

Missouri Department of Natural Resources  
**Total Maximum Daily Load Information Sheet**

## Table Rock Lake

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### Waterbody Segment at a Glance:

<b>Counties:</b>	Barry, Stone and Taney Counties
<b>Nearby Cities:</b>	Kimberling City, Branson
<b>Size of Impairment:</b>	43,100 acres
<b>Pollutant:</b>	Nutrients
<b>Sources:</b>	Point and Nonpoint sources



State map showing Table Rock Lake and its watershed

**TMDL Priority Tanking:** Low

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### Description of the Problem

#### Beneficial Uses of Table Rock Lake

- Livestock and Wildlife Watering
- Protection of Warm Water Aquatic Life
- Protection of Human Health associated with Fish Consumption
- Whole Body Contact Recreation (swimming)
- Boating and Canoeing

#### Use that is impaired

- Whole Body Contact Recreation (swimming)

#### Standards that apply

- All waterbodies in Missouri are protected by the *general* criteria (standards) contained in Missouri's WQS, 10 CSR20-7.031(3). These criteria (also called *narrative* criteria) list substances that all waters "shall be free from". For example, sections (3)(A) and (3)(C) state:
  - Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses.
  - Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses.

#### Background Information and Water Quality Data

Table Rock Lake is an exceptional water resource. It provides unequalled recreational and economic opportunities for Missouri's citizens. It is nationally known for its excellent fishing.

It also provides magnificent scenery due to its location in the Ozark Mountains. Table Rock Lake is the centerpiece for a wide variety of tourist attractions, with its watershed producing over a billion dollars in tourism revenue each year.

Table Rock Lake was added to the 2002 303(d) list of impaired waters due to nutrients from point and nonpoint sources. In recent years, concern had been growing due to reduced water clarity in the lake. The problem with clarity is caused by increased amounts of nitrogen and phosphorus entering the lake. Nitrogen and phosphorus are plant nutrients, which can cause excessive growth of algae. Phosphorus has been identified as the chief cause for the increase in algae, which impart a green color to the water and reduce water clarity. This is particularly true in the James River arm of the lake, which receives heavy loads of phosphorus from urban stormwater, wastewater treatment plants and nonpoint sources. Increasing resident populations in southwest Missouri, the large number of tourists visiting the area, commercial and industrial development and livestock production have all contributed to the increased nutrient loading throughout the lake. Most growth is occurring in areas without municipal sewage treatment. Runoff continues to be a significant problem. Increased nutrients and fecal coliform from ineffective septic tanks and improper farming practices have increased health concerns, reduced water clarity and promoted algae growth. This rapid growth in population, and commercial development, as well as an historic realignment in the agriculture industry, has not been accompanied by comparable improvements in effective wastewater treatment and run-off control. Some communities have made notable and significant investments to reduce pollution reaching the White River and its tributaries. Others are preparing to do so in the near future.

A Total Maximum Daily Load (TMDL) was completed on the James River in 2001 for phosphorus and nitrogen. This TMDL addresses the algal growth in the James River, which is directly related to the decreasing water clarity in Table Rock Lake. The TMDL calculated the reductions in nutrient loading needed to control algal growth. A phosphorus limit of 0.5 mg/L (milligrams per liter or parts per million) has been established for all discharges into the Missouri portion of the Table Rock Lake basin equal to or greater than 22,500 gallons per day. The largest point source in the basin, the Springfield Southwest Treatment Plant, initiated phosphorus removal from its discharge in March 2001 and has been achieving results much lower than the 0.5 mg/L limit. As reported by the Missouri Lakes Voluntary Program in 2003, Table Rock Lake is already responding with greater water clarity directly connected to the decrease in phosphorus output from the Wastewater Treatment Plant<sup>1</sup>.

Besides the James River TMDL, there are many other efforts occurring in the Table Rock Lake watershed to help improve the lake. There are two flourishing watershed groups devoted to Table Rock Lake and the White River Basin. They are the Table Rock Lake Water Quality, Inc., formed in December 1998, and the Upper White River Basin Foundation, started in 2002. These groups have instigated many studies, gotten ordinances passed and encouraged innovative best management practices around the lake. Some of their on-going goals are:

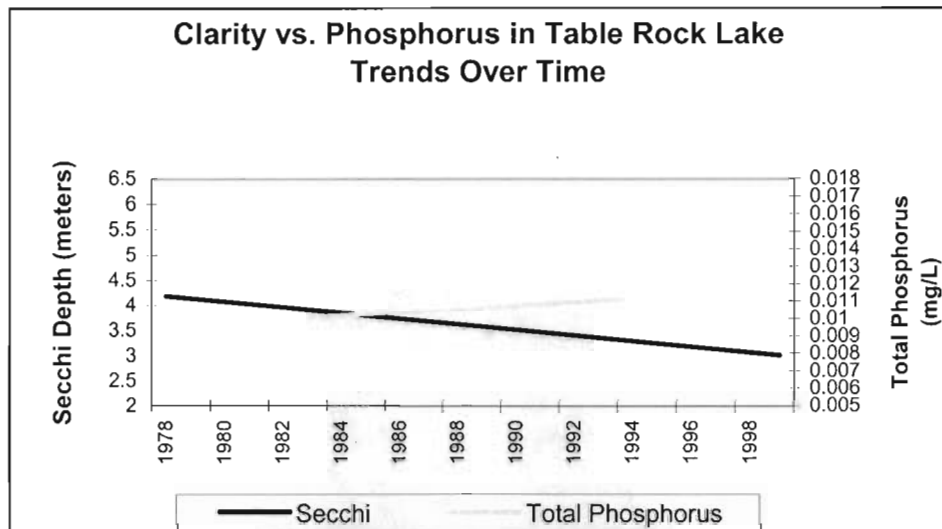
- Improved monitoring of water quality in the basin
- Improved municipal sewage treatment
- Adoption of improved on-site wastewater treatment systems
- Reduction of nutrient run-off

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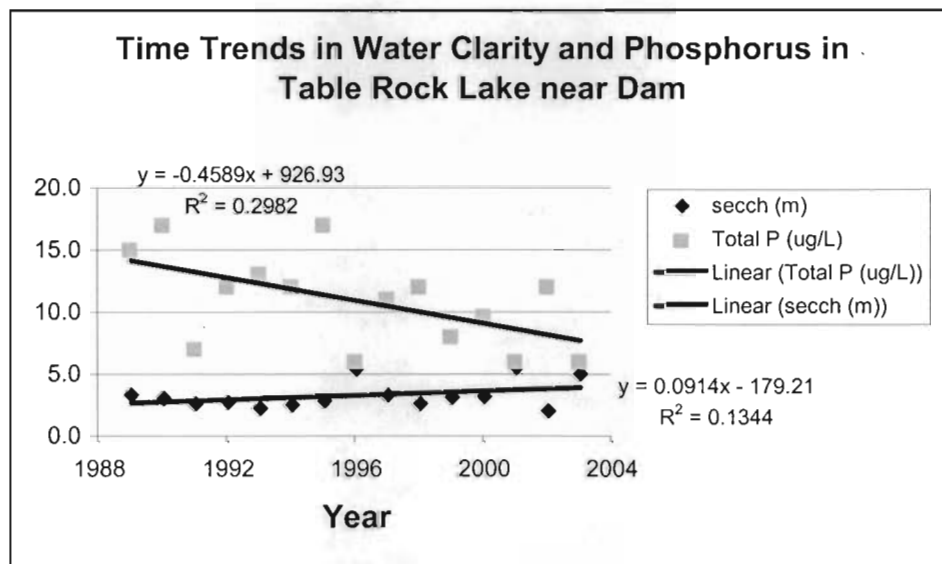
<sup>1</sup> Data poster available on request. Also visit [www.lmvp.org](http://www.lmvp.org)

One continuing concern is that increased phosphorus levels will continue to be a problem in the lake, even after nutrient loading is reduced. This is because phosphorus attaches to soil particles, which are washed into streams by erosion. Table Rock Lake acts as a “sink” as the sediment load coming from its tributaries settles on the bottom of the lake. Phosphorus will continue to be released from this sediment for an unknown period of time.

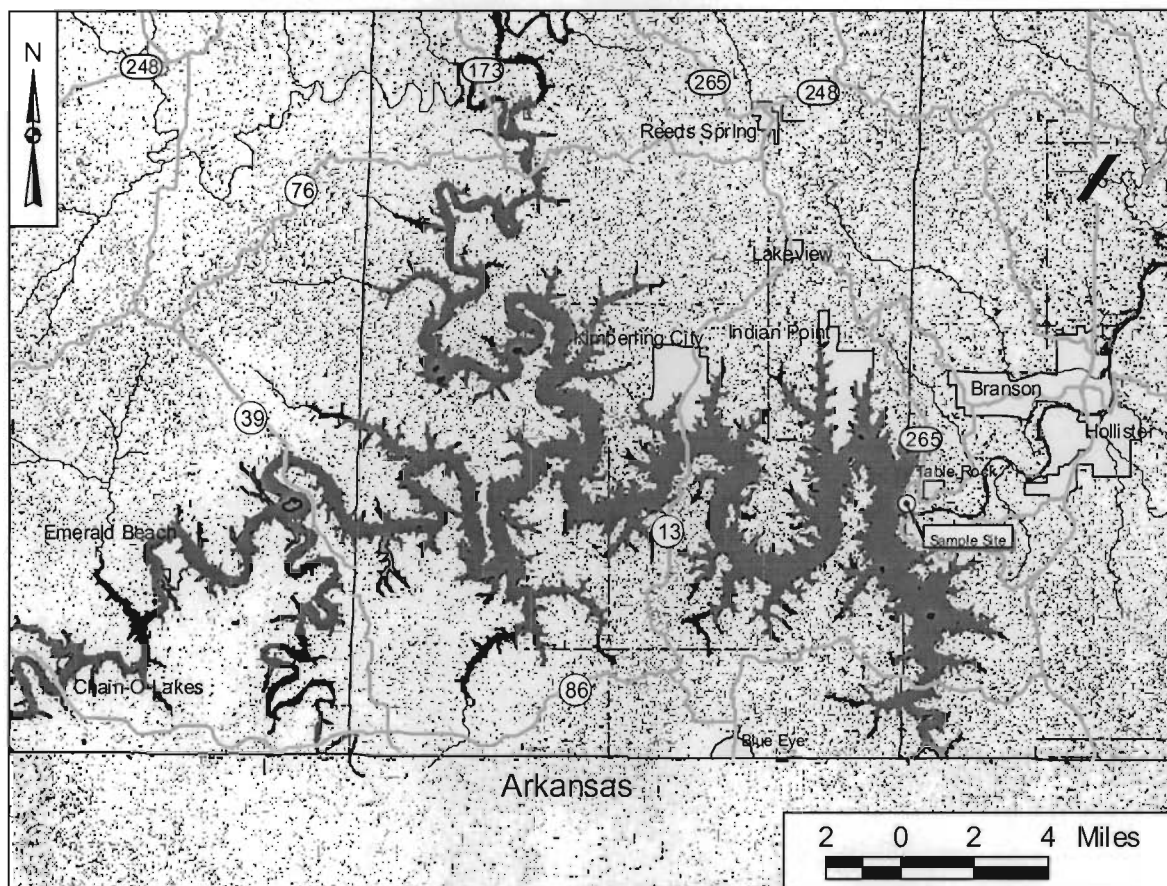
A map of Table Rock Lake and graphs of the data may be found below. The graphs show the distinct relationship between phosphorus and clarity: when phosphorus increases, clarity decreases; when phosphorus decreases, clarity increases.



Source: Dr. Jack Jones, Professor of Limnology, University of Missouri at Columbia



## Table Rock Lake in Southwestern Missouri



**For more information call or write:**

Missouri Department of Natural Resources

Water Protection Program

P.O. Box 176, Jefferson City, MO 65102-0176

1-800-361-4827 or (573) 751-1300 office

(573) 522-9920 fax

Program Home Page: [www.dnr.mo.gov/cnv/wpp/index.html](http://www.dnr.mo.gov/cnv/wpp/index.html)



gpd of effluent, or fraction thereof, except that—

A. Point sources that discharge less than five thousand (5,000) gpd may only be required to submit an annual report;

B. Point sources that discharge more than one point three (1.3) mgd will be required, at a minimum, to collect fifty-two (52) wastewater samples per year unless the applicant can show that the wastewater has a consistent quality, such as once through cooling water or mine dewatering, then the department may set less frequent sampling requirements; and

C. Sludge sampling will be established in the permit.

2. Sampling frequency shall be spread evenly throughout the discharge year. This means that a point source with a continuous discharge shall take samples on a regular evenly spaced schedule, while point sources with seasonal discharges shall collect samples evenly spaced during the season of discharge.

3. Sample types shall be as follows:

A. Samples collected from lagoons may be grab samples;

B. Samples collected from mechanical plants shall be twenty-four (24)-hour composite samples, unless otherwise specified in the operating permit; and

C. Sludge samples shall be grab samples unless otherwise specified in the operating permit.

4. The monitoring frequency and sample types stated in paragraph (3)(C)3. are minimum requirements. The permit writer shall establish monitoring frequencies and sampling types to fulfill the site specific informational needs of the department.

(D) For lakes designated in 10 CSR 20-7.031 as L1, which are primarily used for public drinking water supplies, there will be no discharge into the watersheds above these lakes from domestic or industrial wastewater sources regulated by these rules. Discharges from potable water treatment plants, such as filter wash, may be permitted. Separate storm sewers will be permitted, but only for the transmission of storm water. Discharges permitted prior to the effective date of this requirement may continue to discharge so long as the discharge remains in compliance with its operating permit.

(E) For lakes designated in 10 CSR 20-7.031 as L3 which are not publicly owned, the discharge limitations shall be those contained in section (8).

(F) In addition to other requirements in this section, discharges to Lake Taneycomo and its tributaries between Table Rock Dam and Power Site Dam (and excluding the discharges from the dams) shall not exceed five-

tenths (0.5) mg/L of phosphorus as a monthly average. Discharges meeting both the following conditions shall be exempt from this requirement:

1. Those permitted prior to May 9, 1994; and

2. Those with design flows of less than twenty-two thousand five hundred gallons per day (22,500 gpd). All existing facilities whose capacity is increased would be subject to phosphorus limitations. The department may allow the construction and operation of interim facilities without phosphorus control provided their discharges are connected to regional treatment facilities with phosphorus control not later than three (3) years after authorization. Discharges in the White River basin and outside of the area designated above for phosphorus limitations shall be monitored for phosphorus discharges, and the frequency of monitoring shall be the same as that for BOD<sub>5</sub> and NFR, but not less than annually. The department may reduce the frequency of monitoring if the monitoring data is sufficient for water quality planning purposes.

(G) In addition to other requirements in this section, discharges to Table Rock Lake watershed, defined as hydrologic units numbered 11010001 and 11010002, shall not exceed five-tenths milligrams per liter (0.5 mg/L) of phosphorus as a monthly average according to the following schedules except as noted in paragraph (3)(G)5.:

1. Any new discharge shall comply with this new requirement upon the start of operations;

2. Any existing discharge, or any sum of discharges operated by a single continuing authority, with a design flow of 1.0 mgd or greater shall comply no later than November 30, 2003;

3. Any existing discharge, or any sum of discharges operated by a single continuing authority, with a design flow of 0.1 mgd or greater, but less than 1.0 mgd, shall comply no later than November 30, 2007, and shall not exceed one milligram per liter (1.0 mg/L) as a monthly average as soon as possible and no later than November 30, 2003;

4. Any existing discharge with a design flow of twenty-two thousand five hundred gallons per day (22,500 gpd) or greater, but less than 0.1 mgd, shall comply no later than November 30, 2007;

5. Any existing discharge with a design flow of less than twenty-two thousand five hundred gallons per day (22,500 gpd) permitted prior to November 30, 1999 shall be exempt from this requirement unless the design flow is increased; and

6. Any existing discharge in which the design flow is increased shall comply accord-

ing to the schedule applicable to the final design flow.

(4) Effluent Limitations for Losing Streams.

(A) Discharges to losing streams shall be permitted only after other alternatives including land application, discharge to a gaining stream and connection to a regional wastewater treatment facility have been evaluated and determined to be unacceptable for environmental and/or economic reasons.

(B) If the department agrees to allow a release to a losing stream, the permit will be written using the limitations contained in subsections (4)(B) and (C). Discharges from wastewater treatment facilities which receive primarily domestic waste or from POTWs permitted under this section shall undergo treatment sufficient to conform to the following limitations:

1. BOD<sub>5</sub> equal to or less than a monthly average of ten (10) mg/L and a weekly average of fifteen (15) mg/L;

2. NFRs equal to or less than a monthly average of fifteen (15) mg/L and a weekly average of twenty (20) mg/L;

3. pH shall be maintained in the range from six to nine (6-9) standard units;

4. Discharges to losing streams shall not contain more than a monthly geometric mean of four hundred (400) fecal coliform colonies per one hundred milliliters (100 ml) and a daily maximum of one thousand (1,000) fecal coliform colonies per one hundred milliliters (100 ml);

5. All chlorinated effluent discharges to losing streams or within two (2) stream miles flow distance upstream of a losing stream shall also be dechlorinated prior to discharge;

6. If the facility is a POTW wastewater treatment facility providing at least primary treatment during a precipitation event and discharges on a noncontinuous basis, the discharge may be allowed subject to the following:

A. BOD<sub>5</sub> and NFRs equal to or less than a weekly average of forty-five (45) mg/L;

B. pH shall be maintained in the range from six to nine (6-9) standard units; and

C. Only the wastewater in excess of the capacity of the noncontinuous wastewater treatment plant hydraulic capacity may be discharged;

7. Sludges removed in the treatment process shall not be discharged. Sludges shall be routinely removed from the wastewater treatment facility and disposed of or used in accordance with a sludge management practice approved by the department; and

8. When the wastewater treatment process causes nitrification which effects the BOD<sub>5</sub> reading, the permittee can petition the