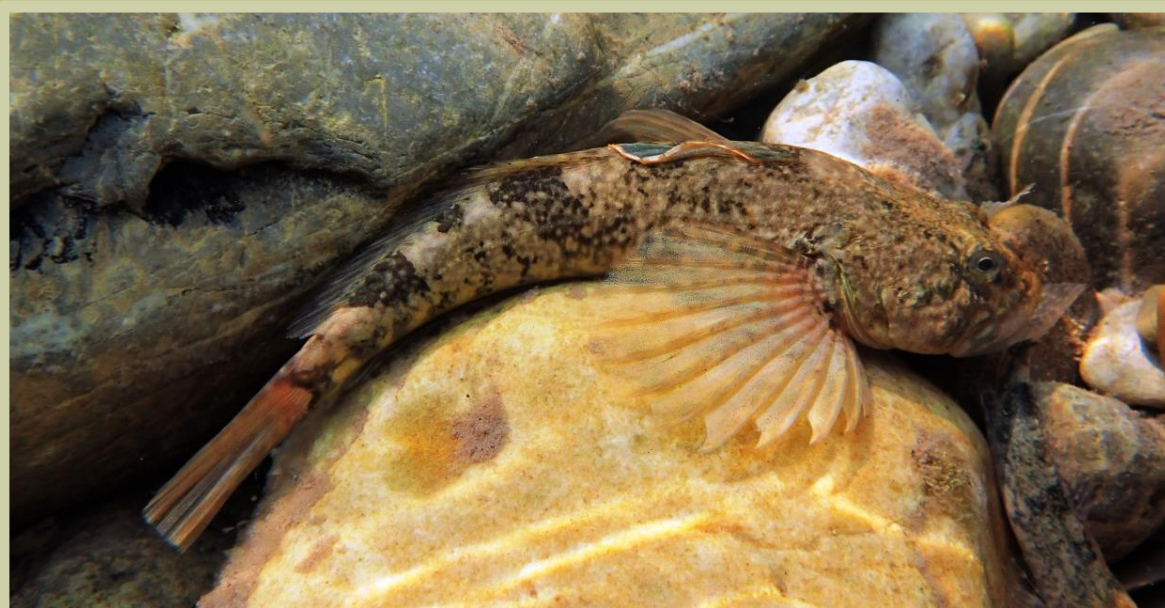


Management Plan for the Rocky Mountain Sculpin (*Cottus* sp.), Westslope populations, in Canada

Rocky Mountain Sculpin, Westslope populations



2020

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Cover illustration: Adult Rocky Mountain Sculpin, Westslope populations. Photo Credit: Tyana Rudolfsen.

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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. Under the *Species at Risk Act* (S.C. 2002, c.29) (SARA), the federal competent ministers are responsible for the preparation of management plans for species listed as special concern and are required to report on progress five years after the publication of the final document on the Species at Risk Public Registry, and every subsequent five years following.

The Minister of Fisheries and Oceans is the competent minister under SARA for the Rocky Mountain Sculpin, Westslope populations, and has prepared this management plan, as per section 65 of SARA. In preparing this management plan, the competent minister has considered, as per section 38 of SARA, the commitment of the Government of Canada to conserving biological diversity and to the principle that, if there are threats of serious or irreversible damage to the listed wildlife species, cost-effective measures to prevent the reduction or loss of the species should not be postponed for a lack of full scientific certainty. To the extent possible, this management plan has been prepared in cooperation with Indigenous organizations, environmental non-governmental organizations, industry, species' experts, and the Province of British Columbia as per section 66(1) of SARA.

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 this plan and will not be achieved by Fisheries and Oceans Canada or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this plan for the benefit of the Rocky Mountain Sculpin, Westslope populations, and Canadian society as a whole.

A SARA management plan includes measures for the conservation of the species to manage the species of special concern to prevent it from becoming threatened or endangered. The competent minister (Minister of Fisheries and Oceans) must prepare a management plan that includes measures for the conservation of the species that the minister considers appropriate. These measures for the conservation of the species are set out to achieve the management objective identified in the management plan. Implementation of this management plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

Acknowledgments

Fisheries and Oceans Canada (DFO) wishes to acknowledge the contributions of those who supported the development of the management plan for Rocky Mountain Sculpin, Westslope populations. This management plan was drafted by Patricia Woodruff, with input from Ahdia Hassan (DFO), Sean MacConnachie (DFO) and Martin Nantel (DFO).

Executive summary

The Rocky Mountain Sculpin (*Cottus* sp.), Westslope populations, was listed as special concern under the *Species at Risk Act* (SARA) in 2017. This management plan is considered one in 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](#) (2010).

The Rocky Mountain Sculpin (*Cottus* sp.) is an unnamed member of a distinctive evolutionary group of sculpins (Uranidea) that occurs in both eastern and western North America (COSEWIC 2010). The Rocky Mountain Sculpin is endemic to the east and west slopes of the Rocky Mountains and is divided into two populations: the Eastslope populations, found in Alberta, Montana and Wyoming; and the Westslope populations, found in the Flathead River and its tributaries in British Columbia, as well as in the North and Middle Forks of the Flathead and the Whitefish River in Montana (COSEWIC 2010).

Sculpins are nocturnal bottom-dwelling fish with large heads and bodies that taper to the tail. In comparison to other sculpin species, the Rocky Mountain Sculpin has a shorter head with small bumps on it (papillae) and a lack of small, hair-like projections (prickles) on its body (COSEWIC 2010; McPhail 2007). This stream-dwelling fish is often found sheltering in riffles and runs with loose rock substrates during the day throughout the summer and fall (COSEWIC 2010). Section 4 describes characteristics and needs of the species.

There have been no quantitative studies on the abundance of Rocky Mountain Sculpin, Westslope populations, in British Columbia, but it is believed that the population is stable. Their distribution appears to have expanded over the past 30 years (Rudolfson 2017), and they can still be captured at the sites where they were first collected over 50 years ago (COSEWIC 2010).

The main threats facing the species are described in section 5 and include: sedimentation from road construction and maintenance, and associated all-terrain vehicle use; and release of harmful substances from proposed resource extraction projects.

The management objective (section 6) for the Rocky Mountain Sculpin, Westslope populations, is to maintain self-sustaining populations throughout their current distribution to ensure the population's long-term viability in the wild.

A description of the broad strategies and measures for the conservation of the species that provide the best chance of achieving the management objective are included in section 7. Broad strategies include monitoring and inventory, research, management and coordination, and stewardship and outreach. Measures for the conservation of the species aim to address knowledge gaps through monitoring and research, thereby strengthening the foundation for any future management actions.

Implementation of this management plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

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1 Introduction

The Rocky Mountain Sculpin (*Cottus* sp.), Westslope populations, was listed as special concern under the *Species at Risk Act* ([SARA](#)) in 2010.

This management plan is part of a series of documents regarding Rocky Mountain Sculpin that should be taken into consideration together, including the [Committee on the Status of Endangered Wildlife in Canada \(COSEWIC\) status report](#) (COSEWIC 2010). A management plan includes measures for the conservation of the species to ensure that a species of special concern does not become threatened or endangered. It sets management objectives and identifies measures for the conservation of the species to support achieving those objectives.

2 COSEWIC species assessment information

Date of assessment: April 2010

Common name: Rocky Mountain Sculpin, Westslope populations

Scientific name: *Cottus* sp.

Status: Special concern

Reason for designation: This small freshwater fish is restricted to a small number of locations (nine) within the Flathead River basin in southeastern British Columbia. It is sedentary as an adult and is particularly susceptible to habitat degradation from road building and associated use.

Occurrence: British Columbia

Status history: Designated special concern in April 2010

3 Species status information

Globally, the Rocky Mountain Sculpin, Westslope populations, is assessed as G3G4 (G3=vulnerable, G4=apparently secure; NatureServe 2017). Provincially, the Rocky Mountain Sculpin, Westslope populations, is assessed as S3S4 (S3= special concern, vulnerable to extirpation or extinction, S4=apparently secure with some cause for concern; British Columbia Conservation Data Centre 2017). The International Union for Conservation of Nature (IUCN) has no rank for the Rocky Mountain Sculpin, Westslope populations.

The Rocky Mountain Sculpin, Westslope populations, was included with a previous COSEWIC assessment of the more broadly distributed Shorthead Sculpin (*Cottus confusus*) and was assigned a threatened status in November 1983 (Peden and Hughes 1984). The Shorthead Sculpin was reassessed in 2001 (COSEWIC 2001); however, the Rocky Mountain Sculpin, Westslope populations, was not included in this second assessment. The Rocky Mountain Sculpin, Westslope populations, was assessed and designated as special concern by

COSEWIC (COSEWIC 2010) and was listed as special concern under Schedule 1 of the SARA in 2017.

4 Species information

4.1 Species description

Sculpins are members of the family Cottidae, which includes eight species of freshwater sculpin found in British Columbia (McPhail 2007; Scott and Crossman 1973). While recent work has helped to clarify the taxonomy of northwestern sculpin species, the relationships among certain species remain unclear (COSEWIC 2010). The Rocky Mountain Sculpin (*Cottus* sp.) is an as yet unnamed member of the Uranidea, a distinctive evolutionary group of sculpins that occurs in both eastern and western North America (COSEWIC 2010).

As a group, sculpins are relatively sedentary bottom-dwelling fish, with a large head and pectoral fins and a heavy body that tapers to a narrow tail fin (caudal area) (Scott and Crossman 1973). In comparison to other sculpin species, the Rocky Mountain Sculpin has a short head covered in small bumps (papillae) and a lack of small, hair-like projections (prickles) on its body (COSEWIC 2010; McPhail 2007). Rocky Mountain Sculpin have two dorsal fins that are weakly conjoined and are generally a dark colour, with indistinct saddles under the dorsal fin and pale lower flanks (COSEWIC 2010). Breeding males are dark with a yellow-orange trim on the first dorsal fin; breeding females retain their normal colour but have noticeably swollen abdomens (McPhail 2007). Rocky Mountain Sculpin generally grow to a maximum total length of 110 mm (COSEWIC 2010).

Additional details of life history and habitat requirements can be found in section 4.3 and COSEWIC (2010).

4.2 Population and distribution

The Rocky Mountain Sculpin is endemic to the east and west slopes of the Rocky Mountains and is split into two Designatable Units by COSEWIC (COSEWIC 2010): the Eastslope populations¹, found in Alberta, Montana and Wyoming; and the Westslope populations, found in the Flathead River and its tributaries in British Columbia, as well as in the North and Middle Forks of the Flathead River and the Whitefish River in Montana (COSEWIC 2010). The Canadian range of the Rocky Mountain Sculpin, Westslope populations, is restricted to British Columbia, where it is found in the Flathead River (from Foisey Creek to the Montana border) as well as the lower reaches of seven Flathead River tributaries: Kishinena, Sage, Couldrey, Burnham, Howell, Cabin, and Commerce creeks (figure 1; Hughes and Peden 1983; Peden and Hughes 1984; COSEWIC 2010; Rudolfsen 2017). Recent surveys suggest that the range of Rocky Mountain Sculpin, Westslope populations, has expanded further upstream within the Flathead mainstem since surveys in the 1980's (Rudolfsen 2017).

It is believed that temperature and competitive interactions with the Slimy Sculpin (*Cottus cognatus*) limit the distribution of the Rocky Mountain Sculpin, Westslope populations. The

¹ The Rocky Mountain Sculpin, Eastslope populations, was listed as Threatened under Schedule 1 of SARA in 2006 and the "Recovery Strategy for the Rocky Mountain Sculpin (*Cottus* sp.), Eastslope populations, in Canada" was published in 2012 (DFO 2012).

Flathead River contains both Slimy Sculpin and Rocky Mountain Sculpin; Slimy Sculpin tend to be numerically dominant in the upstream portion of the river, which is higher in altitude and cooler, while Rocky Mountain Sculpin, Westslope populations, are dominant in the downstream reaches which are lower in altitude and warmer (COSEWIC 2010). Genetic studies indicate that hybrids of the two species exist in two areas: a 6 km section of Kishinena Creek; and a 24 km section of the Flathead River (Rudolfson 2017). The implication of hybridization on the long-term viability of the Rocky Mountain Sculpin, Westslope populations, is unknown (Rudolfson 2017).

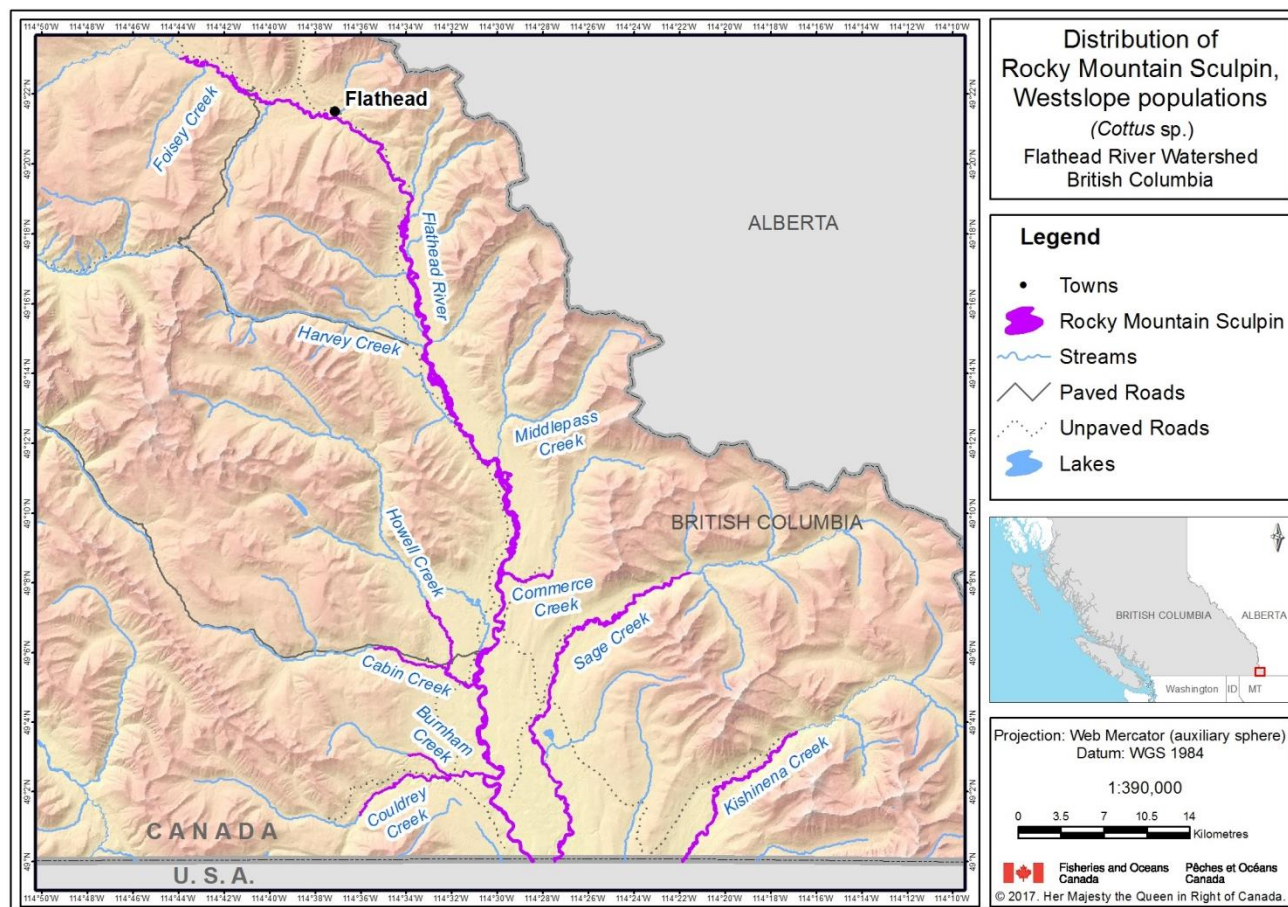


Figure 1: Distribution of Rocky Mountain Sculpin, Westslope populations

There have been no quantitative studies looking at population abundance for the Rocky Mountain Sculpin, Westslope populations, in Canada. The only quantitative assessment of Rocky Mountain Sculpin population densities was provided by studies on the Eastslope populations by McCleave (1964), which gave estimates of 200 to 237 sculpins per 47 linear metres of stream (COSEWIC 2010). There are no comparative studies on the Westslope populations. A semi-quantitative study on sampling effort was conducted by Peden and Hughes (1982); they sampled riffles in the Flathead River in British Columbia in August, and captured an average of eight Rocky Mountain Sculpin individuals for every 100 seconds of electroshocking (COSEWIC 2010).

Without a time series of population estimates, population fluctuations and trends cannot be evaluated; however, fish of the Westslope populations are still present and easy to collect at the locations where the earliest sampling took place (COSEWIC 2010).

4.3 Needs of the Rocky Mountain Sculpin, Westslope populations

Little is known about the habitat requirements of the Rocky Mountain Sculpin, Westslope populations (COSEWIC 2010). Rocky Mountain Sculpin, Westslope populations, are nocturnal, bottom dwelling fish that can be found during the day sheltering in and on rocky substrate (COSEWIC 2010). Few nocturnal observations are available, but adults have been observed foraging along the river edges in quiet waters less than 20 cm deep (McPhail 2007). Their habitat use during the winter is unknown.

In the summer and fall, Rocky Mountain Sculpin, Westslope populations, are often found during the day in riffle and run habitats with loose rock substrate and a moderate surface current (COSEWIC 2010; McPhail 2007). Young-of-the-year fish are found in quiet water areas with substrates of sand and detritus, and juvenile fish occupy habitats similar to the adults, although they are usually found closer to shore and in quieter water (McPhail 2007). Young-of-the-year feed on chironomid larvae; as the fry grow, they also feed on the larvae of aquatic insects. Adult sculpin feed on chironomid larvae as well as the larvae and nymphs of larger aquatic insects; the largest sculpins sometimes contain fish remains (McPhail 2007).

Sculpins are relatively sedentary fish (Scott and Crossman 1973). Data is lacking on the movement of Westslope populations; however, mark-recapture studies on the Eastslope Population in Montana indicate that most fish move less than 50 m over the course of several months, while no fish moved more than 200 m from the site of original capture (Bailey 1952; McCleave 1964). A more recent study within the Canadian range of the Eastslope populations found that approximately 50% of the fish captured only moved a maximum of 10 m over a five month period (Ruppert et al. 2017).

The exact time of spawning in Canada is unknown, but the Rocky Mountain Sculpin, Westslope populations, likely spawns in late June and July in holes under rocks, either excavated or enlarged by male fish (COSEWIC 2010). Males mature at about three years; about two-thirds of female fish are mature by age three, with all females mature by age four (COSEWIC 2010). The maximum reported age for Rocky Mountain Sculpin is 7 years (McPhail 2007). Fecundity varies with female size; the minimum fecundity recorded for the Westslope populations is 128 eggs and the maximum fecundity recorded is 690 eggs (Peden and Hughes 1984).

5 Threats

5.1 Threat assessment

Table 1 presents an assessment of threats to the Rocky Mountain Sculpin, Westslope populations. Background information on the threats can be found in the COSEWIC (2010) status report. For more details on the threat assessment process, refer to the [Guidance on Assessing Threats, Ecological Risk and Ecological Impacts for Species at Risk](#) (DFO 2014).

Table 1. Threat assessment table

Threat category	Threat	Level of concern ²	Extent ³	Occurrence ⁴	Frequency ⁵	Severity ⁶	Causal certainty ⁷
Water pollution	Sedimentation from road construction and maintenance, and associated all-terrain vehicle use	Medium	Wide-spread	Current/anticipated	Recurrent	Moderate	Medium
Water pollution	Release of harmful substances from resource extraction projects ⁸	Low	Localized	Unknown	Unknown	Unknown	Unknown

5.2 Description of threats

Threat category: water pollution

Specific threat: sedimentation from road construction and maintenance, and associated all-terrain vehicle use

COSEWIC (2010) identifies sedimentation as the most immediate threat to the habitat of the Rocky Mountain Sculpin, Westslope populations, especially at the confluence of the Flathead River and McLatchie Creek. Excessive sedimentation leads to an increase in the fine and very fine solid matter particles in a water body and can be caused by catastrophic events (such as volcanic eruptions) or anthropogenic activities, including forest harvesting, road building, dredging and placer mining (Birtwell 1999). In the Flathead River watershed, sedimentation occurs from roads built in association with forest harvesting and mining activities, and associated all-terrain vehicle (ATV) use. Sedimentation can affect the flow resistance in the river channel, the stability of the bed, and the amount of available aquatic habitat types, as well as water clarity and turbidity (Mebane 2001; Birtwell 1999). Direct effects of increased sedimentation on freshwater fish include mortality, reduced growth rates, or reduced resistance to disease; other effects include the abnormal development of eggs and larvae, alteration of movements and migrations, and a reduction in the abundance of prey (Bergstedt and Bergerson 1997). Sculpins have shown declines in all age classes with increasing percentage of fine sediments in streams (Mebane 2001).

² Level of concern: signifies that managing the threat is of (high, medium or low) concern for the conservation of the species, consistent with the management objective. This criterion considers the assessment of all the information in the table.

³ Extent: proportion of the species affected by the threat.

⁴ Occurrence: timing of occurrence of the threat and whether a threat is historical, current, and/or anticipated.

⁵ Frequency: temporal extent of the threat (one-time, seasonal, recurrent, continuous or unknown).

⁶ Severity: magnitude of impact caused by the threat and level to which it affects species conservation.

⁷ Causal certainty: strength of evidence linking the threat to the conservation of the species.

⁸ COSEWIC 2010 identifies the release of harmful substances from resource extraction projects as a potential threat to the Rocky Mountain Sculpin, Westslope populations; however, since the publication of the 2010 COSEWIC report, additional protections have been enacted in the Flathead watershed and the potential threat from resource extractions projects has been mitigated (see section 7.1).

Specific threat: release of harmful substance from resource extraction projects

A potential threat to the Rocky Mountain Sculpin, Westslope populations, is resource development, as the Flathead Valley has major coal deposits and substantial gold mining opportunities. Coal development has resulted in toxic levels of selenium leaching into streams in the Elk River watershed of British Columbia (Orr et al. 2006), while gold extraction methods include the use of mercury or cyanide, which can pose serious environmental threats (COSEWIC 2010; Marrugo-Negrete et al. 2008; Koenig 2000). Though resource development can result in sedimentation, excessive groundwater extraction, and release of harmful substances, the extent of these impacts on the Rocky Mountain Sculpin is currently not well known.

COSEWIC (2010) identified two development proposals that had the potential to negatively impact habitat of the Rocky Mountain Sculpin, Westslope populations. Both proposals were in the Flathead River valley, located on major tributaries: one coal mine in the Foisey Creek Valley, and one gold mine in the headwaters of Howell Creek (COSEWIC 2010); however, the Government of British Columbia passed the *Flathead Watershed Area Conservation Act* in 2011, which prohibits mining activities and oil and gas exploration, development and production on Crown land in the Flathead Watershed. This prohibition applies to the above-mentioned coal and gold mine that were identified as potential threats in the 2010 COSEWIC report. The current moratorium on mining should prevent the release of harmful substances from resource extraction projects.

6 Management objectives

The management objective establishes, to the extent possible, the number of individuals and/or populations, and their geographic distribution, that are necessary to prevent the species from becoming endangered or threatened, or to allow for the removal of the species from schedule 1 of SARA.

Management objectives are ideally stated as quantitative targets; however, insufficient information is available about the current population abundance of Rocky Mountain Sculpin, Westslope populations, to develop scientifically defensible quantitative targets. Therefore, the management objective for the Rocky Mountain Sculpin, Westslope populations, is to maintain self-sustaining populations throughout their current distribution to ensure the species' long-term viability in the wild.

7 Broad strategies and measures for the conservation of the species

This management plan includes four broad strategies and related measures for the conservation of the species to prevent the Rocky Mountain Sculpin, Westslope populations, from becoming threatened or endangered, or to allow for the removal of the species from schedule 1 of SARA.

Section 7.1 provides an overview of the actions related to conserving the species already completed or underway. Section 7.2 identifies the broad strategies for the conservation of Rocky Mountain Sculpin. The measures for the conservation of the species to be implemented are

summarized in an implementation schedule (tables 2, 3 and 4) in section 7.3, which prioritizes actions and identifies leads, partners and timelines, to the extent possible at this time.

7.1 Actions already completed or currently underway

Some conservation actions have already been initiated or are completed. They include:

1. Researchers at the University of Alberta are conducting a study on hybridization zones between Rocky Mountain Sculpin, Westslope populations, and Slimy Sculpin (T. Rudolfsen, pers. comm. 2017). This study will provide information on the limiting factors to the range of the Rocky Mountain Sculpin, Westslope populations.
2. Teck Resources Ltd. purchased approximately 7,150 ha of land in the Flathead and Elk River Valleys, including the Flathead Townsite, for conservation purposes in 2013. The Flathead Townsite land parcel (992 ha) is located on the Flathead River, within the distribution of the Rocky Mountain Sculpin. Teck Resources Ltd. has yet to complete a management plan for this land parcel; however, preliminary management goals for this site include protection or enhancement of aquatic habitat (Teck Resources Ltd. 2014).
3. The British Columbia Ministry of Environment manages two large access management areas within the Flathead River Watershed; the Upper Flathead Access Management Area and the East Flathead Access Management Area. These access management areas limit the use of motorized vehicles and contribute to the conservation of the Rocky Mountain Sculpin by preventing habitat degradation from the increasing amount of ATV traffic in the area (D. Martin, pers. comm. 2016).
4. The Government of British Columbia passed the *Flathead Watershed Area Conservation Act* in 2011, which prohibits mining activities, and oil and gas exploration, development and production on Crown land in the Flathead River basin.

7.2 Broad strategies

The following broad strategies support the management objective outlined in section 6. Broad strategies and measures for the conservation of the species are summarized and prioritized in tables 2 to 4:

1. inventory and monitoring
2. research
3. management and coordination
4. stewardship and outreach

7.3 Measures for the conservation of the species

Success in the conservation of this species is dependent on the actions of many different jurisdictions; it requires the commitment and cooperation of the constituencies that will be involved in implementing the directions and measures set out in this management plan.

This management plan provides a description of the measures that provide the best chance of achieving the management objectives for Rocky Mountain Sculpin, Westslope populations, including measures to be taken to address threats to the species and monitor their

management, to guide not only activities to be undertaken by Fisheries and Oceans Canada (DFO), but those for which other jurisdictions, organizations and individuals have a role to play. As new information becomes available, these measures and the priority of these measures may change. DFO strongly encourages all Canadians to participate in the conservation of the Rocky Mountain Sculpin, Westslope populations, through undertaking measures outlined in this management plan.

Table 2 identifies the measures to be undertaken by DFO to support the conservation of the Rocky Mountain Sculpin, Westslope populations.

Table 3 identifies the measures to be undertaken collaboratively between DFO and its partners, other agencies, organizations or individuals. Implementation of these measures will be dependent on a collaborative approach, in which DFO is a partner in conservation efforts, but cannot implement the measures alone.

As all Canadians are invited to join in supporting and implementing this management plan, table 4 identifies additional measures that represent opportunities for other jurisdictions, organizations or individuals to lead for the management of the species. If your organization is interested in participating in one of these measures, please contact the Species at Risk Pacific office at sara@pac.dfo-mpo.gc.ca.

Federal funding programs for species at risk that may provide opportunities to obtain funding to carry out some of the outlined activities include the [Habitat Stewardship Program for Species at Risk](#), the [Aboriginal Fund for Species at Risk Program](#), and the [Canadian Nature Fund for Aquatic Species at Risk](#).

Implementation of this management plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

Table 2. Measures for the conservation of the species to be undertaken by Fisheries and Oceans Canada

#	Measures for the conservation of the species	Broad strategy	Priority ⁹	Threats addressed	Timeline ¹⁰
1	Develop a sufficiently robust monitoring plan to provide a clear indication of the progress towards the management objective. Monitoring efforts may include: <ul style="list-style-type: none"> • long-term abundance monitoring at index sites throughout the species' range • establishing quantitative population estimates, including variability, at index sites • sedimentation monitoring at various index sites 	Inventory and monitoring	Medium	All	2020 to 2024

⁹ Priority” reflects the degree to which the measure contributes directly to the conservation of the species or is an essential precursor to a measure that contributes to the conservation of the species:

- high priority measures are considered likely to have an immediate and/or direct influence on the conservation of the species
- medium priority measures are important but considered to have an indirect or less immediate influence on the conservation of the species
- low priority measures are considered important contributions to the knowledge base about the species and mitigation of threats

¹⁰ The timelines are intended to indicate the timeframe in which the work should be completed, but the actions can start at any time.

Table 3. Measures for the conservation of the species to be undertaken collaboratively between Fisheries and Oceans Canada and its partners

#	Measures for the conservation of the species	Broad strategy	Priority ⁹	Threats addressed	Timeline ¹⁰	Partners
2	Implement the monitoring plan (see conservation measure #1).	Inventory and monitoring	Medium	All	2025 to 2029	Academia, provincial government
3	<p>Address information gaps. Research may include:</p> <ul style="list-style-type: none"> • study life history requirements (for example, spawning behaviour and susceptibility of early life stages to water level, flow, temperature and sedimentation changes) • assess occurrence of introgression¹¹ with Slimy Sculpin to determine potential impacts on species • study limiting factors to population growth (for example, biotic interactions, climate change) • increase understanding of causes of mortality (temperature, pollutants, predation, sedimentation, etc.) • examine the movements of young-of-the-year sculpin, to determine their dispersal capabilities; confirming the low migration distance of Rocky Mountain Sculpin, Westslope populations • develop an inventory of habitat types (for example, substrate, depth, flow, cover) across the range of the Rocky Mountain Sculpin, Westslope populations, and define key habitat needs • establish habitat requirements during winter and nocturnal hours 	Research	High	All	2025 to 2029	Academia, provincial government

¹¹ The introduction of genetic information from one species or gene pool to another.

#	Measures for the conservation of the species	Broad strategy	Priority ⁹	Threats addressed	Timeline ¹⁰	Partners
4	Determine the upstream extent of distribution in the Flathead River and tributaries where Rocky Mountain Sculpin, Westslope populations, have been documented.	Research	Medium	All	2025 to 2029	Academia, provincial government

Table 4. Measures for the conservation of the species that represent opportunities for other jurisdictions, organizations or individuals to lead

#	Measures for the conservation of the species	Broad strategy	Priority ⁹	Threats addressed	Potential jurisdiction or organization
5	Encourage landowners, industry and relevant levels of government to consider the species in development, implementation and updating of land use plans, official community plans, by-laws and management guidelines.	Management and coordination	Low	All	Stewardship groups, industry, local and provincial governments
6	Promote best management practices (for example, ATV use) through increased cooperation among landowners, stewardship groups and other interested parties.	Stewardship and outreach	Low	All	Stewardship groups, industry, local and provincial governments
7	Incorporate Rocky Mountain Sculpin, Westslope populations, information into existing stewardship programs.	Stewardship and outreach	Low	All	Stewardship groups, industry, local and provincial governments
8	Develop and distribute educational outreach materials for the general public and landowners to foster awareness of the threats to Rocky Mountain Sculpin, Westslope populations, persistence, and general biodiversity values. Outreach materials could include school programs, brochures, web-based materials, and signage to place at targeted locations.	Stewardship and outreach	Low	All	Stewardship groups, industry, local and provincial governments

8 Measuring progress

The performance indicators presented below provide a way to define and measure progress toward achieving the management objective. A successful management plan will achieve the overall aim of maintaining self-sustaining populations throughout their current distribution to ensure the species' long-term viability in the wild. Progress towards meeting this management objective will be reported on in the report on the progress of the management plan implementation.

The performance indicators presented below provide a way to define and measure progress toward achieving the management objective:

1. observe a stable or positive population abundance
2. observe a preservation or expansion of distribution, taking into account natural variation

References

- Bailey, J.E. 1952. Life history and ecology of the sculpin *Cottus bairdi punctulatus* in southwestern Montana. *Copeia* 1952: 243-255.
- Bergstedt, L.C. and E.P. Bergerson. 1997. Health and movements of fish in response to sediment sluicing in the Wind River, Wyoming. *Canadian Journal of Fisheries and Aquatic Sciences* 54: 312-319.
- Birtwell, I.K. 1999. The effects of sediment on fish and their habitat. Canadian Stock Assessment Secretariat Research Document 99/139. Ottawa. 34 pp.
- British Columbia Conservation Data Centre. 2017. [BC Species and Ecosystems Explorer](#). BC Ministry of Environment, Victoria, B.C. (Accessed January 19, 2017).
- COSEWIC. 2001. [Status report on the shorthead sculpin *Cottus confusus* in Canada](#). Committee on the Status of Endangered Wildlife in Canada. Ottawa. 64 pp.
- COSEWIC. 2010. [COSEWIC assessment and status report on the Rocky Mountain Sculpin *Cottus* sp., Westslope populations, in Canada](#). Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 30 pp.
- DFO (Fisheries and Ocean Canada). 2014. [Guidance on assessing threats, ecological risk and ecological impacts for species at risk](#). DFO Canadian Science Advisory Secretariat Science Advisory Report 2014/013. 21 pp.
- DFO (Fisheries and Oceans Canada). 2012. [Recovery strategy for the Rocky Mountain Sculpin \(*Cottus* sp.\), Eastslope populations, in Canada \[Final\]](#). Species at Risk Act Recovery Strategy Series, Fisheries and Oceans Canada, Ottawa. ix + 57 p.
- Hughes, G.W., and A.E. Peden. 1983. Life history and status of the shorthead sculpin (*Cottus confusus*: Pisces, Cottidae) in Canada and the sympatric relationship to the slimy sculpin (*Cottus cognatus*). *Canadian Journal of Zoology* 63: 306-311.
- Koenig, R. 2000. Wildlife deaths are a grim wake-up call in Eastern Europe. *Science* 287 (5459): 173-1738.
- Marrugo-Negrete, J., J.O. Verbel, E.L. Ceballos and L.N. Benitez. 2008. Total mercury and methylmercury concentrations in fish from the Mojana region of Colombia. *Environmental Geochemistry and Health* 30: 21-30.
- Martin, D. personal communication. 2016. British Columbia Ministry of Forests, Lands and Natural Resource Operations
- McCleave, J.D. 1964. Movement and population of the mottled sculpin (*Cottus bairdi girard*) in a small Montana stream. *Copeia* 1964: 506-513.
- McPhail, J.D. 2007. The freshwater fishes of British Columbia. University of Alberta Press. Edmonton, AB. 696p.

Mebane, C.A. 2001. Testing bioassessment metrics: macroinvertebrate, sculpin, and salmonid responses to stream habitat, sediment, and metals. *Environmental Monitoring and Assessment* 67(3): 292-322.

Natureserve. 2017. [NatureServe Explorer: An online encyclopedia of life](#) [web application]. Version 7.0. NatureServe, Arlington, VA. U.S.A. (Accessed: January 24, 2017)

Orr, P.L., K. R. Guiger and C.K. Russel. 2006. Food chain transfer of selenium in lentic and lotic habitats of western Canadian watershed. *Ecotoxicology and Environmental Safety* 63: 175-188.

Peden, A.E. and G.W. Hughes. 1982. Status report of the shorthead sculpin (*Cottus confusus*) in the Flathead River, British Columbia. Status Report submitted to the Committee on the Status of Endangered Wildlife in Canada.

Peden, A.E. and G.W. Hughes. 1984. Status of the shorthead sculpin, *Cottus confusus*, in the Flathead River, British Columbia. *Canadian Field Naturalist* 98: 127-133.

Rudolfson, T. personal communication. 2017. University of Alberta.

Rudolfson, T. 2017. Characterizing adaptive morphological features and resource selection of Rocky Mountain Sculpin (*Cottus* sp.) a species at risk in Canada. M.Sc. thesis, Department of Renewable Resources, University of Alberta, Edmonton, AB. 78 pp.

Ruppert, J.L.W., P.M.A. James, E.B. Taylor, T. Rudolfson, M. Veillard, C.S. Davis, D. Watkinson and M.S. Poesch. 2017. Riverscape genetic structure of a threatened and dispersal limited freshwater species, the Rocky Mountain Sculpin (*Cottus* sp.). *Conservation Genetics* DOI 10.007/s10592-017-0938-6.

Scott, W.B. and E.J. Crossman. 1973. Freshwater fishes of Canada. *Bulletin of the Fisheries Research Board of Canada* 184. 966 pp.

Shaw, R. and B.R. Taylor. 1994. Assessment of federal-provincial water quality data for the Flathead and Similkameen Rivers. Prepared for The Coordinating Committee of the Canada-British Columbia Water Quality Monitoring Agreement. xiv + 188 pp.

Teck Resources Ltd. 2014. [Annex N: Teck's Approach to Biodiversity Management](#). Elk Valley Water Quality Plan.

Tschaplinski, P.J. 2010. [State of stream channels, fish habitats, and their adjacent riparian areas: resource stewardship monitoring to evaluate the effectiveness of riparian management, 2005-2008](#). FREP Report # 27. Min. For. Mines, Lands., For. Prac. Invest. Br., Victoria, B.C., Forest and Range Evaluation Program.

Appendix A: effects on the environment and other species

In accordance with the [Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals](#) (2010), the *Species at Risk Act* (SARA) recovery planning documents incorporate strategic environmental assessment (SEA) considerations throughout the document. The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making and to evaluate whether the outcomes of a recovery planning document could affect any component of the environment or achievement of any of the [Federal Sustainable Development Strategy](#)'s (FSDS) goals and targets.

Management planning is intended to benefit species at risk and biodiversity as a whole. However, it is recognized that management plans may also inadvertently lead to environmental effects beyond the intended benefits. The planning process is based on national guidelines and directly incorporates consideration of all environmental effects, with a particular focus on possible impacts to non-target species or habitats. The results of the SEA are incorporated directly into the management plan itself, but are also summarized in this appendix.

This management plan will benefit the environment by promoting the conservation of the Rocky Mountain Sculpin, Westslope populations, thereby contributing to FSDS goal 4 (Conserving and Restoring Ecosystems, Wildlife and Habitat, and Protecting Canadians). Specifically, it will help to attain the associated target 4.1, which is to have populations of federally listed species at risk exhibit trends that are consistent with recovery strategies and management plans.

The potential for the management plan to inadvertently lead to adverse effects on other species was considered. The SEA concluded that this management plan will clearly benefit the environment and will not entail any significant adverse effects. More specifically, within the distribution of the Rocky Mountain Sculpin, Westslope populations, it is unlikely that the broad strategies recommended within this plan will negatively impact other fish or wildlife species. The broad strategies for conservation suggested in tables 2 to 4 will help to address threats to the Rocky Mountain Sculpin, Westslope populations, and its habitat, such as improving water quality by limiting sediment inputs, which will also benefit other native species including the SARA listed Westslope Cutthroat Trout (*Oncorhynchus clarkii lewis*). Furthermore, conservation efforts may benefit species downstream of the distribution of Rocky Mountain Sculpin, Westslope populations, as improvements in water quality could be conveyed to these areas.

Appendix B: record of cooperation and consultation

The Minister of Fisheries and Oceans (DFO) is the competent minister for the Rocky Mountain Sculpin, Westslope populations, in Canadian waters and prepared the management plan, as per section 65 of the *Species at Risk Act* (SARA). To the extent possible, it has been prepared in cooperation with Indigenous organizations, environmental non-governmental organizations, industry, species' experts, and the Province of British Columbia as per section 66(1) of SARA.

Processes for coordination and consultation between the federal and British Columbia governments on management and protection of species at risk are outlined in the [Canada-British Columbia Agreement on Species at Risk](#). Additional input on the management plan was sought from Indigenous organizations, stakeholders, and the public through the publication of the proposed document on the Species at Risk Public Registry for a 60-day public comment period, from August 23 to October 22, 2018. No feedback was received.