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2020 Management Track Assessment & Peer Review: Butterfish

Charles Adams
NEFSC Population Dynamics Branch

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Outline

- Methods
- Results
- Biological reference points
- Projections
- Assumptions & uncertainties
- ABC projections



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Background

- Last assessed in 2017 with ASAP4 using data for 1989–2016
 - Status: not overfished, overfishing not occurring
- Last benchmark in 2014 as part of SAW 58 with ASAP4 using data for 1989–2012
 - Status: not overfished, overfishing not occurring



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Recommended level of review

- Level 2 (Expedited)
 - Calculate new values for existing BRPs
 - Updated discard estimates
 - Updated NEAMAP indices at age



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Methods: model formulation

- ASAP4
- Years: 1989–2019
- Ages: 0 to 4+
- Fishery
 - 1 fleet (landings + discards)
 - 1 commercial selectivity time block
 - Selectivity set to full for ages 2+
 - CVs based on variance for discards



Methods: model formulation

- Surveys
 - NEFSC fall offshore 1989–2019
 - Catchability fixed as a product of availability ($A = 0.62$) and efficiency (0.2)
 - A is mean for 1989–2015 (no longer updated)
 - NEFSC fall inshore 1989–2008
 - NEAMAP fall 2007–2019
 - Selectivity set to full for age 0
 - CVs design-based estimates rescaled based on RMSE diagnostics



Methods: model formulation

- Recruitment CV set to 0.6
- M is estimated

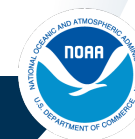
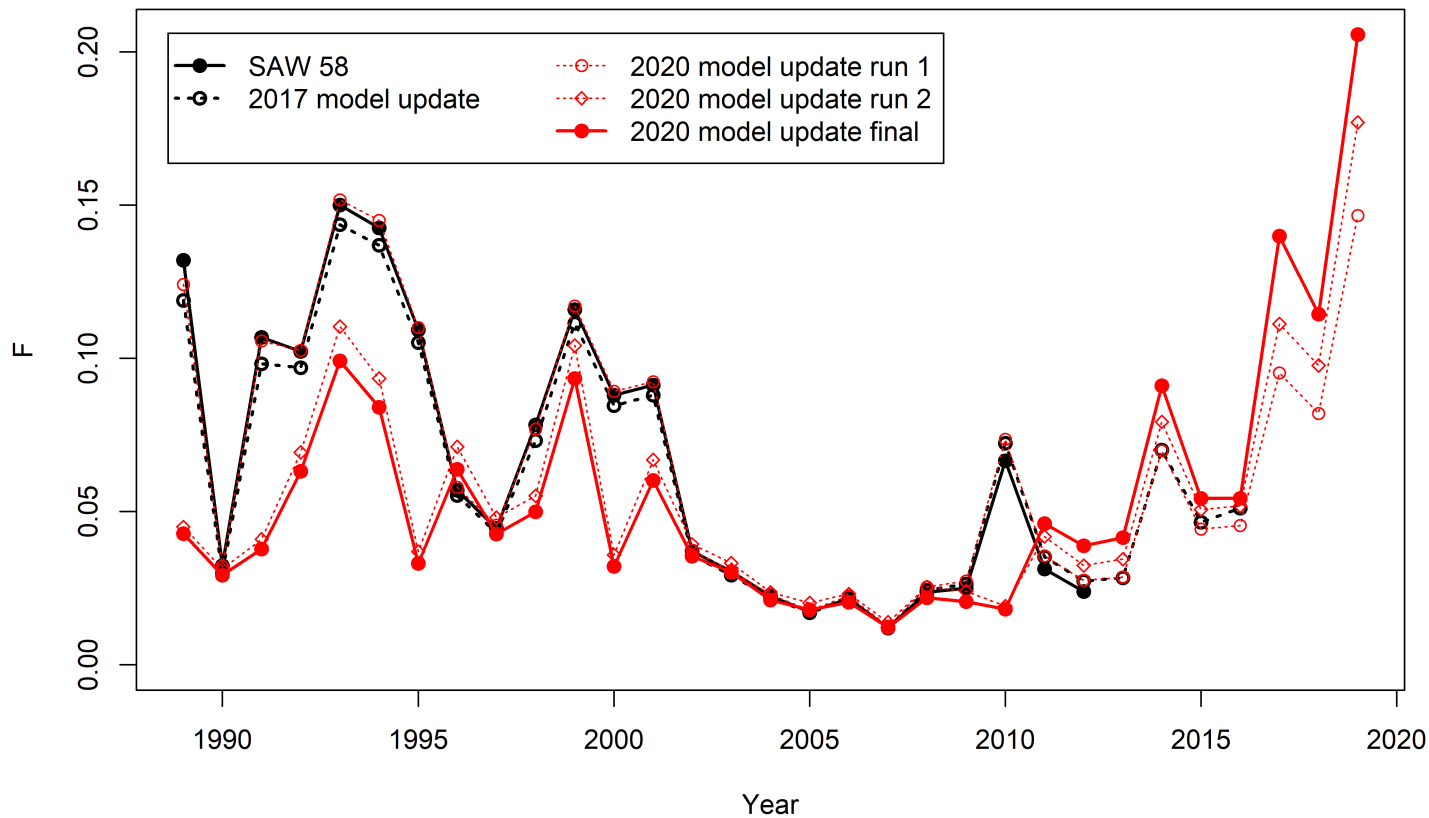


Methods: model runs

- Run 1
 - Add data for 2017–2019 to the 2017 model
- Run 2
 - Switch to corrected time series of discards
- Run 3
 - Use NEAMAP indices at age calculated with the NEAMAP ALK

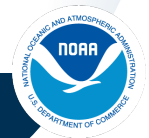
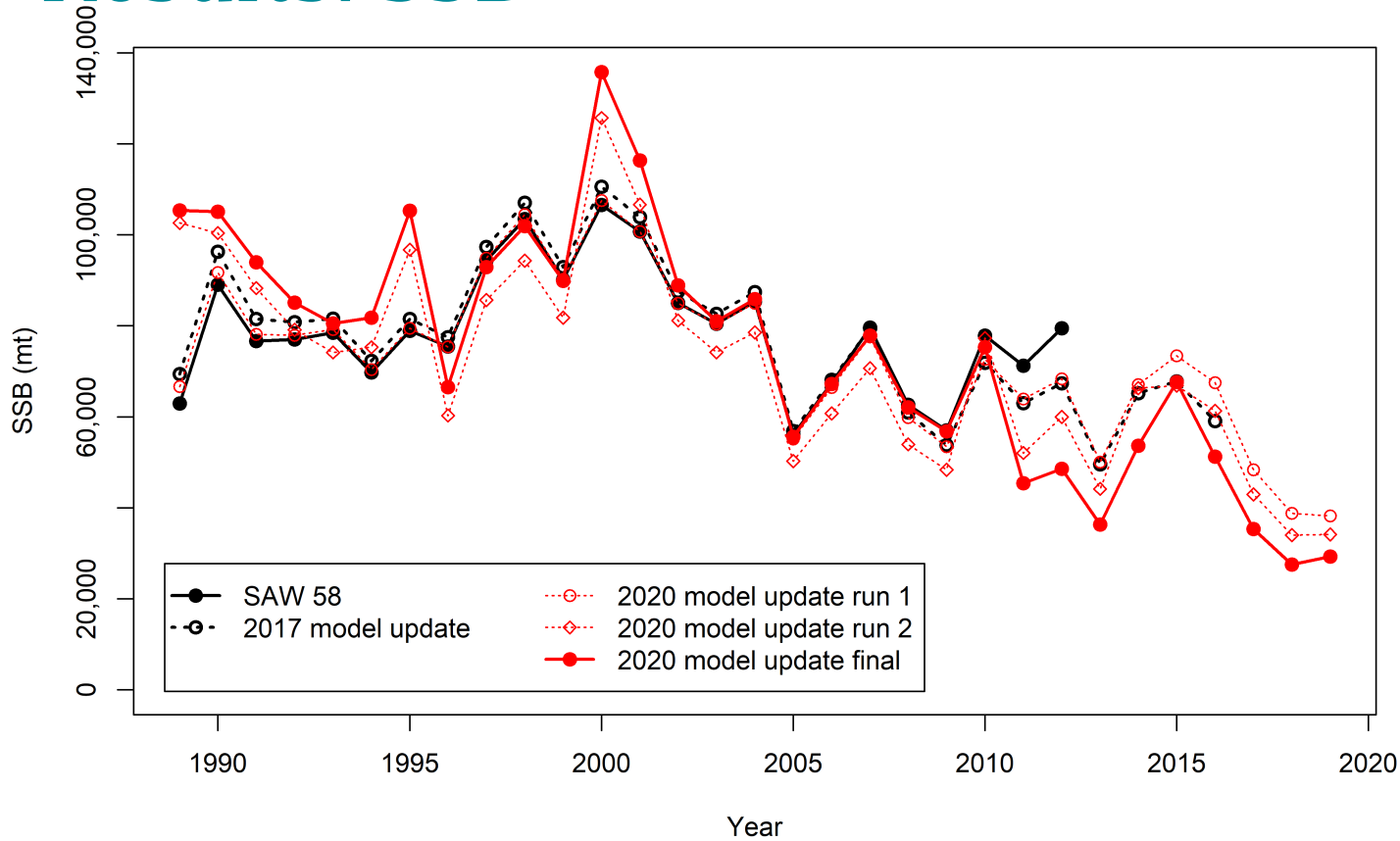


Results: F



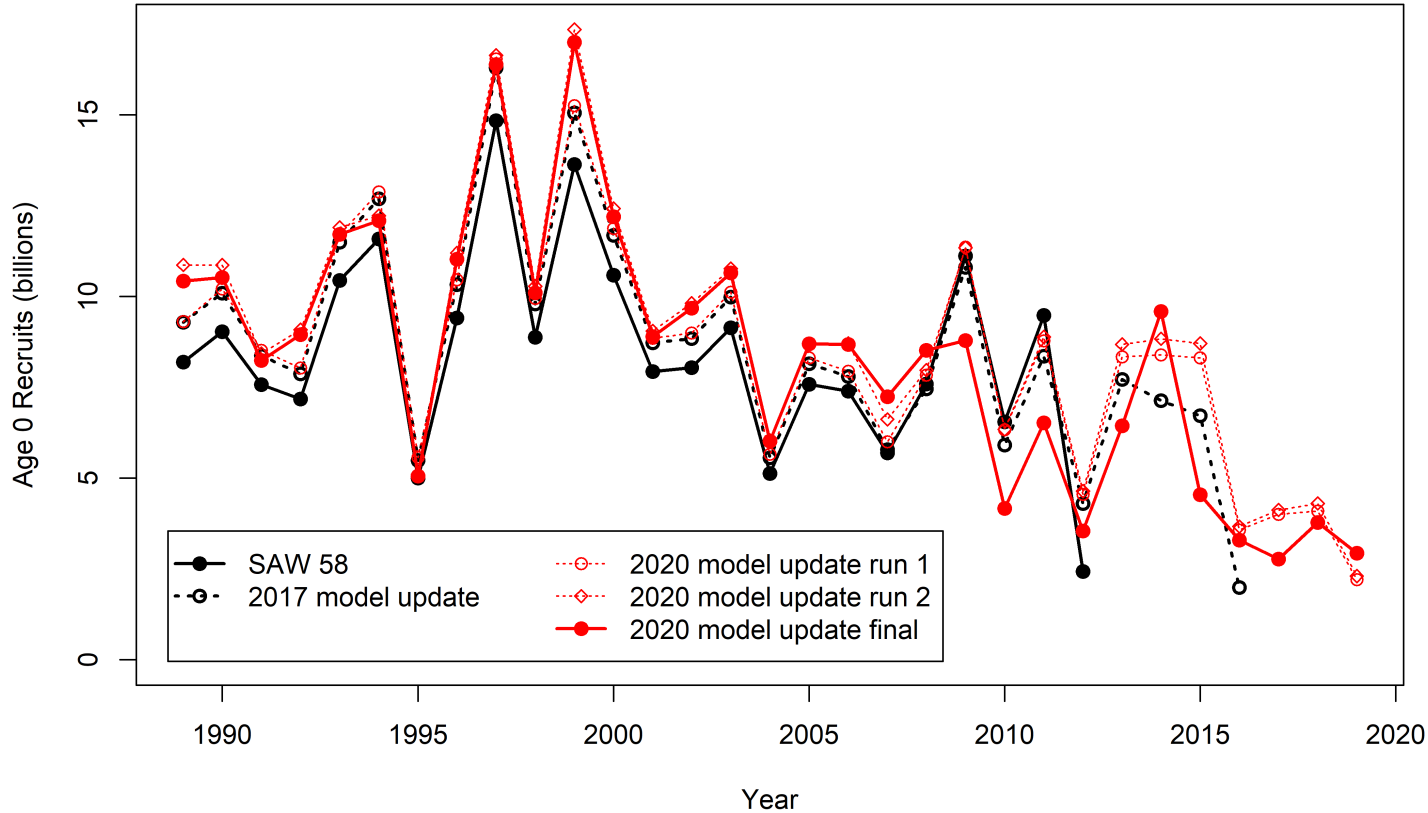
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Results: SSB



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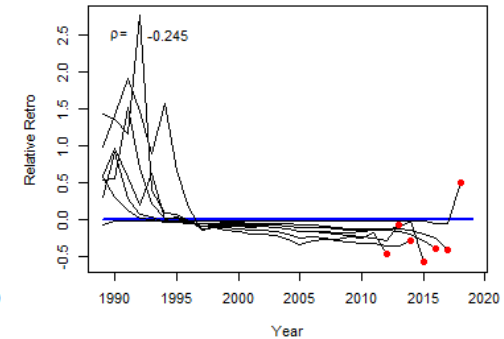
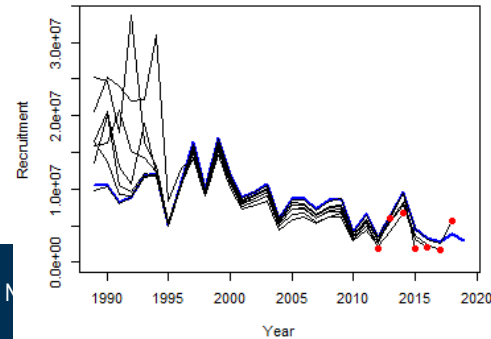
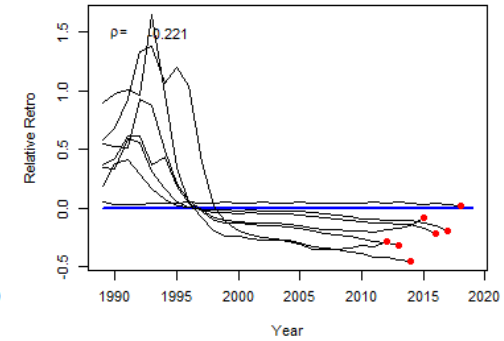
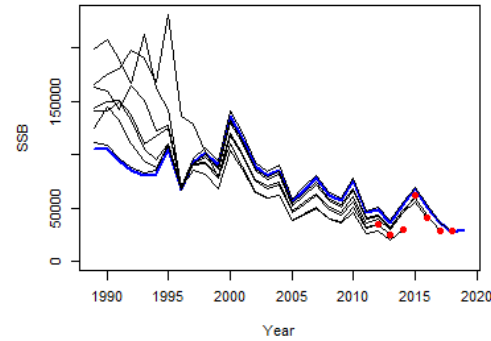
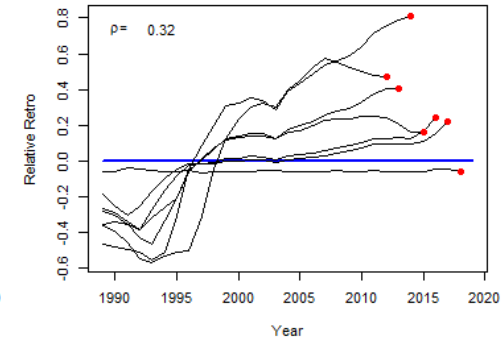
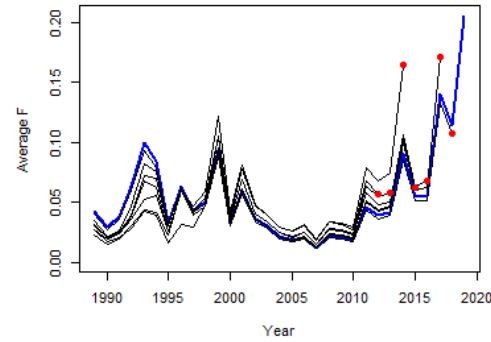
Results: recruitment



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Results: retro

- Run 3



Biological reference points

- Update F_{MSY} using $2M/3$ (Patterson 1992)
 - ASAP4 estimate of $M = 1.29$
 - $F_{MSY} = 2 \times 1.29 / 3 = 0.86$
- Update SSB_{MSY} using AGEPRO projections
 - Fishery selectivity, maturity and weights at age from time series averages
 - Recruitment from ASAP4 estimates 1989–2019
 - 2020 landings = 23,752 mt (DAH)
 - 2021–2070 $F = F_{MSY}$ proxy = 0.86



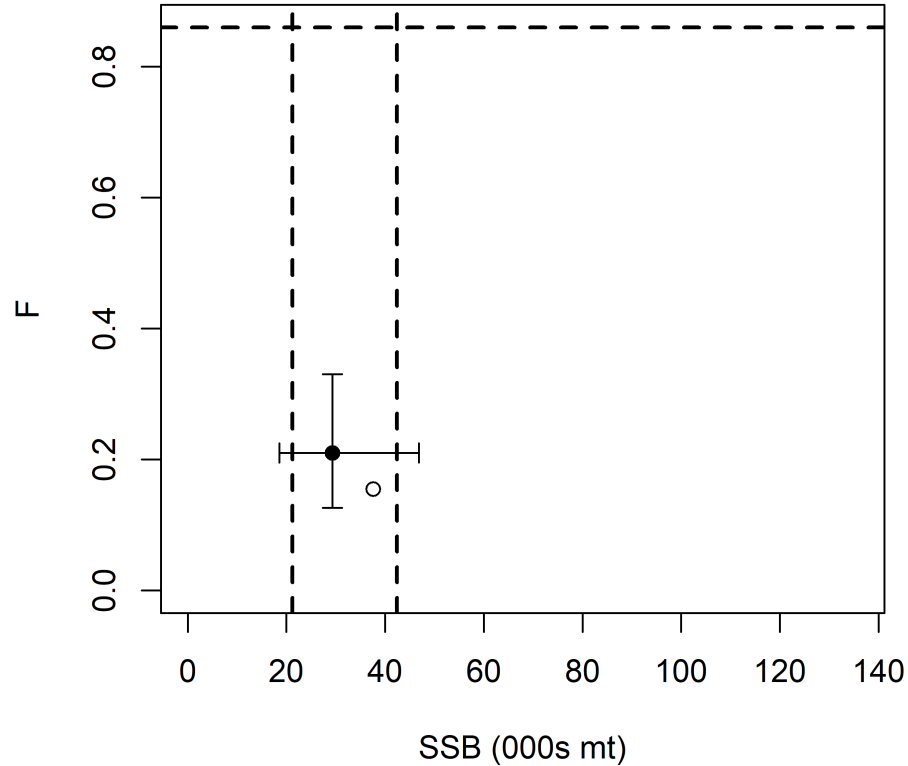
Biological reference points

	2017	2020
F_{MSY} proxy	0.82	0.86
SSB_{MSY} (mt)	48,681	42,247
Overfishing	No	No
Overfished	No	No



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Biological reference points



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Projections

Year	Catch (mt)	SSB (mt)	F
2020	23,752	17,234	1.31
2021	19,588	29,784	0.86
2022	28,239	39,956	0.86



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Assumptions & uncertainties

- Assumptions about recruitment and 2020 catches in the projections were unlikely to be realized and would affect the accuracy of the projections
 - Assumption of achieving the catch limit was unlikely because it has been 5–8 times higher than the observed catches during 2017–2019
 - Because the average recruitment for the whole time series is higher than that in recent years, it may cause the projections to overestimate biomass. Using a recent period of recruitment may improve the accuracy of projections



Assumptions & uncertainties

- Recommendations for 2021 research track
 - Alternative approaches for estimating mean weights at age should be considered
 - Consider a selectivity function that estimates the age-2 fishery selectivity
 - Reconsider the fishing mortality rate reference point
 - Given the observation of declining recruitment with declining stock size, it may be possible to estimate a stock-recruitment function which could be used for reference point estimation



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Assumptions & uncertainties

- Additional uncertainty arises because the reference points are calculated from the previous assessment and are not internally consistent with the estimate of M from the update
 - BRPs have been recalculated to enable internal consistency with the estimate of M



Summary

- SSB & recruitment continue to decline
- No change in stock status
 - Not overfished, overfishing not occurring
- The PRC endorsed the model and the inferences that resulted as representing the best scientific information available
 - Concerns about the 2020 catch assumption and sampling from the entire time series of recruitment



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Requested projections for 2021–2022

- Assumed 2020 catch = 5443 mt
 - Based on linear trend for 2013–2019
- Recruitment drawn from most recent ten years, 2010–2019



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Projections: 100% CV

Annual					
Year	OFL Catch	ABC Catch	ABC F	ABC SSB	ABC P*
2021	22,053	11,993	0.431	36,935	0.232
2022	24,341	17,854	0.590	32,113	0.355

Average					
Year	OFL Catch	ABC Catch	ABC F	ABC SSB	ABC P*
2021	22,053	14,924	0.549	35,957	0.320
2022	23,674	14,924	0.495	32,340	0.290



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Projections: 150% CV

Annual					
Year	OFL Catch	ABC Catch	ABC F	ABC SSB	ABC P*
2021	22,053	9,966	0.352	37,604	0.232
2022	24,810	16,918	0.541	33,160	0.362

Average					
Year	OFL Catch	ABC Catch	ABC F	ABC SSB	ABC P*
2021	22,053	13,442	0.488	36,454	0.324
2022	30,556	13,442	0.432	33,412	0.225



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