

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

Paxton Lake and Vananda Creek Stickleback Species Pairs

(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](#).

Cover photos: Paxton Lake Benthic (top left) and Limnetic (top right) sticklebacks (*Gasterosteus aculeatus*; photos by Nicole Bedford); Vananda Creek Benthic (bottom left) and Limnetic (bottom right) sticklebacks (*Gasterosteus aculeatus*; photos by Gerrit J. Velema, gjvphoto.com)

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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 Alaina Dowling, with input from Carrie Kwok 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 Fisheries and Oceans Canada (DFO) and its partners towards implementing the action plan for the Paxton Lake and Vananda Creek Stickleback Species Pairs (*Gasterosteus aculeatus*) between 2020 and 2025. During the reporting period, progress made included filling research gaps through genome research, and education and outreach on the stickleback species pairs and the invasive species that threaten them. There has been no population monitoring for the Paxton Lake and Vananda Creek Stickleback species pairs 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 Paxton Lake and Vananda Creek Stickleback Species Pairs (*Gasterosteus aculeatus*)

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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 Paxton Lake and Vananda Creek Stickleback Species Pairs \(*Gasterosteus aculeatus*\) in Canada](#)” (DFO 2020), through the actions undertaken between February 2020 and February 2025, to support the recovery of the Paxton Lake Benthic Threespine Stickleback, Paxton Lake Limnetic



Credit: Paxton Lake Benthic (top left) and Limnetic (top right) sticklebacks (*Gasterosteus aculeatus*; photos by Nicole Bedford); Vananda Creek Benthic (bottom left) and Limnetic (bottom right) sticklebacks (*Gasterosteus aculeatus*; photos by Gerrit J. Velema, gjvphoto.com)

Threespine Stickleback (herein referred to as Paxton Lake Stickleback species pair; *Gasterosteus aculeatus*), Vananda Creek Benthic Threespine Stickleback, and Vananda Creek Limnetic Threespine Stickleback (herein referred to as Vananda Creek Stickleback species pair). 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.

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 Paxton Lake and Vananda Creek Stickleback species pairs species profiles on the [Species at Risk Public Registry](#) for more information and related documents.

1.1 Progress towards implementing recovery measures for the Paxton Lake and Vananda Creek Stickleback species pairs

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 Paxton Lake and Vananda Creek Stickleback species pairs are to:

- maintain, or where possible increase, abundance relative to the 2016 observed populations sizes of each species pair²
- maintain the current spatial distribution of each species pair

Eight broad strategies were identified in the recovery strategy to address the threats to the species.

- Broad strategy 1: develop and implement monitoring programs
- Broad strategy 2: conduct research on the Paxton Lake and Vananda Creek Stickleback species pairs
- Broad strategy 3: develop an aquatic invasive species management plan
- Broad strategy 4: establish baseline water quality parameters for the Paxton Lake and Vananda Creek Stickleback species pairs
- Broad strategy 5: develop a comprehensive water management plan for each basin
- Broad strategy 6: develop land management strategies
- Broad strategy 7: develop protocols for scientific investigations of the Paxton Lake and Vananda Creek Stickleback species pairs
- Broad strategy 8: develop and implement outreach and stewardship projects for the Paxton Lake and Vananda Creek Stickleback species pairs

The action plan for Paxton Lake and Vananda Creek Stickleback species pairs then established 21 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.

² The 2016 abundances are thought to be near historical levels and self-sustaining (DFO 2019).

Table 1. Status of recovery measure progress for Paxton Lake and Vananda Creek species pairs for the period of 2020 to 2025.

Recovery measure # ³	Recovery measure	Broad strategy	Status ⁴	Description of progress
6	Conduct scientific research that contributes to recovery and/or addresses knowledge gaps affecting management of the Paxton Lake and Vananda Creek Stickleback species pairs. Examples of potential areas for research include: • developing robust population estimates for Paxton, Priest, Spectacle and Emily Lakes • evaluating impacts on eggs and larvae caused by temporarily removing males from nests • monitoring hybridization rates, particularly as it relates to impacts of removing pure sticklebacks for research • confirming that the Vananda Creek Stickleback species pair is ecologically similar to the Paxton Lake Stickleback	2	Ongoing	A majority of the gaps in the reference genome for Threespine Stickleback were filled using an advanced genome sequencing technique, with a male Paxton Lake Benthic Threespine Stickleback as a genetic model (Nath et al. 2021). A Threespine Stickleback fish community genome browser is available (https://stickleback.genetics.uga.edu), which can inform research on issues such as hybridization, dispersal patterns and DU distribution and relatedness.

³ Recovery measures that were not started, or for which little or no progress has been made (1 to 5, 7, 8, 11 to 13, and 15 to 20) 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

	species pair (that is, similar life histories and timing) • learning more about dispersal and migration linkages between Emily, Priest and Spectacle Lakes (Vananda Creek Stickleback species pair) • determining the effects of lake level fluctuations • investigating the potential water quality implications and effects on the species pairs from the use of explosives for exploration and mining activities within the Paxton Lake and Vananda Creek Stickleback species pairs' watersheds			
14	Participate in aquatic invasive species (AIS) removal or prevention programs	3	In progress	The Government of British Columbia (B.C.) continues to conduct province-wide AIS outreach and prevention campaigns that benefit Paxton Lake and Vananda Creek Stickleback species pairs. Refer to the "Report on the Progress of Recovery Strategy Implementation for the Paxton Lake, Enos Lake, and Vananda Creek Stickleback Species Pairs (Gasterosteus aculeatus) in Canada" (herein referred to as the Paxton Lake and Vananda Creek Stickleback species pairs recovery strategy progress report; DFO 2022) for more information on AIS initiatives in B.C. The Invasive Species Council of British Columbia (ISCBC) has a Texada Island-specific AIS outreach and prevention project underway (refer to recovery measure 21 in this table).

9 and 10	<u>Recovery measure 9:</u> Identify and evaluate water management options to satisfy both conservation and stakeholder needs (for example, timing maximum water extraction during periods of least sensitivity) in the following ways: • share information on the Paxton Lake and Vananda Creek Stickleback species pairs • address impacts of changes in lake water levels • review the number and extent of water use licenses • engage relevant agencies about conservation and water management options <u>Recovery measure 10:</u> Identify and evaluate land use planning and management options in the following ways: • share information about the Paxton Lake and Vananda Creek Stickleback species pairs, land use-related threats, and mitigation measures and management practices to address these threats • encourage relevant agencies or governments to consider the Paxton Lake and Vananda Creek Stickleback species pairs in developing and modifying land use plans, official community plans, management guidelines and by-laws	5 and 6	In progress	Information regarding the protection of Paxton Lake and Vananda Creek Stickleback species pairs was included in the Texada Island Official Community Plan. Policies include promoting water conservation and stewardship, and liaising with property owners to advocate for protection of species pairs and their critical habitat (Roddan et al. 2021). Refer to the Paxton Lake and Vananda Creek Stickleback species pairs recovery strategy progress report for more information (DFO 2022).
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21	Develop outreach and stewardship projects in support of recovery measures. Target audiences should include local community members, landowners, industry, recreational groups, and local schools. For example: • promote best management practices to minimize the effects of various land use practices • promote lake riparian area conservation • promote stewardship practices, such as riparian planting by private landowners • develop, install, and maintain educational signage (for example, at ferry terminals, specific lake access points) about the species and its threats, particularly AIS • where appropriate, participate in water management and land use planning processes • share information at relevant workshops or symposia	8	In progress	The ISCBC educated Texada Island community members on water quality testing methods and invasive plant identification, removal, and disposal techniques. A program at Texada Elementary School was delivered to students and teachers to raise awareness and education surrounding invasive species, species at risk and the characteristics of Paxton Lake and Vananda Creek Stickleback species pairs. ISCBC also developed signage on the Texada stickleback species pairs and the invasive species that threaten them. These signs were displayed on the B.C. Ferries vessel and within the terminals that service Texada Island and Powell River (Lakes and Weinstein 2024). DFO installed public outreach signage describing Paxton Lake and Vananda Creek Stickleback species pairs' biology, SARA status and protection at the Paxton Lake trailhead, Priest Lake, and Spectacle Lake, as noted in the Paxton Lake and Vananda Creek Stickleback species pairs recovery strategy progress report (DFO 2022).
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1.2 Socio-economic costs and benefits

The socio-economic costs and benefits of implementing the action plan for Paxton Lake and Vananda Creek Stickleback species pairs focus on recovery efforts, such as research and management activities. The costs of implementing measures for the Paxton Lake and Vananda Creek Stickleback species pairs are considered low.

A large part of the economic costs borne by the federal government for Paxton Lake and Vananda Creek Stickleback species pairs recovery are provided via funding programs, including the Habitat Stewardship Program for Species at Risk. During the reporting period, 1 project targeting Paxton Lake and Vananda Creek Stickleback species pairs received funding through this program. Projects funded by this program have dollar and in-kind costs fully or partially matched by recipients, where applicable.

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 Paxton Lake and Vananda Creek Stickleback species pairs, 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. The recent and unique evolutionary history of the Paxton Lake and Vananda Creek Stickleback species pairs has been of considerable scientific interest. 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 Paxton Lake and Vananda Creek Stickleback species pairs

There has been no population monitoring for the Paxton Lake and Vananda Creek Stickleback species pairs 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 Paxton Lake and Vananda Creek Stickleback species pairs. Priority next steps may include, but are not limited to:

- developing and implementing a long-term population monitoring program to assess performance indicators, which measure progress toward achieving the population and distribution objectives
- developing and implementing an AIS monitoring and prevention plan for waters containing the Paxton Lake and Vananda Creek Stickleback species pairs

- establishing baseline water quality parameters for all lakes and streams that contain the species pairs
- continuing outreach and stewardship initiatives to inform local land use planning and promote adoption of best management practices for property owners
- researching threats associated with land and water management, and implementing threat mitigation activities
- developing and implementing protocols for scientific investigations of Paxton Lake and Vananda Creek Stickleback species pairs

2 Concluding statement

During the reporting period, progress was made toward implementing the recovery measures identified in the action plan for the Paxton Lake and Vananda Creek Stickleback Species Pairs. During the reporting period, progress made included filling research gaps through genome research, and education and outreach on the stickleback species pairs and the invasive species that threaten them. There has been no population monitoring for the Paxton Lake and Vananda Creek Stickleback species pairs 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 the Paxton Lake and Vananda Creek Stickleback Species Pairs and welcome the participation of additional partners.

3 References

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