

Gulf of Alaska SAFE report

GOA Plan Team Members

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Paul Spencer	AFSC/REFM
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Kresimir Williams	AFSC/RACE
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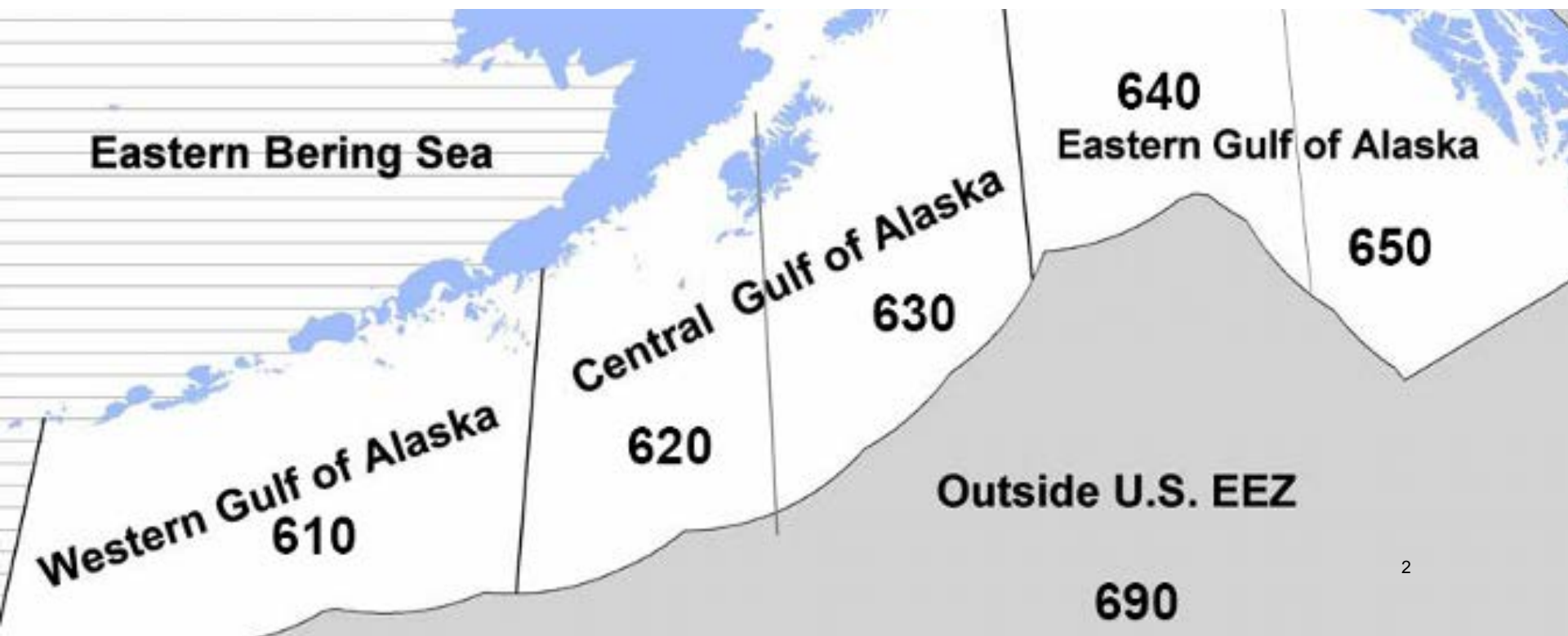
Report of the
Gulf of Alaska Groundfish
Plan Team meeting
Nov 17th-20th, 2020

GOA assessment Overview

“Off” year for GOA, NMFS bottom trawl survey occurred

8 “full” assessments reviewed

8 “partial” assessments



Stock Assessment schedule for the Gulf of Alaska

04 PPT - GOA FIS Report
DECEMBER 2020

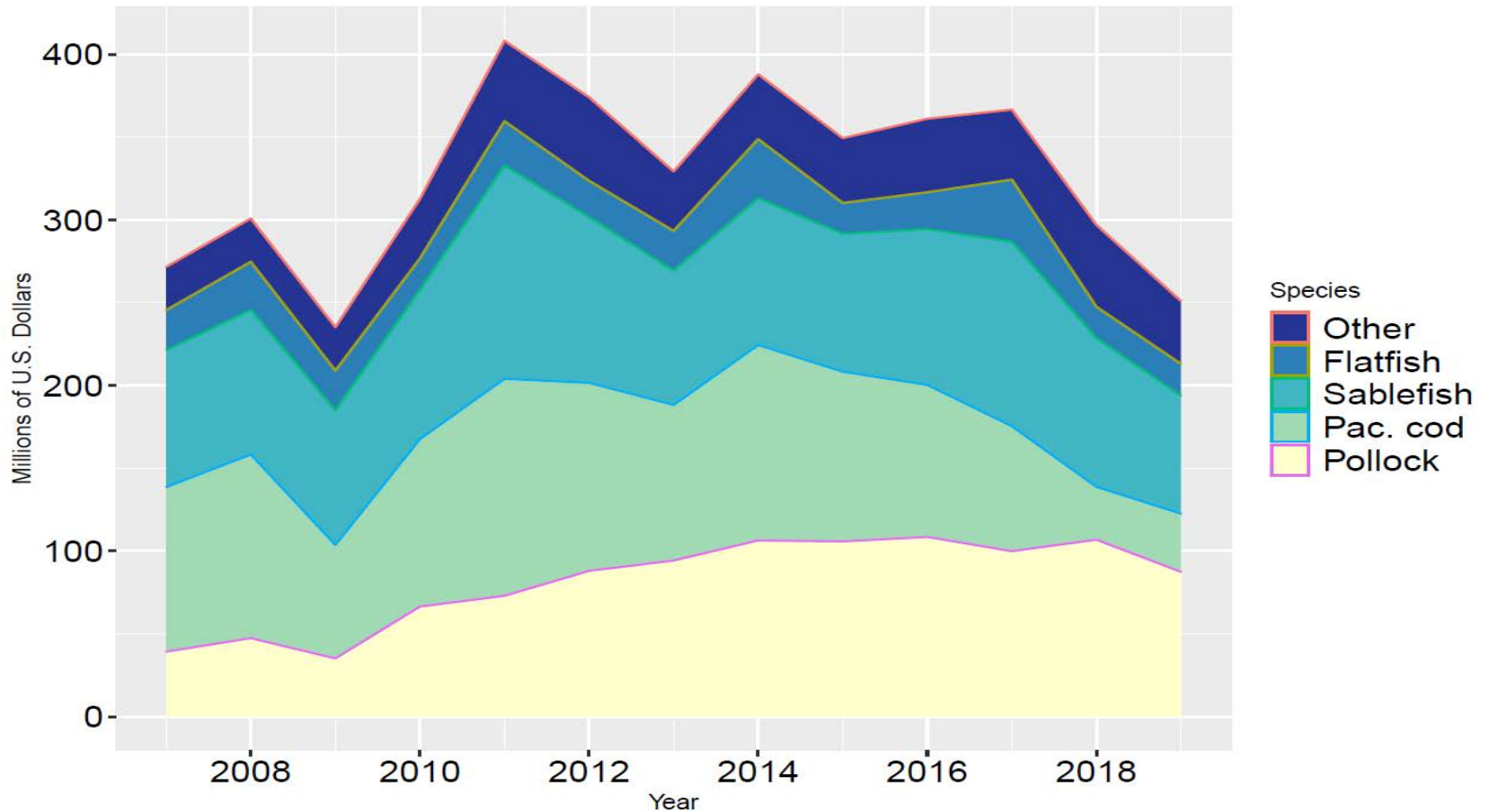
Stock	Assessment	Tier	Frequency (yrs)	Full assessment Year due
Pollock	Full	3	1	2021
Pacific cod	Full	3	1	2021
Sablefish	Full	3	1	2021
<i>Northern and southern rock sole</i>	<i>Partial</i>	3	4	2021
<i>Shallow water flatfish</i>	<i>Partial</i>	5	4	2021
<i>Deepwater flatfish (Dover)</i>	<i>Partial</i>	3/6	4	2023
<i>Rex sole</i>	<i>Partial</i>	5	4	2021
<i>Arrowtooth flounder</i>	<i>Partial</i>	3	2	2021
<i>Flathead sole</i>	<i>Partial</i>	3	4	2021
Pacific ocean perch	Full	3	2	2021
Northern rockfish	Full	3	2	2022
Shortraker rockfish	None	5	2	2021
Other rockfish	None	4/5/6	2	2021
<i>Rougheye & blackspotted rockfish</i>	<i>Partial</i>	3	2	2021
Dusky rockfish	Full	3	2	2022
<i>Demersal shelf rockfish</i>	<i>Partial</i>	4/6	2	2021
Thornyhead rockfish	Full	5	2	2022
Sharks	Full	5/6	2	2022
Skates	None	5	2	2021
Atka mackerel	None	6	2	2021
Octopus	None	6	2	2021
Forage species (including squid)	Report	eco	1	2022
Grenadiers (BSAI/GOA)	Report	eco	1	³ 2024

Overview

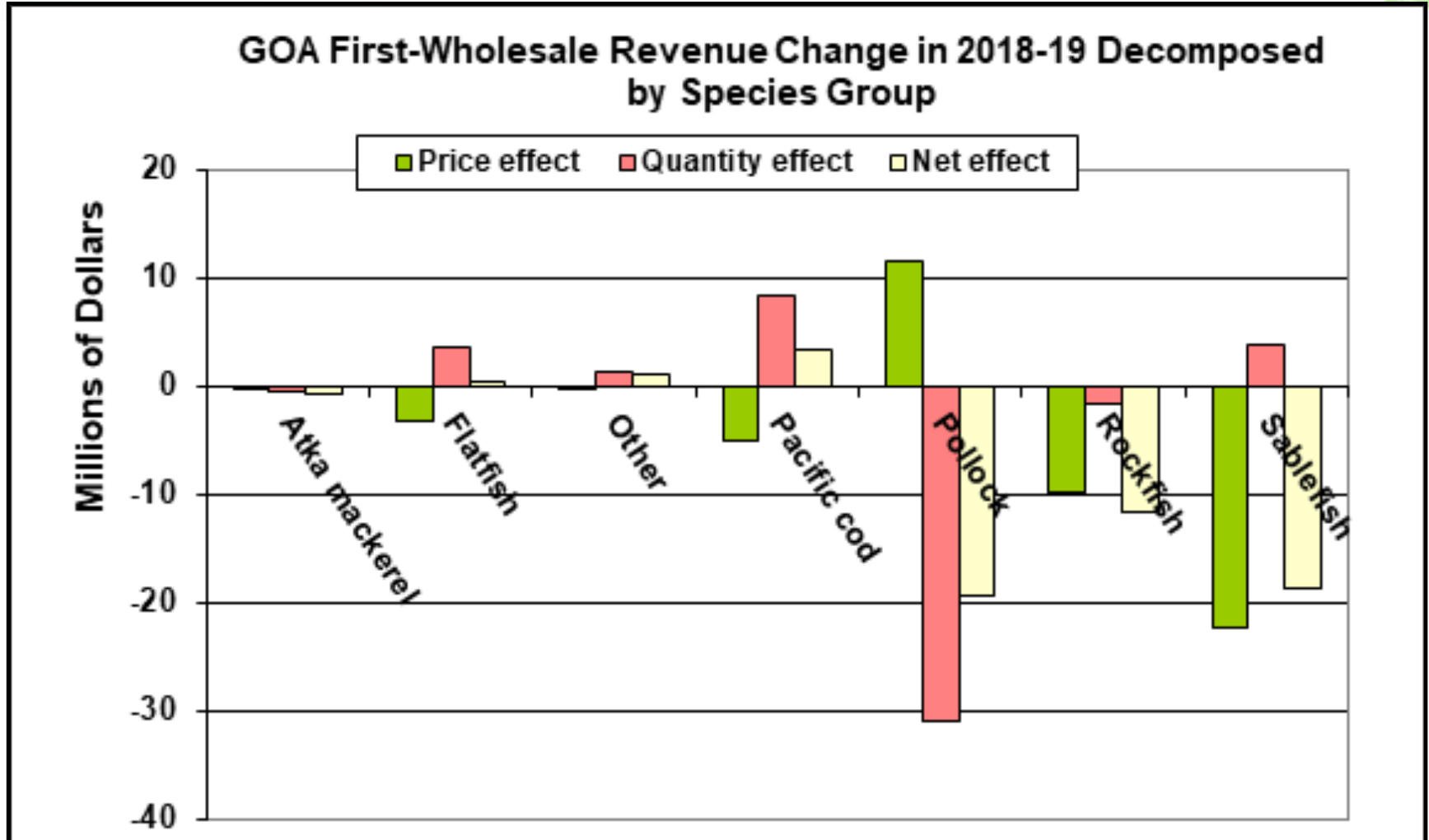
- 8 full assessments (sablefish complete so 7 to discuss); 8 partials

Stock	Assessment	Tier
Pollock	Full	3
Pacific cod	Full	3
Sablefish	Full	3
Pacific ocean perch	Full	3
Northern rockfish	Full	3
Dusky rockfish	Full	3
Thornyhead rockfish	Full	5
Forage species (including squid)	Report	eco

Stock	Assessment	Tier
<i>Northern and southern 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>	5
<i>Arrowtooth flounder</i>	<i>Partial</i>	3
<i>Flathead sole</i>	<i>Partial</i>	3
<i>Rougeye & blackspotted rockfish</i>	<i>Partial</i>	3
<i>Demersal shelf rockfish</i>	<i>Partial</i>	4/6

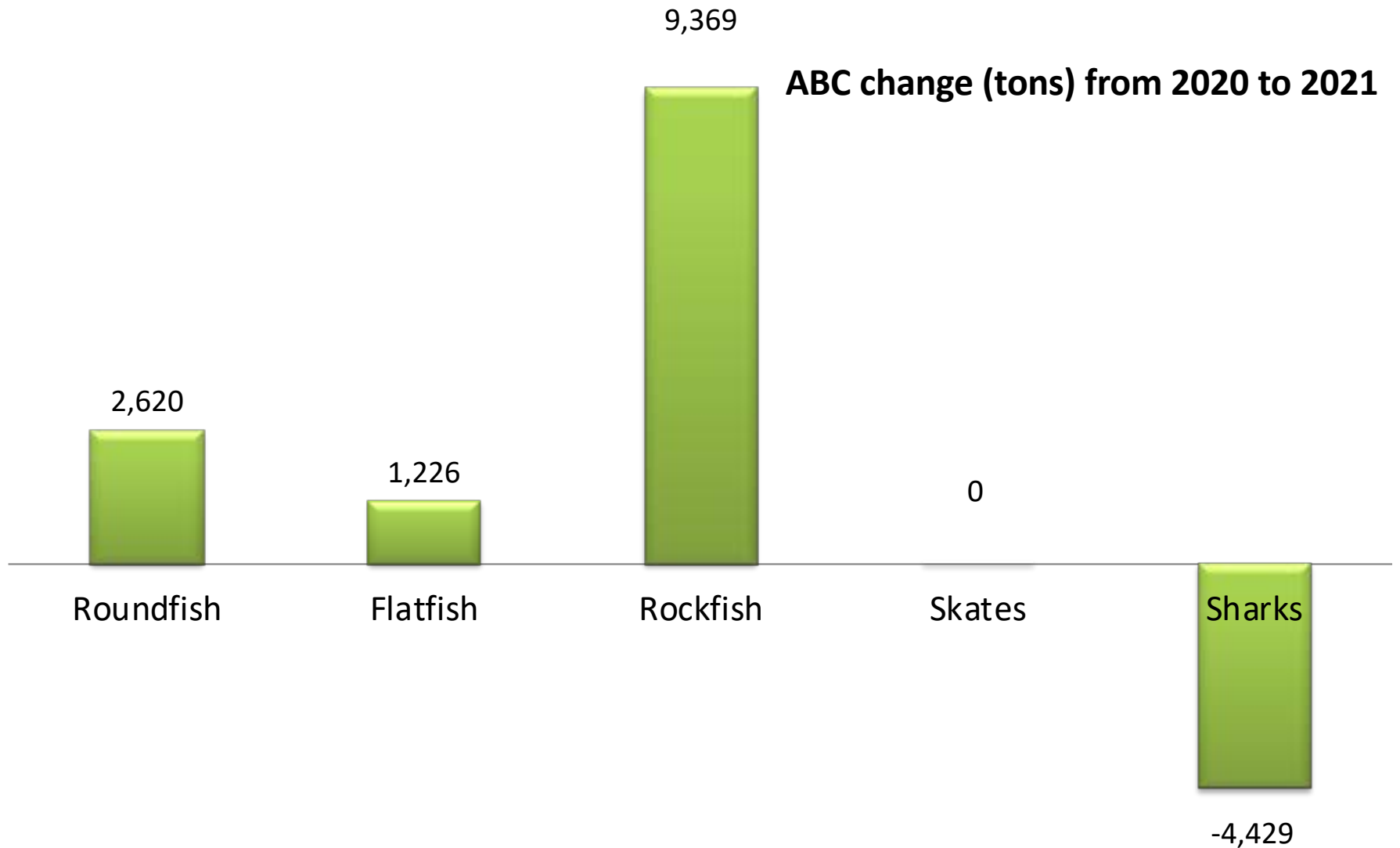


GOA Economic synopsis

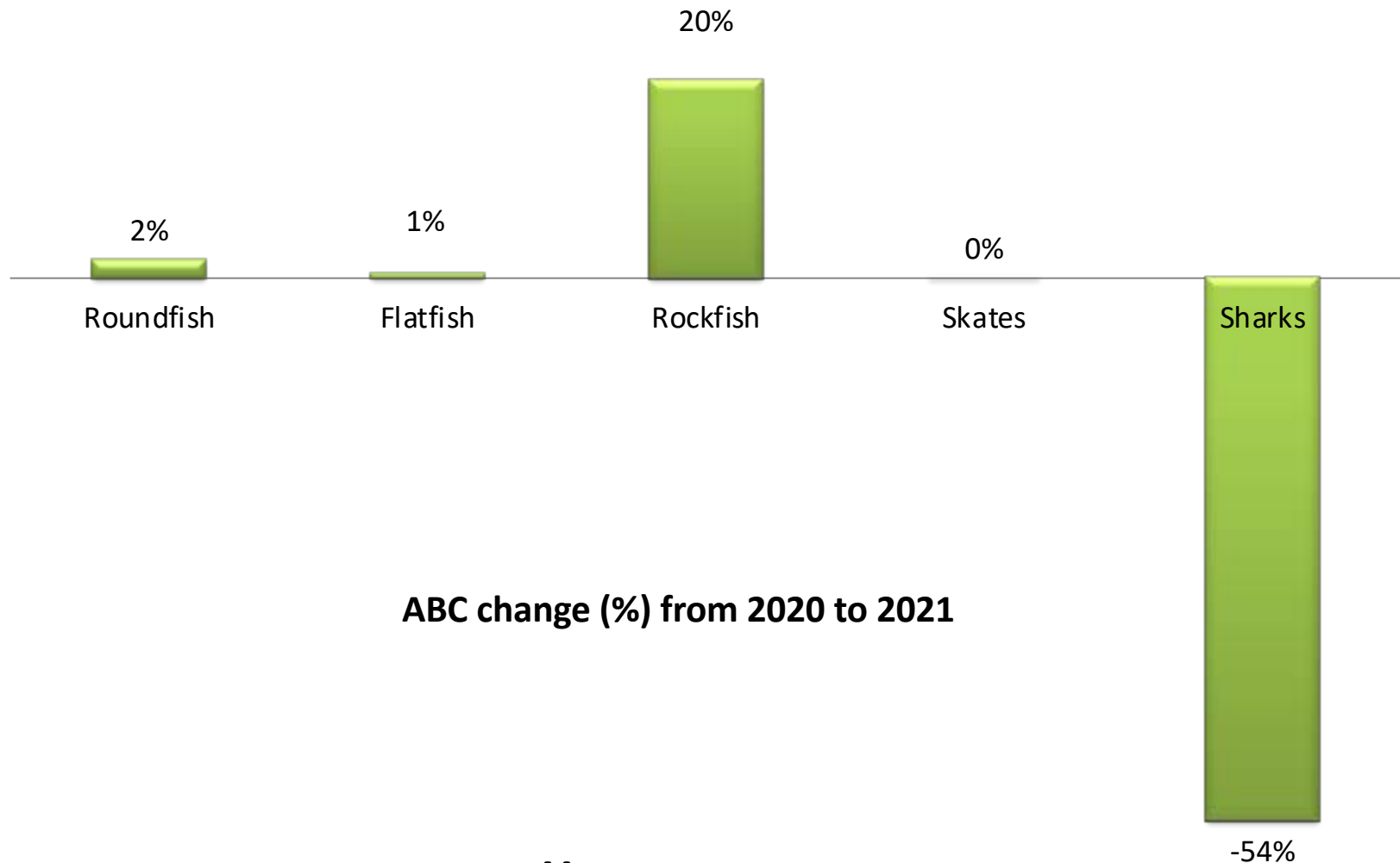


Revenue changes (and source)

2020-2021 ABC change

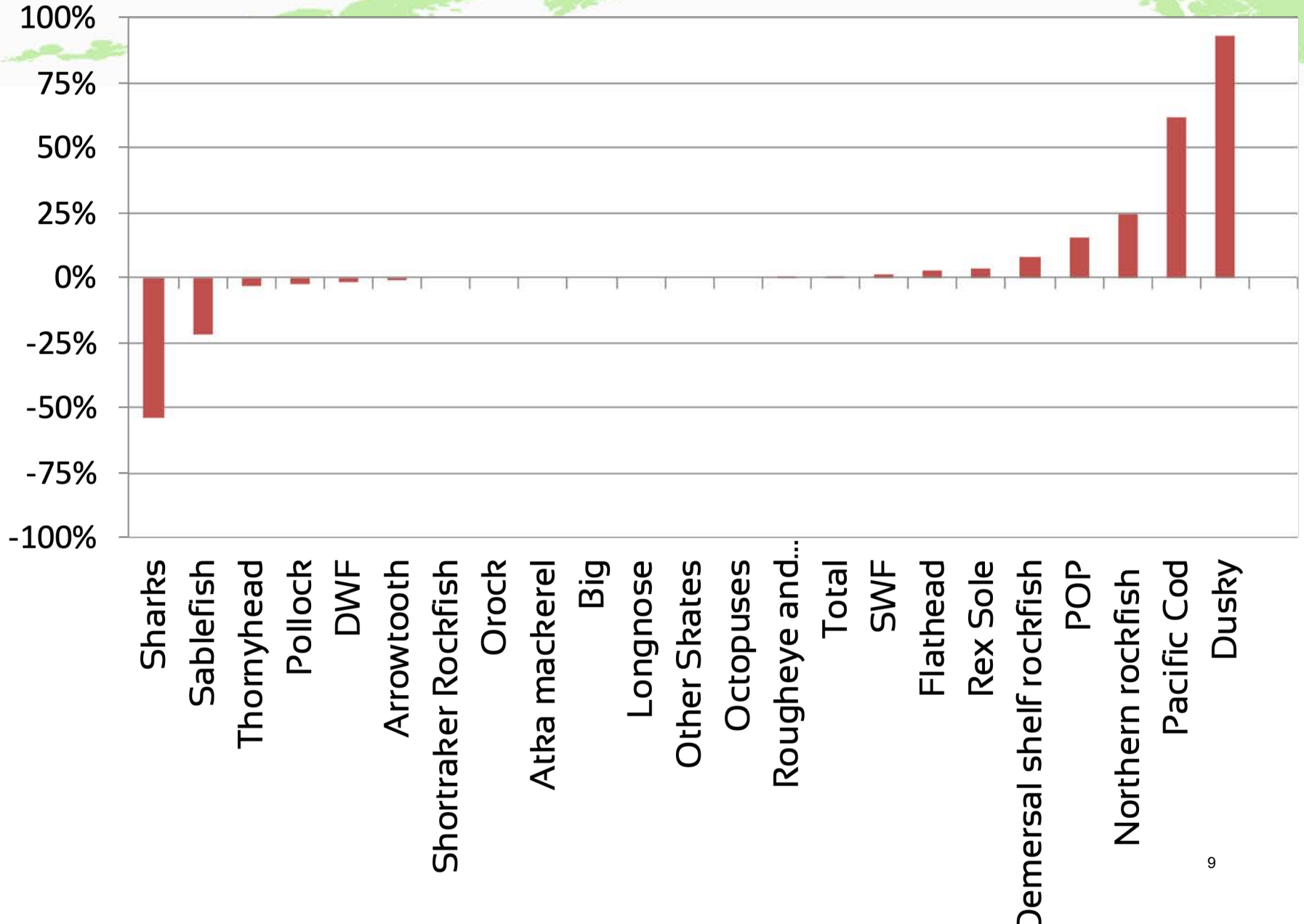


2020-2021 ABC change

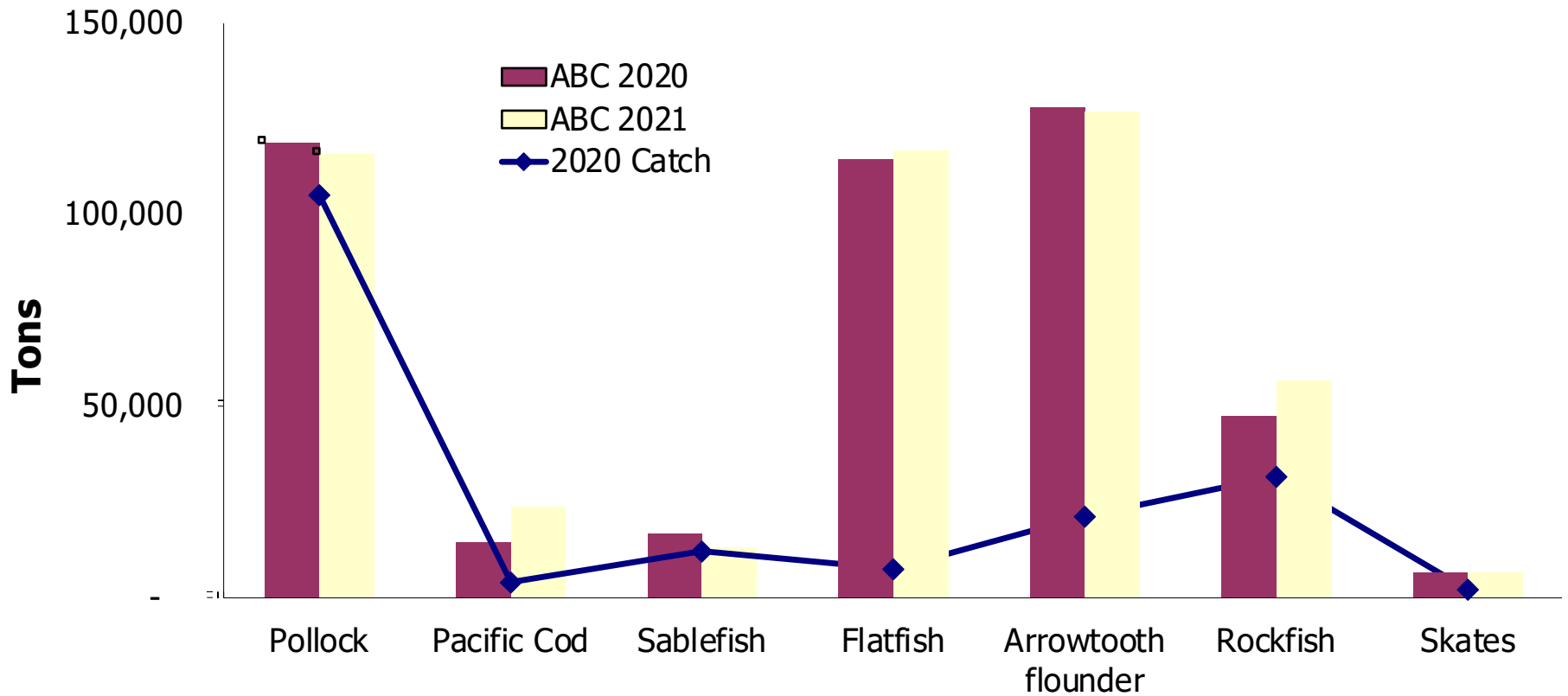


Overall a 1% increase
(assuming authors' sablefish apportionment)⁸

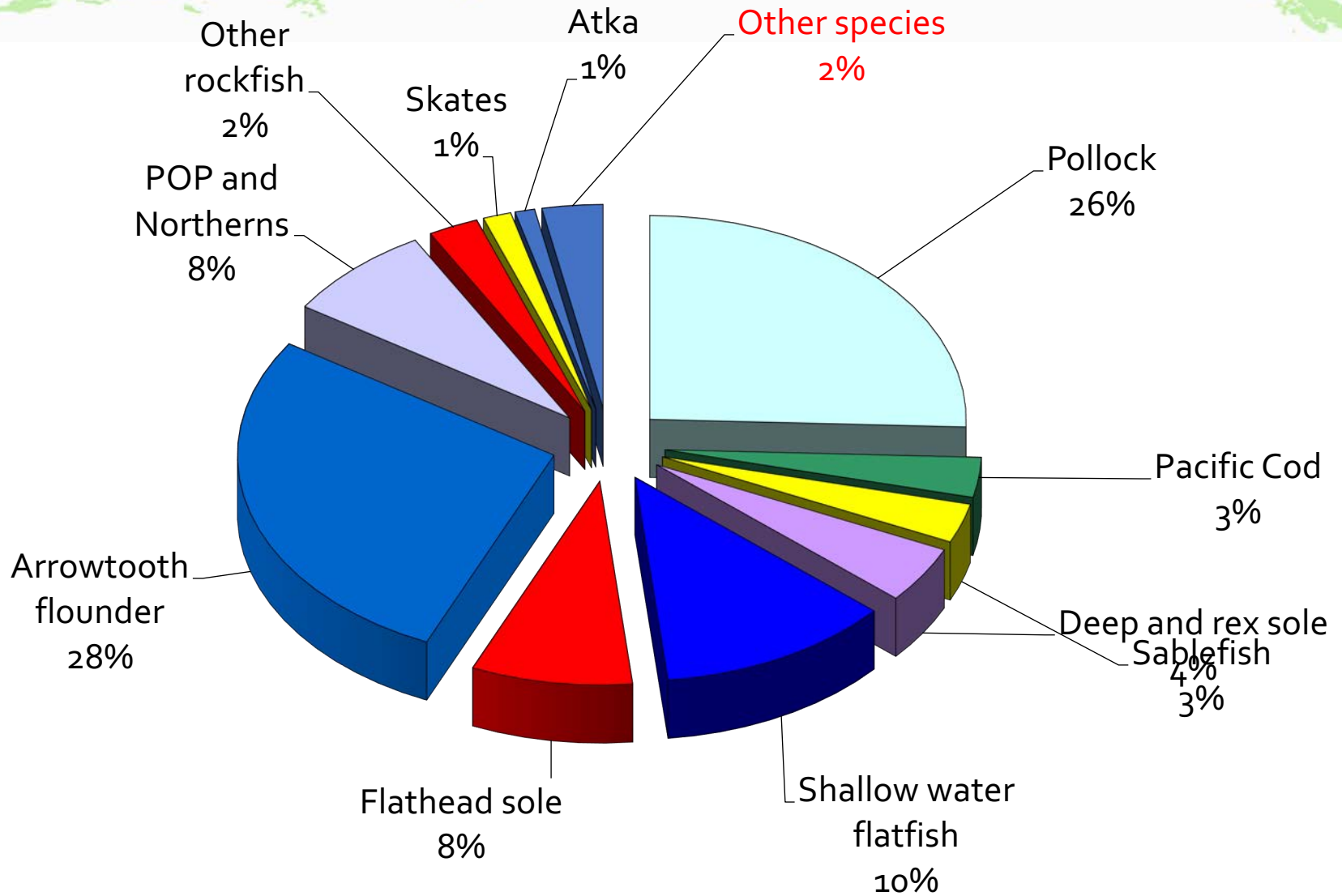
Percentage change in ABC, 2020-2021



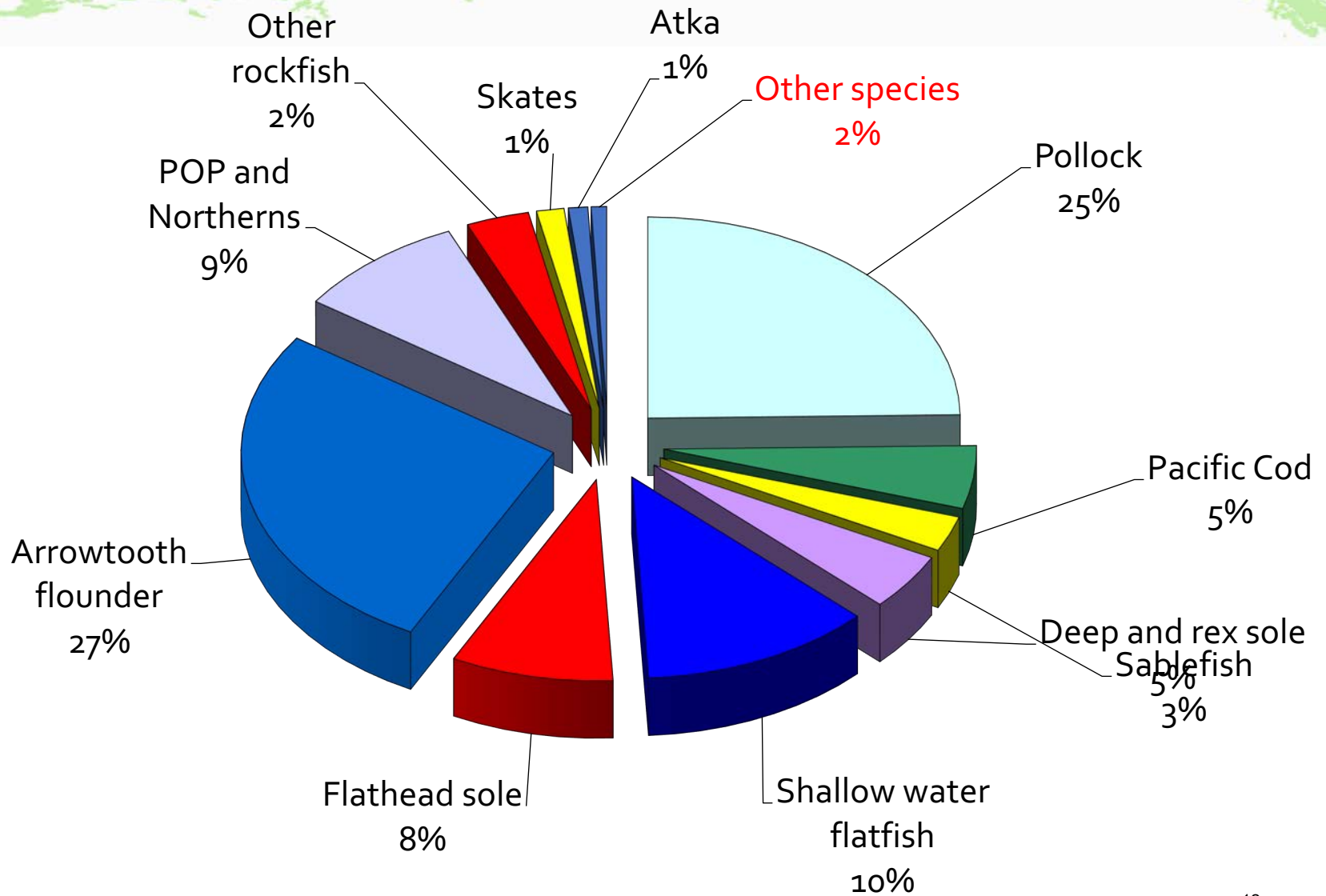
GOA Catch and ABC levels



GOA 2020 ABC's: 463,466 t



GOA 2021 ABC's: 469,543 t



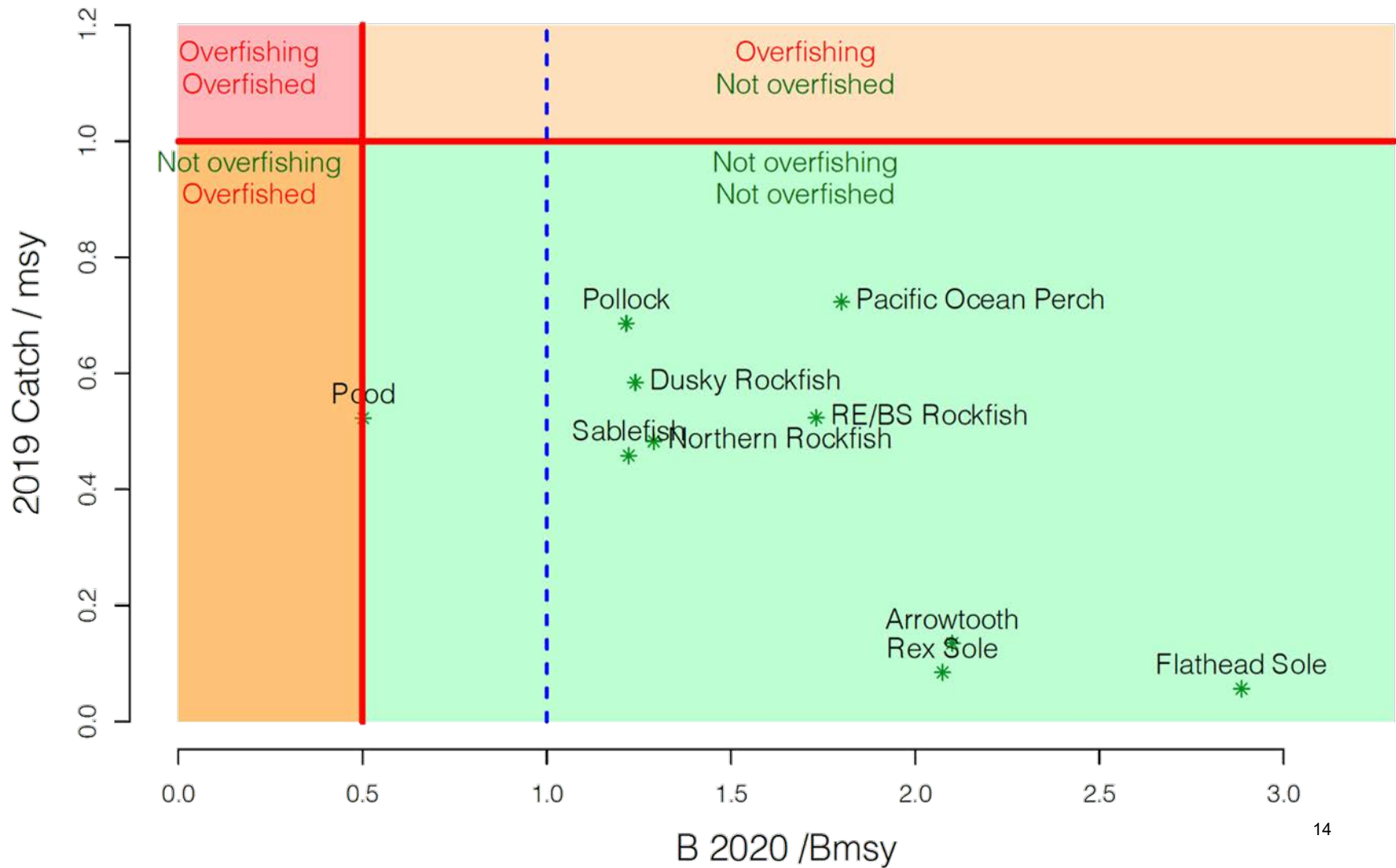
ABC / TAC

Team recommendations where ABC < maximum permissible:

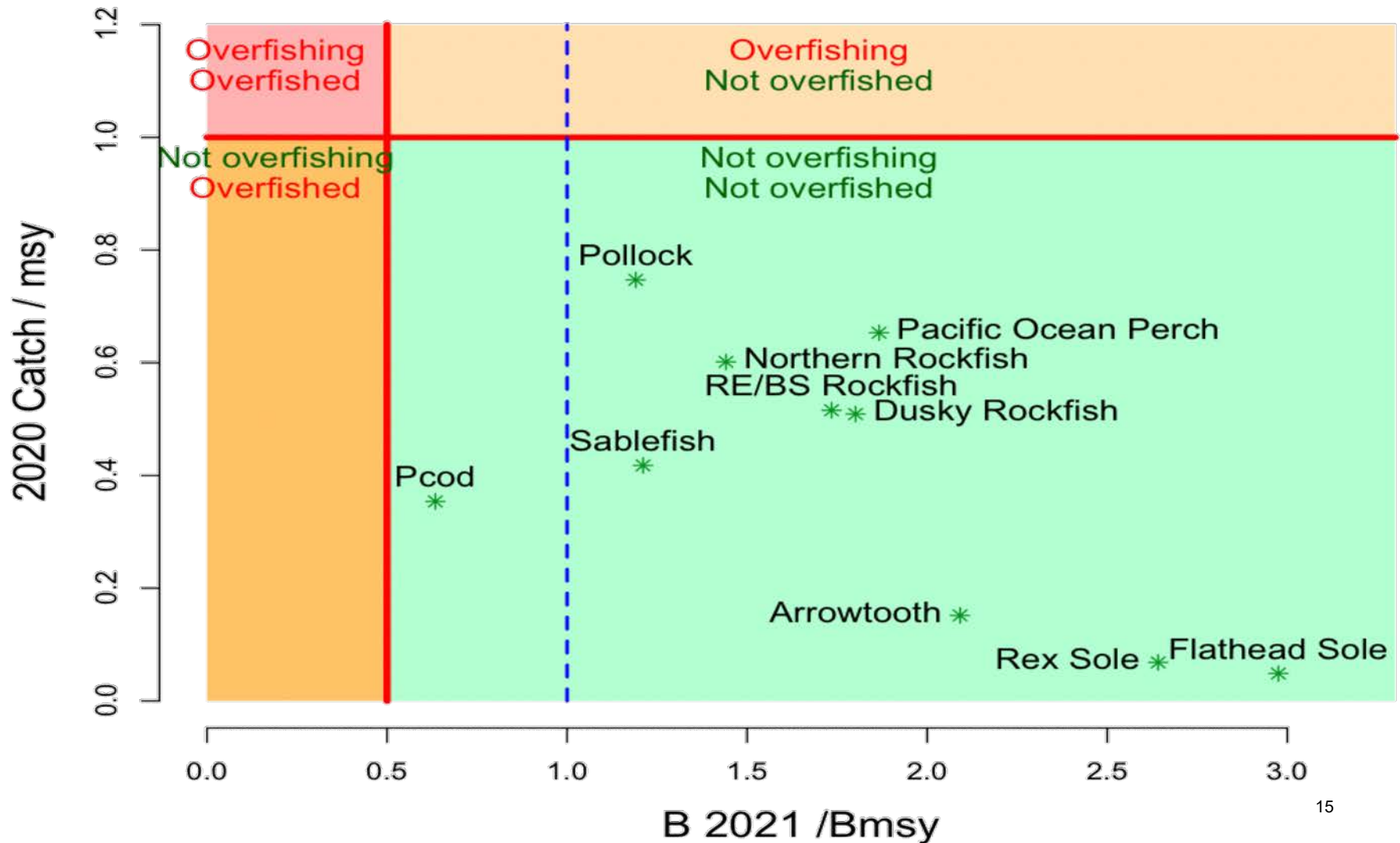
Table 3. Maximum permissible fishing mortality rates and ABCs as defined in Amendment 56 to the GOA and BSAI Groundfish FMPs, and the Plan Team's 2021 and 2022 recommended fishing mortality rates and ABCs, for those species whose recommendations were below the maximum permissible.

Species	Tier	$Max F_{ABC}$	2021		
			$Max ABC$	F_{ABC}	ABC
Sablefish	3a	0.100		0.042	
Demersal shelf rockfish	4, 6	0.026	328	0.02	257

Stock status summary last year



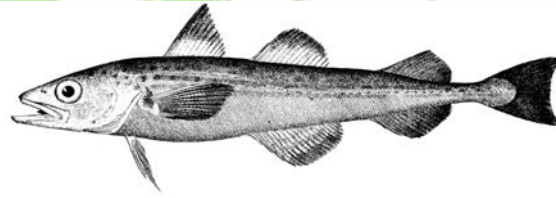
Stock status summary **this** year



Species overviews

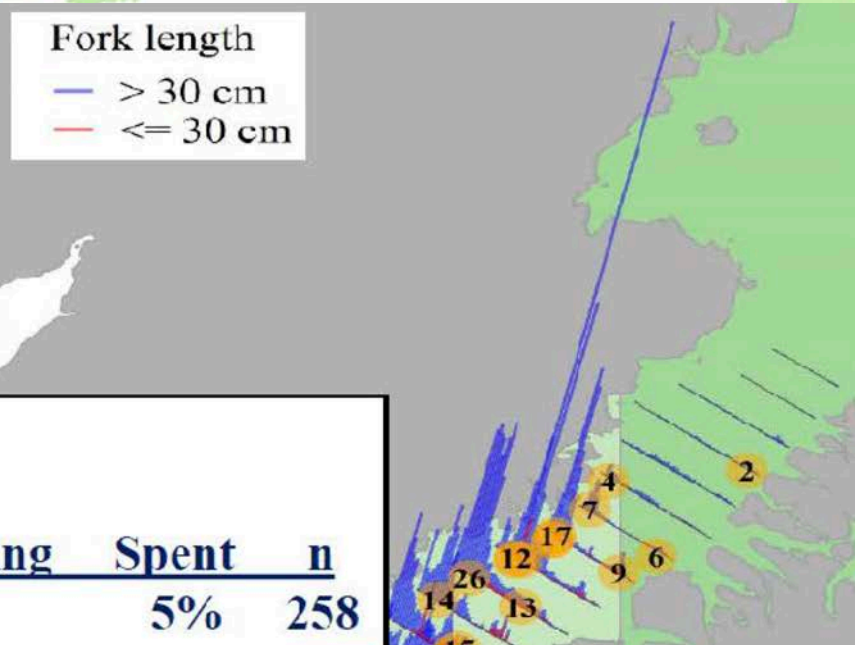
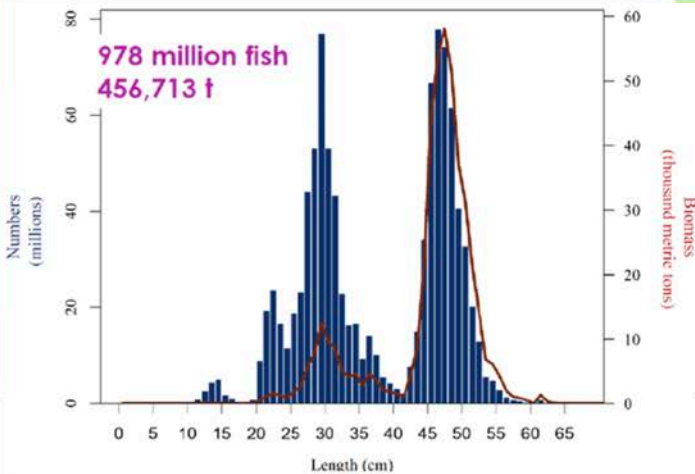
1. 2020 ABC/Catch and recommended changes
2. Highlights
 - New data
 - Analytic approach (changes)
3. Stock status and trend
4. ABC/OFL
 - Tier history and recommendations
 - 2021, 2022 maxABC; recommended ABC

ABC



Species	2020 Catch	2020	2021	Change
Pollock	105,118	118,642	115,870	down 2,772 (2%)
Pacific Cod	3,980	14,621	23,627	up 9,006 (62%)
Sablefish	12,095	16,883	13,269	down 3,614 (21%)
Flatfish	7,497	114,567	116,883	up 2,316 (2%)
Arrowtooth flounder	21,177	128,060	126,970	down 1,090 (1%)
Rockfish	31,628	47,450	56,819	up 9,369 (20%)
Atka mackerel	608	4,700	4,700	same (0%)
Skates	2,165	6,670	6,670	same (0%)
Sharks	1,581	8,184	3,755	down 4,429 (54%)
Octopus	78	980	980	same (0%)
Total	185,927	456,035	469,250	up 13,215 (3%)

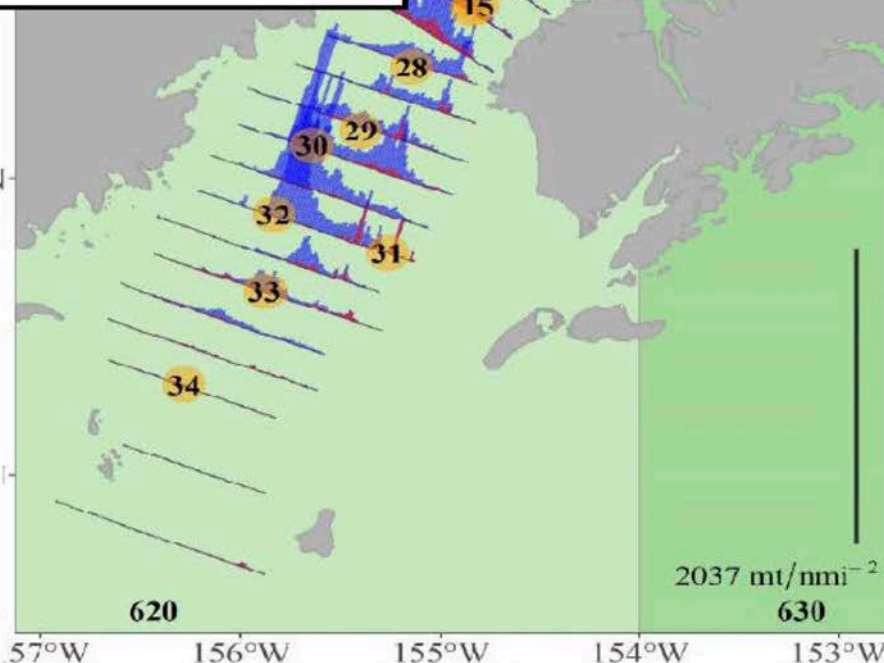
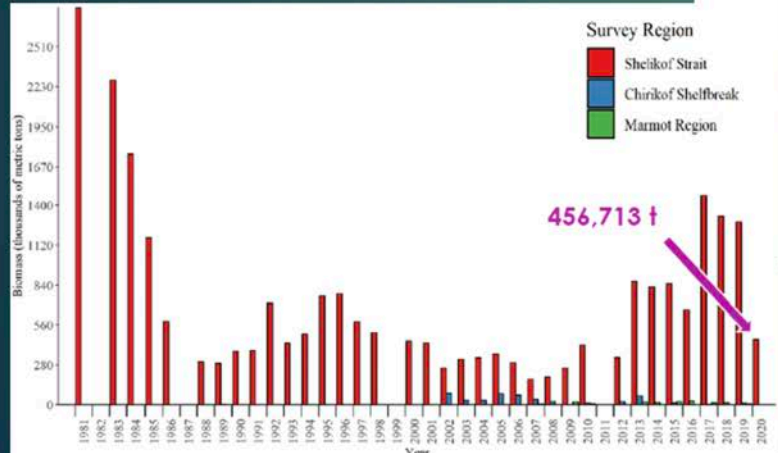
2020 Shelikof Strait EIT survey



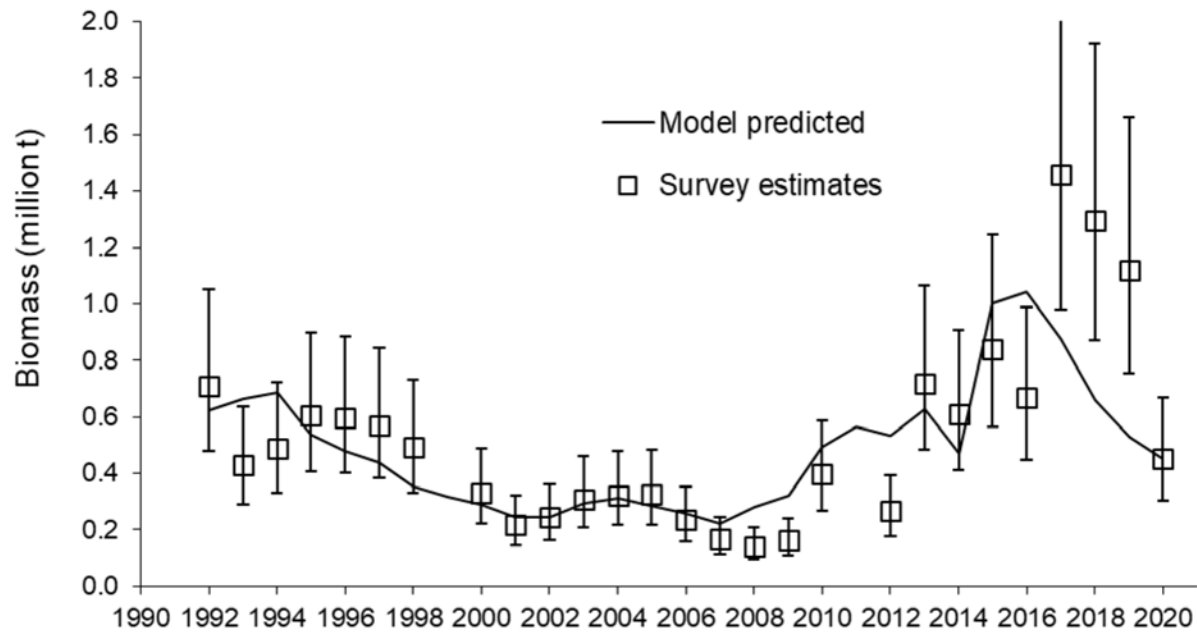
	<u>Prespawning</u>	<u>Spawning</u>	<u>Spent</u>	<u>n</u>
Shelikof	88%	1%	5%	258



2020 Shelikof Strait acoustic survey



Shelikof Strait acoustic survey (1992-2020)



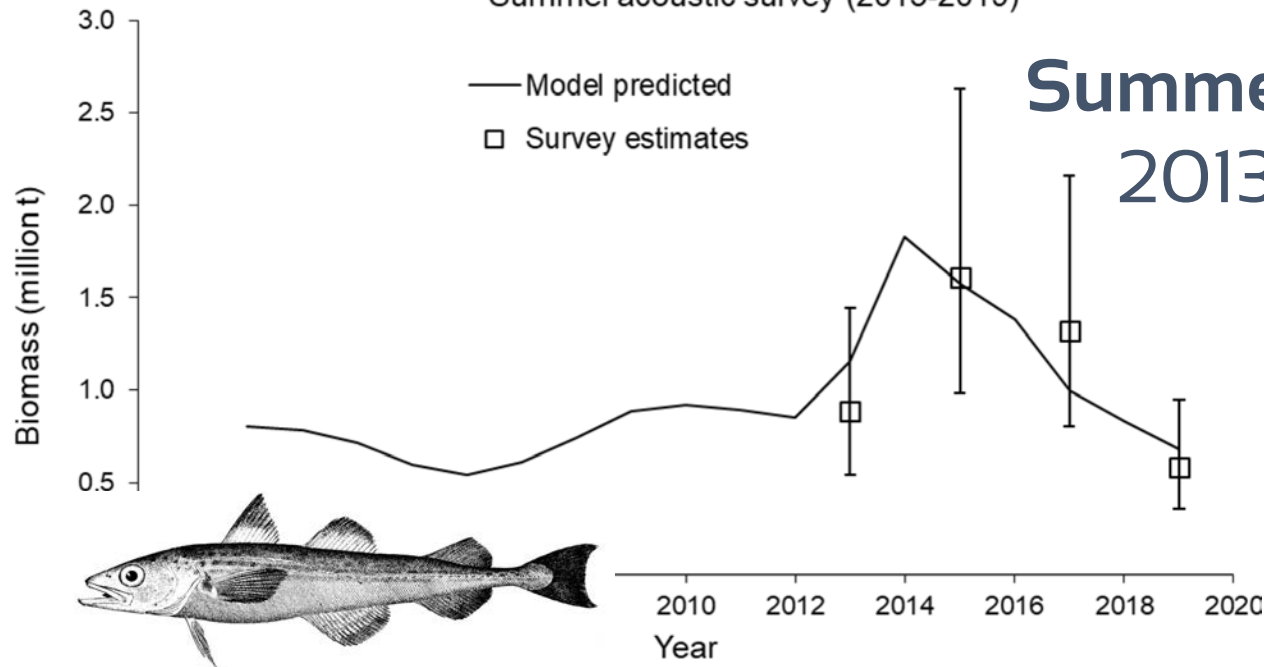
GOA pollock

CURRENT GOA FISH STOCK
DECEMBER 2020

Shelikof Strait winter acoustic survey, 1992-2020



Summer acoustic survey (2013-2019)



Summer acoustic survey
2013, 2015, 2017, 2019

Shelikof Strait winter acoustic survey, 1992-2020

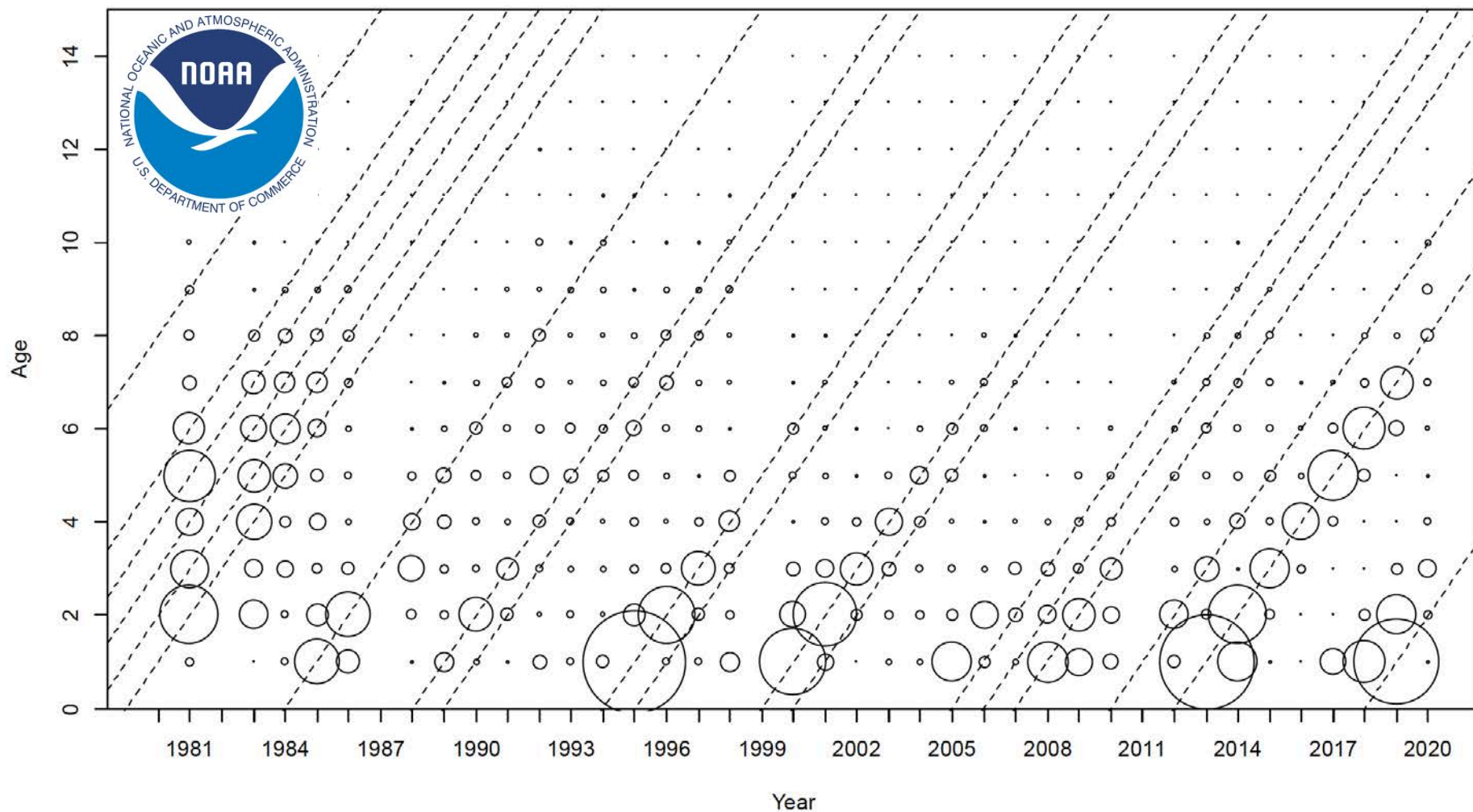
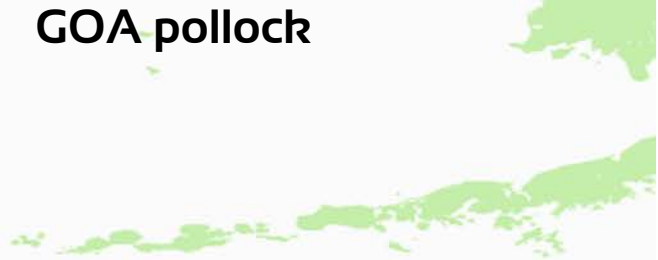
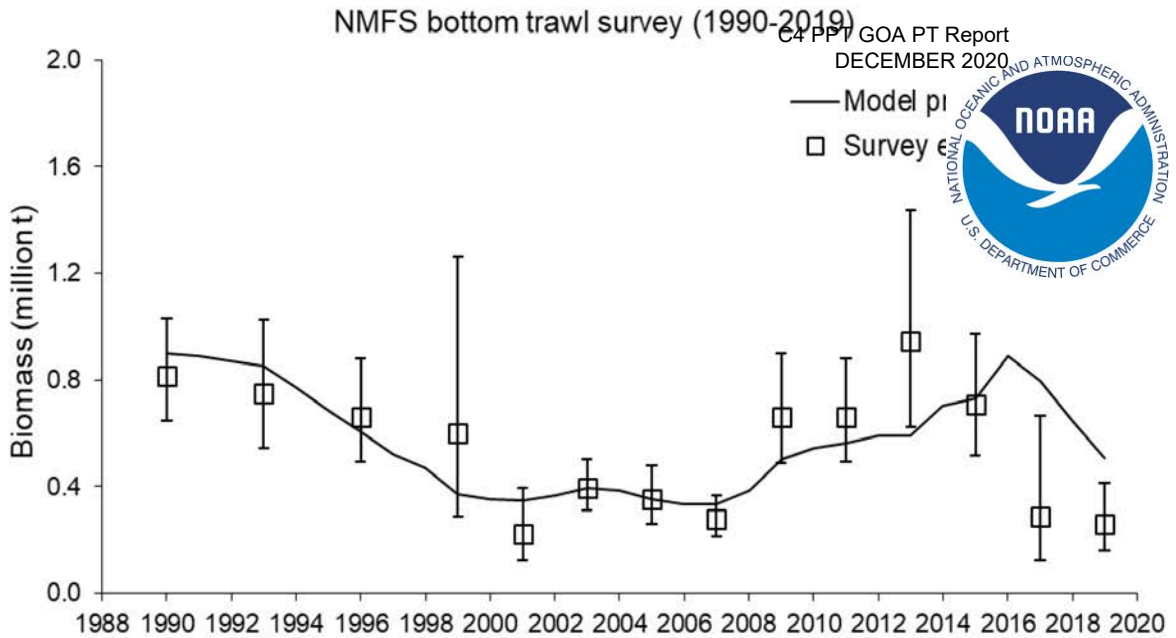


Figure 1.7. Estimated abundance at age in the Shelikof Strait acoustic survey (1981-2020, except 1982, 1987, 1999, and 2011). The area of the circle is proportional to the estimated abundance.

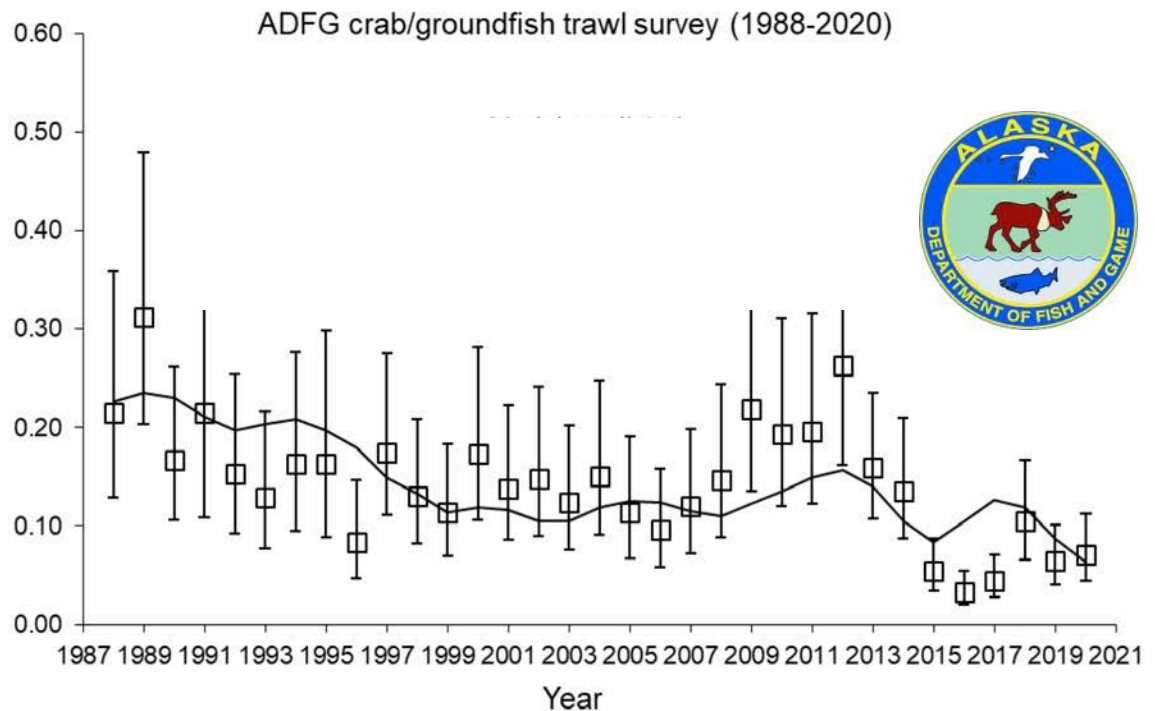
GOA pollock



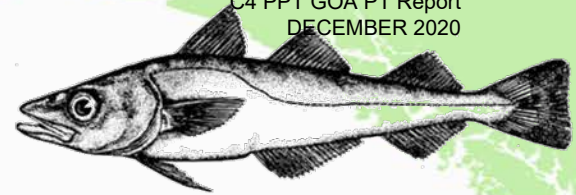
NMFS bottom trawl survey



ADFG trawl survey



Gulf of Alaska pollock Summary



Changes to the assessment model

- None

Author's 2021 ABC 105,722 t

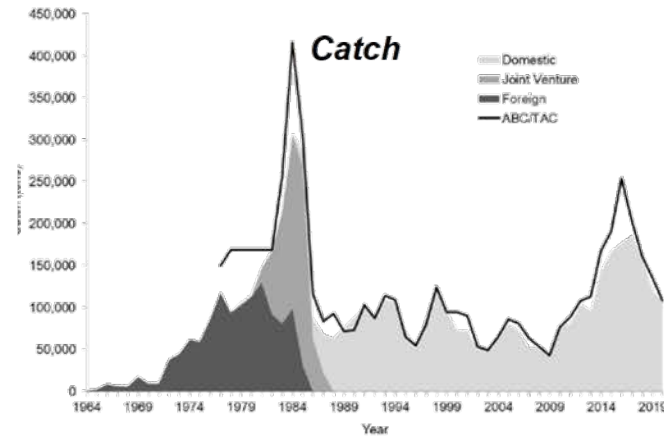
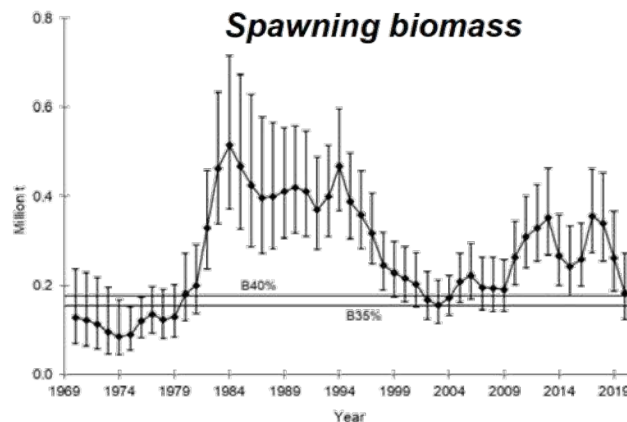
- Decrease of 3% from the 2020 ABC
- 2022 ABC decreases to ~91,000 t

Concerns:

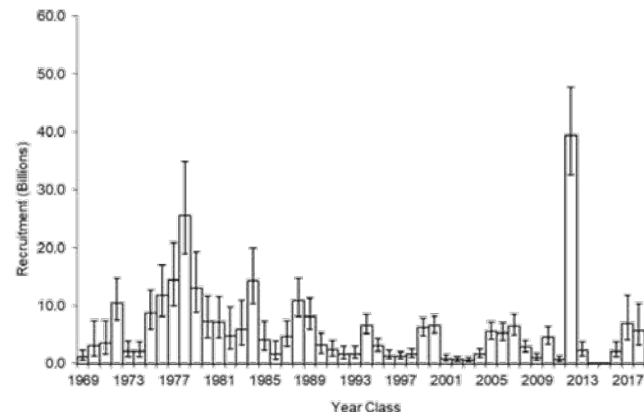
- Big drop Shelikof Strait survey
- Big drop in 2018 year class from 2019 to 2020
- Projections indicating a period of lower abundance and reduced harvests.

Positives:

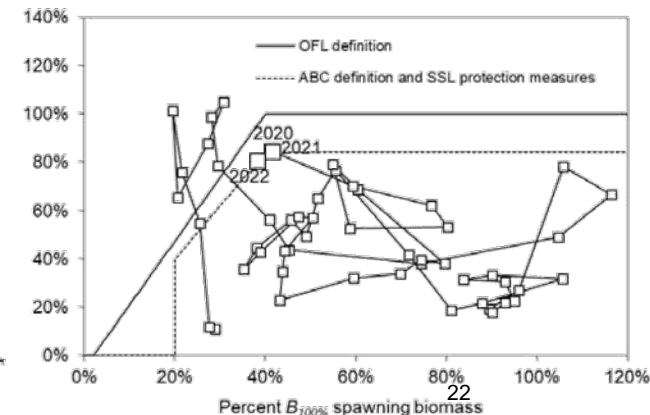
- Environmental conditions are relatively "normal"
- Conditions somewhat favorable for recruitment this year.



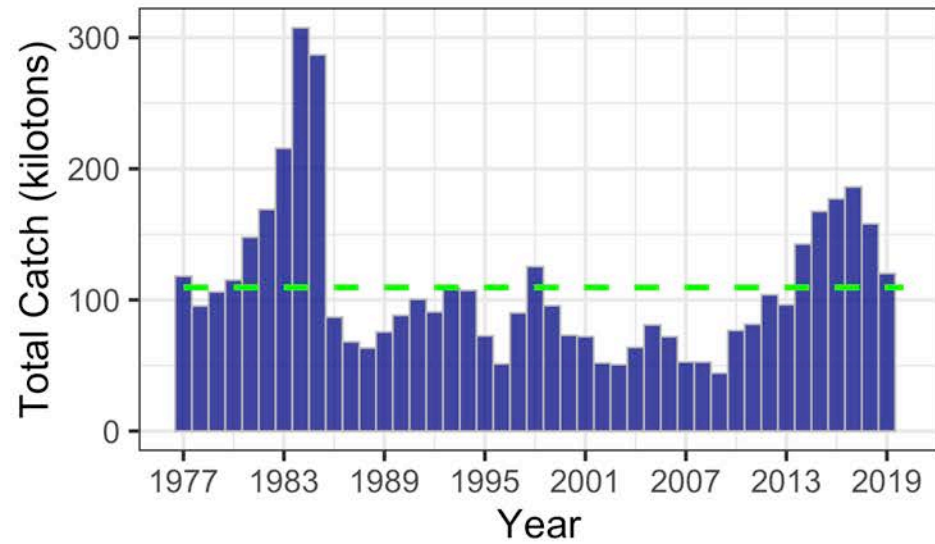
Recruitment



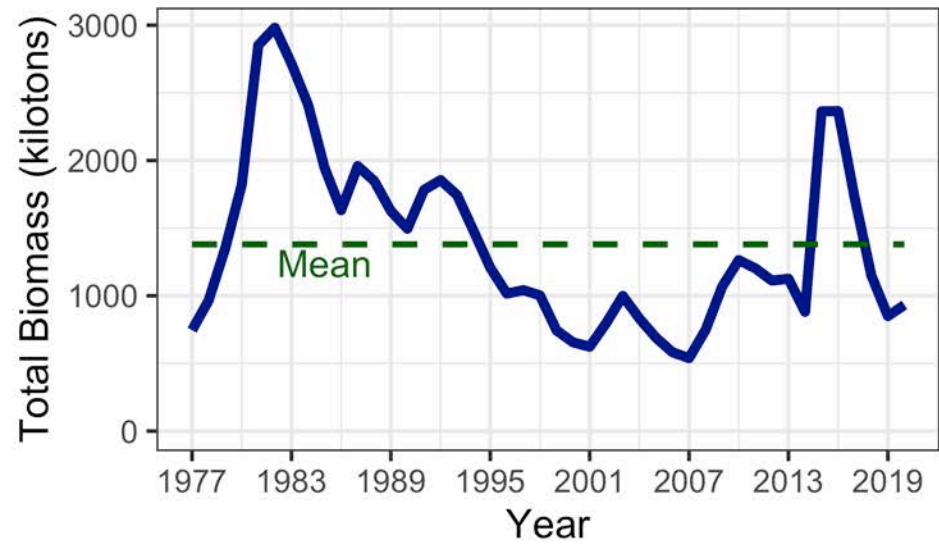
Status phase plot



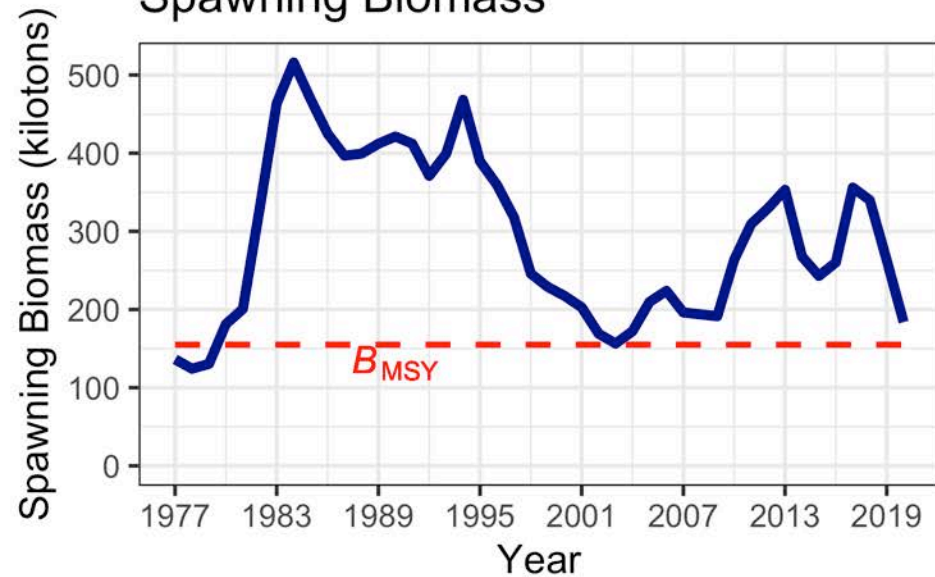
Total Catch



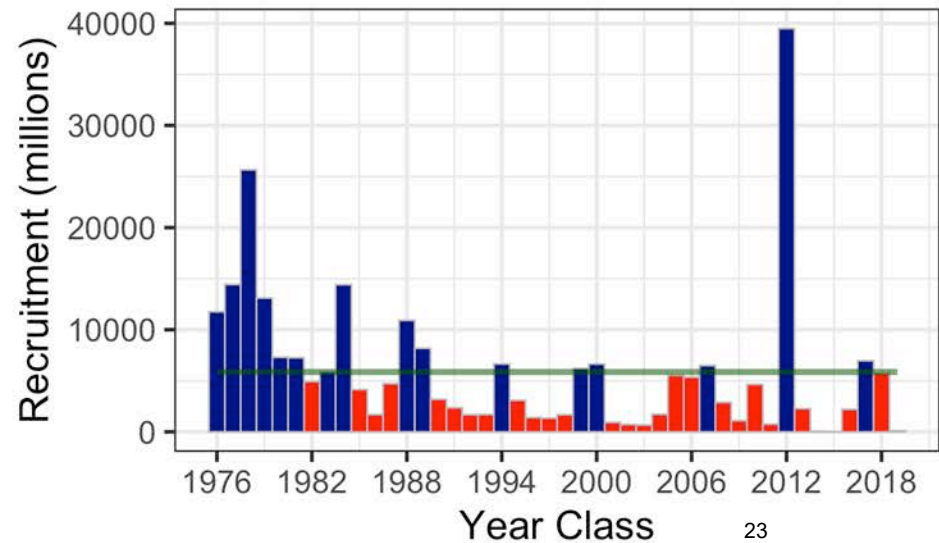
Total Biomass



Spawning Biomass



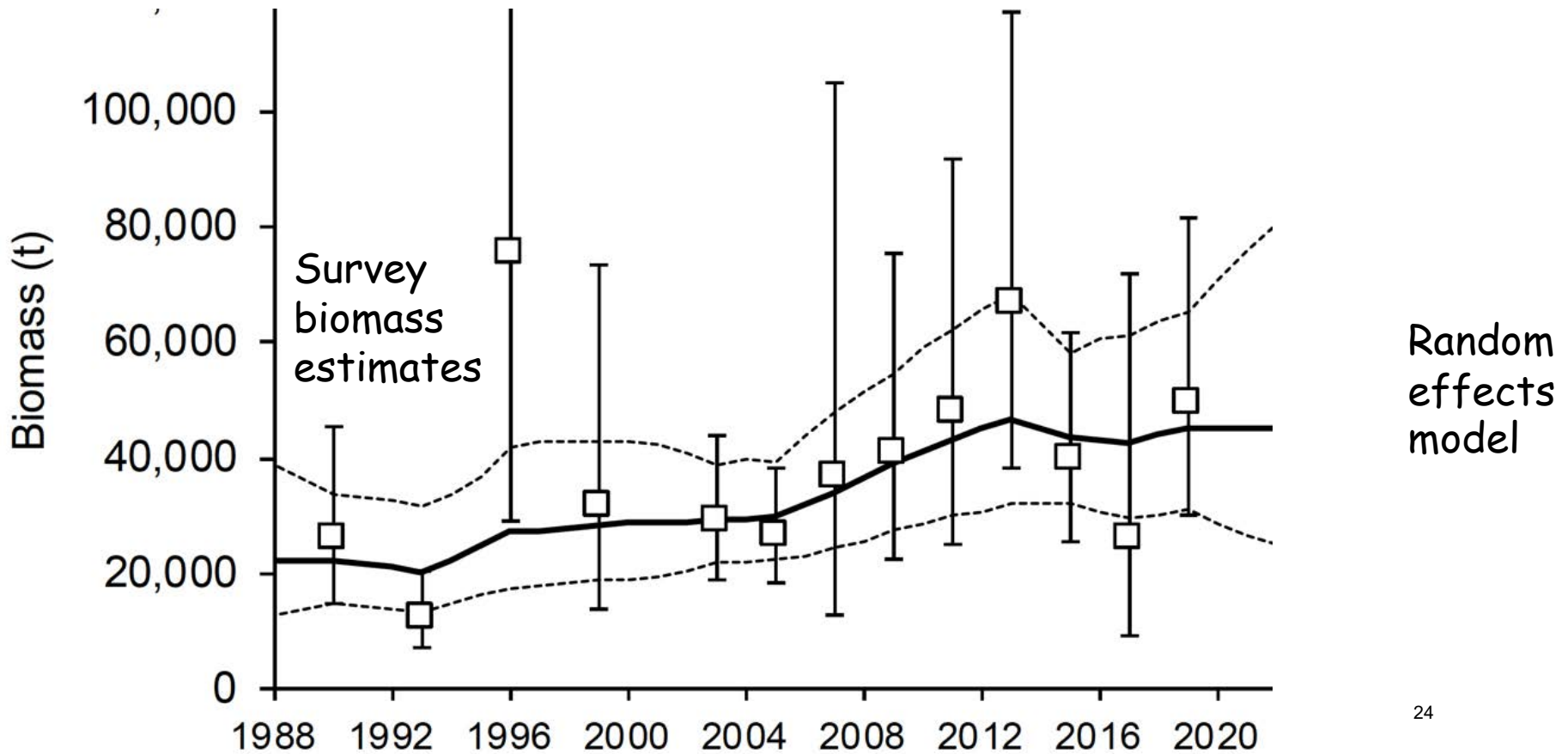
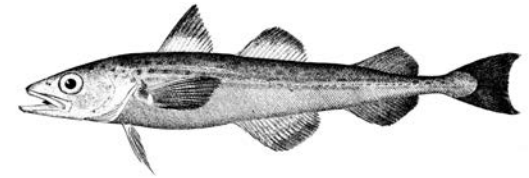
Age 1 Recruitment



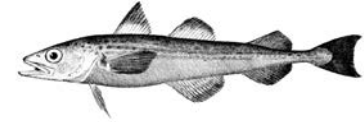
EGOA pollock (Tier 5)

EGOA

Pollock	Biomass	OFL	ABC
2020	45,103	13,531	10,148
2021		13,531	10,148



Team discussions—GOA pollock



- **The Team recommended...**
 - **The Plan Team recommended investigation into the status of the 2018 year class by potentially looking at any available diet data of potential predatory fishes such as sablefish or any other data sources that may support a displacement of this cohort from the Shelikof Strait survey area.**

2. GOA Pacific cod



Species	2020 Catch	2020	2021	Change
Pollock	105,118	118,642	115,870	down 2,772 (2%)
Pacific Cod	3,980	14,621	23,627	up 9,006 (62%)
Sablefish	12,095	16,883	13,269	down 3,614 (21%)
Flatfish	7,497	114,567	116,883	up 2,316 (2%)
Arrowtooth flounder	21,177	128,060	126,970	down 1,090 (1%)
Rockfish	31,628	47,450	56,819	up 9,369 (20%)
Atka mackerel	608	4,700	4,700	same (0%)
Skates	2,165	6,670	6,670	same (0%)
Sharks	1,581	8,184	3,755	down 4,429 (54%)
Octopus	78	980	980	same (0%)
Total	185,927	456,035	469,250	up 13,215 (3%)



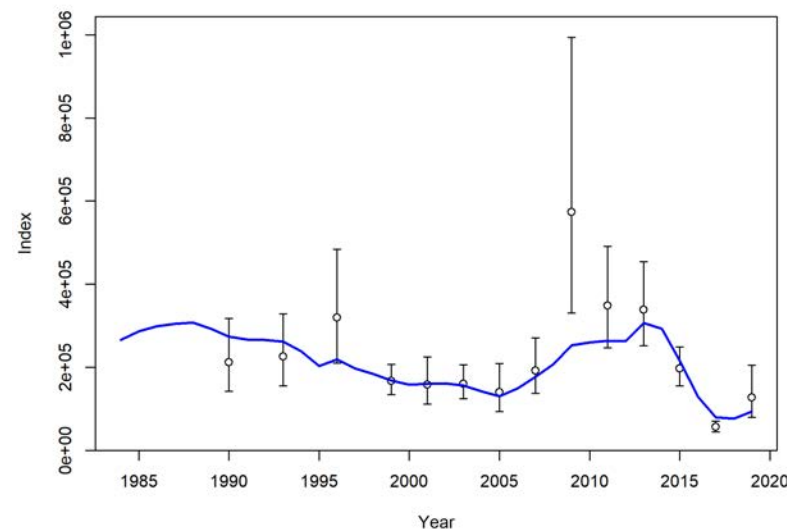
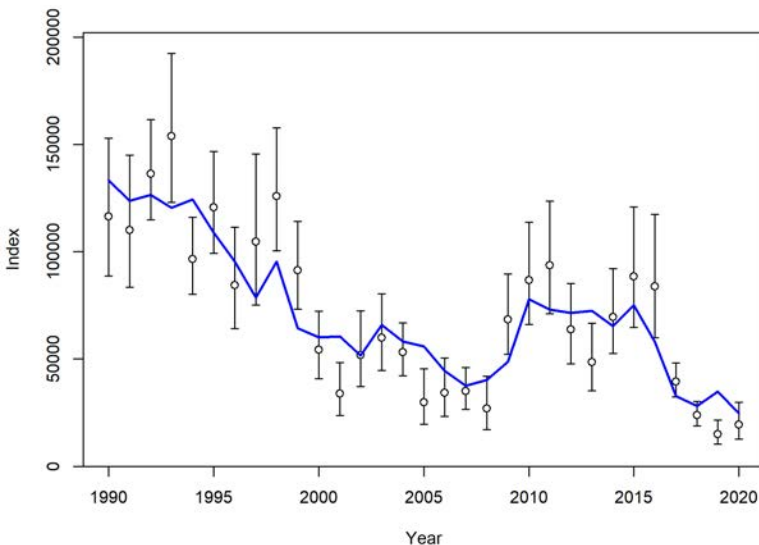
GOA Pacific cod

AFSC bottom trawl survey

- Poor fit to high 2009 estimate.

AFSC longline survey

- Catchability scaled to June CFSR temperatures
- Poor fit to low 2019 estimate

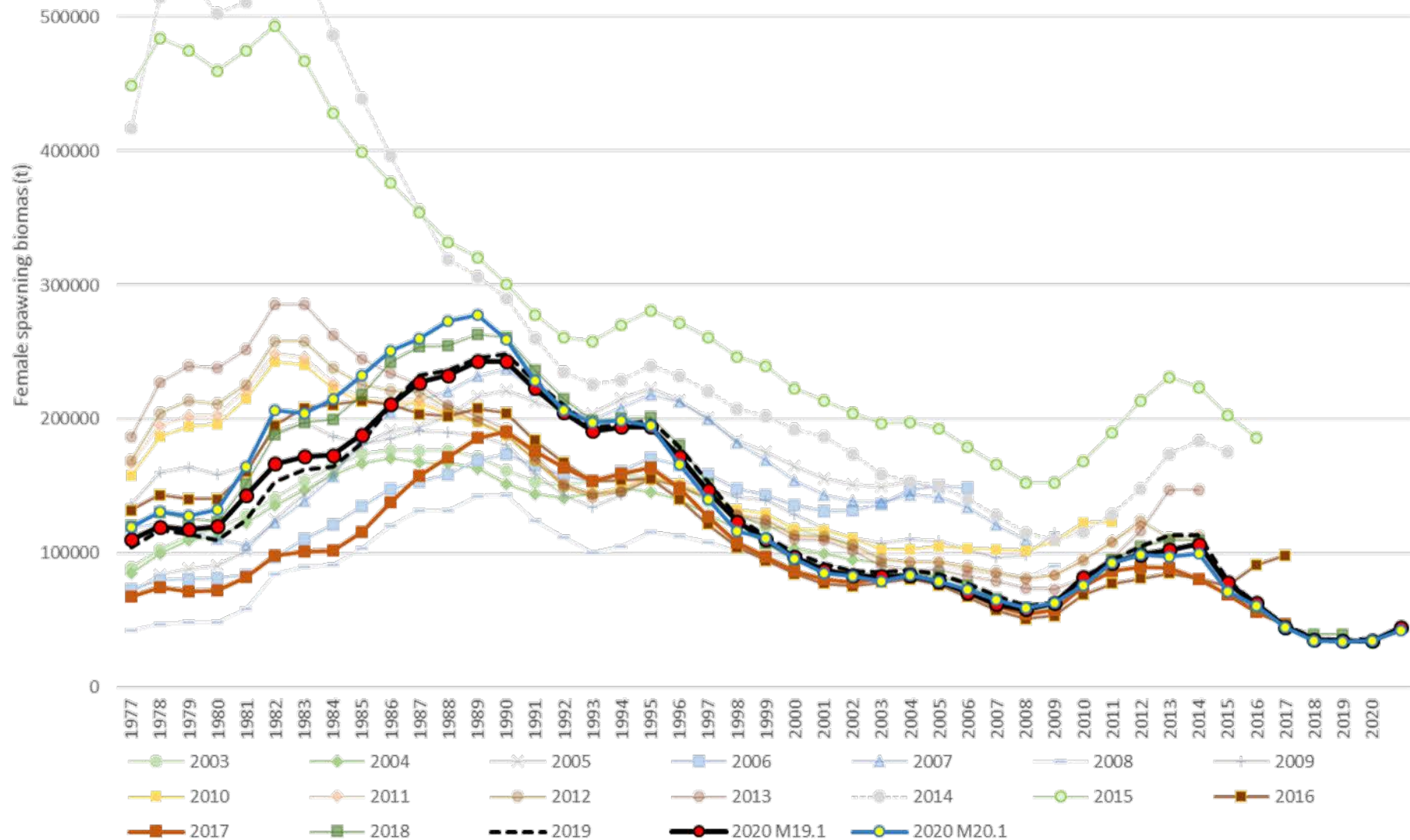


Fit to survey indices

- Generally good fit to surveys, trawl survey difficulty fitting 2009 survey estimate, the longline survey has difficulty fitting 2019 estimate.

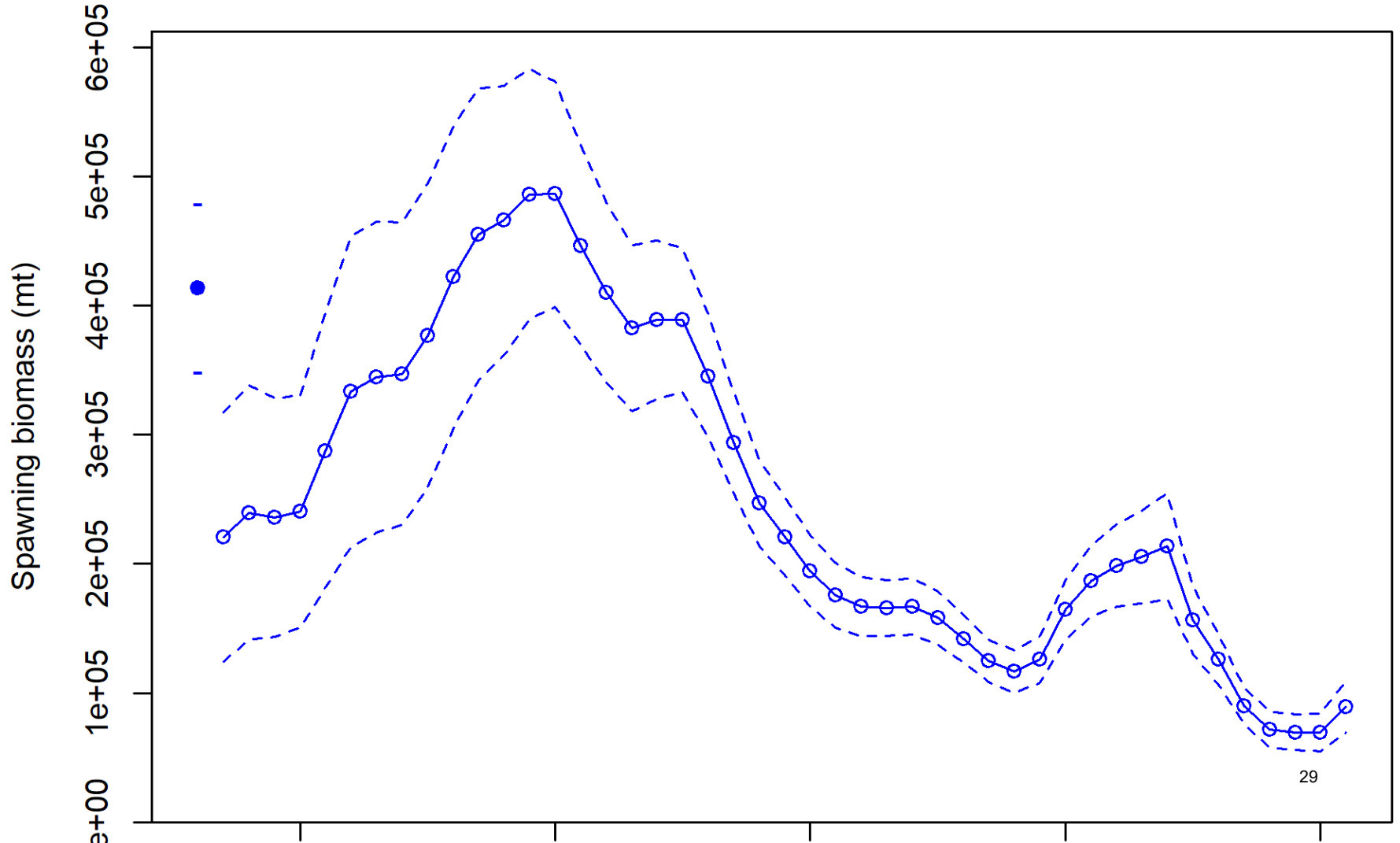


GOA Pacific cod





GOA Pacific cod



GOA Pacific cod

Team recommended

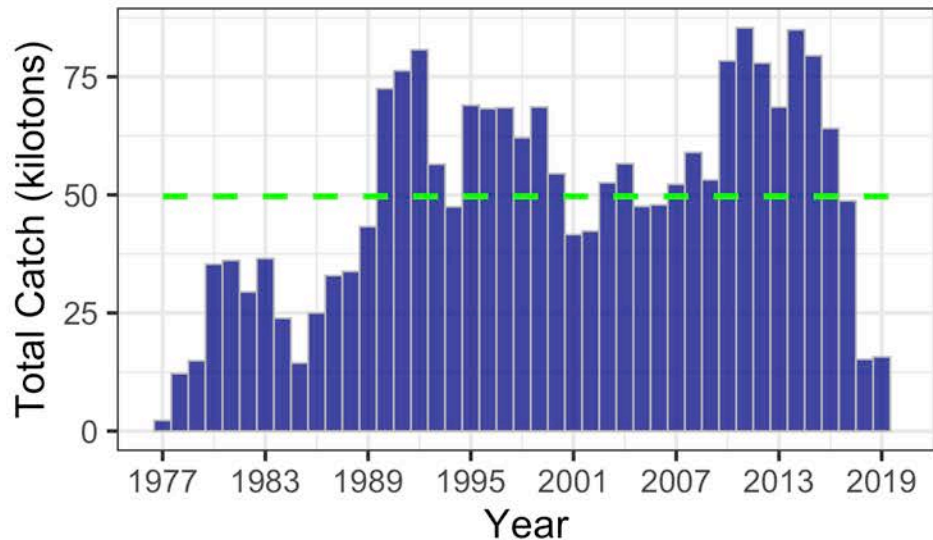
- ... looking at the ADF&G trawl survey as to whether it would be a useful index in the model as well as the overlap with state and federal fisheries to possibly provide information about population demographics.
- ... that authors of assessments with fishery data that have EM participants meet with existing EM committees to determine which biological data would need to be collected to inform assessment.
- ... the AFSC continue to pursue avenues to ensure IPHC surveys provide readily available information on Pacific cod.



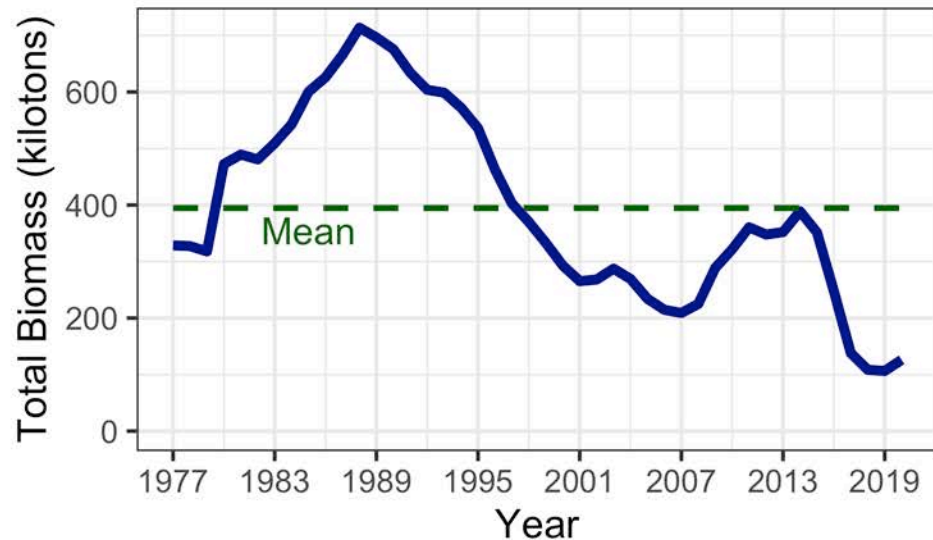
GOA Pacific cod

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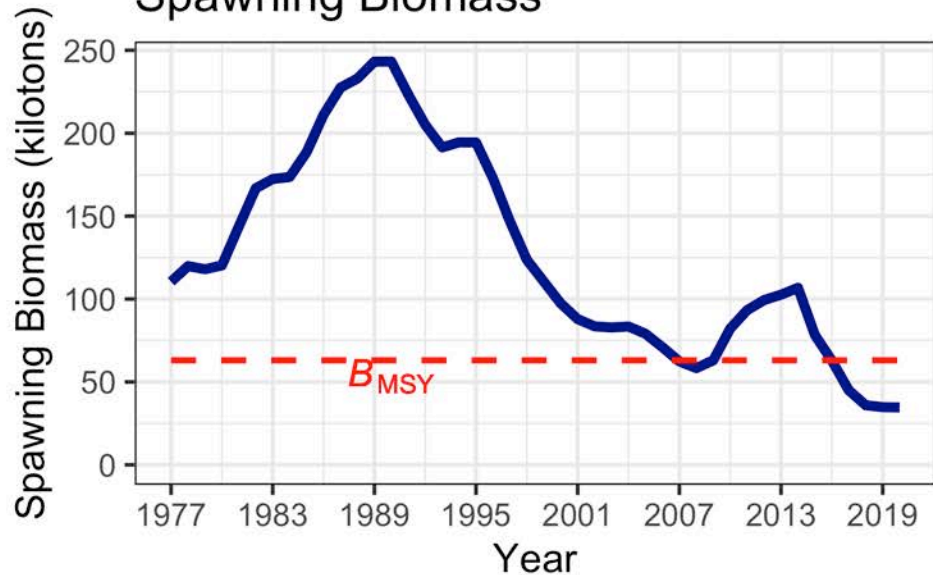
Total Catch



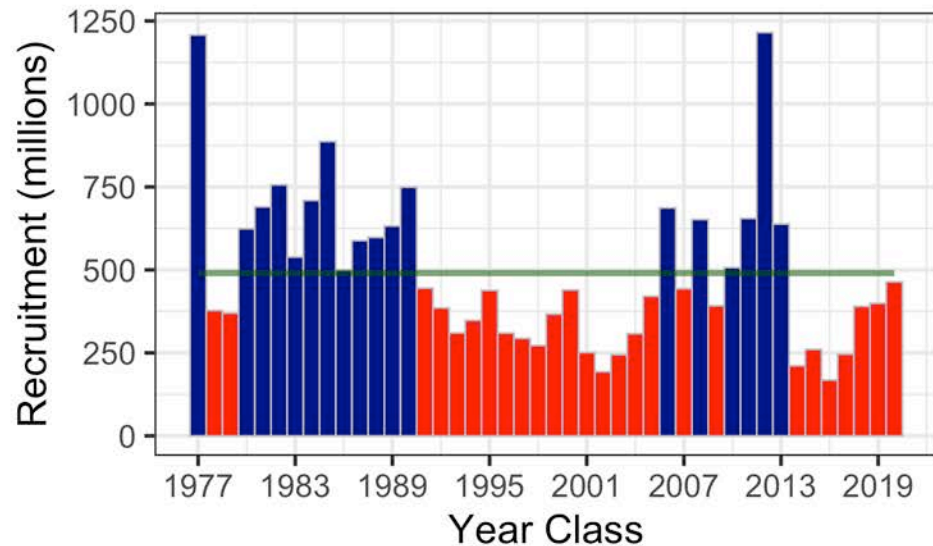
Total Biomass



Spawning Biomass



Age 0 Recruitment



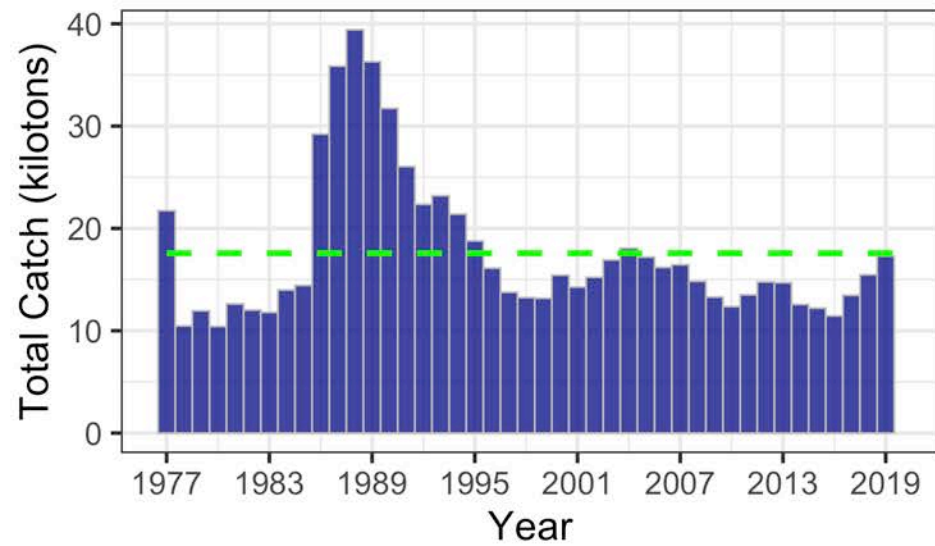
3. Sablefish

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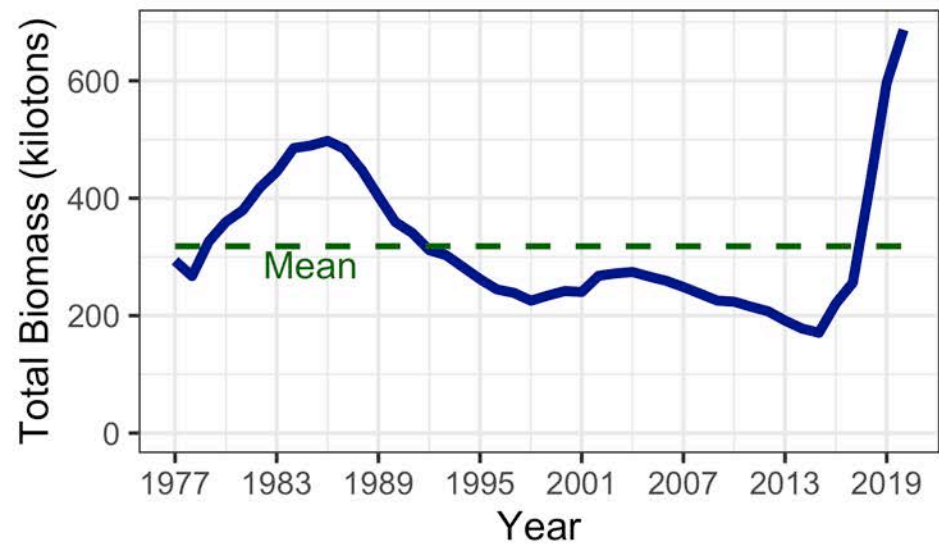
2020 sablefish

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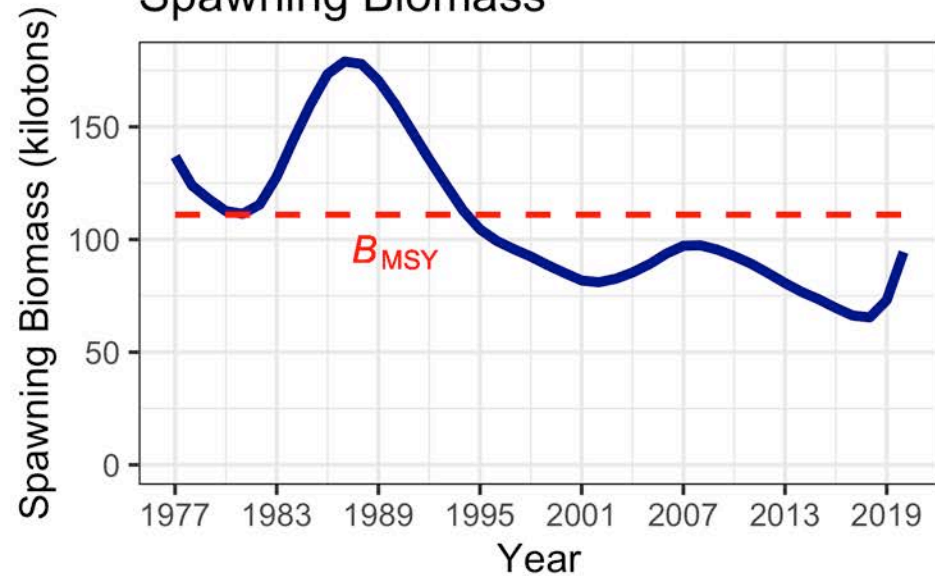
Total Catch



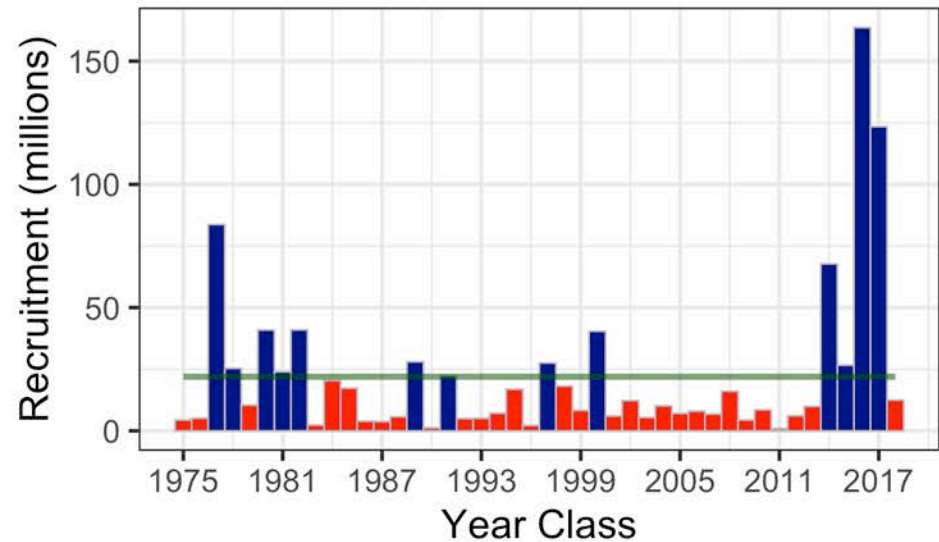
Total Biomass



Spawning Biomass



Age 2 Recruitment



Flatfish ABC Summary



Species	2020 Catch	2020	2021	Change
Pollock	105,118	118,642	115,870	down 2,772 (2%)
Pacific Cod	3,980	14,621	23,627	up 9,006 (62%)
Sablefish	12,095	16,883	13,269	down 3,614 (21%)
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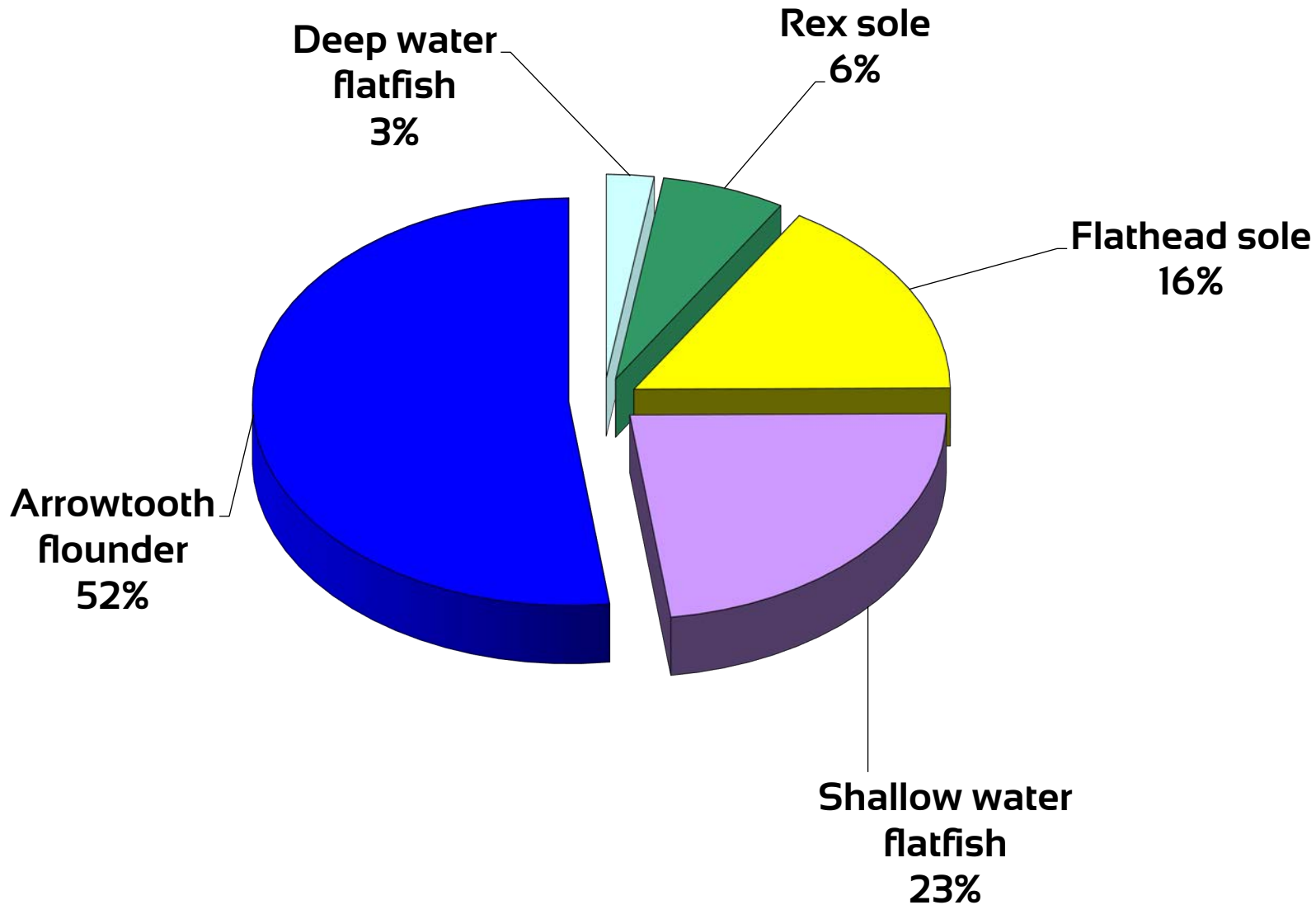
Flatfish ABC's

Species	2020	2021	Change
Shallow water flatfish	55,463	56,164	up 701 (1%)
Rex sole	14,878	15,416	up 538 (4%)
Deep water flatfish	6,030	5,926	down 104 (2%)
Flathead sole	38,196	39,377	up 1,181 (3%)
Arrowtooth flounder	128,060	126,970	down 1,090 (1%)
Subtotal	242,627	243,853	up 1,226 (1%)
Subtotal (without ATF)	114,567	116,883	up 2,316 (2%)

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



General comments on flatfish assessments

- Lightly exploited
- Partials

Flatfish ABC's

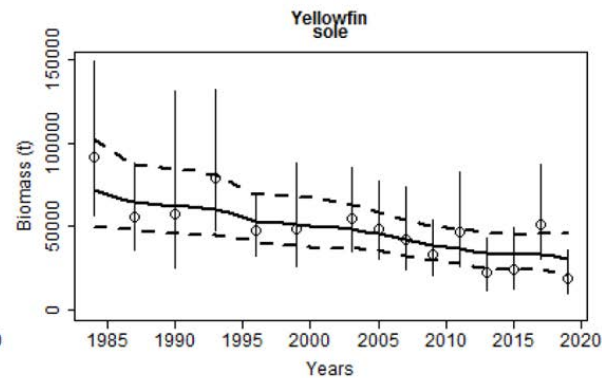
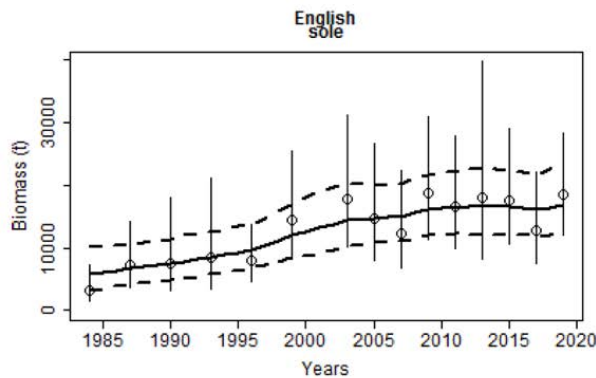
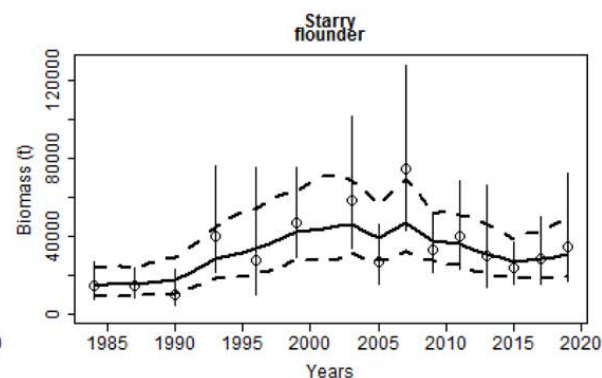
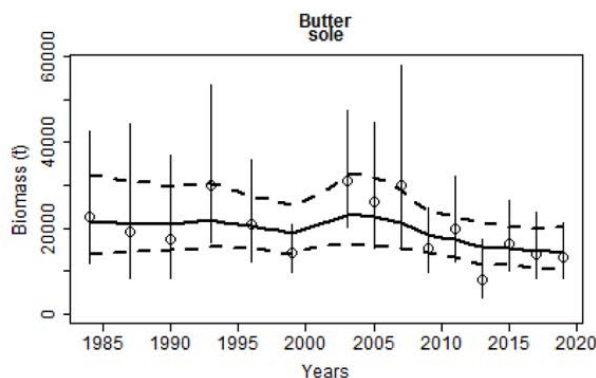
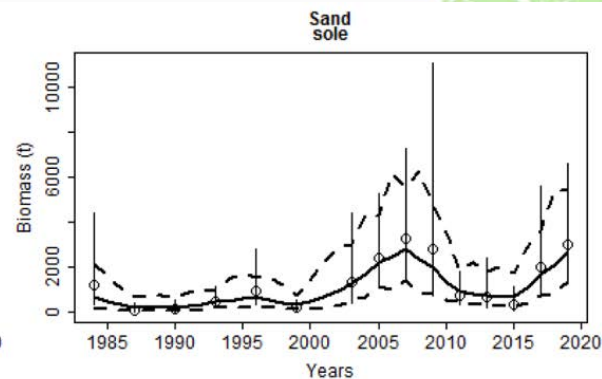
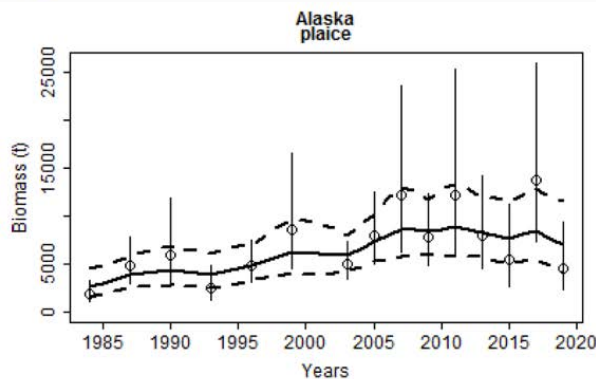
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Rex sole	14,878	15,416	up 538 (4%)
Deep water flatfish	6,030	5,926	down 104 (2%)
Flathead sole	38,196	39,377	up 1,181 (3%)
Arrowtooth flounder	128,060	126,970	down 1,090 (1%)
Subtotal	242,627	243,853	up 1,226 (1%)
Subtotal (without ATF)	114,567	116,883	up 2,316 (2%)

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

4. Shallow-water flatfish

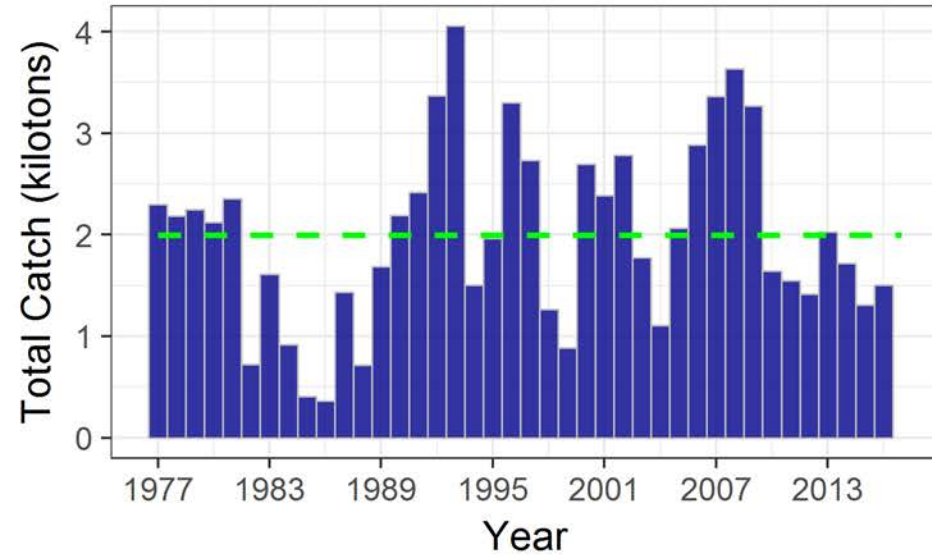
Partial assessment

- 2019 GOA survey biomass down 7% for southern rock sole and down 28% for northern rock sole

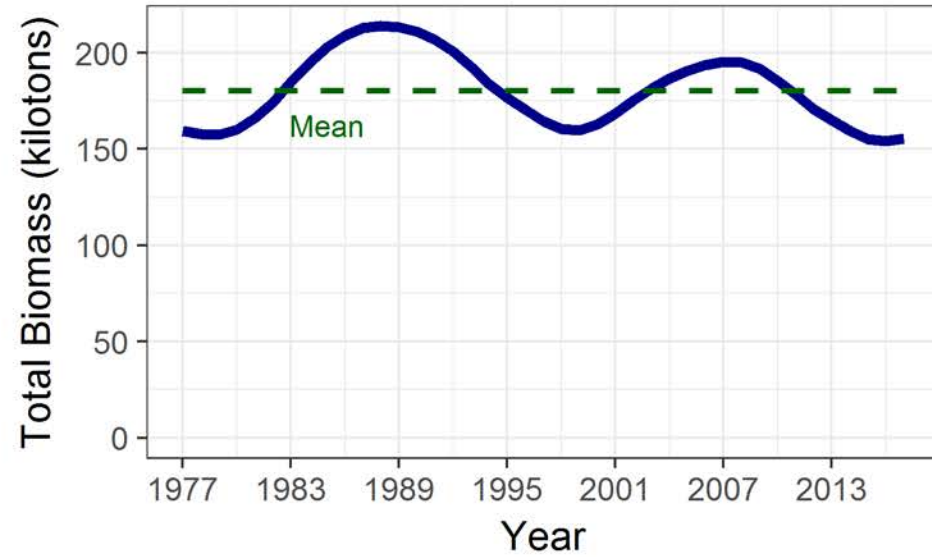


GOA Southern Rock Sole

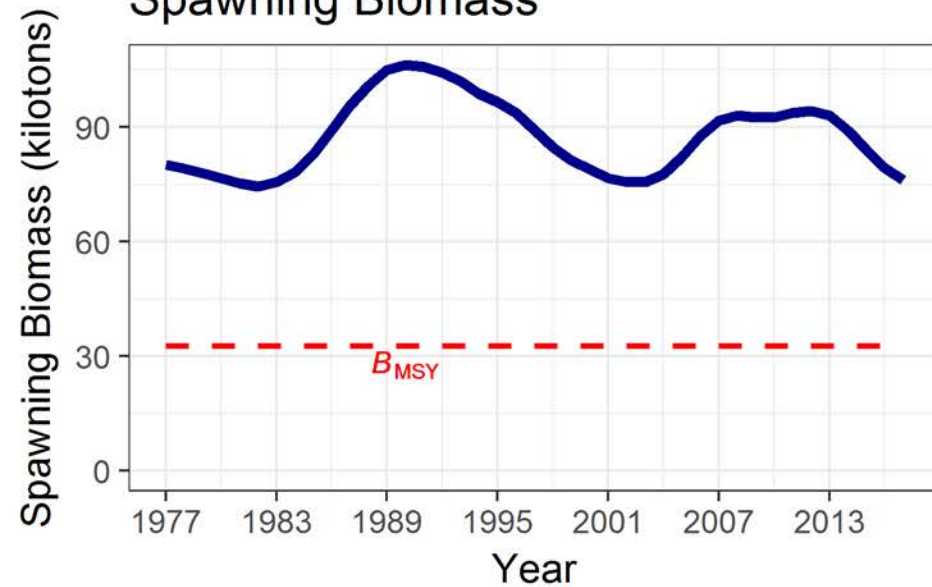
Total Catch



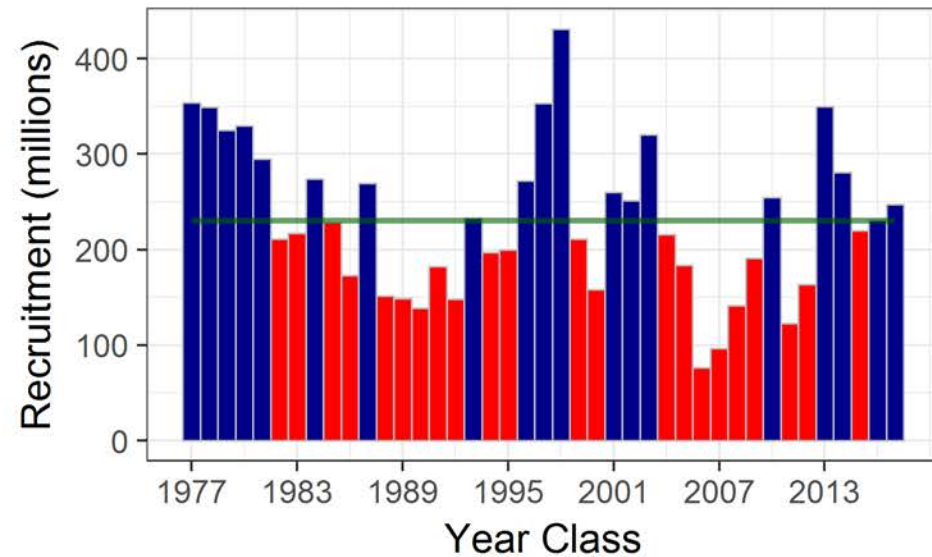
Total Biomass



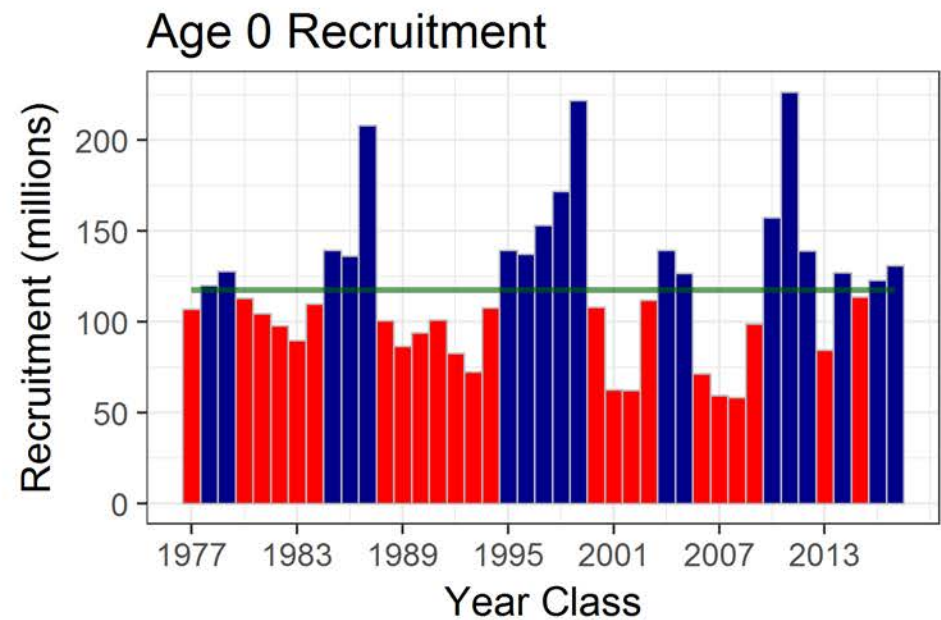
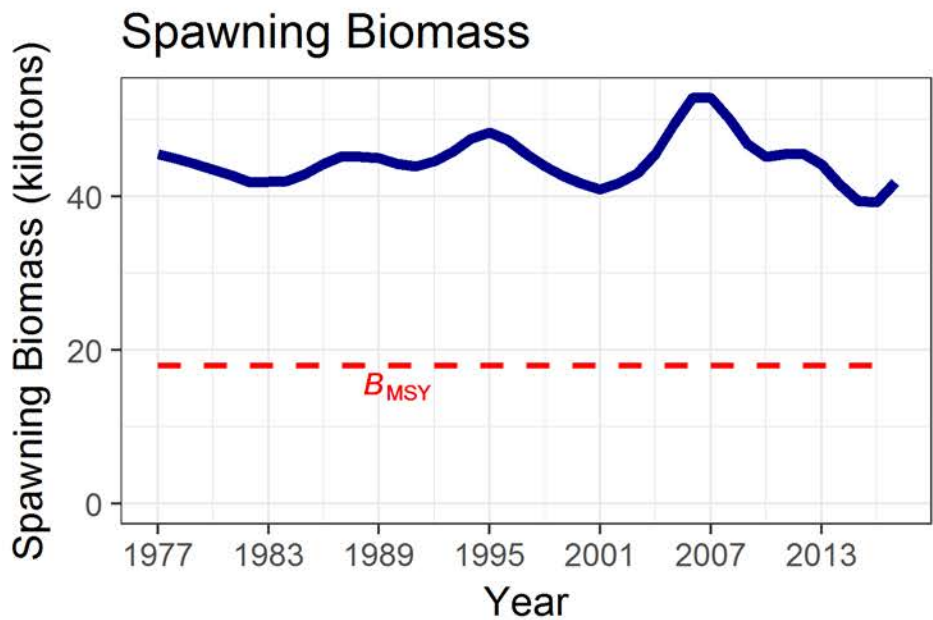
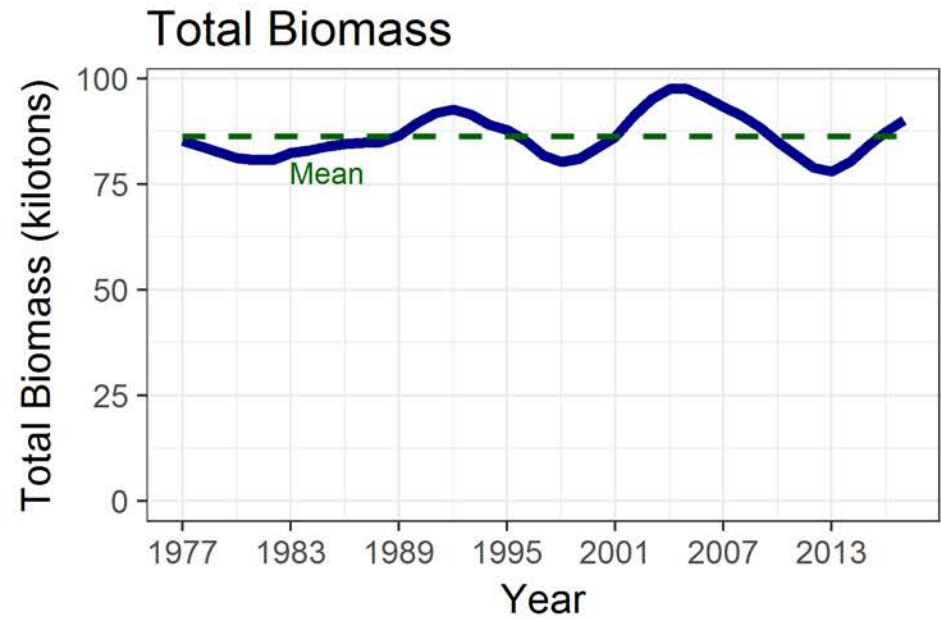
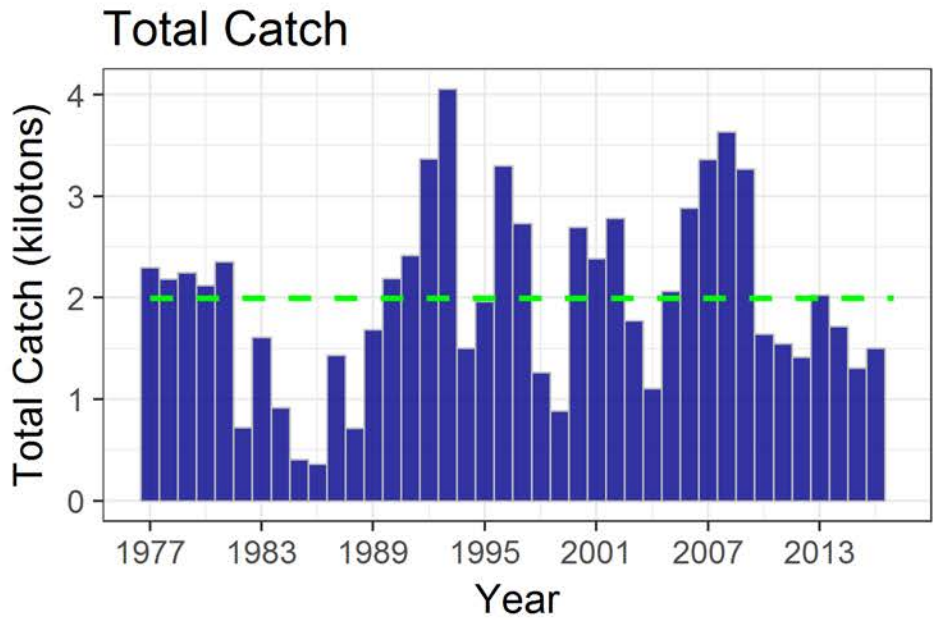
Spawning Biomass



Age 0 Recruitment



GOA Northern Rock Sole



Flatfish ABC's

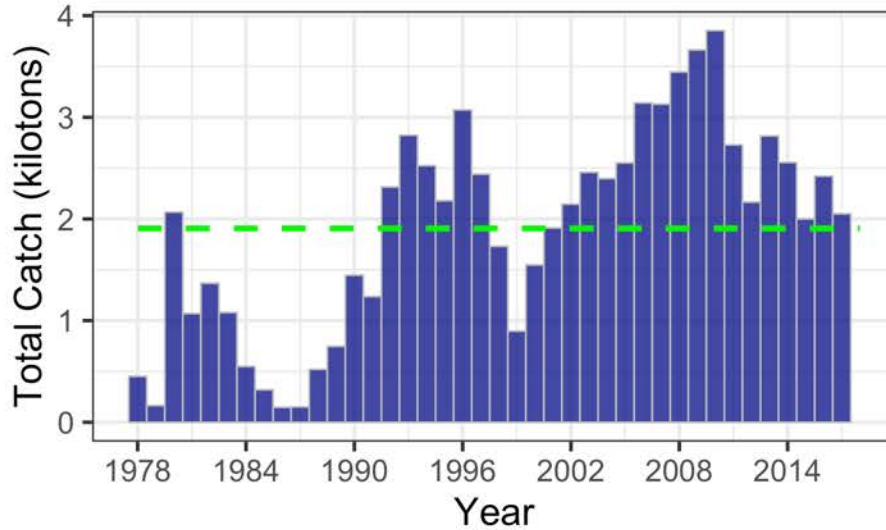
Species	2020	2021	Change
Shallow water flatfish	55,463	56,164	up 701 (1%)
Rex sole	14,878	15,416	up 538 (4%)
Deep water flatfish	6,030	5,926	down 104 (2%)
Flathead sole	38,196	39,377	up 1,181 (3%)
Arrowtooth flounder	128,060	126,970	down 1,090 (1%)
Subtotal	242,627	243,853	up 1,226 (1%)
Subtotal (without ATF)	114,567	116,883	up 2,316 (2%)

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

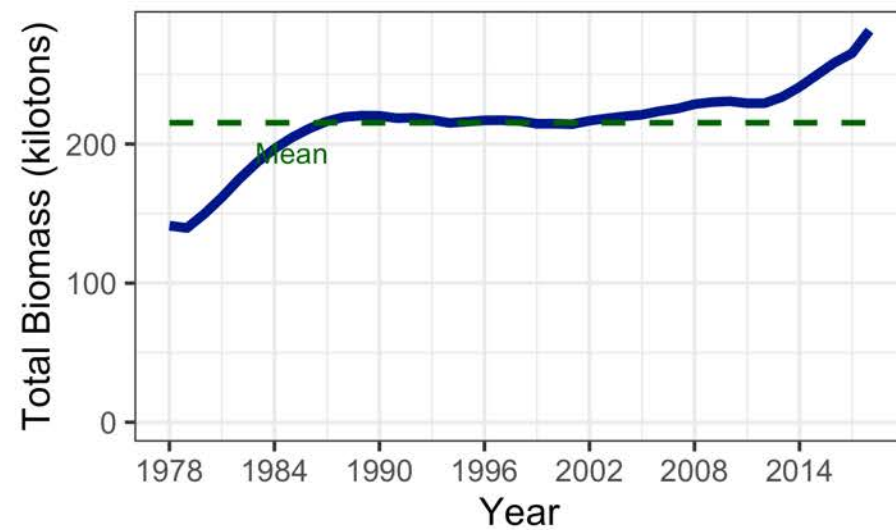
8. Flathead sole

GOA Flathead Sole

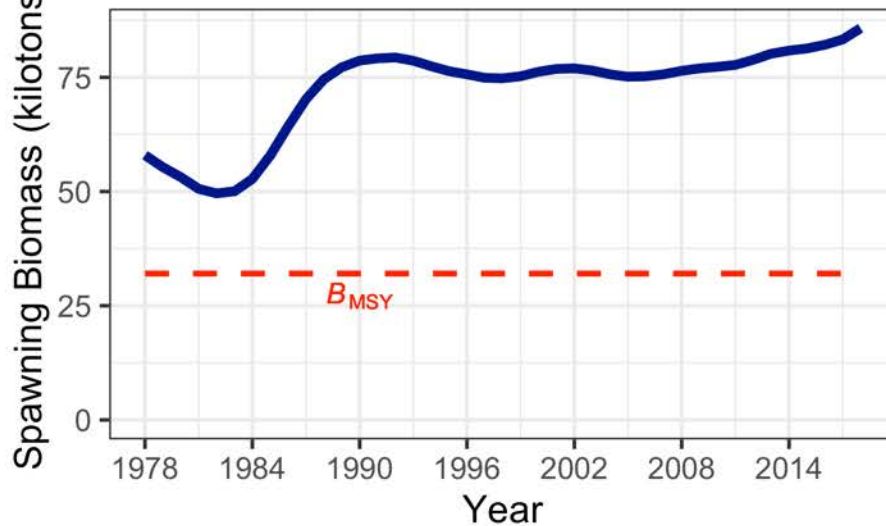
Total Catch



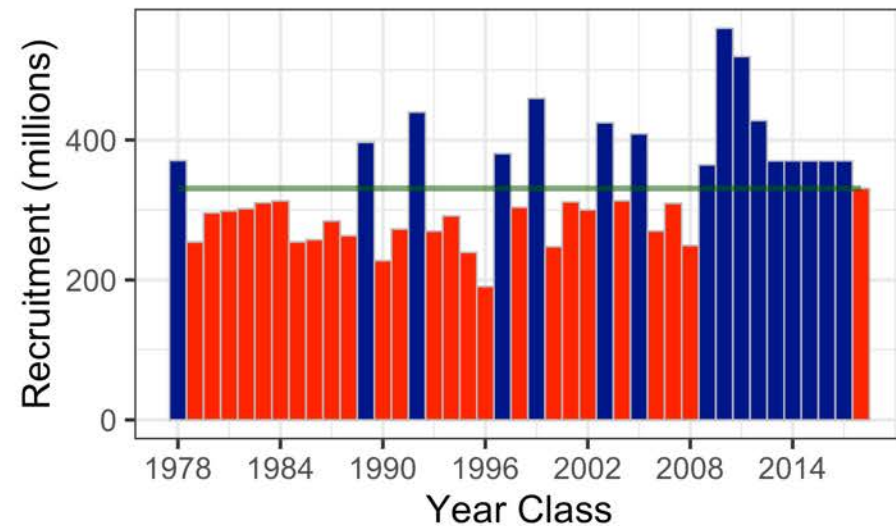
Total Biomass



Spawning Biomass

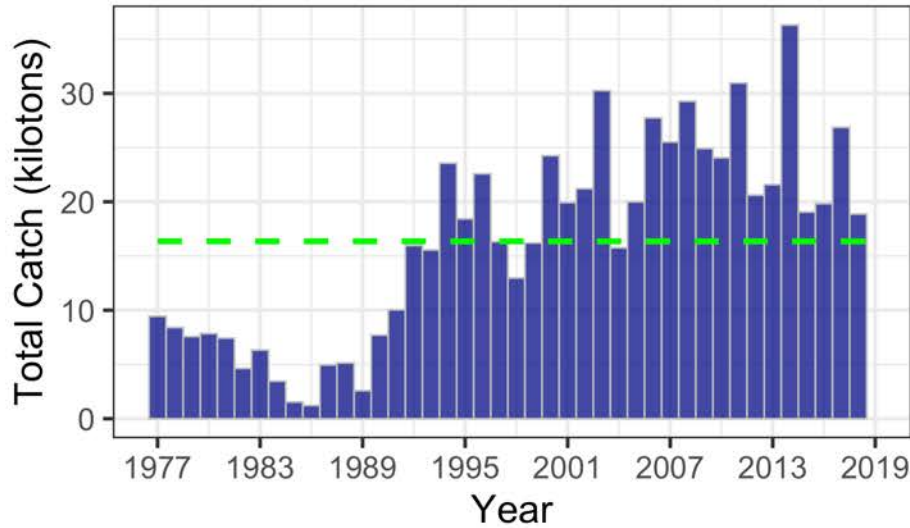


Age 0 Recruitment

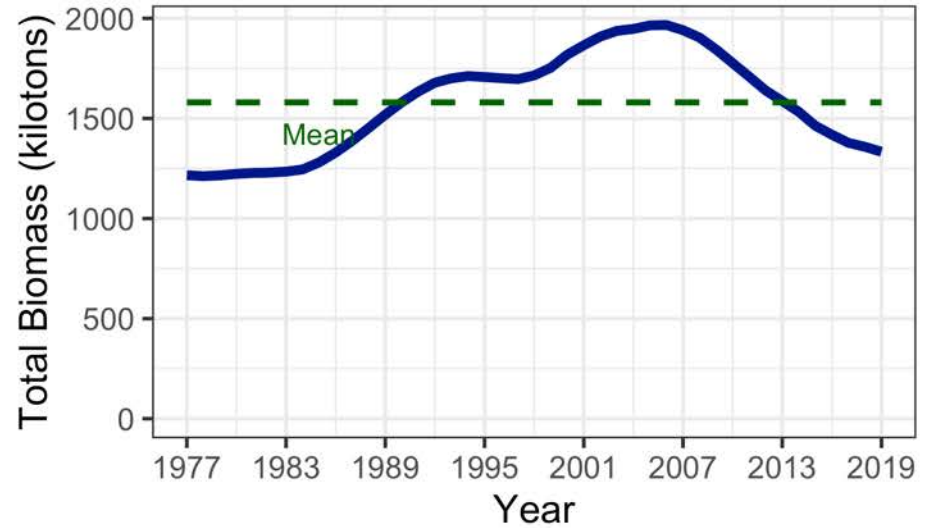


GOA Arrowtooth Flounder

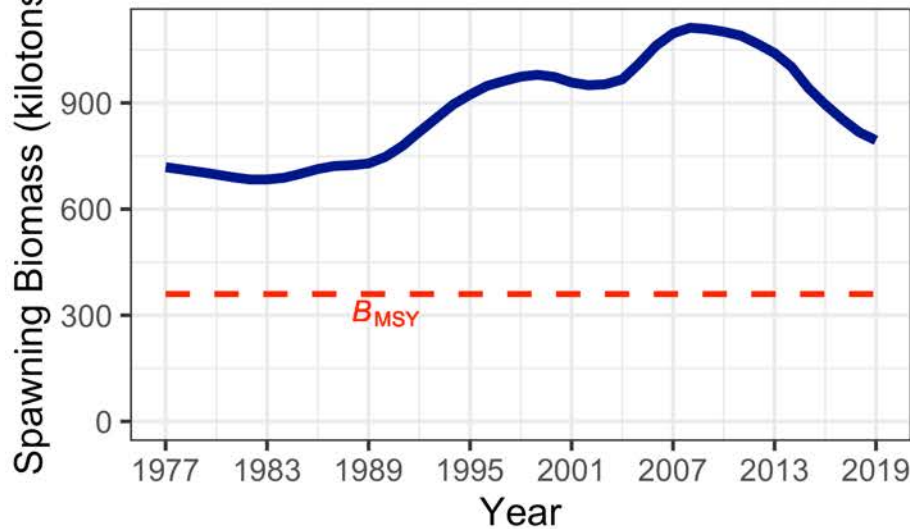
Total Catch



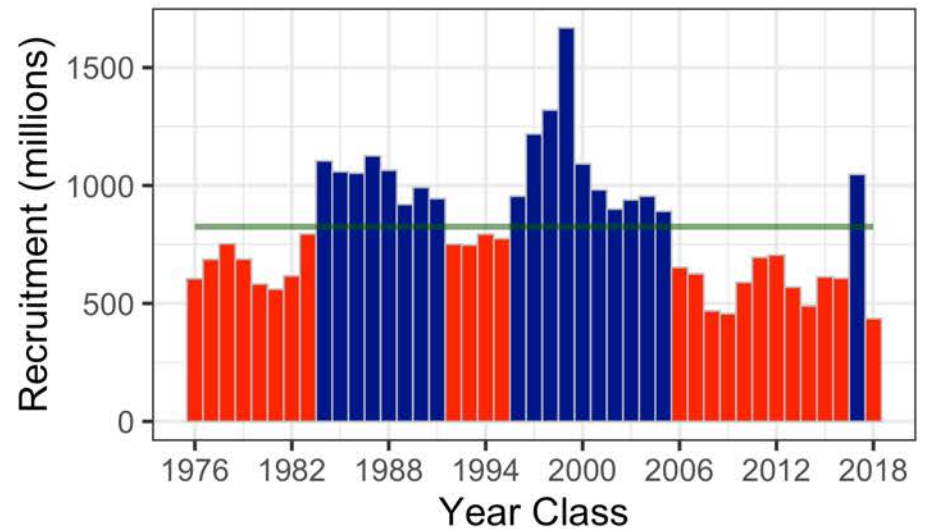
Total Biomass



Spawning Biomass



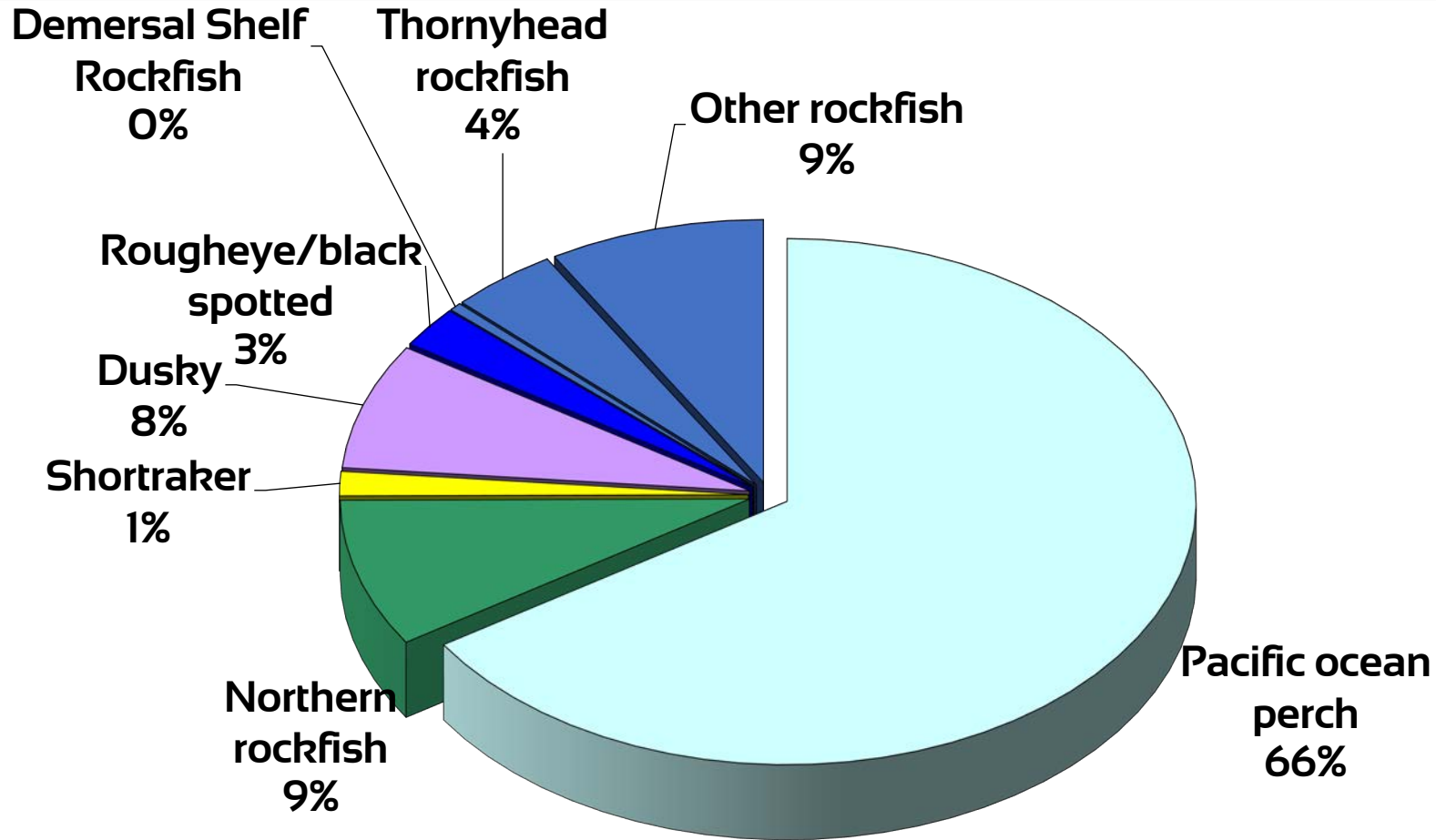
Age 1 Recruitment



GOA Rockfish

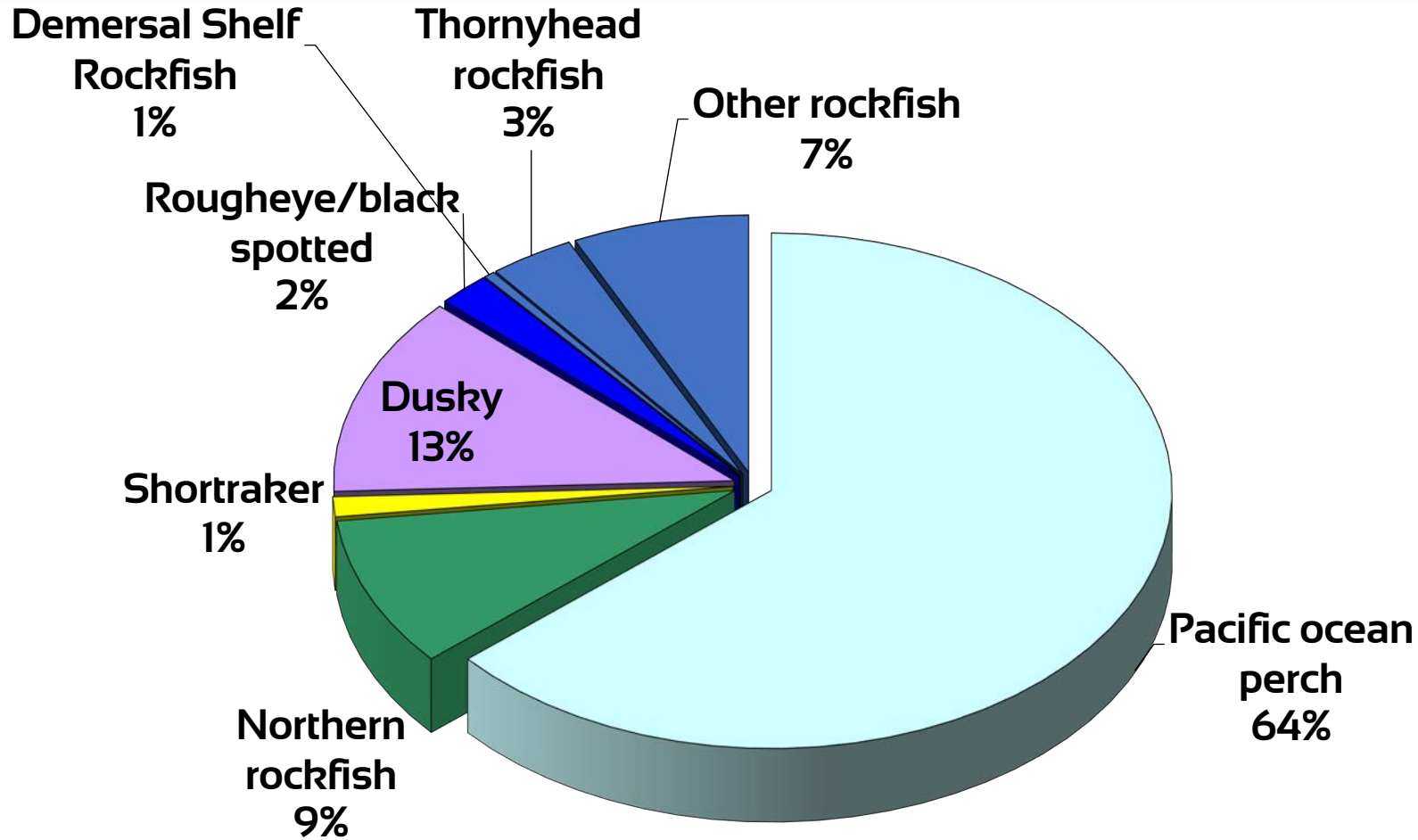
Species	2020 Catch	2020	2021	Change
Pollock	105,118	118,642	115,870	down 2,772 (2%)
Pacific Cod	3,980	14,621	23,627	up 9,006 (62%)
Sablefish	12,095	16,883	13,269	down 3,614 (21%)
Flatfish	7,497	114,567	116,883	up 2,316 (2%)
Arrowtooth flounder	21,177	128,060	126,970	down 1,090 (1%)
Rockfish	31,628	47,450	56,819	up 9,369 (20%)
Atka mackerel	608	4,700	4,700	same (0%)
Skates	2,165	6,670	6,670	same (0%)
Sharks	1,581	8,184	3,755	down 4,429 (54%)
Octopus	78	980	980	same (0%)
Total	185,927	456,035	469,250	up 13,215 (3%)

Rockfish 2020 ABC's 47,450 t total



Rockfish 2021 ABC's

56,819 t total



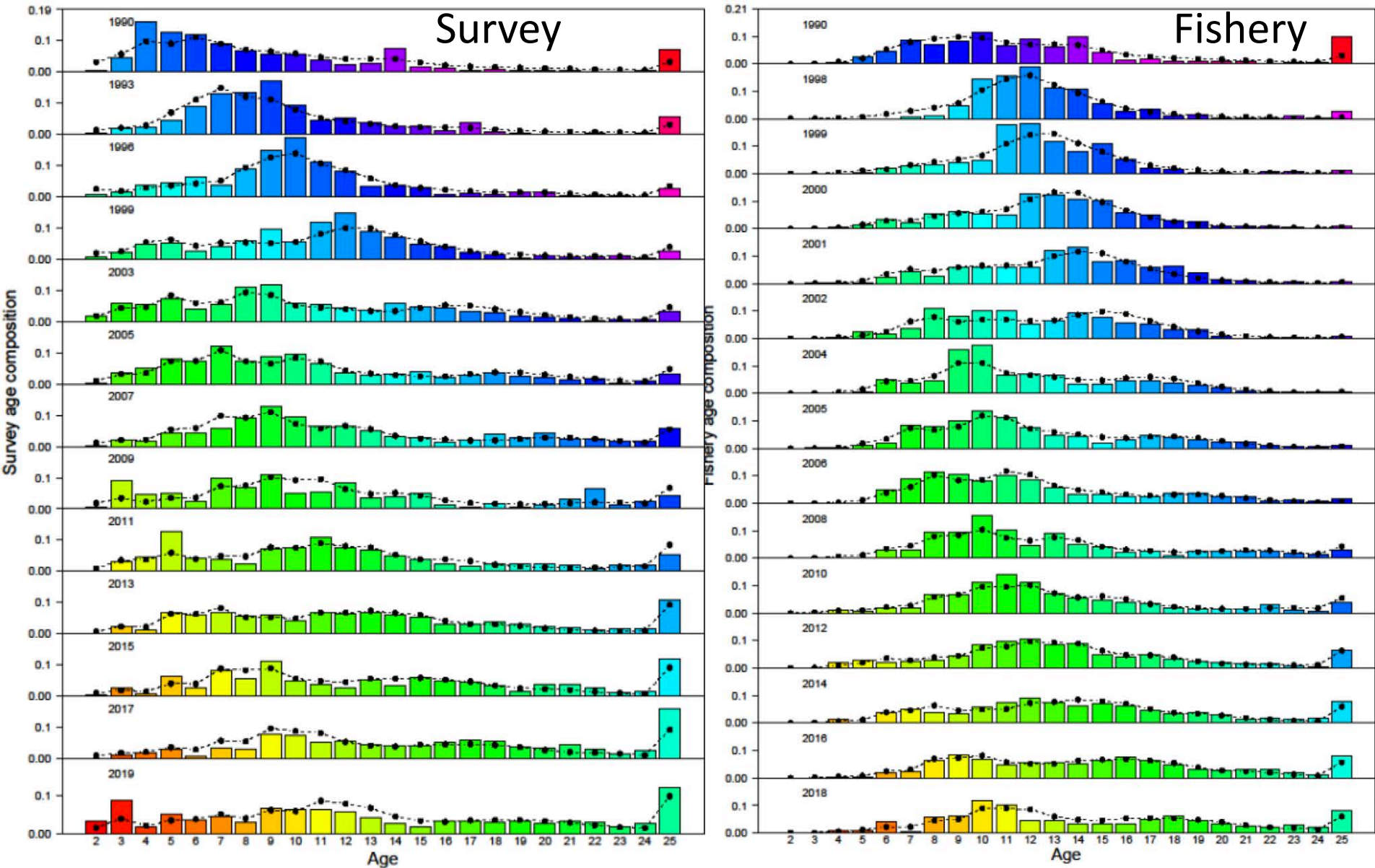
Rockfish ABC Summary

Species	2020	2021	Change
POP	31,238	36,177	up 4,939 (16%)
northern	4,312	5,358	up 1,046 (24%)
Shortraker	708	708	same (0%)
Dusky	3,676	7,101	up 3,425 (93%)
Rougeye and Blackspotted	1,209	1,212	up 3 (0%)
Demersal shelf	238	257	up 19 (8%)
Thornyhead	2,016	1,953	down 63 (3%)
Other	4,053	4,053	same (0%)
Sub Total	47,450	56,819	up 9,369 (20%)

9. Pacific ocean perch

- Full assessment
- CIE review for GOA rockfish scheduled for spring 2021
 1. Use hydroacoustic info
 2. Examine fishery-dependent info, e.g., age sampling
 3. Catchability manuscript is in prep to inform priors...

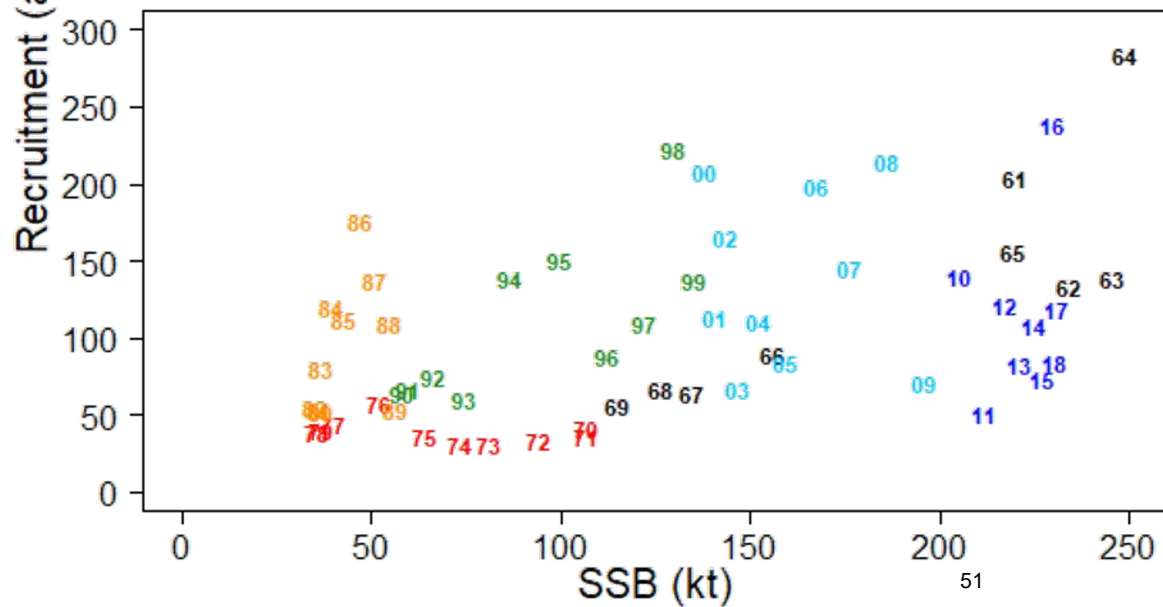
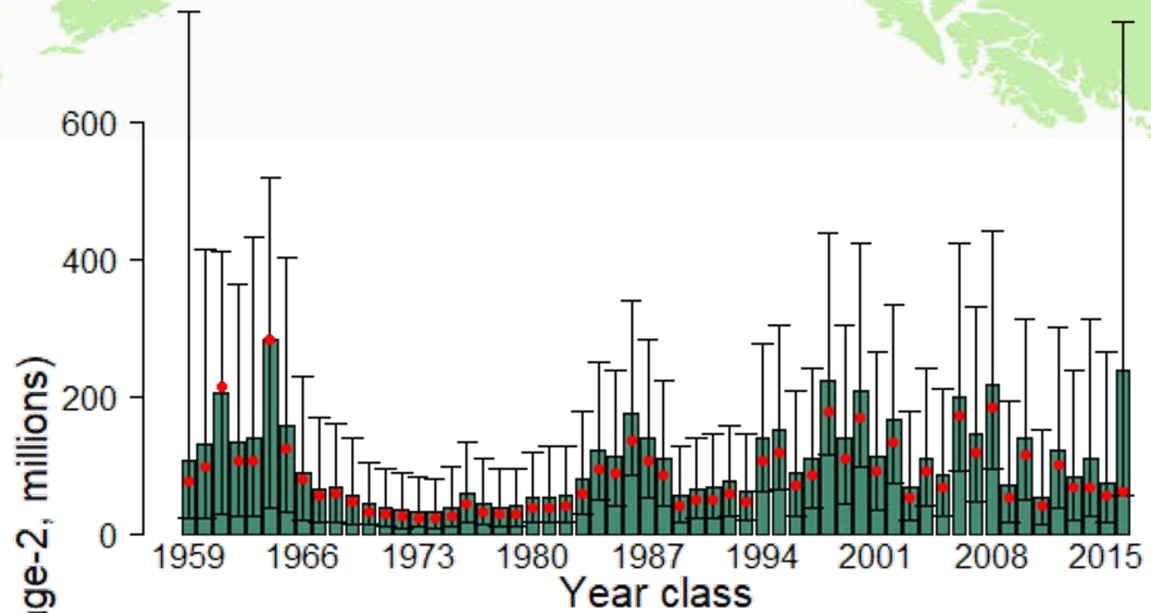
9. Pacific ocean perch



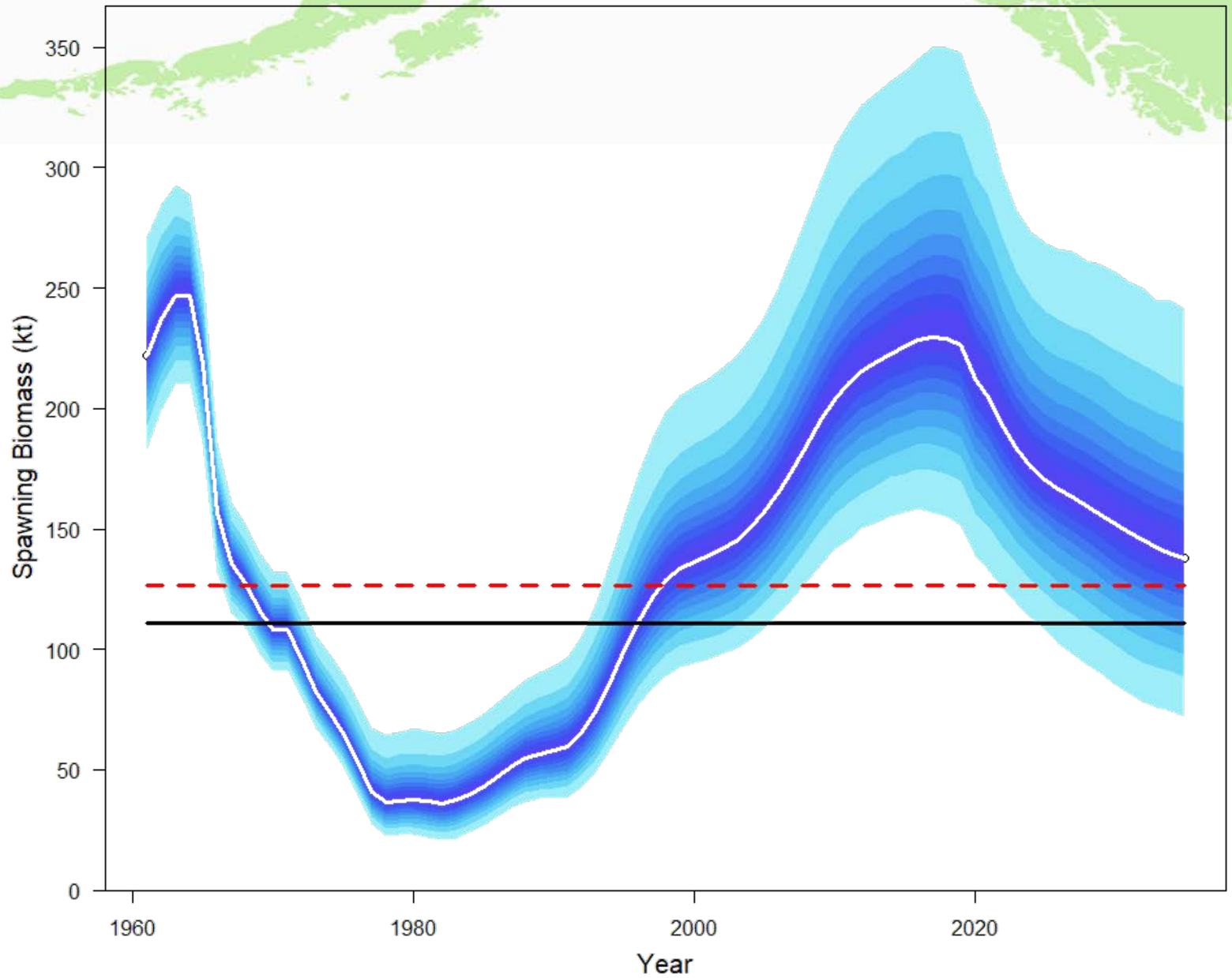
Sign of incoming year classes...2018 survey age composition

9. Pacific ocean perch

Recruits and SSB



9. Pacific ocean perch



Projected decrease in next 10 years

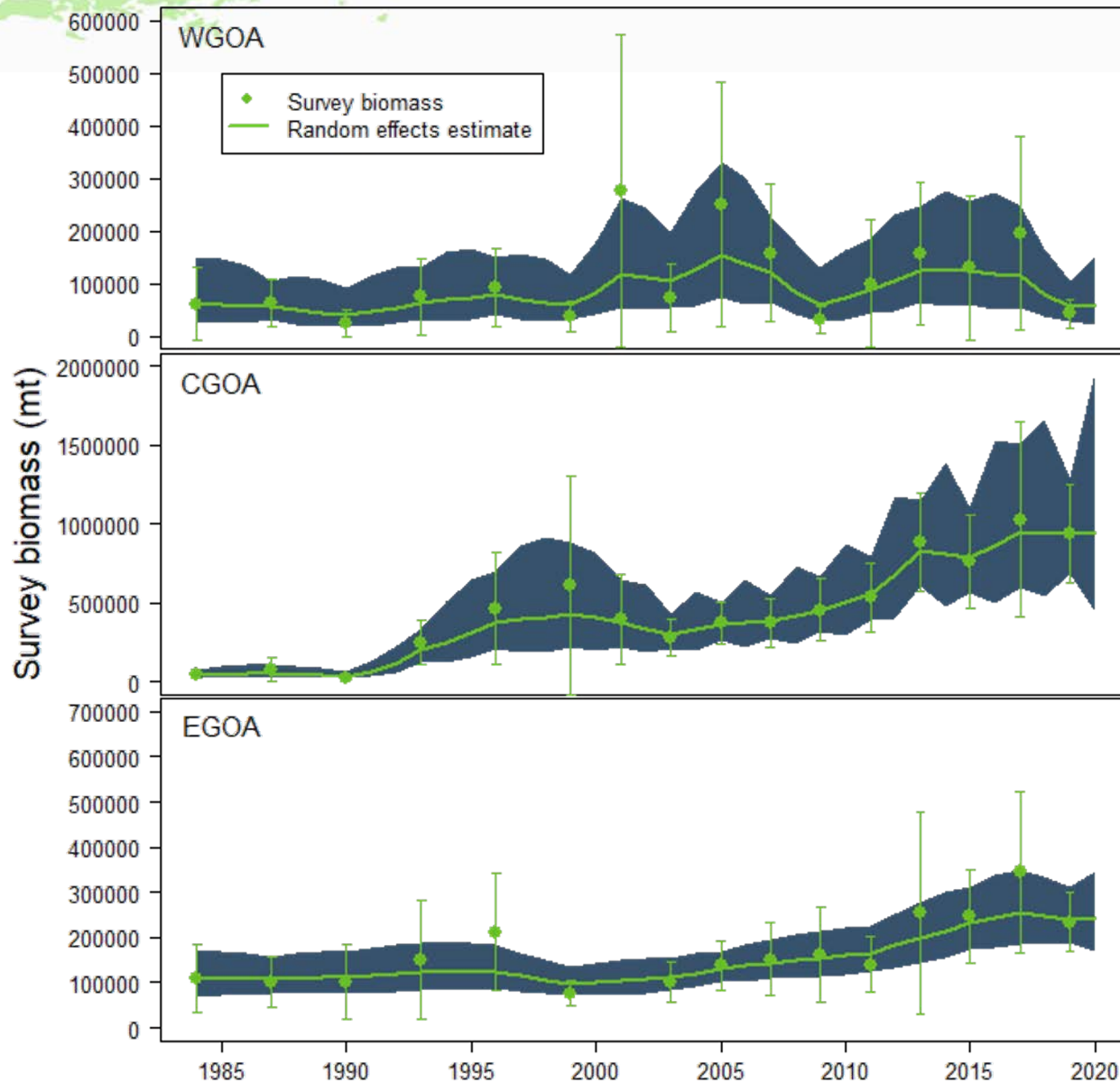
9. GOA POP Risk table

No change from 2019

<i>Assessment-related</i>	<i>Population dynamics</i>	<i>Environmental/ ecosystem</i>	<i>Fishery Performance</i>
Level 2: Substantially increased concerns	Level 2: Substantially increased concerns	Level 1: No apparent concern	Level 1: No apparent concern

- Assessment-related: consistent underestimation of survey biomass since 2013
- Pop'n dynamics: sudden increase in biomass not reflected in dynamics of model

9. GOA Pacific ocean perch apporportionment

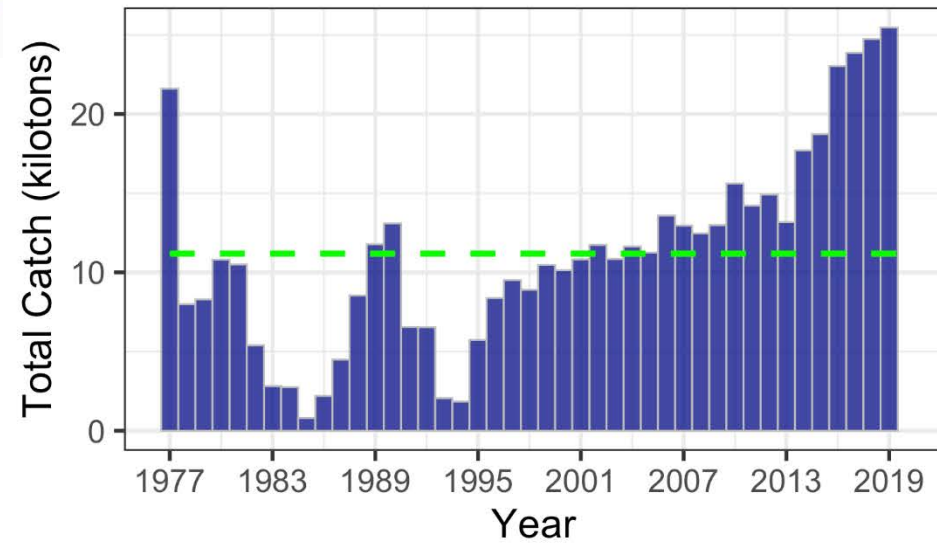


9. GOA Pacific ocean perch

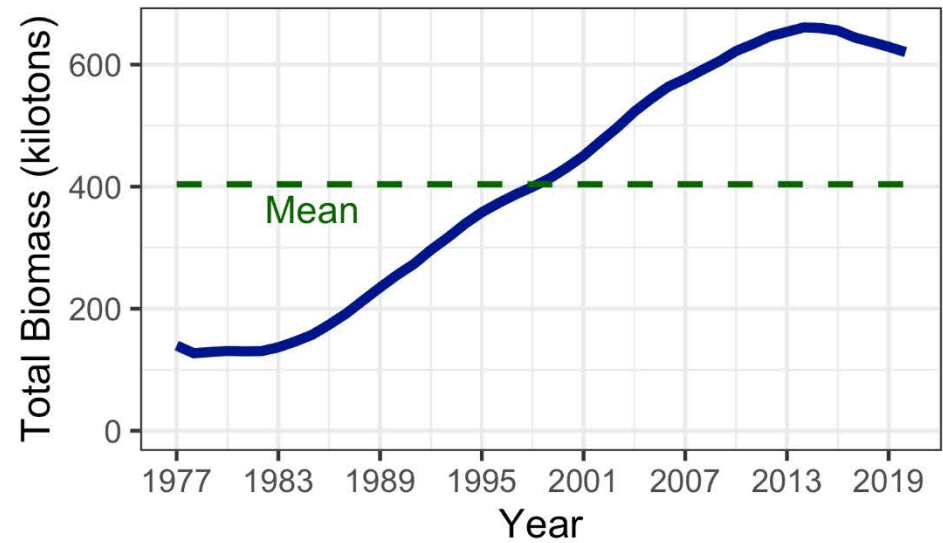
- **The Team recommended that assessment authors work with the MACE group to examine acoustic survey data to see if there are vertical shifts for POP related to water temperature.**
 - There is evidence of behavior changes of pollock because of water temperatures so that they are more available for trawl nets, but it is unknown if this behavior exists for POP
- **The Team supports the ABC recommendations (table) and apportionment (which did not change from last year)**

9. GOA Pacific ocean perch

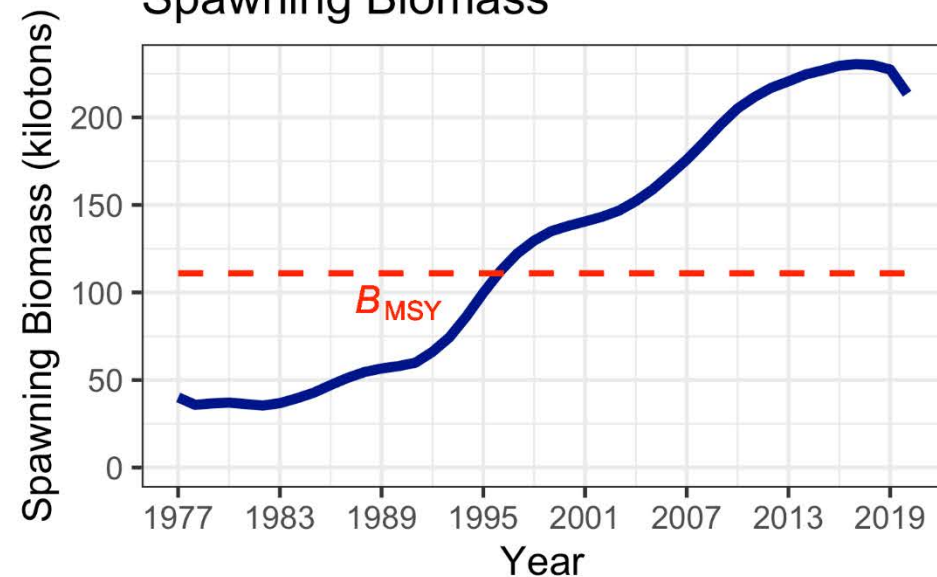
Total Catch



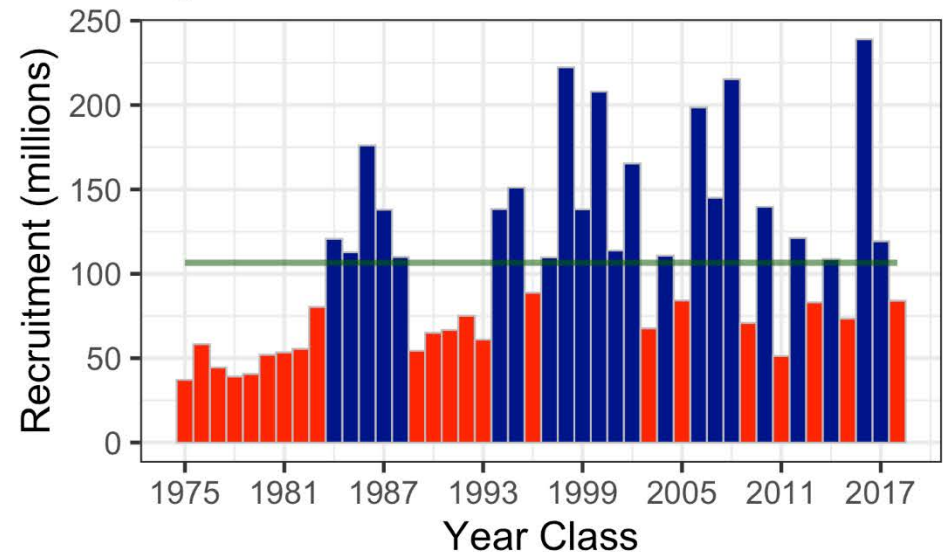
Total Biomass



Spawning Biomass



Age 2 Recruitment



Rockfish ABC Summary

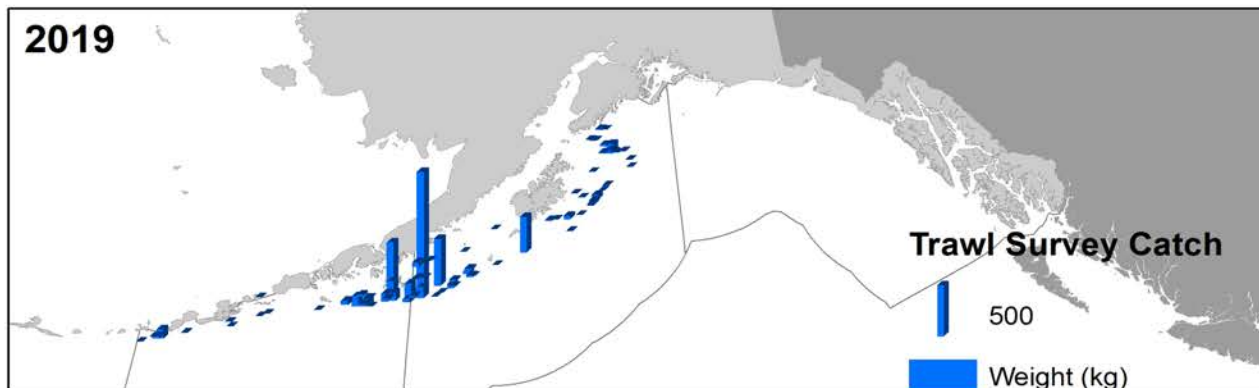
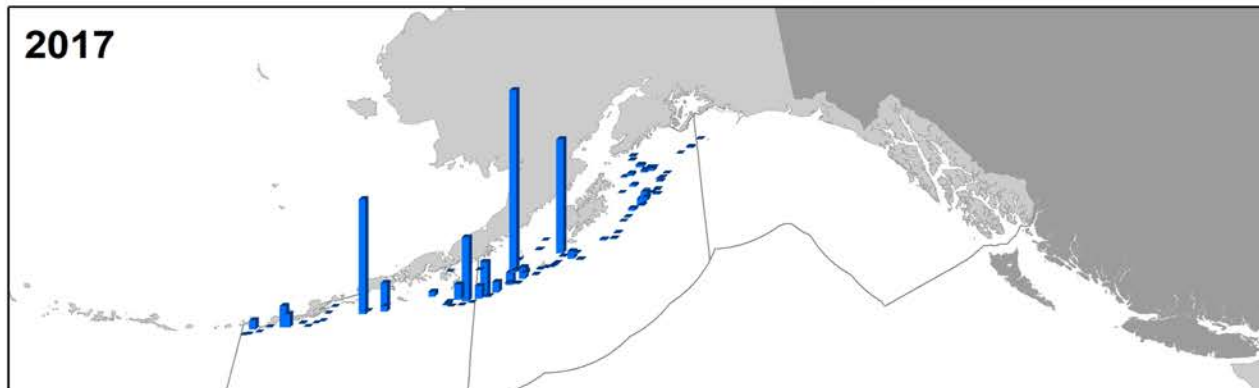
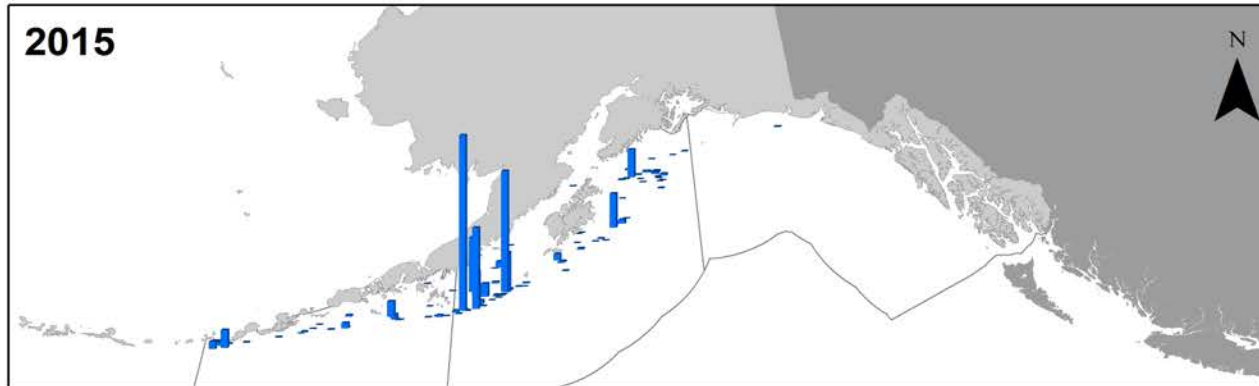
Species	2020	2021	Change
POP	31,238	36,177	up 4,939 (16%)
northern	4,312	5,358	up 1,046 (24%)
Shortraker	708	708	same (0%)
Dusky	3,676	7,101	up 3,425 (93%)
Rougheye and Blackspotted	1,209	1,212	up 3 (0%)
Demersal shelf	238	257	up 19 (8%)
Thornyhead	2,016	1,953	down 63 (3%)
Other	4,053	4,053	same (0%)
Sub Total	47,450	56,819	up 9,369 (20%)



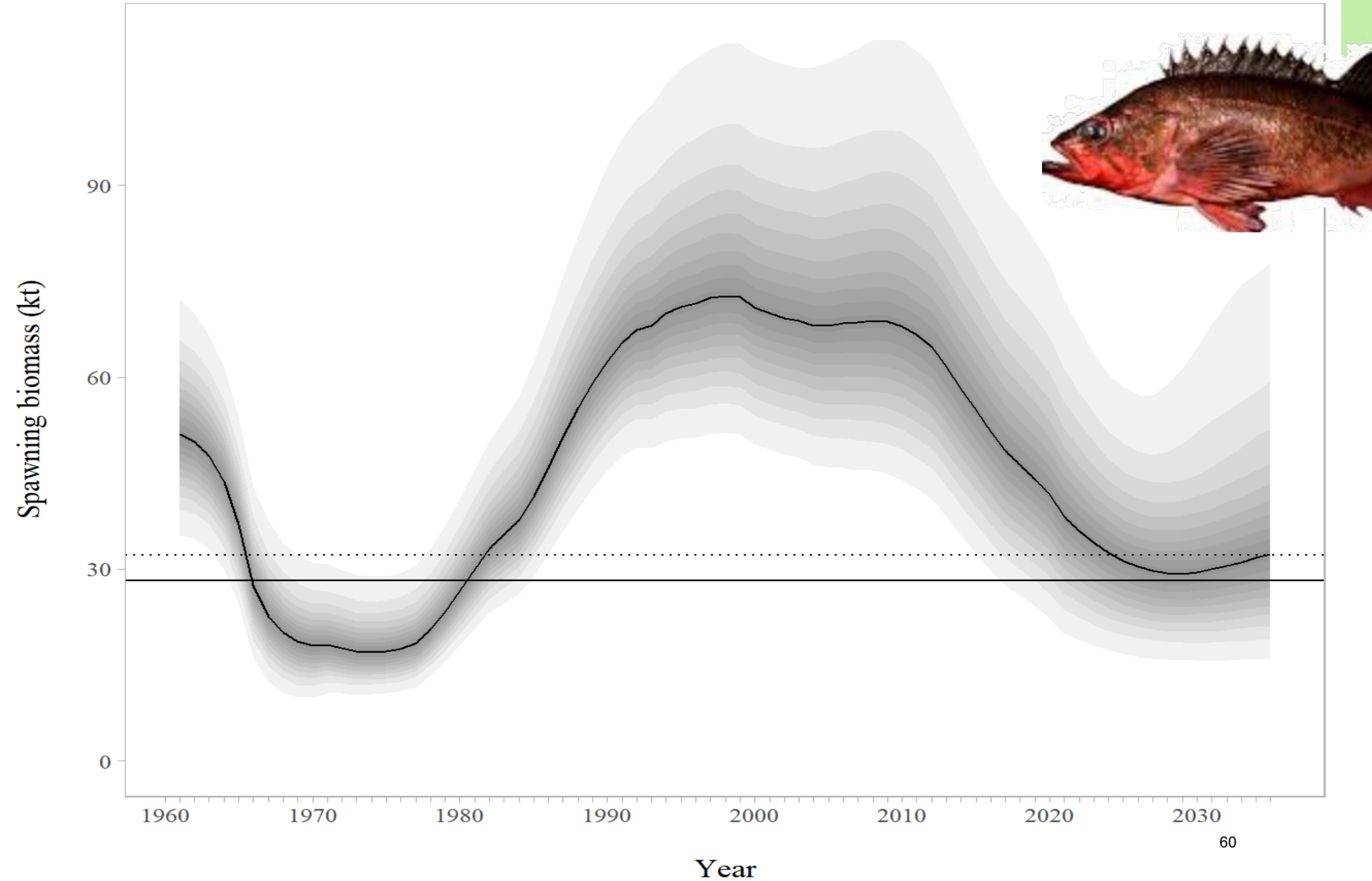
10. Northern rockfish

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

10. Northern rockfish survey distribution



10. Northern rockfish





10. Northern rockfish

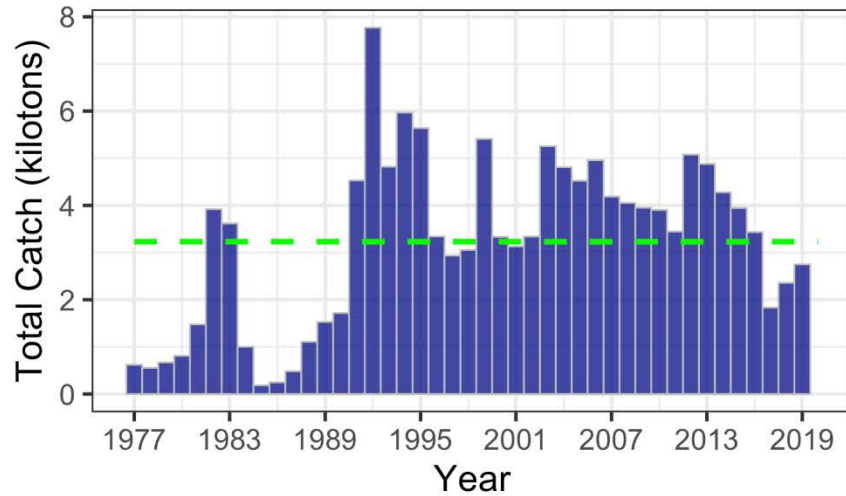
Team recommended

- ...that both northern rockfish and dusky rockfish use GAP VAST estimates of survey biomass and encouraged collaboration on producing model-based estimates of abundance
- ... the authors examine the high proportion of survey and commercial catch that are being assigned to the plus group age bin and investigate why fits to the fishery plus group are so poor

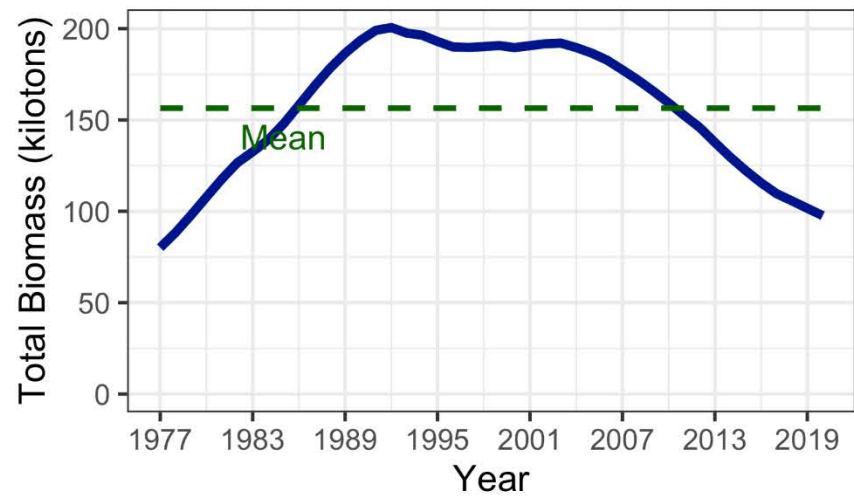
10. Northern rockfish



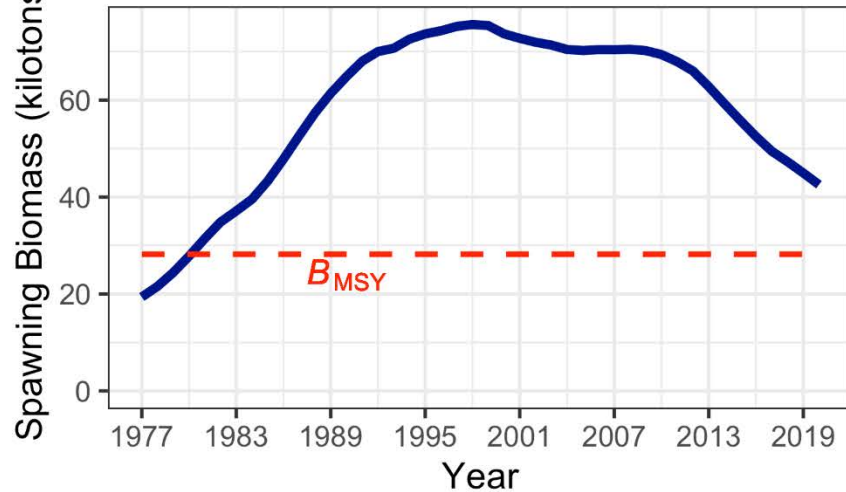
Total Catch



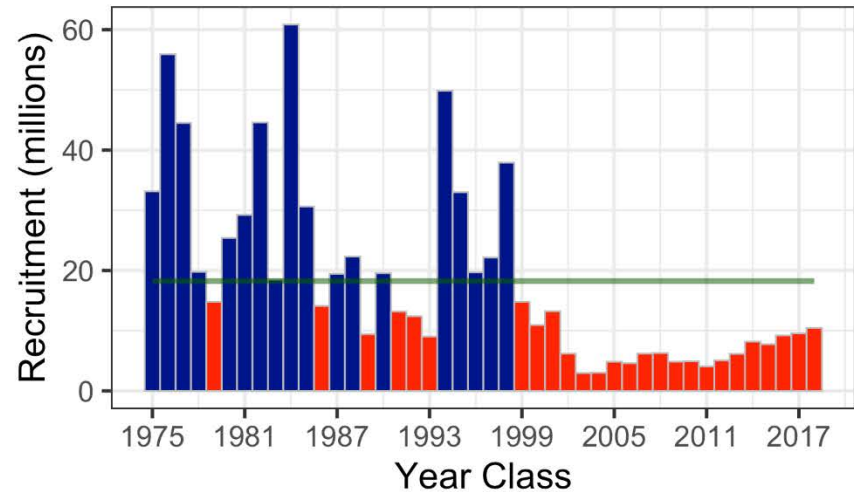
Total Biomass



Spawning Biomass



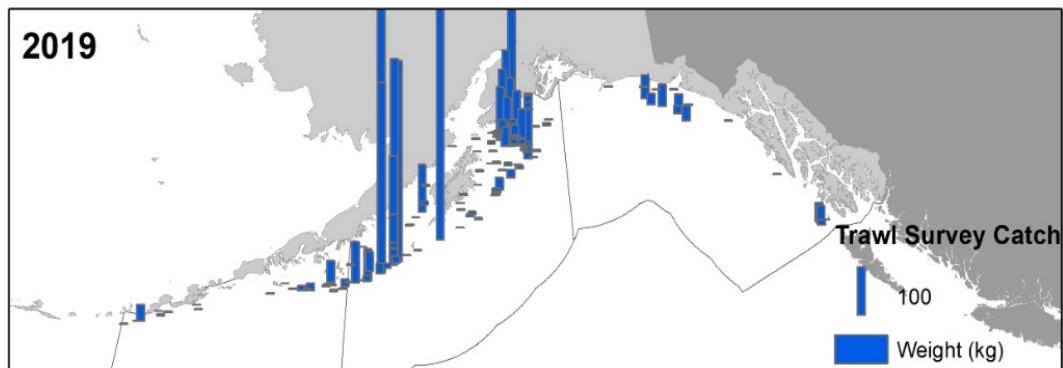
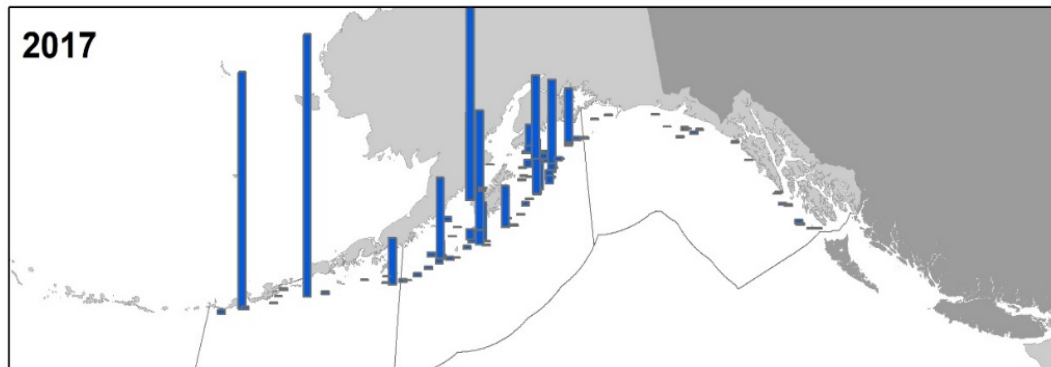
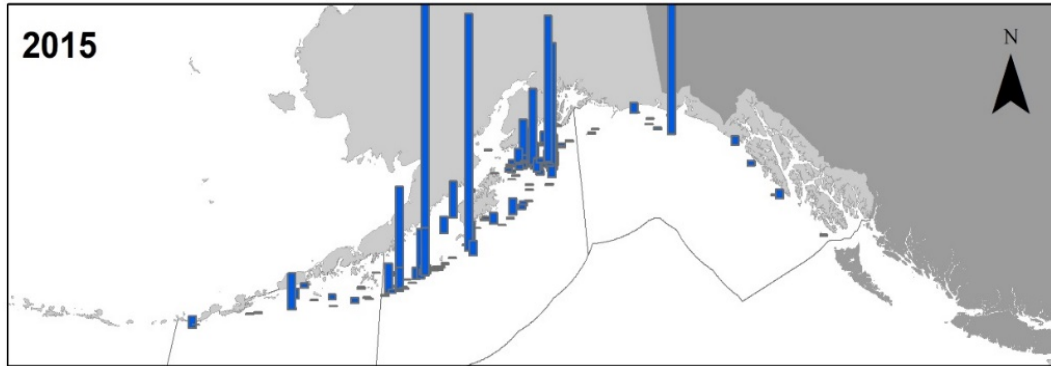
Age 2 Recruitment



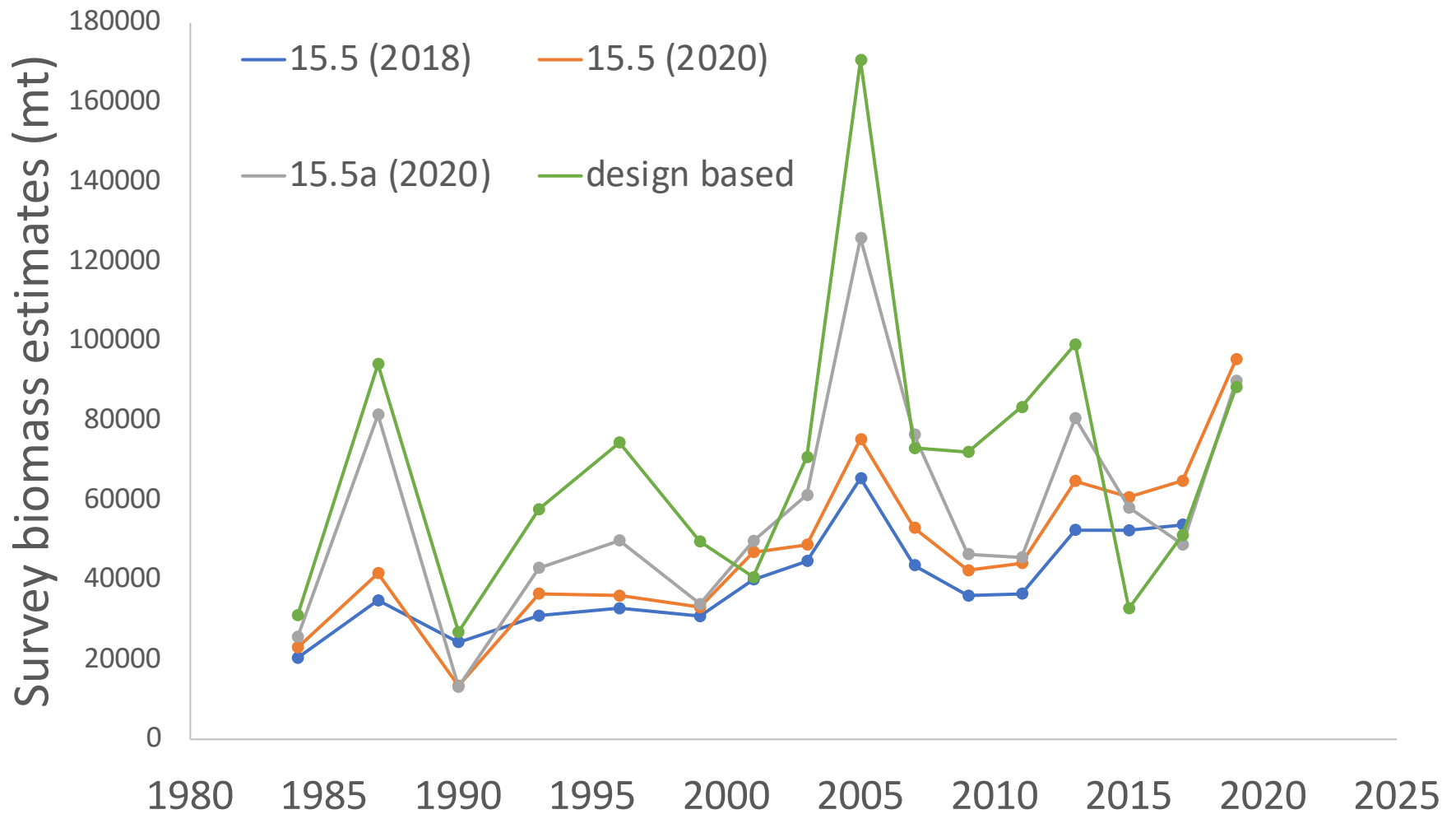
Rockfish ABC Summary

Species	2020	2021	Change
POP	31,238	36,177	up 4,939 (16%)
northern	4,312	5,358	up 1,046 (24%)
Shortraker	708	708	same (0%)
Dusky	3,676	7,101	up 3,425 (93%)
Roughey and Blackspotted	1,209	1,212	up 3 (0%)
Demersal shelf	238	257	up 19 (8%)
Thornyhead	2,016	1,953	down 63 (3%)
Other	4,053	4,053	same (0%)
Sub Total	47,450	56,819	up 9,369 (20%)

12. GOA dusky rockfish



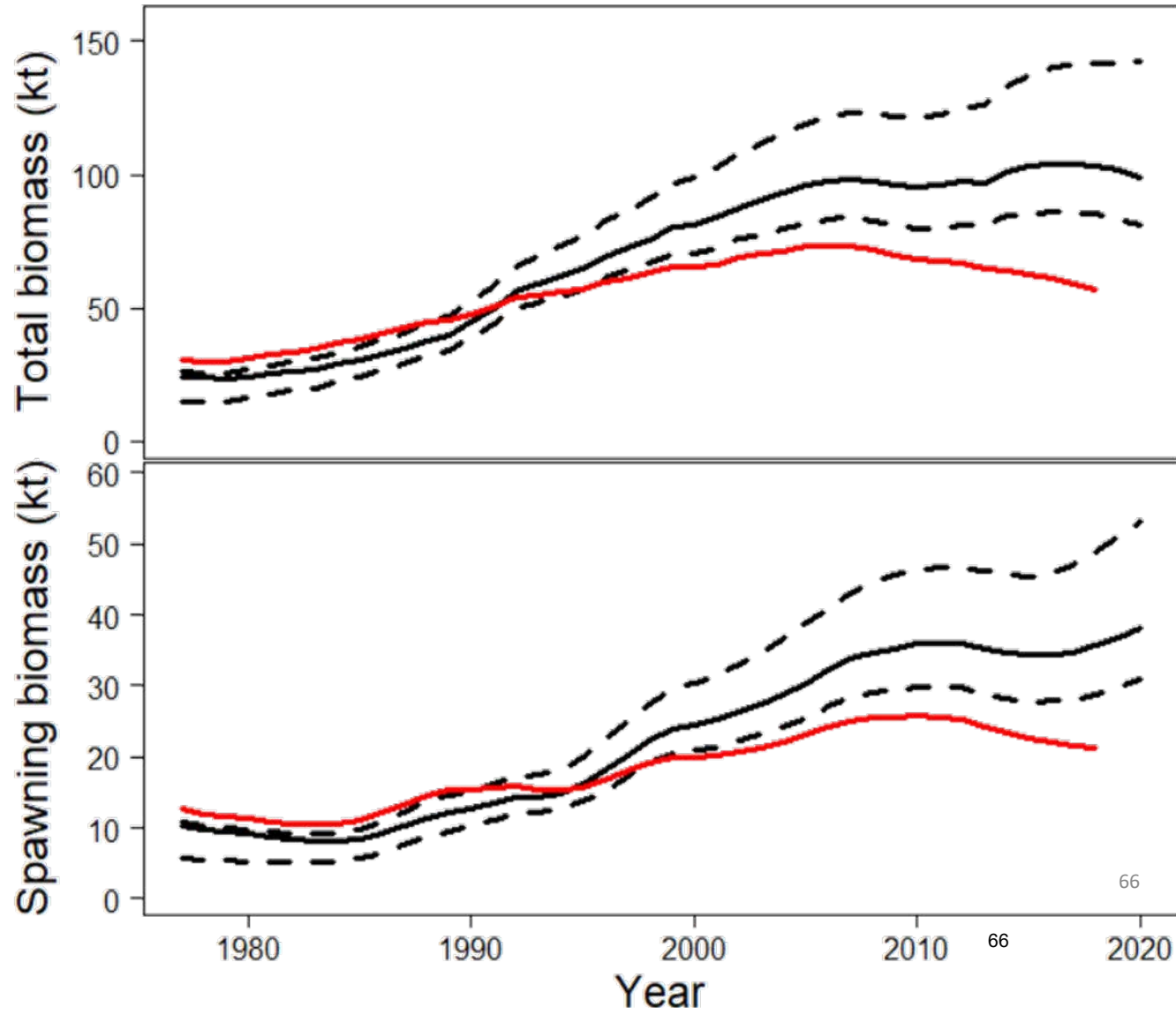
12. GOA dusky rockfish



12. GOA dusky rockfish

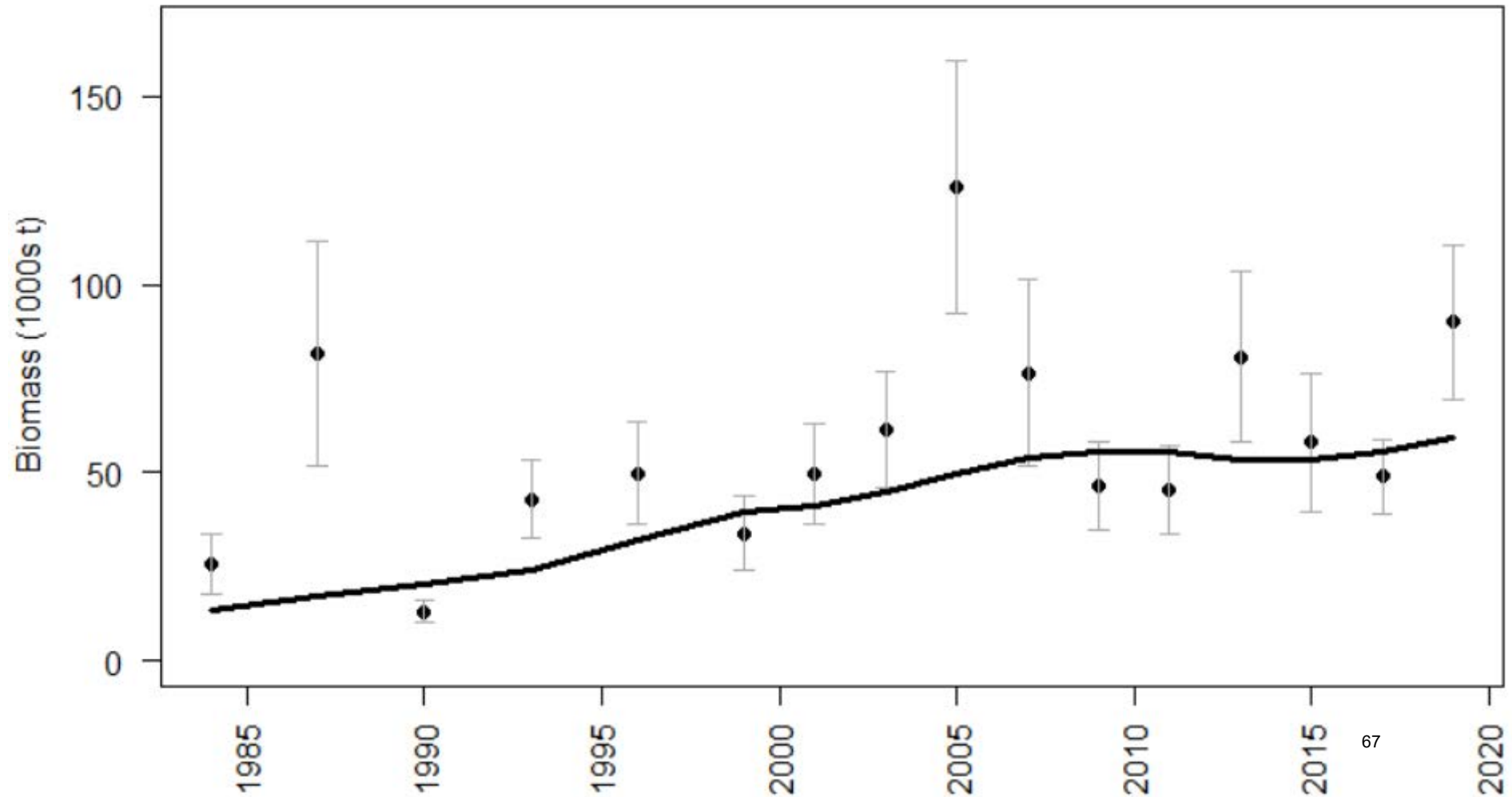
Results

- Model 15.5a (2020)
- Model 15.5 (2018)

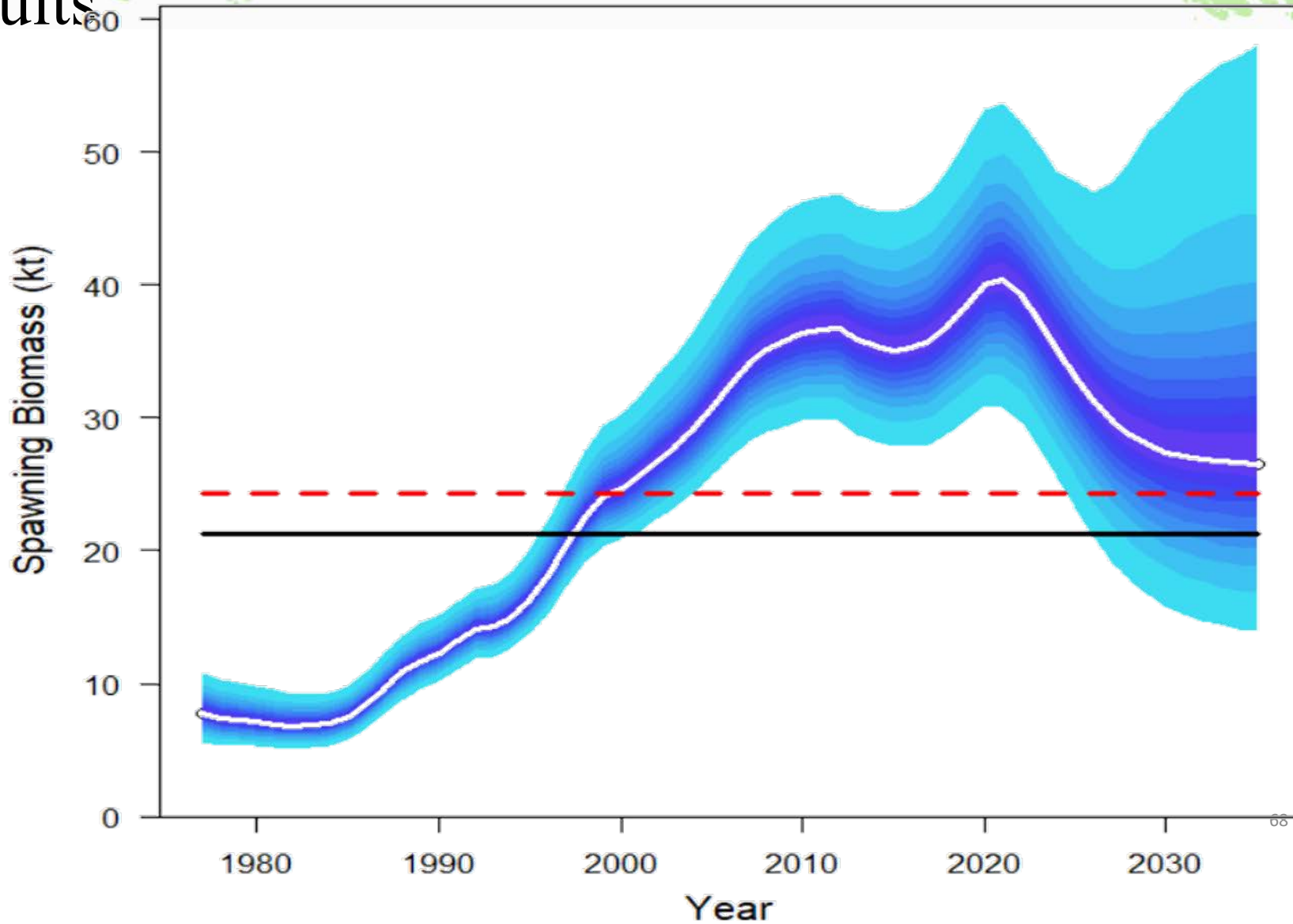


12. GOA dusky rockfish

15.5a (2020)

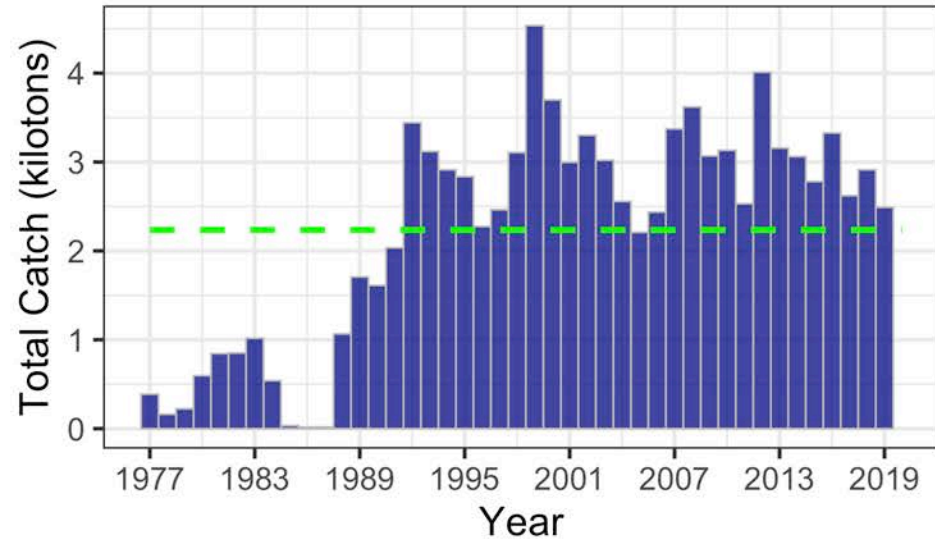


12. GOA dusky rockfish Results

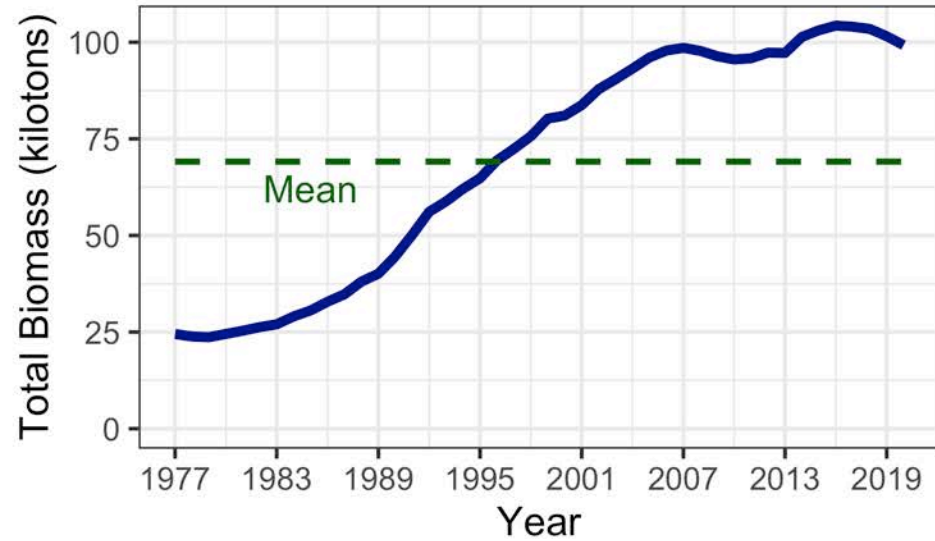


GOA Dusky Rockfish

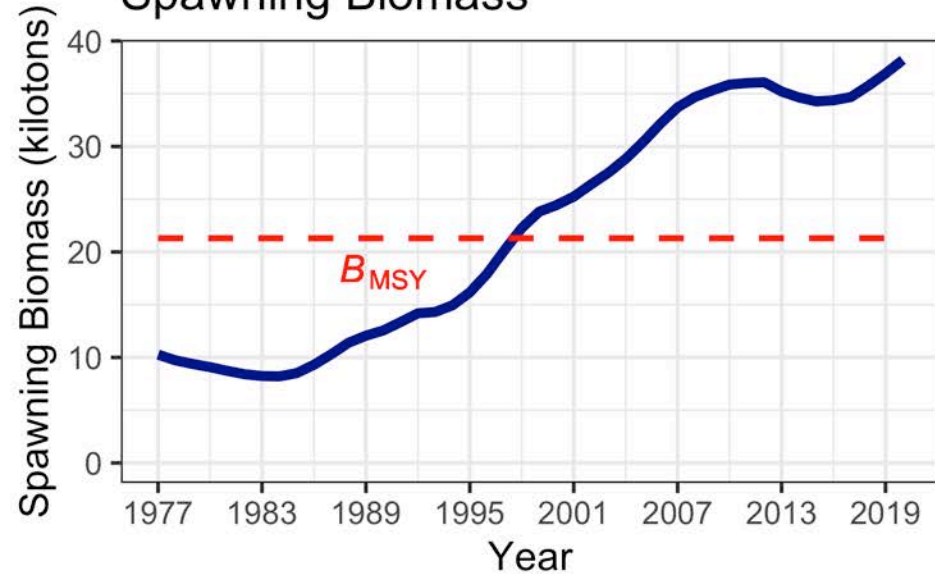
Total Catch



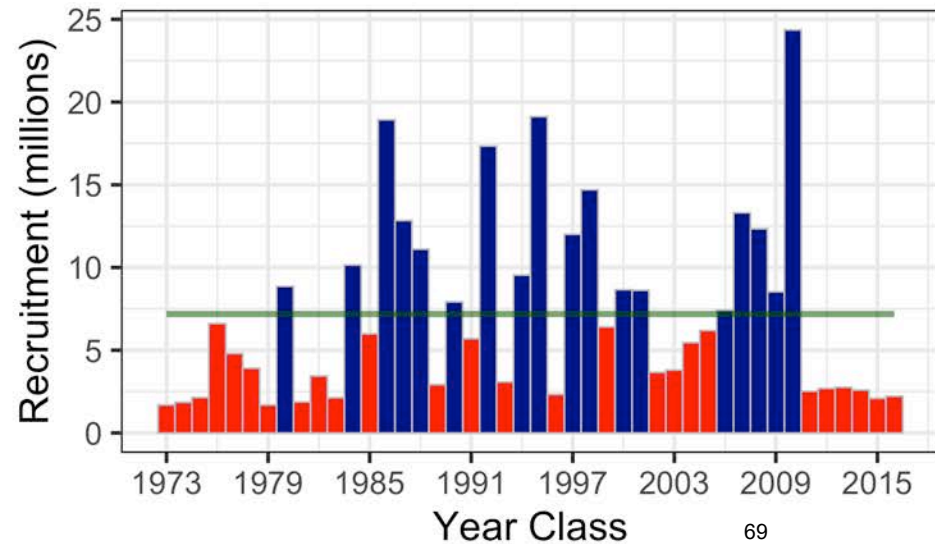
Total Biomass



Spawning Biomass



Age 4 Recruitment

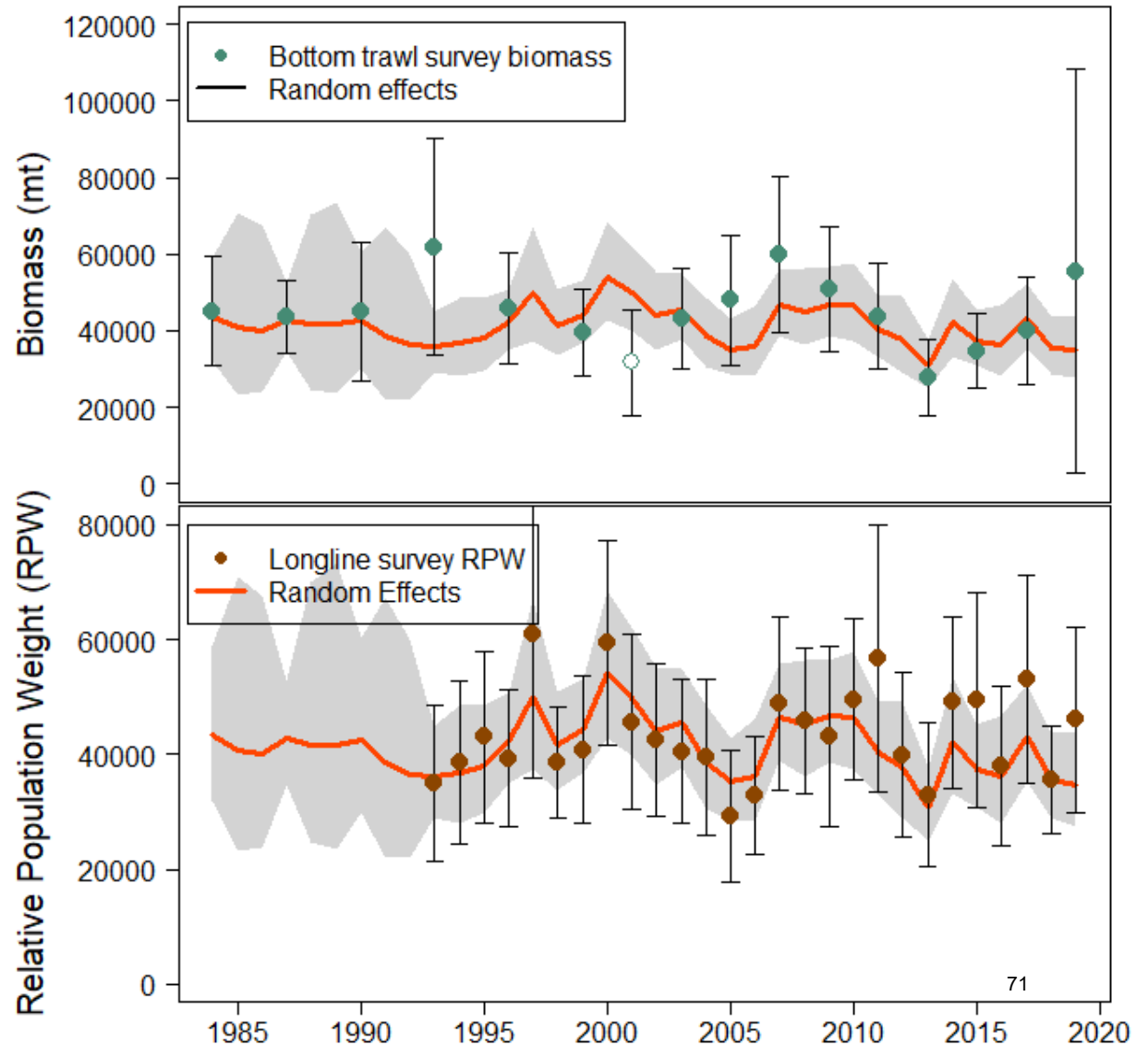
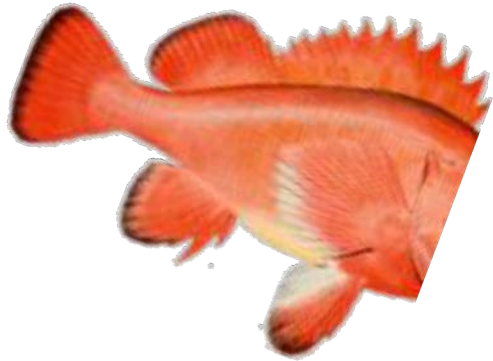


Rockfish ABC Summary

Species	2020	2021	Change
POP	31,238	36,177	up 4,939 (16%)
northern	4,312	5,358	up 1,046 (24%)
Shortraker	708	708	same (0%)
Dusky	3,676	7,101	up 3,425 (93%)
Rougheye and Blackspotted	1,209	1,212	up 3 (0%)
Demersal shelf	238	257	up 19 (8%)
Thornyhead	2,016	1,953	down 63 (3%)
Other	4,053	4,053	same (0%)
Sub Total	47,450	56,819	up 9,369 (20%)

13. GOA Blackspotted/Rougheye Rockfish

Partial assessment

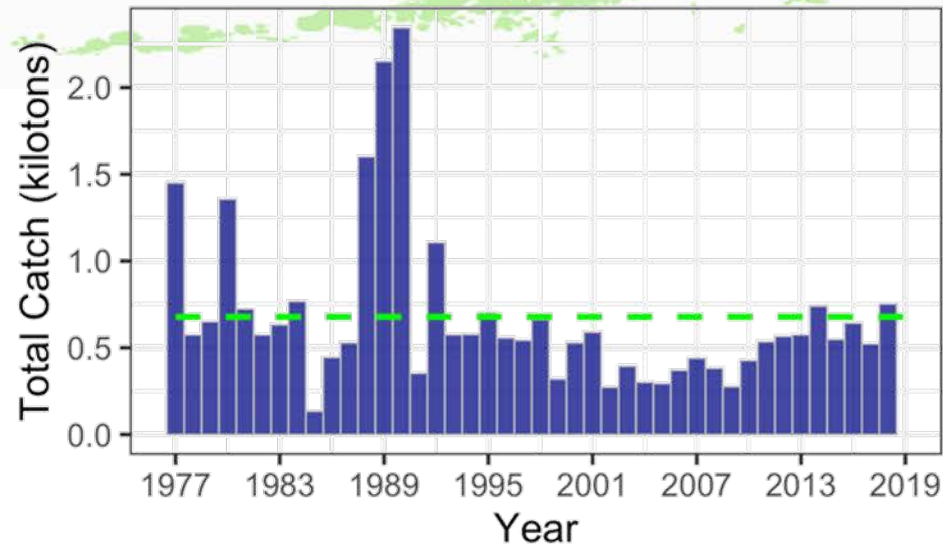


jane.sullivan@noaa.gov

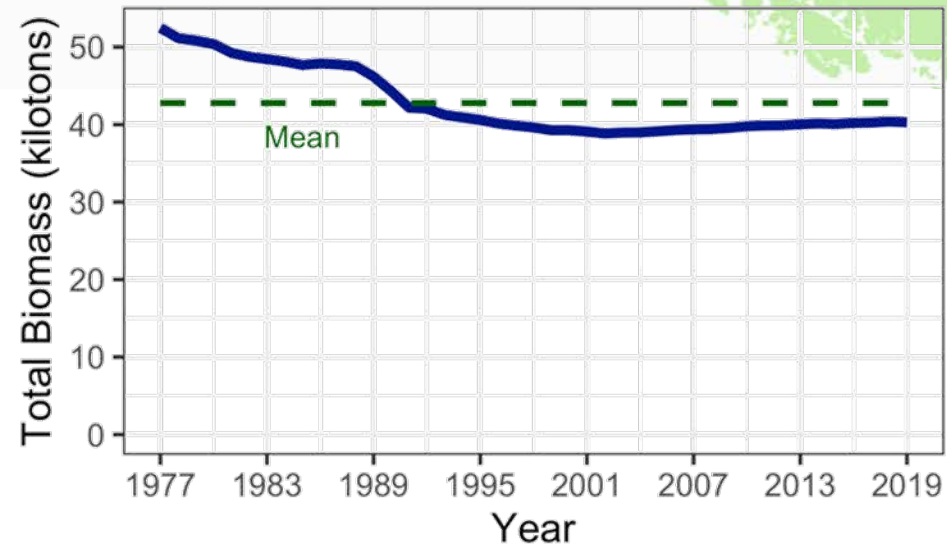
13. Rougheyeye/blackspotted rockfish

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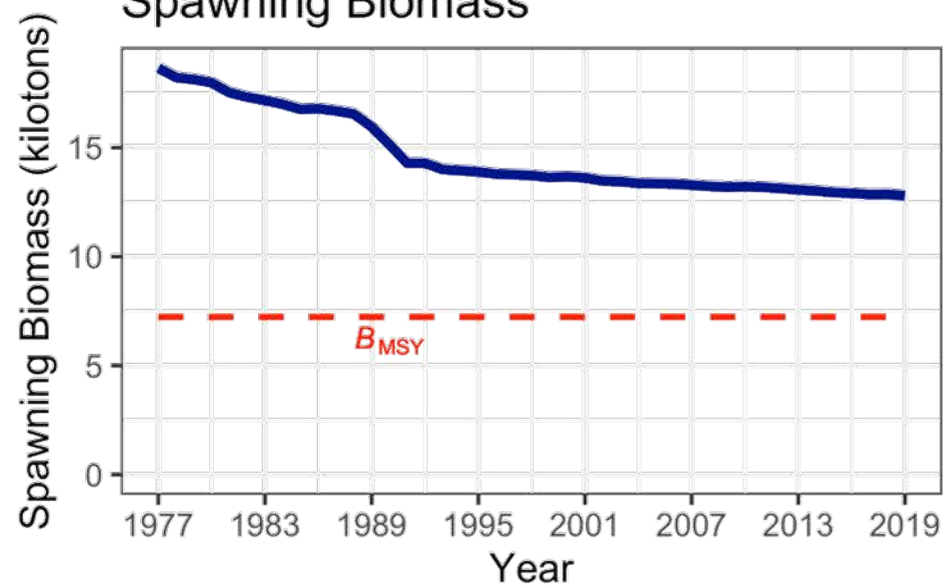
Total Catch



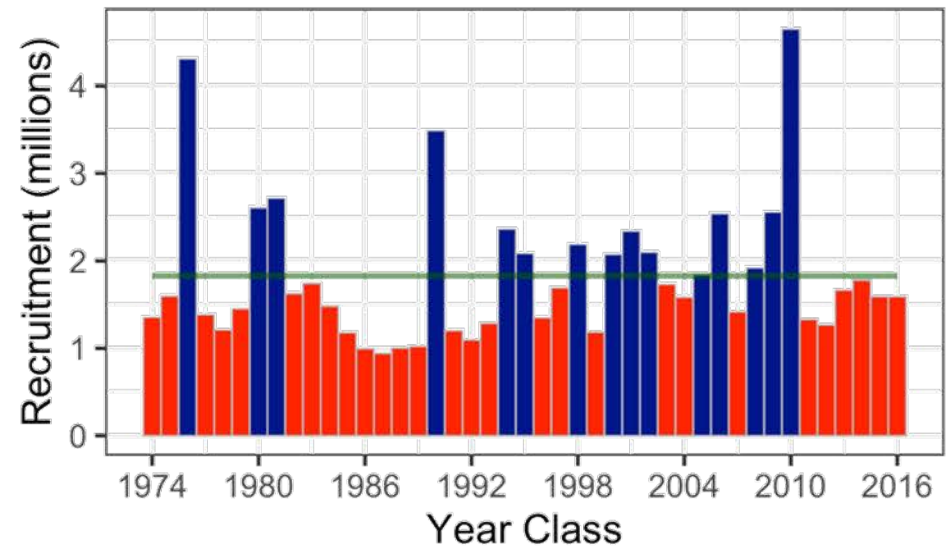
Total Biomass



Spawning Biomass



Age 3 Recruitment



Rockfish ABC Summary

Species	2020	2021	Change
POP	31,238	36,177	up 4,939 (16%)
northern	4,312	5,358	up 1,046 (24%)
Shortraker	708	708	same (0%)
Dusky	3,676	7,101	up 3,425 (93%)
Rougheye and Blackspotted	1,209	1,212	up 3 (0%)
Demersal shelf	238	257	up 19 (8%)
Thornyhead	2,016	1,953	down 63 (3%)
Other	4,053	4,053	same (0%)
Sub Total	47,450	56,819	up 9,369 (20%)

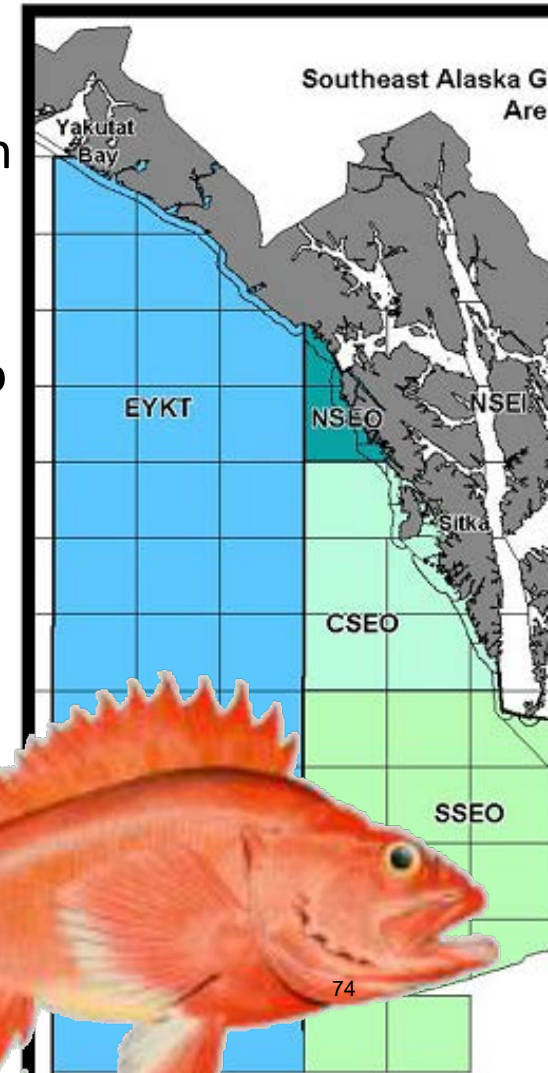
14. Demersal shelf rockfish

Kellii Wood

ADF&G

kellii.wood@alaska.gov

- Partial Assessment, Tier 4 (yelloweye) and Tier 6 (6 other species)
- Three areas (SSEO, CSEO, and NSEO) surveyed by ROV in 2018
- Yelloweye biomass estimate decreased from 12,029 t to 10,903 t (lower CI)



Stock Assessment Survey

Four Management Areas:

Eastern Yakutat (EYKT)

Northern Southeast Outside (NSEO)

Central Southeast Outside (CSEO)

Southern Southeast Outside (SSEO)

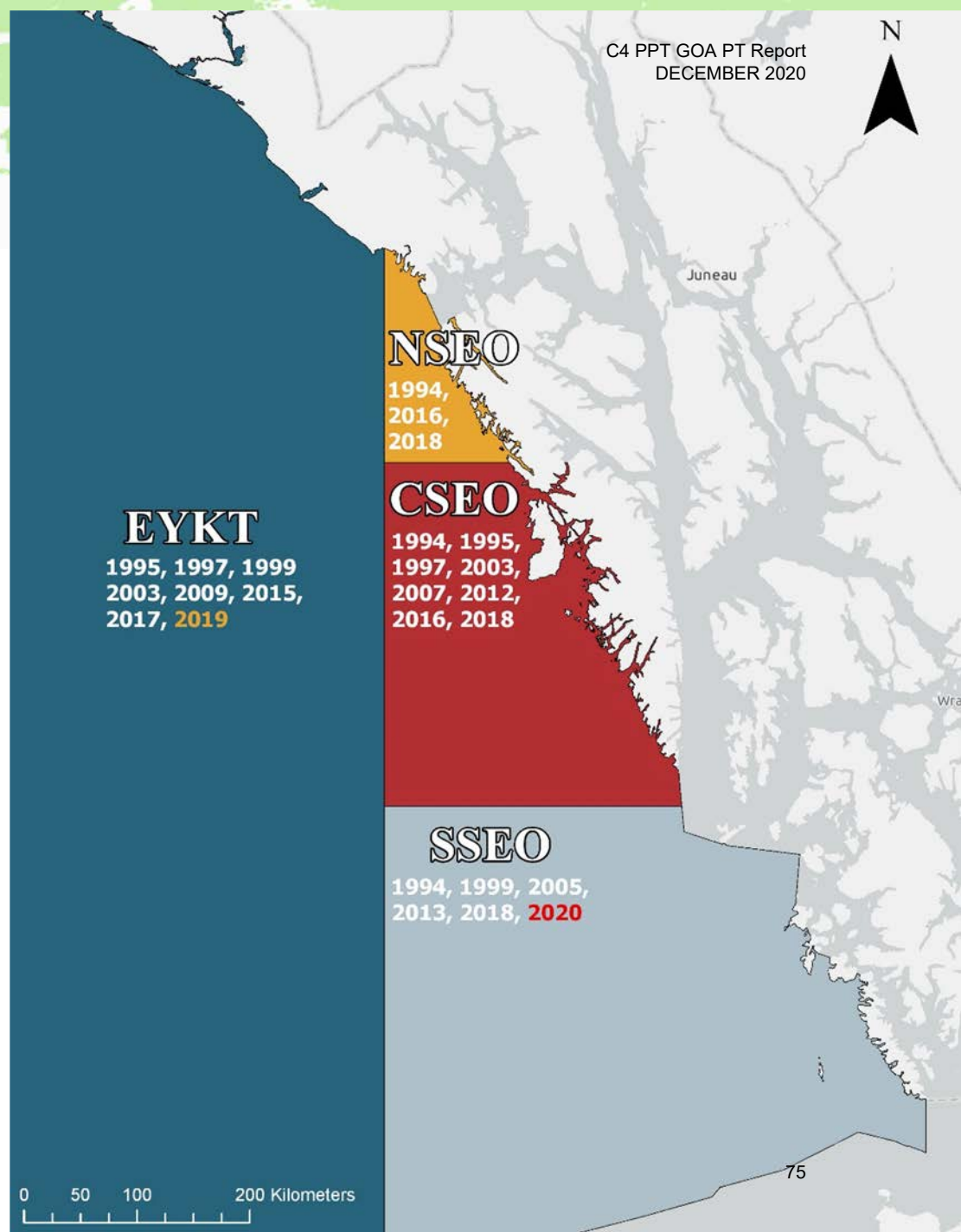
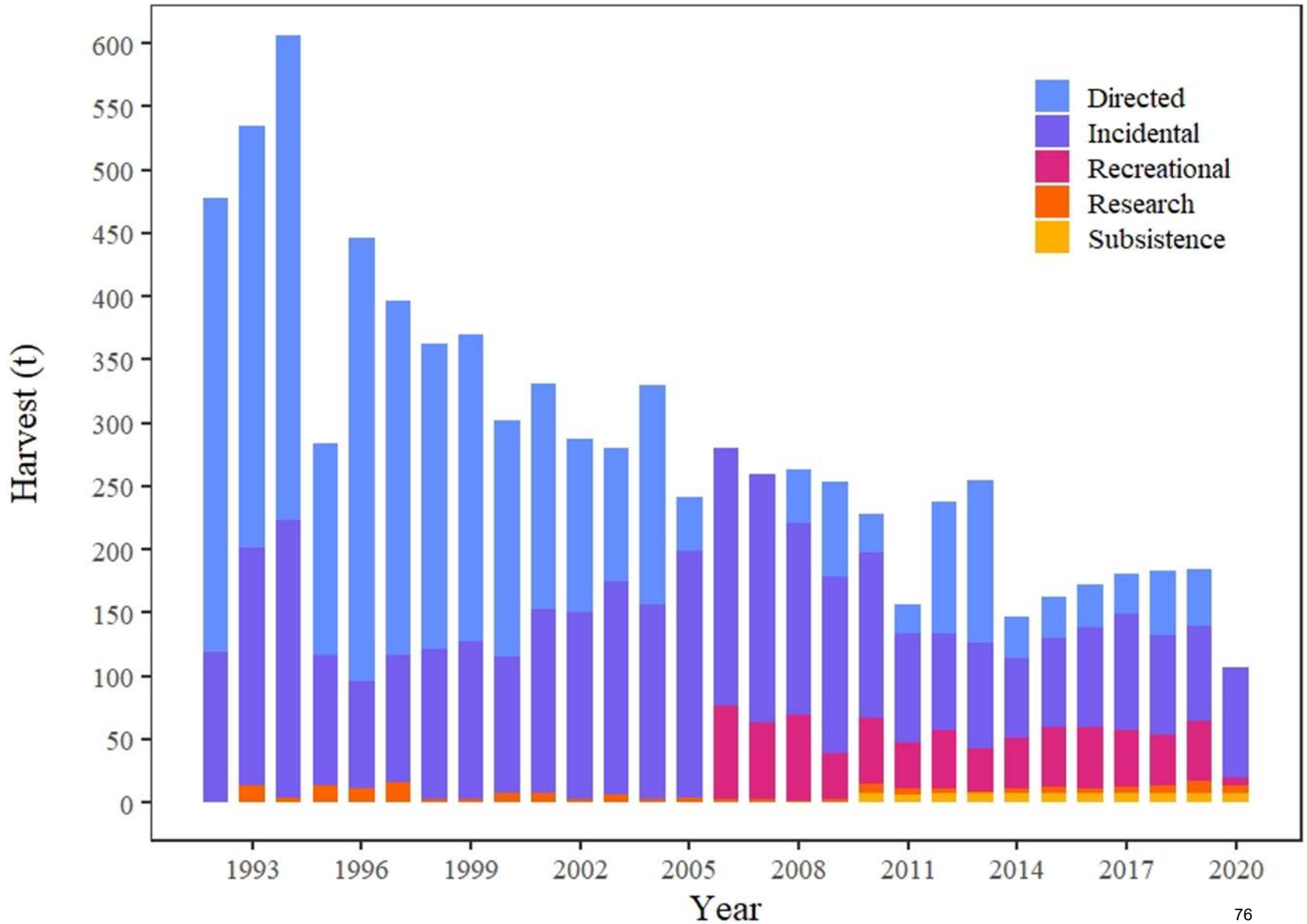


Photo credit: ADF&G

SEO DSR Catch by Sector

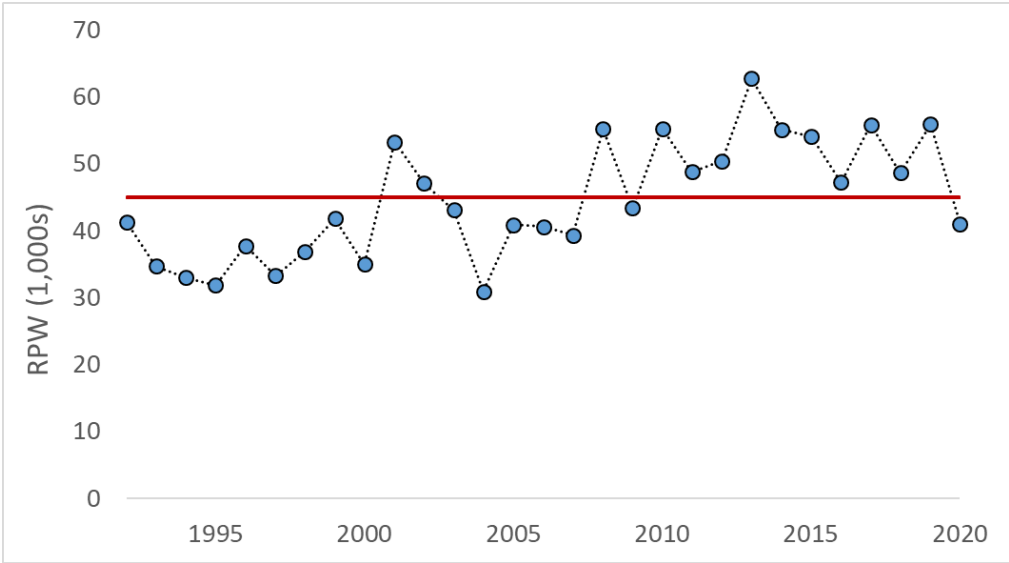
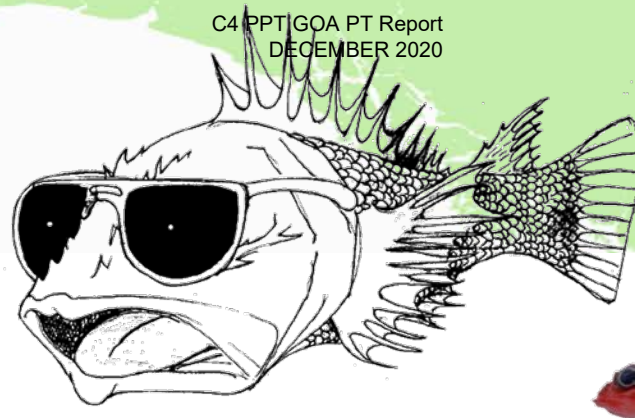
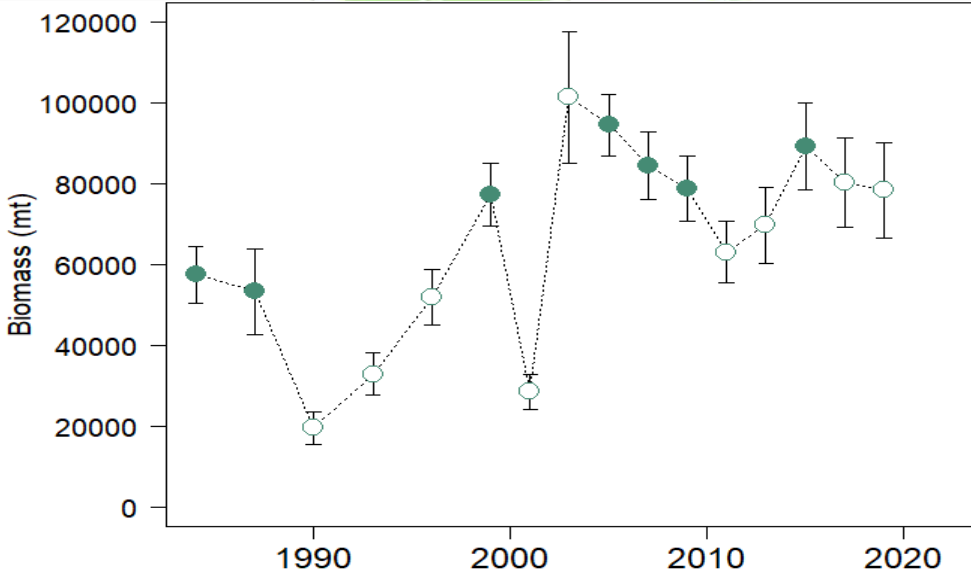
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Rockfish ABC Summary

Species	2020	2021	Change
POP	31,238	36,177	up 4,939 (16%)
northern	4,312	5,358	up 1,046 (24%)
Shortraker	708	708	same (0%)
Dusky	3,676	7,101	up 3,425 (93%)
Rougheye and Blackspotted	1,209	1,212	up 3 (0%)
Demersal shelf	238	257	up 19 (8%)
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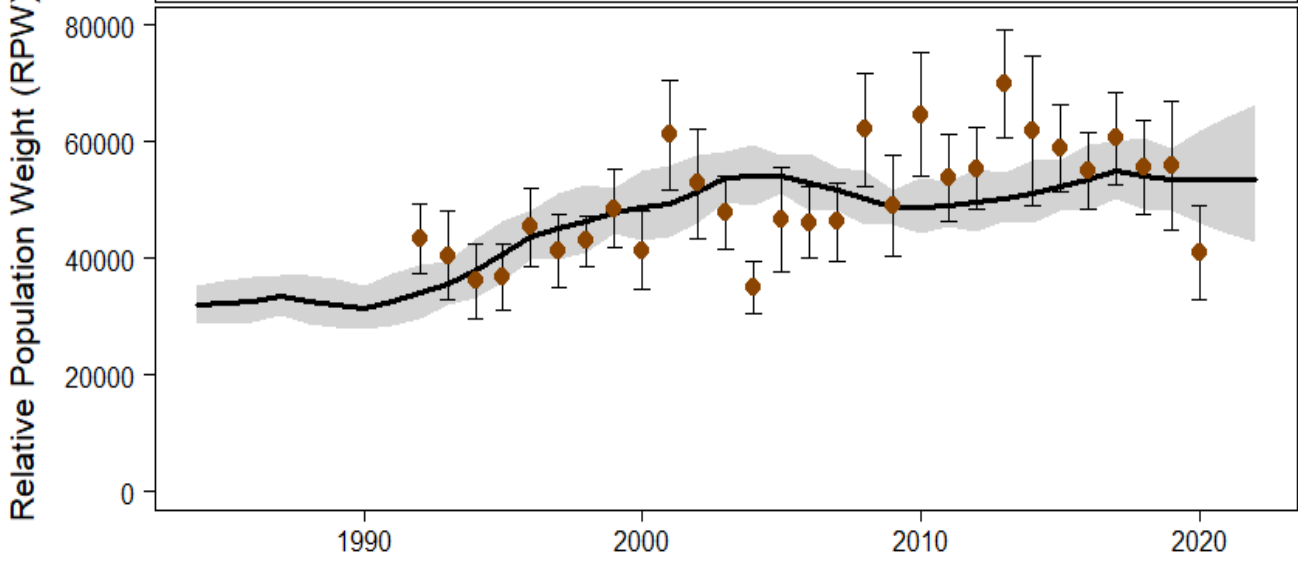
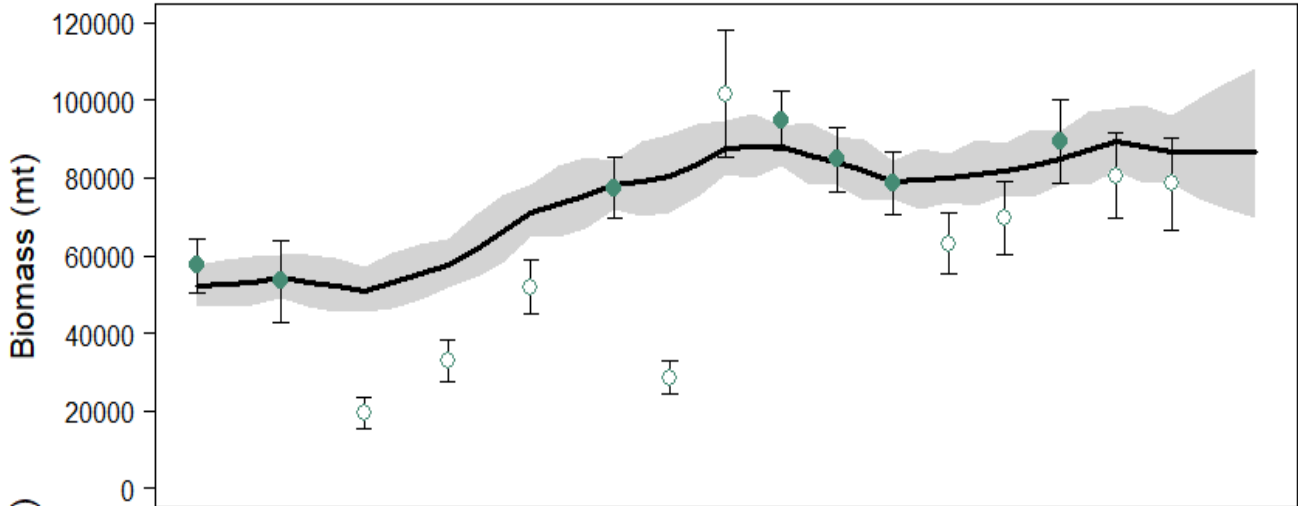
15. Shortspine thornyheads



15. Shortspine thornyheads



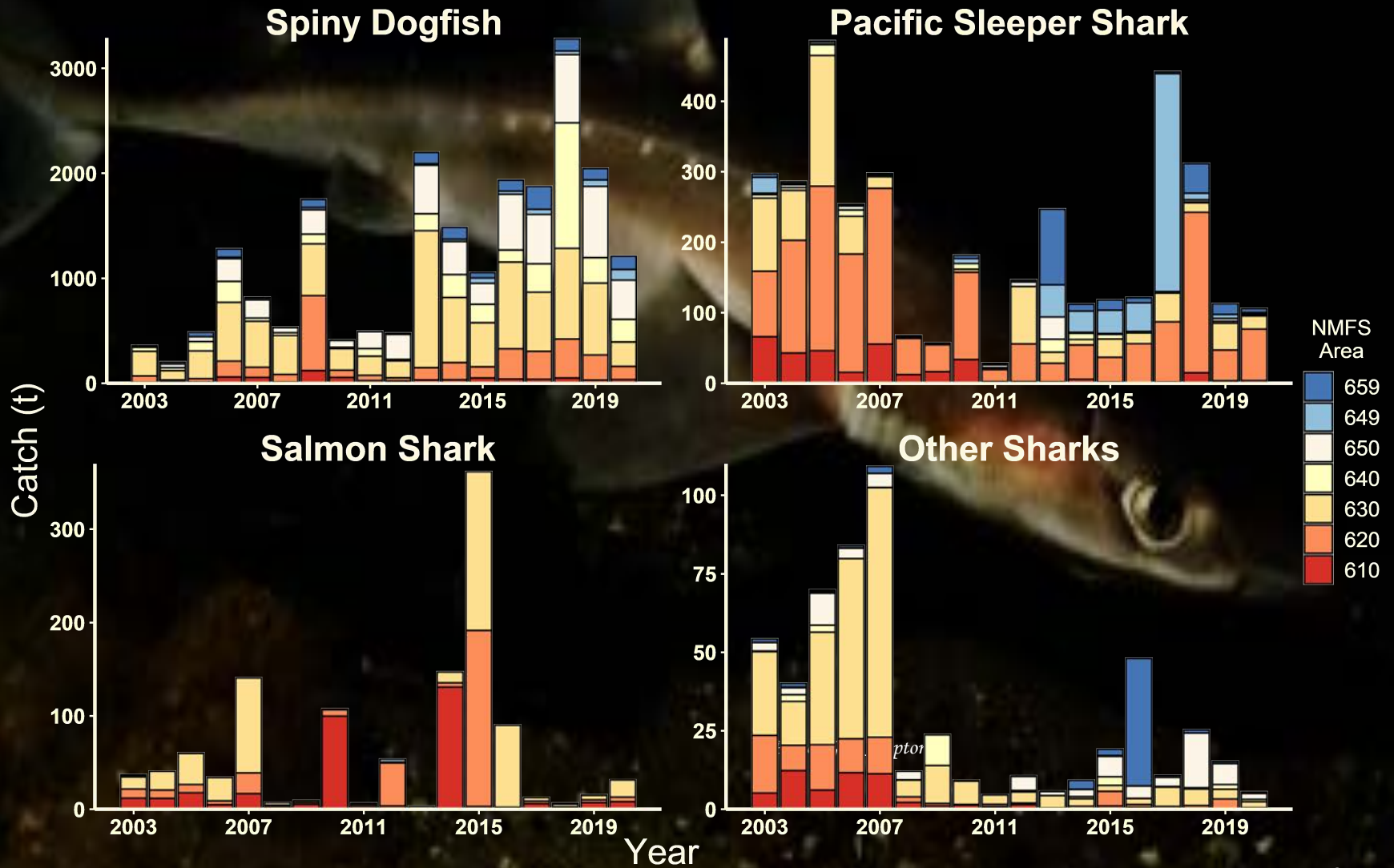
C4 PPT GOA PT Re...
DECEMBER 2020



19. GOA sharks

Species	2020 Catch	2020	2021	Change
Pollock	105,118	118,642	115,870	down 2,772 (2%)
Pacific Cod	3,980	14,621	23,627	up 9,006 (62%)
Sablefish	12,095	16,883	13,269	down 3,614 (21%)
Flatfish	7,497	114,567	116,883	up 2,316 (2%)
Arrowtooth flounder	21,177	128,060	126,970	down 1,090 (1%)
Rockfish	31,628	47,450	56,819	up 9,369 (20%)
Atka mackerel	608	4,700	4,700	same (0%)
Skates	2,165	6,670	6,670	same (0%)
Sharks	1,581	8,184	3,755	down 4,429 (54%)
Octopus	78	980	980	same (0%)
Total	185,927	456,035	469,250	up 13,215 (3%)

19. GOA Sharks Catch by Area



19. GOA Sharks

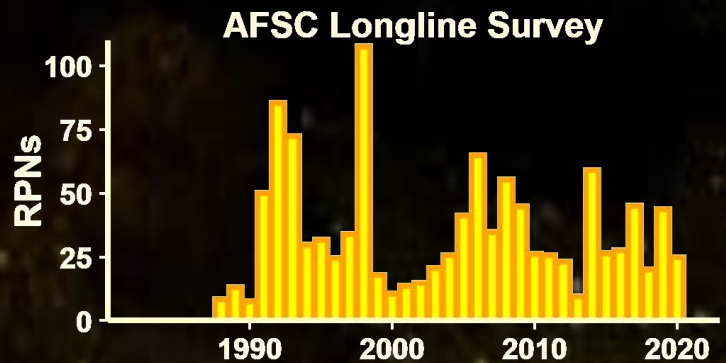
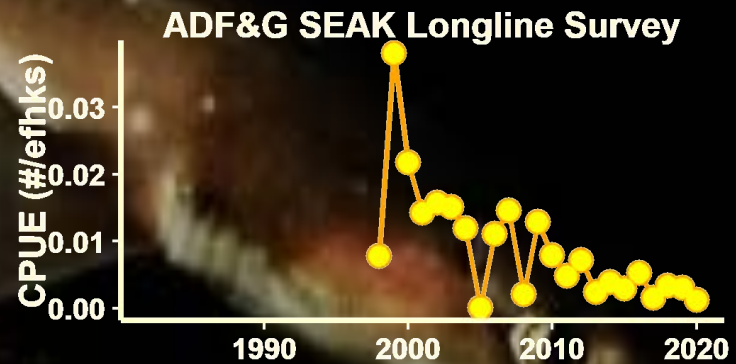
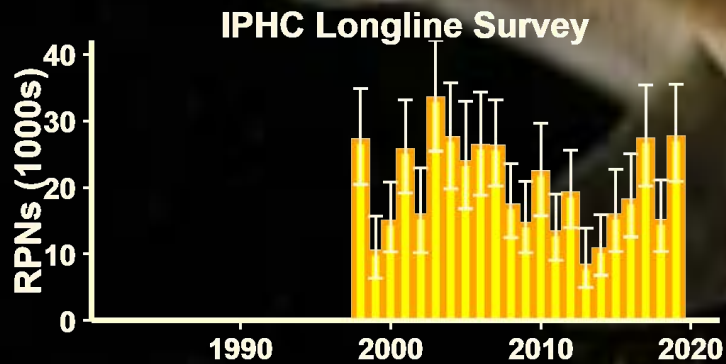
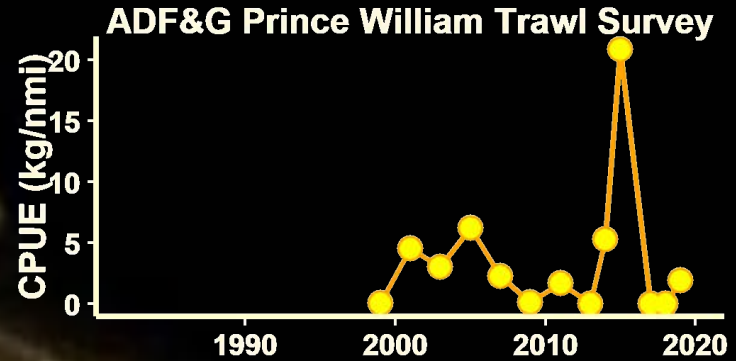
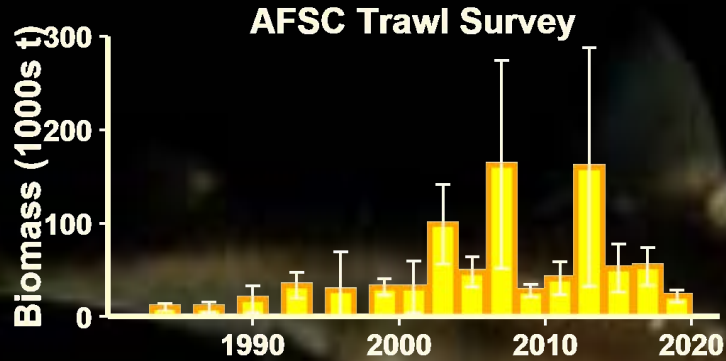
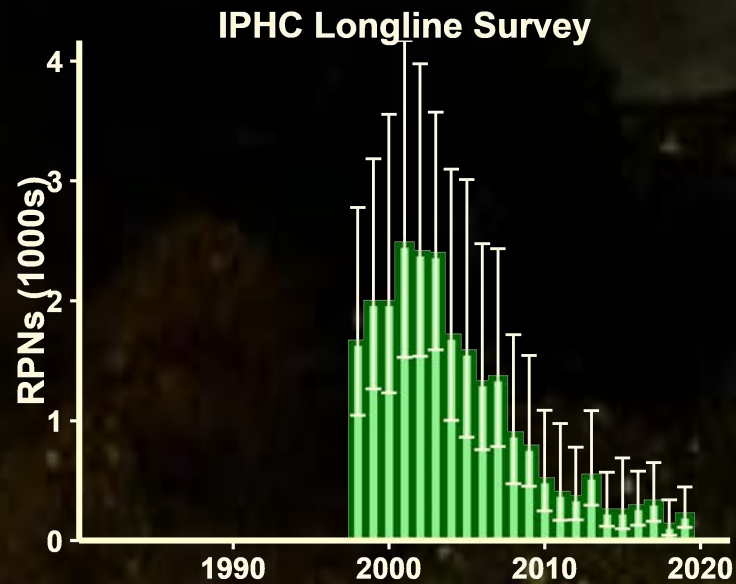
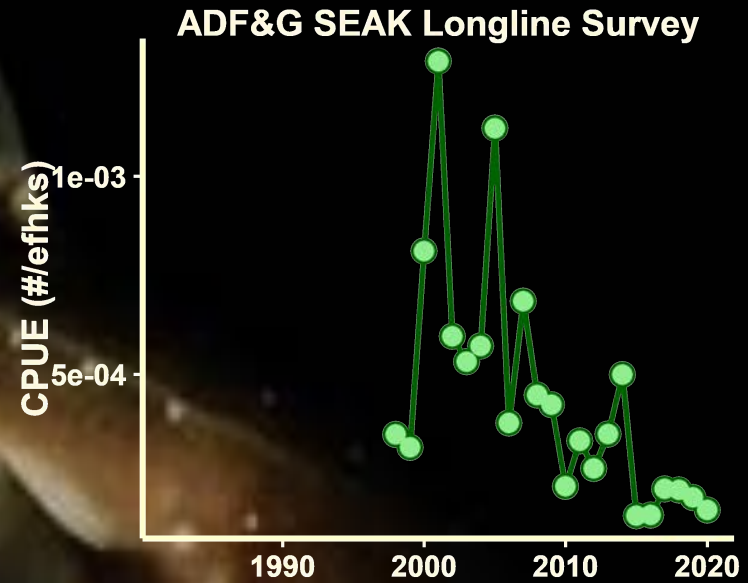
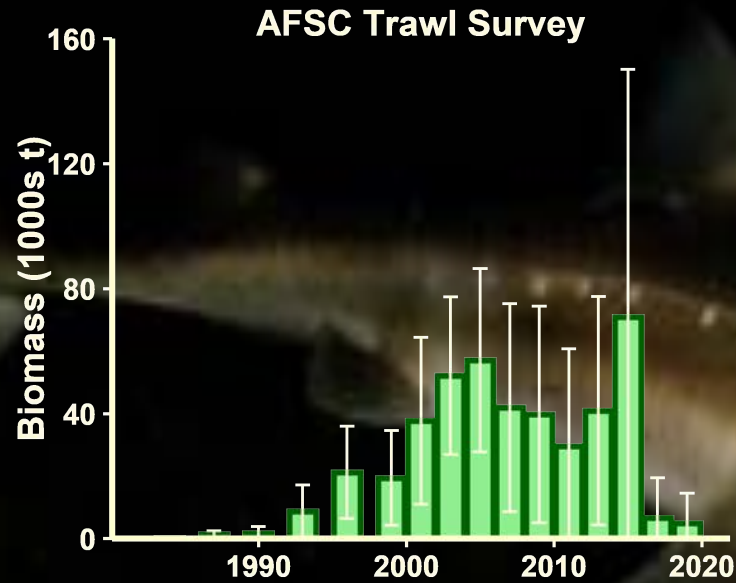


Photo: Greg Ampton

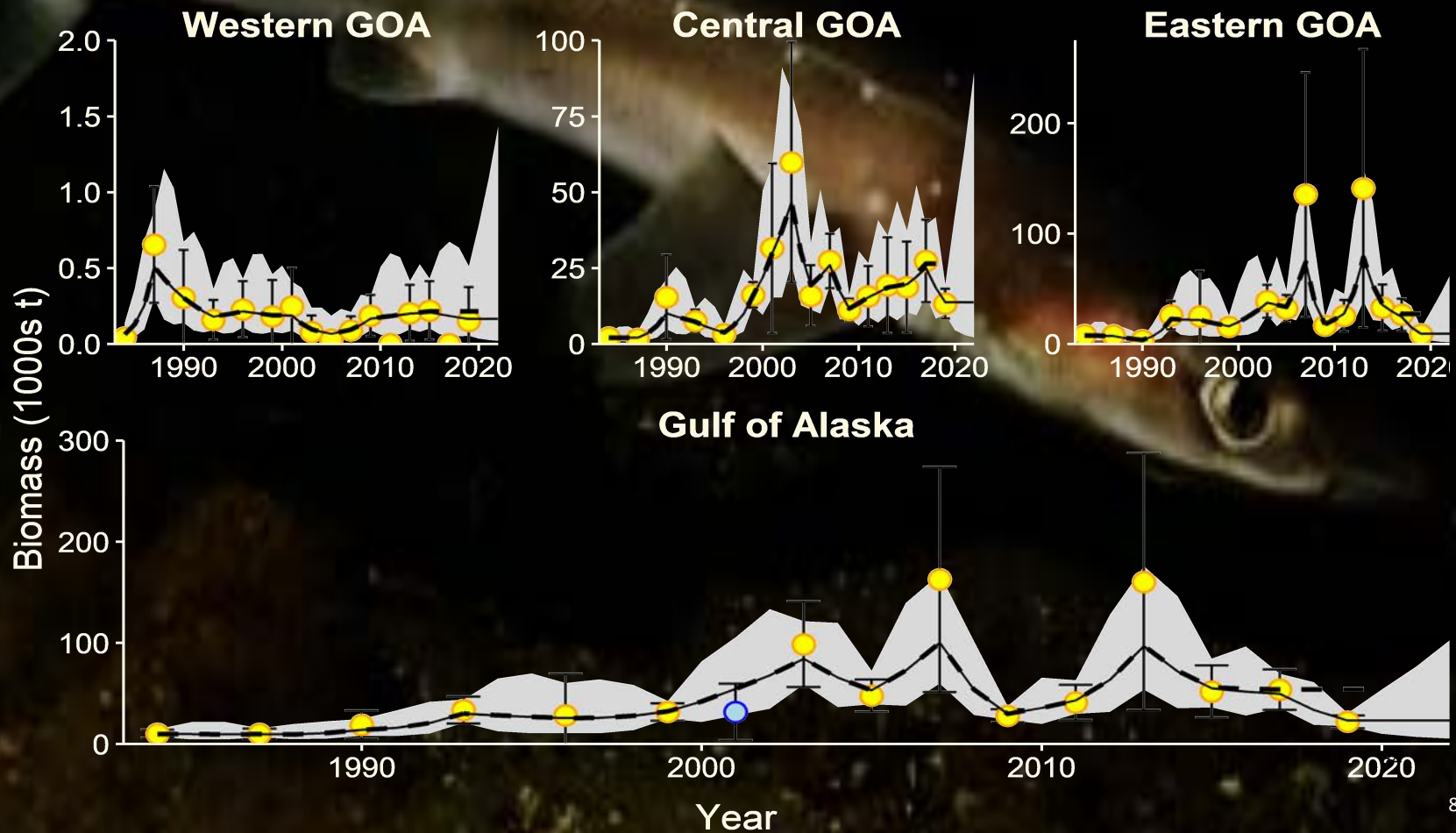
19. GOA Sharks



19. GOA Sharks

Random Effects Biomass

- Spiny dogfish only
 - Fit separately trawl survey data by area, to account for missing 2001 survey in EGOA



19. GOA Sharks

Harvest Recommendations Spiny Dogfish

- Model 15.3A
 - $q = 0.21$
 - $B_a = B_{RFX}/q$
 - $F_{OFL} = F_{max} = 0.04$ (demographic)
 - $OFL = F_{OFL} * B_a$

Reminder:
 $ABC = 0.75OFL$



Risk Table

- Unclear how to score a complex when different species score differently
- Do not recommend any ABC reductions at this time
- A number of projects ongoing to inform on these categories and improve assessments
 - Ageing, improving catch estimates, genetics and stock structure, tagging, data-limited methods

<i>Assessment-related considerations</i>	<i>Population dynamics considerations</i>	<i>Environmental/ecosystem considerations</i>	<i>Fishery performance considerations</i>
Level 2: Substantially increased concerns	Level 2: Substantially increased concerns	Level 1: no increased concerns	Level 1: no increased concerns

19. GOA Sharks



Team discussion

- **The Team inquired about a potential “observer effect” in the fisheries that are sampled more, and recommended that the author look at data from pre- and post-observer restructuring.**