

TABLE XIII  
FISHES TAKEN IN MELTON HILL RESERVOIR  
AREA SAMPLES

## Both Before and After Impoundment

Longnose gar	<i>Lepisosteus osseus</i>
Skipjack herring	<i>Alosa chrysochloris</i>
Gizzard shad	<i>Dorosoma cepedianum</i>
Threadfin shad	<i>Dorosoma petenense</i>
Rainbow trout	<i>Salmo gairdneri</i>
Stoneroller	<i>Campostoma anomalum</i>
Carp	<i>Cyprinus carpio</i>
Common shiner	<i>Notropis cornutus</i>
Whitetail shiner	<i>Notropis galacturus</i>
Spotfin shiner	<i>Notropis spilopterus</i>
Fathead minnow	<i>Pimephales promelas</i>
River carpsucker	<i>Carpiodes carpio</i>
Quillback	<i>Carpiodes cyprinus</i>
White sucker	<i>Catostomus commersoni</i>
Northern hog sucker	<i>Hypentelium nigricans</i>
Smallmouth buffalo	<i>Ictiobus bubalus</i>
Bigmouth buffalo	<i>Ictiobus cyprinellus</i>
Silver redhorse	<i>Moxostoma anisurum</i>
Shorthead redhorse	<i>Moxostoma breviceps</i>
River redhorse	<i>Moxostoma carinatum</i>
Black redhorse	<i>Moxostoma duquesnei</i>
Golden redhorse	<i>Moxostoma erythrurum</i>
Channel catfish	<i>Ictalurus punctatus</i>
Flathead catfish	<i>Pylodictis olivaris</i>
White bass	<i>Roccus chrysoptis</i>
Rock bass	<i>Ambloplites rupestris</i>
Warmouth	<i>Chaenobryttus gulosus</i>
Bluegill	<i>Lepomis macrochirus</i>
Smallmouth bass	<i>Micropterus dolomieu</i>
Spotted bass	<i>Micropterus punctulatus</i>
White crappie	<i>Pomoxis annularis</i>
Logperch	<i>Percina caprodes</i>
Sauger	<i>Stizostedion canadense</i>
Freshwater drum	<i>Aplodinotus grunniens</i>
Banded sculpin	<i>Cottus carolinae</i>

## Before Impoundment Only

Spotted gar	<i>Lepisosteus oculatus</i>
Mooneye	<i>Hiodon tergisus</i>
Bigeye chub	<i>Hybopsis amblops</i>
River chub	<i>Hybopsis micropogon</i>
Warpaint shiner	<i>Notropis coccogenis</i>
Blacknose dace	<i>Rhinichthys atratulus</i>
Blue sucker	<i>Cycleptus elongatus</i>
Black buffalo	<i>Ictiobus niger</i>
Blackspotted topminnow	<i>Fundulus olivaceus</i>
Dollar sunfish	<i>Lepomis marginatus</i>
Greenside darter	<i>Etheostoma blennioides</i>
Blueside darter	<i>Etheostoma jessiae</i>

## After Impoundment Only

Goldfish	<i>Crassius auratus</i>
Golden shiner	<i>Notemigonus crysoleucas</i>
Emerald shiner	<i>Notropis atherinoides</i>
Bluntnose minnow	<i>Pimephales notatus</i>
Spotted sucker	<i>Minytrema melanops</i>
Highfin carpsucker	<i>Carpiodes velifer</i>
Brown bullhead	<i>Ictalurus nebulosus</i>
Mosquitofish	<i>Gambusia affinis</i>
Largemouth bass	<i>Micropterus salmoides</i>
Redbreast sunfish	<i>Lepomis auritus</i>
Redear sunfish	<i>Lepomis microlophus</i>
Johnny darter	<i>Etheostoma nigrum</i>
Walleye	<i>Stizostedion vitreum vitreum</i>

Names are according to American Fisheries Society Special Publication No. 2, 1960.

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## A BACTERIOLOGICAL SURVEY OF LAKE BARKLEY<sup>1</sup>

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### INTRODUCTION

With the impoundment of Lake Barkley on the lower Cumberland River in July 1966, another recreational facility was added to the ever growing number in the Tennessee Valley area. Water skiing, boating and fishing have been increasing on this part of the Cumber-

land River for several years, but with impoundment, the rate of increase will accelerate. The establishment of Land Between the Lakes, a national outdoor recreation and conservation education center being developed by the Tennessee Valley Authority, and forming the west shore for approximately 42 miles on the lower end of the Lake, is expected to make Lake Barkley a major recreation facility. Compounding its significance

<sup>1</sup> This study was supported in part by the Tower Club, a local philanthropic organization.

is the fact that a number of municipalities obtain their water supply from the Lake. It thus becomes highly desirable to know the sanitary condition of the water; to learn the areas, sources, extent, nature and persistence downstream of any bacterial pollution.

To obtain data relating to general sanitation, a bacteriological survey of Lake Barkley from mile 132.4, approximately eight miles upstream from Clarksville, Tennessee to Barkley Dam, Kentucky, a distance of approximately 102 miles, was made during February and April 1967.

Lake Barkley extends 118.1 miles from the Dam at mile 30.6 on the Cumberland River upstream to Cheatham Lock and Dam at mile 148.7, 42 miles below Nashville. Except during flood stage, the lake

surface varies from a minimum of 45,210 acres to a maximum of 57,920 acres. It traverses or borders parts of Livingston, Lyon, Caldwell and Trigg Counties in Kentucky, and Stewart, Montgomery, Houston, Dickson, and Cheatham Counties in Tennessee. The water is influenced primarily by the quality of sewage treatment at Clarksville, Cumberland City, Dover, and Erin in Tennessee, and Fort Campbell, Cadiz, and Eddyville in Kentucky, as well as the quality of the water which enters at Cheatham Lock and Dam. Sewage disposal plants are operated with varying efficiencies at Clarksville, Fort Campbell, Erin, Dover, Cadiz, etc. as well as at smaller stations such as trailer courts. The effluent from these systems is dumped either directly or indirectly into the Lake.

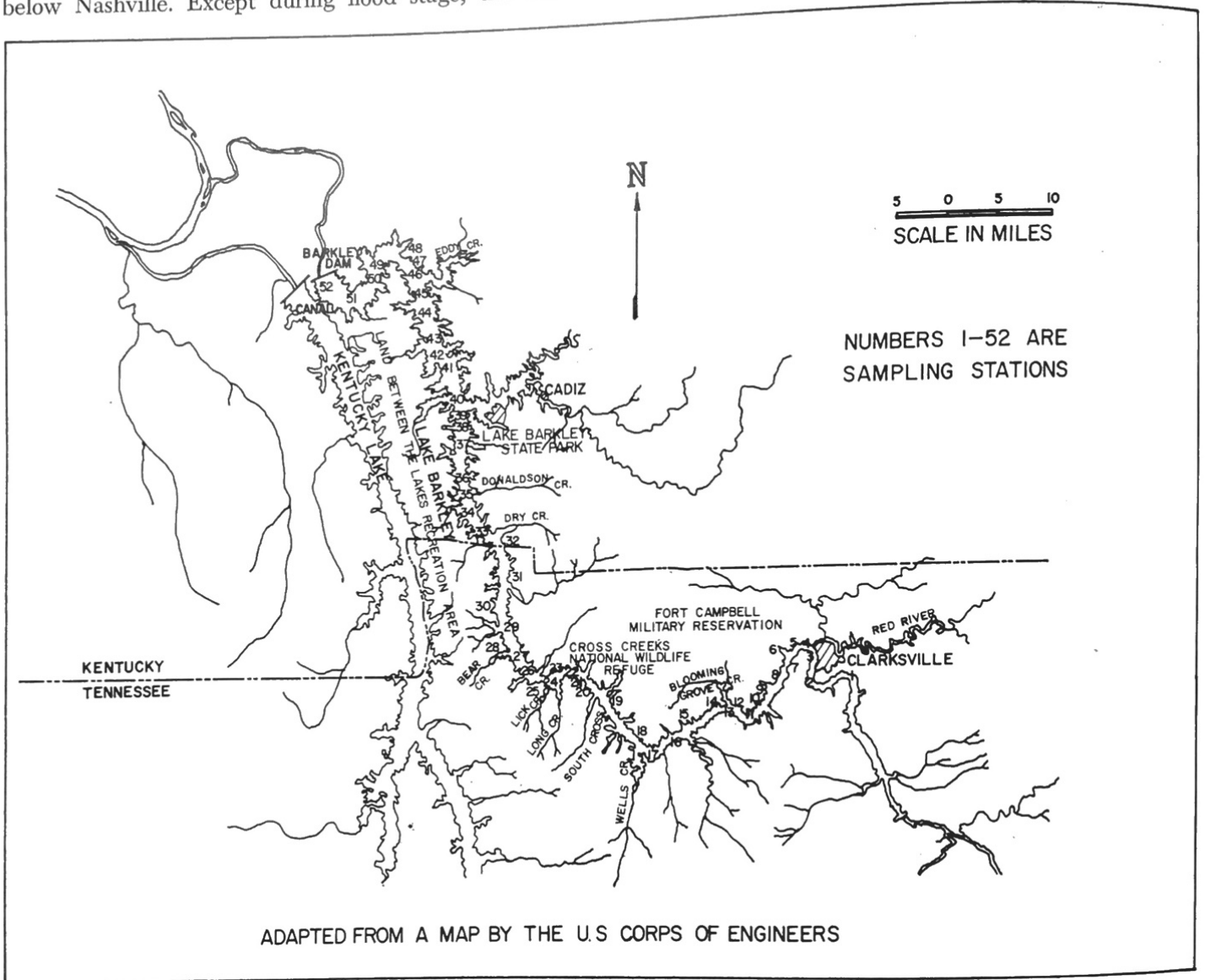


Fig. 1. Lake Barkley and vicinity.

**METHODS**

To obtain a composite picture of the quality of water in the Lake as indicated by enteric bacteria, sampling stations were established regularly every two miles and additionally at suspected pollution sources. Fifty-two such stations were thus selected (Fig. 1 and Table I).

Top samples, at the one foot depth, were taken at every station. Bottom samples were taken at every

even-numbered station and at five odd-numbered stations. To minimize error, at each station the composite top sample was formed by mixing water taken from near each shore and in midstream. A sewage sampler was used for collecting bottom samples. Collections were immediately refrigerated to minimize changes in the number of bacteria present. The sampling boat was met by car at Dover and at Barkley Dam, and the

samples returned to the laboratory for immediate testing, thus assuring that all tests were run within five hours of collection of the specimens.

The micropore filter technique was used for the bacterial study utilizing grid-marked filters with 0.45 micron pore size. Coliform count was determined by growing the organisms on Difco-m Endo Broth MF, while the fecal streptococcus count was determined by growing on Difco-m Enterococcus Agar. Colony counts were made with a 9X binocular dissecting microscope under good light and by observing the characteristic sheen of the coliform colonies and color of fecal streptococcus colonies growing on these differential, selective media. Two filtrate volumes were used for every test, 1 and 10 ml. for the coliform count and 10 and 100 ml. for the fecal streptococcus count. The bacterial count per 100 ml. of water is shown in Table I for the three sampling dates.

### RESULTS

The Tennessee Stream Pollution Control Board (1958, 1964, 1966) has set standards for water quality for various uses as follows: Source of domestic raw water supply—less than 5000 coliform bacteria per 100 ml. (1966); swimming—less than 1000 coliform bacteria per 100 ml. (1958). They also state that water with over 10 fecal streptococci per 100 ml. is of doubtful sanitary quality and greater than 100 per 100 ml. indicates a high degree of recent fecal pollution (1964). Using these standards, several points of pollution were located in Lake Barkley.

At the Clarksville Conservation Club which is one-third mile below the municipal water intake the coliform count ranged from 6800 to 14,000 per 100 ml. There is indication that this is due to frequent overflow of the sewage line at the lift station about two miles upstream as well as to septic tank effluents from a new sub-division.

The worst pollution was encountered at the mouth of Red River at Clarksville, Tennessee at mile 125.2.

Not only were the coliform and fecal streptococcus counts very high at each sampling—up to 47,000 and 612 per ml. respectively—but the water often had a filthy scum and foul odor. Untreated industrial waste is probably the major offender at this point, although the efficiency of the Clarksville disposal plant which also enters via Red River is unknown to us. Notice of these two situations has been conveyed to the Tennessee Stream Pollution Control Board and plans are being instituted to abate these sources of pollution.

In the vicinity of Dover, Tennessee, heavy pollution was indicated on two of the three sampling dates. The number of coliform bacteria per 100 ml. ranged from 2700 to 10,000 in top samples. This is presumed to be from sewage although the city is served by a disposal plant.

The third major contamination area was at station 41, one mile below Rockcastle, Kentucky. The pollution sources at this point is unknown to us; therefore further study is needed.

The last major area of pollution was at station 48, below the Kentucky State Penitentiary, one-fourth mile east of Old Eddyville, at mile 43.5. Here the coliform count ranged from 21,000 to 32,000 per 100 ml.

The fecal streptococcus count usually was high at stations with a high coliform count but this was not always true.

The bacterial count was low enough to be considered safe for water skiing and swimming at only a few stations. Station 34 at Ford's Creek, mile 69.6, and station 37, one-fourth mile above Hopson Creek, mile 62.4, consistently gave the lowest coliform count of all stations. Reasons for these low counts are unknown.

### LITERATURE CITED

- Tennessee Stream Pollution Control Board. 1958. Bacteriological Survey of Old Hickory Reservoir. Tenn. Dept. of Pub. Heal. p. 18.  
 ———. 1966. Public Hearing on Policies and Water Quality Criteria for Tennessee. Tenn. Dept. of Pub. Heal. p. 12.  
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TABLE I

NUMBER OF COLIFORM AND FECAL STREPTOCOCCUS BACTERIA PER 100 ML. WATER AT THE VARIOUS COLLECTING STATIONS FEB. 11, APR. 1 AND 15, 1967. (B = BOTTOM SAMPLES).

Station	Location of Station	Coli./ 100 ml. H <sub>2</sub> O Feb. 11	Strep./ 100 ml. H <sub>2</sub> O Feb. 11	Coli./ 100 ml. H <sub>2</sub> O Apr. 1	Strep./ 100 ml. H <sub>2</sub> O Apr. 1	Coli./ 100 ml. H <sub>2</sub> O Apr. 15	Strep./ 100 ml. H <sub>2</sub> O Apr. 15
1	Conservation Club, mi. 132.3			14,000		6,800	
2	Mi. 127.3	4,000	36	4,900	8	3,000	4
2B		2,200	50	3,100	15	6,000	2
3	Boat Ramp. mi. 126.2	1,900	31	2,700	16	2,000	3
3B				2,200			
4	Red River mi. 125.2	44,000	612	39,000	345	47,000	456
4B		46,000	588	27,300	253	44,000	300
5	Mi. 123.2	5,200	167	7,400	86	4,000	25
6	Mi. 122.1	3,200	54	8,700	88	5,000	65
6B		1,700	34	6,500		6,000	86

(Continued)

Station	Location of Station	Coli./ 100 ml. H <sub>2</sub> O Feb. 11	Strep./ 100 ml. H <sub>2</sub> O Feb. 11	Coli./ 100 ml. H <sub>2</sub> O Apr. 1	Strep./ 100 ml. H <sub>2</sub> O Apr. 1	Coli./ 100 ml. H <sub>2</sub> O Apr. 15	Strep./ 100 ml. H <sub>2</sub> O Apr. 15
		1,600	38	9,500	101	6,000	14
7	Old Lime Works						
	mi. 120.8						
8	Budds Creek	1,300	56	4,700	77	3,000	25
	mi. 119						
8B		2,400	30	4,500	99	4,000	25
9	Hematite Day Mark	2,500	46	7,100	128	4,000	11
	mi. 117.6						
10	Budds Creek	3,000	68	4,300	87	1,000	8
	mi. 116.1						
10B		3,400	56	5,400	74	1,000	3
11	Palmyra	4,600	143	10,800	58	2,000	3
	mi. 114.5						
12	Outlaw Branch	4,300	84	4,300	62	5,000	6
	mi. 113.1						
12B		2,600	131	11,600	56	3,000	6
13	Sugar Creek	6,500	38	6,800	51	1,000	6
	mi. 111.5						
14	Near Bessie Branch	4,800	45	4,800	54	3,000	2
	mi. 109.8						
14B		5,400	55	4,500	63	3,000	3
15	Yellow Creek	5,400	34	5,100	53	2,000	15
15B		8,700	41	6,000	43		
16	Marshall Creek	2,000	33	3,100	38	12,000	6
	mi. 107.2						
16B						14,000	7
17	Mi. 105.5	5,900	27	3,000	11	4,000	18
18	Cumberland City	2,800	27	2,300	14	1,000	9
	mi. 104.3						
18B		9,500	34	2,500	15	1,500	7
19	North Cross Creeks	8,400	42	2,400	19	4,000	8
	mi. 95.8						
20	Near Cub Creek	3,400	34	2,500	18	3,000	3
	mi. 94.0						
20B		5,800	40		17	2,000	7
21	Blood Creek	3,800	36	3,900	16	2,000	14
	mi. 93						
22	Mi. 92	2,600	30	2,700	12	5,000	3
22B		2,200	35		31	5,500	4
23	Mi. 91	2,400	36	2,500	11	4,000	4
24	Mi. 89.3	2,700	30	2,800	5	10,000	4
24B		1,500		5,100	4	7,500	5
25	Bridge at Dover	3,000	14	3,500	18	8,000	3
	mi. 88.7						
25B			18	3,900	4		1
26	Boat Ramp at Dover	2,900	18	6,100	7	4,000	19
	mi. 88.2						
26B		2,000	20				24
27	Near Cow Creek	2,200	5	4,000	3	3,000	1
	mi. 86.2						
27B				4,000			
28	Jackson Landing	1,500	2	2,000	8	2,000	1
	mi. 84.1						
28B		2,000	3		8	1,500	3
29	Bear Creek Light	1,200	4	1,000	4	1,000	2
	mi. 81.6						
30	Mannings Landing	3,500	5	1,000	12	2,000	7
	mi. 78.1						
30B		2,900	5	5,000	16	3,000	7

(Continued)

Station	Location of Station	Coli./ 100 ml. H <sub>2</sub> O Feb. 11	Strep./ 100 ml. H <sub>2</sub> O Feb. 11	Coli./ 100 ml. H <sub>2</sub> O Apr. 1	Strep./ 100 ml. H <sub>2</sub> O Apr. 1	Coli./ 100 ml. H <sub>2</sub> O Apr. 15	Strep./ 100 ml. H <sub>2</sub> O Apr. 15
31	Tobacco Port mi. 78.1	1,200	2	2,000	15	1,500	1
32	Trigg Co. Line mi. 74.7	1,000	10	4,000	19	3,500	7
32B		1,100	4		19	4,200	5
33	Barkley Lake Near House Cemetery mi. 73.0	800	4	1,000	7	1,000	2
33B				5,000			
34	Fords Creek mi. 69.6	1,000	9	500	6	500	8
34B		600	7		7	1,500	5
35	Donaldson Creek mi. 67.7	900	3	2,000	11	2,700	1
36	North West Terrapin Branch mi. 65.2	700	1	500	3	1,000	0
36B		1,000	5	2,000	10	2,300	3
37	Hopson Creek mi. 62.4	700	3	0	3	500	1
38	Mi. 60.6	500	2	1,000	3	2,300	0
38B		400	8	1,000	2	2,500	8
39	Little River mi. 59.1	300	6	0	1	1,000	0
40	Wadlington Cemetery mi. 57.1	400	2	1,000	4	3,500	72
40B		300	0	1,000	4	4,000	61
41	Hurricane Creek mi. 55.0	7,000	5	32,000	0	15,000	18
42	Shelley Island mi. 53.0	3,300	1	4,500	1	5,000	17
42B				2,000	4	6,000	41
43	Dryden Creek mi. 51.8	1,200	1	1,000	1	2,000	8
44	Commerce Landing mi. 50.1	500	3	3,000	3	3,500	6
44B				6,000	3	4,600	19
45	Near Clay Creek mi. 47.5	300	1	3,000	2	3,000	1
46	Tinsley Hollow mi. 46.1	400	2	5,000	0	2,000	6
46B				4,000		3,000	54
47	Kentucky State Prison mi. 43.7	200	0	2,000	1	4,000	6
48	Cove Below Prison mi. 43.5			21,000	30	32,000	38
48B				20,000		36,000	182
49	Ingram Shoals mi. 40.9			5,000	1	6,000	7
50	Money Cliff mi. 39.0			2,000	0	2,000	0
50B				4,000		2,500	5
51	West of Smith Cemetery mi. 35.6			1,000	0	2,000	2
52	West of Canal mi. 32.2			3,000	0	1,000	6
52B				7,000		1,600	4