

Angler Survey on the Clearwater and North Raven rivers, Alberta, 2019

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Angler Survey on the Clearwater and North Raven rivers, Alberta, 2019

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EXECUTIVE SUMMARY

The Clearwater River, Elk Creek (a main tributary to the Clearwater River), and the North Raven River are popular fishing destinations in westcentral Alberta. Alberta Environment and Parks identifies angling effort and angling mortality as key threats to fish populations, yet despite their popularity with anglers, the current level of angler use of these streams is unknown. From June 1 to September 30, 2019, Alberta Conservation Association conducted an angler survey to estimate angling effort on the Clearwater River, Elk Creek, and the North Raven River, providing information that will aid Alberta Environment and Parks in managing these fisheries.

We conducted aerial surveys for instantaneous angler counts and used bootstrapping to derive estimates and confidence intervals for angling effort. During 26 instantaneous counts, we observed 94 anglers on the Clearwater River, 14 on Elk Creek and 56 on the North Raven River.

From June 1 to September 30, 2019 anglers fished for an estimated total of 7,214 hours (95% CI = 4,177 – 10,717) or 58 h/km (95% CI = 33 – 85) on the 125-km section of the Clearwater River, 1,162 hours (95% CI = 388 – 2,027) or 33 h/km (95% CI = 11 – 58) on the 35-km section of the Elk Creek, and 4,283 hours (95% CI = 2,190 – 7,041) or 119 h/km (95% CI = 60 – 194) on the 36-km section of the North Raven River. Atypically protracted spring and early summer high waters in 2019 may have reduced angler use of the Clearwater River.

Key words: Clearwater River, Elk Creek, North Raven River, aerial counts, angler survey, angler effort, sport fishery.

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1.0 INTRODUCTION

The Clearwater River, Elk Creek (a main tributary to the Clearwater River), and the North Raven River are popular fishing destinations in westcentral Alberta. Alberta Environment and Parks identifies angling effort and angling mortality as key threats to fish populations (Government of Alberta 2019a), yet despite their popularity with anglers, the current level of angler use of these streams is unknown. In 2019, we conducted an angler survey to estimate angling effort and aid Alberta Environment and Parks in managing the fisheries in these waterbodies. ACA chose the Clearwater River as a study stream because it is identified as a focal watershed in the Native Trout Recovery Initiative (Government of Alberta 2020). We chose the North Raven River because ACA has significant investment in riparian conservation programming in this watershed that has led to improved water quality, and a potential for increased fish production and increased angler use.

2.0 STUDY AREA

The Clearwater River originates in Banff National Park and flows 211 km northeast to its confluence with the North Saskatchewan River near the town of Rocky Mountain House (Figure 1). The Clearwater River study area included the portion of river 125 km downstream of the confluence of Elk Creek to Rocky Mountain House, and the entire 35 km of Elk Creek (Figure 1). Sportfish in the Clearwater River drainage include bull trout (*Salvelinus confluentus*), burbot (*Lota lota*), mountain whitefish (*Prosopium williamsonii*), brown trout (*Salmo trutta*), and brook trout (*Salvelinus fontinalis*). The Clearwater River is in the Eastern Slopes 2 Fish Management Zone and is open to angling between April 1 and October 31 (Government of Alberta 2019b). Currently, catch-and-release regulations apply to bull trout, and harvest is permitted for brook trout, brown trout and mountain whitefish.

Approximately 22 km southeast of Rocky Mountain House, the North Raven River is a low gradient, spring-fed stream that flows for 36 km until the confluence with the Raven River. Extensive riparian habitat protection along this stream has resulted in 24.7 km (65.5% of the entire river) of stream habitat protected under riparian conservation agreements between ACA and landowners or lessees. Sportfish in the North Raven River include brown trout, brook trout, and northern pike (*Esox lucius*). The North Raven River is in the Eastern Slopes 2 Fish Management Zone and is open to angling year-round. Catch-and-release regulations apply to all trout species, whereas harvest is allowed on northern pike.

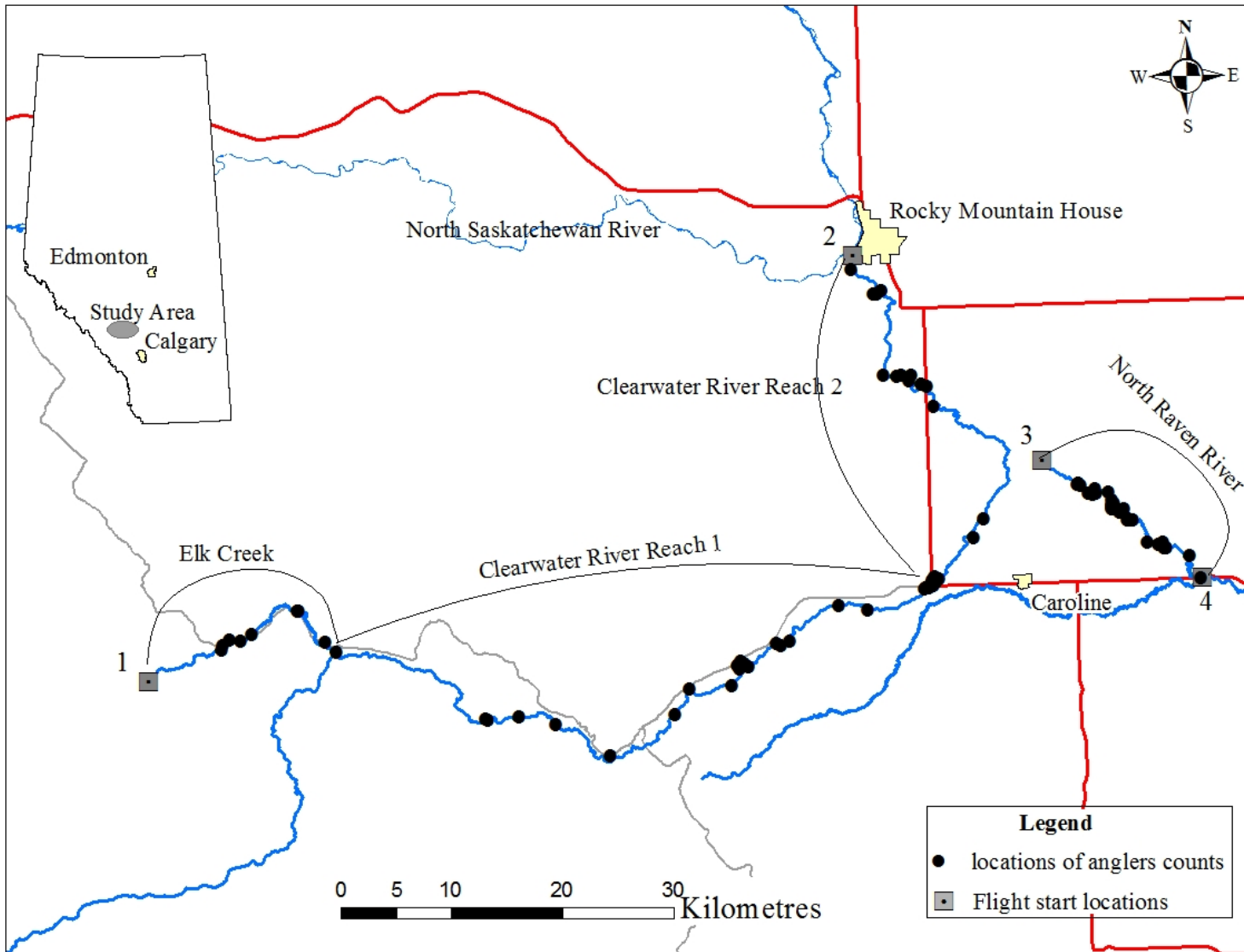


Figure 1. Clearwater and North Raven rivers study area, including locations of angler counts and start locations (1–4) for aerial surveys. Inset map shows the location of the study area within the province of Alberta.

3.0 MATERIALS AND METHODS

3.1 Survey design

From June 1 to September 30, 2019 we conducted aerial-type angler surveys on the Clearwater River, Elk Creek (a main tributary to the Clearwater River), and the North Raven River (Hoenig et al. 1993, Pollock et al. 1994) to estimate angling effort. Flights were conducted using a Robinson R44 helicopter based out of Springbank Airport. Based on differences in angler access and stream gradient, we divided the Clearwater River into two study sections for estimation of angling effort. Reach 1 is the 75 kilometres of river upstream of Caroline that is characterized by moderate gradient and is surrounded by public lands with unimpeded public angling access. Reach 2 is the 50 kilometres downstream of Caroline, where the river is of lower gradient, surrounded by private land, and has markedly less public access points (Figure 1).

We used a power analysis with data from previous angler surveys on the upper Bow River (R.L. & L. Environmental Services 1995) to estimate that between 25 and 30 flights were needed for this survey. We selected days and times for flights using two-stage sampling design (after Pollock et al. 1994) with weekday and weekend days as the primary sampling unit and flight times on a given day as the secondary sampling units. First, the days for flights were selected at random from the 83 available weekdays and 39 weekend days, with the probability of selecting weekday and weekend/holiday adjusted so the final draw had 60% of flights on weekdays and 40% on weekends/holidays. Second, flight times were selected by dividing the day into time blocks equivalent to the duration of a survey, and one of these time blocks was randomly selected. For our study, the secondary sampling times were two-hour time blocks with start times of 0900, 1100, 1300, 1500, or 1700 hours. When weather conditions prevented safe flight (low visibility, high wind, or thunderstorm activity), we rescheduled surveys by randomly selecting a new date from the pool of available dates. Adverse weather towards the end of September forced the cancellation of four weekend flights that were not rescheduled. We conducted a total of 26 angler count surveys during our study period. The distribution of completed flights on weekdays, weekends/holidays and start times is shown in Table 1.

Table 1. Summary of instantaneous aerial angler count surveys completed on the Clearwater and North Raven rivers in 2019. MDT = mountain daylight time.

Time slot (MDT)	Number of flights	
	Weekday	Weekend
0900	4	0
1100	2	1
1300	5	1
1500	2	4
1700	5	5
Total	18	8

We randomized the starting location for each survey to one of four locations and we designated a specific flight path for that location (Table 2, Figure 1). We conducted angler counts with two observers on each flight. Both observers were on the left side of the aircraft, with the front observer counting anglers and marking their position on a handheld global positioning system (GPS) unit while the back observer verified angler counts and recorded waypoint names, and angler numbers. Flights were flown at target airspeed of 90 km/h – 110 km/h and 150 m above ground level. Following Canadian Aviation Regulations, flight altitude was increased to a minimum of 305 m over built-up areas (residences, agricultural buildings, industrial complexes, etc.). The aircraft was maneuvered so that the two observers on the left side had unobstructed views of the entire river channel. When observers were uncertain about angler counts, or river features (braids, cliffs, etc.) prevented adequate observations of the entire river, the pilot circled the area until observers confirmed angler counts. When necessary, we used image stabilizing binoculars to assist with angler counts.

Table 2. Survey flight start locations and route for the Clearwater and North Raven rivers angler survey (2019). See Figure 1 for locations.

Starting location	Route of travel
1	Downstream to 2, then 3 downstream to 4
2	Upstream to 1, then 3 downstream to 4
3	Downstream to 4, then 1 downstream to 2
4	Upstream to 3, then 2 upstream to 1

3.2 Estimation of angler survey parameters

We used bootstrapping (50,000 replicates) to derive estimates and associated 95% confidence intervals for angling effort (Sullivan 2004, Government of Alberta 2015). Bootstrapped instantaneous angler counts produced a distribution of mean instantaneous angler counts used as the basis for calculating angling effort. Weekday and weekend/holiday data were bootstrapped separately. Angler count distributions multiplied by the available angling hours provided mean and confidence intervals estimates for total angling effort (hours). Recognizing that most anglers on the Clearwater River were counted in the last half of the survey (August and September), a separate analysis was completed to estimate angling effort in June and July, and in August and September. In this analysis we did not further stratify by weekday or weekend/holiday day types or stream reach as our sample size was too small to support stratification at this level. Available angling hours were calculated as the sum of daily hours in the study period from 30 min before sunrise to 30 after sunset for Caroline, Alberta, the closest populated centre. Estimates of angler survey parameters were calculated using the R software package (R Core Team 2019).

4.0 RESULTS

During aerial surveys, we counted a total of 94 anglers on the Clearwater River, 14 on Elk Creek, and 56 on the North Raven River (Appendix 1). Angling activity on the Clearwater River was more frequent in the second half of our survey (August and September) than during the first half, with only six of the 94 total anglers counted in June and July. In contrast, Elk Creek had a relatively similar number of anglers both in the early and late periods, at six and eight people, respectively. On all three waterbodies, angler counts were higher on weekend/holidays than on weekdays (Table 3).

Table 3. Mean (SD) angler count between June 1 and September 30, 2019 on weekday and weekends/holidays on the Clearwater River, Elk Creek and the North Raven River.

Waterbody	Mean (SD) angler counts	
	Weekday	Weekend/Holiday
Clearwater River		
Reach 1	1.0 (1.41)	3.5 (5.13)
Reach 2	1.28 (2.19)	3.12 (4.94)
Reach 1 and 2	1.14 (1.82)	3.31 (4.87)
Elk Creek	0.33 (0.69)	1.14 (1.68)
North Raven	1.67 (1.64)	3.25 (5.52)

From June 1 to September 30, 2019 anglers fished for an estimated total of 7,214 hours (95% CI = 4,177 – 10,717) or 58 h/km (95% CI = 33 – 85) on the 125-km section of the Clearwater River, 1,162 hours (95% CI = 388 – 2,027) or 33 h/km (95% CI = 11 – 58) on the 35-km section of the Elk Creek, and 4,283 hours (95% CI = 2,190 – 7,041) or 119 h/km (95% CI = 60 – 194) on the 36-km section of the North Raven River (Table 4). Estimated angler effort on Reaches 1 and 2 of the Clearwater River was similar both spatially (between the two reaches) and temporarily (between weekdays and weekends). Angling effort in June and July on the Clearwater River was estimated at 486 hours (95% CI = 0 – 1,226) and 6,039 h (95% CI = 3,327 – 9,821) in August and September, respectively. As a result of methodological differences between our study and previous angler surveys on the North Raven River (McLeod and DeRosa 1996, Rhude 1990), results from the current survey are not directly comparable to those from previous studies.

Table 4. Mean (95% CI) angler effort (hours) between June 1 and September 30, 2019 on the Clearwater River, Elk Creek and the North Raven River.

Waterbody	Mean (95% CI) angler effort (h)			Mean (95% CI) hours/km	Distance surveyed (km)
	Weekday	Weekend/Holiday	Total		
Clearwater River					
Reach 1	1,349 (524 – 2,246)	2,187 (769 – 4,531)	3,536 (1,596 – 6,013)	47 (21 – 81)	75
Reach 2	1,722 (524 – 3,145)	1,956 (313 – 4,141)	3,678 (1,462 – 6,228)	74 (29 – 125)	50
Total	3,072 (1,572 – 4,717)	4,142 (3,369 – 8,448)	7,214 (4,177 – 10,717)	58 (33 – 85)	125
Elk Creek	449 (75 – 899)	713 (89 – 1,428)	1,162 (388 – 2,027)	33 (11 – 58)	35
North Raven	2,248 (1,272 – 3,295)	2,034 (313 – 4,531)	4,283 (2,190 – 7,041)	119 (60 – 194)	36

5.0 SUMMARY

Our survey provides quantitative estimates of angler effort on the Clearwater River, Elk Creek and the North Raven River in the summer of 2019. These current results allow Alberta Environment and Parks to manage these important fisheries. The low use of the Clearwater River in June and July, compared to August and September, is likely due to prolonged high water and spring flood conditions in the first half of the survey. Atypically protracted spring and early summer high waters in 2019 may have affected angler use of the river; comparison of 2019 to historical averages is not possible as the hydrometric gauging station on the Clearwater River did not record data during the summer of 2019.

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6.0 APPENDICES

Appendix 1. Instantaneous angler counts from the Clearwater River, Elk Creek and the North Raven River, 2019. UTM locations are in NAD 83 Zone 11. NA = not applicable.

Date	Start location	Start Time	Reach	Count	Waterbody	Shore or boat	UTM X	UTM Y
2019-06-03	1	17:41	NA	1	North Raven River	Shore	661202	5781879
2019-06-03	1	17:41	NA	2	North Raven River	Shore	662947	5780647
2019-06-03	1	17:41	NA	0	Elk Creek	NA	NA	NA
2019-06-03	1	17:41	1	0	Clearwater	NA	NA	NA
2019-06-03	1	17:41	2	0	Clearwater	NA	NA	NA
2019-06-12	2	13:11	NA	1	Elk Creek	Shore	585463	5769236
2019-06-12	2	13:11	1	0	Clearwater	NA	NA	NA
2019-06-12	2	13:11	2	0	Clearwater	NA	NA	NA
2019-06-12	2	13:11	NA	2	North Raven River	Shore	663832	5780444
2019-06-12	2	13:11	NA	1	North Raven River	Shore	663241	5780608
2019-06-12	2	13:11	NA	1	North Raven River	Shore	662565	5782088
2019-06-12	2	13:11	NA	1	North Raven River	Shore	661404	5782341
2019-06-15	3	15:05	NA	0	North Raven River	NA	NA	NA
2019-06-15	3	15:05	NA	3	Elk Creek	Shore	582770	5767833
2019-06-15	3	15:05	1	2	Clearwater	Shore	606725	5761500
2019-06-15	3	15:05	1	1	Clearwater	Shore	628721	5764626
2019-06-15	3	15:05	1	1	Clearwater	Shore	638383	5771819
2019-06-15	3	15:05	2	0	Clearwater	NA	NA	NA
2019-06-22	1	18:51	NA	2	North Raven River	Shore	659810	5782784
2019-06-22	1	18:51	NA	1	North Raven River	Shore	660969	5781901
2019-06-22	1	18:51	NA	1	North Raven River	Shore	662927	5780831
2019-06-22	1	18:51	NA	2	North Raven River	Shore	662934	5780551
2019-06-22	1	18:51	NA	2	North Raven River	Shore	663879	5780215
2019-06-22	1	18:51	NA	1	North Raven River	Shore	664303	5779574
2019-06-22	1	18:51	NA	2	North Raven River	Shore	666081	5777577
2019-06-22	1	18:51	NA	2	North Raven River	Boat	667139	5777343
2019-06-22	1	18:51	NA	2	North Raven River	Shore	667602	5777263
2019-06-22	1	18:51	NA	1	North Raven River	Shore	670941	5774330
2019-06-22	1	18:51	NA	0	Elk Creek	NA	NA	NA
2019-06-22	1	18:51	1	0	Clearwater	NA	NA	NA
2019-06-22	1	18:51	2	0	Clearwater	NA	NA	NA
2019-06-23	2	14:33	NA	2	North Raven River	Shore	661310	5781988
2019-06-23	2	14:33	NA	1	North Raven River	Shore	663982	5780572
2019-06-23	2	14:33	NA	1	North Raven River	Shore	667524	5777564
2019-06-23	2	14:33	NA	0	Elk Creek	NA	NA	NA
2019-06-23	2	14:33	1	0	Clearwater	NA	NA	NA

Appendix 1 cont.

Date	Start location	Start Time	Reach	Count	Waterbody	Shore or boat	UTM X	UTM Y
2019-06-23	2	14:33	2	0	Clearwater	NA	NA	NA
2019-06-26	2	16:53	NA	1	North Raven River	Shore	660066	5782638
2019-06-26	2	16:53	NA	1	North Raven River	Shore	661252	5781997
2019-06-26	2	16:53	NA	1	North Raven River	Shore	662945	5780894
2019-06-26	2	16:53	NA	1	North Raven River	Shore	664849	5779566
2019-06-26	3	16:53	NA	0	Elk Creek	NA	NA	NA
2019-06-26	3	16:53	1	0	Clearwater	NA	NA	NA
2019-06-26	3	16:53	2	0	Clearwater	NA	NA	NA
2019-07-02	1	12:35	NA	1	North Raven River	Shore	663095	5781061
2019-07-02	1	12:35	NA	2	North Raven River	Shore	663565	5780214
2019-07-02	1	12:35	NA	0	Elk Creek	NA	NA	NA
2019-07-02	1	12:35	1	0	Clearwater	NA	NA	NA
2019-07-02	1	12:35	2	0	Clearwater	NA	NA	NA
2019-07-07	4	14:39	NA	0	North Raven River	NA	NA	NA
2019-07-07	4	14:39	1	0	Clearwater	NA	NA	NA
2019-07-07	4	14:39	2	0	Clearwater	NA	NA	NA
2019-07-10	3	12:53	NA	2	North Raven River	Shore	661521	5781972
2019-07-10	3	12:53	NA	2	North Raven River	Shore	667860	5777032
2019-07-10	3	12:53	NA	0	Elk Creek	NA	NA	NA
2019-07-10	3	12:53	1	0	Clearwater	NA	NA	NA
2019-07-10	3	12:53	2	0	Clearwater	NA	NA	NA
2019-07-12	1	16:27	NA	1	North Raven River	Shore	659857	5782881
2019-07-12	1	16:27	NA	2	North Raven River	Shore	664420	5779645
2019-07-12	1	16:27	NA	2	Elk Creek	Shore	584501	5768619
2019-07-12	1	16:27	1	1	Clearwater	Shore	623641	5762006
2019-07-12	1	16:27	2	0	Clearwater	Shore	NA	NA
2019-07-21	2	18:46	NA	2	North Raven River	Shore	664522	5779525
2019-07-21	2	18:46	NA	3	North Raven River	Shore	669886	5776327
2019-07-21	2	18:46	NA	0	Elk Creek	NA	NA	NA
2019-07-21	2	18:46	2	0	Clearwater	NA	NA	NA
2019-07-21	2	18:46	1	1	Clearwater	NA	609527	5761800
2019-07-24	3	14:17	NA	1	North Raven River	Shore	660844	5781992
2019-07-24	3	13:15	NA	0	Elk Creek	NA	NA	NA
2019-07-24	3	13:15	1	0	Clearwater	NA	NA	NA
2019-07-24	3	13:15	2	0	Clearwater	NA	NA	NA
2019-07-30	4	8:58	NA	0	Elk Creek	NA	NA	NA
2019-07-30	4	9:24	1	0	Clearwater	NA	NA	NA
2019-07-30	4	9:24	2	0	Clearwater	NA	NA	NA
2019-07-30	4	9:24	NA	0	North Raven River	NA	NA	NA

Appendix 1 cont.

Date	Start location	Start Time	Reach	Count	Waterbody	Shore or boat	UTM X	UTM Y
2019-08-04	4	10:51	NA	0	North Raven River	NA	NA	NA
2019-08-04	4	11:14	NA	1	Elk Creek	Shore	592084	5768475
2019-08-04	4	11:14	NA	1	Elk Creek	Shore	589634	5771274
2019-08-04	4	11:14	NA	2	Elk Creek	Shore	582900	5768176
2019-08-04	4	11:14	1	1	Clearwater	Shore	646452	5773404
2019-08-04	4	11:14	1	2	Clearwater	Shore	646089	5773351
2019-08-04	4	11:14	1	3	Clearwater	Shore	640922	5771413
2019-08-04	4	11:14	1	2	Clearwater	Shore	633944	5768563
2019-08-04	4	11:14	1	1	Clearwater	Shore	629459	5766117
2019-08-04	4	11:14	1	1	Clearwater	Shore	617818	5758236
2019-08-04	4	11:14	1	5	Clearwater	Shore	606521	5761577
2019-08-04	4	11:14	2	2	Clearwater	Shore	642120	5800206
2019-08-04	4	11:14	2	3	Clearwater	Boat	642300	5792608
2019-08-04	4	11:14	2	4	Clearwater	Boat	643601	5792483
2019-08-04	4	11:14	2	1	Clearwater	Shore	642120	5800206
2019-08-04	4	11:14	2	3	Clearwater	Shore	646766	5774077
2019-08-05	2	10:48	NA	2	North Raven River	Shore	661082	5781901
2019-08-05	2	9:17	NA	2	Elk Creek	Shore	589674	5771294
2019-08-05	2	9:17	1	2	Clearwater	Shore	632726	5768397
2019-08-05	2	9:17	2	0	Clearwater	0	NA	NA
2019-08-05	2	9:17	1	2	Clearwater	Shore	629867	5766556
2019-08-13	2	13:05	NA	1	North Raven River	Shore	661163	5781865
2019-08-13	2	13:49	NA	0	Elk Creek	Shore	NA	NA
2019-08-13	2	13:49	1	1	Clearwater	Shore	629278	5766460
2019-08-13	2	13:49	1	2	Clearwater	Shore	630213	5766277
2019-08-13	2	13:49	2	2	Clearwater	Shore	643945	5792596
2019-08-13	2	13:49	2	1	Clearwater	Shore	641751	5799919
2019-08-15	1	18:28	NA	0	North Raven River	NA	NA	NA
2019-08-15	1	16:52	NA	0	Elk Creek	NA	NA	NA
2019-08-15	1	16:52	1	3	Clearwater	Boat	633087	5768254
2019-08-15	1	16:52	2	0	Clearwater	NA	NA	NA
2019-08-24	4	14:47	NA	1	North Raven River	Shore	667628	5777008
2019-08-24	4	15:08	NA	1	Elk Creek	Shore	583492	5768674
2019-08-24	4	15:08	1	1	Clearwater	Shore	646129	5773435
2019-08-24	4	15:08	1	1	Clearwater	Shore	624951	5764269
2019-08-24	4	15:08	1	3	Clearwater	Shore	612876	5761050
2019-08-24	4	15:08	2	2	Clearwater	Shore	650453	5777905
2019-08-24	4	15:08	2	2	Clearwater	Shore	646907	5773663
2019-08-24	4	15:08	1	1	Clearwater	Boat	639404	5802069
2019-08-25	2	16:09	NA	0	North Raven River	NA	NA	NA

Appendix 1 cont.

Date	Start location	Start Time	Reach	Count	Waterbody	Shore or boat	UTM X	UTM Y
2019-08-25	2	14:37	NA	0	Elk Creek	NA	NA	NA
2019-08-25	2	14:37	1	1	Clearwater	NA	629506	5766758
2019-08-25	2	14:37	1	1	Clearwater	Shore	593155	5767615
2019-08-25	2	14:37	2	1	Clearwater	Shore	644841	5792612
2019-08-25	2	14:37	2	1	Clearwater	Shore	645719	5791724
2019-08-25	2	14:37	2	3	Clearwater	Shore	646838	5789807
2019-08-25	2	14:37	2	2	Clearwater	Shore	646939	5774469
2019-08-25	2	14:37	2	1	Clearwater	Shore	647098	5773885
2019-08-28	1	16:14	NA	0	North Raven River	NA	NA	NA
2019-08-28	1	15:04	NA	0	Elk Creek	NA	NA	NA
2019-08-28	1	15:04	1	2	Clearwater	Shore	646692	5773805
2019-08-28	1	15:04	2	4	Clearwater	Shore	651332	5779620
2019-08-28	1	15:04	2	1	Clearwater	Shore	644609	5792051
2019-08-29	1	10:14	NA	1	North Raven River	Shore	662858	5781304
2019-08-29	1	8:59	NA	0	Elk Creek	NA	NA	NA
2019-08-29	1	8:59	1	0	Clearwater	NA	NA	NA
2019-08-29	1	8:59	2	0	Clearwater	NA	NA	NA
2019-09-02	1	14:06	NA	0	North Raven River	NA	NA	NA
2019-09-02	1	12:58	NA	0	Elk Creek	NA	NA	NA
2019-09-02	1	12:58	1	2	Clearwater	Shore	629265	5766430
2019-09-02	1	12:58	2	1	Clearwater	Shore	647376	5774206
2019-09-02	1	12:58	2	1	Clearwater	Shore	646211	5791563
2019-09-02	1	12:58	2	4	Clearwater	Shore	641479	5799901
2019-09-03	3	9:01	NA	0	North Raven River	NA	NA	NA
2019-09-03	3	9:43	NA	0	Elk Creek	NA	NA	NA
2019-09-03	3	9:43	1	0	Clearwater	NA	NA	NA
2019-09-03	3	9:43	2	0	Clearwater	NA	NA	NA
2019-09-05	1	12:12	NA	1	North Raven River	NA	NA	NA
2019-09-05	1	12:12	NA	1	North Raven River	NA	NA	NA
2019-09-05	1	10:59	NA	1	Elk Creek	Shore	NA	NA
2019-09-05	1	10:59	1	2	Clearwater	Shore	NA	NA
2019-09-05	1	10:59	1	1	Clearwater	Shore	NA	NA
2019-09-05	1	10:59	2	1	Clearwater	Shore	NA	NA
2019-09-17	3	16:48	NA	1	North Raven River	Shore	NA	NA
2019-09-17	3	17:34	NA	0	Elk Creek	NA	NA	NA
2019-09-17	3	17:34	1	0	Clearwater	NA	NA	NA
2019-09-17	3	17:34	2	2	Clearwater	Boat	NA	NA
2019-09-23	3	12:15	NA	0	North Raven River	NA	NA	NA
2019-09-23	3	11:03	NA	0	Elk Creek	NA	NA	NA
2019-09-23	3	11:03	1	0	Clearwater	NA	NA	NA

Appendix 1 cont.

Date	Start location	Start Time	Reach	Count	Waterbody	Shore or boat	UTM X	UTM Y
2019-09-23	3	11:03	2	2	Clearwater	Shore	NA	NA
2019-09-23	3	11:03	2	1	Clearwater	Shore	NA	NA
2019-09-23	3	11:03	2	2	Clearwater	Shore	NA	NA
2019-09-23	3	11:03	2	1	Clearwater	Shore	NA	NA

