



GULF OF ST. LAWRENCE NAFO DIVISION 4T AMERICAN PLAICE (*HIPPOGLOSSOIDES PLATESSOIDES*), WINTER FLOUNDER (*PSEUDOPLEURONECTES AMERICANUS*), YELLOWTAIL FLOUNDER (*LIMANDA FERRUGINEA*) AND 4RST WITCH FLOUNDER (*GLYPTOCEPHALUS CYNOGLOSSUS*) STOCK INDICATORS TO 2024

CONTEXT

The Fisheries and Harbour Management Sector of Fisheries and Oceans Canada (DFO) has requested that the NAFO 4T American Plaice (*Hippoglossoides platessoides*), Winter Flounder (*Pseudopleuronectes americanus*), Yellowtail Flounder (*Limanda ferruginea*) and 4RST Witch Flounder (*Glyptocephalus cynoglossus*) stocks indicators be updated and assessed relative to scaled reference points that are consistent with the DFO Precautionary Approach. The last full scientific assessment conducted for 4T American Plaice was in 2016 (DFO 2016), for 4T Winter Flounder in 2017 (DFO 2017), for 4T Yellowtail Flounder in 2021 (DFO 2021b) and for 4RST Witch Flounder in 2022 (DFO 2022a).

This Fisheries Science Response Report is from the regional peer review from December 11, 2024 on the Gulf of St. Lawrence NAFO Division 4T American Plaice (*Hippoglossoides platessoides*), Winter Flounder (*Pseudopleuronectes americanus*), Yellowtail Flounder (*Limanda ferruginea*) and 4RST Witch Flounder (*Glyptocephalus cynoglossus*) Interim Stock Indicators Update to 2024.

SCIENCE ADVICE

Status

- A. 4T American Plaice: The indicator shows that the stock is currently below its scaled limit reference point (LRP) and in the Critical Zone of the Precautionary Approach (PA) Framework.
- B. 4T Winter Flounder: The indicator shows that the stock is currently below its scaled LRP and in the Critical Zone of the PA Framework.
- C. 4T Yellowtail Flounder: The indicator shows that the stock is currently below its scaled LRP and in the Critical Zone of the PA Framework.
- D. 4RST Witch Flounder: The indicator shows that the stock is currently above its scaled LRP, but below its scaled Upper Stock Reference (USR) and in the Cautious Zone of the PA Framework.

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Trends

- A. 4T American Plaice: The indicator is at its lowest levels and has continued to decline since the mid 1990s.
- B. 4T Winter Flounder: The indicator has remained at low levels and varied without trend since 2004.
- C. 4T Yellowtail Flounder: The indicator is at its lowest levels and varied without trend since 2010.
- D. 4RST Witch Flounder: After a positive trend from 2010 to 2022, the indicator decreased in 2023 and 2024. The indicator has decreased by 11% between 2022 and 2024.

Ecosystem and Climate Change Considerations

- Ecosystem and climate change considerations were identified in the most recent stock assessments and were not further updated or reviewed during this interim year update. These considerations remain valid.
- High predation-driven natural mortality remains an important factor influencing the population dynamics of 4T American Plaice, Yellowtail Flounder and Winter Flounder.

Stock Advice

- The most recent stock advice are still valid. Full stock assessments are planned for 2026 (4T Winter Flounder and 4T Yellowtail Flounder) and 2027 (4T American Plaice and 4RST Witch Flounder).
- Given the Critical status of 4T American Plaice, Yellowtail Flounder and Winter Flounder, continued fishery removals from all sources should be kept at the lowest possible level (DFO 2009).

BASIS FOR ASSESSMENT

Assessment Details

Year Assessment Approach was Approved

- A. 4T American Plaice : 2016 (Ricard et al. 2016)
- B. 4T Winter Flounder : 2017 (Surette and Rolland 2019)
- C. 4T Yellowtail Flounder : 2016 (Surette and Swain 2016)
- D. 4RST Witch Flounder : 2012 (Swain et al. 2012)

Assessment Type

Interim Year Update

Most Recent Assessment Date

- A. 4T American Plaice - Last Full Assessment: March 2016 (DFO 2016; Ricard et al. 2016)
Last Interim Year Updates: December 2018 and February 2021 (DFO 2019, 2021b)

**4T American Plaice, Winter Flounder,
Yellowtail Flounder and 4RST Witch
Flounder Indicators Update to 2024**

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- B. 4T Winter Flounder - Last Full Assessment: March 2017 (DFO 2017; Surette and Rolland 2019)
Last Interim Year Updates: December 2019 and March 2022 (DFO 2020, 2022b)
- C. 4T Yellowtail Flounder - Last Full Assessment: February 2021 (DFO 2021a; Rolland et al. 2022)
- D. 4RST Witch Flounder - Last Full Assessment: March 2022 (DFO 2022a; Ricard 2022)

Assessment Approach

- A. 4T American Plaice - Broad category: Single stock assessment model
Specific category: Virtual population analysis
- B. 4T Winter Flounder - Broad category: Single stock assessment model
Specific category: Statistical catch-at-age
- C. 4T Yellowtail Flounder - Broad category: Single stock assessment model
Specific category: Virtual population analysis
- D. 4RST Witch Flounder - Broad category: Single stock assessment model; Specific category: Surplus Production

The interim year update is based on the three-year moving average of the survey-derived indicator.

Stock Structure Assumption

The present document is an interim year update and no new information is being provided regarding stock structure assumptions. The information in the most recent assessments remains valid.

Reference Points

Table 1. Total allowable catch (TAC) values (t), Limit Reference Point (LRP, at the population scale and at the trawlable biomass scale in kg per tow), Upper Stock Reference (USR, at the population scale and at the trawlable biomass scale in kg per tow), Removal Reference (RR) and Target Removal Point (TRP) values for 4T American Plaice, 4T Winter Flounder, 4T Yellowtail Flounder and 4RST Witch Flounder. A dash indicates that a reference point was not defined.

Species	TAC (t)	LRP (t)	scaled LRP (kg per tow)	USR (t)	scaled USR (kg per tow)	RR	TRP
(A) American Plaice	100	139,135	19.5	-	-	-	-
(B) Winter Flounder	150	147,800	3.82	295,700	7.64	-	-
(C) Yellowtail Flounder	150	5,710	0.99 ¹	11,420	1.98 ²	-	-
(D) Witch Flounder	650	10,700	1.43	21,400	2.87	-	-

¹ 40% of the mean value of the survey-derived indicator for the 1985 to 1997 period

² 80% of the mean value of the survey-derived indicator for the 1985 to 1997 period

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Data

The southern Gulf of St. Lawrence ecosystem research vessel survey (NAFO Division 4T) catch data to 2024 are used to compute the stock indicators for American Plaice, Winter Flounder and Yellowtail Flounder. Catch data to 2024 from both the southern and northern Gulf of St. Lawrence ecosystem research vessel surveys (NAFO Division 4T and 4RS) are used in the computation of the Witch Flounder stock indicator. Conversion factors derived from comparative fishing experiments were applied to survey catch data (Benoît and Swain 2003; Benoît 2006; Benoît and Yin 2023; Benoît et al. 2024). Many of these factors are length-dependent which means that calculations must rely on length frequency observations and not on total captures by fishing sets only.

Yearly stratified estimates in years with missing strata were computed as follows. For the southern Gulf survey, hurdle model predictions for American Plaice, Yellowtail Flounder and Winter Flounder were necessary for stratum 421 in 2022 to 2024 (Appendix). For the northern Gulf survey, hurdle model predictions for Witch Flounder were necessary for strata 401, 404, and 411-414 in 2023 (Appendix).

ASSESSMENT

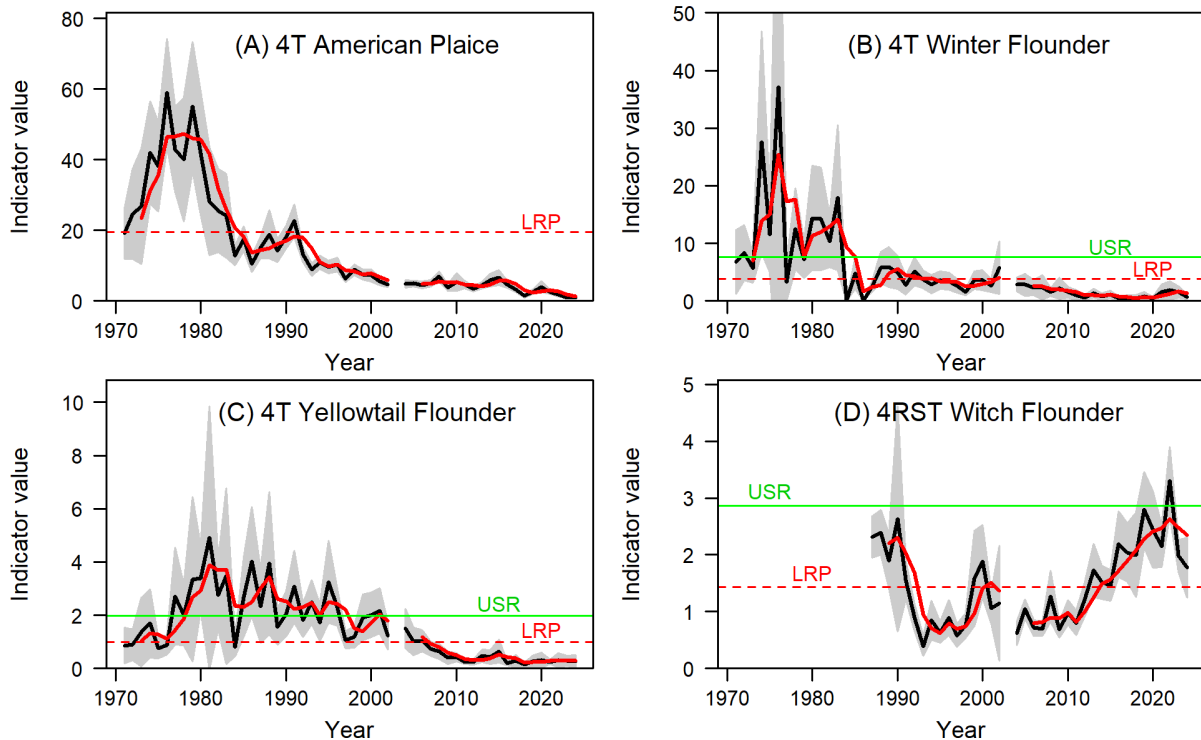


Figure 1. (A) Survey-derived biomass indicator for American Plaice (kg per tow), (B) Survey-derived biomass indicator for Winter Flounder (kg per tow), (C) Survey-derived biomass indicator for Yellowtail Flounder (kg per tow), (D) Survey-derived biomass indicator for Witch Flounder (kg per tow). In each panel, the solid black line shows the stratified mean estimates and the grey shading denotes the 95% confidence intervals of the annual means. The red solid line is the three-year moving average shown in correspondence to the third year of the block of years. The solid green line is the scaled value of the USR and the dashed red line is the scaled value of the LRP. Data from 2003 are omitted from the figures as an uncalibrated vessel was used in that year.

Historical and Recent Stock Trajectory and Trends

Survey-derived biomass index:

- A. 4T American Plaice: The indicator shows that there has been no change in stock status since the last assessment. The indicator (three-year moving average of the survey-derived biomass of commercial size individuals, ≥ 30 cm total length) is currently at 1.25 kg per tow, below the scaled LRP of 19.5 kg per tow, placing this stock in the Critical Zone of the PA Framework.
- B. 4T Winter Flounder: The indicator shows that there has been no change in stock status since the last assessment. The indicator (three-year moving average of the survey-derived biomass of commercial size individuals, ≥ 25 cm total length) is currently at 1.38 kg per tow, below the scaled LRP of 3.82 kg per tow, placing this stock in the Critical Zone of the PA Framework.
- C. 4T Yellowtail Flounder: The indicator shows that there has been no change in stock status since the last assessment. The indicator (three-year moving average of the survey-derived biomass of commercial size individuals, ≥ 25 cm total length) is currently at 0.29 kg per tow, below the scaled LRP of 0.99 kg per tow, placing this stock in the Critical Zone of the PA Framework.
- D. 4RST Witch Flounder: The indicator shows that there has been no change in stock status since the last assessment. The indicator (three-year moving average of the survey-derived biomass of commercial size individuals, ≥ 30 cm total length) is currently at 2.35 kg per tow, over the established scaled LRP of 1.43 kg per tow and under the scaled USR of 2.87 kg per tow, placing it in the Cautious Zone of the PA Framework. The indicator has decreased by 11% between 2022 and 2024.

History of TAC & Catch Advice

- A. 4T American Plaice : The directed commercial fishery was closed in early 2017. An annual TAC of 100 t exists to cover bycatch in other commercial fisheries, Indigenous food, social and ceremonial fisheries, a limited recreational fishery and scientific purposes.
- B. 4T Winter Flounder : The directed commercial fishery was closed in early 2023 (DFO 2023). An annual TAC of 150 t exists to cover bycatch in other commercial fisheries, Indigenous food, social and ceremonial fisheries, a limited recreational fishery and scientific purposes.
- C. 4T Yellowtail Flounder : The directed commercial fishery was closed in early 2023 (DFO 2023). An annual TAC of 150 t exists to cover bycatch in other commercial fisheries, Indigenous food, social and ceremonial fisheries, a limited recreational fishery and scientific purposes.
- D. 4RST Witch Flounder : An annual TAC of 500 t was in place from 2017 to 2021, and was increased to 650 t since 2022.

Projections

The present document is an interim year update and no new information is being provided regarding projections. The information in the most recent assessments remains valid.

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Ecosystem and Climate Change Considerations

The present document is an interim year update and no new information is being provided regarding ecosystem and climate change considerations. The information in the most recent assessments remains valid.

High predation-driven natural mortality remains an important factor influencing the population dynamics of 4T American Plaice, Yellowtail Flounder and Winter Flounder. Therefore, current fishery removals are unlikely to influence stock dynamics.

Evaluation of Exceptional Circumstances/Assessment Triggers

- A. 4T American Plaice: the indicator has not exceeded the scaled LRP, therefore an early assessment is not triggered.
- B. 4T Winter Flounder: the indicator has not exceeded the scaled LRP, therefore an early assessment is not triggered.
- C. 4T Yellowtail Flounder: the indicator has not exceeded the scaled LRP, therefore an early assessment is not triggered.
- D. 4RST Witch Flounder: the indicator has not decreased below the scaled LRP, therefore an early assessment is not triggered.

SOURCES OF UNCERTAINTY

Missing strata and limited number of fishing sets in certain strata of the ecosystem surveys increase the uncertainty of the indicator estimates. However, this is unlikely to change the categorization of stock status within the PA framework.

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APPENDIX

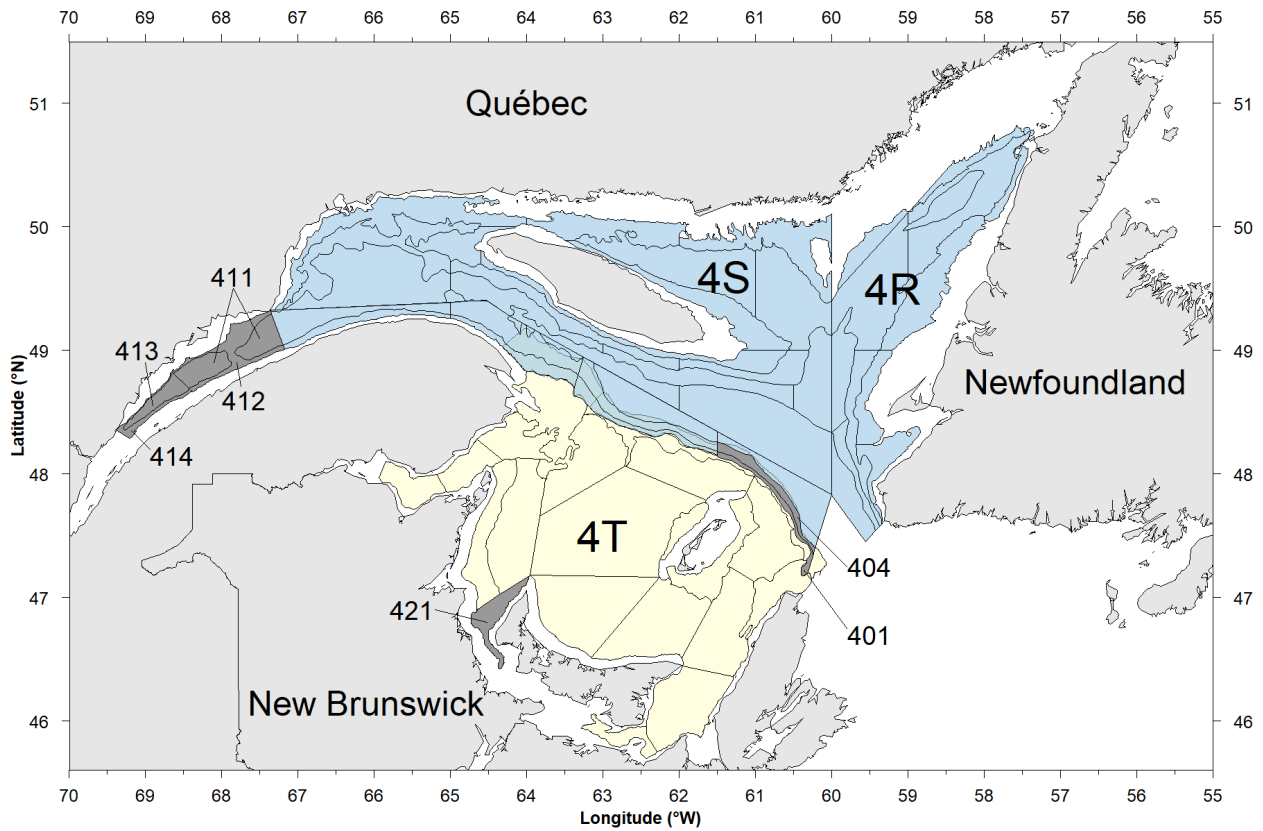


Figure 1A. Location of the strata missed from the northern and southern Gulf of St. Lawrence ecosystem research vessel surveys (survey area of the northern Gulf in light blue and survey area of the southern Gulf in beige). The strata that were missed and that required hurdle model predictions appear in dark grey (strata 401, 404, 411, 412, 413 and 414 in the northern Gulf survey and stratum 421 in the southern Gulf survey).

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