

Gulf of Alaska SAFE report

Report of the
Gulf of Alaska Groundfish
Plan Team meeting
Nov 13th-17th, 2017

GOA Plan Team Members

James Ianelli (chair)	AFSC/REFM
James Armstrong	NPFMC
Ben Williams	ADFG
Nate Nichols	ADFG
Jan Rumble	ADFG
Dan Lew	AFSC/REFM
Chris Lunsford	AFSC/ABL
Jon Heifetz	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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Overview

Biennial **“on”** year for GOA

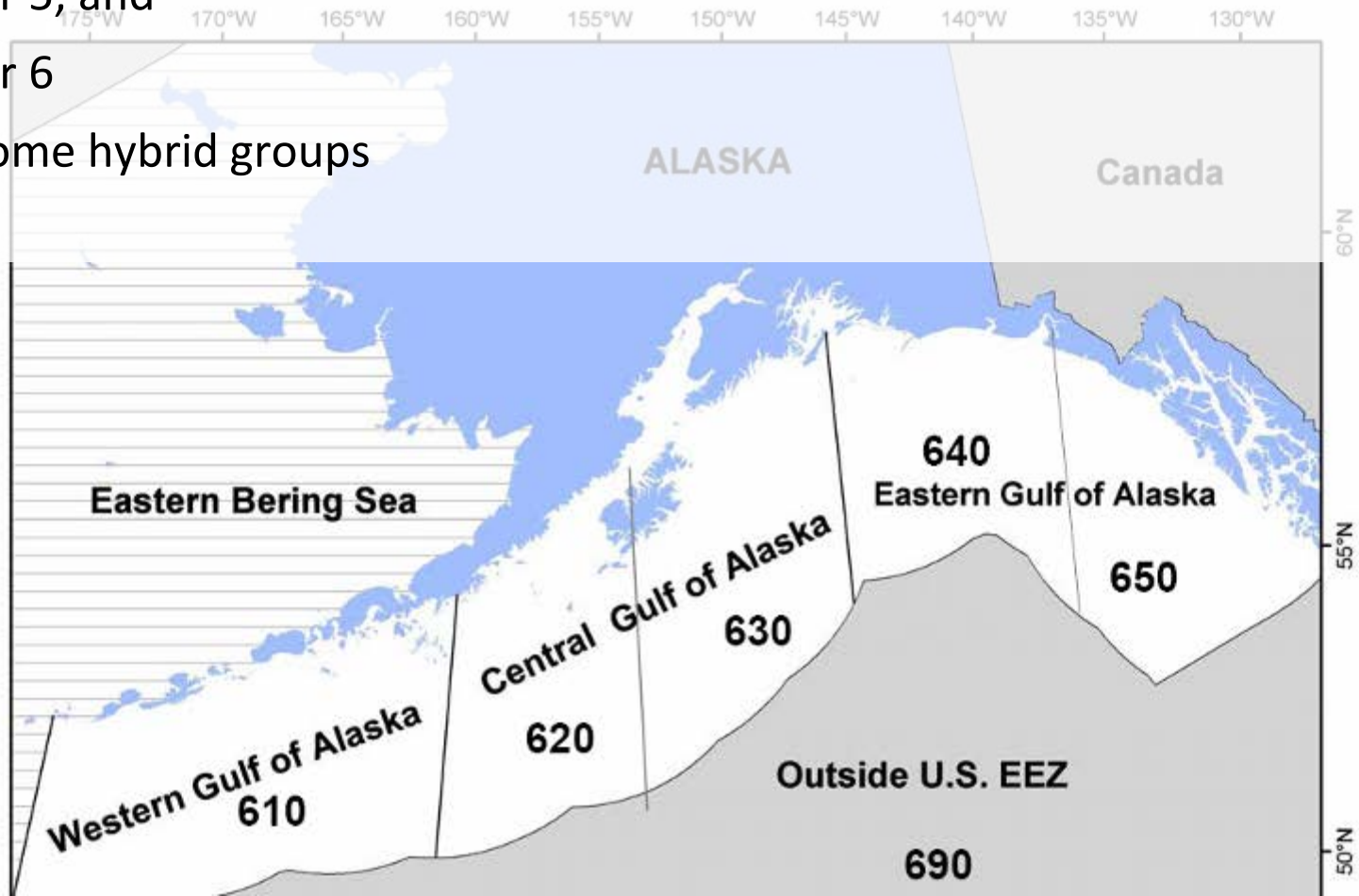
12 stocks in Tier 3

2 in Tier 4

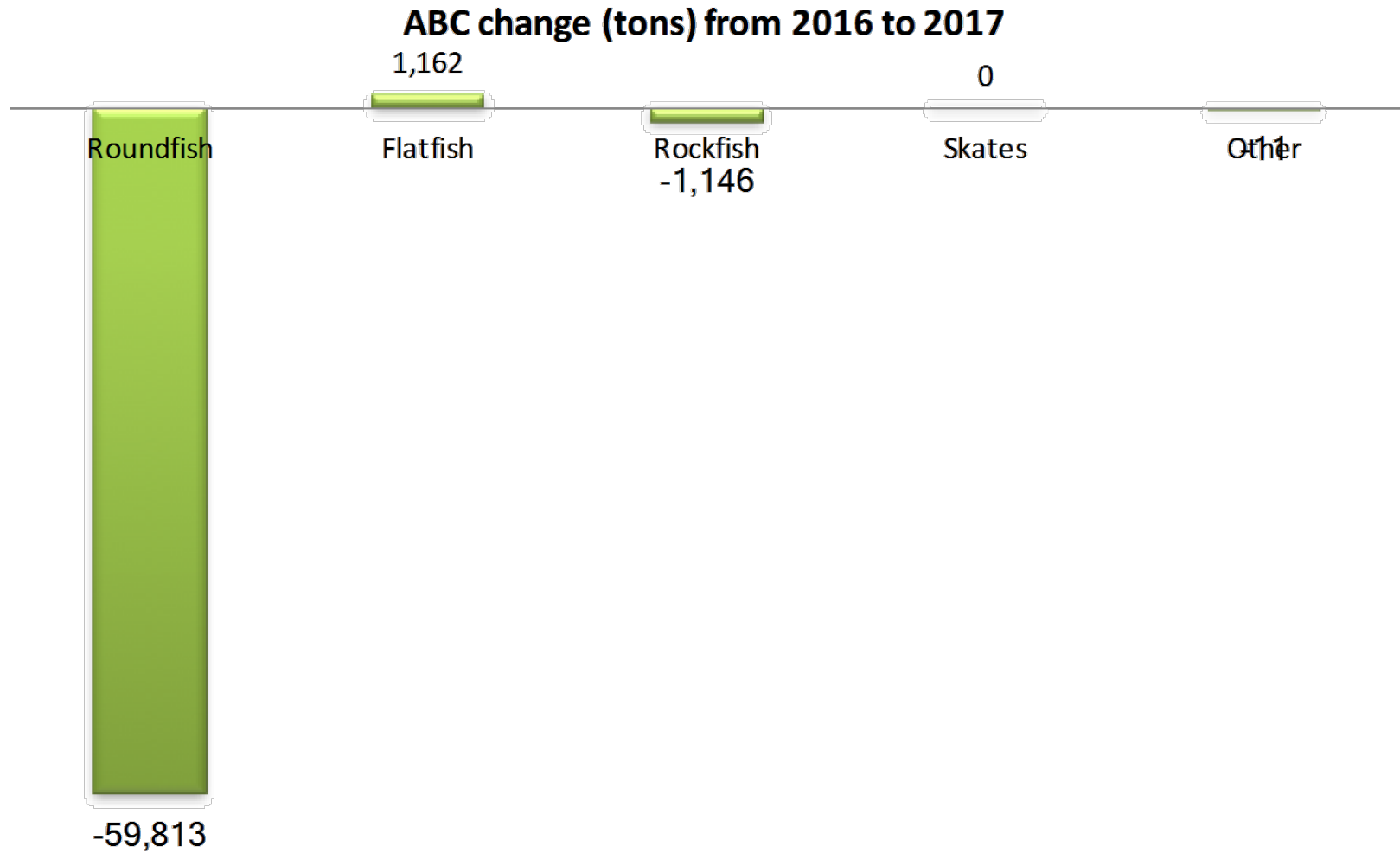
7 in Tier 5, and

5 in Tier 6

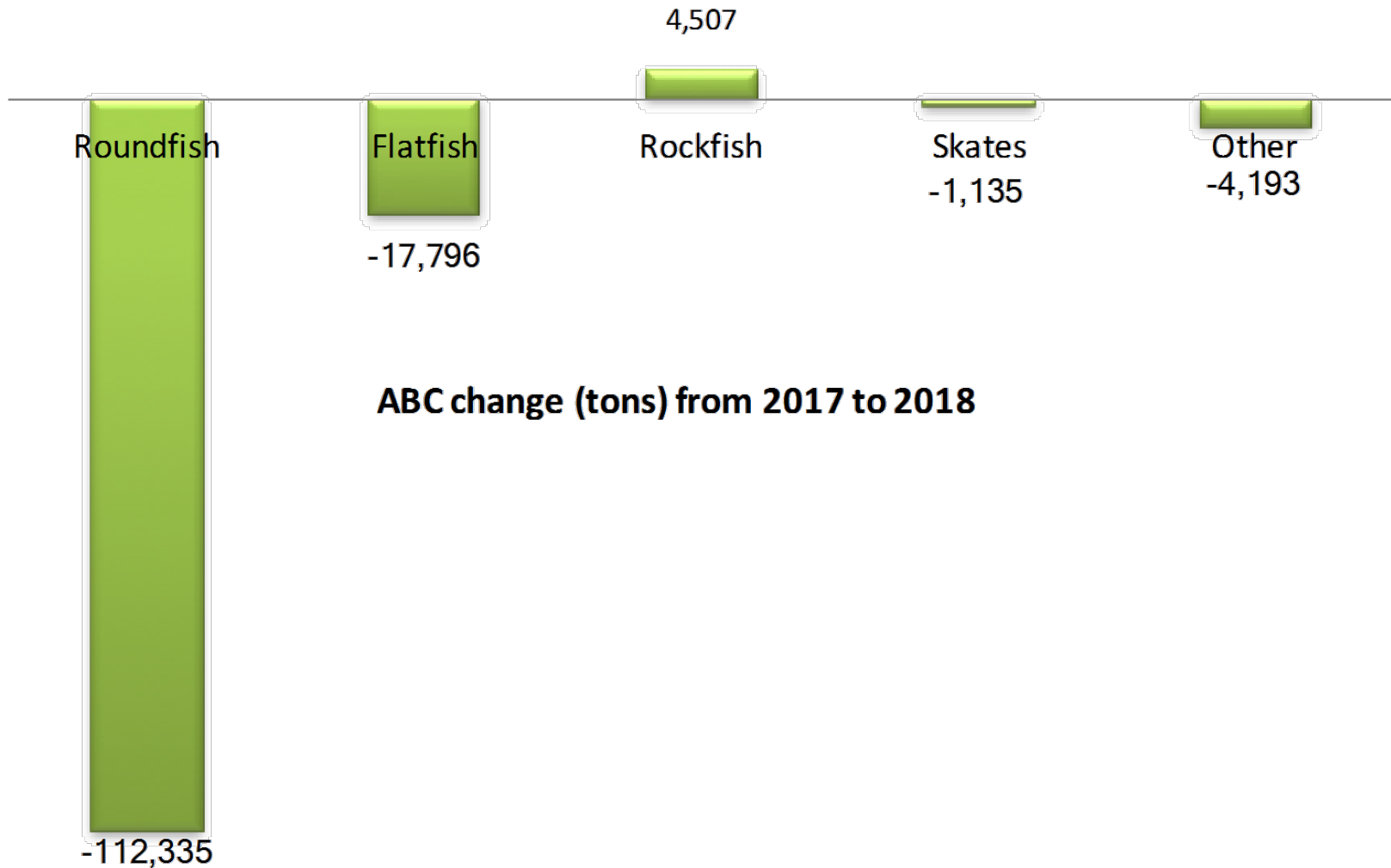
Note some hybrid groups



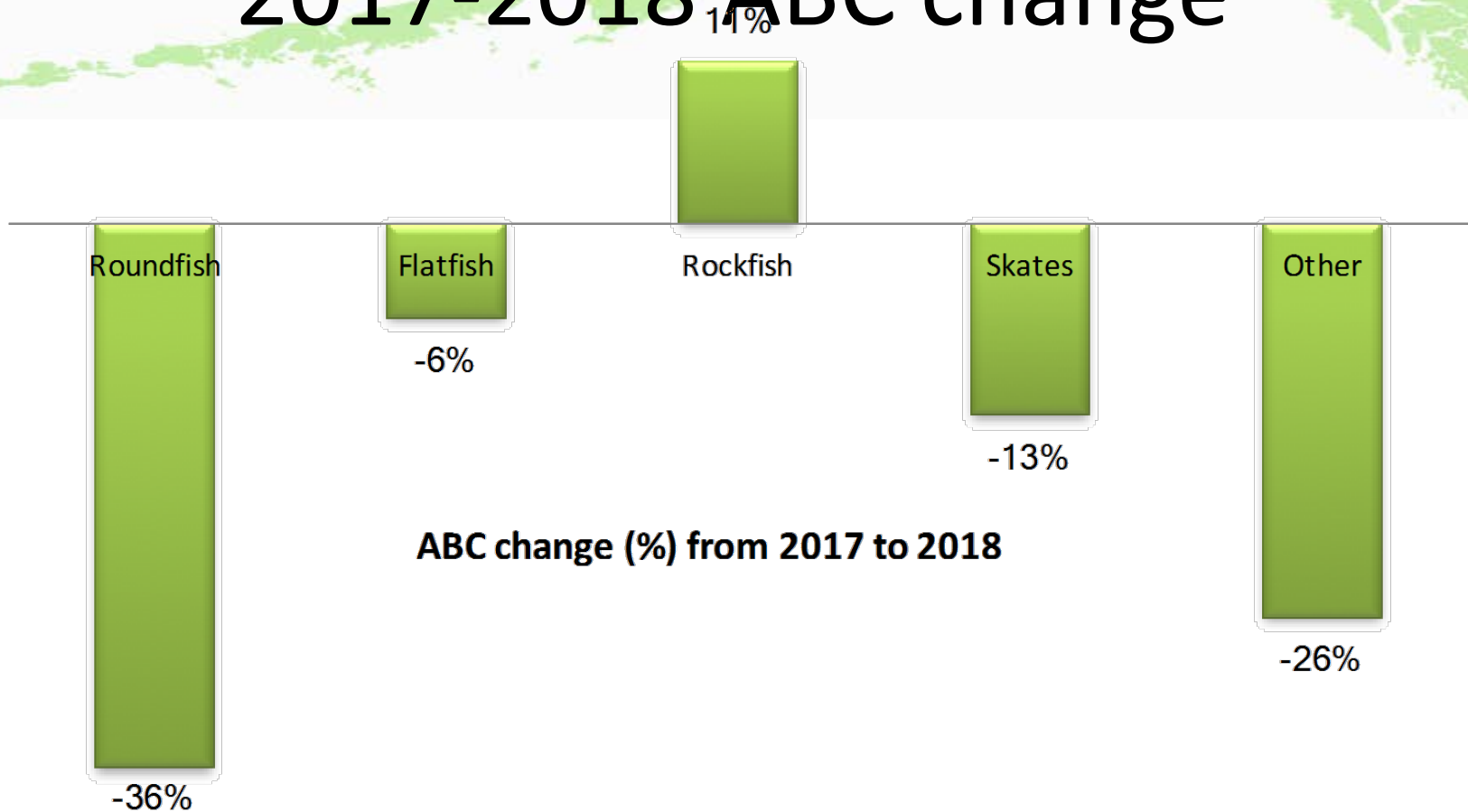
2016-2017 ABC change



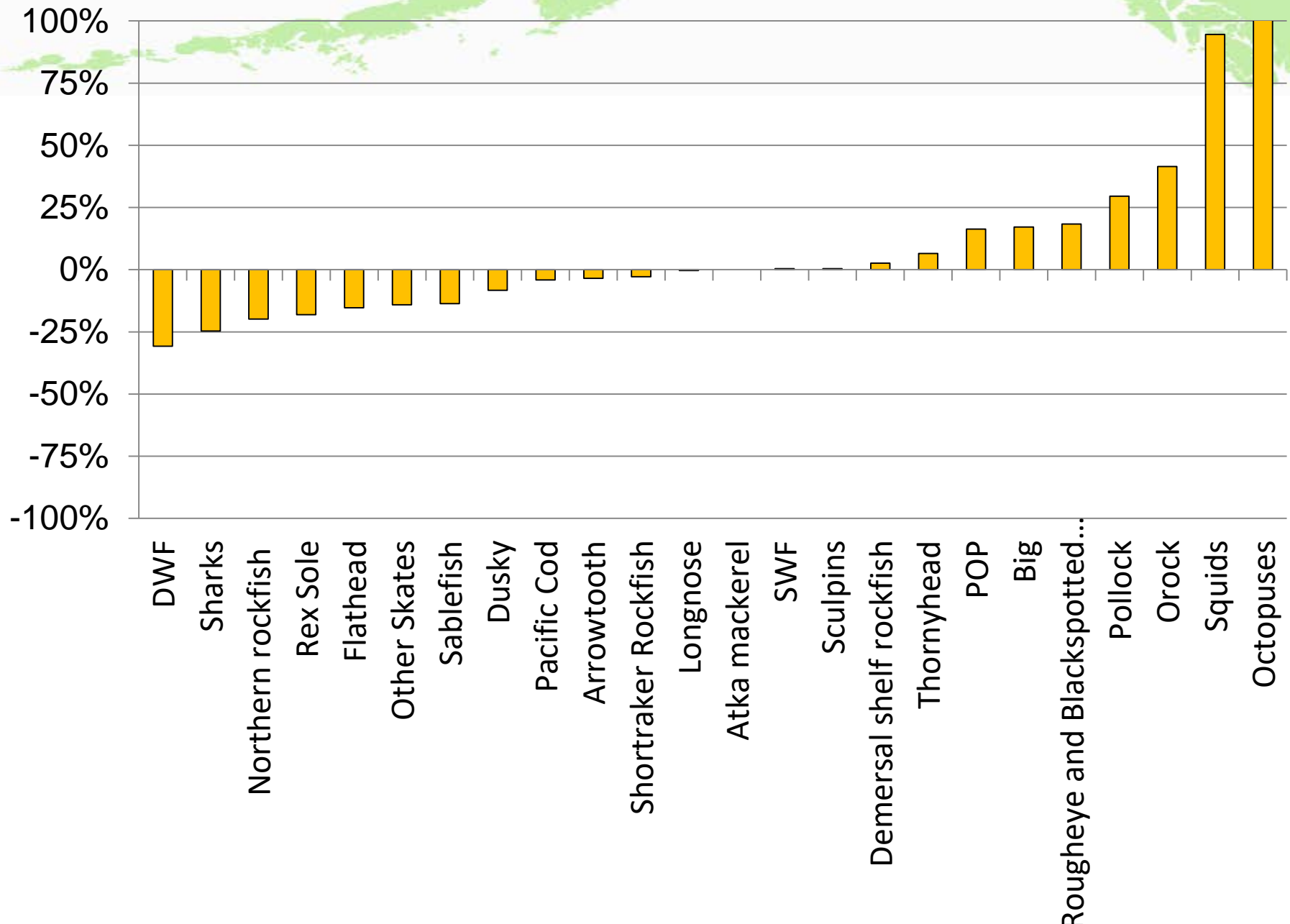
2017-2018 ABC change



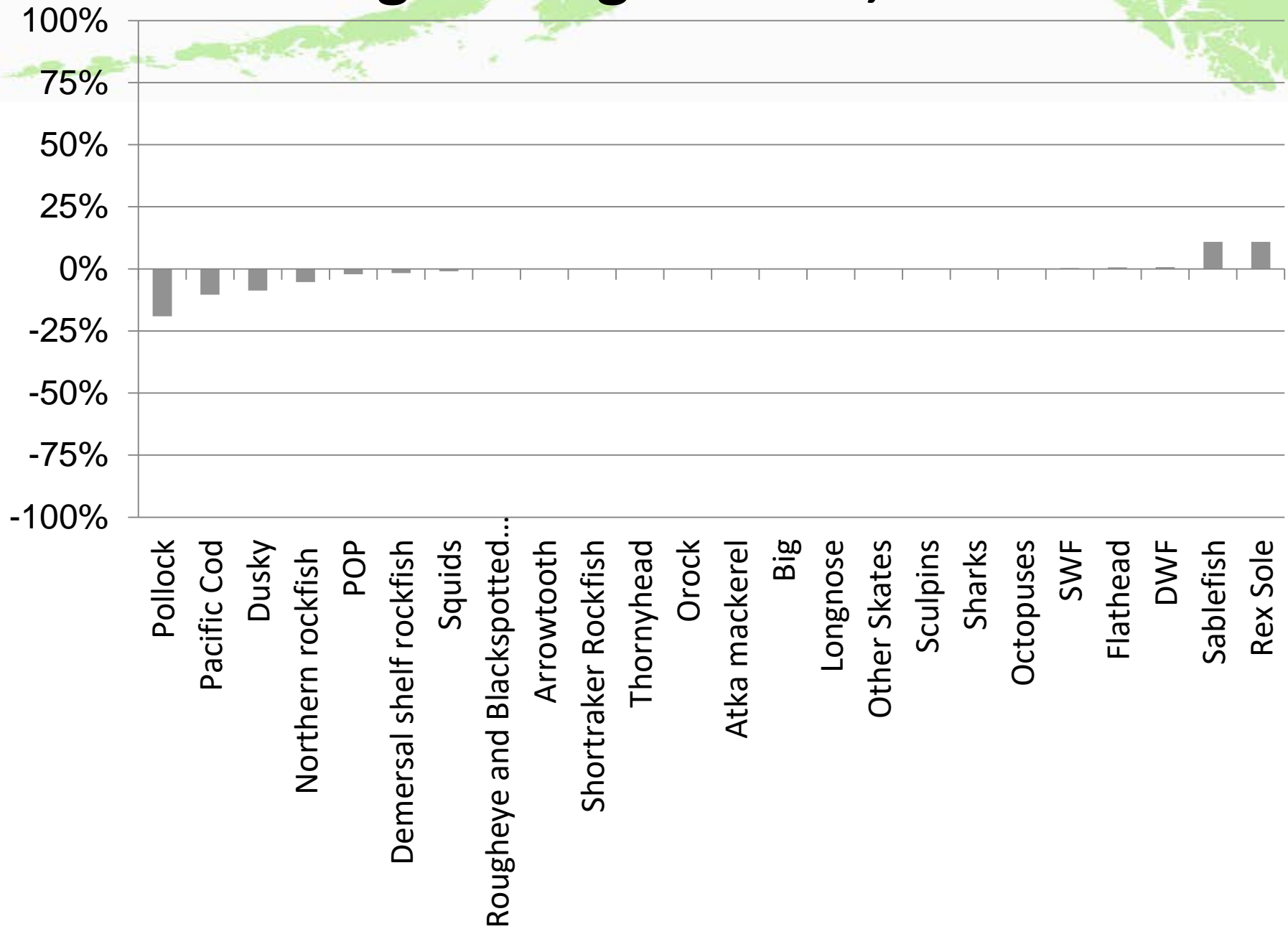
2017-2018 ABC change



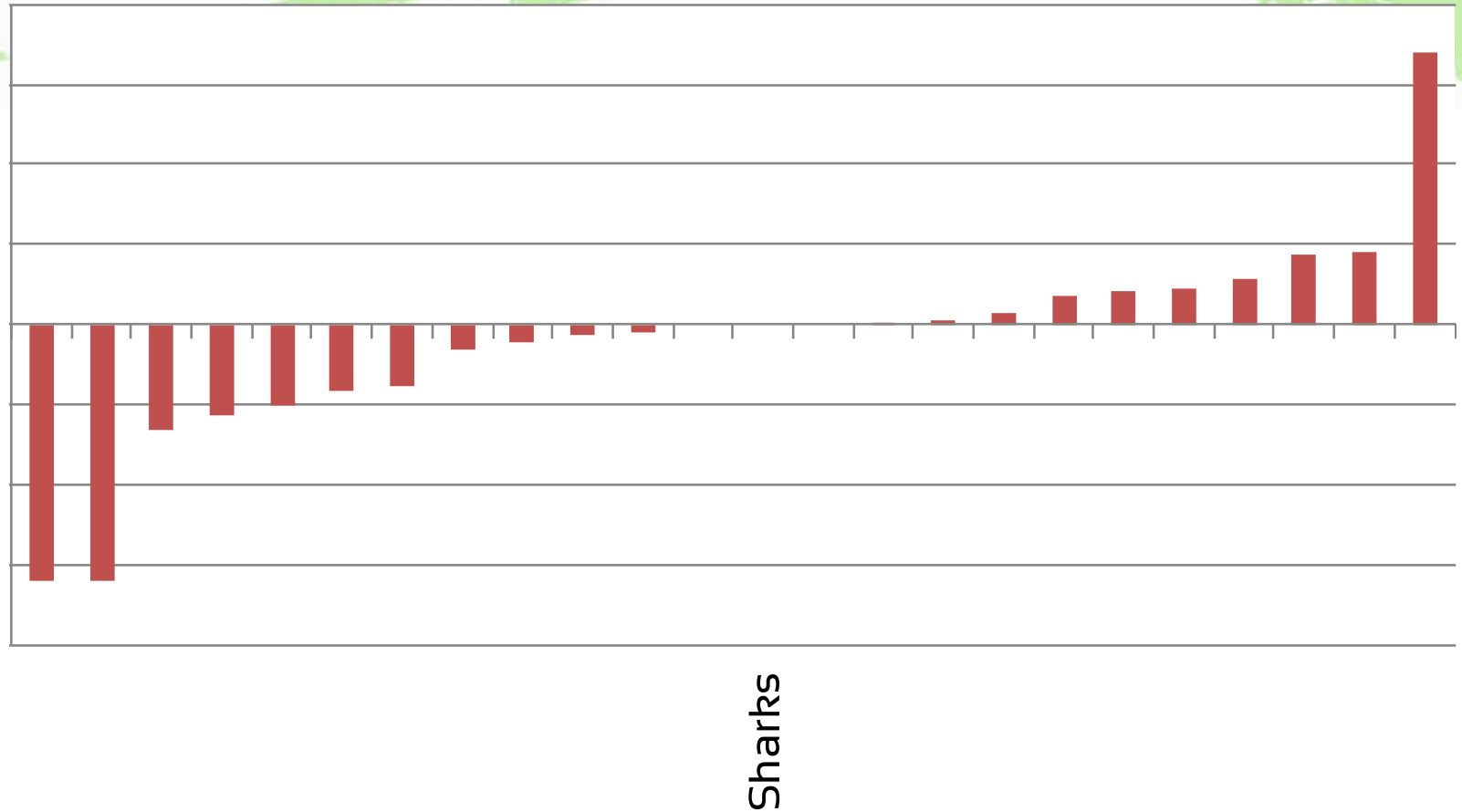
Percentage change in ABC, 2015-2016



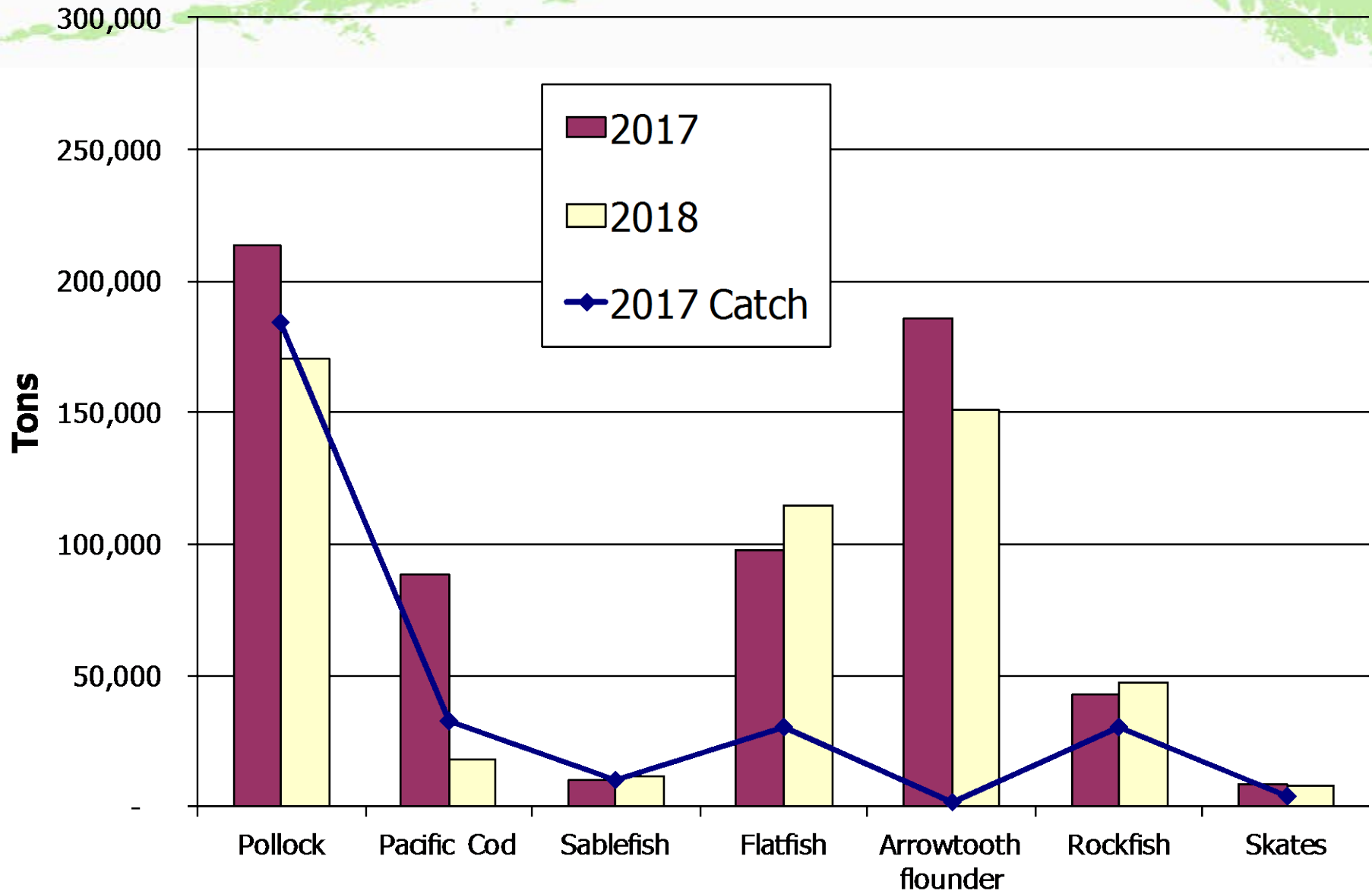
Percentage change in ABC, 2016-2017



Percentage change in ABC, 2017-2018

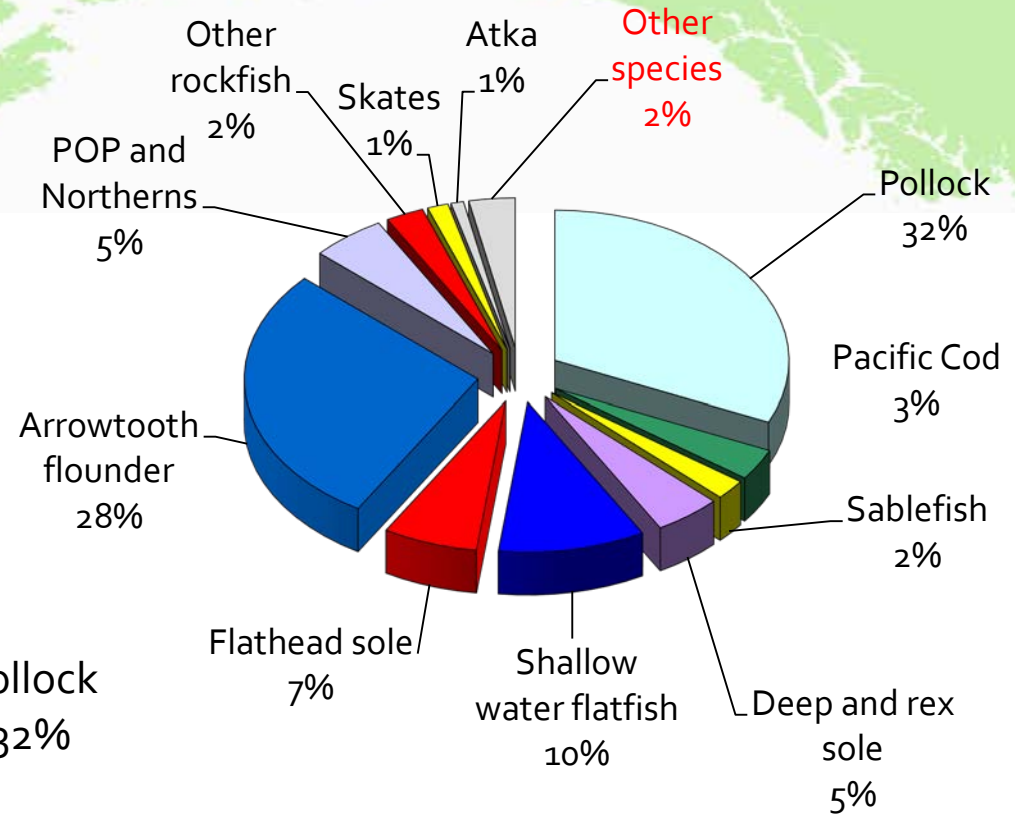
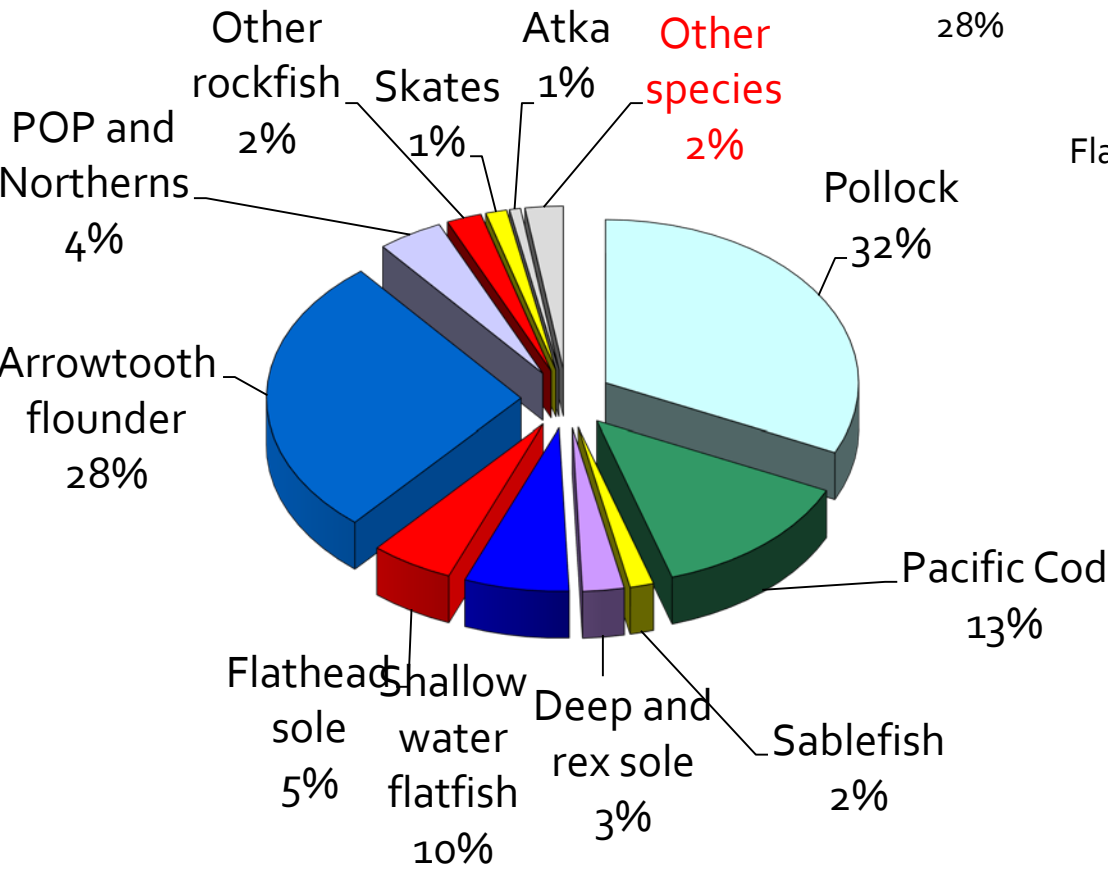


GOA Catch and ABC levels



GULF OF ALASKA GROUNDFISH ASSESSMENTS

2017
667,877 t



2018
536,925 t

ABC / TAC

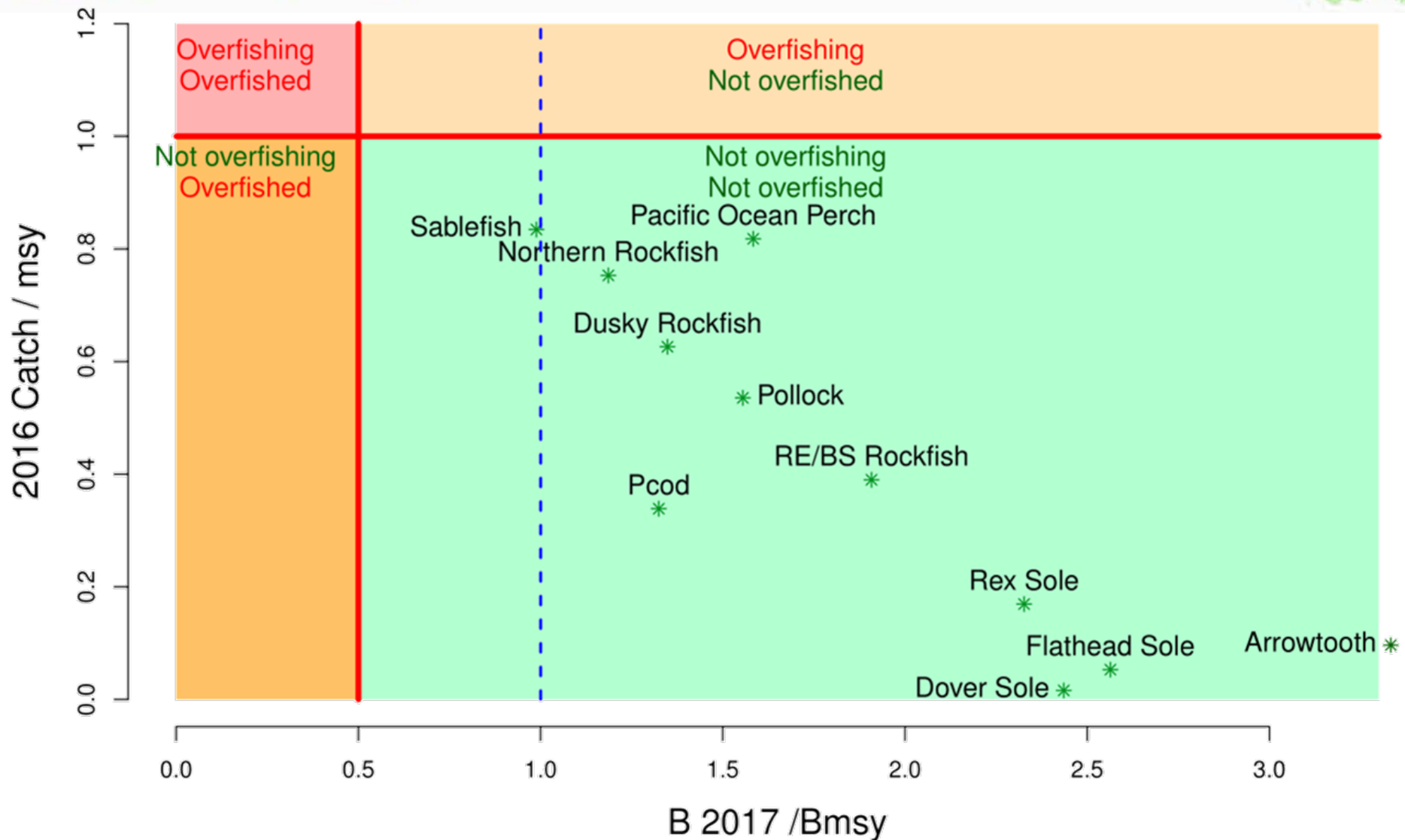
Team recommendations where
ABC < maximum permissible:

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 2018 and 2019 recommended fishing mortality rates and ABCs, for those species whose recommendations were below the maximum.

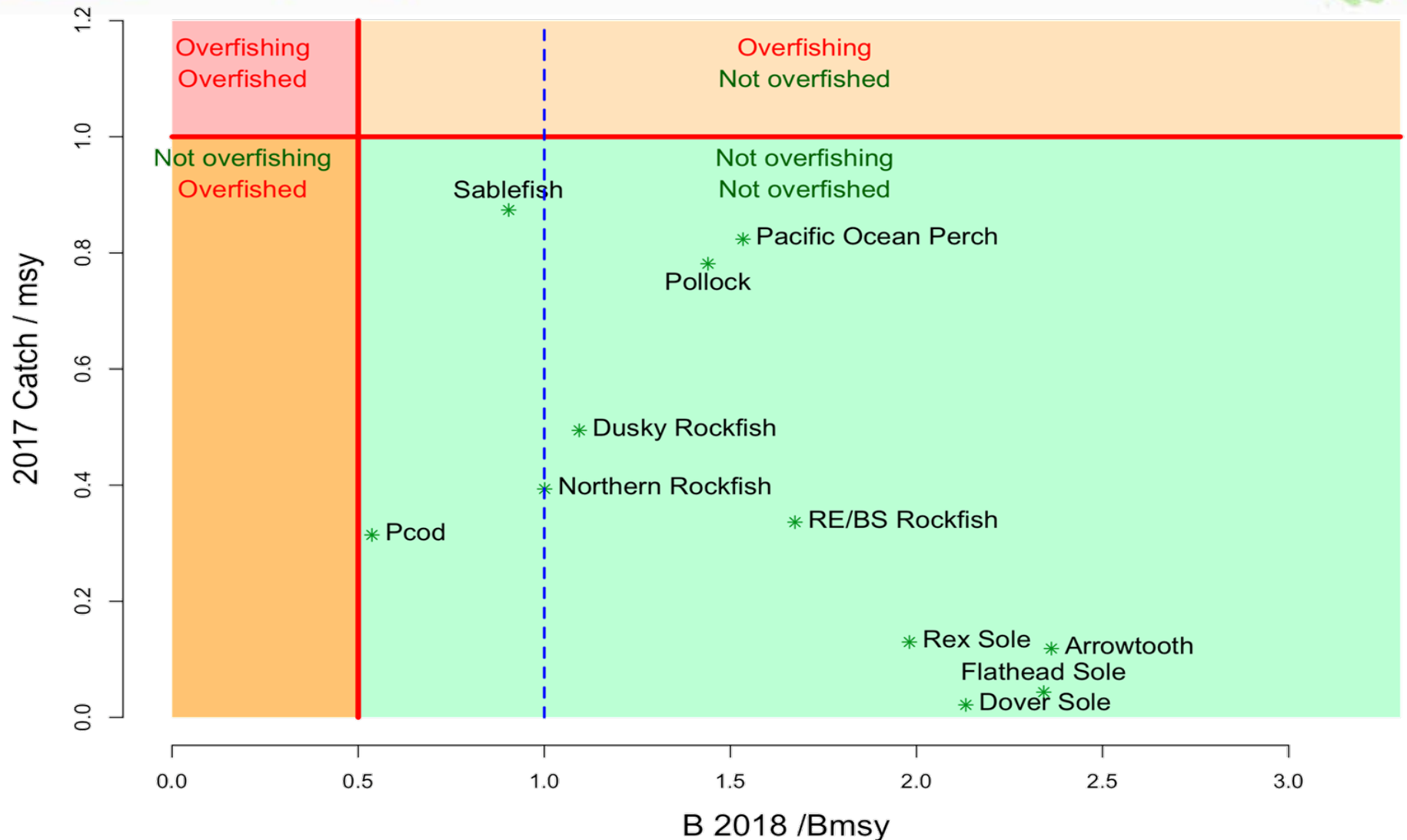
Species	Tier	$Max F_{ABC}$	2018		
			$Max ABC$	F_{ABC}	ABC
Pacific cod	3b	0.34	19,401	0.31	18,000
Sablefish	3b	0.086	25,583	0.077	14,957
Demersal shelf rockfish	4, 6	0.026	289	0.02	227

2019

Stock status summary last year



Stock status summary **this** year



GOA GF assessment issues

New
assessment
cycle
(page 11
of GOAintro)

Revised Stock Assessment Schedule

Based on consideration of stock prioritization including assessment methods and data availability, some stocks are assessed on an annual basis while others are assessed less frequently. The following table provides an overview of the level of assessment presented in this year's SAFE report, the Tier level and schedule, as well as the year of the next full assessment by stock.

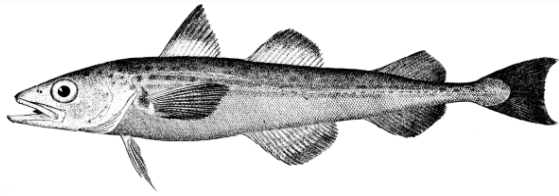
Stock Assessment schedule for the Gulf of Alaska

Stock	2017 Assessment status	Tier	Schedule (years)	Year of next Full Assessment
Pollock	Full	3	1	2018
Pacific cod	Full	3	1	2018
Sablefish	Full	3	1	2018
Northern and southern rock sole	Full	3	4	2021
Shallow water flatfish	Full	5	4	2021
Deepwater flatfish (Dover)	Partial	3/6	4	2019
Rex sole	Full	5	4	2021
Arrowtooth flounder	Full	3	2	2019
Flathead sole	Full	3	4	2021
Pacific ocean perch	Full	3	2	2019
Northern rockfish	Partial	3	2	2018
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	2018
Demersal shelf rockfish	Partial*	4/6	2	2018
Thornyheads	Partial*	5	2	2018
Atka mackerel	Full	6	2	2019
Octopus	Full	6	2	2019
Skates	Full	5	2	2019
Sculpins	Full	5	4	2021
Sharks	None	6	2	2018
Squid	Full	6	2	2019
Forage species	None	eco	2	2018
Grenadiers (BSAI/GOA)	None	eco	4	2020

* Authors elected to undertake analysis

Species overviews

1. 2018 ABC/Catch and recommended changes
2. Highlights
 - ♦ New data
 - ♦ Analytic approach (changes)
3. Stock status and trend
4. ABC/OFL
 - ♦ Tier history and recommendations
 - ♦ 2018, 2019 maxABC; recommended ABC



ABC

ABC

Species	2017 Catch	2017	2018	Change
Pollock	184,243	213,689	170,265	down 43,424(20%)
Pacific Cod	33,115	88,342	18,000	down 70,342(80%)
Sablefish	10,386	10,074	11,505	up 1,431(14%)
Flatfish	30,139	97,360	114,712	up 17,352(18%)
Arrowtooth flounder	1,875	186,093	150,945	down 35,148(19%)
Rockfish	30,563	42,560	47,067	up 4,507(11%)
Atka mackerel	1,048	4,700	4,700	same(0%)
Skates	4,156	8,939	7,804	down 1,135(13%)
Other Species	3,013	16,120	11,927	down 4,193(26%)
Total	298,538	667,877	536,925	down 130,952(20%)

1. GOA pollock

Fishery:

2016 total catch and catch at age

Winter Acoustic survey:

2017 winter biomass and age comp

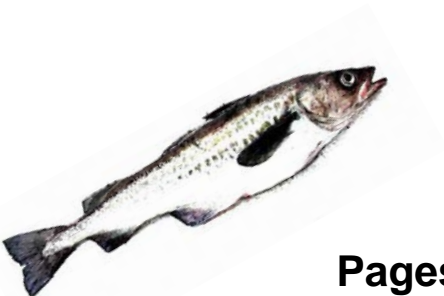
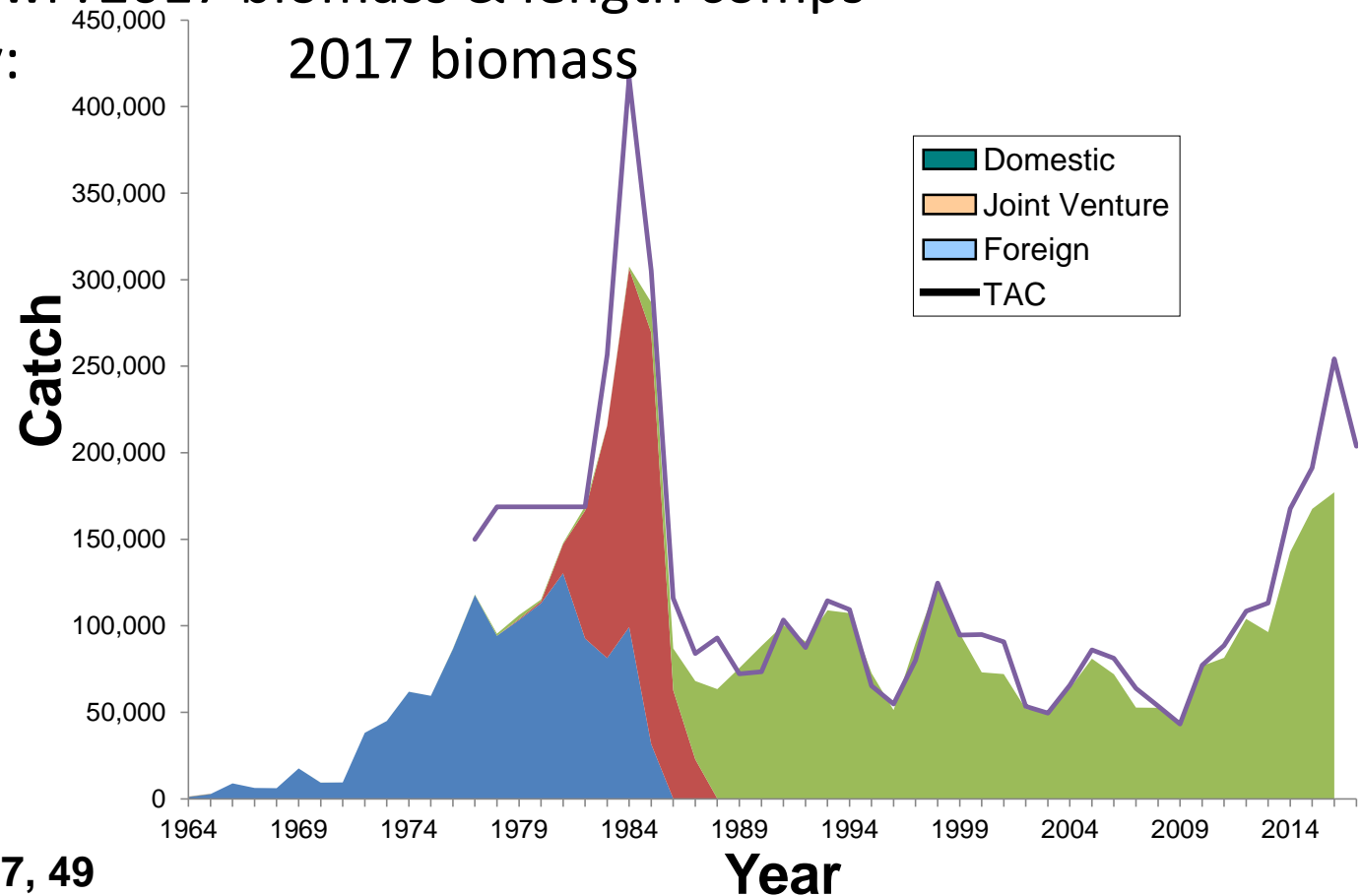
Summer Acoustic survey:

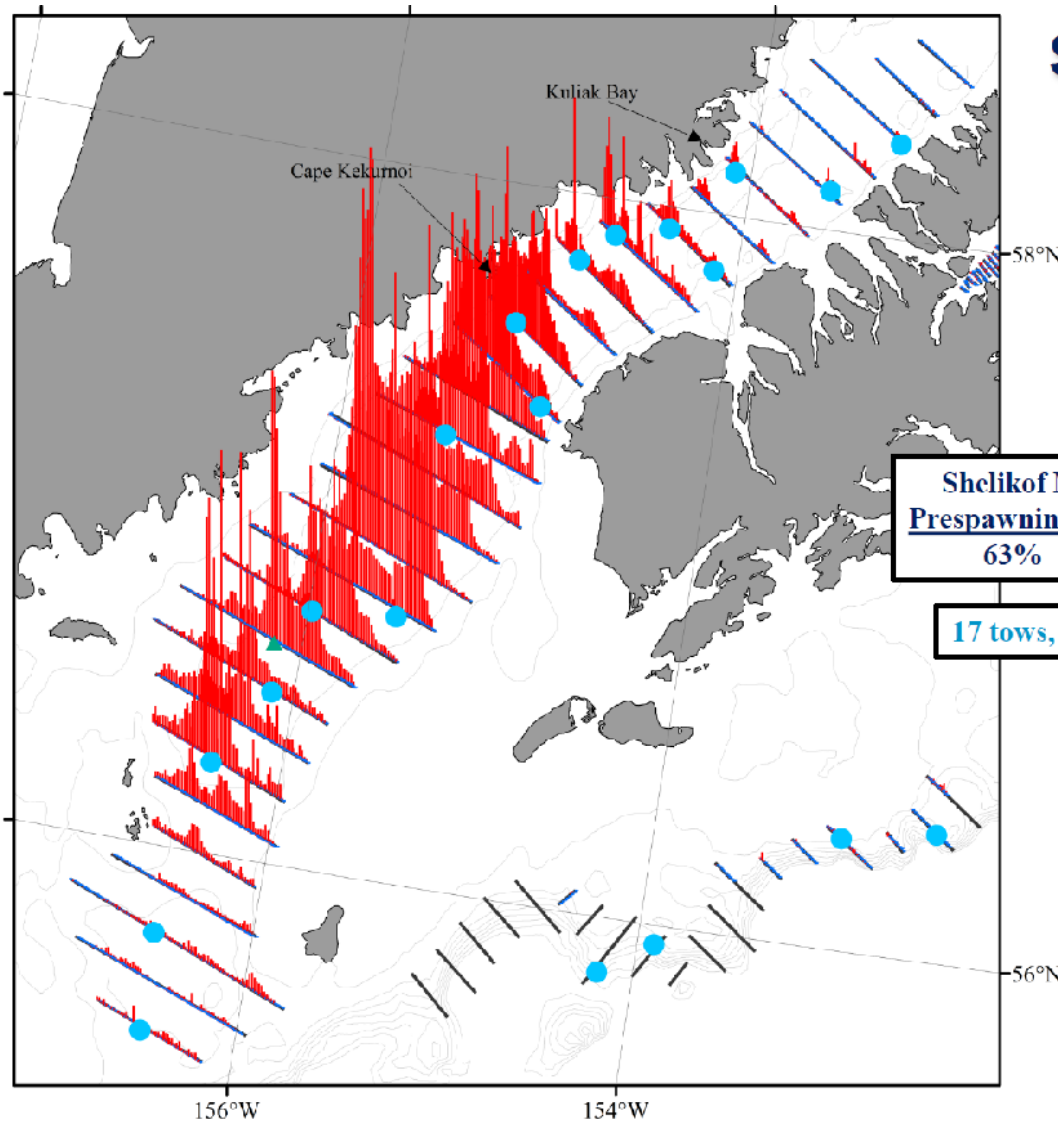
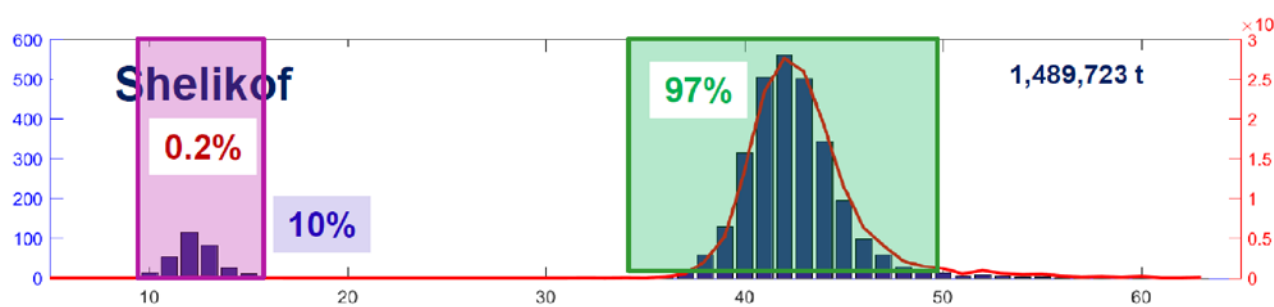
2017 winter biomass

NMFS Summer trawl : 2017 biomass & length comps

ADFG trawl survey:

2017 biomass





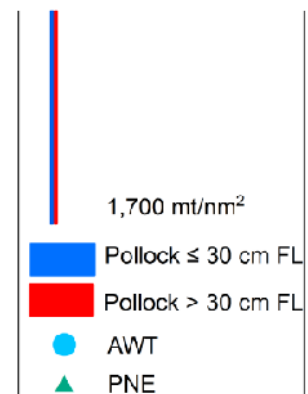
Shelikof Strait March 18-24

1,489,723 t

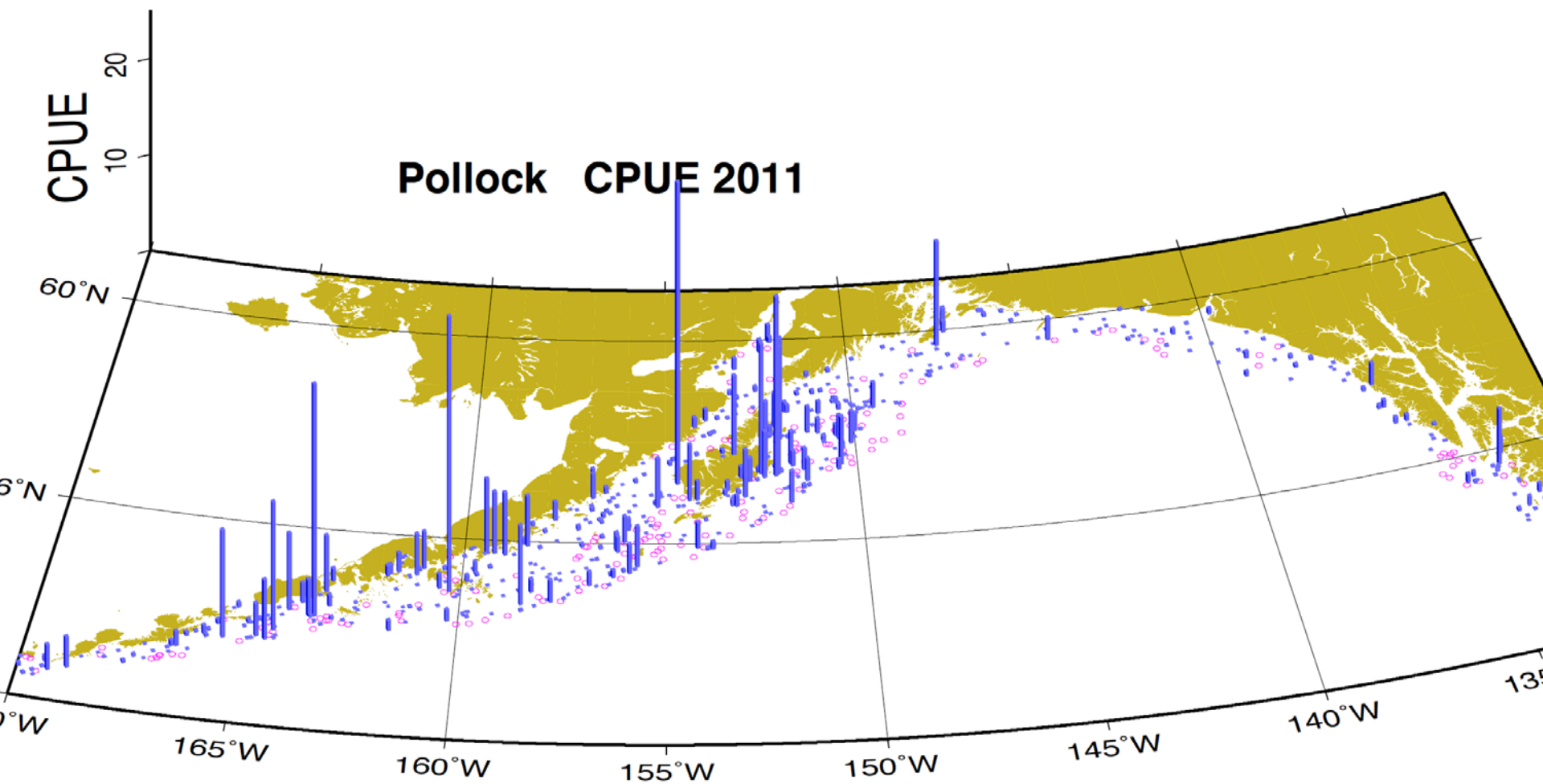
Shelikof Maturities (females > 40cm)

Prespawning	Spawning	Spent	n
63%	7%	26%	404

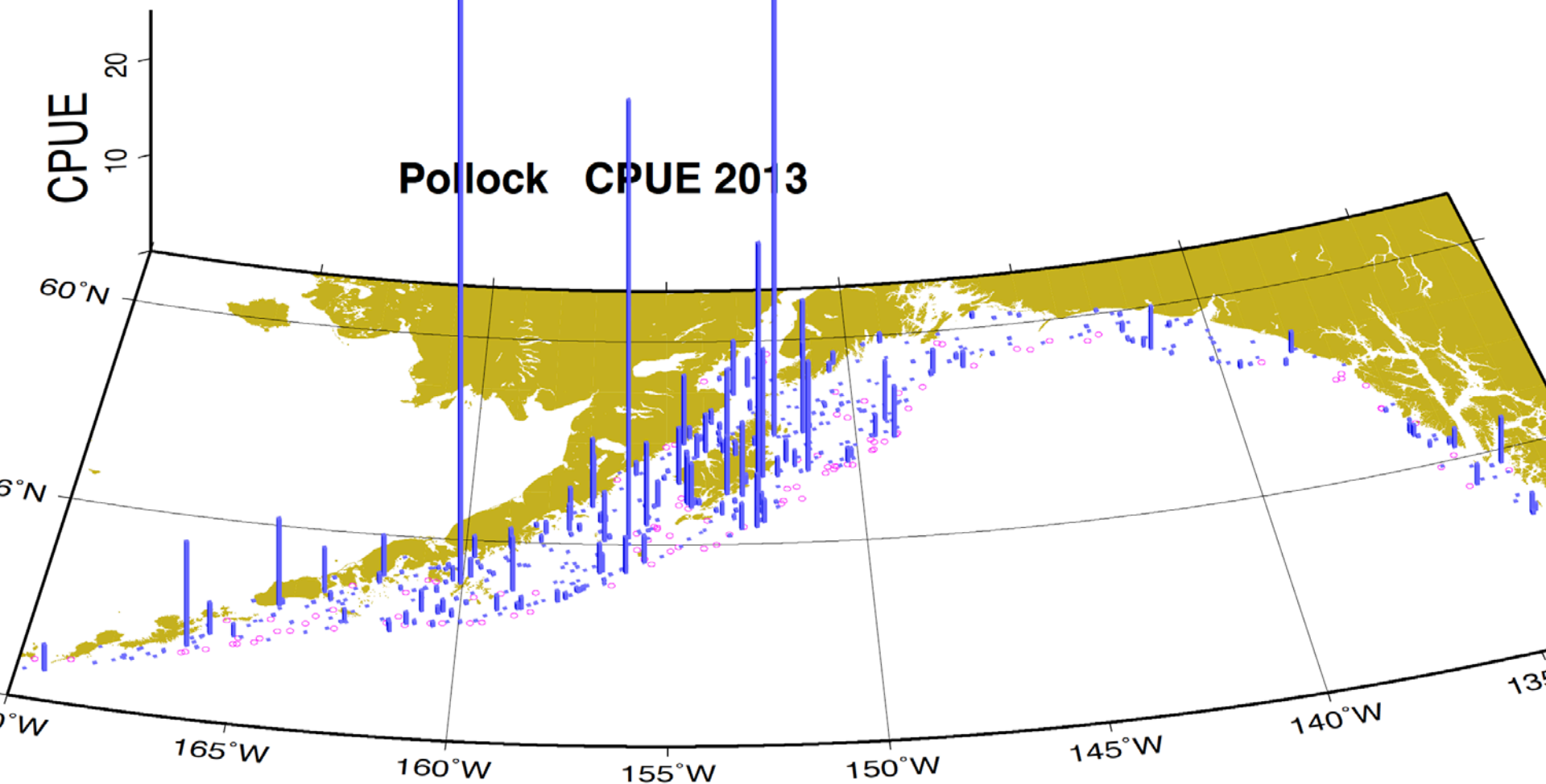
17 tows, 815 nautical miles of trackline



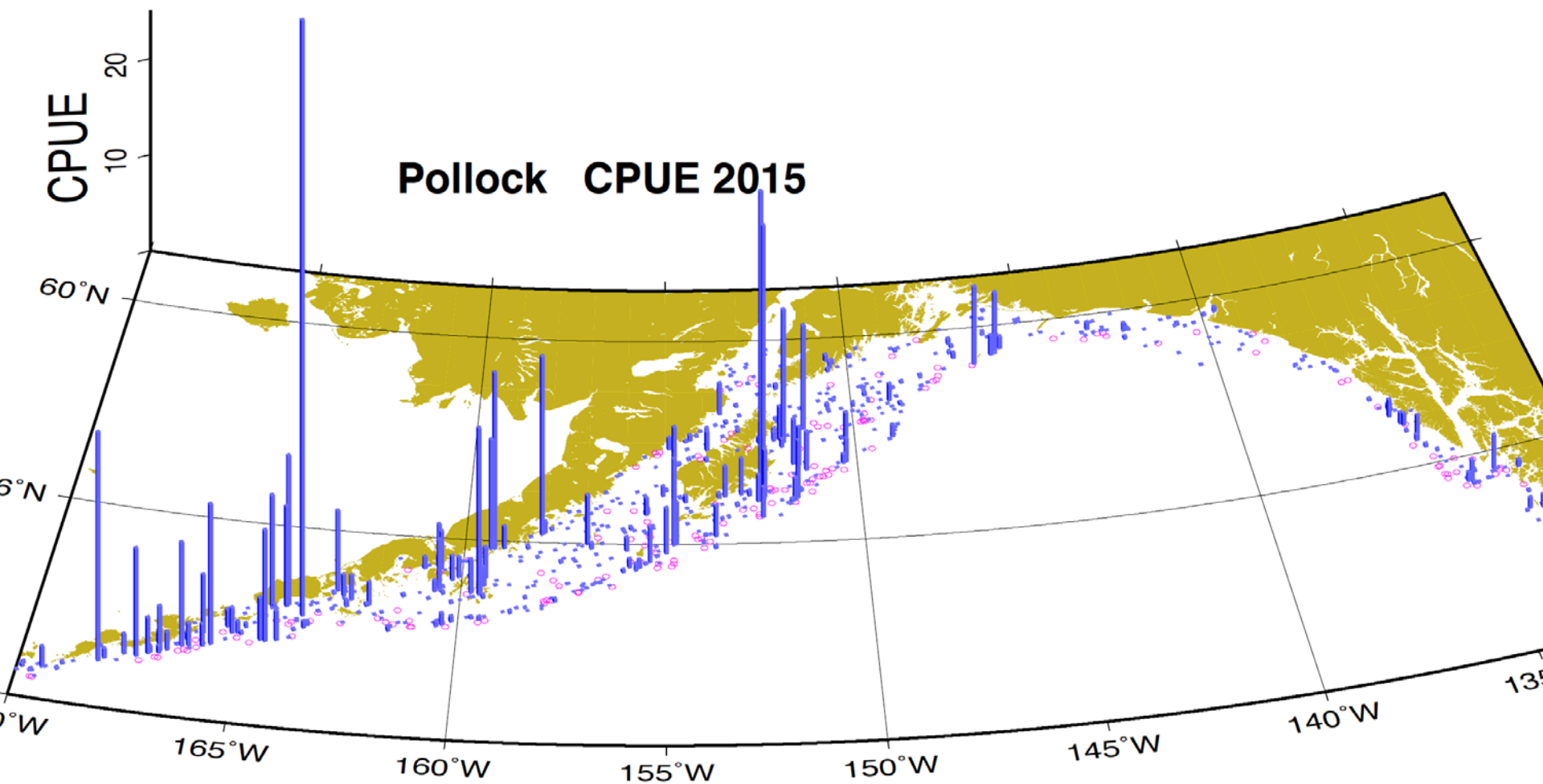
NMFS GOA trawl survey, pollock



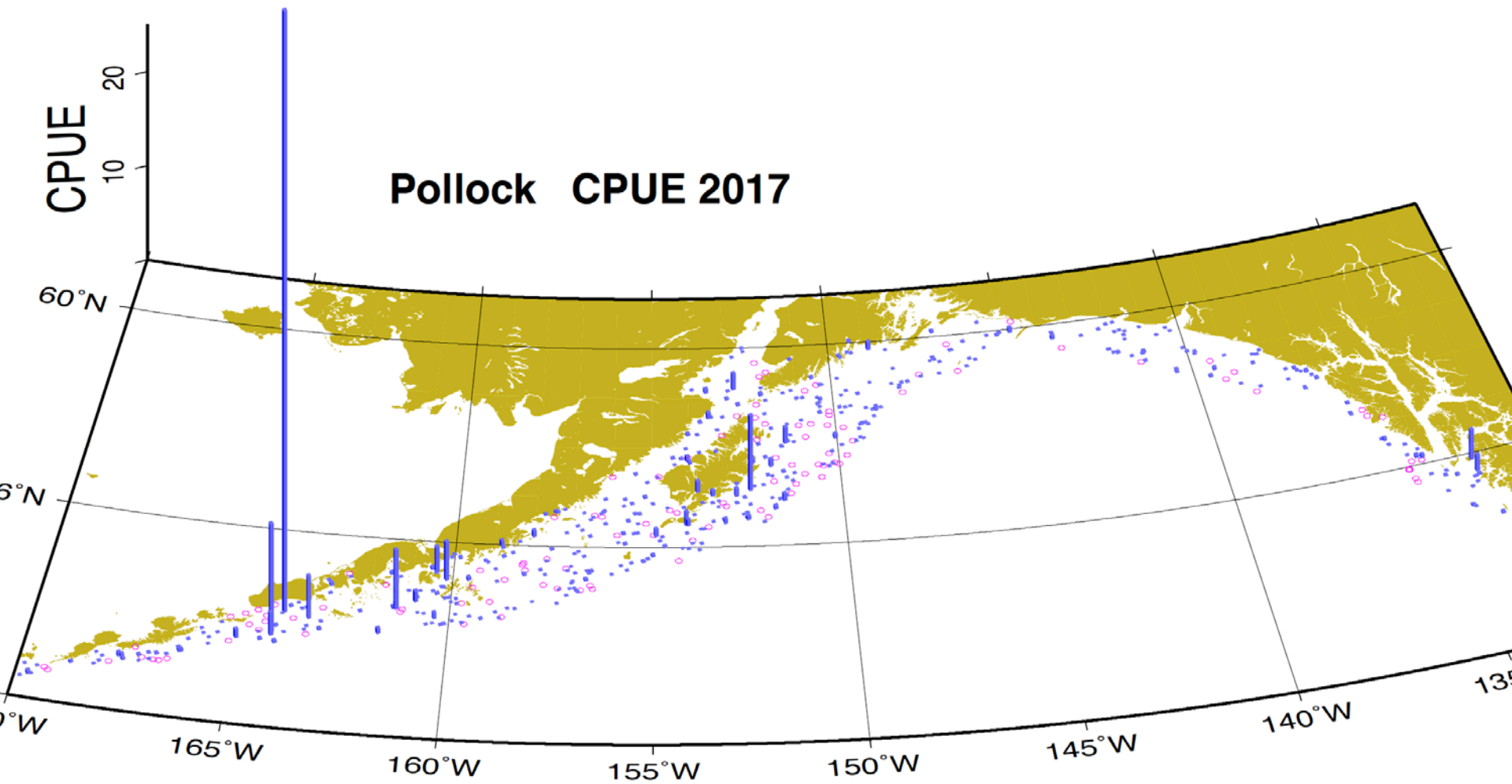
NMFS GOA trawl survey, pollock



NMFS GOA trawl survey, pollock

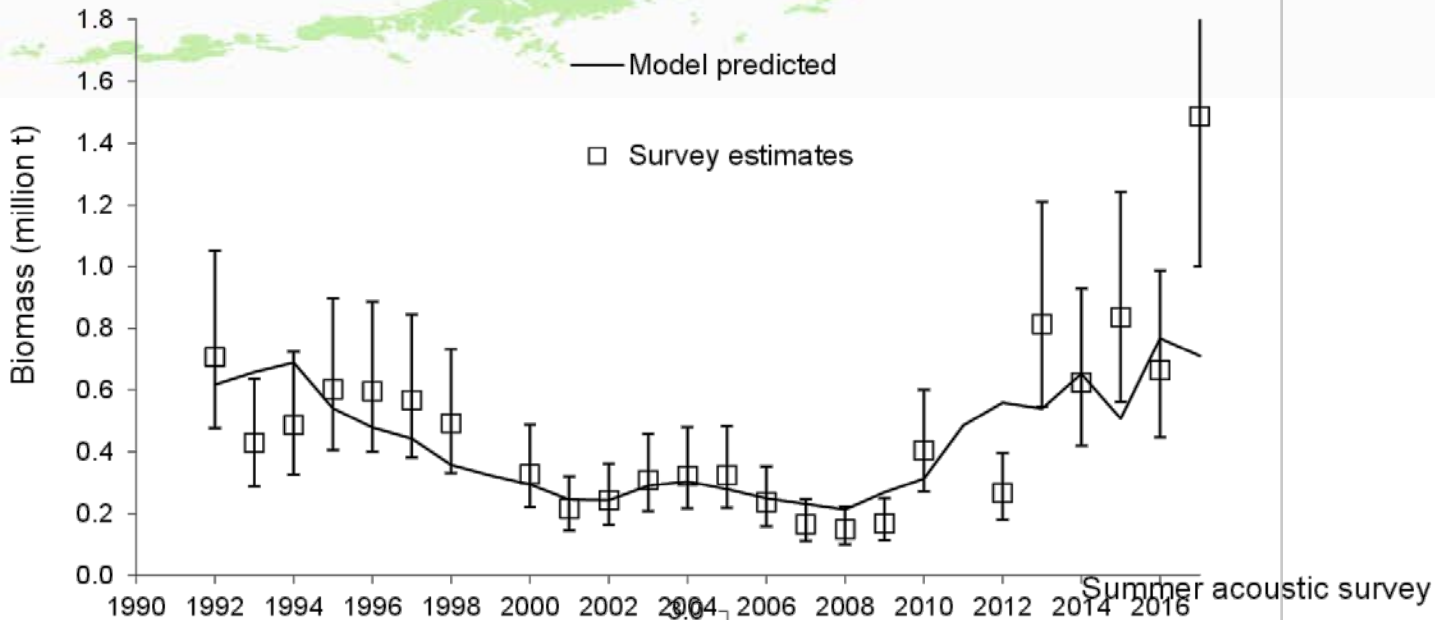


NMFS GOA trawl survey, pollock



Shelikof Strait EIT survey, 1992-2017

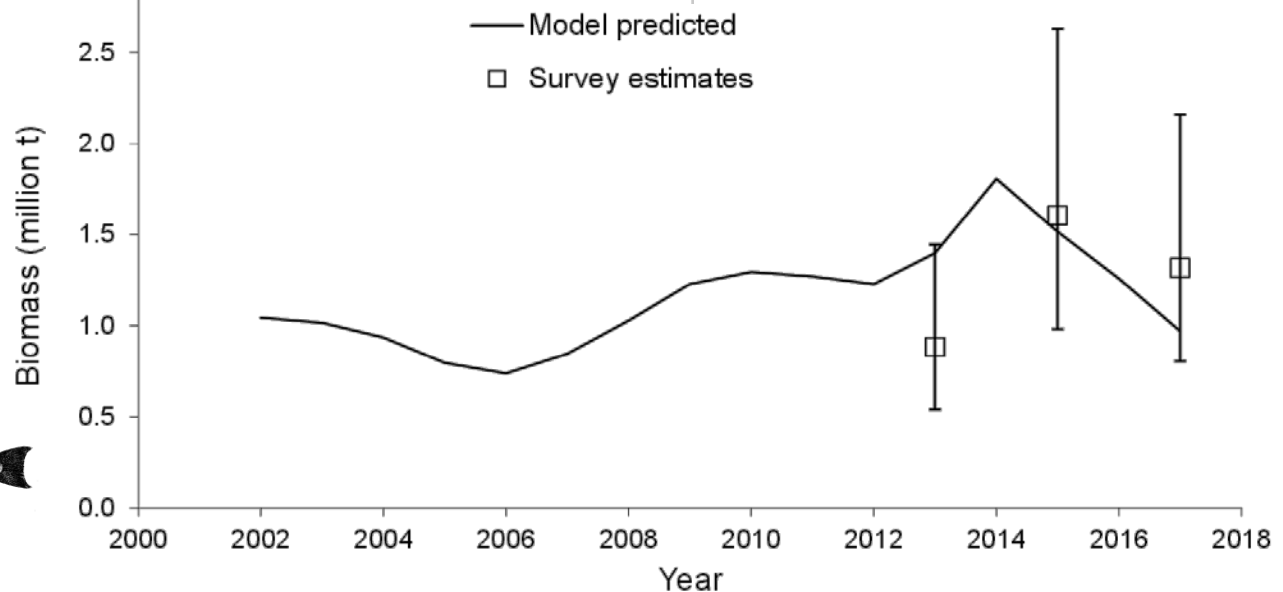
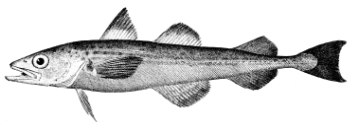
Shelikof Strait acoustic survey (1992-2017)



GOA pollock



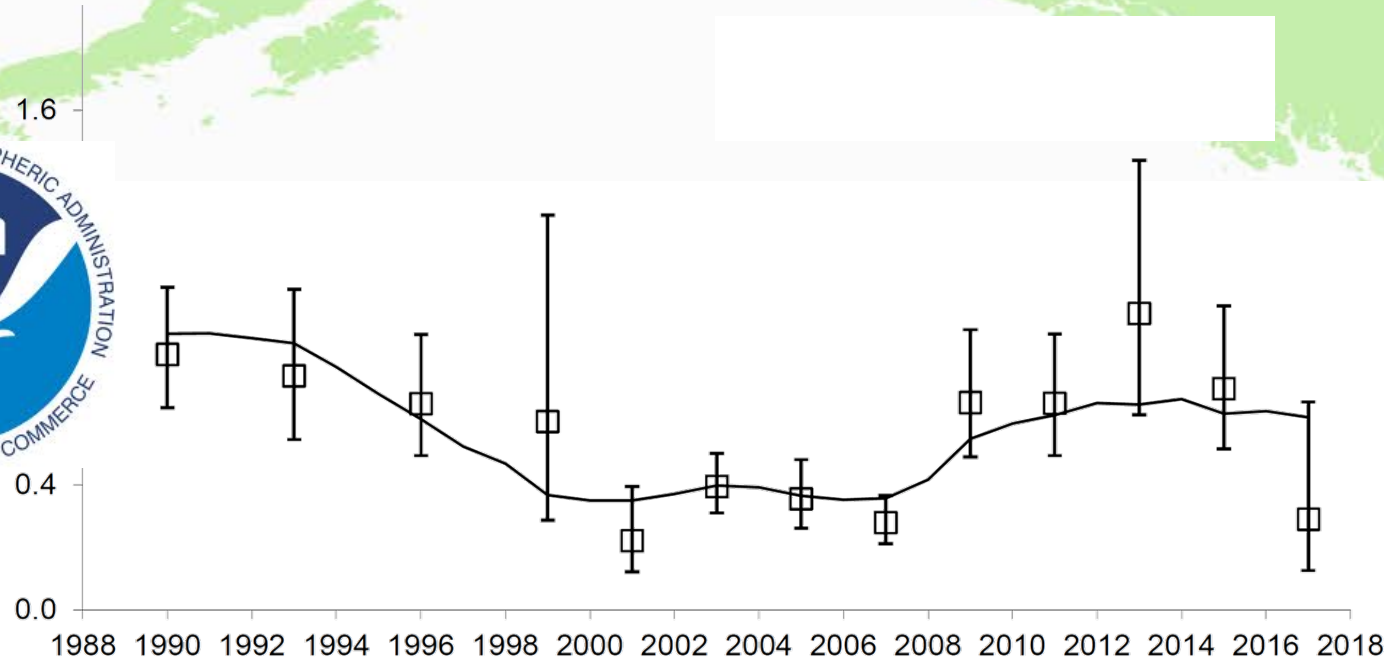
Summer EIT
survey
2013, 2015, 2017



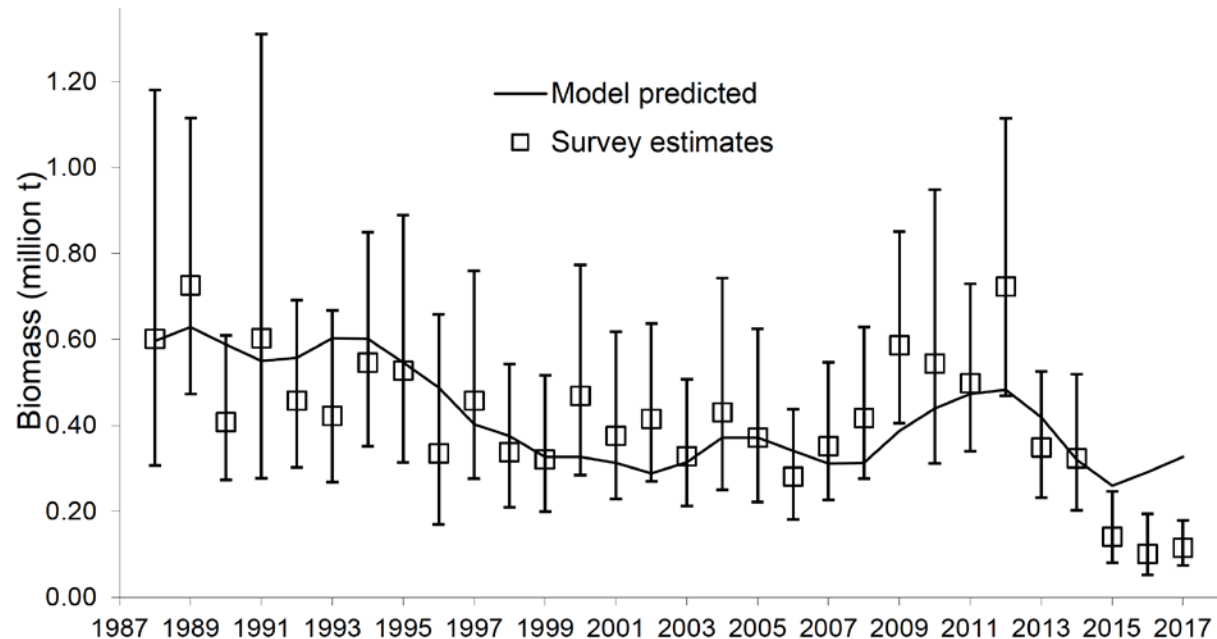
GOA pollock

GULF OF ALASKA GROUNDFISH ASSESSMENTS

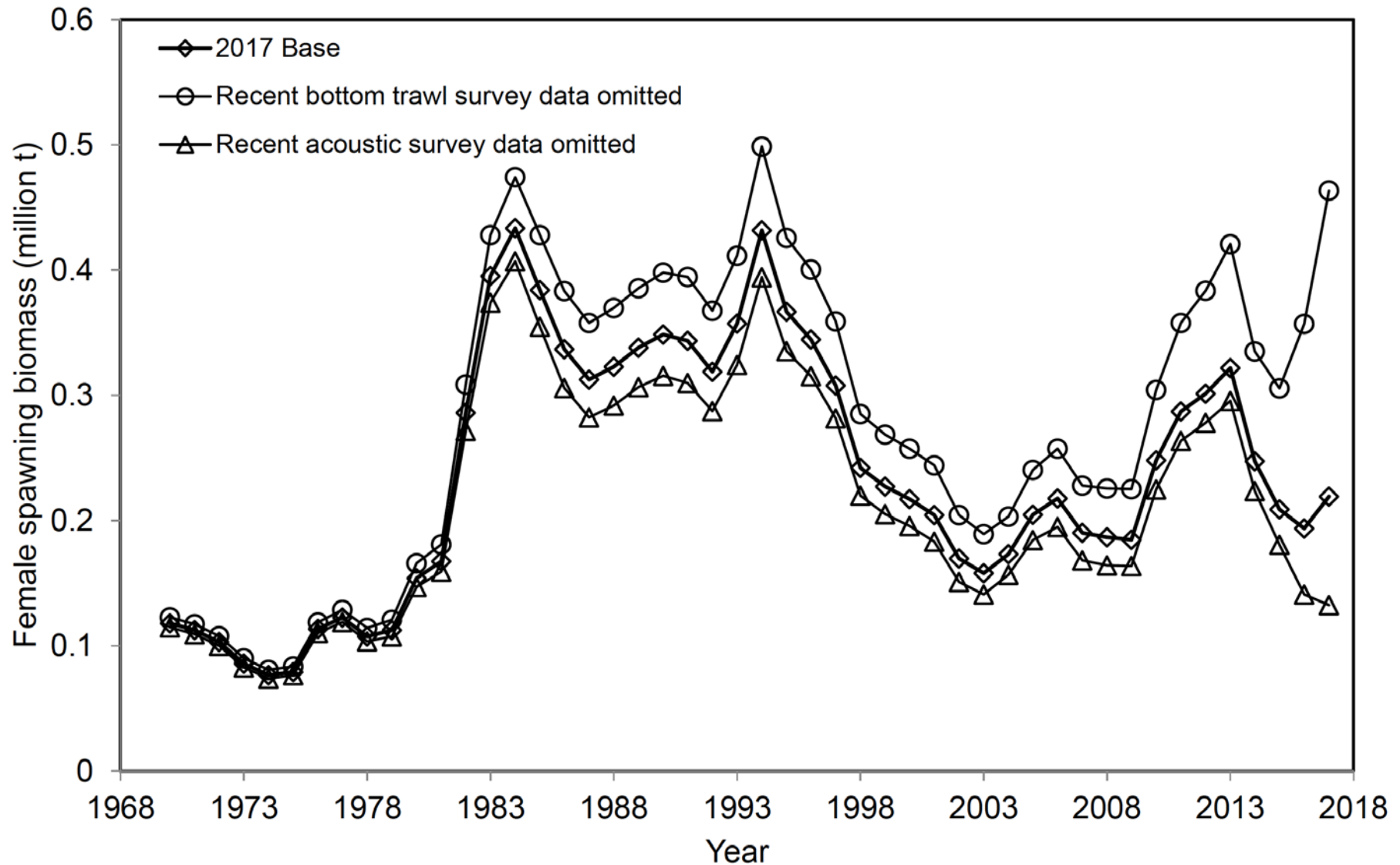
Fit to NMFS
bottom
trawl
survey



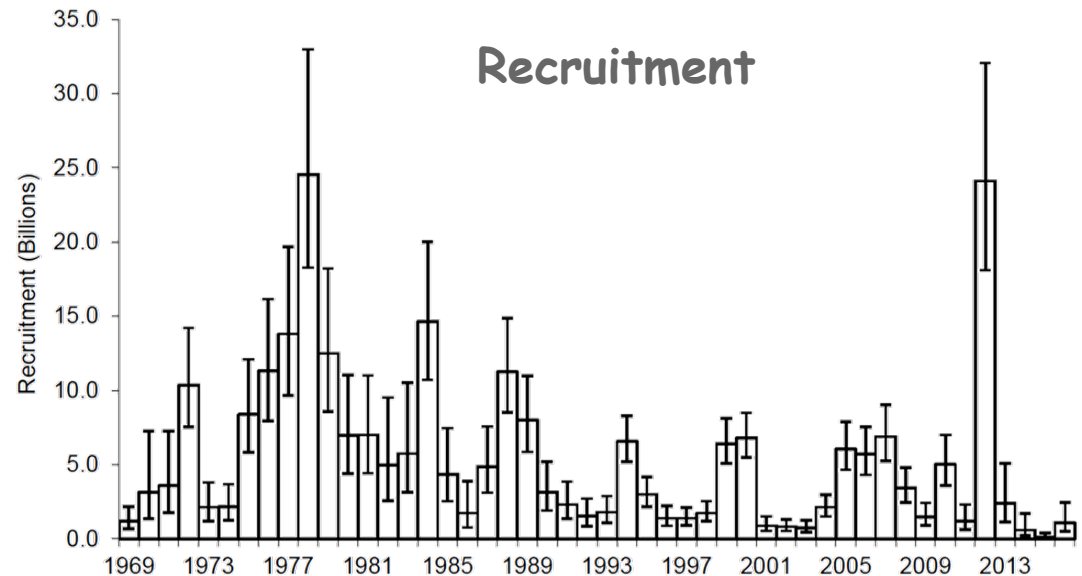
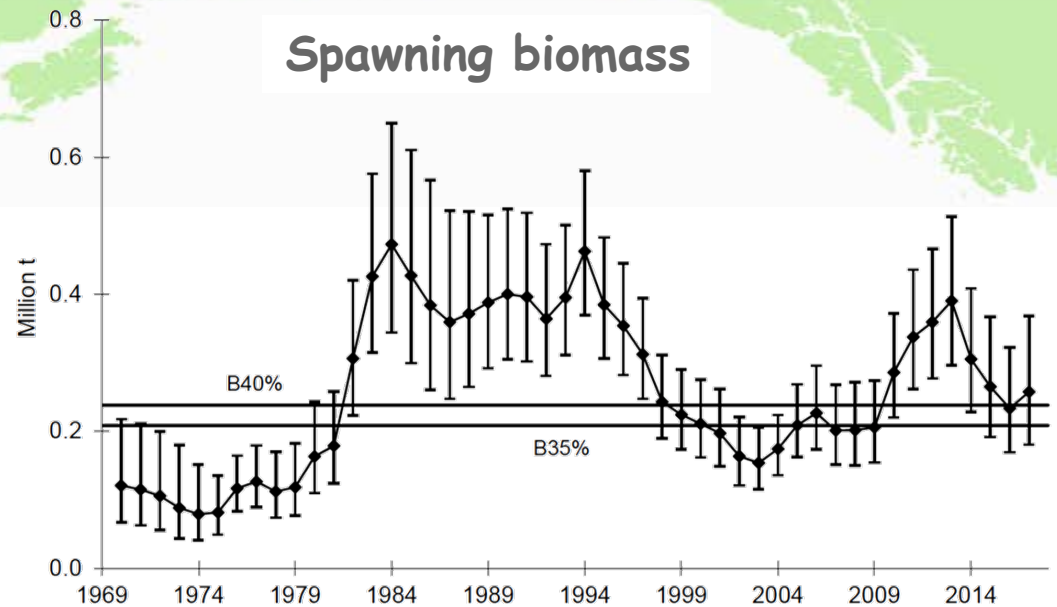
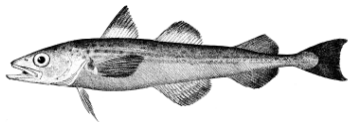
Fit to ADFG
survey



Sensitivity to new survey data...



GOA pollock model results



GOA Pollock summer area allocation options

Option 1: RE from Bottom Trawl

<i>Area 610</i>	<i>Area 620</i>	<i>Area 630</i>	<i>Area 640</i>
76.34%	6.57%	14.89%	2.20%

Option 2: Weighted average from acoustic survey (2013-2017)

<i>Area 610</i>	<i>Area 620</i>	<i>Area 630</i>	<i>Area 640</i>
26.64%	29.64%	38.75%	4.98%

Option 3: Average of RE Bottom trawl and 2017 Acoustic survey (2015 approach)

<i>Area 610</i>	<i>Area 620</i>	<i>Area 630</i>	<i>Area 640</i>
53.65%	16.14%	26.35%	3.85%

Option 4: Average of RE Bottom trawl and weighted average of 2013-2015 acoustic

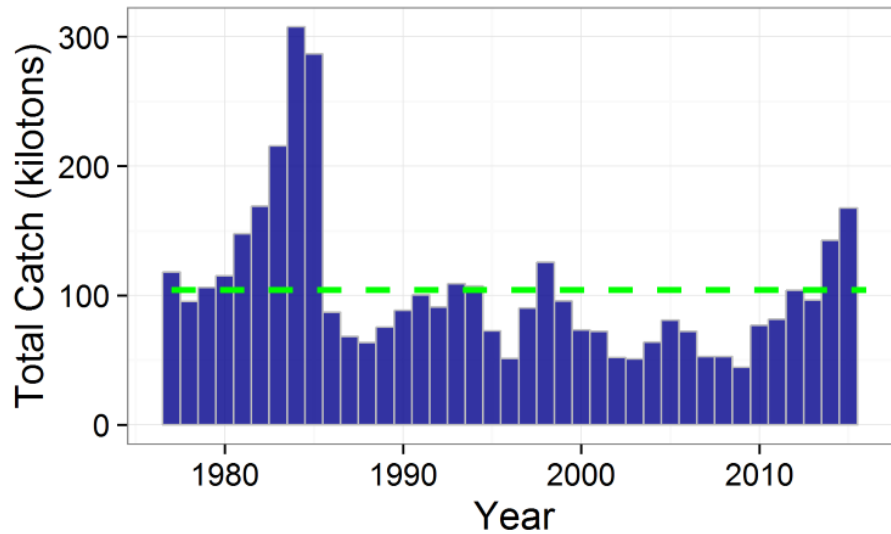
<i>Area 610</i>	<i>Area 620</i>	<i>Area 630</i>	<i>Area 640</i>
51.49%	18.10%	26.82%	3.59%

Option 5: Weighted average of acoustic plus bottom trawl biomass (2013-2017)

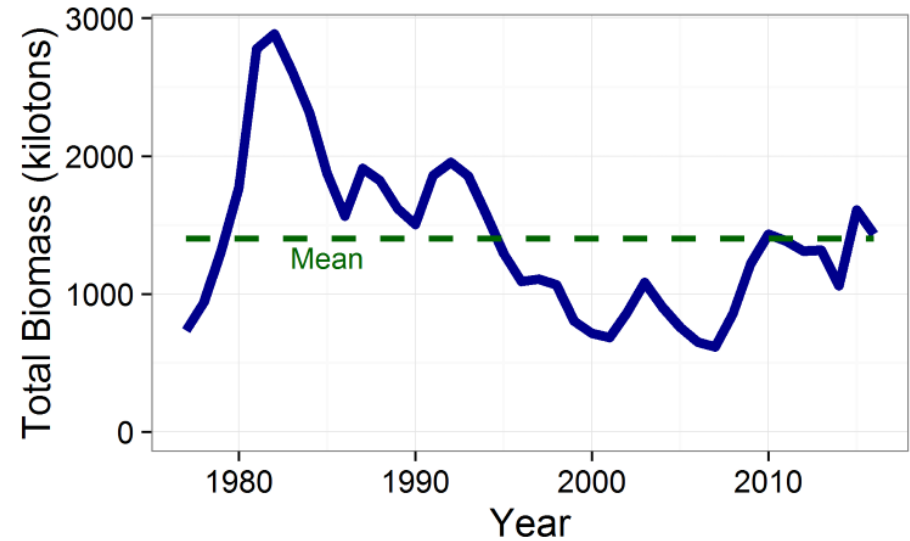
<i>Area 610</i>	<i>Area 620</i>	<i>Area 630</i>	<i>Area 640</i>
643,068	467,377	647,185	79,732
35.00%	25.44%	35.22%	4.34%

WCWYK Walleye Pollock

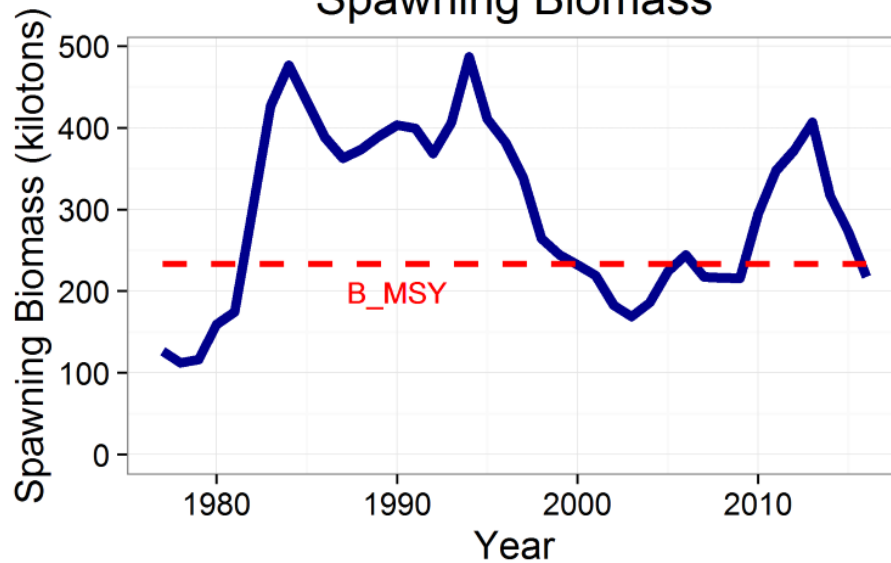
Total Catch



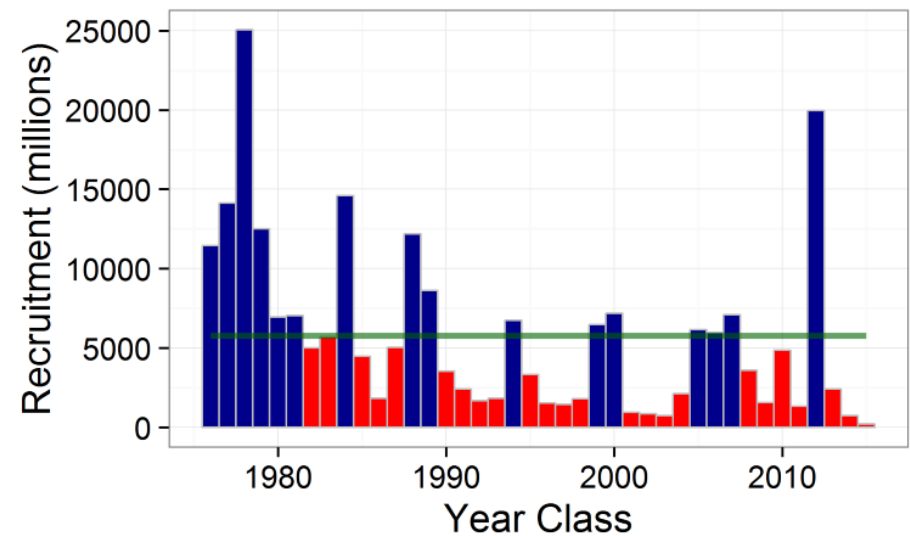
Total Biomass



Spawning Biomass

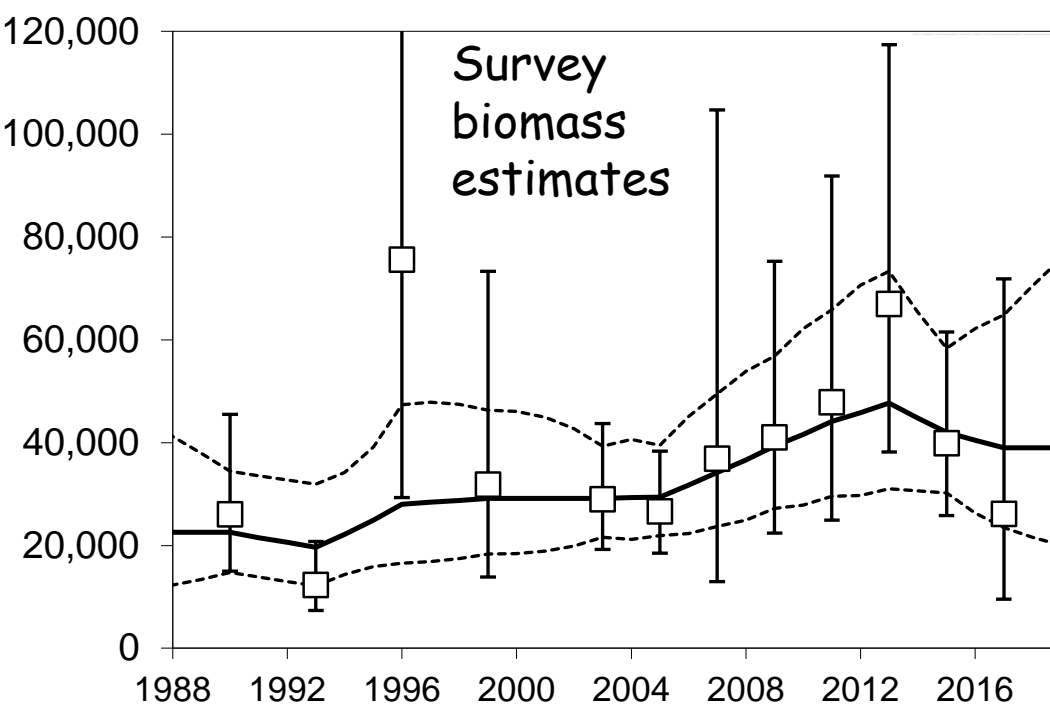
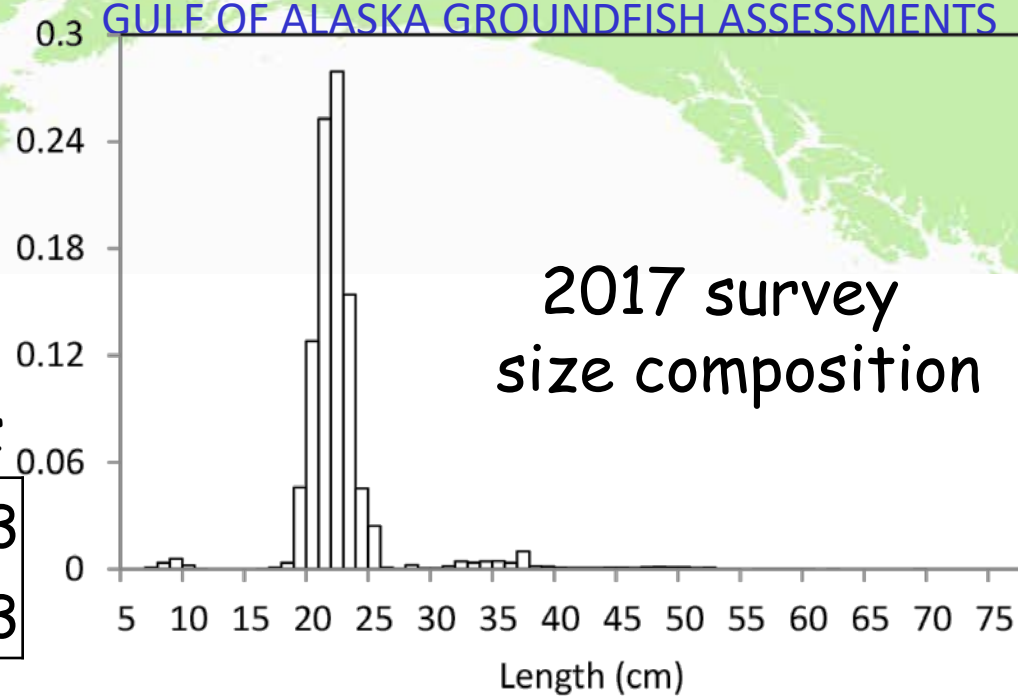


Age 1 Recruitment

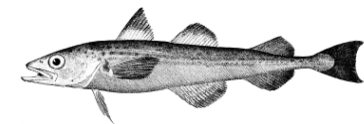


EGOA pollock (Tier 5)

EGOA Pollock	Biomass	OFL	ABC
2018	38,989	11,697	8,773
2019		11,697	8,773



Random
effects
model



2. GOA Pacific cod



ABC

Species	2017 Catch	2017	2018	Change
Pollock	184,243	213,689	170,265	down 43,424(20%)
Pacific Cod	33,115	88,342	18,000	down 70,342(80%)
Sablefish	10,386	10,074	11,505	up 1,431(14%)
Flatfish	30,139	97,360	114,712	up 17,352(18%)
Arrowtooth flounder	1,875	186,093	150,945	down 35,148(19%)
Rockfish	30,563	42,560	47,067	up 4,507(11%)
Atka mackerel	1,048	4,700	4,700	same(0%)
Skates	4,156	8,939	7,804	down 1,135(13%)
Other Species	3,013	16,120	11,927	down 4,193(26%)
Total	298,538	667,877	536,925	down 130,952(20%)

GOA Pacific cod



- Presentation from author



GOA Pacific cod

Team discussions

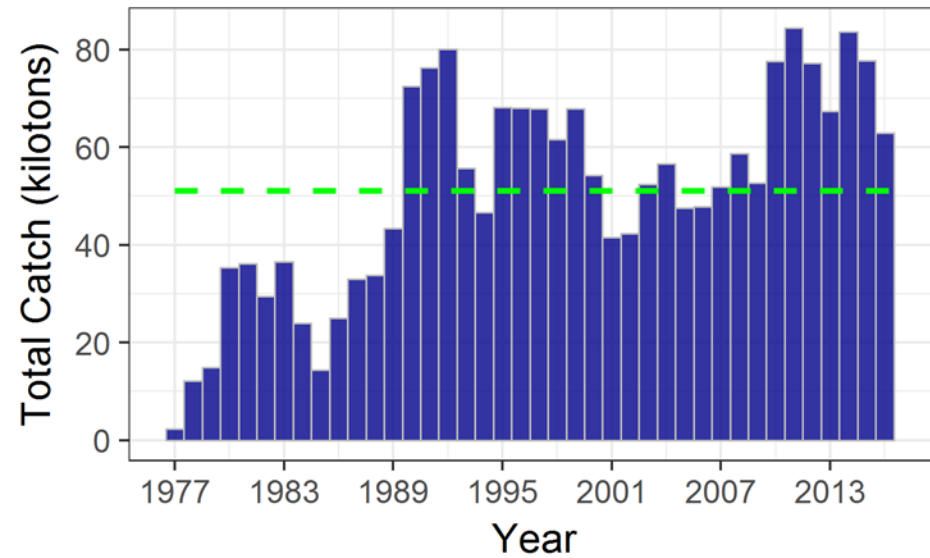
- ♦ Appreciated responsiveness to September 2017 requests and new data urgency

Team recommendations

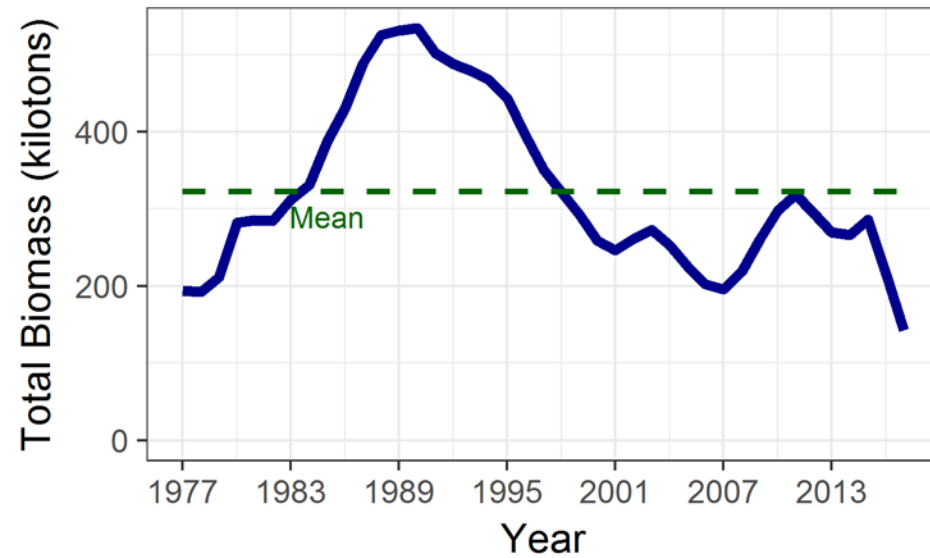
- ♦ Request IPHC to collect Pacific cod lengths in GOA setline survey
- ♦ Coordinating with planned studies for alternative evaluation of these data to develop a refined ADFG index for pollock

GOA Pacific Cod

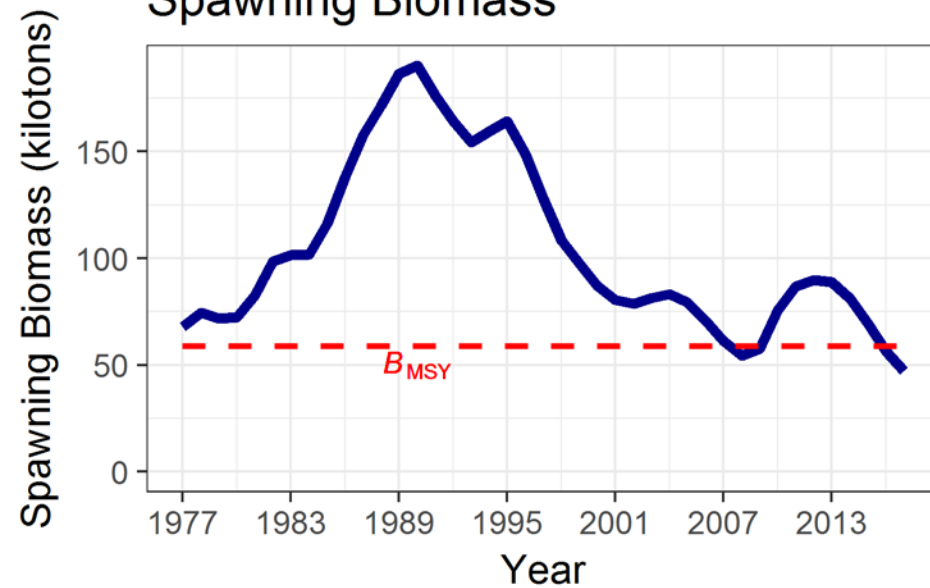
Total Catch



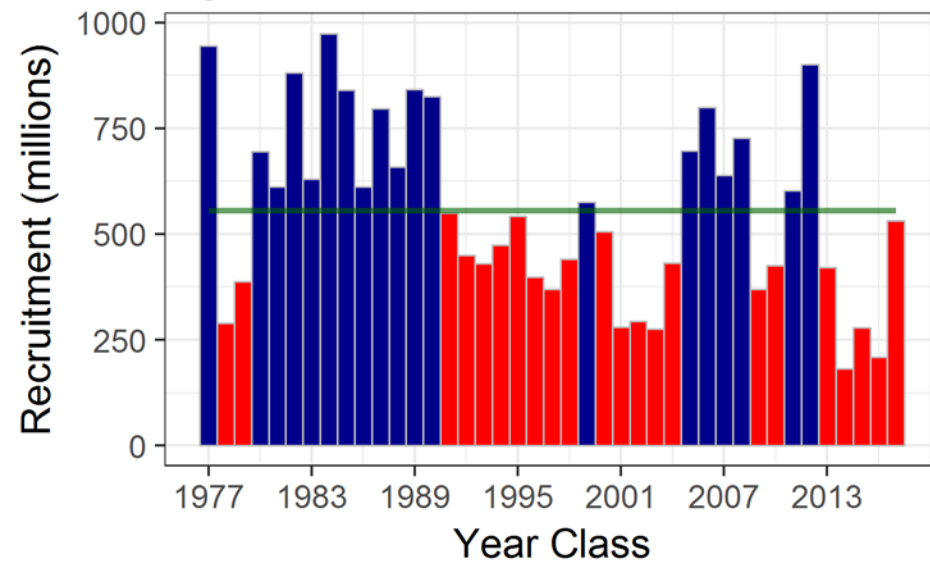
Total Biomass



Spawning Biomass



Age 0 Recruitment



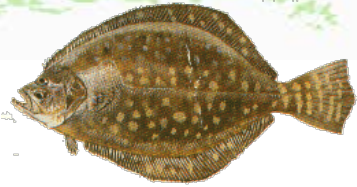
Sablefish ABC Summary

(presented in BSAI report)

ABC

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Pollock	184,243	213,689	170,265	down 43,424 (20%)
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Flatfish ABC Summary



ABC

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Flatfish ABC's

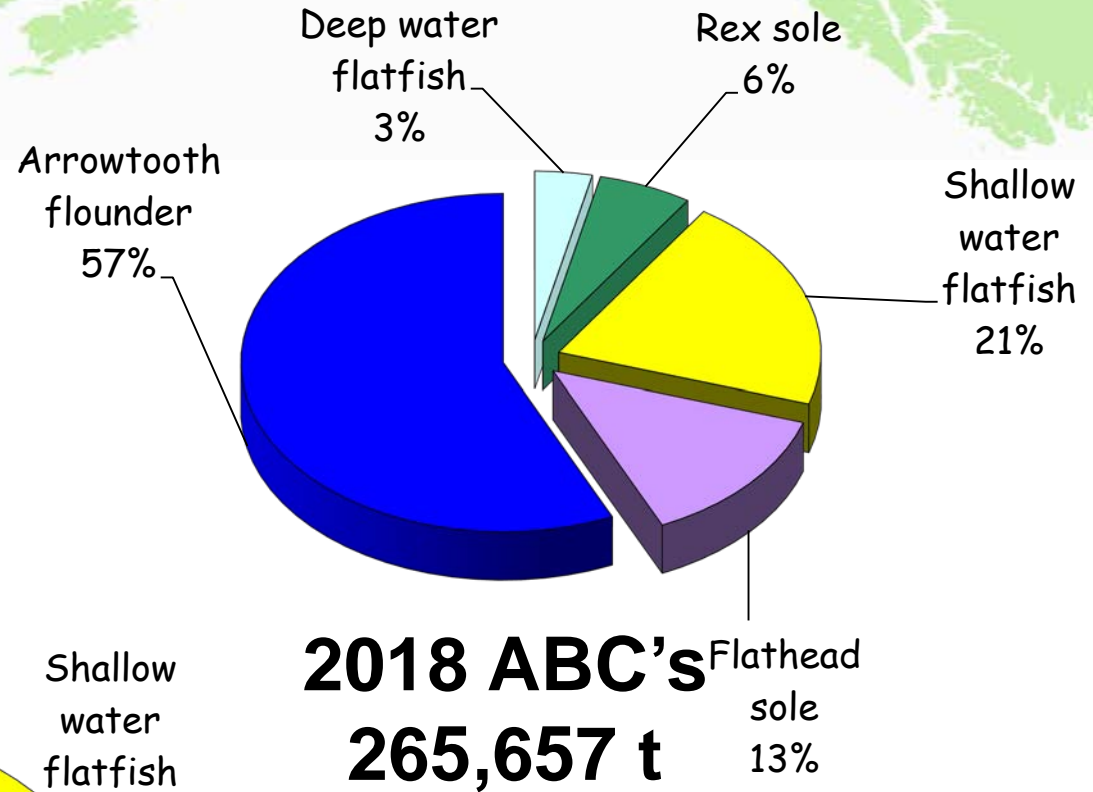
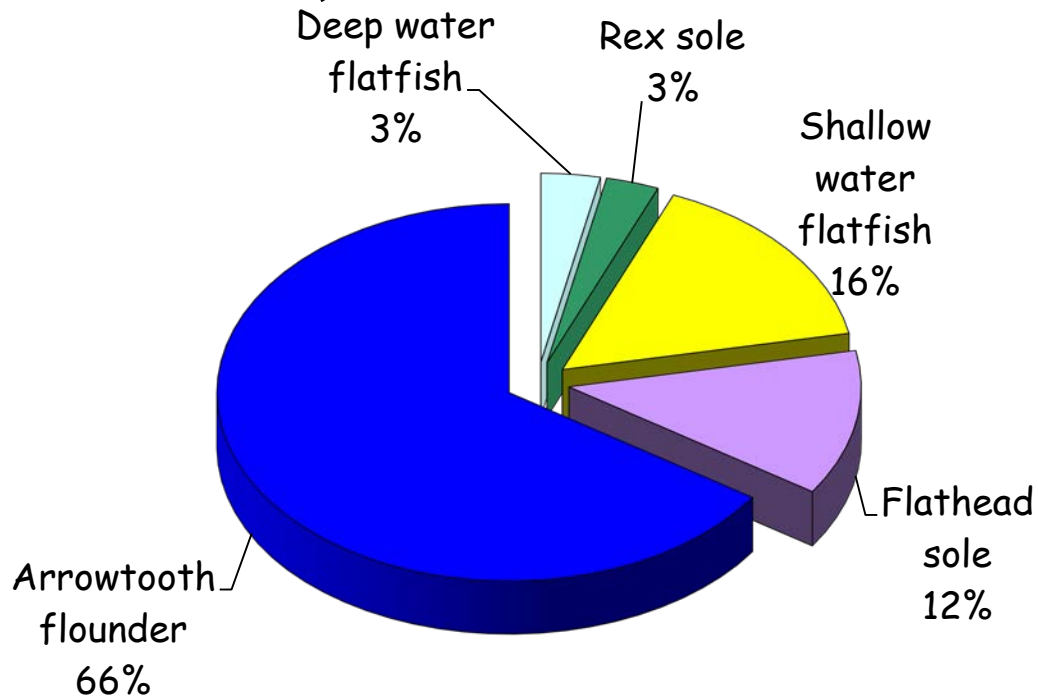
Species	2017 ABC	2018 ABC	Change
Shallow water flatfish	44,514	54,688	up 10,174(23%)
Rex sole	8,311	15,373	up 7,062(85%)
Deep water flatfish	9,292	9,385	up 93(1%)
Flathead sole	35,243	35,266	up 23(0%)
Arrowtooth flounder	186,093	150,945	down 35,148(19%)
Subtotal	283,453	265,657	down 17,796(6%)
Subtotal (without ATF)	97,360	114,712	up 17,352(18%)

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

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

GOA Flatfish

2017 ABC's
283,453 t



General comments on flatfish assessments

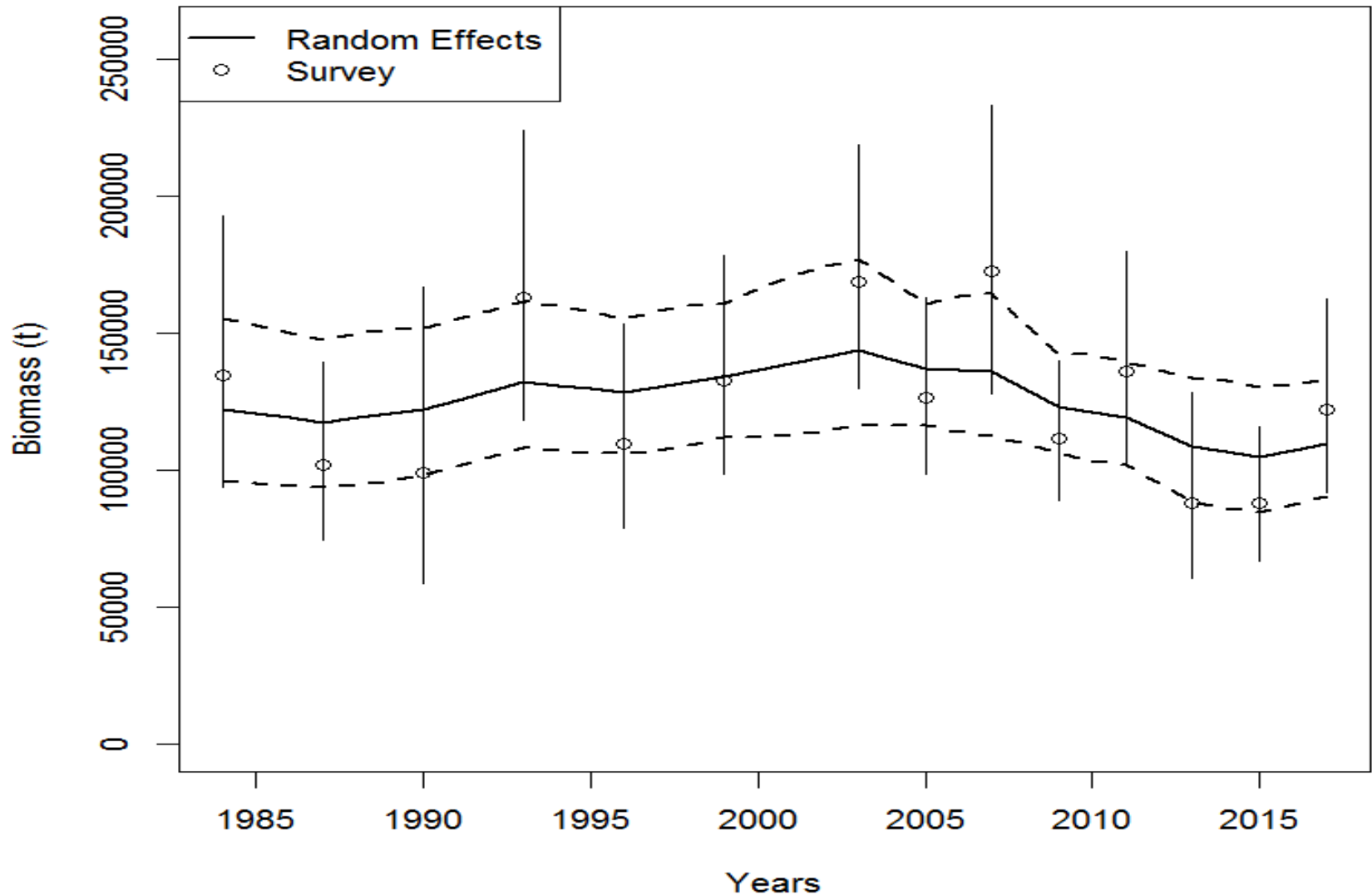
- Lightly exploited
- Analytical developments:
 - ♦ N & S rock sole models
 - ♦ Dover and flathead sole models full in 2015
 - Stock Synthesis modeling platform (SS3) application
 - Models accepted from 2014
 - ♦ Rex sole assessment conversion completed to SS3
 - Full assessment this year

Flatfish ABC's

Species	2017 ABC	2018 ABC	Change
Shallow water flatfish	44,514	54,688	up 10,174 (23%)
Rex sole	8,311	15,373	up 7,062 (85%)
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Shallow water flats: N and S rock sole Tier 3, others Tier 5

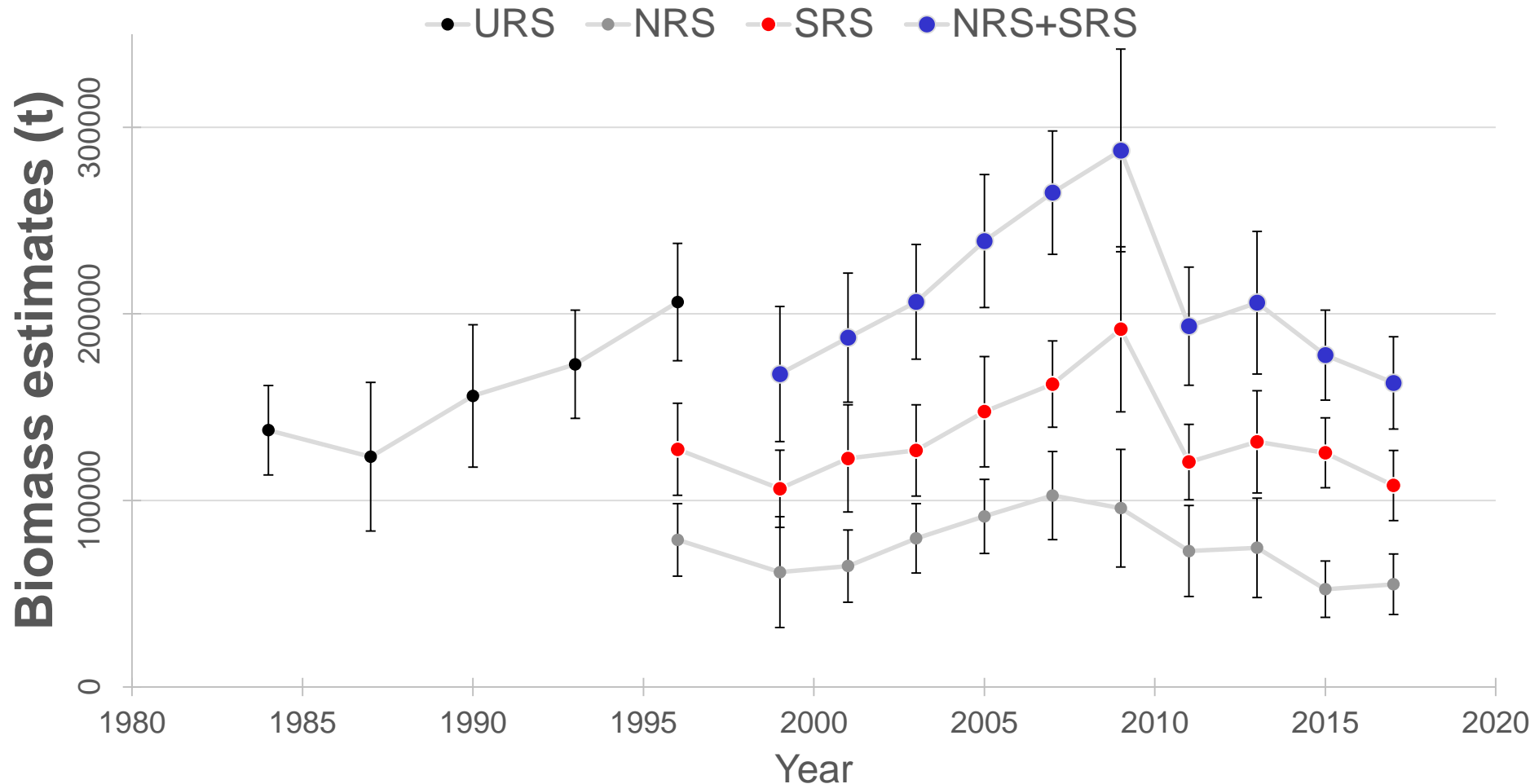
4. Shallow-water flatfish



4. Shallow-water flatfish

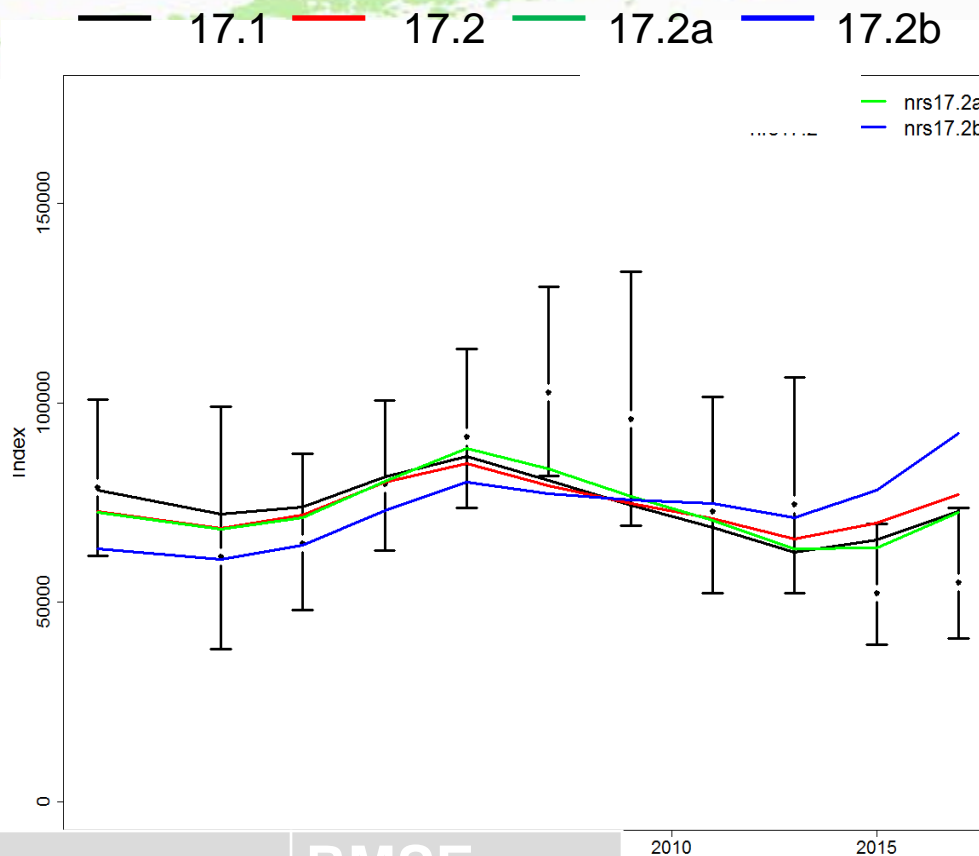
Species					
Shallow-water flatfish	Tier	FABC	FOFL	2018 Biomass ¹	2019 Biomass ¹
Northern rock sole	3a	0.242	0.287	90,794	93,374
Southern rock sole	3a	0.271	0.326	138,620	139,907
Yellowfin sole	5	0.15	0.2	35,284	35,284
Butter sole	5	0.15	0.2	16,368	16,368
Starry flounder	5	0.15	0.2	29,474	29,474
English sole	5	0.15	0.2	16,210	16,210
Sand sole	5	0.15	0.2	1,511	1,511
Alaska plaice	5	0.15	0.2	10,890	10,890
Total ²				339,152	343,018

GOA trawl survey total biomass estimates



- 14% decline in SRS survey biomass
- 5% increase in NRS survey biomass

NRS: Model fit to survey total biomass



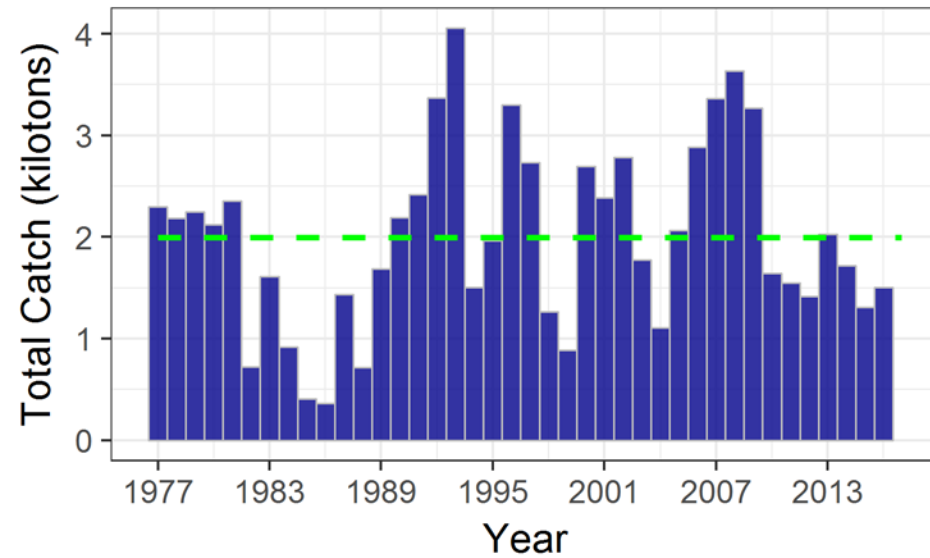
- Similar fit to biomass by 17.1, 17.2, and 17.2
- RMSE favors 17.2a (Francis reweighting)

RMSE

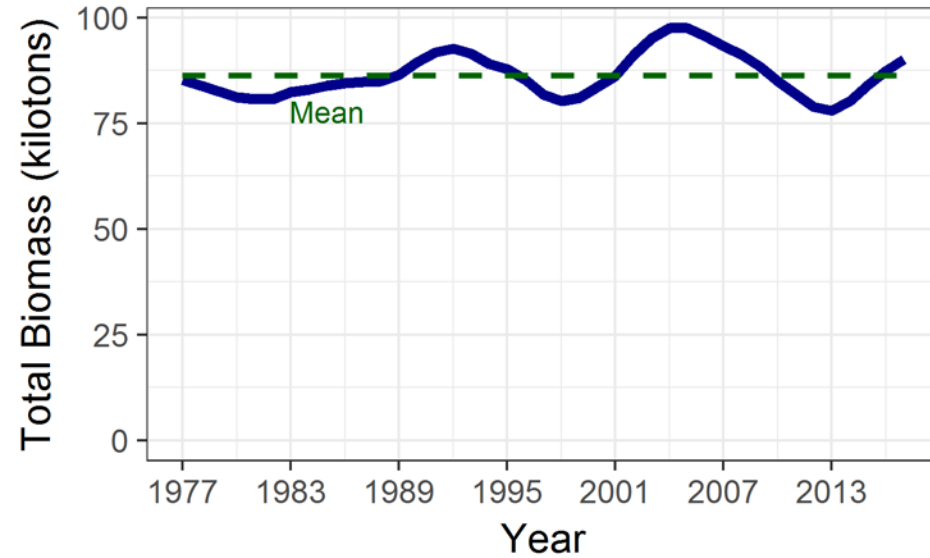
17.1	0.174
17.2	0.184
17.2a	0.155
17.2b	0.241

GOA Northern Rock Sole

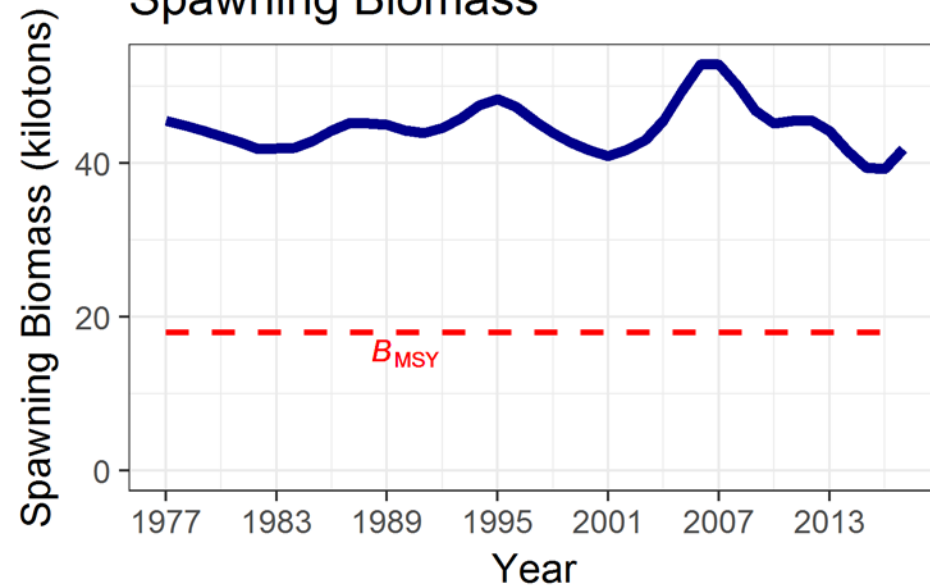
Total Catch



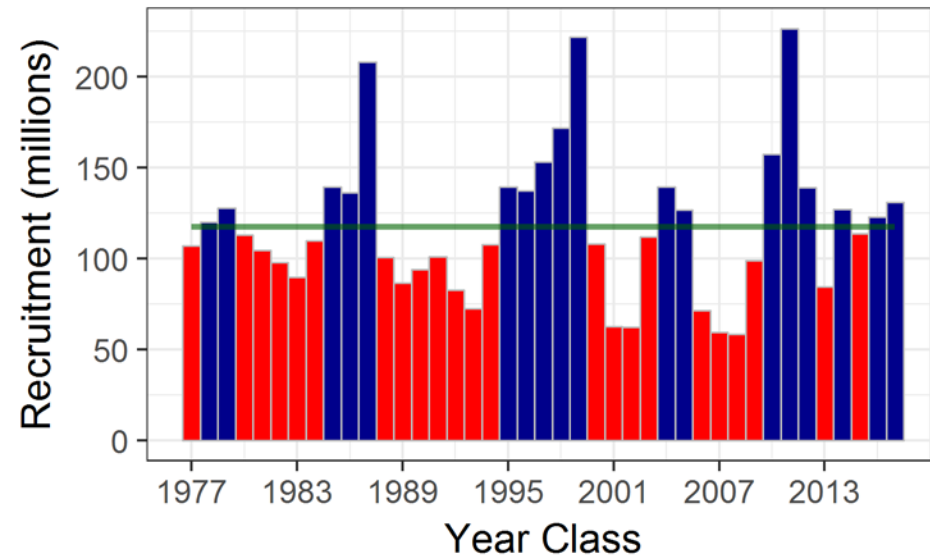
Total Biomass



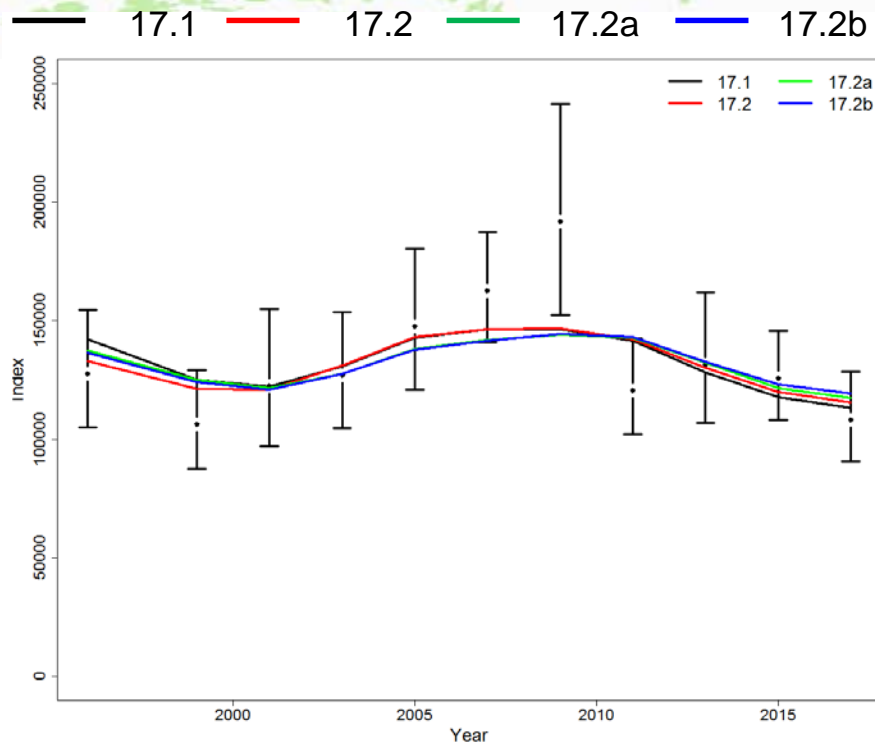
Spawning Biomass



Age 0 Recruitment



SRS: Model fit to survey total biomass

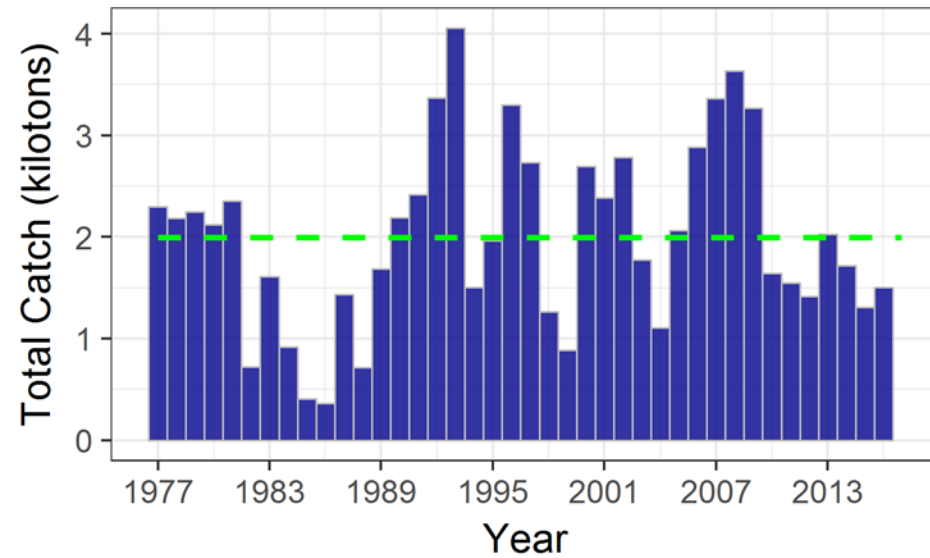


- Similar fit to biomass by all models
- RMSE favors 17.2a (Francis reweighting)

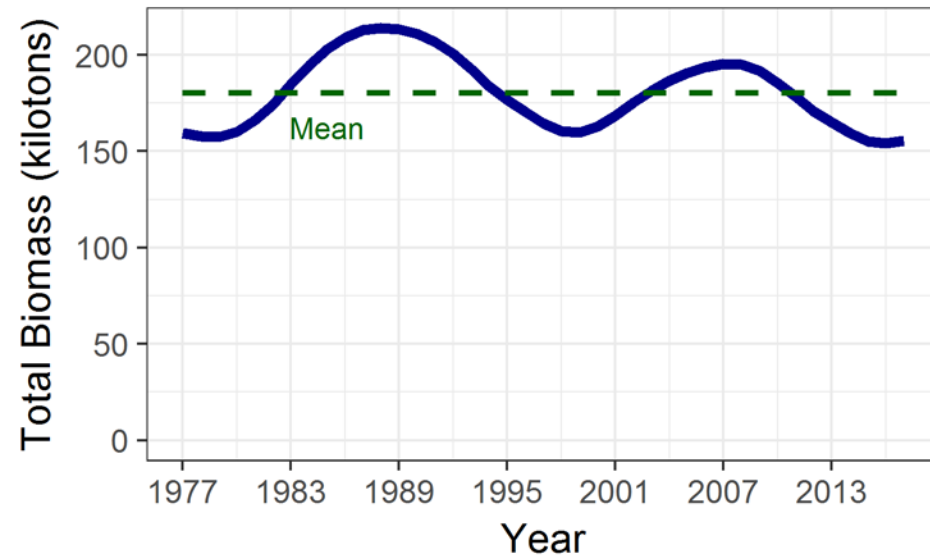
Model	RMSE
17.1	0.174
17.2	0.184
17.2a	0.155
17.2b	0.241

GOA Southern Rock Sole

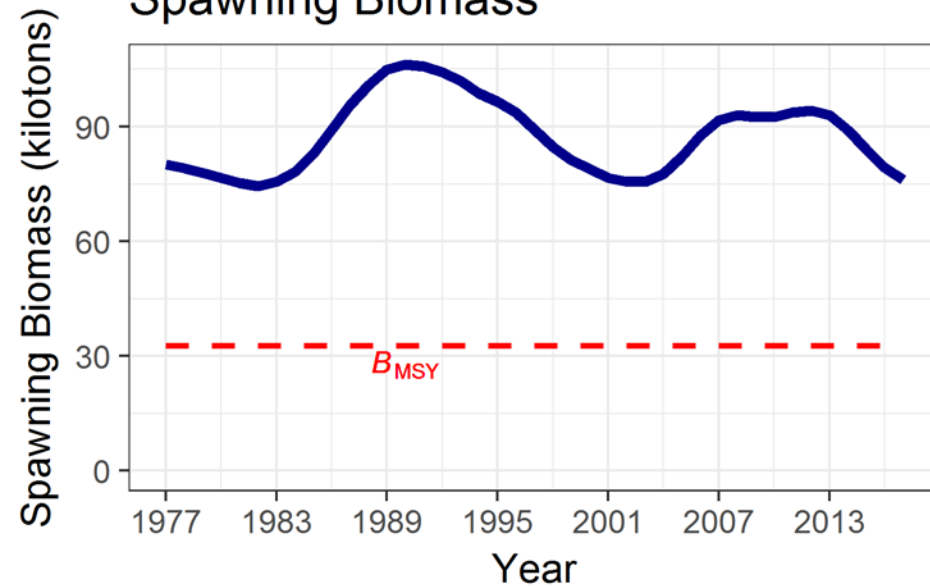
Total Catch



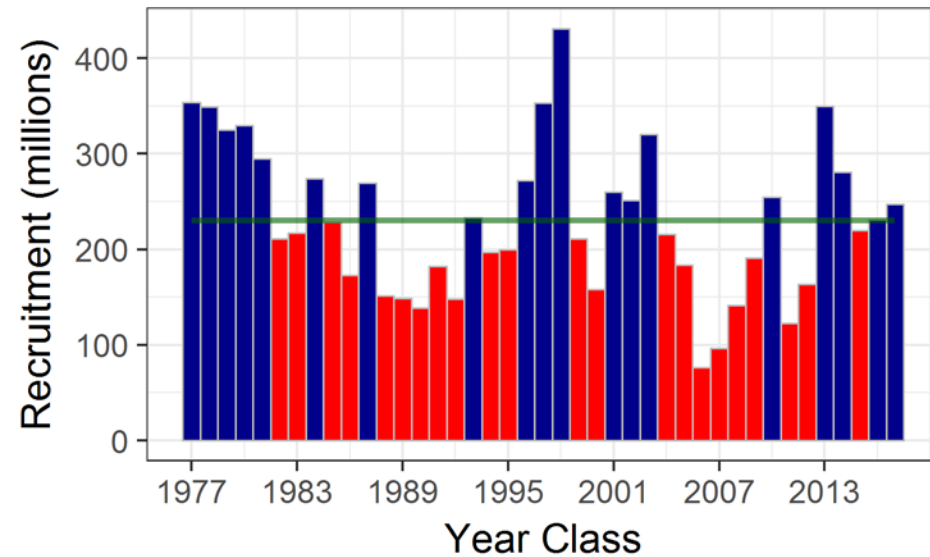
Total Biomass



Spawning Biomass



Age 0 Recruitment



4. Shallow-water flatfish

Species		<i>As recommended this year for:</i>			
		2018		2019	
Shallow-water flatfish	Tier	ABC	OFL	ABC	OFL
Northern rock sole	3a	16,802	19,960	17,243	20,477
Southern rock sole	3a	21,424	25,333	21,717	25,689
Yellowfin sole	5	5,293	7,057	5,293	7,057
Butter sole	5	2,455	3,274	2,455	3,274
Starry flounder	5	4,421	5,895	4,421	5,895
English sole	5	2,432	3,242	2,432	3,242
Sand sole	5	227	302	227	302
Alaska plaice	5	1,634	2,178	1,634	2,178
Total		54,688	67,240	55,422	68,114

Flatfish ABC's

Species	2017 ABC	2018 ABC	Change
Shallow water flatfish	44,514	54,688	up 10,174(23%)
Rex sole	8,311	15,373	up 7,062(85%)
Deep water flatfish	9,292	9,385	up 93(1%)
Flathead sole	35,243	35,266	up 23(0%)
Arrowtooth flounder	186,093	150,945	down 35,148(19%)
Subtotal	283,453	265,657	down 17,796(6%)
Subtotal (without ATF)	97,360	114,712	up 17,352(18%)

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

- Partial assessment
- Script for RE models
 - ♦ Developed to compute 11 series quickly
 - ♦ Accounts

Flatfish ABC's

Species	2017 ABC	2018 ABC	Change
Shallow water flatfish	44,514	54,688	up 10,174(23%)
Rex sole	8,311	15,373	up 7,062(85%)
Deep water flatfish	9,292	9,385	up 93(1%)
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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

6. Rex sole

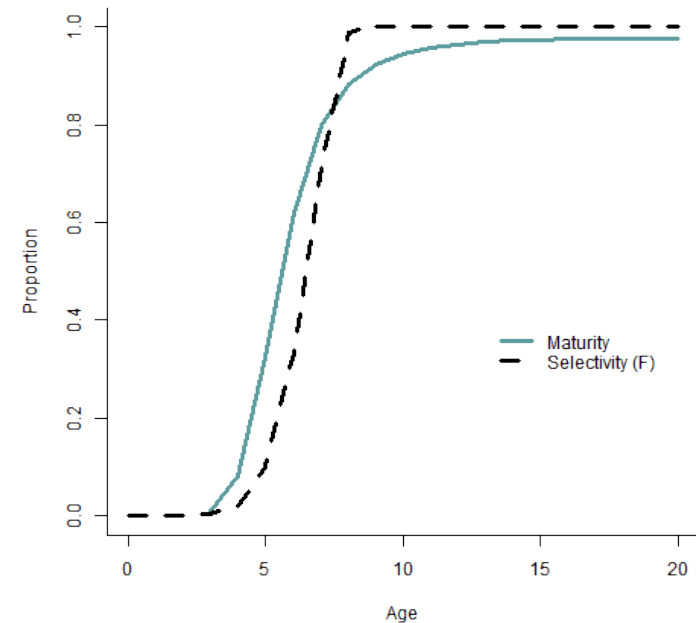
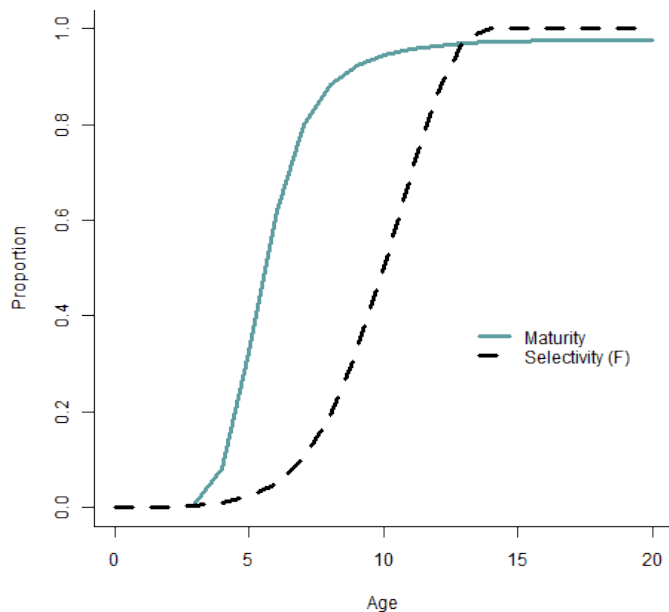
Added fishery ages

- ♦ Improved estimation of fishery selectivity

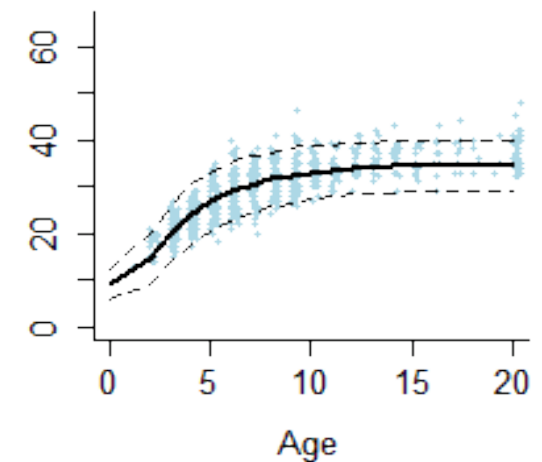
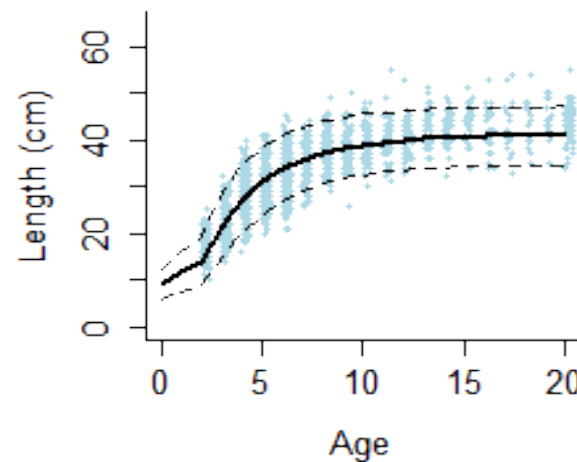
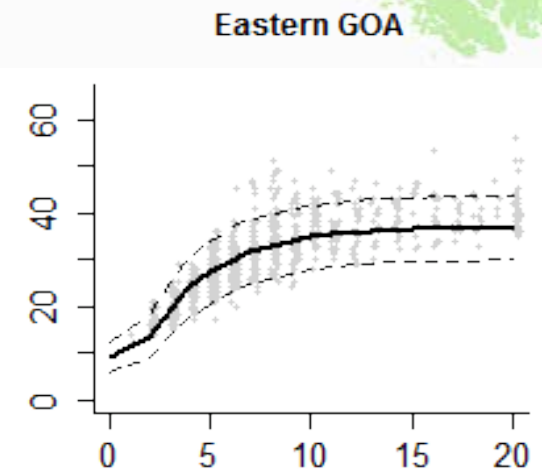
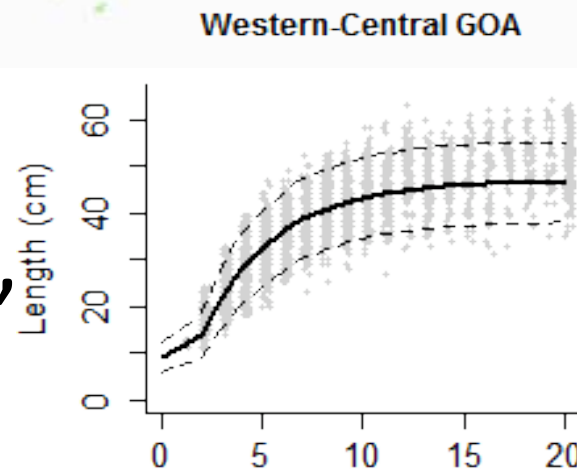
Fishery age data application using port + haul data

Also age-length keys specific to year, area, and season

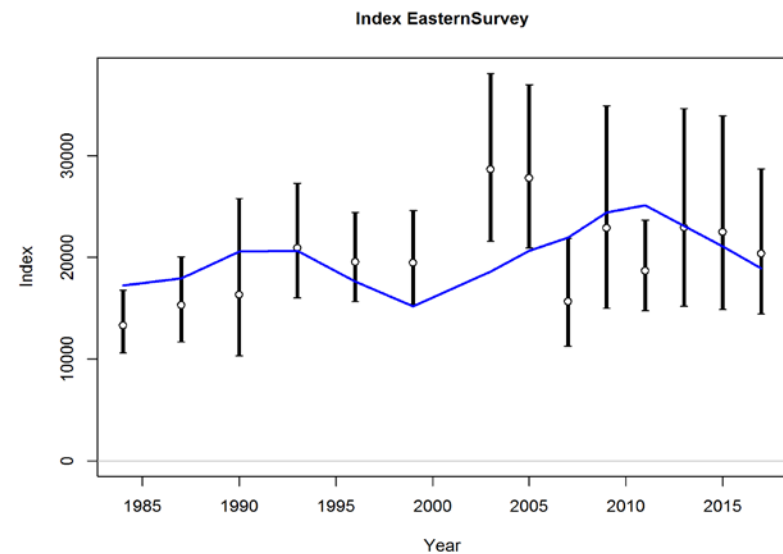
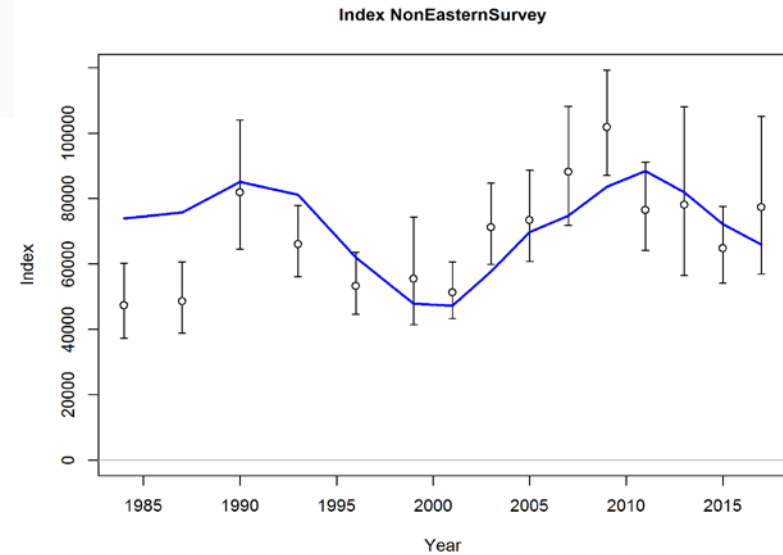
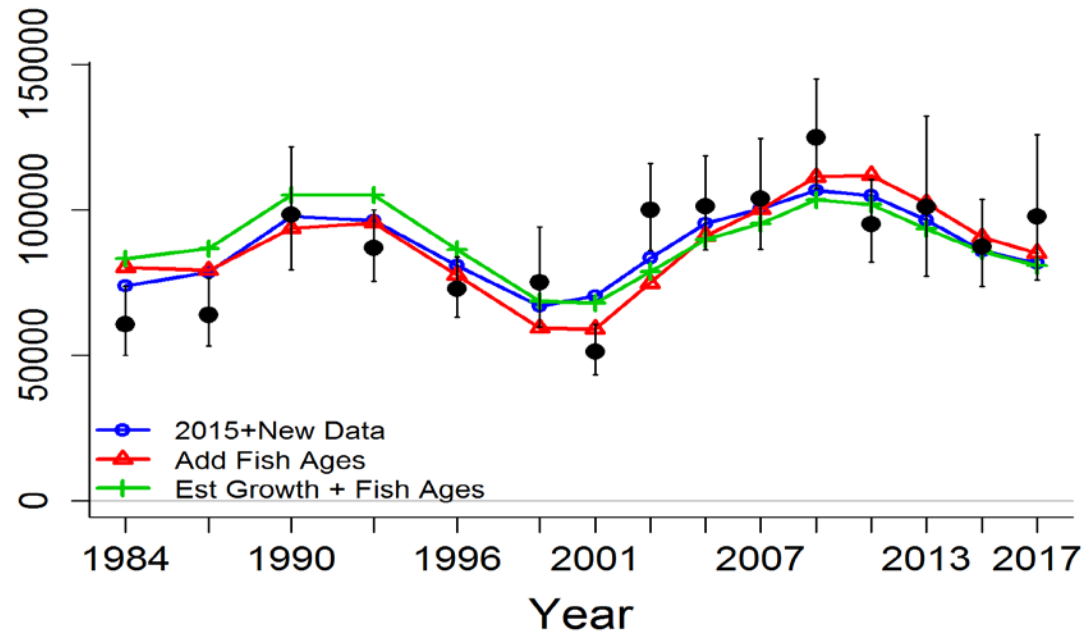
Fishery age data shifted selectivity...



17.2: The
growth “morph”
model
GOA Rex
sole



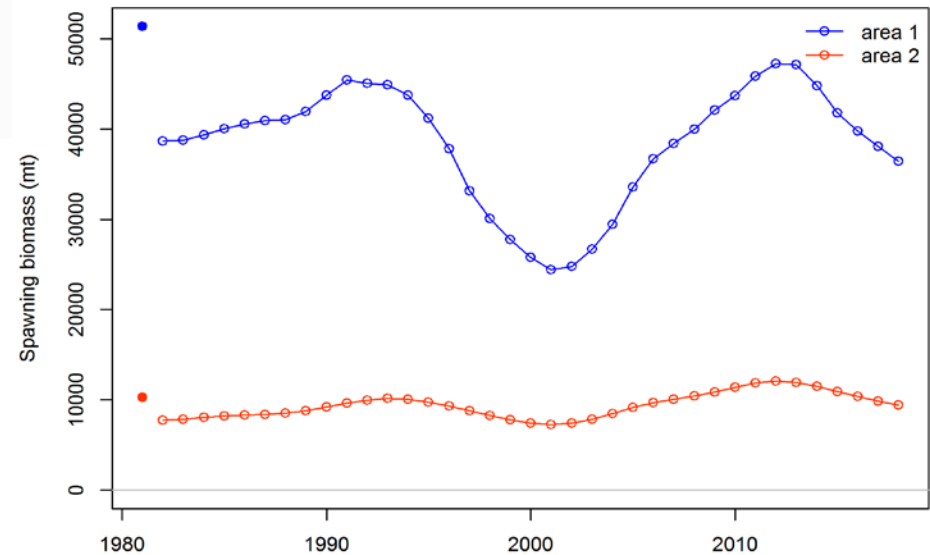
Fits to survey biomass



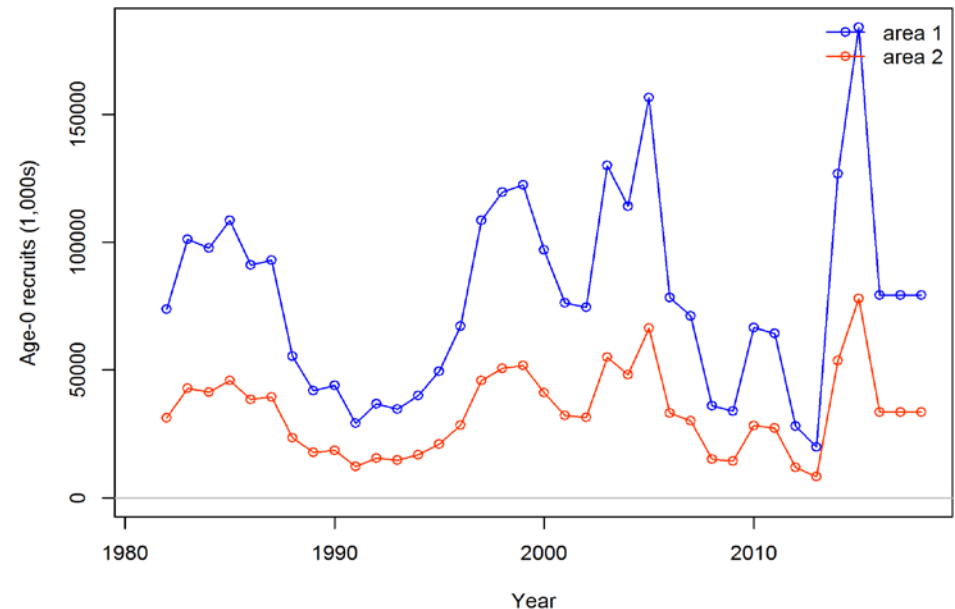
Model 17.2: 2 growth “morphs”

- About 30% settle in EGOA
- Move from Tier 5 to Tier 3(a)
- Team acknowledged innovation to deal with growth by area and account where fishery occurs

Spawning Biomass by Area



Recruitment by Area



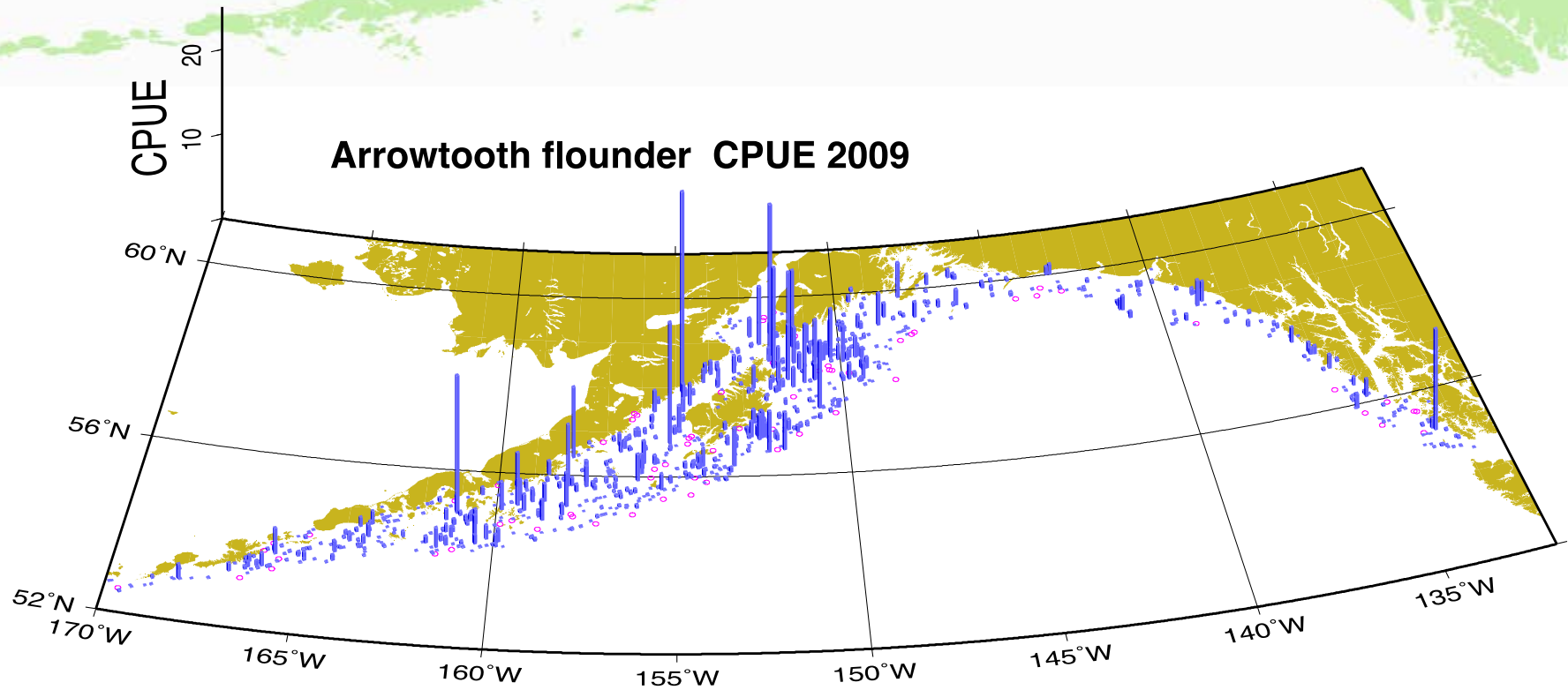
Flatfish ABC's

Species	2017 ABC	2018 ABC	Change
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Subtotal	283,453	265,657	down 17,796(6%)
Subtotal (without ATF)	97,360	114,712	up 17,352(18%)

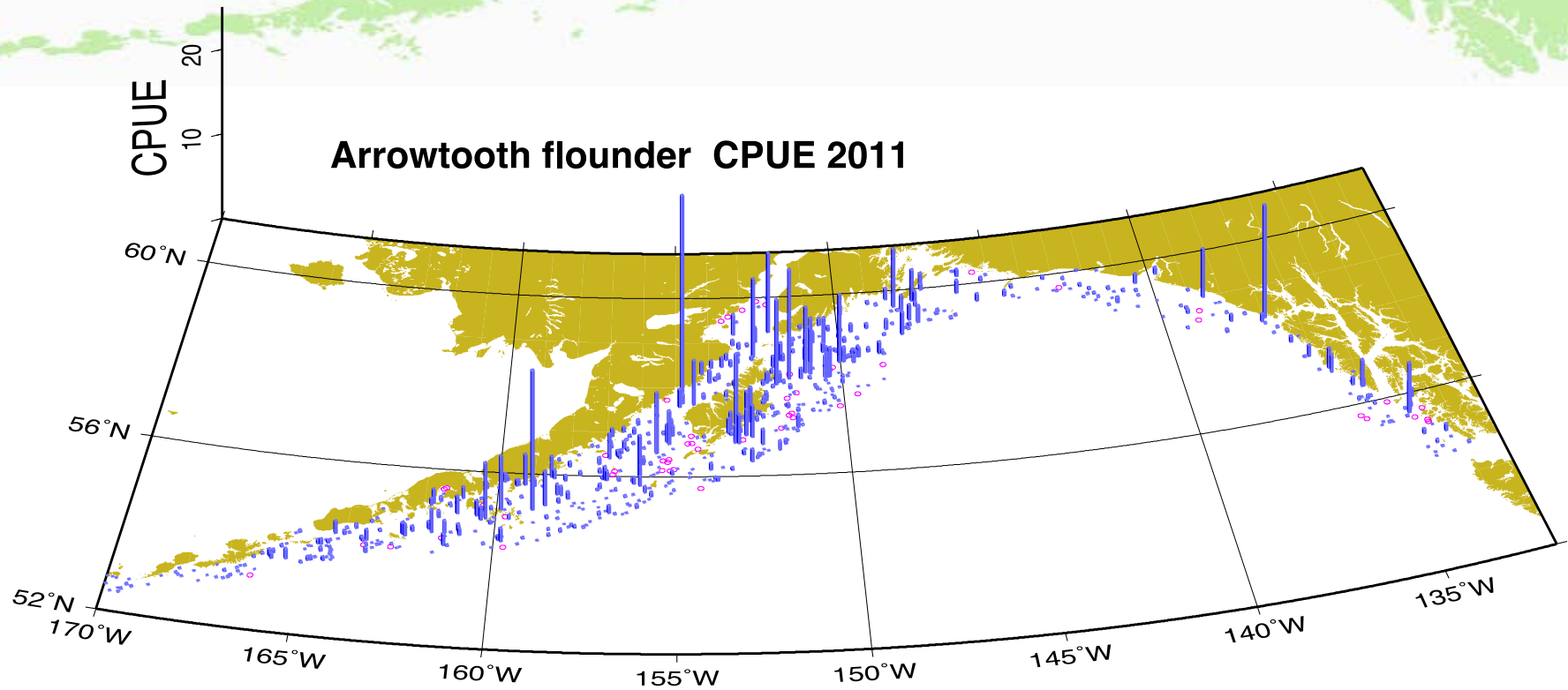
Deep-water ABC from Dover assessment Tier 3 + others Tier 6

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

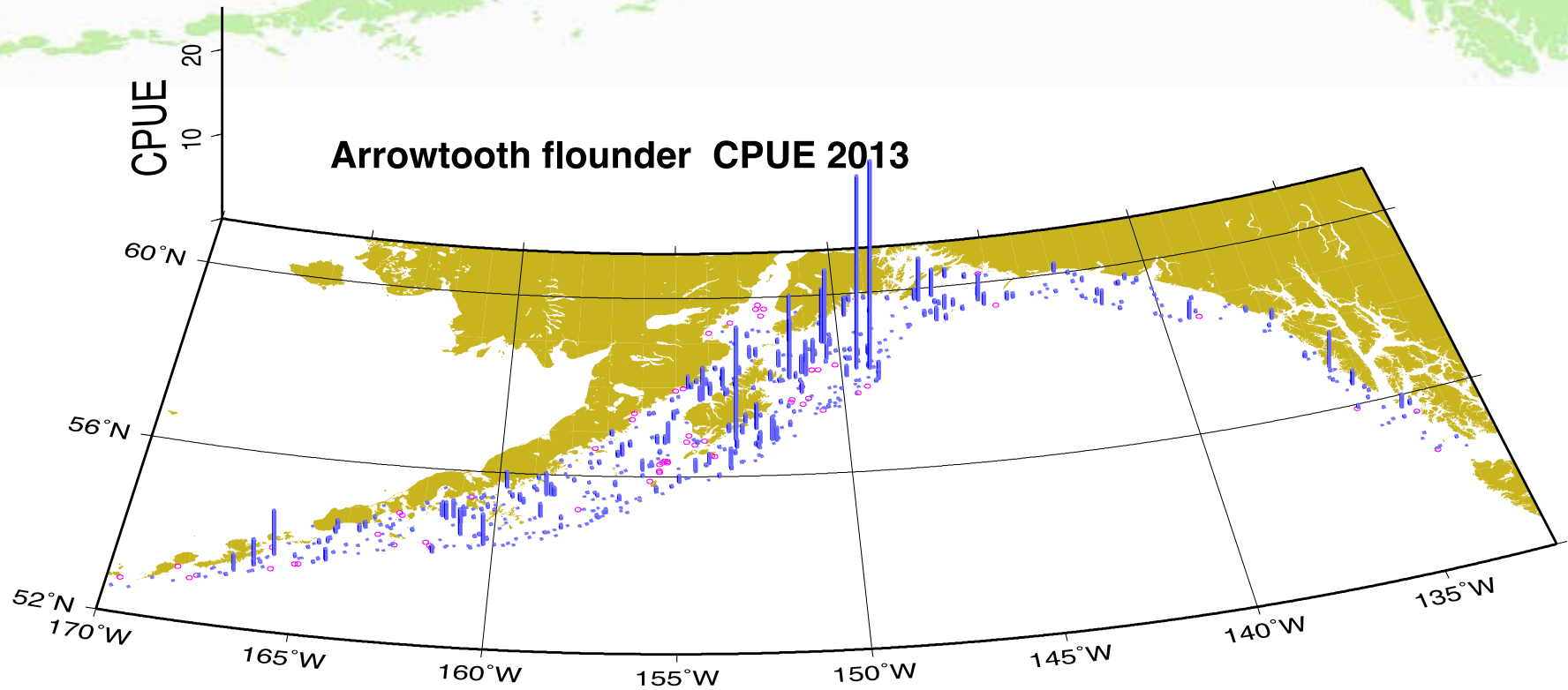
7. Arrowtooth flounder



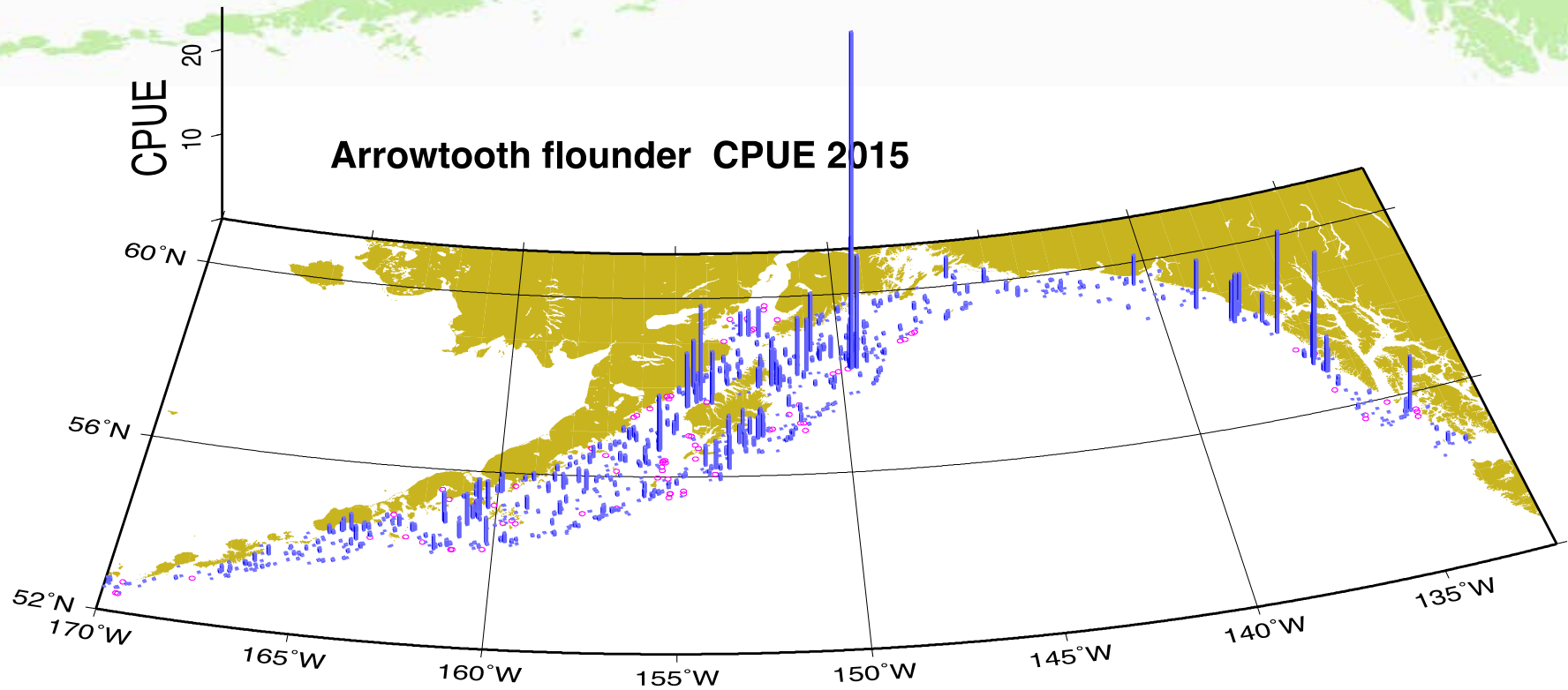
7. Arrowtooth flounder



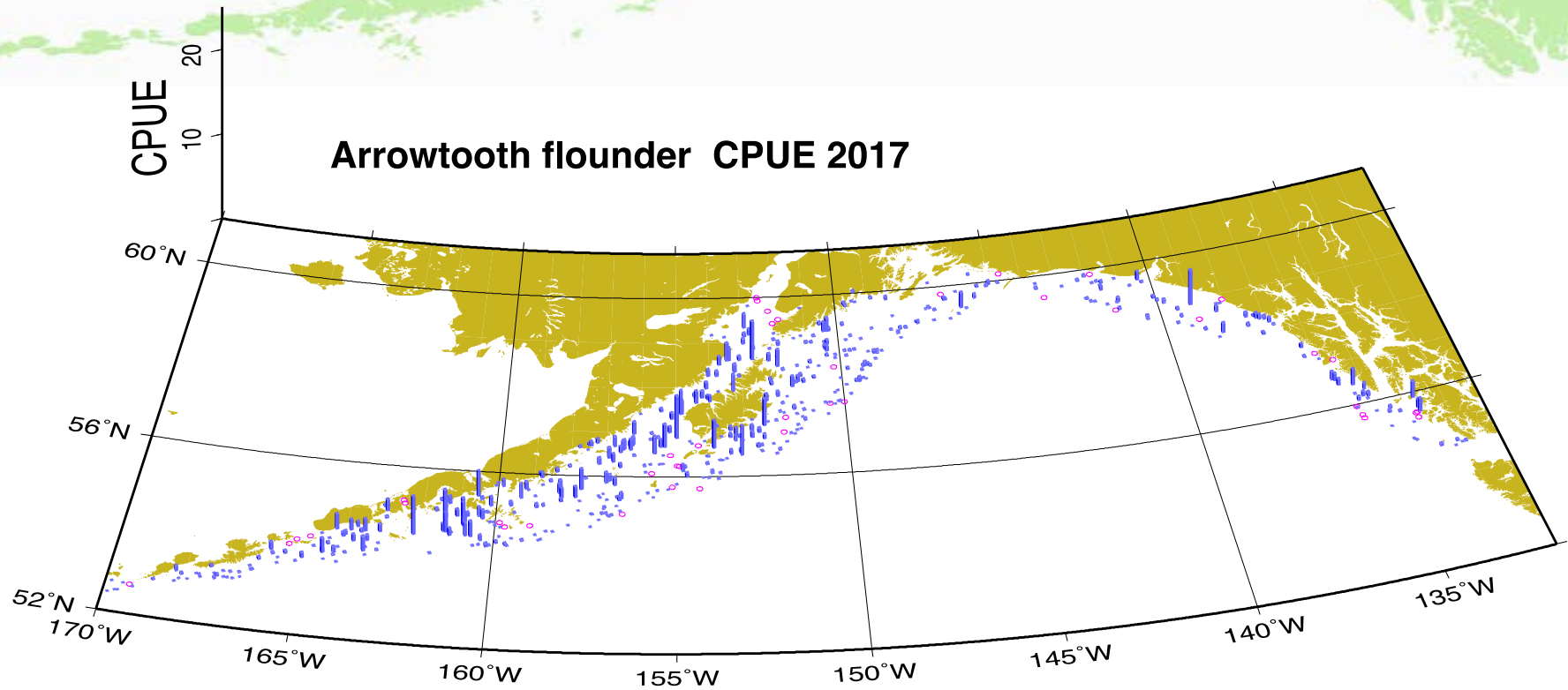
7. Arrowtooth flounder



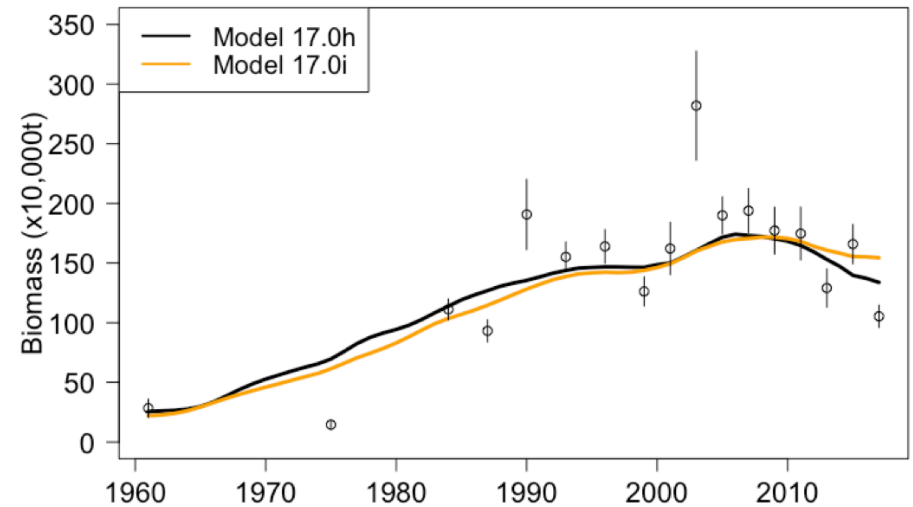
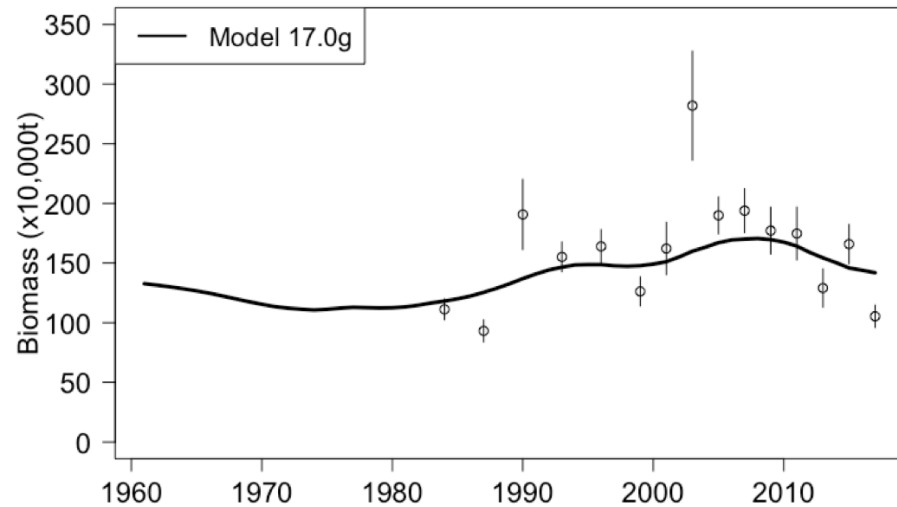
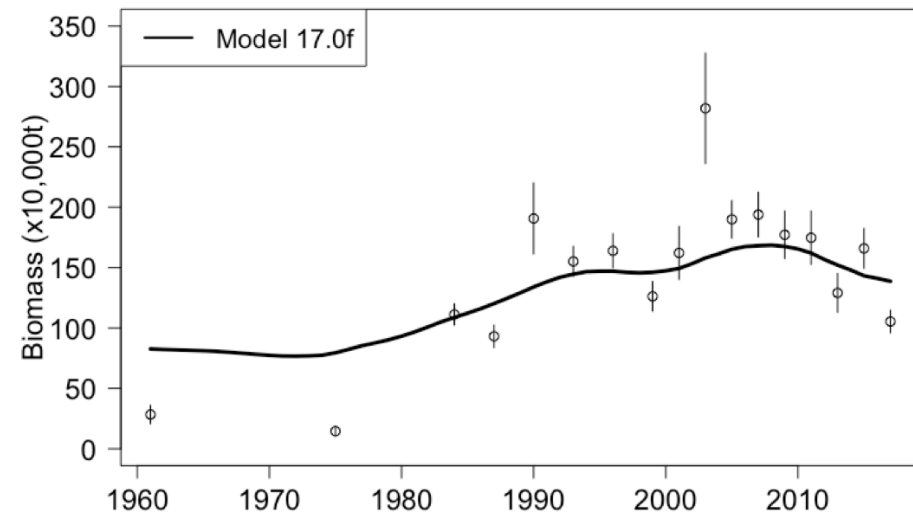
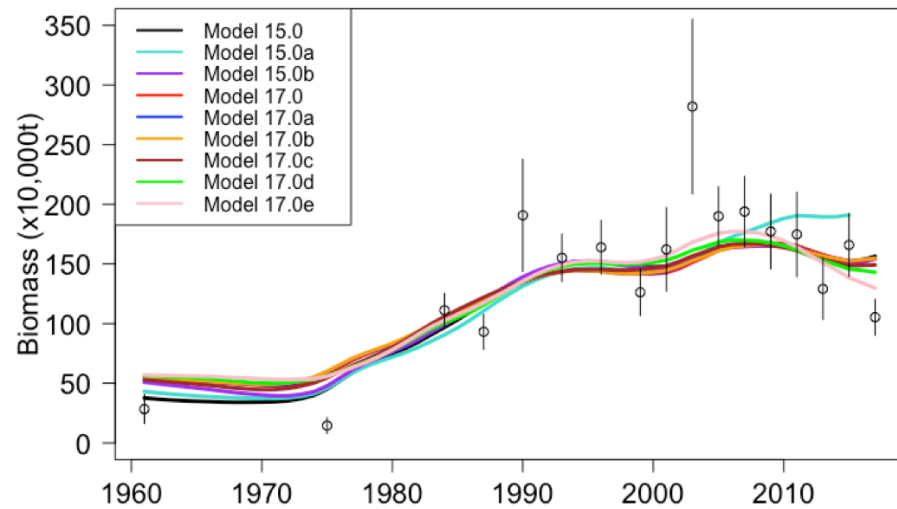
7. Arrowtooth flounder



7. Arrowtooth flounder

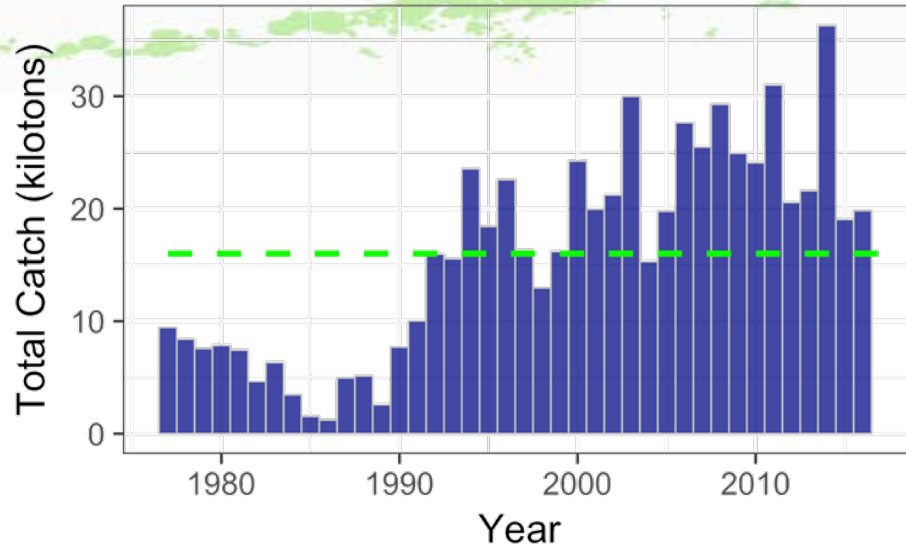


7. Arrowtooth flounder

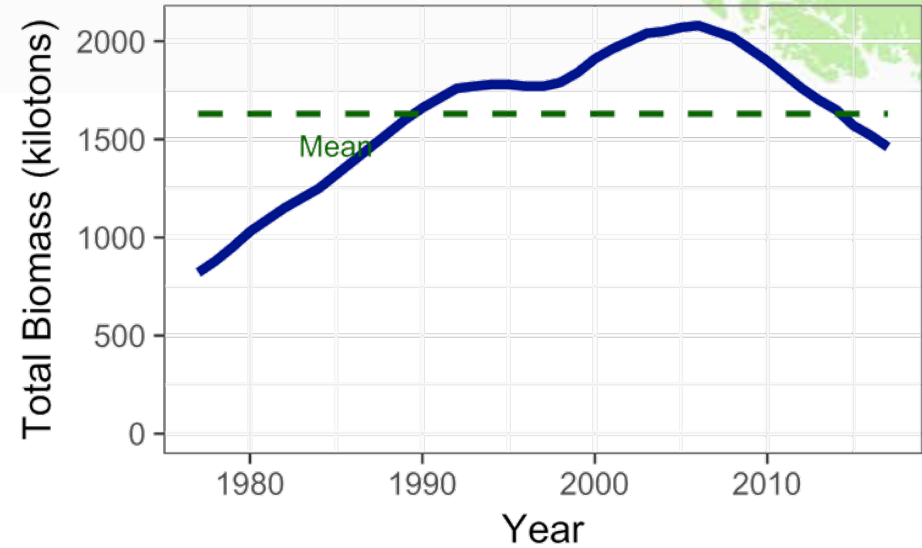


GOA Arrowtooth Flounder

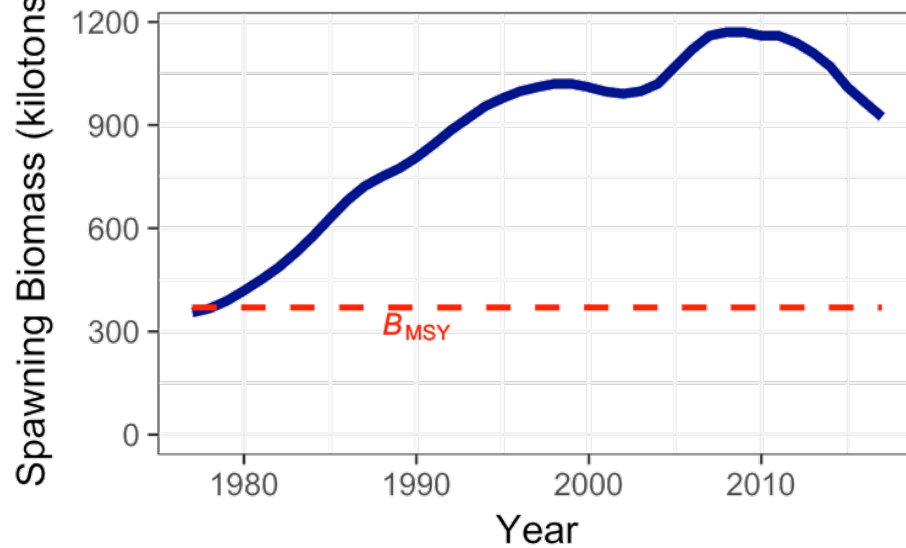
Total Catch



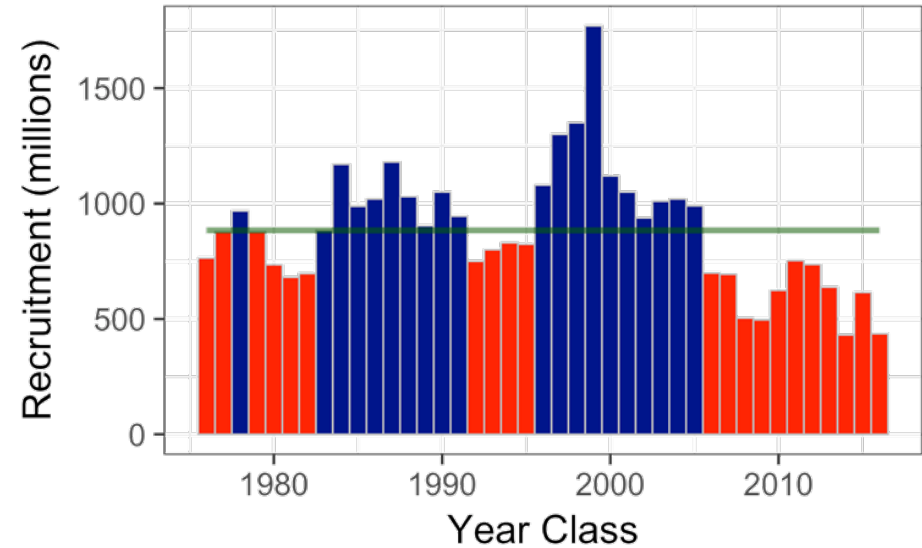
Total Biomass



Spawning Biomass



Age 1 Recruitment



Flatfish ABC's

Species	2017 ABC	2018 ABC	Change
Shallow water flatfish	44,514	54,688	up 10,174(23%)
Rex sole	8,311	15,373	up 7,062(85%)
Deep water flatfish	9,292	9,385	up 93(1%)
Flathead sole	35,243	35,266	up 23(0%)
Arrowtooth flounder	186,093	150,945	down 35,148(19%)
Subtotal	283,453	265,657	down 17,796(6%)
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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. Flathead sole

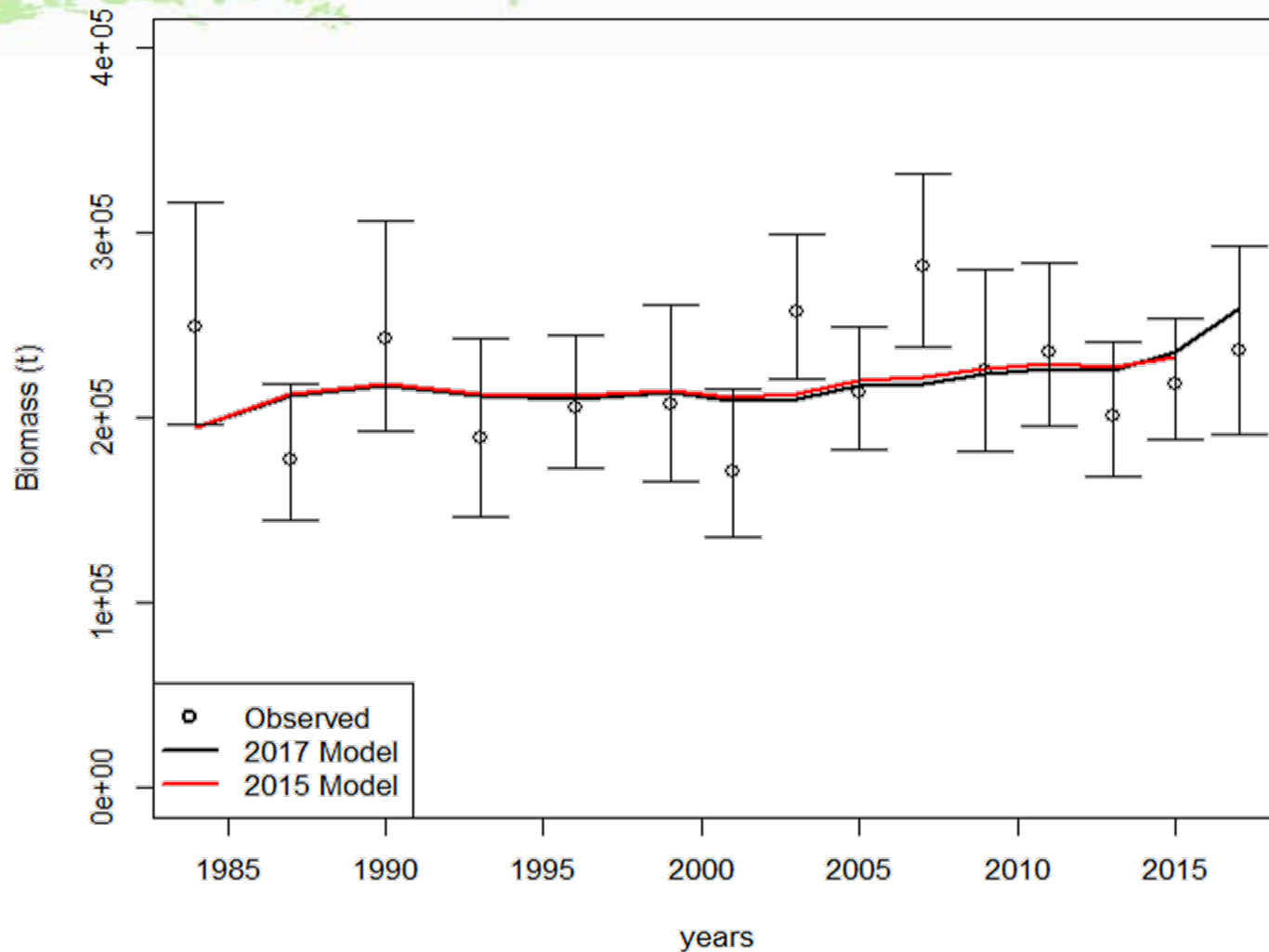
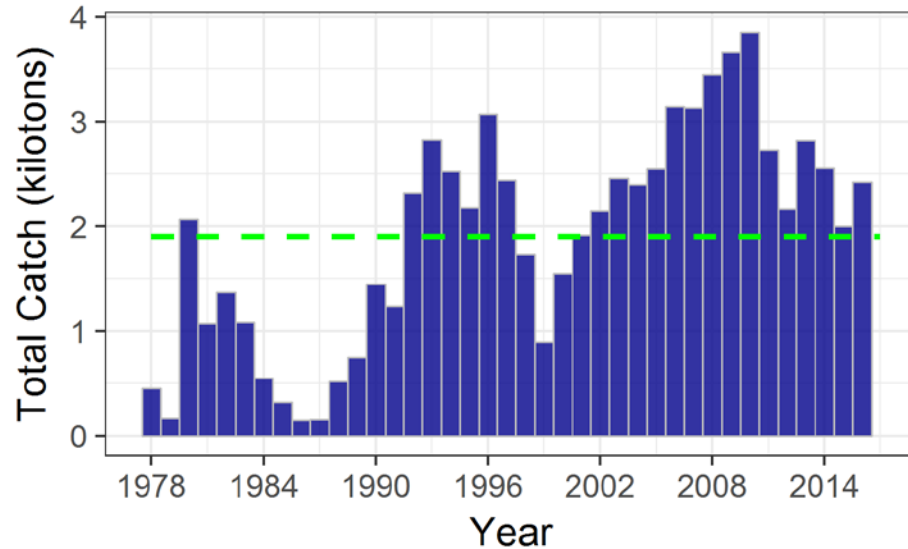


Figure 1. Survey biomass index (circles), asymptotic 95% confidence intervals (vertical black lines), and estimated survey biomass for the proposed 2017 model and the accepted 2015 model (the same as the 2017 Model without 2016-2017 data).

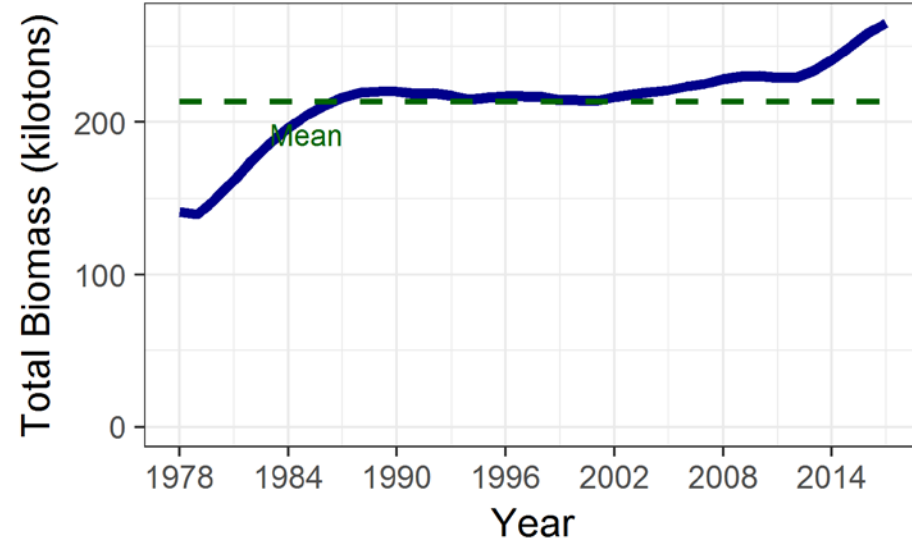
8. Flathead sole

GOA Flathead Sole

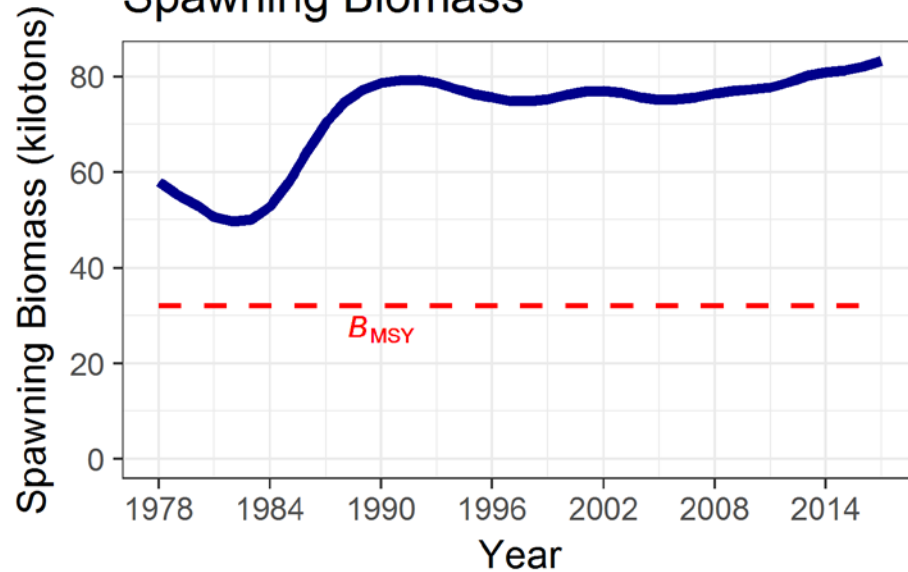
Total Catch



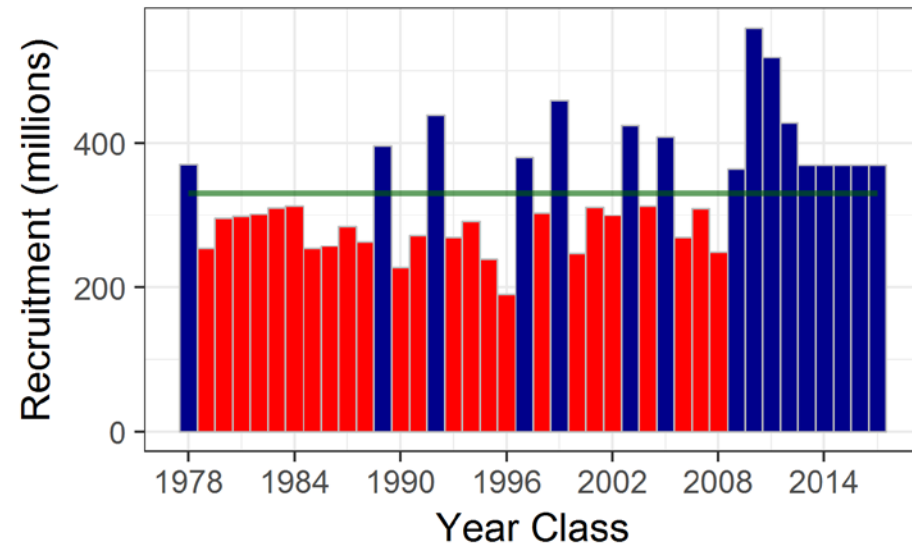
Total Biomass



Spawning Biomass



Age 0 Recruitment



GOA Rockfish

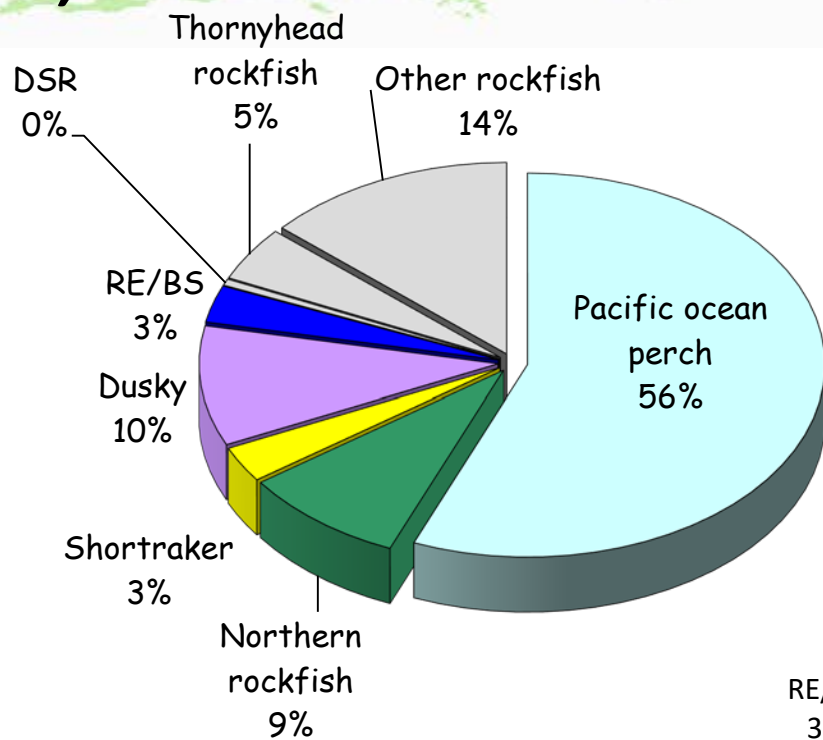
ABC

Species	2017 Catch	2017	2018	Change
Pollock	184,243	213,689	170,265	down 43,424 (20%)
Pacific Cod	33,115	88,342	18,000	down 70,342 (80%)
Sablefish	10,386	10,074	11,505	up 1,431 (14%)
Flatfish	30,139	97,360	114,712	up 17,352 (18%)
Arrowtooth flounder	1,875	186,093	150,945	down 35,148 (19%)
Rockfish	30,563	42,560	47,067	up 4,507 (11%)
Atka mackerel	1,048	4,700	4,700	same (0%)
Skates	4,156	8,939	7,804	down 1,135 (13%)
Other Species	3,013	16,120	11,927	down 4,193 (26%)
Total	298,538	667,877	536,925	down 130,952 (20%)

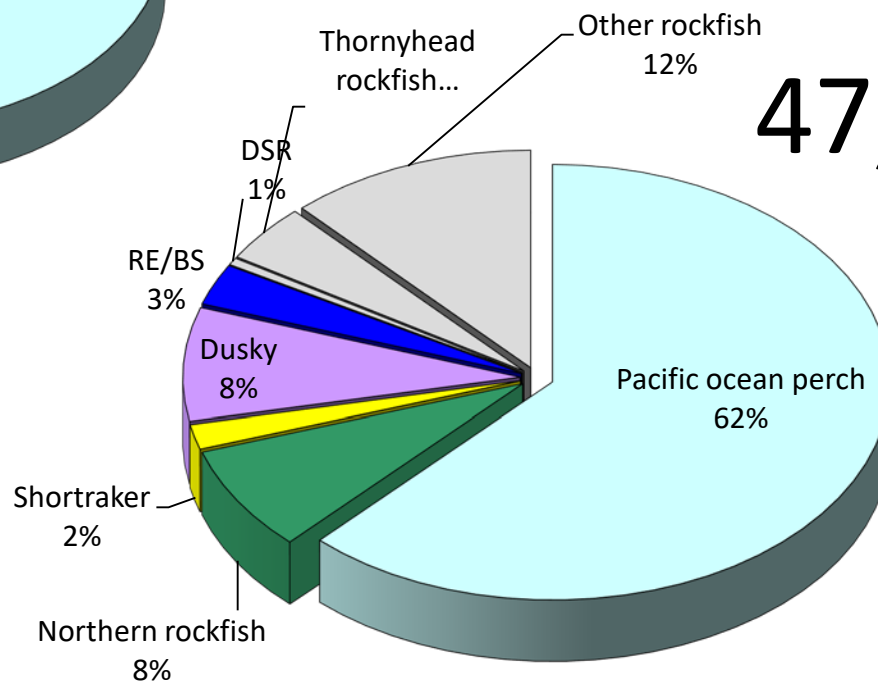
2017
42,560 t

GULF OF ALASKA GROUNDFISH ASSESSMENTS

Rockfish ABCs



2018
47,067 t

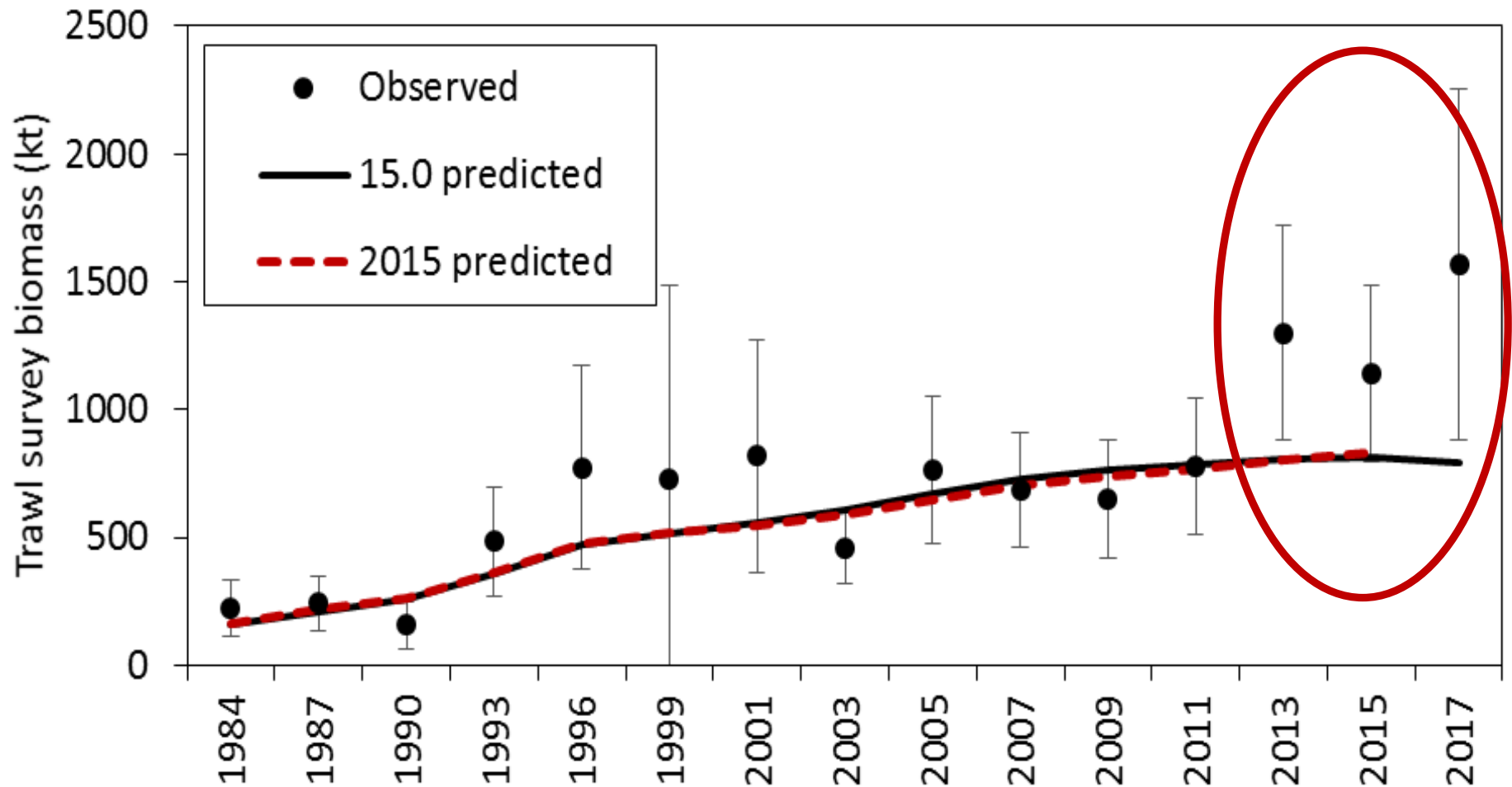


Rockfish ABC Summary

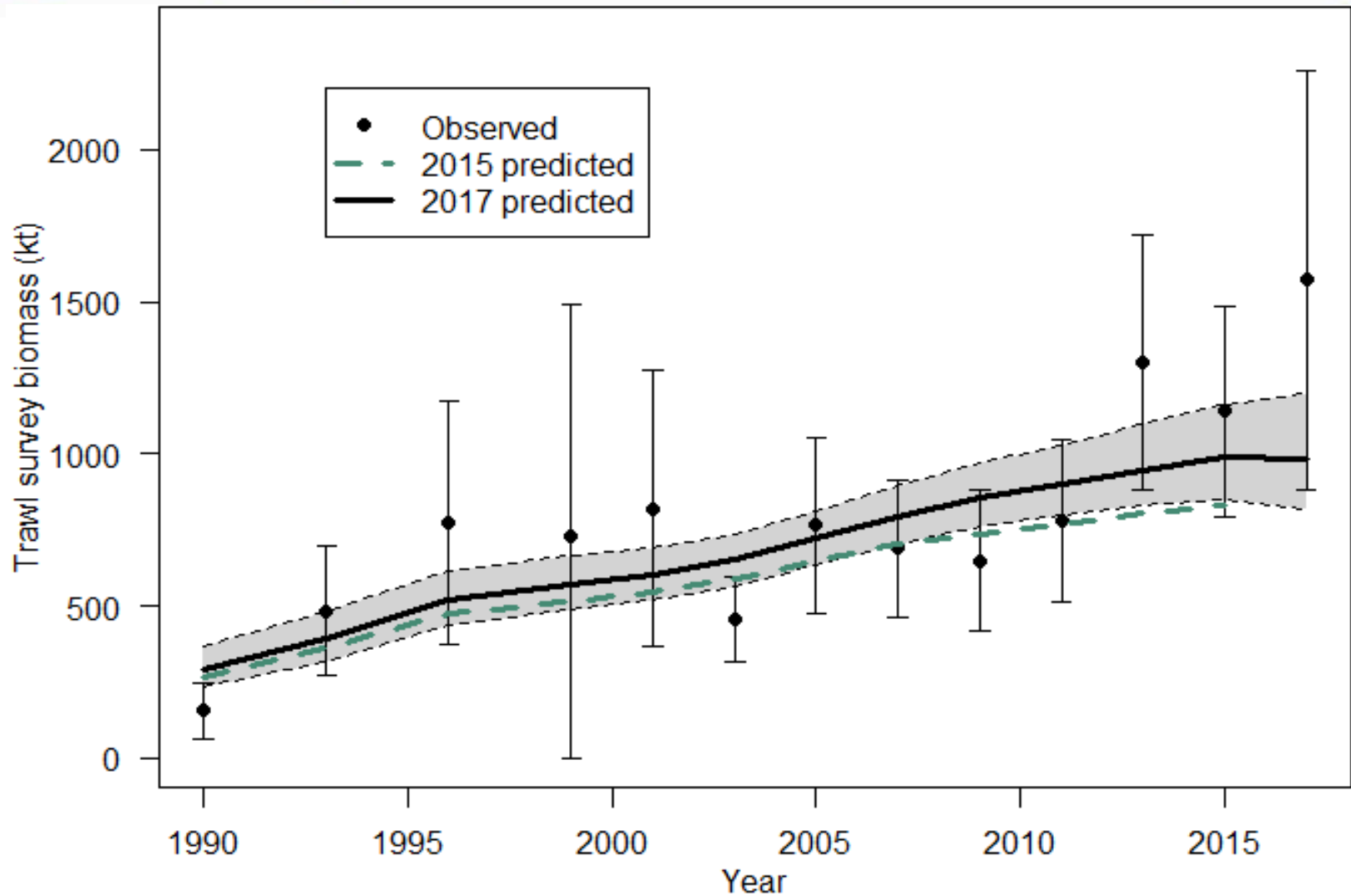
Species	2017	2018	Change
POP	23,918	29,236	up 5,318 (22%)
northern rockfish	3,790	3,685	down 105 (3%)
Shortraker Rockfish	1,286	863	down 423 (33%)
Dusky	4,278	3,957	down 321 (8%)
Rougeye and Blackspotted Rockfish	1,327	1,444	same (0%)
Demersal shelf rockfish	227	250	same (0%)
Thornyhead	1,961	2,038	up 77 (4%)
Other rock	5,773	5,594	down 179 (3%)
Sub Total	42,560	47,067	up 4,507 (11%)

9. POP – Survey biomass

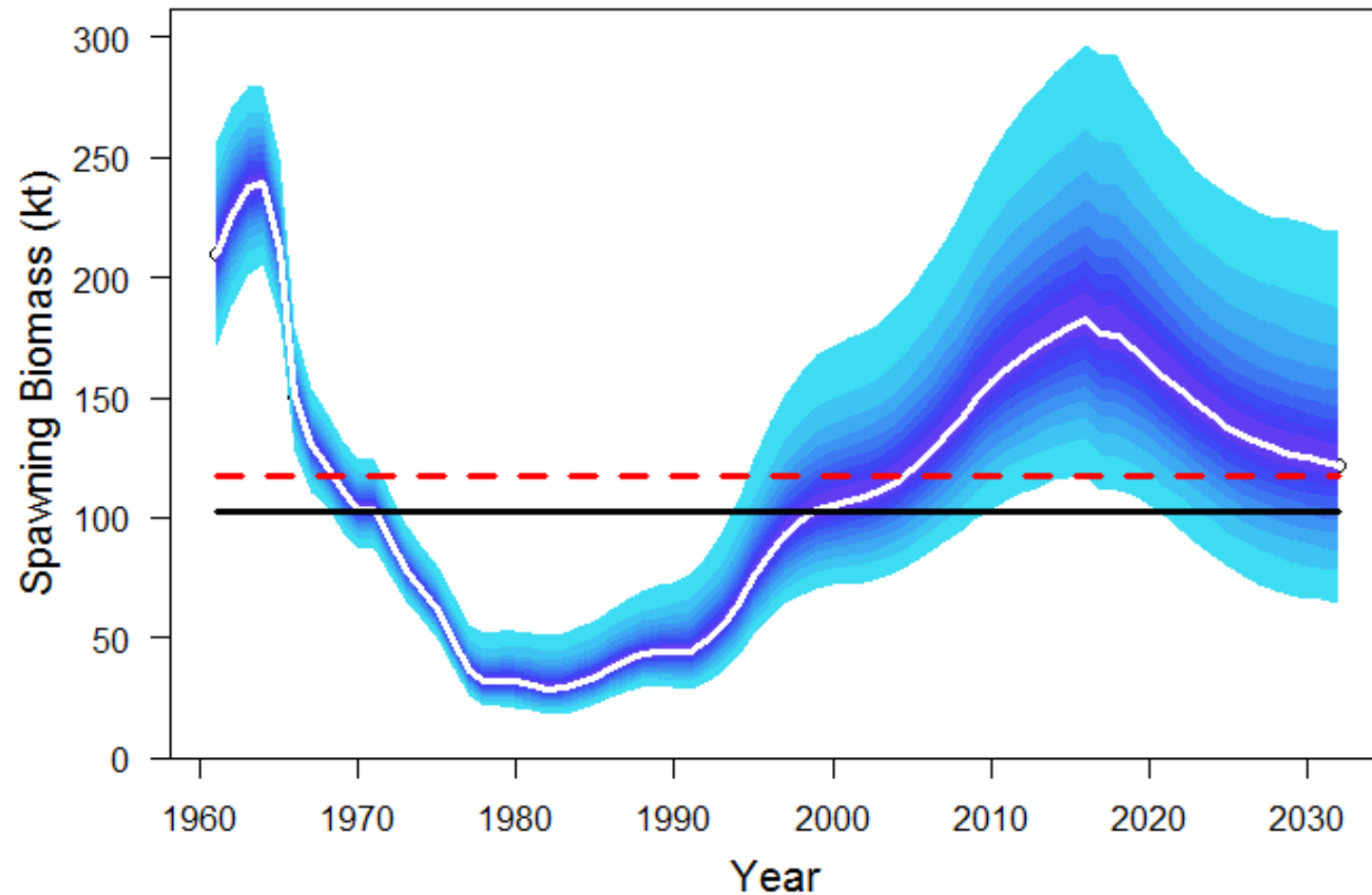
■ Issue #1: fit to trawl survey biomass



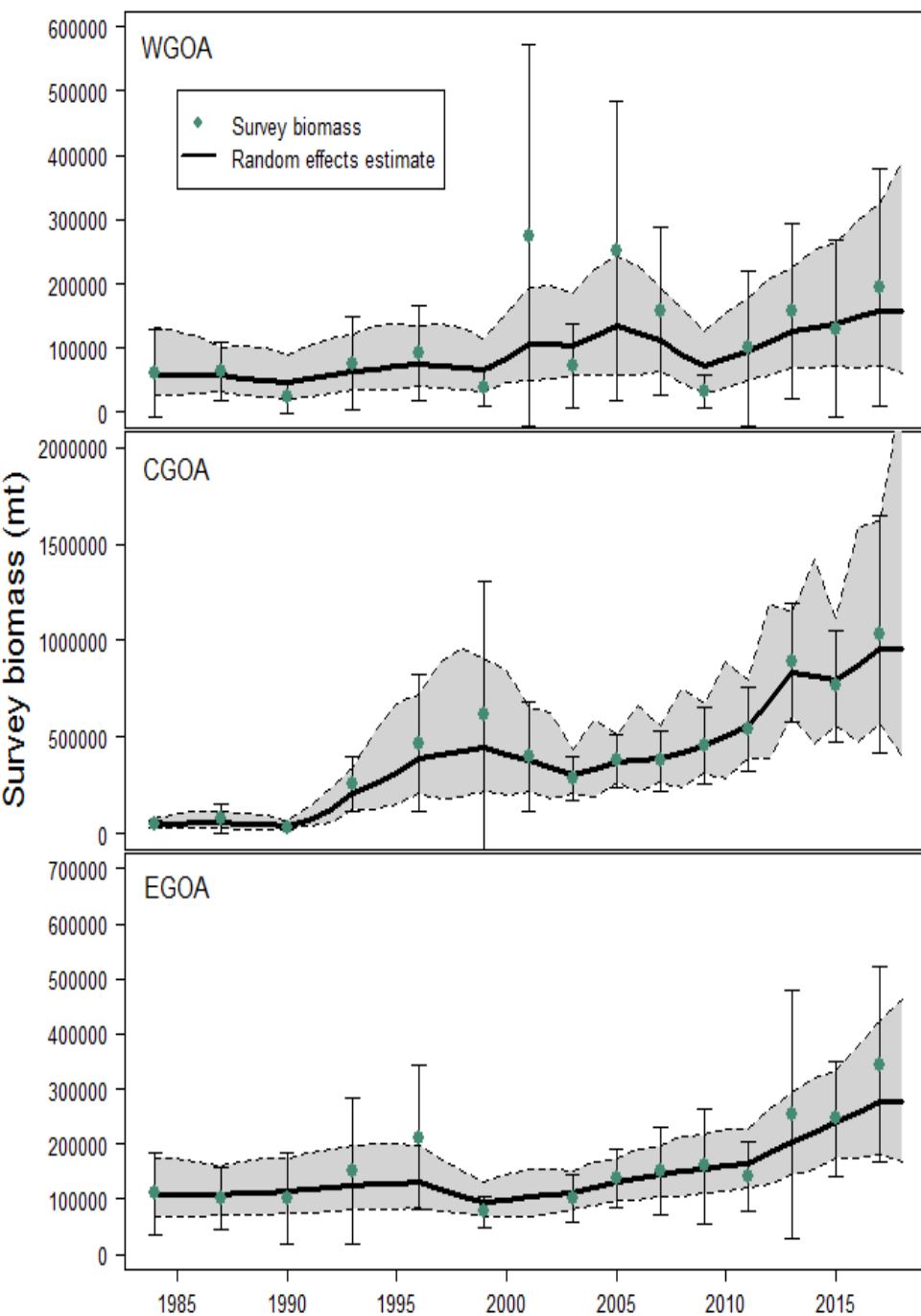
9. POP – Survey biomass



9. POP – Projection



Apportionment

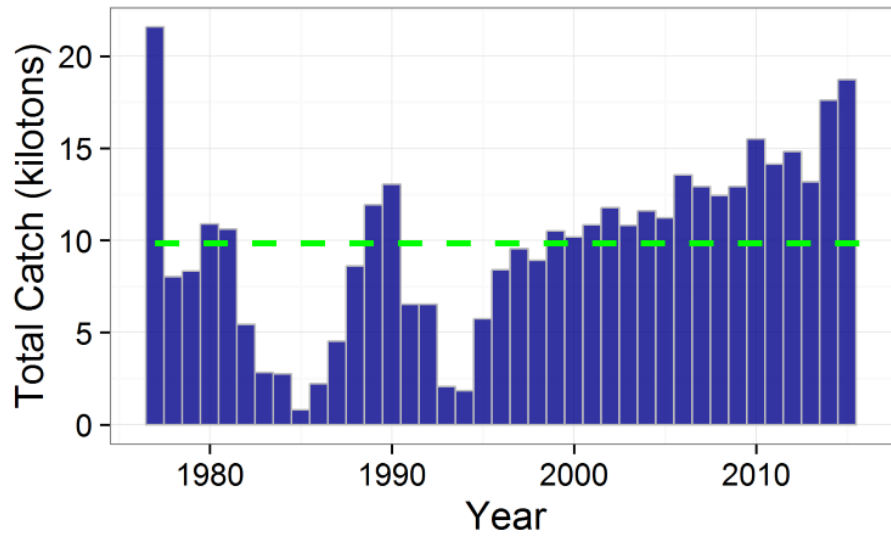


	Western	Central	Eastern	Total
2017 ABC	2,679	16,671	4,568	23,918
2018 ABC	3,312	20,112	5,812	29,236
2019 ABC	3,240	19,678	5,687	28,605

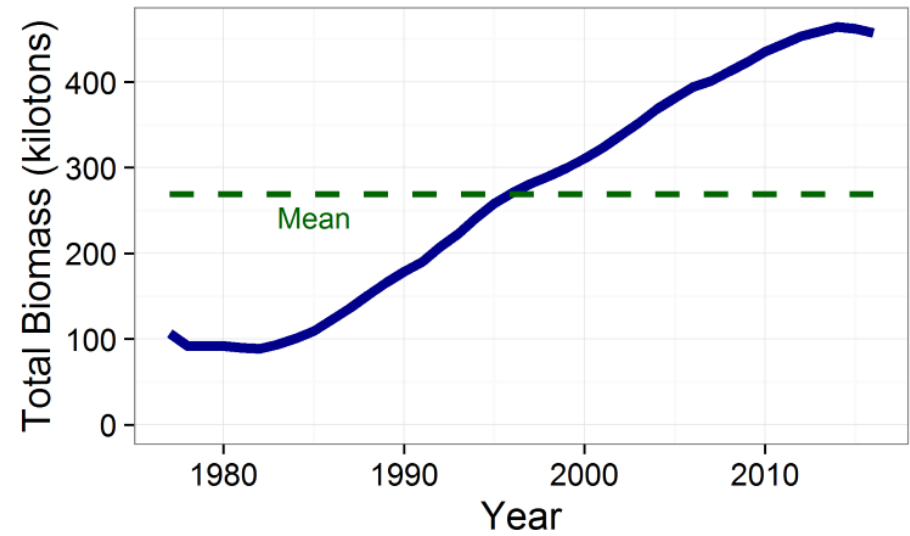
	WYAK (58%)	EYAK/SE (42%)	Total
2017 ABC	2,786	1,782	4,568
2018 ABC	3,371	2,441	5,812
2019 ABC	3,298	2,389	5,687

GOA Pacific Ocean Perch

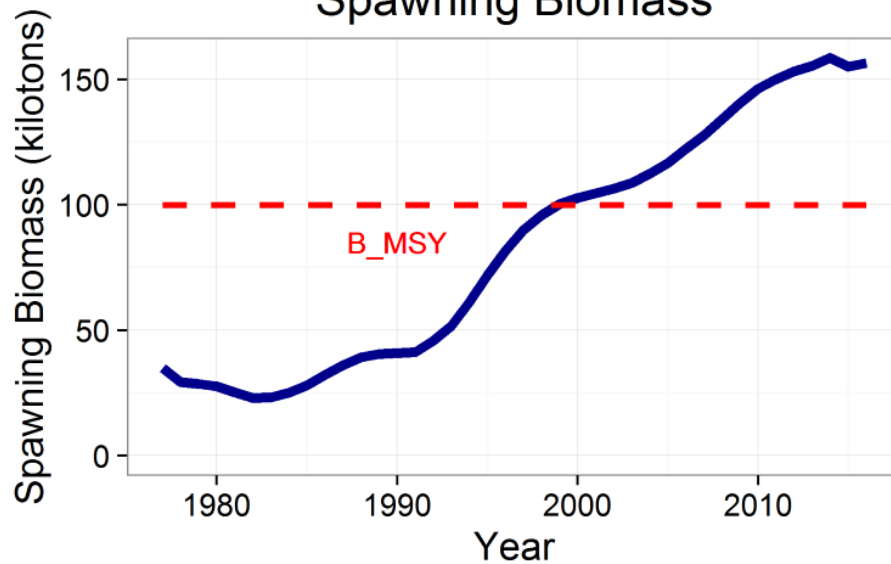
Total Catch



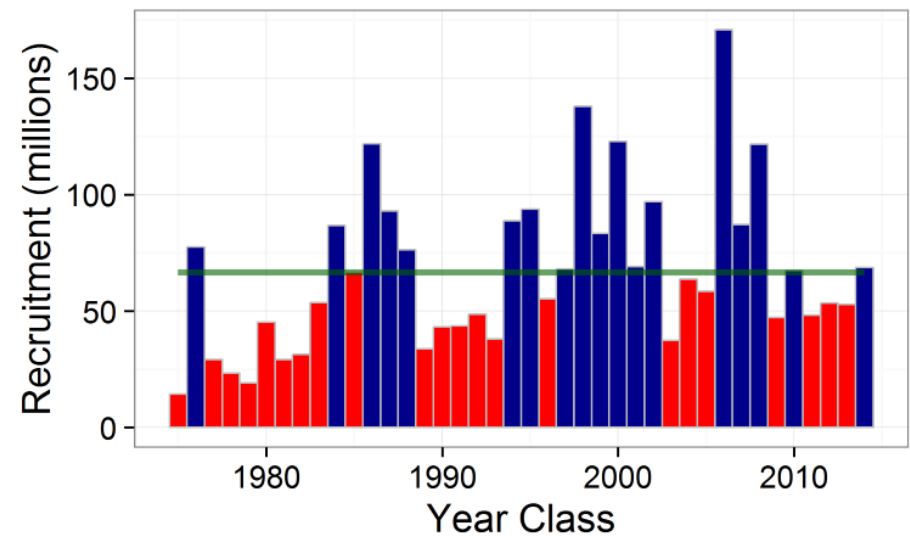
Total Biomass



Spawning Biomass



Age 2 Recruitment

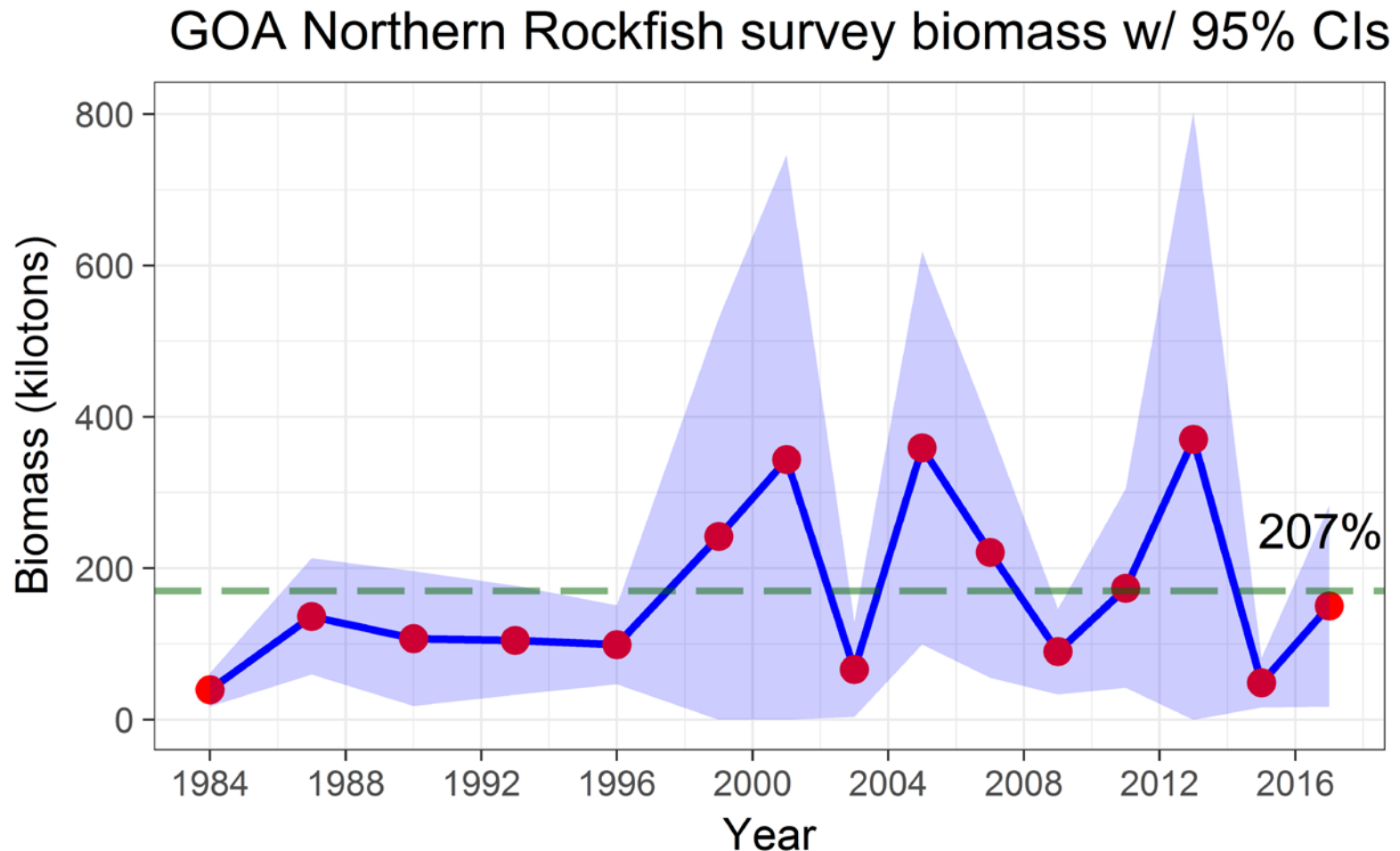


Rockfish ABC Summary

Species	2017	2018	Change
POP	23,918	29,236	up 5,318(22%)
northern rockfish	3,790	3,685	down 105(3%)
Shortraker Rockfish	1,286	863	down 423(33%)
Dusky	4,278	3,957	down 321(8%)
Rougeye and Blackspotted Rockfish	1,327	1,444	same(0%)
Demersal shelf rockfish	227	250	same(0%)
Thornyhead	1,961	2,038	up 77(4%)
Other rock	5,773	5,594	down 179(3%)
Sub Total	42,560	47,067	up 4,507(11%)

10. Northern rockfish: Survey

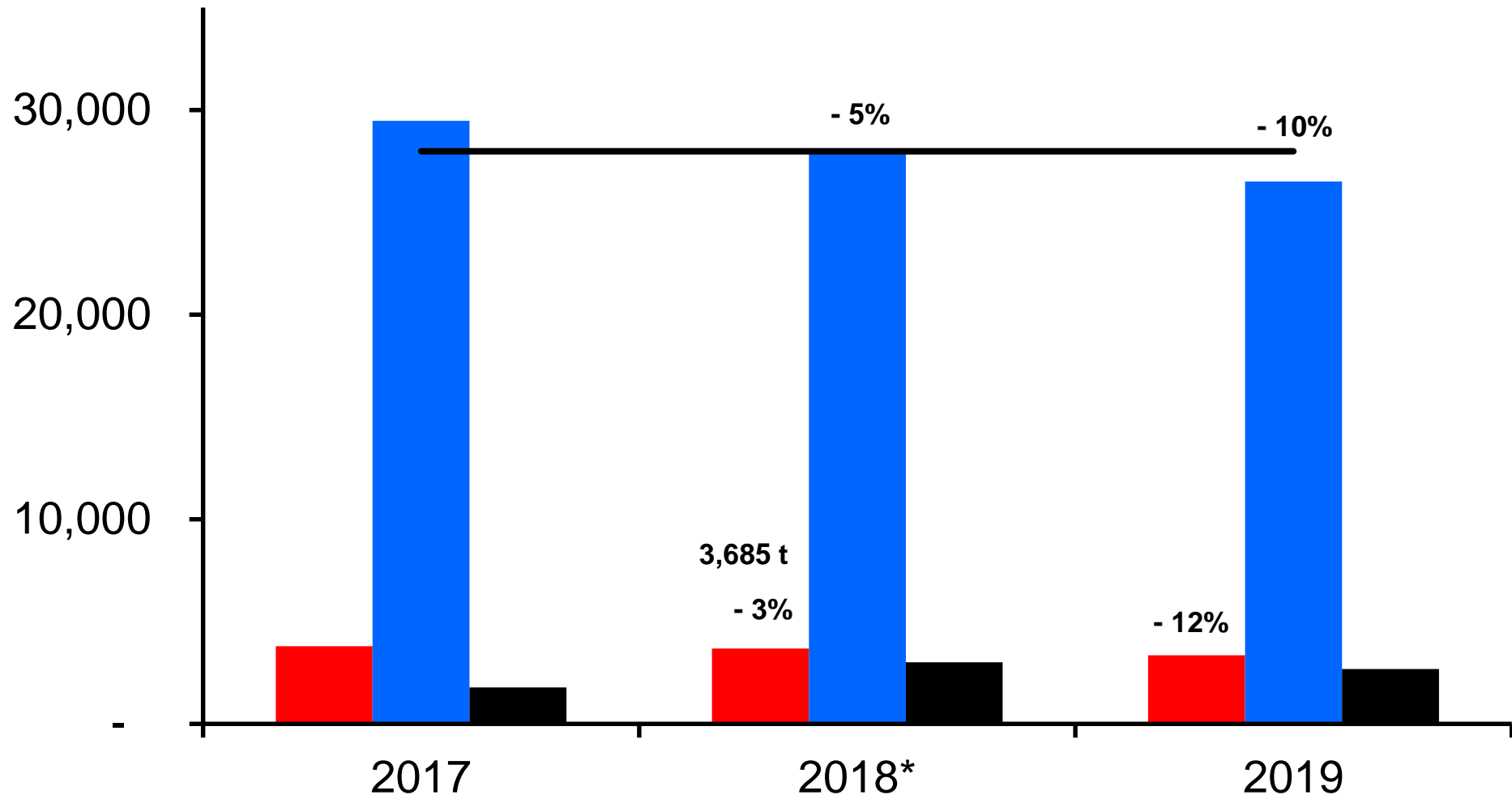
- Design-based GOA Bottom Trawl Survey Biomass Estimate



10. Northern rockfish

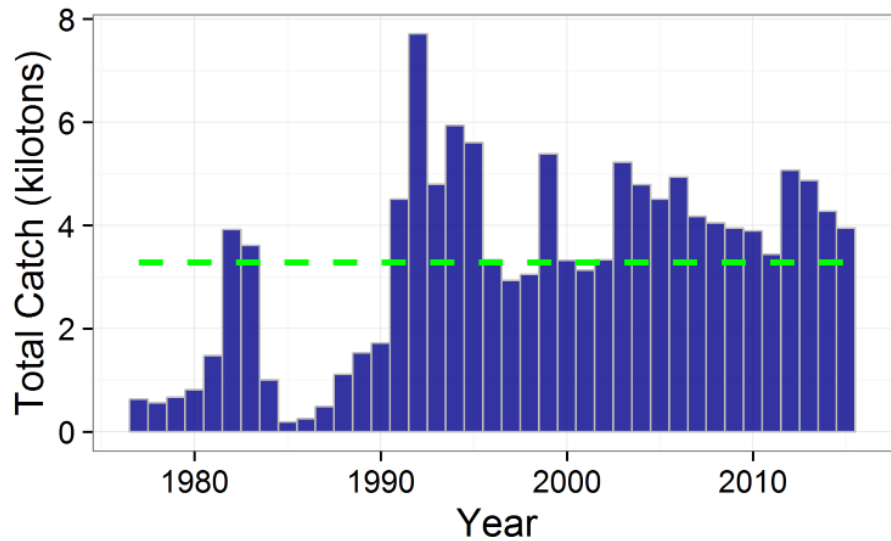
Partial assessment

■ ABC ■ SSB ■ Projected Catch — B_40%

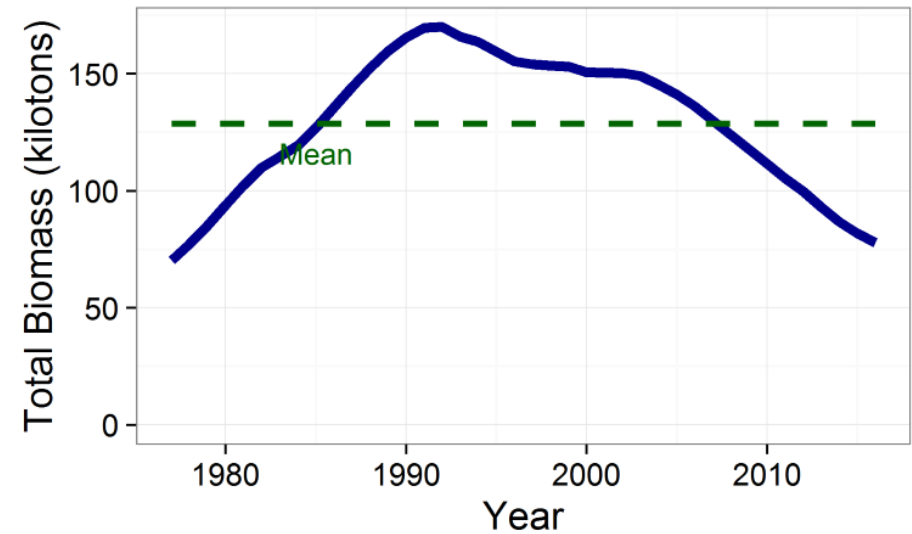


GOA Northern Rockfish

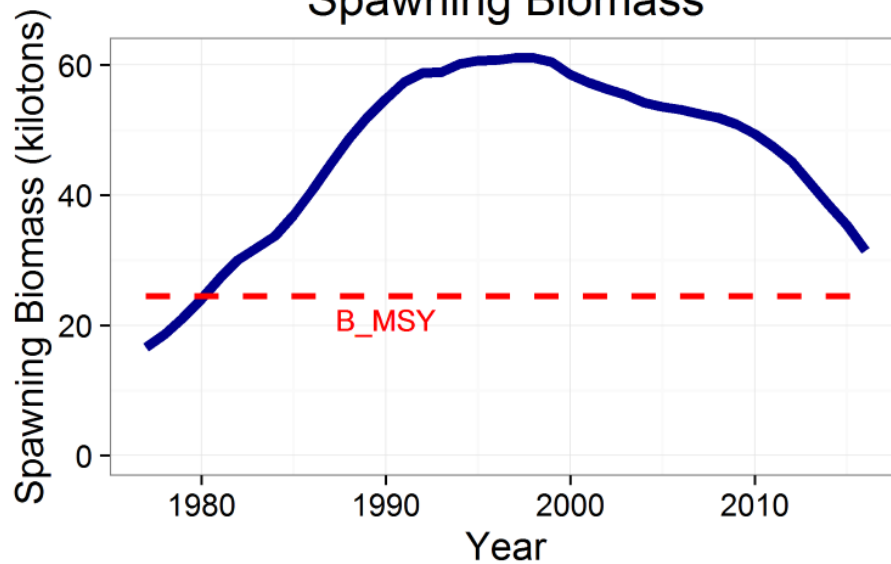
Total Catch



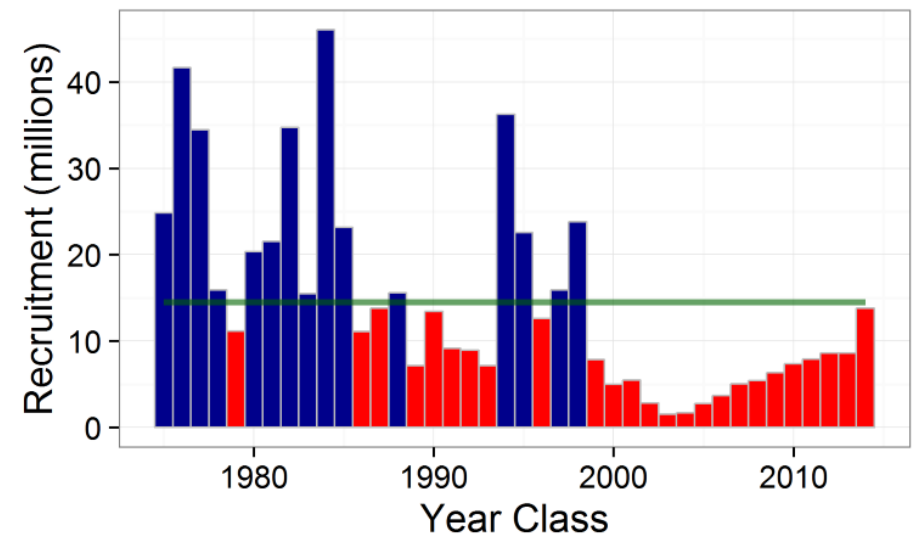
Total Biomass



Spawning Biomass



Age 2 Recruitment

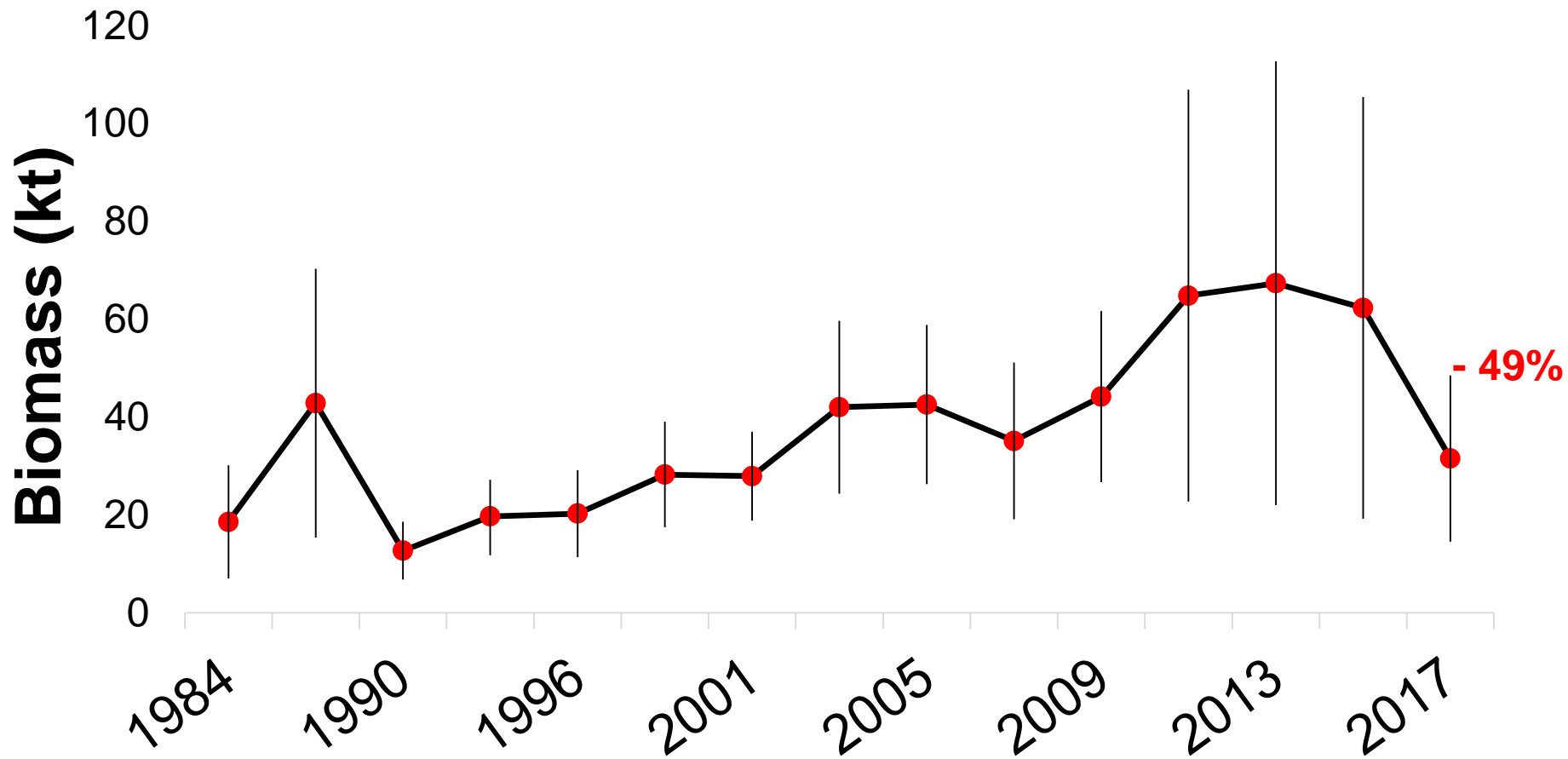


Rockfish ABC Summary

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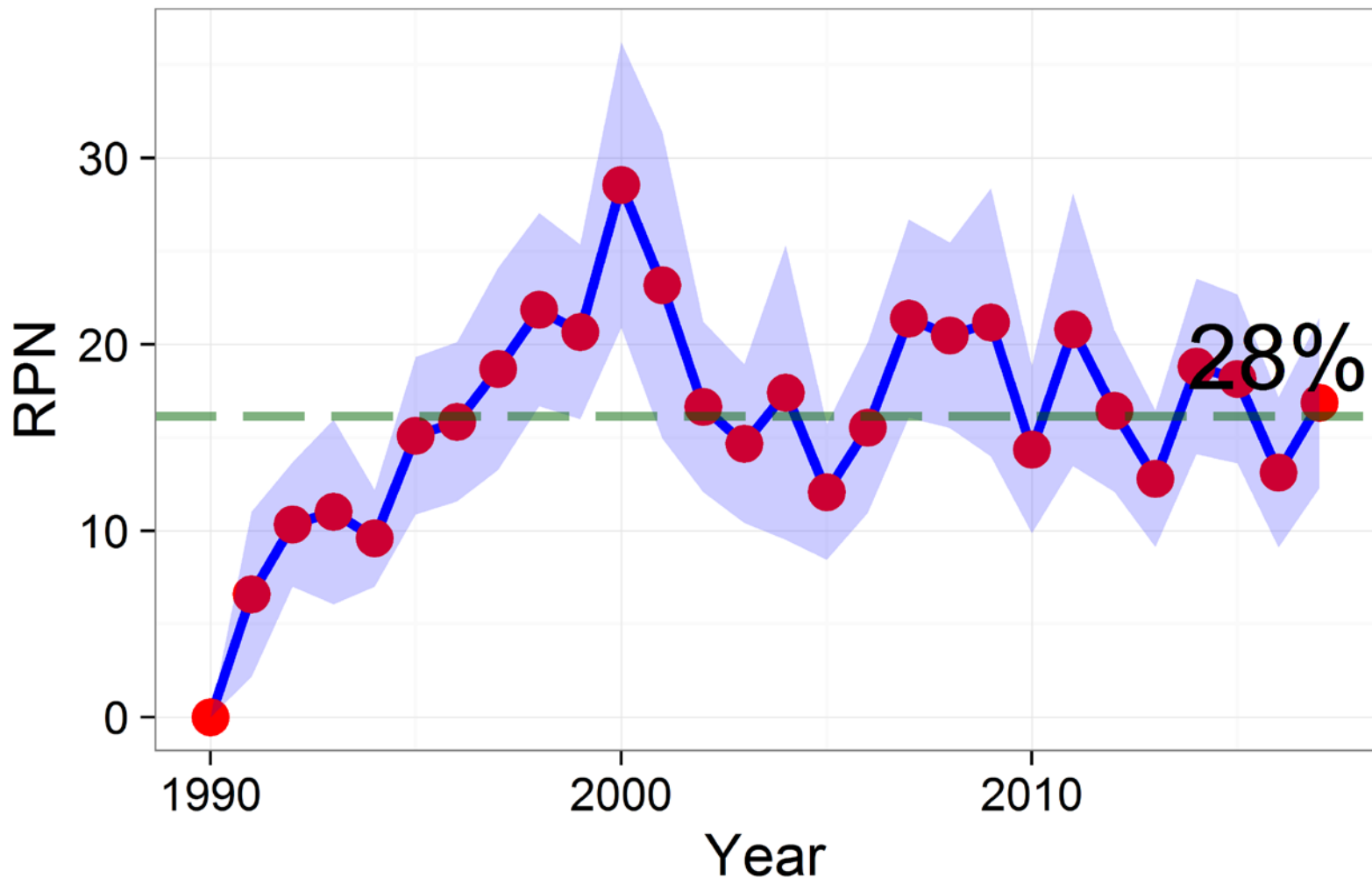
11. GOA Shortraker rockfish

Trawl Survey Biomass

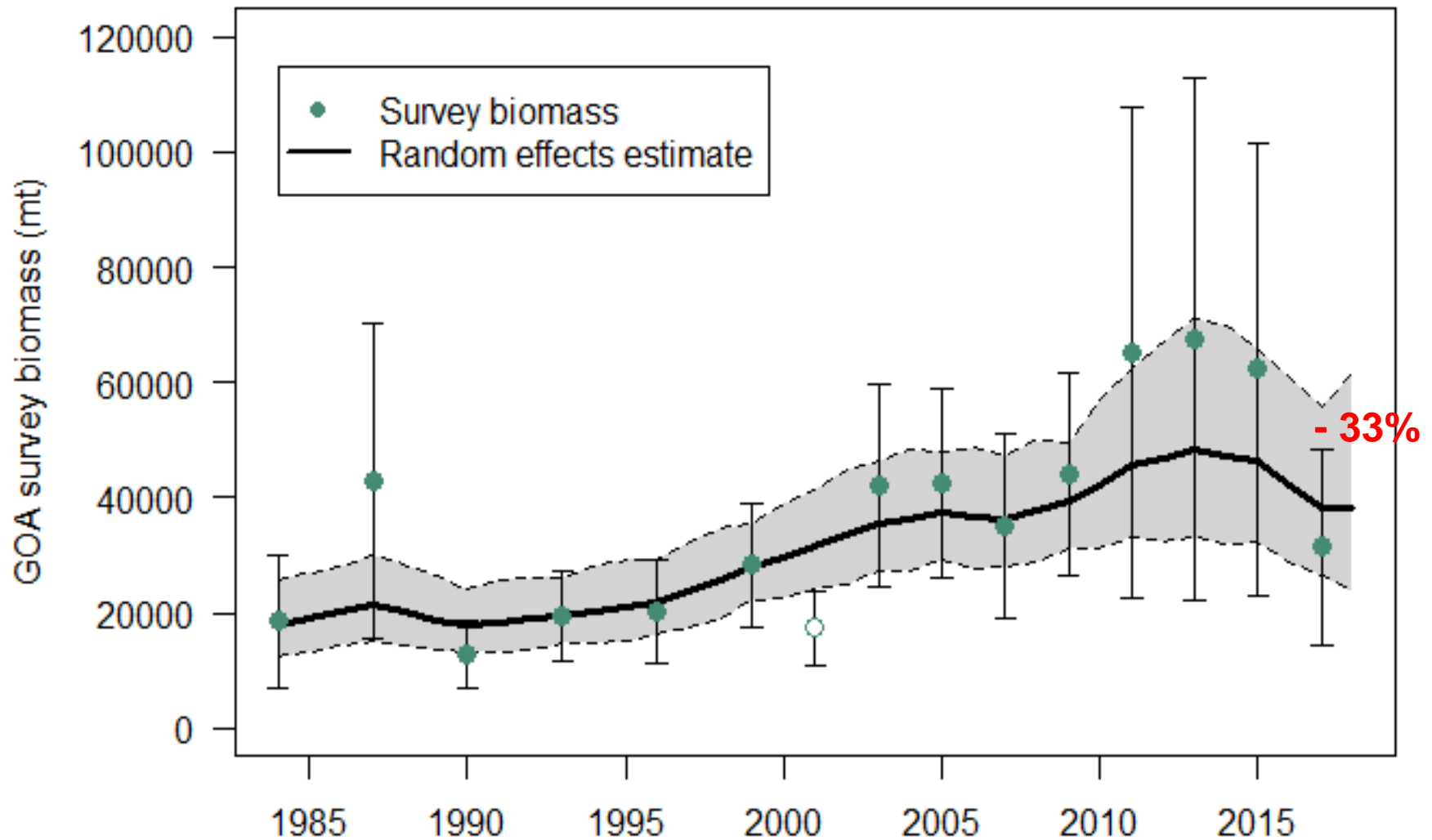


11. Shortraker: LL Survey RPNs

GOA Shortraker longline survey RPNs w/ 95%



Shortraker RE model

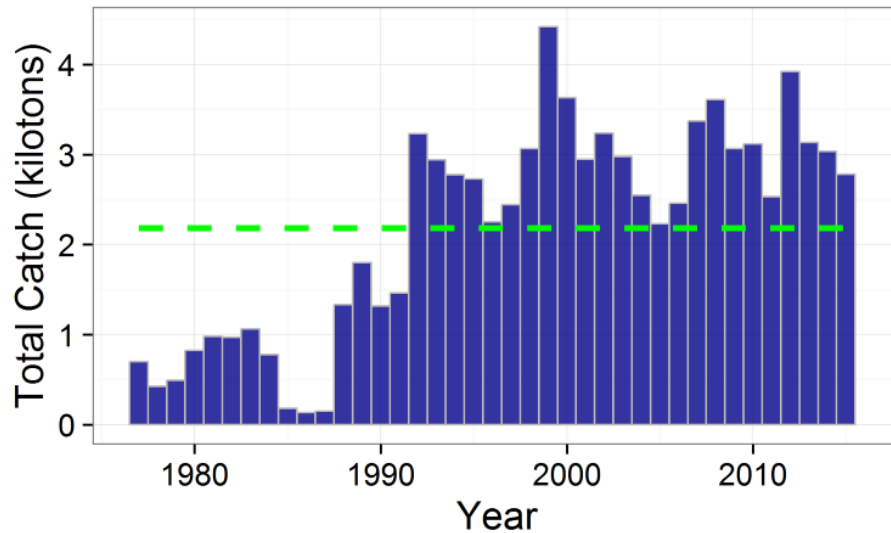


Rockfish ABC Summary

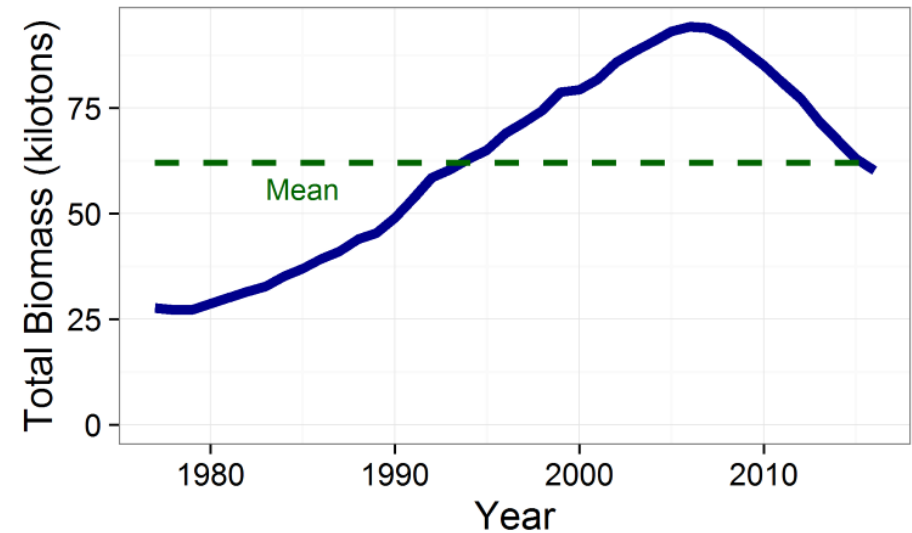
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Other rock	5,773	5,594	down 179(3%)
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12. Dusky Rockfish

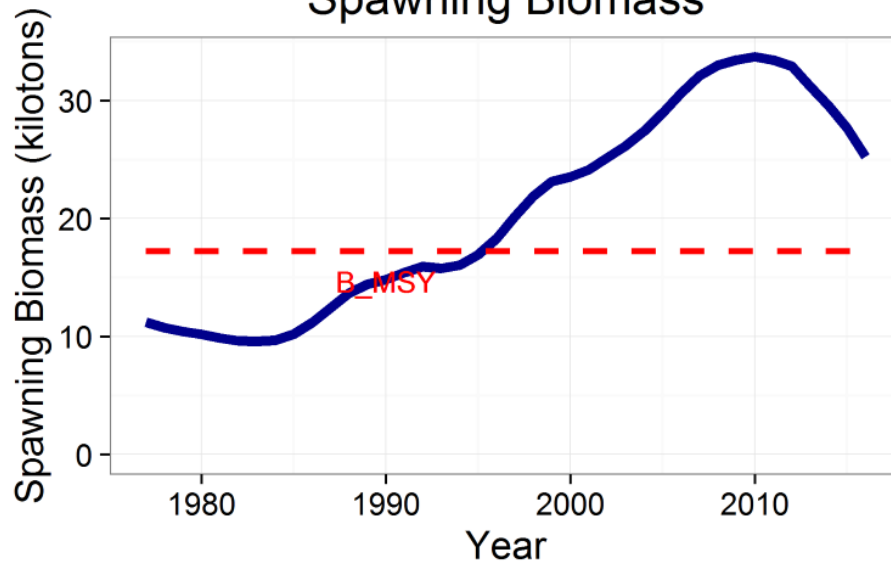
Total Catch



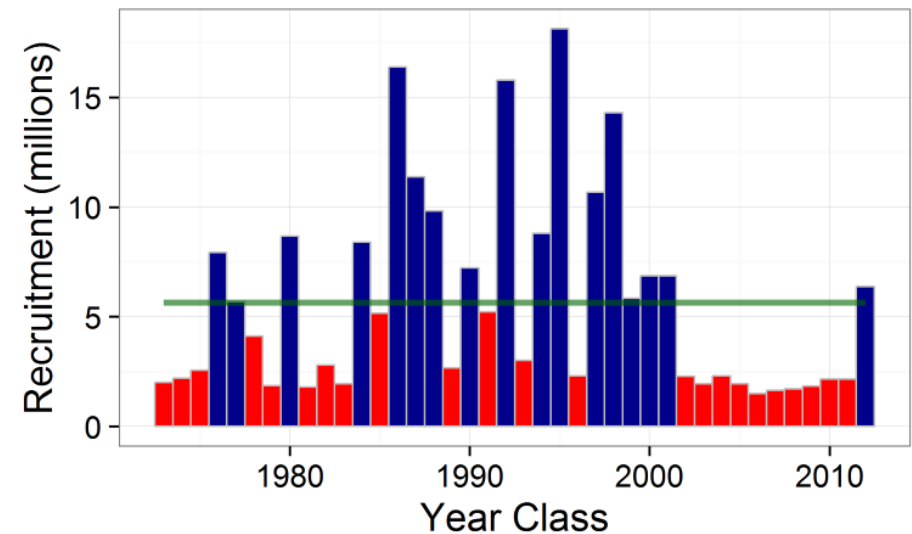
Total Biomass



Spawning Biomass



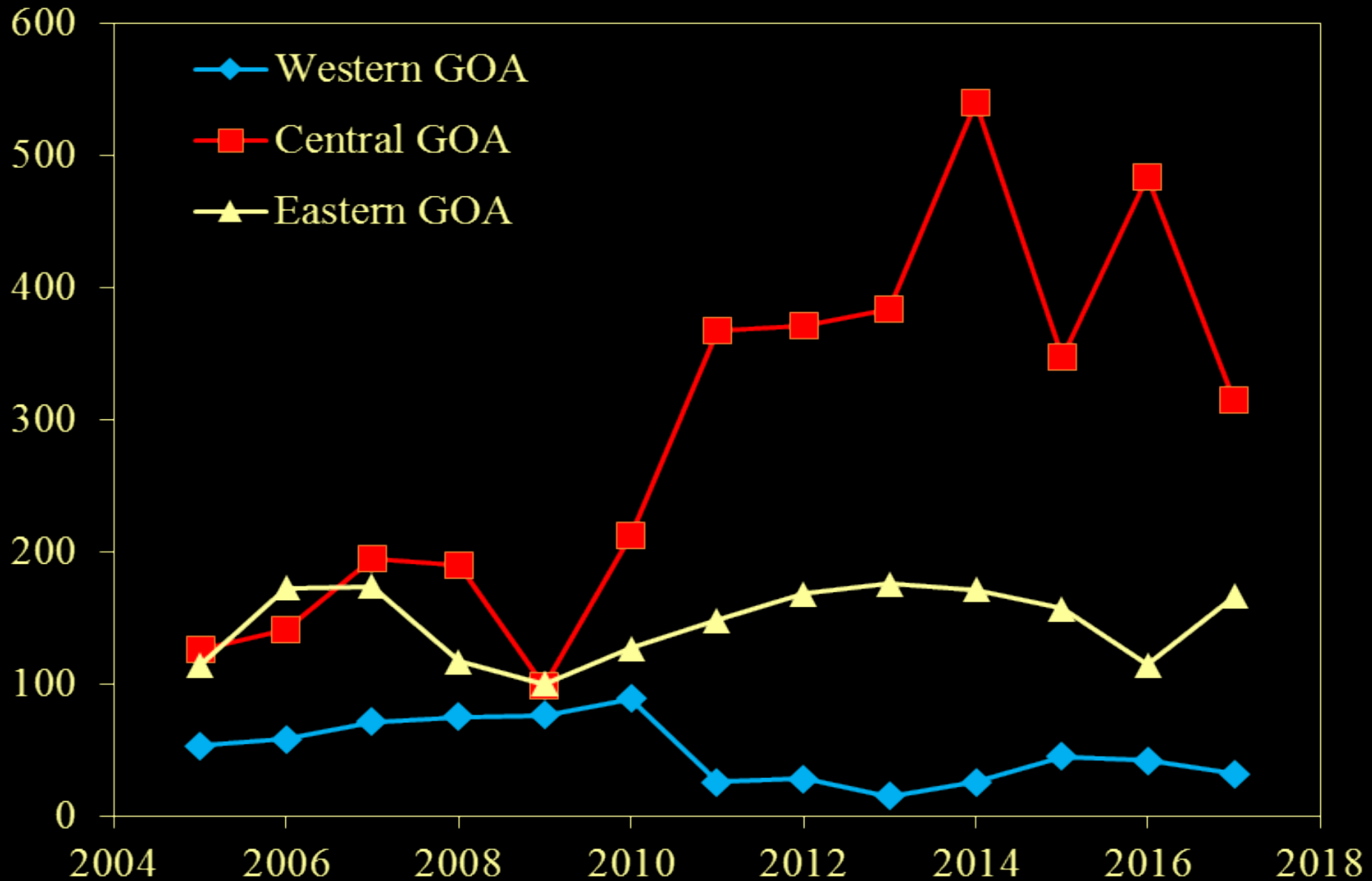
Age 4 Recruitment

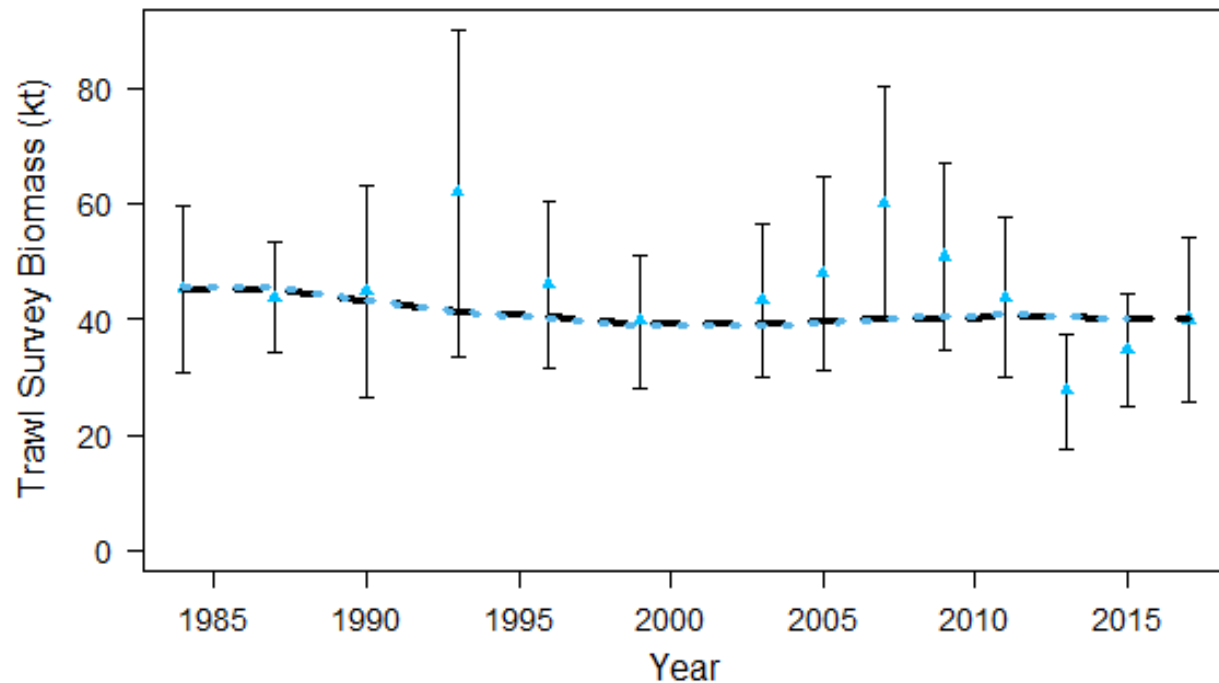


Rockfish ABC Summary

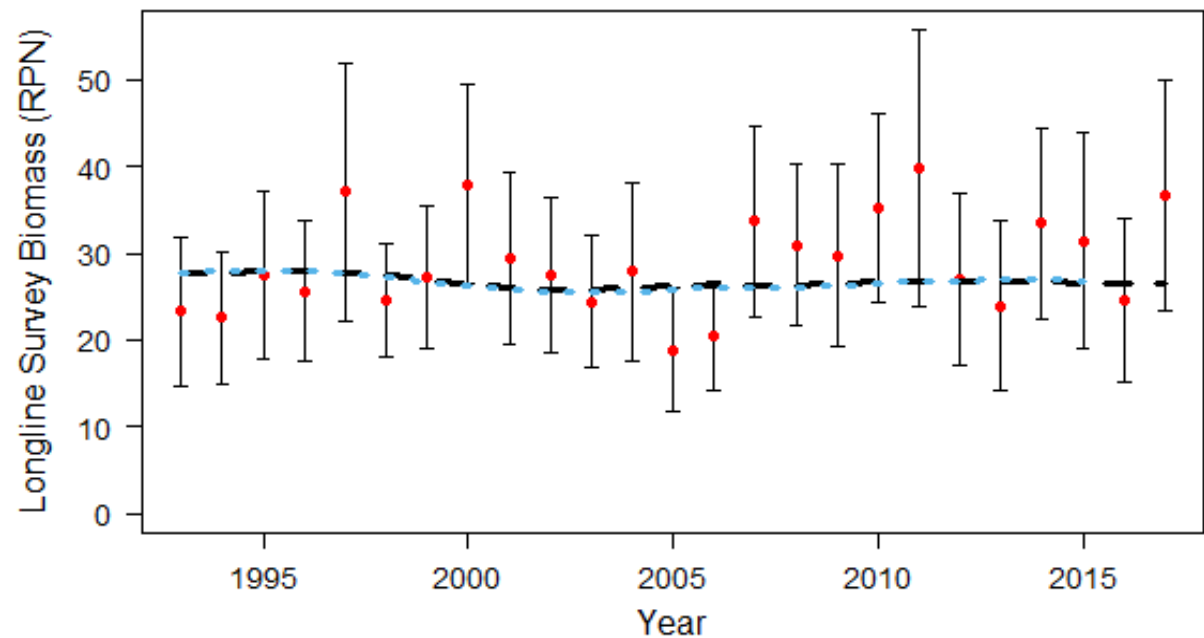
Species	2017	2018	Change
POP	23,918	29,236	up 5,318(22%)
northern rockfish	3,790	3,685	down 105(3%)
Shortraker Rockfish	1,286	863	down 423(33%)
Dusky	4,278	3,957	down 321(8%)
Rougheye and Blackspotted Rockfish	1,327	1,444	same(0%)
Demersal shelf rockfish	227	250	same(0%)
Thornyhead	1,961	2,038	up 77(4%)
Other rock	5,773	5,594	down 179(3%)
Sub Total	42,560	47,067	up 4,507(11%)

GOA Blackspotted/rougheye rockfish catch by area





AFSC
surveys
roughey/
blackspotted
rockfish



RE/BS – biological studies

- 2017 maturity study (Conrath)
 - ◆ 50% maturity similar between species (45 cm RE, 44 cm BS)
 - ◆ Age at 50% maturity younger for rougheye
 - 19.6 years vs 27.4 years
- Otolith morphology (preliminary) for species ID
 - ◆ Application of method to RE/BS 2009 fishery ages found 43% RE and 57% BS in catch

Weighted Average

WGOA 12.2%

CGOA 38.5%

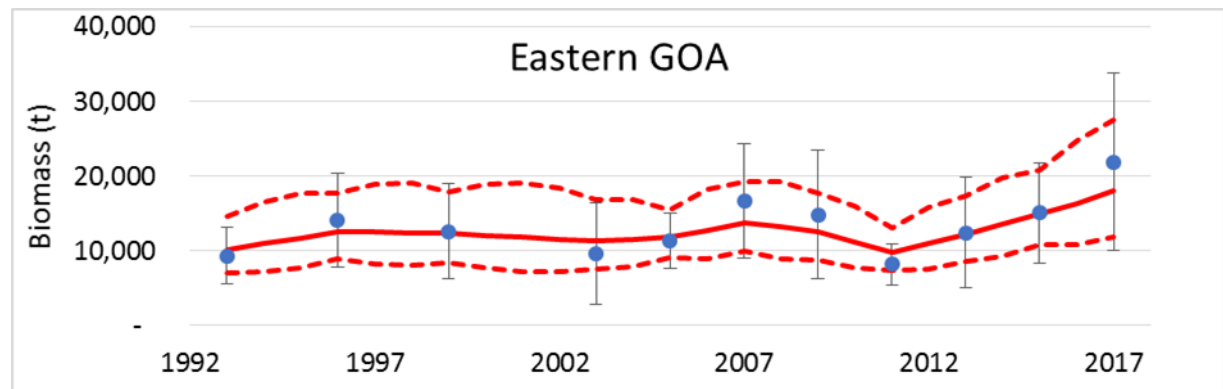
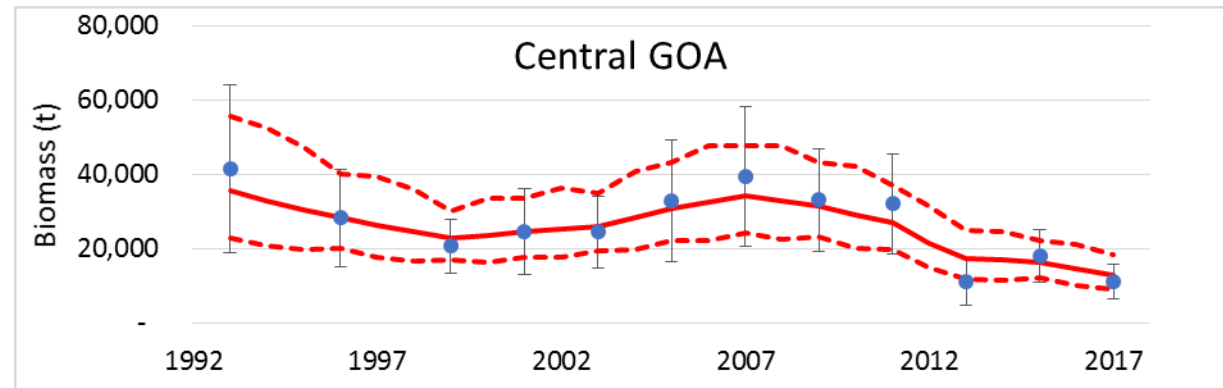
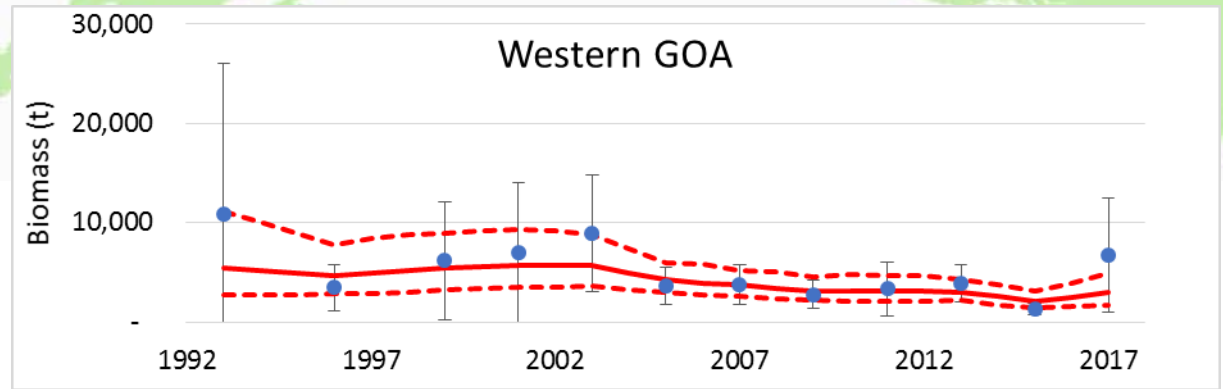
EGOA 49.3%

RE Model

WGOA 8.6%

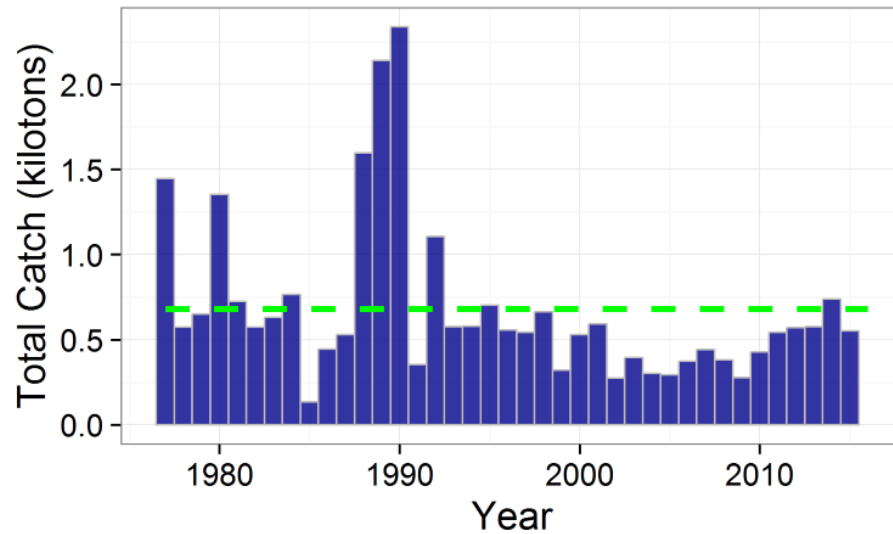
CGOA 38.4%

EGOA 53.0%

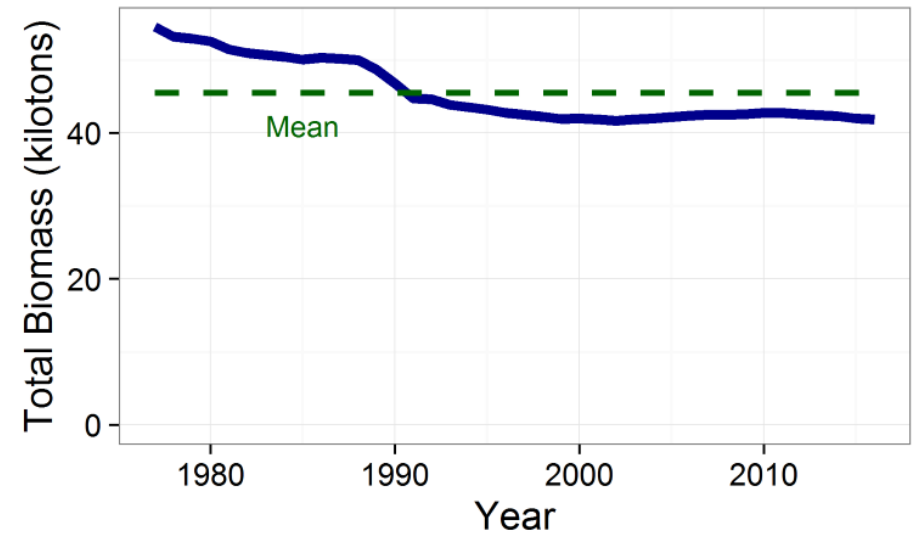


GOA Blackspotted Rockfish

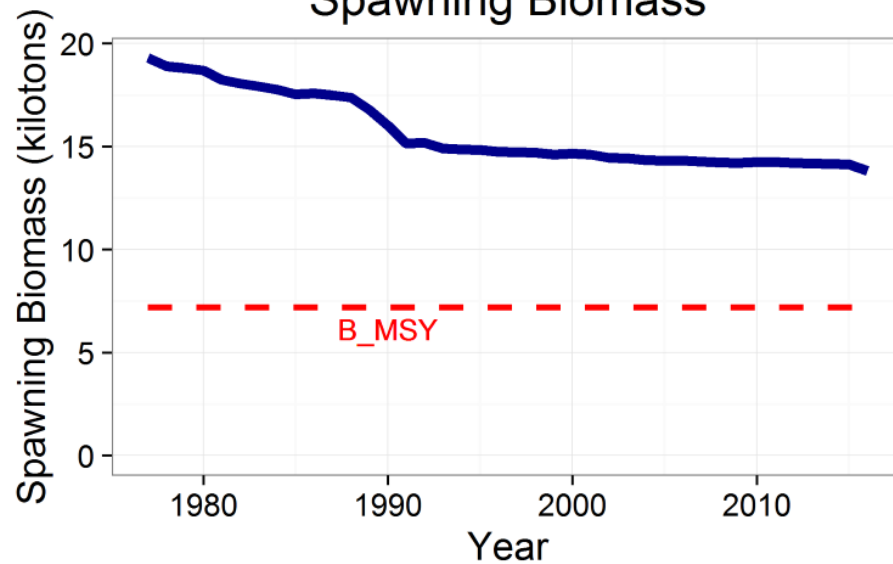
Total Catch



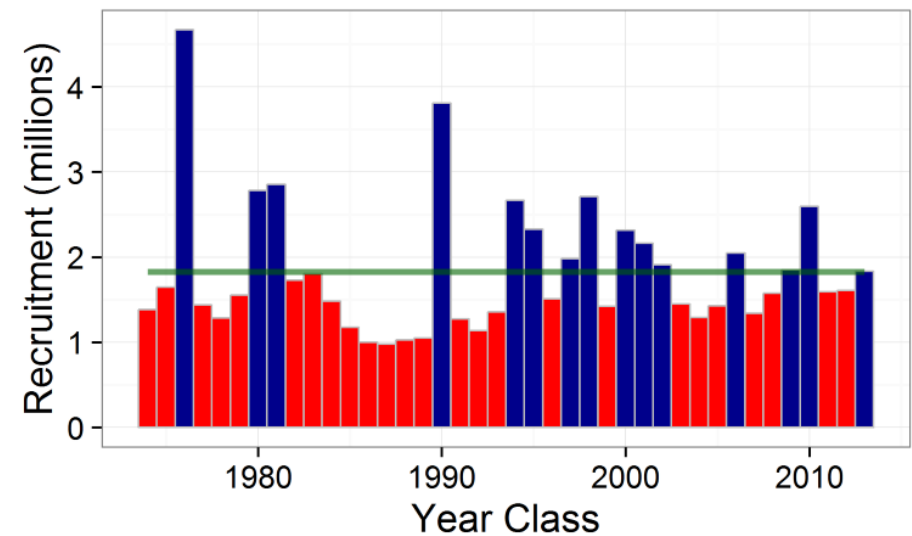
Total Biomass



Spawning Biomass



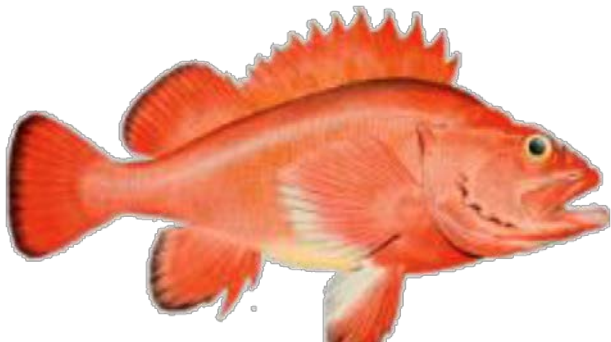
Age 3 Recruitment



14. Demersal shelf rockfish



Species	2017	2018	Change
POP	23,918	29,236	up 5,318 (22%)
northern rockfish	3,790	3,685	down 105 (3%)
Shortraker Rockfish	1,286	863	down 423 (33%)
Dusky	4,278	3,957	down 321 (8%)
Rougheyeye and Blackspotted Rockfish	1,327	1,444	same (0%)
Demersal shelf rockfish	227	250	same (0%)
Thornyhead	1,961	2,038	up 77 (4%)
Other rock	5,773	5,594	down 179 (3%)
Sub Total	42,560	47,067	up 4,507 (11%)



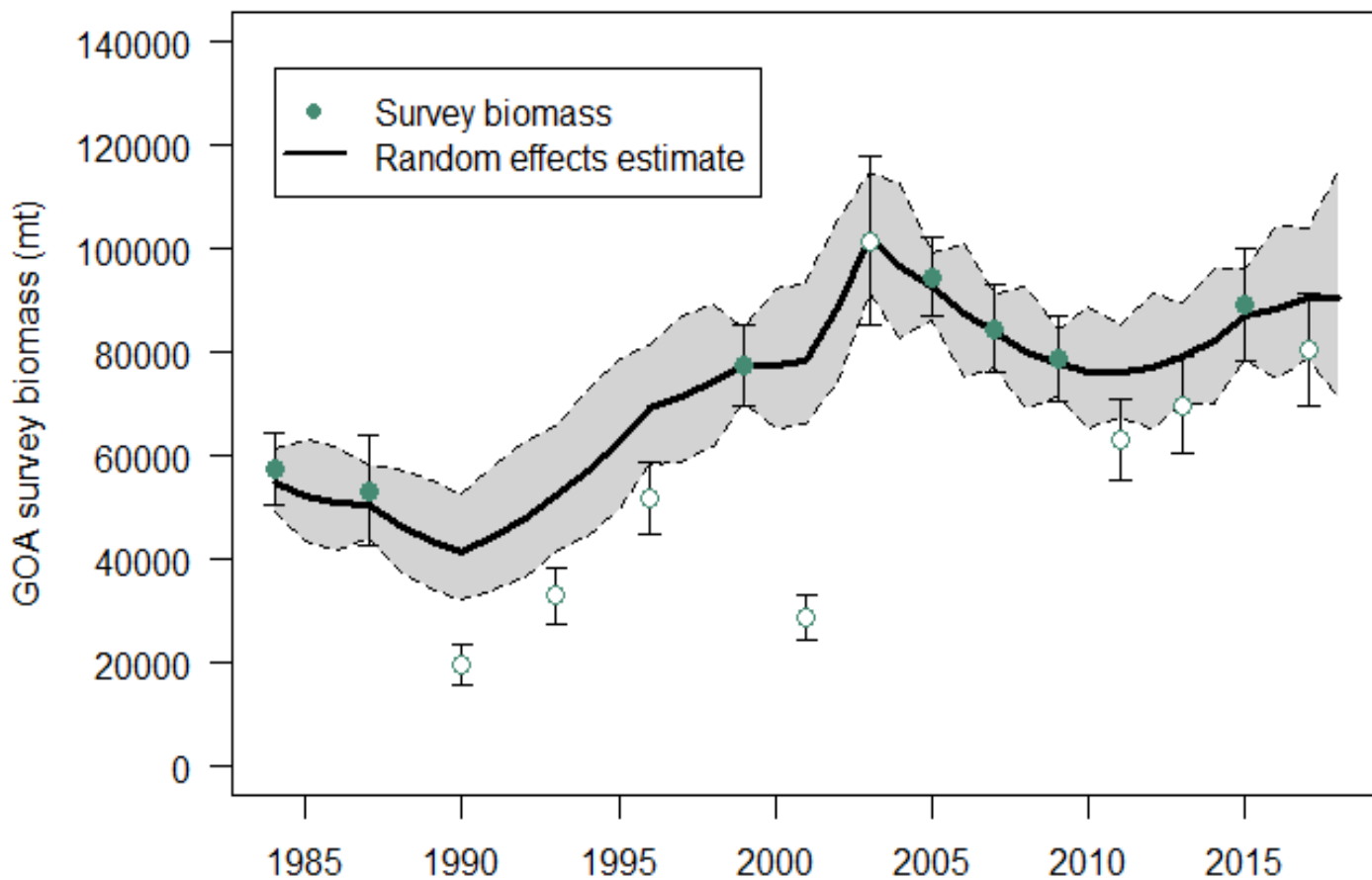
15. Shortspine thornyheads

Species	2017	2018	Change
POP	23,918	29,236	up 5,318(22%)
northern rockfish	3,790	3,685	down 105(3%)
Shortraker Rockfish	1,286	863	down 423(33%)
Dusky	4,278	3,957	down 321(8%)
Rougeye and Blackspotted Rockfish	1,327	1,444	same(0%)
Demersal shelf rockfish	227	250	same(0%)
Thornyhead	1,961	2,038	up 77(4%)
Other rock	5,773	5,594	down 179(3%)
Sub Total	42,560	47,067	up 4,507(11%)

15. Shortspine thornyheads

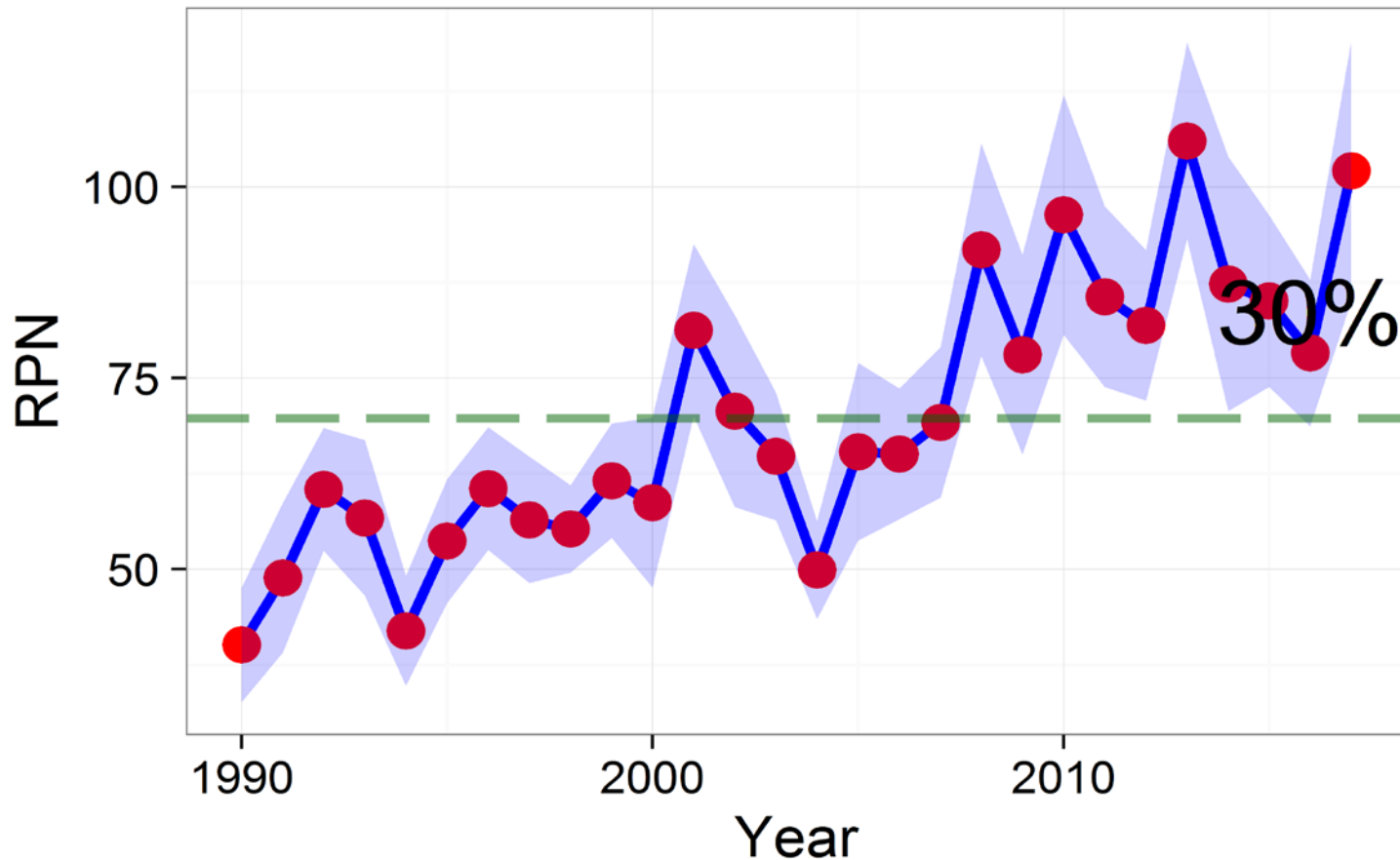
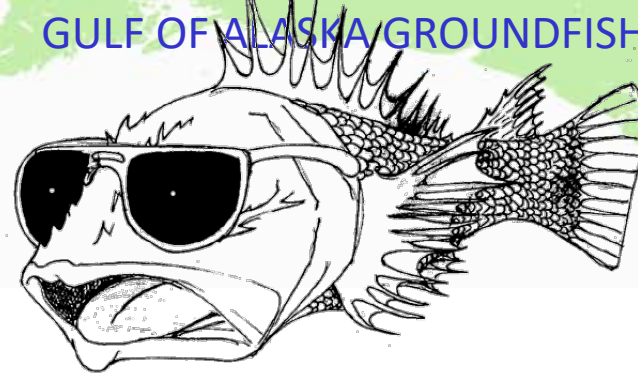


Tier 5



15. Shortspine thornyheads

- Longline survey RPN



16. Other rockfish

Species	2017	2018	Change
POP	23,918	29,236	up 5,318(22%)
northern rockfish	3,790	3,685	down 105(3%)
Shortraker Rockfish	1,286	863	down 423(33%)
Dusky	4,278	3,957	down 321(8%)
Rougeye and Blackspotted Rockfish	1,327	1,444	same(0%)
Demersal shelf rockfish	227	250	same(0%)
Thornyhead	1,961	2,038	up 77(4%)
Other rock	5,773	5,594	down 179(3%)
Sub Total	42,560	47,067	up 4,507(11%)

16. GOA Other rockfish

The Team again supported moving demersal sub-group into the DSR assessment

- ♦ GOA-wide pending Council evaluation of management and economic implications

Sub-group “moderate concern”

- ♦ In the Council’s Stock Structure and Spatial Management Policy scale of concern

The Team recommended a move to Step 2

- ♦ of the Council’s Stock Structure and Spatial Management Policy

ABCs for remaining GOA species

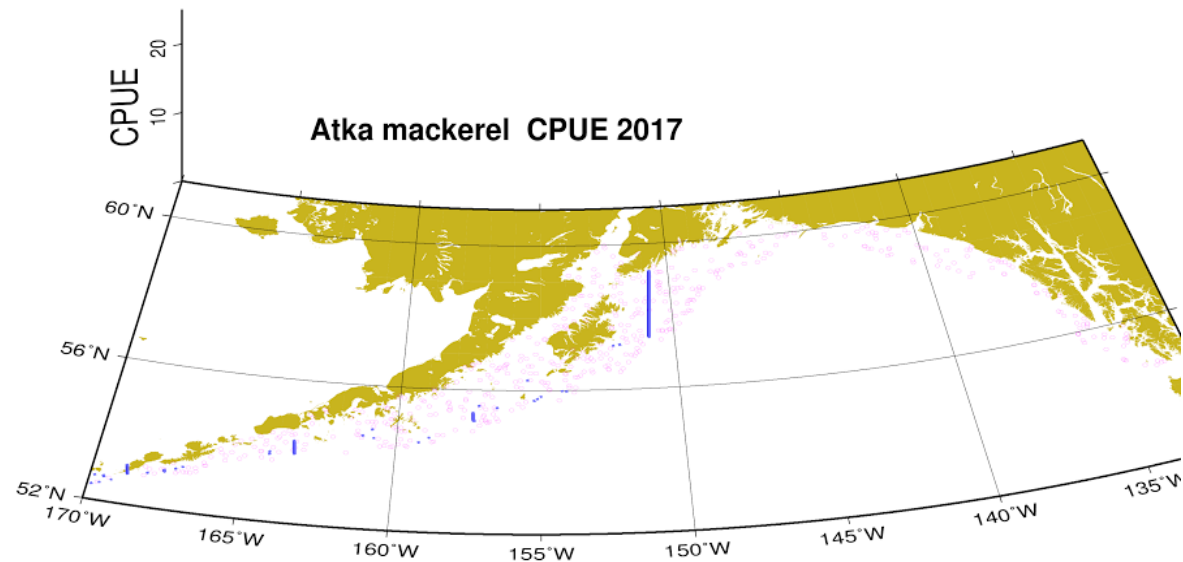
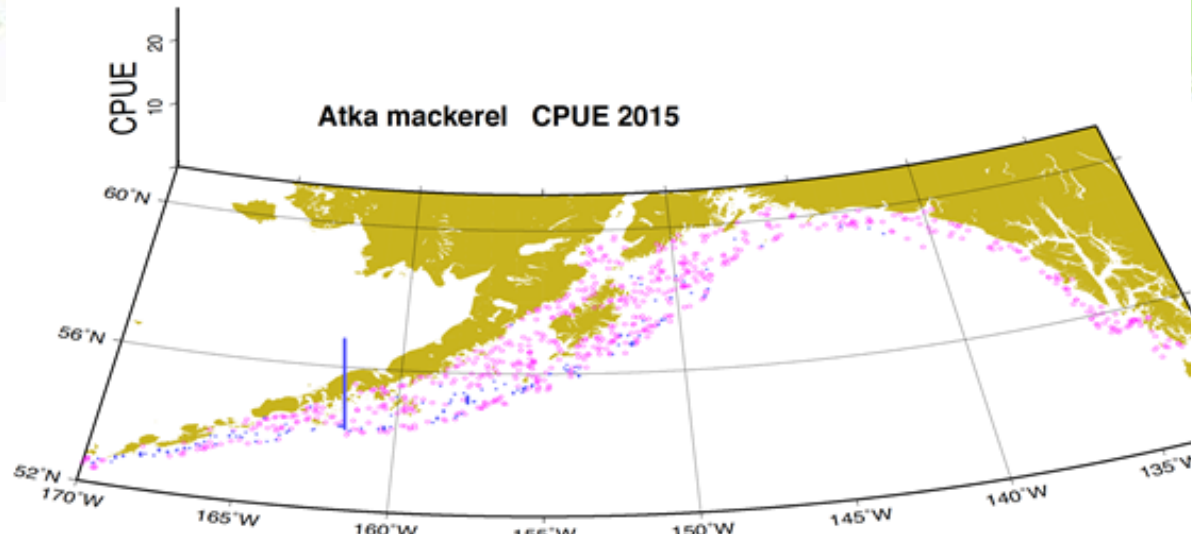


ABC

Species	2017 Catch	2017	2018	Change
Pollock	184,243	213,689	170,265	down 43,424 (20%)
Pacific Cod	33,115	88,342	18,000	down 70,342 (80%)
Sablefish	10,386	10,074	11,505	up 1,431 (14%)
Flatfish	30,139	97,360	114,712	up 17,352 (18%)
Arrowtooth flounder	1,875	186,093	150,945	down 35,148 (19%)
Rockfish	30,563	42,560	47,067	up 4,507 (11%)
Atka mackerel	1,048	4,700	4,700	same (0%)
Skates	4,156	8,939	7,804	down 1,135 (13%)
Other Species	3,013	16,120	11,927	down 4,193 (26%)
Total	298,538	667,877	536,925	down 130,952 (20%)

17. GOA Atka mackerel

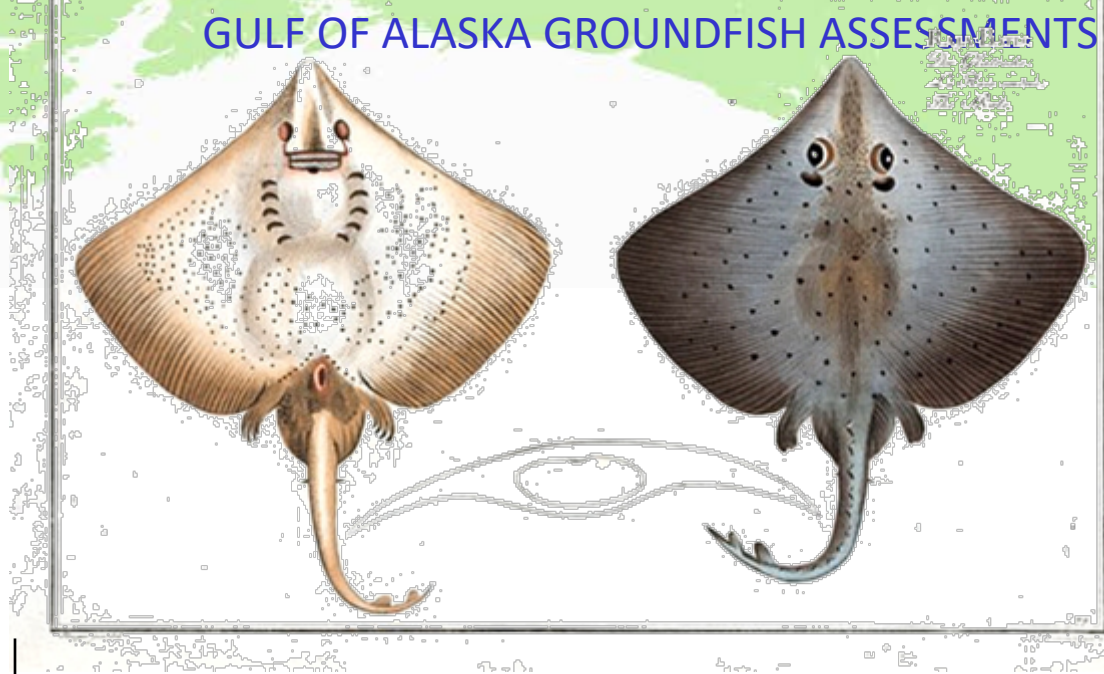
- Full assessment
- Tier 6
- No change in ABC/OFL



Other species...

Species	2017 Catch	2017	2018	Change
Atka mackerel	1,048	4,700	4,700	same(0%)
Big skate	1,565	3,814	2,848	down 966(25%)
Longnose skate	1,119	3,206	3,572	up 366(11%)
Other skates	1,472	1,919	1,384	down 535(28%)
Sculpins	1,284	5,591	5,301	down 290(5%)
Sharks	1,505	4,514	4,514	same(0%)
Squid	44	1,137	1,137	same(0%)
Octopus	180	4,878	975	down 3,903(80%)

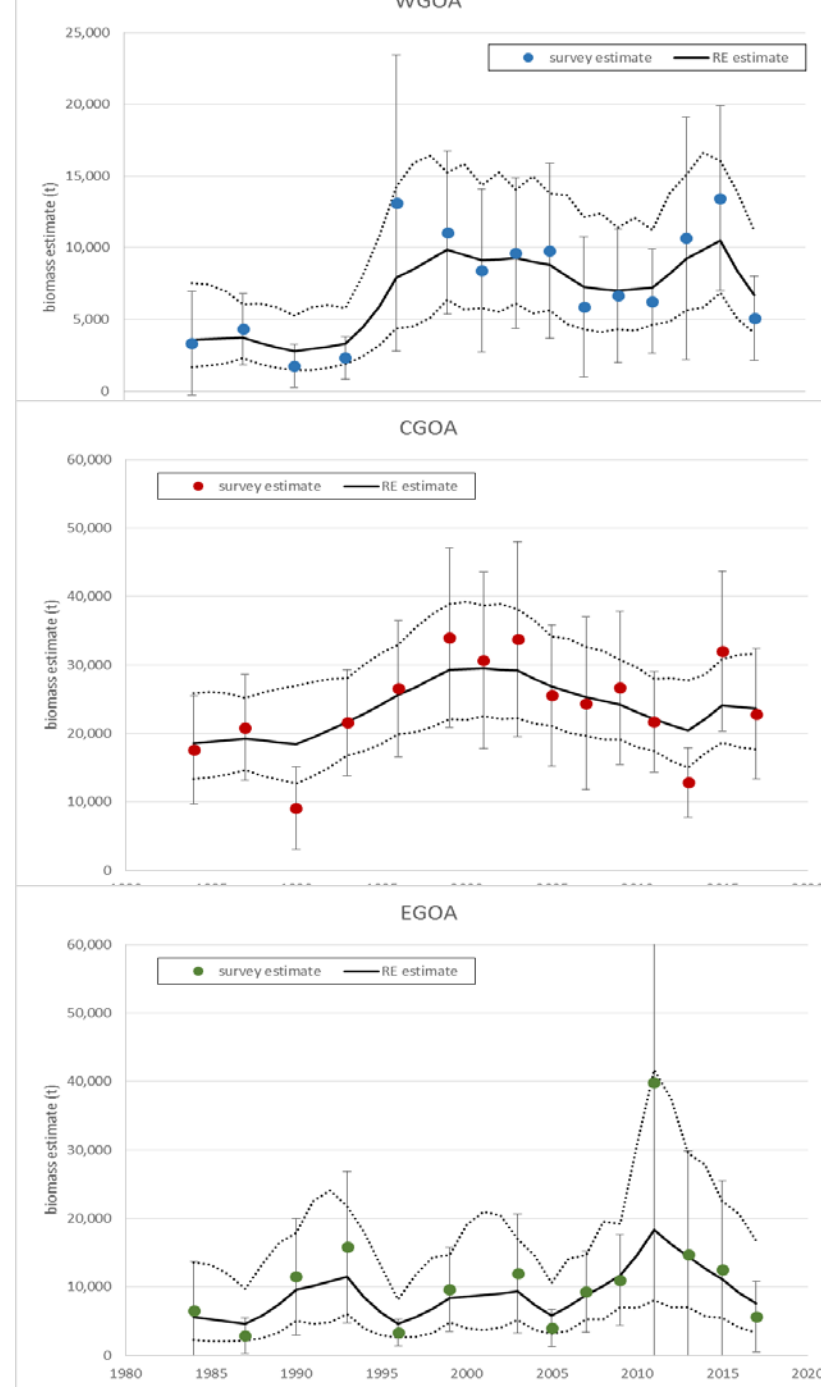
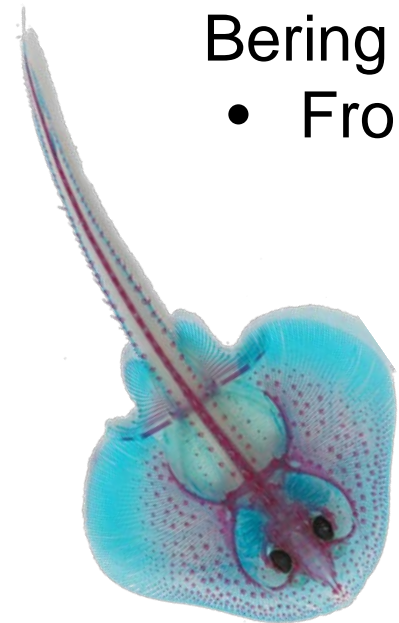
18. GOA skates



Species	2017 Catch	2017	2018	Change
Big skate	1,565	3,814	2,848	down 966 (25%)
Longnose skate	1,119	3,206	3,572	up 366 (11%)
Other skate	1,472	1,919	1,384	down 535 (28%)
All skates	4,156	8,939	7,804	down 1,135 (13%)

18. GOA skates

- 1) Big skate declined from 2015
- 2) Longnose skate increased
- 3) Other Skates declined
- 4) Fewer large-sized big skates encountered
- 6) Longnose depth shallower
- 7) Big skate biomass on eastern Bering Sea shelf up
 - From the GOA?



19. GOA sculpin

- Yellow Irish lord (YIL), plain, great, and bigmouth sculpin



Other species...

Species	2017 Catch	2017	2018	Change
Atka mackerel	1,048	4,700	4,700	same(0%)
Big skate	1,565	3,814	2,848	down 966(25%)
Longnose skate	1,119	3,206	3,572	up 366(11%)
Other skates	1,472	1,919	1,384	down 535(28%)
Sculpins	1,284	5,591	5,301	down 290(5%)
Sharks	1,505	4,514	4,514	same(0%)
Squid	44	1,137	1,137	same(0%)
Octopus	180	4,878	975	down 3,903(80%)

20. Sharks (PSS recommendations)

- Conduct Pacific sleeper shark (PSS) stock structure
 - ♦ For Joint Plan Team in September 2018
- Coordinating with AKRO catch accounting staff
- Continuing to work on PSS genetics
- Developing ageing methods for PSS
- Implementing observer project to quantify sizes of PSS caught in hook-and-line fisheries

21. Squid



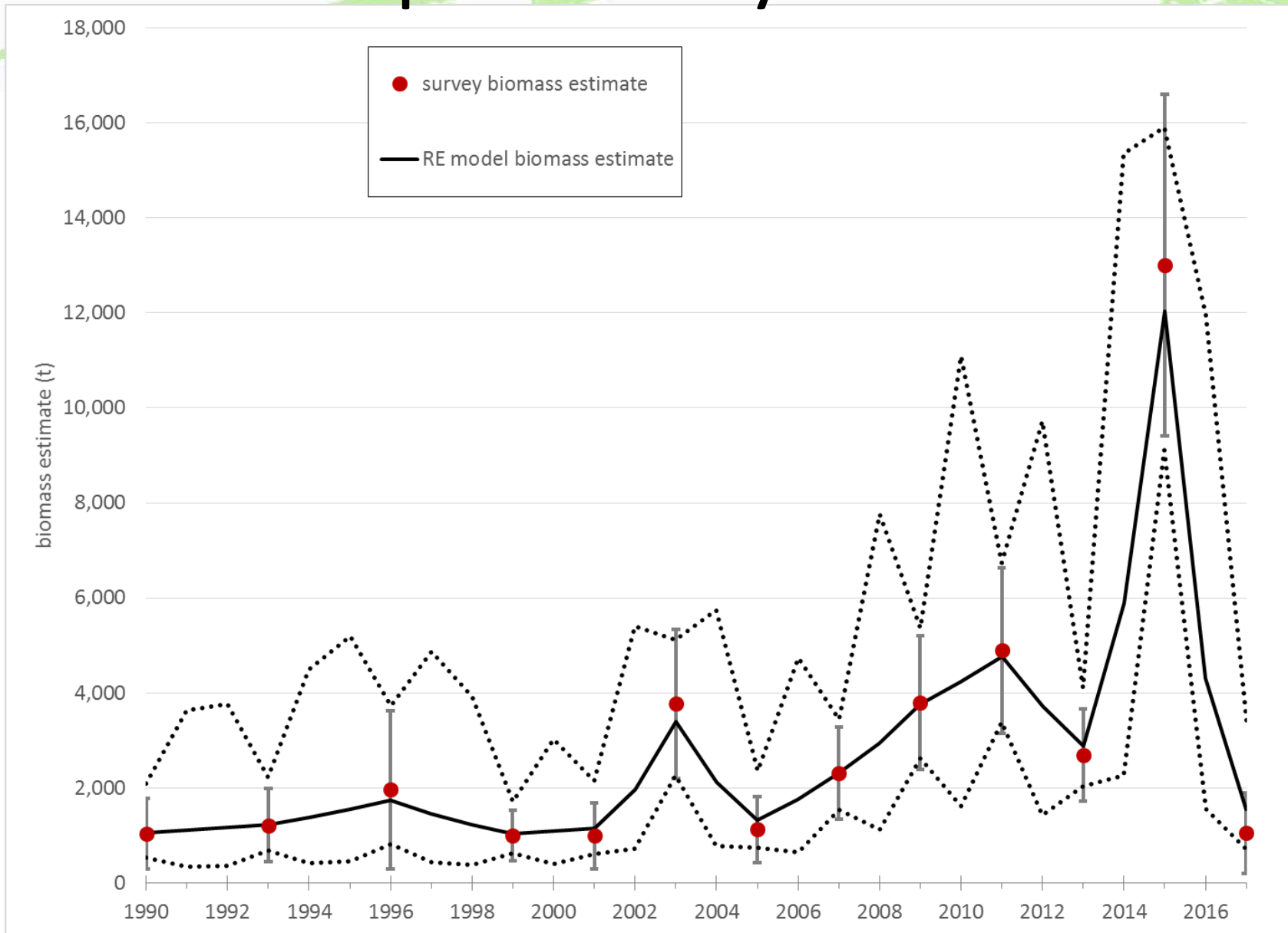
21. Squid

- Catch series changed slightly

Species	2017 Catch	2017	2018	Change
Atka mackerel	1,048	4,700	4,700	same(0%)
Big skate	1,565	3,814	2,848	down 966(25%)
Longnose skate	1,119	3,206	3,572	up 366(11%)
Other skates	1,472	1,919	1,384	down 535(28%)
Sculpins	1,284	5,591	5,301	down 290(5%)
Sharks	1,505	4,514	4,514	same(0%)
Squid	44	1,137	1,137	same(0%)
Octopus	180	4,878	975	down 3,903(80%)

22. Octopus

Octopus survey biomass

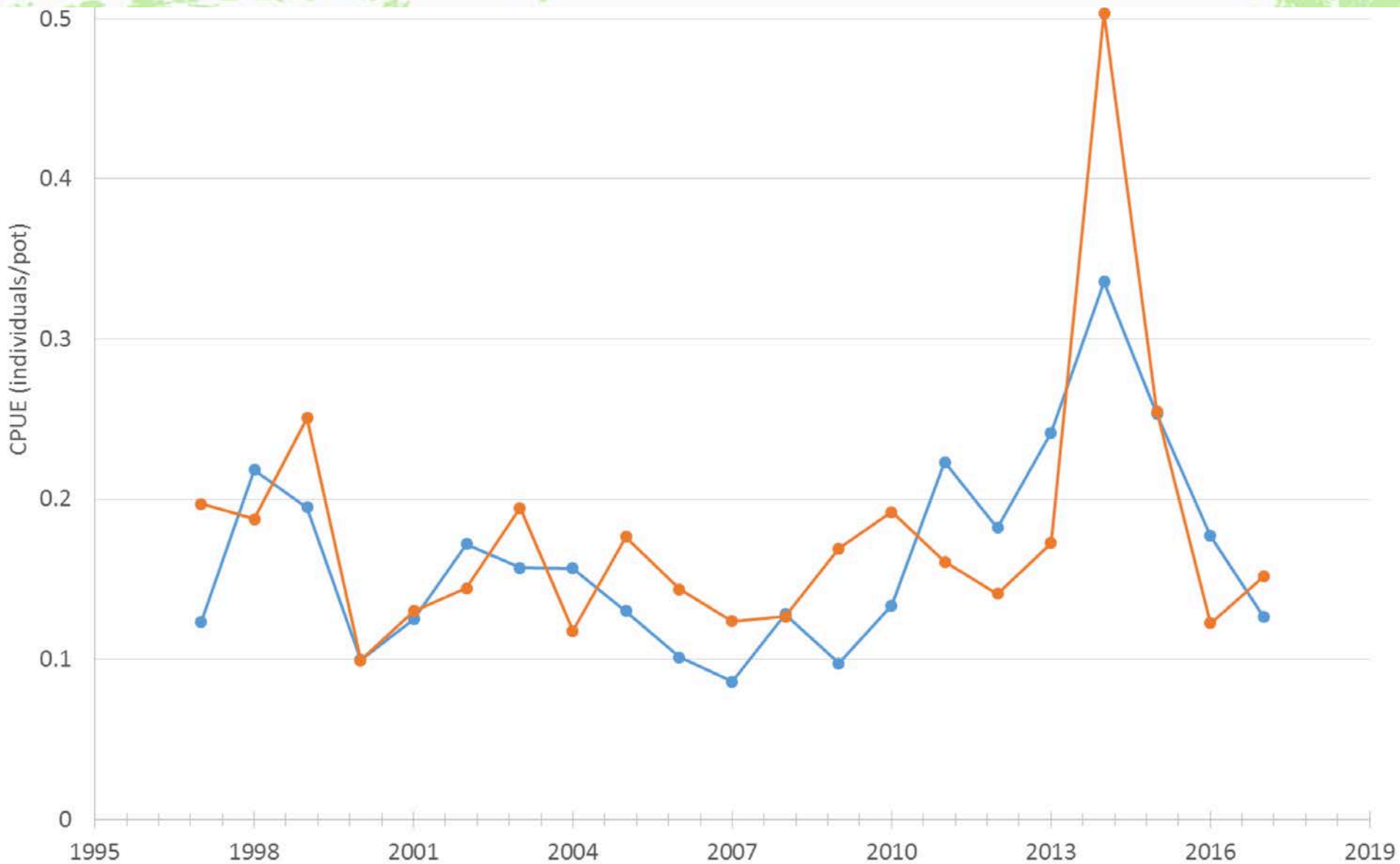


22. Octopus ABC change...

As from the assessment (based on survey)

Harvest Recommendations				
Quantity	As estimated or <i>specified last year for:</i>		As estimated or <i>recommended this year for:</i>	
	2017	2018	2018	2019
Tier 6 (RE model biomass * M)				
M	0.53	0.53	0.53	0.53
RE model biomass estimate	12,270	12,270	1,539	1,539
OFL (t)	6,504	6,504	816	816
maxABC (t)	4,878	4,878	612	612
ABC (t)	4,878	4,878	612	612
Status	As determined <i>last year for:</i>		As determined <i>this year for:</i>	
	2015	2016	2016	2017
Overfishing	no	n/a	no	n/a

Octopus pot-fishery CPUE



Octopus ABC options

- Author ABC (status quo) (612 t)
- Average catch from 2003-2017 (data extent) (444 t)
- Maximum catch (975 t)
- Stairstep from last year to author recommended (2,745 t)

GOA Team recommended:

Option 3, ABC equal 975 t (OFL=1,300)

Rationale

- ♦ No directed fisheries for octopus
- ♦ No evidence of conservation concern (highly fecund and robust)
- ♦ Natural variability very high—year-to-year changes unpredictable
 - Supported by incidental catch variability
- ♦ Such a Tier 6 option used for sharks and other species (precedence)
- ♦ Alternatives would ignore future abundance changes consistent with such short-lived animals