

Missouri
Department of
Natural Resources

DRAFT LAKE TANEYCOMO TMDL

COMMENTS from Southwestern Power Association ONLY

(for the other 19 comment letters, see separate comments file)

Public Notice
July 30 – Sept. 13, 2010

Lake Taneycomo
WBID # 7314

Taney County, Mo.

Missouri Department of Natural Resources
Water Protection Program
PO Box 176
Jefferson City, MO 65102-0176
800-361-4827 / 573-751-1300



Department of Energy

Southwestern Power Administration
One West Third Street
Tulsa, Oklahoma 74103-3519

SEP 13 2010

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John Hoke
Water Quality Monitoring and Assessment Section
Water Protection Program
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102-0176

Dear Mr. Hoke:

This letter and enclosed comments are in response to the Missouri Department of Natural Resources (MDNR) "Total Maximum Daily Load (TMDL) for Lake Taneycomo in Taney County, Missouri DRAFT" (Draft TMDL) published for public comment on July 30, 2010. The notice requested comments regarding the Draft TMDL be provided to MDNR by September 13, 2010. Southwestern Power Administration (Southwestern) appreciates the opportunity to review and provide comments on the Draft TMDL during the public comment period. Please find Southwestern's specific comments regarding the Draft TMDL detailed in the enclosure. In addition, Southwestern has the following major concerns.

Southwestern commends MDNR for addressing at length in the Draft TMDL point and nonpoint source pollution in the Table Rock Lake and Lake Taneycomo watersheds that contribute to low dissolved oxygen (DO) levels and overall water quality. Unfortunately, the Draft TMDL prematurely and inappropriately dismisses the significant impact the inflow from the Table Rock Lake watershed has on the severity of the low DO condition occurring in the hypolimnion of the reservoir. The Draft TMDL states, "While linkages exist between nonpoint sources in the Table Rock Lake watershed and water quality in Lake Taneycomo, this TMDL is not meant to include a comprehensive summary of water quality-related efforts in the Table Rock Lake watershed." Additionally, the Draft TMDL contends that the water quality modeling performed for Lake Taneycomo indicates insignificant impact on DO from point and nonpoint sources; however, the model appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of point and nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. The Draft TMDL cites several improvement efforts made in recent years impacting the Table Rock Lake watershed, but the full impact of those and likely future improvements has not had the time to be fully realized and assessed. Southwestern believes the Table Rock Lake watershed impact should not be minimized but rather should be considered as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.

Southwestern also reviewed the Missouri Water Quality Standards (10 CSR 20-7.031) "Rules of Department of Natural Resources, Division 20 – Clean Water Commission, Chapter 7 – Water Quality, Water Quality Standards" (Missouri WQS). The Missouri WQS state that "...For all waters of the state, if existing water quality is better than applicable water quality criteria established in these rules, that existing quality shall be fully maintained and protected. Water quality may be lowered only if the state finds, after full satisfaction of the intergovernmental coordination and public participation requirements, that the lowered water quality is necessary to allow important economic and social development in the geographical area in which the waters are located..." The value of hydropower and human activity in

geographical area in which the waters are located...” The value of hydropower and human activity in the upstream watershed is undeniably important to economic and social development. Realizing the extreme economic and possible social impacts (reduction in hydropower benefits and reduced human development in the watershed), Southwestern suggests that the river segment immediately below Table Rock dam has been incorrectly designated. Southwestern believes that the river segment downstream of Table Rock is a transition zone that is needed for mixing and water aeration. Under the existing conditions, the Missouri Department of Conservation (MDC) describes the downstream trout fishery as extremely successful, stating, “Angler use and catch rates of trout in upper Lake Taneycomo rank among the highest known for special regulation trout fisheries in the nation,” and according to multiple Lake Taneycomo and Branson area tourism groups and businesses, the fishery is known for “some of the finest trout fishing available anywhere in the world.” Southwestern concedes that while the current operation generally provides sustainability during the seasonal critical period, it does not always provide conditions that are optimal for the growth of the trout. Since increasing the DO levels downstream of Table Rock would require a major investment in the upstream watershed that could have an enormous economic impact to the region, and since the “finest... anywhere in the world” trout fishery was developed under existing conditions, it appears that re-designation of the river reach immediately below Table Rock dam as a transition zone with separate water quality standards would be both justifiable and reasonable. As such, it would not be necessary to list Lake Taneycomo as impaired. The Draft TMDL addresses this assertion but dismisses the regulatory solution, stating “However, this was considered a possible option only in situations having clearly viable aquatic communities and successful fisheries below the dam.” Citing that “Angler use and catch rates of trout in upper Lake Taneycomo rank among the highest known for special regulation trout fisheries in the nation” and that the fishery is known for “some of the finest trout fishing available anywhere in the world,” as well as considering the phenomenal success of recreational fishing tourism in the area, it is difficult to contend that Lake Taneycomo is not a clearly viable aquatic community and successful fishery. Therefore, it is reasonable to re-designate that reach as a transition zone with lower DO standards.

The Draft TMDL discusses at length, and includes in the section on recommended future structural modifications, enhanced minimum flows as provided for in the Water Resource Development Acts (WRDA) of 1999 (Section 374) and 2000 (Section 304) and as discussed in the Army Corps of Engineers (Corps) *White River Minimum Flows Reallocation Study Report*. However, Section 132 of the fiscal year 2006 Energy and Water Development Appropriations Act (Public Law 109-103) repealed the WRDA 1999 and 2000 authorizations, eliminating the authorization for Table Rock, as well as Beaver and Greers Ferry, and authorizing the implementation of enhanced minimum flows only at Bull Shoals and Norfolk. Table Rock Dam had the lowest benefit-cost ratio of the five White River reservoirs for enhanced minimum flows and the Corps determined that it was not economically feasible. Additionally, enhanced minimum flows have not been identified as a solution to low DO issues below the dams in any of the White River project studies. Southwestern believes that the minimum flows discussion is not appropriate in this document and suggests removing enhanced minimum flows from the Draft TMDL, unless desired for historical project information.

The future structural modifications recommended in the Draft TMDL contain extremely high installation costs and prohibitive annual operation and maintenance costs, as well as the need for water storage reallocation at Table Rock Lake for providing enhanced minimum flows with the associated loss of benefits to the current storage users. Any such reallocation could potentially have a negative impact on hydropower production. Additional costs, whether through a loss of power production or increased cost assigned to the hydropower purpose, would ultimately be passed on to Federal hydropower consumers, including consumers in Missouri. It should be noted that Southwestern has voluntarily modified the

hydropower equipment and operations at Table Rock to improve the DO concentrations in the tailwater (Lake Taneycomo) during generation periods, and Southwestern has directly spent well over \$1 million on those efforts. As a result of those modifications, Southwestern has foregone approximately \$3.5 million (2009 rates) in hydropower benefits from 1999 through 2009 to maintain a minimum DO concentration of 4 mg/L in the tailwater during periods of generation. Therefore, Southwestern does not believe it would be appropriate to pass on the additional costs of the solutions identified in the Draft TMDL to further enhance the “finest trout fishing available anywhere in the world” of the existing fishery. As stated on MDC’s web site, “In 1937, the first commissioners of the Department of Conservation decided that trout anglers should ‘pay their own way’ since trout are not native to Missouri and are expensive to produce.” Because trout anglers and the recreational industry built around them in the Lake Taneycomo area are the beneficiaries of the existing trout fishery, the burden of cost for further enhancements should be borne by those that benefit directly rather than by Federal hydropower consumers in a six-state area. Additionally, it should be considered that even the high cost solutions identified as future structural modifications recommended are not likely to provide DO concentrations of 6 mg/L 100 percent of the time immediately downstream of Table Rock; in fact, the forebay oxygen diffuser system deemed “most desirable” is reported to meet the 6 mg/L DO requirement 97 percent of the time.

The hydropower generation at the Table Rock project reduces the need for burning 237,000 tons of coal, 818,000 barrels of fuel oil, or 5,022,000,000 cubic feet of natural gas each year. In addition, the electricity produced at the project annually prevents the emission of 422,000 tons of greenhouse gases. Southwestern has worked with the Corps of Engineers, the White River Dissolved Oxygen Committee and other interests to improve recreation at trout fisheries in the White River Basin, that already enjoy a reputation as “some of the finest trout fishing available anywhere in the world,” in a cost effective manner which protects over eight million electric consumers in Arkansas, Kansas, Louisiana, Missouri, Oklahoma, and Texas.

We appreciate the opportunity to provide comments on the Draft TMDL. Please contact Fritha Ohlson at (918) 595-6684 or Fritha.Ohlson@swpa.gov if you have any questions regarding our comments.

Sincerely,



George Robbins

Director

Division of Resources and Rates

CC:

Colonel Glen Masset w/ enclosure
District Commander
Little Rock District, U.S. Army Corps of Engineers

Ted Coombes (SPRA) w/ enclosure

September 13, 2010

Southwestern Power Administration (Southwestern)
Specific Comments on
Missouri Department of Natural Resources
Water Projection Program
Total Maximum Daily Load (TMDL)
for Lake Taneycomo in Taney County, Missouri
DRAFT
Published July 30, 2010
(Draft TMDL)

(Note: Paragraphs are numbered from the beginning of the referenced section or sub-section)

1. Page 6, 1. Introduction, Paragraph 3, Sentence 2. According to longstanding Environmental Protection Agency (EPA) rules, a discharge from a dam does not constitute an addition of a pollutant even though some physical and chemical properties of the water may have changed as water moved through the dam. Additionally, as provided in the Draft TMDL (page 17, 3. Water Quality Problems and Source Identification, 3.2 Influences from Point and Nonpoint Source Pollution, Paragraph 1), court decisions have determined that “the reduction of oxygen caused by the dam did not constitute the ‘addition’ of a pollutant from a ‘point source.’” As low dissolved oxygen (DO) is not an actual pollutant added to the water, the validity of the TMDL process in this case must be more clearly established.
2. Page 7, 2. Background, 2.1 Lake Taneycomo, Paragraph 2, Sentence 1. Southwestern commends Missouri Department of Natural Resources (MDNR) for addressing at length in the Draft TMDL point and nonpoint source pollution in the Table Rock Lake and Lake Taneycomo watersheds that contribute to low DO levels and overall water quality. Unfortunately, the Draft TMDL prematurely and inappropriately dismisses the significant impact the inflow from the Table Rock Lake watershed has on the severity of the low DO condition occurring in the hypolimnion of the reservoir. As stated in the referenced sentence, “For the purpose of this TMDL, the Lake Taneycomo watershed consists only of those lands draining into Lake Taneycomo below Table Rock Dam.” Therefore, the Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of point and nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. The Draft TMDL cites several improvement efforts made in recent years impacting the Table Rock Lake watershed, but the full impact of those and likely future improvements has not had the time to be fully realized and assessed. Southwestern believes the

Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.

3. Page 8, 2. Background, 2.1 Lake Taneycomo, Paragraph 4, Sentence 2. Suggest changing the wording to “temperature range typically between” as temperatures higher than 55 degrees Fahrenheit (°F) and lower than 45 °F have been recorded.
4. Page 9, 2. Background, 2.1 Lake Taneycomo, Paragraph 5, Sentence 1. The referenced sentence supports Southwestern’s position that under the existing conditions Lake Taneycomo is a clearly viable aquatic community and successful fishery. Therefore it is reasonable to re-designate the reach as a transition zone with lower DO standards. Southwestern suggests adding re-designation as a regulatory solution in the Draft TMDL.
5. Page 9, 2. Background, 2.1 Lake Taneycomo, Paragraph 5, Sentences 2-5. The benefit values provided are not clearly defined, such as whether they are annual values. The statement “MDC estimated the value of the fishery at almost \$15 million” is not sufficient as it does not provide what is included in that value, for what timeframe, and how it is determined. Suggest providing more concrete information on how the benefit values are determined.
6. Page 11, 2. Background, 2.2 Table Rock Dam, Paragraph 4, Sentence 1. Suggest adding the statement “when the turbines are run at overload capacity” at the end of the referenced sentence. Stating overload capacity differentiates the 15,100 cubic feet per second (cfs) value from the 13,000 cfs value provided in the following sentence, correctly identified as the discharge at nameplate capacity.
7. Page 11, 2. Background, 2.2 Table Rock Dam, Paragraph 4, Sentences 3 and 6. Suggest modifying the two referenced sentences to the following “Peak flows of up to 15,100 cfs may be needed during times of high demand for electrical generation. High demand for electrical generation typically occurs in the summer during a single peak over the afternoon and evening hours and in the winter during two separate peaks over the morning and evening hours.” Changing the peak flow from 13,000 cfs to 15,100 cfs is more accurate because Table Rock has been marketed at the overload capacity and as such the units can be run at overload to meet electrical demand.
8. Page 11, 2. Background, 2.2 Table Rock Dam, Paragraph 4, Sentence 5. Fritha Ohlson’s last name is misspelled. Please correct.
9. Page 12, 2. Background, 2.3 Power Generation, Paragraph 2, Sentence 3. See comment 8.
10. Page 12, 2. Background, 2.3 Power Generation, Paragraph 3, Sentence 10. Suggest changing the phrase “an emergency power request” to “to meet power demand.” This wording suggestion was previously provided in the cited source (Fritha Ohlson, SWPA, e-mail communication, Oct. 1, 2009). The wording change is significant because Table Rock has been marketed at the overload

capacity and it does not require a power emergency for Southwestern to schedule or call upon the full overload capacity.

11. Page 12, 2. Background, 2.3 Power Generation, Paragraph 3, Sentence 7, Footnote 6. See comment 8.
12. Page 12, 2. Background, 2.3 Power Generation, Paragraph 3, Sentence 10. See comment 8.
13. Page 12, 2. Background, 2.3 Power Generation, Paragraph 4, Sentence 9. See comment 8.
14. Page 13, 2. Background, 2.3 Power Generation, Paragraph 5, Sentence 8. Suggest changing the phrase “their federal contractual obligation” to “the federal contractual obligation.” This wording suggestion was previously provided in the cited source (Fritha Ohlson, SWPA, e-mail communication, Oct. 1, 2009). The wording change is significant because the contractual obligation is the Federal government’s contractual obligation to the hydropower customers, carried out by Southwestern as the Federal power marketing agency. The way the sentence is worded in the Draft TMDL it could be interpreted to mean that Southwestern itself has a contractual obligation with the Federal government.
15. Page 13, 3. Water Quality Problems and Source Identification, Paragraph 1, Sentence 3. Southwestern agrees that DO content in Lake Taneycomo will be influenced by pollution from point and nonpoint sources; however, unfortunately the Draft TMDL prematurely and inappropriately dismisses the significant impact the inflow from the Table Rock Lake watershed has on the severity of the low DO condition occurring in the hypolimnion of the reservoir. The Draft TMDL cites several improvement efforts made in recent years impacting the Table Rock Lake watershed, but the full impact of those and likely future improvements has not had the time to be fully realized and assessed. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.
16. Page 13, 3. Water Quality Problems and Source Identification, 3.1 Table Rock Dam, 3.1.1 Reservoir Stratification and Hypolimnetic Properties, Paragraph 1, Sentence 10. The terms “spring” and “fall” are reversed. The sentence should state “Most Midwestern lakes naturally turn over in the fall and those that freeze over in the winter also turn over in the spring.” Please correct.
17. Page 13, 3. Water Quality Problems and Source Identification, 3.1 Table Rock Dam, 3.1.1 Reservoir Stratification and Hypolimnetic Properties, Paragraph 1, Sentence 11. The reservoir volume of Table Rock Lake is not the sole factor in why it only experiences fall turnover. The climate in southern Missouri is not cold enough to cause a lake of that volume to freeze over and subsequently experience spring turnover. Suggest clarifying the statement.

18. Page 14, 3. Water Quality Problems and Source Identification, 3.1 Table Rock Dam, 3.1.1 Reservoir Stratification and Hypolimnetic Properties, Paragraph 1, Sentence 11. See Comment 8.
19. Page 14, 3. Water Quality Problems and Source Identification, 3.1 Table Rock Dam, 3.1.1 Reservoir Stratification and Hypolimnetic Properties, Paragraph 1, Sentence 12. The statement that Table Rock Lake experienced late year turnover in January 2009 (following the 2008 DO season) is incorrect according to available data. USGS performed a DO and temperature lake profile on December 12, 2008, which presented uniform DO at all depth measurements, indicating late season turnover had already occurred. Please verify and correct the statement.
20. Page 14, 3. Water Quality Problems and Source Identification, 3.1 Table Rock Dam, 3.1.1 Reservoir Stratification and Hypolimnetic Properties, Paragraph 3. See Comment 15.
21. Page 15, 3. Water Quality Problems and Source Identification, 3.1 Table Rock Dam, 3.1.2 Impacts of Hypolimnetic Releases on Trout and the Trout Fishery in Lake Taneycomo, Paragraph 1, Sentences 3-5. The Draft TMDL dismisses the regulatory solution. However, Missouri Department of Conservation (MDC) describes the downstream trout fishery as extremely successful, stating, "Angler use and catch rates of trout in upper Lake Taneycomo rank among the highest known for special regulation trout fisheries in the nation," and according to multiple Lake Taneycomo and Branson area tourism groups and businesses, the fishery is known for "some of the finest trout fishing available anywhere in the world." Additionally, the current state records for Rainbow Trout (throwline) and Brown Trout (pole and line) were caught in Lake Taneycomo. Considering the phenomenal success of recreational fishing tourism in the area, it is difficult to contend that Lake Taneycomo is not a clearly viable aquatic community and successful fishery. Therefore, it is reasonable to re-designate that reach as a transition zone with lower DO standards. Southwestern suggests adding re-designation as a regulatory solution in the Draft TMDL.
22. Page 15, 3. Water Quality Problems and Source Identification, 3.1 Table Rock Dam, 3.1.2 Impacts of Hypolimnetic Releases on Trout and the Trout Fishery in Lake Taneycomo, Paragraph 4. Suggest clarifying the high water temperature conditions as a separate issue from low DO conditions. The Draft TMDL is for low DO in Lake Taneycomo and not for high temperatures.
23. Page 16, 3. Water Quality Problems and Source Identification, 3.1 Table Rock Dam, 3.1.2 Impacts of Hypolimnetic Releases on Trout and the Trout Fishery in Lake Taneycomo, Paragraph 4, Sentence 3. Suggest changing the phrase "and corresponding low DO" to "coupled with low DO conditions". The wording change is significant because as written it is implied that the low DO conditions are caused by the high temperatures, which is not the case.
24. Page 16, 3. Water Quality Problems and Source Identification, 3.1 Table Rock Dam, 3.1.2 Impacts of Hypolimnetic Releases on Trout and the Trout Fishery in

Lake Taneycomo, Paragraph 4, Sentence 6. The net economic benefit value provided is not clearly defined. It is not clear what is included in the value, for what timeframe, and how it is determined. Suggest providing more concrete information on how the net economic benefit value was determined.

25. Page 16, 3. Water Quality Problems and Source Identification, 3.1 Table Rock Dam, 3.1.2 Impacts of Hypolimnetic Releases on Trout and the Trout Fishery in Lake Taneycomo, Paragraph 5, Sentences 10-14. It should be noted that even during the extreme conditions of 2008 for Table Rock Lake and Lake Taneycomo, there were no significant detrimental fish events and no restrictions in stocking, and the fishery maintained its exceptional reputation.
26. Page 17, 3. Water Quality Problems and Source Identification, 3.2 Influences from Point and Nonpoint Source Pollution, Paragraph 1, Sentence 3. Please cite specific “subsequent caselaw” or remove the biased statement from the Draft TMDL.
27. Page 17, 3. Water Quality Problems and Source Identification, 3.2 Influences from Point and Nonpoint Source Pollution, Paragraph 2, Sentence 2. It should be noted that while the hypolimnetic water in Table Rock Lake is seasonally low in DO due to lake stratification, it also remains cold. The conveyance of cold water from the lower depths of the reservoir allows the trout fishery in Lake Taneycomo below Table Rock dam to exist.
28. Page 17, 3. Water Quality Problems and Source Identification, 3.2 Influences from Point and Nonpoint Source Pollution, Paragraph 3. Southwestern agrees that nutrient and organic material contributions from both point and nonpoint sources in the upstream watershed can be a major factor contributing to low DO concentrations. Unfortunately, the Draft TMDL prematurely and inappropriately dismisses the significant impact the inflow from the Table Rock Lake watershed has on the severity of the low DO condition occurring in the hypolimnion of the reservoir. The Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of point and nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. The Draft TMDL states that Table Rock Lake has been listed on Missouri’s 303(d) List as impaired by nutrients. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it should be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.
29. Page 21, 3. Water Quality Problems and Source Identification, 3.2 Influences from Point and Nonpoint Source Pollution, 3.2.3 Water Quality Analysis of Point and Nonpoint Source Influence, Paragraph 1, Sentence 3. Please substantiate the referenced sentence.

30. Page 21, 3. Water Quality Problems and Source Identification, 3.2 Influences from Point and Nonpoint Source Pollution, 3.2.3 Water Quality Analysis of Point and Nonpoint Source Influence, Paragraph 2. The Draft TMDL description of the water quality modeling effort states that “The results of the water quality modeling indicate that during non-generation low flow conditions there are insignificant differences between model simulations that include point sources of nutrients and oxygen-demanding substances and those that do not.” The Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of point and nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it should be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.
31. Page 22, 4. Applicable Water Quality Standards and Water Quality Targets, 4.1 Designated Beneficial Uses, Paragraph 2, Sentence 2. Lake Taneycomo has been listed as impaired on Missouri’s 303(d) List for the designated beneficial use of “Protection of Aquatic Life (Cold-Water Fishery)” due to low DO. Southwestern believes that the river segment downstream of Table Rock is a transition zone that is needed for mixing and water aeration and should be re-designated. The Draft TMDL dismisses the regulatory solution. However, MDC describes the downstream trout fishery as extremely successful, stating, “Angler use and catch rates of trout in upper Lake Taneycomo rank among the highest known for special regulation trout fisheries in the nation,” and according to multiple Lake Taneycomo and Branson area tourism groups and businesses, the fishery is known for “some of the finest trout fishing available anywhere in the world.” Additionally, the current state records for Rainbow Trout (throwline) and Brown Trout (pole and line) were caught in Lake Taneycomo. Considering the phenomenal success of recreational fishing tourism in the area, it is difficult to contend that Lake Taneycomo is not a clearly viable aquatic community and successful fishery. Therefore, it is reasonable to re-designate that reach as a transition zone with lower DO standards. Southwestern suggests adding re-designation as a regulatory solution in the Draft TMDL.
32. Page 23, 4. Applicable Water Quality Standards and Water Quality Targets, 4.3 Antidegradation Rules, Paragraph 3, Sentence 2. The value of hydropower and human activity in the upstream watershed is undeniably important to economic and social development. Realizing the extreme economic and possible social impacts (reduction in hydropower benefits and reduced human development in the watershed), Southwestern suggests that the river segment immediately below Table Rock dam has been incorrectly designated. Southwestern believes that the river segment downstream of Table Rock is a transition zone that is needed for mixing and water aeration. Southwestern suggests adding re-designation as a regulatory solution in the Draft TMDL.

33. Page 24, 5. Calculation of Load Capacity, 5.1 Critical Conditions, Paragraph 1, Sentence 5. Section 132 of the fiscal year 2006 Energy and Water Development Appropriations Act (Public Law 109-103) repealed the WRDA 1999 and 2000 authorization for Table Rock enhanced minimum flows. Table Rock Dam had the lowest benefit-cost ratio of the five White River reservoirs for enhanced minimum flows and the Corps determined that it was not economically feasible. Additionally, enhanced minimum flows have not been identified as a solution to low DO issues below the dams in any of the White River project studies. The enhanced minimum flows discussion is not appropriate in this document and Southwestern suggests removing enhanced minimum flows from the Draft TMDL, unless desired for historical project information.
34. Page 24, 5. Calculation of Load Capacity, 5.2 Modeling Approaches, Paragraph 1, Sentence 2. The Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of point and nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it should be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.
35. Page 24, 5. Calculation of Load Capacity, 5.2 Modeling Approaches, Paragraph 2, Sentence 6. See comment 33.
36. Page 26, 5. Calculation of Load Capacity, 5.2 Modeling Approaches, 5.2.3 Minimum Flow Condition. See comment 34.
37. Page 27, 6. Wasteload (Point Source) and Load (Nonpoint Source) Allocation, Paragraph 1, Sentence 4. Unfortunately, the Draft TMDL prematurely and inappropriately dismisses the significant impact the inflow from the Table Rock Lake watershed has on the severity of the low DO condition occurring in the hypolimnion of the reservoir. The Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of point and nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. The Draft TMDL states that Table Rock Lake has been listed on Missouri's 303(d) List as impaired by nutrients. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it should be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.
38. Page 28, 6. Wasteload (Point Source) and Load (Nonpoint Source) Allocation, 6.2 Load Allocation (Nonpoint Source Load). See Comment 37.

39. Page 31, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.1 White River Dissolved Oxygen Committee – Past and Current, Paragraph 3, Sentence 12. The acronym SWPA was defined on page 12 of the Draft TMDL, suggest the acronym can be used without definition here.
40. Page 31, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.1 White River Dissolved Oxygen Committee – Past and Current, Paragraph 4, seventh bullet. The U.S. Geological Survey (USGS) is not a member of the White River Dissolved Oxygen Committee (WRDO Committee). USGS provides consulting services to the WRDO Committee, including managing the gage program under contract. Suggest removing USGS from the list of WRDO Committee members and, if desired, describing the USGS relationship to the WRDO Committee as a consulting agency.
41. Pages 31-32, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.1 White River Dissolved Oxygen Committee – Past and Current, Paragraph 5, Sentence 6. The phrase “first through use of the turbine venting system” should be modified to state “first through use of the turbine venting system and load spreading”. According to the *Table Rock Lake, White River, Operational Action Plan for the Low Dissolved Oxygen Season* (Operational Action Plan), load spreading begins when the air vents are opened.
42. Page 32, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.1 White River Dissolved Oxygen Committee – Past and Current, Paragraph 5, Sentence 7. Please remove the word “diffusion” from the phrase “(LOX diffusion)” as “LOX” is the acronym for liquid oxygen and diffusion is not the accurate term for the LOX injection system in current application at Table Rock dam.
43. Page 32, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.1 White River Dissolved Oxygen Committee – Past and Current, Paragraph 5, indented excerpt from the Operational Action Plan. The two paragraphs excerpted from the Operational Action Plan are presented in reverse order from how they appear in the Operational Action Plan. Suggest reversing the excerpted paragraphs.
44. Page 32, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, Paragraph 1, Sentence 1. As Southwestern funded in part or in whole most of the numerous aeration tests, studies, and monitoring operations, including investigations into several structural and operational options, as well as funded the air venting modifications in place at Table Rock, suggest identifying Southwestern as a major player alongside the Corps and MDC, rather than grouped under the broad category “other cooperating agencies”.
45. Page 32, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for

Addressing Low Dissolved Oxygen, Paragraph 1, bullet list. Suggest adding a bullet for a multi-level intake as one of the structural modifications investigated. The Corps' Waterways Experiment Station studied this approach in the 1980's; however, it was determined that an acceptable mix from the reservoir of water from the epilimnion (warmer in temperature but higher in DO) and water from the hypolimnion (cooler in temperature but lower in DO) could not be obtained.

46. Page 33, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.1 Turbine Venting, Paragraph 2, Sentence 1. The *Table Rock Project Aeration Options* report (Proctor *et al*, 1999) was funded by Southwestern and the Corps. In coherence to other funding references in the Draft TMDL, please include the funding source of the referenced report.
47. Page 33, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.1 Turbine Venting, Paragraph 2, Sentence 5. The "subsequent modifications" referred to were implemented via funding by Southwestern. In coherence to other funding references in the Draft TMDL, please include the funding source of the referenced structural modifications.
48. Page 33, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.1 Turbine Venting, Paragraph 3, Sentence 3. The phrase "vacuum breaker system" should be replaced by "vacuum breaker bypass piping system". The air venting modifications implemented in 1998, via funding by Southwestern, included the addition of a piping system that bypassed the vacuum breaker system.
49. Page 34, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.1 Turbine Venting, Paragraph 4, Sentence 2. Suggest changing the phrase "revenue and benefit losses" to state "estimated revenue and benefit losses".
50. Page 34, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.1 Turbine Venting, Paragraph 4, Sentence 2. The Operational Action Plan calls for actions to begin at DO concentrations of 6 mg/L downstream of Table Rock dam. Suggest correcting 4 mg/L to state "4 mg/L and above".

51. Page 34, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.1 Turbine Venting, Paragraph 4, Sentence 3. The phrase “turbine venting” should be modified to state “turbine venting and load spreading”. According to the Operational Action Plan, load spreading begins when the air vents are opened.
52. Page 35, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.2 Penstock Liquid Oxygen Injectors or Diffusers, Paragraph 2, Sentence 3. It should be noted that in the fall of 2008, oxygen supply in the region was extremely limited and at times completely unavailable. Two successive hurricanes prevented the production of oxygen at some facilities and regional supply was directed toward essential purposes, such as medical facilities.
53. Page 36, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.2 Penstock Liquid Oxygen Injectors or Diffusers, Paragraph 4, Sentence 2. Suggest changing the phrase “cost of that purchase” to state “cost and availability of that purchase” to more accurately portray the constraining factors. During extremely high electrical demand periods, such as the peak hours of the summer, Southwestern may not be able to purchase replacement energy because it may not be available from other electricity producers in the region that are already running near their full capacity and/or the transmission system may be at risk of being overloaded by bringing in energy from certain locations.
54. Page 36, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.2 Penstock Liquid Oxygen Injectors or Diffusers, Paragraph 5, Sentence 1. Aside from the physical capabilities, efficiency, and cost of using the current LOX injection system at Table Rock dam, it should also be noted that the Operational Action Plan, as developed in cooperation between the WRDO Committee member agencies, calls for passive methods (turbine venting and load spreading) when DO concentrations fall below 6 mg/L, followed by more active methods (LOX injection, capacity reduction, spill), to prevent DO concentrations from receding below 4 mg/L, if possible. As Table Rock dam serves multiple authorized purposes, the 4 mg/L DO concentration limit was agreed upon in order to “protect the trout fishery downstream from Table Rock Dam from low dissolved oxygen (D.O.) impacts to the extent reasonably possible while preserving the flood control and hydropower benefits of the project to the maximum extent possible.” The agreement and cooperation of the WRDO Committee should be made clear in this section.

55. Page 36, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.3 Forebay Liquid Oxygen Diffuser, Paragraph 2, Sentence 2. Note that the Table Rock Project Forebay Oxygen Diffuser System Report Update released in May 2009 was a draft and has not been finalized. TVA has stated a final report will be published in late 2010. Suggest adding wording that identifies the Table Rock Project Forebay Oxygen Diffuser System Report Update as a draft report.
56. Page 37, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.3 Forebay Liquid Oxygen Diffuser, Paragraph 3, Sentence 4. Suggest qualifying the statement “when used alone, there are no negative impacts on power efficiency or capacity” by adding an additional statement that clarifies that it is not recommended to use the forebay oxygen diffuser system alone, rather it is recommended it is used in conjunction with the turbine venting and load spreading already in place at Table Rock, which do impact power efficiency. This information is provided later in the section, but should be provided as a qualifying statement here as well.
57. Page 37, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.3 Forebay Liquid Oxygen Diffuser, Paragraph 4, Sentence 2. Explain why a system that meets the 6 mg/L downstream DO requirement only 97 percent of the time, rather than 100 percent of the time, is an acceptable solution when the TMDL previously stated that the primary TMDL water quality endpoint is to meet the 6 mg/L DO minimum at all times.
58. Page 38, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.3 Forebay Liquid Oxygen Diffuser, Paragraph 5, Sentence 2. See Comment 51.
59. Page 42, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.2 Past and Current Operational Modifications, 10.2.2.2 Spilling and Flow Mixing, Paragraph 2, Sentence 2. See Comment 8.
60. Page 42, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.2 Past and Current Operational Modifications, 10.2.2.2 Spilling and Flow Mixing, Paragraph 3, Sentence 3. Suggest changing the phrase “their contract and customer demand” to “customer

demand under federal contractual obligation”. The wording change is significant because the contractual obligation is the Federal government’s contractual obligation to the hydropower customers, carried out by Southwestern as the Federal power marketing agency.

61. Pages 42-47, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.2 Past and Current Operational Modifications, 10.2.2.3 Fluctuating Timing and Duration of Flow Releases (Load Spreading, Minimum Flows). See Comment 33.
62. Page 45, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.2 Past and Current Operational Modifications, 10.2.2.3 Fluctuating Timing and Duration of Flow Releases (Load Spreading, Minimum Flows), Paragraph 9, second bullet. Clarify the phrase “hence reducing what a commercial facility can charge for the generated power.” Table Rock dam is not a commercial facility. Table Rock dam is a Federal project and the power generated is marketed and distributed by Southwestern at cost-based rates in order to repay the Federal investment, including initial construction costs, interest on construction, interest on amortization, annual operations and maintenance, and new replacement equipment. However, such a minimum flow certainly reduces the value of the energy and does not help meet Federal peaking requirements, thus increasing the need to purchase more expensive on-peak energy.
63. Page 45, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.2 Past and Current Operational Modifications, 10.2.2.3 Fluctuating Timing and Duration of Flow Releases (Load Spreading, Minimum Flows), Paragraph 10, Sentence 5. Suggest replacing “Southwestern Power’s” with “SWPA’s” as the acronym was defined previously in the Draft TMDL.
64. Page 45, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.2 Past and Current Operational Modifications, 10.2.2.3 Fluctuating Timing and Duration of Flow Releases (Load Spreading, Minimum Flows), Paragraph 10, Sentence 6. Suggest replacing the phrase “Missouri ratepayers may” with “Ratepayers in a six-state area, including Missouri, may”. Southwestern markets and distributes the electricity from Table Rock dam to customers in Arkansas, Kansas, Louisiana, Missouri, Oklahoma, and Texas.
65. Page 46, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.2 Past and Current Operational Modifications, 10.2.2.3 Fluctuating Timing and Duration of Flow Releases (Load

Spreading, Minimum Flows), Paragraph 12, Sentence 2. Explain how enhanced minimum flows have been shown to solve the low DO problem in the Table Rock dam tailwater.

66. Page 47, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.2 Past and Current Operational Modifications, 10.2.2.3 Fluctuating Timing and Duration of Flow Releases (Load Spreading, Minimum Flows), Paragraph 14, Sentence 3. Southwestern published by Federal Register Notice its Final Determination Report in January 2009 followed by the Final Addendum, which was published on June 23, 2010, concerning the Federal and non-Federal hydropower impacts of minimum flows at Bull Shoals and Norfolk.
67. Page 47, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.3 Past and Current Measures Addressing Point and Nonpoint Source Pollution Contributions, Paragraph 1, Sentence 4. Southwestern is concerned that the Draft TMDL prematurely and inappropriately dismisses the significant impact the inflow from the Table Rock Lake watershed has on the severity of the low DO condition occurring in the hypolimnion of the reservoir. The Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of point and nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. Southwestern suggests that the TMDL for Table Rock Lake for impairment by nutrients should address the impact on low DO in the hypolimnion of the reservoir and the subsequent effect on Lake Taneycomo. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.
68. Page 47, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.3 Past and Current Measures Addressing Point and Nonpoint Source Pollution Contributions, 10.3.1 Point Source Pollution Controls: Past and Current, Paragraph 1, Sentence 1. Southwestern is concerned that the Draft TMDL prematurely and inappropriately dismisses the significant impact the inflow from the Table Rock Lake watershed has on the severity of the low DO condition occurring in the hypolimnion of the reservoir. The point and nonpoint sources are identified; however, the Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of point sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low

DO impairment in Lake Taneycomo as well as a significant contributor to the solution.

69. Page 48, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.3 Past and Current Measures Addressing Point and Nonpoint Source Pollution Contributions, 10.3.2 Nonpoint Source Pollution Controls: Past and Current, Paragraph 1, Sentence 3. Southwestern is concerned that the Draft TMDL prematurely and inappropriately dismisses the significant impact the inflow from the Table Rock Lake watershed has on the severity of the low DO condition occurring in the hypolimnion of the reservoir. The sentence states clearly that "...linkages exist between nonpoint sources in the Table Rock Lake watershed and water quality in Lake Taneycomo..." but goes on to state "... this TMDL is not meant to include a comprehensive summary of water quality-related efforts in the Table Rock Lake watershed." Please explain why, if it is known that point and nonpoint source pollution in the Table Rock Lake watershed can impact the low DO in the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo, are those impacts not seriously considered and modeled in the Draft TMDL. The point and nonpoint sources are identified; however, the Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.
70. Page 49, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.3 Past and Current Measures Addressing Point and Nonpoint Source Pollution Contributions, 10.3.2 Nonpoint Source Pollution Controls: Past and Current, Paragraph 5, Sentence 2. Southwestern agrees that, as stated in reference to efforts to improve water quality in the Table Rock Lake watershed, "these efforts can only have a positive influence on the water quality downstream in Lake Taneycomo." Please explain why, if it is known that point and nonpoint source pollution in the Table Rock Lake watershed can impact the low DO in the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo, are those impacts not seriously considered and modeled in the Draft TMDL. The point and nonpoint sources are identified; however, the Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.

71. Page 49, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.3 Past and Current Measures Addressing Point and Nonpoint Source Pollution Contributions, 10.3.3 Influence of Point and Nonpoint Source Pollution Controls: Past and Current, Paragraph 1, Sentences 3-4. See Comment 30.
72. Page 49, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.3 Past and Current Measures Addressing Point and Nonpoint Source Pollution Contributions, 10.3.3 Influence of Point and Nonpoint Source Pollution Controls: Past and Current, Paragraph 1, Sentence 6. Please define what is deemed to be “minor” in terms of the effect of the reduction of point and nonpoint source pollution in Table Rock Lake and Lake Taneycomo on the low DO impairment. The Operational Action Plan provides for 4 mg/L and above DO concentrations during times of generation. If improvement in the Table Rock Lake watershed provided for a 2 mg/L or more improvement, the target of 6 mg/L could be achieved.
73. Page 50, 11. Summary and Introduction to Future Implementation of this TMDL, Paragraph 1, Sentence 3. Please clarify whether nutrients (point and nonpoint sources) from the Table Rock Lake watershed were simulated (existing, no, and at NPDES limits) in the water quality modeling performed for Lake Taneycomo. The Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of point and nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.
74. Page 50, 11. Summary and Introduction to Future Implementation of this TMDL, Paragraph 1, Sentence 4. The Draft TMDL prematurely and inappropriately dismisses the significant impact the inflow from the Table Rock Lake watershed has on the severity of the low DO condition occurring in the hypolimnion of the reservoir. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.
75. Page 50, 11. Summary and Introduction to Future Implementation of this TMDL, Paragraph 3, Sentence 2. Please replace the phrase “penstock venting” with the correct term for the current configuration at Table Rock, “turbine venting”. Also, please add in this sentence load spreading, which is another operational method implemented. Additionally, suggest adding in this sentence, or in a new sentence, the air venting modifications that were implemented in 1998: vacuum breaker bypass piping and hub baffles.

76. Page 50, 11. Summary and Introduction to Future Implementation of this TMDL, Paragraph 4, Sentence 1. Please clarify that the low DO issue is seasonal, as the majority of the year there is no DO issue in Lake Taneycomo. Additionally, MDC describes the downstream trout fishery as extremely successful, stating, “Angler use and catch rates of trout in upper Lake Taneycomo rank among the highest known for special regulation trout fisheries in the nation,” and according to multiple Lake Taneycomo and Branson area tourism groups and businesses, the fishery is known for “some of the finest trout fishing available anywhere in the world.” The current state records for Rainbow Trout (throwline) and Brown Trout (pole and line) were caught in Lake Taneycomo. Considering the phenomenal success of recreational fishing tourism in the area, it is difficult to contend that Lake Taneycomo is not a thriving fishery under existing conditions.
77. Page 51, 12. Implementation: Future Recommendations, 12.1 Future Point and Nonpoint Source Controls, Paragraph 1. See Comment 2.
78. Page 51, 12. Implementation: Future Recommendations, 12.1 Future Point and Nonpoint Source Controls, 12.1.1 Future Point Source Controls, Paragraph 2, Sentence 1. As the first stage of Missouri’s nutrient criteria plan became effective less than a year ago, and there is expected to be further progress in improving the watersheds for both Table Rock Lake and Lake Taneycomo, please explain why the full impact of those improvements has not been given the time to be fully realized and assessed or were not considered completely in the Lake Taneycomo water quality modeling for this Draft TMDL. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.
79. Page 52, 12. Implementation: Future Recommendations, 12.1 Future Point and Nonpoint Source Controls, 12.1.2 Future Nonpoint Source Controls. Southwestern agrees that if the amount of incoming organic material can be reduced in the upper watershed, the impact on DO within Table Rock Lake, and subsequently in the water released to Lake Taneycomo, should be positive. Please explain why nonpoint source pollution in the Table Rock Lake watershed does not appear to be simulated in the water quality modeling performed for Lake Taneycomo. The Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of point and nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.
80. Page 52, 12. Implementation: Future Recommendations, 12.2 Future Structural Modifications, 12.2.1 During Periods of Power Generation, Paragraph 1, Sentence 1. Please add in this sentence load spreading, which is another operational

method implemented. Additionally, suggest adding in this sentence, or in a new sentence, the air venting modifications that were implemented in 1998: vacuum breaker bypass piping and hub baffles.

81. Page 52, 12. Implementation: Future Recommendations, 12.2 Future Structural Modifications, 12.2.1 During Periods of Power Generation, Paragraph 1, Sentence 1. Suggest replacing the word “diffusion” with “injection” as injection more accurately portrays the LOX injection system in current application at Table Rock dam.
82. Pages 52-53, 12. Implementation: Future Recommendations, 12.2 Future Structural Modifications, 12.2.1 During Periods of Power Generation, Paragraphs 2 and 3. Note that both of the “AND EITHER” options contain extremely high installation costs and the forebay oxygen diffuser system contains prohibitive annual operation and maintenance costs. Additional costs, whether through a loss of power production or increased cost assigned to the hydropower purpose, would ultimately be passed on to Federal hydropower consumers, including consumers in Missouri. It should be noted that Southwestern has voluntarily modified the hydropower equipment and operations at Table Rock to improve the DO concentrations in the tailwater (Lake Taneycomo) during generation periods, and Southwestern has directly spent well over \$1 million on those efforts. As a result of those modifications, Southwestern has foregone approximately \$3.5 million (2009 rates) in hydropower benefits from 1999 through 2009 to maintain a minimum DO concentration of 4 mg/L in the tailwater during periods of generation. Therefore, Southwestern does not believe it would be appropriate to pass on the additional costs of the solutions identified in the Draft TMDL to further enhance the “finest trout fishing available anywhere in the world” of the existing fishery. Please address the high cost of the solutions presented in the Draft TMDL and the potential impact to taxpayers and ratepayers.
83. Page 53, 12. Implementation: Future Recommendations, 12.2 Future Structural Modifications, 12.2.2 During Periods of Non-generation, Paragraph 1, Sentence 1. Preliminary estimates from the ongoing TVA study (Perry 2009) suggest the flow from the house turbines would have to be increased and to operate both house units at full gate opening would require a new transformer. Any additional flow from the house units above that required for station service would equate to enhanced minimum flow. As there is no current storage allocation at Table Rock Lake for enhanced minimum flows, legislation would be required to authorize such a storage reallocation. Additionally, generation in excess of the station service needs at the project would be marketed by Southwestern as low-value, off-peak energy around the clock instead of on-peak energy scheduled by Southwestern to meet customer demands. The new transformer required is an additional, costly capital investment, likely at the expense of Federal hydropower. Furthermore, running both house units continuously at the same time eliminates their function as a back-up power source to one another. Please address the high cost and impediments of the solution presented in the Draft TMDL and the potential impact to taxpayers and ratepayers.

84. Page 53, 12. Implementation: Future Recommendations, 12.2 Future Structural Modifications, 12.2.2 During Periods of Non-generation, Paragraph 2, second bullet. See Comment 33.
85. Page 53, 12. Implementation: Future Recommendations, 12.2 Future Structural Modifications, 12.2.2 During Periods of Non-generation, Paragraph 2, third bullet. Generation in excess of the station service needs at the project would be marketed by Southwestern as low-value, off-peak energy around the clock instead of on-peak energy scheduled by Southwestern to meet customer demands. The new transformer required is an additional, costly capital investment, likely at the expense of Federal hydropower. Furthermore, running both house units continuously at the same time eliminates their function as a back-up power source to one another. Please address the high cost and impediments of the solution presented in the Draft TMDL and the potential impact to taxpayers and ratepayers.
86. Page 54, 12. Implementation: Future Recommendations, 12.2 Future Structural Modifications, Paragraph 2 (first paragraph on page 54), Sentence 4. See Comment 33.
87. Page 54, 12. Implementation: Future Recommendations, 12.2 Future Structural Modifications, Paragraph 2 (first paragraph on page 54), Sentence 5. Suggest adding to the sentence, or in a new sentence, also keeping in mind the effect of decreasing the availability of hydropower or increasing the cost of hydropower in the six-state region, including Missouri: increase in greenhouse gas emissions due to replacement energy source, increase in dependence on fossil-fuels due to replacement energy sources, increase in cost of electricity to ratepayers, etc.
88. Page 54, 12. Implementation: Future Recommendations, 12.3 Future Operational Modifications, 12.3.2 Minimum Flow Legislation, Paragraph 1. See Comment 33.
89. Page 61, Appendix A Dissolved Oxygen Data on Which Lake Taneycomo Was Deemed Impaired, Table 1. Percent of D.O. Measurements Failing to Meet Standard, Lake Taneycomo at College of the Ozarks. Please clarify the timeframe for the measurements. According to the USGS data available to Southwestern, each year the gage at College of the Ozarks is only active during the potential low DO season (June through December), which varies year to year. Please provide the timeframe for each year's DO measurement that results in the "Percent of Measurements Not Meeting Standard" as well as information on how the "Estimated Annual Percent Not Meeting Standard" is extrapolated.
90. Page 62, Appendix A Dissolved Oxygen Data on Which Lake Taneycomo Was Deemed Impaired, Table 3. Frequency of Daily D.O. Minima Failing to Meet Standard, Footnote Paragraph 1, Sentence 3. The impact of the Table Rock Lake watershed should also be considered when assessing the frequency of daily DO concentrations failing to meet the standard, as high inflow years result in greater amounts of nutrients, organic matter, and pollutants entering Table Rock Lake,

which impacts the DO in the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution, and should be evaluated accordingly.



STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

Jeremiah W. (Jay) Nixon, Governor • Kip A. Stetzler, Acting Director

www.dnr.mo.gov

November 15, 2010

Mr. George Robbins, Director
Division of Resources and Rates
U.S. Department of Energy
Southwestern Power Administration
One West Third Street
Tulsa, OK 74103-3519

RE: Response to Comments on the Draft Lake Taneycomo Total Maximum Daily Load

Dear Mr. Robbins:

The Missouri Department of Natural Resources (Department) appreciates the comments provided by Southwestern Power Administration (Southwestern) on the draft Lake Taneycomo Total Maximum Daily Load (TMDL). This letter responds to comments received September 13, 2010 during the public comment period for this TMDL. Enclosed find the Department's responses to each comment and the location of the revision (if applicable) within the final TMDL document as it will be submitted to the U.S. Environmental Protection Agency (EPA).

The Department appreciates the attention and dedication of Southwestern staff to review and provide comments on the technical and historical aspects of the draft TMDL document prior to public notice. In particular, the Department appreciates the help and assistance of Ms. Fritha Ohlson, Civil Engineer (Hydrologic). Contributions from Ms. Ohlson made the draft TMDL placed on public notice a more thorough and accurate document and had the same effect through revisions made to the document in response to comments. The Department also appreciates and acknowledges the efforts and participation of Southwestern on the White River Dissolved Oxygen Committee and its implementation of the "Operational Action Plan for Low Dissolved Oxygen Season" at the Table Rock Dam facility. These efforts have helped to improve dissolved oxygen conditions and water quality in Lake Taneycomo. The Department looks forward to future cooperative efforts with your organization to improve and protect the high quality trout fishery below Table Rock Dam.

In its September 13, 2010 letter, Southwestern mentions several areas of concern including point and nonpoint sources of nutrients within the Table Rock Lake and Lake Taneycomo watersheds, redesignation of aquatic life protection beneficial uses, minimum flow conditions, and the economic feasibility of implementation alternatives. These areas of concern were also extremely prevalent in the enumerated comments included with the letter. To better respond to Southwestern's comments, the above areas of concern will be addressed first and answers to individual comments will follow.

Consideration of point and nonpoint sources of nutrients in the Table Rock Lake and Lake Taneycomo watersheds:

The September 13, 2010 comment letter and many individual comments contend that the draft Lake Taneycomo TMDL “prematurely and inappropriately dismisses the significant impact the inflow from the Table Rock Lake watershed has on the severity of the low DO condition occurring in the hypolimnion of the reservoir.” The Department asserts this is not the case. The TMDL development process must consider and determine both point and nonpoint sources of pollutants that may be causing or contributing to the impairment. The TMDL document considers point and nonpoint sources and their impacts in both the Lake Taneycomo and Table Rock Lake watersheds and these sources were included in the TMDL modeling. To this point, Section 4 and Table 4 of Appendix C (Lake Taneycomo Water Quality Model Inputs) indicate that starting water quality input values for nutrients and algal chlorophyll in the Lake Taneycomo model were established using data from Table Rock Lake at Table Rock Dam. In this way, conditions in Table Rock Lake, and by extension its watershed, were represented and considered in the development of the Lake Taneycomo TMDL. The net input of nutrients from both point and nonpoint sources in the Table Rock Lake watershed are represented by these integrated water quality data. As discussed in Appendix C, the dissolved oxygen dynamics at the tailwater of Table Rock Dam are dominated by the low dissolved oxygen releases from the dam and not nutrient inputs (from any source) within the Lake Taneycomo and Table Rock Lake watersheds.

Limnologists from the University of Missouri-Columbia, Professor and Department Chair, John R. Jones, Ph.D.¹ and Senior Research Associate, Daniel V. Obrecht, were consulted in order to address the reoccurring Southwestern comment regarding nutrient levels in Table Rock Lake affecting hypolimnetic water discharged through Table Rock Dam. Both gentlemen have extensive experience in limnology and water quality, and have been instrumental in the development of Missouri’s nutrient water quality standards for lakes. Based on decades of experience and actual examples (See enclosed e-mails dated Oct. 12, 2010), the limnologists confirm the Department’s contention that even the hypolimnions of oligotrophic² reservoirs in Missouri become deficient in oxygen as summer progresses. Limnologists trophically classify water quality in Table Rock Lake near the dam as being on the low end of mesotrophic³. In a document provided via e-mail (mentioned above) by Daniel Obrecht, he describes why, unlike an oligotrophic *natural lake* (i.e., one not created by a dam but instead, for example, by past glacial activity), an oligotrophic *reservoir* (i.e., man-made; e.g., one created by a dam) has, “on average, more annual inflow from the watershed relative to the water body volume.” This difference, he states, “explains why [an oligotrophic] reservoir will have an anoxic hypolimnion, while a natural lake with the same surface nutrient and algal chlorophyll levels will not.” If an oligotrophic reservoir can be expected to have an anoxic hypolimnion as the season progresses, the same can be expected for a more trophically advanced (i.e., more eutrophied) reservoir like Table Rock Lake. Mr. Obrecht goes on to state, “Reductions of nutrient inputs into Table Rock Lake should decrease the average algal biomass within the lake, but the influence of these small

¹ <http://www.snr.missouri.edu/fw/faculty/jones-j.php>

² An oligotrophic reservoir or lake is one with low primary productivity, the result of low nutrient content. These water bodies have low algal production, and consequently, often have very clear waters.

³ Mesotrophic reservoirs and lakes are those with moderate quantities of nutrients and have an intermediate level of productivity productive (in terms of aquatic animal and plant life), greater than oligotrophic lakes, but less than eutrophic lakes.

nutrient reductions on hypolimnetic oxygen dynamics will probably be minor. Any improvements in the hypolimnetic oxygen dynamics will probably be limited to a slight shift in timing of the onset of anoxia.” Dr. Jones concurred with the information and statements provided by Mr. Obrecht.

The Department agrees that reducing nonpoint sources of nutrients in the Table Rock Lake watershed should reduce nutrient loading and oxygen demand in Table Rock Lake. This in turn should result in improved dissolved oxygen conditions within the hypolimnion of Table Rock Lake, the discharge water from Table Rock Dam, and Lake Taneycomo. However, the Department need not wait until full implementation of nutrient reductions in Table Rock Lake watershed before submitting the TMDL for Lake Taneycomo. In fact, due to its placement on the Missouri 303(d) List of impaired waters and inclusion in the Missouri TMDL Consent Decree⁴, the Department or EPA must establish a TMDL for this water body by December 31, 2010. To satisfy its obligations under the TMDL Consent Decree, the Department has chosen to develop the Lake Taneycomo TMDL at this time. Should new data or information become available in the future that would change the calculations or allocations found in the TMDL, the Department may choose to revisit this TMDL.

Consideration of redesignation of Lake Taneycomo to an alternate aquatic life protection beneficial use [i.e., a transition zone]:

The Department acknowledges that Lake Taneycomo deservedly has a strong reputation as a quality trout fishery. That reputation is not gained, however, based on conditions during the low dissolved oxygen (DO) season. During the low DO season (which can be up to six months of the year), DO levels commonly dip below 6 mg/L and result in negative impacts to both the aquatic community and the cold-water fishery.

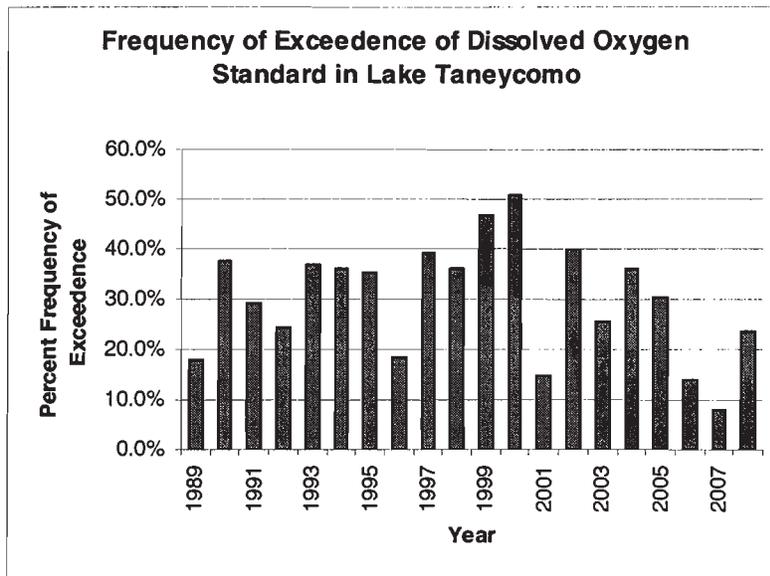
The Lake Taneycomo TMDL describes in detail how achieving the 6 mg/L minimum dissolved oxygen criterion is technically feasible using currently identified technology and operational practices. While some options or methods may be impractical when implemented in isolation (e.g., penstock injection), a coordinated approach that uses multiple methods of adding dissolved oxygen to Table Rock Dam’s discharge (e.g., forebay diffusion, turbine venting, and load spreading) can allow Lake Taneycomo to achieve applicable water quality standards.

The state 303(d) Listing Methodology document⁵ assesses compliance with the dissolved oxygen standard based upon the percent of all criterion measurements taken at the College of the Ozarks monitoring site. If more than 30 measurements are made, the water body is judged to be impaired if more than 10 percent of samples exceed the standard. The dissolved oxygen standard for the Lake Taneycomo cold water fishery is 6 mg/L. Six of the last eight individual years, and the eight year average for the frequency of exceedance, are greater than 10 percent. At Branson, on the lower portion of Lake Taneycomo, the exceedance rate is only about five percent (gathered through bimonthly sampling).

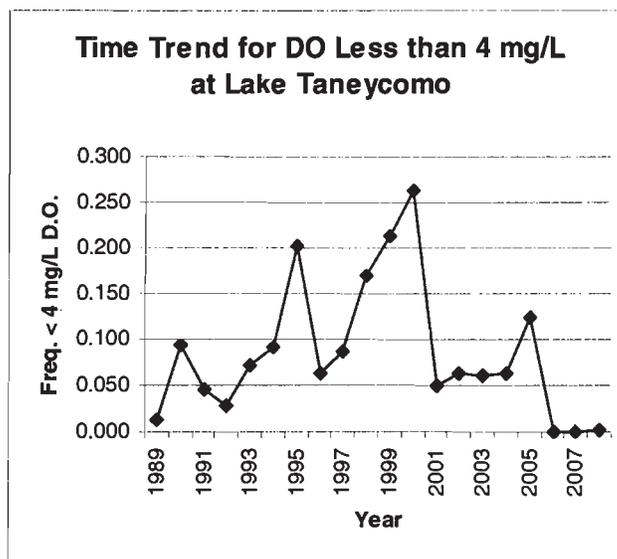
⁴ Consent Decree refers to the 2001 Consent Decree entered in the case of American Canoe Association, et al. v. Carol M. Browner, et al., No. 98-1195-CV-W in consolidation with No. 98-4282-CV-W, February 27, 2001.

⁵ <http://www.dnr.mo.gov/env/wpp/waterquality/303d.htm>

Since 1998, the daily minimum dissolved oxygen has failed to meet the state dissolved oxygen standard 31.7 percent of the time. Over the last seven years, the exceedance rate is somewhat better, 26.8 percent. Since 2006, operations at Table Rock Dam have been much more effective in keeping minimum dissolved oxygen levels above 4 mg/L. Dissolved oxygen frequency of exceedance and time trend plots have been included below for your reference. These plots illustrate that, while applicable water quality standards are not currently being met, conditions in Lake Taneycomo are improving as U.S. Army Corps of Engineers and Southwestern Power Administration implement technologies and practices to improve dissolved oxygen in Table Rock Dam's tailwater.



Source: MoDNR, 2009 – Lake Taneycomo 2010 303(d) Assessment Worksheet



Source: MoDNR, 2009 – Lake Taneycomo 2010 303(d) Assessment Worksheet

Because dissolved oxygen conditions and the cold water fishery use are being met much of the year (especially outside the low DO season), it is premature to discuss changes to the designated uses and/or water quality standards for Lake Taneycomo. Especially considering water quality conditions have improved during the low dissolved oxygen season over time due to structural and operational modifications at the dam. TMDLs are developed to address applicable water quality standards as found in existing state and federal rule. Therefore, modification of the cold-water fishery designated use and applicable criterion will not be included in the TMDL as a regulatory option. However, should Southwestern wish to discuss this topic further, the Department would be willing to review any relevant data and information during a future triennial review of Missouri's Water Quality Standards. Any information used to support a redesignation of beneficial uses would need to demonstrate that a lower aquatic life protection use or DO criterion would not have negative effects (i.e., impair) the existing cold-water fishery designated use.

Consideration of minimum flow conditions in the TMDL is not appropriate:

Section 303(d) of the Clean Water Act and Federal Chapter 40 of the Code of Federal Regulations (CFR) Part 130 require states to develop TMDLs for waters not meeting designated beneficial uses. To ensure that TMDL loading calculations are protective of applicable water quality standards, critical conditions and seasonal variation must be considered during the analysis. Due to the wide number of discharge scenarios that could occur at Table Rock Dam, current and potential future critical conditions were selected and modeled to determine loading for oxygen demand that would achieve the applicable minimum dissolved oxygen criterion of 6 mg/L. Because minimum flows have been discussed for Table Rock Dam and represent a potential future critical condition, these conditions were modeled and TMDL loading calculated to be protective of designated uses during the low dissolved oxygen season. For these reasons, discussions and calculations relating to minimum flow conditions are appropriate and will remain in the TMDL.

Consideration of the economic feasibility of implementation alternatives:

The Department includes discussion of implementation practices and activities in TMDLs to give watershed stewards direction and options for implementing the required load reductions. However, the TMDL document is not required to present socio-economic feasibility calculations as they relate to those practices or activities. TMDL loading calculations must meet applicable water quality standards and are developed without regard to treatment technology or cost. It is the responsibility of watershed citizens and stakeholders to determine which implementation practices and activities are most appropriate.

Specific comments and responses (enclosed):

The Department has included responses to specific comments provided by Southwestern in the enclosed document. Where appropriate, responses to specific comments refer to responses to general concerns discussed previously in this letter.

Mr. George Robbins
Page Six

Thank you again for your comments and for your interest in protecting the quality of Missouri's waters. The incorporation of your suggested revisions has made the document a more technically accurate portrayal of how and why the dam functions and the history behind the issue. If you have questions or would like to discuss this TMDL further, please contact me at (573) 526-1446, or via e-mail at john.hoke@dnr.mo.gov, or by mail at the Missouri Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, Missouri 65102-0176.

Sincerely,

WATER PROTECTION PROGRAM



John Hoke, Chief
TMDL Unit

JH:dml

Enclosures

Southwestern Power Administration (Southwestern)
Specific Comments (in italics) on
Missouri Department of Natural Resources
Water Projection Program
Total Maximum Daily Load (TMDL)
for Lake Taneycomo in Taney County, Missouri
DRAFT Published July 30, 2010

and

Missouri Department of Natural Resources' (Department) Responses
Enclosure to Department's November 15, 2010 Comment Response Letter to Southwestern

1. *Page 6, 1. Introduction, Paragraph 3, Sentence 2.*

According to longstanding Environmental Protection Agency (EPA) rules, a discharge from a dam does not constitute an addition of a pollutant even though some physical and chemical properties of the water may have changed as water moved through the dam. Additionally, as provided in the Draft TMDL (page 17, 3. Water Quality Problems and Source Identification, 3.2 Influences from Point and Nonpoint Source Pollution, Paragraph 1), court decisions have determined that "the reduction of oxygen caused by the dam did not constitute the 'addition' of a pollutant from a 'point source.'" As low dissolved oxygen (DO) is not an actual pollutant added to the water, the validity of the TMDL process in this case must be more clearly established.

Under Section 303(c) of the Clean Water Act and the Missouri Clean Water Law, the state of Missouri has broad authority to set water quality standards to protect the public health or welfare, and/or enhance the water quality of the state, considering the propagation of fish and wildlife in doing so. Missouri has designated Lake Taneycomo for cold water aquatic life protection. To protect this designated use, Missouri has set the water quality standard for dissolved oxygen (DO) at 6 mg/L. Because Lake Taneycomo has failed to meet this standard for DO, it is an impaired water subject to the TMDL process described in section 303(d) of the Clean Water Act. Furthermore, under the 2001 Consent Decree per the American Canoe Association v. EPA lawsuit, a TMDL must be established for Lake Taneycomo.

2. *Page 7, 2. Background, 2.1 Lake Taneycomo, Paragraph 2, Sentence 1.*

Southwestern commends Missouri Department of Natural Resources (MDNR) for addressing at length in the Draft TMDL point and nonpoint source pollution in the Table Rock Lake and Lake Taneycomo watersheds that contribute to low DO levels and overall water quality.

Unfortunately, the Draft TMDL prematurely and inappropriately dismisses the significant impact the inflow from the Table Rock Lake watershed has on the severity of the low DO condition occurring in the hypolimnion of the reservoir. As stated in the referenced sentence, "For the purpose of this TMDL, the Lake Taneycomo watershed consists only of those lands draining into Lake Taneycomo below Table Rock Dam." Therefore, the Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of point and nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. The Draft TMDL cites several improvement efforts made in recent years impacting the Table Rock Lake watershed, but the full impact of those and likely future improvements has not had the time to be fully realized and assessed. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.

As discussed in the Department's November 15, 2010 response letter to Southwestern, point and nonpoint sources in the Table Rock Lake watershed were accounted for in the Lake Taneycomo model by using algal chlorophyll and nutrient water quality data from Table Rock Lake. In Section 4 of Appendix C, "Water Quality Model Setup," the following sentences are found in the first paragraph: "Algal chlorophyll and nutrient data used as upstream boundary conditions were obtained from the monitoring data at site WR1 (in Table Rock Lake at Table Rock Dam) collected by the University of Missouri from 2002 to 2007 (University of Missouri, unpublished data). The monitoring data at Table Rock Dam used as boundary conditions of the model is given in Table A1 (Appendix A)." The monitoring site referenced is just upstream of Table Rock Dam, in Table Rock Lake, and clarification to this effect has been added to the paragraph. In this way, conditions in the Table Rock Lake watershed were considered in the development of the Lake Taneycomo TMDL model and loading calculations. As discussed in Appendix C, the dissolved oxygen dynamics at the tailwater of Table Rock Dam are dominated by the low dissolved oxygen releases from the dam and not nutrient inputs (from any source) within the Lake Taneycomo and Table Rock Lake watersheds.

As stated in the second paragraph of Section 3.1.2, in August 1960, trout in Shepherd of the Hills Hatchery were observed dying as a result of low dissolved oxygen in water coming through the dam (at the same depth from which the penstocks pull water). The watershed of Table Rock Lake was not nearly as developed then as it is now. This fact would indicate that the low DO in the hypolimnion can occur regardless of cultural eutrophication. Please see the enclosed e-mails and attachment dated Oct. 12, 2010 from Dr. John R. Jones and Daniel Obrecht for additional information. The openings to both the hatchery and the penstocks are centered 140 feet in depth so draw water out of the hypolimnion. This has been a problem since the dam was constructed because of how the system was designed.

Additional discussion pertaining to this comment can also be found in the Department's November 15, 2010 comment response letter to Southwestern.

3. *Page 8, 2. Background, 2.1 Lake Taneycomo, Paragraph 4, Sentence 2.*
Suggest changing the wording to "temperature range typically between" as temperatures higher than 55 degrees Fahrenheit (°F) and lower than 45° F have been recorded.

The requested revisions have been made to the referenced sentence.

4. *Page 9, 2. Background, 2.1 Lake Taneycomo, Paragraph 5, Sentence 1.*
The referenced sentence supports Southwestern's position that under the existing conditions Lake Taneycomo is a clearly viable aquatic community and successful fishery. Therefore it is reasonable to re-designate the reach as a transition zone with lower DO standards. Southwestern suggests adding re-designation as a regulatory solution in the Draft TMDL.

The Department believes the cold-water fishery use designation and applicable DO criterion are appropriate for Lake Taneycomo. As discussed in the Department's November 15, 2010 response letter to Southwestern, the Department believes that Lake Taneycomo deservedly has a strong reputation as a quality trout fishery. That reputation is not gained, however, based on conditions during the low DO season. Although the aquatic community and cold-water fishery are viable below the dam a large part of the year, this is often not the case during the low DO season. Research results documenting the negative impacts of low DO on the fish and aquatic community below Table Rock Dam (detailed in the TMDL) do not currently support an alternate

designated use or lower, site specific criterion as options for the Lake Taneycomo cold-water fishery.

Because dissolved oxygen conditions and the cold water fishery use are being met much of the year (especially outside the low DO season), it is premature to discuss changes to the designated uses and/or water quality standards for Lake Taneycomo. Especially considering water quality conditions have improved during the low dissolved oxygen season over time due to structural and operational modifications at the dam. TMDLs are developed to address applicable water quality standards as found in existing state and federal rule. However, should Southwestern wish to discuss this topic further, the Department would be willing to review any relevant data and information during a future triennial review of Missouri's Water Quality Standards. Any information used to support a redesignation of beneficial uses would need to demonstrate that a lower aquatic life protection use or DO criterion would not have negative effects (i.e., impair) the existing cold-water fishery designated use.

5. *Page 9, 2. Background, 2.1 Lake Taneycomo, Paragraph 5, Sentences 2-5.*

The benefit values provided are not clearly defined, such as whether they are annual values. The statement "MDC estimated the value of the fishery at almost \$15 million" is not sufficient as it does not provide what is included in that value, for what timeframe, and how it is determined. Suggest providing more concrete information on how the benefit values are determined.

The Missouri Department of Conservation (MDC) provided the Department with the following information from a 2006 internal briefing paper: "The economic value of Lake Taneycomo's sport fisheries was last updated in 1998. The annual net angling benefit was \$3,463,750 economic indirect benefit of angler spending was \$8,400,899, resulting in a combined annual benefit of angling of \$11,864,649. Assuming a simple 3 percent annual inflation rate (not accounting for any changes in angling pressure) yields a combined annual benefit of angling of \$14,592,022." MDC considers this a conservative estimate. This information has been added to the referenced sentence.

6. *Page 11, 2. Background, 2.2 Table Rock Dam, Paragraph 4, Sentence 1.*

Suggest adding the statement "when the turbines are run at overload capacity" at the end of the referenced sentence. Stating overload capacity differentiates the 15,100 cubic feet per second (cfs) value from the 13,000 cfs value provided in the following sentence, correctly identified as the discharge at nameplate capacity.

The requested revision has been made to the referenced sentence.

7. *Page 11, 2. Background, 2.2 Table Rock Dam, Paragraph 4, Sentences 3 and 6.*

Suggest modifying the two referenced sentences to the following "Peak flows of up to 15,100 cfs may be needed during times of high demand for electrical generation. High demand for electrical generation typically occurs in the summer during a single peak over the afternoon and evening hours and in the winter during two separate peaks over the morning and evening hours." Changing the peak flow from 13,000 cfs to 15,100 cfs is more accurate because Table Rock has been marketed at the overload capacity and as such the units can be run at overload to meet electrical demand.

The requested revisions have been made to the referenced paragraph.

8. *Page 11, 2. Background, 2.2 Table Rock Dam, Paragraph 4, Sentence 5. Fritha Ohlson's last name is misspelled. Please correct.*

The spelling of Fritha Ohlson's last name has been corrected.

9. *Page 12, 2. Background, 2.3 Power Generation, Paragraph 2, Sentence 3. See comment 8.*

The spelling of Fritha Ohlson's last name has been corrected.

10. *Page 12, 2. Background, 2.3 Power Generation, Paragraph 3, Sentence 10.*

Suggest changing the phrase "an emergency power request" to "to meet power demand." This wording suggestion was previously provided in the cited source (Fritha Ohlson, SWPA, e-mail communication, Oct. 1, 2009). The wording change is significant because Table Rock has been marketed at the overload capacity and it does not require a power emergency for southwestern to schedule or call upon the full overload capacity.

The requested revision has been made in the referenced sentence.

11. *Page 12, 2. Background, 2.3 Power Generation, Paragraph 3, Sentence 7, Footnote 6. See comment 8.*

The spelling of Fritha Ohlson's last name has been corrected.

12. *Page 12, 2. Background, 2.3 Power Generation, Paragraph 3, Sentence 10. See comment 8.*

The spelling of Fritha Ohlson's last name has been corrected.

13. *Page 12, 2. Background, 2.3 Power Generation, Paragraph 4, Sentence 9. See comment 8.*

The spelling of Fritha Ohlson's last name has been corrected.

14. *Page 13, 2. Background, 2.3 Power Generation, Paragraph 5, Sentence 8.*

Suggest changing the phrase "their federal contractual obligation" to "the federal contractual obligation." This wording suggestion was previously provided in the cited source (Fritha Ohlson, SWPA, e-mail communication, Oct. 1, 2009). The wording change is significant because the contractual obligation is the Federal government's contractual obligation to the hydropower customers, carried out by Southwestern as the Federal power marketing agency. The way the sentence is worded in the Draft TMDL it could be interpreted to mean that Southwestern itself has a contractual obligation with the Federal government.

The requested revision has been made to the referenced sentence.

15. *Page 13, 3. Water Quality Problems and Source Identification, Paragraph 1, Sentence 3.*

Southwestern agrees that DO content in Lake Taneycomo will be influenced by pollution from point and nonpoint sources; however, unfortunately the Draft TMDL prematurely and inappropriately dismisses the significant impact the inflow from the Table Rock Lake watershed has on the severity of the low DO condition occurring in the hypolimnion of the reservoir. The Draft TMDL cites several improvement efforts made in recent years impacting the Table Rock Lake watershed, but the full impact of those and likely future improvements has not had the time

to be fully realized and assessed. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.

The Missouri 2008 303(d) List of impaired waters lists Lake Taneycomo as impaired for “Low D.O.” from “Table Rock Dam.” The Lake Taneycomo TMDL was developed in accordance with Section 303(d) of the Clean Water Act and federal regulations at 40 CFR 130 to address the low dissolved oxygen impairment. The impacts of point and nonpoint sources within the Table Rock Lake and Lake Taneycomo watersheds were assessed and accounted for in the development of the Lake Taneycomo TMDL. The results of the TMDL analysis indicate the Table Rock Lake watershed is not a significant contributor to the low dissolved oxygen impairment in Lake Taneycomo.

For additional information and details, see the Department’s November 15, 2010 comment response letter to Southwestern and the Department’s response to Southwestern Comment #2.

16. *Page 13, 3. Water Quality Problems and Source Identification, 3.1 Table Rock Dam, 3.1.1 Reservoir Stratification and Hypolimnetic Properties, Paragraph 1, Sentence 10. The terms "spring" and "fall" are reversed. The sentence should state "Most Midwestern lakes naturally turn over in the fall and those that freeze over in the winter also turn over in the spring." Please correct.*

This correction has been made to the referenced sentence.

17. *Page 13, 3. Water Quality Problems and Source Identification, 3.1 Table Rock Dam, 3.1.1 Reservoir Stratification and Hypolimnetic Properties, Paragraph 1, Sentence 11. The reservoir volume of Table Rock Lake is not the sole factor in why it only experiences fall turnover. The climate in southern Missouri is not cold enough to cause a lake of that volume to freeze over and subsequently experience spring turnover. Suggest clarifying the statement.*

Clarification has been added to the referenced paragraph.

18. *Page 14, 3. Water Quality Problems and Source Identification, 3.1 Table Rock Dam, 3.1.1 Reservoir Stratification and Hypolimnetic Properties, Paragraph 1, Sentence 11. See Comment 8.*

The spelling of Fritha Ohlson’s last name has been corrected.

19. *Page 14, 3. Water Quality Problems and Source Identification, 3.1 Table Rock Dam, 3.1.1 Reservoir Stratification and Hypolimnetic Properties, Paragraph 1, Sentence 12. The statement that Table Rock Lake experienced late year turnover in January 2009 (following the 2008 DO season) is incorrect according to available data. USGS performed a DO and temperature lake profile on December 12, 2008, which presented uniform DO at all depth measurements, indicating late season turnover had already occurred. Please verify and correct the statement.*

The referenced sentence has been revised to read, “Late year turnover at Table Rock Lake typically occurs late November through December.”

20. *Page 14, 3. Water Quality Problems and Source Identification, 3.1 Table Rock Dam, 3.1.1 Reservoir Stratification and Hypolimnetic Properties, Paragraph 3.*

See Comment 15.

Please see the Department's November 15, 2010 comment response letter to Southwestern and the Department's response to Southwestern Comments #2 and #15.

21. Page 15, 3. Water Quality Problems and Source Identification, 3.1 Table Rock Dam, 3.1.2 Impacts of Hypolimnetic Releases on Trout and the Trout Fishery in Lake Taneycomo, Paragraph 1, Sentences 3-5.

The Draft TMDL dismisses the regulatory solution. However, Missouri Department of Conservation (MDC) describes the downstream trout fishery as extremely successful, stating, "Angler use and catch rates of trout in upper Lake Taneycomo rank among the highest known for special regulation trout fisheries in the nation," and according to multiple Lake Taneycomo and Branson area tourism groups and businesses, the fishery is known for "some of the finest trout fishing available anywhere in the world." Additionally, the current state records for Rainbow Trout (throwline) and Brown Trout (pole and line) were caught in Lake Taneycomo. Considering the phenomenal success of recreational fishing tourism in the area, it is difficult to contend that Lake Taneycomo is not a clearly viable aquatic community and successful fishery. Therefore, it is reasonable to re-designate that reach as a transition zone with lower DO standards. Southwestern suggests adding redesignation as a regulatory solution in the Draft TMDL.

The Department believes the cold-water fishery use designation and applicable DO criterion are appropriate for Lake Taneycomo. For additional information and details, see the Department's November 15, 2010 comment response letter to Southwestern and the Department's response to Southwestern Comment #4.

22. Page 15, 3. Water Quality Problems and Source Identification, 3.1 Table Rock Dam, 3.1.2 Impacts of Hypolimnetic Releases on Trout and the Trout Fishery in Lake Taneycomo, Paragraph 4.

Suggest clarifying the high water temperature conditions as a separate issue from low DO conditions. The Draft TMDL is for low DO in Lake Taneycomo and not for high temperatures.

After receiving confirmation from MDC staff at Shepherd of the Hills Hatchery that both high temperatures and low DO were an issue for stocking, reference to DO was added to Sentences 2 and 3 in Paragraph 4 of this sub-section.

23. Page 16, 3. Water Quality Problems and Source Identification, 3.1 Table Rock Dam, 3.1.2 Impacts of Hypolimnetic Releases on Trout and the Trout Fishery in Lake Taneycomo, Paragraph 4, Sentence 3.

Suggest changing the phrase "and corresponding low DO" to "coupled with low DO conditions". The wording change is significant because as written it is implied that the low DO conditions are caused by the high temperatures, which is not the case.

The phrase "and corresponding low DO" was removed from Sentence 3 in Paragraph 4 to facilitate the revisions mentioned in the Department's response to Southwestern's Comment #22.

24. Page 16, 3. Water Quality Problems and Source Identification, 3.1 Table Rock Dam, 3.1.2 Impacts of Hypolimnetic Releases on Trout and the Trout Fishery in Lake Taneycomo, Paragraph 4, Sentence 6.

The net economic benefit value provided is not clearly defined. It is not clear what is included in the value, for what timeframe, and how it is determined. Suggest providing more concrete information on how the net economic benefit value was determined.

As stated in the TMDL in the noted sentence, the information was obtained from the cited 1986 study by Weithman and Haas. The full citation is found in the "References" section of the TMDL. The Department would be glad to provide an electronic copy of the cited document upon request.

25. *Page 16, 3. Water Quality Problems and Source Identification, 3.1 Table Rock Dam, 3.1.2 Impacts of Hypolimnetic Releases on Trout and the Trout Fishery in Lake Taneycomo, Paragraph 5, Sentences 10-14.*

It should be noted that even during the extreme conditions of 2008 for Table Rock Lake and Lake Taneycomo, there were no significant detrimental fish events and no restrictions in stocking, and the fishery maintained its exceptional reputation.

The Department contacted Missouri Department of Conservation (MDC) staff Clint Hale, Shepherd of the Hills Hatchery Manager, and Andy Austin, Southwest Fisheries Regional Supervisor, who provided the following information:

There were no fish kills during 2008. However, some trout did exhibit gas bubble disease during 2008 as a result of the spilling operation that was undertaken to evacuate water and still keep DO up. Although MDC does not have formal stocking restriction guidelines like Arkansas does, the stocking regimen in Lake Taneycomo had to be altered because of the high water and low oxygen during this period. Dissolved oxygen and water temperature levels were taken in several areas up- and downstream from MDC's stocking boat location. Some areas of the lake were around 70°F (surface temperature) with oxygen levels below 3 mg/L. Stocking trips were performed during lesser flows as opposed to extreme high water conditions. Fishing in the poor conditions of 2008 was essentially limited to the hatchery outfalls. Note that the Department also added language to the end of the referenced paragraph that clarifies how atypical the 2008 year was, and how the Army Corps of Engineers, Southwestern and MDC took extraordinary measures to manage DO that year.

26. *Page 17, 3. Water Quality Problems and Source Identification, 3.2 Influences from Point and Nonpoint Source Pollution, Paragraph 1, Sentence 3.*

Please cite specific "subsequent caselaw" or remove the biased statement from the Draft TMDL.

In *S.D. Warren Co. v. Maine Board of Environmental Protection*, 547 U.S. 370 (2006), the U.S. Supreme Court determined that the term "discharge" in the Clean Water Act does include releases from hydroelectric dams. *Id.* at 377. Furthermore, the Court re-iterated the intent of the Clean Water Act was not only to deal with addition of pollutants, but with pollution in a general sense, i.e., "the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water." *Id.* at 385.

The above has been added to the referenced section as a footnote.

27. *Page 17, 3. Water Quality Problems and Source Identification, 3.2 Influences from Point and Nonpoint Source Pollution, Paragraph 2, Sentence 2.*

It should be noted that while the hypolimnetic water in Table Rock Lake is seasonally low in DO due to lake stratification, it also remains cold. The conveyance of cold water from the lower

depths of the reservoir allows the trout fishery in Lake Taneycomo below Table Rock dam to exist.

The word “cold” has been added to the referenced sentence, so that it now reads, “The problem is largely due to the depth of the penstock openings that bring cold, hypolimnetic water, low in dissolved oxygen, through the dam.” Acknowledgment of cold water as a requirement for trout is found in Section 2.1, Lake Taneycomo, and many other places throughout the TMDL.

28. *Page 17, 3. Water Quality Problems and Source Identification, 3.2 Influences from Point and Nonpoint Source Pollution, Paragraph 3.*

Southwestern agrees that nutrient and organic material contributions from both point and nonpoint sources in the upstream watershed can be a major factor contributing to low DO concentrations. Unfortunately, the Draft TMDL prematurely and inappropriately dismisses the significant impact the inflow from the Table Rock Lake watershed has on the severity of the low DO condition occurring in the hypolimnion of the reservoir. The Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of point and nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. The Draft TMDL states that Table Rock Lake has been listed on Missouri's 303(d) List as impaired by nutrients. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it should be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.

Please see the Department’s November 15, 2010 comment response letter to Southwestern and the Department’s response to Southwestern Comments #2 and #15.

29. *Page 21, 3. Water Quality Problems and Source Identification, 3.2 Influences from Point and Nonpoint Source Pollution, 3.2.3 Water Quality Analysis of Point and Nonpoint Source Influence, Paragraph 1, Sentence 3.*

Please substantiate the referenced sentence.

Please see the Department’s November 15, 2010 comment response letter to Southwestern and the Department’s response to Southwestern Comment #2.

30. *Page 21, 3. Water Quality Problems and Source Identification, 3.2 Influences from Point and Nonpoint Source Pollution, 3.2.3 Water Quality Analysis of Point and Nonpoint Source Influence, Paragraph 2.*

The Draft TMDL description of the water quality modeling effort states that "The results of the water quality modeling indicate that during non-generation low flow conditions there are insignificant differences between model simulations that include point sources of nutrients and oxygen-demanding substances and those that do not." The Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of point and nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it should be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.

Please see the Department's November 15, 2010 comment response letter to Southwestern and the Department's response to Southwestern Comments #2 and #15.

31. *Page 22, 4. Applicable Water Quality Standards and Water Quality Targets, 4.1 Designated Beneficial Uses, Paragraph 2, Sentence 2.*

Lake Taneycomo has been listed as impaired on Missouri's 303(d) List for the designated beneficial use of "Protection of Aquatic Life (Cold-Water Fishery)" due to low DO.

Southwestern believes that the river segment downstream of Table Rock is a transition zone that is needed for mixing and water aeration and should be re-designated. The Draft TMDL dismisses the regulatory solution. However, MDC describes the downstream trout fishery as extremely successful, stating, "Angler use and catch rates of trout in upper Lake Taneycomo rank among the highest known for special regulation trout fisheries in the nation," and according to multiple Lake Taneycomo and Branson area tourism groups and businesses, the fishery is known for "some of the finest trout fishing available anywhere in the world." Additionally, the current state records for Rainbow Trout (throwline) and Brown Trout (pole and line) were caught in Lake Taneycomo. Considering the phenomenal success of recreational fishing tourism in the area, it is difficult to contend that Lake Taneycomo is not a clearly viable aquatic community and successful fishery. Therefore, it is reasonable to re-designate that reach as a transition zone with lower DO standards. Southwestern suggests adding redesignation as a regulatory solution in the Draft TMDL.

The Department believes the cold-water fishery use designation and applicable DO criterion are appropriate for Lake Taneycomo. For additional information and details, see the Department's November 15, 2010 comment response letter to Southwestern and the Department's response to Southwestern Comment #4.

32. *Page 23, 4. Applicable Water Quality Standards and Water Quality Targets, 4.3 Antidegradation Rules, Paragraph 3, Sentence 2.*

The value of hydropower and human activity in the upstream watershed is undeniably important to economic and social development. Realizing the extreme economic and possible social impacts (reduction in hydropower benefits and reduced human development in the watershed), Southwestern suggests that the river segment immediately below Table Rock dam has been incorrectly designated. Southwestern believes that the river segment downstream of Table Rock is a transition zone that is needed for mixing and water aeration. Southwestern suggests adding re-designation as a regulatory solution in the Draft TMDL.

The Department believes the cold-water fishery use designation and applicable DO criterion are appropriate for Lake Taneycomo. For additional information and details, see the Department's November 15, 2010 comment response letter to Southwestern and the Department's response to Southwestern Comment #4.

33. *Page 24, 5. Calculation of Load Capacity, 5.1 Critical Conditions, Paragraph 1, Sentence 5. Section 132 of the fiscal year 2006 Energy and Water Development Appropriations Act (Public Law 109-1 03) repealed the WRDA 1999 and 2000 authorization for Table Rock enhanced minimum flows. Table Rock Dam had the lowest benefit-cost ratio of the five White River reservoirs for enhanced minimum flows and the Corps determined that it was not economically feasible. Additionally, enhanced minimum flows have not been identified as a solution to low DO issues below the dams in any of the White River project studies. The enhanced minimum flows discussion is not appropriate in this document and Southwestern suggests removing*

enhanced minimum flows from the Draft TMDL, unless desired for historical project information.

Discussion about WRDA 1999, WRDA 2000, and EWDA and their impact on the Table Rock Dam project can be found in the draft TMDL in Section 10.2.2.3 “Fluctuating Timing and Duration of Flow Releases (Load Spreading, Minimum Flows).”

A reference to Section 10.2.2.3 has been added to the end of the fifth sentence (to which Southwestern refers) in order to direct the reader to further discussion on minimum flows. It is the Department’s position that discussion of minimum flows is appropriate in the Lake Taneycomo TMDL, both for technical relevance (See revised Section 10.2.2.3., Paragraph 3) and historical information. For additional information and details, see the Department’s November 15, 2010 comment response letter to Southwestern.

34. *Page 24, 5. Calculation of Load Capacity, 5.2 Modeling Approaches, Paragraph 1, Sentence 2. The Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of point and nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it should be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.*

Please see the Department’s November 15, 2010 comment response letter to Southwestern and the Department’s response to Southwestern Comments #2 and #15.

35. *Page 24, 5. Calculation of Load Capacity, 5.2 Modeling Approaches, Paragraph 2, Sentence 6. See comment 33.*

See the Department’s response to Southwestern Comment #33.

36. *Page 26, 5. Calculation of Load Capacity, 5.2 Modeling Approaches, 5.2.3 Minimum Flow Condition. See comment 34.*

Please see the Department’s November 15, 2010 comment response letter to Southwestern and the Department’s response to Southwestern Comments #2 and #15.

37. *Page 27 ,6. Wasteload (Point Source) and Load (Nonpoint Source) Allocation, Paragraph 1, Sentence 4.*

Unfortunately, the Draft TMDL prematurely and inappropriately dismisses the significant impact the inflow from the Table Rock Lake watershed has on the severity of the low DO condition occurring in the hypolimnion of the reservoir. The Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of point and nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. The Draft TMDL states that Table Rock Lake has been listed on Missouri's 303(d) List as impaired by nutrients. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it should

be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.

Please see the Department's November 15, 2010 comment response letter to Southwestern and the Department's response to Southwestern Comments #2 and #15.

38. *Page 28, 6. Wasteload (Point Source) and Load (Nonpoint Source) Allocation, 6.2 Load Allocation Nonpoint Source Load).
See Comment 37.*

Please see the Department's November 15, 2010 comment response letter to Southwestern and the Department's response to Southwestern Comments #2 and #15.

39. *Page 31, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.1 White River Dissolved Oxygen Committee - Past and Current, Paragraph 3, Sentence 12. The acronym SWPA was defined on page 12 of the Draft TMDL, suggest the acronym can be used without definition here.*

The requested revision has been made to the referenced sentence.

40. *Page 31, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.1 White River Dissolved Oxygen Committee - Past and Current, Paragraph 4, seventh bullet. The U.S. Geological Survey (USGS) is not a member of the White River Dissolved Oxygen Committee (WRDO Committee). USGS provides consulting services to the WRDO Committee, including managing the gage program under contract. Suggest removing USGS from the list of WRDO Committee members and, if desired, describing the USGS relationship to the WRDO Committee as a consulting agency.*

The USGS has been removed from the list of WRDO Committee members provided in the TMDL.

41. *Pages 31-32, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.1 White River Dissolved Oxygen Committee - Past and Current, Paragraph 5, Sentence 6. The phrase "first through use of the turbine venting system" should be modified to state "first through use of the turbine venting system and load spreading". According to the Table Rock Lake, White River, Operational Action Plan for the Low Dissolved Oxygen Season (Operational Action Plan), load spreading begins when the air vents are opened.*

The requested revision has been made to the referenced sentence.

42. *Page 32, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.1 White River Dissolved Oxygen Committee - Past and Current, Paragraph 5, Sentence 7. Please remove the word "diffusion" from the phrase "(LOX diffusion)" as "LOX" is the acronym for liquid oxygen and diffusion is not the accurate term for the LOX injection system in current application at Table Rock dam.*

The requested revision has been made to the referenced sentence.

43. *Page 32, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.1 White River Dissolved Oxygen Committee - Past and Current, Paragraph 5, indented excerpt from the Operational Action Plan.*

The two paragraphs excerpted from the Operational Action Plan are presented in reverse order from how they appear in the Operational Action Plan. Suggest reversing the excerpted paragraphs.

The Department is aware of the reversed order of these paragraphs. In response to this same comment by Fritha Ohlson in an October 1, 2009 e-mail, the draft TMDL was revised prior to public notice to include a separate citation for each paragraph in order to better clarify that they weren't necessarily concurrent. However, in response to this current comment, the Department has added verbiage around the two excerpts that separate the citations.

44. *Page 32, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, Paragraph 1, Sentence 1.*

As Southwestern funded in part or in whole most of the numerous aeration tests, studies, and monitoring operations, including investigations into several structural and operational options, as well as funded the air venting modifications in place at Table Rock, suggest identifying Southwestern as a major player alongside the Corps and MDC, rather than grouped under the broad category "other cooperating agencies".

The requested revision has been made to the referenced sentence.

45. *Page 32, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, Paragraph 1, bullet list.*

Suggest adding a bullet for a multi-level intake as one of the structural modifications investigated. The Corps' Waterways Experiment Station studied this approach in the 1980's; however, it was determined that an acceptable mix from the reservoir of water from the epilimnion (warmer in temperature but higher in DO) and water from the hypolimnion (cooler in temperature but lower in DO) could not be obtained.

Based on subsequent documentation provided by Fritha Ohlson in several Sept. and Oct. 2010 e-mails to Donna Menown of the Department's TMDL Unit, a new subsection (10.2.1.5) was created to acknowledge the provided history of research into the possibility of using multi-level intake structures at Table Rock Dam and the subsequent rejection of that option.

46. *Page 33, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.1 Turbine Venting, Paragraph 2, Sentence 1.*

The Table Rock Project Aeration Options report (Proctor et al, 1999) was funded by Southwestern and the Corps. In coherence to other funding references in the Draft TMDL, please include the funding source of the referenced report.

The requested revision has been made to the referenced paragraph.

47. Page 33, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.1 Turbine Venting, Paragraph 2, Sentence 5.

The "subsequent modifications" referred to were implemented via funding by Southwestern. In coherence to other funding references in the Draft TMDL, please include the funding source of the referenced structural modifications.

The requested revision has been made to the referenced paragraph.

48. Page 33, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.1 Turbine Venting, Paragraph 3, Sentence 3.

The phrase "vacuum breaker system" should be replaced by "vacuum breaker bypass piping system". The air venting modifications implemented in 1998, via funding by Southwestern, included the addition of a piping system that bypassed the vacuum breaker system.

The requested revision has been made to the referenced sentence.

49. Page 34, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.1 Turbine Venting, Paragraph 4, Sentence 2.

Suggest changing the phrase "revenue and benefit losses" to state "estimated revenue and benefit losses".

The referenced sentence already reads, "At the end of each low DO season, SWPA estimates the energy losses, and subsequent revenue and benefit losses, due to various operational modifications performed in order to maintain DO levels at 4 mg/L." In addition, the next sentence begins with, "These estimates..." As a result, the Department feels that the fact that estimates are being discussed is already clear.

50. Page 34, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.1 Turbine Venting, Paragraph 4, Sentence 2.

The Operational Action Plan calls for actions to begin at DO concentrations of 6 mg/L downstream of Table Rock dam. Suggest correcting 4 mg/L to state "4 mg/L and above".

The requested revision has been made to the referenced sentence.

51. Page 34, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.1 Turbine Venting, Paragraph 4, Sentence 3.

The phrase "turbine venting" should be modified to state "turbine venting and load spreading". According to the Operational Action Plan, load spreading begins when the air vents are opened.

The requested revision has been made to the referenced sentence.

52. *Page 35, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.2 Penstock Liquid Oxygen Injectors or Diffusers, Paragraph 2, Sentence 3.*

It should be noted that in the fall of 2008, oxygen supply in the region was extremely limited and at times completely unavailable. Two successive hurricanes prevented the production of oxygen at some facilities and regional supply was directed toward essential purposes, such as medical facilities.

Southwestern's comment was added verbatim to the referenced paragraph.

53. *Page 36, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.2 Penstock Liquid Oxygen Injectors or Diffusers, Paragraph 4, Sentence 2.*

Suggest changing the phrase "cost of that purchase" to state "cost and availability of that purchase" to more accurately portray the constraining factors. During extremely high electrical demand periods, such as the peak hours of the summer, Southwestern may not be able to purchase replacement energy because it may not be available from other electricity producers in the region that are already running near their full capacity and/or the transmission system may be at risk of being overloaded by bringing in energy from certain locations.

The requested revision has been made to the referenced sentence and the second sentence provided in your comment was added to the text in the referenced paragraph.

54. *Page 36, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.2 Penstock Liquid Oxygen Injectors or Diffusers, Paragraph 5, Sentence 1.*

Aside from the physical capabilities, efficiency, and cost of using the current LOX injection system at Table Rock dam, it should also be noted that the Operational Action Plan, as developed in cooperation between the WRDO Committee member agencies, calls for passive methods (turbine venting and load spreading) when DO concentrations fall below 6 mg/L, followed by more active methods (LOX injection, capacity reduction, spill), to prevent DO concentrations from receding below 4 mg/L, if possible. As Table Rock dam serves multiple authorized purposes, the 4 mg/L DO concentration limit was agreed upon in order to "protect the trout fishery downstream from Table Rock Dam from low dissolved oxygen (D.O.) impacts to the extent reasonably possible while preserving the flood control and hydropower benefits of the project to the maximum extent possible." The agreement and cooperation of the WRDO Committee should be made clear in this section.

The language provided in the comment, starting with, "Aside from...." through, "...to the maximum extent possible," has been added to the referenced section as a new paragraph (Paragraph 6).

55. *Page 36, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.3 Forebay Liquid Oxygen Diffuser, Paragraph 2, Sentence 2.*

Note that the Table Rock Project Forebay Oxygen Diffuser System Report Update released in May 2009 was a draft and has not been finalized. TVA has stated a final report will be published in late 2010. Suggest adding wording that identifies the Table Rock Project Forebay Oxygen Diffuser System Report Update as a draft report.

The words, “draft report” have been added in front of the referenced document, and the word “draft” has been added in front of the name of the report in all places it is referenced, including in the “References” section.

56. *Page 37, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.3 Forebay Liquid Oxygen Diffuser, Paragraph 3, Sentence 4.*

Suggest qualifying the statement "when used alone, there are no negative impacts on power efficiency or capacity" by adding an additional statement that clarifies that it is not recommended to use the forebay oxygen diffuser system alone, rather it is recommended it is used in conjunction with the turbine venting and load spreading already in place at Table Rock, which do impact power efficiency. This information is provided later in the section, but should be provided as a qualifying statement here as well.

The following sentence has been added to the end of the referenced paragraph: “However, note that, for reasons detailed later in this section, a forebay diffuser system would need to be used in conjunction with existing turbine venting and load spreading practices at Table Rock Dam, which do impact power efficiency.”

57. *Page 37, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.3 Forebay Liquid Oxygen Diffuser, Paragraph 4, Sentence 2.*

Explain why a system that meets the 6 mg/L downstream DO requirement only 97 percent of the time, rather than 100 percent of the time, is an acceptable solution when the TMDL previously stated that the primary TMDL water quality endpoint is to meet the 6 mg/L DO minimum at all times.

The comment is correct in that Missouri’s Water Quality Standards [10 CSR 20-7.031] require the dissolved oxygen minimum criterion of 6 mg/L be met at all times to be protective of the cold-water fishery designated use. Unlike development of the Lake Taneycomo TMDL which must be completed by December 31, 2010, TMDL implementation activities can be conducted and completed over a period of time. A phased, iterative approach may be used to meet the ultimate goal of compliance with the applicable water quality standard at all times. The White River Dissolved Oxygen Committee and “Operational Action Plan for Low Dissolved Oxygen Season” for the Table Rock Dam facility form the groundwork of such a process. As additional technologies and methods of operation are explored in the future, the ultimate compliance goal can be realized.

58. *Page 38, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.1 Past and Current Structural Modifications, 10.2.1.3 Forebay Liquid Oxygen Diffuser, Paragraph 5, Sentence 2. See Comment 51.*

Specific references to “load spreading” has been added to sentences 2, 3 and 4 in the referenced paragraph as suggested in a September 24, 2010 e-mail from Fritha Ohlson to Donna Menown, with the Department’s TMDL Unit.

59. *Page 42, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.2 Past and Current Operational Modifications, 10.2.2.2 Spilling and Flow Mixing, Paragraph 2, Sentence 2.*
See Comment 8.

The spelling of Fritha Ohlson’s last name has been corrected.

60. *Page 42, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.2 Past and Current Operational Modifications, 10.2.2.2 Spilling and Flow Mixing, Paragraph 3, Sentence 3.*
Suggest changing the phrase "their contract and customer demand" to "customer demand under federal contractual obligation". The wording change is significant because the contractual obligation is the Federal government's contractual obligation to the hydropower customers, carried out by Southwestern as the Federal power marketing agency.

The requested revision has been made to the referenced sentence.

61. *Pages 42-47, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.2 Past and Current Operational Modifications, 10.2.2.3 Fluctuating Timing and Duration of Flow Releases (Load Spreading, Minimum Flows).*
See Comment 33.

The third paragraph in Section 10.2.2.3 of the TMDL, “Fluctuating Timing and Duration of Flow Releases (Load Spreading, Minimum Flows),” has been revised to better explain how the Department believes implementing minimum flows will enhance DO levels in Table Rock Dam’s tailwater. It is the Department’s position that discussion of minimum flows in the Lake Taneycomo TMDL is appropriate both for technical relevance and historical information. For additional information and details, see the Department’s November 15, 2010 comment response letter to Southwestern.

62. *Page 45, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.2 Past and Current Operational Modifications, 10.2.2.3 Fluctuating Timing and Duration of Flow Releases (Load Spreading, Minimum Flows), Paragraph 9, second bullet.*
Clarify the phrase "hence reducing what a commercial facility can charge for the generated power." Table Rock dam is not a commercial facility. Table Rock dam is a Federal project and the power generated is marketed and distributed by Southwestern at cost-based rates in order to repay the Federal investment, including initial construction costs, interest on construction, interest on amortization, annual operations and maintenance, and new replacement equipment. However, such a minimum flow certainly reduces the value of the energy and does not help meet Federal peaking requirements, thus increasing the need to purchase more expensive on-peak energy.

Although the federal projects on the White River system are not “commercial” facilities, there is one commercial facility in the system – Ozark Beach Dam, which impounds Lake Taneycomo. The referenced section has been revised to reflect the existence of both federal dams and a commercial dam in the system, and Southwestern’s mentioned specific impact on the federal projects has been added. As a follow-up, additional wording was added to “Section 2.3: Power Generation,” 2nd paragraph for clarification as to what constitutes “cost.”

63. *Page 45, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.2 Past and Current Operational Modifications, 10.2.2.3 Fluctuating Timing and Duration of Flow Releases (Load Spreading, Minimum Flows), Paragraph 10, Sentence 5. Suggest replacing "Southwestern Power's" with "SWPA's" as the acronym was defined previously in the Draft TMDL.*

The requested revision has been made to the referenced sentence.

64. *Page 45, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.2 Past and Current Operational Modifications, 10.2.2.3 Fluctuating Timing and Duration of Flow Releases (Load Spreading, Minimum Flows), Paragraph 10, Sentence 6. Suggest replacing the phrase "Missouri ratepayers may" with "Ratepayers in a six-state area, including Missouri, may". Southwestern markets and distributes the electricity from Table Rock dam to customers in Arkansas, Kansas, Louisiana, Missouri, Oklahoma, and Texas.*

The requested revision has been made to the referenced sentence.

65. *Page 46, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.2 Past and Current Operational Modifications, 10.2.2.3 Fluctuating Timing and Duration of Flow Releases (Load Spreading, Minimum Flows), Paragraph 12, Sentence 2. Explain how enhanced minimum flows have been shown to solve the low DO problem in the Table Rock dam tailwater.*

The third paragraph in Section 10.2.2.3 of the TMDL, “Fluctuating Timing and Duration of Flow Releases (Load Spreading, Minimum Flows)”, has been revised to better explain how the Department believes implementing minimum flows will enhance DO levels in Table Rock Dam’s tailwater. The Department does not feel that Paragraph 12, to which this Southwestern comment refers, is the appropriate place for that discussion.

66. *Page 47, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.2 Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen, 10.2.2 Past and Current Operational Modifications, 10.2.2.3 Fluctuating Timing and Duration of Flow Releases (Load Spreading, Minimum Flows), Paragraph 15, Sentence 3. Southwestern published by Federal Register Notice its Final Determination Report in January 2009 followed by the Final Addendum, which was published on June 23, 2010, concerning the Federal and now Federal hydropower impacts of minimum flows at Bull Shoals and Norfork.*

Based on clarification provided by (and e-mail from) Fritha Ohlson on September 30, 2010, the last sentence in paragraph 15, starting “At the time this TMDL was written...”, was deleted and

language was added to reflect the latest statutory requirements regarding how impacts and subsequent compensation amounts were determined.

67. *Page 47, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.3 Past and Current Measures Addressing Point and Nonpoint Source Pollution Contributions, Paragraph 1, Sentence 4.*

Southwestern is concerned that the Draft TMDL prematurely and inappropriately dismisses the significant impact the inflow from the Table Rock Lake watershed has on the severity of the low DO condition occurring in the hypolimnion of the reservoir. The Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of point and nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. Southwestern suggests that the TMDL for Table Rock Lake for impairment by nutrients should address the impact on low DO in the hypolimnion of the reservoir and the subsequent effect on Lake Taneycomo. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.

Please see the Department's November 15, 2010 comment response letter to Southwestern and the Department's response to Southwestern Comments #2 and #15.

Table Rock Lake is listed as impaired for nutrients on the Missouri 2008 303(d) List of impaired waters. The Table Rock Lake TMDL, scheduled for development by 2015, will target applicable nutrient criteria (total nitrogen, total phosphorous, and chlorophyll-a) found in state rule for this water body.

68. *Page 47, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.3 Past and Current Measures Addressing Point and Nonpoint Source Pollution Contributions, 10.3.1 Point Source Pollution Controls: Past and Current, Paragraph 1, Sentence 1.*

Southwestern is concerned that the Draft TMDL prematurely and inappropriately dismisses the significant impact the inflow from the Table Rock Lake watershed has on the severity of the low DO condition occurring in the hypolimnion of the reservoir. The point and nonpoint sources are identified; however, the Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of point sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.

Please see the Department's November 15, 2010 comment response letter to Southwestern and the Department's response to Southwestern Comments #2 and #15.

69. *Page 48, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.3 Past and Current Measures Addressing Point and Nonpoint Source Pollution Contributions, 10.3.2 Nonpoint Source Pollution Controls: Past and Current, Paragraph 1, Sentence 3.*

Southwestern is concerned that the Draft TMDL prematurely and inappropriately dismisses the significant impact the inflow from the Table Rock Lake watershed has on the severity of the low DO condition occurring in the hypolimnion of the reservoir. The sentence states clearly that ". . . linkages exist between nonpoint sources in the Table Rock Lake watershed and water quality in Lake Taneycomo. . ." but goes on to state ". . . this TMDL is not meant to include a comprehensive summary of water quality-related efforts in the Table Rock Lake watershed." Please explain why, if it is known that point and nonpoint source pollution in the Table Rock Lake watershed can impact the low DO in the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo, are those impacts not seriously considered and modeled in the Draft TMDL. The point and nonpoint sources are identified; however, the Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.

Please see the Department's November 15, 2010 comment response letter to Southwestern and the Department's response to Southwestern Comments #2 and #15.

70. *Page 49, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.3 Past and Current Measures Addressing Point and Nonpoint Source Pollution Contributions, 10.3.2 Nonpoint Source Pollution Controls: Past and Current, Paragraph 5, Sentence 2. Southwestern agrees that, as stated in reference to efforts to improve water quality in the Table Rock Lake watershed, "these efforts can only have a positive influence on the water quality downstream in Lake Taneycomo." Please explain why, if it is known that point and nonpoint source pollution in the Table Rock Lake watershed can impact the low DO in the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo, are those impacts not seriously considered and modeled in the Draft TMDL. The point and nonpoint sources are identified; however, the Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.*

Please see the Department's November 15, 2010 comment response letter to Southwestern and the Department's response to Southwestern Comments #2 and #15.

71. *Page 49, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.3 Past and Current Measures Addressing Point and Nonpoint Source Pollution Contributions, 10.3.3 Influence of Point and Nonpoint Source Pollution Controls: Past and Current, Paragraph 1, Sentences 3-4. See Comment 30.*

Please see the Department's November 15, 2010 comment response letter to Southwestern and the Department's response to Southwestern Comments #2 and #15.

72. Page 49, 10. Implementation: Past and Current Attempts to Address the Low DO Situation, 10.3 Past and Current Measures Addressing Point and Nonpoint Source Pollution Contributions, 10.3.3 Influence of Point and Nonpoint Source Pollution Controls: Past and Current, Paragraph 1, Sentence 6.

Please define what is deemed to be "minor" in terms of the effect of the reduction of point and nonpoint source pollution in Table Rock Lake and Lake Taneycomo on the low DO impairment. The Operational Action Plan provides for 4 mg/L and above DO concentrations during times of generation. If improvement in the Table Rock Lake watershed provided for a 2 mg/L or more improvement, the target of 6 mg/L could be achieved.

The effect of nutrient reductions in the Table Rock Lake watershed on dissolved oxygen in the hypolimnion (and hence discharge to Lake Taneycomo) has not been quantified at this time. However, what is known is that man-made reservoirs maintain hypolimnion with extremely low dissolved oxygen concentrations, regardless of nutrient input from point and nonpoint source pollution. E-mails and research from limnologists Dr. John R. Jones, Ph.D. and Senior Research Associate, Daniel V. Obrecht from the University of Missouri – Columbia has been enclosed for your reference. For additional information and details, please see the Department's November 15, 2010 comment response letter to Southwestern.

73. Page 50, 11. Summary and Introduction to Future Implementation of this TMDL, Paragraph 1, Sentence 3.

Please clarify whether nutrients (point and nonpoint sources) from the Table Rock Lake watershed were simulated (existing, no, and at NPDES limits) in the water quality modeling performed for Lake Taneycomo. The Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of point and nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.

Please see the Department's November 15, 2010 comment response letter to Southwestern and the Department's response to Southwestern Comments #2 and #15.

74. Page 50, 11. Summary and Introduction to Future Implementation of this TMDL, Paragraph 1, Sentence 4.

The Draft TMDL prematurely and inappropriately dismisses the significant impact the inflow from the Table Rock Lake watershed has on the severity of the low DO condition occurring in the hypolimnion of the reservoir. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.

Please see the Department's November 15, 2010 comment response letter to Southwestern and the Department's response to Southwestern Comments #2 and #15.

75. Page 50, 11. Summary and Introduction to Future Implementation of this TMDL, Paragraph 3, Sentence 2.

Please replace the phrase "penstock venting" with the correct term for the current configuration at Table Rock, "turbine venting". Also, please add in this sentence load spreading, which is another operational method implemented. Additionally, suggest adding in this sentence, or in a

new sentence, the air venting modifications that were implemented in 1998: vacuum breaker bypass piping and hub baffles.

The referenced paragraph has been revised to include the suggested corrections.

76. *Page 50, 11. Summary and Introduction to Future Implementation of this TMDL, Paragraph 4, Sentence 1.*

Please clarify that the low DO issue is seasonal, as the majority of the year there is no DO issue in Lake Taneycomo. Additionally, MDC describes the downstream trout fishery as extremely successful, stating, "Angler use and catch rates of trout in upper Lake Taneycomo rank among the highest known for special regulation trout fisheries in the nation," and according to multiple Lake Taneycomo and Branson area tourism groups and businesses, the fishery is known for "some of the finest trout fishing available anywhere in the world." The current state records for Rainbow Trout (throwline) and Brown Trout (pole and line) were caught in Lake Taneycomo. Considering the phenomenal success of recreational fishing tourism in the area, it is difficult to contend that Lake Taneycomo is not a thriving fishery under existing conditions.

The requested clarification has been added to the referenced sentence. Note the additions as shown underlined in the sentence: "Regardless of the progress made to date, too often during the low DO season the discharge from Table Rock Dam falls below the required minimum water quality criterion of 6 mg/L dissolved oxygen necessary to support a consistently thriving cold-water fishery in Lake Taneycomo."

As Southwestern states in the first sentence of its Comment #76 above, the DO issue that results in the cold-water fishery not thriving is seasonal. For further clarification, please see the Department's response to Comment #4.

77. *Page 51, 12. Implementation: Future Recommendations, 12.1 Future Point and Nonpoint Source Controls, Paragraph 1. See Comment 2.*

Please see the Department's November 15, 2010 comment response letter to Southwestern and the Department's response to Southwestern Comments #2 and #15.

78. *Page 51, 12. Implementation: Future Recommendations, 12.1 Future Point and Nonpoint Source Controls, 12.1.1 Future Point Source Controls, Paragraph 2, Sentence 1.*

As the first stage of Missouri's nutrient criteria plan became effective less than a year ago, and there is expected to be further progress in improving the watersheds for both Table Rock Lake and Lake Taneycomo, please explain why the full impact of those improvements has not been given the time to be fully realized and assessed or were not considered completely in the Lake Taneycomo water quality modeling for this Draft TMDL. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.

Please see the Department's November 15, 2010 comment response letter to Southwestern and the Department's response to Southwestern Comments #2 and #15.

Note that the Department is establishing this TMDL by no later than December 31, 2010 to meet the milestones of the 2001 TMDL Consent Decree, *American Canoe Association, et al. v. EPA*, No. 98-1195-CV-W in consolidation with No. 98-4282-CV-W, February 27, 2001. As such, the

Department does not have the latitude to postpone completion and submittal of the Lake Taneycomo TMDL to EPA. Should new data or information become available in the future that would change the calculations or allocations found in the TMDL, the Department may choose to revisit this TMDL.

79. *Page 52, 12. Implementation: Future Recommendations, 12.1 Future Point and Nonpoint Source Controls, 12.1.2 Future Nonpoint Source Controls.*

Southwestern agrees that if the amount of incoming organic material can be reduced in the upper watershed, the impact on DO within Table Rock Lake, and subsequently in the water released to Lake Taneycomo, should be positive. Please explain why nonpoint source pollution in the Table Rock Lake watershed does not appear to be simulated in the water quality modeling performed for Lake Taneycomo. The Draft TMDL water quality modeling performed for Lake Taneycomo appears to only simulate changes in point sources in the Lake Taneycomo watershed and does not consider the impact of point and nonpoint sources in the Table Rock Lake watershed, which is the watershed affecting the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution.

Please see the Department's November 15, 2010 comment response letter to Southwestern and the Department's response to Southwestern Comments #2 and #15.

80. *Page 52, 12. Implementation: Future Recommendations, 12.2 Future Structural Modifications, 12.2.1 During Periods of power' Generation, Paragraph 1, Sentence 1.*

Please add in this sentence load spreading, which is another operational method implemented. Additionally, suggest adding in this sentence, or in a new sentence, the air venting modifications that were implemented in 1998: vacuum breaker bypass piping and hub baffles.

The requested revision has been made to the referenced sentence.

81. *Page 52, 12. Implementation: Future Recommendations, 12.2 Future Structural Modifications, 12.2.1 During Periods of Power Generation, Paragraph 1, Sentence 1.*

Suggest replacing the word "diffusion" with "injection" as injection more accurately portrays the LOX injection system in current application at Table Rock dam.

The requested revision has been made to the referenced sentence.

82. *Pages 52-53, 12. Implementation: Future Recommendations, 12.2 Future Structural Modifications, 12.2.1 During Periods of Power Generation, Paragraphs 2 and 3.*

Note that both of the "AND EITHER" options contain extremely high installation costs and the forebay oxygen diffuser system contains prohibitive annual operation and maintenance costs. Additional costs, whether through a loss of power production or increased cost assigned to the hydropower purpose, would ultimately be passed on to Federal hydropower consumers, including consumers in Missouri. It should be noted that Southwestern has voluntarily modified the hydropower equipment and operations at Table Rock to improve the DO concentrations in the tailwater (Lake Taneycomo) during generation periods, and Southwestern has directly spent well over \$1 million on those efforts. As a result of those modifications, Southwestern has foregone approximately \$3.5 million (2009 rates) in hydropower benefits from 1999 through 2009 to maintain a minimum DO concentration of 4 mg/L in the tailwater during periods of generation. Therefore, Southwestern does not believe it would be appropriate to pass on the

additional costs of the solutions identified in the Draft TMDL to further enhance the "finest trout fishing available anywhere in the world" of the existing fishery. Please address the high cost of the solutions presented in the Draft TMDL and the potential impact to taxpayers and ratepayers.

Since a more detailed discussion of the proposed options is provided in Section 10.2 of the TMDL, "Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen," the Department did not feel it was necessary to duplicate that information in the referenced section. As stated earlier in this response document, although Lake Taneycomo deservedly has a strong reputation as a quality trout fishery, that reputation is not gained based on conditions during the low DO season.

Acknowledgment of potential costs to taxpayers and ratepayers has been added to Section 11, "Summary and Introduction to Future Implementation of this TMDL." The TMDL document is not required to present socio-economic feasibility calculations for future implementation alternatives. TMDL loading calculations must meet applicable water quality standards and are developed without regard to treatment technology or cost. It is the responsibility of watershed stakeholders and citizens to determine which implementation practices and activities are most appropriate.

83. *Page 53, 12. Implementation: Future Recommendations, 12.2 Future Structural Modifications, 12.2.2 During Periods of Non-generation, Paragraph 1, Sentence 1. Preliminary estimates from the ongoing TVA study (Perry 2009) suggest the flow from the house turbines would have to be increased and to operate both house units at full gate opening would require a new transformer. Any additional flow from the house units above that required for station service would equate to enhanced minimum flow. As there is no current storage allocation at Table Rock Lake for enhanced minimum flows, legislation would be required to authorize such a storage reallocation. Additionally, generation in excess of the station service needs at the project would be marketed by Southwestern as low-value, off-peak energy around the clock instead of on-peak energy scheduled by Southwestern to meet customer demands. The new transformer required is an additional, costly capital investment, likely at the expense of Federal hydropower. Furthermore, running both house units continuously at the same time eliminates their function as a back-up power source to one another. Please address the high cost and impediments of the solution presented in the Draft TMDL and the potential impact to taxpayers and ratepayers.*

Section 12.2.2, "During Periods of Non-generation," has been revised to include mention of Southwestern's listed concerns. In addition, acknowledgment of potential costs to taxpayers and ratepayers has been added to Section 11, "Summary and Introduction to Future Implementation of this TMDL." The TMDL document is not required to present socio-economic feasibility calculations for future implementation alternatives. TMDL loading calculations must meet applicable water quality standards and are developed without regard to treatment technology or cost. It is the responsibility of watershed stakeholders and citizens to determine which implementation practices and activities are most appropriate.

84. *Page 53, 12. Implementation: Future Recommendations, 12.2 Future Structural Modifications, 12.2.2 During Periods of Non-generation, Paragraph 2, second bullet. See Comment 33.*

The third paragraph in Section 10.2.2.3 of the TMDL, "Fluctuating Timing and Duration of Flow Releases (Load Spreading, Minimum Flows)," has been revised to better explain how the

Department believes implementing minimum flows will enhance DO levels in Table Rock Dam's tailwater. The Department does not feel that Paragraph 2, second bullet, to which this Southwestern comment refers, is the appropriate place for that discussion.

85. *Page 53, 12. Implementation: Future Recommendations, 12.2 Future Structural Modifications, 12.2.2 During Periods of Non-generation, Paragraph 2, third bullet.*

Generation in excess of the station service needs at the project would be marketed by Southwestern as low-value, off-peak energy around the clock instead of on-peak energy scheduled by Southwestern to meet customer demands. The new transformer required is an additional, costly capital investment, likely at the expense of Federal hydropower. Furthermore, running both house units continuously at the same time eliminates their function as a back-up power source to one another. Please address the high cost and impediments of the solution presented in the Draft TMDL and the potential impact to taxpayers and ratepayers.

Please see the Department's response to Southwestern Comment #83.

86. *Page 54, 12. Implementation: Future Recommendations, 12.2 Future Structural Modifications, Paragraph 2 (first paragraph on page 54), Sentence 4.*

See Comment 33.

It is the Department's position that discussion of minimum flows is appropriate in the Lake Taneycomo TMDL both for technical relevance (See Section 10.2.2.3., Paragraph 3) and historical information. For additional information and details, see the Department's November 15, 2010 comment response letter to Southwestern.

87. *Page 54, 12. Implementation: Future Recommendations, 12.2 Future Structural Modifications, Paragraph 2 (first paragraph on page 54), Sentence 5.*

Suggest adding to the sentence, or in a new sentence, also keeping in mind the effect of decreasing the availability of hydropower or increasing the cost of hydropower in the six-state region, including Missouri: increase in greenhouse gas emissions due to replacement energy source, increase in dependence on fossil-fuels due to replacement energy sources, increase in cost of electricity to ratepayers, etc.

The summary information formerly included in the referenced section has been moved to Section 11, "Summary and Introduction to Future Implementation of this TMDL." The information in Section 11 has been supplemented to direct the reader to the portion of the TMDL (Section 10.2.2.3) in which concerns voiced by Southwestern in this comment are discussed.

88. *Page 54, 12. Implementation: Future Recommendations, 12.3 Future Operational Modifications, 12.3.2 Minimum Flow Legislation, Paragraph 1.*

See Comment 33.

It is the Department's position that discussion of minimum flows is appropriate in the Lake Taneycomo TMDL both for technical relevance (See Section 10.2.2.3., Paragraph 3) and historical information. For additional information and details, see the Department's November 15, 2010 comment response letter to Southwestern.

89. *Page 61, Appendix A Dissolved Oxygen Data on Which Lake Taneycomo Was Deemed Impaired, Table 1. Percent of D.O. Measurements Failing to Meet Standard, Lake Taneycomo at College of the Ozarks.*

Please clarify the timeframe for the measurements. According to the USGS data available to Southwestern, each year the gage at College of the Ozarks is only active during the potential low DO season (June through December), which varies year to year. Please provide the timeframe for each year's DO measurement that results in the "Percent of Measurements Not Meeting Standard" as well as information on how the "Estimated Annual Percent Not Meeting Standard" is extrapolated.

The date ranges for the USGS data are: 1/1/2002 through 1/7/2002; 6/24/2002 through 1/6/2003; 6/17/2003 through 1/6/2004; 6/29/2004 through 1/3/2005; 6/15/2005 through 1/4/2006; 6/19/2006 through 1/3/2007; 6/12/2007 through 1/2/2008; 6/18/2008 through 12/30/2008. For each calendar year, the number of days that the DO minimum was below the 6 mg/L criterion was divided by 365, then multiplied by 100 to convert to percent (it was assumed that the DO minimum criterion was met for the date ranges the gage was not in operation).

For additional information and data on the assessment of Lake Taneycomo, please see the Department's November 15, 2010 comment response letter to Southwestern and the 2010 303(d) Assessment Worksheet for this water body segment included in the Lake Taneycomo TMDL as Appendix A.

90. *Page 62, Appendix A Dissolved Oxygen Data on Which Lake Taneycomo Was Deemed Impaired, Table 3. Frequency of Daily D.O. Minima Failing to Meet Standard, Footnote Paragraph 1, Sentence 3.*

The impact of the Table Rock Lake watershed should also be considered when assessing the frequency of daily DO concentrations failing to meet the standard, as high inflow years result in greater amounts of nutrients, organic matter, and pollutants entering Table Rock Lake, which impacts the DO in the hypolimnion of the reservoir that is the source of the low DO problem in Lake Taneycomo. Southwestern believes the Table Rock Lake watershed impact should not be minimized and suggests it be added to the Draft TMDL as both a cause of the low DO impairment in Lake Taneycomo as well as a significant contributor to the solution, and should be evaluated accordingly.

A detailed assessment of watershed scale nutrient fate and transport relative to hypolimnetic dissolved oxygen conditions in Table Rock Lake was not directly conducted for the Lake Taneycomo TMDL. However, algal chlorophyll and nutrient data from Table Rock Lake were used as upstream boundary conditions for the Lake Taneycomo TMDL model. These data were collected from 2002 until 2007 and represent a range of inflow discharge and nutrient concentrations from Table Rock Lake. The data used as upstream boundary conditions for dissolved oxygen also considered inflow variations and were taken from the USGS gage located 600 ft downstream of Table Rock Dam. Collectively, these two data sets allowed the Lake Taneycomo TMDL model to be calibrated and validated to high quality data. The model and data used to determine oxygen demand loads protective of applicable water quality standards were therefore representative of nutrient, dissolved oxygen and inflow conditions occurring in Table Rock Lake and Lake Taneycomo.

For additional information and details, please see the Department's November 15, 2010 comment response letter to Southwestern and the Department's response to Southwestern Comments #2 and #15.

From Jones, Jack

Date Monday, October 11, 2010 11:53:56 AM

To Menown, Donna

Cc

Subject FW: graphs showing low DO in oligo reservoirs

 [Low DO in oligotrophic lakes.docx](#) (22 KB [HTML](#))

Donna-

Evidence that oligotrophic reservoirs in MO have low oxygen. If they were deeper it would stay longer but you get the point.

J.

From Obrecht, Daniel V.

Date Tuesday, October 12, 2010 9:12:36 AM

To Menown, Donna

Cc

Subject graphs and words

 [Low DO in oligotrophic lakes.docx](#) (22 KB [HTML](#))

Donna,

Here are a few graphs showing that Missouri's oligotrophic reservoirs have low hypolimnetic DO during the summer, along with a small write-up explaining how hydrology makes our reservoirs different from those oligotrophic natural lakes that support lake trout.

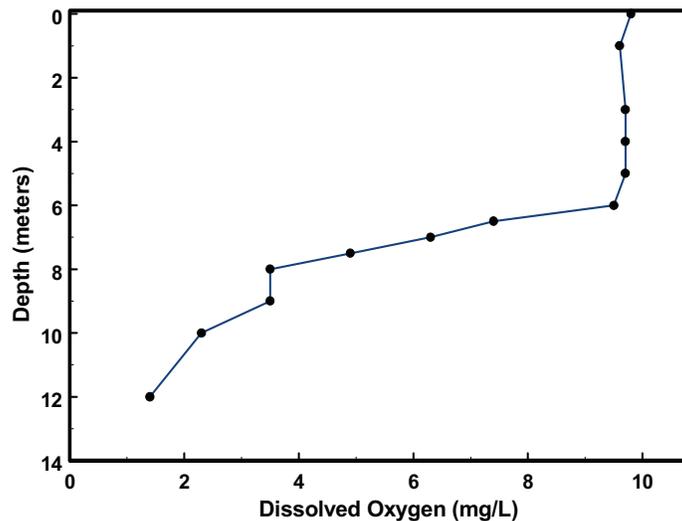
Dan

Examples of Summer Hypolimnetic Dissolved Oxygen Levels in Three Oligotrophic Missouri Reservoirs and Comparison to Table Rock Lake

Summary provided by John R. Jones, Ph.D., Professor and Fisheries and Wildlife Department Chair, and Daniel V. Obrecht, Senior Research Associate, School of Natural Resources, University of Missouri – Columbia, via e-mail to Donna Menown, Missouri Dept. of Natural Resources, Water Protection Program, Water Pollution Control Branch, TMDL Unit, on Oct. 11 and Oct. 12, 2010.

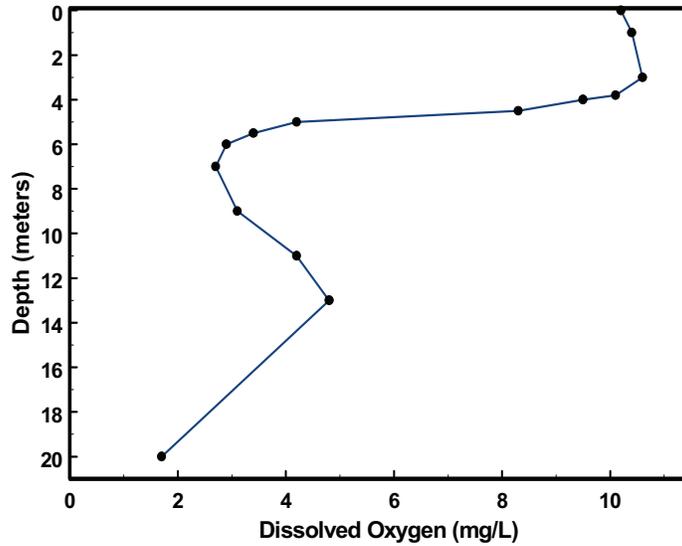
Lac Capri [112-acre reservoir near Leadwood in St. Francois County, Missouri]

This first figure shows the Lac Capri DO profile from 28 July, 2009. The average phosphorus value during the summer of 2009 was 7 $\mu\text{g/L}$, with an average chlorophyll concentration of 3.4 $\mu\text{g/L}$. These values put Lac Capri near the cut-point between oligo- and mesotrophic. Even though algal productivity is low in this lake, the dissolved oxygen levels in the hypolimnion were <6 mg/L below 7.5 meters.



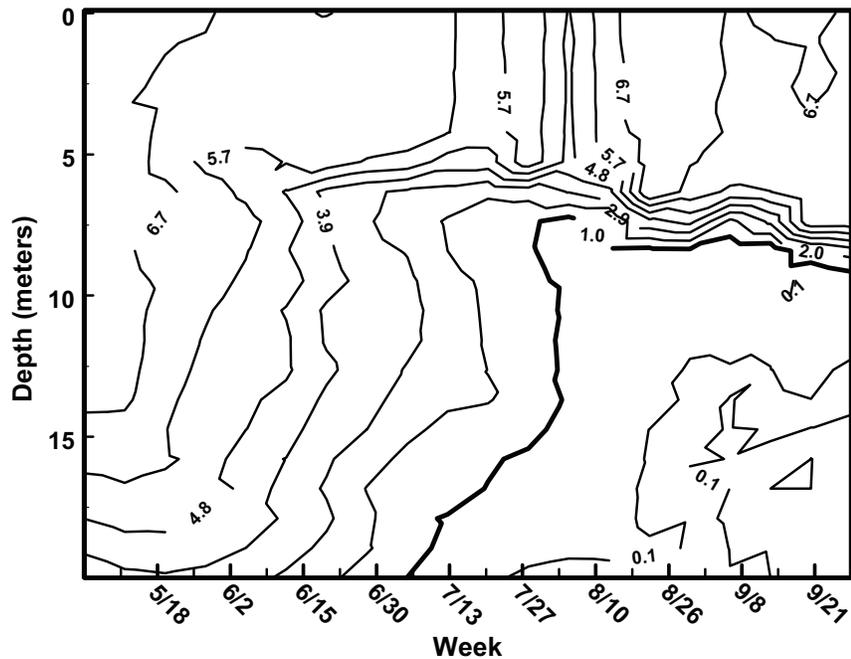
Council Bluff Lake [440-acre reservoir in Iron County, Missouri; the largest lake in the Mark Twain National Forest]

The second figure shows the Council Bluff Lake DO profile from 27 July, 2009. This lake had an average phosphorus value of 8 $\mu\text{g/L}$ and average chlorophyll concentration of 2.5 $\mu\text{g/L}$ during the summer of 2009. Dissolved oxygen levels were <6 mg/L between 5 and 20 meters, representing a full 75% of the water column having insufficient DO levels to support a cold water fishery.



Nehai Tonkayea [250-acre reservoir on a tributary of the Mussel Fork River, Chariton County, Missouri]

Dissolved oxygen profile data was collected on Nehai Tonkayea Lake on a weekly basis in 2004, with the months of May-September being represented in the third figure. Dissolved oxygen levels near the bottom of the lake dip below 1.0 mg/L in early July, with the whole of the hypolimnion being <1.0 mg/L by early August. This lake had an average total chlorophyll value of 1.9 $\mu\text{g/L}$ in 2004 (n=49), a value that qualifies the lake as oligotrophic. Phosphorus averaged 9 $\mu\text{g/L}$ during 2004; again a level that would lead to an oligotrophic classification.



Conclusions

While oligotrophic natural lakes [which Missouri has none] may maintain moderate to high concentrations of dissolved oxygen in the hypolimnion during summer months, Missouri's oligotrophic reservoirs display low hypolimnetic dissolved oxygen levels during summer. These low dissolved oxygen concentrations do not solely reflect oxygen demand associated with in-reservoir production, but also oxygen demand linked to inputs from the watershed (both chemical and biological demand). Man-made reservoirs have, on average, more annual inflow from the watershed relative to water body volume than natural lakes. This difference in hydrology explains why a reservoir will have an anoxic hypolimnion, while a natural lake with the same surface nutrient and algal chlorophyll levels will not.

The targeted reductions in nitrogen and chlorophyll in Table Rock Lake's main channel are fairly minor (based on the 303(d) list [i.e., water quality data information sheets accessed from the Department's 303(d) List webpage: <http://www.dnr.mo.gov/env/wpp/waterquality/303d.htm>]). Reductions of nutrient inputs into Table Rock Lake should decrease the average algal biomass within the lake, but the influence of these small nutrient reductions on hypolimnetic oxygen dynamics will probably be minor. Any improvements in the hypolimnetic oxygen dynamics will probably be limited to a slight shift in timing of the onset of anoxia.