

**Water Quality Status Report No. 13**

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**WATER QUALITY SURVEY**

**BEAR LAKE**

**Gene L. Ralston  
and  
Gordon Hopson**

**Environmental Protection Division  
Idaho Department of Environmental Protection and Health  
Boise, Idaho  
August 1972**

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## INTRODUCTION

On August 1, 1972 a water quality survey was conducted on Bear Lake in Bear Lake County, Idaho, and Rich County, Utah, in cooperation with the Utah State Division of Health. This survey was conducted to determine the effects of urban and residential development around the lake and the status of cultural and natural eutrophication.

Bear Lake has a surface area of about 110 square miles when full. The maximum depth is reported to be near 200 feet.

The lake has considerable recreation value and is important as a fishery. It is also used as a public water supply by the Idaho Department of Parks at North Beach State Park. The lake should be sufficiently protected to maintain and enhance these values.

## METHODS

All sampling on Bear Lake was conducted by boat. Water samples for fecal and total coliform analyses were taken at 37 locations, primarily near developed areas around the shoreline (Figure I). Samples for general chemical analyses were taken at three of these locations.

All samples taken for coliform analyses were iced and transported to the regional laboratory in Pocatello. Samples for general chemical analyses were frozen and transported to the central laboratory in Boise. Temperature and dissolved oxygen were determined in the field.

A 60-foot vertical plankton haul was taken at station 31 for plankton analysis.

## RESULTS AND DISCUSSION

### I. Fecal and Total Coliform Analyses

The results of the fecal and total coliform analyses run on water samples from Bear Lake and small tributary streams are shown in Table I.

In general, the bacteriological quality of the water was good. Five of the stations sampled exceeded the Idaho total coliform concentration standard of 240 organisms per 100 ml.; two of those stations were tributary streams on the south end of the lake in Utah. One of the streams also exceeded the Idaho standard for fecal coliform bacteria. At all other stations the coliform bacteria concentrations were within acceptable limits.

## II. Physical and General Chemical Analyses

The results of chemical analyses are shown in Table II. Surface temperature ranged from 21°C to 24°C. Dissolved oxygen concentration was near 100 percent saturation at the stations sampled. The lake contained high concentrations of total solids, as well as calcium and magnesium. Alkalinity and hardness were also quite high. The major algal nutrients (nitrogen and phosphorus) were present in very low concentrations and may be limiting algal production.

## III. Plankton Analysis

A 60-foot vertical plankton haul was taken in the southeastern part of the lake. The results of the plankton identification and enumeration are shown in Table III. The net plankton was composed primarily of diatoms which indicate high quality water. The exceedingly low numbers of organisms are indicative of very low primary productivity in the lake.

Additional plankton hauls should be taken in different parts of the lake in future studies to get a more accurate characterization of primary productivity.

### SUMMARY AND RECOMMENDATIONS

The results of this survey indicate there is some degradation of water quality in the littoral areas around the highly developed sections of the lakeshore.

This is probably due to untreated or improperly treated domestic sewage. Large numbers of swimmers using the beach areas may also contribute substantial numbers of coliform bacteria.

Since Bear Lake is extensively used for water contact recreation, it is recommended that all sewage be properly collected and treated to prevent unnecessary enrichment and possible pathogenic contamination of the lake. It is further recommended that periodic studies be made on the lake to monitor changes in the water quality.

TABLE I  
Coliform Analyses  
Bear Lake  
August 1, 1972

Station	Fecal/100 ml.	Total/100 ml.
1. North end; East of St. Charles Creek	2	2
2. East of City of St. Charles	2	2
3. Cabin area 2 mi. North of Fish Haven	2	16
4. 1 mi. North of Lake Front Estates	2	360
5. Lake Front Estates, North side	2	6
6. North of Fish Haven dock area, brown cabin	2	10
7. Fish Haven public beach near Texaco dock	2	14
8. South of Texaco dock; A-frame cabin area	2	130
9. Cabin area, South of Station 8, sea wall near landing area	2	4
10. Next cabin area South of Station 9	2	840
11. Near flagpole in next cabin area	2	36
12. Drainage pipe near next cabin	2	170
13. Concrete seawall North of flagpole	2	2
14. Cabin area near Utah-Idaho Supper Club	2	2
15. Between two A-frame cabins in next small cove	2	20
16. Cabin area North of Bear Lake Marina	2	12
17. Bear Lake State Park (Utah) Marina	2	2
18. Cabin area East of Garden City (near flagpole)	2	10
19. Dock at Holiday Marina	2	2
20. Blue Water Beach	2	48
21. Sweetwater Beach	2	100

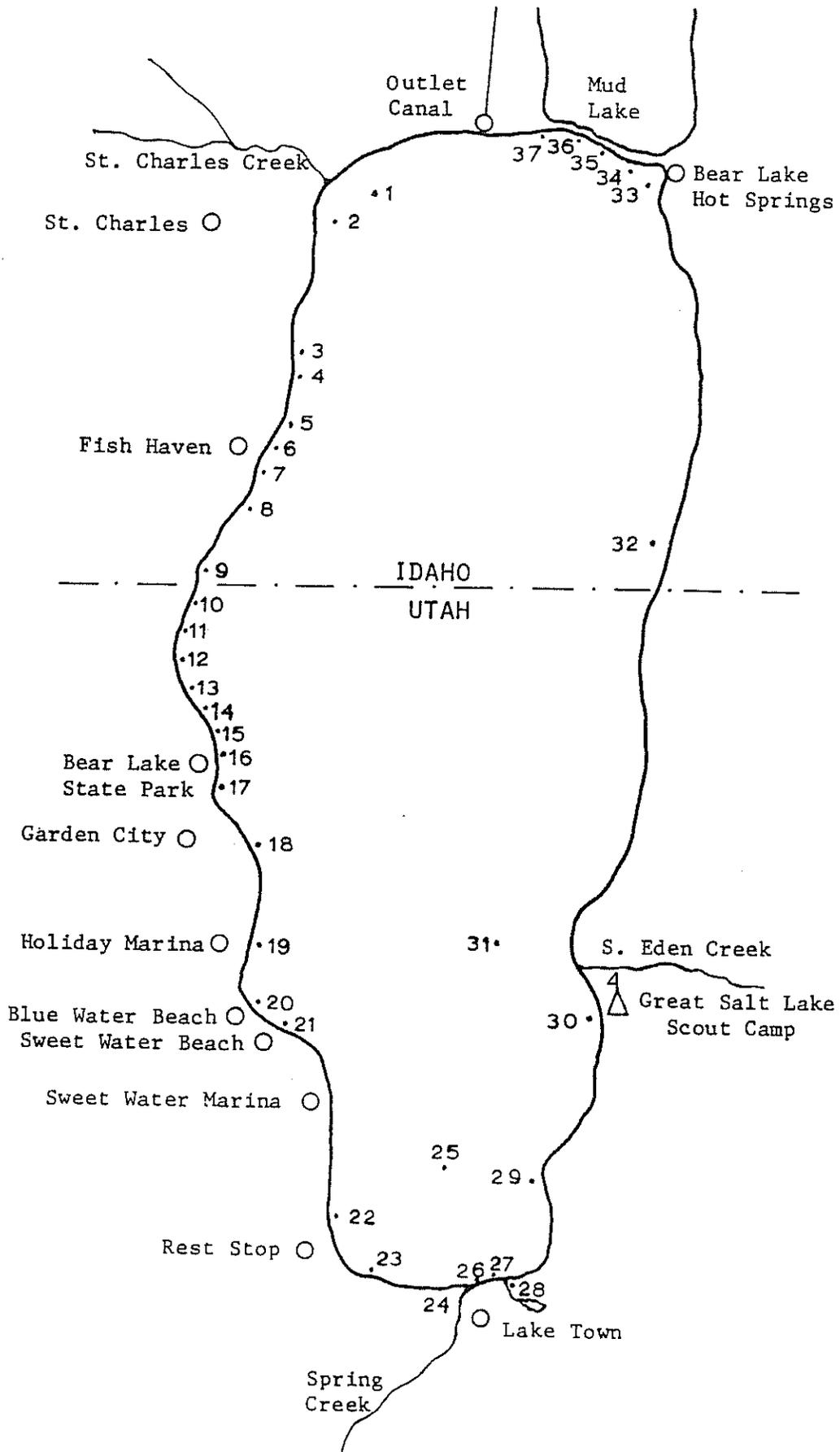


Figure I. Bear Lake Water Quality Sampling Stations

Table I cont'd.

Station	Fecal/100 ml.	Total/100 ml.
22. 3/4 mi. North Utah Highway 30 Rest Stop	2	28
23. Between Rest Stop and Spring Creek	2	2
24. Spring Creek; South end of Bear Lake	28	8400
25. Middle of South end; 2 mi. off shore	2	6
26. Middle of South end; near log seawall	2	900
27. Southeast corner near yellow house with 1/2 rock facing	2	2
28. Small Creek; Southeast corner; between log cabin and pine siding cabin	350	140,000
29. Last cabin area; Southeast side	2	2
30. Off shore from Great Salt Lake Council Scout Camp	2	2
31. 1 mi. offshore, West of South Eden Creek	2	2
32. Cabin area, East side of Lake, North of Idaho-Utah boundary	2	2
33. Offshore from Bear Lake Hot Springs	2	2
34. North Beach, East area	2	2
35. North Beach, mid-East area	2	2
36. North Beach, mid-West area	2	2
37. North Beach, West area	2	2

TABLE II  
Physical and Chemical Factors  
Bear Lake  
August 1, 1972

Parameter	Station		
	1	25	31
Transparency <sup>1</sup>	(too shallow)	13'	18'
Temperature (°C)	21°	24°	23.5°
DO	7.2	6.8	6.8
BOD	0.1	0.2	0.1
COD	18.2	8.2	12.3
pH (lab)	8.4	8.1	8.5
Total Solids	696	684	660
Sp. Conductance	660	670	640
Alkalinity (CaCO <sub>3</sub> )	300	230	290
Hardness (CaCO <sub>3</sub> )	308	336	336
Calcium	27	32	32
Magnesium	58	61	61
Iron	0.17	0.12	0.07
Manganese	0.01	0.01	0.02
Sodium	88	94	92
Chloride	48	55	60
Sulphate	72	43	37
Nitrate	0.7	0.7	0.8
Nitrite	0.002	0.001	0.002
Ammonia	0.5	0.6	0.6
O-Phosphate	0.02	0.01	0.01
Silica	30.2	37.2	30.6
Potassium	3.0	4.0	3.8

1) Secchi Disk Transparency

TABLE III  
Plankton Analysis  
Bear Lake  
Station 31  
August 1, 1972

<u>Organism</u>	<u>No. per liter</u>
<u>Tabellaria</u> sp.	110
<u>Staurostrum</u> sp.	46
<u>Vorticella</u> sp.	38
<u>Fragilaria crotonensis</u>	30
Copepods	23
<u>Ceratium hirundinella</u>	8
<u>Asterionella</u> sp.	4