GOA Pacific ocean perch

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Outline:

1. SSC/Plan team comments
2. Assessment changes
3. Input data
4. Model fits
5. Model results
6. Recommendations
7. Apportionment
8. Risk table
9. Future work

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SSC/Plan team comments:

From 2018:

"The Plan Team supports these future research topics, and additionally recommends:

1. *investigation of natural mortality, as the current estimate of 0.066 is higher than the expected value from the prior distribution (0.05) and may be constraining the model*
2. *re-evaluation of the age-plus group, as changes to the model and input data have occurred since this was previously evaluated*
3. *continued evaluation of methods for weighting for the compositional data as new models are developed and/or changes are made to input data."*

(Plan Team, November 2018)

"The SSC supports the author's and PT's suggestions to investigate the following topics in the next CIE review for GOA rockfish (scheduled for spring 2019):

- *incorporating hydroacoustic information into the assessment as the species are regularly found throughout the water column*
- *examining fishery-dependent information, e.g., how age samples are being collected*
- *examining catchability, which has been an ongoing issue for POP and other rockfish species, coupled with selectivity (a manuscript is currently in preparation to inform priors)*
- *examining the VAST model for POP, and possibly dusky and northern rockfish"*

(SSC, December 2018)

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SSC/Plan team comments:

From 2019:

"The Team discussed the acoustic survey selectivity and recommends further exploration of using the raw acoustic survey lengths, the acoustic abundance weighted length compositions, or using the bottom trawl survey selectivity as a proxy." (September 2019)

The Team endorses the author considerations for the CIE review's terms of reference:

- *incorporating hydroacoustic information into the assessment as the species are regularly found throughout the water column,*
- *examining catchability, which has been an ongoing issue for POP and other rockfish species, coupled with selectivity (a manuscript is currently in preparation to inform priors)*
- *examining the VAST model for POP abundance and apportionment.*

(Plan Team, November 2019)

The SSC supports the GOA GPT recommendation to explore incorporating hydroacoustic information into the assessment, examining catchability and selectivity, and examining the VAST model for POP abundance and apportionment. The SSC agrees that the formation of an internal assessment review team prior to the CIE review would be beneficial. (SSC, December 2019)

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SSC/Plan team comments:

Distilled:

Done:

- ✓ Examine catchability
- ✓ Investigate natural mortality
- ✓ Form an internal review team

To do/ongoing:

- Explore selectivity
- Examine VAST model
- Data weighting for compositional data
- Explore inclusion of hydroacoustic index
- Re-evaluate plus age group
- Examine how fishery-dependent ages are being collected

Assessment changes

- Data updates
- Parameter prior updates

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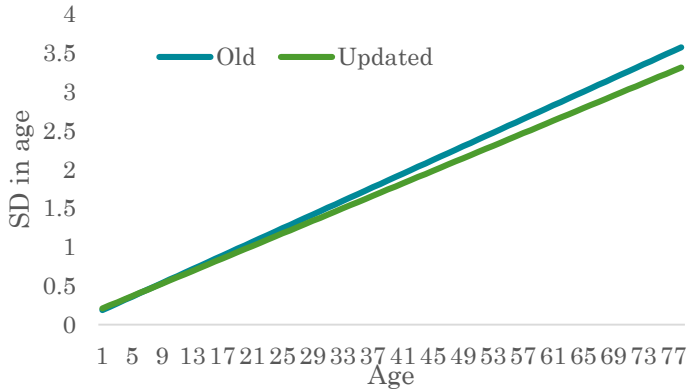
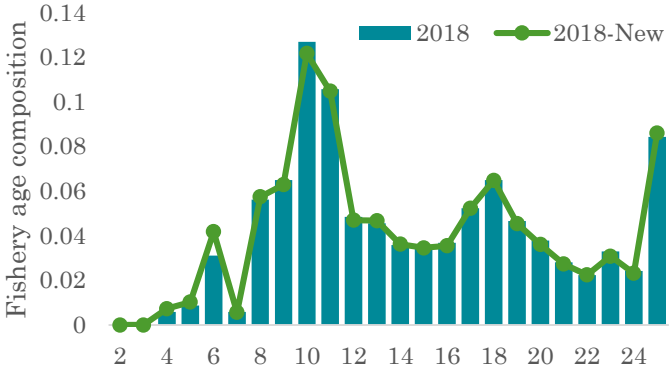
Summary of changes:

Data Updates:

- Update reader-tester agreement data, 2017.1a



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



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Summary of changes:

Parameter prior updates:

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

Estimator	M
$Then_{nls}$	0.0809
$Then_{lm}$	0.0581
$Then_{1parm}$	0.0605
Hamel	0.0614

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

- Combined model, 2020.1

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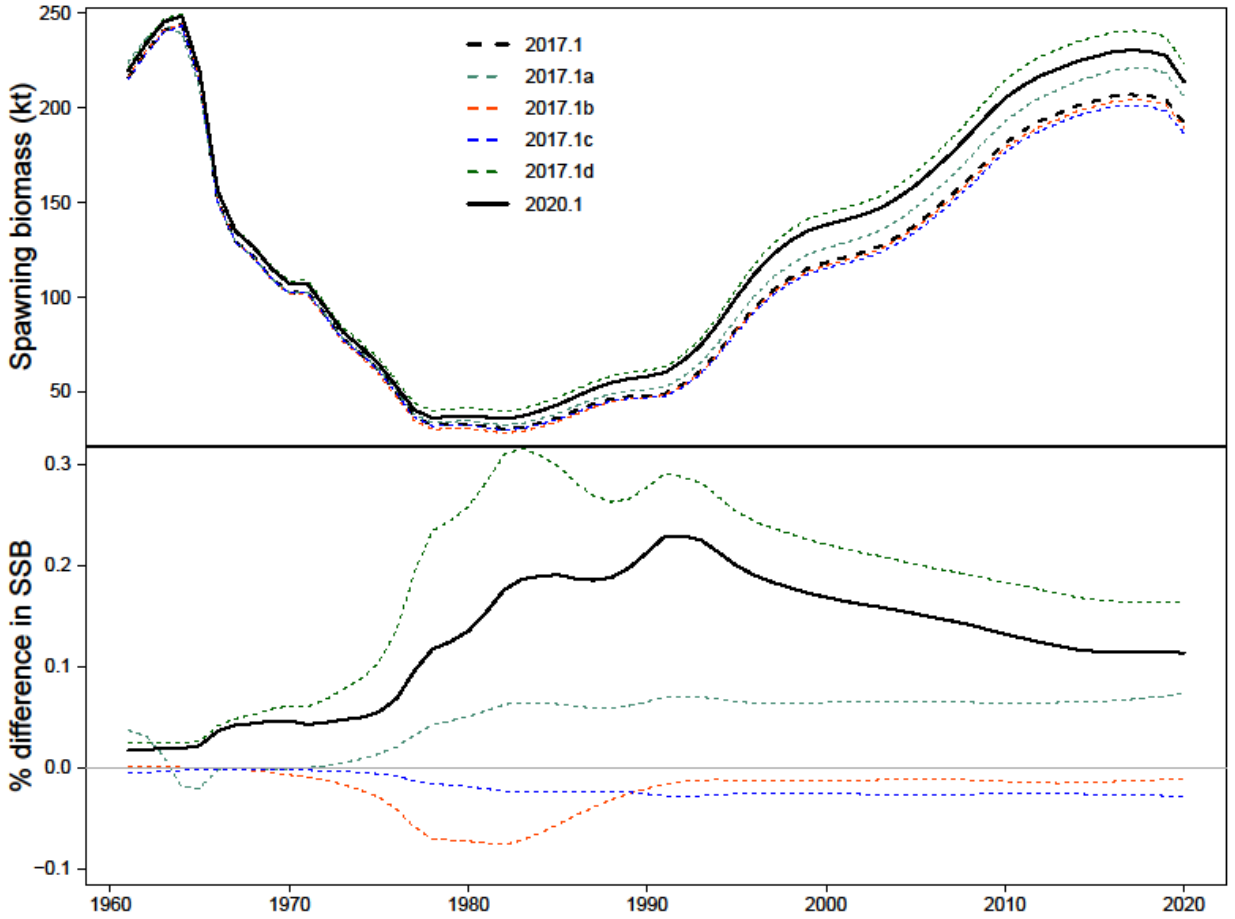

Model scenarios

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

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Input data

- Much the same as 2019 assessment
- New data: 2019 survey age comps

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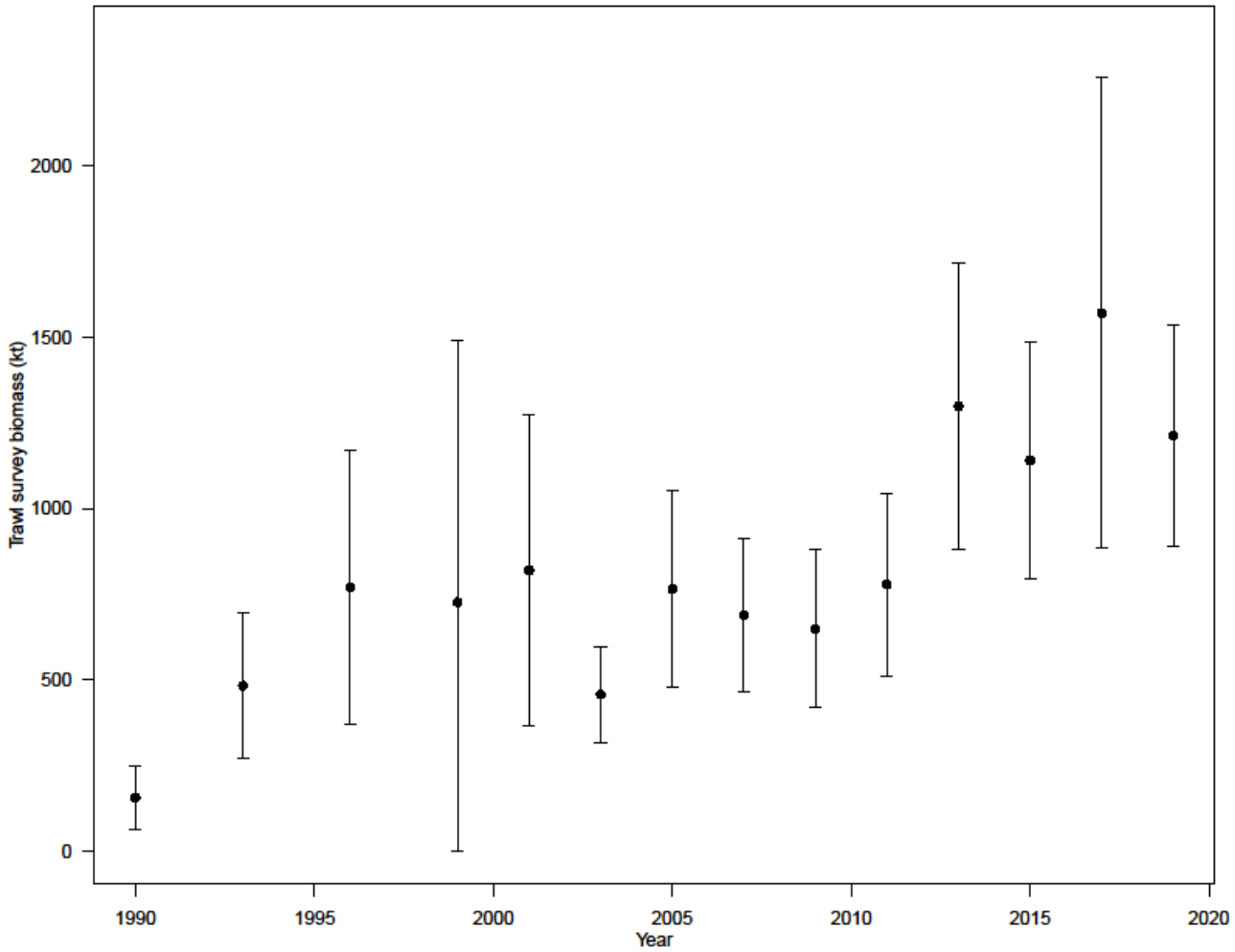

Trawl survey biomass

Reminder: > 1 million mt since 2011, smallest CV (14%) of time series in 2019

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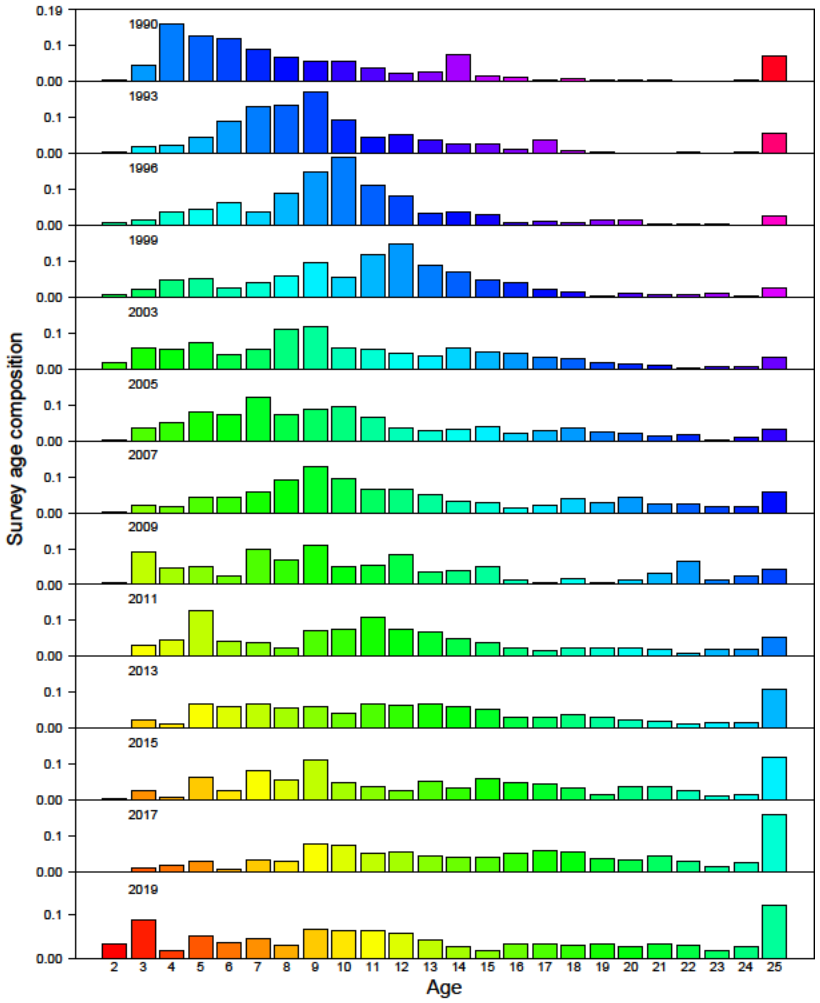

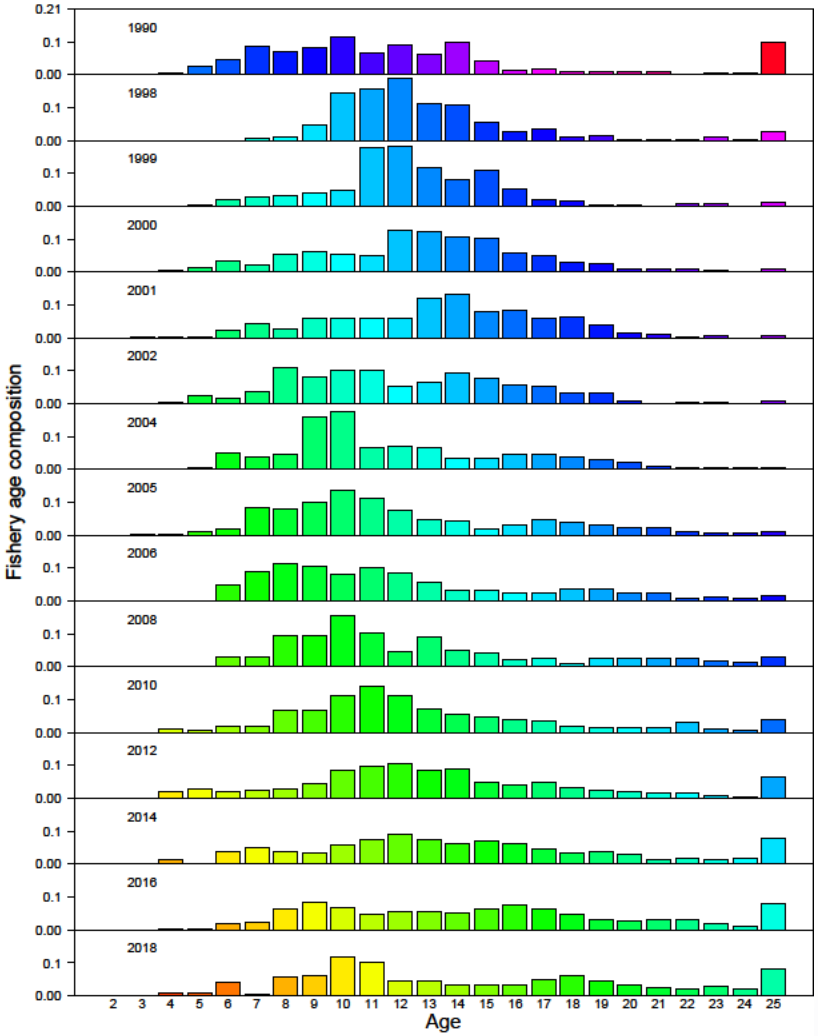

Age composition

Baby of the blob: 2016 year-class showing up in survey

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Model fits

- Catch
- Trawl survey
- Age comp
- Length comp

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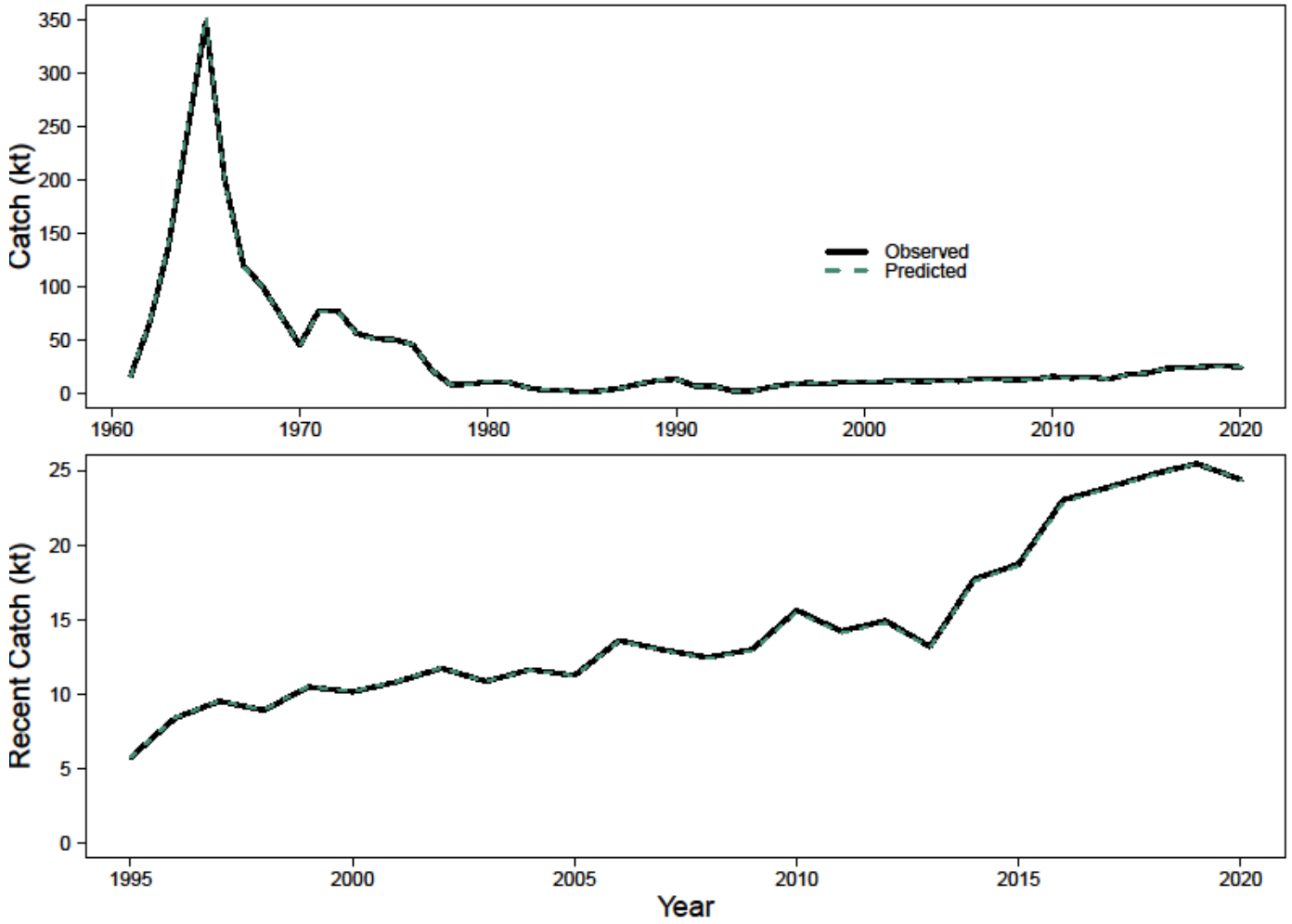

Catch fit

Catch increasing over time in general, downtick in 2020

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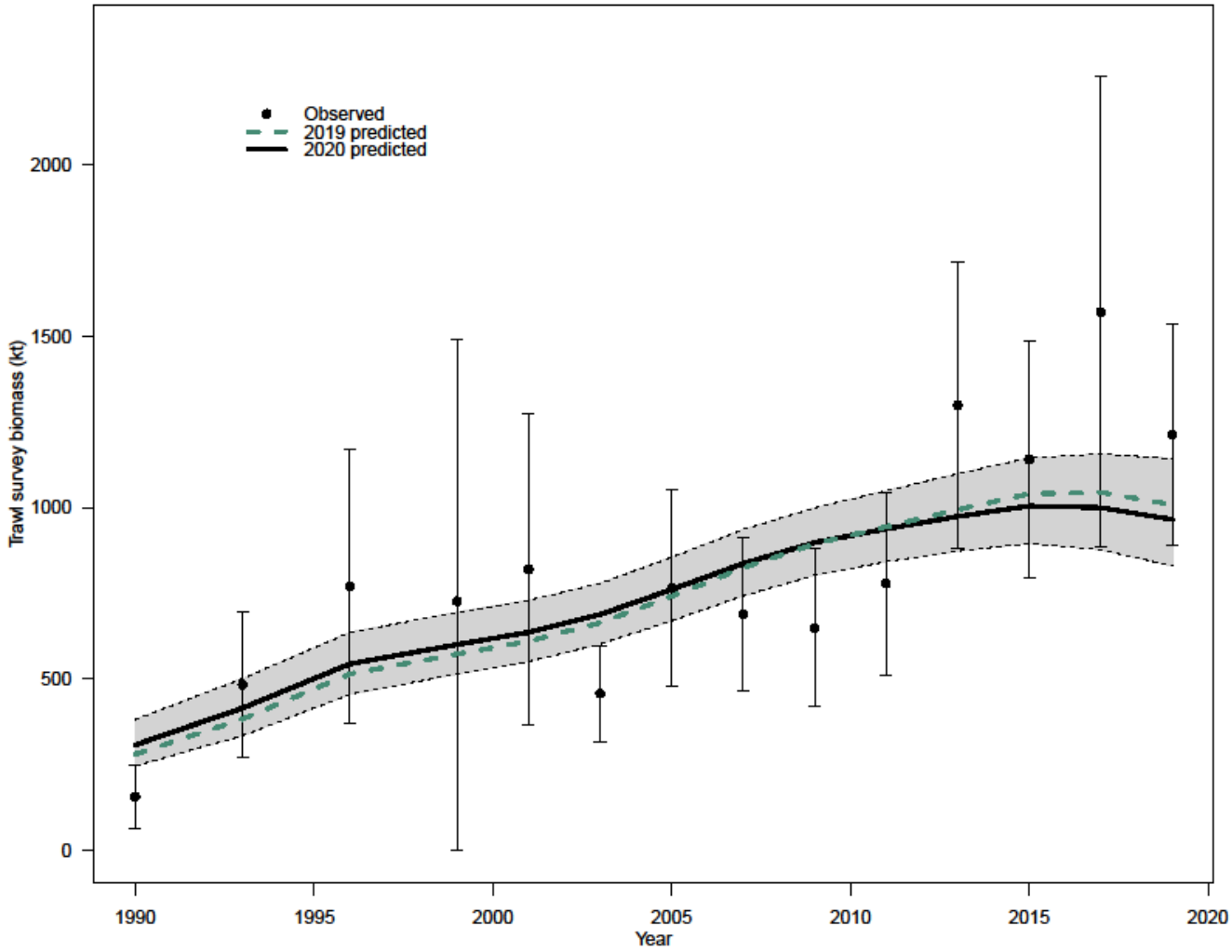

Trawl survey biomass fit

Slightly worse in recent 4 years compared to 2019 assessment

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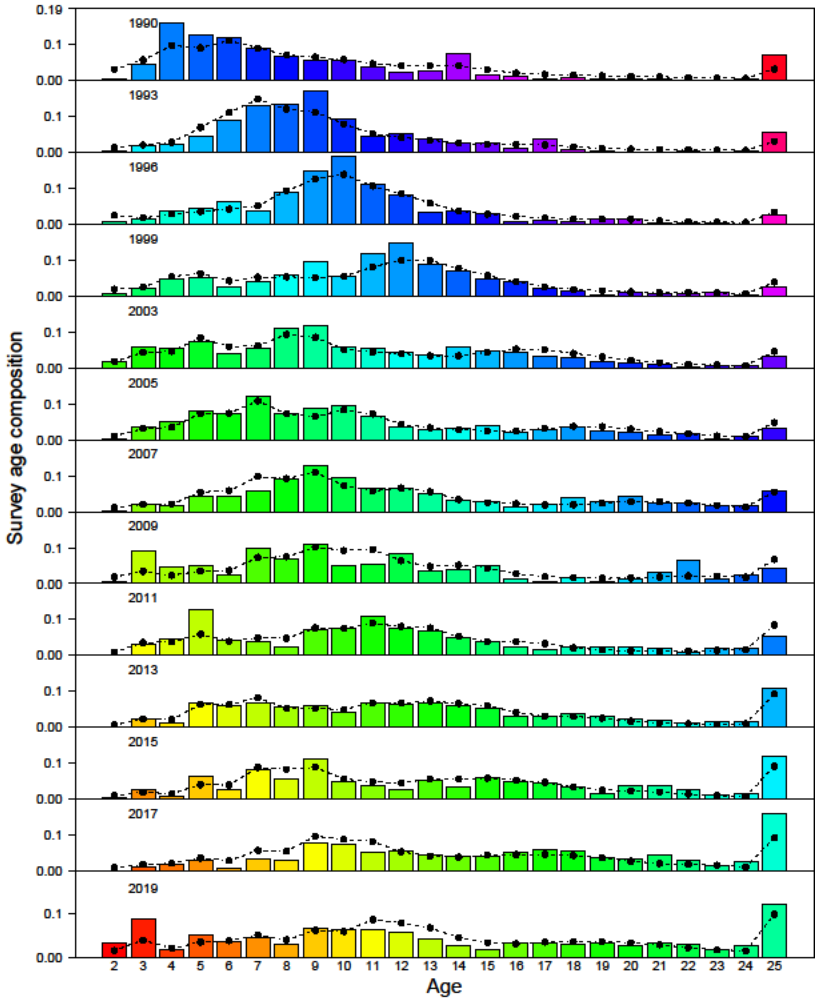

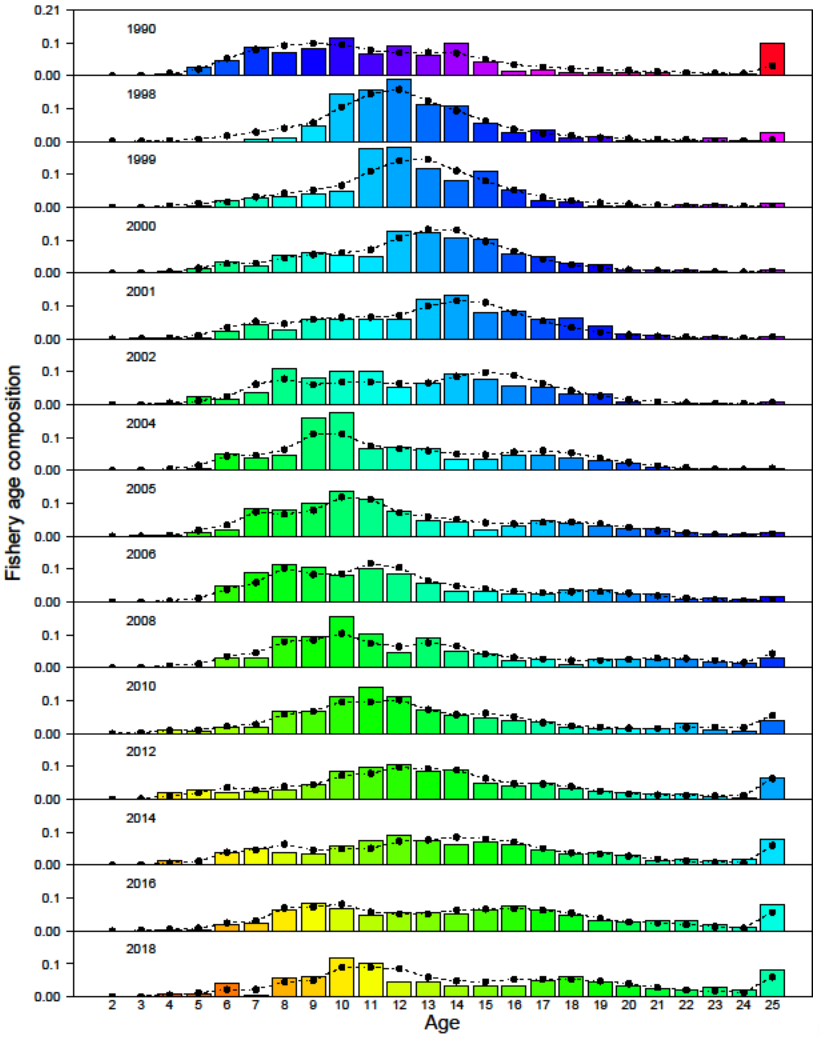

Age comp fit

Not quite fitting the 2016 year class yet

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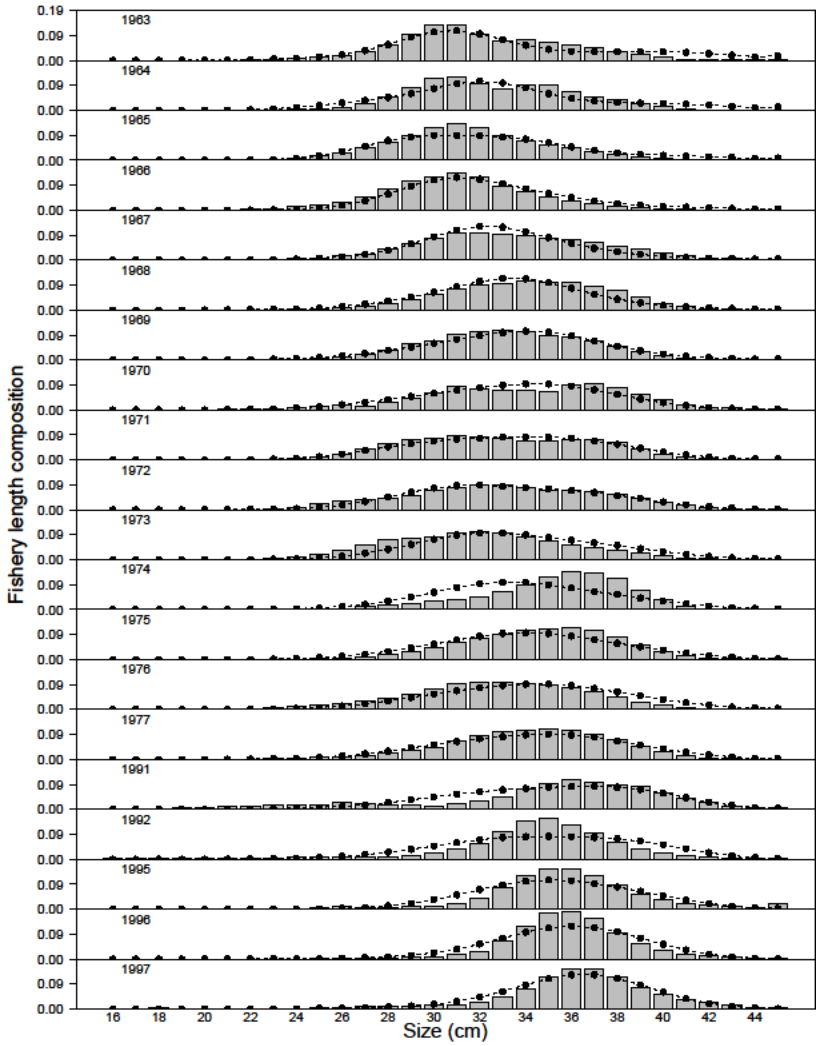

Length comp fit

Nothing particularly unusual

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Likelihoods	17.1 (2019)	20.1
Catch	0.21	0.17
Survey Biomass	13.90	15.65
Fishery Ages	20.83	19.34
Survey Ages	22.34	25.65
Fishery Sizes	66.42	65.06
Maturity	103.52	103.52
Data-Likelihood	227.23	229.39
Penalties/Priors		
Recruitment Devs	16.26	10.56
F Regularity	5.43	5.92
σ_r prior	6.69	7.85
q prior	1.22	0.50
M prior	3.26	2.23
Objective Fun Total	260.09	256.45

Overall fit

Minor differences with data fit, larger difference with penalties/priors

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Model results

- Main parameters & uncertainty
- Selectivity/maturity
- Recruitment
- Biomass
- Retrospective
- Management/projections

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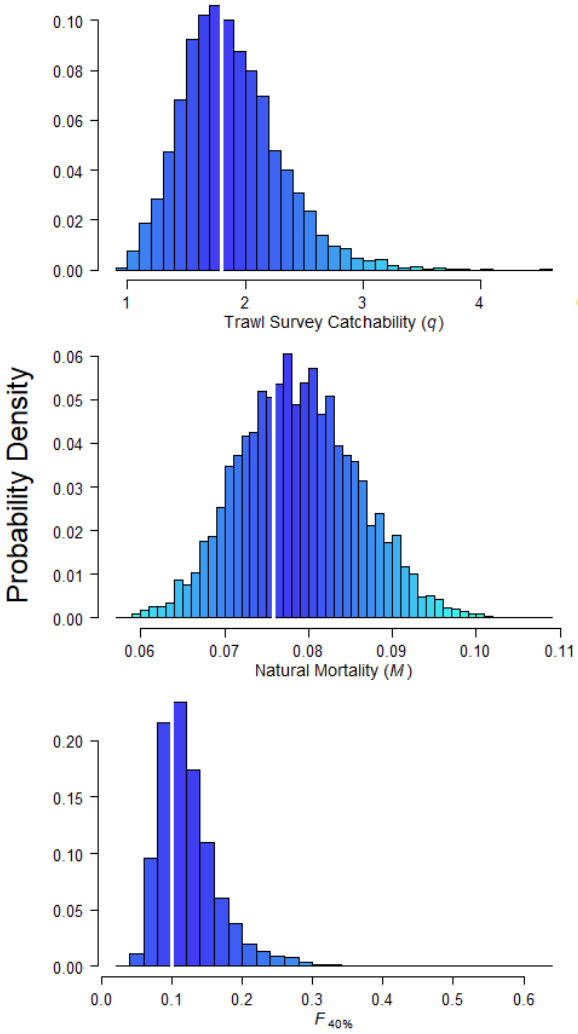
Parameter Ests.	17.1 (2019)	20.1
Active parameters	162	164
q	2.01	1.80
M	0.065	0.076
σ_r	0.82	0.77
Mean Recruitment	62.09	84.07
$F_{40\%}$	0.09	0.10



Main parameters

q decrease with M increase

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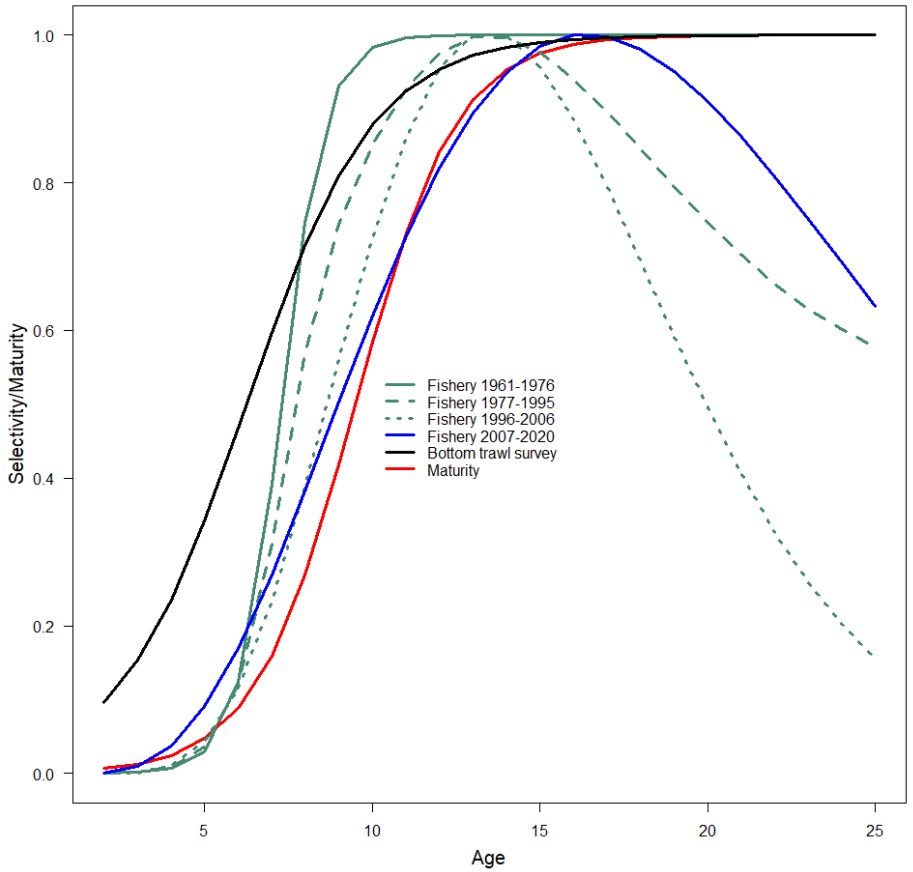

Selectivity/maturity

Not much different than 2019

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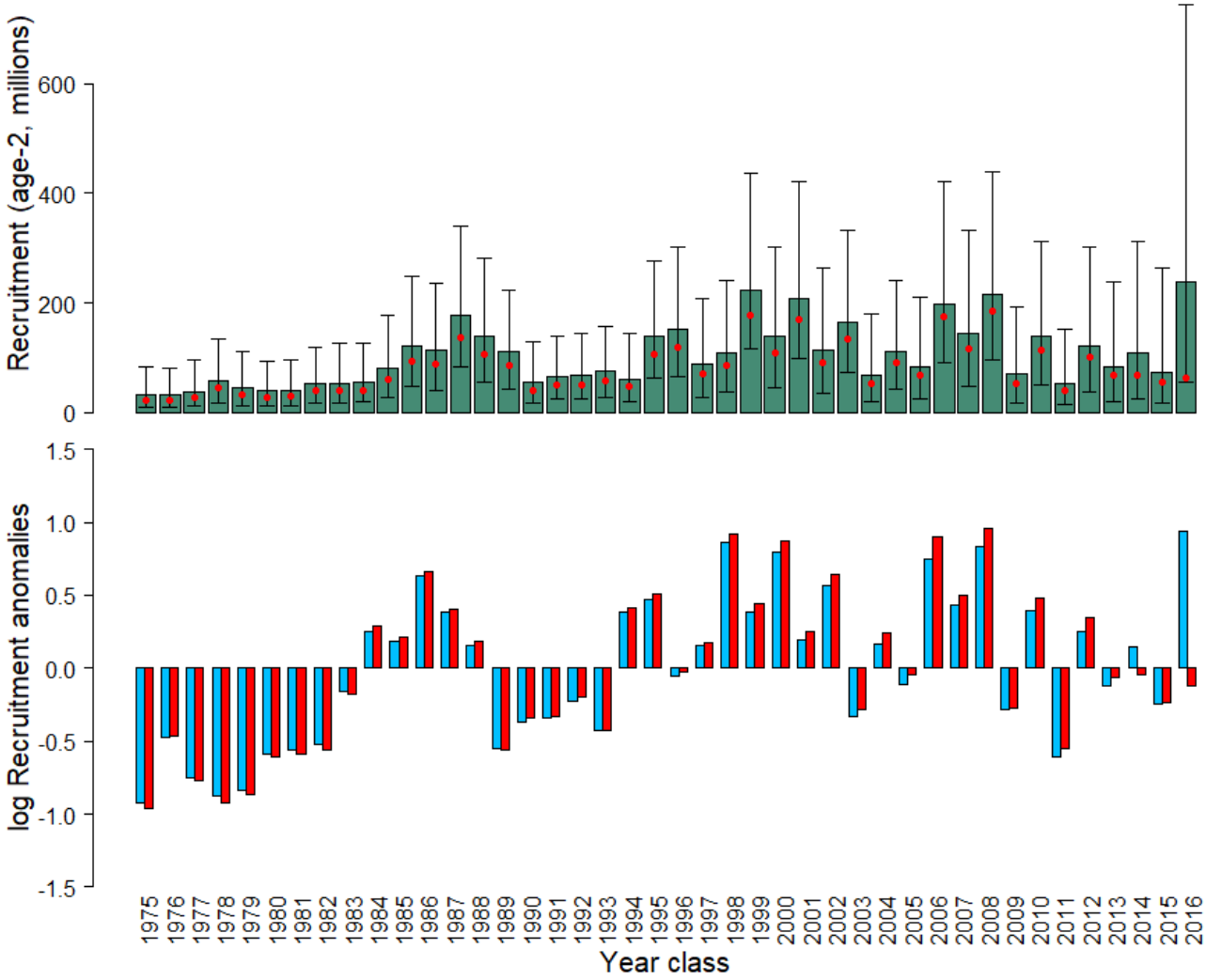

Recruitment

Things starting to decouple in recent year classes (like 2014 and 2016), large uncertainty in 2016 year class strength

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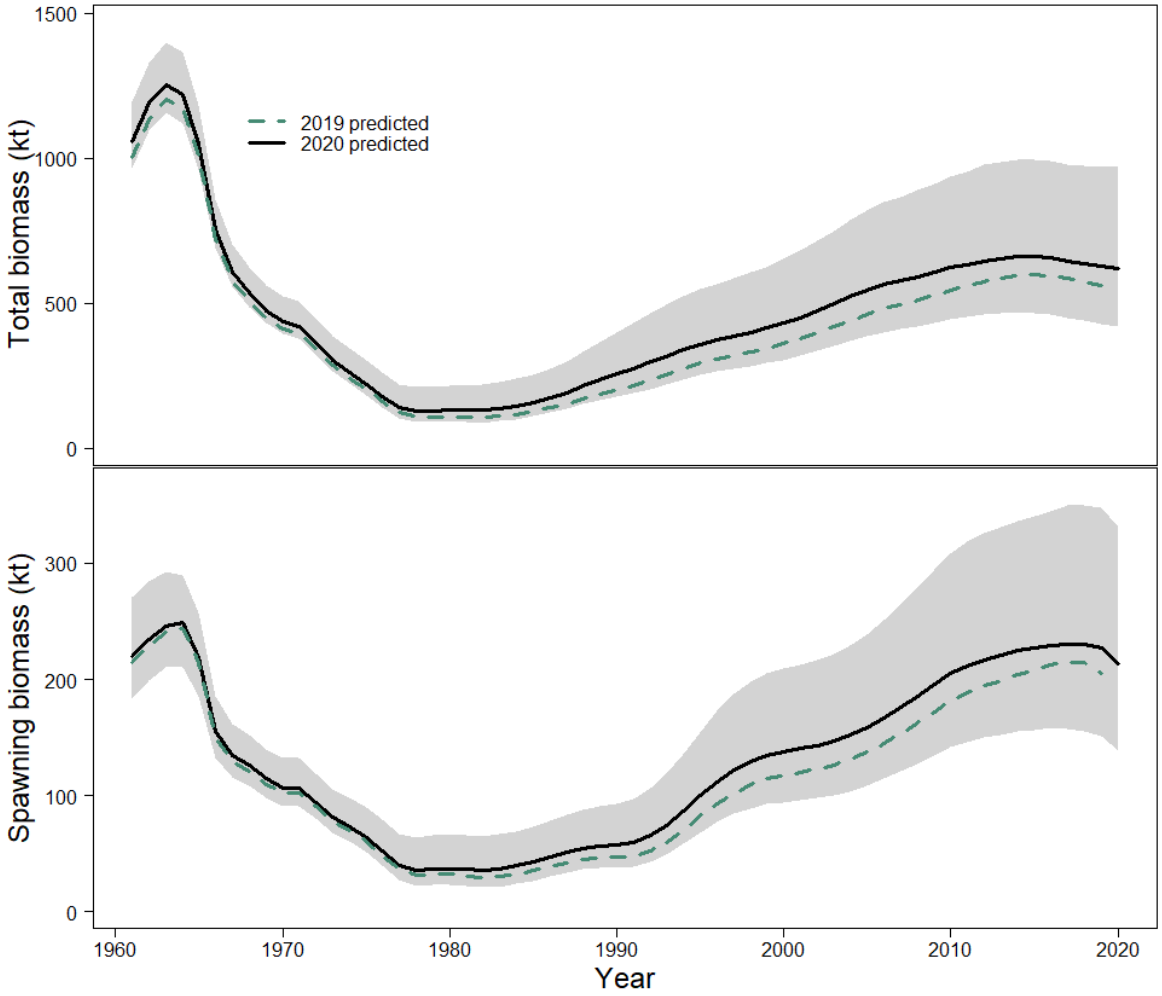

Biomass

Increased compared to 2019 assessment

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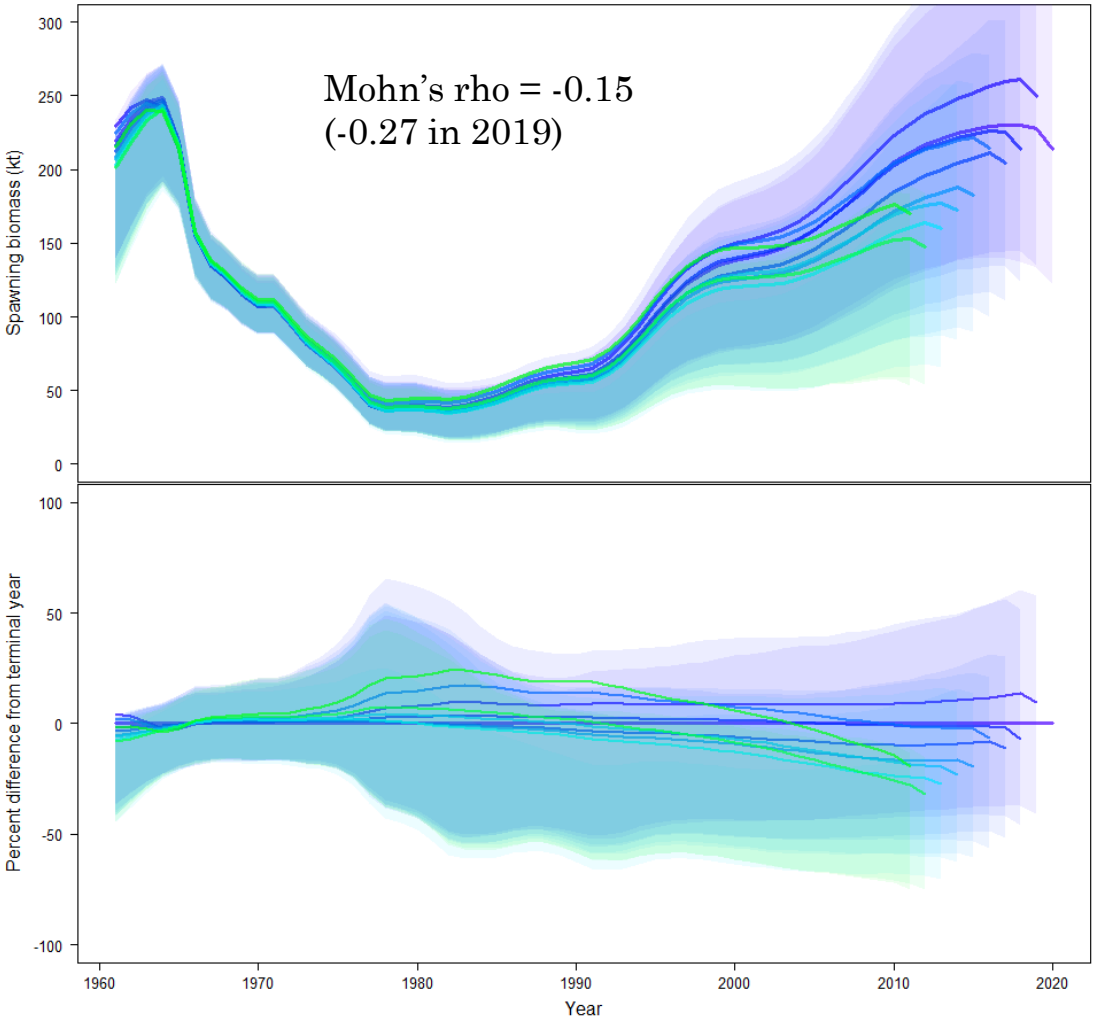

Retrospective

Improved since 2019 assessment

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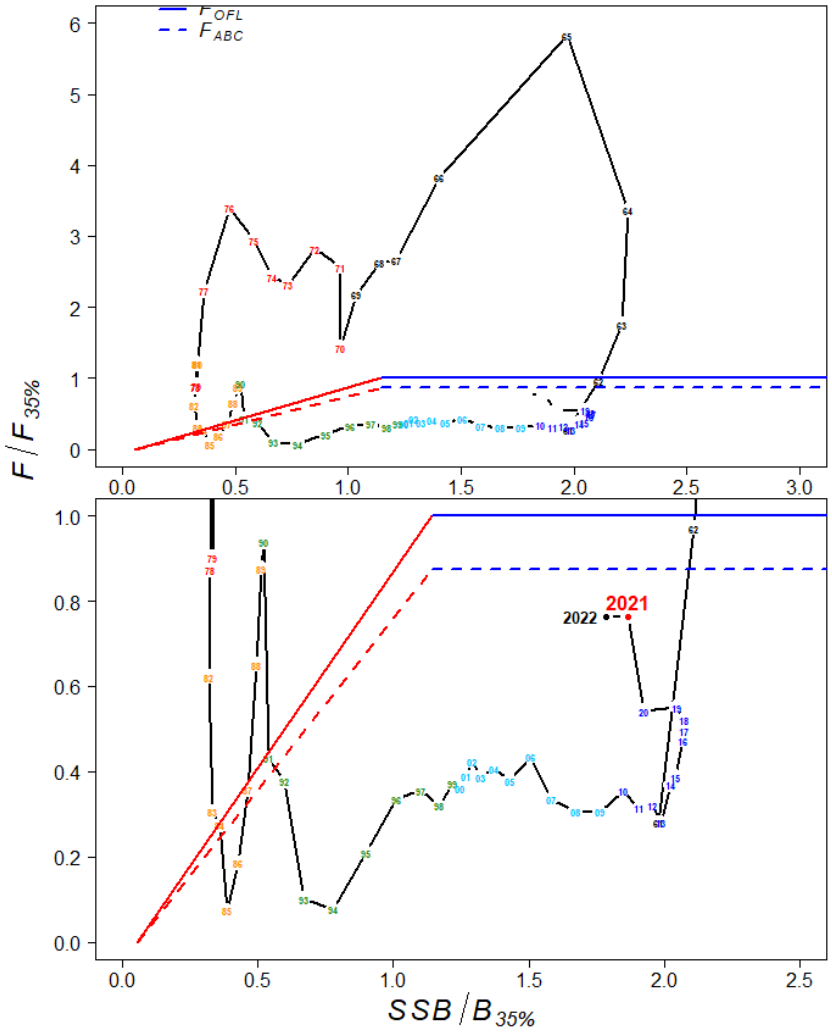

Management path

Still under control rule

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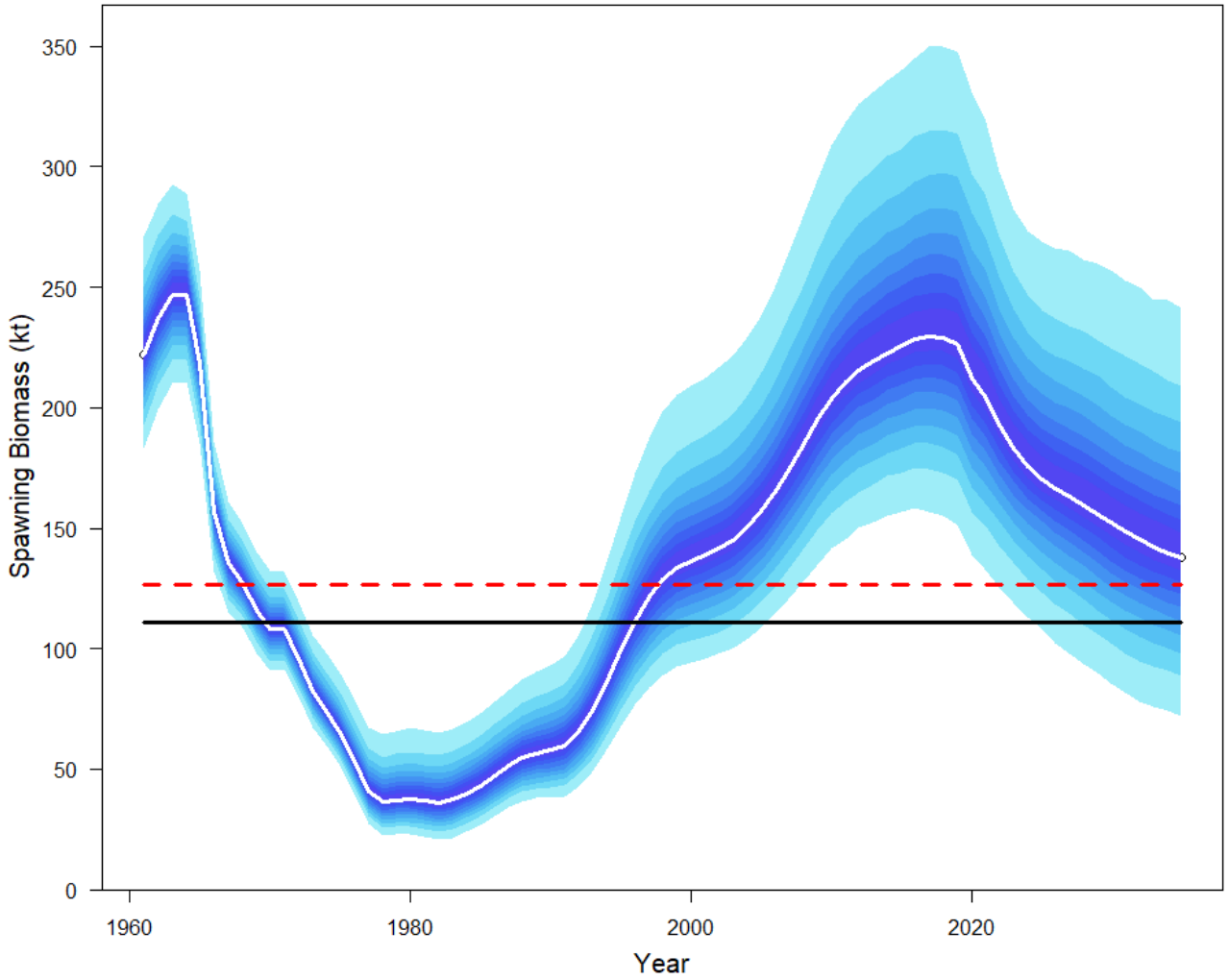

Projections

Projected decrease in next 10 years

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Recommendations

	As estimated or specified last year for:		As estimated or recommended this year for:	
Quantity	2020	2021	2021	2022[1]
M (natural mortality)	0.065	0.065	0.075	0.075
Tier	3a	3a	3a	3a
Projected total (age 2+) biomass (t)	544,569	524,883	613,522	597,732
Projected Female spawning biomass	201,518	194,795	207,096	198,179
$B_{100\%}$	319,837	319,837	317,035	317,035
$B_{40\%}$	127,935	127,935	126,814	126,814
$B_{35\%}$	111,943	111,943	110,962	110,962
F_{OFL}	0.108	0.108	0.120	0.120
$maxF_{ABC}$	0.090	0.090	0.100	0.100
F_{ABC}	0.090	0.090	0.100	0.100
OFL (t)	37,092	35,600	**42,977**	41,110
maxABC (t)	31,238	29,983	**36,177**	34,602
ABC (t)	31,238	29,983	**36,177**	34,602
Status	As determined last year for:		As determined this year for:	
	2018	2019	2019	2020
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

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Apportionment

No change from 2019 (in terms of proportional allocation)

Area Apportionment	Western 4.6%	Central 75.8%	Eastern 19.6%	Total 100%
2021 Area ABC (t)	**1,643**	**27,429**	**7,105**	**36,177**
2022 Area ABC (t)	**1,572**	**26,234**	**6,796**	**34,602**

	W. Yakutat 24%	E. Yakutat/Southeast 76%	Total 100%
2021 Area ABC (t)	**1,705**	**5,400**	**7,105**
2022 Area ABC (t)	**1,631**	**5,165**	**6,796**

	W/C/W. Yakutat	E. Yakutat/Southeast	Total
2021 Area OFL (t)	**36,563**	**6,414**	**42,977**
2022 Area OFL (t)	**34,974**	**6,136**	**41,110**

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Risk table

No change from 2019

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

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

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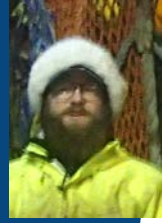

Future work

- Continue working with internal review team
- Virtual CIE scheduled for March

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