Table Rock Lake

Region - Ozark Highlands

Table Rock Lake is a 43,100 acre Army Corps of Engineers reservoir located in southwest Missouri. This lake is in the White River system and is preceded upstream by Beaver Lake in northwest Arkansas. The lake consists of a long, winding main branch and three major arms. Kings River and Long Creek flow north out of Arkansas to enter Table Rock Lake while the James River flows south from the central Ozark Highlands Region. The majority of the lake's watershed is forested, but development around the lake and urban areas on the lake's tributaries threaten water quality.

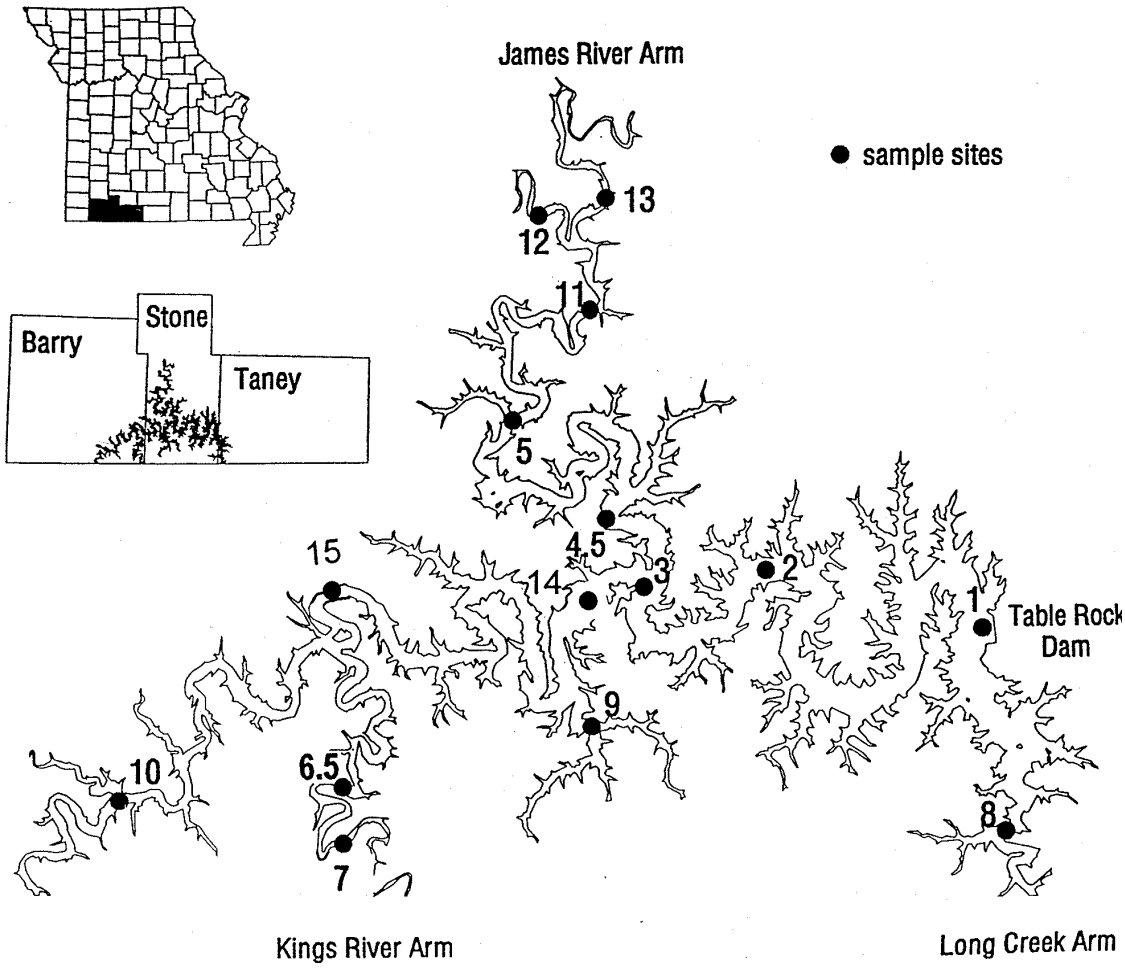

Figure 46. Location of Table Rock Lake sample sites.

Data was collected at 18 sites on Table Rock Lake during 1999. Monitoring was limited to Secchi transparency readings at three of the sites. Six Secchi readings were taken at the Viola site on the Kings River Arm. Sites at the mouths of Schooner and Fisher creeks (near Kimberling City) each had four Secchi readings recorded.

Sites monitored for all parameters had at least seven samples collected with the exception of Site 14 which was sampled six times and sites 5 and 11 which were each sampled twice. Due to the low number of samples, sites 5 and 11 were not included in the figures comparing sites across the lake.

Table 22. Trophic classifications for 1999 based on average phosphorus, nitrogen and chlorophyll values.

Main Lake Channel	Tributaries	James River Arm
Site 1 - oligotrophic	Site 6.5 - eutrophic	Site 4.5 - eutrophic
Site 2 - mesotrophic	Site 7 - eutrophic	Site 13 - eutrophic
Site 3 - mesotrophic	Site 8 - mesotrophic	
Site 14 - mesotrophic	Site 9 - mesotrophic	
Site 15 - mesotrophic	Site 12 - hypereutrophic	
Site 10 - mesotrophic		

- Conditions ranged from oligotrophic to hypereutrophic during 1999.
- Sites in the James River represent the full range of eutrophic conditions. (See page 8 for trophic criteria.) Site 13 was almost hypereutrophic while Site 4.5 was near mesotrophic conditions.

Table 23. Descriptive statistics from the main lake channel sites on Table Rock Lake - 1999.

Parameter		Site 10	Site 15	Site 14	Site 3	Site 2	Site 1
Nitrogen (µg/L)	average	359	276	437	441	336	286
	median	355	280	315	335	300	260
	minimum	250	220	230	200	220	180
	maximum	520	310	930	940	610	530
Phosphorus (µg/L)	average	16	13	13	12	13	9
	median	16	12	12	13	11	9
	minimum	12	11	8	8	9	6
	maximum	26	16	21	18	17	11
Chlorophyll (µg/L)	average	11.0	13.4	11.0	9.3	9.5	5.1
	median	7.5	13.1	11.7	9.5	8.9	4.2
	minimum	3.6	8.6	6.1	3.6	5.5	3.3
	maximum	27.8	21.6	16.0	17.5	15.5	8.5
Secchi (inches)	average	88	74	67	81	91	127
	median	82	75	71	67	78	105
	minimum	61	60	56	48	60	84
	maximum	128	87	73	170	192	216

- Median nitrogen values were comparable for all main lake sites. Higher averages for sites 3 and 14 (and to a lesser extent sites 2 and 10) were due to early season samples with elevated nitrogen levels. Site 15 was not sampled until late June, so no elevated nitrogen values were recorded.
- Phosphorus values for the middle four main lake sites were extremely comparable. Site 10 had a little more phosphorus than the middle sites while levels were lower at the dam (Site 1).
- The highest chlorophyll values in the main lake channel occurred in the upper lake, with the maximum value being measured at Site 10. Site 15 had the highest average and median values. Moving towards the dam, chlorophyll values tended to decrease and become less variable.
- Secchi transparency readings reflected chlorophyll levels with the deepest Secchi readings corresponding to the lowest chlorophyll concentrations.
- Secchi readings taken at the mouths of Fisher and Schooner creeks averaged 85 and 87 inches respectively. These values were similar to the average at

nearby Site 2.

Table 24. Descriptive statistics from sites on the James River Arm of Table Rock Lake - 1999.

Parameter		Site 13	Site 11*	Site 5*	Site 4.5
Nitrogen (µg/L)	average	1184	713	550	533
	median	1040			375
	minimum	710	585	520	190
	maximum	2310	840	580	1020
Phosphorus (µg/L)	average	97	57	41	17
	median	88			15
	minimum	70	52	34	9
	maximum	137	62	48	31
Chlorophyll (µg/L)	average	37.4	35.3	23.1	10.8
	median	44.5			10.7
	minimum	2.6	25.5	21.3	5.0
	maximum	68.0	45.1	24.9	17.2
Secchi (inches)	average	36	35	43	69
	median	36			71
	minimum	31	32	37	53
	maximum	40	37	48	98

* These sites were only sampled twice so direct comparisons with other sites may not be valid.

- Nitrogen displayed a notable gradient in the James River Arm, with the average value at Site 13 being more than twice that found at Site 4.5.
- The gradient for phosphorus was more dramatic as the average for Site 13 was more than five times that of Site 4.5.
- Chlorophyll mimicked the nutrients with the average being 3.5 times higher at Site 13 than Site 4.5.
- Secchi readings were stable at Site 13, ranging only nine inches. Values at Site 4.5 were deeper but more variable.
- Average values for sites 5 and 11 were generally between those of sites 4.5 and 13.

Table 25. Descriptive statistics from tributary sites on Table Rock Lake - 1999.

Parameter		Site 12	Site 9	Site 8	Site 7	Site 6.5
Nitrogen (µg/L)	average	1375	424	385	681	418
	median	1190	310	260	735	340
	minimum	940	200	250	420	250
	maximum	2920	740	1050	940	840
Phosphorus (µg/L)	average	74	11	13	75	43
	median	36	11	12	71	29
	minimum	12	9	10	40	21
	maximum	323	13	21	124	131
Chlorophyll (µg/L)	average	75.3	8.8	9.2	36.3	16.5
	median	3.3	6.6	7.2	33.0	15.7
	minimum	0.8	3.9	4.1	4.6	6.8
	maximum	518.5	16.4	21.4	75.3	28.1
Secchi (inches)	average	41	102	75	28	47
	median	44	63	72	27	50
	minimum	14	52	54	10	24
	maximum	63	283	96	44	53

- Nitrogen concentrations varied widely in the tributaries. Some sites were comparable to the main lake sites while Site 12 in Flat Creek had the highest nitrogen reading in 1999.
- Sites 8 and 9 had phosphorus levels that were indistinguishable from the main lake values.
- Both Kings River sites (7 and 6.5) as well as the Flat Creek site (12) had phosphorus values well above the main lake sites.
- Chlorophyll levels at Site 7 in the Kings River were very comparable to Site 13 in the James River.
- The chlorophyll value of 518 µg/L at Site 12 was the highest reading measured on Table Rock Lake (or any other lake) by the LMVP since the program began in 1992.
- The minimum Secchi reading of 10 inches at Site 7 corresponded to a chlorophyll value of 4.6 µg/L. This low chlorophyll reading suggests that soil materials in the water were impacting water clarity.

- Note the longitudinal gradient in the Kings River Arm (sites 7 and 6.5) for all parameters.
- Average Secchi reading at the Viola site on the Kings River was 62 inches. This value represents a gain of 15 inches in water clarity from Site 6.5.

Table 26. Trophic assessment of sites on Table Rock Lake based on average chlorophyll values.

Site	1992	1993	1994	1995	1996	1997	1998	1999
1		M	M	E	O	M	M	M
2		M	E	E	M	M	M	E
3	E	E	E	E	M	M	M	E
4.5				E	M	M	E	E
5	E	E		E	E	E	E	
6.5					E	E	E	E
7					E	E	E	E
8		M	E	E	M	M	E	E
9			E	E	M	M	M	E
10			M	E	M	M	M	E
11				E	E	E	E	
12				H	E	E	H	H
13				H	H	H	H	E
14								E
15								E

O = Oligotrophic
M = Mesotrophic
E = Eutrophic
H = Hypereutrophic

- Only four sites have been classified in the same trophic category each year.
- There does not appear to be any trends of changing trophic status across the lake. (See page 8 for more information on trophic assessments.)

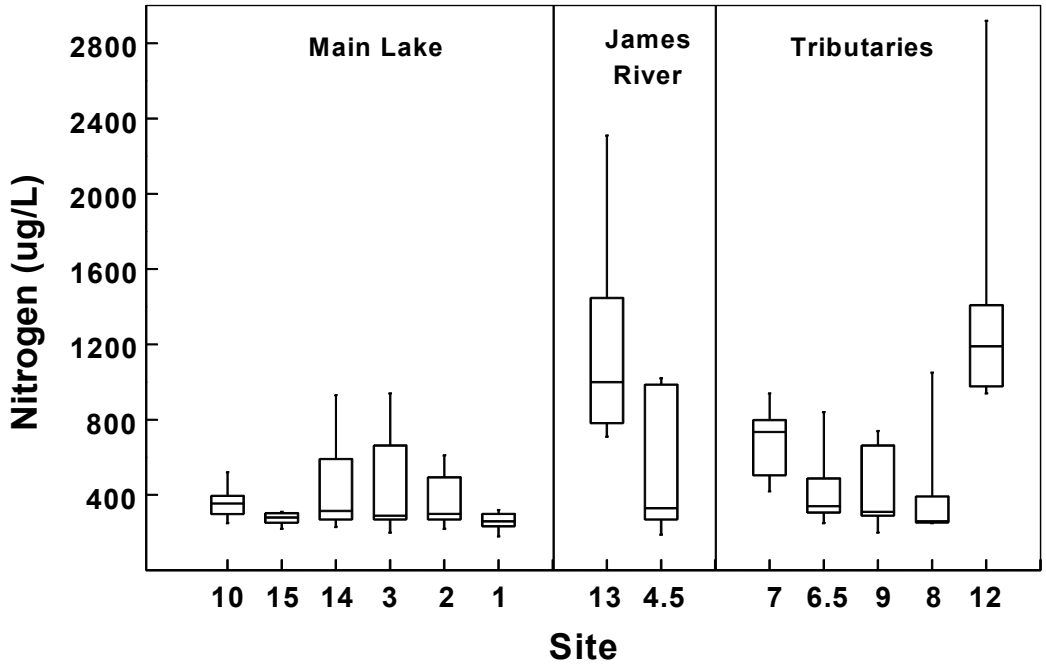

Figure 47. Nitrogen values for Table Rock Lake - 1999.

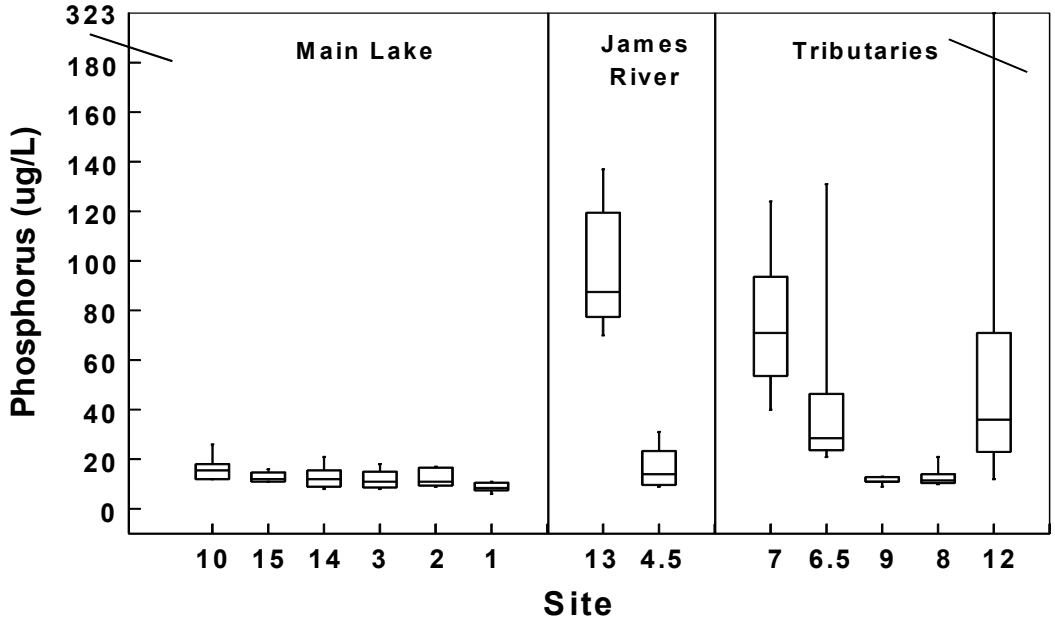

Figure 48. Phosphorus values for Table Rock Lake - 1999.

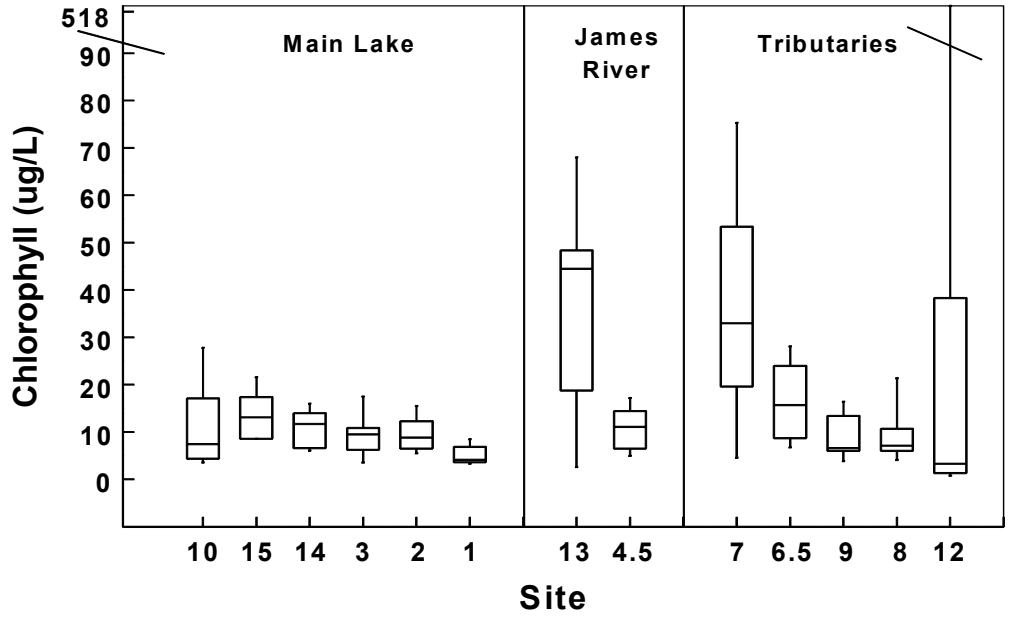

Figure 49. Chlorophyll values for Table Rock Lake - 1999.

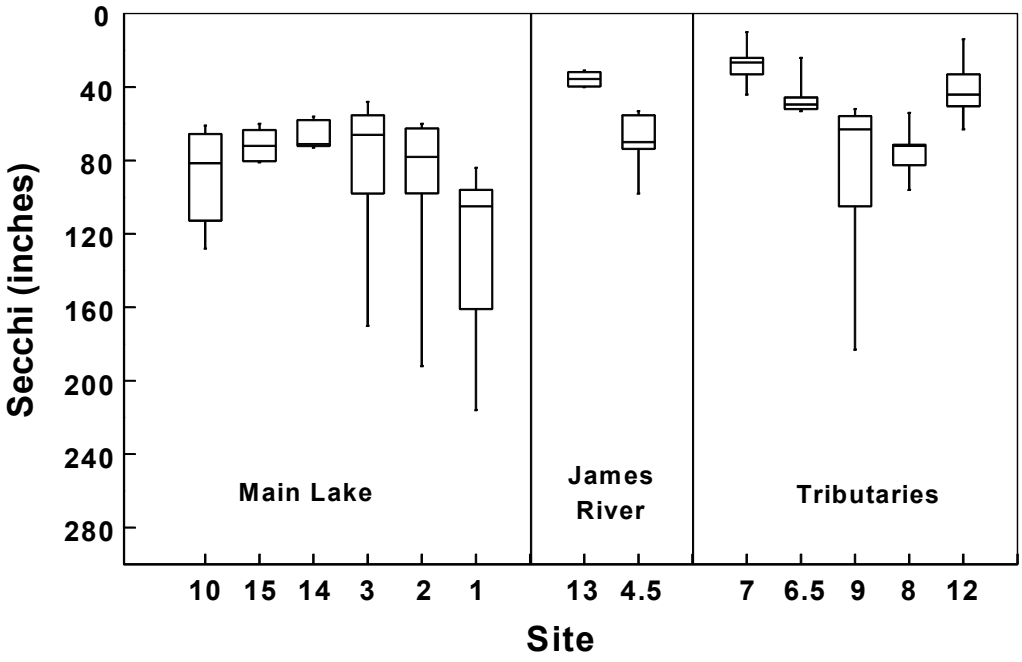

Figure 50. Secchi values for Table Rock Lake - 1999.