



STOCK STATUS UPDATE OF ATLANTIC HALIBUT (*HIPPOGLOSSUS HIPPOGLOSSUS*) ON THE SCOTIAN SHELF AND SOUTHERN GRAND BANKS IN NAFO DIVISIONS 3NOPS4VWX5ZC

CONTEXT

Fisheries and Oceans Canada (DFO) Resource Management (RM) has requested Science advice on the status of the Scotian Shelf and southern Grand Banks (3NOPs4VWX5Zc) Atlantic Halibut (*Hippoglossus hippoglossus*) stock based on the articulated harvest decision rule adopted at the Scotia-Fundy Groundfish Advisory Committee (SFGAC) meeting in March 2022. This Science Response Report results from the regional peer review of December 10th, 2024, on the Stock Status Update for 3NOPs4VWX5Zc Atlantic Halibut.

SCIENCE ADVICE

Status

- The 2024 three-year mean exploitable biomass index (51.9 kt) from the stratified random Industry-DFO Halibut Longline Survey is above the upper stock reference (USR) with a very high probability of being in the healthy zone.

Trends

- The 2024 index of exploitable biomass and the three-year mean are the highest in the time series. Inter-annual changes in the three-year mean have remained relatively stable through the time series with a small increase in 2024 from the previous year.
- Atlantic Halibut catch per tow in 2024 from the Maritimes Summer Ecosystem Research Vessel Survey was the second highest value in the time series. Catch from this survey increased between 2000 and 2011, followed by a decline, but has been increasing again since 2020.

Ecosystem and Climate Change Considerations

- Ecosystem and climate change considerations were taken into account in the most recent assessment framework review and were not further updated or reviewed during this interim-year update.

Stock Advice

- The three-year mean exploitable biomass of 51.9 kt corresponds to removals of 5,149 t under the harvest decision rule (HDR) for this stock.
- Removals of 5,149 t is within the maximum annual change of 15% from the 2024–2025 total allowable catch (TAC). It is 222 t (4.5%) more than last year's TAC.

BASIS FOR ASSESSMENT

Assessment Details

Year Assessment Approach was Approved:

2022 (DFO 2024a; Johnson et al. 2024; Li et al. 2025)

Assessment Type:

Interim Year Update

Most Recent Assessment Date

1. Last Full Assessment: March 2022 (Johnson et al. 2024; DFO 2024a; Li et al. 2025)
2. Last Interim Year Update: December 2023 (DFO 2024b)

Stock Assessment Approach

1. Broad category: index-based (trends in empirical indices only), single stock assessment model, management strategy evaluation (MSE)-lite
2. Specific category: Statistical catch-at-length; index-based (including fishery-dependent and fishery-independent indices)

A new assessment framework was adopted in 2022. This framework used a catch-at-length model with sex and age structure to assess the stock status and provide maximum sustainable yield (MSY) based reference points. The performance of a suite of HDRs were assessed through closed loop simulation (MSE-lite).

Stock, Ecosystem and Fishery Overview Information

Detailed information on the stock, fishery, and ecosystem considerations was covered during the last full assessment (Li et al, 2025; Johnson et al. 2024; DFO 2024a) and last updated during the last interim year update (DFO 2024b).

Stock Structure Assumption

In 1987, Atlantic Halibut in Canadian waters were separated into two management units, 4RST and 3NOPs4VWX5Zc, based primarily on conventional tagging (Li et al. 2025). The Scotian Shelf and southern Grand Banks stock (3NOPs4VWX5Zc) is managed as a single stock with a single set of reference points.

Reference Points

- Limit Reference Point (LRP): 10.9 kt ($0.4B_{MSY}$; DFO 2024a).
- Upper Stock Reference (USR): 21.8kt ($0.8 B_{MSY}$; DFO 2024a).
- Removal Reference (RR): NA

Harvest Decision Rule

The HDR has two steps. First, a fishing mortality rate (F) is applied to the exploitable biomass (B) estimated from the three-year mean of the stratified random Industry-DFO Halibut Longline Survey to calculate total allowable catch (TAC) advice. The articulated HDR includes three control points, the LRP, USR, and $1.2B_{MSY}$. Below the LRP, F is capped at 0.05 and above the USR it is relative to F_{MSY} (i.e., $F = 0.8 F_{MSY}$ when $B = 0.8 B_{MSY}$) up to the third control point (1.2

B_{MSY}), above which it is capped at $1.2 F_{MSY}$. Second, the percentage change from the previous year's TAC is limited by the sliding inter-annual TAC change threshold, where the limit of change ranges from 15% at the USR to 100% at the LRP (Figure 1).

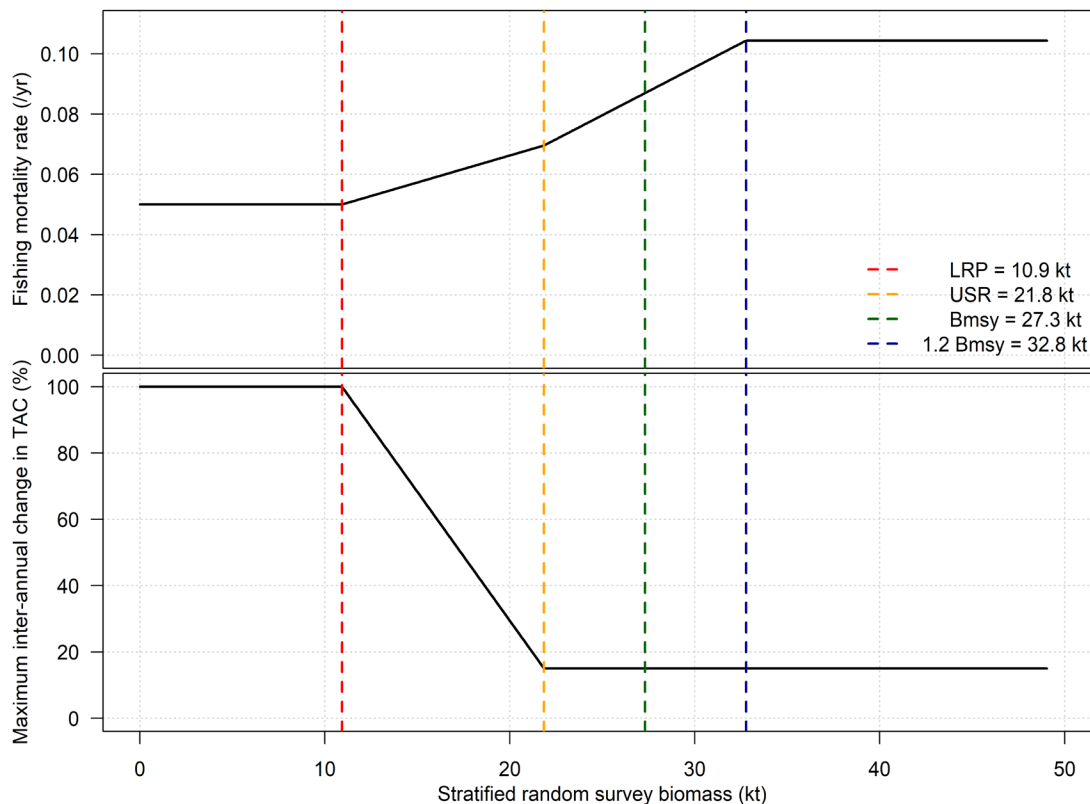


Figure 1. The articulated harvest decision rules with reference points and control points used for determining target harvest rates for Atlantic Halibut based on the three year mean of biomass estimates from the stratified random Industry-DFO Halibut Longline Survey. LRP=limit reference point, USR=upper stock reference, B_{MSY} =biomass at maximum sustainable yield.

Data

- Stratified Random Halibut Survey (Industry-DFO Halibut Longline Survey) Halibut catch (2017–2024)
- Maritimes Summer Ecosystem Research Vessel Survey (RV Summer Survey; NAFO Divs. 4VWX) Halibut abundance (1970-2024)
- Atlantic Halibut landings: Canadian and International landings from Northwest Atlantic Fisheries Organization (NAFO)
- 2024 preliminary Maritimes Region Atlantic Halibut landings from Maritimes Fisheries Information System database (MARFIS)

Data changes:

- Data from the 2021 RV Summer Survey that were not previously included due to the lack of a conversion factors between the new and old vessels have now been included in the time series following completion of comparative fishing and calculation of conversion factors. Incomplete coverage remains in the following years: 2018, 2021, and 2022.

ASSESSMENT

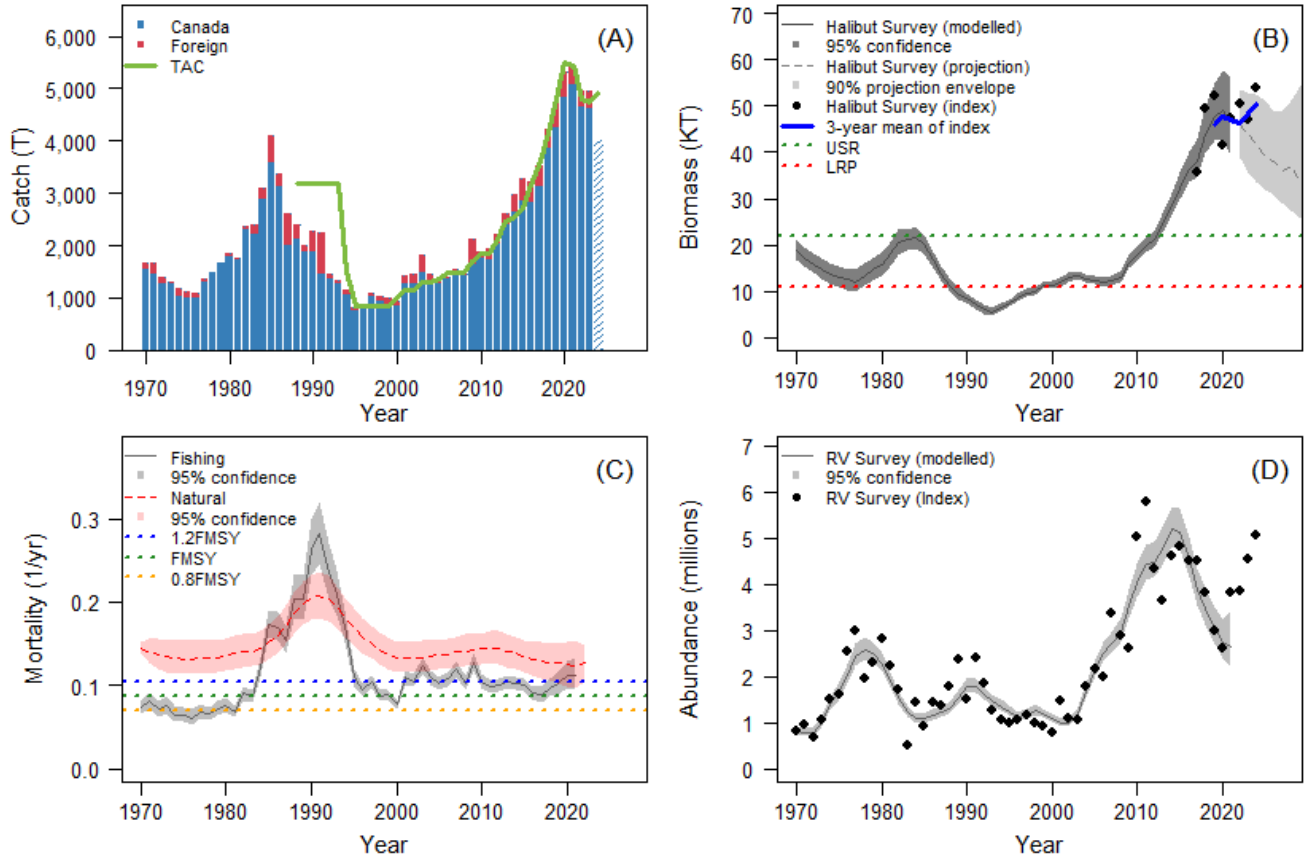


Figure 2. (A) Northwest Atlantic Fisheries Organization (NAFO) reported Canadian (blue) and foreign (red) landings (tonnes) for 3NOPs4VWX5Zc Atlantic Halibut. Landings for 2024 (hashed bar) are preliminary, extracted from the Maritimes Fisheries Information System (MARFIS) as of October 31, 2024 (this does not include landings in Newfoundland which are not yet available). The solid green line is the Canadian total allowable catch (TAC). The NAFO 21A table of landings by country is reported by calendar year; however, the TAC for the stock is set for the period of April–March. (B) Stratified Random Halibut Survey Biomass in relation to the limit reference point (LRP; 10.9 kt) and upper stock reference (USR; 21.8 kt), (C) fishing and natural mortality in relation to the F_{MSY} removal references. (D) Total abundance from RV Summer Survey as an index of recruitment.

Stock Status and Trends

Index of Exploitable Biomass - Industry-DFO Halibut Longline Survey

Following outcomes from the last framework in 2022, harvest advice in interim years is based on the three-year mean exploitable biomass index from the Stratified Random Halibut Survey. Inter-annual changes in this index have been minimal (Figure 2B).

In 2023, a new stratum with reduced allocation of stations was introduced into the survey in an area in the northeast where there has been little to no catch of Atlantic Halibut in the Stratified Random Halibut Survey since 2017 (Figure 3, DFO 2024b).

Although not all stations were completed this year (Figure 3), there was adequate coverage in all strata to effectively calculate the index of exploitable biomass from the Stratified Random Halibut Survey. The 2024 index of exploitable biomass and the three-year mean are the highest

in the time series. Inter-annual changes in the three-year mean have remained relatively stable through the time series with a small increase in 2024 from the previous year.

The 2024 biomass from the Stratified Random Halibut Survey was estimated using a catchability of 0.002 to be 55.5 kt (95% confidence interval: 42.8, 68.2). Based on the three-year mean (Figure 2B), the exploitable biomass index from the Stratified Random Halibut Survey for 2024 is 51.9 kt which is 1.9 B_{MSY} , higher than the LRP ($0.4 B_{MSY}=10.9$ kt) and USR ($0.8 B_{MSY}=21.8$ kt), putting this stock in the healthy zone (Figure 1).

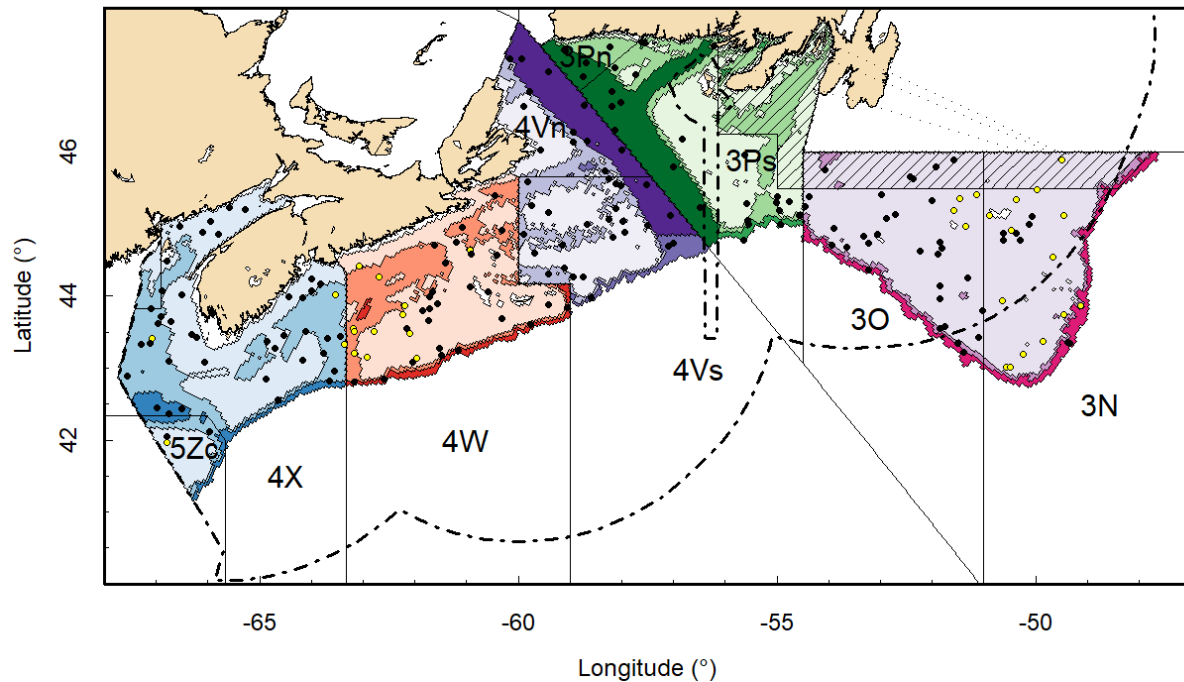


Figure 3. The Stratified Random Industry-DFO Halibut Longline survey area across the Scotian Shelf (SS) and southern Grand Banks (GB). Survey strata are represented by the different colours. The hatched area is a new stratum with lower station allocation introduced in 2023. The survey area includes division 3Pn, which is not part of the management unit. Two hundred stations were assigned in the 2024 survey, black dots indicate completed stations and yellow dots indicate incomplete stations. Solid black lines represent Northwest Atlantic Fisheries Organization Division boundaries, while international boundaries are marked with dashed lines.

Index of Recruitment: Maritimes Summer Ecosystem Research Vessel Survey (RV Survey; NAFO Divisions 4VWX)

The RV Summer Survey provides an index of recruitment for Atlantic Halibut. The median size of Atlantic Halibut caught in the trawl survey is between 40–50 cm. The abundance of Atlantic Halibut in this survey increased between 2000 and 2011 (Figure 2D) but then declined to the lowest value since 2011 in 2020. Since 2020, abundance has been increasing.

A conversion factor for Atlantic Halibut between the old and new survey vessels and fishing gear was estimated (1:1) and data from the 2021 survey that was not included in previous years has now been incorporated into the time series, however coverage remains incomplete for that year as well.

The abundance index for 2024 is the second highest value in the time series. The index of abundance is reviewed annually, exclusively for context and does not directly contribute to the HDR outputs.

Current Outlook

The 2024 three-year mean exploitable biomass index (51.9 kt) from the stratified random Industry-DFO Halibut Longline Survey is above the USR with a very high probability of being in the healthy zone.

History of Management, TAC, Catch Advice and Landings

A TAC for this fishery was first established in 1988 (DFO 2024a, Li et al. 2025) followed by a period of declining landings which led to a significantly reduced TAC by 1995 and the introduction of a minimum size limit of 81 cm. Since then, TAC has increased and peaked at 5,507 t in 2020 (Table 1, Figure 2A).

Landings data for Atlantic Halibut are retrieved from the NAFO database for each calendar year because landings occur in two DFO regions (Maritimes and Newfoundland and Labrador (NL)) as well as in other countries. Landings from the MARFIS database are reported as preliminary Canadian landings for 2024. These preliminary landings do not include landings in NL. The majority of landings occur on the Scotian Shelf (NAFO Divs. 4VWX).

Table 1: Total reported Canadian and foreign landings (tonnes) of Atlantic Halibut from Northwest Atlantic Fisheries Organization (NAFO) Divisions 3NOPs4VWX5Zc and total allowable catch (TAC) for these divisions. The [NAFO 21A table](#) of landings by country are reported by calendar year; however, the TAC for the stock is set for the period of April–March. Data were extracted from the NAFO 21A database on October 31, 2024. An 'NA' indicates where data are not yet available.

Year	3NOPs Canadian Landings	4VWX5Zc Canadian Landings ¹	Total Canadian Landings	3NOPs Foreign Landings	4VWX5Zc Foreign Landings ¹	Total Foreign Landings	Overall Landings	TAC
2015	693	2,174	2,867	395	1	396	3,263	2,738
2016	626	2,186	2,812	393	1	394	3,206	3,149
2017	759	2,353	3,112	403	1	404	3,516	3,621
2018	699	3,171	3,870	343	0	343	4,213	4,164
2019	841	3,416	4,257	480	3	483	4,740	4,789
2020	1,142	3,692	4,834	492	1	493	5,327	5,507
2021	1,342	3,741	5,083	363	1	364	5,447	5,445
2022	1,614	3,028	4,642	317	1	318	4,960	4,807
2023	1,985	2,622	4,607	330	1	331	4,938	4,744
2024 ²	1,163	2,852	4,015	-	-	-	-	4,927

¹Canadian landings in 5Y are assumed to have been in the Canadian portion and are included in the 4VWX+5Zc value. Foreign/US landings in 5Y are not included.

²Landings from the Maritimes Fisheries Information System (MARFIS) for 2024 are preliminary, as of October 31, 2024. Landings for NL in 2024 are not included as they are not yet available.

Ecosystem and Climate Change Considerations

The environmental conditions affecting this stock are currently unknown. Recent work by Czich et al. (2023) suggest that forecasted changes in thermal conditions in the Northwest Atlantic may influence the distribution and abundance of juvenile Atlantic Halibut in the near future.

Stock Advice

Stock status in interim years is assessed based on the three-year mean exploitable biomass index from the Stratified Random Halibut Survey. Closed-loop simulation testing conducted at

the last framework projected a gradual return to B_{MSY} . So far, stock status has remained well above B_{MSY} .

Harvest Decision Rule Outputs

As the 2024 three-year mean exploitable biomass based on the Stratified Random Halibut Survey is higher than $1.2 B_{MSY}$ (32.8 kt, Figure 1), the highest fishing mortality, $1.2 F_{MSY}$ (0.104), would be applied using the articulated HDR. This results in TAC advice for 2025–2026 of 5,149 t. As this is within the maximum annual change of 15% from the 2024–2025 TAC (4,927 t), the 2025–2026 TAC advice is 5,149 t. This application of the HDR assumes all removals from Canadian and international fisheries are included.

Evaluation of Exceptional Circumstances/Assessment Triggers

No significant changes in data sources or significant deviations from expectations were observed that would trigger an early assessment. The 3-year mean index in 2024 was near the upper end, but still within the 90% probability envelope from the closed-loop simulation.

SOURCES OF UNCERTAINTY

The Industry-DFO Halibut Longline Survey index uses the stratified mean catch per tow and does not account for variation associated with hook competition, vessels, and temperature effects. In the current survey year, although the minimum number of stations in each strata were completed, allowing for calculation of the exploitable biomass index, there was low coverage in some strata when compared with previous years.

The 2018 and 2022 RV Summer Survey did not cover all strata due to mechanical issues with the vessels.

The interpretation of trends assumes no changes in vital rates, such as, growth or fecundity, that impact the dynamics of the population. Therefore, it is not known if, or how, vital rates and population growth rate will change with changes in stock size and/or variable environmental conditions. Further, there is uncertainty in the stock recruitment relationship and natural mortality in Atlantic Halibut which can affect outcomes, especially reference points. There is also potential for shifts in habitat usage, spawning areas, migration, and distribution due to changes in thermal conditions in the Northwest Atlantic. Despite these sources of uncertainty, they are not expected to change the outcome of the advice provided.

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