

---

# PISCES ENVIRONMENTAL

FISH POPULATION MONITORING AT THE OBED MOUNTAIN MINE IN 2010:  
BASELINE AND OLDMAN CREEKS



**PISCES ENVIRONMENTAL CONSULTING SERVICES LTD.**

---

---

FISH POPULATION MONITORING AT THE OBED MOUNTAIN MINE IN 2010:  
BASELINE AND OLDMAN CREEKS

*Prepared for:*  
Sherritt International Corporation  
Obed Mountain Mine  
Hinton, Alberta

*Prepared by:*  
J. Sonnenberg and E. Stemo  
Pisces Environmental Consulting Services Ltd.  
Red Deer, Alberta  
February 2011

---

## TABLE OF CONTENTS

1.0	<b>INTRODUCTION</b> .....	<b>1</b>
2.0	<b>OBJECTIVES</b> .....	<b>1</b>
3.0	<b>STUDY AREA</b> .....	<b>1</b>
4.0	<b>METHODS</b> .....	<b>4</b>
5.0	<b>RESULTS</b> .....	<b>4</b>
5.1	BASELINE CREEK.....	4
5.2	OLDMAN CREEK .....	5
6.0	<b>DISCUSSION</b> .....	<b>7</b>
6.1	BASELINE CREEK.....	7
6.2	OLDMAN CREEK .....	8
7.0	<b>REFERENCES</b> .....	<b>10</b>
8.0	<b>PERSONAL COMMUNICATIONS</b> .....	<b>10</b>
	<b>Appendix A: Colour Plates</b>	
	<b>Appendix B: Fish Capture and Population Estimate Record</b>	

## LIST OF TABLES

Table 1.	Sample section characteristics, Oldman and Baseline Creeks, 2010. ....	4
Table 2.	Summary of fish captured from Baseline Creek. ....	5
Table 3.	Summary parameters for the catch from Oldman Creek.....	6
Table 4.	Trout density in Baseline Creek over time. ....	8

## LIST OF FIGURES

Figure 1.	Study Area.....	2
Figure 2.	Monitoring sections on Oldman and Baseline creeks. ....	3
Figure 3.	Length frequency distribution for Brook Trout from Baseline Creek, 2010. ....	5
Figure 4.	Length frequency distribution for Rainbow Trout from Oldman Creek, 2010.....	6
Figure 5.	Percent Brook Trout in catches (survey sampling and population estimates) 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 from 2001 from Schwartz (2002). Data from 2004 from Pisces (2005). Data from 2007 from Sonnenberg and Boorman (2008).] .....	7
Figure 6.	Percent catch composition for the Oldman Creek monitoring Section. [Data for 1998 from Johnson (Pers. Comm.). Data from 2001 from Schwartz (2002). Data from 2004 from Pisces (2005). Data from 2007 from Sonnenberg and Boorman (2008).].....	8

---

## 1.0 **INTRODUCTION**

Sherrit International Corporation operates the Obed Mountain Mine (OMM) east of Hinton, Alberta. The mine began operating in 1984 using surface mining methods to expose and extract the coal. Active mining at the Obed Mountain Mine had ceased in 2003 but resumed in 2009 following infrastructure upgrades.

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 were established on Apetowun Creek and an unnamed tributary to Canyon Creek in 2000, and on Baseline Creek and Oldman Creek in 2001. The monitoring program consists of fish population estimates in two of the four stream sections every 3 years. Fish population estimates were obtained from the monitoring sections on Apetowun Creek and the unnamed tributary to Canyon Creek in 2000, 2003, 2006, and 2009 and from the monitoring sections on Baseline and Oldman Creeks in 2001, and 2004, and 2007. This report presents results of the 2010 installment of the monitoring program.

## 2.0 **OBJECTIVES**

The objectives of the 2010 monitoring program was to obtain fish population estimates from previously established monitoring sections on Baseline Creek and Oldman Creek and report on the findings.

## 3.0 **STUDY AREA**

The Obed lease area comprises 3,254 ha and is situated on a high plateau rising approximately 1600 m above sea level. The area is of moderate relief, characterized by rounded hills and upland plateaus. The hills represent a transitional zone between the mountains and foothills. The lease area is primarily drained by the headwaters of Apetowun Creek, but also by tributaries to Oldman and Canyon creeks as well as the headwaters of Baseline Creek (Figure 1, Figure 2).

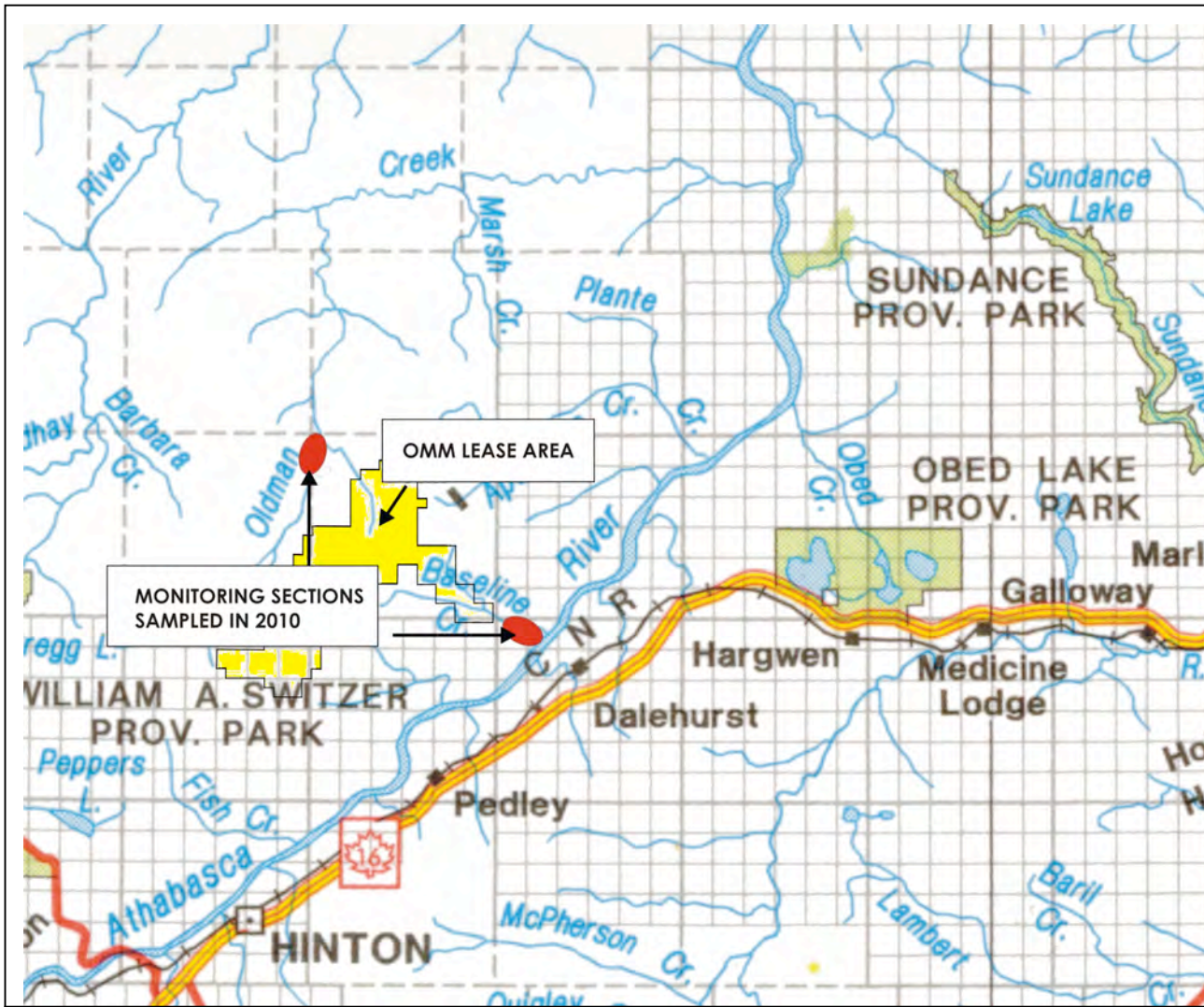


Figure 1. Study Area



Baseline Creek monitoring section



Oldman Creek monitoring section



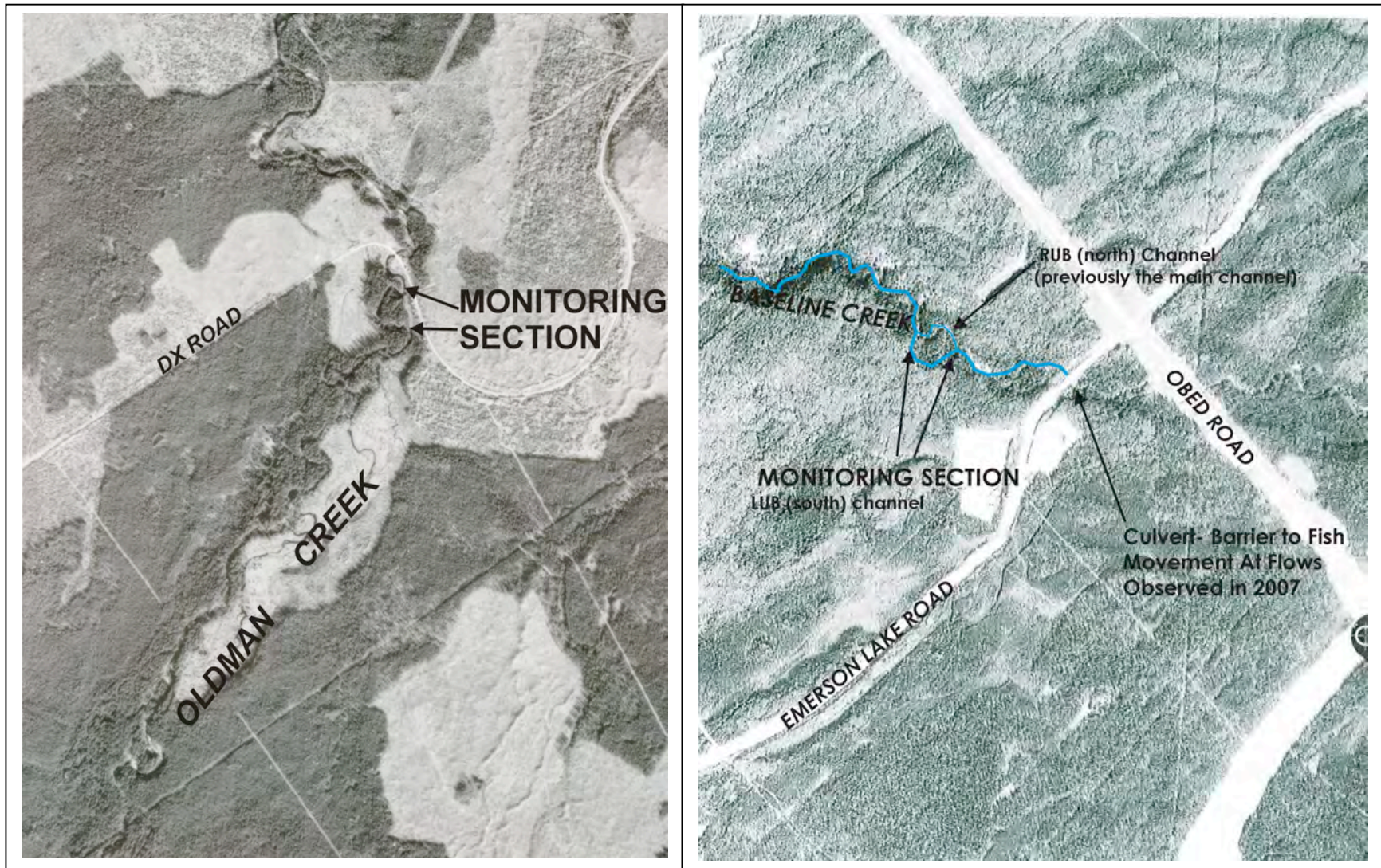


Figure 2. Monitoring sections on Oldman and Baseline Creeks.

Monitoring sections in 2010 were similar to those established in 2001 and described by Schwartz (2002) although slight changes in section length have occurred over the period of record (Schwartz 2002, Pisces 2005, Sonnenberg and Boorman 2008). The 2010 Baseline Creek section was similar to the 2007 section but was extended to 265 m; the majority of the flow in the creek was concentrated in the south or left upstream channel, which was virtually dry prior to 2007 (Figure 2). In 2010, the Oldman Creek monitoring section length and location was the same as in 2007 and could not be lengthened due to presence of deep water and log jam areas upstream and downstream of the monitoring section (Appendix A, Photo 5).

Table 1. Sample section characteristics, Oldman and Baseline Creeks, 2010.

Stream	Date	Length (m)	Area (m <sup>2</sup> )	Discharge (m <sup>3</sup> /s)
Baseline Creek	September 9	335	1614	0.147
Oldman Creek	September 10	265	2094	0.308

#### 4.0 **METHODS**

Fish population estimates were obtained from within the monitoring sections using the removal method (Zippen 1958). Both ends of the sections were blocked with nets and then electrofished three times with a Smith Root Type 24 back pack electrofisher. Population estimates were calculated using MicroFish 3.0 (Van Deventer and Platts 1989). Monitoring section lengths exceeded 150 metres or 40X channel width (McCormick and Hughes 2002).

All captured fish were measured to fork length in millimetres (total length for burbot and sculpins) and weight in grams.

#### 5.0 **RESULTS**

##### 5.1 **BASELINE CREEK**

Brook Trout (*Salvelinus fontinalis*) was the only species captured in the monitoring section in 2010. The population estimate for Brook Trout was 124, which yielded a density estimate of 7.7 fish/100 m<sup>2</sup> and a catch per unit effort (CPUE) for the first electrofishing pass (Run #1) of 0.9 fish per minute (Table 2). Details for the population estimation and fork lengths and weights for individual fish in the catch are provided in Appendix B.

Table 2. Summary of fish captured from Baseline Creek.

Species	n	Population Estimate (95% confidence interval)	Density n/100 m <sup>2</sup>	Fork Length (mm)			Weight (g)		
				Mean	Min	Max	Mean	Min	Max
BKTR	117	124 (117-124)	7.7	113	46	198	23	1	101

Figure 3 shows the length frequency distribution for the brook trout catch. It is likely the specimens on the far left are young of year (YOY) trout, other age class determinations cannot be made as aging data for Baseline Creek is limited.

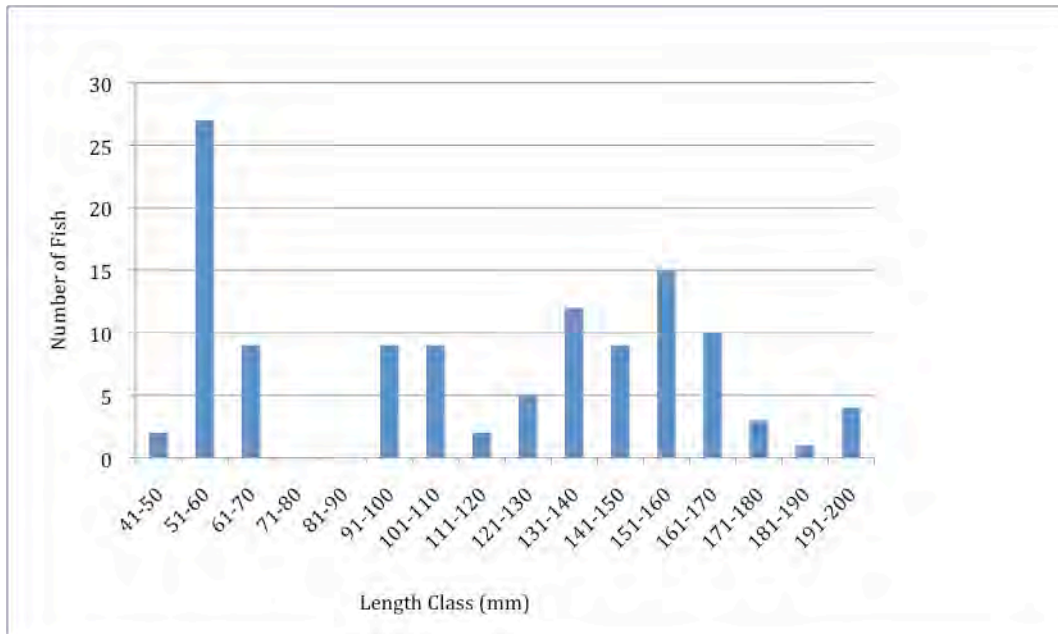


Figure 3. Length frequency distribution for Brook Trout from Baseline Creek, 2010.

## 5.2 **OLDMAN CREEK**

Rainbow Trout (*Oncorhynchus mykiss*), Burbot (*Lota lota*), Mountain Whitefish (*Prosopium williamsoni*) and Spoonhead Sculpin (*Cottus ricei*) were captured from the monitoring section in 2010. The population estimate for Rainbow Trout was 25, which yielded a density estimate of 1.2 fish/100 m<sup>2</sup> and a catch per unit effort (CPUE) for the first electrofishing pass (Run #1) of 0.2 fish per minute (Table 3). A valid population estimate could not be obtained for the other species. Details for the population estimation and fork lengths and weights for individual fish in the catch are provided in Appendix B.



Table 3. Summary parameters for the catch from Oldman Creek

Species	n	Population Estimate (95% confidence interval)	Density n/100 m <sup>2</sup>	Fork Length (mm)			Weight (g)		
				Mean	Min	Max	Mean	Min	Max
RNTR	24	25 (24-29)	1.2	131	37	213	38	0.5	106
BURB	16	n/a		159	66	241	37	2	104.5
MNWH	1	n/a		66			2		
SPSC	3	n/a		106	84	118	13.5	5.5	20

Figure 4 shows the length frequency distribution for rainbow trout captured from Oldman Creek. Although there is little corroborative ageing data for rainbow trout from Oldman Creek, it is expected the 5 specimens at the far left may represent Young of Year fish while the 3 fish clustered between 91mm and 100 mm are likely yearlings. Several other age classes appear to be present, however no ages can be assigned.

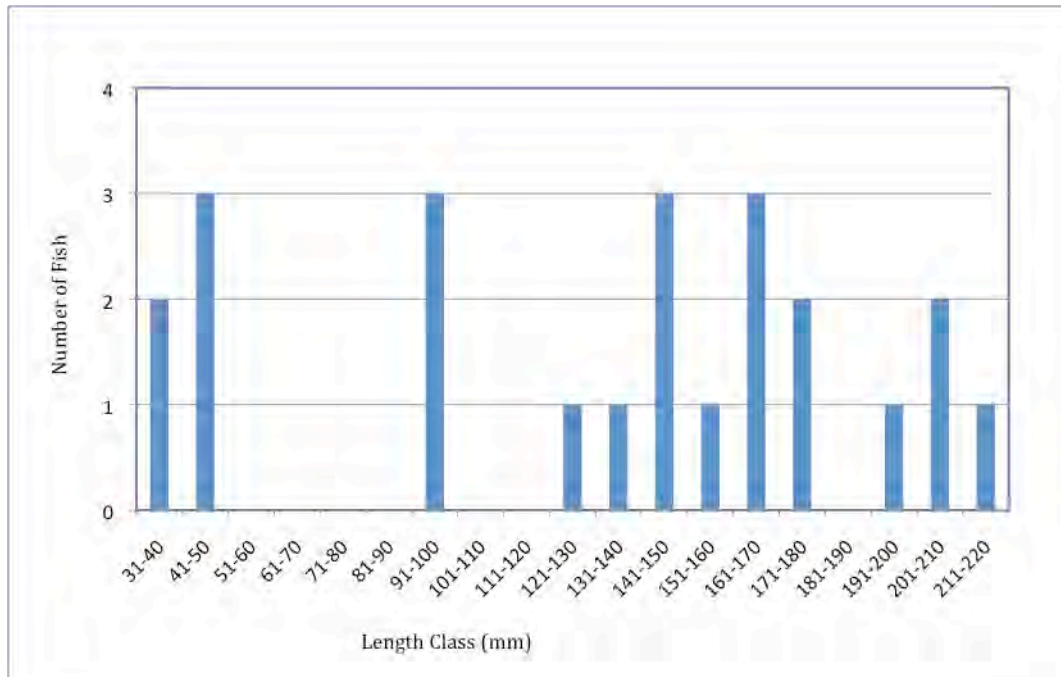


Figure 4. Length frequency distribution for Rainbow Trout from Oldman Creek, 2010.

## 6.0 **DISCUSSION**

### 6.1 **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 (*Salvelinus confluentus*), Burbot and Mountain Whitefish (Hawryluk 1977; Schwartz 2002; Pisces 2005; C. Johnson, Foothills Model Forest, personal communication). Of these species Bull Trout, Burbot, and Mountain Whitefish have not been reported from upstream of the Emerson Lake Road and occur very infrequently.

Since the early 1980's, Brook Trout appear to have become increasingly dominant in Baseline Creek within 3 kilometres upstream of the Emerson Lakes Road (Figure 6). Further upstream, approximately 6+ km, the fish population historically consisted exclusively of rainbow trout (Zallen 1981; C. Johnson, pers. comm.). Brook trout have also dominated 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.

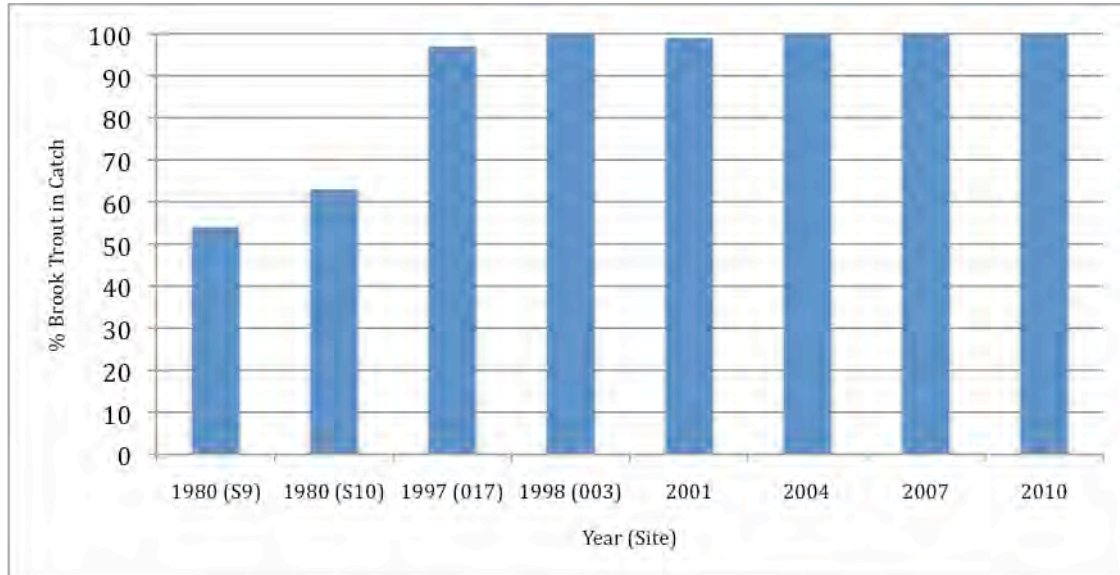


Figure 5. Percent Brook Trout in catches (survey sampling and population estimates) from Baseline Creek upstream of the Emerson Lakes Road crossing. [Data for sites 9 and 10 in 1980 from Zallen (1981). Data for sites 1997 (017) and 1998 (003) from Johnson (Pers. Comm.). Data from 2001 from Schwartz (2002). Data from 2004 from Pisces (2005). Data from 2007 from Sonnenberg and Boorman (2008).]

Brook Trout densities have fluctuated over time and were lower in 2010 compared to most previous monitoring years (Table 4). However, the data set is not adequate to identify any definite trends.

Table 4. Trout density in Baseline Creek over time.

Data Source	Sample Site	Density n/100 m <sup>2</sup>		
		Rainbow trout	Brook trout	All trout
Hawryluk 1977	d/s Emerson Lakes Road	5.4	6.2	10.3
C. Johnson pers. comm. <sup>1</sup>	96152, d/s Emerson Lakes Road	1.0	8.5	9.5
Schwartz 2002	u/s Emerson Lakes Road <sup>2</sup>	0.14	14.6	14.8
Pisces 2005	u/s Emerson Lakes Road	0	20.8	20.8
Sonnenberg and Boorman 2008	u/s Emerson Lakes Road	0	14.9	14.9
This study	u/s Emerson Lakes Road	0	7.7	7.7

<sup>1</sup>Sampling conducted in 1998.

<sup>2</sup>Permanent monitoring section established on Baseline Creek in 2001.

## 6.2 OLDMAN CREEK

Four species of fish have been reported from Oldman Creek in the vicinity of the monitoring section; Rainbow Trout (RNTR), Burbot (BURB), Mountain Whitefish (MNWH) and Spoonhead Sculpin (SPSC, Figure 6). The capture of a Bull Trout (BLTR) in the monitoring section in 2004 may constitute a substantial upstream range extension (approximately 28 km) for this species in Oldman Creek. Although there has been some variation in percentage species composition (Figure 6), Rainbow Trout remain the dominant species.

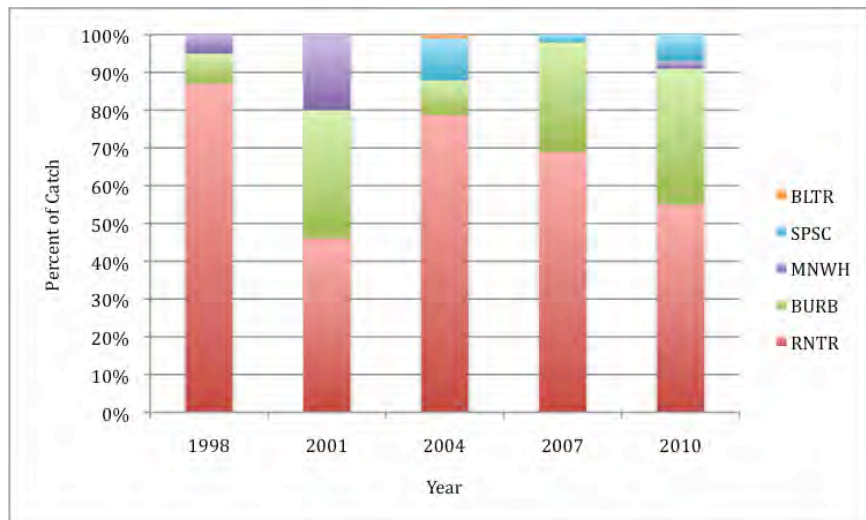


Figure 6. Percent catch composition for the Oldman Creek monitoring Section. [Data for 1998 from Johnson (Pers. Comm.). Data from 2001 from Schwartz (2002). Data from 2004 from Pisces (2005). Data from 2007 from Sonnenberg and Boorman (2008).]

Rainbow trout density in the monitoring section has fluctuated over time (Table 5). The densities in 2010 are lower than in 2008 but are similar to 2002 and 2005. The current data set is not adequate to identify any definite trends.

Table 5. Oldman Creek monitoring section Rainbow Trout density over time.

Data Source	Year Sampled	Density n/100 m <sup>2</sup>
Schwartz 2002	2001	0.9
Pisces 2005	2004	1.8
Sonnenberg and Boorman 2008	2007	3.6
This Study	2010	1.2



## 7.0 **REFERENCES**

- Hawryluk, R. 1977. A preliminary survey of Baseline Creek. Alberta 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.
- Pisces. 2005. Fish population monitoring at the Obed Mountain Mine in 2004: Baseline and Oldman Creeks. Pisces Environmental Consulting Services Ltd. 9pp +app
- 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.
- Sonnenberg and Boorman. 2008. Fish Population Monitoring at the Obed Mountain Mine in 2007: Baseline and Oldman Creeks. *Prepared for Coal Valley Resources Incorporated, Obed Mountain Mine, Hinton, Alberta by Pisces Environmental Consulting Services Ltd.* 9 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.

## 8.0 **PERSONAL COMMUNICATIONS**

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

---

**Appendix A:**

Colour Plates



Plate 1

Plate 1. Baseline Creek culvert crossing on Emerson Road.



Plate 2

Plate 2. Downstream end of Baseline Creek monitoring section (facing upstream).



Plate 3

Plate 3. Baseline Creek typical habitat within monitoring section (facing upstream).



Plate 4

Plate 4. Oldman Creek, facing upstream from road looking at beaver dam located downstream of monitoring section.



Plate 5

Plate 5. Oldman Creek downstream end of monitoring section (facing downstream).



Plate 6

Plate 6. Oldman Creek typical habitat within monitoring section (facing upstream).

---

**APPENDIX B:**

Fish Capture and Population Estimate Record



---

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

Number of runs	3
Duration of runs (s)	4834 4824 2876
Species	BKTR
Removal pattern	74-31-12
Total catch	117
Population estimate	124
Chi square	0.097
Population estimate SE	4.391
Lower confidence interval	117.000
Upper confidence interval	132.694
Capture probability	0.606
Capture probability SE	0.055
Lower confidence interval	0.498
Upper confidence interval	0.714

Table B2. Individual fish capture data for Baseline Creek

Electrofishing Record – 1<sup>st</sup> Pass

Stream Name: Baseline Creek				
Date: 9-Sept-10				
Project: OMM Fish Population Monitoring				
UTM Reference: 474972E 5932112N Zn 12 (NAD83)				
Section Length (m) 335				
Duration (seconds): 4834, 4824, 2876				
1	BKTR	95	9	Run 1
2	BKTR	137	25	Run 1
3	BKTR	157	42	Run 1
4	BKTR	54	2	Run 1
5	BKTR	185	75	Run 1
6	BKTR	158	46	Run 1
7	BKTR	197	99.5	Run 1
8	BKTR	157	43.5	Run 1
9	BKTR	131	28	Run 1
10	BKTR	140	33.5	Run 1
11	BKTR	131	23	Run 1
12	BKTR	134	26	Run 1
13	BKTR	107	12	Run 1
14	BKTR	56	2	Run 1
15	BKTR	131	24.5	Run 1
16	BKTR	159	55	Run 1
17	BKTR	157	48.5	Run 1
18	BKTR	170	54	Run 1
19	BKTR	170	55.5	Run 1
20	BKTR	193	76.1	Run 1
21	BKTR	153	45.5	Run 1
22	BKTR	94	9.5	Run 1
23	BKTR	161	42	Run 1
24	BKTR	127	24	Run 1
25	BKTR	99	11	Run 1
26	BKTR	160	46.2	Run 1
27	BKTR	106	12	Run 1
28	BKTR	143	31	Run 1
29	BKTR	122	17.5	Run 1
30	BKTR	144	31	Run 1
31	BKTR	126	21	Run 1
32	BKTR	127	21	Run 1
33	BKTR	164	45	Run 1
34	BKTR	101	9.5	Run 1
35	BKTR	53	1.5	Run 1
36	BKTR	68	3	Run 1
37	BKTR	54	1	Run 1
38	BKTR	148	37	Run 1
39	BKTR	58	2.5	Run 1
40	BKTR	177	68.5	Run 1
41	BKTR	58	2.5	Run 1
42	BKTR	68	3.5	Run 1
43	BKTR	103	11.5	Run 1
44	BKTR	107	12.5	Run 1
45	BKTR	59	2	Run 1
46	BKTR	57	1.5	Run 1
47	BKTR	62	2.5	Run 1
48	BKTR	59	2	Run 1
49	BKTR	57	2	Run 1
50	BKTR	143		Run 1
51	BKTR	156	45	Run 1
52	BKTR	161	52	Run 1

53	BKTR	166	55	Run 1
54	BKTR	121	19	Run 1
55	BKTR	57	2	Run 1
56	BKTR	103	12	Run 1
57	BKTR	102	11	Run 1
58	BKTR	144	30	Run 1
59	BKTR	153	41.5	Run 1
60	BKTR	105	12	Run 1
61	BKTR	152	38	Run 1
62	BKTR	153	11	Run 1
63	BKTR	93	8	Run 1
64	BKTR	115	17.5	Run 1
65	BKTR	91	7.5	Run 1
66	BKTR	53	1.5	Run 1
67	BKTR	59	1.5	Run 1
68	BKTR	52	1.5	Run 1
69	BKTR	57	2	Run 1
70	BKTR	53	1.5	Run 1
71	BKTR	51	1.5	Run 1
72	BKTR	46	1	Run 1
73	BKTR	54	1.5	Run 1
74	BKTR	61	2.5	Run 1

Electrofishing Record continued – 2<sup>nd</sup> Pass

Species #	Species	Fork Length (mm)	Weight (g)	Comments
1	BKTR	134	23	Run 2
2	BKTR	147	35	Run 2
3	BKTR	162	43	Run 2
4	BKTR	133	26.5	Run 2
5	BKTR	163	46	Run 2
6	BKTR	93	8.5	Run 2
7	BKTR	179	62	Run 2
8	BKTR	153	46	Run 2
9	BKTR	197	96.5	Run 2
10	BKTR	145	34.5	Run 2
11	BKTR	108	14	Run 2
12	BKTR	62	3	Run 2
13	BKTR	48	1	Run 2
14	BKTR	63	2.5	Run 2
15	BKTR	154	43	Run 2
16	BKTR	96	9.3	Run 2
17	BKTR	163	52	Run 2
18	BKTR	136	33	Run 2
19	BKTR	53	2	Run 2
20	BKTR	54	1.5	Run 2
21	BKTR	69	4	Run 2
22	BKTR	65	3.5	Run 2
23	BKTR	116	15	Run 2
24	BKTR	55	2	Run 2
25	BKTR	58	2.5	Run 2
26	BKTR	57	1.5	Run 2
27	BKTR	145	31	Run 2
28	BKTR	198	11	Run 2
29	BKTR	139	29	Run 2
30	BKTR	56	2	Run 2
31	BKTR	65	3	Run 2

Electrofishing Record continued – 3<sup>rd</sup> Pass

Species #	Species	Fork Length (mm)	Weight (g)	Comments
1	BKTR	56	1.5	Run 3
2	BKTR	95	9	Run 3
3	BKTR	165	49.5	Run 3
4	BKTR	135	26	Run 3
5	BKTR	93	9	Run 3
6	BKTR	176	84.8	Run 3
7	BKTR	153	37.9	Run 3
8	BKTR	153	40.1	Run 3
9	BKTR	54	1.5	Run 3
10	BKTR	56	1.5	Run 3
11	BKTR	146	35	Run 3
12	BKTR	137	27	Run 3

---

Table B3. Population estimate parameters for the monitoring section on Oldman Creek

Number of runs	3
Duration of runs (s)	4447 4349 3615
Species	RNTR
Removal pattern	15-5-4
Total catch	24
Population estimate	25
Chi square	1.249
Population estimate SE	2.046
Lower confidence interval	24.000
Upper confidence interval	29.223
Capture probability	0.600
Capture probability SE	0.123
Lower confidence interval	0.347
Upper confidence interval	0.853



Table B4. Individual fish capture data for Oldman Creek

Electrofishing Record – 1 <sup>st</sup> Pass				
Stream Name:	Oldman Creek			
Date:	10-Sept-10			
Project:	OMM fish population monitoring			
UTM Reference:	4649783E 5942256N Zn 12 (NAD83)			
Section Length (m)	265			
Duration (seconds):	4447, 4349, 3615			
1	BURB	124	12.5	Run 1
2	BURB	141	21.5	Run 1
3	BURB	169	34	Run 1
4	BURB	187	44	Run 1
5	BURB	191	51	Run 1
6	BURB	241	92	Run 1
7	RNTR	43	1	Run 1
8	RNTR	93	8	Run 1
9	RNTR	135	25.5	Run 1
10	RNTR	146	35	Run 1
11	RNTR	147	38.5	Run 1
12	RNTR	163	45.5	Run 1
13	RNTR	166	49	Run 1
14	RNTR	167	51	Run 1
15	RNTR	177	71	Run 1
16	RNTR	179	69	Run 1
17	RNTR	191	79	Run 1
18	RNTR	202	92	Run 1
19	RNTR	203	87	Run 1
20	RNTR	213	106	Run 1
21	RNTR	YoY		Run 1
22	SPSC	84	5.5	Run 1
23	SPSC	118	20	Run 1

Electrofishing Record continued – 2<sup>nd</sup> Pass

Species #	Species	Fork Length (mm)	Weight (g)	Comments
1	BURB	71	2.5	Run 2
2	BURB	72	2.5	Run 2
3	BURB	146	16	Run 2
4	BURB	173	38	Run 2
5	BURB	188	52	Run 2
6	BURB	194	49	Run 2
7	RNTR	39		Run 2
8	RNTR	41		Run 2
9	RNTR	95	9.5	Run 2
10	RNTR	99	12	Run 2
11	RNTR	156	47	Run 2

Electrofishing Record continued – 3<sup>rd</sup> Pass

Species #	Species	Fork Length	Weight	Comments
1	BURB	66	2	Run 3
2	BURB	165	34.5	Run 3
3	BURB	184	42.5	Run 3
4	BURB	238	104.5	Run 3
5	MNWH	66	2	Run 3
6	RNTR	37	0.5	Run 3
7	RNTR	42	1	Run 3
8	RNTR	129	24.5	Run 3
9	RNTR	141	29	Run 3
10	SPSC	115	15	Run 3