

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

Misty Lake Sticklebacks (*Gasterosteus aculeatus*) for the Period 2020 to 2025



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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 reports, 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 progress report.

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

The progress report was prepared by Emma Branquinho, with input from Maggie Boothroyd and Oliver Barker. The progress toward species recovery 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 DFO and its partners towards implementing the action plan for the Misty Lake Sticklebacks (*Gasterosteus aculeatus*), between 2020 and 2025. During the reporting period, progress made included education and outreach on the Misty Lake Sticklebacks and the invasive species that threaten them. There was no population monitoring for Misty Lake Sticklebacks during this reporting period (2020 to 2025) and therefore progress towards achieving the population and distribution objectives is unknown.

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

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1 Misty Lake Sticklebacks (*Gasterosteus aculeatus*)

ENDANGERED

Fisheries and Oceans Canada (DFO) and its partners have made progress towards the implementation of the recovery measures identified in the “[Action Plan for the Misty Lake Sticklebacks \(*Gasterosteus aculeatus*\) in Canada](#)” (DFO 2020), through the actions undertaken between February 2020 and February 2025, to support the recovery of the Misty Lake Lentic Threespine Stickleback and Misty Lake Lotic Threespine Stickleback (herein referred to as the Misty Lake Sticklebacks). The action plan outlines recovery measures to address the threats to the species and achieve its population and distribution objectives. It also evaluates the costs and benefits of implementing those measures.



Credit: Misty Lake Lentic Threespine Stickleback (*Gasterosteus aculeatus*; top) and Misty Lake Lotic Threespine Stickleback (*Gasterosteus aculeatus*; bottom). Photos by Renaud Kaueffer, with the help of Marvse Boisiolv and Shahin Muttalib.

This progress report on implementation of the action plan is part of a series of documents for this species that should be taken into consideration together, including the action plan. Refer to the Misty Lake Sticklebacks species profiles on the [Species at Risk Public Registry](#) for more information and related documents.

1.1 Progress towards implementing recovery measures for the Misty Lake Sticklebacks

Population and distribution objectives establish, to the extent possible, the number of individuals and/or populations, and their geographic distribution, that is necessary for the recovery of the species. The population and distribution objectives for the Misty Lake Sticklebacks are to:

- maintain, or where possible increase, abundance of each population (inlet, lake, outlet) relative to the 2016 observed population sizes²
- maintain the current spatial distribution of each population (inlet, lake, outlet) and maintain the 2 distinct forms by preventing an increase in hybridization that could lead to the collapse of the species pair into a hybrid swarm

² The 2016 abundances are thought to be near historical levels and self-sustaining. Lake population (lentic form): 123,991 individuals (95% confidence intervals: 86,169 to 227,717); inlet population (lotic form): 14,991 individuals (95% confidence intervals: 5,481 to 18,855); outlet population (lentic form): 9,851 individuals (95% confidence intervals: 4,586 to 21,604). Abundance data from Oke et al. 2017.

Nine broad strategies were identified in the recovery strategy to address the threats to the species:

- Broad strategy 1: determine the current distribution of key aquatic exotic, invasive or introduced species on Vancouver Island
- Broad strategy 2: develop and implement a Total Prevention Plan for aquatic invasive species
- Broad strategy 3: address information gaps that inhibit conservation of the Misty Lake Sticklebacks and their critical habitat
- Broad strategy 4: increase scientific understanding of the Misty Lake Sticklebacks through additional investigation into their natural history and threats to their persistence
- Broad strategy 5: continue to develop sound protocols for scientific investigations
- Broad strategy 6: manage and protect the habitat of the Misty Lake Sticklebacks
- Broad strategy 7: increase understanding of population trends and make linkages to threats
- Broad strategy 8: continue to develop and implement a long term monitoring program to assess population response to management activities and/or threats
- Broad strategy 9: develop and implement educational outreach materials to foster awareness of the species and encourage active local involvement in stewardship and habitat protection

The action plan for Misty Lake Sticklebacks then established 11 recovery measures to implement these broad strategies and help meet the population and distribution objectives for the species. Progress made towards the completion of these measures by DFO and its partners during the reporting period is described below. Recovery measures that were not started are not included in table 1; gaps and future priorities are discussed in section 1.3 below.

Table 1: Status of recovery measure progress for the Misty Lake Sticklebacks from 2020 to 2025.

Recovery measure # ³	Recovery measure	Broad strategy	Status ⁴	Description of progress
3	Update scientific protocols (for example, collection and handling guidelines) for Misty Lake Sticklebacks. Set boundaries for experimental work and collection activities in an effort to reduce harm to the species.	5	In progress	An update to the collection guidelines is underway, refer to the " Report on the Progress of Recovery Strategy Implementation for the Misty Lake Sticklebacks (<i>Gasterosteus aculeatus</i>) in Canada for the Period 2018 to 2022 " (herein referred to as the Misty Lake Sticklebacks recovery strategy progress report; DFO 2023) for more information.
4	Develop and implement initiatives to prevent aquatic invasive species from entering and becoming established in the Misty Lake watershed. Such initiatives may include: develop a comprehensive list of native, non-native, and cryptogenic species that occur within the Misty Lake watershed. This baseline information will serve as a	1 and 2	Ongoing	Province-wide initiatives underway to monitor and prevent the spread of aquatic invasive species are applicable to the Misty Lake watershed, refer to the Misty Lake Sticklebacks recovery strategy progress report (DFO 2023) for more information on aquatic invasive species initiatives in British Columbia.

³ Recovery measures that were not started, or for which little or no progress has been made (1, 2, 5, 7, 8, and 10) are not reported in this table.

⁴ **Completed:** the recovery measure has been completed and no further action is required

In progress: the recovery measure has a specified end date and progress has been made but it has not been completed

Ongoing: the recovery measure has no specified end date or metric for completion; efforts will continue until such time the population is considered to be recovered (for example, population monitoring) or it is no longer feasible to continue

Cancelled: The recovery measure is no longer moving forward as it is no longer necessary for the species' recovery, or due to other limitations

	benchmark for future invasive species monitoring • risk analysis of intentional and unintentional pathways of introduction for aquatic invasive species • assess likelihood of introduction, establishment, and impact for a variety of aquatic invasive species • implement a system of monitoring and communication for early detection and rapid response in the event that high-risk invasive species are detected within the Misty Lake system			
6	Assess risk of point-source pollution and risk of invasive species introduction from nearby highway rest stop, and consider appropriate mitigation options (for example, add educational signage along highway, modify slope of rest stop away from lake, decommission rest area, and/or reduce footprint of rest area).	6	Ongoing	Signage was developed and installed at 3 locations around Misty Lake, including the adjacent Highway 19 rest stop, describing the sticklebacks' biology, <i>Species at Risk Act</i> protections, and threat mitigation, including preventing pollution and invasive species introductions.
9	Develop and implement initiatives to prevent aquatic invasive species from entering the Misty Lake watershed. For example:	1 and 2	Ongoing	Signage was installed at 3 locations around Misty Lake, which includes suggested messaging about preventing invasive species introductions; refer to recovery measure 6 in this table.

	• increase public knowledge about aquatic invasive species and their impacts • increase public participation in aquatic invasive species prevention, control, and monitoring efforts			Ongoing province-wide initiatives to prevent introduction and spread of aquatic invasive species, and to increase public awareness and engagement in prevention, monitoring and control efforts, are applicable to the Misty Lake watershed. Refer to the Misty Lake Sticklebacks recovery strategy progress report (DFO 2023) for more information on aquatic invasive species initiatives in British Columbia.
11	Develop educational material about the general biology of the species pair, their biodiversity value, threats to their persistence, and to provide information about the Misty Lake Ecological Reserve. Examples of educational materials include web-based and hard-copy material for use in public schools and regional interpretive centres nearest to the species' range.	9	Ongoing	Signage was developed and installed at Misty Lake. Refer to the Misty Lake Sticklebacks recovery strategy progress report (DFO 2023), for more information.

1.2 Socio-economic costs and benefits

The socio-economic costs and benefits of implementing the action plan for Misty Lake Sticklebacks focus on recovery efforts, such as research and management activities. The costs of implementing measures for the Misty Lake Sticklebacks are considered low⁵.

A large part of the economic costs borne by the federal government for Misty Lake Sticklebacks recovery were anticipated to be provided via funding programs, including the Habitat Stewardship Program for Species at Risk, Aboriginal Fund for Species at Risk, and the Canada Nature Fund for Aquatic Species at Risk. Projects funded by these programs have dollar and in-kind costs fully or partially matched by recipients, where applicable. No projects targeting Misty Lake Sticklebacks received funding through these programs during the reporting period.

The socio-economic benefits that have come from the implementation of the action plan include contributing to meeting the population and distribution objectives for the Misty Lake Sticklebacks, as well as positive impacts on biodiversity, the livelihoods of Canadians via the maintenance of healthy ecosystems, and the value individuals place on preserving biodiversity. Misty Lake Sticklebacks are of high scientific interest due to their recent evolutionary history, and their recovery will preserve research value, which may provide insights that benefit other species. The conservation of species at risk is vital to the Government of Canada's commitment to conserving biodiversity and is important to Canada's economic and natural wealth.

1.3 Key gaps and future priorities for the Misty Lake Sticklebacks

There was no population monitoring for Misty Lake Sticklebacks during this reporting period (2020 to 2025) and therefore progress towards achieving the population and distribution objectives is unknown. Further work is required to support the survival and recovery of the Misty Lake Sticklebacks. Priority next steps may include, but are not limited to:

- developing and implementing a population monitoring program to assess performance indicators, which measure progress toward achieving the population and distribution objectives
- developing and implementing an aquatic invasive species monitoring and prevention plan for Misty Lake
- researching threats associated with land use, climate change, and habitat quantity and quality, and implementing threat mitigation activities

⁵ As per the [Treasury Board Secretariat Policy on Cost Benefit Analysis](#), 'low cost' is considered less than \$1 million nationally in average annual costs, while 'high cost' is considered \$1 million or more nationally in average annual costs.

- increasing public outreach and education to promote awareness of Misty Lake Sticklebacks and encourage local stewardship and habitat protection

2 Concluding statement

During the reporting period, progress was made toward implementing the recovery measures identified in the action plan for the Misty Lake Sticklebacks. During the reporting period, progress made included education and outreach on the Misty Lake Sticklebacks and the invasive species that threaten them. There was no population monitoring for Misty Lake Sticklebacks during this reporting period (2020 to 2025) and therefore progress towards achieving the population and distribution objectives is unknown.

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 population and distribution objectives for Misty Lake Sticklebacks and welcome the participation of additional partners.

3 References

- DFO [Fisheries and Oceans Canada]. 2020. [Action Plan for the Misty Lake Sticklebacks \(*Gasterosteus aculeatus*\) in Canada](#). *Species at Risk Act* Action Plan Series. Fisheries and Oceans Canada, Ottawa. iv + 13 pp.
- DFO [Fisheries and Oceans Canada]. 2023. [Report on the Progress of Recovery Strategy Implementation for the Misty Lake Sticklebacks \(*Gasterosteus aculeatus*\) in Canada for the Period 2018 to 2022](#). *Species at Risk Act* Recovery Strategy Report Series. Fisheries and Oceans Canada, Ottawa. iv + 15 pp.
- Oke, K.B., M. Lu, and A.P. Hendry. 2017. Population size and geographical extent of Misty Lake lotic and lentic threespine stickleback. A report prepared for Fisheries and Oceans Canada and the Province of British Columbia. 40 pp.