

8. Assessment of the Flathead Sole Stock in the Gulf of Alaska

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Executive Summary

The Gulf of Alaska flathead sole stock is assessed every four years and was last assessed in 2017. In years without a full assessment, we present an executive summary to recommend harvest levels for the next two years. Please refer to the 2017 full stock assessment report for further information regarding the assessment model (Turnock et al., 2017). A full stock assessment document with updated assessment and projection model results will be presented in 2021.

Flathead sole is assessed using an age-structured model and Tier 3 determination. Thus, the single species projection model was run using parameter values from the accepted 2017 flathead sole assessment model (Turnock et al. 2017), together with updated catch information for 2017-2019 and estimated catch for 2020 and 2021, to predict stock status for flathead sole in 2021 and 2022 and to make ABC recommendations for those years. Projections are conducted using numbers-at-age for flathead sole from age 3-21+ and historical recruitment of age 3 individuals is used to calculate OFL's and ABC's.

Summary of Changes in Assessment Inputs

Changes in input data: The updated information for this partial assessment includes replacing the estimated 2019 catch with the final catch value, and estimating the 2020-2022 catch estimates. The 2020 projected catch was calculated as the current catch as of October 22, 2020 added to the average October 22 – December 31 catches over the 5 previous years. The 2021 and 2022 projected catches were calculated as the average catch over the previous 5 years.

Changes in assessment methodology: There were no changes in assessment methodology for this partial assessment.

Summary of Results

The recommended ABC for flathead sole is 39,377 t for 2021 and 39,851 t for 2022 and the OFL is 47,982 t in 2021 and 48,534 t in 2022. The new ABC recommendation and OFL for 2021 and 2022 are similar to those projected for 2020 and 2021 (38,196 t and 46,572 t). The principal reference values are shown in the following table:

Quantity	As estimated or <i>specified last year for:</i>		As estimated or <i>recommended this year for:</i>	
	2020	2021	2021*	2022*
<i>M</i> (natural mortality rate)	0.2	0.2	0.2	0.2
Tier	3a	3a	3a	3a
Projected total (3+) biomass (t)	282,371	280,730	280,980	278,418
Projected Female spawning biomass (t)	92,467	95,216	95,338	96,833
<i>B</i> _{100%}	91,551	91,551	91,551	91,551
<i>B</i> _{40%}	36,620	36,620	36,620	36,620
<i>B</i> _{35%}	32,043	32,043	32,043	32,043
<i>F</i> _{OFL}	0.36	0.36	0.36	0.36
<i>maxF</i> _{ABC}	0.28	0.28	0.28	0.28
<i>F</i> _{ABC}	0.28	0.28	0.28	0.28
OFL (t)	46,572	47,919	47,982	48,534
maxABC (t)	38,196	39,326	39,377	39,851
ABC (t)	38,196	39,326	39,377	39,851
Status	As determined <i>last year for:</i>		As determined <i>this year for:</i>	
	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

*Projections are based on estimated catches of 1,965 t used in place of maximum permissible ABC for 2020 and 2,269 t used in place of maximum permissible ABC for 2021 and 2022. The 2020 projected catch was calculated as the current catch as of October 22, 2020 added to the average October 22 – December 31 catches over the 5 previous years. The 2021 and 2022 projected catch was calculated as the average catch over the previous 5 years.

Area Apportionment

Area apportionment for ABC of flathead sole is currently based on the proportion of survey biomass projected for each area in 2021 and 2022 using the survey averaging random effects model developed by the survey averaging working group. The recommended ABC area apportionment percentages are listed below.

Quantity	Western	Central	West Yakutat	Southeast	Total
Area Apportionment	36.08%	52.89%	6.16%	4.86%	100.00%
2021 ABC (t)	14,209	20,826	2,427	1,915	39,377
2022 ABC (t)	14,380	21,077	2,456	1,938	39,851

Literature Cited

Turnock, B.J., McGilliard, C.R., and Palsson, W. 2017. 8. Assessment of the Flathead Sole Stock in the Gulf of Alaska. In Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Gulf of Alaska. North Pacific Fishery Management Council, P.O. Box 103136, Anchorage AK 99510.

Tables

Table 1. Total catch of GOA flathead sole by area. Catch for 2020 is current up to October 22, 2020. Columns left blank indicate confidential catch information by area.

Year	Total Catch	Western Gulf	Central Gulf	Eastern Gulf
1978	452			
1979	165			
1980	2,068			
1981	1,070			
1982	1,368			
1983	1,080			
1984	549			
1985	320			
1986	147			
1987	151			
1988	520			
1989	747			
1990	1,447			
1991	1,237	199	1,036	2
1992	2,315	355	1,947	13
1993	2,824			
1994	2,525			
1995	2,180	589	1,563	28
1996	3,074	807	2,166	101
1997	2,441			
1998	1,731			
1999	897	186	687	25
2000	1,548			
2001	1,912			
2002	2,146			
2003	2,459	525	1,934	0
2004	2,398			
2005	2,552	611	1,941	0
2006	3,142	462	2,679	1
2007	3,130	666	2,462	2
2008	3,446			
2009	3,663	303	3,359	1
2010	3,865	462	3,403	0
2011	2,732	393	2,338	0
2012	2,167	277	1,890	0
2013	2,819	588	2,230	0
2014	2,557	219	2,337	1
2015	2,001	199	1,802	1
2016	2,422	228	2,191	2
2017	2,050	73	1,978	0
2018	2,202	150	2,051	0
2019	2,668	210	2,457	0
2020	1,904	99	1,805	0

Table 2. Flathead sole survey biomass (Bio) and CV by year and regulatory area.

Year	Total		Western		Central		Eastern	
	Bio	CV	Bio	CV	Bio	CV	Bio	CV
1984	249,341	0.12	45,100	0.41	158,539	0.14	45,703	0.18
1987	177,546	0.11	33,603	0.19	113,483	0.13	30,459	0.33
1990	243,055	0.12	58,740	0.19	161,257	0.16	23,059	0.31
1993	188,579	0.13	57,760	0.21	113,976	0.19	16,843	0.19
1996	205,521	0.09	66,732	0.18	122,730	0.11	16,059	0.16
1999	207,590	0.12	49,636	0.21	139,356	0.15	18,598	0.45
2001	153,594	0.12	68,164	0.20	85,430	0.14		
2003	257,294	0.08	67,055	0.13	170,852	0.10	19,388	0.14
2005	213,213	0.08	59,458	0.17	142,043	0.09	11,712	0.30
2007	281,402	0.08	78,361	0.16	177,641	0.11	25,400	0.28
2009	225,377	0.11	80,115	0.21	128,910	0.14	16,351	0.34
2011	235,639	0.09	76,049	0.16	128,428	0.12	31,162	0.34
2013	201,233	0.09	62,131	0.19	121,063	0.11	18,039	0.27
2015	218,548	0.08	67,665	0.18	126,200	0.09	24,684	0.14
2017	236,588	0.11	99,009	0.19	123,087	0.14	14,493	0.30
2019	185,840	0.09	66,710	0.17	94,280	0.13	24,849	0.24

Figures

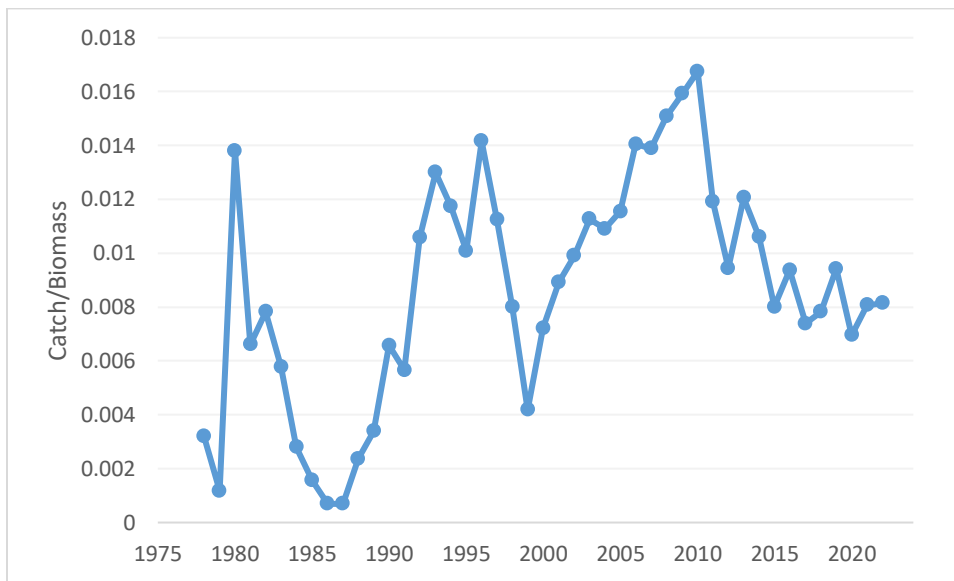


Figure 1. Catch to total biomass ratio using total biomass for age 3+ individuals for GOA flathead sole.