Lower Meramec Watershed Management Plan 2017 Update: Including Mattese/Pomme, Sugar/Fenton, Grand Glaize/Fishpot/ Williams, Hamilton/Kiefer, Fox/LaBarque, and Brush Creeks

This project has been funded in part by the U.S. Environmental Protection Agency, Region 7, through Missouri Department of Natural Resources under assistance agreement G16-NPS-05 to East-West Gateway Council of Governments. Other funders include Great Rivers Greenway, Missouri Department of Conservation and The Nature Conservancy. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency, or other partners, nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.

Prepared by East-West Gateway Council of Governments September 2017

May 2018 - Kiefer Creek Nine Element Plan for Bacteria Accepted by EPA Region 7

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Chapter I. Introduction

A. Introduction

The lower Meramec River extends 109 miles from Meramec State Park at Sullivan to the confluence with the Mississippi River at Arnold. It lies wholly within the East-West Gateway region and the three counties of Franklin, Jefferson, and St. Louis. In 2012, East-West Gateway Council of Governments (EWG) completed a watershed management plan for the Lower Meramec River and its tributaries in Jefferson and St. Louis counties, from Pacific to Valley Park, covering four 12-digit Hydrologic Unit Code, or HUC, watersheds.¹

Water quality problems in the lower Meramec watershed are largely the result of non-point sources of pollution. Over the past few decades point sources of pollution from wastewater treatment plants and industries have been regulated and require permits to discharge into receiving waters. These permits specify effluent limits so the discharge still allows receiving waters to meet water quality standards. Non-point sources are mostly stormwater runoff from urban development. Cities with over 10,000 people are now (since 2000) required to obtain permits through the municipal separate storm sewer system, or MS4, program. While regulations on point source discharges to waterbodies will continue to improve water quality over time, polluted runoff still makes its way into streams and rivers. Past development practices that were not subject to the permitting process, through overland flow outside of MS4 systems and also from failing on-site wastewater treatment systems (septic systems) are major contributors of pollutants. The 2012 Lower Meramec Watershed Plan (2012 Plan) outlined goals, objectives, and projects for improving water quality through the use of green infrastructure to address these unpermitted, non-point sources.

B. Implementation Progress Since 2012

As of 2016, segments of seven streams in the 2012 Plan are still listed as impaired for pollutant loads that exceed water quality standards. Additionally, in 2016, a segment of the Meramec River has now been listed as polluted by bacteria. More significantly, the tributaries east of LaBarque Creek all exhibit serious loss of aquatic habitat as shown by fish populations studies conducted by the Missouri Department of Conservation (MDC) in 2015. The Lower Meramec River remains a prime recreational asset for the region, and water quality improvement and protection are critical to maintaining this resource.

¹ See Lower Meramec Watershed Plan, from Pacific to Valley Park: Water Quality, Green Infrastructure and Watershed Management for the Lower Meramec Watershed, (January 2012) Herein called 2012 Plan. <u>http://www.ewgateway.org/lowermeramec/lowermeramecwatershedplan-final.pdf</u>. It includes the 12 digit HUC watersheds of 1) Brush Creek; 2) Fox and LaBarque Creeks; 3) Hamilton, Antire, Carr, Flat, Forby and Kiefer Creek; and 4) Grand Glaize, Williams and Fishpot Creek.

The 2012 Plan recommended that Kiefer Creek² and other sub-watersheds would each require specific watershed-based management plans. It highlighted Kiefer Creek as a priority subwatershed because it flows through popular Castlewood State Park. Several key projects and initiatives have taken place or are underway in the sub-watershed since the plan was developed, and are described below:

- The production and distribution of a Lower Meramec watershed brochure, an on-site wastewater system management brochure, and informational maps and brochures on septic tank management and rainscaping projects in the region. (EWG, 2013 and 2014)³
- A comprehensive analysis of Kiefer Creek watershed which identified key sources of pollution and decline of habitat (Missouri Coalition for the Environment, or MCE, 2015).⁴
- The Open Space Council for the St. Louis Region (OSC) and St. Louis County Parks implemented a number of small scale projects that had been identified in the plan.
- The Nature Conservancy (TNC) completed a Conservation Action Plan (CAP) for the Meramec watershed⁵.
- Great Rivers Greenway (GRG) District acquired property in the floodplain of the Lower Meramec watershed for the purpose of open space preservation, habitat restoration, and riparian corridor enhancement. These activities will provide opportunity to engage volunteers in these efforts while improving water quality and over all watershed health. In addition, GRG has been a long-time partner of the OSC Operation Clean Stream program which supports citizen involvement in the stewardship of the Meramec River and its tributaries.

C. 2017 Plan Update

The 2017 Lower Meramec Watershed Plan (2017 Plan) updates the 2012 Plan with two additional 12 digit HUC watersheds - Sugar /Fenton Creeks and Mattese /Pomme Creeks. This extends the plan from Pacific to the Mississippi River and identifies new projects and watersheds for the planning area (see Map 1). Building on the framework for addressing non-point sources of pollution and past development practices, established in the 2012 Plan, the 2017 Plan identifies new partners and projects, as well as a timeline for projects aimed at achieving goals in the plan.⁶ The 2017 Plan also references several other plans that have previously set priorities for the area.⁷ EWG will be the entity responsible for managing this plan.

² The official name listed in the Geographic Names Information System (GNIS), which serves as the names repository for all Federal agencies, is spelled Keifer Creek, however East-West Gateway finds no local use of this spelling. Since residents, county roads, subdivisions all spell the creek's name Kiefer, East-West Gateway spells it the way the citizens in the community spell it, since this is a plan for the community.

³ <u>http://www.ewgateway.org/lowermeramec/lowermeramecbrochure-090711.pdf</u>, http://www.ewgateway.org/pdffiles/library/wrc/septictankbrochure.pdf and

http://www.ewgateway.org/pdffiles/library/wrc/RAINSCAPINGBROCHURE.PDF

⁴ http://moenvironment.org/11-clean-water-program/96-kiefer-creek-water-quality-bacteria

⁵ https://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/missouri/meramec-river-conservationaction-plan-2014.xml?redirect=https-301

⁶ See 2012 Plan, Table 41.

⁷ "Water Quality Futures: Watershed Planning for the Lower Meramec River" (July 2005); The recognized need to focus on the Meramec River Basin and the Lower Meramec Watershed dates back to the original 208 Water Quality Management Plan (208 Plan), completed in 1979 to meet requirements of section 208 in the Federal Clean Water Act. Also referenced in this plan are several studies that address specific streams. Links to plans are at http://www.ewgateway.org/environment/waterresources/WRCProducts/wrcproducts.htm

Map 1 Lower Meramec River Watershed



Watersheds (12-digit HUC)

Other Watersheds

Meramec River Watershed (8-digit HUC)

River or Stream

Major Road

County Boundary



Sources: USDA/NRCS via MSDIS, East-West Gateway Council of Governments August 2011



Creating Solutions Across Jurisdictional Boundaries

The 2017 Plan followed the steps to develop a watershed plan as recommended by the U.S. Environmental Protection Agency (EPA)⁸, shown in Figure 1. It is an ongoing planning, implementation, and evaluation process. As projects and programs are implemented and monitored, they can be revised and enhanced to be more effective. In this chapter the partners involved in this planning effort are described. In Chapter Two, information about the lower Meramec watershed and the HUC 12 watersheds is presented. In the remainder of the 2017 Plan, Nine Element Plans have been prepared for three critical sub-watersheds in the planning area as well as discussion about projects to occur along the main stem of the Meramec River.



Figure 1. Steps to Develop a Watershed Plan

Nine Elements refers to the "Nine Key Elements Critical to the Watershed Management Plan" that meet the requirements of the EPA - Section 319 grant program. These elements include:

- A. An identification of causes and sources of pollution that will need to be controlled to achieve load reductions
- B. An estimate of load reductions expected for the management measures
- C. Description of non-point source measures needed and areas implemented
- D. Technical and financial assistance and lead implementers
- E. Education component that will be used to enhance public understanding
- F. Schedule for implementing the non-point source measures identified in the plan
- G. A description of interim, measurable milestones for determining non-point measures are being implemented

⁸ <u>https://www.epa.gov/nps/handbook-developing-watershed-plans-restore-and-protect-our-waters</u> -- the figure is based on but modified from the EPA.

- H. Set of criteria to determine whether loading reductions are being achieved over time to attain water quality standards.
- I. A monitoring component to evaluate effectiveness of implementation efforts over time

D. Public Involvement, Outreach and Engagement

EWG has been engaged in planning activities in the lower Meramec River watershed since 2002. EWG staff first focused on the healthy LaBarque, Fox, and Calvey Creeks in the three counties of the lower Meramec River watershed, organized the 2007 Meramec Summit, and then developed the Lower Meramec Watershed Plan in 2012. In each planning initiative, EWG staff have involved numerous stakeholder organizations. Through these organizations the planning efforts have reached many individuals.

For the 2017 Plan, EWG again has engaged many partners, including cities along the river, federal and state agencies and non-profit organizations involved in activities in the area. Throughout 2015-2016, EWG was contracted by Missouri Department of Natural Resources (MoDNR) to facilitate community engagement meetings within the entire Meramec River watershed. Through these meetings, EWG met with local stakeholders and gathered information that has helped to inform this effort. Local residents have become engaged when there has been a focus on their sub-watershed. Public involvement in the development of this plan is critical since this plan calls for active involvement of the public through volunteer activities and educational programs, and holding meetings and events to assist in bringing more people into the planning process and to engage more individuals in improving water quality.

1. Building Partnerships

Prior to beginning work on this plan, EWG engaged a broad team of agency and organization partners who have a stake in the lower Meramec River watershed, inviting them to participate in the planning process. The core partners involved with developing the plan are presented in Table 1.

Partners	Partners
East-West Gateway Council of Governments (EWG)	St. Louis County Parks Department
The Nature Conservancy (TNC)	Open Space Council of the St. Louis Region (OSC)
Missouri Department of Conservation (MDC)	U.S. Geological Survey (USGS)
Missouri Department of Natural Resources (MoDNR)– Environmental Quality Program	Metropolitan St. Louis Sewer District (MSD)
Missouri Department of Natural Resources – Missouri	U.S. Army Corps of Engineers (USACE)- St. Louis
State Parks	District
Great Rivers Greenway District (GRG)	U.S. Environmental Protection Agency (EPA) – Urban
Great Rivers Greenway District (GRG)	Waters Division

Table 1. Lower Meramec River Watershed Plan Update Core Partners

Many of the partner agencies own significant parcels of land in the watershed or are undertaking notable plans, projects, and initiatives in the watershed that could have an impact on water quality (See Appendix for more information). All core partners contributed funding to the plan development and/or provided important technical support. The partners were able to assist with

information necessary to characterize the watershed, identify goals and solutions, and develop an implementation program as well as monitoring strategy. The partners also have the interest and resources necessary to implement the plan. Any partner may seek funding to implement any of the key elements of the plan and the partners are committed to sharing information resources where appropriate. The core partners will meet on an ongoing basis (at minimum twice a year) to evaluate the progress of implementation activities and achieving load reductions, and to identify any implementation problems. When any course corrections are to occur, the associated schedule and project focus will be revised to address issues noted.

Feedback from the Meramec River Recreation Association (MRRA), the Meramec River Tributary Alliance (MRTA), and the EWG Water Resources Committee (WRC) was also obtained, (See Figure 1). Early in the process these organizations contributed background insights and recommendations. As the early stages of the draft plan were developed, EWG provided updates and preliminary goals and objectives, and then sought additional feedback which helped to shape the draft plan. Finally these organizations and their constituent members were invited to comment on the draft plan.





The MRRA was formed by Governor Bond in 1975 in order to promote recreation, tourism and a coordinated approach to the lower Meramec River. The MRRA board is made up representatives from cities located adjacent to the Meramec River, Franklin County, Jefferson County, St. Louis County and agencies that own or manage conservation lands along the Meramec River. Cities participating include: Arnold, Fenton, Sunset Hills, Kirkwood, Valley Park and Eureka. In 2016, the MRRA members voted to become the Watershed Advisory Committee for the Lower Meramec. The MRRA brings initiatives occurring in a watershed together under one umbrella to strengthen collaboration and coordinate planning efforts. The organization helps to focus available resources to address priorities. The MRRA supports recreational use of the river and its environments. As a result, the by-laws of the organization emphasize the importance of clean water and a healthy watershed system. The MRRA has agreed to be an information sharing and project review body.

The MRTA is an informal organization of federal, state and local agencies, non-profit organizations, and others interested in the Meramec watershed. The group meets at least twice per year to share project information, success stories, and other resources. The MRTA was

formed following the 2007 Summit on the Meramec River watershed to provide a collaborative approach to watershed wide issues and opportunities. The Open Space Council (OSC) has facilitated the meetings of the MRTA since 2007. In 2009, the MRTA and OSC worked in partnership with the U.S. Forest Service, Trust for Public Land, EWG, and representatives of the water and sewer districts and cities to analyze opportunity to protect source drinking water in the Meramec watershed.

The WRC is a standing committee of EWG. It meets two to four times per year to address regional and sub-regional issues related to rivers, floods, watershed planning, stormwater management, and floodplain protection. Membership includes representatives from local government, business, academia and non-profits from the EWG region in Missouri and Illinois, along with representatives of federal and state agencies. The WRC was formed in 2001 and over the years it has addressed issues related to flooding, flood plain development, levee construction and maintenance, watershed planning, and habitat protection and improvement.

Although there is some overlapping membership, these three organizations – MRRA, MRTA, and WRC, together provide a broad cross section of community interest and expertise. These groups also include all of the stakeholders who were engaged in the development of the 2012 Plan. Early in in the planning process, the team also met with stakeholders interested in the Kiefer Creek watershed, including America's Confluence and the Wildlife Rescue Center, situated on Kiefer Creek. Outside of the MRRA, the cities of Pacific and Valley Park have participated in the 2017 Plan development, which has involved all of the cities on the river.

As the 2017 plan is completed, EWG will share the plan with stakeholders to obtain additional input. Following review by MoDNR and EPA, as well as the stakeholders, the 2017 Plan will be completed by September 2017, then revised as needed, at minimum, once every five years.

2. Other Watershed Initiatives

The core partner agencies are also engaged in their own planning initiatives. (See Table 2 for a brief summary of activities underway as of January 2017.) As a result, this plan also incorporates references where appropriate to the activities, actions, initiatives and plans of the partners. They are being described as a way to increase the understanding of all activities occurring in the watershed. With this increased understanding, organizations may find new partners and recognize how their work may relates to other projects. More importantly, organizations can align their work to the overall goals of the plan to improve water quality by 2038 and increase public awareness of water quality issues and challenges. Although this plan is primarily focused on water quality, these other plans and initiatives include the following:

- In 2016, St. Louis County Parks began to develop an update it its master plan, and EWG staff contributed to stakeholder discussions related to that plan.⁹
- TNC developed a CAP for the whole basin in 2014. TNC is now involving most of the same partners in an update to that plan in 2017. This CAP addresses the Meramec, Big River, and Bourbeuse River watersheds, and will make use of extensive modeling being conducted by St. Louis University to identify critical areas in the whole watershed.¹⁰

⁹ http://www.stlcountyparksmasterplan.com/

¹⁰ https://www.nature.org/media/missouri/meramec-river-conservation-action-plan.pdf

- U.S. Geological Survey (USGS) has developed a flood inundation mapping study for the lower Meramec watershed and will complete an interactive map late in 2017. The river cities from Pacific to Arnold, along with the Metropolitan St. Louis Sewer District (MSD) and the U.S. Army Corps of Engineers (USACE), have participated in funding this mapping project which will be a valuable resource both for planning and for emergency response.¹¹
- MoDNR, the USACE and TNC have partnered on a Joint Feasibility Study (FS) for natural resource improvement on the Big River and Meramec River in Jefferson and St. Louis counties. The FS will be completed by 2019.¹²
- MSD has developed plans for reducing sewer overflows as part of Project Clear¹³ and has also identified key stream bank stabilization projects in the lower Meramec tributaries.
- Great Rivers Greenway District (GRG) has a plan for an interconnected set of trails, and is now developing plans for how to manage property that it acquires as a part of the trail network.¹⁴
- OSC has plans to expand its volunteer programs in the lower Meramec River to include more people in volunteer activities to clean up trash and refuse, and to complete more habitat improvement projects.¹⁵

This plan will serve all of these partners, facilitate cooperation and coordination, and provide both background information and a strategy for returning our tributary streams to health. The success of this plan will depend on continued collaboration of the many partners.

E. Goals and Solutions

The overall goal of the 2017 Plan is to restore the Meramec River and its tributary streams to water quality standards, and to maintain healthy streams throughout the lower watershed. Strong partnerships can establish the long-term framework for restoring the streams that are designated as impaired and protect the healthy sub-watersheds. While point sources, especially constructed sanitary sewer overflows (SSOs), have been a problem in the past, the efforts of the MSD should successfully address this problem within the next decade.¹⁶ Therefore, the 2017 Plan focuses on non-point source runoff, including stormwater, which will be an on-going area-wide source of pollution. It is necessary to have a long-term strategic approach to building awareness and support to improve stormwater management practices in local government and the

¹¹ https://dnr.mo.gov/env/meramecfloodingproposal.htm

¹² http://www.mvs.usace.army.mil/Missions/Programs-Project-Management/Plans-

Reports/MeramecFeasibilityStudy/

¹³ http://www.projectclearstl.org/

¹⁴ www.greatriversgreenway.org

¹⁵ www.openspacestl.org

¹⁶ Per John Lodderhose with MSD, any reference to implementation of a supplemental environmental project shall include the following reference: This project was undertaken in connection with the settlement of an enforcement action, *United States of American and the State of Missouri, and Missouri Coalition for the Environment Foundation v. Metropolitan St. Louis Sewer District, No. 4:07-CV-1120-CEJ*, taken on behalf of the U.S. Environmental Protection Agency, State and the Coalition under the Clean Water Act. MSD is currently working under a consent decree with USEPA to eliminate sewer overflows, <u>http://www.projectclearstl.org/about/</u>

private sector. To achieve the water quality goals, the 2017 Plan has identified willing and interested partners who have funds to begin work within the next few years to address significant problems. Voluntary demonstration projects in the first five years of this plan should raise awareness and expand public interest in more complete action to achieve water quality goals in the subsequent years.

Project or Initiative	Lead Organization	Description	Years
St. Louis County Parks Master Plan review	St. Louis County Parks	St. Louis County Parks Department owns significant parcels of park land in the lower watershed. Twenty seven County Parks covering a total of 6,344.55 acres of land occur within the Meramec watershed. Ten of those parks have permanent year round creeks that either drain directly into the Meramec or a tributary. The remaining 17 parks have dry creek beds that flow directly to the Meramec or feed one of the tributaries. Twelve parks have Meramec River frontage representing 2,196.35 acres. Out of the 12 parks directly along the Meramec River there are 87,925 feet or 16.65 miles of river bank within the park system. The department has started a review of their Master Plan to plan for capital works projects. www.stlcountyparksmasterplan.com	2017
Great Rivers Greenway Plan	GRG	Great Rivers Greenway is creating a network of greenways to connect people to some of the region's best assets – rivers, parks and communities. Specifically, GRG is acquiring land to build recreational trails in the Meramec watershed to connect people to this valuable water resource. GRG currently owns more than 300 acres of land, most of which is along the main stem of the river in St. Louis County. This provides opportunity to improve watershed health by implementing projects that restore and enhance natural habitats while engaging volunteers in these efforts. https://greatriversgreenway.org	Ongoing
Joint Feasibility Study- Meramec River Basing Ecosystem Feasibility Study	USACE MoDNR	MoDNR, TNC and the USACE entered into a joint agreement to conduct a Feasibility Study (FS) to assess potential projects to improve aquatic habitat in the lower Meramec River. This study promises to address larger scale stream bank problems and improve the riparian buffers on the Meramec. www.mvs.usace.army.mil/Missions/Programs-Project- Management/Plans-Reports/MeramecFeasibilityStudy/	2017-2018
Flood Inundation Mapping	USGS	Following the December 2015 Meramec River flood, the USGS worked with local governments in the Meramec watershed to develop an interactive flood inundation map, which will enable communities to identify areas at risk when storms are predicted. The program should also assist communities to determine what properties are most at risk and therefore highest priority for buy out or other flood mitigation strategies.	2017-2018

Table 2. Other Projects Underway in Lower Meramec Watershed

Project or Initiative	Lead Organization	Description	Years
Valley Park Levee flood study	USGS	USGS is working with the USACE to determine what impact the recently constructed levee in Valley Park may have had on flooding in December 2015. <u>https://mo.water.usgs.gov</u>	2017-2018
Flood Recovery Planning	Federal Emergency Management Agency (FEMA)	FEMA has encouraged communities to develop comprehensive flood planning and preparation, and this initiative may encourage protection of the riparian buffer especially in the floodway. The City of Pacific is one candidate for flood preparation planning. <u>www.fema.gov/national-</u> <u>disaster-recovery-framework/community-recovery-management-toolkit</u>	2017- Ongoing
Regional All Hazard Mitigation Plan	EWG	This regional (five county) plan is updated every five years and provides general guidance for communities to conduct pre-disaster mitigation planning and project implementation. <u>www.ewgateway.org/ProgProj/Emergency-</u> <u>Response/HazMit/hazmit.html</u>	2019-2020
Stormwater projects	MSD	MSD has stormwater projects on the following streams in the lower Meramec River watershed: Fenton, Fishpot, Grand Glaize, Mattese, Sugar and Williams Creeks; bank stabilization projects in Fishpot and Mattese Creeks and channel improvements in Grand Glaize and Williams Creek. <u>www.stlmsd.com/what-we-do/stormwater-management</u>	2018-2028
Operation Clean Stream	OSC	The OSC organizes and annual clean up on the Meramec River, and will celebrate the 50 th anniversary of its annual cleanup event in 2017. More than 2,000 volunteers participate annually in this single event. OSC also organizes a variety of volunteer efforts to remove trash, plant native plants and trees and remove honeysuckle and other invasive species in the lower Meramec River watershed, and it has played a key role in acquisition of land for parks in the lower Meramec River watershed. These volunteer initiatives also enable more cost effective improvements to public lands. www.openspacestl.org/ocs/	Annually
aBarque Creek watershed plan	Friends of LaBarque Creek /MDC	Nine agencies worked with the citizens in the watershed to develop a plan to protect water quality and aquatic habitat. The Citizen organization Friends of LaBarque Creek has the primary oversight of the plan. www.friendsoflabarquecreek.org	Ongoing

Project or Initiative	Lead Organization	Description	Years
Watershed Advisory Committee	MRRA	Established in 1975 by act of the Governor, the MRRA has played a role in recreation planning for the lower watershed in Franklin, Jefferson and St. Louis Counties, and the board represents, cities, counties and citizens in the watershed. MRRA can facilitate communication, collaboration and planning for the lower Meramec and its sub-watersheds with all partners. In 2016, the board agreed to function as a watershed advisory committee for projects in the lower Meramec watershed. <u>https://www.facebook.com/MeramecRecreation</u>	2017-Ongoing
Interagency communication	MRTA	Informal organization of organizations interested in the Meramec River watershed that facilitates inter-agency communication on river related issues. MRTA may provide a planning role for the upper watershed and involve other organizations in planning in the Lower Meramec Watershed. <u>www.openspacestl.org/meramec-river-tributary-alliance</u>	2017-Ongoing
Meramec River Conservation Action Plan	TNC	In 2014, TNC completed a <i>Meramec River Conservation Action Plan</i> ¹⁷ (CAP) for the entire Meramec watershed. A plan update is underway with completion expected by 2018. As a part of this study St. Louis University, in partnership with TNC, the USACE and MoDNR, is modeling pollutants, as well as, BMPs and potential climate and land use changes in the watershed. This should provide guidance for future project work. All of the partners of the lower Meramec watershed plan have been engaged in the CAP. www.nature.org/Missouri	2017-2018
Sewer Overflow projects	MSD	MSD is working under a Consent Decree to eliminate sanitary sewer overflows in the watershed. This may quickly improve bacteria loading in affected streams. <u>www.projectclearstl.org</u>	2017-2028

¹⁷ http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/missouri/meramec-river-conservation-action-plan-2014.xml

F. About the Lower Meramec Watershed

1. Impaired Streams

MoDNR undertakes water quality monitoring to assess if rivers, streams and lakes meet water quality standards. Table 3 shows the waterbodies in the Lower Meramec watershed that do not meet water quality standards for designated uses and are considered impaired.¹⁸ These waterbodies were listed in the 2012 Plan, with the exception of Mattese and Fenton Creeks which have been added to the 2017 Plan, and a segment of the Meramec River which was recently added to the impaired streams list for bacteria. Urban stormwater runoff is the main source of each pollutant. See Map 2 for locations and extent of the impaired streams.

Lower Meramec Watershed Streams	Impairment
Antire Creek	Bacteria and pH
Fishpot Creek	Bacteria and chloride
Fox Creek	Unknown (decline in aquatic life)
Grand Glaize Creek	Bacteria, chloride, mercury in fish tissue
Kiefer Creek	Bacteria and chloride
Williams Creek	Bacteria
Bee Tree Lake	Mercury in fish tissue
Meramec River	Lead in sediment; Bacteria in a 22.8 mile segment
Mattese Creek	Bacteria and chloride
Fenton Creek	Bacteria and chloride

 Table 3. Impaired Streams in the Lower Meramec Watershed as of 2016

¹⁸ As required by the Clean Water Act, the state completes an assessment of state waters to determine if they are meeting water quality standards. Biennially, on even numbered years, the department develops an Integrated Report that discusses the overall health of Missouri's waters and provides a list of streams that are not currently meeting water quality standards and/or its designated uses. <u>http://dnr.mo.gov/env/wpp/waterquality/303d/303d.htm</u>



MoDNR has an EPA-approved Total Maximum Daily Load (TMDL) for bacteria in Fishpot Creek. Other TMDLs will be developed over time and this plan will be updated as TMDLs are completed. In the meantime, this plan uses available data to identify target reductions in bacteria load in priority streams. EWG worked closely with the MoDNR TMDL staff to develop appropriate load duration curves in focus area streams. Elsewhere, Simple Modeling of best management practices (BMPs) has been used to provide a clear set of recommended practices to reduce bacteria and chloride from streams in the lower Meramec.

Because the lower Meramec watershed planning area includes a healthy stream, LaBarque Creek, at river mile 42, it is important to recognize that efforts should also be placed on protecting and preventing degradation of healthy streams (see 2012 Plan, pages 101-111). The partners recognize the importance of on-going work to maintain stream health and aquatic habitat in healthy tributaries to the Meramec. The MDC, Jefferson County, and local residents have worked collaboratively to develop and maintain a watershed protection plan for LaBarque Creek¹⁹. TNC and local partners are currently leading a streambank stabilization project for LaBarque Creek.

Fox Creek is the site of another stream bank mitigation project²⁰. Fox Creek has been added to the 303d Impaired Water List for unknown pollutants because of a decline in aquatic life. These streams remain a priority for streambank stabilization, and riparian buffer zone protection. Public education programs for land owners and developers should be a high priority. Further study is needed to determine the cause of problems in Fox Creek. MoDNR has completed a biologic study along with a stressor study²¹.

2. Priority Streams

Development has had an impact on the Meramec River and all of its tributaries in the plan area. To mitigate the impact of this development, the 2017 Plan calls for improving the riparian buffer zone along the main stem and the tributaries. Working with key partners in county and state parks, local governments, and not-for profit partners, including TNC and OSC, on a series of projects on public land in the watershed will provide significant improvements to the riparian zone, engage the public in volunteer activity, demonstrate that progress is being made, and provide a baseline for evaluating the effectiveness of the strategy.

¹⁹<u>http://www.jeffcomo.org/uploads/Stormwater/Manuals/LaBarque%20Creek%20Watershed%20Conservation%20</u> Plan%209-03-09%20kjm.pdf

²⁰ <u>http://ascelibrary.org/doi/abs/10.1061/40581(2001)25</u>

²¹ http://dnr.mo.gov/env/esp/wqm/docs/FoxCreekbioreportFy14.pdf

Kiefer Creek stands out as a priority sub-watershed for development of a watershed management plan because it flows through Castlewood State Park, which had more than 750,000 visitors in 2015. Children, adults, and pets all can be found wading in the creek near the park entrance just a quarter mile upstream from its confluence with the Meramec River. The small size of the Kiefer Creek watershed, and the fact that pollutants come from non-point sources, also makes it a good site both to demonstrate voluntary best management practices (BMPs) to achieve water quality goals within twenty years, as well as to measure the water quality impact that result from those projects. The impaired section of the stream extends 1.2 miles upstream from the mouth of the creek where it meets the Meramec River. Most of the impaired section lies in Castlewood Park and the Wildlife Rescue Center. Finally, Kiefer Creek has a draft watershed management plan, prepared by the Missouri Coalition for the Environment (MCE) and several partner organizations with matching funds necessary to implement voluntary water quality projects. EWG has worked with the MoDNR staff to develop a load duration curve for the recreational season for Kiefer Creek, so that BMPs can be evaluated in terms of percent of load reduction goal.

Fishpot Creek and Mattese Creek are a second priority in the 2017 Plan, because these streams are bordered by numerous subdivisions and the opportunity for human exposure is particularly high. In these two streams, there is some limited interest in water quality projects, and therefore the 2017 Plan recommends demonstration projects that will serve to raise public awareness of both the problem and potential solutions. Fishpot Creek has a TMDL approved by EPA in 2016, and the 2003 Geomorphic Study,²² which provides baseline direction for stream improvement. As partners bring projects forward, Fishpot Creek should also become a priority for reduction in bacteria and chloride. Some subdivisions in Mattese Creek have an opportunity to implement BMPs on subdivision land, which can treat and reduce stormwater runoff, reduce erosion and sedimentation, stabilize stream banks and improve the riparian corridor to improve stream health. In addition, MSD has several projects funded, including the removal of a constructed sanitary sewer overflow in Fishpot Creek, and more projects identified once additional funding becomes available, which will stabilize the channel and improve stormwater runoff.

While bacteria and chloride are listed as the impairments for these three creeks, the Nine Element Plans for each creek only address the bacteria impairment for a number of reasons. First, bacteria is considered a priority to address because there is a high risk of human exposure to bacteria in these creeks since they are in residential areas as well as a State Park where hundreds of thousands of people recreate each year. Second, more data and information is needed to adequately quantify the contribution of chloride to the creeks. The application of road salt is the likely source of the chloride impairment, so more data is needed from private contractors as well as public transportation agencies about the use of road salt. There is much more information available about best management practices to reduce bacteria loading that informed the management measures of this plan. Third, bringing together a different set of stakeholders is required to address the application of road salt which can be a sensitive matter since liability and safety is an important factor in any decisions about the use of road salt. The intent is to update this plan at a minimum every five years. Further data and information gathering and discussion with stakeholders about the chloride impairment will take place in the interim in order to inform chloride load reduction goals and management measures in the next update to this plan.

²² <u>http://www.ewgateway.org/pdffiles/library/wrc/meramecriverwatershedsrpt/fishpotwatershed.pdf</u>