

RESULTS OF MONITORING FISH POPULATIONS ON AND ADJACENT  
TO THE OBED MOUNTAIN MINE, APETOWUN CREEK AND AN  
UNNAMED TRIBUTARY TO CANYON CREEK, 2003

Prepared for

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Obed Mountain Mine

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## 1.0 INTRODUCTION

Luscar Limited operates the Obed Mountain Mine (OMM), an open pit coal mine, east of Hinton, Alberta. One component of the environmental monitoring program conducted by the OMM includes monitoring of fish populations in selected streams draining the mine lease area. Two of the four monitoring sites are sampled once every three years.

This document presents the results of fish population monitoring in Apetowun Creek and an unnamed tributary to Canyon Creek conducted in 2003 by Pisces Environmental Consulting Services Ltd.

## 2.0 OBJECTIVES

The objectives of the 2003 program were to obtain fish population estimates from previously established monitoring sections on Apetowun Creek and an unnamed tributary to Canyon Creek and report on the findings.

## 3.0 METHODS

Fish population estimates were obtained using the removal method (Zippen 1958) and calculated using MicroFish 3.0 (Van Deventer and Platts 1989). Where the probability of capture calculated in the field for a two pass removal estimate was less than 0.5, a third pass was conducted. All captured fish were measured to fork length (mm) and weighed (g).

The monitoring sections, described in Table 1 and located on Figures 1 and 2, had been established in 2000 and were described in detail by Allan (2001). The sections sampled were the same as those sampled in 2000, except that the Apetowun Creek section was extended a further 100 m upstream. Section lengths exceeded 40 times average channel width or not less than 150 m, as suggested by Reynolds et al. (2003).

Table 1. Sample section characteristics, Apetowun Creek and Canyon Creek tributary.

Stream	Date	Length (m)	Area (m <sup>2</sup> )	Sampling Duration (s)
Apetowun Creek	August 22	270	513	Run #1 - 2272 Run #2 - 1313
Canyon Creek Tributary	August 18	205	328	Run #1 - 1403 Run #2 - 1208 Run #3 - 1276

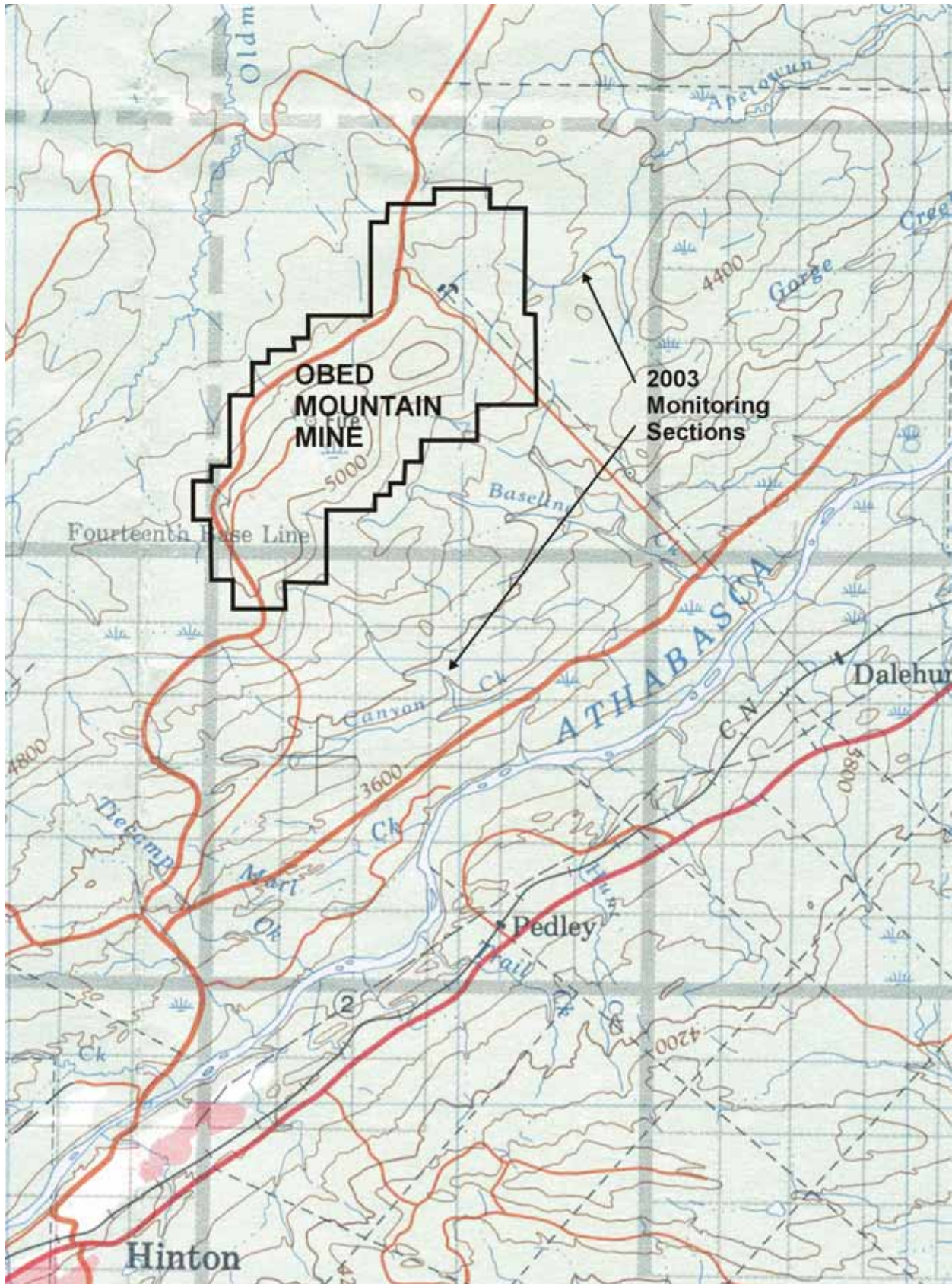


Figure 1. Location of the Obed Mountain Mine and 2003 monitoring sections.



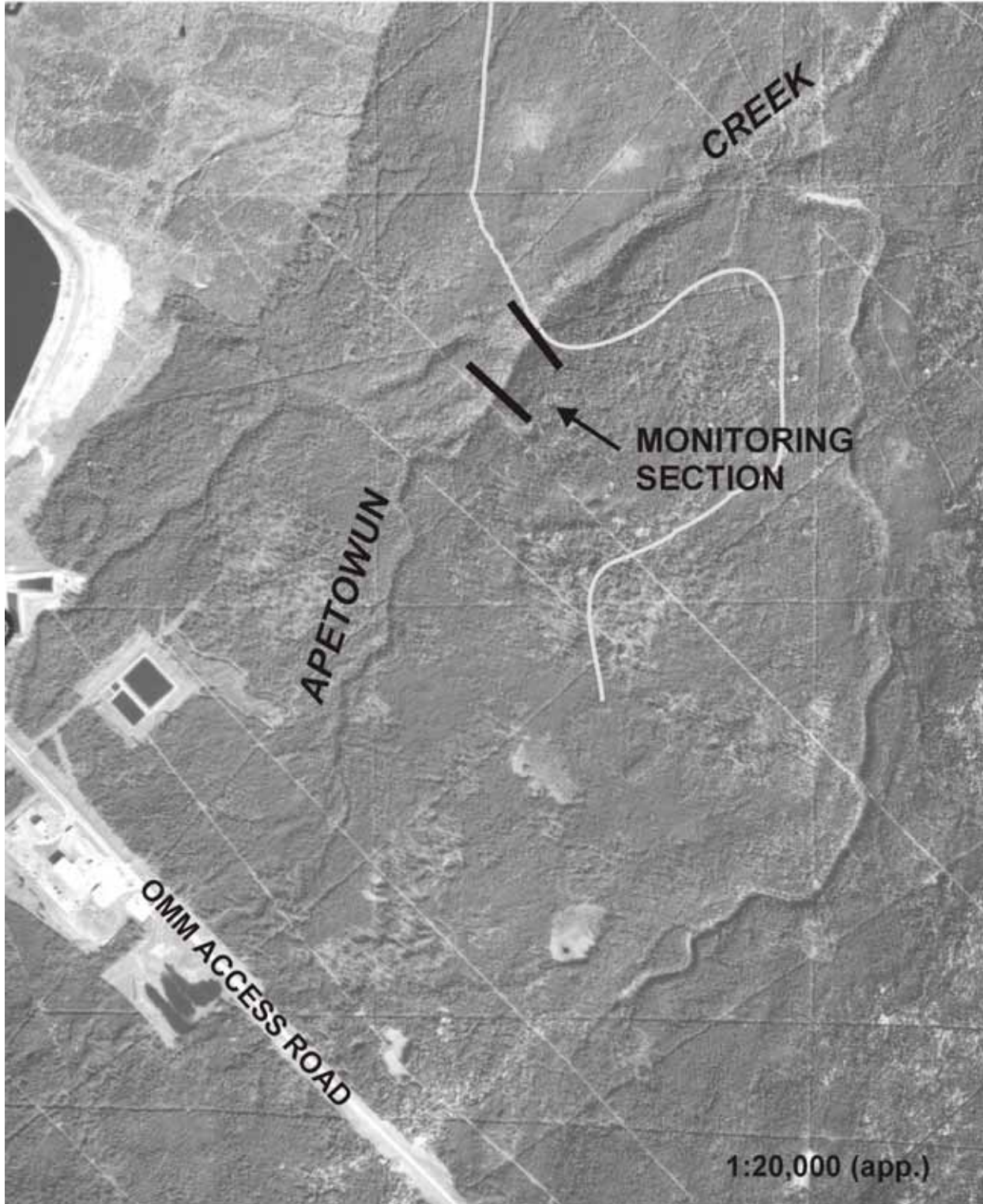


Figure 2. Location of the Apetowun Creek monitoring section.

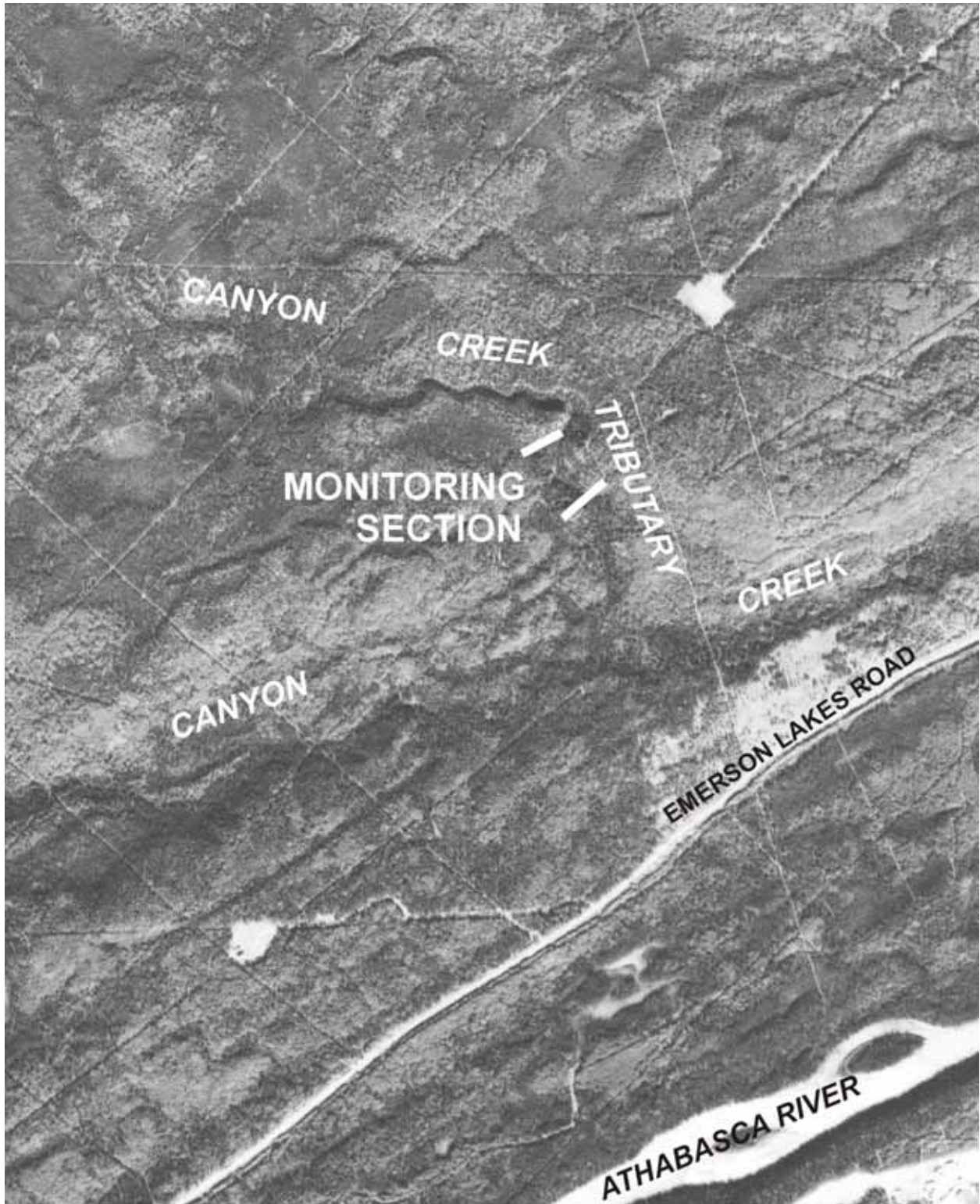


Figure 3. Location of Canyon Creek tributary monitoring section.

## 4.0 RESULTS

### 4.1 Apetowun Creek

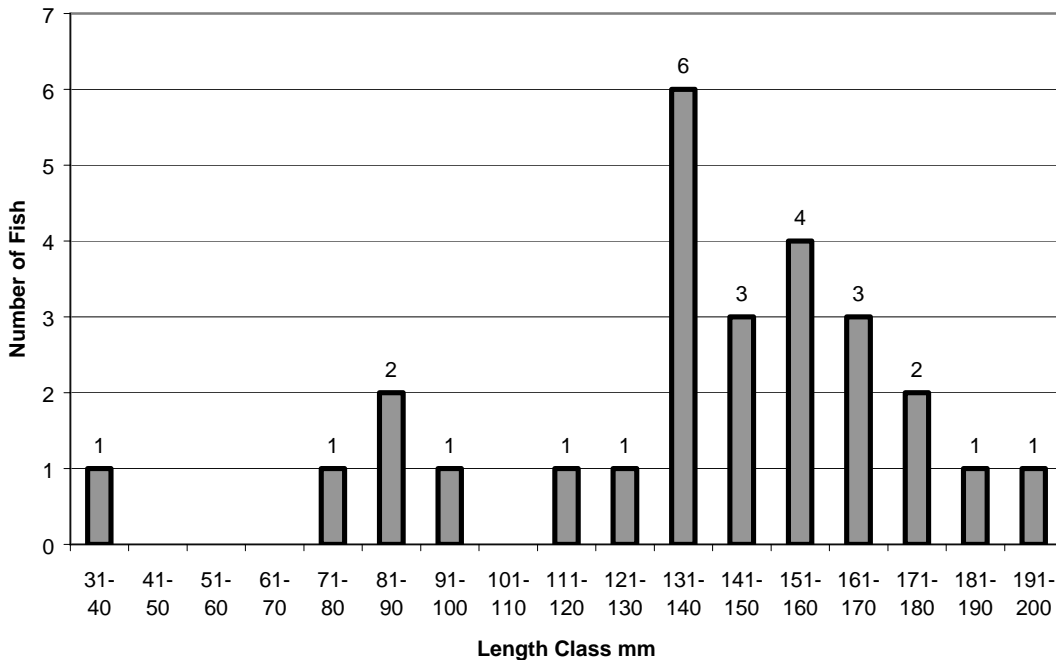
Rainbow trout (*Oncorhynchus mykiss*) was the only species captured in Apetowun Creek in 2003.

The population estimate for the monitoring section was 27, equal to the total catch, and yielded a density estimate of 5.26 fish per 100 m<sup>2</sup>. Details of the results of the population estimate calculations are given in Appendix A. Catch per unit effort (CPUE) for the first run was 0.71 fish per minute.

Discharge at the downstream end of the study section on the date of survey was 0.05 m<sup>3</sup>/s and water temperature was 10 C.

The mean fork length of rainbow trout in the catch was 137.15 mm (range 40 to 191) and the mean weight was 36.1 g (range 1 to 75). The lengths and weights of individual fish in the catch are given in Appendix B. Figure 4 shows the length frequency distribution of the rainbow trout catch. There appears to be at least 3, perhaps 4 or more, age classes present.

Figure 4. Rainbow trout length frequency distribution



### 4.2 Canyon Creek Tributary



Brook trout (*Salvelinus fontinalis*) was the only species of fish captured in the Canyon Creek tributary in 2003.

The population estimate for the monitoring section was 4, equal to the total catch, and yielded a density estimate of 1.22 fish per 100 m<sup>2</sup>. Details of the results of the population estimate calculations are given in Appendix A. Catch per unit effort (CPUE) for the first run was 0.09 fish per minute.

Discharge at the downstream end of the study section on the date of survey was 0.005 m<sup>3</sup>/s and water temperature was 10 C.

The mean fork length of brook trout in the catch was 110.25 mm (range 79 to 142) and the mean weight was 18.75 g (range 5 to 37). The lengths and weights of individual fish in the catch are given in Appendix B.

## 5.0 DISCUSSION AND CONCLUSIONS

### 5.1 Apetowun Creek

Burbot were captured in the monitoring section in 2000 (Allan 2001) however none were captured or observed in 2003. The Foothills Model Forest (FMF) reported the capture of rainbow trout and burbot at a site immediately downstream of the OMM monitoring section (R.McCleary, personal communication) and Zallen (1981) reported the capture of rainbow trout and burbot from a section (Section 7, Reach G) of Apetowun Creek that overlapped the OMM monitoring section.

Rainbow trout density estimates in the Apetowun Creek monitoring section were very nearly the same in 2000 (Allan 2001) and 2003 at 5.1 and 5.26/100 m<sup>2</sup>. The CPUE for rainbow trout in 2003 (0.71) was higher than that in 2000 (0.22) and approached the CPUE (0.89) found by the FMF in 1988. Zallen (1981) reported a CPUE for rainbow trout from his Section 7, Reach G on Apetowun Creek of 0.23 trout per minute.

There appears to have been little if any change in the rainbow trout population in the OMM monitoring section on Apetowun Creek in 2003. The higher CPUE in 2003 may be an artifact of the low flow encountered in 2003. Flow in 2003 was about 25% of that encountered during sampling in August of 2000. The absence of burbot in the OMM monitoring section in 2003 could also be a result of low flow. If burbot are a seasonal user of the section, very low flow may have influenced their occupation of the section, either inhibiting access or encouraging emigration.

### 5.2 Canyon Creek Tributary

There was a decline in brook trout density in the tributary exceeding an order of magnitude between 2000 and 2003, from 20.4/100 m<sup>2</sup> (Allan 2001) to 1.22 in 2003. There was a similar dramatic decline in CPUE, from 1.21 fish/minute to 0.09. No rainbow trout were captured or observed in either 2000 (Allan 2001) or 2003, however Zallen (1981) reported that rainbow trout were more abundant than brook trout in 1980.

The decline in brook trout numbers could be attributed to the substantially lower flow encountered in 2003 (0.005 m<sup>3</sup>/s) compared to 2000 (0.022 m<sup>3</sup>/s) and/or to a significant deterioration of habitat quality caused by a valley wall failure immediately upstream of the monitoring section (Plate 1) that resulted in a dramatic increase in sediment deposition and woody debris. Plates 2 through 5 compare conditions in the section in 2000 and 2003.



Plate 1. Valley wall failure/slump into Canyon Creek tributary upstream of population estimate section.



Plate 2. Canyon Creek tributary within population estimate section, August 18, 2003.



Plate 3. Canyon Creek tributary within population estimate section, August 18, 2003.





Plate 4. Canyon Creek tributary within population estimate section  
August, 16,2000.



Plate 5. Canyon Creek tributary within population estimate section  
August, 16,2000.



## 6.0 REFERENCES

Allan, J. H. 2001. Assessment of fisheries resources in Apetowun Creek and an unnamed tributary to Canyon Creek in 2000. Report of Pisces Environmental Consulting Services Ltd. to Luscar Ltd. Obed Mountain Mine, Hinton, Alberta. 15 pp. + App.

Reynolds, L., A. T. Herlihy, P. R. Kaufmann, S. V. Gregory and R. M. Hughes. 2003. Electrofishing effort requirements for assessing species richness and biotic integrity in western Oregon streams. *N. Am. J. Fisheries Management* 23:450-461.

Van Deventer, J. S. and W. S. Platts. 1989. Microcomputer Software System for Generation of Population Statistics from Electofishing Data – User’s Guide to 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 – Summer 1980. Report of ESL Environmental Sciences Ltd. to Union Oil of Canada Ltd., Calgary, Alberta. 19 pp. + App.

Zippen, C. 1958. The Removal Method of Population Estimation. *J. Wildl. Man.* 22(1):82-90.

## 7.0 PERSONAL COMMUNICATIONS

1. R. McCleary, Foothills Model Forest, Hinton, Alberta.

APPENDIX A.  
 Details of population estimate calculations

Table A1. Detailed population estimate parameters for rainbow trout from Apetowun Creek.	
Removal pattern	24, 3
Total catch	27
Population estimate	27
Lower 95% confidence limit	27
Upper 95% confidence limit	28.312
Capture probability	0.900

Table A2. Detailed population estimate parameters for brook trout from the Canyon Creek tributary.	
Removal pattern	2, 2, 0
Total catch	4
Population estimate	4
Lower 95% confidence limit	4
Upper 95% confidence limit	5.73
Capture probability	0.677

**APPENDIX B.**  
**Lengths and weights of individual fish in the catch**

Table B1. Length (mm) and weight (g) for rainbow trout in the catch from Apetowun Creek.			
Run #1		Run #2	
Length	Weight	Length	Weight
144	37	191	75
172	69	130	25
183	71	40	1
160	49		
160	46		
133	25		
131	27		
154	42		
83	6		
132	27		
142	34		
165	54		
154	44		
163	50		
173	69		
170	62		
147	39		
137	28		
140	30		
114	20		
82	6		
79	5		
93	9		
131	24		

Table B2. Length (mm) and weight (g) for brook trout in the catch from the Canyon Creek tributary.			
Run #1		Run #2	
Length	Weight	Length	Weight
142	37	79	5
132	23	88	8