



Angler Effort at Select Mountain Lakes in Alberta, 2022

Final Report



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**ACA PROJECT
REPORT**

Angler Effort at Select Mountain Lakes in Alberta, 2022

Final Report

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EXECUTIVE SUMMARY

Native populations of westslope cutthroat trout (*Oncorhynchus lewisi*; WSCT) currently occupy only 5% of their historical range in Alberta and the species is listed as *Threatened* under Canada's *Species at Risk Act*. A native WSCT population of conservation concern in Alberta is in Picklejar Lakes in the Upper Bow River drainage. High angling effort is suspected as a threat to the persistence of this unique population. To assess this potential threat, we estimated angling effort at Picklejar Lakes over the summer of 2022 using data collected by trail cameras. We also estimated angler effort at eight additional mountain lakes in the Upper Bow River and Upper Oldman River drainage basins to compare angler effort at Picklejar Lakes to that at lakes with similar characteristics. Our results confirm the suspected high angler use; Picklejar Lakes 2 and 4 had average angler efforts of 86.3 hours/ha and 320.6 hours/ha, respectively, during the 2022 angling season. The angling effort at Picklejar Lake 4 was almost twice as high as at the lake with the second highest angling effort. Overall, our estimates of standardized angler effort in 2022 suggest a wide range of angling pressure on lakes in Alberta's Eastern Slopes, with some lakes very infrequently used (0.1 hours/ha) by anglers, while others have substantial use (320.6 hours/ha). Our estimates are the first quantitative angler effort estimates at the Picklejar Lakes and serve as baseline for future comparisons. As well, the angler effort data we generated can be used by managers to investigate if current angling regulations are adequate to protect the unique population of WSCT in Picklejar Lakes.

Key words: Picklejar Lakes, westslope cutthroat trout, angler effort, Bow River, Oldman River, Alberta.

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TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
2.0	STUDY AREA.....	1
3.0	MATERIALS AND METHODS	3
4.0	RESULTS.....	4
5.0	SUMMARY	6
6.0	LITERATURE CITED.....	7

LIST OF FIGURES

Figure 1.	Alpine and subalpine study lakes in the Bow River and Oldman River Hydrologic Unit Code 4 drainage basins of Alberta, where angler effort was estimated in 2022.	2
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LIST OF TABLES

Table 1.	Characteristics of mountain lakes in Alberta where angler effort was estimated in 2022.....	3
Table 2.	Angler counts and estimated angler effort at select mountain lakes in Alberta, 2022.	5

1.0 INTRODUCTION

Native populations of westslope cutthroat trout (*Oncorhynchus lewisi*; WSCT) currently occupy only 5% of their historical range in Alberta (Alberta Westslope Cutthroat Trout Recovery Team 2013), and the species is listed as *Threatened* under Alberta's *Wildlife Act* (Alberta King's Printer 2023) and Canada's *Species at Risk Act* (Fisheries and Oceans Canada 2014). The cumulative effects of habitat loss, overharvesting, and non-native introductions are considered threats to the species (ASRD and ACA 2006). To effectively safeguard against extirpation, it is imperative to protect existing native populations and expand both the range and number of new populations. A native WSCT population of conservation concern occurs in Picklejar Lakes, a series of four connected lakes (Picklejar Lakes 1, 2, 3, and 4) in the Upper Bow River drainage. Anecdotal evidence suggests that Picklejar Lakes are very popular angling destinations and experience high angling use.

In 2015, the Government of Alberta (GOA) implemented a catch-and-release (zero harvest) angling regulation at Picklejar Lakes to protect the WSCT population from suspected high angling pressure and harvest. In 2021, the GOA completed population assessments at Picklejar Lakes 2 and 4 to evaluate the impact of the catch-and-release regulations on fish size and age structure; however, angling effort has not been estimated. To complement the population assessments, we estimated angling effort at Picklejar Lakes over the summer of 2022 using data collected with trail cameras. To provide a range of angler use relative to that at Picklejar Lakes, we estimated angling effort at eight additional mountain lakes in Alberta's Eastern Slopes. The relatively small size (1.3–18.4 ha) and remote nature of our study lakes make them ideal candidates for trail camera methods to estimate angling effort (Newton et al. 2013).

2.0 STUDY AREA

Our study lakes are in the Alpine and Subalpine natural subregions (Natural Regions Committee 2006) in the south-central Eastern Slopes of Alberta (Figure 1). Six lakes are in the Upper Bow River drainage basins and three are in the Upper Oldman River drainage basin (Figure 1, Table 1). Picklejar Lakes, our focal lakes, are a series of hydrologically connected lakes in the Upper Bow River drainage, numbered sequentially from upstream to downstream as lakes 1 to 4. Lakes 2 and 4 support self-sustaining populations of native WSCT, while lakes 1 and 3 are believed to have only transient populations. Other study lakes are sustained either through regular stocking or have self-sustaining stocked populations of WSCT (*Oncorhynchus lewisi*), golden trout (*Oncorhynchus mykiss aguabonita*), and Dolly Varden (*Salvelinus malma*) (Table 1).

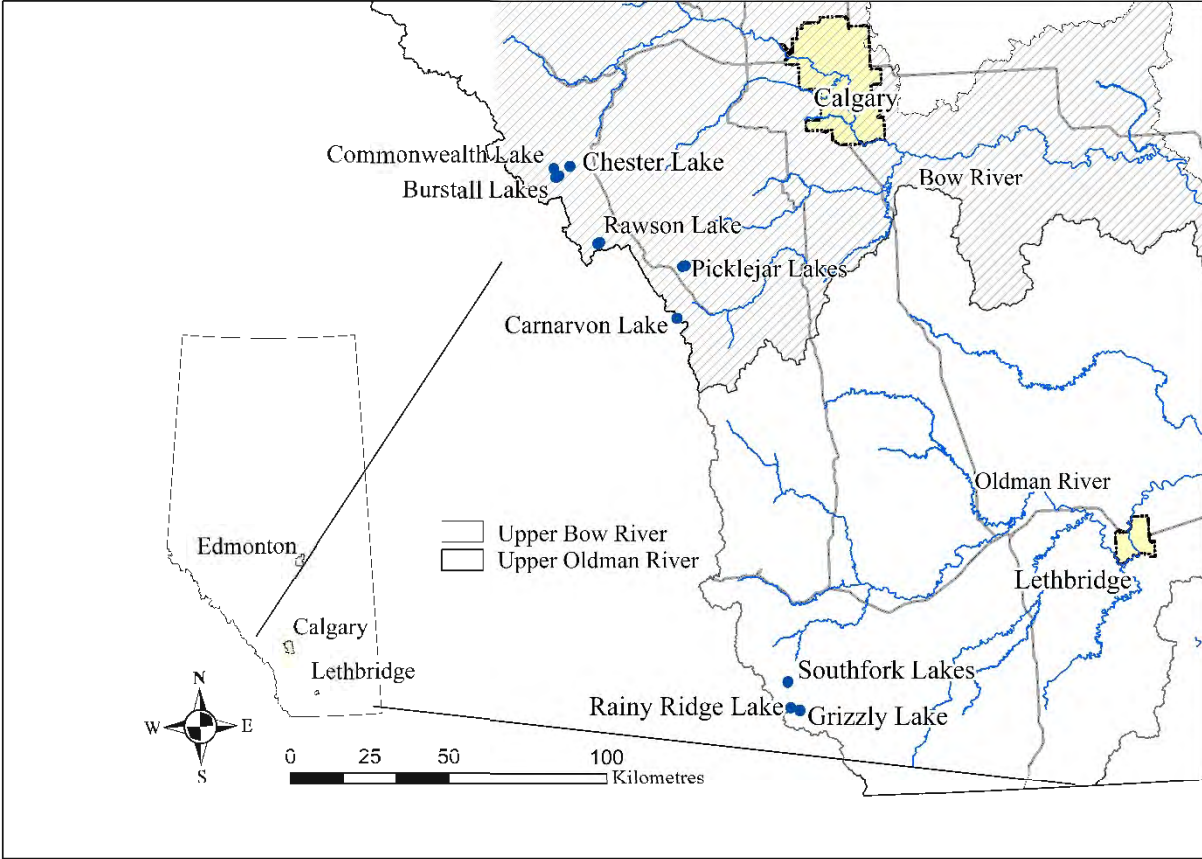


Figure 1. Alpine and subalpine study lakes in the Bow River and Oldman River Hydrologic Unit Code 4 drainage basins of Alberta, where angler effort was estimated in 2022.

Table 1. Characteristics of mountain lakes in Alberta where angler effort was estimated in 2022.

HUC ⁴ Drainage	Natural Subregion ²	Lake	Fishing Season ³	Fish Species ⁴	Surface Area (ha)	Number of Cameras	% Lake Surface Area Camera Covered	
Bow River	Subalpine	Carnarvon	Open all year	CTTR; self-sustaining	6.4	1	17	
		Commonwealth	Open all year	CTTR-stocked	1.8	1	86	
		Picklejar 4	Jul 1–Oct 31	Native WSCT	1.5	2	78	
		Picklejar 3	Jul 1–Oct 31	Native WSCT	1.1	1	53	
		Picklejar 2	Jul 1–Oct 31	Native WSCT	3.3	2	98	
		Picklejar 1	Jul 1–Oct 31	Native WSCT	2.1	1	74	
		Alpine	Chester	Jul 1–Oct 31	CTTR, DLVR; self-sustaining	5.1	1	44
		Alpine	Rawson	Jul 16–Oct 31	CTTR; self-sustaining	18.4	1	45
		Subalpine	Burstall upper	Open all year	CTTR-stocked	9.3	1	52
		Subalpine	Burstall lower	Open all year	CTTR-stocked	8.6	1	36
Oldman River	Subalpine	Rainy Ridge	Jul 16–Oct 31	GLTR; self-sustaining	2.5	1	51	
		Southfork lower	Jul 16–Oct 31	GLTR-stocked	1.3	1	70	
		Southfork upper	Jul 16–Oct 31	GLTR-stocked	2.7	1	75	
		Grizzly	Open all year	Fishless	6.8	1	64	

¹ HUC = hydrologic unit code

² As per the Natural Regions and Subregions of Alberta (Natural Regions Committee 2006)

³ As per the 2023 *Alberta Guide to Sportfishing Regulations* (GOA 2023)

⁴ DLVR = Dolly Varden, CTTR = cutthroat trout, WSCT = westslope cutthroat trout, GLTR = golden trout

3.0 MATERIALS AND METHODS

Between July 5 and July 22, 2022, we installed one to two trail cameras (Reconyx Hyperfire Professional PC900) at each study lake. As the focus of our angler effort estimates were Picklejar Lakes 2 and 4, we installed two cameras at each of these lakes to ensure near full spatial coverage (Table 1); however, angler effort estimates at all lakes were corrected to account for spatial strata not covered by cameras. Cameras with security housings were locked to trees and programmed to take photographs at 30-minute intervals from 0600 to 2300 hours. Our goal was to have trail cameras installed and collecting data before opening day of the fishing season (for

lakes with seasonal closures); however, late snowmelt and extended trail closures in 2022 did not permit this in all cases. Where possible, trail cameras were oriented facing north to minimize sun glare in photos. Photos with angler counts confounded by glare, fog, etc. were removed from the analysis. As fishing seasons and trail camera data collection dates varied between lakes, we standardized our estimates of angler effort from July 1 to September 30.

We counted anglers in each photograph during the open fishing season from 30 minutes before sunrise to 30 minutes after sunset. These counts were then bootstrapped following Haddon (2011) with 10,000 replicates to develop a distribution of mean instantaneous counts (Sullivan and Patterson 2022). A distribution of angler hours in the field of view of a camera was estimated based on Pollock et al. (1994), by multiplying the distribution of mean instantaneous counts by the total available hours in the sample frame (sum of hours in the daily fishing period for the geographic location of the camera). A distribution of whole-lake estimates was derived by multiplying the distribution of angler hours in the field of view by the ratio of total lake area to lake area in the camera field of view. To enable among-lake comparisons of effort, we used standardized effort obtained by dividing the distribution of whole-lake estimates by the surface area of the lake to derive a distribution of hours/ha. We report on means and 95% confidence intervals from these distributions.

4.0 RESULTS

A wide range of angler use was documented at our study lakes (Table 2). Total angler counts for the 2022 angling season ranged from two at Commonwealth Lake to 942 at Rawson Lake (Table 2). Commonwealth Lake had the lowest estimated angling effort (total and standardized), while Rawson Lake had the highest total effort. Picklejar Lake 4 had the highest standardized angler effort, nearly twice that of the lake with the second highest standardized angling effort (lower Southfork Lake) (Table 2). Relative to Picklejar Lake 4, standardized effort was moderate at Picklejar Lake 2 but still higher than that at several other lakes (Table 2). Overall, two of our focal lakes were in the top five lakes with the highest standardized angling effort estimates.

Table 2. Angler counts and estimated angler effort at select mountain lakes in Alberta, 2022.

Lake	Angler Count	Angling Effort (Hours)		Standardized Angling Effort (Hours/ha)	
		Total	95 CI ¹	Total	95 CI ¹
Picklejar 4	552	457.2	406.8–511.3	320.6	285.3–358.5
Picklejar 3	3	3.6	0–9.8	3.4	0–9.0
Picklejar 2	165	257.2	221.3–295.0	86.3	74.2–99.0
Picklejar 1	5	6.8	1.4–13.7	3.3	0.7–6.5
Carnarvon	163	802.4	659.4–954.7	123.8	101.7–147.3
Commonwealth	2	1.7	0–4.2	0.1	0–2.3
Chester	363	573.5	499.2–654.0	113.8	99.0–129.8
Rawson	942	1,386.1	1,260.7–1,519.5	75.5	68.6–82.7
Burstall upper	23	35.7	18.6–55.9	3.8	2.0–6.0
Burstall lower	4	8.9	0–20.2	1.0	0–23.0
Rainy Ridge	132	169.2	132.2–209.2	67.9	53.1–84.0
Southfork lower	252	230.4	197.1–265.7	174.5	149.3–201.3
Southfork upper	27	21.4	12.7–31.7	7.5	4.5–11.1
Grizzly	20	22.4	11.2–35.9	3.3	1.7–5.3

¹ CI = confidence interval

5.0 SUMMARY

Our results from 2022 confirm that Picklejar Lakes 2 and 4 can have high angler use. In 2022, Picklejar Lake 4 had especially high angling pressure relative to the other mountain lakes we assessed. Estimates of standardized effort suggest a wide range of angler use of mountain lakes in Alberta's Eastern Slopes, with some lakes very infrequently used by anglers, while others have substantial use. We provide the first quantitative estimates of angler effort at Picklejar Lakes, and these estimates can serve as a baseline for future comparisons. Estimates of angler effort can also be used to investigate if current angling regulations are adequate to protect this unique population.

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