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Gulf Region

Canadian Science Advisory Secretariat Science Response 2025/011

UPDATE OF SPAWNER ABUNDANCE AND BIOLOGICAL CHARACTERISTICS OF STRIPED BASS (*MORONE SAXATILIS*) IN THE SOUTHERN GULF OF ST. LAWRENCE TO 2024

CONTEXT

The Fisheries and Harbour Management sector of Fisheries and Oceans Canada (DFO) has requested a stock status update including an update of spawner abundance and biological characteristics for Striped Bass (*Morone saxatilis*) in the southern Gulf of St. Lawrence (sGSL). This Science Response Report results from the regional peer review of December 4, 2024 on the Southern Gulf of St. Lawrence Striped Bass (*Morone saxatilis*) Update of Stock Indicators up to 2024.

SCIENCE ADVICE

Status

- The stock was in the Cautious Zone of the Precautionary Approach (PA) framework in 2023 and 2024.
- The median estimate of eggs in Striped Bass spawners in the Northwest Miramichi River (NW) for 2023 and 2024 was approximately 42,000 million and 22,800 million, respectively. In both years, the median estimate of eggs was above the Limit Reference Point (LRP) of 17,300 million eggs and below the candidate Upper Stock Reference Point (USR) of 54,300 million eggs.

Trends

- The median estimate of eggs in Striped Bass spawners exceeded the LRP in all assessed years since 2017, while the candidate USR was exceeded once (Healthy Zone in 2017) throughout the time series beginning in 1994.
- The estimated spawning population (median) of Striped Bass in the NW has increased in three steps since the 1996-2000 period when the average number of spawners was <5 K. The average number of spawners increased between 2001 and 2006 to >20 K, between 2007 and 2010 to >60 K, and between 2011 and 2024 to >300 K. The exception was in 2017 when peak spawner abundance was estimated at just under one million fish.
- In 2023 and 2024, approximately half of the adult Striped Bass population of the sGSL was within the regulation retention slot size of 50-65 cm total length (46-61 cm fork length) for the recreational fishery.

Ecosystem and Climate Change Considerations

• Ecosystem and climate change considerations affecting the productivity of the stock are unknown.

Stock Advice

• This is an interim-year update and the current assessment framework for Striped Bass in the sGSL does not provide forward-looking advice. The most recent stock assessment advice remains valid.

BASIS FOR ASSESSMENT

Assessment Details

Year Assessment Approach was Approved

The Bayesian hierarchical model used to estimate Striped Bass spawner abundance in the NW was approved in 2011 (Chaput and Douglas 2011). Since 2014, an adjustment to the model has been made to account for the observed spawning behaviour of Striped Bass carrying internal acoustic tags (DFO 2015). Reference points for Striped Bass in the sGSL were developed in 2021 (DFO 2021, Chaput and Douglas 2022).

Assessment Type

Interim-year update.

Most Recent Assessment Date

- 1. The Last Full Assessment for Striped Bass in the sGSL was in 2021 (DFO 2021).
- 2. The Last Interim Year Update for Striped Bass in the sGSL was in December 2022 (DFO 2023).

Stock Assessment Approach

- 1. Broad category: Single stock assessment model.
- 2. Specific category: Index-based (including fishery-dependent and fishery-independent indices).

Stock Structure Assumption

The only confirmed spawning location known to produce annual recruitment in the sGSL is the NW (COSEWIC 2004, 2012); consequently, Striped Bass of the sGSL are considered to be one biological unit for the purposes of assessment and management.

Reference Points

- Limit Reference Point (LRP): median estimate of eggs that result in 50% of Beverton-Holt K (half saturation): 17,300 million eggs (DFO 2021).
- Candidate Upper Stock Reference Point (USR): median estimate of eggs at 80% B_{MSY}: 54,300 million eggs (DFO 2021).
- Removal Reference (RR): Exploitation rate median 0.14 (5th to 95th percentile range (0.13 0.16) (DFO 2021).

Gulf Region

Data

Inputs to the population model are:

- Striped Bass mark and recapture data (1995, 1997-2005, 2007-2009).
- Striped Bass catch per unit effort (CPUE) bycatch data from the commercial gaspereau fishery of the NW (1994-2024).
- Telemetry data from bass carrying acoustic transmitters (2014-2024).
- Striped Bass size distribution (1994-2024).

The Bayesian hierarchical model used in previous sGSL Striped Bass assessments was applied to the 2023 and 2024 CPUE bycatch data from the gaspereau fishery of the NW (Chaput and Douglas 2011). Using the approach described in (Bradford and Chaput 1997), Striped Bass bycatch data collected between 7 June and 23 June 2023, and between 30 May and 11 June 2024 was used in the estimation of Striped Bass spawner abundance (Appendix 1).

Since 2014, an adjustment to the model has been made to account for the observed spawning behaviour of Striped Bass carrying internal acoustic tags (DFO 2015). The catch rates on individual sampling dates were assumed to be proportional to the abundance of adult Striped Bass in the NW. In 2023, the percentages of acoustically tagged bass (n = 43) in the Miramichi declined from 30% on 7 June to 2% on 23 June. In 2024, the percentages of acoustically tagged bass (n = 37) in the Miramichi declined from 24% on 30 May to 0% on 11 June (Appendix 1).



ASSESSMENT

Figure 1: The median estimate (dash), 25th to 75th percentile range (grey bar) and 5th to 95th percentile range (vertical dashed line) of the number of eggs in Striped Bass spawners between 1994 and 2024 with the exceptions of 2012 and 2020 when estimates were not possible (DFO 2013, DFO 2022). The 2010 estimate is considered to be an underestimate due to the earlier timing of the spawning events (Douglas and Chaput 2011). The Critical (lower), Cautious (middle), and Healthy (upper) zones of the PA are identified by the areas shaded in red, yellow, and green, respectively, and delineated by the horizontal dashed lines (DFO 2021).



Figure 2: The estimated abundance of Striped Bass spawners in the NW between 1994 and 2024 shown on a logarithmic scale. Box plots are interpreted as follows: dash is the median, boxes are the interquartile range, and the vertical dashed lines are the 5th to 95th percentile ranges. The 2010 estimate (unshaded interquartile box) is considered to be an underestimate due to the earlier timing of the spawning events (Douglas and Chaput 2011) and estimates were not available for 2012 nor 2020 (DFO 2013, DFO 2022).

Stock Status and Trends

The Striped Bass spawner abundance in 2023 was estimated at 584,800 fish (5th and 95th percentile range of 271,900 to 1,347,000), and in 2024 at 340,300 fish (5th and 95th percentile range of 193,900 to 525,700) (Figure 2).

Considering the Striped Bass spawner abundance estimates and the size (fork lengths) of adults sampled in May and June of each year, the median estimate of eggs in Striped Bass spawners for 2023 and 2024 was approximately 42,000 million and 22,800 million, respectively (methodology in DFO 2021 and Chaput and Douglas 2022). In both years, the median estimate of eggs was above the LRP of 17,300 million eggs and below the candidate USR of 54,300 million eggs, placing them within the Cautious Zone of the PA framework (Figure 1) (DFO 2021). The median estimate of eggs in Striped Bass spawners has exceeded the LRP in all assessed years since 2017, while the candidate USR was exceeded once (Healthy Zone in 2017) throughout the time series beginning in 1994 (Figure 1).

Approximately half of the Striped Bass measured at DFO Index trapnets in the spring and fall of 2023 and 2024 were within the regulation retention slot size of 50-65 cm total length (equivalent to 46-61 cm fork length) for the recreational fishery (Table 1, Figure 3).

Striped Bass Southern Gulf to 2024



Figure 3: Relative fork length (cm) frequency distributions of Striped Bass sampled in May and June (left panels) and in September and October (right panels) from DFO index trapnets in 2022 (upper row), 2023 (middle row) and 2024 (lower row). The dark shading represents Striped Bass in the current regulation slot sizes for the recreational fishery (46 to 61 cm fork length, equivalent to 50–65 cm total length) and the pilot commercial fishery (46 to 75 cm fork length, equivalent to 50–80 cm total length).

Table 1: Proportions of Striped Bass measured for fork length between 30-45 cm, 46-61 cm (equivalent to the current recreational fishery retention regulation slot size of 50 to 65 cm total length), and those >62 cm in the spring (May-Jun) and the fall (Sept-Oct) in 2023 and 2024. Rounding may preclude proportions totaling 1.

	2022		2023		2024	
Fork length	May-	Sept-	May-	Sept-	May-	Sept-
	June	Oct	June	Oct	Jun	Oct
30-45 cm	33%	44%	37%	37%	41%	47%
46-61 cm	52%	45%	49%	49%	45%	44%
>62 cm	14%	11%	15%	14%	13%	9%

History of Fisheries

Due to conservation concerns, the commercial fishery for Striped Bass in the sGSL was closed in 1996 and the recreational fishery became hook and release. In 2000, inland and coastal

waters of the sGSL were closed to recreational angling and the Indigenous food, social, and ceremonial (FSC) fishery was suspended. As the abundance of Striped Bass increased, the Indigenous FSC fishery was reinstated in 2012 and the recreational fishery reopened in 2013 with a daily bag limit of one fish within the slot size of 55-65 cm total length. Between 2013 and 2018, angling restrictions were progressively loosened which increased the daily bag limit, the retention season, and the slot size. As a conservation measure beginning in 2017, the Striped Bass spawning area has been closed to angling during peak spawning. In 2018, the recreational daily bag limit was increased again to three and a pilot Indigenous commercial fishery was initiated with an allocation of 50,000 fish. In 2024, further changes to management were made that included increasing the recreational daily bag limit to four and allowing the retention of Striped Bass bycatch on a provisional basis to a limited number of commercial fishermen in Lobster Fishing Area (LFA) 25 with the possibility of expanding the regulation into other LFAs for the 2025 season. Also in 2024, an additional 125,000 Striped Bass was allocated for the expansion of a communal commercial fishery (total 175,000 fish) throughout the sGSL in 2025.

There is no catch and effort information from the Striped Bass recreational fishery in the sGSL other than what has been collected by the Province of Quebec from the north shore of the Baie des Chaleurs between 2014 and 2022 (Lapointe In prep.)¹.

Ecosystem and Climate Change Considerations

The ecosystem and climate change factors affecting the stock status of sGSL Striped Bass are unknown, however climate change is likely to have an impact on the entire coastal community resulting in changes to the ecosystem. Impacts of a warming climate on Striped Bass could include a longer growing season and increased juvenile survival. Potential changes in spawn timing and migration of Striped Bass and other animals in the ecosystem may alter interspecific relationships. Striped Bass are close to the northern edge of their distribution in the Gulf of St. Lawrence and may experience range expansion to areas that were previously too cold, e.g., Striped Bass were first observed in Newfoundland and Labrador in 2017 (DFO 2018).

Stock Advice

This is an interim-year update and the current assessment framework for Striped Bass in the sGSL does not provide forward-looking advice. The most recent stock assessment advice is still valid (DFO 2021).

SOURCES OF UNCERTAINTY

The collection of the Striped Bass bycatch data used in this assessment is subject to the nuances of the NW gaspereau fishery, particularly the opening of the season which has increased from 15 May in 1995 (and prior) to 1 June since 2014. Despite the regulated opening date, commercial fishing effort may only begin when there are sufficient numbers of gaspereau available to catch and after a proportion of the Striped Bass population has spawned and returned to coastal waters of the sGSL for the summer months. As inferred from acoustic telemetry, the proportion of the Striped Bass spawning population in the NW available to capture at the onset of the gaspereau fishery has been annually variable since 2014 (range 6% to 73%).

The monitoring of the movements of Striped Bass onto and away from the spawning grounds using acoustic telemetry provides a method of estimating the total spawning population by

¹ Lapointe, D. In preparation. La pêche récréative au bar rayé au Québec, synthèse 2014-2022. MELCCCFP.

correcting for the proportion of spawners that were available to capture during the bycatch monitoring program of the NW gaspereau fishery. This adjustment however, adds uncertainty to the population estimates.

With the exception of some angling statistics collected from the north shore of the Baie des Chaleurs¹, legal, illegal, unreported, and unregulated removals of Striped Bass in the recreational and FSC fisheries of the sGSL are unknown and not considered in this assessment. Population level effects from existing and/or additional access to the resource cannot currently be projected and may only be perceivable following implementation.

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SOURCES OF INFORMATION

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APPENDIX

Data Used in the 2023 and 2024 Striped Bass Assessment

Figure A1: The number of Striped Bass captured per individual net per day in the commercial gaspereau fishery trapnets of the NW in 2023 and 2024 (upper row) with the Striped Bass bycatch data (red circles) and the period (vertical dashed lines) used in the CPUE analyses. The estimated proportion of available acoustically tagged bass present in the Miramichi (upstream of Loggieville) in May and June 2023 and 2024 (middle row) with the proportions (red triangles) and the period (vertical dashed lines) used in the CPUE analyses. The panels in the lower row depict the mean daily water temperature in May and June at the DFO Cassilis trapnet which is adjacent to the Striped Bass spawning area and the red square represents the temperature on May 23, 2023 and May 17, 2024; the dates of the initial observation of Striped Bass spawning in the upper NW estuary in those years.

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