9. Assessment of the Pacific ocean perch stock in the Gulf of Alaska

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Executive Summary

Gulf of Alaska Pacific ocean Perch (*Sebastes alutus*, POP) is assessed on a biennial stock assessment schedule to coincide with the availability of new trawl survey data (odd years). In alternate (even) years we present an executive summary to recommend harvest levels for the next two years. Please refer to last year's full stock assessment report for further information regarding the assessment model (Hulson et al., 2021). A full stock assessment document with updated assessment and projection model results will be presented in next year's SAFE report.

We use a statistical age-structured model as the primary assessment tool for Gulf of Alaska Pacific ocean perch which qualifies as a Tier 3 stock. For an off-cycle year, we do not re-run the assessment model, but do update the projection model with new catch information. This incorporates the most current catch information without re-estimating model parameters and biological reference points.

Summary of Changes in Assessment Inputs

Changes in the input data: There were no changes made to the assessment model inputs since this was an off-cycle year. New data added to the projection model included an updated 2021 catch and new estimated catches for 2022-2024.

Changes in assessment methodology: There were no changes in assessment methodology as this was an off-cycle year.

Summary of Results

New estimates for this year's projection model are an updated 2021 catch of 28,899 t, and new estimated 2022-2024 catches of 30,556 t, 30,960 t, and 29,748 t, respectively. The 2022 catch was estimated by expanding the November 3, 2022 catch by a factor of 1.11 using the last three complete catch years (2019-2021) to project catch through the end of the 2022 fishing year. To more accurately estimate future catch, an updated yield ratio of 0.83 was computed using the average of the ratio of catch to ABC for the last three complete catch years (2019-2021). The updated yield ratio was then multiplied against the projected ABCs for 2023 and 2024 from the 2021 assessment model to estimate future catches.

For the 2023 fishery, we recommend the maximum allowable ABC of **37,193** t from the updated projection model. The corresponding reference values for Pacific ocean perch are summarized in the following table. Overfishing is not occurring, the stock is not overfished, and it is not approaching an overfished condition.

The Pacific ocean perch catch/biomass ratio has ranged from less than 0.01 to 0.05 between 1991 and 2022 (Figure 9-1). Since 2013, the catch/biomass ratio has been increasing and is mainly a result of the fishery fully taking the ABC in all the areas where trawling is allowed. The catch/biomass ratio decreased by 3% from 2021 to 2022 with catch through November 3, 2022.

Quantity	As estimated or specified *last* year for: 2022	2023	As estimated or recommended *this* year for: 2023*	2024*
M (natural mortality)	0.075	0.075	0.075	0.075
Tier	3a	3a	3a	3a
Projected total (age 2+) biomass (t)	650,832	634,907	636,129	621,249
Projected Female spawning biomass	216,635	210,257	210,795	205,713
$B_{100\%}$	331,917	331,917	331,917	331,917
$B_{40\%}$	132,767	132,767	132,767	132,767
$B_{35\%}$	116,171	116,171	116,171	116,171
F_{OFL}	0.120	0.120	0.120	0.120
$maxF_{ABC}$	0.100	0.100	0.100	0.100
F_{ABC}	0.100	0.100	0.100	0.100
OFL (t)	45,580	44,196	44,302	43,117
maxABC (t)	38,268	37,104	37,193	36,196
ABC (t)	38,268	37,104	37,193	36,196
Status	As determined *last* year for: 2020	2021	As determined *this* year for: 2021	2022
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 an estimated catch of 30,556 t for 2022 and estimates of 30,960 t and 29,748 t used in place of maximum permissible ABC for 2023 and 2024.

Updated catch data (t) for Pacific ocean perch in the Gulf of Alaska as of November 3, 2022 (NMFS Alaska Regional Office Catch Accounting System via the Alaska Fisheries Information Network (AKFIN) database, http://www.akfin.org) are summarized in the following table.

Year	Western	Central	West Yakutat	E. Yakutat/ Southeast	Gulfwide Total	Gulfwide ABC	Gulfwide TAC
2021	1,621	23,616	1,662	< 1	28,899	36,177	36,177
2022	2,505	23,598	1,398	< 1	27,501	38,268	38,268

Area Apportionment

The apportionment percentages are the same as in the 2021 full assessment. The following table shows the recommended apportionment for 2023 and 2024 from the random effects model.

Area Apportionment	Western	Central	Eastern	Total
	6.8%	80.5%	12.7%	100%
2023 Area ABC (t)	2,529	29,940	4,724	37,193
2024 Area ABC (t)	2,461	29,138	4,597	36,196

Amendment 41 prohibited trawling in the Eastern area east of 140° W longitude. The ratio of biomass still obtainable in the W. Yakutat area (between 147° W and 140° W) is 0.29. This results in the following apportionment of the Eastern Gulf area:

	W. Yakutat (WYAK)	E. Yakutat/Southeast (SEO)	Total
2023 Area ABC (t)	1,370	3,354	4,724
2024 Area ABC (t)	1,333	3,264	4,597

In 2012, the Plan Team and SSC recommended combined OFLs for the Western, Central, and West Yakutat areas (W/C/WY) because the original rationale of an overfished stock no longer applied. However, because of concerns over stock structure, the OFL for SEO remained separate to ensure this unharvested OFL was not utilized in another area. The Council adopted these recommendations. This results in the following apportionment for the W/C/WYK area:

	Western/Central/W. Yakutat (W/C/WY)	E. Yakutat/Southeast (SEO)	Total
2023 Area OFL (t)	40,308	3,994	44,302
2024 Area OFL (t)	39,229	3,888	43,117

Summaries for Plan Team

Species	Year	Biomass[1]	OFL	ABC	TAC	Catch[2]
Pacific ocean perch	2021	613,522	42,977	36,177	36,177	28,899
	2022	650,832	45,580	38,268	38,268	27,501
	2023	636,129	44,302	37,193		
	2024	621,249	43,117	36,196		

Stock	Area	2022 OFL	2022 ABC	2022 TAC	2022 Catch[2]	2023 OFL	2023 ABC	2024 OFL	2024 ABC
Pacific ocean perch	W		2,602	2,602	2,505		2,529		2,461
	C		30,806	30,806	23,598		29,940		29,138
	WYAK		1,409	1,409	1,398		1,370		1,333
	SEO	4,110	3,451	3,451	0	3,994	3,354	3,888	3,264
	W/C/WY	41,470				40,308		39,299	
	Total	45,580	38,268	38,268	27,501	44,302	37,193	43,117	36,196

[1]Total biomass (age 2+) from the age-structured model

[2]Current as of November 3, 2022, Source: NMFS Alaska Regional Office via the Alaska Fisheries Information Network (AKFIN).

SSC and Plan Team Comments on Assessments in General

In this section, we list new or outstanding comments on assessments in general from the last full assessment in 2017. Since this is a partial assessment, we only respond to priority comments in the executive summary. We will respond to remaining and future comments in the next full assessment.

"The SSC supports the JGPT's recommendation that stock assessment authors transition from the ADMB RE variants to the rema framework, which implements the same model variants in a single framework with several improvements."(SSC, Oct 2022)

Apportionment in this assessment was not updated from last year's assessment because there was no new data to inform apportionments. However, in future assessments apportionment will be transitioned to the *rema* framework.

SSC and Plan Team Comments Specific to this Assessment

The SSC appreciates the author's compilation of CIE recommendations and requests that the authors develop responses to these recommendations as they address them.

The SSC also reiterates its request from December 2020 that the author explore whether the prior on M is still constraining. (SSC, December 2022)

We will continue to review and address the CIE recommendations prior to the full assessment in 2023.

Figures

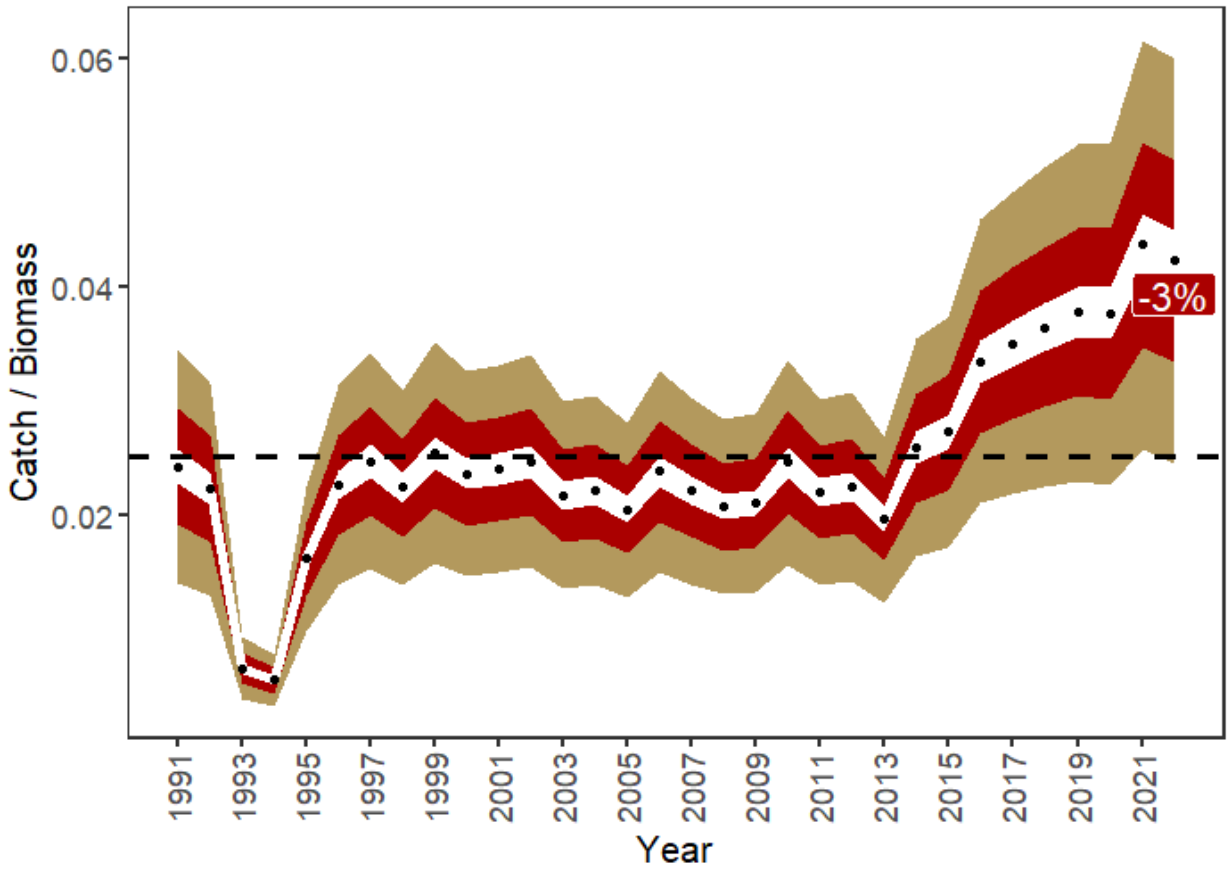

Figure 9-1. Catch divided by age 2+ total biomass from the age-structured model (point estimates shown by black circles) with 95% sampling error confidence intervals (multi-shaded area) for Gulf of Alaska Pacific ocean perch from 1991-2022. Black dashed line is the average of time-series.