

West Fork Niangua River in Missouri
Draft Total Maximum Daily Load (TMDL)
SUMMARY OF COMMENTS AND RESPONSES
Prepared by the Environmental Protection Agency (EPA), Region 7
Water, Wetlands and Pesticides Division
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INTRODUCTION

EPA public noticed a draft TMDL for West Fork Niangua River (water body identification MO_1175) from October 13 to November 15, 2010. EPA is establishing this TMDL to meet the obligations of the 2001 Consent Decree, *American Canoe Association, et al. v. EPA*, Consolidated Case No. 98-482-CV-W, (Consent Decree). This document summarizes and paraphrases comments received, EPA's response to comments and changes made to the final TMDL where appropriate. Included is a list of all commentors.

RESPONSE TO COMMENTS (EPA responses in bold)

1. Comment: The commentor requests to see the Quality Assurance Project Plan that supports the sampling approach used to develop the dataset and TMDL.

1. Response: EPA thanks the commentor for their interest in the TMDL. The data used in the TMDL came from Missouri Department of Natural Resources (MDNR) and was generated by Midwest Environmental Consultants through a contract with MDNR. The data used in the modeling were the best available when writing the TMDL and met MDNR quality assurance requirements for data inclusion: represents instream conditions and meets the Quality Assurance/Quality Control levels of Missouri's Listing Methodology document (10 CSR 20-7.031 and 10 CSR 20-7.050).

To obtain MDNR data, the state's website offers some data online and a request system: <http://www.dnr.mo.gov/env/wpp/waterquality/303d/2008/proposed-2008-303d-list-data.htm> and <http://www.dnr.mo.gov/env/wpp/tmdl/index.html>. The commentor may also call MDNR's Water Quality Monitoring and Assessment Section who maintains information on the past and current quality of water in Missouri and makes the information available to other agencies and the general public (573-751-6623).

2. Comment: Because of data concerns, commentors request that the TMDL not be used to set NPDES WLA effluent limitations.

2. Response: National Pollutant Discharge Elimination System (NPDES)-regulated storm water discharges must be addressed by the wasteload allocation (WLA) component of a TMDL and cannot be removed from the TMDL, please refer to the Code of Federal Regulations at 40 CFR § 130.2(h). Per EPA regulations, it is the state that incorporates the TMDL into its current water quality management plan for implementation (40 CFR 130.7(d)(2)). The conversion of WLAs to permit limits is performed by the state (40 CFR

122.44), specifically MDNR's NPDES Permits and Engineering Section sets permit limits. Should you have questions regarding the determination of permit effluent limits, please contact Mr. Refaat Mefrakis, Chief, NPDES Permits and Engineering Section, at (573) 526-2928 or via email refaat.mefrakis@dnr.mo.gov.

Addressing the commentor's data concerns, West Fork Niangua River's TMDL includes an implicit margin of safety (MOS) which accounts for uncertainties from the data or other factors by using conservative assumptions as described in Section 10 of the TMDL and supported by (40 CFR § 130.7(c)(1)). The data used in the modeling were the best available when writing the TMDL and met MDNR requirements for data inclusion: represents instream conditions and meets the Quality Assurance/Quality Control levels of Missouri's Listing Methodology document (10 CSR 20-7.031 and 10 CSR 20-7.050).

3. Comment: The commentor believes that the nutrient wasteload should be removed from the TMDL because the listed impairment is low dissolved oxygen and EPA hasn't demonstrated that nutrient WLAs are necessary to achieve the statewide DO criterion.

A similar comment about the nutrient loads in the TMDL: Missouri is developing nutrient criteria that will potentially be in Missouri's 2012 Triennial Review. The Missouri Clean Water Commission has not approved total phosphorus [TP] or total nitrogen [TN] criteria for Missouri waters. The TMDL should provide the flexibility to incorporate state-developed nutrient criteria and implementation policies only when or where a quantitative and site-specific linkage is established. Absent a cause and effect relationship between these factors, the commentor requests that the nutrient criteria used in the TMDL be removed.

3. Response: EPA believes that the methodology linking the impairments as described in Appendix B, C & D of the TMDL is technically defensible. This is not a new methodology; the MDNR has used the methodology in developing several TMDLs that were subsequently approved by EPA.

EPA's regulations state that TMDLs can be expressed in several ways, including in terms of toxicity, which is a characteristic of one or more pollutants, or by some "other appropriate measure." 40 CFR § 130.2(i). They also state that TMDLs may be established using a biomonitoring approach as an alternative to the pollutant-by-pollutant approach. 40 CFR § 130.7(c)(1). It is true that Missouri does not have a numeric criterion for TN and TP in freshwater streams; therefore, targets and loading capacities (LCs) are based on EPA-recommended Level III Ecoregion 39 (Ozark/Osage Ecological Drainage Unit (EDU)) reference concentrations and water quality observations throughout the ecoregion where West Fork Niangua River is located. Percent reductions cannot be calculated for TP and TN because the permitted facilities do not have permit limits for these constituents. Please refer to Section 3.1 and Appendix D for a full explanation of how TN and TP are used as translator in this TMDL; refer to Sections 7 and 8 in the TMDL for full discussions about the WLA and LA for TP and TN.

4. Comment: In addition to total nitrogen and total phosphorus, EPA has also published ecoregional criteria guidance for sestonic and benthic algae. The periphyton criterion specified

for Ecoregion 39 is 32.5 mg Chl_a m⁻² and is comparable to the 40 mg Chl_a m⁻² value established by the Region 7 Regional Technical Assistance Group (RTAG). The QUAL2K allocation model simulates periphyton densities above these values, raising an independent applicability concern. As nutrient-algae relationships are uncalibrated and nutrient half-saturation values are well above suggested criteria, the commentor requests EPA to revise the TMDL, and allocation model, to reflect simulation of benthic algae at or below ecoregional targets.

4. Response: The TMDL's QUAL2K model was calibrated, based on July 12, 2000 for summer season and October 19, 2004 for fall season. After it was calibrated, the model was used to estimate the effluent pollutant load reduction needed to achieve the Dissolved Oxygen (DO) WQS criteria of a daily minimum of 5 milligrams per liter (mg/L). Based on the field water quality data, zero order growth modeling was used to depict benthic algae in the Niangua River, with maximum growth rate set to 100 mgA/m²/d (milligrams chlorophyll a per square meters per day).

A scenario was simulated where a major wastewater treatment plant would discharge its effluent with ecoregional nutrient levels to the river. The scenario revealed that under the current stream conditions, the portion of the Niangua River that's downstream from the treatment plant would meet the DO criterion and support its aquatic life designated use. The resulting wasteload model simulation was the aim of the TMDL.

As requested by the commentor, a model with the RTAG periphyton benchmark (32.5 mgA/m², an average value for Ecoregion 39) was tested for the reference stream condition. This model shows that the DO condition in the river would also meet the DO criterion and this DO condition would be only slightly better than the DO condition predicted by the current model. This model would not result in any changes to load allocations in the TMDL.

5. Comment: Nutrient allocations are beyond the limits of tertiary wastewater treatment technology and would likely result in significant socioeconomic impact to the citizens of Marshfield. The commentor requests that the extent of DO benefits achieved through proposed nutrient removal requirements be demonstrated prior to issuance of the final TMDL.

5. Response: The Niangua TMDL was written with the best available data at the time and under the obligations of the Consent Decree. Based on that available data, the TMDL is written to meet WQS without regard to cost or available treatment technology (40 CFR 130.7(c)(1)(ii)). It is MDNR that will work with permitted facilities identified in the TMDL. Per EPA regulations the state incorporates the TMDL into its current water quality management plan for implementation (40 CFR 130.7(c)(1)).

Should WLAs result in effluent limitations that are beyond the limits of current treatment technology (including tertiary wastewater treatment technology), MDNR may develop a phased approach to implementation of effluent limitations through the use of the best available treatment technology. This approach can be implemented either within the operating permit or through a settlement agreement. The conversion of WLAs to permit limits is the purview of the MDNR's NPDES Permits and Engineering Section. Should you

have questions regarding the determination of permit effluent limits, please contact Mr. Refaat Mefrakis, Chief, NPDES Permits and Engineering Section, at (573) 526-2928 or via email refaat.mefrakis@dnr.mo.gov.

EPA understands that resources are limited and that communities are sometimes hard pressed to meet the demands of water and wastewater system improvements. EPA urges the commentor to work with MDNR's Financial Assistance Center to discuss grant, low-interest loans or other options that may be available to the city should wastewater system improvements be necessary. To reach MDNR's Financial Assistance Center, call (573) 751-1192 and ask for either Mr. Doug Garrett or Ms. Traci Newberry, or email Mr. Garrett at doug.garrett@dnr.mo.gov. You can also find them on the Web at <http://www.dnr.mo.gov/env/wpp/srf/index.html>.

6. Comment: Total suspended solids (TSS) concentrations simulated in the allocation model are greater than Table 12 values. WLAs for TSS listed in the draft QUAL2K model are greater than values listed in Table 12 of the draft TMDL. The commentor requests that if a TSS WLA is included in the TMDL, then it be appropriately included in the allocation model.

6. Response: The commentor is correct that the values in Table 12 differ from the TSS concentrations simulated in the allocation model and the WLAs for TSS listed in the draft QUAL2K model. However, both are correct. Table 12 is correct because it uses a monthly permit TSS value (15 mg/L). A weekly permit value (20 mg/L) was used in the model for WLA and LA which is also appropriate. The TMDL conversion between weekly and monthly values for TSS do not impact loading allocations because DO is the focus of the model.

7. Comment: It is not clear what basis supports the derivation and application of a TSS criterion because mechanistic processes linking volatile suspended solids (VSS), sediment oxygen demand (SOD), and dissolved oxygen are largely empirical as benthic demands are largely (>70%) prescribed in the model. It appears that high levels of prescribed SOD were used to fit available dissolved oxygen data. High proportions of prescribed SOD significantly diminish the process-based connection between VSS, SOD and dissolved oxygen; thereby reducing the certainty that reduction in TSS will have any effect on instream dissolved oxygen levels. Further, total SOD values used in the model are at the very upper end of values cited in literature. Environments typically hosting high levels of SOD feature channels composed of organic substrates and/or reduced velocity gradients (backwaters, sloughs, etc.). The commentor believes EPA should reconsider use of prescribed SOD in a revised model.

7. Response: EPA believes that the methodology linking the sources and listed cause of impairments as described in Appendix B, C & D of the TMDL is technically defensible. This is not a new methodology; MDNR has used the methodology in developing several TMDLs that were subsequently approved by EPA. The commentor is directed to Section 6 and Appendix C for a full discussion of the basis supporting the TSS criterion (also refer to Response 14 below). Appendix B of the TMDL describes in detail the modeling. Section B.3.2 of the TMDL discusses the Water Quality Calibration, including an in-depth

discussion about SOD conditions as they were prescribed for each reach of the West Fork Niangua River.

8. Comment: Losing stream hydrologic processes may be oversimplified. As mentioned in the draft TMDL, the WFNR [West Fork Niangua River] has been identified by MDNR hydrogeologists as a losing stream. To incorporate gaining and losing phenomena into the QUAL2K flow balance, diffuse abstractions and sources were used that specified concentrations of CBOD [Carbonaceous Biochemical Oxygen Demand], ammonia and dissolved oxygen of 1.5-2.5 mg/L, 100 ug/L and 6.5 mg/L, respectively. It is not clear what data support high DO concentrations from groundwater sources. Further, in the presence of presumed high DO, it is likely that ammonia and CBOD would oxidize. Hypothetically then, ammonia exported from losing reaches should have less ammonia than imported to the reach absent hydrolysis of organic compounds. Chemistries of diffuse sources and abstraction should be further evaluated within a revised model. Alternatively, we note that QUALKW, a model version authored by Greg Pelletier is better suited to losing stream environments and hyporheic exchange processes. Accuracy of solute transport in some reaches is limited by the simplified approach (see river kilometer 9.01 in 2004 conductivity calibration).

8. Response: In summary, the commentor discusses the gaining and losing phenomena inherent to losing stream hydrologic processes and how the QUAL2K model takes this phenomena into account. The commentor inquired about what high DO data was used in the TMDL's modeling. And finally, the commentor proposes an alternative model that would, in the commentor's best professional judgment, be a better model for a losing stream.

The QUAL2K water quality model was selected for the development of the Niangua TMDL because it is used extensively for TMDL development across the country, especially for issues related to DO concentrations. QUAL2K is discussed in detail in Response 15 below and in Appendix B of the TMDL.

The commentor is directed to the Appendices cited at relevant points in the body of the TMDL to find specific data and further analyses. The sources for all raw data used in the draft TMDL are listed in the References Section. Data used in the TMDL's calculations not in the draft TMDL is being placed into STORET for better data sharing. The STORET Data Warehouse is EPA's repository of the water quality monitoring data collected by water resource management groups across the country. The new water quality exchange (WQX) makes uploading data to STORET easier so more groups are able to share data. Please access data for this TMDL at the following Website: http://www.epa.gov/STORET/dw_home.html. Assistance on using STORET is available at <http://www.epa.gov/STORET/owners.html>.

EPA appreciates information on modeling alternatives. As previously indicated, QUAL2K was selected because of its extensive national use for DO streams, reliability and ability to simulate hydraulics and water quality conditions of small rivers and streams.

9. Comment: The commentor believes that EPA should collect additional data to quantify contributions of shallow groundwater and reaeration processes to the DO balance prior to implementing TMDL WLAs. As an example for why additional data should be collected for modeling purposes the commentor discusses how shallow groundwater and natural reaeration processes are likely contributing to critical dissolved oxygen deficits.

9. Response: EPA agrees that is always preferable to have as much data as possible. However in this instance, modeling appropriately supplemented the limited data. Data in the draft TMDL has been analyzed and presented consistent with the procedures included in Appendices A, B, C, D and E; 40 CFR 130.2(i) and 40 CFR 130.7(c)(1). Based on the model's calibration and validation, the model was well parameterized and adequately described the processes in West Fork Niangua River. Additionally, conservative assumptions and the MOS in the TMDL allow for variability as described by the commentor. The data used in the draft TMDL were the best available when writing the TMDL. Missouri may submit and EPA may approve a revised or modified TMDL for this water at any time. One of the hallmarks of the TMDL process is adaptive management or implementation. Adaptive implementation is an iterative process that makes progress toward achieving water quality goals while incorporating new data and information to reduce uncertainty and adjust implementation activities.

10. Comment: The W. Fk. [West Fork] Niangua River should include adaptive management provisions. The commentor believes that a phased or adaptive management approach should be incorporated into the TMDL. Data cited in the TMDL indicate that dissolved oxygen regimes in the WFNR have not been synoptically measured since 2004.

10. Response: The TMDL is being written at this time to satisfy the requirements of the Consent Decree. The data used in the draft TMDL were the best available when writing the TMDL. Missouri may submit and EPA may approve a revised or modified TMDL for this water at any time. Should more data be made available, MDNR may then consider submitting a revised or modified TMDL for this water based on the newly obtained data. TMDLs are written to meet current surface WQS (40 CFR § 130.7(c)(1)(ii)). EPA appreciates the commentor's information about the need for future measurements that may improve conditions in West Fork Niangua River. One of the hallmarks of the TMDL process is adaptive management or implementation. Adaptive implementation is an iterative process that makes progress toward achieving water quality goals while using any new data and information to reduce uncertainty and adjust implementation activities. MDNR will work with permitted facilities identified in the TMDL as per EPA regulations, the state incorporates the TMDL into its current water quality management plan for implementation (40 CFR § 130.7(c)(1)). Missouri has the authority to monitor and access state waters to ensure protection of the designated beneficial uses.

11. Comment: The commentor invested over 5 million dollars in 2001 to design and construct a tertiary filtration WWTF to meet effluent regulations during the previous renewal process. We note the most recent dataset (2004) was collected after construction of the new Marshfield WWTF in 2001 and does not include DO concentrations below the statewide criterion. It is possible that DO regimes in the WFNR have improved, due in part, to enhanced effluent quality

from the new Marshfield WWTF. In addition, the TMDL model is not well supported by available data. For these reasons, the commentor requests that TMDL implementation include an adaptive management approach and reopener provisions to respecify, or remove, allocations pending results of additional in-stream monitoring or changes to Missouri's water quality standards.

11. Response: EPA applauds the commentor for steps already taken to improve its watershed. The Niangua TMDL was written with the best available data at the time that the TMDL was written. The TMDL is being written at this time to meet the obligations of the Consent Decree. TMDLs are designed to meet WQS without regard to cost or available treatment technology (40 CFR 130.7(c)(1)(ii)). However, EPA understands that resources are limited and that communities are sometimes hard pressed to meet the demands of water and wastewater system improvements. It is MDNR that will work with permitted facilities identified in the TMDL as per EPA because it is the state that incorporates the TMDL into its current water quality management plan for implementation (40 CFR §130.7(d)(2)). It is through MDNR that the commentor may find assistance in implementation. Resources are given below to help the commentor.

Should WLAs result in effluent limitations that are beyond the limits of current treatment technology, MDNR may develop a phased approach to implementation of effluent limitations through the use of the best available treatment technology. This approach can be implemented either within the operating permit or through a settlement agreement. The conversion of WLAs to permit limits is the purview of the MDNR's NPDES Permits and Engineering Section. Should you have questions regarding the determination of permit effluent limits, please contact Mr. Refaat Mefrakis, Chief, NPDES Permits and Engineering Section, at (573) 526-2928 or via email refaat.mefrakis@dnr.mo.gov.

EPA urges the commentor to work with MDNR's Financial Assistance Center to discuss grant and low-interest loan options that may be available to the city should wastewater system improvements be necessary. To reach MDNR's Financial Assistance Center, call (573) 751-1192 and ask for either Mr. Doug Garrett or Ms. Traci Newberry, or email Mr. Garrett at doug.garrett@dnr.mo.gov. You can also find them on the Web at <http://www.dnr.mo.gov/env/wpp/srf/index.html>.

12. Comment: Commentor is a Missouri Stream Team Volunteer from the New Hope Team who reviewed the draft TMDL and supports the TMDL for West Fork Niangua River.

12. Response: Thank you. EPA appreciates support from groups working to improve their watersheds.

13. Comment: Commentor opposes any expansion of the Marshfield WWTP and also supports the TMDL's WLA.

13. Response: EPA thanks the commentor for their support of the TMDL. EPA also encourages the commentor to work with volunteer groups already active in their watershed.

14. Comment: The Missouri Clean Water Commission has not adopted an in stream water quality criterion for total suspended solids so what is the technical and regulatory basis for total suspended solids allocations in the TMDL.

A similar comment on the technical and regulatory basis for TSS in the TMDL: Since documentation of narrative criteria concerns were not included in the TMDL the technical and regulatory basis for total suspended solids allocations is unclear.

14. Response: EPA’s regulations state that TMDLs can be expressed in several ways, including in terms of toxicity, which is a characteristic of one or more pollutants, or by some “other appropriate measure.” 40 CFR § 130.2(i). They also state that TMDLs may be established using a biomonitoring approach as an alternative to the pollutant-by-pollutant approach. 40 CFR § 130.7(c)(1). Additionally, narrative criteria are discussed in Section 4.2 of the TMDL.

From the TMDL: The narrative criteria not being met in the West Fork Niangua River are (3)(A),(C), (D) and (G), as follows:

- **Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses.**
- **Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses.**
- **Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life.**
- **Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community.**

In the absence of Missouri numeric criteria for nutrients in freshwater streams, ambient water quality criteria recommendations provided by EPA are used to quantify TN and TP LCs in Ecoregion 39 and West Fork Niangua River. For this TMDL, recommended TN and TP criteria are used directly in developing LCs for TN and TP. There are many quantitative indicators of sediment, such as TSS, turbidity and bedload sediment, which are appropriate to describe sediment in rivers and streams. A concentration of TSS was selected to represent the numeric target for this TMDL because it enables the use of the highest quality available data and is included in monitoring data.

Additional discussion on watershed-specific targets used to develop LCs for TSS, TN, TP and DO is provided in Section 5.1 and 5.2 of this TMDL.

15. Comment: The WFNR is a riffle-pool system near the WWTF, predominated with cobble, gravel, and coarse sand substrates. The QUAL2K model assumes a high proportion of organic,

oxygen consuming, substrate. Absent in-situ respirometry to the contrary, visual observation suggests that organic substrates compose much less than 75% of the streambed.

15. Response: EPA believes that West Fork Niangua's QUAL2K modeling is scientifically defensible and dynamically models the in-situ respirometry of West Fork Niangua River.

A more detailed discussion of why QUAL2K is a scientifically defensible choice to model West Fork Niangua: The QUAL2K water quality model was selected for the development of the Niangua TMDL because it is used extensively for TMDL development in point source permitting issues across the country, especially for issues related to DO concentrations. The QUAL2K model is suitable for simulating hydraulics and water quality conditions of small rivers and streams (including the conditions the commentor references). It is a one-dimensional uniform flow model with the assumption of a completely mixed system for each computational cell. QUAL2K assumes that the major pollutant transport mechanisms, advection and dispersion, are significant only along the longitudinal direction of flow. The model allows for multiple waste discharges, water withdrawals, nonpoint source loading, tributary flows and incremental inflows and outflows. The processes employed in QUAL2K addresses nutrient cycles, algal growth, particulate settling, Sediment Oxygen Demand (SOD) and DO dynamics. See Appendix B for a detailed explanation of how the QUAL2K modeling in the Niangua TMDL is performed.

The data used in the modeling were the best available when writing the TMDL. If the commentor provides new data indicating that organic substrates compose much less than 75% of the streambed, it must also meet MDNR requirements for data inclusion: represents instream conditions and meets the Quality Assurance/Quality Control levels of Missouri's Listing Methodology document (10 CSR 20-7.031 and 10 CSR 20-7.050). MDNR may submit and EPA may approve a revised or modified TMDL for this water at any time based on newly obtained data that meets MDNR's requirements for data inclusion.

LIST OF COMMENTORS

1. Jami Gay, Missouri Stream Team Volunteer, Missouri
2. Anonymous, Citizen
3. Chris Zell, Geosyntec Consultants for the city of Marshfield, Missouri

END SUMMARY OF COMMENTS AND RESPONSES