



STOCK ASSESSMENT OF EASTERN GEORGES BANK HADDOCK (*MELANOGRAMMUS AEGLEFINUS*) IN 2025

CONTEXT

The Fisheries Management Branch of Fisheries and Oceans Canada (DFO) has requested a review of resource status for eastern Georges Bank Haddock (*Melanogrammus aeglefinus*) in support of the decision-making process for the 2027 fishery. This Fisheries Science Advisory Report is from the regional peer review meeting of June 16–18, 2026 on the Stock Assessment of Atlantic Cod and Haddock on Eastern Georges Bank. Additional publications from this meeting will be posted on the [Fisheries and Oceans Canada \(DFO\) Science Advisory Schedule](#) as they become available.

SCIENCE ADVICE

Status

- The 2025 model-estimated spawning stock biomass (SSB; 12,835 mt) is above the limit reference point (LRP; 7,833 mt) with a very high probability (>99%) and below the upper stock reference (USR; 25,999 mt) with a moderately high probability (73%), placing the stock in the cautious zone.

Trends

- The SSB in 2025 was estimated at 12,835 mt, which is below the median value for the time series (21,688 mt, 1969–2025). This represents a decline of more than 50% from the 2024 SSB estimate.
- Model estimates of age-1 recruitment in 2020 and 2021 (75 million and 71 million, respectively) are above the median recruitment of 8.5 million; however, recruitment in more recent years has been comparatively low.
- Fishing mortality (F) estimates averaged 0.57 over the last five years. The 2025 estimate was 0.46, below the five-year average.
- The model-estimated natural mortality rate (M; 0.508) in the recent time period (2010–2025) continues to be high.

Ecosystem and Climate Change Considerations

- Higher estimates of M have been attributed to both density-dependent impacts of the 2013 year-class, and changes in habitat related to environmental conditions.
- The presence of Haddock in deeper water strata off eastern Georges Bank (EGB) indicates increased movement off the bank throughout the year, likely corresponding with ecosystem changes.

Stock Advice

- Catch advice for 2027 ranged from 830–2,020 mt assuming full utilization of 2026 total allowable catch (TAC), and from 1,010–2,210 mt assuming partial utilization of 2026 TAC. These catch levels are based on the 25–75% risk of exceeding the fishing mortality reference level (F_{ref}).

BASIS FOR ASSESSMENT**Assessment Details**

Data from the 5Z9 stratum for the DFO Ecosystem Winter Research Vessel (RV) Survey were added to the assessment model, improving some of the model diagnostics of the Base model. Additional improvements to the model were discussed during the meeting, and recommendations were made for future exploration.

Year Assessment Approach was Approved

2025 (Barrett and Barrett 2026)

Assessment Type

Full Assessment

Most Recent Assessment Date

1. Last Full Assessment: 2025 (DFO 2025)
2. Last Interim-Year Update: NA

Stock Assessment Approach

1. Broad category: Single stock assessment model
2. Specific category: Statistical catch-at-age

Ecosystem and Climate Change Assessment Approach

Implied and Linked: Ecosystem variables are indirectly accounted for in the advice. The model estimates M since 2010, that may capture both changes in density dependence and changing environmental conditions. Environmental data are evaluated outside of the model to qualitatively assess any recent changes that may impact the stock.

Stock Structure Assumption

The most recent review of stock structure (Kronlund et al. 2023) suggests Haddock on Georges Bank are a single stock. EGB Haddock are currently assessed as a single unit, although some mixing may exist with adjacent stock units. Based on the physical and oceanographic characteristics of Georges Bank, larval dispersal and adult movement are thought to be limited (Kronlund et al. 2023). Tagging studies have suggested seasonal mixing of Haddock between the Bay of Fundy, Gulf of Maine, Great South Channel, and Georges Bank, with movement varying yearly. When abundance is high, boundaries may become more continuous (Sosebee and Cadrin 2006).

Reference Points

- Limit Reference Point (LRP): 7,833 mt; $B_{recover}$ (minimum model-estimated SSB between 1991–1996 [SSB_{1993}] for each assessment; Wang and Carruthers 2025)

Maritimes Region

- Upper Stock Reference (USR): 25,999 mt; Rago-Razor method (minimum model-estimated SSB for which further increases in SSB did not produce markedly improved recruitment; Wang and Carruthers 2025)
- Removal Reference (RR): 0.325; $F_{40\%SPR}$ (fishing mortality rate at 40% spawning potential ratio; TRAC 2022)
- Target Reference Point (TRP): NA

Data

- DFO Winter Ecosystem Research Vessel (RV) Survey index (1987–2025)
- National Marine Fisheries Service (NMFS) Spring Survey (1968–1972; 1982–2025, except 2020 and 2023)
- NMFS Fall Survey (1963–2025, except 2020)
- Canadian commercial fishery data (1969–2025)
- United States of America (US) commercial fishery data (1969–2025)

Data changes: The DFO Winter RV Survey was conducted in 2022 and 2025 with a new vessel and gear. Conversion factors (Yin et al. In Prep¹) were applied to make these data comparable to the time series. Data from 5Z9 were included from 2010–2025 for the DFO Winter RV Survey.

¹ Yin, Y., Martin, R., Brunsdon, E., and Benoit, H. In Prep. Calibration of Bottom Trawl Survey Vessels: Results of Comparative Fishing Between the CCGS *Teleost* and CCGS *John Cabot*/ CCGS *Captain Jacques Cartier* on and around Georges Bank in 2022-2024. DFO Can. Sci. Advis. Sec. Res. Doc.

ASSESSMENT

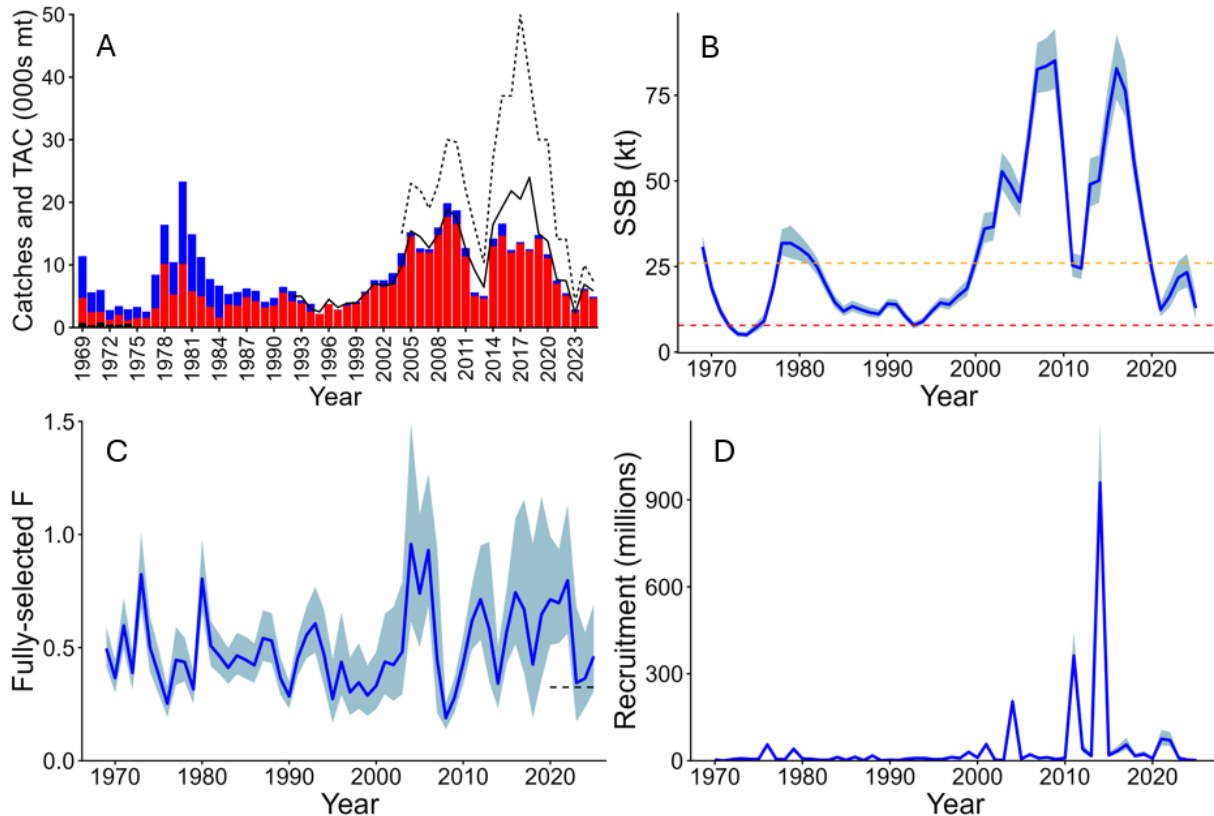


Figure 1. (A – upper left panel) Catch and total allowable catch (TAC) by country (blue-US; red-Canada; black-foreign). TAC is represented by the black line (dashed for total; solid for Canadian), (B – upper right panel) spawning stock biomass (SSB) in relation to the limit reference point (LRP; red) and upper stock reference (USR; orange), (C – bottom left panel) Fully-selected instantaneous fishing mortality rate (F) and fishery removal reference (dashed line, $F_{ref}=0.325$), and (D – bottom right panel) Recruitment (numbers at age-1; millions). 95% confidence intervals provided in light blue shading for Figures B–D.

Stock Status and Trends

Spawning Stock Biomass

The current SSB estimate for 2025 is 12,835 mt, which is below the median SSB of 21,688 mt for the time series (1969–2025, Figure 1B). SSB has declined from 83,000 mt in 2016 to 12,000 mt in 2021, with a slight increase in SSB from 2022 to 2024. The 2025 estimated SSB decreased by more than 50% from the 2024 SSB estimate.

Recruitment

Model-estimated recruitment at age-1 has fluctuated between 1.7 and 90 million since 1990, except for the strong year-classes. The recruitment of the 2003, 2010, and 2013 year-classes was 204, 362, and 959 million, respectively. The model estimates of age-1 recruitment in 2020 and 2021 are 75 and 71 million fish, respectively, exceeding the median recruitment of 8.5 million for the time series; however, recruitment in more recent years has been comparatively low (Figure 1D).

Fishing Mortality

Fully-selected F has varied throughout the time series, fluctuating between 0.18 in 2008 to 0.71 during the mid-2010s (Figure 1C). Fishing mortality (F) estimates averaged 0.57 over the last five years. The 2025 estimate was 0.46, below the five-year average.

Natural Mortality

The trend in M continues to show an increase from the assumed historical level of 0.2 to the model estimated value of 0.508 in the recent time block (2010–2025; time- and age-invariant).

Current Status

The 2025 model-estimated SSB (12,835 mt) is above the LRP with a very high probability (>99%) and below the USR with a moderately high probability (73%), placing the stock in the cautious zone.

History of Landings, Total Allowable Catch & Catch Advice

Combined Canada and US catches for EGB Haddock were 4,920 mt in 2025 (Figure 1A, Table 1). In 2025, the total catch represented 66% of the combined (Canada and US) TAC.

The Canadian catch decreased from 5,908 mt in 2024 to 4,694 mt in 2025. Discards of Haddock by the Canadian Scallop fishery were 13 mt in 2025, and have ranged between 4 mt and 186 mt over the time series. Canada caught 80% of its 5,854 mt TAC. In 2025, US catches were 226 mt, with US landings of 218 mt and 8 mt of estimated discards. The US caught 14.5% of its 1,556 mt TAC.

The 2021 year-class (age 4) was a major contributor to both the 2025 Canadian and US fishery catch (65% and 52% of fish by number, respectively), followed by the 2022 year-class (age 3; 18% by number) for Canada and the 2020 year-class for the US (age 5; 32% by number). Canadian catches peaked at lengths of 42.5 cm for otter trawl, 46.5 cm for longline, and 42.5 cm for scallop dredge gears. US catches peaked at lengths of 42 cm for landings and 36 cm for discards.

Table 1. Landings and total allowable catch (TAC) in metric tons (mt) by Canada and the US for the eastern Georges Bank Haddock fishery by calendar year (January 1–December 31). A dash (-) indicates data are not currently available.

Calendar Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Canadian TAC (mt)	21,830	20,500	24,000	15,000	13,800	7,614	7,473	2,320	6,900	5,854	3,752
Canadian Landings (mt)	11,935	13,377	12,216	14,156	11,045	6,997	5,143	2,499	5,889	4,681	-
Canadian Discards (mt)	8	8	5	4	7	5	7	8	9	13	-
US TAC (mt)	15,170	29,500	16,000	15,000	16,200	6,486	6,627	1,520	3,100	1,556	998
US Landings (mt)	341	214	253	544	633	518	327	299	285	218	-

Maritimes Region

Calendar Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
US Discards (mt)	125	81	21	50	50	6	8	33	26	8	-
Total TAC (mt)	37,000	50,000	40,000	30,000	30,000	14,100	14,100	3,840	10,000	7,410	4,750
Total Catch (mt)	12,409	13,679	12,495	14,735	11,735	7,526	5,485	2,840	6,219	4,920	-

Ecosystem and Climate Change Considerations

Higher M estimates in the model have been attributed to both density dependent impacts of the 2013 year-class (e.g., reduced growth, condition, spatial distribution expanded) and changes in habitat related to environmental conditions (e.g., movement, Friedland et al. 2015; Wang et al. 2021; Wang et al. 2024).

Haddock presence in deeper waters within the EGB management area indicates that fish movement off the bank may be occurring. Although the mechanism driving changes in movement has not been identified, it is likely related to ecosystem changes occurring in the EGB area (e.g., temperature, predation, competition). To account for changes in distribution observed in the spring, this assessment includes data from the 5Z9 stratum of the DFO Winter RV Survey.

Spring bottom temperature anomalies on EGB were below normal for 2025 and near average for 2026 compared to the standard time-period (1991–2020). During the 2025 DFO Winter RV Survey, a non-toxic plankton bloom was observed. The impacts of both lower bottom temperatures and the presence of the algal bloom on Haddock are unclear, but may partially explain lower fish catches in the area.

Projections

An estimate of catch for 2026 is required for the model projections. Two catch estimates for 2026 were considered:

1. full utilization of the 2026 TAC (4,750 mt), and
1. partial utilization of the 2026 TAC (3,750 mt).

In the past 10 years, 38–74% of the annual TAC was utilized. This is largely driven by lower US catches relative to the US TAC and the Canadian fleet-share arrangements. Based on the recent history of US catches (approximately 350 mt average over the last 5 years), and further information from Resource Management related to fleet-share arrangements, 3,750 mt was selected as a best estimate for the partial utilization catch scenario.

Model projections predict a decline in SSB for 2026 and 2027. The 2021 and 2025 year-classes are projected to be the dominant contributors to fishery catch in 2027 (Barrett In Prep²).

Catch Advice

Catch advice for EGB Haddock is based on 25–75% risk of exceeding the fishing mortality reference level (F_{ref} ; Tables 2a, 2b). Model-projected catch advice for the 2027 fishing year,

² Barrett, M.A. In Prep. Stock Assessment of Haddock (*Melanogrammus aeglefinus*) on Eastern Georges Bank for 2025. DFO Can. Sci. Adv. Sec. Res. Doc.

based on an assumption of full utilization of the 2026 TAC (4,750 mt), ranges from 830–2,020 mt. An assumption of partial utilization of the 2026 TAC (3,750 mt) produces catch advice ranging from 1,010–2,210 mt. Projections of SSB_{2028} and the probabilities that SSB_{2028} will exceed the LRP and the USR are presented for the full-utilization and partial-utilization scenarios in Tables 2a and 2b, respectively.

Additional catch scenarios, requested by Resource Management include:

1. no fishing (0 mt),
2. 50% below the 2026 TAC (3,563 mt), and
3. 25% below the 2026 TAC (2,375 mt).

The projected median SSB for Jan 1st, 2028 is provided for all of the catch scenarios in Tables 2a, 2b, and 3.

Figure 2 provides an illustration of projections for SSB_{2028} for 2027 TAC scenarios of 0 mt, 1,450 mt, and 3,563 mt in 2027. The SSB estimate is the same across the three scenarios for 2026 (reflects recorded catch from 2025), and 2027 (reflects partial utilization of TAC for 2026, 3,750).

Table 2a. Catch advice for eastern Georges Bank Haddock for 2027 with full utilization of the 2026 TAC (4,750 mt). Probabilities are based on spawning stock biomass (SSB) as of Jan 1st, 2028. LRP=limit reference point. USR=upper stock reference point. F_{ref} =fishing mortality reference point.

Full utilization of 2026 TAC- 4,750 mt	25% risk of exceeding F_{ref}	50% risk of exceeding F_{ref}	75% risk of exceeding F_{ref}
2027 catch advice (mt)	830	1,290	2,020
SSB_{2028} (mt)	8,588	8,223	7,655
$P(SSB_{2028} > LRP)$	0.454	0.441	0.412
$P(SSB_{2028} > USR)$	0.188	0.185	0.174

Table 2b. Catch advice for eastern Georges Bank Haddock for 2027 with partial utilization of the 2026 TAC (3,750 mt). Probabilities are based on spawning stock biomass (SSB) as of Jan 1st, 2028. LRP=limit reference point. USR=upper stock reference point. F_{ref} =fishing mortality reference point.

Partial utilization of 2026 TAC- 3,750 mt	25% risk of exceeding F_{ref}	50% risk of exceeding F_{ref}	75% risk of exceeding F_{ref}
2027 catch advice (mt)	1,010	1,430	2,210
SSB_{2028} (mt)	9,030	8,681	8,073
$P(SSB_{2028} > LRP)$	0.472	0.458	0.435
$P(SSB_{2028} > USR)$	0.194	0.189	0.182

Table 3. Projected 2028 spawning stock biomass (SSB_{2028}) under alternative total allowable catch (TAC) scenarios for 2027 fishing year. Probabilities of SSB_{2028} being above the limit reference point (LRP) and the upper stock reference (USR) are based on SSB as of January 1, 2028 and a partial utilization of the TAC in the 2026 fishing year (3,750 mt).

Alternative TAC Scenarios for 2027 Fishing Year	SSB_{2028} (mt)	$P(SSB_{2028} > LRP)$	$P(SSB_{2028} > USR)$
0 mt	9,847	0.521	0.206
2,375 mt*	7,944	0.430	0.180
3,563 mt**	7,050	0.392	0.168

*50% below the 2026 fishing year TAC.

**25% below the 2026 fishing year TAC.

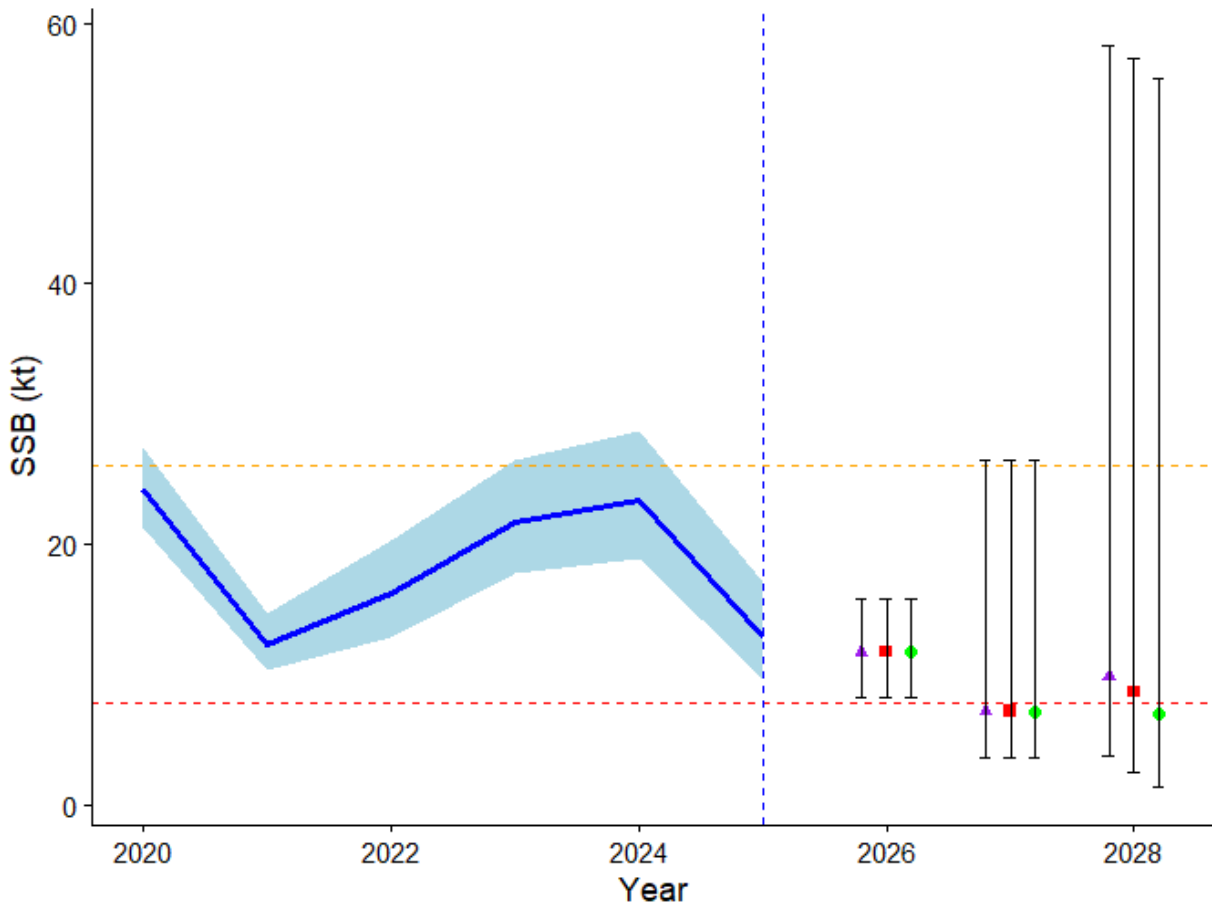


Figure 2. Spawning stock biomass (SSB) of eastern Georges Bank Haddock from 2020–2025, and projections for 2026–2028 based on three total allowable catch (TAC) scenarios for 2027 (No fishing–0 mt, purple triangles; 50% risk of exceeding F_{ref} –1,430 mt, red squares; and 25% reduction in TAC from 2026–3,563 mt, green circles). Projected values reflect the Jan 1st median SSB with error bars extended to the 5th and 95th percentiles with an assumed partial utilization of the 2026 TAC (3,750 mt). The dashed lines represent the limit reference point (red), upper stock reference point (orange), and the terminal year of the model (2025, blue).

SOURCES OF UNCERTAINTY

Natural mortality remains an uncertainty for the EGB Haddock stock. The expectation was that with the exit of the 2013 year-class and the reduction in overall stock biomass, the model-

estimated M would decrease. Contrary to expectations, model-estimated M remains high. However, our understanding of the factors leading to high M in recent years is incomplete (e.g., migration, catch reporting and ageing errors, misspecification of selectivity). Additional uncertainties identified during the peer-review were related to the disconnect between the M used in the F_{ref} calculation and M used for projections.

The impact of the reduced spatial coverage and later timing of the 2025 NMFS Fall Survey on model performance was evaluated by excluding these data from the model. Excluding the 2025 NMFS Fall Survey data did not improve model performance. The inclusion of deepwater sets from stratum 5Z9 of the DFO Winter RV Survey was also evaluated. The model configuration accepted at peer review includes data from the 5Z9 stratum of the DFO Winter RV Survey, consistent with the previous assessment.

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