



MISSOURI
NONPOINT SOURCE
MANAGEMENT
PLAN (2015-2019)



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Sara Parker Pauley
Director

Executive Summary

The 2015-2019 Missouri Nonpoint Source Management Plan (NPSMP or plan) will serve to guide the state's efforts in coordinating nonpoint source pollution reduction efforts and supporting state activities pursuant to Section 319 of the federal Clean Water Act. This plan will also serve as a guide for department decisions involving the allocation of resources to address nonpoint source pollution.

In 2012, the department launched statewide watershed planning efforts to strategically address local water resource issues. These watershed planning efforts create a locally-led, coordinated, holistic approach for protecting water resources in Missouri. Through these watershed planning efforts, the department is forming partnerships with landowners, communities, industries, and local leaders to share information and set priorities for each watershed in the state. By coordinating the efforts of organizations and individuals who have a vested interest in Missouri's watersheds, staff and financial resources will be better focused on solutions to priority water quality problems. The watershed planning efforts provide direction and focus for all of the department's programs, and support of these watershed planning efforts is the top priority of Missouri's NPSMP.

Missouri's NPSMP is a five-year action plan that incorporates the most recent U.S. Environmental Protection Agency (EPA) guidance, *Nonpoint Source Program and Grants Guidelines for States and Territories, April 12, 2013* (<http://water.epa.gov/polwaste/nps/upload/319-guidelines-fy14.pdf>) and *Section 319 Program Guidance: Key Components of an Effective State Nonpoint Source Management Program November 2012* (http://water.epa.gov/polwaste/nps/upload/key_components_2012.pdf). Chapter 2 of the plan includes short-term, medium-term, and long-term goals, objectives, milestones, and performance measures. Although flexibility to respond to short-term needs consistent with medium- and long-term goals and objectives has been included in this plan; the department intends to review and update the NPSMP at least every five years.

Information about nonpoint source (NPS) acronyms and terms, pollution categories, best management practices, state and federal partners, an EPA funding exemption, and example NPS projects can be found in the Appendices.

Chapter 1: Introduction

“Nonpoint source pollution occurs when rainfall, snowmelt, or irrigation water runs over land or through the ground, picks up pollutants, and deposits them into rivers, lakes, and coastal waters or introduces them into ground water.” (U.S. Environmental Protection Agency: <http://water.epa.gov/polwaste/nps/outreach/point1.cfm>). Nonpoint sources of pollution enter waterways by overland flow or infiltration as opposed to point source pollution which is defined as any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. Point source pollution does not include agricultural storm water discharges and return flows from irrigated agriculture (Clean Water Act, Section 502(14)).

By the early 1970s, many of the nation’s streams and lakes had become severely polluted by sewage and industrial waste discharges. With passage of the Federal Water Pollution Control Act of 1972 (PL92-500), Congress set in motion a massive cleanup effort for the nation’s water resources. Throughout the subsequent decades, hundreds of wastewater treatment facilities were constructed or upgraded. Previously polluted streams and lakes became cleaner and aquatic life began to reappear where they had been absent. However, there is still much work yet to be done as more than half of the nation’s impaired waters still do not fully support aquatic life and recreational uses due to nonpoint sources (NPS) of pollution.

Chapter 1.1 History of Missouri NPS Pollution Management

In 1979, prior to the federal requirement for states to develop NPS management plans, a Missouri Water Quality Management Plan (Section 208 Plan) was developed by the department pursuant to Sections 208 and 303 of the Clean Water Act. Planning was performed through a cooperative effort between the Department, East-West Gateway Coordinating Council, Mid-America Regional Council, and Ozark Gateway Council of Local Governments. This plan outlined the actions that were needed to protect the quality of surface waters and groundwater in Missouri, including control of both point and NPS pollution. Municipal wastewater planning was completed and future needs were identified. Nonpoint sources were assessed regarding the magnitude of water quality problems and solutions were proposed. Federal regulations required Section 208 plans to consider NPS pollution from construction, mining, silviculture, and agriculture; however, designated areas identified in the Missouri Section 208 plan did not address agriculture based on a state task force recommendation. Instead, agricultural needs were addressed on a statewide basis. Section 208 was essentially a federal funding mechanism for state programs that attempted to control NPS pollution. However, Section 208 was significantly underfunded and all available funds were expended by 1980. Many considered Section 208 a failure because it did little to actually reduce NPS pollution. (Gould, George (1990). “Agriculture, Nonpoint Source Pollution, and Federal Law.” *U.C. Davis Law Review* 23: 461.) It created a voluntary provision that directed states to determine whether regulatory point source controls were needed.

However, according to Szalay (2010) (“Breathing life into the dead zone: Can the federal common law of nuisance be used to control nonpoint source water pollution?” *Tulane Law Review* 85: 215–246.), “The section placed full control over regulation of NPS water pollution with the states and did not provide any mechanisms to actually control NPS water pollution.”

In 1987, in response to the limited success of Section 208 in controlling NPS water pollution, Congress passed the Water Quality Act and created Section 319 to focus on the problem of nonpoint source pollution. Section 319 required states to identify water bodies that cannot meet water quality standards without control of nonpoint sources. States were also required to develop implementation plans that identified best management practices and measures for the sources of those impaired waters. Acceptance of these plans by the EPA was required before the plans could be implemented. However, the section does not actually place limits on NPS pollution nor is there an enforcement mechanism. The Water Quality Act of 1987 states: “It is the national policy that programs for the control of nonpoint sources of pollution be developed and implemented in an expeditious manner so as to enable the goals of this Act to be met through the control of both point and nonpoint sources of pollution.” Pursuant to the requirements of Section 319 of the federal Water Quality Act of 1987, the department was designated by the governor to prepare Missouri’s NPSMP. Coordination among agencies was recognized as a key component for successful development and implementation of state NPS plans, particularly those agencies with funding for implementing conservation practices.

The Missouri NPSMP was first accepted by EPA in 1988, with subsequent minor and significant revisions accepted in 1996 and 2000, respectively. In addition, minor revisions to individual sections were accepted by EPA in 2001, 2002, 2003, and 2004. In 2005, the accepted revisions to the Missouri NPSMP were more complex and described the eight key components of an effective NPS pollution plan.

Following the 2005 revisions, the department deliberated on several occasions about potential revisions to the NPSMP and several drafts were written that outlined different approaches to the five-year plan. These considerations included:

- Determining which watershed prioritization methods should be used.
- Concentrating projects in a single watershed versus statewide or regional watershed projects.
- Reducing or increasing the amount of funds allocated for pass-through subgrant projects.
- Relying less on Section 319 NPS grants and more on state cost-share funds to implement conservation and management practices.
- Using department provided water quality monitoring versus subgrantee or contractor water quality monitoring.
- Avoiding duplication of state and federal cost-share funding strategies to fund practices that typically are not covered by other incentive programs.

- Determining how long to allocate funding to individual watershed projects and how much money should be provided.
- Determining what percentage of Section 319 funding should be focused on urban and other non-agricultural projects.
- Determining if more staff assistance is needed for watershed assessment and planning.

This plan addresses each of EPA’s eight key components and describes how the state will improve and protect water quality impacted or threatened by NPS pollution. The NPSMP includes goals, objectives, performance measures, milestones and strategies for achieving improved water quality as it relates to NPS pollution. These efforts are compatible with and support the strategic plans of many partner agencies including the Missouri Departments of Health and Senior Services (DHSS), Conservation (MDC), and Agriculture (MDA); University of Missouri Extension (MUE); U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS); and U.S. Environmental Protection Agency (EPA).

Chapter 1.2: Missouri Watershed Planning

The statewide watershed planning efforts are conducted at the eight-digit Hydrologic Unit Code (HUC-8) watershed scale, which is used by the department to protect our state’s water resources. These watershed planning efforts provide direction and focus for all of the department’s programs and support of these watershed planning efforts is the top priority of the Missouri NPSMP. These watershed planning efforts recognize the nexus between local citizen engagement and the development and implementation of successful watershed-based plans (WBPs) and policies. The watershed planning efforts also provide opportunities for local citizens and leaders to provide input and influence decisions regarding water resource priorities and goals. These opportunities for local citizen engagement occur throughout the watershed planning process.

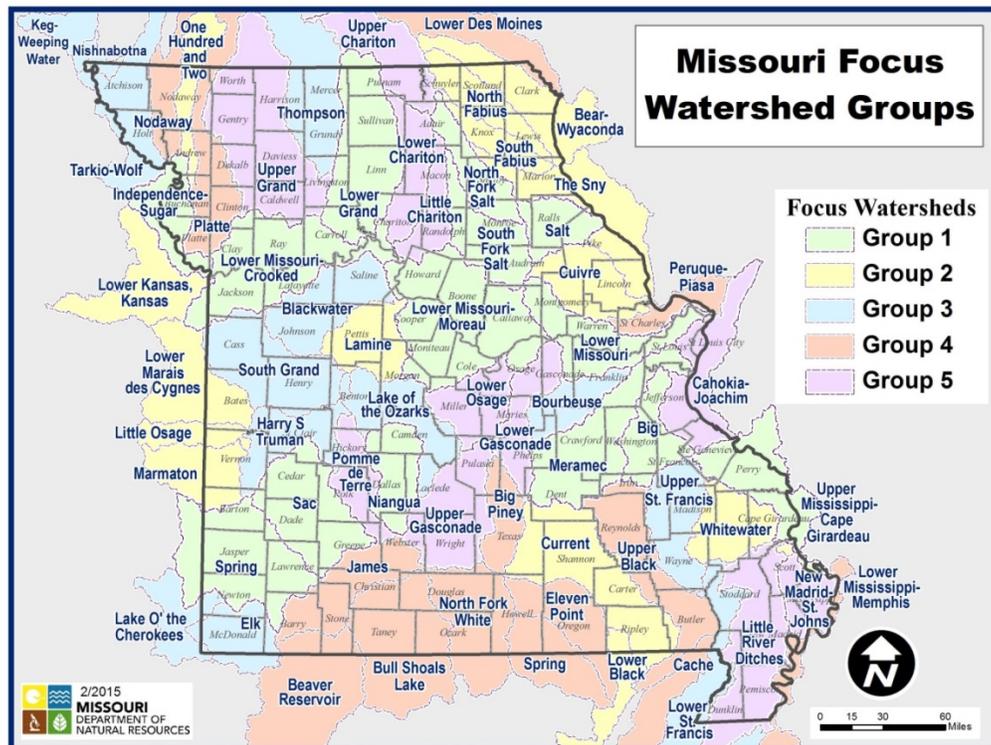
The statewide watershed planning approach, in partnership with Regional Planning Commissions, Councils of Governments, and other local organizations, conducts a collaborative watershed effort in HUC-8 watersheds throughout the state. This process includes coordinating meetings of local Watershed Advisory Committees within individual HUC-8 watersheds. Through these meetings, local participants will have the opportunity to share information and reach common understandings about the water resources in their watershed. They will also provide input for setting watershed priorities and documenting next steps and actions for addressing those priorities. Some of the intangible products of these watershed planning efforts are a shared understanding of each watershed by its citizens, and a shared, proactive call for action for the protection of the local water resources. The tangible product of these watershed planning efforts will be Healthy Watershed Plans that detail local citizens’ discussions and recommendations for actions in their watersheds. These Healthy Watershed Plans represent the foundational step for later developing more in-depth conservation planning and recommended actions through nine-element WBPs or other acceptable alternative plans.

The watershed planning efforts will concurrently act as the framework for coordinating resources between the department and its partner organizations to enhance the success of actions that address local priorities. The department is also committed to ensuring that watershed planning efforts are responsive to local conditions and continuously adapt to new information. This will be

accomplished by seeking and responding to input from Statewide Watershed Advisory Committees, local Watershed Advisory Committees, an Internal Steering Committee, and other statewide partners.

During implementation of the NPSMP (2015–2019), the watershed planning efforts will use federal Section 319 and other state funds to bring together strong partnerships of local leaders, technical experts and research/education professionals to produce highly-informative Healthy Watershed Plans. Following development of the Healthy Watershed Plans, Section 319 funds will be used in developing and implementing nine-element WBPs. The WBPs will identify realistic pollution load reduction goals based on the conservation practices that local producers and municipalities have indicated they are willing to implement. Specific areas where conservation practices need to be implemented will be determined through watershed assessments and stakeholder input. The duration of the WBPs will be the estimated number of years needed to meet nonpoint source pollutant load reduction goals established by local stakeholders. The watershed planning efforts are based on HUC-8 watersheds, but focuses on priorities within smaller watersheds and catchment basins. Every five years, the cycle will be repeated by reassessing the results from previous WBPs and using adaptive management to build upon earlier successes. New comprehensive planning and development of Healthy Watershed Plans and nine-element WBPs will be initiated, while progress continues in all watersheds. The watershed planning and implementation process will be continued over time in all 66 HUC-8 watersheds of the state in conjunction with the annual watershed planning cycles. Figure 1 shows how the HUC-8 watersheds in Missouri have been grouped during the five-year rotating cycle for watershed planning efforts.

Figure 1. Missouri HUC-8 Focus Watershed Groups.



Chapter 2: Mission, Goals, Objectives, Milestones, Strategies, and Performance Measures.

The mission of Missouri's Nonpoint Source Management Program (NPSMP) is: *“Protect and improve the quality of the state's water resources using a collaborative, statewide watershed planning approach to address nonpoint source pollution impairments.”* The NPSMP provides the state's strategies for addressing NPS pollution pursuant to Section 319 of the federal Clean Water Act. This plan is intended to serve as a voluntary tool for assisting stakeholders with the nonpoint source challenges and issues facing Missouri. Every watershed in Missouri faces potential challenges from nonpoint source pollution. By implementing a strategy to achieve nonpoint source goals, objectives, and milestones, this plan will lead to enhanced protection of our Missouri waters.

Identifying and engaging committed watershed partners through the watershed planning efforts will be primary objectives of the NPSMP during this five-year period. Committed technical and financial assistance is available from several state and federal organizations to address NPS pollution. The following lists of state and federal partners are not intended to be comprehensive lists of all organizations that address NPS pollution efforts at various levels throughout the state, but include many having active water quality activities familiar to the state NPS program. The department will strive to increase all partner commitments and participation in NPS efforts.

The success of the watershed planning process will initially be measured by outputs such as the number of partners engaged, actions identified and prioritized, and actions implemented. Over time as more actions are implemented, the focus of performance measures will shift to outcomes such as reductions in NPS pollutant loads and delisting of waterbodies impaired by nonpoint sources of pollution.

Chapter 2.1: Goals, Objectives, Milestones, and Strategies

The state program recognizes two primary long-term goals, one medium-term goal, and six short-term goals in addressing nonpoint source pollution. These goals will be achieved using the statewide watershed planning approach of engagement, assessment and understanding, priority-setting and action. This watershed planning approach provides a framework to engage local watershed citizens, listen and understand their priority concerns, and then coordinate department programs, including the Section 319 Nonpoint Source Management Program, to provide a more coordinated, efficient and effective response to address the priority watershed concerns.

The NPS Management Program's top priority is to engage citizens in addressing nonpoint source pollution challenges within their communities through planning and development of watershed management plans and voluntary implementation of conservation practices that address NPS pollutants. Projects implemented through Section 319 grants must meet at least two of the following criteria:

- EPA accepted nine-element watershed-based plans or acceptable alternative plans.
- NPS water quality impairments.
- NPS Total Maximum Daily Loads (TMDLs).
- High quality, unimpaired waters.

- State priority waters of high importance or projects with significant leveraging opportunities.
- State and federal initiatives and projects that involve restoration and protection of impaired, threatened, and high quality waters.
- Tributary streams and other surface waters and watersheds located immediately upstream of identified NPS impaired waters that contribute to the NPS pollutant loads.
- Protection of public drinking water supplies for both groundwater wells and surface water intakes.

The effective use of resources to reduce NPS pollution should be characterized by strategic placement and selection of conservation practices. This is a guiding principle in Missouri's approach to NPS pollution. Assessed watersheds that are implementing detailed management strategies will be more cost effective and have greater impact on improving water quality in the long term as compared to random placement, passive methods, or emphasis on less effective practices. Missouri's approach is one of voluntary prevention of NPS pollution and implementation of NPS projects, believing that the best solutions to water quality problems are those with broad and active local support and involvement. Recommended NPS conservation practices are listed in Appendix 3.

The NPSMP is a continuing state plan that identifies goals and objectives for a watershed-based approach for restoring and protecting waters impacted by NPS pollution. Following are the long, medium, and short-term goals. After five years, the goals and objectives will be re-evaluated to determine their progress, completeness and adequacy.

Long-Term Goals

1. *Abate known water quality impairments attributed to NPS pollution.*
2. *Prevent significant NPS threats to water quality from present and future activities.*

General considerations for long-term program implementation goals include:

- State priority waters.
- Restoration of impaired waters through implementation of WBPs or acceptable alternative plans.
- Protection of priority unimpaired waters (e.g. designated outstanding state and national resource waters or other designated high quality or high value waters).
- Protection of threatened waters on the most recent Section 305(b) report (Other Waters Rated as Impaired and Believed to be Impaired, but not on the Section 303(d) List) or the most recent Section 305(b) report (Other Potentially Impaired Waters). These can be found at: <http://dnr.mo.gov/env/wpp/waterquality/303d/303d.htm>.
- Protection of public water supplies and karst areas of contamination.
- Restoration and protection of wetlands and riparian areas.

Medium-Term Goals

Achieve full support of designated aquatic life uses and recreational uses in 25% of nonpoint source pollution impaired water bodies by 2030.

Achieving full support of designated aquatic life uses is a primary driver for the NPS Program because biotic assemblages are excellent indicators of water quality. Restoration and protection of aquatic life uses is a key objective of the federal Clean Water Act. Priorities considered for this medium-term NPSMP goal includes strategies for implementing:

- Stream and riparian restoration and protection.
- Dam, low water crossing, and obstruction removal in streams.
- Wetland restoration and protection.
- Innovative stormwater practices.
- Lake management and restoration.
- Abandoned mine drainage abatement.
- High impact agricultural practices.
- Statewide and watershed-based water quality monitoring.
- Statewide and watershed-based education, outreach, and technology transfer.

Short-Term Goals

Goal I. Support water quality monitoring throughout the state.

Objectives:

1. Annually provide NPS program monitoring priorities and data needs to the Division of Environmental Quality (DEQ) and Statewide Watershed Planning Coordinator.
 - Develop water quality monitoring components specific to NPS program needs for the department's annual monitoring strategy (e.g., long-term ambient NPS monitoring program and watershed trend monitoring) in accordance with the Missouri Water Quality Monitoring Strategy (<http://dnr.mo.gov/env/wpp/docs/monitoring-strat.pdf>).
 - Identify statewide water quality monitoring goals based on watershed priorities established through the watershed planning collaborative process.
2. On a quarterly basis, catalog water quality data that has been internally reviewed for quality assurance into the state's Water Quality Assessment System (WQA) (http://dnr.mo.gov/mocwis_public/wqa/waterbodySearch.do) and Biological Assessments Sampling Database (<http://www.dnr.mo.gov/asp/esp/bioassessment/sample-select.asp>).
3. On a biennial basis, compile quality-assured water quality data for development of the Section 305(b) Water Quality Report and Section 303(d) list of Impaired Waters.
4. Increase department NPS monitoring funding annually by \$400,000.

Goal II. Assess water quality at the HUC-8 watershed scale to support engagement, planning, and WBP development and implementation efforts. Support NPS TMDLs for informing watershed-based plans.

Objectives:

1. Annually evaluate watersheds following the statewide focus watershed groupings to determine NPS impairments.
2. Participate in collaborative watershed efforts to assist with identification of priority watersheds and critical source areas of NPS pollution.
 - Collaborate with other partners that conduct watershed-based water quality assessments.
 - Identify watersheds in need of water quality data and other watershed information to fill “gaps” in information.
 - Collaborate with watershed partners in assessing and prioritizing watersheds, including identification of NPS pollutants of concern, existing pollutant loads, water quality trends, and critical source areas of NPS pollution.
 - Support NPS TMDLs based on the department’s current TMDL development schedule through voluntary WBPs and conservation practice implementation.

Goal III. Support development of nine-element watershed-based plans or acceptable alternative plans for Missouri’s HUC-8 watersheds and priority HUC-12 watersheds and catchment basins.

Objectives:

1. Support collaborative watershed efforts that engage and empower local leaders, technical experts, and citizens in setting water resource priorities and defining next steps and actions to address those priorities.
 - Support five contracts a year for 5 years with the Missouri Association of Councils of Government (MACOG), Regional Planning Commissions, and other qualified organizations for implementing comprehensive watershed planning, assessment, technical assistance, education and outreach, and capacity building.
 - Support local watershed meetings; a minimum of 20 per year in the focus watersheds.
2. Assist qualified organizations in developing or updating WBPs to meet requirements of nine-element watershed-based management plans (<http://www.epa.gov/region9/water/nonpoint/9elements-WtrshdPlan-EpaHndbk.pdf>) or acceptable alternative watershed plans.
 - Contract with universities or other qualified organizations to develop two new HUC-8 WBPs that identify critical source areas of priority HUC-12 watersheds and catchment basins and target systems of conservation practices for achieving NPS pollutant load reduction goals in the next five years.
 - Update existing watershed plans, as needed, to obtain EPA acceptance as nine-element WBPs or acceptable alternative watershed plans; three plans a year for the next five years.

Goal IV. Promote NPS education and outreach throughout the state.

Objectives:

1. Promote use of NPS educational materials to address NPS issues identified by stakeholders during collaborative watershed efforts. Document the efficacy of these materials based on behavior modifications within the watershed and other appropriate measures.
2. Conduct and support statewide and priority watershed-related NPS information, education, and outreach efforts.
 - Project WET or similar proven programs.
 - Outreach conducted as part of watershed planning efforts.
 - Department and partner presentations on NPS-related topics.
3. Maintain a NPS website that provides information, references and web links that inform, educate and assist watershed partners with ongoing watershed efforts. Document the annual numbers of NPS webpage updates and webpage hits.
4. Collaborate with partners to assist with watershed and water quality outreach, education, and information and other NPS water quality issues consistent with this plan.
5. Provide NPS educational materials and outreach at water quality events.
 - Annually participate in at least four water quality events to:
 - Provide educational materials and information about the NPS Program and available Section 319 project funds.
 - Solicit partner collaboration on priority water quality projects related to stormwater, source water, monitoring, habitat improvement, and agriculture.

Goal V. Examine and improve NPS Program administrative and fiscal procedures to ensure a cost-effective program that leverages and builds upon existing NPS efforts and maintains a strong emphasis on water quality improvements.

Objectives:

1. Improve and protect water quality in priority watersheds using competitive and noncompetitive grants and subgrants.
 - As adequate resources are available, provide annual funding for the following activities.
 - Water quality monitoring, modeling, and assessments, including estimates of NPS load reductions.
 - Support NPS TMDLs.
 - Watershed planning.
 - Education and outreach.
 - Subgrants, joint funding agreements, and contracts for developing and implementing watershed restoration and protection projects.
2. The NPS Program will collaborate with DEQ on their internal control plan to ensure subgrant project objectives are achieved, funds are expended appropriately and in a timely fashion, and project implementation schedules are met.

3. Beginning in FFY 2015, develop an eligible strategy using the department's Soil and Water Conservation Program and other state NPS funding sources to meet requirements for EPA's "Exemption from the 50% Watershed Funding Requirement for Substantial State Fund Leveraging," to maximize flexibility for support of voluntary NPS outcomes.
 - State matching funds will be used in implementing WBPs and accepted alternative watershed plans for restoring NPS impaired waters.
 - State matching funds will be used to provide cost-share to landowners to voluntarily implement conservation practices that reduce NPS pollution.
 - State matching funds will assist with water quality monitoring, modeling, and assessments, including estimates of NPS load reductions.
 - State matching funds will be tracked on a watershed scale.
4. Implement streamlined NPS Program and fiscal processes that focus on timely award and expenditure of Section 319 grant funds according to EPA Grants Policy 12-06 "Timely Obligation, Award, and Expenditure of EPA Grant Funds."
 - Follow the department's E3 approach (Enhancing Efficiency and Effectiveness), which uses principles and methods that focus on the identification and elimination of non-value added activity to improve the delivery and operation of the Section 319 Program.
 - Announce a Request for Proposal (RFP) at least every two years that focuses on NPS impaired waters on the Missouri Section 303(d) List; but may, from time to time, include protection of high quality waters threatened by NPS pollution.
 - Announce the RFP prior to the federal fiscal grant application due date, as recommended by EPA in the revised 2013 Section 319 Guidance, so project proposals may be selected in advance and included in the state's application for Section 319 grant funds.
 - Annually encourage unfunded project proposals to identify projects that will assist implementation of WBPs.
 - Promote understanding of WBPs to target audiences such as watershed organizations, municipalities, soil and water conservation districts, and regional planning organizations.
 - Maintain a waiting list of high quality project proposals between open RFP announcements and annually evaluate this list for use of Section 319 grant funds.
 - Streamline and improve administrative and fiscal processes by incorporating the following best practices developed during the joint Lean Section 319 Kaizen between EPA Region 7 and Region 7 states (Iowa, Kansas, Missouri, Nebraska):
 - Standardized application forms.
 - Standardized and improved proposal review documents.
 - Develop RFPs that provide applicants with explicit requirements (e.g. eligibility, priorities, criteria, financial and programmatic performance goals, expectation, milestones, deadlines).
 - Ensure project applicants have sufficient staff qualifications to implement the proposed project.
 - Incorporate applicant financial capabilities criteria as part of the eligibility, rating, and ranking process of the RFP (e.g. financial stability; quality of management systems; history of performance; effective internal controls; findings from audits

- or reviews; applicant's ability to effectively implement statutory; regulatory or other requirements).
- Evaluate the likelihood for success of potential award recipients by using the Applicant Capabilities Determination Questionnaire (required by the new grants reform under the Office of Budget and Management (OMB)) to conduct a pre-award risk assessment of their fiscal accountability and financial integrity.
 - Increase the number of noncompetitive, program-critical subawards in order to facilitate development of high quality WBPs; implement important monitoring, assessment, and project auditing/inspection activities; and improve targeting of high priority conservation practices in critical source areas.
5. Strive to increase additional funding sources for NPS project implementation and reduce water quality monitoring costs by examining alternative methods and metrics for evaluating the effectiveness of the NPS Program, WBPs, and associated water quality improvements.
- Increase the cost-effectiveness of water quality monitoring and modeling at the HUC-8 watershed scale through the watershed planning efforts by pooling staff and resources.
 - Increase use of water quality models (e.g. Nutrient Tracking Tool (NTT), Agricultural Policy Environmental eXtender model (APEX), Soil and Water Assessment Tool (SWAT)) to estimate NPS load reductions from implemented conservation practices at the field and watershed levels.
 - Broaden the number and type of applicant for Section 319 funding.
 - Annually meet with appropriate state, federal, and local agencies and organizations to seek commitments for statewide and watershed-specific collaborations.
 - Encourage development of formal Memorandum of Agreement (MOA) and other written agreements among watershed partners to increase stakeholder commitments and participation in the development and implementation of WBPs.
 - Attend watershed stakeholder meetings that include watershed project activity briefings or contributions by watershed representatives through the watershed planning efforts.
 - Annually report on the resource commitments and stakeholder support provided in developing and implementing WBPs.
6. Encourage federal consistency with state NPSMP objectives.
- Provide a copy of the most recent EPA-accepted NPSMP to the directors of appropriate agencies that manage federal lands in Missouri.
 - Meet with land managers of appropriate federal agencies to review the NPSMP objectives and identify potential areas of collaboration.
 - Request that appropriate federal agencies involve the department in reviews of NPS-related activities, including grant and funding opportunities.
 - Cooperatively develop and implement action plans with appropriate federal agencies to address any federal activities that are inconsistent with NPSMP objectives.
 - Document all federal consistency reviews and actions taken to address inconsistencies with NPSMP objectives.
 - Notify EPA of any unresolved issues with federal agencies.

Goal VI. Assess the effectiveness of the NPS Program and NPS water quality restoration and protection efforts.

Objective:

1. Develop an Annual Progress Report that evaluates progress in achieving the goals and objectives of the NPSMP.
 - Section 319 project progress.
 - Soil and Water Conservation Program technical and financial assistance.
 - Reduce sediment loss from agricultural fields by 1,000,000 tons per year.
 - Federal technical and financial assistance.
 - State Revolving Funds provided for NPS projects.
 - Water quality modeling and monitoring assessments in priority watersheds.
 - Conservation practice effectiveness in reducing pollutant load reductions and NPS impairments.
 - Progress of the state Nutrient Loss Reduction Strategy for NPS portions of the strategy.
 - Numbers of subaward contracts, Joint Funding Agreements, and other funds awarded by the NPS Program and other related programs.
 - A Water Quality Measure 10 (WQ10) Success Story.

Chapter 2.2: Performance Measures

Most environmental performance measures are included under long-term goals. Long-term water quality monitoring as described in the Water Quality Monitoring Strategy (<http://dnr.mo.gov/env/wpp/docs/monitoring-strat.pdf>) or the Section 305(b) Water Quality Report (<http://dnr.mo.gov/env/wpp/waterquality/303d/303d.htm>) are based on water quality trends in NPS-impaired lakes and streams. During this five-year planning period, other performance measures and indicators will be used to demonstrate progress. Such measures may include volunteer monitoring, acres of riparian restoration, feet of streambank restored, species richness and diversity improvement, creel studies, acres of wetland or floodplain restored, and other indicators that are commonly associated with improvements in water quality.

Functional program measures include an EPA accepted NPSMP and progress in achieving performance milestones, which are provided with the goals and objectives. Progress reports will be submitted through the EPA's Grants Reporting and Tracking System (GRTS), EPA Success Stories (WQ10), Regional and National EPA meetings, Watershed-Based Plan (WBP) Performance Reports, and Section 319 Program Annual Progress Reports. These measurement tools provide the broader reporting and tracking of achievements required by EPA: Reporting metrics for pollutant load reductions, the Section 303(d) List of Impaired Waters, Section 319 Program Annual Progress Report, and Section 319 Success Stories.

NPS Pollutant Load Reductions

Pollutant load is the total quantity of pollutants from point and NPS pollution that discharges into a water body. A combination of land management practices and point source permits can reduce the pollutant load in a water body. The first step toward meeting load reduction targets is to link the water quality indicator to the pollutant source, based upon a cause-effect

relationship. Next, a load limit is established for each of the watershed sources based on the quantitative load reduction goals. The options for establishing such links range from qualitative evaluations to detailed computer modeling.

The appropriate approach depends on several factors, including data availability, pollutants of concern, water body type, source types, time frame, spatial scale, and cost. Most importantly, the approach must be compatible with the method used to quantify loads and meet the goals for the watershed. Load estimates need to be updated over time as more information and data are collected.

The NPS monitoring uses two basic approaches to characterize NPS loads and load reductions over time. The first approach is project-specific monitoring. This approach monitors water quality before, during, and after a NPS project. Short-term, project-specific monitoring can be advantageous because it uses multiple sites within a watershed and produces a large number of samples in a short period of time. Although this approach can be costly, if individual fields or small watersheds are monitored, it may be able to demonstrate the effectiveness of the conservation practices implemented. The second approach is to maintain a regular schedule of monitoring at long-term fixed station monitoring sites within watersheds. A long-term, fixed monitoring station is an acceptable alternative when individual watershed projects may produce only small changes in water quality that are difficult or impossible to detect with an isolated conservation practice or a project-specific monitoring approach. In such cases, other performance measures may be appropriate such as simple models, or spreadsheet calculation tools.

Modeling load reductions is a viable alternative to site-specific monitoring in many situations. Models vary in complexity, but can be significantly less costly than some monitoring efforts, while still providing reasonable loading and reduction estimates. Models are appropriate for smaller NPS watershed-based projects with limited funding; particularly those projects that are not likely to result in dramatic load reductions resulting in attainment of water quality standards.

Removing Waters from the 303(d) List

Waters on the Section 303(d) list have significant water quality problems that prevent one or more of their designated beneficial uses from being fully met. Federal and state laws require the protection of water quality and designated aquatic life beneficial uses. Additionally, most Missourians believe our waters must be clean and healthy for the protection of public health and aquatic life. Removal of waterbodies with a nonpoint source impairment from the Section 303(d) list is one of the primary goals of the NPSMP. A description of the assigned beneficial uses in Missouri is provided at http://www.dnr.mo.gov/env/wpp/wqstandards/wq_uses.htm. The most recent Section 303(d) list of impaired waters is available at <http://www.dnr.mo.gov/env/wpp/waterquality/303d.htm>.

Measuring improvement of physical and biological characteristics of a water body may be acceptable as an alternative to monitoring water chemistry. Improved hydrologic regimes, stream stability, aquatic communities, and aquatic/riparian ecology are also strong indicators of water quality improvements pursuant to the program goal of improving aquatic life uses.

Annual Progress Report

Missouri's NPS Program Annual Progress Report is completed each year. The report includes NPS pollutant load reductions and other measures of success including NPS activities contributed by the department and its agency partners. The most recent Section 319 NPS Program Annual Progress Report is available at:

<http://dnr.mo.gov/env/wpp/nps/319annualreport.htm>.

EPA Success Story Publication

The EPA measures success according to their Strategic Planning Objectives for water quality improvement. In particular, section WQ10 of EPA's strategic plan measures the number of water bodies identified by states as being primarily NPS-impaired that have their designated uses partially or fully restored. Missouri commits to providing EPA with at least one "Success Story" per year. "Success Stories" are journal style publications of successful state projects and are published on the EPA Headquarters website at:

<http://water.epa.gov/polwaste/nps/success319/>.

Chapter 3: NPS Partnerships

Missouri's NPS Program is dependent upon coordination among many partners to achieve its goals and objectives. A stakeholder committee representing numerous interest groups was convened to develop the initial Missouri NPSMP in 1989, and these organizations have continued to work together in reducing nonpoint source pollution and providing assistance with subsequent updates to the NPSMP. The primary focus of the original committee was to establish goals and objectives. The NPSMP is now supportive of, and benefits from, the watershed planning efforts, which provide a framework for local citizen engagement. These statewide watershed planning efforts are summarized in Chapter 1.2. Information regarding state and federal partners is provided in Appendix 4.

Other opportunities for stakeholder input is provided through several department-sponsored groups comprised of representatives from federal, state, and local agencies, organizations and citizens. The following groups meet regularly to provide input for education and water quality issues:

- The department chairs the Water Quality Coordinating Committee (WQCC) meetings on a bimonthly basis to present and discuss information with stakeholders on water quality activities and initiatives throughout the state.
- The Missouri Nutrient Loss Reduction Strategy Committee (<http://www.dnr.mo.gov/env/wpp/mnrsc/index.htm>) is chaired by the department and a large, diverse stakeholder group participated in the development of the Missouri Nutrient Loss Reduction Strategy from 2011-2014. The primary goals of this committee were to develop a comprehensive, integrated state-level nutrient loss reduction strategy that was science-based, effective, achievable, and economically sustainable. The Missouri Nutrient Reduction Strategy was completed in December 2014 and is available at: <http://www.dnr.mo.gov/env/wpp/mnrsc/index.htm>.
- The Water Protection Forum (WPF) is convened by the Water Protection Program Director and is used to present and discuss the department's current water quality issues. A number of advisory groups meet through the WPF. More information about these advisory groups can be found at the WPF website: <http://dnr.mo.gov/env/wpp/cwforum/index.html>.

Identifying and engaging committed watershed partners are primary objectives of the NPS Management Program and this five year NPSMP. Committed technical and financial assistance is available from several agencies to address NPS pollution through strong partnerships. The following is not a comprehensive list of all agencies that address NPS pollution efforts at various levels throughout the state, but does include many having active water quality activities that contribute to the state NPS program. As stated in Goal IV, Objective 4 and 5, the department will strive to increase all partner commitment and participation in NPS efforts.

Chapter 4: NPS Water Quality Impairments and Threats

Missouri is a diverse state which presents many challenges for the NPSMP including large rural areas, major agriculture and mining industries, and two complex metropolitan areas (Kansas City and St. Louis). Table 1 provides a summary of Missouri's resources.

Table 1. Summary of Missouri's Resources.

Category	Totals
Population (2014 Census ¹)	6,063,589
Surface Area (square miles)	68,742
HUC-4 Watersheds	12
HUC-8 Watersheds	66
HUC-12 Watersheds	1,965
Stream Miles ²	115,791
Lake Acres ²	363,587
Wetland Acres ³	624,000

¹The most recent U.S. Census Bureau population estimate for Missouri is available at: (<http://quickfacts.census.gov/qfd/states/29000.html>).

²Calculated from 10 CSR 20-7.031.

³Missouri Geological Survey (1992).

The Missouri Integrated Water Quality Report is prepared every two years by the department to meet requirements of sections 303(d), 305(b), and 314 of the federal Clean Water Act. Section 303(d) requires states to submit a list of waters not meeting water quality standards. Section 305(b) requires an assessment of surface water quality and summary of monitoring and pollution control activities. The primary purpose of the Section 305(b) report is to provide Congress, EPA, and residents of Missouri with an update on the condition of surface water and groundwater quality in the state. Data used in this report were generated through the monitoring activities of the department and other agencies and organizations. Data are assessed using procedures in the department's Listing Methodology Document (LMD) (<http://dnr.mo.gov/env/wpp/waterquality/303d/303d.htm>). Section 314 requires a status and trends assessment of publicly-owned lakes. The most recent Missouri Integrated Water Quality Report is available at: <http://dnr.mo.gov/env/wpp/waterquality/303d/303d.htm>.

The 2014 Section 303(d) List of Impaired Waters still requiring development of total maximum daily loads (TMDLs) was approved by EPA in an October 22, 2014, letter (<http://dnr.mo.gov/env/wpp/wqstandards/docs/uw-rule-action-final-letter-10-22-14.pdf>) and included 395 water body/pollutant pairs. Common pollutants included bacteria, heavy metals, low dissolved oxygen in water, and mercury in fish tissue. Most common pollutant sources included nonpoint source runoff (agriculture, urban, rural, unspecified nonpoint sources), mining related impacts, atmospheric deposition, and municipal wastewater treatment plants (WWTPs) and other point sources. Thirty-one water body/pollutant pairs listed in the 2012 Section 303(d) were removed from the 2014 Section 303(d) list.

Missouri has a population of slightly more than six million people with over one-third of the state's population residing in the metropolitan areas of Kansas City and St. Louis. Both of these

cities are located adjacent to major rivers, the Missouri River (both Kansas City and St. Louis) and the Mississippi River (St. Louis). In addition to these major rivers, Missouri's landscape contains a large number of streams and lakes (Table 1). Streams and lakes with designated uses are listed in Tables G and H of Missouri's Water Quality Standards at 10 CSR 20-7.031 (<https://www.sos.mo.gov/adrules/csr/current/10csr/10c20-7a.pdf>).

For the 2014 Missouri Integrated Water Quality Report (<http://dnr.mo.gov/env/wpp/waterquality/303d/303d.htm>), data were available to assess designated uses for approximately 10,473 miles of streams and 188,142 acres of lakes. Of the assessed stream miles, 4,814 miles (46 percent) fully supported the designated uses that were assessed; while 5,659 miles (54 percent) were found to be impaired for one or more designated use. Major causes for impaired uses included bacteria, low dissolved oxygen, mercury in fish tissue, heavy metals, and limited aquatic macroinvertebrate communities. Major sources of impaired uses included urban and agricultural nonpoint source pollution and mining activities. For the assessed lakes; 188,142 acres (73 percent) fully supported the designated uses that were assessed; while 70,372 acres (27 percent) were found to be impaired for one or more designated uses. Primary causes of impaired uses in lakes included nutrients, chlorophyll-a, and mercury in fish tissue. Major pollutant sources included urban and agricultural nonpoint source pollution and atmospheric deposition. Trophic status was summarized for 227 lakes (269,193 ac.), where 13 lakes (757 ac.) were classified as oligotrophic; 48 lakes (85,107) were mesotrophic; 136 lakes (178,917 ac.) were eutrophic; and 30 lakes (4,412 ac.) were hypereutrophic. The most notable lake trend was observed in the Ozark Highlands region where decreasing levels of nutrients and mineral turbidity were observed.

At one time, wetlands covered 4.8 million acres of Missouri, primarily in the southeastern part of the state. They began to decline in the late 1800s due to widespread land development, reaching a low of about 624,000 acres in 1992 according to the Missouri Geological Survey. In comparison, the United States Fish and Wildlife Service's National Inventory of Wetlands (<http://www.fws.gov/wetlands/Documents/Status-and-Trends-of-Prairie-Wetlands-in-the-United-States-1997-to-2009.pdf>) estimated there were approximately 1.4 million acres of wetlands in Missouri. However, this estimate was based on palustrine wetland types that included streams and lakes with designated uses. Consequently, because only estimates of Missouri's wetland acres exist at this time, a more precise measurement is needed. In order for wetlands to be designated under Missouri's Water Quality Standards 10 CSR 20-7.031(1)(F), wetlands must meet criteria established in the *United States Army Corps of Engineers Wetlands Delineation Manual 1987* (<http://el.erdc.usace.army.mil/elpubs/pdf/wlman87.pdf>); although, at this time, Missouri does not have wetland water quality standards.

The Missouri Water Quality Standards were first promulgated for Missouri streams and lakes in 1970 and are required to be revised at least every three years. Missouri's Water Quality Standards now list 115,791 miles of streams and 363,587 acres of lakes with designated uses. Table 2 summarizes the various beneficial uses assigned to Missouri waters. The numbers of stream miles and lake acres listed in Table 2 are current as of October 22, 2014.

Table 2. Beneficial Uses Assigned to Missouri Waters.¹

Designated Uses	Stream Miles	% of Total	Lake Acres	% of Total
Warm Water Habitat (WWH)	115,791	100.00%	363,587	100%
Human Health Protection (HHP)	115,791	100.00%	363,587	100%
Cold Water Habitat (CDH)	301	0.26%	47,183	13%
Drinking Water Supply (DWS)	3,551	3.07%	122,363	34%
Industrial Water Supply (IND)	1,638	1.41%	6,519	2%
Irrigation (IRR)	115,791	100.00%	363,587	100%
Livestock and Wildlife Protection (LWP)	115,791	100.00%	363,587	100%
Whole Body Contact Category A (WBC-A)	6,269	5.41%	302,613	83%
Whole Body Contact Category B (WBC-B)	108,875	94.03%	60,975	17%
Secondary Contact Recreation (SCR)	115,791	100.00%	363,587	100%
Outstanding State Resource Waters (OSRW)	217 ²	0.18%	467 ³	0%
Outstanding National Resource Waters (ONRW)	202 ⁴	0.17%	0 ³	0%
Warm Water Habitat (WWH)	115,791	100.00%	363,587	100%
Human Health Protection (HHP)	115,791	100.00%	363,587	100%
Cold Water Habitat (CDH)	301	0.26%	47,183	13%

¹Numbers of stream miles and lake acres are based on designated uses approved in the October 22, 2014, Water Quality Standards letter from EPA.

²Most, but not all OSRW streams (213 of 217 miles) are designated uses in Table H (10 CSR 20-7.031) – Stream Classifications and Use Designations.

³OSRW and ONRW lakes are not designated uses in Table G (10 CSR-20.70.31) - Lake Classifications and Use Designations.

⁴All ONRW streams are designated uses in Table H (10 CSR 20-7.031) - Stream Classifications and Use Designations.

Chapter 4.1: NPS Impaired Waters

A challenge in addressing NPS pollution in Missouri is the wide variety of nonpoint sources. Table 3 shows the most common NPS impairments in Missouri's streams and lakes with designated uses.

Table 3. Major Nonpoint Pollution Sources and Impairments in Missouri Waters.¹

Sources	Stream Miles Impaired	Percent of Total Miles	Lake Acres Impaired	Percent of Total Acres
Nonpoint Sources (Unspecified)	2,169	9%	44,257	15%
Unknown Sources	1,091	5%	580	0.2%
Atmospheric Deposition	664	3%	25,260	8%
Mining	276	1%	--	--
Tailings	255	1%	--	--
Other Mining Activities	21	<1%	--	--
Agriculture	151	0.6%	133	<1%
Hydromodification	115	0.5%	246	0.1%
Channelization	66	0.3%	--	--
Flow Regulation/Modification	29	0.1%	--	--
Upstream Impoundment	20	0.1%	246	0.1%
Habitat Modification	41	0.2%	--	--
Urban Runoff and Construction	244	1%	185	0.1%
Natural Sources	2	<1%	--	--
Recreational Activities	8	<1%	--	--

¹2014 Missouri Integrated Water Quality Report, <http://dnr.mo.gov/env/wpp/waterquality/303d/303d.htm>.

Chapter 4.2: NPS Threatened Waters

High Quality Waters

The protection of high quality waters, which are determined by the state to be threatened by NPS pollution, is an eligible use of Section 319 funds for EPA-accepted WBPs or alternative plans. In Missouri, high quality waters are considered to be designated outstanding national resource waters and outstanding state resource waters. These waters are designated in Tables D and E of 10 CSR 20-7.031. Additional protection is afforded state waters through the antidegradation policy of the Missouri Water Quality Standards (10 CSR 20-7.031(2)). Missouri's antidegradation policy consists of a three tiered system in which outstanding national resource waters and outstanding state resource waters are included under Tier 3. Following is a summary of the three tiers:

- Tier 1 - 10 CSR 20-7.031(2)(A)
For waters that just maintain a level of water quality that protect public health and existing in-stream water uses there will be no impairment or loss of existing uses.
- Tier 2 - 10 CSR 20-7.031(2)(B)
For waters that maintain a level of water quality better than applicable water quality criteria. Existing levels of water quality shall be fully maintained and protected unless lowered water quality is necessary to allow important economic and social development in the area.
- Tier 3 - 10 CSR 20-7.031(2)(C)
There shall be no lowering of water quality in outstanding state or national resource waters as designated in Tables D and E.

Potentially Impaired Waters

Watershed protection efforts for streams and lakes that are determined by the state to be potentially impaired by NPS pollution are also an eligible use of Section 319 funds for EPA-accepted WBPs or alternative plans. Potentially impaired waters include waters designated by the state in Appendix E and F of the most recent Section 305(b) report (<http://dnr.mo.gov/env/wpp/waterquality/303d/303d.htm>). Appendix E includes other waters rated as impaired and believed to be impaired, but which do not meet criteria for Section 303(d) listing. This list includes waters with approved TMDLs, waters where sufficient pollution control measures are in place, waters which are impaired by measures other than discrete pollutants, and other waters which were not approved for Section 303(d) listing by the Clean Water Commission. Appendix F includes potentially impaired waters for which there is some indication of an impairment to a designated use may exist, but current data or information indicating the impairment does not meet the data requirements in Missouri's Section 303(d) Listing Methodology. As resources allow, the department will conduct further monitoring on these waters to determine whether these impairments actually exist.

Chapter 4.3: Emerging NPS Pollutants

The widespread use of chemicals that may have adverse effects on the endocrine systems of aquatic life is an emerging issue of nationwide concern. Laboratory and stream studies have demonstrated strong evidence that exposure to some of these chemicals is associated with adverse developmental and reproductive effects on fish and other aquatic life. Primary chemicals of concern include hormones, antibiotics, pharmaceuticals, herbicides, and pesticides that can be associated with NPS runoff into streams, lakes, and groundwater.

The toxins produced by some species of blue-green algae are another growing concern. Several incidents of pet or livestock deaths and human illness in the United States have been linked to blue-green algal blooms. These blooms usually occur in mid to late summer and can produce toxins. Death of pets or livestock usually occurs from directly drinking contaminated water or accumulating a heavy coat of toxic algae on their hair while wading or swimming, and later ingesting the algae while cleaning themselves. Humans can be affected by accidental ingestion of water or direct contact with the skin and other sensitive organs. The department is supportive of research on emerging NPS pollutants. Section 319 funds may be used to support studies that investigate the extent and severity of emerging pollutants or the effectiveness of conservation practices.

Chapter 5: Watershed Prioritization

Addressing watershed priorities is a key component of the NPSMP. Criteria to be considered in each watershed include: known and potential sources of impairment, pollutant categories, planning and assessment capabilities, and ability to share resources. Other individual watershed priorities may include available water quality monitoring data, physical watershed assessments, presence of pollutant load reduction studies, modeling information, funding, potential for leveraging, and partnering opportunities.

The geographic focus of watershed activities helps to concentrate efforts in specific waters with impairments. Watershed assessments, planning, implementation and measuring progress become simpler and more efficient using defined drainage areas associated with the impairments. The Missouri NPSMP emphasizes a geographic focus on watersheds of a manageable size, which can vary depending upon complexities of the watershed (e.g. population, pollutant sources, land cover). Manageable size could be HUC-8 or HUC-12 watersheds or even smaller catchment areas.

Watershed-based approaches focus problem solving on defined areas using the drainage characteristics as a way of setting boundaries and isolating problem areas. These hydrologically-defined areas are used to better identify impairment sources and coordinate solutions to correct water pollution problems. The concept is advantageous because it integrates all activities within a watershed landscape that effect watershed health, by integrating biology, chemistry, economics, and social considerations into decision-making processes. Watershed based approaches also consider water quality, flood control, navigation, hydropower, fisheries, biodiversity, habitat preservation, user needs, and recreation. Collaborative watershed-based planning helps establish local priorities in the context of national and state goals.

The statewide watershed planning efforts initially establish a watershed-based framework at the HUC-8 scale. As more detailed assessments are conducted, smaller areas (e.g. HUC-12 watersheds or smaller catchment areas) may be identified as areas of major concern. These subwatersheds will be further broken down to identify critical source areas where cost-effective projects having the highest water quality improvement potential can be implemented. Missouri watersheds represented at the HUC-8 level, along with their focus watershed grouping, are displayed in Figure 1 in Chapter 1.2.

The statewide watershed planning approach also provides a watershed prioritization process that may be used as a framework for implementing EPA's *Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program*. This Long-Term Vision encourages States to "review, systematically prioritize, and report priority watersheds or waters for restoration and protection in their biennial integrated reports to facilitate State strategic planning for achieving water quality goals" for the 2016 integrated reporting cycle and beyond. Missouri will use the watershed planning and rotating basin approach for prioritization and implementation of its Section 303(d) assessment and TMDL development program. The new reporting measures under development by EPA (WQ-27 and WQ-28) will be used to measure and assess progress toward established water quality goals.

Chapter 6: NPS Program Administration

Missouri uses Performance Partnership Grants (PPGs), which are designed to provide greater flexibility to states to address their pollution problems holistically as measured by environmental goals and indicators, and to move away from a focus on specific narrowly-defined outputs. Section 319 funds are contributed annually to the PPG to help support the NPS Program and other essential department functions regarding improved water quality. The PPG and other collaborative watershed-based approaches have become increasingly important to water quality restoration efforts as costs associated with addressing NPS impairments using only Section 319 funds are not adequate considering current funding levels, the extent of NPS impairments, and the numbers and types of sources.

A variety of technical staff positions with expertise in the following areas are supported with Section 319 and PPG funds:

- Section 319 program management,
- Section 319 financial management,
- Watershed planning,
- Stream hydrology,
- Lake and stream limnology,
- Agriculture,
- Agricultural stormwater runoff,
- Urban stormwater runoff,
- Water quality monitoring and assessment,
- Water quality modeling,
- Water quality standards,
- Development of TMDLs,
- Development of watershed-based plans, and
- Education and outreach.

These diverse areas of expertise complement and enhance the state's NPS Program by improving the effectiveness and efficiency of program management and implementation. In addition annual allocations of Section 319 and PPG funds support several of Missouri's water quality monitoring programs (e.g., Missouri's Regional Conservation Partnership Program (RCPP) project; Wadeable Streams; Low Flow Investigations; Sediment Quality Assurance Project Plan (QAPP); and the Volunteer Monitoring QAPP).

Missouri's financial management of the program involves following Generally Accepted Accounting Principles (GAAP) guidelines issued by the Governmental Accounting Standards Board, State of Missouri code of regulations, applicable federal Office of Management and Budget (OMB) Circulars, and the Code of Federal Regulations (CFR Part 40). The department's Fiscal Management Section and Grants Management Unit support the program through a variety of fiscal staff with expertise in following areas:

- Grant application development.
- Workplan development and coordination.

- Internal Controls.
- Grant tracking and reporting.
- Fiscal Accountability.
- Applicant Capability Determination.
- Risk Assessment.
- Budget Development.
- Fiscal and Programmatic Monitoring.
- Procurement Standards.
- Standards for Financial Management Systems.
- Federal and State Laws/Regulations.
- Code of Federal Regulations.
- EPA's Grants Reporting and Tracking System (GRTS).

Regular reviews and reports, along with coordinated communication among department managers, provide effective and efficient management and obligation of funds for NPS efforts. Missouri makes extensive use of GRTS, as required by Section 319 grant conditions, for project and grant reporting, budget tracking, and documenting environmental results.

Chapter 6.1: Federal Funding

The CWA was amended in 1987 to include Section 319. Congress appropriated the first Section 319 grant funds in Federal Fiscal Year (FFY) 1990. The CWA requires at least a 40 percent nonfederal match for Section 319 NPS grants. Eligible Section 319 activities identified by the CWA include: non-regulatory programs, education, training, technology transfer, and technical and financial assistance. The following is a brief description of several potential federal funding sources to help support NPS.

Clean Water Act of 1987, Section 104(b): Section 104(b) grants may be used for activities associated with wetlands. Some grants require nonfederal match.

The *Clean Water State Revolving Fund (CWSRF)*: The CWSRF is a self-perpetuating loan assistance authority for water quality improvement projects. This fund is administered by the EPA and state agencies. The CWSRF replaced the Clean Water Act Construction Grants program and provides loans for the construction of municipal wastewater treatment facilities and implementation of nonpoint source pollution control projects. Congress first established the fund in the Water Quality Act of 1987. Clean Water Act sections 212, 319, and 320 provide the statutory authority for programs funded by the CWSRF. The CWSRF includes two NPS loan programs. Low interest financing can be provided to producers for the design and construction of animal waste treatment facilities. The program can finance 100 percent of the eligible costs (<http://www.dnr.mo.gov/env/wpp/srf/cwsrf-animal-loans.htm>). In addition, the Missouri On-site Loan Program can provide county or municipal governments with funding for implementing onsite wastewater treatment systems (septic tanks) (<http://www.dnr.missouri.gov/env/wpp/srf/wastewater-assistance.htm>).

Clean Water Act Section 604(b) Water Quality Management Grants: Federal funds from Section 604(b) of the CWA are awarded annually to the department to carry out planning activities under sections 303(e) and 205(j) of that act. Section 303(e) requires the state to have a continuing planning process (CPP) and 205(j) addresses water quality management (WQM) planning. The grant funds are used both for program implementation by the department and for funding specific eligible projects by regional planning commissions (RPCs) and councils of governments (COGs). Federal Water Quality Act Amendments require states to pass through forty percent (40%) of annual section 604(b) funds to regional public comprehensive planning organizations (RPCPOs) and interstate organizations (IOs). The department's current focus with these funds are for the prevention, control, and/or abatement of water pollution in a manner that improves the ability of small communities to provide cost-effective wastewater treatment services to their residents, institutions and businesses and in areas with waterbodies identified on the Missouri 2014 303(d) List of impaired waters or in statewide focus watersheds.

Safe Drinking Water Act of 1996 (SDWA): The SDWA provides funding for a drinking water revolving fund which is used to provide low interest loans to public water systems for capital improvements (e.g. planning, design and construction of water plants, tanks, lines).

Missouri Conservation Heritage Foundation's Stream Stewardship Trust Fund (MCHF - SSTF): The Stream Stewardship Trust Fund is a voluntary in-lieu fee mitigation program to which developers can make payments to meet the requirements of Section 404 of the CWA and Section 10 of the Rivers and Harbors Act. Since it began administering this fund, the Foundation has dispersed approximately \$5 million for priority stream protection efforts. A Memorandum of Understanding between the MCHF and U.S. Army Corps of Engineers (ACOE) authorized and established operating conditions for the Trust Fund. Resources are earmarked for restoration, enhancement, and protection of streams and associated riparian habitats (<http://mochf.org/stream-stewardship-trust-fund/>).

USDA/NRCS Environmental Quality Incentives Program (EQIP): EQIP is the largest NRCS cost-share program. The EQIP offers cost-share contracts to agricultural producers for implementing conservation practices. Landowners or farm operators who are engaged in livestock or agricultural production on eligible land may participate in the EQIP program. The EQIP conservation practices and activities are implemented in accordance with an EQIP plan of operations developed with the producer, which identifies the appropriate conservation practice or measures needed to address resource concerns. The practices must be implemented in accordance with NRCS technical standards adapted for local conditions. Historically-underserved producers (limited resource farmers/ranchers, beginning farmers/ranchers, socially disadvantaged producers) may be eligible for and increased percentage of payments toward the estimated approved costs. Information regarding the EQIP program and other USDA/NRCS programs is available at: <http://www.nrcs.usda.gov/programs/>.

Chapter 6.2: State Funding

State funding for NPS water quality issues is available through several state agencies including:

- Department of Natural Resources
- Department of Conservation
- Department of Agriculture
- Department of Health and Senior Services

State funding sources include:

- Missouri Soil and Water Conservation Cost-Share Program through the Soil and Water Conservation Program (SWCP) for agricultural resource concerns;
- Solid Waste and Hazardous Waste program funding through grants or fees that address NPS issues (e.g. abandoned landfills, hazardous household waste and , pesticide collection);
- Natural Resource Damages Assessment Fund; and
- State Revolving Fund.

The Department of Agriculture (<http://mda.mo.gov/abd/financial/>) provides:

- Animal Waste Treatment System Loan Program
- Bridge Loan Program
- Pesticide Technical Services

The Department of Conservation (<http://mdc.mo.gov/>) provides funds and services such as:

- Stream Stewardship Trust Fund
- Various educational programs including forestry, wetlands, understanding streams and native species management
- Technical advice and funds for stream and riparian restoration

The Department of Health and Senior Services (<http://health.mo.gov/index.php>) provides assistance with:

- Well testing
- On-site wastewater facility inspections

Chapter 6.3: NPS Program Funding Allocations

Section 319 NPS grant funding is generally available to the department on an annual basis for pass-through funding of eligible statewide and watershed-based projects. The allocation of Section 319 funds to states is based on an EPA formula. The Section 319 funds received from EPA are allocated according to the most recent EPA Section 319 guidance. Funds are awarded based on an RFP to help watershed groups, government agencies and educational institutions implement practices that will reduce NPS impairments in Section 303(d) listed, impaired water bodies or protect threatened and high quality waters from NPS degradation. The purpose for the funding is to support education, assessment, monitoring, planning and implementation resulting in on-the-ground practices that restore, improve, or protect water quality from NPS pollution. The focus of targeted restoration and protection projects solicited may vary from RFP to RFP. A nonfederal match of 40% is required for Section 319 funds awarded to Missouri.

Subawards support the NPSMP, and can be both noncompetitive and competitive. Project awards and methods will vary depending upon program need, urgency of priorities, availability and qualifications of recipients. Missouri will offer a variety of subawards including subgrants to address NPS concerns as described in this plan.

For more information about EPA allocation history and provisions for an exemption from the “50 Percent Watershed Funding Requirement for Substantial State Fund Leveraging,” please refer to Appendix 5.

Minigrants

Minigrants usually focus on information and education needs targeted to NPS impaired watersheds or other priority watersheds that lack local support for watershed initiatives. Minigrants can be used to build capacity, help form stakeholder groups, and introduce watershed-based approaches to improve local water quality. Minigrant availability is currently limited and applications are accepted or solicited on a case-by-case basis.

WBP Subawards

The WBPs must adequately address EPA’s Nine-Critical Elements (<http://dnr.mo.gov/env/wpp/nps/WatershedBasedPlanning.htm>). Collaborative assessment and planning approaches are expected through committed partnerships to coordinate activities, maximize efficiency, and leverage funds. The department targets these opportunities and subcontracts nine-element planning or acceptable alternative plans to qualified organizations.

Protection and Implementation Subawards

Subgrants and other funding awards are provided to qualified entities to implement WBPs and address state NPS priorities and protection efforts. Projects can vary in size and scope with the focus of implementing watershed goals.

Project Solicitation

Keys to the success of Missouri’s watershed projects include holistic, collaborative planning, prioritizing watersheds, and targeting cost-effective conservation practices. Depending upon

department needs and priorities, project solicitation is conducted using a variety of methods including: RFPs, non-competitive awards, contracts, and cooperative or joint funding agreements. Funding is limited to eligible applicants in priority watersheds and conservation practices as discussed in this plan. This flexible solicitation process allows the state to target specific priority areas for better success and cost-effectiveness.

Following are some of the items that are expected in eligible subgrant applications (note: fewer or additional requirements may be included in subaward solicitations).

- Implement milestone(s) in a WBP or alternative plan accepted by the department and EPA. Watershed protection projects may also be eligible.
- Address an EPA-accepted NPS Section 303(d) water body (or NPS TMDL), Outstanding State or National Resource Water, other high quality waters, or state prioritized focus watersheds.
- Work with an active and committed watershed partnership to carry out implementation of conservation practices.
- Possess existing staff or be able to recruit staff with the capability, expertise, and experience to perform the proposed work and grant administration.
- Successful applicant risk assessment evaluation.
- Demonstrate the ability to maintain partnerships to ensure project implementation and long-term operation and maintenance of installed conservation practices.
- Include a water quality monitoring component depending on the type of project (to document water quality changes and help show pollution reductions), whether provided by recipient, contractor, the department, or another partnering agency.
- Demonstrate the ability to conduct water quality modeling or contract for modeling of conservation practices depending on the type of project for reporting of pollutant reductions of the NPS impairment(s).
- Include or collaborate for an information and education component relative to the impairment(s) and conservation practices to be implemented, as described in the WBP.

As the NPS Program continues to evolve during the next five-year planning period, the above criteria will be dynamic and may be modified, as needed, to improve program effectiveness. More information regarding Missouri's Section 319 NPS Program grants is available at <http://dnr.mo.gov/env/wpp/nps/index.html>.

Section 319 Project Funding Priorities

As Section 319 NPS grant funding becomes insufficient to meet project demands, the state program will need to rely more on partners and stakeholders to carry out much of the NPS pollution remediation and water quality protection activities. In this regard, Missouri is fortunate to have the best-funded state conservation cost-share program in the nation. Progressive USDA conservation/easement programs work closely within the statewide watershed planning framework to target conservation cost-share dollars in high priority impaired and high quality waters with accepted WBPs. It is expected that most available NPS grant funds will be targeted by the department for activities that other department programs and organizations are unable to

address (e.g. watershed planning, water quality monitoring and assessment, development of NPS WBPs and pollutant loads, demonstrations of new technologies and innovative conservation practices, and education and outreach). Pursuant to this approach, Missouri will report information about the combined efforts of its NPS partners that collaborate with Section 319 projects into the GRTS database to better demonstrate overall progress in reducing NPS pollution loads in the state.

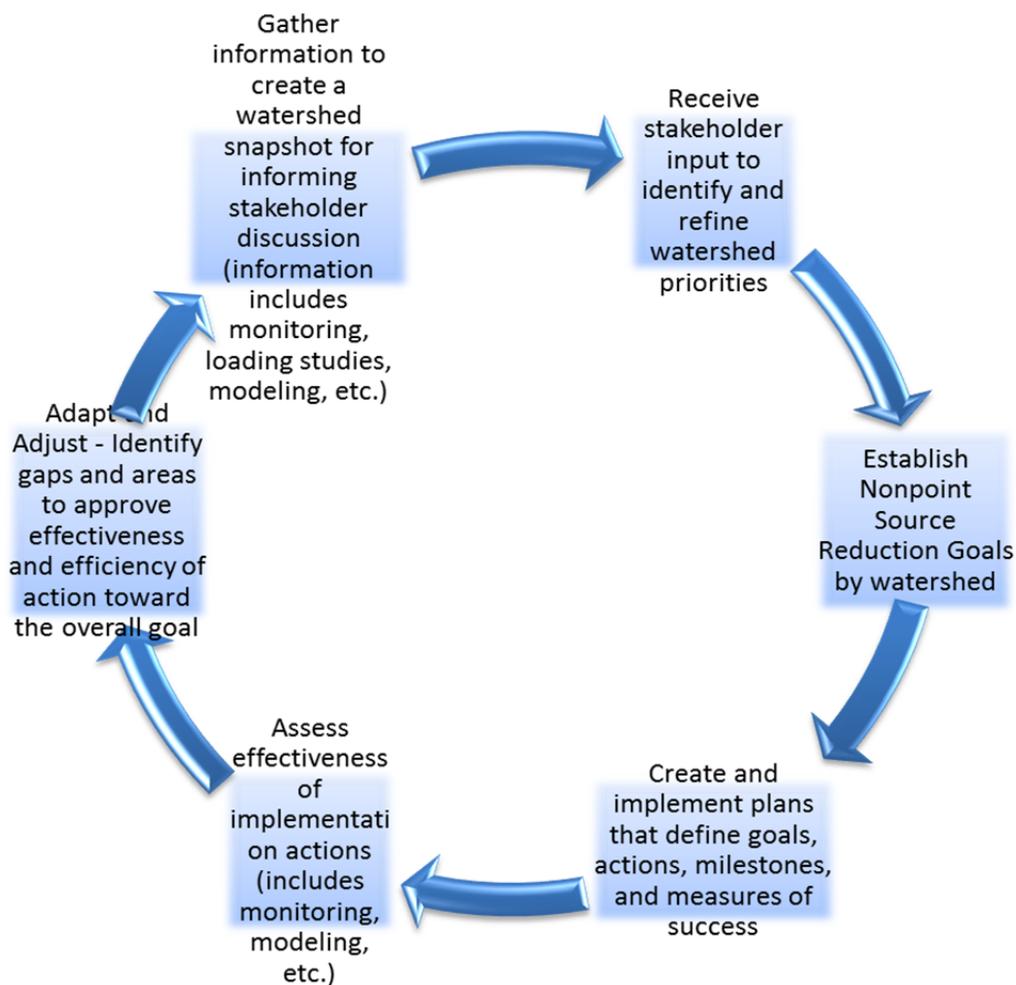
Chapter 7: Adaptive Management and Strategic Approaches

Adaptive management is used when natural resources are responsive to management, but there is uncertainty about the impacts of management interventions. In its simplest form, adaptive management is learning by doing, and adapting based on what's learned. Applications usually involve dynamic natural resource systems that are only partially predictable and involve multiple sources of uncertainty that limit effective management. Adaptive decision making is based on the recognition of alternatives to resource management and using monitoring data to assess those alternatives.

Chapter 7.1: Adaptive Management Framework

The department periodically reviews and revises the NPSMP at least every five years using an adaptive management cycle. Figure 2 shows a diagram of the adaptive management cycle used by the department.

Figure 2. Missouri's Adaptive Management Cycle.



Chapter 7.2: Strategic Approaches

The department's statewide watershed planning approach is used to facilitate NPS water quality assessment and planning activities, education and outreach efforts, identification of critical source areas of impaired waters, and geographic targeting of cost-effective conservation practices. These watershed planning efforts are described in Chapter 1.2.

The department's Division of Environmental Quality (DEQ) addresses NPS issues through a variety of state and federal programs which use voluntary approaches that work collaboratively with the Section 319 NPS Management Program. These collaborative, strategic approaches for addressing NPS pollution are summarized below.

Water Protection Program

The Watershed Protection Section (WPS) consists of three units: TMDL, Modeling, and Monitoring and Assessment. Each of these units is represented on teams that review WBPs, Requests for Proposals, NPS project plans, and various processes associated with the NPS Program. Staff in these units work directly with monitoring, modeling, watershed planning, and project designs associated with NPS pollutant loads and contribute significantly to the overall success of the Section 319 NPS Program.

The Public Drinking Water Branch (PDWB) administers the Missouri Source Water Protection Program. This program, required by the 1996 amendments to the federal Safe Drinking Water Act, promotes local, voluntary protection programs designed to protect surface and groundwater sources of public drinking water from contamination. A major component of this program includes source water assessments and corresponding vulnerability assessments of every source of public drinking water in Missouri. This information is provided to local communities and public water providers to facilitate more detailed assessments and source water protection planning. Additionally, the PDWB publishes a bi-annual source water protection newsletter and offers technical and financial assistance to public water systems to further promote source water protection activities such as proper plugging of abandoned water wells and development or implementation of local protection programs.

Source Water Protection provides a unique opportunity for local communities to become engaged with larger, regional water quality protection efforts such as those envisioned through the statewide watershed planning efforts. Local source water protection plans submitted by local communities, are reviewed by PDWB and NPS staff and ultimately approved by the department. One of the department's goals is to better integrate the Clean Water Act and Safe Drinking Water Act programs and opportunities. More information about the Source Water Protection Program and available grants can be found at: <http://dnr.mo.gov/env/wpp/pdwb/swpp.htm>.

The Financial Assistance Center (FAC) manages several financial activities, including the State Revolving Fund (SRF). Many of the resulting SRF-funded projects address NPS issues (e.g. remediation and hookups of individual on-site waste management systems to sewer lines, sewage treatment plant improvements, design and construction of animal waste treatment and composting facilities).

Soil and Water Conservation Program

The NPS Unit was previously located in the WPS. However, in December 2014, the NPS Unit was relocated within the SWCP after the SWCP was moved to the DEQ. These organizational realignments were strategically implemented to elevate coordination between the SWCP and WPP programs and enhance achievement of NPSMP goals and objectives.

The SWCP works closely with the 114 local soil and water conservation districts and the NRCS district offices, which share office space in most counties in Missouri. These collaborative efforts are essential in implementing NPS conservation practices through voluntary technical and financial assistance to landowners.

Chapter 8: Federal Consistency Reviews

An effective NPS Program identifies federal actions that are not managed consistently with state NPSMP goals and objectives. Where appropriate, the state seeks EPA assistance to help resolve these issues. Section 319 of the Clean Water Act (CWA) requires states to review federal assistance and development programs and projects for consistency with their NPSMPs. The CWA also directs federal agencies to modify their regulations to accommodate state reviews of individual applications and to address the identified concerns in accordance with Executive Order 12372. In August 1998, the EPA proposed federal guidelines for implementation of Section 319 consistency provisions.

Many protocols for reviewing these activities already exist at the state level. These include the State Clearinghouse administered by the Office of Administration (OA) and the National Environmental Policy Act (NEPA), which mandates the environmental assessment (EA) and environmental impact statement (EIS) processes. The success of these review processes depends on the ability of the state and federal agencies to work cooperatively to resolve any conflicts. In addition to major federal actions which are subject to these procedures, other federal permits and licenses may also require reviews to determine consistency with the NPSMP. The development of WBPs throughout the state will likely provide additional opportunities for addressing consistency on federal lands.

Specific federal assistance programs that will be reviewed by the state for consistency include changes to USDA assistance programs and conservation practice specifications, and development of the U.S. Forest Service (USFS) master plan. For USDA programs and practices, the SWCP and NPS Program staff will use their participation in the State Technical Committee to review and comment on changes as they are proposed and discussed. In addition, state staff may also review new programs or conservation practices that emerge during the period of this plan.

The federal government owns and manages land within the state of Missouri. The state will work cooperatively with the federal agencies responsible for these lands to assure they are managed in compliance with the provisions of this plan. Missouri often works with the USFS and the U.S. Army Corps of Engineers (ACOE) to review plans that have NPS planning or conservation practice implementation components. Provided adequate funding is available, below are activities that will be conducted by the state to assure consistency with the NPSMP on federal lands:

- Provide a copy of the EPA-accepted NPSMP to the director of each agency managing federal lands in Missouri.
- Visit with the land manager or other appropriate personnel of each federal agency to review provisions of the five-year NPSMP.
- Cooperatively, develop an action plan for any noncomplying issues.
- Document these reviews and any actions taken in quarterly and annual progress reports.
- Notify EPA of any unresolved issues following completion of the above activities.

Missouri's NPS Program staff review and comment on federally-written plans and project designs that involve water quality-related activities on federal lands. Consistency reviews often

occur when collaborative Section 319 grant-funded projects are located within or adjacent to federal lands. Consistency is also addressed at regularly-scheduled meetings. The Missouri single point of contact for Consistency can be found at:
<http://content.oa.mo.gov/commissioners-office>.

APPENDICES

Appendix 1: Glossary of Terms and Common Acronyms

Glossary

The following definitions are intended to enhance understanding of common terms and acronyms associated with the NPSMP. It is important to note that the NPSMP is not a standard, rule, or regulation promulgated pursuant to Sections 644.006 to 644.141 RSMo. Therefore, definitions found in RSMo sections will serve as the formal definition of terms that may be found in this document. Nevertheless, most of the common terms and acronyms listed below are consistent with definitions used in the Missouri Code of State Regulations (10 CSR 20-2.010) and Missouri Watershed Information Network.

305(b) Report: Includes all information which the state, tribe, or territory knows about all its waters -- healthy, threatened, and impaired. The 305(b) report should also provide information on which pollutants (chemicals, sediments, nutrients, metals, temperature, pH) and other stressors (altered flows, modification of the stream channel, introduction of exotic invasive species) are the most common causes of impairment to water bodies and what are the most common sources of those stressors (updated every two years).

303(d) List: Includes only those waters that are either threatened or impaired. [Waters attaining Water Quality Standards (WQS) should not be on the list.] Current EPA regulations call for 303(d) lists to include only waters impaired by “pollutants,” not those impaired by other types of “pollution” (altered flow and/or channel modification). If it is certain that a water body’s impairment is not caused by a “pollutant” but is due to another type of “pollution” such as flow modification, the water body does not need to be on the 303(d) list, but is still categorized as impaired under category 4C and included in the 305(b) Report. If, however, biological monitoring indicates there is impairment of aquatic life uses, but it is not clear whether a pollutant is at least one of the reasons, the water should be on the 303(d) list and further analysis to identify the causes are needed (updated every two years).

Antidegradation: A set of policies that protect the existing uses of waters and protect waters with water quality levels better than necessary to support propagation of fish, shellfish, and wildlife, and recreation in and on waters of the states. The purpose of these policies is to keep clean waters clean. States, tribes, and territories usually cover this program as part of their water quality standards regulations. Antidegradation has three components, or “tiers” of protection: (1) protection and maintenance of existing uses of waters, (2) protection of high quality waters, and (3) outstanding national resource waters.

Aquifer: A subsurface water-bearing bed or stratum that stores or transmits water in recoverable quantities that is presently being utilized or could be utilized as a water source for private or public use. It does not include water in the vadose zone. For the purpose of effluent regulation, sandy or gravelly alluvial soils in or on the floodplains of intermittent streams are not an aquifer.

Designated uses (10 CSR 20-7.031): Uses specified for each water body whether or not they are being attained. Uses are designated according to section (2) of this rule and include, but are not limited to—

1. Protection and propagation of fish, shellfish and wildlife. Streams will be designated to one of the following aquatic habitat protection uses based on watershed size, scale within the stream network and other hydrological and physical data. Lakes and reservoirs will be designated to one of the following aquatic habitat protection uses based on limnological characteristics (such as temperature) and biological assemblages.

A. Warm Water Habitat (WWH)—Waters in which naturally-occurring water quality and habitat conditions allow the maintenance of a wide variety of warm-water biota—

- (I) Warm water habitat (Great River);
- (II) Warm water habitat (Large River);
- (III) Warm water habitat (Small River);
- (IV) Warm water habitat (Creek);
- (V) Warm water habitat (Headwater); and
- (VI) Warm water habitat (Lake or reservoir).

B. Cool Water Habitat (CLH)—Waters in which naturally-occurring water quality and habitat conditions allow the maintenance of a wide variety of cool-water biota. These waters can support a sensitive, high-quality sport fishery (i.e., smallmouth bass and rock bass)—

- (I) Cool water habitat (Large River);
- (II) Cool water habitat (Small River);
- (III) Cool water habitat (Creek);
- (IV) Cool water habitat (Headwater); and
- (V) Cool water habitat (Lake or reservoir).

C. Cold Water Habitat (CDH)—Waters in which naturally-occurring water quality and habitat conditions allow the maintenance of a wide variety of cold-water biota. These waters can support a naturally reproducing or stocked trout fishery and populations of other cold-water species—

- (I) Cold water habitat (Large River);
- (II) Cold water habitat (Small River);
- (III) Cold water habitat (Creek);
- (IV) Cold water habitat (Headwater); and
- (V) Cold water habitat (Lake or reservoir).

D. Ephemeral Aquatic Habitat (EAH)—Waters having surface flow or pools in response to precipitation events or snow melt, but without permanent surface flow or permanent pools; naturally-occurring water quality and habitat conditions may allow the maintenance of a limited or transient community of aquatic biota.

E. Modified Aquatic Habitat (MAH)—Waters in which natural habitat conditions have been physically, chemically or biologically modified; habitat and resulting water quality conditions may prevent the maintenance of a wide variety or diversity of aquatic biota.

F. Limited Aquatic Habitat (LAH)—Waters in which natural habitat conditions have been substantially and irretrievably altered; habitat and resulting water quality conditions do not allow maintenance of aquatic biota, or if present, the community is of poor variety or diversity.

2. Recreation in and on the water. Assignment of these uses does not grant an individual the right to trespass.

A. Whole body contact recreation (WBC)—Activities involving direct human contact with waters of the state to the point of complete body submergence. The water may be ingested accidentally and certain sensitive body organs, such as the eyes, ears, and the nose, will be exposed to the water. Although the water may be ingested accidentally, it is not intended to be used as a potable supply unless acceptable treatment is applied. Waters so designated are intended to be used for swimming, water skiing, or skin diving.

(I) Category A (WBC-A)—This category applies to waters that have been established by the property owner as public swimming areas welcoming access by the public for swimming purposes and waters with documented existing whole body contact recreational use(s) by the public. Examples of this category include, but are not limited to: public swimming beaches and property where whole body contact recreational activity is open to and accessible by the public through law or written permission of the landowner.

(II) Category B (WBC-B)—This category applies to waters designated for whole body contact recreation not contained within category A.

B. Secondary contact recreation (SCR)—Uses include fishing, wading, commercial and recreational boating, any limited contact incidental to shoreline activities, and activities in which users do not swim or float in the water. These recreational activities may result in contact with the water that is either incidental or accidental and the probability of ingesting appreciable quantities of water is minimal.

3. Human health protection (HHP)—Criteria to protect this use are based on the assumption of an average amount of fish consumed on a long-term basis. Protection of this use includes compliance with Food and Drug Administration (FDA) limits for fish tissue, maximum water concentrations corresponding to the 10^{-6} cancer risk level, and other human health fish consumption criteria.

4. Irrigation (IRR)—Application of water to cropland or directly to cultivated plants that may be used for human or livestock consumption. Occasional supplemental irrigation, rather than continuous irrigation, is assumed.

5. Livestock and wildlife protection (LWP)—Maintenance of conditions in waters to support health in livestock and wildlife.

6. Drinking water supply (DWS)—Maintenance of a raw water supply which will yield potable water after treatment by public water treatment facilities.

7. Industrial water supply (IND)—Water to support various industrial uses; since quality needs will vary by industry, no specific criteria are set in these standards.

8. Storm- and flood-water storage and attenuation (WSA)—Wetlands and other waters which serve as overflow and storage areas during flood or storm events slowly release water to downstream areas, thus lowering flood peaks and associated damage to life and property.

9. Habitat for resident and migratory wildlife species, including rare and endangered species (WHP)—Wetlands and other waters that provide essential breeding, nesting, feeding, and predator escape habitats for wildlife including waterfowl, birds, mammals, fish, amphibians, and reptiles.

10. Recreational, cultural, educational, scientific, and natural aesthetic values and uses (WRC)—Wetlands and other waters that serve as recreational sites for fishing, hunting, and observing wildlife; waters of historic or archaeological significance; waters which provide great diversity for nature observation, educational opportunities, and scientific study.

11. Hydrologic cycle maintenance (WHC)—Wetlands and other waters hydrologically connected to rivers and streams serve to maintain flow conditions during periods of drought. Waters that are connected hydrologically to the groundwater system recharge groundwater supplies and assume an important local or regional role in maintaining groundwater levels.

Daily maximum: An effluent limitation that specifies the total mass or average concentration of pollutants that may be discharged in a calendar day.

Discharge: The causing or permitting of one (1) or more water contaminants to enter waters of the state.

Nonpoint source (NPS) pollution: Occurs when water runs over land or through the ground, picks up natural or human-made pollutants, and deposits them in surface waters or groundwater. Pollutants commonly associated with NPS include nutrients (phosphorus and nitrogen), pathogens, clean sediments, oil and grease, salt, and pesticides.

Pesticide: Any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest; or any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.

Pollutant: Dredged spoil, solid waste, incinerator residue, sewage, garbage, sewer sludge, munitions, chemical waste, biological material, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, filter backwash or industrial, municipal or agricultural waste discharged into water.

Pollution: Contamination or other alteration of the physical, chemical, or biological properties of any waters of the state, including change in temperature, taste, color, turbidity, or odor of the waters, or discharge of any liquid, gaseous, solid, radioactive, or other substance into any waters of the state will or is reasonably certain to create a nuisance or render the waters harmful, detrimental, or injurious to public health, safety or welfare, or to domestic, industrial, agricultural, recreational, or other legitimate designated uses, or to wild animals, birds, fish, or other aquatic life, or which violates, or is reasonable certain to violate, any effluent regulations, limitations, or any other standards or limitations adopted by the Clean Water Commission.

Source water protection area: The portion of a watershed or groundwater area that may contribute water (therefore, pollutants) to the water supply.

Stream: A defined watercourse which carries water either continuously or intermittently and which is not entirely confined or located completely upon land owned, leased, or otherwise controlled by one (1) person.

Total Maximum Daily Load (TMDL): TMDLs are "pollutant budgets" for a specific water body or segment that, if not exceeded, will result in attainment of WQS. Pollutants include clean sediments, nutrients (nitrogen and phosphorus), pathogens, acids/bases, heat, metals, cyanide, and synthetic organic chemicals. (Pollution includes all pollutants but also includes flow alterations and physical habitat modifications.) Elements in a TMDL include allowable pollutant

load (cap), margin of safety (MOS), and allocation of cap among sources.

Wastewater: Water or other liquids which carry or contain pollutants or water contaminants from any source.

Wastewater treatment facility: Any facility, method or process which removes, reduces or renders less obnoxious pollutants or water contaminants released from any source.

Water contaminant: Any particulate matter or solid matter or liquid or any gas or vapor or any combination thereof, or any temperature change which is in or enters any waters of the state either directly or indirectly by surface runoff, by sewer, by subsurface seepage, otherwise, which causes or would cause pollution upon entering waters of the state, or which violates or

exceeds any of the standards, regulations, or limitations under the Missouri Clean Water Law or the Federal Clean Water Act or is included in the definition of pollutant in the federal act.

Watershed: An area of land that catches rainfall and snowmelt, which then drains into low-lying bodies of water. Watersheds come in all shapes and sizes, from a few acres to over a million square miles and are sometimes difficult to delineate. Consequently, Hydrologic Unit Codes (HUCs) were created to logically convey the drainage relationship of stream systems, watersheds, and larger river basins.

Acronyms

ACOE	Corps of Engineers (United States Army)
APEX	Agricultural Policy Environmental eXtender Model
CAFNR	College of Agriculture, Food and Natural Resources
CFR	Code of Federal Regulations
COG	Councils of Government
CPP	Continuing Planning Process
CSR	Code of State Regulations
CWA	Clean Water Act
CWC	Clean Water Commission
CWMWQ	Center for Watershed Management and Water Quality
CWSRF	Clean Water State Revolving Fund
DEQ	Division of Environmental Quality
DHSS	Department of Health and Senior Services
DNR	Department of Natural Resources
E3	Enhancing Efficiency and Effectiveness
EA	Environmental Assessment
EIERA	Environmental Improvement and Energy Resources Authority
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
FAC	Financial Assistance Center (DNR)
FSA	Farm Service Agency (USDA)
GAAP	Generally Accepted Accounting Principles
GRTS	Grants Reporting and Tracking System
HUC	Hydrologic Unit Code
IOs	Interstate Organizations
LID	Low Impact Development
LMD	Listing Methodology Document
LMVP	Lakes of Missouri Volunteer Program
LRP	Land Reclamation Program (DNR)
MACOG	Missouri Association of Councils of Government
MASBDA	Missouri Agricultural and Small Business Development Authority
MCHF-SSTF	Missouri Conservation Heritage Foundation-Stream Stewardship Trust Fund
MCWC	Missouri Clean Water Commission
MDA	Missouri Department of Agriculture
MDC	Missouri Department of Conservation
MGS	Missouri Geological Survey
MOA	Memorandum of Agreement
MoDOT	Missouri Department of Transportation
MoWIN	Missouri Watershed Information Network
MU	University of Missouri
MUE	Missouri University Extension
NASS	National Agricultural Statistics Service
NEPA	National Environmental Policy Act

NPS	Nonpoint Source
NPSMP	Nonpoint Source Management Plan
NRCS	Natural Resources Conservation Service (USDA)
NTT	Nutrient Tracking Tool
OA	Office of Administration
OMB	Office of Management and Budget
PDWB	Public Drinking Water Branch
PDWS	Public Drinking Water Supply
PPG	Performance Partnership Grant
QAPP	Quality Assurance Project Plan
RCPP	Regional Conservation Partnership Program
RFP	Request for Proposal
RPCPOs	Regional Public Comprehensive Planning Organizations
RSMo	Revised Statutes of Missouri
SDWA	Safe Drinking Water Act
SRF	State Revolving Fund
ST	Stream Team (Missouri)
SWAT	Soil and Water Assessment Tool
SWCD	Soil and Water Conservation District
SWCP	Soil and Water Conservation Program (DNR)
SWPP	Source Water Protection Plan
TMDL	Total Maximum Daily Load
USFWS	United States Fish and Wildlife Service
USDA	United States Department of Agriculture
USFS	United States Forest Service
USGS	United States Geological Survey
VWQM	Volunteer Water Quality Monitoring
WBPs	Watershed-Based Plans
WET	Water Education for Teachers
WPF	Water Protection Forum (DNR)
WPP	Water Protection Program (DNR)
WPS	Watershed Protection Section (DNR)
WQ10	Water Quality Measure 10
WQA	Water Quality Assessment System
WQCC	Water Quality Coordinating Committee
WQM	Water Quality Management
WQS	Water Quality Standards
WWTP	Wastewater Treatment Plant

Appendix 2: NPS Pollution Categories

Urban

In urban and suburban areas, impervious surfaces cover much of the land, thus preventing infiltration of rain and snowmelt into the ground. Most developed areas rely on storm drains to carry large amounts of runoff from roofs and paved areas to nearby waterways. Storm water runoff carries pollutants such as oil, dirt, chemicals, and lawn fertilizers directly to streams and rivers, where they may harm water quality. The varied and ubiquitous nature of storm water flows makes it challenging to identify and solve the resultant pollution problems.

Urban stressors may begin to affect biological communities when the impervious cover within a watershed reaches 8-20%, and irreparably damage communities in the range of 25-60%. This degradation is from both pollutants and altered habitat. Since only 2.5% of the nation's land surface, it is apparent that urban impacts are concentrated and localized.

Construction

Construction activities of varying size occur in every county of Missouri and often require land disturbance permits for the use and maintenance of erosion and sediment control measures, as well as storm water pollution prevention plans for construction activities. Sites under a certain size are unregulated under the storm water laws and thus considered NPS. Sediment washing from all sizes of construction sites may have severe impacts on lakes and streams. Because developers tend to grade an entire site at one time and then develop the site in phases, large tracts of land can be laid bare for many months if not years. The amounts of sediment coming off these sites can range from 100 to 200 tons per acre per year.

Low Impact Development (LID)

LID is an approach to land development (or re-development) that works with nature to manage storm water as close to its source as possible. LID employs principles such as preserving and creating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that treats storm water as a resource rather than a waste product. Many practices adhere to these principles, such as, bioretention facilities, rain gardens, vegetated rooftops, rain barrels, and permeable pavements. Careful site planning eliminates many potential erosion and sedimentation problems by preventing them from occurring in the first place. Project phasing is another excellent conservation practice. The phasing of a project can keep large areas from being graded and destabilized for extended periods. LID principles and practices manage water in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem or watershed. Applied on a broad scale, LID can maintain or restore a watershed's hydrologic and ecological functions.

Agriculture

Various aspects of agricultural production are critical to determining what effect agriculture has on water quality and which conservation practices will be the most effective. Agricultural pollutants are often bound to sediment and have a tendency to travel once they are waterborne. Some chemicals, such as atrazine, resist degradation once they enter a water body. Wide ranges of voluntary and incentive programs are in place, the majority of which

prevent soil erosion. Assistance is available in the form of educational materials, technical assistance, training, special mechanical equipment, cost-share assistance and incentive payments. A list of conservation practices is located in Appendix 3.

Crop production

Crop production is particularly important to Missouri's economy. The United States Department of Agriculture/National Agricultural Statistics Service (USDA/NASS), 2015

2015 Missouri Prospective Plantings:

http://www.nass.usda.gov/Statistics_by_State/Missouri/Publications/Press_Releases/20150331-Prospective_Planting.pdf

showed the acres (million) of prospective plantings for 2015 to be: corn, 3.5; soybeans, 5.65; hay, 3.48; winter wheat, .88; cotton, .25; rice, .26; and sorghum and oats at 85,000 and 25,000 acres. A significant amount of this production is occurring on highly erodible soils; therefore, it is of great importance to use conservation practices to manage erosion. Missouri has reduced its rate of soil erosion more than any other state with over 10 million acres of cultivated cropland since 1982.

Animal Production

Managing NPS pollution from animal production usually emphasizes protecting waters from livestock through exclusion and proper waste management. This is accomplished in several ways: 1) management of animal manure and bedding through collection and prevention from runoff into waters; 2) manure that is used as fertilizer and applied at proper rates to agricultural fields so excess nutrients load don't leach or run off into nearby waters, and 3) livestock excluded from waters. A wide range of voluntary and incentive type programs prevent pollution by animal waste or the degradation of riparian areas by animal use.

Assistance is available in the form of educational materials, technical assistance, training, demonstration projects, specialized mechanical equipment, cost-share assistance and incentive payments, both for management as well as pollution prevention or habitat restoration.

Forestry

According to the National Association of State Foresters, State Forestry Statistics, 2006: Missourians owned 12.2 million acres of private forests. Federally owned acreage totaled 1.7 million acres and the state accounted for 0.7 million. Sixty-three urban communities are actively managing their forests with 115 developing such programs. Voluntary and incentive type programs provide educational materials, technical assistance, training, specialized mechanical equipment, cost-share assistance and incentive payments, both for management as well as pollution prevention or habitat restoration. A list of conservation practices is located in Appendix 3.

Certain forest management activities such as timber harvesting, construction of logging roads and skid trails, log landings, and allowing livestock access to forests can significantly influence water quality. Improper forestry practices may cause:

Hydromodification/Habitat Alteration

Hydromodification is changing the natural flow of rivers and streams through channelization, bridges, bank destabilization, cut-off devices, dredging, locks and dams, spillways, and

watershed construction. NPS pollution associated with these activities includes sediment, nutrients, pesticides, and organic pollutants. Modifications to water bodies may benefit humans in numerous ways, but also may have detrimental effects on wildlife and aquatic ecosystem functions. Alteration of the hydrologic properties of lakes and streams such as water residence time, water level, and basin morphology often has unintended consequences. Often, wetlands in the littoral zone suffer from either too much or too little water. A list of conservation practices is located in Appendix 3.

Channelization

One form of hydromodification is channelization or channel modification. These terms (used interchangeably) describe river and stream channel engineering undertaken for flood control, navigation, drainage improvement, or reduction of channel migration. This category includes activities such as straightening, widening, deepening, or relocating existing stream channels and clearing or snagging operations. Hydromodification typically results in more uniform channel cross sections, steeper stream gradients, and reduced average pool depths.

Dams

Dams are another form of hydromodification. The construction of a dam is undertaken for many purposes, including flood control, power generation, irrigation, livestock watering, fish farming, navigation, and municipal water supply. Other reservoir uses may include recreation and water sports, fish and wildlife propagation, and augmentation of low flows.

Dams can adversely influence the hydraulic regime, resulting in adverse effects on water quality, and habitat in their source stream.

Bank Destabilization

Streambank and shoreline erosion are forms of hydromodification that refer to the loss of land along streams and lakes. The force of water flowing in a stream is the most important process causing erosion of a streambank. Eroded material travels downstream and deposits in the channel bottom or in point bars located along bends in the waterway. Surface flow of upland runoff across a bank face can also dislodge sediments through sheet flow, or through the creation of rills and gullies on the shoreline banks and bluffs.

The erosion of shorelines and streambanks is a natural process that has designated and adverse impacts on the creation and maintenance of riparian habitat. Sand and gravel erode from streambanks, and deposit in the channel. Adverse impacts from shoreline and streambank erosion include: high sediment loads that smother submerged aquatic vegetation beds, fill in riffle pools, and contribute to increased levels of turbidity and nutrients. Surface run-off can carry excess pollutants, bound to sediment particles, into the water body.

Sediment fills in lakes reducing their useful lifetime. However, little research exists that can identify levels below which streambank and shoreline erosion is beneficial and above which it is an NPS-related problem.

Dredging

Dredging is a management practice that modifies the hydrology and habitat of a water body. At the point where water from a stream enters a lake, the water slows down and the sediment load it carried falls out of the water column. Over time, the sediment builds up, bringing the lake bottom toward the surface and causing the water to become shallower. One solution to increased sedimentation in coves and entire lakes is dredging. From a habitat standpoint, when a water body is dredged completely it could take 2 to 3 years for the reestablishment of benthic fish-food organisms. In most cases, installment of conservation practices in the watershed to protect the water body from sedimentation is economically more feasible as well as less damaging to aquatic life. Typically NPS programs do not fund dredging unless accompanied by improved land management practices upstream to prevent or reduce reoccurrence.

The most prevalent form of dredging in Missouri within streams and rivers is for mining of sand and gravel. Dredging in active river channels typically results in stream incision around the site. Incision may cause undermining of structures, lowering of alluvial water tables, channel destabilization and widening, and loss of aquatic and riparian habitat. Floodplain gravel pits can become good wildlife habitat upon reclamation, if margins are appropriately contoured and water table fluctuations are not excessive. The Department's LRP promulgates gravel and sand mining rules.

Marinas/Boating

<http://water.epa.gov/polwaste/nps/marinas.cfm>

The cumulative impact of pollution from individual boaters and marinas is significant in lakes and rivers. Poor maintenance of watercraft and environmentally insensitive marina construction are two common sources. Boat sewage discharges can increase both pathogen and algae concentrations in a water body. Excess pathogens are a human health hazard and excess algae can cause eutrophication.

Other sources of pollution include boat maintenance and storm water runoff from the parking lots surrounding a marina. Boaters must be careful when using products such as fuels, oils, paints, and solvents near any lake or river. These substances can enter the water, accumulate in the bottom sediments and persist for long periods. A list of conservation practices is located in Appendix 3.

Mining Operations

http://water.epa.gov/polwaste/nps/acid_mine.cfm

Resource extraction is one of the NPS categories identified by EPA as contributing to degradation of the nation's waters. Resource extraction includes a wide range of land disturbing activities. EPA's definition includes seven resource extraction activities: surface mining, subsurface mining, placer mining, dredge mining, petroleum activities, and mine tailings. Each of these activities has specific pollutants associated with them, affecting the type of water quality impairment that may occur within the watershed. Mining activities and inactive mine sites can contain some of the most environmentally detrimental compounds of any discharging activity.

Missouri's NPS program deals primarily with sites of historical origin. Abandoned mined lands contribute localized chronic impairments and episodic impacts to Missouri's water bodies. There are three issues with abandoned mines that impact water quality:

- acid mine drainage (the most prevalent)
- alkaline mine drainage
- metal mine drainage

The scale of many sites is too large to for remediation through NPS funding alone, although smaller treatable sites may be considered. The department's Land Reclamation Program permits currently operating mines, provides additional resources for dealing with mining operations, and abandoned mine lands. <http://www.dnr.mo.gov/env/lrp/index.html>

Roads, Highways, and Bridges

Roads, highways, and bridges are significant contributors of pollutants to water. Contaminants from vehicles and activities associated with road and highway construction and maintenance, wash from roads during rains and snow melts. For example, road salt applied to melt winter precipitation is unregulated in Missouri and often excessively applied. This compound may accumulate for several days before a thaw flushes it into a water body. Road construction increases the area of a watershed impacted by impervious surfaces, thereby increasing runoff and altering the natural hydrology of the watershed. Bridge approaches and structures may constrict the floodway increasing the potential for downstream bank erosion

Nonpoint Source Impacts

Sediment

Cropland sheet and rill erosion are only partly responsible for sediment impacts to in-stream habitat with much coming from gullies and stream banks. Sediment comes from construction sites and gravel roads and ditches. Erosion control practices are an important segment of appropriate conservation practices with benefits for both soil conservation and prevention of movement of some pesticides and nutrients.

Pesticides

Pesticides historically have been widely used for multiple reasons from agricultural pests to termites in homes. With widespread use, however, pesticides began appearing in water bodies, which can cause unsafe levels in drinking water and also accumulation in fish tissue which resulted in fish advisory information for the public <http://health.mo.gov/living/environment/fishadvisory/index.php>. Passage of the Safe Drinking Water Act, which limits the levels of certain contaminants in drinking water, has brought the issue to the forefront. Lakes are at high risk because of retention time; late spring runoff events generally carry a flush of recently applied pesticides, which may move slowly through the system; or, in the case of drinking water reservoirs, the spring flush may be held for use throughout the remainder of the year.

Irrigation

Irrigation usage in Missouri ranges from supplemental on upland areas to ensure adequate moisture during key crop growth stages to essential in sandy alluvial soils and in production of

rice or specialty crops. Inefficient and/or over-irrigation can result in runoff and leaching of nutrients and pesticides. Irrigation management methods developed in areas of the country where irrigation water is costly and scarce reduce off-site movement of irrigation water and its associated chemical load. Some of those methods (i.e. surge and side inlet rice irrigation) are applicable in Missouri. Site specific irrigation management methods considering soil type and water holding capacity, topography, crop moisture needs, rainfall, soil moisture and nutrient and pesticide management plans require closer attention to irrigation management and possibly changes in application methods and equipment used, but can significantly reduce material input costs, yield loss, and the potential for NPS pollution.

Riparian Corridors

One result of agricultural production has been degradation or destruction of riparian corridors, much of which occurred early in the century when channelization was customary and recommended. Streams have been straightened and riparian corridors removed for flood prevention, farming convenience and increased production. The results include increased sedimentation from destabilized stream banks, loss of pollutant trapping effects from vegetation, increased water temperature and evaporation, lowered dissolved oxygen and a degraded physical habitat. Increased impervious surfaces in urban areas has created a large impact to streambank erosion in urban streams.

Nutrients/Eutrophication

Nutrient inputs from nonpoint sources such as farm fields, septic systems, and urban lawns may influence aquatic systems by encouraging excessive growth of algae and other aquatic plants. Aquatic life may be impaired by the growth and subsequent decomposition of algae and aquatic macrophytes with the resulting depletion of dissolved oxygen in the water column. Species of fish and invertebrates may be replaced by more tolerant species. Aesthetic impairment may also occur. A water body's response to nutrient input varies with light availability. In southern Missouri's clear Ozark streams and lakes nutrients such as phosphorus and nitrogen lead to increased aquatic plant growth. However, in northern Missouri where water bodies are less clear due to high turbidity, limited light availability inhibits the algae growth. Nevertheless, high nutrient concentration remains a threat to streams and reservoirs.

In waters used for drinking water supply, taste and odor problems can be caused by the proliferation of organism growth due to high levels of nutrients entering the water. Another potential threat to Missouri's drinking water reservoirs stems from nutrient enrichment enhancing algal blooms, which in turn, provide the precursors that react with chlorine (the primary drinking water disinfectant) to form disinfection by-products (DBPs). The primary DBPs are trihalomethanes and haloacetic acids.

Nitrate occurs naturally in groundwater, even under pristine conditions. Scientists generally concur that nitrate as nitrogen in groundwater at concentrations above 1 mg/L is caused by human activity, although under certain conditions, the natural concentration can be higher. Concentrations of more than 10 mg/L in drinking water can cause adverse health effects in humans, most notably infants under six months of age, and in young livestock. Nitrate toxicity, or methemoglobinemia (blue baby disease), reduces the blood's ability to absorb oxygen.

Pathogens

Animal waste and septic system discharges have the potential for pathogens that may harm aquatic life or humans.

Ammonia Toxicity

Ammonia is a form of nitrogen and many aquatic organisms are sensitive to relatively low levels of ammonia. Ammonia toxicity cases related to fish kills are often linked to animal waste discharges. The water quality standards contain numeric criteria for ammonia in waters with designated uses. The toxic concentration of ammonia is related to temperature and pH. Under proper containment and management, animal waste is not discharged to water and nitrogen in the ammonia form does not run off application sites in any significant concentration.

Riparian Corridors/Sediment

The loss of vegetation in riparian areas contributes to increased temperature and evaporation, decreased dissolved oxygen and degraded habitat. In addition to the immediate impacts in the riparian area, the filtering properties of the riparian strip, which would otherwise buffer the water from sediment or other contaminants, are lost. Livestock with free access to water generally cause bank instability, bank sloughing and erosion of the riparian area, in addition to the direct introduction of nutrients and possibly pathogens into the water.

Improper Harvests and Logging

One threat to wildlife is loss of habitat and habitat fragmentation. Healthy riparian zones counter habitat fragmentation by establishing a corridor, which provides protection and food for a variety of wildlife species. The Missouri Department of Conservation developed a publication entitled: Missouri Woody Biomass Harvesting/Best Management Practices Manual. The manual provides information to private and state forest managers, loggers, and other interested persons about effective use of conservation practices to prevent the following:

1. Sediment from eroding logging roads, forest harvesting practices, and livestock damage;
2. Tree removal along streambanks can increase water temperatures thus reducing oxygen levels, increase soil erosion, and decrease the pollutant filtering capacity of riparian vegetation;
3. Tree tops and limbs from tree harvesting can cause streambank erosion and restrict stream flow; and
4. Improperly applied herbicides, pesticides, fertilizers, or oils and fuels from machinery can wash into streams.

A list of conservation practices used to reduce nonpoint source impacts is located in Appendix 3

Appendix 3: NPS Conservation Practices

Section 319 of the CWA requires each state to identify the conservation practices it will use to control pollutants in the following NPS categories.

Urban (traditional)

Buffer Zone/Strip Catch
Basin Cleaning
Catch Basin-Leaching 051
Check Dams (053)
Chemical Stabilization – soil binder
Construction Entrance/ exit Pad,
Temporary Gravel (930)
De-icing Chemical Use & Storage
Detention Ponds and Basins Detention Ponds
& Basins, Extended Dikes & Swales,
Interceptor Diversion, Dike (820)
Diversion, Permanent (815)
Diversion, Temporary (955)
Dust Control (825)
Energy Dissipaters
Erosion Blanket (830)
Filter Strip, Urban (835)
Geotextiles
Grade Stabilization Structure
Gravel/Stone Filter
Berm Infiltration Basin (845)
Infiltration Ditches 753
Infiltration Trench (845)
Inlet Protection – Block & Gravel
Inlet Protection – Excavated Drain (855)
Inlet Protection – Fabric Drop (860)
Land Grading (865)
Landscaping and Lawn Maintenance Controls
Lot Benching
Mulching

Oil/grit Separators
Parking Lot and Street Cleaning
Operations Porous Pavement (890)
Portable Sediment Trap (895)
Road Salt Application Control
Retaining Walls
Right-of-Way Diversion (Water Bar) (900)
Riprap Lined Channel
Rock Dam
Rock Outlet Protection (910)
Sediment Basin, Permanent (960)
Sediment Basin, Temporary (960)
Seeding, Permanent (880)
Seeding, Temporary (965)
Silt Curtain, Flotation
Silt Fence (920)
Slope Drain, Temporary (970)
Sodding (925)
Soil Bioengineering for Slope Protection
Stormwater Wetland, Urban (800)
Straw Bale Barrier (935)
Stream Crossing, Temporary (975)
Streambank Setback
Stream Stabilization (940)
Subsurface Drain (945)
Sump Pit (950)
Surface Roughening
Swale, Temporary (980)
Tree and Shrub Planting (985)
Vegetative Streambank and Stabilization (995)

Low Impact Development (LID)

Conservation Design Cluster
Development Open Space
Preservation
Street Design
Cul-de-Sac Design
Curb Elimination
Conservation Easements (016)
Recreation Area Improvement 562
Animal Trail and Walkways 575
Animal Waste Collection Infiltration
Practices
Parking Lot Design
Turf Pavers
Plant Boxes (071)
Bioretention Systems

Surface Sand Filters
Underground Filters
Filter Strips
Sand Filters
Urban Filtration Basin 906
Urban Grassed/vegetative Swale (907)
Urban Infiltration Basin (908)
Urban Infiltration Trench (909)
Urban Porous Pavement (910)
Urban Stormwater Wetland (911)
Urban Vegetated Filter (912)
Runoff Storage Practices
Green Rooftop Systems (011)
On-Lot Infiltration
Water Harvesting Catchment (636)

Rain garden/bioretention basin (009)
 Cistern 708
 Rain Barrels
 Constructed Wetlands
 Sediment Forebay (052)
 Stormwater Wetlands
 Wet Swales
 Urban Wet Pond/ Wet Retention Ponds (913)
 Extended Storage Ponds
 Wet Vaults
 Dry Ponds
 Oil/Grit Separators
 Oil and Grease Trap Devices
 Dry Swales
 Stormwater Wet Detention/Chemical Treatment System (787)
 Urban Catch Basin (901)
 Urban Catch Basin –Oil (902)
 Urban Catch Basin – Sand (903)
 Urban Concrete Grid (904)

Agricultural

Agricultural Fuel Containment Facility (710)
 Agrochemical Mixing Facility (702)
 Agrochemical Mixing Station (703)
 Alley Cropping (313)
 Alternative Water Source (914)
 Alum Treatment of Poultry Litter (786)
 Anaerobic Digester – Ambient Temperature (365)
 Anaerobic Digester – Controlled Temperature (366)
 Animal Mortality Facility (316)
 Aquaculture Ponds (397)
 Barnyard Runoff Management (707)
 Brush Management (314)
 Closure of Water Impoundment (360)
 Composting Facility (317)
 Comprehensive Nutrient Management Plan (100)
 Conservation Buffer Strips (332)
 Conservation Cover Crop (327)
 Conservation Crop Rotation (328)
 Constructed Wetland (656)
 Contour Drainage (335)
 Contour Farming (330)
 Contour Orchard and Other Fruit Area (331)
 Controlled Livestock Lounging Area (711)
 Controlled Stream Access for Livestock Watering (730)
 Corral Dust Control (785)
 Cover Crop (340)
 Critical Area Planting (342)
 Cross Slope Block Farming (750)
 Cross Slope Farming (733)
 Dam Diversion (348)
 Deep Tillage (324)

Urban Ext Detention Pond (905)
 Runoff Conveyance Practices
 Eliminating curbs and gutters
 Grassed swales
 Grassed lined channels
 Surface roughening
 Mulches, Blankets, and Mats
 Sediment Control
 Silt Fences
 Inlet Protection
 Temporary Sedimentation Basins/Traps
 Check Dams
 Toxic Salt Reduction
 Rock Barrier 555
 Slope Roughening 726
 Flow Control Structures
 Debris Removal
 Anion Polyacrylamide (PAM)
 Erosion Control (450)

Dike (356)*
 Diversion (362)
 Drainage Water Management (554)
 Dry Hydrant (432)
 Early Successional habitat-development/Management (647)
 Field Border (386)
 Field Windbreak (392)
 Filter Strip (393)
 Firebreak (394)
 Fish Passage (396)
 Fishpond Management (399)
 Forage Harvest Management (511)
 Grade/Legumes Rotation (411)
 Grade Stabilization Structure (410)
 Grassed Waterway (412)
 Grazing – Deferred (348)
 Grazing Land Mechanical Treatment (548)
 Heavy Use Area Protection (561)
 Hedgerow Planting (422)
 Herbaceous Wind Barriers (603)
 Hydro Seeder (1001)
 Incinerator (769)
 Invasive Species/Noxious Weed Control (950)
 Irrigation Canal or Lateral (320)
 Irrigation Field Ditch (388)
 Irrigation Land Leveling (464)*
 Irrigation Pit (552A)
 Irrigation Regulating Reservoir (552)
 Irrigation –Regulating Reservoir (552B)
 Irrigation Storage Reservoir (436)
 Irrigation System – Sprinkler (442)*
 Irrigation System – Surface & Subsurface (443)*

Irrigation System – Tailwater Recovery (447)*
 Irrigation Water Conveyance – Ditch (428)
 Irrigation Water Conveyance – Pipeline 430
 Irrigation Water Management (449)
 Land Clearing (460)*
 Land Grading (744)*
 Land Smoothing (466)
 Lined Waterway or Outlet (468)
 Livestock Stream Crossing (728)
 Livestock Use Area Protection (757)
 Long Term No-Till (778)
 Manure Transfer (634)
 Monitoring Well (353)
 Mulching (484)
 Nutrient Management (590)
 Pasture & Hayland Management (510)
 Pasture and Hayland Planting (512)
 Pest Management (595)
 Pesticide Management (915)
 Pipeline (516)
 Planned Grazing Systems (556)
 Pond (378)*
 Pond Sealing or Lining (521)*
 Precision Land Forming (462)
 Prescribe Burning (338)
 Prescribe Grazing (528)
 Residue management – no-till /strip (329A)
 Residue Management – Ridge till (329C)
 Residue Management –Mulch Till (329B)
 Residue Management- Seasonal (344)
 Restoration and Management of Declining
 Habitats (643)

Forestry

Agro Forestry Planning (704)
 Brush Barrier
 Check Dam
 Grade Stabilization Structure
 Revegetation
 Riprap
 Sediment Basin/Rock Dam
 Sediment Fence (Silt Fence)/Straw Bale Barrier
 Sediment Trap
 Vegetated Filter Strip
 Clearing and Snagging (326)
 Culverts and Cross-Ditches
 Timber Harvesting
 Fertilizer and Pesticide Application
 Forest – Direct Seeding (652)
 Forest – Erosion Management (409)
 Forest – Improved Harvest (654)
 Forest Chemical Management
 Forest Site Preparation (490)
 Forest Stand Improvement (666)

Riparian Buffers – Vegetative (759)
 Shallow Water Management for Wildlife (646)
 Silvopasture Establishment (791)
 Silvopasture Management (792)
 Sinkhole and Sinkhole Area Treatment (725)
 Spring Development (574)
 Stream Habitat Improvement/Management (580)
 Stripcropping – Field (586)
 Stripcropping – Wind (589)
 Stripcropping (585)
 Terraces (600)
 Transition to Organic Production (789)
 Underground Outlet (620)
 Upland Wildlife Habitat Management (645)
 Use Exclusion (472)
 Variable Application Rate Technology (070)
 Vegetated Barrier (601)
 Vegetative Buffer Strips (741)
 Waste Facility Cover (367)
 Waste Storage Facility (313)
 Waste Storage Pond (425)
 Waste Treatment Lagoon (359)
 Waste Utilization (633)
 Water and Sediment Control Basin (638)
 Water Well – Livestock (642)
 Watering Facility (614)
 Well Decommissioning (351)
 Well Plugging (755)
 Windbreak/Shelterbelt Establishment (380)
 Windbreak/Shelterbelt Renovation (650)

Forest Trails & Landings (655)
 Land Clearing Woodland (460)
 Revegetation of Disturbed Areas
 Riparian Buffers – Vegetative
 Riparian Forest Buffer (391)
 Riparian Herbaceous Cover (390)
 Road Construction and Management
 Streamside Management Areas
 Road Construction / Reconstruction
 Road Management
 Timber Harvesting
 Site Preparation and Forest Regeneration
 Fire Management
 Trail Closure/Improvements (041)
 Trees/Shrub Establishment (612)
 Wetlands Forest Management
 Woodland Improved Harvest (654i)
 Woodland Pruning (660)
 Woody Root Pruning (747)

Hydromodification/Habitat Alteration

Dredging 007*
Stream Channel Restoration (Dam Removal) 009
Bedding 310
Dam – Multiple Purpose 249
Channel Bank Vegetation 322
Dam removal
Floodwater Diversion 400*
Floodway 404
Obstruction Removal 500

Stream Crossing 578
Open Channel 582
Stream Channel Stabilization 584
Floodproofing 714
Cut Bank Stabilization 742
Stream Corridor Improvement 745
Baffle Boxes 916
Natural Channel Restoration 998
Instream and Riparian Habitat Restoration

Marinas/Boating

Habitat Assessment
Fuel Station Design
Sewage Facility
Marina and Boat Operation and Maintenance
Marina Flushing
Petroleum Control
Boat Cleaning
Public Education
Sewage Facilities Maintenance

Boat Operation
Riprap Shoreline
Shoreline Stabilization
Stormwater Runoff
Soil Waste Management
Fish Waste Management
Liquid Material Management
Water Quality Assessment

Mining Operations

Brush Barrier
Check Dam Chemical Treatment
Conveyance Measures
Drop Inlet Protection
Temporary Fabric Drop Inlet Protection
Temporary Sod Drop Inlet Protection
Vegetated Filter Strip
Dust Control Mulching
Anoxic Limestone Drains Grade
Stabilization Structure Grass-
Lined Channel
Gravel Drop Inlet Protection
Hardened Channel
Land Reclamation (451)
Land Reclamation, Landslide Treatment (453)
Land Reclamation, Toxic Discharge control (455)
Land Reconstruction, Abandoned Mine (543)
Land Reconstruction, Brine Damaged Areas (773)
Land Reconstruction, Currently Mined Land (544)
Level Spreader
Mine Shaft & Audit Closing (457)
Outlet Protection

Outlet Stabilization
Structure Paved Flume (Chute)
Reclamation Runoff Diversion Riprap
Runoff Control and
Sediment Basin/Rock Dam
Sediment Fence/Straw Bale Barrier Stream
Protection
Sediment Traps and Barriers
Sodding
Surface Roughening
Temporary Gravel Construction Access
Temporary Excavated Grade Stabilization
Streambank Stabilization
Surface Stabilization
Temporary Block
Temporary Slope Drain
Temporary Stream Crossing
Temporary and Permanent Seeding
Topsoil Replacement
Wetlands, Constructed
Wetlands, Natural and Restored

Road, Highways, and Bridges

Access Road (500)
Animal Waste Collection
Curb Elimination
Debris Removal
Parking Lot and Street Cleaning Operations
Road Salt Application Control
Camp Crowning/Ditching (080)
Ditch Stabilization (581)
Dry Detention Basins
Infiltration Devices
Oil and Grease Trap Devices
Porous Pavement
Sand Filters
Vegetative Practices
Filter Strips
Grassed Swales
Operation and Maintenance
Road, Highway, and Bridge Runoff Systems
Planning, Siting and Developing Roads and
Highways
Bridges
Construction Projects
Construction Site Chemical Control
Road Ditch Creation/Improvements (082)
Road/Landing Removal (722)
Salt of Deicer Storage Facility (1000)
Wetlands, Constructed
Wetlands, Natural and Restored

Wetland/Riparian Management

Constructed Wetland (656)
Restoration of Wetlands and Riparian
Areas Riparian Buffers – Vegetative
Riparian Forest Buffer (391)
Riparian Herbaceous Cover (390)
Wetlands Acquisition - Protection (006)
Wetland Wildlife Habitat Management (644)
Wetland Creation (658)
Wetland (657)
Wetland Enhancement (659)
Wetlands Forest Management
Vegetated Treatment System

Appendix 4: State and Federal Partner Information

State Partner Organizations

Missouri Department of Agriculture (<http://agriculture.mo.gov/>)

The Missouri Department of Agriculture (MDA) sets agriculture policy and assists farmers throughout the state. MDA's primary mission is to serve, promote, and protect the agricultural producers, processors, and consumers of Missouri's food, fuel, and fiber products. Links between MDA and the NPS Program include the control and proper application of pesticides, dead animal disposal, and loans for animal waste handling. These efforts support the NPSMP long- and medium-term goals.

Missouri Department of Conservation (<http://mdc.mo.gov/>)

The Missouri Department of Conservation (MDC) partners with the department to support Missouri Stream Team efforts, collaborate on fish kills, and promote management practices to protect watersheds. There is also a cooperative effort between the agencies to develop a Missouri-specific habitat index. This index will be beneficial to the department in its efforts to develop tiered aquatic life uses, use attainability analyses (UAAs), and Section 303(d) impaired waters assessments. The MDC will be a key partner in identifying and implementing projects that specifically address NPS sources impacting aquatic life. For example, there are numerous low water crossings, undersized culverts, and headwater impoundments that reduce the availability of habitat quality for Missouri's sensitive aquatic life species. The MDC has also developed watershed inventories and assessments that provide natural resource-related information about Missouri's primary watersheds, especially information pertaining to management of aquatic resources. Watershed inventory and assessment reports are available at: <http://mdc.mo.gov/landwater-care/stream-and-watershed-management/missouri-watersheds>. In addition, MDC's annual reports include many NPS related accomplishments (<http://mdc.mo.gov/about-us/get-know-us/annual-reports>)

Missouri Stream Teams/Volunteer Water Quality Monitoring Program

<http://www.mostreamteam.org/>

Missouri Stream Team network consists of citizens who are concerned about Missouri streams and administered by the department and MDC. The organization offers free membership to any interested citizen, family or organization and strives to assist in the proper management of these waterways. The Missouri Stream Team program helps organize interested citizens to address stream problems at the local level. Members learn to monitor water quality at a geographic scale beyond what government agencies can do. They also work together to clean waterways, plant trees, stabilize stream banks, and improve fish and wildlife habitats in or near streams.

The Stream Team Volunteer Water Quality Monitoring (VWQM) program has trained approximately 7,000 volunteers since the program was launched in 1993. Currently, the program averages approximately 440 volunteers attending workshops annually and at times receives support from the NPS Program. More detailed information about Missouri Stream Team and Volunteer Water Quality Monitoring programs can be found at: <http://www.mostreamteam.org/>.

The Stream Team's volunteer monitoring will continue to play a valuable role in Missouri's overall NPSMP. The NPS Program will rely on observations from the Stream Team volunteer network to provide indicators of restoration and protection success.

Missouri Department of Transportation (<http://www.modot.org/>)

The Missouri Department of Transportation (MoDOT) recognizes the richness of our state's diverse environment and aspires to balance Missouri's transportation needs with environmental sensitivity and responsibility. To that end, MoDOT seeks out new and innovative ideas for more environmentally-friendly and cost-effective projects. Links to these topics are located at the top of the page (<http://contribute.modot.mo.gov/ehp/index.htm>). The MoDOT supports the long- and medium-term goals with attention to wetlands, endangered species, and critical habitat; including stream crossing and stormwater runoff-related conservation practices.

Missouri Department of Health and Senior Services (<http://www.dhss.mo.gov/>)

The mission of the Department of Health and Senior Services (DHSS) is to protect and promote quality of life and health for all Missouri citizens. The DHSS monitors adverse health effects and prepares population risk assessments regarding environmental hazards. There is particular cooperation and partnership regarding NPS issues relating to private drinking water, recreational water quality, on-site sewage and other wastewater systems, and fish consumption advisories.

Missouri Department of Natural Resources (MDNR) (<http://dnr.mo.gov/>)

The MDNR protects, preserves, and enhances Missouri's natural and cultural resources. The department helps develop mineral resources in an environmentally safe manner, protects Missouri's land, air and water resources and works to preserve the state's cultural and natural heritage through state parks and state historic sites and the state historic preservation office.

Section 319 Nonpoint Source Pollution Management Program: This watershed-based program is authorized and funded under Section 319 of the Clean Water Act. The program uses an integrated approach that develops and coordinates NPS activities with federal, state, local and private sector entities for outreach, information, education, demonstration practices, technical assistance, and implementation assistance. The Soil and Water Conservation Program (SWCP) Director administers the NPS Program and ensures that a sustainable watershed-based approach is used to address NPS issues. The department funds approximately four to 20 NPS projects annually, depending on available funding and funding requests. Projects often complement efforts of partners such as NRCS and MDC and the implementation of conservation practices by the SWCP by providing valuable components not eligible for other funding sources in priority watersheds. The program may also add incentives for installing practices in critical areas or for highly effective, but less popular conservation practices. The NPS Program plays a key role in supporting the Our Missouri Waters statewide watershed planning efforts through watershed outreach, information, education, development of watershed-based plans (WBPs), pass-through funding for conservation practice implementation, and funding for monitoring and assessment.

Soil and Water Conservation Program (SWCP) (<http://www.dnr.mo.gov/env/swcp/>)

In 2015, the MDNR moved the SWCP under the Division of Environmental Quality and the Missouri Nonpoint Source Management Program became a program within the SWCP, although each operates under their respective funding authorities. The SWCP provides staff support for the Soil and Water Districts Commission and supports all 114 county soil and water conservation districts. Both the Section 319 program and the SWCP use voluntary approaches for reducing NPS pollution. Half of the proceeds of a one-tenth of one percent Parks, Soils and Water sales tax in Missouri support SWCP activities, while the other half maintains the state's park system. A minimum of 60 percent of the SWCP portion of the tax goes directly to landowners for soil and water quality conservation practices through a cost-share program (http://dnr.mo.gov/env/swcp/service/swcp_cs.htm). The SWCP is the state's primary program for addressing NPS pollution on agricultural lands. From 1984-2014 over \$635 million was provided to landowners for projects to reduce soil erosion and protect water quality.

Water Protection Program (<http://www.dnr.mo.gov/env/wpp/index.html>)

The Water Protection Program (WPP) administers rules promulgated by the Missouri Clean Water Commission under Missouri's Clean Water Law. The following programs are implemented by the WPP and have important roles in remediating and preventing NPS pollution.

Water Quality Standards: The Missouri Water Quality Standards are reviewed and modified every three years. Water quality standards provide the numeric and narrative criteria that are used to determine the attainment of water quality objectives. The antidegradation rule may require actions to maintain a level of water quality above those mandated by criteria. The attainment frequency of water quality standards is used in identifying and characterizing waters of the state for the Section 303(d) List and Section 305(b) Report. For more information about the Water Quality Standards, please visit the following links: <http://dnr.mo.gov/env/wpp/wqstandards/index.html> and <http://www.sos.mo.gov/adrules/csr/current/10csr/10c20-7a.pdf>.

State Revolving Fund (SRF): This program provides low interest loans to public entities for planning, design and construction of water and wastewater treatment facilities. The program is a cooperative effort of the department, EPA, the Clean Water Commission and the Environmental Improvement and Energy Resources Authority (EIERA). A NPS loan program is offered to qualifying individual farmers with animal waste treatment needs through the Missouri Agricultural and Small Business Development Authority. In 2011, the SRF provided a \$1,000,000 grant to a nonprofit watershed organization to address on-site waste system problems through loans and subgrants. Similarly, in 2012 a \$1,000,000 grant was provided to the Missouri Association Council of Governments (MACOG) to assess and plan for addressing waste management in other parts of the state.

Stormwater Permits: National and state stormwater regulations require certain communities to obtain a Municipal Separate Storm Sewer Systems (MS4) permit. Communities that are working to reduce NPS pollution above and beyond the requirements of their permits may be eligible for Section 319 funding. As part of the statewide watershed planning approach, watershed permitting will be synchronized within watersheds. The effort will allow for

more effective watershed management by allowing simultaneous review and relation of pollution loads with operator reporting data and watershed based permit renewal.

Public Drinking Water Branch (PDWB) (<http://dnr.mo.gov/env/wpp/dw-index.html>)

The PDWB supervises the design, construction and maintenance of public water systems. The PDWB supports the NPSMP through water quality monitoring of public drinking water supplies and source water protection planning. A pilot project entitled “Enabling Source Water Protection: Aligning State Land Use and Water Protection Programs” was implemented using grants from EPA, The Trust for Public Land and the Smart Growth Leadership Institute, in partnership with the Association of State Drinking Water Administrators and River Network. Missouri, with the assistance of the national team, developed a guidance document to assist the department in offering easier access to funding by merging applications and requirements with intent to assist communities in their efforts to form coalitions to address source water protection and land use issues in their watersheds. The PDWB is also responsible for the *Source Water Inventory* (<http://drinkingwater.missouri.edu/swip/index.html>) which provides information on source water assessments for Missouri’s drinking water supplies.

Continuing Planning Process (<http://www.dnr.mo.gov/env/wpp/cpp/index.html>)

The CPP is a document that describes the department’s water quality management planning activities and processes and provides links to additional sources of information and references (e.g. technical guidance documents, memorandums of agreement and legislative updates). The NPSMP is part of Missouri’s Continuing Planning Process. Section 303(e) of the Clean Water Act (CWA) requires each state to develop and maintain an EPA accepted Continuing Planning Process (CPP). Upon state approval of changes to their CPP, the department is required to submit the revised CPP to the U.S. Environmental Protection Agency (EPA) Region 7 administrator for review. While the Missouri Clean Water Commission approves the CPP document, the EPA Region 7 administrator determines whether the document is consistent with the CWA. Missouri received approval for its original CPP, which was developed in 1973, and the revised CPP of 1984. In 1974, following approval of the original CPP, Missouri was granted National Pollution Discharge Elimination System (NPDES) implementation authority by the EPA. Missouri’s CPP was last approved by the Clean Water Commission on November 28, 2001. Future revisions to the CPP, including the public participation process, will be public noticed and submitted to the Clean Water Commission for approval.

Missouri Geological Survey (MGS)

The MGS (<http://www.dnr.mo.gov/geology/index.html>) is responsible for determining positions, formations, arrangements, composition and utilization of both surface and groundwater. The Geological Survey Program within MGS has developed an Aquifer Classification System which categorizes aquifers into areas according to their susceptibility to contamination. The program regulates well drilling which assists with reducing NPS by specifying setback distances from pollution or contamination sources such as chemical and fertilizer storage areas, manure storage areas and septic tanks. The WRC (<http://www.dnr.mo.gov/env/wrc/index.html>) is also part of MGS and provides technical assistance with stream erosion, deposition, flooding, drought impacts, location and health of

wetland resources, location of contributing areas for springs and wells, groundwater level monitoring in association with USGS and additional studies used to determine water movement and predictions of ground and surface water flow.

Land Reclamation Program (LRP)

The U.S. Surface Mining Control and Reclamation Act of 1977 (SMCRA) regulates surface coal mining operations and provides funding for reclaiming abandoned coal mine lands that were disturbed prior to August 3, 1977. When surface mining sites are abandoned or go into bond forfeiture, funding is provided by the LRP (<http://www.dnr.mo.gov/env/lrp/index.html>) to mitigate NPS impacts. Funding is also provided for surface and groundwater monitoring and analysis of soil and mine wastes. Management practices are designed and implemented to control and mitigate both point and NPS related surface and subsurface flows.

University of Missouri (MU) (<http://missouri.edu/>)

Water quality is a major focus area of MU's College of Agriculture, Food and Natural Resources on the state and regional level. Emphasis on educational programs, information and demonstration promotes water quality and continued learning throughout the state. The university partners with the department and NRCS to periodically present a statewide Water Quality Short Course for current and upcoming water quality professionals. Historically, MU Extension (<http://extension.missouri.edu/>) has been a strong partner with the department's watershed-based efforts and Section 319 NPS Program. Through subgrants, joint funding agreements and university contributions, MU Extension has played a key role in watershed outreach, education, monitoring, and planning.

Center for Watershed Management and Water Quality (<http://watercenter.missouri.edu/>)

The Center for Watershed Management and Water Quality (CWMWQ) is located within the University of Missouri's College of Agriculture, Food and Natural Resources (CAFNR) and its mission includes developing sustainable solutions to contemporary watershed management and water quantity and quality problems to attain maximum benefits of Missouri's waters and enhance the environmental, social and economic status of the state.

Soil Health Assessment Center (<http://cafnr.missouri.edu/soil-health/about.php>)

The Soil Health Assessment Center originated in 1985 when the MDNR, in cooperation with the National Resources Conservation Service, funded an in-state soil lab to aid the ongoing Missouri Soil Survey. MDNR provided the initial funding to set up the Soil Characterization Lab in the CAFNR and provided financial support until the Missouri Soil Survey was completed in 2008. The laboratory has changed locations several times over the years; however, in 2015, the lab returned to the CAFNR and moved into a newly remodeled facility at the university's South Farm. Soil characterization deals with the physical and chemical properties of soil, but does not typically address the biological component. However, since about 2010, interest in the biological component of soil has increased and this more holistic approach to soil health has now been included in several new soil test analyses.

Lakes of Missouri Volunteer Program (LMVP) (<http://www.lmvp.org/>)

The University of Missouri partners with the department in implementing the LMVP. The goals of the LMVP are to: 1) determine the current water quality based on productivity or

trophic state of Missouri's lakes, 2) monitor for changes in water quality over time, and 3) educate the public about lake ecology and water quality issues. A cooperative agreement with the UMC streamlines the lakes activities required by Section 314 and 319(h) of the Clean Water Act and 303(d) processes for lake water quality monitoring and assessments. The department relies on UMC's lakes monitoring data to meet Section 303(d) reporting requirements and for the development of nutrient criteria. This cooperation also provides for prioritizing monitoring sites that would benefit both parties and better meet both parties' needs and monitoring strategies.

Statewide Lake Assessment Program (<http://www.lmvp.org/Waterline/fall2004/slap.htm>)
The Statewide Lake Assessment Program began in 1978 and has monitored lakes every year since 1989. This program has produced one of the most complete, long-term studies of lakes in the nation. The data generated through the Statewide Lake Assessment helps the state meet Clean Water Act requirements for monitoring lake water quality, but more importantly, this information help Missouri agencies identify water quality problems and better manage our lakes. Section 319 funds help support this program. Data is provided to the department also for use in the 305(b) report and 303(d) List.

Missouri State University (<http://projectwet.missouristate.edu/>)

Missouri State University currently helps support Missouri Project Water Education for Teachers (Project WET). Project WET is an environmental education program for teachers and other educators working with children from kindergarten through grade 12. Interdisciplinary instructional activities include workshops and in-service programs for teachers, natural resource professionals, parks, and nature centers. A current statewide subgrant is providing support for NPS components of Project WET until December 2014.

Missouri State University houses the Ozarks Environmental and Water Resources Institute (OEWRI) (<http://oewri.missouristate.edu/>). The Institute provides data collection, trend analysis, and results interpretation in southwest Missouri. Through collaboration, contracts, and grants, OEWRI provides advice and technical support to watershed groups, local communities, and private businesses to help plan and implement water quality monitoring programs. The institute maintains a website exhibiting environmental resources including research, partnerships, projects and services, publications and annual reports.

Missouri Association of Councils of Government (MACOG) (<http://www.macogonline.org/>)

The MACOG is a statewide organization representing Missouri's 19 regional planning commissions and councils of governments. These regional councils are engaged in a myriad of activities, including environmental issues. The NPS program has partnered with several regional councils and provided various grant funding to support cooperative water quality related projects. MACOG's focus is on planning and NPS activities have been on green infrastructure, assessing onsite waste management water quality issues, and conducting feasibility studies and designs that help to bring these onsite systems on line with existing treatment plants.

Federal Partner Organizations

U.S. Environmental Protection Agency (EPA) (<http://www.epa.gov/>)

The EPA is the lead federal agency for environmental protection and an essential partner in the states NPSMP. The Office of Wetlands, Oceans and Watersheds (OWOW) (<http://www.epa.gov/owow/>) serves as the national program manager for EPA's Section 319 NPS Management Program efforts and provides NPS program guidance that each state is required to follow under Section 319 of the CWA (<http://www.epa.gov/owow/nps/>). The EPA provides funding for NPS through the Section 319 Grant. The EPA Region 7 (<http://www2.epa.gov/aboutepa/epa-region-7-midwest>) serves as a primary partner in Missouri watershed protection and restoration and is responsible for primary oversight of the Missouri NPS Program. A variety of watershed resources and opportunities are provided to help citizens and organizations improve or protect water quality in their communities including technical assistance and funding opportunities.

U.S. Department of Agriculture (USDA) (<http://www.usda.gov/>)

There are many agencies and offices in the USDA including the Natural Resources Conservation Service (NRCS), Farm Service Agency (FSA), and the Agricultural Research Service (ARS), which are key conservation partners in coordinating implementation of the NPSMP in Missouri. The NRCS and FSA work closely with the Soil and Water Conservation Districts and the department's Soil and Water Conservation Program in delivering financial and technical assistance to private landowners for implementing practices that conserve soil, water, and other natural resources. The department will continue to engage with USDA in identifying common goals and increasing efforts to improve water quality by encouraging producers to implement conservation practices in the high priority watersheds. The department has participated in several USDA partnership initiatives and programs, including the Regional Conservation Partnership Program (<http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/farmland/?cid=stelprdb1242525>), National Water Quality Initiative (<http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/financial/equip/?&cid=STELPRDB1047761>), and the Mississippi River Basin Healthy Watersheds Initiative (<http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/initiatives/?cid=stelprdb1048200>). The NWQI initiative with NRCS is also an EPA priority. The EPA is working with states through their Section 319 NPS programs to provide monitoring support for their NWQI projects and other priority watersheds capable of tracking water quality changes. From 2014-2018, the department is providing \$200,000 per year in Section 319 Project Funds to support water quality monitoring for a USDA Regional Conservation Partnership Program project.

U.S. Forest Service (USFS) (<http://www.fs.fed.us/>)

The USFS promotes the sustainability of ecosystems and provides public service through conservation leadership. In 1986, the signing of the Record of Decision for the environmental impact statement of the Mark Twain National Forest (<http://www.fs.fed.us/r9/forests/marktwain/>) established standards and guidelines for protecting national forests in Missouri. Specific NPS related language regarding Forest Service

management is included in 36 CFR section 219.23 - forest planning shall provide compliance with requirements of the Clean Water Act and evaluation of existing or potential watershed conditions that will influence soil productivity, water yield, water pollution or hazardous conditions; and section 219.27 – “conserve soil and water resources...”, “provide for adequate fish and wildlife habitat to maintain viable populations...”, and “manage riparian areas to avoid detrimental water temperature and chemical composition changes, blockages of water course or deposits of sediment.”

U.S. Department of Interior

U.S. Geological Survey (USGS), Water Resources Division (<http://water.usgs.gov/>)

The mission of the USGS is to provide reliable, impartial, and timely information that is needed to understand the Nation’s water resources. Consistent with the USGS mission, the Missouri District is available to provide assistance in the collection and interpretation of groundwater and surface water data. The USGS uses hydrologic data and other data in research and hydrologic studies which describes the quantity, quality, and location of Missouri’s water resources. The department partners with USGS to fund sites for NPS ambient water quality monitoring and groundwater levels throughout the state. The USGS also funds national water quality programs through congressional appropriations such as the National Stream Quality Accounting Network (NASQAN) (<http://water.usgs.gov/nasqan/>) which provides data for three water quality monitoring stations on the Missouri and Mississippi rivers.

U.S. Fish and Wildlife Service (USFWS) (<http://www.fws.gov/>)

The USFWS administers several programs that are important to the NPSMP. The Partners for Fish and Wildlife Program was established by Public Law 109-204 and focuses efforts in three areas: wetland restoration, grassland restoration, and stream and riparian restoration. This program works cooperatively with landowners to enhance privately-owned land for Federal Trust Species. Another companion program to the Partners for Fish and Wildlife Program is the Challenge Cost Share Program (<http://www.fws.gov/policy/055fw6.html>) which allows the USFWS to provide matching funds for projects that support the management, restoration and protection of natural resources on wildlife refuges, fish hatcheries, research facilities and private lands. These programs may provide opportunities to leverage efforts for protecting high quality surface waters or remediating impaired aquatic life uses.

Appendix 5: EPA Provisions for an Exemption from the 50% Watershed Funding Requirement for Substantial State Fund Leveraging.

The Section 319 fund targeting process is guided by funding availability, amount of stakeholder support, presence of adequate watershed assessments, TMDLs, accepted WBPs, and other considerations. Prior to the revised EPA Section 319 Guidance in April 2013, the Section 319 funds received by Missouri were typically allocated 48% to the Base Program and 52% to the Incremental Program. Since 2013, the current revised Section 319 Guidance requires states to allocate 50% to Project Funds and 50% to Program Funds. Thus, in previous years, Section 319 requests for proposals (RFPs) were based on available Incremental Funds. However, beginning with the FFY 2014 Section 319 funds, the RFPs are now primarily based on available Project Funds. The focus of targeted restoration and protection projects solicited may vary from RFP to RFP.

As a result of the revised Section 319 Nonpoint Source Program Guidance (April 2013 Guidance) which redefined the allocation categories to 50% Program Funds and 50% Project Funds (50/50), Project Funds can now only be used to implement accepted EPA nine-element watershed-based plans (WBPs) and acceptable alternate plans for restoring impaired waters. Projects can include some non-competitive activities, such as funding for volunteer water quality monitoring activities, special monitoring projects, the annual water quality short course, and any on-going projects that are funded annually. EPA also provides flexibility to use a limited amount of Project Funds for protecting unimpaired or high quality waters. Water quality monitoring in National Water Quality Initiative (NWQI) watersheds is also allowed, even when a WBP has not been developed. All other NPS activities must be funded from Program funds. Eligible activities for Program funds include: Section 319 Program operating costs; non-regulatory and regulatory programs for enforcement; technical assistance; financial assistance; education and information; training; technology transfer; eligible NPS demonstration projects; eligible NPS monitoring and assessment; lake projects; ambient network monitoring and assessment; state NPS management plan updates; development of WBPs or acceptable alternative plans; implementation of EPA accepted nine-element watershed-based plans and acceptable alternate plans to restore impaired waters, with limited flexibility to protect unimpaired or high quality waters; development of NPS and mixed source TMDLs; and monitoring of water quality results in National Water Quality Initiative (NWQI) watersheds, even when a WBP has not been developed.

A nonfederal match of 40% is required for all federal Section 319 funds awarded to Missouri and must be comprised of state, local, or other nonfederal funds. The April 2013 Guidance included a new provision that allows for an “Exemption from the 50 Percent Watershed Funding Requirement for Substantial State Fund Leveraging” (the Exemption). To utilize the exemption, states must leverage an equal amount of nonfederal (state and/or local) funds equivalent to the state’s total federal Section 319 fund allocation (twice the total amount of a state’s watershed project funds) they receive each year. The leveraged funds must be used for implementing WBPs or acceptable alternative plans for watershed restoration and/or protection projects aligned with the priorities described in the state’s NPS management program. In 2014, the department requested, but was denied the Exemption from EPA and instead was granted a one-time waiver,

an alternative provision in the Guidance, to deviate from the new Section 319 50/50 allocations requirement. This request was necessary due to the absence of other department resources to fund critical Section 319-related staff positions and other non-eligible project activities that were previously eligible and funded in part using Project Funds (formerly called Incremental Funds) prior to the FFY 2014 funding year. However, this situation is not expected to change in the foreseeable future as there are no additional Section 106 funds or other new resources available to pay the salaries of these key staff positions. Therefore, the department will annually conduct a review to determine if other resources are available to fund the most critical Section 319-related staff positions and meet the 50/50 allocation requirement for that year. If such additional resources are not available, the department will submit an Exemption request for the 50/50 allocation requirement.

The primary justification for an Exemption to the 50/50 allocation requirement is that Missouri implements its Section 319 Program activities through a coordinated holistic, statewide watershed planning approach and now invests more resources towards NPS watershed project implementation through its existing state cost-share program. It is expected the level of funds for leveraging, will annually exceed at least twice the total amount of Missouri's watershed Project Funds. The Missouri Soil and Water Conservation Cost-Share Program is used to target a significant portion of the implementation costs of restoration and protection actions for accepted nine-element watershed-based plans (WBPs) and acceptable alternate plans for restoring impaired waters. Thus, EPA approval of exemption requests from the department for the 50/50 allocation requirement will not reduce the effectiveness of Section 319 watershed project implementation efforts.

Prior to the April 2013 Guidance, states were allowed to use up to 20% of the Base Funds (now called Program Funds) to develop NPS TMDLs or watershed-based plans for impaired, threatened, high-quality and source waters, and conduct NPS monitoring and program assessment/development activities. The NPS water quality monitoring activities included the Ambient Water Quality Network, internal Quality Assurance Project Plans (QAPPs), TMDLs, and WBPs. Previously, states were also allowed to use up to 20% of Incremental Funds (now called Project Funds) to develop NPS TMDLs and watershed-based plans. Also, EPA was able to authorize states to use over 20% of the Incremental Funds for activities such as developing watershed-based plans for Section 303(d)-listed waters, TMDLs, coordination and monitoring efforts involving TMDLs and special studies, modeling related to TMDLs or watershed management plans, and public meetings. When no alternative funds are available for the above activities, EPA approval of annual exemption requests from the state for the 50/50 allocation requirement will be important to ensure these critical NPS activities are funded.

Appendix 6: Examples of Nonpoint Source Projects.

Eligible Restoration and Protection Projects

The following restoration and protection projects will be eligible for Section 319(h) grant funding:

- Stream restoration.
Stream restoration or naturalization projects that re-establish natural ecology, morphology and flow are encouraged. Eligible projects include natural stream channel reconstruction; ditch conversion; stream bank stabilization in areas of known impairment; instream habitat restoration; and other projects that restore natural stream ecology, morphology and flow.
- Wetland restoration and re-naturalization.
The restoration of wetlands that are hydrologically-connected to surface waters is important for effective filtering of NPS pollutants. Projects that restore wetland areas that are being degraded through existing agricultural land uses are encouraged.
- Innovative stormwater practice projects.
Many municipalities in Missouri are required to regulate or manage stormwater flows and do so under stormwater permits issued by the Department (Note: Section 319 grants may not be used to implement activities required by stormwater permits or as mitigation for other permits such as those certified under Section 401 of the Clean Water Act).
Some potentially eligible urban stormwater demonstration projects include:
 - Retrofitting public commons or parking areas with permeable pavements.
 - Installing small-scale green roofs on public buildings.
 - Installing bio-filtration islands and vegetated retention structures such as large public rain gardens or large infiltration vegetated areas.
 - Installing passive treatment in series or parallel that combine multiple conservation practices such as pocket wetlands and bio-filtration islands to treat stormwater flow.
 - Constructing stormwater treatment wetlands.
 - Installing rainwater harvesting and reuse systems on public buildings.
 - Other practices designed to demonstrate innovative management of stormwater flows.
- Lake management and restoration.
Lake management and restoration projects may be eligible in priority watersheds that are adversely affected by NPS pollution. However, funding is available only for publicly-owned or publicly-accessible lakes. Eligible lake management and restoration projects and practices may include:
 - Lake shore stabilization conservation practices to reduce sediment loads and turbidity.
 - Alum treatment demonstration projects designed to inactivate phosphorus.
 - Instream alum dosing demonstration to reduce tributary phosphorus loads.
 - Lake water circulators or other devices to reduce blue-green algae blooms.
 - Upstream forebays or constructed wetlands designed to filter nutrients, sediment, and other NPS pollutants.

- Other techniques designed to specifically address lake-related recreational, human health, or aquatic life impairments or concerns.
- Agricultural best management practices.
When cost-effective agricultural conservation practices are targeted in critical source areas of high priority watersheds and catchment basins, they can be highly effective in reducing nutrient, sediment, and bacteria, and other NPS pollutant loads. Types of preferred projects include:
 - Nutrient management (must include more than development and implementation of nutrient management plans);
 - Sediment control and stream restoration (particularly streambank stabilization, riparian forest buffers, and filter strips);
 - Some forestry conservation practices;
 - Some controlled drainage projects;
 - Livestock exclusion and manure management projects;
 - Conservation crop rotation projects with cover crops;
 - Riparian re-vegetation and/or protection projects; and
 - Buffers and field borders.
- Section 319 NPS grant funding limitations for the above agricultural conservation practice projects include:
 - Projects must be implemented at targeted locations and addressed through an accepted watershed-based plan that addresses an impairment.
 - Section 319(h) grant funds should not be used to replace or expand an existing USDA (or other farm-bill funded) initiative within the same watershed for which a grant project is proposed. Section 319(h) grant funds may not be used as cost-share for tillage practices or agricultural equipment purchases.
 - Preferred use of Section 319 funds will be for innovative agricultural practices that are not available through existing USDA or state cost-share programs.
- Mine Drainage.
Mine drainage abatement and abandoned mine land reclamation projects may be eligible when conducted consistent with or in concert with other state or federal project activities on abandoned mine land.
- Riparian restoration.
Riparian areas are important in preventing pollutants from entering surface waters. Tree plantings, dike removal, riparian wetland restoration, and other projects designed to restore previously impacted riparian zones and floodplains are encouraged.
- Riparian and wetland protection and easements.
Riparian and wetland protection/easement projects, when hydrologically connected to surface waters, may be important in protecting surface water quality from potential NPS pollution threats. The following types of projects may be supported:
 - Riparian protection/easement projects in areas where NPS pollution has been identified as the source of the water quality impairments or threats.

- Riparian protection projects in priority watersheds with high quality streams where the threat of NPS impairments has been identified.
- Protection projects involving conservation easement acquisition.
- Groundwater protection.
 - Abandoned well closure.
 - Sinkhole protection.
 - Closure of exploration drill holes that occurred prior to the passage of legislation.
 - Eligible public wellhead protection areas.
- Protection of High Quality Waters.
 - Designated National Outstanding Resource Waters.
 - Designated State Outstanding Resource Waters.
- Protection of Potentially Impaired Waters.
 - Section 305(b) Report (Other Waters Rated as Impaired and Believed to be Impaired, but not on the Section 303(d) List).
 - Section 305(b) Report (Other Potentially Impaired Waters).