STATE OF MISSOURI
Jeremiah W. (Jay) Nixon, Governor • Mark N. Templeton, Director
DEPARTMENT OF NATURAL RESOURCES
www.dnr.mo.gov

JUL 29 2009

Mr. William A. Spratlin
Water, Wetlands, and Pesticides Division
U.S. Environmental Protection Agency, Region 7
901 North 5th Street
Kansas City, KS 66101

Re: Submittal of Lake of the Ozarks (Water Body ID: 7205) for Category 4C of Missouri's 2008 Water Quality Report

Dear Mr. Spratlin:

The Lake of the Ozarks near the City of Warsaw in Benton County, Mo. remains on the Missouri 303(d) List for fish trauma. The source of this impairment is listed as Truman Dam. The Missouri Department of Natural Resources (Department) is requesting that this impairment be accepted as pollution, not a pollutant, and that the Lake of the Ozarks therefore be placed in Category 4C of Missouri's Water Quality Report. As a result, a Total Maximum Daily Load (TMDL) would not be required for this water body.

In October 2006, the United States Environmental Protection Agency (EPA) issued a memorandum entitled "Information Concerning 2008 CWA Sections 303(d), 305(b) and 314 Integrated Reporting and Listing Decisions." This memorandum serves as EPA's guidance to the states for categorizing and presenting the quality of waters for the 2008 reporting cycle. The memorandum recommends states utilize the document *"Guidance for 2006 Assessment, Listing, and Reporting Requirements Pursuant to Sections 303(d), 305(b), and 314 of the Clean Water Act"* [2006 Integrated Report Guidance (IRG)], with supplemental additions, as the basis for their 2008 303(d) Lists. The 2006 Integrated Report Guidance provides information on the placement of waters into Category 4C. Specifically:

> *Segments should be placed in Category 4C when the state demonstrates that the failure to meet an applicable water quality standard is not caused by a pollutant, but instead is caused by other types of pollution. Segments placed in Category 4c do not require the development of a TMDL. Pollution, as defined by the CWA is "the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water" (section 502(19)). In some cases, the pollution is caused by the presence of a pollutant and a TMDL is required. In other cases, pollution does not result from a pollutant and a TMDL is not required. States should schedule these segments for monitoring to confirm that there continues to be no pollutant associated with the failure to meet the water quality standard and to support water quality management actions necessary to address the cause(s) of the impairment. Examples of circumstances where an impaired segment may be placed in Category 4C include segments impaired solely due to lack of adequate flow or to stream channelization.*

EPA encourages the state to collect or assemble additional data and/or information to verify the initial placement of the segment, and to re-categorize the segment based on the assessment of the additional data and/or information where appropriate.

The Department believes that fish trauma from hydroelectric dam operation constitutes an impairment by pollution rather than by a discrete pollutant. Therefore, please find enclosed the document "Missouri Water Quality Integrated Report Category Change for the Lake of the Ozarks, Benton County, Missouri" that contains details and information to support re-categorization of the Lake of the Ozarks from Category 5 (i.e., the 303(d) List) to Category 4C.

In researching this re-categorization request, the Department learned the Missouri Department of Conservation is working with the U.S. Army Corps of Engineers to adjust the dam operations so as to lessen or stop fish trauma caused by "entrainment and impingement" issues. Because regulatory or administrative actions are not readily available, the Department believes cooperation between these agencies will result in the best possible outcome for the resource.

With this letter, the Department requests EPA allow the Lake of the Ozarks to be placed in Category 4C of the Missouri 2008 Water Quality Report. Because the Lake of the Ozarks is a Consent Decree water body, we appreciate EPA taking prompt action on this request. If you have questions, please contact Mr. John Hoke of my staff by phone 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, MO 65102-0176.

Sincerely,

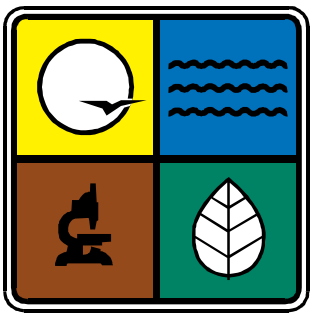
WATER PROTECTION PROGRAM

Earl W. Pabst
Acting Director

EWP:jhl

Enclosure

c: Mr. Daniel R. Schuette, Director, DEQ
Mr. John Ford, Water Quality Monitoring & Assessment Section, WPP
Missouri Clean Water Commission
Mr. Jack McManus, Missouri Attorney General's Office
Mr. John DeLashmit, U.S. EPA Region 7



Missouri Department of Natural Resources
Water Protection Program

Missouri Water Quality Integrated Report
Category Change

for

Lake of the Ozarks
Benton County, Missouri

Missouri Water Quality Integrated Report Category Change

For Lake of the Ozarks
Pollution: Fish Trauma (impingement/entrainment)

Name: Lake of the Ozarks


State map showing Lake of the Ozarks and its watershed

Location: Benton County, Missouri

Hydrologic Unit Code (HUC): 10290109

Water Body Identification (WBID): 7205

Missouri Stream Class: L2[1]

Designated Uses:
- Livestock and Wildlife Watering
- Protection of Warm Water Aquatic Life
- Human Health Protection (Fish Consumption)
- Whole Body Contact Recreation – Category A
- Secondary Contact Recreation

Use that is impaired: Protection of Warm Water Aquatic Life

Area of Impairment: 50 acres

Source: Harry S. Truman Dam

Pollution: Fish Trauma (impingement/entrainment)

First Listing Cycle for Pollution/Impairment: 1998

TMDL Priority Ranking: Medium*

*This document proposes to change the reporting category for this waterbody to Category 4c of the state's integrated report. A Total Maximum Daily Load (TMDL) is not required for Category 4c waters.

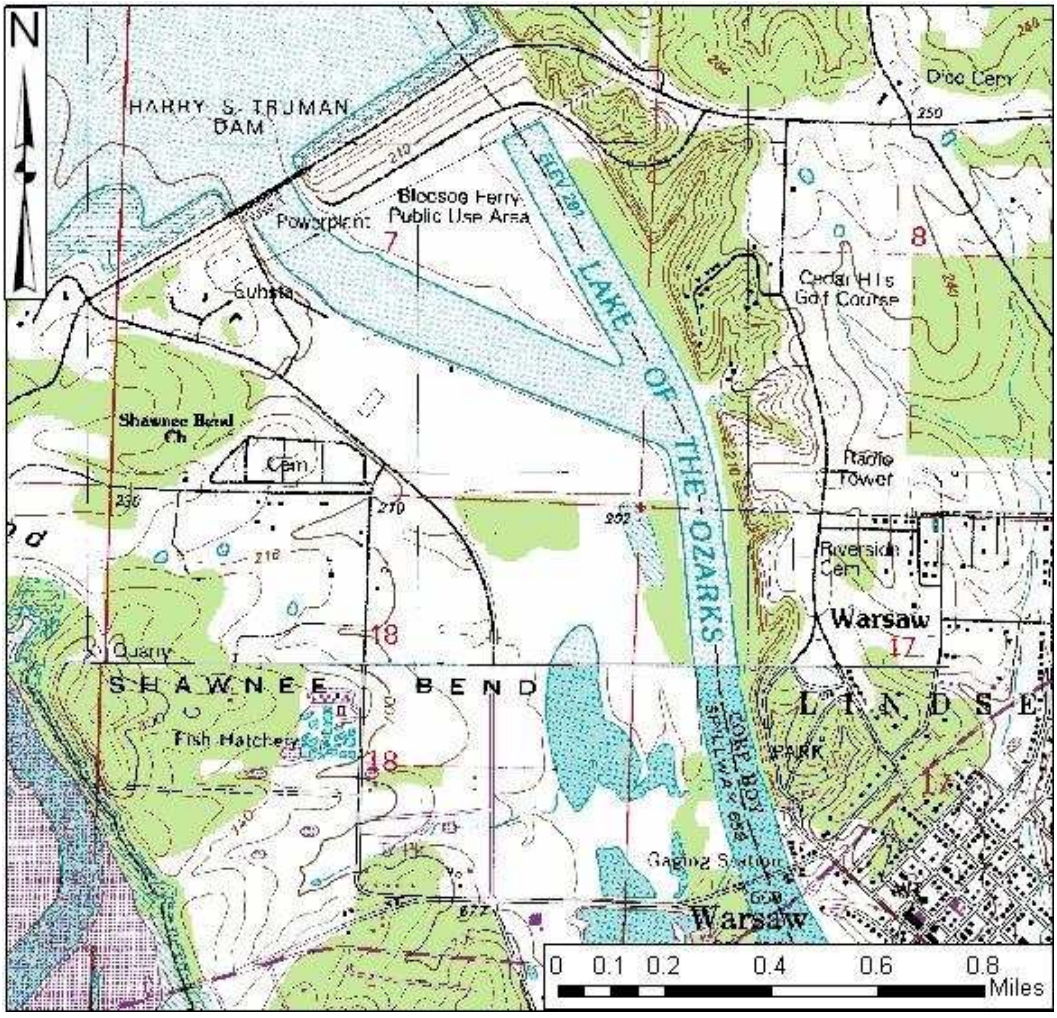
[1] Class L2 lakes are defined in rule as major reservoirs. See Missouri Water Quality Standards 10 CSR 20-7.031(1)(F). The WQS can be found at the following uniform resource locator (URL): http://www.sos.mo.gov/adrules/csr/current/10csr/10c20-7.pdf

1 Introduction

The proposed 2008 Missouri 303(d) List of impaired waters identified Lake of the Ozarks in Benton County as impaired by fish trauma due to Harry S. Truman Dam (Figure 1). Fish trauma is caused by conditions that cause lethal or sub-lethal effects on fish populations that exist in a water body. Initially, and in accordance with EPA guidance, Lake of the Ozarks was listed in Category 5 (i.e., the 303(d) List) of Missouri's 2008 Water Quality Report. Waters listed in Category 5 are required to have a Total Maximum Daily Load (TMDL) developed to address water quality problems caused by discrete pollutants.

Further investigation by the Missouri Department of Natural Resources (Department) indicates the fish trauma impairment occurring in Lake of the Ozarks is not the result of discrete pollutants. Rather, the impairment is a function of the manner in which Harry S. Truman Dam (Truman Dam) is managed. The purpose of this document is to provide the information necessary to document the design and operation of Truman Dam is the cause of the fish trauma impairment occurring in Lake of the Ozarks and to provide justification to include this impairment as a candidate for Category 4c in current and future water quality reports.

Figure 1. Lake of the Ozarks at Truman Dam, Benton County, Missouri
(Below HS Truman Lake)



2 Background

This section of the report provides background information on federal and state listing guidance and current and historic water quality data.

2.1 Federal and State Guidance

In October 2006, the United States Environmental Protection Agency (EPA) issued a memorandum entitled "Information Concerning 2008 CWA Sections 303(d), 305(b) and 314 Integrated Reporting and Listing Decisions." This memorandum serves as EPA's guidance to the states for categorizing and presenting the quality of waters for the 2008 reporting cycle. The memorandum recommends states utilize the document *"Guidance for 2006 Assessment, Listing, and Reporting Requirements Pursuant to Sections 303(d), 305(b), and 314 of the Clean Water Act"* [2006 Integrated Report Guidance (IRG)], with supplemental additions, as the basis for their 2008 303(d) Lists. The 2006 Integrated Report Guidance provides information on the placement of waters into Category 4c. Specifically:

> *Segments should be placed in Category 4c when the states demonstrates that the failure to meet an applicable water quality standard is not caused by a pollutant, but instead is caused by other types of pollution. Segments placed in Category 4c do not require the development of a TMDL. Pollution, as defined by the CWA is "the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water" (section 502(19)). In some cases, the pollution is caused by the presence of a pollutant and a TMDL is required. In other cases, pollution does not result from a pollutant and a TMDL is not required. States should schedule these segments for monitoring to confirm that there continues to be no pollutant associated with the failure to meet the water quality standard and to support water quality management actions necessary to address the cause(s) of the impairment. Examples of circumstances where an impaired segment may be placed in Category 4c include segments impaired solely due to lack of adequate flow or to stream channelization.*
>
> *EPA encourages the state to collect or assemble additional data and/or information to verify the initial placement of the segment, and to re-categorize the segment based on the assessment of the additional data and/or information where appropriate.*

Because water quality data and assessments may present situations where data indicate criteria are not being met but the impairment is not the result of a discrete pollutant, the State of Missouri included Category 4c in its integrated report listing guidance. This document, "Methodology for the Development of the 2008 Section 303(d) List in Missouri," provides information on the placement of waters into Category 4c:

> *Category 4C. Any portion of the water is rated as being in non-attainment with state WQS or other criteria as explained in Table 1 of this document, and a discrete pollutant(s) or other discrete property of the water does not cause the impairment. Discrete pollutants may include specific chemical elements (e.g., lead, zinc), chemical compounds (e.g., ammonia, dieldrin, atrazine) or one of the following quantifiable physical, biological or bacteriological conditions: water temperature, percent of gas saturation, amount of dissolved oxygen, pH, deposited sediment, toxicity or counts of fecal coliform or E. coli bacteria.*

Initially, and in accordance with EPA guidance, Lake of the Ozarks was listed in Category 5 (i.e., the 303(d) List) of Missouri's 2008 Water Quality Report. Waters listed in Category 5 are required to have a Total Maximum Daily Load (TMDL) developed to address water quality problems caused by discrete pollutants. Further investigation has indicated the fish trauma occurring in Lake of the Ozarks is not the result of discrete pollutants, but rather a function of the manner in which Truman Dam manages HS Truman Lake.

2.2 Current and Historic Water Quality Data

The Missouri Department of Conservation (MDC) has documented fish kills in Lake of the Ozarks below Truman Dam since 1978 (Table1). During construction of the dam, high flows were discharged over the partially completed spillway in 1978 and 1979 resulting in large fish kills due to supersaturation. Subsequent modifications were made to the spillway plunge pools in an attempt to address the worst supersaturation issues, but fish trauma and some supersaturation continued.

Since 1995, two fish kills and one occurrence of physical injury have been documented in Lake of the Ozarks below Truman Dam. Due to data indicating attainment of water quality standards, EPA removed the pollutants of low dissolved oxygen and gas supersaturation from Missouri's 303(d) List during the 2004-2006 303(d) listing cycle. However, the occurrence of two fish kills in July 2001 and May 2002 due to Truman Dam operations did not allow EPA the opportunity to remove the fish trauma impairment for Lake of the Ozarks. Specific information regarding the 2001 and 2002 fish kills can be found in Attachment A.

Table 1. Fish kills in Lake of the Ozarks below HS Truman Lake during 1978 – 2002

Date	Duration	Cause	Number of Fish Killed	Species Killed (Abbreviated)	Value ($)
4-8-78	3 Months	Supersaturation	421,785	WAE, WHC, LMB, WHB, DRM, Sun., Gar, Shad, CAR, Cat., SPB	168,350
4-24-79	3 Months	Supersaturation	104,346	WHB, CPS, WHC, WAE, CAR, CCF, SPB, Shad, DRM, Sun.	38,084
5-12-80	3 Weeks	Physical Injury	571	PDF, Gar, DRM, Buff.	38,257
5-15-80	Unknown	Physical Injury	334	PDF, Gar, CAR, Buff.	21,696
8-24-80	1 Day	Dewatering Effort	508	FHC, BCF, WCF, CAR, Buff.	Unknown
7-19-81	1 Month	Supersaturation Physical Injury	1,668	WHC, CPS, PDF, BCF, Sun. Bull. LMB, DRM, Shad, CAR	2,773
7-29-81	1-2 Days	Low Dissolved Oxygen (O2)	2,149	DRM, WHB, Buff., WHC, LMB, Sun., BCF, CCF, Bull., PDF, Shad	Unknown

Table 1 (cont). Fish kills in Lake of the Ozarks below HS Truman Lake during 1978 – 2002

Date	Duration	Cause	Number of Fish Killed	Species Killed (Abbreviated)	Value ($)
8-17-81	2 Days	Unknown	Unknown	WAE, LMB, PDF, BCF, CCF, Sun., Gar, Shad	Unknown
6-25-82	1 Day	Rapid Drop in Water Level	135 Or >>	WHC, SPB, CPS, CAR, Cat, Gar	Unknown
6-21-83	1 Day	Unknown	186	WHC, WAE, WHB, Hyb., PDF, Cat, Sun, DRM, Gar, Buff.	Unknown
6-23-83	1 Day	Dewatering Effort	538	Unknown	Unknown
7-6-83	1 Day	Unknown	184	WHB, Hyb., BCF, DRM, Buff.	Unknown
8-9-83	Unknown	Low Dissolved Oxygen in turbine bays.	111	WAE, WHB, SPB, Hyb., WHC, BCF, CAR, DRM, Gar, Buff., Others	1,060
6-4-86	2 Days	Low Dissolved Oxygen	175	WHB, SPB, Hyb., PDF, DRM, Cat., Gar	Unknown
5-23-88	1 Week	Low Dissolved O2/Degreasing Agent	429	WHB, BCF, PDF, Hyb., Gar, Others	Unknown
6-15-90	1 Week	Supersaturation and Low Dissolved O2	Unknown	Unknown	Unknown
8-2-93	3 Weeks	Supersaturation Physical Injury	Unknown	WHC, PDF	Unknown
4-14-94	8 Weeks	Supersaturation Physical Injury	2,078	WHC, PDF, Sun., Shad, DRM	2,434,092
7-3-01	Unknown	Dam Operations	14	WHB, CAR, BCF, DRM, PDF	8,959
5-24-02	30 days	Dam Operations	996	BLC, GZS, CAR, FHC, CCF, BCF, LMB, Hyb., Buff., PDF, DRM, Gar	140,109

Key to fish species: : BCF=Blue Catfish, BLC=Black Crappie, BLG=Bluegill, Buff.=Buffalo, Bull.=Bullhead Catfish, CAR=Carp, Cat.=all catfish, CCF=Channel Catfish, CPS=Carpsucker, DRM=Drum, FHC=Flathead Catfish, GSF=Green Sunfish, GZS=Gizzard Shad, Hyb=Hybrid Striped Bass, LMB=Largemouth Bass, PDF=Paddlefish, RES=Redear Sunfish, Shad.=gizzard and threadfin shad, SMB= Smallmouth Bass, SPB=Spotted Bass, Sun. includes bluegill, redear, rock bass, green sunfish, warmouth, orangespotted sunfish and longear sunfish, WAE=Walleye, WCF=White Catfish, WHB=White Bass, WHC=White Crappie.

Source: Missouri Department of Conservation

3 Source Determination and Evaluation

Previous impairments of Lake of the Ozarks for low dissolved oxygen and gas supersaturation have been removed from the Missouri 303(d) List due to data showing attainment of water quality standards for those pollutants. As indicated above, however, the proposed Missouri 2008 303(d) List includes Lake of the Ozarks as impaired for fish trauma from Truman Dam. Because MDC has not considered low dissolved oxygen or gas supersaturation to be a cause of any fish kill since 1995, mechanical trauma due to high water velocities appears to be the continuing problem.

Fish trauma is the result of conditions that cause lethal or sub-lethal effects on fish populations that live in a water body. Two common mechanisms for inducing fish trauma are entrainment and impingement due to hydroelectric dam operations. Entrainment occurs when fish are caught in water flowing through or over a dam during periods of power generation or flood control, respectively. Fish that become entrained in flow through water can suffer injury and mortality due to pressure changes and collisions with hydroelectric structures (e.g., turbines). Impingement occurs when fish become caught on screens, grates, or other protective structures designed to limit fish entry into the workings of the hydroloelectric facility.

In the reports associated with the July 2001 and May 2002 fish kills, MDC suspects the fish were entrained in high velocity water flowing through or over Truman Dam during power generation activities and release of high water levels from HS Truman Lake. The report continues that this entrainment caused mortality and severe physical trauma to the fish associated with these events. Therefore, the cause of the fish trauma impairment is not the result of a discrete pollutant, but rather a function of the manner in which HS Truman Lake and Truman Dam are managed.

4 Department Recommendation

The MDC fish kill data found in Table 1 and Attachment A clearly indicate the fish trauma impairment in Lake of the Ozarks is caused by power generation and flood control operations associated with Truman Dam. These operations constitute both man-made and man-induced alterations of the physical integrity of Lake of the Ozarks and therefore are covered under the definition of "pollution" as defined in Section 502(19) of the Clean Water Act. Because the fish trauma impairment is due to pollution rather than a discrete pollutant, a TMDL is not required for Lake of the Ozarks and it is a candidate for Category 4c in Missouri's 2008 Water Quality Report.

After assembling additional data and information to verify the initial placement of Lake of the Ozarks on the Missouri 303(d) list, the Department has determined the impairment is due to "pollution" rather than a discrete pollutant. This assessment has resulted in the Department revising its earlier listing and recommending that Lake of the Ozarks (Water Body ID: 7205) be removed from Category 5 and re-categorized to Category 4c of Missouri's 2008 Water Quality Report.