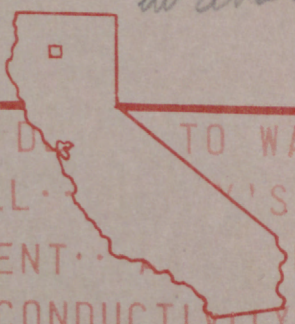
Water Quality of the Lake Siskiyou Area and a Reach of Upper Sacramento River below Box Canyon Dam, California May 1970 through September 1971



U.S. GEOLOGICAL SURVEY
Water Resources Division

Water-Resources Investigations 15-73

Prepared in cooperation with
the Siskiyou County Flood Control and Water Conservation District

BIBLIOGRAPHIC DATA SHEET	1. Report No.	2.	3. Recipient's Accession No.

4. Title and Subtitle

WATER QUALITY OF THE LAKE SISKIYOU AREA AND A REACH OF UPPER SACRAMENTO RIVER BELOW BOX CANYON DAM, CALIFORNIA, MAY 1970 THROUGH SEPTEMBER 1971

5. Report Date

6.

7. Author(s)

Alex E. Dong and Robert L. Tobin

8. Performing Organization Report No. WRI 15-73

9. Performing Organization Name and Address

U.S. Geological Survey
345 Middlefield Rd.
Menlo Park, Calif. 94025

10. Project/Task/Work Unit No.

11. Contract/Grant No.

12. Sponsoring Organization Name and Address

Same as 9 above.

13. Type of Report & Period Covered Progress report
May 1970-Sept. 1971

14.

15. Supplementary Notes

Prepared in cooperation with the Siskiyou County Flood Control and Water Conservation District

16. Abstracts

Field and laboratory measurements of water quality in samples from streams tributary to Lake Siskiyou, from the lake itself, and from selected downstream sites near sewage-disposal ponds, indicate that water in most of the inflows, in the lake, and in the downstream reach of the Sacramento River contains low concentrations of nitrogen and phosphorus. Water samples from Wagon Creek and Cold Creek contain higher concentrations of nitrogen and phosphorus, and have higher counts of total and fecal coliform bacteria than the water in samples from the other tributary streams. Analyses of samples from above and below the fish hatchery on Big Spring Creek (tributary to Cold Creek) indicate that the water downstream from the hatchery is somewhat higher in coliform bacteria counts, lower in dissolved oxygen, and higher in nitrogen and phosphorus concentrations. Water samples from one site in the lake indicate that thermal and dissolved oxygen stratification occur in Lake Siskiyou during the summer.

17. Key Words and Document Analysis. 17a. Descriptors

*Recreation, *Wildlife, Flood control, Water-quality standards, Data collection

California

17b. Identifiers/Open-Ended Terms

Lake Siskiyou area, Upper Sacramento River, Box Canyon Dam

17c. COSATI Field/Group 05C

18. Availability Statement

No restriction to distribution.

19. Security Class (This Report) UNCLASSIFIED

20. Security Class (This Page) UNCLASSIFIED

21. No. of Pages

22. Price

WATER QUALITY OF THE LAKE SISKIYOU AREA AND A REACH OF UPPER SACRAMENTO RIVER BELOW BOX CANYON DAM, CALIFORNIA, MAY 1970 THROUGH SEPTEMBER 1971

By Alex E. Dong and Robert L. Tobin

U.S. GEOLOGICAL SURVEY, Water Resources Division

Water-Resources Investigations 15-73

Prepared in cooperation with
the Siskiyou County Flood Control
and Water Conservation District

6220-02

September 1973

UNITED STATES DEPARTMENT OF THE INTERIOR

Rogers C. B. Morton, Secretary

GEOLOGICAL SURVEY

Vincent E. McKelvey, Director

For additional information write to:

District Chief
Water Resources Division
U.S. Geological Survey
345 Middlefield Rd.
Menlo Park, Calif. 94025

September 1973

CONTENTS

ILLUSTRATIONS

TABLES

WATER QUALITY OF THE LAKE SISKIYOU AREA AND A REACH OF UPPER SACRAMENTO RIVER BELOW BOX CANYON DAM, CALIFORNIA MAY 1970 THROUGH SEPTEMBER 1971

By Alex E. Dong and Robert L. Tobin

ABSTRACT

Periodic field and laboratory measurements of water quality in samples from streams tributary to Lake Siskiyou, from the lake itself, and from selected downstream sites near three sewage-disposal ponds indicate that water in most of the inflows, in the lake, and in the downstream reach of the Sacramento River contain low concentrations of nitrogen and phosphorus.

Water samples from Wagon Creek and Cold Creek contain higher concentrations of nitrogen and phosphorus and have higher counts of total and fecal coliform bacteria than the water in samples from the other tributary streams. Analyses of samples from above and below the fish hatchery on Big Spring Creek (tributary to Cold Creek) indicate that the water downstream from the hatchery is higher in coliform bacteria counts, lower in dissolved oxygen, and higher in nitrogen and phosphorus concentrations.

Periodic water samples from one site in the lake indicate that thermal and dissolved-oxygen stratification occur in Lake Siskiyou during the summer.

In the Sacramento River below Lake Siskiyou, samples collected at sites downstream from the sewage effluent exhibit higher average concentrations of total phosphorus than samples from the upstream site. Concentrations of other constituents and coliform bacteria counts are similar in samples from sites upstream and downstream from the sewage effluent.

INTRODUCTION

Lake Siskiyou was formed in 1969 after completion of Box Canyon Dam on the Sacramento River near the town of Mount Shasta, Calif. The dam was constructed to provide a reservoir for recreation, fish and wildlife enhancement, and incidental flood control. The Siskiyou County Flood Control and Water Conservation District was formed to construct and operate the dam and reservoir, and is also responsible for the operation of three sewage-disposal ponds adjacent to the Sacramento River below Box Canyon Dam. The California Regional Water Quality Control Board--Central Valley Region, established water-quality standards and waste-discharge requirements for the Sacramento River in the area below the effluent of the sewage-disposal ponds. Subsequently, the Siskiyou County Flood Control and Water Conservation District requested that the U.S. Geological Survey prepare and execute a water-quality data-collection program.

Purpose and Scope

This report presents the data obtained by the U.S. Geological Survey, in cooperation with the Siskiyou County Flood Control and Water Conservation District. The purpose of the study was to obtain water-quality information in Lake Siskiyou, its tributaries, and the reach of the Sacramento River below the lake at sites upstream and downstream from the effluent of the three sewage-disposal ponds near the city of Mount Shasta. The scope of the work included periodic field and laboratory water-quality determinations at selected sites (table 1 and fig. 1). Field determinations included discharge, air and water temperatures, DO (dissolved oxygen), residual chlorine, specific conductance, pH, and total and fecal coliform bacteria counts. Laboratory chemical analyses included total Kjeldahl nitrogen (organic nitrogen plus ammonia), nitrate nitrogen, total phosphorus and BOD (biochemical oxygen demand). The same parameters were measured 36 miles downstream from Lake Siskiyou at a site on the Sacramento River at Delta, which is outside Siskiyou County. Data collection at this site was done under a cooperative agreement with the California Regional Water Quality Control Board--Central Valley Region.

Generally, samples for the analysis of all selected constituents were collected at 22 sites (table 1). Exceptions were residual chlorine which was measured only at sites 15, 16, 17, 18, and 19, which are in the vicinity of the sewage-disposal ponds near the city of Mount Shasta. Samples for BOD were collected only at sites 16 and 17, and turbidity was measured regularly only at site 19. Sites 5, 7, 8, 9, and 13 were sampled only during the initial phase of the study; the results of sample analyses for these five stations are in table 9.

Table 1.--*Sampling sites for Lake Siskiyou and vicinity*

Station number on map 1/	USGS downstream number	Location 2/	Altitude (feet above mean sea level)	Drainage area (sq. mi.)	Station name
1	11-3413.00	40N/5W-25E	3360	47.8	Sacramento River above Lake Siskiyou, near Mt Shasta
2	3413.05	40N/5W-24M	3400	5.00	Deer Creek near Mt Shasta
3	3413.10	40N/4W-31H	3250	4.62	Scott Camp Creek at diversion dam, near Mt Shasta
4	3413.15	40N/4W-32L	3220	2.90	Castle Lake Creek at road crossing, near Mt Shasta
a5	3413.20	40N/4W-32L	3220	--	Spring near Castle Lake Creek site, near Mt Shasta
6	3413.25	40N/4W-20R	3240	19.1	Wagon Creek near Mt Shasta
a7	3413.30	40N/4W-20R	3240	--	Spring near Wagon Creek site, near Mt Shasta
a8	3413.35	40N/4W-16K	3520	.57	Cold Creek at Mt Shasta
a9	3413.40	40N/4W-8H	3590	--	Big Springs Creek at Southern Pacific railroad, near Mt Shasta
10	3413.41	40N/4W-17J	3500	--	Big Springs Creek above fish hatchery, near Mt Shasta
11	3413.42	40N/4W-17R	3420	.67	Big Springs Creek below fish hatchery, near Mt Shasta
12	3413.44	40N/4W-28C	3220	(c)	Cold Creek above Lake Siskiyou, near Mt Shasta
a13	3413.45	40N/4W-29M	3180	--	Lake Siskiyou at boat ramp, near Mt Shasta
14	3413.60	40N/4W-29R	3180	127	Lake Siskiyou near Mt Shasta
15	3413.65	40N/4W-33C	2880	134	Sacramento River above sewage effluent, near Mt Shasta
16	3413.70	40N/4W-28Q	3270	--	Mt Shasta sewage pond effluent at weir, near Mt Shasta
17	3413.75	40N/4W-33C	2880	--	Mt Shasta sewage pond effluent at river, near Mt Shasta
18	3413.80	40N/4W-33G	2870	134	Sacramento River below sewage effluent, near Mt Shasta
19	3414.00	40N/4W-33R	2800	135	Sacramento River near Mt Shasta
20	3414.40	39N/4W-13L	2420	160	Sacramento River at Shasta Retreat, near Dunsmuir
21	3414.60	38N/4W-11Q	2060	185	Sacramento River at Soda Creek Road, near Dunsmuir
b22	3420.00	36N/5W-35E	1075	425	Sacramento River at Delta

1. Figure 1.
2. Mount Diablo Base and Meridian.

a. Reconnaissance site--sampled only during initial phase of study (see table 10).
b. The station on Sacramento River at Delta is 36 miles downstream from Box Canyon Dam and is not shown on figure 1.
c. Surface drainage area is difficult to define because of lack of relief.

Location and General Description

Lake Siskiyou is in northern California in Siskiyou County (fig. 1). The lake was formed by the construction of Box Canyon Dam, an earthfill dam on the Sacramento River near the city of Mount Shasta. The capacity of the lake is 26,000 acre-feet and the normal pool-surface area is 430 acres. Tributaries to the lake include Deer Creek, Scott Camp Creek, Castle Lake Creek, the Sacramento River, Cold Creek, and Wagon Creek. The Sacramento River, Deer, Scott Camp, and Castle Lake Creeks drain large areas of forested land, whereas Cold Creek drains mainly rural and agricultural areas. Wagon Creek drains both agricultural and forested lands.

The Sacramento River below Lake Siskiyou receives effluent from three sewage-oxidation ponds (fig. 1). Domestic sewage is held in these ponds before being chlorinated and discharged into the river. Southward, the river drains a combination of forest, rural, and agricultural lands.

METHODS

Field processing of samples immediately after collection included filter incubation for coliform bacteria. Turbidity and specific conductance were determined within 96 hours after collection, from water samples packed in ice at the time of collection. Five-day BOD analyses were also begun within 96 hours from water samples packed in ice since collection. Lake-water samples were collected using a Van Dorn PVC (polyvinyl chloride) sampler[1].

Prior to April 1971, samples for laboratory chemical analysis were collected in polyethylene bottles, immediately packed in ice, and delivered to the Geological Survey chemical laboratory in Sacramento. Samples collected after April 1, 1971 were shipped to the Geological Survey laboratory in Salt Lake City, Utah, for chemical analysis. Nitrogen and phosphorus samples (250 ml) shipped to the Salt Lake laboratory were chilled and preserved by adding 1 milliliter of mercuric chloride solution (concentration 40 milligrams of mercury per liter). The addition of mercuric chloride as well as chilling help reduce biological activity in the samples. All samples for dissolved constituents were filtered through a 0.45-micrometer membrane filter immediately after collection.

---

[1] The use of named products in this report is for identification only and does not imply endorsement by the U.S. Geological Survey.

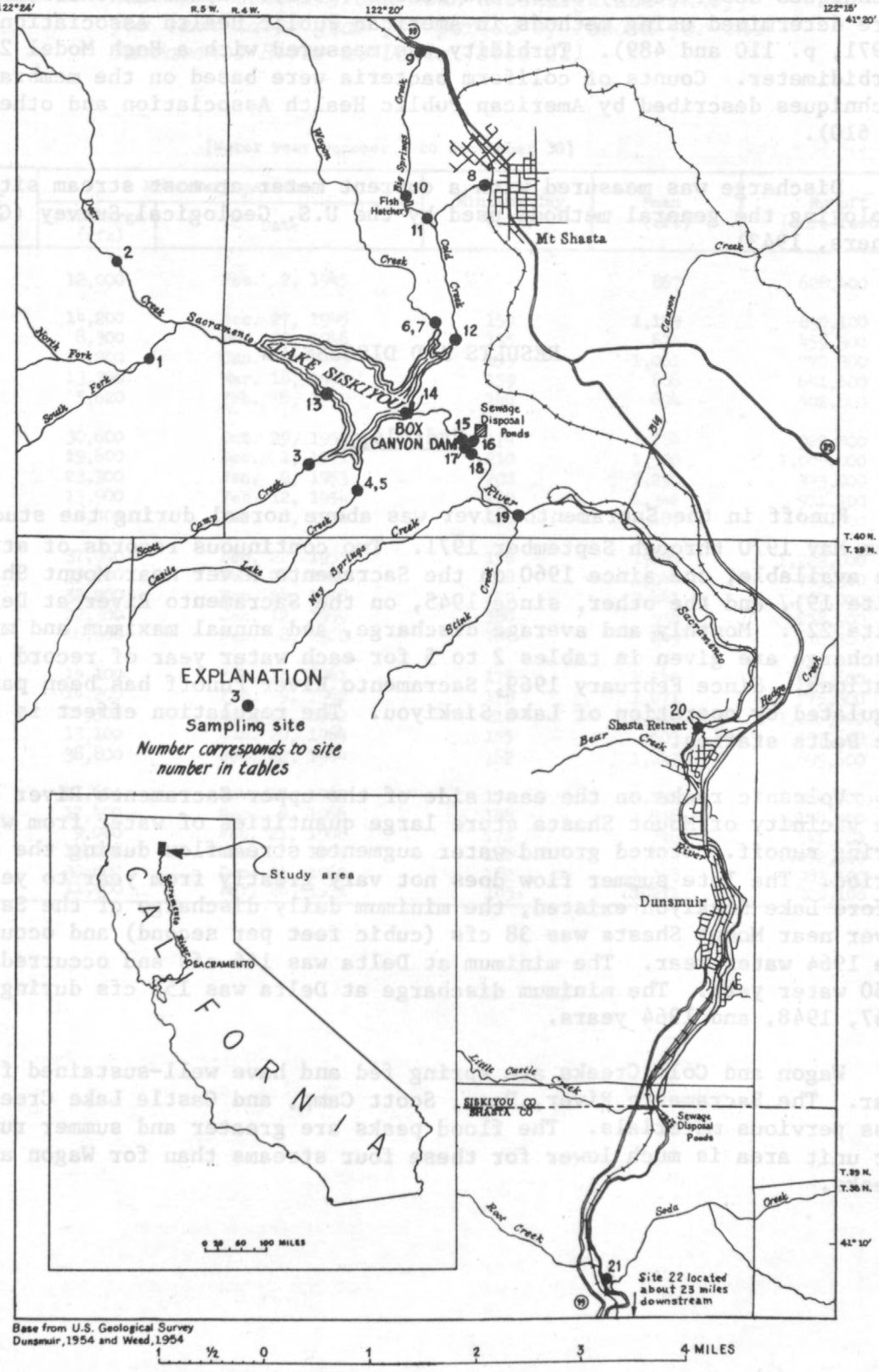


FIGURE 1.--Study area and sampling sites.

Determinations of nitrogen, phosphorus, DO, and pH were made using techniques described by Brown and others (1970). Residual chlorine and BOD were determined using methods in American Public Health Association and others (1971, p. 110 and 489). Turbidity was measured with a Hach Model 2100 turbidimeter. Counts of coliform bacteria were based on the membrane filter techniques described by American Public Health Association and others (1965, p. 610).

Discharge was measured with a current meter at most stream sites employing the general methods used by the U.S. Geological Survey (Corbett and others, 1943).

RESULTS AND DISCUSSION

Hydrology

Runoff in the Sacramento River was above normal during the study period from May 1970 through September 1971. Two continuous records of streamflow are available, one since 1960 on the Sacramento River near Mount Shasta (site 19), and the other, since 1945, on the Sacramento River at Delta (site 22). Monthly and average discharge, and annual maximum and minimum discharge are given in tables 2 to 5 for each water year of record at the two stations. Since February 1969, Sacramento River runoff has been partly regulated by operation of Lake Siskiyou. The regulation effect is small at the Delta station.

Volcanic rocks on the east side of the upper Sacramento River basin in the vicinity of Mount Shasta store large quantities of water from winter and spring runoff. Stored ground water augments streamflow during the dry summer period. The late summer flow does not vary greatly from year to year. Before Lake Siskiyou existed, the minimum daily discharge of the Sacramento River near Mount Shasta was 38 cfs (cubic feet per second) and occurred in the 1964 water year. The minimum at Delta was 146 cfs and occurred in the 1950 water year. The minimum discharge at Delta was 155 cfs during the 1947, 1948, and 1964 years.

Wagon and Cold Creeks are spring fed and have well-sustained flow all year. The Sacramento River, Deer, Scott Camp, and Castle Lake Creeks drain less pervious materials. The flood peaks are greater and summer runoff per unit area is much lower for these four streams than for Wagon and Cold Creeks.

Table 2.--*Maximum, minimum, and mean discharge and runoff for each water year for period of record for the Sacramento River at Delta (site 22)*

[Water year October 1 to September 30]

Water year	Momentary maximum		Minimum day (cfs)	Mean (cfs)	Runoff (acre-feet)
	Discharge (cfs)	Date			
1945	12,000	Feb. 2, 1945	-	867	628,400
1946	14,200	Dec. 27, 1945	159	1,159	839,100
1947	8,300	Nov. 22, 1946	155	634	459,300
1948	24,200	Jan. 7, 1948	155	1,061	770,300
1949	13,300	Mar. 18, 1949	159	886	641,600
1950	5,620	Feb. 6, 1950	146	694	502,800
1951	30,600	Oct. 29, 1950	174	1,284	929,500
1952	19,600	Dec. 1, 1951	210	1,500	1,089,000
1953	23,300	Jan. 9, 1953	202	1,290	933,900
1954	13,900	Feb. 12, 1954	210	1,342	971,200
1955	11,400	Dec. 6, 1954	158	687	497,600
1956	37,000	Dec. 22, 1955	176	1,685	1,223,000
1957	25,700	Feb. 24, 1957	188	1,040	753,300
1958	32,200	Feb. 24, 1958	279	2,441	1,767,000
1959	22,300	Jan. 12, 1959	180	938	678,900
1960	16,300	Feb. 8, 1960	167	849	616,300
1961	14,100	Feb. 11, 1961	175	1,143	827,600
1962	14,200	Feb. 9, 1962	178	1,071	775,300
1963	26,300	Oct. 12, 1962	218	1,418	1,026,000
1964	13,100	Jan. 20, 1964	155	603	437,600
1965	38,800	Dec. 22, 1964	162	1,243	899,600
1966	11,600	Nov. 18, 1965	172	1,195	864,900
1967	17,400	Dec. 5, 1966	188	1,558	1,128,000
1968	9,080	Feb. 21, 1968	178	746	541,700
1969	14,200	Feb. 11, 1969	182	1,453	1,052,000
1970	30,000	Dec. 21, 1969	182	1,358	983,100
1971	11,000	Mar. 26, 1971	185	1,271	920,100

Table 3.--*Monthly and annual mean discharge, in cubic feet per second, during period of record for the Sacramento River at Delta (site 22)*

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1945	a150	a600	a1,200	813	2,646	1,023	1,497	1,424	598	265	182	163	a867
1946	504	1,235	3,356	1,814	928	1,329	1,992	1,514	543	273	194	181	1,159
1947	204	529	521	295	1,080	1,636	1,173	558	1,038	279	190	165	634
1948	537	394	334	2,537	525	886	2,955	2,252	1,382	423	260	237	1,061
1949	257	325	341	279	960	3,390	2,526	1,477	499	237	184	168	886
1950	186	234	226	801	1,369	1,416	1,980	1,181	464	211	162	170	694
1951	1,837	1,584	2,580	1,423	2,730	1,319	1,447	1,476	459	260	201	185	1,284
1952	260	949	2,553	1,250	2,828	2,200	3,351	2,690	1,035	457	268	232	1,500
1953	220	271	1,093	4,261	1,332	1,806	2,152	1,931	1,348	503	289	241	1,290
1954	268	1,163	752	2,046	3,468	2,331	3,314	1,567	557	306	284	248	1,342
1955	256	824	1,332	554	677	709	1,271	1,556	472	247	173	177	687
1956	186	432	4,310	4,234	2,743	1,907	2,222	2,285	1,004	383	260	233	1,685
1957	282	288	261	430	2,979	2,247	1,664	2,741	704	313	219	514	1,040
1958	1,371	894	1,637	2,296	9,557	3,623	4,117	3,442	1,701	592	354	302	2,441
1959	271	283	297	2,897	2,166	1,632	1,693	1,003	431	236	196	231	935
1960	218	215	242	652	2,274	2,308	1,454	1,453	777	287	197	176	849
1961	233	622	1,989	885	3,103	1,969	1,700	1,760	879	293	226	211	1,143
1962	222	598	1,086	528	3,818	1,600	2,389	1,457	711	269	232	194	1,071
1963	1,335	706	1,704	765	3,198	1,380	4,269	2,280	680	374	265	242	1,418
1964	342	1,357	558	1,181	777	646	814	586	433	223	169	172	603
1965	195	585	4,265	2,545	1,032	744	2,990	1,257	532	278	243	204	1,243
1966	200	1,920	790	1,779	1,665	2,911	2,650	1,389	460	258	188	189	1,195
1967	196	1,767	2,548	1,636	1,955	2,518	2,433	3,202	1,477	461	290	240	1,558
1968	262	270	442	803	2,678	1,554	1,132	858	426	223	212	188	746
1969	252	355	1,042	2,533	2,742	2,076	3,434	2,962	1,071	341	229	506	1,453
1970	246	273	2,490	6,310	2,073	1,828	948	967	481	247	188	200	1,358
1971	280	1,487	2,138	2,458	1,525	2,056	1,819	1,913	789	343	229	215	1,271

a. Not previously published; estimated on basis of records for Trinity River at Lewiston and Antelope Creek near Red Bluff.

Table 4.--*Maximum, minimum, and mean discharge and runoff for each water year for period of record for the Sacramento River near Mount Shasta (site 19)*

Water year	Momentary maximum		Minimum day (cfs)	Mean (cfs)	Runoff (acre-feet)
	Discharge (cfs)	Date			
1960	2,680	Feb. 8, 1960	43	176	127,700
1961	-	-	42	257	185,800
1962	1,200	Apr. 14, 15, 1962	40	222	160,900
1963	9,490	Oct. 12, 1962	47	307	222,300
1964	2,220	Nov. 14, 1964	38	154	112,100
1965	12,200	Dec. 22, 1964	46	291	210,400
1966	2,480	Nov. 17, 1965	45	235	169,900
1967	2,720	Nov. 20, 1966	48	300	217,000
1968	1,140	Feb. 23, 1968	46	173	125,700
1969	1,490	June 3, 1969	26	293	211,800
1970	4,070	Jan. 23, 1970	34	247	178,900
1971	1,330	Mar. 26, 1971	37	278	201,200

Table 5.--*Monthly and annual mean discharge, in cubic feet per second, during period of record for the Sacramento River near Mount Shasta (site 19)*

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1960	63.4	65.3	74.5	109	282	409	352	402	208	55.3	46.8	49.1	176
1961	62.7	111	267	178	539	273	475	666	364	70.9	49.7	50.8	257
1962	63.0	99.6	145	119	331	199	793	529	241	64.8	52.3	49.4	222
1963	321	224	425	168	752	229	619	643	167	75.2	50.7	48.8	307
1964	96.0	264	156	179	167	182	294	231	146	57.4	40.2	46.8	154
1965	55.4	120	938	399	244	210	684	450	181	85.9	60.4	51.5	291
1966	54.4	336	156	192	174	418	725	480	132	58.7	46.9	48.3	235
1967	50.8	283	382	236	291	367	316	913	532	115	59.1	50.6	300
1968	70.4	76.2	95.5	167	394	303	319	346	152	62.7	54.4	48.8	173
1969	63.1	88.7	128	240	298	313	707	832	399	74.4	42.4	338	293
1970	77.1	44.1	262	891	428	298	223	398	188	67.3	41.0	51.0	247
1971	91.4	231	299	359	334	336	445	733	308	98.5	50.9	52.1	278

Water Quality

Results of physical, chemical, and microbiological analyses for the dates and time of the study are tabulated in table 12. The mean, 95-percent probability confidence interval of the mean, and range for specific conductance values, dissolved oxygen, nitrate nitrogen, total Kjeldahl nitrogen and total phosphorus are shown in figures 2, 3, and 4. A vertical profile of temperature, dissolved oxygen, and oxygen concentration at saturation in Lake Siskiyou is shown in figure 5. The results given in the figures are valid only for the times and dates (table 12) when the samples were collected. All the samples were collected during daylight hours and many of them during periods of low flow. Because of these limitations, the results cannot be extrapolated to describe diurnal conditions nor conditions that might occur during other flows. Concentrations of total phosphorus in samples collected May 19, 1970, were not used in the calculations shown in figure 4 because of excessively high values which were believed to be a result of sampling or analytical error. Nitrite concentrations were assumed to be insignificant and the nitrate values shown include any nitrite that might have been present in the water.

Comparison of specific conductance values (fig. 2) shows the highest values and fluctuations in samples from the Sacramento River above Lake Siskiyou and Deer Creek (sites 1 and 2). The specific conductance at sites 1 and 2 may be influenced by mineralized springs upstream (Berkstresser, 1968, p. 28, 44, and 45).

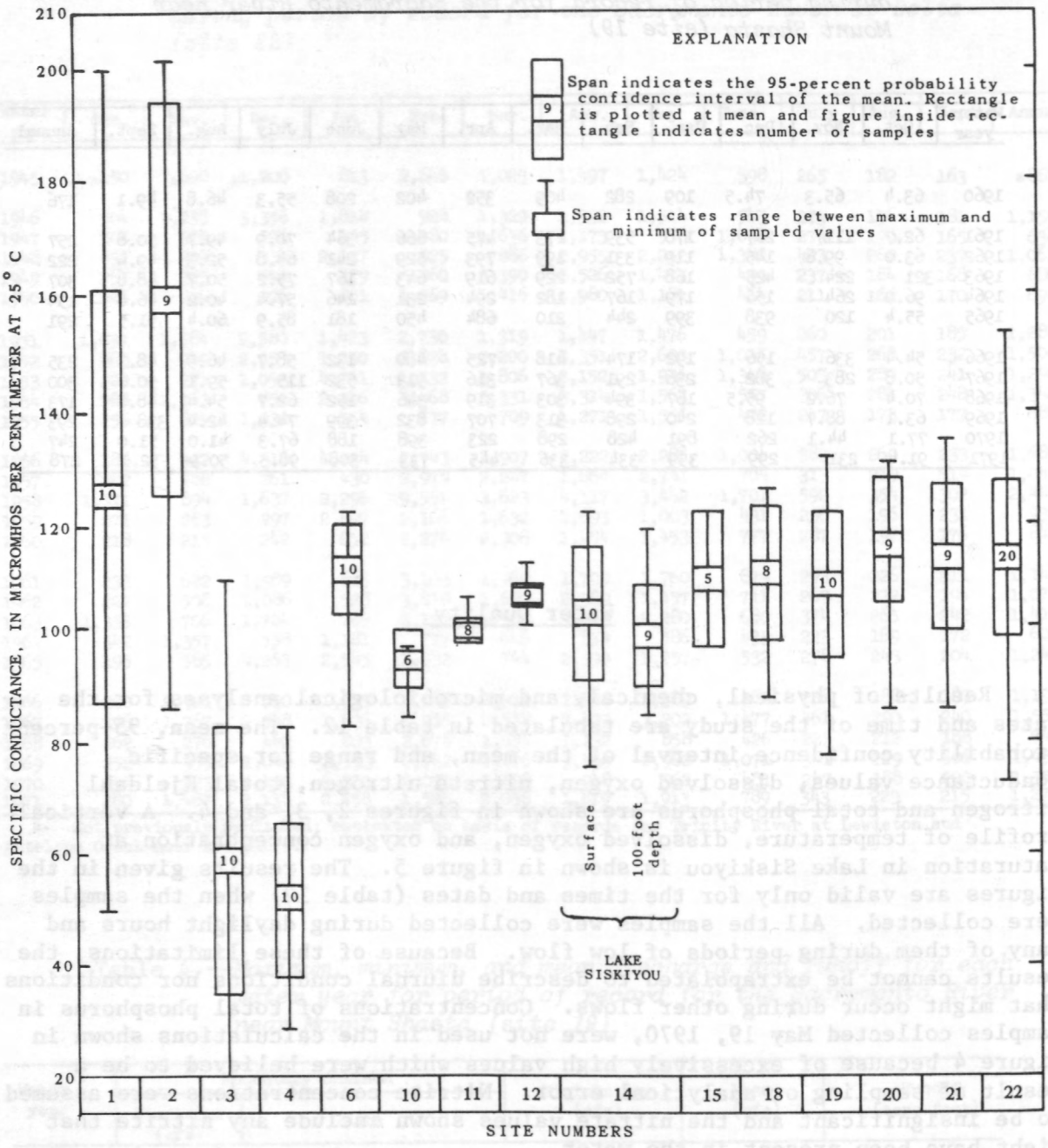


FIGURE 2.--The range of specific conductance values; the mean, and the 95-percent probability confidence interval of the mean.

The periodic determinations of DO were near 100-percent saturation at most sites (fig. 3). The DO concentrations and percentage saturation were different between sites 10 and 11 on Big Springs Creek above and below the fish hatchery, suggesting waste matter from the fish hatchery slightly reduces the oxygen resources of the stream. The oxygen concentration in the Sacramento River immediately downstream from the sewage-disposal pond effluent (site 18) was near saturation when sampled.

Average nitrate nitrogen and total phosphorus concentrations were similar at sampling sites 1 to 4 in the lake tributaries (fig. 4). Concentrations at these sites were much lower than at sites 6, 10, 11, and 12. The highest average nitrate nitrogen concentration was recorded at Wagon Creek (site 6), whereas Big Spring Creek below the fish hatchery (site 11) had the highest total phosphorus concentration. The higher nitrogen and phosphorus concentrations in Wagon, Big Springs, and Cold Creeks (site 12) probably reflect agricultural use in their drainage basins. Again it should be emphasized that many of the samples were collected during periods of low flow.

Average total phosphorus concentrations in Wagon, Big Springs, and Cold Creeks were above the recommended level of 0.05 mg/l (milligram per liter) ([U.S.] Federal Water Pollution Control Adm., 1968, p. 53) for streams entering lakes. The recommentation is based on the role of phosphorus as a stimulating and a limiting nutrient for algal growth.

All sampling sites on streams tributary to Lake Siskiyou except Big Springs Creek below the fish hatchery (site 11) exhibited an overlap of the 95-percent probability confidence intervals for the mean TKN (total Kjeldahl nitrogen) concentrations (fig. 4). The overlapping suggests that the mean TKN concentrations in tributary streams are similar. Big Springs Creek below the fish hatchery and Cold Creek (sites 11 and 12) had relatively high TKN values, possibly a result of organic loading at the fish hatchery.

In the Sacramento River below Lake Siskiyou (sites 15 and 18-22), the average nitrate and total phosphorus concentrations in samples were generally lower than the concentrations in samples from the lake tributaries (sites 6 and 10-12, fig. 4). The average total phosphorus concentration of nine samples at the river-sampling site immediately downstream from the sewage-pond effluent (site 18, fig. 4) was noticeably higher that the average of six samples immediately upstream from the sewage-pond effluent (site 15, fig. 4). Water at site 15 is representative of the direct outflow from Lake Siskiyou through Box Canyon Dam and has a total phosphorus concentration comparable to the lake water at sampling site 14 (fig. 4). The increased concentration of total phosphorus at site 18 (below the sewage-pond effluent) may indicate the effect on the river water of treated sewage discharged from the ponds. Analyses of sewage effluent at the outflow from the ponds and at the river (sites 16 and 17) include total phosphorus concentrations near 4 mg/l (table 12).

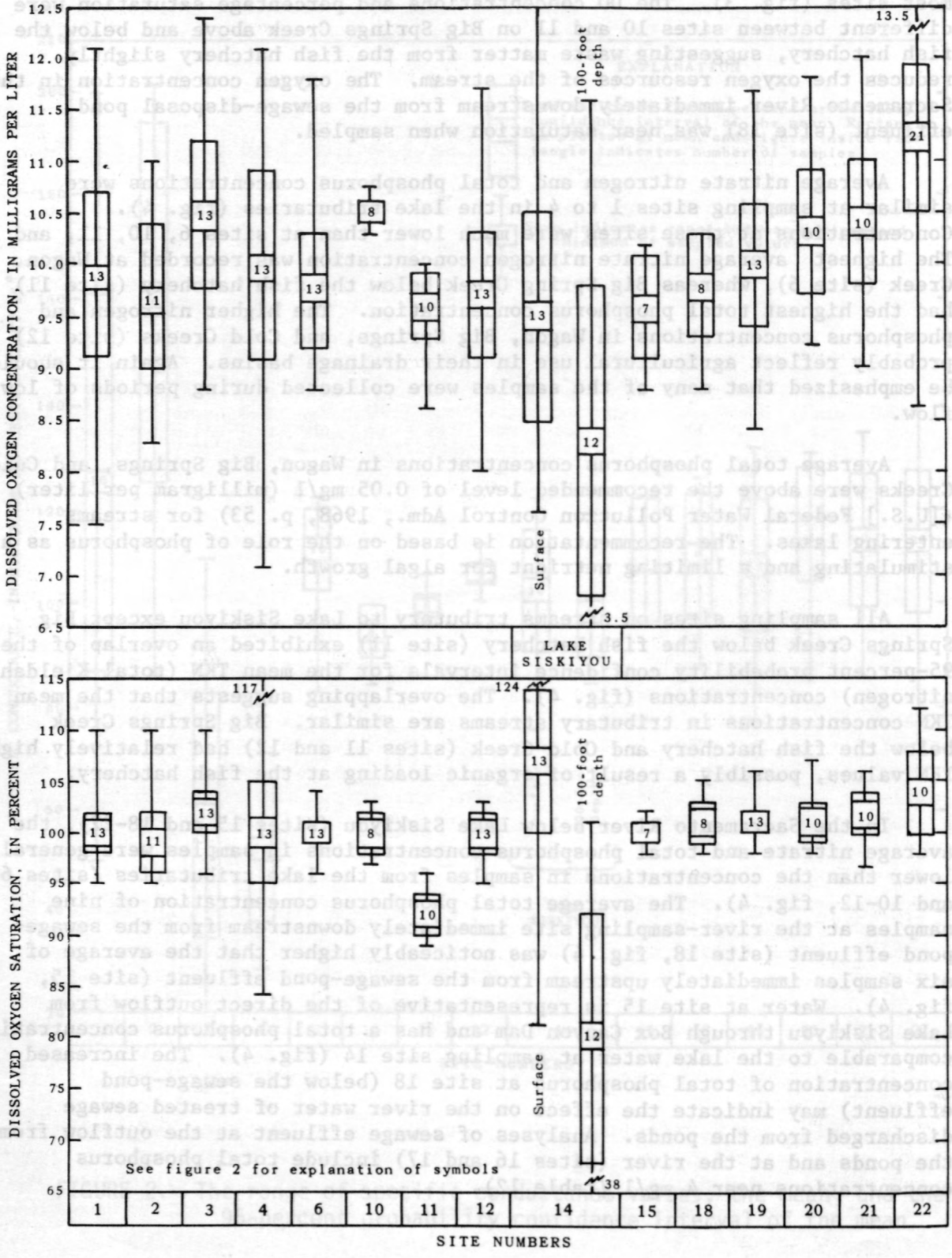


FIGURE 3.--The range of dissolved oxygen and percent saturation of dissolved oxygen, the mean, and the 95-percent probability confidence interval of the mean.

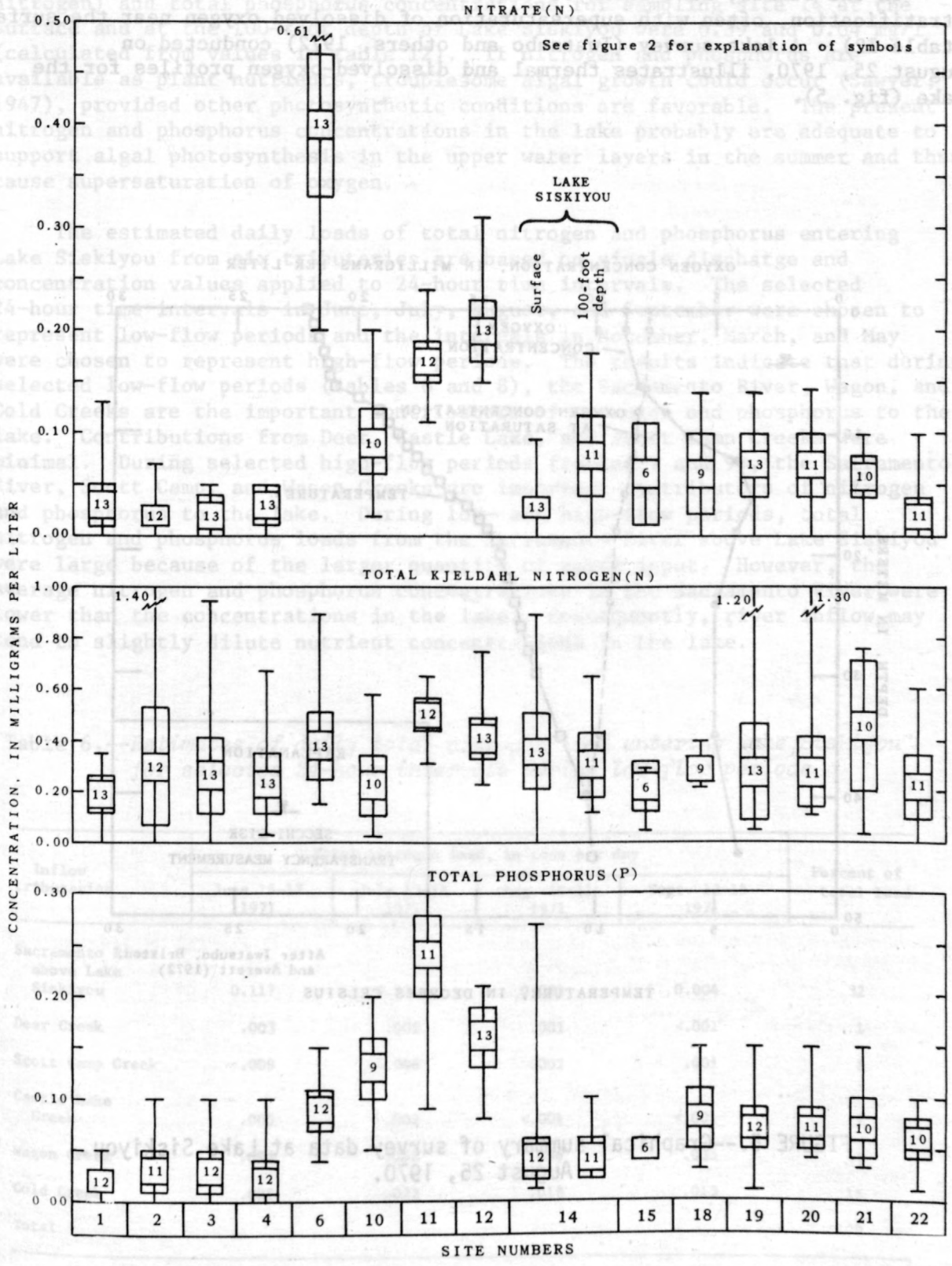


FIGURE 4.--The range of nitrate nitrogen, total Kjeldahl nitrogen, and total phosphorus; the mean and the 95-percent probability confidence interval of the mean.

In the summer, Lake Siskiyou (site 14) exhibited DO and thermal stratification, often with supersaturation of dissolved oxygen near the surface (table 12). A lake survey (Iwatsubo and others, 1972) conducted on August 25, 1970, illustrates thermal and dissolved-oxygen profiles for the lake (fig. 5).

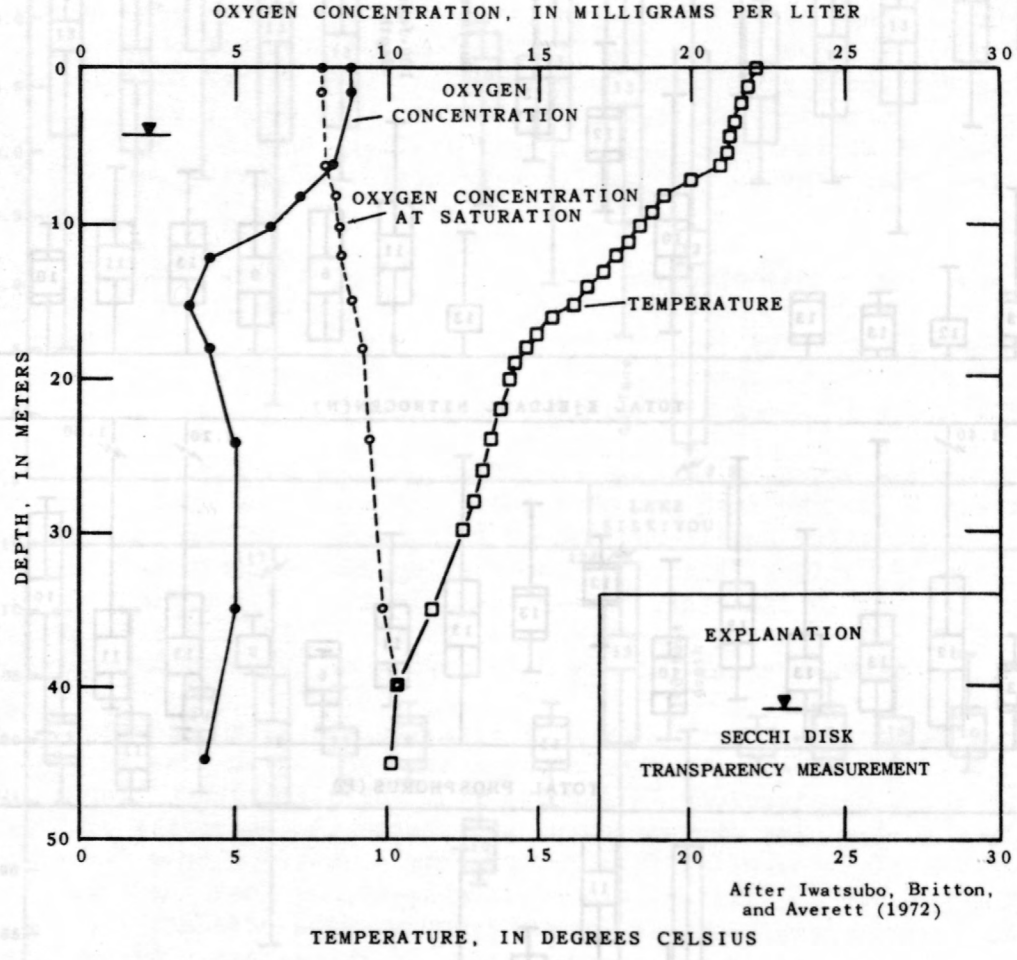


FIGURE 5.--Graphical summary of survey data at Lake Siskiyou, August 25, 1970.

Average total nitrogen (nitrate as nitrogen plus total Kjeldahl nitrogen) and total phosphorus concentrations for sampling site 14 at the surface and at the 100-foot depth of Lake Siskiyou were 0.39 and 0.04 mg/l (calculated from values in table 12). If nitrogen and phosphorus are available as plant nutrients, troublesome algal growth could occur (Sawyer, 1947), provided other photosynthetic conditions are favorable. The present nitrogen and phosphorus concentrations in the lake probably are adequate to support algal photosynthesis in the upper water layers in the summer and thus cause supersaturation of oxygen.

The estimated daily loads of total nitrogen and phosphorus entering Lake Siskiyou from six tributaries are based on single discharge and concentration values applied to 24-hour time intervals. The selected 24-hour time intervals in June, July, August, and September were chosen to represent low-flow periods and the intervals in November, March, and May were chosen to represent high-flow periods. The results indicate that during selected low-flow periods (tables 6 and 8), the Sacramento River, Wagon, and Cold Creeks are the important contributors of nitrogen and phosphorus to the lake. Contributions from Deer, Castle Lake, and Scott Camp Creeks were minimal. During selected high-flow periods (tables 7 and 9), the Sacramento River, Scott Camp, and Wagon Creeks are important contributors of nitrogen and phosphorus to the lake. During low- and high-flow periods, total nitrogen and phosphorus loads from the Sacramento River above Lake Siskiyou were large because of the larger quantity of water input. However, the average nitrogen and phosphorus concentrations in the Sacramento River were lower than the concentrations in the lake. Consequently, river inflow may tend to slightly dilute nutrient concentrations in the lake.

Table 6.--*Estimates of daily total nitrogen load entering Lake Siskiyou for selected 24-hour intervals during low-flow periods*

Inflow tributaries	Total nitrogen load, in tons per day				Percent of total load
	June 16-17 1971	July 13-15 1971	Aug. 10-11 1971	Sept. 13-15 1971	
Sacramento River above Lake Siskiyou	0.117	0.026	0.021	0.004	32
Deer Creek	.003	.002	.001	<.001	1
Scott Camp Creek	.009	.006	.002	.001	4
Castle Lake Creek	.005	.002	<.001	<.001	1
Wagon Creek	.093	.058	.056	.035	47
Cold Creek	.025	.023	.018	.013	15
Total					100

Table 7.--*Estimates of daily total nitrogen load entering Lake Siskiyou for selected 24-hour intervals during high-flow periods*

Inflow tributaries	Total nitrogen load, in tons per day			Percent of total load
	November 10-12 1970	March 24-25 1971	May 11-12 1971	
Sacramento River above Lake Siskiyou	0.091	0.233	0.498	38
Deer Creek	.002	.132	.040	8
Scott Camp Creek	.010	.312	.064	18
Castle Lake Creek	.003	.144	.052	9
Wagon Creek	.093	.258	.102	21
Cold Creek	.039	.061	.032	6
Total				100

The loading results are only useful in estimating nitrogen and phosphorus loads carried by Lake Siskiyou tributaries during the selected flow conditions. Nitrogen and phosphorus loads during other flow conditions may vary greatly from loads given in tables 6, 7, 8, and 9. To determine the overall nutrient load flowing into Lake Siskiyou, nitrogen and phosphorus samples in all tributaries should be collected more frequently, in a schedule that includes all flow conditions.

Table 8.--*Estimates of daily total phosphorus load entering Lake Siskiyou for selected 24-hour intervals during low-flow periods*

Inflow tributaries	Total phosphorus load, in tons per day				Percent of total load
	June 16-17 1971	July 13-15 1971	Aug. 10-11 1971	Sept. 13-15 1971	
Sacramento River above Lake Siskiyou	0.009	0.002	0.001	0.001	19
Deer Creek	<.001	<.001	<.001	<.001	
Scott Camp Creek	.001	<.001	<.001	<.001	2
Castle Lake Creek	.001	<.001	<.001	<.001	1
Wagon Creek	.009	.008	.004	.006	40
Cold Creek	.009	.008	.004	.005	38
Total					100

Table 9.--*Estimates of daily total phosphorus load entering Lake Siskiyou for selected 24-hour intervals during high-flow periods*

Inflow tributaries	Total phosphorus load, in tons per day			Percent of total load
	November 10-12 1970	March 24-25 1971	May 11-12 1971	
Sacramento River above Lake Siskiyou	<0.001	0.026	0.089	39
Deer Creek	<.001	.009	.005	5
Scott Camp Creek	<.001	.030	.010	14
Castle Lake Creek	<.001	.026	.006	11
Wagon Creek	.009	.035	.018	21
Cold Creek	.008	.013	.010	11
Total				100

Average fecal coliform bacteria counts at all but one sampling site (sewage-disposal-pond effluent at site 17) were below the recommended limit of 200 colonies per 100 ml (milliliters) of water for primary contact recreational use ([U.S.] Federal Water Pollution Control Adm., 1968, p. 12). The results are shown in table 8. Single samples taken in August and September 1970 from the effluent of the sewage pond just before it flowed into the river (site 17) revealed counts in excess of the recommended limit[1/].

Average total and fecal coliform bacteria counts at sites 6, 11, and 12 (table 10) were higher than those at other sites tributary to Lake Siskiyou. The differences probably are a result of cultural variations in the drainage basins of the tributaries. The total and fecal coliform bacteria counts are similar and were usually low at sites 15 and 18 (above and below the sewage effluent), indicating that the effluent has no immediate significant influence on the coliform bacteria population of the reach of Sacramento River near Mount Shasta.

Coliform bacteria counts generally were higher at most sampling sites during the summer months than in the winter and spring. These variations might have been related to changes of flow patterns, faunal activities, and seasonal water temperatures.

1 Values based on plate counts outside recommended range of 20 to 80 colonies per 100 ml for total coliform and 20 to 60 colonies per 100 ml for fecal coliform.

Table 10.--*Summary of total and fecal coliform bacteria counts, May 1970 through September 1971*

Site number	Site identification and name	Number of samples		Coliform bacteria counts colonies per 100 ml			
				Average		Range	
		Total	Fecal	Total	Fecal	Total	Fecal
1	11-3413.00 Sacramento River above Lake Siskiyou, near Mt. Shasta	13	8	170	5	4-800	0-32
2	11-3413.05 Deer Creek near Mt. Shasta	12	6	820	3	5-4,600	0-12
3	11-3413.10 Scott Camp Creek at diversion dam near Mt. Shasta	13	9	270	8	2-2,300	0-49
4	11-3413.15 Castle Lake Creek at road crossing near Mt. Shasta	13	12	340	6	0-3,000	0-21
6	11-3413.25 Wagon Creek near Mt. Shasta	13	11	1,600	49	54-4,900	4-120
10	11-3413.41 Big Springs Creek above fish hatchery near Mt. Shasta	9	10	280	28	20-1,000	1-79
11	11-3413.42 Big Springs Creek below fish hatchery near Mt. Shasta	12	11	1,100	42	90-3,400	1-140
12	11-3413.44 Cold Creek above Lake Siskiyou near Mt. Shasta	14	13	2,100	100	80-8,900	25-200
14	11-3413.60 Lake Siskiyou at Box Canyon Dam, near Mt. Shasta						
	at surface	12	8	230	0	1-1,000	0-2
	at 100-ft depth	12	8	270	1	0-1,100	0-8
15	11-3413.65 Sacramento River above sewage effluent near Mt. Shasta	8	8	900	3	15-2,800	0-7
16	11-3413.70 Mt. Shasta sewage pond effluent at weir, near Mt. Shasta	6	6	530	0	0-2,500	0-0
17	11-3413.75 Mt. Shasta sewage pond effluent at river, near Mt. Shasta	8	8	4,300	420	0-26,000	0-2,000
18	11-3413.80 Sacramento River below sewage effluent near Mt. Shasta	9	10	850	6	0-2,800	0-35
19	11-3414.00 Sacramento River near Mt. Shasta	14	10	640	14	1-4,800	1-50
20	11-3414.40 Sacramento River at Shasta Retreat near Dunsmuir	13	10	650	6	1-3,600	0-18
21	11-3414.60 Sacramento River at Soda Creek Road near Dunsmuir	12	10	670	18	7-2,000	0-81
22	11-3420.00 Sacramento River at Delta	12	10	1,000	7	7-6,200	0-31

In the initial reconnaissance of the Lake Siskiyou area, samples for nitrogen, phosphorus, and total coliform bacteria were collected at five additional sites, numbers 5, 7, 8, 9, and 13. Data collected at these sites during this first sampling period are shown in table 9. Because only a few samples were collected, no discussion of the data will be made.

Table 11.--*Miscellaneous water-quality measurements for discontinued sites*

Site number	Site identification and name	Date sampled	Nitrate (N) (mg/l)	Total nitrogen (N) (mg/l)	Total phosphorus (P) (mg/l)	Total coliform bacteria counts, in colonies/100 ml	Temperature (°C)
5	11-3413.20 Spring near Castle Lake Creek site, near Mount Shasta	6-11-70	0.02	0.17	0.01	-	--
7	11-3413.30 Spring near Wagon Creek site, near Mount Shasta	6-11-70	.05	.28	.11	300	18.0
8	11-3413.35 Cold Creek at Mount Shasta	5-20-70	.09	.27	.93	-	-
		6-12-70	.16	.28	.11	200	11.4
9	11-3413.40 Big Springs Cr at So. Pac. RR nr Mount Shasta	6-11-70	.07	.05	.15	-	--
13	11-3413.45 Lake Siskiyou at boat ramp, near Mount Shasta	5-19-70	.00	.20	1.1	-	-

SUMMARY

The physical, chemical, and microbiological measurements indicate water in the tributaries to Lake Siskiyou is of good quality except in Wagon and Cold Creeks. Inflows from Wagon and Cold Creeks contain relatively higher nitrogen and phosphorus concentrations and during low-flow conditions are probably important contributors to the enrichment of the lake. Total and fecal coliform bacteria counts also were relatively greater in Wagon and Cold Creeks. The quality of the water in Wagon Creek and Cold Creek probably reflects the influence of urban and agricultural activities in their drainage basins.

A noticeable difference in water quality was recorded between the sampling sites (10 and 11) above and below the fish hatchery on Big Spring Creek. Water downstream from the fish hatchery generally was higher in coliform bacteria counts, lower in DO, and higher in nitrogen and phosphorus concentrations than that from the site upstream from the fish hatchery.

Thermal and DO stratification occurred in Lake Siskiyou during the summer. High pH values and supersaturation of oxygen in the surface layer of Lake Siskiyou suggest active photosynthesis taking place near the water surface. Nitrogen and phosphorus concentrations must be adequate to support plant growth. Data on the lake from this study were limited to only one sampling site and variables measured were not sufficient to define adequately the water-quality conditions in the lake. Future monitoring programs should consider more intensive sampling in the lake, including algal cell counts and algal productivity measurements, frequent temperature and dissolved-oxygen profiles, and frequent nitrogen, phosphorus, and phytoplankton determination at several depths including, at a minimum, the euphotic zone and the bottom water.

The water in the Sacramento River downstream from the effluent of the sewage-oxidation ponds had a higher average total phosphorus concentration than that upstream. This probably reflects the influence of the discharged sewage effluent on the river water. Total and fecal coliform bacteria counts, DO, nitrate, and TKN concentrations were not noticeably different in samples collected upstream and downstream from the sewage effluent.

REFERENCES CITED

American Public Health Association, American Water Works Association, and Water Pollution Control Federation, 1965, Standard methods for the examination of water and wastewater [12th ed.]: New York, 769 p.

_____1971, Standard methods for the examination of water and wastewater [13th ed.]: New York, 874 p.

Berkstresser, C. F., Jr., 1968, Data for springs in the northern Coast Ranges and Klamath Mountains of California: U.S. Geol. Survey open-file rept., 49 p.

Brown, Eugene, Skougstad, M. W., and Fishman, M. J., 1970, Methods for collection and analysis of water samples for dissolved minerals and gases: U.S. Geol. Survey Techniques Water-Resources Inv., book 5, chap. A., 160 p.

Corbett, D. M., and others, 1943, Stream-gaging procedure, a manual describing methods and practices of the Geological Survey: U.S. Geol. Survey Water-Supply Paper 888, 245 p.

Iwatsubo, R. T., Britton, L. J., and Averett, R. C., 1972, Selected physical and chemical characteristics of 20 California lakes: U.S. Geol. Survey open-file rept., 59 p.

Sawyer, C. N., 1947, Fertilization of lakes by agricultural and urban drainage: New England Water Works Assoc. Jour., 61 (2), p. 109-127.

[U.S.] Federal Water Pollution Control Administration, 1968, Water quality criteria: Rept. Natl. Tech. Advisory Comm. to Secretary of Interior, Washington, 234 p.

Table 12.--*Results of water-quality analyses*

[Type 2, laboratory analysis; type 3, field analysis]

11-3413.00 SACRAMENTO RIVER ABOVE LAKE SISKIYOU (SITE 1)

WATER QUALITY DATA

DATE	TIME	TYPE	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	AIR TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	TOTAL NITROGEN (N) (MG/L)
MAY , 1970								
19...	0730	2	342	8.0	13.5	10.8	103	--
JUNE								
11...	0900	2	90	8.5	--	11.4	110	--
JULY								
30...	0900	2	11	16.5	19.0	8.8	101	--
AUG.								
28...	0855	2	6.5	15.0	--	8.8	99	--
SEP.								
29...	1040	2	6.5	12.0	--	9.6	101	--
NOV.								
11...	1515	2	177	7.0	8.0	10.3	97	--
JAN., 1971								
26...	0940	2	133	2.5	.5	12.1	101	--
MAR.								
25...	1000	2	192	3.0	5.0	11.5	98	.45
MAY								
12...	1200	2	E660	6.0	14.0	10.9	100	.28
JUNE								
16...	1420	2	167	14.0	24.0	9.1	100	.26
JULY								
14...	0815	2	37	13.0	19.0	9.2	100	.26
AUG.								
10...	1315	2	17	21.0	35.0	7.5	95	.45
SEP.								
15...	1540	2	8.8	17.0	30.0	8.6	101	.15

DATE	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	FECAL COLIFORM (COL. PER 100 ML)	IMMEDIATE COLIFORM (COL. PER 100 ML)
MAY , 1970								
19...	.00	--	.02	.13	50	--	--	4
JUNE								
11...	.05	--	.02	.000	--	--	--	7
JULY								
30...	.23	--	.05	.000	--	--	--	54
AUG.								
28...	.15	--	.02	.000	200	8.1	--	6
SEP.								
29...	.29	--	.00	.040	--	--	3	5
NOV.								
11...	.14	--	.05	.000	100	8.0	--	20
JAN., 1971								
26...	.10	--	.00	.000	116	7.8	32	428
MAR.								
25...	.35	.10	--	.050	116	7.6	1	27
MAY								
12...	.28	.00	--	.050	70	7.9	0	35
JUNE								
16...	.24	.02	--	.020	85	7.9	0	26
JULY								
14...	.25	.01	.01	.020	136	8.0	2	800
AUG.								
10...	.32	.13	.13	.020	174	8.2	1	550
SEP.								
15...	.12	.03	.03	.040	194	8.3	1	300

Table 12.--Continued

11-3413.05 DEER CREEK NEAR MT SHASTA (SITE 2)

WATER QUALITY DATA

DATE	TIME	TYPE	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	AIR TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	TOTAL NITROGEN (N) (MG/L)
NOV., 1970								
10...	1345	2	3.7	7.0	--	10.1	95	--
MAR., 1971								
24...	1320	2	E35	5.0	11.0	11.0	99	1.4
MAY								
11...	0810	2	39	6.0	10.0	10.9	100	.38
JUNE								
16...	0945	2	5.0	10.5	19.0	9.8	100	.24
JULY								
13...	1045	2	2.5	12.0	23.0	9.3	99	.32
AUG.								
10...	0720	2	1.2	15.5	18.5	8.4	95	.29
SEP.								
15...	0740	2	.95	10.0	5.5	9.7	99	.15

DATE	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	FECAL COLIFORM (COL. PER 100 ML)	IMMEDIATE COLIFORM (COL. PER 100 ML)
NOV., 1970								
10...	.14	--	.02	.000	197	8.1	--	48
MAR., 1971								
24...	1.4	.00	--	.10	111	7.4	0	52
MAY								
11...	.38	.00	--	.050	108	7.9	0	96
JUNE								
16...	.23	.01	--	.030	157	8.0	2	240
JULY								
13...	.25	.07	.07	.020	180	8.1	1	1200
AUG.								
10...	.25	.04	.04	.040	192	8.1	12	4600
SEP.								
15...	.13	.02	.02	.040	194	8.2	4	3500

Table 12.--Continued

11-3413.10 SCOTT CAMP CREEK AT DIVERSION DAM, NEAR MT SHASTA (SITE 3)

WATER QUALITY DATA

DATE	TIME	TYPE	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	AIR TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	TOTAL NITROGEN (N) (MG/L)
NOV., 1970								
12...	0830	2	11	4.5	3.0	11.0	96	--
JAN., 1971								
27...	1545	2	8.5	2.0	--	12.4	102	--
MAR.								
26...	0945	2	110	3.0	7.0	12.0	101	1.0
MAY								
12...	1615	2	77	6.5	18.0	10.9	101	.31
JUNE								
16...	1530	2	14	11.5	25.0	9.5	100	.22
JULY								
15...	0750	2	4.0	11.0	14.5	9.7	100	.55
AUG.								
10...	1515	2	2.1	15.0	34.0	8.8	99	.36
SEP.								
15...	1500	2	1.6	11.0	28.0	9.8	101	.17

DATE	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	FECAL COLIFORM (COL. PER 100 ML)	IMMEDIATE COLIFORM (COL. PER 100 ML)
NOV., 1970								
12...	.35	--	.02	.000	44	8.0	13	30
JAN., 1971								
27...	.08	--	.00	.000	48	7.7	1	7
MAR.								
26...	.95	.10	--	.10	33	6.9	3	39
MAY								
12...	.30	.01	--	.050	25	7.4	0	26
JUNE								
16...	.20	.02	--	.030	39	7.3	1	150
JULY								
15...	.51	.04	.04	.020	76	7.7	0	500
AUG.								
10...	.31	.05	.05	.030	94	7.9	7	2300
SEP.								
15...	.14	.03	.03	.060	104	8.0	2	330

Table 12.--Continued

11-3413.15 CASTLE LAKE CREEK AT ROAD CROSSING, NEAR MT SHASTA (SITE 4)

WATER QUALITY DATA

DATE	TIME	TYPE	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	AIR TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	TOTAL NITROGEN (N) (MG/L)
MAY , 1970								
19...	1410	2	11	13.0	--	10.0	108	--
JUNE								
11...	1130	2	--	10.0	--	11.6	117	--
JULY								
29...	1410	2	--	15.5	25.0	8.9	100	--
AUG.								
28...	1315	2	.17	11.5	--	9.7	101	--
SEP.								
29...	1445	2	.13	9.0	--	10.0	98	--
NOV.								
12...	0945	2	12	5.5	5.5	10.9	97	--
JAN., 1971								
27...	1455	2	8.4	2.5	--	12.1	101	--
MAR.								
26...	0815	2	97	3.0	5.5	12.0	101	.55
MAY								
12...	1430	2	60	6.5	18.0	10.9	101	.32
JUNE								
17...	0800	2	6.5	11.0	12.5	9.6	99	.27
JULY								
15...	0830	2	1.5	12.5	14.5	9.4	100	.42
AUG.								
11...	1500	2	.34	17.0	33.0	7.1	84	.42
SEP.								
15...	1320	2	.22	13.0	25.0	8.2	88	.25

DATE	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	FECAL COLIFORM (COL. PER 100.ML)	IMMEDIATE COLIFORM (COL. PER 100 ML)
MAY , 1970								
19...	.08	--	.02	.030	32	--	--	6
JUNE								
11...	.06	--	.00	.000	--	--	--	0
JULY								
29...	.68	--	.02	.000	--	--	--	18
AUG.								
28...	.14	--	.02	.010	83	7.5	--	4
SEP.								
29...	.04	--	.00	.020	--	--	--	21
NOV.								
12...	.08	--	.02	.000	46	7.7	--	17
JAN., 1971								
27...	.03	--	.00	.000	46	7.8	11	192
MAR.								
26...	.45	.10	--	.10	39	7.0	4	82
MAY								
12...	.32	.00	--	.040	28	6.9	0	27
JUNE								
17...	.25	.02	--	.040	41	7.2	1	84
JULY								
15...	.36	.06	.06	.020	56	7.5	0	240
AUG.								
11...	.36	.06	.06	.030	70	--	7	3000
SEP.								
15...	.19	.06	.06	.040	82	7.0	0	670

Table 12.--Continued

11-3413.25 WAGON CREEK NEAR MT SHASTA (SITE 6)

WATER QUALITY DATA

DATE	TIME	TYPE	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	AIR TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	TOTAL NITROGEN (N) (MG/L)
MAY , 1970								
19...	0840	2	44	9.0	--	10.6	104	--
JUNE								
10...	1645	2	43	13.0	--	9.4	101	--
JULY								
28...	1545	2	21	16.0	29.5	8.8	100	--
AUG.								
27...	1430	2	16	14.5	--	9.2	102	--
SEP.								
30...	1000	2	16	9.0	--	10.2	100	--
NOV.								
10...	1225	2	43	8.0	--	10.1	96	--
JAN., 1971								
26...	1145	2	72	4.0	--	11.8	103	--
MAR.								
24...	1415	2	87	8.0	10.0	10.6	102	1.1
MAY								
11...	1015	2	73	11.0	18.0	9.6	99	.52
JUNE								
16...	1045	2	49	12.0	18.0	9.5	100	.70
JULY								
13...	1355	2	25	14.5	25.5	9.0	100	.86
AUG.								
10...	0930	2	20	12.5	25.5	9.4	100	1.0
SEP.								
13...	1630	2	19	15.5	29.5	8.8	100	.69

DATE	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	FECAL COLIFORM (COL. PER 100 ML)	IMMEDIATE COLIFORM (COL. PER 100 ML)
MAY , 1970								
19...	.15	--	.36	.59	83	--	--	100
JUNE								
10...	.36	--	.41	.040	--	--	45	120
JULY								
28...	.29	--	.45	.12	--	--	86	164
AUG.								
27...	.20	--	.52	.10	113	8.0	120	450
SEP.								
30...	.70	--	.43	.070	--	--	--	180
NOV.								
10...	.48	--	.32	.080	120	8.0	32	400
JAN., 1971								
26...	.34	--	.32	.060	104	8.1	4	54
MAR.								
24...	.90	.20	--	.15	102	7.6	10	1360
MAY								
11...	.22	.30	--	.090	116	8.0	12	2800
JUNE								
16...	.43	.27	--	.070	116	8.1	30	2600
JULY								
13...	.31	.55	.55	.12	121	7.9	100	3000
AUG.								
10...	.42	.61	.61	.080	120	7.9	60	4900
SEP.								
13...	.18	.51	.51	.12	117	8.0	36	4200

Table 12.--Continued

11-3413.41 BIG SPRINGS CREEK ABOVE HATCHERY, NEAR MT SHASTA (SITE 10)

WATER QUALITY DATA

DATE	TIME	TYPE	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	AIR TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	TOTAL NITROGEN (N) (MG/L)
MAY , 1970								
19...	1615	2	--	9.5	--	--	--	--
JUNE								
12...	0850	2	--	8.0	--	--	--	--
18...	0850	2	--	8.0	--	--	--	--
JULY								
28...	0800	2	--	8.0	14.0	10.7	103	--
AUG.								
27...	0915	2	--	7.0	--	10.7	101	--
OCT.								
01...	0915	2	--	7.0	--	10.4	98	--
NOV.								
10...	0800	2	--	7.0	--	10.3	97	--
MAR., 1971								
24...	0840	2	16	7.0	5.0	10.7	101	.55
MAY								
12...	0840	2	16	8.5	11.5	10.3	100	.25
JUNE								
15...	0800	2	15	8.0	13.0	10.4	100	.28
JULY								
13...	0730	2	16	7.5	15.0	10.5	100	.37

DATE	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	FECAL COLIFORM (COL. PER 100 ML)	IMMEDIATE COLIFORM (COL. PER 100 ML)
MAY , 1970								
19...	.02	--	.07	.82	--	--	--	--
JUNE								
12...	.17	--	.02	.050	--	--	38	90
18...	--	--	--	--	--	--	79	108
JULY								
28...	.04	--	.09	.12	--	--	63	104
AUG.								
27...	.09	--	.09	.13	97	7.5	27	75
OCT.								
01...	.35	--	.07	.12	--	--	28	--
NOV.								
10...	.58	--	.11	.12	96	7.5	6	20
MAR., 1971								
24...	.35	.20	--	.20	97	7.2	1	260
MAY								
12...	.15	.10	--	.17	97	7.7	3	1000
JUNE								
15...	.19	.09	--	.15	96	7.8	22	400
JULY								
13...	.28	.09	.09	.15	85	7.5	16	460

Table 12.--Continued

11-3413.42 BIG SPRINGS CREEK BELOW HATCHERY, NEAR MT SHASTA (SITE 11)

WATER QUALITY DATA

DATE	TIME	TYPE	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	AIR TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	TOTAL NITROGEN (N) (MG/L)
MAY , 1970								
19...	1630	2	--	14.5	--	--	--	--
JUNE								
12...	1015	2	--	9.5	--	--	--	--
19...	1030	2	--	12.0	--	--	--	--
JULY								
28...	0920	2	--	9.0	21.0	9.7	96	--
AUG.								
27...	1015	2	--	8.0	--	10.0	96	--
OCT.								
01...	0945	2	--	7.0	--	9.5	90	--
NOV.								
10...	0900	2	--	6.5	--	9.7	90	--
MAR., 1971								
24...	1020	2	9.3	7.5	7.5	10.0	95	.80
MAY								
12...	1015	2	9.3	9.0	15.0	9.3	92	.65
JUNE								
15...	0845	2	7.1	8.5	15.5	9.6	93	.82
JULY								
13...	0800	2	5.8	8.0	15.0	9.8	94	.64
AUG.								
10...	1115	2	4.4	11.0	31.5	8.6	89	.75
SEP.								
15...	0930	2	2.6	8.0	19.0	9.4	90	.55

DATE	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	FECAL COLIFORM (COL. PER 100 ML)	IMMEDIATE COLIFORM (COL. PER 100 ML)
MAY , 1970								
19...	.53	--	.16	.50	--	--	--	--
JUNE								
12...	.57	--	.14	.090	--	--	--	450
19...	--	--	--	--	--	--	140	410
JULY								
28...	.41	--	.14	.19	--	--	88	680
AUG.								
27...	.50	--	.18	.26	99	7.3	77	300
OCT.								
01...	.47	--	.11	.29	--	--	8	120
NOV.								
10...	.45	--	.11	.22	99	7.4	4	90
MAR., 1971								
24...	.60	.20	--	.30	100	7.0	1	1200
MAY								
12...	.45	.20	--	.30	106	7.3	46	2800
JUNE								
15...	.66	.16	--	.30	99	7.8	14	620
JULY								
13...	.48	.16	.16	.22	98	7.3	16	1100
AUG.								
10...	.56	.19	.19	.25	100	7.6	48	3400
SEP.								
15...	.31	.24	.24	.24	99	7.6	16	2500

Table 12.--Continued

11-3413.44 COLD CREEK ABOVE LAKE SISKIYOU, NEAR MT SHASTA (SITE 12)

WATER QUALITY DATA

DATE	TIME	TYPE	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	AIR TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	TOTAL NITROGEN (N) (MG/L)
MAY , 1970								
19...	1445	2	19	15.0	--	9.1	101	--
JUNE								
10...	1445	2	16	13.5	--	9.4	102	--
19...	1215	2	--	14.0	--	--	--	--
JULY								
28...	1400	2	9.2	16.5	28.0	8.7	100	--
AUG.								
27...	1120	2	12	10.5	--	10.0	103	--
OCT.								
01...	1030	2	20	8.5	--	10.6	102	--
NOV.								
10...	1025	2	26	7.0	--	10.2	95	--
JAN., 1971								
27...	1015	2	29	4.5	5.5	11.7	103	--
MAR.								
24...	1600	2	24	10.0	11.5	10.2	102	.95
MAY								
11...	1210	2	19	13.0	25.5	9.4	101	.62
JUNE								
16...	1145	2	16	12.5	21.0	9.4	100	.58
JULY								
13...	1610	2	14	16.5	30.0	8.6	100	.61
AUG.								
11...	1630	2	10	17.5	27.5	8.1	95	.66
SEP.								
15...	1015	2	13	9.5	12.0	10.2	101	.38

DATE	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	FECAL COLIFORM (COL. PER 100 ML)	IMMEDIATE COLIFORM (COL. PER 100 ML)
MAY , 1970								
19...	.27	--	.16	.68	--	--	--	600
JUNE								
10...	.56	--	.18	.080	--	--	122	440
19...	--	--	--	--	--	--	65	260
JULY								
28...	.43	--	.20	.16	--	--	140	460
AUG.								
27...	.52	--	.18	.21	106	7.6	144	450
OCT.								
01...	.34	--	.16	.19	--	--	150	510
NOV.								
10...	.37	--	.18	.12	107	7.7	89	400
JAN., 1971								
27...	.32	--	.29	.090	101	8.1	30	80
MAR.								
24...	.75	.20	--	.20	103	7.3	25	620
MAY								
11...	.42	.20	--	.20	105	7.9	64	3900
JUNE								
16...	.42	.16	--	.20	105	8.1	46	800
JULY								
13...	.36	.25	.24	.20	105	7.8	100	4600
AUG.								
11...	.35	.31	.31	.16	108	7.8	128	8900
SEP.								
15...	.23	.15	.15	.15	112	8.0	200	8000

Table 12.--Continued

11-3413.60 LAKE SISKIYOU NEAR MT SHASTA (SITE 14)

WATER QUALITY DATA

DATE	TIME	TYPE	DEPTH (FT)	TEMP-ERATURE (DEG C)	AIR TEMP-ERATURE (DEG C)	DIS-SOLVED OXYGEN (MG/L)	PER CENT SATUR-ATION	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)
MAY, 1970									
19...	1105	2	0	13.5	--	11.4	124	--	--
19...	1335	2	100	9.5	--	9.8	97	--	--
JUNE									
10...	--	2	0	17.0	--	9.6	112	--	--
JULY									
29...	1115	2	0	22.5	--	8.8	114	--	--
29...	1145	2	100	14.0	--	6.6	72	--	--
AUG.									
25...	1755	2	0	21.5	28.5	8.8	113	--	--
25...	1800	2	100	13.0	28.5	5.2	56	--	--
SEP.									
29...	1700	2	0	16.0	--	7.6	86	--	--
29...	1730	2	100	13.5	--	3.5	38	--	--
NOV.									
10...	1600	2	0	11.0	--	7.9	81	--	--
10...	1545	2	100	10.5	--	7.9	81	--	--
JAN., 1971									
27...	1215	2	0	2.0	--	12.5	102	--	--
27...	1130	2	100	3.0	--	11.4	96	--	--
MAR.									
25...	1505	2	0	5.0	5.0	11.8	105	--	--
25...	1415	2	100	4.0	5.0	11.6	101	--	--
MAY									
11...	1430	2	0	11.0	23.0	10.7	110	--	--
11...	1400	2	100	6.5	23.0	10.0	93	--	--
11...	1430	3	--	--	--	--	--	--	--
JUNE									
14...	1620	2	0	16.5	21.5	9.9	114	--	--
14...	1545	2	100	7.5	21.5	9.7	92	--	--
14...	1620	3	--	--	--	--	--	--	--
JULY									
14...	1530	2	0	21.5	32.0	8.6	110	--	--
14...	1500	2	100	8.0	32.0	8.5	82	--	--
14...	1530	3	--	--	--	--	--	--	--
AUG.									
09...	1640	2	0	25.5	33.0	7.9	108	--	--
09...	1500	2	100	8.0	34.0	8.2	79	--	--
09...	1640	3	--	--	--	--	--	--	--
SEP.									
14...	1415	2	0	20.0	25.5	8.6	106	--	--

Table 12.--Continued

11-3413.60 LAKE SISKIYOU NEAR MT SHASTA (SITE 14).--Continued

WATER QUALITY DATA

DATE	ORGANIC NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L)	DIS-SOLVED AMMONIA NITRO-GEN (N) (MG/L)	DIS-SOLVED NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L)	ALKA-LINITY AS CACO3 (MG/L)
MAY , 1970									
19...	--	--	.00	--	--	.00	.27	--	--
19...	--	--	--	--	--	--	--	--	--
JUNE									
10...	--	--	.56	--	--	.02	.010	--	--
JULY									
29...	--	--	.29	--	--	.05	.010	--	--
29...	--	--	.39	--	--	.11	.020	--	--
AUG.									
25...	--	--	.35	--	--	.00	.030	--	--
25...	--	--	.12	--	--	.11	.020	--	--
SEP.									
29...	--	--	.78	--	--	.07	.030	--	--
29...	--	--	.12	--	--	.11	.040	--	--
NOV.									
10...	--	--	.22	--	--	.09	.030	--	--
10...	--	--	.14	--	--	.09	.030	--	--
JAN., 1971									
27...	--	--	.23	--	--	.18	.030	--	--
27...	--	--	.27	--	--	.05	.040	--	--
MAR.									
25...	--	--	.55	.00	--	--	.10	.030	--
25...	--	--	.90	.00	--	--	.10	.030	--
MAY									
11...	--	--	.28	.00	--	--	.060	.030	--
11...	--	--	.18	.03	--	--	.060	.030	--
11...	--	--	--	--	--	--	--	--	--
JUNE									
14...	--	--	.24	.03	--	--	.050	--	--
14...	--	--	.26	.00	--	--	.040	--	--
14...	--	--	--	--	--	--	--	--	--
JULY									
14...	--	--	.66	.05	--	.05	.040	--	--
14...	--	--	.45	.03	--	.03	.020	--	--
14...	--	--	--	--	--	--	--	--	--
AUG.									
09...	--	--	.40	.08	--	.08	.030	--	--
09...	--	--	.33	.04	--	.04	.030	--	--
09...	--	--	--	--	--	--	--	--	--
SEP.									
14...	--	.22	.19	.03	--	.03	.040	--	--

Table 12.--Continued

11-3413.60 LAKE SISKIYOU NEAR MT SHASTA (SITE 14).--Continued

WATER QUALITY DATA

DATE	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	COLOR (PLATINUM-COBALT UNITS)	TURBIDITY (JTU)	TRANSPARENCY SECCHI DISK (IN)	CARBON DIOXIDE (CO2) (MG/L)	FECAL COLIFORM (COL. PER 100 ML)	IMMEDIATE COLIFORM (COL. PER 100 ML)
MAY , 1970								
19...	76	--	--	--	--	--	--	3
19...	--	--	--	--	--	--	--	4
JUNE								
10...	--	--	--	--	--	--	--	--
JULY								
29...	--	--	--	--	--	--	--	5
29...	--	--	--	--	--	--	--	30
AUG.								
25...	118	8.6	2	0	--	--	0	1
25...	100	6.9	4	0	--	--	0	0
SEP.								
29...	--	--	--	--	--	--	--	27
29...	--	--	--	--	--	--	--	37
NOV.								
10...	118	7.6	--	--	--	--	--	16
10...	118	7.7	--	--	--	--	--	18
JAN., 1971								
27...	104	7.7	--	--	--	--	8	860
27...	100	7.8	--	--	--	--	0	420
MAR.								
25...	113	7.5	--	--	--	--	1	35
25...	112	7.6	--	--	--	--	0	60
MAY								
11...	98	7.6	--	--	--	--	0	78
11...	85	7.9	--	--	--	--	2	290
11...	--	--	--	--	66	--	--	--
JUNE								
14...	89	7.4	--	--	--	--	0	190
14...	85	8.3	--	--	--	--	0	12
14...	--	--	--	--	120	--	--	--
JULY								
14...	89	7.4	--	--	--	--	0	450
14...	98	8.4	--	--	--	--	0	110
14...	--	--	--	--	120	--	--	--
AUG.								
09...	88	7.5	--	--	--	--	0	1100
09...	116	8.4	--	--	--	--	0	790
09...	--	--	--	--	180	--	--	--
SEP.								
14...	121	8.5	--	--	--	--	0	1100

Table 12.--Continued

11-3413.65 SACRAMENTO RIVER ABOVE SEWAGE EFFLUENT, NEAR MT SHASTA (SITE 15)

WATER QUALITY DATA

DATE	TIME	TYPE	TEMPERATURE (DEG C)	AIR TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	TOTAL RESIDUAL CHLORINE (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)
AUG., 1970									
26...	1020	2	10.5	--	10.1	102	--	--	--
SEP.									
09...	1105	2	11.0	--	--	--	--	--	--
14...	1245	2	10.8	--	--	--	.00	--	--
30...	1645	2	11.2	21.5	9.6	98	.00	--	.05
NOV.									
11...	1000	2	10.5	10.5	9.8	99	.00	--	.29
JUNE, 1971									
15...	1410	2	16.0	24.0	9.0	101	.00	--	.26
JULY									
14...	1040	2	16.5	25.0	8.8	100	.00	--	.26
AUG.									
11...	0815	2	8.5	14.5	10.2	98	.00	--	.29
SEP.									
14...	0915	2	11.5	17.5	10.0	101	.00	.29	.20

DATE	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	BIOCHEMICAL OXYGEN DEMAND (MG/L)	FECAL COLIFORM (COL. PER 100 ML)	IMMEDIATE COLIFORM (COL. PER 100 ML)
AUG., 1970								
26...	--	--	--	--	--	--	--	18
SEP.								
09...	--	--	--	--	--	--	6	--
14...	--	--	--	--	--	--	2	178
30...	--	.11	.040	--	--	--	4	15
NOV.								
11...	--	.11	.040	121	8.0	--	7	60
JUNE, 1971								
15...	.01	--	.050	97	8.2	--	0	330
JULY								
14...	.02	.02	.050	110	8.0	--	5	1700
AUG.								
11...	.02	.02	.040	103	7.9	--	1	2100
SEP.								
14...	.09	.09	.060	116	7.9	--	0	2800

Table 12.--Continued

11-3413.70 MT SHASTA SEWAGE EFFLUENT AT WEIR, NEAR MT SHASTA (SITE 16)

WATER QUALITY DATA

DATE	TIME	TYPE	DIS-CHARGE (CFS)	TEMP-ERATURE (DEG C)	AIR TEMP-ERATURE (DEG C)	DIS-SOLVED OXYGEN (MG/L)	PER-CENT SATUR-ATION	TOTAL RESI-DUAL CHLO-RINE (MG/L)	TOTAL NITRO-GEN (N) (MG/L)
JULY, 1970									
28...	1115	2	.72	23.5	--	6.5	87	1.6	--
AUG.									
25...	1700	2	--	21.0	--	5.7	72	3.2	--
26...	0845	2	.67	18.0	--	4.8	58	1.8	--
26...	1800	2	--	--	--	--	--	3.2	--
SEP.									
09...	1710	2	.71	19.7	--	--	--	2.3	--
14...	1000	2	.62	12.0	--	--	--	4.6	--
14...	1600	2	--	--	--	--	--	10	--
30...	1510	2	.80	15.0	--	--	--	3.6	--
NOV.									
11...	1445	2	--	9.0	--	--	--	1.8	--
JUNE, 1971									
15...	1330	2	.76	22.0	25.5	--	--	4.8	--
JULY									
14...	1010	2	.49	21.0	26.0	--	--	2.3	--
SEP.									
14...	0815	2	.55	18.0	15.5	--	--	3.1	--
16...	0815	2	--	16.5	--	--	--	3.2	--

DATE	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L)	DIS-SOLVED NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	BIO-CHEM-ICAL OXYGEN DEMAND (MG/L)	FECAL COLI-FORM (COL. PER 100 ML)	IMME-DIATE COLI-FORM (COL. PER 100 ML)
JULY, 1970									
28...	5.9	--	.11	2.3	--	--	--	0	600
AUG.									
25...	--	--	--	--	--	--	--	0	0
26...	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	0	60
SEP.									
09...	4.4	--	.23	4.6	198	--	8.0	--	--
14...	--	--	--	--	--	--	--	0	0
14...	--	--	--	--	--	--	--	--	--
30...	7.5	--	.11	4.9	--	--	--	0	0
NOV.									
11...	--	--	--	--	--	--	--	--	--
JUNE, 1971									
15...	--	--	--	--	--	--	--	--	--
JULY									
14...	--	--	--	--	--	--	--	--	--
SEP.									
14...	--	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	0	2500

Table 12.--Continued

11-3413.75 MT SHASTA SEWAGE EFFLUENT AT RIVER, NEAR MT SHASTA (SITE 17)

WATER QUALITY DATA

DATE	TIME	TYPE	TEMPERATURE (DEG C)	AIR TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	TOTAL RESIDUAL CHLORINE (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)
AUG., 1970									
26...	1100	2	17.0	--	--	--	.80	--	6.2
SEP.									
09...	1120	2	16.0	--	--	--	2.0	--	4.1
14...	1240	2	13.0	--	--	--	6.3	--	--
30...	1655	2	15.0	21.5	9.5	104	2.8	--	7.6
NOV.									
11...	1020	2	--	--	--	--	1.1	--	8.3
JUNE, 1971									
15...	1530	2	21.0	24.0	--	--	3.9	--	--
JULY									
14...	1130	2	20.0	25.0	--	--	.70	--	--
SEP.									
14...	0930	2	15.5	17.5	--	--	1.9	--	--

DATE	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TURBIDITY (JTU)	BIOCHEMICAL OXYGEN DEMAND (MG/L)	FECAL COLIFORM (COL. PER 100 ML)	IMMEDIATE COLIFORM (COL. PER 100 ML)
AUG., 1970									
26...	--	.09	4.6	187	6.8	10	--	2000	6200
SEP.									
09...	--	.25	4.2	202	--	--	10	1360	1900
14...	--	--	--	--	--	--	--	0	0
30...	--	.14	4.6	--	--	--	--	0	4
NOV.									
11...	--	--	--	187	--	--	--	0	0
JUNE, 1971									
15...	--	--	--	--	--	--	--	0	0
JULY									
14...	--	--	--	--	--	--	--	0	0
SEP.									
14...	--	--	--	--	--	--	--	0	26000

Table 12.--Continued

11-3413.80 SACRAMENTO RIVER BELOW SEWAGE EFFLUENT, NEAR MT SHASTA (SITE 18)

WATER QUALITY DATA

DATE	TIME	TYPE	TEMPERATURE (DEG C)	AIR TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	TOTAL RESIDUAL CHLORINE (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)
AUG., 1970									
26...	1145	2	12.0	--	10.1	105	.00	--	.32
SEP.									
09...	1430	2	12.0	--	--	--	.00	--	.32
14...	1215	2	10.5	--	--	--	.00	--	--
30...	1630	2	11.0	21.5	9.8	101	.00	--	.23
NOV.									
11...	1045	2	10.5	9.0	9.8	99	.00	--	.28
MAY , 1971									
13...	0930	2	9.5	14.5	10.3	101	--	--	.22
JUNE									
15...	1435	2	16.0	24.0	9.0	101	.00	--	.40
JULY									
14...	1115	2	17.0	25.0	8.8	101	.00	--	.35
AUG.									
11...	0845	2	8.5	14.5	10.2	98	.00	--	.25
SEP.									
14...	1000	2	11.5	18.0	10.0	101	.00	.34	.28

DATE	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TURBIDITY (JTU)	BIOCHEMICAL OXYGEN DEMAND (MG/L)	FECAL COLIFORM (COL. PER 100 ML)	IMMEDIATE COLIFORM (COL. PER 100 ML)
AUG., 1970									
26...	--	.09	.10	125	7.7	1	--	35	233
SEP.									
09...	--	.09	.12	124	--	--	--	2	--
14...	--	--	--	--	--	--	--	0	0
30...	--	.11	.15	--	--	--	--	1	25
NOV.									
11...	--	.14	.070	121	8.0	--	--	3	420
MAY , 1971									
13...	.00	--	.060	88	8.1	--	--	17	400
JUNE									
15...	.01	--	.060	89	8.0	--	--	0	210
JULY									
14...	.03	.03	.050	109	8.0	--	--	2	2800
AUG.									
11...	.01	.01	.030	105	7.8	--	--	2	1100
SEP.									
14...	.06	.06	.11	117	8.0	--	--	0	2500

Table 12.--Continued

11-3414.00 SACRAMENTO RIVER NEAR MT SHASTA (SITE 19)

WATER QUALITY DATA

DATE	TIME	TYPE	DIS-CHARGE (CFS)	TEMP-ERATURE (DEG C)	AIR TEMP-ERATURE (DEG C)	DIS-SOLVED OXYGEN (MG/L)	PER-CENT SATUR-ATION	TOTAL RESI-DUAL CHLO-RINE (MG/L)	TOTAL NITRO-GEN (N) (MG/L)
MAY , 1970									
20...	1340	2	478	13.5	--	9.7	102	.00	--
JUNE									
10...	1255	2	267	9.0	--	11.0	106	.00	--
19...	1650	2	129	12.0	--	--	--	.00	--
JULY									
30...	1135	2	63	12.5	27.0	10.0	104	--	--
AUG.									
26...	1430	2	40	15.0	--	9.5	103	.00	--
OCT.									
01...	1455	2	41	13.0	--	9.3	98	.00	--
NOV.									
12...	1345	2	213	10.0	7.5	9.9	98	--	--
JAN., 1971									
26...	1635	2	119	4.5	3.0	11.7	101	--	--
MAR.									
23...	1445	2	241	6.0	10.0	11.4	102	--	--
MAY									
13...	1030	2	967	9.5	13.0	10.4	101	--	--
JUNE									
17...	1030	2	296	15.0	12.5	9.1	100	--	--
JULY									
15...	1200	2	88	18.5	32.0	8.4	101	--	--
AUG.									
11...	1315	2	60	14.0	38.0	9.3	100	--	--
SEP.									
16...	1030	2	48	11.5	18.0	9.8	100	--	.20

DATE	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L)	DIS-SOLVED NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TUR-BID-ITY (JTU)	BIO-CHEM-ICAL OXYGEN DEMAND (MG/L)	FECAL COLI-FORM (COL. PER 100 ML)	IMME-DIATE COLI-FORM (COL. PER 100 ML)
MAY , 1970										
20...	.05	--	.00	.23	78	--	--	--	--	1
JUNE										
10...	.22	--	.00	.010	--	--	--	--	--	4
19...	--	--	--	--	--	--	--	--	1	17
JULY										
30...	.28	--	.05	.050	--	--	--	--	--	31
AUG.										
26...	.17	--	.07	.10	131	8.3	1	--	13	96
OCT.										
01...	.16	--	.14	.11	--	--	--	--	1	14
NOV.										
12...	.23	--	.09	.050	121	8.0	1	--	--	480
JAN., 1971										
26...	.24	--	.14	.050	110	7.9	1	--	50	104
MAR.										
23...	1.2	.10	--	.15	109	7.6	1	--	31	260
MAY										
13...	.18	.03	--	.070	83	7.9	--	--	26	330
JUNE										
17...	.25	.02	--	.050	91	7.8	1	--	8	220
JULY										
15...	.34	.04	.04	.090	116	8.0	2	--	4	2000
AUG.										
11...	.24	.11	.11	.030	110	8.1	1	--	1	650
SEP.										
16...	.14	.06	.06	.090	128	8.2	1	--	2	4800

Table 12.--Continued

11-3414.40 SACRAMENTO RIVER AT SHASTA RETREAT, NEAR DUNSMUIR (SITE 20)

WATER QUALITY DATA

DATE	TIME	TYPE	DIS-CHARGE (CFS)	TEMP-ERATURE (DEG C)	AIR TEMP-ERATURE (DEG C)	DIS-SOLVED OXYGEN (MG/L)	PER-CENT SATUR-ATION	TOTAL NITRO-GEN (N) (MG/L)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)
MAY , 1970									
22...	0800	2	--	13.0	--	--	--	--	--
JUNE									
19...	1735	2	--	14.0	--	--	--	--	--
JULY									
30...	1400	2	152	13.0	--	10.3	107	--	.12
AUG.									
26...	1550	2	--	13.0	--	10.0	104	--	.76
OCT.									
02...	0745	2	--	13.0	9.6	--	--	--	.05
NOV.									
12...	1450	2	332	9.5	8.0	10.2	98	--	.18
JAN., 1971									
28...	0810	2	--	4.5	--	11.8	101	--	.18
MAR.									
23...	1345	2	--	6.0	--	11.3	100	--	.55
MAY									
13...	1400	2	--	10.5	20.0	10.3	101	--	.22
JUNE									
17...	1245	2	--	15.0	24.5	9.3	101	--	.29
JULY									
15...	1410	2	171	16.0	31.0	9.2	101	--	.35
AUG.									
12...	0715	2	151	9.5	17.0	10.3	99	--	.27
SEP.									
16...	0900	2	136	8.5	10.5	10.7	101	.20	.12

DATE	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L)	DIS-SOLVED NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TUR-BID-ITY (JTU)	FECAL COLI-FORM (COL. PER 100 ML)	IMME-DIATE COLI-FORM (COL. PER 100 ML)
MAY , 1970								
22...	--	--	--	--	--	--	--	1
JUNE								
19...	--	--	--	--	--	--	2	4
JULY								
30...	--	.05	.050	--	--	--	--	13
AUG.								
26...	--	.05	.070	130	7.8	1	3	8
OCT.								
02...	--	.11	.10	--	--	--	6	12
NOV.								
12...	--	.09	.050	126	7.8	--	--	220
JAN., 1971								
28...	--	.14	.050	118	7.6	--	18	120
MAR.								
23...	.10	--	.15	111	7.3	--	6	243
MAY								
13...	.00	--	.070	86	7.6	--	10	650
JUNE								
17...	.04	--	.050	99	7.5	--	0	940
JULY								
15...	.08	.08	.080	122	7.6	--	2	1200
AUG.								
12...	.06	.06	.040	123	7.6	--	4	1400
SEP.								
16...	.08	.08	.090	127	7.8	--	6	3600

Table 12.--Continued

11-3414.60 SACRAMENTO RIVER AT SODA CREEK ROAD, NEAR DUNSMUIR (SITE 21)

WATER QUALITY DATA

DATE	TIME	TYPE	DIS-CHARGE (CFS)	TEMP-ERATURE (DEG C)	AIR TEMP-ERATURE (DEG C)	DIS-SOLVED OXYGEN (MG/L)	PER-CENT SATUR-ATION	TOTAL NITRO-GEN (N) (MG/L)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)
MAY , 1970									
22...	--	2	555	--	--	--	--	--	--
JUNE									
19...	1830	2	228	17.0	--	--	--	--	--
AUG.									
28...	1440	2	129	15.0	--	10.0	106	--	.39
OCT.									
02...	0930	2	126	8.0	--	11.1	101	--	.16
NOV.									
13...	0825	2	329	7.5	3.5	10.8	97	--	.17
JAN., 1971									
28...	0900	2	362	4.0	--	12.0	99	--	.79
MAR.									
23...	1015	2	566	6.0	9.0	11.4	99	--	.65
MAY									
13...	1500	2	1280	11.5	20.5	10.1	100	--	.20
JUNE									
17...	1315	2	410	16.0	23.5	9.6	104	--	.40
JULY									
15...	1545	2	184	19.0	33.0	9.0	105	--	.44
AUG.									
12...	0945	2	161	12.5	27.0	10.2	103	--	1.3
SEP.									
16...	1415	2	147	14.0	28.0	10.2	106	.18	.12

DATE	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L)	DIS-SOLVED NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TUR-BID-ITY (JTU)	BIO-CHEM-ICAL OXYGEN DEMAND (MG/L)	FECAL COLI-FORM (COL. PER 100 ML)	IMME-DIATE COLI-FORM (COL. PER 100 ML)
MAY , 1970									
22...	--	--	--	--	--	--	--	--	7
JUNE									
19...	--	--	--	--	--	--	--	20	78
AUG.									
28...	--	.07	.080	134	8.2	0	--	2	12
OCT.									
02...	--	.09	.10	--	--	--	--	2	52
NOV.									
13...	--	.09	.040	121	7.7	--	--	--	220
JAN., 1971									
28...	--	.09	.030	99	7.8	--	--	24	200
MAR.									
23...	.10	--	.15	100	7.4	--	--	81	1500
MAY									
13...	.00	--	.070	86	8.0	--	--	13	850
JUNE									
17...	.03	--	.050	99	8.1	--	--	8	1100
JULY									
15...	.04	.04	.080	123	8.3	--	--	2	1400
AUG.									
12...	.04	.04	.040	125	8.1	--	--	28	2000
SEP.									
16...	.06	.06	.10	132	8.3	--	--	0	640

Table 12.--Continued

11-3420.00 SACRAMENTO RIVER AT DELTA (SITE 22)

WATER QUALITY DATA

DATE	TIME	TYPE	DIS-CHARGE (CFS)	TEMP-ERATURE (DEG C)	AIR TEMP-ERATURE (DEG C)	DIS-SOLVED OXYGEN (MG/L)	PER-CENT SATUR-ATION	TOTAL NITRO-GEN (N) (MG/L)
MAY , 1970								
22...	1030	2	984	--	--	--	--	--
JUNE								
19...	1920	2	396	20.0	--	--	--	--
AUG.								
28...	1675	2	182	19.0	--	9.7	108	--
OCT.								
02...	1215	2	188	13.5	31.2	10.9	108	--
NOV.								
13...	1015	2	977	7.5	--	11.4	98	--
JAN., 1971								
28...	1045	2	1620	5.5	--	12.3	102	--
MAR.								
23...	0830	2	2270	6.5	7.5	11.7	99	--
MAY								
14...	0900	2	2280	9.0	18.0	10.9	99	--
JUNE								
17...	1500	2	722	17.0	30.0	9.6	102	--
JULY								
15...	1845	2	320	21.0	28.0	8.6	100	--
AUG.								
12...	1215	2	236	22.5	34.5	9.4	112	--
SEP.								
16...	1625	2	204	18.5	33.5	9.8	108	.20

DATE	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L)	DIS-SOLVED NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	BIO-CHEM-ICAL OXYGEN DEMAND (MG/L)	FECAL COLI-FORM (COL. PER 100 ML)	IMME-DIATE COLI-FORM (COL. PER 100 ML)
MAY , 1970									
22...	.00	--	.00	.31	--	--	--	--	7
JUNE									
19...	--	--	--	--	--	--	--	2	10
AUG.									
28...	.18	--	.02	.060	147	8.8	--	2	8
OCT.									
02...	.22	--	.00	.060	--	--	--	1	31
NOV.									
13...	.08	--	.05	.020	106	8.0	--	--	80
JAN., 1971									
28...	.10	--	.02	.010	80	7.8	--	11	56
MAR.									
23...	.60	.10	--	.10	82	7.3	--	31	1020
MAY									
14...	.25	.03	--	.070	73	7.9	--	2	1200
JUNE									
17...	.25	.00	--	.040	96	8.1	--	3	220
JULY									
15...	.44	.02	.02	.070	124	8.3	--	8	2100
AUG.									
12...	.31	.00	.00	.050	133	8.4	--	9	6200
SEP.									
16...	.19	.01	.01	.080	143	8.7	--	0	1600

KALINITY···GAINING STREAM···SPECIFIC YIELD···MILLIGRAMS
ANSMISSIVITY···TEST WELL···HYDRAULIC CONDUCTIVITY···MO
PRINGS···FLOOD FREQUENCY···DIGITAL MONITOR···RAIN GAGE
SSOLVED SOLIDS···WATER QUALITY···TEMPERATURE···STAGE-
C···FLOODFLOW···PERCOLATION···CONFINING BED···METEORIC
ABLEWAY···TOTAL KJELDAHL NITROGEN···RUNOFF···PRECIPIT
TOMATIC ANALYZER···TURBIDITY···BIODEGRADATION···E. COL
ONE OF SATURATION···BASE OF FRESH WATER···DEPOSITION
CTRICAL LOGS···SAFE YIELD···EFFECTIVE PRECIPITATION···
SCHARGE···SALTWATER INTRUSION···HYDROGRAPHS···CONE OF
···HYDROLOGIC BUDGET···LIMNOLOGY···AQUICLUDE···WATER Y
ROSITY···LAKES···DRAINAGE DIVIDE···RESERVOIRS···CANALS
UGHNESS COEFFICIENT···GLACIER···SNOWMELT···PARTICLE S
···HEAD DECLINE···EUTROPHICATION···MOISTURE EQUIVALENT
ORDER···SEDIMENT TRANSPORT···DYE TRACER···STREAM GAG
SSOLVED OXYGEN···SODIUM ADSORPTION···BIOCHEMICAL OXYG
TENTIOMETRIC SURFACE···INFILTRATION···HEAD···ACRE-FEET
VE SIZE···STREAMS···TOTAL NITROGEN···GRAIN SIZE···GA
···CUBIC FEET PER SECOND···SLOPE-AREA METHOD···DRAINAG
ANIC POLLUTION···SPECIFIC CONDUCTANCE···TOTAL ORGANIC
TER TABLE···HYDROLOGY···SUBSURFACE GEOLOGY···DIVERSI