

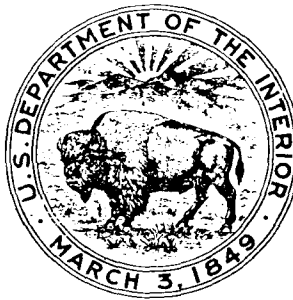
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

NOTES ON WATER CHEMISTRY AND AQUATIC BIOLOGY
OF REDWOOD CREEK AND SELECTED TRIBUTARIES

Prepared in cooperation with the National Park Service

OPEN-FILE REPORT

This report is preliminary and has not
been edited or reviewed for conformity
with Geological Survey standards and
nomenclature.



Menlo Park, California

October 1975

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By R. C. Averett and R. T. Iwatsubo

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NOTES ON WATER CHEMISTRY AND AQUATIC BIOLOGY
OF REDWOOD CREEK AND SELECTED TRIBUTARIES

The streams included in the study and their sampling stations are presented in table 1. The data types included in this report and the inclusive dates of collection are in table 2. For this study, Little Lost Man and Hayes Creeks were considered as control streams. Land disturbances in their watersheds was minimal and both streams drained tracts of virgin forest.

Table 1.--Sampling stations included in this report

<u>Station number</u>	<u>Station name</u>
11481500	Redwood Creek near Blue Lake, Calif.
11482220	Redwood Creek at South Park Boundary, near Orick
11482225	Harry Wier Creek near Orick
11482250	Miller Creek near Orick .
11482260	Miller Creek at Mouth, near Orick
11482330	Hayes Creek near Orick
11482450	Lost Man Creek near Orick
11482468	Little Lost Man Creek at Site No. 2, near Orick
11482470	Little Lost Man Creek near Orick
11482475	Geneva Creek near Orick
11482500	Redwood Creek at Orick

Table 2.--Data types included in this report and inclusive dates
of sample collection

<u>Data type</u>	<u>Inclusive dates of collection</u>
Water chemistry	
Water temperature	November 1973 to July 1975
Dissolved oxygen (concentration and percent saturation)	November 1973 to July 1975
pH and total alkalinity	November 1973 to July 1975
Specific conductance	November 1973 to July 1975
Major dissolved ions	November 1973 to July 1975
Selected plant nutrients (nitrogen, phosphorus, and organic carbon)	November 1973 to July 1975
Trace metals (cadmium, copper, lead, and zinc)	November 1973 to April 1974
Pesticides (chlorinated hydrocarbons and organic phosphorus compounds), bottom sediments only	July 1974 only
Aquatic biology	
Benthic invertebrates	September 1973 to Sept. 1974
Phytoplankton and periphyton	May to September 1974
Fish	May 1974 to September 1975
Seston	November 1973 to July 1975
Coliform bacteria	February 1974 to July 1975
Intragravel dissolved oxygen and surface water conditions	June 1974 to November 1974

Water Chemistry

Water Temperature

Water temperature was measured at a near-hourly frequency during eight synoptic storm-sampling periods with a hand-held mercury thermometer calibrated to $\pm 0.2^{\circ}$. The temperature data collected during these periods show diel trends and minimum-maximum values for each storm period measured. At selected stations, hourly measurements over a diel period of water temperature were made in the summer and early autumn months. The data presented show the range and mean of water temperature measured during each diel period but not necessarily the seasonal minimum-maximum values. Results are given in table 3.

Seasonal water-temperature values varied greatly. Redwood Creek values ranged from 6.0°C in late February to 23.5°C in late July. No August temperatures were available at the time of this writing. Hayes Creek water temperatures ranged from 7.0°C in the winter to 11.0°C in late autumn. A single summer temperature recorded on July 27, 1974 was 15.0°C . Little Lost Man Creek also had low and stable winter water temperatures compared to a maximum of 19.0°C recorded in mid September 1974. The remaining tributary streams all had low winter water temperatures averaging about 6°C . Summer water temperatures (some not shown on table 3) averaged about 14°C .

The temperature data available for this report indicate that water temperatures for the Redwood Creek tributaries are suitable for salmonid

the native? - salmon?

fish. However, the higher summer temperature in the Redwood Creek main stem 24.5°C could have an adverse effect upon fish and other aquatic biota. Additional water temperature data from continuous records are presently being collected and analyzed for several Redwood Creek main-stem stations.

Dissolved Oxygen

The mean dissolved-oxygen concentrations as percent saturation values were all near the 100 percent level (table 3). Summer diel measurements (July and September 1974) revealed expected patterns of oxygen production during daylight hours and oxygen reduction during the hours of darkness. The concentration values never dropped below critical values (5.0 mg/l) for aquatic life during the study period.)

have the values been established for species occurring in study area

pH and Total Alkalinity

The pH and total alkalinity values in table 3 were all determined onsite.

? The pH of Redwood Creek varied depending upon season and storm periods. Some of the higher pH values shown in table 3 probably resulted from algal photosynthesis. *please explain* Alkalinity data from Redwood Creek displayed the expected tendency to increase in a downstream direction. The pH values in Redwood Creek were consistent, with little variation throughout a given diel period.

Overall, the pH values in the selected tributary streams were similar to those of Redwood Creek. However, in Miller Creek (at mouth), Little

Lost Man, and Geneva Creeks some pH values were quite low (5.5, 5.8, and 5.9). These values are quite low for surface water, but no explanation for them can be given at this time.

The total alkalinity of the Redwood Creek drainage is low, particularly in the tributary streams. The values are only slightly higher in the Redwood Creek main stem. This means that the waters of the drainage are poorly buffered with respect to resisting changes in pH.

Specific Conductance

Specific conductance of most natural streams is inversely related to stream discharge and thus, the value is a function of simple dilution. ^{of what?} The final reports of this study will consist of discharge-specific conductance regressions, illustrating seasonal effects. In this memorandum specific conductance is discussed only briefly in non-statistical terms.

Specific-conductance measurements between upstream and downstream stations (Redwood Creek near Blue Lake and Redwood Creek at Orick) (table 3) during high flows of winter were similar. Low-flow specific-conductance values varied between stations. A slightly increasing trend in specific conductance occurred between Redwood Creek near Blue Lake and Redwood Creek at South Park Boundary, and a slightly decreasing trend occurred from Redwood Creek at South Park Boundary to Redwood Creek at Orick.

Specific-conductance measurements of the tributaries during high flows of winter varied slightly between stations. Low-flow specific-conductance values were generally lower in the tributaries than in Redwood Creek. Little more can be said regarding specific conductance until the data are statistically related to stream discharge.

Table 3.--Results of streamside water-quality measurements
(Dissolved oxygen percent saturation was calculated)

Station number and name	Date	Temperature (°C)			Dissolved oxygen (mg/l)			Dissolved oxygen (percent saturation)			pH		Total alkalinity as CaCO ₃ (mg/l)			Specific conductance (micromhos)		
		Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n
11481500																		
Redwood Creek	Jan. 12-13, 1974	5.0- 8.0	7.0	5	--	--	--	--	--	--	--	--	--	27	1	66- 79	71	5
near Blue	Feb. 21, 1974	--	6.0	2	--	11.6	1	--	93	1	6.8	1	--	29	1	71- 72	72	2
Lake	Mar. 3, 1974	--	5.0	2	--	12.3	1	--	96	1	7.3	1	--	28	1	--	69	1
	July 30-31, 1975	16.0-24.5	19.0	26	7.9- 9.7	8.7	25	85-104	93	25	7.3-8.5	24	51-62	60	11	159-170	164	25
11482200																		
Redwood Creek	Nov. 7-9, 1973	12.0-12.5	12.5	6	10.5-10.9	10.7	3	97-102	100	3	6.3-6.5	2	27-33	29	3	68- 82	72	7
at South Park	Jan. 12-13, 1974	7.0- 8.0	7.5	5	11.1-11.7	11.5	3	92- 96	94	2	6.8	3	29-30	30	3	74- 80	76	4
Boundary,	Feb. 20-22, 1974	6.0- 8.0	7.0	8	11.5-11.9	11.7	5	95- 99	96	4	6.8	2	26-29	28	4	68- 75	72	9
near Orick	Mar. 1-2, 1974	6.5- 7.5	7.0	6	11.3-12.2	11.8	3	93- 99	97	3	6.8-6.9	3	27-31	30	4	69- 77	71	5
	July 18-19, 1974	18.5-23.5	21.0	13	8.0- 9.0	8.5	13	89-105	94	13	7.2-8.4	15	59-73	70	13	124-196	174	18
	Sept. 10-11, 1974	16.0-21.5	18.5	15	7.5- 9.0	8.2	14	78-100	87	14	7.3-8.2	14	81-90	85	13	235-250	245	14
	Nov. 7-8, 1974	9.5-12.0	11.0	2	--	--	--	--	--	--	--	--	--	--	--	244-255	250	3
	Nov. 21-22, 1974	9.5-11.0	10.5	7	10.0-10.5	10.0	2	89- 95	92	2	7.1-8.2	4	64-83	70	4	224-250	236	7
	Feb. 5-9, 1975	6.0- 8.0	7.5	6	11.5-12.4	11.8	5	95-100	98	5	7.1-7.5	5	26-47	34	5	71- 79	74	8
	Feb. 12-14, 1975	6.5- 8.5	7.5	3	11.1-11.8	11.5	3	90- 99	96	3	6.8	3	23-32	26	3	61- 68	67	4
	July 30-31, 1975	17.0-22.5	19.5	24	8.5-10.2	8.9	19	89-103	96	19	8.1-8.9	24	70-75	74	12	185-201	195	24
11482225																		
Harry Wier	Nov. 7-9, 1973	11.5-12.5	12.0	20	10.6-10.9	10.8	6	99-101	100	3	7.0-7.3	15	11-16	13	7	36- 80	57	20
Creek near	Jan. 11-13, 1974	6.5- 9.0	7.5	19	11.4-12.4	11.8	8	95-102	99	8	6.8-7.3	14	14-20	16	11	43- 64	56	16
Orick	Feb. 20-22, 1974	6.5- 8.0	7.5	15	11.7-12.2	11.9	7	98-101	99	6	6.8-7.5	12	13-19	16	8	40- 55	49	14
	Feb. 28-Mar. 3, 1974	6.0- 8.0	7.0	26	11.3-12.0	11.7	13	93- 99	97	12	6.3-6.9	23	13-16	15	15	42- 64	52	27
	July 18-19, 1974	14.0-14.5	14.0	24	8.8-10.0	9.6	19	85- 96	92	20	7.0-7.7	23	35-45	37	21	92-112	109	21
	Sept. 10-11, 1974	13.0-14.5	14.0	21	9.1- 9.7	9.3	18	87- 91	89	18	7.1-7.7	20	44-51	49	16	117-138	126	23
	Nov. 6-8, 1974	9.0-10.5	9.5	28	10.5-11.2	10.9	10	94- 99	96	8	7.4-7.8	9	36-50	41	19	104-145	129	29
	Nov. 20-22, 1974	8.5-10.0	9.5	18	9.6-11.3	10.8	11	85-100	95	10	7.2-7.6	11	31-42	38	9	102-130	116	18
	Feb. 5-9, 1975	7.5-10.0	9.0	31	10.8-11.9	11.4	12	92-100	97	12	6.7-7.2	25	11-16	14	25	40- 49	45	33
	Feb. 12-14, 1975	7.5-10.0	9.0	18	11.2-12.2	11.6	10	97-103	100	10	6.7-7.7	9	12-17	14	9	37- 57	43	24
	July 30-31, 1975	12.0-14.0	13.0	19	9.3- 9.9	9.6	16	89- 94	91	16	7.0-8.2	19	41-51	47	11	131-152	140	19
11482250																		
Miller Creek	Nov. 7-9, 1973	12.0-12.5	12.0	20	10.7-10.8	10.8	6	99-100	100	6	7.0-7.1	12	13-17	14	7	41- 60	46	22
near Orick	Jan. 11-13, 1974	7.0- 9.0	7.5	13	11.0-12.1	11.4	5	92- 99	95	5	6.6-7.4	11	11-18	15	9	37- 74	54	22
	Feb. 20-22, 1974	7.0- 9.0	8.0	13	11.1-11.9	11.4	3	93-100	97	3	6.6-7.0	5	12-16	14	3	36- 57	46	13
	Feb. 28-Mar. 3, 1974	7.0- 8.5	7.5	16	11.1-11.7	11.4	8	93- 98	95	7	6.8-7.2	9	12-15	13	7	39- 49	43	18
	July 18-19, 1974	13.0-14.0	13.5	13	9.5-10.0	9.8	13	90- 95	93	13	6.5-7.5	13	30-36	32	13	71- 83	76	13
	Sept. 10-11, 1974	12.5-14.0	13.5	12	8.7- 9.7	9.2	12	82- 92	87	12	6.9-7.8	12	31-37	36	10	78- 98	93	12
	Nov. 6-8, 1974	9.0-12.0	11.0	5	9.6-10.5	10.0	5	86- 94	91	4	7.4-7.7	5	28-47	34	5	72- 85	80	9
	Nov. 20-22, 1974	9.0-10.0	9.5	11	9.9-10.9	10.3	7	84- 94	90	7	6.8-7.5	7	20-31	27	7	54- 79	71	11
	Feb. 5-9, 1975	8.0- 9.5	9.0	12	9.9-11.4	10.8	6	85- 96	92	5	7.0-7.6	8	13-14	14	6	26- 89	48	12
	Feb. 12-14, 1975	7.5-10.0	9.5	17	10.7-11.4	11.0	8	92- 98	95	7	7.2-7.4	12	13-16	14	8	39- 51	45	22
11482260																		
Miller Creek	Nov. 7-9, 1973	12.0-12.5	12.0	16	10.6-10.7	10.7	8	98-100	99	8	7.0-7.3	13	12-15	14	9	35- 70	50	16
at mouth,	Jan. 11-13, 1974	6.0- 9.0	8.0	24	11.3-12.2	11.7	13	96-100	98	13	7.1-7.4	3	10-18	14	2	38- 60	53	24
near Orick	Feb. 20-22, 1974	7.0- 8.5	8.0	16	11.7-12.2	11.9	8	98-100	99	8	7.0-7.3	13	11-15	13	11	39- 52	47	16
	Feb. 28-Mar. 3, 1974	6.5- 8.5	7.5	22	11.3-11.7	11.5	12	96- 98	97	12	6.9-7.5	9	11-16	13	6	32- 43	40	22
	July 18-19, 1974	13.0-14.0	13.0	25	10.1-10.6	10.4	25	96-101	98	25	6.8-7.3	25	26-34	28	25	80- 85	82	25
	Sept. 10-11, 1974	12.5-13.5	13.0	24	9.5- 9.8	9.7	24	90- 93	92	24	7.2-7.6	24	31-33	32	17	90- 99	95	24
	Nov. 6-8, 1974	9.0-10.0	10.0	12	10.8-11.0	10.8	4	93- 97	95	4	5.5-6.6	7	25-31	29	5	--	--	--
	Nov. 20-22, 1974	8.0-10.5	9.0	29	10.6-11.5	11.1	15	95- 98	96	15	7.2-7.5	24	17-28	25	17	75- 89	82	24

Table 3.--Results of streamside water-quality measurements--Continued

Station number and name	Date	Temperature (°C)			Dissolved oxygen (mg/l)			Dissolved oxygen (percent saturation)			pH		Total alkalinity as CaCO3 (mg/l)			Specific conductance (micromhos)		
		Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n
11482330																		
Hayes Creek near Orick	Nov. 8-9, 1973	--	11.0	8	9.8-10.7	10.3	5	88- 96	92	5	7.4	1	12-14	13	2	49- 63	56	7
	Jan. 11-13, 1974	7.0- 8.5	8.0	17	11.2-11.7	11.4	6	94- 96	95	5	6.6-7.4	9	17-23	18	8	59- 66	62	14
	Feb. 20-22, 1974	7.5- 8.5	8.0	20	11.2-11.9	11.4	7	96- 99	97	7	6.2-7.2	9	14-17	15	5	52- 86	61	19
	Feb. 28-Mar. 3, 1974	7.0- 9.0	8.0	29	11.2-11.8	11.5	13	96- 99	97	13	7.2-7.7	15	13-16	14	12	53- 63	56	29
	Nov. 7-8, 1974	9.0-10.0	10.0	13	9.7-10.8	10.4	6	86- 95	91	6	6.8-7.4	13	31-37	33	13	120-140	127	13
	Nov. 20-22, 1974	8.5-11.0	9.5	30	10.1-11.9	10.8	9	88-103	95	9	6.4-7.4	27	20-37	28	16	100-287	191	30
	Feb. 5-9, 1975	8.0- 9.5	9.0	39	10.7-11.9	11.2	12	93-100	96	11	6.5-7.4	39	13-15	14	12	58- 86	77	42
	Feb. 12-14, 1975	8.0-10.0	9.0	44	10.7-11.9	11.4	13	95-100	98	13	6.4-7.0	41	12-14	13	13	53- 88	78	48
11482450																		
Lost Man Creek near Orick	Nov. 7-9, 1973	11.5-13.0	12.0	18	10.0-10.7	10.5	10	93-100	97	10	5.7-6.6	11	10-13	12	6	34- 46	38	5
	Jan. 11-13, 1974	5.0- 7.5	6.0	19	10.4-12.0	11.4	9	85- 98	92	9	6.5-7.5	13	12-14	13	9	37- 46	43	17
	Feb. 20-22, 1974	6.5- 8.0	7.5	18	10.2-12.2	11.8	8	85-102	96	6	6.3-7.3	12	10-12	11	12	23- 44	36	19
	Feb. 28-Mar. 3, 1974	5.0- 8.0	7.0	27	10.4-12.3	11.6	21	87- 99	95	19	7.1-7.3	20	11-12	12	20	30- 38	36	22
	July 18-19, 1974	13.5-14.5	14.0	25	8.8- 9.2	9.0	13	83- 89	87	13	6.8-7.0	13	30-33	31	14	53- 78	67	25
	Sept. 10-11, 1974	13.0-16.5	14.5	25	7.8- 8.7	8.4	22	77- 86	81	22	6.8-7.0	24	47-50	48	23	70-112	88	26
	Nov. 6-8, 1974	10.0-11.5	11.0	25	8.9-10.2	9.4	12	80- 91	85	11	6.6-6.9	13	31-41	37	13	95-120	110	27
	Nov. 20-22, 1974	9.5-10.5	10.0	23	9.6-10.9	10.2	7	85- 95	90	7	6.8-7.0	15	24-32	28	15	83-145	95	25
	Feb. 5-9, 1975	6.5- 9.0	7.5	42	11.1-12.0	11.7	13	92-103	97	13	7.0-7.8	13	11-13	12	13	27- 45	41	48
	Feb. 12-14, 1975	6.5- 9.0	8.0	39	10.5-12.0	11.2	10	91- 99	95	9	7.1-7.4	32	11-13	12	10	33- 39	36	47
11482468																		
Little Lost Man Creek at site No. 2, near Orick	July 18-19, 1974	13.0-14.5	13.5	23	9.3-10.3	10.0	13	88- 99	95	11	6.5-7.6	5	24-25	24	3	61- 88	76	17
	Sept. 10-11, 1974	11.5-16.0	13.0	22	9.6-10.4	10.0	14	90-102	94	14	7.1-7.6	15	21-26	25	10	70- 77	75	18
	Nov. 6-8, 1974	8.0- 9.5	9.2	26	10.8-11.4	11.0	6	93- 97	95	6	7.1-8.1	26	23-26	24	20	69- 75	73	28
	Nov. 20-22, 1974	8.0-10.5	9.0	24	10.5-11.6	11.0	10	91- 99	95	10	7.5-8.5	13	20-26	23	11	64- 76	70	25
	Feb. 5-9, 1975	7.5- 9.0	8.5	19	11.1-11.6	11.4	9	92-100	97	9	6.6-7.2	19	9-16	13	15	30- 57	42	31
Feb. 12-14, 1975	7.5-10.0	9.0	23	11.1-11.7	11.4	13	93-100	97	13	6.9-7.4	22	11-13	12	15	38- 45	41	36	
11482470																		
Little Lost Man Creek near Orick	Nov. 7-9, 1973	11.0-11.5	11.0	10	9.8-10.5	10.2	6	88- 95	92	6	6.8-6.9	2	--	12	1	40- 52	45	9
	Jan. 11-13, 1974	6.5- 8.0	7.0	12	11.0-11.8	11.5	6	92- 96	94	6	5.9-6.9	8	11-15	14	7	46- 49	48	14
	Feb. 20-22, 1974	7.0- 8.0	7.5	6	11.4-11.6	11.5	3	94- 97	96	3	6.9-7.2	6	12-18	14	6	44- 48	46	6
	Feb. 28-Mar. 3, 1974	6.5- 8.5	7.5	22	11.0-11.9	11.5	10	92- 98	96	10	5.8-7.0	19	7-14	12	12	40- 44	42	19
	July 18-19, 1974	14.0-17.0	15.5	5	--	--	--	--	--	--	--	--	--	--	--	66- 81	73	5
	Sept. 10-11, 1974	11.5-19.0	15.0	7	8.1-10.0	9.1	7	77-100	90	7	7.0-7.4	2	--	25	1	67- 75	72	7
	Nov. 7-8, 1974	--	--	--	--	--	--	--	--	--	--	--	23-24	23	14	75- 80	78	14
	Nov. 21, 1974	--	9.5	1	--	10.2	1	--	89	1	6.6	1	--	20	1	--	74	1
11482475																		
Geneva Creek near Orick	Nov. 7-9, 1973	11.0-11.5	11.5	11	9.6-10.5	10.2	8	88- 96	93	8	6.5-6.8	2	11-12	12	2	41- 52	45	11
	Jan. 11-13, 1974	7.0- 8.0	7.5	12	11.1-11.6	11.4	5	93- 97	95	5	5.8-6.6	7	9-12	10	6	42- 50	45	12
	Feb. 21-22, 1974	7.0- 9.0	8.0	6	11.3-11.6	11.5	4	94- 97	96	4	6.8-7.0	4	12-13	12	4	42- 45	43	6
	Feb. 28-Mar. 3, 1974	6.5- 9.5	8.0	23	11.1-11.9	11.4	9	93- 98	96	9	5.8-7.1	17	10-16	13	11	42- 47	43	22
	Nov. 7-8, 1974	8.0- 9.5	9.0	8	10.1-10.2	10.2	2	85- 89	87	2	6.2-6.5	8	11-16	13	8	60- 70	62	8
	Nov. 20-22, 1974	8.0-10.0	9.5	20	9.9-10.7	10.3	12	86- 93	90	12	6.4-7.1	12	11-20	16	11	68- 89	74	20
	Feb. 5-9, 1975	8.0- 9.5	9.0	31	11.1-11.7	11.4	12	96- 99	97	12	6.4-7.0	20	9-13	11	13	32- 81	52	41
	Feb. 12-14, 1975	8.0- 9.5	9.5	16	10.7-11.6	11.2	10	93-100	97	10	6.4-7.0	15	10-12	11	15	43- 48	45	27

Table 3.--Results of streamside water-quality measurements--Continued

Station number and name	Date	Temperature (°C)			Dissolved oxygen (mg/l)			Dissolved oxygen (percent saturation)			pH		Total alkalinity as CaCO ₃ (mg/l)			Specific conductance (micromhos)		
		Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n
11482500																		
Redwood Creek at Orick	Nov. 7-9, 1973	12.0-13.5	12.5	5	--	--	--	--	--	--	--	--	--	--	--	77- 89	82	5
	Jan. 12-13, 1974	--	8.0	5	--	--	--	--	--	--	--	--	--	28	1	70- 79	74	5
	Feb. 21, 1974	--	7.5	4	--	11.5	1	--	96	1	6.7	1	--	24	1	68- 73	70	4
	Mar. 1, 1974	--	7.5	4	--	11.9	1	--	99	1	7.2	1	--	29	1	69- 78	72	4
	July 18-19, 1974	16.0-19.0	17.5	24	8.4- 9.8	9.0	24	84-104	93	24	6.9-8.1	24	58-65	62	21	151-162	158	25
	Sept. 10-11, 1974	12.0-21.0	17.0	17	6.8- 9.8	8.3	17	65-105	85	17	6.9-7.9	17	55-63	59	17	118-129	123	17
	Nov. 7, 1974	--	11.5	1	--	--	--	--	--	--	--	--	--	--	--	--	107	1
	Nov. 21, 1974	10.0-11.0	10.5	2	--	10.1	1	--	91	1	6.8	1	--	55	1	139-184	162	3
	Feb. 6, 1975	--	7.5	1	--	12.0	1	--	99	1	7.4	1	--	29	1	61- 81	76	11
	Feb. 13, 1975	--	7.5	1	--	11.8	1	--	102	1	8.0	1	--	13	1	48- 68	63	10
	July 30-31, 1975	13.5-22.0	17.5	25	8.1- 9.7	8.7	25	81-107	90	25	7.4-8.0	25	64-66	65	13	52-118	74	7

Major Dissolved Ions

Major dissolved ions include the cations calcium, magnesium, sodium, potassium, and the anions bicarbonate, carbonate, sulfate, and chloride. Dissolved silica, as SiO_2 , also is considered in the major dissolved-ion list, even though the reported form is not ionic. The major dissolved-ion data are not presented in this memorandum, but may be found in Iwatsubo and others (1975, table 10). A complete analysis is not available at this time but the following general statements can be made.

Redwood Creek contains calcium-bicarbonate water. The other tributaries are mixed water types as defined by Hem (1959, p. 155). Miller and Little Lost Man Creeks are calcium-sodium-bicarbonate-chloride water types and Hayes, Lost Man, and Geneva Creeks are predominantly calcium-sodium and bicarbonate.

Major dissolved-ion concentrations were relatively low in all streams. The dissolved-solids concentrations, computed as the sum of the anions and cations, ranged only from 25 to 47 mg/l, which would be considered dilute water.

Regressions of discharge and particular ions should reveal upstream changes resulting from land-use practice. The geologic map of the area, which is presently being prepared, will also be of value in explaining differences in water types between the tributaries and between the tributaries and Redwood Creek.

Selected Plant Nutrients

for sure!

The plant nutrients included in this report are dissolved nitrite plus nitrate ($\text{NO}_2 + \text{NO}_3$), dissolved Kjeldahl nitrogen, dissolved ammonia, dissolved organic nitrogen, dissolved phosphorus, dissolved orthophosphorus, dissolved organic carbon, and suspended organic carbon. The results are listed in table 4.

Dissolved nitrite plus nitrate levels were low (table 4) in all streams with the exception of Geneva Creek on Feb. 21, 1974, and Harry Wier Creek on Feb. 20-23, 1974. The two largest dissolved Kjeldahl nitrogen concentrations were measured at Lost Man Creek near Orick on November 9, 1973 and at Miller Creek near Orick on June 6, 1975. All other values at other times and stations are within an expected range.

A review of the data in table 4 revealed no high values of dissolved phosphorus (and orthophosphorus) or organic carbon (dissolved and suspended).

Trace Metals

Trace-metal concentrations (table 5) were determined as support information concerning plant nutrients, and as possible indicators of changes in upstream land use. The trace-metal concentrations did not reveal drastic changes in water quality and were considered inconclusive. Additional analysis is needed.

Table 4.--Results of plant analyses
(Milligrams per litre)

Date	NO ₂ + NO ₃ as N			NO ₃ as N			Diss KJN as N			Diss NH ₄ as N			Diss Org N as N			Diss P as P			Diss OrthoP as P			DOC			SOC		
	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n
11-4815.00 Redwood Creek near Blue Lake																											
Jan. 12, 1974	--	0.02	1	--	0.02	1	--	0.14	1				--	0.01	1	--	0.01	1	--	2.0	1	--	0.1	1			
Feb. 21, 1974	--	.03	1	--	.03	1	--	.27	1				--	.01	1	--	.01	1	--	1.2	1	--	--	--			
11-4822.00 Redwood Creek at South Park Boundary																											
Synoptic #1 Nov. 7-9, 1973	--	.07	1	--	.07	1	--	.19	1				--	.03	1	--	.02		--	7.5	1	--	--	--			
Synoptic #2 Jan. 11-13, 1974	--	.02	1	--	.02	1	--	.47	1				--	.02	1	--	.01	1	--	--	--	--	--	--			
Synoptic #3 Feb. 20-23, 1974	0.0-0.1	.07	3	0.02-.09	.07	3	0.16-.25	.22	3				0.01-.02	.01	3	--	.0	3	0.8-1.6	1.2	2	--	.5	1			
Synoptic #4 Feb. 28-Mar. 3, 1974	--	.03	1	--	.03	1	--	.66	1				--	.19	1	--	.17	1	--	--	--	--	.3	1			
Summer 1974 July 19 & 22	0 -.01	.01	2	0 -.01	.01	2	0-.03	.02	2	--	0.03	2	--	0.0	2	.01-.03	.02	2	--	--	--	1-2.3	1.6	2	--	.1	2
Autumn 1974 Sept. 11 & 13	0-.09	.05	2	0-.09	.05	2	.03-.06	.04	2	0-.09	.05	2	0.03-.04	.04	2	.01-1	.51	2	--	--	--	1.7-1.8	1.8	2	0.0-.1	.05	2
Summer 1974 June 3 & 10	0-.01	.01	2	0-.01	.01	2	--	.02	2	0-.01	.01	2	.01-.02	.02	2	0-.02	.01	2	0.01-.02	.02	2	.6-1.6	1.1	2	--	.1	2
11-4822.25 Harry Wier Creek near Orick																											
Synoptic #1 Nov. 7-9, 1973	--	.06	1	--	.04	1	--	.16	1				--	.04	1	--	.03	1	--	6.7	1	--	.9	1			
Synoptic #2 Jan. 11-13, 1974	.03-.09	.06	2	.03-.09	.06	2	.03-1.5	.77	2				--	.02	2	--	.0	2	2.6-4.0	3.3	2	--	.2	2			
Synoptic #3 Feb. 20-23, 1974	.09-.38	.21	3	.09-.38	.22	3	.14-.23	.19	3				.01-.02	.01	3	.01-.02	.01	3	1.9-4.0	3.0	2	--	--	--			
Synoptic #4 Feb. 28-Mar. 3, 1974	--	.03	1	--	.03	1	--	.66	1				--	.02	1	--	.0	1	--	--	--	--	.6	1			
Spring 1974	--	.08	1	--	.08	1	--	.04	1				--	.12	1	--	.03	1	--	1.4	1	--	--	--			
Summer 1974	.0-.01	.01	2	.0-.01	.01	2	.03-.1	.07	2	.0-.04	.02	2	0-.01	.01	2	.02-.03	.03	2	--	--	--	1.5-3.2	2.4	2	.1-.2	.15	2
Autumn 1974	.01-.13	.07	2	.01-.13	.07	2	.17-.2	.19	2	.11-.26	.19	2	.0-.06	.03	2	.01-.41	.21	2	--	--	--	.7-1.2	1.0	2	--	.3	1
Synoptic #5 Nov. 7-8, 1974	.01-.48	.06	15	.01-.48	.06	15	.02-.33	.21	15	.01-.03	.01	15	0-.32	.19	15	.02-.07	.05	15	--	--	--	.2-6.9	4.4	15	.1-1.2	.47	14
Synoptic #7 Feb. 6-9, 1975	.05-.6	.19	14	.05-.6	.19	14	.09-.22	.12	15	.01-.22	.11	15	.09-.22	.11	15	.0-.03	.18	15	--	--	--	2.7-6.4	4.2	14	.2-1.1	.47	14
Summer 1975 June 1	--	.01	1	--	.01	1	--	.08	1	--	.01	1	--	.07	1	--	.01	1	--	.02	1	--	.7	1	--	.1	1

Table 4.--Results of plant nutrient analyses--Continued

Date	NO ₂ + NO ₃ as N			NO ₃ as N			Diss KJN as N			Diss NH ₄ as N			Diss OrgN as N			Diss P as P			Diss OrthoP as P			DOC			SOC		
	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n
<u>11-4822.50 Miller Creek near Orick</u>																											
Synoptic #1 Nov. 7-9, 1973	--	0.21	1	--	0.21	1	--	0.13	1							--	0.02	1	--	0.02	1	--	2.8	1	--	--	--
Synoptic #2 Jan. 11-13, 1974	--	.03	1	--	.03	1	--	.20	1							--	.01	1	--	.0	1	--	--	--	--	0.3	--
Synoptic #3 Feb. 20-23, 1974	--	.93	1	--	.93	1	--	.14	1							--	.02	1	--	.0	1	--	1.9	1	--	--	--
Synoptic #4 Feb. 28-Mar. 3, 1974	--	.09	1	--	.08	1	--	.11	1							--	.08	1	--	.07	1	--	3.2	1	--	--	--
Spring 1974	--	.01	1	--	.01	1	--	.11	1							--	.02	1	--	.01	1	--	2.6	1	--	.4	1
Summer 1974	0.04-.11	.08	2	0.04-.11	.08	2	0-.05	.03	2	0-.06	0.03	2	--	0	2	0.03-.05	.04	2	--	--	--	1.6-5.7	3.6	2	0.1-.2	.15	2
Autumn 1974	.03-.08	.06	2	0-.03	.02	2	.1-.19	.1	2	0-.01	.00	2	0.10-.18	.14	2	.02-.05	.04	2	--	--	--	1.5-3.6	2.6	2	--	.1	2
Spring 1975	--	.08	1	--	.08	1	--	.07	1	--	.01	1	--	.06	1	--	.02	1	--	.02	1	--	1.6	1	--	.1	1
Summer 1975 June 6	--	.0	1	--	0	1	--	3.2	1	--	0	1	--	3.2	1	--	.02	1	--	.01	1	--	.9	1	--	.1	1
<u>11-4822.60 Miller Creek at Mouth near Orick</u>																											
Synoptic #1 Nov. 7-9, 1973	--	.16	1	--	.16	1	--	.24	1							--	.03	1	--	.02	1	--	4.4	1	--	1.3	1
Synoptic #2 Jan. 11-13, 1974	--	.03	1	--	.03	1	--	.16	1							--	0	1	--	0	1	--	6.7	1	--	--	--
Synoptic #3 Feb. 20-23, 1974	.03-.09	.07	3	.03-.09	.07	3	.05-.75	.03	3							--	.1	3	--	0	3	--	1.9	3	--	--	--
Synoptic #4 Feb. 28-Mar. 3, 1974	--	.07	1	--	.07	1	--	.07	1							--	.11	1	--	.1	1	--	2	1	--	--	--
Spring 1974	--	.06	1	--	.06	1	--	.02	1							--	.01	1	--	.00	1	--	2.0	1	--	--	--
Summer 1974	.01-.02	.02	2	.01-.02	.02	2	.00-.11	.06	2	.00-.05	.02	2	.00-.06	.03	2	.01-.02	.02	2	--	--	--	1.5-3.4	2.4	2	.1-.3	.2	2
Autumn 1974	.01-.03	.02	2	.01-.03	.02	2	.04-.13	.08	2	.03-.11	.07	2	.01-.02	.02	2	.01-.03	.02	2	--	--	--	--	1.0	1	--	.1	2
Spring 1975	--	.02	1	--	.02	1	--	.06	1	--	.01	1	--	.05	1	--	.01	1	--	.02	1	--	.9	1	--	.1	1
Summer 1975	--	.01	1	--	.01	1	--	3.3	1	--	.00	1	--	3.3	1	--	.01	1	--	.02	1	--	2.0	1	--	.1	1

Table 4.--Results of plant nutrient analyses--Continued

Date	NO ₂ + NO ₃ as N			NO ₃ as N			Diss KJN as N			Diss NH ₄ as N			Diss OrgN as N			Diss P as P			Diss OrthoP as F			DOC			SOC		
	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n
11-4823.30 <u>Hayes Creek nr Orick</u>																											
Synoptic #1																											
Nov. 7-9, 1973	--	0.06	1	--	0.06	1	--	0.34	1	--	--	--	--	--	--	--	0.04	1	--	0.03	1	--	--	--	--	--	--
Synoptic #2																											
Jan. 11-13, 1974	--	.02	1	--	.02	1	--	.22	1	--	--	--	--	--	--	--	.01	1	--	.00	1	--	2.0	1	--	0.1	1
Synoptic #3																											
Feb. 20-23, 1974	--	.03	1	--	.03	1	--	.08	1	--	--	--	--	--	--	--	.02	1	--	.02	1	--	1.8	1	--	.2	1
Synoptic #4																											
Feb. 28-Mar.3, 1974	--	.07	1	--	.07	1	--	.10	1	--	--	--	--	--	--	--	.02	1	--	.00	1	--	--	--	--	.2	1
Spring 1974																											
Apr. 9	--	.04	1	--	.04	1	--	.09	1	--	--	--	--	--	--	--	.02	1	--	.01	1	--	3.5	1	--	.1	1
Summer 1974																											
July 27	--	.01	1	--	.01	1	--	.09	1	--	0.01	1	--	0.08	1	--	.01	1	--	--	--	--	--	--	--	--	--
11-4824.50 <u>Lost Man Creek nr Orick</u>																											
Synoptic #1																											
Nov. 7-9, 1973	--	.01	1	--	.01	1	--	.09	1							--	.02	1	--	.02	1	--	3.8	1	--	.5	1
Synoptic #2																											
Jan. 11-13, 1974	--	.01	1	--	.01	1	--	.51	1							--	.0	1	--	.0	1	--	2.7	1	--	.2	1
Synoptic #3																											
Feb. 20-23	--	0	1	--	0	1	--	.07	1							--	.02	1	--	.02	1	--	--	--	--	--	--
Synoptic #4																											
Feb. 28-Mar. 3,1974	--	0	1	--	0	1	--	.08	1							--	0	1	--	0	1	--	1.7	1	--	.5	1
Spring 1974	--	.02	1	--	.02	1	--	.11	1							--	.01	1	--	.01	1	--	5.2	1	--	.1	1
Summer 1974	--	0	2	--	0	2	0.04-0.05	.04	2	0.02-.08	.05	2	0-.03	.02	2	0.01-.03	.02	2	--	--	--	2.3-2.5	2.4	2	0.1-.2	.15	2
Autumn 1974	0.05-.33	.19	2	0.05-.33	.19	2	.14-.16	.15	2	0-.01	.05	2	.13-.19	.16	2	0-.03	.02	2	--	--	--	--	1.2	1	--	0	1
Summer 1975	--	0	2	--	0	2	.2-3.3	1.8	2	0-.01	.05	2	.01-3.3	1.66	2	0-.01	.00	2	--	.01	2	2.0-3.1	2.6	2	0-.1	.05	2
June 6																											

Table 4.--Results of plant nutrients analyses--Continued

Date	NO ₂ + NO ₃ as N			NO ₃ as N			Diss KJN as N			Diss NH ₄ as N			Diss OrgN as N			Diss P as P			Diss OrthoP as P			DOC			SOC		
	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n
<u>11-4824.68 Little Lost Man Creek at Site No. 2 nr Orick</u>																											
Synoptic #7 Feb. 5-9, 1975	0.00-.15	0.03	14	0.00-.14	0.03	14	0.04-1.2	0.25	14	0.00-.03	0.00	14	0.04-1.2	0.25	14	0.00-.03	0.01	14	--	--	--	2.6-8.6	3.8	14	0.1-.6	0.21	14
Spring 1974	.00-.05	.02	4	.00-.05	.02	4	.06-.12	.09	5	.01-.04	.02	4	.03-.11	.07	4	--	.02	2	0.00-.03	0.02	4	--	--	--	--	--	--
Summer 1974	--	.00	2	--	.00	2	.00-.11	.04	5	.03-.04	.04	2	--	.00	2	.01-.04	.02	6	--	--	--	1.3-1.7	1.5	2	--	.1	2
Autumn 1974	.00-.01	.00	2	--	.00	2	.03-.28	.10	5	.00-.01	.00	2	.02-.28	.15	2	.01-.03	.02	5	--	--	--	1.3-1.8	1.6	2	--	.1	2
Spring 1975	--	--	--	--	--	--	.02-.50	.19	4	--	--	--	--	--	--	.01-.05	.02	4	--	--	--	--	--	--	--	--	--
Summer 1975	--	.00	2	--	.00	2	.01-3.0	.40	9	.01-.02	.02	2	.07-3.0	1.8	2	.00-.03	.01	12	--	.01	2	1.8-2.0	1.9	2	.0-.1	.05	2
<u>11-4824.70 Little Lost Man Creek nr Orick</u>																											
Synoptic #1 Nov. 9, 1973	--	.03	1	--	.03	1	--	.11	1	--	--	--	--	--	--	--	.03	1	--	.02	1	--	--	--	--	--	--
Synoptic #2 Jan. 13, 1974	--	.02	1	--	.02	1	--	.07	1	--	--	--	--	--	--	--	.01	1	--	0	1	--	2.5	1	--	.1	1
Synoptic #3 Feb. 20-22, 1974	.01-.02	.017	3	.01-.02	.017	3	.06-.15	.12	3	--	--	--	--	--	--	.01-.02	.017	3	--	0	3	--	3.4	1	--	--	--
Synoptic #4	--	0	1	--	0	1	--	.06	1	--	--	--	--	--	--	--	.02	1	--	0	1	--	1	1	--	.2	1
Spring 1974	.01-.05	.02	4	.01-.05	.02	4	.07-.31	.16	5	.01-.08	.04	3	.08-.11	.09	3	--	.02	4	.02-.03	.02	4	--	7.0	1	--	.1	1
Summer 1974	--	--	--	--	--	--	0-.09	.04	2	--	--	--	--	--	--	--	.01	2	--	--	--	--	--	--	--	--	--
Autumn 1974	.03-.38	.11	14	.03-.38	.11	14	.01-.33	.15	15	.01-.03	.02	14	0-.3	.14	14	.02-.06	.03	14	--	--	--	4.6-11.1	7.0	12	.2-.4	.28	11
Spring 1975	--	--	--	--	--	--	.02-.1	.06	2	--	--	--	--	--	--	.0-.05	.02	2	--	--	--	--	--	--	--	--	--
Summer 1975	--	--	--	--	--	--	--	.12	1	--	--	--	--	--	--	--	.03	1	--	--	--	--	--	--	--	--	--
<u>11-4824.75 Geneva Creek nr Orick</u>																											
Synoptic #1 Nov. 9, 1973	--	.03	1	--	.03	1	--	.36	1	--	--	--	--	--	--	--	.02	1	--	.02	1	--	--	--	--	--	--
Synoptic #2 Jan. 13, 1974	--	.02	1	--	.01	1	--	.25	1	--	--	--	--	--	--	--	.01	1	--	0	1	--	5.4	1	--	.2	1
Synoptic #3 Feb. 21, 1974	--	.36	1	--	.35	1	--	.09	1	--	--	--	--	--	--	--	.02	1	--	.03	1	--	5.1	1	--	.2	1
Synoptic #4 Mar. 2, 1974	--	.11	1	--	.1	1	--	.14	1	--	--	--	--	--	--	--	.01	1	--	1	1	--	4.7	1	--	--	--
Spring 1974	--	.05	1	--	.05	1	--	.2	1	--	--	--	--	--	--	--	.01	1	--	0	1	--	4.8	1	--	.2	1
<u>11-4825.00 Redwood Creek at Orick</u>																											
Synoptic #2 Jan. 13, 1974	--	.03	1	--	.03	1	--	.27	1	--	--	--	--	--	--	--	.01	1	--	0	1	--	1.8	1	--	.3	1
Synoptic #3 Feb. 21, 1974	--	1.0	1	--	1.0	1	--	.20	1	--	--	--	--	--	--	--	.01	1	--	.01	1	--	1.2	1	--	--	--
Summer 1974	--	.03	2	--	.03	2	0-.07	.04	2	0-.04	.02	2	0-.03	.02	2	0-.07	.04	2	--	--	--	1.6-1.8	1.7	2	--	--	--
Autumn 1974	0-.01	.00	2	0-.01	.00	2	.14-.24	.19	2	0-.01	.00	2	.13-.24	.18	2	0-.03	.02	2	--	--	--	1.2-1.7	1.4	2	--	--	--
Summer 1975	--	0	2	--	0	2	.05-3.3	1.7	2	0-.01	.00	2	.04-3.3	1.7	2	.1-.2	.15	2	--	.01	2	.1-1.7	.9	2	--	--	--

Table 4.--Results of plant nutrient analyses--Continued

Date	NO ₂ + NO ₃			NO ₃			Diss KJN			Diss NH ₄			Diss O - N			Diss P			Diss OrthoP			DOC			SOC		
	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n
11-4824.75 Geneva Creek nr Orick																											
Synoptic #1 Nov. 9, 1973	--	0.03	1	--	0.03	1	--	0.36	1							--	0.02	1	--	0.02	1	--	--	--	--	--	--
Synoptic #2 Jan. 13, 1974	--	.02	1	--	.01	1	--	.25	1							--	.01	1	--	0	1	--	5.4	1	--	0.2	1
Synoptic #3 Feb. 21, 1974	--	.36	1	--	.35	1	--	.09	1							--	.02	1	--	.03	1	--	5.1	1	--	.2	1
Synoptic #4 Mar. 2, 1974	--	.11	1	--	.1	1	--	.14	1							--	.01	1	--	1	1	--	4.7	1	--	--	--
Spring 1974	--	.05	1	--	.05	1	--	.2	1							--	.01	1	--	0	1	--	4.8	1	--	.2	1
11-4825.00 Redwood Creek at Orick																											
Synoptic #2 Jan. 13, 1974	--	.03	1	--	.03	1	--	.27	1							--	.01	1	--	0	1	--	1.8	1	--	.3	1
Synoptic #3 Feb. 21, 1974	--	1.0	1	--	1.0	1	--	.20	1							--	.01	1	--	.01	1	--	1.2	1	--	--	--
Summer 1974	--	.03	2	--	.03	2	0-.07	.04	2	0-.04	0.02	2	0-.03	0.02	2	0-.07	.04	2	--	--	--	1.6-1.8	1.7	2	--	--	--
Autumn 1974	0-.01	.00	2	0-.01	.00	2	.14-.24	.19	2	0-.01	.00	2	.13-.24	.18	2	0-.03	.02	2	--	--	--	1.2-1.7	1.4	2	--	--	--
Summer 1975	--	0	2	--	0	2	.05-3.3	1.7	2	0-.01	.00	2	.04-3.3	1.7	2	.1-.2	.15	2	--	.01	2	.1-1.7	.9	2	--	--	--

Table 5.--Results of trace-metals analyses

		(micrograms per litre)								
Station and date		Cadmium			Copper			Zinc		
		Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n
11481500	Redwood Creek nr Blue Lake									
	Jan. 12, 1974	1		1	2		1	10		1
	Feb. 21, 1974	0		1	5		1	10		1
11482200	Redwood Creek at S. Park Boundary									
	Nov. 7-9, 1973	2		1	6		1	30		1
	Jan. 11-13, 1974	--		--	--		--	--		--
	Feb. 20-23, 1974	0		2	4-9	6.5	2	10-20	15	2
	Feb. 28-Mar. 3, 1974	0		1	8		1	30		1
11482225	Harry Wier Creek near Orick									
	Nov. 7-9, 1973	6		1	9		1	40		1
	Jan. 11-13, 1974	1		2	4-5	4.5	2	10-20	15	2
	Feb. 20-23, 1974	1		3	6-9	8	3	10-40	23	3
	Feb. 23-Mar. 3, 1974	1		1	12		1	40		1
11482250	Miller Creek near Orick									
	Nov. 7-9, 1973	--		--	--		--	10		1
	Jan. 11-13, 1974	0		1	1		1	0		1
	Feb. 20-23, 1974	0		1	10		1	30		1
	Feb. 28-Mar. 3, 1974	2		1	8		1	30		1
11482260	Miller Creek at Mouth nr Orick									
	Nov. 7-9, 1973	0		1	9		1	10		1
	Jan. 11-13, 1974	1		1	2		1	10		1
	Feb. 20-23, 1974	0		2	3-5	4	2	20-30	30	3
	Feb. 28-Mar. 3, 1974	0		1	5		1	20		1
11482330	Hayes Creek near Orick									
	Nov. 7-9, 1973	1		1	3		1	10		1
	Jan. 11-13, 1974	1		1	4		1	10		1
	Feb. 20-23, 1974	0		1	3		1	20		1
	Feb. 28-Mar. 3, 1974	2		1	2		1	40		1
11482450	Lost Man Creek near Orick									
	Nov. 7-9, 1973	1		1	3		1	20		1
	Jan. 11-13, 1974	1		1	2		1	10		1
	Feb. 20-23, 1974	0		1	5		1	20		1
	Feb. 28-Mar. 3, 1974	0		1	4		1	30		1
11482470	Little Lost Man Creek nr Orick									
	Nov. 9, 1973	0		1	7		1	20		1
	Jan. 13, 1974	1		1	6		1	20		1
	Feb. 20-22, 1974	1		3	3-5	4.3	3	10		3
	Mar., 1974	1		1	4		1	20		1
11482475	Geneva Creek near Orick									
	Nov. 9, 1973	1		1	3		1	10		1
	Jan. 13, 1974	0		1	2		1	20		1
	Feb. 21, 1974	--		--	--		--	0		1
	Mar. 2, 1974	0		1	4		1	20		1
11482500	Redwood Creek at Orick									
	Jan. 13, 1974	1		1	4		1	10		1
	Feb. 21, 1974	0		1	4		1	20		1

Pesticides

The concentrations of pesticides (chlorinated hydrocarbons and organic phosphorus compounds) in stream-bottom sediments were determined once at ten stations in the Redwood Creek drainage (table 6). No pesticides were detected in any of the stream-bottom sediment samples collected.

Table 6.--Results of pesticides analysis, Redwood Creek drainage,
July 1974

Station	Date	Time	Pesticide-types analyzed in bottom sediments
Redwood Cr at South Park Boundary nr Orick	1974 July 1	1200	Aldrin, Chlordane, DDD, DDE, DDT, Diazinon, Dieldrin, Endrin, Ethion, Heptachlor, Heptachlor epoxide, Lindane, Malathion, Methyl Parathion, Methyl Trithion, Parathion, PCB (polychlorinated biphenyls), PCN (polychlorinated naphthalene), Toxaphene, Trithion, 2,4-D, 2,4,5-T, Silvex.
Harry Wier Cr nr Orick	July 2	1515	
Tom McDonald Cr nr Orick	July 2	1330	
Fortyfour Cr nr Orick	July 2	1205	
Miller Cr nr Orick	July 3	0945	
Miller Cr at Mouth nr Orick	July 2	1100	
Hayes Cr nr Orick	July 1	1515	
Lost Man Cr nr Orick	July 3	1130	
Little Lost Man Cr nr Orick	July 3	1220	
Geneva Cr nr Orick	July 1,	1615	

Aquatic Biology

Benthic Invertebrates

Benthic invertebrates were collected in the autumn of 1973, spring of 1974, autumn of 1974, spring of 1975 and autumn of 1975. Samples collected

in 1975 have not been analyzed at the time of this writing (October 1975). All benthic invertebrate samples were collected with a Surber one-square-foot net sampler, using the procedures described in Slack and others (1973).

A species list of benthic organisms is presented to show the types of organisms in the Redwood Creek drainage (table 7). This list is complete except for the omission of some rare species for which identification has not been verified. Although the species list reveals a rather rich benthic fauna for all the streams, the types of organisms between streams and stream sections varied considerably.

The Shannon-Weaver (1949) and Wiener (1948) diversity index formula ($\bar{d} = \sum p_i \log p_i$) was used to calculate species diversity (see Slack and others, 1973, p. 24-25; Averett, 1975; and Wilhm and Dorris, 1968). The results, based upon either three or four one-square-foot samples, are in table 8 for autumn 1973, spring 1974, and autumn 1974. The diversity value $\bar{d}$ is the most meaningful value in table 8 because the minimum and maximum values are theoretical numbers that depend upon the evenness of the distribution of species in the sample. The evenness term $J = \frac{\bar{d}}{\bar{d}_{\max}}$ (Pielou, 1969) will be computed in the final formal report on benthic invertebrates.

Species diversity, as the name implies, is a measure of the species "richness" of the benthic community, that is, the number of types of organisms. Although species-diversity values for various stages of organic

enrichment of streams have been given (Wilhm and Dorris, 1968; Wilhm, 1970), agreement among ecologists is by no means universal. The diversity of any community of aquatic flora and fauna depends upon a number of factors. Nevertheless, a relative comparison of diversity values can be made from the data in table 8.

The diversity indices for Little Lost Man Creek and Hayes Creek, the control streams, were similar to those for the other streams. Overall, the diversity indices ranged from 2.128 (Miller Creek at Mouth near Orick on October 31, 1973) to 4.018 (Lost Man Creek near Orick on September 15, 1974). Most diversity indices were 3 or larger and are indicative of a relatively diverse stream fauna. Note that in Miller Creek at Mouth in autumn 1973, the number of organisms was 14, the number of species was 6, and the diversity index was 2.128. At Hayes Creek on November 1, 1973, the number of organisms was 32, the number of species was 15, and the diversity index was 3.499. These two examples illustrate that even though the number of organisms in the samples collected may be low, the number of different types of organisms was proportionally high. Consequently, any adverse factor that influenced the well-being of the organisms in the stream probably operated equally on all taxa.

Little more can be said about the diversity index results at this time. When all the data are available, an evenness factor will be computed and further analysis made. The diversity index results presented here imply little difference between sampling stations. All values are relatively high and most are within the diversity index range that Wilhm and Dorris (1968) found in "clean water" streams. An analysis of the low values,

for example Miller Creek at Mouth on October 31, 1973, and Redwood Creek above Hayes Creek on May 15, 1974, will be made at a later date when all the data are available. Comparison of the diversity index calculated from benthic invertebrate samples collected before and after the March 1975 storm will be particularly useful.

A similarity index was calculated to determine the proportion of benthic organism types common to the sampling sites on Redwood Creek and selected tributaries (tables 9, 10, and 11). The similarity index is calculated as $S = \frac{2C}{A+B}$, where A is the number of species at site A, B is the number of species at site B, and C is the number of species common to both samples. A discussion of the technique is given in Odum (1971, p. 144).

In using the similarity index, comparisons were made between the Redwood Creek main-stem stations and selected Redwood Creek tributaries, including two control streams (Hayes and Little Lost Man Creeks). The benthic invertebrates for Little Lost Man Creek collected during the autumn 1974 survey have not yet been identified, and no comparisons between this and other stations can be made at this time. A similarity index comparison between the spring and autumn sampling periods of 1974 has been made for Redwood Creek and selected tributaries (table 11). The similarity indices between the ten Redwood Creek stations were relatively high, ranging from 0.65 to 0.84 during the autumn 1974 survey. A similarity index of 0.84 is exceptionally high. The result of the similarity index comparison indicate that the benthic fauna were relatively similar along the main stem of Redwood Creek.

When samples of benthic organisms from Redwood Creek and selected tributaries are compared to samples from Hayes Creek, the control stream, the similarity index values are also relatively high. The values, as shown in table 11, ranged from 0.54 to 0.70 during the autumn 1974 survey. The similarity index comparison between the spring and autumn samples for 1974 ranged from 0.42 to 0.68, again a rather high similarity, considering the types of habitats encountered, the land-use practices, and expected seasonal differences resulting from life history events, such as egg laying and emergence.

In summary, the similarity indices did not reveal great differences in benthic invertebrates between sampling stations. That is, changes in water quality resulting from upstream land use influencing the habitat requirements of the biota were not strongly expressed by the similarity index values as presented here. It will be most useful to compare the 1975 diversity and similarity values, especially those obtained after the March 1975 flood.

Table 7.--Species list of benthic invertebrates, Redwood Creek
drainage, 1973 and 1974

Turbellaria

Annelida

Oligochaeta

Hirudinea

Piscicolidae

Amphipoda

Copepoda

Isopoda

Exosphaeroma

Hydracarina

Insecta

Collembola

Ephemeroptera

Baetidae

Baetis (nymph)

Centroptilum (nymph)

Ephemerella (nymph)

Paraleptophlebia (nymph)

Siphonurus (nymph)

Ameletus (nymph)

Heptageniae

Heptagenia (nymph)

Ironodes (nymph)

Rhithrogena (nymph)

Ironopsis (nymph)

Cinygmula (nymph)

Unidentified adults and
sub-imagos

Odonata

Gomphidae

Ophigomphos (naiad)

Plecoptera

Chloroperlidae

Alloperla (nymph)

Paraperla (nymph)

Perlodidae

Isoperla (nymph)

Isogenus (nymph)

Nemouridae

Capnia (nymph)

Leuctra (nymph)

Nemoura (nymph)

Peltoperlidae

Peltoperla (nymph)

Perlidae

Acroneuria (nymph)

Pteronarcidae

Pteronarcys (nymph)

Hemiptera

Corixidae

Saldidae

Ioscytus

Coleoptera

Elmidae

Ampumixis (larva)

Heterlimnius (adult)

Heterlimnius (larva)

Optioservus (adult)

Optioservus (larva)

Ordobrevia (adult)

Ordobrevia (larva)

Zaitzevia (adult)

Zaitzevia (larva)

Limnius (larva)

Narpus (larva)

Dytiscidae

Bidessus (larva)

Hydraenidae

Hydraena (adult)

Hydrophylidae

Berosus (larva)

Cymbiodyta (adult)

Helophorus (larva)

Table 7.--Species list of benthic invertebrates, Redwood Creek drainage, 1973 and 1974--continued

Psephenidae	Diptera
<u>Eubrianax</u> (larva)	Chironomidae
<u>Acneus</u>	Chironominae (larvae)
	Chironominae (pupa)
	Tahytarsini (larva)
Staphylinidae	Diamesinae
<u>Emplenota</u> (adult)	+ { <u>Orthoclaadiinae</u> (larva)
Unknown adults	→ { <u>Orthoclaadiinae</u> (pupa)
Unknown larvae	Tanypodinae (larva)
	Tanypodinae (pupa)
Trichoptera	
Beraeidae	<u>Thienemanniella</u> (larva)
<u>Beraea</u> (larva)	Dixidae (larva)
Hydropsychidae	Dolichopodidae
<u>Cheumatopsyche</u> (larva)	<u>Dolichopus</u> (adult)
<u>Hydropsyche</u> (larva)	
<u>Parapsyche</u> (larva)	
Philopotamidae	Empididae (larva)
<u>Wormaldia</u> (larva)	
Hydroptilidae	Heleidae
<u>Hydroptila</u> (larva)	<u>Atrichopogon</u> (larva)
<u>Hydroptila</u> (pupa)	<u>Bezzia</u> (larva)
<u>Ochrotrichia</u> (larva)	<u>Palpomyia</u> (larva)
<u>Ochrotrichia</u> (pupa)	Stratiomyiidae
Limnephilidae	<u>Euparyphus</u> (larva)
<u>Neophylax</u> (larva)	
Lepidostomatidae	Simuliidae (larva)
<u>Lepidostoma</u> (larva)	Simuliidae (pupa)
Rhyacophilidae	Rnagionidae
<u>Agapetus</u> (larva)	<u>Atherix</u> (larva)
<u>Agapetus</u> (pupa)	Tabanidae (larva)
<u>Glossosoma</u> (larva)	
<u>Glossosoma</u> (pupa)	
<u>Protophila</u> (larva)	
<u>Rhyacophila</u> (larva)	Tipulidae
<u>Rhyacophila</u> (pupa)	<u>Antocha</u> (larva)
Brachycentridae	<u>Dicranota</u> (larva)
<u>Micrasema</u> (larva)	<u>Hexatoma</u> (larva)
	<u>Limnophila</u> (larva)
	<u>Limonia</u> (larva)
	<u>Ormosia</u> (larva)
	<u>Tipula</u> (larva)
	<u>Utomorpha</u> (larva)
	<u>Pedicia</u> (larva)

Table 7.--Species list of benthic invertebrates of Redwood Creek
drainage, 1973 and 1974--continued

Hymenoptera

Mymaridae

Anagrus (adult)

Patasson (adult)

Gastropoda

Bulimidae

Table 8.--Number of taxa, total number of individuals, and diversity index for Redwood Creek drainage

Station name (date)	Total number of taxa (S)	Total number of individ- uals (N)	Diversity $\bar{d}$ ($\log_2$)	Theoretical	
				Maximum $\bar{d}_{\max}$	Minimum $\bar{d}_{\min}$
Autumn 1973 - Results based on 3-ft ² samples					
Redwood Cr nr Blue Lake (10-03)	24	517	3.251	4.585	0.464
Redwood Cr at S. Boundary (10-01)	20	207	2.722	4.322	0.832
Bridge Cr nr Orick (9-25)	16	267	2.842	4.000	0.532
Harry Wier Cr nr Orick (9-26)	22	89	3.669	4.459	1.825
do. (10-31)	10	30	2.816	3.322	1.832
Redwood Cr below Tom McDonald Cr (9-27)	13	103	2.405	3.700	0.937
Miller Cr nr Orick (11-02)	15	55	3.309	3.907	1.788
Miller Cr at Mouth nr Orick (9-27)	10	25	3.109	3.322	2.084
do. (10-31)	6	14	2.128	2.585	1.770
Redwood Cr below Elam Cr (9-28)	15	90	3.212	3.907	1.216
Hayes Cr nr Orick (9-28)	14	41	3.216	3.807	2.074
do. (11-01)	15	32	3.499	3.907	2.654
Redwood Cr below Hayes Cr (9-28)	16	188	2.701	4.000	0.713
Lost Man Cr nr Orick (9-25)	25	148	3.910	4.644	1.383
do. (11-01)	11	27	3.028	3.459	2.181
Little Lost Man Cr nr Orick (10-04)	32	1170	3.619	5.000	0.308
do. (11-01)	13	77	2.694	3.700	1.183
Spring 1974 - Results based on 4-ft ² samples; when more than 4 samples were collected at a station, 4 were picked at random. *Based on 2 samples.					
Redwood Cr nr Blue Lake (5-08)	22	93	3.482	4.459	1.762
Redwood Cr at S. Boundary (5-09)	25	158	3.645	4.644	1.311
Bridge Cr nr Orick (5-13)	24	406	2.454	4.585	0.570
Harry Wier Cr nr Orick (5-13)	31	683	3.460	4.954	0.476
Redwood Cr abv Tom McDonald Cr (5-14)	18	214	2.475	4.170	0.725
Miller Cr nr Orick (5-10)	33	1640	2.327	5.044	0.236
Miller Cr at Mouth nr Orick (5-14)	24	247	3.556	4.585	0.868
Redwood Cr blw Elam Cr (5-15)	23	228	2.821	4.524	0.888
Redwood Cr abv Hayes Cr (5-15)	30	974	2.093	4.907	0.338
Hayes Cr nr Orick (5-15)	28	458	3.251	4.807	0.604
Lost Man Cr nr Orick (5-10)	25	387	3.816	4.644	0.620
Little Lost Man Cr at Site No. 2	34	1522	3.559	5.087	0.260
nr Orick (5-10)	33*	730*	3.625*	5.044*	0.479*
Geneva Cr nr Orick (5-18)	25*	329*	3.223*	4.644*	0.711*
Autumn 1974-Results based on 4-ft ² samples; when more than 4 samples were collected at a station, 4 were picked at random.					
Redwood Cr nr Blue Lake (9-18)	32	8250	2.892	5.000	0.054
Redwood Cr at S. Boundary (9-13)	39	4796	3.172	5.285	0.108
Bridge Cr nr Orick (9-16)	44	3519	3.375	5.459	0.161
Harry Wier Cr nr Orick (9-16)	48	1395	3.722	5.585	0.400
Redwood Cr abv Tom McDonald Cr (9-24)	35	6593	3.368	5.129	0.073
Miller Cr nr Orick (9-17)	45	2082	3.593	5.492	0.263
Miller Cr at Mouth nr Orick (9-17)	37	851	3.748	5.209	0.471
Redwood Cr blw Elam Cr (9-21)	39	6555	3.191	5.285	0.082
Redwood Cr abv Hayes Cr (9-14)	36	15276	2.804	5.170	0.035
Hayes Cr nr Orick (9-14)	46	5340	3.772	5.524	0.116
Lost Man Cr nr Orick (9-15)	43	2600	4.018	5.426	0.206
Little Lost Man Cr at Site No. 2		(analysis not finished)			
Geneva Cr nr Orick		(not sampled)			

Table 9.--*Similarity indices for Redwood Creek drainage, autumn 1973*
 [Results based on 3-ft² samples]

Station (A) name	Station (B) name	Number of taxa in A	Number of taxa in B	Number of taxa common to A & B (C)	Similarity index (S)
Redwood Cr nr Blue Lake	Redwood Cr at South Boundary	24	20	15	0.68
do.	Redwood Cr below Tom McDonald Cr	24	13	13	.70
do.	Redwood Cr below Elam Cr	24	15	12	.62
do.	Redwood Cr below Hayes Cr	24	16	12	.60
Redwood Cr at South Boundary	Redwood Cr below Tom McDonald Cr	20	13	10	.61
do.	Redwood Cr below Elam Cr	20	15	10	.57
do.	Redwood Cr below Hayes Cr	20	16	10	.56
Redwood Cr below Tom McDonald Cr	Redwood Cr below Elam Cr.	13	15	9	.64
do.	Redwood Cr below Hayes Cr	13	16	8	.55
Redwood Cr below Elam Cr	Redwood Cr below Hayes Cr	15	16	10	.65
Redwood Cr nr Blue Lake	Hayes Cr nr Orick (9-28)	24	14	7	.37
Redwood Cr at South Boundary	do.	20	14	7	.41
Bridge Cr nr Orick	do.	16	14	5	.33
Harry Wier Cr nr Orick (9-26)	do.	22	14	10	.56
Redwood Cr blw Tom McDonald Cr	do.	13	14	4	.30
Miller Cr nr Orick (11-02)	do.	15	14	10	.69
Miller Cr at Mouth nr Orick (9-27)	do.	10	14	6	.50
Redwood Cr below Elam Cr	do.	15	14	3	.21
Redwood Cr below Hayes Cr	do.	16	14	4	.27
Lost Man Cr nr Orick (9-25)	do.	25	14	7	.36
Little Lost Man Cr nr Orick (10-04)	do.	32	14	11	.48
Redwood Cr nr Blue Lake	Little Lost Man Cr (10-04)	24	32	19	.68
Redwood Cr at South Boundary	do.	20	32	15	.58
Bridge Cr nr Orick	do.	16	32	11	.46
Harry Wier Cr nr Orick (9-26)	do.	22	32	14	.52
Redwood Cr blw Tom McDonald Cr	do.	13	32	10	.44
Miller Cr nr Orick (11-02)	do.	15	32	13	.55
Miller Cr at Mouth (9-27-73)	do.	10	32	10	.48
Redwood Cr below Elam Cr.	do.	15	32	11	.47
Hayes Cr nr Orick (9-28-73)	do.	14	32	10	.43
Redwood Cr below Hayes Cr	dq.	16	32	13	.54
Lost Man Cr nr Orick (9-25)	do.	25	32	16	.56
<u>Comparison of similarity indices before and after first storm</u>					
Harry Wier Cr nr Orick (9-26)	(10-31)	22	10	8	.50
Miller Cr at Mouth Nr Orick (9-27)	(10-31)	10	6	3	.38
Hayes Cr nr Orick (9-28)	(11-01)	14	15	8	.55
Lost Man Cr nr Orick (9-25)	(11-01)	25	11	8	.44
Little Lost Man Cr nr Orick (10-04)	(11-01)	32	13	13	.58

Table 10.--*Similarity indices for Redwood Creek drainage, spring 1974*[Results based on 4-ft² samples; when more than 4 were collected at a station, 4 were picked at random]

Station (A) name	Station (B) name	Number of taxa in A	Number of taxa in B	Number of taxa common to A & B (C)	Similarity index (S)
Redwood Cr nr Blue Lake	Redwood Cr at South Boundary	22	25	13	0.55
do.	Redwood Cr abv Tom McDonald Cr	22	18	11	.55
do.	Redwood Cr below Elam Cr	22	23	11	.49
do.	Redwood Cr abv Hayes Cr	22	30	17	.65
Redwood Cr at South Boundary	Redwood Cr abv Tom McDonald Cr	25	18	11	.51
do.	Redwood Cr below Elam Cr	25	23	16	.67
do.	Redwood Cr abv Hayes Cr	25	30	21	.76
Redwood Cr abv Tom McDonald Cr	Redwood Cr below Elam Cr	18	23	10	.49
do.	Redwood Cr abv Hayes Cr	16	30	14	.61
Redwood Cr below Elam Cr	Redwood Cr abv Hayes Cr	23	30	17	.64
Redwood Cr nr Blue Lake	Hayes Cr nr Orick	22	28	14	.56
Redwood Cr at South Boundary	do.	25	28	14	.53
Bridge Cr nr Orick	do.	24	28	16	.62
Harry Wier Cr nr Orick	do.	31	28	19	.64
Redwood Cr abv Tom McDonald Cr	do.	18	28	12	.52
Miller Cr nr Orick	do.	33	28	21	.69
Miller Cr at Mouth nr Orick	do.	24	28	17	.65
Redwood Cr below Elam Cr	do.	23	28	14	.55
Redwood Cr abv Hayes Cr	do.	30	28	16	.55
Lost Man Cr nr Orick	do.	25	28	19	.72
Little Lost Man Cr nr Orick	do.	34	28	21	.68
Redwood Cr nr Blue Lake	Little Lost Man Cr nr Orick	22	34	17	.61
Redwood Cr at South Boundary	do.	25	34	20	.68
Bridge Cr nr Orick	do.	24	34	17	.59
Harry Wier Cr nr Orick	do.	31	34	22	.68
Redwood Cr abv Tom McDonald Cr	do.	18	34	15	.58
Miller Cr nr Orick	do.	33	34	19	.57
Miller Cr at Mouth nr Orick	do.	24	34	17	.59
Redwood Cr below Elam Cr	do.	23	34	16	.56
Redwood Cr abv Hayes Cr	do.	30	34	22	.69
Hayes Cr nr Orick	do.	28	34	21	.68
Lost Man Cr nr Orick	do.	25	34	20	.68
Geneva Cr nr Orick	do.	25*	33*	16*	.55*

*Based upon 2 samples from Geneva Creek and 2 randomly picked samples from Little Lost Man Creek.

Table 11.--Similarity indices for Redwood Creek drainage, Autumn 1974

[Results based upon 4 ft² samples; when more than 4 samples were collected at a station, 4 were picked at random]

Station (A) name	Station (B) name	Number of taxa in A	Number of taxa in B	Number of taxa common to A & B (C)	Similarity index (S)
Redwood Cr nr Blue Lake	Redwood Cr at South Boundary	32	39	24	0.68
do.	Redwood Cr abv Tom McDonald Cr	32	35	23	.69
do.	Redwood Cr below Elam Cr	32	39	23	.65
do.	Redwood Cr abv Hayes Cr	32	36	23	.68
Redwood Cr at South Boundary	Redwood Cr abv Tom McDonald Cr	39	35	28	.76
do.	Redwood Cr below Elam Cr	39	39	29	.74
do.	Redwood Cr abv Hayes Cr	39	36	28	.75
Redwood Cr abv Tom McDonald Cr	Redwood Cr below Elam Cr	35	39	31	.84
do.	Redwood Cr abv Hayes Cr	35	36	26	.73
Redwood Cr below Elam Cr	Redwood Cr abv Hayes Cr	39	36	29	.77
Redwood Cr nr Blue Lake	Hayes Cr nr Orick	32	46	21	.54
Redwood Cr at South Boundary	do.	39	46	26	.61
Bridge Cr nr Orick	do.	44	46	30	.67
Harry Wier Cr nr Orick	do.	48	46	30	.64
Redwood Cr abv Tom McDonald Cr	do.	35	46	22	.54
Miller Cr nr Orick	do.	45	46	32	.70
Miller Cr at Mouth nr Orick	do.	37	46	28	.67
Redwood Cr below Elam Cr	do.	39	46	24	.56
Redwood Cr abv Hayes Cr	do.	36	46	24	.59
Lost Man Cr nr Orick	do.	43	46	27	.61
<u>Spring versus Autumn 1974</u>		<u>Spring</u>	<u>Autumn</u>	<u>Both</u>	<u>(S)</u>
Redwood Cr nr Blue Lake		22	32	15	.56
Redwood Cr at South Boundary		25	39	17	.53
Bridge Cr near Orick		24	44	18	.53
Harry Wier Cr nr Orick		31	48	24	.61
Redwood Cr abv Tom McDonald Cr		18	35	14	.53
Miller Cr nr Orick		33	45	22	.56
Miller Cr at Mouth nr Orick		24	37	19	.62
Redwood Cr below Elam Cr		23	39	13	.42
Redwood Cr abv Hayes Cr		30	36	20	.61
Hayes Cr nr Orick		28	46	25	.68
Lost Man Cr nr Orick		25	43	19	.56

Phytoplankton

Phytoplankton are unattached algae that move with the water currents and are collected by immersing a 1-litre bottle at the estimated centroid of flow of each stream. The purpose of collecting phytoplankton was to document the present species composition for future comparisons. Only the results of data collection in 1974 were available at the time of this writing.

The phytoplankton species list for all streams sampled is given in table 12. The number of taxa for each stream sampled is given in table 13. The Redwood Creek at Orick station (the most downstream station in the drainage) had the expected largest number of phytoplankton taxa. However, the low numbers of taxa from some of the tributaries such as Little Lost Man Creek and Miller Creek in July is unexpected. Redwood Creek at South Park Boundary also contained a small number of phytoplankton taxa in July. A future comparison of the 1974 phytoplankton data with the 1975 data is needed before any conclusion can be made regarding the phytoplankton data.

Table 12.--List of phytoplankton types in Redwood Creek and selected tributaries, 1974

DIVISION--CHLOROPHYTA

CLASS--CHLOROPHYCEAE

ORDER--CHLOROCOCCALES

Family Oocystaceae

Genus sp.--*Ankistrodesmus falcatus*

Selenastrum minutum

Selenastrum sp.

Tetraëdron minimum

Family--Scenedesmaceae

Genus sp.--*Scenedesmus bijuga*

Scenedesmus dimorphus

Scenedesmus tenuispina

ORDER--VOLVOCALES

Family--Chlamydomonadaceae

Genus sp.--*Chlamydomonas* sp. (flagellate)

ORDER--ZYGNEATALES

Family--Desmidiaceae

Genus sp.--*Closterium* sp.

DIVISION--CHRYSTOPHYTA

CLASS--BACILLARIOPHYCEAE

ORDER--CENTRALES

SUBORDER--Coscinodiscineae

Family--Coscinodiscaceae

Genus sp.--*Coscinodiscus* sp.

Cyclotella sp.

Melosira varians

ORDER--PENNALES

SUBORDER--Achnanthineae

Family--Achnanthaceae

Genus sp.--*Achnanthes lanceolata*

Achnanthes minutissima

Cocconeis placentula

Rhoicosphenia curvata

SUBORDER--Fragilarineae

Family--Diatomaceae

Genus sp.--*Diatoma vulgare*

Family--Fragilariaceae

Genus sp.--*Fragilaria crotonensis*

Fragilaria sp.

Synedra rumpens

Synedra ulna

SUBORDER--Naviculineae

Family--Cymbellaceae

Genus sp.--*Cymbella cistula*

Cymbella mexicanum

Cymbella ventricosa

Epithemia sorex

Epithemia turgida

Rhopalodia gibba

Table 12.--Continued

DIVISION--CHRYSTOPHYTA--Continued

CLASS--BACILLARIOPHYCEAE--Continued

ORDER--PENNALES--Continued

SUBORDER--Naviculineae--Continued

Family--Gomphonemataceae

Genus sp.--*Gomphonema olivaceum*
Gomphonema sp.

Family--Naviculaceae

Genus sp.--*Amphiprora paludosa*
Navicula bacillum
Navicula cryptocephala
Navicula exigua
Navicula globulifera
Navicula menisculus
Navicula viridula
Navicula sp.
Pinnularia sp.

SUBORDER--Surirellineae

Family--Nitzschiaceae

Genus sp.--*Nitzschia acicularis*
Nitzschia amphibia
Nitzschia dissipata
Nitzschia filiformis
Nitzschia linearis
Nitzschia palea
Nitzschia romana
Nitzschia sp.

Family Surirellaceae

Genus sp.--*Surirella elegans*

CLASS--CHRYSTOPHYCEAE

ORDER--RHIZOCHRYSIDALES

Family--Rhizochrysidaceae

Genus sp.--*Chrysidiastrium* sp.

DIVISION--CYANOPHYTA

CLASS--MYXOPHYCEAE

ORDER--CHROOCOCCALES

Family--Chroococcaceae

Genus sp.--*Merismopedia* sp.

ORDER--OSCILLATORIALES

SUBORDER--Nostochineae

Family--Nostocaceae

Genus sp.--*Anabaena* sp.

SUBORDER--Oscillatorineae

Family--Oscillatoriaceae

Genus sp.--*Oscillatoria* sp.

DIVISION--PYRRROPHYTA

CLASS--DINOPHYCEAE

ORDER--PERIDINIALES

Family--Glenodiniaceae

Genus sp.--*Glenodinium* sp.

DIVISION--GROUPS OF UNCERTAIN SYSTEMATIC POSITION

CLASS--CRYPTOPHYCEAE

ORDER--CRYPTOMONADALES

Family--Cryptomonadaceae

Genus sp.--*Cryptomonas* sp.

Table 13.--Number of phytoplankton taxa found at Redwood Creek and selected tributaries, 1974

Station	Date	Number of taxa
Redwood Creek at South Park Boundary, nr Orick	July 19, 1974 Sept. 11	5 26
Harry Wier Creek nr Orick	July 19 Sept. 11	7 8
Miller Creek	July 19 Sept. 11	6 8
Miller Creek at Mouth	July 19 Sept. 11	6 -
Hayes Creek	July 19	7-
Lost Man Creek	July 19 Sept. 11	3 15
Little Lost Man Creek at Site No. 2	July 19 Sept. 11	8 12
Redwood Creek at Orick	July 19 Sept. 11	9 29

Periphyton

Periphyton are algae and associated organisms that are found attached to solid materials in water. In this study, periphyton were collected by placing plastic strips in the stream for periods of time sufficient to permit colonization by the periphyton community. After the colonization period, the plastic strips were removed and known areas of periphyton and assorted debris were scraped from the strips for biomass determinations. Usually, areas of 0.01 to 0.005 m² were scraped. The scrapings were dried at 105°C until a constant weight was obtained. Next, the scrapings were placed in a muffle furnace at 500°C for 1 hour. The residue after heating at 500°C is the ash weight of periphyton. The difference in weights after drying and after ashing represents the volatile or organic material contained in the sample. The 1974 periphyton results are expressed as a daily unit weight of periphyton biomass (table 14). A species list of periphyton is given in table 15.

There were no apparent relations between the control streams (Hayes and Little Lost Man Creeks) and the other streams sampled. For example, Harry Wier, Miller, and Hayes Creeks contained lower values of organic material than did Bridge Creek, Little Lost Man Creek, and Redwood Creek above Hayes Creek.

The results of analysis of periphyton data available at this time are insufficient to make valid water-quality conclusions for the streams under consideration. They do, however, point out the areas where enrichment was possibly taking place and where particular attention should be given when all the periphyton data are available for analysis.

Table 14 .--Mean net community productivity of periphyton

Dates	Dry weight g/m ² /day	Ash weight g/m ² /day	Organic weight g/m ² /day
<u>Redwood Creek at South Park Boundary</u>			
May 9 to July 16, 1974	0.13	0.09	0.04
July 16 to Sept. 13	.05	.02	.03
<u>Bridge Creek</u>			
May 13 to July 15	.02	.01	.01
July 15 to Sept. 16	.43	.29	.14
<u>Harry Wier Creek</u>			
May 13 to July 15	.10	.07	.03
July 15 to Sept. 16	.12	.09	.03
<u>Miller Creek near Orick</u>			
May 10 to July 16	.03	.03	.00
July 16 to Sept. 17	.05	.03	.02
<u>Miller Creek at Mouth</u>			
May 14 to July 16	1.18	1.12	.06
July 16 to Sept. 17	.91	.83	.08
<u>Redwood Creek above Hayes Creek</u>			
May 15 to July 15	.11	.09	.02
July 15 to Sept. 14	1.61	1.15	.46
<u>Hayes Creek</u>			
May 15 to July 15	.06	.05	.01
July 15 to Sept. 14	.01	.01	.00
<u>Lost Man Creek</u>			
May 10 to July 15	.05	.03	.02
July 15 to Sept. 15	.12	.08	.04
<u>Little Lost Man Creek at Site No. 2</u>			
(Spring samplers vandalized)	--	--	--
July 15 to Sept. 14	.45	.35	.10

Table 15.--List of periphyton types, Redwood Creek and selected tributaries, 1974

DIVISION--CHLOROPHYTA

CLASS--CHLOROPHYCEAE

ORDER--Chlorococcales

Family--Oocystaceae

Genus sp.--*Ankistrodesmus falcatus*
Selenastrum minutum

Family--Scenedesmaceae

Genus sp.--*Scenedesmus dimorphus*

ORDER--VOLVOCALES

Family--Volvocaceae

Genus sp.--*Eudorina elegans* (individual cell count)

ORDER--ZYGNEATALES

Family--Zygnemataceae

Genus sp.--*Mougeotia* sp. (individual cell count)
Spirogyra sp.

DIVISION--CHRYSTOPHYTA

CLASS--BACILLARIOPHYCEAE

ORDER--CENTRALES

SUBORDER--Coscinodiscineae

Family--Coscinodiscaceae

Genus sp.--*Melosira varians*

ORDER--PENNALES

SUBORDER--Achnanthineae

Family--Achnanthaceae

Genus sp.--*Achnanthes lanceolata*
Achnanthes minutissima
Cocconeis placentula
Rhoicosphenia curvata

Family--Eunotiaceae

Genus sp.--*Eunotia pectinalis*

SUBORDER--Fragilarineae

Family--Diatomaceae

Genus sp.--*Diatoma vulgare*

Family--Fragilariaceae

Genus sp.--*Fragilaria vaucheriae*
Synedra amphicephala
Synedra rumpens
Synedra ulna

SUBORDER--Naviculineae

Family--Cymbellaceae

Genus sp.--*Cymbella cistula*
Cymbella mexicanum
Cymbella sp.
Epithemia sorex
Epithemia turgida
Rhopalodia gibba

Table 15.--Continued

DIVISION --CHRYSTOPHYTA--Continued

CLASS--BACILLARIOPHYCEAE--Continued

ORDER--CENTRALES--Continued

SUBORDER--Naviculineae

Family--Gomphonemataceae

Genus sp.--*Gomphonema olivaceum*

Family--Naviculaceae

Genus sp.--*Navicula cryptocephala**Navicula globulifera**Navicula menisculus**Navicula* sp.*Pinnularia* sp.

SUBORDER--Surirellineae

Family--Nitzschiaceae

Genus sp.--*Nitzschia acicularis**Nitzschia dissipata**Nitzschia linearis**Nitzschia palea**Nitzschia romana**Nitzschia* sp.

Family--Surirellaceae

Genus sp.--*Surirella elegans*

DIVISION--CYANOPHYTA

CLASS--MYXOPHYCEAE

ORDER--OSCILLATORIALES

SUBORDER--Nostochineae

Family--Nostocaceae

Genus sp.--*Anabaena* sp.

SUBORDER--Oscillatorineae

Family--Oscillatoriaceae

Genus sp.--*Oscillatoria* sp.

MISCELLANEOUS

Rounded-unknown flagellates

Miscellaneous flagellates

Fish

Electrofishing and seining techniques were used to capture fish in Redwood Creek and selected tributaries. Species composition of all fish and the condition factor and length-weight relation of steelhead rainbow trout were calculated to evaluate the well-being of fish population in the basin (table 16).

The types of fish captured in the Redwood Creek basin include: Steelhead rainbow trout (*Salmo gairdneri gairdneri*); coho salmon (*Oncorhynchus kisutch*); king salmon (*Oncorhynchus tshawytscha*); prickly sculpin (*Cottus asper*); threespine stickleback (*Gasterosteus aculeatus*); and Humboldt sucker (*Catostomus humboldtinus*).

The condition factor for steelhead rainbow trout was calculated from the equation:

$$K = \frac{W \times 10^5}{L^3} \quad (1)$$

where K = condition factor,

W = weight in grams,

and L = length in millimetres.

Attention

The condition factor can be used to indicate the relative robustness of fish and can reflect the effects of any environmental changes which may improve or retard growth. The length-weight relation for steelhead rainbow trout was determined by the equation:

$$W = aL^b \quad (2)$$

where W = weight in grams,

L = length in millimetres,

a = a constant,

and b = an exponent.

The values for a and b were determined empirically. A least-squares regression was calculated from the logarithmic transformation of the length-weight relation equation (2). The slope of the regression line can be used to indicate the extent of allometric growth occurring in the population sampled; the steeper the slope of the regression line the more weight the fish is gaining per unit growth in length. Generally, when the slope of the regression line is larger than 3, the fish are stout, and when the slope is less than 3, the fish are slim.

A total of 1,013 fish were captured during the survey: Steelhead rainbow trout (67.4 percent); Humboldt sucker (11.2 percent); threespine stickleback (10.9 percent); pricklysculpin (6.3 percent); silver salmon (3.9 percent); and king salmon (0.3 percent). The mean condition factor for steelhead rainbow trout captured in Redwood Creek ranged from 0.89 to 1.38 and the slope of the regression line for the length-weight relation ranged from 2.9977 to 3.6069. The mean condition factor for steelhead rainbow trout captured in the tributaries ranged from 1.16 to 1.56 and the slope of the regression line ranged from 2.7114 to 3.1755. Similar comparisons between Redwood Creek and tributaries for coho and king salmon were not made due to insufficient data.

Is this all we know about
the fish of Redwood Creek?

Table 16.--Results of fish survey

Station	Date	Species-type captured	Species composition (percent)	Fork length (cm)			Weight (gm)			Condition factor			Length-weight relation $W = al^b$		
				Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	a	b	
Redwood Cr. nr. Redwood Valley Bridge nr. Blue Lake	8- 2-74	Steelhead rainbow trout	66.7	4.4 - 14.5	8.0	50	0.7 - 37.1	8.8	50	0.70 - 1.72	1.11	50	0.0070	3.2255	
		Humboldt sucker	32.0	--	--	24	--	--	--	--	--	--	--	--	
		Threespine stickleback	1.3	--	--	1	--	--	--	--	--	--	--	--	
	7-25-75	Humboldt sucker	59.4	--	--	19	--	--	--	--	--	--	--	--	
		Steelhead rainbow trout	40.6	4.3 - 5.8	4.9	13	--	--	--	--	--	--	--	--	
	9-26-75	Steelhead rainbow trout	100	7.2 - 16.1	10.3	50	4.2 - 56.1	17.2	50	1.05 - 1.90	1.28	50	.0127	2.9977	
	Humboldt sucker (observed only)	--	--	--	--	--	--	--	--	--	--	--	--		
Redwood Cr. at mouth of Copper Cr. nr. Orick	7-24-75	Steelhead rainbow trout	100	1.1 - 2.2	4.4	11	--	--	--	--	--	--	--	--	
	9-24-75	Humboldt sucker	73.7	--	--	14	--	--	--	--	--	--	--	--	
		Steelhead rainbow trout	26.3	6.3 - 11.0	8.8	5	3.5 - 18.5	10.9	5	1.07 - 1.56	1.38	5	.0073	3.2928	
Copper Cr. nr. Orick	7-24-75	Steelhead rainbow trout	100	2.5 - 9.4	3.8	42	--	--	--	--	--	--	--	--	
	9-24-75	Steelhead rainbow trout	100	4.3 - 7.3	5.3	40	1.0 - 5.1	2.4	40	1.18 - 2.29	1.56	40	.0249	2.7114	
Bridge Cr. nr. Orick	5-23-4	Prickly sculpin	100	--	--	5	--	--	--	--	--	--	--	--	
	7-17-75	Steelhead rainbow trout	100	2.5 - 13.5	6.0	16	--	--	--	--	--	--	--	--	
	9-25-75	Steelhead rainbow trout	80.0	5.0 - 12.6	6.8	48	1.5 - 22.6	4.8	48	1.09 - 2.29	1.37	48	.0243	2.7276	
		Prickly sculpin	18.3	--	--	11	--	--	--	--	--	--	--	--	
Humboldt sucker		1.7	--	--	1	--	--	--	--	--	--	--	--		
Harry Wier Cr. nr. Orick	5-23-74	Steelhead rainbow trout	75.0	3.9 - 11.3	8.1	3	--	--	--	--	--	--	--	--	
		Prickly sculpin	25.0	--	--	1	--	--	--	--	--	--	--	--	
	7-16-75	Steelhead rainbow trout	100	3.0 - 4.8	3.9	16	--	--	--	--	--	--	--	--	
	9-25-75	Steelhead rainbow trout	92.6	4.1 - 11.7	5.3	50	.5 - 21.4	2.2	50	.59 - 2.00	1.18	50	.0117	2.9890	
		Prickly sculpin	5.6	--	--	3	--	--	--	--	--	--	--	--	
	Humboldt sucker	1.8	--	--	1	--	--	--	--	--	--	--	--		
Redwood Cr. below Harry Wier Cr. nr. Orick	7-30-74	Steelhead rainbow trout	58.3	4.2 - 9.3	5.99	60	.5 - 9.1	2.3	60	.36 - 1.32	.92	60	.0031	3.6069	
		Threespine stickleback	26.2	--	--	27	--	--	--	--	--	--	--	--	
		Humboldt sucker	14.6	--	--	15	--	--	--	--	--	--	--	--	
		Prickly sculpin	.9	--	--	1	--	--	--	--	--	--	--	--	

Table 16.--Results of fish survey--Continued

Station	Date	Species-type captured	Species composition (percent)	Fork length (cm)			Weight (gm)			Condition factor			Length-weight relation $W = aL^b$		
				Range	$\bar{x}$	n	Range	$\bar{x}$	n	Range	$\bar{x}$	n	a	b	
Tom McDonald Cr. nr. Orick	5-24-74	Silver salmon	78.9	3.2 - 4.9	3.9	19	--	<1	19	--	--	--	--	--	--
		Prickly sculpin	15.8	--	--	3	--	--	--	--	--	--	--	--	--
		Threespine stickleback	5.3	--	--	1	--	--	--	--	--	--	--	--	--
	7-21-75	Steelhead rainbow trout	64.7	1.1 - 17.3	5.7	44	--	--	--	--	--	--	--	--	--
		Prickly sculpin	27.9	--	--	19	--	--	--	--	--	--	--	--	--
		Threespine stickleback	7.4	--	--	5	--	--	--	--	--	--	--	--	--
Miller Cr. at mouth. nr. Orick	9-25-75	Steelhead rainbow trout	89.3	5.1 - 15.8	6.9	50	0.7 - 44.2	5.26	50	0.53 - 1.94	1.16	50	0.0081	3.1755	
		Prickly sculpin	10.7	--	--	6	--	--	--	--	--	--	--	--	--
	7-24-74	Steelhead rainbow trout	66.7	3.9 - 9.5	6.7	2	--	--	--	--	--	--	--	--	--
		Silver salmon	33.3	--	4.7	1	--	--	--	--	--	--	--	--	--
		Steelhead rainbow trout	70.0	4.1 - 11.2	7.6	7	--	--	--	--	--	--	--	--	--
		Prickly sculpin	30.0	--	--	3	--	--	--	--	--	--	--	--	--
Redwood Cr. nr. Hayes Cr.	5-22-74	Prickly sculpin	83.3	--	--	5	--	--	--	--	--	--	--	--	--
		Silver salmon	16.7	--	5.0	1	--	--	--	--	--	--	--	--	--
	7-29-74	Threespine stickleback	37.3	--	--	59	--	--	--	--	--	--	--	--	--
		Steelhead rainbow trout	29.1	4.9 - 14.6	8.2	46	.6 - 31.0	7.7	46	.46 - 1.20	.89	46	.0033	3.4804	
		Humboldt sucker	24.7	--	--	39	--	--	--	--	--	--	--	--	--
		Silver salmon	5.7	5.1 - 9.5	6.7	9	.9 - 10.5	3.5	9	.64 - 1.22	.94	9	.0015	3.9657	
		King salmon	1.9	8.0 - 9.6	8.7	3	5.5 - 10.0	7.2	3	1.02 - 1.13	1.07	3	.0046	3.3934	
		Prickly sculpin	1.3	--	--	2	--	--	--	--	--	--	--	--	--
Little Lost Man Cr. nr. Orick	5-22-74	Steelhead rainbow trout	49.0	6.3 - 16.0	9.6	19	<1 - 51	--	19	--	--	--	--	--	--
		Silver salmon	25.5	3.9 - 7.7	5.3	10	<1 - 4	--	10	--	--	--	--	--	--
		Threespine stickleback	25.5	--	--	10	--	--	--	--	--	--	--	--	--
	7-23-75	Steelhead rainbow trout	85.7	4.6 - 12.7	7.0	72	--	--	--	--	--	--	--	--	--
		Threespine stickleback	8.3	--	--	7	--	--	--	--	--	--	--	--	--
		Prickly sculpin	6.0	--	--	5	--	--	--	--	--	--	--	--	--
	9-24-75	Steelhead rainbow trout	100	6.0 - 23.6	8.6	39	1.4 - 147.3	11.7	39	.56 - 2.13	1.24	39	.0148	2.8965	
		Prickly sculpin (observed only)		--	--	--	--	--	--	--	--	--	--	--	--

* a value is equivalent to the slope of the linear regression line of the length-weight relation.

Seston

Seston is the total particulate matter (organic and inorganic) suspended in water. Analysis of seston material followed the methods described in Slack and others (1973, p. 54). As with the periphyton analysis, the difference between dry and ash weight seston is the volatile or organic weight of seston.

The seston data are in table 17. Sampling stations other than those listed in the introduction are included in this table. The results are for the periods November 1973 to July 30, 1975.

The percentage of organic matter of seston ranged from 0.0 to 100 percent.

The organic seston concentrations measured at the Redwood Creek stations during the November 1973 to April 10, 1974 period ranged from 1.0 to 5.3 percent with the highest value measured at Redwood Creek at Orick station. Harry Wier, Miller, Hayes, and Lost Man Creeks had variable concentrations of organic seston with no values exceeding 18 percent. In contrast, Little Lost Man and Geneva Creeks had values as high as 43 and 73 percent organic seston.

Between April 11, 1974 and November 6, 1974, increased concentrations of organic seston were measured at Redwood Creek at South Park Boundary Station. The concentrations of organic seston in Harry Wier, Miller, Hayes, and Lost Man Creeks increased. Concentration in Little Lost Man Creek and Redwood Creek at Orick were also higher than during the previous sampling period (table 17).

In the period November 7, 1974 to July 1975, lower organic seston percentages were noted in all streams listed (table 17).

The erratic patterns of the seston values included in report indicate that a more detailed evaluation of the data should be made. The hourly seston values for Harry Wier and Little Lost Man Creeks for November 1974 and February 1975 probably are related to storm intensity and stream discharge, but should be studied further to evaluate the relation.

Table 17.--Results of seston analyses, Redwood Creek basin

Station No.	Station name	Date	Time	Dry weight (mg/l)	Organic weight (mg/l)	Percent organic weight	Percent Organic weight		
							Range	$\bar{x}$	n
11481500	Redwood Creek near Blue Lake	1-12-74	0945	60.5	3.0	5.0	--	5.0	1
		2-21-74	0800	309.0	7.0	2.3	--	2.3	1
11482200	Redwood Creek at South Park Boundary, near Orick	11-8-73	0815	1,701.0	44	2.6	--	2.6	1
		1-12-74	1230	92.0	4.5	4.9	--	4.9	1
		2-20-74	2100	229.0	5.0	2.2	1.2 - 2.2	1.7	2
		2-22-74	1200	323.0	4.0	1.2			
		3-2-74	1615	293.5	6.0	2.0	--	2.0	1
11482220	Redwood Creek above Harry Wier Creek, near Orick	2-22-74	1240	198.0	2.0	1.0	--	1.0	1
11482225	Harry Wier Creek near Orick	11-8-73	0900	154.2	5.0	3.2	--	3.2	1
		1-12-74	1800	115.0	13	11	11 - 16	13.5	2
		1-13-74	1235	20.0	3.3	16			
		2-21-74	0015	13.0	2.1	16	5.7 - 16	10.4	3
		2-21-74	1200	37.7	3.6	9.6			
		2-22-74	0930	14.0	.8	5.7			
		3-3-74	0930	8.4	.0	.0	--	.0	1
11482250	Miller Creek near Orick	11-8-73	0530	368.5	5.0	1.4	--	1.4	1
		1-12-74	1450	30.5	4.0	13	--	13	1
		2-21-74	1025	101.0	6.5	6.4	--	6.4	1
		3-1-74	0930	63.7	2.2	3.4	--	3.4	1

Table 17.--Results of seston analyses, Redwood Creek basin--Continued

Station No.	Station name	Date	Time	Dry weight (mg/l)	Organic weight (mg/l)	Percent organic weight	Percent Organic weight		
							Range	$\bar{x}$	n
11482260	Miller Creek near Orick	11-8-73	0800	523.1	3.7	0.7	--	0.7	1
		1-13-74	0630	1,432.0	100	7.0	--	7.0	1
		2-20-74	1930	77.2	5.6	7.2	1.5 - 7.2	4.8	3
		2-21-74	1050	204.6	12	5.8			
		2-22-74	1030	27.1	.4	1.5			
		3-1-74	1030	124.8	7.9	6.3	--	6.3	1
11482330	Hayes Creek near Orick	11-9-73	1155	92.2	.0	.0	--	.0	1
		1-13-74	1300	3.3	.6	18	--	18	1
		2-21-74	1845	10.8	.0	.0	--	.0	1
		3-2-74	1600	15.2	.4	2.6	--	2.6	1
		4-9-74	1330	24.0	.0	.0	--	.0	1
11482450	Lost Man Creek near Orick	11-8-73	0730	160.5	.0	.0	--	.0	1
		1-13-74	0930	20.5	2.0	9.8	--	9.8	1
		2-21-74	1500	50.5	3.1	6.1	--	6.1	1
		3-2-74	1000	25.6	1.6	6.2	--	6.2	1
		4-8-74	1330	8.0	.0	.0	--	.0	1
11482460	Larry Damm Creek near Orick	4-8-74	1515	7.5	.0	.0	--	.0	1
11482470	Little Lost Man Creek near Orick	11-9-73	1135	9.7	4.2	43	--	43	1
		1-13-74	1210	6.0	.0	.0	--	.0	1
		2-20-74	2330	10.0	.0	.0	.0 - 13	6.0	3
		2-21-74	1100	8.0	.4	5.0			
		2-22-74	1000	6.2	.8	13			
		3-2-74	1500	7.8	.8	10	--	10	1
		4-9-74	1020	23.0	.8	3.5	--	3.5	1

Table 17.--Results of seston analyses, Redwood Creek basin--Continued

Station No.	Station name	Date	Time	Dry weight (mg/l)	Organic weight (mg/l)	Percent organic weight	Percent Organic weight		
							Range	$\bar{x}$	n
11482475	Geneva Creek near Orick	11-9-73	1145	7.2	2.0	28	--	28	1
		1-13-74	1030	12.7	1.6	13	--	13	1
		2-21-74	1220	9.4	.6	6.4	--	6.4	1
		3-2-74	1715	3.8	.0	.0	--	.0	1
		4-9-74	0850	4.4	3.2	73	--	73	1
11482500	Redwood Creek at Orick	1-13-74	1250	247.0	13	5.3	--	5.3	1
		2-21-74	1300	429.0	14	3.3	--	3.3	1

Table 17.--Results of seston analyses, Redwood Creek basin--Continued

Station No.	Station name	Date	Time	Dry weight (mg/l)	Organic weight (mg/l)	Percent organic weight	Percent Organic weight			
							Range	$\bar{x}$	n	
11481500	Redwood Creek near Blue Lake	7-18-74	1000	1.3	0.2	15	--	15	1	
11482020	Redwood Creek at Redwood Valley Bridge, near Blue Lake	7-18-74	1255	1.9	.2	11	--	11	1	
11482120	Redwood Creek above Panther Creek, near Orick	7-18-74	1410	1.5	.0	0	--	.0	1	
11482140	High-Slope Schist Creek near Orick	7-23-74	1145	2.9	1.1	38	--	38	1	
11482160	Copper Creek near Orick	4-16-74	1400	11	--	0	--	.0	1	
11482200	Redwood Creek at South Park Boundary, near Orick	7-18-74	2400	.0	.0	0	0	-100	46	3
		7-19-74	1200	.4	.4	100				
		7-22-74	1230	.8	.3	38				
		9-11-74	1200	3.1	2.2	71	71	- 82	76.5	2
		9-13-74	1300	1.7	1.4	82				
11482210	Bridge Creek near Orick	4-26-74	1100	.0	--	0	--	.0	1	
		7-23-74	1230	.5	.2	40	--	40	1	

Table 17.--Results of seston analyses, Redwood Creek basin--Continued

Station No.	Station name	Date	Time	Dry weight (mg/l)	Organic weight (mg/l)	Percent organic weight	Percent Organic weight		
							Range	$\bar{x}$	n
11482225	Harry Wier Creek near Orick	4-12-74	1530	7.3	--	0	--	0.0	1
		7-18-74	2400	.4	.0	0	--	.0	2
		7-19-74	1200	.5	.0	0			
		9-11-74	1200	3.9	1.9	49			
		9-16-74	1330	11	1.0	9.1	9.1 - 49	29	2
11482230	Tom McDonald Creek near Orick	4-26-74	1335	1.2	--	0	--	.0	1
		7-23-74	1515	.5	.1	20	--	20	1
11482240	Fortyfour Creek near Orick	5-8-74	1500	6.0	.0	0	--	.0	1
		7-23-74	1230	4.1	.8	20	--	20	1
11482250	Miller Creek near Orick	4-25-74	1100	1.7	--	0	--	.0	1
		7-18-74	2400	3.0	.0	0	--	.0	2
		7-19-74	1200	1.6	.0	0			
		9-11-74	1200	2.2	1.7	77			
		9-17-74	1430	1.2	.3	25	--	51	2
11482260	Miller Creek at mouth, near Orick	4-11-74	1600	13	.0	0	--	.0	1
		7-18-74	2400	2.0	.0	0			
		7-19-74	1200	2.0	.1	5.0	0 - 10	5.0	3
		7-24-74	1030	4.0	.4	10			
		9-11-74	1300	2.1	1.2	57			
		9-17-74	1200	1.8	.5	28	28 - 57	42.5	2
11482270	Bond Creek near Orick	5-8-74	1615	4.4	.0	0	--	.0	1
11482300	Elam Creek near Orick	5-9-74	1310	.8	.8	100	--	100	1

Table 17.--Results of seston analyses, Redwood Creek basin--Continued

Station No.	Station name	Date	Time	Dry weight (mg/l)	Organic weight (mg/l)	Percent organic weight	Percent Organic weight		
							Range	$\bar{x}$	n
11482310	McArthur Creek near Orick	5-9-74	1400	2.8	0.4	14	--	14	1
11482320	Low Slope Schist Creek near Orick	5-10-74	0930	1.2	.0	0	--	.0	1
48	Hayes Creek near Orick	4-9-74	1330	24	.0	0	--	0	1
		7-19-74	1150	1.3	.4	31	--	15.5	2
		7-27-74	1430	.4	.0	0			
	Lost Man Creek near Orick	4-8-74	1330	8.0	.0	0	--	.0	1
		7-18-74	2400	2.4	.0	0			
		7-19-74	1230	.8	.0	0	--	.0	3
		7-22-74	1330	.8	.0	0			
		9-11-74	1200	1.7	1.4	82	82 - 89	85.5	2
	Larry Damm Creek near Orick	4-8-74	1515	7.5	.0	0	--	.0	1
		7-27-74	1030	2.1	.4	19	--	19	1
11482468	Little Lost Man Creek at site No. 2, near Orick	4-9-74	1020	23	1.0	4.3	--	4.3	1
		7-18-74	2400	1.2	.2	17			
		7-19-74	1200	.6	.1	17	17 - 33	22.3	3
		7-22-74	1300	.6	.2	33			
		9-11-74	1200	1.4	1.3	93			
		9-15-74	1400	.4	.2	50	50 - 93	71.5	2
11482475	Geneva Creek near Orick	4-9-74	0850	4.4	3.2	73	--	73	1

Table 17.--Results of seston analyses, Redwood Creek basin--Continued

Station No.	Station name	Date	Time	Dry weight (mg/l)	Organic weight (mg/l)	Percent organic weight	Percent Organic weight		
							Range	$\bar{x}$	n
11482480	Berry Glen Creek near Orick	4-25-74	1245	7.9	1.7	22	--	22	1
11482500	Redwood Creek at Orick	7-18-74	2400	3.0	.5	17	17 - 21	18.3	3
		7-19-74	1200	1.9	.4	21			
		7-24-74	1400	1.8	.3	17			
		9-11-74	1200	3.3	2.9	88	50 - 88	69	2
		9-17-74	1645	1.2	.6	50			

Table 17.--Results of seston analyses, Redwood Creek basin--Continued

Station No.	Station name	Date	Time	Dry weight (mg/l)	Organic weight (mg/l)	Percent organic weight	Percent Organic weight		
							Range	$\bar{x}$	n
11482200	Redwood Creek at South Park Boundary, near Orick	6-3-75	1415	15.0	0.5	3.3	2.5 - 3.3	2.9	2
		6-8-75	1145	8.1	.2	2.5			
11482225	Harry Wier Creek near Orick	11-7-74	0455	4.4	.4	9.1	0.0 - 22	10.8	15
		11-7-74	0555	8.7	.4	4.6			
		11-7-74	0655	18.4	.8	4.3			
		11-7-74	0755	11.5	1.2	10			
		11-7-74	0855	8.1	1.7	21			
		11-7-74	0955	29.4	2.5	8.5			
		11-7-74	1055	90.4	11.1	12			
		11-7-74	1155	109.6	9.9	9.0			
		11-7-74	1255	115.9	7.7	6.6			
		11-7-74	1355	63.7	5.9	9.3			
		11-7-74	1455	32.0	3.7	11			
		11-7-74	1655	14.3	3.2	22			
		11-7-74	1855	13.1	2.2	17			
		11-8-74	0255	4.4	.8	18			
		11-8-74	0655	.2	.0	.0			

Table 17.--Results of seston analyses, Redwood Creek basin--Continued

Station No.	Station name	Date	Time	Dry weight (mg/l)	Organic weight (mg/l)	Percent organic weight	Percent Organic weight		
							Range	$\bar{x}$	n
11482225	Harry Wier Creek near Orick	2-6-75	1045	20	3.0	15	0.0 - 15	8.55	15
		2-7-75	1615	15	2.0	13			
		2-8-75	2000	31	3.0	9.7			
		2-8-75	2100	56	6.0	11			
		2-8-75	2200	61	7.0	11			
		2-8-75	2300	132	10	7.6			
		2-8-75	2400	226	15	6.7			
		2-9-75	0100	147	12	8.2			
		2-9-75	0200	104	6.0	5.8			
		2-9-75	0300	69	5.0	7.2			
		2-9-75	0400	52	4.0	7.7			
		2-9-75	0500	50	4.0	8.0			
		2-9-75	0600	40	4.0	10			
		2-9-75	0800	27	2.0	7.4			
		2-9-75	1000	21	.0	.0			
		6-1-75	1500	4.4	.3	6.8	6.8 - 11	8.90	2
		6-7-75	1330	3.6	.4	11			
11482250	Miller Creek near Orick	5-31-75	1510	6.6	.6	9.1	9.1 - 10.6	9.85	2
		6-6-75	1530	4.7	.5	10.6			
11482260	Miller Creek at mouth, near Orick	5-31-75	1150	2.7	.0	.0	0.0 - 12	6.0	2
		6-6-75	1300	2.4	.3	12			
11482450	Lost Man Creek near Orick	6-2-75	1130	2.2	.7	32	7.7 - 32	19.85	2
		6-8-75	1200	1.3	.1	7.7			

Table 17.--Results of seston analyses, Redwood Creek basin--Continued

Station No.	Station name	Date	Time	Dry weight (mg/l)	Organic weight (mg/l)	Percent organic weight	Percent Organic weight		
							Range	$\bar{x}$	n
11482468	Little Lost Man Creek at site No. 2, near Orick	11-7-74	0535	3.5	2.4	69	0.0 - 91	35.9	14
		11-7-74	0635	4.6	2.7	59			
		11-7-74	0735	4.5	.9	20			
		11-7-74	0835	3.2	1.4	44			
		11-7-74	0935	3.5	.8	23			
		11-7-74	1100	7.2	1.3	18			
		11-7-74	1200	4.1	1.2	29			
		11-7-74	1300	2.4	1.2	50			
		11-7-74	1400	3.0	1.4	47			
		11-7-74	1530	1.7	.9	53			
		11-7-74	1730	.7	.0	.0			
		11-7-74	1900	3.3	3.0	91			
		11-7-74	2100	.0	.0	.0			
		11-8-74	0910	.0	.0	.0			
		2-5-75	1400	9.8	.7	7.1	0.0 - 39	18.59	13
		2-6-75	0330	8.3	.8	9.6			
		2-6-75	1410	7.6	1.4	18			
		2-6-75	2040	.8	.0	.0			
		2-8-75	2000	7.8	3.0	38			
		2-8-75	2300	14	2.0	14			
		2-9-75	0110	20	3.0	15			
		2-9-75	0200	24	3.0	12			
		2-9-75	0300	18	3.0	17			
		2-9-75	0500	10	2.2	22			
		2-9-75	0700	9.5	2.3	24			
		2-9-75	0930	8.9	2.3	26			
		2-9-75	1215	5.7	2.2	39			
		6-2-75	1415	.8	.2	25	12 - 25	18.5	2
		6-8-75	1400	.8	.1	12			

Table 17.--Results of seston analyses, Redwood Creek basin--Continued

Station No.	Station name	Date	Time	Dry weight (mg/l)	Organic weight (mg/l)	Percent organic weight	Percent Organic weight		
							Range	$\bar{x}$	n
11482500	Redwood Creek at Orick, near Orick	6-2-75	1630	15.9	0.8	5.0	5.0 - 6.1	5.55	2
		6-8-75	1730	6.6	.4	6.1			

Coliform Bacteria

Coliform bacteria are used as biological indicators for assessment of the sanitary quality of water to determine its suitability for human use. Total coliform, fecal-coliform, and fecal streptococcal-bacteria densities (table 18) were determined using the membrane-filter method with immediate incubation of the filters (Slack and others, 1973, p. 30).

Total-coliform colony counts in Redwood Creek ranged from 4 to 32 colonies per 100 millilitres (mℓ) during the February 20-22, 1974, storm. Fecal-coliform and fecal streptococcal-colony counts in Redwood Creek throughout the study period ranged from <1 to 47 and from 1 to 280 colonies per 100 mℓ, respectively. Bacterial densities in selected tributaries ranged from <1 to 220 for fecal coliform and from <1 to 753 per 100 mℓ for fecal streptococci. The two highest counts (220 and 753 colonies per 100 mℓ) were found in water samples from Prairie Creek. Excluding Prairie Creek, bacteria densities in the tributaries ranged from <1 to 30 mℓ for fecal coliform and from <1 to 190 per 100 mℓ for fecal streptococci.

Are these waters suitable for human use?

Table 18.--Results of coliform bacteria survey

[* indicates counts based on nonideal numbers of colonies in sample]

Station	Date	Coliform bacteria (colonies per 100 ml)		
		Total	Fecal	Fecal streptococcal
Redwood Cr. nr Blue Lake	Feb. 21, 1974	*32	*28	--
	July 18, 1974		*26	* 3
	July 26, 1974		* 1	24
	June 10, 1975		* 7	* 6
	July 31, 1975		* 6	*17
Redwood Cr. at Redwood Valley Bridge nr Blue Lake	July 18, 1974		12	* 8
	July 26, 1974		*<1	34
	June 10, 1975		22	21
	July 31, 1975		* 3	*52
Redwood Cr. above Panther Cr. nr Orick	July 18, 1974		* 7	--
	July 26, 1974		*47	280
	June 10, 1975		* 4	* 8
	July 31, 1975		*17	50
Redwood Cr. at South Park Boundary nr Orick	Feb. 22, 1974	* 8	*<1	--
	July 19, 1974		* 5	* 2
	July 26, 1974		* 2	26
	Sept. 11, 1974		*<1	*12
	June 10, 1975		* 8	* 4
	July 31, 1975		* 2	* 8
Redwood Cr. above Harry Wier Cr. nr Orick	July 31, 1975		* 1	*11
Harry Wier Cr. nr Orick	July 19, 1974		* 9	* 4
	Sept. 11, 1974		*<1	26
	July 31, 1975		* 1	190
Miller Cr. nr Orick	July 19, 1974		30	*<1
	Sept. 11, 1974		* 6	*16
Miller Cr. at Mouth nr Orick	July 19, 1974		* 2	* 3
	Sept. 11, 1974		*<1	*11
Hayes Cr. nr Orick	July 19, 1974		*10	* 6
Lost Man Cr. nr Orick	July 19, 1974		* 1	*<1
	Sept. 11, 1974		*<1	* 6
Redwood Cr. abv Prairie Cr. Cr. nr Orick	July 26, 1974		29	* 1
	June 10, 1975		* 8	* 5

Table 18.--Continued

Station	Date	Coliform bacteria (colonies per 100 ml)		
		Total	Fecal	Fecal streptococcal
Little Lost Man Cr. at Site No. 2, nr Orick	July 19, 1974		* 3	* 1
	Sept. 11, 1974		* 4	* 9
	July 31, 1975		* <1	* 8
Prairie Cr. nr Orick	July 26, 1974		22	*753
	June 10, 1975		220	*11
Redwood Cr. at Orick	Feb. 21, 1974	* 4	*24	--
	July 19, 1974		*46	*32
	July 26, 1974		*13	*160
	Sept. 11, 1974		*14	*62
	June 10, 1975		24	* 6
	July 31, 1975		* 4	*12

Intragravel and Surface-Water Conditions

An intragravel and surface-water condition study was conducted on three tributaries to Redwood Creek (Panther Creek, tributary to Lost Man Creek, and Little Lost Man Creek) between June and November 1974. The study included measurements of intragravel dissolved-oxygen concentration, temperature of intragravel and surface water, and determination of the percentage composition of streambed materials. Each of the three tributaries represented a different type of land-use history. Panther Creek represented a recently logged redwood-forest watershed, tributary to Lost Man Creek represented a clear-cut redwood-forest watershed recovering from logging, and Little Lost Man Creek represented a virgin redwood-forest watershed.

No pre-logging data were available; therefore, an assessment of the effects of logging on each tributary was not possible. However, comparisons are made of the differences in surface and intragravel conditions among the streams in the three types of watershed history. Data collected during this study are presented in Woods (1975).

any significant results?

SUMMARY

Water Chemistry

Water Temperature

Water temperatures in Redwood Creek were uniform in the winter period at about 6°C and reached as high as 24.5°C in the summer. Continuous water-temperature data are presently being analyzed and will be available for Redwood Creek near Blue Lake, Redwood Creek at South Park Boundary, and Redwood Creek at Orick stations at a later date.

High-water temperatures in excess of 25°C for prolonged periods of time may be detrimental to salmonid fish present in Redwood Creek. Water temperature should be monitored in critical areas determined from the temperature data obtained from the 3 stations previously mentioned.

Dissolved Oxygen

The dissolved-oxygen concentrations determined in Redwood Creek and selected tributaries were above critical values for aquatic life during the study period. These values represent the dissolved-oxygen concentration of the water near the surface of each stream sampled and not of the water near the streambed where decomposition of bottom material, and respiration by organisms are utilizing dissolved oxygen. A more comprehensive analysis of the dissolved-oxygen concentration may reflect greater differences between streams than provided in this memorandum.

pH and Total Alkalinity

The results of the pH data collected from Redwood Creek and the selected tributaries indicated seasonal variations. During the summer season pH values were higher than the values measured in the winter and are probably the result of algal photosynthesis. During the winter season photosynthesis is limited and decaying organic material may contribute to lower pH values. ^{any evidence?} The low pH values recorded from Miller Creek at mouth, Little Lost Man and Geneva Creeks cannot be explained until a more detailed analysis can be made.

Alkalinity of Redwood Creek tended to increase in a downstream direction. All values determined for the Redwood Creek drainage were low, particularly in the tributary streams. This means that the waters of the Redwood Creek drainage are poorly buffered with respect to neutralizing acids.

Specific Conductance

Specific-conductance values reflect the low major dissolved-ion concentrations of the Redwood Creek drainage. Seasonal variations in specific conductance occurred along Redwood Creek. During high-flow periods specific-conductivity values were similar between stations; however, during low-flow periods, specific conductance first increased then decreased between upstream and downstream stations. This may be caused by variations in discharge along Redwood Creek, upwelling of intragravel water, increased contact period between waters of Redwood Creek and bottom materials, and the dilution from tributaries. Further

evaluation is needed. Specific conductance of the tributaries during high-flow periods varied slightly between stations. During low-flow periods specific-conductance values for the tributaries were generally lower than in Redwood Creek and varied slightly between stations. These variations are probably due to differences in discharge and leaching of dissolved minerals from different soil types occurring in each tributary basin. Further evaluation including water chemistry of the stations will be made in the final report.

Major Dissolved Ions

The major dissolved-ion data indicated a distinct calcium-bicarbonate water type in Redwood Creek, and mixed water types in many of the tributaries. A geologic map is needed in order to further assess the major dissolved ion data. Moreover, water types should be related to discharge data if they are to be useful in describing land-use activities. There was insufficient time to carry this work out at the time of this writing.

Selected Plant Nutrients

Selected plant-nutrient values were variable and need additional analysis before conclusive results can be made. The areas having the highest values of dissolved nitrate were Geneva Creek and Harry Wier Creek near Orick stations. The highest dissolved Kjeldahl nitrogen values were found at Lost Man Creek and Miller Creek near Orick stations. There were no exceptionally high values of dissolved phosphorus (total and orthophosphate) or organic carbon (dissolved and suspended).

Total chem.

Trace Metals

Trace-metal concentrations were low and inconclusive. Their meaning will depend on the relation of trace metals to the areal geology and will require a geologic map.

Pesticides

No pesticides (chlorinated hydrocarbons and organic phosphorus compounds) were detected in stream-bottom materials collected from 10 selected stations within the Redwood Creek drainage. |||

Aquatic Biology

Benthic Invertebrates

Benthic-invertebrate data disclose that the species diversity was similar, even in areas where the number of benthic organisms in the samples was low. In addition, there was often a high similarity index between sampling stations, illustrating small differences in benthic invertebrate richness between sampling stations. The benthic-invertebrate data are, however, only from the 1973 and 1974 periods and do not reflect the effect of the March 1975 flood. In addition, a more complete analysis of the benthic-invertebrate data may reflect greater differences between streams than discussed in this memorandum.

Phytoplankton and Periphyton

The phytoplankton taxa composition was low in almost all streams sampled. Only in Redwood Creek at Orick and Lost Man Creek were taxa numbers relatively high. The 1975 phytoplankton data are needed before a more complete analysis can be made.

Periphyton sampling results indicated high rates of production at some sites (Bridge Creek, Little Lost Man Creek, and Redwood Creek above Hayes Creek). Insolation is probably a limiting factor in periphyton production within the Redwood Creek drainage. The periphyton data available for this memorandum were, however, insufficient for detailed analysis. Periphyton samples collected during 1975 are still being currently analyzed.

Fish

A total of 1,013 fish was captured during the study period. Species composition ranged as follows: Steelhead rainbow trout (67.4%); Humboldt sucker (11.2%); threespine stickleback (10.9%); prickly sculpin (6.3%); silver salmon (3.9%); and king salmon (0.3%). Steelhead rainbow trout were captured during both the 1974 and 1975 surveys; however, silver and king salmon were captured only during the 1974 survey. The absence of salmon fry during the 1975 survey may possibly be attributed to the March 1975 flood. Steelhead rainbow trout fry captured during the July 1975 survey were probably the result of the spawning activity of a late-run steelhead rainbow trout population that had ascended Redwood Creek after the March 1975 flood. This assumption is based on the field observations of recent yolk-sac absorption of many steelhead fry. Survival of steelhead rainbow trout and salmon fry from spawning activity prior to the March 1975 flood is unknown.

(The condition factors of) steelhead rainbow trout captured in the tributaries were larger than those of the trout captured in Redwood Creek,

whereas, in Redwood Creek, the slopes of the linear-regression lines for the length-weight relation of steelhead rainbow trout were steeper than those of the trout captured in the tributaries.

Fish captured during the 1974 and 1975 surveys appeared to be in good condition except for the steelhead rainbow trout captured in August 2, 1974, at the Redwood Creek near Redwood Valley Bridge station. These fish were extremely weak due to a high water temperature of 26.5°C at 1215 hours. The species composition is of concern because of the absence of salmon, especially silver salmon, within the areas sampled in 1975. A better assessment of the fisheries resources is definitely needed in the Redwood Creek drainage. *Will we get it?*

Seston

Although seston values were erratic they did show some seasonal trends. The seston data need statistical treatment to clarify these trends. The high seston values in Little Lost Man and Geneva Creeks probably are associated with forested areas which these streams drain.

Coliform Bacteria

The analysis of the total-coliform, fecal-coliform, and fecal-streptococcal bacterial data indicated low densities at the times sampled for Redwood Creek and selected tributaries. The larger densities of bacteria determined from water samples collected at Prairie Creek probably reflect the pasture-land activities occurring adjacent to the creek. The

hardly an adequate conclusion

larger densities of bacteria determined from waters collected at the Redwood Creek at Orick station are probably influenced by the input from Prairie Creek into Redwood Creek.

On the bases of the results of the coliform counts, waters of Redwood Creek and selected tributaries sampled are suitable for primary-contact recreation. If recreational pressure increases at Prairie Creek, then further coliform counts should be made in this tributary.

Intragravel and Surface-Water Conditions

The intragravel and surface-water conditions study of three tributary streams to Redwood Creek (Panther Creek, tributary to Lost Man Creek, and Little Lost Man Creek) revealed differences in surface and intragravel water conditions between streams in logged and unlogged watersheds. The streambeds of Panther Creek and tributary to Lost Man Creek, both logged, had from $1\frac{1}{2}$ to 2 times greater percentages of fine sediments (<0.833 mm in size) than did the unlogged stream, Little Lost Man Creek. In the two logged streams, the interchange of surface and intragravel water was impeded by the excessive quantities of fine sediments in their streambeds.

The three streams had surface water dissolved-oxygen concentrations near saturation, yet only Little Lost Man Creek contained intragravel water that was near saturation. Little Lost Man Creek also maintained a large-interchange percentage. These two conditions indicated that a high rate of interchange existed in Little Lost Man Creek. In contrast, intragravel water percentage saturation and interchange percentage were reduced in the two logged streams.

more data in summary than text!

Surface and intragravel water temperatures in Panther Creek and tributary to Lost Man Creek were warmer than those in Little Lost Man Creek. Due to the removal of streamside vegetation, the logged streams received more insolation than did the well-shaded, unlogged stream. Temperatures did not reach levels considered lethal or sub-lethal to salmonid fish.

No assessment of the fishery resources of these three streams has been made; however, salmonid production in the three streams probably would not be limited by streambed-fine sediment levels, or surface and intragravel water dissolved-oxygen concentrations and temperatures. Some localized problems could occur in spawning areas of the two logged streams because of the movement of bedload sediments which could create temporary reductions in intragravel dissolved-oxygen concentrations (Woods, 1975, p. 58-59).

A similar comparison of intragravel and surface-water conditions for the three Redwood Creek stations will be made. At the time of this writing (October 1975) data for this comparison is currently being compiled.

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