

Gulf of Alaska SAFE report

GOA Plan Team Members

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Obren Davis	AKRO

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

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	2024

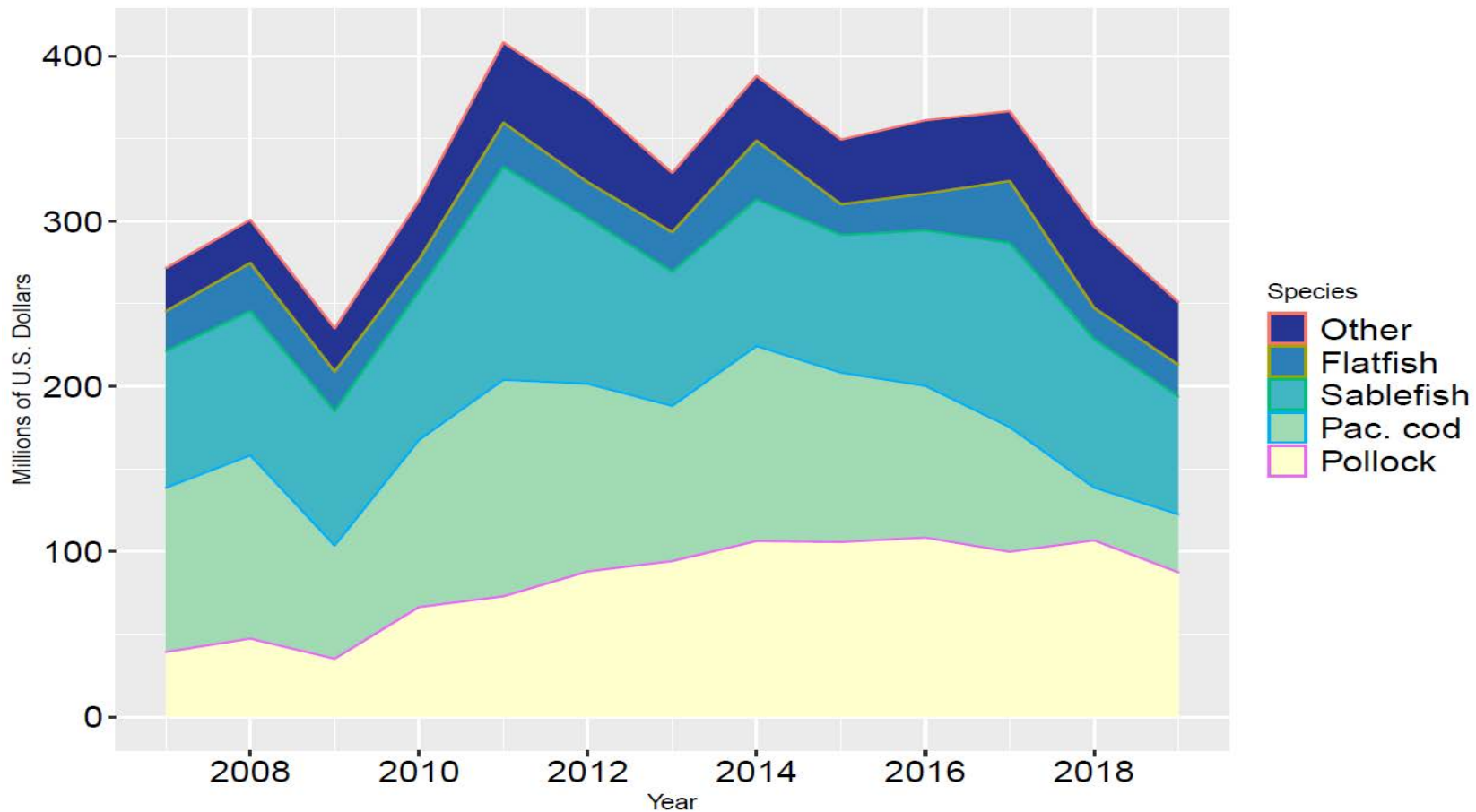
Overview

- 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

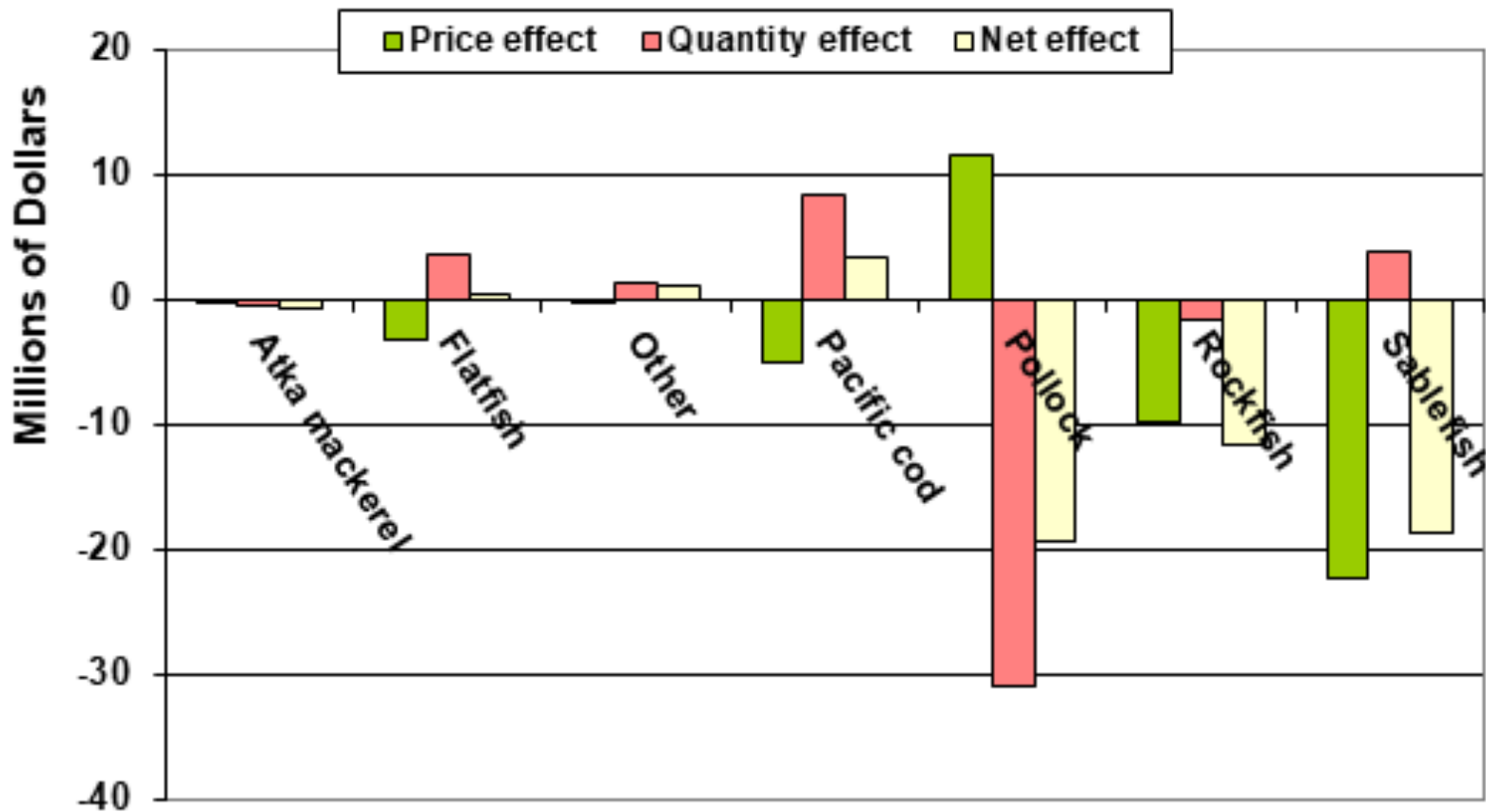
Stock	Assessment	Tier
<i>Northern and southern rock sole</i>	<i>Partial</i>	3
<i>Shallow water flatfish</i>	<i>Partial</i>	5
<i>Deepwater flatfish (Dover)</i>	<i>Partial</i>	3/6
<i>Rex sole</i>	<i>Partial</i>	5
<i>Arrowtooth flounder</i>	<i>Partial</i>	3
<i>Flathead sole</i>	<i>Partial</i>	3
<i>Rougeye & blackspotted rockfish</i>	<i>Partial</i>	3
<i>Demersal shelf rockfish</i>	<i>Partial</i>	4/6

- 
- Document layout and links...



GOA Economic synopsis

GOA First-Wholesale Revenue Change in 2018-19 Decomposed by Species Group



Revenue changes (and source)



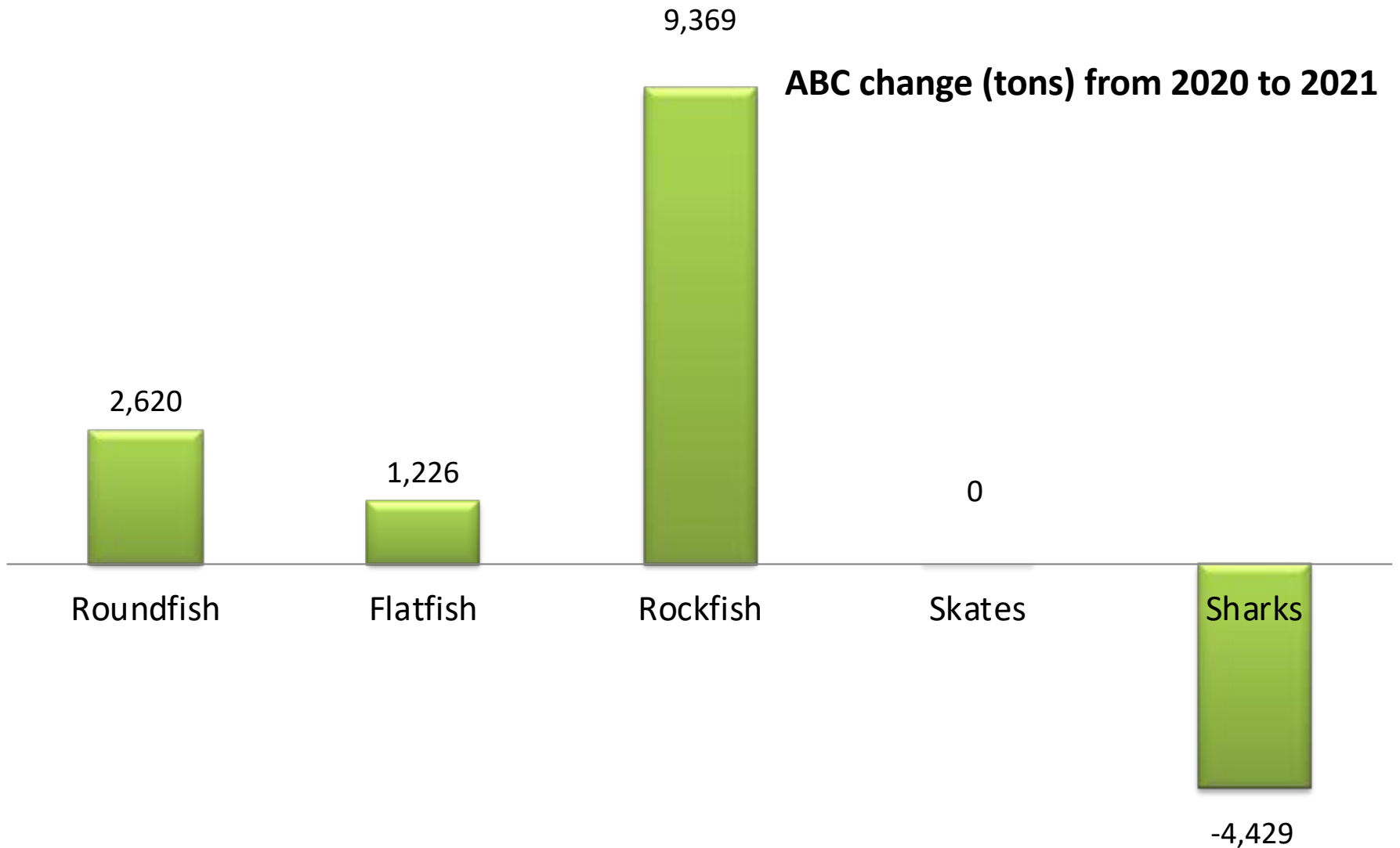


CIE reviews (Center for Independent Experts)

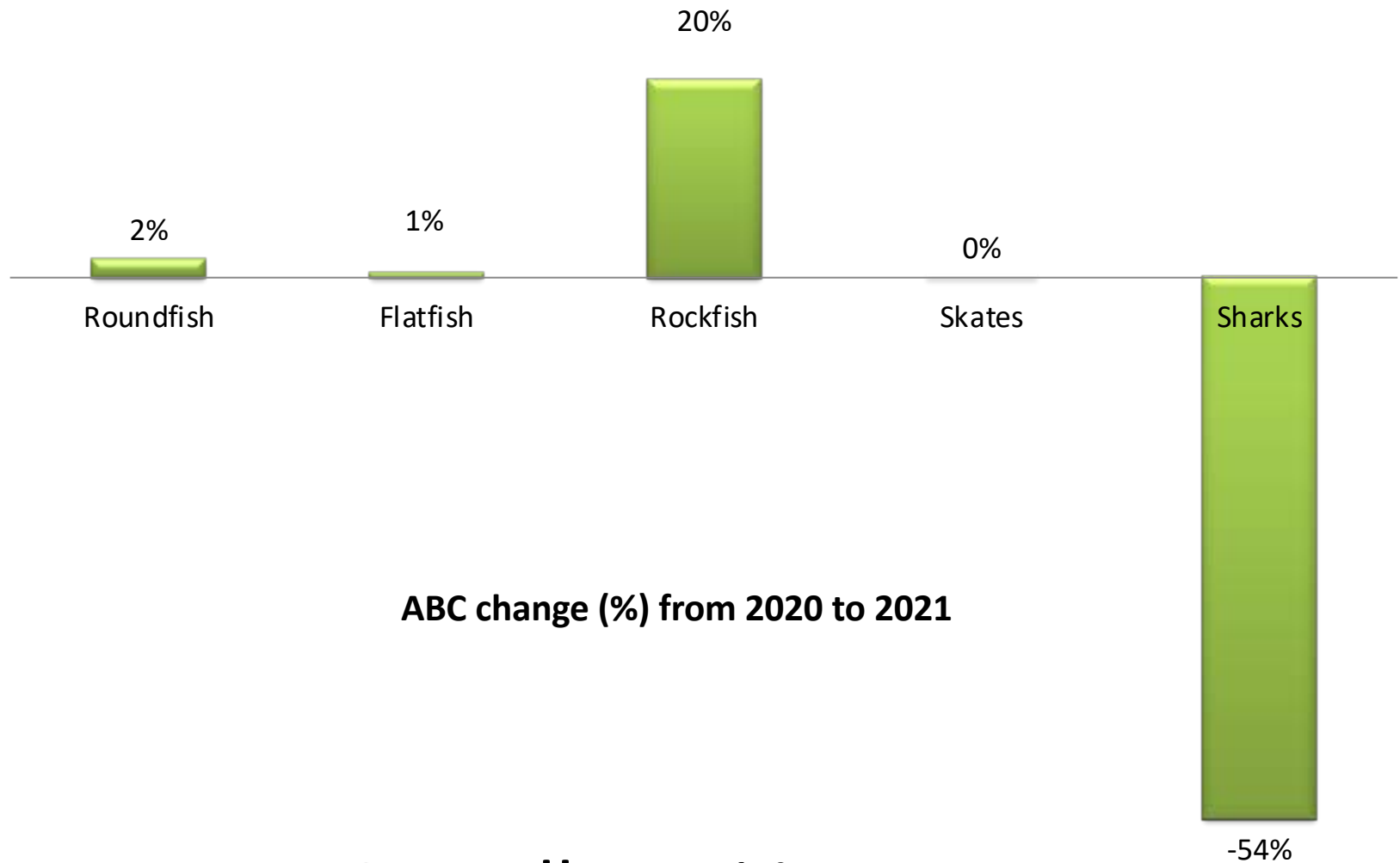
- 2021: GOA Rockfish planned

The Team encouraged authors to consistently notify Council of upcoming CIE activities to ensure these activities benefit to the extent practical the provision of management advice.

2020-2021 ABC change

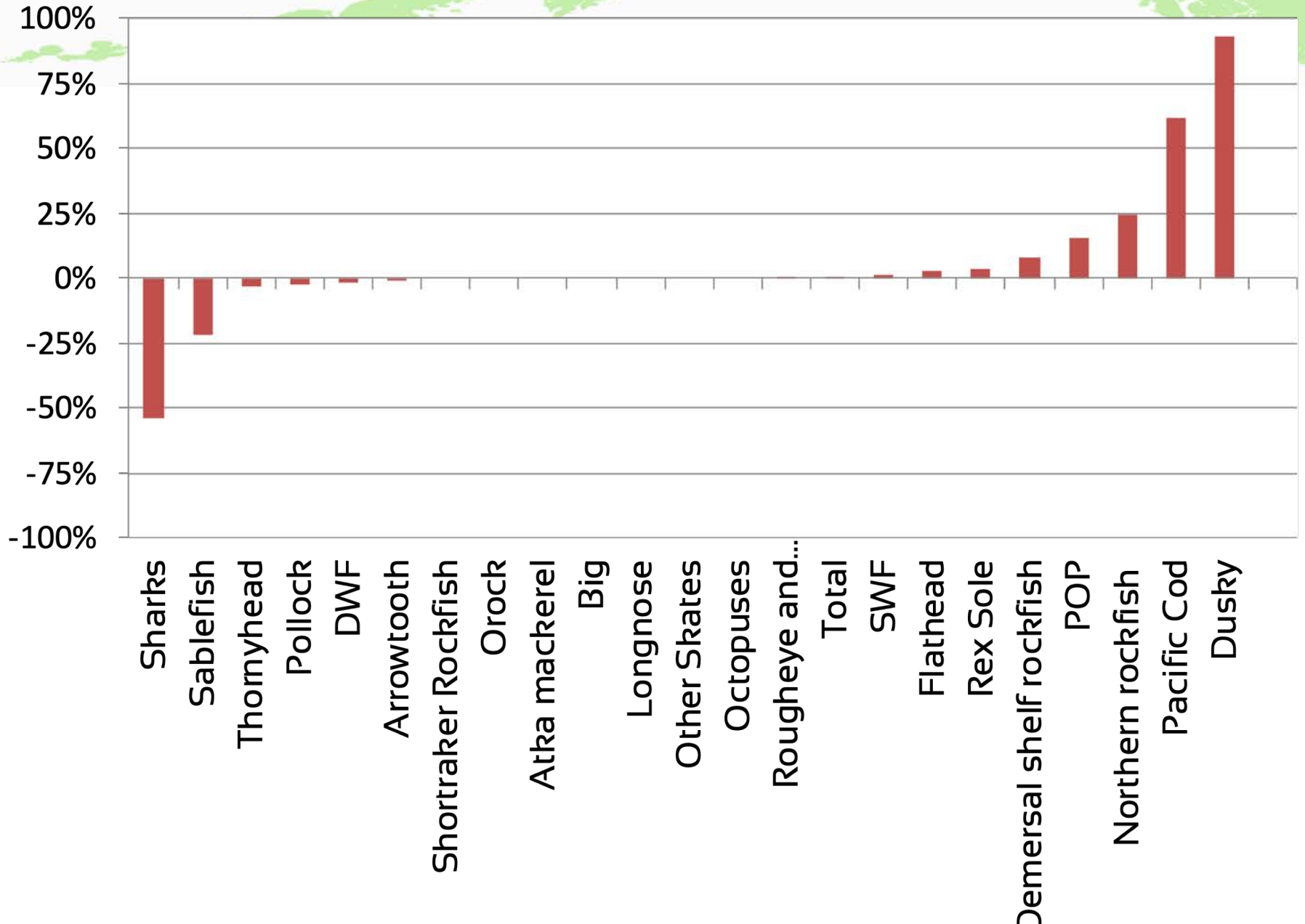


2020-2021 ABC change

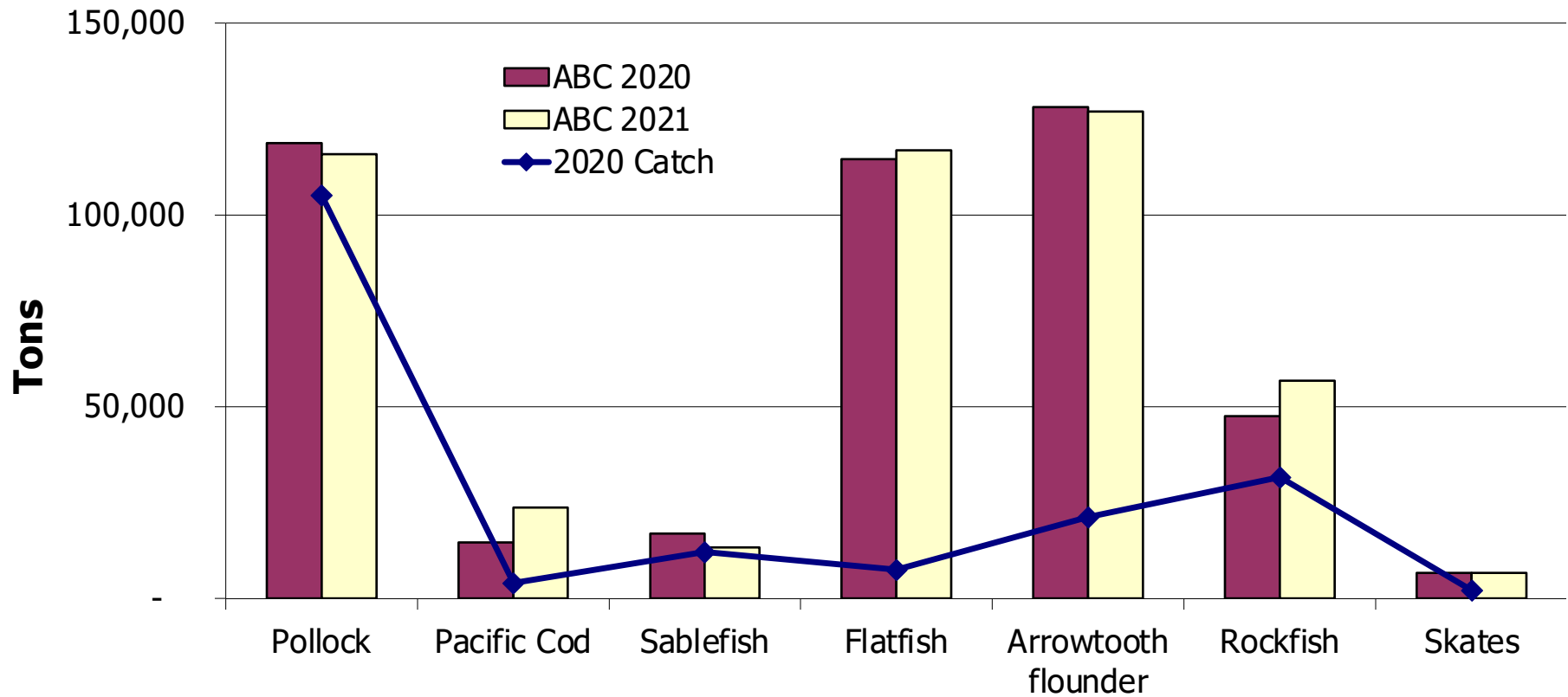


Overall a 1% increase
(assuming authors' sablefish apportionment)

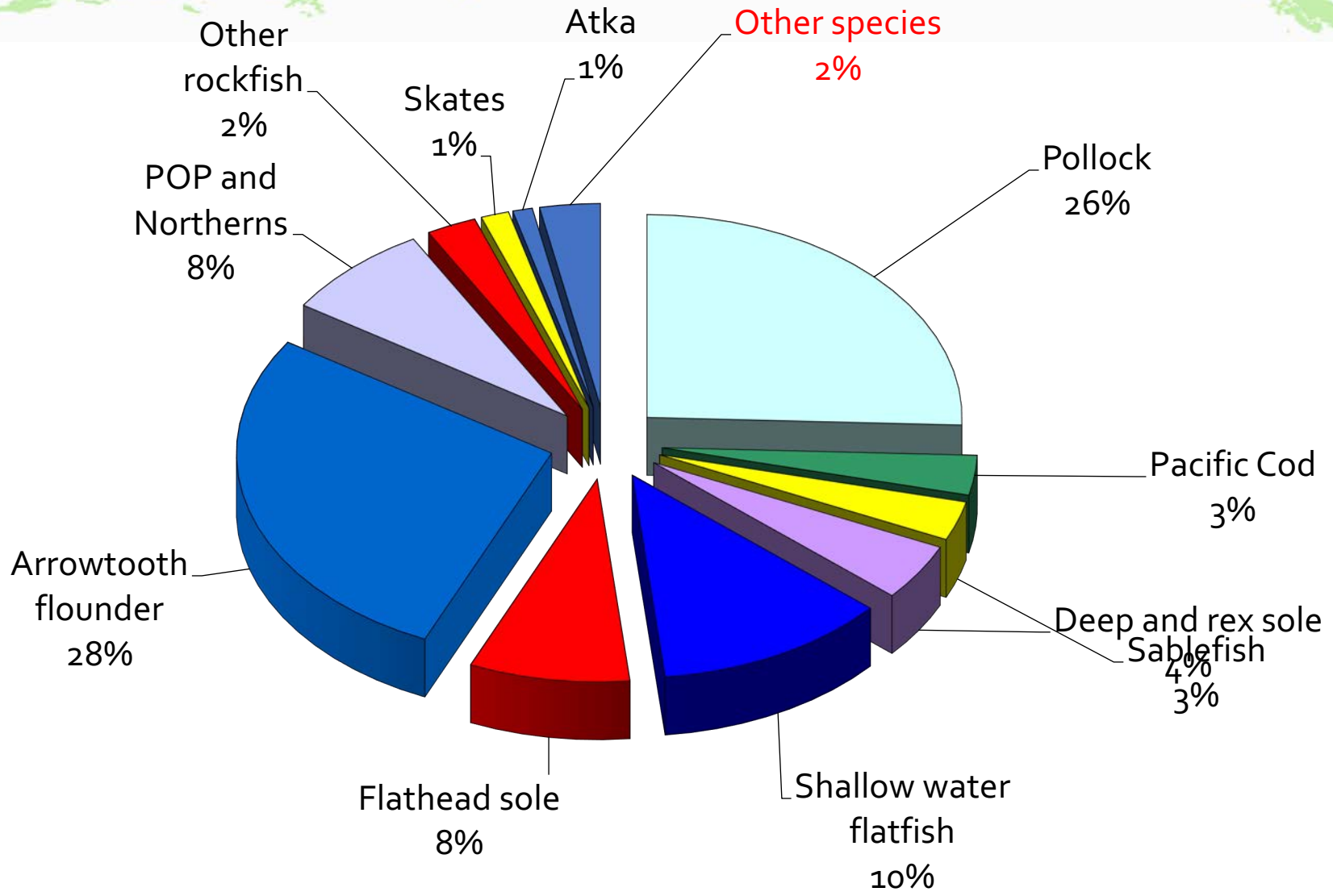
Percentage change in ABC, 2020-2021



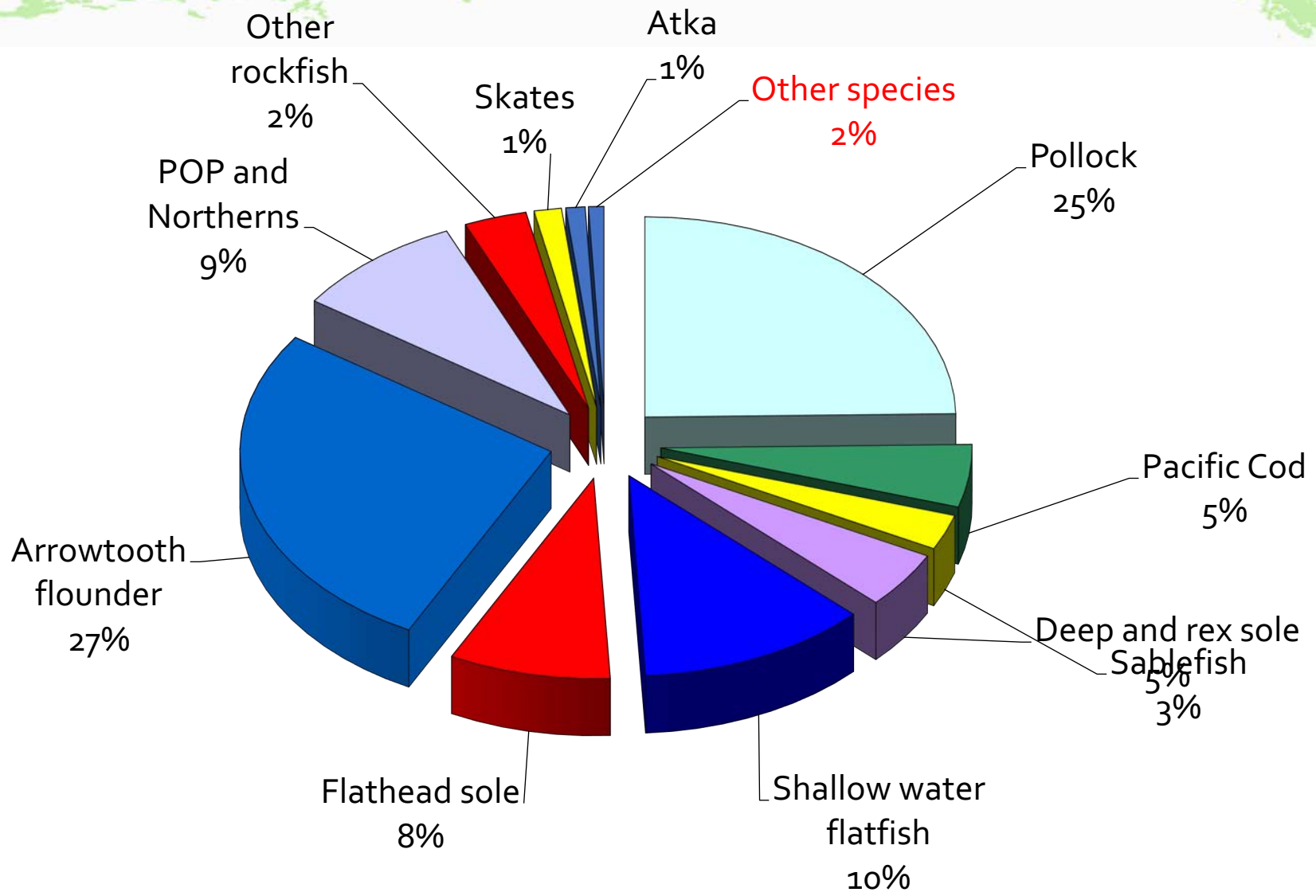
GOA Catch and ABC levels



GOA 2020 ABC's: 463,466 t



GOA 2021 ABC's: 469,543 t



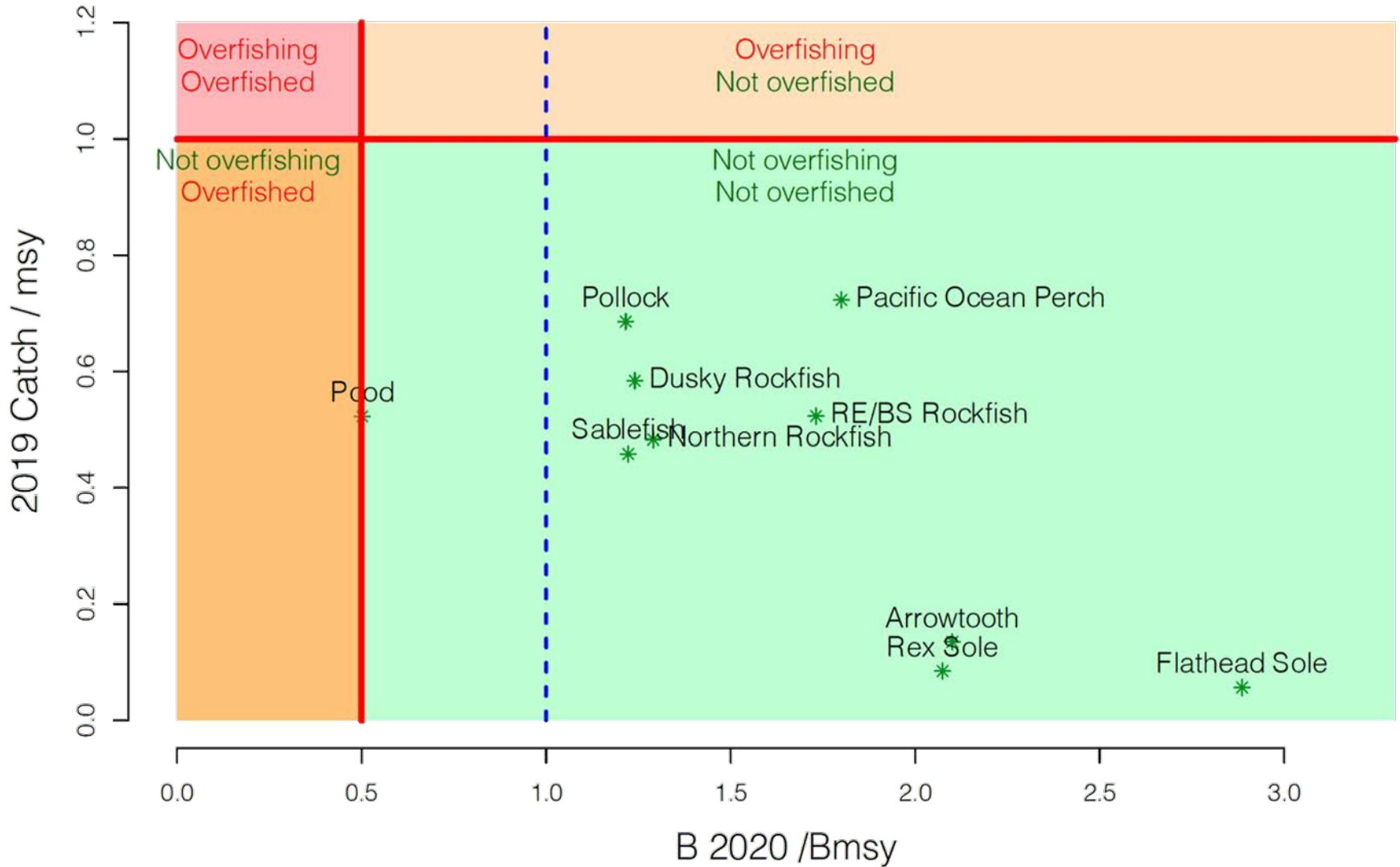
ABC / TAC

Team recommendations where ABC < maximum permissible:

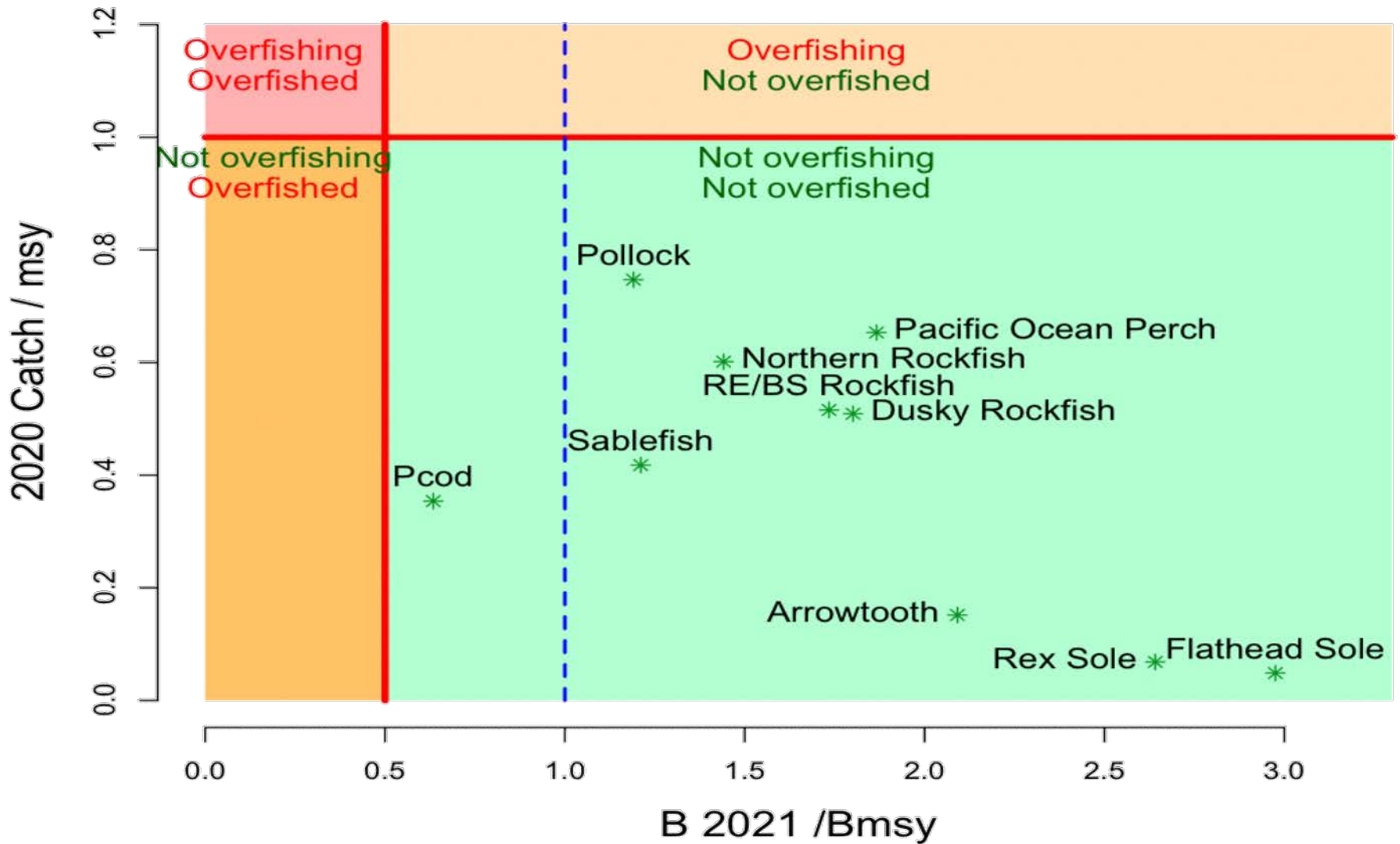
Table 3. Maximum permissible fishing mortality rates and ABCs as defined in Amendment 56 to the GOA and BSAI Groundfish FMPs, and the Plan Team's 2021 and 2022 recommended fishing mortality rates and ABCs, for those species whose recommendations were below the maximum permissible.

Species	Tier	2021			
		$Max F_{ABC}$	$Max ABC$	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

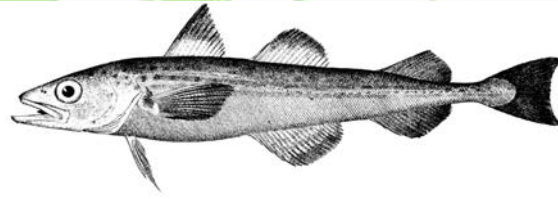




Species overviews

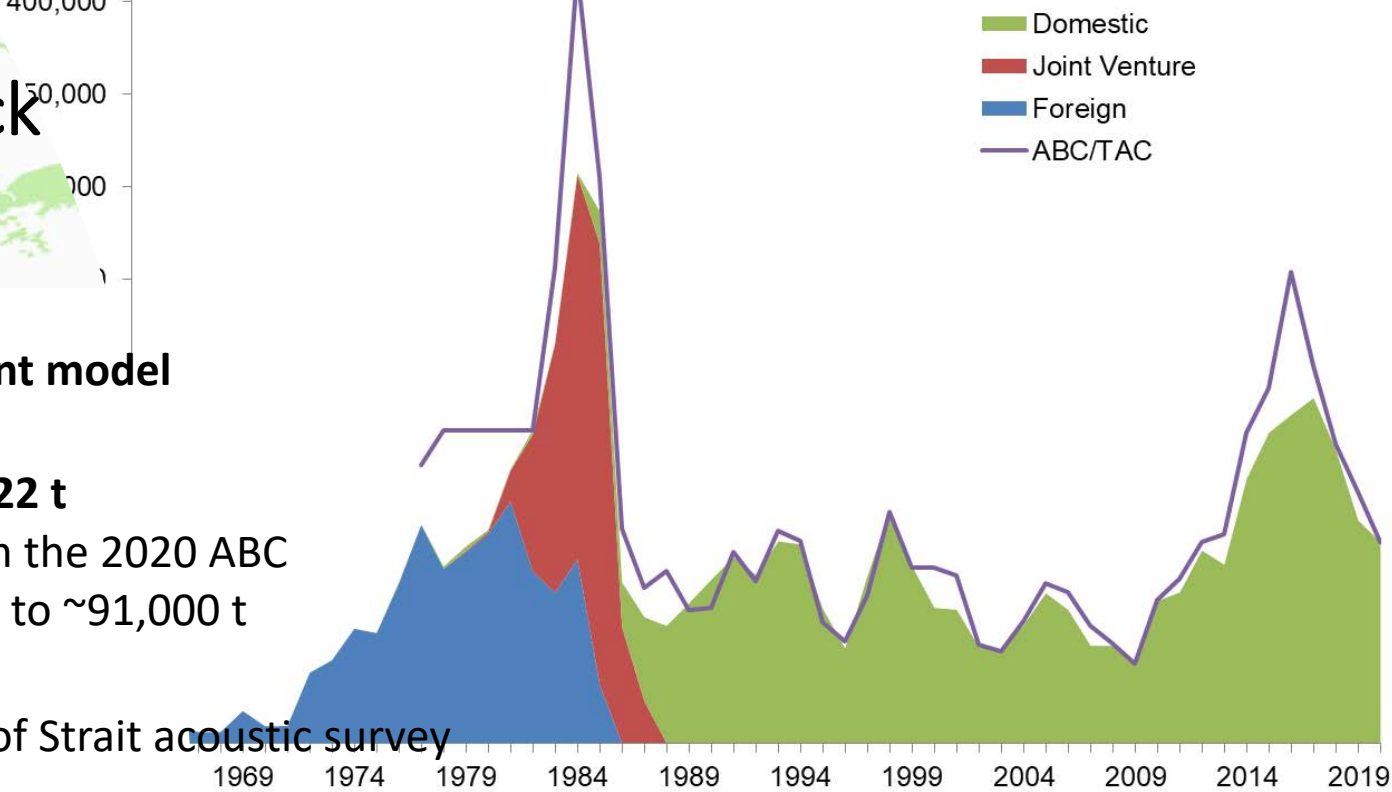
1. 2020 ABC/Catch and recommended changes
2. Highlights
 - New data
 - Analytic approach (changes)
3. Stock status and trend
4. ABC/OFL
 - Tier history and recommendations
 - 2021, 2022 maxABC; recommended ABC

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	3,462	3,462	same (0%)
Octopus	78	980	980	same (0%)
Total	185,927	456,035	469,250	up 13,215 (3%)

1. GOA pollock overview



Changes to the assessment model

- None

Author's 2021 ABC 105,722 t

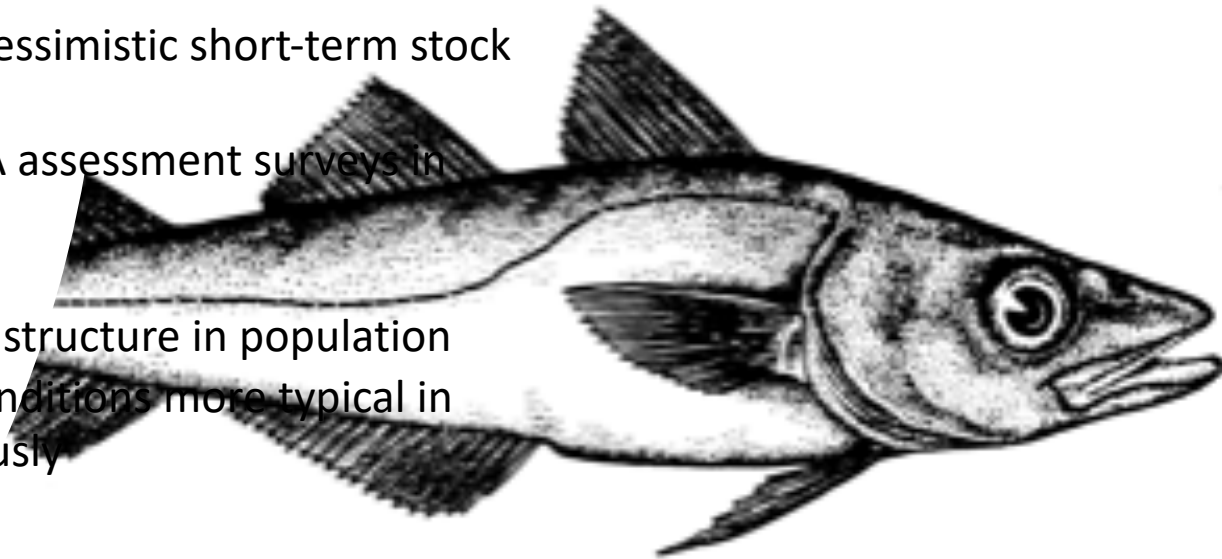
- Decrease of 3% from the 2020 ABC
- 2022 ABC decreases to ~91,000 t

Concerns:

- Large drop in Shelikof Strait acoustic survey biomass
- Vanishing 2018 year class
- Generally more pessimistic short-term stock projections
- Will there be GOA assessment surveys in 2021

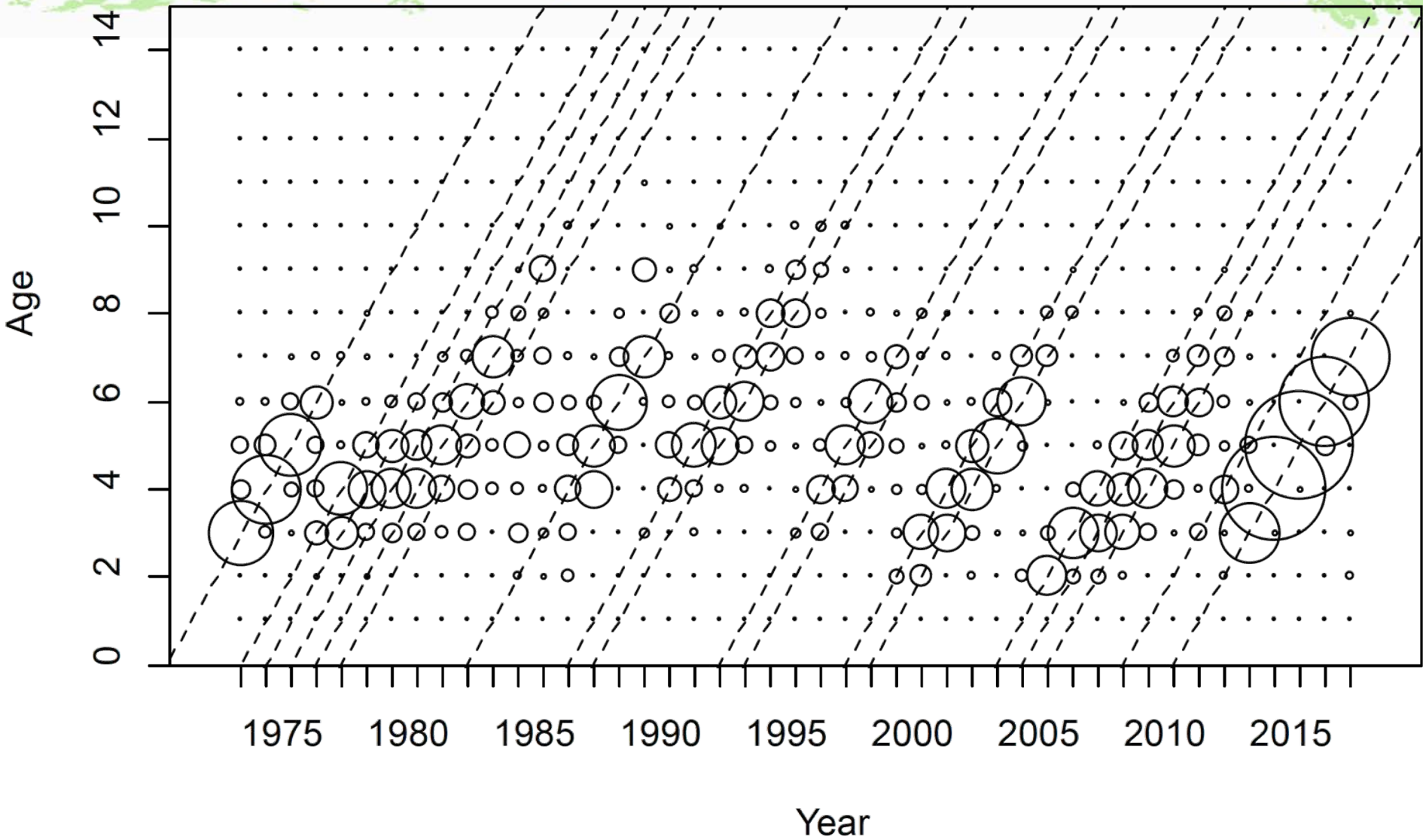
Positives:

- More diverse age structure in population
- Environmental conditions more typical in 2020 than previously



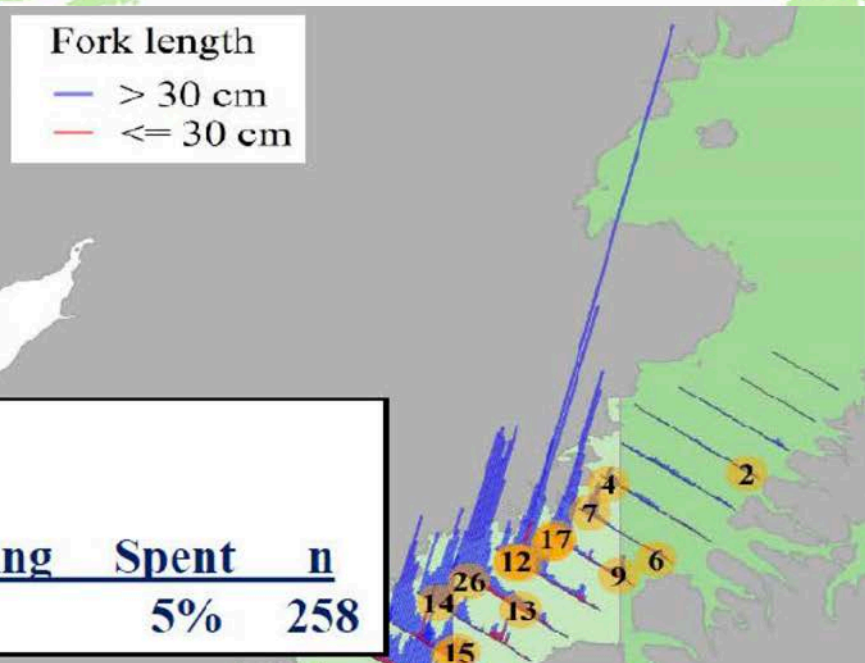
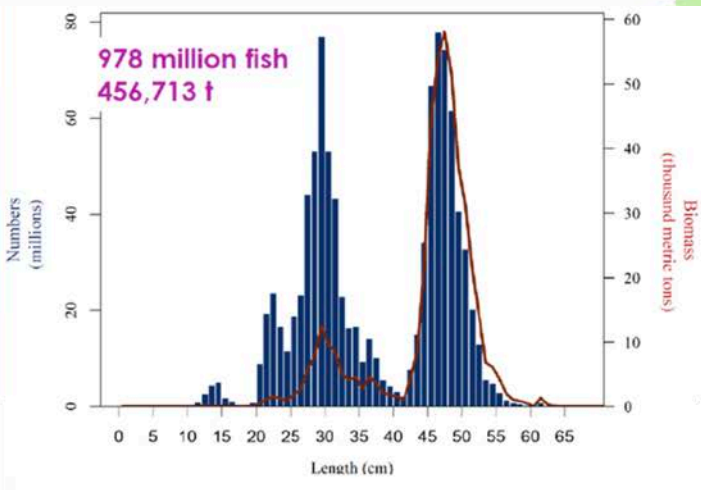
GOA pollock

Catch at age, 1975-2019



2020 Shelikof Strait EIT survey

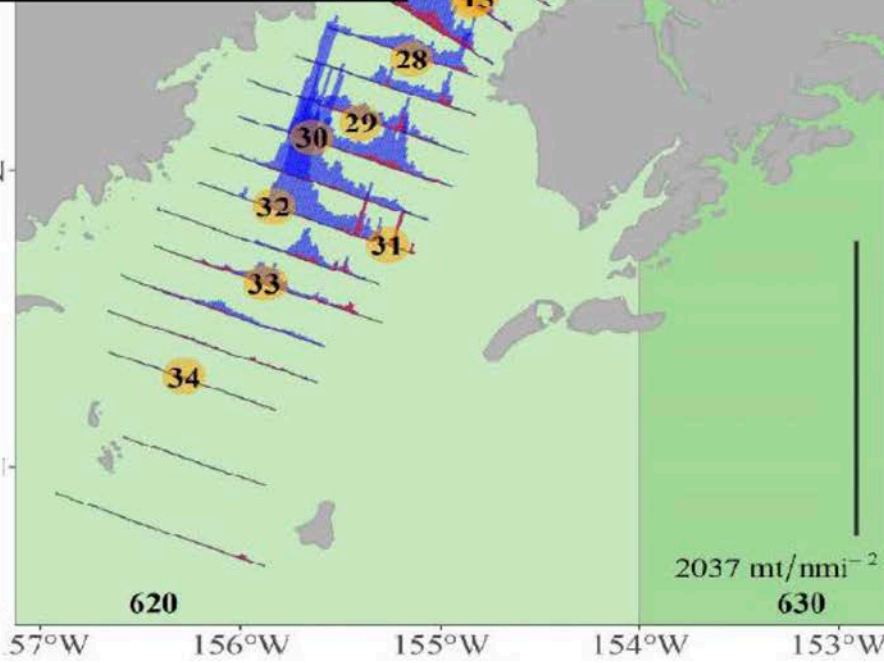
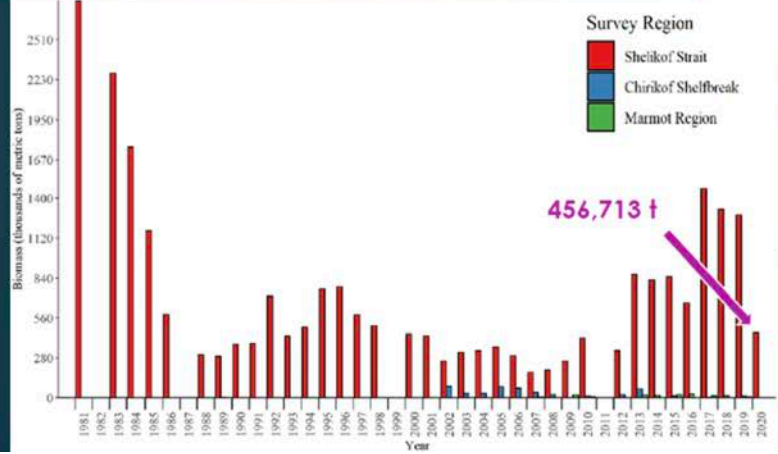
GOA pollock



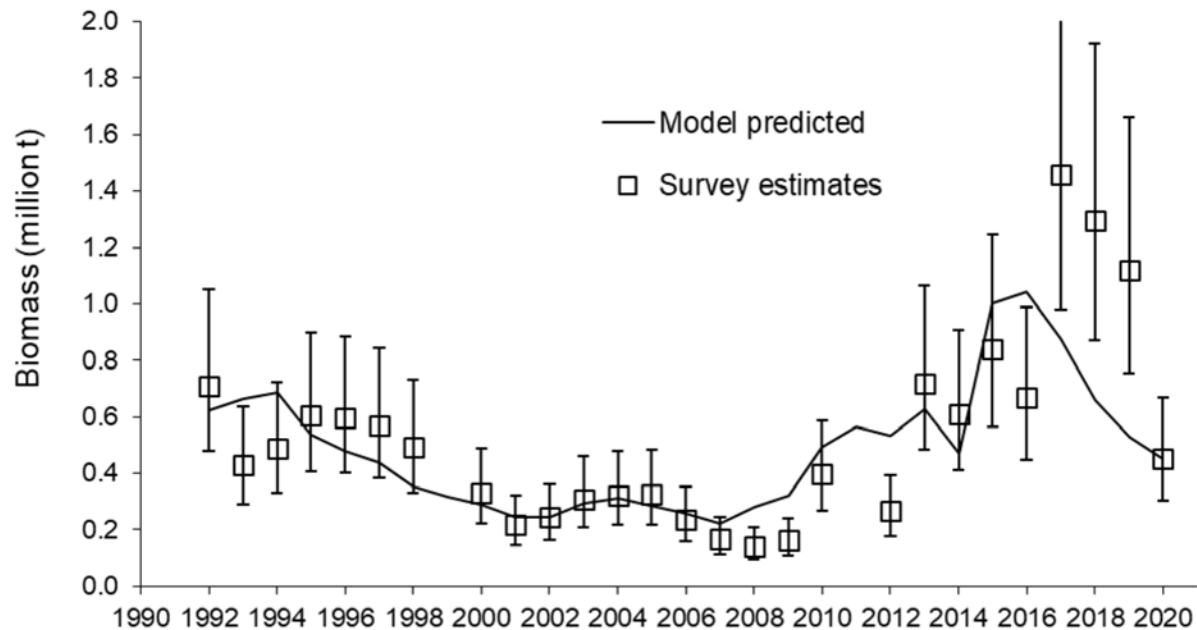
	<u>Prespawning</u>	<u>Spawning</u>	<u>Spent</u>	<u>n</u>
Shelikof	88%	1%	5%	258



2020 Shelikof Strait acoustic survey



Shelikof Strait acoustic survey (1992-2020)

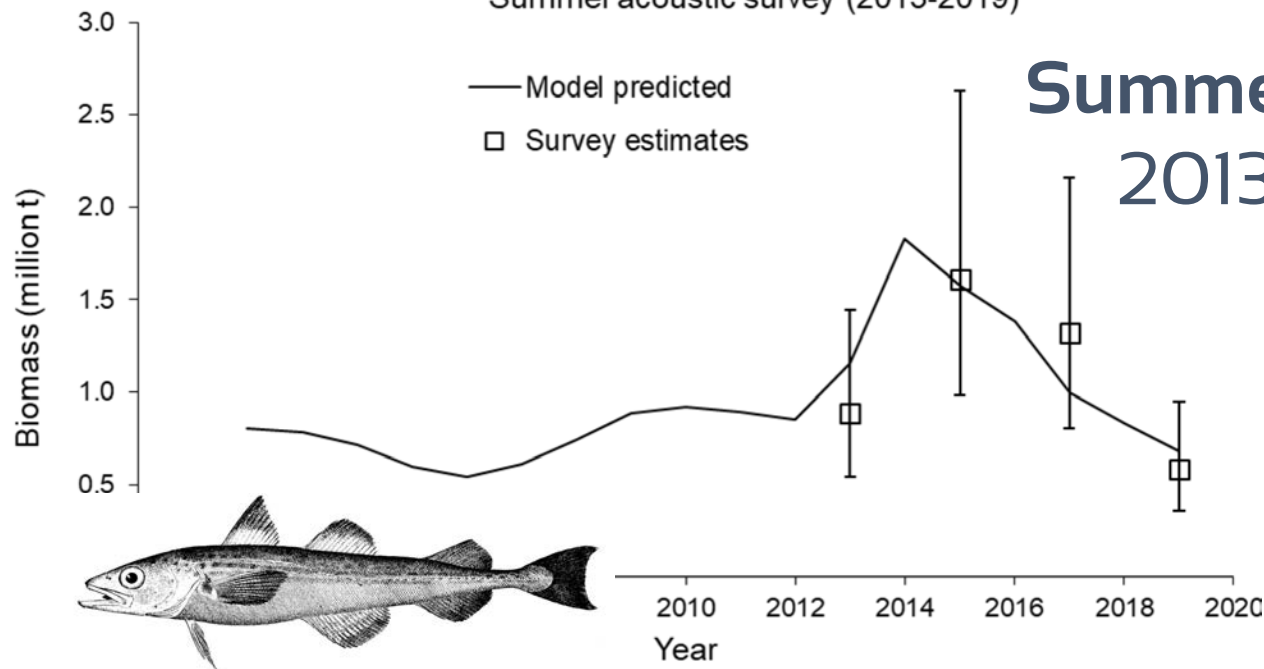


GOA pollock

Shelikof Strait winter acoustic survey, 1992-2020



Summer acoustic survey (2013-2019)



Summer acoustic survey
2013, 2015, 2017, 2019

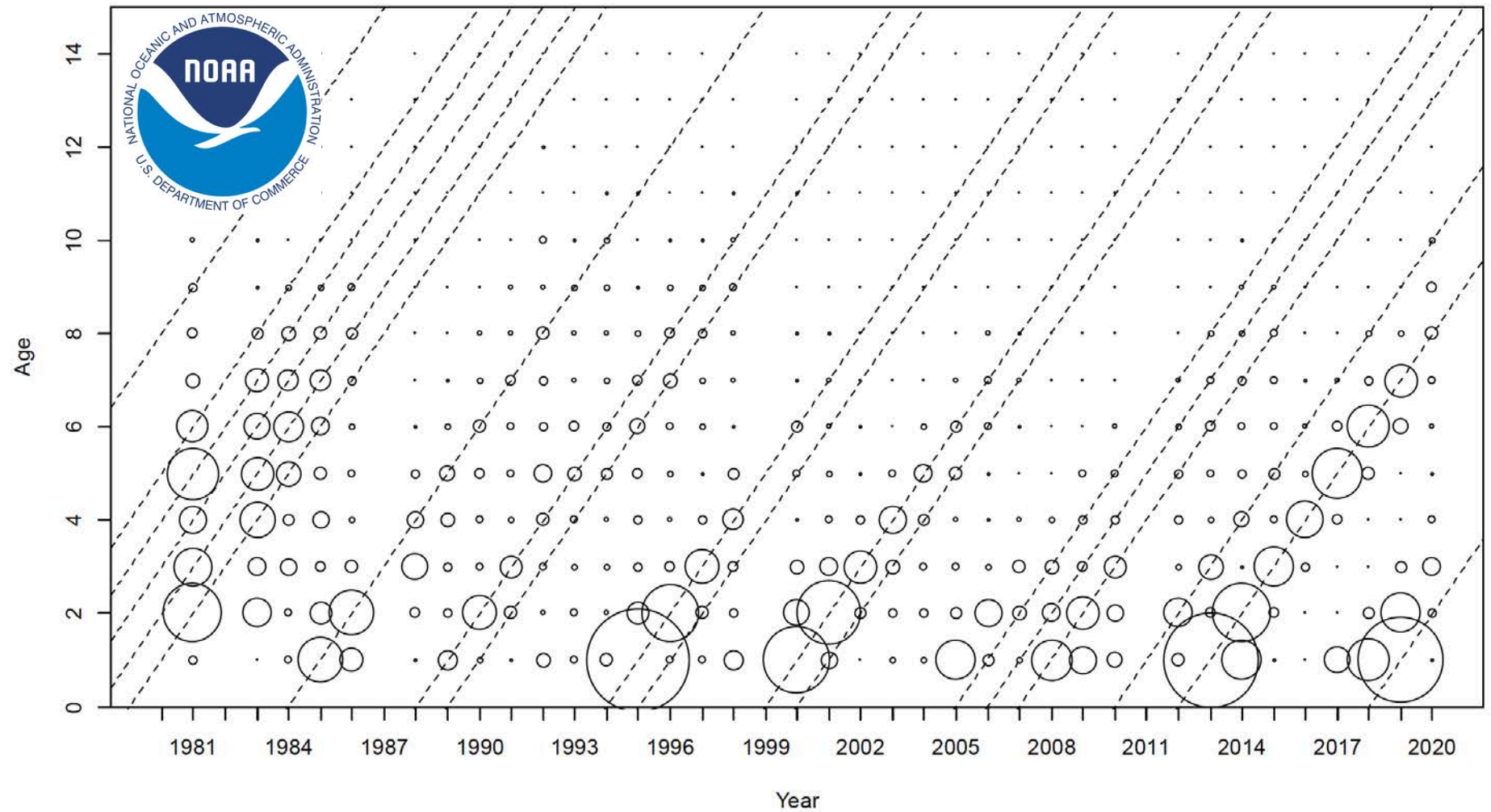
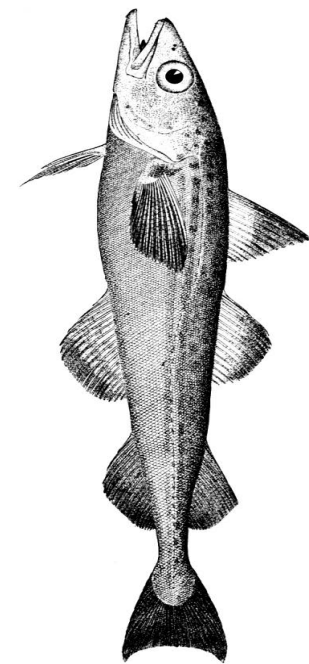
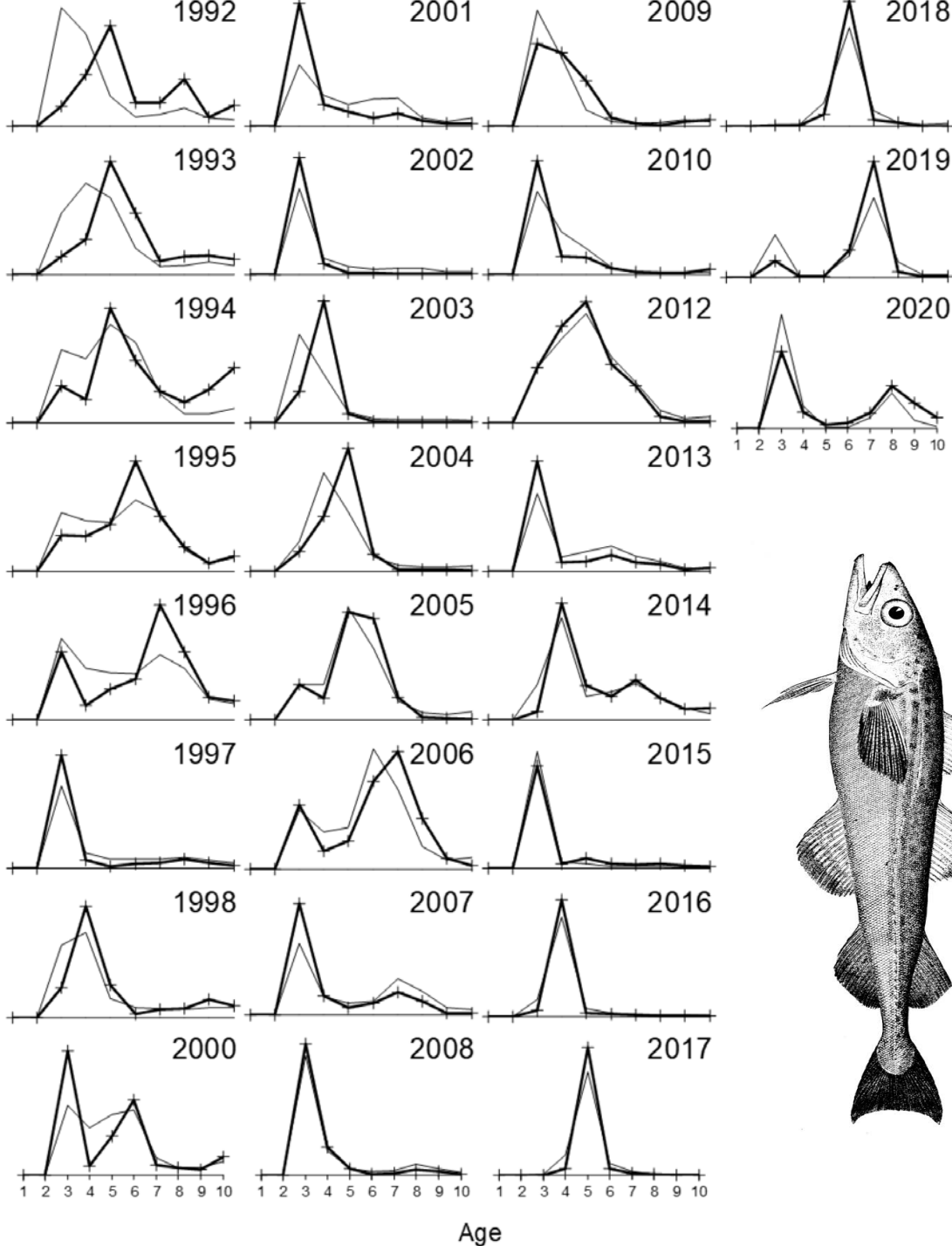
Shelikof Strait **winter** acoustic survey, 1992-2020

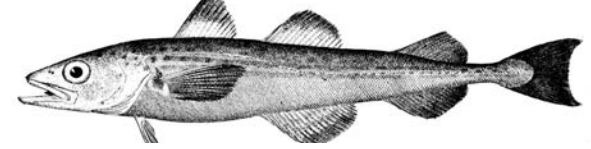
Figure 1.7. Estimated abundance at age in the Shelikof Strait acoustic survey (1981-2020, except 1982, 1987, 1999, and 2011). The area of the circle is proportional to the estimated abundance.

; GOA Pollock

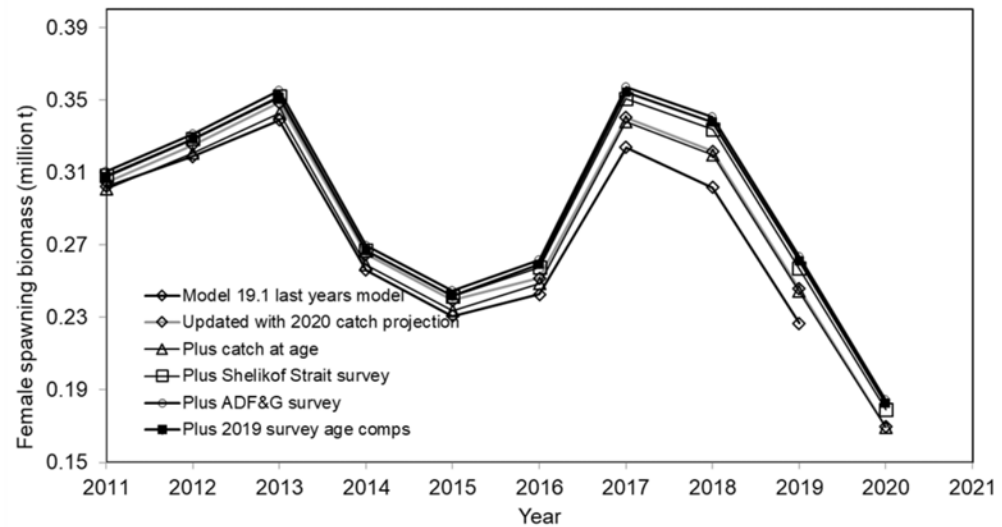
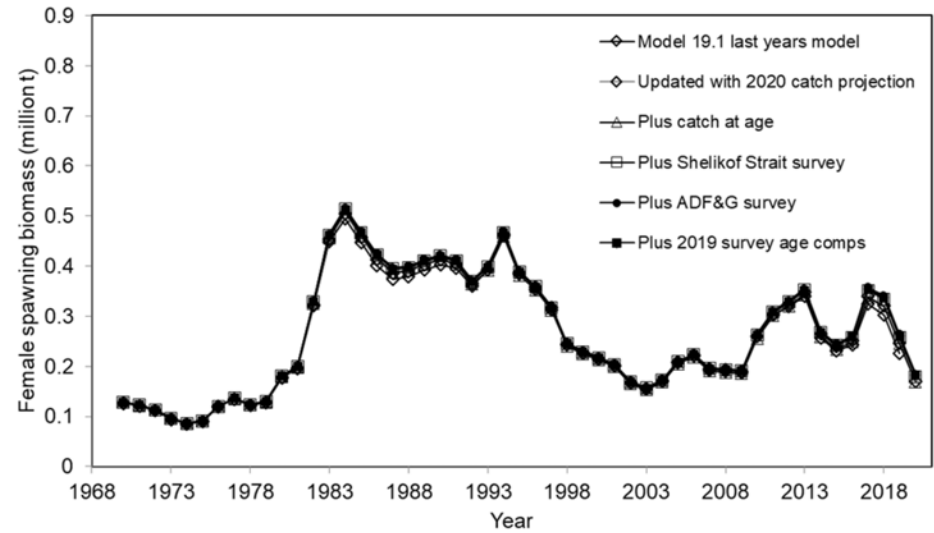
Shelikof Strait survey age compositions, 1981-2020



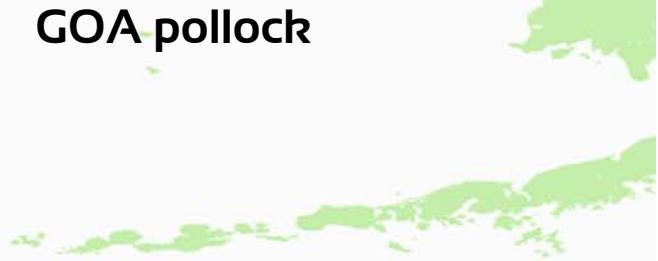
Sensitivity to new survey data...



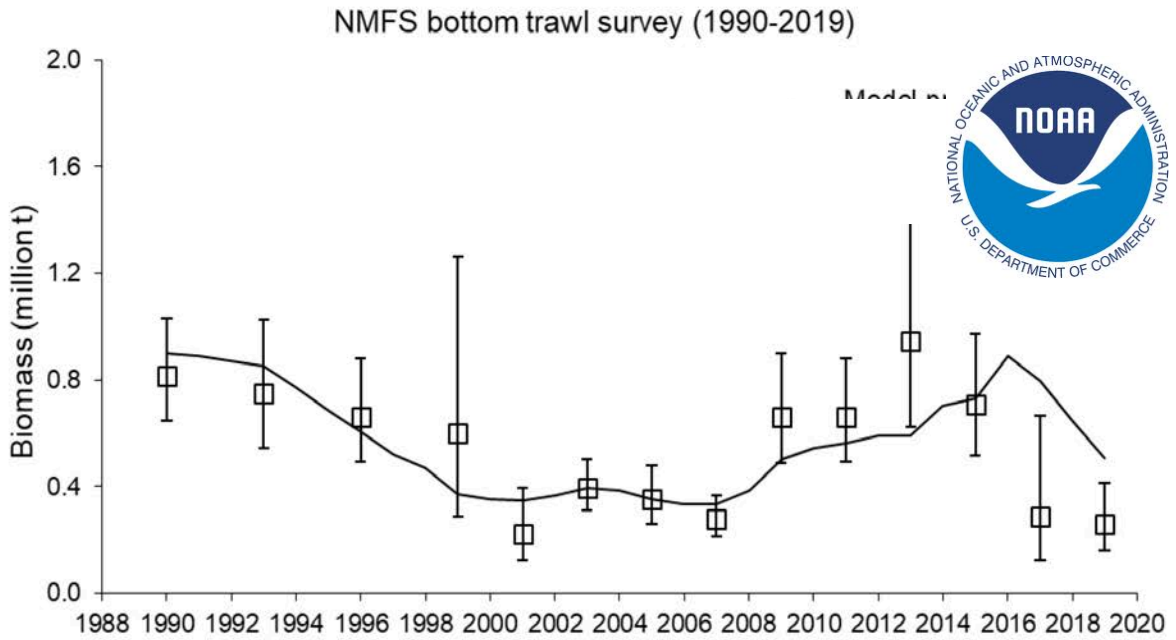
- GOA pollock



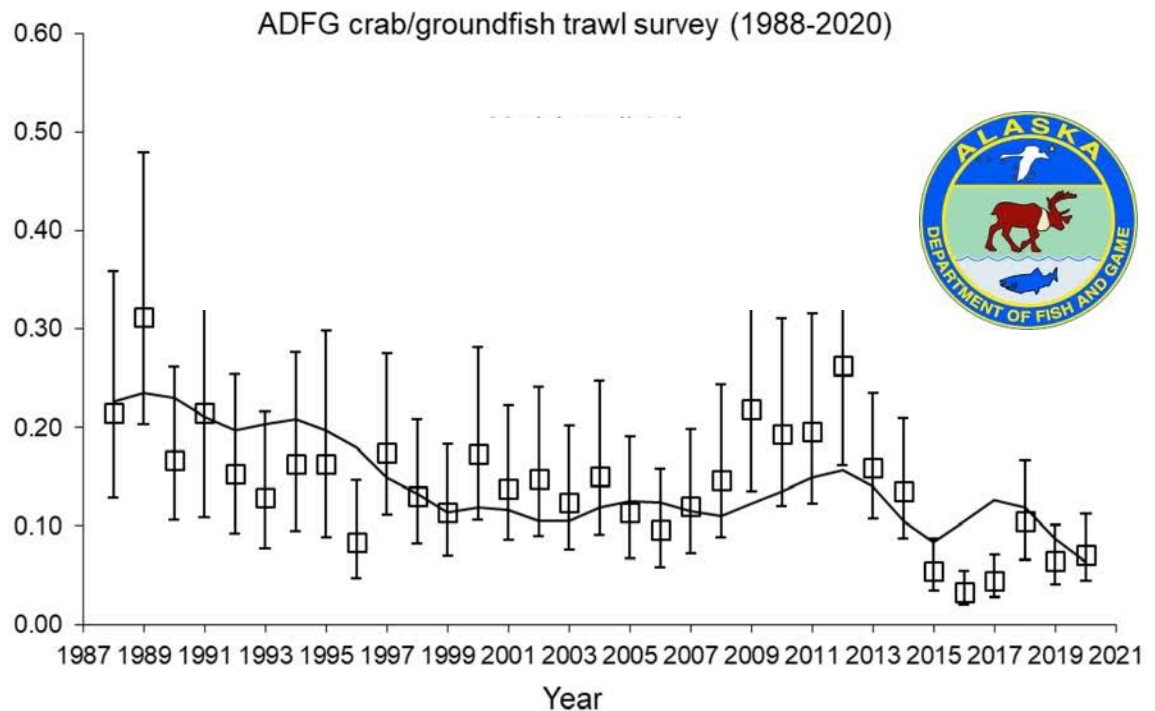
GOA pollock



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

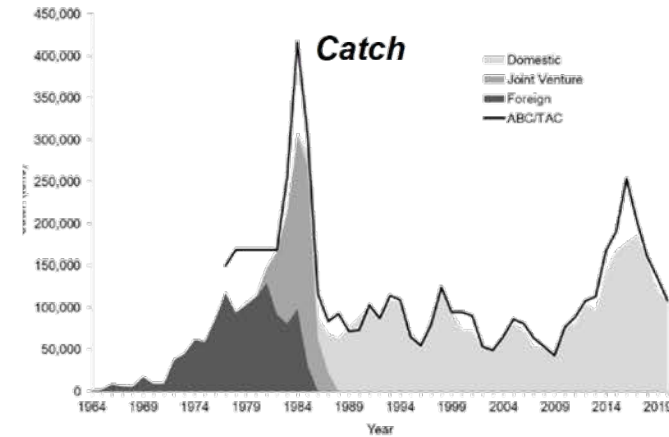
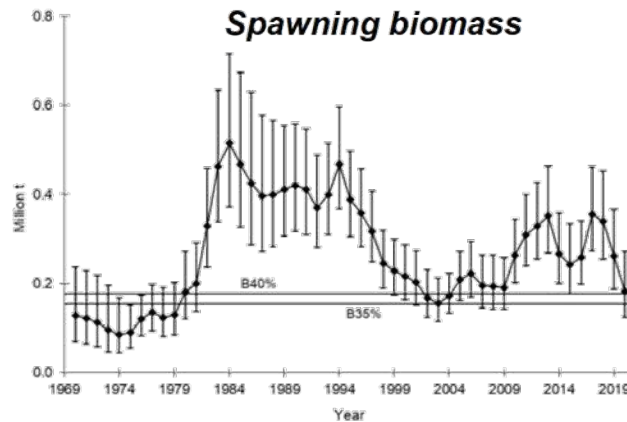
- Decrease of 3% from the 2020 ABC
- 2022 ABC decreases to ~91,000 t

Concerns:

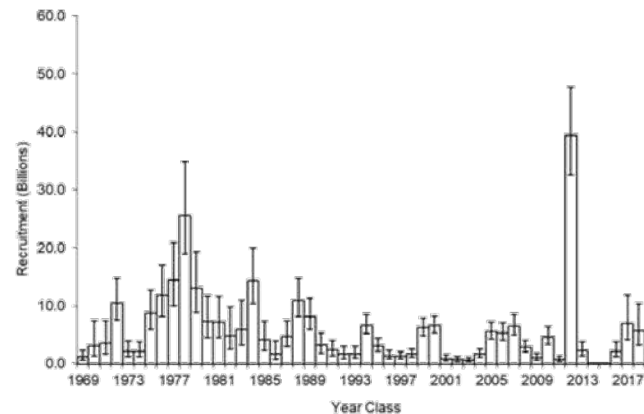
- Big drop Shelikof Strait survey
- Big drop in 2018 year class from 2019 to 2020
- Projections indicating a period of lower abundance and reduced harvests.

Positives:

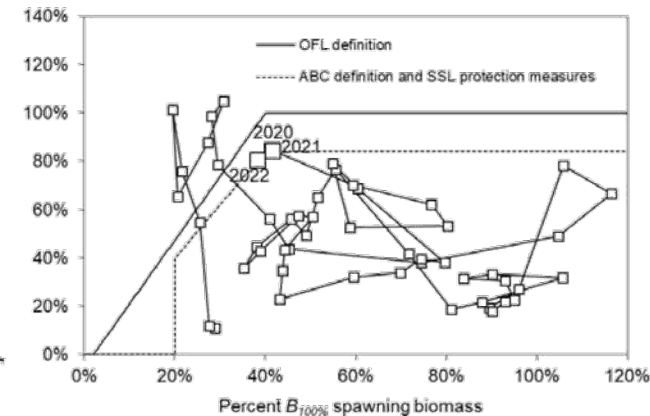
- Environmental conditions are relatively “normal”
- Conditions somewhat favorable for recruitment this year.



Recruitment

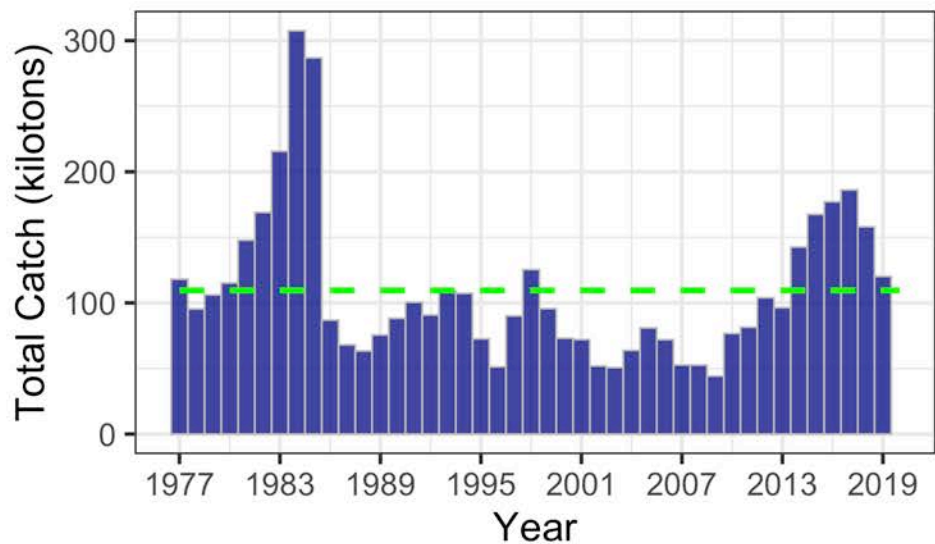


Status phase plot

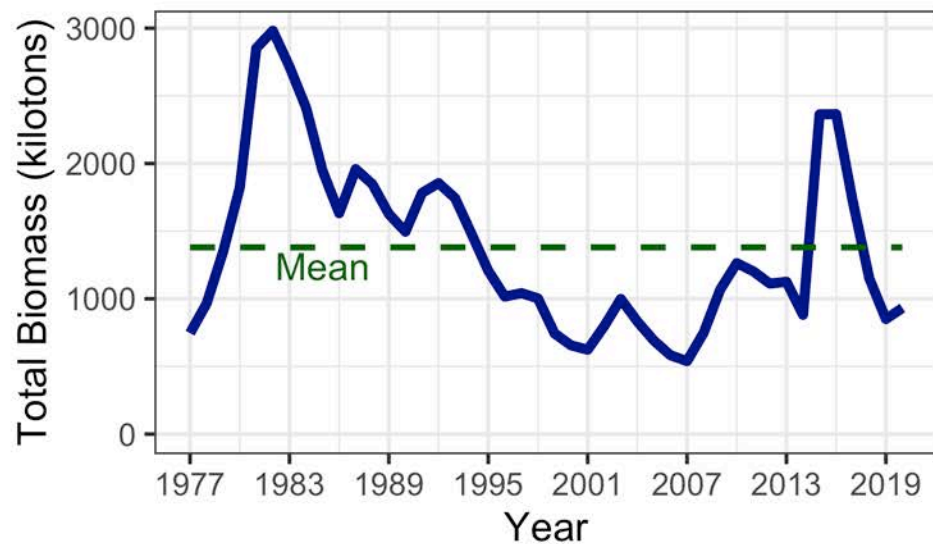




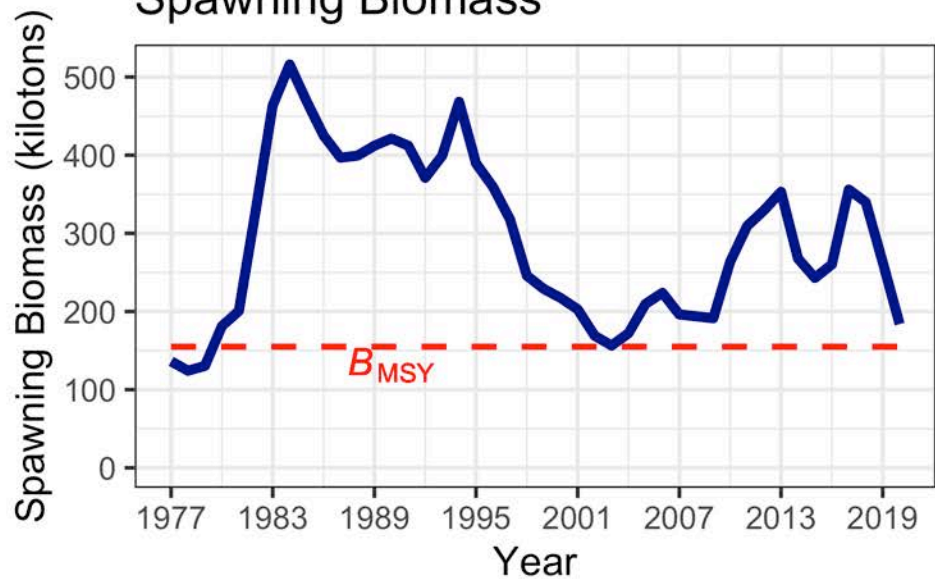
Total Catch



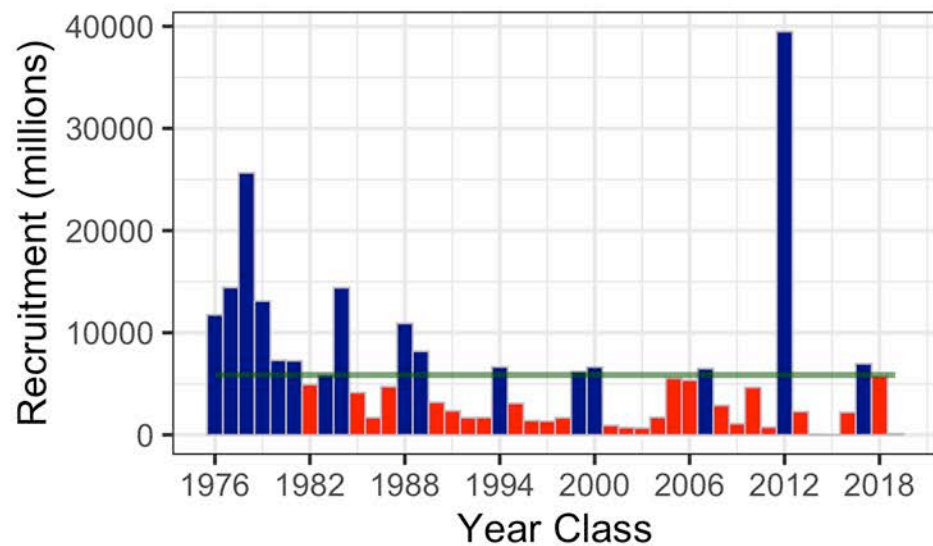
Total Biomass



Spawning Biomass

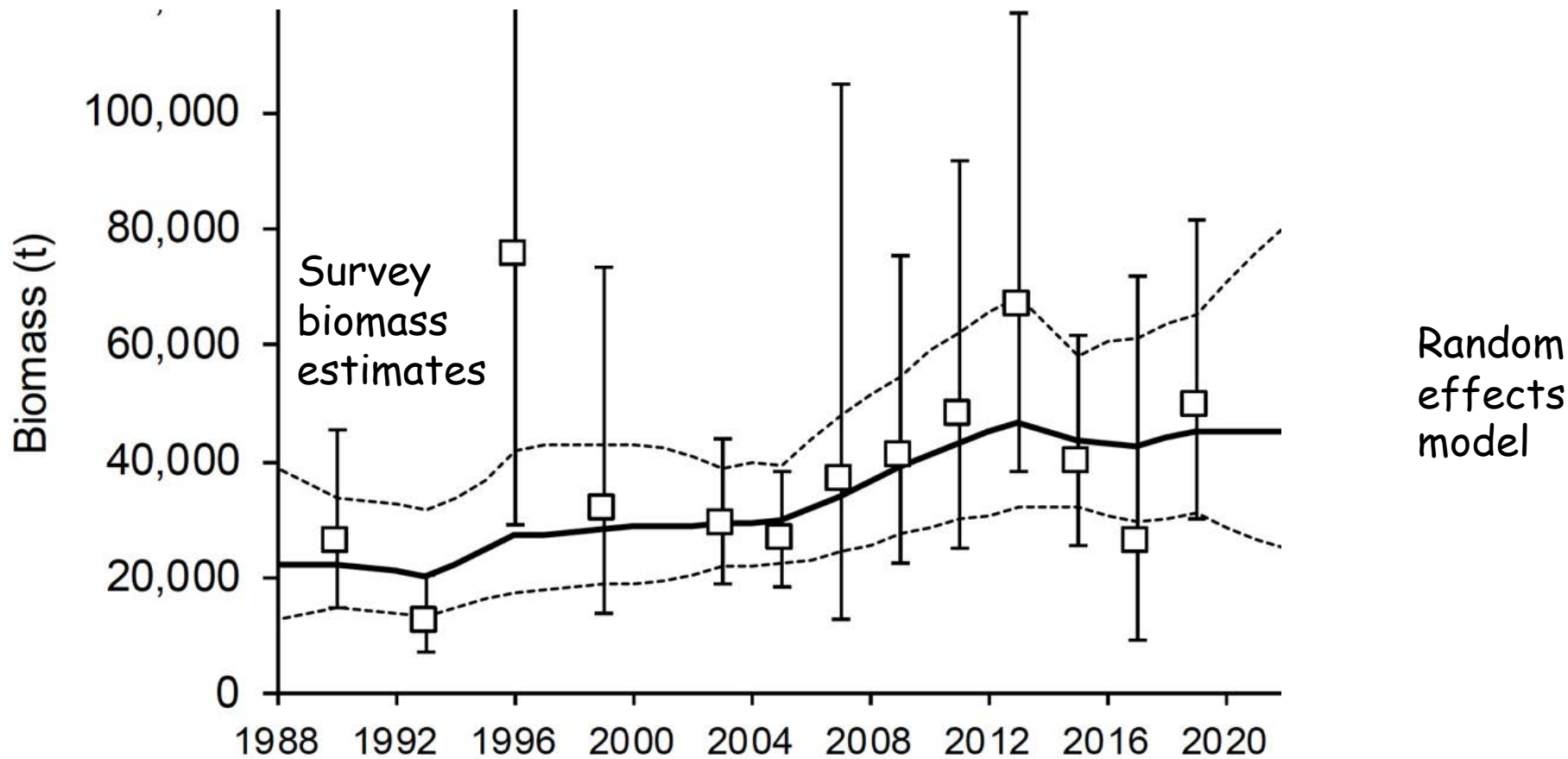
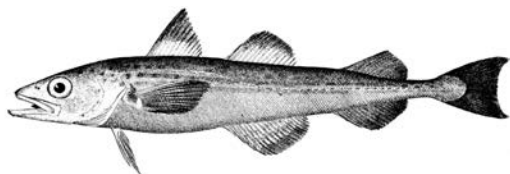


Age 1 Recruitment

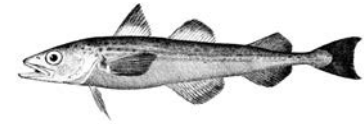


EGOA pollock (Tier 5)

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	3,462	3,462	same (0%)
Octopus	78	980	980	same (0%)
Total	185,927	456,035	469,250	up 13,215 (3%)

GOA Pacific cod



- Presentation from author



GOA Pacific cod

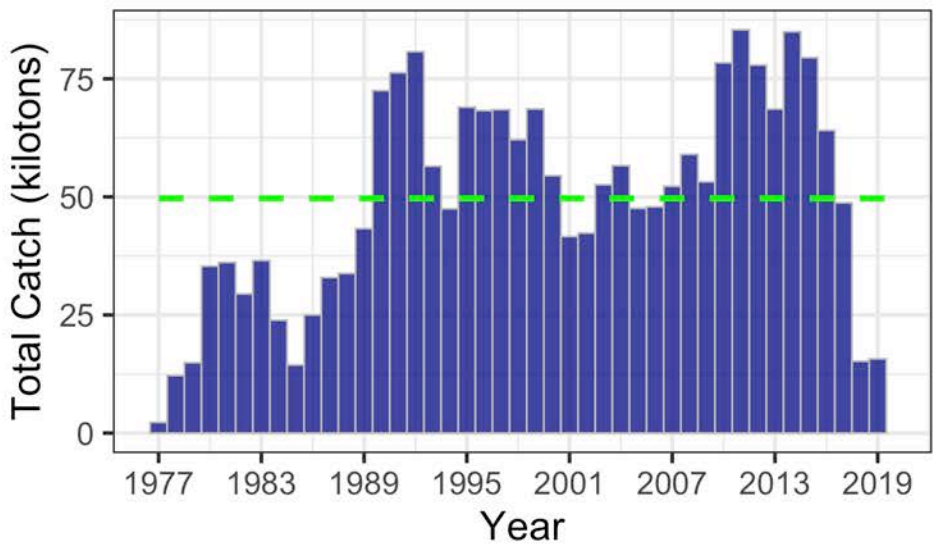
Team recommended

- ... 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.

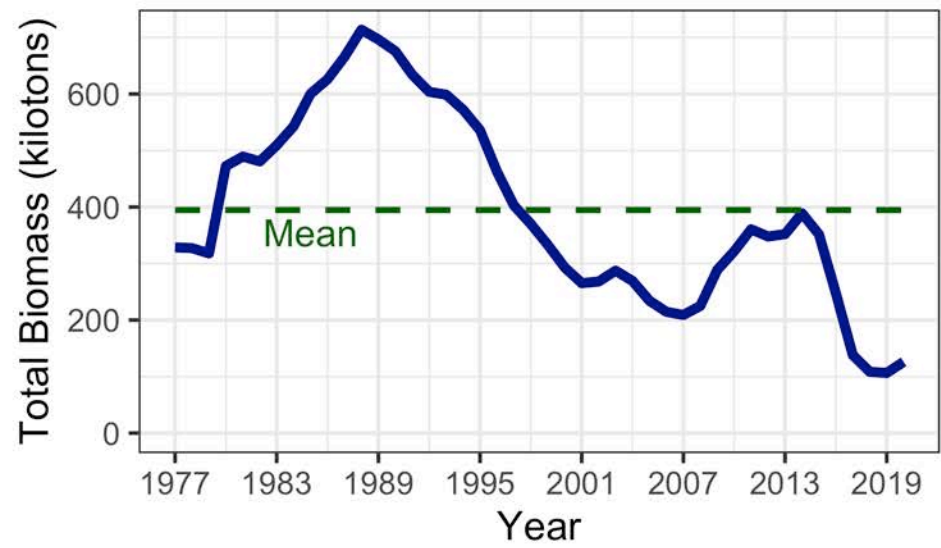


GOA Pacific cod

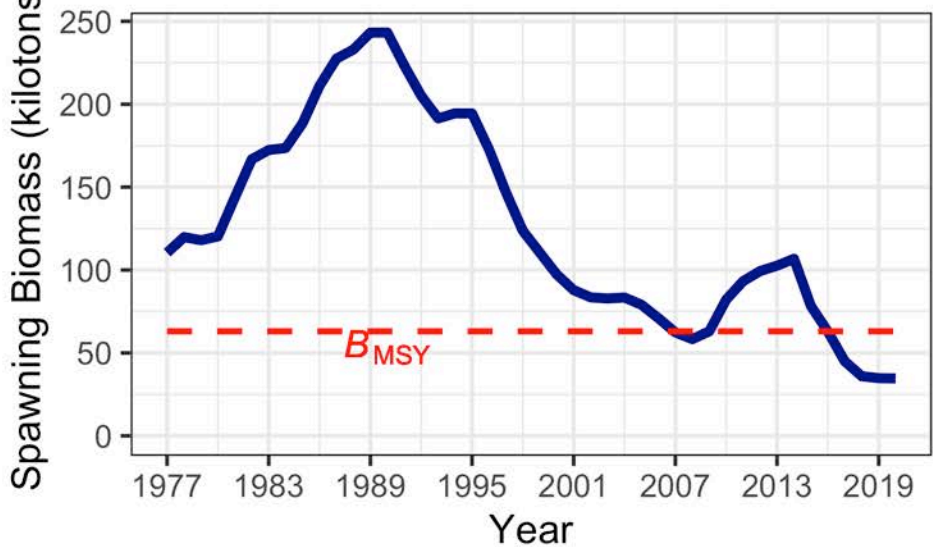
Total Catch



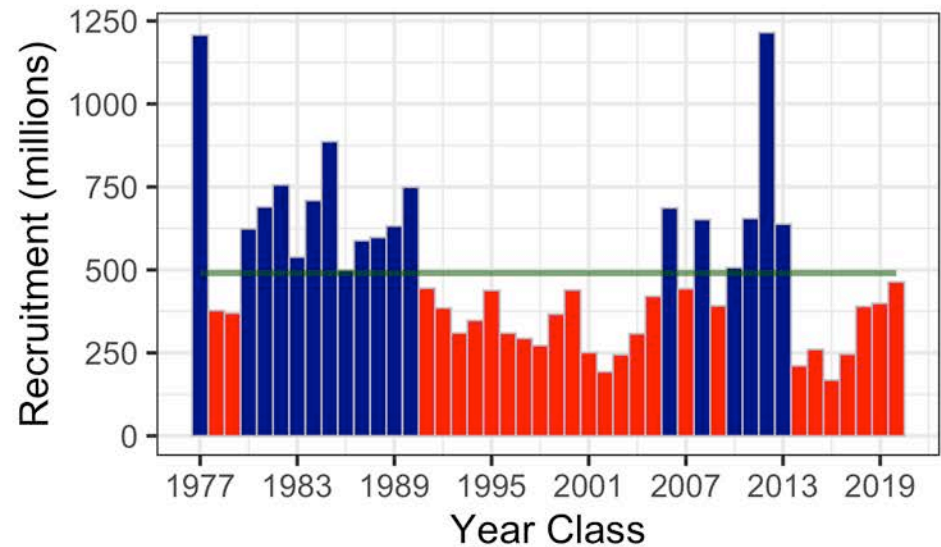
Total Biomass



Spawning Biomass



Age 0 Recruitment

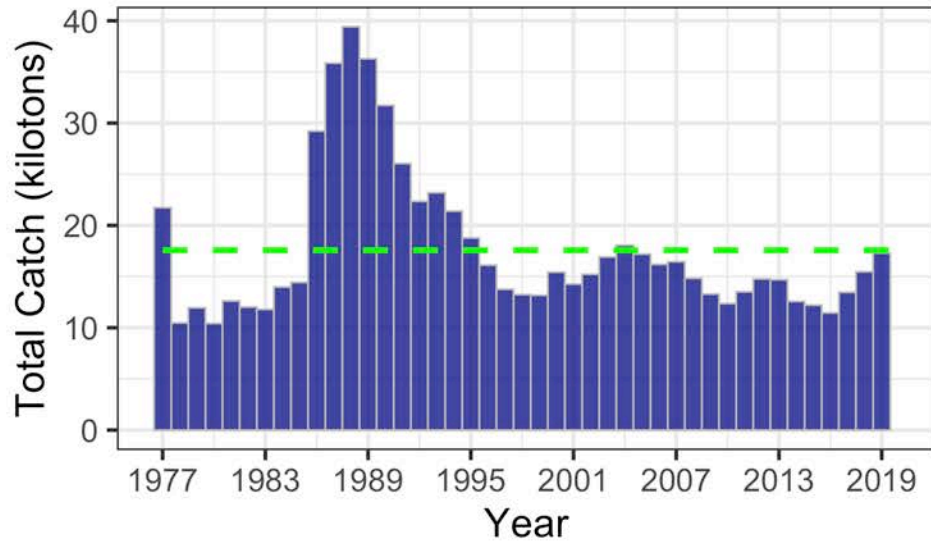


3. Sablefish

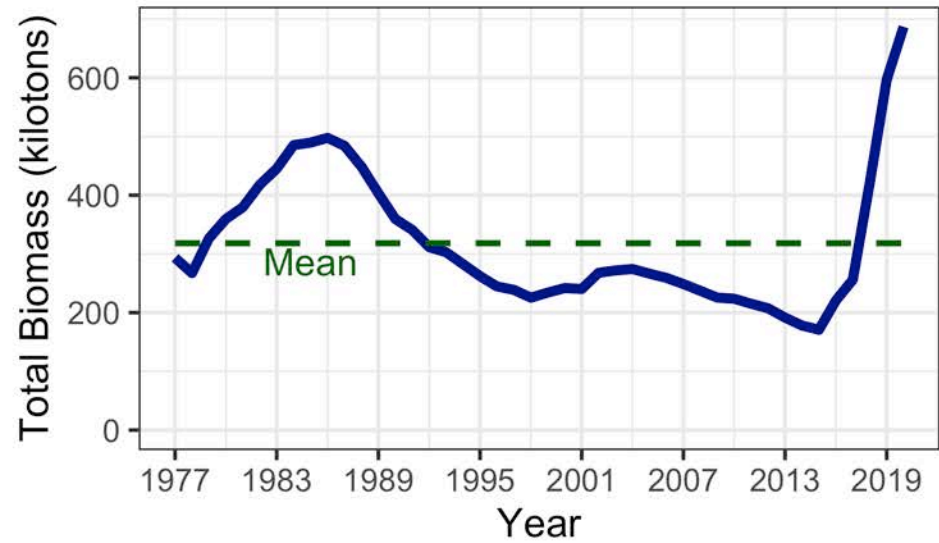
Species	2020 Catch	2020	2021	Change
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Rockfish	31,628	47,450	56,819	up 9,369 (20%)
Atka mackerel	608	4,700	4,700	same (0%)
Skates	2,165	6,670	6,670	same (0%)
Sharks	1,581	3,462	3,462	same (0%)
Octopus	78	980	980	same (0%)
Total	185,927	456,035	469,250	up 13,215 (3%)

2020 sablefish

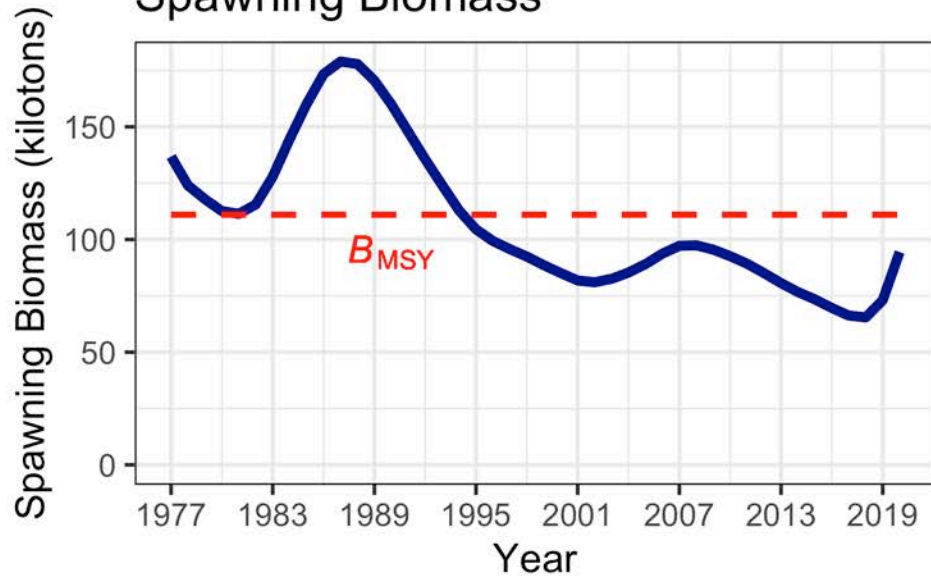
Total Catch



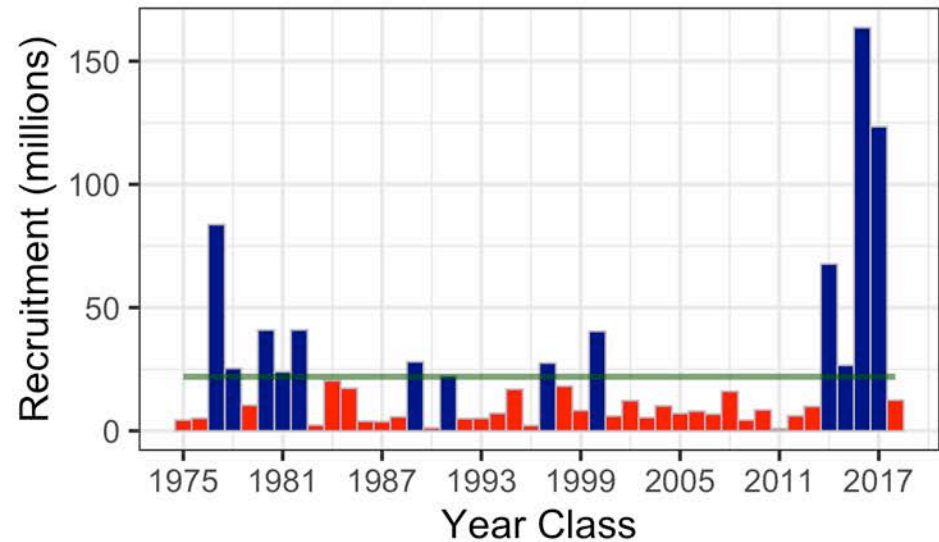
Total Biomass



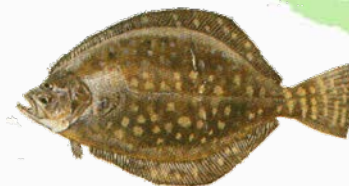
Spawning Biomass



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%)
Flatfish	7,497	114,567	116,883	up 2,316 (2%)
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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	3,462	3,462	same (0%)
Octopus	78	980	980	same (0%)
Total	185,927	456,035	469,250	up 13,215 (3%)

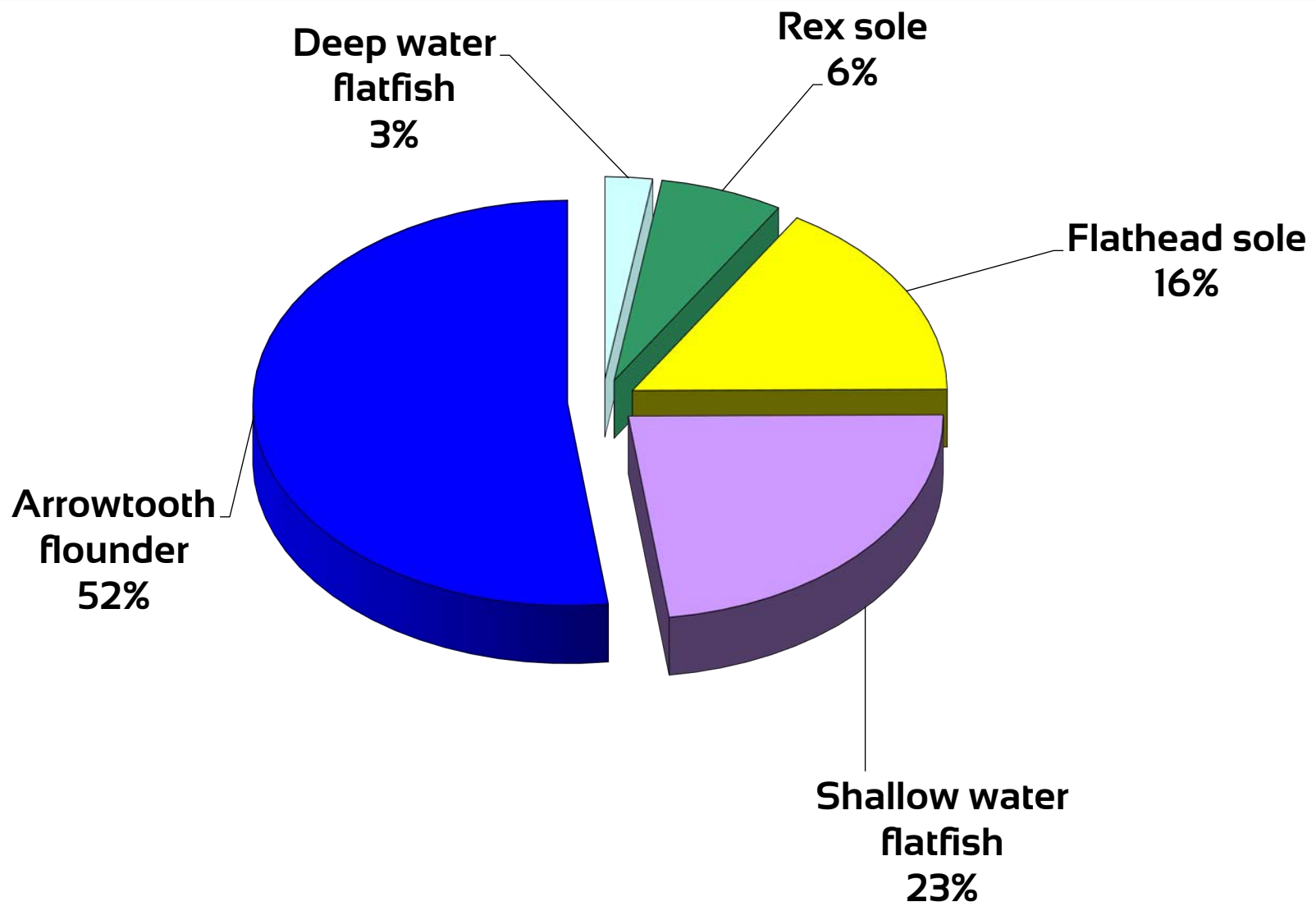
Flatfish ABC's

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



A green-tinted map of the North Atlantic region, showing the outlines of North America, Greenland, and Europe, serving as a background for the title.

General comments on flatfish assessments

- Lightly exploited
- Partials

Flatfish ABC's

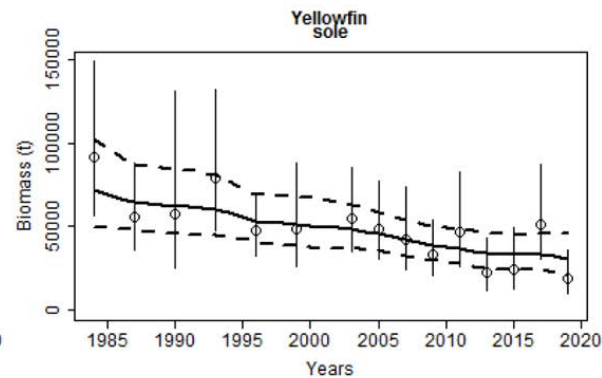
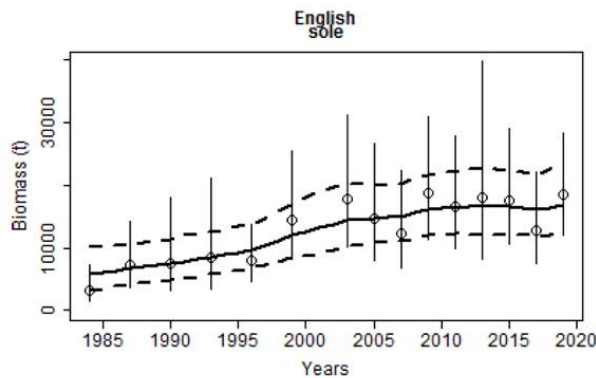
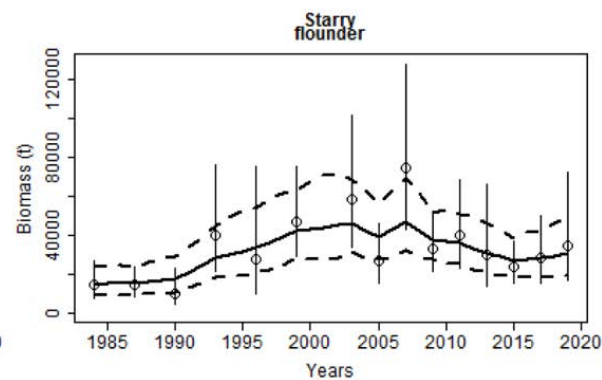
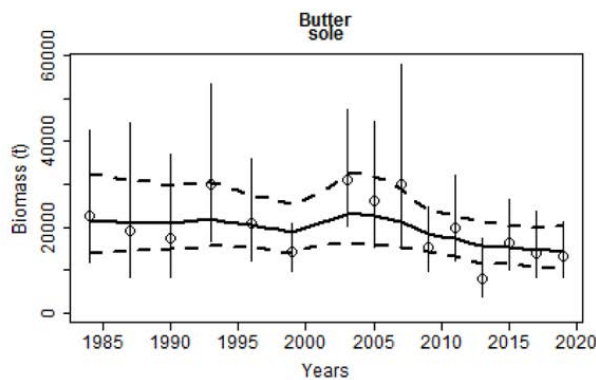
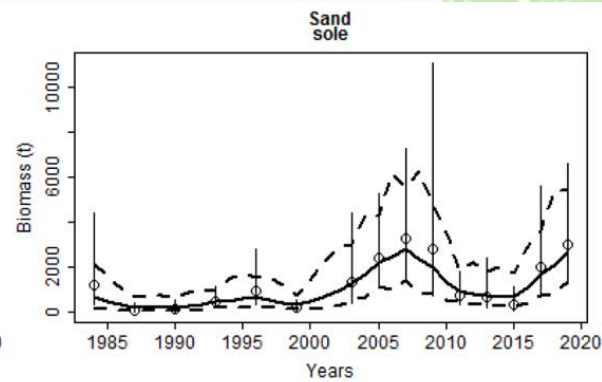
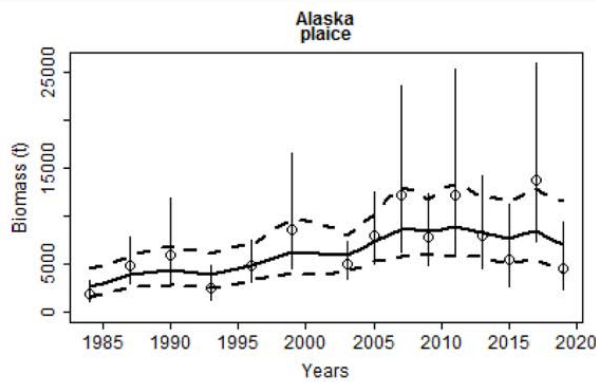
Species	2020	2021	Change
Shallow water flatfish	55,463	56,164	up 701 (1%)
Rex sole	14,878	15,416	up 538 (4%)
Deep water flatfish	6,030	5,926	down 104 (2%)
Flathead sole	38,196	39,377	up 1,181 (3%)
Arrowtooth flounder	128,060	126,970	down 1,090 (1%)
Subtotal	242,627	243,853	up 1,226 (1%)
Subtotal (without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

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

4. Shallow-water flatfish

Partial assessment

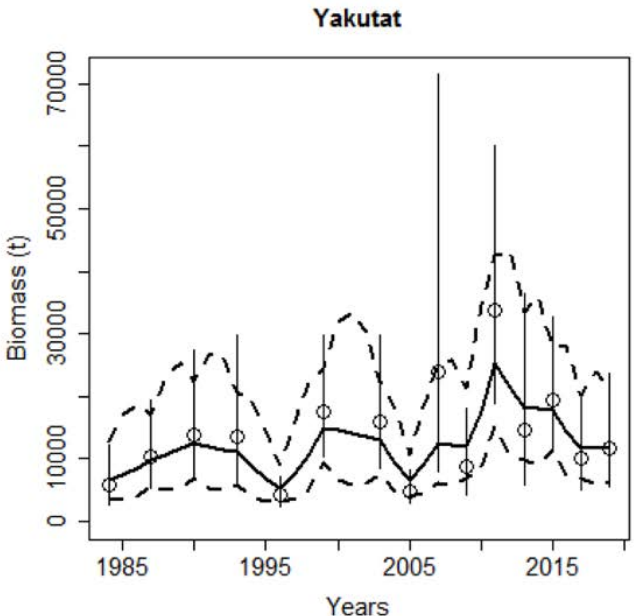
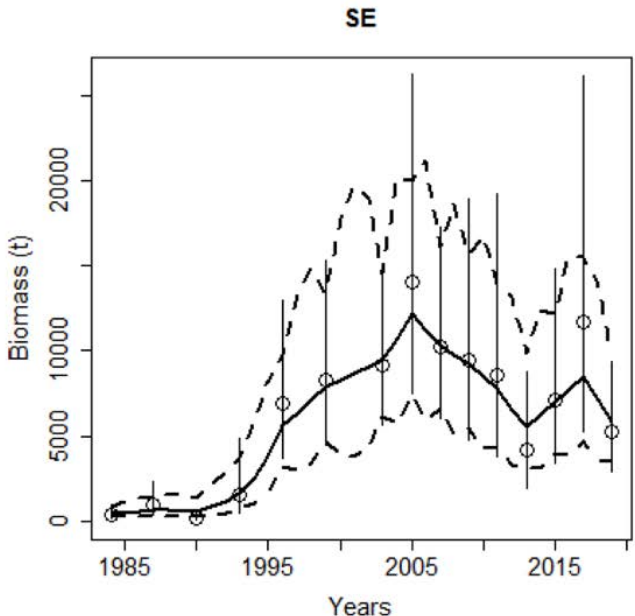
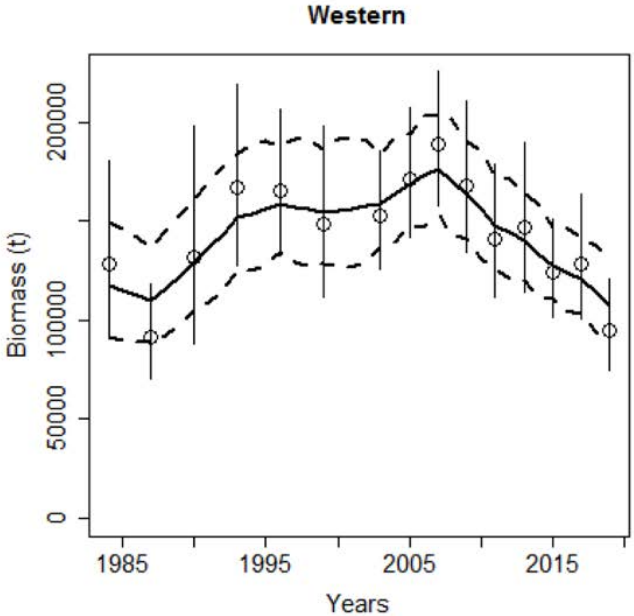
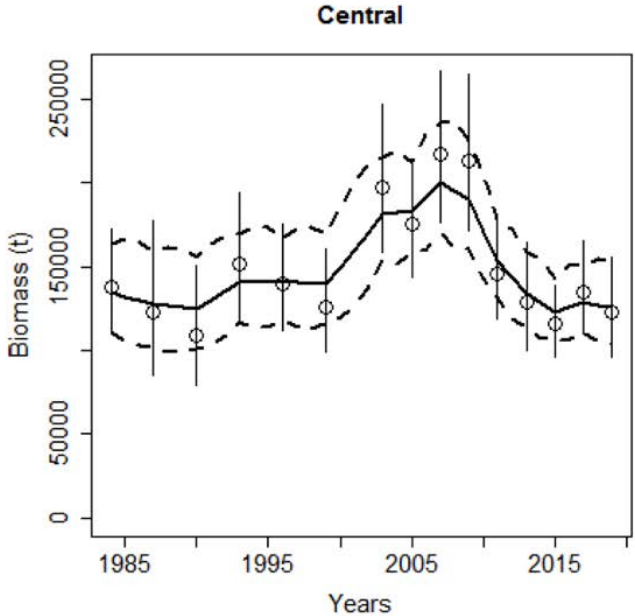
- 2019 GOA survey biomass down 7% for southern rock sole and down 28% for northern rock sole



4. Shallow-water flatfish

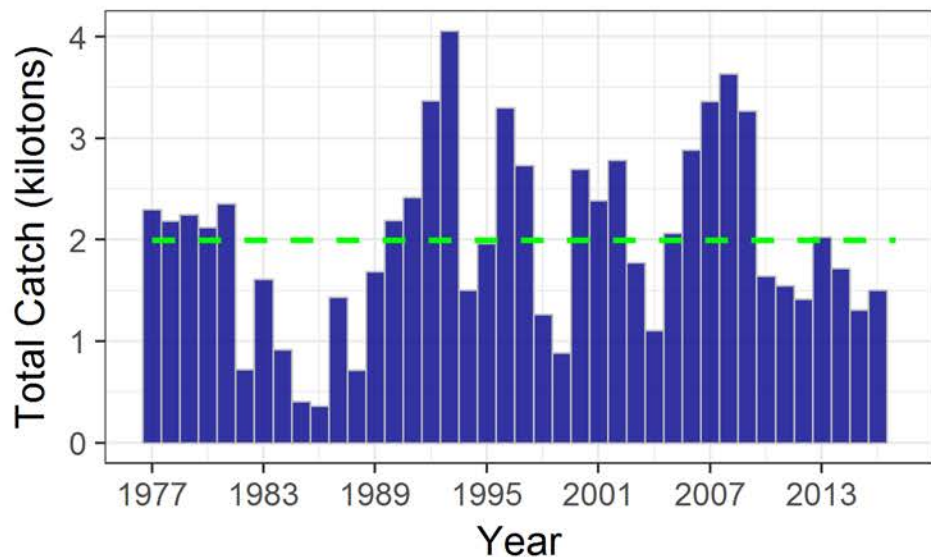
Partial assessment

- Apportionments same

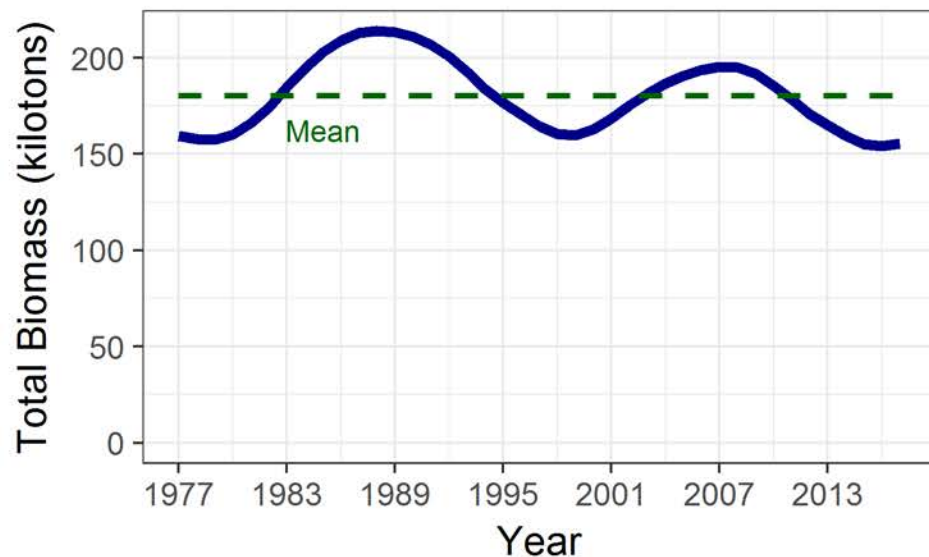


GOA Southern Rock Sole

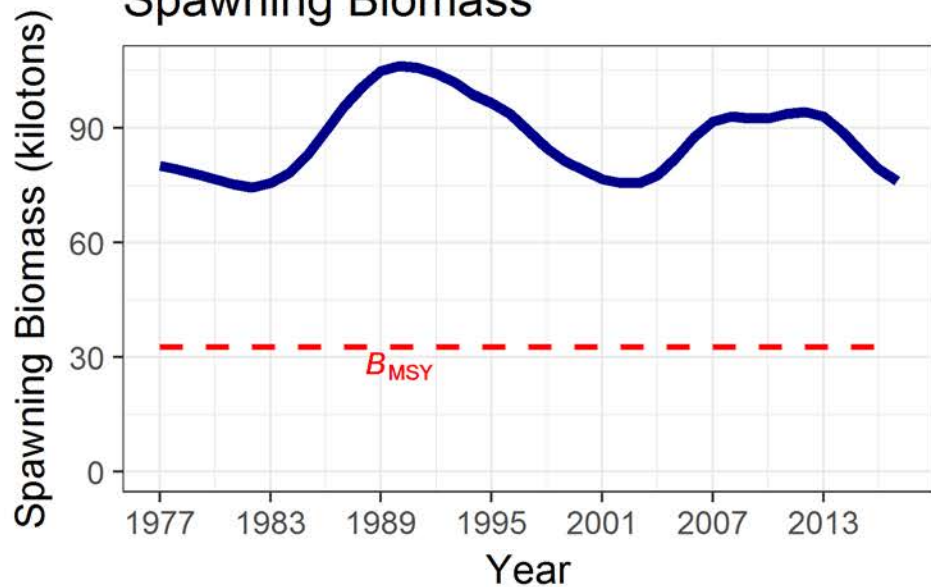
Total Catch



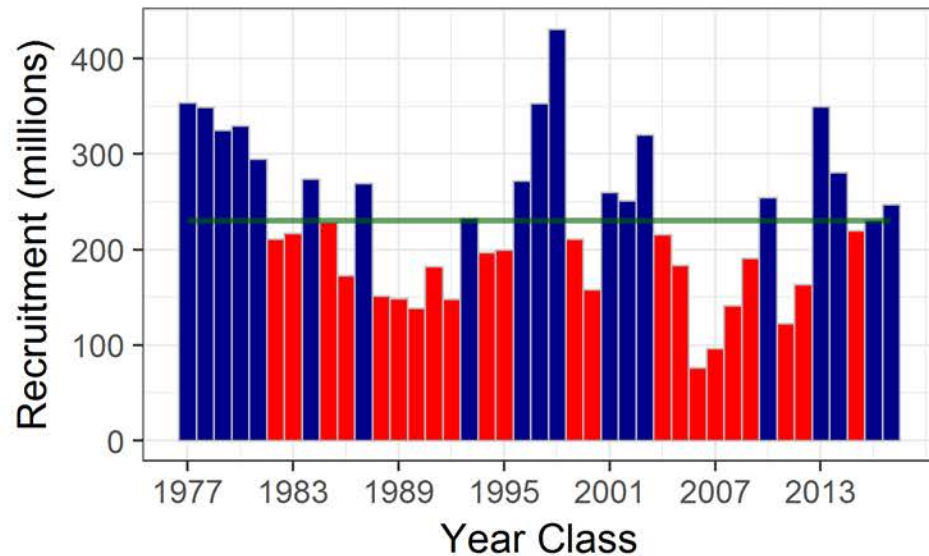
Total Biomass



Spawning Biomass

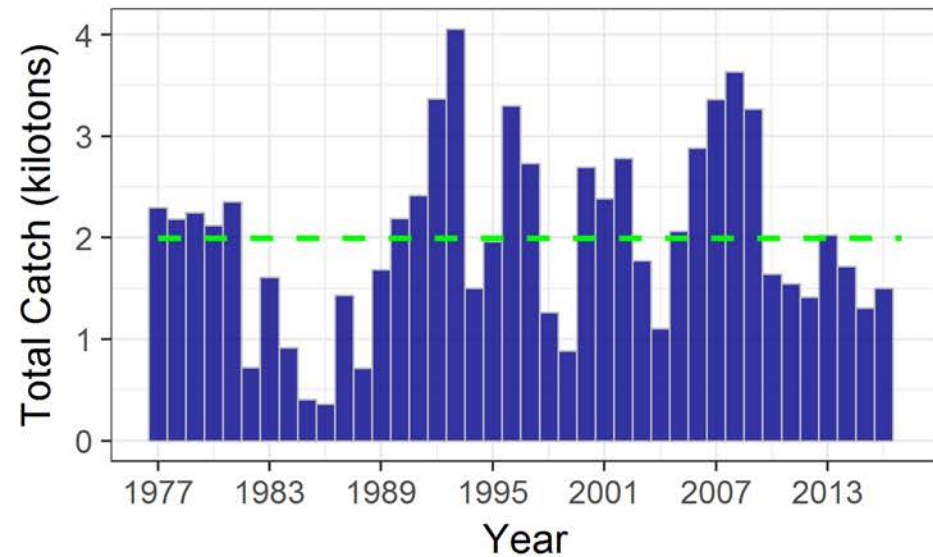


Age 0 Recruitment

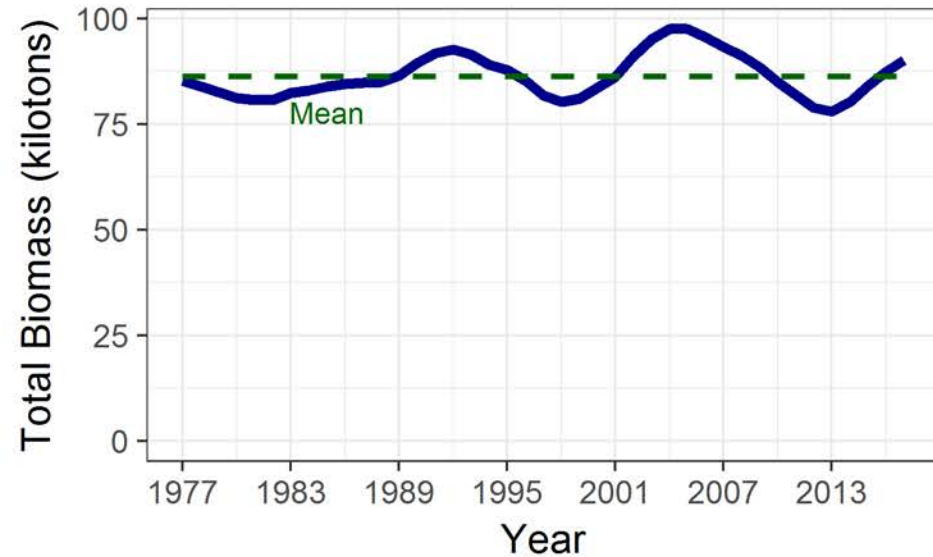


GOA Northern Rock Sole

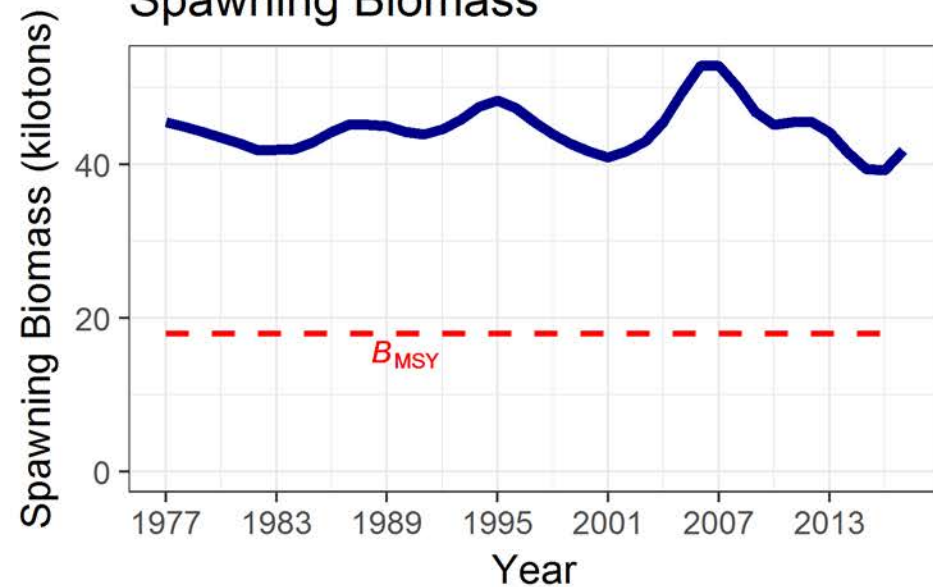
Total Catch



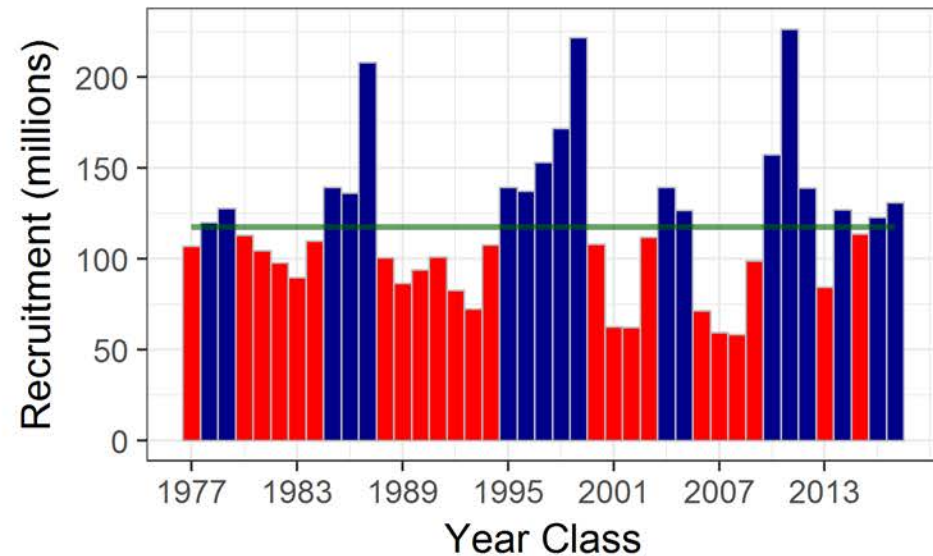
Total Biomass



Spawning Biomass



Age 0 Recruitment



Flatfish ABC's

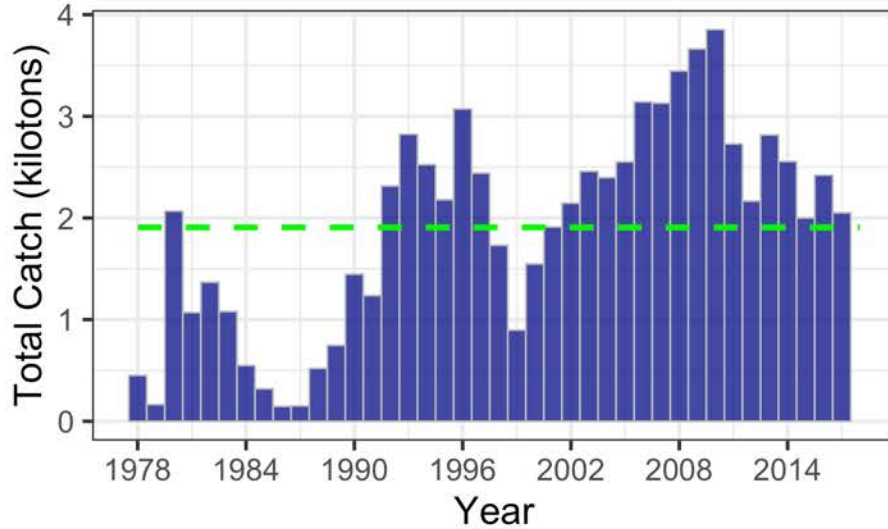
Species	2020	2021	Change
Shallow water flatfish	55,463	56,164	up 701 (1%)
Rex sole	14,878	15,416	up 538 (4%)
Deep water flatfish	6,030	5,926	down 104 (2%)
Flathead sole	38,196	39,377	up 1,181 (3%)
Arrowtooth flounder	128,060	126,970	down 1,090 (1%)
Subtotal	242,627	243,853	up 1,226 (1%)
Subtotal (without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

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

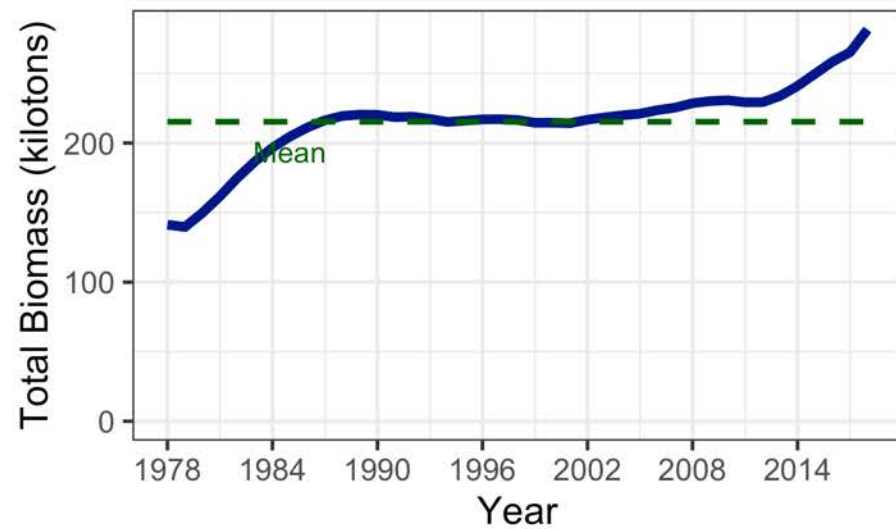
8. Flathead sole

GOA Flathead Sole

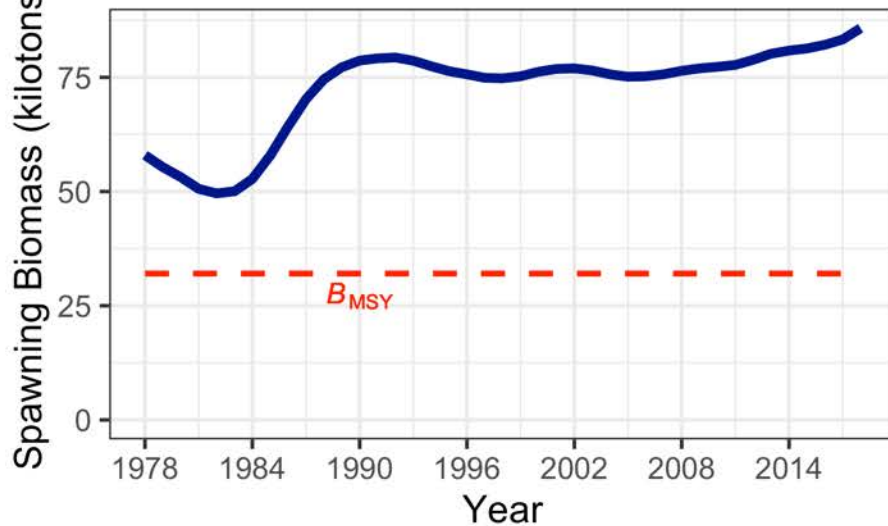
Total Catch



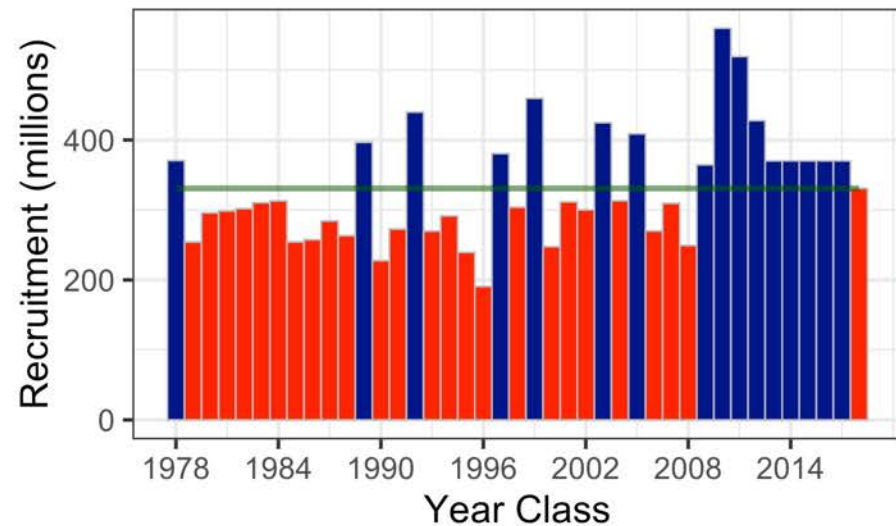
Total Biomass



Spawning Biomass

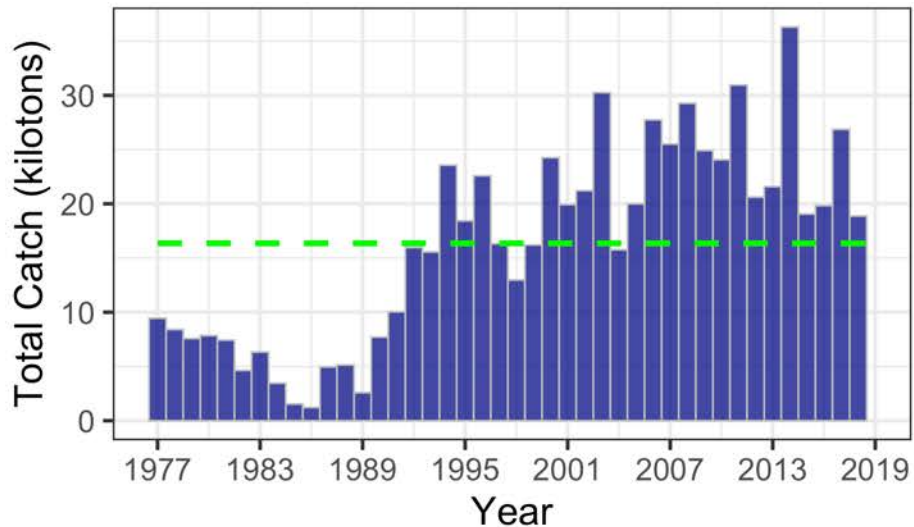


Age 0 Recruitment

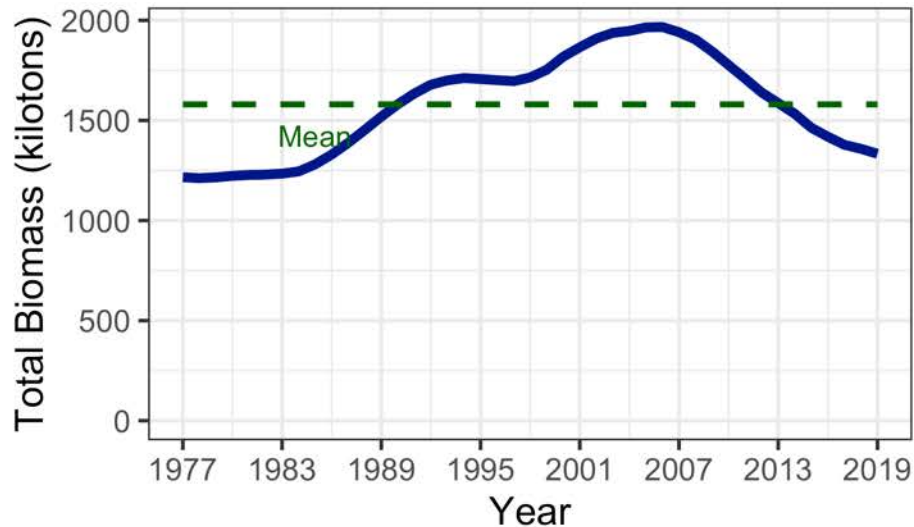


GOA Arrowtooth Flounder

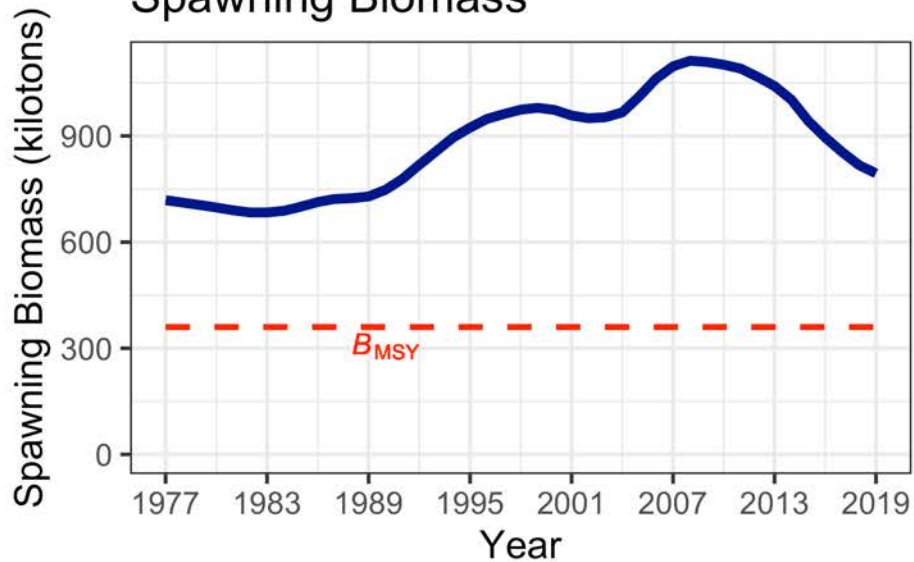
Total Catch



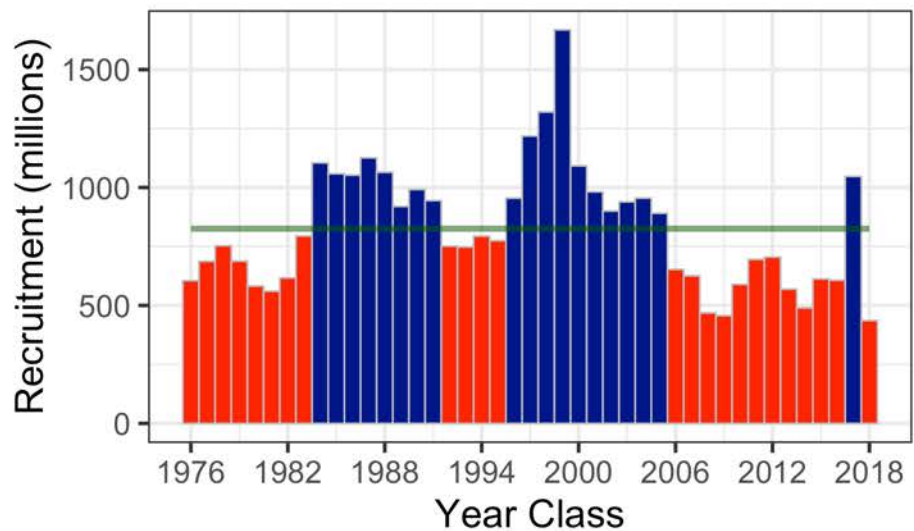
Total Biomass



Spawning Biomass



Age 1 Recruitment

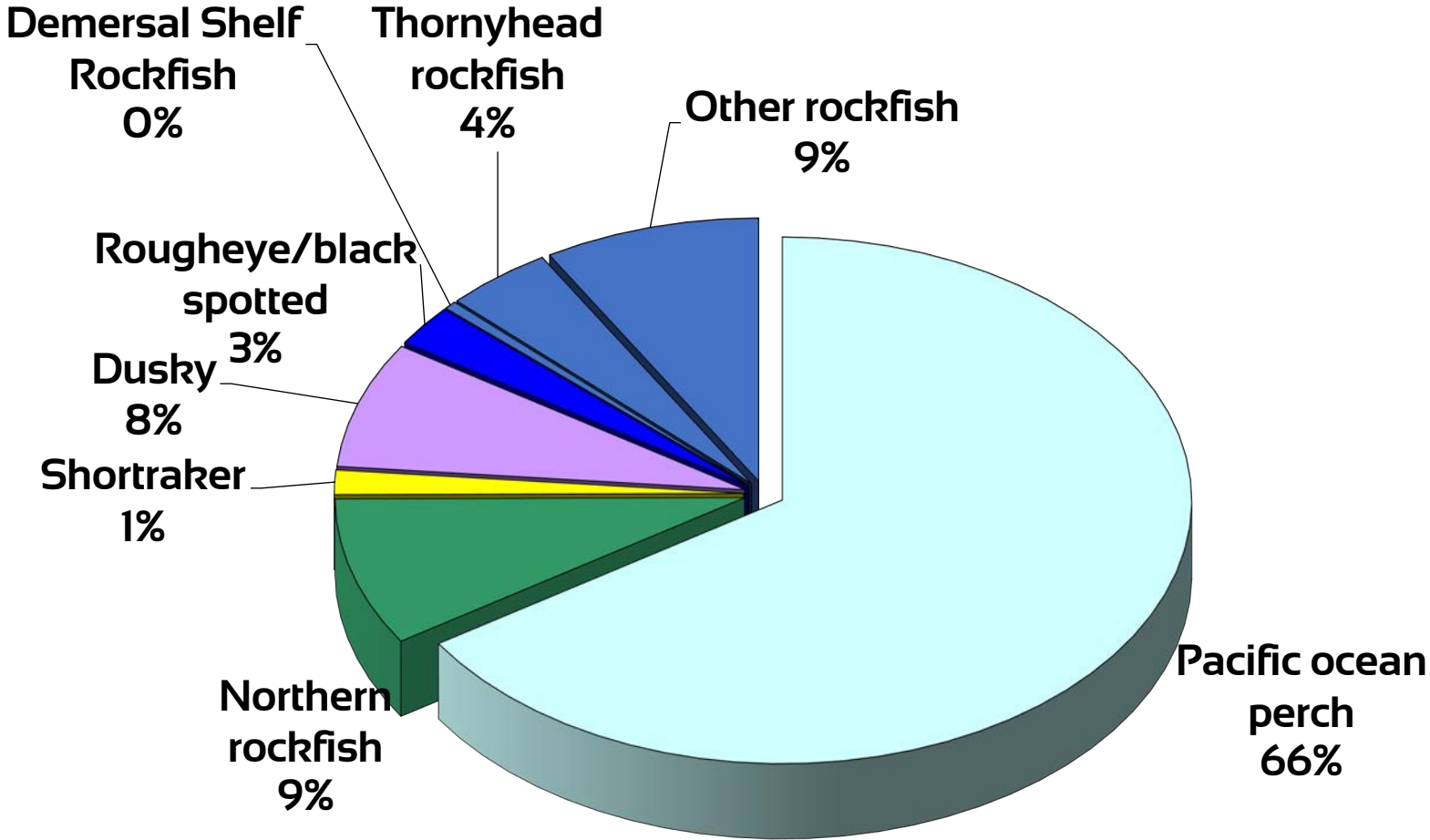


GOA Rockfish

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	3,462	3,462	same (0%)
Octopus	78	980	980	same (0%)
Total	185,927	456,035	469,250	up 13,215 (3%)

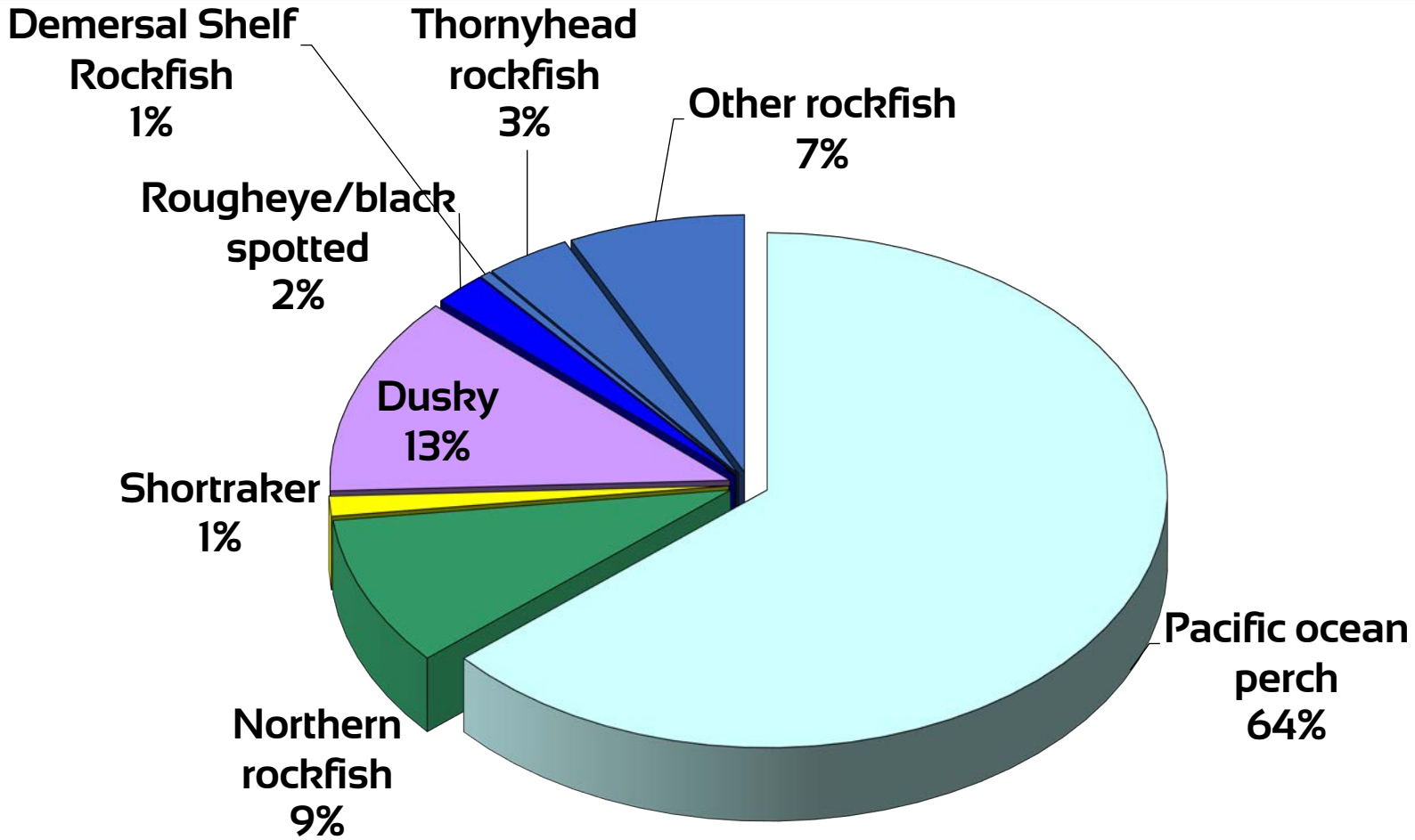
Rockfish 2020 ABC's

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%)
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%)



9. Pacific ocean perch

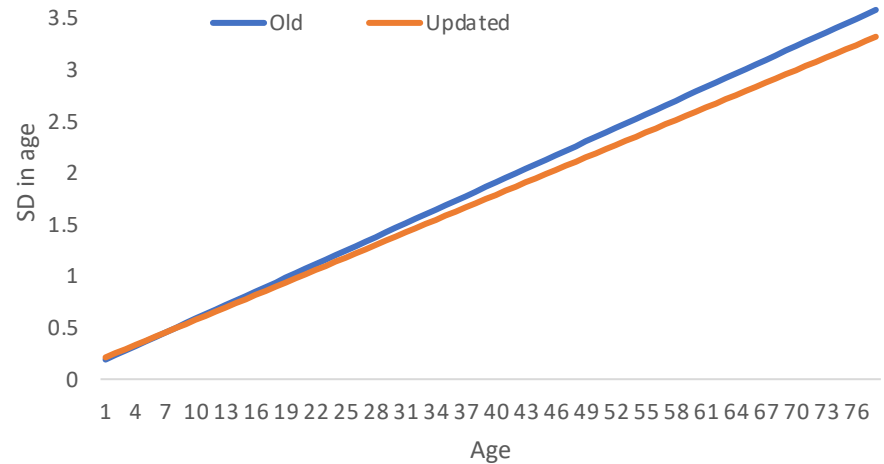
- Full assessment
- CIE review for GOA rockfish scheduled for spring 2021
 1. Use hydroacoustic info
 2. Examine fishery-dependent info, e.g., age sampling
 3. Catchability manuscript is in prep to inform priors...

9. Pacific ocean perch

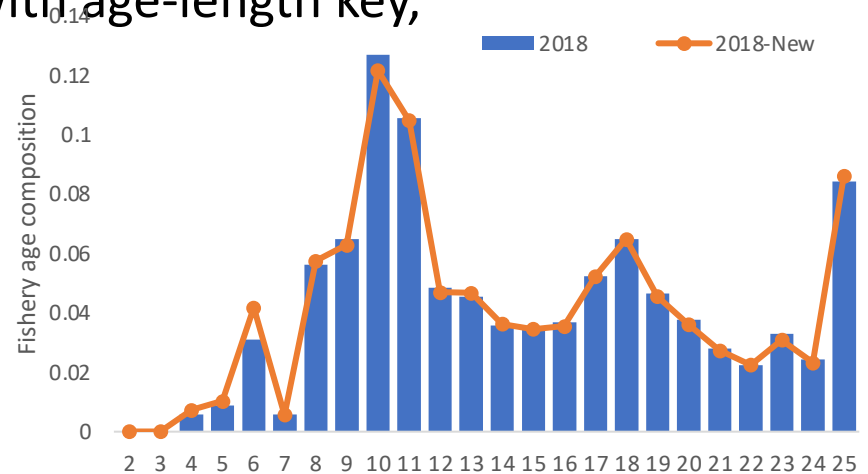
Summary of changes

Data Updates

- Update reader-tester agreement data, 2017.1a



- Construct fishery age comp with age-length key, 2017.1b



9. Pacific ocean perch

Summary of changes

Parameter prior updates

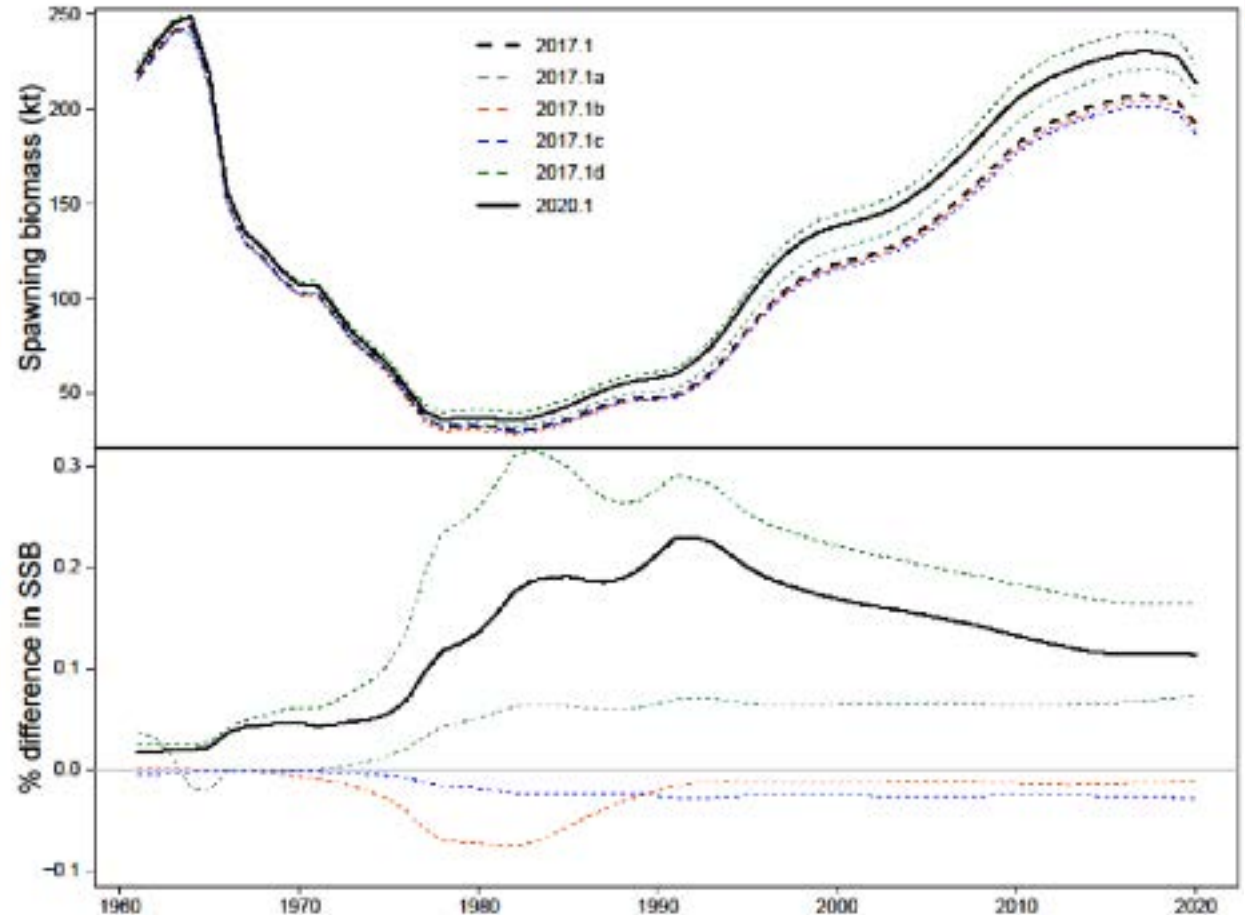
- Change prior for bottom trawl survey catchability from 1 to 1.15 (Jones et al., in press), 2017.1c
- Change prior on natural mortality from 0.05 to 0.0614 (Hamel 2015), 2017.1d

<u>Estimator</u>	<u>M</u>
Then _{nls}	0.0809
Then _{lm}	0.0581
Then _{1param}	0.0605
Hamel	0.0614

Meta-analytical approach adopted by NWFSC (5.40/max age)

- Combined model, 2020.1

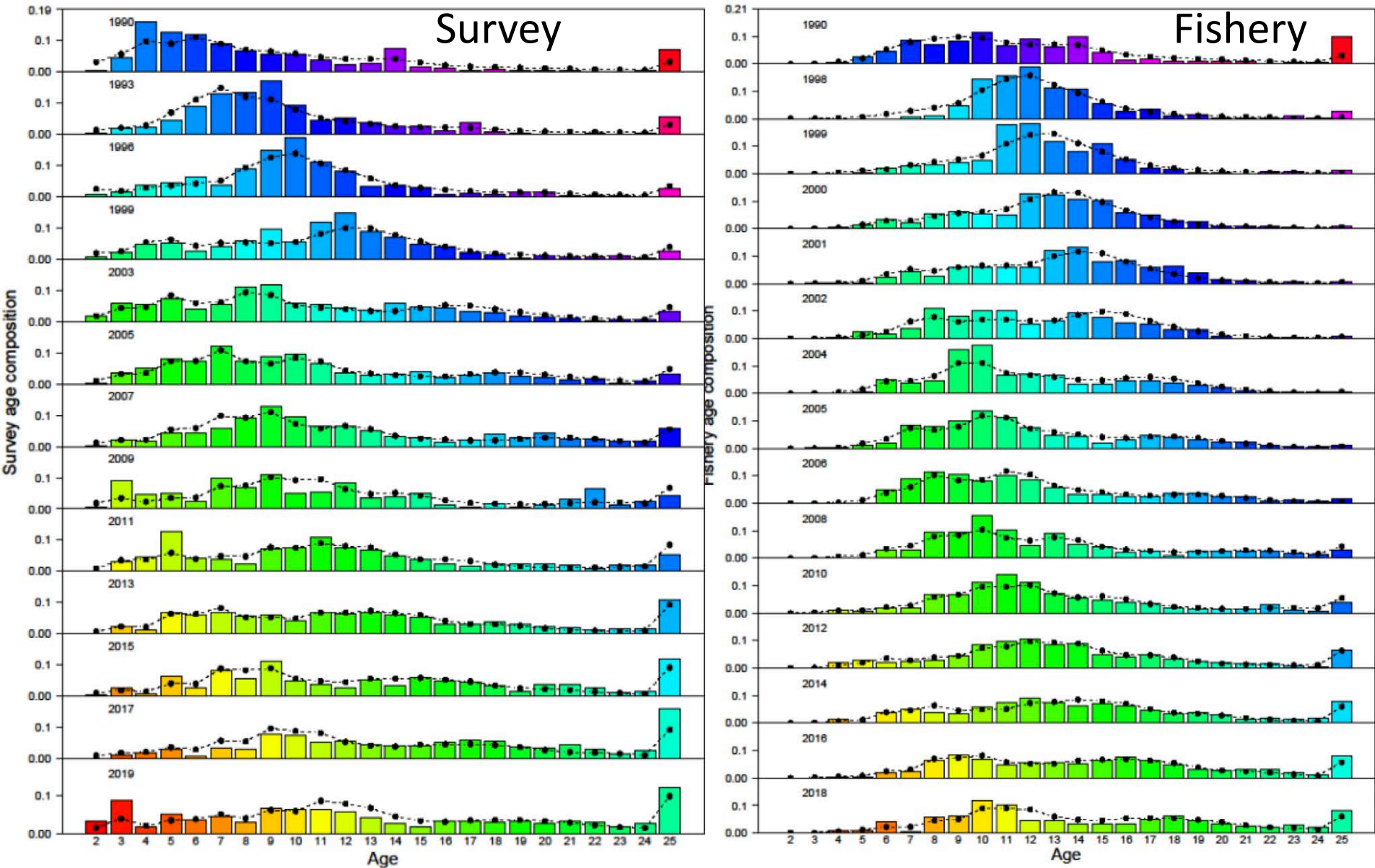
9. Pacific ocean perch Model scenarios



Overall, model 2020.1 increases estimates of Spawning Biomass compared to 2019 assessment

9. Pacific ocean perch

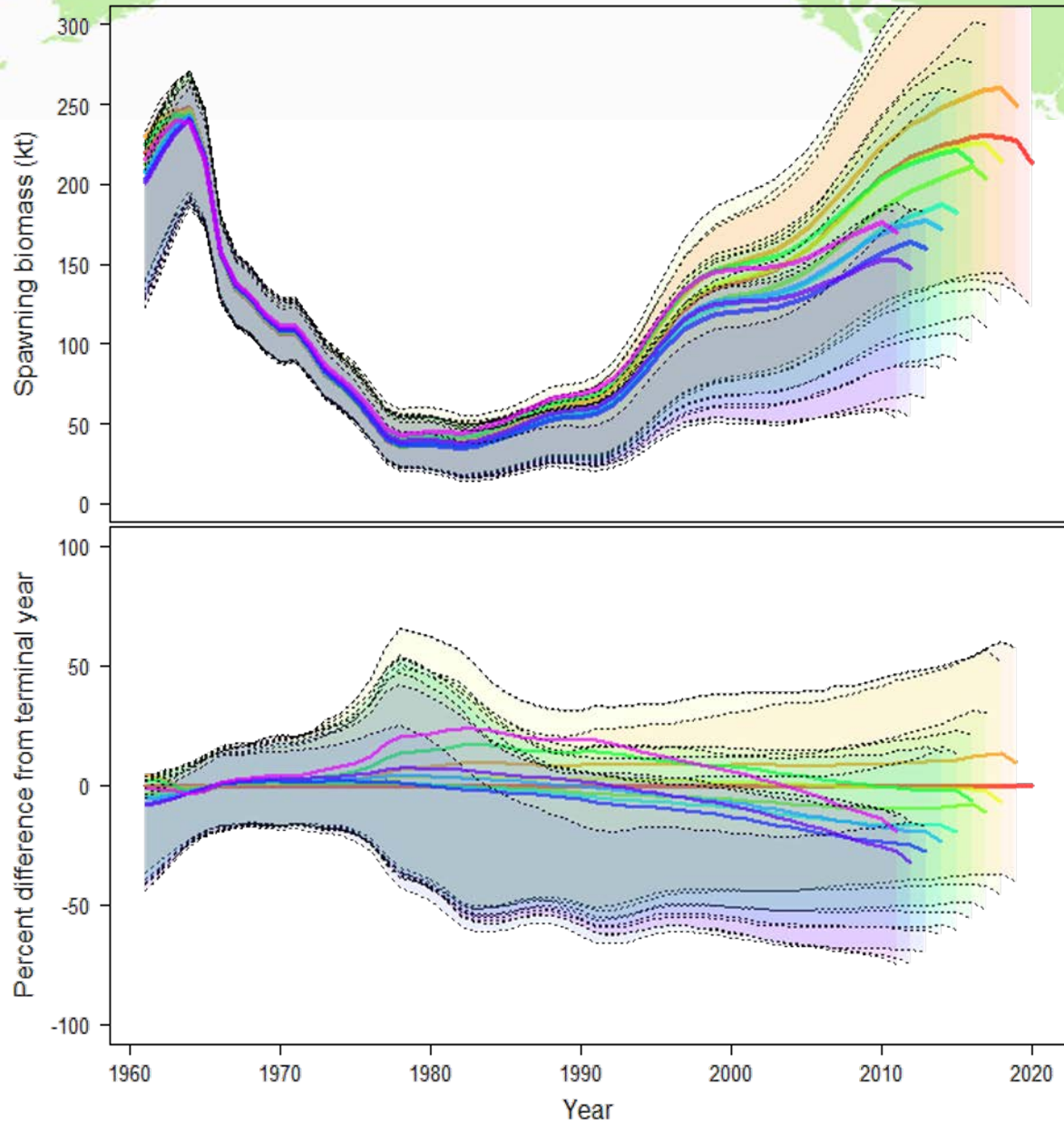
Age data



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

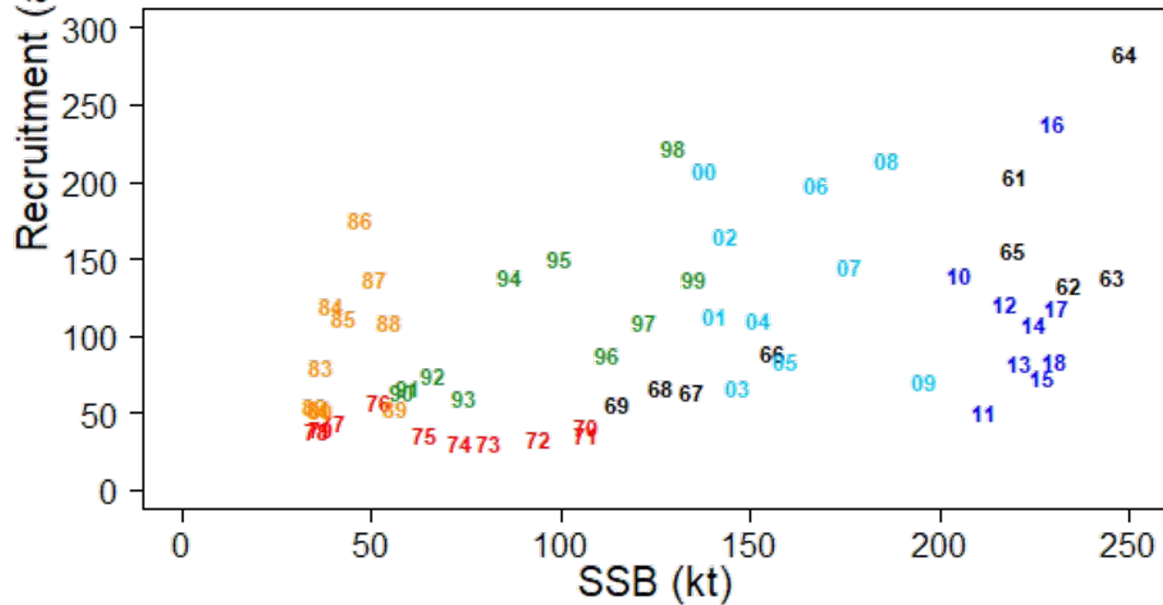
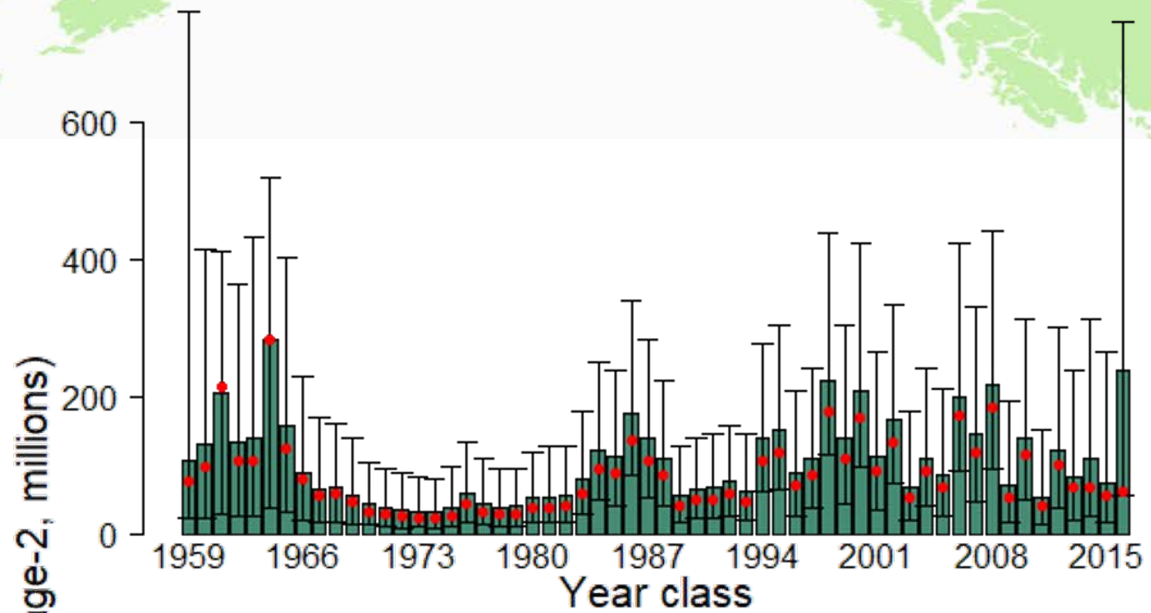
9. Pacific ocean perch

Retrospectives

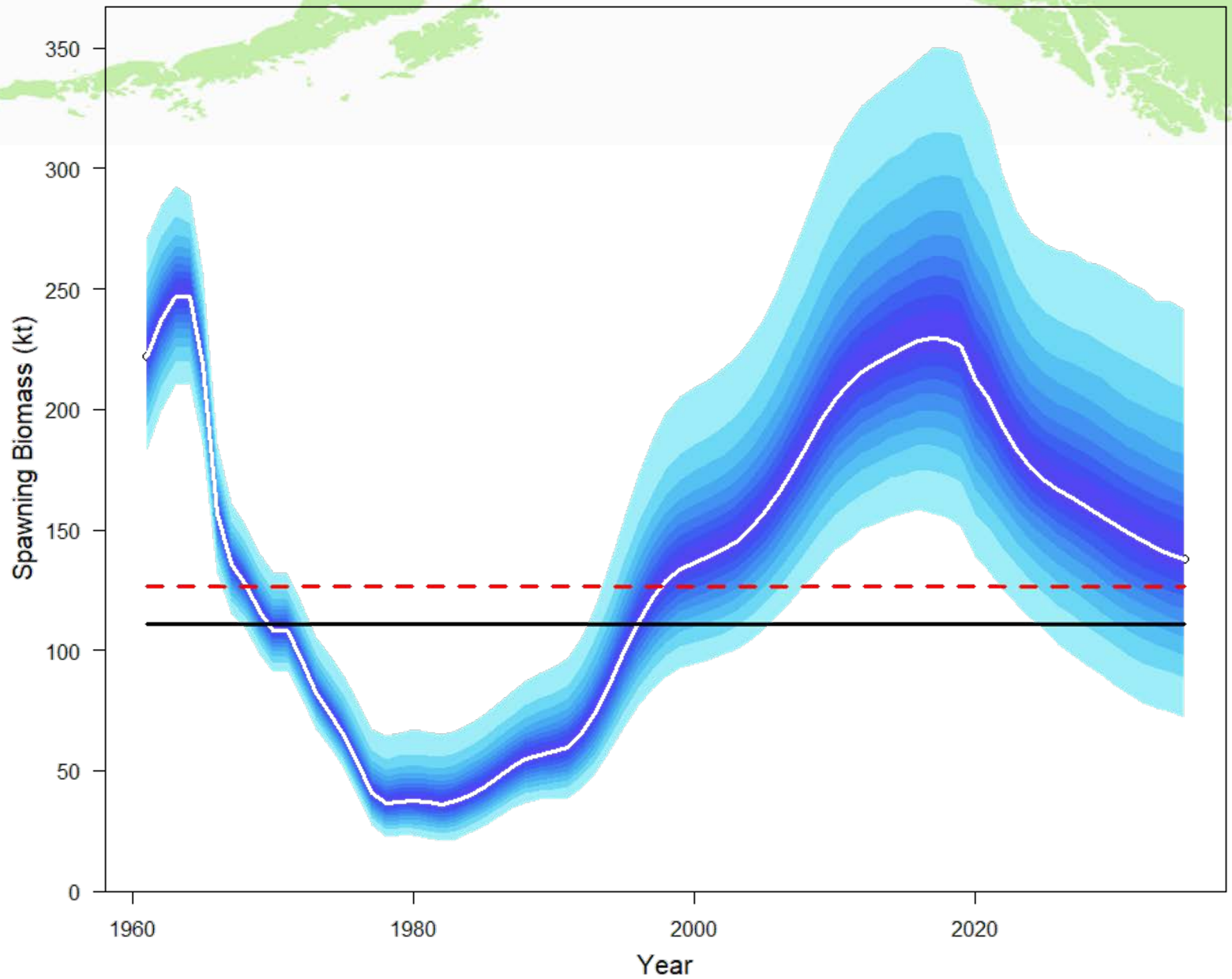


9. Pacific ocean perch

Recruits and SSB



9. Pacific ocean perch



Projected decrease in next 10 years

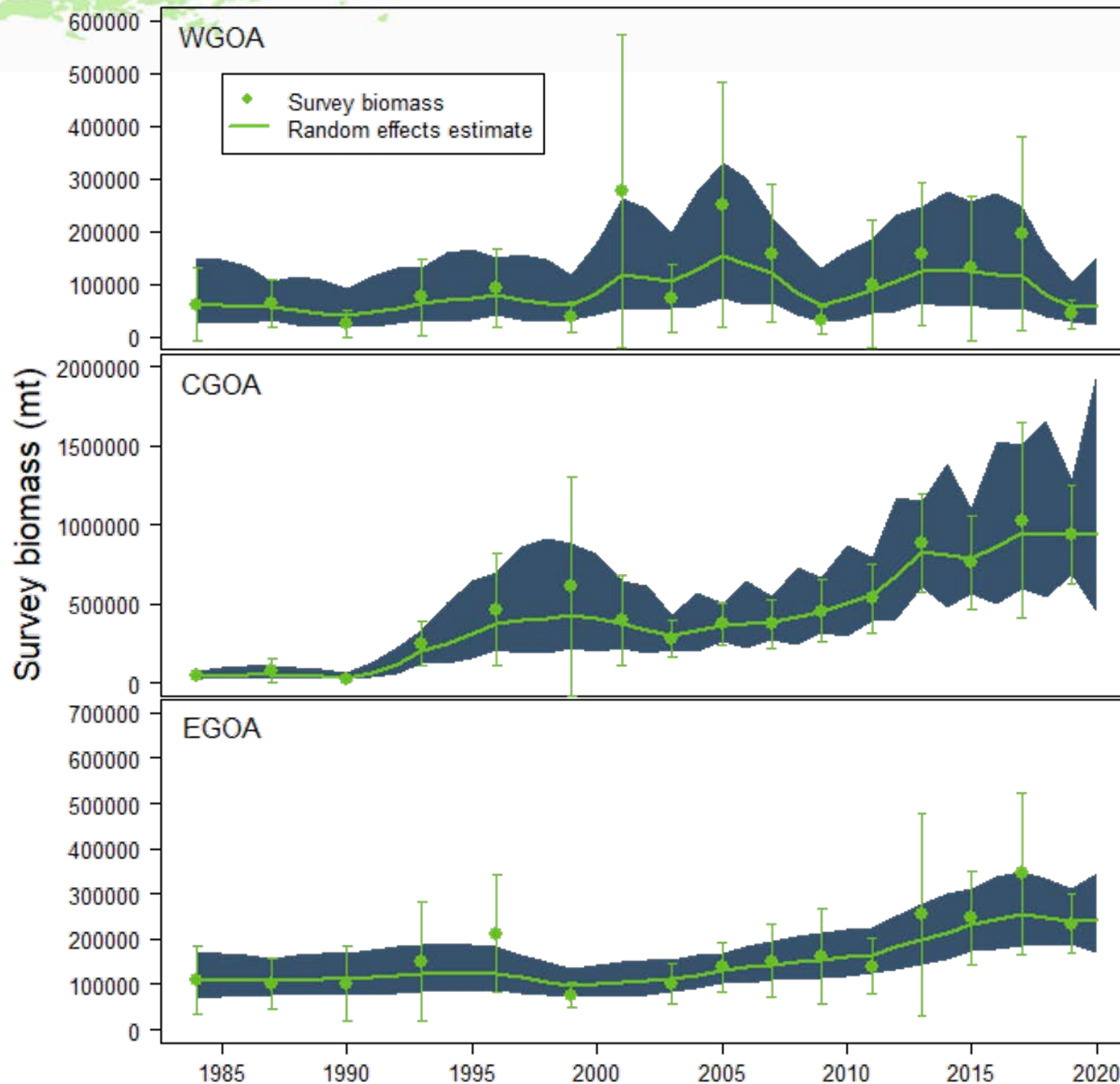
9. GOA POP Risk table

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

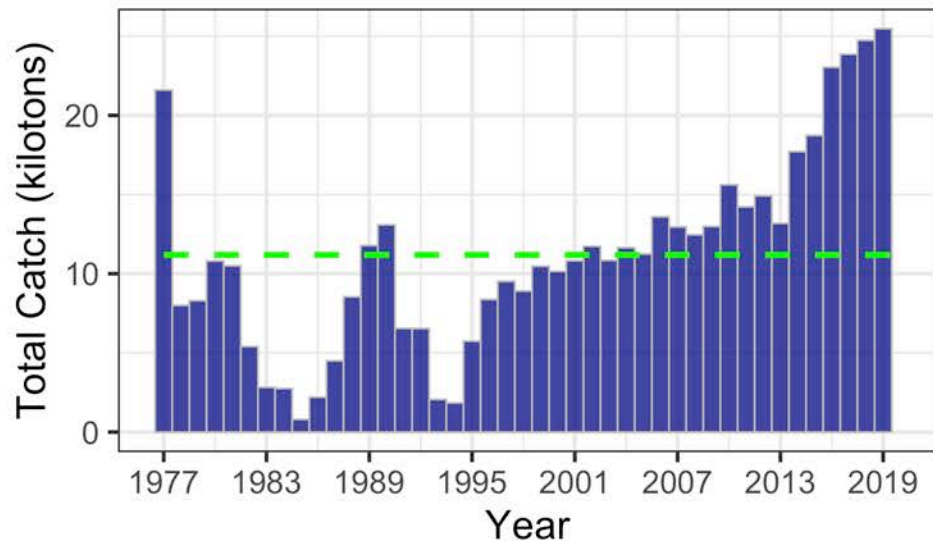


9. GOA Pacific ocean perch

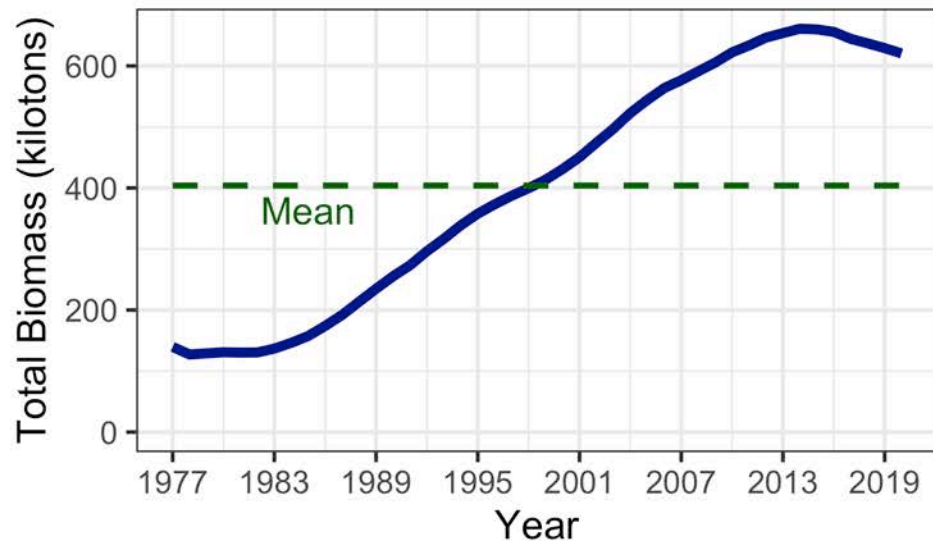
- **The Team recommended that assessment authors work with the MACE group to examine acoustic survey data to see if there are vertical shifts for POP related to water temperature.**
 - There is evidence of behavior changes of pollock because of water temperatures so that they are more available for trawl 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

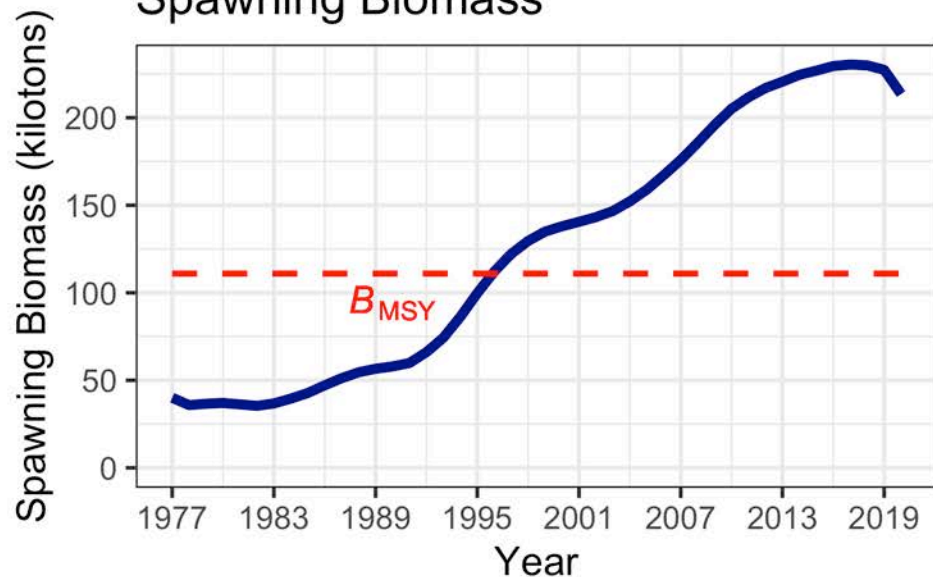
Total Catch



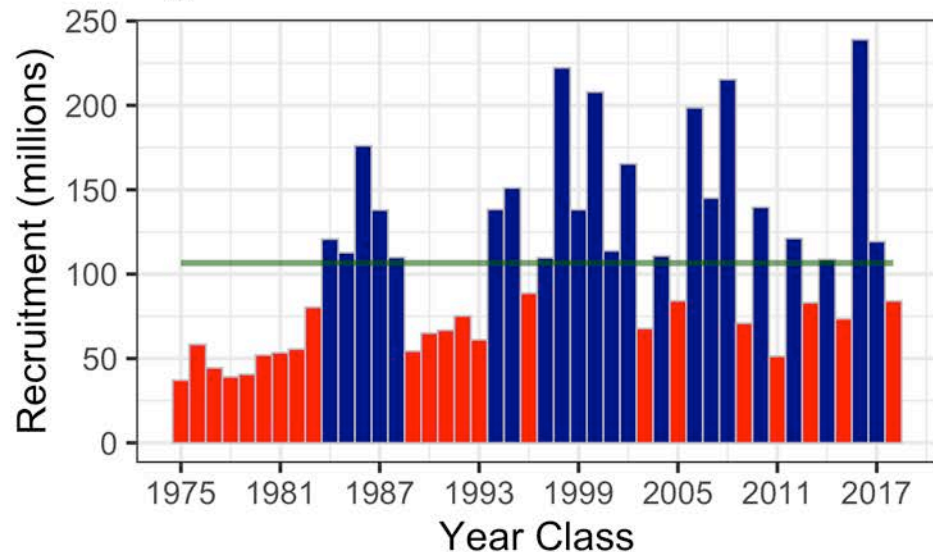
Total Biomass



Spawning Biomass



Age 2 Recruitment



Rockfish ABC Summary

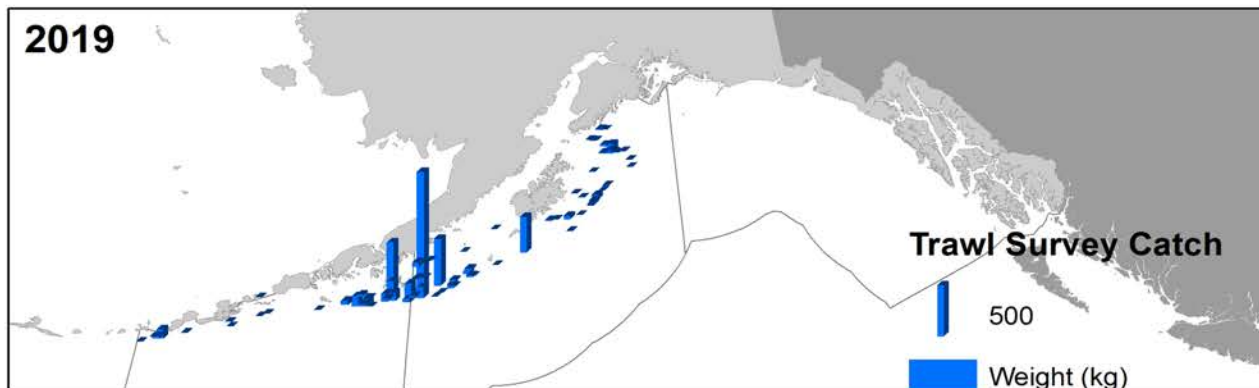
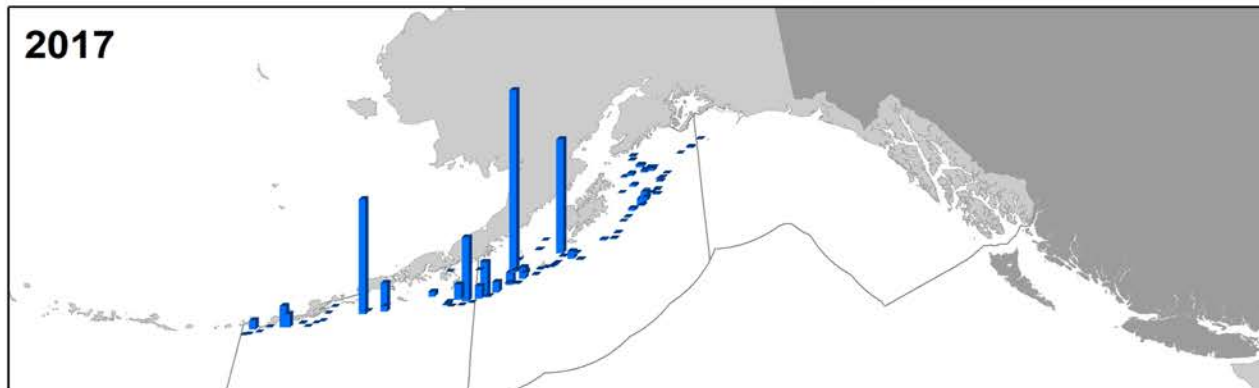
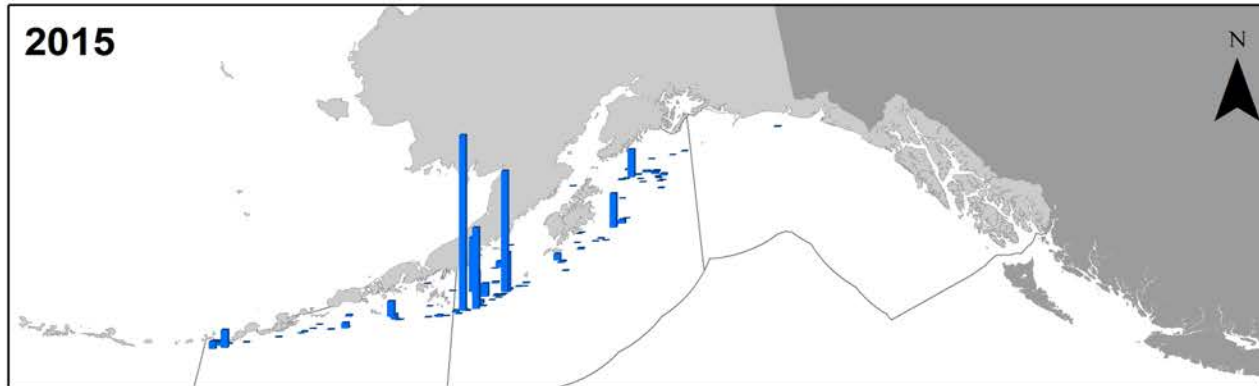
Species	2020	2021	Change
POP	31,238	36,177	up 4,939 (16%)
northern	4,312	5,358	up 1,046 (24%)
Shortraker	708	708	same (0%)
Dusky	3,676	7,101	up 3,425 (93%)
Rougeye and Blackspotted	1,209	1,212	up 3 (0%)
Demersal shelf	238	257	up 19 (8%)
Thornyhead	2,016	1,953	down 63 (3%)
Other	4,053	4,053	same (0%)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

A close-up photograph of a northern rockfish, showing its reddish-brown scales and the dorsal fin. The fish is positioned on the right side of the slide, with its body extending towards the left. The background is dark and out of focus.

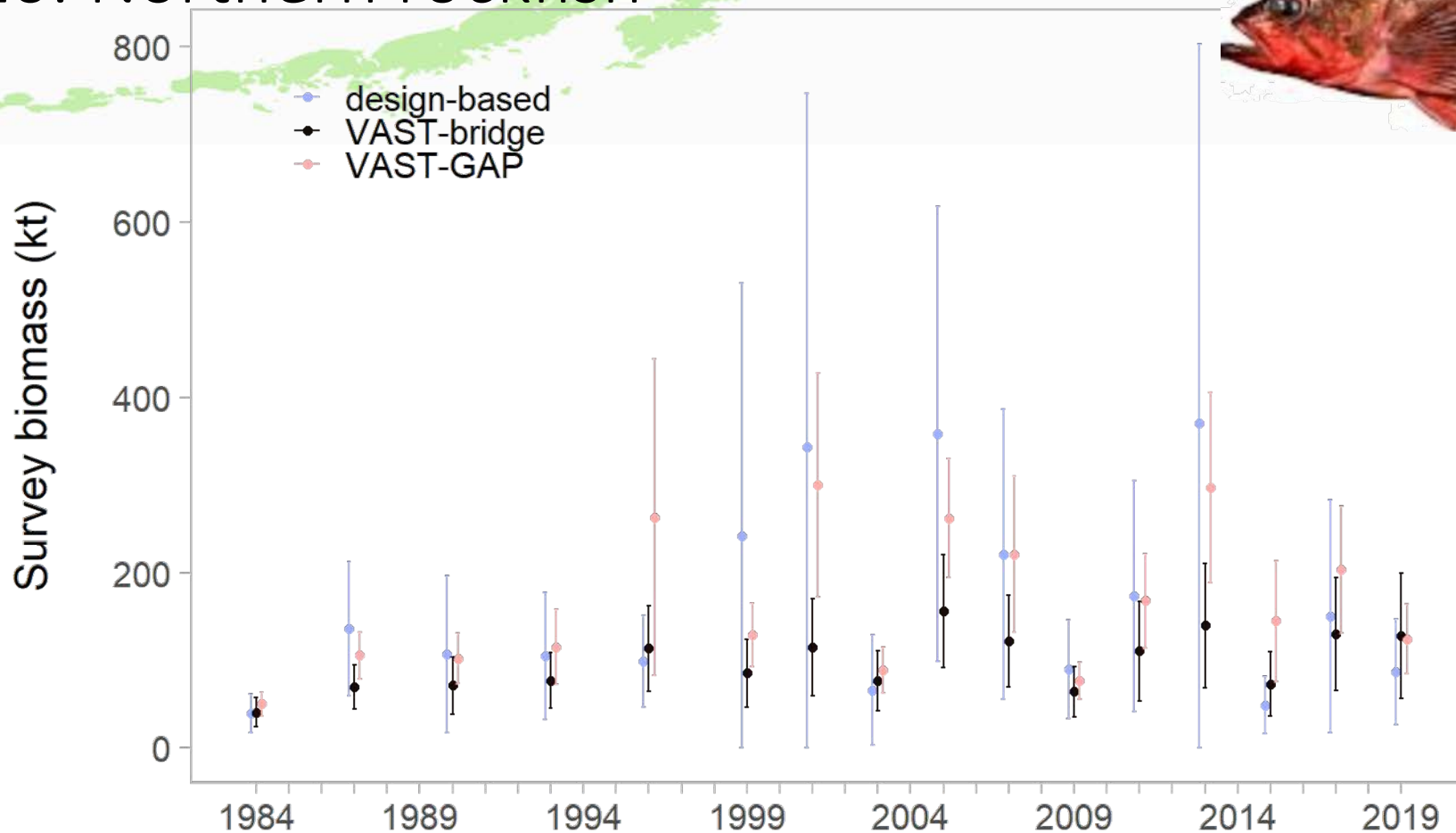
10. Northern rockfish

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

10. Northern rockfish survey distribution

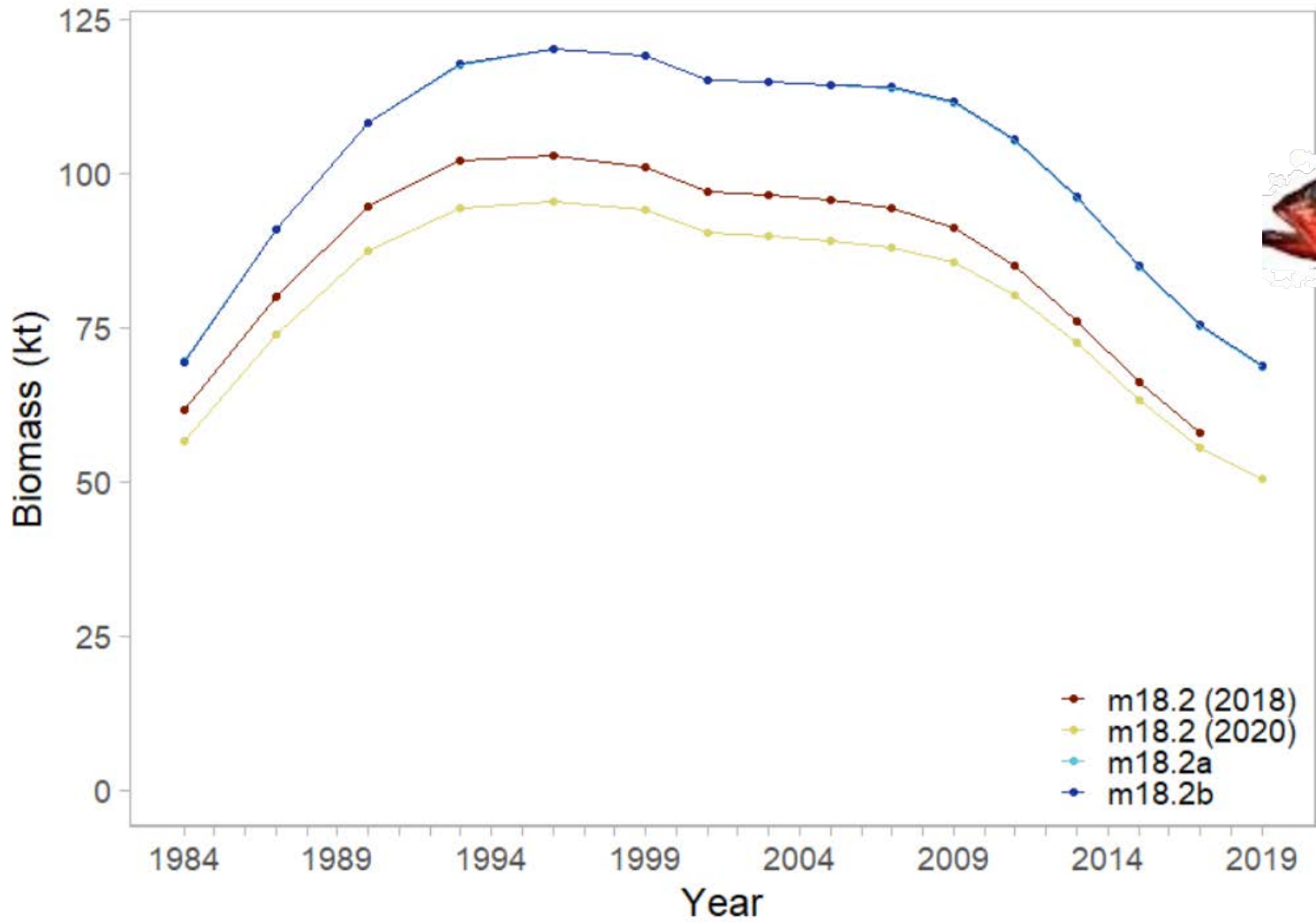


10. Northern rockfish



	VAST settings					
Model	Computed by	Knots	Depth	Obs model	PCR	Bias correction
Model 18.2 (2018)	MESA	1000	all	delta	lognormal	No
Model 18.2 (2020)	GAP	500	<700 m	delta-gamma	lognormal	No
Model 18.2a 2020	GAP	500	<700 m	delta-gamma	gamma	Yes

10. Northern rockfish



Impact of alternative models

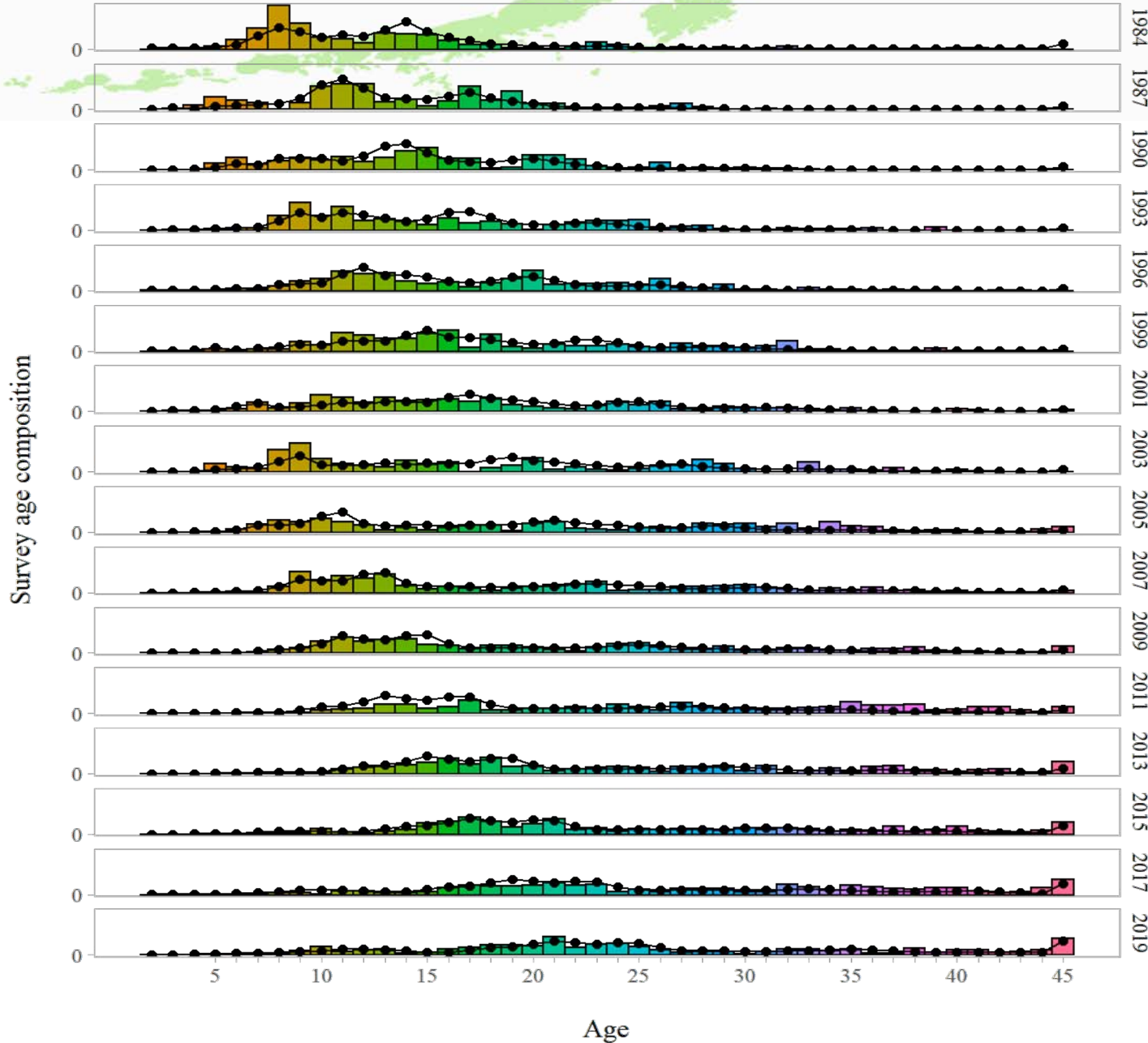
10. Northern rockfish

Table 10-12. Summary of results (including likelihood and key parameter estimates) from the 2020 model cases investigated compared with 2018 results. The author preferred model max ABC and OFL are in bold.

	M18.2 (2018)	M18.2 (2020)	M18.2a (2020)	M18.2b (2020)
Catch	0.10	0.09	0.133	0.126
Survey biomass	4.10	3.77	11.54	11.50
Fishery ages	33.10	37.68	34.93	37.43
Survey ages	63.25	67.61	68.90	68.74
Fishery sizes	46.10	46.81	46.34	46.27
Maturity	70.23	70.23	70.23	70.23
Data Likelihood	216.88	226.19	234.53	234.29
Penalties/Priors				
Recruitment deviations	9.22	8.90	8.89	8.93
<i>F</i> regularity	5.54	5.51	5.56	5.60
σ_r prior	0.40	0.50	0.37	0.37
<i>M</i> prior	0.03	0.03	0.06	0.06
Objective function Total	232.06	241.13	249.84	249.27

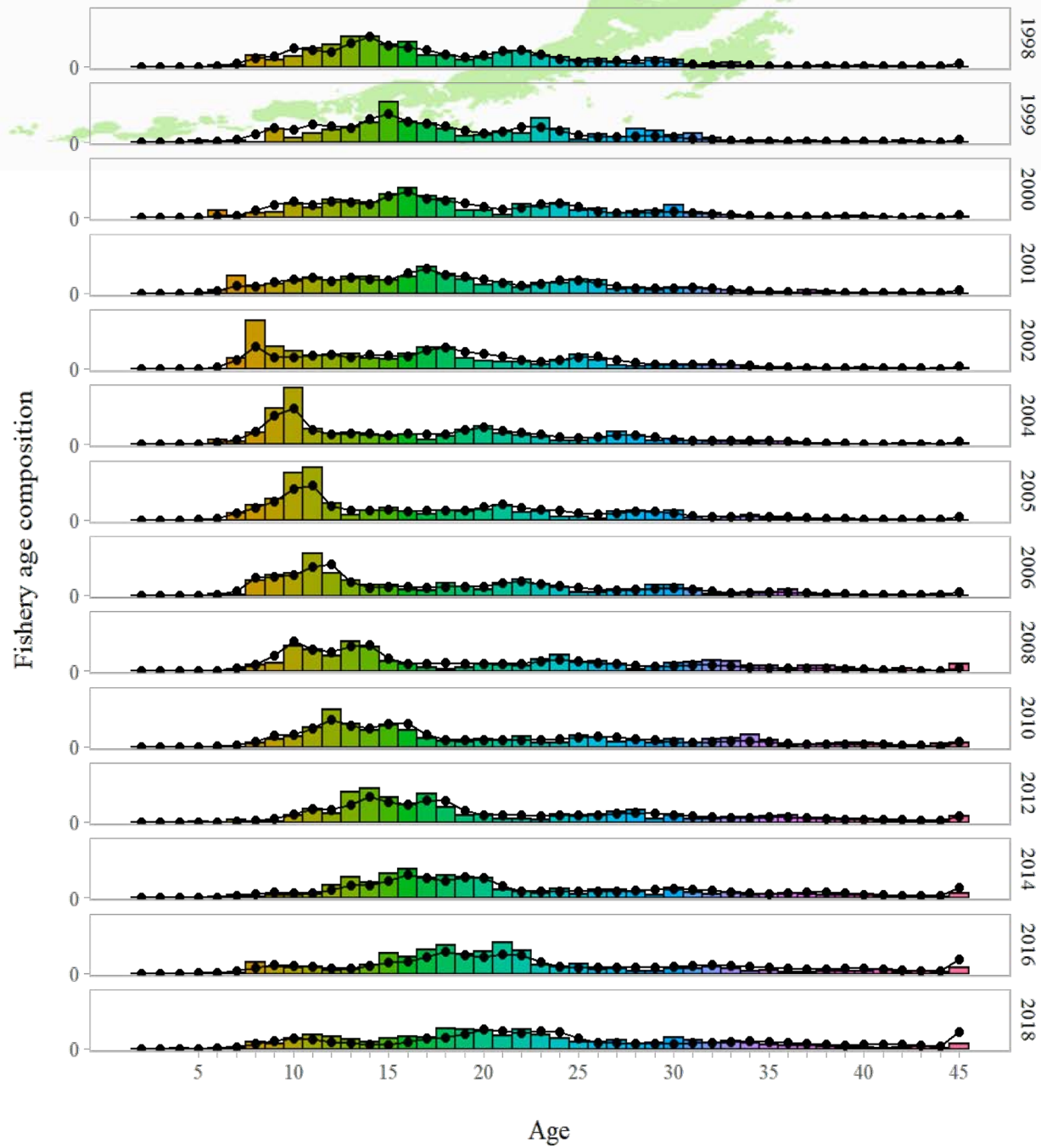


10. Northern rockfish



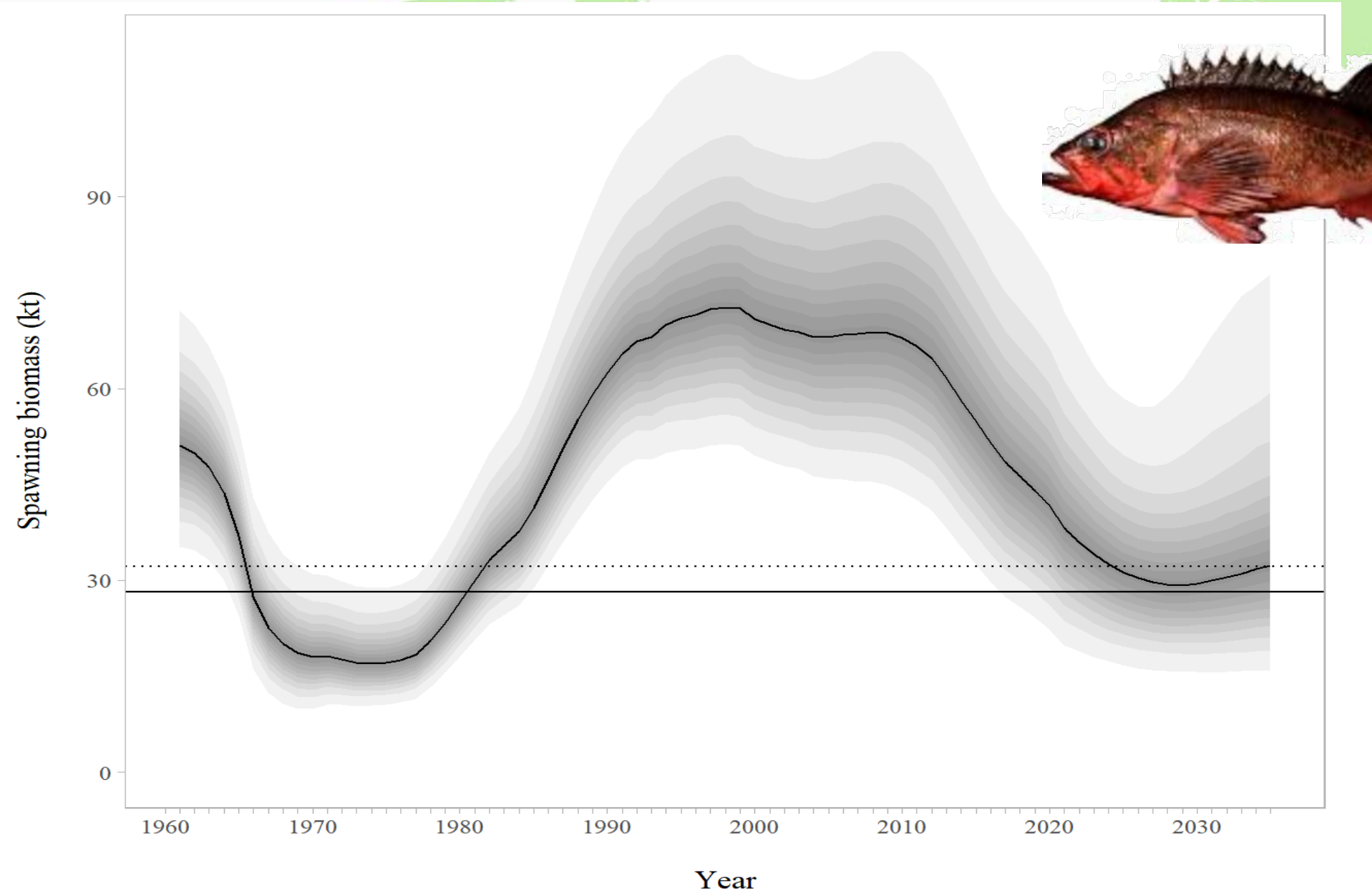
Survey age composition

10. Northern rockfish

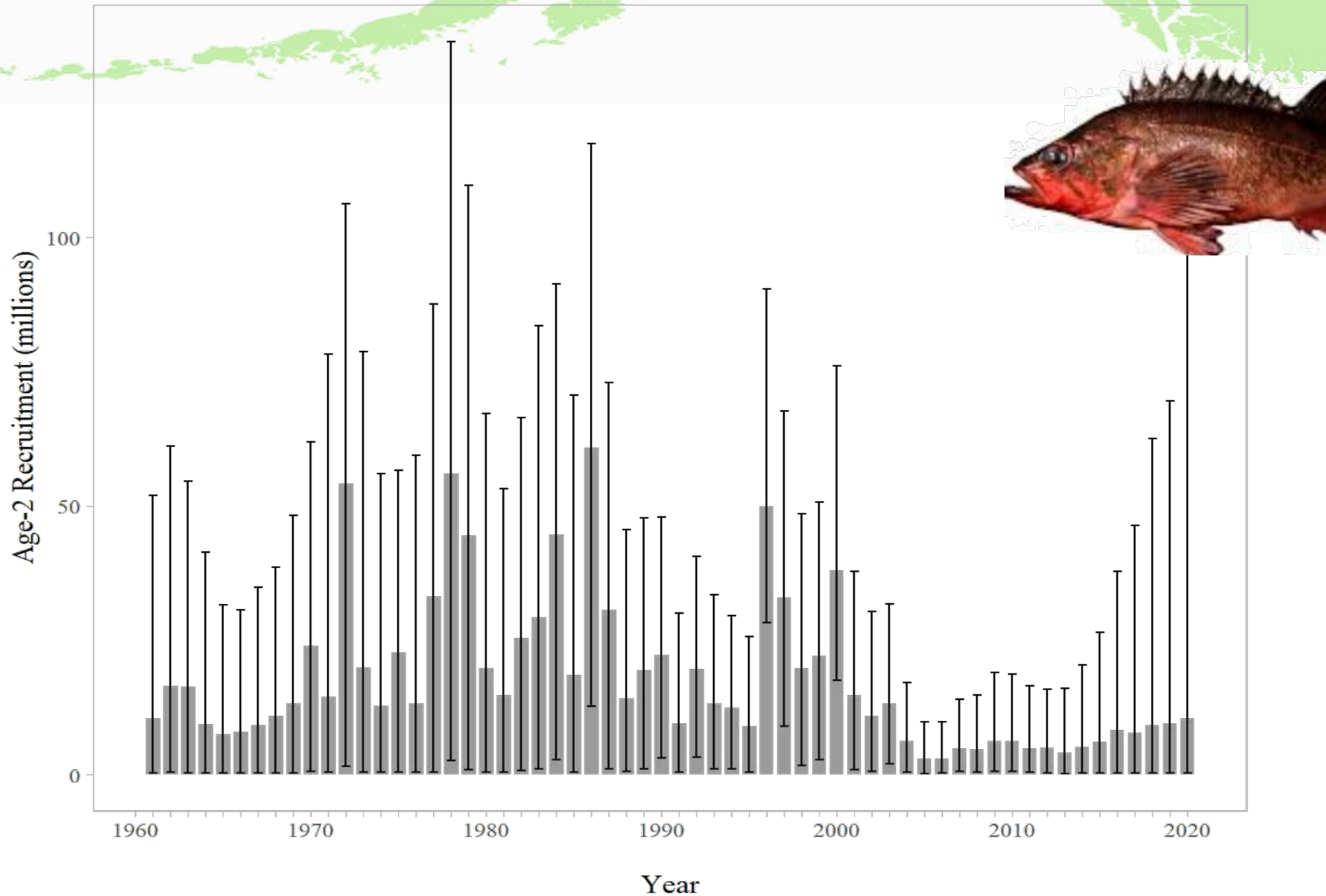


Fishery age composition

10. Northern rockfish

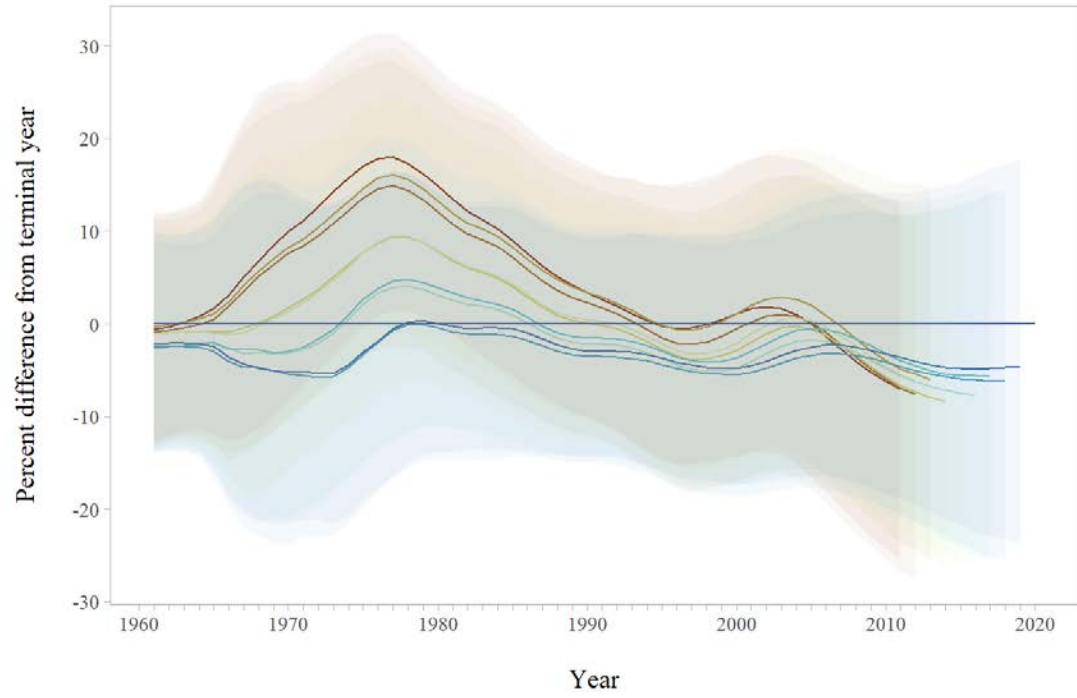
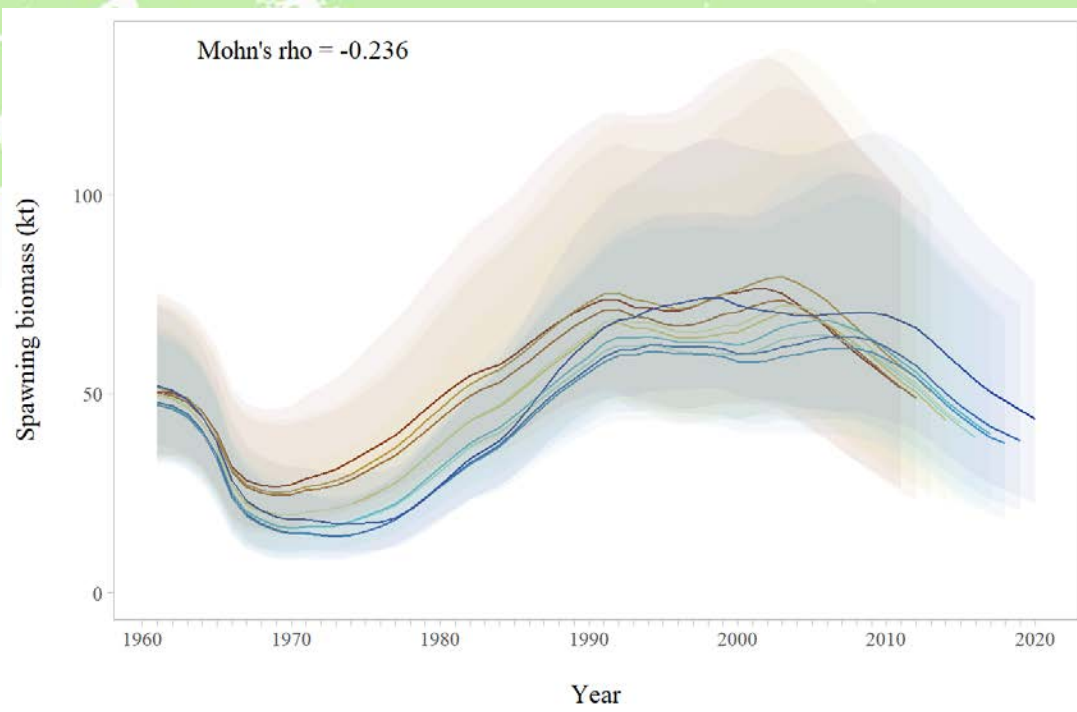


10. Northern rockfish recruitment

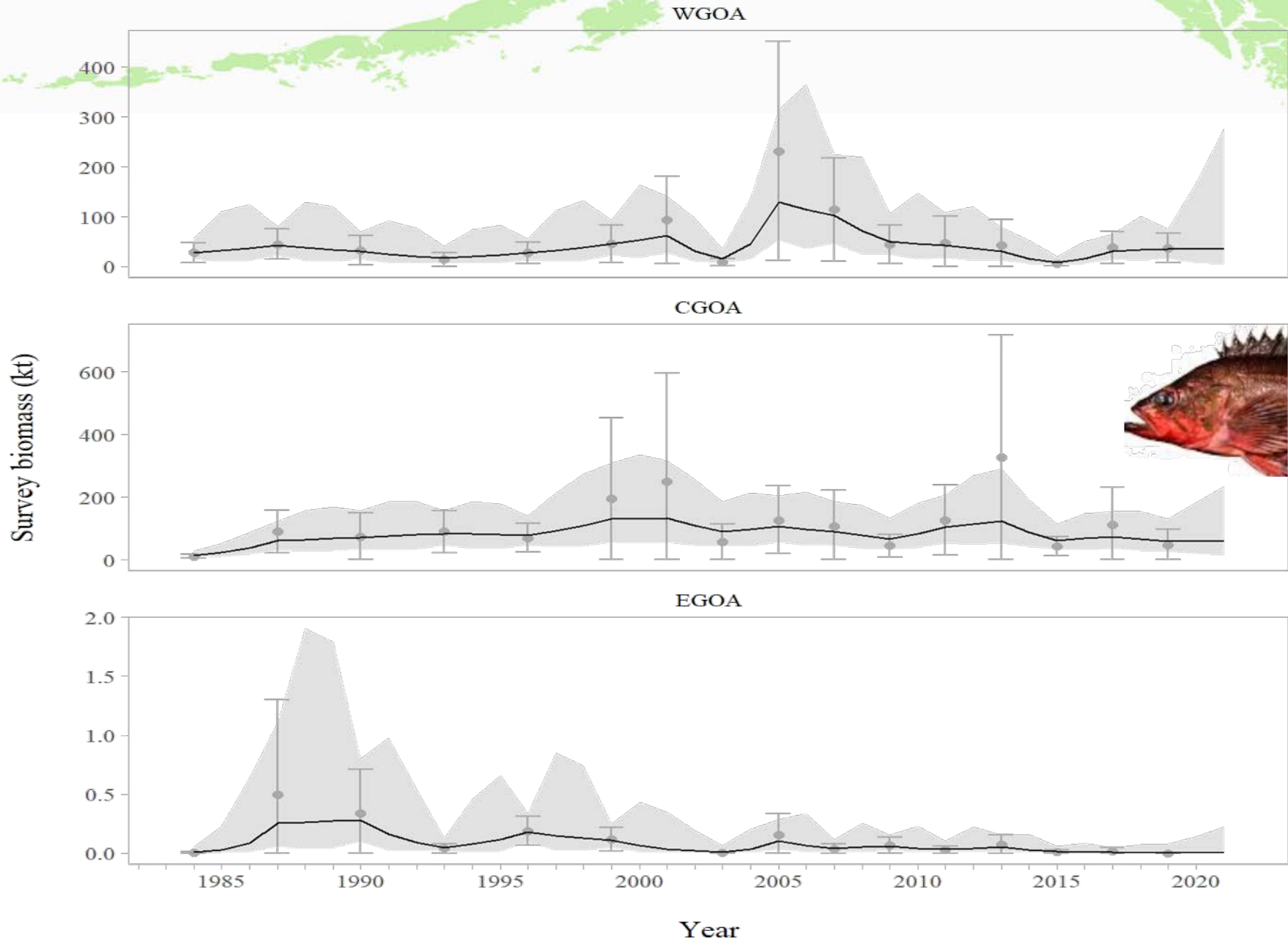


10. Northern rockfish

- Retrospectives



10. Northern rockfish Apportionments...



10. Northern rockfish



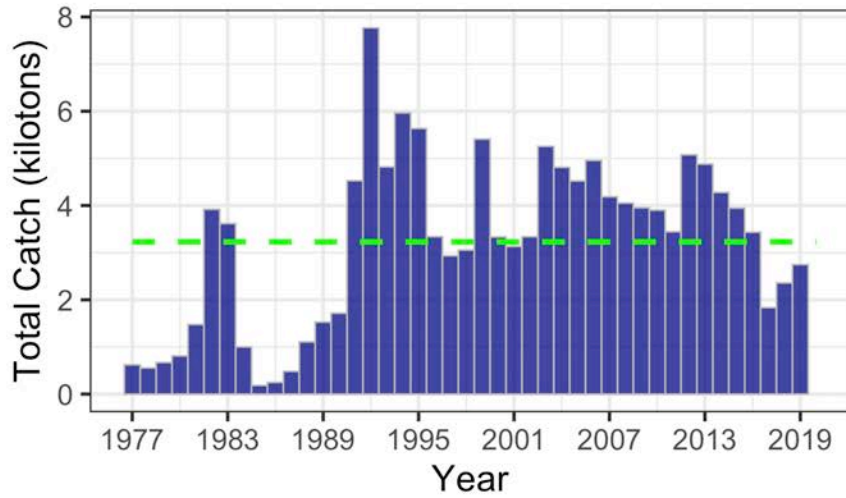
Team recommended

- ...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

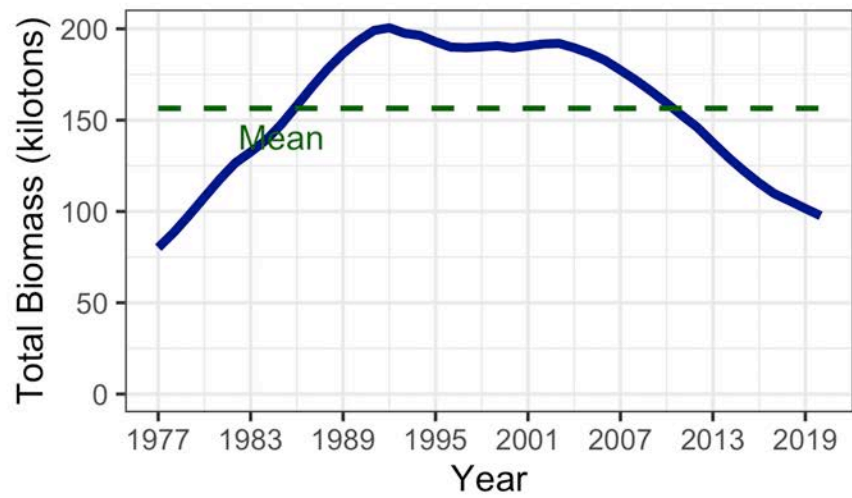
10. Northern rockfish



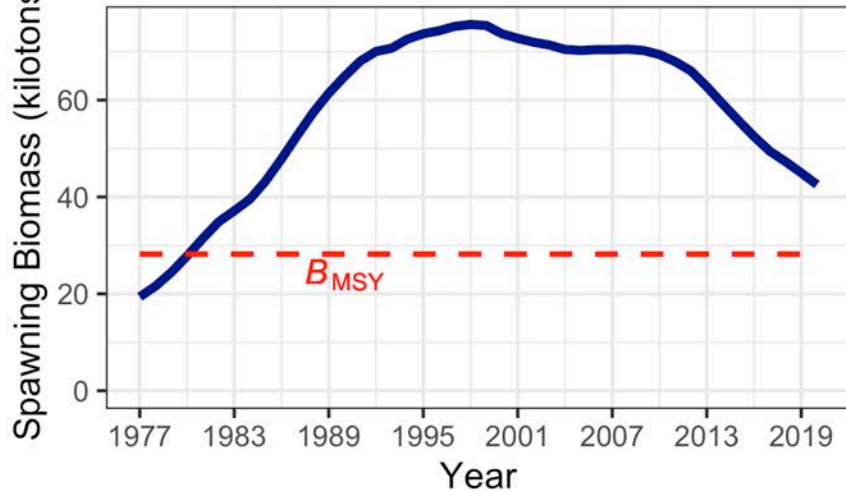
Total Catch



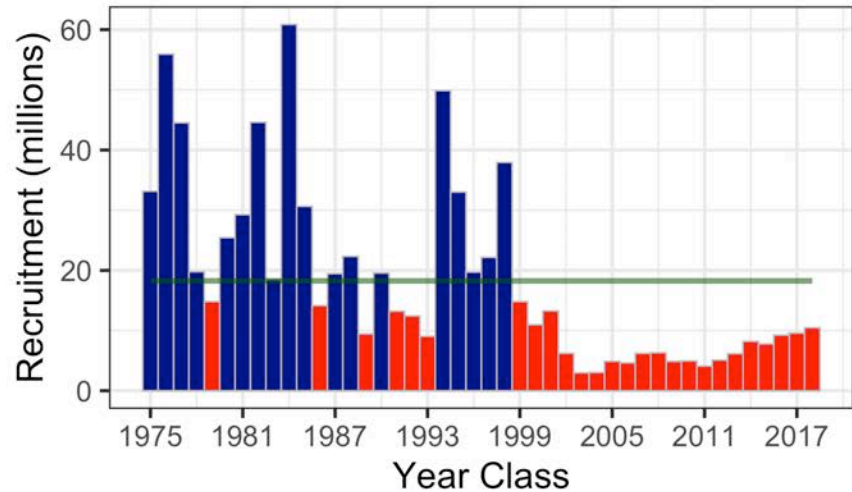
Total Biomass



Spawning Biomass

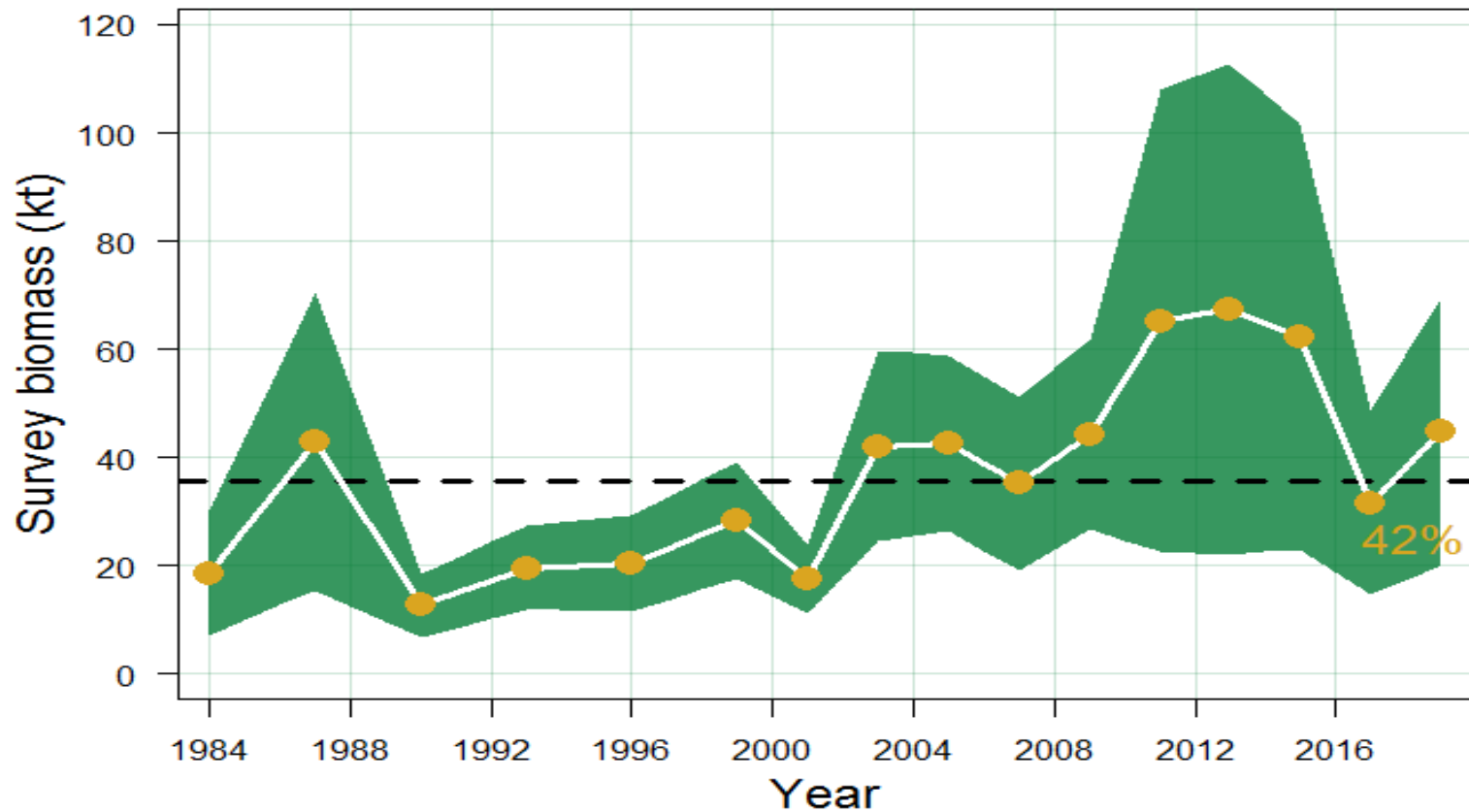


Age 2 Recruitment



11. GOA Shortraker rockfish

- Tier 5 No assessment



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%)

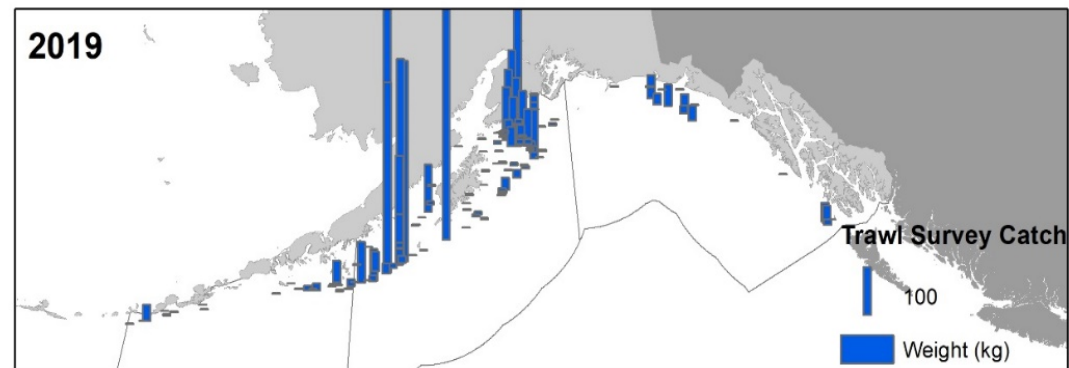
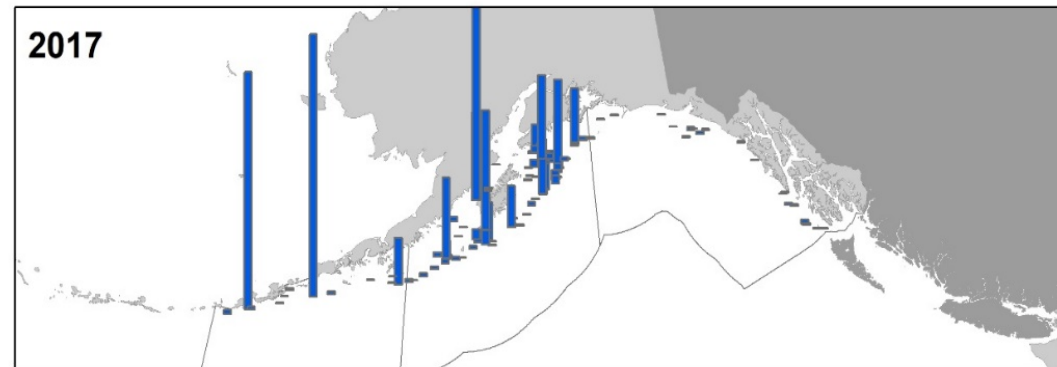
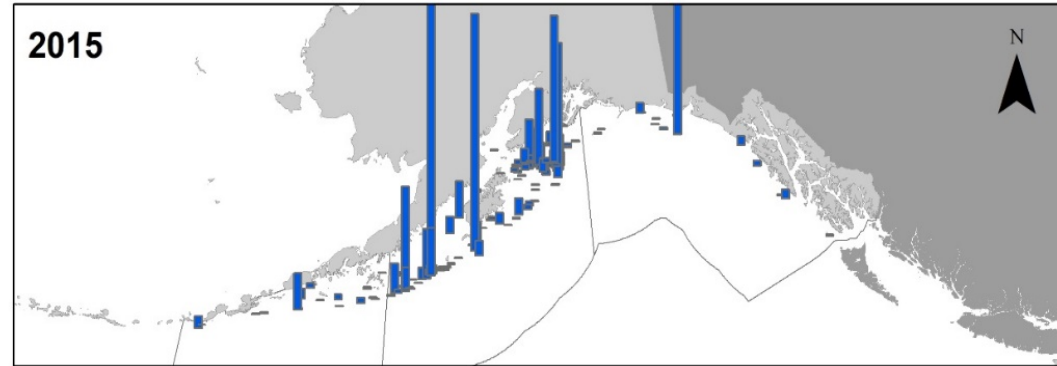
12. GOA dusky rockfish

Data

New data to model:

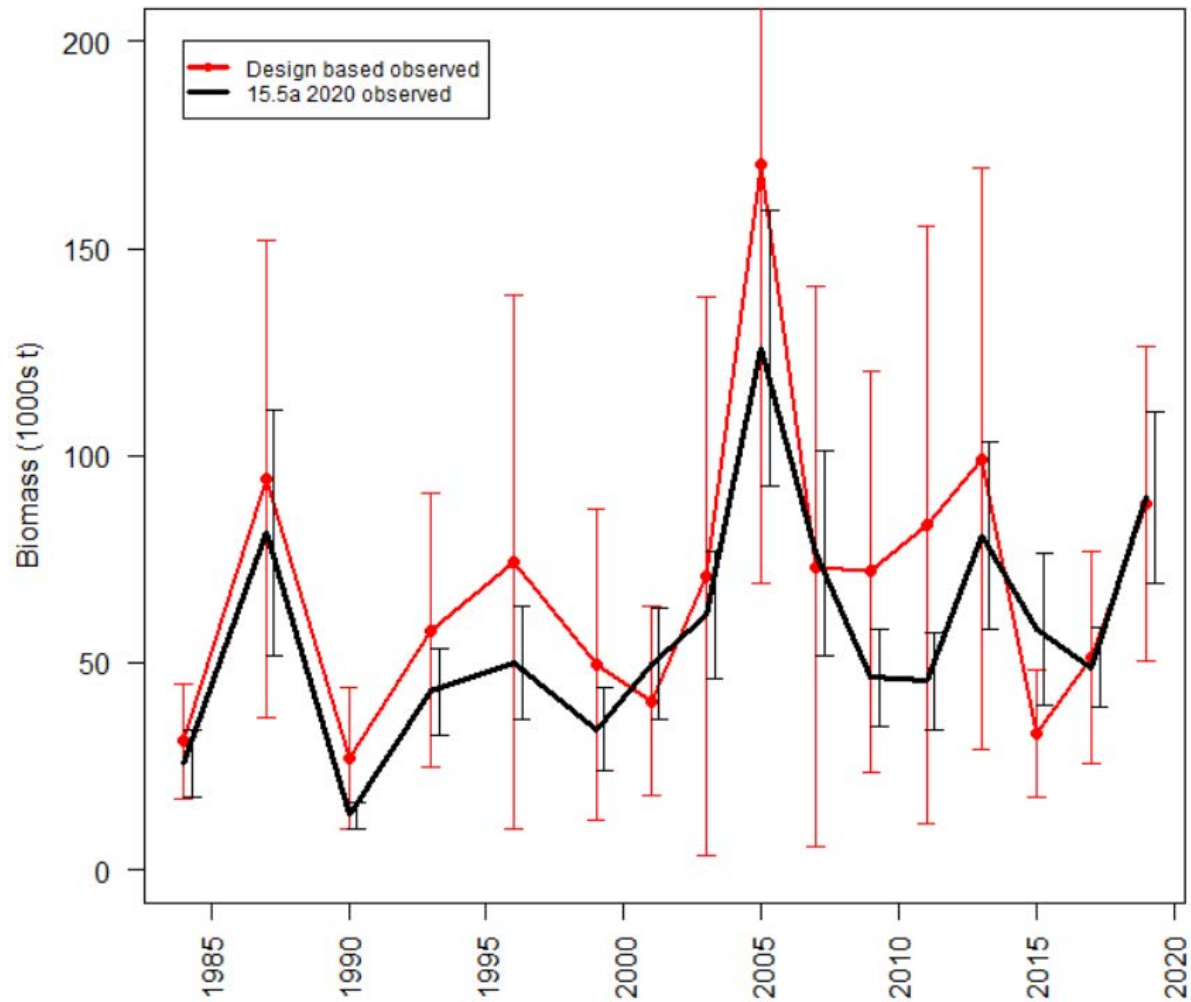
- 2019, 2020* catch (*projected)
- 2019 trawl survey biomass
- 2019 survey age comps
- 2018 fishery age comps
- 2019 fishery length comps





12. GOA dusky rockfish

12. GOA dusky rockfish



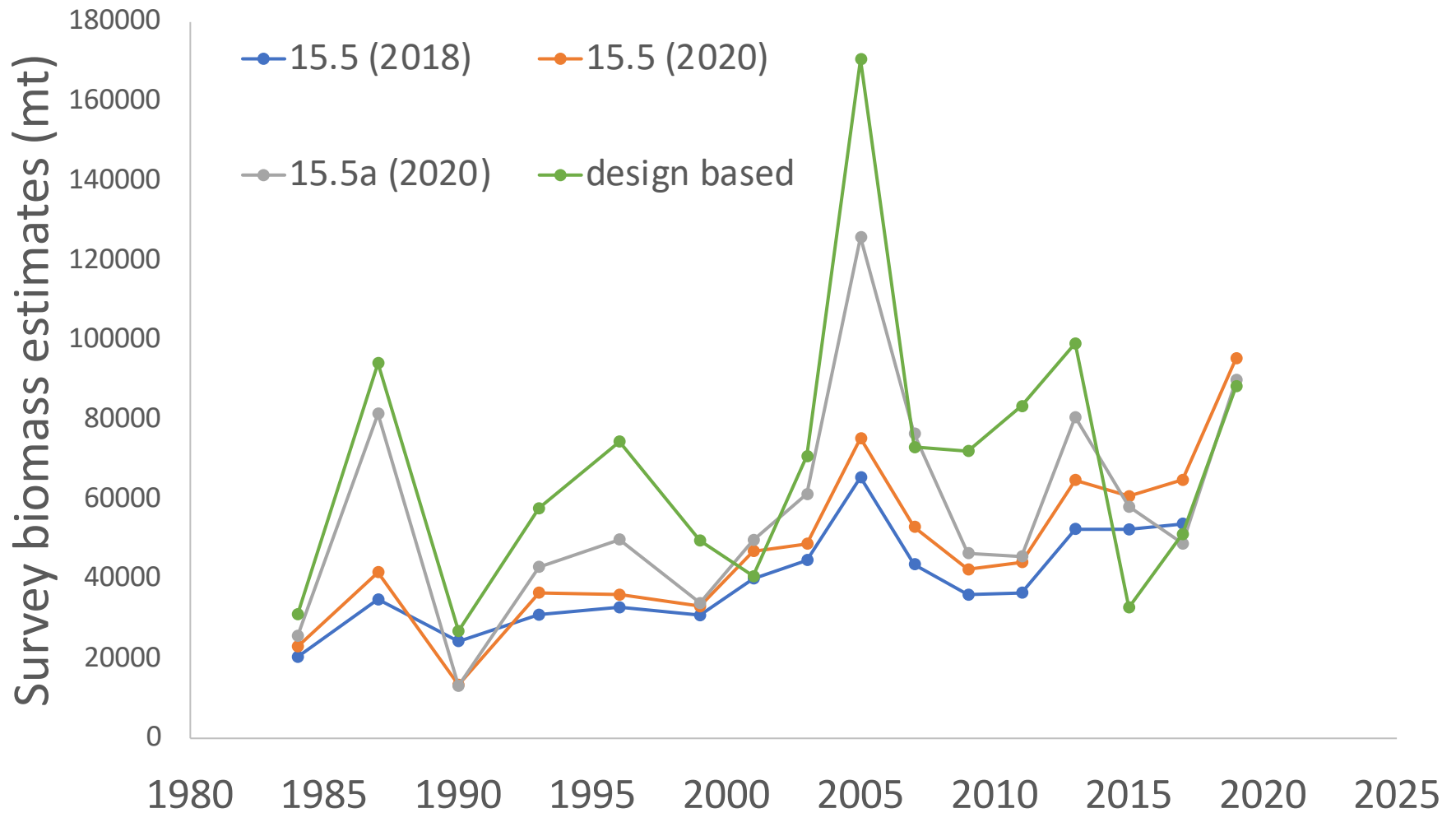
12. GOA dusky rockfish

Models

Model case	Description
15.5 (2018)	2018 accepted model (Model case M5 in 2015)
15.5 (2020)	‘Bridge’ model. Same model as 2018, but with updated data through 2020 using VAST parametrization described for Model 15.5 (2020) above
15.5a (2020)	Same model as 2018, but with updated data through 2020 using new VAST standard parametrization described for Model 15.5a (2020) above (preferred model)

<u>Model</u>	<u>Computed by</u>	<u>Survey years</u>	<u>Knots</u>	<u>Obs model</u>	<u>PCR</u>
15.5 (2018)	MESA	1984-2017	1000	delta	lognormal
15.5 (2020)	GAP	1984-2019	500	delta	lognormal
15.5a (2020)	GAP	1984-2019	500	delta-gamma	gamma

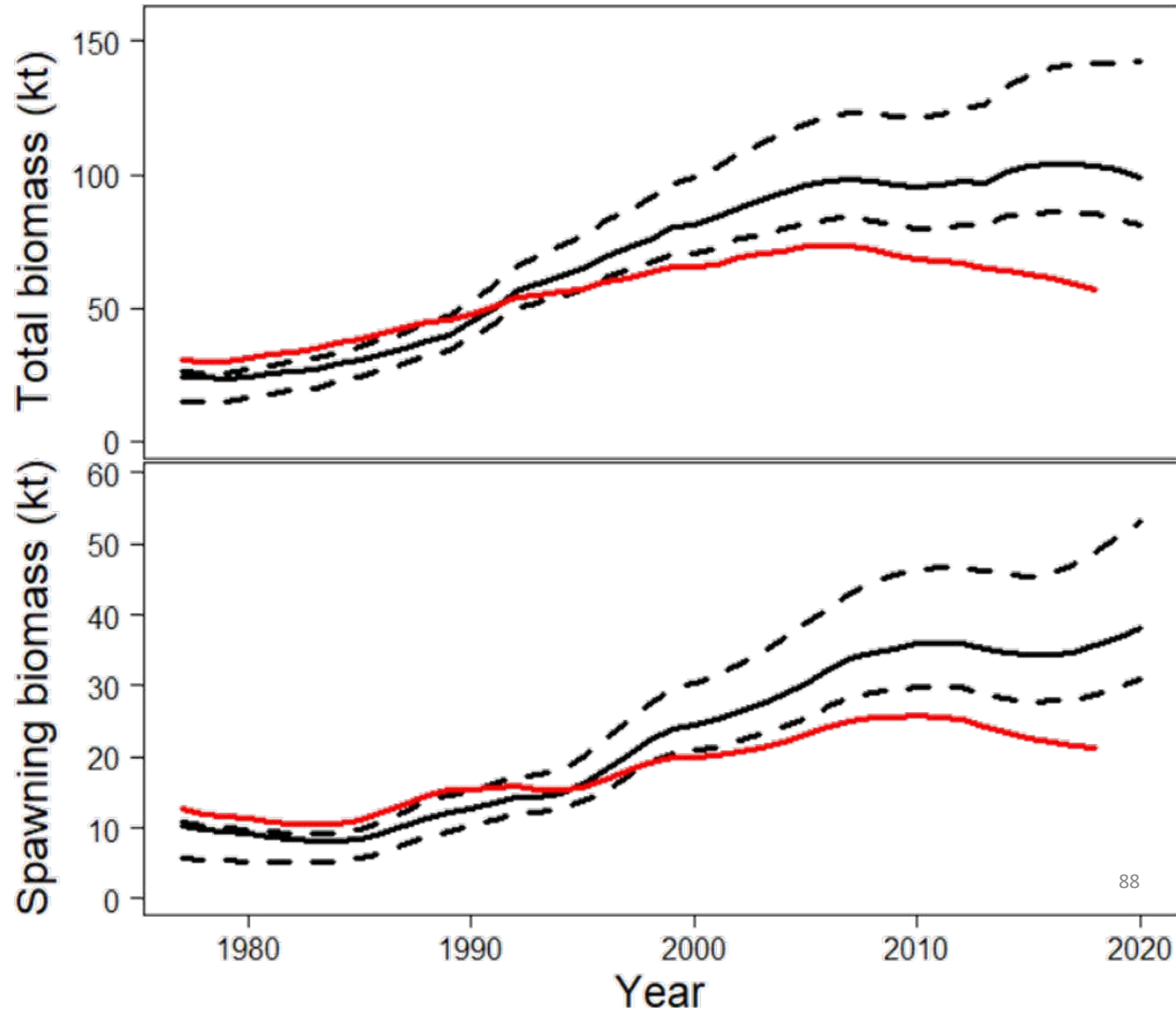
12. GOA dusky rockfish



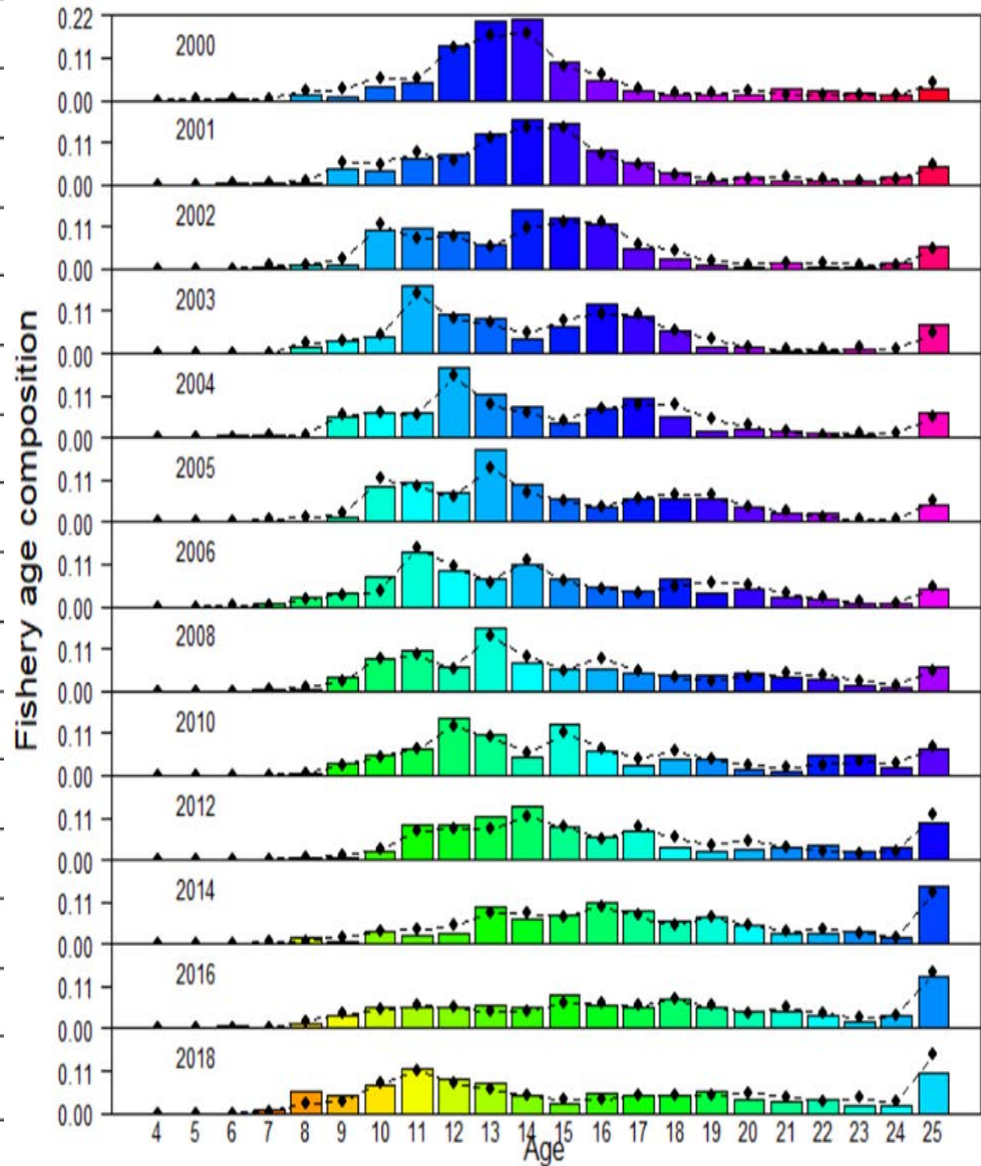
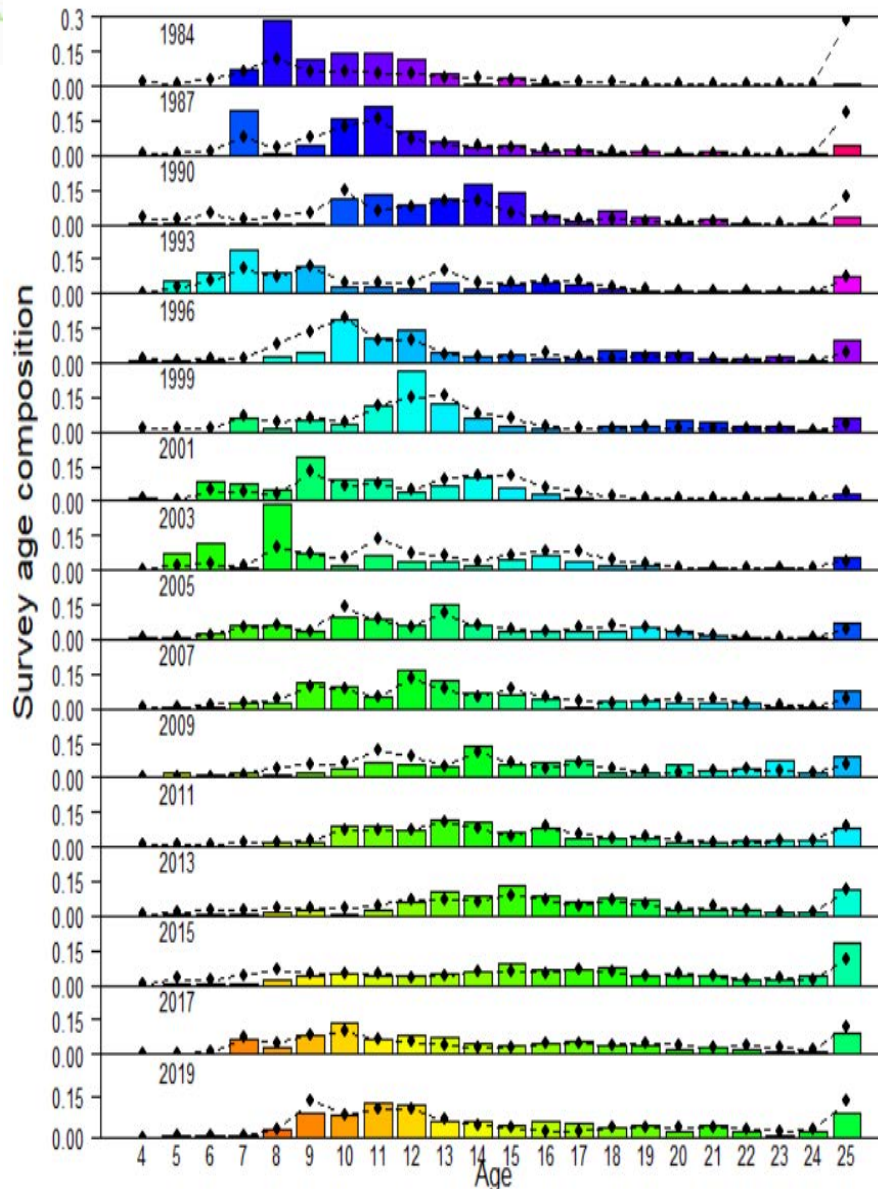
12. GOA dusky rockfish

Results

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

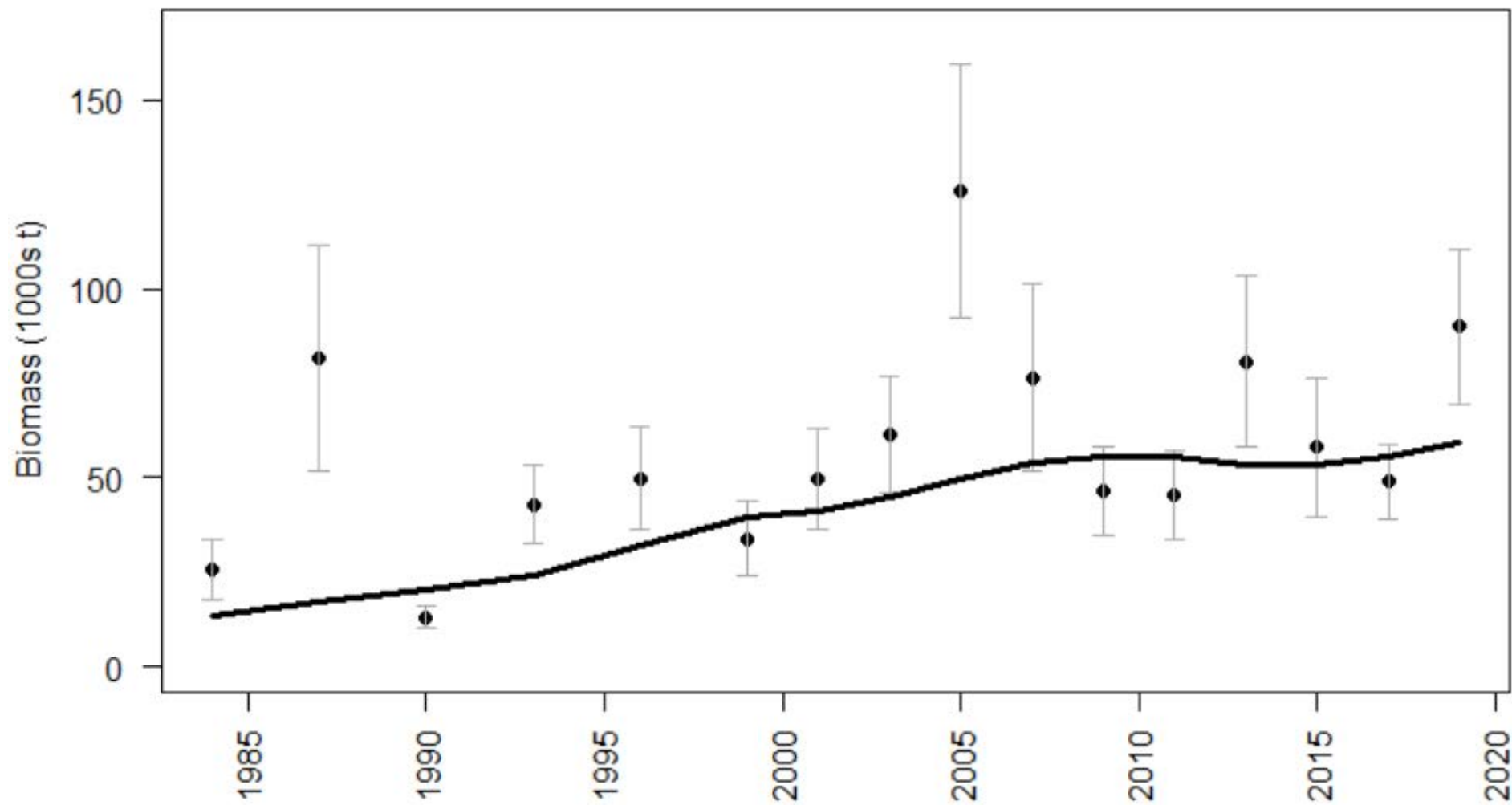


12. GOA dusky rockfish

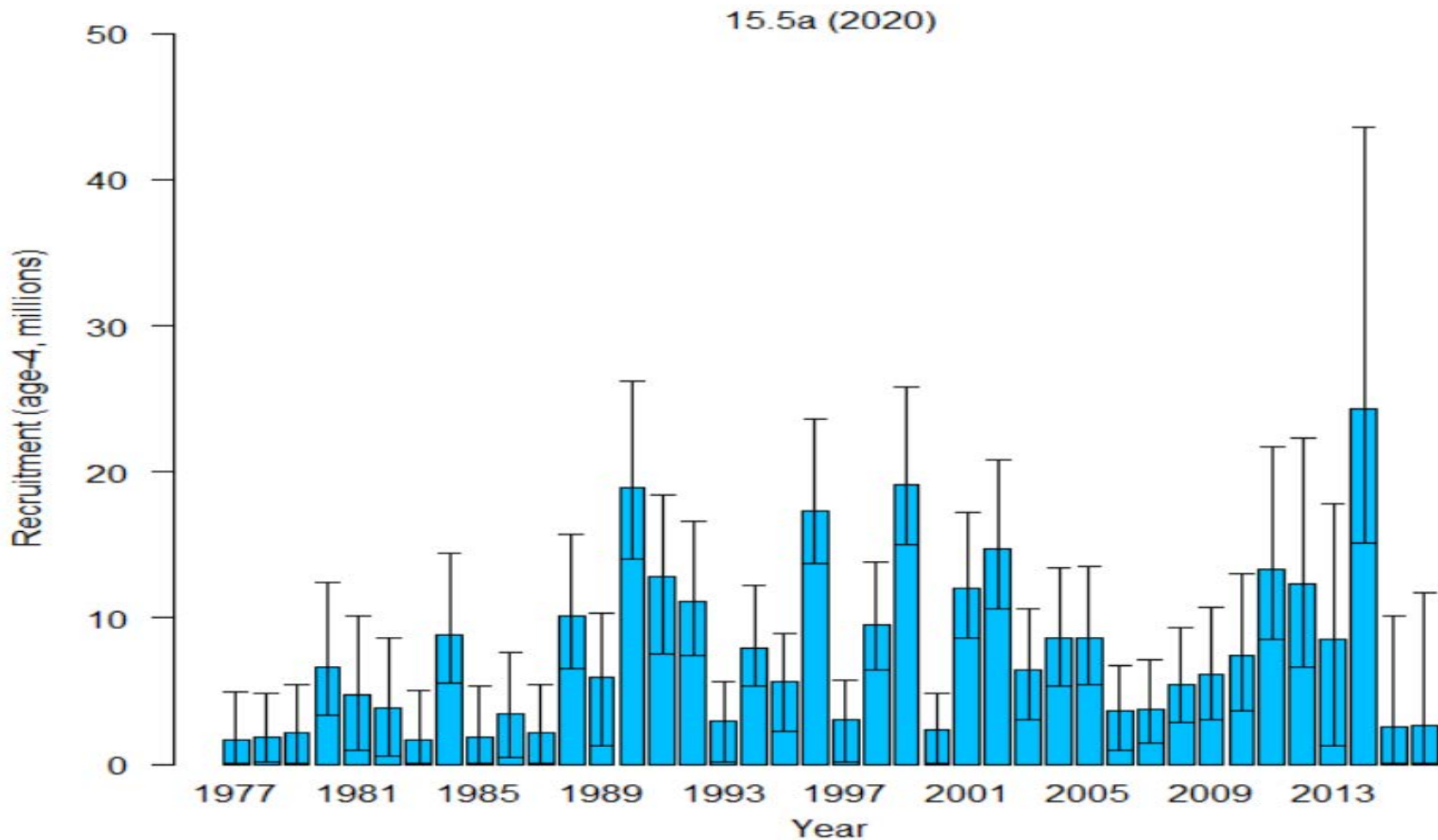


12. GOA dusky rockfish

15.5a (2020)

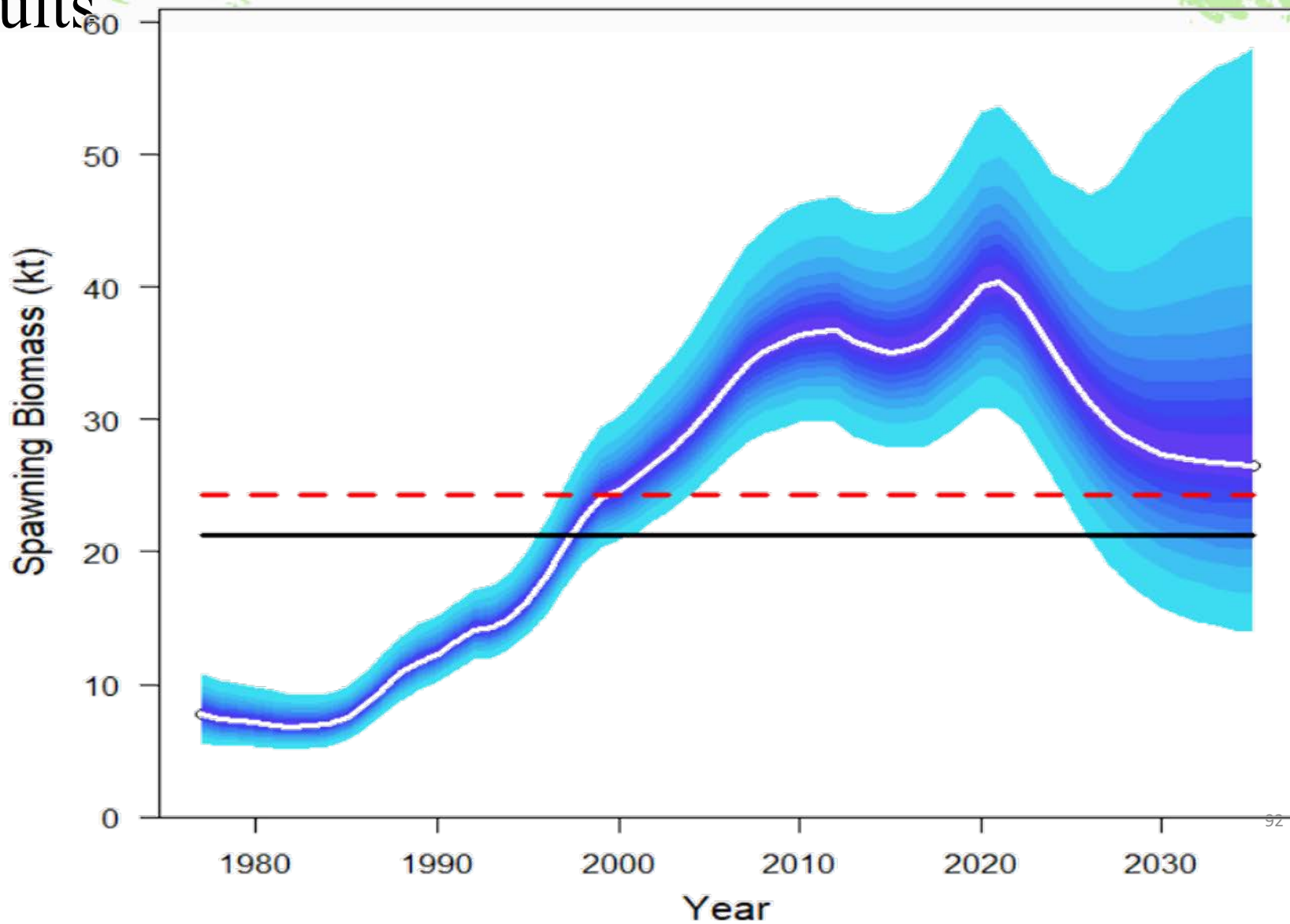


12. GOA dusky rockfish



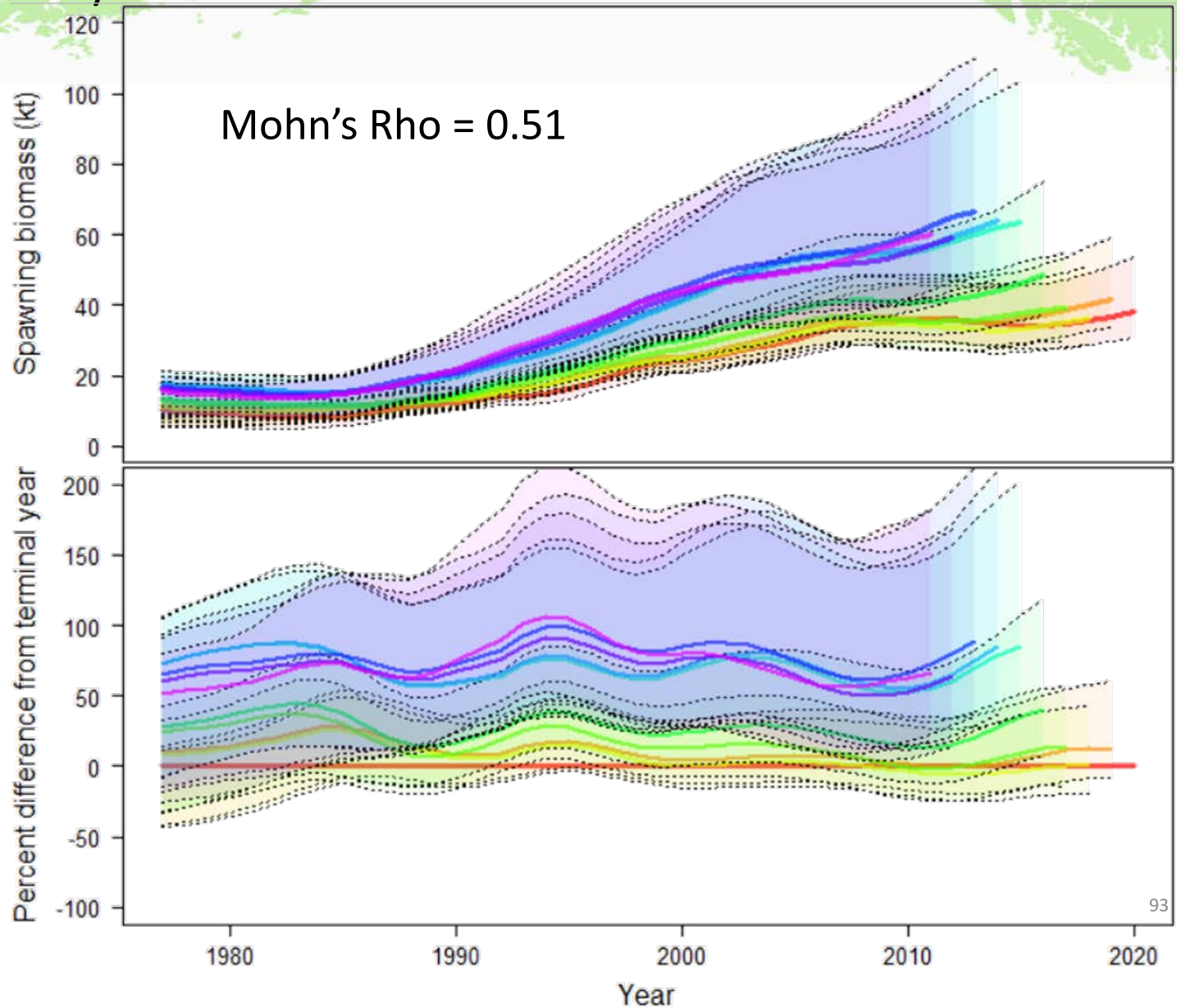
12. GOA dusky rockfish

Results



12. GOA dusky rockfish

Results



12. GOA dusky rockfish

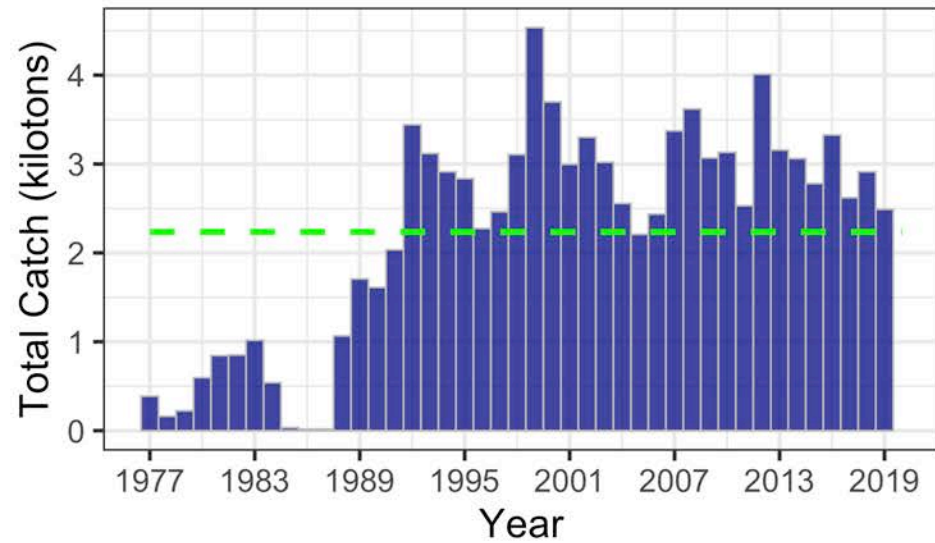
Risk

<i>Assessment-related</i>	<i>Population dynamics</i>	<i>Environmental/ ecosystem</i>	<i>Fishery Performance</i>
2	1	1	1

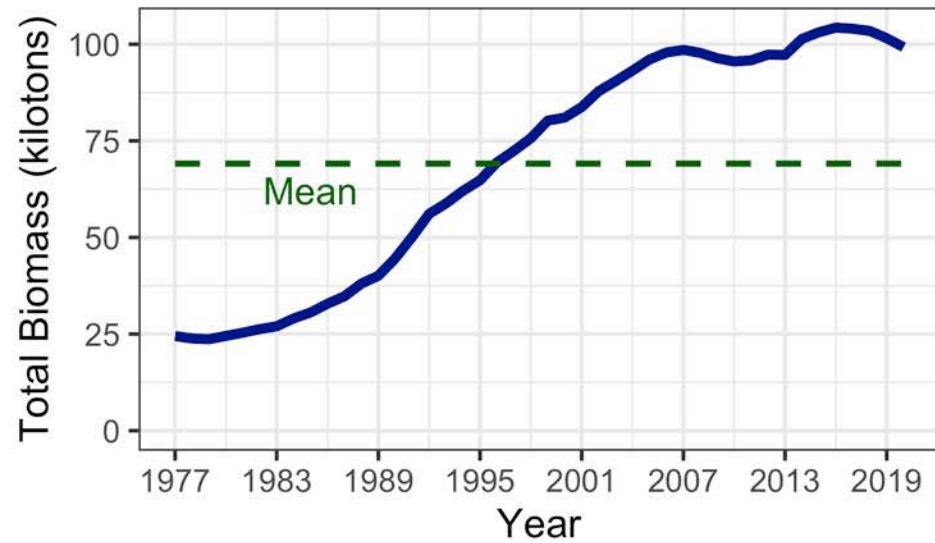
- Had some concerns about the estimated increase in biomass and resulting increase in ABC and the model retrospective pattern.

GOA Dusky Rockfish

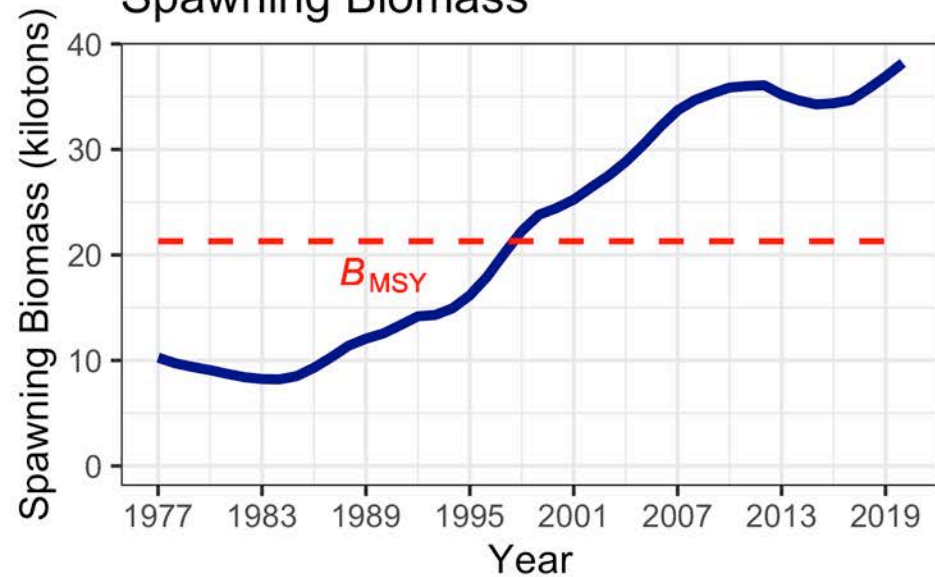
Total Catch



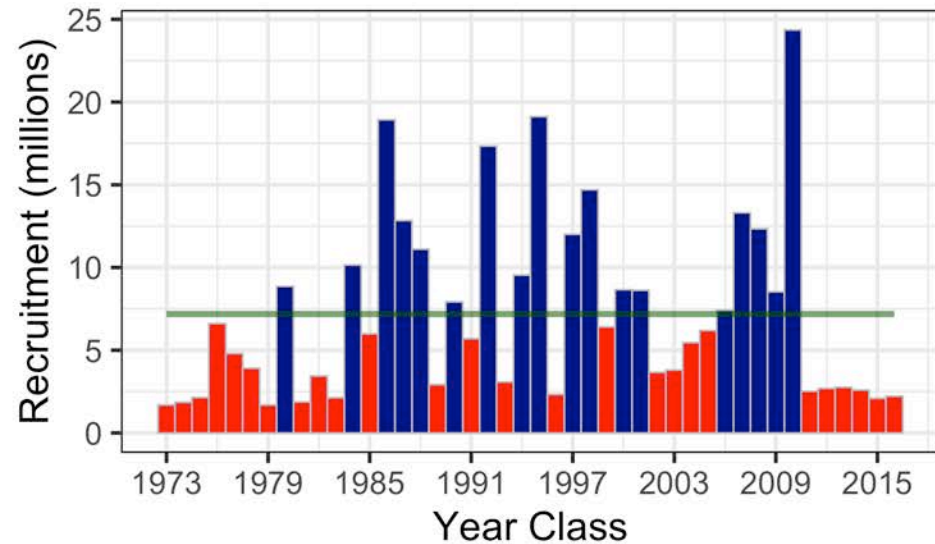
Total Biomass



Spawning Biomass



Age 4 Recruitment

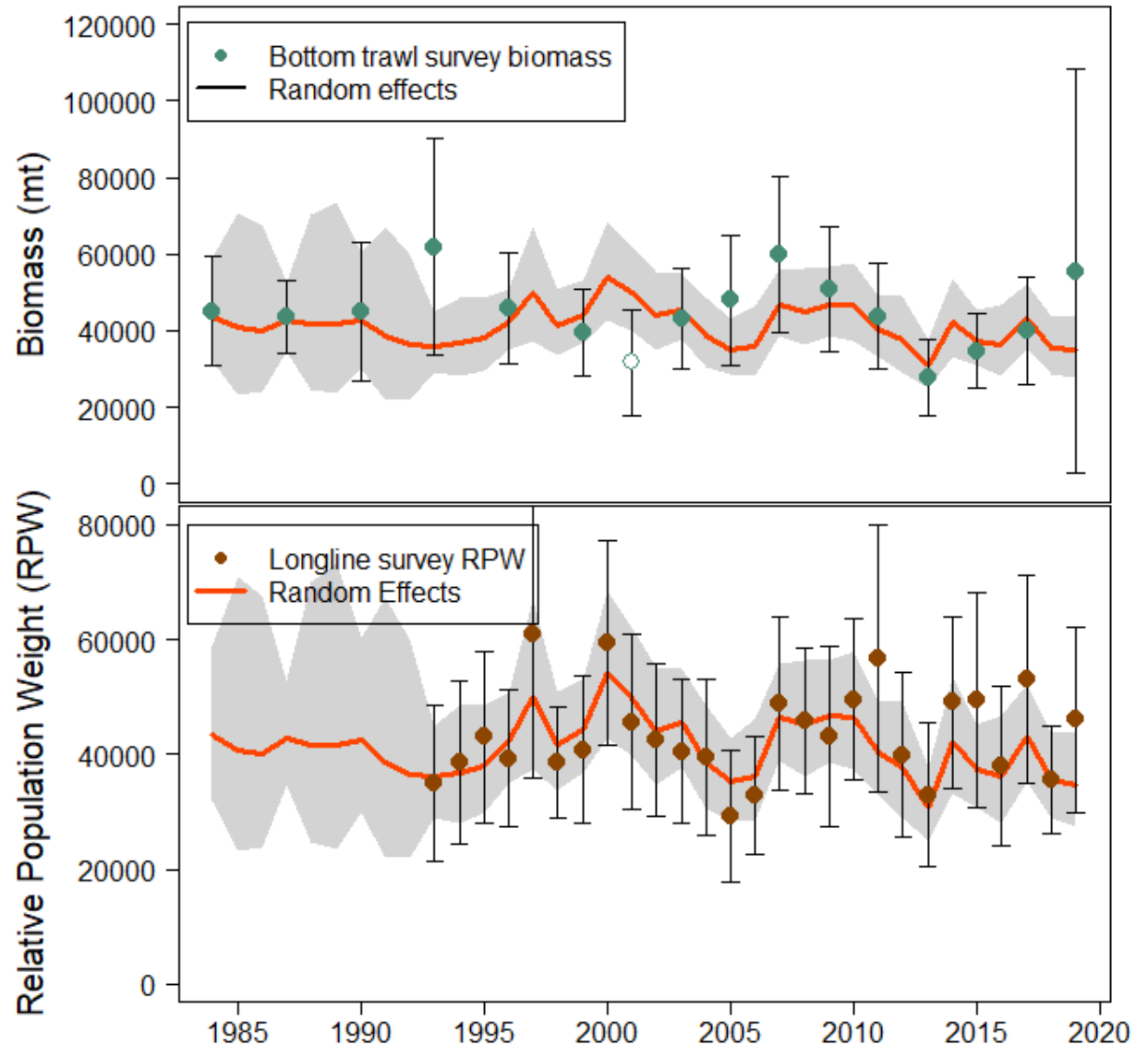
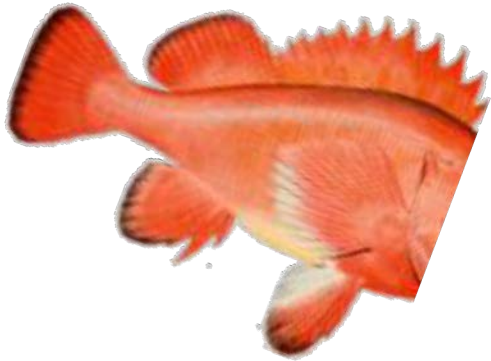


Rockfish ABC Summary

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%)

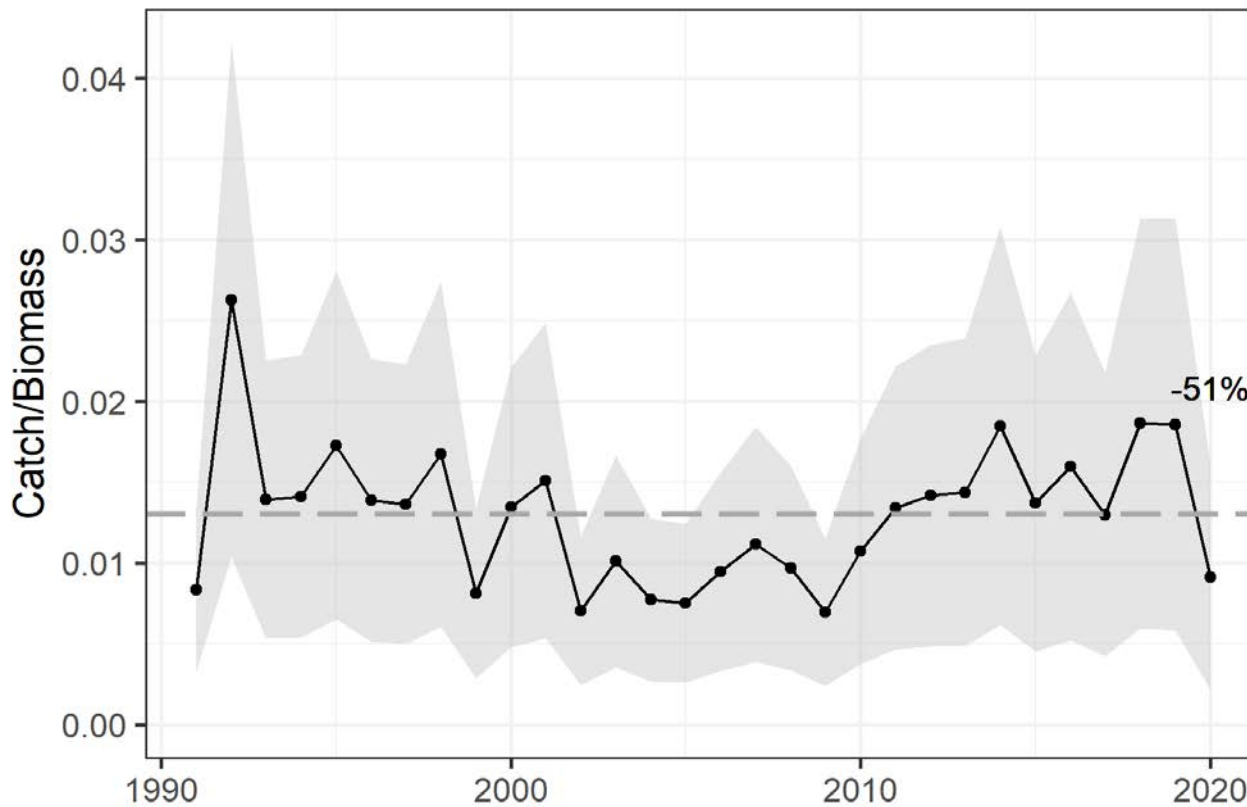
13. GOA Blackspotted/Rougheye Rockfish

Partial assessment



jane.sullivan@noaa.gov

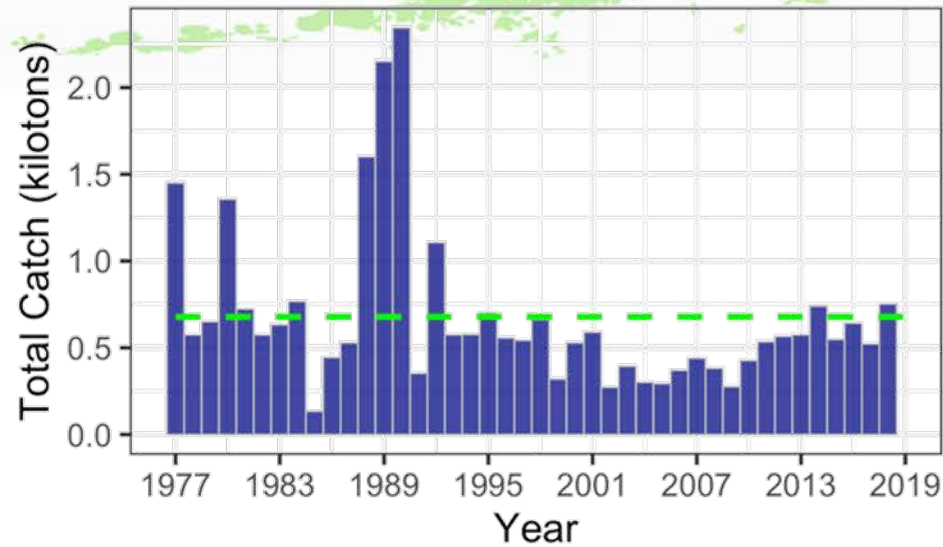
13. GOA Blackspotted/Rougheye Rockfish



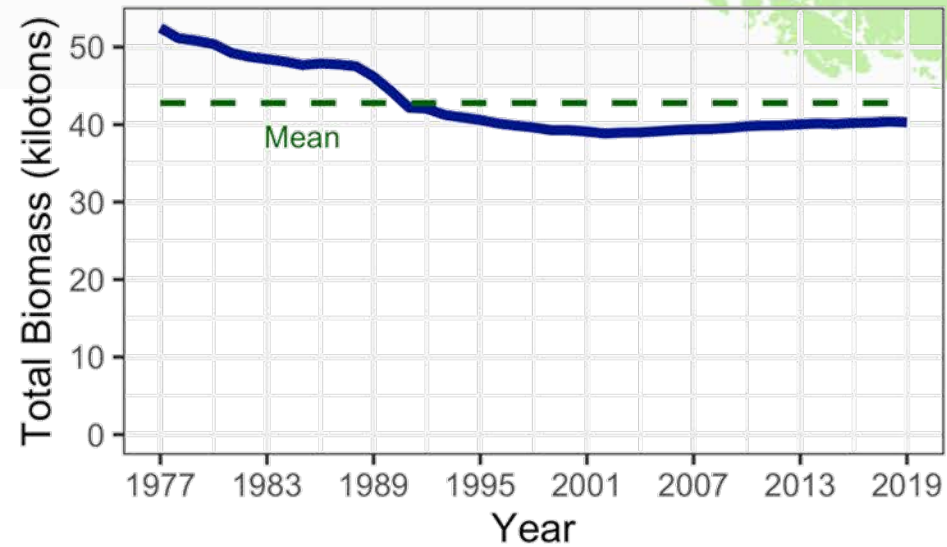
- Catch/biomass

13. Rougheye/blackspotted rockfish

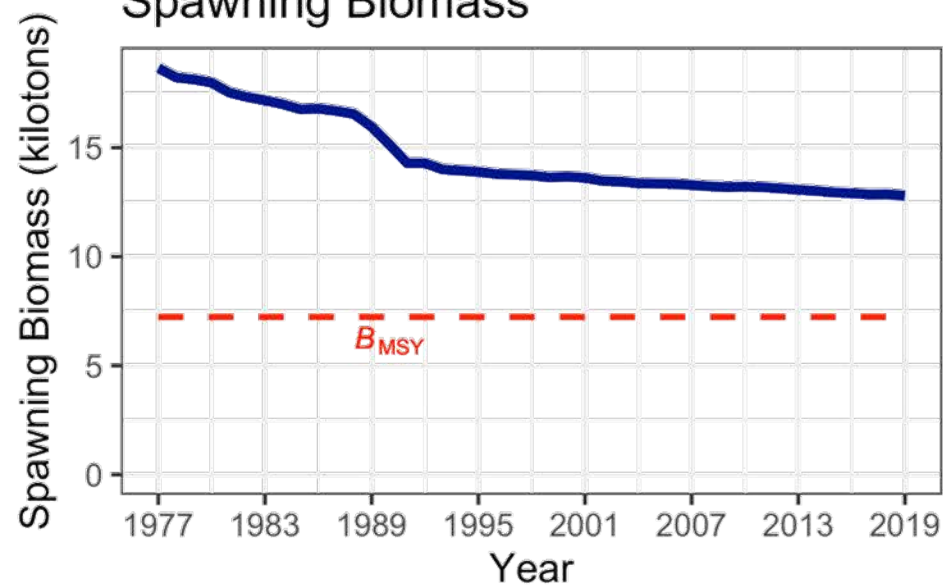
Total Catch



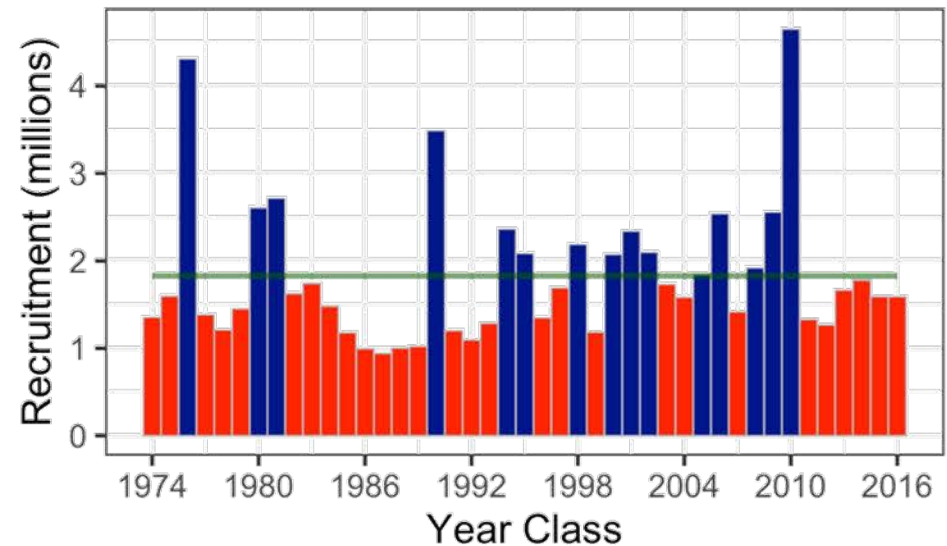
Total Biomass



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)



Yelloweye
(*S. ruberrimus*)

Quillback
(*S. maliger*)

Tiger
(*S. nigrocinctus*)

China
(*S. nebulosus*)



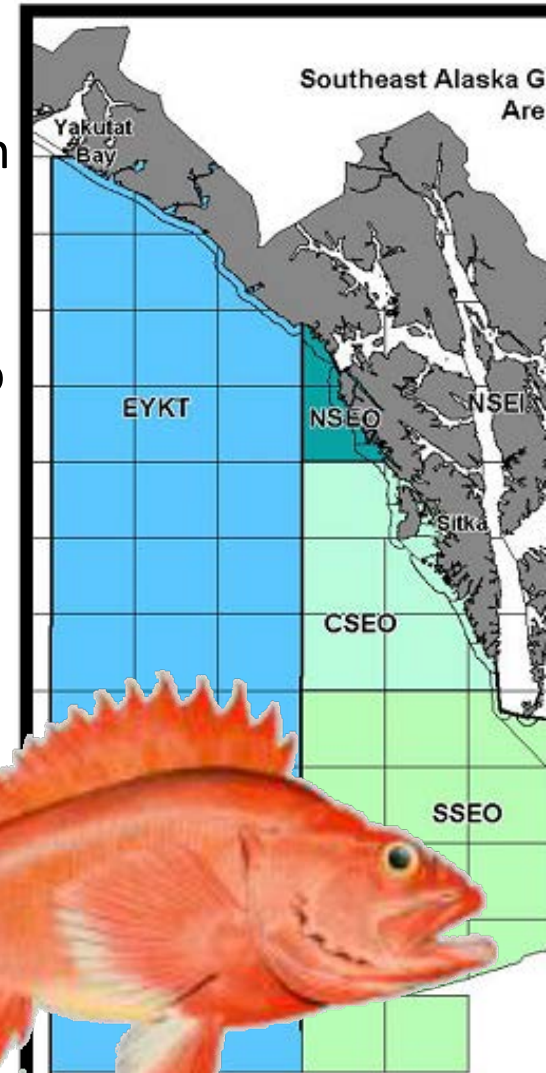
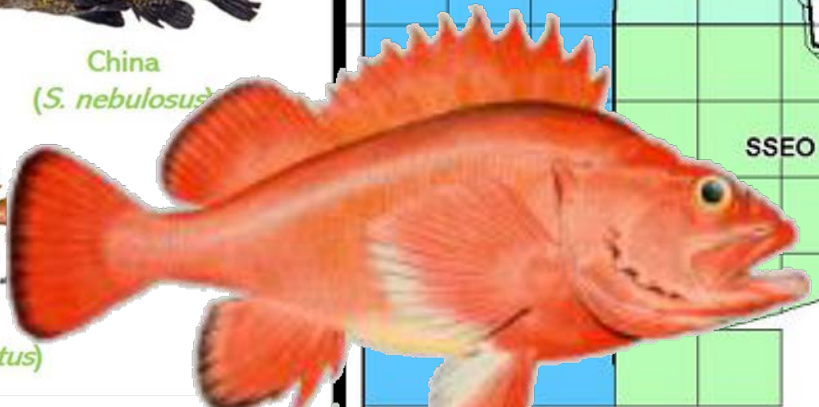
Canary
(*S. pinniger*)



Copper
(*S. caurinus*)



Rosethorn
(*S. helvomaculatus*)



Stock Assessment Survey

Four Management Areas:

Eastern Yakutat (EYKT)

Northern Southeast Outside (NSEO)

Central Southeast Outside (CSEO)

Southern Southeast Outside (SSEO)

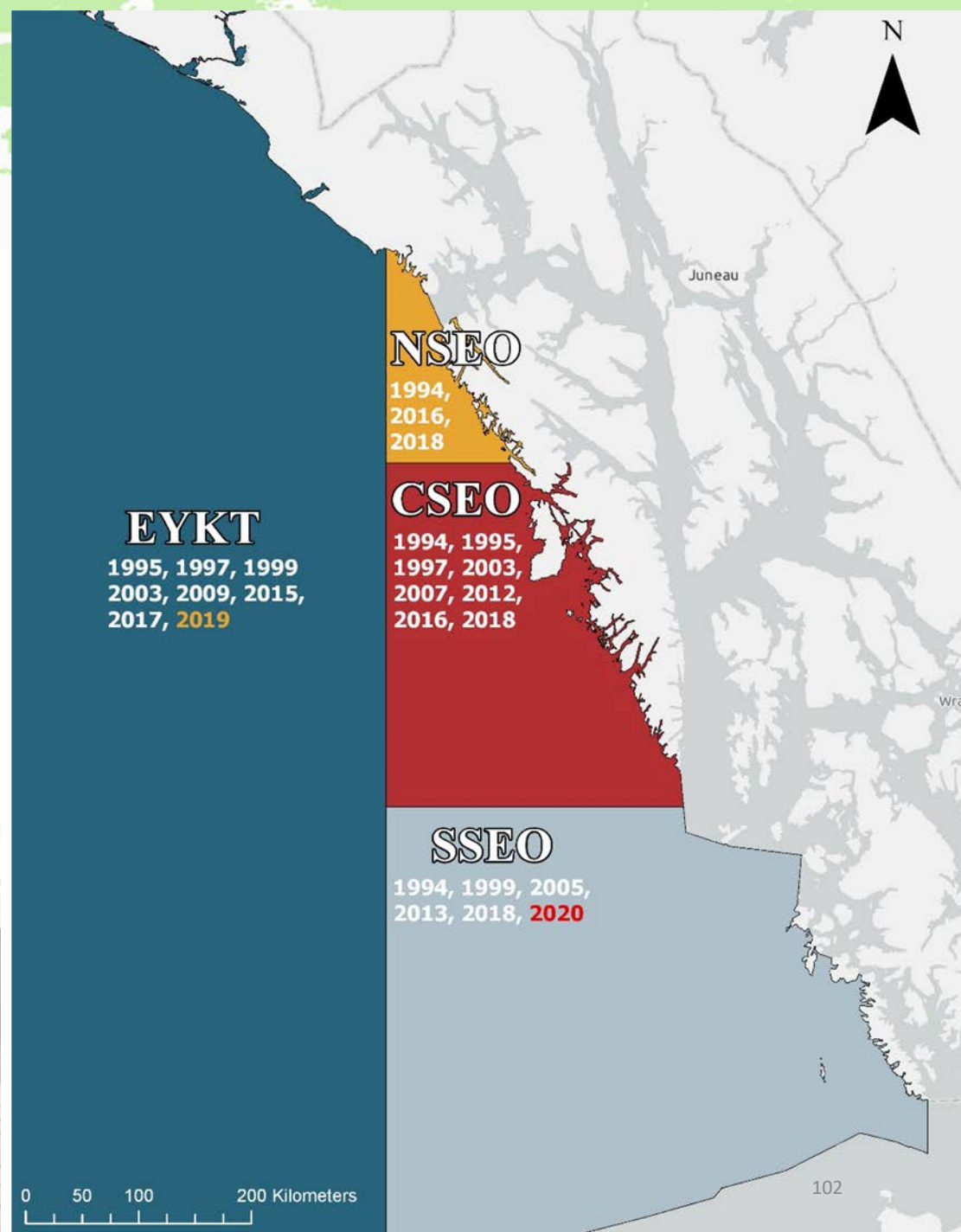
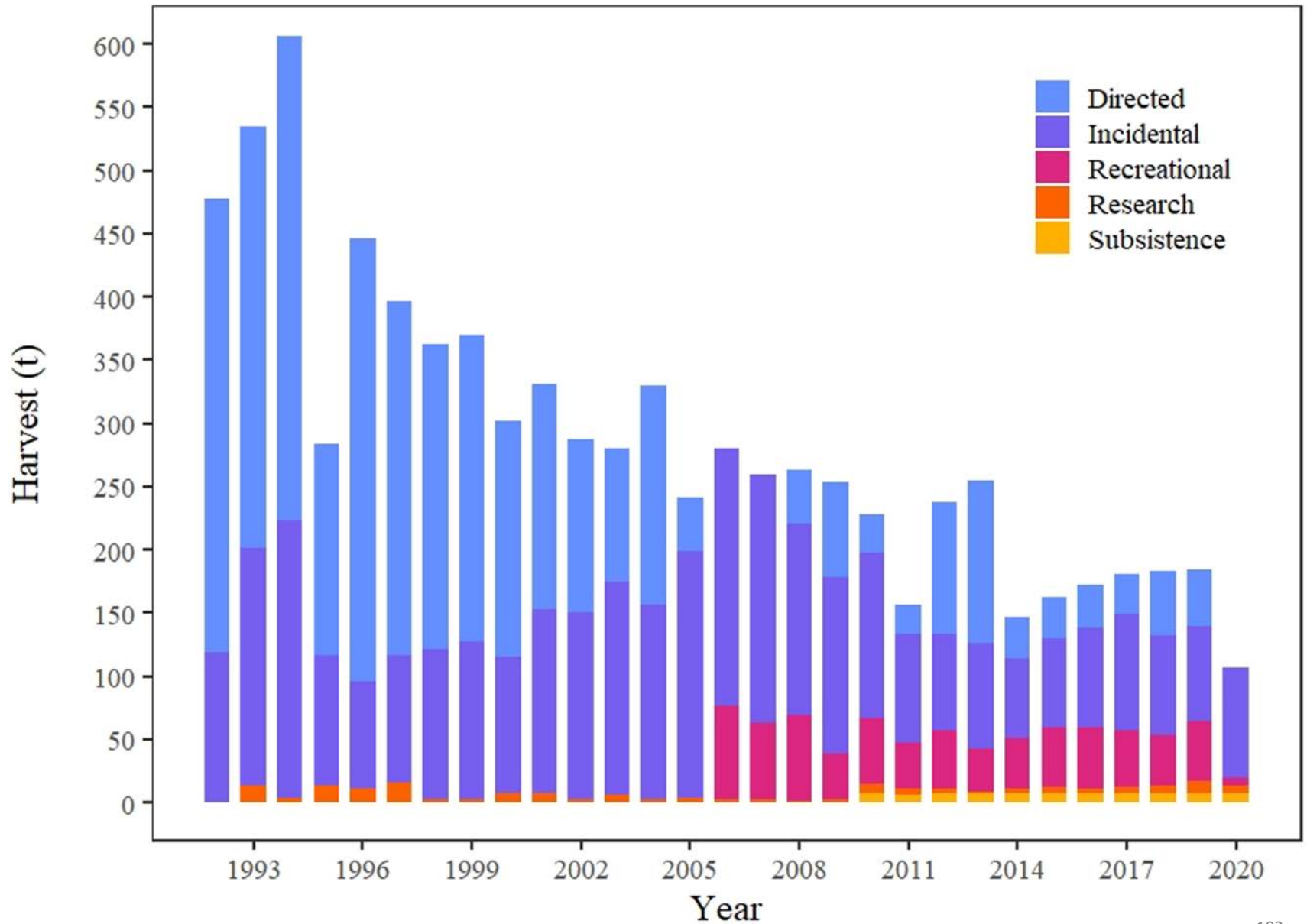


Photo credit: ADF&G

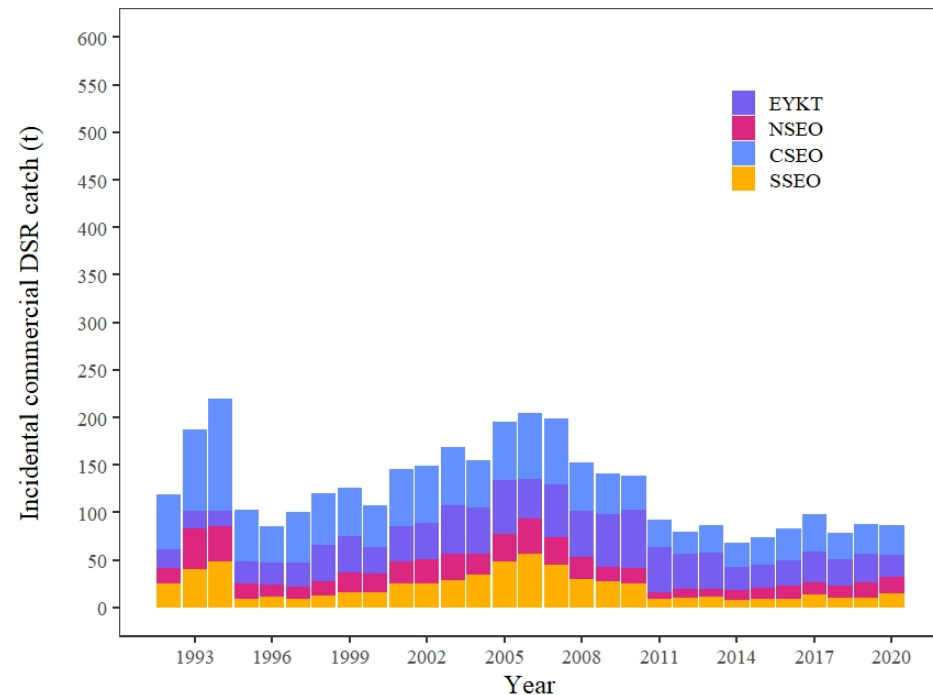
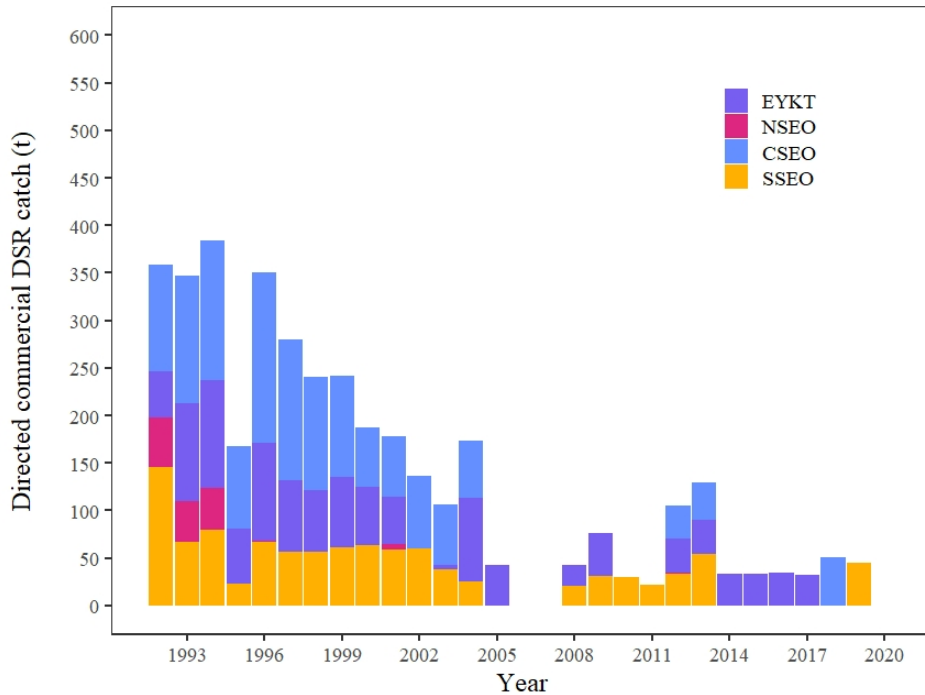
SEO DSR Catch by Sector



Directed and Incidental DSR Harvest by Management Area

Incidental Commercial Catch Includes:

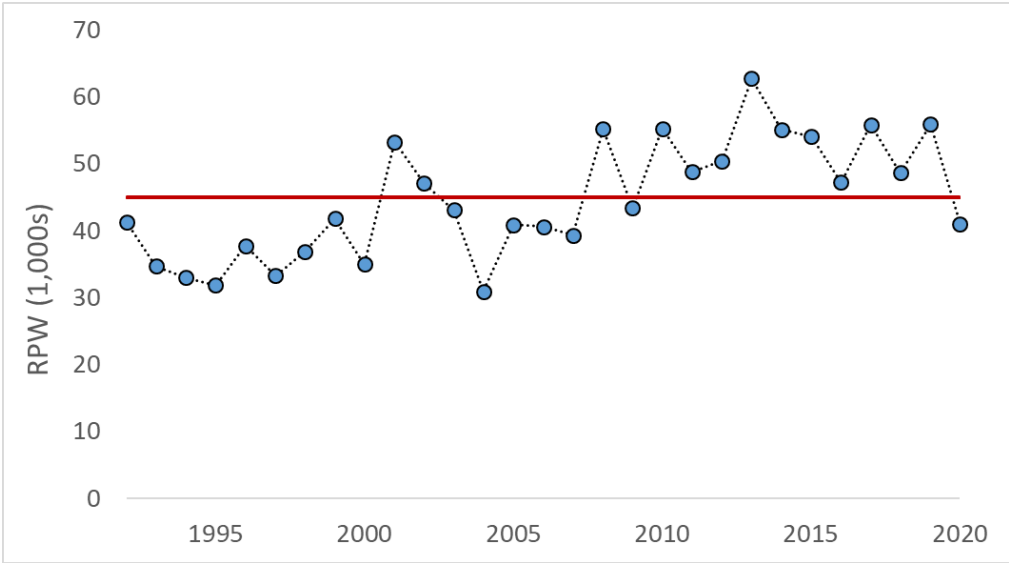
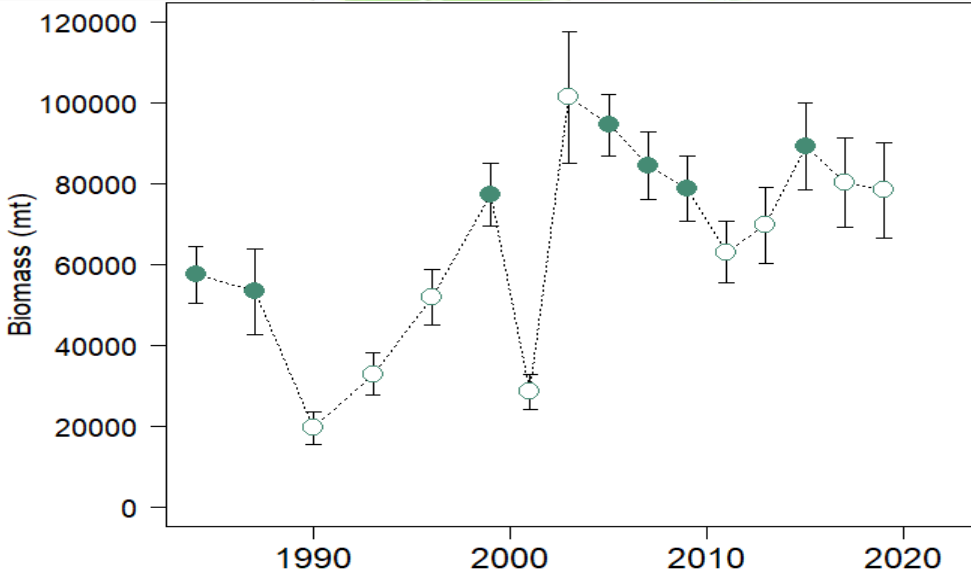
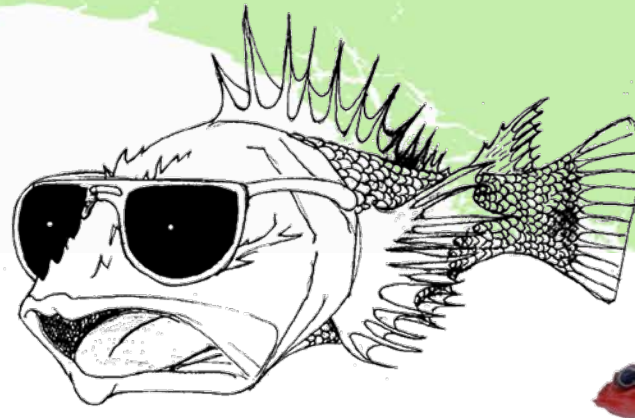
- Halibut fisheries
- Lingcod fisheries
- Sablefish fisheries
- Pacific cod fisheries
- Salmon troll fisheries (2015 to present)



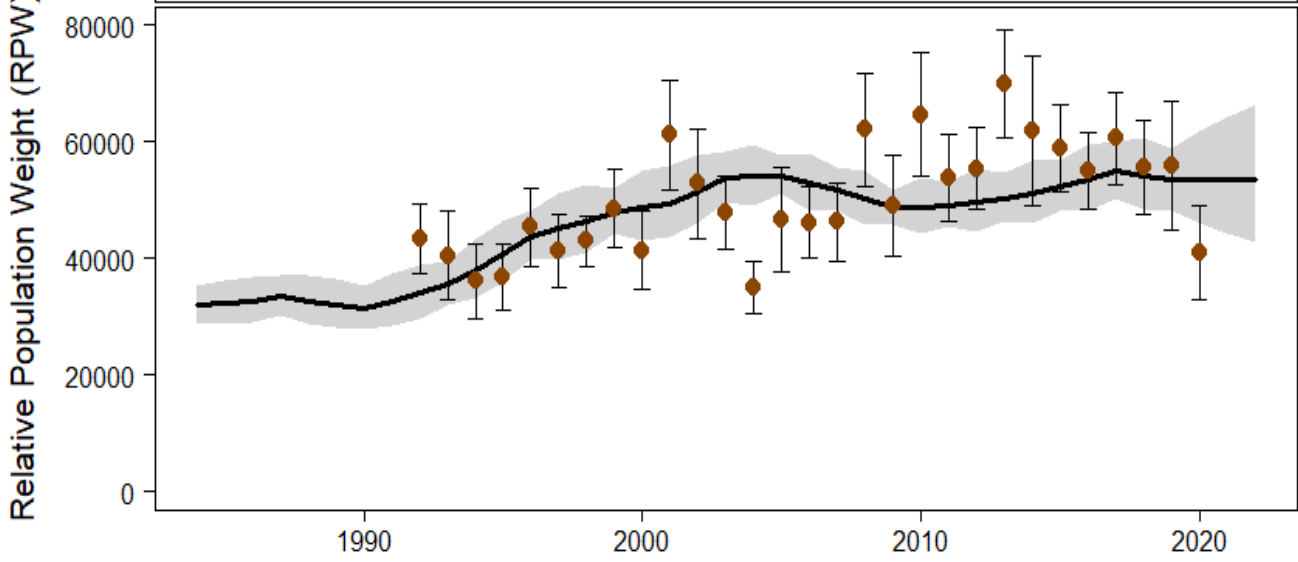
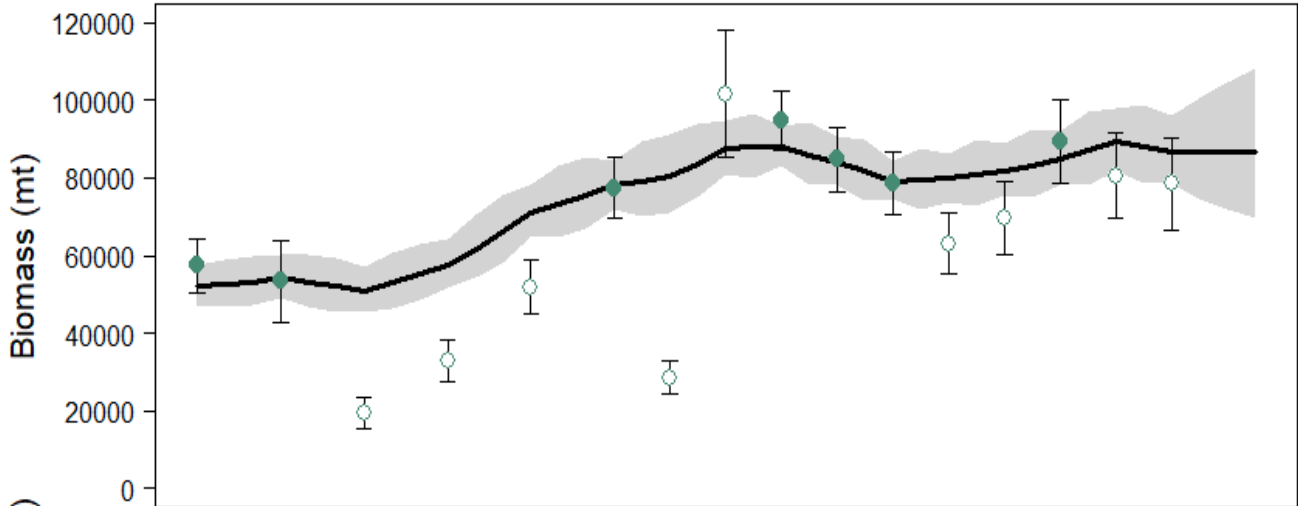
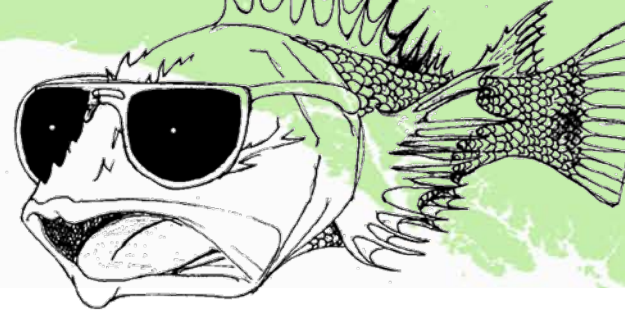
Rockfish ABC Summary

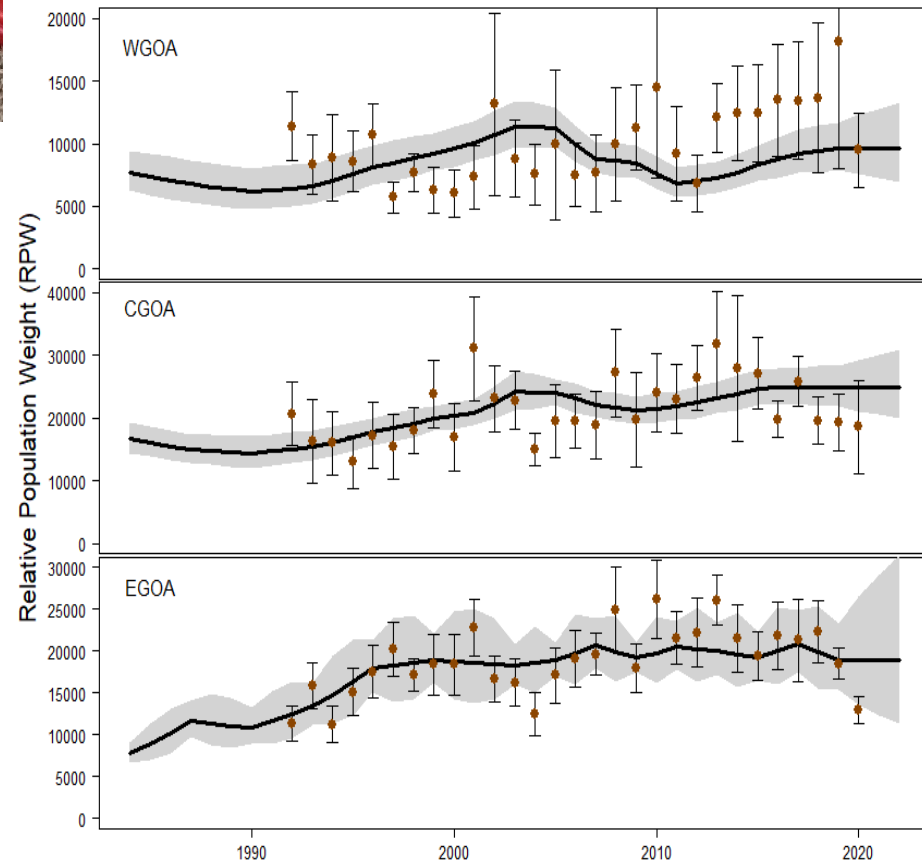
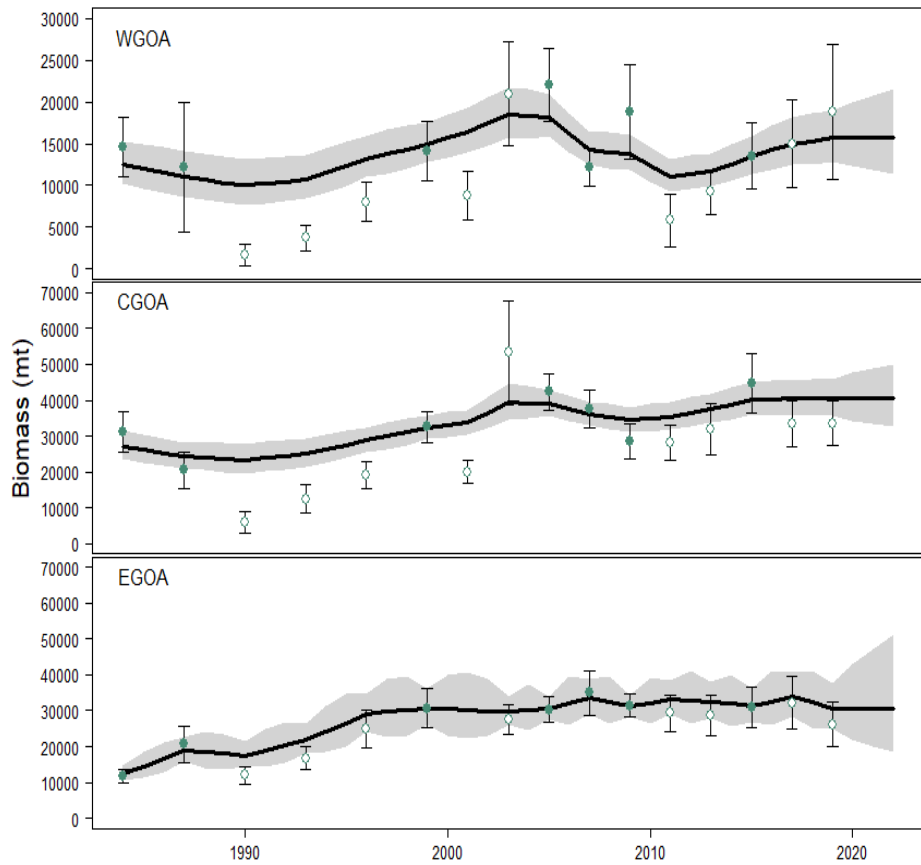
Species	2020	2021	Change
POP	31,238	36,177	up 4,939 (16%)
northern	4,312	5,358	up 1,046 (24%)
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Other	4,053	4,053	same (0%)
Sub Total	47,450	56,819	up 9,369 (20%)

15. Shortspine thornyheads

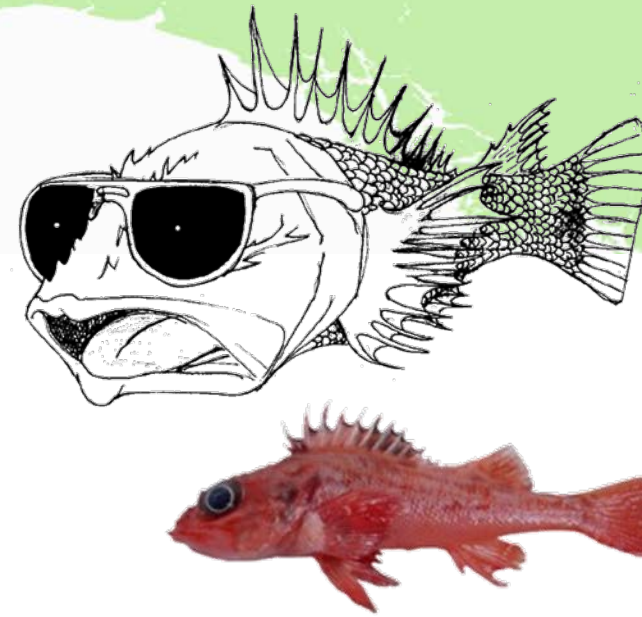


15. Shortspine thornyheads





15. Shortspine thornyheads



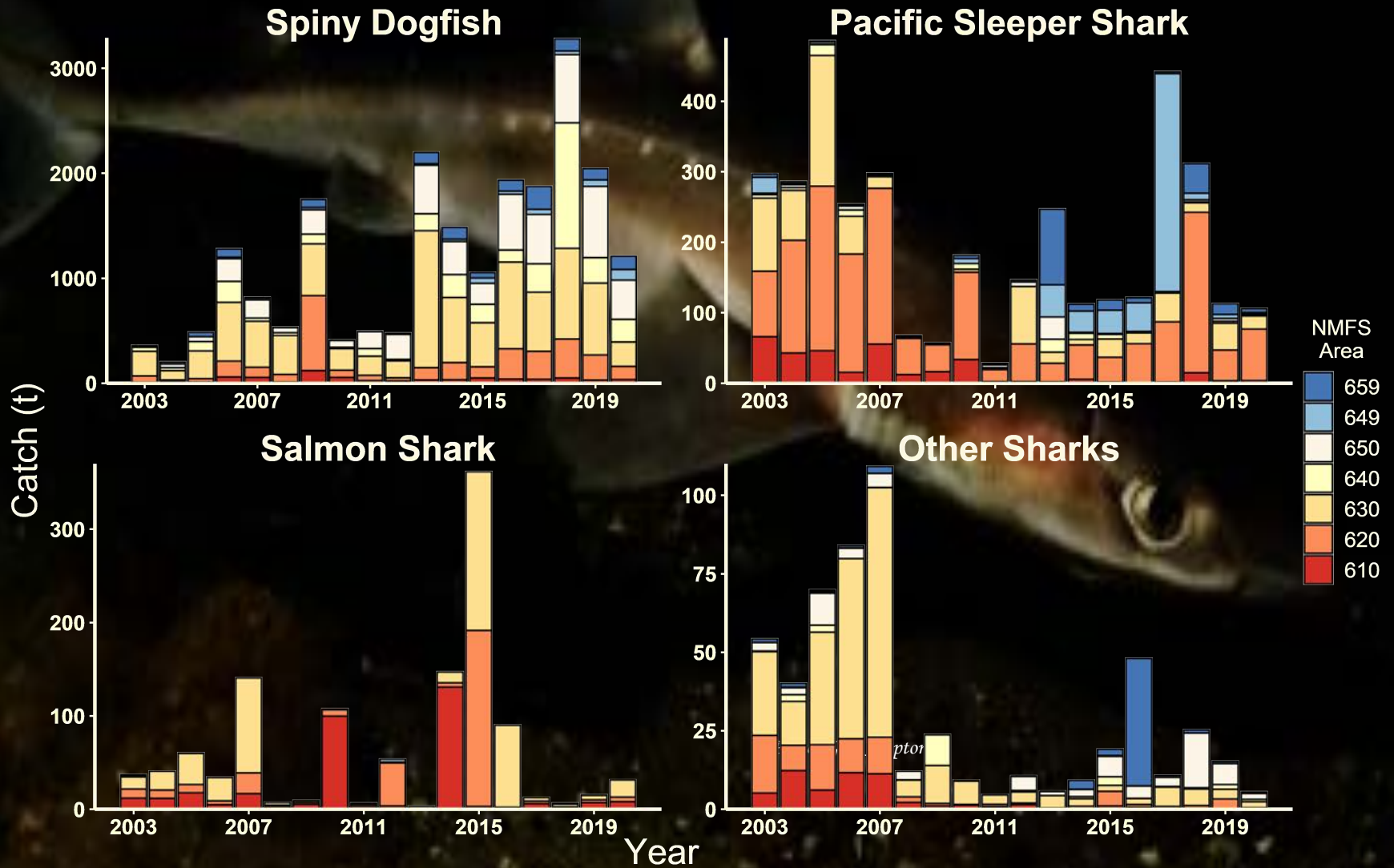
Risk table

Assessment-related	Population dynamics	Environmental/ Ecosystem	Fishery Performance
Level 1	Level 1	Level 1	Level 1

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	3,462	3,462	same (0%)
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

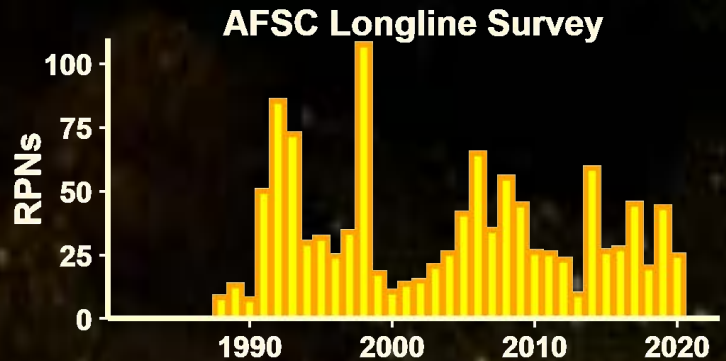
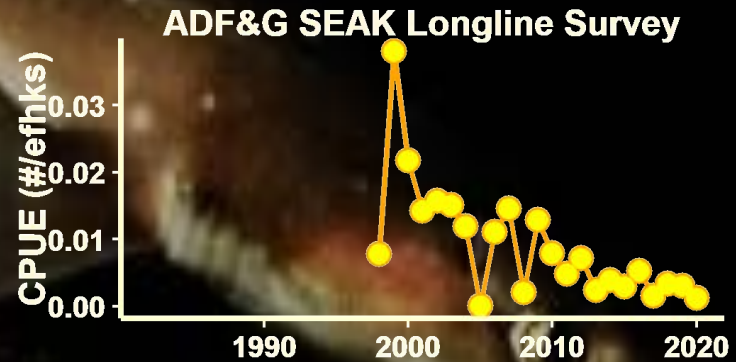
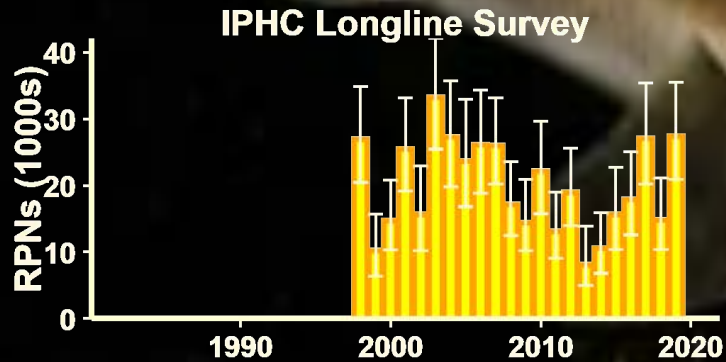
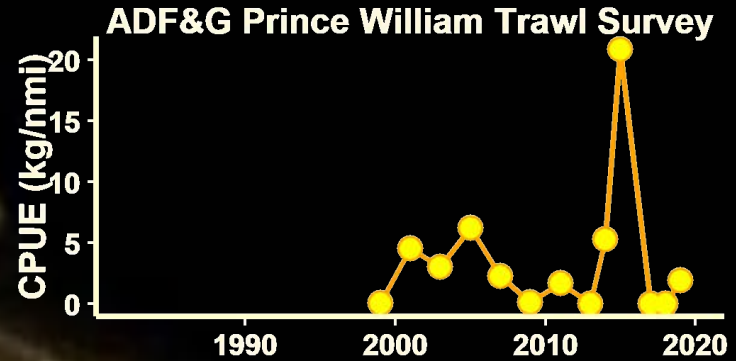
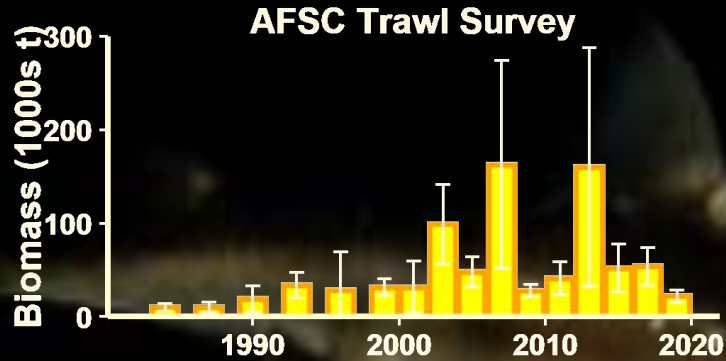
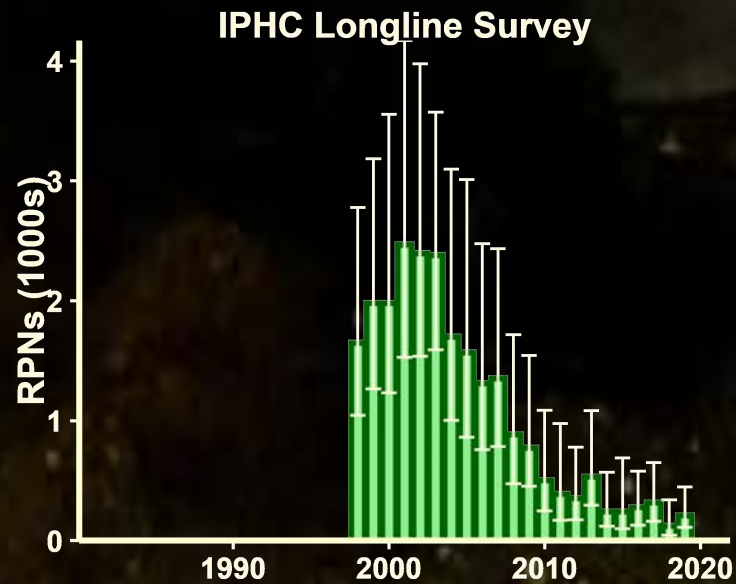
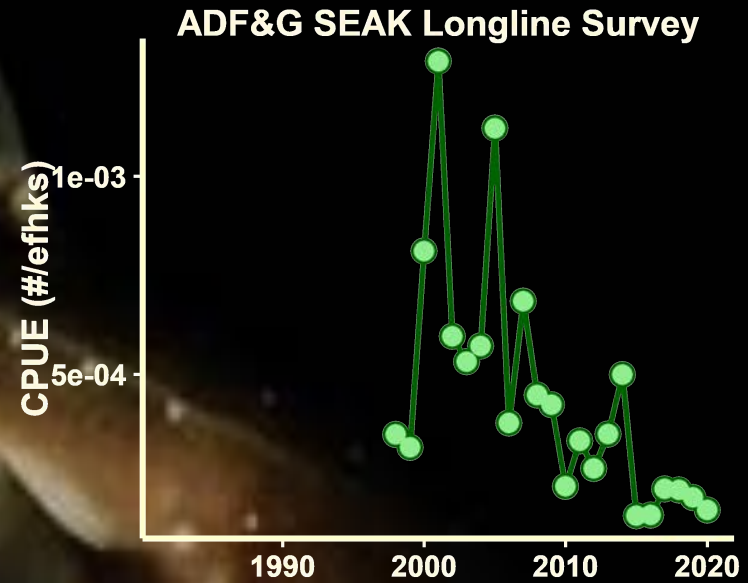
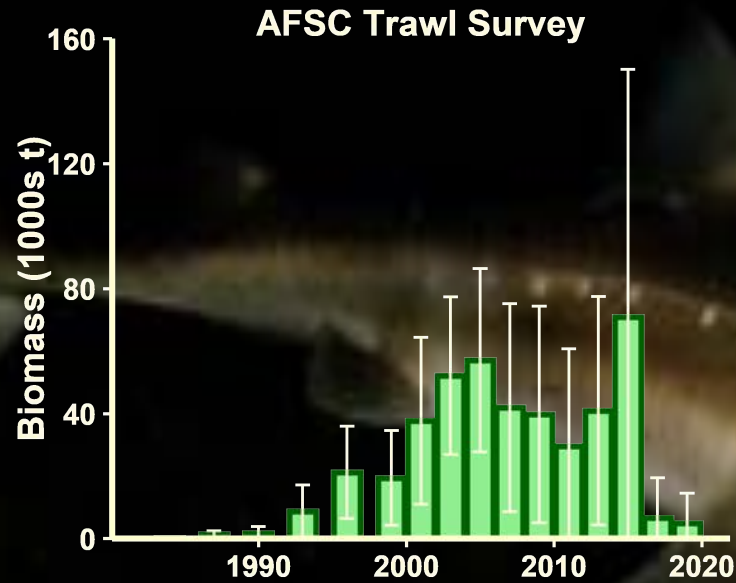


Photo: Greg Ampton

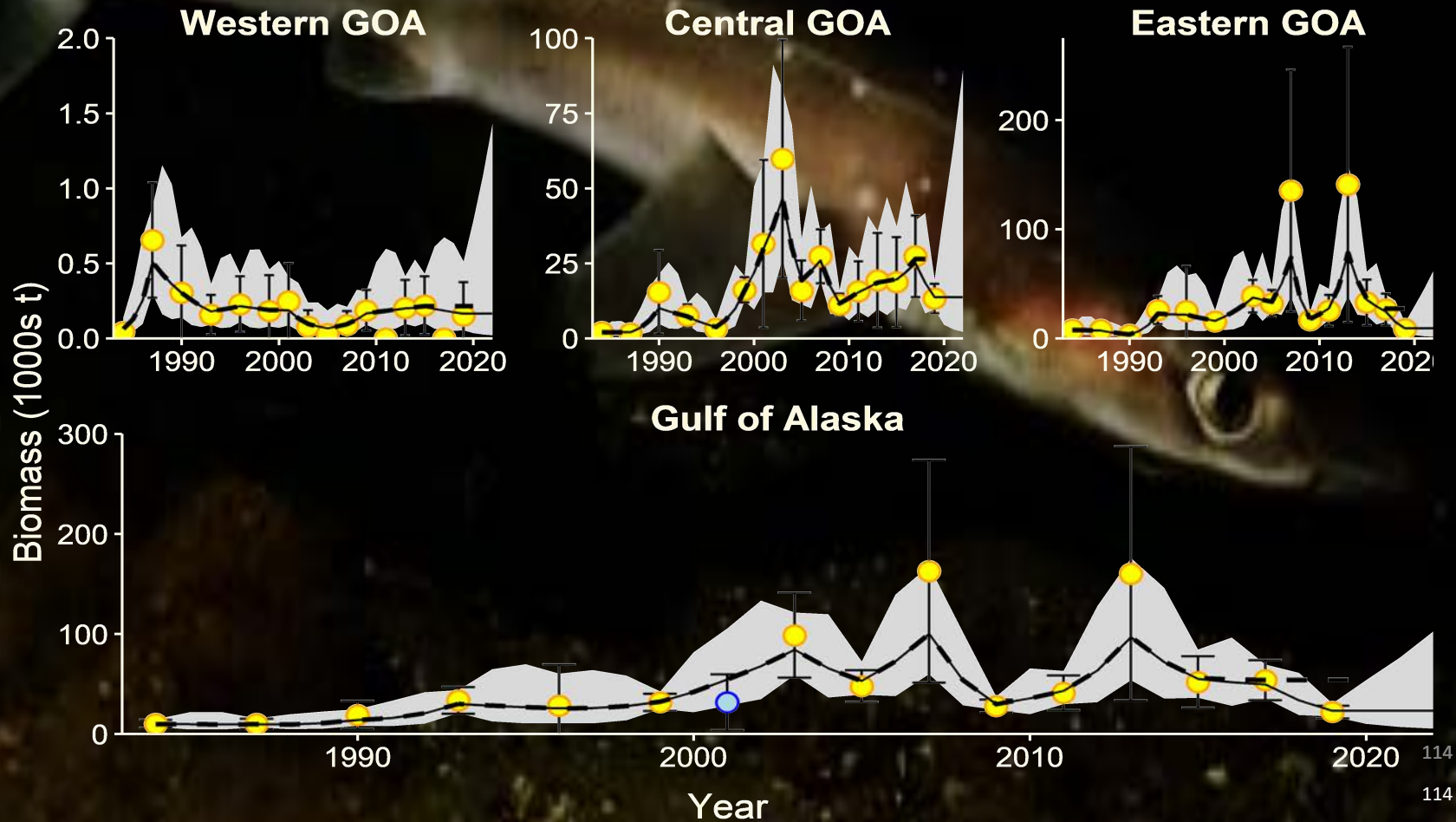
19. GOA Sharks



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:
 $ABC = 0.75OFL$



19. GOA Sharks

Spiny Dogfish Quantity	As estimated or specified last year for:		As estimated or recommended this year for:	
	2020	2021	2021	2022
M (natural mortality rate)	0.097	0.097	0.097	0.097
Tier	5	5	5	5
Biomass (t)	54,301	54,301	23,289	23,289
F _{OFL}	0.04	0.04	0.04	0.04
maxF _{ABC}	0.03	0.03	0.03	0.03
F _{ABC}	0.03	0.03	0.03	0.03
OFL (t)	10,343	10,343	4,436	4,436
maxABC (t)	7,757	7,757	3,327	3,327
ABC (t)	7,757	7,757	3,327	3,327

Pacific sleeper, salmon and other sharks				
Tier	6	6	6	6
OFL (t)	570	570	570	570
maxABC (t)	427	427	427	427
ABC (t)	427	427	427	427

Total Complex				
OFL (t)	10,913	10,913	5,006	5,006
ABC (t)	8,184	8,184	3,755	3,755

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

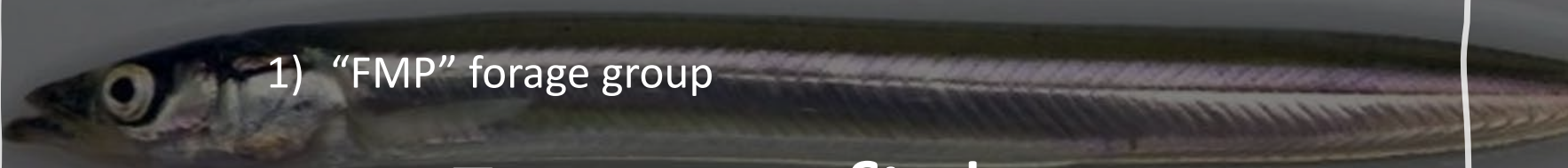
- **The Team inquired about a potential “observer effect” in the fisheries that are sampled more, and recommended that the author look at data from pre- and post-observer restructuring.**

20. GOA Octopus

- Tier 6, no change



forage species in the report




1) "FMP" forage group

2) Squids

Forage fish

3) Pacific herring



4) Pandalid shrimp



Forage fish

summary

- capelin population increasing after negative MHW impacts
- multiple data sources suggest high herring abundance in 2019
- catches of osmerids (eulachon) and squid remain low
- catches of pandalid shrimps especially high