

FISHERIES MANAGEMENT ENHANCEMENT PROGRAM

&

FOOTHILLS MODEL FOREST

**SURVEY OF SPORTFISH IN UPPER
SUNDANCE CREEK, AUGUST 1996**



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SURVEY OF SPORTFISH IN UPPER

SUNDANCE CREEK AUGUST 1996

by

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ABSTRACT

The nomination of upper Sundance Creek and Sundance Lakes for Special Places 2000 prompted a fisheries survey of the upper portions of the creek. On 17 August 1996, 20 anglers from local conservation groups and an electrofishing crew from the Foothills Model Forest flew by helicopter into the upper Sundance Creek valley. Although both the lake and upper creek were nominated for Special Places 2000, only the creek was surveyed. The anglers fished for a total of 48.5 hours and captured 8 fish (5 rainbow trout, 2 Arctic grayling, and 1 northern pike). The catch rates for each of these species were very low, suggesting that fish densities are low. Three electrofishing surveys captured 43 fish, none of which were sport-fish (3 burbot, 38 longnose sucker, and 1 white sucker). The results of the habitat surveys showed a range of habitat types, which suggests that habitat is probably not limiting fish production in upper Sundance Creek. Although present fish population densities appear lower than reported historical densities, the fisheries potential for Sundance Creek probably still exists and it should not be excluded from Special Places 2000 based upon this.

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INTRODUCTION

In 1996, Sundance Lake and upper Sundance Creek (Plate 1) were nominated for inclusion in Special Places 2000. The Special Places 2000 program was initiated by the Alberta Government to ensure the protection of unique and sensitive areas in Alberta. This program places emphasis on preservation, heritage appreciation, outdoor recreation and tourism/economic development. The nomination of the upper Sundance Creek area was initiated in part by the findings of Sweetgrass Consultants (1994) who identified this area as regionally important for several reasons, including fish resources.

Sweetgrass Consultants (1994) suggested that Sundance Creek provides habitat for bull trout (*Salvelinus confluentus*), native rainbow trout (*Oncorhynchus mykiss*), and a significant population of Arctic grayling (*Thymallus arcticus*). In addition to this, Sweetgrass Consultants (1994) identified Sundance Creek as “one of a handful of important fish habitats in the Lower Foothills of the region”. Although considerable work has been completed on the fish populations of lower Sundance Creek in the early 1990s (R.L. & L. 1993 and 1996), little work has been completed in the upper portions of Sundance Creek. As a result, it is unknown if the comments made by Sweetgrass Consultants regarding the fisheries resource and associated habitats are valid for the upper portions of Sundance Creek.

The purpose of this study was to conduct a small fish inventory of upper Sundance Creek in 1996 to gain a better understanding of the status of the fish populations in this area. The main objectives of the study were:

1. To provide fisheries information needed to evaluate the nomination of the area.
2. To provide baseline fisheries information to Fish and Wildlife in an unsurveyed area of Fish Management Area 4 (FMA 4).
3. To provide anglers with an opportunity to participate in a nomination effort for resource preservation.
4. To determine whether species introduced into the lower reaches have expanded their range to include the headwaters.



Plate 1. Looking north on Sundance Creek upstream from the transmission line.

METHODS AND MATERIALS

Description of study area

Sundance Creek is a tributary to the McLeod river and is located in the Lower Foothills Sub-region of the Foothills Natural Region (Beckingham, et al. 1996) of west-central Alberta. A more detailed description of Sundance Creek can be found in R.L. & L. (1993). The present study focused on the upper portion of Sundance Creek for approximately 6 km downstream from the outlet of Sundance Lake (Figure 1).

Because of the difficult access associated with this area (see Plate 2), both the anglers and the electrofishing crew were flown in by helicopter. Three helicopter



Plate 2. View of the upper Sundance Creek valley. Note the steep valley walls.

landing-pads were located along the creek; one immediately downstream from Sundance Lake ($53^{\circ}43'15''$ W $116^{\circ}55'53''$), one downstream of the transmission line crossing ($53^{\circ}39'48''$ W $116^{\circ}52'00''$), and a third located between these two ($53^{\circ}40'59''$ W $116^{\circ}53'18''$). These helicopter landing-pads were used as staging areas for both the angling and electrofishing surveys. The landing-pads were identified as site 1 being closest to the lake (electrofishing site 96128), the next downstream landing-pad as site 2 (electrofishing site 96127), and the landing-pad downstream from the transmission line as site 3 (electrofishing site 96126).

Angling survey

Anglers from local interest groups were contacted and invited to participate in a one-day angling survey. A maximum of 20 anglers was allowed because of safety and logistical concerns. This group of anglers was divided into three groups and each group transported by helicopter to one of the three landing-pads. From there, the anglers were divided into two parties; one party to angle upstream from the landing-pad, and the other to angle downstream from the landing-pad. Each angler was to record the length of time spent angling, the gear type used (fly, spin, barbed, barbless, bait), and if any fish were captured, the species and fork length (to the nearest mm).

Electrofishing survey

Site locations

The three electrofishing sites were located near the helicopter landing-pads. Each site was 300 m in length measured upstream from each of the landing-pads. Anglers were allowed to angle the section of stream prior to electrofishing.

Fish data

Fish were captured using a Smith-Root Type 12-A backpack electrofisher following provincial electrofishing guidelines (Kraft *et al.* 1982). Data collected and recorded from captured fish included fork length measurements (to the nearest mm) and species identification.

Habitat data

Several habitat parameters were collected during the electrofishing surveys. Although most of the parameters collected were estimated, some were measured. The estimated parameters included: substrate composition, pool:riffle:run ratio, bank stability, obstructions, and cover composition which includes surface turbulence, aquatic vegetation, instream debris, terrestrial canopy, rock/boulder, undercut banks, and depth. The variables that were measured included section length, stream width (wetted and bank-full), and stream depth. A more complete description of the sampling protocol can be found in Johnson and Lech (1996) and Johnson (1997).

RESULTS

Angling Survey

On 17 August 1996, 20 anglers fished for a total of 48.5 hours. The mean number of hours fished per angler was 2.4. This effort resulted in a total of 8 fish captured, of which 5 were rainbow trout, 2 Arctic grayling, and 1 northern pike (*Esox lucius*). The catch rate (number of fish per angler-hour) for rainbow trout was 0.103, followed by Arctic grayling (0.041) and northern pike (0.021) (Figure 2). No bull trout were captured during the angling survey.

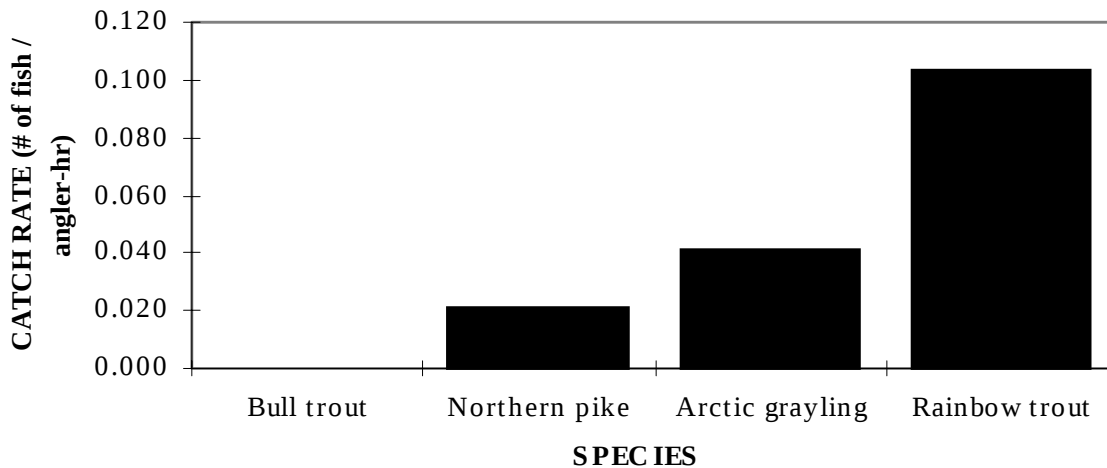


Figure 2. Angler catch rates of sport-fish species captured; upper Sundance Creek, 17 August 1996.

Anglers chose to fly-fish most often (80%), although spin-casting (13.3%) and a combination of the two (6.7%) was also used. The group of anglers was divided approximately into thirds, with 40% at site 1 (Figure 1) and 30% at each of sites 2 and 3. Most of the fish captured were angled from site 3 (4 rainbow trout, 2 Arctic grayling) (Figure 3). No fish were angled from site 2, while only 1 rainbow trout and 1 northern pike were angled from site 1.

Electrofishing survey

A total of 43 fish were captured at the 3 sites during the electrofishing surveys, none of which were sport fish. Four non-sport fish species were captured during the electrofishing surveys (Table 1). These species were burbot (*Lota lota*), longnose sucker (*Catostomus catostomus*), white sucker (*C. commersoni*),

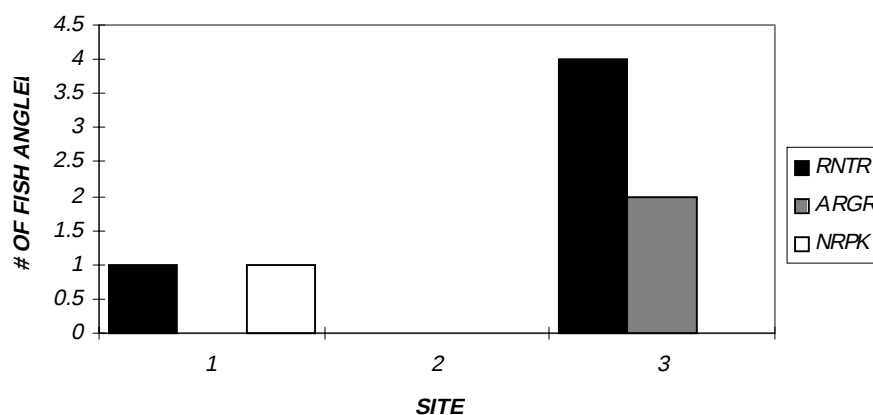


Figure 3. Number of each species angled from the upper, middle, and lower reaches; Sundance Creek, August 1996.

and spoonhead sculpin (*Cottus ricei*). None of the species captured were sport-fish. Sites 1 and 2 accounted for most of the fish captured (18 and 22, respectively) (Figure 4). Site 3 accounted for only 3 fish. Longnose sucker were the most common, accounting for 88.4% of the catch, followed by burbot (7%), and white sucker and spoonhead sculpin, both at 2.3%. Summaries for each of these sites are presented in Appendix I.

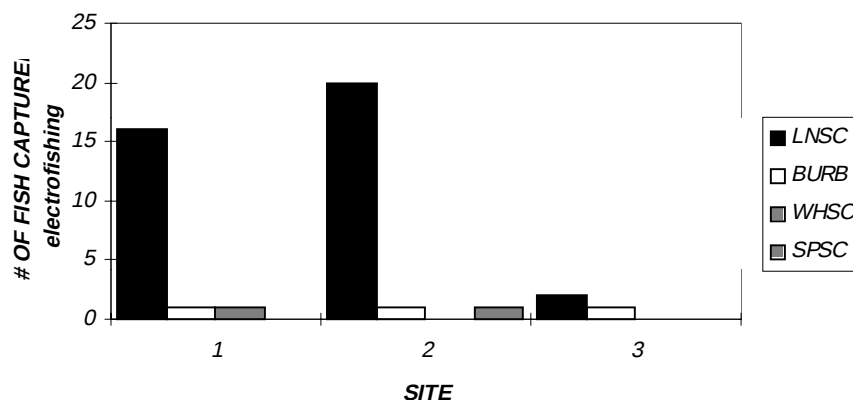


Figure 4. Number of fish captured at each reach during the electrofishing surveys; Sundance Creek, August 1996.

All three sites were estimated to contain relatively high proportions of sediment, especially site 2 (100%) and site 3 (95%). Site 1 had less sediment (63%) and more gravels and cobbles, especially small gravel

(23%). At each of the sites, instream debris was a large component of cover and was the largest proportion at site 1. The largest proportion of cover was depth at site 3, and aquatic vegetation at site 2. The electrofishing crews estimated that rearing, spawning, and overwintering habitat potential is low at site 3, with more potential being seen at site 1, especially for spawning.

Table 1. Numbers and catch rates of fish species captured during electrofishing surveys; Sundance Creek, August 1996.

Site Number	Species	Number captured	CUE (#/second)
Site 1 (96126)	Burbot	1	0.001
	Longnose sucker	2	0.002
Total site 1	2 species	3	0.002
Site 2 (96127)	Burbot	1	0.001
	Longnose sucker	20	0.010
	Spoonhead sculpin	1	0.001
Total site 2	3 species	22	0.011
Site 3 (96128)	Burbot	1	0.000
	White sucker	1	0.000
	Longnose sucker	16	0.008
Total site 3	3 species	18	0.009
TOTAL (all sites)	4 species	43	0.008

DISCUSSION

Status of fish populations in Sundance Creek

The catch rates of fish for upper Sundance Creek by either method (angling or electrofishing) were low. This suggests that the abundance of these species is also low. Historical records (Bryski 1997 *in prep*) indicate that the abundance of Arctic grayling in Sundance Creek has been much higher in previous years. These reports suggest that fishing for grayling and rainbow trout was good near the lake in the 1960's and 1970's. The results of the present study indicate that the populations of both Arctic grayling and rainbow trout may have declined.

Walker and Sullivan (1996) compared angler catch rates for 21 Arctic grayling populations from Alberta and Saskatchewan. They found catch rates that ranged from 0-7 Arctic grayling per angling hour (Figure 5). The angler catch rates from Sundance Creek (0.041 fish / angler-hr) are very low when compared with these, and are especially low when compared with the Little Smoky River (4-7 fish / angler-hr) (Walker and Sullivan 1996). These low catch rates coupled with the results of the electrofishing surveys suggest that the population density of Arctic grayling in upper Sundance Creek is low.

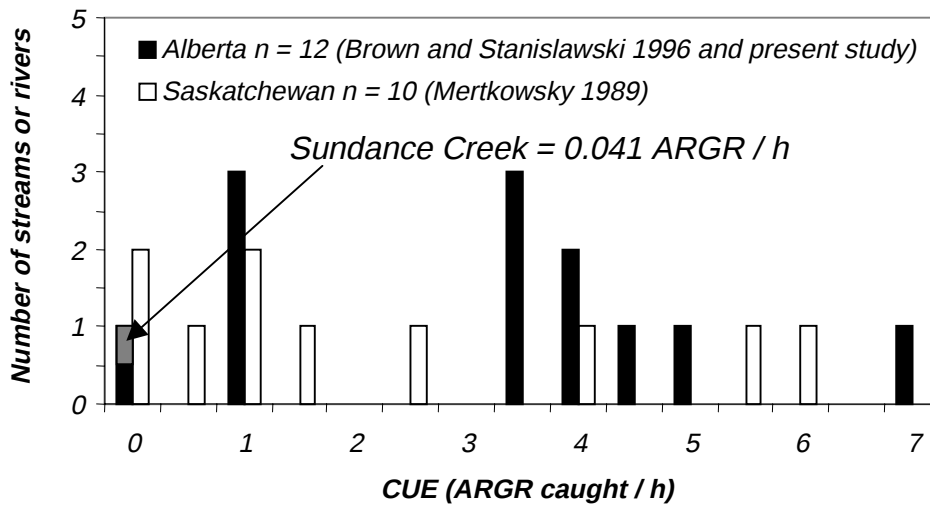


Figure 5. Distribution of catch rates of Arctic grayling from Alberta and Saskatchewan.

Although only one northern pike was captured during the angling survey, the survey was limited to the creek and not to the lake where most of the northern pike population may reside.

Bull trout were not captured during the present survey. While completing surveys on the lower sections of Sundance Creek, R.L. & L. (1993 and 1996) captured very few bull trout. It is unknown from historical accounts if bull trout were abundant in upper Sundance Creek.

The low density of sport fish in upper Sundance Creek is likely a result of over-exploitation rather than poor quality of fish habitat. As early as 1949, it was reported that catches of grayling declined in lower Sundance Creek, likely because this area was accessible to anglers. In contrast, the upper portions of the creek supported good populations of grayling into the 1960's and 1970's (Bryski 1997 *in prep*). During the present study, aquatic habitat in upper Sundance Creek varied from higher gradient, cobble-bottom sections to sections of low gradient that were dominated by fine substrates. Although it is unknown whether the aquatic habitat has been altered in upper Sundance Creek, it is the opinion of the authors that habitat is not limiting sport-fish production in upper Sundance Creek.

Presence of introduced species in upper Sundance Creek

Sweetgrass Consultants (1993) identified the native sport-fish resource in upper Sundance Creek as one of the reasons that this area was environmentally significant. As Arctic grayling and northern pike have not been officially stocked in Sundance Creek, it is probable that these species are native. The genetic origin of the rainbow trout captured is unknown because Alberta Fish and Wildlife have stocked non-native rainbow trout into Sundance Creek several times in the past. It is possible that these non-native stocks have mixed or replaced native stocks, making the genetic status of the present rainbow trout population uncertain.

Other sport-species namely brown trout (*Salmo trutta*) and brook trout (*S. fontinalis*) have been stocked into Sundance Creek in the past. Neither of these species was captured in upper Sundance Creek although R.L. & L. (1993) identified brook trout as being abundant in Little Sundance Creek (a tributary to Sundance Creek). It seems that these species have not moved into upper Sundance Creek, although their status between the study section and the lower sections is unknown.

CONCLUSIONS

Although the densities of sport-fish populations are presently low, it is likely that the sport-fish potential still exists for upper Sundance Creek. It is still unknown if the statement made by Sweetgrass Consultants (1994) that Sundance Creek is “one of a handful of important fish habitats in the Lower Foothills of the region” is accurate. It is important to note however, that the aquatic habitats found in Sundance Creek are important to fish populations resident in the creek, as well as to those populations that use the lower portions of the creek seasonally. The results of this survey also suggest that aquatic habitats are not limiting fish production in upper Sundance Creek. Protection of this area from development, coupled with changes to angling regulations that would limit harvest, may improve the present quality of the sport-fish populations in upper Sundance Creek.

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Appendix I. Database summary reports for the three electrofished sites; Sundance Creek, August 1996.

Appendix 2. Angler, electrofishing, and fish data collected from Sundance Creek; August 1996.

**Summary of angling and electrofishing data from
Sundance Creek - 17 August 1996**

Upper Sundance Ck (below
Sundance Lk)

Angler #	hours angled	RNTR	BLTR	ARGR	NRPK	OTHER	location	gear type	barbed	bait
1	3	0	0	0	0	0	3	1	1	
2	3	2	0	0	0	0	3	2	1	
3	2	0	0	0	0	0	1	1	1	1
4	2	0	0	0	0	0	1	1	1	1
5	2	0	0	0	0	0	1	1	2	
6	2.5	1	0	0	0	0	1			
8	3	1	0	0	0	0	3			
9	0.5	0	0	0	0	0	3			
10	2	0	0	1	0	0	3	1	1	1
11	1.5	1	0	1	0	0	3			
12	2	0	0	0	0	0	1	1		
13	4	0	0	0	1	0	1	3	1	1
14	4	0	0	0	0	0	1	2	1	
15	4	0	0	0	0	0	1	1		
16	3.5	0	0	0	0	0	2	1	2	
17	3	0	0	0	0	0	2			
18	1.5	0	0	0	0	0	2	1	2	1
19	1.5	0	0	0	0	0	2	1	2	1
20	2	0	0	0	0	0	2	1	2	1
20	1.5	0	0	0	0	0	2	1	2	
		RNTR	BLTR	ARGR	NRPK	OTHER				
Total	48.5	5	0	2	1	0				
Mean	2.4	0.3	0.0	0.1	0.1	0.0				
CUE		0.103	0.000	0.041	0.021	0.000				

Total #
anglers 20

Location codes:
1 nearest lake
2 middle
7 transmission line

Hook-type codes:
1 barbed
2 barbed ss
3 both

Gear type codes:
1 flyfishing
2 spincasting
3 both

Bait codes:
1 no bait
2 bait

CODE	location	location %	gear type	gear type %	barbed	barbed %	bait
1	8	40.0	12	80.0	7	53.8	7
2	6	30.0	2	13.3	6	46.2	0
3	6	30.0	1	6.7	0	0.0	
total	20	100	15	100	13	100	7

Species	Total	Mean	CUE
Bull trout	0	0.0	0.000
Northern pike	1	0.1	0.021
Arctic grayling	2	0.1	0.041
Rainbow trout	5	0.3	0.103

Angling location of fish capture RNTR ARGR NRPK

Angler #	Species	FL	
10	ARGR	185 mean	227.5
11	ARGR	270 n=	2
13	NRPK	175	
8	RNTR	250 mean	208
11	RNTR	140 n=	5
6	RNTR	210	
2	RNTR	230	
2	RNTR	210	

Upper	1	1	0	1
Middle	2	0	0	0
Lower	3	4	2	0

Electrofishing location of fish capture		LNSC	BURB	WHSC	SPSC
Upper	1	16	1	1	0
Middle	2	20	1	0	1
Lower	3	2	1	0	0
Total		38	3	1	1
%		88.4	7.0	2.3	2.3

96126 (lower)	Burbot	1	0.001
96126 (lower)	Longnose sucker	2	0.002
Total 96126	2 species	3	0.002
96127 (middle)	Burbot	1	0.001
96127 (middle)	Longnose sucker	20	0.01
96127 (middle)	Spoonhead sculpin	1	0.001
Total 96127	3 species	22	0.011
96128 (upper)	Burbot	1	0
96128 (upper)	White sucker	1	0
96128 (upper)	Longnose sucker	16	0.008
Total 96128	3 species	18	0.009
TOTAL (combined)	4 species	43	0.008