18. Assessment of the skate stock complex in the Bering Sea and Aleutian Islands

Cindy A. Tribuzio, Mary Elizabeth Matta, and Steve Barbeaux
Alaska Fisheries Science Center

This report may be cited as:
Tribuzio, C.A., M.E. Matta, and S. Barbeaux. 2024. Assessment of the skate stock complex in the Bering Sea and Aleutian Islands. North Pacific Fishery Management Council, Anchorage, AK. Available from https://www.npfmc.org/library/safe-reports/

Executive Summary

The Bering Sea and Aleutian Islands (BSAI) skate stock complex is managed in aggregate, with a single set of harvest specifications applied to the entire complex. However, to generate the harvest recommendations the stock is divided into two units. Harvest recommendations for Alaska skate *Bathyraja parmifera*, the most abundant skate species in the BSAI, are made using the results of an age-structured model and are managed under Tier 3. The remaining species (Other skates) are managed under Tier 5 due to a lack of data. BSAI skates are assessed on a biennial stock assessment schedule. An operational assessment is conducted in odd years, and in even years a harvest projection is produced. The most recent operational assessment was presented in 2023 (Tribuzio et al. 2023), with the next operational assessment scheduled for 2025.

The Tier 3 and Tier 5 recommendations are combined to generate recommendations for the complex as a whole. For the Tier 3 Alaska skate component of the stock complex, catch data were updated as follows for this year's harvest projections: the 2023 total catch was updated to reflect Alaska Regional Office Catch Accounting System (CAS) estimates of total catch of Alaska skate for 2023, the 2024 projected catch of all skates was updated to the extrapolated total catch for 2024, and the 2025 projected catch of all skates was the mean of the total catch for the most recent 5 years (2020-2024). The 2024 extrapolated and 2025 mean catch are for all skates because harvest limits are set for the complex as a whole, and not just for Alaska skates. The Tier 5 rema model was not updated and the harvest recommendations were carried over from the previous assessment (Tribuzio et al. 2023).

Description of Updated Catch

Catch data were queried from the CAS on August 26, 2024. End of the year total catch was estimated for the current year by estimating the mean proportion of harvest, by gear and species, which occurs after the data pull date over the previous 5 years.

For the 2024 stock assessment cycle, all harvest project assessments are being completed for the September Groundfish Plan Team meeting. Catch data are being pulled over a month earlier than in previous years. Sensitivity analyses were conducted for this stock. The increased uncertainty in catch estimates due to the earlier data pull date did not result in changes to the OFL and ABC that could be problematic for this stock, for which catch is generally well below ABC.

Summary of Results

The principal results of the present assessment, based on the previously accepted models, Model 14.2d for Alaska skate and Model 23.0 for the Other skates, are listed in the table below (biomass and catch figures

are in units of metric tons, t) and compared with the corresponding quantities as specified last year by the SSC:

Alaska skate harvest recommendations				
	As estimated or specified *last* year for:		As estimated or recommended *this* year for:	
Quantity	2024	2025	2025*	2026*
M (natural mortality rate)	0.13	0.13	0.13	0.13
Tier	3a	3a	3a	3a
Projected total (age 0+) biomass (t)	453,053	437,751	436,238	425,822
F_{OFL}	0.093	0.093	0.093	0.093
$maxF_{ABC}$	0.080	0.080	0.080	0.080
F_{ABC}	0.080	0.080	0.080	0.080
OFL (t)	32,429	31,058	30,941	30,140
maxABC (t)	27,950	26,767	26,665	25,975
ABC (t)	27,950	26,767	26,665	25,975
	As determined *last* year for:		As determined *this* year for:	
Status	2022	2023	2023	2024
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 updated 2023 catches of 21,481 t (Alaska skate only), estimated catches of 21,017 t for 2024 and 23,075 t (5 yr mean total catch) used in place of maximum permissible ABC for 2024 and 2025. The catch estimates for the full complex are used for 2024 and 2025 because ABCs are not set for the Alaska skate separately.

Other skate harvest recommendations				
	As estimated or specified *last* year for:		As estimated or recommended *this* year for:	
Quantity	2024	2025	2025	2026
M (natural mortality rate)	0.10	0.10	0.10	0.10
Tier	5	5	5	5
Biomass (t)	131,446	131,446	131,446*	131,446*
F_{OFL}	0.10	0.10	0.10	0.10
$maxF_{ABC}$	0.075	0.075	0.075	0.075
F_{ABC}	0.075	0.075	0.075	0.075
OFL (t)	13,145	13,145	13,145	13,145
maxABC (t)	9,858	9,858	9,858	9,858
ABC (t)	9,858	9,858	9,858	9,858
	As determined *last* year for:		As determined *this* year for:	
Status	2022	2023	2023	2024
Overfishing	No	n/a	No	n/a

* The rema model was not updated for this harvest projection document, thus the Other skate biomass is carried over from the most recent model run (2023 Model 20.0).

aggregate harvest recommendations for the BSAI skate complex				
	As estimated or specified *last* year for:		As estimated or recommended this year for:	
Quantity	2024	2025	2025	2026
OFL (t)	45,574	44,203	**44,086**	43,285
maxABC (t)	37,808	36,625	36,523	35,833
ABC (t)	37,808	36,625	**36,523**	35,833

Summaries for Plan Team

Area	Year	Age 0+ Biomass	OFL	ABC	TAC	Catch
BSAI	2023	580,701	46,220	38,605	27,441	25,844
	2024	584,499	45,574	37,808	30,519	21,017*
	2025	567,684	44,086	36,523	n/a	n/a
	2026	557,268	43,285	35,833	n/a	n/a

* The 2024 catch is the extrapolated end of the year catch for the current year.

Fishery

The most recent fishery data are presented in Table 1. Catch data are presented at the same resolution as the assessment methods: total complex, Alaska skate and Other skates. Observer data of species-specific extrapolated weight by harvest sector and gear type are used to estimate the proportions of catch by species (see description of methods in Ormseth 2018). Catch data were queried August 26, 2024, thus the current year estimates of total catch are extrapolated as described in the Description of Updated Catch section.

Alaska skate is the Tier 3 component in the BSAI skate stock complex. The ratio of the total catch to the modeled biomass (age 0+) of Alaska skate was the highest of the time series in 2023 with the ratios for 2024 and 2025 also projected to be above historical values (Figure 1).

The ratio of the total catch to biomass of Other skates is presented for the entire BSAI area and the biomass is the sum of the rema model outputs across survey areas (Figure 2). The catch to biomass ratio for Other skates was up from a historical low in 2023.

Survey

Surveys were conducted in the EBS shelf and Aleutian Islands in 2024; however, data were not finalized at the time of writing. No survey updates are provided in this report. See the previous operational assessment (Tribuzio et al. 2023) for the available survey information.

Responses to SSC and Plan Team Comments on Assessments in General

Comments relevant to this assessment are recorded here and will be responded to at the next full assessment.

SSC and Plan Team Comments Specific to this Assessment

Comments relevant to this assessment are recorded here and will be responded to at the next full assessment.

"*The SSC suggests that it may be appropriate to update the stock structure template during the next full assessment, with a focus on Alaska skate, as was requested by the SSC in 2018.*" (SSC December 2020)

"The SSC continues to support prior SSC and GPT recommendations for the next full assessment, including transitioning the model from ADMB to the rema framework and considering whether updating the stock structure template for Alaska skate is warranted." (SSC December 2023)

"*The Team recommends the authors examine using a catchability that is tuned to temperature.*" (BSAI GPT November 2023)

"*The SSC concurs with the recommendation to explore using a catchability tuned to temperature.*" (SSC December 2022)

"*The SSC encourages considerations of collecting and ageing Alaska skate vertebrae when prioritizing fishery and survey sampling determining age-reading priorities at the AFSC Age and Growth Lab.*" (SSC December 2022)

"The leopard skate biomass in the AI continues to decline and the SSC reiterates its concern over the decline of this rare endemic species." (SSC December 2023)

Tables and Figures

Table 1. Catch of skates since 2003. Data queried from AKFIN on Aug 26, 2024. The catch for 2024 is the extrapolated end of the year catch.

Year	All skates	Alaska skate	Other skates
2003	21,143	18,215	2,929
2004	22,330	17,846	4,484
2005	23,083	18,835	4,248
2006	20,250	17,015	3,235
2007	18,622	15,723	2,899
2008	21,677	15,948	5,729
2009	20,594	16,642	3,952
2010	17,705	13,651	4,054
2011	23,827	18,788	5,039
2012	24,791	19,638	5,153
2013	26,993	22,183	4,810
2014	27,482	21,388	6,094
2015	28,227	21,435	6,792
2016	29,164	23,225	5,939
2017	31,863	24,832	7,033
2018	31,156	24,780	6,376
2019	20,157	15,853	4,304
2020	19,247	15,633	3,614
2021	20,032	16,905	3,127
2022	29,235	26,035	3,200
2023	25,844	21,480	4,364
2024	*21,017*	*18,686*	*2,331*

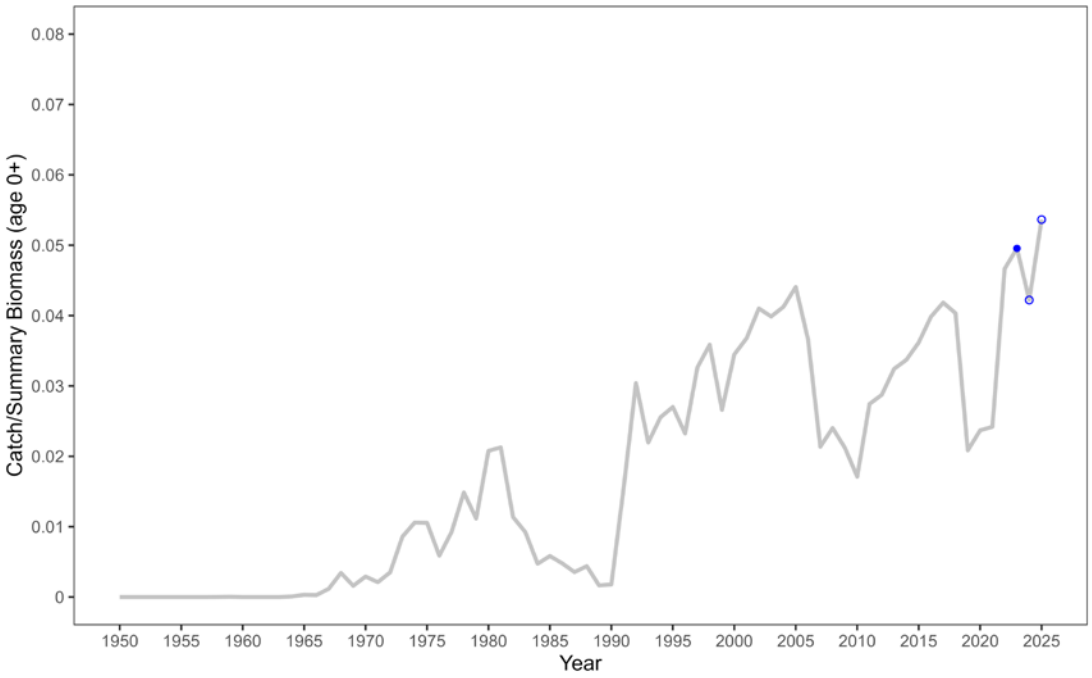

Figure 1. Modeled catch divided by modeled total (age 0+) biomass. The catch for the projection model was updated to reflect the total catch for 2023 (blue solid dot) and extrapolated end of the year catch for 2024 and projected catch for 2025 (blue open circles).

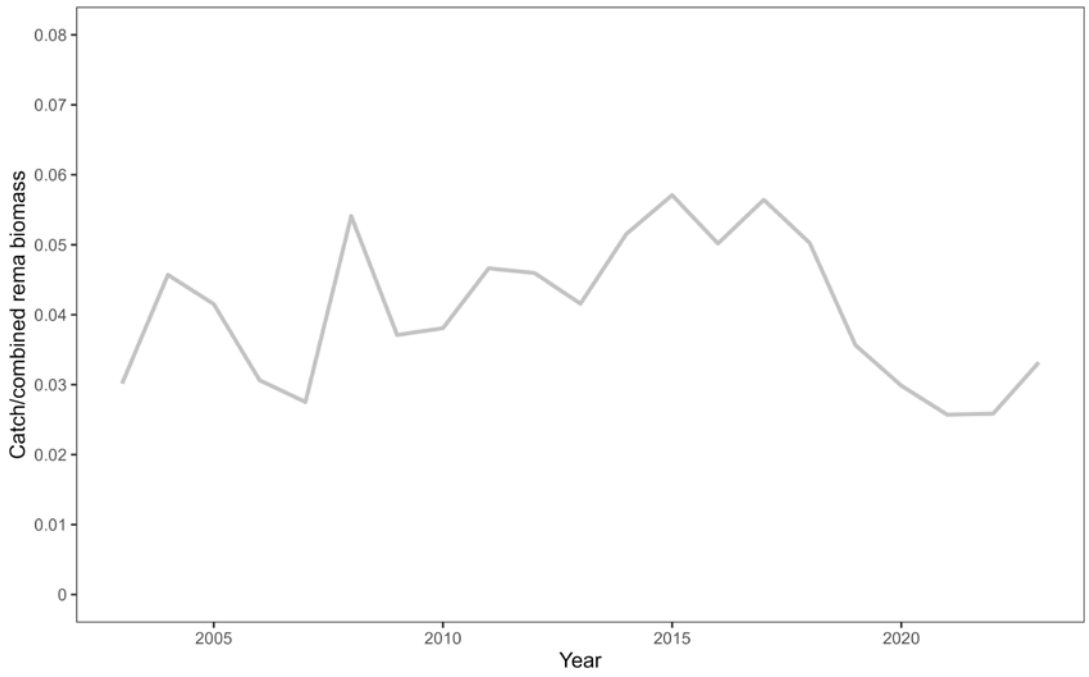

Figure 2. Ratio of the total catch of Other skates (t) to the sum biomass (t) of the three rema model outputs for Other skates: Aleutian Islands, Eastern Bering Sea slope and shelf.

References

Ormseth, O. 2018. Improved catch estimation for individual species in the BSAI skate complex. September Groundfish Plan Team document. North Pacific Fishery Management Council. https://meetings.npfmc.org/CommentReview/DownloadFile?p=3f43bf6d-83e9-4d43-a00f-4d4beeb0f8a6.pdf&fileName=Improved%20BSAI%20skate%20catch%20estimation.pdf

Tribuzio, C.A., M.E. Matta, and S. Barbeaux. 2023. Assessment of the skate stock complex in the Bering Sea and Aleutian Islands. North Pacific Fishery Management Council, Anchorage, AK. Available from https://www.npfmc.org/library/safe-reports/