Implementation Guidance for the Fecal Coliform Total Daily Maximum Loads Adopted by the Florida Department of Environmental Protection

developed by the
Florida Department of Environmental Protection
Division of Environmental Assessment and Restoration
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LIST OF ACRONYMS

ARV	Air Release Valve
BMAP	Basin Management Action Plan
BMP	Best Management Practice
CAD	Computer Aided Drafting
CEU	Council of the European Union
CMOM	Capacity, Management, Operations, and Maintenance
DMR	Discharge Monitoring Report
EP	European Parliament
EPA	U.S. Environmental Protection Agency
F.A.C.	Florida Administrative Code
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FDOH	Florida Department of Health
FDOT	Florida Department of Transportation
FOG	Fats, Oils, and Grease
F.S.	Florida Statutes
GIS	Geographic Information System
GPS	Global Positioning System
HDPE	High-Density Polyethylene
MEP	Maximum Extent Practicable
MOM	Management, Operations, and Maintenance
MS4	Municipal Separate Storm Sewer System
MST	Microbial Source Tracking
NHD	National Hydrography Dataset
NRC	National Research Council
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
OSTDS	Onsite Sewage Treatment and Disposal System
PIC	Potential Illicit Connection
PSA	Public Service Announcement
SOP	Standard Operating Procedure
SSO	Sanitary Sewer Overflow
STORET	STOrage and RETrieval (Database)
TMDL	Total Maximum Daily Load
UCF	University of Central Florida
WBID	Waterbody Identification (Number)
WHO	World Health Organization

1.0 PURPOSE

This guidance document, prepared by the Florida Department of Environmental Protection (FDEP), provides assistance to local stakeholders with the development of a Total Maximum Daily Load (TMDL) implementation plan for waters impaired by fecal coliform. The main objectives of this document include understanding the variability of fecal coliform sources, determining the actions necessary to prepare a TMDL implementation plan, developing a monitoring plan to demonstrate success, and determining if the plan should be an adopted Basin Management Action Plan (BMAP). **Appendix A, Fecal Coliform Criteria and Information,** discusses the fecal coliform criteria and provides background information on bacterial indicators.

This guidance is intended for waterbodies with an adopted TMDL; however, the document is also useful for stakeholders to begin an assessment of any waterbody with a fecal coliform impairment. Where practical, examples of possible steps or actions are provided either as hyperlinks or reproduced documentation. Additional reference documents are listed as appendices, and copies of the documents can be obtained online or by contacting FDEP.

The document should be considered as guidance only and not as an interpretation of the rules that FDEP has promulgated. It will be periodically updated with new information about assessment techniques and other fecal coliform–related resources. If this guidance document was not recently downloaded, please check http://www.dep.state.fl.us/water/watersheds/bmap.htm

1.1 BACKGROUND ON TMDLS

FDEP adopts TMDLs by rule, and these TMDLs establish the maximum amount of specific pollutants a waterbody can assimilate while maintaining water quality standards and designated uses. Waterbodies not meeting water quality standards are identified as "impaired" for the particular pollutant of concern (such as nutrients, bacteria, and mercury), and TMDLs must be developed, adopted, and implemented for each pollutant, so that the waterbodies meet water quality standards. Additional details about TMDLs can be found on the FDEP website at: http://www.dep.state.fl.us/water/tmdl/.

1.2 DOCUMENT OUTLINE

Section 2 provides guidance on the information about the basin that should be reviewed and the stakeholders who should be involved in preparing the TMDL implementation plan. For waterbodies that are impaired for fecal coliform bacteria, additional analysis is usually needed before a TMDL implementation plan is developed. The plan should be developed by local stakeholders who have expert knowledge of their watershed and a detailed understanding of their infrastructure and other potential sources of fecal coliform.

Fecal coliform is variable in the natural environment and it is difficult to identify the source of the bacteria; therefore, further evaluation of the watershed is necessary to determine potential sources that are impacting water quality. **Section 3** outlines tools that have been developed by FDEP and local stakeholders in basins across the state. One or more of these tools can be used to identify fecal coliform sources. **Section 4** describes various management actions that stakeholders can use to address or remove potential sources once these have been identified.

Section 5 includes guidance on a recommended format and the individual components of a TMDL implementation plan. Following this format will result in a plan that can be adopted by

FDEP as a BMAP, if needed or desired. Adopted BMAPs demonstrate the existence of a formal plan to reduce fecal coliform concentrations, provide assurance to the U.S. Environmental Protection Agency (EPA) that FDEP-approved actions will be taken, provide an enforcement mechanism for FDEP and local stakeholders to ensure that all entities maintain their commitment to the projects and activities to address sources, and may provide more opportunities for project funding.

2.0 UNDERSTANDING THE BASIN

The first step in preparing a TMDL implementation plan is to gain an understanding of the basin. This section outlines the types of information and data that should be reviewed by the stakeholders to familiarize themselves with the basin and to begin identifying potential fecal coliform sources. In addition, this section discusses the types of stakeholders who are typically involved in a plan to reduce fecal coliform.

2.1 USING THE TMDL REPORT

Stakeholders should be familiar with the adopted TMDL report before developing a TMDL implementation plan. The TMDL report will provide a good starting point for understanding the extent of the impairment, potential sources, and required reductions needed to meet water quality standards. Additional local investigations will be needed to completely understand the issues and sources of the impairment. The draft and final TMDL reports by basin group and waterbody may be found at the following links:

- *Final TMDLs: http://www.dep.state.fl.us/water/tmdl/final_tmdl.htm*
- *Draft TMDLs: http://www.dep.state.fl.us/water/tmdl/draft_tmdl.htm*

2.2 COMPILING AND EVALUATING DATA

To gain a better understanding of the basin, it is useful to compile existing data from all stakeholders in the basin. The data can be compiled into a Geographic Information System (GIS) database to provide a base map of information. If GIS data are not available, Computer Aided Drafting (CAD) files or even paper maps can be used. Viewing all available data together in one place can help to identify potential sources and areas that have had repetitive problems and is a valuable tool to select appropriate projects to address sources. Types of data that should be gathered include the following:

- *Sewer infrastructure – location of pipes, pipe material, manholes, lift stations, valves, and wastewater treatment facilities; information on any past problems and upgrades.*
- *Sanitary sewer overflow (SSO) database – location of each SSO, impact to surface waters, amount of sewage spilled, cause of the overflow, and correction of the root cause.*
- *Private systems – any available information on private sewer infrastructure such as lift stations and package plants.*
- *Stormwater infrastructure – location of canals, ditches, treatment ponds, outfalls, inlets, and control structures.*
- *Septic tanks – location of tanks and repair permits.*
- *Existing reports and/or studies for the basin.*
- *Water quality data.*
- *Rainfall information.*

2.3 IDENTIFYING THE RESPONSIBLE STAKEHOLDERS

When creating a plan to eliminate sources of fecal coliform, it is important to identify and engage all appropriate stakeholders who have authority to address the sources. These are likely a mix of local entities and state agencies. Local entities who typically have authority to address

bacteria sources include municipal separate storm sewer system (MS4) permittees, local municipalities' public works departments, utilities (owners of the sewer collection system and wastewater treatment facilities), and the county health department. These entities are responsible for ensuring that the stormwater system, sewer system, and septic tanks in the area (which are the major categories of fecal coliform sources) are functioning properly (see **Section 3** for a discussion of fecal coliform sources). In addition, state agencies that may be involved include FDEP, the Florida Department of Agriculture and Consumer Services (FDACS), the Florida Department of Health (FDOH), and the appropriate Florida Department of Transportation (FDOT) district.

FDEP will work with stakeholders throughout the process of creating the TMDL implementation plan to ensure that the appropriate source assessment tools are used, that management actions are sufficient to address the potential sources, and that the completed plan includes the necessary actions to achieve the TMDL. FDACS is involved if there is an agricultural operation that may generate fecal coliform (such as a cow/calf or equine farm) in the area, and works with the owners to implement the appropriate best management practices (BMPs). If there are FDOT roadways in the area, their stormwater systems must be properly maintained to prevent the conveyance and regrowth of fecal coliform bacteria, which is the same standard that all MS4s and local stormwater systems in the area must meet. FDOH could be involved to ensure that septic tanks in the basin are functioning properly and to take any necessary enforcement actions.

2.4 COORDINATING WITH FDEP

Stakeholders should contact the FDEP Basin Coordinator at the beginning of the process so that FDEP is aware that a TMDL implementation plan is being developed for the watershed. Stakeholders can refer to the map at http://www.protectingourwater.org/watersheds/map/ to determine who is the Basin Coordinator based on their watershed location. They can also contact John Abendroth, Environmental Administrator for the Watershed Planning and Coordination Section, at john.abendroth@dep.state.fl.us for the appropriate contact person.

During this initial data collection process, the FDEP Basin Coordinator is available to assist stakeholders and answer any questions about the TMDL implementation plan process. The FDEP Basin Coordinator can guide stakeholders to existing information about the watershed and provide input on the preliminary sources identified based on data provided by stakeholders.

3.0 POTENTIAL SOURCE IDENTIFICATION

This section provides information on fecal coliform source identification tools and options for evaluating the data collected to ensure that they are useful in developing the TMDL implementation plan.

3.1 SOURCES OF FECAL COLIFORM

Typical fecal coliform sources include (1) sewer infrastructure, (2) onsite sewage treatment and disposal systems (OSTDS) (septic tanks), (3) stormwater, (4) nonpoint sources, and (5) wildlife. A centralized sewer system may contribute fecal coliform pollution to the environment through the slow and continuous leakage of sanitary sewer infrastructure, treatment failure in wastewater treatment plants, and SSOs. An OSTDS can contribute to fecal coliform contamination if it is failing, which means it is not functioning in a sanitary manner and may result in the transport of untreated or partially treated wastewater to surface waters. Stormwater may be a source by conveying fecal coliform bacteria through stormwater runoff, or if there are illicit connections to the stormwater system that discharge fecal coliform (i.e., septic tanks that are directly piped to the stormwater system). Nonpoint sources of fecal coliform include pet waste, homeless populations, and certain types of agricultural operations. In addition, wildlife can be a source of fecal coliform bacteria; however, this source is considered to be uncontrollable and part of the natural background condition of the basin.

3.2 TOOLS FOR SOURCE IDENTIFICATION

FDEP has worked with stakeholders in several basins across the state to prepare BMAPs for fecal coliform reductions. During these BMAP processes, tools were developed and used to assess the basins to identify potential sources of fecal coliform. The following subsections summarize these tools and include links to additional information, where available. This information is provided to help stakeholders select the tool(s) that would work best in their basin. There is no single measure that can be used to identify sources, and an implementation plan should use multiple tools to determine the likely sources in the basin. The results of these assessment methods will provide the basis for the selection of management actions (**Section 4**) and the TMDL implementation plan (**Section 5**).

3.2.1 WALK THE WATERBODY PROCESS

Walk the Waterbody is a field reconnaissance effort to gain a better understanding of a watershed, including the hydrology of the basin and its contributing branches, where infrastructure (sewer and stormwater) is located, and what potential sources are contributing fecal coliform to the waterbody. This activity is a useful tool for impaired waterbodies in which the source(s) of the fecal coliform loading are not readily apparent. The following sections provide guidelines, based on past efforts, for organizing and conducting a Walk the Waterbody exercise. **Appendix B, Walk the Waterbody,** contains information on the Walk the Waterbody process**.**

3.2.1.1 Initial Steps

Before going into the field, the lead entity should hold a data review meeting with other stakeholders. Each stakeholder provides available information about the watershed to better acquaint other stakeholders with the conditions in the watershed. This information includes GIS data, infrastructure maps, and any waterbody-specific reports. The data are combined and large-format maps are made available for review and discussion during the meeting. Stakeholders need to review the maps and information identifying areas of potential fecal coliform sources, such as areas where storm sewer and sanitary sewer lines may be close to each other and lead to cross-contamination, areas with homeless populations, routes used intensively for dog walking, and large stormwater culverts and ponds discharging to surface

water. This process results in the identification of specific areas for field investigation to confirm or eliminate areas with potential sources. After this review, the lead entity conducts a preliminary reconnaissance of the watershed to identify areas of focus and to determine appropriate routes for the Walk the Waterbody effort.

Once the lead entity has gained a better understanding of the watershed, the Walk the Waterbody field team should be organized. The members of this team are determined based on the conditions in the watershed and the likely sources identified in the data review meeting. For instance, if failing septic tanks are common (based on the number of repair permits issued), it would be beneficial to include the local health department on the team, since it can access private property to inspect a septic tank.

Depending on the potential sources, not all stakeholders need to participate in the field exercise and some need to only attend the follow-up meeting. However, the lead entity should ensure that it has the emergency call-in numbers and appropriate contact information for other stakeholders in case an incident that should be reported is observed while in the field.

The team should meet briefly before the exercise to review any pertinent information that the lead entity has gathered and to choose a date and time for the Walk the Waterbody. Based on past efforts, it is generally most effective to walk no more than two waterbodies in one day.

3.2.1.2 Field Reconnaissance

The Walk the Waterbody team should have large-format maps while conducting the field investigations, including the watershed boundary, roads, stormwater infrastructure, sewer infrastructure, potential septic tank locations, National Hydrography Dataset (NHD), and jurisdictional boundaries when appropriate. A Global Positioning System (GPS) unit, camera, and notepad are essential for obtaining the coordinates of a potential source, capturing an image of the potential source, and correlating the coordinates with the photo for later follow-up. Sampling equipment should also be included to provide additional water quality information about potential sources identified in the field.

The team should try to explore the entire waterbody while in the field, referring to the maps to follow the waterbody above and below ground, where the waterbody branches, or where it is piped underground. The team must investigate the banks and other areas in the vicinity of the waterbody for potential sources such as exposed pipes. Canals/ditches that intersect the waterbody are also walked to ensure that the waterbody and its associated branches are all included within the watershed boundary.

The team should also investigate any potential sources. This can include identifying sewer infrastructure (manholes and pump stations, sewer lines crossing creeks) and inspecting for signs of recent overflows, MS4 conveyances that need cleaning, failing septic tanks, wildlife, heavy tree cover or vegetated ditches, homeless populations, and pets and livestock. Care should be taken to ensure that only appropriate representatives access private property, unless the property owner has offered access to the entire team.

Any potential sources identified while in the field need to be properly recorded and reported to the appropriate entity. The lead entity should record major findings during the Walk the Waterbody effort, including observations about the waterbody, potential sources, items to be followed up and the responsible stakeholder, and any areas that should be added to the monitoring plan.

3.2.1.3 Follow-Up Activities

After the Walk the Waterbody field visit, the lead entity should provide a summary of the findings, which should include the following components:

1. *Identification of the watershed walked;*
2. *Results of any preliminary investigation or issues identified;*
3. *List of entities and personnel participating in the field efforts or other operations;*
4. *Sources and potential sources observed;*
5. *Immediate follow-up actions taken;*
6. *Follow-up actions still needed;*
7. *Sources eliminated or investigated;*
8. *Monitoring sites identified or proposed; and*
9. *Any other pertinent information.*

This information is included in the TMDL implementation plan to provide a record of the walk, actions that were taken, and responsibility for additional follow-up to investigate and address sources.

3.2.2 Decision Matrix and Ranking Tool

A decision matrix and ranking tool has been developed to assist local stakeholders in determining the level of impairment in a waterbody and to guide management actions to address fecal coliform impairments. This framework is based on technical approaches and resource management strategies recommended by the National Research Council (NRC) (2000, 2004), World Health Organization (WHO) (2000, 2003), European Parliament/Council of the European Union (EP/CEU) (2006), and EPA (1986, 2007). This decision-support tool incorporates fecal coliform levels, the presence and relative magnitudes of human fecal contamination, and other potential sources of human pathogens. **Appendix C, Decision Matrix,** provides more detailed information on the tool and how to develop a location-specific matrix.

3.2.3 Source Identification

The identification of fecal coliform sources should be a tiered or phased process, as explained in **Appendix D, Source Identification.** Phase I of the approach is the initial screening, which includes the compilation and synthesis of relevant documents and local knowledge, and a detailed review of existing data to guide the field reconnaissance and sampling stages of the project (**Figure 1**). Phase II, implementation, uses a decision tree that builds on the results of Phase I and continues screening for potential sources of fecal contamination by using lower-cost, more basic methods first, followed by higher-cost, more sophisticated methods to minimize cost and time. The decision tree is used in conjunction with background knowledge of the watershed and land use patterns to document and assess the contribution of various potential fecal coliform sources to waterbodies. Because pathogens from human sources present the highest potential for infection, identifying the type of source (human, livestock, or wildlife) affects the evaluation of risk. Source identification is critical to implementing management actions to improve water quality and protect human health.

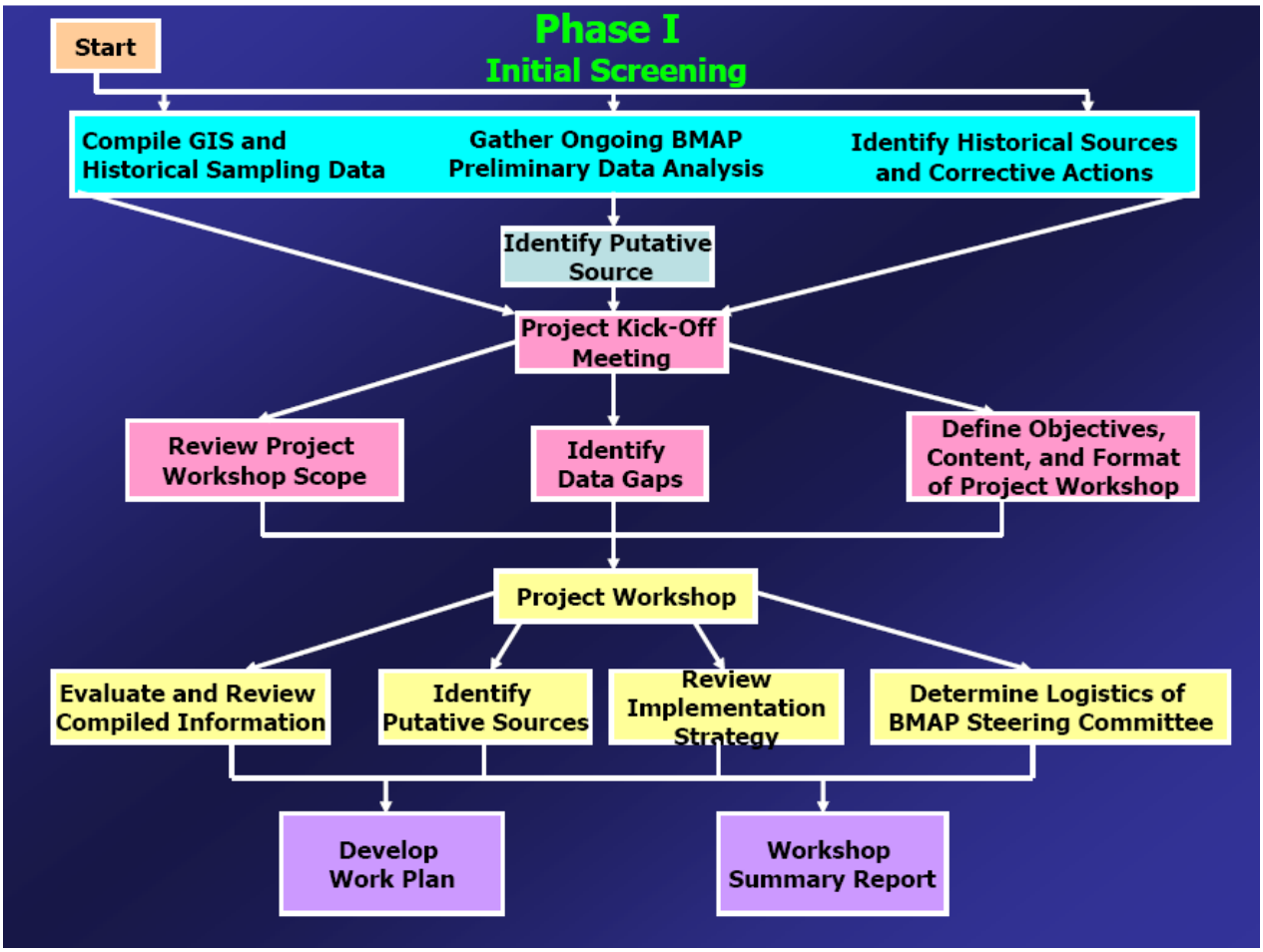

FIGURE 1: STEPS INVOLVED IN THE PHASE I INITIAL SCREENING PROCESS

3.2.4 POLLUTION ASSESSMENT

Appendix E, Pollution Assessment, outlines methods for assessing, tracking, and mitigating fecal microbial contaminants in surface waters. The assessment and direct identification of sources of fecal coliform contaminants are complicated by many variables inherent in the use of indicator organisms for monitoring and in the dynamics of microbial populations in various substrates and environmental conditions. This document examines some of these questions and presents the results of recent research in microbial source tracking (MST) in the context of guidelines for assessing and developing corrective actions for listed impaired waterbodies.

3.2.5 STATE OF OREGON IMPLEMENTATION MATRIX TEMPLATE

Oregon has developed guidance for developing TMDL implementation plans that includes an implementation tracking matrix to assist in describing, tracking, and reporting on TMDL implementation efforts. This guidance document contains a fecal coliform example of the matrix that serves as another useful evaluation tool for stakeholders. The matrix includes columns for information on the pollutant sources, strategies to control the source, specific projects to address the source, expected resources needed, how implementation will be measured, timeline and milestones, and status of the activity. The matrix is found in Appendix D of the report *TMDL Implementation Plan Guidance for State and Local Government Designated Management Agencies* (available at http://www.deq.state.or.us/wq/tmdls/implementation.htm).

3.2.6 WILDLIFE SURVEYS

In some areas, wildlife can be a significant source of fecal coliform, especially in watersheds with significant acreages of wetlands, upland forest, or wooded corridors. While wildlife is a contributing source of fecal coliform loading to a waterbody, this is considered a background concentration and uncontrollable source. Stakeholders are not asked to remove or discourage wildlife in and near waterbodies. However, it is helpful to record instances or indicators of wildlife to help correlate potential sources with fecal coliform concentrations.

Wildlife surveys can be used to help determine what portion of the fecal coliform impairment might be attributed to natural conditions. Information on and methods for conducting these surveys are provided in the following links:

- *http://edis.ifas.ufl.edu/department_wildlife_ecology_and_conservation;*
- *http://edis.ifas.ufl.edu/uw140;*
- *http://www.websitefororg.com/OldWebsites/NPS/CompiledMethodsFrameset.htm;*
- *http://www.freac.fsu.edu/projects.cfm;*
- *http://el.erdc.usace.army.mil/elpubs/pdf/si34.pdf;*
- *http://www.waterbirdconservation.org/pubs/PSGManual03.PDF; and*
- *http://www.wec.ufl.edu/extension/extension/survey.php.*

3.3 EVALUATING DATA SUFFICIENCY

The data collected using the tools above should be compiled and analyzed to determine the completeness of the database. This data evaluation may show that there are gaps in the understanding of fecal coliform sources and transport in the watershed, and that additional assessments may be needed. Other options can be used to gather additional data to further evaluate the basin conditions, and to ensure that the management actions focus on the correct sources.

One option is to conduct follow-up sampling after high fecal coliform counts are found. This technique is used in the Lower St. Johns River Tributaries BMAP and follows the protocol outlined in the *Tributary Pollution Assessment Manual* (see **Section 3.2.4**). Samples are collected monthly at set stations in the tributaries, and if the analysis of the samples shows fecal coliform greater than 5,000 counts per milliliter (mL) (assumed to be mainly from human sources), additional samples are collected upstream and downstream of the location of the high count in an effort to identify the source.

Another option is MST, which uses different types of indicator bacteria to determine whether the source of fecal coliform is human or another organism. MST has been used in the Hillsborough River and Lower St. Johns River Tributaries Basins, Studies in these basins used human, ruminant, and horse indicators. **Appendix F, Microbial Source Tracking,** contains examples of MST studies used in BMAP documents.

MST sampling is useful in areas where there are several potential sources, and additional information is needed to determine which source is creating the problem. In addition, human sources can result in greater public health concerns, and MST can help identify where human sources are a large portion of the fecal coliform pollution. Users of MST sampling should be aware that currently no single method can be applied to all types of fecally contaminated water

systems, and also that a general lack of data-reporting consistency exists among the analyzing labs. Additional information on MST may be found at the EPA website and specifically in the EPA *Microbial Source Tracking Guide Document* (EPA, 2005), available at http://www.epa.gov/nrmrl/pubs/600r05064/600r05064.pdf.

Also, in the Lower St. Johns River Tributaries Basin (see **Appendix G, Thermal Imaging**), thermal imaging was used to identify inputs to several creeks that could be sources of fecal coliform. This process uses the differences in temperatures between the warmer inputs and the cooler creeks. The inputs to the creeks can be from a variety of sources, including natural (such as ground water) and pollutants (such as illicit connections). In association with the thermal imagery, it is helpful to have sampling before and after the fly-over to help correlate fecal coliform counts to the anomalies found through the imaging.

The data collected from all assessments should be compiled into a database. It is also helpful to use rainfall data from near the sample locations to determine whether rainfall appears to be associated with the high fecal coliform counts. The database should be checked for any missing, duplicate, or erroneous values before any analyses are conducted. **Appendix H, Data Analysis,** contains information on the data analysis used in previous BMAPs.

3.4 COORDINATING WITH FDEP

The sections above provide descriptions of source assessment tools that may be helpful to identify fecal coliform sources in a watershed. Before proceeding with any of these assessment methods, stakeholders should meet with the FDEP Basin Coordinator to ensure that the most appropriate tools are selected. They should present any preliminary sources that were identified during the data evaluation stage so that the Basin Coordinator has an understanding of the basin and can provide input on the assessment tools. Stakeholders should also follow up with the Basin Coordinator after the assessment efforts to discuss the findings before identifying management actions. Based on the potential sources identified during assessment, the Basin Coordinator can provide guidance on the types of management actions that should be pursued.

4.0 MANAGEMENT ACTIONS

Once the watershed has been evaluated using one or more of the tools described in **Section 3** to identify potential sources, the responsible stakeholders must implement management actions to address these sources. If an assessment of existing efforts by stakeholders in the basin demonstrates that the current practices are sufficient to address the potential sources, then this should be documented and monitoring begun to ensure that the necessary fecal coliform reductions are occurring. However, if additional work is needed to sufficiently address the impairment, the stakeholders should develop a TMDL implementation plan that describes the additional management actions that will be implemented and timelines for completion. The sections below include examples of the projects and programs that have been used in other basins to reduce fecal coliform loading. The identified fecal coliform source will guide the most appropriate management actions to be taken.

4.1 PROJECTS AND ACTIVITIES

Many different types of activities can be implemented to address potential sources of fecal coliform. Once the potential sources have been evaluated, the appropriate projects to address those sources can be identified.

4.1.1 STRUCTURAL ACTIVITIES

There are several types of stormwater and sanitary sewer structural projects that can reduce fecal coliform loading to waterbodies. Flood control projects are one option. These projects not only help to reduce the amount of nonpoint source pollution to a waterbody after a rain event but also to prevent flooding in septic tank areas, alleviating conditions that can cause septic tank failures. In addition, flooding can cause infiltration of the sanitary sewer system, leading to overflows; therefore, controlling flooding also benefits the sewer system. Prior to implementing a flood control project to control fecal coliform, the ecological impacts of the action must be understood.

Several types of standard stormwater treatment BMPs such as wet ponds and swales can also reduce fecal coliform loading. These projects capture and treat stormwater before it is discharged to surface waters, reducing the amount of fecal coliform.

Upgrades to the sanitary sewer system can also address fecal coliform. Replacing and upgrading old sewer lines, rehabilitating or relining manholes, rebuilding pump stations, and replacing air release valves (ARVs) are types of projects that make the system more efficient and reduce the likelihood of an SSO from faulty infrastructure.

4.1.2 NONSTRUCTURAL ACTIVITIES

The following sections outline several types of nonstructural activities that address fecal coliform loading.

4.1.2.1 Fats, Oils, and Grease (FOG) Program

Fats, oils, and grease (FOG) generated during food preparation build up in sanitary sewer lines. Without proper maintenance, these lines clog, eventually leading to SSOs. The Florida Building Code, Plumbing Section, Chapter 10, Section 1003, addresses traps, interceptors, and separators. Creating a FOG Program via a local ordinance can regulate commercial grease dumped into the sewer system to help prevent clogs in the system, reducing SSOs and fecal coliform discharges to the watershed.

This program should be required for food service establishments, and they should pump out their systems on a regular schedule. Failure to meet the pump-out requirement would result in enforcement actions, such as an initial notice of violation, followed by a cease-and-desist order,

and finally the emergency suspension of service for establishments that fail to comply with previous actions.

4.1.2.2 Root Cause Program

When an SSO is reported, the assumption made about the cause of the overflow may be incorrect. In order to properly address the problem and prevent future issues, it is important to identify the root (actual) cause of the SSO. A Root Cause Program allows the utility to determine the best short- and long-term corrective actions to prevent the problem from reoccurring. In areas where this program has been established, a committee should be formed to meet periodically to determine the root cause of the SSOs. The purpose of this committee is to identify key issues across the system to better prioritize resources for the maintenance, repair, and replacement of sewer infrastructure, and to prevent future issues with the system.

For example, JEA (the utility provider in Jacksonville) established such a program in January 2007. In general, the Root Cause Program has allowed JEA to better prioritize repair and replacement resources to optimize limited financial resources. A group of first responders meets every two weeks to determine the root cause of each SSO so that an effective solution can be implemented. The Root Cause Committee identifies the root cause and determines short- and long-term corrective actions to prevent reoccurrences. It also identifies any improvements that can be made to reporting procedures. Through this program, JEA has done the following:

- *Learned to check the lines for the cause of any blockages, instead of just removing the blockage and putting the line back in service;*
- *Identified tuberculated iron pipe as a significant concern for its system;*
- *Worked to determine the cause of the grease blockage and to ensure that upstream sources are in compliance with the Industrial Pretreatment Program; and*
- *Determined that high-density polyethylene (HDPE) pipe is responsible for a high percentage of SSOs, and therefore implemented the targeted cleaning of HDPE pipe.*

4.1.2.3 Capacity, Management, Operations, and Maintenance (CMOM)

The EPA has started the Management, Operations, and Maintenance (MOM) Programs Project, which is a pilot project for EPA Region 4. The purpose of this project is to help bring municipal sewer systems into compliance with the federal Clean Water Act by eliminating SSOs. The purpose of implementing MOM or CMOM programs is to incorporate many of the standard operations and maintenance activities that are routinely implemented by the utility with a new set of management requirements that help to do the following:

- *Better manage, operate, and maintain collection systems;*
- *Investigate capacity-constrained areas of the collection system;*
- *Proactively prevent SSOs; and*
- *Respond to SSO events.*

The program tracks different components in the following areas:

- *Capacity – size of the sewer system and areas where there are limitations.*

- *Management – complaint management tracking, sewer system design and construction standards, and public notification.*
- *Operations – pump station operations, pretreatment monitoring, and grease trap monitoring.*
- *Maintenance – collection system such as pump station inspections and sewer line cleaning.*

Documenting and reporting information for these elements allows the utility to make more informed decisions, identify and address system priorities, detect trends, and proactively address problems. More information about this program can be found on the EPA website at http://www.epa.gov/region4/water/wpeb/momproject/index.html.

4.1.2.4 Inspection and Maintenance Programs

By implementing inspection and maintenance programs, a utility can proactively identify and prevent problems with infrastructure before the problems result in water quality issues.

For sanitary sewer systems, inspections should include the pipes, manholes, ARVs, and lift stations. These are all important components of the collection system that need to be inspected and maintained on a regular basis to prevent breaks and overflows of sewage. Any part of the system identified as compromised (i.e., tuberculated pipes, leaking ARVs, broken lift station components) should be rehabilitated, repaired, or replaced to prevent failures.

Private lift stations can be a significant source of coliform loadings and should be identified and inventoried. A private lift station inspection program is an effective way to ensure that the stations are maintained and operating correctly. Local ordinances requiring certified operators can ensure that lift stations are properly maintained and operating correctly.

Stormwater conveyance systems should be inspected regularly to ensure that they are free of trash and debris. All ditches, canals, ponds, pipes, and outfall structures that make up the stormwater system should be maintained regularly. During the inspection and maintenance efforts, any potential illicit discharges should be identified and followed up on to ensure that the connection is not contributing fecal coliform bacteria to the conveyance system.

An inspection and maintenance program for septic tanks is also important to ensure they are functioning properly and to identify any repairs needed on the systems. It may also be useful to have a periodic septic tank pump-out requirement as part of the maintenance program.

4.1.2.5 Litter Removal

Trash and sediments from roadways and their associated rights-of-way could provide a breeding ground for fecal coliform bacteria once this litter reaches stormwater conveyances and the waterbody. Removing trash and sediment helps to reduce bacterial regrowth in sediments. This can be achieved through street sweeping, litter clean up on the rights-of-way and stormwater conveyances, and the Adopt-A-Highway Program. Local governments can implement street sweeping and litter clean-up efforts to reduce sediments and trash along their roadways. Adopt-A-Highway is typically coordinated through the local FDOT district. This program is voluntary, and the volunteers can identify the sections of roadways they wish to clean; therefore, directing litter pickup where needed through this program may be difficult.

4.1.2.6 Public Education and Outreach

Public education and outreach options should be used to inform the public about sources of fecal coliform and how to prevent these sources from impacting waters in their area. These

efforts could help to reduce fecal coliform loading to a waterbody to improve water quality conditions. Examples of these efforts include the following:

- *Public service announcements (PSAs) on local cable or commercial television and radio stations. PSAs can include those developed locally or those developed through the Think about Personal Pollution Campaign (http://www.tappwater.org/). Other PSAs are available through the University of Central Florida (UCF) Stormwater Management Academy (http://www.stormwater.ucf.edu).*
- *Informational pamphlets and/or presentations on pollution prevention, septic tank maintenance, and pet waste management. The Stormwater Education ToolBox is available online from the UCF Stormwater Management Academy (http://www.stormwater.ucf.edu).*
- *Websites to provide information on reducing fecal coliform pollution for homeowners and businesses.*
- *Inspection program and a public call-in number to address illicit discharges.*

4.1.2.7 Ordinances

Adopting and implementing rules or ordinances can give local governments the additional authority needed to achieve fecal coliform reductions.

One type of useful ordinance that addresses fecal coliform is a septic tank ordinance, which can involve several different measures. It could require inspections on a set schedule, and could require the tanks to be pumped out every few years, with a notice to local government that this maintenance occurred. The ordinance could also mandate a greater distance between the septic system drainfield and the ground water table and/or surface waters to reduce the amount of bacteria that go directly from the septic system to ground or surface water.

Another option is to require septic tanks to be connected to the sanitary sewer system, where sewer lines are available. This could be a requirement when a septic tank has failed, when the property with a septic tank has changed ownership, or in areas near impaired waterbodies where the sewer system would provide better treatment. Prior to developing and implementing a local septic tank ordinance, Section 381.0065, Florida Statutes (F.S.), should be reviewed for applicability and compliance.

Another ordinance that is important to address fecal coliform is a pet waste management ordinance, which would require residents to pick up and properly dispose of pet wastes. To help implement this ordinance, local governments could provide pet stations with bags and a trash can in areas where residents typically walk their dogs. Local governments could also implement a fine for not complying with the ordinance as an incentive for residents to pick up after their pets. **Appendix I, Pet Waste Ordinances,** summarizes several examples of current pet waste ordinances in Florida.

4.2 PROJECT SELECTION PROCESS

While all of the management actions listed above are useful to reduce fecal coliform loading, the stakeholders will need to choose a combination of these activities based on the conditions in the watershed. Management actions must be selected to address the potential sources identified during the basin evaluation process. Projects can be most effective in areas that do not already have stormwater treatment and in areas with older sewer or septic tank infrastructure that could be upgraded or replaced. Adding stormwater treatment to flood-prone areas would help to

reduce fecal coliform loading from stormwater runoff and any septic tanks in the area, while also reducing the amount of infiltration in the sanitary sewer system. The stakeholders should analyze the costs and benefits of the projects to select the most cost-effective options. Once the projects have been selected, a timeline for project implementation should be determined, in coordination with FDEP, to provide a reasonable schedule to achieve water quality benefits.

The Lower St. Johns River Tributaries BMAP (Chapter 11) (available at http://www.dep.state.fl.us/water/watersheds/bmap.htm) provides a good example of how all of the above considerations come together to form a plan for restoration activities.

4.2.1 Summary of Potential Sources and Management Actions

In order to determine if the identified management actions are sufficient to address the potential fecal coliform sources in the watershed, the information on sources and actions should be summarized in a format that aids in evaluation. Each stakeholder should provide information on past and current projects and programs, as well as any planned projects and programs that could reduce fecal coliform loading. These efforts should be matched to the potential fecal coliform source(s) they address. Summarizing the existing and planned management actions compared with the sources in the watershed is helpful in identifying any sources that are not adequately addressed.

Tables 1A through **1E**, based on the tables in the Lower St. Johns River Tributaries BMAP, provide examples of how the efforts in the basin can be summarized. These tables list the responsible entities, as well as the potential sources and types of management actions to address those sources. Under each entity, the following symbols are placed in the tables to explain the level of effort:

- *A check mark ("√") is placed next to an activity that the entity currently implements or plans to implement in the near future;*
- *A dash ("-") is placed next to an activity that the entity currently does not implement in the basin but could implement if additional actions are needed; and*
- *An "X" is placed next to an activity that is not the responsibility of that entity (note that those boxes can also be shaded to help illustrate what activities are and are not the responsibility of that entity).*

Table 1A: Sample Summary of Efforts Table: OSTDS

Source/Action	Entity 1	Entity 2	Entity 3	Entity 4
Ordinances	√	X	X	X
Enforcement	√	√	X	X
Program Implementation	√	√	X	X
Permit Review (new and repair permits)	X	√	X	X
Failure Area Evaluation	√	√	X	X
Failure Area Ranking	√	√	X	X
Septic Tank Inspection	√	√	X	X
Septic Tank Phase-Out	√	√	X	X
Public Education (PSAs)	√	X	X	X
Surface Water Sampling for Conditions and Trends	√	X	X	X

TABLE 1B: SAMPLE SUMMARY OF EFFORTS TABLE: SEWER SYSTEM

SOURCE/ACTION	ENTITY 1	ENTITY 2	ENTITY 3	ENTITY 4
Sewer Line Upgrades	X	X	X	√
Manhole Inspection and Rehab	X	X	X	√
Pump Station Inspection and Maintenance	X	X	X	√
Pump Station Rebuild	X	X	X	-
ARV Inspection and Rehab	X	X	X	√
Program Implementation	X	X	X	√
Private Lift Station Inspections and Enforcement	√	X	X	X
SSO Investigations	√	X	X	√
Surface Water Sampling for Conditions and Trends	X	X	X	√

TABLE 1C: SAMPLE SUMMARY OF EFFORTS TABLE: STORMWATER

SOURCE/ACTION	ENTITY 1	ENTITY 2	ENTITY 3	ENTITY 4
Flood Control Capital Projects	√	X	-	X
Capital Projects/Stormwater Water Quality BMPs	√	X	-	X
Stormwater System Ditch and Canal Maintenance	√	X	√	X
Stormwater Pond Maintenance	√	X	-	X
Stormwater Pipe Cleaning and Maintenance	√	X	√	X
Potential Illicit Connection (PIC) Identification	√	X	√	X
Illicit Connection Removal	√	X	√	X
Public Education and Outreach	√	X	√	X
Surface Water Sampling for Conditions and Trends	√	X	√	X
Program Implementation	√	X	√	X

TABLE 1D: SAMPLE SUMMARY OF EFFORTS TABLE: PET WASTE MANAGEMENT

SOURCE/ACTION	ENTITY 1	ENTITY 2	ENTITY 3	ENTITY 4
Ordinances and Enforcement	√	X	X	X
Public Education and Outreach	√	X	X	X

TABLE 1E: SAMPLE SUMMARY OF EFFORTS TABLE: SPECIAL SOURCE ASSESSMENT ACTIVITIES

SOURCE/ACTION	ENTITY 1	ENTITY 2	ENTITY 3	ENTITY 4
Intensive Water Quality Sampling To Track Sources	√	X	X	X
MST	√	X	X	√
Thermal Imagery To Identify PICs	√	X	X	X

4.2.2 EVALUATION OF MANAGEMENT ACTIONS

Summarizing the existing and planned actions will help stakeholders identify further actions that are needed to address the fecal coliform impairment. All of the stakeholders' activities should be organized by the type of source the project addresses. When comparing the actions with each fecal coliform source, stakeholders should determine whether the actions are sufficient to remove or reduce the fecal coliform source, or if additional actions are necessary. They should work together to determine what additional actions are needed and to identify the appropriate

stakeholder(s) responsible for implementing the action. In addition, stakeholders should identify any data gaps or uncertainties related to the fecal coliform sources, and the TMDL implementation plan should include a description of assessment efforts to address these needs.

4.2.2.1 Example of Sufficiency of Effort Evaluation

One way to determine if the management actions are adequate to address the potential sources is to conduct a "sufficiency of effort" evaluation. This evaluation method was employed in the Lower St. Johns River Tributaries BMAP and provides a good example of the actions stakeholders can follow to determine what, if any, additional actions are needed. The following describes the steps used in the Lower St. Johns River Tributaries BMAP; more detail can be found in the full document, available at http://www.dep.state.fl.us/water/watersheds/bmap.htm.

Based on the potential sources in each watershed, the stakeholders identified their activities to reduce or remove bacteria sources that had been implemented since 1996 (the start of the TMDL verified period) and additional efforts that were currently under way or planned in the next five years. All responsible stakeholders submitted information on projects and programs for their prevention, reduction, and source removal activities in the watershed. FDEP's sufficiency of effort evaluation was not an assessment of each entity's individual activities; instead, it focused on whether the activities submitted by all the entities corresponded to the potential sources identified and whether the total efforts were adequate to eliminate the known sources, assess unknown sources, and prevent the development of new sources.

During the sufficiency of effort evaluation, FDEP reviewed the following information about each watershed:

- *Documentation of the most likely sources;*
- *A GIS database to determine the spatial and temporal distribution of the sources;*
- *Permit and water quality information;*
- *Relevant field information; and*
- *The completed corrective actions.*

As the evaluation was conducted, the stakeholders' programs and activities for each type of source were recorded in a set of tables summarizing restoration activities (see **Tables 1A** through **1E**). For each waterbody evaluation, FDEP used information on the potential sources and compared it with these tables to ensure that appropriate programs and activities were being implemented for the most likely sources to either decrease or eliminate the known sources, or to further assess fecal coliform loadings. If any of the likely sources was not sufficiently addressed, FDEP identified the need for additional actions.

The criteria for sufficiency for OSTDS-related efforts included the following:

- *Designation as a septic tank (OSTDS) failure or nuisance area in accordance with the City of Jacksonville Ordinance Code, which prioritizes these areas for transition to sewer service;*
- *The status of OSTDS phase out to sewer;*
- *The number of complaint investigations and any resulting enforcement actions; and*

- *The number of septic tank repair permits and proximity of the repair sites to surface waters or stormwater inlets.*

In addition, program implementation was evaluated for efforts such as inspections, training programs, plan reviews and site visits, and the regulation of annual operating permits. Local ordinances were also evaluated for their ability to proactively address potential OSTDS failures.

The evaluation of efforts for sewer infrastructure included a determination of the percentage of the infrastructure within the watershed boundary with recent sewer line upgrades (cured in place pipe [CIPP], pipe bursting, and open cut and removal). In addition, the number of rebuilt pump stations in each basin was compared with the SSO history to determine if a previous problem was addressed through repairs and upgrades. Rehabilitated manholes can also prevent overflows from occurring at the manhole and potentially reaching surface waters or the stormwater system; therefore, manhole rehabilitation and monitoring efforts were quantified. Additional sanitary sewer programs, including ARV inspection and rehabilitation, SSO investigations, and sewer line inspection and cleaning, were also evaluated as measures to prevent and control sewer infrastructure as a potential fecal coliform source.

The stormwater sufficiency evaluations included a review of flood control projects and stormwater BMPs; the maintenance of stormwater ditches, ponds, and closed conveyances; the detection and removal of illicit connections to stormwater conveyances; public education campaigns; the Adopt-A-Highway Program; street sweeping; and PSAs for the pet waste ordinance.

As water quality improves in response to these actions and the fecal coliform source information is refined, future TMDL implementation plans may recommend different activities or levels of effort.

4.3 COORDINATING WITH FDEP

When determining the suite of management actions that should be implemented in the basin, it will be important for stakeholders to coordinate with the FDEP Basin Coordinator. The Basin Coordinator can provide feedback on the selected management actions to ensure that the projects will address the fecal coliform sources and help meet the TMDL reductions. The Basin Coordinator can also assist stakeholders with the sufficiency of effort review to determine if additional problems or unidentified sources exist that need to be addressed prior to commencing with management actions. At this time, stakeholders should also work with the Basin Coordinator on the outline for the TMDL implementation plan, to ensure that all required elements are included (see **Section 5**).

5.0 IMPLEMENTATION PLAN AND DOCUMENTATION

This section outlines what elements should be included in the TMDL implementation plan, the benefits of adopting the TMDL implementation plan as a BMAP, and an overview of BMAP components. This information will help stakeholders prepare a comprehensive plan to address the fecal coliform impairment to meet the TMDL.

5.1 PLAN ELEMENTS

To ensure that the TMDL implementation plan includes all the necessary information to show how fecal coliform sources will be removed or reduced, data gaps will be filled, and the waterbody monitored to show progress towards the TMDL, certain elements must be included. A helpful tool for preparing a TMDL implementation plan is the EPA's *Handbook for Developing Watershed Plans to Restore and Protect Our Waters*, which outlines the following nine elements essential for a watershed plan:

1. *An identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in the watershed-based plan.*
2. *An estimate of the load reductions expected for the management measures described under Item (3) below.*
3. *A description of the nonpoint source management measures that will need to be implemented to achieve the load reductions estimated under Item (2) above and an identification of the critical areas in which those measures will be needed to implement the plan.*
4. *An estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied on to implement the plan.*
5. *An information/education component that will be used to enhance public understanding of the project and encourage early and continued public participation in selecting, designing, and implementing the nonpoint source management measures that will be implemented.*
6. *A schedule for implementing the nonpoint source management measures identified in this plan that is reasonably expeditious.*
7. *A description of interim, measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented.*
8. *A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards and, if not, the criteria for determining whether this watershed-based plan needs to be revised or, if a nonpoint source TMDL has been established, whether the TMDL needs to be revised.*
9. *A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under Item (8) above.*

Additional information can be found in the full version of the EPA handbook at http://www.epa.gov/owow/nps/watershed_handbook/.

FDEP has worked with stakeholders in several basins across the state on BMAPs for fecal coliform impairments. Based on these efforts, FDEP recommends the following outline for TMDL implementation plans:

- *List of Acronyms*
- *Executive Summary*
- *Chapter 1: Purpose and Scope of the Plan*
  - *Plan Purpose and Approach*
  - *Plan Scope*
  - *Stakeholder Involvement*
  - *TMDL(s) Being Implemented*
  - *Assumptions and Considerations for TMDL Implementation*
  - *Addressing Future Growth in the Watershed*
- *Chapter 2: Water Quality Trends and Anticipated Outcomes*
  - *Summary of Water Quality Trends in the Watershed*
  - *Anticipated Outcomes of Plan Implementation*
- *Chapter 3: Assessing Progress and Making Changes*
  - *Water Quality Monitoring Plan*
  - *Additional Assessments*
  - *Milestones for Implementation*
  - *Adaptive Management Measures*
  - *Tracking Plan Implementation*
- *Chapter 4: Stakeholder Commitment to Plan Implementation*
- *Chapter 5: TMDL Implementation Plan*
  - *Potential Sources*
    - Sanitary Sewer Systems
    - OSTDS
    - Stormwater
    - Nonpoint Sources
    - Wildlife
  - *Projects To Reduce Fecal Coliform Loading*
    - Management Actions for Each Stakeholder
  - *Summary of Restoration Activities and Sufficiency of Effort*
- *References*
- *Appendices with Supporting Information*

Using this outline, Chapter 1 of the TMDL implementation plan includes background information on the watershed and the TMDLs addressed by the plan. This chapter should describe the purpose of the plan, the watershed area, existing sources of fecal coliform, and how efforts

included in the plan were evaluated to ensure that they will be sufficient to meet the TMDL. The underlying assumptions for the plan should be outlined, as well as any further assessments of the basin or refinements of the plan that may be needed in the future to achieve the fecal coliform load reductions. This chapter should also include a discussion of what future growth is expected in the watershed and how any increases in fecal coliform loading associated with this growth will be addressed.

Chapter 2 summarizes fecal coliform trends in the watershed, based on existing water quality monitoring (i.e., whether fecal coliform concentrations appear to be increasing or decreasing, the influence of rainfall, and whether concentrations are higher at certain times of the year). This chapter should also outline stakeholders' expected outcomes from plan implementation.

Chapter 3 discusses the plan for assessing progress towards meeting the required fecal coliform reductions. This includes a monitoring plan (see **Section 5.1.1** for details), any additional assessments needed to better understand the watershed, and milestones to help measure progress. In addition, information about how plan implementation will be tracked, including annual progress reports and meetings (see **Section 5.1.2**), should be included.

Chapter 4 describes stakeholders' commitment to implementing their components of the plan, including their projects, programs, and monitoring.

Chapter 5 provides the details of the TMDL implementation plan, including a description of the potential sources identified, the management actions that will be implemented by each stakeholder to address the potential sources, and a sufficiency of effort evaluation for the projects listed.

In addition, appendices can be included to provide supporting information. For example, an appendix can provide additional details about the projects and programs to augment the discussion of the management actions from Chapter 5.

5.1.1 Developing a Monitoring Plan

The monitoring plan is an important component of the TMDL implementation plan because it will be used to measure progress towards meeting the TMDL and water quality targets. The first step in preparing a monitoring plan is to gather information on existing sampling from the stakeholders conducting the monitoring in the watershed. Important monitoring information includes the station name, station location, parameters sampled, frequency of sampling, period of record, and responsible entity.

When developing the monitoring plan, several key items should be considered, including the following:

- *The TMDL parameter(s) addressed in the BMAP;*
- *Goals and objectives for the monitoring to determine the success of the BMAP;*
- *Core and supplemental parameters that should be assessed related to the impairment (see **Table 2**);*
- *Any important assumptions made in the development of the TMDL;*
- *Specific allocations to sources (where applicable);*
- *The use of stations that have previously been sampled; and*
- *Responsible entities.*

The monitoring network should include trend and source monitoring to provide adequate information about how the waterbody is responding to plan implementation, with particular attention to responses at previously identified "hot spots." The monitoring plan should also include information on how the extent of the monitoring network was determined (i.e., through a statistical analysis, such as a power analysis, or by ensuring that all major tributaries and inputs are monitored), how the sampling frequency was determined, and how progress towards meeting the TMDL will be assessed.

The data collected as part of the monitoring plan should adhere to the requirements established in Section 62-160, Florida Administrative Code (F.A.C.), Quality Assurance, available at http://www.dep.state.fl.us/legal/Rules/general/62-160/62-160.pdf. The most current version of the FDEP standard operating procedures (SOPs) can be downloaded at http://www.dep.state.fl.us/labs/library/lab_sops.htm. In addition, checklists for field collection and laboratory activities are available at http://www.dep.state.fl.us/labs/library/index.htm. FDEP will determine the usability of the data received following the guidelines in the document, *Process for Assessing Data Usability* (DEP-EA 001/07).

TABLE 2: EXAMPLE OF SAMPLING PARAMETERS FOR A FECAL COLIFORM MONITORING PLAN

WATER QUALITY INDICATORS	FIELD PARAMETERS
Fecal coliform	Air temperature
Conductivity	Cloud cover
Dissolved oxygen	Rainfall
Dissolved oxygen saturation	Tide stage
pH	Canopy cover
Salinity	Water Flow condition
Temperature	Wind
Turbidity	-

A useful document to consult while preparing the monitoring plan is the 2003 EPA document, *Elements of a State Water Monitoring and Assessment Program* (see http://water.epa.gov/type/watersheds/monitoring/index.cfm, which includes the following 10 essential elements for a monitoring plan:

1. *Monitoring program strategy;*
2. *Monitoring objectives;*
3. *Monitoring design;*
4. *Core and supplemental indicators of water quality;*
5. *Quality assurance;*
6. *Data management;*
7. *Data analysis/assessment;*
8. *Reporting;*
9. *Programmatic evaluation; and*
10. *General support and infrastructure.*

An example of a water quality monitoring plan can be found in Section 4.2 of the Lower St. Johns River Tributaries BMAP (http://www.dep.state.fl.us/water/watersheds/bmap.htm).

5.1.2 Annual Progress Report

In order to assess progress made towards the TMDL and targets, the TMDL implementation plan efforts should be analyzed yearly through a progress report and stakeholder meeting. The annual progress reports created for the TMDL implementation plan should include the same information as the progress reports for a BMAP.

The annual progress report provides the opportunity to discuss the TMDL implementation plan accomplishments for the past year. **Appendix J, Annual Progress Report Template,** contains a template providing guidance on what information should be collected and included in the annual progress report The report should include a discussion, as appropriate, of the major accomplishments for the year related to project completion and implementation, water quality monitoring, special projects, local development regulations, funding, and TMDL revisions. It should also include any major issues that were encountered during the year related to the above topics and how those issues were addressed to move forward with plan implementation.

The efforts planned for the upcoming year should also be discussed in the report to show how progress will continue to be made towards meeting the TMDL. In addition, once four to five years of water quality data have been collected, the data should be analyzed for trends and this information included in the annual report. This will allow for a comparison of current conditions with the TMDL goals.

The information needed to write the annual progress report comes from a variety of sources. Project status and associated reduction information should be obtained from National Pollutant Discharge Elimination System (NDPES) permits, Discharge Monitoring Reports (DMRs), agricultural Notice of Intents (NOIs), and the responsible entities. Monitoring data should be collected from FDEP's water quality database, STORET (ambient monitoring), and the responsible entities for other types of data (such as follow-up samples on high fecal coliform counts) that cannot be uploaded to STORET. The data collection process is especially important for the annual report, which includes a summary of water quality data and trends.

Once the annual progress report is compiled, the stakeholders should meet to discuss the contents of the report, any issues that need to be addressed, and modifications to the TMDL implementation plan and the monitoring plan for the upcoming year. The annual meeting also provides an opportunity for the stakeholders to learn about and discuss items such as the following:

- *New technologies to reduce fecal coliform;*
- *The effectiveness of existing fecal coliform assessment techniques and new sampling technologies that will improve source identification;*
- *Water quality monitoring and any available trend information; and*
- *Reports from other basins with tools or other information that could be applied to the TMDL implementation plan.*

Table 3 provides an example of the form that can be used to collect project updates for the annual report.

TABLE 3: PROPOSED BMAP ANNUAL REPORTING FORM

___YEAR__ ANNUAL IMPLEMENTATION REPORT

REPORTING ENTITY: _____ **DATE**: _____

Note: Relevant MS4 activities, whether contained in the implementation plan or not, may be included in this report.

IMPLEMENTATION STATUS – IMPLEMENTATION PLAN MANAGEMENT STRATEGIES

PROJECT #	AFFECTED AREA	BRIEF DESCRIPTION	PROJECTED START/ END	PROJECT/ ACTIVITY STATUS	PROJECT MONITORING RESULTS	COMMENTS
Shade if also an MS4 activity						

NEW MANAGEMENT STRATEGIES

PROJECT #	AFFECTED AREA	BRIEF DESCRIPTION	PROJECTED START/ END	PROJECT/ ACTIVITY STATUS	PROJECT MONITORING RESULTS	COMMENTS
Shade if also an MS4 activity						

5.2 BENEFITS OF PLAN ADOPTION AS A BMAP

While developing the TMDL implementation plan, stakeholders may consider having FDEP adopt the plan as a formal BMAP. There are several benefits to an adopted BMAP as opposed to a more informal TMDL implementation plan.

An adopted BMAP shows that a formal plan is in place to reduce fecal coliform concentrations to meet the TMDL. This can provide assurance to the EPA that actions approved by FDEP will be taken to improve an impaired waterbody. In addition, the BMAP provides an enforcement mechanism for FDEP, ensuring that each of the stakeholders meet their commitments so that all responsible entities are helping to address the problem.

Another major benefit is that an adopted BMAP provides an avenue or an advantage for certain funding sources. Examples of funding assistance available to local stakeholders include the following:

- *Clean Water State Revolving Fund loan program;*
- *Small Community Wastewater Facilities Grants Program;*
- *Section 319 Grant Program;*
- *FDEP TMDL funding;*
- *Community Budget Issue Request;*
- *Small Cities Community Development Block Grant Program; and*
- *Water management district funding programs.*

Additional details about these funding and other funding sources may be found in **Appendix K, Funding**.

FDEP can also provide technical assistance to stakeholders as part of the BMAP process. This support includes document management and formatting, coordination for water quality data in STORET, and assistance in obtaining FDEP Secretarial adoption. FDEP staff are also available to help collect and compile information for the annual progress reports and assist in identifying additional actions needed if the necessary reductions are not being achieved.

5.3 BMAP OVERVIEW

Although advancement of the TMDL implementation plan to a BMAP is not mandatory and not always needed, stakeholders may choose to have an adopted BMAP for some of the benefits listed in **Section 5.2**. BMAPs are the most comprehensive approach to TMDL implementation. They are developed through collaborative processes with the cooperation of local stakeholders and are applicable where multiple sources are affecting a waterbody. The goals of this process are to reach consensus on the scientific foundation, and to determine how responsibility will be assigned and how load reductions will be accomplished. More information on BMAPs is available on the FDEP website at http://www.dep.state.fl.us/water/watersheds/bmap.htm.

Section 403.067, F.S., guides the TMDL implementation process. The latest version should always be checked for minor revisions and can be found by accessing the Florida Legislature website at http://www.leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=0400-0499/0403/0403PARTIContentsIndex.html.

The major components of a BMAP, as outlined in Section 403.067, F.S., are as follows:

1. *The establishment of an implementation schedule for management strategies, identification of feasible funding, and establishment of a basis for evaluating the plan's effectiveness;*
2. *The equitable allocation of pollutant reductions;*
3. *The involvement of a broad range of interested parties (key stakeholders);*
4. *Secretarial adoption;*
5. *Milestones for implementation and water quality improvement and a water quality monitoring component;*
6. *Water quality trading; and*
7. *The application of equitable abatement and impact on an existing BMAP's future land use determination.*

Once adopted by order of the FDEP Secretary, BMAPs are enforceable through wastewater and municipal stormwater permits for point sources and through BMP or management action implementation for nonpoint sources. BMAPs typically include the following:

- *Water quality goals (based directly on the TMDL);*
- *Refined source identification;*
- *Load reduction requirements for stakeholders (quantitative detailed allocations, if technically feasible);*
- *A description of the load reduction activities to be undertaken, including structural projects, nonstructural BMPs, and public education and outreach;*
- *A description of further research, data collection, or source identification needed in order to achieve the TMDL;*
- *Timetables for implementation;*
- *Implementation funding mechanisms;*
- *An evaluation of future increases in pollutant loading due to population growth;*
- *Implementation milestones, project tracking, water quality monitoring, and adaptive management procedures; and*
- *Stakeholder statements of commitment (typically a local government resolution or letter of support).*

BMAPs are updated through annual meetings and may be officially revised every five years. Completed BMAPs in the state have improved communication and cooperation among local stakeholders and state agencies; improved internal communication within local governments; applied high-quality science and local information in managing water resources; clarified the

obligations of wastewater point sources and MS4 and non-MS4 stakeholders for TMDL implementation; enhanced transparency in FDEP decision making; and built strong relationships between FDEP and local stakeholders that have benefited other program areas. If FDEP chooses to move forward with a BMAP, it will be developed through a transparent, stakeholder-driven process intended to result in a plan that is cost-effective, technically feasible, and meets the restoration needs of the applicable waterbodies and their communities.

5.4 COORDINATING WITH FDEP

Stakeholders should be in contact with the FDEP Basin Coordinator while preparing the TMDL implementation report. The Basin Coordinator will help ensure that the necessary components are included and that the plan is sufficient to meet the TMDL reductions. In addition, if stakeholders determine that they want to adopt the plan as a BMAP, the Basin Coordinator can assist in preparing the necessary briefing documents for FDEP review and Secretarial adoption.

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APPENDICES

The following appendices contain additional documents referenced in this guidance document that may be useful to review when preparing a TMDL implementation plan or BMAP for a watershed. These Appendices can be obtained in Compact Disk format by contacting John.Abendroth@dep.state.fl.us.

- ***Appendix A*** *– Fecal Coliform Criteria and Information*
- ***Appendix B*** *– Walk the Waterbody*
- ***Appendix C*** *– Decision Matrix*
- ***Appendix D*** *– Source Identification*
- ***Appendix E*** *– Pollution Assessment*
- ***Appendix F*** *– Microbial Source Tracking*
- ***Appendix G*** *– Thermal Imaging*
- ***Appendix H*** *– Data Analysis*
- ***Appendix I*** *– Pet Waste Ordinances*
- ***Appendix J*** *– Annual Progress Report Template*
- ***Appendix K*** *– Funding*