

FISH POPULATION MONITORING AT THE OBED MOUNTAIN MINE IN 2004:
BASELINE AND OLDMAN CREEKS

Prepared for
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Obed Mountain Mine
Hinton, Alberta

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1.0 INTRODUCTION

Luscar Ltd. operates the Obed Mountain Mine east of Hinton, Alberta. A component of the environmental monitoring program carried out by the mine includes monitoring of the fish populations in streams draining the mine lease area. Permanent monitoring sections have been established on 4 area streams; Baseline, Oldman and Apetowun creeks and an unnamed tributary to Canyon Creek. Two stream sections are monitored every 3 years.

Pisces Environmental Consulting Services Ltd. (Pisces) was retained by the Obed Mountain Mine to monitor fisheries resources in Oldman Creek and in Baseline Creek. This document presents the findings of the monitoring program on these two streams in 2004.

2.0 OBJECTIVES

The objectives of the monitoring program in 2004 were:

- Obtain population estimates from the Oldman and Baseline creek monitoring sections
- Report on the findings

3.0 METHODS

Fish population estimates were obtained from within the monitoring sections using the removal method (Zippen 1958). Both ends of the section were blocked with nets and the section electrofished two or three times with a Smith Root Type VII and/or Type 24 back pack fish shocker. Two back pack shockers were used simultaneously on Oldman Creek to improve catch rates under the high flow conditions encountered. As a general rule, if the probability of capture calculated after the second run, or pass, exceeded 0.5, a third pass was not conducted. Population estimates were calculated using MicroFish 3.0 (Van Deventer and Platts 1989).

Section lengths exceeded 150 m or 40 channel widths (McCormick and Hughes 2002). Monitoring section locations are shown on Figures 1 through 3.

All captured fish were measured to fork length in mm (total length for burbot and sculpins) and a sub sample weighed (g).



Figure 1. Monitoring section locations on Baseline and Oldman creeks.

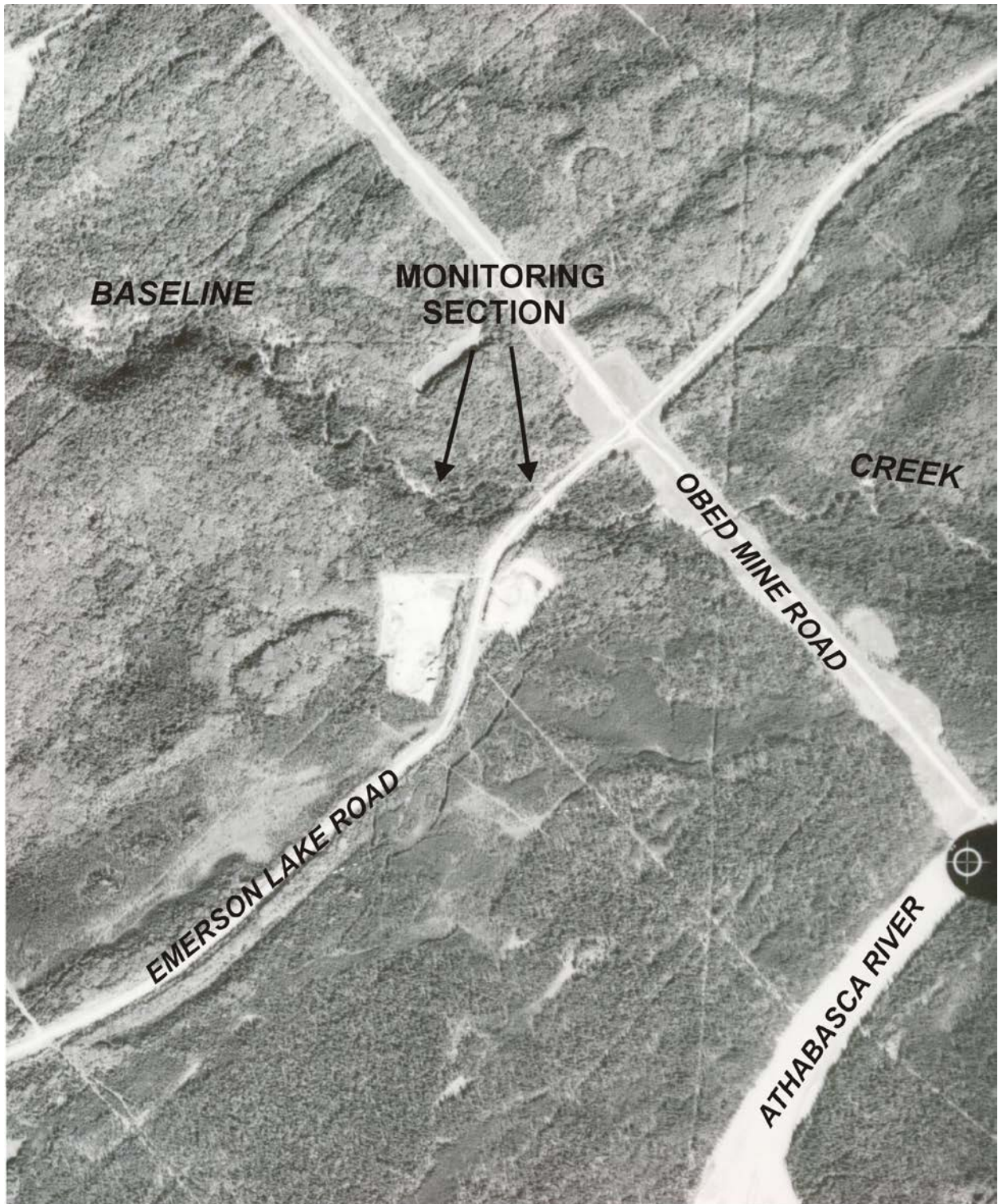


Figure 2. Location of the Baseline Creek monitoring section (31-52-23-W5).

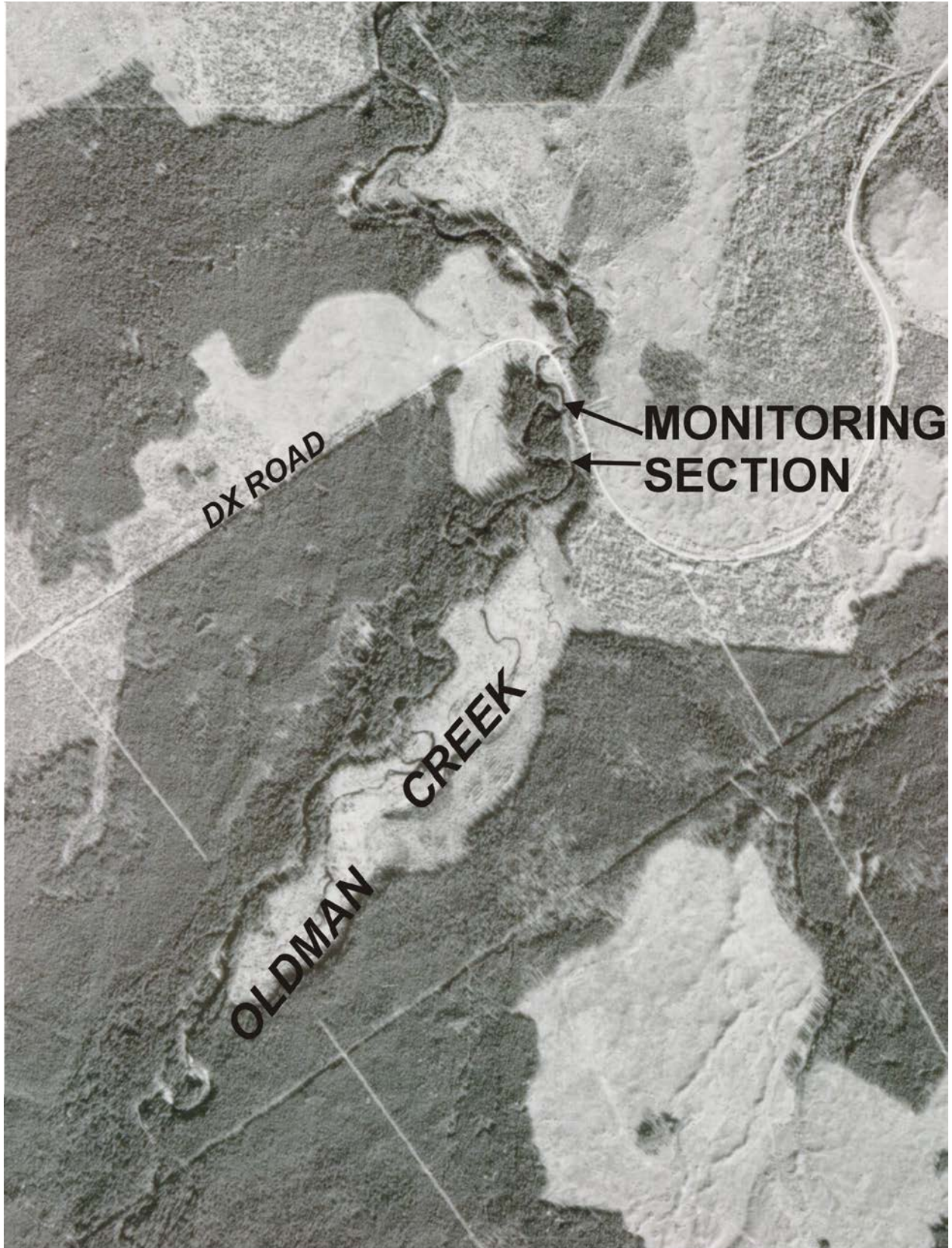


Figure 3. Location of the monitoring section on Oldman Creek (31-53-24-W5).

4.0 RESULTS

4.1 Baseline Creek

The Baseline Creek monitoring section was 241 m in length with an area of 744 m². Discharge on August 28, the date of survey, was estimated at 0.325 m³/s.

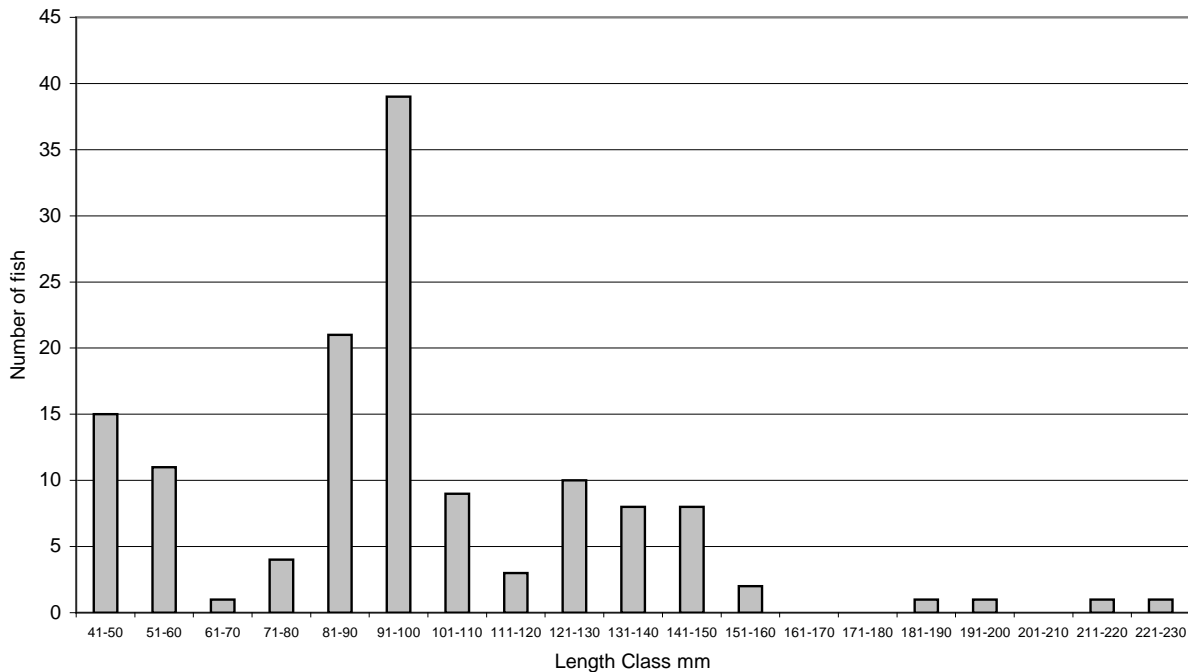
Brook trout (*Salvelinus fontinalis*) was the only species captured. Summary parameters for the catch are shown on Table 1. Details for the population estimation and fork lengths and weights for individual fish in the catch are given in Appendix A.

Table 1. Summary parameters for the brook trout catch from Baseline Creek.

Number captured	Population estimate (95% confidence limits)	Density n/100 m ²	Mean fork length mm (range)	Mean weight g (range)
135	155 (135 – 175.572)	20.8	97.38 (41 – 228)	14.18 (1 – 142)

Figure 4 shows the length frequency distribution for the brook trout catch. The group clustered at the left between 41 and 60 mm probably represent young-of-the-year, or age 0, fish and the group clustered between 81 and 110 are likely age 1 fish.

Figure 4. Length frequency distribution for brook trout from Baseline Creek



4.2 Oldman Creek

The Oldman Creek monitoring section was 305 m in length with an area of 2440 m². Discharge on September 10, the date of survey, was estimated at 1.78 m³/s.

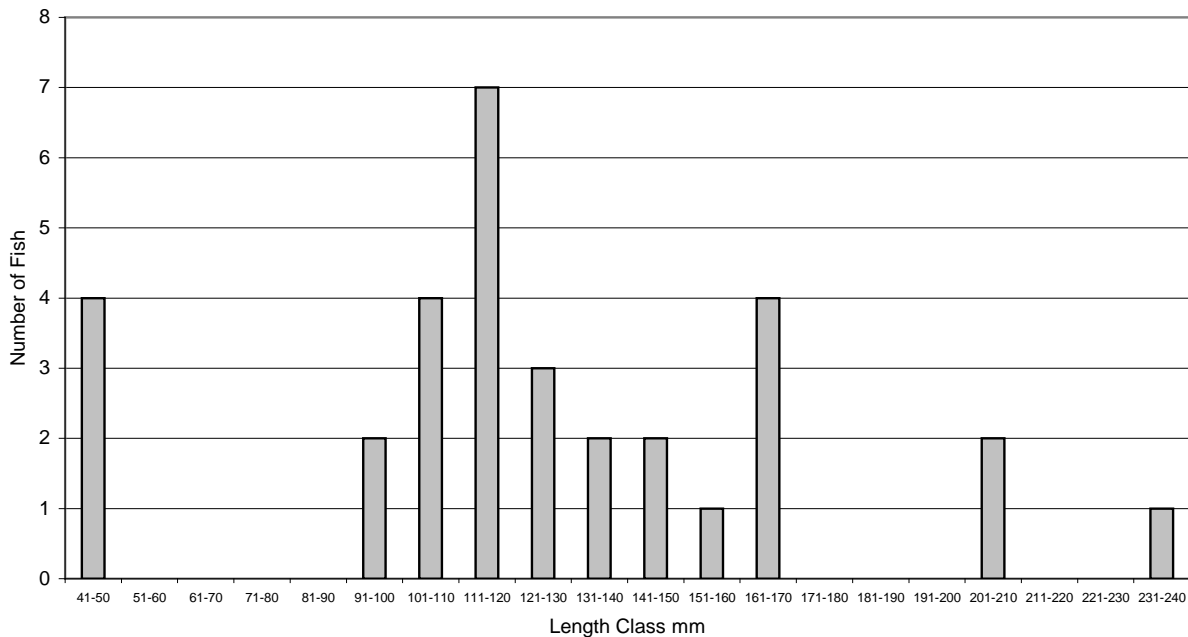
Four species, rainbow trout (*Oncorhynchus mykiss*), bull trout (*Salvelinus confluentus*), burbot (*Lota lota*) and spoonhead sculpin (*Cottus ricei*) were captured. Summary parameters for the catch are shown on Table 2. Details for the population estimations and fork lengths and weights for individual fish in the catch are given in Appendix A.

Table 2. Summary parameters for the catch from Oldman Creek.

Species	Number captured	Population estimate (95% confidence limits)	Density n/100 m ²	Mean fork length mm (range)	Mean weight g (range)
Rainbow trout	36	43 (36 - 56.43)	1.76	125.41 (42 - 238)	31.7 (1 - 181)
Burbot	4	4 (4 - 5.73)	0.16	152.8 (121 - 180)	23 (16 - 43)
Spoonhead sculpin	5	5 (5 - 6.23)	0.205	80.8 (69 - 112)	5.6 (3 - 14)
Bull trout	1	n/a		121	12

Figure 5 shows the length frequency distribution for rainbow trout captured from Oldman Creek. Although there is no corroborative ageing data for rainbow trout from Oldman Creek, the 4 specimens at the extreme left may represent age 1 fish. Several other age classes appear to be present, however no ages can be assigned.

Figure 5. Length frequency distribution for rainbow trout from Oldman Creek



5.0 DISCUSSION AND CONCLUSIONS

5.1 Baseline Creek

Five species of fish have been captured in Baseline Creek downstream of the Emerson Lakes Road crossing; brook trout, rainbow trout, bull trout, burbot and mountain whitefish (*Prosopium williamsoni*) (Hawryluk 1977; Schwartz 2002; C. Johnson, Foothills Model Forest, personal communication). Bull trout, burbot or mountain whitefish have not been reported from upstream of the Emerson Lake Road. Typically, bull trout, burbot and mountain whitefish occur very infrequently and the fish population is increasingly dominated by brook trout, to the degree that in 2004, brook trout were the only species captured in the monitoring section upstream of the Emerson Lake Road. Figure 6 provides a visual appreciation of the dominance of brook trout in Baseline Creek within 3 km upstream of the Emerson Lakes Road crossing. Since the early 1980's, brook trout appear to have become increasingly dominant in Baseline Creek immediately upstream of the Emerson Lakes Road. Further upstream, approximately 6+ km, the fish population consists exclusively of rainbow trout (Zallen 1981; C. Johnson, pers. comm.). Brook trout have also dominated in the catch downstream of the Emerson Lakes Road since 1977 (Hawryluk 1977; Zallen 1981; C. Johnson, pers. comm.), ranging from 55% of the catch in 1977 to 98% in 1996.

Figure 6. Percent brook trout in catches from Baseline Creek upstream of the Emerson Lakes Road crossing. Data for sites 9 and 10 in 1980 from Zallen (1981). Data for sites 1997 017 and 1998 003 from Johnson (pers. comm.). Data for 2001 from Schwartz (2002).

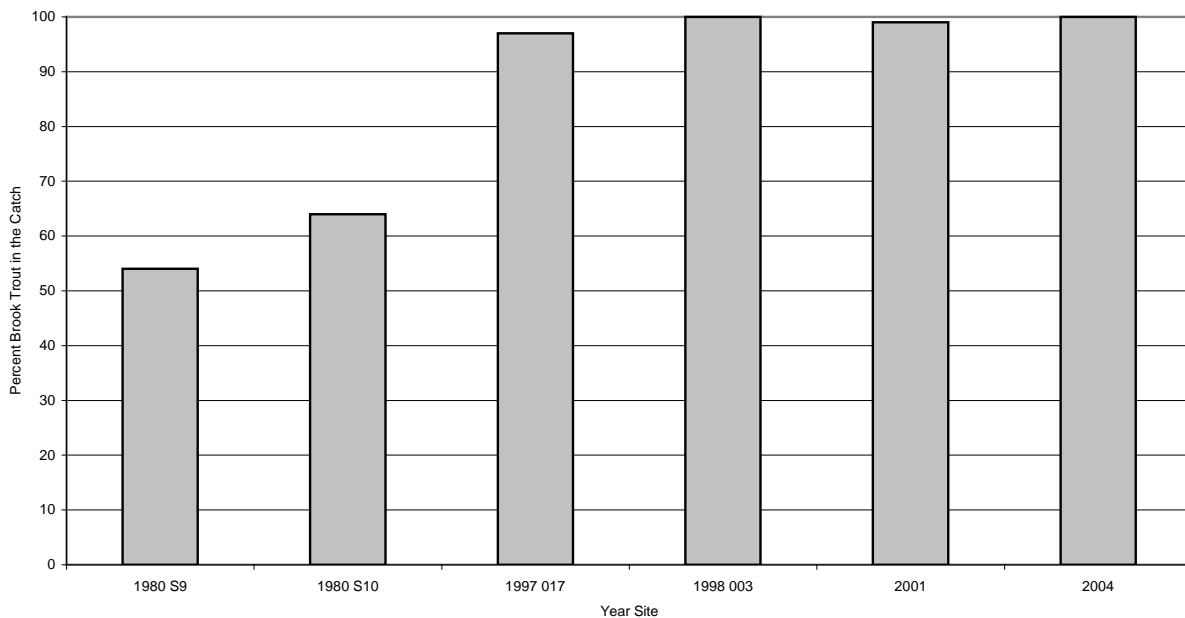


Table 3 summarizes the fish density estimate data for Baseline Creek. Although brook trout densities in particular appear to be increasing over time, the data set is not adequate to identify any definite trends.

Table 3. Trout density estimates for Baseline Creek.

Data Source	Sample Site	Density n/100 m ²		
		Rainbow trout	Brook trout	All trout
Hawryluk 1977	d/s Emerson Lakes Road	5.4	6.2	10.3
C. Johnson pers. comm.	96152, d/s Emerson Lakes Road	1.0	8.5	9.5
Schwartz 2002	u/s Emerson Lakes Road	0.14	14.6	14.8
This study	u/s Emerson Lakes Road	0	20.8	20.8

5.2 Oldman Creek

Four species of fish have been reported from the vicinity of the monitoring section; rainbow trout (RNTR), burbot (BURB), mountain whitefish (MNWH) and spoonhead sculpin (SPSC) (Zallen 1981; Schwartz 2002; C. Johnson, pers. comm.). The capture of a bull trout (BLTR) in the monitoring section in 2004 may constitute a substantial upstream range extension (approximately 28 km) for the species in Oldman Creek. Although there has been substantial variation in percentage species composition (Table 4), rainbow trout remain the dominant species.

Table 4. Percent catch composition for Oldman Creek at the monitoring section.

Data source	Year	SPECIES				
		RNTR	BURB	MNWH	SPSC	BLTR
C. Johnson, pers. comm..	1998	87	8	5	0	0
Schwartz 2002	2001	46	34	20	0	0
This report	2004	78	9	0	11	2

6.0 REFERENCES

Hawryluk, R. 1977. A preliminary survey of Baseline Creek. Alverta Recreation, Parks and Wildlife, Fish and Wildlife Div., Edson, AB. 24 pp.

McCormick, F. H. and R. M. Hughes. 2002. Aquatic vertebrates. Pages 203-226 in D. V. Peck, J. M. Lazorchak and D. J. Klemm, editors. Western pilot study: field operations manual for wadeable streams. U.S Environmental Protection Agency, Corvallis, Oregon.

Schwartz, T. 2002. Obed Mine fisheries monitoring 2001: Baseline and Oldman creeks. Report of Pisces Environmental Consulting Services Ltd. to Luscar Ltd, Obed Mountain Mine, Hinton, AB. 18 pp + App.

Van Deventer, J. S. and W. S. Platts. 1989. Microcomputer Software System for Generation of Population Statistics from Electrofishing Data – User’s Guide for MicroFish 3.0. General Technical Report INT-254. U.S. Dept. Agriculture, Forest Service, Intermountain Research Station, Ogden, UT. 29 pp.

Zallen, M. 1981. Fisheries Surveys in Streams Near the Obed-Marsh Development Area. Report of ESL Environmental Sciences Ltd. to Union Oil of Canada Ltd., Calgary, AB. 19 pp + App.

Zippen, C. 1958. The removal method of population estimation. J. Wildl. Man. 22(1):82-90.

7.0 PERSONAL COMMUNICATIONS

C. Johnson, Foothills Model Forest, Hinton, AB. Fish inventory reports for Baseline and Oldman creeks.

APPENDIX A

Population estimates and length and weight data for fish in the catch from Baseline Creek

Table A1. Population estimate parameters for the monitoring section on Baseline Creek

Number of runs	2
Duration of runs (s)	3992, 3031
Species	BKTR
Removal pattern	98, 37
Total catch	135
Population estimate	155
Chi square	0.043
Population estimate SE	10.39
Lower confidence interval	135
Upper confidence interval	175.572
Capture probability	0.637
Capture probability SE	0.071
Lower confidence interval	0.497
Upper confidence interval	0.777

Table A2. Fork length (mm) and weight (g) for brook trout in the catch for the first electrofishing pass from the Baseline Creek monitoring section.

Length	Weight	Length	Weight	Length	Weight	Length	Weight
51	1	85	6	110	15	87	7
109	13	100	12	100	11	99	10
48	1	98	9	53	2	104	10
228	142	95	8	128	21	95	6
100	10	82	5	95	8	41	1
52	2	138	28	152	44	192	84
85	6	92	7	53	2	100	10
78	5	98	10	89	9	93	8
85	6	140	31	134	24	50	1
49	1	125	19	119	17	84	5
102	11	92	9	102	12	93	8
142	32	48	1	48	1	48	1
152	37	51	2	91	8	87	5
47	1	89	8	92	8	50	1
66	3	77	5	48	1	190	81
147	37	100	11	89	7	94	9
116	17	96	10	105	13	90	7
89	7	93	8	108	13	98	9
99	11	106	10	98	8	92	8
97	10	130	23	124	18	138	30
126	22	86	7	135	27	95	9
98	10	143	28	92	8	135	25
142	31	85	9	145	36	95	9
143	31	93	10	128	23	87	7
92	9	123	19				

Table A3. Fork length (mm) and weight (g) for brook trout in the catch for the second electrofishing pass from the Baseline Creek monitoring section.

Length	Weight	Length	Weight	Length	Weight	Length	Weight
118	16	218	125	89	7	79	4
135	27	55	2	88	7	146	35
78	4	87	8	132	28	47	2
47	2	54	2	52	2	53	2
52	2	52	2	45	1	49	1
100	12	93	9	100	10	93	9
95	9	98	9	82	6	50	1
85	7	145	33	123	20	128	20
121	19	102	11	84	6	93	8
94	8						

APPENDIX B

Population estimates and length and weight data for fish in the catch from Oldman Creek

Table B1. Population estimate parameters for the monitoring section on Oldman Creek.

Number of runs	3		
Duration of runs (s)	4494, 4401, 3625		
Species	Rainbow trout	Burbot	Spoonhead sculpin
Removal pattern	17, 14, 5	2, 2, 0	4, 0, 1
Total catch	36	4	4
Population estimate	43	4	5
Chi square	1.452	1.858	2.796
Population estimate SE	6.659	0.544	0.444
Lower confidence interval	36	4	5
Upper confidence interval	56.438	5.73	6.231
Capture probability	0.444	0.667	0.714
Capture probability SE	0.124	0.272	0.222
Lower confidence interval	0.194	-0.198	0.099
Upper confidence interval	0.694	1.531	1.33

Table B2. Fork length (total length for burbot and sculpin) in mm and weight in grams for the catch from the Oldman Creek monitoring section.

Species	Length	Weight	Species	Length	Weight	Species	Length	Weight
RNTR	112	12	RNTR	207	121	RNTR	238	181
RNTR	210	120	RNTR	126	16	RNTR	112	12
RNTR	135	18	RNTR	165	59	RNTR	115	14
RNTR	116	16	RNTR	114	14	RNTR	112	14
RNTR	123	21	BURB	180	43	BURB	152	21
SPSC	69	3	SPSC	82	4	SPSC	112	14
SPSC	71	4	RNTR	109	11	RNTR	166	67
RNTR	166	60	RNTR	121	13	RNTR	139	25
RNTR	110	9	RNTR	141	18	RNTR	42	1
RNTR	104	12	RNTR	160	51	RNTR	109	13
RNTR	100	13	RNTR	161	44	RNTR	49	1
BLTR	121	12	BURB	121	20	BURB	171	22
RNTR	44	1	RNTR	46	1	RNTR	100	11
RNTR	114	12	RNTR	150	-	BURB	150	16
BURB	143	16	SPSC	70	3			