ROCKY MOUNTAIN SCULPIN (COTTUS SP.) SAMPLING IN THE ST. MARY AND MILK RIVER WATERSHEDS, ALBERTA (2022)

Robert T. Barrett, Matthew Teillet, Doug A. Watkinson, Tyana A. Rudolfsen, and Lee F. G. Gutowsky

Fisheries and Oceans Canada
Ecosystems and Oceans Science
Ontario and Prairie Region
Freshwater Institute
Winnipeg, MB
R3T 2N6

2024

Canadian Data Report of
Fisheries and Aquatic Sciences 1389

Fisheries and Oceans Canada | Pêches et Océans Canada

Canada

Canadian Data Report of Fisheries and Aquatic Sciences

Data reports provide a medium for filing and archiving data compilations where little or no analysis is included. Such compilations commonly will have been prepared in support of other journal publications or reports. The subject matter of the series reflects the broad interests and policies of Fisheries and Oceans Canada, namely, fisheries management, technology and development, ocean sciences, and aquatic environments relevant to Canada.

The correct citation appears above the abstract of each report. Each report is abstracted in the data base *Aquatic Sciences and Fisheries Abstracts*.

Data reports are produced regionally but are numbered nationally. Requests for individual reports will be filled by the issuing establishment listed on the front cover and title page.

Numbers 1-25 in this series were issued as Fisheries and Marine Service Data Records. Numbers 26-160 were issued as Department of Fisheries and Environment, Fisheries and Marine Service Data Reports. The current series name was changed with report number 161.

Rapport statistique canadien des sciences halieutiques et aquatiques

Les rapports statistiques servent de base à la compilation des données de classement et d'archives pour lesquelles il y a peu ou point d'analyse. Cette compilation aura d'ordinaire été préparée pour appuyer d'autres publications ou rapports. Les sujets des rapports statistiques reflètent la vaste gamme des intérêts et politiques de Pêches et Océans Canada, notamment la gestion des pêches, la technologie et le développement, les sciences océaniques et l'environnement aquatique, au Canada.

Le titre exact figure au haut du résumé de chaque rapport. Les rapports à l'industrie sont résumés dans la base de données *Résumés des sciences aquatiques et halieutiques*.

Les rapports statistiques sont produits à l'échelon régional, mais numérotés à l'échelon national. Les demandes de rapports seront satisfaites par l'établissement d'origine dont le nom figure sur la couverture et la page du titre.

Les numéros 1 à 25 de cette série ont été publiés à titre de Records statistiques, Service des pêches et de la mer. Les numéros 26-160 ont été publiés à titre de Rapports statistiques du Service des pêches et de la mer, ministère des Pêches et de l'Environnement. Le nom de la série a été modifié à partir du numéro 161.

Canadian Data Report of
Fisheries and Aquatics Sciences 1389

2024

ROCKY MOUNTAIN SCULPIN (*COTTUS* SP.) SAMPLING IN THE ST. MARY AND MILK RIVER WATERSHEDS, ALBERTA (2022)

By

Robert T. Barrett, Matthew Teillet, Doug A. Watkinson, Tyana A. Rudolfsen, and Lee F. G. Gutowsky

Fisheries and Oceans Canada
Ecosystems and Oceans Science
Ontario and Prairie Region
Freshwater Institute
Winnipeg, MB
R3T 2N6

Cat. No. Fs97-13/1389E-PDF ISBN 978-0-660-70851-5 ISSN 1488-5395

Correct citation for this publication:

Barrett, R.T., Teillet, M., Watkinson, D.A., Rudolfsen, T.A., and Gutowsky, L.F.G. 2024. Rocky Mountain Sculpin (*Cottus* sp.) sampling in the St. Mary and Milk River watersheds, Alberta (2022). Can. Data Rep. Fish. Aquat. Sci. 1389: v + 16 p.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Barrett, R.T., Teillet, M., Watkinson, D.A., Rudolfsen, T.A., and Gutowsky, L.F.G. 2024. Rocky Mountain Sculpin (*Cottus* sp.) sampling in the St. Mary and Milk River watersheds, Alberta (2022). Can. Data Rep. Fish. Aquat. Sci. 1389: v + 16 p.

Rocky Mountain Sculpin (*Cottus* sp.) is a species at risk whose Canadian range is limited to the Milk and St. Mary river watersheds in Alberta and the Flathead River watershed in British Columbia. Sampling was conducted in the Alberta portion of the species' distribution to assess relative abundance and distribution following a standardized sampling protocol developed by Fisheries and Oceans Canada. Although Rocky Mountain Sculpin was collected in all rivers and creeks within the known range in Alberta, specimens were not collected at the upstream and downstream extent of their known distribution in the Milk River. Here, habitat is likely a limiting factor for the species. Rocky Mountain Sculpin were detected at two access points in Tough Creek and one access point in Aetna Creek. These new distribution records are a result of new sampling effort, as no sampling previously occurred at these sites. Rocky Mountain Sculpin distribution and abundance appears to be variable and dependent on changing habitat quality and quantity. It is recommended that sampling continues to follow the standardized field protocol to better understand trends in Rocky Mountain Sculpin distribution and abundance in the St. Mary and Milk river watersheds.

RÉSUMÉ

Barrett, R.T., Teillet, M., Watkinson, D.A., Rudolfsen, T.A., and Gutowsky, L.F.G. 2024. Rocky Mountain Sculpin (*Cottus* sp.) sampling in the St. Mary and Milk River watersheds, Alberta (2022). Can. Data Rep. Fish. Aquat. Sci. 1389: v + 16 p.

Le chabot des montagnes Rocheuses (*Cottus* sp.) est une espèce en péril dont l'aire de répartition canadienne se limite aux bassins versants des rivières Milk et St. Mary en Alberta et flathead en Colombie-Britannique. L'échantillonnage a été effectué dans la partie albertaine de l'aire de répartition de l'espèce afin d'évaluer l'abondance et la répartition relatives selon un protocole d'échantillonnage normalisé élaboré par Pêches et Océans Canada. Bien que le chabot des montagnes Rocheuses ait été capturé dans toutes les rivières et tous les ruisseaux de l'aire de répartition connue en Alberta, les spécimens n'ont pas été recueillis dans l'étendue en amont et en aval de leur aire de répartition connue dans la rivière Milk. Ici, l'habitat est probablement un facteur limitatif pour l'espèce. Le chabot des montagnes Rocheuses a été détecté à deux points d'accès dans le ruisseau Tough et à un point d'accès dans le ruisseau Aetna. Ces nouvelles mentions de répartition sont le résultat d'un nouvel effort d'échantillonnage, car aucun échantillonnage n'a déjà eu lieu à ces sites. La répartition et l'abondance du chabot des montagnes Rocheuses semblent être variables et dépendent de l'évolution de la qualité et de la quantité de l'habitat. Il est recommandé que l'échantillonnage continue de suivre le protocole normalisé sur le terrain afin de mieux comprendre les tendances de la répartition et de l'abondance du chabot des montagnes Rocheuses dans les bassins versants des rivières St. Mary et Milk.

1. INTRODUCTION

Rocky Mountain Sculpin (*Cottus* sp.) is a bottom-dwelling, cryptic, small-bodied, freshwater fish with a restricted range in Canada that is limited to the Flathead River watershed in British Columbia and the St. Mary and Milk river watersheds in southern Alberta (Bailey 1952; Ruppert et al. 2017). Rocky Mountain Sculpin populations in the St. Mary and Milk river watersheds are divided into two designatable units (DU), DU2 and DU3 respectively (COSEWIC 2010). The DU2 and DU3 populations were both re-assessed with a Threatened status by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (COSEWIC 2019) and listed as Threatened by Canada's *Species at Risk Act* (DFO 2012).

To provide science information for Species at Risk Program objectives and inform future COSEWIC re-assessments, Fisheries and Oceans Canada developed a standardized sampling protocol (Macnaughton et al. 2019) to assess the relative abundance and distribution of Rocky Mountain Sculpin in DU2 and DU3. This protocol also proposes guidelines for surveying the species in the Flathead River system. Macnaughton et al. (2019) details: (1) the sampling gear, (2) sampling effort required and timing, and (3) sampling sites for Rocky Mountain Sculpin abundance and range extension monitoring. This standardized sampling is intended to improve monitoring and the assessment of population trends of the species throughout its Canadian range, allowing for a better-informed management of the species over time. In 2022, we executed the standardized monitoring protocol at existing and new sites within DU2 and DU3.

2. METHODS

2.1 STUDY SYSTEM AND SITE SELECTION

The St. Mary, North Milk, and Milk rivers' discharge is heavily modified by water diversions, reservoirs, and water removal for irrigation. In 1915, the St. Mary Canal was completed in Montana (USA) to divert water from the St. Mary River to the North Milk River to convey water into the Milk River for irrigation. In most years, the canal diverts water (up to ~17 $m^3 \cdot s^{-1}$) from April to September, increasing water volume in the North Milk River and the Milk River proper downstream of its confluence with the North Milk River. The canal may be closed prematurely if canal repairs are required or if there are floods in the Missouri or Mississippi River in the United States (Palliser Environmental Services Ltd. 2019). The construction of the St. Mary Reservoir in 1951 significantly altered the type of habitat available to fish species in the St. Mary River as Rocky Mountain Sculpin are not known to be present in the reservoir or downstream of the reservoir. Future range expansion downstream of the reservoir is unlikely, as reservoir habitat is unsuitable for Rocky Mountain Sculpin (Macnaughton et al. 2019). These factors, in combination with the droughts experienced in southern Alberta, affect the availability of sculpin habitat (Macnaughton et al. 2019).

2.2 FISH SAMPLING

Access points at which sampling occurred are identified in Macnaughton et al. (2019). These sites include areas known to historically contain Rocky Mountain Sculpin (n=24) as well as range expansion sites (n=8) in the St. Mary and Milk river watersheds (Table 1). The purpose of the range extension access points is to assess for the potential occurrence of either existing established populations at a previously unsampled site, or the expansion of the population into new, previously unsampled areas. The relative

abundance and distribution of Rocky Mountain Sculpin in DU2 and DU3 was assessed at 32 access points within the St. Mary River and Milk River watersheds (Table 1, Figures 1, 2). Sampling took place between September 20-22 and October 3-5, 2022. Fish sampling followed a standardized protocol outlined by McNaughton et al. (2019). At access points with moderate to high flow (n=27) were sampled at transects, four per access point, spaced 20 m apart. Along each transect, five 1.0 m by 1.0 m stainless steel quadrats were placed at a random depth within depth strata (0.01–0.20 m, 0.21–0.40 m, 0.41–0.60 m, 0.61–0.80 m, and 0.81–1.00 m) (Figure 3). All five quadrats at the first transect were sampled before the sampling crew moved 20 m upstream to the next transect, with 20 quadrats sampled per access point. At each quadrat, one crew member operated a LR-24 backpack electrofisher, while the other crew member positioned two, 60 cm wide by 20 cm high dipnets downstream. Each quadrat was electrofished for a duration of 20 s, while the operator disturbed the quadrat substrate with their feet to dislodge sculpin. St. Mary River Access 1, 2, and 7, Aetna Creek Access 2, and Tough Creek Access 2 (Table 6) were not sampled following this method due to low water levels, resulting in the creation of separated pools and/or low to no flow. At these access points, approximately 600 s of electrofishing was conducted by moving upstream in a zig-zag pattern across the river, netting fish as observed. Fish were held in a 20 L bucket of fresh water.

The LR-24 backpack electrofisher was set according to Macnaughton et al. (2019) (30 Hz, 15% pulse width DC, 200 V). Once electrofishing was completed, fishes were identified, enumerated, and released immediately with the exception of those retained as vouchers (Table A1). Voucher specimens were randomly selected and preserved in ethanol or formalin for identification confirmation, morphometrics, genetics, and aging.

2.3 HABITAT SAMPLING

Habitat characteristics including wetted and rooted width (m), water temperature (°C), conductivity ($\mu S \cdot cm^{-1}$), and turbidity (NTU) were measured once at each access point (Macnaughton et al. 2019). At each quadrat, depth (m) and water velocity ($m \cdot s^{-1}$) was measured, and percent substrate composition based on the Wentworth Scale (Wentworth 1922) was estimated visually.

Table 1. Summary of access points sampled in Alberta, Canada in 2022 within the known range of Rocky Mountain Sculpin or range extensions.

Waterbody	Date Sampled	Access Point Description	Access Type	Latitude	Longitude
Aetna Creek	20-Sep-22	Access 1, Range Rd 245a	Range Extension	49.168980	-113.196140
Aetna Creek	20-Sep-22	Access 2, Range Rd 250	Range Extension	49.139710	-113.207230
Lee Creek	20-Sep-22	Access 1, HWY 501	Known Range	49.201958	-113.294470
Lee Creek	20-Sep-22	Access 2, HWY 5	Known Range	49.223590	-113.266720
Lee Creek	20-Sep-22	Access 3, HWY 2	Known Range	49.195529	-113.302290
Lee Creek	21-Sep-22	Access 4, HWY 501 at Beazer	Known Range	49.112640	-113.487154
Lee Creek	21-Sep-22	Access 5, Township Rd 11a	Known Range	49.017691	-113.540029
Lee Creek	21-Sep-22	Access 6, HWY 501	Known Range	49.168953	-113.342241
Milk River	22-Sep-22	Access 1, Township Rd 12	Known Range	49.029770	-112.532240
Milk River	22-Sep-22	Access 2, HWY 501	Known Range	49.089740	-112.398140
Milk River	3-Oct-22	Access 3, Twin River Heritage Rangeland	Known Range	49.145656	-112.327414
Milk River	4-Oct-22	Access 4, HWY 4	Known Range	49.145309	-112.080524
Milk River	4-Oct-22	Access 5, Township Rd 24a	Known Range	49.157046	-112.193483
Milk River	5-Oct-22	Access 6, HWY 500	Known Range	49.088278	-111.536882
Milk River	5-Oct-22	Access 7, Township Rd 21a	Known Range	49.102805	-111.701709
Milk River	4-Oct-22	Access 8, Range Rd 154	Known Range	49.105546	-111.965086
North Milk River	4-Oct-22	Access 1, HWY 62	Known Range	49.093693	-112.777703
North Milk River	4-Oct-22	Access 2, HWY 501	Known Range	49.026249	-112.969250
North Milk River	4-Oct-22	Access 3, Range Rd 225a	Known Range	49.067611	-112.922668
North Milk River	4-Oct-22	Access 4, Range Rd 212a	Known Range	49.114109	-112.722977
North Milk River	4-Oct-22	Access 5, Range Rd 222b	Known Range	49.092996	-112.869999
Rolph Creek	20-Sep-22	Access 1, Range Rd 224	Range Extension	49.151319	-113.163353
St. Mary River	20-Sep-22	Access 1, HWY 5	Known Range	49.223640	-113.265870
St. Mary River	20-Sep-22	Access 2, Woolford Park	Known Range	49.176530	-113.189392
St. Mary River	20-Sep-22	Access 3, HWY 501	Known Range	49.090930	-113.221963
St. Mary River	21-Sep-22	Access 4, Township Rd 12	Known Range	49.041989	-113.253217
St. Mary River	21-Sep-22	Access 5, Private Ranch	Known Range	49.002346	-113.320791
St. Mary River	21-Sep-22	Access 6, Township Rd 50a	Range Extension	49.465320	-112.995760
St. Mary River	21-Sep-22	Access 7, Range Rd 240a	Range Extension	49.361120	-113.123430
St. Mary River	21-Sep-22	Access 8, Township Rd 50a	Range Extension	49.365850	-113.102940
Tough Creek	22-Sep-22	Access 1, Range Rd 272a	Range Extension	49.064524	-113.553408
Tough Creek	3-Oct-22	Access 2, Range Rd 272a	Range Extension	49.054990	-113.564341

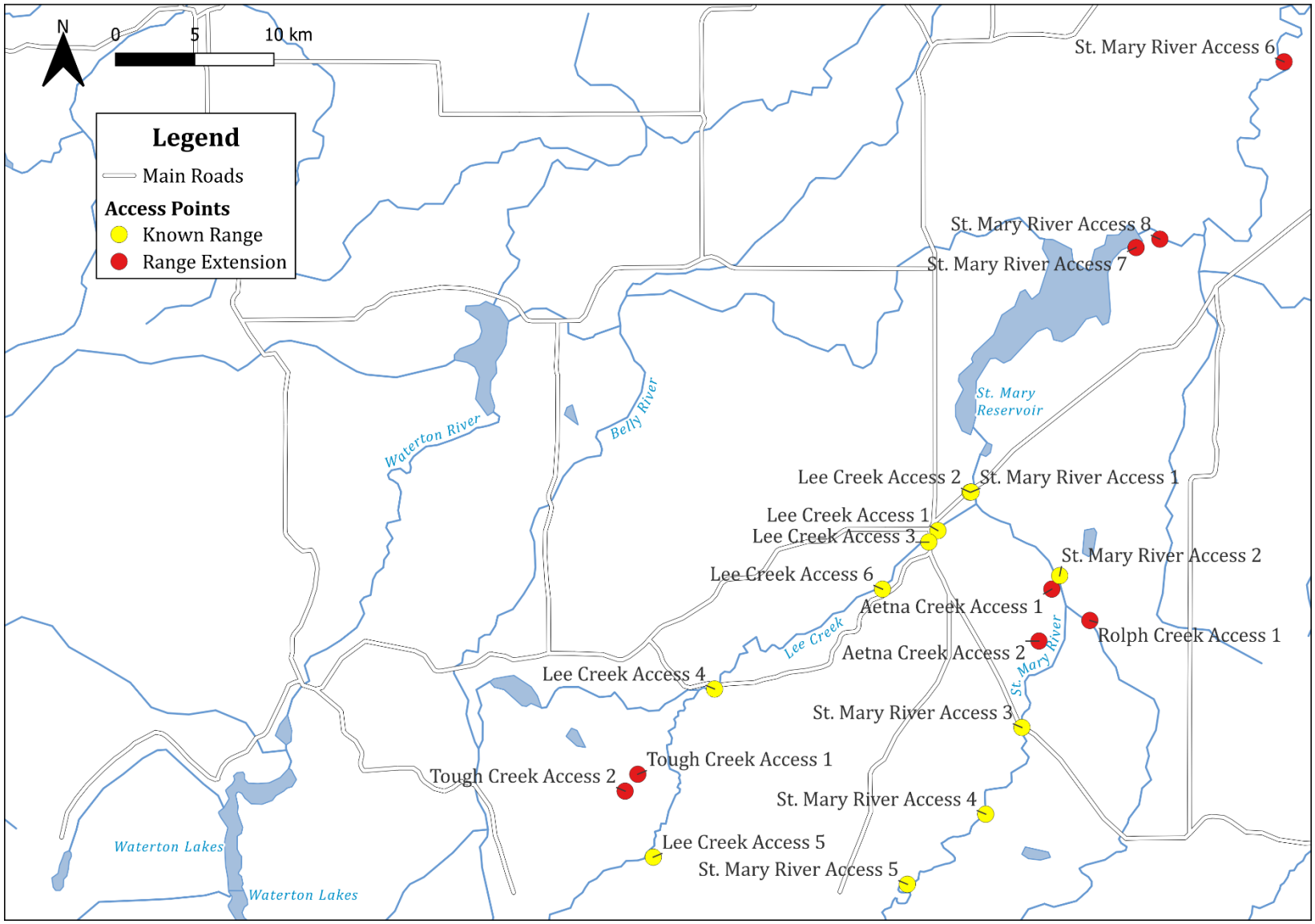

Figure 1. Map of St. Mary River and Lee Creek (DU2) access points for Rocky Mountain Sculpin sampling in Alberta, 2022.

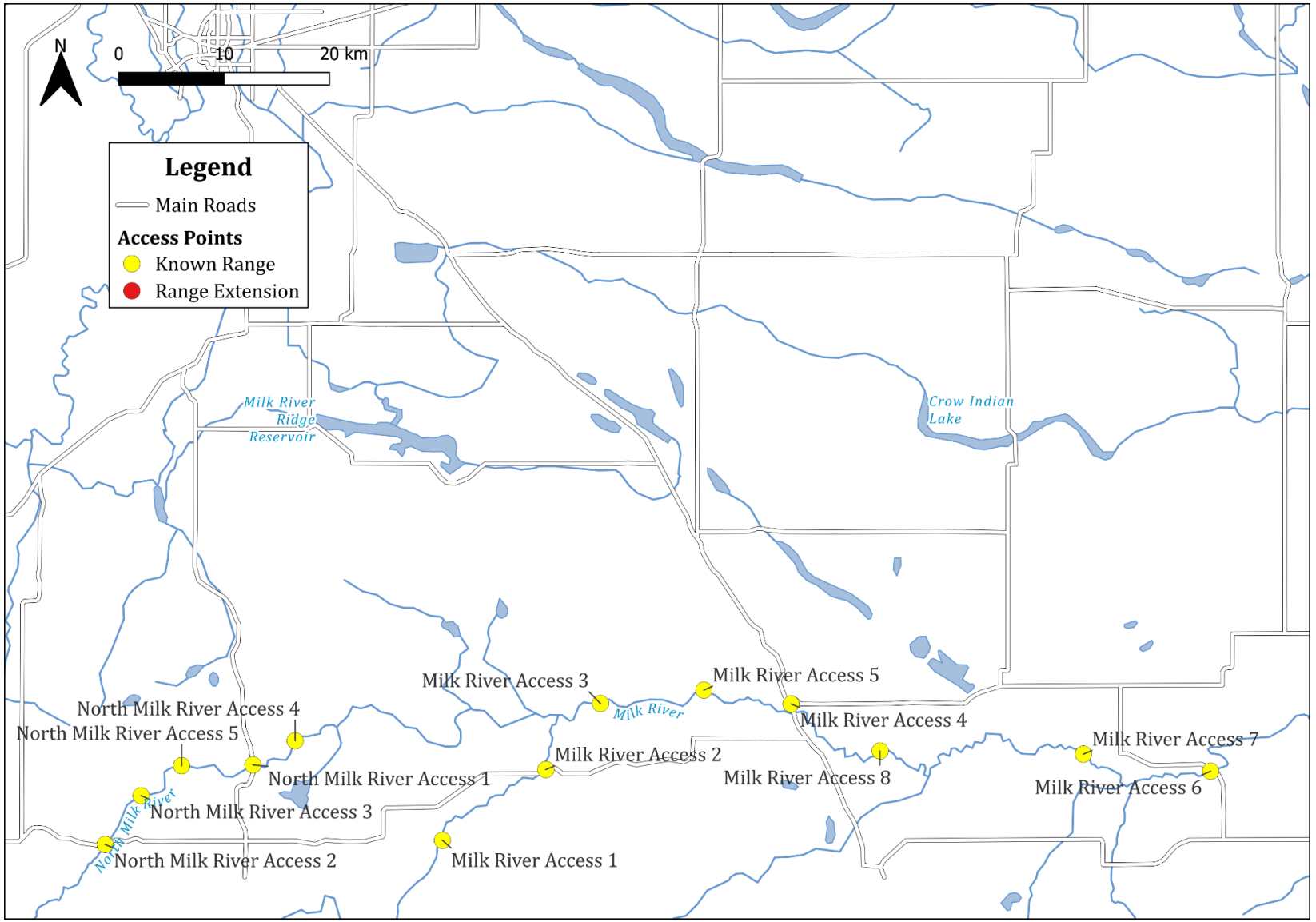

Figure 2. Map of Milk River and North Milk River (DU3) access points for Rocky Mountain Sculpin sampling in Alberta, 2022.

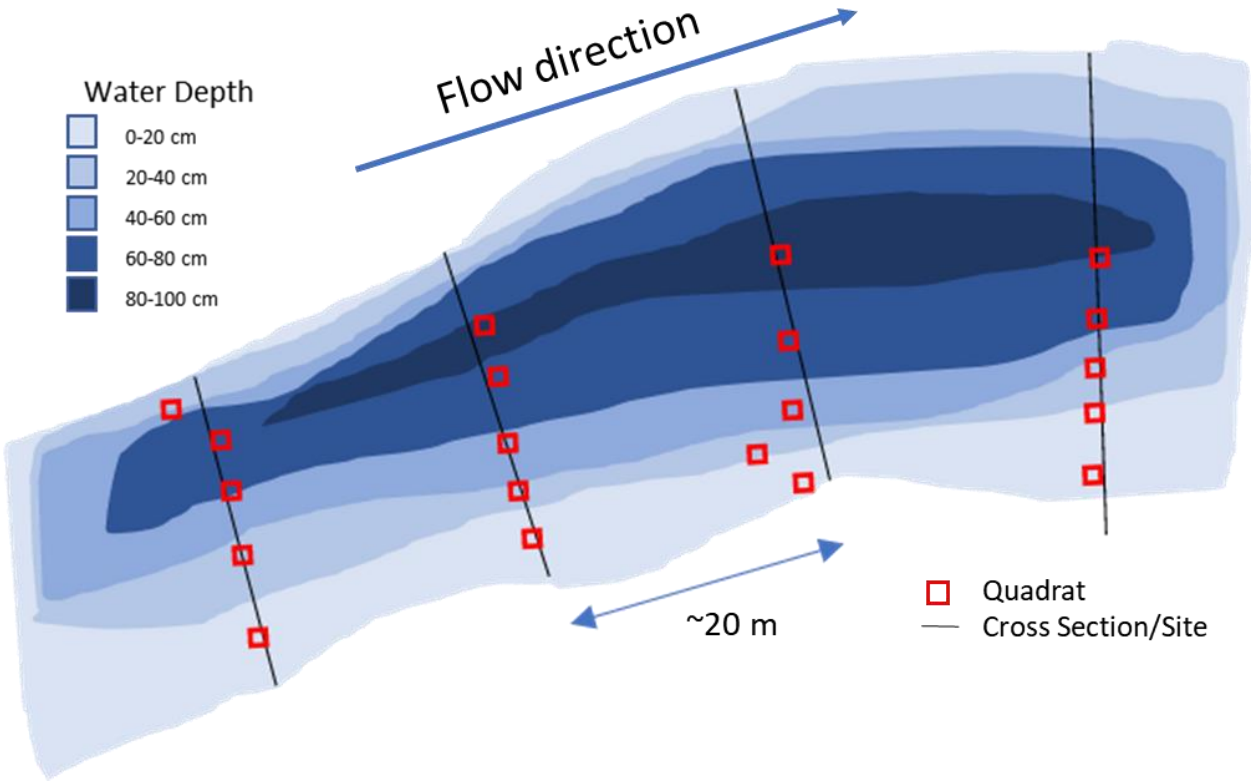

Figure 3. Schematic of a sample location displaying transects (black lines) and quadrats (red squares) distributed along a river or tributary. (Modified from figure in Macnaughton et al. 2019).

3. RESULTS

3.1 HABITAT SAMPLING

Rooted width at access points ranged from 2.0–72.0 m and wetted width ranged from 2–66 m (Table 2). The St. Mary River had the widest rooted and wetted widths (Table 2). Mean depth ranged from 0.12–0.57 m and the mean water velocity ranged from 0–0.57 $m \cdot s^{-1}$ (Table 2). Water temperature ranged from 6.8–17.3 °C, conductivity ranged from 132–643 $\mu S \cdot cm^{-1}$, and turbidity ranged from 0–24 NTU (Table 2). The dominant substrate within quadrats ranged in size from clay to bedrock, with large gravel and cobble dominating most sites (Table 3). Habitat details by waterbody are found in Table A3 and Table A4.

3.2 FISH SAMPLING

A total of 1,160 fishes encompassing 14 species were captured across the 32 sampled locations. The most abundant species collected was Longnose Dace (*Rhinichthys cataractae*) (n=579). Rocky Mountain Sculpin (n=365) was the second most abundant species and captured at 88% (21/24) of access points within the known range. Among the range expansion access points, 38% (3/8) contained at least one Rocky Mountain Sculpin (Table 4).

The mean catch-per-unit-effort (CPUE) at quadrat-sampled access points within the known range of Rocky Mountain Sculpin was 0.09 $fish \cdot m^{-2}$ (range 0.05 to 0.25 $fish \cdot m^{-2}$) in the Milk River (n=11), 0.38 $fish \cdot m^{-2}$ (range 0.35–0.85 $fish \cdot m^{-2}$) in the St. Mary River (n=53), 0.89 $fish \cdot m^{-2}$ (0.05–2.5 $fish \cdot m^{-2}$) in Lee Creek (n=107), and 1.26 $fish \cdot m^{-2}$ (0.9–2.6 $fish \cdot m^{-2}$) in the North Milk River (n=126) (Table 5, Table A3). The range extension access point in Tough Creek sampled with quadrats had a CPUE of 0.5 $fish \cdot m^{-2}$ (n=10) and the Aetna Creek range extension access point sampled with quadrats had a CPUE of 0.15 $fish \cdot m^{-2}$ (n=3) (Table 5). The mean CPUE of Rocky Mountain Sculpin caught at access points sampled with quadrats (n=310) was 0.57 $fish \cdot m^{-2}$ (Table 5). Rocky Mountain Sculpin CPUE for access points sampled with ~600 s of electroshocking was 0.19 $fish \cdot min^{-1}$ in the Milk River (n=2), and 5.3 $fish \cdot min^{-1}$ in Tough Creek (n=53) (Table 6, Table A4). The mean CPUE of Rocky Mountain Sculpin caught at access points sampled with ~600 s of electroshocking (n=55) was 1.098 $fish \cdot min^{-1}$ (Table 6).

Of the 365 Rocky Mountain Sculpin that were caught, eight escaped before length measurements were recorded. The total length of the 357 Rocky Mountain Sculpin was 23–108 mm, with a mean of 56 mm (Figure 4).

A total of 396 fish encompassing 10 species were vouchered (Table A1) and are currently stored at the Freshwater Institute in Winnipeg, Manitoba.

Table 2. Summary of mean habitat and water quality variables at each sample location in Alberta, 2022. Equipment malfunction or unavailability of equipment is denoted by `-`.

Access Point	Rooted Width (m)	Wetted Width (m)	Mean Depth (m)	Mean Water Velocity ($m \cdot s^{-1}$)	Water Temperature (°C)	Conductivity ($\mu S \cdot cm^{-1}$)	Turbidity (NTU)
Aetna Creek Access 1	2	2	0.24	0.02	11.7	249	8.3
Aetna Creek Access 2	-	-	-	0.00	12.4	349	7.6
Lee Creek Access 1	12	8	0.47	0.14	9.3	260	3.7
Lee Creek Access 2	18	5	0.21	0.43	10.5	238	12.1
Lee Creek Access 3	11	11	0.27	0.31	12.0	374	3.7
Lee Creek Access 4	6	18	0.32	0.17	7.2	274	0.8
Lee Creek Access 5	20	16	0.36	0.09	9.8	299	0.8
Lee Creek Access 6	8	9	0.19	0.35	6.8	287	3.5
Milk River Access 1	27	10	-	0.00	9.2	643	12.7
Milk River Access 2	-	-	-	0.00	9.1	398	8.0
Milk River Access 3	52	31	0.37	0.17	17.3	238	2.4
Milk River Access 4	26	24	0.24	0.27	15.1	289	4.0
Milk River Access 5	32	20	0.49	0.13	16.7	247	-
Milk River Access 6	29	16	0.57	0.40	12.0	294	7.8
Milk River Access 7	26	20	0.32	0.36	12.4	281	-
Milk River Access 8	31	26	0.44	0.19	17.0	254	2.6
North Milk River Access 1	22	20	0.27	0.23	11.3	183	3.8
North Milk River Access 2	18	12	0.29	0.22	10.8	203	-
North Milk River Access 3	18	14	0.29	0.15	13.0	201	-
North Milk River Access 4	23	9	0.26	0.40	12.1	194	2.1
North Milk River Access 5	39	20	0.37	0.10	14.0	192	-
Rolph Creek Access 1	6	6	0.35	0.08	12.2	545	-
St. Mary River Access 1	39	27	0.41	0.48	10.3	132	24.0
St. Mary River Access 2	40	29	0.34	0.57	10.3	192	-
St. Mary River Access 3	44	39	0.30	0.31	13.5	179	-
St. Mary River Access 4	38	26	0.30	0.47	8.4	179	-
St. Mary River Access 5	72	66	0.37	0.37	10.3	177	0.0
St. Mary River Access 6	14	14	0.23	0.20	12.3	155	14.1
St. Mary River Access 7	-	-	-	0.00	16.0	152	3.6
St. Mary River Access 8	62	62	0.45	0.27	15.2	151	4.8
Tough Creek Access 1	6	3	0.28	0.03	8.9	281	1.0
Tough Creek Access 2	10	7	0.12	0.14	13.4	324	-

Table 3. Summary of mean percent substrate composition at each sample location in Alberta, 2022. Substrate assessment not conducted is denoted by `-`.

Access Point	Clay (%)	Silt (%)	Sand (%)	Small Gravel (%)	Large Gravel (%)	Cobble (%)	Boulder (%)	Bedrock (%)	Vegetation (%)
Aetna Creek Access 1	0	60	2	2	5	24	7	0	7
Aetna Creek Access 2	-	-	-	-	-	-	-	-	-
Lee Creek Access 1	0	19	22	33	20	5	1	0	0
Lee Creek Access 2	0	0	9	30	26	19	0	16	7
Lee Creek Access 3	0	3	10	31	31	20	5	0	0
Lee Creek Access 4	0	2	4	19	36	24	5	10	0
Lee Creek Access 5	0	18	4	5	23	18	4	4	24
Lee Creek Access 6	0	3	6	24	37	23	7	0	2
Milk River Access 1	-	-	-	0	0	-	-	-	-
Milk River Access 2	0	40	5	5	10	20	20	0	10
Milk River Access 3	5	4	19	17	14	24	17	0	14
Milk River Access 4	0	8	25	37	10	11	9	0	0
Milk River Access 5	0	8	17	4	8	22	25	16	0
Milk River Access 6	0	0	90	9	1	0	0	0	1
Milk River Access 7	0	0	20	30	36	13	1	0	0
Milk River Access 8	0	2	58	8	9	15	8	0	0
North Milk River Access 1	0	5	4	10	44	28	9	0	0
North Milk River Access 2	0	0	0	18	50	28	4	0	4
North Milk River Access 3	0	3	11	57	25	4	0	0	0
North Milk River Access 4	0	2	0	5	22	59	12	0	0
North Milk River Access 5	0	16	0	21	30	25	8	0	0
Rolph Creek Access 1	0	24	27	34	10	5	0	0	77
St. Mary River Access 1	0	5	5	21	42	27	0	0	36
St. Mary River Access 2	0	0	0	18	29	49	4	0	0
St. Mary River Access 3	0	0	1	7	31	49	12	0	0
St. Mary River Access 4	0	0	1	5	25	51	18	0	0
St. Mary River Access 5	0	0	0	7	18	31	44	0	0
St. Mary River Access 6	0	0	7	18	19	54	2	0	5
St. Mary River Access 7	0	0	60	15	15	10	0	0	0
St. Mary River Access 8	0	0	3	13	23	37	19	5	10
Tough Creek Access 1	0	32	23	6	21	13	5	0	15
Tough Creek Access 2	-	-	-	-	-	-	-	-	-

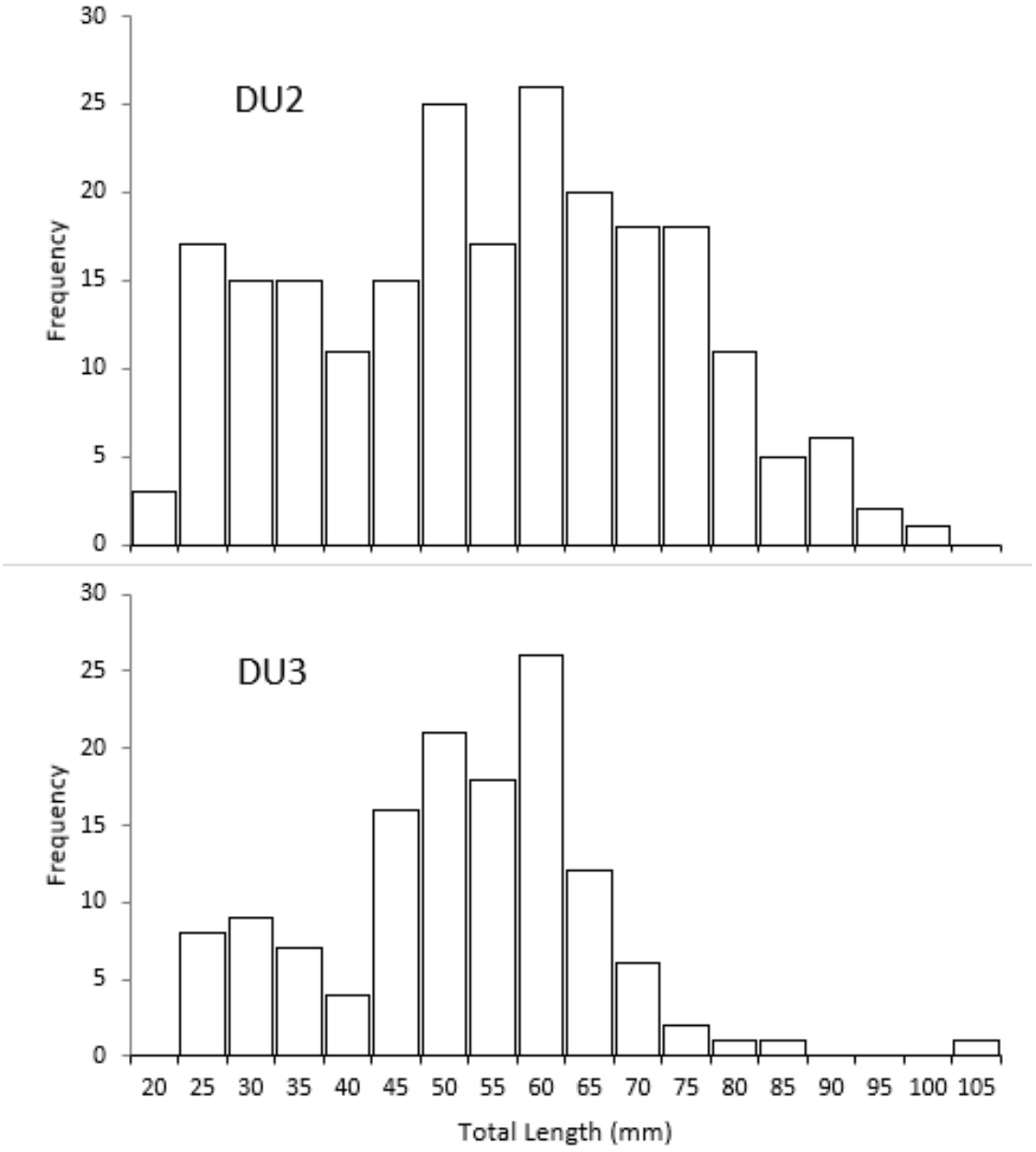

Figure 4. Frequency distribution of Rocky Mountain Sculpin total length (mm) across all access points sampled in the St. Mary River watershed (DU2) and the Milk River watershed (DU3) in Alberta, 2022.

Table 4. Total catch at all locations sampled in Alberta in 2022. Species codes are listed in Table A2.

Access Point	Access Type	BKSB	CTTR	FHMW	LKCH	LNDC	LNSK	PLSK	RBTR	RMSC	SCAT	SPSC	STSH	TRPR	WHSK	Total
Aetna Ck. 1	Range Extension	0	0	0	9	34	3	0	0	3	0	0	0	0	29	78
Aetna Ck. 2	Range Extension	0	0	2	3	62	0	1	0	0	0	0	0	0	28	96
Lee Ck. 1	Known Range	0	0	0	2	5	0	0	0	1	0	0	1	0	1	10
Lee Ck. 2	Known Range	0	0	0	0	82	3	4	0	3	0	0	0	1	3	96
Lee Ck. 3	Known Range	0	0	0	1	37	0	2	0	7	0	0	0	0	2	49
Lee Ck. 4	Known Range	0	0	0	1	17	3	0	1	17	0	0	0	0	0	39
Lee Ck. 5	Known Range	0	0	0	0	0	0	0	0	29	0	0	0	0	0	29
Lee Ck. 6	Known Range	0	0	0	0	58	0	2	0	50	0	0	0	0	1	111
Milk R. 1	Known Range	0	0	0	5	73	2	5	0	2	1	0	0	6	9	103
Milk R. 2	Known Range	0	0	0	3	40	0	3	0	0	0	0	0	7	3	56
Milk R. 3	Known Range	0	0	0	0	2	0	0	0	4	0	0	0	0	0	6
Milk R. 4	Known Range	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2
Milk R. 5	Known Range	0	0	0	1	0	0	1	0	5	3	0	0	0	0	10
Milk R. 6	Known Range	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Milk R. 7	Known Range	0	0	0	0	7	1	0	0	0	2	0	0	1	1	12
Milk R. 8	Known Range	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N. Milk R. 1	Known Range	0	0	0	0	9	0	0	0	18	0	0	0	0	1	28
N. Milk R. 2	Known Range	0	0	0	0	30	0	1	0	52	0	0	0	0	0	83
N. Milk R. 3	Known Range	0	0	0	0	4	0	0	0	20	0	0	0	0	0	24
N. Milk R. 4	Known Range	0	0	0	0	16	0	2	0	18	0	0	0	0	0	36
N. Milk R. 5	Known Range	0	0	0	0	8	0	0	0	18	0	0	0	1	0	27
Rolph Ck. 1	Range Extension	13	0	2	1	8	2	0	0	0	0	0	4	0	2	32
St. Mary R. 1	Known Range	0	0	0	0	28	2	0	0	14	0	0	0	1	1	46
St. Mary R. 2	Known Range	0	0	0	0	9	0	0	0	7	0	0	0	0	0	16
St. Mary R. 3	Known Range	0	0	0	0	2	2	0	0	8	0	0	0	0	0	12
St. Mary R. 4	Known Range	0	0	0	0	3	0	0	0	17	0	0	0	0	0	20
St. Mary R. 5	Known Range	0	0	0	0	0	0	0	0	7	0	0	0	0	0	7
St. Mary R. 6	Range Extension	0	0	0	0	35	0	0	1	0	0	0	0	0	1	37
St. Mary R. 7	Range Extension	0	0	0	1	2	0	0	0	0	0	0	7	0	0	10
St. Mary R. 8	Range Extension	0	0	0	0	0	0	0	1	0	0	1	0	0	1	3
Tough Ck. 1	Range Extension	0	0	0	3	8	0	3	2	10	0	0	0	0	0	26
Tough Ck. 2	Range Extension	0	2	0	0	0	0	0	0	53	0	0	0	0	0	55
	Total	**13**	**2**	**4**	**30**	**579**	**18**	**24**	**5**	**365**	**6**	**1**	**12**	**18**	**83**	**1160**

Table 5. Catch-per-unit-effort (fish·m^{-2}) at quadrat sampled access points. Species codes are listed in Table A2.

Access Point	Access Type	Effort (m²)	BKSB	CTTR	FHMW	LKCH	LNDC	LNSK	PLSK	RBTR	RMSC	SCAT	SPSC	STSH	TRPR	WHSK
Aetna Ck. 1	Range Extension	20	0	0	0	0.45	1.7	0.15	0	0	0.15	0	0	0	0	1.45
Lee Ck. 1	Known Range	20	0	0	0	0.1	0.25	0	0	0	0.05	0	0	0.05	0	0.05
Lee Ck. 2	Known Range	20	0	0	0	0	4.1	0.15	0.2	0	0.15	0	0	0	0.05	0.15
Lee Ck. 3	Known Range	20	0	0	0	0.05	1.85	0	0.1	0	0.35	0	0	0	0	0.1
Lee Ck. 4	Known Range	20	0	0	0	0.05	0.85	0.15	0	0.05	0.85	0	0	0	0	0
Lee Ck. 5	Known Range	20	0	0	0	0	0	0	0	0	1.45	0	0	0	0	0
Lee Ck. 6	Known Range	20	0	0	0	0	2.9	0	0.1	0	2.5	0	0	0	0	0.05
Milk R. 3	Known Range	20	0	0	0	0	0.1	0	0	0	0.2	0	0	0	0	0
Milk R. 4	Known Range	20	0	0	0	0	0	0	0	0	0.05	0	0	0	0.05	0
Milk R. 5	Known Range	20	0	0	0	0.05	0	0	0.05	0	0.25	0.15	0	0	0	0
Milk R. 6	Known Range	20	0	0	0	0	0	0	0	0	0.05	0	0	0	0	0
Milk R. 7	Known Range	20	0	0	0	0	0.35	0.05	0	0	0	0.1	0	0	0.05	0.05
Milk R. 8	Known Range	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N. Milk R. 1	Known Range	20	0	0	0	0	0.45	0	0	0	0.9	0	0	0	0	0.05
N. Milk R. 2	Known Range	20	0	0	0	0	1.5	0	0.05	0	2.6	0	0	0	0	0
N. Milk R. 3	Known Range	20	0	0	0	0	0.2	0	0	0	1	0	0	0	0	0
N. Milk R. 4	Known Range	20	0	0	0	0	0.8	0	0.1	0	0.9	0	0	0	0	0
N. Milk R. 5	Known Range	20	0	0	0	0	0.4	0	0	0	0.9	0	0	0	0.05	0
Rolph Ck. 1	Range Extension	20	0.65	0	0.1	0.05	0.4	0.1	0	0	0	0	0	0.2	0	0.1
St. Mary R. 1	Known Range	20	0	0	0	0	1.4	0.1	0	0	0.7	0	0	0	0.05	0.05
St. Mary R. 2	Known Range	20	0	0	0	0	0.45	0	0	0	0.35	0	0	0	0	0
St. Mary R. 3	Known Range	20	0	0	0	0	0.1	0.1	0	0	0.4	0	0	0	0	0
St. Mary R. 4	Known Range	20	0	0	0	0	0.15	0	0	0	0.85	0	0	0	0	0
St. Mary R. 5	Known Range	20	0	0	0	0	0	0	0	0	0.35	0	0	0	0	0
St. Mary R. 6	Range Extension	20	0	0	0	0	1.75	0	0	0.05	0	0	0	0	0	0.05
St. Mary R. 8	Range Extension	20	0	0	0	0	0	0	0	0.05	0	0	0.05	0	0	0.05
Tough Ck. 1	Range Extension	20	0	0	0	0.15	0.4	0	0.15	0.1	0.5	0	0	0	0	0
	Mean	**20**	**0.024**	**0.000**	**0.004**	**0.033**	**0.744**	**0.030**	**0.028**	**0.009**	**0.574**	**0.009**	**0.002**	**0.009**	**0.009**	**0.080**

Table 6. Catch-per-unit-effort (fish·min^{-1}) at access points sampled with ~600 s of backpack electroshocking. Species codes are listed in Table A2.

Access Point	Access Type	Effort (s)	BKSB	CTTR	FHMW	LKCH	LNDC	LNSK	PLSK	RBTR	RMSC	SCAT	SPSC	STSH	TRPR	WHSK
Aetna Ck. 2	Range Extension	666	0	0	0.18	0.27	5.59	0	0.09	0	0	0	0	0	0	2.52
Milk R. 1	Known Range	625	0	0	0	0.48	7.01	0.19	0.48	0	0.19	0.10	0	0	0.58	0.86
Milk R. 2	Known Range	603	0	0	0	0.30	3.98	0	0.30	0	0	0	0	0	0.70	0.30
St. Mary R. 7	Range Extension	617	0	0	0	0.10	0.19	0	0	0	0	0	0	0.68	0	0
Tough Ck. 2	Range Extension	600	0	0.20	0	0	0	0	0	0	5.30	0	0	0	0	0
	Mean	**622**	**0.000**	**0.040**	**0.036**	**0.229**	**3.354**	**0.038**	**0.174**	**0.000**	**1.098**	**0.019**	**0.000**	**0.136**	**0.255**	**0.737**

4. DISCUSSION

Rocky Mountain Sculpin were collected in all rivers and creeks within their known range in Alberta; however, they were not collected at all access points. Although imperfect detection is a possible explanation for the inconsistency in capture across access points within the known range of Rocky Mountain Sculpin, the standardized protocol should be effective at detecting low abundances. An alternative explanation is that some habitats within the sampling area were unsuitable. Rocky Mountain Sculpin abundance in the Milk River watershed is highest in the North Milk River and the Milk River downstream of the confluence of the Milk and North Milk rivers. Milk River access 2, 7, and 8 are within the known range, but Milk River access 2 is upstream of the confluence where abundance is historically low. The habitat here often undergoes periods of no flow during August and September (station 11AA025, ECCC, 2023). During sampling in 2022, the river was characterised as standing pools only. Milk River access 7 and 8 are downstream of the confluence, but towards the downstream extent of Rocky Mountain Sculpin's distribution in a reach of the Milk River where previous sampling effort indicated low abundance (COSEWIC 2019). Habitat is likely limiting with respect to substrate, as sand dominates this reach and provides minimal interstitial spaces for sculpin to find cover. Water temperatures may exceed a thermal tolerance for the species; however, data are not available to confirm.

Rocky Mountain Sculpin was detected at two access points in Tough Creek and one access point in Aetna Creek where it had previously not been captured (COSEWIC 2019). Since the last COSEWIC species status assessment, Rocky Mountain Sculpin have also been collected (n=13) from Tough Creek by Alberta Fisheries Management on August 22, 2018. In 2022, Aetna Creek had low water velocities and silt-dominated substrate, which is considered poor-quality habitat for Rocky Mountain Sculpin. However, a small section of the sampled reach in Aetna Creek where Rocky Mountain Sculpin was collected had a higher gradient and coarser substrate. The sample reach in Aetna Creek would backwater during high discharge events in the St. Mary River, allowing sculpin to easily access the habitat. The distribution and abundance in Aetna Creek is likely limited by habitat, and may be restricted to the reach near its confluence with the St. Mary River. The relatively high abundance of Rocky Mountain Sculpin observed in Tough Creek suggests the species has likely been present in this system for some time. Additionally, these new distribution records are related to new sampling effort, as opposed to expanding their upstream distribution into the Lee Creek tributaries. No fish sampling data exist for Tough Creek prior to 2018 (COSEWIC 2019). Given the high abundance at the upstream access point in Tough Creek, additional sampling effort will likely reveal an expanded distribution of Rocky Mountain Sculpin further upstream.

Sampling locations for Rocky Mountain Sculpin were dominated by large gravel and cobble, although quadrats without Rocky Mountain Sculpin typically contained more sand and aquatic vegetation (Table 3). Sample locations with >10 Rocky Mountain Sculpin had higher amounts of small gravel, large gravel, and cobble, and lower amounts of clay, silt, sand, and bedrock than sites with few to no sculpin (Table 3). The North Milk River and Lee Creek had the highest mean percentages of large gravel (29% and 34%, respectively), as well as relatively low mean water velocity (0.22 $m \cdot s^{-1}$ and 0.25 $m \cdot s^{-1}$, respectively). The substrate and mean water velocity observed in Tough Creek do not match the preferred habitat of Rocky Mountain Sculpin, with higher percentages of silt (32%) and sand (23%), and a lower percentage of large gravel and cobble (21%, 13%). Water velocities were also low (0.09 $m \cdot s^{-1}$). Nevertheless, the relatively high upstream abundance at Tough Creek indicates this reach contains critical habitat for Rocky Mountain Sculpin.

The 2022 collections show that Rocky Mountain Sculpin distribution and abundance may be variable and dependant on changing habitat quality and quantity. We recommend that sampling continues to follow the standardized field protocol (Macnaughton et al. 2019) to better understand temporal trends in Rocky Mountain Sculpin distribution and abundance in the St. Mary and Milk river watersheds. When sampling fails to detect Rocky Mountain Sculpin at known access points, additional effort should be made at those sites to confirm whether the species is absent, or present at low densities. If increased sampling effort yields no specimens, range contraction may have occurred.

ACKNOWLEDGEMENTS

Fisheries and Oceans Canada wishes to acknowledge the contributions of those who collected field samples: Sarah Glowa, Ramona Muster, Casey Saliba, Amelia Corrigan, Zing-Ying Ho, and Jamie Card. We also would like to thank Karl Lamothe and Lisa Schaubel for their review of the report.

5. REFERENCES

Bailey, J.E. 1952. Life history and ecology of the Sculpin *Cottus bairdi punctulatus* in southwestern Montana. Copeia **1952**(4): 243-255.

Macnaughton, C.J., Rudolfsen, T. Watkinson, D.A., and Enders, E.C. 2019. Standardized field sampling method for monitoring the occurrence and relative abundance of the Rocky Mountain Sculpin (*Cottus* sp.) in Canada. Can. Tech. Rep. Fish. Aquat. Sci. 3313: x + 54 p.

COSEWIC. 2019. COSEWIC assessment and status report on the Rocky Mountain Sculpin *Cottus* sp., Pacific populations, Saskatchewan – Nelson River populations and Missouri River populations in Canada. Committee on the Status of Endangered Wildlife in Canada. xxi + 67 p.

COSEWIC. 2010. Status report on the Columbia Mottled Sculpin *Cottus bairdi hubbsi* in Canada. Committee on the Status of Endangered Wildlife in Canada. 57 p.

ECCC. 2023 *Environment and Climate Change Canada Real-time Hydrometric Data* [Online]. Available at: https://wateroffice.ec.gc.ca/mainmenu/real_time_data_index_e.html (Accessed: 04/04/2023)

DFO (Fisheries and Oceans Canada). 2012. Recovery Strategy for the Rocky Mountain Sculpin (*Cottus* sp.), Eastslope Populations, in Canada. Species at Risk Act Recovery Strategy Series, Fisheries and Oceans Canada, Ottawa. x + 57 p.

Palliser Environmental Services Ltd. 2019 A summary of past water supply investigations in the Milk River watershed, Alberta. Prepared for the Milk River Watershed Council Canada, Milk River, AB., 24 p.

Ruppert, J.L., James, P.M., Taylor, E.B., Rudolfsen, T., Veillard, M., Davis, C.S., and Poesch, M.S. 2017. Riverscape genetic structure of a threatened and dispersal limited freshwater species, the Rocky Mountain Sculpin (*Cottus* sp.). Cons. Gen. **18**(4): 925-937.

Wentworth, C.K. 1922. A Scale of Grade and Class Terms for Clastic Sediments. J. Geo. **30**(5): 377-392.

6. APPENDIX

Table A1. Number of individuals retained as vouchers. Vouchers are stored at the Freshwater Institute in Winnipeg, Manitoba.

Access Point	LKCH	LNDC	LNSK	PLSK	RMSC	SCAT	TRPR	WHSK
Aetna Creek Access 1	0	0	0	0	3	0	0	0
Aetna Creek Access 2	0	0	0	1	0	0	0	0
Lee Creek Access 2	0	0	1	4	3	0	0	0
Lee Creek Access 3	0	0	0	2	7	0	0	0
Lee Creek Access 4	0	0	2	0	17	0	0	0
Lee Creek Access 5	0	0	0	0	29	0	0	0
Lee Creek Access 6	0	0	0	2	50	0	0	1
Milk River Access 1	0	0	0	5	2	1	0	0
Milk River Access 3	0	0	0	0	4	0	0	0
Milk River Access 4	0	0	0	0	1	0	1	0
Milk River Access 5	1	0	0	1	3	2	0	0
Milk River Access 6	0	0	0	0	1	0	0	0
Milk River Access 7	0	1	1	0	0	2	1	1
North Milk River Access 1	0	1	0	0	18	0	0	1
North Milk River Access 2	0	0	0	1	50	0	0	0
North Milk River Access 3	0	0	0	0	18	0	0	0
North Milk River Access 4	0	0	0	2	18	0	0	0
North Milk River Access 5	0	0	0	0	17	0	1	0
St. Mary River Access 1	0	0	0	0	14	0	0	0
St. Mary River Access 2	0	0	0	0	7	0	0	0
St. Mary River Access 3	0	0	0	0	8	0	0	0
St. Mary River Access 4	0	0	0	0	17	0	0	0
St. Mary River Access 5	0	0	0	0	7	0	0	0
Tough Creek Access 1	0	0	0	3	10	0	0	0
Tough Creek Access 2	0	0	0	0	53	0	0	0
Total	**1**	**2**	**4**	**21**	**357**	**5**	**3**	**3**

Table A2. Species codes for fish species mentioned in this report.

Code	Common Name	Scientific Name
BKSB	Brook Stickleback	*Culaea inconstans*
CTTR	Cutthroat Trout	*Oncorhynchus clarkii*
FHMW	Fathead Minnow	*Pimephales promelas*
LKCH	Lake Chub	*Couesius plumbeus*
LNDC	Longnose Dace	*Rhinichthys cataractae*
LNSK	Longnose Sucker	*Catostomus catostomus*
PLSK	Plains Sucker	*Pantosteus jordani*
RBTR	Rainbow Trout	*Oncorhynchus mykiss*
RMSC	Rocky Mountain Sculpin	*Cottus* sp.
SPSC	Spoonhead Sculpin	*Cottus ricei*
STSH	Spottail Shiner	*Notropis hudsonius*
SCAT	Stone Cat	*Noturus flavus*
TRPR	Trout-perch	*Percopsis omiscomaycus*
WHSK	White Sucker	*Catostomus commersonii*

Table A3. Mean water velocity ($m \cdot s^{-1}$), mean substrate composition (%), mean CPUE ($fish \cdot m^{-2}$), and total count of Rocky Mountain Sculpin in waterbodies sampled with quadrats.

Waterbody	Mean Water Velocity ($m \cdot s^{-1}$)	Clay (%)	Silt (%)	Sand (%)	Small Gravel (%)	Large Gravel (%)	Cobble (%)	Boulder (%)	Bedrock (%)	Vegetation (%)	RMSC Total	CPUE ($fish \cdot m^2$)
Aetna Creek	0.02	0	60	2	2	5	24	7	0	7	3	0.15
Lee Creek	0.25	0	9	9	25	29	19	4	5	6	107	0.89
Milk River	0.25	1	4	38	17	13	14	10	3	3	11	0.09
North Milk River	0.22	0	5	3	22	34	29	7	0	1	126	1.26
Rolph Creek	0.08	0	24	27	34	10	5	0	0	77	0	0.00
St. Mary River	0.38	0	1	2	13	27	42	14	1	7	53	0.38
Tough Creek	0.03	0	32	23	6	21	13	5	0	15	10	0.50

Table A4. Mean water velocity ($m \cdot s^{-1}$), mean substrate composition (%), mean CPUE ($fish \cdot min^{-1}$), and total count of Rocky Mountain Sculpin caught per waterbody sampled with ~600 s of backpack electrofishing. Substrate assessment not conducted are denoted by `-`.

Waterbody	Mean Water Velocity ($m \cdot s^{-1}$)	Clay (%)	Silt (%)	Sand (%)	Small Gravel (%)	Large Gravel (%)	Cobble (%)	Boulder (%)	Bedrock (%)	Vegetation (%)	RMSC Total	CPUE ($fish \cdot min^{-1}$)
Aetna Creek	0	-	-	-	-	-	-	-	-	-	0	0.00
Milk River	0	0	40	5	5	10	20	20	0	10	2	0.10
St. Mary River	0	0	0	60	15	15	10	0	0	0	0	0.00
Tough Creek	0.14	-	-	-	-	-	-	-	-	-	53	5.30