BSAI Plan Team report

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NOAA FISHERIES
Alaska Fisheries Science Center

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Team members

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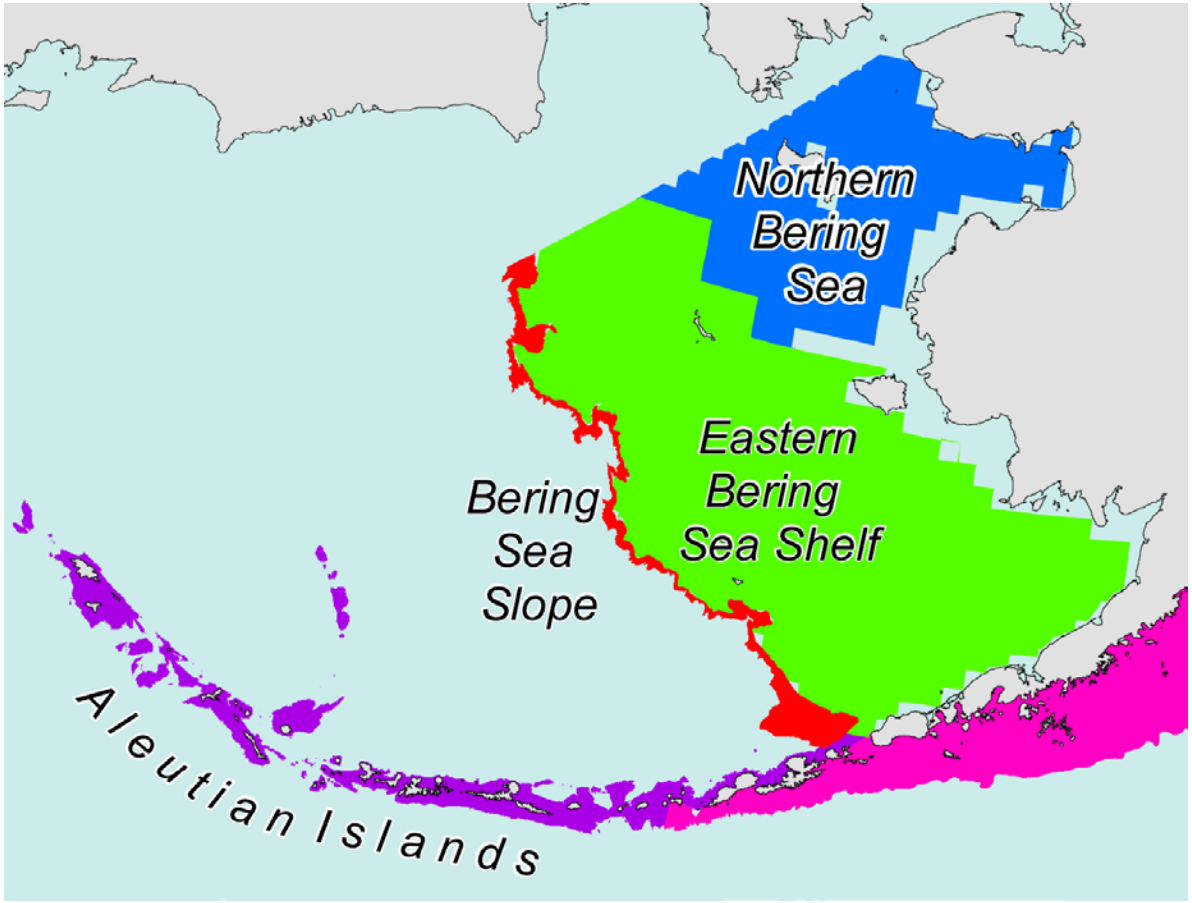
- Jennifer Cahalan (PSMFC)
- Mary Furuness (NMFS AKRO)
- Alan Haynie (AFSC REFM)
- Allan Hicks (IPHC)
- Kirstin Holsman (AFSC REFM)
- Brenda Norcross (UAF)
- Chris Siddon (ADF&G)
- Jane Sullivan (ADF&G)
- Cindy Tribuzio (AFSC ABL)

“Big picture” overview

BSAI bottom trawl survey areas



Changes in EBS shelf biomass, 1998-2017

- Not included: sablefish, rockfish, Atka mackerel, shark, squid, octopus
- Color gradients are row-specific

Stock/complex	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Alaska plaice	-0.28	0.05	-0.07	0.22	-0.22	0.09	0.04	0.06	0.26	-0.34	0.20	0.04	-0.06	0.04	0.12	-0.13	-0.11	-0.21	0.20	0.15
arrowtooth flounder	-0.25	-0.31	0.31	0.20	-0.17	0.59	0.04	0.28	-0.08	-0.21	0.10	-0.23	0.30	-0.01	-0.23	0.01	0.15	-0.12	0.16	-0.11
flathead sole	-0.13	-0.41	-0.04	0.32	0.07	-0.06	0.20	0.04	-0.03	-0.10	-0.04	-0.24	0.19	0.19	-0.34	0.28	0.07	-0.23	0.16	0.19
Greenland turbot	-0.01	-0.38	0.08	0.18	-0.12	0.29	-0.09	-0.25	-0.02	-0.20	-0.19	-0.19	1.14	0.12	-0.17	0.14	0.13	-0.10	-0.11	-0.04
Kamchatka flounder	0.22	-0.20	0.12	0.45	-0.24	0.17	0.09	0.54	0.33	0.06	-0.11	-0.15	0.18	-0.21	-0.07	0.08	0.25	0.04	-0.08	-0.13
other flatfish	0.04	-0.06	0.00	0.12	0.24	-0.09	0.44	-0.16	0.39	-0.11	-0.22	-0.01	0.10	-0.18	-0.09	-0.11	0.70	-0.46	0.40	1.17
Pacific cod	-0.12	0.12	-0.13	0.54	-0.28	0.05	-0.08	0.11	-0.15	-0.17	-0.05	0.01	1.02	0.05	-0.02	-0.09	0.35	0.01	-0.11	-0.35
pollock	-0.25	0.41	0.34	-0.18	0.18	0.69	-0.54	0.26	-0.37	0.42	-0.30	-0.25	0.64	-0.17	0.12	0.31	0.62	-0.14	-0.23	-0.02
rock soles	-0.16	-0.25	0.26	0.13	-0.20	0.12	0.04	-0.03	0.05	-0.08	0.00	-0.24	0.34	-0.04	-0.03	-0.09	0.06	-0.24	0.03	-0.08
sculpin	-0.15	-0.19	0.09	-0.12	0.22	0.10	0.09	0.08	-0.07	0.02	-0.04	-0.28	0.16	0.03	-0.13	-0.22	0.29	0.08	0.14	-0.12
skate	-0.11	-0.06	-0.01	0.28	-0.11	0.06	0.09	0.16	-0.10	0.09	-0.23	-0.03	0.04	0.11	-0.10	0.07	0.04	0.14	0.21	0.04
yellowfin sole	0.02	-0.43	0.26	0.06	0.14	0.13	0.18	0.11	-0.24	0.01	-0.02	-0.17	0.36	0.01	-0.19	0.17	0.10	-0.23	0.48	-0.03

Fun facts (1 of 3)

- Full assessments (7)

Ch.	Assessment	Pages		Comments	
		Number	Proportion	Number	Proportion
1	EBS pollock	130	0.130	2	0.028
2	EBS Pacific cod	288	0.288	47	0.653
2.1	AI Pacific cod	46	0.046	3	0.042
3	Sablefish	176	0.176	6	0.083
4	Yellowfin sole	106	0.106	3	0.042
10	Alaska plaice	50	0.050	1	0.014
17	Atka mackerel	114	0.114	7	0.097

Fun facts (2 of 3)

- Partial assessments (11)

Ch.	Assessment	Pages		Comments	
		Number	Proportion	Number	Proportion
1.1	AI pollock	4	0.004	0	0.000
5	Greenland turbot	8	0.008	0	0.000
6	Arrowtooth flounder	8	0.008	0	0.000
7	Kamchatka flounder	8	0.008	0	0.000
8	Northern rock sole	10	0.010	0	0.000
9	Flathead sole	6	0.006	0	0.000
12	Pacific ocean perch	6	0.006	1	0.014
13	Northern rockfish	4	0.004	1	0.014
14	Blackspotted/rougheye	4	0.004	1	0.014
18	Skate	10	0.010	0	0.000
19	Sculpin	8	0.008	0	0.000

Fun facts (3 of 3)

- No assessment (7)

Ch.	Assessment	Pages		Comments	
		Number	Proportion	Number	Proportion
1.2	Bogoslof pollock	2	0.002	0	0.000
11	Other flatfish	2	0.002	0	0.000
15	Shortraker rockfish	2	0.002	0	0.000
16	Other rockfish	2	0.002	0	0.000
20	Shark	2	0.002	0	0.000
21	Squid	2	0.002	0	0.000
22	Ocotpus	2	0.002	0	0.000

Review of model numbering system

- SSC requested that model numbers "*ensure that the origin of the model can be traced back to the original derivation*"
- Changes are defined with respect to original version of the base model
- Original version of base model has a number of the form "$xx.i$," where xx is the year in which the model was introduced, and i is an integer
- Models constituting *major* changes have numbers of the form "$yy.j$," where yy is the year in which the model is introduced and j is an integer
- Models constituting *minor* changes have numbers of the form "$xx.ia$," where a is a letter

Changes in models

- Only two assessments contained multiple models this year

Ch.	Assessment	Models	Comments
1	EBS pollock	16.1	
2	EBS Pacific cod	16.6, 17.1, 17.2, 17.3, 17.6, 17.7	Author chose 17.2, Team 16.6
2.1	AI Pacific cod	13.4	
3	Sablefish	16.5	
4	Yellowfin sole	14.1	
10	Alaska plaice	11.1	
17	Atka mackerel	16.0, 16.0a, 16.0b, 16.0c	Authors and Team chose 16.0b

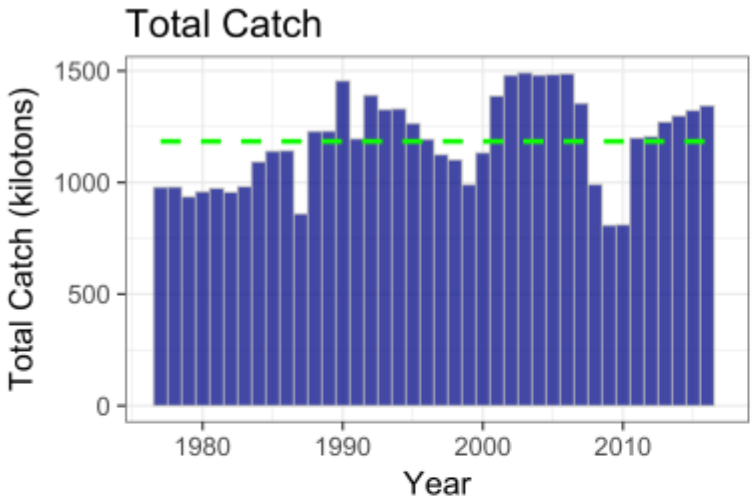
Reference point comparisons (all chapters)

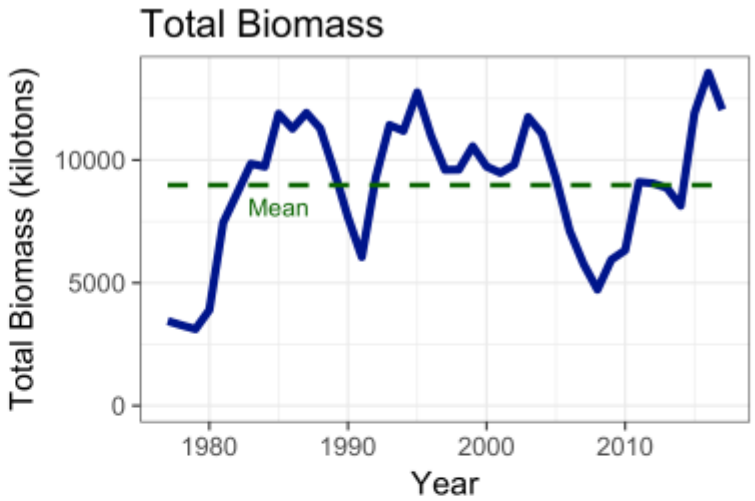
Quantity	Last year	This year	Change
M	0.097	0.097	0.00
2017 tier	3b	n/a	none
2018 tier	3b	3b	none
2017 age+ biomass	239,244	n/a	0.38
2018 age+ biomass	249,252	330,655	0.33
2017 spawning biomass	91,553	n/a	-0.03
2018 spawning biomass	89,601	88,928	-0.01
B100%	264,590	245,829	-0.07
B40%	105,836	98,332	-0.07
B35%	92,606	86,040	-0.07
2018 FOFL	0.097	0.102	0.05
2018 FABC	0.078	0.077	-0.01
2017 OFL	15,428	n/a	0.91
2018 OFL	15,996	29,507	0.84
2017 ABC	13,083	n/a	0.14
2018 ABC	13,256	14,957	0.13

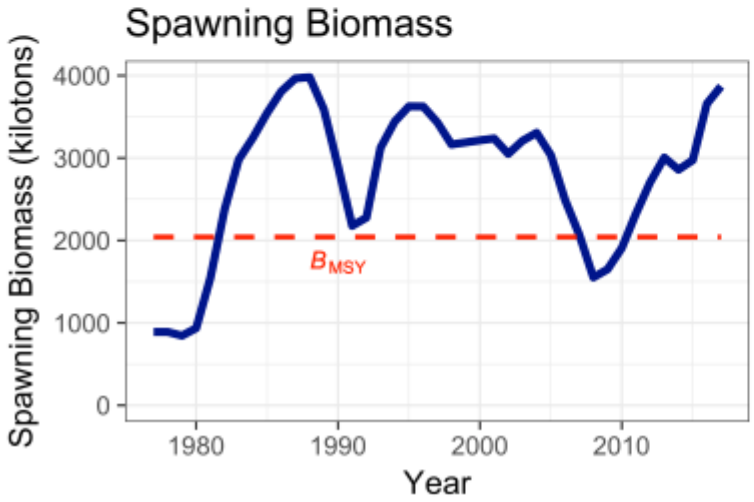
Except where "quantity" is shaded, "change" represents the relative difference between *this year's value* and *last year's value* for the same quantity.

Where "quantity" is shaded, "change" represents the relative difference between *this year's value for 2018* and *last year's value for 2017*.

Graphs for Tiers 1-3 “full” assessments







Changes in reference points (Tier 1)

Quantity	*EBS pollock*	*Yellowfin*	*Rock sole*
M	0.00	0.00	0.00
2017 age+ biomass	-0.16	0.11	-0.08
2018 age+ biomass	-0.09	0.16	0.00
2017 spawning biomass	-0.20	0.15	-0.12
2018 spawning biomass	-0.18	0.16	0.00
B0	-0.05	0.00	0.00
Bmsy	-0.06	0.08	0.00
2018 FOFL	0.34	-0.04	0.00
2018 FABC	-0.09	-0.04	0.00
2017 OFL	0.32	0.07	-0.08
2018 OFL	0.10	0.11	0.00
2017 ABC	-0.07	0.06	-0.08
2018 ABC	-0.13	0.11	0.00

Changes in reference points (Tier 3)

Quantity	*AI pollock*	*EBS P. cod*	*Sablefish*	*G. turbot*	*Arrowtooth*	*Kamchatka*	*Flathead*	*Ak plaice*	*POP*	*No. rockfish*	*Blackspot.*	*Atka mack.*	*Ak skate*
M	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2017 age+ biomass	0.09	-0.27	0.38	0.04	0.01	0.11	0.02	0.01	-0.02	-0.01	0.05	0.00	-0.06
2018 age+ biomass	0.00	-0.17	0.33	0.04	0.02	0.05	0.01	0.02	0.00	0.00	0.00	-0.02	-0.02
2017 spawning biomass	0.01	-0.20	-0.03	0.15	0.01	0.06	-0.04	0.03	-0.03	-0.01	0.12	-0.04	-0.03
2018 spawning biomass	-0.04	-0.23	-0.01	0.05	0.06	0.02	0.04	0.08	-0.01	0.00	0.00	0.00	-0.03
B100%	0.00	-0.04	-0.07	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	-0.02	0.00
B40%	0.00	-0.04	-0.07	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	-0.02	0.00
B35%	0.00	-0.05	-0.07	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	-0.02	0.00
2018 FOFL	0.00	0.00	0.05	0.00	0.00	-0.04	0.00	-0.03	0.00	0.00	0.00	0.15	0.00
2018 FABC	0.00	0.00	-0.01	0.00	0.00	-0.03	0.00	-0.03	0.00	0.00	0.00	0.12	0.00
2017 OFL	0.13	-0.16	0.91	0.13	0.01	0.10	-0.02	-0.04	-0.03	-0.02	0.22	0.06	-0.06
2018 OFL	0.00	-0.21	0.84	0.02	0.15	0.06	0.01	0.12	-0.01	0.00	0.00	0.09	-0.02
2017 ABC	0.13	-0.21	0.14	0.13	0.01	0.10	-0.02	-0.04	-0.03	-0.02	0.22	0.06	-0.06
2018 ABC	0.00	-0.26	0.13	0.02	0.12	0.06	0.01	0.08	-0.01	0.00	0.00	0.08	-0.02

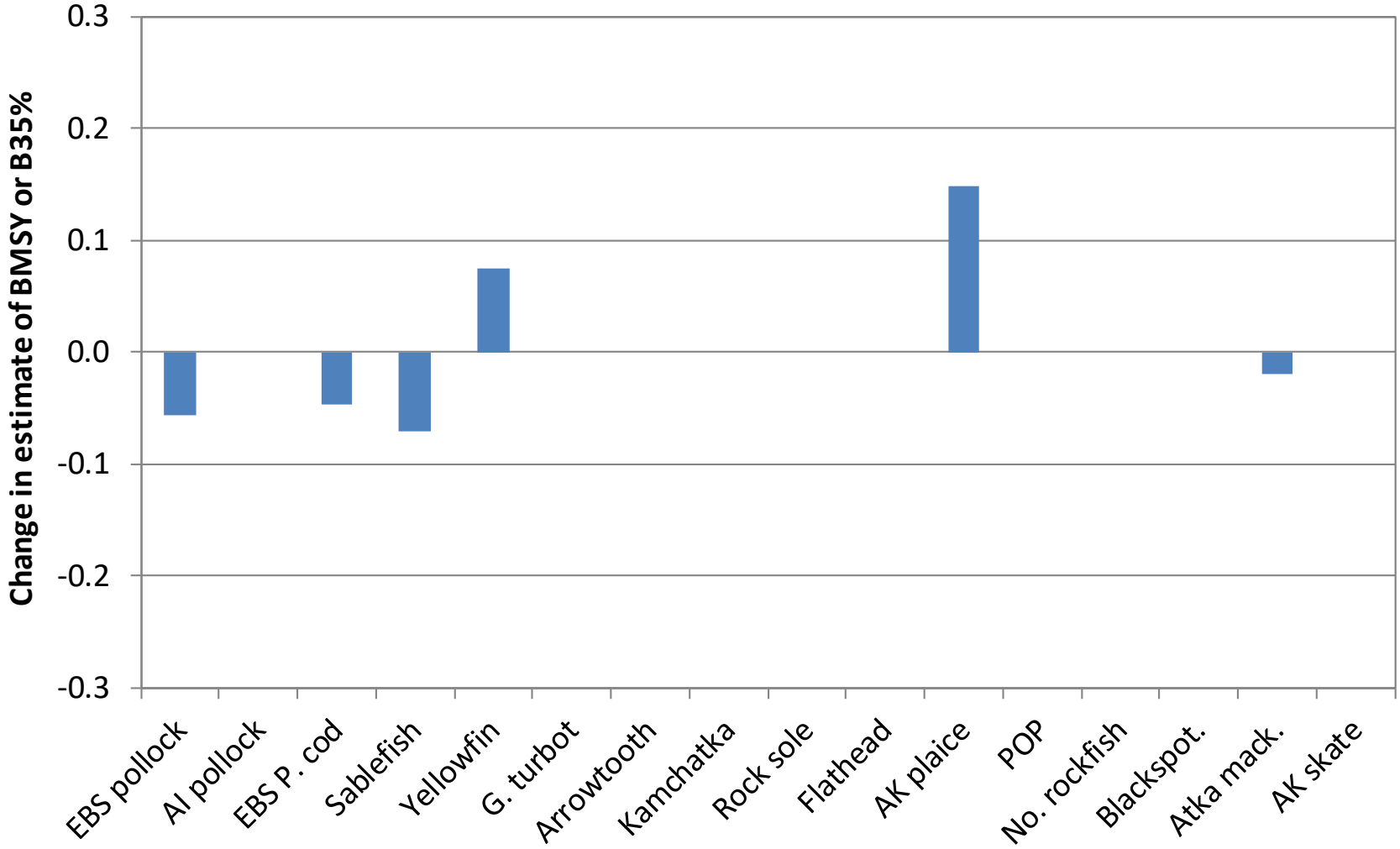
Changes in reference points (Tier 5)

Quantity	*Bog. pollock*	*AI P. cod*	*O. flatfish*	*Shortraker*	*O. rockfish*	*O. skates*	*Sculpins*
M	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Biomass	0.00	0.00	0.00	0.00	0.00	0.00	-0.06
2018 FOFL	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2018 FABC	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2017 OFL	0.00	0.00	0.00	0.00	0.00	0.00	-0.06
2018 OFL	0.00	0.00	0.00	0.00	0.00	0.00	-0.06
2017 ABC	0.00	0.00	0.00	0.00	0.00	0.00	-0.06
2018 ABC	0.00	0.00	0.00	0.00	0.00	0.00	-0.06

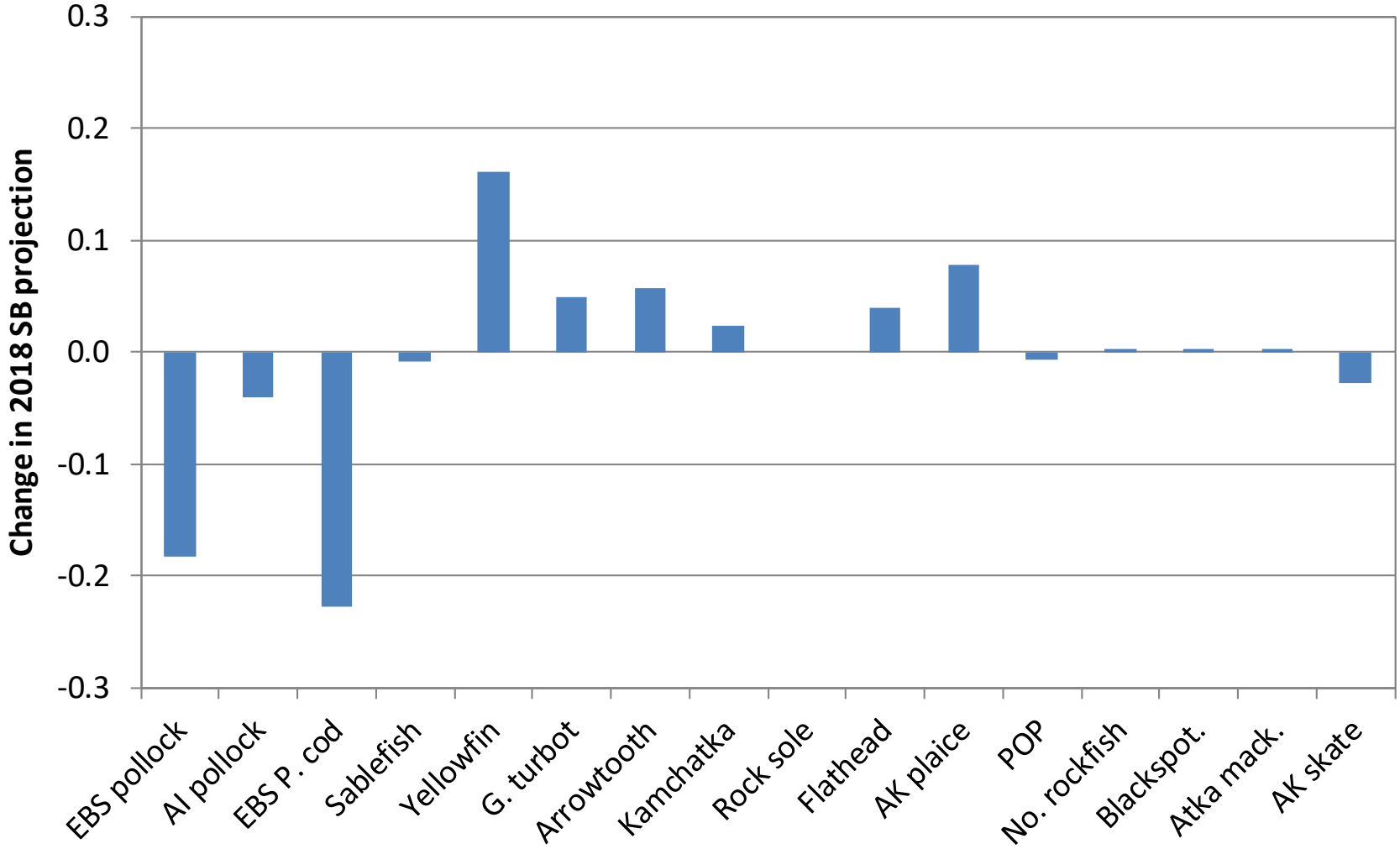
Changes in reference points (Tier 6)

Quantity	*Sharks*	*Squid*	*Octopus*
2017 OFL	0.00	0.00	0.00
2018 OFL	0.00	0.00	0.00
2017 ABC	0.00	0.00	0.00
2018 ABC	0.00	0.00	0.00

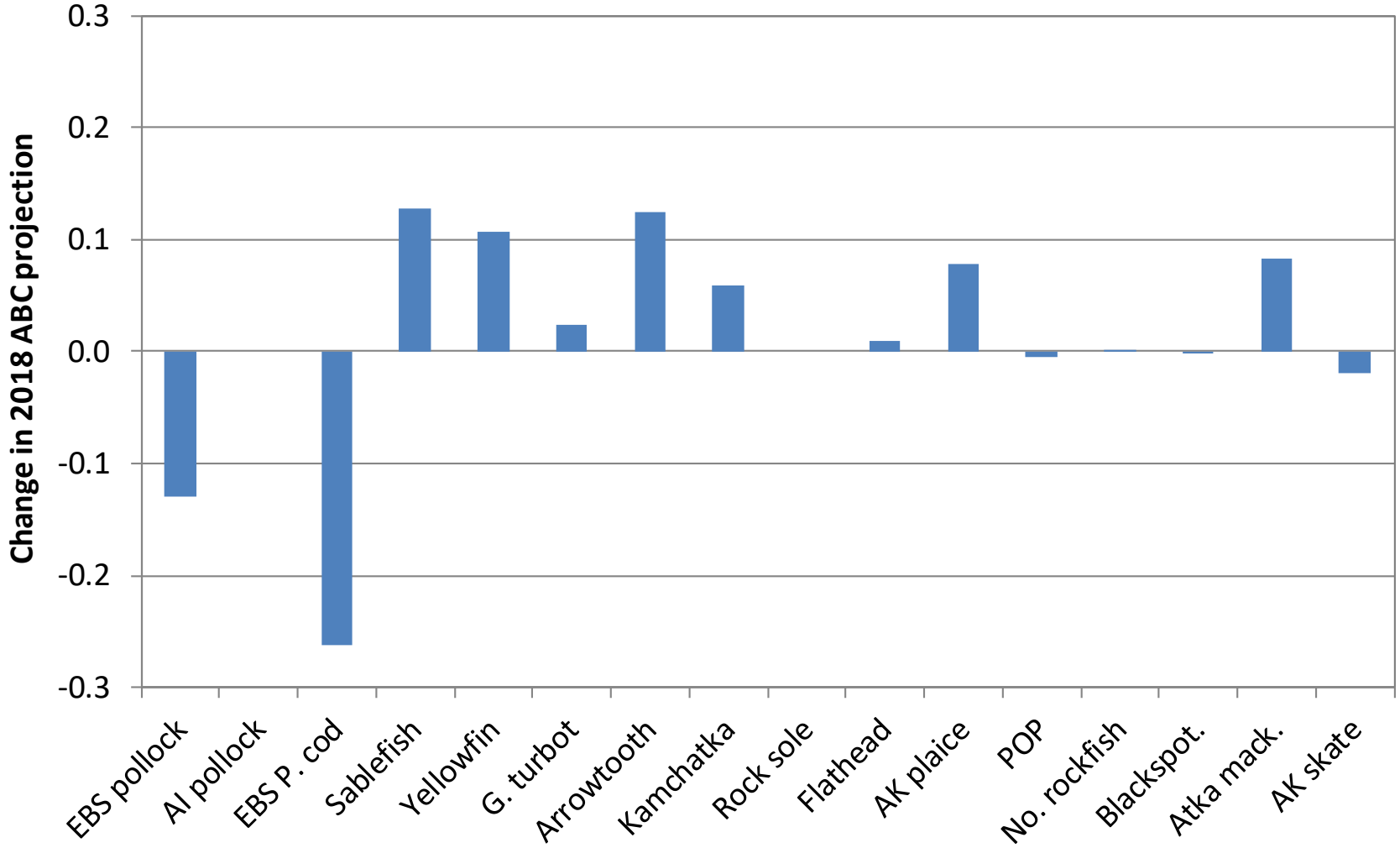
Change in estimate of B_{MSY} or $B_{35\%}$



Change in 2018 spawning biomass projection

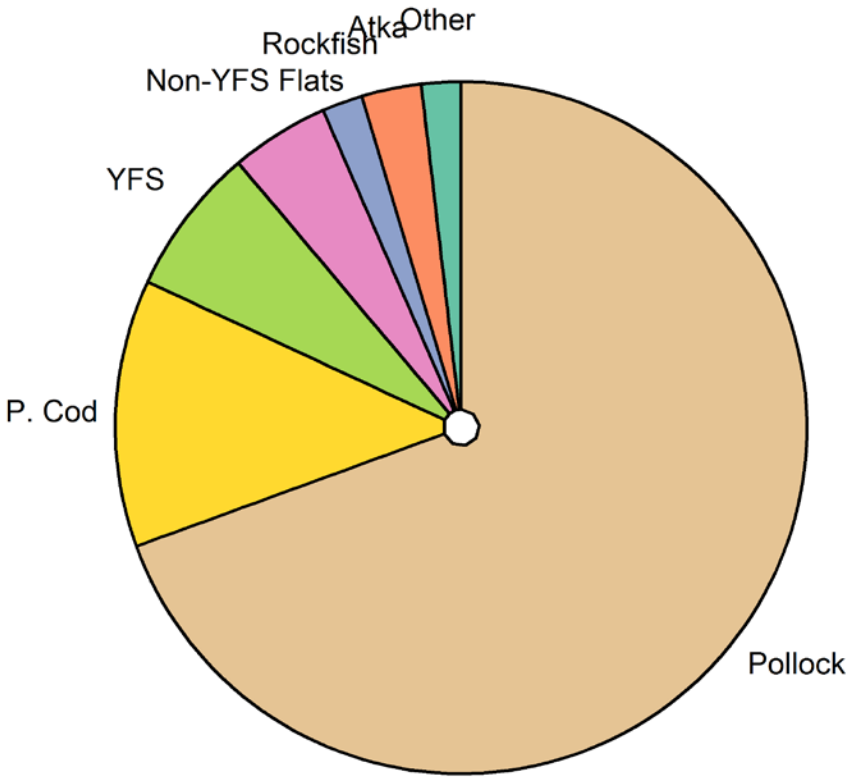


Change in 2018 ABC projection

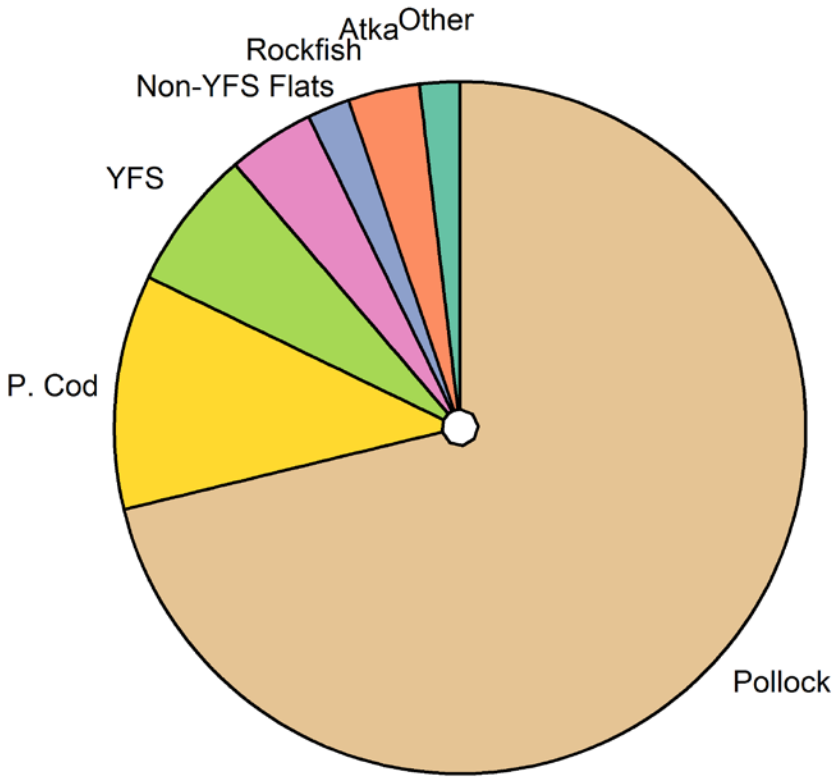


Catch by year and species/group

2017

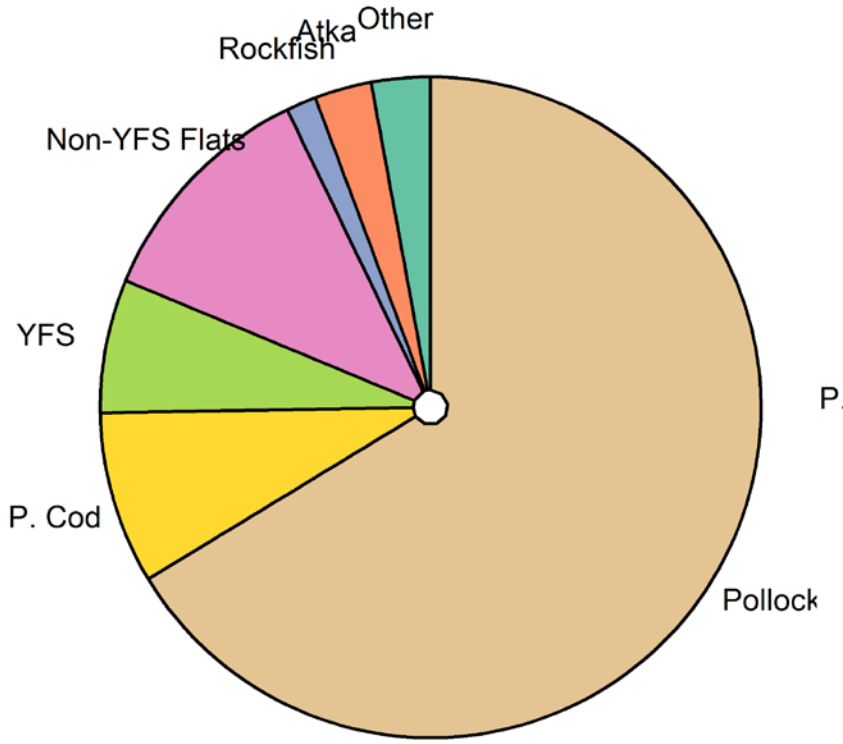


2018

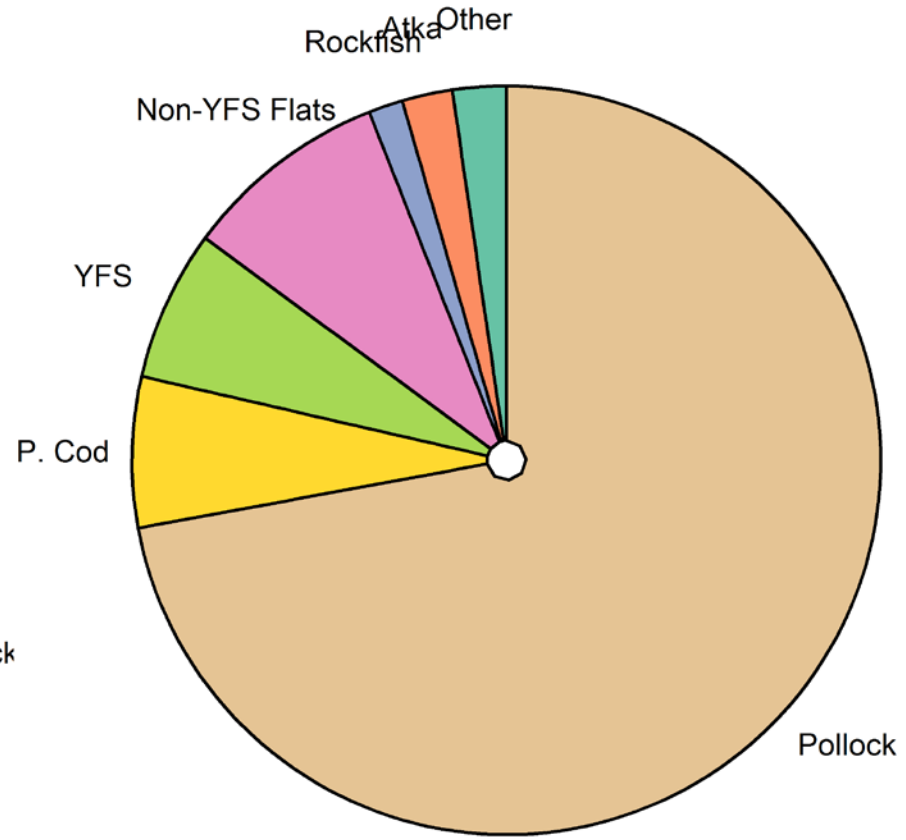


ABC by year and species/group

2017

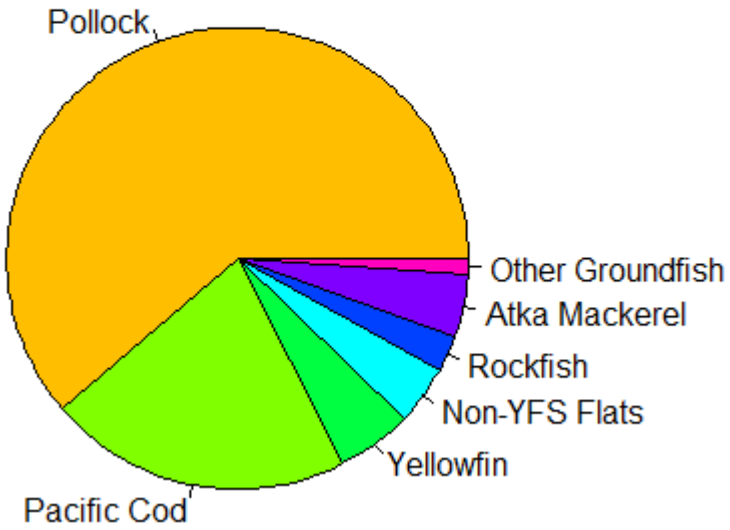


2018

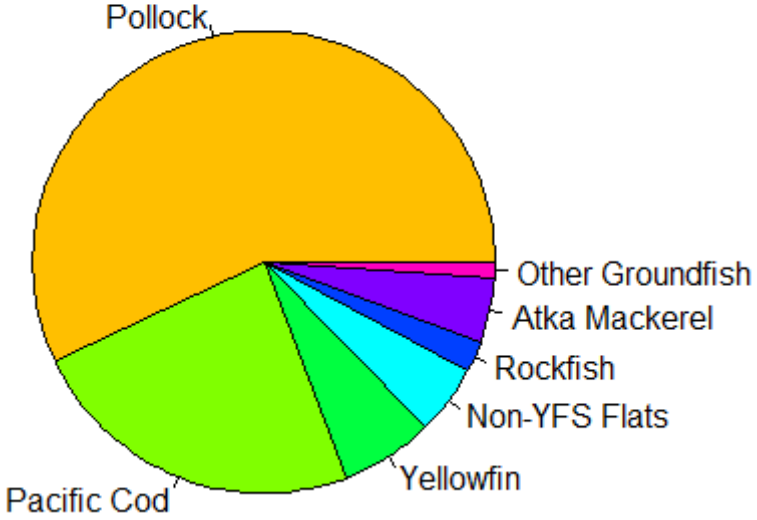


Ex-vessel value by year and species/group

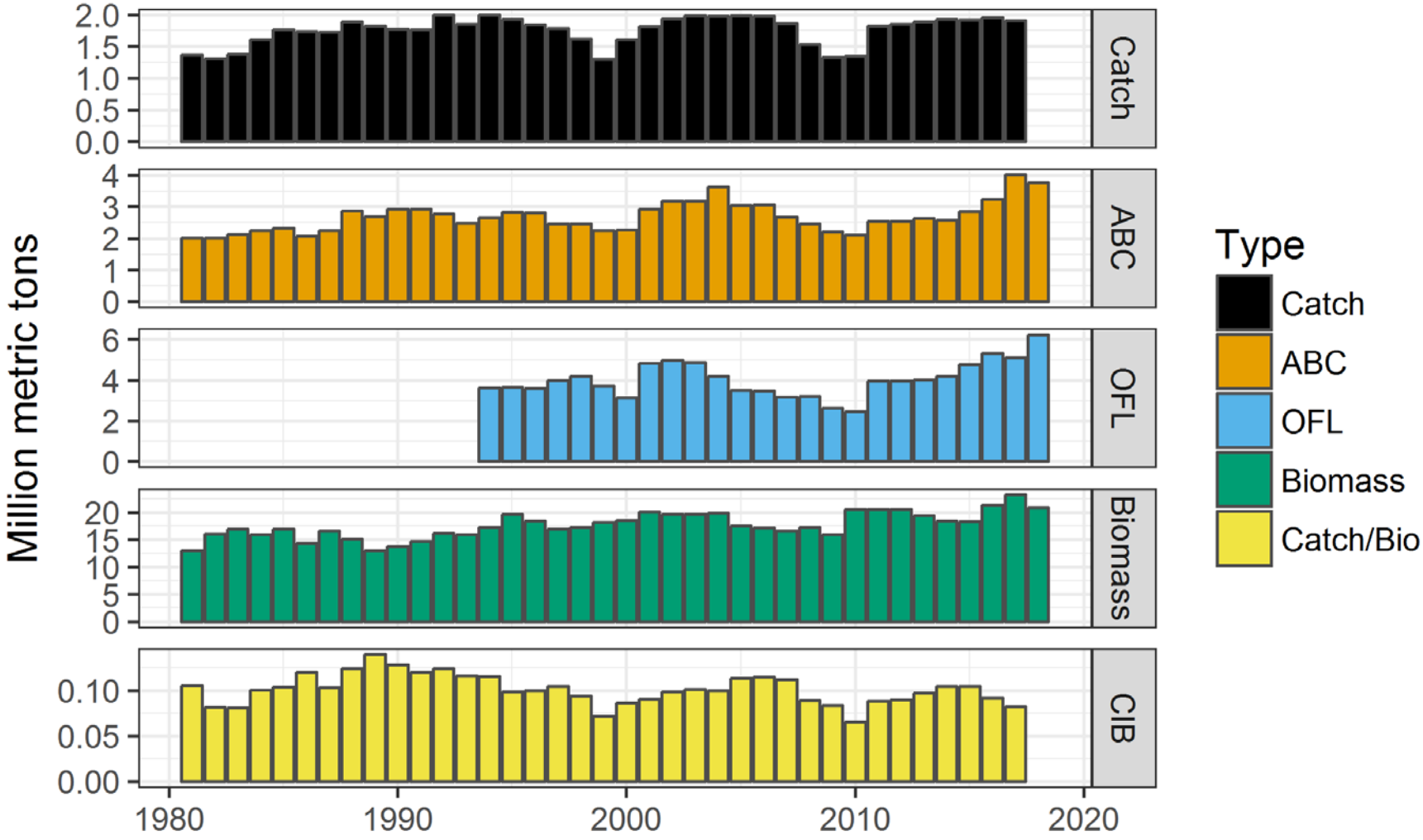
BSAI Ex-vessel Value 2015, Total = $674



BSAI Ex-vessel Value 2016, Total = $657



Aggregating across species/groups



Presentation format

- Of the 6 non-sablefish full assessments, the author or a coauthor is here at the meeting and available to make presentations on 4
- So, the usual Team summary of trends, recruitment strengths, etc. will be provided only for the 2 assessments where the author is not present
- For “partial” and “none” assessments, presentations will be confined to new estimates of reference points and specs, and recommendations
- Partial assessments reported new survey data and catch/biomass ratios
  - These were noted by the Team, with no “red flags,” and so are not reported here, except for Tier 5 stocks where RE model was re-run
- “None” assessments are just the 2016 results with years rolled forward
- Not covered in presentation (see SAFE Intro instead):
  - Specs for 2019, area allocations (except: WAI Pcod and BS/RE)

A few final “big picture” items

- Team agreed with authors’ ABC recommendations in all cases except EBS Pcod, AI Pcod, and Greenland turbot
- ABC recommendations correspond to maximum permissible values in all cases except EBS pollock, EBS Pcod, and sablefish
- Of the 16 stocks/complexes in Tiers 1-3, none are in Tier 1b and only 3 (AI pollock, sablefish, and blackspotted/rougheye) are in Tier 3b
- No stocks/complexes were subjected to overfishing in 2016, and no stocks/complexes are overfished or approaching a condition of being overfished as of 2017

General Team recommendations

Policy on acceptance of non-previewed models

- Except in emergency situations, if a new model is presented in November but was not previewed in September of that year or requested by the Team or SSC in September of that year, the Team will consider accepting the new model only if the author demonstrates that the new model passes the test for average difference in spawning biomass as described in the SAFE chapter guidelines, regardless of the author's designation of the new model as a major or minor change
- In all cases where an author recommends a change from the current base model, all reference points and harvest specifications as estimated by the current base model must be provided to the Team in writing, preferably as part of the SAFE chapter

Policy on unscheduled assessments

- If a partial or full assessment is provided when none has been scheduled, the Team will take no action on it unless the authors have identified an immediate conservation concern

Northern Bering Sea surveys

- The Team recommends that more NBS surveys be conducted in the near future, as a time series of such data may be essential for understanding changes in the abundance of some individuals stocks as well as the overall ecosystem
- Some species, such as pollock and Pacific cod, exhibited enormous changes in NBS survey biomass between 2010 and 2017, both in absolute terms and relative to the NBS+EBS total, while others, such as Alaska plaice, exhibited very little change
- The Team also recommends that assessment authors evaluate data from the NBS survey to determine if they should be included in their respective assessment models, particularly if more surveys are conducted, recognizing that it may be appropriate to include these data in some assessments but not others, and that the methods used to include these data may vary between assessments

Ecosystem status report

- The Team recommends continued evaluation of approaches to incorporating local ecological knowledge into the ESR, particularly for helping to understand patterns in the Northern Bering Sea ecosystem
- The Team supports continued refinement and development of ecosystem indicators across physical, biological, and socio-economic categories
- The Team recommends that assessment authors be more fully integrated into the prioritization of AFSC ecosystem research, in order to: 1) develop methods and approaches (where appropriate) of linking ecosystem indicators to individual species; 2) identify species-specific ecosystem "red-flags;" and 3) track indicator performance retrospectively, as is done for some of the pollock recruitment indicators

Chapter summaries

Chapter 1: EBS walleye pollock (full)

- Switch to author's presentation (Team comments will follow)

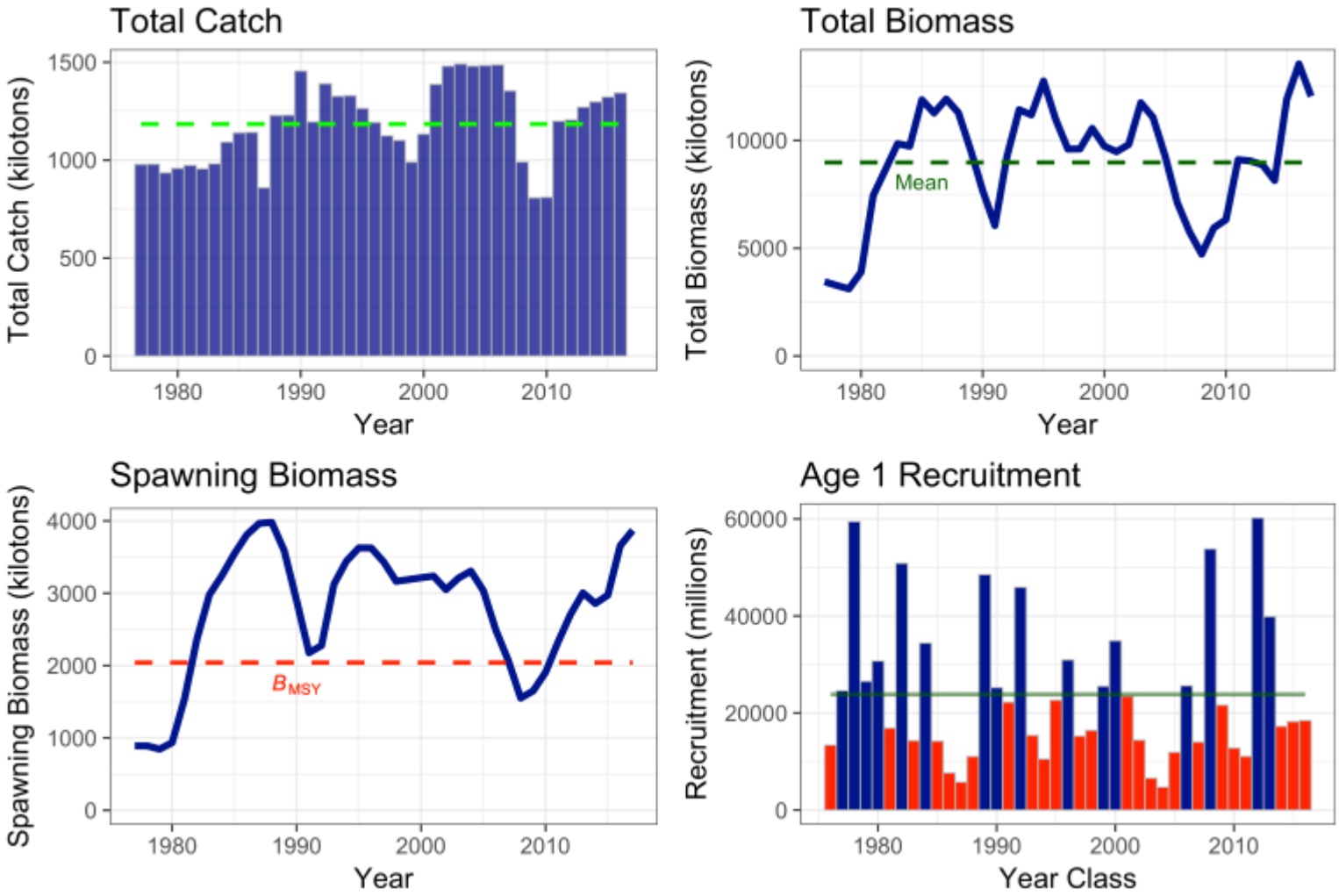
EBS walleye pollock, continued

- Although this stock has been determined to qualify for management under Tier 1a, the authors recommend setting ABC at the Tier 3a level, as has been done for the last three years
  - Seven reasons for doing so are listed in the chapter
  - Multi-species model ("CEATTLE") gives slightly higher maxABC values than the assessment, authors also suggest setting ABC significantly below the maximum
- Team accepted authors' choice of model and harvest specifications
  - Not a change in Tier classification; just borrowing the control rule

EBS walleye pollock, continued

- As a reminder, the Team is still interested in seeing a response to its September 2016 request that the authors develop a better prior for steepness, or at least a better rationale, and perhaps consider a meta-analytic approach
- The Team requests that the “year class diversity” index that had been reported in previous assessments be included in future assessments
- The Team recommends that the authors compare fishery CPUE and survey CPUE in the core fishery area
- The Team recommends that next year’s assessment include additional projections based on fixed levels of catch rather than fixed levels of fishing mortality, with the number of additional projections and the levels of fixed catch to be chosen by the author

EBS walleye pollock, continued



EBS walleye pollock, continued

Quantity	Last year	This year	Change
M	0.30	0.30	0.00
2017 tier	1a	n/a	none
2018 tier	1a	1a	none
2017 age+ biomass	13,000,000	n/a	-0.16
2018 age+ biomass	12,100,000	10,965,000	-0.09
2017 spawning biomass	4,600,000	n/a	-0.20
2018 spawning biomass	4,500,000	3,678,000	-0.18
B0	5,700,000	5,394,000	-0.05
Bmsy	2,165,000	2,042,000	-0.06
2018 FOFL	0.465	0.621	0.34
2018 FABC	0.370	0.336	-0.09
2017 OFL	3,640,000	n/a	0.32
2018 OFL	4,360,000	4,795,000	0.10
2017 ABC	2,800,000	n/a	-0.07
2018 ABC	2,979,000	2,592,000	-0.13

Chapter 1A: AI walleye pollock (partial)

Quantity	Last year	This year	Change
M	0.19	0.19	0.00
2017 tier	3b	n/a	none
2018 tier	3b	3b	none
2017 age+ biomass	250,221	n/a	0.09
2018 age+ biomass	271,831	272,675	0.00
2017 spawning biomass	77,579	n/a	0.01
2018 spawning biomass	81,545	78,305	-0.04
B100%	203,100	203,100	0.00
B40%	81,240	81,240	0.00
B35%	71,085	71,085	0.00
2018 FOFL	0.397	0.397	0.00
2018 FABC	0.319	0.319	0.00
2017 OFL	43,650	n/a	0.13
2018 OFL	49,291	49,291	0.00
2017 ABC	36,061	n/a	0.13
2018 ABC	40,788	40,788	0.00

Chapter 1B: Bogoslof walleye pollock (none)

Quantity	Last year	This year	Change
M	0.30	0.30	0.00
2017 tier	5	n/a	none
2018 tier	5	5	none
Biomass	434,760	434,760	0.00
2018 FOFL	0.30	0.30	0.00
2018 FABC	0.225	0.225	0.00
2017 OFL	130,428	n/a	0.00
2018 OFL	130,428	130,428	0.00
2017 ABC	51,300	n/a	0.00
2018 ABC	51,300	51,300	0.00

Chapter 2: EBS Pacific cod (full)

- Switch to author's presentation (Team comments will follow)

EBS Pacific cod, continued

- The Team discussed whether the NBS Pacific cod are the same stock as the EBS or if they are distinct stocks, and the resulting implications for the assessment
  - If the two areas are comprised of the same stock, the population would be bigger than estimated in just the EBS, and this should be reflected in the assessment in terms of catchability and selectivity
  - If it is a distinct population, this could be a large concern, but the amount of fishing in the NBS is relatively small and hence may not negatively impact the stock

EBS Pacific cod, continued

- The Team had a lengthy discussion of the models presented and what should be used to provide management advice
- The Team appreciates the advances in model averaging, but before model averaging is used to replace a single model entirely, the Team would like to make sure that model averaging is a valid substitute
- The SSC minutes from the February workshop suggested that an assessment should consider model averaging, but also encouraged a “go slow” approach
  - The Team supports the “go slow” approach, and the subsequent discussion focused on the choice of a single model for management

EBS Pacific cod, continued

- Differences in predicted ABC between models were a big concern
- Model 17.2 was seen as an improvement in some aspects based on first principles
  - It included more specific data weighting and fishery time-varying selectivity, which may or may not improve the model
- However, 16.6 is the status quo model, is more parsimonious, is structurally simpler than the 17.X series, and provides stability to the choice of the assessment model
- None of the 17.x series of models were a clear and obvious improvement over Model 16.6
- The Team recommends that Model 16.6 be used for determining stock status and setting management quantities

EBS Pacific cod, continued

- The discussion of models led into a discussion on which (if any) of these models are appropriate for inclusion in a suite of models to use for model averaging
- The Team noted that 17.7 and 17.6 are similar models (17.7 is 17.6 with a constraint on data weighting) and thus at most one should be part of the suite
  - It is possible that the constraint could be limiting and there was support for keeping 17.6 as a contender
- Model 17.2 is an obvious contender and it was felt that Model 16.6 was structurally different and thus its inclusion would help to encompass model uncertainty
- The Team was not certain if Model 17.1 and 17.3 were useful models for an ensemble

EBS Pacific cod, continued

- Ecosystem considerations:
  - While there are observations that suggest the stock may be low, there are also indications that it could be high
  - The negative indicators include the recent estimates of low recruitment, recent high age 1 mortality from the multispecies model, recent low weight-at-age in young ages, recent warming of ocean temperatures, recent bird die offs, recent low crab abundance in the BS, and other environmental indicators
  - Positive indicators are the high abundance in the north, relatively high Fulton's condition values in 2016 and 2017, and predictions of cooler temperatures in future years
  - (Continued on next slides)

EBS Pacific cod, continued

- Ecosystem considerations, continued:
  - Bottom and surface temperatures in the EBS were the highest on record in 2016, and more than 1 SD greater than the mean of the time series, yet EBS in 2017 appears to be returning to a near-neutral condition, although still slightly warmer than average in 2017
  - In July-August 2017 an anomalously large EBS-wide bird mortality event was observed and necropsy of 20 carcasses revealed emaciation (starvation) and drowning as primary causes of mortality
  - Trawl survey biomass of multiple other groundfish species was down in 2017 relative to 2016, although drop was greatest for Pcod
  - Mean weight per length, an index of fish condition, was low for many species including Pacific cod, especially in the inner domain
  - (Continued on next slide)

EBS Pacific cod, continued

- Ecosystem considerations, continued:
  - New work by Duffy-Anderson suggests the small cold pool in 2016 may have provided a thermal and foraging refuge for other groundfish species (e.g., pollock) during warm water conditions
  - The 2017 cold pool was narrow but extended south and is projected to be around average in 2018 (based on <1 deg C)
  - The motile epifauna guild remains above the long-term mean and the trend is increasing (driven by brittle stars and urchins-dollars-cucumbers), except for crab (important prey of Pacific cod) which have been declining in recent years and were down again in 2017

EBS Pacific cod, continued

- The Team recommends that the ABC should be below the maximum permissible because of many concerns related to the dramatic declines in the EBS shelf survey index, recent poor environmental conditions, lack of incoming recruitment, and recent small size-at-age of young fish
- Some of the options considered included a 10% reduction, the ABC from model 17.2, or some version of the averages given in the appendix on model averaging
- Since the Team really considered accepting only Models 16.6 and 17.2 for management quantities and these two models had the highest final weightings, a combination of 16.6 and 17.2 was used to adjust the ABC
  - Model 17.6 was not included because it had a very low final weight, showed some implausible results and the reasons for its extreme difference from the status quo were not completely understood

EBS Pacific cod, continued

- To determine the 2018 ABC, Models 16.6 and 17.2 were used, and the average ABC was calculated assuming equal weights
- Table 2.5.2 was used so that other options (e.g., unequal weighting) could be used to determine a recommended ABC
- Table 2.5.2 uses projected ABCs from Stock Synthesis, which is slightly different than the AFSC projection model ("Proj")
- Therefore, a calibration was done using the averaged value with equal weighting in Table 2.5.2 (200), maxABC from Model 16.6 using SS (214), and maxABC from Model 16.6 using Proj (201):
- (maxABC(M16.6,Proj)/maxABC(M16.6,SS))×maxABC(Table2.5.2,SS) = (201/214)×200 = 188
- The recommended 2018 ABC is 188,000 t
- The Team recommends a 2019 ABC equal to the maximum 2019 ABC from Model 16.6 (170,000 t)

EBS Pacific cod, continued

- Other Team recommendations:
  - The Team recommends making a direct comparison between the EBS trawl survey length compositions and the NBS survey length compositions for 2010 and 2017, within each year
  - The Team recommends presenting in the next assessment document, the fishery CPUE for each of the separate sectors (pot, trawl, longline), as has been done in the past
  - The Team recommends reporting the fishery CPUE by area in the NBS areas to provide a context for the genetics proposal
  - The Team recommends investigating the utility of dropping the first five years in the EBS shelf survey (starting the series in 1987) and thus allowing for the incorporation of the northwest strata (areas 82 and 90) into the survey index time-series
  - (Continued on next slide)

EBS Pacific cod, continued

- Other Team recommendations, continued:
  - The Team recommends funding the genetics proposal presented by Ingrid Spies as soon as possible
  - The Team does not want to lose the momentum of the exceptional work done by the author to address the many concerns raised, and the Team recommends that models 17.2 and 17.6 remain as candidate model structures for continuing to understand the relationships between data and model choices
  - Models 16.6, 17.2, and 17.6 are structurally different models that represent a range of model uncertainty
  - The Team recommends continuing an investigation of why the various models show very different results

EBS Pacific cod, continued

- Near the end of the meeting, the discussion of EBS Pacific cod was reopened to plan for 2018
- The Team reiterated that it was disinterested in continuing the subcommittee indefinitely to continue reviewing, selecting, and recommending new operational models for Pacific cod as a unique case, while other stocks do not get this added benefit of additional review
- There has been a general consensus that continuing the status quo has become counterproductive as both the Team and members of the public have been interested in some model stability
- Instead of a spring meeting focused on choosing piecemeal adjustments to the base model for EBS Pcod, the Team discussed possibilities for a meeting with a broader focus, both in terms of stocks and topics

EBS Pacific cod, continued

- For a meeting with a broader focus, topics could include:
  - What ecological hypotheses should be considered (drawing on other models such as CEATTLE and FEAST)?
  - How to choose models for inclusion in the ensemble (statistics, goodness of fit, plausibility, etc.)?
  - Which first principles and standard practices of assessment models should be considered, identifying models for the ensemble as opposed to models that are merely sensitivity analyses?
  - Which models are useful for management?
  - How to link the ESR to the assessment (potentially involving other ecosystem researchers within the AFSC)?
  - When should ABC be reduced from the maximum, and by how much?

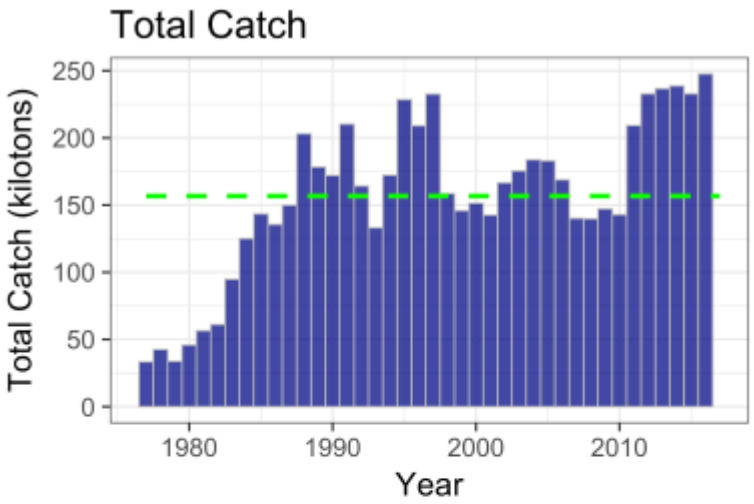
EBS Pacific cod, continued

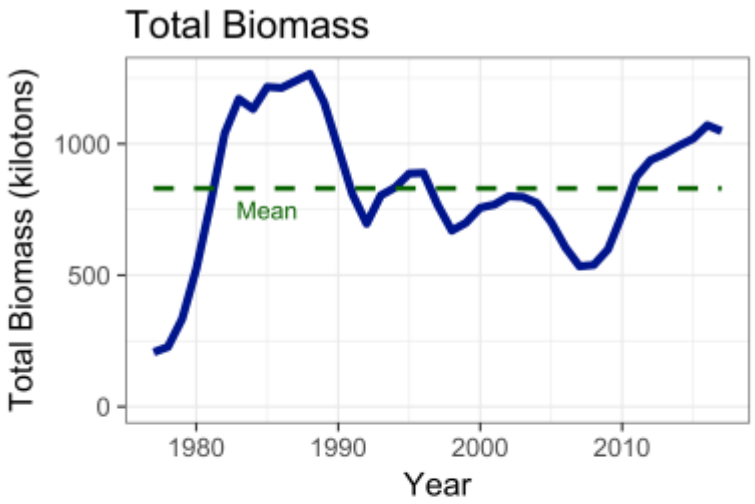
- Summarizing so far:
  1. The Team *does not* want the spring subcommittee meetings to continue in their present form, focused exclusively on Pacific cod and largely on sensitivity analyses of the current base model
  2. The Team *does* want to see a different type of subcommittee meeting that focuses on a wider range of stocks and topics such as those listed on the previous slide
- However...
- The Team recommends that *if* the SSC requests a subcommittee meeting focused on EBS Pacific cod only, the meeting should contain at least these three topics on the agenda:
  - The first topic should be to investigate the effects of different features on the model outputs (e.g., complete the bridging analysis)
  - (Continued on next slide)

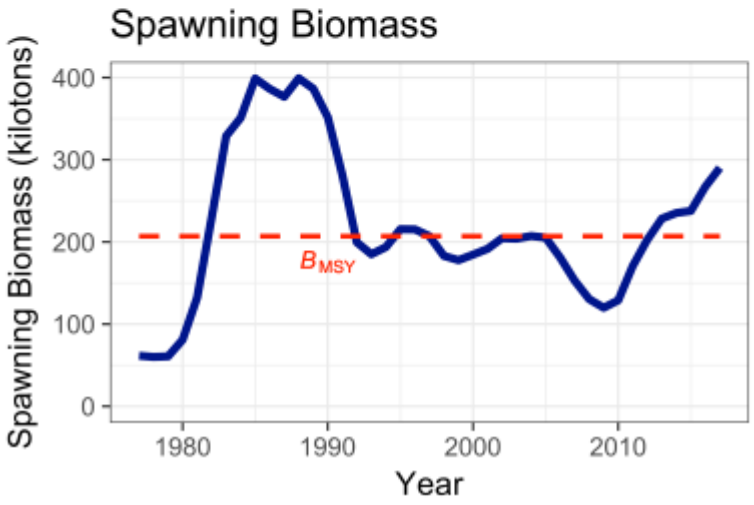
EBS Pacific cod, continued

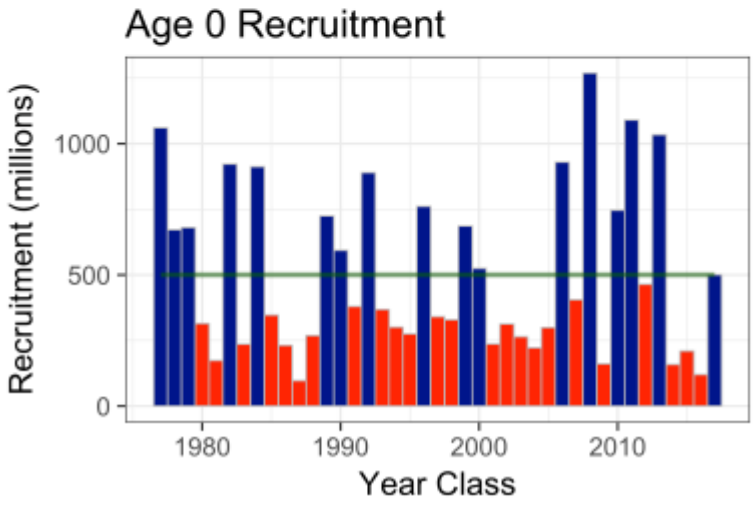
- Team recommendation, continued:
  - The second topic would be to examine ecological hypotheses related to the EBS Pacific cod stock, model assumptions that address those hypotheses, and potential models that would be included in an ensemble of models to represent structural uncertainty
  - The third topic would be to investigate what external indicators or thresholds may indicate a need to reduce the ABC from the maximum ABC

EBS Pacific cod, continued









EBS Pacific cod, continued

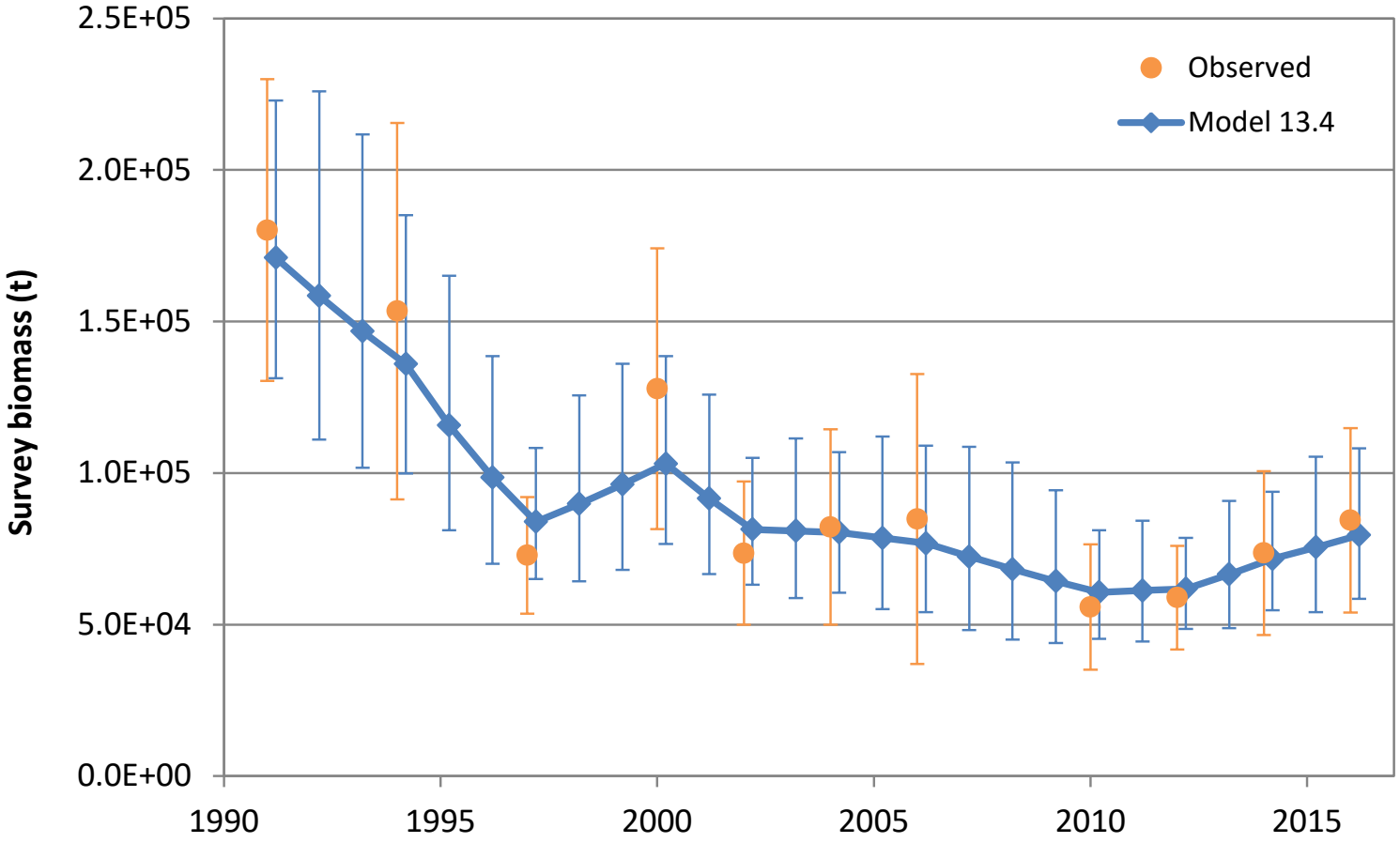
Quantity	Last year	This year	Change
M	0.36	0.36	0.00
2017 tier	3a	n/a	none
2018 tier	3a	3a	none
2017 age+ biomass	1,260,000	n/a	-0.27
2018 age+ biomass	1,110,000	918,000	-0.17
2017 spawning biomass	327,000	n/a	-0.20
2018 spawning biomass	340,000	263,000	-0.23
B100%	620,000	593,000	-0.04
B40%	248,000	237,000	-0.04
B35%	217,000	207,000	-0.05
2018 FOFL	0.38	0.38	0.00
2018 FABC	0.31	0.31	0.00
2017 OFL	284,000	n/a	-0.16
2018 OFL	302,000	238,000	-0.21
2017 ABC	239,000	n/a	-0.21
2018 ABC	255,000	188,000	-0.26

Chapter 2A: AI Pacific cod (full)

- New data: none
- Model changes/alternatives: none
  - Standard Tier 5 random effects model
- Stock status and trend:
  - Survey biomass has increased consistently since the all-time low observed in 2010
  - 2016 survey biomass was 89% of average for the time series
- Biomass apportionment (per SSL final rule):
  - "Harvest limit" for the WAI is computed by subtracting State GHL from AI ABC, then multiplying by proportion of biomass in WAI
  - Proportion of biomass to be "determined by the annual stock assessment process"
  - Based on RE model, 25.6% of biomass is in WAI

AI Pacific cod, continued

- Survey biomass



AI Pacific cod, continued

- Following past practice, the author recommended changes based on the M (=0.38) from his recommended EBS model, but the Team's recommended EBS model keeps M at last year's value (0.36)

Quantity	Last year	This year	Change
M	0.36	0.36	0.00
2017 tier	5	n/a	none
2018 tier	5	5	none
Biomass	79,600	79,600	0.00
2018 FOFL	0.36	0.36	0.00
2018 FABC	0.27	0.27	0.00
2017 OFL	28,700	n/a	0.00
2018 OFL	28,700	28,700	0.00
2017 ABC	21,500	n/a	0.00
2018 ABC	21,500	21,500	0.00

Chapter 3: sablefish (full)

- Covered in GOA Team presentation (Thanks, Jim and Jim!)

Chapter 4: yellowfin sole (full)

- New data:
  - Fishery and survey agecomps for 2016
  - EBS shelf biomass estimate for 2017 down 3% from high in 2016
- Model changes/alternatives:
  - Model 14.1: last year's model
    - Except for change in 2008-2014 fishery weight at age introduced last year, same model since about 2010
  - Model 14.2 uses different period to estimte the SRR
    - Model 14.1 uses 1978-2012; Model 14.2 uses 1955-2012
    - FMSY is higher, BMSY is lower under Model 14.2
  - Authors and Team accepted Model 14.1

Yellowfin sole, continued

- Stock status and trend:
  - 2003, 2006, and 2009 cohorts are 74%, 23%, and 19% above ave.
  - Spawning biomass declined from 2007-2014, but has begun trending back up
  - 2017 spawning biomass is 74% of B_0 and 196% of B_{MSY}
- Mohn's ρ = -0.193
  - In response to Team comments, author profiled over grid of *M* and *q* values (with no temperature effect on *q*)
  - Eliminating temperature dependence changes sign of ρ
  - Low values of *M* and *q* (e.g., *M*=0.09, *q*=0.8; versus base values *M*=0.12, *q*=0.9) eliminate retrospective pattern

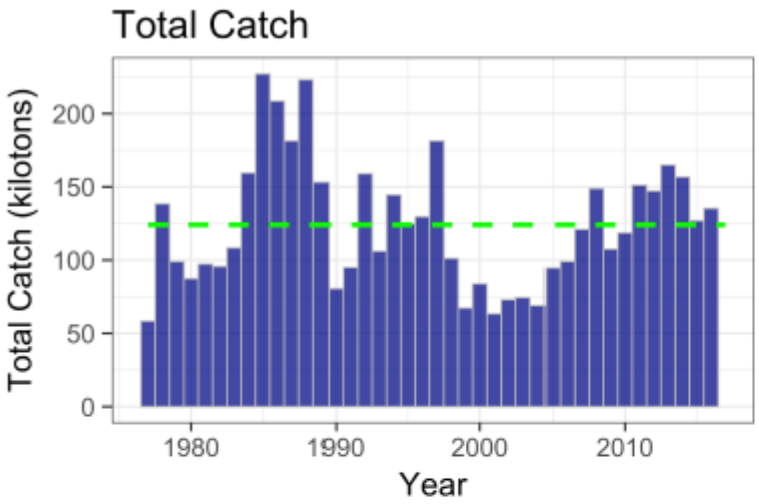
Yellowfin sole, continued

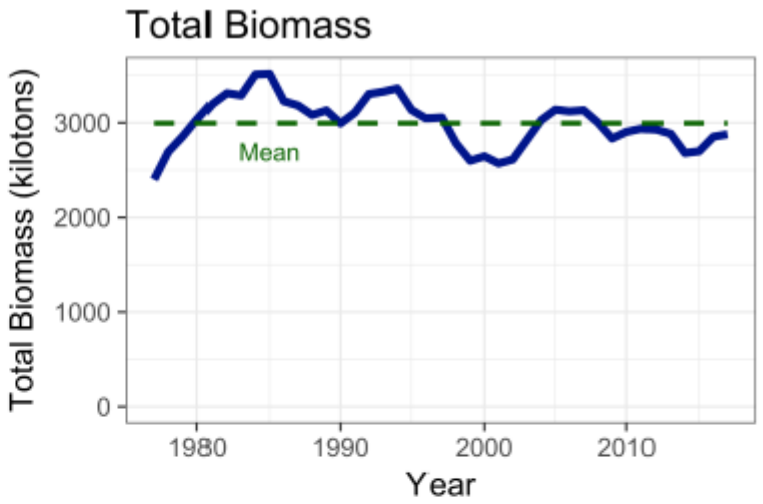
- Team discussion focused on three general topics:
  1. A strong residual pattern from 1984 – 2005 in the survey fit
  2. Similar proportions of biomass in the NBS in 2010 and 2017 (~15%)
  3. Continued exploration of *q* (including temperature effects) and *M* and their influence on retrospective patterns.
- The Team recommends plotting the estimated spawning biomass trajectory with a fixed pair of *M* and *q* values that reduces the retrospective pattern (e.g., *M*=0.09 and *q*=1.0) on top of the estimated spawning biomass trajectory, with confidence intervals, from the base model run
  - This comparison will help to determine if the different combination of *M* and *q* values is within the estimated uncertainty of the base model, or is describing a completely different population size

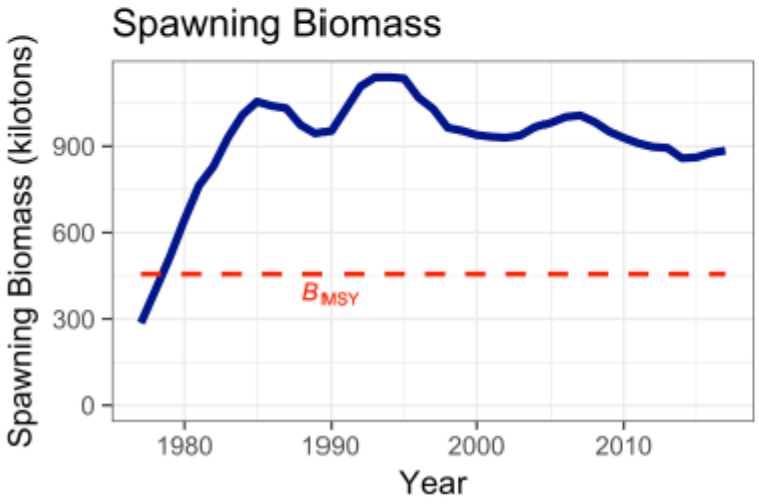
Yellowfin sole, continued

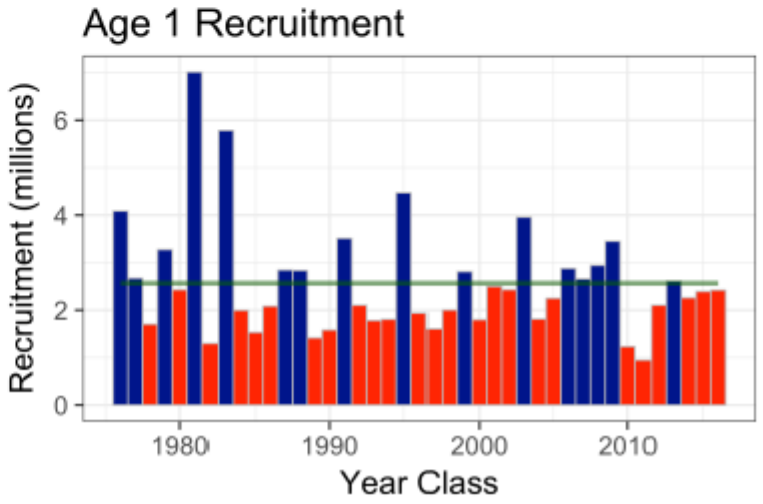
- The Team recommends continuing to explore the retrospective patterns in relation to values of *M* and *q*, with fixed values of *M* and fixed values of *q*, reporting values of Mohn's rho for each combination (range to be decided by the authors)
- Additionally, using those same model runs, report the total likelihood for each combination to create a bivariate likelihood profile for those parameters
- Realizing that this will require a considerable number of model runs, the Team leaves it up to the authors to decide whether using the model runs done for the 2017 assessment will suffice, or if important differences arise from a 2018 model that warrant redoing those model runs

Yellowfin sole, continued









Yellowfin sole, continued

Quantity	Last year	This year	Change
M	0.12	0.12	0.00
2017 tier	1a	n/a	none
2018 tier	1a	1a	none
2017 age+ biomass	2,290,100	n/a	0.11
2018 age+ biomass	2,202,300	2,553,100	0.16
2017 spawning biomass	778,600	n/a	0.15
2018 spawning biomass	770,900	895,000	0.16
B0	1,202,700	1,204,000	0.00
Bmsy	424,000	456,000	0.08
2018 FOFL	0.125	0.120	-0.04
2018 FABC	0.114	0.109	-0.04
2017 OFL	287,000	n/a	0.07
2018 OFL	276,000	306,700	0.11
2017 ABC	260,800	n/a	0.06
2018 ABC	250,800	277,500	0.11

Chapter 5: Greenland turbot (partial)

- The authors' recommended an ABC of 7,000 t for the next two years, a value that the authors had also recommended last year
- Last year, the Team agreed that capping harvests at the 7,000 t level would likely result in less variable future harvests and keep the stock above $B_{35\%}$, abut the Team felt that these were more appropriately viewed as TAC considerations than ABC considerations, and so proposed setting ABC at the maximum permissible level instead
- Last year, the SSC embarked on a 2-year stair-step for ABC, putting the SSC on track to recommend the maximum permissible this year
- The Team proposes setting ABC at the maximum permissible level for 2018 and 2019

Greenland turbot, continued

Quantity	Last year	This year	Change
M	0.112	0.112	0.00
2017 tier	3a	n/a	none
2018 tier	3a	3a	none
2017 age+ biomass	121,804	n/a	0.04
2018 age+ biomass	122,032	126,417	0.04
2017 spawning biomass	50,461	n/a	0.15
2018 spawning biomass	55,347	58,035	0.05
B100%	103,097	103,097	0.00
B40%	41,239	41,239	0.00
B35%	36,084	36,084	0.00
2018 FOFL	0.22	0.22	0.00
2018 FABC	0.18	0.18	0.00
2017 OFL	11,615	n/a	0.13
2018 OFL	12,831	13,148	0.02
2017 ABC	9,825	n/a	0.13
2018 ABC	10,864	11,132	0.02

Chapter 6: arrowtooth flounder (partial)

Quantity	Last year	This year	Change
M	0.35/0.20	0.35/0.20	0.00
2017 tier	3a	n/a	none
2018 tier	3a	3a	none
2017 age+ biomass	779,195	n/a	0.01
2018 age+ biomass	772,153	785,141	0.02
2017 spawning biomass	485,802	n/a	0.01
2018 spawning biomass	464,066	490,663	0.06
B100%	530,135	530,135	0.00
B40%	212,054	212,054	0.00
B35%	185,547	185,547	0.00
2018 FOFL	0.151	0.151	0.00
2018 FABC	0.129	0.129	0.00
2017 OFL	76,100	n/a	0.01
2018 OFL	67,023	76,757	0.15
2017 ABC	65,371	n/a	0.01
2018 ABC	58,633	65,932	0.12

Chapter 7: Kamchatka flounder (partial)

Quantity	Last year	This year	Change
M	0.11	0.11	0.00
2017 tier	3a	n/a	none
2018 tier	3a	3a	none
2017 age+ biomass	170,300	n/a	0.11
2018 age+ biomass	181,000	189,868	0.05
2017 spawning biomass	60,300	n/a	0.06
2018 spawning biomass	62,200	63,718	0.02
B100%	126,954	126,954	0.00
B40%	50,782	50,782	0.00
B35%	44,434	44,434	0.00
2018 FOFL	0.078	0.075	-0.04
2018 FABC	0.066	0.064	-0.03
2017 OFL	10,360	n/a	0.10
2018 OFL	10,700	11,347	0.06
2017 ABC	8,880	n/a	0.10
2018 ABC	9,200	9,737	0.06

Chapter 8: northern rock sole (partial)

- This is the only Tier 1 stock not on an annual assessment cycle
- Problem:
  - Assessment models are not supposed to be re-run in “off” years
  - Just the projection model is supposed to be re-run
  - Tier 1 projection model is configured for 2-years-ahead only
    - Tier 1 propagates the full uncertainty, unlike the Tier 3 projection model, so increasing the time horizon is complicated
- Authors’ proposed solution:
  - For now, assume that proportionate changes from 2018-2019 will equal proportionate changes from 2017-2018
  - Expand the time horizon in the Tier 1 projection model from 2 years to 3 before the next “off” year

Northern rock sole, continued

Quantity	Last year	This year	Change
M	0.15	0.15	0.00
2017 tier	1a	n/a	none
2018 tier	1a	1a	none
2017 age+ biomass	1,000,600	n/a	-0.08
2018 age+ biomass	923,200	923,200	0.00
2017 spawning biomass	539,500	n/a	-0.12
2018 spawning biomass	472,200	472,200	0.00
B0	678,310	678,310	0.00
Bmsy	257,000	257,000	0.00
2018 FOFL	0.16	0.16	0.00
2018 FABC	0.155	0.155	0.00
2017 OFL	159,700	n/a	-0.08
2018 OFL	147,300	147,300	0.00
2017 ABC	155,100	n/a	-0.08
2018 ABC	143,100	143,100	0.00

Chapter 9: flathead sole (partial)

Quantity	Last year	This year	Change
M	0.20	0.20	0.00
2017 tier	3a	n/a	none
2018 tier	3a	3a	none
2017 age+ biomass	747,557	n/a	0.02
2018 age+ biomass	758,543	762,513	0.01
2017 spawning biomass	223,469	n/a	-0.04
2018 spawning biomass	206,029	214,124	0.04
B100%	322,938	322,938	0.00
B40%	129,175	129,175	0.00
B35%	113,028	113,028	0.00
2018 FOFL	0.41	0.41	0.00
2018 FABC	0.34	0.34	0.00
2017 OFL	81,654	n/a	-0.02
2018 OFL	79,136	79,862	0.01
2017 ABC	68,278	n/a	-0.02
2018 ABC	66,164	66,773	0.01

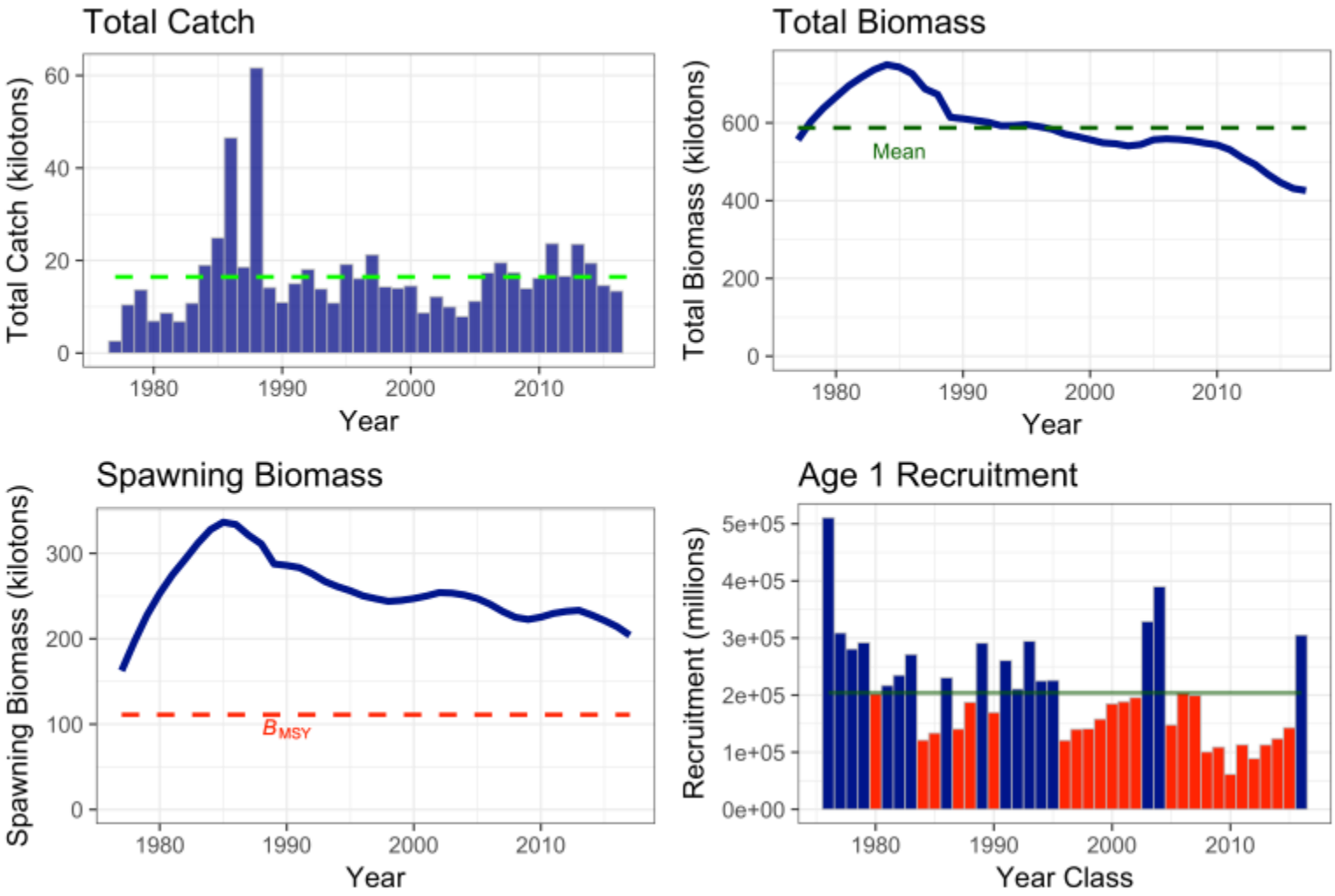
Chapter 10: Alaska plaice (full)

- New data:
  - EBS shelf survey biomass up 15% from 2016
  - 2016 survey agecomp
  - 2016 fishery agecomp
- Model changes/alternatives: none
- Stock status and trend:
  - 2001 and 2002 cohorts are 74% and 106% above average
    - However, 7 most recent cohorts are all below average
  - Spawning biomass has declined at a rate of ~1.4%/year since 2002
  - 2017 spawning biomass is 60% of $B_{100\%}$
- Mohn's ρ = 0.027

Alaska plaice, continued

- Discussion centered around the NBS survey
- In 2017, 40% of the Alaska plaice were caught in the NBS survey, which is comparable to the 38% there in 2010, unlike the dramatic increases seen in Pacific cod and walleye pollock
- A Team Member said it appears that Alaska plaice is moving northward because of recent presence of young plaice north of the NBS; its abundance is inversely related to bottom water temperature
- It is unknown if Alaska plaice is all one stock throughout the Bering Sea and northward into the Chukchi Sea; however, it is likely, as plaice has antifreeze proteins and cold water is not a deterrent
- At present this is not a problem because the biomass is above $B_{40\%}$, but it could be a problem in the future if migration out of the EBS survey area is mistakenly interpreted as implying a large reduction in stock size

Alaska plaice, continued



Alaska plaice, continued

Quantity	Last year	This year	Change
M	0.13	0.13	0.00
2017 tier	3a	n/a	none
2018 tier	3a	3a	none
2017 age+ biomass	412,600	n/a	0.01
2018 age+ biomass	407,300	417,300	0.02
2017 spawning biomass	186,300	n/a	0.03
2018 spawning biomass	177,500	191,460	0.08
B100%	276,250	317,360	0.15
B40%	110,500	126,900	0.15
B35%	96,700	111,100	0.15
2018 FOFL	0.154	0.149	-0.03
2018 FABC	0.128	0.124	-0.03
2017 OFL	42,800	n/a	-0.04
2018 OFL	36,900	41,170	0.12
2017 ABC	36,000	n/a	-0.04
2018 ABC	32,100	34,590	0.08

Chapter 11: other flatfish (none)

Quantity*	Last year	This year	Change
M	0.155	0.155	0.00
2017 tier	5	n/a	none
2018 tier	5	5	none
Biomass	113,450	113,450	0.00
2018 FOFL	0.155	0.155	0.00
2018 FABC	0.116	0.116	0.00
2017 OFL	17,591	n/a	0.00
2018 OFL	17,591	17,591	0.00
2017 ABC	13,193	n/a	0.00
2018 ABC	13,193	13,193	0.00

*Instantaneous rates are biomass-weighted averages

Chapter 12: Pacific ocean perch (partial)

Quantity	Last year	This year	Change
M	0.058	0.058	0.00
2017 tier	3a	n/a	none
2018 tier	3a	3a	none
2017 age+ biomass	767,767	n/a	-0.02
2018 age+ biomass	753,302	749,925	0.00
2017 spawning biomass	314,489	n/a	-0.03
2018 spawning biomass	307,808	305,804	-0.01
B100%	536,713	536,713	0.00
B40%	214,685	214,685	0.00
B35%	187,849	187,849	0.00
2018 FOFL	0.101	0.101	0.00
2018 FABC	0.082	0.082	0.00
2017 OFL	53,152	n/a	-0.03
2018 OFL	51,950	51,675	-0.01
2017 ABC	43,723	n/a	-0.03
2018 ABC	42,735	42,509	-0.01

Chapter 13: northern rockfish (partial)

Quantity	Last year	This year	Change
M	0.046	0.046	0.00
2017 tier	3a	n/a	none
2018 tier	3a	3a	none
2017 age+ biomass	248,160	n/a	-0.01
2018 age+ biomass	245,693	246,160	0.00
2017 spawning biomass	107,660	n/a	-0.01
2018 spawning biomass	106,184	106,486	0.00
B100%	164,674	164,674	0.00
B40%	65,870	65,870	0.00
B35%	57,636	57,636	0.00
2018 FOFL	0.08	0.08	0.00
2018 FABC	0.065	0.065	0.00
2017 OFL	16,242	n/a	-0.02
2018 OFL	15,854	15,888	0.00
2017 ABC	13,264	n/a	-0.02
2018 ABC	12,947	12,975	0.00

Chapter 14: blackspotted/rougheye (partial)

- WAI MSSC = 35 t (2018), 39 t (2019); up from 31 t in 2017
- Because of the high uncertainty in recruitment, the Team recommends that the author consider updating the ageing error matrix, as it is currently based on the GOA and may be contributing to the uncertainty about recruitment

Blackspotted/rougheye, continued

Quantity	Last year	This year	Change
M	0.033	0.033	0.00
2017 tier	3b	n/a	none
2018 tier	3b	3b	none
2017 age+ biomass	35,669	n/a	0.05
2018 age+ biomass	37,474	37,453	0.00
2017 spawning biomass	7,305	n/a	0.12
2018 spawning biomass	8,188	8,208	0.00
B100%	20,777	20,777	0.00
B40%	8,311	8,311	0.00
B35%	7,272	7,272	0.00
2018 FOFL	0.054	0.054	0.00
2018 FABC	0.044	0.044	0.00
2017 OFL	612	n/a	0.22
2018 OFL	750	749	0.00
2017 ABC	501	n/a	0.22
2018 ABC	614	613	0.00

Chapter 15: shortraker rockfish (none)

Quantity	Last year	This year	Change
M	0.030	0.030	0.00
2017 tier	5	n/a	none
2018 tier	5	5	none
Biomass	22,191	22,191	0.00
2018 FOFL	0.030	0.030	0.00
2018 FABC	0.0225	0.0225	0.00
2017 OFL	666	n/a	0.00
2018 OFL	666	666	0.00
2017 ABC	499	n/a	0.00
2018 ABC	499	499	0.00

Chapter 16: other rockfish (none)

Quantity*	Last year	This year	Change
M	0.033	0.033	0.00
2017 tier	5	n/a	none
2018 tier	5	5	none
Biomass	55,312	55,312	0.00
2018 FOFL	0.033	0.033	0.00
2018 FABC	0.025	0.025	0.00
2017 OFL	1,816	n/a	0.00
2018 OFL	1,816	1,816	0.00
2017 ABC	1,362	n/a	0.00
2018 ABC	1,362	1,362	0.00

*Instantaneous rates are biomass-weighted averages

Chapter 17: Atka mackerel (full)

- Switch to author's presentation (Team comments will follow)

Atka mackerel, continued

- In Models 16.0a and 16.0b, the use of Francis weights to tune the constraint on the amount of time variability in fishery selectivity required specifying the mean sample size for the fishery agecomp data *a priori*
- The authors chose a value of 100 for this purpose, which they viewed as “a reasonable specification of overdispersion in fitting composition data” and “a defensible way to arrive at a balance between process and observation error”
- Although Model 16.0a did involve tuning the constraint on the amount of time variability in fishery selectivity, the authors did not consider it to be a viable option, because it did not involve tuning either the fishery or survey age composition data sample sizes
- Model 16.0 also did not involve tuning either the fishery or survey age composition data sample sizes; nor did it involve tuning the constraint on the amount of time variability in fishery selectivity

Atka mackerel, continued

- The authors deemed Model 16.0c to be “too preliminary for further consideration” because:
  - Significant recruitment events were obscured
  - Estimated selectivity for a given block sometimes seemed to reflect the pattern for only a subset of the years in that block
  - Allowing selectivity to vary annually allows the model to fit the fishery age composition data better
- The authors therefore recommended adoption of Model 16.0b, because it tuned the sample sizes of at least one of the compositional data types (*viz*., the survey age compositions), and it addressed the desire for a statistical method for tuning the constraint on the amount of time variability in fishery selectivity

Atka mackerel, continued

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  - Significant recruitment events were obscured
  - Estimated selectivity for a given block sometimes seemed to reflect the pattern for only a subset of the years in that block
  - Allowing selectivity to vary annually allows the model to fit the fishery age composition data better
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Atka mackerel, continued

- The Team engaged in considerable discussion as to whether Model 16.0b constituted a new model, whether it should have been previewed in September, and whether it would be better to retain Model 16.0 for this year and revisit Model 16.0b again next year
- The authors consider all four models to have the same "configuration," but they also identify Model 16.0b with a model number distinct from that of the base model
- Ultimately, the Team accepted the authors' recommendations regarding adoption of Model 16.0b and harvest specifications for 2018-2019

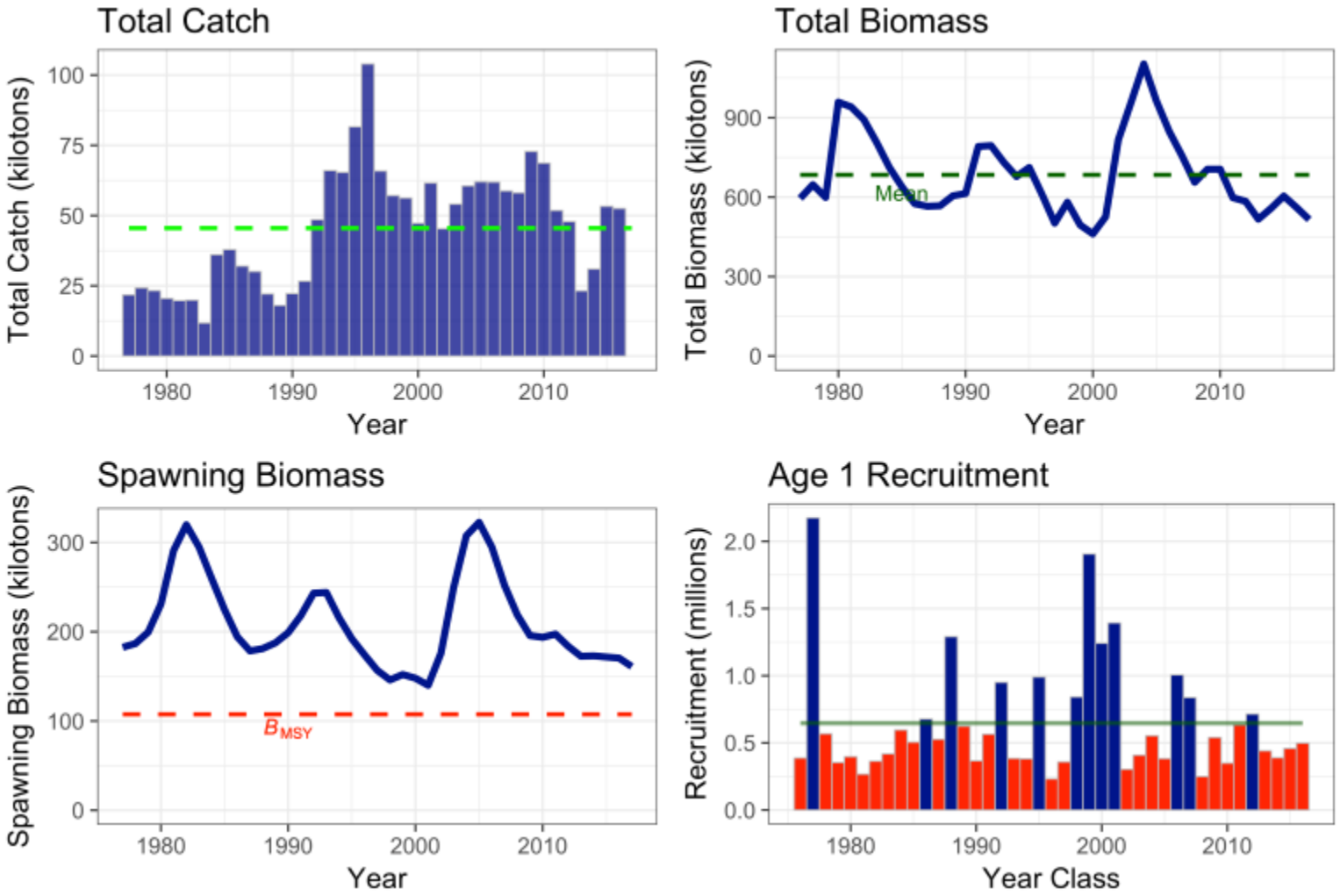
Atka mackerel, continued

- The Team recommends that the authors undertake the following during one or more future assessments (as this is a long list, the Team does not expect all items to be addressed by next September, and understands that the authors can prioritize the list as they see fit):
  - Investigate which parameters (including derived quantities) are changing in the retrospective peels that might contribute to the relationship between historical scale and number of peels
  - Consider dropping the 1986 age composition from the analysis, to be consistent with the policy of not using pre-1991 survey data
  - Improve documentation for the process of using Francis weights to tune the constraint governing the amount of time variability in fishery selectivity
  - (Continued on next slide)

Atka mackerel, continued

- Team recommendations, continued:
  - Continue to investigate fishery selectivity time blocks, with blocks linked to identifiable changes in the fishery
  - Evaluate the sensitivity of model results to an assumed average sample size of 100 for the fishery age composition data, or better yet (if possible), find a way to tune the sample size and the constraint governing the amount of time variability in fishery selectivity simultaneously
  - Investigate whether a larger number of survey otoliths can be collected in a representative fashion
  - Continue the investigation of age-dependent natural mortality
  - Continue to include (and update) Figure 17.5

Atka mackerel, continued



Atka mackerel, continued

Quantity	Last year	This year	Change
M	0.30	0.30	0.00
2017 tier	3a	n/a	none
2018 tier	3a	3a	none
2017 age+ biomass	598,791	n/a	0.00
2018 age+ biomass	611,442	599,000	-0.02
2017 spawning biomass	145,258	n/a	-0.04
2018 spawning biomass	138,791	139,300	0.00
B100%	313,220	307,150	-0.02
B40%	125,288	122,860	-0.02
B35%	109,627	107,500	-0.02
2018 FOFL	0.40	0.46	0.15
2018 FABC	0.34	0.38	0.12
2017 OFL	102,700	n/a	0.06
2018 OFL	99,900	108,600	0.09
2017 ABC	87,200	n/a	0.06
2018 ABC	85,000	92,000	0.08

Chapter 18: skates (partial)

- Alaska skate:

Quantity	Last year	This year	Change
M	0.13	0.13	0.00
2017 tier	3a	n/a	none
2018 tier	3a	3a	none
2017 age+ biomass	506,921	n/a	-0.06
2018 age+ biomass	487,035	478,306	-0.02
2017 spawning biomass	110,180	n/a	-0.03
2018 spawning biomass	110,159	107,136	-0.03
B100%	180,556	180,556	0.00
B40%	72,222	72,222	0.00
B35%	63,195	63,195	0.00
2018 FOFL	0.092	0.092	0.00
2018 FABC	0.079	0.079	0.00
2017 OFL	39,162	n/a	-0.06
2018 OFL	37,365	36,655	-0.02
2017 ABC	33,731	n/a	-0.06
2018 ABC	32,183	31,572	-0.02

Skates, continued

- Other skates:
  - Although a new EBS shelf survey estimate was available, the Tier 5 random effects model was not re-run, because new estimates from the EBS slope and AI surveys were not available
  - The Team recommends that the author work with FMA and AKRO staff to investigate species composition
  - The Team requests that the author examine exploitation rates by species for the complex, in particular the endemic species in the Aleutian Islands (leopard and butterfly skates)

Skates, continued

- Other skates, continued

Quantity	Last year	This year	Change
M	0.10	0.10	0.00
2017 tier	5	n/a	none
2018 tier	5	5	none
Biomass	100,130	100,130	0.00
2018 FOFL	0.10	0.10	0.00
2018 FABC	0.075	0.075	0.00
2017 OFL	10,013	n/a	0.00
2018 OFL	10,013	10,013	0.00
2017 ABC	7,510	n/a	0.00
2018 ABC	7,510	7,510	0.00

Chapter 19: sculpins (partial)

- EBS shelf biomass estimate for 2017 down 9% from high in 2016
- Tier 5 random effects model *was* re-run

Quantity*	Last year	This year	Change
M	0.283	0.282	0.00
2017 tier	5	n/a	none
2018 tier	5	5	none
Biomass	199,937	188,656	-0.06
2018 FOFL	0.283	0.282	0.00
2018 FABC	0.212	0.212	0.00
2017 OFL	56,582	n/a	-0.06
2018 OFL	56,582	53,201	-0.06
2017 ABC	42,387	n/a	-0.06
2018 ABC	42,387	39,995	-0.06

*Instantaneous rates are biomass-weighted averages

Chapter 20: sharks (none)

Quantity	Last year	This year	Change
2017 tier	6	n/a	none
2018 tier	6	6	none
2017 OFL	689	n/a	0.00
2018 OFL	689	689	0.00
2017 ABC	517	n/a	0.00
2018 ABC	517	517	0.00

Chapter 21: squids (none)

Quantity	Last year	This year	Change
2017 tier	6	n/a	none
2018 tier	6	6	none
2017 OFL	6,912	n/a	0.00
2018 OFL	6,912	6,912	0.00
2017 ABC	5,184	n/a	0.00
2018 ABC	5,184	5,184	0.00

Chapter 22: octopus (none)

Quantity	Last year	This year	Change
2017 tier	6	n/a	none
2018 tier	6	6	none
2017 OFL	4,769	n/a	0.00
2018 OFL	4,769	4,769	0.00
2017 ABC	3,576	n/a	0.00
2018 ABC	3,576	3,576	0.00

Forage fish

- Per SSC request, this report will continue to be produced inside the SAFE report on a biennial cycle instead of inside the ESR
- The Team discussed the utility of reporting the bycatch of these species in either this chapter or the ESR instead of in the individual species-specific chapters
  - There seemed to be some benefit to consolidating all discussions of bycatch of non-target species in the ESR as more applicable to a broader audience than within the species-specific chapters as per present practice
- The Team discussed the current results for the examination of temperature and trends, noting that the assessment author may wish to plot mean annual CPUE as a function of annual temperature and, until the warm/cold relationship is established, remove “warm” and “cold” from the block names

Forage fish (continued)

- The Team discussed the herring savings area closures and potential mis-specificity of their application and locations
- The Team noted that the assessment author may wish to examine catch inside and outside of the current herring areas in the next report
- The Team also noted that the assessment author may wish to evaluate spatial population considerations to consider aspects such as herring migration or whether some core areas of abundance for herring and broader forage species locations have shifted over time
    - This could help to elucidate reasons for corollary issues such as broad scale seabird die-offs