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THE EFFECTS OF THE HOLDEN MINE TAILINGS  
UPON THE AQUATIC INSECT FAUNA  
OF RAILROAD CREEK,  
A TRIBUTARY TO LAKE CHELAN

BY

ROLAND E. PINE

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INTRODUCTION

Area Description and Background

Railroad Creek flows into Lake Chelan at Lucerne, Washington and is one of the lake's major tributaries. It is a typical glacial fed, mountain stream with a drainage area of 54.8 square miles.

Between river mile 8.8 and 9.5 at Holden, the creek flows adjacent to a large tailing pile. The mine which created the tailings was operated by the Howe Sound Mining Company from 1937 to 1957. The concentrating equipment has since been dismantled and all mining activity has ceased.

Purpose

The purpose of the study was to evaluate the effects of the Holden mine tailings upon biological quality of Railroad Creek, employing the aquatic insect fauna as an indicator.

## METHODOLOGY

### Aquatic Organisms

Samples were collected in Railroad Creek at various locations with the aid of a simple hand screen, one meter square. The screen was mounted on two poles and placed in the stream below the point to be sampled. Approximately one square meter of the stream bottom was then vigorously disturbed and the dislodged material caught on the screen. The organisms were then picked from the screen at random for a period of ten (10) minutes and preserved in 4% formalin. In most instances all of the insects were removed from the screen in less than the ten minute period.

The stations were selected on the basis of accessibility and consistency of bottom type.

## RESULTS AND DISCUSSION

Table I shows the number of organisms found at each river mile sampled as well as the number of families represented. River mile 1.1 was located at Lucerne near the mouth of Railroad Creek and river mile 10.6 was located a short distance above Holden village. The mine tailings are located at approximately river mile 9.5.

A total of 24 and 29 organisms were found at river mile 10.6 and 10.4 respectively. At river mile 9.4, just inside that area of the creek influenced by the tailing pile, only two (2) organisms were found. Recovery was not noted until river mile 3.2 and river mile 1.1. The same trend was evident regarding the number of families of organisms represented.

The samples collected from Ten Mile Creek were comparable to those collected from Railroad Creek above the influence of the mine tailings. Ten Mile Creek flows into Railroad Creek at river mile 8.8.

## CONCLUSIONS

High mountain glacial fed streams, such as Railroad Creek, are not generally considered highly productive waters due primarily to the cold temperatures and the low nutrient levels of the water. The results of this study, however, indicate that the mine tailings at Holden are significantly affecting the already limited productivity of the creek. This is due principally to the deposition of tailing material upon the stream bottom effectively suffocating the aquatic insect fauna. A more subtle cause of this condition may be the solution of certain substances from the tailing material which may be toxic to aquatic organisms.

Over the years wind and, to some degree, water runoff, have deposited significant quantities of tailings into the creek which have filled the interstitial spaces between the rocks and rubble of the stream bottom. This condition was evident to river mile 8.9 and to a somewhat lesser degree to river mile 7.6. Such a condition precludes the survival of organisms such as mayflies (Ephemeroptera) stoneflies (Plecoptera) and caddisflies (Tricoptera) which depend upon the circulation of clean, well oxygenated water around external gills for their respiration.

The rocks and rubble along the stream bottom and below the high waterline were stained a reddish brown color as far downstream as river mile 6.3 and to a lesser extent at river mile 3.2. Above the tailings and at river mile 1.1 the rocks were a normal white, grey and blue-grey color. This condition indicates the solution of certain substances from the tailing material.

TABLE I

## NUMBERS OF ORGANISMS COLLECTED IN RAILROAD CREEK AT SELECTED STATIONS

ON SEPTEMBER 20 and 21, 1967

	<u>RIVER MILE</u>										<u>TEN MILE CREEK</u>
	<u>1.1</u>	<u>3.2</u>	<u>6.3</u>	<u>7.6</u>	<u>8.2</u>	<u>8.9</u>	<u>9.2</u>	<u>9.4</u>	<u>10.4</u>	<u>10.6</u>	<u>RIVER MILE</u>
											<u>0.5</u>
<u>Plecoptera (Stoneflies)</u>											
Isogenus	2			1							
Perlidae	8	3					1	1	1	2	2
Nemouridae		4				2		1			
Pteronarcidae									1		
<u>Ephemeroptera (Mayflies)</u>											
Heptageniidae		4	2						21	11	8
Baetidae		1	3				1		5	7	5
<u>Tricoptera (Caddisflies)</u>											
Hydropsychidae	9	1		1	1	2	6		1	1	7
Rhyalophilidae										1	4
Philopotamidae							1				
<u>Diptera (Two winged flies)</u>											
Blephariceridae	1										
Simuliidae			1							1	
<u>Other</u>											
Planaria										1	
Total Number of Organisms	20	13	6	2	1	5	8	2	29	24	26
Number of Families Represented	4	5	3	2	1	3	3	2	5	7	5