



STATE OF WASHINGTON  
DEPARTMENT OF ECOLOGY

7272 Cleanwater Lane, LU-11 • Olympia, Washington 98504 • (206) 753-2353

September 10, 1982

Mr. Don Hendrick  
Skagit Laboratory  
Department of Fisheries  
302 Sharon Avenue  
Burlington WA 98233

Dear Mr. Hendrick:

In response to your request to the Department of Ecology, Art Johnson and I conducted a water quality survey of Anderson Creek and nearby surface waters on July 12, 1982. The object of our survey was to determine if water quality problems existed sufficient to make Anderson Creek an unsuitable stream for salmon rearing -- as your observations have suggested.

The enclosed map shows the four stations included in our survey, namely:

Station #1 - Anderson Creek about 100 feet upstream of the Highway 2 bridge

Station #2 - "KOA" trout pond on Anderson Creek (pond water taken directly from Anderson Creek)

Station #3 - Skykomish River upstream of Anderson Creek, at "KOA" camp ground

Station #4 - Proctor Creek immediately downstream of the Highway 2 bridge

Dissolved oxygen (Winkler-azide modification), temperature, and pH were measured in the field at each station. The following parameters were determined on iced samples returned to our Tumwater laboratory and analyzed according to EPA's *Manual of Methods for Chemical Analysis of Water and Wastes*:

Specific Conductivity	Total Zinc
Turbidity	Total Copper
Total Suspended Solids	Total Nickel
Nitrate	Total Chromium
Nitrite	Total Cadmium
Ammonia	Total Lead
Orthophosphate	Total Arsenic
Total Phosphate	Total Mercury
Total Hardness	
Total Alkalinity	

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In addition to the above, approximately 40 liters of water each was collected from Anderson and Proctor creeks and tested for toxicity to rainbow trout in 96-hour bioassays conducted in accordance with WDOE's "General Procedure for Static Basic Acute Fish Toxicity Test". Near the Anderson Creek water sampling site, we also did some electroshocking and made an attempt to collect benthic macroinvertebrates.

The results of our water quality measurements are shown in the attached table. Except for its relatively low temperature (7.5 °C), Anderson Creek was physically and chemically similar to the Skykomish River and Proctor Creek. Anderson Creek was within WDOE Class AA (extraordinary) standards for dissolved oxygen, temperature, and turbidity. The pH in Anderson Creek was below the 6.5 lower limit for Class AA waters but was still within a range suitable for salmonids and other fishes. Dissolved solids (as measured by conductance), suspended solids, and nutrients were low in all waters tested. Neither ammonia nor nitrite approached toxic levels.

Trace metal concentrations were low in Anderson Creek as well as other parts of the drainage and were, for the most part, within EPA criteria for protection of aquatic life shown in the data table. Our laboratory's detection limits for copper, cadmium, lead, and mercury were not sufficiently low to determine if these waters were within EPA's extremely low 24-hour average criteria for these metals. EPA criteria for maximum allowable concentrations of copper, cadmium, and lead were met.

The bioassays on Anderson Creek and Proctor Creek water samples (results enclosed) showed no mortalities. These findings coupled with the physical/chemical data discussed above and the healthy trout population we observed in the KOA camp ground pond, suggest that Anderson Creek water should be no less well suited for salmonids than Proctor Creek, a productive salmon-rearing stream.

We did not, however, observe salmonids or any other species of fish while electroshocking portions of lower Anderson Creek. Juvenile salmon were abundant in Proctor Creek (we did not shock here). Only two chironomids and two caddis fly larvae were retained in three surber samples collected from the gravels of Anderson Creek.

We suspect that the steep gradient and high velocity characteristic of this creek is responsible for its apparent low productivity. As a fisheries biologist, you, of course, would be better able to judge the suitability of this habitat than ourselves. Ed Barber, KOA camp ground manager, told us that Anderson Creek is subject to rapid changes in water level and severe scouring.

In summary, we found nothing in our survey to indicate a water quality problem in Anderson Creek. My only recommendation for additional work

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would be to get some more pH measurements in the creek in light of the relatively low pH measured during our survey. Please let me know if you have any questions about our results or if we can be of further assistance.

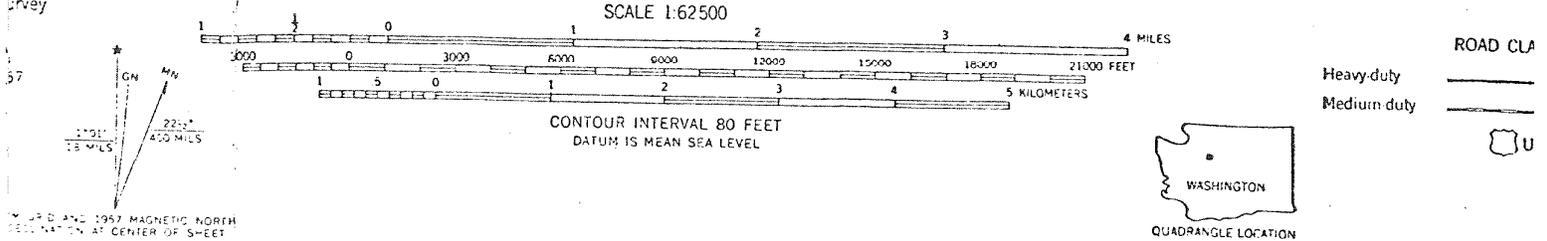
Sincerely,

A handwritten signature in cursive script that reads "Bob Bishop".

Bob Bishop, Environmentalist  
Water Quality Investigations Section

BB:cp

Enclosures



FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR WASHINGTON, D. C. 20242  
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Water Quality Sampling Stations for the WDOE Anderson Creek Survey of 12 July 8

Anderson Creek survey conducted July 12, 1982.

Proctor Creek Mouth Station #4	WDOE Class AA Water Quality Standards	EPA Criteria for Protection of Aquatic Life <sup>1</sup>			
		24-hr. Average	Not to Exceed	Acute Toxicity	Chronic Toxicity
11.4	>9.5 mg/L				
11.0	<16.0°C				
6.7	6.5 - 8.5				
27					
2	<5 NTU over background				
1					
0.07					
0.01					
0.01					
<0.01					
0.01					
16					
11					
28		47	180		
<10		5.6	12		
<20		56	1100		
<10			2200		44
<2		0.012	1.5		
<10		0.75	74		
<1			440	40	
<0.2		0.00057	0.0017		

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M E M O R A N D U M

August 9, 1982

To: Art Johnson, Water Quality Investigations Section  
Through: *JF* Perry Freeman, Laboratory Section Head  
From: *DK* Don Kjosness, Aquatic Biologist, Olympia Environmental Laboratory  
Subject: 96-Hour Bioassay Information. Sample from Anderson Creek - Gold Bar, WA

Sample Identification:

Laboratory Reference Number: 82-3441  
Date Sample Collected: July 12, 1982  
Date Sample Received: July 12, 1982  
Sample Submitted by: Art Johnson  
Sample Description: "Mouth". A clear colored liquid.

Test Procedure:

The sample was tested for toxic properties in accordance with the Department of Ecology "General Procedure for Static Basic Acute Fish Toxicity Test".

Test Results:

The test data are tabulated in detail on the following pages.

Test Details:

The sample was tested at full strength (100%).

The test organisms were rainbow trout (*Salmo gairdneri*). The organism length ranged from 31 to 41 mm, giving a short-to-long ratio of 1:1.3. The average length was 35 mm. The average weight was .61 grams.

Fifteen trout were added to 15 liters of sample/water mixture in each aquarium. This gave a flesh-to-mixture ratio of .6 grams/liter.

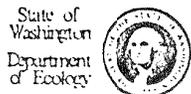
The test was started on July 13, 1982 at 1400 hours and completed on July 17, 1982 at 1400 hours.

Conclusions:

Full strength (100%) - 0/30 fish died = 0% mortality.  
Control - 0/30 fish died = 0% mortality.

DK:cp

Attachments



DATA SHEET FOR STATIC BASIC ACUTE FISH TOXICITY TEST\*

Laboratory OLYMPIA ENVIRONMENTAL LAB  
 Analyst JOHN KJOSNESS

Industry/Toxicant ANDERSON CREEK  
 Address GOLD BAR  
 Collector ARI JOHNSON  
 Date Sample Collected 7-12-82

Beginning: Date 7-13-82 Time 1400  
 Ending: Date 7-17-82 Time 1400  
 Test Organism RAINBOW TROUT (SALMO GATRIENARI)  
 Required Test Temperature Range 12° ± 1°C

Laboratory Reference Number	Test Container No.	Conc. (mg/l)	Number of Cumulative Deaths					Dissolved Oxygen (mg/l)					pH 25°C					Temperature (C)					Total Hardness (mg/l as CaCO <sub>3</sub> )		Total Alkalinity (mg/l as CaCO <sub>3</sub> )		Conductivity (µMHOS/cm)	
			0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96	0	96	0	9
82-3441	16	100%	0	0	0	0	0	9.9	9.6	9.1	8.6	8.2	7.5	7.4	7.4	7.4	7.4	13.1	13.0	12.6	12.6	12.8	8	12	49	11	20	3
mount	23	100%	0	0	0	0	0	9.7	9.4	8.9	8.4	8.1	7.5	7.4	7.4	7.4	7.4	13.4	13.0	12.6	12.6	12.8	8	8	49	11	20	4
CONTROL	21	TAP H <sub>2</sub> O	0	0	0	0	0	9.6	9.3	8.7	8.4	8.0	7.6	7.4	7.4	7.4	7.4	13.6	13.4	13.0	13.0	13.2	44	44	48	48	120	12
	22	TAP H <sub>2</sub> O	0	0	0	0	0	9.4	9.1	8.6	8.1	7.8	7.6	7.4	7.4	7.4	7.4	13.6	13.4	13.0	13.0	13.2	44	40	42	51	111	12

Sample Description A CLEAR COLORED LIQUID  
 Average Weight .61 Mean Length 35 Longest 41 Shortest 31 Ratio (long/short) 1.3:1  
 Number of organisms per chamber 15 Ratio of flesh to water .6 Comments 15 L/TANK

\* Method on file with the Department of Ecology:  
 GENERAL PROCEDURE FOR STATIC BASIC ACUTE FISH TOXICITY TEST  
 ECY 030-1-40

DATA VERIFIED BY S. Filmon DATE 8-11-82  
 EW > 10/30  
 DW > 11/30



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From: *DK* Don Kjosness, Aquatic Biologist, Olympia Environmental Laboratory  
Subject: 96-Hour Bioassay Information. Sample from Proctor Creek - Gold Bar, WA

Sample Identification:

Laboratory Reference Number: 82-3444  
Date Sample Collected: July 12, 1982  
Date Sample Received: July 12, 1982  
Sample Submitted by: Art Johnson  
Sample Description: "Mouth". A clear colored liquid.

Test Procedure:

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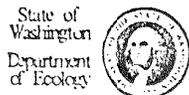
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 Analyst Don Krosnars  
 Beginning: Date 7-13-82 Time 1400  
 Ending: Date 7-17-82 Time 1400  
 Test Organism RAINBOW TROUT (SALMO GAIRDNERI)  
 Required Test Temperature Range 12° ± 1°C

Industry/Toxicant PROUTER CREEK  
 Address GOLD BAR  
 Collector ART JOHNSON  
 Date Sample Collected 7-12-82

Laboratory Reference Number	Test Container No.	Conc. (mg/l)	Number of Cumulative Deaths					Dissolved Oxygen (mg/l)					pH 25°C					Temperature (C)					Total Hardness (mg/L as CaCO <sub>3</sub> )		Total Alkalinity (mg/L as CaCO <sub>3</sub> )		Conductivity (µMHOS/cm)	
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82-3444	19	100%	0	0	0	0	0	9.8	9.7	9.2	8.9	8.5	7.2	7.2	7.2	7.2	7.2	13.6	13.2	12.8	12.8	13.0	16	16	49	19	26	3
MOUTH	20	100%	0	0	0	0	0	9.7	9.5	9.0	8.6	8.3	7.2	7.2	7.2	7.2	7.2	13.6	13.2	12.8	12.8	13.0	16	16	49	17	26	3
Control	21	TAP H <sub>2</sub> O	0	0	0	0	0	9.6	9.3	8.7	8.4	8.0	7.6	7.4	7.4	7.4	7.4	13.6	13.4	13.0	13.0	13.2	44	44	48	48	110	12
	22	TAP H <sub>2</sub> O	0	0	0	0	0	9.4	9.1	8.6	8.1	7.8	7.6	7.4	7.4	7.4	7.4	13.6	13.4	13.0	13.0	13.2	44	40	42	51	111	12

Sample Description A CLEAR COLORED LIQUID  
 Average Weight .61 Mean Length 35 Longest 41 Shortest 31 Ratio (long/short) 1.3:1  
 Number of organisms per chamber 15 Ratio of flesh to water .6 Comments 15% TANIC

Method on file with the Department of Ecology:  
 GENERAL PROCEDURE FOR STATIC BASIC ACUTE FISH TOXICITY TEST  
 ECV 030-1-40

DATA VERIFIED BY S. Freeman DATE 8-11-82  
 EHW > 10/30  
 DW > 11/30