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Quebec Region

Canadian Science Advisory Secretariat
Science Advisory Report 2025/013

GULF OF ST. LAWRENCE (4RST) ATLANTIC HALIBUT (*HIPPOGLOSSUS HIPPOGLOSSUS*) STOCK ASSESSMENT IN 2024

CONTEXT

The Fisheries Management Branch of Fisheries and Oceans Canada (DFO) has requested an assessment of the status of the gulf of St. Lawrence (GSL, Divisions 4RST of the Northwest Atlantic Fisheries Organization (NAFO)) Atlantic halibut stock as part of the multi-year stock assessment cycle.

This Science Advisory Report is from the regional peer review of February 24-25, 2025 on the Gulf of St. Lawrence (4RST) Atlantic Halibut Stock Assessment in 2024. 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 2024 exploitable biomass is estimated at 81,392 t, and is above the proposed upper stock reference (USR) with a very high probability, placing the stock in the Healthy Zone of the Precautionary Approach.
- The fishing mortality rate (*F*) in 2024 is estimated at 0.03 and is below the maximum sustainable yield exploitation rate (F_{MSY}) estimated by the model with a very high probability.

Trends

- Exploitable biomass has been increasing since the early 2000s, and is currently at its highest level since 1983.
- Recruitment has been stable at high levels since 2010.
- Fishing mortality rate (*F*) has been stable since 2012, at around 30% of F_{MSY}.

Ecosystem and Climate Change Considerations

- The observed rise in water temperatures in the Gulf of St. Lawrence does not appear to be adversely affecting the survival and development of Atlantic halibut. Warming could continue to improve habitat conditions.

Stock Advice

- Constant catch scenarios (2,466 to 4,932 t) indicate, with probabilities greater than 99%, that exploitable biomass will remain above the proposed USR over the two projected years

(2025-26 and 2026-27). Under these catch scenarios, exploitable biomass would vary between a 4% increase and a 3% decrease over two years.

- The fishing mortality rates (*F*) corresponding to the catch scenarios evaluated all remain under F_{MSY}.

BASIS FOR ASSESSMENT

Assessment Details

Year Assessment Approach was Approved

The assessment approach has been revised during the current assessment.

Assessment Type

Full Assessment.

Most Recent Assessment Date

1. Last Full Assessment: 2023 (DFO 2023).
2. Last Interim-Year Update: S.O.

Stock Assessment Approach

1. Broad category: Single stock assessment model.
2. Specific category: Delay difference population dynamics model.

Stock Structure Assumption

Although tagging work has confirmed the seasonal movements of some Atlantic halibut between the GSL stock and the Scotian Shelf/Southern Grand Banks stock, genetic work has shown subtle but significant differences between these two stocks, supporting the stock delimitation in force since 1987.

Reference Points

The reference points have been updated for the current assessment:

- Limit Reference Point (LRP): 40% of B_{MSY} (21,721 t)
- Upper Stock Reference (USR): 80% of B_{MSY} (43,442 t)
- Removal Reference (RR): N/A
- Target Reference Point (TRP): N/A

Data

Commercial landings: 1960-2024.

Sampling of commercial catches at sea and dockside: 1998-2024.

DFO trawl surveys:

- Ecosystemic survey in the estuary and northern GSL (1984-2024)
- Ecosystemic survey in the southern GSL (1990-2024)

- Winter ecosystemic survey in northern GSL (1983-1994)

Longline survey, DFO-industry collaboration: 2017-2024.

Capture-marking-recapture project, DFO-industry collaboration: 2017-2024.

ASSESSMENT

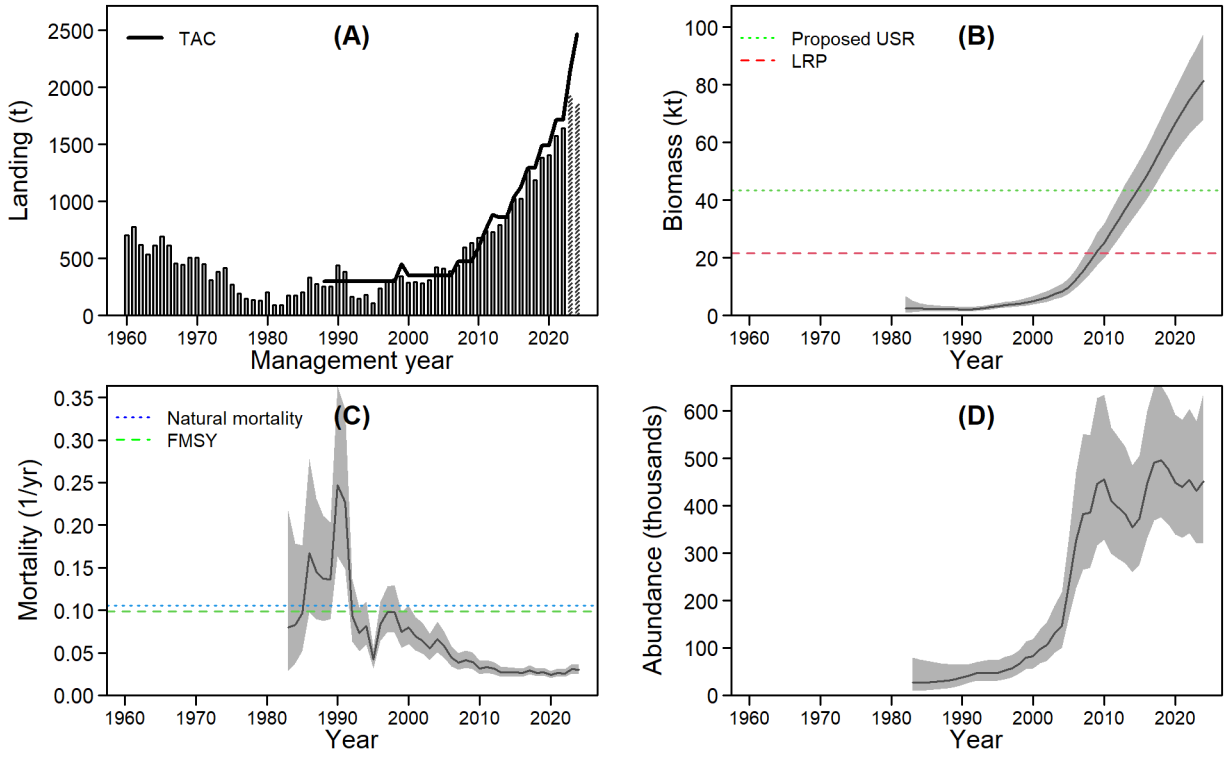

Figure 1. (A) Landings and total allowable catches (TACs) by management year, preliminary data in 2023 and 2024; (B) exploitable biomass (≥85 cm) with 95% confidence intervals (CI) relative to the limit reference point (LRP, dashed) and the proposed upper stock reference point (USR, dotted); (C) fishing mortality (F) with 95% CI relative to the exploitation rate at maximum sustainable yield (F_{MSY}, dashed) and fishing mortality (M, dotted); (D) recruitment to the fishery with 95% CI.

Stock Status and Trends

Biomass

The assessment model estimates harvestable biomass in 2024 (B_{2024}) at 81,392 t (95% CI: 67,935-97,516 t), or 150% of the B_{MSY} value (54,290 t). Exploitable biomass has been steadily increasing since the early 2000s, following a stable period at low levels. The probability of B_{2024} falling below the USR is less than 1%.

Exploitation Rate

The assessment model estimates an instantaneous fishing mortality rate in 2024 (F_{2024}) of 0.03 (95% CI: 0.025-0.035), or 30% of the F_{MSY} value (0.099). Instantaneous fishing mortality rates (F) have been stable since 2012.

Recruitment

The assessment model estimates that recruitment to the fishery has been high and stable since 2010. There is no sign of a significant drop in recruitment in the short term.

Current Status

Relative to the LRP and the proposed USR, the GSL Atlantic halibut stock was in the healthy zone in 2024 with a probability of over 99%. The exploitable stock biomass has been increasing since the 2000s, and there are no indications that this trend may change.

History of Management

Annual landings of Atlantic halibut were around 600 t in the early 1960s. These landings declined to an all-time low of 91 t in 1982. Annual landings have been rising since 2008, reaching historic highs of around 2,000 t in 2023 and 2024.

Ecosystem and Climate Change Considerations

The GSL ecosystem has undergone significant changes in recent decades, with warming of surface and deep waters, where record temperatures have been observed in recent years (Galbraith et al. 2024). Atlantic halibut are characterized by a broad thermal tolerance. Studies have linked recent changes in the distribution and abundance of Atlantic halibut to thermal conditions, and suggest that continued warming could further improve habitat conditions (Czich et al. 2023). One of Atlantic halibut's main prey species, redfish, is currently at historically high abundances in the GSL, which could be beneficial for halibut. The stock's recent high productivity suggests that adverse bottom-up environmental effects are unlikely.

Projections

Stock dynamics were projected over two years according to five harvest levels, i.e., 2,466 t, 3,083 t, 3,699 t, 4,136 t, and 4,932 t, (Table 1). The highest removal level predicts a biomass decline of around 3%, while the other levels maintain biomass or allow it to increase. The probability of biomass falling below the proposed USR and PRL levels is less than 1% for all five projected harvest levels.

Table 1. Two-year projection of stock dynamics based on 5 harvest levels.

Projected annual landings (t)	F 2025	F 2026	Biomass variation 2024-2026	Probability B2026 <0.8*B_{MSY}	Probability B2026 <0.4*B_{MSY}
2,466	0.035	0.034	4.3%	<1%	<1%
3,083	0.044	0.043	2.5%	<1%	<1%
3,699	0.053	0.053	0.7%	<1%	<1%
4,136	0.059	0.059	-0.6%	<1%	<1%
4,932	0.071	0.072	-2.9%	<1%	<1%

PROCEDURE FOR INTERIM-YEAR UPDATES

Given the dynamics of the stock and the two-year assessment cycle, it is suggested that the scientific advice be considered valid for the interim year, and that no updates be provided.

However, if the frequency of advice were to change, the process to be completed in the interim years would have to be revised.

SOURCES OF UNCERTAINTY

Gaps in the acquisition of commercial fishing data from logbooks and dockside and at-sea sampling programs are reported mainly in NAFO Division 4R. These gaps contribute to the uncertainty of some important model inputs, namely the annual average individual weight in the population and the commercial catch per unit of effort biomass index.

Exploitable biomass indices from bottom trawl surveys may underestimate the abundance of the largest individuals. The potential impact of this underestimation on the conclusions of the advice has not been explored.

Natural mortality is not well documented for this stock, and the model proved ineffective in estimating it. Sensitivity tests indicated that the calculation of the LRP and USR is strongly influenced by the natural mortality value used to fit the model. As a result, the calculation of the LRP and USR and the establishment of stock status relative to them remains highly imprecise until a better characterization of natural mortality is available. Despite the model's sensitivity, the body of evidence points to the conclusion that the stock is in the healthy zone.

LIST OF MEETING PARTICIPANTS

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SOURCES OF INFORMATION

Czich, A.N., Stanley, R.R.E., Avery, T.S., den Heyer, C.E., and Shackell, N.L. 2023. Recent and projected climate change–induced expansion of Atlantic halibut in the Northwest Atlantic. FACETS. 8: 1-14.

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