Gulf of Alaska SAFE report

Report of the
Gulf of Alaska Groundfish
Plan Team meeting
Nov 12th-15th, 2019

GOA Plan Team Members

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

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GOA assessment Overview

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

12 “full” assessments reviewed (7 in Tier 3)

8 “partial” assessments (4 also in Tier 3)

Stock Assessment schedule for the Gulf of Alaska

Stock	Assessment	Tier	Frequency (yrs)	Full assessment Year due
Pollock	Full	3	1	2019
Pacific cod	Full	3	1	2019
Sablefish	Full	3	1	2019
Northern and southern rock sole	Partial	3	4	2021
Shallow water flatfish	Partial	5	4	2021
Deepwater flatfish (Dover)	Full	3/6	4	2019
Rex sole	Partial	5	4	2021
Arrowtooth flounder	Full	3	2	2019
Flathead sole	Partial	3	2	2021
Pacific ocean perch	Full	3	2	2019
Northern rockfish	Partial	3	2	2020
Shortraker rockfish	Full	5	2	2019
Other rockfish	Full	4/5/6	2	2019
Rougheye & blackspotted rockfish	Full	3	2	2019
Dusky rockfish	Partial	3	2	2020
Demersal shelf rockfish	Partial	4/6	2	2020
Thornyheads	None	5	2	2020
Atka mackerel	Full	6	2	2019
Skates	Full	5	2	2019
Octopus	Full	6	2	2019
Sculpins	Partial	5	4	2021
Sharks	none	6	2	2020
Forage species (includes squid)	Report	eco	2	2020
Grenadiers (BSAI/GOA)	None	eco	4	2020

- Document layout and links…

Econ and Ecosystem summary in SAFE Introduction

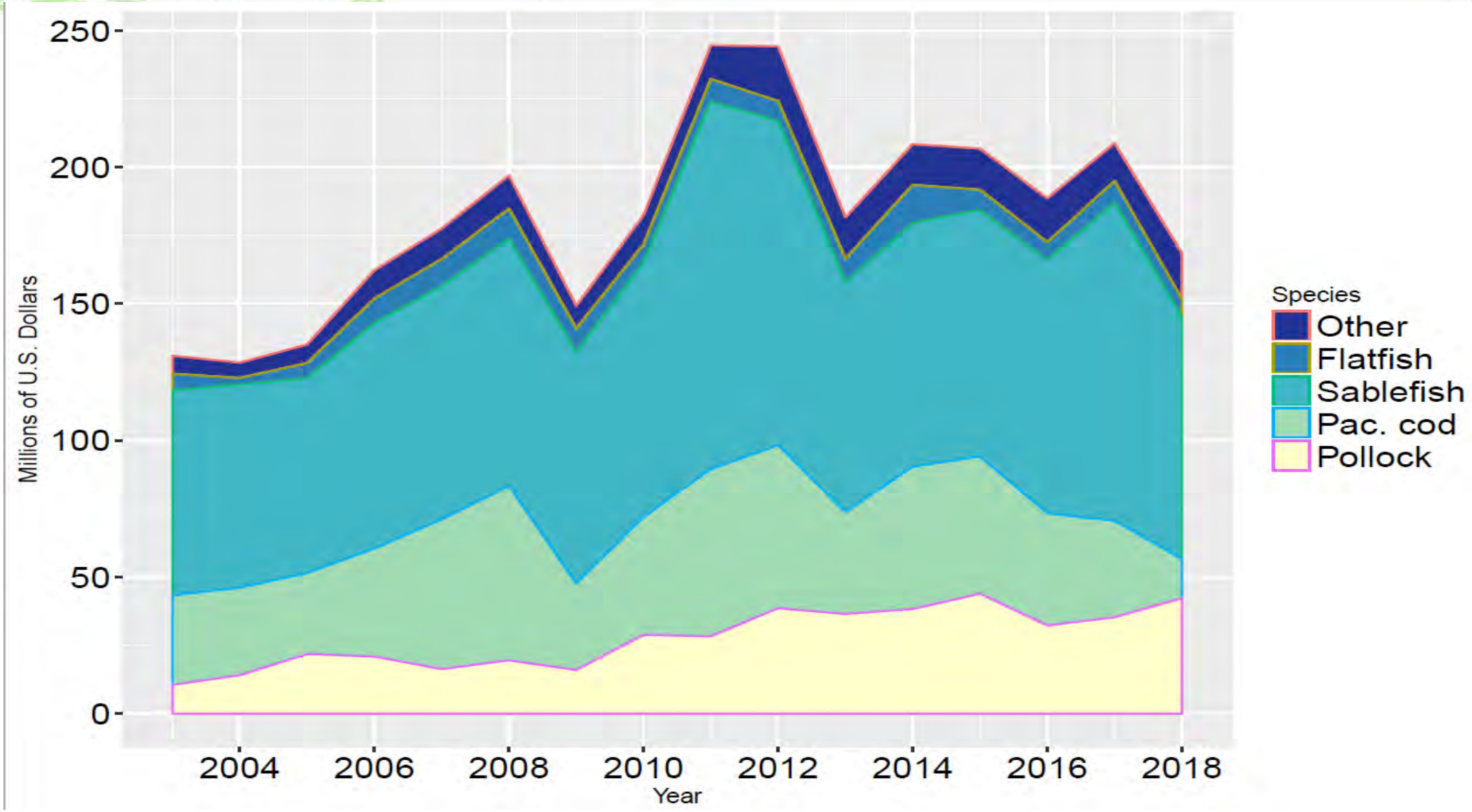
GOA Ecosystem SAFE…

- a recap of the 2018 Ecosystem state with updated data sources,
- a current (2019) Western and Eastern GOA ecosystem state summary, and
- a listing of the ecosystem indicators

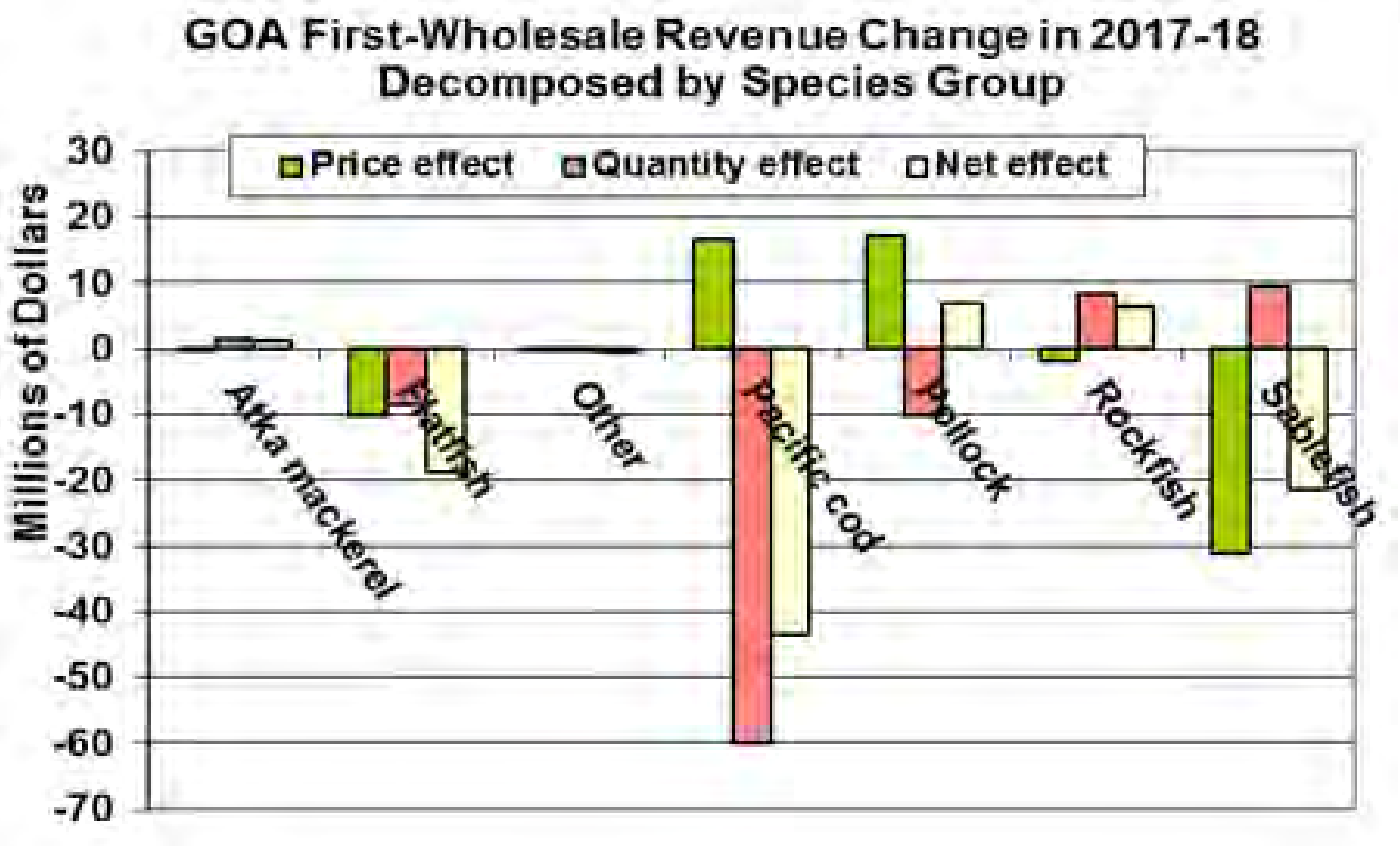
Noteworthy:

- Large gray whale mortality event was observed coast-wide in 2019…emaciation evident
- Possible range expansion of market squid (*Doryteuthis opalescens*)
  - Thought to spawn only south of BC, Canada
  - also observed in seabird chick diets

GOA Economic synopsis



Revenue changes (and source)



General assessment considerations

GOA bottom trawl survey effort…

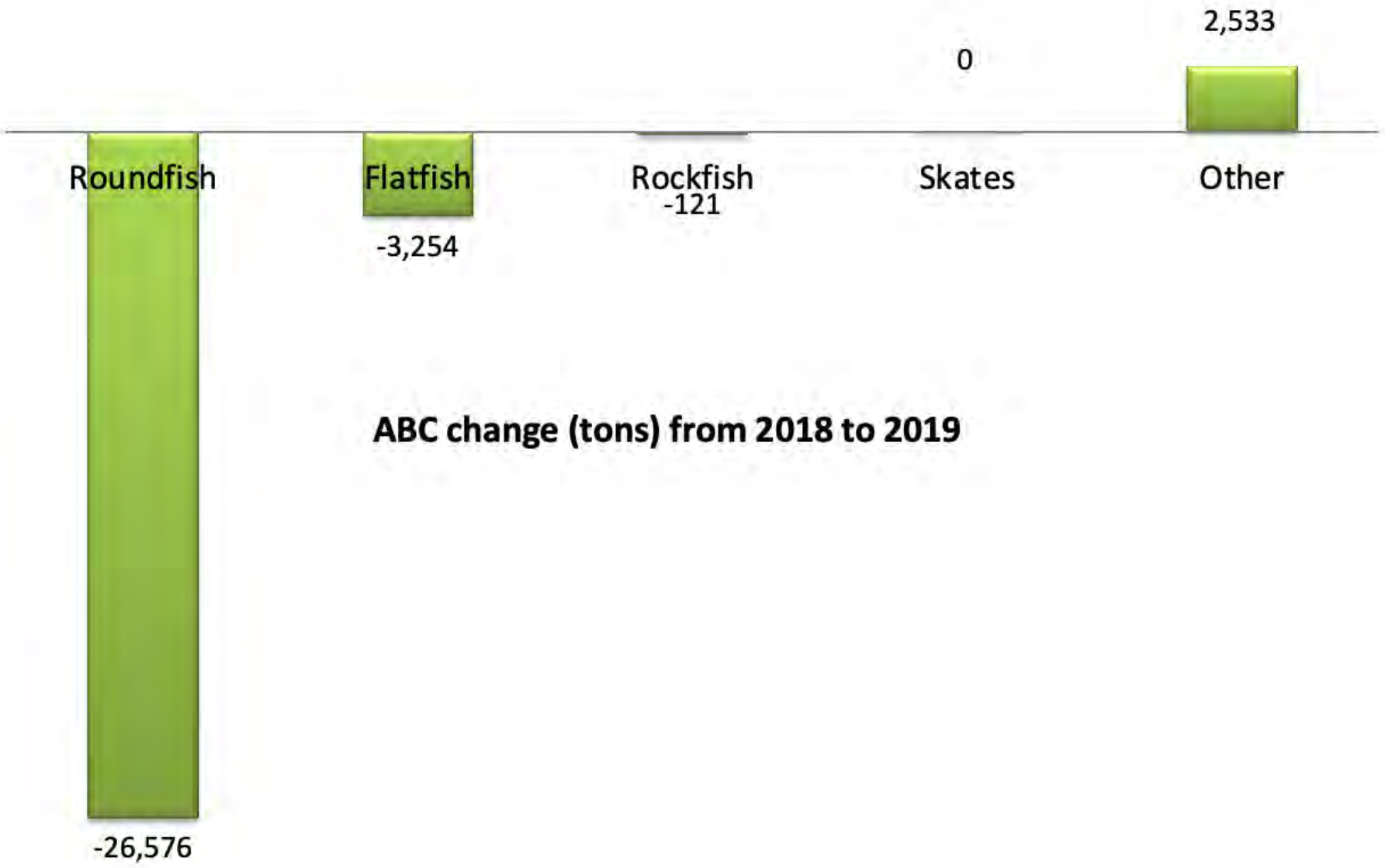
- Expressed concern regarding reducing the survey to two vessels and thinning the number of stations sampled in the survey in recent years
- In 2019 there were notable shifts in apportionment in many of the stocks, largely due to the absence of large catches of fish in the Western GOA but it is uncertain what's drivingthese observations
- There was also concern expressed for not having additional survey effort focused in the Western and Central areas in 2020 to help inform the Pacific cod stock assessment model and effectively evaluate stock status

The Team continues to recognize the importance of the GOA bottom trawl survey for making informed management decisions and continues to support full funding for the continuation of this survey

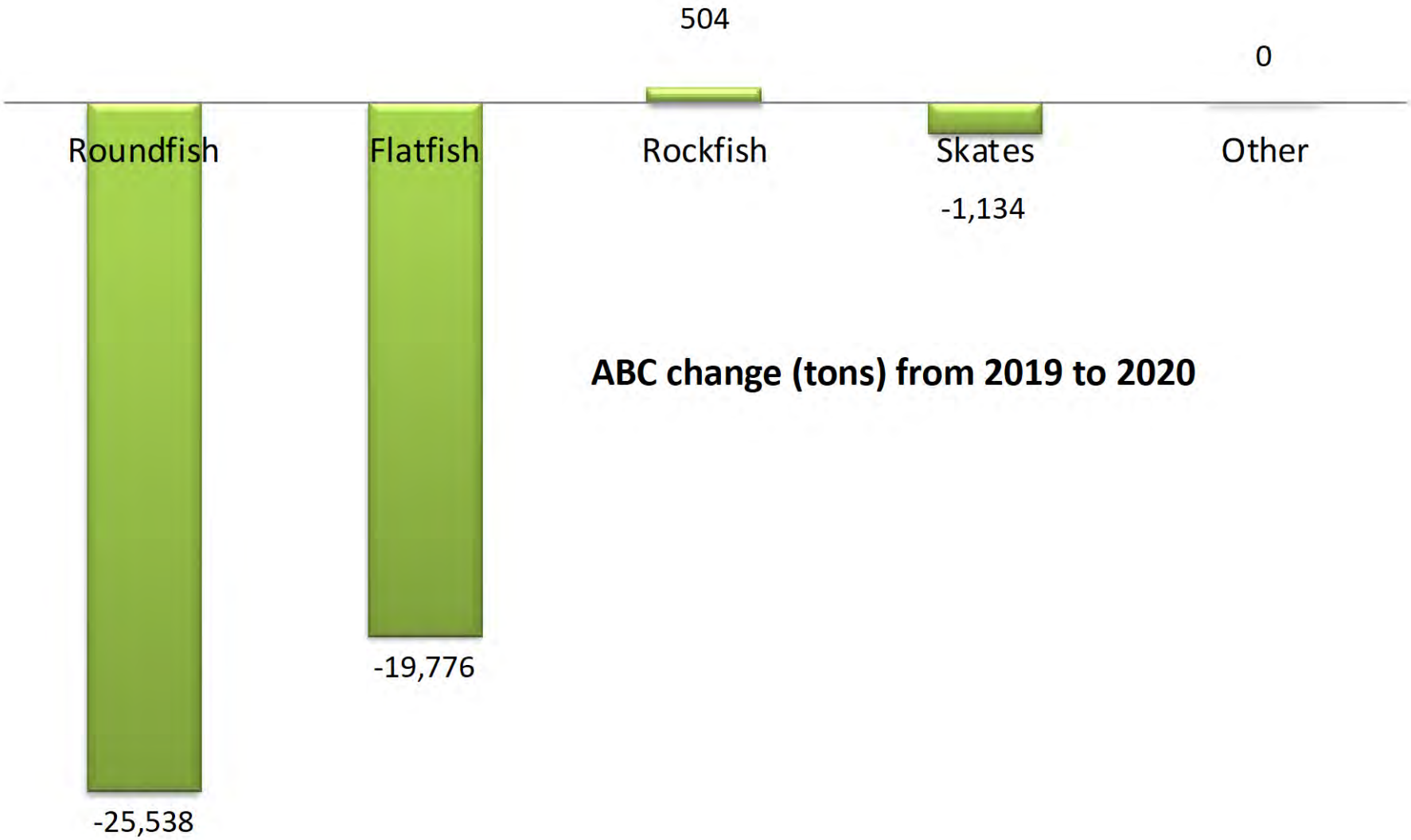
CIE reviews (**C**enter for **I**ndependent **E**xperts)

- 2020: GOA Rockfish planned
- Team discussed appropriate level of Council involvement surrounding these reviews
- 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.

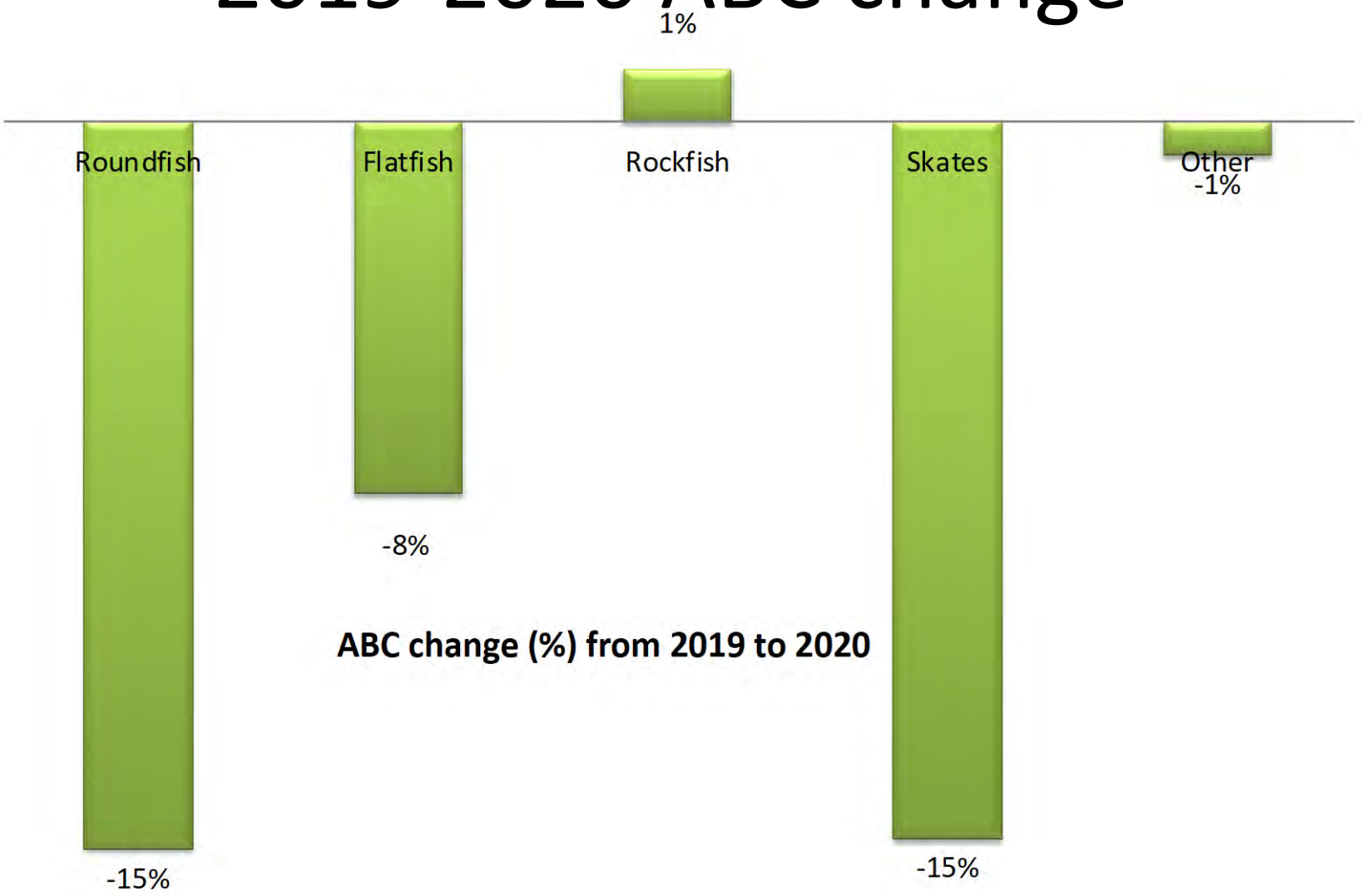
2018-2019 ABC change



2019-2020 ABC change

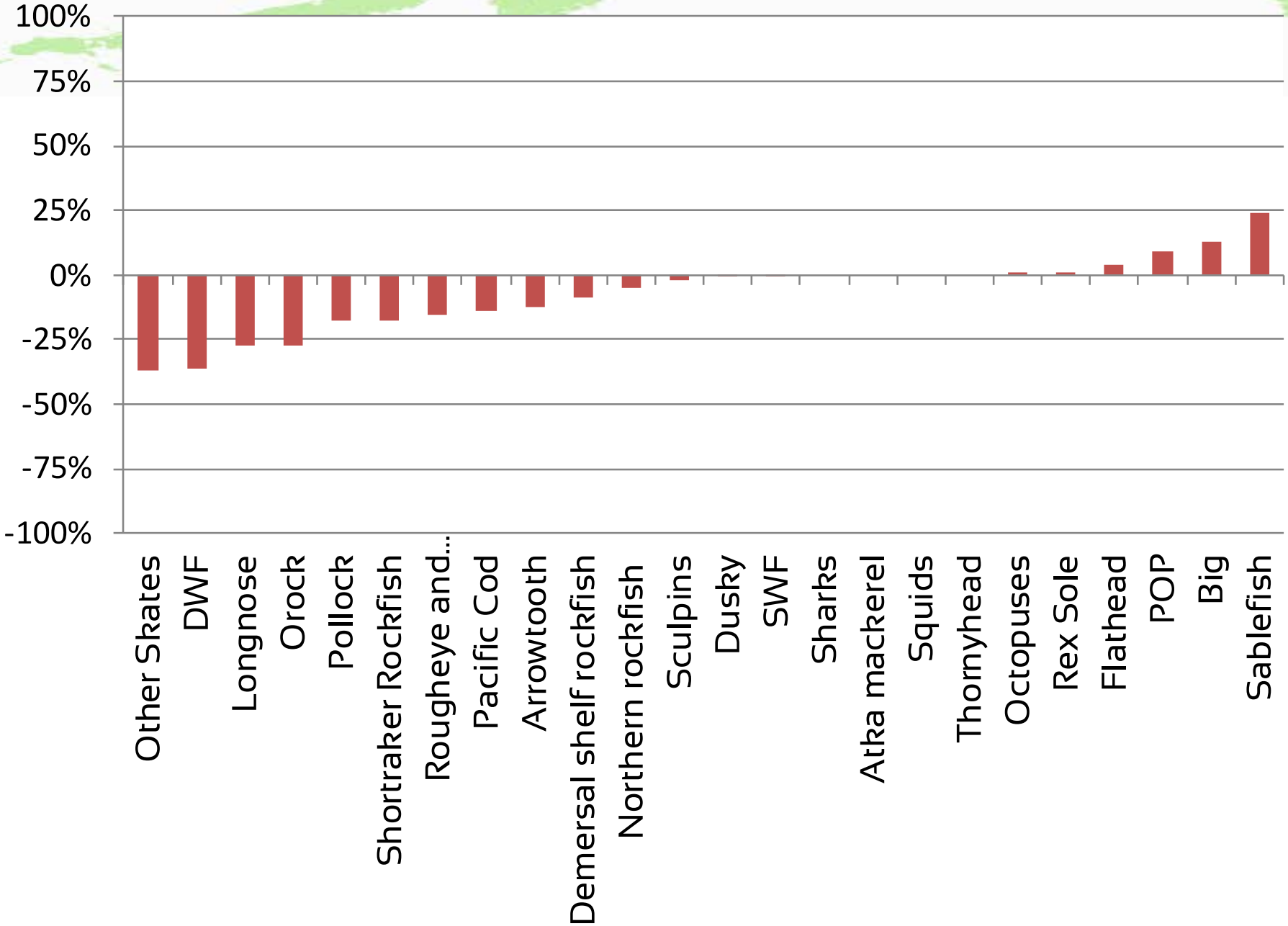


2019-2020 ABC change

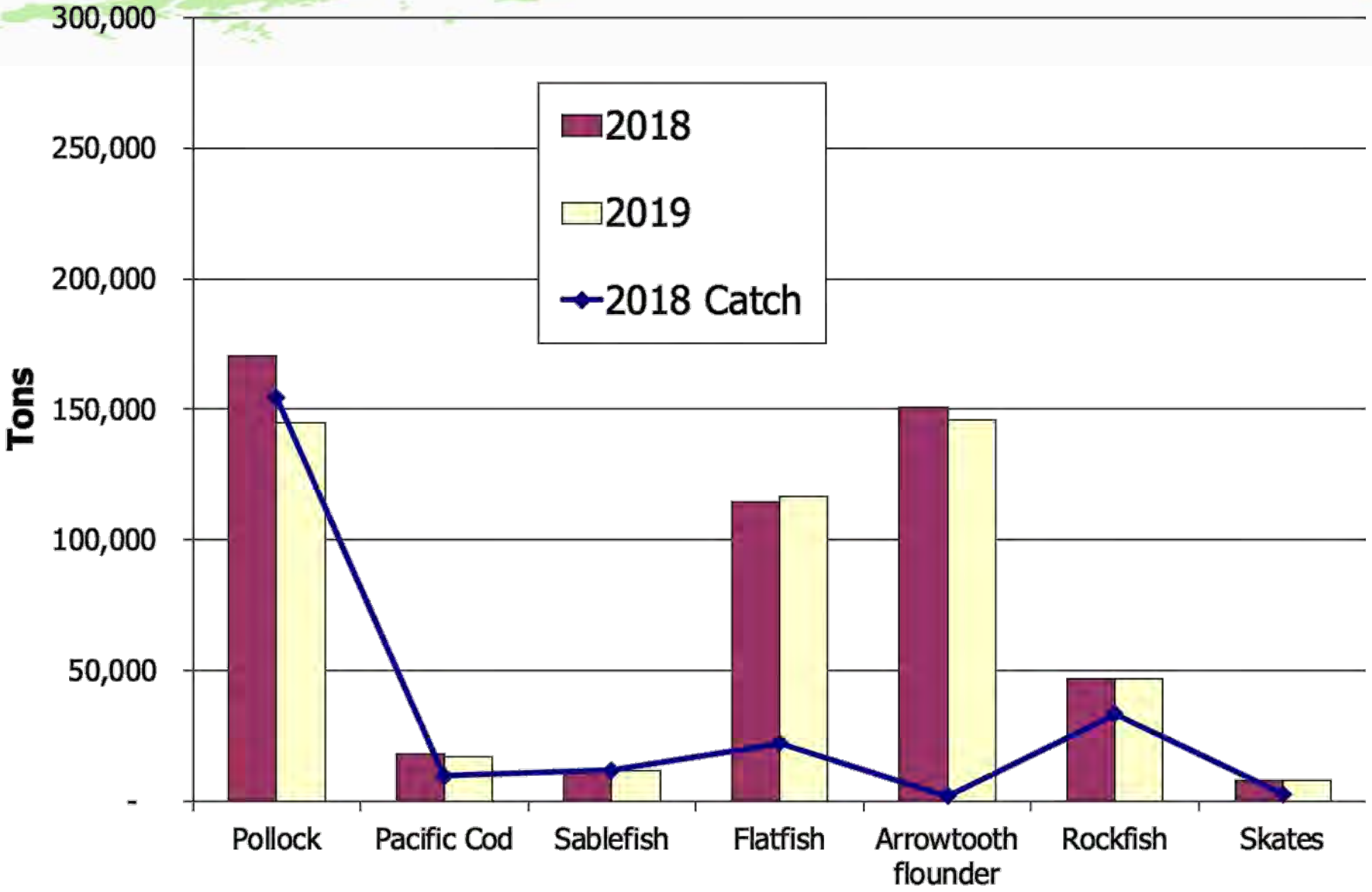


Overall a 9% decline

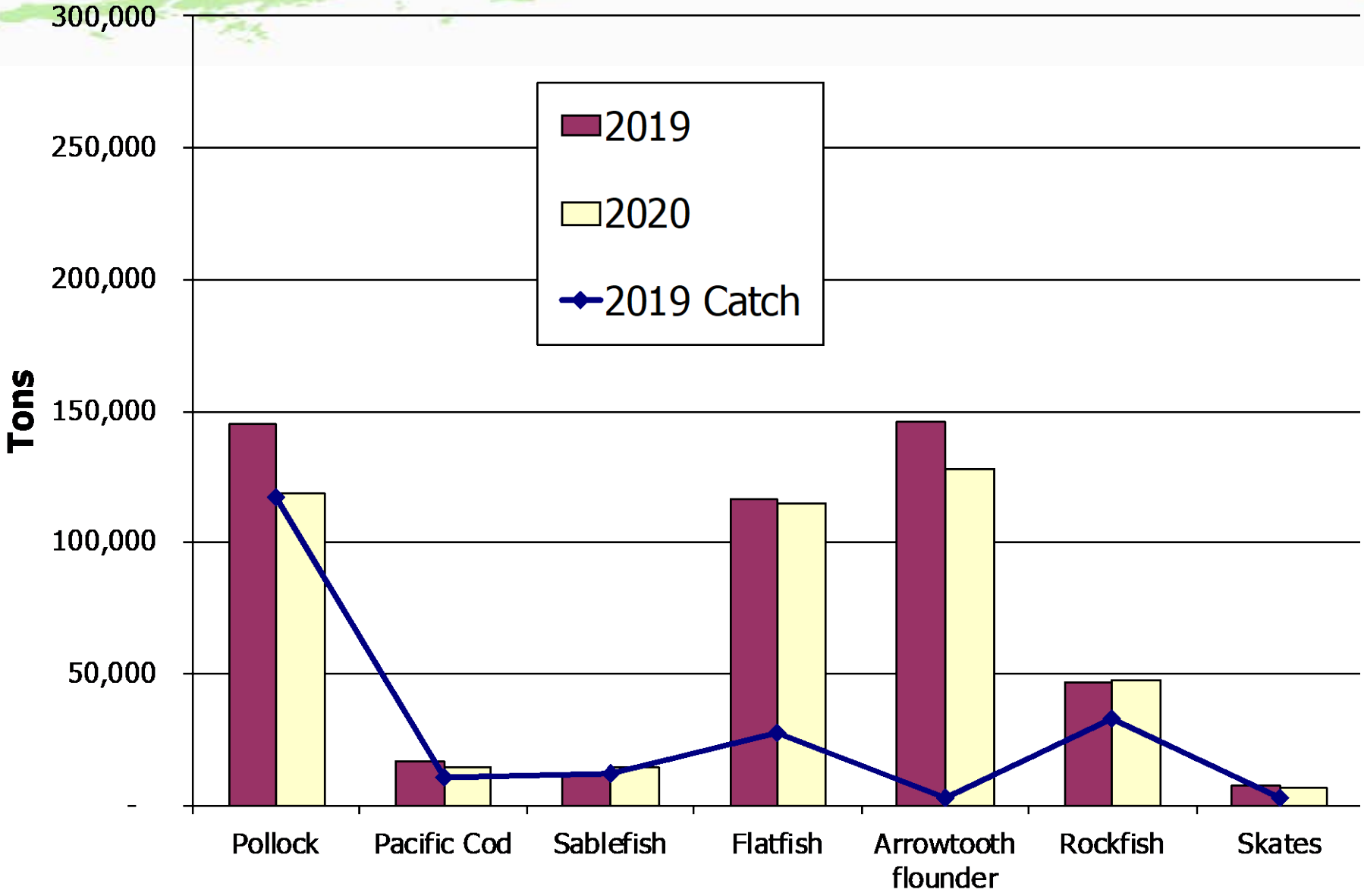
Percentage change in ABC, 2019-2020



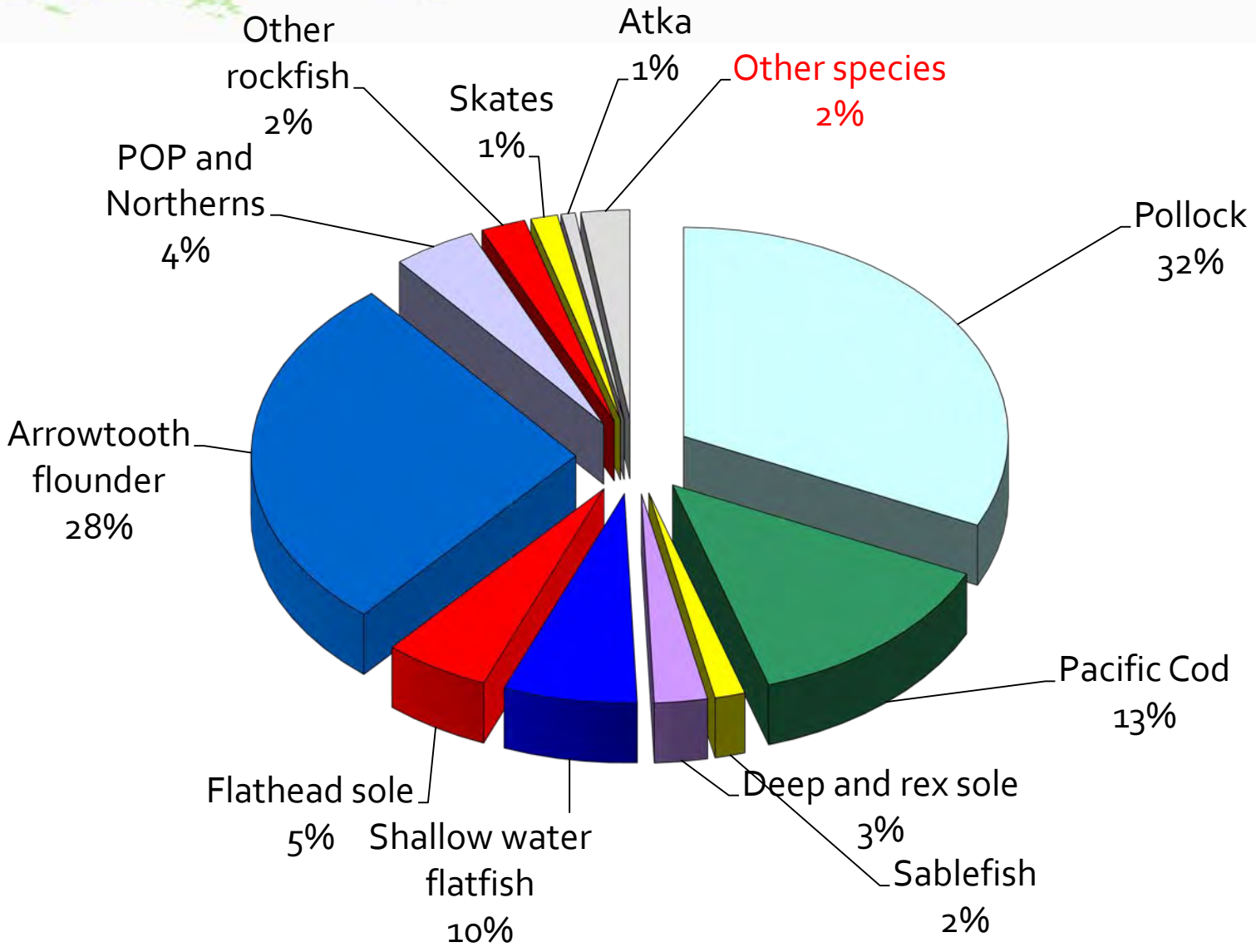
GOA Catch and ABC levels



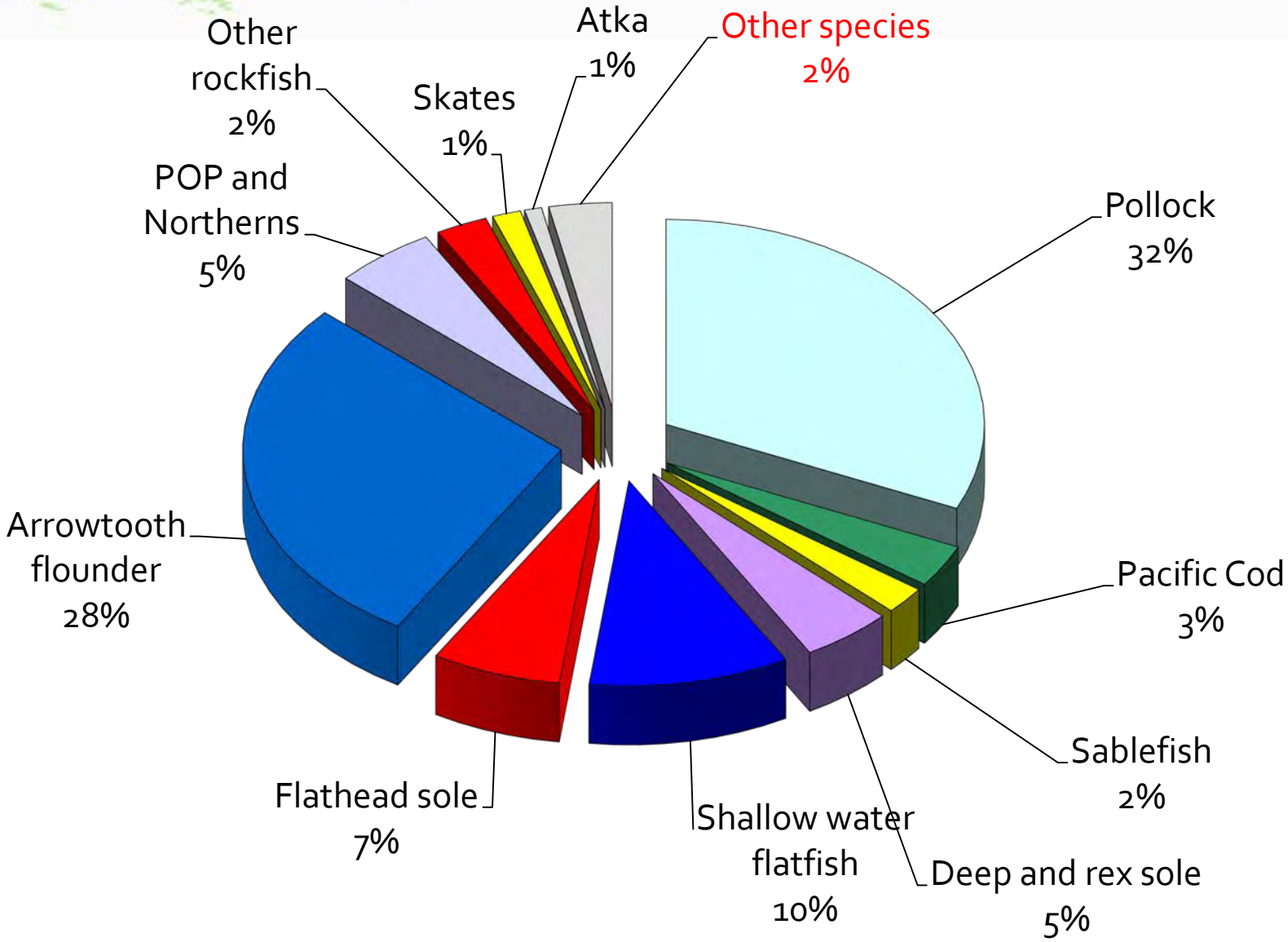
GOA Catch and ABC levels



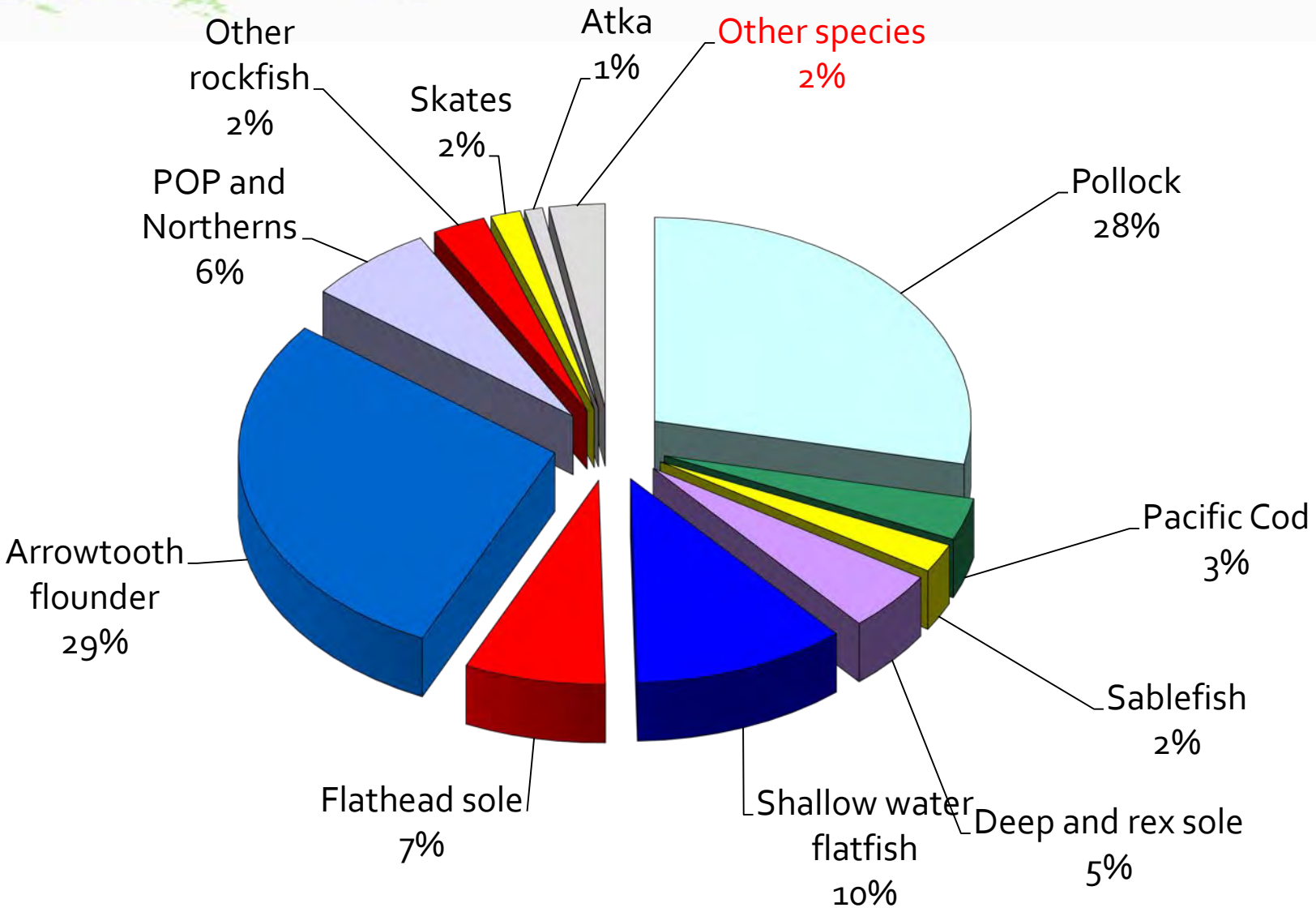
GOA 2017 ABC's: 667,877 t



GOA 2018 ABC's: 536,925 t

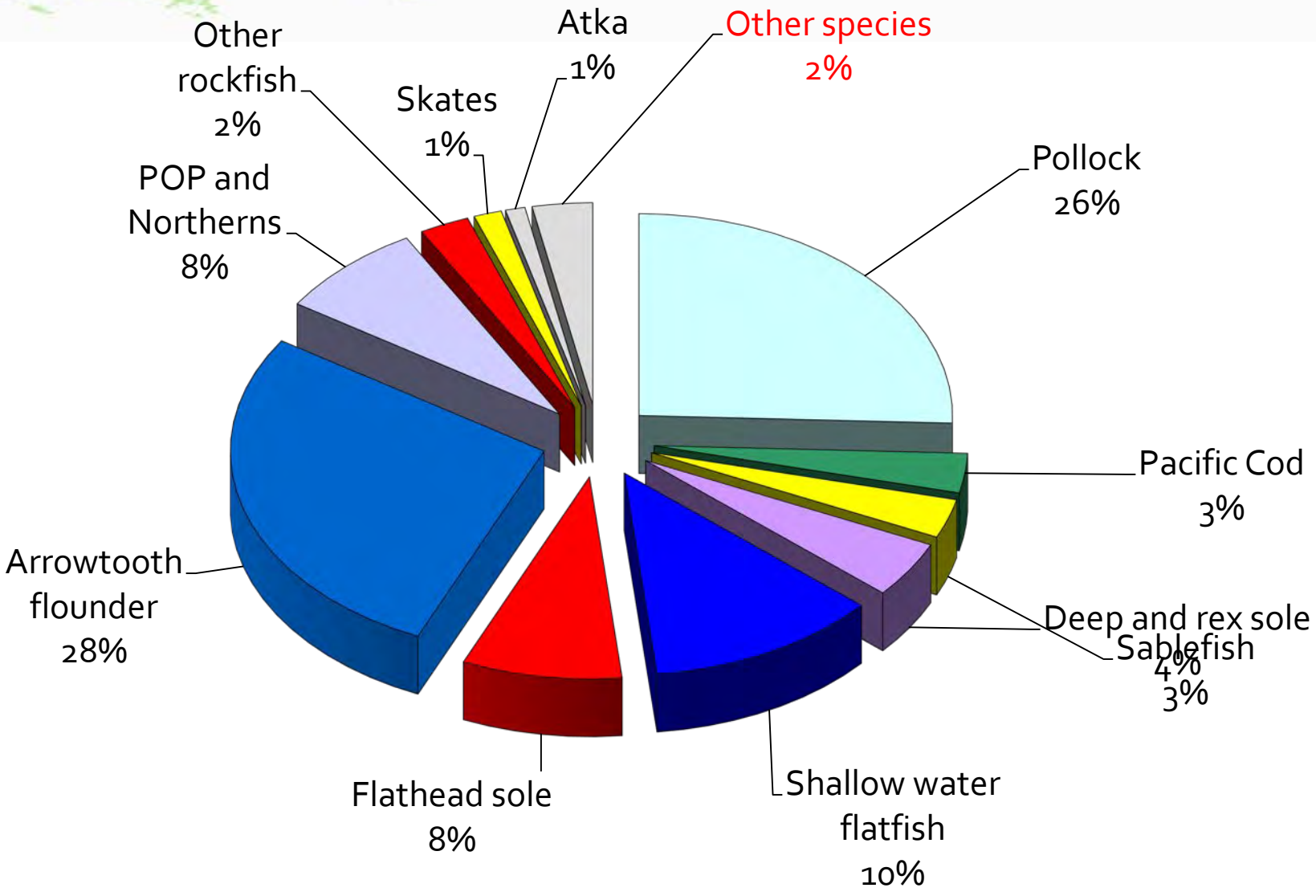


GOA 2019 ABC's: 509,507 t



Overall a 30% drop from 2016 aggregate ABC

GOA 2020 ABC's: 463,466 t



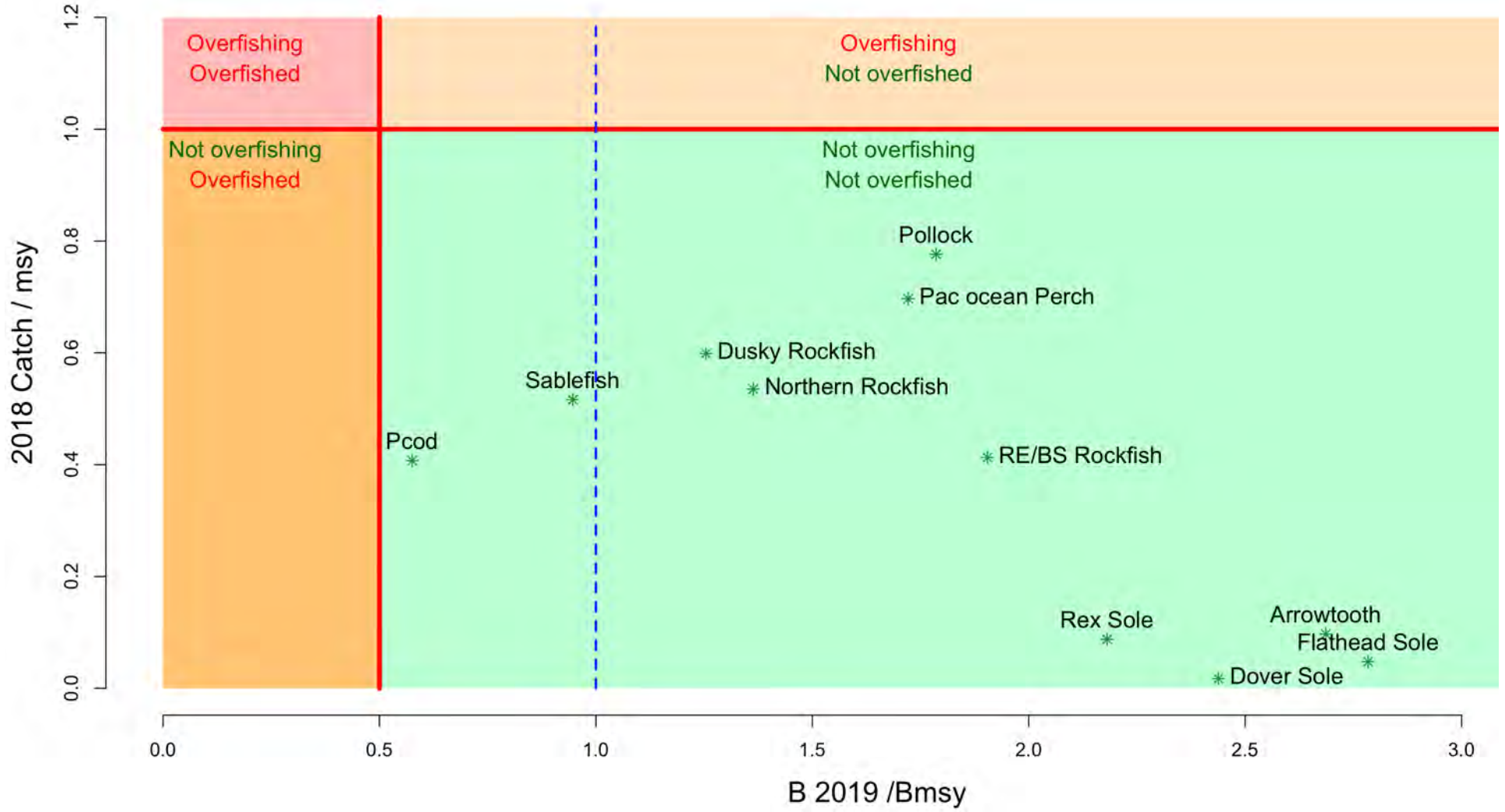
ABC / TAC

Team recommendations where ABC <maximum permissible:

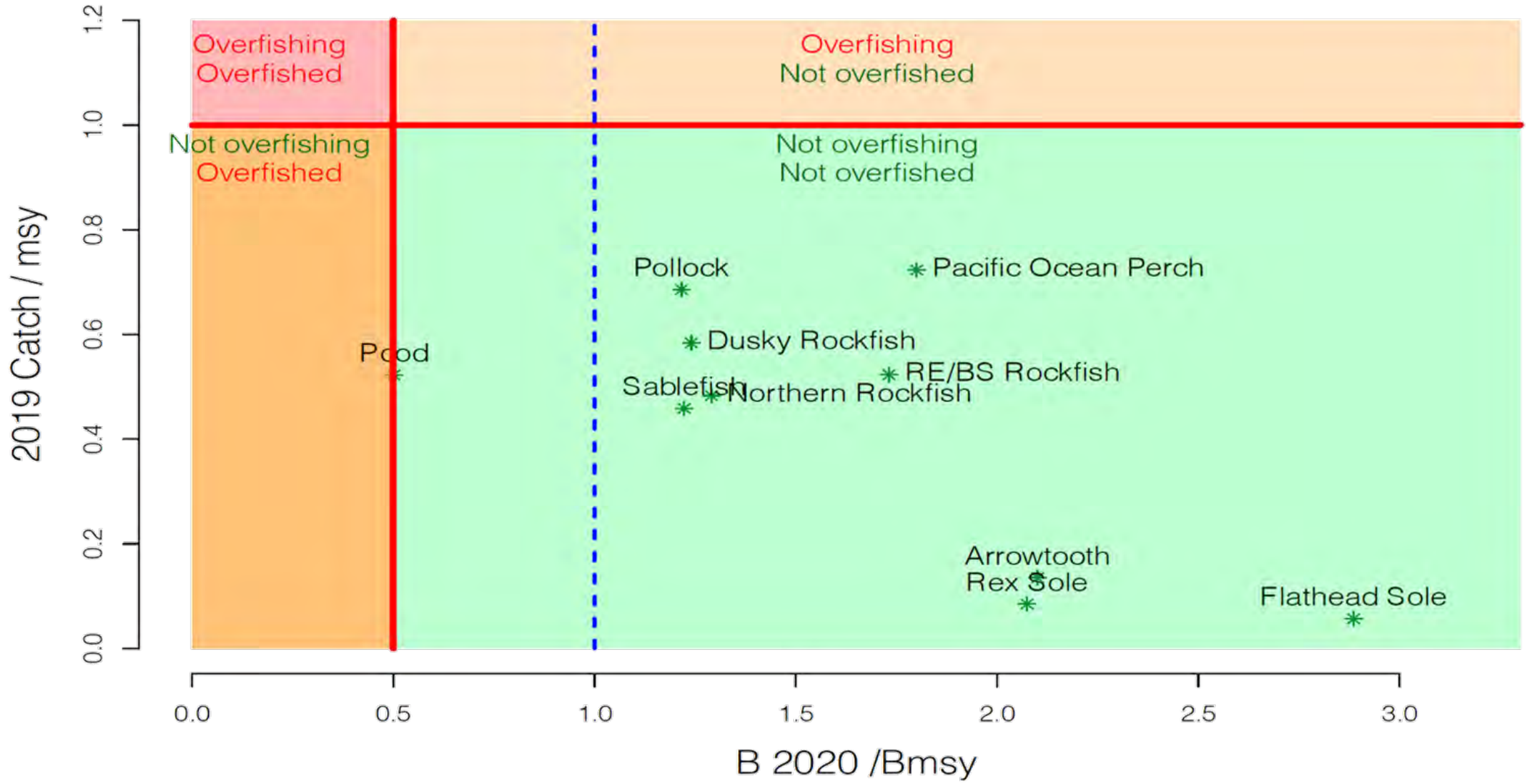
Table 3. Maximum permissible fishing mortality rates and ABCs as defined in Amendment 56 to the GOA and BSAI Groundfish FMPs, and the Plan Team's 2020 and 2021 recommended fishing mortality rates and ABCs, for those species whose recommendations were below the maximum permissible.

		2020			
Species	Tier	*Max* F_{ABC}	*Max* ABC	F_{ABC}	ABC
Pollock[1] (W/C/WYAK)	3a	0.28	120,549 t	0.23	108,494
Sablefish	3a	0.102	33,949	0.043	14,393
Demersal shelf rockfish	4, 6	0.026	303	0.02	238

Stock status summary last year

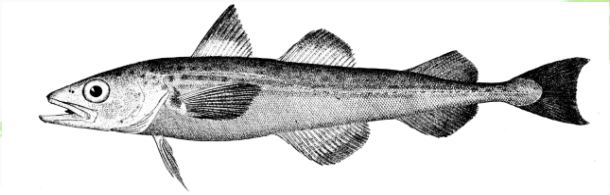


Stock status summary **this** year



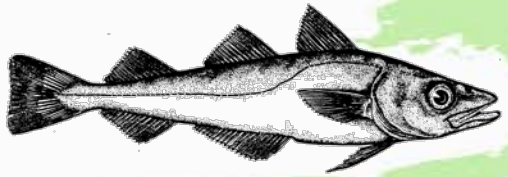
Species overviews

1. 2019 ABC/Catch and recommended changes
2. Highlights
   - New data
   - Analytic approach (changes)
3. Stock status and trend
4. ABC/OFL
   - Tier history and recommendations
   - 2020, 2021 maxABC; recommended ABC



ABC

Species	2019 Catch	2019	2020	Change
Pollock	117,019	144,623	118,642	down 25,981 (18%)
Pacific Cod	10,909	17,000	14,621	down 2,379 (14%)
Sablefish	12,219	11,571	14,393	up 2,822 (24%)
Flatfish	27,638	116,562	114,567	down 1,995 (2%)
Arrowtooth flounder	2,553	145,841	128,060	down 17,781 (12%)
Rockfish	32,730	46,946	47,450	up 504 (1%)
Atka mackerel	1,254	4,700	4,700	same (0%)
Skates	3,042	7,804	6,670	down 1,134 (15%)
Other Species	2,618	14,460	14,363	down 97 (1%)
Total	209,982	509,507	463,466	down 46,041 (9%)



1. GOA pollock overview

Changes to the assessment model

- New approach to estimating maturity
- Changed random walk penalty in catchability for Shelikof Strait acoustic survey

Author's 2020 ABC 108,494 t

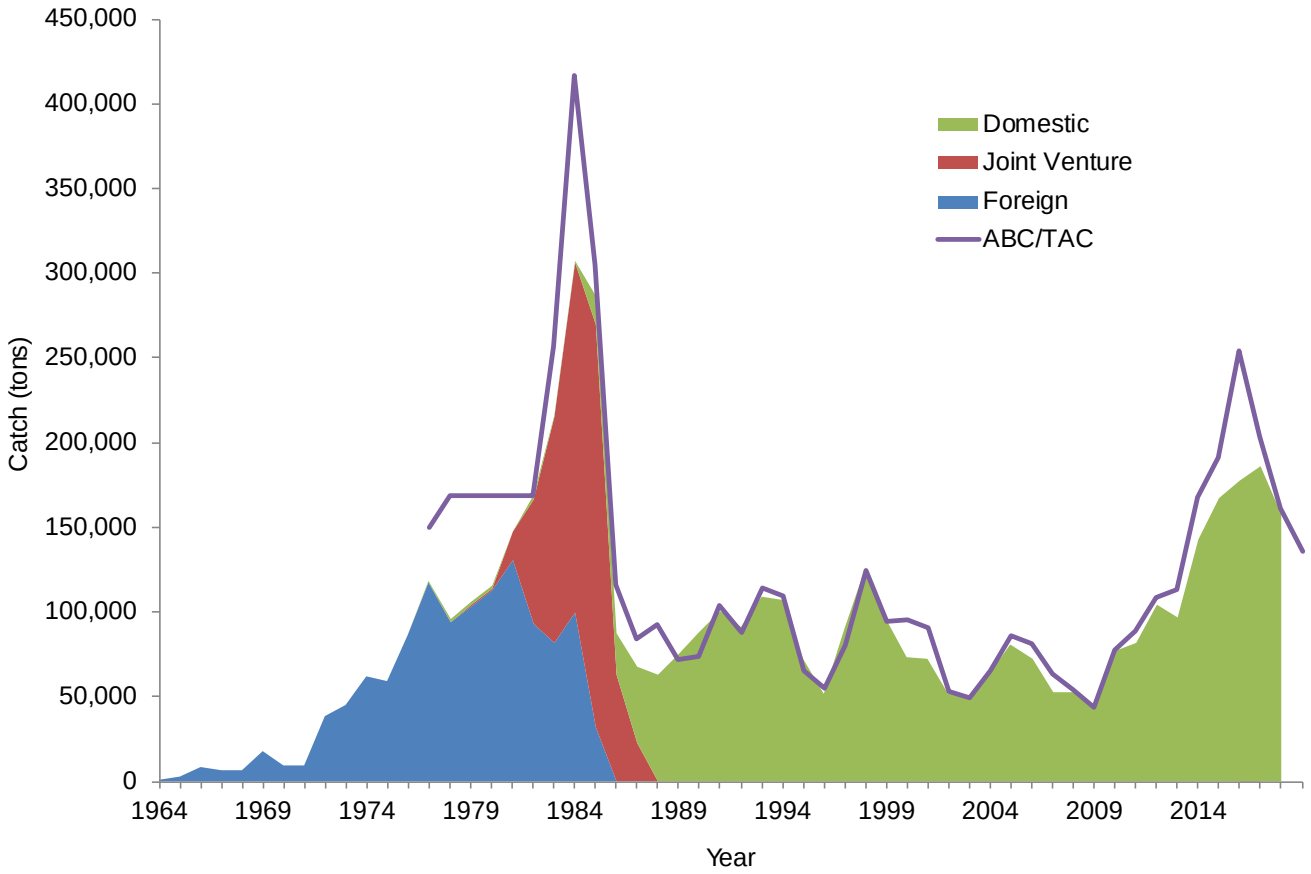
- 20% decrease from 2019 ABC
- 2021 ABC stabilizes ~110,000 t

Concerns:

- Conflicting trend data
- Poor model fit
- Assessment uncertainty

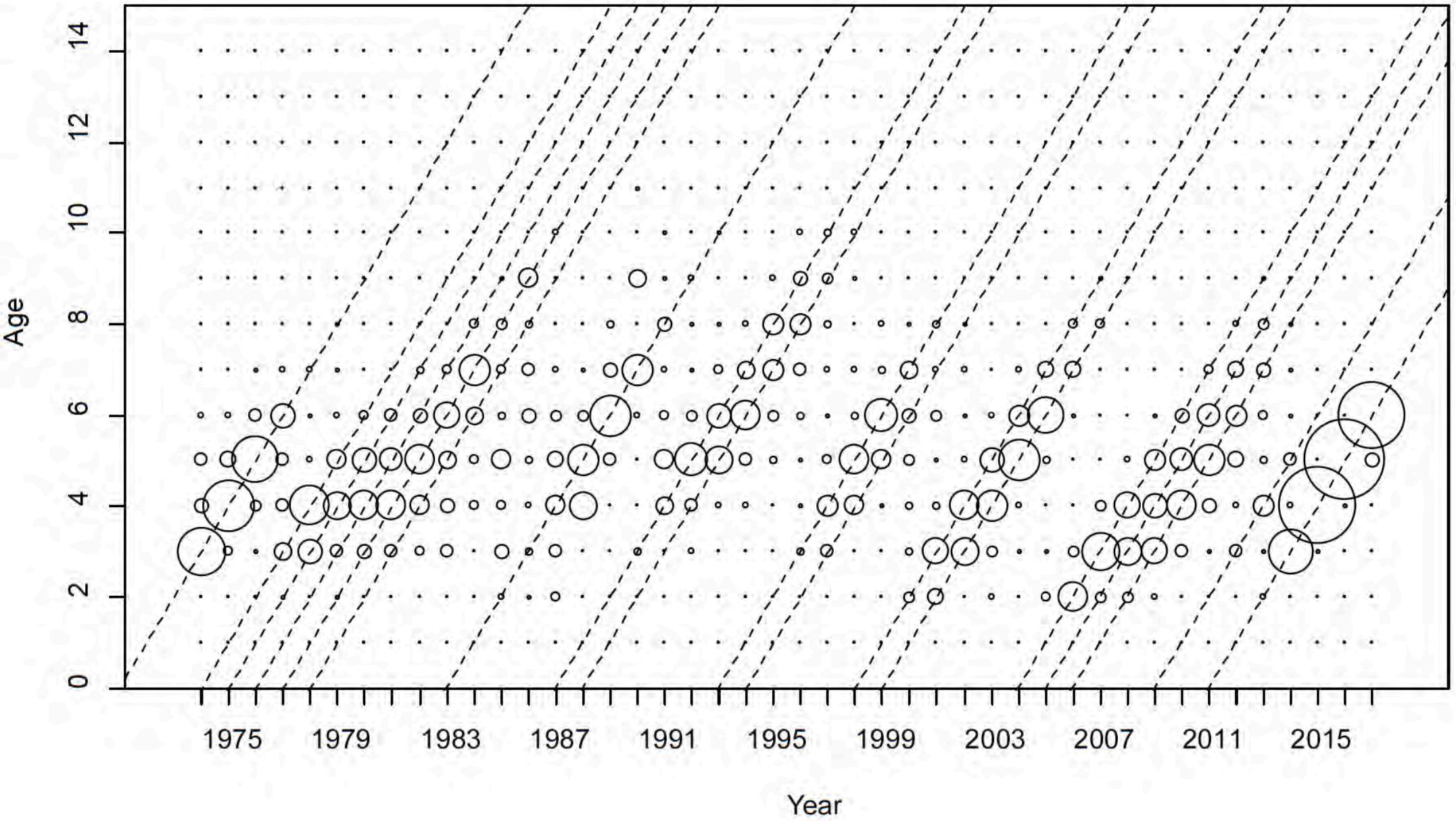
Positives

- Apparent strong 2018 year class
- Catches and SSB projected to stabilize
- Environmental condition seems OK for adults

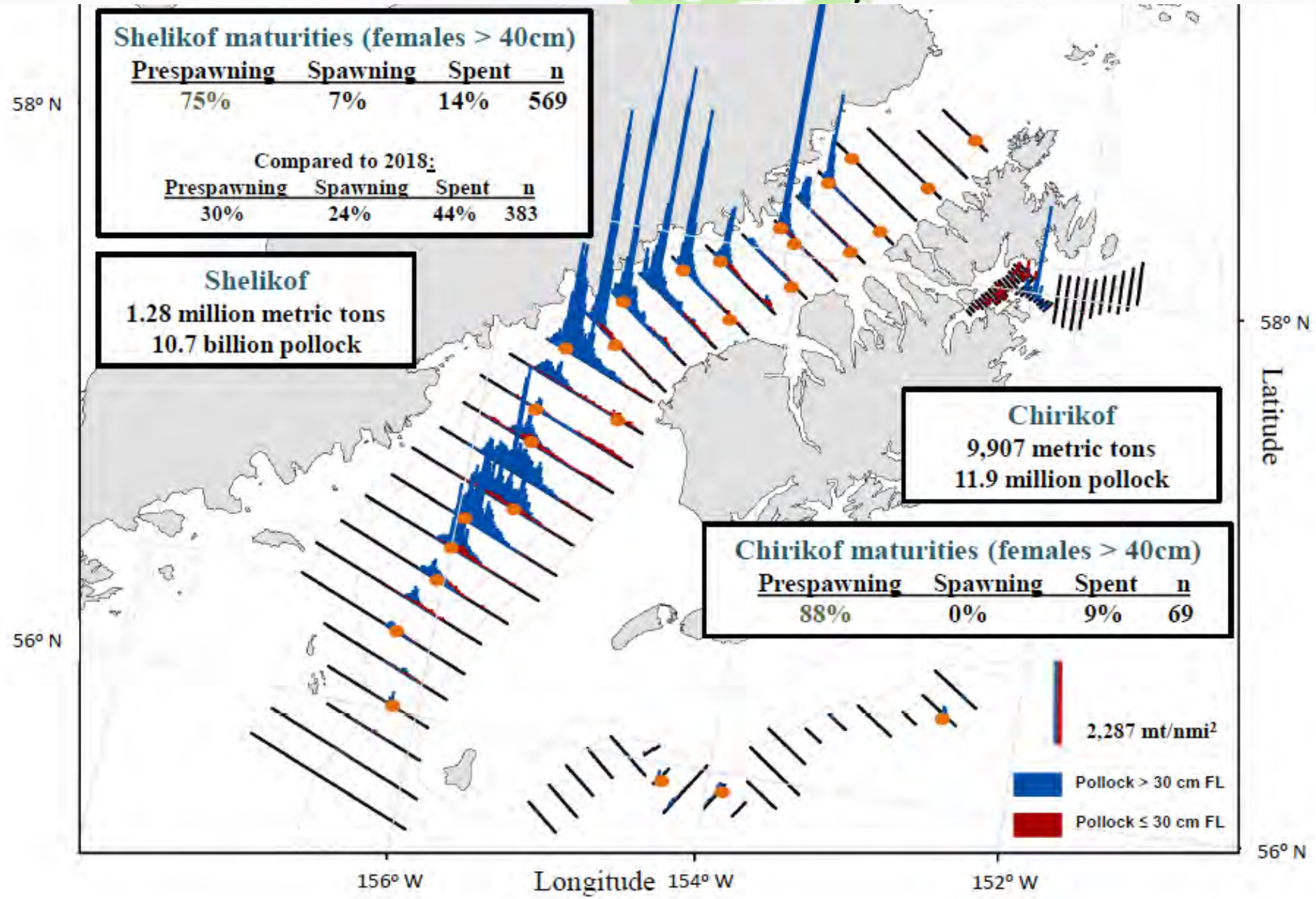


GOA pollock

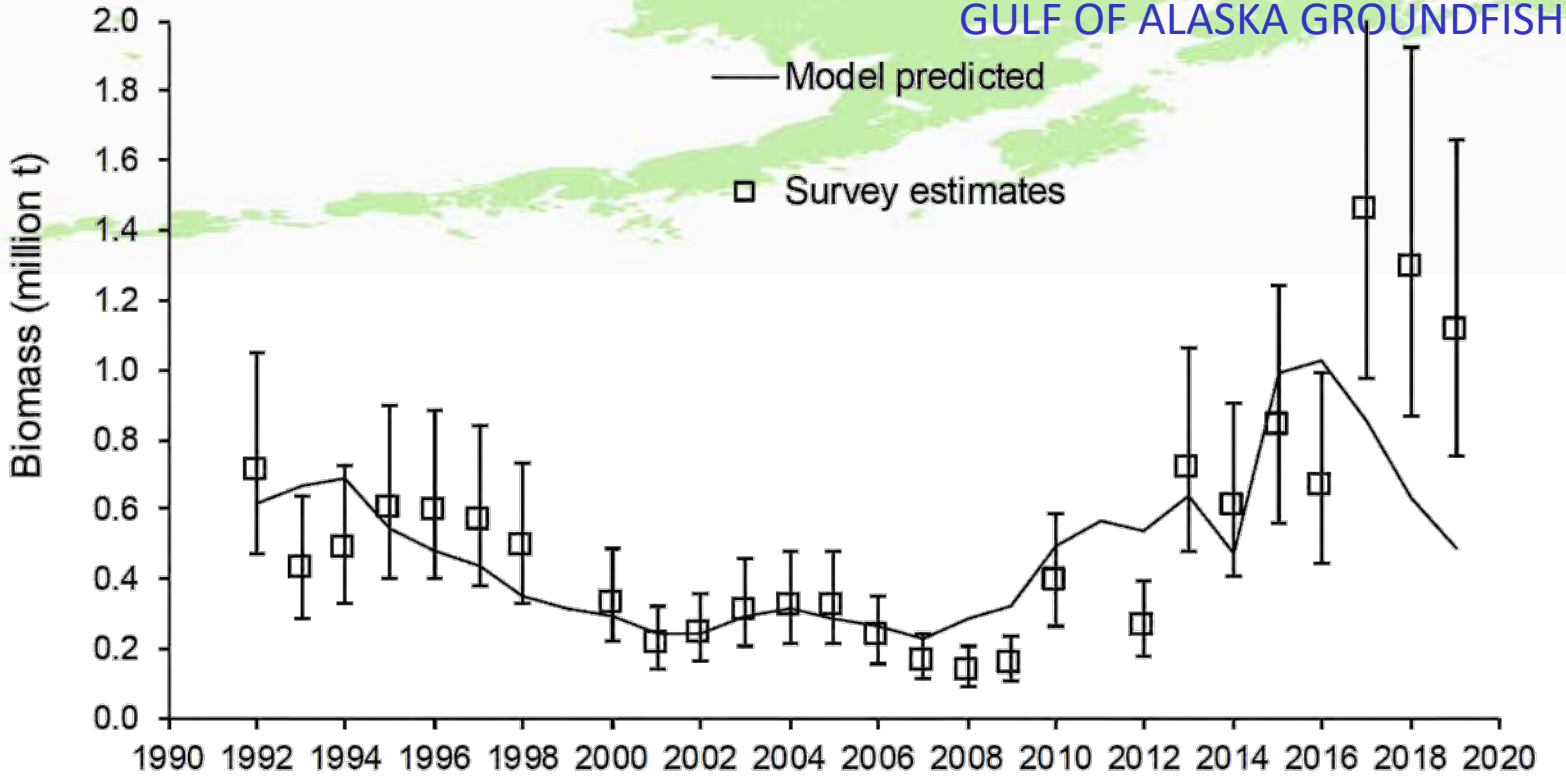
Fishery catch at age, 1976-2018



2019 Shelikof Strait EIT survey

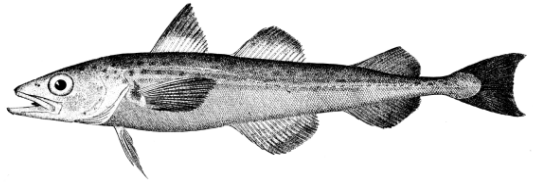


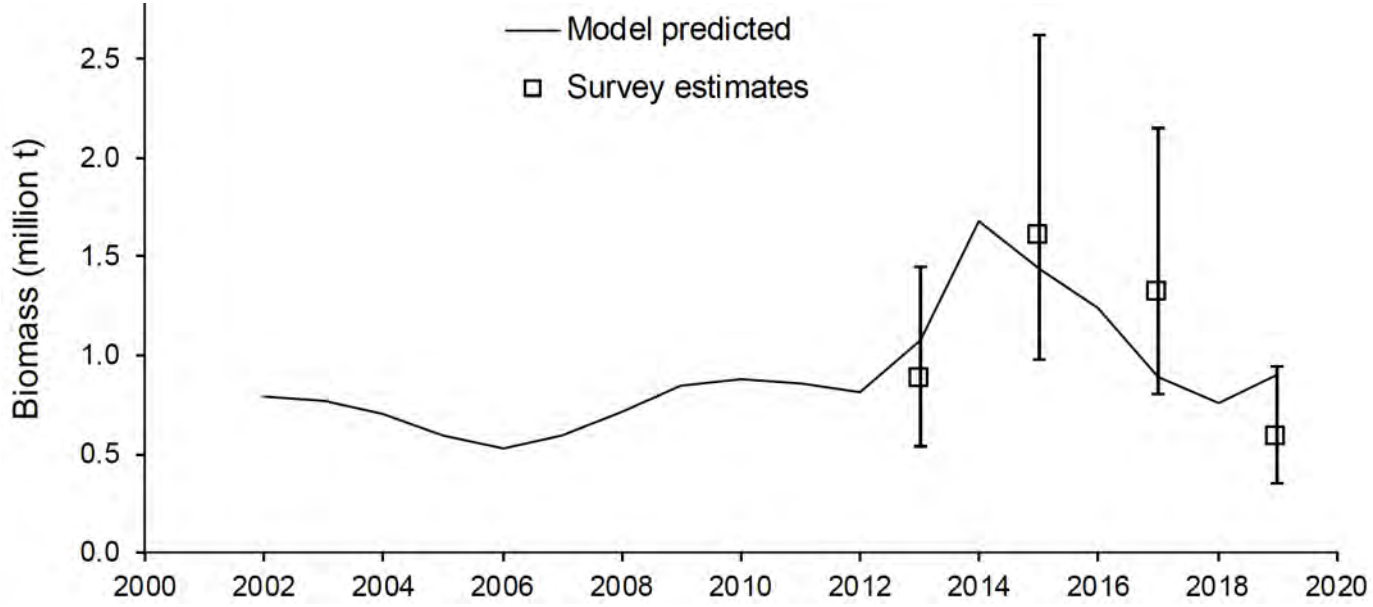
GOA pollock



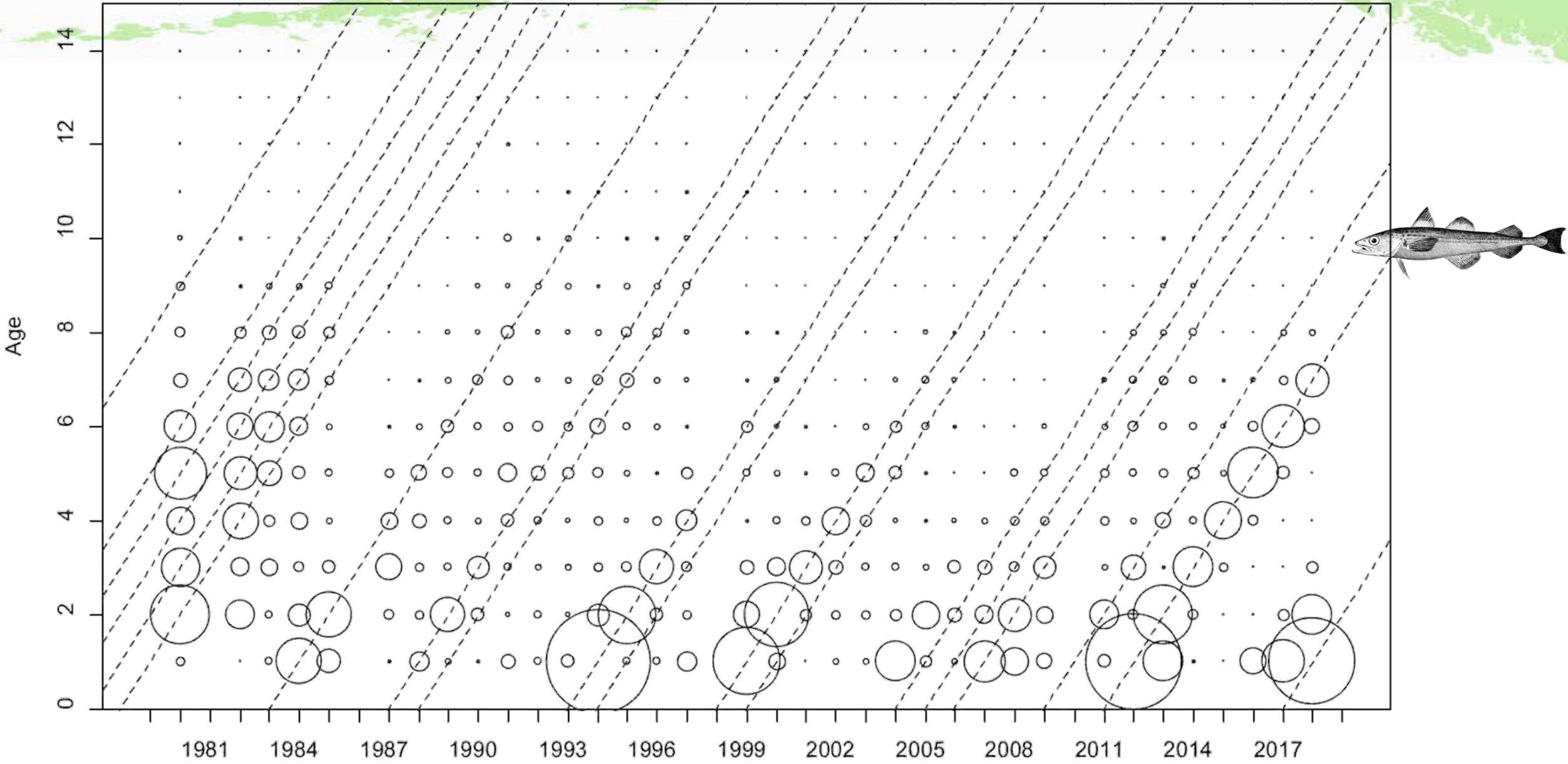
Shelikof Strait **winter** acoustic survey, 1992-2019

Summer acoustic survey 2013, 2015, 2017, 2019

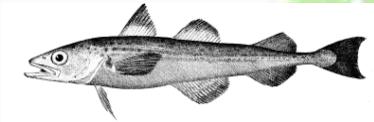


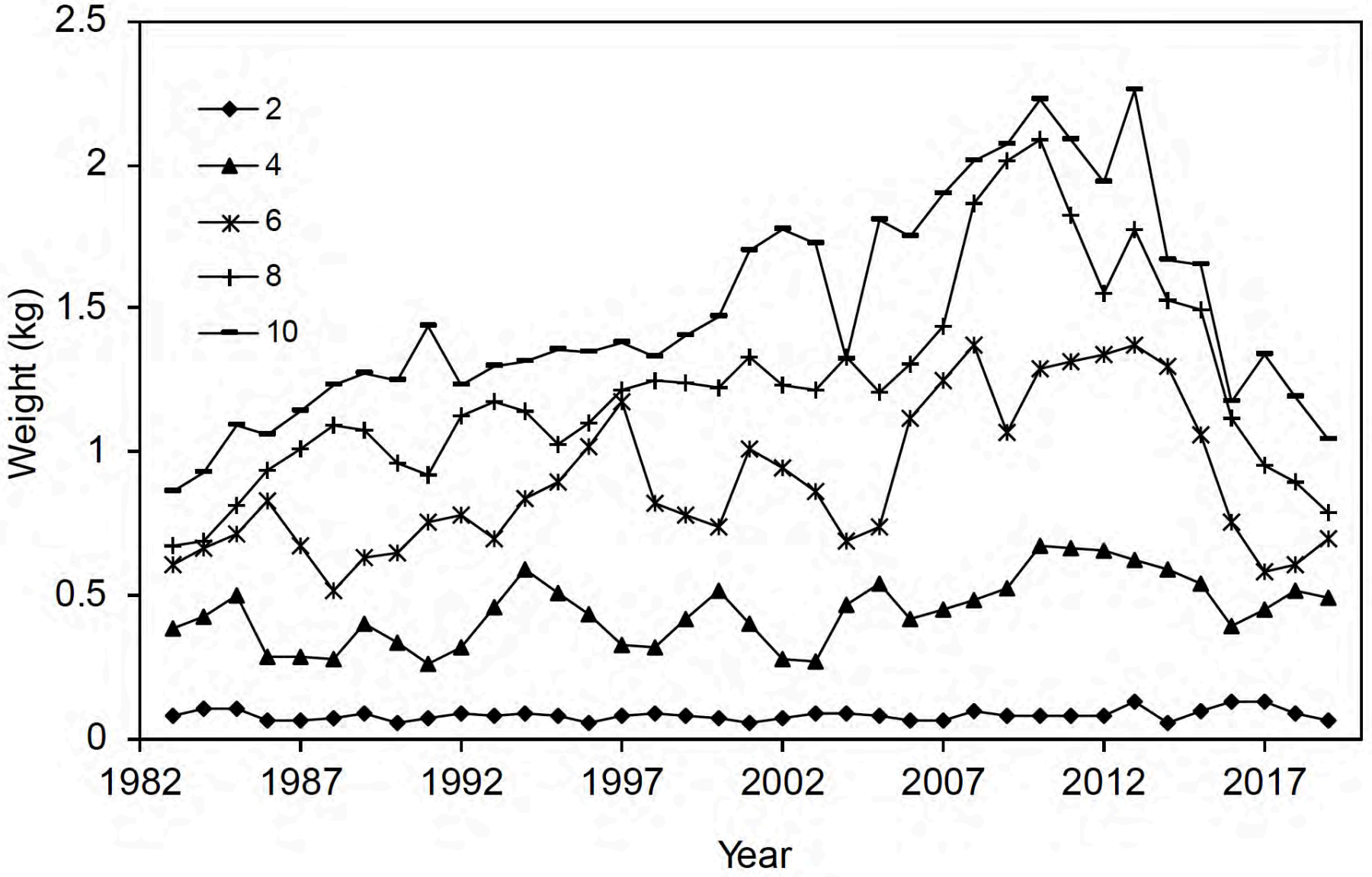


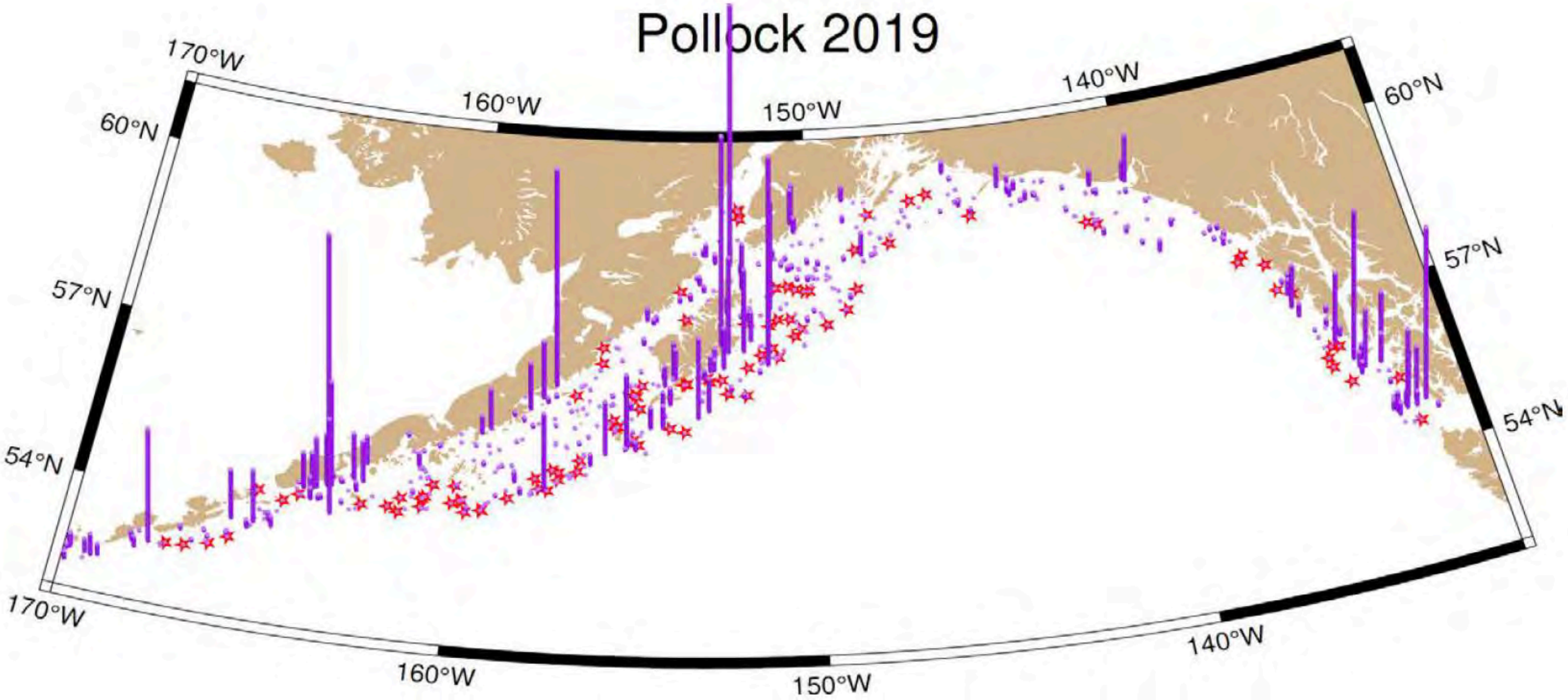
Shelikof Strait survey age compositions, 1981-2019



Shelikof survey weight-at-age over time, GOA pollock



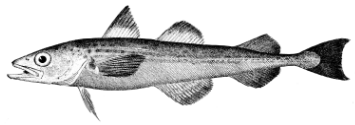



Pollock 2019
170°W
160°W
150°W
140°W
60°N
57°N
54°N

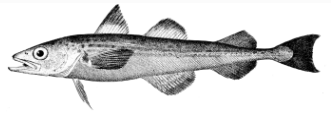
GOA pollock model changes:

Model 18.3 Last year's model

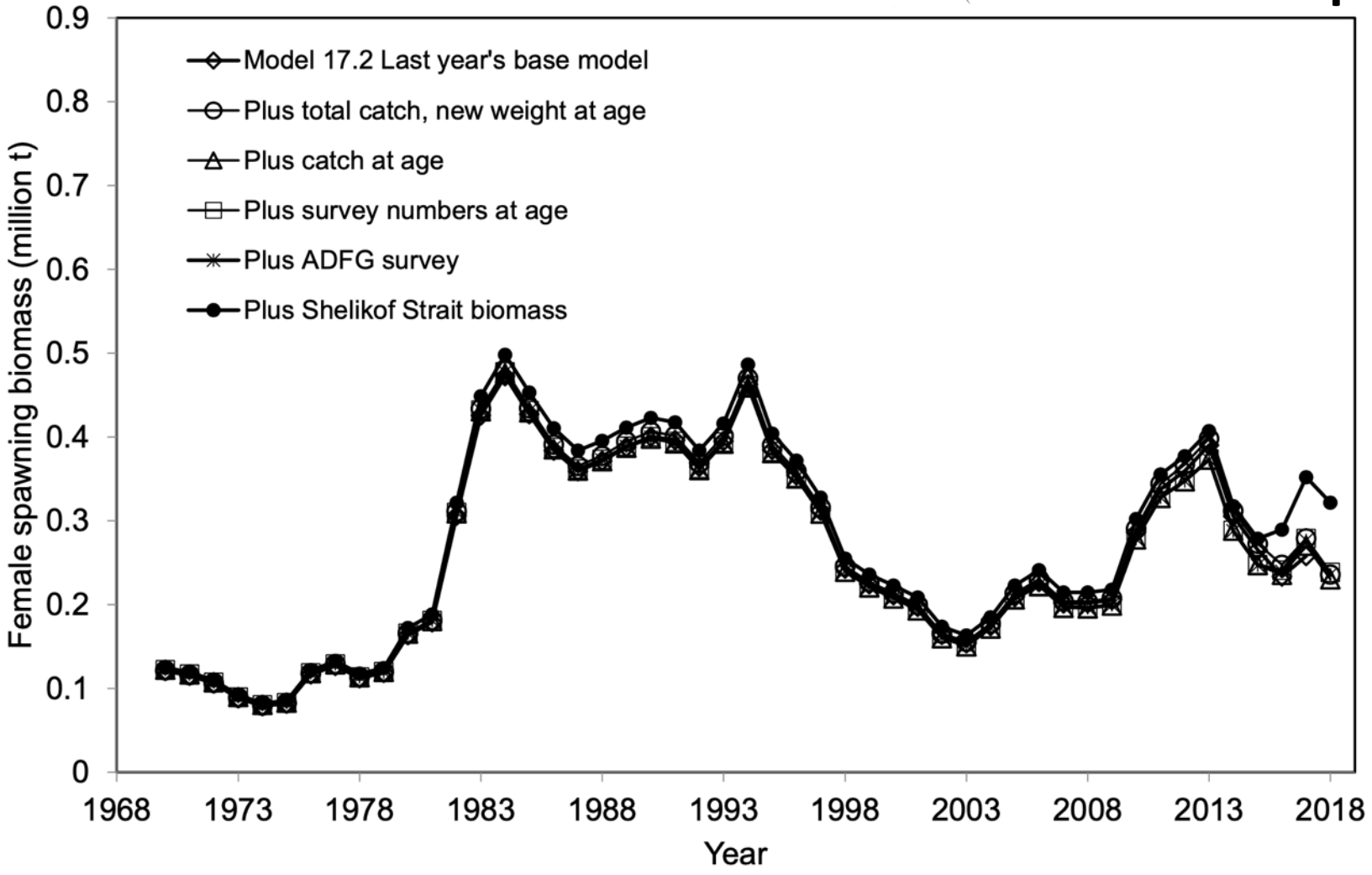
Model 19.1 Increased penalty on survey q random walk…



Sensitivity to new survey data…



GOA pollock



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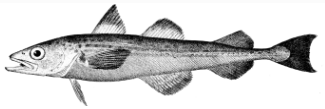
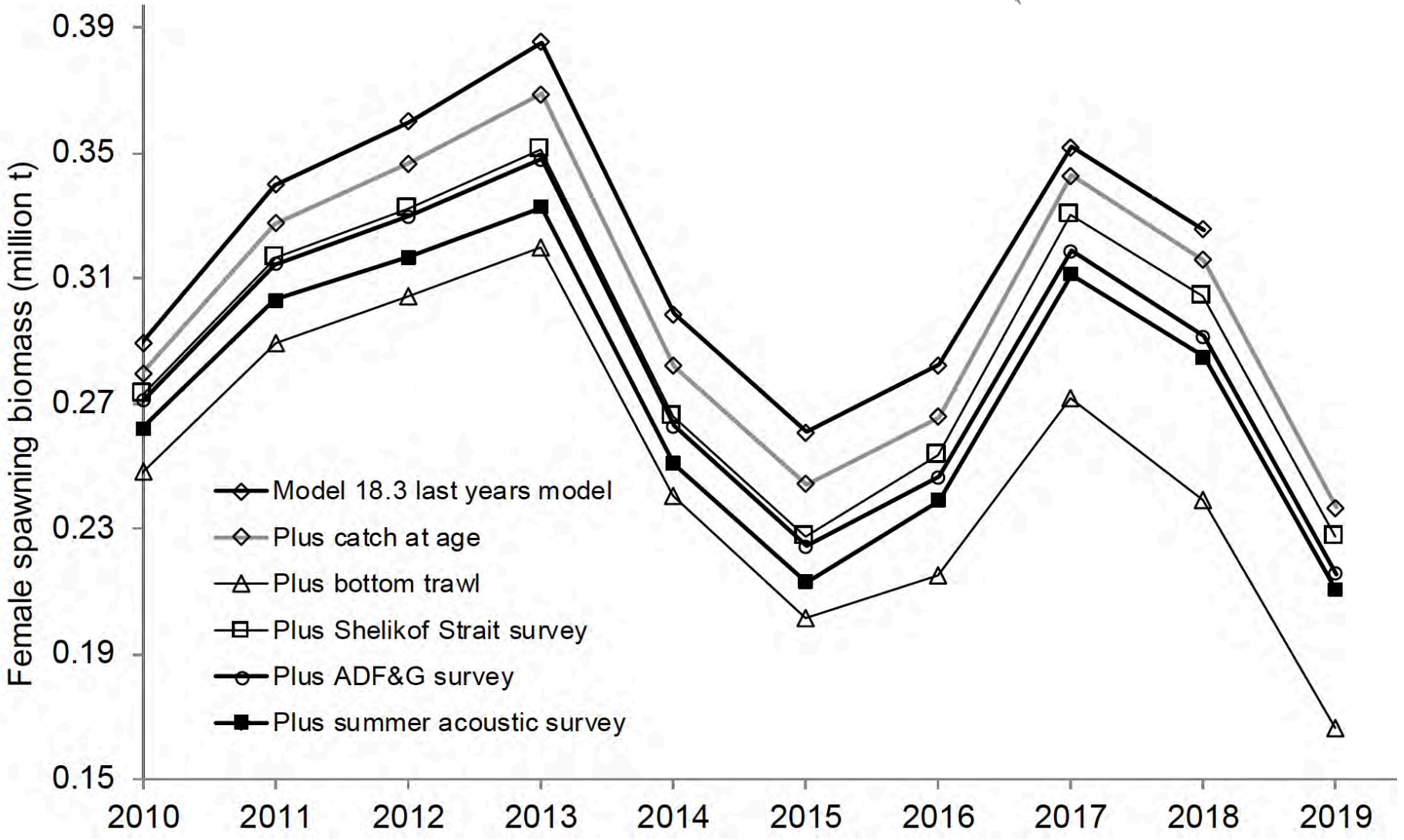
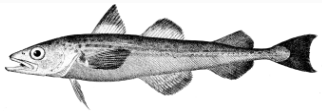
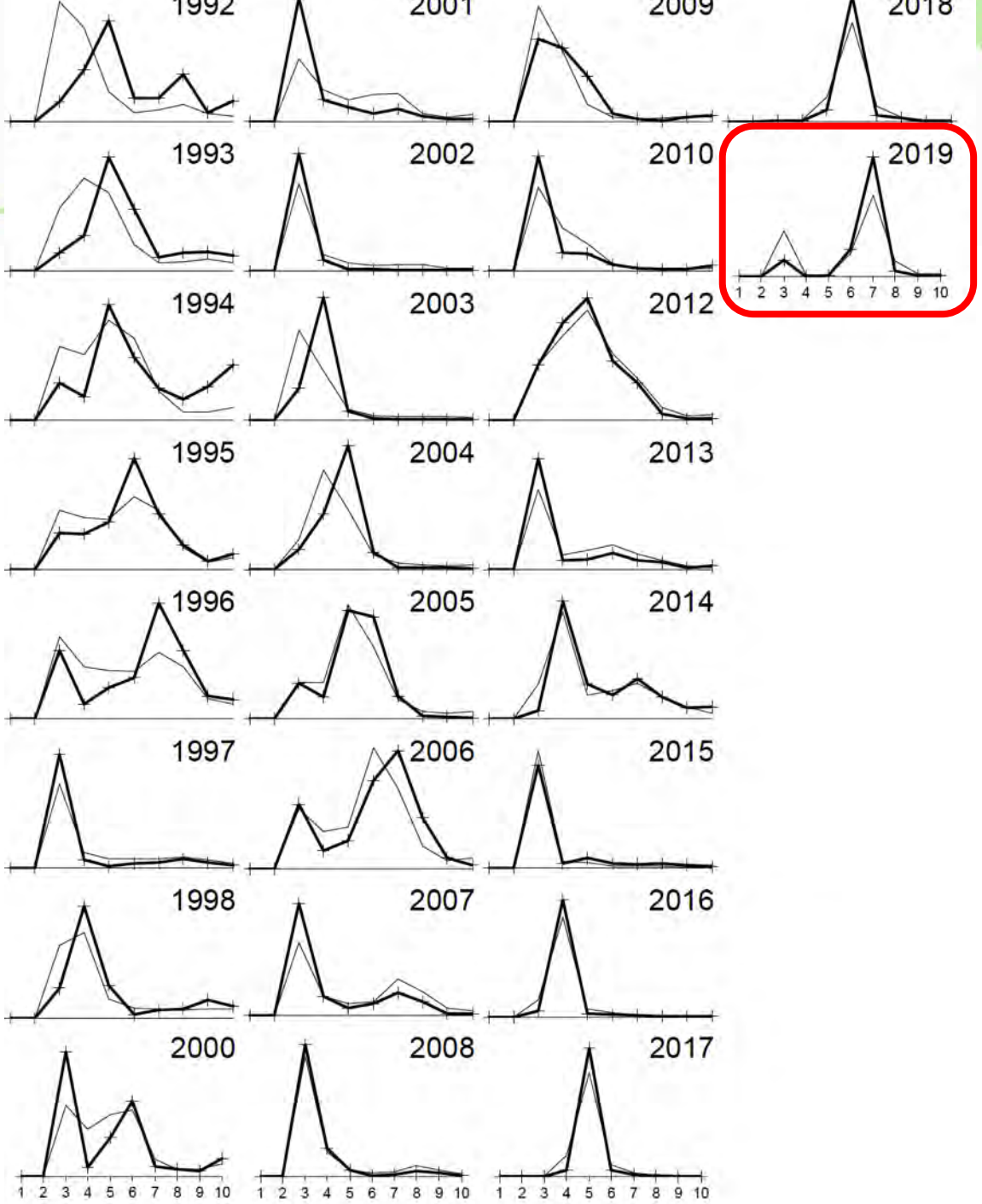


GOA pollock

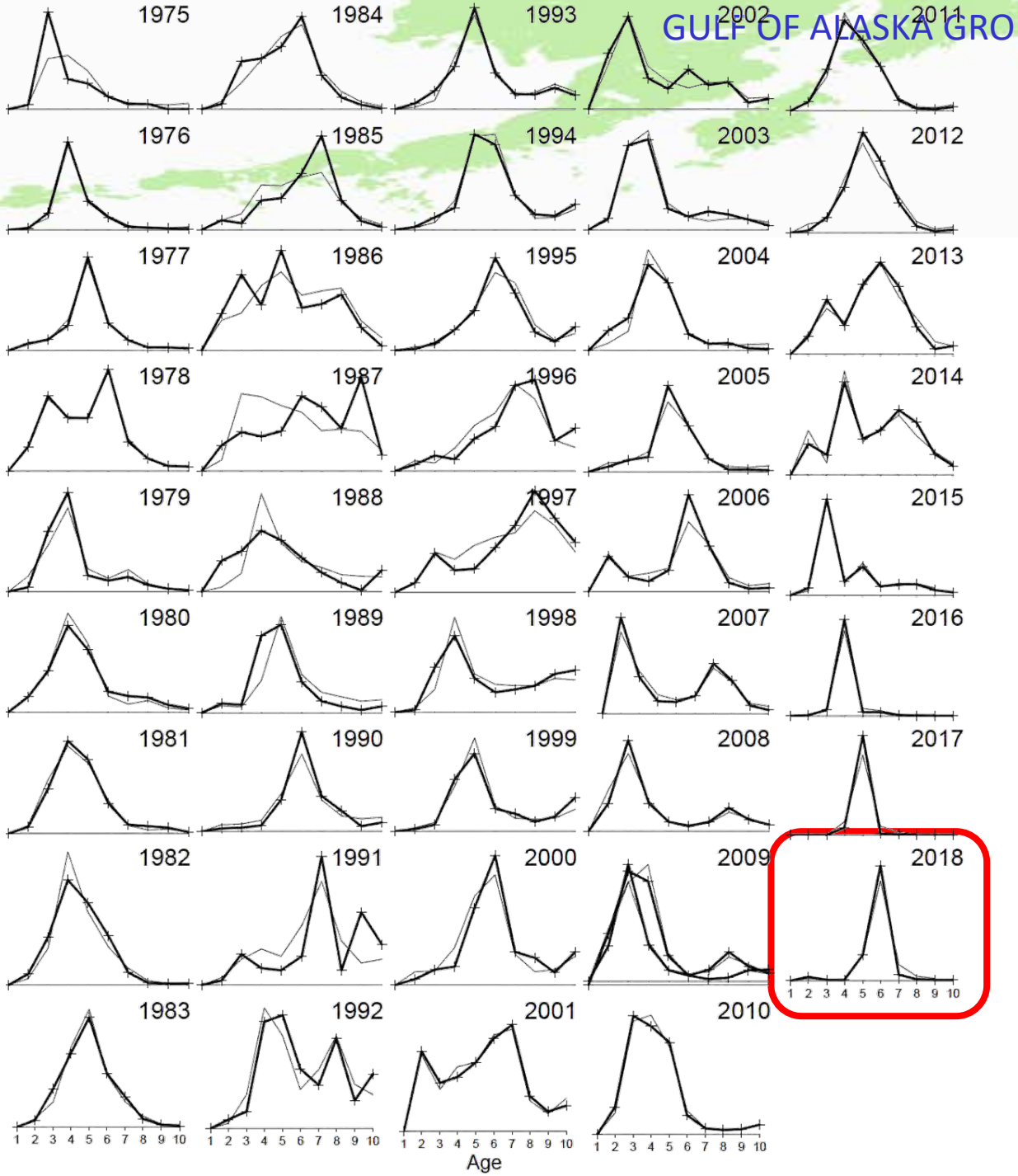




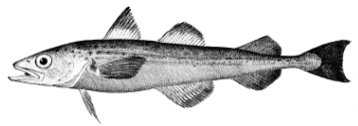
GOA pollock



Shelikof Strait survey age composition (predicted vs observed)

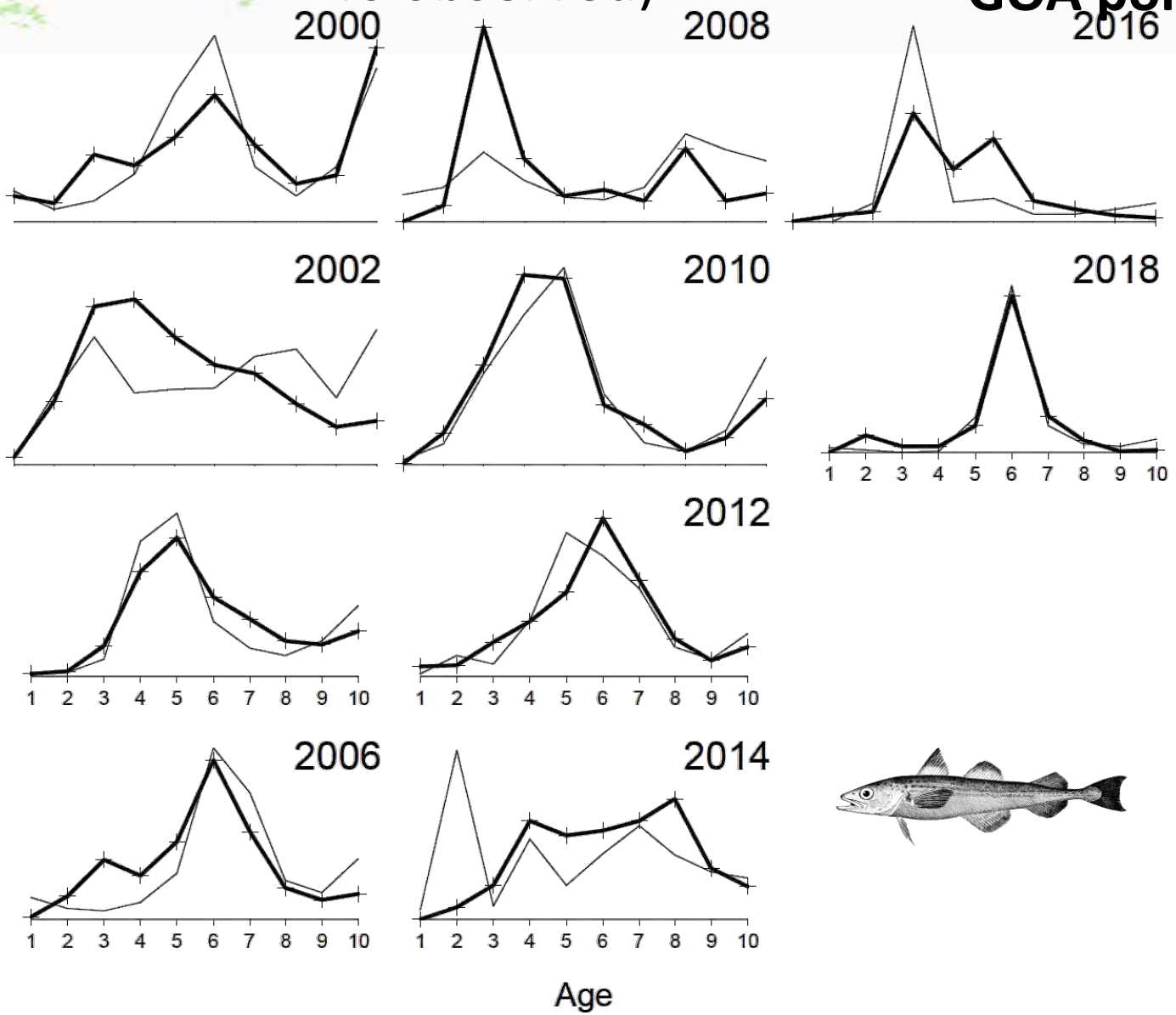


GOA pollock age composition (predicted vs observed)



ADFG bottom trawl age composition (predicted vs observed)

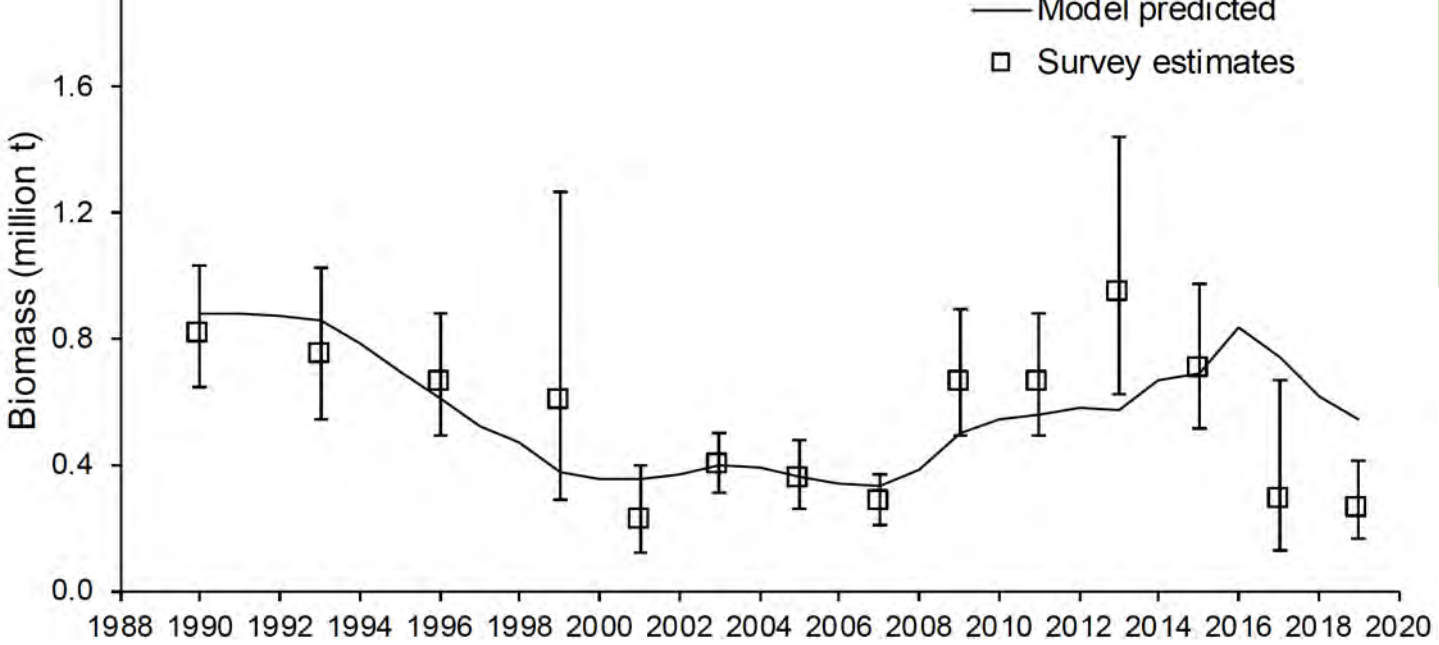
GOA pollock



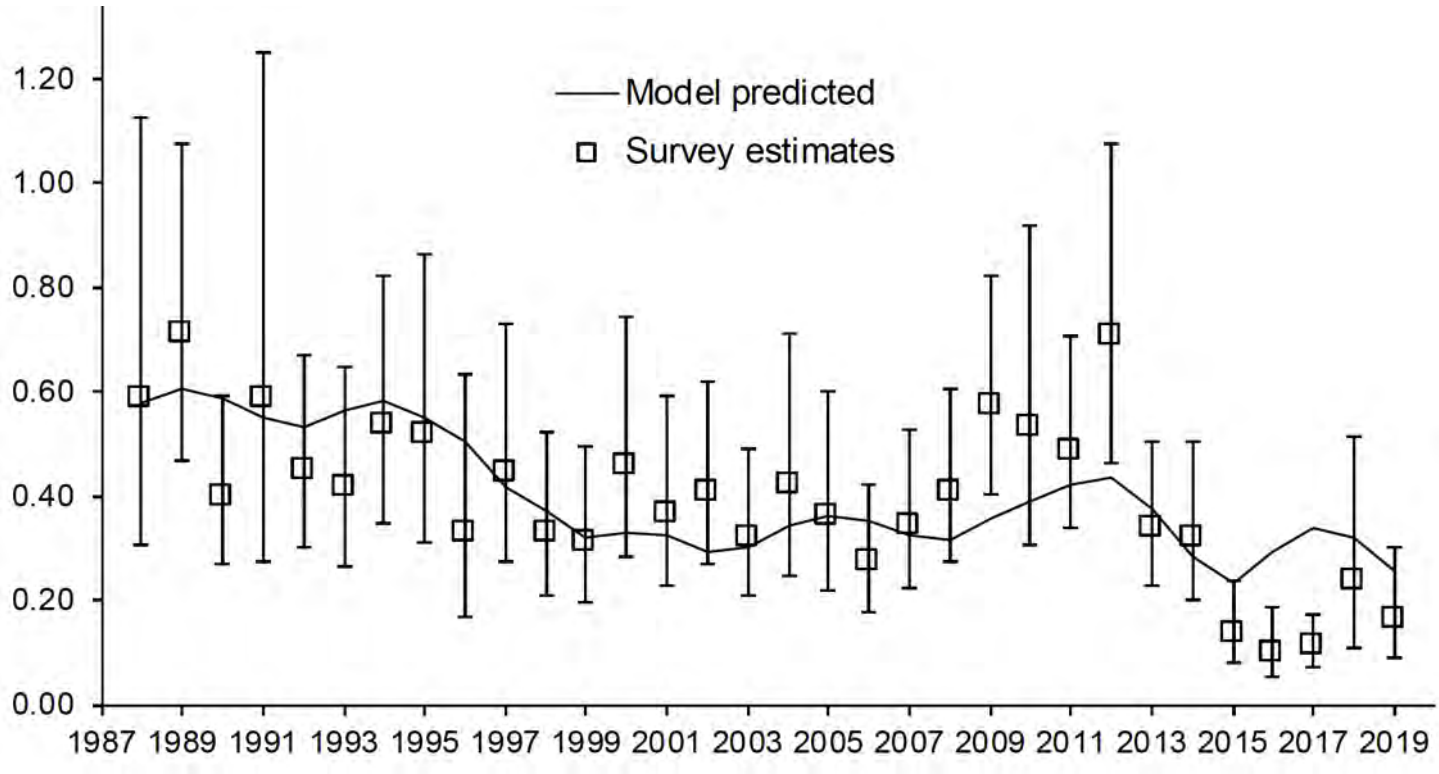
GOA pollock

GUL

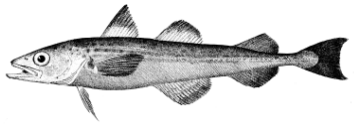
NMFS bottom trawl survey

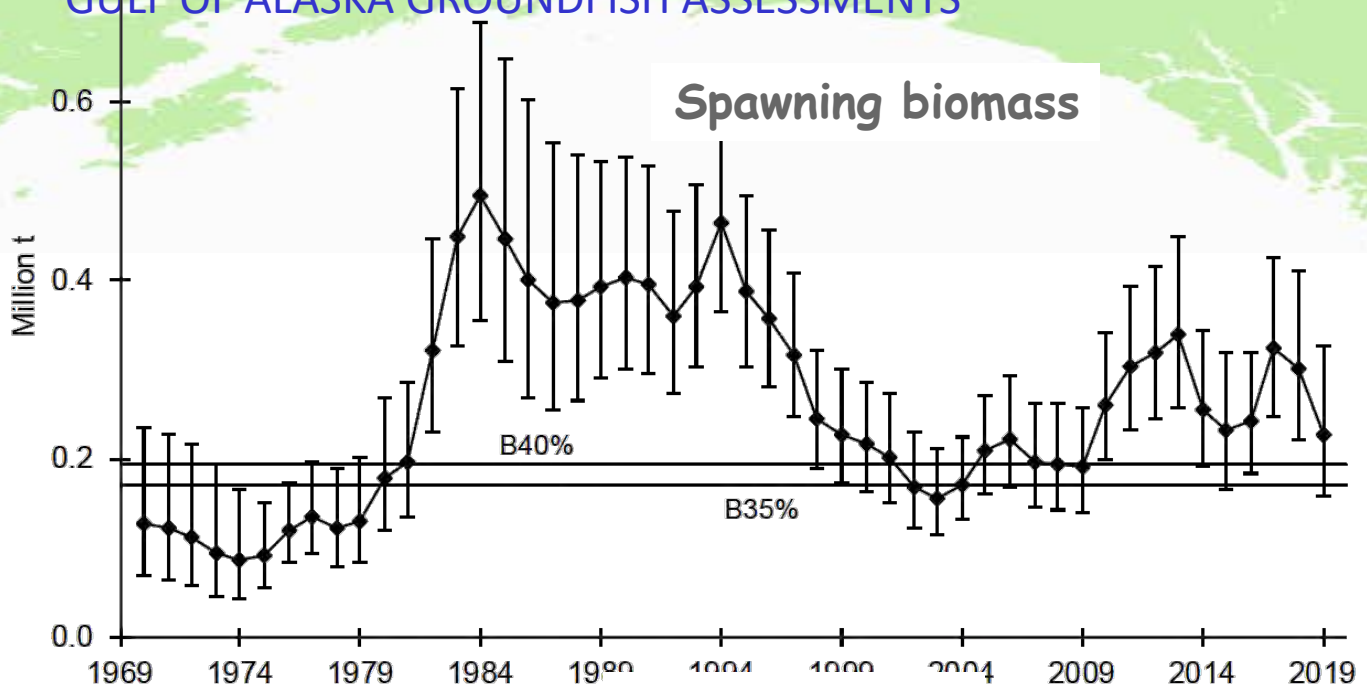


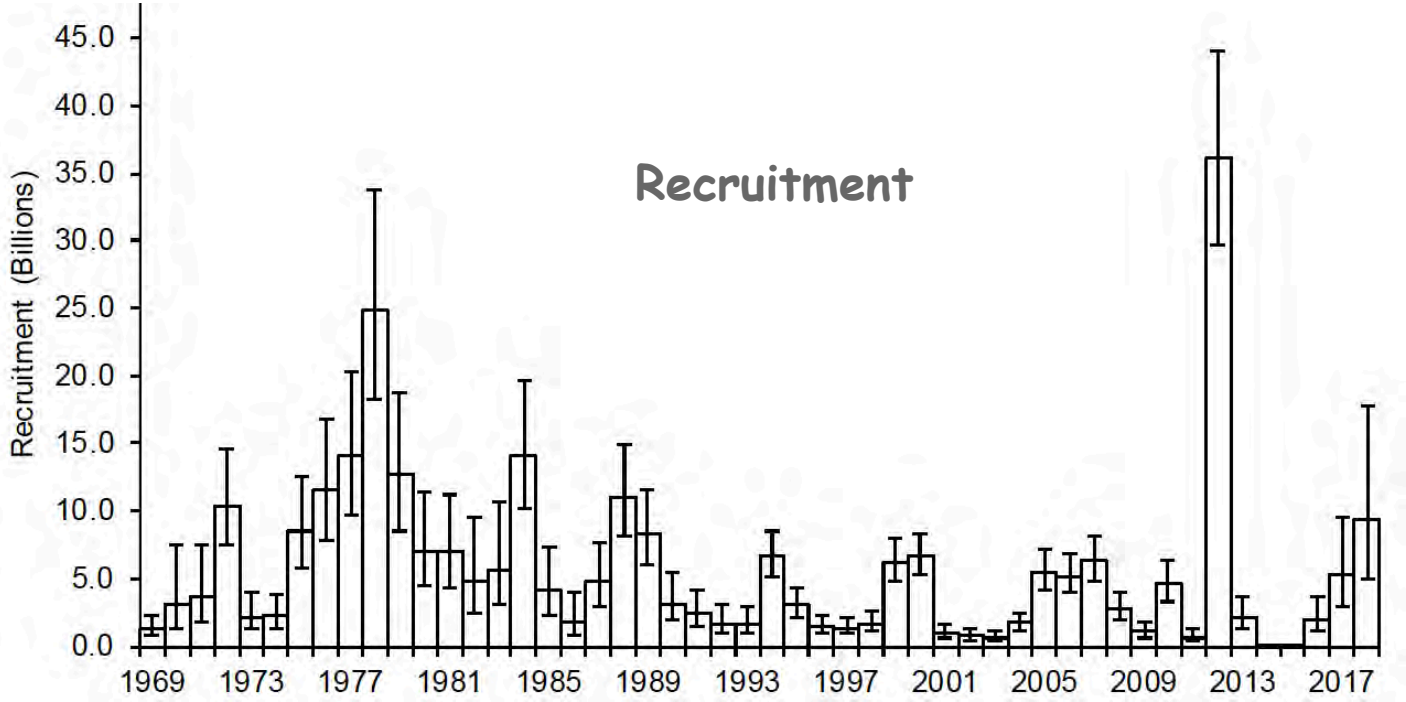
ADFG trawl survey



GOA pollock model results







GOA pollock ESP

- National initiatives and AFSC research priorities led to doing an ecosystem and Socioeconomic profile (ESP) for Gulf of Alaska (GOA) walleye pollock
- Research that improves our understanding of environmental and climate forcing of ecosystem processes specifically to improve stock assessment and management supported by AFSC
- Standardized framework applied—can it help assessment and management advice?

Potential application for better clarity on uncertain aspects of assessment…

GOA pollock ESP

ESP steps: (paraphrased…)

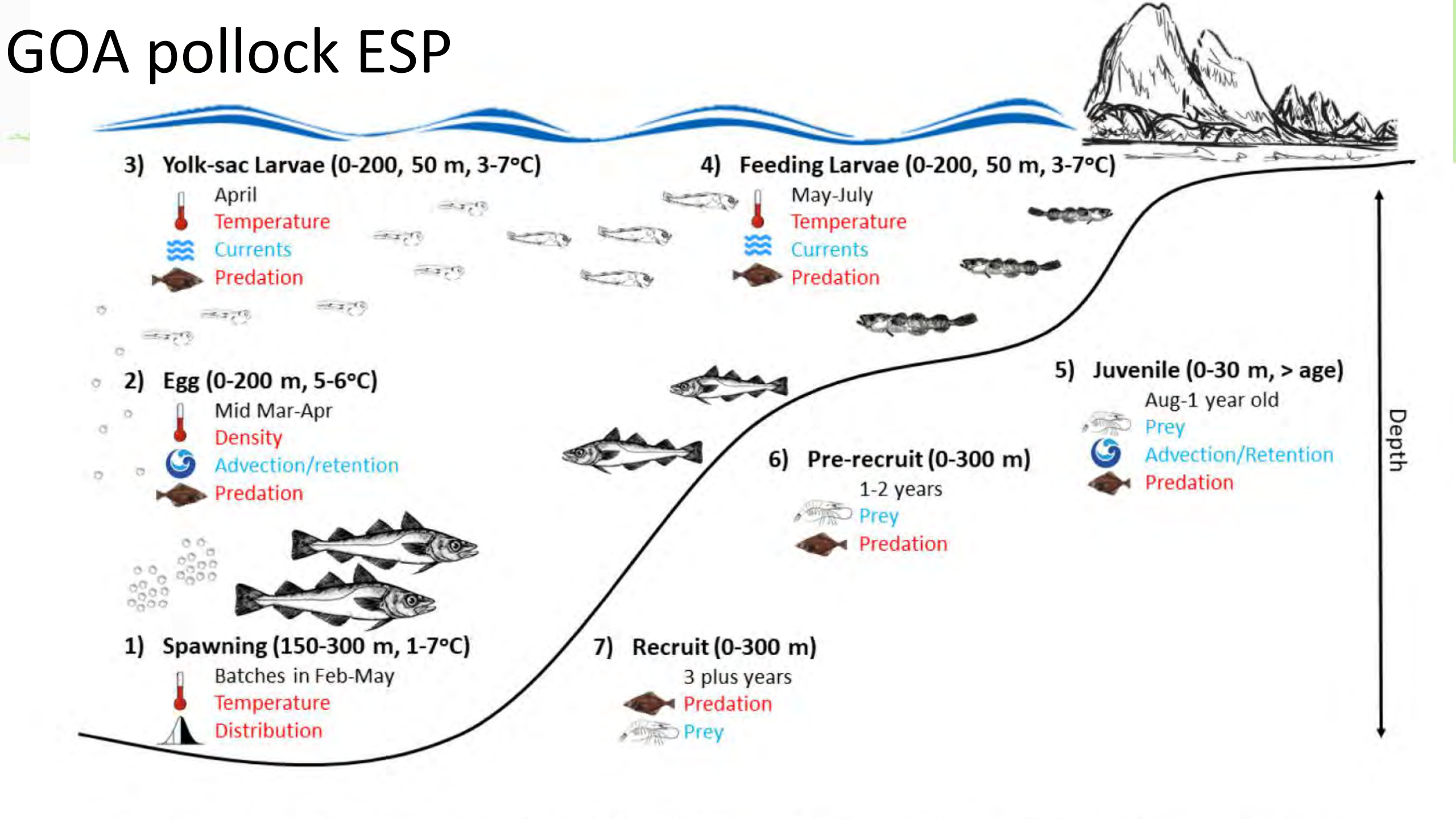
1. Evaluate national initiative and stock assessment classification scores against regional research priorities

2. Identify potential vulnerabilities and bottlenecks over life history stages to aid indicator selection (via mechanistic hypotheses)

3. Examine indicators using appropriate statistical approaches given available data

4. Use standardized template to report on ecosystem and socioeconomic considerations, data gaps, caveats, and research priorities

GOA pollock ESP



Ecosystem Processes

- Spawning-egg and larval stages-recruits-

Indicator Suite

- Organization
  - By trophic level following ecosystem status report
  - GOA pollock life history stages and socioeconomics
- Summary
  - 21 total ecosystem: 15 current year, 6 not updated
  - 5 total socioeconomic: 3 current year, 2 not updated

Category	Total	2019	Gap
Physical	4	3	1
Zooplankton	4	4	0
Larval & YOY	5	4	1
Juvenile	2	0	2
Adult	6	4	2
Socioecon	5	3	2

Traffic Light

- Evaluated for current year
  - Ecosystem: 5 poor, 12 stable
  - Socioecon: 1 good, 2 stable
- Summary
  - Physical indicators poor with increased heat, prey stable
  - Larvae/YOY poor, but adult condition, predators stable
  - Good/stable socioecon

Category	Good	Poor	Stable
Physical		3	
Zooplankton			4
Larval & YOY		2	2
Juvenile			
Adult			4
Socioecon	1		2

Indicator Considerations

Socioeconomic

Fishery CPUE above average since 2016, consistent with stock biomass

Drop in ex-vessel price and in roe per-unit catch in 2014/2015

- Rebounded in 2018/2019

Percent revenue in Kodiak from GOA pollock reached high in 2018

- High level of reliance on GOA pollock fishery by Kodiak residents

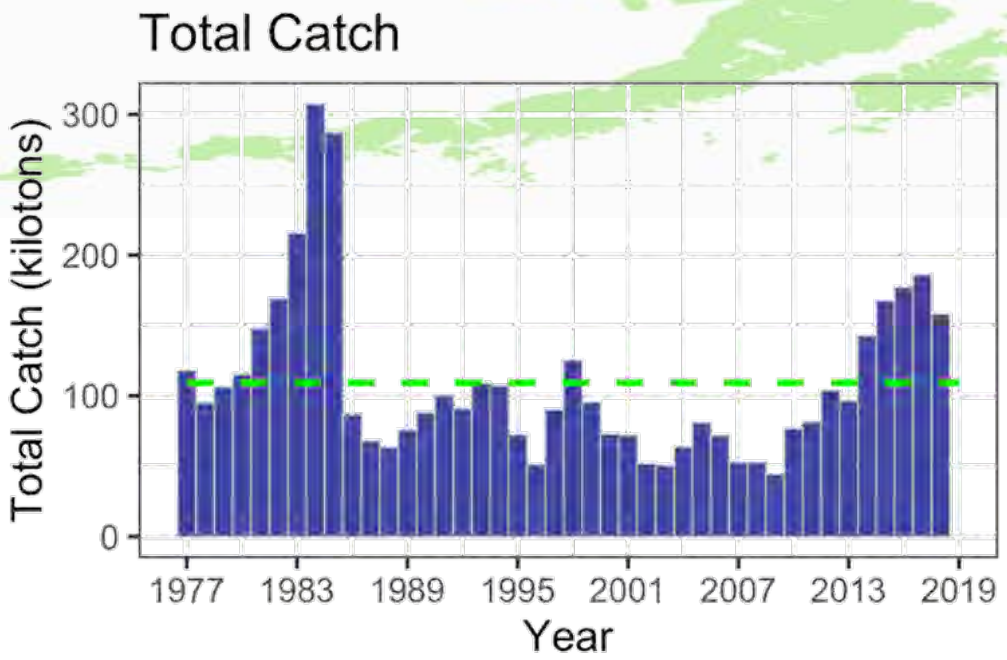
Gaps & Future

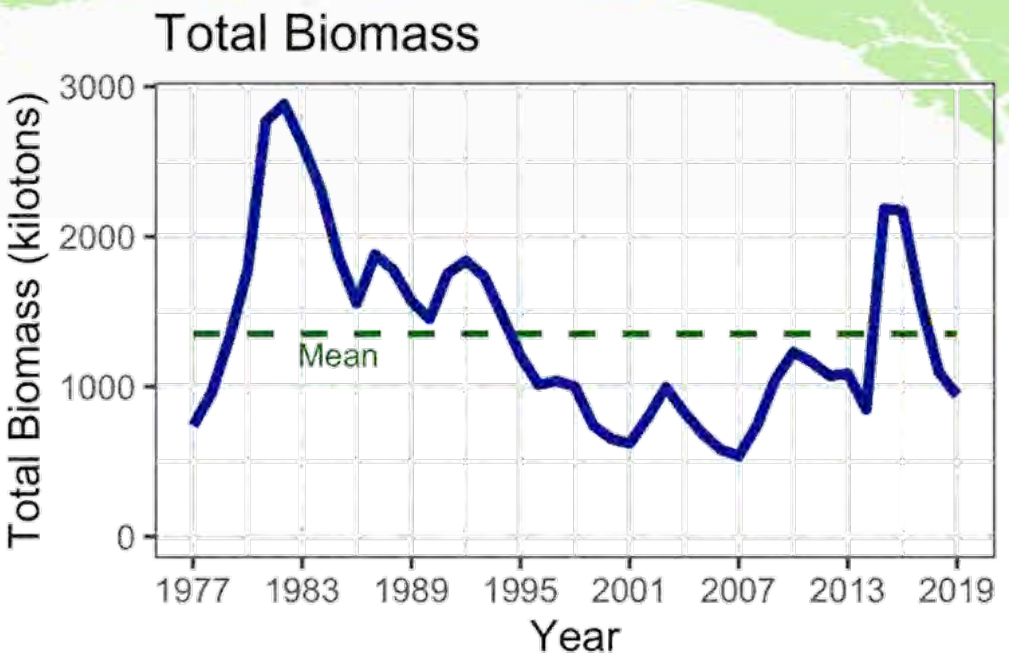
- **Continuity of indicator series**
  - Investigate remote sensing, climate model options
  - Refinement of GOA CEATTLE model

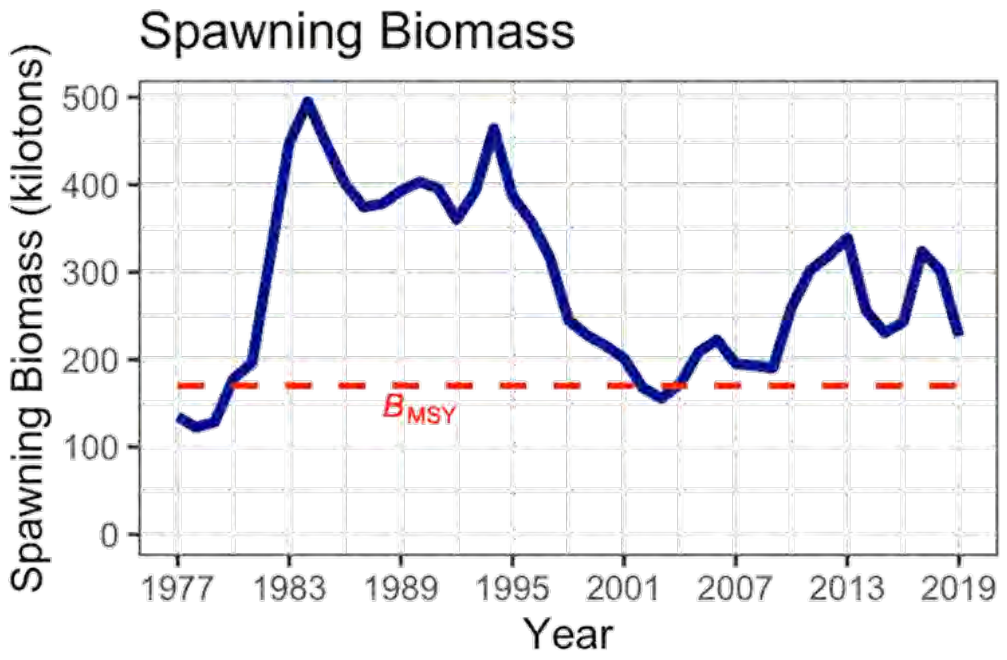
Alternative Indicators

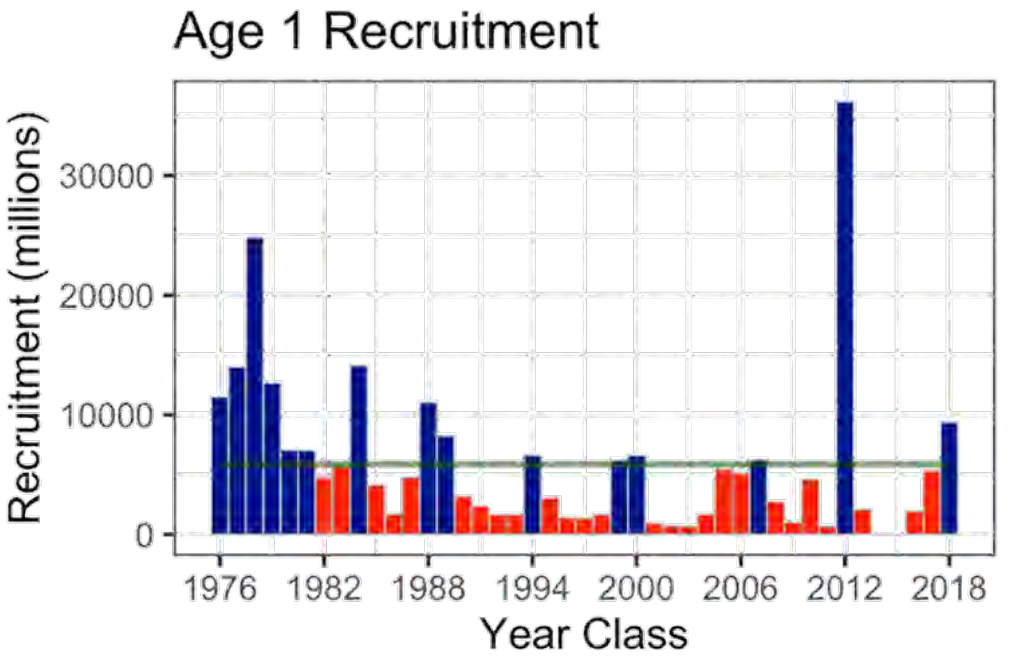
- Upcoming competitors (sablefish, POP)
- Condition, energy density at edges of range

- **Next Year**
  - ESP modeling workshop (March 10-12, 2020)
  - Potentially conduct partial ESP


Total Catch
Total Catch (kilotons)
300
200
100
0
1977
1983
1989
1995
2001
2007
2013
2019
Year

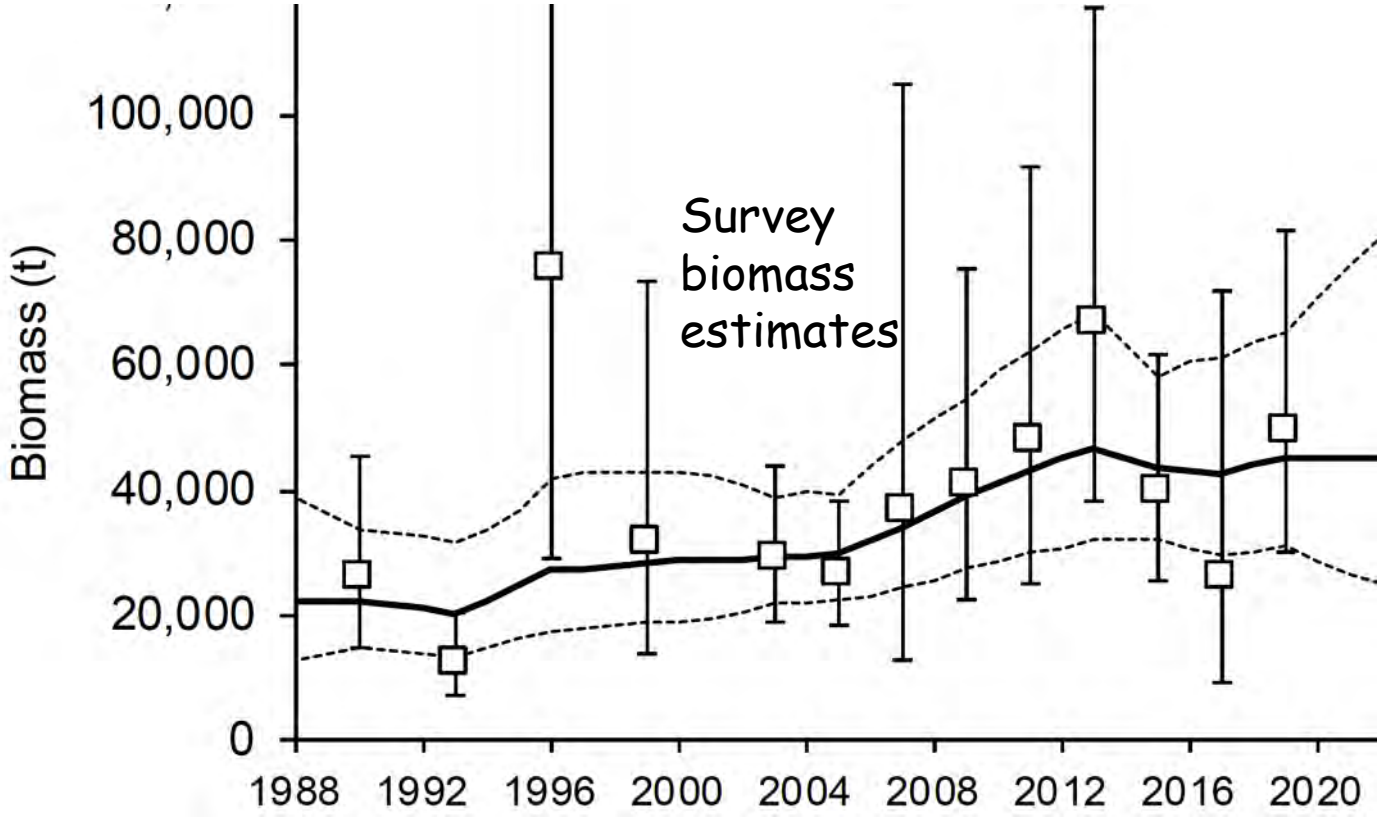

Total Biomass
Total Biomass (kilotons)
3000
2000
1000
0
Mean
1977
1983
1989
1995
2001
2007
2013
2019
Year

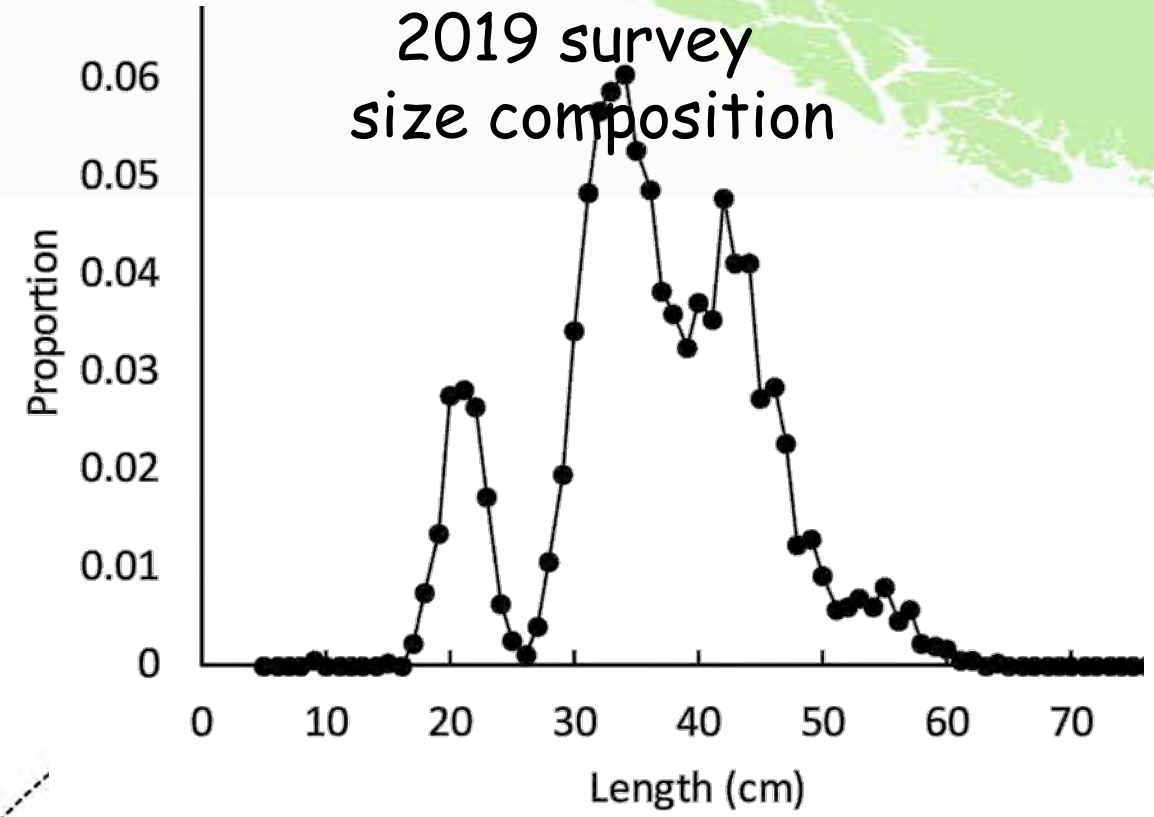

Spawning Biomass
Spawning Biomass (kilotons)
500
400
300
200
100
0
B_{MSY}
1977
1983
1989
1995
2001
2007
2013
2019
Year


Age 1 Recruitment
Recruitment (millions)
30000
20000
10000
0
1976
1982
1988
1994
2000
2006
2012
2018
Year Class

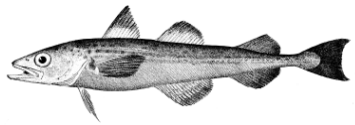
EGOA pollock (Tier 5)

EGOA Pollock	Biomass	OFL	ABC
2019	45,103	13,531	10,148
2020		13,531	10,148

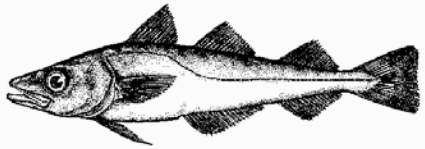




Random effects model



Gulf of Alaska pollock
Authors' risk table evaluation



Assessment-related considerations	*Population dynamics considerations*	*Environmental/ ecosystem considerations*	*Fishery Performance*	*Overall score (highest of the individual scores)*
Level 2: substantially increased concerns	Level 1: no increased concerns	Level 1: no increased concerns	Level 1: no increased concerns	Level 2: Substantially increased concerns

Overall score is Level 2: Substantially increased concerns.
Author's recommended ABC = 90% of maximum permissible (10% buffer)

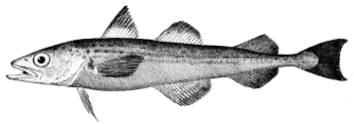
- based on mode of historical buffers.

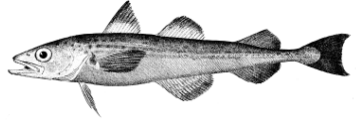
GOA Pollock Team discussions

Relative to reductions from maximum permissible:

The Team

- Agreed with the scoring of level 2
- Concurred with the author's 10% reduction—but on the premise that it was consistent with keeping fishing mortality stable

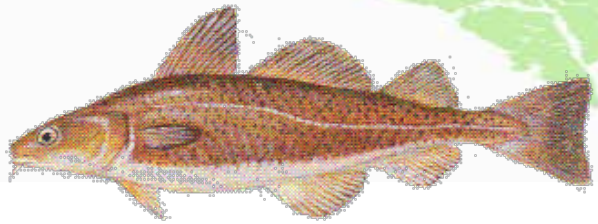




Team discussions—GOA pollock

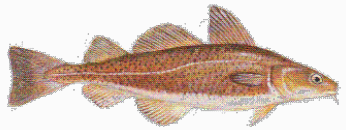
- **The Team recommended…**
  - a re-analysis of maturity at length and age be made for individual cohorts, which would prevent poor estimates for years where age and size diversity is low, such as 2004 and 2017.
  - the author examine fishery selectivity, as persistent patterns in the residuals of observed and model fitted catch-at-age may represent artifacts of the selectivity functional form used.
  - the author ensures adequate fishery data is collected and available due to the observer program implementation of Electronic Monitoring.
  - the author explore better methods for constraining the time varying catchability parameter to be under 1 for the Shelikof Strait acoustic survey.
  - An exploration of combining the Acoustic summer survey and the GOA bottom trawl survey using a VAST framework, similar to the approach used by Cole Monahan for EBS pollock surveys.

2. GOA Pacific cod



Species	2019 Catch	2019	2020	Change
Pollock	117,019	144,623	118,642	down 25,981 (18%)
Pacific Cod	10,909	17,000	14,621	down 2,379 (14%)
Sablefish	12,219	11,571	14,393	up 2,822 (24%)
Flatfish	27,638	116,562	114,567	down 1,995 (2%)
Arrowtooth flounder	2,553	145,841	128,060	down 17,781 (12%)
Rockfish	32,730	46,946	47,450	up 504 (1%)
Atka mackerel	1,254	4,700	4,700	same (0%)
Skates	3,042	7,804	6,670	down 1,134 (15%)
Other Species	2,618	14,460	14,363	down 97 (1%)
Total	209,982	509,507	463,466	down 46,041 (9%)

GOA Pacific cod



- Presentation from author

GOA Pacific cod

Team recommended

- that the author coordinate with IPHC to obtain and evaluate length compositions so that the IPHC RPN index can be investigated within the assessment model.
- that the author work with the AFSC FMA Division (Observer Program) to identify alternative ways to collect information on cod for 2019 and beyond
  - …given the likelihood of a reduced fishery and expanding displacement of observers with EM and that these efforts should complement ADFG data collection efforts.

GOA Pacific cod

Team discussions

The Team recommended that the author coordinate with IPHC to obtain and evaluate length compositions so that the IPHC RPN index can be investigated within the assessment model.

Further ABC reductions?

- Consistent with last year's recommendation as adopted by the SSC
- Assurance that spawning biomass above 20% of unfished

The Team recommended that the author investigate the role that fishery catch has had on the decline in abundance. That is, project estimated historical recruits forward without fishing mortality.

- This should help discern the extent that the stock declines are the result of environmental conditions versus the impact of fishing.

GOA Pacific cod

Team discussions

ABC reductions from risk table?

The Team agreed that a reduction from *maxABC* is warranted, given the concerns highlighted in the risk table, but concurs with the author to defer to the SSC to set the specific reduction percentage

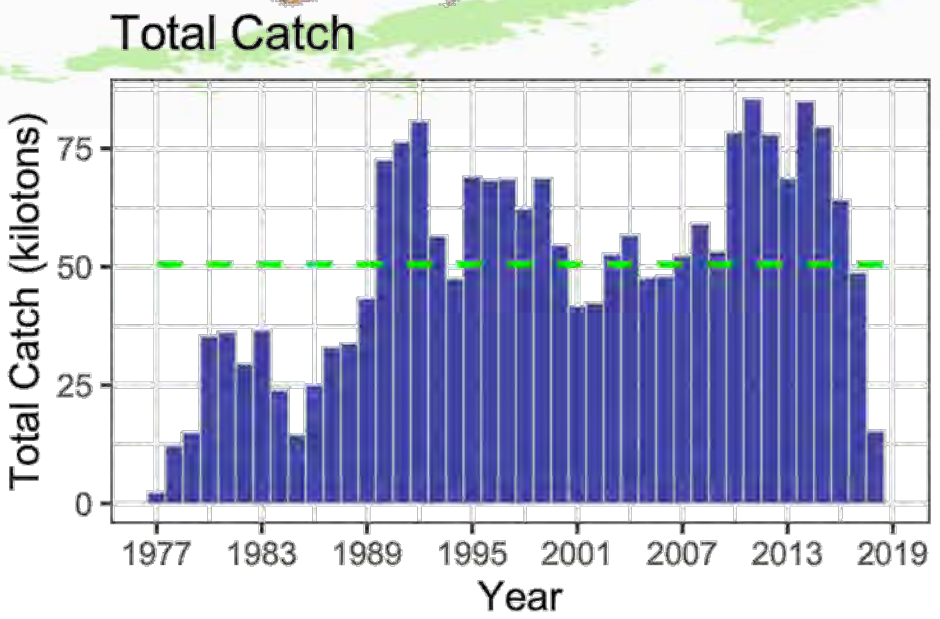
GOA Pacific cod

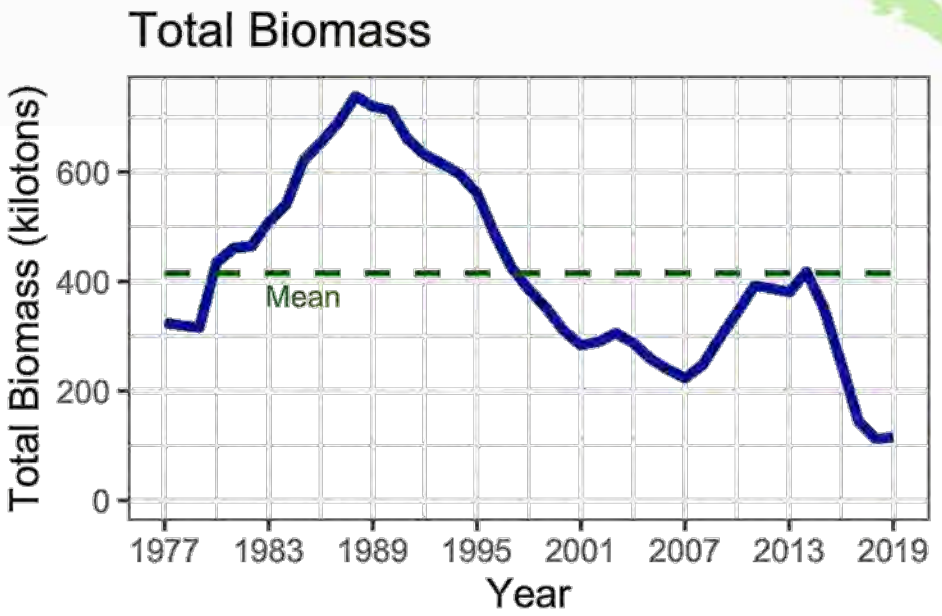
Apportionment

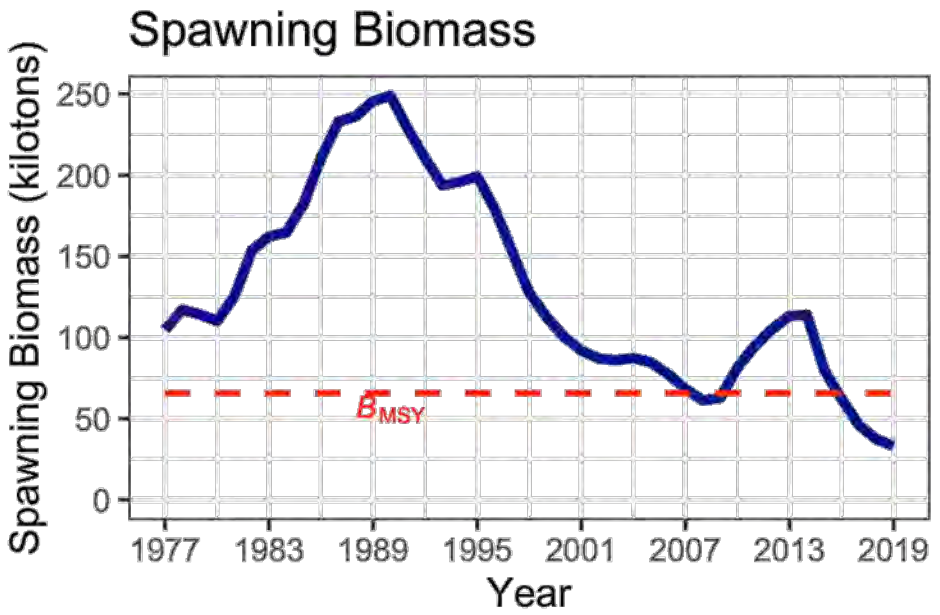
The Team proposed apportionment percentages that are an average between the apportionments estimated in 2017 and 2019 as an alternative to the 2019 random effects model results.

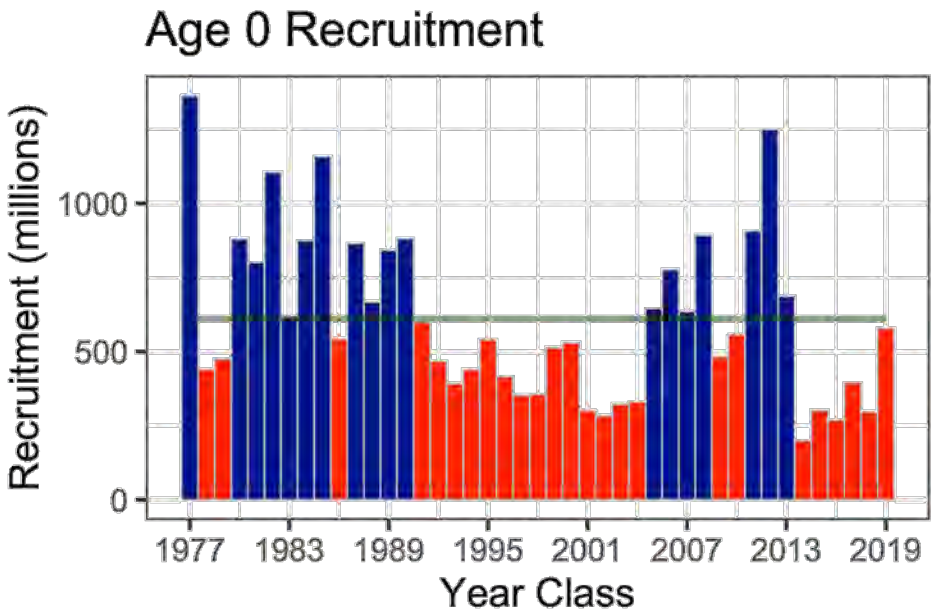
The Team also recommended that the author investigate alternatives of the random effects model that integrates multiple population indices.

GOA Pacific cod

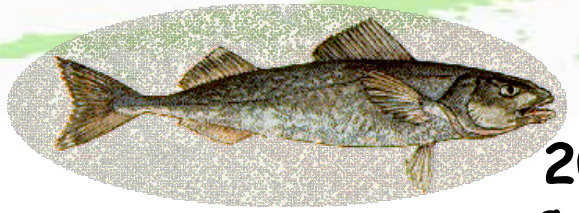








3. Sablefish



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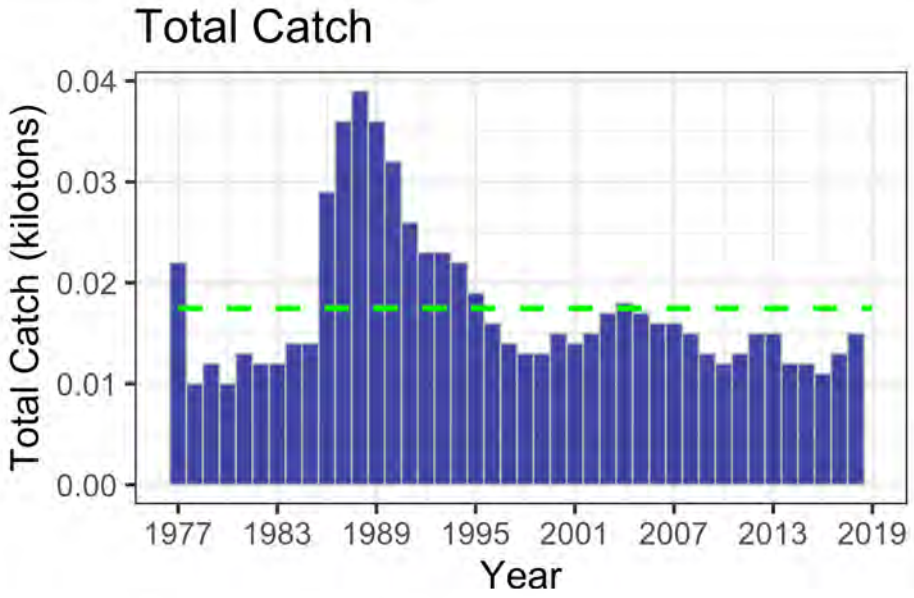
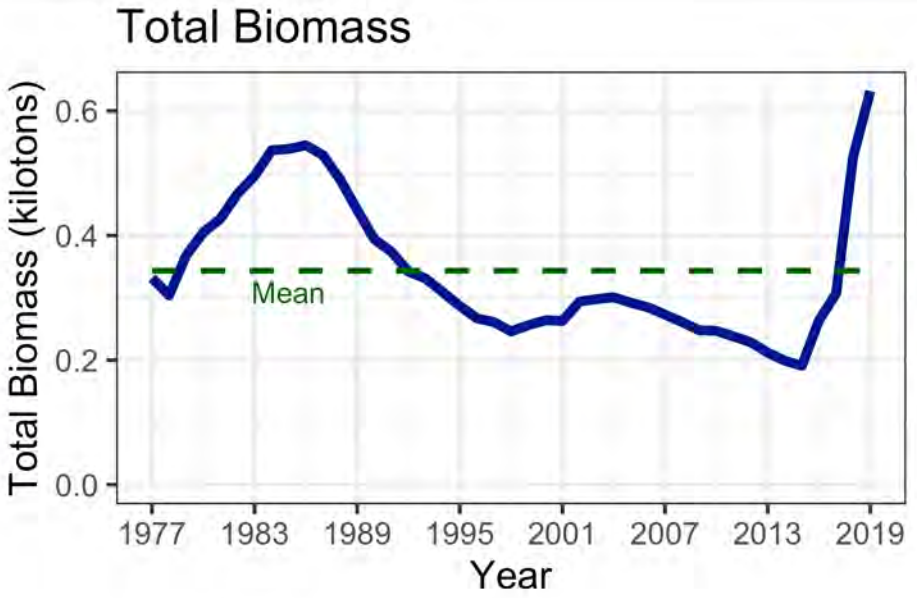
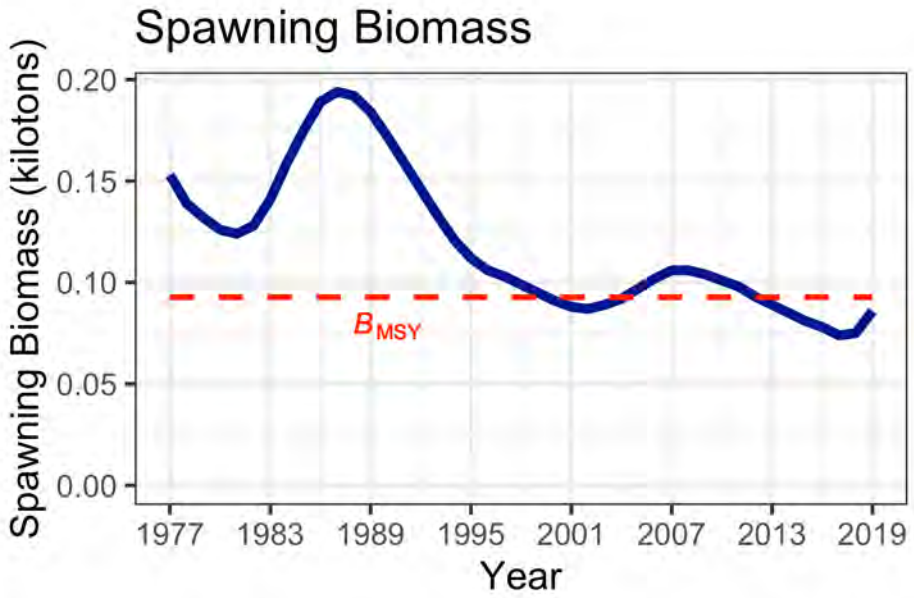
2019

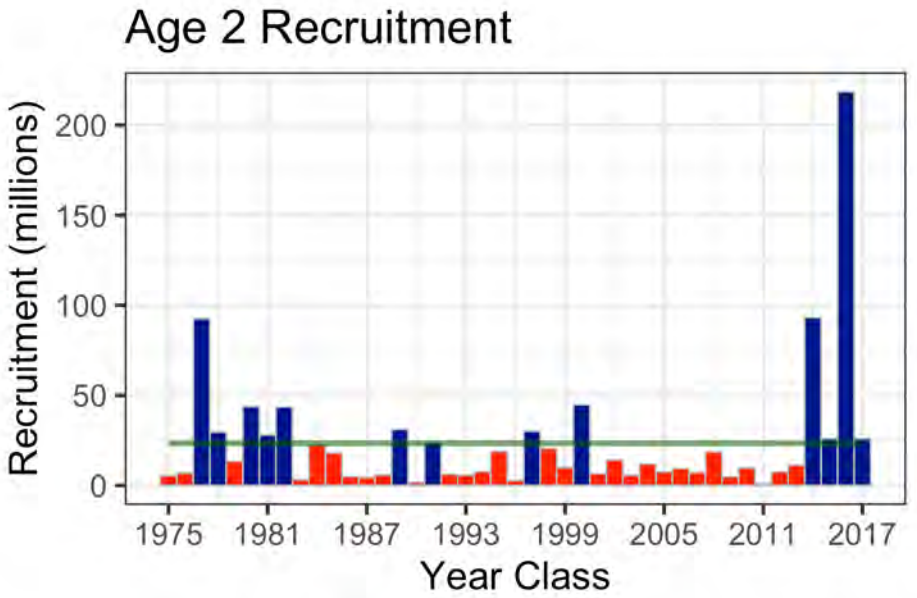
GULF OF ALASKA GROUNDFISH ASSESSMENTS

AK Sablefish

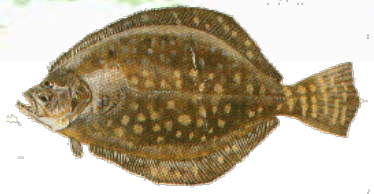








Flatfish ABC Summary



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Total	209,982	509,507	463,466	down 46,041 (9%)

Flatfish ABC's

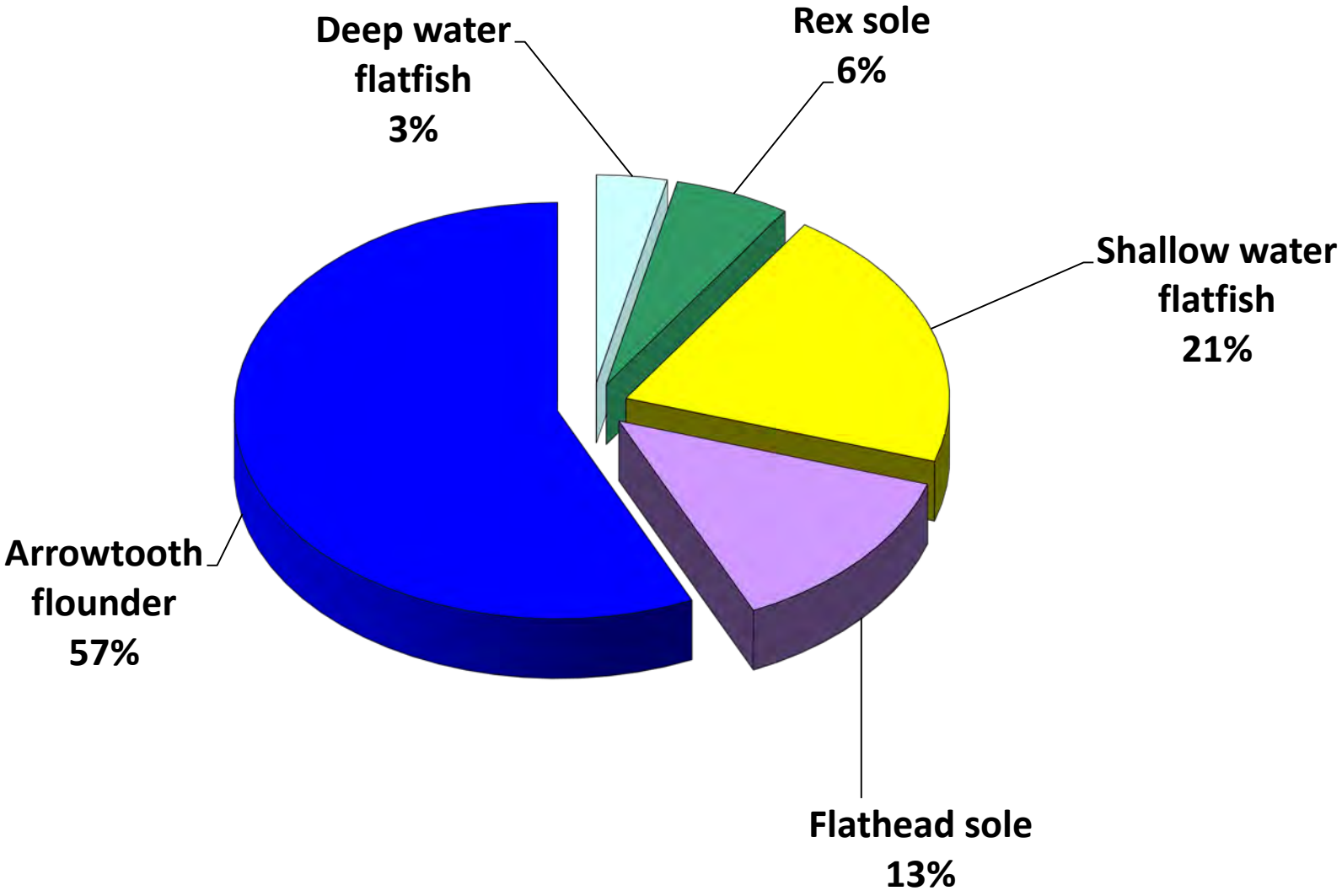
Species	2019 ABC	2020 ABC	Change
Shallow water flatfish	55,587	55,463	down 124 (0%)
Rex sole	14,692	14,878	up 186 (1%)
Deep water flatfish	9,501	6,030	down 3,471 (37%)
Flathead sole	36,782	38,196	up 1,414 (4%)
Arrowtooth flounder	145,841	128,060	down 17,781 (12%)
Subtotal	262,403	242,627	down 19,776 (8%)
Subtotal (without ATF)	116,562	114,567	down 1,995 (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 2018 ABC's

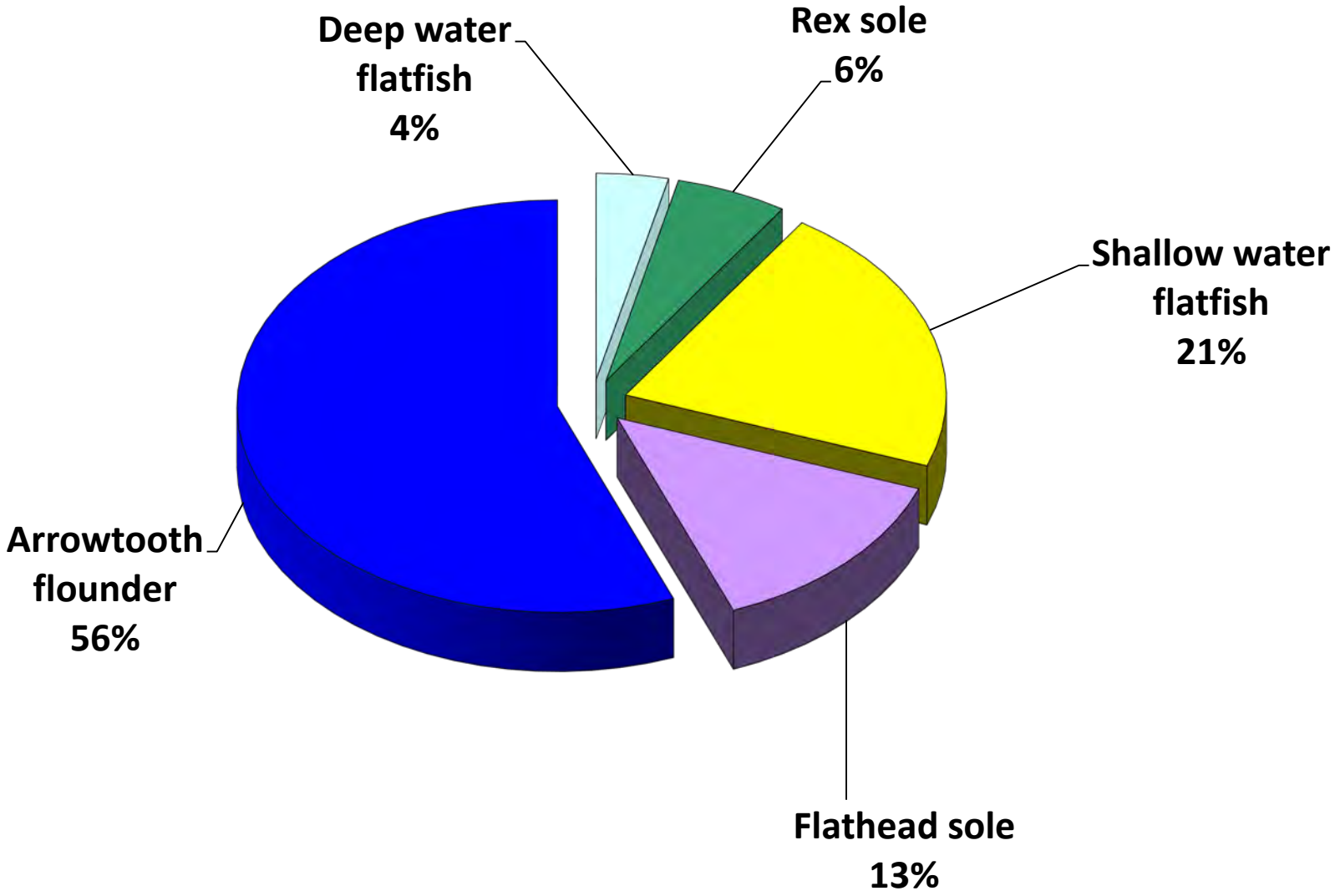
265,657 t combined



260,887

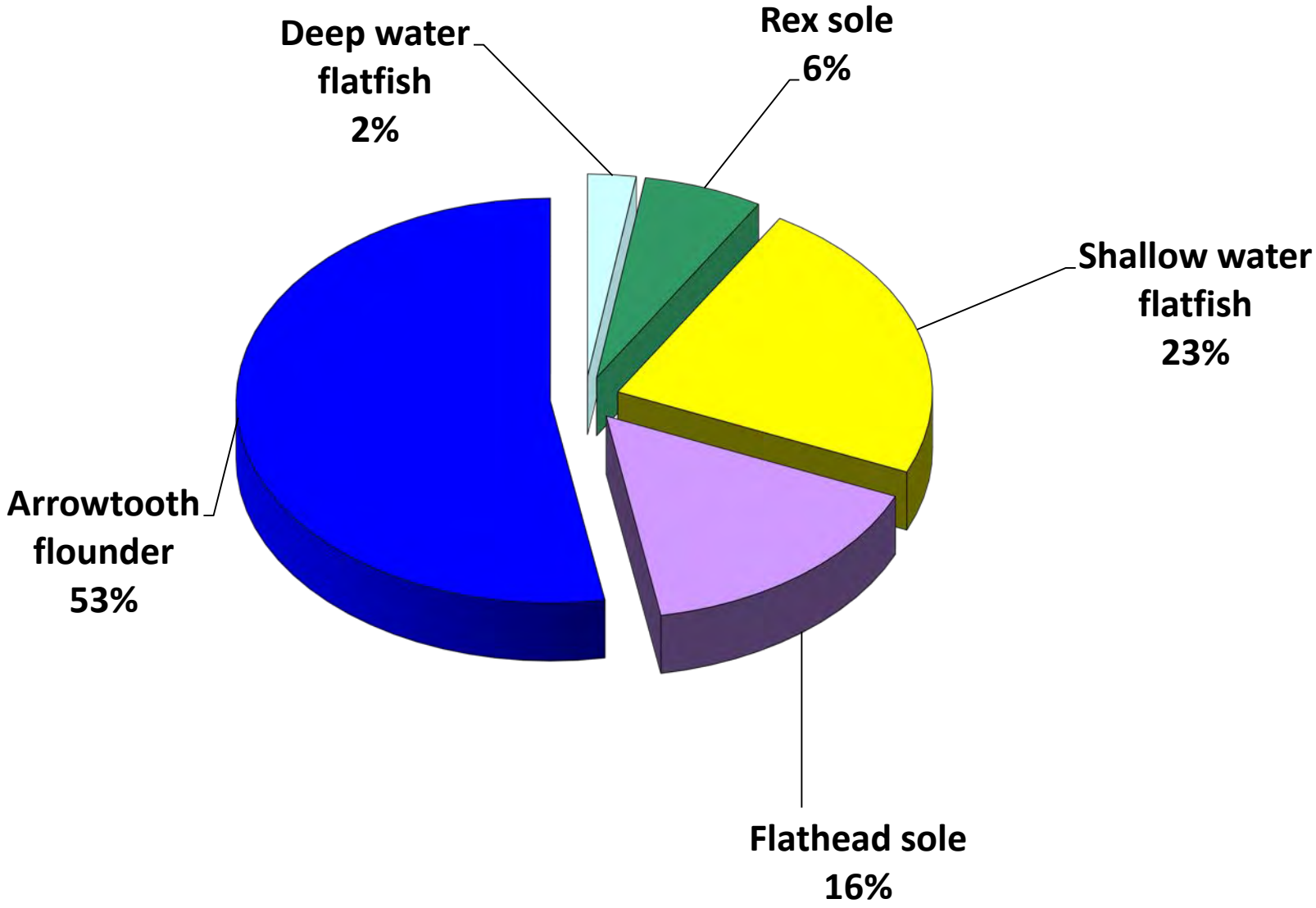
Flatfish 2019 ABC's

260,887 t combined



Flatfish 2020 ABC's

242,627 t combined



General comments on flatfish assessments

- Lightly exploited
- Analytical developments:
  - Dover and flathead sole models full in 2019

    Stock Synthesis modeling platform (SS3) application

Flatfish ABC's

Species	2019 ABC	2020 ABC	Change
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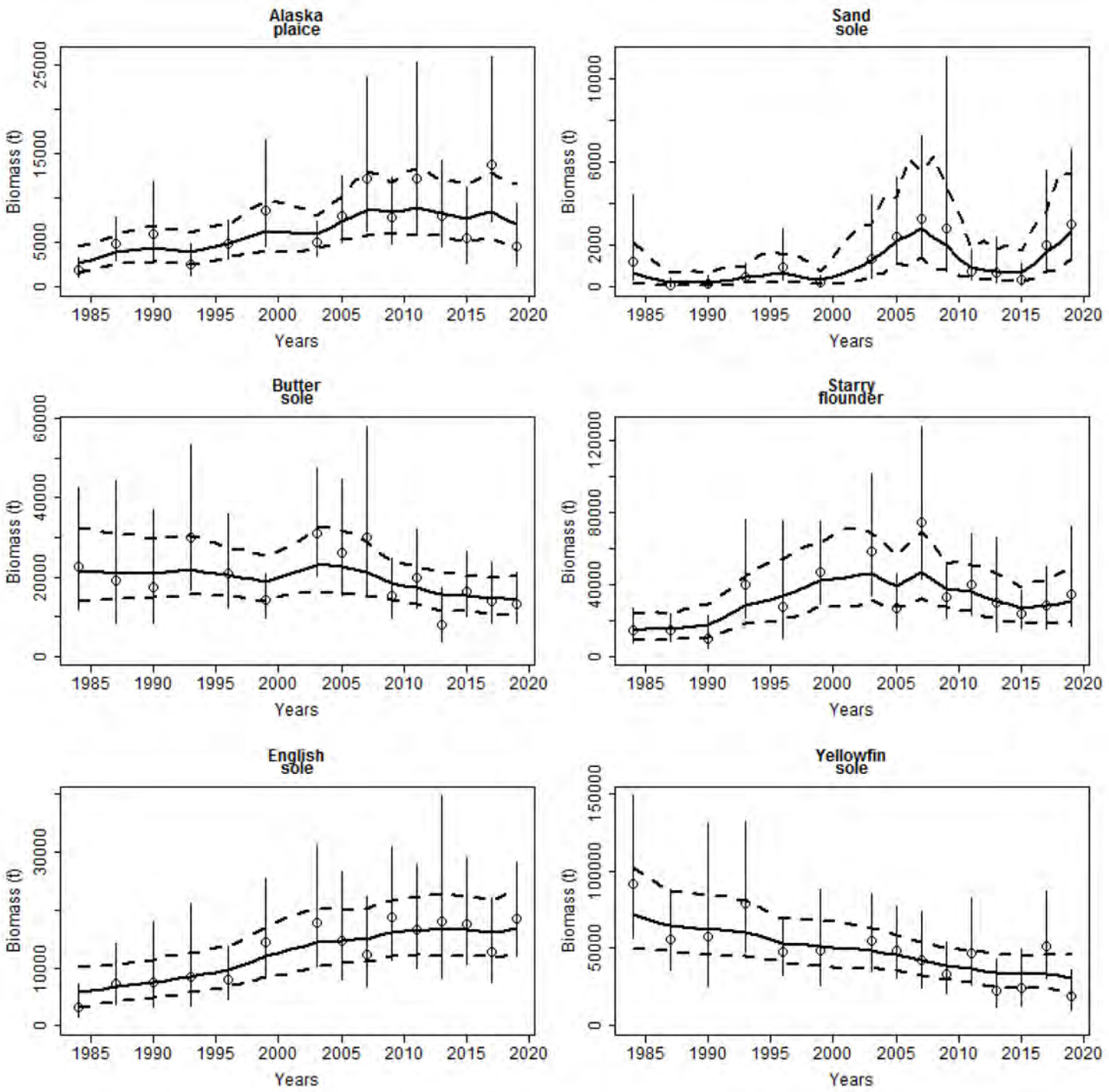
Shallow water flats: N and S rock sole Tier 3, others Tier 5

4. Shallow-water flatfish

Partial assessment

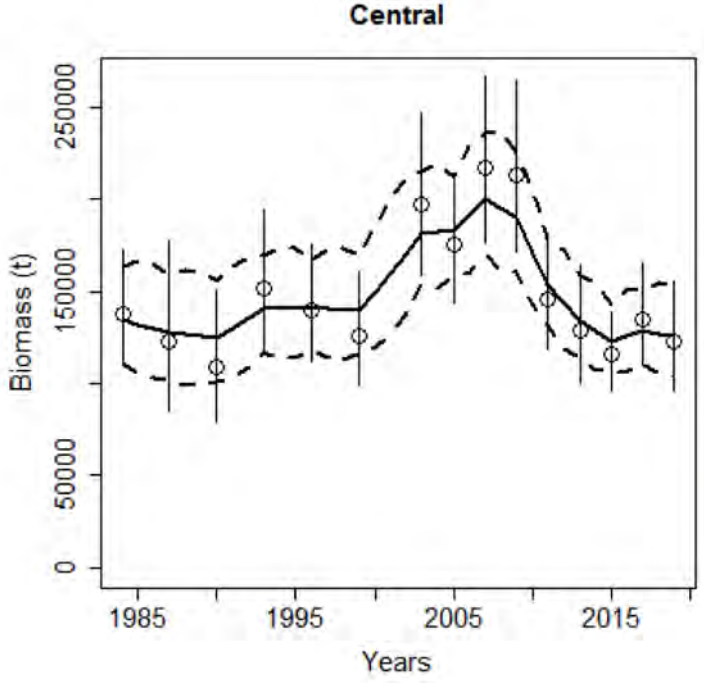
- 2019 GOA survey biomass down 7% for southern rock sole and down 28% for northern rock sole

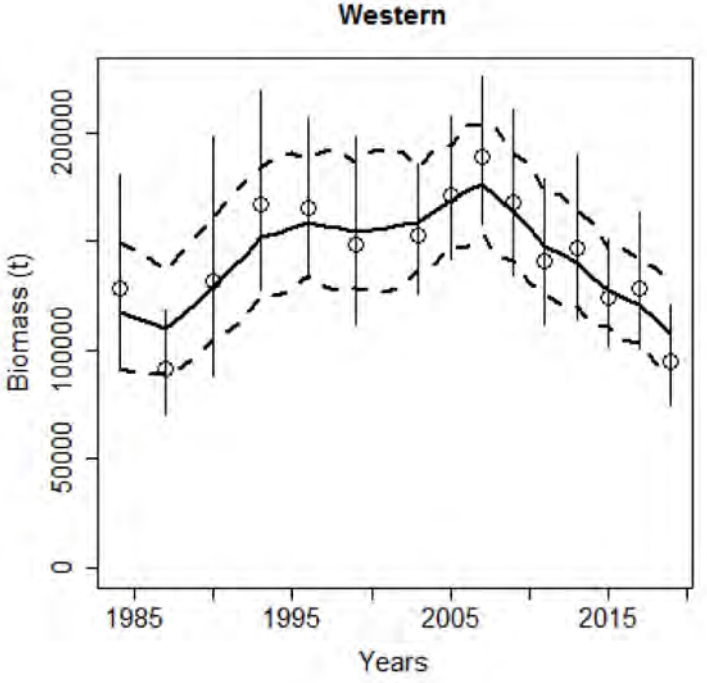


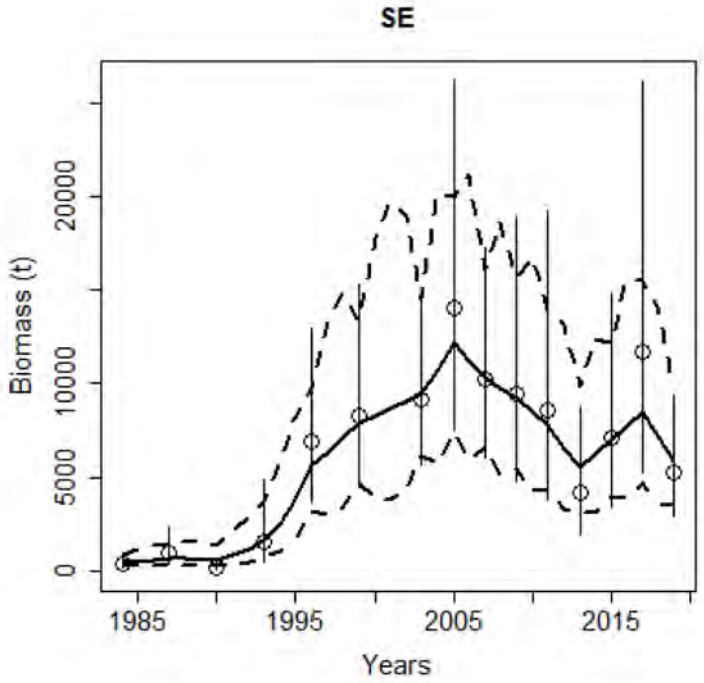
4. Shallow-water flatfish

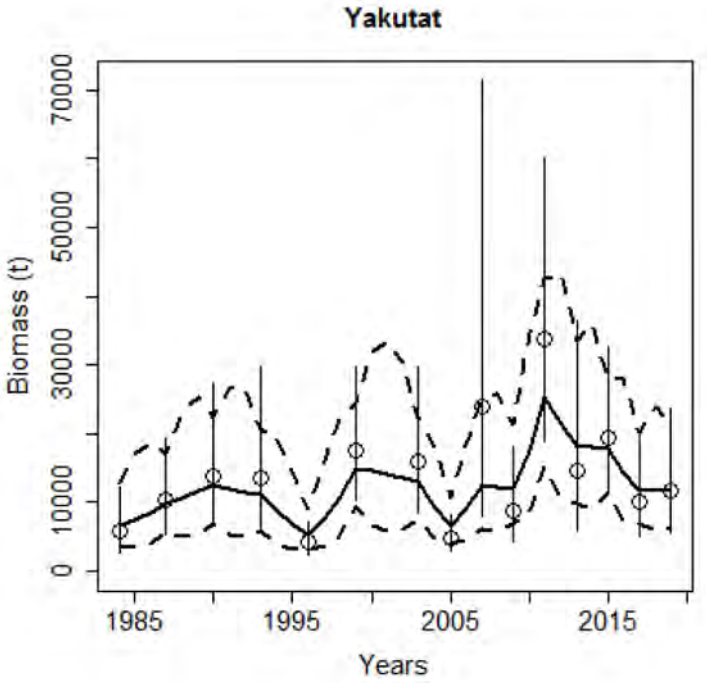
Partial assessment

- Apportionments re-run

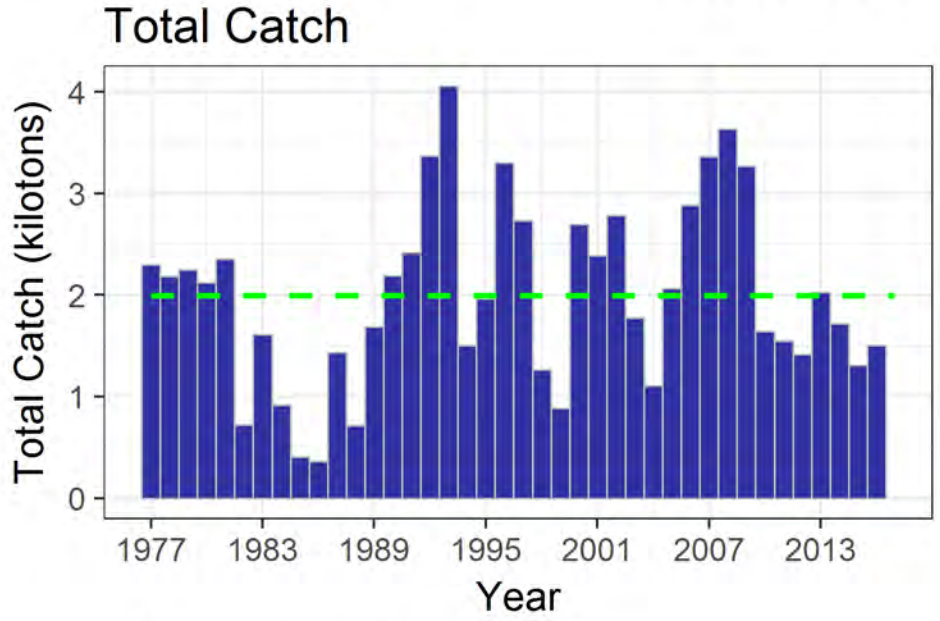


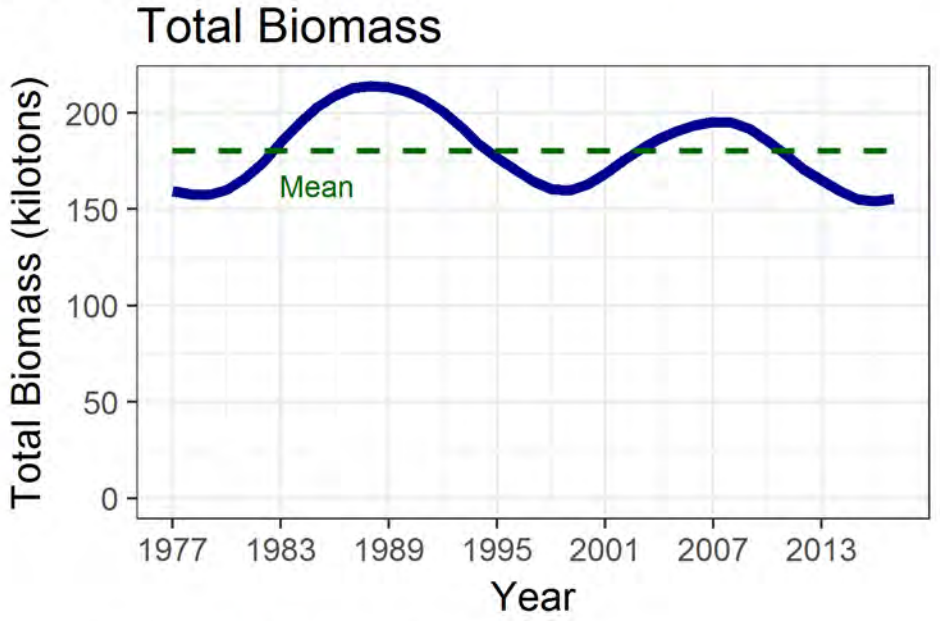


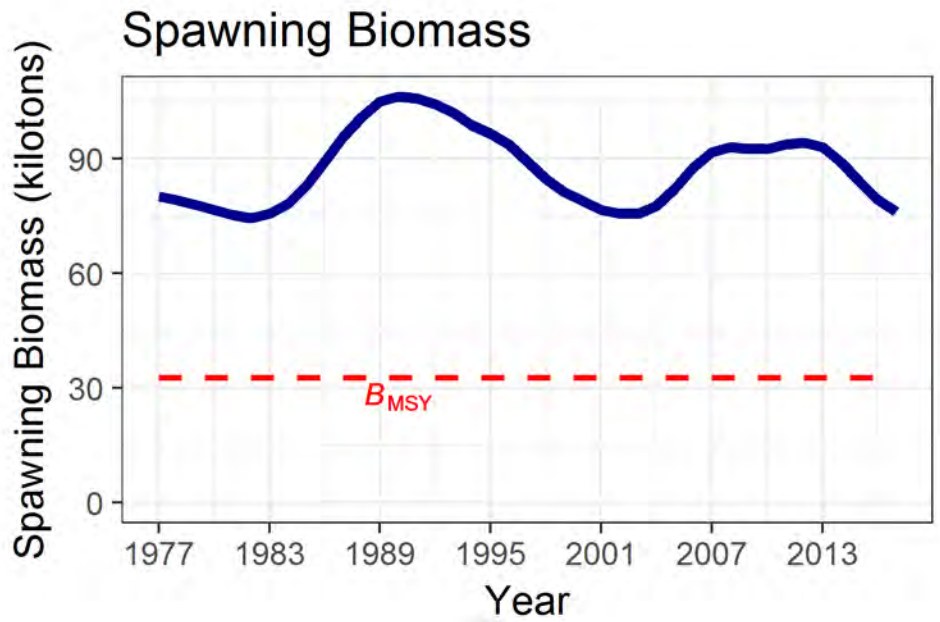


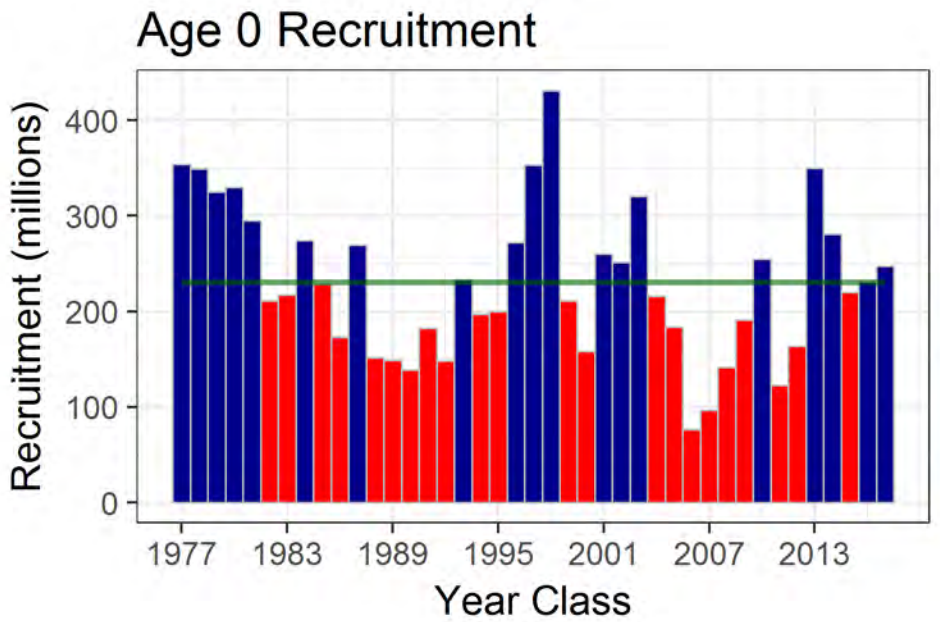


GOA Southern Rock Sole

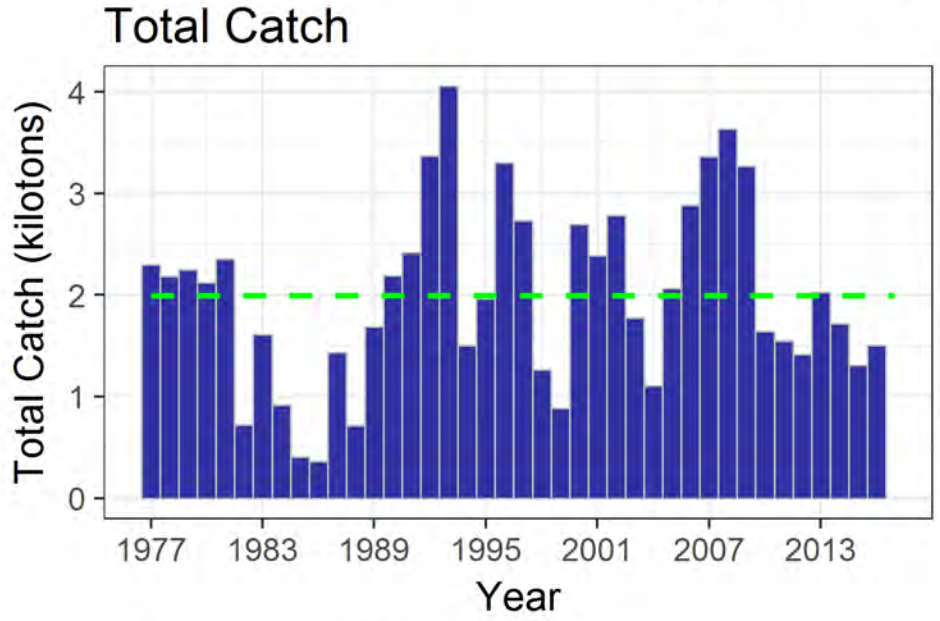


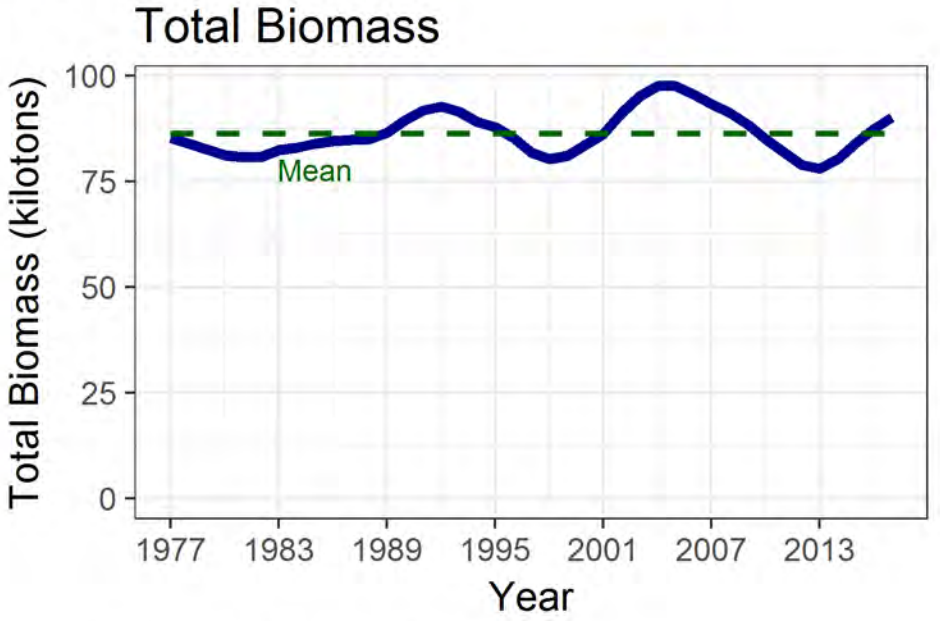


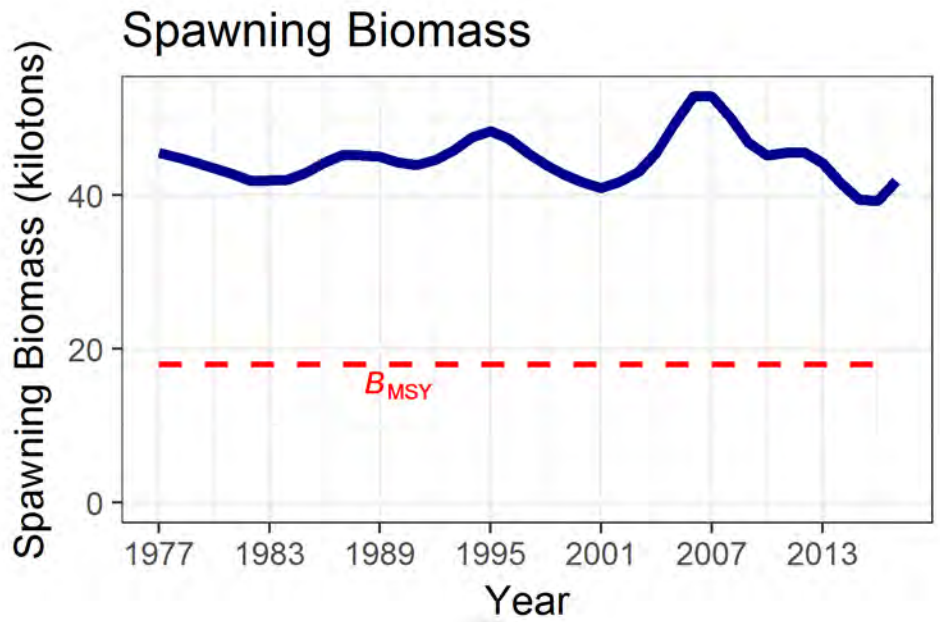


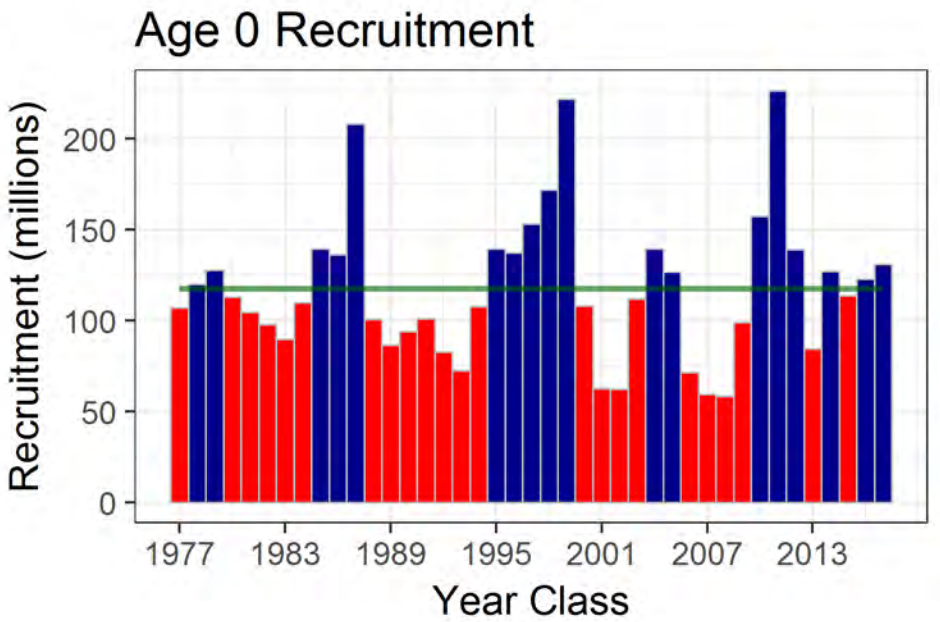


GOA Northern Rock Sole









Flatfish ABC's

Species	2019 ABC	2020 ABC	Change
Shallow water flatfish	55,587	55,463	down 124 (0%)
Rex sole	14,692	14,878	up 186 (1%)
Deep water flatfish	9,501	6,030	down 3,471 (37%)
Flathead sole	36,782	38,196	up 1,414 (4%)
Arrowtooth flounder	145,841	128,060	down 17,781 (12%)
Subtotal	262,403	242,627	down 19,776 (8%)
Subtotal (without ATF)	116,562	114,567	down 1,995 (2%)

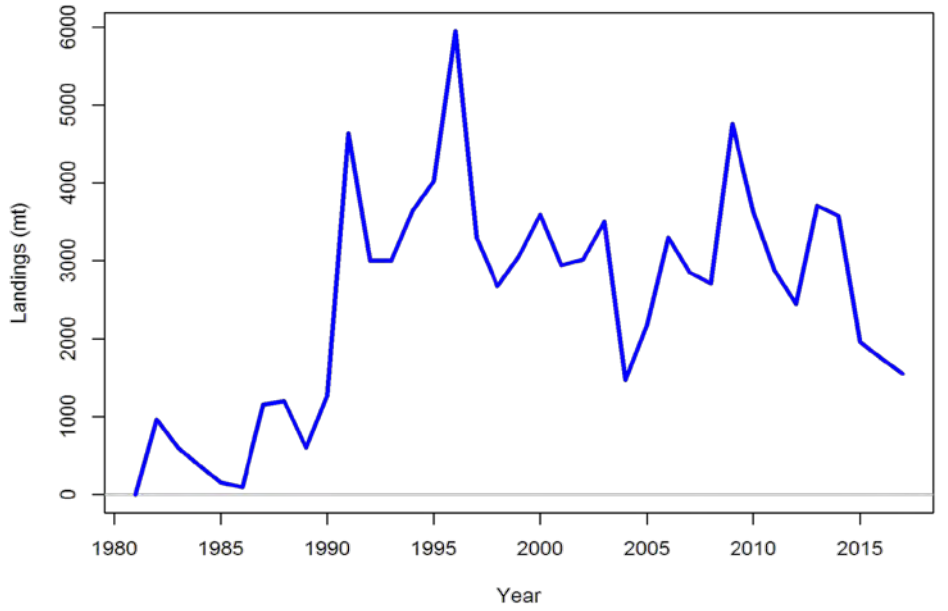
Deep-water ABC from Dover assessment Tier 3 + others Tier 6

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

6. Rex sole

Partial Assessment, Tier 3a

- Projections done separately for Western/Central region and the Eastern region
  - Done to account for differing growth patterns in these areas
- 2019 survey biomass 90,414 t
  - Down ~8% from 2017 (97,720 t)
- Apportionment **updated** using random effects model including 2019 survey biomass
- Catch below ABC and catch to biomass ratio low



Catch

Flatfish ABC's

Species	2019 ABC	2020 ABC	Change
Shallow water flatfish	55,587	55,463	down 124 (0%)
Rex sole	14,692	14,878	up 186 (1%)
Deep water flatfish	9,501	6,030	down 3,471 (37%)
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Deep-water ABC from Dover assessment Tier 3 + others Tier 6

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

5. Deepwater flatfish

Full assessment

CIE review done in March 2019

Responses presented at September Team meeting

What is the deepwater flatfish complex?

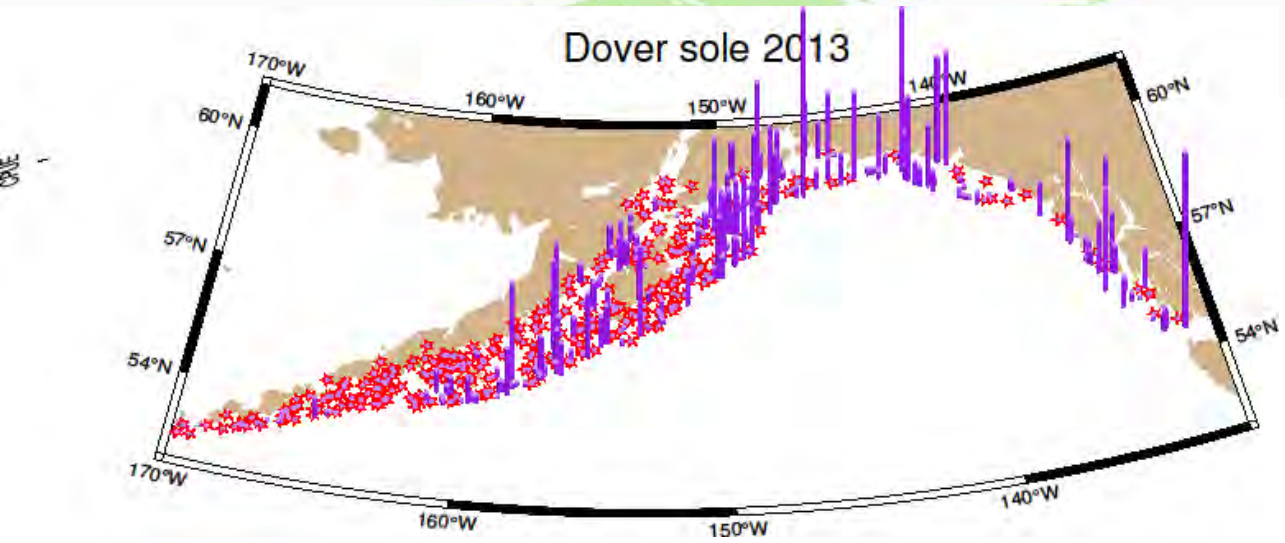
Historically:

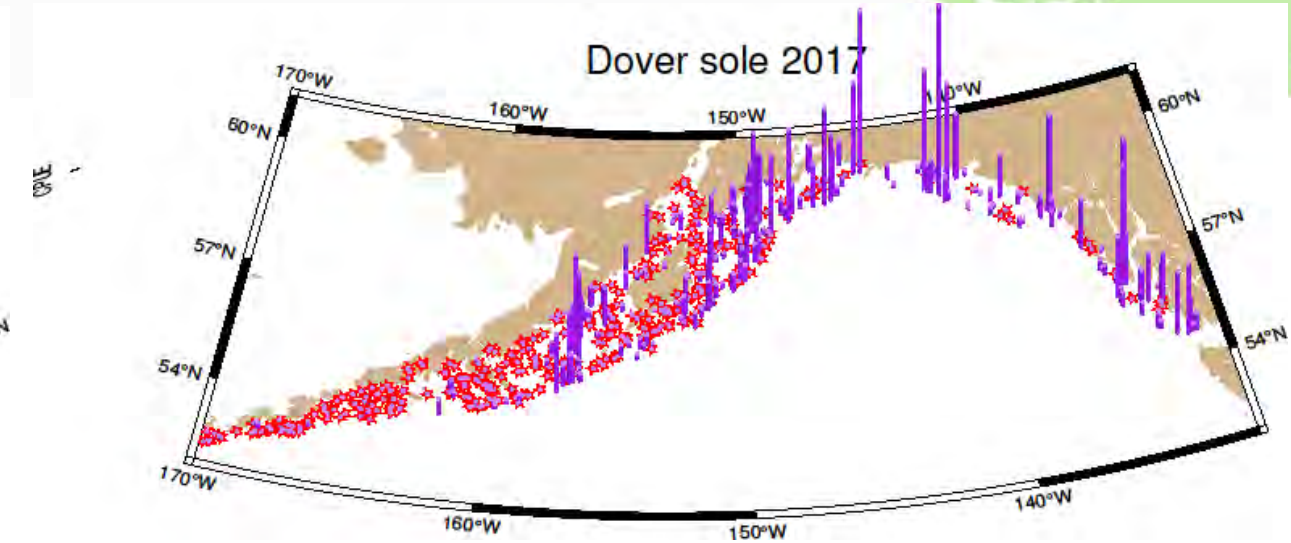
- Dover
- Greenland turbot
- Deepsea sole
  (Absent in AKRO CAS)
- Unidentified

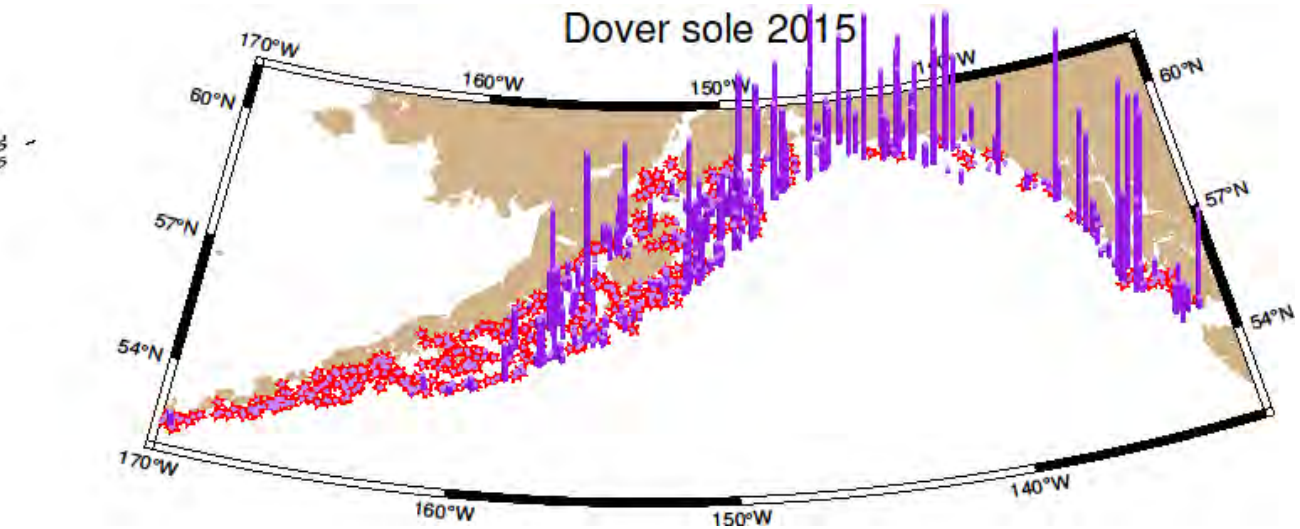
Since 2011 AK Regional Office Includes:

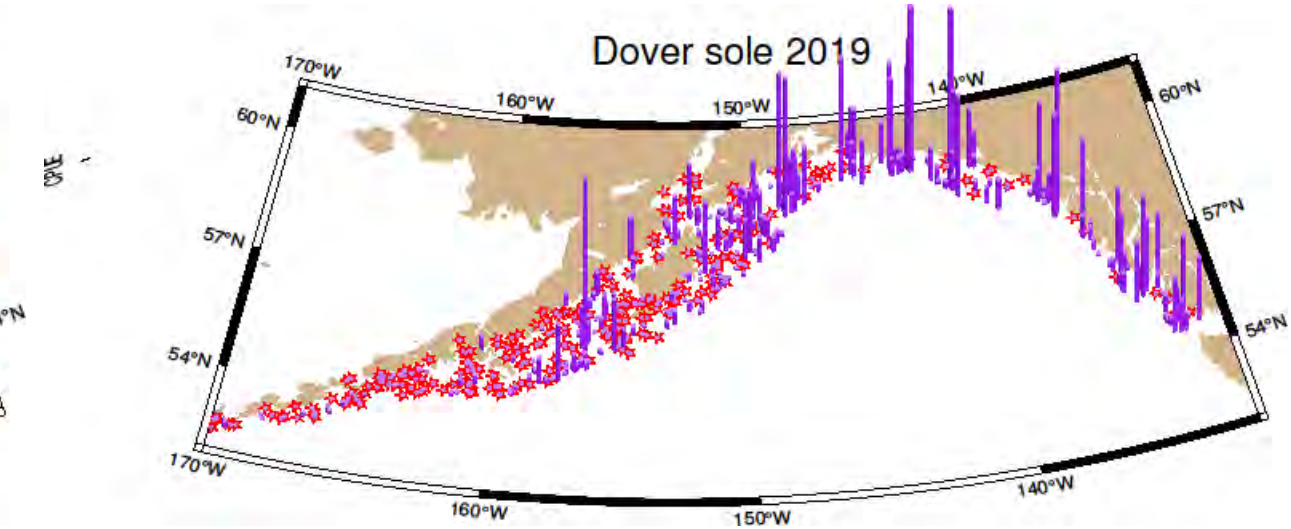
- Dover
- Greenland turbot
- **Kamchatka flounder**

Dover sole survey cpue



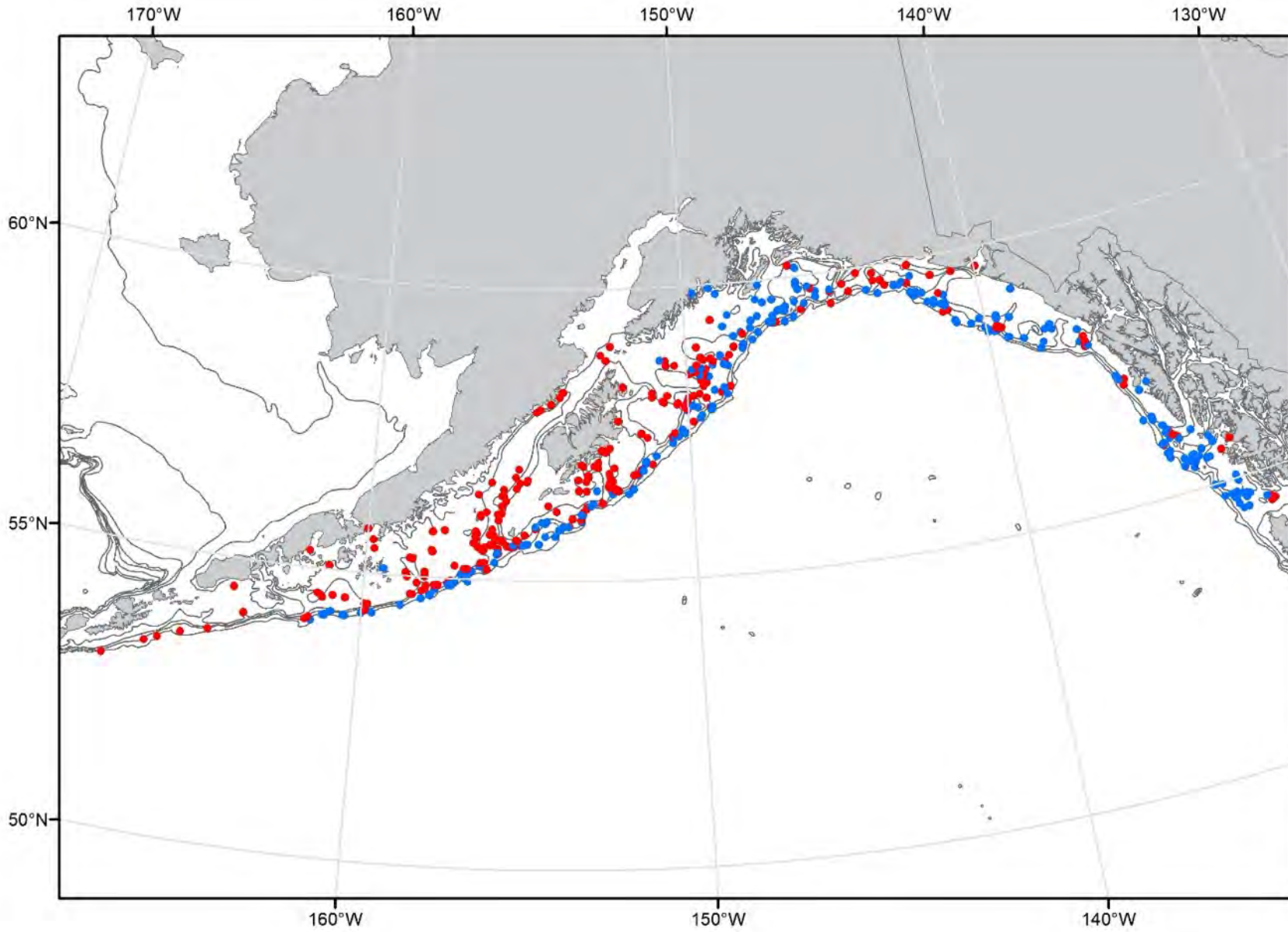






GOA Dover sole growth residuals

- sex-specific von-Bertalanffy fits
- Blue points > 1 std error
- Red points < 1 std error



Dover sole (deepwater flatfish)

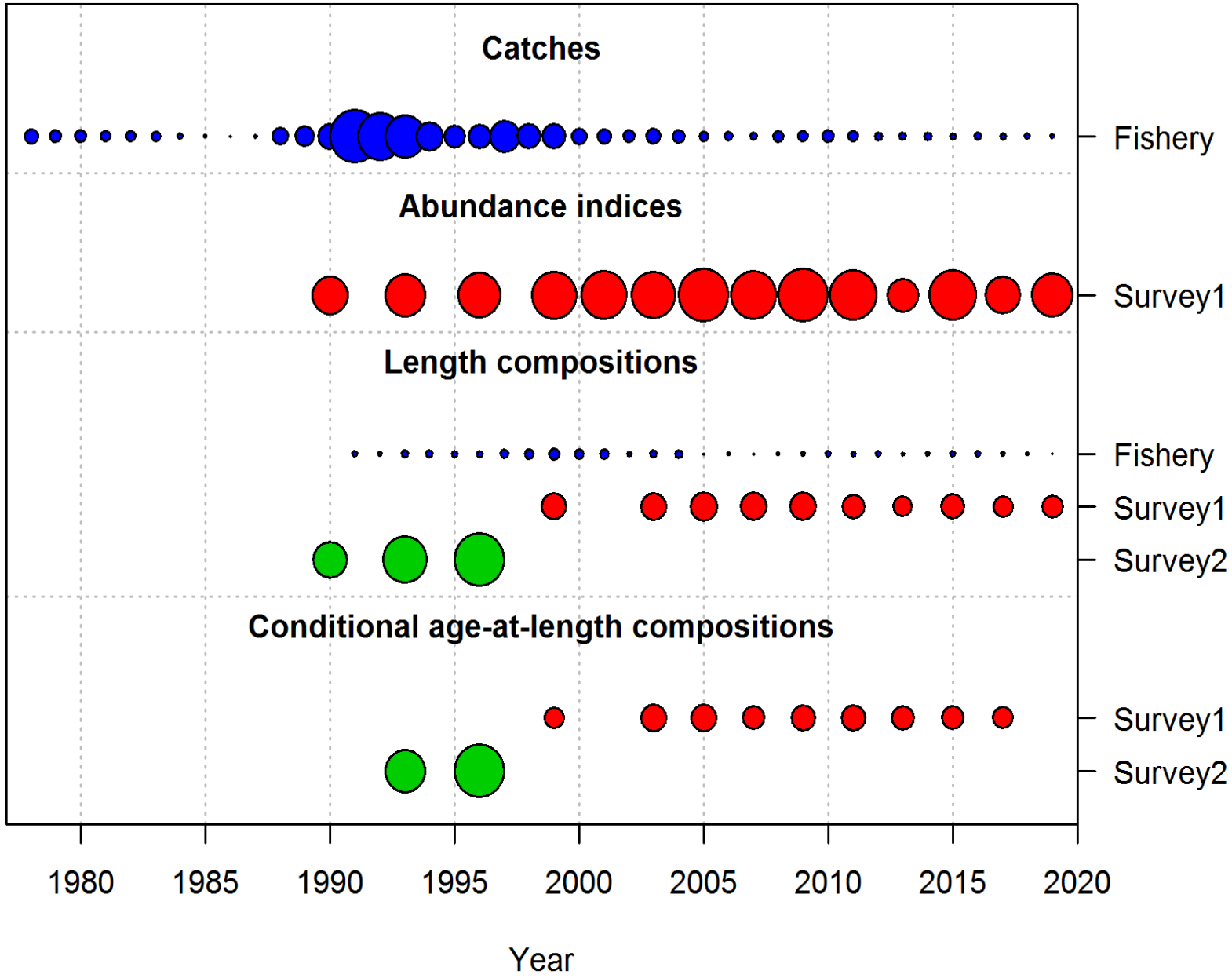
Model work…bridging 2015-2019

"Cleaned-up" version of 2015 model based on CIE and SSC/PT comments

- Disaggregated age 1-3 age data
- Omitted 1984 and 1987 survey data (all)
- Historical F = 0
- Omit early recruitment deviations
- Francis data weighting
- Timing of survey refined to occur in June in model
- Poorly informed selectivity parameters corrected

- No parameters on bounds in cleaned-up model

Dover sole (deepwater flatfish)



Dover sole (deepwater flatfish)

Models

19.0: “Cleaned-up,” but M and q estimated (time-invariant)

=> Low recent survey bio. due to observation error

19.1: M block 2014-2019

=> Low recent survey bio. due to change in natural mortality

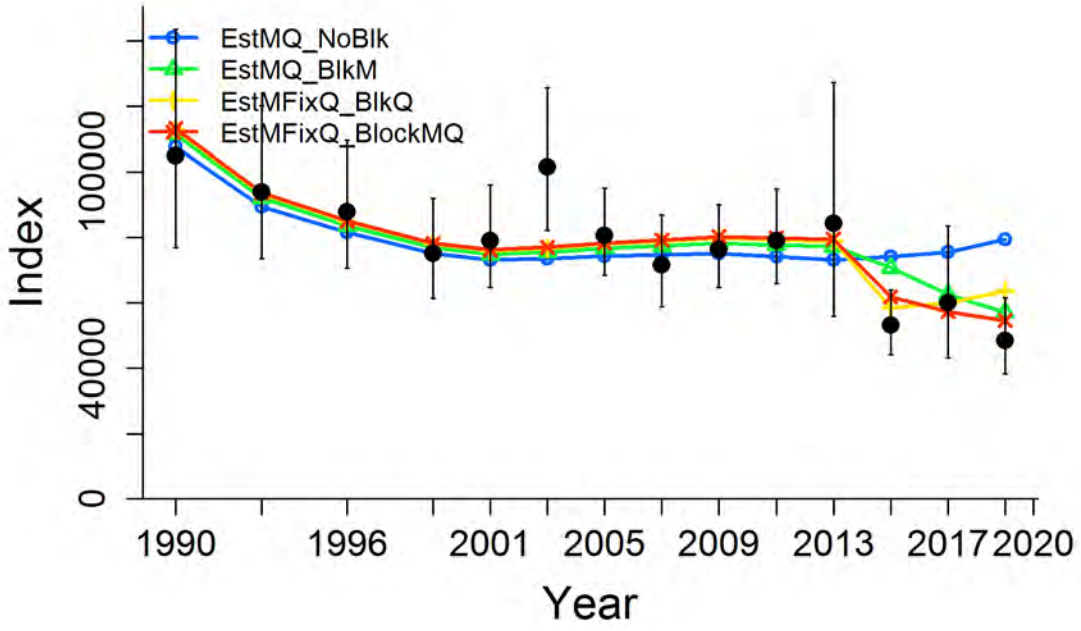
19.2: q fixed at 19.1’s estimate for 1978-2013, q estimated after

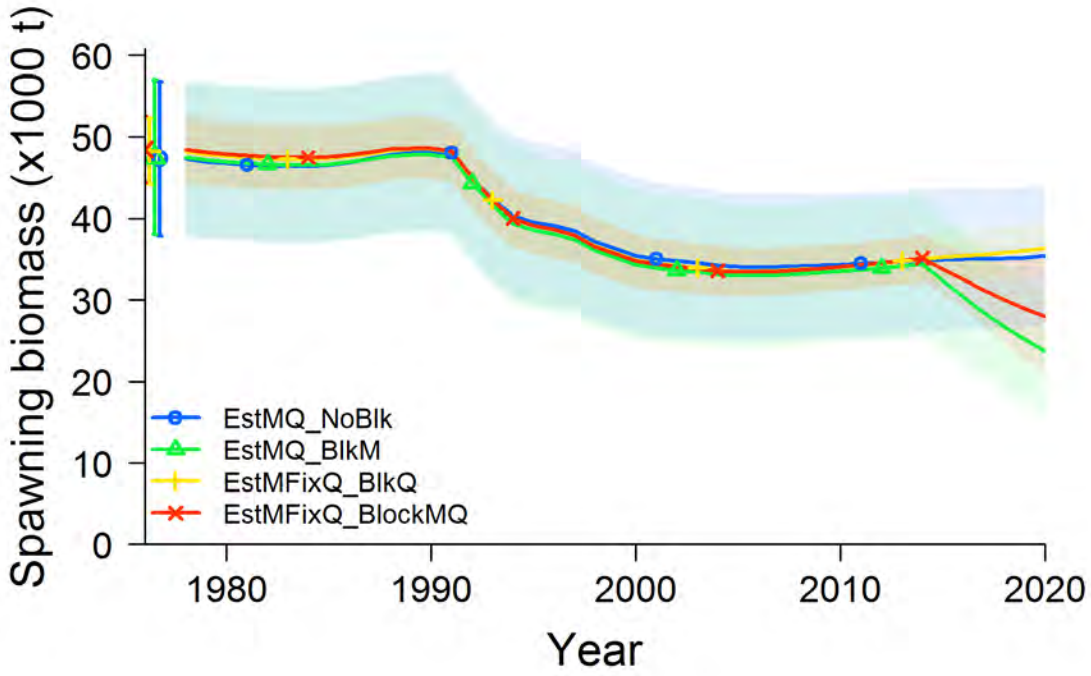
=> Low recent survey bio. due to change in catchability

19.3: As 19.2, M and q both estimated after 2013

=> Low recent survey bio. due to both change in natural mortality and change in catchability

Dover sole (deepwater flatfish)





Area Apportionment (PT chose method in 2016)

- Dover sole proportions from area- and depth-specific random effects models to smooth survey biomass and fill in depth/area gaps
- Greenland turbot and deepsea sole proportions based on average survey biomass for each species since 2001
- ABCs are applied at the complex level

Species	Year	Western	Central	West Yakutat	Southeast	Total
Dover Sole		0.8%	33.3%	36.0%	29.9%	100.0%
	2020	47	1,945	2,104	1,751	5,847
	2021	46	1,911	2,067	1,719	5,743
Greenland Turbot		100.0%	0.0%	0.0%	0.0%	100.0%
	2020	179	0	0	0	179
	2021	179	0	0	0	179
Deepsea Sole		0.7%	72.8%	14.5%	12.0%	100.0%
	2020	0	3	1	0	4
	2021	0	3	1	0	4
Deepwater Flatfish	**2020**	**226**	**1,948**	**2,105**	**1,751**	**6,030**
	2021	**225**	**1,914**	**2,068**	**1,719**	**5,926**

GOA Dover sole / Deepwater flatfish

The Team recommended:

- **Kamchatka flounder be included in the 2021 partial assessment as a Tier 6 species using 2011–2019 maximum catch (69 t) as the OFL.**
  - Maximum catch is more appropriate than average catch based on the high variability and short time series of catch.
- **Examining area apportionment relative to Kamchatka flounder**
  - Are they only in WGOA?
- **That the presentation on VAST and further work on multi-area model be reviewed at the September 2020 Plan Team meetings for consideration in future assessment applications**
  - An appendix was in development this year but was unavailable in time for review

Flatfish ABC's

Species	2019 ABC	2020 ABC	Change
Shallow water flatfish	55,587	55,463	down 124 (0%)
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Deep-water ABC from Dover assessment Tier 3 + others Tier 6

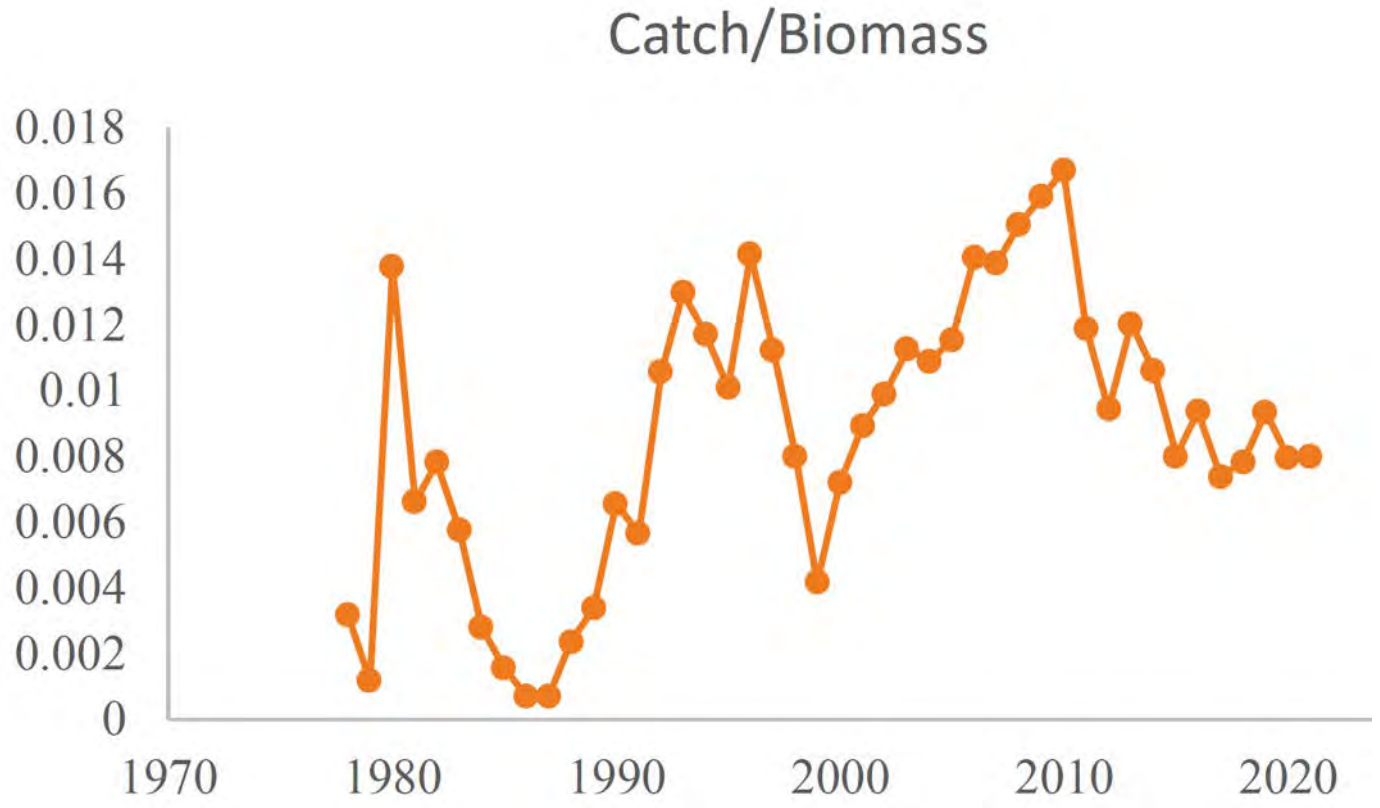
Shallow water flats: N and S rock sole Tier 3, others Tier 5

8. GOA Flathead sole

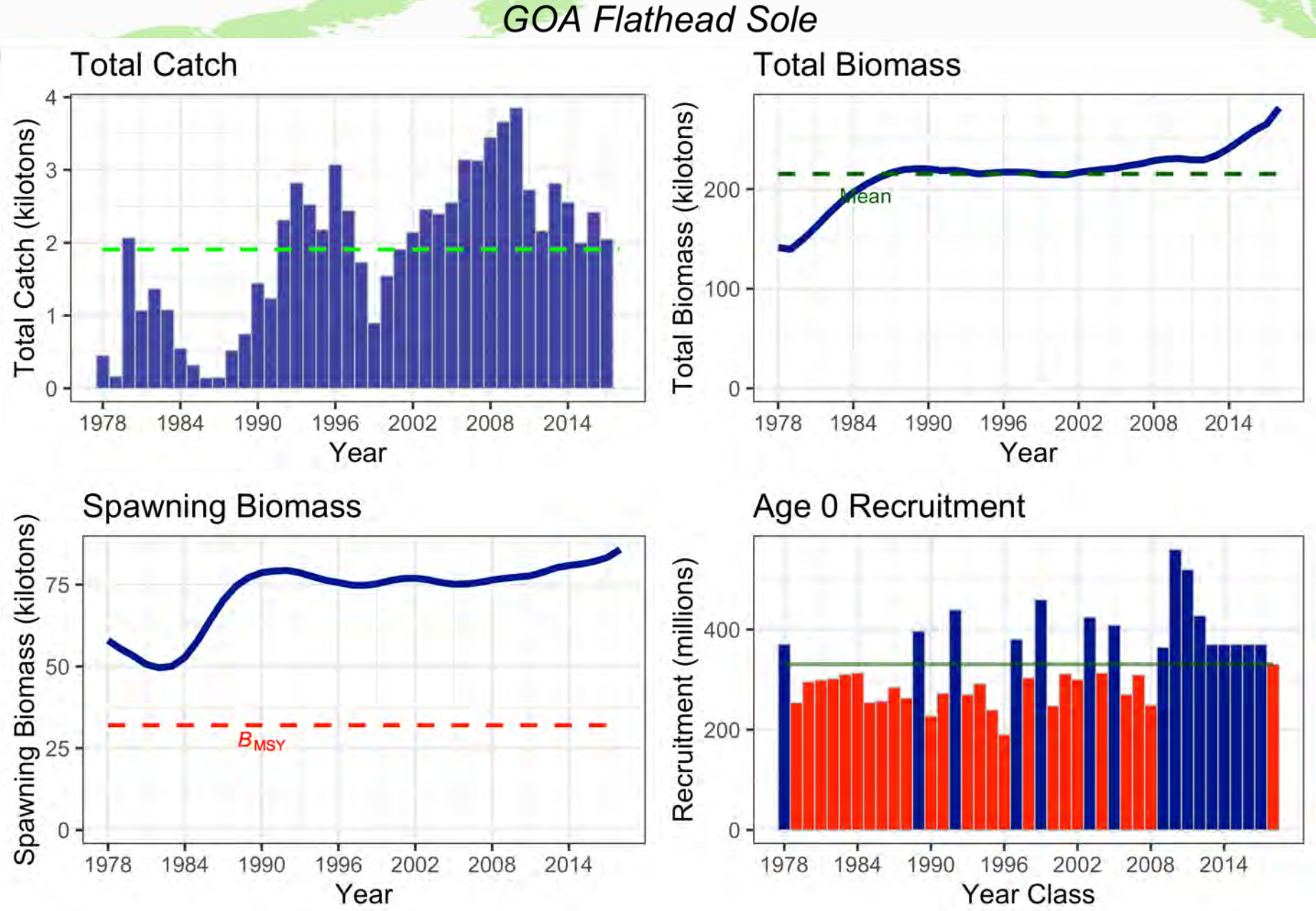
Partial Assessment, Tier 3a

- 2019 survey 185,840 t
  down from 236,588 t in 2017
- Apportionment updated

Quantity	Western	Central	West Yakutat	Southeast	Total
Area Apportionment	36.08%	52.89%	6.16%	4.86%	100.00%
2020 ABC (t)	13,783	20,201	2,354	1,858	38,196
2021 ABC (t)	14,191	20,799	2,424	1,912	39,326



8. Flathead sole



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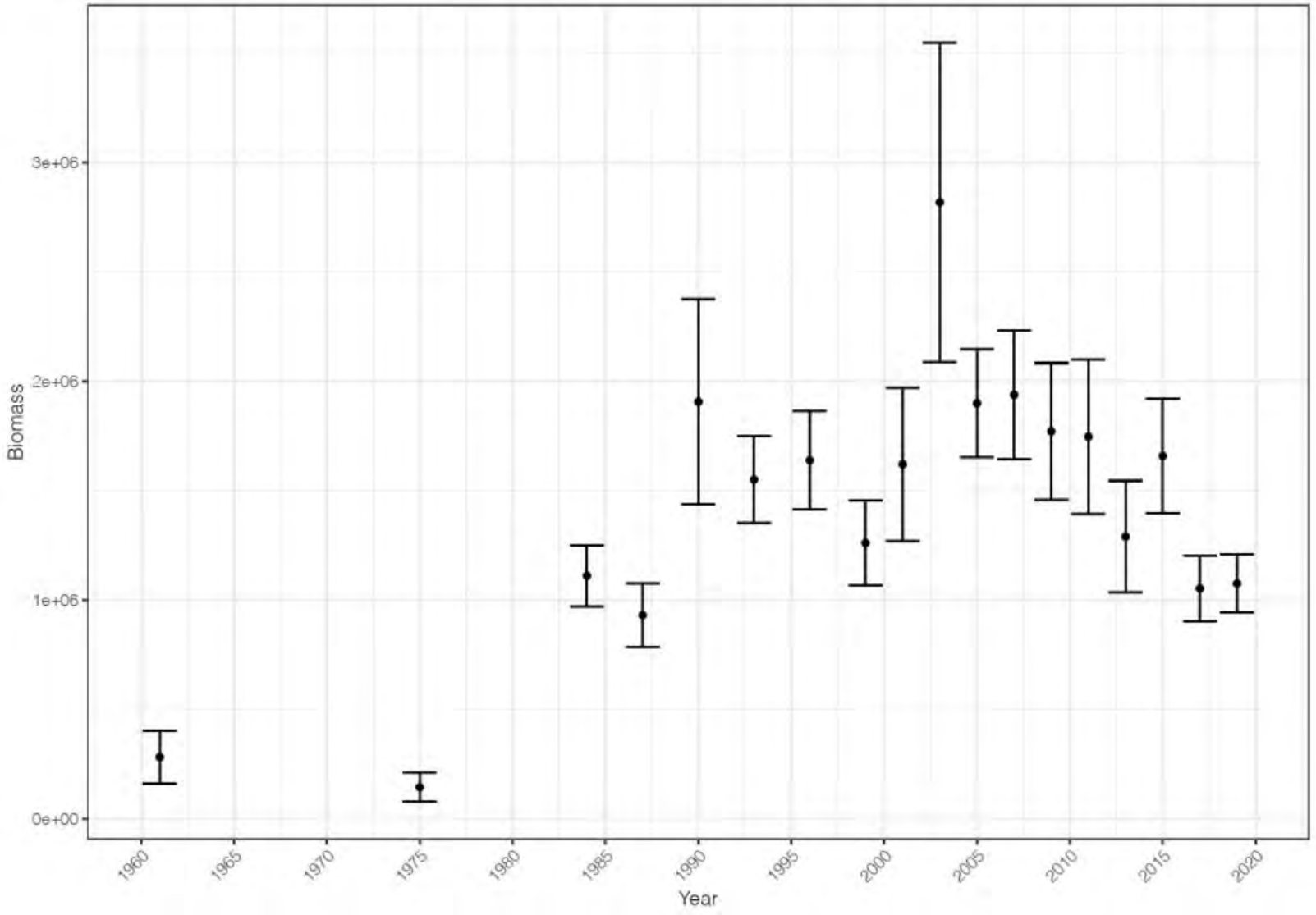
Deep-water ABC from Dover assessment Tier 3 + others Tier 6

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

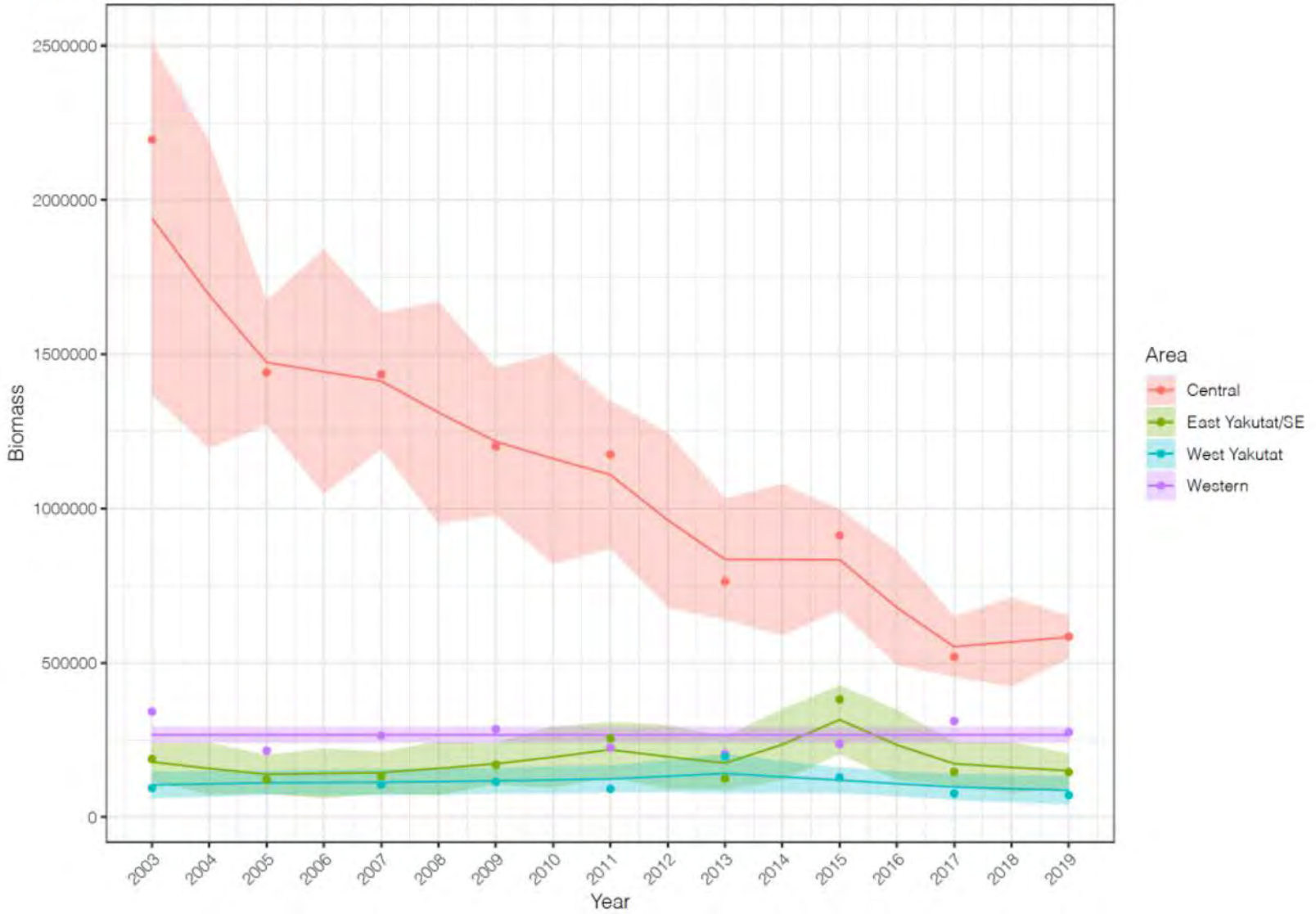
7. GOA arrowtooth flounder

Two early nonstandard surveys, 1961-1962 (IPHC trawl survey) and 1973-1976 (NMFS exploratory trawl).



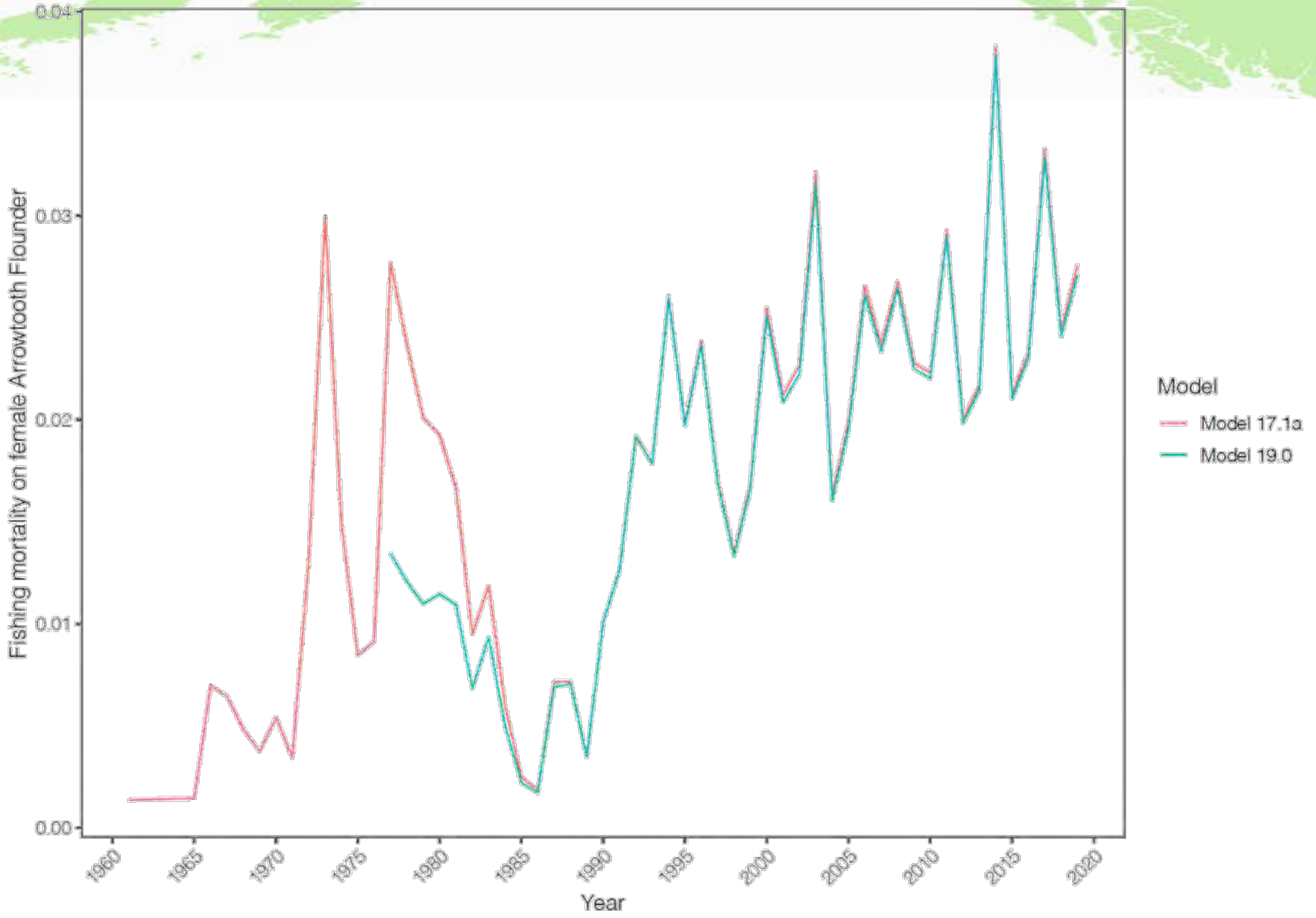
7. GOA arrowtooth flounder

Central area (NMFS area 620 and 630) shows greatest decline in biomass of Arrowtooth Flounder



7. GOA arrowtooth flounder

Fishing mortality nearly identical…

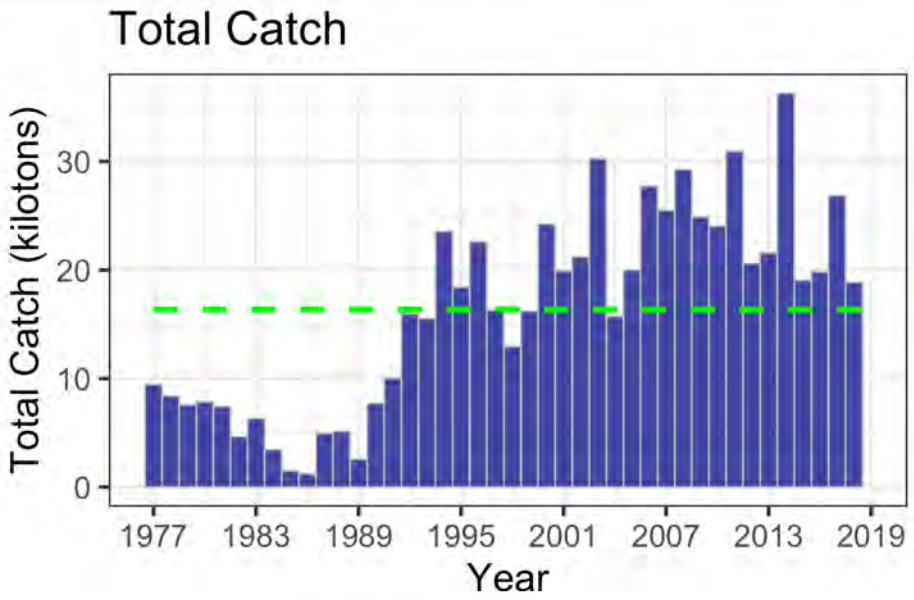


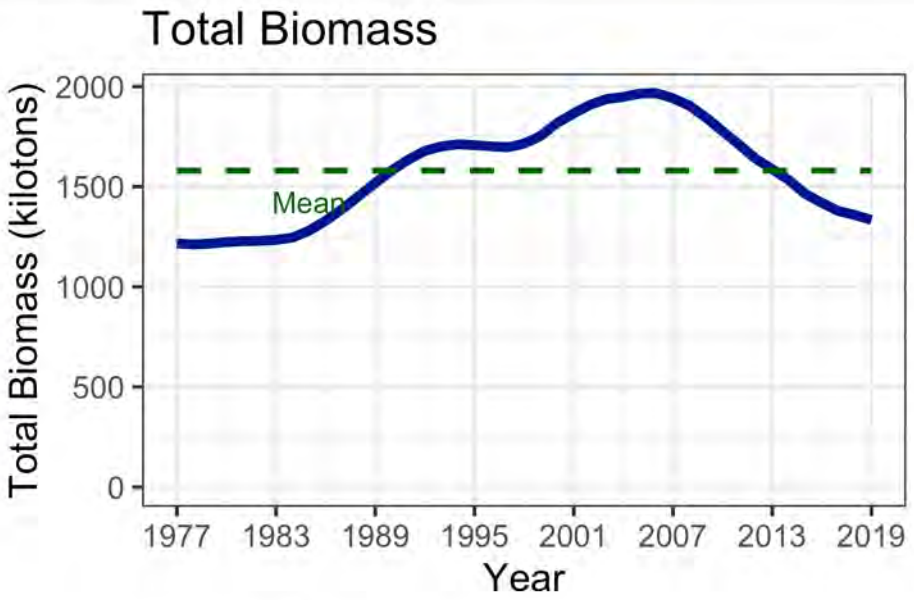
7. GOA arrowtooth flounder

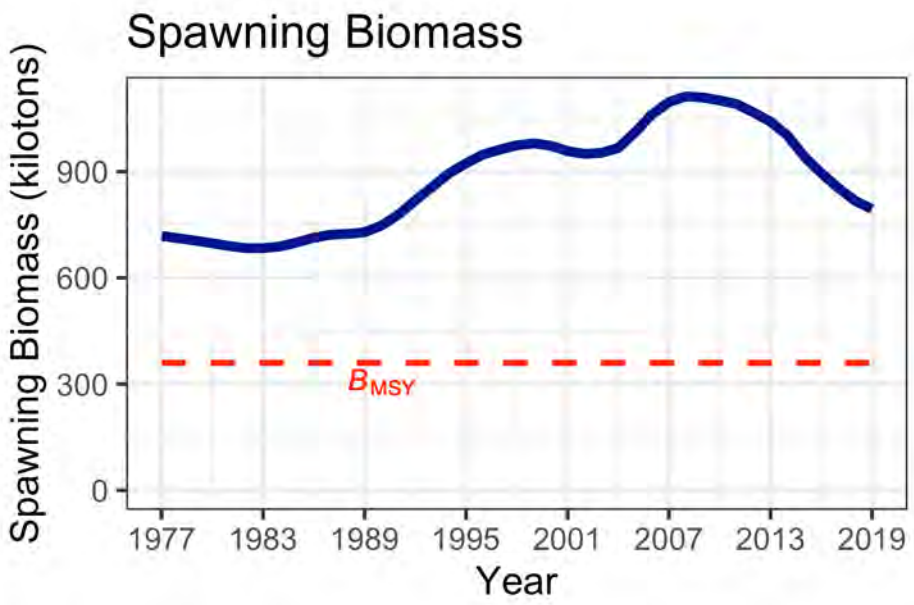
Team discussions

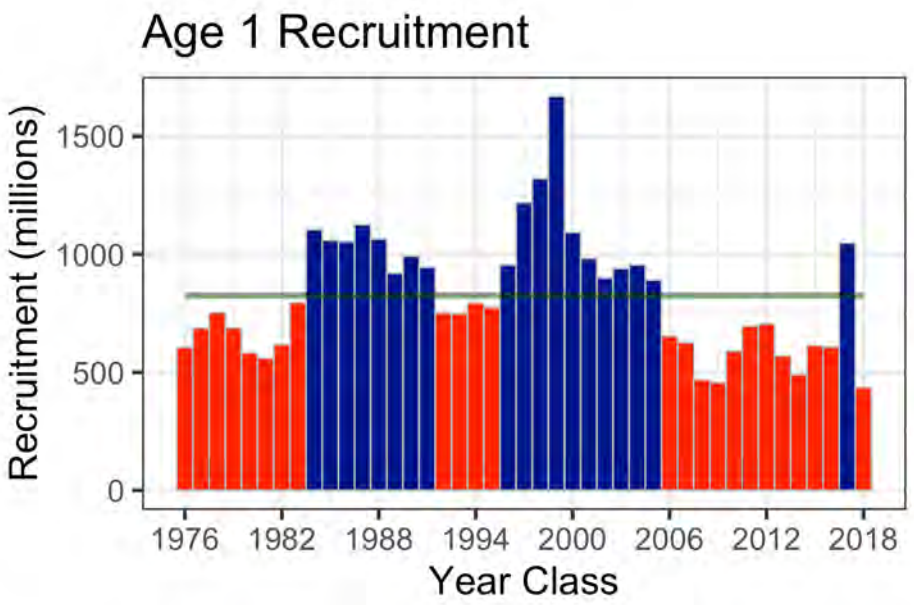
- Accepted the shorter model
- Lower recruitment in recent years, beginning in 2006
  - **The Team recommended investigating whether these lower recruitments are related to environmental conditions in the GOA.**
- Noted the potential of using AFSC longline survey data
- T**he Team recommended investigating whether 1980s data should be omitted**

GOA Arrowtooth Flounder





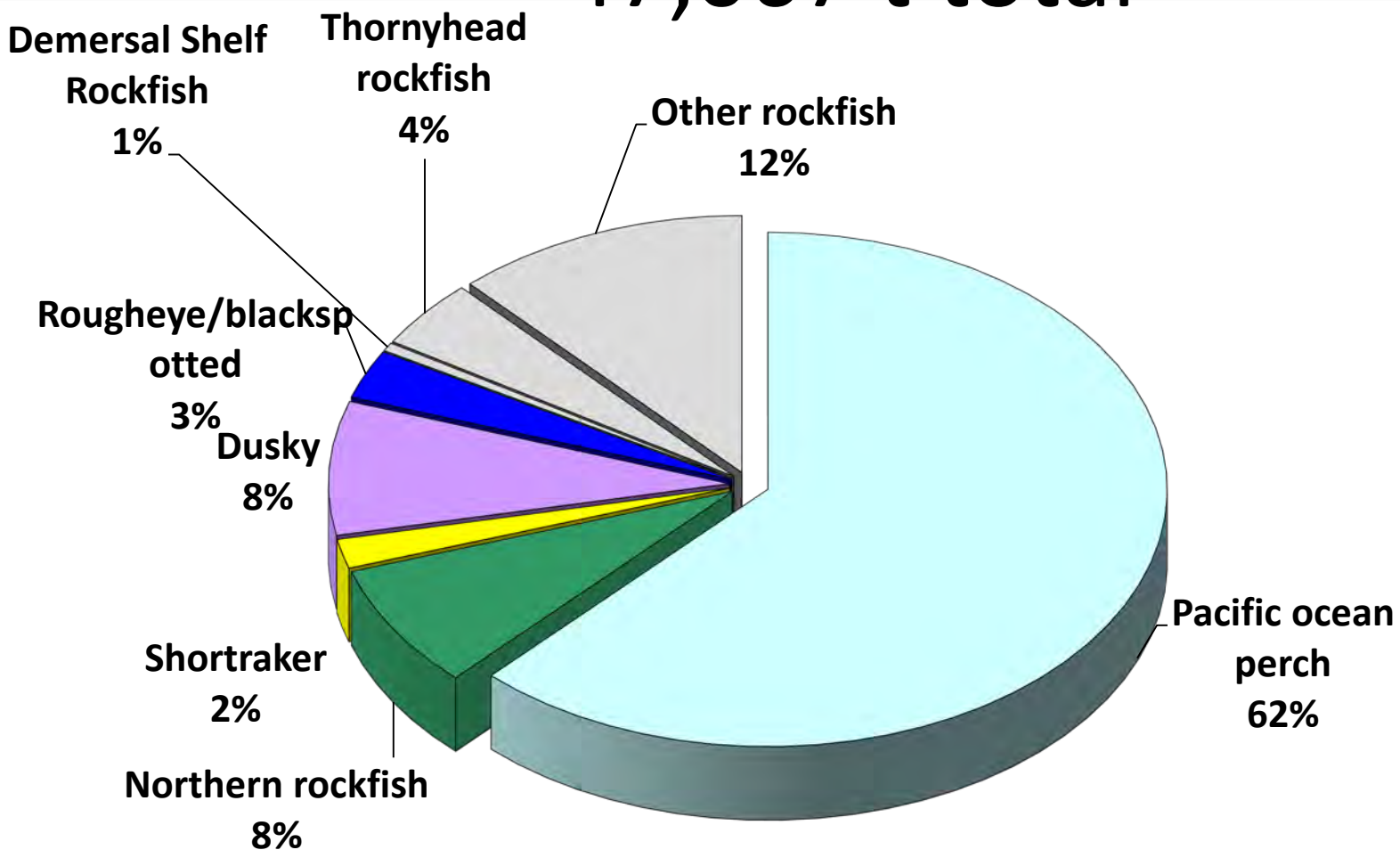




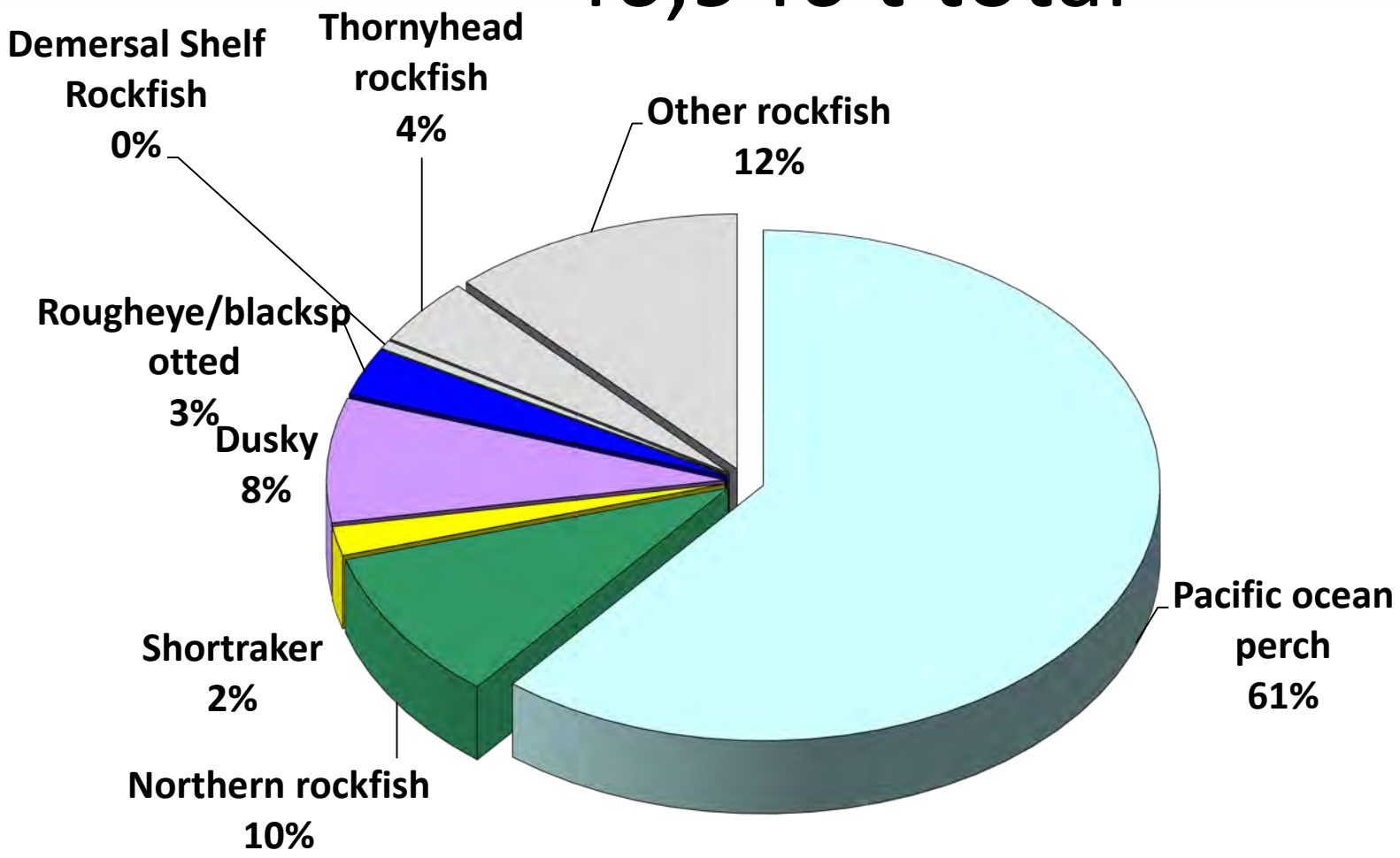
GOA Rockfish

Species	2019 Catch	2019	2020	Change
Pollock	117,019	144,623	118,642	down 25,981 (18%)
Pacific Cod	10,909	17,000	14,621	down 2,379 (14%)
Sablefish	12,219	11,571	14,393	up 2,822 (24%)
Flatfish	27,638	116,562	114,567	down 1,995 (2%)
Arrowtooth flounder	2,553	145,841	128,060	down 17,781 (12%)
Rockfish	32,730	46,946	47,450	up 504 (1%)
Atka mackerel	1,254	4,700	4,700	same (0%)
Skates	3,042	7,804	6,670	down 1,134 (15%)
Other Species	2,618	14,460	14,363	down 97 (1%)
Total	209,982	509,507	463,466	down 46,041 (9%)

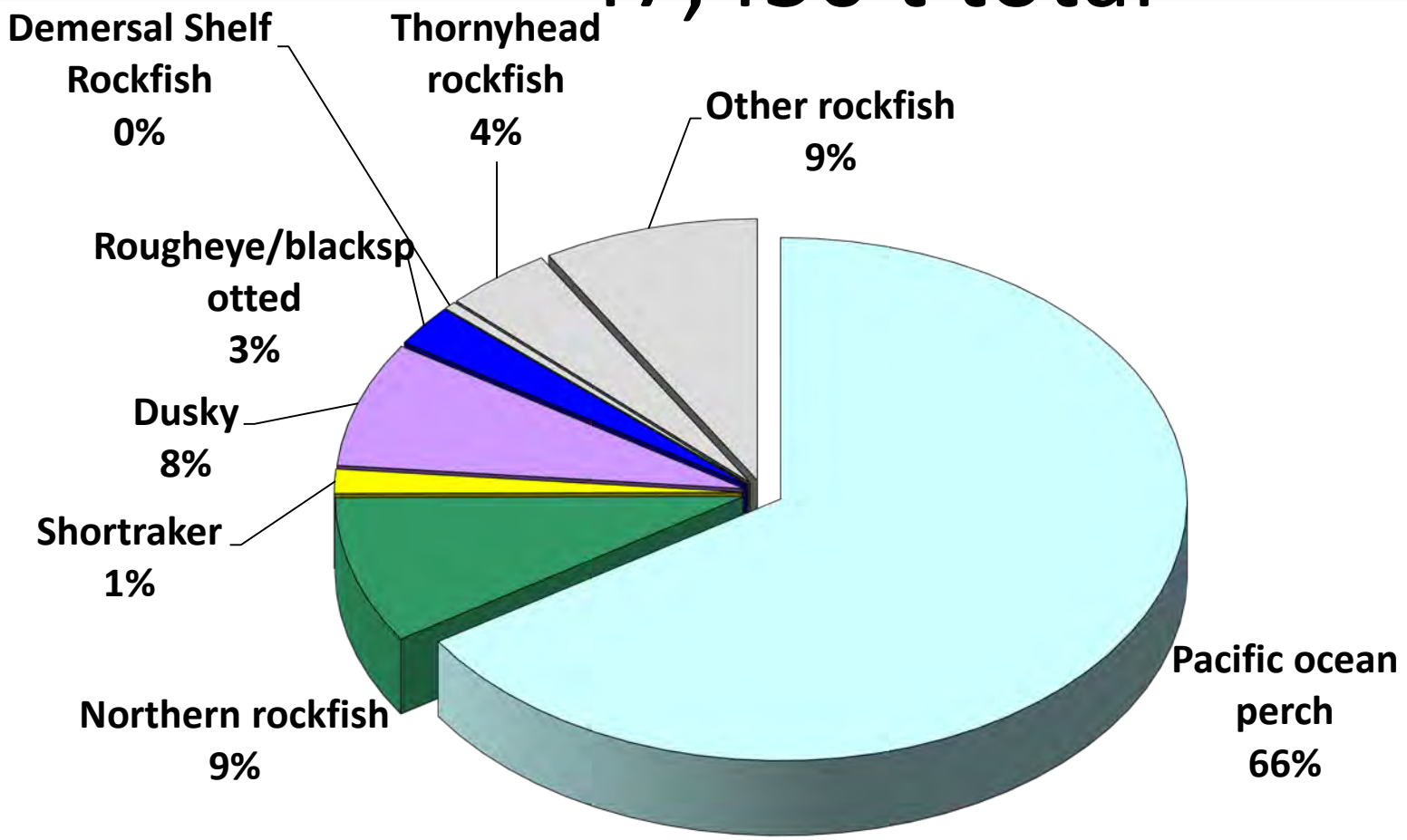
Rockfish 2018 ABC's 47,067 t total



Rockfish 2019 ABC's 46,946 t total



Rockfish 2020 ABC's
47,450 t total



Rockfish ABC Summary

Species	2019	2020	Change
POP	28,555	31,238	up 2,683 (9%)
northern rockfish	4,529	4,312	down 217 (5%)
Shortraker Rockfish	863	708	down 155 (18%)
Dusky	3,700	3,676	down 24 (1%)
Rougheye and Blackspotted Rockfish	1,428	1,209	down 219 (15%)
Demersal shelf rockfish	261	238	down 23 (9%)
Thornyhead	2,016	2,016	same (0%)
Other rock	5,594	4,053	down 1,541 (28%)
Sub Total	46,946	47,450	up 504 (1%)

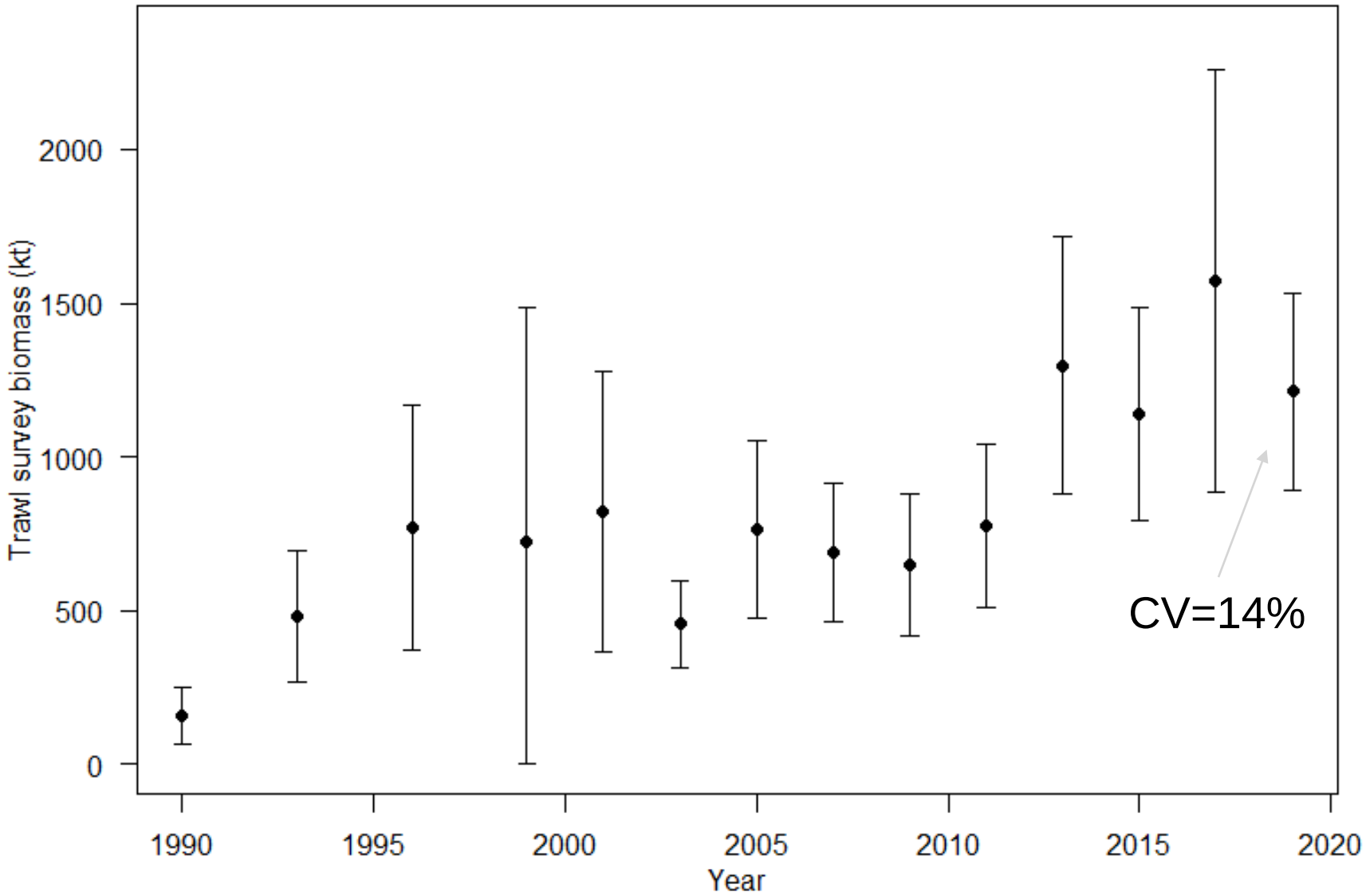
9. Pacific ocean perch

- Full assessment
- CIE review for GOA rockfish scheduled for spring 2020
  1. Use hydroacoustic info
  2. Examine fishery-dependent info, e.g., age sampling
  3. Catchability manuscript is in prep to inform priors…

The Plan Team supports the review CIE review topics, and additionally recommends the assessment authors incorporate an examination of the VAST model during the CIE review

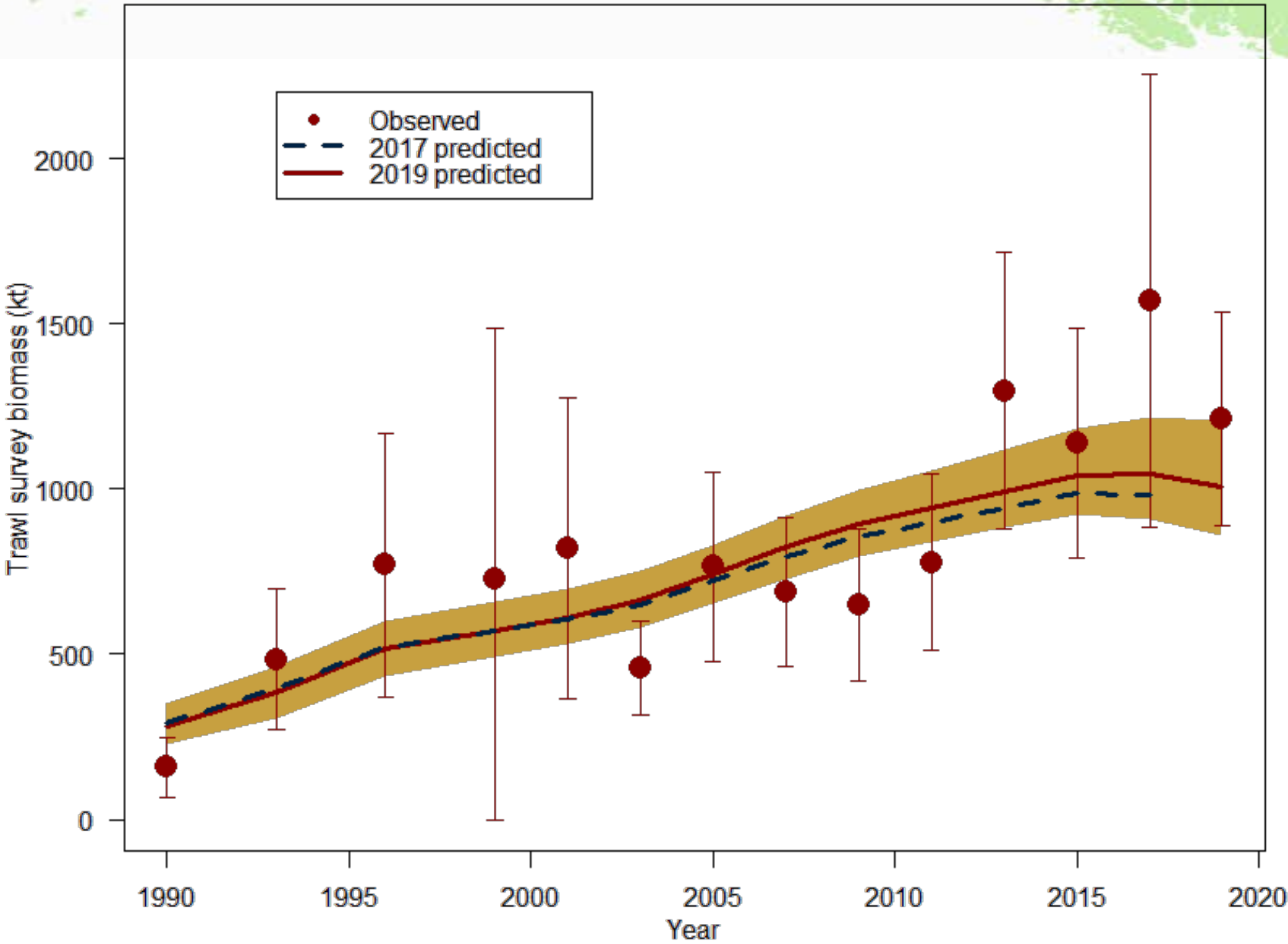
9. GOA Pacific ocean perch

NMFS trawl survey biomass



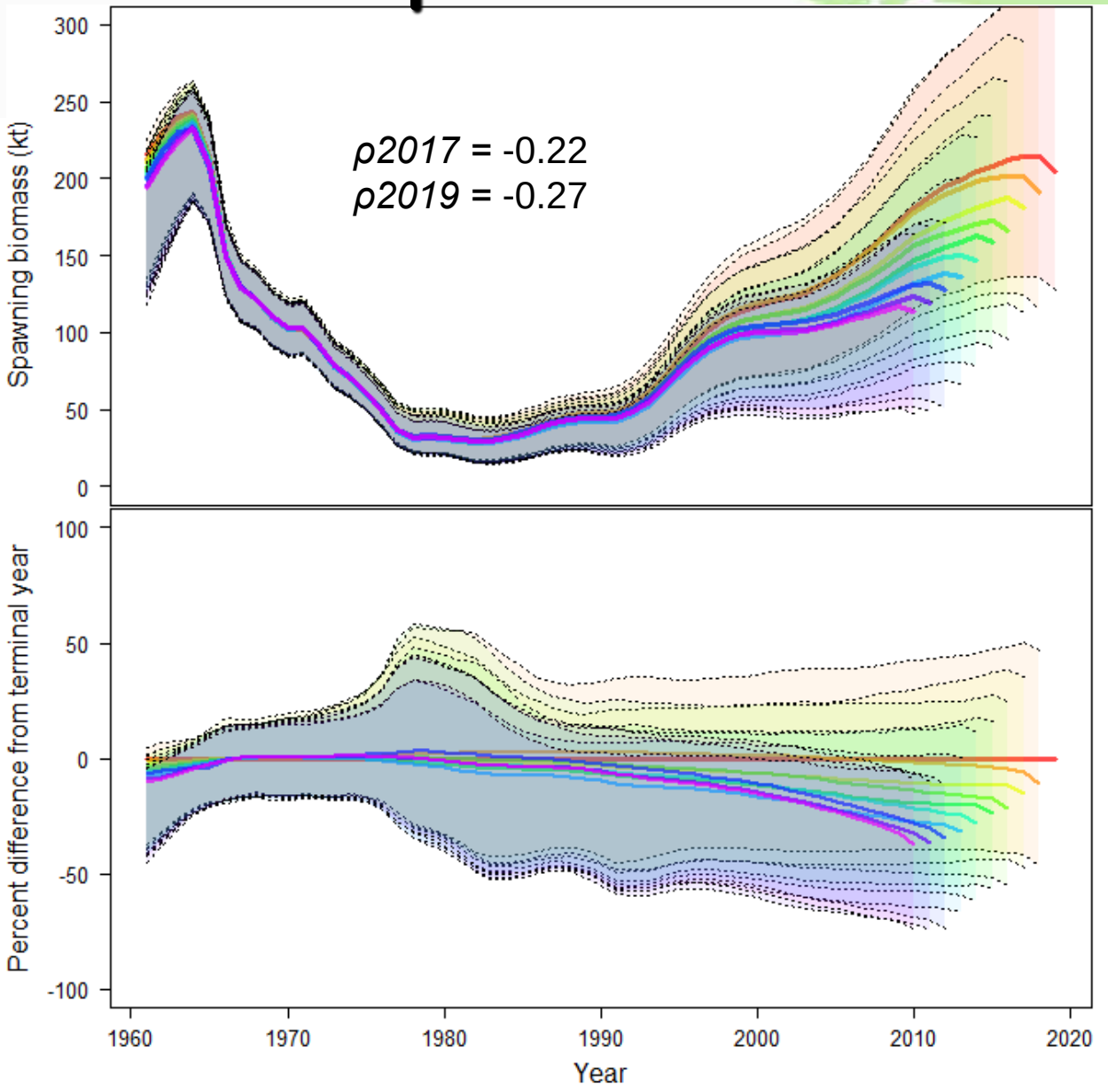
9. GOA Pacific ocean perch

NMFS trawl survey biomass

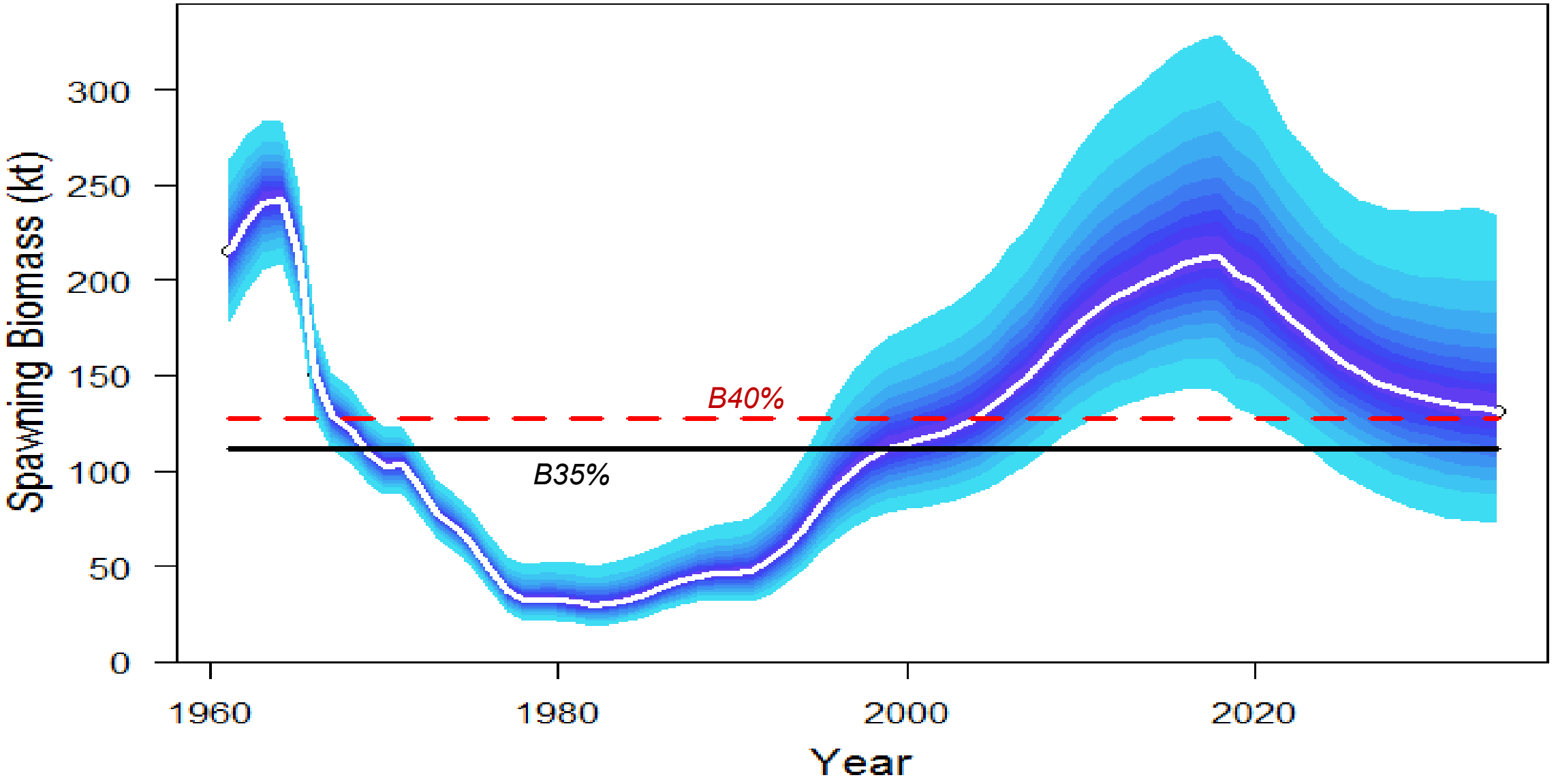


9. GOA Pacific ocean perch

Retrospective biomass



9. GOA Pacific ocean perch projections

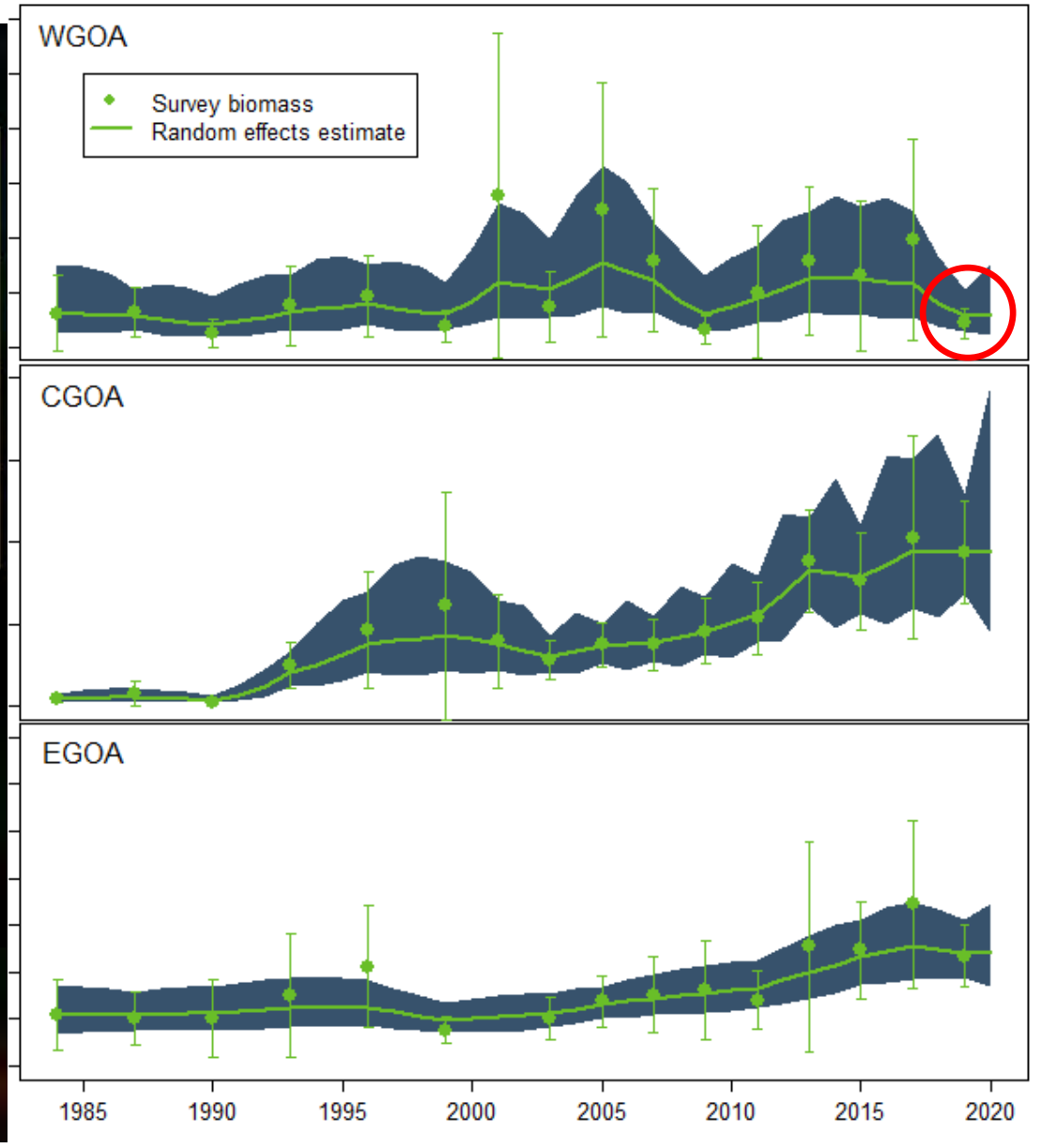


9. GOA Pacific ocean perch apportionment

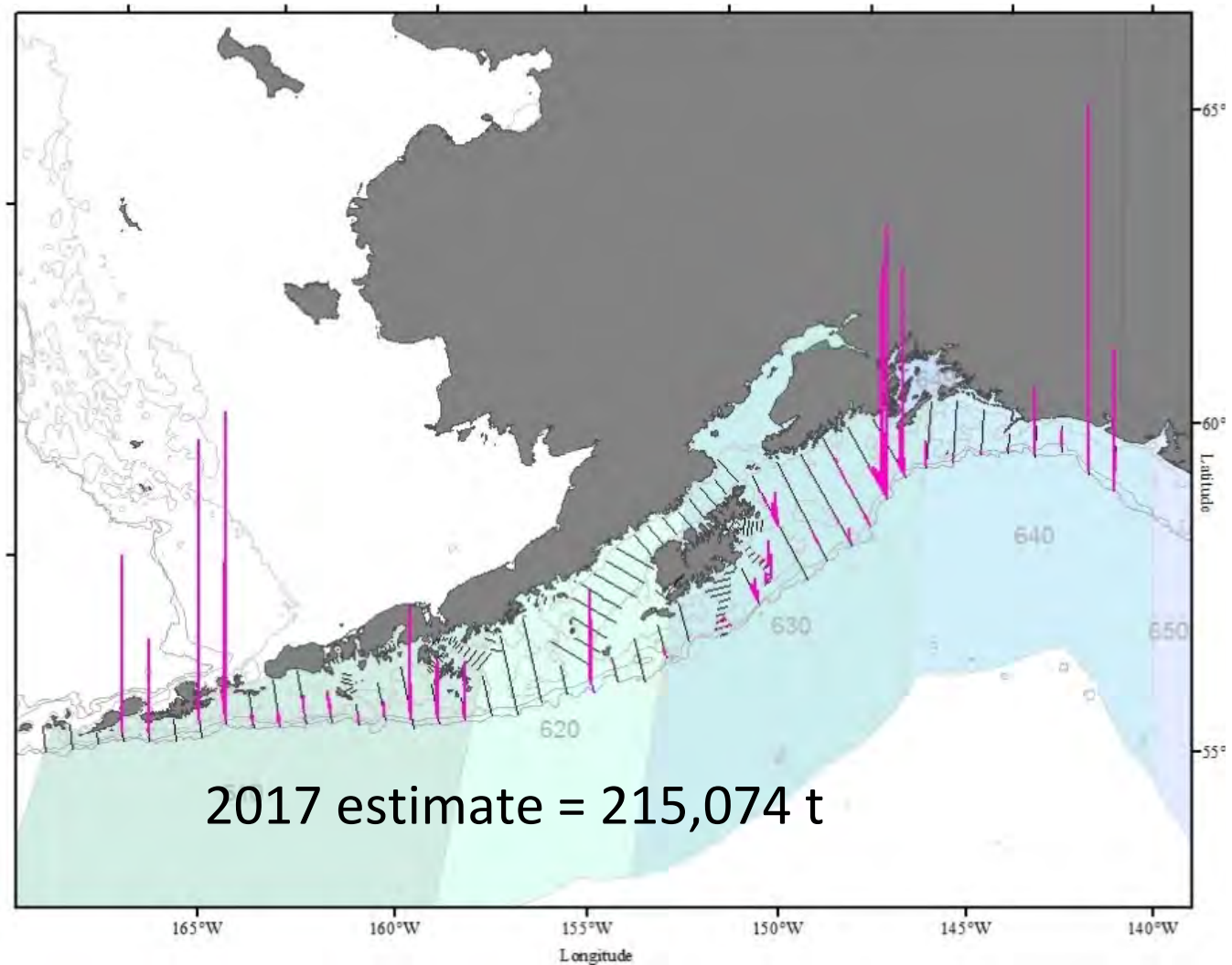
Apportionment – ABC

	Western	Central	Eastern	Total
2019 ABC	3,240	19,678	5,687	28,605
2020 ABC	**1,437**	**23,678**	**6,123**	**31,238**
2021 ABC	**1,379**	**22,727**	**5,877**	**29,983**

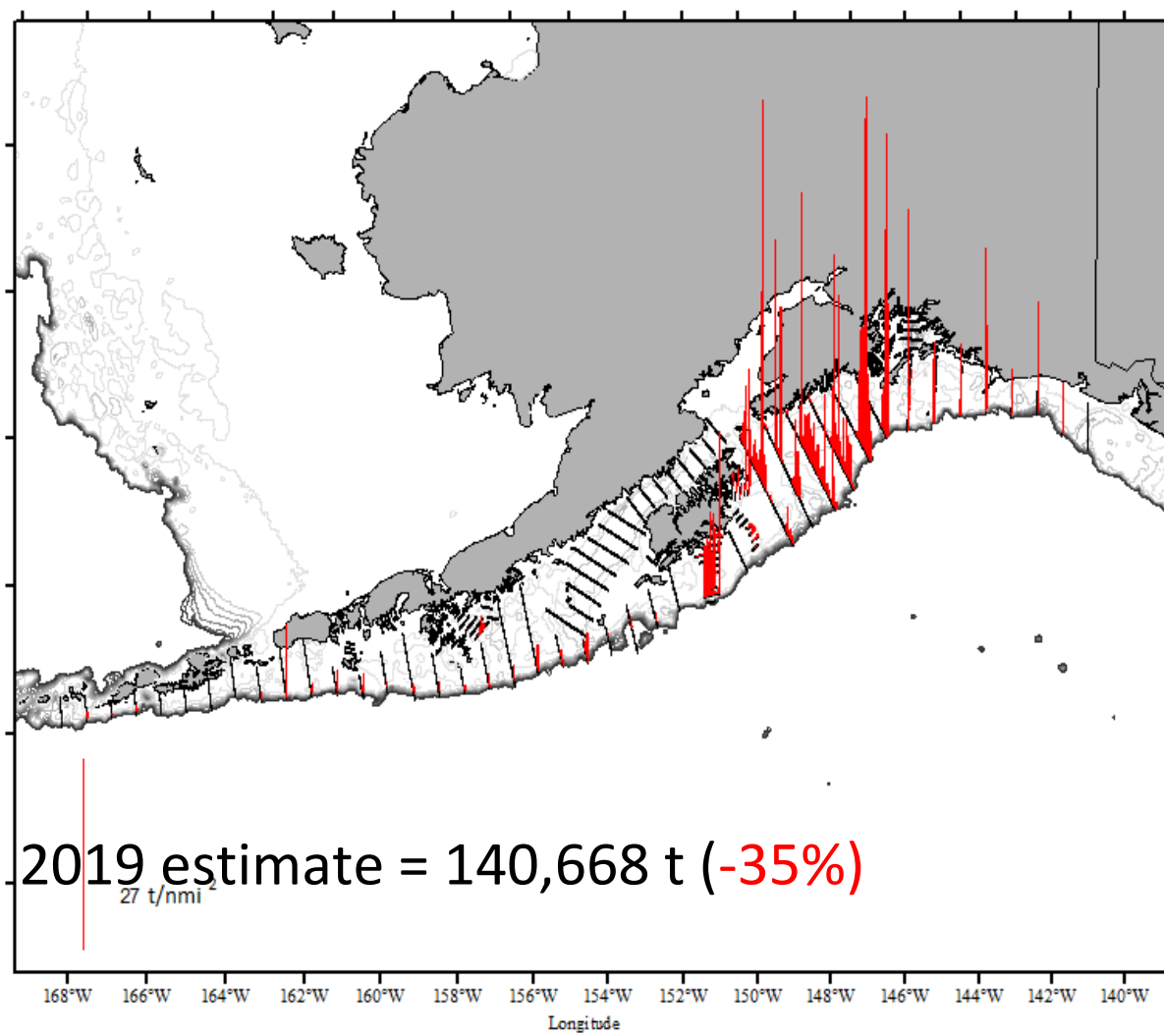
	WYAK (24%)	EYAK/SE (72%)	Total
2019 ABC	3,298	2,389	5,687
2020 ABC	**1,470**	**4,653**	**6,123**
2021 ABC	**1,410**	**4,467**	**5,888**



9. GOA Pacific ocean perch Acoustic survey



2017 estimate = 215,074 t



2019 estimate = 140,668 t (-35%)

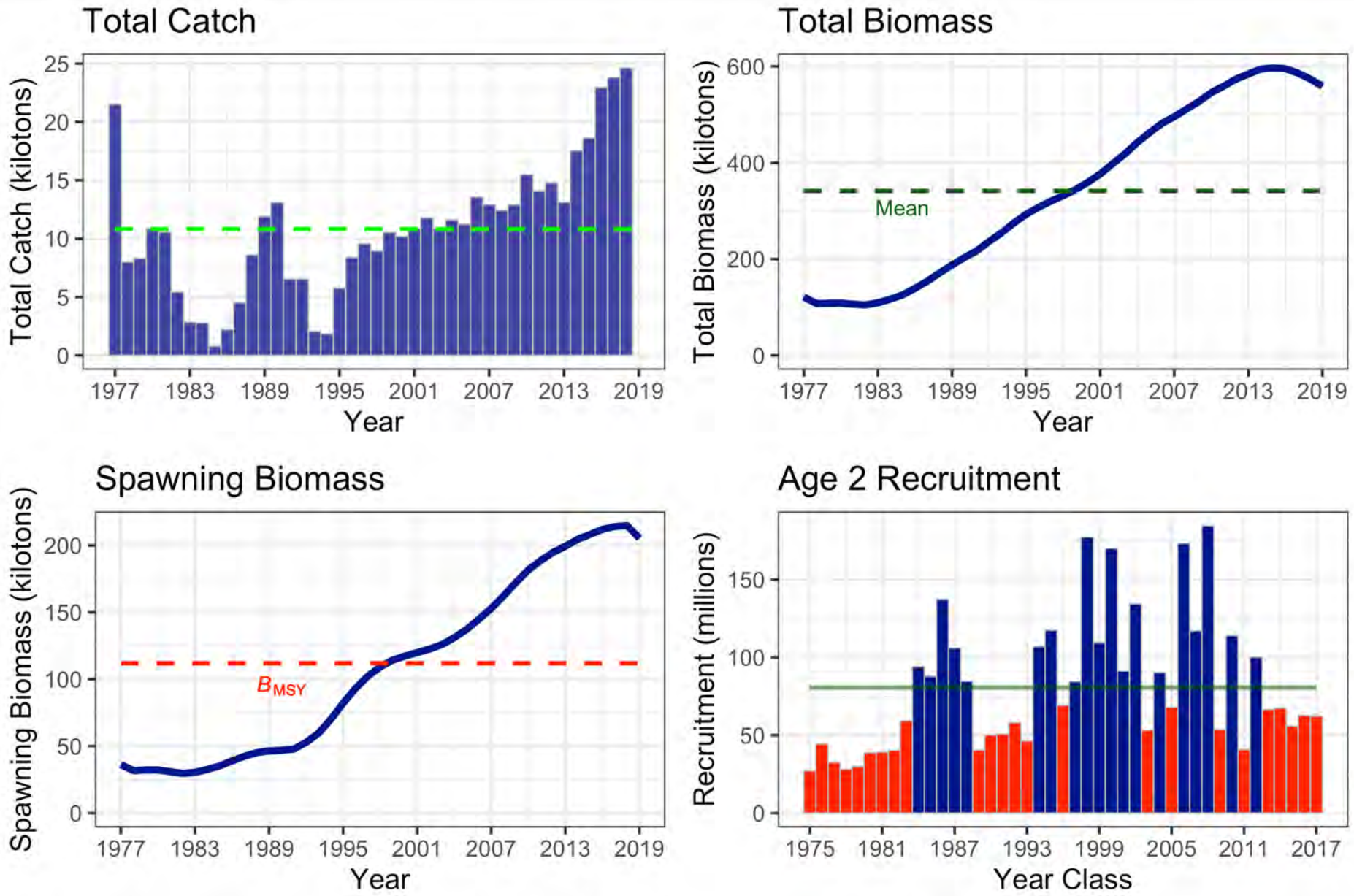
9. GOA Pacific ocean perch risk table

Assessment-related	***Population dynamics***	***Environmental/ ecosystem***	***Fishery Performance***	***Overall score***
Level 2: Substantially increased concerns	Level 2: Substantially increased concerns	Level 1: No apparent concern	Level 1: No apparent concern	Level 2: Substantially increased concerns

- Overall, level 2, but no recommendation for decrease
- Healthy pop'n, not driven by single year class, biomass underestimated
- Highlights case of risk matrix usage that could indicate increasing rather than decreasing ABC

9. GOA Pacific ocean perch

GOA Pacific Ocean Perch



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Other rock	5,594	4,053	down 1,541 (28%)
Sub Total	46,946	47,450	up 504 (1%)

10. Northern rockfish

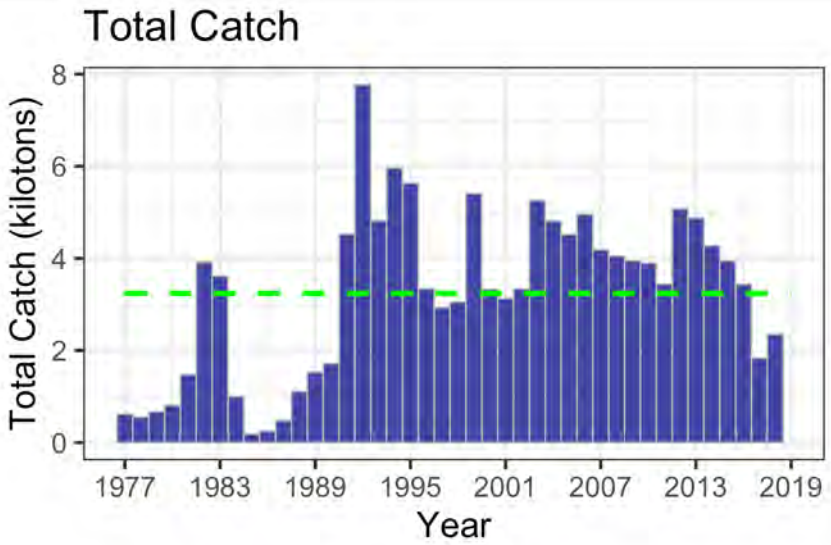
Partial Assessment, Tier 3a

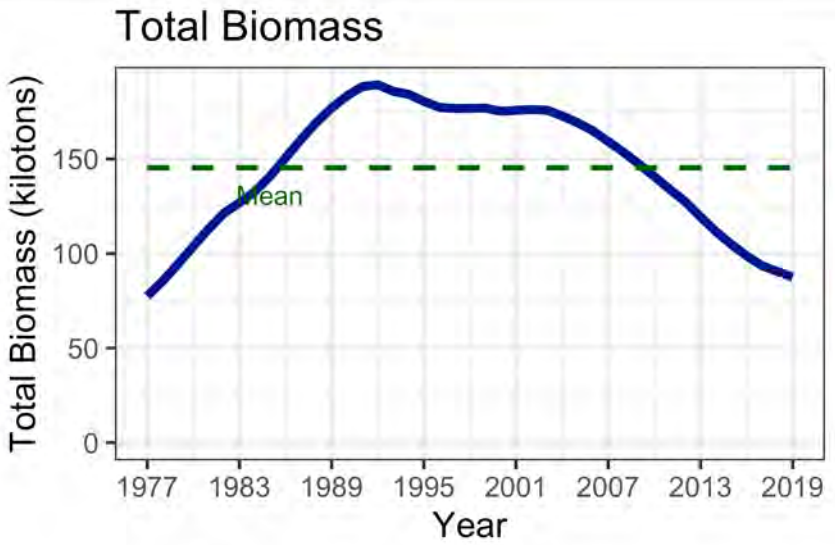
- 2020 ABC 4,312 t, down 5% from 2018
- Apportionment from last full assessment

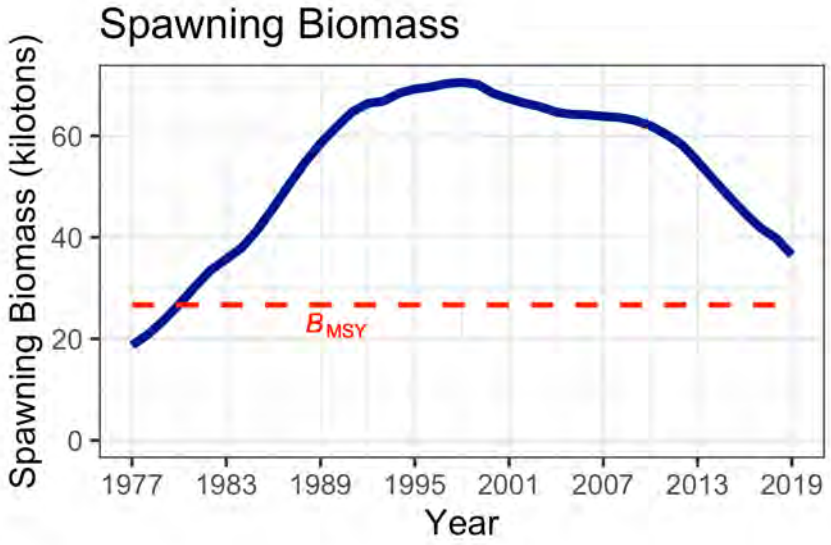
In 2020 authors will investigate weighting of composition data, exploring covariance matrix, VAST vs design-based

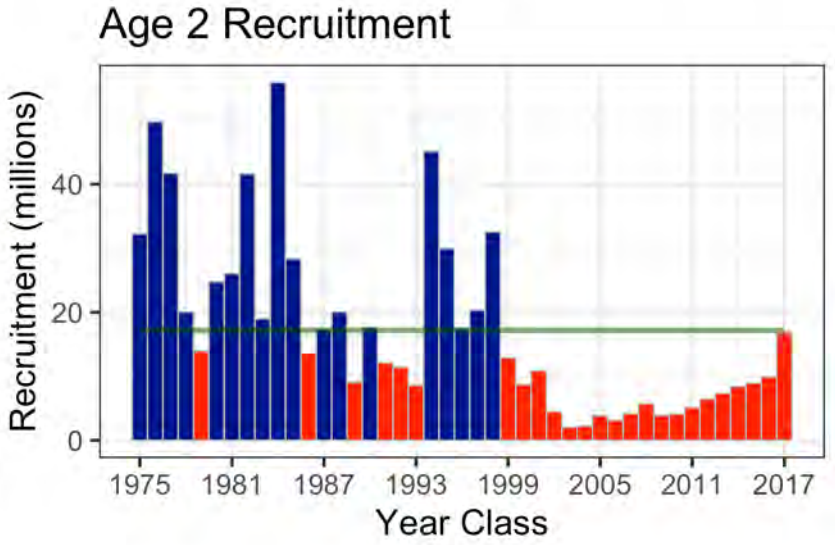
10. Northern rockfish

GOA Northern Rockfish









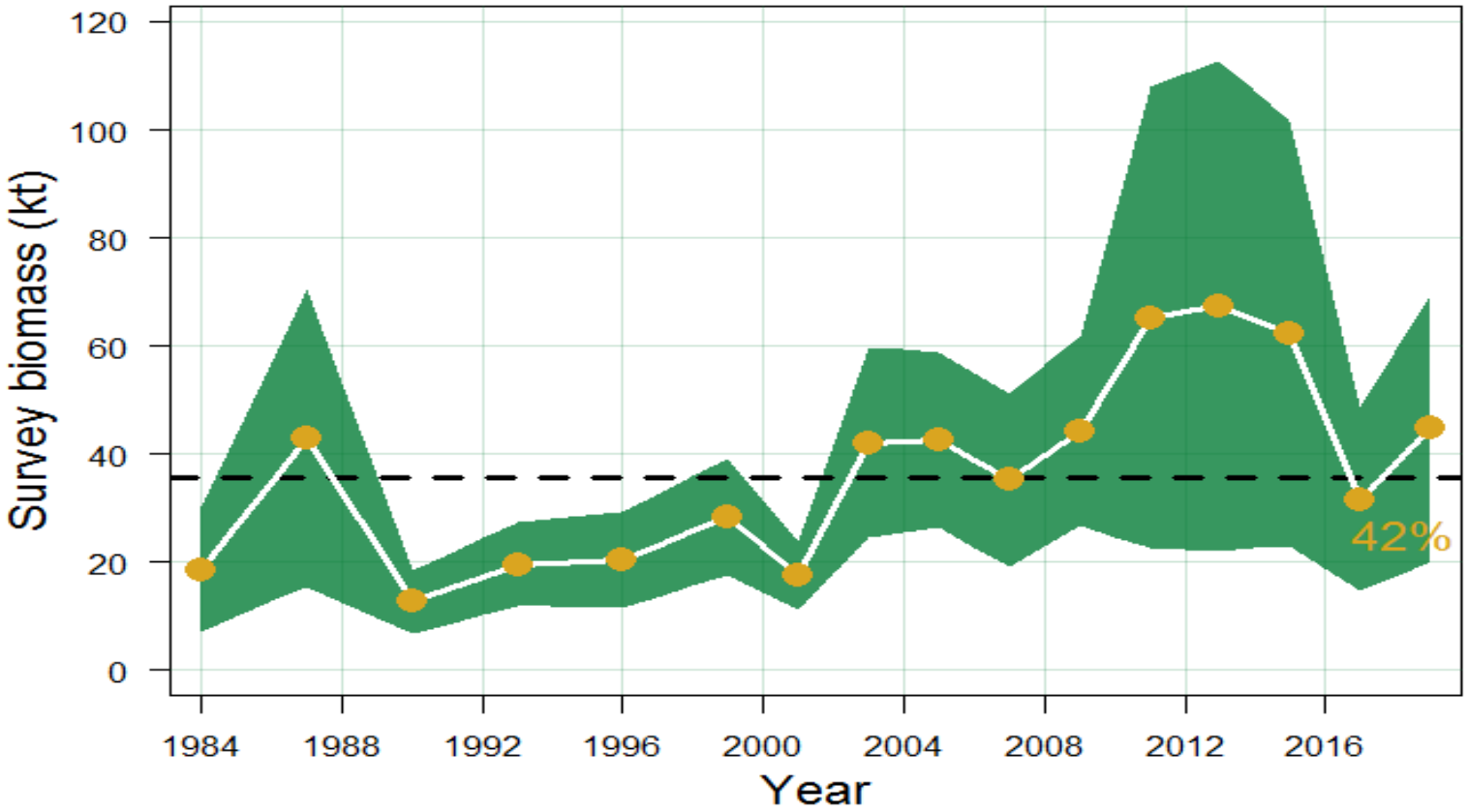
Full assessment done in 2018

Rockfish ABC Summary

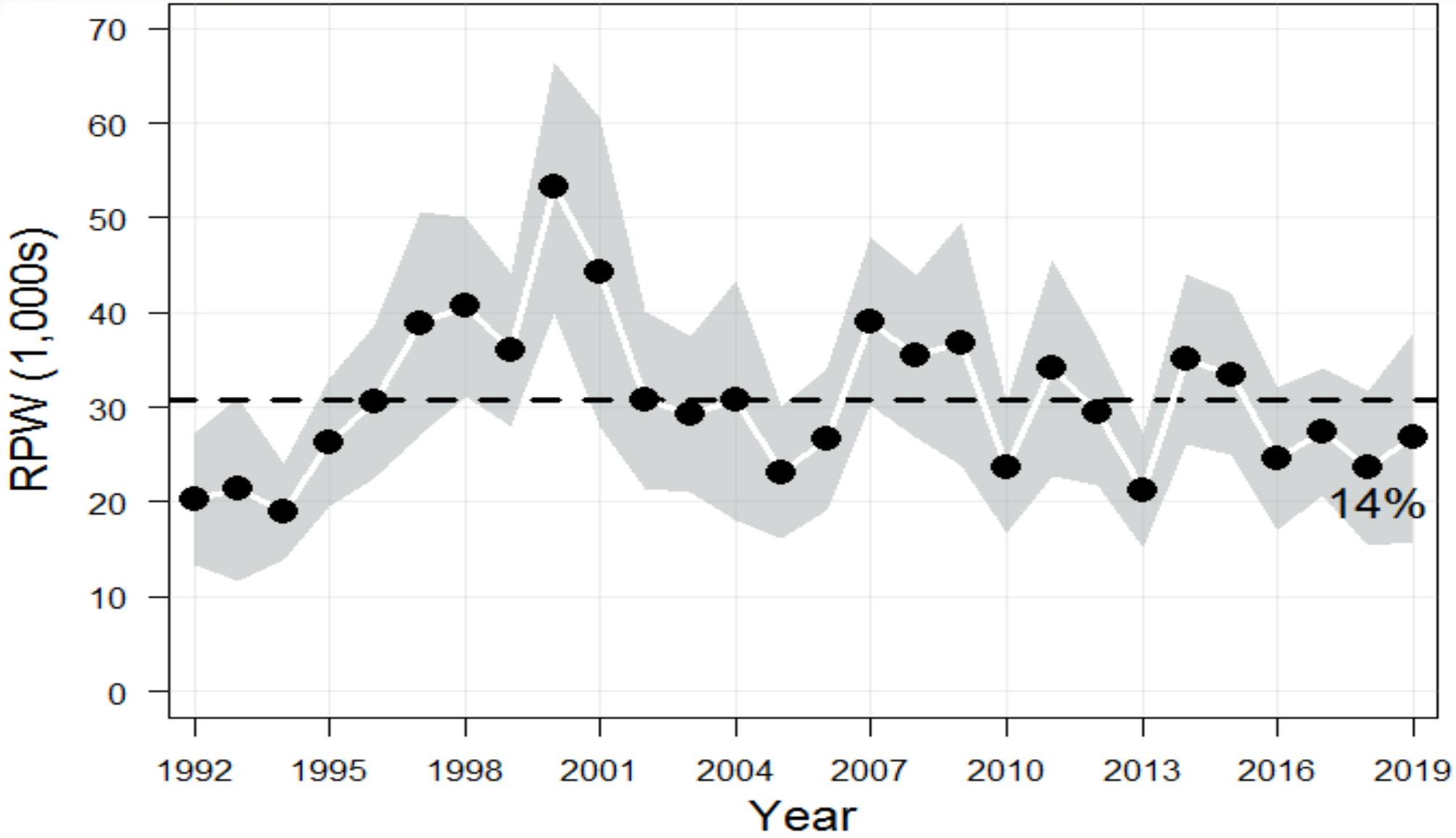
Species	2019	2020	Change
POP	28,555	31,238	up 2,683 (9%)
northern rockfish	4,529	4,312	down 217 (5%)
Shortraker Rockfish	863	708	down 155 (18%)
Dusky	3,700	3,676	down 24 (1%)
Rougheye and Blackspotted Rockfish	1,428	1,209	down 219 (15%)
Demersal shelf rockfish	261	238	down 23 (9%)
Thornyhead	2,016	2,016	same (0%)
Other rock	5,594	4,053	down 1,541 (28%)
Sub Total	46,946	47,450	up 504 (1%)

11. GOA Shortraker rockfish

- Tier 5
- Recommended model change: include LL survey RPW index into RE model



11. GOA Shortraker rockfish AFSC longline survey



GOA Shortraker apportionment

Apportionment is based on random effects estimation of biomass by region, fit to 1984-2019 trawl survey biomass and 1992-2019 longline survey RPWs

- Western: 52 t (↑18%)
- Central: 284 t (↓7%)
- Eastern: 372 t (↓28%)

GOA Shortraker

- Risk table score 1
  - No need to reduce ABC from max ABC.
  - Noted a disconnect between the survey biomass increasing and the model biomass decreasing.

Rockfish ABC Summary

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POP	28,555	31,238	up 2,683 (9%)
northern rockfish	4,529	4,312	down 217 (5%)
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Thornyhead	2,016	2,016	same (0%)
Other rock	5,594	4,053	down 1,541 (28%)
Sub Total	46,946	47,450	up 504 (1%)

12. GOA Dusky Rockfish

Partial assessment, 3a

- Model based survey up 42%

Apportionment same as last full assessment

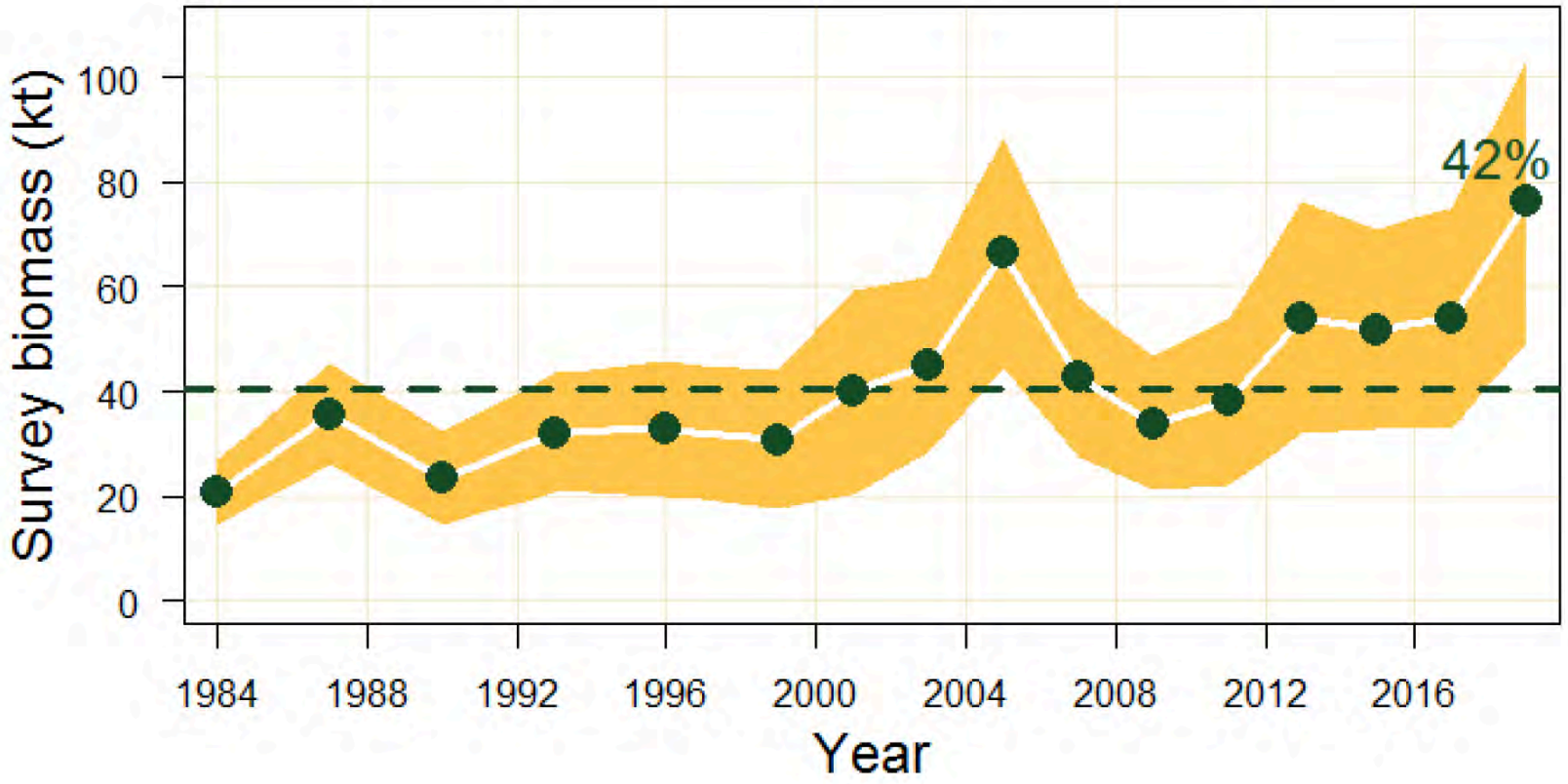
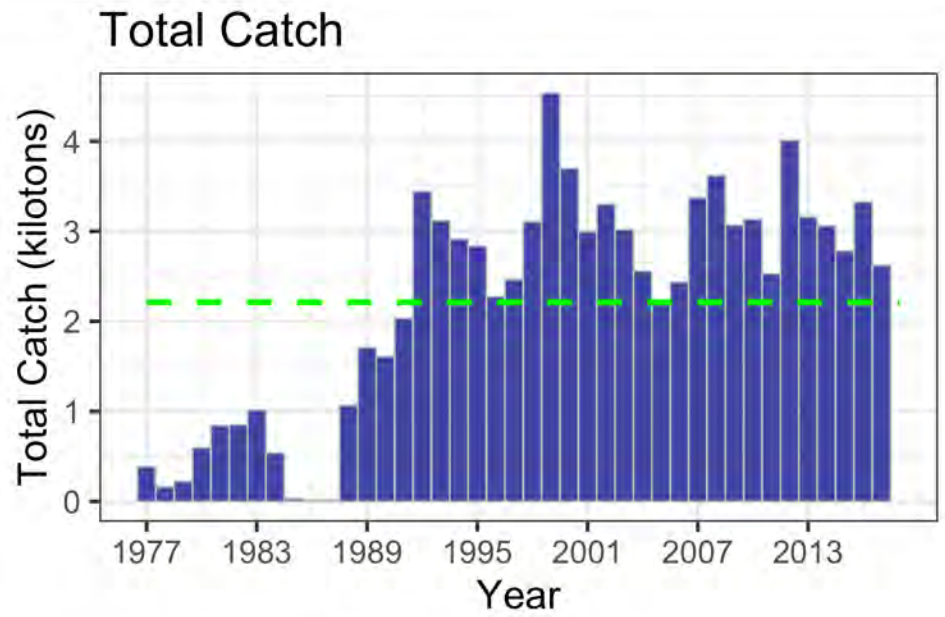
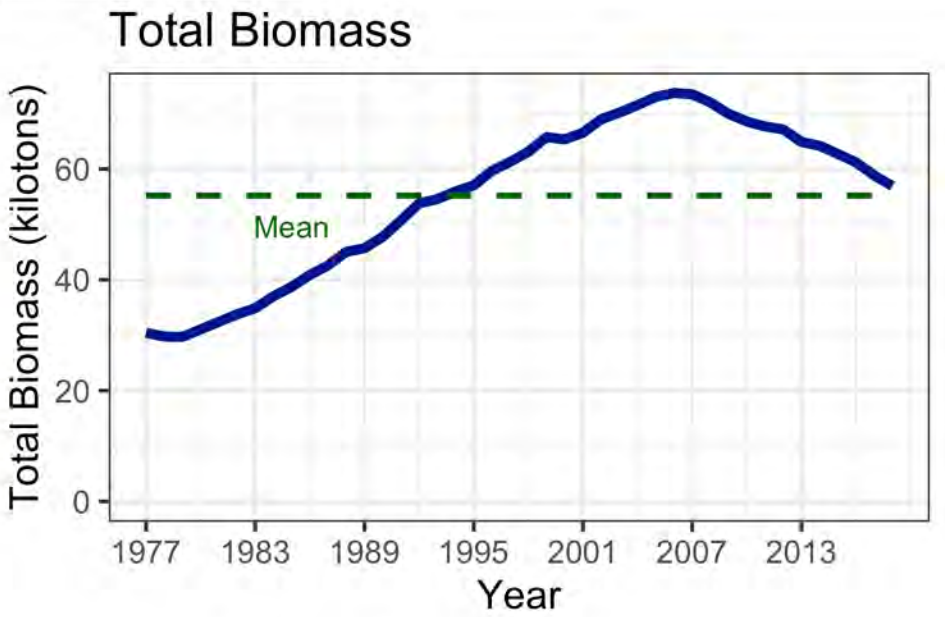
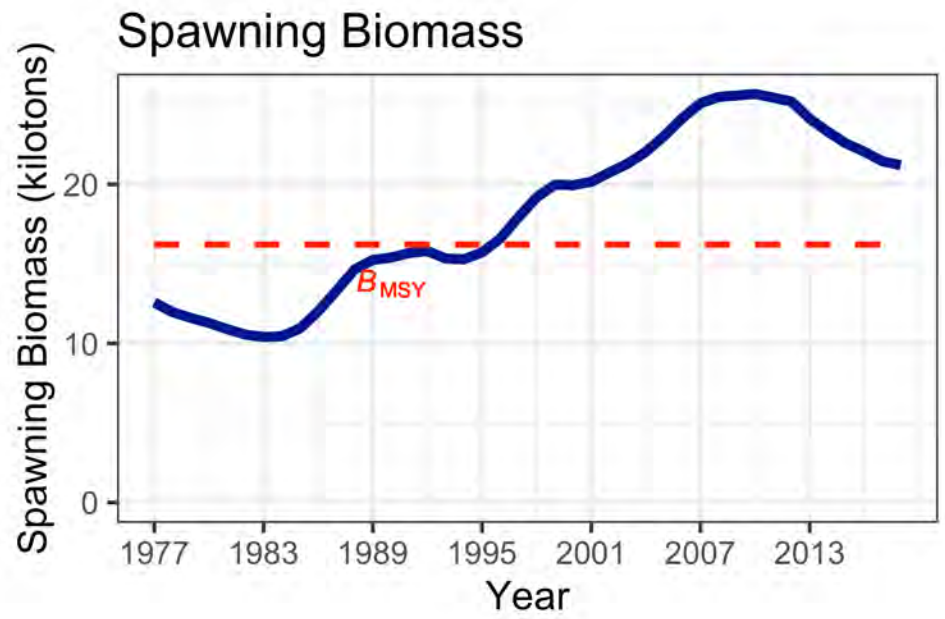


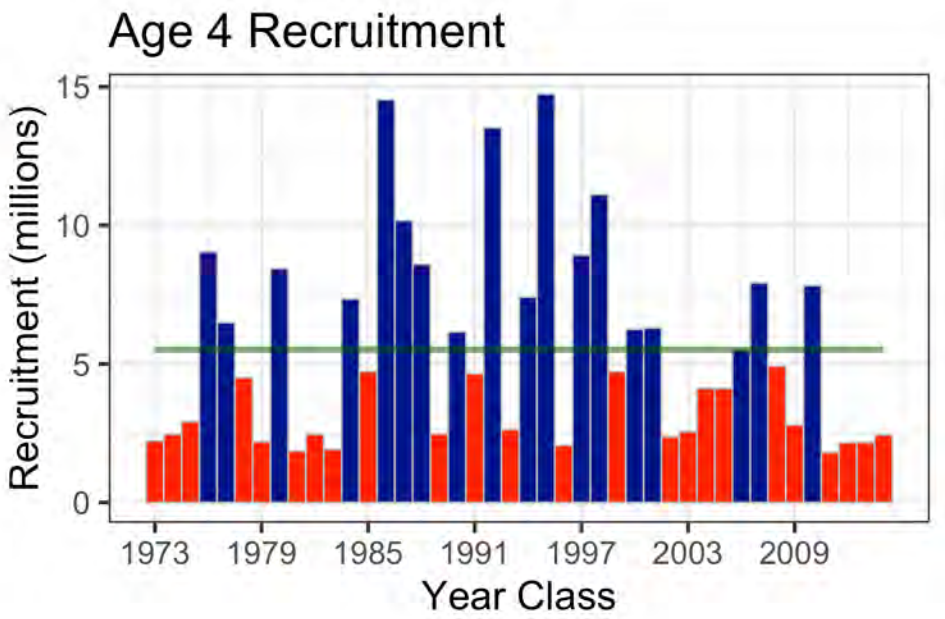
Figure 12-2. Model-based biomass index for GOA dusky rockfish from the NMFS bottom trawl survey, point estimates (in dark green circles) with 95% sampling error confidence intervals (shaded area), from 1984-2019. Dashed line is long-term average for the time series. Text percentage is the change of the 2019 index from the 2017 index.

GOA Dusky Rockfish









Rockfish ABC Summary

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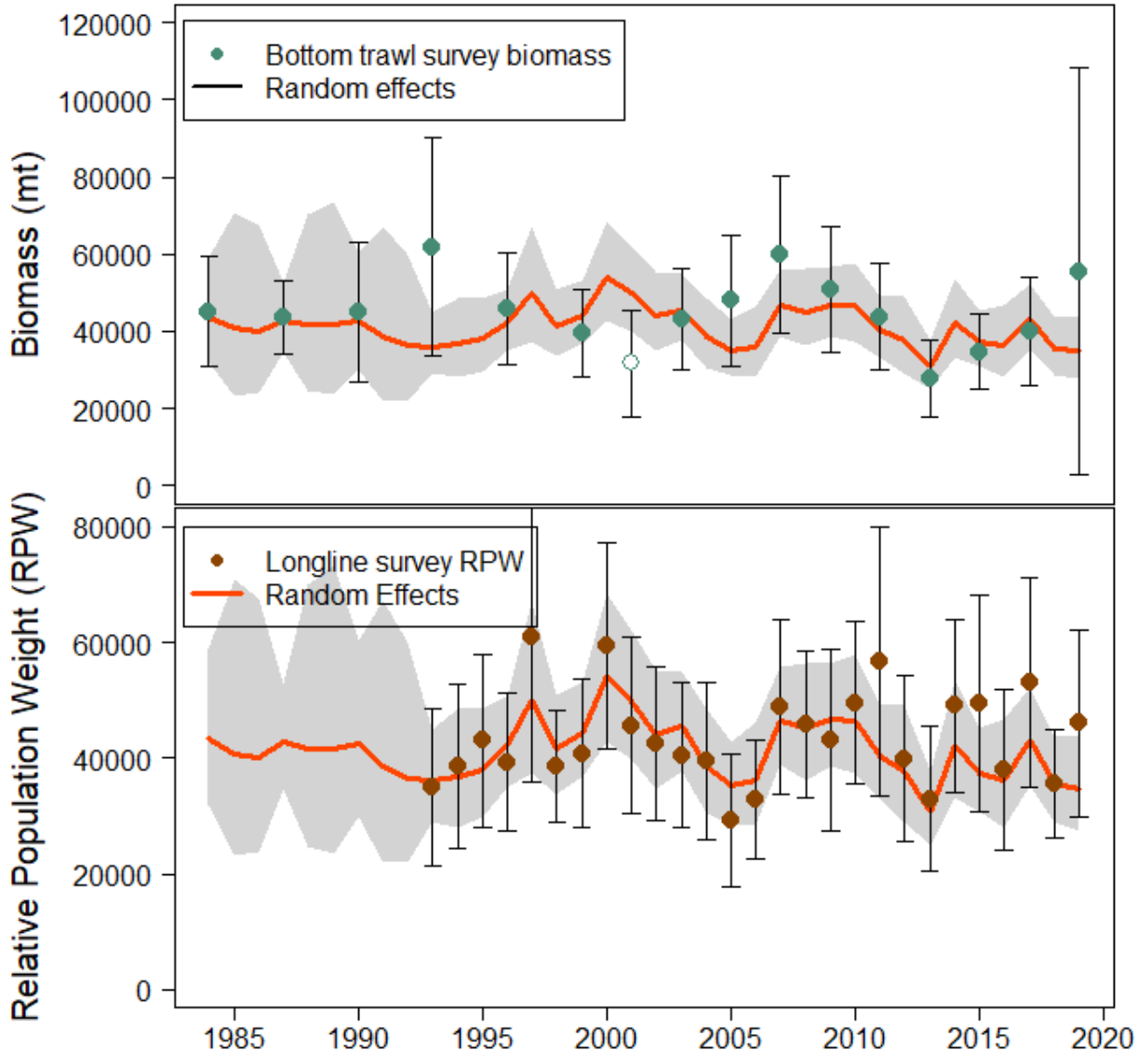
Other rock	5,594	4,053	down 1,541 (28%)
Sub Total	46,946	47,450	up 504 (1%)

13. GOA Blackspotted/Rougheye Rockfish

Full assessment

Catches low relative to total biomass

- Range 0.6% to 2%

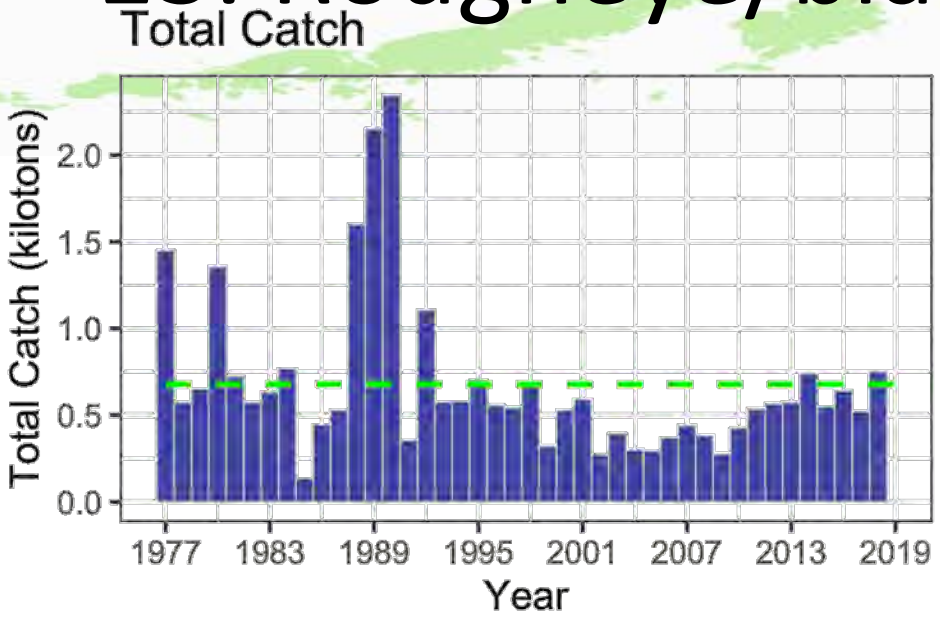


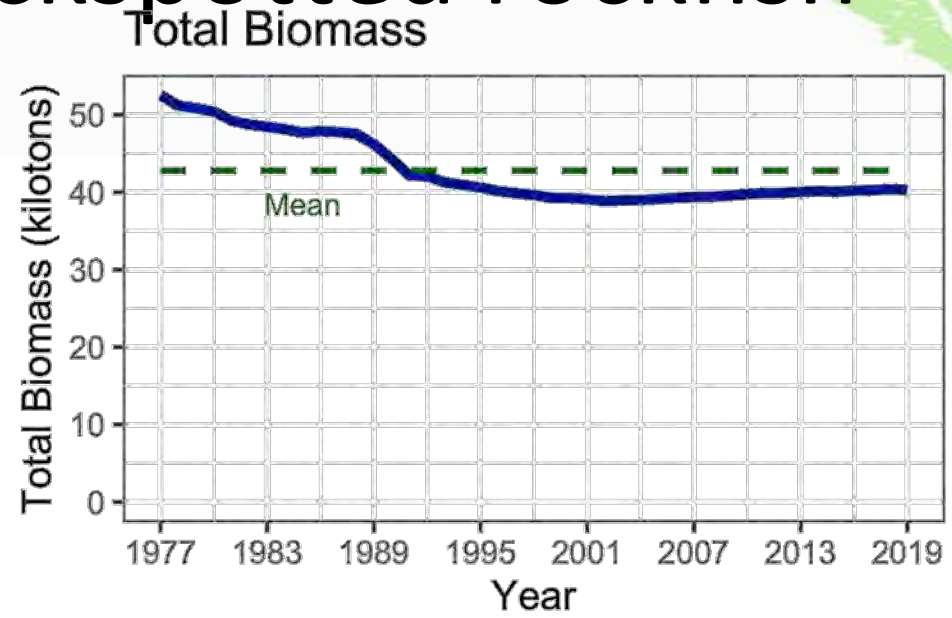
13. GOA Blackspotted/Rougheye Rockfish

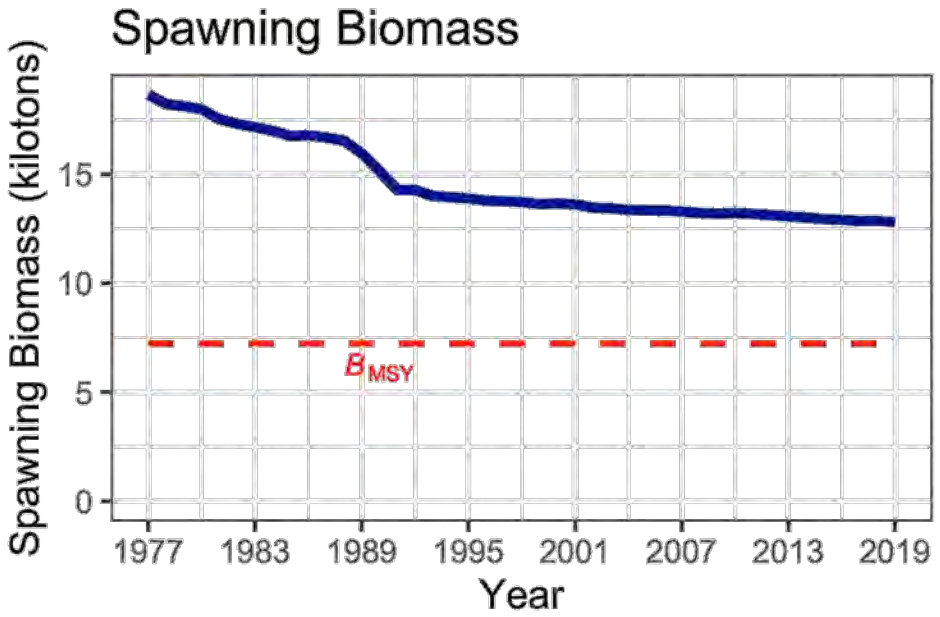
The Team recommended

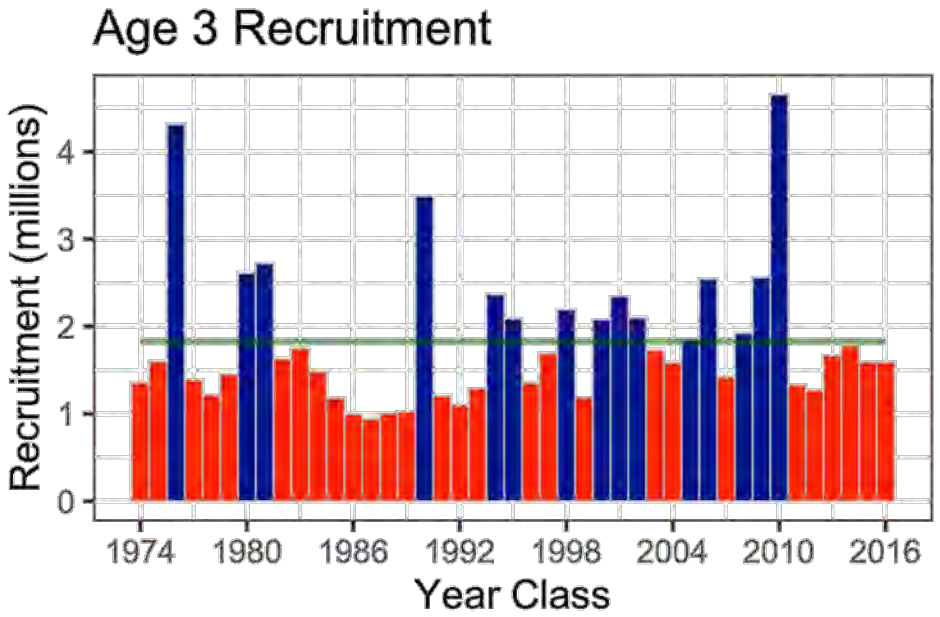
- **species identification using otolith morphology**
- **Refinements in selectivity**
- **Continue to apply new apportionment method**

13. Rougheye/blackspotted rockfish









Rockfish ABC Summary

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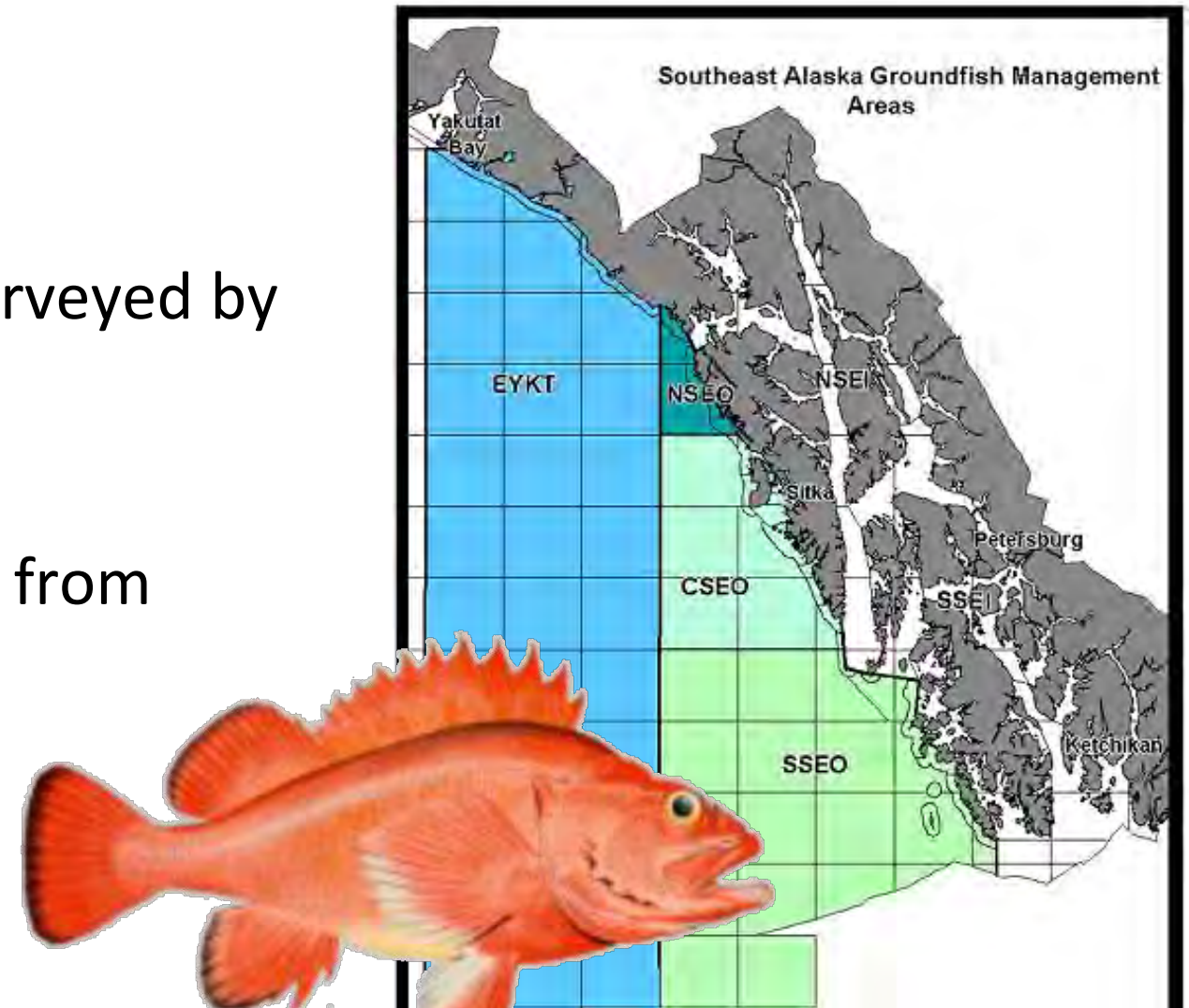
Other rock	5,594	4,053	down 1,541 (28%)
Sub Total	46,946	47,450	up 504 (1%)

14. Demersal shelf rockfish

- 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)



Rockfish ABC Summary

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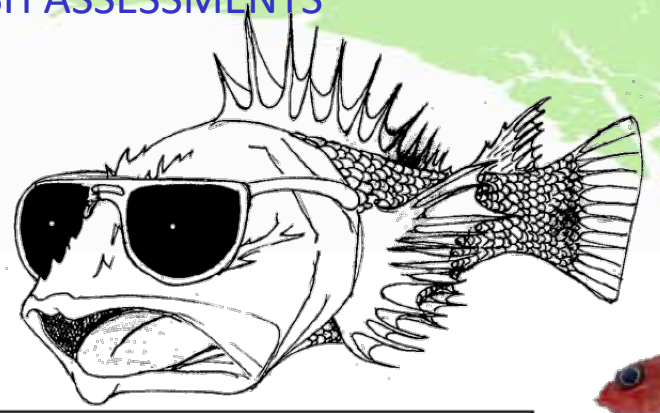
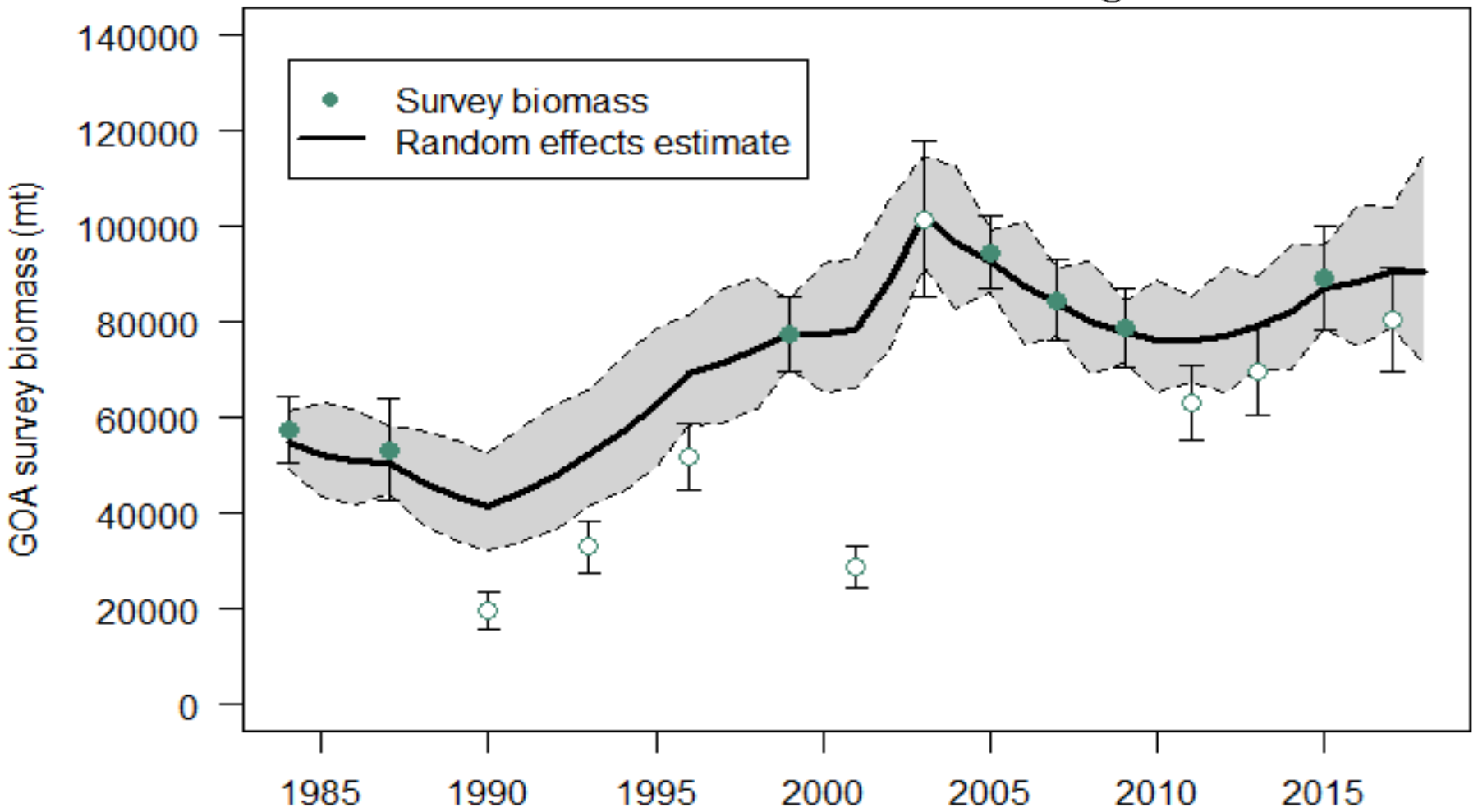
Other rock	5,594	4,053	down 1,541 (28%)
Sub Total	46,946	47,450	up 504 (1%)

15. Shortspine thornyheads



No assessment

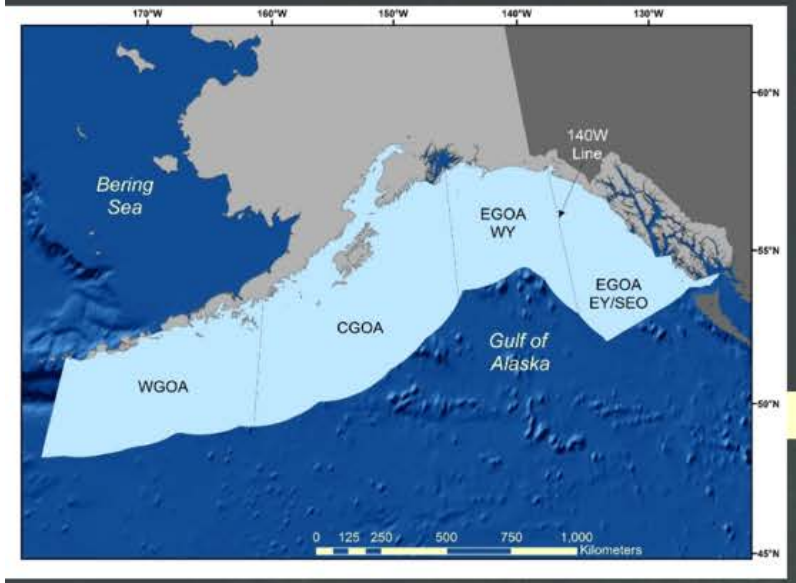
Tier 5



15. Other rockfish

Full assessment

Tier 5



WGOA & CGOA	EGOA (WY)	EGOA (EY/SEO)
Aurora rockfish	Aurora rockfish	Aurora rockfish
Blackgill rockfish	Blackgill rockfish	Blackgill rockfish
Bocaccio	Bocaccio	Bocaccio
Canary rockfish	Canary rockfish	
Chilipepper rockfish	Chilipepper rockfish	Chilipepper rockfish
China rockfish	China rockfish	
Copper rockfish	Copper rockfish	
Darkblotched rockfish	Darkblotched rockfish	Darkblotched rockfish
Greenstriped rockfish	Greenstriped rockfish	Greenstriped rockfish
Harlequin rockfish	Harlequin rockfish	Harlequin rockfish
	Northern rockfish	Northern rockfish
Pygmy rockfish	Pygmy rockfish	Pygmy rockfish
Quillback rockfish	Quillback rockfish	
Redbanded rockfish	Redbanded rockfish	Redbanded rockfish
Redstripe rockfish	Redstripe rockfish	Redstripe rockfish
Rosethorn rockfish	Rosethorn rockfish	
Sharpchin rockfish	Sharpchin rockfish	Sharpchin rockfish
Shortbelly rockfish	Shortbelly rockfish	Shortbelly rockfish
Silvergray rockfish	Silvergray rockfish	Silvergray rockfish
Splitnose rockfish	Splitnose rockfish	Splitnose rockfish
Stripetail rockfish	Stripetail rockfish	Stripetail rockfish
Tiger rockfish	Tiger rockfish	
Vermilion rockfish	Vermilion rockfish	Vermilion rockfish
Widow rockfish	Widow rockfish	Widow rockfish
Yelloweye rockfish	Yelloweye rockfish	
Yellowmouth rockfish	Yellowmouth rockfish	Yellowmouth rockfish
Yellowtail rockfish	Yellowtail rockfish	Yellowtail rockfish
26 Species	27 Species	20 Species

15. Other rockfish

Full assessment

Tier 5

Risk table

Assessment-related	Population dynamics	Environmental/ ecosystem	Fishery Performance	**Overall**
Level 1: Typical to moderately increased uncertainty/minor unresolved issues in assessment.	**Level 1**: Stock trends are typical for the stock; recent recruitment is within normal range.	**Level 1**: No apparent environmental/ecosystem concerns	**Level 1**: No apparent fishery/resource-use performance and/or behavior concerns	**Level 1: Normal**

15. Other rockfish

Area Allocation

Current

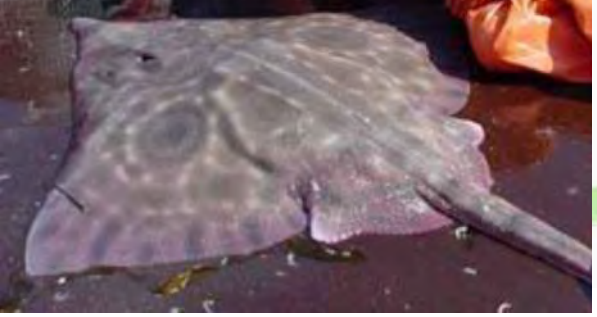
Full Complex	W GOA	Central GOA	Eastern GOA		Total
			West Yakutat	E Yakutat/ Southeast	
Area ABC (t)	940		369	2,744	4,053
OFL (t)					5,320

Previous

Full Complex	W GOA	Central GOA	Eastern GOA		Total
			West Yakutat	E Yakutat/ Southeast	
Area ABC (t)	1,737		368	3,489	5,594
OFL (t)					7,365

15. Other rockfish Team discussions

- **The Team recommended, as new data is collected based on the 2020 full retention mandate and new EM data, the author may provide an update to the Team in September, especially if there are concerns bycatch amounts approaching ABC levels.**
  - The Team also expressed concern about the disconnect between the survey findings (sporadic catches) and the fleet reports of increasing harlequin numbers.
- **The Team continues to recommend the Council move forward with Step 2 of the Spatial Management Policy for this complex and cautions potential changes in catch estimates may occur in 2020 due to full retention regulations and the incorporation of EM data.**



ABCs for remaining GOA species

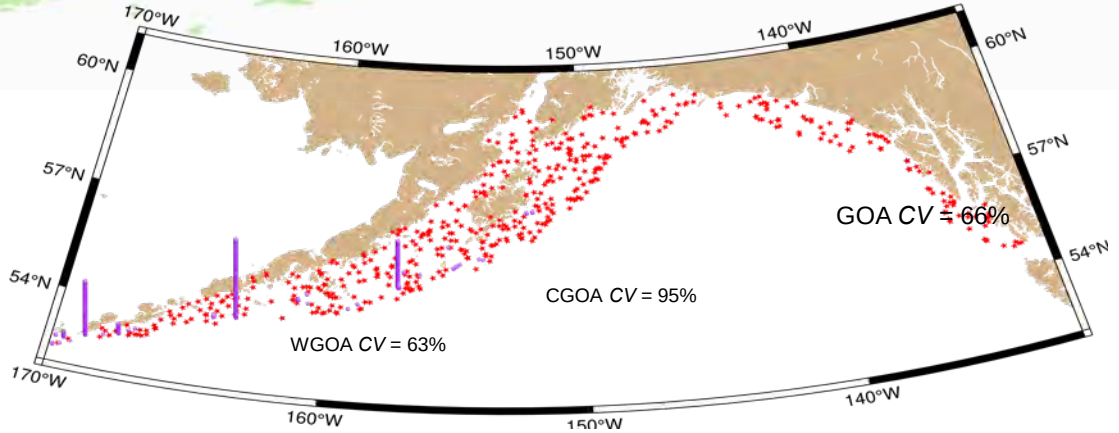
Species	2019 Catch	2019	2020	Change
Pollock	117,019	144,623	118,642	down 25,981 (18%)
Pacific Cod	10,909	17,000	14,621	down 2,379 (14%)
Sablefish	12,219	11,571	14,393	up 2,822 (24%)
Flatfish	27,638	116,562	114,567	down 1,995 (2%)
Arrowtooth flounder	2,553	145,841	128,060	down 17,781 (12%)
Rockfish	32,730	46,946	47,450	up 504 (1%)
Atka mackerel	1,254	4,700	4,700	same (0%)
Skates	3,042	7,804	6,670	down 1,134 (15%)
Other Species	2,618	14,460	14,363	down 97 (1%)
Total	209,982	509,507	463,466	down 46,041 (9%)

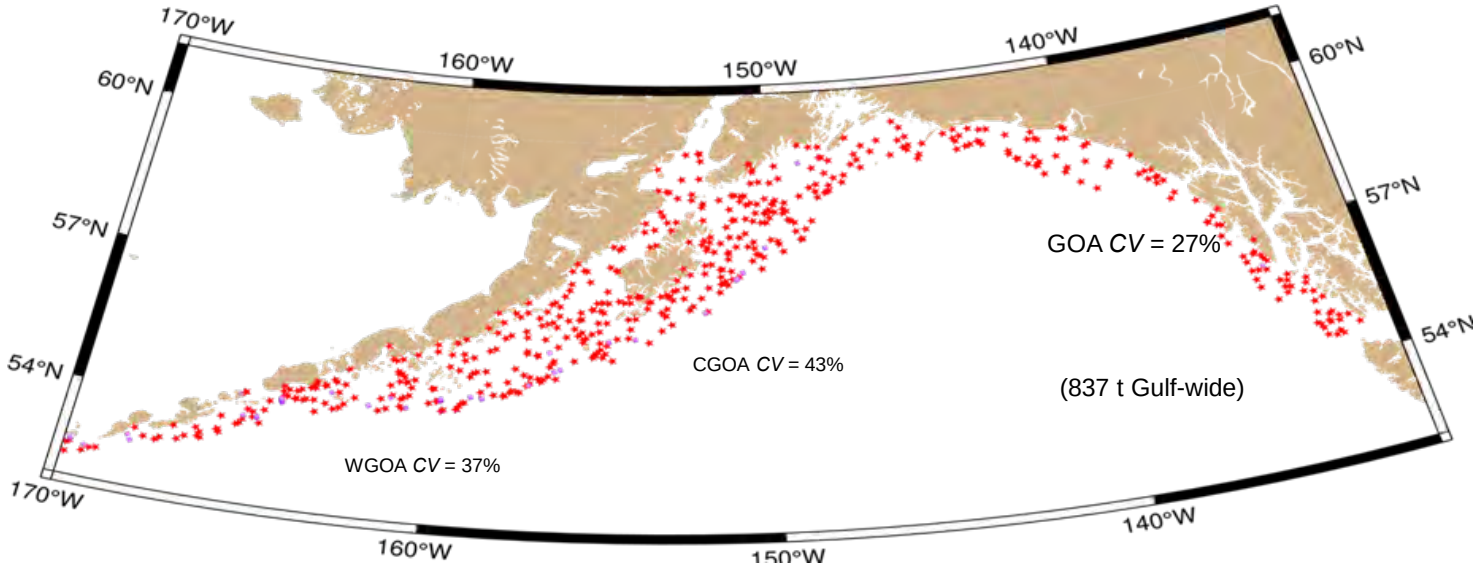
Other species…

Species	2019 Catch	2019	2020	Change
Atka mackerel	1,254	4,700	4,700	same(0%)
Big skate	1,192	2,848	3,208	up 360(13%)
Longnose skate	983	3,572	2,587	down 985(28%)
Other skates	867	1,384	875	down 509(37%)
Sculpins	574	5,301	5,199	down 102(2%)
Sharks	1,728	8,184	8,184	same(0%)
Squid	-	-	-	--
Octopus	316	975	980	up 5(1%)

17. GOA Atka mackerel

2017





2019

Atka mackerel survey CPUE by station for 2015 and 2017.

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

17. GOA Atka mackerel

- Risk table

Assessment-related	*Population dynamics*	*Environmental/ Ecosystem*	*Fishery Performance*	*Overall score (*
Level 1: Typical to moderately increased concerns	Level: UNK Stock and recruitment trends are unknown	Level 1: No apparent environmental/ ecosystem concerns	Level 1: No apparent fishery/resource-use performance and/or behavior concerns	Level 1: Normal

18. GOA Skates

Species	2019 Catch	2019	2020	Change
Big skate	1,192	2,848	3,208	up 360 (13%)
Longnose skate	983	3,572	2,587	down 985 (28%)
Other skate	867	1,384	875	down 509 (37%)
All skates	3,042	7,804	6,670	down 1,134 (15%)

Full Assessment, Tier 5 complex

- 2019 Big skate survey biomass increased relative 2017
- 2019 Longnose skate decreased relative to 2017
- “Other” skate biomass decreased relative to 2017

- Four additional surveys examined
  - (AFSC and IPHC longline and ADF&G trawl survey in Kodiak and Prince William Sound)
- Risk Table was scored Level 1 for all categories – no reduction to maxABC

19. GOA Sculpins

- Partial Assessment, Tier 5 complex
- Sculpin complex biomass 33,010 t (random effects model)

Sculpins last year as a “target” species complex!

- moving to the ecosystem component category

20. GOA Sharks

- No assessment this year

21. GOA Octopus

- Full assessment, Tier 6
- **The Team recommended that the author investigate bottom trawl survey catch by numbers as well as frequency of occurrence in hauls.**
- **The Team recommended that the period for which maximum catch is computed be fixed.**
- Using the risk table, the author ranked the octopus complex as a level of 1 and noted the difficulty in applying the risk table to Tier 6 stocks such as this one