EPA Region 7 TMDL Review

TMDL ID: MO_0710 **State:** MO

Document Name: STINSON CREEK

Basin(s): LOWER MISSOURI-BLACKWATER (LOWER MISSOURI-MOREAU RIVER BASIN)

HUC(s): 10300102

Water body(ies): STINSON CR., STINSON CREEK

Tributary(ies): AUXVASSE CREEK, SMITH BRANCH

Pollutaut(s): BIOCHEMICAL OXYGEN DEMAND, DISSOLVED OXYGEN, TOTAL NITROGEN, TOTAL PHOSPHORUS, TOTAL SUSPENDED SOLIDS, VOLATILE SUSPENDED SOLIDS (VSS)

Submittal Date: 2/24/2010 **Approved:** Yes

Submittal Letter

State submittal letter indicates final Total Maximum Daily Load(s) (TMDL) for specific pollutant(s)/water(s) were adopted by the state, and submitted to EPA for approval under section 303(d) of the Clean Water Act [40 CFR § 130.7(c)(1)]. Include date submitted letter was received by EPA, date of receipt of any revisions, and the date of original approval if submittal is a phase II TMDL.

This TMDL document was formally submitted by the Missouri Department of Natural Resources (MDNR). The United States Environmental Protection Agency (EPA) received this document by mail on February 24, 2010. Revisions to this doeument were received by email on April 29, 2010.

Water Quality Standards Attainment

The water body's loading capacity (LC) for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards (WQS) [40 CFR § 130.7(c)(1)]. A statement that WQS will be attained is made.

The Stinson Creek TMDL was developed to address the low dissolved oxygen (DO) and organic sediment impairments of Stinson Creek segment MO_0710. A TMDL is needed for Stinson Creek because it is not meeting the WQS for DO and organic sediment. Low DO is an issue because concentrations have been measured at less than the water quality criterion of 5 milligrams per liter (mg/L). DO in streams may be affected by several factors including water temperature, the amount of decaying organic matter in the stream, turbulence at the air-water interfaee, and the amount of photosynthesis occurring in plants within the stream. Organic matter ean come from wastewater effluent as well as agricultural and urban runoff, and the rate at which it decays and consumes oxygen is typically measured instream as biochemical oxygen demaud (BOD). Nitrogen and phosphorus can also contributc to low DO problems because they can accelerate algae growth in streams. Algae growth in streams is most frequently assessed based on the amount of chlorophyll a in the water. The algae consumc DO during respiration at night and have the potcntial to remove large amounts of DO from the stream. The breakdown of dead, decaying algae also removes oxygen from water.

Pollutants which result in oxygen concentrations below saturation are fine partiele size bottom sediment, high nutrient levels (nitrogen and phosphorus), and suspended particles of organic matter. Because these three pollutants vary to a large extent based on authropogenic influences, they are appropriate targets for a TMDL written to address an impairment of low DO.

Volatile suspended sediments (VSS) are those sediments that can be removed from the water by filtration and are

lost on ignition (heating to 550 degrees Celsius) and approximate the amount of organic matter contained in a water sample. Missouri changed the listed cause of impairment from VSS to organic sediment, on its 2004/2006 303(d) List to provide a more understandable list to the general public. The causes of the impairment, and the data used to identify it, has not changed and these impairments remain on the 2008 303(d) List of inpaired waters. Organic sediment is a problem based on observed violations of the narrative criteria. Wastewater treatment plants may discharge high levels of organic sediment. Organic sediment can settle onto the bottom of a stream and smother natural substrates (materials in the streambed), aquatic invertebrate animals (like mayfly larvae and crayfish) and fish eggs. Also, high amounts of organic sediment contribute to sludge on the stream bottom, which has an offensive odor in addition to being unsightly. Through previous experience MDNR has found that the treatment technology required to reduce BOD should result in corresponding reductions in organic sediment. Organic sediment is one component of total suspended solids (TSS). TSS consists of fine particles of both organic and inorganic solids suspended in the water column.

To address nutrient levels, the EPA nutrient ecoregion reference concentrations were used. For the ecoregion where Stinson Creek is located, the reference concentration for total nitrogen (TN) is 0.855 mg/L, and the reference concentration for total phosphorus (TP) is 0.092 mg/L. This TMDL will not specifically target chlorophyll a, but will use a linkage between nutrient concentrations and chlorophyll a response to achieve the ecoregion reference concentrations.

There are many quantitative indicators of organic sediment, such as TSS, turbidity, and bedload sediment, which are appropriate to describe sediment in rivers and streams. TSS was selected as one of the numeric targets for this TMDL because it enables the use of the highest quality data available, including permit conditions and monitoring data. Since fine particle sized sediment and suspended particles of organic matter are derived from similar loading conditions of terrestrial and stream bank erosion, this TMDL will have TSS (organic sediment) as one of its allocations. This target was derived based on a reference approach by targeting the 25th percentile of TSS measurements in the geographic region in which Stinson Creek is located.

The TMDLs for TN, TP, and TSS were determined using load duration curves (LDCs). These reductions in nutrients and sediment protects the warm water aquatic life use of the stream and the TMDLs should result in WQS attainment. The LC for TN and TP is defined by a LDC set at the ecoregion reference concentrations. The LC for TSS is defined by a LDC set at the 25th percentile of TSS measurements available in the ecological drainage unit (EDU). The LCs for TN, TP, and TSS at the 60 percent flow exceedance are 37.62 pounds per day (lbs/day), 4.48 lbs/day, and 200.16 lbs/day, respectively.

Numeric Target(s)

Submittal describes applicable WQS, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.

The water quality criterion for DO for all Missouri streams, except cold water fisheries, is a daily minimum of 5 mg/L (10 CSR 20-7.031 Table A).

The designated beneficial uses of Stinson Creek are:
- Livestock and Wildlife Watering,
- Protection of Warm Water Aquatic Life,
- Protection of Human Health (Fish Consumption), and
- Whole Body Contact Recreation - Category B.

The general, or narrative, criteria that apply may be found in the general criteria section of the WQS at 10 CSR 20-7.031 (3)(A) and (C) (Missouri Secretary of State, 2008). Here it states:
- 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.

The use that is impaired is Protection of Warm Water Aquatic Life.

Since fine particle sized sediment and suspended particles of organic matter are derived from similar loading conditions of terrestrial and stream bank erosion, this TMDL will have TSS (organic sediment) as one of its allocations.

To address nutrient levels, the EPA nutrient ecoregion reference concentrations were targeted. To address TSS the 25th percentile of TSS measurements available in the EDU were targeted. The TMDL LDC's represent flow under all possible stream conditions. The advantage of a LDC approach is that it avoids the constraints associated with using a single-flow critical condition and is applicable under all flow conditions. The LCs for TN, TP, and TSS at the 60 percent flow exceedance are 37.62 lbs/day, 4.48 lbs/day, and 200.16 lbs/day, respectively.

Pollutant(s) of concern

An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety (MOS) that do not exceed the LC. If submittal is a phase II TMDL there are refined relationships linking the load to WQS attainment. If there is an increase in the TMDL there is a refined relationship specified to validate the increase in TMDL (either load allocation (LA) or waste load allocation (WLA)). This section will compare and validate the change in targeted load between the versions.

The data available suggests that high nutrient loads are contributing to excessive algal growths in Stinson Creek. The excessive algal growths, in turn, are causing low DO to occur late at night when the algae are consuming but not producing oxygen. Large amounts of algae may also be contributing to low DO when the plants die and decay. The Fulton Wastewater Treatment Plant (WWTP) may be contributing to the high nutrient loads but there might also be contributions from other upstream sources. To address nutrient levels, the EPA nutrient ecoregion reference concentrations were used. For the ecoregion where Stinson Creek is located, the reference concentration for TN is 0.855 mg/L, and for TP is 0.092 mg/L. The LC for TN and TP is defined by LDCs set at the ecoregion reference concentrations. An established link between nutrient concentrations and chlorophyll a response was used to achieve the ecoregion reference concentrations and define this TMDL as a numeric value.

Another essential component of developing a TMDL is establishing a relationship between the source loadings and resulting water quality. For this TMDL, the relationship between the source loadings of BOD and nutrients on DO is generated by the water quality model QUAL2K. The processes employed in QUAL2K address nutrient cycles, algal growth, and DO dynamics. The WLA for BOD was derived from the QUAL2K modeling run that resulted in meeting WQS.

A TMDL establishing an allocation for suspended solids was developed. In cases where sufficient pollutant data for the impaired stream are not available a reference approach is used. In this approach, the target for pollutant loading is the 25th percentile of the EDU condition calculated from all data available within the EDU in which the water body is located. The LC for TSS is defined by a LDC set at the 25th percentile of TSS measurements available in the EDU. The TMDL is written for organic sediment. An established link between TSS and sediment was used to define this TMDL as a numeric value. TSS consists of fine particles of both organic (VSS) and inorganic (non-volatile suspended solids [NVSS]) solids suspended in the water column. VSS and NVSS concentrations added together give the TSS concentration. Since fine particle-sized organic bottom sediments and suspended particles of organic matter are derived from similar loading conditions of terrestrial and stream bank erosion, this TMDL will have as one of its allocations TSS. The WLA, LA, and MOS for all pollutants are set to not exceed the LC. Reductions in concentration for all pollutants should ensure the DO WQS of 5 mg/L and the narrative standards are met.

Source Analysis

Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, nonpoint and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered. If this is a phase II TMDL any new sources or removed sources will be specified and explained.

There are 33 facilities in the Stinson Creek watershed that have national pollutant discharge elimination system (NPDES) permits through the state of Missouri. Thirteen of the permits within the watershed are site specific, four are general permits, and sixteen are storm water permits.

Site Specific Permits

Facility	Permit Number	Design Flow Million Gallons/Day
Harbison-Walker Refractor	MO0003018	0.874
Red Maples Mobile Home Community	MO0049590	0.038
Tower Mobile Home Park	MO0085936	0.022
Christopher Subdivision #2	MO0093742	0.007
Green Meadows Subdivision	MO0093751	0.019
Mertens Convenienee Store	MO0093882	0.012
Country Livin' Subdivision	MO0102148	0.005
Fulton WWTP	MO0103331	2.930
Callaway Christian Chureh	MO0124290	0.001
Callaway Raceway	MO0125571	0.002
Red Creek Estates	MO0128104	0.007
Stonehaven Estates	MO0129020	0.023
Master Key Homeplace Subdivision	MO0132713	0.020

The Fulton WWTP is the largest permitted faeility in the watershed with a design flow that eomprises more than 94 percent of the total of all facilities shown. The Fulton WWTP merits special attention because of its size and also because it is loeated just upstream of the impaired segment. The faeility was built in 1987, and consists of an oxidation ditch, sludge holding tanks, clarifiers, and aerobie sludge digesters. It has a design flow of 2.93 million gallons per day, although it is currently operating at a flow of 1.7 million gallons per day. The sludge is land applied, and in 1998 the city installed a new vacuum-assisted biosolids dewatering system that dramatically reduced the volume of dewatered matcrial. Thc currcnt discharge permit expires August 11, 2010. At the direction of EPA, when the operating permit for the Fulton WWTP is next rcnewed, a condition will be placed in the permit requiring the facility to eliminate Outfall #002 and redircct overflow from the lagoon into the mechanical treatment plant.

A mixing zone currently applies to this permit, extending approximately 1000 feet downstream from outfall 001 to just above the Stinson Creek confluenee with Smith Branch. However, as a rcsult of rule changes incorporated into the Missouri Code of State Regulations in Novembcr 2005, mixing zoncs are no longcr allowed in low-flow streams with 7-day Q_{10} low flows of less than 0.1 cfs, such as Stinson Creek. The permit will be revised to comply with the new standards the next time the permit is opened for reissuance. Modeling of permit limit WLAs does not incorporatc a mixing zone.

General Permits

Facility	Permit Number	Design Flow Million Gallons/Day
Echo-L Holsteins	MOG010552	0.021
A.P. Green Refractorics	MOG490549	Gcneral Permit
Mo-Con, Inc.	MOG490763	General Permit
Backer Potato Chip Co.	MOG822156	Gencral Permit

Storm Water Permits

Facility	Permit Number	Design Flow Million Gallons/Day
Fulton Small MS4	MOR040061	Storm water Permit
Southwind Estates Plat 4	MOR10A195	Storm water Permit
Walgreen's Retail Center	MOR10A265	Storm watcr Permit
Helm Subdivision	MOR10A344	Storm water Permit
Central Missouri Energy	MOR10A408	Storm water Permit
Westminster College Residence Hall	MOR10A989	Storm water Pcrmit
Junior Lake (William Woods University)	MOR10B037	Storm water Permit

Callaway Electric Industries	MOR10B740	Storm water Permit
Stonehaven Estates Subdivision	MOR10B749	Storm water Permit
Kingdom Projects Inc.	MOR80H008	Storm water Permit
Tanglewood Estates	MOR102553	Storm water Permit
Tanglewood Estates #3,4,5	MOR103423	Storm water Permit
Tanglewood Business Park	MOR104115	Storm water Permit
Tanglewood Fastlane	MOR105239	Storm water Permit
Fulton Commons	MOR107435	Storm water Permit
Westminster College Dining Hall	MOR109Q64	Storm water Permit

Since critical conditions for low DO and organic sediment occur during periods of low stream flow, it is unlikely that storm water discharge from facilities with storm water permits are a significant contributor to the low DO problem. It is also unlikely the general permits for land application of wastewater will contribute to the DO problem because these permits are no-discharge and contain restrictions designed to minimize the impact of land application to surface waters. Concentrated animal feeding operations (CAFOs) are no-discharge except during storms exceeding the design storm event, and so are not likely to impact streams during critical periods of low flow. The other types of general permits within the Stinson Creek watershed do allow both storm and non-storm water discharge. These facilities are also required to adhere to operating conditions with the permits designed to minimize their impacts to surface waters.

Illicit straight pipe discharges of household waste are potential point sources in agricultural areas. These are discharges straight into streams or land areas and are different than illicitly connected sewers. There is no specific information on the number of illicit straight pipe discharges of household wastes in the Stinson Creek watershed.

Failing septic systems are sources of nutrients that can reach nearby streams through both surface runoff and ground water flows. The exact number of onsite wastewater systems in the Stinson Creek watershed is unknown. An estimate was made based on approximately 1,488 people in the rural watershed area with 2.5 persons per household gives 492 systems potentially.

Storm water runoff from urban areas can be a significant source of nutrients, sediment and oxygen consuming substances. Lawn fertilization can lead to high nutrient loads, and pet wastes can contribute both nutrient loads and oxygen-consuming substances. Phosphorus loads from residential areas can be comparable to or higher than loading rates from agricultural areas. Warmer storm runoff from urban areas such as parking lots and buildings can lead to higher water temperatures that lower the DO saturation capacity of streams. Excessive discharge of suspended solids, including organic sediment, from urban areas can also lead to streambed siltation problems. Fulton's municipal separate storm sewer system (MS4) permit accounts for 9.6 square miles within the watershed and includes discharge from 25 out of 33 of the permitted storm water outfalls. Approximately 10 percent of the riparian corridor is classified as impervious and urban areas.

Lands used for agricultural purposes can be a source of nutrients, sediment and oxygen-consuming substances. Accumulation of nitrogen and phosphorus on cropland occurs from decomposition of residual crop material, fertilization with chemical and manure fertilizers, atmospheric deposition, wildlife excreta, and irrigation water. The land use/land cover data indicates that approximately 14 percent of the watershed consists of cropland and nearly 2 percent of the riparian corridor along Stinson Creek is classified as cropland.

Riparian areas can be sources of natural background material that could possibly contribute to the low DO and organic sediment problem. Leaf fall from vegetation near the water's edge, aquatic plants, and drainage from organically rich areas like swamps and bogs are all natural sources of materials that consume oxygen and increase sediment. Other types of land use includes forest (28 percent), herbaceous, open water, and wetland (all totaling 3.78 percent). Forest comprises 44.27 percent of the riparian corridor. While herbaceous, open water and wetland is 34.95 percent of the riparian corridor.

There is one permitted CAFO in the watershed. Echo-L-Holsteins is regulated under a general permit. Although there is only one permitted CAFO in the watershed, the presence of unpermitted or pasture operations of lower density livestock populations could be contributing to the nutrient and sediment loads in Stinson Creek. The cattle are most likely located on the approximately 13,210 acres of grassland/pastureland in the watershed, and runoff from these areas can be potential sources of nutrients and oxygen-consuming substances. Animals grazing in pasture areas deposit manure directly upon the land surface and, even though a pasture may be relatively large

and animal densities low, the manure will often be concentrated near the feeding and watering areas in the field. These areas can quickly become barren of plant cover, increasing the possibility of erosion and contaminated runoff during a storm event. Grassland makes up 44 percent of the watershed land use and 8.6 percent of the riparian corridor.

In the absence of an NPDES permit, the discharges associated with sources were applied to the LA, as opposed to the WLA for purposes of this TMDL. The decision to allocate these sources to the LA does not reflect any determination by EPA as to whether these discharges are, in fact, unpermitted point source discharges within this watershed. In addition, by establishing these TMDLs with some sources treated as LAs, EPA is not determining that these discharges are exempt from NPDES permitting requirements. If sources of the allocated pollutant in this TMDL are found to be, or become, NPDES-regulated discharges, their loads must be considered as part of the calculated sum of the WLAs in this TMDL. WLA in addition to that allocated here is not available.

Any CAFO that does not obtain an NPDES permit must operate as a no discharge operation. Any discharge from an unpermitted CAFO is a violation of Section 301. It is EPA's position that all CAFOs should obtain an NPDES permit because it provides clarity of compliance requirements, authorization to discharge when the discharges are the result of large precipitation events (e.g., in excess of 25-year and 24-hour frequency/duration) or are from a man-made conveyance. However, many large CAFOs (mostly the poultry and swine sectors) contend that they do not discharge nor propose to discharge therefore are not required to obtain an NPDES permit. It is EPA's opinion that many of the "no discharge" CAFOs do not have adequate land application area to ensure the agronomic uptake of land applied waste or are not designed, constructed, operated, or maintained so that they do not discharge or propose to discharge. Furthermore, there are many animal feeding operations (AFOs) that meet the definition of a medium CAFO (i.e., discharge via a man-made conveyance) but are unpermitted and have not limited their impact on waters by applying Best Professional Judgment to effluent reductions.

Any permitted CAFOs identified in this TMDL would have been assigned a WLA. At this time, AFOs and unpermitted CAFOs are considered under the LA because we do not currently have enough detailed information to know whether these facilities are required to obtain NPDES permits. This TMDL does not reflect a determination by EPA that such facility does not meet the definition of a CAFO nor that the facility does not need to obtain a permit. To the contrary, a CAFO that discharges or proposes to discharge has a duty to obtain a permit. If it is determined that any such operation is an AFO or CAFO that discharges, any future WLA assigned to the facility must not result in an exceedance of the sum of the WLAs in this TMDL as approved.

All known sources have been considered.

Allocation - Loading Capacity

Submittal identifies appropriate WLA for point, and load allocations for nonpoint sources. If no point sources are present the WLA is stated as zero. If no nonpoint sources are present, the LA is stated as zero [40 CFR § 130.2 (i)]. If this is a phase II TMDL the change in LC will be documented in this section.

The LCs for TN, TP, and TSS at the 60 percent flow exceedance are 37.62 lbs/day, 4.48 lbs/day, and 200.16 lbs/day, respectively. For TN, TP, and TSS: the MOS is implicit, the LAs are zero at low flow (100 percent exceedance), and the sum of the WLA and LA do not exceed the LC.

WLA Comment

Submittal lists individual WLAs for each identified point source [40 CFR § 130.2(h)]. If a WLA is not assigned it must be shown that the discharge does not cause or contribute to WQS excursions, the source is contained in a general permit addressed by the TMDL, or extenuating circumstances exist which prevent assignment of individual WLAs. Any such exceptions must be explained to a satisfactory degree. If a WLA of zero is assigned to any facility it must be stated as such [40 CFR § 130.2(i)]. If this is a phase II TMDL any differences in phase I and phase II WLAs will be documented in this section.

The WLAs for TN, TP, and TSS were derived from the load duration curves at the critical condition of low flow, when inputs are set at the Fulton WWTP design flow of 4.54 cubic feet per second.

The TN WLA for the city of Fulton's WWTP is 20.95 lbs/day at all flow conditions. The TN sum WLA for all other permits is 7.36 lbs/day. The TN WLA for the city of Fulton's MS4 varies with flow. As an example, at the 60 percent flow exceedance the MS4 WLA is 2.33 lbs/day.

The TP WLA for the city of Fulton's WWTP is 2.25 lbs/day at all flow conditions. The TP sum WLA for all other permits is 0.79 lbs/day. The TP WLA for the city of Fulton's MS4 varies with flow. As an example, at the 60 percent flow exceedance the MS4 WLA is 0.28 lbs/day.

The TSS WLA for the city of Fulton's WWTP is 122.51 lbs/day at all flow conditions. The TSS sum WLA for all other permits is 43.06 lbs/day. The TSS WLA for the city of Fulton's MS4 varies with flow. As an example, at the 60 percent flow exceedance the MS4 WLA is 8.65 lbs/day.

The carbonaceous biochemical oxygen demand (5 days) (CBOD5) WLA for the city of Fulton's WWTP is set at 220 lbs/day. The WLA for CBOD5 was derived from the QUAL2K modeling that resulted in meeting WQS.

LA Comment

Includes all nonpoint sources loads, natural background, and potential for future growth. If no nonpoint sources are identified the LA must be given as zero [40 CFR § 130.2(g)]. If this is a phase II TMDL any differences in phase I and phase II LAs will be documented in this section.

The LAs for the Stinson Creek TMDL are for all nonpoint sources of TN, TP, and TSS. The LAs were calculated based on the total of all headwater and lateral inflow loads used in the QUAL2K model for the allocation scenario model run. The LAs are intended to allow the DO target and the organic sediment target (TSS) to be met at all locations within the stream.

As an example, at the 60 percent flow exceedance the LA for TN is 6.98 lbs/day, for TP is 1.15 lbs/day, and for TSS is 25.94 lbs/day. During critical conditions when flow is at its lowest, and there is effectively no flow from nonpoint sources, the LAs for all targeted pollutants is 0 (zero) lbs/day.

Margin of Safety

Submittal describes explicit and/or implicit MOS for each pollutant [40 CFR § 130.7(c)(1)]. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided. If this is a phase II TMDL any differences in MOS will be documented in this section.

An implicit MOS was incorporated into the TMDL based on conservative assumptions applied to the QUAL2K model and used in the development of the TMDL LDCs. Conservative assumptions included targeting the 25th percentile of TSS concentrations in the geographic region in which Stinson Creek is located. WLAs for the Fulton WWTP were also calculated under critical low flow conditions when discharge from this facility will dominate the stream flow.

Seasonal Variation and Critical Conditions

Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s) [40 CFR § 130.7(c)(1)]. Critical conditions are factors such as flow or temperature which may lead to the excursion of WQS. If this is a phase II TMDL any differences in conditions will be documented in this section.

The impairment of Stinson Creek is low DO and organic sediment. The critical condition for low DO would be during low flow conditions. Low DO can also occur due to increased nutrients and organic sediments being carried into the water body through storm water runoff. A critical condition for organic sediment is during the high flow conditions of storm water runoff. These conditions are more likely to occur during seasonal periods having significant precipitation. Setting LCs that are protective for organic sediment during the high flow conditions addresses the organic sediment critical condition. Seasonal variation has been implicitly taken into account within the TMDL calculations. Using a LDC for TMDL development during these conditions will be protective, the TMDL LDC represents flow under all possible stream conditions and seasons, and avoids the constraints associated with using a single-flow critical condition.

Public Participation

Submittal describes required public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s) [40 CFR § 130.7(c)(1)(ii)].

This water quality limited segment of Stinson Creek is included on the EPA approved 2008 303(d) List for Missouri. The public notice period for the draft Stinson Creek TMDL was from September 28, 2009, to November 11, 2009. The public notice, the TMDL Information Sheet, and this document were posted on the MDNR Web site, making them available to anyone with Internet access. The public notice announcement

was also sent to a variety of interest groups. Comments received, and MDNR's response to those comments, have been placed in the Stinson Creek administrative record file. Two comments were received and MDNR responded and made changes to the draft TMDL.

Monitoring Plan for TMDL(s) Under Phased Approach

The TMDL identifies a monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used) [40 CFR § 130.7].

Post-TMDL monitoring will be scheduled and carried out by MDNR three years after the TMDL is approved, following the compliance schedule outlined in the permit and the application of any new effluent limits. The Missouri State Operating Permit (MSOP) for the city of Fulton's WWTP was reissued August 12, 2005, and expires August 11, 2010. The permit will be renewed at that time with new effluent limits, based on the WLAs developed in this TMDL.

The permit currently requires instream monitoring downstream of the wastewater treatment plant. This requirement will be carried over at permit renewal in order to provide additional data with which to assess the impact of the revised permit limits on Stinson Creek. Currently, instream data is collected monthly in Stinson Creek for DO, pH, ammonia and temperature. The local Stream Team had gathered chemistry data on Stinson Creek above the WWTP several times a year between 1998 and 2005. These two sources of data (permittee instream monitoring and volunteer monitoring) will be used for screening purposes, to compare the stream's current condition with future, post-TMDL, conditions.

MDNR will routinely examine physical habitat, water quality, invertebrate community, and fish community data collected by other state and federal agencies in order to assess the effectiveness of TMDL implementation. One example is the Resource Assessment and Monitoring Program administered by the Missouri Department of Conservation. This program randomly samples streams across Missouri on a five to six year rotating schedule.

Reasonable Assurance

Reasonable assurance only applies when less stringent WLAs are assigned based on the assumption of nonpoint source reductions in the LA will be met [40 CFR § 130.2(i)]. This section can also contain statements made by the state concerning the state's authority to control pollutant loads.

Reasonable assurances are not required within this TMDL because all permitted point sources have received a WLA that is set to meet WQS. MDNR has the authority to issue and enforce MSOPs. Inclusion of effluent limits derived from TMDL WLAs into a state permit, and monitoring of the effluent reported to MDNR, should result in compliance with WQS. MDNR will work with the city of Fulton to discuss treatment plant upgrades and funding options, and will issue a permit reflective of the WQS that must be met.