

Water Quality Status Report No. 12

WATER QUALITY SURVEY

COEUR D'ALENE RIVER – COEUR D'ALENE LAKE

**Lee W. Stokes, Ph.D.
and
Gene L. Ralston**

**Environmental Improvement Division
Idaho Department of Health
Boise, Idaho
March 1972**

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INTRODUCTION

The Coeur d'Alene River and Lake have been periodically examined to determine the chemical quality of the water and the composition of the aquatic biota.

Surveys were conducted on December 6, 1962, September 10-11, 1969, May 26-29, 1970, August 26-29, 1970, December 15-17, 1970, March 15-17, 1971, July 12-14, 1971, and September 22-23, 1971. The survey conducted on September 22 and 23, 1971, was in cooperation with the Environmental Protection Agency.

The purpose of this continuing surveillance program is to determine the effects of the domestic sewage and the mine and mill wastes on the aquatic life in the river system.

METHODS

Benthic communities were sampled by taking two one-square-foot bottom samples with a Surber Sampler in riffle areas at each sampling station. Bottom samples were not taken at stations 5, 6, 7 and 8 on May 26, 1970, due to high water level. Samples were preserved in 95% alcohol.

In the laboratory, each bottom sample was transferred to a large white pan and the macroinvertebrates were removed with forceps. These organisms were then identified and counted with the aid of a dissecting microscope.

Water samples for routine chemical analyses were taken in one-liter Nalgene bottles at each biological sampling station. Water temperature and dissolved oxygen were determined with a Model 54 Oxygen Meter (Yellow Springs Instrument Co., Inc.)

Biological samples and routine water chemistry samples were taken at the following locations (Figure 1):

1. South Fork Coeur d'Alene River above Mullan
2. South Fork Coeur d'Alene River at Golconda
3. South Fork Coeur d'Alene River below Osburn at the mouth of Terror Gulch
4. Big Creek at mouth
5. South Fork Coeur d'Alene River above confluence with North Fork
6. North Fork Coeur d'Alene River above confluence with South Fork
7. Coeur d'Alene River below Cataldo
8. Spokane River below Stateline

Water samples for analyses of metallic ion concentrations (Zn, Cu, Cd, and Pb) were collected in acid-stripped pyrex flasks from the following 21 stations (8 of which correspond with the biological sampling stations):

1. South Fork Coeur d'Alene River above Mullan
2. South Fork Coeur d'Alene River at Golconda
3. South Fork Coeur d'Alene River above Wallace (below Lucky Friday Mine)
4. Canyon Creek 500 feet below Star tailings pond
5. Effluent from Star tailings pond
6. Nine Mile Creek below Day Rock and Rex Mines
7. Nine Mile Creek below Rex Mine and above Day Rock Mine
8. Lake Creek below Galena and below ASARCO tailings ponds
9. Lake Creek below Galena and above ASARCO tailings ponds
10. South Fork Coeur d'Alene River below Osburn at mouth of Terror Gulch
11. Big Creek below Sunshine tailings pond
12. Big Creek above Sunshine tailings pond
13. Effluent from Sunshine tailings pond
14. Government Gulch at Freeway
- 14a. Government Gulch (at school house below Bunker Hill Smelter area)

- 14b. Government Gulch above Bunker Hill Smelter
15. South Fork Coeur d'Alene River above Kellogg (near city limits)
16. South Fork Coeur d'Alene River below Kellogg (near airport)
17. South Fork Coeur d'Alene River above confluence with North Fork
18. North Fork Coeur d'Alene River above confluence with South Fork
19. Coeur d'Alene River at Cataldo
20. Coeur d'Alene River at Rose Lake
21. Green's Ferry Bridge below Coeur d'Alene Lake
22. Spokane River below Stateline

Total concentrations of metals (Zn, Cu, Cd, Pb, Fe, and Mn) were determined by the use of atomic absorption techniques and all other ions were quantitated on the basis of wet chemistry. All samples for chemical analyses were transported to the State Laboratory in Boise.

Sampling stations on Coeur d'Alene Lake were located along five transects (Figure 2). Three sites were sampled on each transect--one at each end of the transect (about 150 to 200 yards offshore), and one station at the middle.

Samples for heavy metals analyses were taken from the surface water at all stations on May 29 and August 21, 1970, in addition to a sample taken at a depth of 20 feet at the five middle stations.

On December 15, 1970, samples were taken from the surface water in addition to samples taken at a depth of 100 feet, or at 50 feet in shallower areas at the five middle stations. On July 13, 1971, samples were taken from only the five middle stations.

Samples for routine chemical analyses were taken from the surface water at the five middle stations. Temperature and dissolved oxygen were determined at various depths.

All samples on Coeur d'Alene Lake were taken with the aid of a float plane.

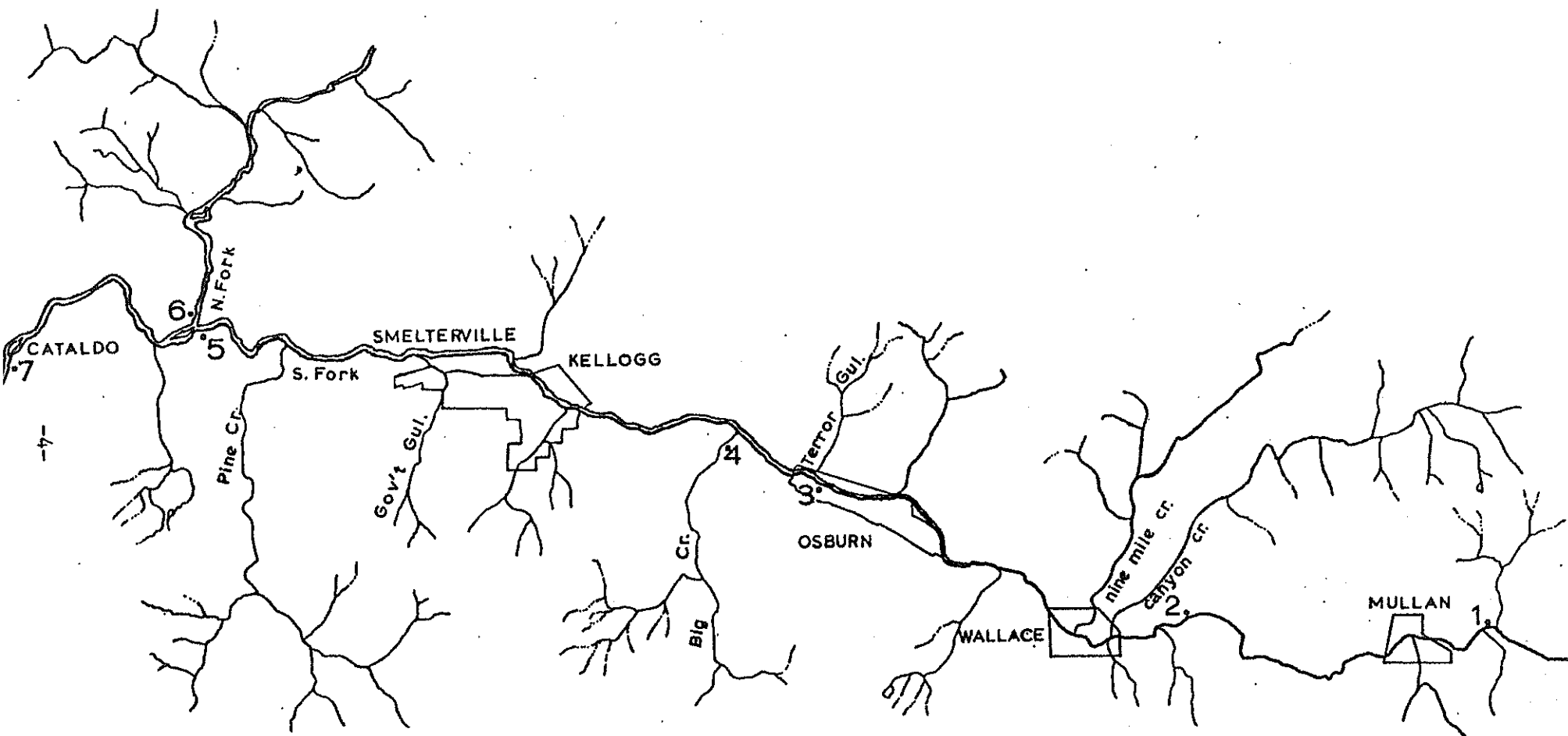


FIGURE 2

BIOLOGICAL SAMPLING STATIONS-CD'A RIVER SYSTEM

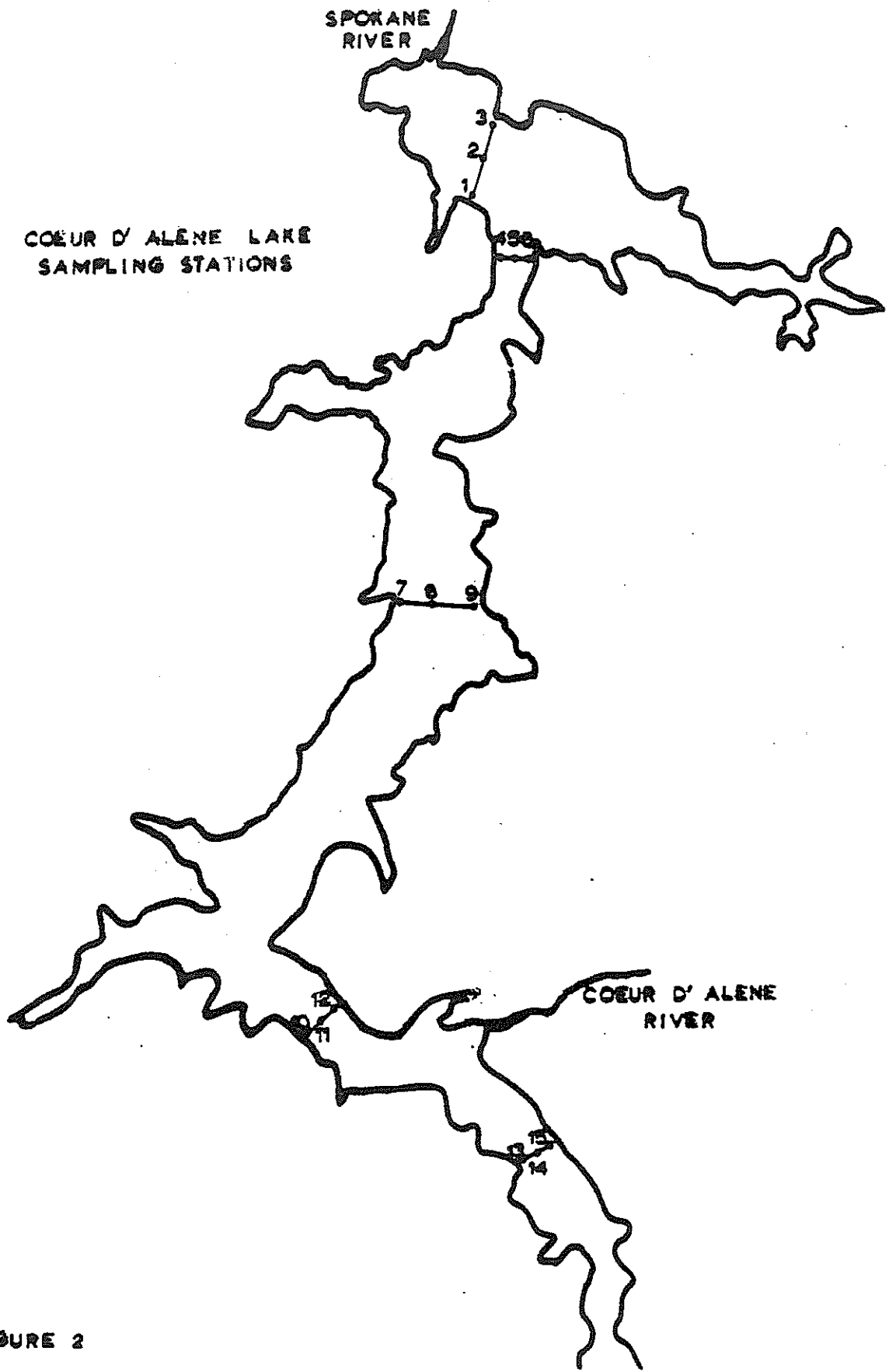


FIGURE 2

RESULTS AND DISCUSSION

I. General Chemistry

Coeur d'Alene and Spokane Rivers

The results of general physical and chemical analyses run on samples from the Coeur d'Alene and Spokane Rivers are shown in Table I. It is apparent that the South Fork of the Coeur d'Alene River (Station 1) above Mullan is of high quality as indicated by the selected parameters. Total and dissolved solids are low, as are the individual cations and anions. Analysis of samples from the remainder of the South Fork stations (2, 3, and 5) reflects a general deterioration of water quality as the river flows west toward the confluence with the North Fork. This general deterioration is evidenced by steadily increasing concentrations of total and dissolved solids, calcium, iron, manganese, sulfate, nitrate and phosphate. Big Creek (Station 4), sampled at its mouth, is similar to the South Fork at point of their junction in terms of general chemistry.

The North Fork of the Coeur d'Alene River (Station 6) is of high quality as indicated by relatively low levels of dissolved materials. The dilution effect provided by this stream as it mixes with the South Fork is reflected by analyses performed on samples from the main stem of the Coeur d'Alene River at Cataldo (Station 7). Nearly every chemical constituent is lower in concentration at Cataldo than at the mouth of the South Fork. Seasonal fluctuations in chemical concentrations are noticeable; during periods of low flow, total solids are more concentrated.

The Spokane River at Stateline (Station 8) contains lesser amounts of the reported chemical constituents than does the Coeur d'Alene River, and seasonal fluctuation in concentrations is less evident.

Coeur d'Alene Lake

The routine chemical analyses performed on samples from Coeur d'Alene Lake surface water (Table II) show the lake to be of generally higher quality than the Coeur d'Alene River.

II. Analysis of Heavy Metals

Coeur d'Alene and Spokane Rivers

The concentrations of zinc, copper, lead and cadmium were determined on three occasions in 1970 and twice during 1971 at various stations along the Coeur d'Alene River, selected tributaries, and the Spokane River at Stateline (see Table III). Copper concentrations are generally low throughout the river system; copper is apparently present in significant amounts in the Star tailings pond effluent, but does not appear in the water of Canyon Creek below the Star pond. Rather high concentrations of lead were present in Canyon Creek, Nine Mile Creek, Government Gulch, and the lower part of the South Fork Coeur d'Alene River. Cadmium is present in significant amounts in Canyon Creek below the Star Mine, Nine Mile Creek below the Rex and Day Rock Mines, Government Gulch, and the lower part of the South Fork. The concentration of zinc was quite low in the South Fork above Mullan. The amount of zinc in the river increased progressively downstream until diluted by water from the North Fork. In August, 1970, the zinc concentration in the South Fork at its mouth exceeded 22 ppm. Much of the zinc reaches the South Fork through Government Gulch, which drains the Bunker Hill smelter area. Zinc concentrations in that tributary ranged from 122.9 to 967.0 ppm on the days it was sampled in 1970 and 1971. The main stem of the Coeur d'Alene River at Cataldo and at Rose Lake carried approximately one-fifth of the zinc concentration that was found in the South Fork at its mouth. The reduction in zinc concentration is due primarily to the dilution

provided by the North Fork, which has no zinc, although some zinc may be precipitated following mixing of the two streams.

The Spokane River at Stateline contained essentially no copper, lead or cadmium on the five sampling dates. However, zinc was detectable in amounts as high as 0.4 ppm.

Coeur d'Alene Lake

Zinc is the only heavy metal found consistently in the lake in significant amounts (see Table IV). The concentration of zinc found in the lake water along the two southernmost transects was quite different for each season of the year. Those values would be expected to vary with the changing concentrations introduced by the Coeur d'Alene River. In August, 1970, when the lake was thermally stratified, samples across transect 10-11-12 averaged 0.681 ppm zinc. A sequential reduction in zinc concentrations was demonstrated across the lake in a northerly direction; the lowest concentration of zinc in the lake occurred along the northernmost transect (0.153 ppm). In December, the same pattern is obvious, but the zinc concentrations were higher at every sampling station. These increases were too substantial to be caused by accelerated discharge of zinc through the Coeur d'Alene River. It is more likely that the additional metal was raised from bottom muds during the fall turnover of the lake, a phenomenon which normally occurs as summertime thermal stratification dissipates. Nearly all zinc values reported throughout the year are above the level thought by many researchers to impair reproduction and development of most species of salmonid fish.

III. Analysis of Aquatic Invertebrate Communities - Coeur d'Alene River, Big Creek, and Spokane River

Table V contains a quantitative list of specific macroinvertebrates comprising the aquatic communities of the Coeur d'Alene River system. Species

diversity indices are shown in Table VI. A species diversity index above 2.5 is considered to be indicative of a stable, high-quality stream. Values between 1.5 and 2.5 generally indicate an unstable situation, while values below 1.5 reflect serious pollution.

The South Fork of the Coeur d'Alene River above Mullan supports a well-balanced, diverse insect community throughout the year. Calculated diversity index values ranged from 2.47 to 3.35. Somewhat less desirable values are reported for the South Fork at Golconda, where the range was 1.38 to 2.70. The insect community in the river at Terror Gulch (below Osburn) was quite variable, ranging from 0.59 in September, 1969, to 2.16 in April, 1971.

Big Creek, which enters the South Fork of the Coeur d'Alene River below Osburn, supported a poor insect community in September, 1969, a healthy community in May, 1970, and no invertebrates whatever in August or December, 1970. Two invertebrates were found in the sample taken in April, 1971. This variation is due to changes in the volume and character of effluent from the Sunshine tailings ponds. Materials discharged from the ponds completely destroyed the lower one-quarter mile of Big Creek in terms of aquatic habitat.

The biological picture at the mouth of the South Fork is almost equally bleak. The species diversity index slowly increased from zero in September, 1969, to 1.92 in April, 1971. On the other hand, a stable, diverse aquatic community was present in the North Fork on the three days it was sampled (diversity index 2.69 - 3.60).

The insect habitat is very poor in the main stem of the river at Cataldo. Precipitated materials have cemented the stones to the river bottom and covered them with a crust which is not conducive to the support of proper communities; few organisms were found.

The Spokane River at Stateline, while very productive in terms of biomass, did not produce species diversity indices indicative of a high quality stream. It is conceivable that continuous exposure to moderately high concentrations of zinc has decimated some insect groups. Although the diversity value was very low in December, 1970, a fair variety of organisms was actually present, the index being lowered as a result of the overwhelming preponderance of one blackfly species.

TABLE I
 PHYSICAL AND CHEMICAL FACTORS¹ - COEUR D'ALENE RIVER SYSTEM

Date	°C	pH	DO	TS ²	TDS ³	Alk ⁴	Hard- ness	Ca	Mg	Fe	Mn	Na	Cl	SO ₄	NO ₃	PO ₄	F	NH ₃
8-19-70	10.0	7.3	9.4	96	79	56	56	6	10	0.01	0.02	1	7	3	0.9	0.03	0.01	0.30
12-16-70	--	7.4	--	88	65	40	36	8	4	0.02	0.03	1	2	2	0.4	0.01	0.01	0.01
3-16-71	2.0	7.5	12.4	140	138	52	124	16	20	*	0.05	1	9	3	0.1	0.17	*	0.10
7-12-71	11.0	7.3	10.2	66	48	36	24	5	3	*	*	1	8	1	0.1	0.07	*	< 0.10
5-26-70	--	7.6	--	84	70	44	48	6	6	0.34	0.10	1	2	4	0.4	0.02	0.01	0.40
8-19-70	14.0	8.0	9.4	116	101	56	76	13	11	0.04	0.04	2	7	5	1.1	0.17	0.01	0.30
12-16-70	--	7.4	--	100	62	48	48	14	3	0.18	0.12	3	2	6	0.7	0.12	0.01	0.12
3-16-71	3.0	7.5	11.6	104	105	64	84	21	8	0.17	0.09	2	11	6	0.3	0.20	*	< 0.10
7-12-71	12.0	7.4	10.2	88	52	40	32	10	2	0.27	0.02	2	8	1	< 0.1	0.07	*	< 0.10
5-26-70	9.0	7.5	--	88	75	36	40	10	8	0.41	0.18	1	4	4	0.5	0.30	0.01	0.50
8-19-70	18.2	8.3	10.6	152	118	60	72	14	9	0.10	0.06	4	7	19	1.6	0.41	0.02	0.40
12-16-70	3.0	7.2	11.2	120	102	48	48	16	2	0.08	0.11	3	2	24	2.0	0.15	0.01	0.15
3-16-71	4.0	7.2	11.0	132	132	52	88	21	9	*	0.11	3	9	22	3.1	0.26	*	*
7-14-71	13.0	7.2	10.6	104	58	36	44	14	2	0.06	0.06	3	2	5	0.2	0.06	*	0.10
5-27-70	7.5	7.4	--	76	68	44	36	5	6	0.18	0.03	3	6	4	0.3	0.12	0.01	0.40
8-19-70	18.2	7.2	6.7	222	174	44	156	11	7	0.08	0.12	21	7	51	1.2	1.04	0.06	0.60
12-16-70	--	6.4	--	144	128	44	32	10	2	0.24	0.63	4	22	49	1.1	0.16	0.01	0.36
3-16-71	5.4	9.3	10.4	236	232	40	92	13	14	0.68	0.05	27	11	90	3.9	0.50	*	3.00
7-14-71	--	8.8	--	176	152	28	56	10	8	0.05	0.04	38	6	36	6.7	0.28	*	< 0.10
5-27-70	--	7.1	--	92	80	32	44	10	4	1.34	0.68	1	4	9	0.5	0.07	0.01	0.40
8-19-70	20.4	7.1	10.2	440	371	20	120	27	13	0.84	4.85	9	7	180	1.3	0.27	1.02	0.60
12-16-70	--	6.5	--	240	215	24	80	24	5	0.36	1.18	15	4	90	1.6	1.60	0.45	0.28
3-16-71	4.0	6.3	10.8	356	358	28	180	42	18	1.21	2.19	5	7	125	1.9	20.00	1.44	0.20
7-14-71	17.1	6.9	10.4	176	164	28	88	18	11	0.24	1.06	6	6	50	0.2	0.08	*	0.10
8-19-70	18.0	7.7	9.1	88	74	36	56	11	7	0.01	0.01	1	10	2	0.7	0.06	0.01	0.30
12-16-70	--	7.1	--	84	73	28	40	6	6	0.27	0.69	4	4	3	0.4	0.02	0.01	0.02
3-16-71	2.0	7.0	11.8	100	90	36	72	8	13	*	0.19	1	7	6	0.4	0.22	*	< 0.10
7-14-71	16.0	7.4	9.6	72	56	36	44	6	7	*	0.01	1	4	2	< 0.1	0.08	*	< 0.10

TABLE I cont'd.
 PHYSICAL AND CHEMICAL FACTORS¹ - COEUR D'ALENE RIVER SYSTEM

Sta	Date	°C	pH	DO	TS ²	TDS ³	Alk ⁴	Hard- ness	Ca	Mg	Fe	Mn	Na	Cl	SO ₄	NO ₃	PO ₄	F	NH ₃
	8-20-70	16.6	6.9	8.4	204	162	32	68	16	7	0.25	1.66	4	10	50	0.9	0.10	0.42	0.40
	12-16-70	--	6.9	--	108	94	28	44	11	4	0.45	0.57	3	2	20	0.6	0.48	0.01	0.24
	3-16-71	2.0	6.7	11.0	180	188	28	116	26	13	0.29	0.57	2	7	52	1.6	1.68	0.83	0.20
	7-14-71	16.2	7.0	11.2	112	88	32	64	10	10	0.05	0.35	2	6	11	0.1	0.07	0.01	< 0.10
	5-27-70	--	7.4	--	80	72	32	36	6	5	0.31	0.05	1	4	4	0.5	0.02	0.01	0.40
	8-20-70	23.2	7.4	8.6	96	84	32	60	6	11	0.01	0.01	1	10	4	1.1	0.06	0.01	0.30
	12-15-70	4.5	7.1	10.6	88	73	24	48	8	7	1.18	0.50	3	2	5	0.6	0.05	0.01	0.10
	3-15-71	2.5	7.0	13.6	112	106	36	84	14	12	0.03	0.23	2	7	8	0.5	0.16	*	0.20
	7-13-71	17.8	7.3	9.8	68	48	28	36	10	3	0.01	0.01	1	6	1	0.1	0.07	*	*

- All results are reported in parts per million
- Total solids
- Total dissolved solids
- Alkalinity
- Element less than 0.01 ppm

TABLE II
PHYSICAL AND CHEMICAL FACTORS¹ - COEUR D'ALENE LAKE

Date	°C	pH	DO	TS ²	TDS ³	Alk ⁴	Hard- ness	Ca	Mg	Fe	Mn	Na	Cl	SO ₄	NO ₃	PO ₄	F	NH ₃
9-11-69	--	7.5	--	160	132	32	72	11	11	0.19	0.01	1	19	3	0.9	0.01	0.01	0.42
8-21-70	20.0	7.5	8.7	80	64	32	48	5	9	0.04	0.01	1	3	3	1.0	0.04	0.01	0.30
12-15-70	--	6.8	--	87	59	32	40	10	4	0.14	0.07	2	3	6	0.3	0.03	0.01	0.06
7-14-71	18.5	7.5	10.2	104	96	32	80	5	16	0.02	0.03	1	8	2	0.1	0.07	*	0.10
8-21-70	--	7.5	--	84	71	32	56	5	11	0.03	0.01	1	7	3	1.0	0.14	0.01	0.30
12-15-70	--	6.9	--	80	58	28	40	10	4	0.01	0.04	2	2	5	0.4	0.01	0.01	0.10
7-14-71	19.0	7.5	10.2	76	68	28	56	5	11	0.06	0.02	1	8	2	0.1	0.08	*	0.10
9-11-69	--	7.5	--	164	140	24	84	18	10	0.24	0.02	2	29	4	0.9	0.01	0.01	0.42
8-21-70	20.2	7.6	9.3	96	82	24	56	5	11	0.09	0.01	1	13	4	1.0	0.09	0.01	0.30
12-15-70	--	6.9	--	76	59	32	40	10	4	0.03	0.05	2	2	6	0.8	0.01	0.01	0.10
7-14-71	19.5	7.3	10.0	84	76	32	60	8	10	0.03	0.02	1	8	2	0.1	0.07	*	0.10
9-11-69	--	7.6	--	160	128	32	80	14	11	0.03	0.06	1	25	5	0.5	0.01	0.01	0.56
8-21-70	--	7.5	--	88	78	28	60	8	10	0.08	0.05	1	7	3	0.9	0.09	0.01	0.30
12-15-70	--	7.0	--	76	61	28	28	8	2	0.13	0.14	2	2	6	0.6	0.06	0.06	0.10
7-14-71	17.0	7.3	9.8	84	74	32	56	5	11	0.07	0.02	1	8	2	0.1	0.08	*	0.10
8-21-70	19.8	7.3	8.4	84	71	28	56	6	10	0.08	0.03	1	7	3	1.1	0.04	0.01	0.30
12-15-70	--	6.9	--	80	61	28	32	8	3	0.07	0.11	2	2	5	0.7	0.04	0.01	0.04
7-14-71	19.0	7.3	9.5	76	66	32	52	6	9	0.04	0.01	1	8	2	0.1	0.07	*	0.10

- All results are reported in parts per million
- Total solids
- Total dissolved solids
- Alkalinity
- Indicates element was less than 0.01 ppm

TABLE III
HEAVY METALS CONCENTRATIONS
Coeur d'Alene River System

Station	Date	Zn	Cu	Pb	Cd
-----ppm-----					
1	5-26-70	*	0.010	*	*
	8-19-70	**	**	*	0.016
	12-16-70	0.116	**	*	**
	3-16-71	**	*	*	**
	7-12-71	0.009	**	*	**
2	5-26-70	0.040	0.010	0.03	*
	8-19-70	0.158	**	*	**
	12-16-70	0.414	**	*	**
	3-16-71	0.205	*	*	**
	7-12-71	0.059	**	*	**
3	5-26-70	0.080	0.010	0.07	*
	8-19-70	0.276	**	*	**
	12-16-70	0.566	**	*	**
	3-16-71	0.388	*	*	**
	7-12-71	0.085	**	*	**
4	5-26-70	1.190	*	2.24	0.010
	8-19-70	3.134	**	0.09	0.008
	12-16-70	4.110	**	*	0.022
	3-16-71	5.640	*	*	**
	7-12-71	1.918	**	*	**
5	5-26-70	1.980	0.840	0.28	0.010
	8-19-70	0.600	0.349	0.13	0.035
	12-16-70	0.633	1.421	*	**
	3-16-71	8.701	0.230	0.12	**
	7-12-71	6.125	0.261	0.28	0.039
6	5-26-70	2.410	0.010	0.98	0.030
	8-19-70	6.940	**	*	0.089
	12-16-70	16.410	**	0.17	0.100
	3-16-71	6.910	0.030	*	0.011
	7-12-71	2.459	**	0.12	0.015
7	5-26-70	2.580	0.010	1.23	*
	8-19-70	7.800	**	0.14	0.057
	12-16-70	15.750	**	0.18	0.063
	3-16-71	5.004	*	0.03	0.024
	7-12-71	2.350	**	0.01	0.009
8	5-26-70	*	*	*	*
	8-19-70	0.020	0.014	*	**
	12-16-70	0.117	**	*	**
	3-16-71	9.051	*	*	**
	7-12-71	0.027	0.010	*	**

TABLE III cont'd.
HEAVY METALS CONCENTRATIONS
Coeur d'Alene River System

Station	Date	Zn	Zn	Cu	Cd
		ppm			
9	5-26-70	*	*	*	*
	12-16-70	0.009	**	*	0.008
	3-16-71	**	*	*	**
	7-12-71	0.019	**	*	**
10	5-26-70	0.950	0.010	0.79	*
	8-19-70	1.733	**	*	0.017
	12-16-70	3.242	**	*	0.012
	3-16-71	2.922	*	0.02	0.003
	7-12-71	0.937	**	*	**
11	5-26-70	*	*	*	*
	8-19-70	**	**	*	**
	12-16-70	0.020	**	*	**
	3-16-71	**	*	*	**
	7-12-71	**	**	*	**
12	8-19-70	**	**	*	**
	12-16-70	0.013	**	*	**
	3-16-71	**	*	*	**
	7-12-71	**	*	*	**
13	5-26-70	0.260	0.020	0.28	*
	12-16-70	0.203	**	*	**
	3-16-71	**	*	*	**
	7-12-71	0.008	**	*	0.008
14	12-16-70	52.100	0.017	7.67	2.744
	3-16-71	107.300	0.120	7.57	3.102
	7-12-71	312.000	0.133	9.08	3.586
14A	5-26-70	168.800	0.040	2.31	1.050
	8-19-70	309.400	0.333	8.78	2.960
	12-16-70	122.900	0.216	3.68	1.605
	3-16-71	183.100	0.120	3.45	1.386
	7-12-71	967.000	0.240	6.55	1.966
14B	12-16-70	1.730	**	*	0.047
	3-16-71	**	*	*	**
	7-12-71	0.036	**	*	**
15	5-26-70	0.880	*	0.68	0.010
	8-19-70	1.685	**	0.08	**
	12-16-70	2.440	**	0.03	0.003
	7-12-71	0.996	**	*	0.014
16	5-26-70	2.550	0.010	0.87	0.020
	8-19-70	16.125	**	0.13	0.212
	12-16-70	9.820	**	0.83	0.252

TABLE III cont'd.
HEAVY METALS CONCENTRATIONS
Coeur d'Alene River System

Station	Date	Zn	Cu	Pb	Cd
-----ppm-----					
16 (cont'd.)	3-16-71	11.490	*	3.70	0.240
	7-12-71	12.780	**	0.07	0.480
17	5-26-70	1.650	0.020	0.70	0.010
	8-19-70	22.720	0.011	0.92	0.201
	12-16-70	7.160	**	0.04	0.284
	3-16-71	5.293	*	1.01	0.075
	7-12-71	8.072	**	*	0.366
18	5-26-70	*	*	*	0.010
	8-19-70	**	**	*	0.006
	12-16-70	0.002	**	*	**
	3-16-71	**	*	*	**
	7-12-71	0.086	**	*	0.002
19	8-19-70	3.940	**	0.18	0.023
	12-16-70	1.897	**	*	0.018
	3-16-71	2.196	*	*	0.018
	7-12-71	1.941	**	*	0.020
20	5-26-70	0.600	0.010	0.06	0.060
	8-19-70	3.210	**	0.18	0.021
	12-16-70	1.870	**	*	**
	3-16-71	1.589	*	*	0.025
	7-12-71	1.617	**	*	0.018
21	8-19-70	0.100	**	*	**
	3-16-71	0.423	*	0.12	**
22	5-26-70	0.230	*	*	*
	8-19-70	0.014	**	0.06	**
	12-16-70	0.403	**	*	**
	3-16-71	0.388	*	*	**
	7-12-71	0.228	**	*	**

* - less than .01 ppm

** - less than .001 ppm

TABLE IV
HEAVY METALS CONCENTRATIONS
Coeur d'Alene Lake

Station	Date	Zn	Cu	Pb	Cd
-----ppm-----					
1	5-29-70	0.230	*	*	*
	8-21-70	0.181	0.007	*	0.016
	12-15-70	0.412	**	*	**
2	5-29-70	0.230	*	*	*
	8-21-70	0.164	**	*	*
	12-15-70	0.387	**	*	**
	7-13-71	0.153	**	*	**
2A	5-29-70	0.250	0.020	0.07	*
	8-21-70	0.169	**	*	0.002
2B	12-15-70	0.387	**	*	**
2C	7-13-71	0.300	**	*	**
3	5-29-70	0.190	*	0.03	*
	8-21-70	0.114	**	*	**
	12-15-70	0.522	**	*	**
4	5-29-70	0.260	*	*	*
	8-21-70	0.120	**	*	**
	12-15-70	0.512	**	*	**
5	5-29-70	0.190	*	*	*
	8-21-70	0.159	**	*	**
	12-15-70	0.525	**	*	**
	7-13-71	0.187	**	*	**
5A	5-29-70	0.190	0.020	*	*
	8-21-70	0.190	**	*	**
5B	7-13-71	0.237	**	*	**
5C	12-15-70	0.583	**	*	**
	7-13-71	0.281	**	*	**
6	5-29-70	0.180	0.020	*	*
	8-21-70	0.179	**	*	**
	12-15-70	0.512	**	*	**
7	5-29-70	0.270	*	*	*
	8-21-70	0.271	**	*	**
	12-15-70	0.566	**	*	**

TABLE IV cont'd.
HEAVY METALS CONCENTRATIONS
Coeur d'Alene Lake

Station	Date	Zn	Cu	Pb	Cd
-----ppm-----					
8	5-29-70	0.180	*	*	*
	8-21-70	0.252	**	*	0.007
	12-15-70	0.616	**	*	**
	7-13-71	0.221	**	*	**
8A	5-29-70	0.190	*	*	*
	8-21-70	0.243	**	*	**
8B	8-21-70	0.475	*	*	**
	7-13-71	0.248	**	*	**
8C	12-15-70	0.556	**	*	**
	7-13-71	0.380	**	*	**
9	5-29-70	0.170	*	*	*
	8-21-70	0.213	**	*	**
	12-15-70	0.560	**	0.04	**
10	5-29-70	0.090	*	*	*
	8-21-70	0.548	**	*	**
	12-15-70	0.739	**	*	**
11	5-29-70	0.070	0.030	*	*
	8-21-70	0.687	**	*	0.007
	12-15-70	0.733	**	*	0.004
	7-13-71	0.306	**	*	**
11A	5-29-70	0.220	*	*	*
	8-21-70	0.492	**	*	**
	7-13-71	0.287	**	*	**
11B	12-15-70	0.872	**	*	0.002
	7-13-71	0.213	**	*	**
12	5-29-70	0.170	*	*	*
	8-21-70	0.809	**	*	0.017
	12-15-70	0.316	**	*	0.005
13	5-29-70	*	*	*	*
	8-21-70	0.330	0.006	*	**
	12-15-70	0.741	**	*	**
14	5-29-70	*	*	*	*
	8-21-70	0.237	**	*	0.005
	12-15-70	0.670	**	*	**
	7-13-71	0.129	**	*	**

TABLE IV cont'd.
 HEAVY METALS CONCENTRATIONS
 Coeur d'Alene Lake

Station	Date	Zn	Cu	Pb	Cd
		-----ppm-----			
14B	12-15-70	0.916	**	*	**
	7-13-71	0.192	**	*	**
14C	7-13-71	0.296	**	*	**
15	5-29-70	*	*	0.02	*
	8-21-70	0.262	**	*	**
	12-15-70	0.383	**	*	**

-
- A. Sample from 20 feet
 - B. Sample from 50 feet
 - C. Sample from 100 feet

* Less than 0.01
 ** Less than 0.001

TABLE V
AQUATIC MACROINVERTEBRATES - COEUR D' ALENE RIVER SYSTEM

	Date	SAMPLING STATIONS							
		1	2	3	4	5	6	7	8
----- Number per square foot -----									
<u>Ephemeroptera nymphs</u>									
<u>Ironopsis</u> sp.	9-10-69		1.00						
	5-26-70	0.25	1.50			*	*	*	*
	8-19-70	6.50					2.0	*	*
	12-16-70	*	4.00				*	*	
<u>Ironodes</u> sp.	5-26-70				0.66	*	*	*	*
<u>Iron</u> sp.	5-26-70		4.00	0.25		*	*	*	*
<u>Heptagenia</u> sp.	9-10-69						2.0	*	
<u>Rhithrogena</u> sp.	5-26-70			0.25	1.00	*	*	*	*
	8-19-70						18.5		
<u>Arthroplea</u> sp.	5-26-70				6.00	*	*	*	*
<u>Ephemerella cognata</u>	5-26-70	0.50				*	*	*	*
<u>E. inermis</u>	5-26-70				17.0	*	*	*	*
<u>E. doddsi</u>	5-26-70	2.00	2.00		0.33	*	*	*	*
	8-19-70						7.5		
	12-16-70	*	1.00				*	*	
<u>E. mollitia</u>	5-26-70				5.00	*	*	*	*
<u>E. proserpina</u>	5-26-70	1.25	0.75	0.25		*	*	*	*
<u>E. infrequens</u>	5-26-70				11.33	*	*	*	*
<u>E. coloradensis</u>	5-26-70				7.66	*	*	*	*
	8-19-70	1.0					*	*	*
<u>E. flavilinea</u>	5-26-70		6.50		0.33	*	*	*	*
	8-19-70	33.0				0.5	39.5		*
<u>Ephemerella</u> sp.	9-10-69								
	5-26-70			1.25		*	9.0	*	*

TABLE V
AQUATIC MACROINVERTEBRATES - COEUR D' ALENE RIVER SYSTEM

	Date	SAMPLING STATIONS							
		1	2	3	4	5	6	7	8
Ephemeroptera nymphs (cont.)		----- Number per square foot -----							
<u>Ephemerella</u> : <u>serrata</u> group	8-19-70						1.5		
<u>Baetis</u> sp.	9-10-69		2.00		2.00		1.0	*	1.0
	5-26-70	0.75	1.25	4.50	10.00	*	*	*	*
	8-19-70	79.00	26.00	1.00		3.0	14.5		2.0
	12-16-70	*	82.00	6.00	1.50	1.0	*	*	
<u>Pseudocloen</u> sp.	8-19-70						37.0		
Other Heptaginiidae	5-26-70	7.00	3.75	1.25	7.33	*	*	*	*
	8-19-70					1.5			
Other Ephemerellinae	5-26-70	15.00			0.66	*	*	*	*
	8-19-70	37.00							
Other Baetidae	8-10-69	17.00						*	
	5-26-70	7.25	1.50	1.50	1.00	*	*	*	*
	8-19-70	196.00	49.00				*	*	
	12-16-70	*					*	*	8.5
Leptophlebiinae	5-26-70		1.25	0.25		*	*	*	*
Plecoptera nymphs									
<u>Arcyanopteryx</u> sp.	9-10-69	6.00						*	
<u>Arcyanopteryx aurea</u>	8-19-70	2.50					0.5		
<u>Chloroperla</u> sp. and/or <u>Hastaperla</u> sp.	8-19-70	5.00	2.50				10.0		
<u>Alloperla</u> sp.	9-10-69	4.00						*	
	12-16-70	*	1.00				*	*	
<u>Claasenia sabulosa</u>	8-19-70						2.0		
<u>Pteronarcys californica</u>	8-19-70						1.0		

TABLE V

AQUATIC MACROINVERTEBRATES - COEUR D' ALENE RIVER SYSTEM

Plecoptera nymphs (cont.)	Date	Number per square foot								
		1	2	3	4	5	6	7	8	
<u>Pteronarca</u> <u>badia</u>	8-19-70							1.0		
<u>Isoperla</u> sp.	12-16-70	*	1.00							
<u>Nemoura</u> sp.	12-16-70	*	3.00							
<u>Acroneuria</u> sp.	8-19-70							0.5		
Other Perlodidae	9-10-69							4.0	*	
	5-26-70	0.75	1.75			*	*	*	*	
Other Chloroperlidae	9-10-69							3.0	*	
	5-26-70			0.75			*	*	*	*
Other Perlidae	9-10-69							1.0	*	
Unidentified Plecoptera	9-10-69			56.00						
	8-19-70								*	
	12 16-70	*			0.50			1.0	*	*
Trichoptera larvae										
<u>Rhyacophila</u> sp.	9-10-69			1.00						
	8-19-70	5.50	11.00							*
<u>Glossosoma</u> sp.	8-19-70	6.00	0.50							7.5
<u>Agapetus</u> sp. and/or <u>Anagapetus</u> sp.	8-19-70	81.50								
<u>Psychomyia</u> sp.	9-10-69							2.0	*	
<u>Polycentropus</u> sp.	9-10-69	1.00								
	8-19-70	1.50								
<u>Hydropsyche</u> sp. larvae	9-10-69							55.0	*	
	5-26-70			0.25	2.66	*	*	*	*	
	8-19-70					8.59	107.5		*	116.5

TABLE V
AQUATIC MACROINVERTEBRATES - COEUR D'ALENE RIVER SYSTEM

Trichoptera larvae	Date	SAMPLING STATIONS							
		1	2	3	4	5	6	7	8
		----- Number per square foot -----							
<u>Hydropsyche</u> sp. pupae	8-19-70								2.5
<u>Diplectrona</u> sp.	12-16-70	*	1.00				*	*	
<u>Arctopsyche</u> sp.	9-10-69	23.00	14.00		1.00				
	5-26-70	1.75	1.00	0.25	0.66	*	*	*	
	8-19-70	32.50	0.50				*	*	*
	12-16-70	*	0.50				*	*	
<u>Cheumatopsyche</u> sp.	9-10-69								
	8-19-70							*	8.0
									11.5
<u>Agraylea</u> sp.	5-26-70	0.50		0.25		*	*	*	*
<u>Athripsodes</u> sp.	8-19-70								2.5
<u>Brachycentrus</u> sp.	5-26-70	1.25							
	8-19-70	0.50	0.50			*	*	*	*
							0.5		
Other Brachycentridae	5-26-70		0.25	0.75	0.33	*	*	*	*
	8-19-70		5.00				7.0 (pupae)		*
Other Rhyacophilidae	5-26-70	4.00	0.25	1.5	3.33	*	*	*	*
	8-19-70	2.00	5.00				*	*	*
Other Psychomyiidae	5-26-70	1.75	2.25		0.66	*	*	*	*
	12-16-70	*	3.50			*	*	*	*
Other Hydropsychidae	5-26-70	2.00				*	*	*	*
Lepidostomatidae	5-26-70	1.50				*	*	*	*
Limnephilidae	9-10-69	1.00						*	
	5-26-70	5.75	2.00	3.00	1.33	*	*	*	*
	8-19-70	0.50					*	*	*
	12-16-70	*					1.0		0.5
							*	*	0.5
Unidentified Trichoptera	5-26-70	0.75		0.25		*	*	*	*
	12-16-70	*	1.00				*	*	*

TABLE V
AQUATIC MACROINVERTEBRATES - COEUR D'ALENE RIVER SYSTEM

	Date	SAMPLING STATIONS							
		1	2	3	4	5	6	7	8
		----- Number per square foot -----							
Lepidoptera									
<u>Paragyraactis</u> sp. (?) larvae	8-19-70								8.5
<u>Paragyraactis</u> sp. pupae	8-19-70								3.5
Coleoptera									
<u>Zaitzevia</u> sp. larvae	8-19-70	7.50							
<u>Zaitzevia</u> sp. adults	8-19-70						11.0		
<u>Narpus</u> sp. larvae	9-10-69	1.00					1.0	*	
	5-26-70			0.25	0.33	*	*	*	*
	8-19-70	1.00							
<u>Narpus</u> sp. adults	8-19-70						3.0		
<u>Brychius</u> sp. larvae	8-19-70						1.0		
<u>Optioservus</u> sp. larvae	8-19-70						4.5		
Other Elmidae larvae	8-19-70						14.0		
Other Elmidae adults	8-19-70					1.0		1.0	
Heteroceridae larvae	9-10-69						19.0	*	
Diptera larvae									
<u>Simulium</u> sp.	9-10-69	40.00	16.00		2.00		28.0	*	
	5-26-70	0.50				*	*	*	*
	8-19-70	194.00	13.00	1.00		2.5	81.5		36.5
	12-16-70	*	2.00				*	*	960.0
<u>Atherix variegata</u>	9-10-69						4.0	*	
	8-19-70						4.0	1.0	

TABLE V
AQUATIC MACROINVERTEBRATES - COEUR D'ALENE RIVER SYSTEM

	Date	SAMPLING STATIONS							
		1	2	3	4	5	6	7	8
		----- Number per square foot -----							
Diptera larvae (cont.)									
<u>Hexatoma fultonensis</u>	9-10-69						1.0	*	
<u>Limnophila</u> (?)	9-10-69						2.0	*	
<u>Limonia</u> sp.	9-10-69							*	1.0
Tipulidae	5-26-70	1.75	3.00	1.00	0.33	*	*	*	*
	8-26-70		1.50	0.50					2.5
	12-16-70	*	5.50	1.00			*	*	0.5
Rhagionidae	12-16-70	*	*	0.50			*	*	
Chironomidae /o ventral gills	9-10-69	36.00	101.00	6.00	65.00	12.0	54.0	*	115.0
	5-26-70	19.50	38.25	22.50	2.33	*	*	*	*
	8-19-70	21.50	495.00	34.00	29.00	67.0	47.0	133.0	469.5
	12-16-70	*	2.00	6.50		0.5	*	*	141.0
Muscidae	5-26-70		0.25			*	*	*	*
Heleidae	5-26-70			0.50		*	*	*	*
Psychodidae	8-19-70			4.00					
Dixidae	5-26-70	0.25				*	*	*	*
Sarcophagidae	5-26-70	0.25				*	*	*	*
Hirudinea	9-10-69	2.00						*	
Oligochaeta									
<u>Nais obtusa</u>	9-10-69				210.00			*	
Other Oligochaeta	9-10-69	1.00						*	
Nematoda	8-19-70	2.50				0.5			
	12-16-70	*					*	*	5.0
Planariidae	8-20-70								0.5

TABLE V

AQUATIC MACROINVERTEBRATES - COEUR D'ALENE RIVER SYSTEM

Date	SAMPLING STATIONS								
	1	2	3	4	5	6	7	8	
	----- Number per square foot -----								
Total number of organisms per square foot	9-10-69	132.00	91.00	7.00	281.00	12.0	186.0	*	521.0
	5-26-70	74.25	72.00	41.50	61.00	*	*	*	*
	8-19-70	716.50	662.00	93.50	29.00	168.0	425.0	147.0	657.0
	12-16-70	*	108.00	29.00	1.50	1.5	*	*	1116.0

* Station was not sampled

TABLE VI
SPECIES DIVERSITY VALUES

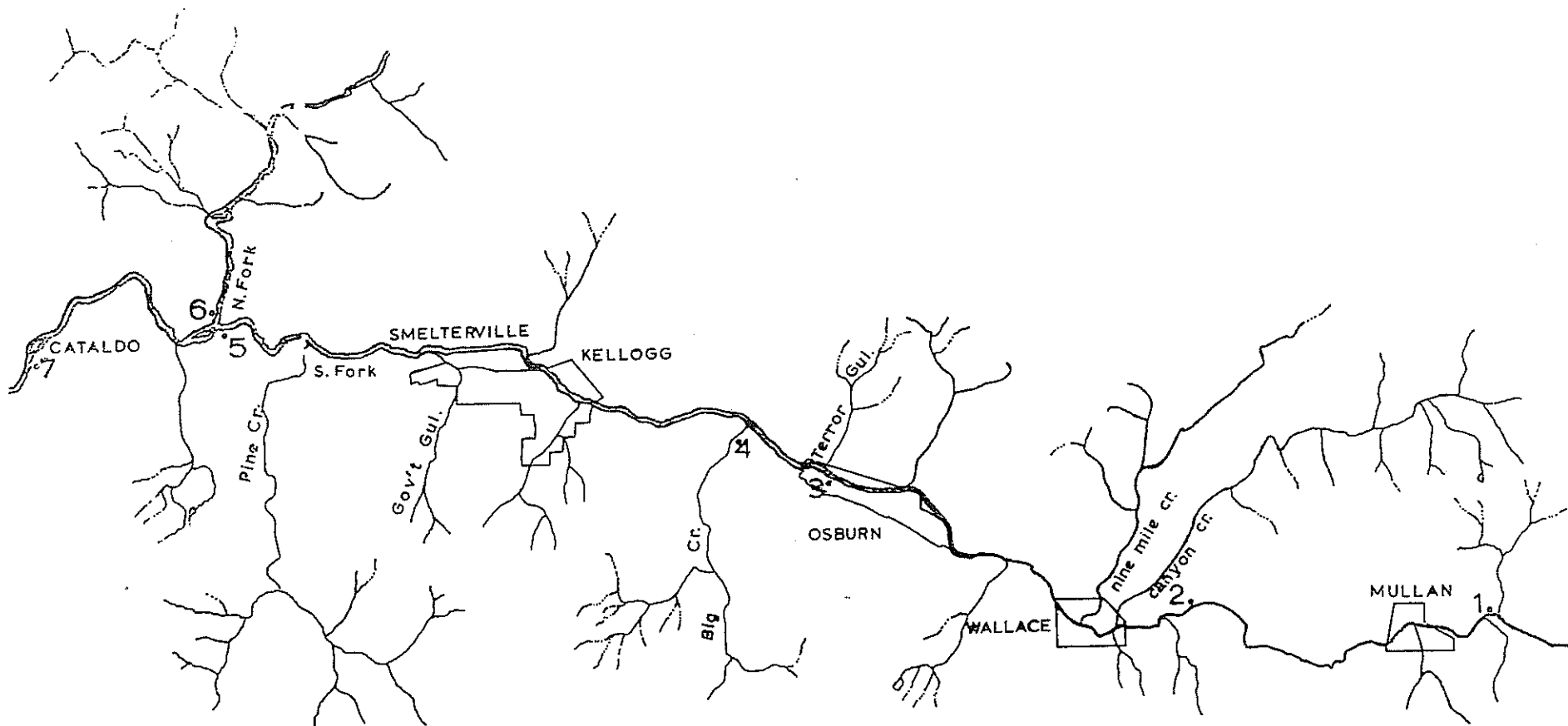
Station	Sampling Dates				
	9-10-69	5-26-70	8-19-70	12-16-70	4-16-71
1	2.47	3.32	2.97	---	3.35
2	1.54	2.70	2.48	1.62	1.38
3	0.59	2.62	1.37	1.65	2.16
4	0.96	3.96	0.00	0.00	0.00
5	0.00	---	1.55	0.92	1.92
6	2.88	---	3.60	---	2.69
7	---	---	0.25	---	0.33
8	1.62	---	1.37	0.67	1.60

Margalef's diversity index was used to compute species diversity values.

$$\bar{H} = 3.3219 \left(\log_{10} N - \frac{\sum n_i \log_{10} n_i}{N} \right)$$

where n_i = the number of individuals of the i^{th} species
 N = the total number of individuals of all species

The value of this index ranges from 0 in a monospecific community to 3 or 4 in a highly polyspecific community. In general, a species diversity index above 2.5 indicates a stable, high-quality stream. Values between 1.5 and 2.5 generally indicate an unstable situation, while values less than 1.5 reflect serious pollution.



BIOLOGICAL SAMPLING STATIONS-CD'A RIVER SYSTEM

AQUATIC MACROINVERTEBRATES - COEUR D'ALENE RIVER SYSTEM

Date	SAMPLING STATIONS								
	1	2	3	4	5	6	7	8	
----- Number per square foot -----									
Ephemeroptera nymphs									
<u>Ironopsis</u> sp.	9-10-69	0	1.00	0	0	0	0	-	0
	5-26-70	0.25	1.50	0	0	-	-	-	-
	8-19-70	6.50	0	0	0	0	2.0	0	0
<u>Ironodes</u> sp.	5-26-70	0	0	0	0.66	-	-	-	-
<u>Iron</u> sp.	5-26-70	0	4.00	0.25	0	-	-	-	-
<u>Heptagenia</u> sp.	9-10-69	0	0	0	0	0	2.0	-	0
<u>Rhithrogena</u> sp.	5-26-70	0	0	0.25	1.00	-	-	-	-
	8-19-70	0	0	0	0	0	18.5	0	0
<u>Arthroplea</u> sp.	5-26-70	0	0	0	6.00	-	-	-	-
<u>Ephemerella cognata</u>	5-26-70	0.50	0	0	0	-	-	-	-
<u>E. inermis</u>	5-26-70	0	0	0	17.0	-	-	-	-
<u>E. doddsi</u>	5-26-70	2.00	2.00	0	0.33	-	-	-	-
	8-19-70	0	0	0	0	0	7.5	0	0
<u>E. mollitia</u>	5-26-70	0	0	0	5.00	-	-	-	-
<u>E. proserpina</u>	5-26-70	1.25	0.75	0.25	0	-	-	-	-
<u>E. infrequens</u>	5-26-70	0	0	0	11.33	-	-	-	-
<u>E. coloradensis</u>	5-26-70	0	0	0	7.66	-	-	-	-
	8-19-70	1.0	0	0	0	0	0	0	0
<u>E. flavilinea</u>	5-26-70	0	6.50	0	0.33	-	-	-	-
	8-19-70	33.0	0	0	0	0.5	39.5	0	0
<u>Ephemerella</u> sp.	9-10-69	0	0	0	0	0	9.0	-	0
	5-26-70	0	0	1.25	0	-	-	-	-

AQUATIC MACROINVERTEBRATES - COEUR D' ALENE RIVER SYSTEM

	Date	SAMPLING STATIONS							
		1	2	3	4	5	6	7	8
		----- Number per square foot -----							
<u>Coleoptera</u>									
<u>Zaitzevia</u> sp. larvae	8-19-70	7.50	0	0	0	0	0	0	0
<u>Zaitzevia</u> sp. adults	8-19-70	0	0	0	0	0	11.0	0	0
<u>Narpus</u> sp. larvae	9-10-69	1.00	0	0	0	0	1.0	-	0
	5-26-70	0	0	0.25	0.33	-	-	-	-
	8-19-70	1.00	0	0	0	0	0	0	0
<u>Narpus</u> sp. adults	8-19-70	0	0	0	0	0	3.0	0	0
<u>Brychius</u> sp. larvae	8-19-70	0	0	0	0	0	1.0	0	0
<u>Optioservus</u> sp. larvae	8-19-70	0	0	0	0	0	4.5	0	0
Other Elmidae larvae	8-19-70	0	0	0	0	0	14.0	0	0
Other Elmidae adults	8-19-70	0	0	0	0	1.0	0	1.0	0
Heteroceridae larvae	9-10-69	0	0	0	0	0	19.0	-	0
<u>Diptera larvae</u>									
<u>Simulium</u> sp.	9-10-69	40.00	16.00	0	2.00	0	28.0	-	0
	5-26-70	0.50	0	0	0	-	-	-	-
	8-19-70	194.00	13.00	1.00	0	2.5	81.5	0	36.5
<u>Atherix variegata</u>	9-10-69	0	0	0	0	0	4.0	-	0
	8-19-70	0	0	0	0	0	4.0	1.0	0
<u>Hexatoma fultonensi</u>	9-10-69	0	0	0	0	0	1.0	-	0
<u>Limnophila</u> (?)	9-10-69	0	0	0	0	0	2.0	-	0
<u>Limonia</u> sp	9-10-69	0	0	0	0	0	0	-	1.0
Tipulidae	5-26-70	1.75	3.00	1.00	0.33	-	-	-	-
	8-26-70	0	1.50	0.50	0	0	0	0	2.5

AQUATIC MACROINVERTEBRATES - COEUR D' ALENE RIVER SYSTEM

	Date	SAMPLING STATIONS							
		1	2	3	4	5	6	7	8
Diptera larvae (cont.)		----- Number per square foot -----							
Chironomidae w/o ventral gills	9-10-69	36.00	101.00	6.00	65.00	12.0	54.0	-	115.0
	5-26-70	19.50	38.25	22.50	2.33	-	-	-	-
	8-19-70	21.50	495.00	34.00	29.00	67.0	47.0	133.0	469.5
Muscidae	5-26-70	0	0.25	0	0	-	-	-	-
Heleidae	5-26-70	0	0	0.50	0	-	-	-	-
Psychodidae	8-19-70	0	0	4.00	0	0	0	0	0
Dixidae	5-26-70	0.25	0	0	0	-	-	-	-
Sarcophagidae	5-26-70	0.25	0	0	0	-	-	-	-
Hirudinea	9-10-69	2.00	0	0	0	0	0	-	0
Oligochaeta									
<u>Nais obtusa</u>	9-10-69	0	0	0	210.00	0	0	-	0
Other Oligochaeta	9-10-69	1.00	0	0	0	0	0	-	0
Nematoda	8-19-70	2.50	0	0	0	0.5	0	0	0
Planariidae	8-20-70	0	0	0	0	0	0	0	0.5
<hr/>									
Total number of organisms per square foot	9-10-69	132.00	91.00	7.00	281.00	12.0	186.0	---	521.0
	5-26-70	74.25	72.00	41.50	61.00	---	---	---	---
	8-19-70	716.50	662.00	93.50	29.00	168.0	425.0	147.0	657.0

PHYSICAL AND CHEMICAL FACTORS*- COEUR D'ALENE RIVER SYSTEM

Sta.	Date	°C	pH	DO	TS	TDS	ALK	Hard- ness	Ca	Mg	Fe	Mn	Na	Cl	SO ₄	NO ₃	PO ₄	F	NH ₃
1	8-19-70	10.0	7.3	9.4	96	79	56	56	6	10	0.01	0.02	1	7	3	0.9	0.03	0.01	0.30
2	5-26-70	--	7.6	--	84	70	44	48	6	6	0.34	0.10	1	2	4	0.4	0.02	0.01	0.40
	8-19-70	14.0	8.0	9.4	116	101	56	76	13	11	0.04	0.04	2	7	5	1.1	0.17	0.01	0.30
3	5-26-70	9.0	7.5	--	88	75	36	40	10	8	0.41	0.18	1	4	4	0.5	0.30	0.01	0.50
	8-19-70	18.2	8.3	10.6	152	118	60	72	14	9	0.10	0.06	4	7	19	1.6	0.41	0.02	0.40
4	5-27-70	7.5	7.4	--	76	68	44	36	5	6	0.18	0.03	3	6	4	0.3	0.12	0.01	0.40
	8-19-70	18.2	7.2	6.7	222	174	44	156	11	7	0.08	0.12	21	7	51	1.2	1.04	0.06	0.60
5	5-27-70	--	7.1	--	92	80	32	44	10	4	1.34	0.68	1	4	9	0.5	0.07	0.01	0.40
	8-19-70	20.4	7.1	10.2	440	371	20	120	27	13	0.84	4.85	9	7	180	1.3	0.27	1.02	0.60
6	8-19-70	18.0	7.7	9.1	88	74	36	56	11	7	0.01	0.01	1	10	2	0.7	0.06	0.01	0.30
7	8-20-70	16.6	6.9	8.4	204	162	32	68	16	7	0.25	1.66	4	10	50	0.9	0.10	0.42	0.40
8	5-27-70	--	7.4	--	80	72	32	36	6	5	0.31	0.05	1	4	4	0.5	0.02	0.01	0.40
	8-20-70	23.2	7.4	8.6	96	84	32	60	6	11	0.01	0.01	1	10	4	1.1	0.06	0.01	0.30

PHYSICAL AND CHEMICAL FACTORS*- COEUR D'ALENE LAKE

2	9-11-69	--	7.5	--	160	132	32	72	11	11	0.19	0.01	1	19	3	0.9	0.01	0.01	0.42
	8-21-70	20.0	7.5	8.7	80	64	32	48	5	9	0.04	0.01	1	3	3	1.0	0.04	0.01	0.30
5	8-21-70	--	7.5	--	84	71	32	56	5	11	0.03	0.01	1	7	3	1.0	0.14	0.01	0.30
8	9-11-69	--	7.5	--	164	140	24	84	18	10	0.24	0.02	2	29	4	0.9	0.01	0.01	0.42
	8-21-70	20.2	7.6	9.3	96	82	24	56	5	11	0.09	0.01	1	13	4	1.0	0.09	0.01	0.30
11	9-11-69	--	7.6	--	160	128	32	80	14	11	0.03	0.06	1	25	5	0.5	0.01	0.01	0.56
	8-21-70	--	7.5	--	88	78	28	60	8	10	0.08	0.05	1	7	3	0.9	0.09	0.01	0.30
14	8-21-70	19.8	7.3	8.4	84	71	28	56	6	10	0.08	0.03	1	7	3	1.1	0.04	0.01	0.30

* All results are reported in parts per million.

HEAVY METALS CONCENTRATIONS
Coeur d'Alene River System

Station	Date	Zn	Cu	Pb	Cd
----- ppm -----					
1	5-26-70	<0.010	0.010	<0.01	<0.010
	8-19-70	<0.001	<0.001	<0.01	0.016
2	5-26-70	0.040	0.010	0.03	<0.010
	8-19-70	0.158	<0.001	<0.01	<0.001
3	5-26-70	0.080	0.010	0.07	<0.010
	8-19-70	0.276	<0.001	<0.01	<0.001
4	5-26-70	1.190	<0.010	2.24	0.010
	8-19-70	3.134	<0.001	0.09	0.008
5	5-26-70	1.980	0.840	0.28	0.010
	8-19-70	0.600	0.349	0.13	0.035
6	5-26-70	2.410	0.010	0.98	0.030
	8-19-70	6.940	<0.001	<0.01	0.089
7	5-26-70	2.580	0.010	1.23	<0.010
	8-19-70	7.800	<0.001	0.14	0.057
8	5-26-70	<0.010	<0.010	<0.01	<0.010
	8-19-70	0.020	0.014	<0.01	<0.001
9	5-26-70	<0.010	<0.010	<0.01	<0.010
10	5-26-70	0.950	0.010	0.79	<0.010
	8-19-70	1.733	<0.001	<0.01	0.017
11	5-26-70	<0.010	<0.010	<0.01	<0.010
	8-19-70	<0.001	<0.001	<0.01	<0.001
12	8-19-70	<0.001	<0.001	<0.01	<0.001
13	5-26-70	0.260	0.020	0.28	<0.010
14	5-26-70	168.800	0.040	2.31	1.050
	8-19-70	309.400	0.333	8.78	2.960
15	5-26-70	0.880	<0.010	0.68	0.010
	8-19-70	1.685	<0.001	0.08	<0.001
16	5-26-70	2.550	0.010	0.87	0.020
	8-19-70	16.125	<0.001	0.13	0.212
17	5-26-70	1.650	0.020	0.70	0.010
	8-19-70	22.720	0.011	0.92	0.301
18	5-26-70	<0.010	<0.010	<0.01	<0.010
	8-19-70	<0.001	<0.001	<0.01	0.006
19	5-26-70	0.600	0.010	0.06	0.060
	8-19-70	3.210	<0.001	0.18	0.021
20	8-19-70	0.100	<0.001	<0.01	<0.001
21	5-26-70	0.230	<0.010	<0.01	<0.010
	8-19-70	0.014	<0.001	0.06	<0.001

HEAVY METALS CONCENTRATIONS
Coeur d' Alene Lake

Station	Date	Zn	Cu	Pb	Cd
----- ppm -----					
1	5-29-70	0.230	<0.010	<0.01	<0.010
	8-21-70	0.181	0.007	<0.01	0.016
2	5-29-70	0.230	<0.010	<0.01	<0.010
	8-21-70	0.164	<0.001	<0.01	0.010
2A	5-29-70	0.250	0.020	0.07	0.010
	8-21-70	0.169	<0.001	<0.01	0.002
3	5-29-70	0.190	0.010	0.03	<0.010
	8-21-70	0.114	<0.001	<0.01	<0.001
4	5-29-70	0.260	<0.010	<0.01	0.010
	8-21-70	0.120	<0.001	<0.01	<0.001
5	5-29-70	0.190	<0.010	<0.01	0.010
	8-21-70	0.159	<0.001	<0.01	<0.001
5A	5-29-70	0.190	0.020	<0.01	<0.010
	8-21-70	0.190	<0.001	<0.01	<0.001
6	5-29-70	0.180	0.020	<0.01	<0.010
	8-21-70	0.179	<0.001	<0.01	<0.001
7	5-29-70	0.270	<0.010	<0.01	<0.010
	8-21-70	0.271	<0.001	<0.01	<0.001
8	5-29-70	0.180	<0.010	<0.01	<0.010
	8-21-70	0.252	<0.001	<0.01	0.007
8A	5-29-70	0.190	0.010	<0.01	<0.010
	8-21-70	0.243	<0.001	<0.01	<0.001
8B	8-21-70	0.475	<0.001	<0.01	<0.001
9	5-29-70	0.170	<0.010	<0.01	<0.010
	8-21-70	0.213	<0.001	<0.01	<0.001
10	5-29-70	0.090	<0.010	<0.01	<0.010
	8-21-70	0.548	<0.001	<0.01	<0.001
11	5-29-70	0.070	0.030	<0.01	<0.010
	8-21-70	0.687	<0.001	<0.01	0.007
11A	5-29-70	0.220	0.010	<0.01	<0.010
	8-21-70	0.492	<0.001	<0.01	<0.001
12	5-29-70	0.170	0.010	<0.01	<0.010
	8-21-70	0.809	<0.001	<0.01	0.017
13	5-29-70	<0.010	<0.010	<0.01	<0.010
	8-21-70	0.330	<0.006	<0.01	<0.001
14	5-29-70	<0.010	<0.010	<0.01	0.010
	8-21-70	0.237	<0.001	<0.01	0.005
15	5-29-70	<0.010	<0.010	0.02	0.010
	8-21-70	0.262	<0.001	<0.01	<0.001

A. Sample from 20 feet
B. Sample from 50 feet