,628	down 325 (17%)
Other rock	4,054	4,054	same (0%)
Sub Total	56,651	57,519	up 868 (2%)

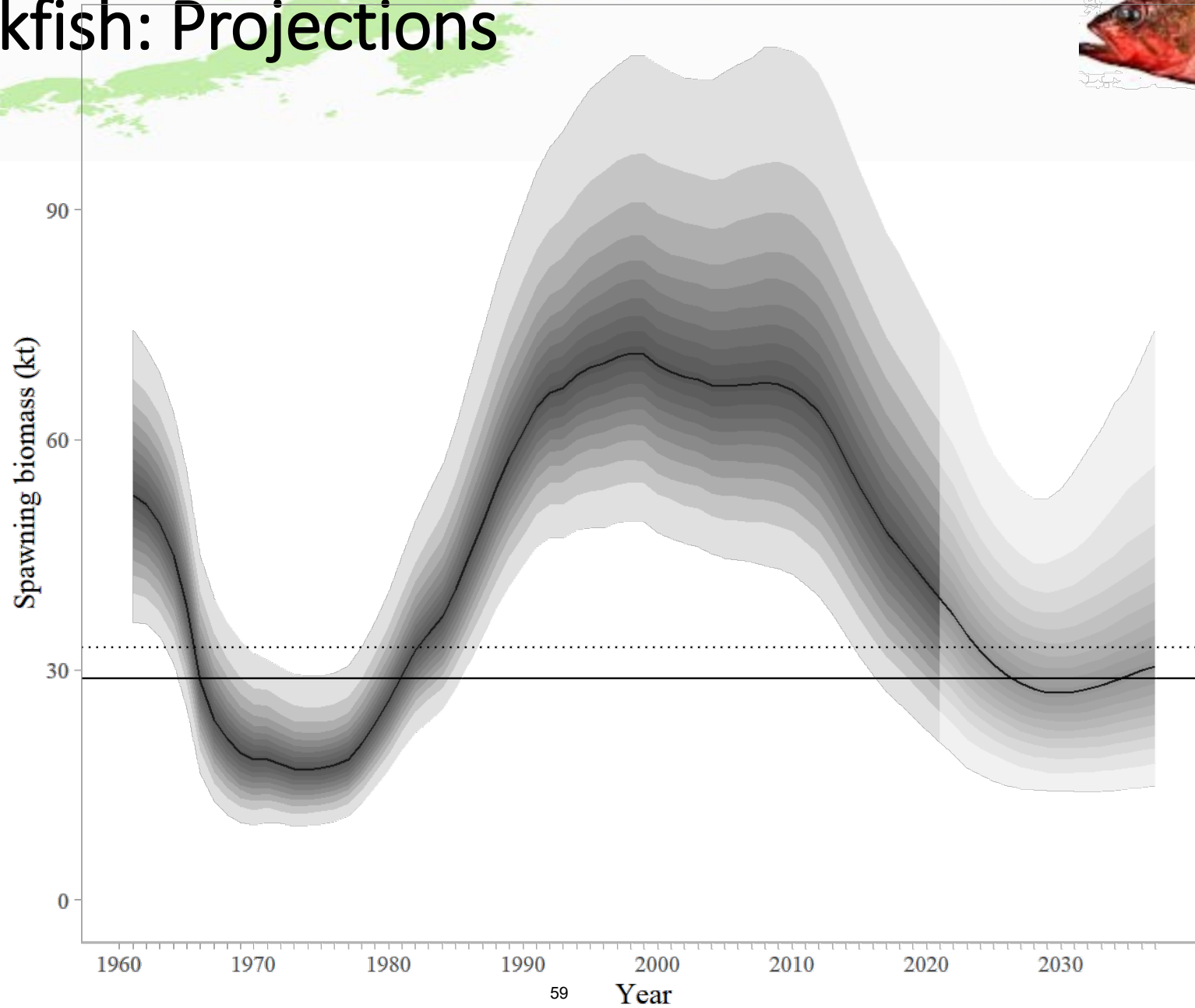
Northern rockfish: Survey-biomass



NMFS Bottom-trawl survey options



Northern rockfish: Projections



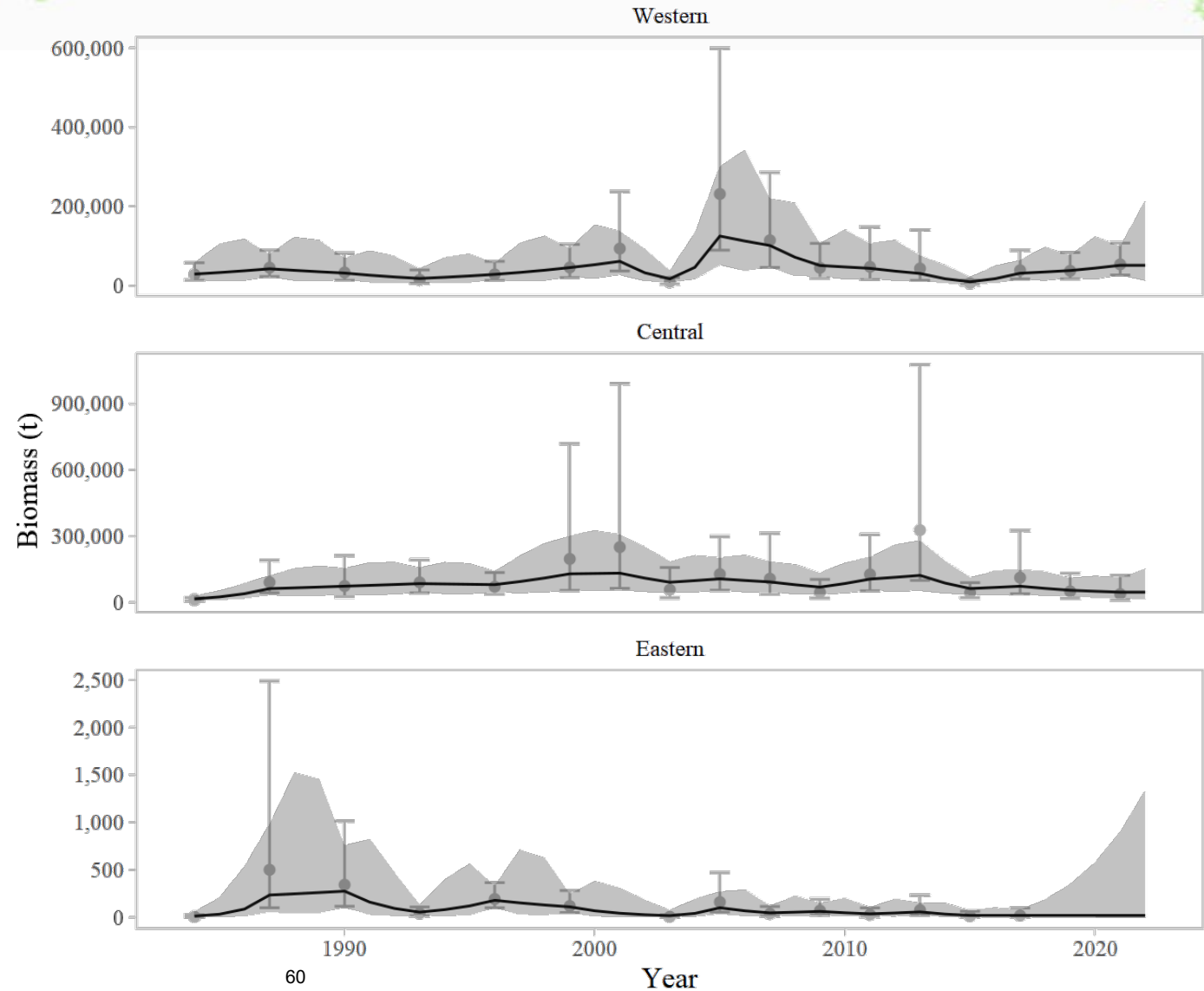
Northern rockfish: Apportionment



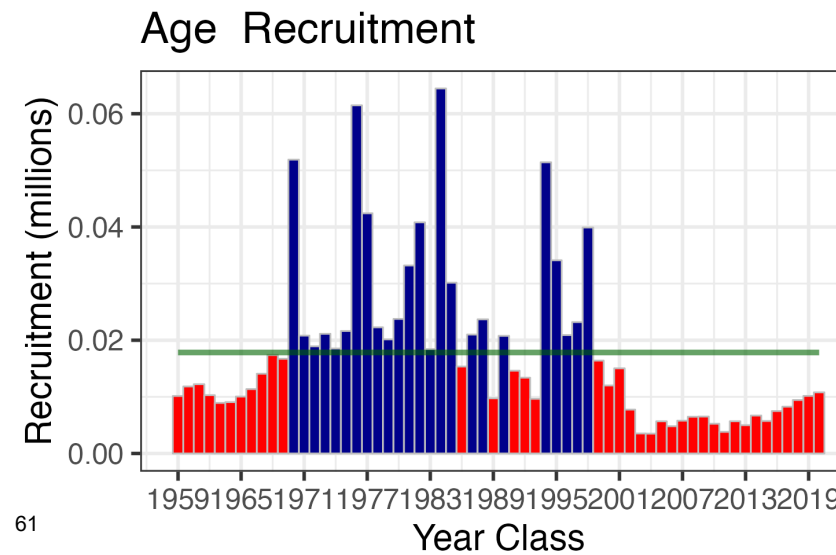
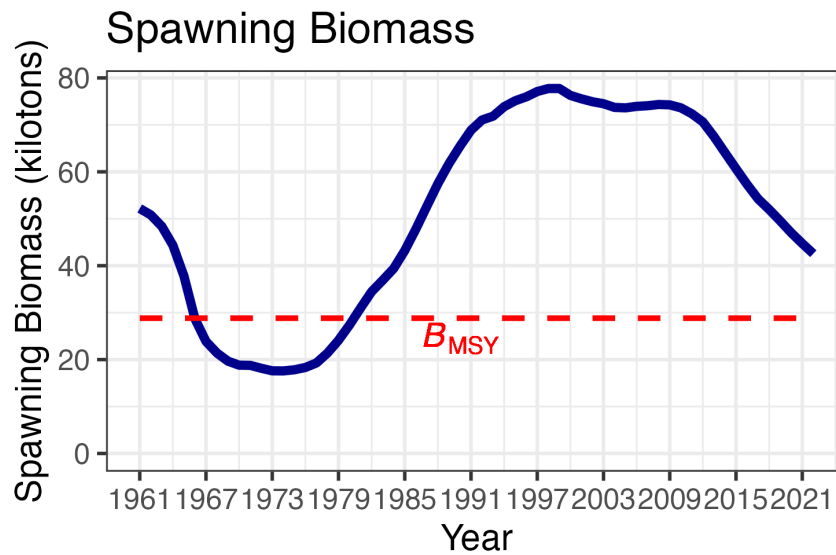
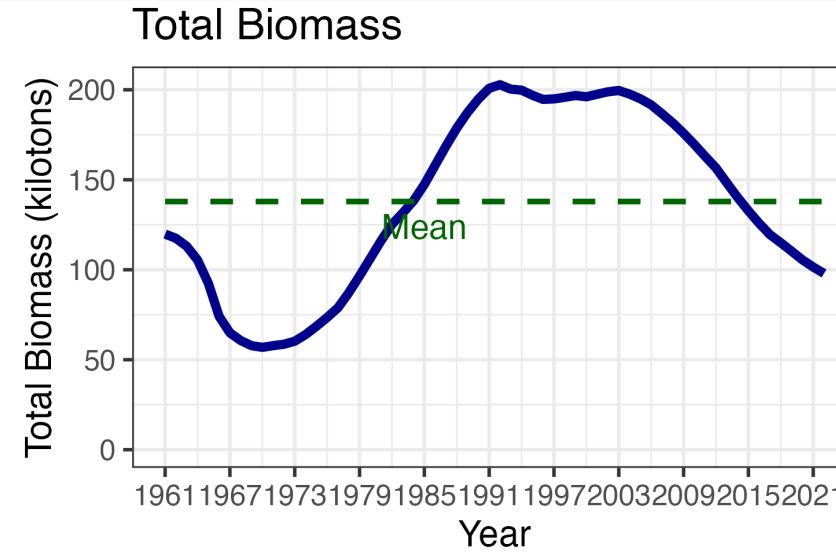
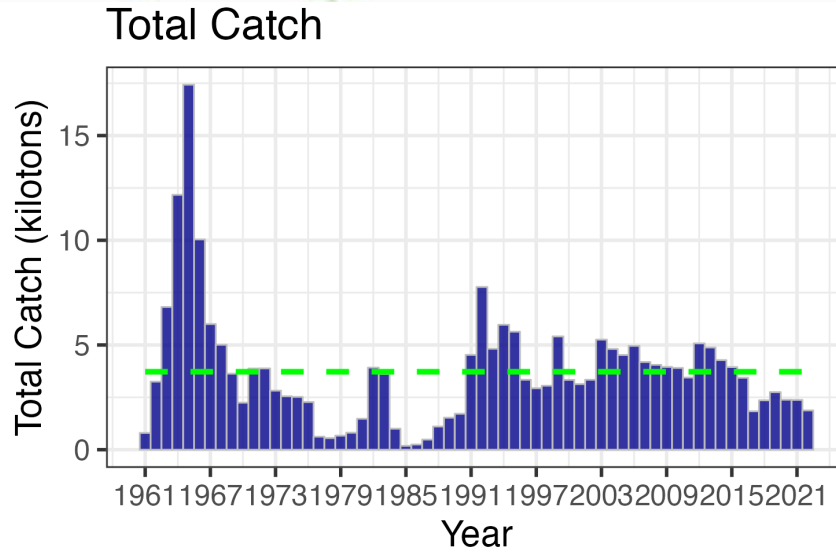
Western 37.76% → 52.65%

Central 62.22% → 47.33%

Eastern 0.02% → 0.02%



Northern rockfish: Overview



Rockfish ABC Summary

Species	ABC 2022	ABC 2023	Change
POP	38,268	37,193	down 1,075 (3%)
northern rockfish	5,146	4,964	down 182 (4%)
Shortraker Rockfish	705	705	same (0%)
Dusky	5,372	7,917	up 2,545 (47%)
Rougheye and Blackspotted Rockfish	788	775	down 13 (2%)
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Thornyhead	1,953	1,628	down 325 (17%)
Other rock	4,054	4,054	same (0%)
Sub Total	56,651	57,519	up 868 (2%)

GOA Blackspotted/Rougheye Rockfish (partial assessment)

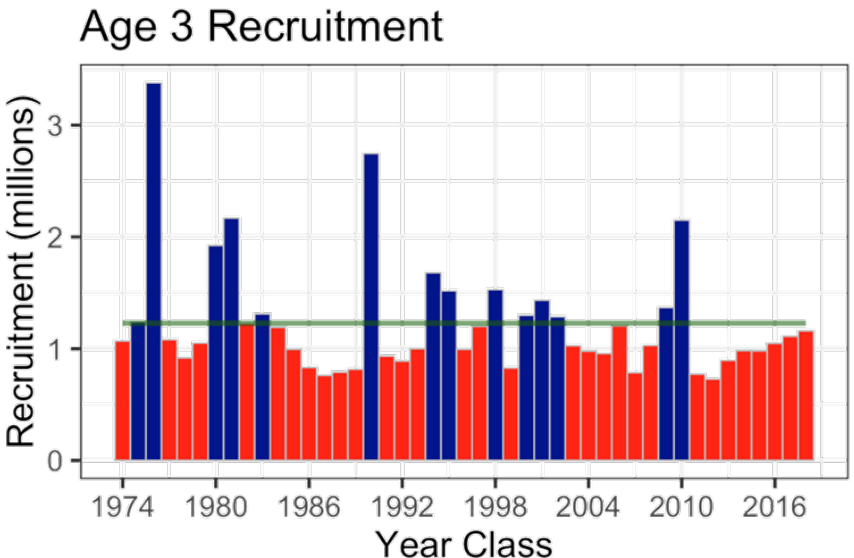
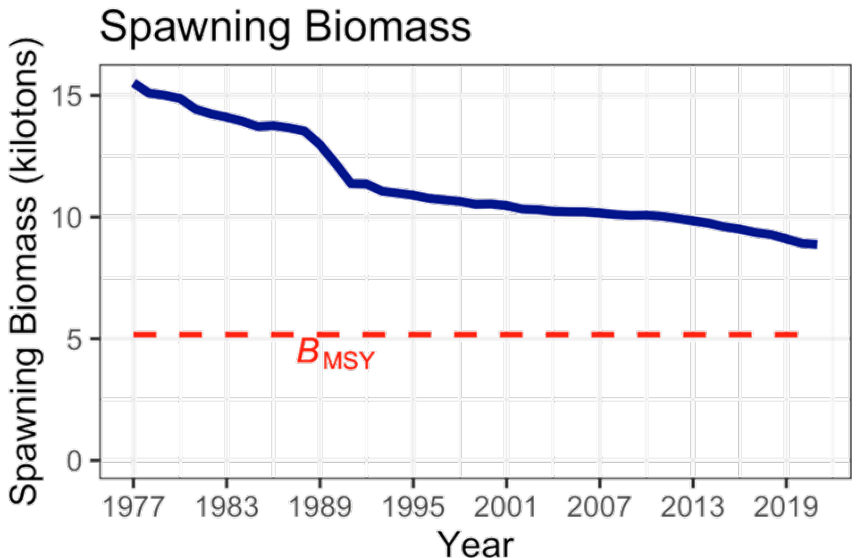
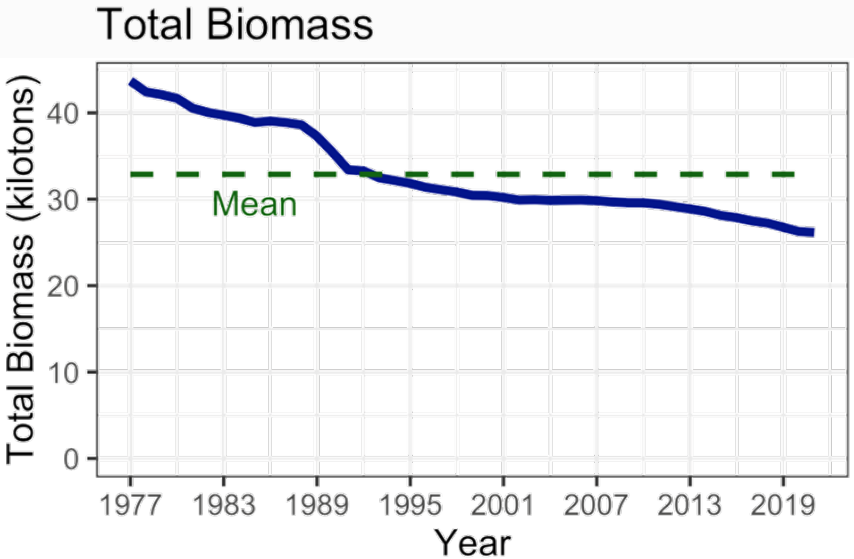
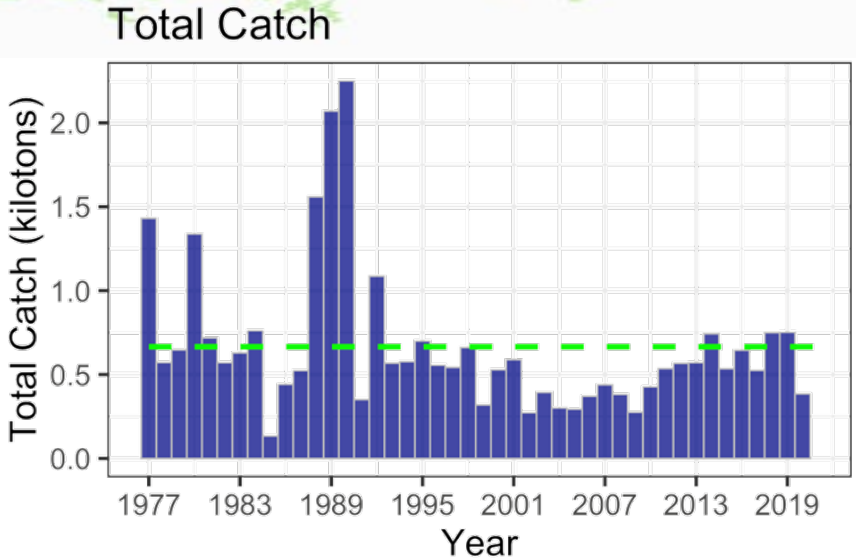
- Tier 3 species – 2021 was last full assessment
 - No model changes since 2015
 - Uses two surveys (NMFS bottom trawl & NMFS longline) for model and apportionment
 - New data: new/updated catch, new trawl/longline survey, new fishery/longline survey sizes



GOA Blackspotted/Rougheye Rockfish

Quantity	As estimated or specified last year for:		As estimated or recommended this year for:	
	2022	2023	2023	2024
M (natural mortality rate)	0.034	0.034	0.034	0.034
Tier	3a	3a	3a	3a
Projected total (ages 3+) biomass (t)	26,060	25,997	25,837	25,755
Projected female spawning biomass (t)	8,648	8,627	8,554	8,514
$B_{100\%}$	14,776	14,776	14,776	14,776
$B_{40\%}$	5,911	5,911	5,911	5,911
$B_{35\%}$	5,172	5,172	5,172	5,172
F_{OFL}	0.046	0.046	0.046	0.046
$\underline{\text{max}F_{ABC}}$	0.038	0.038	0.038	0.038
F_{ABC}	0.038	0.038	0.038	0.038
OFL (t)	947	937	930	927
$\underline{\text{max}ABC}$ (t)	788	781	775	772
ABC (t)	788	781	775	772
Status	As determined last year for:		As determined this year for:	
	2020	2021	2021	2022
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

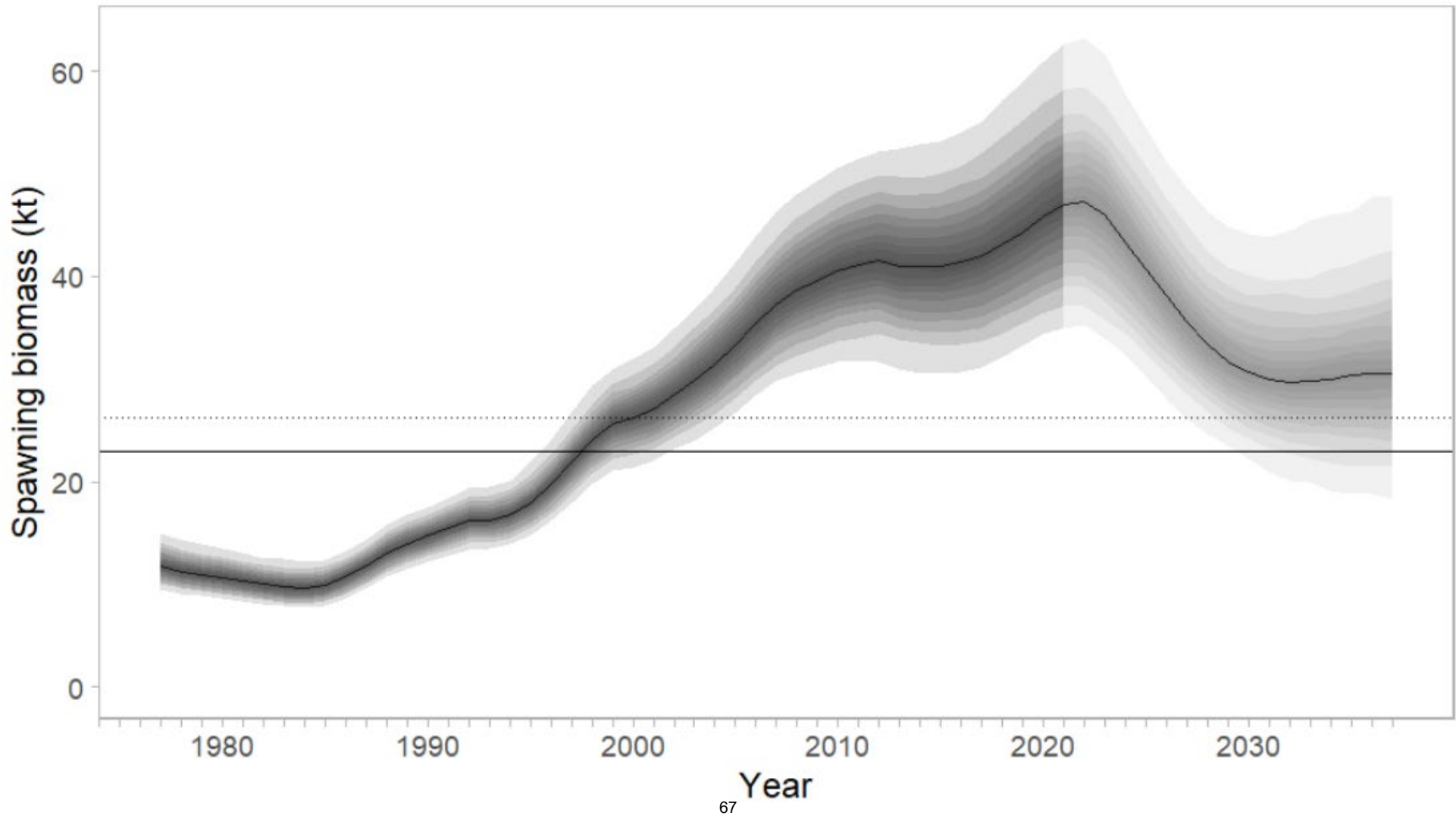
GOA Blackspotted/Rougheye Rockfish: Overview



Rockfish ABC Summary

Species	ABC 2022	ABC 2023	Change
POP	38,268	37,193	down 1,075 (3%)
northern rockfish	5,146	4,964	down 182 (4%)
Shortraker Rockfish	705	705	same (0%)
Dusky	5,372	7,917	up 2,545 (47%)
Rougheye and Blackspotted Rockfish	788	775	down 13 (2%)
Demersal shelf rfish	365	283	down 82 (22%)
Thornyhead	1,953	1,628	down 325 (17%)
Other rock	4,054	4,054	same (0%)
Sub Total	56,651	57,519	up 868 (2%)

Dusky rockfish: Projections

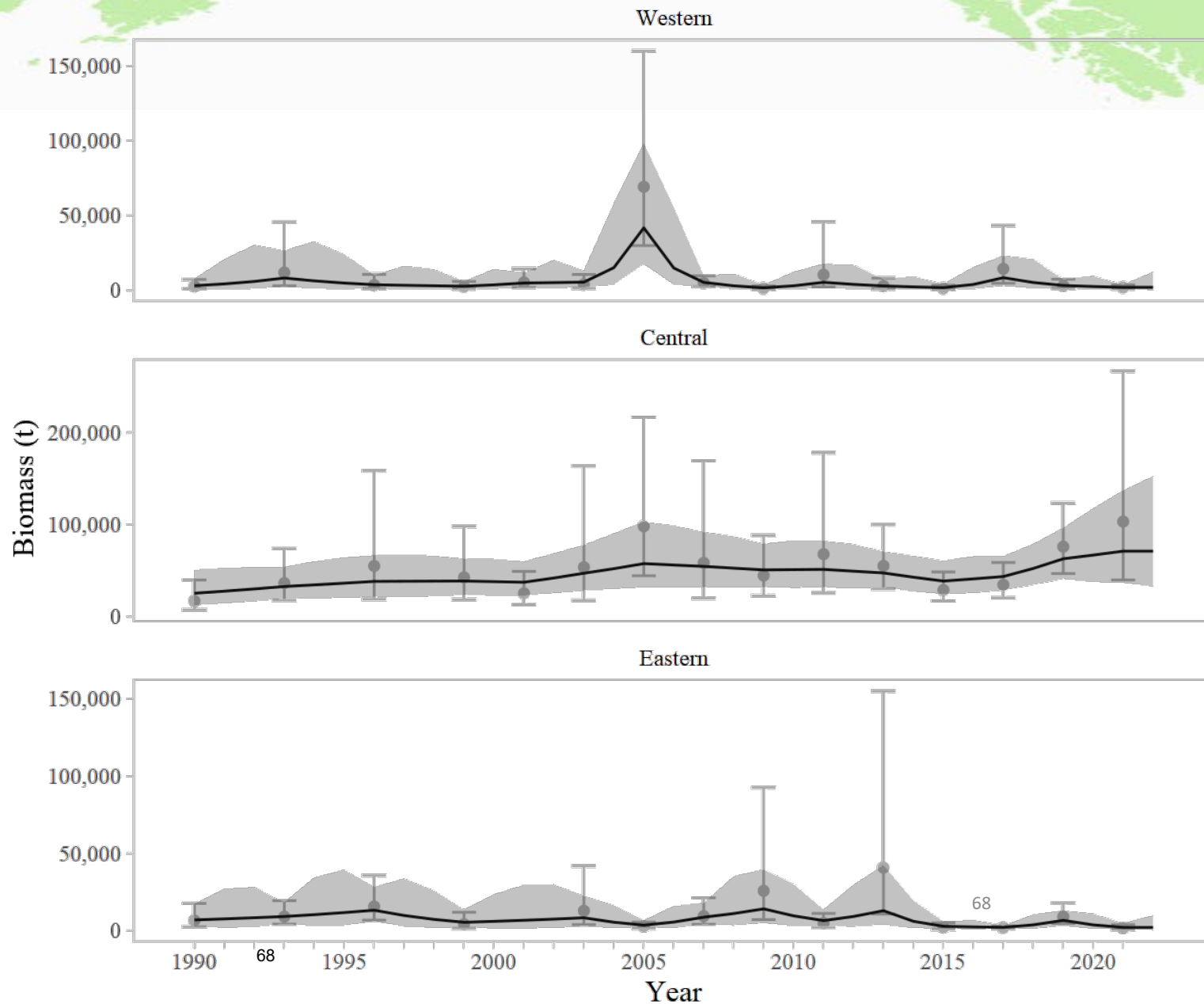


Dusky rockfish: Apportionments

Western 5.0% → 1.9%

Central 84.4% → 96.6%

Eastern 10.6% → 1.5%



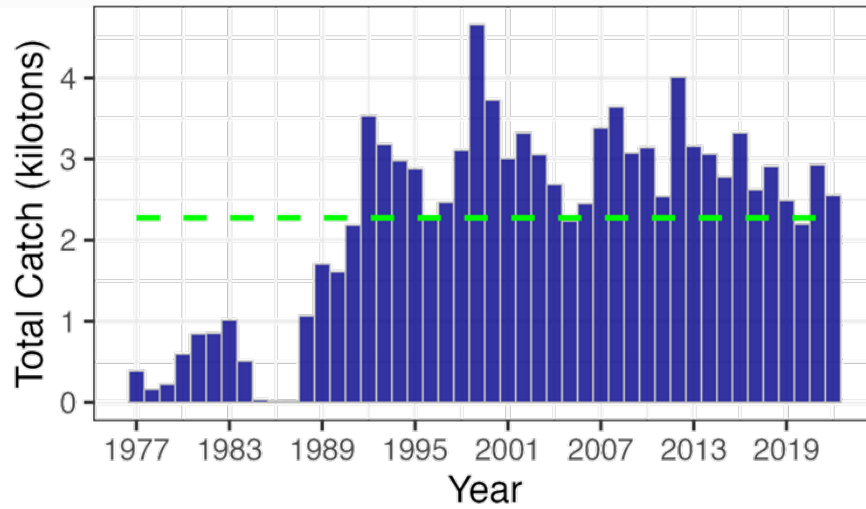
Dusky rockfish: Discussion

Plan Team recommended:

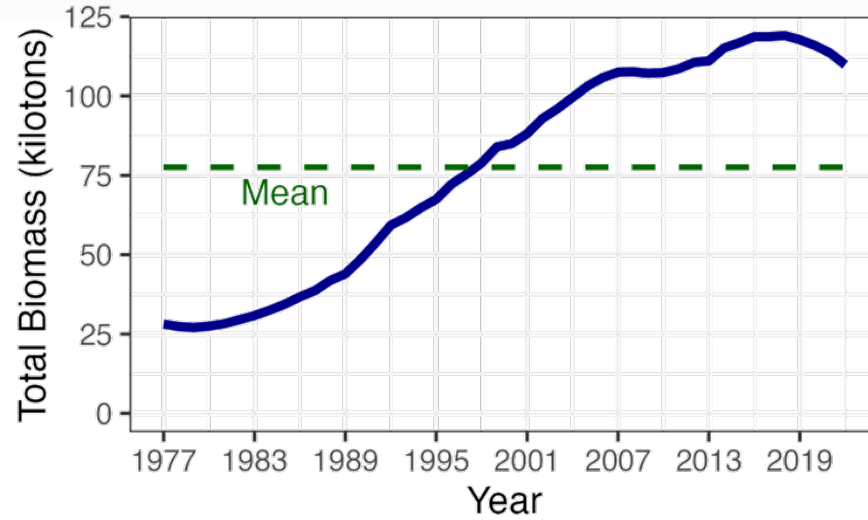
- Evaluating the use of VAST estimates of survey biomass for apportionments.
- Exploratory model runs to identify how model changes improved the retrospective pattern

Dusky rockfish: Overview

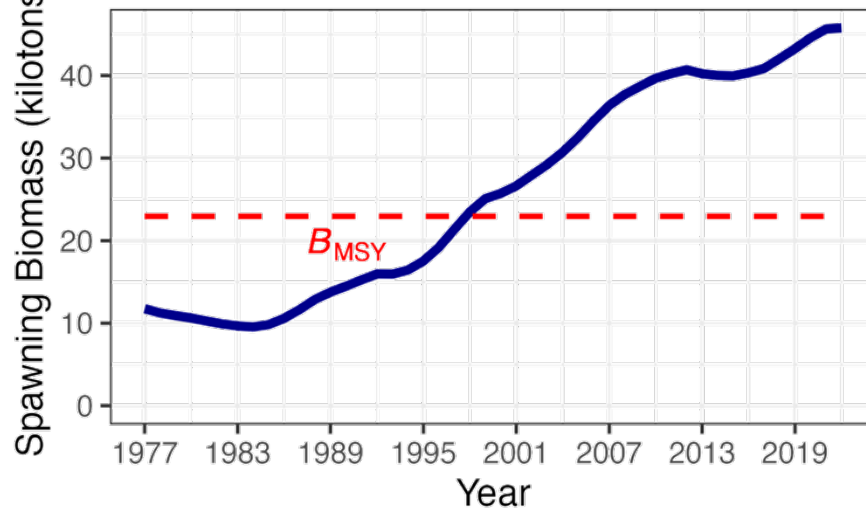
Total Catch



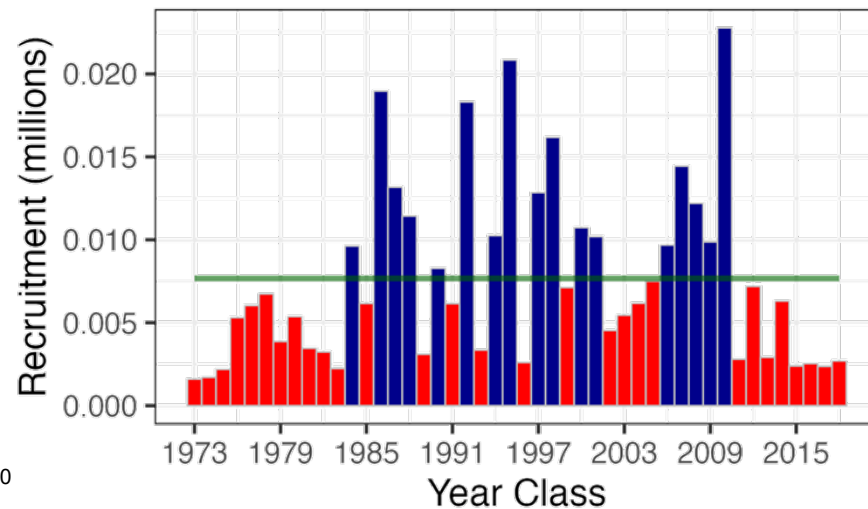
Total Biomass



Spawning Biomass



Age Recruitment



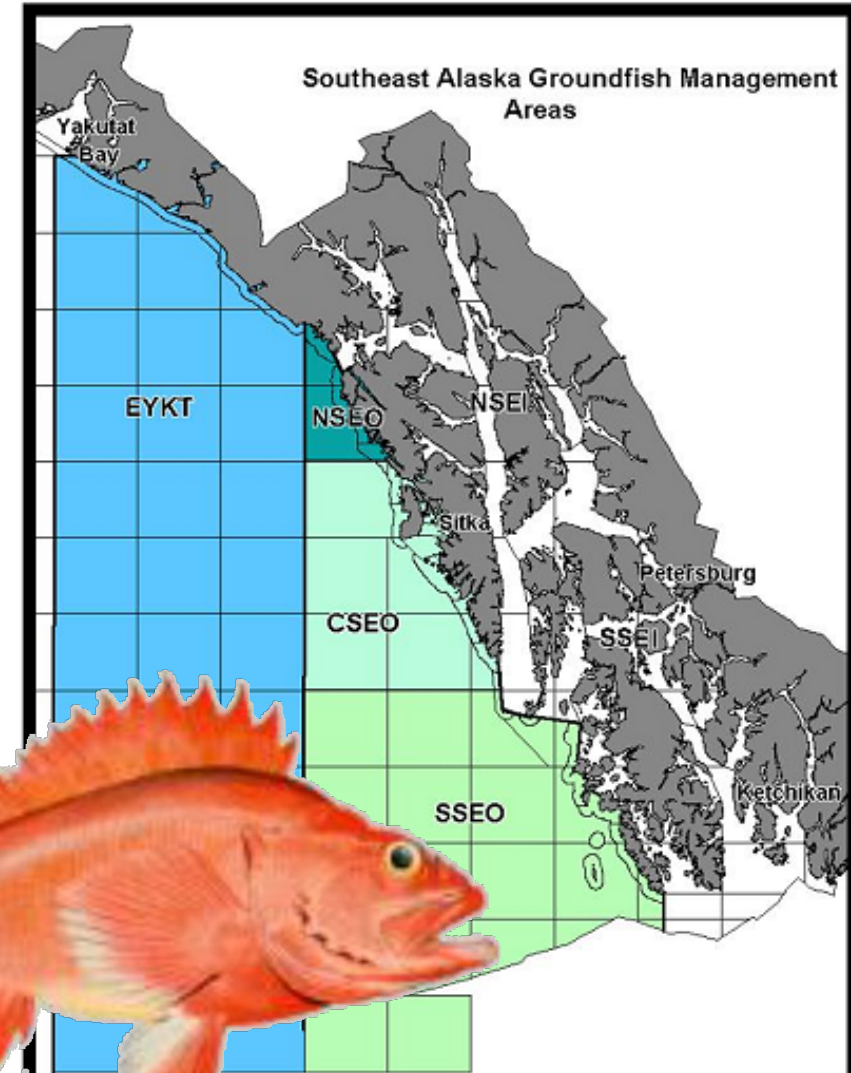
Rockfish ABC Summary

Species	ABC 2022	ABC 2023	Change
POP	38,268	37,193	down 1,075 (3%)
northern rockfish	5,146	4,964	down 182 (4%)
Shortraker Rockfish	705	705	same (0%)
Dusky	5,372	7,917	up 2,545 (47%)
Rougheye and Blackspotted Rockfish	788	775	down 13 (2%)
Demersal shelf rockfish	365	283	down 82 (22%)
Thornyhead	1,953	1,628	down 325 (17%)
Other rock	4,054	4,054	same (0%)
Sub Total	56,651	57,519	up 868 (2%)

SEO Demersal shelf rockfish (full assessment)

Phil Joy
ADF&G
Phil.Joy@alaska.gov

- Tier 5 (yelloweye) and Tier 6 (6 other species)



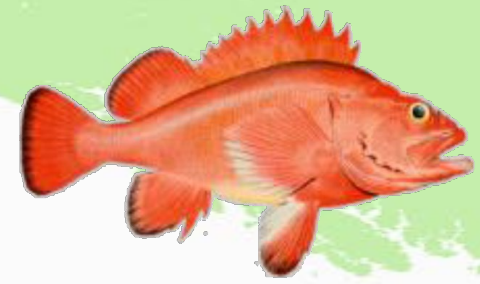
2022 Assessment

1. Standardize status-quo methods ✓
2. Random effect model updated ✓
 - Spatially stratified
 - IPHC CPUE index as secondary
3. Harvest reconstruction
 - Developing methods to estimate unobserved discards in the halibut fishery
4. State-space surplus production model
 - Development
 - Risk analysis

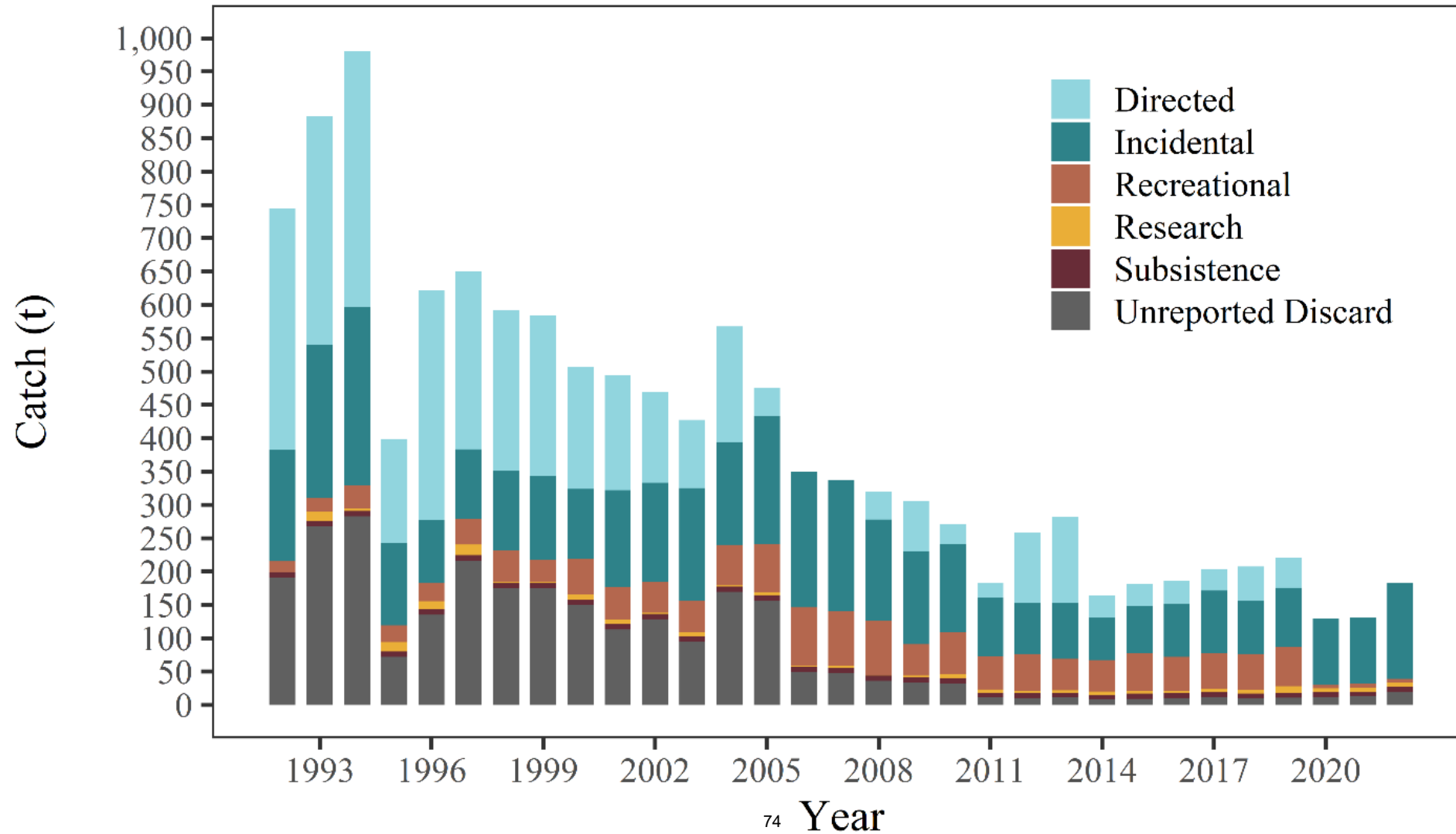
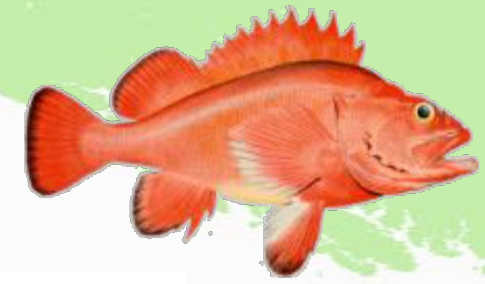
September Plan
Team
Recommendations:

OFL and ABC

Research Model
CIE review in 2023



SEO Demersal shelf rockfish: Catch



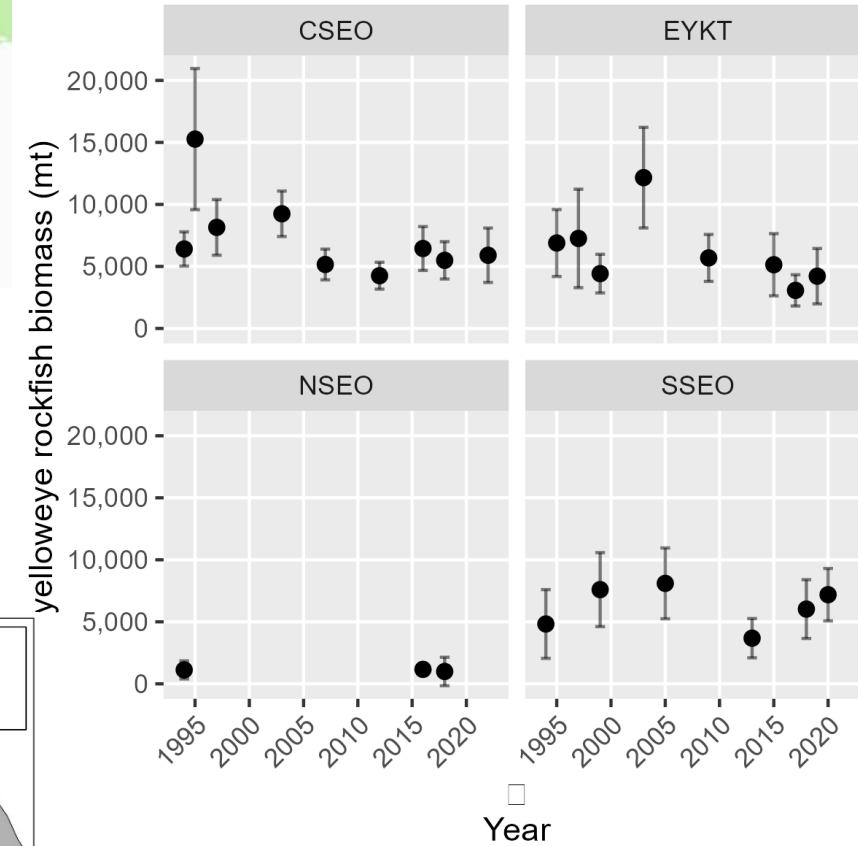
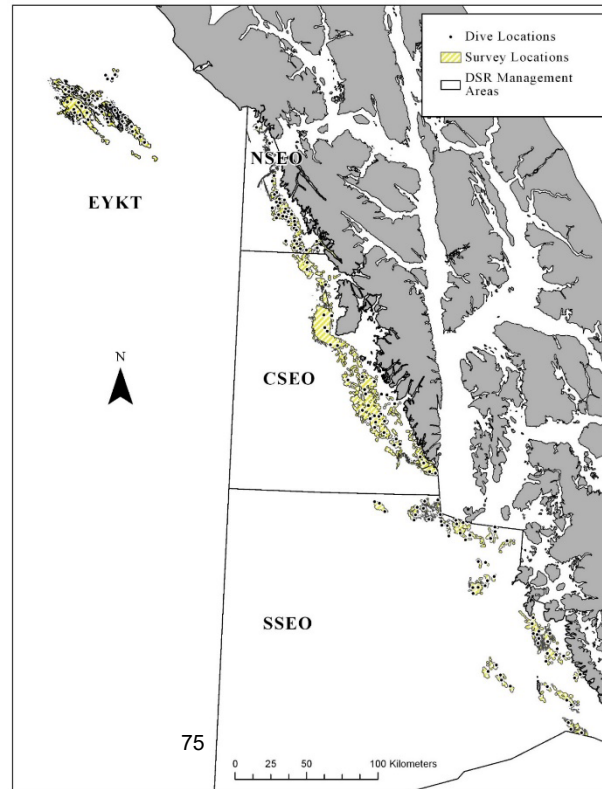
SEO Demersal shelf rockfish

Biomass estimate

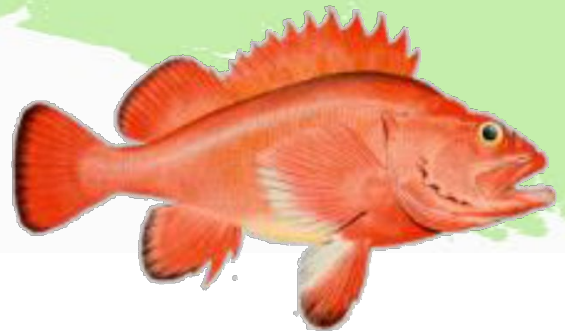
Density (+ variance)
x Avg. weight of yelloweye from portside
sampling (+ variance)
x Estimate of yelloweye habitat (no variance)
= Management Area Biomass

*High interannual variability; unlikely for long
lived species*

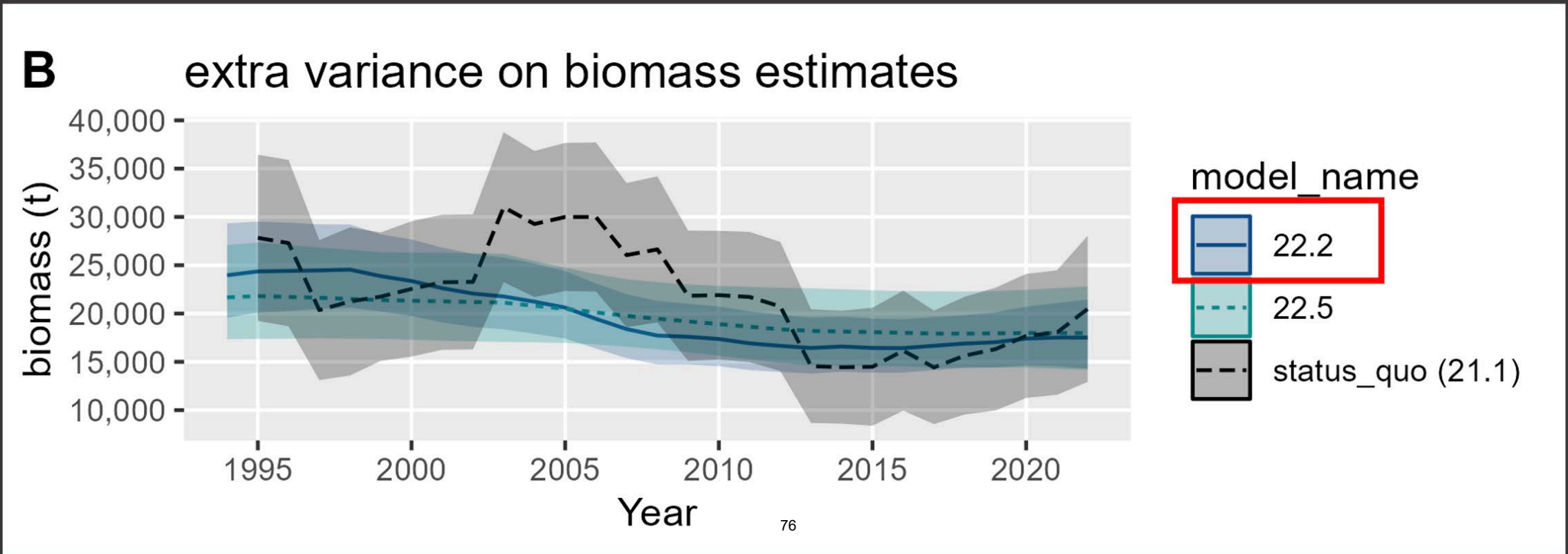
EYKT: 739 km²
NSEO: 442 km²
CSEO: 1,661 km²
SSEO: 1,056 km²



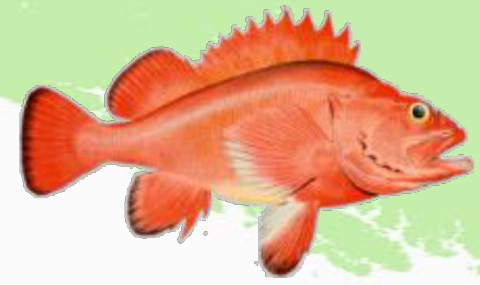
SEO Demersal shelf rockfish



Preferred Model 22.2: Extra observation error & IPHC CPUE index



SEO Demersal shelf rockfish: Team Discussion



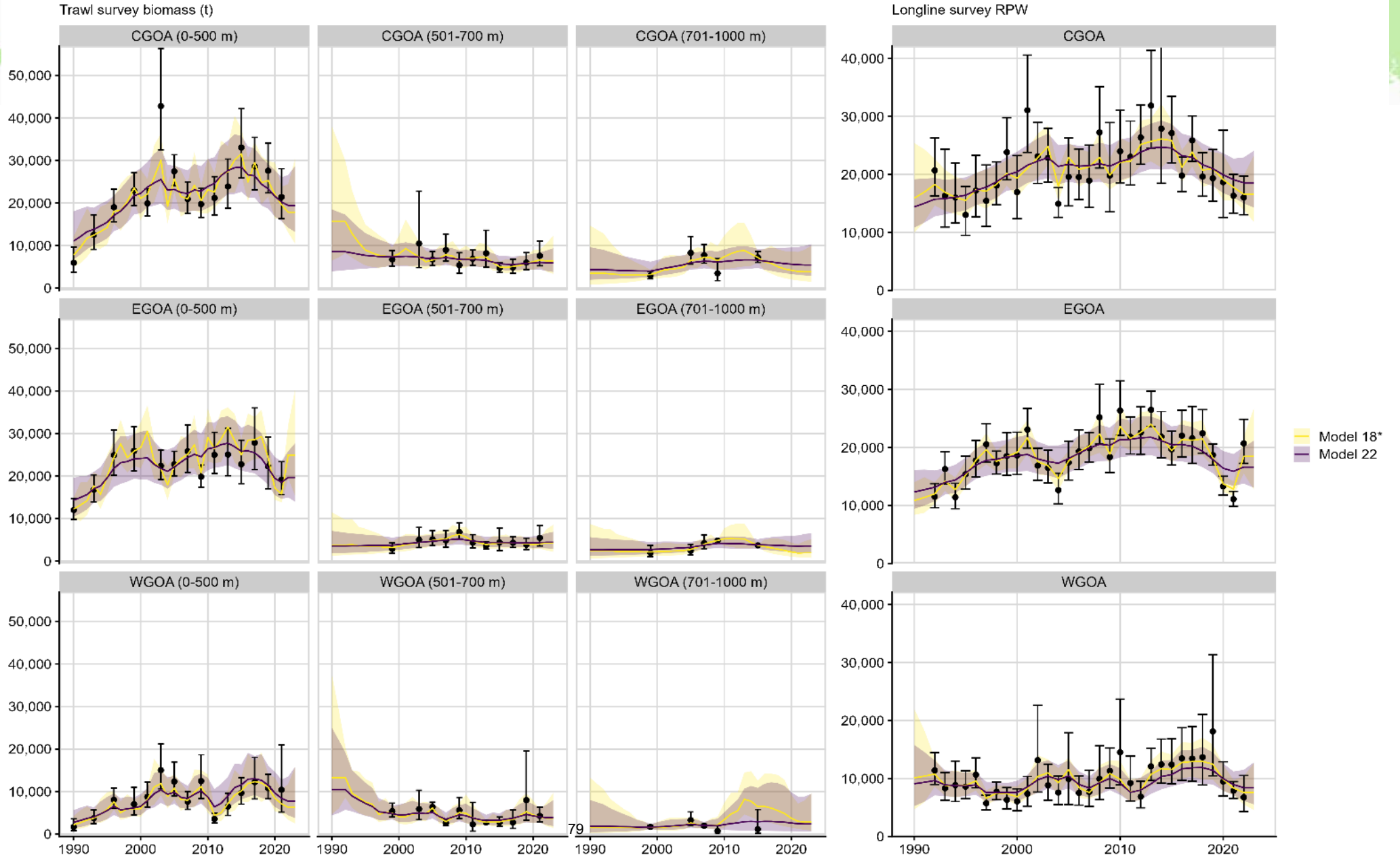
- The Team supported the author's recommended OFL (376 t)
- The Team recommended ABC of 283 t (maxABC)
 - Noted lower F rate in shift from Tier 4 to Tier 5 a sufficient conservation buffer

Rockfish ABC Summary

Species	ABC 2022	ABC 2023	Change
POP	38,268	37,193	down 1,075 (3%)
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Other rock	4,054	4,054	same (0%)
Sub Total	56,651	57,519	up 868 (2%)

No thornyhead rockfish assessment in 2021

Thornyhead rockfish (full assessment)



Thornyhead rockfish: Apportionments



GOA Area	2023 Biomass (t)	Percent of Total Biomass	Area ABC Apportionment (t)	% Change from 2022 Apportionment
Western	13,944	19%	314	↓ 11%
Central	30,810	43%	693	↓ 24%
Eastern	27,595	38%	621	↓ 10%
Gulfwide Total	72,349	100%	1,628	↓ 17%

GOA sharks (full assessment)

Species	2022 catch	ABC 2022	ABC 2023	Change
Pollock	129,876	144,444	160,301	up 15,857 (11%)
Pacific Cod	18,275	32,811	24,634	down 8,177 (25%)
Sablefish	17,531	22,794	40,502	up 17,708 (78%)
Flatfish	2,673	115,834	119,497	up 3,663 (3%)
Arrowtooth flounder	11,456	119,779	119,485	down 294 (0%)
Rockfish	36,055	56,651	57,519	up 868 (2%)
Atka mackerel	880	4,700	4,700	same (0%)
Skates	2,706	6,563	6,563	same (0%)
Sharks	2,112	3,755	4,891	up 1,136 (30%)
Octopus	111	980	980	same (0%)
Total	221,675	508,311	539,072	up 30,761 (6%)

GOA Sharks

Spiny dogfish

Biomass = 31,243 t (RE model)

Assume $q = 0.21$

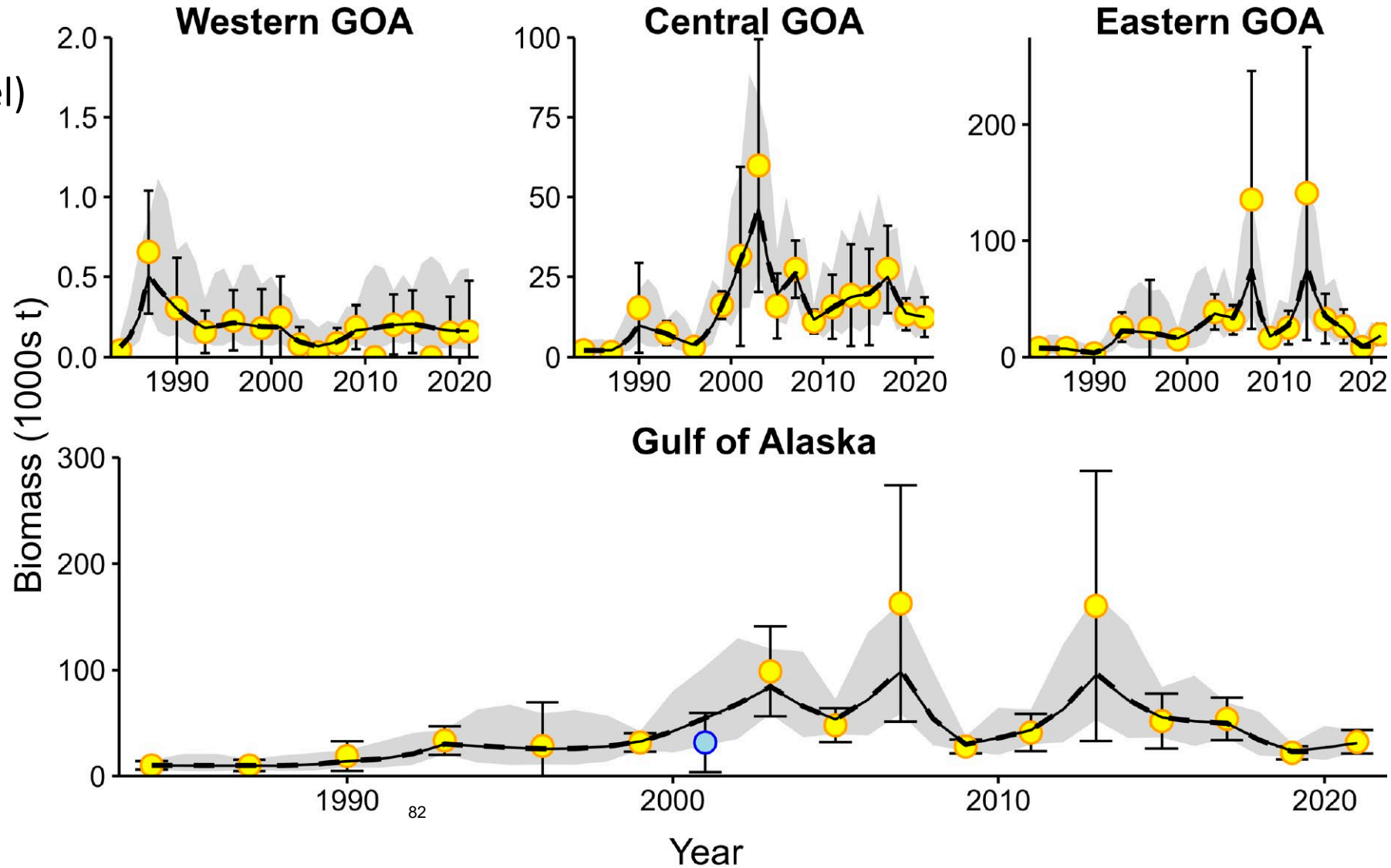
Biomass = 148,776 t

FOFL = 0.04

FABC = 0.03

OFL = 5,591 t

ABC = 4,463 t



GOA Sharks

Status quo approach

OFL = mean catch 1997 – 2007
ABC = 0.75 * OFL

Pacific
Sleeper
Shark
(PSS)

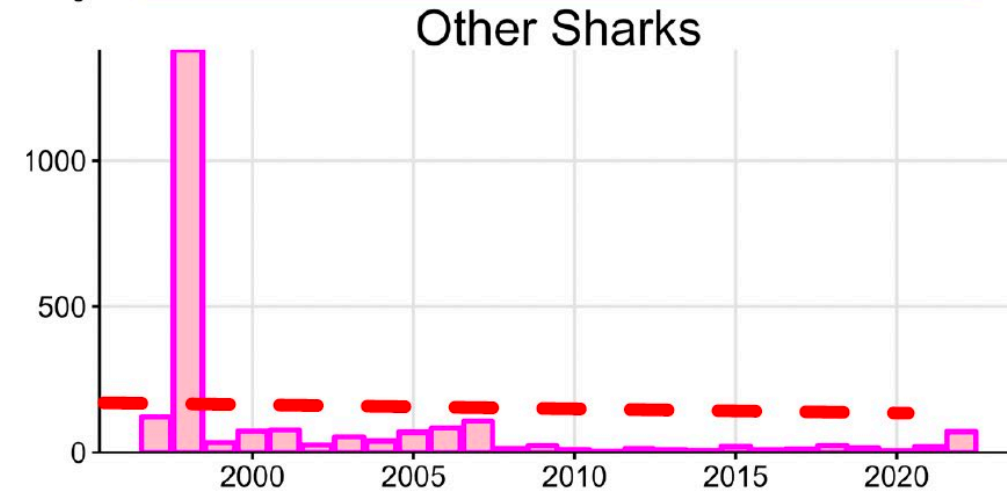
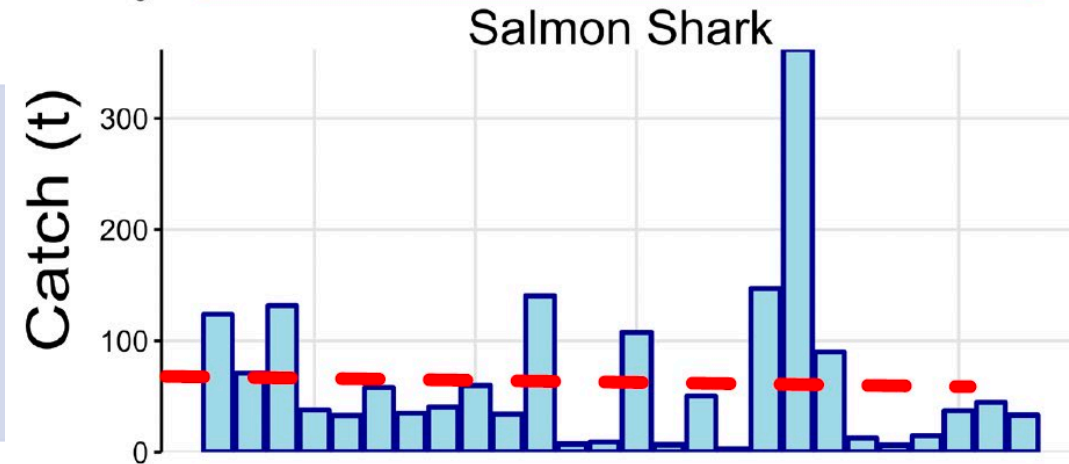
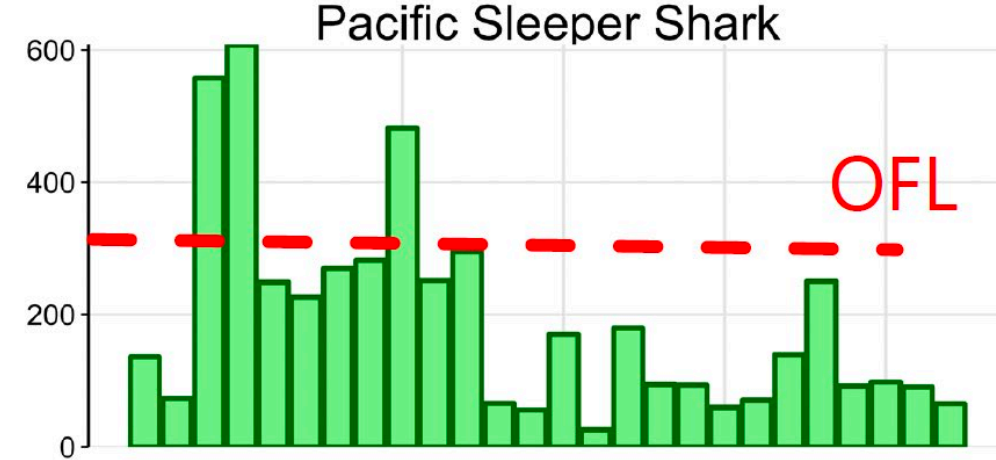
- OFL = 312 t
ABC = 234 t

Salmon
Shark (SS)

- OFL = 70 t
ABC = 53 t

Other/uni
dentified
Sharks
(OS)

- OFL = 188 t
ABC = 141 t



GOA Sharks

Status Quo

Species	Model	OFL (t)	ABC (t)
Pacific Sleeper	11.0	312	234
Salmon	11.0	70	53
Other/Unid	11.0	188	141
Spiny Dogfish	SD15.3A	5,951	4,463
Shark Stock Complex		6,521	4,891

Alternative Models

Species	Model	OFL (t)	ABC (t)
Pacific Sleeper	PSS22.0	197	148
Salmon	SS11.0	70	53
Other/Unid	OU22.0	123	92
Spiny Dogfish	SD15.3A	5,951	4,463
Shark Stock Complex		6,341	4,756

GOA sharks: Team Discussion

The Team recommended that a working group be formed to investigate alternative data-limited methods and harvest control rules for Tier 6 stocks.

- This WG should investigate how the ORCS approach might be applied to Tier 6 stocks with conservation concerns

Commended creative work of author

- But recommended status quo Tier 5/6 hybrid method for this year's specification

GOA Groundfish Harvest Specifications for 2023-2024

- Adopted the ABC/OFL recommendations as specified in [Table 1: Plan Team Recommended OFL/ABC 2023-2024.](#)
- *The SSC supports the GOA GPT's recommendation to approve the Halibut DMR Working Group recommendation for proposed halibut DMRs for 2023/2024.*
 - SSC Final Report October 2022