Species at Risk Act
Recovery Strategy Report Series

Report on the Progress of Recovery Strategy Implementation for the Rocky Mountain Sculpin, Eastslope Populations, (*Cottus* sp.) in Canada for the Period 2012 to 2019

Rocky Mountain Sculpin, Eastslope Populations

2024

Canada

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Preface

The federal, provincial, and territorial government signatories under the Accord for the Protection of Species at Risk (2019) agreed to establish complementary legislation and programs that provide for the protection of species at risk throughout Canada. Under section 46 of the *Species at Risk Act* (S.C. 2002, c.29) (SARA), the competent ministers are responsible for reporting on the implementation of the recovery strategy for a species at risk, and the progress towards meeting its objectives within 5 years of the date when the recovery strategy was placed on the Species at Risk Public Registry and in every subsequent 5-year period, until its objectives have been achieved or the species' recovery is no longer feasible.

Reporting on the progress of recovery strategy 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 to the species' recovery. Recovery strategies identify broad strategies and approaches that will provide the best chance of recovering species at risk. Some of the identified strategies and approaches are sequential to the progress or completion of others, and not all may be undertaken or show significant progress during the timeframe of a report on the progress of recovery strategy implementation (progress report).

The Minister of Fisheries and Oceans is the competent minister under SARA for the Rocky Mountain Sculpin, Eastslope populations, and has prepared this progress report.

As stated in the preamble to SARA, success in the recovery of species at risk depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in the recovery strategy, and will not be achieved by Fisheries and Oceans Canada (DFO) or any other jurisdiction, alone. The cost of conserving species at risk is shared amongst different contributors. All Canadians are invited to join in supporting and implementing the recovery strategy for the Rocky Mountain Sculpin, Eastslope populations for the benefit of the species and Canadian society as a whole.

Acknowledgments

This progress report was prepared by Pooi-Leng Wong (DFO) and Ashley Gillespie (DFO). This progress report has also benefitted from input from Alberta Environment and Protected Areas (EPA; formerly Alberta Environment and Parks). DFO would like to express its appreciation to all individuals and organizations who have contributed to the recovery of the Rocky Mountain Sculpin, Eastslope populations.

Executive summary

The Rocky Mountain Sculpin, Eastslope populations, (*Cottus* sp.) was listed as threatened under the *Species at Risk Act* (SARA) in 2006. The recovery strategy for the Rocky Mountain Sculpin, Eastslope populations, (*Cottus* sp.) was finalized and published on the Species at Risk Public Registry in 2012 (Species at risk public registry).

Rocky Mountain Sculpin are listed as threatened because of their extremely limited distribution in Canada. In Alberta, the species is only found in Lee Creek and St. Mary and Milk Rivers. The main threat identified for the species in Alberta is habitat loss/degradation associated with water removal, which has been exacerbated in recent years by drought.

The population and distribution objective for the Rocky Mountain Sculpin is “to protect and maintain self-sustaining populations of the Rocky Mountain Sculpin within its current range in the St. Mary and Milk river watersheds in Canada.” The key objectives in the recovery strategy are to: 1) quantify and maintain current population levels of Rocky Mountain Sculpin in the St. Mary and Milk river watersheds; 2) increase knowledge of the taxonomy, life history, basic biology and habitat requirements of the Rocky Mountain Sculpin, with a view towards refining the identification of, and protecting, critical habitat; and 3) increase understanding of how human activities affect Rocky Mountain Sculpin survival, so that potential threats to the species can be avoided, eliminated, or mitigated. The “Report on the Progress of Recovery Strategy Implementation for the Rocky Mountain Sculpin, Eastslope Populations, (*Cottus* sp.) in Canada for the Period 2012 to 2019” (progress report) reports on the progress made by Fisheries and Oceans Canada (DFO) and its partners towards implementing the recovery strategy and achieving its objectives.

Overall, recovery activities conducted from 2012 to 2019 have helped to provide a clearer understanding of the functions, features, and attributes necessary for the maintenance of a self-sustaining population of Rocky Mountain Sculpin in Alberta. Investigations into the genetic structure of Rocky Mountain Sculpin revealed there are 4 subpopulations in Canada. The greatest genetic difference is in the Flathead River subpopulation in British Columbia compared to the 3 subpopulations (Lee Creek, St. Mary River, and North Milk/Milk River) in southern Alberta.

The species are now known to occupy most reaches of Lee Creek. Its distribution in the Milk River system is limited to the upper reaches of the river, with temperature and habitat limiting expansion downstream. Distribution of this species has not changed in the St. Mary River from upstream of the reservoir to the United States border. Routine and opportunistic monitoring of environmental parameters is ongoing.

Management and regulatory frameworks to review development activities are well established and conducted by Alberta Environment and Protected Areas (EPA), with input from DFO when warranted, to avoid unnecessary habitat degradation and mortality of Rocky Mountain Sculpin.

Not all of the research activities described in the recovery strategy have been completed to date; however, there is no evidence to indicate there has been any decline in the populations or loss of habitat of Rocky Mountain Sculpin in the Milk or St. Mary river basins. Education and outreach actions are completed or ongoing. These actions are aimed at improving the awareness of the species and its habitat, reducing potential damage to populations with the introductions of predators and competitors, and improving the accessibility and security of data.

Efforts will continue to ensure that habitat quantity and quality is maintained or improved through existing regulations.

A science-based monitoring methodology has been developed (Macnaughton et al. 2019) that will assist with evaluating whether Rocky Mountain Sculpin populations are maintained in the St. Mary and Milk river drainage. Rocky Mountain Sculpin have a limited distribution in Canada and as such, recovery efforts should focus on maintaining existing populations in the Milk and St. Mary river systems.

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1. Introduction

The “Report on the Progress of Recovery Strategy Implementation for the Rocky Mountain Sculpin, Eastslope Populations, (*Cottus* sp.) in Canada for the Period 2012 to 2019” outlines the progress made towards meeting the goals and objectives listed in the "Recovery Strategy for the Rocky Mountain Sculpin (*Cottus* sp.), Eastslope populations, in Canada” during the indicated time period and should be considered as part of a series of documents for this species that are linked and should be taken into consideration together, including the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) status report (COSEWIC 2005), science advisory report from the recovery potential assessment (DFO 2013), a recovery strategy (DFO 2012), and an action plan (DFO 2018).

Section 2 of the progress report summarizes key information on the threats to the species, population, and distribution objectives for achieving its recovery, approaches to meeting the objectives, and performance indicators to measure the progress of recovery. For more details, readers should refer to the “Recovery Strategy for the Rocky Mountain Sculpin (*Cottus* sp.), Eastslope populations in Canada” (DFO 2012). Section 3 reports on the progress of activities identified in the recovery strategy, to support achieving the population and distribution objectives, while section 4 summarizes the progress made towards achieving the objectives.

2. Background

2.1 Committee on the Status of Endangered Wildlife in Canada assessment summary

The listing of the Rocky Mountain Sculpin under the *Species at Risk Act* (SARA) in 2006 led to the development and publication of the recovery strategy for the Rocky Mountain Sculpin in Canada in 2012. The recovery strategy is consistent with the information provided in the COSEWIC status report (COSEWIC 2005) and the COSEWIC summary information included in section 1 of the recovery strategy.

COSEWIC assessment summary:

Date of assessment: May 2005
Common name: Eastslope Sculpin (St. Mary and Milk river populations)
Scientific name: *Cottus* sp.
COSEWIC status: Threatened
Reason for designation: This species has a very restricted area of occurrence in the St. Mary and Milk rivers in Canada where it has been impacted by habitat loss and degradation from water diversion, conditions that have been exacerbated in recent years by drought.
Canadian occurrence: Alberta
Status history: Designated threatened in May 2005. Assessment based on a new status report.

Alberta summary:

Common name: St. Mary Sculpin
Scientific name: *Cottus bairdi*
Rank: Threatened/endangered
Designated: 2007
Note: Eastslope/St. Mary Sculpin have been determined to be Rocky Mountain Sculpin. Taxonomic work is progressing.
Reason for designation: This species has a very restricted area of occupancy. The only locations in Alberta where this species is found are in the Milk River basin and upper St. Mary River basin of southern Alberta. Dispersal and exchange with adjacent population is limited.
Status history: Designated “may be at risk” in 2000. Upgraded to threatened in 2004 based on a new status report. “At Risk” in 2015 under the Alberta Wild Species General Status Listings. Listed in the Alberta *Wildlife Act* as both threatened and endangered in 2019 (Province of Alberta 2019).

2.2 Threats

This section summarizes the information found in the recovery strategy on threats to survival and recovery of the Rocky Mountain Sculpin and threats to its critical habitat.

2.2.1 Threats to the Rocky Mountain Sculpin

Table 1. Summary of threats identified for the Rocky Mountain Sculpin, Eastslope populations, based on the recovery strategy. Adapted from DFO (2012).

Threat	Activities	Effect	Level of concern
Habitat loss or degradation	Dam construction (water impoundment or reservoir creation)	Large-scale loss of habitat (change from riverine to reservoir)	Low[1]
Habitat loss or degradation	Dam operation (flow modification)	Reduction in available habitats	Low[2]
Habitat loss or degradation	Changes to existing flow regime	Reduced productivity and/or reduced population size	Low to medium[3]
Changes in ecological dynamics or natural processes	Algae blooms of the diatom, *Didymosphenia geminata*	Reduced productivity, displacement, and reduced fitness	Low[4]
Exotic or invasive species	International fish stocking	Altered productivity and/or reduced population size	Low

[1] Rocky Mountain Sculpin are not found in existing impoundments, such as the St. Mary Reservoir. There is currently no plan to build a dam on the Milk River in Canada. In the event that such a development were to occur, the anticipated level of concern would be high, as impoundment could lead to local, or perhaps complete, extirpation of the species.

[2] The St. Mary Diversion (diverts water from St. Mary River in Montana into the North Milk River) exerts significant control over seasonal flow in the St. Mary River downstream and in the North Milk and Milk rivers in Canada. Dam construction on the Milk River would add another level of flow control. Flow changes could have positive or negative effects depending upon their timing and volume, and the resultant effects on fish habitat. Rocky Mountain Sculpin are not found in existing impoundments, such as the St. Mary Reservoir. There is currently no plan to build a dam on the Milk River in Canada. In the event that such a development were to occur, the anticipated level of concern would be high, as impoundment could lead to local, or perhaps complete, extirpation of the species; however, this concern would need to be quantified once project details are known.

[3] The effect would depend on how releases from a dam were controlled. The seasonality (for example, during incubation) of any sediment may be an important consideration. In the event that such a development were to occur, the anticipated level of concern would be high, as impoundment could lead to local, or perhaps complete, extirpation of the species.

[4] The existing flow regime has been regulated for most of the past century. Changes to this regime that alter seasonal flow patterns and volumes could alter the seasonal availability of suitable sculpin habitat. At the population level, the net effect of any change could be positive or negative. The effects of flow changes have historically been greatest on the North Milk River, which is generally a small river with heavily influenced water flows that are dependant on seasonal precipitation amounts (snow melt/run-off). The North Milk River receives large volumes of water from the St. Mary River in relation to flows that would occur naturally.

Threat	Activities	Effect	Level of concern
Exotic or invasive species	Unintentional species introduction	Altered productivity and/or reduced population size	Low
Pollution	Point source pollution	Toxic effects, reduced productivity, and increased mortality	Low
Pollution	Non-point source pollution	Toxic effects and increased mortality	Low
Disturbance or persecution	Scientific sampling	Increased mortality	Low
Climate change	Climate change	Increased mortality and reduced fitness	Low

2.2.2 Threats to critical habitat

Critical habitat for the Rocky Mountain Sculpin has been identified, to the extent possible, in section 7 of the recovery strategy. Table 2 provides examples of activities that are likely to result in the destruction of critical habitat (that is, threats to critical habitat). The list of activities provided in this table is neither exhaustive nor exclusive, and their inclusion has been guided by the examples of activities that are likely to result in the destruction of critical habitat. For more details on the activities likely to result in the destruction of critical habitat, consult the recovery strategy.

Table 2. Threats to critical habitat of the Rocky Mountain Sculpin, Eastslope populations, adapted from the recovery strategy (DFO 2012).

Threat	Activities	Effect-pathway
Habitat loss or degradation	Dam construction (water impoundment or reservoir creation)	Large-scale loss of habitat (change from riverine to reservoir)
Habitat loss or degradation	Dam operation (flow modification)	Reduction in available habitats
Habitat loss or degradation	Water withdrawal	Reduction in available habitats
Point source pollution	Release of harmful substances	Reduction in available habitat (for example, loss of interstitial spaces)

2.3 Recovery

This section summarizes the information in section 5 of the recovery strategy (DFO 2012) on the population and distribution objectives that are necessary for the recovery of the Rocky Mountain Sculpin, and in section 6 of the recovery strategy on the broad approaches that provide a way to define and measure progress towards achieving the population and distribution objectives.

2.3.1 Population and distribution objectives

Section 5 of the recovery strategy (DFO 2012) identified the following population and distribution objective necessary for the recovery of the species:

> "To protect and maintain self-sustaining populations of the Rocky Mountain Sculpin within its current range in the St. Mary and Milk river watersheds in Canada."

A number of recovery objectives are proposed to meet the recovery goal and to address threats to the survival of the species. The recovery objectives are:

> Objective 1: Quantify and maintain current population levels of Rocky Mountain Sculpin in the St. Mary and Milk river watersheds (within the population's range of natural variation), as determined from a standardized survey program;
>
> Objective 2: Increase knowledge of the taxonomy, life history, basic biology, and habitat requirements of the Rocky Mountain Sculpin, with a view towards refining the identification of, and protecting, critical habitat; and
>
> Objective 3: Increase understanding of how human activities affect Rocky Mountain Sculpin survival, so that potential threats to the species can be avoided, eliminated, or mitigated.

2.3.2 Performance indicators

The recovery strategy did not include performance indicators for Rocky Mountain Sculpin. The progress towards achieving population and distribution objectives, as described in table 3, will be informed by the progress made under the approaches and studies in sections 3.1 and 3.2 below.

Table 3. Population and distribution objectives, broad strategy and approach, strategy, and priority of objectives for the Rocky Mountain Sculpin, Eastslope populations, as described in the recovery strategy. Adapted from DFO (2012).

Population and distribution objective	Broad strategy and approach[5]	Strategy	Priority[6]
Objective 1	R4	Develop population models	Necessary
Objective 1	M1	Monitor population	Necessary
Objective 2	R1	Confirm distribution and abundance	Necessary
Objective 2	R2	Clarify life history requirements	Necessary
Objective 2	R3	Clarify habitat requirements	Necessary
Objective 2	R4	Develop population models	Necessary

[5] Strategy code as defined in Section 6.2, Narrative to Support the Recovery Planning Table, of the recovery strategy for the Rocky Mountain Sculpin (DFO 2012).
[6] Necessary = Medium priority for long-term species conservation. Beneficial = Lower priority, primarily directed at potential future activities.

Population and distribution objective	Broad strategy and approach[5]	Strategy	Priority[6]
Objective 3	MR1	Employ water management and conservation	Necessary
Objective 3	MR2	Develop impact mitigation	Necessary
Objective 3	MR5	Use data conservation	Necessary
Objective 3	E3	Facilitate information exchange	Necessary
Objective 3	R5	Assess stressors	Necessary
Objective 3	M2	Monitor habitat	Necessary
Objective 3	MR4	Gain international cooperation	Beneficial
Objective 3	E1	Improve awareness of species	Beneficial
Objective 3	E2	Encourage stakeholder participation	Beneficial
Objective 3	E4	Discourage species introductions	Beneficial

3. Progress towards recovery

The recovery strategy for the Rocky Mountain Sculpin (DFO 2012) divides the recovery effort into 4 broad strategies: 1) research (R1 to 5), 2) monitoring (M1 to 2), 3) management and regulatory actions (MR 1 to 4), and 4) education and outreach (E1 to 4). Progress in carrying out these broad strategies is reported in section 3.1. Section 3.2 reports on the activities identified in the schedule of studies to identify critical habitat. Section 3.3 reports on the progress made towards meeting the performance indicators and other commitments (for example, action plan and Critical Habitat Order) identified in the recovery strategy and information obtained through implementing the recovery strategy.

3.1 Activities supporting recovery

Table 4 provides information on the implementation of activities undertaken to address the broad approaches and strategies identified in the recovery planning table of the recovery strategy.

Table 4. Details of activities supporting the recovery of the Rocky Mountain Sculpin, Eastslope populations, from 2012 to 2019.

Activity	Broad strategy and approach	Descriptions and results	Recovery objectives	Participants[7]
Clarify life history requirements	Broad strategy 1: Research Approach: R3. Clarify habitat requirements	A study on movement and genetic structure of Rocky Mountain Sculpin was conducted by Ruppert et al. (2017). It revealed that adult Rocky Mountain Sculpin are primarily sedentary with a typical movement of less than 10 m from their release point over a 5-month period; the largest movement was in the downstream direction. This movement has implications on gene flow and connectivity to suitable habitat. The genetic analyses showed Canada has 4 subpopulations of Rocky Mountain Sculpin. These subpopulations are located in the Flathead River in British Columbia, Lee Creek, St. Mary River, and North Milk/Milk River in southern Alberta. (Note: the Flathead River population is part of the Westslope populations, or Designatable Unit [DU], of Rocky Mountain Sculpin). This DU is listed as special concern by the *Species at Risk Act* (SARA). The greatest genetic difference was observed between the Flathead River population (west of the Continental Divide) and the other 3 populations (east of the Continental Divide). The Lee Creek and St. Mary River populations are genetically most similar, with more individuals exhibiting genetic similarities at the confluence of both systems than in the headwaters of each system. The genetic analyses illustrate the insurmountable barrier of the Continental Divide and that watershed structure (river basins) is the main geographic feature influencing the genetic structure of the species.	2	**University of Alberta (U. of A.)** Fisheries and Oceans Canada (DFO)

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

Activity	Broad strategy and approach	Descriptions and results	Recovery objectives	Participants[7]
Clarify life history requirements	Broad strategy 1: Research Approach: R2. Clarify life history requirements	A biotic and abiotic interaction study showed inter- and intra-specific competition was among the most important factors influencing movement of Rocky Mountain Sculpin in Lee Creek. Movement was clearly influenced by a shift from high to low abundances of Rocky Mountain Sculpin, providing evidence of a density-dependent response (Veillard 2016). Abiotic factors influencing movement include a high presence of cobble substrate, and velocity and depth variables. This study showed a wide range of depths occupied by Rocky Mountain Sculpin (13.4 to 61.4 cm) and that its movement was from preferred riffle habitat (20 cm s^{-2} < standard deviation of velocity < 40 cm s^{-2}) towards slightly slower riffle margins (standard deviation of velocity ~ 10 cm s^{-2}). The study concluded that Rocky Mountain Sculpin in Lee Creek may be experiencing competitive pressure, and that suitable habitat may be the limiting resource driving inter- and intra-specific competition (Veillard 2016).	2	**U. of A.** DFO

Activity	Broad strategy and approach	Descriptions and results	Recovery objectives	Participants[7]
Clarify life history requirements	Broad strategy 1: Research Approach: R2. Clarify life history requirements	Veillard et al. (2017) described the swimming abilities of the Rocky Mountain Sculpin. The species' swimming average was 49 ± 22.8 cm s^{-1} (6.8 ± 2.9 body lengths [BL] s^{-1}) over a duration of 3.2 ± 1.5 minutes before failing, and its holding stations average was 23.4 ± 14.5 cm s^{-1} (3.3 ± 2.2 BL s^{-1}) before slipping. Additionally, failure velocity significantly decreased with repeated tests with a 30-minute rest period between tests. Bursting ability is associated with predator evasion, which means that Rocky Mountain Sculpin's ability to escape predators will be impeded. No significant differences were found in the swimming abilities of Rocky Mountain Sculpin from the 4 rivers with large differences of discharges. The fact that the species' life history is completed in the microhabitat of silt-free rocky substrates near stream margins with low to moderate water velocities likely reduces the impact of broad-scale hydrologic regimes, which lowers the selection pressure for swimming adaptations. The study also demonstrated the prominence of caudal morphology in the swimming and station-holding performance of different Rocky Mountain Sculpin individuals. Individuals with wider and longer caudal peduncles swam to higher velocities before failing, resulting in higher slip and failure velocities.	2	**U. of A.** DFO

Activity	Broad strategy and approach	Descriptions and results	Recovery objectives	Participants[7]
Clarify life history requirements	Broad strategy 1: Research Approach: R2. Clarify life history requirements	In a study on morphological divergence of Rocky Mountain Sculpin, Rudolfsen et al. (2017) found that high-flow river systems produced sculpins with more dorso-ventrally compressed, slender body shapes that minimized resistance to flow, more pectoral fin rays to potentially allow them to increase friction when gripping to substrates, and more anteriorly and dorsally located head pores to better detect floating prey. Biogeographic isolation and difference in flow regime were thought to be the likely basis of morphological variation in Rocky Mountain Sculpin. Though stream hydrology may be driving local adaptions, the degree to which it is doing so remains unclear. Additional environmental factors may exert important influence on the phenotype of this species.	2	**U. of A.** DFO
Monitor habitat	Broad strategy 2: Monitoring Approach: M2. Monitor habitat	Routine and opportunistic monitoring of environmental parameters including flow conditions, turbidity, water temperature, and dissolved oxygen has been completed. There has been some, but not continuous, monitoring of these environmental parameters to track water quality. These activities are ongoing, which may lead to presentation of results in the future.	3	**DFO** **Alberta Environment and Protected Areas (EPA)[8]** U. of A.

[8] Known as Alberta Sustainable Resource Development, then as Alberta Environment and Parks during the period of reporting (2012 to 2019).

Activity	Broad strategy and approach	Descriptions and results	Recovery objectives	Participants[7]
Employ water management and conservation	Broad strategy 3: Management and regulation Approach: MR1. Employ water management and conservation	In Alberta, a licence must be obtained under the province's *Water Act* before ground or surface water can be diverted. Temporary diversion licenses (TDLs) are approved by EPA. DFO will provide advice for TDLs when impacts to species at risk may occur. Recommended TDL sources are surface run-off dugouts, sloughs, and non-fish-bearing lakes and creeks. Fish-bearing lakes and creeks are least recommended. This activity is ongoing.	3	**EPA** DFO
Apply stocking program rationalization	Broad strategy 3: Management and regulation Approach: MR3. Apply stocking program rationalization	The intention of this activity is to reduce the potential for species introductions and stocking-related impacts to Rocky Mountain Sculpin. In Alberta, stocking programs are provincially managed. Lakes, reservoirs, and ponds are stocked throughout the province with Brook Trout (*Salvelinus fontinalis*), Rainbow Trout (*Oncorhynchus mykiss*), Cutthroat Trout (*O. clarkii*), and/or Brown Trout (*Salmo trutta*). Rocky Mountain Sculpin are not typically found in these lacustrine environments, as these areas do not provide a suitable habitat for the species. Additionally, EPA will consult with DFO prior to stocking in waters where species at risk are found.	3	**EPA** DFO

Activity	Broad strategy and approach	Descriptions and results	Recovery objectives	Participants[7]
Gain international cooperation	Broad strategy 3: Management and regulation Approach: MR4. Gain international cooperation	The Milk River watershed is shared between Canada and the United States (U.S.) and, as such, it is subject to provisions in the Boundary Waters Treaty of 1909. The treaty is administered by a binational organization called the International Joint Commission (IJC), which has appointed members from both governments. The treaty provides the principles and mechanism to resolve disputes concerning shared water. The IJC has designated accredited officers for the St. Mary-Milk Rivers, made up of Canadian federal organizations and U.S. federal organizations. In addition, EPA have been working with the U.S. agencies to avoid unscheduled flow interruptions in the Milk River during flow augmentation. This activity is ongoing.	3	**DFO** U.S. agencies EPA
Use data conservation	Broad strategy 3: Management and regulation Approach: MR5. Use data conservation	All Rocky Mountain Sculpin samples and information (current and future) are appropriately preserved and archived. Information collected from EPA, universities, and SARA permit holders is shared between DFO and EPA and archived. This activity is ongoing.	3	DFO EPA Universities

Activity	Broad strategy and approach	Descriptions and results	Recovery objectives	Participants[7]
Improve awareness of the species	Broad strategy 4: Public education and outreach Approach: E1. Improve awareness of the species	Various groups and organizations, including EPA, have been involved in events and/or developed informational material related to improving awareness of Rocky Mountain Sculpin. From 2012 to 2015, DFO participated and provided information about the Rocky Mountain Sculpin at the following conferences and workshops: • National Fish and Wildlife Conservation Congress, Ottawa, Ontario, May 2012 • Prairie Conservation and Endangered Species Conference, Red Deer, Alberta, February 2013 • Great Plains Fisheries Workshop Association Annual Meeting, Winnipeg, Manitoba, February 2013 • Cumulative Environmental Management Association, Fort McMurray, Alberta, February 2013 • Going Wild event, Coleman, Alberta 2015 This activity is ongoing.	3	**DFO** **EPA**

Activity	Broad strategy and approach	Descriptions and results	Recovery objectives	Participants[7]
Encourage stakeholder participation	Broad strategy 4: Public education and outreach Approach: E2. Encourage stakeholder participation	Interpretative signage has been developed in cooperation with the Milk River Fish Species at Risk Recovery Team and local municipalities and has been installed along the Milk River. Signage includes information related to the Rocky Mountain Sculpin and the SARA.	3	**DFO** Milk River Fish Species at Risk Recovery Team Town of Milk River Cardston County County of Warner No. 5
Facilitate information exchange	Broad strategy 4: Public education and outreach Approach: E3. Facilitate information exchange	See above under broad strategy 3, use data conservation.	3	DFO EPA Universities

Activity	Broad strategy and approach	Descriptions and results	Recovery objectives	Participants[7]
Discourage species introductions	Broad strategy 4: Public education and outreach Approach: E4. Discourage species introductions	Provincial regulations are in place to prevent species introductions, which may reduce the potential for damage to Rocky Mountain Sculpin populations from introduced predators and competitors. Potential invasive species may include goldfish and Prussian Carp. Under the Alberta General Sportfishing Regulations, it is unlawful to: • release live fish or live fish eggs into any waters, except back to the waters from which they were caught • possess live bait fish and use live fish for bait	3	**EPA**

3.2 Activities supporting the identification of critical habitat

Table 5 provides information on the implementation of the studies outlined in the schedule of studies to identify critical habitat found in the recovery strategy (DFO 2012). Each study has been assigned 1 of 4 statuses:

1) completed: the study has been carried out and concluded
2) in progress: the planned study is underway and has not concluded
3) not started: the study has been planned but has yet to start
4) cancelled: the planned study will not be started or completed

Table 5. Provides information on the implementation of the studies outlined in the schedule of studies to identify critical habitat found in the recovery strategy for the Rocky Mountain Sculpin, Eastslope populations.

Study	Timeline	Status	Descriptions and results	Participants[9]
Conduct studies to identify and characterize habitat use by life stage of Rocky Mountain Sculpin	2012 to 2019	In progress	A sampling protocol has been developed using historic data to inform what sufficient sampling for this species is. This protocol may be used in future to ascertain the distribution and abundance of the Rocky Mountain Sculpin (Macnaughton et al. 2019).	**Fisheries and Oceans Canada (DFO)**

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

Study	Timeline	Status	Descriptions and results	Participants[9]
Conduct movement studies	2012 to 2015	Completed	Ruppert et al. (2017) reported that adult Rocky Mountain Sculpin are sedentary, with movement of less than 10 m from their release point over a 5-month period following tagging. The largest displacement was in the downstream direction. Veillard et al. (2017) described the swimming abilities of the Rocky Mountain Sculpin. Individuals swam to an average of 49 ± 22.8 cm s^{-1} (6.8 ± 2.9 body lengths [BL] s^{-1}) over a duration of 3.2 ± 1.5 minutes before failing. Individuals also held stations to an average of 23.4 ± 14.5 cm s^{-1} (3.3 ± 2.2 BL s^{-1}) before slipping. The study also indicated that a large-scale hydrologic regime did not influence the swimming or station-holding ability of the species. The study demonstrated the prominence of caudal morphology in the swimming and station-holding performance of Rocky Mountain Sculpin. Individuals with wider caudal measurements swam to higher velocities before failing. A positive relationship was found relating to slip velocity; however, the correlation was not statistically significant.	**University of Alberta** DFO

3.3 Summary of progress towards recovery

3.3.1 Status of performance indicators

Work is underway to meet the goals and objectives of the recovery strategy. There is no evidence to indicate there has been any decline in the populations or habitat of Rocky Mountain Sculpin in the Milk River and St. Mary River basins in Alberta. This lack of evidence suggests that there is maintenance of Rocky Mountain Sculpin populations in Alberta.

Some progress has been made in research and monitoring activities. Work includes clarifying some aspects of the life history requirements of the Rocky Mountain Sculpin, such as adult movement, adult swimming ability, bursting ability, the importance of caudal morphology in swimming abilities of individuals, inter- and intra-specific competition, and morphological diversion. Research on genetics revealed that there are 4 subpopulations of Rocky Mountain Sculpin in Canada. They are comprised of the Flathead River population in British Columbia (B.C.) and the Lee Creek, St. Mary River, and North Milk/Milk River subpopulations in southern Alberta. Genetic difference is greatest between the B.C. subpopulation and those from southern Alberta, which is explained by the Continental Divide that separates the 2 groups. The Lee Creek and St. Mary River subpopulations are genetically most similar, with more individuals exhibiting genetic similarities at the confluence of these 2 systems than at their headwaters. Rocky Mountain Sculpin are now known to occupy most reaches of Lee Creek. It is uncertain if this is from additional sampling effort or an expansion of the species range. Distribution in the North Milk and Milk rivers is limited to its upper reaches. Temperature and habitat are likely limiting the expansion of the Rocky Mountain Sculpin into downstream reaches (Watkinson pers. comm. 2022).

As outlined in tables 4 and 5, routine and opportunistic monitoring of environmental parameters is ongoing. These activities are primarily being led by EPA and DFO, with some stakeholder involvement.

Management and regulatory frameworks to review development activities are well established and implemented by EPA, with input from DFO when necessary.

Education and outreach activities are completed or ongoing and have been aimed at improving awareness of the species and its habitat, reducing potential damage to populations due to introductions of predators and competitors, and improving accessibility and security of data. A few of the research actions have not been completed yet, although there is no evidence to suggest that populations are in decline. It is expected that the current range contains the necessary habitat features to support all life stages. Efforts will continue to ensure that habitat is maintained or improved. DFO, in partnership with EPA, has developed a science-based monitoring methodology (Macnaughton et al. 2019) that will assist with evaluating the success of maintaining Eastslope populations of Rocky Mountain Sculpin (objective 1).

3.3.2 Completion of action plan

The “Action Plan for the Milk River and St. Mary River Drainage Basins in Canada” was published in 2018 (DFO 2018). It addressed Rocky Mountain Sculpin (Eastslope populations) (*Cottus* sp.) and Western Silvery Minnow (*Hybognathus argyritis*) found in the Milk and St. Mary drainages in Alberta. It followed a multispecies approach to protect and maintain self-sustaining

populations of both species. The action plan builds upon the recovery strategies of the Rocky Mountain Sculpin and Western Silvery Minnow.

3.3.3 Critical habitat identification and protection

Critical habitat for the Eastslope populations of Rocky Mountain Sculpin was identified in the 2012 recovery strategy in the following locations: the St. Mary River, Lee Creek, the North Milk River, and the Milk River. This critical habitat is protected through the 2017 SARA Critical Habitat Order made under subsections 58(4) and (5), which invoked the prohibition in subsection 58(1) against the destruction of the identified critical habitat. In addition, nests created and used by Rocky Mountain Sculpin during spawning are considered a residence for the species and are protected under section 33 of the SARA. This section prohibits damage to, or destruction of, a listed threatened, endangered, or extirpated species' residence.

3.3.4 Recovery feasibility

Currently, there is no need to review the recovery feasibility for this species as there is no information that would suggest the Eastslope populations of Rocky Mountain Sculpin are no longer meeting the feasibility criteria laid out in the recovery strategy. The recovery goal and objectives to maintain and protect Rocky Mountain Sculpin are still biologically and technically feasible. The distribution of Rocky Mountain Sculpin in Canada is limited, so recovery efforts should continue to focus on protecting and maintaining the existing populations. The species appears to be expanding upstream in Lee Creek. The distribution in the Milk River system is limited to the upper reaches of the river.

4. Concluding statement

Overall, activities conducted from 2012 to 2019 have helped to provide a clearer understanding of the functions, features, and attributes of critical habitat necessary for the maintenance of the Rocky Mountain Sculpin populations in Alberta. Some aspects of adult behaviour were studied, determining that they are sedentary animals and that their movements are influenced by inter- and intra-specific competition, abiotic factors, and density dependence. Swimming ability was described and found to be associated with caudal morphology. Genetic studies revealed 4 subpopulations of Rocky Mountain Sculpin in Canada, with the greatest genetic difference between the subpopulation in B.C. (Flathead River) and the 3 subpopulations in southern Alberta (Lee Creek, St. Mary River, and North Milk/Milk River). There was also evidence of gene-sharing at the confluence of Lee Creek (a tributary) and St. Mary River. Together, the studies suggest that geographic features such as river basins play a role in the genetic structure of the species. Activities aimed at maintaining populations of Rocky Mountain Sculpin in southern Alberta include routine and opportunistic monitoring of environmental parameters, implementation of management and regulatory frameworks by EPA, education and outreach to improve awareness of the species and its habitat, and reduction of potential damage to populations by introductions of predators and competitors.

Some research identified in the recovery strategy was not completed, particularly that related to studying life history requirements of various life stages. However, there is no evidence to suggest that populations are in decline; therefore, assumptions can be made that the current range contains all the habitat features required for all life stages. Efforts will continue to ensure that habitat is maintained or improved. A science-based monitoring methodology has been

developed (Macnaughton et al. 2019) that will assist with evaluating whether Rocky Mountain Sculpin populations are maintained in the St. Mary and Milk river drainage basins. This species has a limited distribution in Canada and, as such, recovery efforts should focus on maintaining the existing populations in the North Milk and Milk Rivers, St. Mary River, and Lee Creek. Future steps include continuation and implementation of ongoing and pending recovery measures found in the recovery strategy.

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