5. Assessment of the Greenland turbot stock in the Bering Sea and Aleutian Islands
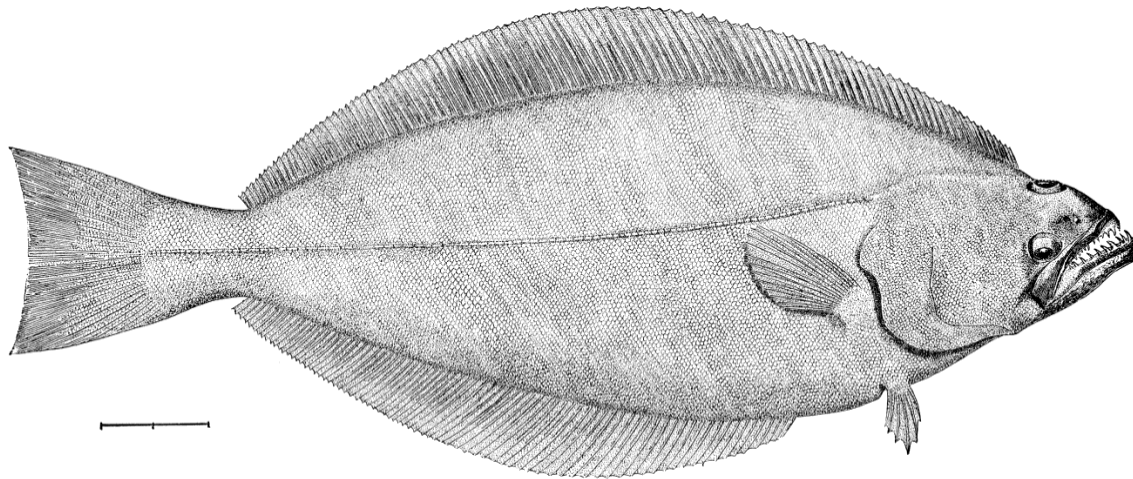

THE GREENLAND TURBOT.

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Executive Summary

Bering Sea and Aleutian Islands (BSAI) Greenland turbot are assessed biennially according to the stock assessment prioritization schedule. A statistical catch-at-age model configured in Stock Synthesis 3 (Methot and Wetzel, 2013) is used as the primary assessment tool for BSAI Greenland turbot, which qualifies as a Tier 3 stock. The assessment model is not run during an off-cycle year. During odd years, a harvest projection is presented with recommendations of harvest levels for the next two years for this species, using updated catch information in the projection model. The last full assessment stock assessment conducted in 2022 is available online https://apps-afsc.fisheries.noaa.gov/Plan_Team/2022/BSAIturbot.pdf. A full stock assessment document with updated assessment and projection model results will be presented in November, 2024.

Description of Updated Catch

The specified ratios of fishing mortality for the trawl and fixed gear fleets were updated to 0.86 and 0.14, respectively, in the projection model. This was based on a five year average (2018-2022). In previous assessment years the ratio had been closer to 0.5, but since fishing mortality of the trawl fleet has increased and this fleet encounters smaller Greenland turbot, the updated average ratio better reflects the current relative split between the two fleets.

New data added to the projection model included an updated 2022 catch estimate of 1,478 t, and new catch estimates for 2023-2025. The estimated 2023 catch is the average proportion of the TAC harvested over the previous 5 years (2018-2022) applied to the 2023 TAC. This resulted in an estimated catch for

2023 of 1,437 t. The 2023 estimated catch was used for the 2024 and 2025 catch values in the projection model.

Summary of results

Based on the projection model results, recommended ABCs for 2024 and 2025 are 3,188 t and 2,740 t. The recommended OFLs are 3,705 t and 3,185 t for 2024 and 2025, respectively. The new ABC and OFL recommendations for 2024 are 20% lower than the 2023 ABCs and OFL developed using the 2022 full assessment model, and 6% lower than the 2024 ABC and OFL specified last year. The stock is not overfished, and is not approaching a condition of being overfished. The results are presented in the following table.

Greenland turbot biomass in the EBS shelf bottom trawl survey has been steadily declining since 2015. The EBS shelf bottom trawl survey biomass declined by 25% in 2023 and is at the lowest levels since 1977 (Figure 5.1). Exploitation rates have been generally increasing since 2015 as total biomass declines (Table 5.1 and Figure 5.2).

Quantity	As estimated or *specified last* year for:		As estimated or *recommended this* year* for:	
	2023	2024	2024	2025
M (natural mortality rate)	0.112	0.112	0.112	0.112
Tier	3a	3a	3a	3a
Projected total (age 1+)	53,907	48,850	50,278	47,854
Female spawning biomass Projected	33,554	30,484	31,653	29,439
$B_{100\%}$	67,647	67,647	67,647	67,647
$B_{40\%}$	27,058	27,058	27,058	27,058
$B_{35\%}$	23,676	23,676	23,676	23,676
F_{OFL}	0.2	0.2	0.18	0.18
$maxF_{ABC}$	0.17	0.17	0.15	0.15
F_{ABC}	0.17	0.17	0.15	0.15
OFL (t)	4,645	3,947	3,705	3,185
maxABC (t)	3,960	3,364	3,188	2,740
ABC (t)	3,960	3,364	3,188	2,740
Status	As determined *last* year for:		As determined *this* year for:	
	2021	2022	2022	2023
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 model 16.4c. The assumed fishing mortality ratios for the trawl and fixed gear fleets were updated to 86% and 14%, respectively. Catch in 2022 was updated to 1,478 t and preliminary estimated catches for 2023 – 2025 were set to 1,437 t in place of the maximum ABC. The preliminary catch estimates represent the average proportion of the TAC captured over the previous 5 years (2018-2022) and the 2023 TAC.

Table 5.1. Biomass estimates for Greenland turbot from the 2022 full assessment model, except 2023, which was generated by the single species projection model. *Catch data is from the NMFS AKRO BLEND/Catch Accounting System, except for 2023 which is an estimate based on the average proportion of the TAC captured over the previous 5 years (2018-2022) and the 2023 TAC. Exploitation is the ratio between catch and total biomass.

Year	Total biomass (t)	Catch (t)	Exploitation
1977	722,445	29,722	0.04
1978	712,367	39,560	0.06
1979	696,237	38,401	0.06
1980	683,858	48,689	0.07
1981	658,025	53,298	0.08
1982	620,918	52,090	0.08
1983	580,468	47,529	0.08
1984	536,207	23,107	0.04
1985	510,129	14,690	0.03
1986	487,249	9,864	0.02
1987	465,420	9,551	0.02
1988	441,121	6,827	0.02
1989	417,521	8,293	0.02
1990	390,655	12,119	0.03
1991	359,232	6,246	0.02
1992	333,676	749	0.00
1993	313,198	1,145	0.00
1994	287,940	6,427	0.02
1995	260,701	3,979	0.02
1996	236,509	1,653	0.01
1997	214,989	1,210	0.01
1998	193,776	1,576	0.01
1999	172,067	1,795	0.01

Table 5.1 continued. Biomass estimates for Greenland turbot from the 2022 full assessment model, except 2023, which was generated by the single species projection model. *Catch data is from the NMFS AKRO BLEND/Catch Accounting System, except for 2023 which is an estimate based on the average proportion of the TAC captured over the previous 5 years (2018-2022) and the 2023 TAC. Exploitation is the ratio between catch and total biomass.

| Year	Total biomass (t)	Catch (t)	Exploitation
2000	154,529	1,947	0.01
2001	137,138	2,149	0.02
2002	123,049	1,033	0.01
2003	112,452	931	0.01
2004	103,864	675	0.01
2005	97,224	729	0.01
2006	90,792	361	0.00
2007	85,374	458	0.01
2008	80,301	1,935	0.02
2009	75,037	3,080	0.04
2010	69,722	1,977	0.03
2011	66,993	1,618	0.02
2012	66,631	2,613	0.04
2013	66,338	1,045	0.02
2014	69,348	951	0.01
2015	72,019	1,095	0.02
2016	73,285	1,228	0.02
2017	73,428	1,838	0.03
2018	71,834	1,550	0.02
2019	70,018	2,316	0.03
2020	66,219	2,035	0.03
2021	62,174	1,582	0.03
2022	58,349	1,478	0.03
2023*	53,897	1,437	0.03
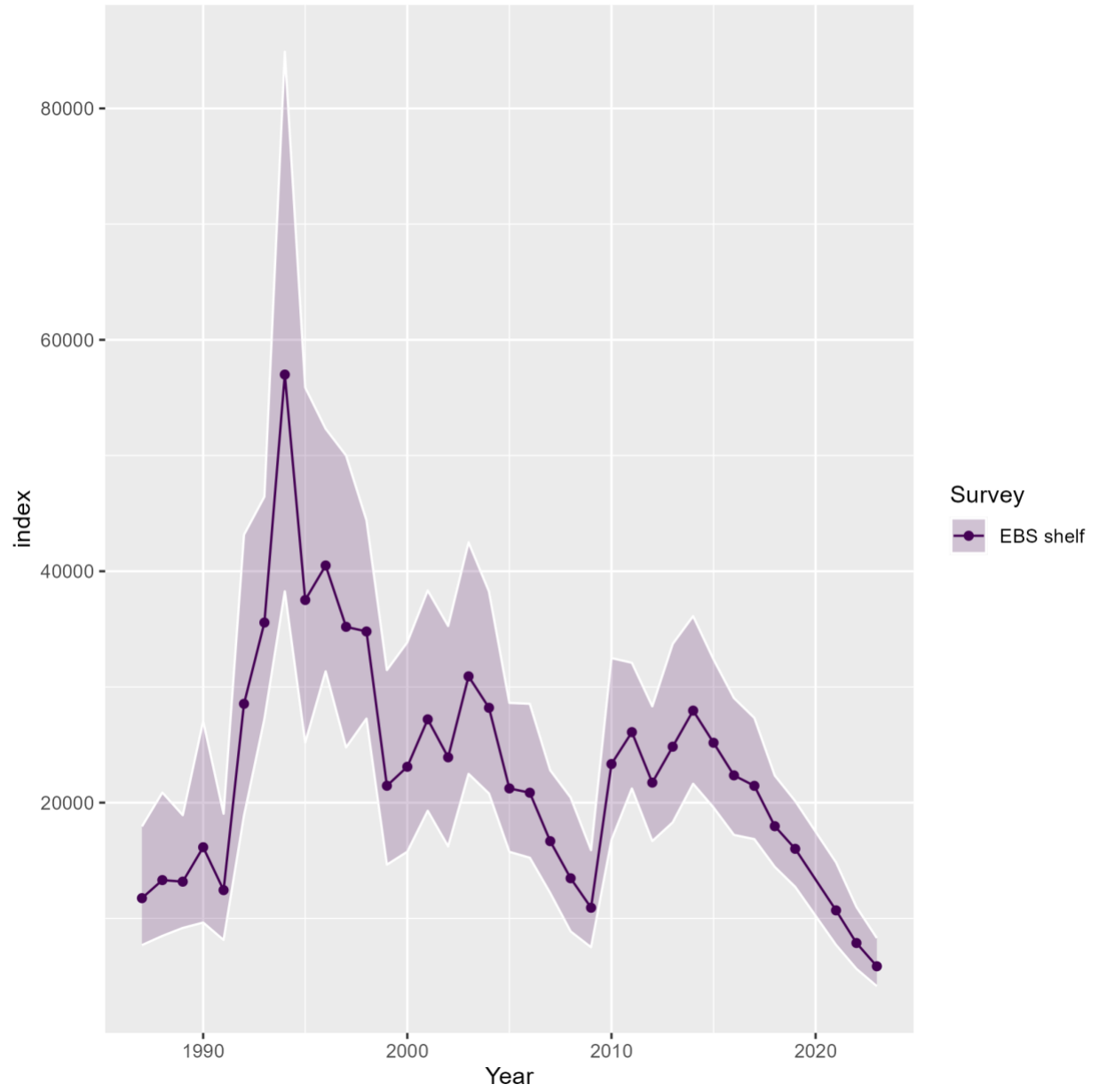
Figure 5.1. Biomass estimates of Greenland turbot from the AFSC Eastern Bering Sea shelf bottom trawl survey, 1987-2023, with 95% confidence intervals.
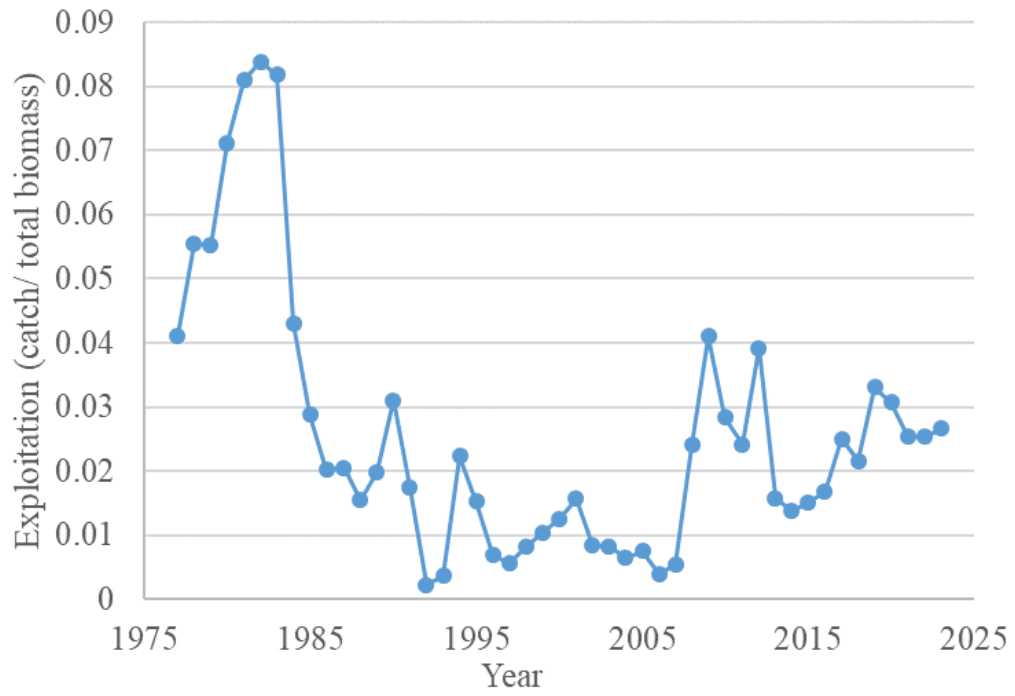
Figure 5.2. Catch to biomass ratio for BSAI Greenland turbot from1977-2023. Value for 2023 was based on projected estimates.