

## Table Rock Lake

Ozark Highlands Region

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 threatens water quality.



Figure 52. Location of Table Rock Lake and sample sites.

- Data were collected at 19 sites in 2002.
- Of these sites, nine were in the main lake, four in the James River arm, three in the Kings River arm, and one each in Long Creek, Indian Creek and Flat Creek.
- Secchi was the only parameter measured at the Viola access of the Kings River arm (“V” on the map).
- See the *Trends* section (page 85) for long-term analyses of Table Rock Lake data.

Table 25. Trophic assessment of sample sites on Table Rock Lake, based on geometric mean values (note: these assessments are based on geometric means of *all* samples, not just summer samples)

Main Lake	Sample Sites							
	1	2	3	14	17	15	18	10
Nitrogen	M	E	M	M	M	M	M	M
Phosphorus	O	M	M	M	M	M	M	M
Chlorophyll	M	M	M	M	E	E	E	M

James River and Kings River	Sample Sites					
	13	11	5	4.5	7	6.5
Nitrogen	E	E	E	M	E	M
Phosphorus	E	E	E	M	E	E
Chlorophyll	E	E	E	E	E	E

Tributaries	Sample Sites			
	9	8	12	16
Nitrogen	M	M	E	E
Phosphorus	M	M	E	E
Chlorophyll	E	E	E	E

O = Oligotrophic  
M = Mesotrophic  
E = Eutrophic

**Main Lake**

- Based on nitrogen geometric means, all main lake sites (except site 2) are mesotrophic. Site 2 had a different sampling schedule, which probably skewed the results.
- All main lake sites, except Site 1, were mesotrophic based on phosphorus geometric means. This site was oligotrophic, though its geometric mean of 9 µg/L is very close to the mesotrophic cut point.
- Based on geometric mean chlorophyll values, main lake sites between Roaring River and Indian Creek (Sites 17, 15 and 18) were eutrophic, while the other main lake sites were mesotrophic.

**Tributaries (including James River and Kings River)**

- Sites 4.5, 6.5, 9 and 8 were mesotrophic based on nitrogen geometric means, while all other tributary sites were eutrophic.
- Sites 4.5, 8 and 9 were mesotrophic based on phosphorus geometric means, while all other tributary sites were eutrophic.
- All tributary sites were eutrophic based on chlorophyll geometric means.

Table 26. Descriptive statistics from the main lake channel sites on Table Rock Lake – 2002.

\*Site 2 was sampled between January 28 and May 13 only and may not be comparable to other sites

<b>Parameters</b>		<b>Site 10</b>	<b>Site 18</b>	<b>Site 15</b>	<b>Site 17</b>	<b>Site 14</b>	<b>Site 3</b>	<b>Site 2*</b>	<b>Site 1</b>
<b>Secchi Transparency (inches)</b>	<b># samples</b>	5	6	9	8	7	4	4	7
	<b>geomean</b>	82	51	59	63	79	89	127	125
	<b>median</b>	71	55	57	71	79	93	183	108
	<b>minimum</b>	56	32	27.0	30.0	57	69	122	60
	<b>maximum</b>	119	78	95.0	92.0	119	107	266	228
<b>Phosphorus (µg/L)</b>	<b># samples</b>	5	6	8	8	7	4	4	8
	<b>geomean</b>	14	16	20	16	15	10	12	9
	<b>median</b>	13	17	17	13	16	10	13	10
	<b>minimum</b>	11	11	11	11	10	9	10	5
	<b>maximum</b>	21	24	69	46	23	12	21	12
<b>Nitrogen (µg/L)</b>	<b># samples</b>	5	6	8	8	7	4	4	8
	<b>geomean</b>	443	398	416	390	479	415	605	476
	<b>median</b>	400	390	340	350	420	415	535	480
	<b>minimum</b>	320	280	300	250	330	390	450	370
	<b>maximum</b>	610	690	1190	860	830	440	1060	590
<b>Chlorophyll (µg/L)</b>	<b># samples</b>	5	6	8	8	7	4	4	8
	<b>geomean</b>	6.6	9.0	11.7	10.2	5.1	5.8	4.7	4.8
	<b>median</b>	8.3	9.3	9.3	9.7	5.0	5.9	5.9	5.7
	<b>minimum</b>	2.1	4.8	4.8	5.4	1.4	4.3	0.8	2.3
	<b>maximum</b>	15.6	17.2	135.3	38.2	16.3	8.0	8.9	9.7

- After an initial decline in Secchi from Site 10 to Site 18, Secchi values increased toward the dam. At Sites 1 and 2, the increase in Secchi is dramatic, with maximums more than double those at any other site
- Phosphorus values are comparable across the main lake, with high maximum values at Sites 15 and 17 on April 22 (69 and 46, respectively)
- Nitrogen values tend to increase closer to the dam. This is likely due to the inflow from major tributaries such as the James and Kings river. The higher values at site 2 are likely due to the influence of Kimberling City, and the timing of the sampling.
- Main lake chlorophyll values were generally lower between the dam and Indian Creek compared to upstream of Indian Creek. The high value at Site 15 (135.3 µg/L) is the highest ever recorded by the LMVP for a main lake site at Table Rock Lake

Table 27. Descriptive statistics from the James River Arm of Table Rock Lake – 2002.

<b>Parameters</b>		<b>Site 13</b>	<b>Site 11</b>	<b>Site 5</b>	<b>Site 4.5</b>
<b>Secchi Transparency (inches)</b>	<b># samples</b>	8	4*	4*	4*
	<b>geomean</b>	39	40	32	67
	<b>median</b>	38	33	43	62
	<b>minimum</b>	33	32	11	40
	<b>maximum</b>	54	54	56	132
<b>Phosphorus (µg/L)</b>	<b># samples</b>	8	4	4	4
	<b>geomean</b>	67	27	31	8
	<b>median</b>	63	33	23	11
	<b>minimum</b>	59	23	16	2
	<b>maximum</b>	94	40	108	17
<b>Nitrogen (µg/L)</b>	<b># samples</b>	8	3	4	4
	<b>geomean</b>	1045	523	683	310
	<b>median</b>	925	520	820	290
	<b>minimum</b>	650	450	290	106
	<b>maximum</b>	2060	560	1290	970
<b>Chlorophyll (µg/L)</b>	<b># samples</b>	8	4	4	4
	<b>geomean</b>	21.3	13.1	21.9	11.4
	<b>median</b>	36.9	23.7	21.8	10.4
	<b>minimum</b>	0.7	15.6	14.0	6.3
	<b>maximum</b>	63.8	26.2	35.1	28.8

\*Note the low number of samples for Sites 11, 5 and 4.5. Comparisons of values is difficult, as samples from Site 11 were taken late in the season while samples from Sites 5 and 4.5 were taken early in the season.

- The upper 3 sites have similar Secchi values (geometric means of 32 – 40 inches). The geometric mean at Site 4.5 is almost 70 inches, making this site comparable to the main lake.
- Phosphorus values show a longitudinal gradient, with values decreasing at sites closer to the main lake. Site 5 had a very high value for May 14. Other sites had high values on that date, indicating a storm event.
- Nitrogen and chlorophyll values generally decrease closer to the main lake.

Table 28. Descriptive statistics from the Kings River and other tributary sites on Table Rock Lake – 2002.

Parameters		Kings River Arm			Indian Creek	Long Creek	Flat Creek	Roaring River
		Site 7	Site 6.5	Site Viola	Site 9	Site 8	Site 12	Site 16
Secchi Transparency (inches)	# samples	8	8	9	7	7	8	8
	geomean	29	54	60	60	72	39	61
	median	36	56	58	61	78	40	60
	minimum	6	30	19	47	48	30	58
	maximum	44	83	168	86	111	56	66
Phosphorus ( $\mu\text{g/L}$ )	# samples	8	8		7	8	8	8
	geomean	52	27		16	16	46	27
	median	47	26		17	16	48	30
	minimum	37	15		13	10	16	12
	maximum	122	45		19	27	84	42
Nitrogen ( $\mu\text{g/L}$ )	# samples	7	8		7	8	8	8
	geomean	661	474		449	473	843	594
	median	610	440		430	365	790	565
	minimum	400	350		350	330	570	420
	maximum	1490	1030		610	870	1440	1160
Chlorophyll ( $\mu\text{g/L}$ )	# samples	8	8		7	8	8	8
	geomean	15.1	11.9		8.1	9.3	13.8	16.5
	median	18.8	15.2		8.0	9.9	26.9	19.4
	minimum	3.1	5.8		5.3	3.7	0.4	7.7
	maximum	42.3	22.3		13.1	18.8	55.4	34.5

- Kings River Arm sites show a trend of increasing clarity and decreasing nutrients nearer the main lake. Nitrogen and phosphorus values decrease from Site 7 to Site 6.5, with phosphorus approaching the cut point between mesotrophic and eutrophic. Chlorophyll values also decrease nearer the main lake.
- Flat Creek Secchi values are lower than those from Indian Creek, Long Creek or Roaring River tributary sites.
- Long Creek and Indian Creek phosphorus values are similar to the main lake and are considered mesotrophic based on geometric means. Sites at Roaring River and Flat Creek are higher than the main lake and are eutrophic, based on geometric means.
- Nitrogen values are similar among the Long Creek, Flat Creek and Roaring River tributary sites, and are considered eutrophic based on geometric means. Indian Creek has lower nitrogen values than the other sites and is considered mesotrophic based on the geometric mean.

Table 29. Trophic Assessment of sites on Table Rock Lake based on average chlorophyll values.

Site	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
1		M	M	E	O	M	M	M	M	O	M
2		M	E	E	M	M	M	E	M	O	M
3	E	E	E	E	M	M	M	E	M	O	M
4.5				E	M	M	E	E	M	M	E
5	E	E		E	E	E	E		E	E	E
6.5					E	E	E	E	E	E	E
7					E	E	E	E	E	E	E
8		M	E	E	M	M	E	E	M	M	E
9			E	E	M	M	M	E	M	M	E
10			M	E	M	M	M	E	M	O	E
11				E	E	E	E				E
12				H	E	E	H	H	E	E	E
13				H	H	H	H	E	H	H	E
14								E	O	O	M
15								E	M	M	E
16									E	E	E
17									M	M	E
18									M	O	E

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

- Overall, there were higher chlorophyll values in 2002 relative to 2001.
- Site 13 was eutrophic for only the second time since monitoring began in 1995.
- Sites 17 and 18 had higher chlorophyll levels in 2002 compared to past years, but these sites have only been sampled for 3 years.

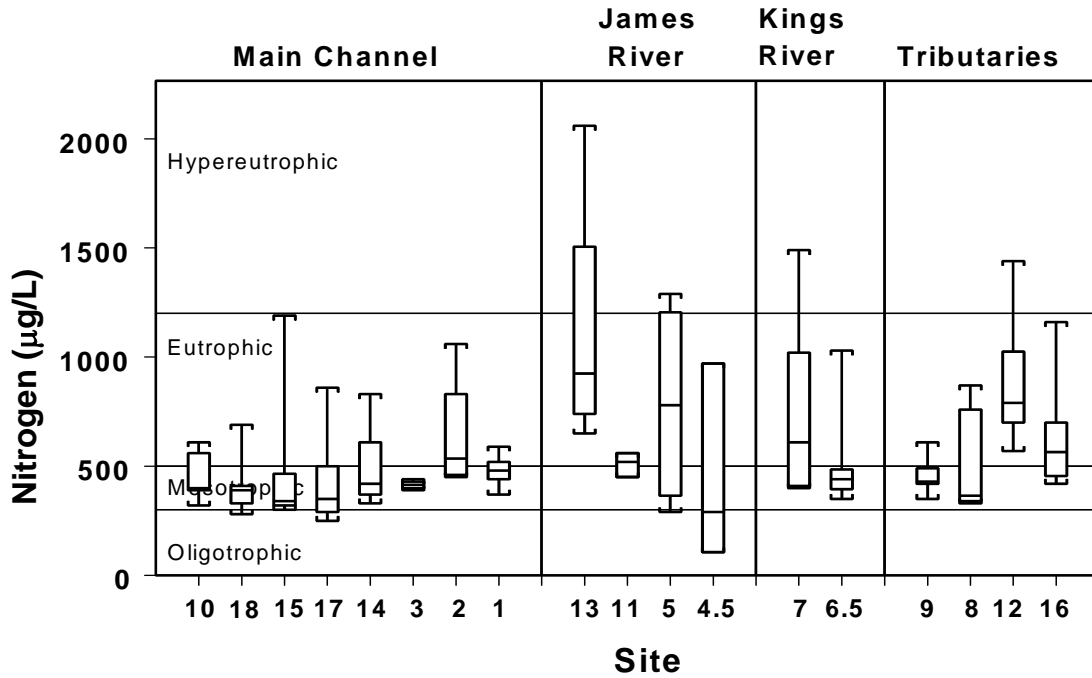


Figure 53. Nitrogen values for Table Rock Lake – 2002.

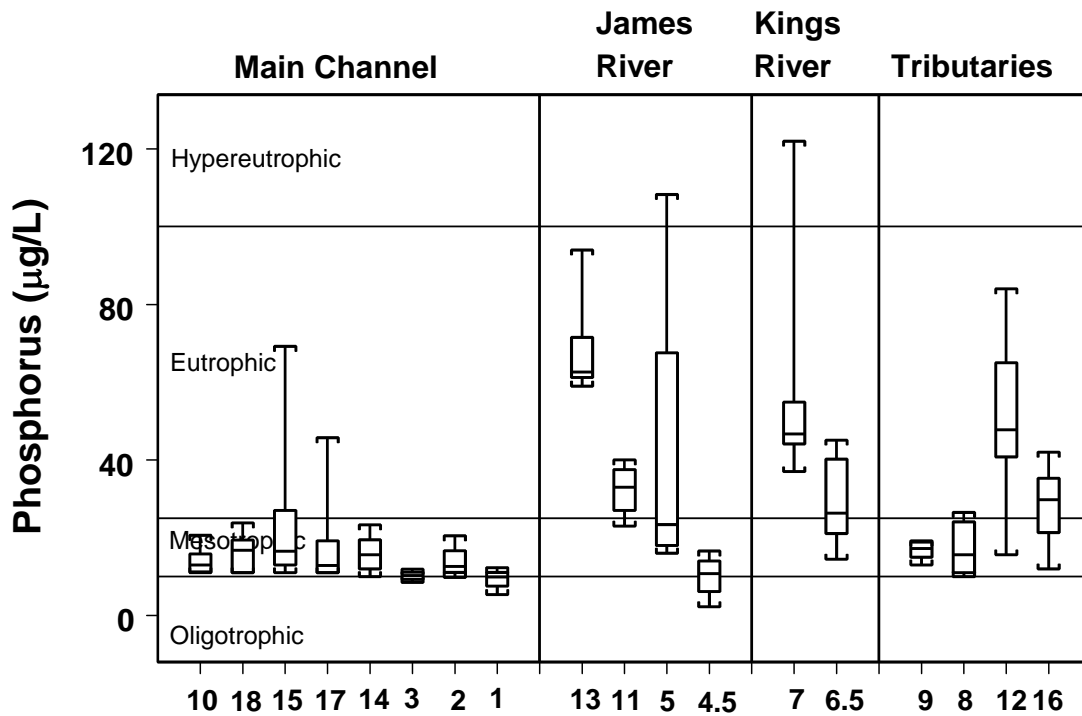


Figure 54. Phosphorus values for Table Rock Lake – 2002.

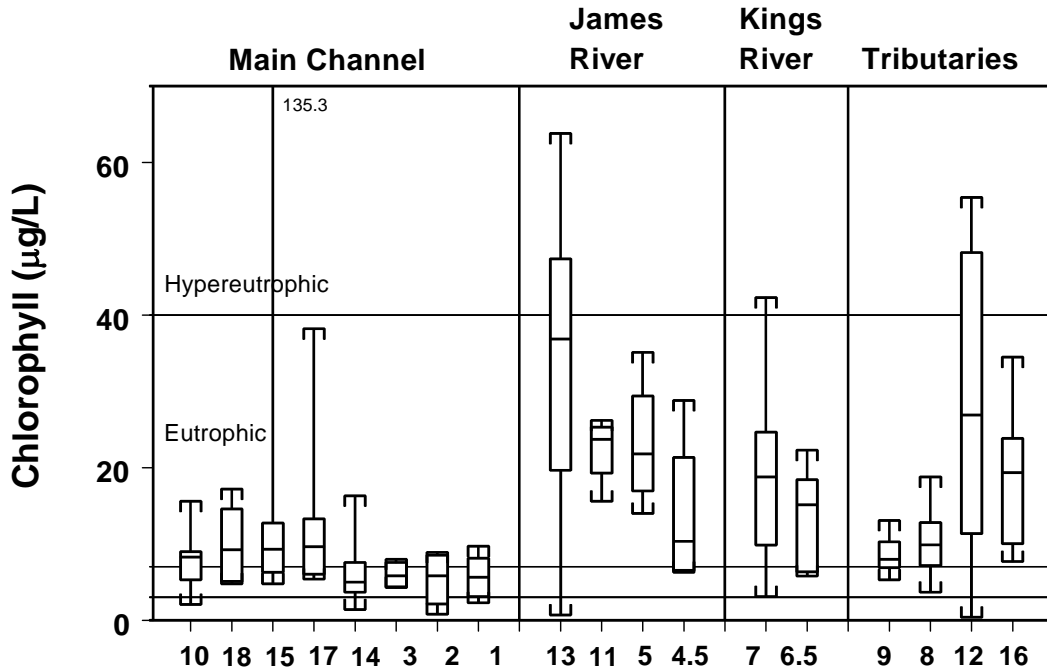


Figure 55. Chlorophyll values for Table Rock Lake – 2002.

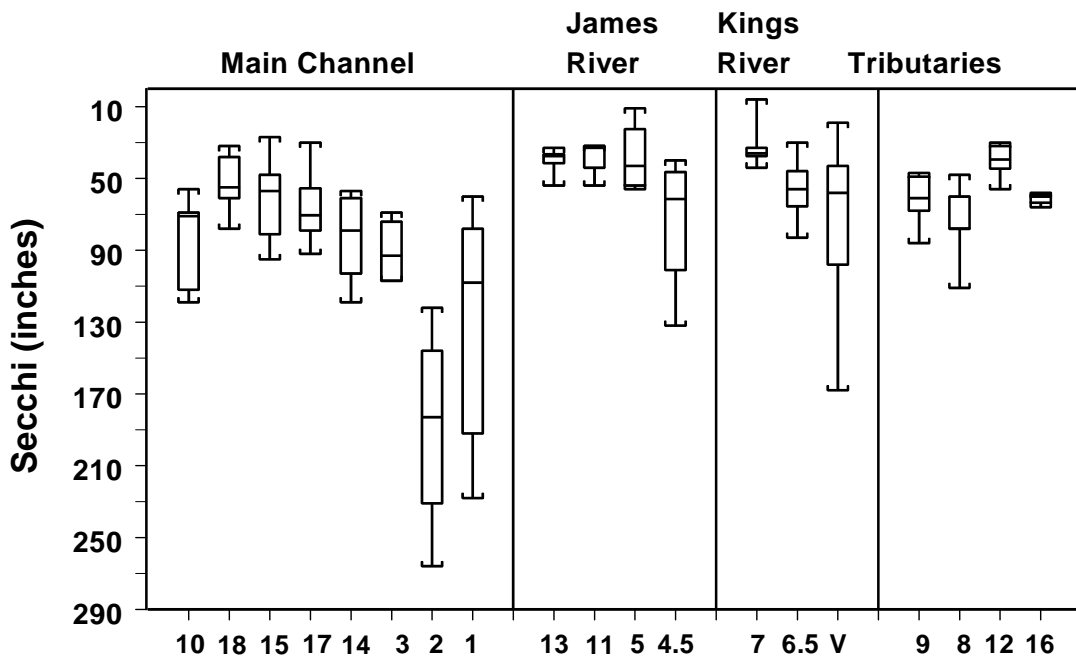


Figure 56. Secchi values for Table Rock Lake – 2002.