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## American plaice

## 2024 Management Track Assessment Report

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This assessment of the American place (Hippoglossoides platessoides) stock is a level 2 management track (MT) assessment of the 2022 MT assessment (NEFSC 2022). In 2022 the stock was not overfished and overfishing was not occurring (NEFSC 2022). This assessment updates commercial fishery catch data, indices of abundance, the analytical WHAM assessment model, and reference points through 2023. Additionally, short-term projections were updated through 2027.

State of Stock: Based on this MT assessment, the American plaice (*Hippoglossoides platessoides*) stock is not overfished and overfishing is not occurring (Figures 1-2). Retrospective adjustments were not made to the model results because the retrospective pattern was minor. Spawning stock biomass (SSB) in 2023 was estimated to be 25,248 (mt) which is 195% of the biomass target ( $SSB_{MSY}$  proxy = 12,963; Figure 1). The 2023 fully selected fishing mortality was estimated to be 0.057 which is 11% of the overfishing threshold proxy ( $F_{MSY}$  proxy = 0.519; Figure 2).

Table 1: Catch and status table for American plaice. All weights are in (mt) recruitment is in (000s) and  $F_{Full}$  is the fishing mortality on fully selected ages (6-9). Model results are from the current updated WHAM assessment.

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Data										
Commercial Landings	1,239	1,231	1,009	$1,\!134$	1,087	970	597	631	699	1,168
Commercial Discards	92	86	108	102	109	78	74	71	58	77
Total catch	1,331	1,317	$1,\!117$	1,235	$1,\!196$	1,048	671	702	757	1,244
			Mode	l Result	s					
Spawning Stock Biomass	32,766	37,035	$45,\!530$	$48,\!698$	45,743	30,378	$23,\!682$	$19,\!644$	21,206	$25,\!248$
$F_{Full}$	0.042	0.041	0.03	0.029	0.027	0.037	0.031	0.041	0.041	0.057
Recruits	109,468	28,942	$59,\!527$	$15,\!283$	69,501	40,833	$56,\!544$	65,743	$61,\!410$	$46,\!657$

Table 2: Comparison of analytical reference points estimated in the previous and current Management Track assessments. An  $F_{40\%}$  proxy was used for the overfishing threshold. Mean recruitment was calculated over 1980-2023 and estimates are reported with 95% confidence bounds.

	2022	2024
$F_{MSY}$ proxy	0.41	$0.52 \ (0.35 - 0.77)$
$SSB_{MSY}$ (mt)	19051	12963 (9971 - 16853)
MSY (mt)	6203	5090(3899 - 6644)
Mean recruits (age 1) $(000s)$	60914	59784
Overfishing	No	No
Overfished	No	No

**Projections:** Short term projections of biomass and catch were conducted in WHAM (Stock and Miller, 2021) using the standard projection approach. Following the 2021 research track (RT) decisions, projections used a terminal 5 year average of the maturity ogive, selectivity, and weights-at-age. The NEFMC Groundfish Plan Development Team provided an interim catch for 2024, and fishing was projected at  $F_{MSY}$  proxy for 2025-2027. Retrospective adjustments were not applied in the projections because the retrospective pattern was minor.

Year	Catch (mt)	SSB (mt)	$F_{Full}$
2024	1752	27560(17945 - 42325)	0.073
Year	Catch (mt)	SSB (mt)	$F_{Full}$
2025	11048	25993 (15911 - 42463)	0.519
2026	8135	19459 (11382 - 33270)	0.519
2027	6418	15889 (8823 - 28613)	0.519

Table 3: Short term projections of total fishery catch and spawning stock biomass for American place based on a harvest scenario of fishing at  $F_{MSY}$  proxy between 2025 and 2027. Catch in 2024 was assumed to be 1,752 (mt).

## **Special Comments:**

• What are the most important sources of uncertainty in this stock assessment? Explain, and describe qualitatively how they affect the assessment results (such as estimates of biomass, F, recruitment, and population projections).

Fishery age compositions and resulting weight-at-age estimates from 2018-2023 are the largest source of uncertainty for this assessment. The 2022 MT identified declining WAA trends in the terminal years of that assessment (2020-2021), and this 2024 MT assessment identified landings-at-length data processing as the driver of this trend. Analyses completed during this 2024 MT assessment identified that an inadvertent grouping had occurred during the 2022 RT and MT assessments where electronic monitoring maximum retention data were unintentionally included with data from the portside sampling program when estimating landings-at-length for the combined small/peewee market category. As a result, length samples from the electronic monitoring maximum retention program became predominant in characterizing landings-at-length for the combined small market category during 2018-2023. Consequently, length frequency for the combined small market category was biased towards smaller fish that were heavily sampled in the maximum retention program, and this resulted in an apparent decrease in median length, median age, and weight-at-age estimates. This bias was compounded by reduced representation of the small market category due to decreased port sampling over the same years in which the maximum retention data was included (2018-2023). The inclusion of electronic monitoring maximum retention lengths and unintended consequences were discovered at a late stage of the 2024 management track preparation, and there was insufficient time to re-estimate landings-at-length and landings-at-age for the years of the maximum retention program. Consequently, the 2024 MT excluded catch age composition data from the model for years of the maximum retention program (2018-2023), resulting in higher model uncertainty in these years.

• Does this assessment model have a retrospective pattern? If so, is the pattern minor, or major? (A major retrospective pattern occurs when the adjusted SSB or  $F_{Full}$  lies outside of the approximate joint confidence region for SSB and  $F_{Full}$ ).

The 7-year Mohn's  $\rho$ , relative to SSB, was 0.084 in the 2022 MT assessment and was 0.076 in 2023. The 7-year Mohn's  $\rho$ , relative to F, was -0.065 in the 2022 MT assessment and was -0.05 in 2023. The retrospective pattern was considered minor in this assessment because the  $\rho$ -adjusted estimates of 2023 SSB (SSB $_{\rho}$ =23466) and 2023 F ( $F_{\rho}$ =0.06) were within the approximate 90% confidence intervals around SSB (18,612 - 34,250) and F (0.034 - 0.095). Therefore, no retrospective adjustment of spawning stock biomass or fishing mortality in 2023 was required.

• Based on this stock assessment, are population projections well determined or uncertain? If this stock is in a rebuilding plan, how do the projections compare to the rebuilding schedule?

Population projections for American plaice are well determined and the 2022-2023 estimates of SSB from this MT assessment fall well within the confidence bounds of the 2022 MT projected SSB estimates for these years. The stock is not in a rebuilding plan.

• Describe any changes that were made to the current stock assessment, beyond incorporating additional years of data and the effect these changes had on the assessment and stock status.

 $\mathbf{2}$ 

Bigelow spring and fall survey time series were updatated to incorporate tow-specific area swept measurements that became available following the 2022 MT. Additionally, no Bigelow spring survey data was available in 2023 due to a sampling interuption. Commercial discards (2022-2023) were incorporated using the Catch Accounting and Monitoring System (CAMS) for the first time in this MT for American plaice. This MT explored several approaches to resolve the declining WAA trends identified in the 2022 MT, and in doing so updated total catch for 2020-2023. The underlying driver of this trend was ultimately attributed to the unintentional grouping of electronic monitoring maximum retention data with port sampling small and peewee market categories when processing landings-at-length from 2018-2023. This grouping resulted in a bias towards smaller fish that were heavily sampled by the maximum retention program and was compounded by decreasing availability of port samples for the small market category. The late identification of this driver during MT preparation resulted in insufficient time to re-estimate landings-at-age and -length. Consequently, catch age composition was excluded from the model for all affected years (2018-2023). A lognormal adjustment for biological reference points was implemented following new quidance to allign biological reference point settings with the settings for process and observation error adjustments. This change had little impact on model fit, diagnostics, and model results but biological reference points for F increased slightly and reference points for SSB and yield decreased. None of the above changes altered stock status.

- If the stock status has changed a lot since the previous assessment, explain why this occurred. The stock status for American plaicehas not changed since the last assessment (NEFSC 2022).
- Provide qualitative statements describing the condition of the stock that relate to stock status. SSB estimates have steadily increased over the terminal three years of the assessment (2021-2023) and correspond to increases in Bigelow spring and fall survey indices over the same time period.
- Indicate what data or studies are currently lacking and which would be needed most to improve this stock assessment in the future.

Increased port sampling would aid efforts to revise data processing procedures for commercial catch age composition. Additionally, the fit to the Bigelow fall survey age composition could be indicitive of age-varying interactions with survey gear so an investigation of age-specific distribution in the fall could be informative.

• Are there other important issues?

Survey sampling interruptions could be a potential problem if they persist in future years, especially if they reduce coverage of spawning grounds.

## **References:**

NEFSC. 2022. Management Track Assessments Fall 2022. US Dept Commer, Northeast Fish Sci Cent Tech Memo. 305; 167p.+xv. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/nefsc/publications/.

Stock, B.C. and T.J. Miller. 2021. The Woods Hole Assessment Model (WHAM): A general state-space assessment framework that incorporates time- and age-varying processes via random effects and links to environmental covariates. Fisheries Research, 240, p.105967. https://doi.org/10.1016/j.fishres.2021.105967.



Figure 1: Trends in spawning stock biomass of American place between 1980 and 2023 from the current Management Track (solid line) and the 2022 Management Track assessment (dashed line). The corresponding  $SSB_{Threshold}$  ( $\frac{1}{2}$   $SSB_{MSY}$  proxy; horizontal dashed line) as well as  $SSB_{Target}$  ( $SSB_{MSY}$  proxy; horizontal dashed line) as well as  $SSB_{Target}$  ( $SSB_{MSY}$  proxy; horizontal dashed line) are based on the 2024 assessment. The approximate 90% lognormal confidence intervals are shown.



Figure 2: Trends in the fully selected fishing mortality  $(F_{Full})$  of American plaice between 1980 and 2023 from the current Management Track (solid line), the 2022 Management Track assessment (dashed line), and the corresponding  $F_{Threshold}$  ( $F_{MSY}$  proxy=0.519; horizontal dashed line). The approximate 90% lognormal confidence intervals are shown.



Figure 3: Trends in Recruits (000s) of American plaice between 1980 and 2023 from the current Management Track (solid line) and previous 2022 Management track (dashed line) assessment. The approximate 90% lognormal confidence intervals are shown.



Figure 4: Total commercial landings and discards of American plaice between 1980 and 2023. There is no recreational fishery for this stock.



Figure 5: Indices of biomass for the American plaice between 1980 and 2023 for the spring (top) and fall (bottom) NEFSC bottom trawl surveys. Gaps where data is not available are indicated by parallel breaks in the time series. The approximate 90% lognormal confidence intervals are shown.