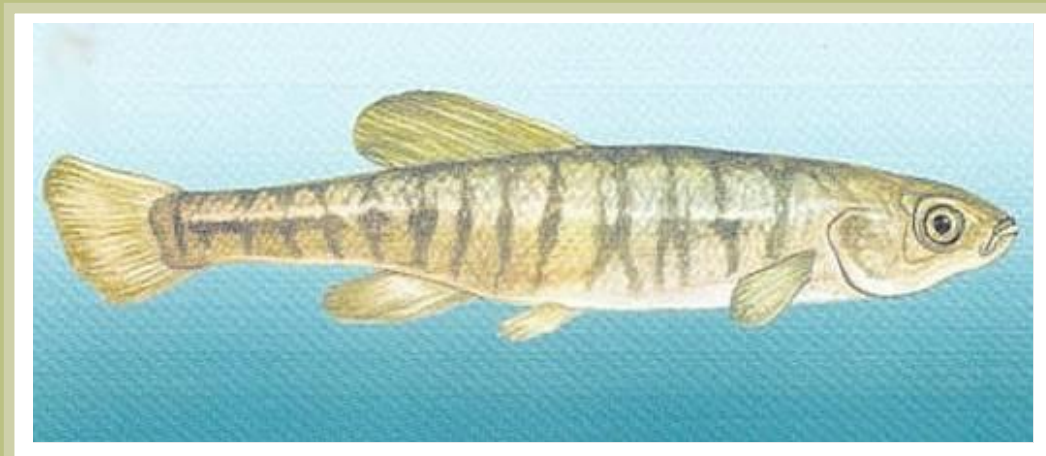


Report on the Progress of the Management Plan Implementation for the Banded Killifish (*Fundulus diaphanus*), Newfoundland Populations, in Canada for the Period 2016 to 2021

Banded Killifish



2022

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Preface

The federal, provincial, and territorial government signatories under the [Accord for the Protection of Species at Risk \(1996\)](#) agreed to establish complementary legislation and programs that provide for the protection of species at risk throughout Canada. Section 72 of the *Species at Risk Act* (S.C. 2002, c.29) (SARA) requires that the competent ministers monitor the implementation of the management plan for a species of special concern, and assess its implementation five years from the date it was placed on the Species at Risk Public Registry, and in every subsequent five-year period, until its objectives have been achieved.

Reporting on the progress of management plan implementation requires reporting on the collective efforts of the competent minister(s), provincial and territorial governments and all other parties involved in conducting activities that contribute towards the species' management and conservation. Management plans identify measures for the conservation of a species of special concern. Some of the identified measures may be sequential to the progress or completion of others, and not all may be undertaken or show significant progress during the time frame of a report on the progress of management plan implementation (progress report).

The Minister of Fisheries and Oceans is the competent minister under SARA for the Banded Killifish, Newfoundland populations, and has prepared this progress report.

As stated in the preamble to SARA, success in the conservation of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in the management plan and will not be achieved by Fisheries and Oceans Canada or any other jurisdiction alone. The cost of conserving species at risk is shared amongst different constituencies. All Canadians are invited to join in supporting and implementing the management plan for the Banded Killifish, Newfoundland populations, for the benefit of the species and Canadian society as a whole.

Acknowledgments

This progress report was prepared by Fisheries and Oceans Canada (DFO). To the extent possible, this progress report has been prepared with input from Qalipu Mi'kmaq First Nation Band. DFO would also like to express its appreciation to all individuals and organizations who have contributed to the recovery of the Banded Killifish.

Executive summary

The Banded Killifish (*Fundulus diaphanus*), Newfoundland populations, from here forward referred to as “Banded Killifish” was listed as special concern under the *Species at Risk Act* (SARA) in 2005. “The Management Plan for the Banded Killifish (*Fundulus diaphanus*), Newfoundland population, in Canada” was finalized and published on the [Species at Risk Public Registry](#) in 2011.

The main threats identified for the Banded Killifish include sedimentation and altered water flows resulting from land use activities (for example, forest harvesting, road construction/maintenance).

The goal of the Banded Killifish management plan is to maintain existing Banded Killifish population levels and distribution, and protect habitat within watersheds where this species is found. This goal is supported by four objectives:

1. conduct surveys and population monitoring
2. develop site-specific best management practices to protect habitat
3. reduce bycatch mortality in the American Eel fishery
4. increase public awareness and stewardship

“The Report on the Progress of the Management Plan for the Banded Killifish (*Fundulus diaphanus*), Newfoundland populations, in Canada for the Period 2016 to 2021” reports on the progress made by Fisheries and Oceans Canada (DFO) and its partners towards implementing the management plan and achieving its objectives. This is the second progress report for the Newfoundland populations of Banded Killifish. It follows a previous progress report published in 2016 which reported on the progress made between 2011 and 2016.

For the period 2016 to 2021, progress has been made towards fulfilling the objectives of the management plan. Research and survey work undertaken by DFO Science has verified 46 sites in Newfoundland. Four of these sites have been newly identified since the previous progress report in 2016 (objective 1). Existing best management practices/mitigation measures that support the protection of fish and fish habitat continue to apply to Banded Killifish (objective 2). In the American Eel fishery, it remains mandatory to release all bycatch (including Banded Killifish) in a manner that causes it the least harm (objective 3). In addition, a number of educational and stewardship activities have taken place to increase awareness of Banded Killifish including the development and distribution of educational material, participation in outreach programs, presentations to fish harvesters, and school visits (objective 4).

As per the management plan, population surveys and monitoring will be continued on an opportunistic basis to improve knowledge of the Banded Killifish distribution in Newfoundland. As new information becomes available on the Banded Killifish, Newfoundland populations, educational material will be updated as necessary and shared with partners, Indigenous groups, stakeholders, and the general public.

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1. Introduction

“The Report on the Progress of Management Plan Implementation for the Banded Killifish, Newfoundland populations, in Canada for the Period 2016 to 2021” outlines the progress made towards meeting the objectives listed in the “Management Plan for the Banded Killifish (*Fundulus diaphanus*), Newfoundland Population” during the indicated time period. This progress report is part of a series of documents for the Banded Killifish, Newfoundland populations, from here forward referred to as “Banded Killifish”, that are linked and should be taken into consideration together, including the previous progress report ([Fisheries and Oceans Canada \[DFO\] 2016](#)), the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) status reports (COSEWIC [2003](#), [2014](#)), and the management plan ([DFO 2011](#)).

Section 2 of the progress report provides references to, or reproduces key information on, the threats to the species; population and distribution objectives for achieving its management actions; approaches to meeting the objectives; and performance indicators to measure the progress of the management actions. For more details, readers should refer back to the management plan (DFO 2011).

Section 3 reports on the progress of activities and performance indicators identified in the management plan to support achieving the outlined objectives. Section 4 summarizes the progress toward achieving the objectives.

2. Background

2.1 COSEWIC assessment summary

The listing of the Banded Killifish under Schedule 1 of the *Species at Risk Act* (SARA) in 2005 led to the development and publication of the “Management Plan for the Banded Killifish (*Fundulus diaphanus*), Newfoundland population, in Canada” in 2011. The management plan is consistent with the information provided in the COSEWIC status report (COSEWIC 2003) and the COSEWIC summary information is included in section 1.1 of the management plan. In 2014, COSEWIC re-examined and confirmed the status of the Banded Killifish as special concern (COSEWIC 2014).

Assessment Summary: May 2014

Common name: Banded Killifish (Newfoundland populations)

Scientific name: *Fundulus diaphanus*

Status: Special concern

Reason for designation: This species has a scattered distribution in insular Newfoundland and occupies a small area of occupancy. The species can be impacted negatively by turbidity and hydrological alterations that result from road, forestry, cottage, and hydrological development. It could become threatened if these impacts are not managed or reversed with demonstrable effectiveness.

Occurrence: Newfoundland and Labrador

Status history: Designated special concern in April 1989. Status re-examined and confirmed May 2003 and May 2014.

2.2 Threats

This section summarizes the information found in the management plan, on threats to the Banded Killifish.

Table 1 summarizes the threats identified for Banded Killifish. Please refer to section 1.5 of the management plan for more information on these threats.

Table 1. Summary of threats identified for the Banded Killifish, Newfoundland populations, based on the management plan.

| Threat | Stress | Activity | Level of concern | Mitigation potential |
|--|--|---|------------------|----------------------|
| Increased suspended sediment loads | Decreased primary production; decreased feeding success for sight feeding species; increased mortality; damage to gills; increased susceptibility to disease and predation | Forest harvest | Low | High |
| Increased suspended sediment loads | Decreased primary production; decreased feeding success for sight feeding species; increased mortality; damage to gills; increased susceptibility to disease and predation | Other land use/development (road development/maintenance) | High | High |
| Altered water flow regime | Increased mortality; increased susceptibility to disease, prey availability | Other land use/development (road development/maintenance) | Medium-high | High |
| Impediments to migration | Habitat fragmentation; habitat conversion; isolation; increased susceptibility to predation | Other land use/development (road development/maintenance) | Low | Medium |
| Contamination (for example, fluids from equipment, oil spills, run-off) | Lower reproductive rates; increased mortality; increased susceptibility to disease and predation | Other land use/development (road development/maintenance) | Low-medium | Medium-high |
| Contamination (for example, fluids from equipment, oil spills, run-off) | Lower reproductive rates; increased mortality; increased susceptibility to disease and predation | Other land use/development (mineral exploration, urban/cabin development) | Medium | Medium-high |
| Directed catch, use as bait | Mortality | Harvested for bait | Low | Unknown |

| Threat | Stress | Activity | Level of concern | Mitigation potential |
|--|-----------|--------------------|------------------|----------------------|
| Bycatch in American Eel fishery | Mortality | Commercial fishing | Low-medium | High |
| Predation | Mortality | Invasive species | Unknown | Unknown |

2.3 Management objectives

This section summarizes the conservation objectives from the management plan linked to the performance indicators that define and measure progress toward achieving the objectives.

Table 2. Conservation objectives and corresponding performance indicators for the Banded Killifish, Newfoundland populations, found in the management plan.

| Objectives | Performance indicator |
|---|--|
| 1) Conduct surveys and population monitoring | 1) Where opportunities have been present, have surveys and monitoring of Banded Killifish been completed? |
| 2) Develop site-specific best management practices to ensure habitat protection | 2) Has information regarding the biology, threats and distribution of Banded Killifish been shared with those responsible for land use planning and project referral reviews? 3) Have Banded Killifish concerns been incorporated into land use planning and the project referral review process? |
| 3) Reduce bycatch mortality in the American Eel fishery | 4) Has information regarding the impact of bycatch in American Eel fisheries been considered in fisheries management plans, license conditions and fisher educational programs? |
| 4) Increase public awareness and stewardship | 5) Has a communications strategy been implemented? |

3. Progress towards management objectives

The management plan for the Banded Killifish describes 4 management objectives for the conservation of the species, as well as 5 associated performance indicators, as outlined in table 2. Progress on activities to support the management objectives and towards meeting the performance indicators is reported in section 3.1.

3.1 Activities supporting conservation and status of performance indicators

In 2011, when the Banded Killifish management plan was published, there were only 10 documented locations of Banded Killifish in Newfoundland. Since then, research and field surveys conducted by DFO have verified 36 additional sites, resulting in 46 identified locations of Banded Killifish, including the Avalon Peninsula, the Northern Peninsula, as well as additional watersheds in southwestern Newfoundland on the Burin Peninsula and in Bonavista north. Four of these new sites were identified since the publication of the previous progress report in 2016 (2 sites in 2016, 1 site in 2017, and 1 site in 2020) (figure 1). Identification of additional Banded Killifish locations in insular Newfoundland is ongoing on an opportunistic basis.

Table 3 provides information on the implementation of activities undertaken to address the management objectives and the status of performance indicators identified in the management plan. Each activity has been assigned one of four statuses:

- 1) not met: the performance indicator has not been met, and little to no progress has been made
- 2) partially met, underway: moderate to significant progress has been made toward meeting one or more elements of the performance indicator, and further work is ongoing or planned
- 3) met: the performance indicator has been met and no further action is required
- 4) met, ongoing: the performance indicator has been met, but efforts will continue until such time the population is considered to be recovered (that is, the indicator will be reported against in the next five-year progress report)

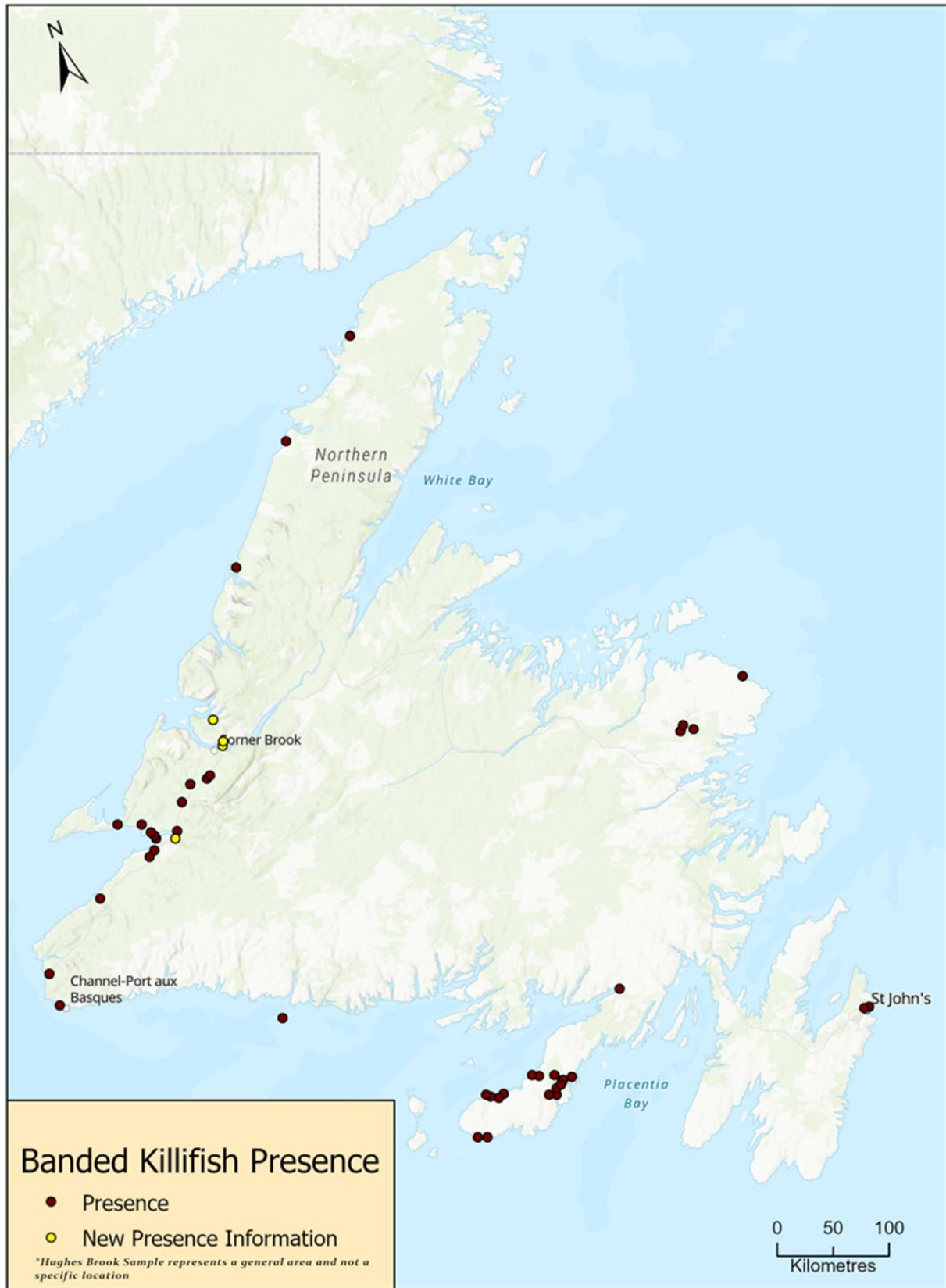


Figure 1. Current (2021) known distribution of Banded Killifish in Newfoundland.

Table 3. Details and status of activities supporting the conservation of the Banded Killifish, Newfoundland Populations, from 2016 to 2021.

| Activity | Performance indicator ¹ | Activity status | Details | Participants ² |
|--|------------------------------------|-----------------|--|--|
| Development of monitoring protocols | 1 | Met | <ul style="list-style-type: none"> • Fisheries and Oceans Canada (DFO) developed and used a standard protocol to conduct surveys for Banded Killifish from 2013 to 2017 • In 2021, "Banded Killifish (<i>Fundulus diaphanus</i>) and Mummichog (<i>Fundulus heteroclitus</i>) distributions in insular Newfoundland waters: implications for a Species at Risk" was published in the journal Canadian Field-Naturalist which references updated survey and monitoring protocols and the known distribution ranges | DFO |
| Population surveys to identify additional Banded Killifish locations | 1 | Met, ongoing | <ul style="list-style-type: none"> • DFO has conducted research and surveys since 2013 that have verified 46 locations. Four of these sites have been newly identified since the previous progress report in 2016 (2 sites in 2016, 1 site in 2017, and 1 site in 2020) (Sargent et al. 2020; Peddle pers. comm. 2020) • Sightings/locations have been and are continuing to be reported and recorded by Fishery Officers, other DFO personnel and external sources • DFO continues to advise the public and anglers that if caught, Banded Killifish should be returned to the water alive immediately. DFO also briefs Fishery Guardians each season on identifying Banded Killifish and reporting any sightings • Through the Aboriginal Fund for Species at Risk, the Mi'kmaq Alsumk Mowimsikik Koqoey Association (MAMKA), particularly the Qalipu Mi'kmaq First Nation Band, conducted surveys to identify Banded Killifish locations from 2016 to 2021; however, no new locations were identified during this survey period by this group | DFO, MAMKA, Qalipu Mi'kmaq First Nation Band, Humber Arm Environmental Association Inc. |

¹ Performance indicators are described in table 2.

² Lead participant(s) is/are listed on top and in bold; other participants are listed alphabetically; not all activities have specific participants identified.

| Activity | Performance indicator ¹ | Activity status | Details | Participants ² |
|---|------------------------------------|-----------------|---|---------------------------|
| Circulate Banded Killifish distribution information to jurisdictional authorities and land managers | 2 and 3 | Met, ongoing | <ul style="list-style-type: none"> DFO has been and continues to present information on Banded Killifish as opportunities arise. DFO attended the Canadian Conference for Fisheries Research in St. John’s in 2016 and presented information on Banded Killifish | DFO |
| Develop site-specific best management practices as necessary | 2 and 3 | Met | <ul style="list-style-type: none"> Existing mitigation measures/best management practices for the protection of fish and fish habitat previously developed by the former Habitat Management Program of DFO, now the Fish and Fish Habitat Protection Program (FFHPP), still apply and site-specific protocols have not been necessary The DFO “Projects Near Water” website provides information and guidance for those conducting work near water, including a list of current standards and codes of practice, measures to protect fish and fish habitat, and links to the <i>Species at Risk Act</i> (SARA) In conducting project referral reviews, DFO FFHPP considers SARA-listed species, including Banded Killifish | DFO |
| Include mandatory bycatch release in eel license conditions and future fisheries management plans | 4 | Met, ongoing | <ul style="list-style-type: none"> Mandatory bycatch release of Banded Killifish is implemented through licence conditions Fishery Officers conduct patrols and monitor the bycatch of Banded Killifish in eel fyke nets and pots in western Newfoundland Fishery Officers promote information to anglers through on site conversations, distribution of identification cards and brochures | DFO |
| Distribute Banded Killifish identification cards | 5 | Met, ongoing | <ul style="list-style-type: none"> Wallet-sized identification cards continue to be distributed to fish harvesters, recreational fishers and local residents in areas where Banded Killifish may be encountered as opportunities arise Species identification cards containing the most recent location data were reprinted in 2020 and will be distributed through various venues, for example, school visits and World Oceans Day events | DFO |

| Activity | Performance indicator ¹ | Activity status | Details | Participants ² |
|--|------------------------------------|-----------------|---|---------------------------|
| Develop factsheet | 5 | Met, ongoing | <ul style="list-style-type: none"> The Banded Killifish brochure, developed in 2016 and containing location data and contact information to report sightings, was reprinted in 2017 and continues to be distributed to the public including schools and fishers | DFO |
| Promote Banded Killifish conservation during outreach events | 5 | Met, ongoing | <ul style="list-style-type: none"> Identification cards, brochures, and information continue to be distributed during school visits and conservation outreach events (for example, World Oceans Day events) | DFO |
| Implement communications strategy | 5 | Met, ongoing | <ul style="list-style-type: none"> Educational material has been and continues to be developed and distributed by DFO to the public including schools and fishers Fishery Officers and Guardians, and DFO scientists provide information to anglers at meetings and in the field Banded Killifish information, including updated distribution, is available on the Species at Risk Public Registry Media has been engaged in the conservation and protection of the Banded Killifish, including an interview with a DFO research technician (Philip Sargent) who profiled the species for the Canadian Broadcasting Company “What’s Down There?” series in 2016 Several tweets released from regional Twitter account (@DFO_NL) to raise awareness of the species, encourage the general public to keep an eye out for Banded Killifish, providing information on where it may be found and how to report to DFO | DFO |

4. Concluding statement

Over the last five years, through the implementation of the activities identified in the management plan, progress has been made towards achieving the objectives identified in the management plan.

The progress made includes: research and survey work conducted to increase knowledge of distribution; information on the Banded Killifish provided to the public including fishers and schools; mandatory bycatch release included in eel license conditions; and educational outreach carried out through various media, school visits, and conservation outreach events.

Based on DFO Science research and field surveys, the Banded Killifish, is found to have a larger distribution than previously documented. Forty-six locations were verified, 4 of which have been newly identified since the previous progress report in 2016 (2 sites in 2016, 1 site in 2017, and 1 site in 2020) (Sargent et al. 2020; Peddle pers. comm. 2020).

Given the new information about Banded Killifish, educational material has been updated and is being shared with partners, Indigenous groups, stakeholders, and the general public.

Continuation of management plan implementation is required to fully achieve the objectives. Population surveys and monitoring will be continued on an opportunistic basis to improve knowledge of the Banded Killifish distribution in Newfoundland. Public education and stewardship activities by DFO will continue, and information will be updated as necessary.

DFO remains committed to managing the Banded Killifish. The work started and completed to date has built a strong foundation for continued research and management of this species over the next reporting period. Progress made to date would not have been achieved without the contribution from our partners. DFO is looking forward to continuing this successful collaboration and welcomes the participation of additional partners.

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