



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7

11201 Renner Boulevard
Lenexa, Kansas 66219

13 JUL 2016

OMs. Sara Parker Pauley, Director
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, Missouri 65102

RE: Approval of TMDL document for Coldwater Creek

Dear Ms. Pauley:

This letter responds to the submission from the Missouri Department of Natural Resources, received by the U.S. Environmental Protection Agency, Region 7, on January 7, 2015, for a Total Maximum Daily Load document which contained a TMDL for *Escherichia coli*. Coldwater Creek was identified on the 2014 Missouri Section 303(d) List as impaired for *E. coli*. This submission fulfills the Clean Water Act statutory requirement to develop TMDLs for impairments listed on a state's § 303(d) List. The specific impairment (water body segment and pollutant) is:

<u>Water Body Name</u>	<u>WBIDs</u>	<u>Cause</u>
Coldwater Creek	MO_1706	<i>Escherichia coli</i>

The EPA has completed its review of the TMDL document with supporting documentation and information. By this letter, the EPA approves the submitted TMDL. Enclosed with this letter is the EPA Region 7 TMDL Decision Document which summarizes the rationale for the EPA's approval of the TMDL. The EPA believes the separate elements of the TMDL described in the enclosed document adequately address the pollutants of concern, taking into consideration seasonal variation and a margin of safety.

Although the EPA does not approve the monitoring or implementation plans submitted by the state, the EPA acknowledges the state's efforts. The EPA understands that the state may use the monitoring plan to gauge the effectiveness of the TMDL and determine if future revisions are necessary or appropriate to meet applicable water quality standards. The EPA recognizes that technical guidance and support are critical to determining the feasibility of achieving the goals outlined in this TMDL document. Therefore, the implementation plan in this TMDL provides information regarding implementation efforts to achieve the loading reductions identified.



The EPA appreciates the thoughtful effort that the MDNR has put into this TMDL. We will continue to cooperate with and assist, as appropriate, in future efforts by the MDNR to develop TMDLs.

Sincerely,



Karen A. Flournoy
Director
Water, Wetlands and Pesticides Division

Enclosure

cc: Mohsen Dkhili, MDNR



EPA Region 7 TMDL Review

TMDL ID: MO_1706

State: MO

Document Name: COLDWATER CREEK

Basin(s): LOWER MISSOURI RIVER BASIN

HUC(s): 10300200

Water body(ies): COLDWATER CR.

Tributary(ies):

Pollutant(s): ESCHERICHIA COLI (E. COLI)

Submittal Date: 1/7/2015

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 Total Maximum Daily Load document was formally submitted by the Missouri Department of Natural Resources. The U.S. Environmental Protection Agency received this document on January 7, 2015. After comments from the EPA, a revised final submittal was received as an email attachment on March 3, 2015.

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 listing of Coldwater Creek as impaired by *Escherichia coli* bacteria was approved by the EPA on August 26, 2014. The MDNR's 303(d) submittal to the EPA listed urban runoff and storm sewers as the likely sources of impairment. The TMDL document directly addresses the Coldwater Creek bacteria impairment by establishing an *E. coli* target. Data analysis from the listing process and the TMDL development are presented in the TMDL document. The data demonstrates that high *E. coli* bacteria concentrations exceeds Missouri's water quality criterion for whole body contact recreation category B designated use.

Recreational season *E. coli* data for Coldwater Creek (2006 – 2010)*

Year	Sampling Events	Geometric Mean	Minimum	Maximum	WBC Category**	WBC Criterion	Exceedance
2006	18	353.98	50	3,800	B	206	Yes
2007	12	223.05	20	37,000	B	206	Yes
2008	5	184.89	5	1,500	B	206	No
2009	7	503.46	86	5,172	B	206	Yes
2010	2	121.27	86	171	B	206	--

* The units for all *E. coli* values are counts per 100 milliliters of water. Years with fewer than five samples within the recreational season are not assessed for compliance with the whole body contact recreation criterion.

** WBC = whole body contact recreation

At 50 percentile flow exceedance, loading capacity is 6.11E+10 counts per day *E. coli*. The concentration value of 206 counts/100 mL will serve as the numeric target for TMDL development. This target will be expressed as a

daily load that varies by flow. Achieving this target will also result in the achievement of the state's whole body contact recreation category B water quality criteria and attainment of WQS.

The WQS for WBC category B will be attained through the implementation of the TMDL document.

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 following designated uses for Coldwater Creek are in the Missouri water quality standards at 10 CSR 20-7.031- Table H, and in the Missouri Use Designation Dataset (version 1) described at 10 CSR 20-7.031(1)(P). The MUDD includes both pending and the EPA approved use determinations:

The TMDLs established within this document for *E. coli* bacteria are protective of all the designated uses with within Coldwater Creek.

The following designated uses for Coldwater Creek have been assigned and are reflected in the Missouri Use Designation Dataset as described at 10 CSR 20-7.031 (2)(E):

- Livestock and wildlife protection (LWP)
- Irrigation (IRR)
- Protection and propagation of fish, shellfish and wildlife - warm water habitat (WWH)
- Human health protection (HHP)
- Industrial (IND)
- Secondary contact recreation (SCR)
- Whole body contact recreation category B (WBC-B)

The impaired designated use in Coldwater Creek is the protection of whole body contact recreation category B. Category A waters include water bodies that have been established as public swimming areas and water with documented existing whole body contact recreational uses by public. Category B applies to waters designated for whole body recreation, but are not contained within category A.

The applicable water quality criteria for protection of the above designated uses are listed in Missouri's water quality standards at 10 CSR 20-7.031 (5) (C) and Table A, specific numeric criteria are given for the protection of the whole body contact recreation use. For category B waters, *E. coli* counts, measured as a geometric mean, shall not exceed 206 counts per 100 milliliters of water "during the recreational season." The state's recreational season is defined in this section of the rule as being from April 1 to October 31.

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.

A TMDL is needed for Coldwater Creek because the MDNR has determined that this stream is not meeting the state bacteria water quality criterion for whole body contact recreation category B. Data collected from Coldwater Creek by the U.S. Geological Survey, the MDNR and the Metropolitan St. Louis Sewer District show exceedances of the state's whole body contact recreation category B criterion of 206 *E. coli* counts per 100 milliliters of water (206/100 mL). This assessment is based on the geometric mean of samples collected during the state's recreational season (April 1 through October 31). For TMDL purposes, bacteria data collected from Coldwater Creek within the last five years (2006 - 2010) were used. This data is expected to be the most representative of the stream's current condition. Table 4 and Figure 6 in the TMDL document summarize bacteria data collected from the impaired segment of Coldwater Creek during the 2006 - 2010 recreational seasons. Figure 7 in the TMDL document summarizes *E. coli* data by month for this same period. All available *E. coli* data collected from Coldwater Creek, including any data collected outside the recreational season, are contained in Appendix A.

High counts of *E. coli* may be an indication of increased risk of pathogen-induced illness to humans. *E. coli* are bacteria found in the intestines of humans and warm-blooded animals and are used as indicators of the risk of waterborne disease from pathogenic bacteria or viruses. Infections due to pathogen-contaminated waters include gastrointestinal, respiratory, eye, ear, nose, throat and skin diseases. To address these potential health risks, this TMDL targets instream bacteria levels using *E. coli* as the primary measurement parameter. Selection of *E. coli* as the numeric target enables the use of the highest quality data available and provides consistency with Missouri's WQS.

For Coldwater Creek, the load duration curve approach was used. When stream flow gage information is available, a load duration curve is useful in identifying and differentiating between storm-driven and steady-input sources. The load duration approach may be used to provide a visual representation of stream flow conditions under which pollutant criteria exceedances have occurred, to assess critical conditions, and to estimate the level of pollutant load reduction necessary to meet the surface water quality targets in the stream. Average daily flow data for Coldwater Creek were directly available from July 11, 1996, to July 7, 2011, from the USGS gaging station USGS 06936475 Coldwater Creek near Black Jack, Missouri. Flow data from this gage was adjusted to the impaired watershed based on the ratio of the impaired watershed area to the gage drainage area of 40.4 square miles. A detailed discussion of the methods used to develop the bacteria load duration curve is presented in Appendix B of the TMDL document.

A load duration curve also identifies the maximum allowable daily pollutant load for any given day as a function of the flow occurring that day, which is consistent with the EPA guidance. The EPA guidance recommends that all TMDLs and associated pollutant allocations be expressed in terms of daily time increments, and suggests that there is flexibility in how these daily increments may be expressed. The EPA guidance indicates that where pollutant loads or water body flows are highly dynamic, it may be appropriate to use a load duration curve approach, provided that such an approach identifies the allowable daily pollutant load for any given day as a function of the flow occurring on that day. In addition, for targets that are expressed as a concentration of a pollutant, it may be appropriate to use a table or graph to express individual daily loads over a range of flows as a product of a water quality criterion multiplied by stream flow and a conversion factor.

The concentration value of 206 counts/100 mL will serve as the numeric target for TMDL implementation. This targeted concentration will be expressed as a daily load that varies by flow using a load duration curve. Loading at or below the TMDL curve will result in achieving the state's whole body contact B water quality criterion. Because the whole body contact category B criterion is a geometric mean, fluctuations in instantaneous bacteria concentrations are expected, and individual bacteria measurements greater than the TMDL target do not in and of themselves indicate an exceedance of WQS.

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.

Land use calculations for Coldwater Creek are based on data from 2000 to 2004 at 30-meter resolution obtained from Thematic Mapper Imagery. The watershed is predominantly an urban environment, with areas categorized as urban or impervious accounting for over 77 percent of the watershed. This percentage includes low-intensity and high-intensity urban environment. Impervious areas of the watershed account for over 15 percent and is the second most abundant land use type in the watershed. The majority of the watershed area that is classified as impervious is concentrated primarily at and around the Lambert-St. Louis International Airport. The third most abundant land use type in the Coldwater Creek is grassland, which accounts for 12 percent of the watershed area. The remaining land use categories are forest and woodland - 6 percent; barren - 0.71 percent; wetland - 0.55 percent; open water - 0.37 percent and herbaceous - 0.07 percent.

St. Louis County covers an area of 523 square miles and has a population of 999,021. Coldwater Creek watershed has an estimated population of 147,467, with 99.5 percent of the watershed categorized as urban environment.

Coldwater Creek watershed contains 38 permitted entities. Five of these permitted facilities have site-specific permits, of which one is a municipal domestic wastewater discharger. Seven facilities have general permits for discharging either non-domestic process water or storm water; twenty six permitted facilities have storm water

permits, including two small municipal separate storm sewer system permits. There are no permitted concentrated animal feeding operation facilities in this watershed. Municipal and domestic wastewater treatment facilities are designed to treat household waste, which includes both greywater and sewage and are potential sources of bacteria. The Metropolitan St. Louis Sewer District's Coldwater Creek Wastewater Treatment Facility is currently the only facility permitted to discharge municipal domestic wastewater present in the watershed. This facility discharges its domestic wastewater to the Missouri River outside of the Coldwater Creek watershed. This facility's permit was renewed and issued on January 13, 2012, and only allows storm water discharges in the Coldwater Creek watershed. Prior permits allowed emergency sewage discharges to Coldwater Creek should a failure occur at the facility's main outfall. Emergency discharges were not treated and it would be assumed that bacteria is a potential source. Despite this allowance, emergency discharges were infrequent and are not considered to cause or contribute to the bacteria impairment of this water body.

General (Mo-G) and storm water (MO-R) permits in the Coldwater Creek watershed

Permit Number	Facility Name
MO-G140040	Signature Flight Support
MO-G490133	Fort Bellefontaine Quarry CS31
MO-G490910	Pace Construction- Fort Belle
MO-G491175	Millstone Bangert
MO-G760065	The New Wedgewood Bath and Tennis Club
MO-G940221	Allied Aviation Fueling Company of St. Louis
MO-G970015	FT Bellefontaine Compost
MO-R070005	Metropolitan St. Louis Sewer District and co-permittees' small MS4
MO-R040063	Missouri Department of Transportation Small MS4
MO-RA00161	CVS Pharmacy Store #6745
MO-RA00263	Lambert St. Louis Airport- East of I-270
MO-RA00262	Lambert St. Louis Airport- West of I-270
MO-RA00298	Millstone Bangert- Natural Bridge Road
MO-RA00648	Misty Hollow
MO-RA00749	Hunter Engineer Company
MO-RA01020	Florissant Shopping Center Redevelopment
MO-RA01393	Dollar General
MO-RA01456	McDonald's Restaurant- St. John
MO-RA01809	Hazelwood High School
MO-RA01977	Aviator Lot 4
MO-RA02128	Berkeley Manor
MO-R107791	Victory Baptist Church
MO-R130014	Bernadette Business Forms
MO-R130039	Printpack Incorporated
MO-R203051	Hunter Engineering Company
MO-R203242	The Gateway Company
MO-R23A095	LHB Industries
MO-R23D118	Graham Packaging Company
MO-R80C254	Fleet Car Carriers
MO-R80C325	Prairie Farms Hazelwood
MO-R80C395	MO Air National Guard - 131 Bomb Wing
MO-R80C484	The Special School District
MO-R80H119	Republic Services Recycling of MO North

Industrial/non-domestic wastewater site-specific permits in the Coldwater Creek watershed

Permit Number	Facility Name
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MO-0127329	Allied Aviation Fueling Company of St. Louis
MO-011210	Lambert- St. Louis International Airport
MO-004782	The Boeing Company
MO-0135950	GKN Aerospace- St. Louis

There are two small Municipal Separate Storm Sewer System permits regulating portions of the Coldwater Creek watershed. Municipal Separate Storm Sewer System permits authorize the discharge of urban storm water runoff. In general, urban runoff has been found to carry high levels of bacteria and can be expected to exceed water quality criteria for bacteria during the and immediately after storm events in most streams throughout the country. *E. coli* contaminated runoff come from heavily paved areas and from open areas where soil erosion is common. For these reasons, urban runoff is a significant potential contributor of bacteria to Coldwater Creek.

Although the infrequency of past emergency discharges and the presence of primary wastewater outfalls is located outside the watershed, the presence of the sewage system infrastructure within the Coldwater Creek watershed presents a potential source of bacteria due to possible overflows. Sanitary sewer overflows are untreated or partially treated sewage releases from a sanitary sewer system. Overflows could occur for numerous reasons including blockages, line breaks, sewer defects, lapses in sewer system operation and maintenance, inadequate sewer design and construction, power failures and vandalism. Sanitary overflows can occur during either dry or wet weather and at any point in the collection system, including manholes. Overflows are unpermitted and unauthorized by the federal Clean Water Act. Occurrences of sanitary sewer overflows can result in periods of elevated bacteria concentrations. There are twenty constructed sanitary sewer overflows, installed to relieve the sanitary sewers from excess flow caused by inflow and infiltration of storm water during high rain events located within the watershed. United States Geological Survey study of sources of *E. coli* in metropolitan St. Louis streams, including Coldwater Creek, estimated that at least on-third of the measured, instream *E. coli* found in St. Louis area streams originates from humans. The study also indicated that there is a correlation between *E. coli* densities and the number of upstream sanitary sewer overflows. As a result, sanitary sewer overflows are considered significant potential contributors of *E. coli* to Coldwater Creek.

Bacterial inputs to streams from urban runoff can also be caused by sanitary sewer overflows, but also commonly results from residential and green space runoff carrying domestic and wild animal wastes. Birds, dogs, cats and rodents have been stated as common sources *E. coli* contamination in urban storm water. Another component of urban runoff is runoff originating from highway corridors. The Federal Highway Administration published research showing that runoff from highway corridors may also contain bacteria. Sources of *E. coli* to highway areas identified include bird droppings, soil and vehicles carrying livestock and stockyard wastes, which may periodically "seed" a roadway. The study also notes that the magnitude and contributions from highway systems are site-specific and can be affected by numerous factors, such as traffic, design, maintenance, land use, climate and accidental spills. For these reasons, the significance of any highway contributions of bacteria in the Coldwater Creek watershed can not be quantified in this TMDL document. As a result of the urban nature of the watershed, contributions from vehicles transporting livestock and stockyard wastes are likely to be less significant than in more rural watersheds. Additionally, bacteria contributions from sanitary sewer overflows, or onsite wastewater treatment systems are not likely to occur from highway corridors. Highway systems, however, do remain a significant source of heavy metals, inorganic salts, aromatic hydrocarbons and suspended solids.

In addition to sanitary sewer overflows, combined sewer overflows are also present within some of the areas serviced by the Metropolitan St. Louis Sewer District. A combined sewer system collects both storm water runoff and wastewater, including domestic sewage. They are designed to transport wastewater to treatment facilities and discharge directly to a water body if its capacity is exceeded due to storm water inputs. As an offset of both sanitary sewer overflows and combined sewer overflows, periods of elevated bacteria concentrations in a water body due to the discharge of domestic sewage as the runoff component from roofs, parking lots and residential yards and driveways. Fortunately, there are no combined sewer overflows in the Coldwater Creek watershed, therefore, they do not contribute to the bacteria impairment.

There are four industrial or non-domestic wastewater facilities with site-specific permits in the Coldwater Creek watershed. They are not considered to be contributors to the bacteria impairment of Coldwater Creek watershed because they are facilities that discharge wastewater resulting from non-sewage generating activities.

Any concentrated animal feeding operation that does not obtain an National Pollutant Discharge Elimination System permit must operate as a no discharge operation. Any discharge from an unpermitted CAFO is a violation of Section 301. It is the EPA's position that all CAFOs should obtain an NPDES permit because it provides clarity of compliance requirements and authorization to discharge when the discharges are the result of large

precipitation events.

While there are no CAFOs identified in this TMDL document, the AFOs and unpermitted CAFOs are considered under the load allocation because there is currently not enough detailed information to know whether these facilities are required to obtain NPDES permits. This TMDL document does not reflect a determination by the 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 has a duty to obtain a permit. If it is determined that any such operation is a CAFO that discharges, any future wasteload allocations assigned to the facility must not result in an exceedance of the sum of the WLAs in this TMDL document as approved.

Although livestock sources and animal feeding operations appear to be insignificant or non-existent in the Coldwater Creek watershed, any concentrated animal feeding operation that does not obtain an National Pollutant Discharge Elimination System permit must operate as a no discharge operation. Any discharge from an unpermitted CAFO is a violation of Section 301 of the Clean Water Act. It is the 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 such as in excess of the 25-year and 24-hour frequency/duration event or are from a man-made conveyance. However, many large CAFOs contend that they do not discharge and therefore are not required to obtain an NPDES permit. It is the EPA's opinion that many of the "no discharge" CAFOs may 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 will not discharge. Furthermore, there are likely many animal feeding operations 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, pursuant to a permit.

Riparian corridor conditions can have a major impact on instream water quality. Wooded riparian buffers are a vital functional component of stream ecosystems and are instrumental in the detention, removal and assimilation of pollutants from runoff. In hindsight, a stream with good riparian cover is able to moderate the impacts of high pollutant loads than a stream with poor or no riparian cover. The riparian cover for Coldwater Creek is predominantly urban and the land is classified as low-density. This comprises 53 percent of the riparian corridor. Runoff from low-density urban areas, such as residential areas, have a potential to contribute bacteria loading to a waterbody from a pet or wild animal wastes. Because of this, riparian corridor conditions in the watershed are likely to contribute to the bacteria impairment. As a result of the highly urbanized environment of the Coldwater Creek watershed, livestock inputs are not likely to be contributing significantly to the bacteria impairment. There is still a chance that bacterial inputs from these areas may occur from pets and wildlife.

There are no specific data on the number or presence of illicit straight pipe dischargers of household waste in the Coldwater Creek watershed. Due to the presence of a sewerage system throughout the watershed, illicit straight pipe discharges are not expected to be significant contributors of *E. coli* to Coldwater Creek.

Another source of bacterial loading to Coldwater Creek is storm water runoff from land use. Agricultural land uses that may contribute bacteria to a waterbody include manure fertilization of croplands or pastures and livestock grazing. Cropland accounts for less than 2 percent of the entire watershed area and there may be some bacterial inputs from cropland; however, this loading is not likely to be a significant contributor to Coldwater Creek's impaired condition. Bacterial inputs from livestock are also likely to be minor. Almost 13 percent of the watershed is classified as grassland, due to the urban nature of the watershed these areas include golf courses, cemeteries, parks or schoolyards where livestock animals are not likely to graze. County zoning regulations prohibit livestock throughout much of the watershed in most instances. However, certain areas, primarily restricted to areas of the watershed that are unincorporated are zoned as non-urban areas where dairy farming and domestic livestock production are allowed. A very small portion of the watershed near the community of Old Jamestown is zoned for karst preservation which allows dairy farming and domestic livestock production. These activities also occur in areas currently not zoned as on-urban areas or karst preservation. If they were in existence prior to 1965 when the zoning regulations were established. Although that these practices are allowed in some areas, no data exists on the number of livestock that may be present in the watershed. Due to the overall urban nature of the watershed and the very small portion of the watershed that is unincorporated, any existing livestock densities are likely to be low.

In the Coldwater Creek watershed, urban storm water runoff falls within the jurisdiction of two MS4 permits. For purposes of this TMDL, urban runoff within the Coldwater Creek watershed is considered a potential point source contributor *E. coli* to Coldwater Creek. For this reason, no nonpoint urban runoff sources have been identified that are likely to be contributing to the bacteria impairment.

Failing onsite wastewater treatment systems are known to be sources of bacteria, which can reach nearby streams through surface runoff and groundwater flows, therefore contributing bacteria loads under either wet or dry weather conditions. Onsite wastewater treatment systems may contribute bacteria to Coldwater Creek either directly or as a component of MS4 permitted storm water. The exact number of onsite wastewater treatment systems in the Coldwater Creek watershed is unknown. Onsite wastewater treatment systems are known to exist in older areas of the county that were developed prior to the sewerage systems serviced by the Metropolitan St. Louis Sewer District.

The wasteload allocations listed in this TMDL document do not preclude the establishment of future point sources of bacterial loading in the watershed. Any future points should be evaluated against the TMDL and the range of flows, which any additional bacterial loading will affect.

All known sources have been considered in the current TMDL document.

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.

$$TMDL = LC = \Sigma WLA + \Sigma LA + MOS$$

The Coldwater Creek TMDL is expressed as *E. coli* counts per day using a load duration curve. To develop a load duration curve, the TMDL target was multiplied by the flow and a conversion factor to generate the allowable load at different flows. Figure 9 of the TMDL document is the bacteria TMDL load duration curve calculated for Coldwater Creek.

Table 8. Selected *E. coli* TMDL values for Coldwater Creek

<i>Percentile Flow Exceedance</i>	<i>Flow (cfs)</i>	<i>TMDL (counts/day)</i>	<i>MS4 WLA (counts/day)</i>	<i>LA (counts/day)</i>
95	2.86	1.44E+10	1.38E+10	6.21E+08
75	5.95	3.00E+10	2.87E+10	1.29E+09
50	12.12	6.11E+10	5.84E+10	2.63E+09
25	26.44	1.33E+11	1.28E+10	5.73E+09
10	98.91	4.99E+11	4.77E+11	2.14E+10

*cfs= cubic feet per second; MS4= Municipal Sewer Separate Storm Sewer System; WLA = wasteload allocation; LA = load allocation

The WLA listed in this TMDL document do not preclude the establishment of future point sources of bacterial loading in the watershed. Any future sources should be evaluated against the TMDL and the range of flows, which any additional bacterial loading will affect.

Nonpoint sources are identified to be the primary contributors of bacteria to the watershed. The LA associated with areas not having a regulated MS4 is calculated as the remainder of the loading capacity after allocations are made to the WLA.

This TMDL document has an implicit margin of safety due to conservative assumptions.

WLA Comment

Submittal shows 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 total wasteload allocations in the Coldwater Creek watershed over a range of flows are presented in Table 8 of the TMDL document. At 50 percentile flow exceedance, the WLA for the municipal separate storm sewer systems is 5.84E+10 counts per day.

There are no site-specific permitted point sources in this watershed that are likely to contribute to the bacteria impairment, therefore, the industrial and non-domestic dischargers identified have a WLA of zero. Sanitary sewer overflows may still occur within the watershed and are likely significant contributors of bacteria loading to Coldwater Creek. These discharges are unpermitted and not authorized under the Clean Water Act and was given a WLA of zero. Table 6 of the TMDL document lists other facilities with general or non-MS4 storm water permits. These are not considered to cause or contribute to the bacteria impairment of Coldwater Creek and the assigned WLA is zero.

Disaggregating the MS4 wasteload allocation based solely on the area of each MS4 would assume bacterial contributions are equally proportional to the areas of each source, which may not be the case. For these reasons, the MS4 wasteload allocation cannot be accurately disaggregated. Future bacteria monitoring may provide more specific information regarding each MS4 area's actual contributions, including specific sources and mechanisms of transport, thereby allowing permits to be modified accordingly.

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.

Onsite wastewater treatment systems do not contribute to the impairment of Coldwater Creek, therefore, they are assigned a load allocation of zero.

The LA associated with areas not having a regulated municipal separate storm sewer systems is calculated as the remainder of the loading capacity after allocations are made to the wasteload allocation. The LA in the Coldwater Creek watershed over a range of flows are presented in Table 8 of the TMDL document. At 50 percentile flow exceedance, the LA is 2.63E+09 counts per 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.

The margin of safety for this TMDL is implicit due to conservative assumptions such as the use of multiple years of flow gage data collected from Coldwater Creek during all seasons and the reduced uncertainty of the sources of impairment and their remediation through the Metropolitan St. Louis Sewer District's consent decree. Bacteria decay rates weren't applied and the direct recreation-geometric mean was used for estimating the Clean Water Act required daily loading value.

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.

Missouri's water quality criteria for the protection of whole body contact recreation are applicable during the recreational season of April 1 to October 31. The TMDL load duration curve in Figure 9 of the TMDL document represents stream flow under all conditions and uses flow data collected in all seasons. As a result, the *E. coli* targets and allocations established in this TMDL document will be protective throughout the recreational season. The advantage of a load duration curve approach is that all flow conditions are considered and the constraints associated with using a single-flow critical condition are avoided.

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)].

Coldwater Creek was placed on public notice for a 45 day public comment period from June 29 to August 13, 2012. All comments received were considered and the Missouri Department of Natural Resources' responses to those comments will be maintained on file with the department and on the Coldwater Creek total maximum daily load record webpage at www.dnr.mo.gov/env/wpp/tmdl/1706-coldwater-ck-record.htm. A public meeting was held on September 12, 2012, at the Daniel Boone Branch of the St. Louis County Library in Ellisville.

Due to comments received during the 2012 public comment period and revisions made to the state's water quality standards in 2014, changes to the TMDL document were necessary. As a result, a second public comment period was held for 90 days from May 23 to August 21, 2014. This comment period was extended an additional 60 days to October 21, 2014, per request from the Metropolitan St. Louis Sewer District and members of the Partnership for Tomorrow. During this public comment period, the department met with groups who wanted to share their concerns regarding the TMDL document. The department met twice during the public comment period with the Metropolitan St. Louis Sewer District, once on July 22, 2014, and again on October 2, 2014. The department also met with Missouri Department of Transportation during the public comment period on June 24, 2014, to discuss their concerns with the TMDL document and again on October 9, 2014, to discuss potential bacteria monitoring and implementation of the TMDLs. A third meeting, requested by the Metropolitan St. Louis Sewer District was held on December 30, 2014.

The public notice, water body TMDL information sheets and TMDL document for both public comment periods were posted on the department's website making them available to anyone with access to the internet. Additionally, the department maintains an email distribution list via govdelivery.com for notifying subscribers regarding significant TMDL updates or activities.

All comments for the 2014 public comment period were addressed as needed.

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 is usually scheduled and carried out by the department approximately three years after the approval of the TMDL or in a reasonable time period following completion of permit compliance schedules and the application of new effluent limits, or following significant implementation actions, such as removal of constructed sanitary sewer overflows. The Missouri Department of Natural Resources has not scheduled post TMDL monitoring for Coldwater Creek.

The department will routinely examine water quality data collected by other local, state and federal entities in order to assess the effectiveness of TMDL implementation. Such entities may include the United States Geological Survey, the EPA, neighboring state agencies, the Missouri Department of Health and Senior Services, the Missouri Department of Conservation, county health departments and the Metropolitan St. Louis Sewer District. In addition, certain quality-assured data collected by universities, municipalities, private companies and volunteer groups may potentially be considered for monitoring water quality following TMDL implementation.

As noted in Section 3.1.3 of this document, the significance of any highway contributions of bacteria in the Coldwater Creek watershed cannot be quantified in this TMDL due to insufficient data, and contributions from these systems in the Coldwater Creek watershed are expected to be low.

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.

Section 303(d)(1)(C) of the federal Clean Water Act required that TMDLs be established at a level necessary to implement applicable water quality standards. As part of the TMDL process, consideration must be given to the assurances that point and nonpoint source allocations will be achieved and WQS attained. Where TMDLs are developed for point source impaired waters, reasonable assurance derived from the National Pollutant Discharge Elimination System. The wasteload allocations for Municipal Separate Storm Sewer Systems will be implemented through the NPDES MS4 permits with the ultimate goal to employ an iterative process using best management practices to the maximum extent practicable, assessment and refocused BMPs to the maximum extent practicable, leading toward attainment of WQS (64 FR 68753).

The consent decree established as part of the *United States of America and the State of Missouri, and Missouri Coalition for the Environment Foundation v. Metropolitan St. Louis Sewer District*, No. 4:07-CV-1120 requires specific eliminations and reductions of point sources in the Metropolitan St. Louis Sewer District's service area, for which Coldwater Creek is a part. This court-approved decree will provide an additional reasonable assurance of bacteria reductions in Coldwater Creek from point sources over a 23-year period. Progress toward meeting water quality standards in Coldwater Creek is expected to be long-term and will primarily be a continuation of

current, ongoing or legally required activities, such as the consent decree mentioned above. The MDNR's stated intent for the implementation plan was to not impose any additional activities beyond those already being undertaken to satisfy existing regulations or legal requirements.

A large percentage of the watershed is serviced by the Metropolitan St. Louis Sewer District's Coldwater Creek wastewater treatment facility located within the watershed. As a result of the availability of this sewer system and a St. Louis County ordinance requiring that a sewer connection to a building be made when a sanitary sewer line is within 200 feet of the property, many septic systems in the Coldwater Creek watershed is expected to be low. The consent decree established requires the implementation of a supplemental environmental project to decommission some septic tanks to low-income residents within the Metropolitan St. Louis Sewer District's service area. This project could aid in further reducing the number of septic tanks within the watershed, however, overall reductions are dependent upon availability of funding for this supplemental project.

Municipal Separate Sewer Storm System permits regulate urban storm water discharges for approximately 95.7 percent of the Coldwater Creek watershed. This regulated area corresponds to the MS4 area depicted in Figure 7 of the TMDL document, which is comprised of the U.S. Census Bureau's defined urban area as well as the Missouri Department of Transportation's right of way. For purposes of this TMDL, urban storm water runoff from these MS4 regulated areas is considered a point sources. Although storm water discharges are untreated, small MS4 permit holder must develop, implement and enforce storm water management plans to reduce the contamination of storm water runoff and prohibit illicit discharges. These plans must include measurable goals, must be reported on annually, and must meet six minimum control measures. These six minimum control measures are public education and outreach, public participation and involvement, illicit discharge detections and elimination, construction site runoff control, post-construction runoff control and pollution prevention. Entities within the Coldwater Creek watershed that are regulated under the MS4 permits noted in Table 6 of the TMDL document include the Missouri Department of Transportation and the Metropolitan St. Louis Sewer District and its co-permittees, which include St. Louis County and the municipalities of Berkeley, Black Jack, Breckenridge Hills, Bridgeton, Charlack, Ferguson, Florissant, Hazelwood, Overland, St. Ann, St. John and Woodson Terrace.

A variety of grants and loans may be available to assist watershed stakeholders with developing and implementing watershed plans, controls and practices to meet the required wasteload and load allocations in the TMDL document and demonstrate additional reasonable assurance.