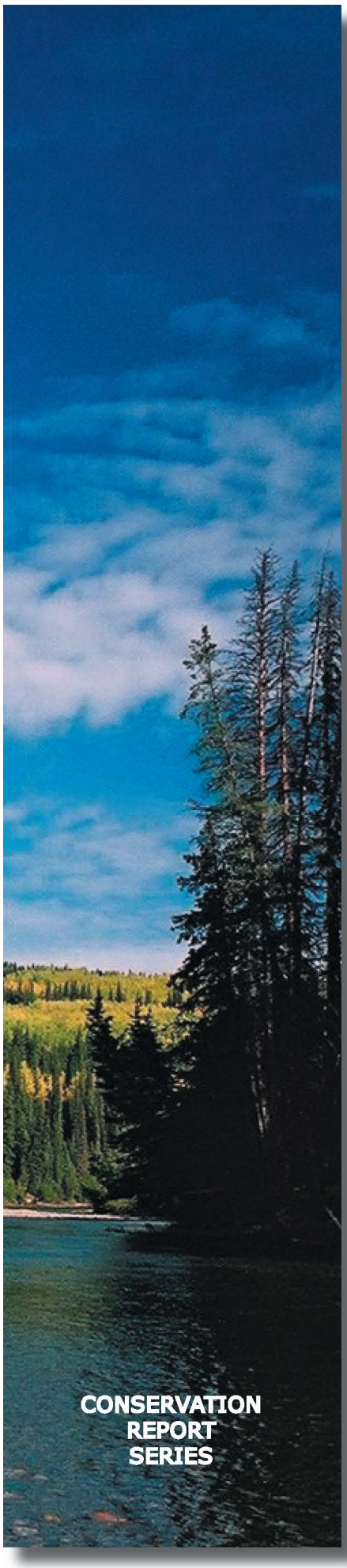

Angler Survey in the Berland River Watershed, Alberta, 2019

Alberta Conservation Association

Angler Survey in the Berland River Watershed, Alberta, 2019

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EXECUTIVE SUMMARY

The Native Trout Recovery Initiative (NTRI) is a government-based program that promotes the recovery of declining native trout and whitefish populations along the eastern slopes of northcentral Alberta. The Berland River watershed is a focal system in the NTRI, as recent fisheries sustainability index analysis indicates that native trout and whitefish populations in the system are at a *high*- to *very high*-risk state compared to provincial standards. Given the Berland River is open to public recreational fishing, angling pressure is a potential threat that could affect fish populations, yet very little recent data exist. To address this need and support the NTRI, Alberta Conservation Association conducted an aerial-type angler survey on the Berland River during the summer of 2019 to estimate angling effort.

We conducted instantaneous aerial angler counts on the Berland River between June 1 and September 15, 2019. We selected survey dates and times using Pollock et al. (1994) two-stage sampling design, stratified by day type (weekend/holiday or weekday), and flight times (3-h time blocks: 0900, 1200, 1500, 1800 hours). We flew 23 surveys and observed 28 anglers during the study period; we did not observe anglers during 14 (61%) flights, 10 of which occurred in June and July during unseasonably high stream flows. We used bootstrapping to derive estimates and associated 95% confidence intervals for angling effort from aerial angler counts.

Between June 1 and September 15, 2019, we estimated anglers fished an estimated total of 1,595 hours (95% CI = 773 – 2,541) or 7.45 h/km (95% CI = 3.6 – 11.9) on the 214 km surveyed on the Berland River. Most of the angling effort, 1,158 hours (95% CI = 532 – 1,789) or 5.41 h/km (95% CI = 0 – 8.36), occurred on weekend/holiday days; weekday angling effort was estimated at 437 hours (95% CI = 0 – 1,092) or 2.04 h/km (95% CI = 0 – 5.10).

Key words: aerial counts, angling effort, angler survey, Berland River, Fisheries Sustainability Index, native trout, Native Trout Recovery Initiative, whitefish.

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Funding for this project was provided by Alberta Conservation Association (ACA). We thank ACA staff members Dave Jackson, Garrett McKen, and Scott Seward for assisting with data collection during aerial surveys. Thanks to Mike Blackburn (Alberta Environment and Parks) for his input into the project.

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1.0 INTRODUCTION

The Native Trout Recovery Initiative (NTRI) is a government-led program that promotes the recovery of native trout and whitefish populations in the central and northern east slopes of Alberta (Government of Alberta 2020a). The Berland River watershed is one of the focal systems for the NTRI. Focal NTRI species in the Berland River watershed include the Athabasca rainbow trout *(Oncorhynchus mykiss*), which is *Endangered* in Canada (Fisheries and Oceans 2019a) and *Threatened* in Alberta (Alberta Queen's Printer 2019), bull trout (*Salvelinus confluentus*), which is a *Species of Special Concern* in Canada (Fisheries and Oceans 2019b) and *Threatened* in Alberta (Alberta Queen's Printer 2019), Arctic grayling (*Thymallus arcticus*), which is a *Species of Special Concern* in Alberta (Alberta Environment and Parks and Alberta Conservation Association 2015, Government of Alberta 2020b), and mountain whitefish (*Prosopium williamsoni*).

Alberta Environment and Park (AEP) uses a Fish Sustainability Index (FSI) as a standardized process of assessment that provides a landscape-level overview of fish sustainability in provincial waters (MacPherson et al. 2014). Recent FSI analysis for the Berland River indicates that populations of native trout and mountain whitefish in the system are at *high*- to *very high*-risk state compared to provincial standards (Government of Alberta 2017, Government of Alberta 2020c). Given the Berland River is open to public recreational fishing, angling pressure constitutes a potential threat that could impact fish populations, yet very little recent data exist (Mike Blackburn, AEP pers. comm.). In 2019, Alberta Conservation Association (ACA) conducted an aerial-type angler survey to estimate angling pressure in the Berland River during the summer angling season to generate data that support the NTRI.

2.0 STUDY AREA

Our study took place in the Berland River hydrological unit code 8 watershed along the eastern slopes of northcentral Alberta, approximately 275 km northwest of Edmonton (Figure 1). The survey was from the confluence of the Berland and Athabasca rivers, upstream approximately 214 km to the confluence of the South Berland and North Berland rivers. The Berland River headwaters are in the Willmore Wilderness Park, north of Jasper National Park. Downstream of the headwaters, the watershed is part of Alberta's Public Lands and managed as Forest Management Areas. Angling is considerably more accessible in the lower half of the watershed as road development from industry is considerably more extensive than in the upper half. The Berland River is in the Eastern Slopes 3 Fish Management Zone and streams are open to angling between April 1 and October 31 (Government of Alberta 2019). Currently, catch-and-release regulations apply to Athabasca rainbow trout, bull trout, and Arctic grayling; harvest is permitted for the three other sportfish species, including mountain whitefish, northern pike (*Esox lucius*), and walleye (*Sander vitreus*).

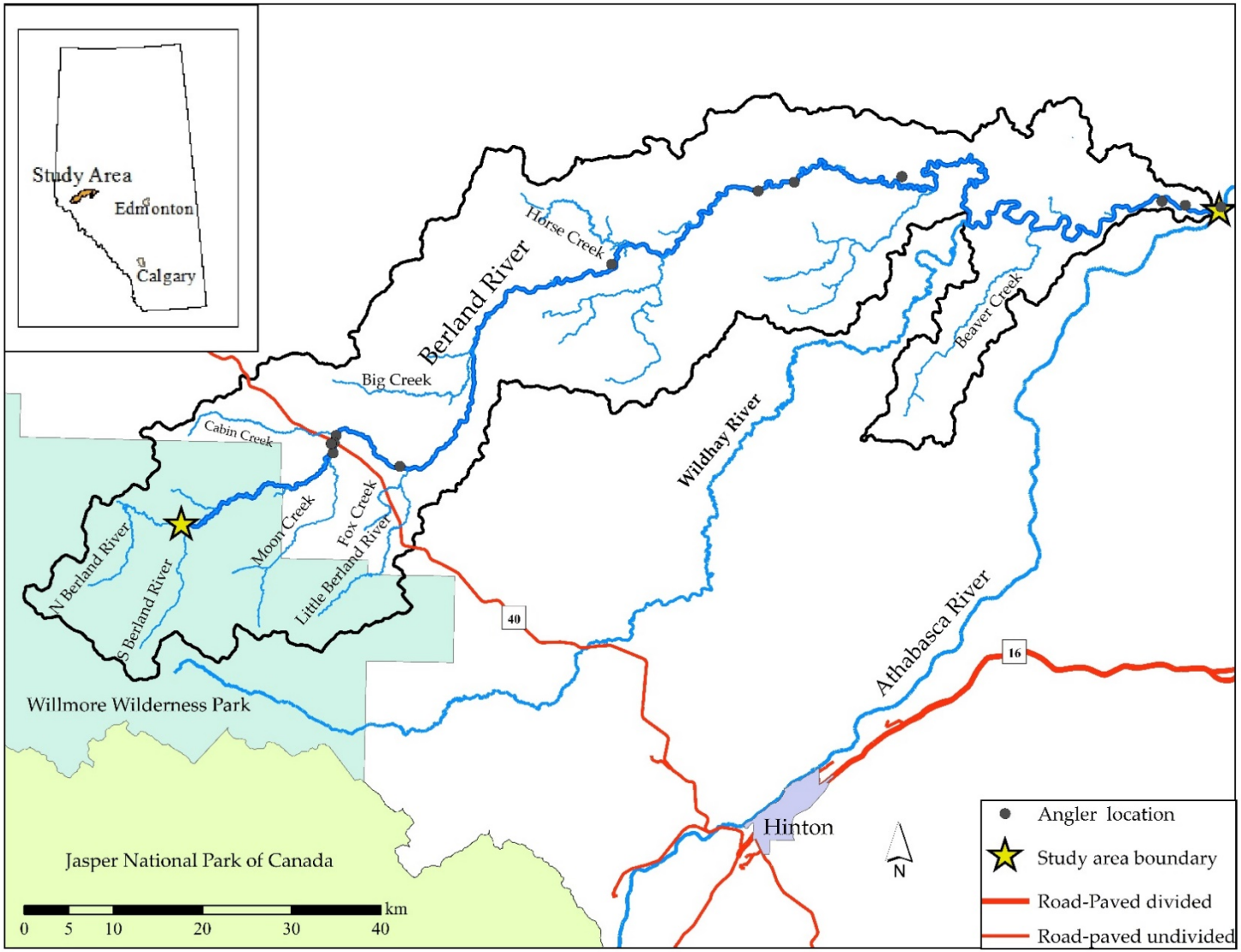

Figure 1. Berland River angler survey study area, 2019. Inset map shows the location of the study area within the province of Alberta.

3.0 MATERIALS AND METHODS

3.1 Survey design

Between June 1 and September 15, 2019, we conducted an aerial-type angler survey on the Berland River following the methods in Pollock et al. (1994) and Hoenig et al. (1993) to estimate angling effort. Flights were conducted using a Robinson R44 helicopter. We used a power analysis of data from previous upper Bow River angler counts (R.L. & L. Environmental Services 1995) to estimate the required number of flights for this survey.

Days and times for flights were selected by 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 72 available weekdays and 34 weekend days, with the probability of selecting weekday and weekend/holiday adjusted so the final draw had 60% of flights on weekends/holidays and 40% on weekdays. Second, flight times were selected by dividing the day into time blocks equivalent to the time it takes to complete a count, and one of these time blocks was randomly selected. For our study, the secondary sampling unit was a 3-h time block with start times of 0900, 1200, 1500, or 1800 hours. When weather conditions prevented safe flight (low visibility, high wind, or thunderstorm activity), surveys were rescheduled by randomly selecting a new date from the pool of available dates. We completed a total of 23 aerial counts between June 1 and September 15, 2019. The distribution of flights over weekdays and weekends/holidays is shown in Table 1.

Table 1. Number of instantaneous aerial angler surveys completed on the Berland River, 2019.

Start time (h)	Number of flights	
	Weekend/holiday	Weekday
0900	3	1
1200	4	3
1500	4	4
1800	2	2
Total	13	10

Direction of aerial flights was randomized in either upstream or downstream from specified location. Downstream flights began at the confluence of the South and North Berland rivers and ended at the confluence of the Athabasca and Berland rivers (see Figure 1); upstream flights were conducted in the opposite direction.

We conducted aerial survey counts with two observers, both positioned 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 approximately 150 m above ground level. The aircraft was maneuvered to provide both observers full view of the river channel. If observers were uncertain about angler counts, or their view was obstructed by river features (braids, cliffs etc.), the aircraft circled the area until observers confirmed angler counts. When necessary, we used image stabilizing binoculars to assist with angler counts.

3.2 Estimation of creel parameters

We used bootstrapping (50,000 replicates) to derive estimates and associated 95% confidence intervals for angling effort from aerial angler counts (Sullivan 2004, Government of Alberta 2015). Bootstrapped angler counts produced a distribution of mean angler counts used as the basis for calculating angling effort. Weekday and weekend/holiday data were bootstrapped separately and then combined as a total estimate. Angler count distributions multiplied by the available angling hours (i.e., total daylight hours ±30 minutes from sunrise/sunset) between June 1 and September 15 in Edson, Alberta, provided estimates and confidence intervals for angling effort (h). We calculated estimates of angler survey parameters using the R software package (R Core Team 2017).

4.0 RESULTS

Between June 1 and September 15, 2019, we counted 28 anglers during 23 flights; only eight anglers were counted in the first 12 flights in June and July when streams were flooded. The mean (±SD) instantaneous angler count was 1.22 ± 1.78 anglers per flight and was almost three times higher on weekends (1.82 ± 1.78) than weekdays (0.67 ± 1.61). We did not observe anglers on the Berland River on 14 (61%) flights, and of the nine flights when we observed anglers, the maximum count was five (Appendix 1).

Anglers fished for an estimated total of 1,595 h (95% CI = 773 – 2,541) or 7.45 h/km (95% CI = 3.6 – 11.9) on the 214 km surveyed on the Berland River during the survey period. The majority of angling effort, 1,158 h (95% CI = 532 – 1,789) or 5.41 h/km (95% CI = 0 – 8.36), occurred on weekends/holidays; weekday angling effort was estimated at 437 h (95% CI = 0 – 1,092) or 2.04 h/km (95% CI = 0 – 5.10).

Recognizing that most anglers were counted in the last half of the survey (August and September, n = 20), we completed a separate analysis to estimate angling effort in June and July (early summer), and in August and September (late summer). In this analysis, we did not stratify by weekday and weekend/holiday day types as our sample size was too small to support stratification at this level. Early summer angling effort was estimated at 716 h (95% CI = 0 – 1,800) or 3.35 h/km (95% CI = 0 – 8.41), and late summer effort was 1,274 h (95% CI = 574 – 1,976) or 5.95 h/km (95% CI = 2.68 – 9.23).

5.0 SUMMARY

From June 1 to September 15, 2019, we estimated that anglers fished the Berland River for a total of 1,595 hours, with most of the angling effort occurring on weekends. It is likely that unseasonably high stream flows in June and July reduced angler counts in the Berland River in 2019. Therefore, angling effort estimates in this report may not have adequately captured the level of effort in a typical year.

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7.0 APPENDICES

Appendix 1. Summary of aerial angler count survey on the Berland River, 2019. (WE = weekend day, WD = weekday).

Flight number	Date	Time	Day type	Time of day	Angler count
1	Jun-02-2019	11:56:00	WE	AM	0
2	Jun-19-2019	12:06:00	WD	AM	3
3	Jun-23-2019	18:00:00	WE	PM	0
4	Jun-25-2019	12:10:00	WD	AM	0
5	Jul-02-2019	18:45:00	WD	PM	0
6	Jul-07-2019	13:34:00	WE	PM	0
7	Jul-11-2019	18:20:00	WD	PM	0
8	Jul-13-2019	9:11:00	WE	AM	0
9	Jul-17-2019	15:34:00	WD	PM	0
10	Jul-21-2019	19:24:00	WE	PM	5
11	Jul-23-2019	12:10:00	WD	AM	0
12	Jul-27-2019	9:47:00	WE	AM	0
13	Aug-03-2019	14:55:00	WE	PM	5
14	Aug-13-2019	15:31:00	WD	PM	0
15	Aug-24-2019	15:11:00	WE	PM	4
16	Aug-27-2019	15:19:00	WD	PM	0
17	Aug-31-2019	15:25:00	WE	PM	2
18	Sep-01-2019	9:51:00	WE	AM	3
19	Sep-06-2019	9:57:00	WD	AM	1
20	Sep-07-2019	12:31:00	WE	AM	3
21	Sep-11-2019	12:43:00	WD	AM	0
22	Sep-13-2019	15:13:00	WD	PM	0
23	Sep-15-2019	15:04:00	WE	PM	2


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