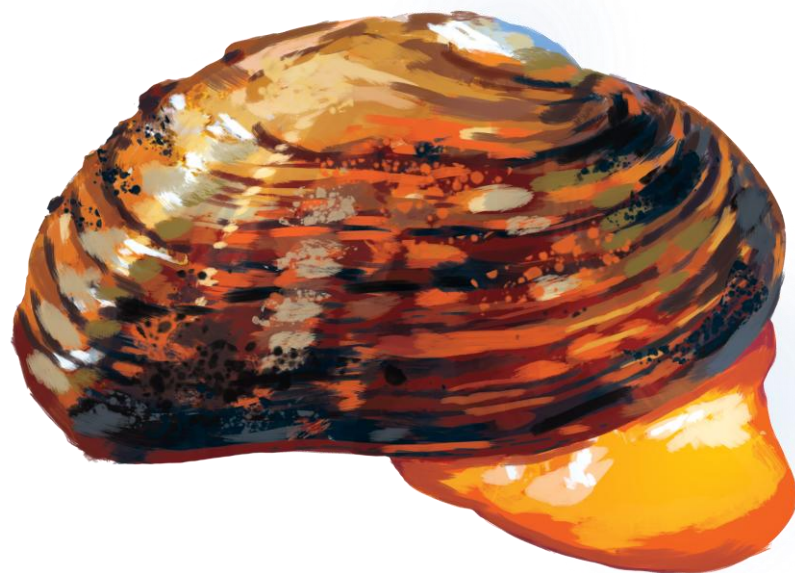


Report on the Progress Towards the Implementation
of the Management Plan for the:

Brook Floater

(Alasmidonta varicosa)

for the period 2018 to 2023



2026

Species at Risk Act

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For copies of the recovery document, or for additional information on species at risk, including Committee on the Status of Endangered Wildlife in Canada (COSEWIC) status report, and other related documents, please visit the [Species at Risk Public Registry](#).

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Preface

The *Species at Risk Act* (S.C. 2002, c.29) (SARA) requires the competent minister(s) to monitor and report on the implementation of recovery documents (that is, recovery strategies, action plans, and management plans) for species at risk. These reports must describe the progress made towards the species' recovery or conservation¹.

The Minister of Fisheries is the competent minister for aquatic species at risk. Fisheries and Oceans Canada (DFO) has prepared this document.

Reporting on the progress toward implementing recovery documents includes reporting on the collective efforts of the competent minister(s), provincial and territorial governments, and all other parties involved in carrying out actions that contribute to the species' recovery or conservation.

As stated in the preamble to SARA, success in the recovery and conservation of species at risk depends on the commitment and cooperation of many contributors and will not be achieved by DFO, or any other jurisdiction, alone. All Canadians are invited to join in supporting and implementing the recovery documents, for the benefit of the species and Canadian society as a whole.

Acknowledgements

This document was prepared by the DFO recovery planners. The progress toward species conservation described in this report would not have been achieved without the partnerships and contributions of many individuals and organizations.

¹ "Recovery" applies to species listed under SARA as threatened, endangered or extirpated, which require a recovery strategy and one or more action plan(s). "Conservation" applies to species listed under SARA as special concern, which require a management plan.

Executive summary

This report summarizes the progress made by Fisheries and Oceans Canada (DFO) and its partners towards implementing the management plan for Brook Floater during the period 2018 to 2023. This includes progress towards achieving the management objective and the 4 broad strategies of the Brook Floater management plan.

DFO and its partners succeeded in meeting 1 performance indicator and in partially meeting 4 of the 5 performance indicators established in the management plan. The indicator to promote awareness and stewardship actions to conserve the Brook Floater and its habitat in Canada was met through the creation and development of various outreach tools and initiatives. Efforts were undertaken and are still underway to: promote continued awareness of compliance with existing regulations; reduce threats to the species and its habitat; address knowledge gaps on the species life cycle and its habitat requirements; and, to better understand the population dynamics and distribution. While notable, more work is needed to fully address these performance indicators. At present, it remains unclear if the Brook Floater population is viable and self-sustaining at current known locations.

For more information on the contents of this document, please contact the Species at Risk Program (DFO.GLFSARA-LEPGLF.MPO@dfo-mpo.gc.ca).

Table of contents

Preface	i
Acknowledgements	i
Executive summary	ii
Table of contents	iii
1 Brook Floater (<i>Alasmidonta varicosa</i>)	1
1.1 Progress towards meeting the management objective for the Brook Floater	1
1.2 Key gaps and future priorities for the Brook Floater	6
2 Concluding statement	7
3 References	8

1 Brook Floater (*Alasmidonta varicosa*)

SPECIAL CONCERN

Fisheries and Oceans Canada (DFO) and its partners have made progress towards the implementation of the conservation measures identified in the "[Management Plan for the Brook Floater \(*Alasmidonta varicosa*\) in Canada](#)", through the actions undertaken between March 2018 and December 2023, to support the conservation of the Brook Floater. The management plan provides detailed information on the species, its threats, needs, management objective, broad strategies and conservation measures.



Credit: Darlene Elward

This progress report on the implementation of the management plan is part of a series of documents for this species that should be taken into consideration together, including the management plan (DFO 2018). Refer to the [Brook Floater species profile](#) on the [Species at Risk Public Registry](#) for more information and related documents.

1.1 Progress towards meeting the management objective for the Brook Floater

The management objective establishes, to the extent possible, the conditions that are necessary for the conservation of the species. The management objective for the Brook Floater is to:

- Maintain a viable, self-sustaining Brook Floater population in Canada at current and new locations (including historical sites should they become naturally re-established).

Four broad strategies were identified in the management plan to meet the management objective for the Brook Floater. During the reporting period, activities were undertaken by DFO and its partners to support each broad strategy. Some key achievements are described below.

Broad strategy 1: Protection - Conserve the quality and quantity of Brook Floater habitat

- The Canadian aquatic species at risk map was created for public use in 2019. Hosted on the DFO Species at Risk website ([Aquatic species at risk](#)), the map compiles distribution data for aquatic species listed under the *Species at Risk Act*, including Brook Floater's distribution in New Brunswick and Nova Scotia, and is accessible to municipal, provincial, and federal regulators (DFO 2025) to enhance consideration of the species and its habitat during project reviews
- Through its own "Recovery Plan for the Brook Floater (*Alasmidonta varicosa*) in Nova Scotia" (Nova Scotia Department of Natural Resources and Renewables 2022), the Government of Nova Scotia identified all known sites with records of Brook Floater in Nova Scotia as core habitat and identified activities likely to result in the destruction of core habitat. The Recovery Plan also serves to enhance awareness among the public

and Nova Scotia provincial agencies of the importance of promoting compliance with regulations to maintain Brook Floater subpopulations

- Federal and provincial governments continued to implement their legislations and guidelines to protect riparian and aquatic habitats important to Brook Floater. The Government of Nova Scotia enforced its *Forests Act* (R.S.NS. 1989, c. 179) and *Environment Act* (S.NS. 1994-95, c. 1) while the Government of New Brunswick enforced its *Crown Lands and Forests Act* (S.NB. 1980, c. C-38). Both provincial governments used technical guidelines to reduce impacts on sensitive habitats (Government of New Brunswick 2015; Government of Nova Scotia 2015). Federally, DFO enforces the modernized *Fisheries Act* (R.S.C. 1985, c. F-14) to safeguard all fish and their habitats, with project reviews and authorizations incorporating avoidance, mitigation, and offset measures

Broad strategy 2: Management - Mitigate threats to the Brook Floater and its habitat

- DFO hosted 2 workshops, which were the Brook Floater Virtual Workshop in January 2021, and the Freshwater Mussel Recovery Implementation Workshop in Moncton, NB, on November 8 and 9, 2023. Both events were attended by Indigenous groups, environmental non-governmental organizations (ENGOS), watershed associations, academia, and federal and provincial regulators to discuss conservation and stewardship projects, challenges, opportunities for collaboration, knowledge gaps, research and potential future projects
- Preventing and mitigating the spread of invasive species is critical to protect Brook Floater and its habitat. Since 2018, DFO and the Canadian Council on Invasive Species have conducted a range of activities to raise public awareness about aquatic invasive species and promote activities to prevent and stop their spread. These activities range from the public awareness campaigns “Clean, Drain, Dry” and “Don’t Let it Loose”, to installation and promotion of boat decontamination stations, operating a mobile boat cleaning station, creating and promoting of online reporting tools, establishing monitoring networks, and developing risk assessments
- The Watershed and Aquatics Research and Monitoring Lab at the University of New Brunswick works with the New Brunswick Department of Transportation and Infrastructure to conduct freshwater mussel surveys and translocations in advance of planned in-water construction work. Survey work occurred in the Magaguadavic River, but no Brook Floaters were identified and translocated (New Brunswick Species-at-Risk Research Program 2023)
- The Confederacy of Mainland Mi’kmaq, Passamaquoddy Recognition Group, and the Greater Kouchibouguac Watershed Association have assessed rivers with Brook Floater for fish passage and connectivity issues, developed restoration plans, and performed restoration work while considering Brook Floater and its potential host fish

Broad strategy 3: Research and monitoring - Improve knowledge of the Brook Floater in Canada

- Using environmental DNA (eDNA) in water samples is an efficient and cost-effective method to detect Brook Floater presence in rivers, lakes, and estuaries and identifies its potential locations within watersheds. DFO designed, optimized, and validated a species-specific DNA testing method for the detection of Brook Floater from eDNA samples (LeBlanc et al. 2021). An eDNA sampling protocol was also developed and

validated by DFO and its partners (North Shore Mi'kmaq Tribal Council - Anqotum Resource Management, Greater Kouchibouguac Watershed Association, Miramichi River Environmental Assessment Committee, Shediac Bay Watershed Association, and the Southeastern Anglers Association) to support Brook Floater monitoring efforts. Cape Breton University has also developed eDNA assays to provide additional tools to analyze Brook Floater eDNA (Rawlings and White 2022). DFO tested the seasonal variability of Brook Floater eDNA detection at sites in New Brunswick and concluded that eDNA detection rates were lower when water temperatures were below 10°C (DFO 2024)

- A freshwater mussel molecular key was developed to facilitate the identification of freshwater mussel glochidia on sampled fish gills (Ryan 2022). This could facilitate the future identification of Brook Floater host fish species, as well as for other freshwater mussel species
- Water sampling and analysis for Brook Floater eDNA has been used by DFO, academia, Indigenous organizations and environmental organizations across Maritime provinces to investigate Brook Floater presence in unknown, known, and historical Brook Floater sites (Hébert and Donelle 2020; LeBlanc et al. 2021; Gallant 2022; Rawlings and White 2022; Nova Scotia Salmon Association 2023; Greater Kouchibouguac Watershed Association 2022, 2023, 2024), including some of those recommended for further investigation in the COSEWIC Assessment and Status Report on the Brook Floater (COSEWIC 2009). The eDNA results provided information on Brook Floater's distribution in Canada
- Many organizations have made important contributions to the knowledge of Brook Floater's abundance and distribution across New Brunswick and Nova Scotia (Hébert et al. 2019; Hébert and Donelle 2020; Elward and Thongboonmee 2021; Biodiversity 2022; Elward 2022; Petitcodiac Watershed Alliance 2023; Greater Kouchibouguac Watershed Association 2024). The Confederacy of Mainland Mi'kmaq discovered new Brook Floater sites in the Stewiacke River and the Wallace River where Brook Floater had not been found since 1975. They also discovered one of, if not the, largest subpopulations of Brook Floater in Canada in the East Branch St. Mary's River (Lachance and MacDonald 2020). The Petitcodiac Watershed Alliance surveyed sites with many Brook Floater and found new sites in the Petitcodiac River, one of the areas with the largest concentrations of Brook Floater in Canada, while Fort Folly Habitat Recovery surveyed other sites in the Petitcodiac River and found lower numbers of Brook Floater
- The Confederacy of Mainland Mi'kmaq collected various data on habitat and water quality where Brook Floater is present in Nova Scotia rivers (Lachance 2021). Data collected included water qualitative turbidity, substrate size composition, in-water characterization, land-use characterization, vegetation characterization in the riparian area, erosion, canopy cover and fish species presence if observed

Broad strategy 4: Outreach and communication - promote education and awareness of the Brook Floater and efforts to conserve the species and its habitat

- The New Brunswick Museum and the Canada Museum of Nature, in partnership with DFO, developed a waterproof, pocket-sized field guide, "Freshwater Mussels of Maritime Canada: a Flashcard Guide", available in English, French, Mi'kmaq, and Wolastoqey-Peskotomuhkati (McAlpine et al. 2021). These field guides have been shared with many partners and groups that work on Brook Floater and other freshwater mussels for identification training, surveys, and other field work

- The New Brunswick Museum, in partnership with DFO, developed 3 reference collections of freshwater mussels with accompanying guides in French and English (Sollows and McAlpine, 2021). These reference collections (figure 1) have been lent to partners and organizations to facilitate identification training, surveys, and other field work



Figure 1: Freshwater mussel reference collection created by the New Brunswick Museum, in partnership with DFO. Photo credit: Mary Sollows

- DFO developed 4 mini-museums (2 in English and 2 in French) on Brook Floater, with 2 of them also including information on Yellow Lampmussel (*Lampsilis cariosa*) and Dwarf Wedgemussel (*Alasmidonta heterodon*). The mini museums are portable and interactive exhibits with educational videos used by DFO and ENGOs at public outreach events to educate and inform the public about Brook Floater and the ecological importance of freshwater mussels
- Seven in-person freshwater mussel identification workshops have been organized by DFO, New Brunswick Museum, Confederacy of Mainland Mi'kmaq, Cape Breton University, Petitcodiac Watershed Alliance, Greater Kouchibouguac Watershed Association, Miramichi River Environmental Assessment Committee, Kingsclear First Nation and North Shore Mi'kmaq Tribal Council - Anqotum Resource Management, which provided training to over 120 people. Identification workshops build capacity at a regional and local level for more groups and individuals to participate in Brook Floater conservation activities, particularly monitoring activities such as surveys. They harness further interest in stewardship and conservation projects for Brook Floater and freshwater mussels and their habitat
- Greater Kouchibouguac Watershed Association, Miramichi River Environmental Assessment Committee, Shediac Bay Watershed Association, and Passamaquoddy Recognition Group developed outreach materials and built relationships with local all-terrain vehicle (ATV) associations and clubs to reduce ATV river crossings and enhance their awareness of the impact of in-stream crossings on Brook Floater and its habitat
- Indigenous groups and ENGOs created a wide range of outreach products including pamphlets, posters (Shediac Bay Watershed Association 2018) and YouTube videos (Shediac Bay Watershed Association 2020) on Brook Floater and freshwater mussels, as well as guides for shoreline property owners and best management practices for

agricultural and forestry practitioners. North Shore Mi'kmaq Tribal Council - Anqotum Resource Management, Greater Kouchibouguac Watershed Association, Petitcodiac Watershed Alliance, Shediac Bay Watershed Association, and Confederacy of Mainland Mi'kmaq hosted educational events about Brook Floater and its habitat. These events included citizen scientist event days, kiosks at public events, development and delivery of youth stewardship workshops in Indigenous communities, presentations in schools, and virtual and in-person camps and activities for children

Achievement of the management objective and the broad strategies is evaluated using performance indicators. Table 1 provides an overview of the status of performance indicators as of the end of the reporting period. Performance indicators that were partially met or not met are discussed in the “Key gaps and future priorities” section below.

Table 1: Status of performance indicators for Brook Floater for the period 2018 to 2023.

Performance indicator	Status ²	Description of progress
Measures have been taken to promote continued awareness of compliance with existing regulations to maintain quality and quantity of Brook Floater habitat	Partially met, underway	Existing provincial and federal water quality and habitat conservation regulations and guidelines are continuously implemented. Further effort is required to promote awareness among agencies and regulators about the importance of promoting compliance with existing regulations to maintain Brook Floater subpopulations in New Brunswick and Nova Scotia.
Measures have been taken to reduce threats to the Brook Floater and its habitat in Canada	Partially met, underway	Groups and organizations have developed and implemented conservation and stewardship projects to benefit Brook Floater and its habitat, and guidance has been provided to enhance those projects and collaborations. Brook Floater is considered when new or modifications to fish passage and dam infrastructures are proposed. However, further effort is required to promote best practices with agricultural and forest practitioners and residential developers across the Brook Floater's range in Canada.
Measures have been taken to address knowledge gaps focusing on high and medium priorities related to the Brook Floater's life	Partially met, underway	There have been some efforts to collect data on habitat and water parameters where Brook Floater live, but habitat and water quality requirements for Brook Floater have not yet been determined. No data were collected to

² **Met:** the performance indicator has been met and no further action is required

Met, ongoing: the performance indicator has been met, but efforts will continue until all population objectives have been met

Not met: the performance indicator has not been met, and little to no progress has been made

Partially met, underway: the performance indicator has not been met, but there has been moderate to significant progress made

Performance indicator	Status ²	Description of progress
cycle and habitat requirements required to support conservation efforts		better understand the life cycle requirements of the Brook Floater in Canada, including identifying host fish species.
Measures have been taken to better understand Brook Floater population dynamics and distribution	Partially met, underway	Visual surveys and environmental DNA analysis of water samples have greatly increased our knowledge of Brook Floater's distribution. However, Brook Floater population dynamics in Canada are still not well studied or understood, nor has a survey strategy to periodically monitor the population been developed.
Measures have been taken to promote awareness and stewardship actions to conserve the Brook Floater and its habitat in Canada	Met, ongoing	Efforts to raise awareness of Brook Floater and its conservation needs in local communities and promote best management practices for various target audiences have been conducted by Fisheries and Oceans Canada, Indigenous groups, and environmental non-governmental organizations.

1.2 Key gaps and future priorities

Preventing and mitigating threats to Brook Floater and its habitat to enhance its protection remains a priority for the species. Future work should include additional development and promotion of best management practices to be implemented by agricultural and forestry practitioners and residential developers across locations where Brook Floater is known to occur. Efforts should continue to prevent the spread of invasive species, including Zebra Mussels which were first discovered in New Brunswick in 2023 and are spreading closer to where Brook Floater lives (DFO 2023). Furthermore, protecting and restoring Brook Floater habitats, along with nearby riparian areas, will increase their resilience to various climate change impacts, such as droughts and high-water temperatures. These actions are essential for the long-term survival of Brook Floater in its present habitat.

More research and monitoring on Brook Floater are required to better understand its distribution, abundance and life cycle in Canada. Water sampling for Brook Floater eDNA detection in eastern Canada will continue to be used as a tool to provide direction on where to focus the use of semi-quantitative protocols, such as timed visual surveys, for monitoring distribution and occupancy. Qualitative surveys are also needed to evaluate Brook Floater population age structure at known locations. A robust survey strategy using quantitative standard protocols to periodically monitor Brook Floater population dynamics in Canada has yet to be developed. Most importantly, studies are needed to collect information on Brook Floater's host fish species in Canada and the Brook Floater's habitat requirements. While most evidence indicates that Brook Floater is a generalist parasite, in that it is able to use multiple hosts in its

glochidia stage, identification of the most likely fish hosts in its Canadian range would help regulators manage any potential effects of works, undertakings, and activities in its range.

Finally, the outreach and communication efforts of many groups are to be celebrated, but further action is needed. Target groups (landowners, residents, ATV users, agricultural and forestry practitioners) should be surveyed to assess the effectiveness of current outreach and education efforts aimed at conserving Brook Floater and its habitat and improved where needed.

2 Concluding statement

During the reporting period, DFO and its partners made progress toward implementing the conservation measures identified in the management plan for the Brook Floater. One of the 5 performance indicators was met (promote awareness and stewardship actions to conserve the Brook Floater and its habitat in Canada). The other 4 performance indicators were partially met, which are to promote continued awareness of compliance with existing regulations, reduce threats to the species and its habitat, address knowledge gaps on the species life cycle and its habitat requirements, and better understand the population dynamics and distribution.

All evidence demonstrates that the management objective has not been achieved yet, since there is still not enough scientific evidence to demonstrate the Brook Floater population trends. The extent to which the management objective has been achieved cannot be determined.

DFO remains committed to the recovery and conservation of all aquatic species at risk and the work that has been initiated and completed to date represents an important step in that direction. DFO and its partners will continue to work towards the achievement of the management objective for Brook Floater and welcome the participation of additional partners.

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