

PRELIMINARY RESULTS OF AMPHIBIAN MONITORING WITHIN
CHURN CREEK PROTECTED AREA

Prepared for
B.C. Parks – Thompson-Cariboo



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Executive Summary

In an effort to better understand the distribution and breeding habitat of amphibians within Churn Creek Protected Area seventy-three auditory and eighteen time-constrained surveys were completed in 2021 and 2022. Surveys focused on the identification of five species of amphibians; the Columbia Spotted Frog (*Rana luteiventris*), Great Basin Spadefoot (*Spea intermontane*), Pacific Chorus Frog (*Pseudacris regilla*), Western Toad (*Anaxyrus boreas*) and Wood Frog (*Lithobates sylvaticus*). Surveys and incidental observations detected Columbia Spotted Frog, Western Toad and Wood Frog within the protected area. Observations of Columbia Spotted Frog in both 2021 and 2022 suggest that this species is distributed along Koster Creek at least from Stinky Lake upstream to Koster Lake. Two incidental observations of Western Toad along the Black Dome Road suggest they are distributed within the Interior Douglas-fir very dry mild (IDFxm) biogeoclimatic subzone and time-constrained surveys confirmed the presence of breeding habitat at Grasshopper Lake. An auditory survey at Hairyfish Lake detected Wood Frog.

Additional surveys should be considered along and near Koster Creek to further the understanding of the distribution of Columbia Spotted Frog and Western Toad. Monitoring of amphibians should also be expanded to include wetlands and lakes north of Churn Creek and along the mainstem of Churn Creek within Churn Creek Protected Area.

Acknowledgments

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Introduction

Wetland habitats are extremely productive and often support high levels of biodiversity within grassland ecosystems. Wetlands within Churn Creek Protected Area (CCPA) are identified as critical habitat for a wide range of wildlife and as priority ecosystems for inventory, monitoring and conservation (BC Parks 2000). Wetlands are also a valuable source of water for livestock which utilize the protected area. In 2018 Friends of Churn Creek Protected Area Society (FCCPAS) initiated a long-term project to inventory and assess wetland characteristics within the protected area to provide land managers with background information on the resiliency of the different forms of wetlands in a time of changing climate (Steen 2018). In 2020, Steen and Iverson (2021) mapped 79 wetlands and 10 lakes and provided an initial description of the vegetation of several of the wetlands. In view of ongoing monitoring each wetland or lake was also given a unique habitat identity number as part of the project. As part of the second phase of the project, in 2021, detailed vegetation monitoring was initiated along with hydrological monitoring of a select number of wetlands (Iverson and Steen, 2022).

The current distribution and abundance of amphibians with CCCA is poorly understood. Three auditory detections of amphibians were recorded during surveys undertaken in 2007 and 2008 as part of a project to detect Great Basin Spadefoot within the One Hundred Mile House Forest District. On June 18th and 19th, 2007 Western Toad were heard calling in Swamp 1 at the northwest end of BC Lake and a lone Pacific Chorus Frog was heard April 29th, 2008 at Stinky Lake (Marsh 8). Only a small number of sites were surveyed within the protected area during that project (Nicolson and Packham 2008, Kline and Packham 2009).

As a component of the project to better understand the ecology and resilience of wetlands within CCPA in the face of ongoing climate change an initial sample of wetlands were surveyed for amphibians by FCCPAS volunteers in 2021 and 2022. The primary goal of this monitoring is to document current distribution patterns and breeding habitats of amphibians within the protected area.

Methods

Amphibian Provincial range maps, anecdotal sightings and previous survey results were reviewed prior to initiating surveys resulting in the project focusing on attempting to detect five species of amphibians, the Columbia Spotted Frog (*Rana luteiventris*), Great Basin Spadefoot (*Spea intermontane*), Pacific Chorus Frog (*Pseudacris* [aka *Hyla*] *regilla*), Western Toad (*Anaxyrus* [aka *Bufo*] *boreas*) and Wood Frog (*Lithobates sylvaticus* [aka *Rana sylvatica*]).

Both auditory and time-constrained search surveys were utilized to detect amphibians following methods developed by the Provincial Resource Inventory Committee (Province of BC 1998). Monitoring efforts focused on wetlands and lakes located between Churn Creek in the north and Lone Cabin Creek in the south and within approximately ten kilometers of the Fraser River (Figure 1). In 2021 the listening duration of auditory surveys varied from five to fifteen minutes. In 2022 the listening duration of auditory surveys was for a minimum of fifteen minutes as suggested by Province of BC (2008) as Pierce and Gutzwiller (2004) found increased detection efficiency in some amphibians utilizing a listening duration of fifteen minutes as compared to five minutes. Auditory surveys were undertaken from May 25th to June 15th in 2021 and from May 4th to June 10th in 2022. Time-constrained search surveys were undertaken in both 2021 and 2022. Search times varied depending on the size of the habitat being surveyed and usually consisted of searching the near shore portion of a wetland or lake. Search times ranged from three to 45 minutes in duration. Several incidental observations also occurred during field work.

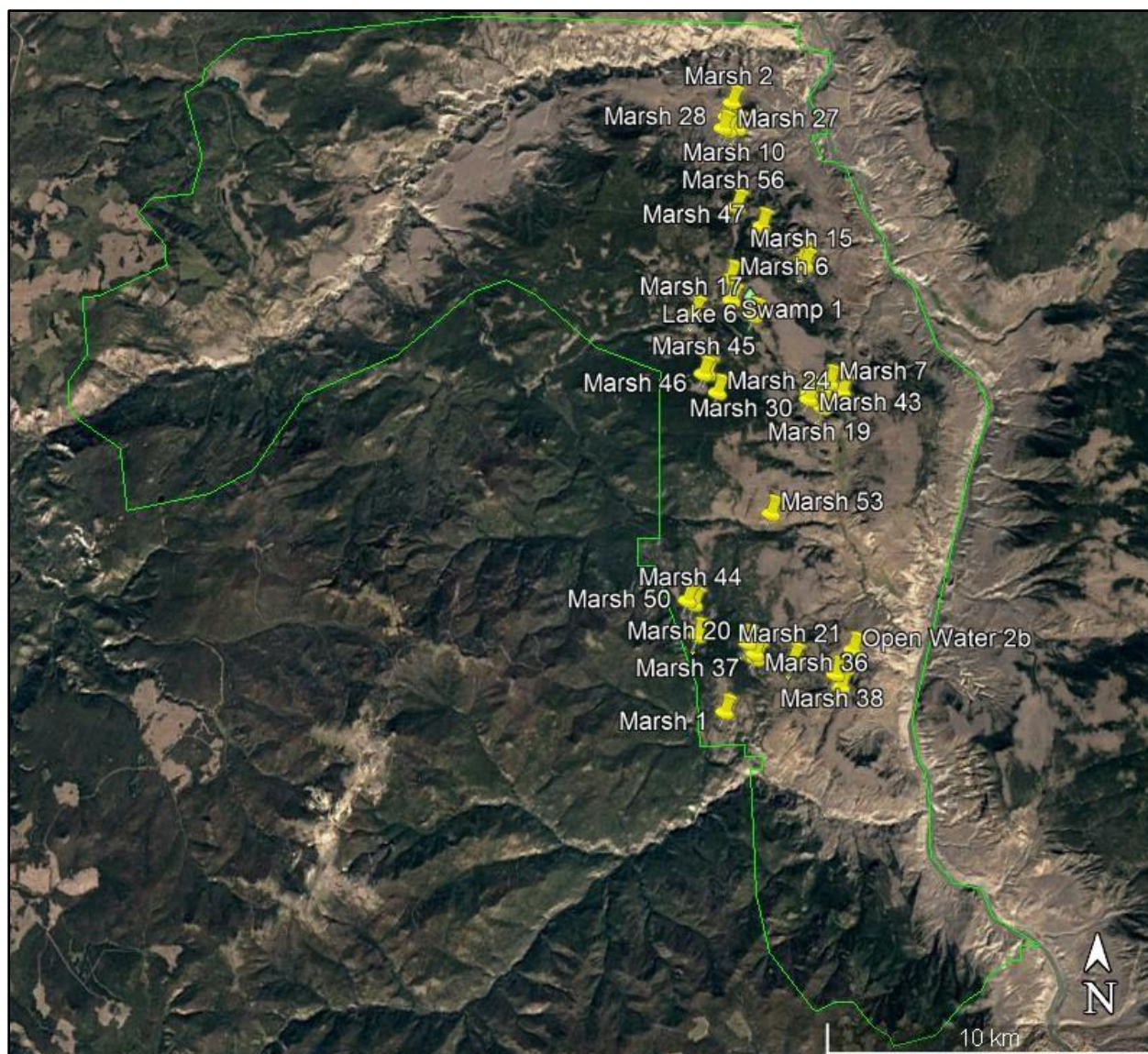


Figure 1: Distribution of wetlands and lakes monitored for amphibians within Churn Creek Protected Area in 2021 and 2022.

Results

Auditory Surveys

In 2021 a total of 27 auditory surveys were completed at 25 wetlands or lakes between May 25th and June 15th (Table 1, Appendix 1). Four habitats had more than one listening station and four listening stations served two habitats where they were within close proximity to each other. None of the listening stations were surveyed more than once. No amphibians were heard at any listening station in 2021.

In 2022 a total of 46 auditory surveys were completed at 16 wetlands or lakes between May 4th and June 10th (Table 1, Appendix 2). One listening station served two habitats that were within close proximity to each other. One habitat was surveyed four times, fourteen habitats were surveyed three times and one habitat was surveyed twice. Twelve of the wetlands or lakes were also surveyed in 2021. The surveys resulted in one detection; a Wood Frog was heard at Hairyfish Lake (Marsh 6) on May 4th. Two additional wetlands (Marsh 15 and 48) were scheduled for auditory surveys in 2022 but when found to contain no standing water on May 4th, the surveys were cancelled.

Time-constrained Searches

In 2021 a total of seventeen time-constrained searches were completed at seventeen different wetlands or lakes between June 1st and June 16th (Table 1, Appendix 3). Searches involved checking the near shore portion of each habitat for evidence of amphibian eggs, tadpoles or adults. The entire shoreline of a habitat was not always completely searched. Auditory surveys were also completed at seven of the habitats. On June 1st Columbia Spotted Frogs were observed in Stinky Lake (Marsh 8) and within Koster Creek immediately below the outlet of Stinky Lake (Marsh 8; Figures 4 & 5). On June 10th five large clusters of Western Toad tadpoles were observed within Grasshopper Lake (Marsh 17; Figure 2).



Figure 2: A cluster of Western Toad tadpoles observed at Grasshopper Lake (Marsh 17).

In 2022 Grasshopper Lake (Marsh 17) was resurveyed, again on June 10th, and two large clusters of Western Toad tadpoles were observed (Appendix 2). No other wetlands or lakes were time-constrained searched in 2022.

Table 1: Results of the 2021 and 2022 Amphibian Auditory and Time Constrained Surveys within Churn Creek Protected Area. The species code for Columbia Spotted Frog is A-RALU, for Western Toad A-ANBO and for Wood frog A-LISY. Null indicates no amphibians detected, N/A indicates not planned for a survey and N/S indicates a survey was planned for the habitat but not undertaken due to lack of standing water within the wetland.

Habitat ID	Local Name	2021		2022	
		Aud. Survey	Time Survey	Aud. Survey	Time Survey
Lake 6	BC Lake	NULL	N/A	NULL	N/A
Lake 7	Browns Lake	NULL	N/A	NULL	N/A
Marsh 1		NULL	NULL	N/A	N/A
Marsh 2	Dry Lake	NULL	N/A	NULL	N/A
Marsh 6	Hairyfish Lake	NULL	N/A	A-LISY	N/A
Marsh 7		NULL	N/A	N/A	N/A
Marsh 8	Stinky Lake	N/A	A-RALU	NULL	N/A
Marsh 10		NULL	N/A	NULL	N/A
Marsh 15		N/A	N/A	N/S	N/A
Marsh 17	Grasshopper Lake	N/A	A-ANBO	NULL	A-ANBO
Marsh 19		NULL	NULL	NULL	N/A
Marsh 20	Grouse Lake	NULL	NULL	NULL	N/A
Marsh 21	High Lake	NULL	NULL	NULL	N/A
Marsh 22		NULL	NULL	NULL	N/A
Marsh 23	Hog Lake	NULL	NULL	N/A	N/A
Marsh 24		N/A	NULL	N/A	N/A
Marsh 27		NULL	N/A	N/A	N/A
Marsh 28		NULL	N/A	N/A	N/A
Marsh 30		NULL	N/A	N/A	N/A
Marsh 36		NULL	N/A	N/A	N/A
Marsh 37		NULL	N/A	N/A	N/A
Marsh 39		NULL	NULL	NULL	N/A
Marsh 43		NULL	N/A	NULL	N/A
Marsh 44		NULL	NULL	N/A	N/A
Marsh 45		N/A	NULL	N/A	N/A
Marsh 46		N/A	NULL	N/A	N/A
Marsh 48		N/A	N/A	N/S	N/A
Marsh 50		NULL	NULL	N/A	N/A
Marsh 53	Grinder Meadow	N/A	NULL	N/A	N/A
Marsh 56		NULL	N/A	NULL	N/A
Open Water 2a	Coffee Pot Lake	NULL	NULL	NULL	N/A
Open Water 2b		NULL	NULL	NULL	N/A
Swamp 1		NULL	N/A	N/A	N/A

Incidental observations

In 2021 an adult Western Toad was observed on the Black Dome Road on June 1st (Table 2, Figure 5). On June 10th and again on June 16th Columbia Spotted Frog were observed near the ford of Koster Creek northwest of Bishop Field and between Brown Lake and BC Lake (Table 2, Figure 5).

In 2022 an adult Western Toad was observed on the Black Dome Road on June 9th (Table 2, Figure 3) and on June 10th several Columbia Spotted Frog were observed near the outlet of Koster Lake which is located west of and just outside of the protected area (Table 2, Figure 5).



Figure 3: Lone Western Toad observed along the Black Dome Road June 9th, 2022.



Figure 4: Columbia Spotted Frog observed in Koster Creek below Stinky Lake, June 1st, 2021.

Table 2: Incidental observations of amphibians within Churn Creek Protected Area in 2021 and 2022. The species code for Columbia spotted Frog is A-RALU and for Western Toad A-ANBO.

Location	UTM (NAD 83) Zone 10		Date	Species
	Easting	Northing		
Black Dome Road	548718	5697091	01 Jun 21	A-ANBO
Koster Creek ford	548718	5698294	10 Jun 21	A-RALU
Koster Creek ford	548411	5698313	16 Jun 21	A-RALU
Koster Creek ford	548491	5698263	16 Jun 21	A-RALU
Black Dome Road	546700	5696600	09 Jun 22	A-ANBO
Koster Lake	541289	5698307	10 Jun 22	A-RALU

Discussion and Recommendations

Many of the wetlands within CCPA are located within closed catchment basins having no seasonal outflow. Some are also ephemeral, often drying up by mid-summer. The lack of permanent standing water in some wetlands or their distance to permanent water sources may benefit or negatively impact their value to local amphibian populations as each amphibian species has different habitat needs.

Prior to this project Western Toad had been detected calling in the swamp at the northwest end of BC Lake in 2007. The current understanding of the distribution of Western Toad has been expanded to include observations along the Black Dome Road within the Interior Douglas-fir very dry mild (IDFxm) biogeoclimatic subzone and the confirmation of breeding habitat at Grasshopper Lake (Marsh 17, Figure 5).

Although not detected through the use of auditory surveys, observations of Columbia Spotted Frog in both 2021 and 2022 suggest that this species is distributed along Koster Creek at least from Stinky Lake upstream to Koster Lake (Figure 5). These observations have also confirmed the presence of Columbia Spotted Frog within the Fraser River Basin Ecoregion.

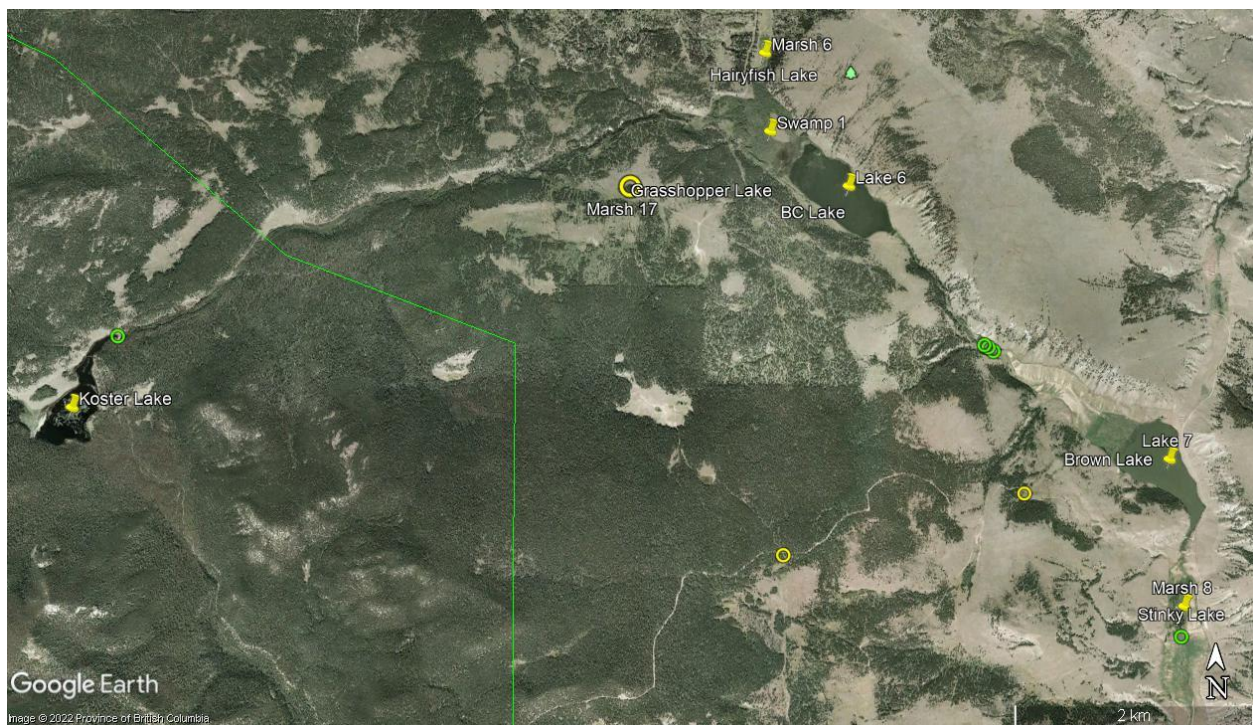


Figure 5: Observations of Columbia Spotted Frog (locations depicted by green circles) and Western Toad (small yellow circles = adult locations; large yellow circle = breeding habitat location) at Churn Creek Protected Area.

To date no Great Basin Spadefoot have been detected within CCPA and for that matter none have been documented west of the Fraser River. Documentation of the presence of Wood Frog and Pacific Chorus Frog within the protected area remains scanty with one detection of Wood Frog near Hairyfish Lake (Marsh 6) in 2022 and a previous project detecting Pacific Chorus Frog near Stinky Lake (Marsh 8) in 2008.

Additional surveys should be considered to further the understanding of the distribution of Columbia Spotted Frog and Western Toad along and near Koster Creek. Monitoring of amphibians should also be expanded to include wetlands and lakes north of Churn Creek and along the mainstem of Churn Creek within Churn Creek Protected Area.

Literature Cited

BC Parks. 2000. Churn Creek Protected Area Management Plan. BC Ministry of Environment Lands and Parks, Victoria, B.C.

Kline, J. and R Packham. 2009. Great Basin Spadefoot (*Spea intermontane*) Auditory Surveys in the Cariboo Region of British Columbia, 2008. Unpublished report. Ministry of Environment.

Iverson, K. and O. Steen. 2022. Wetlands and Lakes of Churn Creek Protected Area: Vegetation and Hydrology Monitoring 2021. Unpublished report submitted to BC Parks, Regional Operations, Protected Area Section, Williams Lake.

Nicolson, H. and R. Packham. 2008. 2007 Cariboo Region Great Spadefoot Toad (*Spea intermontane*) Auditory Survey Report. Unpublished draft report. Ministry of Environment.

Pierce, B. A. and K. J. Gutzwiller, 2004. Auditory Sampling of Frogs; Detection Efficiency in relation to Survey Duration. *Journal of Herpetology* 38: 496-500.

Province of British Columbia. 1998. Inventory methods for pond-breeding amphibians and painted turtle: Standards for Components of British Columbia's Biodiversity No.37: Version 2. Resources Inventory Committee.

Province of British Columbia. 2008. Inventory methods for pond-breeding amphibians and painted turtle: Standards for Components of British Columbia's Biodiversity No.37: Version 2. Errata No.3. Resources Inventory Committee.

Steen, O. and K. Iverson. 2021. Wetlands and lakes of Churn Creek Protected Area: inventory, mapping, and initial assessment. Unpublished report prepared for BC Parks, Regional Operations, Protected Area Section, Williams Lake and BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Regional Operations, Wildlife and Terrestrial Section – Cariboo, Williams Lake.

Steen, O. 2018. Preliminary Aerial Image-Based Inventory of Wetlands in Churn Creek Protected Area, 2018. Unpublished report submitted to BC Parks, Interior Region – Thompson/Cariboo, Williams Lake, B.C.

Appendices

Appendix 1: Summary of 2021 Auditory Surveys within Churn Creek Protected Area.

Survey No.	Date	Habitat ID	Local Name	Habitat UTM (NAD 83)		Station	Station UTM (NAD 83)		Start Time	End Time	Species Code
				Zone 10			Zone 10				
				Easting	Northing		Easting	Northing			
1	25-May-21	Marsh 2	Dry Lake	596629	5705947	1	546480	5705980	21:45	21:50	NULL
2	25-May-21	Marsh 2	Dry Lake	596629	5705947	2	546580	5705870	21:56	22:01	NULL
3	25-May-21	Marsh 2	Dry Lake	596629	5705947	3	546680	5705940	22:07	22:12	NULL
4	25-May-21	Marsh 28		546322	5705199		546350	5705210	22:39	22:44	NULL
5	25-May-21	Marsh 27		546487	5705126		546515	5705160	22:50	22:55	NULL
6	25-May-21	Marsh 10		546761	5705207		546780	5705220	23:05	23:10	NULL
7	25-May-21	Marsh 56		546717	5702799		546700	5702850	23:48	23:53	NULL
8	26-May-21	Marsh 6	Hairyfish Lake	546563	5700779	1	546523	5700741	0:10	0:15	NULL
9	26-May-21	Marsh 6	Hairyfish Lake	546563	5700779	2	546509	5700641	0:19	0:24	NULL
10	31-May-21	Swamp 1 & Lake 6		546742	5699793	1	546954	5700011	22:15	22:25	NULL
11	31-May-21	Lake 6	BC Lake	547186	5699564	2	547206	5699869	22:32	22:42	NULL
12	31-May-21	Lake 6	BC Lake	547186	5699564	3	547416	5699656	22:49	22:59	NULL
13	31-May-21	Marsh 7 & Lake 7		549665	5697562	1	549774	5697685	23:30	23:40	NULL
				549970	5697340						
14	31-May-21	Lake 7	Browns Lake	549970	5697340	2	550064	5697616	23:47	23:57	NULL
15	01-Jun-21	Lake 7 & Marsh 7	Browns Lake	549970	5697340	3	550125	5696728	0:03	0:13	NULL
				549665	5697562						
16	01-Jun-21	Marsh 19		549336	5696800		549348	5696883	0:21	0:31	NULL
17	01-Jun-21	Marsh 30 & Marsh 43		548913	5697046		548910	5697064	0:38	0:48	NULL
18	09-Jun-21	Marsh 20	Grouse Lake	548938	5697230		547069	5689810	21:30	21:45	NULL
19	09-Jun-21	Marsh 36		547265	5689452		547253	5689468	21:55	22:06	NULL
20	09-Jun-21	Marsh 37		547325	5689281		547303	5689293	22:15	22:25	NULL

Appendix 1: Summary of 2021 Auditory Surveys within Churn Creek Protected Area (continued).

Survey No.	Date	Habitat ID	Local Name	Habitat UTM (NAD 83)		Station	Station UTM (NAD 83)		Start Time	End Time	Species Code
				Zone 10			Zone 10				
				Easting	Northing		Easting	Northing			
21	09-Jun-21	Marsh 21	High Lake	548433	5689216		548409	5689159	22:47	23:00	NULL
22	09-Jun-21	Marsh 22	Hog Lake	549755	5688816		549762	5688767	23:55	0:05	NULL
23	10-Jun-21	Marsh 23		549912	5688537		549898	5688569	0:13	0:23	NULL
24	15-Jun-21	Marsh 1		546383	5687713		546436	5687697	22:00	22:15	NULL
25	15-Jun-21	Marsh 39		545550	5689930		545539	5689901	22:48	22:58	NULL
26	15-Jun-21	Marsh 50		545295	5690938		545210	5690949	23:12	23:22	NULL
27	15 Jun 21	Marsh 44		545409	5690931		545371	5690924	23:27	23:37	NULL

Appendix 2: Summary of 2022 Auditory Surveys within Churn Creek Protected Area.

Survey No.	Date	Habitat ID	Local Name	Habitat UTM (NAD 83)		Station UTM (NAD 83)		Start Time	End Time	Species Code
				Zone 10		Zone 10				
				Easting	Northing	Easting	Northing			
1	04-May-22	Marsh 39		545550	5689930	545509	5689928	21:00	21:15	NULL
2	04-May-22	Marsh 43		548938	5697230	548967	5697228	22:20	22:35	NULL
3	04-May-22	Marsh 19		549336	5696800	549300	5696826	22:45	23:00	NULL
4	04-May-22	Marsh 8	Stinky Lake	550087	5696068	550125	5696037	23:25	23:40	NULL
5	04-May-22	Marsh 6	Hairyfish Lake	546563	5700779	546564	5706680	20:55	21:10	A-LISY
6	04-May-22	Marsh 56		546717	5702799	546720	5702823	21:25	21:40	NULL
7	04-May-22	Marsh 2	Dry Lake	596629	5705947	546520	5705956	22:10	22:25	NULL
8	04-May-22	Marsh 10		546761	5705207	546773	5705207	22:40	22:55	NULL
9	04-May-22	Marsh 20	Grouse Lake	547020	5689763	547069	5689810	21:00	21:15	NULL
10	04-May-22	Marsh 21	High Lake	548433	5689216	548407	5689156	21:40	21:55	NULL
11	04-May-22	Marsh 23	Hog Lake	549912	5688537	549898	5688569	22:15	22:30	NULL
12	04-May-22	Open water 2a & 2b	Coffee Pot Lake	550354	5689495	550300	5689495	22:50	23:05	NULL
13	05-May-22	Marsh 17	Grasshopper Lake	545444	5699579	545378	5699529	21:00	21:15	NULL
14	05-May-22	Lake 6	BC Lake	547186	5699564	547440	5699197	21:36	21:51	NULL
15	05-May-22	Lake 7	Brown Lake	549970	5697340	549736	5697687	22:12	22:27	NULL
16	24-May-22	Marsh 6	Hairyfish Lake	546563	5700779	546564	5706680	21:30	21:45	NULL
17	24-May-22	Marsh 56		546717	5702799	546720	5702823	21:57	22:12	NULL
18	24-May-22	Marsh 2	Dry Lake	596629	5705947	546520	5705956	22:38	22:57	NULL
19	24-May-22	Marsh 10		546761	5705207	546773	5705207	23:10	23:25	NULL
20	24-May-22	Marsh 17	Grasshopper Lake	545444	5699579	545378	5699529	21:30	21:45	NULL
21	24-May-22	Lake 6	BC Lake	547186	5699564	547440	5699197	22:05	22:20	NULL
22	24-May-22	Lake 7	Brown Lake	549970	5697340	549736	5697687	22:37	22:52	NULL
23	24-May-22	Marsh 8	Stinky Lake	550087	5696068	550105	5695955	23:02	23:17	NULL
24	25-May-22	Marsh 20	Grouse Lake	547020	5689763	547069	5689810	21:30	21:45	NULL

Appendix 2: Summary of 2022 Auditory Surveys within Churn Creek Protected Area (continued).

Survey No.	Date	Habitat ID	Local Name	Habitat UTM (NAD 83)		Station UTM (NAD 83)		Start Time	End Time	Species Code
				Zone 10		Zone 10				
				Easting	Northing	Easting	Northing			
25	25-May-22	Marsh 21	High Lake	548433	5689216	548407	5689156	22:08	22:23	NULL
26	25-May-22	Marsh 23	Hog Lake	549912	5688537	549898	5688569	22:41	22:56	NULL
27	25-May-22	Open water 2a & 2b	Coffee Pot Lake	550354	5689495	550300	5689495	23:16	23:31	NULL
28	25-May-22	Marsh 39	Stinky Lake	545550	5689930	545525	5689930	21:30	21:45	NULL
29	25-May-22	Marsh 43		548938	5697230	548967	5697228	22:45	23:00	NULL
30	25-May-22	Marsh 19		549336	5696800	549284	5696856	23:15	23:30	NULL
31	25-May-22	Marsh 8		550087	5696068	550166	5696071	23:45	24:00	NULL
32	09-Jun-22	Marsh 39	Stinky Lake	545550	5689930	545525	5689930	21:40	21:55	NULL
33	09-Jun-22	Marsh 43		548938	5697230	548979	5697228	23:00	23:15	NULL
34	09-Jun-22	Marsh 19		549336	5696800	549300	5696841	23:25	23:40	NULL
35	09-Jun-22	Marsh 8		550087	5696068	550107	5695955	23:45	00:05	NULL
36	09-Jun-22	Marsh 2	Dry Lake	596629	5705947	546520	5705956	21:45	22:00	NULL
37	09-Jun-22	Marsh 10	Hairyfish Lake	546761	5705207	546773	5705207	22:20	22:35	NULL
38	09-Jun-22	Marsh 56		546717	5702799	546720	5702823	22:58	23:13	NULL
39	09-Jun-22	Marsh 6		546563	5700779	546564	5706680	23:27	23:42	NULL
40	10-Jun-22	Marsh 17		Grasshopper Lake	545444	5699579	545427	5699499	21:45	22:00
41	10-Jun-22	Lake 6	BC Lake	547186	5699564	547452	5699185	22:20	22:35	NULL
42	10-Jun-22	Lake 7	Brown Lake	549970	5697340	549735	5697689	23:00	23:15	NULL
43	10-Jun-22	Marsh 8	Stinky Lake	550087	5696068	550114	5695983	23:25	23:40	NULL
44	10-Jun-22	Marsh 21	High Lake	548433	5689216	548407	5689156	21:45	22:00	NULL
45	10-Jun-22	Marsh 23	Hog Lake	549912	5688537	549898	5688569	22:19	22:34	NULL
46	10-Jun-22	Open water 2a & 2b	Coffee Pot Lake	550354	5689495	550300	5689495	22:56	23:11	NULL

Appendix 3: Summary of 2021 and 2022 Time-constrained searches within Churn Creek Protected Area.

Survey No.	Date	Habitat ID	Local Name	UTM (NAD 83) Zone 10		Time Start	Time End	Species Code
				Easting	Northing			
1	01-Jun-21	Marsh 8	Stinky Lake	550087	5696068	12:00	12:45	A-RALU
2	09-Jun-21	Open Water 2a	Coffee Pot Lake	550354	5689495	14:10	?	NULL
3	09-Jun-21	Open Water 2b				?	?	NULL
4	09-Jun-21	Marsh 23	Hog Lake	549912	5688537	16:00	16:20	NULL
5	09-Jun-21	Marsh 22		549755	5688816	16:30	16:50	NULL
6	09-Jun-21	Marsh 21	High Lake	548433	5689216	19:35	20:00	NULL
7	09-Jun-21	Marsh 20	Grouse Lake	547020	5689763	20:50	21:10	NULL
8	10-Jun-21	Marsh 1		546383	5687713	9:35	9:50	NULL
9	10-Jun-21	Marsh 17	Grasshopper Lake	545437	5699573	13:05	13:25	A-ANBO
10	15-Jun-21	Marsh 53	Grinder Meadow	547806	5693611	14:20	14:55	NULL
11	15-Jun-21	Marsh 50		545295	5690938	17:05	15:30	NULL
12	15-Jun-21	Marsh 44		545409	5690931	17:40	17:50	NULL
13	15-Jun-21	Marsh 39		545550	5689930	18:23	18:35	NULL
14	16-Jun-21	Marsh 24		546078	5697197	8:55	9:15	NULL
15	16-Jun-21	Marsh 45		545789	5697785	9:25	9:28	NULL
16	16-Jun-21	Marsh 46		545688	5697757	9:35	9:42	NULL
17	16-Jun-21	Marsh 19		549336	5696800	11:37	11:48	NULL
1	10 Jun 22	Marsh 17	Grasshopper Lake	545437	5699573	9:09	9:23	A-ANBO