

Missouri
Department of
Natural Resources

DRAFT LAKE TANEYCOMO TMDL
PUBLIC COMMENTS

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

Hoke, John

From: Hoke, John**Sent:** Wednesday, November 10, 2010 9:51 AM**To:** 'michael powell'**Subject:** RE: Response to Comments on the Draft Lake Taneycomo Total Maximum Daily Load

Dear Mr. Powell:

The Missouri Department of Natural Resources (Department) appreciates the August 8, 2010 comments you provided via e-mail regarding the draft Lake Taneycomo Total Maximum Daily Load (TMDL) [\[1\]](#). This e-mail responds to your comments received during the public comment period for this TMDL that ended on September 13, 2010 [\[2\]](#).

LAKE ERIE:

Your observations on Lake Erie are interesting and certainly many lessons have been learned from that situation. Unlike Lake Erie, which was created after receding glaciers left the Great Lakes, the chain of lakes created by the series of dams on the White River, including Lake Taneycomo and Table Rock Lake, are manmade reservoirs. The dams themselves result in dissolved oxygen patterns in these reservoirs that are often drastically different from those found in naturally created lakes. You will be glad to know that the draft TMDL includes information provided by experts on lake chemistry from the University of Missouri and the U.S. Geological Survey who have studied Table Rock Lake and Lake Taneycomo.

PADDLEWHEEL AERATION:

Although not specifically investigated for use in Lake Taneycomo (and, as a result, not included in the draft TMDL), the possibility of using a paddlewheel-type aerator had been investigated by the Arkansas Game and Fish Commission (AGFC), in conjunction with the U.S. Army Corps of Engineers, for use below Norfork Dam on the North Fork River. The Arkansas Department of Environmental Quality included discussion of this option, and their decision not to pursue it further, in their May 1, 2009 document titled, "TMDLs for Dissolved Oxygen for White River below Bull Shoals Dam and North Fork River below Norfork Dam"[\[3\]](#). The following paragraph summarizes their findings:

"5.5.2 Paddlewheel Aerator

In 2003, AGFC personnel investigated the potential for a mechanical "paddlewheel" aerator to improve DO conditions in the Norfork tailwaters under base flow conditions. Initially, this appeared to be an effective low-cost alternative with a purchase and installation cost of about \$6,400. However, additional evaluation of this alternative has identified a number of obstacles. The primary obstacle is the vulnerability of the aerator to damage during the high-flow conditions during power generation. A system for lifting the aerator out of the water during generation periods would have cost over \$100,000. In addition, it appears that the initial estimates of DO improvement with the aerator were higher than is actually likely to occur. As a result, this alternative is no longer being considered as a likely option for increasing tailwater DO levels."

As a result of these types of findings, the paddlewheel option was apparently ruled out for the Table Rock Dam/Lake Taneycomo low dissolved oxygen situation. Although the paddlewheel option was discarded, your idea of having "a pump continually pumping air into a spread of holes lain across the width of the river/lake..." is a good one. You may have noticed in the draft TMDL that a device similar to what you propose is found in Section 10.2, "Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen," Subsection 10.2.1.3, "Forebay Liquid Oxygen Diffuser," and again in Section 12, "Implementation: Future Recommendations." In this case, the aerating lines (dispensing liquid dissolved oxygen) are proposed to be laid near the bottom of Table Rock Lake just upstream from the dam, rather than in Lake Taneycomo itself.

IMPACT OF NUTRIENTS:

As you likely noticed in the draft TMDL, the influence of point and nonpoint source pollution from the watershed is acknowledged and discussed at length. Included in that discussion is the role of nutrients, especially phosphorus, that, as you mentioned, is an important factor.

Thank you again for your comments and interest in protecting the quality of Missouri's waters. 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

11/10/2010

John Hoke, Chief
TMDL Unit

JH:dml

[1] <http://www.dnr.mo.gov/env/wpp/tmdl/7314-lk-taneycomo-tmdl.pdf>

[2] <http://www.dnr.mo.gov/env/wpp/tmdl/pn-lk-taneycomo.htm>

[3] [http://www.adeg.state.ar.us/ftproot/Pub/WebDatabases/Water/TMDL/pdfs/Bull Shoals White River Tailwaters 2009 05 01.pdf](http://www.adeg.state.ar.us/ftproot/Pub/WebDatabases/Water/TMDL/pdfs/Bull_Shoals_White_River_Tailwaters_2009_05_01.pdf)

John Hoke
Env. Specialist IV, TMDL Unit Chief
Water Quality Monitoring & Assessment
Missouri Department of Natural Resources
Phone: (573) 526-1446 Fax: (573) 522-9920

From: michael powell [mailto:michaelangelohs@yahoo.com]
Sent: Sunday, August 08, 2010 4:59 AM
To: Hoke, John
Subject: lake water oxygen possible remedies

Why does Lake Erie have a problem with low levels of oxygen?

In recent decades, the bottom waters in the Central Basin of Lake Erie become anoxic (without oxygen) in the late summer. Aquatic creatures, including fish and bottom-dwelling animals, need oxygen in the water to live or they suffocate. The fish may be able to swim to better waters, but most of the other animals cannot.

The configuration of this part of Lake Erie is largely responsible for the problem. However, too many nutrients, especially phosphorus, make the problem much worse. Most of the excess phosphorus comes from human activities, including sewage treatment plants and agriculture.

Odd Idea : build a waterwheel thats driven from the flow out and it make a pump continually pump air into a spread of holes in a tube lain across the width of the river/lake of taneycomo most likely a 4" pvc pipe would work well possibly. Add 1 per every few miles and keep all phosphorus and other ills from reaching water that deplete oxygen into lake. A very grand test indeed. or this link may provide an answer yet the idea mentioned is basically run by lake flow more natural yet waterwheels are an old sight to behold and might attract tourism, unsure. A test on a small scale model may provide insight to how it would work or not be enough oxygen add or build a couple an test that stretch of depleted oxygen levels with it in action.

The link from lake erie remedy :

<http://www.renewableenergyworld.com/rea/partner/baker-energy/news/article/2009/11/lake-erie-dissolved-oxygen-problem-new-renewable-energy-resource?cmpid=rss>

**Missouri Department of Natural Resources
Water Protection Program
Telephone Record**

Date: 8/16? Or 8/17?/10 (guessing on original message date); 7 attempted contacts: 8/18/10 -9/17/10

Subject: Chrissy Mann's comment on draft Lake Taneycomo TMDL

Telephone Number/Fax: (417) 546-5550 and (417) 334-9998 – both phone #s, not Fax

Incoming X

Outgoing X

Persons Involved:

Name:

Chrissy Mann

Donna Menown

Representing:

Environmental Solutions

Mo DNR, TMDL Developer

SUMMARY OF CONVERSATION:

Ms. Mann left a voice mail message on John Hoke's (TMDL Unit Chief) phone in early August. The exact date is unknown because the original message was lost from my voice mail when I retired, although I suspect it was 8/16 or 17 since most of the newspaper articles came out about then.

Ms. Mann had provided two telephone numbers on her voice mail message, as listed above. John forwarded the voice mail message to me on 8/18/10 when I returned, post-retirement, as a part-time employee, since I was responsible for developing the draft Lake Taneycomo Total Maximum Daily Load (TMDL) for low dissolved oxygen and was back to respond to comments. Ms. Mann reported that she saw an article in the newspaper about the draft TMDL and that she represented a business called "Environmental Solutions." She stated that their business markets solutions to water quality problems (such as low dissolved oxygen) in ponds and lakes throughout the Branson region and she wanted to talk to us about Lake Taneycomo.

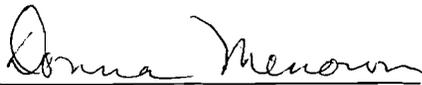
I called the first phone number she provided. The phone number apparently belonged to a friend of Ms. Mann's who she happened to be house sitting for when she left the original voice mail with John Hoke. I explained why I was calling and the friend said she didn't know anything about it. She confirmed that the second phone number was Ms. Mann's cell phone, so I immediately called that and got voice mail and left a message. I provided my name and phone number and that I was calling on behalf of the department. I also explained that some of the TV interviews and newspaper stories gave people the impression that the department was soliciting ideas from the public as to how to solve the Lake Taneycomo DO problem. I explained that what we really were after was comments on the draft TMDL, which itself contained a detailed history of decades of attempts to come up with solutions and that millions of dollars had been spent on the research to date. I told her I would be glad to speak with her. I did not receive a return call.

9/3/10: I called her cell phone number twice in the morning. Got a busy signal both times.

9/7/10: I called her cell phone number twice in the afternoon. Got a busy signal both times.

9/17/10: I called her cell phone at 2:42pm and got voice mail. I left another message with my name, that I worked for DNR, phone number and that I was again returning her call about the low dissolved oxygen problem at Lake Taneycomo. I never received a return call.

Name: Donna Menown
Title: Environmental Specialist III
Water Protection Program, Water Pollution Control Branch
Watershed Protection Section, Total Maximum Daily Load Unit
Jefferson City

Signature: 

Hoke, John

From: Daniel Spalding--Gooneybird [DanSpalding@CenturyTel.net]
Sent: Tuesday, August 10, 2010 7:41 AM
To: Hoke, John
Subject: LAKE TANEYCOMO

8/10/10

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

Dear Mr. John Hoke,

I read an article about the low oxygen level in Lake Taneycomo. Below, find our business card that should give you an idea of the many facets of water quality we have the ability to affect. With today's lakebed aeration technology, there is no excuse for any body of water to be suffering from "Low Oxygen Level." I have sent you a post card with a still animation of our lakebed aeration systems.

Give me a call so we can discuss Lake Taneycomo and other bodies of water or streams your department is concerned with.



Kindest regards,

Daniel Spalding, "Gooneybird"

We Do Pure Air and Lake Care

Gooneybird's LLC

www.GooneybirdsLLC.com

710 Lawn Street, Monroe City, MO 63456

Office 573 735 2527

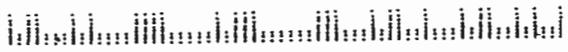
Toll Free 866 754 2527

Hannibal Cellular 573 248 6411

8/18/2010



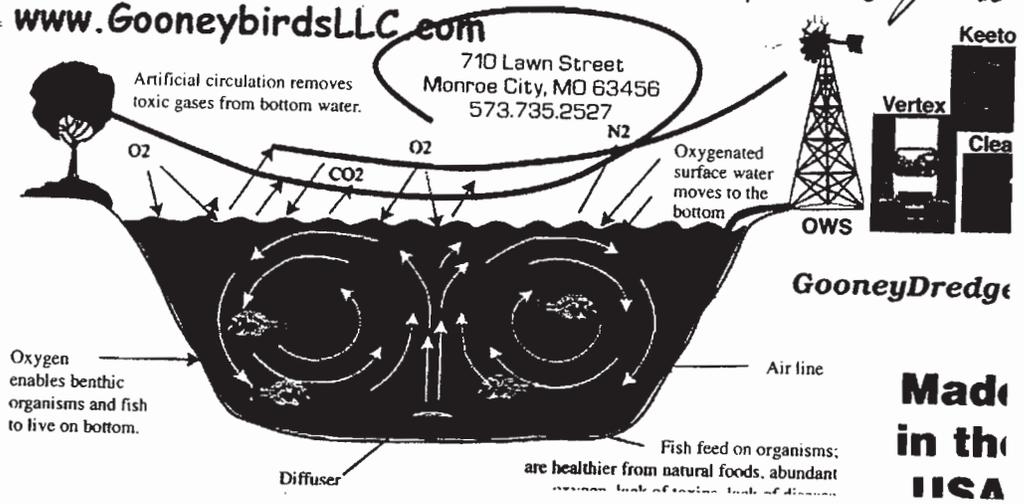
Mr John Hoke
 Missouri Dept of Natural Resources
 PO Box 176
 Jefferson City, MO 65102-0176



As with any other body of water we can be
 with Lake Taneycomo.
 Give me a call, Daniel Gald

www.GooneybirdsLLC.com

710 Lawn Street
 Monroe City, MO 63456
 573.735.2527



Made
 in the
 USA



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

DEPARTMENT OF NATURAL RESOURCES

www.dnr.mo.gov

November 10, 2010

Mr. Daniel Spalding
Gooneybird's LLC
710 Lawn Street
Monroe City, MO 63456

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

Dear Mr. Spalding:

The Missouri Department of Natural Resources (Department) appreciates the August 10, 2010 comments you provided via e-mail, and the follow-up postcard, regarding the draft Lake Taneycomo Total Maximum Daily Load (TMDL)¹. This letter responds to your comments received during the public comment period for this TMDL that ended on September 13, 2010².

In the development of this TMDL, one of the Department's goals was to compile a comprehensive history of the efforts at Table Rock Dam to address the low dissolved oxygen problem in its tailwater, Lake Taneycomo. Past and current implementation efforts are reviewed in Section 10 of the TMDL, while future implementation recommendations are discussed in Section 12. The Department worked closely with the federal and state agencies involved with this issue. These agencies included the U.S. Army Corps of Engineers, Southwestern Power Administration, and the Missouri Department of Conservation. These agencies agreed the history provided in the draft TMDL is fairly comprehensive of what has been considered for the past several decades.

You may have noticed in the draft TMDL that a device similar to what you propose is found in Section 10.2, "Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen," Subsection 10.2.1.3, "Forebay Liquid Oxygen Diffuser," and again in Section 12, "Implementation: Future Recommendations." In this case, the aerating lines (dispensing liquid dissolved oxygen) are proposed to be laid near the bottom of Table Rock Lake just upstream from the dam, rather than in Lake Taneycomo itself.

¹ <http://www.dnr.mo.gov/env/wpp/tmdl/7314-lk-taneycomo-tmdl.pdf>

² <http://www.dnr.mo.gov/env/wpp/tmdl/pn-lk-taneycomo.htm>

Mr. Daniel Spalding
Page Two

As detailed in Section 2.1 of the draft TMDL, Lake Taneycomo has characteristics of both a river and a lake, especially in the upper portions where the dissolved oxygen problem occurs. These characteristics make it difficult to apply standard aeration practices that may work well on smaller, more static lakes. Also, the large volumes of water often produced during times of power generation make it difficult to successfully anchor equipment in the tailwater. Regardless, funding sources for implementing any type of recommended solution have yet to be identified.

Thank you again for your comments and interest in protecting the quality of Missouri's waters. 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

A handwritten signature in black ink, appearing to read "John Hoke", written over a horizontal line.

John Hoke, Chief
TMDL Unit

JH:dml

Hoke, John

From: Dwayne/Charlotte Miller [charbill@netins.net]
Sent: Thursday, August 12, 2010 9:31 AM
To: Hoke, John
Subject: Lake Taneycomo TMDL

Mr. Hoke,

Several things stand out on the TMDL sheet for Lake Taneycomo. I am not sure what the temperature of the "Lake" has attained recently, but in the 60's and 70's it was frequently in the range of mid 40's to very low 50's. At those temperatures it seems rather hard to maintain the Warm Water aquatic life very well. It seems to me that we are trying to have our "cake and eat it too" to manage for two distinct and separate resources, warm and cold water. Since this was originally or could have been classified as a warm water/cool water fisheries or aquatic ecosystem we have lost that designation due to the construction of Tablerock Dam.

On a second note, to improve the oxygen levels in the water I do take note with one suggestion to inject air into the discharge water. Your folks at the MDC should have noted that injecting air into water going through or that has passed through turbines under pressure will be certain to supersaturate the water with nitrogen causing problems with the fisheries. I would hope that some way of determining what levels of nitrogen are acceptable to prevent gas bubble disease in the fish community. This are just some comments on those points and I am sure are addressed at more detail in a official document from the MDC as to approaches to take to achieve a healthy aquatic resource.

Sincerely,

Dwayne W. Miller
2369 Route C
Goodman, MO 64843
417-364-6421



STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

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

www.dnr.mo.gov

November 9, 2010

Mr. Dwayne Miller
2369 Route C
Goodman, MO 64843

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

Dear Mr. Miller:

The Missouri Department of Natural Resources (Department) appreciates the August 12, 2010 comments you provided via e-mail regarding the draft Lake Taneycomo Total Maximum Daily Load (TMDL)¹. This letter responds to your comments received during the public comment period for this TMDL that ended on September 13, 2010².

Maintaining both “cold-water fishery” and “warm water aquatic life” designated beneficial uses in Lake Taneycomo:

The Department acknowledges that Lake Taneycomo is assigned both the Protection of Warm Water Aquatic Life and Human Health-Fish Consumption (AQL) and Cold Water Fishery (CDF) designated uses in Missouri’s Water Quality Standards [10 CSR 20-7.031, Table G]. When multiple uses of the same category (e.g. aquatic life protection) are assigned to a water body, the Department recognizes and protects the most sensitive designated use. In the case of Lake Taneycomo, dissolved oxygen and temperature criteria protective of the CDF designated use apply.

Your comment does bring to our attention, however, the need to better refine and delineate aquatic life protection uses in Lake Taneycomo. The Department intends to address this issue during a future triennial review of Missouri’s water quality standards.

Nitrogen Supersaturation:

In the development of this TMDL, one of the Department’s goals was to compile a comprehensive history of the efforts at Table Rock Dam to address the low dissolved oxygen problem in its tailwater, Lake Taneycomo. Past and current implementation efforts are reviewed in Section 10 of the TMDL, while future implementation recommendations are discussed in Section 12. The Department worked closely with the federal and state agencies involved with this issue. These agencies included the U.S. Army Corps of Engineers, Southwestern Power Administration, and the Missouri

¹ <http://www.dnr.mo.gov/env/wpp/tmdl/7314-lk-taneycomo-tmdl.pdf>

² <http://www.dnr.mo.gov/env/wpp/tmdl/pn-lk-taneycomo.htm>

Mr. Dwayne Miller
Page Two

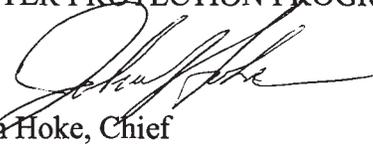
Department of Conservation. These agencies agreed the history provided in the draft TMDL is fairly comprehensive of what has been considered for the past several decades. The draft TMDL was also developed in close coordination with several Department of Conservation employees, including Mike Smith, whose position in their Policy Coordination office involved many dam-related issues.

The Department appreciates your observations regarding the difficulties associated with injecting atmospheric "air" into turbine discharges. Reference to nitrogen supersaturation is made in the draft TMDL's summary of past and current operational modifications that have been investigated and/or used to address low dissolved oxygen in Table Rock Dam's discharge water (Section 10.2.2). Specifically, information on this topic can be found in Section 10.2.2.2, "Spilling and Flow Mixing." As you mention in your comment, there are dangers associated with "injecting" air into the discharge water. Please note that only liquid oxygen (LOX) is currently being "injected" into the penstocks, and it is also proposed to be "diffused" in a system that could be installed in the forebay, just upstream from the dam in Table Rock Lake itself. The only air that is currently entering the discharge water is that pulled passively in as the water passes through the turbines, as discussed in detail in the draft TMDL (Section 10.2.1.1, "Turbine Venting"). Nitrogen supersaturation has not been reported as a resulting problem in the decades in which this venting has occurred at Table Rock Dam. However, when the turbines at Table Rock Dam are eventually replaced, consideration of the potential for nitrogen supersaturation in the discharge must be seriously evaluated prior to recommending a new turbine designed to promote more dissolved oxygen in the discharge.

Thank you again for your comments and interest in protecting the quality of Missouri's waters. 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.

Sincerely,

WATER PROTECTION PROGRAM



John Hoke, Chief
TMDL Unit

JH:dml

Hoke, John

From: Rainbow Haven Resort [rainbowhaven@suddenlinkmail.com]
Sent: Saturday, August 14, 2010 10:32 AM
To: Hoke, John
Subject: Lake Taneycomo
Attachments: Copy (2) of DSC00007.JPG; Copy (2) of DSC00009.JPG; Copy (2) of DSC00016.JPG; Copy (2) of DSC00017.JPG; Copy (2) of DSC00020.JPG; Copy (2) of DSC00034.JPG; Copy (2) of DSC00041.JPG; sandy 029.JPG; Copy of DSC00012.JPG; DSC00013.JPG

TO whom it may concern

I am the Mayor of Rockaway Beach.

We have been trying to get the lake cleaned up for last 4 years. Nobody seemed concerned. We have worked with Federal, State, and County Governments

You have more of a problems then Oxygen.

We are putting a lot of information together on what we have tried to get it cleaned up.

If you would like more information contact Rockaway Beach City Clerk or myself. We have alot more pictuers to share.

We now have weeds so thick that we can not get boats in and out. And the smell is keeping the families in the Condos to keep their windows closed.

Our next step is a civil lawsuit against the Governments mentioned above.

Please contact us, to see if we can help clean up our lake and Nautral Resources.

Thanks for your time.

Larry Cline
417-593-1357

City Hall
417-561-4424
rockawaycity@suddenlinkmail.com

<Rainbow Haven Resort and Marina
Phone 417-561-4179
Fax 417-561- 8321
Web Site: Rainbowhavenresoert.com
Email: Rainbowhaven@suddenlinkmail.com



STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

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

www.dnr.mo.gov

November 9, 2010

The Honorable Larry Cline, Mayor
City of Rockaway Beach
City Hall, P.O. Box 315
Rockaway Beach, MO 65740

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

Dear Mayor Cline:

The Missouri Department of Natural Resources (Department) appreciates the comments provided by the City of Rockaway Beach (City) via e-mail on August 14, 2010 regarding the draft Lake Taneycomo Total Maximum Daily Load (TMDL)¹. This letter responds to comments received from the City during the public comment period for this TMDL that ended on September 13, 2010².

Pursuant to Section 303(d)(1)(C) of the federal Clean Water Act, the Lake Taneycomo TMDL must address the low dissolved oxygen impairment of the water body as listed on the EPA approved 2008 303(d) List of impaired waters. While the Department appreciates the information provided by the City regarding observations of weeds and odors, these issues are not the purview of the TMDL process and are not addressed by the TMDL. However, the information and photographs provided by the City regarding drums and solid waste in Lake Taneycomo were forwarded to the Department's Southwest Regional Office (SWRO) and Emergency Environmental Response (EER) Section for investigation and follow-up.

Regarding the drums seen in the photographs provided by the City, the Department's EER has been in contact with your office and investigated the area on August 23, 2010. Due to water level conditions present during the survey, EER was unable to determine the location of the drums in question. During the survey, EER staff requested the City (Mr. Edwin Godley, Public Works Director, City of Rockaway Beach) mark the drums when water levels are low enough and contact the Department EER for follow-up. If you should have further questions or concerns, please contact Mr. Wendell Hall (SWRO-EER) at (417) 891-4315.

¹ <http://www.dnr.mo.gov/env/wpp/tmdl/7314-lk-taneycomo-tmdl.pdf>

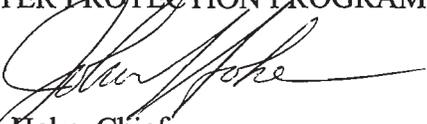
² <http://www.dnr.mo.gov/env/wpp/tmdl/pn-lk-taneycomo.htm>

The Honorable Larry Cline, Mayor
Page Two

Thank you again for your comments and interest in protecting the quality of Missouri's waters. If you have questions or would like to discuss the Lake Taneycomo 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

Hoke, John

From: k9dsj1@suddenlink.net
Sent: Sunday, August 15, 2010 12:35 PM
To: Hoke, John
Subject: Trout

How feasible would it be to lay plastic pipe with holes in them across areas of the river and have air compressors pump air into them. I know its not as good a liquid oxygen but seems this would be cheaper and these pipes could be laid in the river at different points where needed. I have seen ponds that spray the water into the air to put oxygen in the water also. I am not an engineer but maybe a more simplistic approach could work. Thank you for getting involved and looking for solutions.

Ken Ramos
1741 Robinson Point Road
Mountain Home, Arkansas
69441



STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

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

www.dnr.mo.gov

November 10, 2010

Mr. Ken Ramos
1741 Robinson Point Road
Mountain Home, AR 69441

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

Dear Mr. Ramos:

The Missouri Department of Natural Resources (Department) appreciates the August 15, 2010 comments you provided via e-mail regarding the draft Lake Taneycomo Total Maximum Daily Load (TMDL)¹. This letter responds to your comments received during the public comment period for this TMDL that ended on September 13, 2010².

Your idea of laying plastic pipe with holes in them across areas of the river and having air compressors pump air through them is an interesting suggestion. You will be glad to know that a device similar to what you suggest is proposed in the draft Lake Taneycomo TMDL in Section 10.2 "Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen," Subsection 10.2.1.3, "Forebay Liquid Oxygen Diffuser." Differences between your idea and the one found in the draft TMDL are that the lines are proposed to be laid near the bottom of Table Rock Lake just upstream from the dam and would dispense liquid dissolved oxygen (LOX) instead of atmospheric "air".

The Department is not aware of the successful application of fountain aeration in large reservoirs. There may be technological, financial, or other reasons for this. Fountain aeration has, however, been successfully used in small lakes and ponds, where fountain aerators spray water into the air to add additional oxygen before returning to the water surface. If you are interested in learning more about previous and current techniques used to add oxygen to Table Rock Dam's discharge water, please refer to Section 10.2 "Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen" of the draft Lake Taneycomo TMDL.

¹ <http://www.dnr.mo.gov/env/wpp/tmdl/7314-lk-taneycomo-tmdl.pdf>

² <http://www.dnr.mo.gov/env/wpp/tmdl/pn-lk-taneycomo.htm>

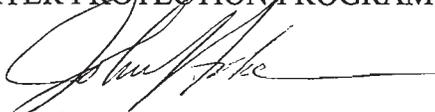
Mr. Ken Ramos
Page Two

In the development of this TMDL, one of the Department's goals was to compile a comprehensive history of the efforts at Table Rock Dam to address the low dissolved oxygen problem in its tailwater, Lake Taneycomo. Past and current implementation efforts are reviewed in Section 10 of the TMDL, while future implementation recommendations are discussed in Section 12. The Department worked closely with the federal and state agencies involved with this issue. These agencies included the U.S. Army Corps of Engineers, Southwestern Power Administration, and the Missouri Department of Conservation. These agencies agreed the history provided in the draft TMDL is fairly comprehensive of what has been considered for the past several decades.

Thank you again for your comments and interest in protecting the quality of Missouri's waters. 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

Hoke, John

From: David Fieth [dcfent@sbcglobal.net]
Sent: Monday, August 16, 2010 9:29 AM
To: Hoke, John
Subject: Oxygen levels Taneycomo

Mr. Hoke,

I have information concerning equipment and knowledge of how to aerate the lake from the bottom. I previously sold and installed this type of equipment. Works well.

Sincerely,

David Fieth
10241 North Farm Road 149
Pleasant Hope, MO 65725
417-209-7760

8/18/2010



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

DEPARTMENT OF NATURAL RESOURCES

www.dnr.mo.gov

November 10, 2010

Mr. David Fieth
10241 North Farm Road
Pleasant Hope, MO 65725

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

Dear Mr. Fieth:

The Missouri Department of Natural Resources (Department) appreciates the August 16, 2010 comment you provided via e-mail regarding the draft Lake Taneycomo Total Maximum Daily Load (TMDL)¹. This letter responds to your comment received during the public comment period for this TMDL that ended on September 13, 2010².

In the development of this TMDL, one of the Department's goals was to compile a comprehensive history of the efforts at Table Rock Dam to address the low dissolved oxygen problem in its tailwater, Lake Taneycomo. Past and current implementation efforts are reviewed in Section 10 of the TMDL, while future implementation recommendations are discussed in Section 12. The Department worked closely with the federal and state agencies involved with this issue. These agencies included the U.S. Army Corps of Engineers, Southwestern Power Administration, and the Missouri Department of Conservation. These agencies agreed the history provided in the draft TMDL is fairly comprehensive of what has been considered for the past several decades.

You may have noticed in the draft TMDL that a device similar to what you propose is found in Section 10.2, "Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen," Subsection 10.2.1.3, "Forebay Liquid Oxygen Diffuser," and again in Section 12, "Implementation: Future Recommendations." In this case, the aerating lines (dispensing liquid dissolved oxygen) are proposed to be laid near the bottom of Table Rock Lake just upstream from the dam, rather than in Lake Taneycomo itself.

¹ <http://www.dnr.mo.gov/env/wpp/tmdl/7314-lk-taneycomo-tmdl.pdf>

² <http://www.dnr.mo.gov/env/wpp/tmdl/pn-lk-taneycomo.htm>

Mr. David Fieth
Page Two

As detailed in Section 2.1 of the draft TMDL, Lake Taneycomo has characteristics of both a river and a lake, especially in the upper portions where the dissolved oxygen problem occurs. These characteristics make it difficult to apply standard aeration practices that may work well on smaller, more static lakes. Also, the large volumes of water often produced during times of power generation make it difficult to successfully anchor equipment in the tailwater. Regardless, funding sources for implementing any type of recommended solution have yet to be identified.

Thank you again for your comments and interest in protecting the quality of Missouri's waters. 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

A handwritten signature in black ink, appearing to read "John Hoke", with a horizontal line extending to the right.

John Hoke, Chief
TMDL Unit

JH:dml

Hoke, John

From: Lonnie Vann [lvann@centurytel.net]
Sent: Monday, August 16, 2010 6:40 PM
To: Hoke, John
Subject: Lake Taneycomo

Could a vertical structure be added to the penstock inlet?

This structure could be built with gates at various elevations, to allow a mix of oxygenated water and lower colder water.

I realize as the elevation rises, the gates would have to be larger, due to the lower head pressure. But through proper operation, this could be a possible solution and may not require as long a period to strike the balance that you desire.

Thank You!

Lonnie Vann
204 w. Poplar St.
El Dorado Springs, MO. 64744
(417) 876-6407



STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

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

www.dnr.mo.gov

November 9, 2010

Mr. Lonnie Vann
204 West Poplar Street
El Dorado Springs, MO 64744

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

Dear Mr. Vann:

The Missouri Department of Natural Resources (Department) appreciates the August 16, 2010 comment you provided via e-mail regarding the draft Lake Taneycomo Total Maximum Daily Load (TMDL)¹. This letter responds to your comment received during the public comment period for this TMDL that ended on September 13, 2010².

In the development of this TMDL, one of the Department's goals was to compile a comprehensive history of the efforts at Table Rock Dam to address the low dissolved oxygen problem in its tailwater, Lake Taneycomo. Past and current implementation efforts are reviewed in Section 10 of the TMDL, while future implementation recommendations are discussed in Section 12. The Department worked closely with the federal and state agencies involved with this issue. These agencies included the U.S. Army Corps of Engineers, Southwestern Power Administration, and the Missouri Department of Conservation. These agencies agreed the history provided in the draft TMDL is fairly comprehensive of what has been considered for the past several decades.

That said, your question regarding the use of a multi-level intake structure for the penstock intakes is an astute one. The Department omitted mention of this option from the draft TMDL that went on public notice July 30, 2010, because Southwestern Power Administration (SWPA) was still searching its records to find documentation of that investigation. Since that time, SWPA has located and shared related correspondence with the Department, so that mention of this option can be added to a revised version of the TMDL. Although the public noticed version of the draft TMDL does not include this option, it has since been added to the following section, which will appear in the version that will be submitted to the U.S. Environmental Protection Agency (EPA).

¹ <http://www.dnr.mo.gov/env/wpp/tmdl/7314-lk-taneycomo-tmdl.pdf>

² <http://www.dnr.mo.gov/env/wpp/tmdl/pn-lk-taneycomo.htm>

Mr. Lonnie Vann
Page Two

“10.2.1.5 Multi-level Intake Structure

Installation of multi-level intake structures, or modification of existing intake structures on a dam’s penstock intakes, can allow mixing of released water from different depths of a reservoir. In some situations, they have been used to provide temperature control on dam project outflows. In the early 1980s, the USACE’s Waterways Experiment Station studied the approach, among others, as a possible solution to the low DO situation. According to a March 1, 1985 letter from the USACE to then Missouri governor, John Ashcroft (USACE 1985), the draft report of the study provided a recommendation that multi-level intakes (termed, “selective withdrawal structures”) be investigated further (Fritha Ohlson, e-mail communication, Sept. 23, 2010). Subsequent model studies were initiated to evaluate the proposed structures. In a March 25, 1992 letter from the USACE’s Little Rock District to SWPA (USACE-LR 1992), the USACE states, “Results of the model studies indicate that the multilevel intake structure will not solve the problem of low dissolved oxygen (D.O.) at Table Rock while maintaining an acceptable temperature regime for trout.” At the time this TMDL was developed, a copy of the 1985 report, *Dissolved Oxygen Study, Table Rock Dam & Lake, White River, Missouri, Reconnaissance Report, April 1985*, had not yet been located. As a result, details supporting the rejection of the multi-level intake structure option are not included in Table 2.”

Thank you again for your comment and interest in protecting the quality of Missouri's waters. The incorporation of your suggested revision has made the document a more technically accurate portrayal of 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.

Sincerely,

WATER PROTECTION PROGRAM



John Hoke, Chief
TMDL Unit

JH:dml

Hoke, John

From: Darrell [ddlund2@suddenlink.net]
Sent: Tuesday, August 17, 2010 7:59 AM
To: Hoke, John
Subject: Oxygen.

What happened to the rocks that was suppose to be put in the upper end of Taney Como that would help with the oxygen level? As I understand that oxygen used to be put in more often than it is now. We have tried to through Trout unlimited to help with the cost of the oxygen but no response from conservation. Also I think that if you had conservation or again Trout unlimited asked fishermen to donate to the cost of oxygen that the fishermen would donate that if it is about cost. But my feelings is that nobody cares about the fishermen. Come down and talk to the fishermen you may find out what would help the area.

Darrell Lundberg
ddlund2@suddenlink.net
417-230-0276

Hoke, John

From: Darrell [ddlund2@suddenlink.net]

Sent: Wednesday, August 18, 2010 6:45 AM

To: Hoke, John

Subject: Ideas for more oxygen

Air stones that are used in tanks for gold fish. Only in a bigger version pump air in the water. Another idea have the conservation agents in force the law on river, no power bait upper end and people keeping fish over size of 12 in. or over the limit, that would pay for some of the oxygen that could be put in the water.

Hoke, John

From: Hoke, John
Sent: Wednesday, November 10, 2010 11:36 AM
To: 'ddlund2@suddenlink.net'
Subject: RE: Response to Comments on the Draft Lake Taneycomo Total Maximum Daily Load
Attachments: Comment-Taneycomo-Lundberg-1&2.pdf

Dear Mr. Lundberg:

The Missouri Department of Natural Resources (Department) appreciates the August 17 and 18, 2010 comments you provided via e-mail (attached) regarding the draft Lake Taneycomo Total Maximum Daily Load (TMDL) [1]. This e-mail responds to your comments received during the public comment period for this TMDL that ended on September 13, 2010 [2].

Comment: WHAT HAPPENED TO THE ROCKS THAT WERE SUPPOSED TO BE PUT IN THE UPPER END OF LAKE TANEYCOMO?

Since the Department had no knowledge of the rocks to which you referred, we contacted Mr. Shane Bush, Fisheries Management Biologist with the Missouri Department of Conservation. He stated that the Conservation Department is planning to add some trout habitat next year in the form of rock and boulder clusters in the upper portion of Lake Taneycomo. The purpose of the additional rocks and boulders is strictly to increase the amount of trout habitat and, in turn, increase the places for fishermen to catch trout. It is not intended to increase the dissolved oxygen level in the lake. If you would like to contact Mr. Bush for more information, his contact information is provided below:

Shane Bush (Shane.Bush@mdc.mo.gov)
 Fisheries Management Biologist
 Missouri Department of Conservation
 610 Hatchery Road
 Branson, MO 65616
 Office: 417-334-4859
 Fax: 417-334-4996

Comment: COST OF OXYGEN?

As noted in the draft TMDL's Section 10.2.1.2, "Penstock Liquid Oxygen Injectors or Diffusers," Southwestern Power Administration spent almost \$35,000 on liquid oxygen (LOX) during the 2008 low dissolved oxygen season (July – Dec.). This expenditure was to cover the LOX injected into Table Rock Dam's penstocks in efforts to ensure that dissolved oxygen in the turbine discharge water did not fall below 4 mg/L. Any implementation of additional means to increase dissolved oxygen in the dam's discharge to the required 6 mg/L (See Section 12. "Implementation," in the draft TMDL) may increase LOX requirements. Although Southwestern Power Administration (the federal agency that markets energy produced at Table Rock Dam) usually purchases LOX used at the dam, the Little Rock District of the Army Corps of Engineers may also make LOX purchases. Since the Corps has special authority in place that allows them to accept third-party funding for projects, all questions regarding donations of funds toward the purchase of LOX should be directed to that agency.

As you are likely aware, any changes adopted at Table Rock Dam by the Army Corps of Engineers, or Southwestern Power Administration, in an attempt to keep dissolved oxygen levels in the dam's discharge from falling below 6 mg/L will be complicated and costly. Any resulting increase in LOX use would be only one of many costs associated with implementing a system different than that currently practiced. Among others, additional costs would likely include purchase, construction and annual maintenance of any new system, and possible impacts on rate payers receiving electricity produced at the dam. Specific questions regarding donations for LOX purchase should be directed to the Corps of Engineers, specifically to:

Mr. Titus Hardiman
~~Titus.Hardiman@usace.army.mil~~
 (501) 324-5899
 Cell phone: (501) 772-9491

should read: Titus.V.Hardiman@usace.army.mil

*11/12/10 D. Menown
 sent Mr. Lundberg
 an e-mail with
 this e-mail address
 correction.*

11/10/2010

Comment: LACK OF CONCERN FOR FISHERMEN?

As presented in the draft TMDL, millions of dollars have been spent by federal agencies (Southwestern Power Administration and the U.S. Army Corps of Engineers) and state agencies managing and monitoring the dissolved oxygen levels entering Lake Taneycomo through Table Rock Dam. These expenditures also include investigating ways to improve dissolved oxygen levels in Lake Taneycomo year round. The Conservation Department's Shepherd of the Hills Hatchery and the federal Neosho Fish Hatchery exist to support a trout fishery for fishermen. Continuing efforts to investigate, manage, and solve low dissolved oxygen problems that negatively impact the fishery have been detailed in the Lake Taneycomo TMDL document. The Department hopes that these facts, including the existence of the draft TMDL itself, provide evidence of the importance that has been assigned to supporting the cold-water fishery, and the dedication of both state and federal agencies toward that end.

Comment: USING AIR STONES TO PUMP AIR INTO THE WATER?

Numerous solutions have been investigated and implemented to solve the low dissolved oxygen problem in Lake Taneycomo. The draft TMDL includes a mechanism similar to what you propose in Section 10.2, "Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen," Subsection 10.2.1.3, "Forebay Liquid Oxygen Diffuser," and again in Section 12, "Implementation: Future Recommendations." In this case, the aerating lines (dispensing liquid dissolved oxygen) are proposed to be laid near the bottom of Table Rock Lake just upstream from the dam, rather than in Lake Taneycomo itself. This option is being given serious consideration.

Comment: CONSERVATION AGENTS ENFORCING FISHING REGULATIONS/ PAYING FOR OXYGEN?

Statutorily, the Missouri Department of Natural Resources is responsible for water quality under the federal Clean Water Act and Missouri Clean Water Law in Missouri. The Missouri Department of Conservation is responsible for enforcing fishing regulations and Missouri's Wildlife Code. As a result, any concerns regarding enforcement of the Wildlife Code should be directed to the Missouri Department of Conservation. Southwestern Power Administration, and sometimes the U.S. Army Corps of Engineers, is responsible for purchasing the LOX used at Table Rock Dam, not the Missouri Department of Conservation. The Department applauds any effort taken to identify ways to reduce state expenditures, although funds saved in one agency do not generally equate to a savings in funds managed by another.

Thank you again for your comments and interest in protecting the quality of Missouri's waters. 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

[1] <http://www.dnr.mo.gov/env/wpp/tmdl/7314-lk-taneycomo-tmdl.pdf>

[2] <http://www.dnr.mo.gov/env/wpp/tmdl/pn-lk-taneycomo.htm>

John Hoke
Env. Specialist IV, TMDL Unit Chief
Water Quality Monitoring & Assessment
Missouri Department of Natural Resources
Phone: (573) 526-1446 Fax: (573) 522-9920

11/10/2010

**Missouri Department of Natural Resources
Water Protection Program
Telephone Record**

Date: 9/1/10

Subject: Questions/Suggestions regarding low DO problem at Lake Taneycomo (TMDL)

Telephone Number/Fax: (417) 773-1389

Incoming ___

Outgoing X ___

Persons Involved:

Name:

Donna Menown

Benjamin Thomas

Representing:

TMDL Unit/ Mo DNR

Springfield citizen

SUMMARY OF CONVERSATION:

On 8/24, Mr. Thomas left a message regarding the public notice on the draft Lake Taneycomo Total Maximum Daily Load (TMDL) document open for comment through 9/13. I returned his call and apologized for my late response, explaining that I am retired but back just part time.

Mr. Thomas had received word about the news articles on the draft TMDL and had been speaking with many people in Branson and also with Rep. Blunt's office about possible solutions to the low dissolved oxygen (DO) problem. I explained to Mr. Thomas that DNR press releases were in error when they stated that DNR was soliciting, from the public, ideas on how to solve the problem. What we are really looking for is comments on the draft TMDL itself. I conveyed that the TMDL contained a summary of the investigated solutions to the problem that has existed since Table Rock Dam was built in 1958. I had to again explain that our PI people made a mistake when they indicated the low DO situation had only been a problem since 2008. He said he knew that latter since he grew up in the Springfield area.

Mr. Thomas is a whitewater kayak enthusiast and was investigating the possibility of solving the low DO problem by building a white water park below the dam, using existing flows without requiring special "surges" for waterpark function. He's met with Branson govt and found that this idea has been on their long-term agenda for many years. He said they'd been wanting to attract a more diverse group to the Branson area and thought this would be a way to do it - to "revitalize Branson." I explained that millions of dollars had been spent researching possible solutions to the low DO problem and this research had been summarized in the draft TMDL, which acts as a snapshot in time of the information collected, and tried at Table Rock Dam, to date. We discussed how just an engineering/hydrological evaluation of a hypothetical whitewater park below the dam would cost a small fortune, and that wouldn't even include convincing the Army Corps of Engineers that adding hard structures below the dam was deserving of 404 certification, and then, of course, who would pay for any type of implementation? Who would pay for the evaluation? Since the idea has yet to be researched, it's inappropriate to include any mention of it in the TMDL. He understood that fact and also that the timing is bad on raising funds to even begin to look into the possibility. I asked if he was aware of any other similar situations around the country where they've successfully installed such a structure and solved a low DO problem. He answered that although waterparks have been successful in economic return in many areas (e.g. in Reno, Nev. & Gauley River in W. Va), he hasn't found a comparable situation to that below Table Rock Dam, especially since it discharges directly into another impounded lake.

I forwarded a hotlink to his e-mail address (jacksonkayker@gmail.com) so he could review the draft TMDL, which he hadn't yet seen. He stated that he would study it and submit written comments by 9/13.

Name: Donna Menown

Title: ES III

Water Protection Program, Water Pollution Control Branch

Watershed Protection Section, Total Maximum Daily Load Unit

Jefferson City

Signature: _____

Hoke, John

From: J [jacksonkayker@gmail.com]
Sent: Tuesday, August 17, 2010 11:33 AM
To: Hoke, John
Subject: Oxygen content in lake taneycomo

I noticed a weir/low head dam as one of the suggested solutions for increasing oxygen in the lake. I suggest creating whitewater structures either in the channel or auxillary spillway, which would be safely navigable to users, while also naturally increasing oxygen for trout. The city of branson already has a whitewater park listed on their city agenda. This would be a maintenace free, low impact option.

Thank you for your time,

Benjamin Thomas

Sent from my iPhone

From Paddlemonster **Date** Tuesday, September 07, 2010 4:10:53 PM
To Menown, Donna
Cc
Subject Re: Lake Taneycomo Total Maximum Daily Load- draft on PN through 9/13

Donna,

After reading the TMDL, I feel much more educated, not only on the problems facing the DO in Lake Taneycomo, but about Table Rock Dam as well. Page 39 address the low-head dam/weir option, and I see the problems facing it are: the effect on the "head" due to changing the water level in the tailwater, the navigability restrictions, and the danger of such a structure's subsequent river-wide keeper hydraulic. I did not see any references or research that showed the effect of structures in the water, whether that be an engineer's opinion of low-head dams, or if there was some kind of hydrology principle that could be used to estimate the DO produced by a structure in water. If this is contained in the report, or you could direct me to something like this that has been found as part of the Dept.'s research, I would appreciate it.

That being said, I think the idea of whitewater structures put in place below the dam avoid some of the major problems associated with the weir. Namely, the waterway would be navigable, the water level would not be restricted so as to raise the water level and affect the "head", and the water would not feature a river-wide keeper hydraulic. Additionally, there is considerable research and evidence (available if you would like to see it), that a white water park would not be cost prohibitive. Once the structure is in place, and managed correctly, the stretch of white water should generate money to cover costs of construction, and even make money for the area. Additionally, the structures will be natural, relatively maintenance-free, and in line with what the Dept. of Conservation and local anglers have already desired: structures in the water to allow the trout resting places and areas in the water rich in resources.

The Gauley River, at the base of the Summersville dam, in West Virginia is listed as the premier commercial whitewater run in the Eastern United States, as well as the world. Interestingly enough, it is also a great fishing river, particularly for different species of trout, as the "swift currents, boulders, and deep pools provide an ideal habitat" (<http://www.2fishwv.com/float-fishing.html>, accessed 9-3-10). While Table Rock and Taneycomo are not mirror twins with Summersville lake and the Gauley River, the TMDL says that Taneycomo becomes a "deep, cold, fast-running river". Throughout the Southeast, there are whitewater stretches existing below TVA dams, and they find successful ways to balance the needs of both.

I appreciate the time you have taken, and will take, entertaining this matter, and hope to hear from you soon.

Thank You,

Benjamin Thomas
417-773-1389

On Wed, Sep 1, 2010 at 4:18 PM, Menown, Donna <donna.menown@dnr.mo.gov> wrote:
<http://www.dnr.mo.gov/env/wpp/tmdl/pn-lk-taneycomo.htm>

Donna Menown
Environmental Specialist III (TMDL Developer)
Div. of Env. Quality/ Water Protection Program
Missouri Dept. of Natural Resources, Jeff. City
(573) 526-1595; FAX [573-522-9920]
<http://www.dnr.mo.gov/index.html>
donna.menown@dnr.mo.gov

Hoke, John

From: Hoke, John
Sent: Wednesday, November 10, 2010 1:00 PM
To: 'J'
Subject: RE: Response to Comments on the Draft Lake Taneycomo Total Maximum Daily Load

Dear Mr. Thomas:

The Missouri Department of Natural Resources (Department) appreciates the August 17, 2010 comment you provided via e-mail regarding the draft Lake Taneycomo Total Maximum Daily Load (TMDL) [1]. This letter responds to your comment received during the public comment period for this TMDL that ended on September 13, 2010 [2].

In the development of this TMDL, one of the Department's goals was to compile a comprehensive history of the efforts at Table Rock Dam to address the low dissolved oxygen problem in its tailwater, Lake Taneycomo. Past and current implementation efforts are reviewed in Section 10 of the TMDL (including a section discussing a weir), while future implementation recommendations are discussed in Section 12. The Department worked closely with the federal and state agencies involved with this issue. These agencies included the U.S. Army Corps of Engineers, Southwestern Power Administration, and the Missouri Department of Conservation. These agencies agreed the history provided in the draft TMDL is fairly comprehensive of what has been considered for the past several decades.

Your suggestion to create whitewater structures, either in the main channel or auxiliary spillway, is an interesting one. It is also interesting to know that the City of Branson has considered developing a whitewater park as one of its own long term goals. As detailed in Section 2.1 of the draft TMDL, Lake Taneycomo has characteristics of both a river and a lake, especially in the upper portions where the dissolved oxygen problem occurs. These characteristics may make it difficult to develop and maintain a whitewater park below Table Rock Dam. This may be especially true during periods when large volumes of water are produced during times of power generation, making it difficult to successfully anchor equipment in the tailwater.

As noted above, the Department coordinated with other state and federal agencies to compile a comprehensive history of the efforts at Table Rock Dam to address the low dissolved oxygen problem in Lake Taneycomo. If your specific idea was considered or tested, the Department's TMDL staff was not made aware of it. However, the involved agencies often share ideas through a committee venue; specifically, the White River Dissolved Oxygen Committee. And, although the committee itself has no decision making authority or funding of its own, the Department will share your e-mails with the member agencies in case they had not already considered your ideas.

Thank you again for your comments and interest in protecting the quality of Missouri's waters. 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

[1] <http://www.dnr.mo.gov/env/wpp/tmdl/7314-1k-taneycomo-tmdl.pdf>

[2] <http://www.dnr.mo.gov/env/wpp/tmdl/pn-1k-taneycomo.htm>

John Hoke

Env. Specialist IV, TMDL Unit Chief
Water Quality Monitoring & Assessment
Missouri Department of Natural Resources
Phone: (573) 526-1446 Fax: (573) 522-9920

-----Original Message-----

From: J [mailto:jacksonkayker@gmail.com]
Sent: Tuesday, August 17, 2010 11:33 AM
To: Hoke, John
Subject: Oxygen content in lake taneycomo

I noticed a weir/low head dam as one of the suggested solutions for increasing oxygen in the lake. I suggest creating whitewater structures either in the channel or auxillary spillway, which would be safely navigable to users, while also naturally increasing oxygen for trout. The city of branson already has a whitewater park listed on their city agenda. This would be a maintenace free, low impact option.

Thank you for your time,

Benjamin Thomas

Sent from my iPhone

Hoke, John

From: jim eilers [jimeilers81@gmail.com]
Sent: Tuesday, August 17, 2010 2:01 PM
To: Hoke, John
Subject: Lake Taneycomo Low Oxygen Solution. Please read my input

Dear John Hoke,

I recently read the articles about the oxygen levels of lake Taneycomo getting down to 2-3ppm during the hot summer months. I have a background in raising salt water reef tanks and also Freshwater fish tanks. There are certain water filters that put in place a water wheel mechanism for keeping oxygen levels up and also for biological filtering. I believe the solution could be as simple as an old fashion water wheel. Particularly the style we used to use to generate power for grain mills and old homes on the waterway. By using a simple water wheel ,even in a slow current, with proper weighting and balancing I'm sure it could be perpetual. The serface disruption from several water wheels along the river would easily improve oxygen levels. I also think it would be neat to add a generator and transformer to power lighting along the lake near these water wheels.

If you have any feedback or would like to discuss this, feel free to call me at 417-576-3936

Have a great day and I'm glad our DNR is doing something about this.

James Eilers
165 Fox Ridge Rd.
Branson, MO 65616
417-576-3936
jimeilers81@gmail.com



STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

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

www.dnr.mo.gov

November 9, 2010

Mr. James Eilers
165 Fox Ridge Road
Branson, MO 65616

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

Dear Mr. Eilers:

The Missouri Department of Natural Resources (Department) appreciates the August 17, 2010 comment you provided via e-mail regarding the draft Lake Taneycomo Total Maximum Daily Load (TMDL)¹. This letter responds to your comment received during the public comment period for this TMDL that ended on September 13, 2010².

Your idea regarding use of a water wheel mechanism to enhance dissolved oxygen in Lake Taneycomo is an interesting one and you will be glad to know it was considered. Although not specifically investigated for use in Lake Taneycomo (and, as a result, not included in the draft TMDL), the possibility of using a paddlewheel-type aerator had been investigated by the Arkansas Game and Fish Commission (AFGC), in conjunction with the U.S. Army Corps of Engineers, for use below Norfolk Dam on the North Fork River. The Arkansas Department of Environmental Quality included discussion of this option, and their decision not to pursue it further, in their May 1, 2009 document titled, "TMDLs for Dissolved Oxygen for White River below Bull Shoals Dam and North Fork River below Norfolk Dam"³. The following paragraph summarizes their findings:

"5.5.2 Paddlewheel Aerator

In 2003, AGFC personnel investigated the potential for a mechanical "paddlewheel" aerator to improve DO conditions in the Norfolk tailwaters under base flow conditions. Initially, this appeared to be an effective low-cost alternative with a purchase and installation cost of about \$6,400. However, additional evaluation of this alternative has identified a number of obstacles. The primary obstacle is the vulnerability of the aerator to damage during the high-flow conditions during power generation. A system for lifting the aerator out of the water during generation periods would have cost over \$100,000. In addition, it appears that the initial estimates of DO improvement with the aerator were higher than is actually likely to occur. As a result, this alternative is no longer being considered as a likely option for increasing tailwater DO levels."

¹ <http://www.dnr.mo.gov/env/wpp/tmdl/7314-lk-taneycomo-tmdl.pdf>

² <http://www.dnr.mo.gov/env/wpp/tmdl/pn-lk-taneycomo.htm>

³ http://www.adeq.state.ar.us/ftp/rooft/Pub/WebDatabases/Water/TMDL/pdfs/Bull_Shoals_White_River_Tail_waters_2009_05_01.pdf

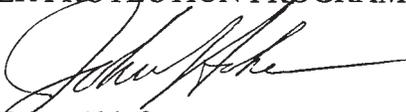
Mr. James Eilers
Page Two

As a result of these types of findings, the paddlewheel option was apparently ruled out for the Table Rock Dam/Lake Taneycomo low dissolved oxygen situation.

Thank you again for your comments and interest in protecting the quality of Missouri's waters. 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

A handwritten signature in black ink, appearing to read "John Hoke", written over a horizontal line.

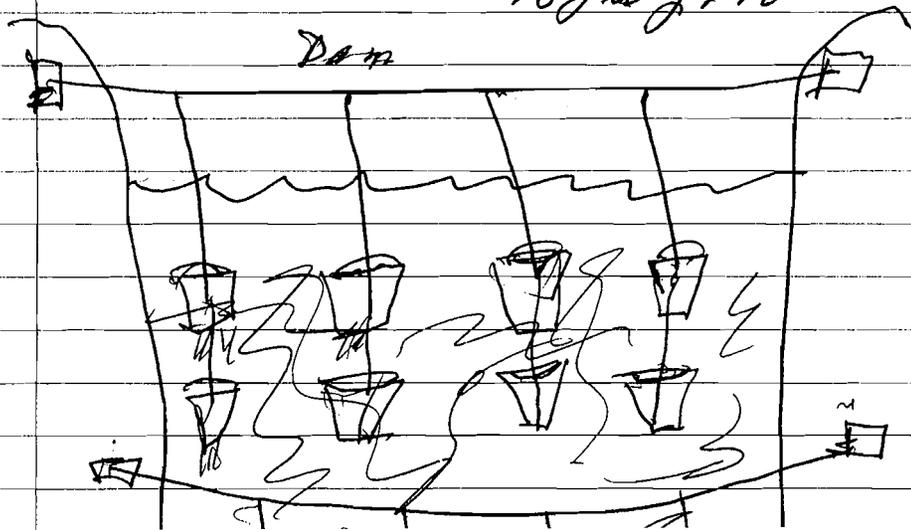
John Hoke, Chief
TMDL Unit

JH:dml

Peter A. McKilligan
13618 Hwy. 39 S.
Mt. Vernon, MO 65712
417-466-4064

Can you run cables across
the Lake Texcoco in Mo.
with with drag lines
into the water with some
kind of cone or device
that will help stir up
the water, the cones
under water near the ~~bottom~~
surface

15 July 10



STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

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

www.dnr.mo.gov

November 9, 2010

Mr. Peter A. McKilligan
13618 Highway 39 South
Mount Vernon, MO 65712

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

Dear Mr. McKilligan:

The Missouri Department of Natural Resources (Department) appreciates the August 18, 2010 comment you provided regarding the draft Lake Taneycomo Total Maximum Daily Load (TMDL)¹. This letter responds to your comment received during the public comment period for this TMDL that ended on September 13, 2010². For your reference, please find enclosed a TMDL fact sheet that describes what a TMDL is and what it involves.

Your idea of running cables across Lake Taneycomo with some sort of cone-like device to help stir air into the water is a good one. You will be glad to know that a device somewhat similar to what you describe is actually proposed in the draft Lake Taneycomo TMDL in Section 10.2 "Past and Current Structural and Operational Actions for Addressing Low Dissolved Oxygen," Subsection 10.2.1.3, "Forebay Liquid Oxygen Diffuser" (pages enclosed). In the option found in the draft TMDL, lines dispensing liquid dissolved oxygen are proposed to be laid near the bottom of Table Rock Lake just upstream from the dam.

Thank you again for your comments and interest in protecting the quality of Missouri's waters. 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

¹ <http://www.dnr.mo.gov/env/wpp/tmdl/7314-lk-taneycomo-tmdl.pdf>

² <http://www.dnr.mo.gov/env/wpp/tmdl/pn-lk-taneycomo.htm>

Hoke, John

From: Hoke, John
Sent: Monday, November 15, 2010 8:18 AM
To: 'Phil Lilley'
Subject: RE: Lake Taneycomo Comment

Mr. Lilley,

The Missouri Department of Natural Resources (Department) appreciates the August 23, 2010 comments you provided via e-mail regarding the draft Lake Taneycomo Total Maximum Daily Load (TMDL) [\[1\]](#). This e-mail responds to your comments received during the public comment period for this TMDL that ended on September 13, 2010 [\[2\]](#).

From your comments it is obvious you are more than well-versed on the complexity of this ongoing issue. You will find the fact that fish do not “thrive” during the low dissolved oxygen season mentioned many times in the Lake Taneycomo TMDL (e.g., Section 3.1.2). You will also note that the history of the minimum flow issue and Missouri’s involvement (or lack thereof) is also detailed in the TMDL (specifically, Sections 10.2.2.3 and 12.3, although mentioned elsewhere as well).

The Department is aware of the Arkansas Department of Environmental Quality’s TMDL to which you refer – TMDL for Dissolved Oxygen for White River Below Bull Shoals Dam and North Fork River Below Norfork Dam (<http://www.adeg.state.ar.us/water/tmdls/default.asp>; listed under Bulls Shoals tailwater). As you mentioned, Arkansas is in the process of beginning implementation of the minimum flow regimes required by Section 132 of the Federal Fiscal Year 2006 Energy and Water Development Appropriations Act (EWDAA; Public Law 109-103). As detailed in Section 10.2.2.3 of the Lake Taneycomo TMDL, Missouri waters are not included in that legislation. As a result, the federal dams on the Whiter River System that include tailwaters in Missouri (Beaver Dam and Table Rock Dam) are excluded from implementation of the current minimum flow regime. The Department will be watching with interest, as you state you will, as EWDAA is implemented. However, as it stands now, any proposed alternative that would increase the minimum flow from Table Rock Dam would require authorizing legislation in order to ensure the adequate allocation of storage necessary to facilitate additional flows.

You are correct about the tremendous increase in liquid oxygen (LOX), as well as the associated commensurate increases in cost, if injections were increased in the penstocks in an attempt to reach the 6 mg/L goal. This situation is discussed in detail in the draft TMDL’s Section 10.2.1.2, “Penstock Liquid Oxygen Injectors or Diffusers,” and includes the logistical reasons why that tact has been deemed impractical

Thank you again for your comments and for your interest in protecting the quality of Missouri's waters. 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

[\[1\] http://www.dnr.mo.gov/env/wpp/tmdl/7314-lk-taneycomo-tmdl.pdf](http://www.dnr.mo.gov/env/wpp/tmdl/7314-lk-taneycomo-tmdl.pdf)

[\[2\] http://www.dnr.mo.gov/env/wpp/tmdl/pn-lk-taneycomo.htm](http://www.dnr.mo.gov/env/wpp/tmdl/pn-lk-taneycomo.htm)

John Hoke
Env. Specialist IV, TMDL Unit Chief
Water Quality Monitoring & Assessment
Missouri Department of Natural Resources
Phone: (573) 526-1446 Fax: (573) 522-9920

11/15/2010

From: Phil Lilley [mailto:lilley@lilleyslanding.com]
Sent: Monday, August 23, 2010 10:34 PM
To: Hoke, John
Subject: Lake Taneycomo Comment

Mr. Hoke,

I'm writing in regards to your quest, asking for comments on Lake Taneycomo's water quality.

We've been through many autumn seasons, holding our collective breath, hoping our trout survive another low dissolved oxygen period. Some years are worse than others; 2008 for instance was very bad because of spring and fall flooding.

It's a balancing act in the way Southwest Power, the U.S. Corp of Engineers and Missouri Department of Conservation manage water releases from Table Rock into our lake. By the use vents on the turbines, injecting liquid O2 and releasing water through hatchery outlets, they try to provide just enough oxygenated water to keep fish alive, not to thrive, but to survive. Throw into that equation water temperatures, which can't be controlled, and you have quite a game of, "keep the fish alive".

Arkansas is trying to help the problem by increasing the minimum flow from Bull Shoals and Norfolk Dams. I see that more of an issue of helping the food base than raising the D.O. levels. We'll see if that works for them, then Missouri might try it here. TVA has done extensive research on tailwaters and how to increase D.O. levels. I believe there's one dam using their model and that's Flaming Gorge Reservoir in N.W. Colorado.

One thing that can be done is require S.P.A. to raise their standard D.O. levels from 4 ppm to 6 ppm. They would have to inject more liquid O2 into the incoming flow of water which would cost them more money.

The simple fact is until the powers-that-be decide to spend an awful lot of money to fix the problem, nothing will be done. Considering the financial state of both our state and country, we won't see a fix anytime soon.

Thank You,

Phil Lilley
Lilleys' Landing Resort and Marina
President, Branson Chapter of Trout Unlimited

Hoke, John

From: David Miller [dmiller@bransonmo.gov]
Sent: Friday, September 10, 2010 4:40 PM
To: Hoke, John
Cc: Mike Ray
Subject: Draft Lake Taneycomo Total Maximum Daily Load Public Notice

Mr. Hoke,

It is my understanding that the Water Protection Program has invited comments on the proposed targets for oxygen demand for Lake Taneycomo.

In reviewing the information on the TMDL, I noted with particular concern that it states that "Due to the location and relative size of their discharges, the 41 domestic site specific permits within the Lake Taneycomo watershed are not significantly contributing to the low dissolved oxygen water quality impairment below Table Rock Dam. Because these facilities are not considered to be causing or contributing to the impairment, the wasteload allocation for these permits is set at current permit limits and conditions."

I do not feel that this is accurate and it is unacceptable to the City of Branson.

Since the TMDL states that that permitted discharges are not significantly contributing to low DO, this is a unacceptably stringent restriction on Branson's ability to expand its wastewater treatment plants.

Therefore, the City of Branson is asking that this wasteload allocation cap to be removed from the TMDL and replaced with a more correct and acceptable statement that the impacts of each facility will be considered individually at the time an expansion is proposed. This suggestion is much more reasonable and will allow the City of Branson to work closely with DNR to develop wasteload allocation caps that are appropriate for the situation.

David Miller, P.E.

City Engineer/Director of Public Works

City of Branson

110 W. Maddux – City Hall

Branson, MO 65161

417-337-8559



STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

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

www.dnr.mo.gov

November 8, 2010

Mr. David Miller, P.E.
City Engineer/Director of Public Works
City of Branson
110 West Maddux
Branson, MO 65616

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

Dear Mr. Miller:

The Missouri Department of Natural Resources (Department) appreciates the comments provided by the City of Branson (City) via e-mail on September 10, 2010 regarding the draft Lake Taneycomo Total Maximum Daily Load (TMDL)¹. This letter responds to comments received from the City during the public comment period for this TMDL that ended on September 13, 2010².

As you discussed over the telephone with a member of my staff, Donna Menown, on September 16, 2010, it was not the intention of the TMDL to set caps on permit limits assigned to existing discharge facilities in the Lake Taneycomo watershed. As stated in the draft TMDL, existing facilities do not appear to be causing or contributing to the dissolved oxygen impairment of the lake, and, as a result, no changes are being proposed to permit limits for existing dischargers. The intent of the draft language was to communicate that the wasteload allocations assigned to permits within the watershed are simply those currently found in the existing permits.

Due to the City's comments, the draft language found in Section 6.1.2 (Site Specific Permits – Domestic Wastewater), as well as similar language found in Sections 6.1.1 and 6.1.3 of the draft TMDL, has been revised. Additional clarifying language has been added to Section 6.1 (Wasteload Allocation – Point Source Load) that indicates wasteload allocations listed in the TMDL do not preclude the establishment of future new or expanded sources of oxygen demanding substances in the Lake Taneycomo watershed. This new text also clarifies that any future new or expanded point sources should be evaluated in light of established TMDLs, water quality standards, and the Department's antidegradation rule and implementation procedures.

¹ <http://www.dnr.mo.gov/env/wpp/tmdl/7314-lk-taneycomo-tmdl.pdf>

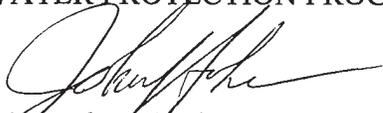
² <http://www.dnr.mo.gov/env/wpp/tmdl/pn-lk-taneycomo.htm>

Mr. David Miller, P.E.
Page Two

Thank you for your comments and interest in protecting the quality of Missouri's waters. The incorporation of revisions based on your comments has made the document a more technically accurate portrayal of the current situation. 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

A handwritten signature in black ink, appearing to read "John Hoke", written over the printed name below.

John Hoke, Chief
TMDL Unit

JH:dml

c: Mr. Michael Ray, City of Branson, Utilities Director



MISSOURI DEPARTMENT OF CONSERVATION

Headquarters

2901 West Truman Boulevard, P.O. Box 180, Jefferson City, Missouri 65102-0180
Telephone: (573) 751-4115 ▲ www.MissouriConservation.org

ROBERT L. ZIEHMER, Director

September 13, 2010

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

Attn: John Hoke

Dear John:

Thanks for the opportunity to comment on the draft TMDL for Lake Taneycomo. Several of MDC's staff familiar with Lake Taneycomo have reviewed and their comments are provided below.

General comments:

Lake Taneycomo is a nationally recognized trout fishery. Generally, from July through December, chronically low dissolved oxygen (DO) levels in Lake Taneycomo due to hypolimnetic releases from Table Rock Dam limit the potential of this resource.

The principal cause of the DO problem in Lake Taneycomo is stratification of the reservoir and the resulting depletion of DO in the hypolimnion. This condition is typical in large midwestern reservoirs and is a widely recognized factor in the release of oxygen depleted waters into tailwaters below large dams. The Missouri Department of Conservation (MDC) acknowledges the role that watershed health may have in contributing to this problem. MDC currently has programs in place to improve watershed health in watersheds throughout the state, including the Table Rock Lake watershed. MDC has provided technical expertise and funding to landowners, partner agencies and non-governmental organizations to reduce nutrient inputs, reduce sedimentation and improve riparian conditions in Table Rock Lake watershed. While this is important work, improving watershed health will not appreciably contribute to improving DO in the hypolimnion of Table Rock Lake and, therefore, will not raise DO levels in Lake Taneycomo to prescribed standards.

As described in the draft TMDL, some improvements in Lake Taneycomo DO have been realized through a combination of operational modifications, such as load spreading, and structural modifications such as turbine venting and liquid

COMMISSION

DON C. BEDELL
Sikeston

DON R. JOHNSON
Festus

CHIP MCGEEHAN
Marshfield

BECKY L. PLATTNER
Grand Pass

oxygen injection. Additional measures are necessary for DO to improve to prescribed levels. These measures should be directed toward improved turbine technologies (i.e., pursuing replacement of the original, main turbines with new, technologically advanced turbines designed to enhance dissolved oxygen uptake), taking advantage of proven technologies to enhance dissolved oxygen at the point of intake in Table Rock Lake (e.g., forebay diffuser installation) and improving dissolved oxygen concentrations in flows from the house turbines by either adding liquid oxygen injection capability to their penstocks or installing new, more advanced turbines. To fully address habitat limitations in the upper reaches of Lake Taneycomo, efforts to enhance DO levels should be coupled with enhanced ecological flows.

Specific comments:

- Page 8 – Shepherd of the Hills Hatchery is the source of the trout stocked into Lake Taneycomo. The trout, however, are stocked in lower segments of the lake, not where the hatchery is located.
- Page 22- Change “Beanch” to “Beach”
- In Appendix B, under general permits, Permit Number MOG130009 for Shepherd of the Hills Hatchery for 15.1 mgd is correct. In Table 3 of Appendix C, however, Permit Number MO0097373 is incorrectly attributed to Shepherd of the Hills Fish Hatchery and incorrectly adds one mgd to the design flow of the hatchery.

MDC has and will continue to participate in efforts to identify the most effective, feasible solution to the DO problem at Lake Taneycomo. We appreciate the opportunity to provide comment on the draft TMDL for Lake Taneycomo.

We are submitting a copy of this letter by e-mail and will follow with a hard copy by regular post.

Sincerely,



Michael J. McKee, Ph. D.
Resource Scientist
Resource Science Center
Missouri Department of Conservation

Cc: Karen Bataille, MDC
Andy Austin, MDC
Doyle Brown, MDC
Brian Canaday, MDC
Chris Vitello, MDC



STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

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

www.dnr.mo.gov

November 9, 2010

Dr. Michael J. McKee
Missouri Department of Conservation
Resource Science Center
1110 South College Avenue
Columbia, MO 65201

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

Dear Dr. McKee:

The Missouri Department of Natural Resources (Department) appreciates the September 13, 2010 comments provided by the Missouri Department of Conservation (MDC) via email and letter on the draft Lake Taneycomo Total Maximum Daily Load (TMDL)¹. This letter responds to comments received from MDC during the public comment period for this TMDL that ended on September 13, 2010². Please find herein the Department's response to each comment and the location of the revision (if applicable) within the final document as it will be submitted to the U.S. Environmental Protection Agency (EPA).

The Department appreciates the attention and dedication of MDC staff to review and provide comments on the technical and historical aspects of the draft TMDL document prior to public notice. The Department also appreciates the general comments and recommendations provided by MDC in its September 13, 2010 comment letter. Below are responses to specific comments included in that letter:

1) Page 8 - Shepherd of the Hills Hatchery is the source of the trout stocked into Lake Taneycomo. The trout, however, are stocked in lower segments of the lake, not where the hatchery is located.

The referenced sentence from Section 2.1 of the draft document has been revised to clarify where stocking of trout occurs.

¹ <http://www.dnr.mo.gov/env/wpp/tmdl/7314-lk-taneycomo-tmdl.pdf>

² <http://www.dnr.mo.gov/env/wpp/tmdl/pn-lk-taneycomo.htm>

Dr. Michael J. McKee
Page Two

2) Page 22 - Change "Beanch" to "Beach."

The spelling of "Beach" in Section 4.2 of the document has been corrected.

3) In Appendix B, under general permits, Permit Number MOG130009 for Shepherd of the Hills Hatchery for 15.1 mgd is correct. In Table 3 of Appendix C, however, Permit Number MO0097373 is incorrectly attributed to Shepherd of the Hills Fish Hatchery and incorrectly adds one mgd to the design flow of the hatchery.

As you are probably aware, the Missouri State Operating Permit (MSOP) for the Shepherd of the Hills Hatchery (MO-0002020) expired August 21, 2008. The expired site-specific permit was replaced on December 19, 2008 by a newly available General Permit (GP) for cold water hatcheries. The new GP for the Shepherd of the Hills Hatchery facility (MO-G130009) does not include a specific list of outfall design flows as did the former, site-specific permit. Rather than use actual reported flows from discharge monitoring reports in the water quality model (as provided in Appendix C, Table 3), the combined design flow (16.1 MGD) for all four outfalls listed in the hatchery's former site-specific permit, MO-0002020, was used. This ensures that the water quality model was run under appropriate critical conditions, where flow from the hatchery is represented by the maximum potential flow from the facility. Additional clarification has been added to Table 3 of Appendix C.

Regarding Shepherd of the Hills Amusement Park (MO-0097373), the MSOP for this facility was wrongly listed as issued to MDC, Shepherd of the Hills Hatchery and has been removed from Table 3 of Appendix C.

Thank you again for your comments and interest in protecting the quality of Missouri's waters. MDC's review and suggested revisions have made the TMDL document a more technically accurate portrayal of the history behind the issue. If you have questions or would like to discuss this TMDL further, please contact me at (573) 526-1446, 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

RECEIVED

2010 SEP 15 PM 12:47

WATER PROTECTION PROGRAM
rec. via e-mail 9/13/10



September 13, 2010

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

RE: Lake Taneycomo Total Maximum Daily Load (TMDL) Comment

Dear Mr. Hoke:

We have reviewed the Draft TMDL proposed for Lake Taneycomo and have the following comment:

Section 6.1.2 states, *"Due to the location and relative size of their discharges, the 41 domestic site specific permits within the Lake Taneycomo watershed are not significantly contributing to the low dissolved oxygen water quality impairment below Table Rock Dam. Because these facilities are not considered to be causing or contributing to the impairment, the wasteload allocation for these permits is set at current permit limits and conditions."*

The City does not agree that capping the waste load allocations of existing facilities is an appropriate step to take at this time and requests flexibility in the implementation of the TMDL as it relates to domestic site specific permits, including the City of Hollister's WWTP.

A precedent for type of flexibility can be found in the TMDL issued by EPA in 2006 for Big Creek located in Henry, Johnson, Jackson and Cass Counties. In this TMDL issued for sediment pollution, it was stated in Section 7 that, *"point sources do not contribute to water quality impairment relative to sediment impacts on stream biology."* This is similar to the finding that point sources are not significant contributors to low dissolved oxygen in Lake Taneycomo. The Big Creek TMDL then went on to state, *"The WLAs listed in this TMDL do not preclude the establishment of future point sources of sediment loading in the watershed. Any future point sources should be evaluated in light of the TMDL established and the range of flows into which any additional load will impact."* The City requests that similar provisions be made in the Lake Taneycomo TMDL that would allow for case by case consideration of permit limits for new or expanded facilities.

Thank you for your consideration of our comments. We would be willing to meet with Department staff to discuss this matter further. Feel free to contact me to set up a meeting.

Respectfully,

CITY OF HOLLISTER


Rick Ziegenfuss
City Administrator



STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

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

www.dnr.mo.gov

November 8, 2010

Mr. Rick Ziegenfuss, City Administrator
City of Hollister
P.O. Box 638
Hollister, MO 65673

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

Dear Mr. Ziegenfuss:

The Missouri Department of Natural Resources (Department) appreciates the comments provided by the City of Hollister (City) via e-mail on September 13, 2010 regarding the draft Lake Taneycomo Total Maximum Daily Load (TMDL)¹. This letter responds to comments received from the City during the public comment period for this TMDL that ended on September 13, 2010².

As you discussed over the telephone with a member of my staff, Donna Menown, on September 16, 2010, it was not the intention of the TMDL to set caps on permit limits assigned to existing discharge facilities in the Lake Taneycomo watershed. As stated in the draft TMDL, existing facilities do not appear to be causing or contributing to the dissolved oxygen impairment of the lake, and, as a result, no changes are being proposed to permit limits for existing dischargers. The intent of the draft language was to communicate that the wasteload allocations assigned to permits within the watershed are simply those currently found in the existing permits.

Due to the City's comments, the draft language found in Section 6.1.2 (Site Specific Permits – Domestic Wastewater), as well as similar language found in Sections 6.1.1 and 6.1.3 of the draft TMDL, has been revised. Additional clarifying language has been added to Section 6.1 (Wasteload Allocation – Point Source Load) that indicates wasteload allocations listed in the TMDL do not preclude the establishment of future new or expanded sources of oxygen demanding substances in the Lake Taneycomo watershed. This new text also clarifies that any future new or expanded point sources should be evaluated in light of established TMDLs, water quality standards, and the Department's antidegradation rule and implementation procedures.

¹ <http://www.dnr.mo.gov/env/wpp/tmdl/7314-lk-taneycomo-tmdl.pdf>

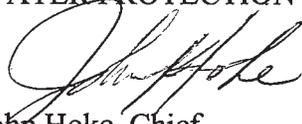
² <http://www.dnr.mo.gov/env/wpp/tmdl/pn-lk-taneycomo.htm>

Mr. Rick Ziegenfuss
Page Two

Thank you for your comments and interest in protecting the quality of Missouri's waters. The incorporation of revisions based on your comments has made the document a more technically accurate portrayal of the current situation. 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

A handwritten signature in cursive script, appearing to read "John Hoke".

John Hoke, Chief
TMDL Unit

JH:dml



DEPARTMENT OF THE ARMY
LITTLE ROCK DISTRICT CORPS OF ENGINEERS
POST OFFICE BOX 867
LITTLE ROCK, ARKANSAS 72203-0867

(501) 324-5751 □ FAX: 501-324-5605 □ <http://www.swl.usace.army.mil>

RECEIVED
via e-mail
SEP 13 2010

WATER PROTECTION PROGRAM

September 10, 2010

Missouri Department of Natural Resources
Water Protection Program
Water Quality Monitoring and Assessment Section
P.O. Box 176
Jefferson City, MO 65101

This letter and attachment is to serve as comment to the Missouri Department of Natural Resources recent public review period of the Draft Lake Taneycomo Total Maximum Daily Load (TMDL). The Little Rock District Corps of Engineers (SWL) appreciates this opportunity for comment and the previous cooperative efforts our agencies have undertaken in regard to this low dissolved oxygen issue. SWL also recognizes the thorough and accurate history and explanation of the low dissolved oxygen issue that affects all of the large reservoirs of the White River system presented in the TMDL.

The SWL is responsible for the operation and maintenance of Table Rock Lake. This multi-purpose reservoir was constructed in the upper White River Basin for flood control and hydropower generation. The power generated at the project is marketed by the Southwestern Power Administration, as provided by the Flood Control Act of 1941 and in addition to the flood control and hydropower benefit, Table Rock also has contributed largely to the economic and recreation benefits of the region. SWL contends it is relevant to acknowledge that while observing the original purpose of the reservoirs, the tailwater currently supports a high quality trout fishery under current operations.

The Draft TMDL identifies impairment of Protection of Warm Water Aquatic Life and Cold Water Fishery uses below the project with the cause as low levels of Dissolved Oxygen (DO) and the source as Table Rock Dam. SWL concurs that the low dissolved oxygen concentration in the hypolimnion is conveyed to Lake Taneycomo during generating and non-generating periods and is due to the natural and unavoidable condition that occurs in the hypolimnion of lakes. Unfortunately, the Missouri Water Quality Standard for dissolved oxygen in Cold Water Fisheries of 6 milligrams per liter (mg/L) or parts per million is often not met during the low DO season of summer and autumn. The action of water conveyance from the reservoir to tailwater whether during periods of power generation or not, does not in and of itself result in the decrease in DO levels. This decrease in DO levels is a function of the low DO levels found in the hypolimnion of the reservoir. Without this cold water release, the critical temperature necessary for trout species survival could not be met on a "year round" basis.

SWL appreciates the efforts made within Table Rock watershed to reduce negative influence of excessive nutrient loading on water quality in Lake Taneycomo and Table Rock Lake, as well as specific restrictions on phosphorus in effluent from point sources in the two watersheds. The numerous voluntary, grass root efforts to address nonpoint sources of nutrients

and other dissolved oxygen-influencing pollutants in the Table Rock Lake watershed show the public concern for the water quality of the water bodies.

SWL is committed to the highest water quality in the reservoir and tail waters of all of its projects and recognizes the economical and ecological benefits of the trout fisheries to the State of Missouri. The District has been working with numerous partners, including the White River Dissolved Oxygen Committee to minimize the DO problem since the early 1990s through various structural and operation modifications. Numerous project modifications and, the development of an Operational Action Plan for Low Dissolved Oxygen Season, are some of measures that SWL has implemented to maintain and improve the high quality of water and fisheries associated with our projects. While a long-term permanent solution has not been adopted, incremental progress has been achieved in an effort to protect the trout fishery downstream of Table Rock Dam.

Considering the natural process of stratification in the large reservoirs, the influence of watershed runoff, and the nature of the largely non-regulated non point source pollution programs, SWL would also acknowledge that the consideration of revision or tailwater exemption of 6 mg/L state water quality standard or designated use may be warranted to reflect the reasonable and prudent dissolved oxygen conditions in the tail water reaches.

We look forward to actively working with your organization to preserve the high quality water sources and fisheries that are currently maintained in the State. If you have any questions regarding this letter, the point of contact for this action is Mr. Mike Rodgers, at 501-324-5030.

Sincerely



for Patricia Anslow
Chief, Planning and Environmental Division

Enclosure

September 10, 2010 Review Comments on Proposed Total Maximum Daily Load (TMDL) for Lake Taneycomo in Taney County, Missouri

1. In the next to the last paragraph in section 3.1.2, it is stated “The higher than normal water levels at Table Rock Lake, and the release of warm water through the flood gates during the late summer and fall, created very poor water quality conditions and the early onset of the low dissolved oxygen season in Lake Taneycomo.” It should be noted here that the rise into the flood storage zone at Table Rock Lake in early to mid September required flood releases that exceeded the maximum recommended generation rate. The combination of spillway and turbine releases that was made moved downstream and mixed, and an improvement in the dissolved oxygen was observed at the College of the Ozarks monitoring site, and adequate water temperatures were maintained.
2. Section 10.2.1.5, last paragraph: “At the time this TMDL was written, the USACE had plans to hook the two house units up to the power grid.” SWL request the statement be removed, because while this is technically true there will not be sufficient transformer capacity to tie both house units to the grid and deliver power. The purpose of the connection is to provide backup power when one of the house units is removed from service for major/long term maintenance activities. The comment should be removed from the TMDL because it is not sufficiently explained or understood.
3. Section 11. Summary and Introduction to Future Implementation of this TMDL, last paragraph states: “Rather than continuing to put funds into additional studies, it is recommended those funds be put toward implementing already-identified solutions.” In addition, Section 12. Implementation: Future Recommendations, in first paragraph it states “However, a combination of structural and operational actions (as detailed in Section 10), with due regard for water supply demands, are needed to ensure that Table Rock Dam’s discharge more consistently reaches DO levels of 6 mg/L during the low DO season.” The report recognizes that 6 mg/l 100% of the time is likely not possible, and as such, consideration of changing the designated use and/or state water standard may be necessary to reflect the reasonable and prudent DO conditions in the tailwater.
4. Section 3.2 Influences from Point and Nonpoint Source Pollution. The USACE feels it would be appropriate to add current regulation language from the Federal Register / Vol. 73, No. 115 / Friday, June 13, 2008 / Rules and Regulations National Pollutant Discharge Elimination System (NPDES) Water Transfers Rule and is consistent with the *State of Missouri ex rel. Ashcroft v. Dept. of the Army* case findings in 1982. This would show conveyance that remains within the same water body of the U.S. is not a point source subject to NPDES permitting and the water on both sides of a dam is part of the same water of the U.S.



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

DEPARTMENT OF NATURAL RESOURCES

www.dnr.mo.gov

November 17, 2010

CERTIFIED MAIL #7007 3020 0002 9079 6529
RETURN RECEIPT REQUESTED

Ms. Patricia Anslow, Chief
Planning and Engineering Division
U.S. Department of the Army
Little Rock District Corps of Engineers
P.O. Box 867
Little Rock, AR 72203-0867

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

Dear Ms. Anslow:

As indicated in a letter to you dated November 12, 2010, the Missouri Department of Natural Resources (Department) appreciates the comments provided by the Little Rock District Corps of Engineers (SWL) via email and letter on the draft Lake Taneycomo Total Maximum Daily Load (TMDL). Since we sent you the first response letter, we identified two important typographic errors that we have corrected and included in this version of the response letter. Please discard the earlier response and accept this one in its place. Specifically, the first revision is in our response to your Comment #3, first paragraph, second sentence, second parenthetical example, in which we have replaced the words "penstock injection" with "forebay diffusion" and underlined the two new words to indicate the exact location of the change. The second revision involves the last paragraph of Comment #3 where we have added additional clarification that the cold-water fishery use is being met much of the year, especially outside of the low dissolved oxygen season, and that conditions have improved over time. Additional discussion has also been added pertaining to modification of designated beneficial uses. Other than these revisions, everything else in the letter (excluding this first paragraph) remains unchanged from the one sent to you dated November 12, 2010. We apologize for any inconvenience associated with this substitution. In summary, this letter replaces the one dated November 12, 2010, and responds to your comments received September 13, 2010 during the public comment period for the Lake Taneycomo TMDL. This letter includes the Department's responses to each comment and the location of the revision (if applicable) within the final TMDL document as it was submitted to the U.S. Environmental Protection Agency (EPA) on November 15, 2010.

The Department appreciates the attention and dedication of SWL 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 Mr. Stanley Jones, Superintendent of the Table Rock Dam facility. Contributions from Mr. Jones made the draft TMDL placed on public notice a more thorough and accurate document. The Department also appreciates and acknowledges the efforts and participation of SWL on the White River Dissolved Oxygen Committee and its development of an "Operational Action Plan for Low

Dissolved Oxygen Season” for 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. Below are responses to specific comments provided by SWL in its September 10, 2010 comment letter.

Comment #1 – *In the next to the last paragraph in section 3.1.2, it is stated "The higher than normal water levels at Table Rock Lake, and the release of warm water through the flood gates during the late summer and fall, created very poor water quality conditions and the early onset of the low dissolved oxygen season in Lake Taneycomo." It should be noted here that the rise into the flood storage zone at Table Rock Lake in early to mid September required flood releases that exceeded the maximum recommended generation rate. The combination of spillway and turbine releases that was made moved downstream and mixed, and an improvement in the dissolved oxygen was observed at the College of the Ozarks monitoring site, and adequate water temperatures were maintained.*

A statement has been added to Section 3.1.2. of the TMDL document that indicates water level rise into the flood storage zone of Table Rock Lake in early to mid September 2008 required flood releases that exceeded the maximum generation rate. While it is true that spillway and turbine releases allowed for improvement of dissolved oxygen conditions at the College of the Ozarks monitoring site relative to that below Table Rock Dam, dissolved oxygen concentrations at the College of the Ozarks site were still below the applicable minimum water quality criterion of 6 mg/L during September 2008.

Comment #2 – *Section 10.2.1.5, last paragraph: "At the time this TMDL was written, the USACE had plans to hook the two house units up to the power grid." SWL request the statement be removed, because while this is technically true there will not be sufficient transformer capacity to tie both house units to the grid and deliver power. The purpose of the connection is to provide backup power when one of the house units is removed from service for major/long term maintenance activities. The comment should be removed from the TMDL because it is not sufficiently explained or understood.*

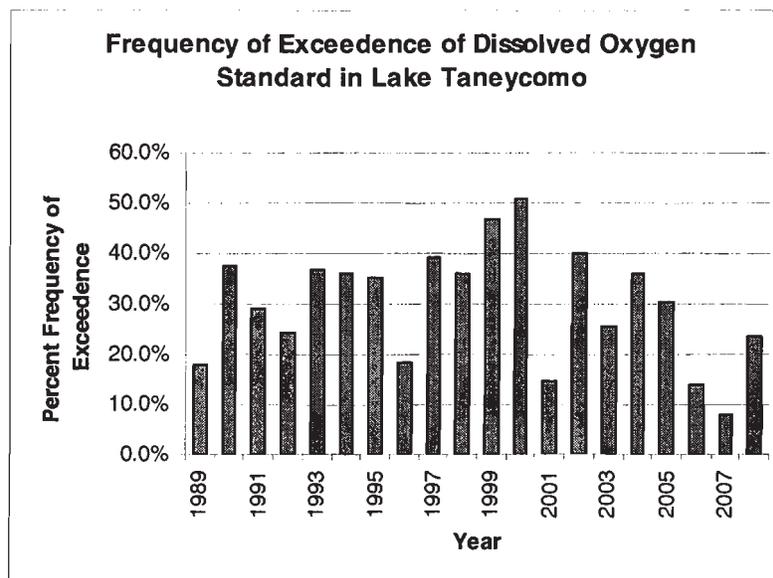
The last paragraph of Section 10.2.1.5 has been removed from the TMDL. Additional language has been added to Section 2.2, “Table Rock Dam,” to clarify that the house turbines serve to back each other up, and that the dam is considered to be in emergency mode if there is no readily available back-up power source for the running house unit.

Comment #3 – *Section 11. Summary and Introduction to Future Implementation of this TMDL, last paragraph states: "Rather than continuing to put funds into additional studies, it is recommended those funds be put toward implementing already-identified solutions." In addition, Section 12. Implementation: Future Recommendations, in first paragraph it states "However, a combination of structural and operational actions (as detailed in Section 10), with due regard for water supply demands, are needed to ensure that Table Rock Dam's discharge more consistently reaches DO levels of 6 mg/L during the low DO season." The report recognizes that 6 mg/l 100% of the time is likely not possible, and as such, consideration of changing the designated use and/or state water standard may be necessary to reflect the reasonable and prudent DO conditions in the tailwater.*

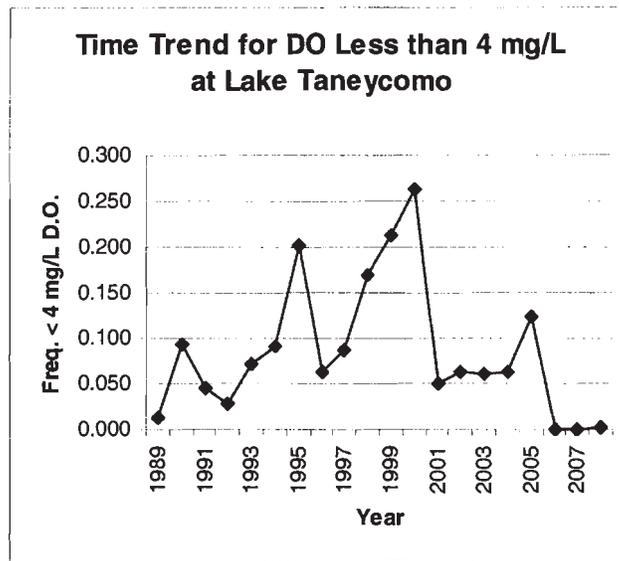
The draft Lake Taneycomo TMDL describes in detail that achieving the 6 mg/L minimum dissolved oxygen criterion is technically feasible using currently identified technology and operational practices. While some options or methods may be impractical when implemented in isolation (e.g., penstock injection), 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 Listing Methodology document 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).

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 SWL and Southwestern Power Administration implement technologies and practices to improve dissolved oxygen in Table Rock Dam's tailwater.



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



Source: MDNR, 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 SWL 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.

Comment #4 – Section 3.2 Influences from Point and Nonpoint Source Pollution. The USACE feels it would be appropriate to add current regulation language from the Federal Register / Vol. 73, No. 115 /Friday, June 13, 2008 / Rules and Regulations National Pollutant Discharge Elimination System (NPDES) Water Transfers Rule and is consistent with the State of Missouri ex rel. Ashcroft v. Dept. of the Army case findings in 1982. This would show conveyance that remains within the same water body of the U.S. is not a point source subject to NPDES permitting and the water on both sides of a dam is part of the same water of the U.S.

The Department appreciates the reference provided by SWL to the EPA “National Pollutant Discharge Elimination System (NPDES) Water Transfers Rule”. A copy of the rule has been added to the Lake Taneycomo TMDL administrative record. However, reference to this rule has not been added to the TMDL document due to pending Department legal review as to its applicability in this instance.

It should be noted, however, that the water bodies on either side of Table Rock Dam are not the same water of the state. Table Rock Lake and Lake Taneycomo are different water body segments with unique designated beneficial uses and criteria that apply. Table Rock Lake is

Ms. Patricia Anslow
Page Five

designated as a warm water fishery [10 CSR 20-7.031, Table G] and must achieve a minimum dissolved oxygen criterion of 5 mg/L. Lake Taneycomo is designated as a cold-water fishery [10 CSR 20-7.031, Table C] and must achieve a minimum dissolved oxygen criterion of 6 mg/L. Lake Taneycomo is also designated in state rule as a drinking water supply.

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.

Sincerely,

WATER PROTECTION PROGRAM

A handwritten signature in black ink, appearing to read "John Hoke", written over a horizontal line.

John Hoke, Chief
TMDL Unit

JH:dml

Hoke, John

From: Loretta Bishop [lbishop@bransonmo.gov]
Sent: Monday, September 13, 2010 4:50 PM
To: Hoke, John
Subject: TMDL/Taneycomo
Attachments: 2010 Lake Taneycomo TMDL comment 091310.docx

Dear Mr. Hoke: We would like to make comment regarding the TMDL on Lake Taneycomo. Please see the attached letter. If you have any questions please contact me at 417-243-2740. Thank you, Mike Ray.

September 13, 2010

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

RE: Lake Taneycomo - Total Maximum Daily Load (TMDL) Comment

Dear Mr. Hoke:

We have reviewed the Draft TMDL proposed for Lake Taneycomo and have the following comment:

Section 6.1.2 states, "Due to the location and relative size of their discharges, the 41 domestic site specific permits within the Lake Taneycomo watershed are not significantly contributing to the low dissolved oxygen water quality impairment below Table Rock Dam. Because these facilities are not considered to be causing or contributing to the impairment, the wasteload allocation for these permits is set at current permit limits and conditions."

The City does not agree that capping the waste load allocations of existing facilities is an appropriate step to take at this time and requests flexibility in the implementation of the TMDL as it relates to domestic site specific permits, including the City of Branson's two WWTPs.

A precedent for type of flexibility can be found in the TMDL issued by EPA in 2006 for Big Creek located in Henry, Johnson, Jackson and Cass Counties. In this TMDL issued for sediment pollution, it was stated in Section 7 that, *"point sources do not contribute to water quality impairment relative to sediment impacts on stream biology."* This is similar to the finding that point sources are not significant contributors to low dissolved oxygen in Lake Taneycomo. The Big Creek TMDL then went on to state, *"The WLAs listed in this TMDL do not preclude the establishment of future point sources of sediment loading in the watershed. Any future point sources should be evaluated in light of the TMDL established and the range of flows into which any additional load will impact."* The City requests that similar provisions be made in the Lake Taneycomo TMDL that would allow for case by case consideration of permit limits for new or expanded facilities.

Thank you for your consideration of our comments. We would be willing to meet with Department staff to discuss this matter further. Feel free to contact me to set up a meeting.

Sincerely,

Michael Ray
City of Branson
Utilities Director



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

DEPARTMENT OF NATURAL RESOURCES

www.dnr.mo.gov

November 8, 2010

Mr. Michael Ray
Utilities Director
City of Branson
110 West Maddux
Branson, MO 65616

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

Dear Mr. Ray:

The Missouri Department of Natural Resources (Department) appreciates the comments provided by the City of Branson (City) via e-mail on September 13, 2010 regarding the draft Lake Taneycomo Total Maximum Daily Load (TMDL)¹. This letter responds to comments received from the City during the public comment period for this TMDL that ended on September 13, 2010².

As your City Engineer, David Miller, discussed over the telephone with a member of my staff, Donna Menown, on September 16, 2010, it was not the intention of the TMDL to set caps on permit limits assigned to existing discharge facilities in the Lake Taneycomo watershed. As stated in the draft TMDL, existing facilities do not appear to be causing or contributing to the dissolved oxygen impairment of the lake, and, as a result, no changes are being proposed to permit limits for existing dischargers. The intent of the draft language was to communicate that the wasteload allocations assigned to permits within the watershed are simply those currently found in the existing permits.

Due to the City's comments, the draft language found in Section 6.1.2 (Site Specific Permits – Domestic Wastewater), as well as similar language found in Sections 6.1.1 and 6.1.3 of the draft TMDL, has been revised. Additional clarifying language has been added to Section 6.1 (Wasteload Allocation – Point Source Load) that indicates wasteload allocations listed in the TMDL do not preclude the establishment of future new or expanded sources of oxygen demanding substances in the Lake Taneycomo watershed. This new text also clarifies that any future new or expanded point sources should be evaluated in light of established TMDLs, water quality standards, and the Department's antidegradation rule and implementation procedures.

¹ <http://www.dnr.mo.gov/env/wpp/tmdl/7314-lk-taneycomo-tmdl.pdf>

² <http://www.dnr.mo.gov/env/wpp/tmdl/pn-lk-taneycomo.htm>

Mr. Michael Ray
Page Two

Thank you for your comments and interest in protecting the quality of Missouri's waters. The incorporation of revisions based on your comments has made the document a more technically accurate portrayal of the current situation. 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,

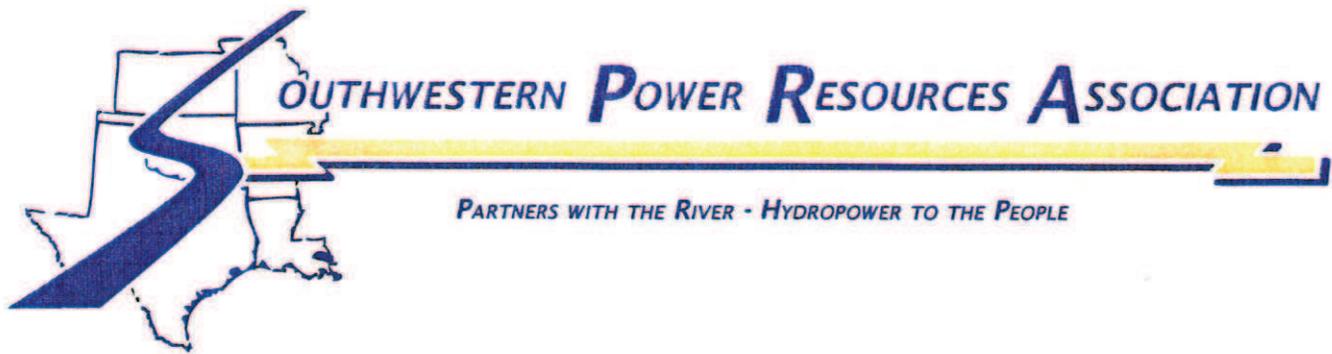
WATER PROTECTION PROGRAM

A handwritten signature in black ink, appearing to read "John Hoke", written over a horizontal line.

John Hoke, Chief
TMDL Unit

JH:dml

c: Mr. David Miller, Branson City Engineer/Director of Public Works



September 13, 2010

Mr. 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

RE: Draft Total Maximum Daily Load for Lake Taneycomo

Dear Mr. Hoke:

Southwestern Power Resources Association (SPRA) represents the rural electric cooperatives, municipally owned electric utilities, and state power agencies and authorities that purchase the hydroelectric energy and capacity generated at 24 Corps of Engineers (Corps) dams in this region. This energy and capacity is marketed to SPRA members by Southwestern Power Administration (SWPA), an agency of the U.S. Department of Energy. One of the sources of our hydroelectric power is the Table Rock Lake project, immediately upstream from Lake Taneycomo. Consequently, we have an interest in the Draft Total Maximum Daily Load for Lake Taneycomo (Draft TMDL), particularly since the report identifies Table Rock Dam as the source of low dissolved oxygen (DO) impairment in Lake Taneycomo.

We have read SWPA's comments on the Draft TMDL and agree with them in their entirety. However, we would like to expound upon the following points:

Inclusion of minimum flow recommendations for Table Rock Dam is inappropriate in the Draft TMDL

Accomplishment of minimum flow releases from Table Rock Dam should not be an objective of the Draft TMDL. Rather, the objective of the document should be identifying cost-effective ways to achieve the established DO standard. Using the Draft TMDL as a shill for obtaining minimum flow releases from Table Rock Dam is both gratuitous and despicable for the following reasons:

- Although the Draft TMDL cites authorization for minimum flow releases from Table Rock Dam in the Water Resources Development Acts of 1999 and 2000, the report later notes that the authorization specific to Table Rock Dam was repealed by the FY 2006 Energy and Water Development Appropriations Act.
- Storage dedicated to minimum flow releases would have to be provided in Table Rock Lake and paid for by a project sponsor. Because all storage in the lake is already allocated, this storage would have to be taken from some other purpose – hydropower, water supply or flood control.
- The Draft TMDL does not estimate the cost of storage, does not identify a sponsor willing to pay for the storage (which would include the cost of lost hydropower, water supply or flood control benefits), nor does it investigate the financial feasibility of such an undertaking. But the Corps of Engineers has. As the Draft TMDL admits, “Table Rock Dam had the lowest Benefit-Cost Ratio of the five White River reservoirs considered for minimum flows and the USACE determined that it was not economically feasible.”¹
- The objective of minimum flow releases is to improve trout habitat and thus improve recreational fishing, not to improve DO. This habitat improvement is achieved primarily by “enhanc[ing] wetted habitat in the Table Rock Dam tailwater.”² As the Draft TMDL goes on to note, “The latter [increasing wetted habitat] is a bonus to the cold-water fishery, over and above DO improvements.”³

The Draft TMDL should restrict its recommendations to cost-feasible actions that are directly linked to improving DO releases from Table Rock Lake. The report’s recommendation “that the involved state agencies (Department of Natural Resources and Department of Conservation) initiate discussions with the goal of examining the pros and cons of suggested minimum flow options at Table Rock Dam...”⁴ is totally inappropriate in this document. All discussions of minimum flow releases should be removed from the final TMDL.

More Attention Should be Paid to Nonpoint Sources in Table Rock Watershed

While the Draft TMDL wastes time and resources flacking for minimum flow releases, it gives short shrift to consideration of nonpoint source controls in the Table Rock Lake watershed. The report asserts that “the addition of nutrients and oxygen-demanding substances from anthropogenic sources in the watershed may not have appreciable effects on the size of the hypolimnion, the duration of the low DO season in Table Rock

¹ Draft TMDL, p. 46.

² *Ibid.*, p, 54

³ *Ibid.*

⁴ *Ibid.*

Lake, or dissolved oxygen concentrations in Lake Taneycomo.”⁵ However, the modeling used to support this assertion (found in Appendix C) deals only with conditions in the Lake Taneycomo watershed, not the Table Rock Lake watershed.

Indeed, the Draft TMDL recognizes that “Two of the most important nonpoint source-related issues in the Table Rock Lake and Lake Taneycomo watersheds are onsite wastewater treatment systems [septic systems] and riparian zones [streamside contamination].” It quotes EPA statistics that the failure rate of onsite wastewater treatment systems in Missouri is 30 to 50 percent, adding, “Although the exact number of onsite wastewater treatment systems in the Table Rock Lake and Lake Taneycomo watersheds is unknown, much of the area has yet to be serviced by consolidated wastewater conveyance systems and treatment facilities despite expansion of urban areas in the past three decades.”⁶ Simply put, there is a problem, and it is growing.

But the Draft TMDL largely ignores the nonpoint sources of nutrient loading in the Table Rock Lake watershed. Why? Because it is solely focused on the DO levels of the releases from Table Rock Dam, and confines its investigation of point and nonpoint sources to the watershed of Lake Taneycomo, to the exclusion of the nonpoint sources in the Table Rock Lake watershed.

“Dissolved oxygen modeling ... confirmed that hypolimnetic waters low in dissolved oxygen, and not nutrients from the Table Rock Lake and Lake Taneycomo watersheds, are the source of the Missouri 303(d) listed low DO impairments,” the Draft TMDL concludes.⁷ SPRA does not disagree with that statement. But reducing nonpoint sources in the Table Rock Lake watershed would reduce nutrient loading and oxygen demand in Table Rock Lake, leading to improved DO uptake in releases from Table Rock Dam, thus improving DO levels in upper Lake Taneycomo. Even the draft TMDL supports our conclusion:

- “Best management practices that include preservation and/or re-establishment of healthy riparian corridors could contribute to improved dissolved oxygen in tributaries of both Table Rock Lake and Lake Taneycomo.”⁸
- “If best management practices are not voluntarily adopted to control nonpoint sources of pollution, contributions of nutrients and oxygen-demanding substances from storm water runoff and other sources are likely to increase.”⁹

⁵ *Ibid.*, p. 21.

⁶ *Ibid.*, p. 20.

⁷ *Ibid.*, p. 50.

⁸ *Ibid.*, p. 21.

⁹ *Ibid.*

- [A]ny point or nonpoint source nutrient contributions to both Table Rock Lake and Lake Taneycomo should be moderated... [A] broad-scale nutrient reduction effort aimed at streams ... can positively impact reservoir water quality. These types of efforts should continue in the two watersheds.”¹⁰
- “If the amount of incoming organic material can be reduced through best management practices (BMPs) in the upper watershed, the impact on DO within Table Rock Lake, and hopefully in the water released to Lake Taneycomo, should be positive.”¹¹

The last quote serves as the basis for SPRA’s recommendation that the Draft TMDL be withdrawn and rewritten after the Draft TMDL is prepared for Table Rock Lake. After all, the Table Rock Lake TMDL should more thoroughly identify point and nonpoint sources for nutrients and oxygen-demanding substances affecting the DO levels in that lake and should quantify the improvements possible in DO levels of Table Rock Dam releases that could be achieved with improved regulation of point sources and implementation of BMPs for nonpoint sources in the Table Rock watershed.

General Comments

SPRA provides the following general comments:

- The Draft TMDL provides several alternatives for future implementation to achieve the DO standard in Lake Taneycomo. However, the report provides no substantive analysis of the cost-effectives of each alternative. Before implementation of any of the recommendations, such an analysis should be performed, and only those alternatives that are cost-effective and that specifically address the low-DO situation in Lake Taneycomo should be implemented.
- The Draft TMDL should identify environmental impacts associated with delivery of up to four semi-tractor trailer loads of liquid oxygen (LOX) daily required to support a forebay oxygen diffuser system. The report should also examine any dangers associated with transmitting the liquid oxygen from the proposed 22,000 gallon, 104-ton capacity LOX tank to a forebay diffuser. Although LOX is already stored on site and delivered to the penstocks, the forebay diffuser envisioned would be on an order of magnitude from existing LOX deliveries, storage and transmission.

¹⁰ *Ibid.*, p. 51.

¹¹ *Ibid.*, p. 52.

- If and when it is cost-effective to replace the existing main turbine-generator units at the dam, SPRA supports selection of the most up-to-date technology that maximizes capacity and energy production while minimizing environmental impacts at a reasonable cost. However, SPRA opposes and objects to any recommendation to redesign the main turbines to provide minimum flow releases for the reasons cited earlier in our comments.
- Likewise, SPRA supports replacement of the house generation units with state-of-the-art technology that minimizes environmental impacts at reasonable costs if and when such replacement is cost-effective. Again, however, SPRA objects to sizing the units to meet the proposed minimum flow requirements and selling energy excess to the project's needs on the grid. As noted before, achieving minimum flow releases should not be an objective of this draft TMDL. Also, as the report acknowledges, minimum flow releases off-peak would reduce the value of the energy provided, while use of the stored water off-peak for this purpose would reduce the energy available on peak.

Recommendations

- All references to minimum flow releases from Table Rock Dam, and all alternatives based on such releases, should be removed from the final TMDL.
- The Draft TMDL should be withdrawn and resubmitted after the TMDL is developed for Table Rock Lake and the identified DO improvements available from implementing recommendations of the Table Rock TMDL have been incorporated into the Lake Taneycomo TMDL.

Respectfully submitted,



Ted Coombes
Executive Director



STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

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

www.dnr.mo.gov

November 12, 2010

Mr. Ted Coombes
Executive Director
Southwestern Power Resources Association
P.O. Box 471827
Tulsa, OK 74147

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

Dear Mr. Coombes:

The Missouri Department of Natural Resources (Department) appreciates the comments provided by the Southwestern Power Resources Association (SPRA) via email and letter 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).

In its September 13, 2010 letter, SPRA mentions agreement with comments submitted by the Southwestern Power Administration (SWPA) on the draft Lake Taneycomo TMDL. The Department's responses to SWPA comments may provide further clarification on SPRA's issues of concern. Responses to comments will be made available on the Department's TMDL website at <http://www.dnr.mo.gov/env/wpp/tmdl/index.html>

Comment #1 – Inclusion of minimum flow recommendations for Table Rock Dam is inappropriate in the Draft TMDL.

Section 303(d) of the Clean Water Act and Federal Chapter 40 of the Code of Federal Regulations (CFR) Part 130 requires 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.

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.

Comment #2 – More Attention Should be Paid to Nonpoint Sources in Table Rock Watershed.

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 draft Lake Taneycomo TMDL includes discussion of nonpoint sources throughout the document (e.g., Sections 3.2.2, 6.2, 10.3.2, 10.3.3, and 12.1.2). The TMDL document considers 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. 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 its comment, SPRA does not disagree with the draft TMDL statement that “Dissolved oxygen modeling . . . confirmed that hypolimnetic waters low in dissolved oxygen, and not nutrients from the Table Rock Lake and Lake Taneycomo watersheds, are the source of the Missouri 303(d) listed low DO impairments.” 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. More importantly, however, reductions in nutrient loading to Table Rock Lake should allow the water body to address its own water quality impairment for nutrients.

The Department acknowledges SPRA’s recommendation that the Lake Taneycomo TMDL should be withdrawn and rewritten after the draft TMDL is prepared for Table Rock Lake. However, due to its placement on the Missouri 303(d) List of impaired waters and inclusion in the TMDL Consent Decree¹, 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. The Department may choose to revisit this TMDL in the future, should new data or information become available that would change the calculations or allocations found in the TMDL.

¹ 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.

General Comment #1 – *The Draft TMDL provides several alternatives for future implementation to achieve the DO standard in Lake Taneycomo. However, the report provides no substantive analysis of the cost-effectiveness of each alternative. Before implementation of any of the recommendations, such an analysis should be performed, and only those alternatives that are cost-effective and that specifically address the low DO situation in Lake Taneycomo should be implemented.*

As discussed in the response to Comment #1, 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 citizens and stakeholders to determine which implementation practices and activities are most appropriate.

General Comment #2 – *The Draft TMDL should identify environmental impacts associated with delivery of up to four semi-tractor trailer loads of liquid oxygen (LOX) daily required to support a forebay oxygen diffuser system. The report should also examine any dangers associated with transmitting the liquid oxygen from the proposed 22,000 gallon, 104-ton capacity LOX tank to a forebay diffuser. Although LOX is already stored on site and delivered to the penstocks, the forebay diffuser envisioned would be on an order of magnitude from existing LOX deliveries, storage and transmission.*

An analysis of the environmental impacts associated with implementation alternatives is not within the purview of the TMDL process. Analysis and consideration of technical, socio-economic and environmental impacts should occur during the implementation phase of the TMDL and involve watershed citizens and stakeholders.

General Comment #3 – *If and when it is cost-effective to replace the existing main turbine-generator units at the dam, SPRA supports selection of the most up-to-date technology that maximizes capacity and energy production while minimizing environmental impacts at a reasonable cost. However, SPRA opposes and objects to any recommendation to redesign the main turbines to provide minimum flow releases for the reasons cited earlier in our comments.*

The Department agrees the most up-to-date technology that maximizes capacity and energy production while minimizing environmental impacts should be selected when replacing the turbine-generator units. Redesign and installation of the turbines should consider current and future demands for hydropower generation, water supply, flood control and the cold water fishery in Lake Taneycomo.

General Comment #4 – *Likewise, SPRA supports replacement of the house generation units with state-of-the-art technology that minimizes environmental impacts at reasonable costs if and when such replacement is cost-effective. Again, however, SPRA objects to sizing the units to meet the proposed minimum flow requirements and selling energy excess to the project's needs on the grid. As noted before, achieving minimum flow releases should not be an objective of this draft TMDL. Also, as the report acknowledges, minimum flow releases off-peak would reduce the value of the energy provided, while use of the stored water off-peak for this purpose would reduce the energy available on peak.*

Mr. Ted Coombes
Page Four

The Department agrees the most up-to-date technology that minimizes environmental impacts should be selected when replacing the house generation units. Again, redesign and installation of these turbines should consider current and future demands for hydropower generation, water supply, flood control and the cold water fishery in Lake Taneycomo.

Recommendation #1 – *All references to minimum flow releases from Table Rock Dam, and all alternatives based on such releases, should be removed from the final TMDL.*

As stated in the response to Comment #1, the Lake Taneycomo TMDL must be protective of applicable water quality standards and include critical conditions and seasonal variation in the analysis. As a potential future critical condition, it is reasonable and appropriate to consider minimum flow releases from Table Rock Dam in the Lake Taneycomo TMDL.

Recommendation #2 – *The Draft TMDL should be withdrawn and resubmitted after the TMDL is developed for Table Rock Lake and the identified DO improvements available from implementing recommendations of the Table Rock TMDL have been incorporated into the Lake Taneycomo TMDL.*

As stated in the response to Comment #2, the Lake Taneycomo TMDL must be established by either the Department or EPA by December 31, 2010 pursuant to the Missouri TMDL Consent Decree. However, the Department may choose to revisit the Lake Taneycomo TMDL in the future, should new data or information become available that would change the calculations or allocations found in the TMDL.

Thank you again for your comments and for your interest in protecting the quality of Missouri's waters. 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