BASIN MANAGEMENT ACTION PLAN

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

in the

Lower St. Johns River Basin Tributaries

developed by the
Lower St. Johns River Tributaries Basin Working Group

in cooperation with the
Florida Department of Environmental Protection
Division of Environmental Assessment and Restoration
Bureau of Watershed Restoration
Tallahassee, Florida 32399

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LIST OF ACRONYMS

ARV	Air Release Valve
BMAP	Basin Management Action Plan
BMP	Best Management Practice
BWG	Basin Working Group
CAFO	Concentrated Animal Feeding Operation
CARE	Citizen Action Response Effort
CBP	Concrete Batch Plant
CIPP	Cured In Place Pipe
CDM	Camp, Dresser & McKee
CIP	Capital Improvement Plan
CMOM	Capacity, Management, Operations, and Maintenance
COJ	City of Jacksonville
CPAC	Citizen Policy Advisory Committee
DCHD	Duval County Health Department
DCP	Drainage Connection Program
EPA	U.S. Environmental Protection Agency
EPB	Environmental Protection Board
EQD	Environmental Quality Division
ETM	England-Thims and Miller
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
FEHA	Florida Environmental Health Association
FOG	Fats, Oils, and Grease
FOWA	Florida Onsite Wastewater Association
F.S.	Florida Statutes
FSE	Food Service Establishment
FWRA	Florida Watershed Restoration Act
FY	Fiscal Year
GIS	Geographic Information System
IMZ	Industrial/Manufacturing Zone
IP	Industrial Pretreatment
IWR	Impaired Surface Waters Rule
LF	Linear Feet
LSJR	Lower St. Johns River
MEP	Maximum Extent Practicable
MF	Membrane Filter
M/H	Manhole
mL	Milliliter
MPN	Most Probable Number
MS4	Municipal Separate Storm Sewer System

LIST OF ACRONYMS

MSMP	Master Stormwater Management Plan
MST	Microbial Source Tracking
NHD	National Hydrography Dataset
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
OSTDS	Onsite Sewage Treatment and Disposal System
PBS&J	Post, Buckley, Schuh & Jernigan
PBTS	Performance-Based Treatment and Disposal System
PHP	Preferred Hauler Program
PIC	Potential Illicit Connection
PSA	Public Service Announcement
PVC	Polyvinyl Chloride
PWD	Public Works Department
QA/QC	Quality Assurance/Quality Control
R&R	Repair and Replacement
SCADA	Supervisory Control and Data Acquisition
SCS	U.S. Soil Conservation Service
SJRWMD	St. Johns River Water Management District
SOP	Standard Operating Procedure
SSO	Sanitary Sewer Overflow
SWIM	Surface Water Improvement and Management
SWMP	Stormwater Management Program
TAT	Tributary Assessment Team
TMDL	Total Maximum Daily Load
USF	University of South Florida
UV	Ultraviolet
WAV	Watershed Action Volunteer
WBID	Waterbody Identification
WSEA	Water and Sewer Expansion Authority
WWTF	Wastewater Treatment Facility

EXECUTIVE SUMMARY

TRIBUTARIES OF THE LOWER ST. JOHNS RIVER BASIN

The 10 tributaries discussed in this Basin Management Action Plan (BMAP) occupy approximately 6% or more than 166 square miles of the Lower St. Johns River (LSJR) Basin. The urban planning units are streams in the Duval County area, which include Trout River, Ortega River, North Mainstem, and Intracoastal Waterway. These urban streams are smaller and their water quality affected by urbanization. At least part of the drainage from these tributaries flows through urban Jacksonville and many are tidally influenced for substantial distances.

The area addressed by this Lower St. Johns River Tributaries BMAP comprises the following four planning units, which include several smaller lakes and canals:

1. *The **Trout River Planning Unit**, which contains the Trout River tributary watershed, is located west of the St. Johns River in northwestern Duval County. It covers approximately 94 square miles. The watershed, which joins the St. Johns River where it turns east toward the Atlantic Ocean, is heavily influenced by tidal fluctuations (Bergman, 1992). A portion of Hogan Creek is located in the planning unit.*

2. *The **Ortega River Planning Unit**, consisting of the Ortega River tributary watershed, is located west of the St. Johns River in south-central Duval County and covers approximately 99 square miles. Cedar River, the largest tributary of the Ortega River, flows predominately southeast (Bergman, 1992). Tributaries of the Cedar River include Butcher Pen Creek and most of Big Fishweir Creek.*

3. *The **North Mainstem Planning Unit** lies almost entirely in Duval County and includes the main stem of the St. Johns River from the mouth to Piney Point. It also includes many of the urbanized streams in downtown Jacksonville, such as Hogan Creek, Deer Creek, Goodbys Creek, Terrapin Creek, Newcastle Creek, Miramar Creek, and Miller Creek (Bergman, 1992).*

4. *The **Intracoastal Waterway Planning Unit**, which is south of the St. Johns River near its mouth at the Atlantic Ocean, covers approximately 99 square miles, primarily in St. Johns County. It includes the cities of Atlantic Beach, Neptune Beach, and Jacksonville Beach (Bergman, 1992). Open Creek is located in this planning unit.*

TOTAL MAXIMUM DAILY LOADS

Total Maximum Daily Loads (TMDLs) are water quality targets for specific pollutants (such as fecal coliform) that are established for impaired waterbodies that do not meet their designated uses based on Florida water quality standards. During Cycle 1 of the watershed management cycle in the LSJR Basin, as required by federal law, the Florida Department of Environmental Protection (FDEP) identified 55 tributaries that have verified fecal coliform impairments.

In 2006, FDEP adopted TMDLs for the following waterbodies included in the BMAP:

- *Miramar Creek*
- *Butcher Pen Creek*
- *Hogan Creek*
- *Goodbys Creek*

FDEP then adopted additional TMDLs for the BMAP in 2009 for the following waterbodies:

- *Miller Creek*
- *Big Fishweir Creek*
- *Newcastle Creek*
- *Deer Creek*
- *Terrapin Creek*
- *Open Creek*

TMDLs also adopted in 2006 and 2009 for other fecal coliform impaired tributaries in the LSJR Basin include:

- *Williamson Creek*
- *Moncrief Creek*
- *Wills Branch*
- *Cedar River*
- *Ribault River*
- *McCoy Creek*
- *Durbin Creek*
- *Deep Bottom Creek*
- *Blockhouse Creek*
- *Trout River*
- *Big Davis Creek*

THE LOWER ST. JOHNS RIVER TRIBUTARIES BASIN MANAGEMENT ACTION PLAN

This BMAP for the tributaries to the LSJR addresses 10 of the 55 tributaries impaired for fecal coliform. These initial 10 tributaries were identified as the worst-case waterbody identification (WBID) numbers, based on a ranking method establishing the severity of bacterial contamination. The projects and activities outlined in this BMAP are sufficient to address all of the identified sources and, with full implementation of this BMAP, the 10 WBIDs are expected to meet the TMDL requirements. Through ongoing studies, the five year BMAP milestone evaluation and the annual reviews we will be able to identify and address any additional sources that occur. Any future BMAPs will address additional subsets of the tributaries verified impaired for fecal coliform.

BMAP BASIN WORKING GROUP MEMBERSHIP

FDEP worked with the Basin Working Group to prepare this BMAP. The BWG members represent the following groups and organizations:

- *City of Jacksonville*
- *Duval County Department of Health*
- *Florida Department of Transportation*
- *JEA*

BMAP APPROACH

This BMAP provides for phased implementation pursuant to Section 403.067(7)(a)1, Florida Statutes (F.S.). The adaptive management approach for TMDL implementation described in this BMAP will address fecal coliform bacteria reductions and the iterative evaluation process will continue until attainment of the TMDL. The phased BMAP approach allows for implementation of projects designed to achieve reductions while simultaneously implementing source assessment, monitoring, and conducting studies to better understand fecal coliform variability and water quality dynamics in each impaired waterbody.

A five-year milestone in this BMAP will assess and verify that adequate progress is being made towards achieving the TMDLs. During the fifth year following the BMAP adoption (2014), the water quality data will be evaluated for in-stream reductions of fecal coliform levels within each WBID. By this year, the median value for the fecal coliform counts in the first four years of BMAP implementation should be 50 percent of the median expressed in the TMDL, which was based on the verified period of record (January 1, 1996 to June 30, 2003) in each WBID. If this 50 percent reduction is not achieved by the time of this year five analysis, additional efforts may be required. Achieving 50 percent of the required reductions will be an important milestone for this BMAP and will provide an opportunity to improve source assessment and management measures going forward.

SUFFICIENCY OF EFFORT EVALUATION

The tributary fecal coliform TMDLs are expressed as a percent reduction based on in-stream fecal coliform concentrations. This method of TMDL allocation prevents detailed allocations, as it is complicated to equitably allocate to stakeholders based on a percent reduction of in-stream concentration. Fecal coliform can be highly variable and easily transported, which makes it difficult, in many cases, to identify the source of the bacteria. Additionally, there are nearly no data that show the efficiency of stormwater BMPs and management actions in removing or reducing fecal coliforms.

FDEP evaluated fecal coliform reduction activities using a "sufficiency of effort" approach, which is a WBID-specific assessment of the identified potential sources and the specific activities that reduce or eliminate sources of fecal coliform loading. This sufficiency of effort evaluation is not an assessment of each entity's individual activities; instead, the focus is whether the submitted activities corresponded to the potential sources identified in the WBID and whether the total efforts were adequate to eliminate the known sources, assess unknown sources, and prevent the development of new sources. If any of the likely sources were not sufficiently addressed, FDEP identified the need for additional actions, which were added to the responsible entity's project table for that WBID. The sum of the actions in this BMAP is sufficient to address the potential sources, based upon the information available. Additional actions may be necessary in the next cycle if reductions do not occur as expected.

KEY ELEMENTS OF THE BMAP

This BMAP addresses the key elements required by the Florida Watershed Restoration Act (FWRA), Chapter 403.067, Florida Statutes (F.S.), including the following:

- *Document how the public and other stakeholders were encouraged to participate or participated in developing the BMAP (**Section 1.3.1** and **Appendix C**);*
- *Equitably allocate pollutant reductions in the basin (**Section 1.3.4**);*
- *Identify the mechanisms by which potential future increases in pollutant loading will be addressed (**Section 1.5**);*
- *Document management actions/projects to achieve the TMDLs (**Chapter 6** through **Chapter 15**);*
- *Document the implementation schedule, funding, responsibilities, and milestones (**Sections 6.3, 7.3, 8.3, 9.3, 10.3, 11.3, 12.3, 13.3, 14.3,** and **15.3**); and*
- *Identify monitoring, evaluation, and a reporting strategy to evaluate reasonable progress over time (**Section 4.2**).*

ANTICIPATED OUTCOMES OF BMAP IMPLEMENTATION

Through the implementation of projects, activities, and additional source assessment in this BMAP, stakeholders expect the following outcomes:

- *Improved water quality trends in the tributaries of the LSJR that will also help improve water quality in the main stem of the river;*
- *Decreased loading (levels) of the target pollutant (fecal coliform);*
- *Enhanced public awareness of fecal coliform sources and impacts on water quality;*
- *Enhanced effectiveness of corresponding corrective actions by stakeholders;*
- *Enhanced understanding of basin hydrology, water quality, and pollutant sources; and*
- *The ability to evaluate management actions, estimate their benefits and identify additional pollutant sources.*

BMAP COST

Costs were provided for 79% of the activities identified in the BMAP, with an estimated total cost of more than $31 million for capital projects and approximately $59 million for ongoing programs and activities. In addition, some of the activities identified in the BMAP only had countywide costs available, for a total of almost $5.5 million. The funding sources range from local contributions to legislative appropriations. Technical stakeholders and Basin Working Group (BWG) members will continue to explore new opportunities for funding assistance to ensure that the activities listed in this BMAP can be maintained at the necessary level of effort.

BMAP FOLLOW-UP

As a part of BMAP follow-up, FDEP and stakeholders will track implementation efforts and monitor water quality to determine additional sources and water quality trends. The sampling locations in the monitoring plan were selected to identify other potential sources of contamination through source assessment monitoring in key locations throughout the watersheds and to track trends in fecal coliform in the WBIDs by using existing stations with extensive historical data. The source assessment monitoring will follow the established Tributaries Assessment Team (TAT) protocol in which any observed fecal coliform colony counts, over 5,000, will be followed-up with bracketed sampling in an effort to determine the source of the high fecal coliform count. FDEP and COJ are responsible for the trend and source assessment sampling in the monitoring plan and JEA has committed to processing up to 32 samples each month in their laboratory for FDEP and COJ.

The results of these efforts will be used to evaluate the effectiveness of the BMAP activities in reducing fecal coliform loading in the tributaries. The BWG will meet at least every 12 months to discuss implementation issues, consider new information, and determine what other management strategies are needed if monitoring indicates that additional measures are necessary to reduce fecal coliform.

BENEFITS OF THE BMAP PROCESS

With the implementation of activities outlined in this BMAP, in addition to the anticipated outcomes noted above, the following benefits are expected:

- *Increased coordination between state and local governments and within divisions of local governments in problem solving for surface water quality restoration;*
- *Securing additional state and local funding for water quality restoration;*
- *Improved communication and cooperation among state and local agencies responding to restoration needs; and*
- *Determination of effective projects through the stakeholder decision-making and priority-setting processes.*

COMMITMENT TO BMAP IMPLEMENTATION

The Basin Working Group members will provide endorsement of the BMAP on behalf of the entities they represent and are committed to ensuring the plan is implemented to achieve reductions of fecal coliforms in the tributaries. In addition to this endorsement, the entities will also provide FDEP with letters of commitment or resolutions of support to ensure that as staff and board members change over time, the entity has a way to ensure support for the BMAP and the efforts included.

CHAPTER 1: CONTEXT, PURPOSE, AND SCOPE OF THE PLAN

1.1 WATER QUALITY STANDARDS AND TOTAL MAXIMUM DAILY LOADS

Florida's water quality standards are designed to ensure that surface waters can be used for their designated purposes, such as drinking water, recreation, and agriculture. Currently, most surface waters in Florida, including those in the Lower St. Johns River (LSJR) Basin, are categorized as Class III waters, which means they must be suitable for recreation and must support the propagation and maintenance of a healthy, well-balanced population of fish and wildlife. **Table 1** shows all designated use categories.

Under Section 303(d) of the federal Clean Water Act, every two years each state must identify its "impaired" waters, including estuaries, lakes, rivers, and streams, that do not meet their designated uses and are not expected to improve within the subsequent two years. The Florida Department of Environmental Protection (FDEP) is responsible for developing this "303(d) list" of impaired waters.

TABLE 1: DESIGNATED USE ATTAINMENT CATEGORIES FOR FLORIDA SURFACE WATERS

CATEGORY	DESCRIPTION
Class I*	Potable water supplies
Class II*	Shellfish propagation or harvesting
Class III	**Recreation, propagation and maintenance of a healthy, well-balanced population of fish and wildlife**
Class IV	Agricultural water supplies
Class V	Navigation, utility, and industrial use (*no current Class V designations*)

* Class I and II waters include the uses of the classifications listed below them.

Florida's 303(d) list identifies hundreds of waterbody segments that fall short of water quality standards. The three most common water quality concerns are coliform, nutrients, and oxygen-demanding substances. The listed waterbody segments are candidates for more detailed assessments of water quality to determine whether they are impaired according to state statutory and rule criteria. FDEP develops and adopts Total Maximum Daily Loads (TMDLs) for the waterbody segments it identifies as impaired. A TMDL is the maximum amount of a specific pollutant that a waterbody can assimilate while maintaining its designated uses.

The water quality evaluation and decision-making processes for listing impaired waters and establishing TMDLs are authorized by Section 403.067, Florida Statutes (F.S.), known as the Florida Watershed Restoration Act (FWRA), and contained in Florida's Identification of Impaired Surface Waters Rule (IWR), Rule 62-303, Florida Administrative Code (F.A.C.). The impaired waters in the tributaries of the LSJR Basin addressed in this plan are all Class III waters. TMDLs have been established for these waters, identifying the amount of fecal coliform and other pollutants they can receive and still maintain Class III designated uses.

TMDLs are developed and implemented as part of a watershed management cycle that rotates through the state's 52 river basins every 5 years (see **Appendix A**) to evaluate waters, determine impairments, and develop and implement management strategies to restore impaired waters to their designated uses. **Table 2** summarizes the five phases of the watershed management cycle.

TABLE 2: PHASES OF THE WATERSHED MANAGEMENT CYCLE

Phase 1	Preliminary evaluation of water quality
Phase 2	Strategic monitoring and assessment to verify water quality impairments
Phase 3	Development and adoption of TMDLs for waters verified as impaired
Phase 4	Development of management strategies to achieve the TMDL(s)
Phase 5	Implementation of TMDL(s), including monitoring and assessment

1.2 TMDL IMPLEMENTATION

Rule-adopted TMDLs may be implemented through Basin Management Action Plans (BMAPs), which contain strategies to reduce and prevent pollutant discharges through various cost-effective means. During Phase 4 of the TMDL process, FDEP and the affected stakeholders in the various basins jointly develop BMAPs or other implementation approaches. A basin may have more than one BMAP, based on practical considerations. The FWRA contains provisions that guide the development of BMAPs and other TMDL implementation approaches. **Appendix B** summarizes the statutory provisions related to BMAP development.

Stakeholder involvement is critical to the success of the TMDL Program, and varies with each phase of implementation to achieve different purposes. The BMAP development process is structured to achieve cooperation and consensus among a broad range of interested parties. Under statute, FDEP invites stakeholders to participate in the BMAP development process and encourages public participation to the greatest practicable extent. FDEP must hold at least one noticed public meeting in the basin to discuss and receive comments during the planning process. Stakeholder involvement is essential to develop, gain support for, and secure commitments to implement the BMAP.

1.3 THE LOWER ST. JOHNS RIVER TRIBUTARIES BASIN MANAGEMENT ACTION PLAN

1.3.1 STAKEHOLDER INVOLVEMENT

In 2005, the Tributaries Assessment Team (TAT) was formed to investigate potential sources of fecal coliform in the LSJR tributaries. The TAT membership comprises several agencies and organizations, including FDEP, City of Jacksonville (COJ) Environmental Quality Division (EQD), COJ Public Works Department (PWD), Duval County Health Department (DCHD), and JEA (the regional utility provider). The TAT has collected much of the water quality data that provide the basis for the analyses presented in this BMAP.

As part of its efforts, the TAT samples a number of tributaries (10 WBIDs are included in the 2009 sampling plan). When a sample is above a fecal coliform colony count of 5,000, the TAT collects additional samples upstream and downstream of the high count in an effort to bracket the location of the source. In addition to intensive water quality sampling, the TAT analyzes the water quality data in conjunction with GIS information to identify opportunities for eliminating sources and carrying out additional focused sampling. This effort requires interagency coordination and communication to effectively address a source, because the TAT member who identifies the source may not be associated with the appropriate entity to implement the corrective action. The TAT's interagency, coordinated effort has identified and eliminated fecal coliform sources in the tributaries, which has helped to improve water quality in the tributaries.

In July 2006, FDEP initiated BMAP technical meetings involving key stakeholders. The purpose of the technical meetings is for stakeholders to gather information on the impaired tributaries to aid in the development of the BMAP and to identify management actions to improve water quality.

In addition to stakeholder input on the technical issues of BMAP development, FDEP solicited further input from key stakeholder groups at the management level by creating the Basin Working Group (BWG) in October 2007. The BWG provides recommendations to FDEP on issues related to BMAP development. The BWG developed the following mission statement:

> *The mission of the Lower St. Johns River Tributaries Basin Working Group is to encourage participation of all interested parties in working to restore impaired waterbodies through recommendations for an equitable and cost-effective Basin Management Action Plan to achieve Total Maximum Daily Load reduction goals in the tributaries of the Lower St. Johns River.*

Except as specifically noted in subsequent sections, this BMAP document reflects the input of the technical stakeholders and the BWG, along with public input from workshops and meetings held to discuss key aspects of the TMDL and BMAP development. **Appendix C** provides further details.

1.3.2 Plan Purpose and Approach

As reflected in the BWG's mission statement, the purpose of this BMAP is to implement load reductions to achieve the fecal coliform TMDLs for the LSJR Basin tributaries. The plan also outlines specific actions that will achieve load reductions and a schedule for implementation. In addition, it details a monitoring approach to identify additional sources of fecal coliform and to track trends in water quality. The BWG will meet at least annually to review progress made towards achieving the TMDLs.

This BMAP for the LSJR tributaries addresses 10 of the 55 tributaries impaired for fecal coliform. Specifically, it focuses on actions that reduce fecal coliform levels, with a goal of meeting the associated TMDLs. Other water quality concerns will benefit from these BMAP actions, such as issues with nutrients and low dissolved oxygen. However, it must be emphasized that this BMAP does not address all of the water quality issues in the basin. Future fecal coliform BMAPs in the LSJR tributaries will include additional subsets of the tributaries listed as impaired for fecal coliform.

For assessment purposes, FDEP has divided the LSJR Basin into water assessment polygons with a unique waterbody identification (WBID) number for each watershed or stream reach. **Figure 1** shows the 10 most severely impacted WBIDs discussed in this BMAP.

Though considerable effort was taken to understand the dynamics of the TMDL waterbodies, the relationship of fecal coliform water quality exceedances to pollutant sources is not well understood. Where specific fecal coliform sources were identified, the BWG and stakeholders have proposed projects and activities to eliminate those sources. In areas where specific sources were not definitively identified, programs to prevent further fecal coliform loading, including assessments and sampling to identify and eliminate sources, are listed.

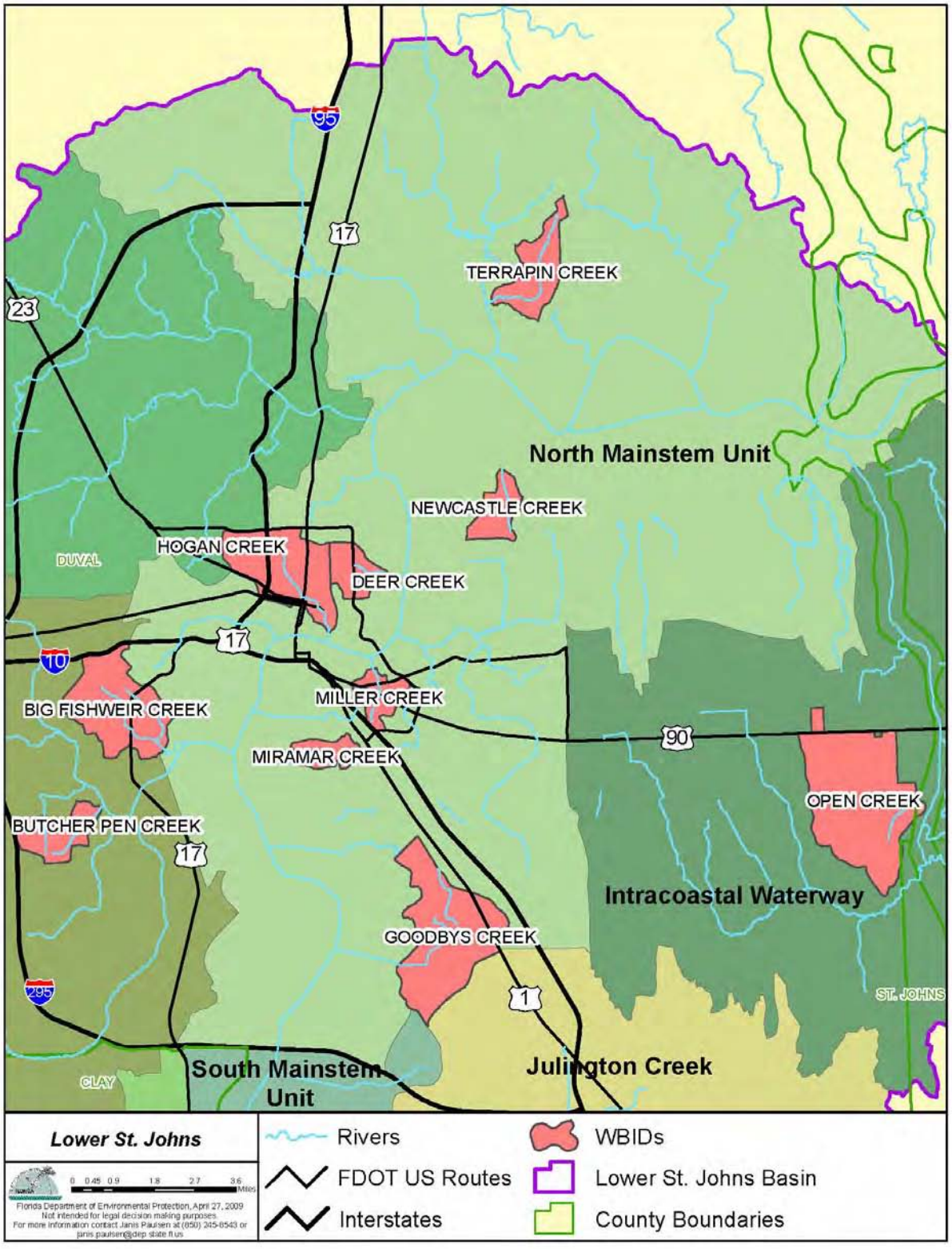

FIGURE 1: LSJR BASIN TRIBUTARIES INCLUDED IN THE BMAP

For the projects and programs in this BMAP, quantitative values for pollutant load reduction activities cannot be calculated due to a lack of scientific information on the bacteria removal rates for best management practices (BMPs) and activities that reduce fecal coliform levels. While it is known that certain BMPs prevent or remove fecal coliform sources, it is not known exactly how much of a reduction will occur in the tributaries. As a result, the expected dates on which the TMDLs will be achieved are not provided; however, there is a milestone to evaluate progress in Year 5 of the BMAP (**Section 4.5**). Despite the uncertainties, stakeholders do expect to achieve water quality improvements by the end of the first five-year BMAP cycle through past and future activities, projects, and programs to eliminate sources outlined in this BMAP.

1.3.3 Plan Scope

The initial subset of 10 tributaries included in this BMAP was identified as the worst-case WBIDs. This determination uses a ranking method that establishes the severity of water quality impairment based on the number of exceedances of fecal coliform colony counts. The water quality ranking method uses the total number of fecal coliform samples in the waterbody during the period of record to categorize how many samples were over 800, 5,000, and 10,000 colony counts. A combined rank is then created based on the number of exceedances in each category. The WBIDs are sorted from worst to best to provide a guideline for assessment priorities, with the worst-case waterbody ranked as number one.

In an effort to address the known impairments in these tributaries, FDEP contracted with Post, Buckley, Schuh & Jernigan (PBS&J) to develop technical reports that describe and interpret the water quality, spatial, and geographic data from FDEP, DCHD, COJ, and JEA. The available data are analyzed in the reports to identify the most probable sources of fecal coliform, which fall into five main categories (not in order of magnitude), as follows: (1) stormwater; (2) onsite sewage treatment and disposal systems (OSTDS); (3) sewer infrastructure; (4) nonpoint sources such as pet waste; and (5) natural background such as wildlife.

These reports were peer reviewed by the technical stakeholders in the basin, who also provided additional input based on their knowledge of the tributaries. Each of the technical reports provides individual waterbody–specific information in a stand-alone document. The technical stakeholders used the reports to establish a baseline and to assist in identifying projects and additional monitoring needs, which are included in this BMAP. **Chapter 6** through **Chapter 15** summarize key findings from the technical reports. Additional detailed information for each WBID is located in the full versions of the technical reports, which are available from FDEP.

The technical reports use a "weight-of-evidence" approach to help identify likely sources of fecal coliform and guide follow-up reconnaissance and investigation toward corrective actions. This approach utilizes statistical and Geographic Information System (GIS) data analyses to focus watershed management efforts, classify priorities, and support decisions related to fecal coliform reduction efforts. These analyses are a product of the best information available at the time to summarize impairments and identify potential sources. The limitations of the available datasets were identified in the technical reports to provide context for data interpretation. The weight-of-evidence method, in conjunction with the best professional judgment of the stakeholders who have local knowledge of these WBIDs, was used to aid in source identification to the maximum extent possible.

At this time, water quality modeling has not been used to assess the temporal relationship between the source of fecal coliform and the associated impact on the waterbody. Due to the inherent variability of fecal coliform and the diffuse nature of nonpoint sources, modeling was not considered viable, and the weight-of-evidence approach was utilized to provide information

on the most likely sources. Modeling may be considered in the future to help refine the understanding of sources and impacts in the tributaries.

1.3.4 Sufficiency of Effort Approach and Determination of Sufficiency

Fecal coliform can be highly variable and easily transported, making it difficult, in many cases, to identify the source of the bacteria. Based on the potential sources in each WBID, the stakeholders were asked to identify their activities to reduce or remove bacteria sources that have been implemented since 1996 (the start of the TMDL verified period) and additional efforts that are currently under way or planned in the next five years. COJ, DCHD, Florida Department of Transportation (FDOT) District 2, and JEA all submitted project sheets and program descriptions for the prevention, reduction, and source removal activities they conduct in each of the 10 WBIDs or on a countywide basis. FDEP then used a "sufficiency of effort" approach to conduct a WBID-specific assessment of the potential sources, and cumulative projects and activities that address or eliminate fecal coliform loading. This sufficiency of effort evaluation was not an assessment of each agency'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 WBID:

- *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 agencies' programs and activities for each type of source were recorded in a table summarizing restoration activities (see the sections on *Summary of Restoration Activities* in **Chapter 6** through **Chapter 15**). Because the controllable sources (sewer infrastructure, septic tanks, and stormwater conveyances) vary considerably among the WBIDs, the actions and responsibilities of the stakeholders also vary considerably from WBID to WBID. To describe each WBID accurately and assess the efforts appropriately, each WBID is described in its own chapter and evaluated separately.

The criterion for sufficiency for OSTDS-related efforts included the following: designation as a septic tank (OSTDS) failure or nuisance area in accordance with COJ Ordinance Code (further described in **Appendix E**), which prioritizes these areas for transition to sewer service; status of OSTDS phase-out to sewer; number of complaint investigations and any resulting enforcement actions; and 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 waterbody boundary with recent sewer line upgrades (cured in place

pipe, pipe bursting, and open cut and removal). In addition, the number of rebuilt pump stations in each WBID was compared with the sanitary sewer overflow (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 into surface waters or the stormwater system; therefore, manhole rehabilitation and monitoring efforts were quantified. Additional sanitary sewer programs that occur on a systemwide or countywide basis, including air release valve (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 (which reduce fecal coliform loading by preventing water from inundating septic systems) and stormwater BMPs, such as wet/dry retention and baffle boxes (which reduce sediment buildup that can provide a breeding ground for fecal coliform). Consideration was also given to the maintenance of stormwater ditches, ponds, and closed conveyances to prevent debris, vegetation, dense tree canopy, and sediment from potentially providing conditions that would allow new sources of fecal coliform bacteria.

Another important activity that was evaluated was the detection and removal of illicit connections to stormwater conveyances to eliminate illegal discharges that can contribute fecal coliform and other pollutants into surface waters. Stormwater-related program implementation also includes public education campaigns, the Adopt-A-Highway Program, street sweeping, and the Drainage Connection Permit Program, all of which reduce contaminants entering the stormwater system. Additionally, COJ is developing a pet waste public education campaign using public service announcements, website content, and printed handouts to raise awareness and promote compliance with the Pet Waste Ordinance.

In addition to efforts specific to each source, the entities also participate in special source assessment activities. The activities include TAT sampling of several WBIDs and follow-up sampling at locations where high counts occur, in an effort to identify potential sources. A "Walk the WBID" exercise was completed in 2008 to gain a better understanding of the WBIDs and potential sources. Additional sampling and thermal imaging (see **Section 4.3**) are currently being implemented in 10 tributaries (including several that are part of this BMAP) to further identify sources of fecal coliform.

For each waterbody evaluation, FDEP used the technical report source summary and compared it with the summary of restoration activities table to ensure that appropriate programs and activities were being implemented for the most likely sources to either decrease or eliminate the known sources, or further assess fecal coliform loadings. If any of the likely sources was not sufficiently addressed, FDEP identified the need for additional actions. The full implementation of the management actions/projects identified in this BMAP is deemed sufficient to address the fecal coliform bacteria reductions needed to meet the TMDLs.

1.3.5 Pollutant Reduction and Discharge Allocations

1.3.5.1 Categories for Rule Allocations

The rules adopting TMDLs must establish reasonable and equitable allocations that will alone, or in conjunction with other management and restoration activities, attain the TMDL. Allocations may be to individual sources, source categories, or basins that discharge to the impaired waterbody. The allocations identify either how much pollutant discharge in colonies per day each source designation may continue to contribute (discharge allocation), or the colonies per

day or the percent of its loading the source designation must reduce (reduction allocation). Currently, the TMDL allocation categories are as follows:

- ***Wasteload Allocation*** *– The allocation to point sources permitted under the National Pollutant Discharge Elimination System (NPDES) Program includes the following:*
  - **Wastewater Allocation** is the allocation to industrial and domestic wastewater facilities.
    - **NPDES Stormwater Allocation** is the allocation to NPDES stormwater permittees that operate municipal separate storm sewer systems (MS4s). These permittees are treated as point sources under the TMDL Program.
  - **Load Allocation** is the allocation to nonpoint sources, including agricultural runoff and stormwater from areas that are not covered by an MS4.

1.3.5.2 Initial and Detailed Allocations

Under the FWRA, the TMDL allocation in rule may be an "initial" allocation among point and nonpoint sources. In such cases, the "detailed" allocation to specific point sources and specific categories of nonpoint sources must be established in the BMAP. The FWRA further states that the BMAP may make detailed allocations to individual "basins" (i.e., sub-basins) or to all basins as a whole, as appropriate. Both initial and detailed allocations must be determined based on a number of factors listed in the FWRA, including cost-benefit, technical and environmental feasibility, implementation time frames, and others (see **Appendix B**).

Due to the nature of the fecal coliform impairment, this BMAP does not specify detailed allocations. It is difficult to attribute the fecal coliform loads to specific sources because bacteria are highly variable and can be easily transported. In addition, research is not available that quantifies the expected fecal coliform reduction from project implementation. Instead of assigning detailed allocations, a sufficiency of effort evaluation (as described in **Section 1.3.4**) was conducted to assess whether the management actions provided by the entities in the basin were sufficient to address the potential sources of fecal coliform identified in each WBID.

1.3.6 TMDLs in the Tributaries of the LSJR Basin

The water quality criterion for fecal coliform bacteria is detailed in Rule 62-302, F.A.C. The requirements for exceeding maximum fecal coliform concentrations in a Class III waterbody are stated as follows:

> *The most probable number (MPN) or membrane filter (MF) counts per 100 milliliters (mL) of fecal coliform bacteria shall not exceed a monthly average of 200, nor exceed 400 in 10% of samples, nor exceed 800 on any one day.*

FDEP has verified the 10 tributaries of the LSJR included in this BMAP as impaired for fecal coliform bacteria. The TMDLs for Hogan Creek, Butcher Pen Creek, Miramar Creek, and Goodbys Creek were adopted by FDEP in 2006. In July 2009, FDEP adopted the TMDLs for Newcastle Creek, Miller Creek, Big Fishweir Creek, Deer Creek, Terrapin Creek, and Open Creek.

Table 3 lists the TMDLs and pollutant load allocations adopted by rule for the 10 tributaries that are the focus of this BMAP.

TABLE 3: TMDLS FOR THE LSJR TRIBUTARIES

WBID NUMBER	WBID NAME	WATERBODY TYPE	WASTELOAD ALLOCATION		LOAD ALLOCATION (%)
			WASTEWATER* (COLONIES/DAY)	NPDES STORMWATER (%)	
2235	Newcastle Creek	Stream	N/A	84	84
2252	Hogan Creek	Stream	200	92	92
2322	Butcher Pen Creek	Stream	Meet permit limits	83	83
2287	Miller Creek	Stream	N/A	92	92
2304	Miramar Creek	Stream	N/A	92	92
2280	Big Fishweir Creek	Stream	N/A	87	87
2256	Deer Creek	Stream	N/A	86	86
2204	Terrapin Creek	Stream	N/A	71	71
2326	Goodbys Creek	Stream	N/A	87	87
2299	Open Creek	Stream	N/A	60	60

* Cannot exceed 200 counts/100mL as a monthly average, 400 counts/100mL in more than 10% of the samples, or 800 counts/100mL at any given time.
N/A – Not applicable

1.4 ASSUMPTIONS AND CONSIDERATIONS REGARDING TMDL IMPLEMENTATION

The water quality impacts of BMAP implementation are based on several fundamental assumptions about the pollutants targeted by the TMDLs, modeling approaches, waterbody response, and natural processes. In addition, there are important considerations to keep in mind about the nature of the BMAP and its long-term implementation.

1.4.1 ASSUMPTIONS

The following assumptions were used during the BMAP process:

- *Load reductions for stormwater discharges are typically expressed as a percent reduction because it is very difficult to quantify the loads from MS4s (given the numerous discharge points) and to distinguish loads from MS4s from other nonpoint sources (given the nature of stormwater transport).*
- *Quantified bacteria loads from specific sources are generally not known because they are highly variable. As the bacteria loads from individual sources are not well understood, it is not possible to calculate a specific load for a specific source. Rather, a percent reduction in load, calculated from stream load, not source to stream, is the best way to quantify the necessary reduction.*
- *The technical stakeholders evaluated the known sources of bacteria contributing to the impairment in each waterbody and where there was strong evidence of responsibility. The stakeholders and BWG then determined projects to address these problems and included these projects in the BMAP.*
- *In cases where the sources were unknown, the stakeholders and BWG determined appropriate assessment programs to investigate the sources of bacteria loadings.*

- *It is difficult to determine the quantitative load reductions expected from management actions to decrease fecal coliform due to a lack of literature values and high variability; therefore, the benefits of these management actions were evaluated on a qualitative basis by matching elimination, reduction, and prevention activities to known or potential sources.*
- *Flood control projects are included as activities that help achieve the TMDL because these projects help to reduce flooding after a storm event, which reduces the amount of fecal coliform loading to the nearby waterbody through stormwater runoff. Programs such as Adopt–A-Highway and street sweeping are also included because they remove trash, sediment, debris, and pollutants from roadways that would otherwise be transported to stormwater systems and surface waters. Fecal coliform can be transported in sediments and debris, and these materials can also create a breeding ground for bacteria. Therefore, flood control projects and roadway clean-up programs were given credit in this BMAP as actions to reduce fecal coliform.*
- *The penetration of ultraviolet (UV) light into waters and sediments may assist in aiding fecal coliform die-off and preventing bacteria regrowth.*

1.4.2 CONSIDERATIONS

This BMAP requires all stakeholders to implement their projects and programs to achieve reductions as soon as practicable. However, the full implementation of this BMAP will be a long-term process. While some of the projects and activities contained in the BMAP were recently completed or are currently ongoing, several projects require more time to design, secure funding, and construct. While funding the projects could be an issue, funding limitations do not affect the requirement that every entity must implement the activities listed in the BMAP.

Since BMAP implementation is a long-term process, the TMDL targets established for the LSJR Basin may not be achieved in the next five years. It may take even longer for the tributaries to respond to reduced loadings and fully meet applicable water quality standards. Regular follow-up and continued coordination and communication by the BWG and stakeholders will be essential to ensure the implementation of management strategies and assessment of their incremental effects. Any additional management actions required to achieve TMDLs, if necessary, will be developed as part of BMAP follow-up.

During the BMAP process, several items were identified that should be addressed in future watershed management cycles to ensure that future BMAPs use the most accurate information:

1. ***Source Identification –*** *Sources of fecal coliform impairment are particularly difficult to trace. For this reason, source identification studies are included as management actions. The TAT is monitoring 10 WBIDs as part of its 2009 sampling plan. In addition, FDEP has contracted with PBS&J to conduct detailed assessments of 11 WBIDs (several of which are included in this BMAP) through a combination of field reconnaissance, microbial source tracking (MST), and thermal imaging. These studies will provide additional information that will aid in identifying potential sources in the impaired tributaries.*
2. ***Septic Tanks –*** *FDEP is implementing a study,* Evaluation of Septic Tank Influences on Nutrient Loading to the Lower St. Johns River Basin and Its Tributaries, *to provide a better understanding of the nutrient and bacteria loading from septic tanks via ground water by monitoring conditions at representative sites. The study seeks to answer questions related to potential OSTDS impacts*

and the attenuation of nitrogen, phosphorus, and bacteria (fecal coliform) by soil type, under the range of conditions that represent typical OSTDS sites near impaired surface waters. This study will also document the nutrients and bacteria in the receiving LSJR tributaries at each site. The results will provide information about the relative contribution of fecal coliform from septic tanks located near the impaired tributaries.

3. ***GIS information –*** *During the BMAP process, the available GIS data, which provide a basis for some of the source analyses, have improved. As more information becomes available, the updated GIS database for the tributaries will be utilized to aid in source identification. This information will include determining the locations for private wastewater systems and infrastructure, collecting jurisdictional or systemwide programs and activities on a WBID scale for future reporting and assessment, and systematically updating all GIS information databases used to compile the BMAP.*

4. ***BMP evaluations –*** *During the five-year BMAP implementation cycle, studies to evaluate the effectiveness of BMPs to remove fecal coliform may present new science for consideration in the BMAP process. As more information becomes available, the new science will be incorporated into the annual review process.*

1.5 Future Growth in the Tributaries

The FWRA (Paragraph 403.067[7][a][2], F.S.) requires that BMAPs "identify the mechanisms by which potential future increases in pollutant loading will be addressed." To meet this requirement, fecal coliform loadings associated with future growth in the 10 tributaries were analyzed. Currently, human land uses predominate in the vast majority of these WBIDs (**Table 4**). These uses include residential (high, medium, and low density), commercial/utility/ institutional, transportation, recreational, industrial, feeding operations, and cropland/ pastureland (Terrapin Creek only). Since these watersheds are mostly developed, any future growth in these areas is not expected to substantially increase fecal coliform loadings to the creeks.

Table 4: Percent Human Land Uses by WBID

WBID	% in Human Uses
Newcastle Creek	94.5
Hogan Creek	98.2
Butcher Pen Creek	94.4
Miller Creek	94.1
Miramar Creek	95.4
Big Fishweir Creek	96.9
Deer Creek	87.1
Terrapin Creek	36.2
Goodbys Creek	78.8
Open Creek	42.6

New development in these tributaries would most likely be connected to existing or future JEA sanitary sewer system infrastructure, as opposed to septic tanks, where the wastewater will be treated to high levels. Several WBIDs include failure areas and, as funding is available, sewer lines will be installed in these areas to remove failing septic tanks, which will reduce fecal coliform loading from current development. Where sewer service is not available, DCHD reviews septic tank plans and evaluates sites before issuing new permits, so that the new systems are correctly designed, placed, and operated to prevent further fecal coliform loading.

In addition, ordinances, regulations, and guidelines address fecal coliform loading from new development and redevelopment. COJ has ordinances for pet waste management and septic tank phase-out that address sources of fecal coliform. COJ also participates in the Florida Yards and Neighborhoods Program and has ordinances for landscape irrigation and fertilization that reduce sediment loads to waterbodies. Sediment loading may increase survival rates and may support the regrowth of fecal coliform bacteria. DCHD also has ordinances for repairing faulty septic tanks and phasing out systems in septic tank nuisance areas.

These programs and regulations, in conjunction with the COJ and FDOT stormwater and flood control projects described later in this BMAP, will effectively address potential fecal coliform loadings from any future growth in these tributaries.

CHAPTER 2: WATER QUALITY TRENDS IN THE TRIBUTARIES

2.1 WATER QUALITY TRENDS

2.1.1 NEWCASTLE CREEK

FDEP verified Newcastle Creek as impaired for fecal coliform using the IWR database. **Table 5** summarizes the results, by year, for the verified period. There is an 88.46% overall exceedance rate for fecal coliform in Newcastle Creek during the verified period. There are 26 samples, ranging from 140 to 11,000 counts/100mL, with 23 samples exceeding the fecal coliform criterion. Exceedances occur in all months in which samples have been collected, except for March. March and April are the only months where 100% exceedance rates do not occur.

When aggregating data by season, the summer and fall seasons demonstrate the highest percentages of exceedances. The yearly data show that exceedance rates started declining in the last 2 years of the verified period. The sample size is small, ranging from 1 to 7 samples per year, making it difficult to verify potential trends. From the available data, the trend shows that exceedances remain at 100% until 2002. In 2002, there is a 71.43% exceedance rate, and in 2003 the exceedance is 50%.

TABLE 5: SUMMARY OF NEWCASTLE CREEK FECAL COLIFORM DATA BY YEAR FOR THE VERIFIED PERIOD (JANUARY 1, 1996–JUNE 30, 2003)

YEAR	N[1]	MINIMUM	MAXIMUM[2]	MEDIAN[2]	MEAN[2]	NUMBER OF EXCEEDANCES[3]	% EXCEEDANCES
1996	1	5,000	5,000	5,000	5,000	1	100
1997	1	5,000	5,000	5,000	5,000	1	100
1998	3	1,300	2,400	2,400	2,033	3	100
1999	4	800	2,400	1,400	1,500	4	100
2000	4	800	10,100	3,250	4,350	4	100
2001	4	532	7,000	2,350	3,058	4	100
2002	7	260	11,000	2,200	3,479	5	71.43
2003	2	140	800	470	470	1	50

[1]Number of samples.
[2]Coliform counts are #/100mL.
[3]Exceedances represent values above 400 counts/100mL.

2.1.2 HOGAN CREEK

Table 6 summarizes the fecal coliform data results in Hogan Creek, by year, for the verified period. The highest exceedances are observed during the summer (100%) and fall (83.33%). The yearly data show that the median fecal coliform concentration fluctuates over the verified period of record, with a high percentage of exceedances in most years.

TABLE 6: SUMMARY OF HOGAN CREEK FECAL COLIFORM DATA BY YEAR FOR THE VERIFIED PERIOD (JANUARY 1, 1996–JUNE 30, 2003)

YEAR	N[1]	MINIMUM[2]	MAXIMUM[2]	MEDIAN[2]	MEAN[2]	NUMBER OF EXCEEDANCES[3]	% EXCEEDANCES
1996	1	1,300	1,300	1,300	1,300	1	100
1997	1	800	800	800	800	1	100
1998	3	2,600	11,000	8,000	7,200	3	100
1999	4	2,600	17,000	8,500	9,150	4	100
2000	4	300	9,000	530	2,590	3	75
2001	5	100	7,100	202	2,514	2	40
2002	4	96	24,000	3,020	7,534	3	75

[1]Number of samples
[2]Coliform counts are #/100mL.
[3]Exceedances represent values above 400 counts/100mL.

2.1.3 BUTCHER PEN CREEK

Table 7 summarizes the fecal coliform data results for Butcher Pen Creek, by year, for the verified period. There is a 95% overall exceedance rate for fecal coliform, with a 100% exceedance rate for all months except April, which has a 66.67% exceedance rate. In addition, there is a 100% exceedance rate for all years except 1999, which has a 75% exceedance rate. While the median concentration of fecal coliform decreases over the verified period, the levels remain consistently above fecal coliform standards.

TABLE 7: SUMMARY OF BUTCHER PEN CREEK FECAL COLIFORM DATA BY YEAR FOR THE VERIFIED PERIOD (JANUARY 1, 1996–JUNE 30, 2003)

YEAR*	N[1]	MINIMUM[2]	MAXIMUM[2]	MEDIAN[2]	MEAN[2]	NUMBER OF EXCEEDANCES[3]	% EXCEEDANCES
1996	1	800	800	800	800	1	100
1998	4	500	90,000	5,368	25,309	4	100
1999	4	270	3,000	2,350	1,993	3	75
2000	4	1,300	4,800	2,050	2,550	4	100
2001	4	500	6,000	1,263	2,256	4	100
2002	4	460	5,200	1,180	2,005	4	100

* Table represents years for which data exist.
[1]Number of samples.
[2]Coliform counts are #/100mL.
[3]Exceedances represent values above 400 counts/100mL.

2.1.4 MILLER CREEK

Table 8 summarizes the fecal coliform data results for Miller Creek, by year, for the verified period. There is a 75% overall exceedance rate during the verified period. There are 20 samples, ranging from 88 to 200,000 counts/100mL, with 15 samples exceeding the criterion for fecal coliform. When the data are examined by season, the summer and fall seasons demonstrate the highest percentages of exceedances. For the yearly data, exceedance rates start declining in the last 3 years of the verified period; however, sample size is small, ranging from 1 to 4 samples per year, making it difficult to verify potential trends. From the available data, the trend shows exceedances dip down to 75% in 1999, return to 100% in 2000, and then gradually drop to 0% by 2003.

TABLE 8: SUMMARY OF MILLER CREEK FECAL COLIFORM DATA BY YEAR FOR THE VERIFIED PERIOD (JANUARY 1, 1996–JUNE 30, 2003)

YEAR*	N[1]	MINIMUM[2]	MAXIMUM[2]	MEDIAN[2]	MEAN[2]	NUMBER OF EXCEEDANCES[3]	% EXCEEDANCES
1996	1	5,000	5,000	5,000	5,000	1	100
1997	0	-	-	-	-	-	-
1998	3	500	30,000	16,000	15,500	3	100
1999	4	270	5,000	1,050	1,843	3	75
2000	4	800	2,400	950	1,275	4	100
2001	4	300	200,000	706	50,428	3	75
2002	3	88	6,900	280	2,423	1	33.33
2003	1	112	112	112	112	0	0

*Table represents years for which data exist. "–" means no data are available.
[1]Number of samples.
[2]Coliform counts are #/100mL.
[3]Exceedances represent values above 400 counts/100mL.

2.1.5 MIRAMAR CREEK

Table 9 summarizes the fecal coliform results for Miramar Creek, by year, during the verified period. There is a 95.7% overall exceedance rate for fecal coliform. Exceedances occur in all seasons which, except for spring (April through June), have a 100% exceedance rate. The spring season has an 80% exceedance rate. The yearly data show 100% exceedances in all years, except 2002, which has a 90% exceedance rate. The highest counts occur in 1998, 1999, and 2000. The fecal coliform concentration remains well above standards during the verified period.

TABLE 9: SUMMARY OF MIRAMAR CREEK FECAL COLIFORM DATA BY YEAR FOR THE VERIFIED PERIOD (JANUARY 1, 1996–JUNE 30, 2003)

YEAR	N[1]	MINIMUM[2]	MAXIMUM[2]	MEDIAN[2]	MEAN[2]	NUMBER OF EXCEEDANCES[3]	% EXCEEDANCES
1996	1	5,000	5,000	5,000	5,000	1	100
1998	3	8,000	16,000	9,000	11,000	3	100
1999	4	2,600	16,000	15,000	12,150	4	100
2000	4	2,000	16,000	6,700	7,850	4	100
2001	4	500	4,000	2,350	2,300	4	100
2002	10	384	7,000	1,565	2,406	9	90

[1]Number of samples.
[2]Coliform counts are #/100mL.
[3]Exceedances represent values above 400 counts/100mL.

2.1.6 BIG FISHWEIR CREEK

Table 10 summarizes the results in Big Fishweir Creek, by year, for the verified period. There is an 83.7% overall exceedance rate for fecal coliform. There are 64 samples collected in the verified period, ranging from 10 to 160,000 counts/100mL; 53 of the 64 observations exceed the state criterion of 400 counts/100mL. Seasonally, exceedances occur in all seasons; exceedances are highest in the summer and fall, with the lowest percentage of exceedances occurring in the spring. When considering the data by year, all years have at least a 62% exceedance rate.

TABLE 10: SUMMARY OF BIG FISHWEIR CREEK FECAL COLIFORM DATA BY YEAR FOR THE VERIFIED PERIOD (JANUARY 1, 1996–JUNE 30, 2003)

YEAR	N[1]	MINIMUM[2]	MAXIMUM[2]	MEDIAN[2]	MEAN[2]	NUMBER OF EXCEEDANCES[3]	% EXCEEDANCES
1996	2	1,300	2,400	1,850	1,850	2	100
1998	6	40	90,000	5,350	25,173	4	66.67
1999	8	330	5,000	3,000	3,041	7	87.5
2000	8	140	160,000	500	22,293	5	62.5
2001	12	10	160,000	2,500	16,450	10	83.33
2002	22	264	17,200	927	3,607	19	86.36
2003	6	700	5,000	3,000	3,183	6	100

[1]Number of samples.
[2]Coliform counts are #/100mL.
[3]Exceedances represent values above 400 counts/100mL.

2.1.7 DEER CREEK

Table 11 summarizes the fecal coliform results for Deer Creek, by year, during the verified period. There is a 71% overall exceedance rate for fecal coliform. There are 50 samples, ranging from 80 to 200,000 counts/100mL, with 41 samples exceeding the criterion for fecal coliform. Summer has the highest exceedance rate, and fall and spring have the lowest percentage of exceedances. Over the years, exceedance rates have generally fallen. In 1996, 1998, and 1999, 100% exceedance rates are observed, while 2003 only has an exceedance rate of 20%.

TABLE 11: SUMMARY OF DEER CREEK FECAL COLIFORM DATA BY YEAR FOR THE VERIFIED PERIOD (JANUARY 1, 1996–JUNE 30, 2003)

YEAR*	N[1]	MINIMUM[2]	MAXIMUM[2]	MEDIAN[2]	MEAN[2]	NUMBER OF EXCEEDANCES[3]	% EXCEEDANCES
1996	1	8,000	8,000	8,000	8,000	1	100
1997	-	-	-	-	-	-	-
1998	6	300	24,000	7,550	13,513	6	100
1999	8	140	16,000	7,550	13,513	8	100
2000	10	80	160,000	5,650	29,148	8	80
2001	9	300	13,000	7,100	6,711	8	88.89
2002	11	130	200,000	1,700	20,494	9	81.82
2003	5	100	830	230	334	1	20

*Table represents years for which data exist. "–" means no data are available.
[1]Number of samples.
[2]Coliform counts are #/100mL.
[3]Exceedances represent values above 400 counts/100mL.

2.1.8 TERRAPIN CREEK

Table 12 summarizes the fecal coliform results for Terrapin Creek, by year, during the verified period. There is a 65.52% overall exceedance rate. There are 29 samples, ranging from 30 to 160,000 counts/100mL, with 19 samples exceeding the criterion for fecal coliform. When aggregating data by season, winter, summer, and fall demonstrate the highest percentages of exceedances (all above 66%), and spring has the lowest (40%). Exceedance rates appear to be relatively uniform throughout the verified period. Sample size is small, ranging from 1 to 11 samples per year, making it difficult to verify potential trends. However, from the data that are

available, exceedances remain between 50 and 75%, except for 1996, which has an exceedance rate of 100%, based on only 1 sample.

TABLE 12: SUMMARY OF TERRAPIN CREEK FECAL COLIFORM DATA BY YEAR FOR THE VERIFIED PERIOD (JANUARY 1, 1996–JUNE 30, 2003)

YEAR*	N[1]	MINIMUM[2]	MAXIMUM[2]	MEDIAN[2]	MEAN[2]	NUMBER OF EXCEEDANCES[3]	% EXCEEDANCES
1996	1	1,300	1,300	1,300	1,300	1	100
1997	-	-	-	-	-	-	-
1998	3	300	24,000	1,700	8,667	2	66.67
1999	4	140	16,000	1,000	4,535	3	75
2000	4	40	160,000	7,550	43,785	3	75
2001	4	30	1,000	356	436	2	50
2002	11	30	66,600	1,367	6,983	7	63.64
2003	2	70	580	325	325	1	50

*Table represents years for which data exist. "–" means no data are available.
[1]Number of samples.
[2]Coliform counts are #/100mL.
[3]Exceedances represent values above 400 counts/100mL.

2.1.9 GOODBYS CREEK

Table 13 summarizes the fecal coliform results for Goodbys Creek, by year, during the verified period. Summer has the highest percent exceedance rate (60%), and fall has the lowest (28.57%). Exceedances occur in all years, except 1996. While a decrease in the median levels of fecal coliform is observed, the concentrations from 1998–2001 exceed standards, with maximum counts ranging from 3,000 to 35,000 counts/100mL.

TABLE 13: SUMMARY OF GOODBYS CREEK FECAL COLIFORM DATA BY YEAR FOR THE VERIFIED PERIOD (JANUARY 1, 1996–JUNE 30, 2003)

YEAR	N[1]	MINIMUM[2]	MAXIMUM[2]	MEDIAN[2]	MEAN[2]	NUMBER OF EXCEEDANCES[3]	% EXCEEDANCES
1996	1	300	300	300	300	0	0
1998	3	130	3,000	3,000	2,043	2	67
1999	8	63	35,000	470	6,900	4	50
2000	4	70	9,000	835	2,685	2	50
2001	4	170	3,000	400	993	2	50
2002	7	160	720	250	297	1	14

[1]Number of samples.
[2]Coliform counts are #/100mL.
[3]Exceedances represent values above 400 counts/100mL.

2.1.10 OPEN CREEK

Table 14 summarizes the fecal coliform results for Open Creek, by year, during the verified period. There is a 57.1% overall exceedance rate for fecal coliform. There are 21 samples, ranging from 70 to 5,000 counts/100mL. When examining the data by season, the greatest percentage of exceedances occurs in the spring and winter, with the lowest percentage in the summer. By year, there appears to be no general trend in exceedances. However, sample size is very small, ranging from 1 to 5, making it difficult to identify potential trends.

TABLE 14: SUMMARY OF OPEN CREEK FECAL COLIFORM DATA BY YEAR FOR THE VERIFIED PERIOD (JANUARY 1, 1996–JUNE 30, 2003)

YEAR*	N[1]	MINIMUM[2]	MAXIMUM[2]	MEDIAN[2]	MEAN[2]	NUMBER OF EXCEEDANCES[3]	% EXCEEDANCES
1996	1	500	500	500	500	1	100
1998	3	230	700	500	477	2	66.7
1999	4	70	500	335	310	2	50
2000	4	1,200	5,000	1,650	2,375	4	100
2001	4	130	700	455	435	2	50
2002	5	140	688	180	274	1	20

*Table represents years for which data exist.
[1]Number of samples.
[2]Coliform counts are #/100mL.
[3]Exceedances represent values above 400 counts/100mL.

CHAPTER 3: POLLUTANT SOURCES AND ANTICIPATED OUTCOMES

3.1 POLLUTANT SOURCES COMMON TO THE TRIBUTARIES

The following sections summarize the general types of sources associated with the fecal coliform impairments in the tributaries. Additional details on these sources, specific for each tributary, can be found in **Chapter 6** through **Chapter 15** and the supporting documents available from FDEP.

3.1.1 SANITARY SEWER SYSTEMS

A centralized sewer system (i.e., public and privately owned sewer infrastructure) 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. Common causes of SSOs may include the following:

1. *Heavy rainfall resulting in the inflow of stormwater or infiltration of ground water into sewer lines;*
2. *Breaks or blockages in sewer lines due to aging infrastructure or the accumulation of grease; and*
3. *Malfunctioning equipment and pumps (possibly due to power failures).*

It is not clear how much leaking sewer infrastructure below ground may contribute to surface water contamination. Although there is evidence that in some soils, bacteria do not readily transport to nearby surface waters, there are no local data for bacterial transport in the soil types and ground water conditions of the LSJR Basin (PBS&J, March 2008).

Underground sanitary sewer pipes can leak. When ground water levels are low or the pressure in the sanitary sewer pipes is greater than the surrounding pressure of ground water, wastewater in the sanitary sewer pipes can exfiltrate out through the leaks in the pipes into the surrounding ground water and potentially migrate to adjacent surface waters. When ground water levels are high, ground water surrounding the pipes can infiltrate into the leaks in the sanitary sewer pipes. Surface water associated with flooding also can inflow into the sanitary sewer pipes when stormwater pipes are connected illegally to the sanitary sewer pipes. In addition, surface water and/or ground water can inflow into the sanitary sewer pipes when the caps are off sanitary sewer laterals or when there are holes in the sanitary sewer pipes.

A study in California (Brown and Caldwell, 2005) confirmed that high water tables do not usually result in the exfiltration of sewage from pipes or couplings into ground water. Rather, as indicated above, ground water is more likely to infiltrate into the collection system. Some studies suggest that the transport of sewage and fecal coliform bacteria into ground water depends on many factors, with one of the largest being the difference in hydraulic head between the sewage and the ground water table. According to a recent U.S. Environmental Protection Agency (EPA) study, "The occurrence of exfiltration is limited to those areas where sewer elevations lie above the ground water table. Since ground water elevations near surface water bodies are typically near the ground surface, sewers near surface water bodies generally are below the ground water table, and infiltration (rather than exfiltration) will dominate the mode of sewer leakage in these areas (Amick and Burgess, 2003)." It is important to note that the majority of the Jacksonville area has a relatively high ground water table, and therefore infiltration may be the primary form of sewer leakage in many areas.

The sewer system serves the majority of the watershed (more than 50%) in a number of WBIDs, including Newcastle Creek, Hogan Creek, Butcher Pen Creek, Miller Creek, Big Fishweir Creek, Deer Creek, Goodbys Creek, and Open Creek. Therefore, it is possible that the sewer system and the associated infrastructure contribute to the impairments in these areas, especially where this infrastructure crosses or is located near the creeks. A number of these tributaries have had SSOs with the potential to impact surface waters. They include Newcastle Creek, Hogan Creek, Butcher Pen Creek, Big Fishweir Creek, Deer Creek, Goodbys Creek, and Open Creek.

3.1.2 Onsite Sewage Treatment and Disposal Systems

OSTDS consist of a septic tank and a subsurface wastewater infiltration system, or drainfield, where most of the treatment occurs in the soil above the water table. The drainfield and underlying soils are the most critical components of septic systems for the treatment of wastewater. Under Subsection 64E-6.002(23), F.A.C., a failing septic system is one that is not functioning in a sanitary manner and that may result in the transport of untreated or partially treated wastewater to surface waters.

OSTDS failure can be due to a number of causes, including unsuitable soil conditions, flooding, improper design and installation, or inadequate maintenance practices. Improperly functioning septic systems are recognized as a significant contributor of pollutants, including microbiological pathogens (Nicosia et al., 2001; McDowell et al., 2005). These failing systems may result in obvious sanitary hazards, such as ponding on the ground and runoff into surface waters or stormwater collection systems, and less conspicuous nuisances, including the leaching of untreated wastewater into ground water (PBS&J, March 2008). As noted above, the Jacksonville area has a relatively high ground water table, which could potentially transport fecal coliform from septic tanks through shallow ground water into the creeks.

The majority of households in both Miramar Creek and Terrapin Creek are on septic tanks. OSTDS in areas near the creeks are likely contributing to the fecal coliform concentrations and the impairment in these waterbodies. Septic tank failure areas, as determined by DCHD, are located in Newcastle Creek, Butcher Pen Creek, Miller Creek, Miramar Creek, Big Fishweir Creek, and Goodbys Creek. DCHD has issued repair permits for septic tanks in Newcastle Creek, Butcher Pen Creek, Miller Creek, Miramar Creek, Big Fishweir Creek, Terrapin Creek, Goodbys Creek, and Open Creek. The locations of the repair permits closely correspond with the failure areas in Miller Creek, Miramar Creek, Big Fishweir Creek, and Goodbys Creek.

3.1.3 Stormwater

The term “nonpoint sources” is used to describe intermittent, rainfall-driven, diffuse sources of pollution (e.g., stormwater runoff) associated with everyday human activities, including runoff from urban land uses, agriculture, silviculture, and mining; discharges from failing septic systems; and atmospheric deposition. Additional nonpoint sources may include areas with concentrated wildlife (e.g., bird rookeries) or domestic animals (e.g., dog parks). Certain land uses are likely to contribute fecal coliform loading to surface waters, including agricultural activities and marinas. Runoff from agricultural areas containing animals (e.g., livestock grazing, dairies, cattle farms, or concentrated animal feeding operations [CAFOs]) can contribute a significant amount of fecal contamination to surface waters. Marinas that provide onsite waste disposal areas (flush-out pumps) can leak or overflow and can dump raw sewage directly into a waterbody. Marinas that do not provide onsite waste disposal areas can be much larger sources of contamination if boaters discharge their waste directly into waterbodies.

Sediments in streambeds can allow stormwater conveyance systems, especially those underground, to act as reservoirs for contamination as bacteria persist and possibly regrow in

sediment environments. These sediment bacteria sources can periodically result in the influx of high levels of bacteria to receiving waters (Anderson et al., 2005; Brownell et al., 2007). Bacteria from sediments could be an issue in areas where the majority of the watershed (more than 50%) is served by stormwater treatment areas, such as Hogan Creek, Big Fishweir Creek, Deer Creek, Terrapin Creek, and Open Creek.

Illicit connections to a stormwater system can also contribute to fecal coliform loading. COJ and FDOT have a program to identify potential illicit connections (PICs) to MS4 conveyances and tributaries. As part of this program, they have verified and removed illicit connections in all the WBIDs discussed in this BMAP, except for Terrapin Creek. Open PIC cases are pending in several WBIDs, and the results of these investigations will be reported in the first annual BMAP progress report. The Walk the WBIDs event also uncovered additional PICs. COJ is currently following up on these findings and will report the status of any identified PICs in the first annual BMAP progress report.

3.2 Anticipated Outcomes

Although the relationship between fecal coliform loading and sources is not fully understood for these WBIDs, the implementation of the projects, programs, and additional source assessments in this BMAP should improve water quality in the impaired tributaries. The following outcomes are expected from BMAP implementation:

- *Improved water quality trends in the tributaries of the LSJR that will also help improve water quality in the main stem of the river;*
- *Achievement of TMDLs;*
- *Decreased loading of the target pollutant (fecal coliform bacteria);*
- *Increased coordination between state and local governments and within divisions of local governments in problem solving for surface water quality restoration;*
- *Securing additional state and local funding for water quality restoration;*
- *Improved communication and cooperation among local agencies responding to restoration needs;*
- *Determination of effective projects through the stakeholder decision-making and priority-setting processes;*
- *Enhanced public awareness of pollutant sources, pollutant impacts on water quality, and corresponding corrective actions; and*
- *Enhanced understanding of basin hydrology, water quality, and pollutant sources.*

CHAPTER 4: ASSESSING PROGRESS AND MAKING CHANGES

Successful BMAP implementation requires commitment and follow-up. In the Commitment to Plan Implementation (see **Chapter 5**), BWG members have expressed their intention to carry out the plan, monitor its effect, and continue to coordinate within and across jurisdictions to achieve water quality targets. The FWRA requires that an assessment be conducted every five years to determine whether there is reasonable progress in implementing the BMAP and achieving pollutant load reductions. This chapter contains the water quality monitoring component sufficient to make this evaluation.

4.1 TRACKING IMPLEMENTATION

FDEP will work with the stakeholders to organize the monitoring data and track project implementation. This information will be presented to the BWG in an annual report. The BWG has agreed to meet at least every 12 months after the adoption of the BMAP to follow up on plan implementation, share new information, and continue to coordinate on TMDL-related issues. The following types of activities may occur at annual meetings:

- ***Implementation Data and Reporting***
  - Collect project implementation information from the stakeholders and MS4 permit reporting and compare with the BMAP schedule. **Table 15** provides a sample annual reporting form on BMAP project implementation (to be completed by the entities).
  - Discuss the data collection process, including any concerns and possible improvements to the process.
  - Review the monitoring plan implementation, as detailed in **Section 4.2**.

- ***Sharing New Information***
  - Report on results from water quality monitoring and trend information.
  - Provide updates on new projects and programs in the basin that will help reduce fecal coliform loading.
  - Identify and review new scientific developments on addressing fecal coliform contamination and incorporate any new information into annual progress reports.
  - Discuss new sampling technologies that will improve source identification.

- ***Coordinating TMDL-Related Issues***
  - Provide updates from FDEP on the basin cycle and activities related to any impairments, TMDLs, and BMAP.
  - Obtain reports from other basins where tools or other information may be applicable to the LSJR tributaries' TMDLs.

Covering all of these topics is not required for the annual meetings of the BWG, but they provide examples of the types of information that should be considered for the agenda to assist with BMAP implementation and improve coordination among the agencies and stakeholders.

TABLE 15: PROPOSED BMAP ANNUAL REPORTING FORM

2009 Tributaries of the LSJR BMAP

___YEAR__ ANNUAL IMPLEMENTATION REPORT

REPORTING ENTITY: _____ **DATE**: _____

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

IMPLEMENTATION STATUS – BMAP MANAGEMENT STRATEGIES

[1] BMAP PROJECT #	AFFECTED AREA (WBID)	[2] BRIEF DESCRIPTION	[3] PROJECTED START/ END	[4] PROJECT/ ACTIVITY STATUS	[5] PROJECT MONITORING RESULTS	[6] COMMENTS
Shade if also an MS4 activity						

NEW MANAGEMENT STRATEGIES

[1] BMAP PROJECT #	AFFECTED AREA (WBID)	[2] BRIEF DESCRIPTION	[3] PROJECTED START/ END	[4] PROJECT/ ACTIVITY STATUS	[5] PROJECT MONITORING RESULTS	[6] COMMENTS
Shade if also an MS4 activity						

Directions for BMAP Annual Reporting Format:

[1] **BMAP Projects**: This includes projects and other management strategies. Use the project number assigned in the BMAP Activities Tables (e.g., COJ-1). Please include all management strategies for which you have lead responsibility in the BMAP, regardless of their status. **New Management Strategies**: Include new projects/activities that are not included in the BMAP in the New Management Strategies table. Create a project number for new management strategies by using the prefix, then -N# (e.g., COJ-N1). **If a management action listed in either table is part of your MS4, please shade the project number box in grey**.

[2] Include a brief description of the management action being reported (e.g., street sweeping removing gross debris on all streets with "L curbs" – 5 miles performed each month).

[3] If applicable, include the start and end dates for the management action. If not applicable, put "N/A" or, if it is a continuous activity, put "Continuous" and indicate how often the activity takes place (e.g., for street sweeping).

[4] Clearly summarize the status of the management action, in a way that makes sense for the item listed. For instance, for educational activities, list pertinent publications, events, etc., including name and/or topic for each. Include specific or general time frames (e.g., two public workshops on pet waste disposal in March 2009). Also, describe any significant changes to the management action that have taken place.

[5] As applicable: If monitoring is required as part of a management action (e.g., in a cost-share situation), or is conducted voluntarily (e.g., as part of an effort to collect information on BMAP effectiveness), include the monitoring results to date, as practicable.

[6] Include comments on any implementation obstacles, including weather, funding, technical difficulties, etc. Identify needs for assistance from the BWG as a whole, or from individual entities represented on the BWG. Include any other comments you consider important.

4.2 Water Quality Monitoring

4.2.1 Water Quality Monitoring Objectives

Focused objectives are critical for a monitoring strategy to provide the information needed to evaluate implementation success. The primary and secondary objectives of the monitoring strategy for the tributaries are described below. These objectives will be used to evaluate the success of the BMAP, help interpret the data collected, and provide information for potential future refinements of the BMAP.

Primary Objective

- *Identify additional sources in the 10 tributaries to guide the implementation of future actions to reduce fecal coliform.*

Secondary Objective

- *Track trends in fecal coliform colony counts in the tributaries through ambient monitoring to determine if reductions are occurring with the implementation of BMAP actions.*

4.2.2 Water Quality Indicators

The water quality indicators listed in **Table 16** will be sampled to achieve the monitoring plan objectives. These parameters will be analyzed to determine if there is a correlation with the observed fecal coliform concentrations. In addition, descriptions of the field conditions are important because factors outside of water quality could affect the observed bacterial colony counts.

Table 16: Water Quality Indicators and Field Parameters

Water Quality Indicators
Fecal coliform (colony-forming units per 100 milliliters [cfu/100mL])
Conductivity (micromhos per centimeter [umho/cm])
Dissolved Oxygen (milligrams per liter [mg/L])
Dissolved Oxygen Saturation (%)
pH
Salinity (parts per thousand [ppt])
Temperature (°C)
Turbidity (Nephelometric Turbidity Units [NTU])
Field Conditions
Air Temperature (°C)
Cloud Cover
Rainfall
Tide Stage
Canopy Cover
Water Flow Condition
Wind

4.2.3 Monitoring Network

The monitoring network for this plan builds on existing COJ and FDEP sampling programs and stations in the basin. These entities will be responsible for conducting the sampling in their respective WBIDs. JEA is committed to processing up to 32 samples per month through the JEA laboratory for COJ and FDEP. Participation by the JEA laboratory will reduce the analysis costs associated with the monitoring plan for the other entities.

The specific stations in the monitoring network and responsibilities for sampling are described below for each WBID. Stations listed as trend stations will be sampled quarterly, and monitoring efforts will continue at existing locations. Stations shown as source assessment will be sampled monthly, with additional sampling occurring as needed to follow up on high fecal coliform counts. This additional sampling will follow the process outlined in the TAT Manual (PBS&J, 2006). While some of the source assessment stations are existing sampling locations, stations were added to meet the objectives of the monitoring plan and to better identify potential sources in each WBID. The BMAP monitoring plan, as outlined below, will be initiated once the BMAP is adopted.

In addition to this monitoring plan, several of the entities conduct other monitoring in the basin that will provide additional information about water quality in the tributaries. FDEP conducts an intensive sampling event every 5 years as part of the TMDL process. This event generally involves collecting at least 20 samples over 4 seasons. To include the data in the IWR run to assess impaired waters, the samples must be collected with at least a 200-meter separation between stations, with 4 days between samples collected in the same location. COJ also collects quarterly samples in most of the tributaries as part of its routine monitoring program. COJ uses this program to meet its NPDES permit requirements.

4.2.3.1 Newcastle Creek Monitoring Network

COJ will be responsible for monitoring in Newcastle Creek. **Table 17** lists the stations that will be sampled.

TABLE 17: MONITORING STATIONS IN NEWCASTLE CREEK

Monitoring Station	Station Type	Frequency	Location	Responsible Entity
21FLJXWQARL6	Trend	Quarterly	Fort Caroline Hills Drive	COJ
21FLJXWQARL5A	Source assessment	Monthly	Berrywood Lane	COJ
21FLJXWQARL5B	Source assessment	Monthly	Near mouth of creek	COJ

4.2.3.2 Hogan Creek Monitoring Network

COJ will be responsible for monitoring in Hogan Creek, which is one of its WBIDs as part of the 2009 TAT Sampling Plan. **Table 18** lists the stations that will be sampled.

TABLE 18: MONITORING STATIONS IN HOGAN CREEK

Monitoring Station	Station Type	Frequency	Location	Responsible Entity
21FLJXWQHC3	Trend	Quarterly	First Street	COJ
21FLJXWQHC4	Source assessment	Monthly	10th Street	COJ
21FLJXWQHC1A	Source assessment	Monthly	Broad Street	COJ
21FLJXWQHC2A	Source assessment	Monthly	Hubbard Street (Confederate Park)	COJ

4.2.3.3 Butcher Pen Creek Monitoring Network

FDEP will be responsible for monitoring in Butcher Pen Creek. **Table 19** lists the stations that will be sampled.

TABLE 19: MONITORING STATIONS IN BUTCHER PEN CREEK

MONITORING STATION	STATION TYPE	FREQUENCY	LOCATION	RESPONSIBLE ENTITY
21FLA 20030082	Trend	Quarterly	Confederate Point Road	FDEP
21FLA 20030760	Source assessment	Monthly	Wesconnett Boulevard	FDEP
21FLA 20030955	Source assessment	Monthly	Ducheneau Drive	FDEP
21FLA 20030829	Source assessment	Monthly	Jammes Road	FDEP

4.2.3.4 Miller Creek Monitoring Network

COJ will be responsible for monitoring in Miller Creek, which is one of its WBIDs as part of the 2009 TAT Sampling Plan. **Table 20** lists the stations that will be sampled.

TABLE 20: MONITORING STATIONS IN MILLER CREEK

MONITORING STATION	STATION TYPE	FREQUENCY	LOCATION	RESPONSIBLE ENTITY
21FLJXWQSS1	Trend	Quarterly	Atlantic Boulevard	COJ
21FLJXWQSS2A	Source assessment	Monthly	Stillman Street	COJ
21FLJXWQSS21	Source assessment	Monthly	Camden Avenue	COJ
21FLJXWQSS23	Source assessment	Monthly	Mayfair Road	COJ

4.2.3.5 Miramar Creek Monitoring Network

COJ will be responsible for monitoring in Miramar Creek, which is one of its WBIDs as part of the 2009 TAT Sampling Plan. **Table 21** lists the stations that will be sampled.

TABLE 21: MONITORING STATIONS IN MIRAMAR CREEK

MONITORING STATION	STATION TYPE	FREQUENCY	LOCATION	RESPONSIBLE ENTITY
21FLJXWQSS4	Trend	Quarterly	San Jose Boulevard	COJ
21FLJXWQSS5A	Source assessment	Monthly	Orlando Circle West	COJ
21FLJXWQSS505	Source assessment	Monthly	Adjacent to JEA Lift Station #S505	COJ

4.2.3.6 Big Fishweir Monitoring Network

FDEP will be responsible for monitoring in Big Fishweir Creek, which is one of its WBIDs as part of the 2009 TAT Sampling Plan. **Table 22** lists the stations that will be sampled.

TABLE 22: MONITORING STATIONS IN BIG FISHWEIR CREEK

MONITORING STATION	STATION TYPE	FREQUENCY	LOCATION	RESPONSIBLE ENTITY
21FLA 20030139	Trend	Quarterly	Hershel Street	FDEP
21FLA 20030952	Source assessment	Monthly	Greenwood Avenue (Little Fishweir)	FDEP
21FLA 20030951	Source assessment	Monthly	Park Street – East Crossing	FDEP
21FLA 20030953	Source assessment	Monthly	Little Fishweir Creek at Oak	FDEP

4.2.3.7 Deer Creek Monitoring Network

COJ will be responsible for monitoring in Deer Creek. **Table 23** lists the stations that will be sampled.

TABLE 23: MONITORING STATIONS IN DEER CREEK

MONITORING STATION	STATION TYPE	FREQUENCY	LOCATION	RESPONSIBLE ENTITY
21FLJXWQDR1	Trend	Quarterly	Talleyrand Avenue	COJ
21FLJXWQDR2	Source assessment	Monthly	Haines Street	COJ
21FLJXWQDR3	Source assessment	Monthly	Midstream between DR1 and DR2	COJ
21FLJXWQDR2S	Source assessment	Monthly	Southwest branch, just downstream of confluence of southwest branch and main channel	COJ

4.2.3.8 Terrapin Creek Monitoring Network

FDEP will be responsible for monitoring in Terrapin Creek. **Table 24** lists the stations that will be sampled.

TABLE 24: MONITORING STATIONS IN TERRAPIN CREEK

MONITORING STATION	STATION TYPE	FREQUENCY	LOCATION	RESPONSIBLE ENTITY
21FLA 20030654	Trend	Quarterly	Alta Drive	FDEP
21FLA 20030653	Source assessment	Monthly	Faye Road	FDEP
21FLA 20030490	Source assessment	Monthly	Terrapin Creek at Blasius Road	FDEP

4.2.3.9 Goodbys Creek Monitoring Network

FDEP will be responsible for monitoring in Goodbys Creek. **Table 25** lists the stations that will be sampled.

TABLE 25: MONITORING STATIONS IN GOODBYS CREEK

MONITORING STATION	STATION TYPE	FREQUENCY	LOCATION	RESPONSIBLE ENTITY
21FLA 20030594	Trend	Quarterly	Sanchez Road	FDEP
21FLA 20030518	Trend	Quarterly	State Road (S.R.) 13	FDEP
21FLA 20030891	Source assessment	Monthly	Goodbys Creek above west branch at San Clerc	FDEP
21FLA 20030889	Source assessment	Monthly	Goodbys Creek at Old Kings Road	FDEP
21FLA 20030538	Source assessment	Monthly	West branch Goodbys Creek at San Clerc Road	FDEP
21FLA 20030537	Source assessment	Monthly	Goodbys Creek at Plaza Gate Road	FDEP
21FLA 20030599	Source assessment	Monthly	West branch Goodbys Creek at Camp Tommyhawk	FDEP

4.2.3.10 Open Creek Monitoring Network

FDEP will be responsible for monitoring in Open Creek. **Table 26** lists the stations that will be sampled.

TABLE 26: MONITORING STATIONS IN OPEN CREEK

MONITORING STATION	STATION TYPE	FREQUENCY	LOCATION	RESPONSIBLE ENTITY
21FLA 20030695	Trend	Quarterly	San Pablo Road	FDEP
21FLA 20030949	Source assessment	Monthly	Cross Water Blvd (northwestern branch)	FDEP
21FLA 20030848	Source assessment	Monthly	Northwest tributary to Open Creek at Hodges Blvd	FDEP
21FLA 20030950	Source assessment	Monthly	Open Creek at powerlines east of Danforth Drive	FDEP

4.2.4 QUALITY ASSURANCE/QUALITY CONTROL

Through cooperation on TMDL-related data collection, FDEP and stakeholders have consistently used similar standard operating procedures (SOPs) for field sampling and lab analyses. This consistency will continue into the future to ensure that data can be used not only for tracking BMAP progress but also for future TMDL evaluations and other purposes. The collection of water quality data will be conducted in a manner consistent with FDEP's SOPs for quality assurance/quality control (QA/QC). The most current version of these procedures can be downloaded from www.dep.state.fl.us/labs/qa/sops.htm. All stakeholders contributing data in support of the BMAP agree to follow these SOPs.

4.2.5 DATA MANAGEMENT AND ASSESSMENT

Data collected as part of this monitoring plan will need to be tracked, compiled, and analyzed for it to be useful in support of the BMAP. The Florida STORET database will serve as the primary resource for storing ambient data and providing access for all stakeholders, in accordance with Section 62-40.540, F.S. Stakeholders have agreed to upload data to STORET in a timely manner, after the appropriate QA/QC checks have been completed. All applicable data collected by the entities responsible for monitoring will be uploaded to STORET regularly, but at least quarterly. FDEP will be responsible for data storage and retrieval from the STORET database.

STORET uploads are only appropriate for data that represent ambient conditions. Data that are collected to follow up on fecal coliform water quality exceedances should not be uploaded to STORET. The sampling entities will be responsible for submitting this type of data to FDEP in the TAT spreadsheet each month.

Only data that are uploaded to STORET or submitted to FDEP as follow-up data will be utilized in the WBID ranking process and water quality analyses. It is important that each sampling entity follow these procedures to ensure that the most current data are available for future analyses of the impairments and water quality trends in the tributaries.

4.3 ONGOING ASSESSMENTS IN THE TRIBUTARIES

This BMAP provides for phased implementation under Paragraph 403.067(7)(a)1, F.S. The management actions and adaptive management approach described in the BMAP will address fecal coliform bacteria reductions, and the process will continue until the TMDL is attained. The phased BMAP approach allows for the implementation of projects designed to achieve incremental reductions, while simultaneously implementing source assessment, monitoring, and conducting studies to understand better water quality dynamics (sources and response variables) in each impaired waterbody. During subsequent five-year management cycles, stakeholders will evaluate progress and make adjustments, as needed, to meet the TMDLs.

Additional assessments of the tributaries are currently ongoing. FDEP has initiated a study on septic tanks in the Jacksonville area in an effort to assess fecal coliform and nutrient loadings and associated surface and ground water quality impacts from septic tanks. FDEP has also contracted with PBS&J to conduct detailed assessments of 11 impaired tributaries. The assessments include a Walk the WBIDs effort to conduct a field assessment of the tributaries, MST sampling of 10 tributaries, and thermal imaging for 4 WBIDs. As part of this detailed assessment, the University of South Florida (USF) is collecting and analyzing sediment samples to determine the fecal coliform concentrations in the sediments. This will help improve the understanding of bacterial regrowth in sediments and how this loading may contribute to the waterbody impairment. Of the 11 WBIDs receiving these additional assessments, this BMAP discusses the following 4: Miller Creek, Miramar Creek, Hogan Creek, and Big Fishweir Creek. Subsequent BMAP updates will include the additional information obtained from these assessments.

MST sampling is currently under way in Miller Creek, Miramar Creek, Big Fishweir Creek, and Hogan Creek. Sampling began as a part of Walk the WBIDs and will continue until July 2009. This sampling program utilizes fecal coliform samples and MST testing, including a quantitative human assay as well as animal assays, to assist in determining if the bacteria sources are human or animal, helping to guide corrective actions. The program is designed to have fixed and flexible sampling stations, with the flexible stations moved to assist in identifying sources associated with high in-stream concentrations. In addition, the TAT will continue to coordinate on implementing appropriate measures when sources are discovered.

Thermal imaging is a useful tool for identifying PICs in waterbodies. Often, unpermitted or unauthorized discharges come from pipes located underground and underwater, making them nearly impossible to locate through field identifications and intensive sampling alone. Thermal imagery uses the thermal portion of the light spectrum to identify inputs that are warmer than the surrounding water. This may indicate ground water, a stormwater outlet, a failing septic tank, or illicit connections as potential sources. The flyover for the thermal imaging occurred the night of February 6, 2009, with a presampling event earlier that day and a postsampling event the following morning. Of the WBIDs discussed in this BMAP, thermal imagery was completed for Miramar Creek and Big Fishweir Creek.

In addition to the field studies discussed above, COJ is considering a review of its septic tank ordinance (Chapter 751: Septic Tank Superfund) for potential modifications that could increase considerations for water quality impairments and cost-effective sewer expansion, in addition to addressing public health concerns. This review could include re-evaluating the criteria used to rank the septic tank failure areas to incorporate a greater focus on water quality data and potentially increase the sewering requirements in severely impaired watersheds. The modification of the ordinance would enable COJ to more accurately identify surface waters that are most impacted by failing septic tanks, and to focus its septic tank phase-out efforts to reduce fecal coliform and nutrients entering the COJ tributaries.

4.4 Data Tracking and Reporting Systems Modifications

The management entities in the basin use multiple recording systems to track and report data and activities. These systems must record data generated by multiple divisions within the organization. Multiple datasets are managed through a defined process specific to the organization's performance measures. The BMAP process requires stakeholders to provide information on their activities in a format that may be outside their respective systems' current processes.

Currently, JEA processes provide multiple data systems for reporting quantitative performance measures specific to the organization. Through the BMAP process, JEA is making efforts to report this quantitative information spatially. This implementation effort will benefit the tributaries by allowing JEA to analyze its system data on a waterbody scale, rather than exclusively by the current systemwide analysis. JEA is working towards a GIS-compatible electronic reporting system for construction and maintenance activities that will make the information more readily available than it currently is through the non-spatial reporting process. In addition, JEA is streamlining its database, which will include spatial information on programs and activities. As part of the expanded GIS data, first responders will have a more robust dataset to help them implement corrective actions. These improvements will aid JEA in identifying and correcting sewer infrastructure problems before they result in overflows, reducing fecal coliform loading in the tributaries.

COJ EQD and PWD each have sections that are responsible for a variety of activities. COJ is also changing its data systems to improve the processes associated with these activities. COJ is working to consolidate multiple database formats and update the online countywide GIS database to include the WBID and other key datasets; this consolidation will provide valuable information from the multiple divisions in one location.

COJ is also modifying the information included in the Citizen Action Response Effort (CARE) database, which will aid in reporting activities on a WBID basis. These modifications will improve COJ's ability to identify the problems and activities at the waterbody scale and allow it to better recognize patterns and respond to issues. The enhancements to the data systems will assist in reducing fecal coliform loading from stormwater, private wastewater infrastructure, illicit connections, and failing septic tanks.

4.5 Implementation Milestones

The full implementation of the management actions/projects identified in this BMAP is sufficient to address the fecal coliform bacteria reductions needed to meet the TMDLs. However, to verify that adequate progress is being made, a 5-year milestone will be assessed. During the fifth year following the BMAP adoption (2014), the water quality data collected as part of the monitoring plan (see **Section 4.2**) and the TAT sampling plan will be evaluated for reductions in fecal coliform levels in each WBID, and progress towards the TMDL will be documented. By this year, the median value for the fecal coliform counts in the first 4 years of BMAP implementation should be 50% of the median in the TMDL, which was based on the verified period of record (January 1, 1996, to June 30, 2003) in each WBID. The median in the TMDLs was calculated to determine the in-stream percent reduction required from current conditions to achieve the fecal coliform standard of 400 counts.

If this 50% reduction is not achieved by the time of the Year 5 analysis, additional efforts may be required. These efforts may include Walk the WBIDs–type assessment actions to identify and remove sources and/or additional projects and programs to reduce and prevent sources from reaching surface waters. Achieving 50% of the required reductions will be an important milestone for this BMAP and will provide an opportunity to improve source assessment and management measures going forward. As noted in **Table 27**, efforts implemented since the TMDL verified period have led to improved water quality in most of the WBIDs.

TABLE 27: PERCENT FECAL COLIFORM REDUCTION SINCE THE TMDL VERIFIED PERIOD

WBID NUMBER	WBID NAME	TMDL MEDIAN (1996–2003)[1]	MEDIAN (2004–08)[1]	% REDUCTION
2235	Newcastle Creek	2,500	1,650	34
2252	Hogan Creek	5,000	1,091	78
2322	Butcher Pen Creek	2,400	3,000	-25
2287	Miller Creek	5,000	5,000	0
2304	Miramar Creek	7,000	3,350	52
2280	Big Fishweir Creek	3,000	1,700	43
2256	Deer Creek	2,765	652	76
2204	Terrapin Creek	1,367	860	37
2326	Goodbys Creek	3,000	600	80
2299	Open Creek	1,000	600	40

Note: The geometric mean was not used because there is not a minimum of 10 samples within a 30-day period, which is required under the Florida Administrative Code to calculate a geometric mean.
[1]Coliform counts are #/100mL.

Major components of this BMAP to achieve the milestones are the maintenance, inspection, enforcement, and public outreach programs conducted by COJ, DCHD, FDOT, and JEA. Many of these existing programs began during the cycle 1 verified period (1996-2004) and are ongoing programs. However, since many of these programs have been expanded or enhanced since their initiation, or targeted toward specific problems recently identified, these programs are expected to increase their effectiveness. Information gathered through the tributaries assessment activities, Walk the WBIDs exercise, source assessment sampling, intensive monitoring, MST, and thermal imaging have required the entities to adjust their programs to respond more efficiently to potential fecal coliform sources. These programs will continue over the next 5 years as part of BMAP implementation and continue to be refined based on new data and more experience with removing fecal coliform sources.

In addition to these programs, COJ has several capital improvement projects planned in the next 5 years including 7 projects under construction and 4 currently in the design phase. These 11 projects will be completed by 2013. COJ has also committed to removing septic tanks in failure areas that are within 300 meters of surface water, as part of their responsibilities in the 2008 LSJR Main Stem BMAP. As a more specific commitment for reducing coliform sources to the 10 tributaries in this BMAP, there are 1,167 septic tanks within 300 meters of surface waters that will be prioritized by COJ for removal. COJ must submit a plan to FDEP for removing septic tanks within 6 months of completion of the septic tank study (see **Section 4.3**), or by June 30, 2011, whichever is earlier. At a minimum, COJ will accomplish a 50% implementation of the septic tank phase-out projects by July 31, 2015, with the phase-outs completed by December 31, 2023. These COJ projects will alleviate flooding, improve drainage systems, and remove failing septic tanks, which will reduce the amount of fecal coliform entering the tributaries.

4.6 ADAPTIVE MANAGEMENT MEASURES

Adaptive management involves setting up a mechanism for making adjustments in the BMAP when circumstances change or feedback indicates the need for a more effective strategy. Adaptive management measures include the following:

- *Procedures to determine whether additional cooperative strategies are needed;*

- *Criteria/processes for determining whether and when plan components need revision due to changes in costs, environmental impacts, social effects, watershed conditions, or other factors; and*
- *Descriptions of the BWG's role after BMAP completion.*

Key components of adaptive management to share information and expertise are tracking plan implementation, monitoring water quality and pollutant loads, and holding periodic meetings.

BMAP execution will be a long-term process. Some key projects with significant source reductions will extend beyond the first five years of BMAP cycle. The BWG will track implementation efforts and monitor water quality to measure effectiveness and ensure BMAP compliance. The BWG will meet at least every 12 months to discuss implementation issues, consider new information, and, if the tributaries are not projected to meet the TMDLs, determine additional corrective actions. Project implementation as well as program and activity status will be collected annually from the participating entities. The BWG will review these reports to assess progress towards meeting the BMAP's goals.

CHAPTER 5: COMMITMENT TO PLAN IMPLEMENTATION

Section 403.067(7), F.S., lays out the mechanisms for BMAP implementation *(*see **Appendix B***)*. While the BMAP is linked by statute to permitting and other enforcement processes that target individual entities, successful implementation mandates that local stakeholders willingly and consistently work together to attain adopted TMDLs. This collaboration fosters the sharing of ideas, information, and resources. The members of the BWG have demonstrated their willingness to confer with and support each other in their efforts.

The BWG members endorsed the BMAP at their July 9, 2009 meeting on behalf of the entities they represent, as these members been actively involved in the BMAP process. In addition to this endorsement, FDEP will ask for letters of commitment or resolutions of support for the BMAP from the entities to ensure that as staff and board members change over time, the entity has a way to show support for the BMAP and the efforts included. This process will occur concurrently with BMAP adoption, and the written statements of commitment will be added to this chapter of the BMAP as they are received.

2009
LOWER ST. JOHNS RIVER TRIBUTARIES BASIN MANAGEMENT ACTION PLAN

STATEMENT OF COMMITMENT TO SUPPORT PLAN IMPLEMENTATION

The Lower St. Johns River Tributaries Basin Management Action Plan (BMAP) was endorsed as a consensus document on 7/09, 2009, by authorized representatives of the agencies and organizations listed as members of the Lower St. Johns River Tributaries Basin Working Group (BWG).

The signatories of the BMAP agree that, as applicable, their organizations will:

- Support the use of an equitable and cost-effective coordinated comprehensive watershed management approach to address and achieve TMDL-related pollutant load reductions and water quality improvements.
- Support the necessary approvals and funding needed to implement the consensus management actions identified in the BMAP, and assist implementation of those actions as required approvals and funding are secured.
- Pursuant to the process agreed upon by the BWG, track the implementation of management actions for which they are responsible to assure that the BMAP is carried out.
- Identify and advise DEP and the BWG of any issues or concerns that could be obstacles to carrying out management actions identified in the BMAP, including technical, funding, and legal obstacles.
- As appropriate, assist with water quality monitoring according to the BMAP monitoring strategy approved by the BWG.
- Continue to communicate and coordinate actions and funding across community organizations, agencies, and programs with regard to BMAP implementation.

Organization: Duval County Health Department's Environmental Health

Authorized Name/Title (print): Heale Tyler Disney
Environmental Director
DCHD

OFFICE OF THE MAYOR

JOHN PEYTON
MAYOR

ST. JAMES BUILDING
117 WEST DUVAL STREET
SUITE 400
JACKSONVILLE, FLORIDA 32202

September 14, 2009

Mr. Greg Strong
Director
Florida Department of Environmental Protection
7825 Baymeadows Way, Suite B200
Jacksonville, Florida 32256-7577

Dear Mr. Strong:

Re: Lower St Johns River Tributaries Basin Management Action Plan (BMAP)

The City of Jacksonville (City) is pleased to submit this letter of support for the Lower St. Johns River Tributaries BMAP. The BMAP was endorsed as a consensus document on July 9, 2009 by authorized representatives of the agencies and organizations listed as members of the Lower St Johns River Tributaries Basin Working Group (BWG).

As a member of the BWG the City will support the implementation of the BMAP as follows:

- Support the use of an equitable and cost-effective coordinated comprehensive watershed management approach to address and achieve TMDL-related pollutant load reductions and water quality improvements.
- Support the necessary approvals and funding needed to implement the consensus management actions identified in the BMAP, and assist implementation of those actions as required approvals and funding are secured.
- Pursuant to the process agreed upon by the BWG, track the implementation of management actions for which they are responsible to assure that the BMAP is carried out.
- Identify and advise DEP and the BWG of any issues or concerns that could be obstacles to carrying out management actions identified in the BMAP, including technical, funding, and legal obstacles.

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- As appropriate, assist with water quality monitoring according to the BMAP monitoring strategy approved by the BWG.

- Continue to communicate and coordinate actions and funding across community organizations, agencies, and programs with regard to BMAP implementation.

The City appreciates the opportunity to support this collaborative effort and to reiterate our commitment toward working collaboratively on restoring the health of the St. Johns River and its Tributaries.

Thank you for your assistance in this matter.

Sincerely,

Alan R. Mosley, P.E.
Chief Administrative Officer

CC: John Abendroth, DEP Environmental Administrator

21 West Church Street
Jacksonville, Florida 32202-3139

September 21, 2009

Lower St. Johns River Tributaries Basin Management Action Plan

The Lower St. Johns River Tributaries Basin Management Action Plan (BMAP) was endorsed as a consensus document on July 9, 2009, by authorized representatives of the agencies and organizations listed as members of the Lower St. Johns River Tributaries Basin Working Group (BWG).

As a member of the BWG, JEA will support the BMAP implementation as follows:

- Support the use of an equitable and cost-effective coordinated comprehensive watershed management approach to address and achieve TMDL-related pollutant load reductions and water quality improvements.
- Support the necessary approvals and funding needed to implement the consensus management actions identified in the BMAP, and assist implementation of those actions as required approvals and funding are secured.
- Pursuant to the process agreed upon by the BWG, track the implementation of management actions for which they are responsible to assure that the BMAP is carried out.
- Identify and advise DEP and the BWG of any issues or concerns that could be obstacles to carrying out management actions identified in the BMAP, including technical, funding, and legal obstacles.
- As appropriate, assist with water quality monitoring according to the BMAP monitoring strategy approved by the BWG.
- Continue to communicate and coordinate actions and funding across community organizations, agencies, and programs with regard to BMAP implementation.

JEA welcomes the opportunity to support the collaborative effort of the BWG members to restore the health of the St. Johns River and its Tributaries

Sincerely,

Athena T. Mann

Vice president, Environmental Services

JEA

CHAPTER 6: NEWCASTLE CREEK (WBID 2235)

6.1 WBID DESCRIPTION

Newcastle Creek, WBID 2235, is located in Duval County, southeast of the LSJR within the North Mainstem Planning Unit, as designated by the St. Johns River Water Management District (SJRWMD) (

Figure 2). The headwaters of Newcastle Creek presumably comprise stormwater runoff that surfaces from under a large shopping center parking lot approximately 0.1 miles north of Merrill Road, just west of Townsend Boulevard (**Figure 3**). The entire creek flows northward in a single channel, except for a branch that flows from the west and merges with the main channel just north of Millcrest Place, until it meets the St. Johns River north of Fort Caroline Road. The upper reaches of Newcastle Creek, south to Greenfern Lane, are artificially channelized; the lower reaches, approximately 0.18 miles north of Fort Caroline Road, are tidally influenced. The creek, in its entirety, is characterized by a relatively small water volume with periods of low flow throughout (PBS&J, November 2007).

The land use categories in the Newcastle Creek watershed were identified using 2004 land use coverage data from SJRWMD (**Table 28**). The dominant land use (74.2% of total acreage) in the watershed, and directly adjacent to the creek itself, is medium-density residential. The next 2 most abundant land cover categories are (1) commercial/utility/ institutional areas, located along Merrill Road to the south, as well as smaller areas along Greenfern Lane and Fort Caroline Road, farther downstream (8.9% of total); and (2) high-density residential, found between Greenfern Lane and Fort Caroline Road, east of Townsend Boulevard (7.2% of total). Upland forests and wetland habitat accounted for less than 5% of land use (PBS&J, November 2007).

According to the 2000 Census, there are 1,872 households in the watershed, averaging 2.75 people per household. Areas with the highest population densities are not located directly adjacent to the creek (PBS&J, November 2007). In addition, assuming that 40% of households have 1 dog (Tyler, 2006), there are 749 dogs in the watershed.

TABLE 28: LAND USES IN THE NEWCASTLE CREEK WATERSHED

LAND USE	ACRES	% OF TOTAL
Medium-Density Residential Total	518.3	74.2
Commercial/Utility/Institutional Total	62.0	8.9
High-Density Residential Total	50.5	7.2
Wetlands Total	25.3	3.6
Transportation Total	16.4	2.4
Low-Density Residential Total	11.9	1.7
Water Total	7.8	1.1
Upland Forest Total	5.8	0.8
TOTAL:	**698.1**	**100**

FIGURE 2: LOCATION OF THE NEWCASTLE CREEK WATERSHED

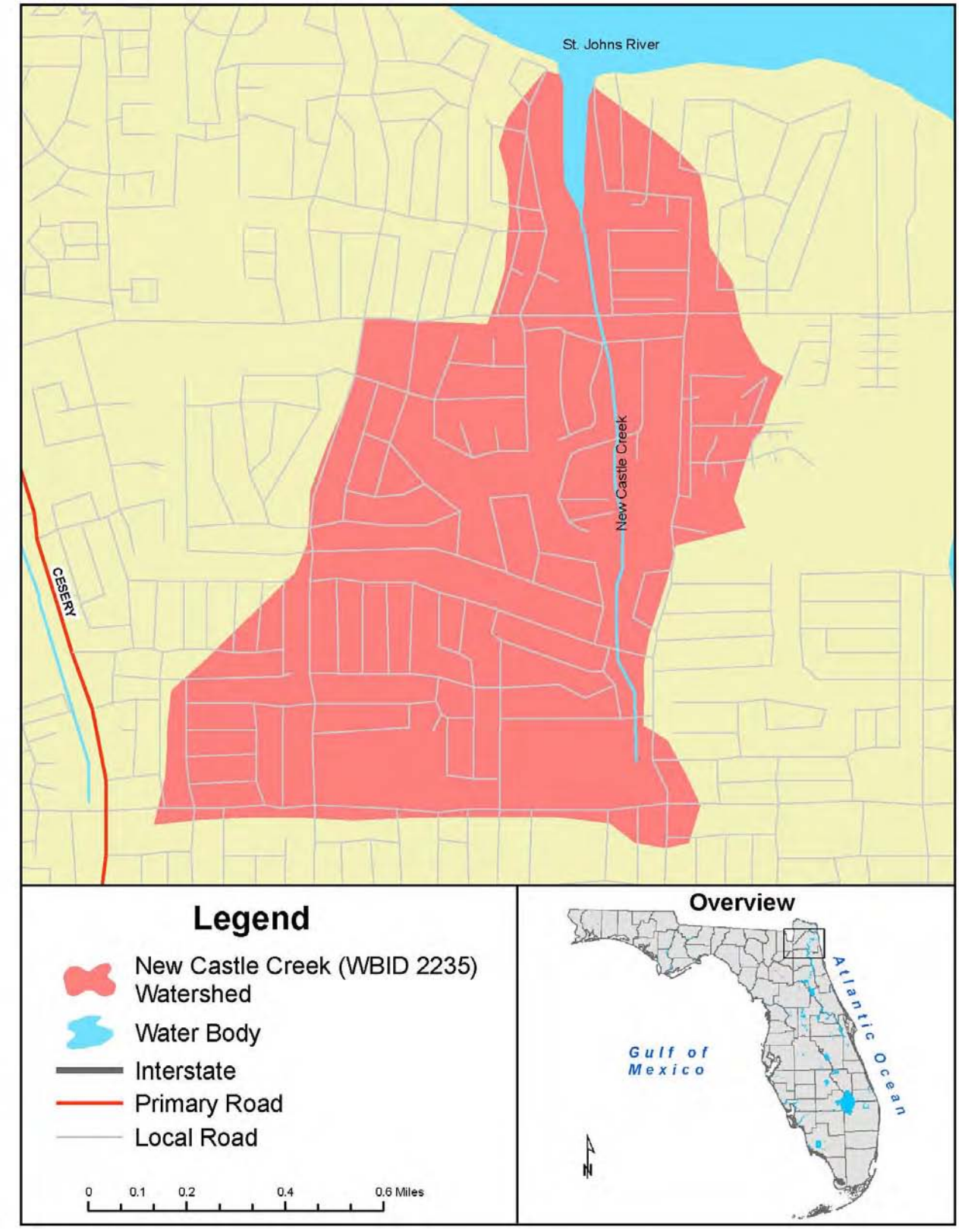

FIGURE 3: NEWCASTLE CREEK WBID LOCATOR MAP

6.2 Potential Sources

6.2.1 Point Sources

There are no industrial or domestic wastewater facilities, CAFOs, application sites for septic residuals, or landfills permitted to discharge to Newcastle Creek. COJ does have an MS4 permit that includes the Newcastle Creek watershed (PBS&J, November 2007). FDOT is a co-permittee of the MS4; the cities of Atlantic Beach and Neptune Beach are also co-permittees but are not located in the impaired tributaries discussed in this BMAP.

6.2.2 Illicit Discharges

The contamination of the stormwater drainage system and receiving waters by illegal and/or improper discharges occurs in a variety of ways. Such discharges may include, but are not limited to, sanitary sewer flow, industrial process water, chlorinated pool water, and laundry releases. Sanitary sewer flow into the stormwater drainage system may result from improper connections to sanitary sewage pipes, leaking and broken sewage pipes, backups and overflows of sewage conveyance systems during localized flooding, and the direct connection of septic systems to stormwater conveyance systems that short-circuits treatment provided by the drainfield.

COJ EQD is continuing a program to identify, confirm, and respond to illicit connection issues in Jacksonville (see **Appendix E**). As part of this effort, the city has confirmed approximately 1,100 PICs to the MS4 (as of September 2006); most were related to swimming pools and washing machines and have been resolved (PBS&J, November 2007). COJ responded and investigated 43 PICs in the Newcastle Creek watershed between 1998 and 2006. Of these, 20 were verified as illicit connections and were removed, while the remaining 23 PICs were confirmed as not illicit.

6.2.3 Centralized Sewage Infrastructure and Overflows

An estimated 1,402 households (approximately 75% of households) are connected to the sanitary sewer system in the Newcastle Creek watershed. JEA has reported 9 SSOs within the WBID boundaries (**Table 29**). The estimated volume of spill associated with these overflows ranged from 50 to 7,000 gallons and averaged 1,608 gallons; however, only 4 SSOs were reported to have potentially impacted surface waters (PBS&J, November 2007).

Although the occurrences of reported SSOs have likely contributed to the overall contamination of the watershed, these incidents do not explain the elevated levels detected during the JEA Tributary Pollution Assessment Project monitoring events (PBS&J, November 2007).

6.2.4 OSTDS

The Water and Sewer Expansion Authority (WSEA) estimates that there are approximately 155 OSTDS in the Newcastle Creek watershed. According to DCHD, 18 septic tank repair permits were issued in this area. The majority of the permits, and presumably failed septic systems, were located in the northeastern portion of the WBID adjacent to Newcastle Creek and the St. Johns River. However, it should be noted that Eggleston Heights, a DCHD-designated septic tank failure area, is located along the watershed's southern boundary. MST sampling performed in 2006 indicated that most of the bacteria sources in Newcastle Creek are human, supporting the possibility that OSTDS are contributing sources in this tributary (PBS&J, November 2007).

TABLE 29: SSOS REPORTED IN THE NEWCASTLE CREEK WATERSHED, 2001–07

WBID NAME (NUMBER)	DATE OF OVERFLOW	ESTIMATED VOLUME OF SPILL (GALLONS)	POTENTIALLY IMPACTED SURFACE WATERS
Newcastle Creek (2235)	14-Nov-02	900	No
Newcastle Creek (2235)	25-Dec-02	200	No
Newcastle Creek (2235)	17-Apr-03	800	No
Newcastle Creek (2235)	18-Apr-03	200	No
Newcastle Creek (2235)	21-Jul-03*	7,000	Yes
Newcastle Creek (2235)	20-Nov-04*	100	Yes
Newcastle Creek (2235)	11-Jan-05	50	No
Newcastle Creek (2235)	31-May-05*	5,176	Yes
Newcastle Creek (2235)	16-Sep-06*	50	Yes

*Reportable SSOs that spilled > 1,000 gallons of sewage and/or affected surface waters.

6.2.5 NONPOINT SOURCES

An analysis of impervious surface indicates that the Newcastle Creek WBID contains 10 to 25% impervious surface. The calculation of runoff potential based on impervious surface and other factors, such as soil type and rainfall, demonstrates that the majority of the WBID contains a moderate-to-high potential for stormwater runoff, especially near the creek. Exceptions to this designation include the following areas with higher probability for runoff: (1) just upstream of the headwaters; and (2) midstream between Green Arbor Place and Fort Caroline Road, east of the creek (PBS&J, November 2007).

The storm sewer network in the Newcastle Creek watershed includes 5 permitted stormwater treatment areas, encompassing approximately 5.64% of the WBID area. Stormwater infrastructure in the WBID includes 54 outfalls by receiving water (none classified by FDEP as major outfalls) and 357 inlets. Although closed conveyances are common throughout the WBID, ditch systems are primarily confined to the southern and far western portions (PBS&J, November 2007).

In the absence of any identified major point sources of fecal coliform bacteria, nonpoint sources are considered potential sources of bacterial loading. Rainfall transports fecal coliform to waterbodies via runoff (stormwater, septic failure, and/or wastewater treatment facility [WWTF] failure) (Eleria and Vogel, 2005) and is therefore an important element to consider when identifying sources of fecal contamination. A correlation between rainfall and bacteria loads could not be determined (PBS&J, November 2007).

6.3 PROJECTS TO REDUCE FECAL COLIFORM LOADING

6.3.1 JEA ACTIVITIES IN THE NEWCASTLE CREEK WATERSHED

6.3.1.1 **Completed JEA Projects**

There was a repetitive SSO at the lift station located at 3254 Townsend Boulevard caused by electrical issues. To address the problem, JEA installed a new electrical control panel in May 2008. The completion of this project has eliminated the repetitive SSOs at the station and removed a reoccurring source of fecal coliform loading in the Newcastle Creek watershed.

6.3.1.2 Ongoing JEA Programs and Activities

JEA is currently implementing a number of countywide specific improvement programs, as follows, to address the sanitary sewer system as a source of fecal coliform contamination: (1) FOG Reduction Program; (2) SSO Root Cause Program; (3) Pop-Top Program; (4) Non-Destructive Testing and ARV Programs; (5) SCADA; (6) Third Party Education and Enforcement Program; (7) Manhole Monitoring; (8) Force Main Discharge Manholes; and (9) CMOM Program. **Appendix E** describes each of these programs.

JEA also inspected sections of sewer infrastructure in the upstream portion of the Newcastle Creek watershed as part of the TAT-directed reconnaissance. Investigations included the use of remote camera equipment to inspect 1,108 feet of pipe as well as dye testing of a nearby station; however, no problems were identified. In addition, JEA, as part of the TAT, proposed sampling at 1 or 2 locations biweekly for 6 months, and then weekly sampling at 1 site over a 5-month period.

JEA reported that monthly sampling at Greenfern Lane commenced in December 2006. This ongoing effort yielded 6 sampling events of 26, with values exceeding the maximum criterion of 400 cfu/100mL with a maximum value of 2,300 cfu/100mL on July 13, 2007 (PBS&J, November 2007).

JEA also conducts several types of activities to replace or rehabilitate failing or leaking infrastructure. These efforts in the Newcastle Creek watershed include the following:

- *Pipe bursting 40.47% of the watershed to increase carrying capacity; and*
- *Cured in place pipe (CIPP) of 2.28% of the pipes in the watershed to install a new inner lining.*

JEA has also replaced or repaired components on 3 of the 5 (60%) lift stations in the WBID. In addition, JEA conducts activities to help prevent future infrastructure problems. In the Newcastle Creek watershed during fiscal year (FY) 2007, using a closed-circuit television system, JEA inspected 897 linear feet (LF) of pipe. It also pipe cleaned 3,601 LF of pipe in FY07 to avoid blockages. These activities will continue in the future to maintain the sanitary sewer system and prevent future problems. **Table 30** provides additional information on JEA's activities in the Newcastle Creek watershed.

TABLE 30: JEA ACTIVITIES IN THE NEWCASTLE CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	ESTIMATED COST	FUNDING SOURCE	PROJECT STATUS	START DATE OF PROJECT
Sewer Line Upgrades							
JEA – 1	Pipe Bursting – Increase Carrying Capacity	Replace failing/leaking infrastructure	Total footage of pipe burst in watershed since 2001: 50,279	$3,900,153	JEA	Ongoing	FY00
JEA – 2	CIPP – Install New Inner Lining	Rehabilitate failing/leaking infrastructure	Total footage of CIPP in watershed since 2001: 2,834	$148,554	JEA	Ongoing	FY00
Other Sewer Infrastructure Upgrades							
JEA – 3	Manhole Linings Rehabbed	Repair deteriorating manhole linings	Not applicable	$330,469*	JEA	Ongoing	FY01
JEA – 4	ARV Inspection and Rehab	See **Appendix E**	0 ARVs replaced within 200 feet of tributary (only 1 ARV total in watershed)	$481,873*	JEA	Ongoing	Ongoing
JEA – 5	Pump Station SCADA Upgrades	Retrofit completed in 2004; all stations constructed since have SCADA installed. See **Appendix E**	Not applicable	Unknown	JEA	Complete	Complete
JEA – 6	Inspect Force Main Discharge Manholes, Repair/Rehab as Necessary	See **Appendix E**	Not applicable	$466,576*	JEA	Ongoing	FY07
JEA – 7	Pump Station Class I/II Rebuilding	Repair or replace components of existing pump stations	Projects in watershed since 2002: 3	$238,135	JEA	Ongoing	
Programs To Reduce Sewer Problems							
JEA – 8	FOG Reduction Program	See **Appendix E**	Not applicable	Unknown	JEA	Ongoing	Current FOG Program initiated in 2004
JEA – 9	Pipe TV Inspection	Inspect existing infrastructure through use of closed-circuit television	897 linear feet of pipe inspected in FY07	$163,099*	JEA	Ongoing	Carried over from city operation (1997)
JEA – 10	Pipe Cleaning	Clean existing pipes to avoid blockages	3,601 linear feet of pipe cleaned in FY07	$743,054*	JEA	Ongoing	Carried over from city operation (1997)
JEA – 11	CMOM Program	See **Appendix E**	Not applicable	$ 163,269*	JEA	Ongoing	Ongoing
JEA – 12	Manhole Monitoring	See **Appendix E**	Not applicable	$ 137,526*	JEA	Ongoing	August 2007
JEA – 13	SSO Root Cause Program	See **Appendix E**	Not applicable	Unknown	JEA	Ongoing	February 2007
JEA – 14	Pop-Top Program	See **Appendix E**	Not applicable	$64,324*	JEA	Ongoing	February 2007
JEA – 15	Non-Destructive Testing Program/Pipe Integrity Testing	See **Appendix E**	Not applicable	$74,284*	JEA	Ongoing	Ongoing
JEA – 16	Lift Station @ 3254 Townsend Blvd.	Upgrade station to address multiple SSOs related to electrical problems	Installed new electrical control panel; work completed in May 2008	$70,000	JEA	Complete	Ongoing

* Costs provided are total systemwide costs for the program because WBID-specific costs are currently unavailable.

6.3.2 DCHD Activities in the Newcastle Creek Watershed

6.3.2.1 Ongoing DCHD Programs and Activities

Currently, DCHD is implementing a variety of countywide specific improvement programs and restoration activities to address OSTDS as sources of fecal coliform contamination. These include (1) the OSTDS Program, (2) training programs, and (3) the designation of septic tank failure and nuisance areas for transfer to central sewer. **Appendix E** includes a description of each of these programs.

Failure and nuisance areas were first identified in 1999–2000. As of July 28, 2008, DCHD updated the listing of failure and nuisance areas and corrected the accuracy of the defined geographic areas through the re-evaluation process. There is currently 1 designated failure area, Eggleston Heights, that extends slightly into the southern portion of the Newcastle Creek watershed (0.25% of the failure area is located in the WBID). The ranking of these areas is determined using an 8-point criteria system. One of these criteria, sanitary conditions, is based on fecal coliform concentrations and is analyzed using the TAT ranking process described in **Section 1.3.3**. Those areas scoring above a total of 56 points across all 8 criteria (a maximum of 80 possible points) have been identified as "nuisance areas" (PBS&J, November 2007).

DCHD has implemented the OSTDS Program to address septic tanks as a potential source in the watershed. As part of this effort, it has issued 5 new construction permits, 18 repair permits, and 1 abandonment permit in the WBID. DCHD also performs a plan review and site evaluation for each application received for an OSTDS, whether it is new construction or repair or modification to an existing system. In the watershed, DCHD has conducted 24 plan reviews and site evaluations. In addition, it has performed 6 investigations in response to complaints received. DCHD will continue these activities in the future to reduce and prevent issues related to OSTDS. **Table 31** lists DCHD's projects in the Newcastle Creek watershed.

TABLE 31: DCHD ACTIVITIES IN THE NEWCASTLE CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	ESTIMATED COST (1996–2008)	FUNDING SOURCE	PROJECT STATUS
DCHD – 1	OSTDS Program	Implementation of programs to address septic systems as potential sources	Approximately 5 new construction permits, 18 repair permits, and 1 abandonment permit issued	$9,760	Florida Department of Health (FDOH)	Ongoing
DCHD – 2	Surface Water Improvement and Management (SWIM) Project	Implementation of broad-ranging septic tank ordinance	Approximately 0.25% of Eggleston Heights Septic Tank Failure Area is in WBID	$2,000	FDOH/ LSJR SWIM Grant	Completed
DCHD – 3	DCHD-Sponsored Training Programs	Annual training programs held for septic tank contractors, certified plumbers, maintenance entities, and environmental health professionals	1 to 2 trainings per year providing up to 12 contact hours	$2,500	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 4	Application/ Plan Review/ Site Evaluations	DCHD performs plan review and site evaluation for each application received for OSTDS new construction, repair, or modification of existing system	Approximately 24 plan reviews and site evaluations were performed in WBID based on permitting history	$5,000	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 5	Septic Tank Failure Area Ranking	Septic tank failure area scored and prioritized on annual basis	Less than 1 year since previous update	Not applicable	Not applicable	Ongoing
DCHD – 6	Complaint Investigations	DCHD investigates all complaints received, performs site visit, and initiates enforcement action on sanitary nuisance violations	6 complaint investigations were performed in WBID	$2,000	FDOH/ LSJR SWIM Grant	Ongoing

6.3.3 COJ ACTIVITIES IN THE NEWCASTLE CREEK WATERSHED

6.3.3.1 Completed COJ Projects

COJ has completed a wet detention pond project on Townsend Road that treats stormwater from an area of 151 acres. It also has completed a drainage system rehabilitation project at Townsend Road. These two projects have reduced flooding and provided stormwater treatment, both of which have helped to reduce fecal coliform loading to Newcastle Creek from stormwater runoff in this area.

During TAT sampling of Newcastle Creek, one particular area of the stream at Berrywood Lane had high levels of fecal coliform bacteria. Resampling and field reconnaissance of the area to identify potential sources could not isolate the source; however, it appeared that sediment buildup could have contributed to the high counts. EQD worked with PWD and JEA to schedule sediment removal in May 2008. Sediment and water samples were collected before and after the cleanout. Post sediment removal sampling indicates lower levels of fecal coliform bacteria in the stream at this location, reducing the total loading to Newcastle Creek.

6.3.3.2 Ongoing COJ Programs and Projects

COJ has also established a monitoring plan to evaluate the effectiveness of the Stormwater Management Program (SWMP) and the associated pollutant reduction from MS4 systems to waters of the state to the Maximum Extent Practicable (MEP). The monitoring plan is a requirement of Part V.B. of the COJ/FDOT NPDES MS4 permit and supported by Title 40 of the Code of Federal Regulations, Part 122.26(d)(2)(iii). It is the responsibility of the MS4 co-permittees (COJ, FDOT, City of Atlantic Beach, and City of Neptune Beach). In this watershed, 1 routine monitoring station is sampled quarterly, with 42 samples taken between 1995 and 2008. The *Annual Report Form for Individual NPDES Permits for Municipal Separate Storm Sewer Systems (Subsection 62-624.600[2], F.A.C*) provides additional information on the SWMP.

In addition to the routine monitoring, COJ EQD is part of the TAT and conducts sampling to help identify potential sources of fecal coliform contamination. In 2005 and 2006, EQD sampled 5 sites in Newcastle Creek, for a total of 40 samples, as part of the TAT effort.

COJ PWD's Streets and Drainage Division is responsible for maintaining its stormwater conveyance systems in Jacksonville. From 2005 through 2008, this included 77 work orders for ditch and creek regrading, erosion control, and cleaning; 4 work orders for lake and pond maintenance; and 55 work orders for the repair/clearing of blocked structures and measures to prevent flooding. PWD will maintain a future level of effort for the maintenance activities based on information in the CARE database.

In addition, COJ EQD is working with England-Thims and Miller (ETM) to implement the PIC Program. ETM is currently developing an inventory and mapping MS4s in Duval County. COJ EQD keeps a record of reported PICs in a database, and that information is transferred into GIS. This system is checked to determine where site visits are necessary. COJ inspectors conduct the site visits and talk to both the people who live on the site, as well as their neighbors, to verify the nature of the issue. If there is a known discharge, the inspector investigates in order to direct the resolution of the discharge to the appropriate entity (COJ, DCHD, or FDEP). If necessary, a sample is collected to determine the nature of the discharge. COJ may assist the individual in remedying the situation and return to ensure that the connection has been removed. Between 1998 and 2006, 43 PICs were identified in the Newcastle Creek watershed, of which 20 were confirmed as illicit and removed.

Educational outreach is a vital part of the PIC Program. COJ EQD, and formerly COJ PWD, primarily provides this outreach by distributing materials to the public such as educational pamphlets and informational door hangers, and through a storm drain–stenciling program. COJ also collaborates with SJRWMD's Watershed Action Volunteer (WAV) Program, which equips volunteers through training and education to perform a variety of tasks to improve the environmental quality of their local watersheds (PBS&J, November 2007).

In the Newcastle Creek watershed, inspections between 2000 and 2008 included 2 investigations into illicit water discharges, 1 sewer line that drained into a yard or ditch, and 10 SSOs. These inspections are initiated through information from the CARE database, and PWD will maintain a future level of effort for these investigations based on requests, which are logged and tracked through the CARE database.

Table 32 provides additional details on COJ's activities in the watershed.

TABLE 32: COJ ACTIVITIES IN THE NEWCASTLE CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	TOTAL COST	FUNDING SOURCE	PROJECT STATUS
Capital Improvement Projects						
COJ – 1	Townsend Road (COJ-31)	Wet detention	151 acres	Unknown	COJ	Complete
Drainage System Rehab Projects						
COJ – 2	Townsend Road	Townsend Road drainage system rehab	Along Townsend	$173,326	COJ	Complete
COJ – 3	Berrywood Lane	Ditch cleanout to remove sediments and vegetation	Along Berrywood Lane	Unknown	COJ	Complete
MS4 Maintenance Activities						
COJ – 4	Ditch/Creek Regrade/Erosion/Clean	All maintenance activities completed in response to CARE requests. Costs shown limited to activities completed after release of work order system.	77 (for 2005–08)	$15,789.25	COJ	Ongoing
COJ – 5	Lake or Pond Problem		4 (for 2005–08)	$58.68	COJ	Ongoing
COJ – 6	Structure Blocked/Repair/General Flooding		55 (for 2005–08)	$3,425.92	COJ	Ongoing
Inspection, Enforcement, and Sampling						
COJ – 7	Illicit Water Discharge	CARE initiated	2 (for 2000–08)	$424	COJ	Ongoing
COJ – 8	Sewer Drains into Yard/Ditch	CARE initiated	1 (for 2000–08)	$212	COJ	Ongoing
COJ – 9	Sewer Overflow	CARE initiated	10 (for 2000–08)	$2,120	COJ	Ongoing
COJ – 10	Private Lift Station Inspection	No lift stations in WBID; inspect as ID stations or new stations constructed	Not applicable	Not applicable	COJ	Ongoing
COJ – 11	Illicit Discharge Detection and Elimination	20 illicit, no open	43 (for 1998–2006)	$9,116	COJ	Ongoing
COJ – 12	Routine Surface Water Sampling	NPDES permit–related quarterly water quality sampling – 1 station in WBID	42 (for 1995–2008)	$8,904	COJ	Ongoing
COJ – 13	TAT Sampling	Conducted by EQD to assess bacteria levels in creek and help identify potential fecal bacteria sources	5 sites / 40 samples (for 2005–06)	$17,880	COJ	Complete
Septic Tank Phase-Out Program						
COJ – 14	Eggleston Heights Failure Area – Septic Tank Phase-Out	Phase out of septic tanks in failure areas (also listed as part of larger LSJR Main Stem BMAP project)[1]	10 total tanks, 0 connected	Unknown	COJ	Ongoing
COJ – 15	Septic Tanks Outside Failure Area – Septic Tank Phase-Out	Phase-out program as provided by COJ ordinance	145 total tanks, 0 connected	Unknown	COJ	Ongoing
COJ – 16	Septic Tank Maintenance Public Education	Public service announcements	Ongoing	Unknown	COJ	Ongoing
Management and Reduction of Pet and Animal Waste						
COJ – 17	Pet/Animal Management Public Education	Public service announcements (PSAs)	Ongoing	Unknown	COJ	Ongoing

Note: Inspection unit cost = $212; sampling event unit cost = $447; and septic tank per connection = $35.

[1] COJ has committed to removing septic tanks in failure areas that are within 300 meters of a surface water in the 2008 LSJR Main Stem BMAP. COJ must submit a plan to FDEP for removing septic tanks within 6 months of completion of the septic tank study, or by June 30, 2011, whichever is earlier. At a minimum, COJ will accomplish a 50% implementation of the septic tank phase-out projects by July 31, 2015, with the phase-outs completed by December 31, 2023. For the 10 tributaries addressed in this BMAP, a total of 1,167 septic tanks are located in failure areas, although not all of them may be located within 300 meters of a surface water. The failing tanks within 300 meters of a surface water will be included in the COJ plan and schedule to phase out tanks and will be identified as Tributaries BMAP-related tanks in the plan.

6.3.4 FDOT Activities in the Newcastle Creek Watershed

6.3.4.1 Ongoing FDOT Programs and Activities

FDOT works with COJ on several efforts related to the MS4 permit. FDOT participates in the PIC Program in conjunction with COJ. FDOT has instructed staff to be alert for illicit connections during routine maintenance activities, and investigates observances found in the right of way. Those located outside the right of way are reported to the applicable municipality for further investigation and enforcement action. FDOT maintains a toll-free number to be used for reporting illicit connections and has removed 10 illicit connections to its conveyances in the watershed. FDOT also helps to fund one monitoring station in the Newcastle Creek watershed that is sampled quarterly as part of the routine monitoring program. FDOT will continue these activities in the future to support the maintenance of the MS4 system. **Table 33** lists FDOT's activities in the watershed.

Table 33: FDOT Activities in the Newcastle Creek Watershed

Project Number	Project Name	Estimated Cost	Funding Source	Level of Effort	Project Status
Identification and Removal of Illicit Connections					
FDOT – 1	PIC Program – Search for Illicit Connections	See Note 1	State of Florida (FDOT)/COJ	Effort is continuous in WBID	Ongoing
FDOT – 2	PIC Program – Illicit Connections Identified and Removed in WBID if Found To Be Truly Illicit	See Note 1	State of Florida (FDOT)/COJ	10 illicit connections removed	Ongoing
Surface Water Sampling To Assess Conditions and Identify Sources					
FDOT – 3	Routine Tributary Monitoring as Part of MS4 Permit	See Note 2	State of Florida (FDOT)/COJ	1 station quarterly	Ongoing

[1] Countywide Program – Average cost is $37,605 per year contribution to COJ.
[2] Countywide Program – Average cost is $22,546 per year contribution to COJ.

6.4 Summary of Restoration Activities and Sufficiency of Efforts

Table 30 through **Table 33** list the projects and programs to reduce fecal coliform loading in the Newcastle Creek watershed. Several key efforts completed in this WBID are summarized, as well as activities that are expected to continue or to be implemented in future years. The efforts outlined in the project tables, including the activities highlighted below, will reduce fecal coliform loading and improve water quality in Newcastle Creek based on the best information available about fecal coliform sources. As water quality improves as a result of these actions and the bacteria source information is refined, future BMAPs may recommend different activities or levels of effort. For this BMAP, the full implementation of the projects and programs listed in the project tables for the Newcastle Creek watershed is sufficient to significantly reduce fecal coliform sources and make substantial progress towards meeting the TMDL.

6.4.1 OSTDS

Failure Area – Based on the GIS current database, there are approximately 155 septic tanks in the WBID. Ten OSTDS are eligible for sewer connection due to their inclusion located in the Eggleston Heights failure area. COJ committed to removing septic tanks in failure areas that are within 300 meters of surface waters in the 2008 LSJR Main Stem BMAP. The failing tanks in the Eggleston Heights failure area in the Newcastle Creek watershed that are within 300

meters of a surface water will be included in the COJ phase-out plan and schedule, as described in the Main Stem BMAP, and will be identified in the plan as Tributaries BMAP-related efforts.

Repair Permits – Outside the Eggleston Heights failure area, there are no indications that additional failure areas are developing. Of the 18 repair permits filed in the WBID, the majority issued before 2005, are concentrated (1) in the southwest corner, which is not close to surface waters; and (2) in the northeast portion of the WBID that has no stormwater infrastructure. Therefore, the locations of these repair sites indicate that the remaining 145 OSTDS are not an immediate threat to surface water contamination and are not discharging to the stormwater system.

Capital Improvement Projects – The COJ Townsend Boulevard flood control project will help to reduce OSTDS as a source by reducing flooding in the northeastern portion of the WBID, where there is a higher concentration of septic tanks and where flooding would greatly decrease the effectiveness of the OSTDS to treat waste before contact with surface waters. COJ PWD should continue to evaluate flooding in the Newcastle Creek WBID, and if frequent flooding is an issue in areas with high concentrations of OSTDS, capital improvement projects should be implemented, depending on available funding to address those problems.

Program Implementation – City ordinances, inspections, and program implementation, combined with DCHD permit review processes and inspections, proactively address potential sources. Program implementation ensures the proper review of new OSTDS sites and ensures the maintenance of existing systems. These activities need to be continued and fully enforced to manage potential impacts from existing systems in the nonfailure areas and to prevent the creation of new OSTDS sources.

6.4.2 Sewer Infrastructure

Private Infrastructure – The COJ database does not indicate that there are private sewer lift stations in the watershed; however, the database only includes private lift stations permitted by COJ since 1991, or lift stations that have applied for repair permits since that time. It is likely that private lift stations are located in the watershed but have not been identified. As private stations are identified or new private lift stations are constructed, COJ will include these stations in the BMAP annual progress report and implement annual inspections.

Sewer Infrastructure Projects – The JEA lift station at 3254 Townsend Boulevard, located near surface waters, previously had repetitive SSOs; however, JEA replaced the electrical panel in May 2008, resulting in no subsequent SSOs, and thus removing a recurring source of fecal coliform loading.

Program Implementation – Since 2001, following inspections and a condition assessment of the sewer lines, over 40% of the sewer lines in the WBID were pipe bursted and 60% of the lift stations upgraded. These sewer infrastructure repairs constitute a large percentage of the total number of sewer lines and lift stations in the WBID, indicating that the previous system was due for substantial maintenance and that the repairs have likely addressed some leakage and potential SSO problems. Continued inspection, repair, and maintenance activities in conjunction with the systemwide programs are sufficient to address potential sewer sources in the WBID at this time. The Root Cause Program and other SSO prevention efforts, such as FOG and CMOM implementation, should be continued so that any additional infrastructure problems that develop will be identified and repaired. JEA will report its inspection, prevention, and maintenance efforts in the WBID as part of the annual BMAP reporting process to demonstrate that the system is monitored and maintained.

6.4.3 STORMWATER

Illicit Connection Removal – Twenty illicit connections have been removed through the PIC Program run by COJ and FDOT; this is a substantial number of illicit connections and potential sources of bacteria eliminated. COJ and FDOT have committed to continue the PIC Program, including identifying additional illicit connections and removing those connections in a timely manner.

COJ Program Implementation – According to the *Newcastle Creek Technical Report* (PBS&J, November 2007), the higher concentrations of bacteria in the more upstream portion of the creek may be attributed to bacteria regrowth in sediments and the persistence of bacteria populations due to conditions of little or no light. COJ completed a project to remove excessive vegetation growth in the upstream portion of the creek, increasing UV light to the waters and potentially increasing the die-off of sediment bacteria. COJ also removed sediments from the upstream portions of the creek, some of which were most likely transported through the underground stormwater collection system. Subsequent water sampling indicates that bacteria levels have decreased downstream of these locations. These actions and a continued commitment by COJ to prevent overgrowth along Newcastle Creek should help to control sediments as a source in the stormwater system.

TABLE 34: SUMMARY OF RESTORATION ACTIVITIES FOR THE NEWCASTLE CREEK WATERSHED

SOURCE/ACTION	COJ	DCHD	FDOT	JEA
OSTDS				
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 (PSA)	√	X	X	X
Surface Water Sampling for Conditions and Trends	√	X	X	X
Sewer System				
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	√
Air Release Valve (ARV) Inspection and Rehab	X	X	X	√
Program Implementation	X	X	X	√
Private Lift Station Inspections and Enforcement	*	X	X	X
Private Non-NPDES Wastewater Facility Inspections and Enforcement	*	X	X	X
Sanitary Sewer Overflow (SSO) Investigations	*	X	X	√
Surface Water Sampling for Conditions and Trends	X	X	X	√
Stormwater				
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

SOURCE/ACTION	COJ	DCHD	FDOT	JEA
Public Education and Outreach	√	X	+	X
Surface Water Sampling for Conditions and Trends	√	X	+	X
Program Implementation	√	X	√	X
Pet Waste Management				
Ordinances and Enforcement	√	X	X	X
Public Education and Outreach	√	X	X	X
Special Source Assessment Activities				
Intensive Water Quality Sampling To Track Sources	√	X	X	√
Tributary Assessment Team (TAT)	√	X	X	√
Microbial Source Tracking (MST)	√	X	X	√
Thermal Imagery To Identify PICs	-	X	X	X

Note: Shaded cells (marked with an X) represent activities that do not apply to the associated entity.
* Activity is not applicable for the waterbody due to a lack of infrastructure.
+ FDOT participation in these activities is provided by funding in the NPDES MS4 agreements with COJ.

CHAPTER 7: HOGAN CREEK (WBID 2252)

7.1 WBID DESCRIPTION

Hogan Creek, WBID 2252, is located in Duval County, north of the LSJR within the North Mainstem Planning Unit, as designated by SJRWMD (**Figure 4**). The headwaters of Hogan Creek appear to comprise stormwater runoff originating just southwest of West 15th Street (**Figure 5**). The entire creek flows southward in a single channel, except for two branches joining Hogan Creek from the west. Segments of each branch appear to be man-made and are classified by COJ PWD as ditches. The more northern of the two branches extends west to Shands Jacksonville Medical Center and merges with the main channel just west of the intersection of West 12th Street and North Jefferson Street. The more southern branch extends west to Cleveland Street before joining the main channel south of the intersection of 8th Street and North Jefferson Street. In the southern portion of the WBID, approximately 400 feet of the creek flows into an underground water conveyance system at East State Street before resurfacing near the intersection at North Washington Street and Union Street Expressway. The waters of Hogan Creek eventually flow into the St. Johns River just south of East Bay Street (PBS&J, March 2008).

Hogan Creek traverses the watershed within a commercial/utility/institutional and recreational landscape that supports neighboring high-density residential communities. The dominant land use (1,082.7 acres; 49.2% of total coverage) in the watershed is high-density residential, which extends throughout the watershed (**Table 35**). The next two most abundant land cover categories are (1) commercial/utility/institutional areas, predominantly located in the southern portion of the watershed (452.4 acres; 20.6% of total coverage); and (2) recreational habitat, which borders the creek, providing direct access to the waterbody (384.7 acres; 17.5% of total coverage). Wetland habitat accounts for less than 5% of land use (PBS&J, March 2008).

According to the 2000 Census, there are 7,109 households in the watershed, averaging 1.59 people per household. The areas directly adjacent to the creek, especially in the midstream section of the watershed, consist of recreational and commercial areas bounded by high population densities (PBS&J, March 2008). In addition, assuming that 40% of households have 1 dog (Tyler, 2006), there are 2,844 dogs in the watershed.

TABLE 35: LAND USES IN THE HOGAN CREEK WATERSHED

LAND USE	ACRES	% OF TOTAL
High-Density Residential	1,082.7	49.2
Commercial/ Utility/Institutional	452.4	20.6
Recreational	384.7	17.5
Industrial	115.9	5.3
Transportation	104.5	4.7
Medium-Density Residential	20.0	0.9
Open Land	14.8	0.7
Water	12.0	0.5
Nonforested Upland	7.5	0.3
Wetlands	5.7	0.3
TOTAL:	**2,200.1**	**100**

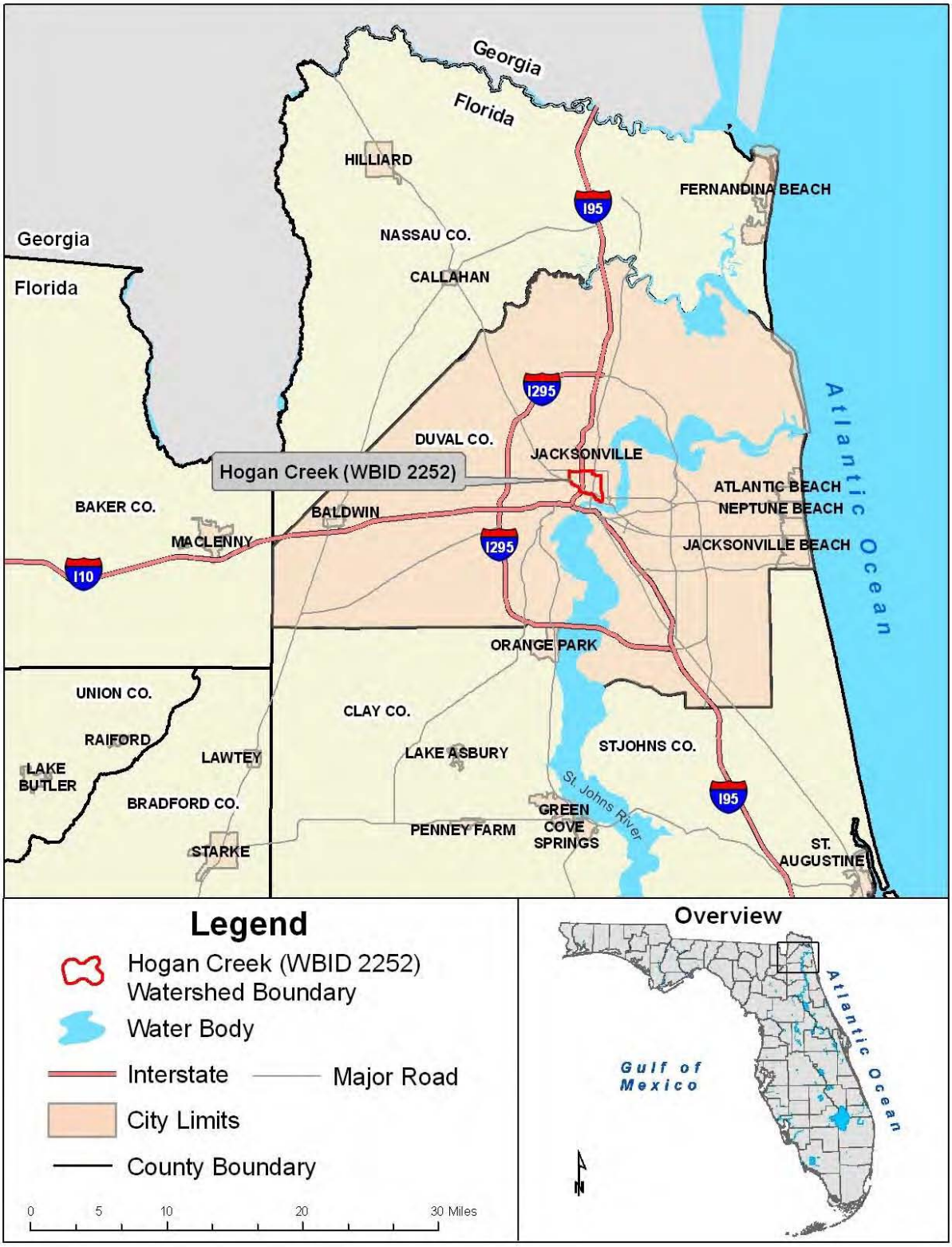

FIGURE 4: LOCATION OF THE HOGAN CREEK WATERSHED

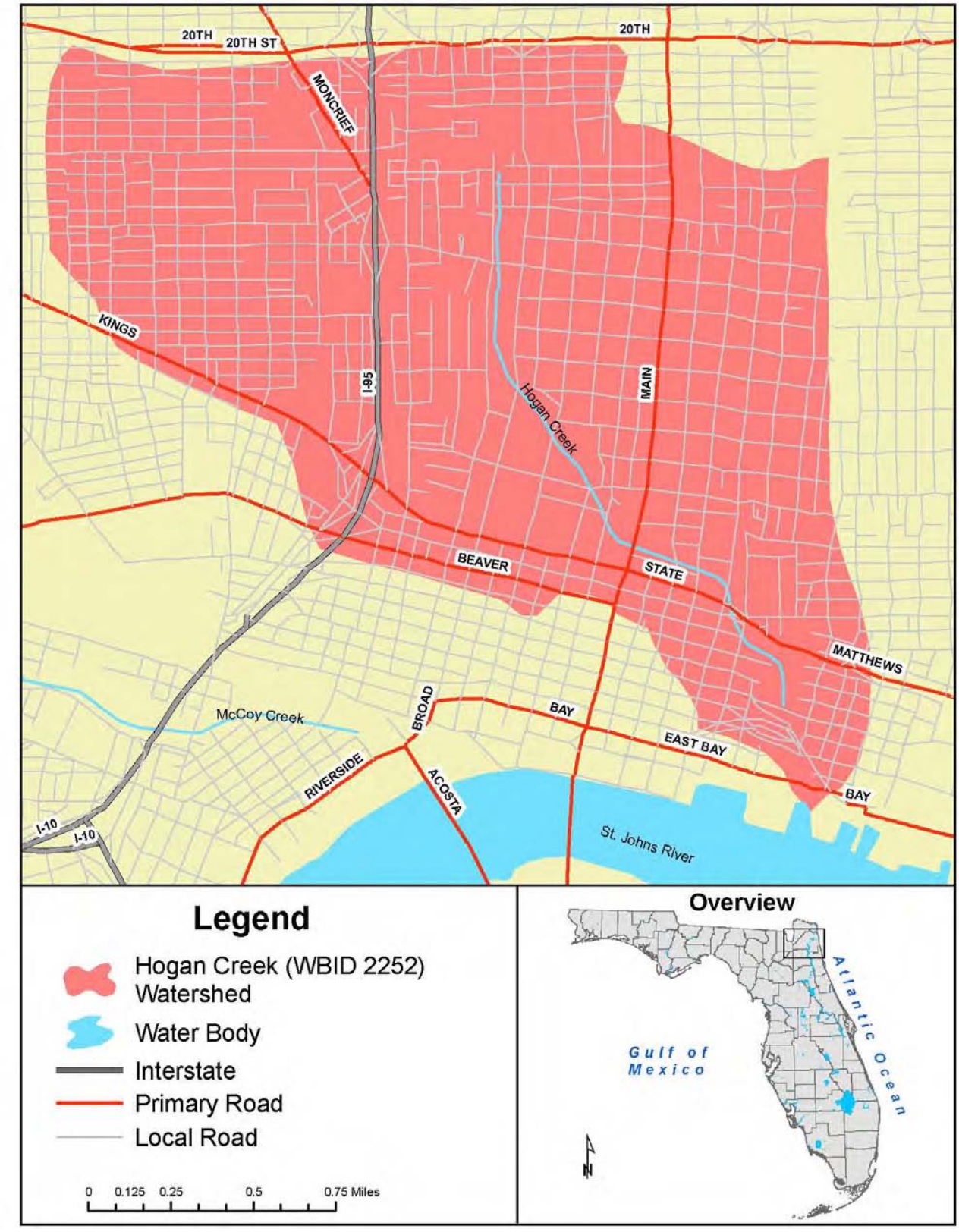

FIGURE 5: HOGAN CREEK WBID LOCATOR MAP

7.2 Potential Sources

7.2.1 Point Sources

There are no industrial or domestic wastewater facilities, CAFOs, application sites for septic residuals, or landfills permitted to discharge to Hogan Creek. The COJ/FDOT MS4 permit includes the Hogan Creek watershed (PBS&J, March 2008).

7.2.2 Illicit Discharges

COJ EQD identified seven PICs in the Hogan Creek watershed between 2004 and 2006; five were confirmed as illicit connections and removed.

7.2.3 Centralized Sewage Infrastructure and Overflows

An estimated 6,227 households (approximately 88% of households) are connected to the sanitary sewer system in the Hogan Creek watershed. The sanitary sewer lift stations are all located near (within approximately 300 feet of) Hogan Creek; therefore, potential failures at these lift stations are likely to contribute bacterial contamination to the creek's surface waters. JEA has reported 36 SSOs, 11 of them potentially impacting surface waters, within the WBID boundaries (**Table 36**). The estimated volume of spill associated with these overflows ranged from 1 to 45,000 gallons and averaged 2,570 gallons. More recently, an SSO that occurred at East Bay Street on February 4, 2008, released approximately 104,000 gallons of sewage near the creek's surface waters; an estimated 10,000 gallons were recovered, resulting in an approximate net discharge of 94,000 gallons.

The number of reported SSOs in the Hogan Creek watershed has likely contributed to the overall contamination of the watershed, considering that 11 of the 36 (31%) reported SSOs occurred near the creek's surface waters. It is possible, however, that unidentified sewer infrastructure leaks are contributing to this pollution, as sewer infrastructure (e.g., lift stations, manholes) are regularly located near the creek throughout the watershed (PBS&J, March 2008). The inoculation of sediments following an SSO event or unknown infrastructure leak may lead to the persistence and likely regrowth of indicator bacteria in sediments, thus possibly allowing an influx of high levels of bacteria to receiving waters for an unspecified period (Davies et al., 1995; Anderson et al., 2005). It is also important to note that the number of gallons of spilled sewage due to reported SSOs decreased from 59,230 gallons in 2003 to 270 gallons in 2006.

7.2.4 OSTDS

WSEA estimates that there are approximately 428 OSTDS in the Hogan Creek watershed. According to DCHD, no septic tank repair permits have been issued in the WBID. No DCHD-designated septic tank failure area is located near the boundary of the watershed.

7.2.5 Nonpoint Sources

An analysis of impervious surface indicates that the Hogan Creek WBID contains primarily 10 to 25% and greater than 25% impervious surface. Furthermore, the potential for stormwater runoff was predicted through the calculation of runoff coefficients using the U.S. Soil Conservation Service (SCS) Curve Number approach (SCS, 1986). This analysis demonstrates that the majority of the WBID contains a moderate-to-high potential for stormwater runoff, especially near the creek (PBS&J, March 2008).

TABLE 36: SSOS REPORTED IN THE HOGAN CREEK WATERSHED, 2001–07

WBID NAME (NUMBER)	DATE OF OVERFLOW	ESTIMATED VOLUME OF SPILL (GALLONS)	POTENTIALLY IMPACTED SURFACE WATERS
Hogan Creek (2252)	21-Aug-01*	2,500	-
Hogan Creek (2252)	21-Nov-01*	10,000	-
Hogan Creek (2252)	15-Jan-02	50	-
Hogan Creek (2252)	25-Jan-02	200	-
Hogan Creek (2252)	8-Feb-02	500	-
Hogan Creek (2252)	24-May-02	200	-
Hogan Creek (2252)	13-Aug-02	100	-
Hogan Creek (2252)	14-Aug-02	75	-
Hogan Creek (2252)	2-Oct-02	500	No
Hogan Creek (2252)	23-Oct-02	200	No
Hogan Creek (2252)	8-Nov-02*	6,000	Yes
Hogan Creek (2252)	11-Feb-03*	45,000	Yes
Hogan Creek (2252)	10-Mar-03	30	No
Hogan Creek (2252)	18-Mar-03*	1,560	Yes
Hogan Creek (2252)	10-Jul-03	50	No
Hogan Creek (2252)	30-Jul-03	200	No
Hogan Creek (2252)	15-Oct-03*	12,240	Yes
Hogan Creek (2252)	17-Oct-03*	120	Yes
Hogan Creek (2252)	20-Oct-03	30	No
Hogan Creek (2252)	19-Feb-04*	200	Yes
Hogan Creek (2252)	17-Mar-04	200	No
Hogan Creek (2252)	15-Apr-04*	540	Yes
Hogan Creek (2252)	26-Apr-04*	1,000	Yes
Hogan Creek (2252)	14-May-04*	600	Yes
Hogan Creek (2252)	25-Jun-04*	1,100	Yes
Hogan Creek (2252)	1-Jul-04*	8,900	Yes
Hogan Creek (2252)	12-Oct-04	1	No
Hogan Creek (2252)	4-Jan-05	35	No
Hogan Creek (2252)	24-Mar-05	60	No
Hogan Creek (2252)	30-Mar-05	20	No
Hogan Creek (2252)	26-Oct-05	5	No
Hogan Creek (2252)	9-Dec-05	25	No
Hogan Creek (2252)	27-Dec-05	20	No
Hogan Creek (2252)	4-Jan-06	50	No
Hogan Creek (2252)	6-Feb-06	20	No
Hogan Creek (2252)	8-May-06	200	No

Note: Data on SSOs that potentially affected surface waters are unavailable before October 2002.
* Reportable SSOs that spilled > 1,000 gallons of sewage and/or affected surface waters.

The storm sewer network in the Hogan Creek watershed includes 50 permitted stormwater treatment areas, encompassing approximately 64.71% of the WBID area. Stormwater infrastructure in the WBID includes 53 outfalls by receiving water (1 classified by FDEP as a major outfall) and 1,623 inlets. There is also an underground conveyance system in the downstream portion of the watershed. Although closed conveyances are common throughout the WBID, ditch systems are primarily confined to the northern portions of the WBID, except for one that forms the westernmost segment of the southern branch (PBS&J, March 2008).

7.3 PROJECTS TO REDUCE FECAL COLIFORM LOADING

7.3.1 JEA ACTIVITIES IN THE HOGAN CREEK WATERSHED

7.3.1.1 Ongoing JEA Programs and Activities

JEA is currently implementing a number of countywide specific improvement programs, as follows, to address the sanitary sewer system as a source of fecal coliform contamination: (1) FOG Reduction Program; (2) SSO Root Cause Program; (3) Pop-Top Program; (4) Non-Destructive Testing and ARV Programs; (5) SCADA; (6) Third Party Education and Enforcement Program; (7) Manhole Monitoring; (8) Force Main Discharge Manholes; and (9) CMOM Program. **Appendix E** describes each of these programs.

JEA has initiated infrastructure rehabilitation projects in the Hogan Creek watershed to help prevent and reduce future overflows (PBS&J, March 2008). As part of the infrastructure rehabilitation projects in the watershed, JEA conducts several types of activities to replace or rehabilitate failing or leaking infrastructure, including (1) pipe bursting to increase carrying capacity, (2) CIPP to install a new inner lining in the pipe, and (3) open cut to remove and replace pipe. A total of 12.46% of the sewer lines in the watershed have been pipe bursted, 1.37% have CIPP, and 0.16% have been repaired through open cut.

JEA has also replaced or repaired components on 1 of the 4 (25%) lift stations in the WBID. In addition, it conducts activities to help prevent future infrastructure problems. In the Hogan Creek watershed, 11,821 LF of pipe were inspected during FY07 using a closed-circuit television system. JEA also pipe cleaned 57,198 LF of pipe in FY07 to avoid blockages. These activities will continue in the future to maintain the sanitary sewer system and prevent future problems. **Table 37** provides additional information on JEA's activities in the Hogan Creek watershed.

TABLE 37: JEA ACTIVITIES IN THE HOGAN CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	ESTIMATED COST	FUNDING SOURCE	PROJECT STATUS	START DATE OF PROJECT
Sewer Upgrades							
JEA – 17	Pipe Bursting – Increase Carrying Capacity	Replace failing/leaking infrastructure	Total footage of pipe burst in watershed since 2001: 180,230	$15,713,951	JEA	Ongoing	FY00
JEA – 18	CIPP – Install New Inner Lining	Rehabilitate failing/leaking infrastructure	Total footage of CIPP in watershed since 2001: 19,788	$1,731,285	JEA	Ongoing	FY00
JEA – 19	Open Cut – Removal and Replacement	Replace failing/leaking infrastructure	Total footage of open cut replacement in watershed since 2001: 2,366	$415,957	JEA	Ongoing	Ongoing
Other Sewer Infrastructure Upgrades							
JEA – 20	Manhole Linings Rehabbed	Repair deteriorating manhole linings	Not applicable	$330,469*	JEA	Ongoing	FY01
JEA – 21	Pump Station SCADA Upgrades	Retrofitting completed in 2004; all stations constructed since have SCADA installed. See **Appendix E.**	Not applicable	Unknown	JEA	Complete	Complete
JEA – 22	Inspect Force Main Discharge Manholes; Repair/Rehab as Necessary	See **Appendix E**	Not applicable	$466,576*	JEA	Ongoing	FY07
JEA – 23	Pump Station Class I/II Rebuilding	Repair or replace components of existing pump stations	Projects in watershed since 2002: 1	$75,159	JEA	Ongoing	Ongoing
Programs To Reduce Sewer Problems							
JEA – 24	FOG Reduction Program	See **Appendix E**	Not applicable	Unknown	JEA	Ongoing	Current FOG Program initiated in 2004
JEA – 25	Pipe TV Inspection	Inspect existing infrastructure through closed-circuit television	11,821 LF of pipe inspected (FY07)	$163,099*	JEA	Ongoing	Carried over from city operation (1997)
JEA – 26	Pipe Cleaning	Clean existing pipes to avoid blockages	57,198 LF of pipe cleaned (FY07)	$743,054*	JEA	Ongoing	Carried over from city operation (1997)
JEA – 27	Implement CMOM Program	See **Appendix E**	Not applicable	$ 163,269*	JEA	Ongoing	Ongoing
JEA – 28	Manhole Monitoring	See **Appendix E**	1 manhole monitor installed in watershed as of January 2009	$ 137,526*	JEA	Ongoing	August 2007
JEA – 29	SSO Root Cause Program	See **Appendix E**	Not applicable	Unknown	JEA	Ongoing	February 2007
JEA – 30	Pop-Top Program	See **Appendix E**	Not applicable	$64,324*	JEA	Ongoing	February 2007
JEA – 31	Non-Destructive Testing Program/ Pipe Integrity Testing	See **Appendix E**	Not applicable	$74,284*	JEA	Ongoing	Ongoing

***** Costs provided are total systemwide costs for the program because WBID-specific costs are currently unavailable.

7.3.2 DCHD Activities in the Hogan Creek Watershed

7.3.2.1 Ongoing DCHD Programs and Activities

Currently, DCHD is implementing a variety of countywide specific improvement programs and restoration activities to address OSTDS as sources of fecal coliform contamination. These include (1) the OSTDS Program, (2) training programs, and (3) the designation of septic tank failure and nuisance areas for transfer to central sewer. **Appendix E** describes each of these programs.

As part of the OSTDS Program, DCHD has issued 2 new construction permits and 8 abandonment permits in the WBID. In addition, 1 annual operating permit has been issued for a performance-based treatment and disposal system (PBTS) in the watershed. DCHD has also performed 1 plan review and site evaluation and 126 investigations in response to complaints received. DCHD will continue these efforts in the future to reduce and prevent issues related to OSTDS. **Table 38** lists DCHD's projects in the Hogan Creek watershed.

TABLE 38: DCHD ACTIVITIES IN THE HOGAN CREEK WATERSHED

Project Number	Project Name	Project Description	Level of Effort	Estimated Cost (1996–2008)	Funding Source	Project Status
DCHD – 7	OSTDS Program	Implementation of programs to address septic systems as potential sources	Approximately 2 new construction permits and 8 abandonment permits issued in WBID	$2,000	FDOH	Ongoing
DCHD – 8	Annual Operating Permits	Annual operating permits issued for PBTS, systems located in industrial/ manufacturing zones (IMZ), and commercial systems	One annual operating permit for PBTS/IMZ located in WBID	$2,500	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 9	DCHD-Sponsored Training Programs	Annual training programs held for septic tank contractors, certified plumbers, maintenance entities, and environmental health professionals	One to 2 trainings per year providing up to 12 contact hours	$2,500	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 10	Application/Plan Review/Site Evaluations	DCHD performs plan review and site evaluation for each application received for OSTDS new construction, repair, or modification of existing system	Approximately 17 plan reviews and site evaluations have been performed in WBID based on permitting history	$4,000	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 11	Septic Tank Failure Area Ranking	Septic tank failure area scored and prioritized on annual basis	Less than 1 year since previous update	Not applicable		Ongoing
DCHD – 12	Complaint Investigations	DCHD investigates all complaints received, performs site visit, and initiates enforcement action on sanitary nuisance violations	126 complaint investigations have been performed in WBID	$13,000	FDOH/ LSJR SWIM Grant	Ongoing

7.3.3 COJ Activities in the Hogan Creek Watershed

7.3.3.1 Completed COJ Projects

COJ PWD has completed 3 projects in the watershed: (1) the Hogan Creek Wet Detention Pond, which treats 48 acres; (2) the Durkeeville West Wet Detention Pond, which treats 106 acres; and (3) the Edmonson West Project, a drainage improvement project that alleviated flooding by improving conveyances. These projects capture and treat stormwater runoff, helping to reduce stormwater-associated bacterial loadings to Hogan Creek. In addition, the Bay Street Bridge Expansion Project is under construction and is projected to replace the existing bridge structure, with the expectation of lowering the hydraulic grade line during larger rainfall events, thus helping in flood control (PBS&J, March 2008).

7.3.3.2 COJ Projects in Design or Construction

COJ currently has one flood improvement project in the Newtown area in design. In addition, there are two drainage system rehabilitation projects under construction at (1) 7th and Ionia, which is an area that has standing water at the curb; and (2) Boulevard Railroad Crossing, where the headwall has failed and caused the drain pipes to break. These projects, once completed, will reduce stormwater runoff in their respective areas, in turn reducing fecal coliform loading to the creek.

7.3.3.3 Ongoing COJ Programs and Activities

COJ has established a monitoring plan to evaluate the effectiveness of the SWMP and the associated pollutant reduction from MS4 systems to waters of the state. In Hogan Creek, COJ has 1 routine monitoring station that is sampled quarterly. A total of 43 samples were taken at this station between 1995 and 2008. In addition to the routine sampling, COJ EQD also participates in the TAT. EQD has collected 28 samples at 10 sites as part of the TAT, with an additional 3 samples taken at 3 sites to follow up on high fecal coliform counts in an effort to identify potential sources.

COJ PWD's Streets and Drainage Division is responsible for maintaining its stormwater conveyance systems in Jacksonville. This maintenance includes 105 work orders for ditch and creek regrading, erosion control, and cleaning; 10 work orders for lake and pond maintenance; and 264 work orders for the repair of blocked structures and measures to prevent flooding. These work orders were completed between 2005 and 2008. PWD will continue a level of effort to maintain the MS4 conveyances based on CARE requests.

In addition, COJ has implemented the PIC Program, which keeps track of reported PICs in a database for COJ inspector follow-up. Of the seven PICs identified by COJ in the watershed, five were confirmed as illicit connections and were removed. Three of these PICs were considered sources of bacterial contamination and may have contributed to the bacterial loading of Hogan Creek prior to their removal (PBS&J, March 2008). The status of one PIC is still pending investigation. As part of the PIC Program, COJ EQD provides public outreach through educational pamphlets, informational door hangers, and the storm drain–stenciling program.

COJ PWD has also conducted inspections in the watershed, including 13 investigations into illicit water discharges, 12 illegal discharges, 19 sewer lines that drained into a yard or ditch, 62 SSOs, and 1 private lift station. PWD will maintain a future level of effort for these investigations based on requests, which are logged and tracked through the CARE database.

Table 39 provides additional information on COJ's activities in the Hogan Creek watershed.

TABLE 39: COJ ACTIVITIES IN THE HOGAN CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	TOTAL COST	FUNDING SOURCE	PROJECT STATUS
Capital Improvement Projects						
COJ – 18	Durkeeville West	Wet detention	106 acres	Unknown	COJ	Complete
COJ – 19	Newtown Area	Flood improvement	Newtown Area	$5,375,000	COJ	Design
COJ – 20	Hogan Creek	Wet detention	48 acres	Unknown	COJ	Complete
Drainage System Rehab Projects						
COJ – 21	Edmonson West	Alleviate flooding by improving conveyances	Edmonson West	Unknown	COJ	Complete
COJ – 22	7th & Ionia	Standing water at curbing	7th and Ionia	Unknown	COJ	Construction
COJ – 23	Boulevard RR Crossing	Headwall has failed, causing dual drain pipes to break	RR crossing	$100,000	COJ	Construction
COJ – 24	W&M-18th & Fla	Drainage system rehab project	W&M 18th and Fla	$2,620	COJ	Complete
COJ – 25	Trash Removal in Main Channel	Removed trash in main channel of creek as Walk the WBID follow-up	Main channel	Unknown	COJ	Complete
COJ – 26	Venus and Mars Apartment Complex Pond Maintenance	Conducted maintenance activities at pond at apartment complex as Walk the WBID follow-up	Venus and Mars apartment complex	Unknown	COJ	Complete
MS4 Maintenance Activities						
COJ – 27	Ditch /Creek Regrade/Erosion/Clean	Completed in response to CARE requests. Costs limited to activities completed after release of work order system.	105 (for 2005–08)	$23,248.37	COJ	Ongoing
COJ – 28	Lake or Pond Problem		10 (for 2005–08)	$3,793	COJ	Ongoing
COJ – 29	Structure Blocked/Repair/General Flooding		264 (for 2005–08)	$112,659	COJ	Ongoing
Inspection, Enforcement, and Sampling						
COJ – 30	Illicit Water Discharge	CARE-initiated Inspection	13 (for 2000–08)	$2,756	COJ	Ongoing
COJ – 31	Pollution – Water – Illegal Discharge	CARE-initiated Inspection	12 (for 2000–08)	$2,544	COJ	Ongoing
COJ – 32	Sewer Drains into Yard/Ditch	CARE-initiated Inspection	19 (for 2000–08)	$4,028	COJ	Ongoing
COJ – 33	Sewer Overflow	CARE-initiated Inspection	62 (for 2000–08)	$13,144	COJ	Ongoing
COJ – 34	Private Lift Station Inspection	No lift stations in WBID prior to 2007; 1 annual inspection	1 (for 2007)	$212	COJ	Ongoing
COJ – 35	Illicit Discharge Detection and Elimination	5 illicit, 1 open	7 (for 2004–06)	$1,484	COJ	Ongoing
COJ – 36	Follow Up on Outstanding PIC	Follow up on 1 open PIC in watershed	1 (for 2009–10)	$212	COJ	Planned
COJ – 37	Routine Surface Water Sampling	NPDES permit-related quarterly water quality sampling – 1 sampling station in WBID	43 (for 1995–2008)	$19,221	COJ	Ongoing
COJ – 38	TAT Sampling	Conducted by EQD to assess bacteria levels in creek and help identify potential fecal bacteria sources	10 sites/28 samples	$12,516	COJ	Ongoing
COJ – 39	Source ID Sampling	Source ID sampling conducted when high levels of fecal coliform bacteria are noted	3 sites/3 samples	$3,000	COJ	Ongoing
Septic Tank Phase-Out Program						
COJ – 40	Outside Failure Areas – Septic Tank Phase-Out	Phase out program as provided by COJ ordinance	428 total tanks, 0 connected	Unknown	COJ	Ongoing
COJ – 41	Septic Tank Maintenance Public Education	Public service announcements	Ongoing	Unknown	COJ	Ongoing
Management and Reduction of Pet and Animal Waste						
COJ – 42	Pet/Animal Management Public Education	Public service announcements	Ongoing	Unknown	COJ	Ongoing

Note: Inspection unit cost = $212; sampling event unit cost =$447; and septic tank per connection = $35.

7.3.4 FDOT Activities in the Hogan Creek Watershed

7.3.4.1 Completed FDOT Projects

FDOT has completed a wet detention pond located at S.R. 115 and 8th Street that treats stormwater from 31 acres. By capturing and treating stormwater in this area, the project has helped reduce additional fecal coliform loading to the creek from runoff.

7.3.4.2 Ongoing FDOT Programs and Activities

Under Subsection 334.044(15), F.S., and Rule 14-86, F.A.C., FDOT implements a Drainage Connection Program. The program does not issue water quality permits but requires the connecting entity to certify that the discharge is of acceptable water quality. Connecting entities are required to maintain the discharge of acceptable water quality for the duration of the FDOT Drainage Connection permit. If connecting entities fail to meet this requirement after sufficient warning by FDOT, they will be reported to FDEP, SJRWMD, and, if applicable, to the local municipality; these entities regulate stormwater quality through state rules, ordinances, and codes. FDOT performs periodic site inspections as part of the MS4 NPDES permit. FDOT supports the Adopt-A-Highway Program in the watershed and collects trash from 12 acres, for an average annual removal of 1,101 pounds. Street sweeping also occurs monthly on 25 miles of roadways, reducing the amount of trash and sediment entering the stormwater conveyance system. As part of the maintenance program, FDOT removes sediment, trash, and debris from the system, as needed. This maintenance occurs in approximately 350 inlets and 12 miles of piping.

FDOT also works with COJ on several efforts related to the MS4 permit. FDOT participates in the PIC Program in conjunction with COJ. FDOT has instructed staff to be alert for illicit connections during routine maintenance activities, and investigates observances in the right of way. Those located outside the right of way are reported to the applicable municipality for further investigation and enforcement action. FDOT maintains a toll-free number to be used for reporting illicit connections. FDOT also helps to fund one monitoring station in the Hogan Creek watershed that is sampled quarterly as part of the routine monitoring program. FDOT will continue these activities in the future to support the maintenance of the MS4 system. **Table 40** lists FDOT's activities in the watershed.

TABLE 40: FDOT ACTIVITIES IN THE HOGAN CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	ESTIMATED COST	FUNDING SOURCE	LEVEL OF EFFORT	PROJECT STATUS
Identification and Removal of Illicit Connections					
FDOT – 4	PIC Program – Search for Illicit Connections	See Note 1	State of Florida (FDOT)/COJ	Effort is continuous in WBID	Ongoing
FDOT – 5	PIC Program – Illicit Connections Identified and Removed in WBID if Found To Be Truly Illicit	See Note 1	State of Florida (FDOT)/COJ	No true illicit connection identified to date	Ongoing
Surface Water Sampling To Assess Conditions and Identify Sources					
FDOT – 6	Routine Tributary Monitoring as Part of MS4 Permit	See Note 2	State of Florida (FDOT)/COJ	1 station quarterly	Ongoing
Roadway Projects with Structural BMPs					
FDOT – 7	S.R. 115/8th Street Project	$2,941,944	State of Florida (FDOT)	31 acres, wet detention	Completed
Drainage Connection Program (DCP)					
FDOT – 8	DCP – Connecting Entity Must Certify that All Discharges to FDOT MS4 Are Treated Prior to Connection	See Note 3	State of Florida (FDOT)	Ongoing effort	Ongoing
Adopt-A-Highway Program					
FDOT – 9	Adopt-A-Highway Program	See Note 4	Not applicable	Trash collected from 12 acres. Amount collected annually averages 1,101 pounds.	Ongoing
Catch Basin/Inlet and Closed Loop MS4 Cleaning					
FDOT – 10	Sediment Accumulation, Trash, and Debris Removed As Needed	$77,148	State of Florida (FDOT)	Approximately 350 inlets/catch basins and about 12 miles of piping	Ongoing
Street Sweeping Program					
FDOT – 11	Street Sweeping Program	$6,848	State of Florida (FDOT)	25 miles of roadway swept monthly	Ongoing
Routine Maintenance Activities					
FDOT – 12	Maintain FDOT Stormwater Systems	See Note 5	State of Florida (FDOT)	Clean drainage structures, replace/repair storm/cross/side drains, clean/reshape roadside ditches, clear/repair outfall ditches, mowing, roadside litter removal, respond to citizen complaints	Ongoing

[1] Countywide Program – Average cost is $37,605 per year contribution to COJ.
[2] Countywide Program – Average cost is $22,546 per year contribution to COJ.
[3] Countywide Program – Average cost is $27,151 per year.
[4] Associated cost unknown. Program is voluntary.
[5] Countywide Program – Average cost is $2,750,735 per year.

7.4 SUMMARY OF RESTORATION ACTIVITIES AND SUFFICIENCY OF EFFORTS

Table 37 through **Table 40** show the projects and programs to reduce fecal coliform loading in the Hogan Creek watershed. Several key efforts completed in the WBID are summarized below, as well as activities that are expected to continue or to be implemented in future years. The efforts outlined in the project tables, including the activities highlighted below, will reduce fecal coliform loading and improve water quality in Hogan Creek based on the best information

available about fecal coliform sources. As water quality improves in response to these actions and the bacteria source information is refined, future BMAPs may recommend different activities or levels of effort. For this BMAP, the full implementation of the projects and programs listed in the project tables for the Hogan Creek watershed is sufficient to significantly reduce fecal coliform sources and make substantial progress towards meeting the TMDL.

7.4.1 OSTDS

OSTDS Inspection – Based on the current GIS database, there are approximately 428 septic tanks in the watershed. Very few are estimated to be near surface waters and therefore are not considered significant potential sources directly affecting surface waters. However, many are close to stormwater inlets and could be a source to the stormwater conveyance system. Since there are no designated failure areas and no plans to connect these neighborhoods to sewer, the continuation of the COJ CARE system to report and follow up with public complaints, as well as the DCHD inspections and permit programs, are vital to identifying improperly functioning OSTDS. COJ and DCHD have committed to continuing these programs, documenting problems, and requiring property owners to fix them. They are also committed to the continued coordination of their efforts so their respective roles and legal authorities are properly used in these situations.

Capital Improvement Projects – Several COJ flood control projects, including two stormwater retention ponds, have reduced high-water conditions that can contribute to septic tank failure from improperly treated waste. COJ PWD should continue to evaluate flooding in the Hogan Creek WBID, and if frequent flooding is an issue in areas with high concentrations of OSTDS, capital improvement projects should be implemented, depending on available funding to address those problems.

Program Implementation – The Walk the WBIDs effort conducted in September 2008 did not reveal any additional septic tank problems. City ordinances, inspections, and program implementation, combined with DCHD permit review processes and inspections, proactively address potential sources. Program implementation ensures the proper review of new OSTDS sites and ensures the maintenance of existing systems. These activities need to be continued and fully enforced to manage potential impacts from existing systems in the nonfailure areas and to prevent the creation of new OSTDS sources.

7.4.2 Sewer Infrastructure

Private Infrastructure – According to the COJ database, there is one private lift station that was constructed in 2007 and inspected by COJ in 2008. In accordance with COJ's private lift station inspection program, COJ is committed to the continued inspection of private lift stations in its jurisdiction to ensure that privately owned infrastructure is monitored and properly maintained by its owners.

Sewer Infrastructure Projects – SSOs, previously a significant issue in the WBID, have decreased dramatically since 2003. In 2002, JEA repaired one pump station located near surface waters that was linked to SSO problems. In 2004, JEA removed the gravity sewer line at Pearl Street and installed a lift station and force main, removing the cause of the repetitive SSO problem in this area. JEA eliminated a reoccurring SSO on Broad Street by relining the force main and then placing the two manholes in the area on the Manhole Monitoring Program. JEA addressed the SSO at 6th Street and North Davis by removing and replacing tuberculated iron piping, scheduling relining, and cleaning pipes in the surrounding area. The completion of these projects has resulted in lower fecal coliform counts in the creek.

Program Implementation – Continued program implementation and additional follow-up, as required by the current Walk the WBID effort, as well as the implementation of the JEA Root Cause Program to identify infrastructure issues, are needed. Additionally, the implementation of systemwide SSO prevention programs, such as FOG and CMOM, should continue. JEA will report its inspection, prevention, and maintenance efforts in the WBID as part of the annual BMAP reporting process to demonstrate that the system is monitored and maintained.

7.4.3 Stormwater

Illicit Connection Removal – Between 2000 and 2008, COJ addressed 12 illegal discharges and 19 sewer lines that drained into a yard or ditch, constituting significant source eliminations. COJ will follow up and provide information on the status of 1 outstanding PIC investigation in the first annual BMAP progress report. COJ and FDOT have committed to continue the PIC Program, which includes identifying additional illicit connections and removing those connections in a timely manner.

FDOT Program Implementation – In accordance with Rule 14-86, F.A.C., FDOT requires any new connections to its MS4 stormwater conveyance systems to be evaluated and permitted to prevent the introduction of new sources to its conveyances. The permit program will continue, and FDOT will periodically inspect its facilities as part of its MS4 permit to prevent unpermitted connections. In addition, the FDOT Adopt-A-Highway Program removes trash from roadways, preventing it from entering the stormwater system and providing a potential medium for bacteria regrowth. This effort is expected to continue if the Adopt-A-Highway volunteers continue to be active in the WBID.

Capital Improvement Projects – FDOT constructed a stormwater improvement project at S.R. 115 and 8th Street that treats 31 acres of roadway and urban runoff through a wet detention pond. COJ completed several projects that are expected to relieve flooding and provide additional acres of stormwater treatment. These projects have reduced the amount of stormwater-related fecal coliform bacteria entering the creek.

Walk the WBID – As a follow-up to the 2008 Walk the WBID effort in Hogan Creek, COJ PWD removed trash from the main channel and conducted maintenance activities on the pond at the Venus and Mars apartment complex, which discharges to Hogan Creek. The removal of trash from the pond prevented trash from entering the creek and providing a potential medium for bacteria regrowth.

7.4.4 Wildlife and Other Anthropogenic Sources

Ducks and other waterfowl densely populate the pond at Confederate Park and are therefore a source of fecal coliform that is considered natural and uncontrollable unless waterfowl populations are unnaturally large. Some areas in the watershed, such as the bridge at Broad Street, appear to be inhabited by homeless populations. COJ should be aware of this potentially significant source and prepare recommendations on how to address the situation in the BMAP annual reports until it is resolved.

TABLE 41: SUMMARY OF RESTORATION ACTIVITIES FOR THE HOGAN CREEK WATERSHED

SOURCE/ACTION	COJ	DCHD	FDOT	JEA
OSTDS				
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 (PSA)	√	X	X	X
Surface Water Sampling for Conditions and Trends	√	X	X	X
Sewer System				
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	√
Air Release Valve (ARV) Inspection and Rehab	X	X	X	*
Program Implementation	X	X	X	√
Private Lift Station Inspections and Enforcement	√	X	X	X
Private Non-NPDES Wastewater Facility Inspections and Enforcement	*	X	X	X
Sanitary Sewer Overflow (SSO) Investigations	√	X	X	√
Surface Water Sampling for Conditions and Trends	X	X	X	√
Stormwater				
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
Pet Waste Management				
Ordinances and Enforcement	√	X	X	X
Public Education and Outreach	√	X	X	X
Special Source Assessment Activities				
Intensive Water Quality Sampling To Track Sources	√	X	X	-
Tributary Assessment Team (TAT)	√	X	X	-
Microbial Source Tracking (MST)	-	X	X	-
Thermal Imagery To Identify PICs	√	X	X	X

Note: Shaded cells (marked with an X) represent activities that do not apply to the associated entity.
* Activity is not applicable to the waterbody due to a lack of infrastructure.
+ FDOT participation in these activities is provided by funding in the NPDES MS4 agreements with COJ.

CHAPTER 8: BUTCHER PEN CREEK (WBID 2322)

8.1 WBID DESCRIPTION

Butcher Pen Creek, WBID 2322, is located in Duval County, west of the LSJR within the Ortega River Planning Unit, as designated by SJRWMD (**Figure 6**). The headwaters of Butcher Pen Creek appear to comprise stormwater runoff originating near the intersection of Jammes Road and Anvers Boulevard South (**Figure 7**). The entire creek flows northward in a single channel, except for two branches joining Butcher Pen Creek from the west. The more northern of the two branches extends west towards Rainer Road and merges with the main channel just east of Arthur Durham Drive. The more southern branch extends west towards Solandra Circle West and joins the main channel just northwest of Claret Drive. The waters of Butcher Pen Creek merge with the Cedar River at Confederate Point and eventually discharge into the Ortega River before reaching the St. Johns River (PBS&J, April 2008).

The spatial distribution and acreage of different land use categories in the Butcher Pen Creek watershed were identified using 2004 land use coverage data from SJRWMD (**Table 42**). The dominant land use (630 acres; 75.1% of total coverage) in the watershed, and directly adjacent to the creek itself, is medium-density residential, which extends throughout the watershed. The next 2 most abundant land cover categories are (1) commercial/utility/institutional areas, located predominantly along Blanding Boulevard, which bisects the watershed north to south (102.2 acres; 12.2% of total coverage); and (2) recreational areas, which border the creek from Nazworth Road southward to Solandra Drive South and are also found in patchy areas in the southwest central portion of the WBID. Upland forests and wetland habitat accounted for less than 5% of land use (PBS&J, April 2008).

According to the 2000 Census, there are 1,873 households in the watershed, averaging 2.5 people per household. It should be noted that a high-density residential area (16 to 25 people per acre) is situated on the eastern side of Butcher Pen Creek between Confederate Point Road and its confluence with the St. Johns River (PBS&J, April 2008). In addition, assuming that 40% of households have 1 dog (Tyler, 2006), there are an estimated 749 dogs in the watershed.

TABLE 42: LAND USES IN THE BUTCHER PEN CREEK WATERSHED

LAND USE	ACRES	% OF TOTAL
Medium-Density Residential	630.0	75.1
Commercial/Utility/Institutional	102.2	12.2
Recreational	36.2	4.3
Wetlands	24.1	2.9
Transportation	17.2	2.0
Upland Forest	11.7	1.4
Water	10.7	1.3
High-Density Residential	6.8	0.8
TOTAL:	**838.9**	**100**

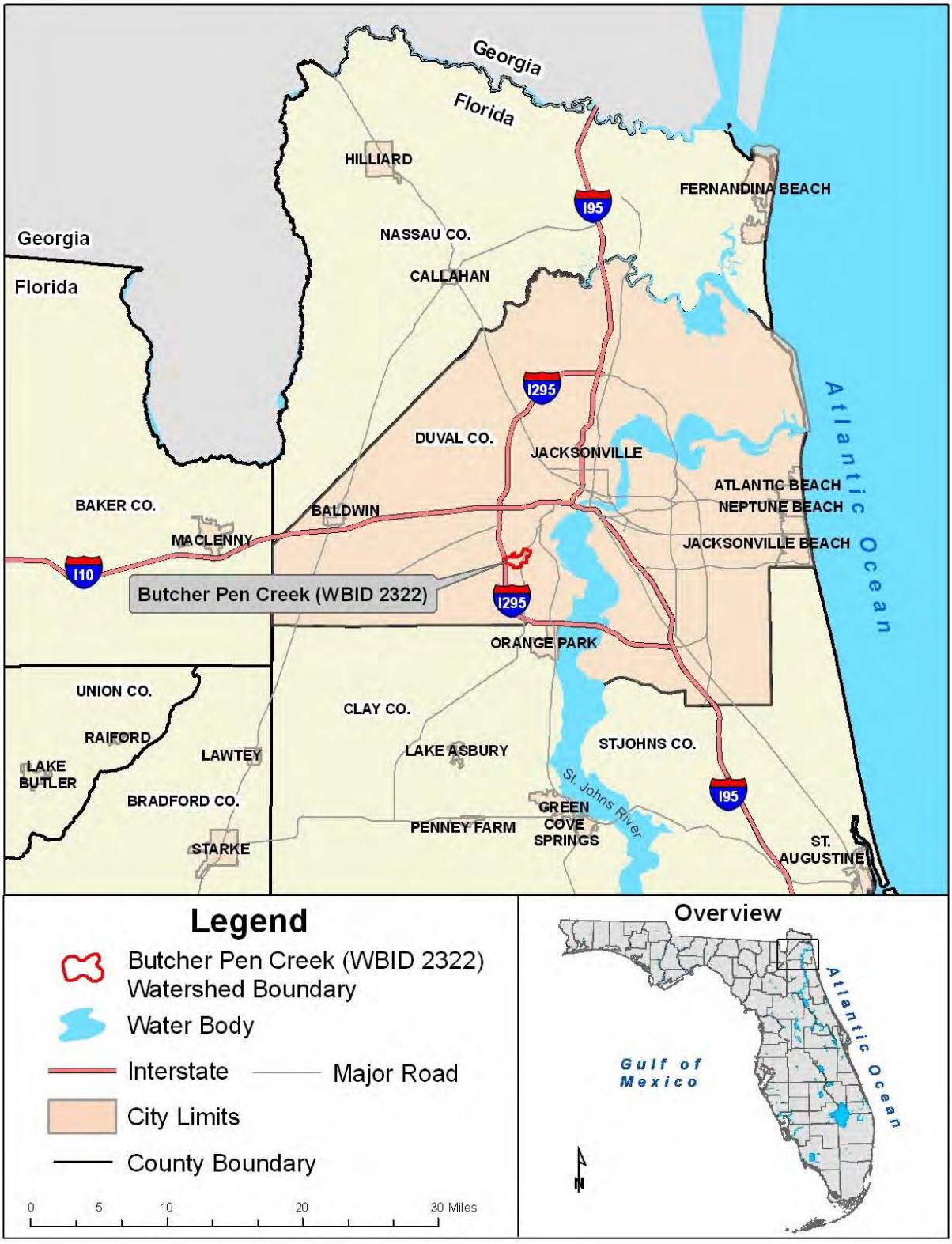

FIGURE 6: LOCATION OF THE BUTCHER PEN CREEK WATERSHED

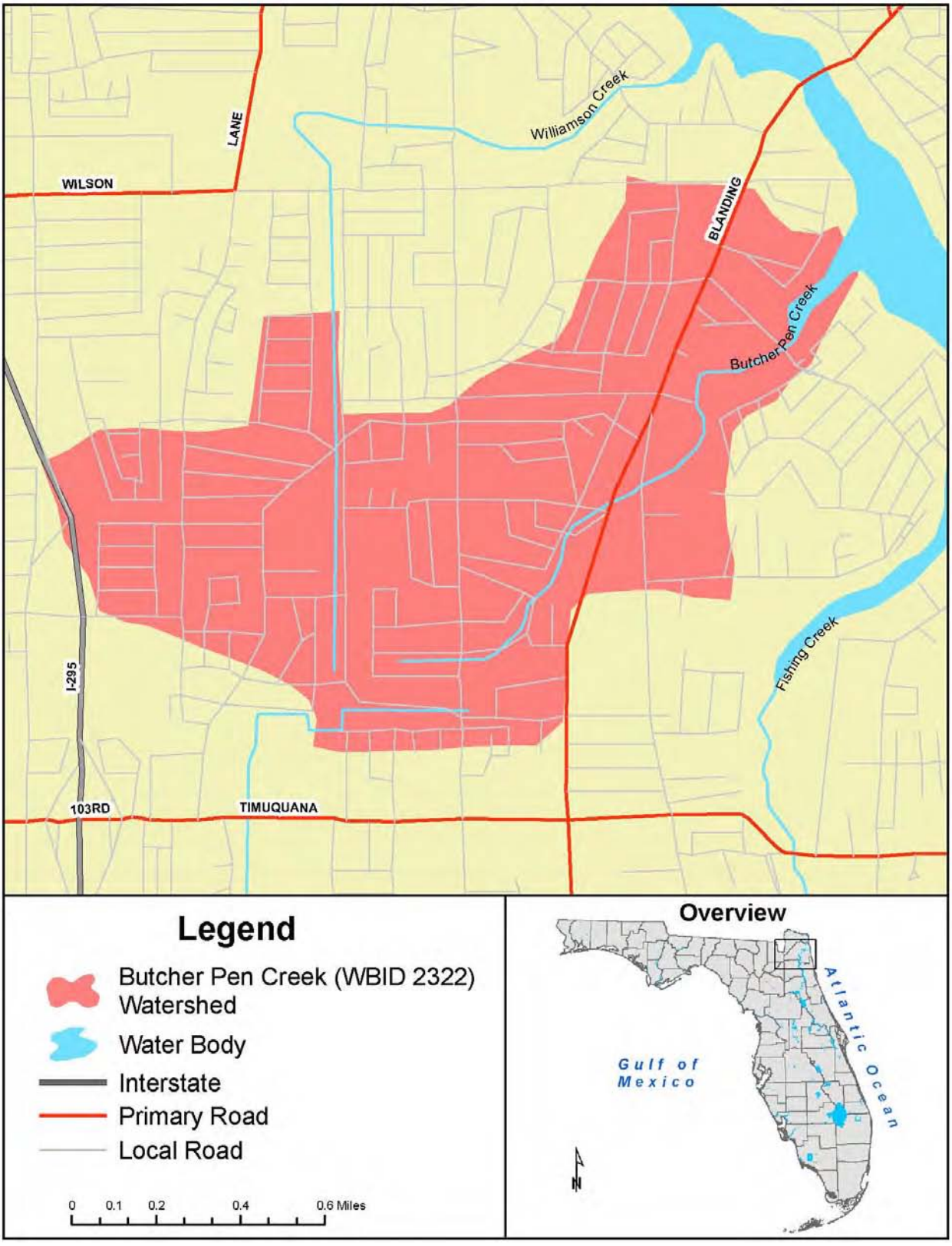

FIGURE 7: BUTCHER PEN CREEK WBID LOCATOR MAP

8.2 Potential Sources

8.2.1 Point Sources

There are no industrial or domestic wastewater facilities, CAFOs, application sites for septic residuals, or landfills permitted to discharge to Butcher Pen Creek. The Jacksonville Heights WWTF discharges UV-treated wastewater into a ditch system approximately 0.75 miles south of the WBID at 5957 Tampico Road. The UV light is used at the WWTF to eliminate bacterial contamination, and thus the WWTF should not be a source of fecal coliform as long as the required treatment is being performed. The ditch system runs east towards Fishing Creek and north into the Butcher Pen WBID, just south of the main stem near the Romilly Drive and Jammes Road intersection. Therefore, there is a potential for wastewater discharges from the facility to contribute to the bacteriological loading of Butcher Pen Creek. In addition, the COJ/FDOT MS4 permit includes the Butcher Pen Creek watershed (PBS&J, April 2008).

8.2.2 Illicit Discharges

COJ EQD is continuing a program to identify, confirm, and respond to illicit connection issues in Jacksonville. COJ identified 27 PICs in the Butcher Pen Creek watershed between 2000 and 2005. Three of these were determined to be illicit connections and were removed. There are 14 PICs still pending investigation.

8.2.3 Centralized Sewage Infrastructure and Overflows

An estimated 1,894 households (approximately 100% of households) are connected to the sanitary sewer system in the Butcher Pen Creek watershed. From 2001 to 2007, JEA reported a total of 16 SSOs within the Butcher Pen Creek WBID boundaries (**Table 43**). The estimated volume of spill associated with these overflows ranged from 10 to 1,200 gallons and averaged 276 gallons (PBS&J, April 2008).

The number of reported SSOs has likely contributed to the overall contamination of the watershed, considering that 5 of the 16 (31%) reported events were observed to potentially impact the associated surface waters. The watershed includes abundant sewer infrastructure (e.g., lift station, sewer mains, manholes) near to and crossing either above or below the creek; therefore, continual inputs from unidentified sewer infrastructure leaks (e.g., from underground sewer mains) may be contributing to the overall bacterial contamination (PBS&J, April 2008).

TABLE 43: SSOS REPORTED IN THE BUTCHER PEN CREEK WATERSHED, 2001–07

WBID NAME (NUMBER)	DATE OF OVERFLOW	ESTIMATED VOLUME OF SPILL (GALLONS)	POTENTIALLY IMPACTED SURFACE WATERS
Butcher Pen Creek (2322)	19-Apr-02	150	No
Butcher Pen Creek (2322)	6-May-02	20	No
Butcher Pen Creek (2322)	28-May-02	200	No
Butcher Pen Creek (2322)	19-Aug-02*	300	Yes
Butcher Pen Creek (2322)	17-Sep-02	10	No
Butcher Pen Creek (2322)	23-Sep-02*	1,200	Yes
Butcher Pen Creek (2322)	25-Sep-02	10	No
Butcher Pen Creek (2322)	8-Jul-03	200	No
Butcher Pen Creek (2322)	22-Oct-03	50	No
Butcher Pen Creek (2322)	17-Oct-04	500	No
Butcher Pen Creek (2322)	2-Nov-04*	800	Yes
Butcher Pen Creek (2322)	1-Dec-04	20	No
Butcher Pen Creek (2322)	9-Dec-05	100	No
Butcher Pen Creek (2322)	14-Feb-06	30	No
Butcher Pen Creek (2322)	10-Oct-07*	770	Yes
Butcher Pen Creek (2322)	8-Mar-08*	50	Yes

Note: The October 2007 and March 2008 SSOs occurred after the reporting period.
*Reportable SSOs that spilled > 1,000 gallons of sewage and/or affected surface waters.

8.2.4 OSTDS

WSEA estimates that there are a total of 108 septic tanks in the WBID. According to DCHD, 13 septic tank repair permits were issued in the area. The majority of the permits, and presumably failed septic systems, were located in the northeast corner of the WBID.

There is one DCHD-designated septic-tank failure area, Cedar River, located in the watershed. Approximately 15% of the failure area is within the WBID. Since the majority of homes are connected to sanitary sewer in the Butcher Pen Creek watershed, it is unlikely that septic tanks are responsible for the high levels of fecal coliform that have been observed (PBS&J, April 2008).

8.2.5 NONPOINT SOURCES

An analysis of impervious surface indicates that the Butcher Pen WBID contains predominantly 10 to 25% impervious surface; however, the majority of land close to the creek has greater than 25% impervious surface. It should be noted that although more elevated levels of fecal coliform contamination appear to be associated with areas of higher percent impervious surface, the high density of wastewater infrastructure in these portions of the watershed should also be considered as a likely source. Furthermore, the calculation of runoff coefficients demonstrates that the majority of the WBID contains a moderate-to-high potential for stormwater runoff, especially near the creek (PBS&J, April 2008).

The storm sewer network in the Butcher Pen Creek watershed includes a total of 8 permitted stormwater treatment areas, encompassing approximately 25.82% of the WBID area. Stormwater infrastructure in the WBID includes 72 outfalls by receiving water (none classified by FDEP as a major outfall) and 411 inlets. Although closed conveyances are common throughout the WBID, ditch systems are primarily confined to the western and southern portions (PBS&J, April 2008).

Higher concentrations of fecal coliform were identified in the "wet" season (June through October), suggesting that the majority of bacterial loading was delivered to Butcher Pen Creek through nonpoint source discharges, failing wastewater conveyance systems, or septic systems during high rainfall. Elevated levels of fecal coliform following rainfall may be an indication that pollution from unidentified sources (e.g., leaking wastewater conveyance systems) is being transported by stormwater into Butcher Pen Creek.

8.3 Projects To Reduce Fecal Coliform Loading

8.3.1 JEA Activities in the Butcher Pen Creek Watershed

8.3.1.1 Ongoing JEA Programs and Activities

JEA is currently implementing a number of countywide specific improvement programs, as follows, to address the sanitary sewer system as a source of fecal coliform contamination: (1) FOG Reduction Program; (2) SSO Root Cause Program; (3) Pop-Top Program; (4) Non-Destructive Testing and ARV Programs; (5) SCADA; (6) Third Party Education and Enforcement Program; (7) Manhole Monitoring; (8) Force Main Discharge Manholes; and (9) CMOM Program. **Appendix E** describes each of these programs.

JEA inspected sections of sewer infrastructure in the midstream portion of Butcher Pen Creek as part of the TAT-directed reconnaissance. Investigations included surcharged dye testing that did not identify any leaks into the creek; however, a manhole located at 4557 Arthur Durham Drive did show evidence of a recent overflow. JEA reported that additional investigations of the line were being conducted. A cave-in on a gravity line was also identified at a pump station at 4807 Ducheneau Drive and was given a priority status for repair. There was no evidence of overflow at that location (PBS&J, April 2008).

JEA conducts several types of activities to replace or rehabilitate failing or leaking infrastructure, including pipe bursting, CIPP, and open cut. A total of 15.75% of the sewer lines in the WBID have been pipe bursted, 0.89% have CIPP, and 0.39% have been repaired through open cut. JEA has also replaced or repaired components on 3 of the 8 (37.5%) lift stations in the WBID. In addition, JEA conducts activities to help prevent future infrastructure problems. In FY07, JEA inspected 1,594 LF of pipe and cleaned 6,467 LF of pipe. These activities will continue in the future to maintain the sanitary sewer system and prevent future problems.

Table 44 provides additional information on JEA's activities in the Butcher Pen Creek watershed.

TABLE 44: JEA ACTIVITIES IN THE BUTCHER PEN CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	ESTIMATED COST	FUNDING SOURCE	PROJECT STATUS	START DATE OF PROJECT
Sewer Upgrades							
JEA – 32	Pipe Bursting – Increase Carrying Capacity	Replace failing/leaking infrastructure	Total footage of pipe burst in watershed since 2001: 71,072	$5,440,212	JEA	Ongoing	FY00
JEA – 33	CIPP – Install New Inner Lining	Rehabilitate failing/leaking infrastructure	Total footage of CIPP in watershed since 2001: 4,030	$741,836	JEA	Ongoing	FY00
JEA – 34	Open Cut – Removal and Replacement	Replace failing/leaking infrastructure	Total footage of open cut replacement in watershed since 2001: 1,770	$442,500	JEA	Ongoing	Ongoing
Other Sewer Infrastructure Upgrades							
JEA – 35	Manhole Linings Rehabbed	Repair deteriorating manhole linings	Not applicable	$330,469*	JEA	Ongoing	FY01
JEA – 36	Line Inspection of Manhole at 4557 Arthur Drive	Report on results of manhole line inspection	Inspect one manhole	Unknown	JEA	Planned	2009
JEA – 37	ARV Inspection and Rehab	See **Appendix E**	2 ARVs replaced within 200 feet of tributary (only 3 ARVs total in watershed)	$481,873*	JEA	Ongoing	Ongoing
JEA – 38	Pump Station SCADA Upgrades	Retrofitting completed in 2004; all stations constructed since have SCADA installed. See **Appendix E.**	Not applicable	Unknown	JEA	Complete	Complete
JEA – 39	Inspect Force Main Discharge Manholes, Repair/Rehab as Necessary	See **Appendix E**	Not applicable	$466,576*	JEA	Ongoing	FY07
JEA – 40	Pump Station Class I/II Rebuilding	Repair or replace components of existing pump stations	Projects in watershed since 2002: 3	$195,163	JEA	Ongoing	Ongoing
JEA – 41	Pump Station Repair at 4807 Ducheneau Drive	Report on status of pump station repair in first annual progress report	Repair one pump station	Unknown	JEA	Planned	2009
Programs To Reduce Sewer Problems							
JEA – 42	FOG Reduction Program	See **Appendix E**	Not applicable	Unknown	JEA	Ongoing	Current FOG program initiated in 2004
JEA – 43	Pipe TV Inspection	Inspect existing infrastructure through use of closed-circuit TV system	1,594 LF of pipe inspected (FY07)	$163,099*	JEA	Ongoing	Carried over from city operation (1997)
JEA – 44	Pipe Cleaning	Clean existing pipes to avoid blockages	6,467 LF of pipe cleaned (FY07)	$743,054*	JEA	Ongoing	Carried over from city operation (1997)
JEA – 45	Implement CMOM Program	See **Appendix E**	Not applicable	$ 163,269*	JEA	Ongoing	Ongoing

Project Number	Project Name	Project Description	Level of Effort	Estimated Cost	Funding Source	Project Status	Start Date of Project
JEA – 46	Manhole Monitoring	See **Appendix E**	Not applicable	$ 137,526*	JEA	Ongoing	August 2007
JEA – 47	SSO Root Cause Program	See **Appendix E**	Not applicable	Unknown	JEA	Ongoing	February 2007
JEA – 48	Pop-Top Program	See **Appendix E**	Not applicable	$64,324*	JEA	Ongoing	February 2007
JEA – 49	Non-Destructive Testing Program/Pipe Integrity Testing	See **Appendix E**	Not applicable	$74,284*	JEA	Ongoing	Ongoing

* Costs provided are total systemwide costs for the program because WBID-specific costs are currently unavailable.

8.3.2 DCHD Activities in the Butcher Pen Creek Watershed

Currently, DCHD is implementing a variety of countywide specific improvement programs and restoration activities to address OSTDS as sources of fecal coliform contamination. These include (1) the OSTDS Program, (2) training programs, and (3) the designation of septic tank failure and nuisance areas for transfer to central sewer (**Appendix E**). As of July 28, 2008, DCHD updated the listing of failure and nuisance areas. There is currently 1 designated failure area, Cedar River, in the Butcher Pen Creek watershed. Approximately 15% of this area is located in the WBID.

As part of the OSTDS Program, DCHD has issued 4 new construction permits, 13 repair permits, and 5 abandonment permits in the WBID. In addition, 1 annual operating permit has been issued for a PBTS in the watershed. DCHD has also performed 22 plan reviews and 13 complaint investigations. It will continue these activities in the future to reduce and prevent issues related to OSTDS. **Table 45** shows the DCHD project table for Butcher Pen Creek.

TABLE 45: DCHD ACTIVITIES IN THE BUTCHER PEN CREEK WATERSHED

Project Number	Project Name	Project Description	Level of Effort	Estimated Cost (1996–2008)	Funding Source	Project Status
DCHD – 13	OSTDS Program	Implementation of programs to address septic systems as potential sources	Approximately 4 new construction permits, 13 repair permits, and 5 abandonment permits issued	$8,000	FDOH	Ongoing
DCHD – 14	Annual Operating Permits	Annual operating permits issued for PBTS, systems located in IMZ, and commercial systems	1 annual operating permit issued for PBTS/IMZ in WBID	$2,500	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 15	SWIM Project	Implementation of broad-ranging septic tank ordinance	Approximately 15% of Cedar River Septic Tank Failure Area is in WBID	$48,750	FDOH/ LSJR SWIM Grant	Completed
DCHD – 16	DCHD-Sponsored Training Programs	Annual training programs held for septic tank contractors, certified plumbers, maintenance entities, and environmental health professionals	1 to 2 trainings per year providing up to 12 contact hours	$2,500	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 17	Application/ Plan Review/ Site Evaluations	DCHD performs plan review and site evaluation for each application received for OSTDS new construction, repair, or modification of existing system	Approximately 22 plan reviews and site evaluations have been performed in WBID based on permitting history	$5,000	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 18	Septic Tank Failure Area Ranking	Septic tank failure area scored and prioritized on annual basis	Less than 1 year since previous update	Not applicable		Ongoing

Project Number	Project Name	Project Description	Level of Effort	Estimated Cost (1996–2008)	Funding Source	Project Status
DCHD – 19	Complaint Investigations	DCHD investigates all complaints received, performs site visit, and initiates enforcement action on sanitary nuisance violations	13 complaint investigations have been performed in WBID	$1,500	FDOH/ LSJR SWIM Grant	Ongoing

8.3.3 COJ Activities in the Butcher Pen Creek Watershed

8.3.3.1 Completed COJ Projects

COJ PWD has completed 2 wet detention projects in the watershed to capture and treat stormwater runoff: the Wesconnett Boulevard and La Moya Roadway projects treat 396 acres and 17 acres, respectively. These projects help to reduce stormwater-associated bacterial loadings to Butcher Pen Creek.

8.3.3.2 Ongoing COJ Programs and Activities

COJ has also established a monitoring plan to evaluate the effectiveness of the SWMP and the associated pollutant reduction from MS4 systems to waters of the state. As part of this plan, COJ has 1 routine monitoring station in the watershed that is sampled quarterly. A total of 46 samples were taken at this station between 1995 and 2008. In addition to the routine sampling, COJ EQD also participates in the TAT and has collected 12 samples at 8 sites as part of this effort.

COJ PWD's Streets and Drainage Division is responsible for maintaining its stormwater conveyance systems in Jacksonville. This maintenance includes 115 work orders for ditch and creek regrading, erosion control, and cleaning; 2 work orders for lake and pond maintenance; and 76 work orders for the repair of blocked structures and measures to prevent flooding. These work orders were completed between 2005 and 2008. PWD will continue a level of effort to maintain the MS4 conveyances based on CARE requests.

In addition, COJ has implemented the PIC Program, which keeps track of reported PICs in a database for COJ inspector follow-up. A total of 27 PICs were identified, with 3 confirmed as illicit and removed, and 14 still pending investigation. As part of the PIC Program, COJ EQD provides public outreach through educational pamphlets, informational door hangers, and the storm drain–stenciling program.

COJ PWD also conducts inspections in the watershed that are initiated through the CARE database. Between 2000 and 2008, PWD conducted two investigations into illicit water discharges, four illegal discharges, two sewer lines that drained into a yard or ditch, and nine SSOs. PWD will maintain a future level of effort for these investigations based on requests, which are logged and tracked through the CARE database.

Table 46 provides additional details on COJ's activities in the watershed.

TABLE 46: COJ ACTIVITIES IN THE BUTCHER PEN CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	TOTAL COST	FUNDING SOURCE	PROJECT STATUS
Capital Improvement Projects						
COJ – 43	Wesconnett Blvd (Blanding to Blanding)	Wet detention	396 acres	Unknown	COJ	Complete
COJ – 44	La Moya Roadway Project	Wet detention	17 acres	Unknown	COJ	Complete
MS4 Maintenance Activities						
COJ – 45	Ditch/Creek Regrade/Erosion/Clean	Completed in response to CARE requests. Costs limited to activities completed after release of work order system.	115 (for 2005–08)	$7,000	COJ	Ongoing
COJ – 46	Lake or Pond Problem		2 (for 2005–08)	Unknown	COJ	Ongoing
COJ – 47	Structure Blocked/Repair/General Flooding		76 (for 2005–08)	$38,484	COJ	Ongoing
Inspection, Enforcement, and Sampling						
COJ – 48	Illicit Water Discharge	CARE-initiated Inspection	2 (for 2000–08)	$424	COJ	Ongoing
COJ – 49	Pollution – Water – Illegal Discharge	CARE-initiated Inspection	4 (for 2000–08)	$848	COJ	Ongoing
COJ – 50	Sewer Drains into Yard/Ditch	CARE-initiated Inspection	2 (for 2000–08)	$424	COJ	Ongoing
COJ – 51	Sewer Overflow	CARE-initiated Inspection	9 (for 2000–08)	$1,908	COJ	Ongoing
COJ – 52	Private Lift Station Inspection	No lift stations in WBID; inspect as ID stations or new stations constructed	Not applicable	Not applicable	COJ	Ongoing
COJ – 53	Illicit Discharge Detection and Elimination	3 illicit, 14 open	27 (for 2000–05)	$5,724	COJ	Ongoing
COJ – 54	Follow Up on Outstanding PICs	Follow up on 14 open PICs in watershed	14 (for 2009–10)	$2,968	COJ	Planned
COJ – 55	Routine Surface Water Sampling	NPDES permit-related quarterly water quality sampling – 1 sampling station in WBID	46 (for 1995–2008)	$20,562	COJ	Ongoing
COJ – 56	TAT Sampling	Conducted by EQD to assess bacteria levels in creek and identify potential fecal bacteria sources	8 sites/12 samples	$5,364	COJ	Ongoing
Septic Tank Phase-Out Program						
COJ – 57	Cedar River Failure Area – Septic Tank Phase-Out	Phase-out of septic tanks in failure areas (also listed as part of larger LSJR Main Stem BMAP project)[1]	69 total tanks, 0 connected	Unknown	COJ	Ongoing
COJ – 58	Outside Failure Areas – Septic Tank Phase-Out	Phase out program as provided by COJ ordinance	39 total tanks, 0 connected	Unknown	COJ	Ongoing
COJ – 59	Septic Tank Maintenance Public Education	Public service announcements	Ongoing	Unknown	COJ	Ongoing
Management and Reduction of Pet and Animal Waste						
COJ – 60	Pet/Animal Management Public Education	Public service announcements	Ongoing	Unknown	COJ	Ongoing

Note: Inspection unit cost = $212; sampling event unit cost = $447; and septic tank per connection = $35.

[1] COJ has committed to removing septic tanks in failure areas that are within 300 meters of a surface water in the 2008 LSJR Main Stem BMAP. COJ must submit a plan to FDEP for removing septic tanks within 6 months of completion of the septic tank study, or by June 30, 2011, whichever is earlier. At a minimum, COJ will accomplish a 50% implementation of the septic tank phase-out projects by July 31, 2015, with the phase-outs completed by December 31, 2023. For the 10 tributaries addressed in this BMAP, a total of 1,167 septic tanks are located in failure areas, although not all of them may be located within 300 meters of a surface waterbody. The failing tanks within 300 meters of a surface waterbody will be included in the COJ plan and schedule to phase out tanks and will be identified as Tributaries BMAP-related tanks in the plan.

8.3.4 FDOT Activities in the Butcher Pen Creek Watershed

8.3.4.1 Ongoing FDOT Programs and Activities

Under Subsection 334.044(15), F.S., and Rule 14-86, F.A.C., FDOT implements a Drainage Connection Program. The program does not issue water quality permits but requires the connecting entity to certify that the discharge is of acceptable water quality. Connecting entities are required to maintain the discharge of acceptable water quality for the duration of the FDOT Drainage Connection permit. If connecting entities fail to meet this requirement after sufficient warning by FDOT, they will be reported to FDEP, SJRWMD, and, if applicable, to the local municipality; these entities regulate stormwater quality through state rules, ordinances, and codes. FDOT performs periodic site inspections as part of the MS4 NPDES permit. FDOT also sweeps 12 miles of roadways in the watershed monthly, reducing the amount of trash and sediment entering the stormwater conveyance system.

FDOT also works with COJ on several efforts related to the MS4 permit. FDOT participates in the PIC Program in conjunction with COJ. FDOT has instructed staff to be alert for illicit connections during routine maintenance activities, and investigates observances found in the right of way. Those located outside the right of way are reported to the applicable municipality for further investigation and enforcement action. FDOT maintains a toll-free number to be used for reporting illicit connections. FDOT also contributes funding for one monitoring station in the Butcher Pen Creek watershed that is sampled quarterly as part of the routine monitoring program. FDOT will continue these activities in the future to support the maintenance of the MS4 system. **Table 47** lists FDOT's activities in the watershed.

Table 47: FDOT Activities in the Butcher Pen Creek Watershed

Project Number	Project Name	Estimated Cost	Funding Source	Level of Effort	Project Status
Identification and Removal of Illicit Connections					
FDOT – 13	PIC Program – Search for Illicit Connections	See Note 1	State of Florida (FDOT)/COJ	Effort is continuous in WBID	Ongoing
FDOT – 14	PIC Program - Illicit Connections Identified and Removed in WBID if Found To Be Truly Illicit	See Note 1	State of Florida (FDOT)/COJ	No illicit connection found to date	Ongoing
Surface Water Sampling To Assess Conditions and Identify Sources					
FDOT – 15	Routine Tributary Monitoring as Part of MS4 Permit	See Note 2	State of Florida (FDOT)/COJ	1 station quarterly	Ongoing
Drainage Connection Program (DCP)					
FDOT – 16	DCP – Connecting Entity Must Certify that All Discharges to FDOT MS4 Are Treated Prior to Connection	See Note 3	State of Florida (FDOT)	Ongoing effort	Ongoing
Street Sweeping Program					
FDOT – 17	Street Sweeping Program	$3,287	State of Florida (FDOT)	12 miles of roadway swept monthly	Ongoing

Project Number	Project Name	Estimated Cost	Funding Source	Level of Effort	Project Status
Routine Maintenance Activities					
FDOT – 18	Maintain FDOT Stormwater Systems	See Note 5	State of Florida (FDOT)	Clean drainage structures, replace/repair storm/cross/side drains, clean/reshape roadside ditches, clear/repair outfall ditches, mowing, roadside litter removal, respond to citizen complaints	Ongoing

[1] Countywide Program – Average cost is $37,605 per year contribution to COJ.
[2] Countywide Program – Average cost is $22,546 per year contribution to COJ.
[3] Countywide Program – Average cost is $27,151 per year.
[5] Countywide Program – Average cost is $2,750,735 per year.

8.4 Summary of Restoration Activities and Sufficiency of Efforts

Table 44 through **Table 47** list the projects and programs to reduce fecal coliform loading in the Butcher Pen Creek watershed. Several key efforts completed in the WBID are summarized below, as well as activities that are expected to continue or to be implemented in future years. The efforts outlined in the project tables, including the activities highlighted below, will reduce fecal coliform loading and improve water quality in Butcher Pen Creek based on the best information available about fecal coliform sources. As water quality improves in response to these actions and the bacteria source information is refined, future BMAPs may recommend different activities or levels of effort. For this BMAP, the full implementation of the projects and programs listed in the project tables for the Butcher Pen Creek watershed is sufficient to significantly reduce fecal coliform sources and make substantial progress towards meeting the TMDL.

8.4.1 OSTDS

Failure Area – Of approximately 108 septic tanks within the WBID boundary, 69 systems are located in the Cedar River failure area and are eligible to receive sewer connection. The majority of the 13 OSTDS repair permits issued since 1996 are located in the northeastern corner of the watershed, in the septic tank failure area. COJ committed to removing septic tanks in failure areas that are within 300 meters of surface waters in the 2008 LSJR Main Stem BMAP. The failing tanks in the Cedar River failure area in the Butcher Pen Creek watershed within 300 meters of surface waters will be included in the COJ phase-out plan and schedule, as described in the Main Stem BMAP, and will be identified in the plan as Tributaries BMAP-related efforts.

Program Implementation – Septic tanks do not appear to be a major contributor to fecal coliform loading in the WBID. DCHD will continue its programs, inspections, and enforcement efforts, which will be sufficient to address the remaining OSTDS at this time.

8.4.2 Sewer Infrastructure

Private Infrastructure – The COJ database does not indicate that there are private sewer lift stations in the watershed; however, the database only includes private lift stations permitted by COJ since 1991, or lift stations that have applied for repair permits since that time. It is likely that private lift stations are located in the watershed but have not been identified. As private stations are identified or new private lift stations are constructed, COJ will include these stations in the BMAP annual progress report and implement annual inspections.

Sewer Infrastructure Projects – Since 2002, the frequency and severity of SSOs has been decreasing. JEA replaced 2 ARVs within 200 feet of surface waters, preventing line failure from corrosive gases. Three lift stations were rebuilt in the watershed: 1 at the site of a repetitive SSO and the others near surface waters. A manhole at 4557 Arthur Durham Drive is scheduled for line inspection, and JEA will provide the results of this inspection for the first BMAP annual progress report. Additionally, JEA will provide information on the status of the pump station repair at 4807 Ducheneau Drive that has a cave-in of the gravity line. JEA will continue these efforts and its systemwide programs, and this will be sufficient to address potential sewer sources in the WBID at this time.

Program Implementation – Program implementation, including inspections and line cleaning coupled with the Root Cause Program, are proactive activities preventing fecal coliform loading. Systemwide SSO prevention programs, such as FOG and CMOM implementation, should be continued. JEA will be expected to report its inspection, prevention, and maintenance efforts in the WBID as part of the annual BMAP reporting process to ensure that the system is being monitored and maintained.

8.4.3 Stormwater

Illicit Connection Removal – The PIC Program has removed 3 illicit discharges; however, 14 inspections are currently still pending. COJ must complete the PIC investigations and either execute enforcements or close the cases within a year of BMAP adoption and report the results in the annual BMAP progress report.

FDOT Program Implementation – In accordance with Rule 14-86, F.A.C., FDOT requires any new connections to its MS4 stormwater conveyance systems to be evaluated and permitted to prevent the introduction of new sources to its conveyances. This permit program will continue, and FDOT will continue to periodically inspect its facilities as part of its MS4 permit to prevent unpermitted connections. In addition, FDOT sweeps 12 miles of roadway monthly, preventing sediments from entering the stormwater conveyance system, and funds public education campaigns addressing nonpoint pollution and preventative measures. FDOT will continue stormwater infrastructure maintenance, as these efforts prevent potential regrowth in the MS4 conveyances.

COJ Program Implementation – COJ continues to maintain ditches, ponds, and stormwater infrastructure to prevent problems and fecal coliform loading from the MS4 system. Since 2005, it has completed 76 repairs to the stormwater system in the watershed. Additionally, 2 wet detention projects treat over 300 acres, reducing the stormwater-associated fecal coliform loading to Butcher Pen Creek.

TABLE 48: SUMMARY OF RESTORATION ACTIVITIES FOR THE BUTCHER PEN CREEK WATERSHED

SOURCE/ACTION	COJ	DCHD	FDOT	JEA
OSTDS				
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 (PSA)	√	X	X	X
Surface Water Sampling for Conditions and Trends	√	X	X	X

Source/Action	COJ	DCHD	FDOT	JEA
Sewer System				
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	√
Air Release Valve (ARV) Inspection and Rehab	X	X	X	√
Program Implementation	X	X	X	√
Private Lift Station Inspections and Enforcement	-	X	X	X
Private Non-NPDES Wastewater Facility Inspections and Enforcement	*	X	X	X
Sanitary Sewer Overflow (SSO) Investigations	-	X	X	√
Surface Water Sampling for Conditions and Trends	X	X	X	√
Stormwater				
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
Pet Waste Management				
Ordinances and Enforcement	√	X	X	X
Public Education and Outreach	√	X	X	X
Special Source Assessment Activities				
Intensive Water Quality Sampling To Track Sources	√	X	X	-
Tributary Assessment Team (TAT)	√	X	X	√
Microbial Source Tracking (MST)	√	X	X	√
Thermal Imagery To Identify PICs	-	X	X	X

Note: Shaded cells (marked with an X) represent activities that do not apply to the associated entity.
* Activity is not applicable for the waterbody due to a lack of infrastructure.
+ FDOT participation in these activities is provided by funding in the NPDES MS4 agreements with COJ.

CHAPTER 9: MILLER CREEK (WBID 2287)

9.1 WBID DESCRIPTION

Miller Creek, WBID 2287, is located in Duval County, south of the LSJR within the North Mainstem Planning Unit, as designated by SJRWMD (**Figure 8**). The headwaters of Miller Creek appear to comprise stormwater runoff originating at West Seville Street (**Figure 9**). The entire creek flows northward in a single channel, except for two branches that join Miller Creek from the east (more northern branch) and west (more southern branch). Segments of each branch appear to be man-made and are classified by COJ PWD as ditches. The more northern of the two branches extends east towards the Hart Bridge Expressway and merges with the main channel just east of Luce Street. The more southern branch extends northwest to just south of South Street and joins the main channel east of the intersection of Drexel Street and Schumacher Avenue. The main channel widens just downstream of Atlantic Boulevard and merges with the St. Johns River north of Morier Street (PBS&J, May 2008).

The spatial distribution and acreage of different land use categories in the Miller Creek watershed were identified using 2004 land use coverage data from SJRWMD (**Table 49**). Miller Creek traverses the watershed within a commercial/utility/institutional landscape that supports neighboring high-, medium-, and low-density residential communities. The dominant land use (212.8 acres; 33.8% of total coverage) in the Miller Creek watershed, and found adjacent to the lower reaches of the creek and in patches throughout the watershed, is medium-density residential. The next two most abundant land cover categories are (1) commercial/utility/ institutional areas (169.7 acres; 27% of total coverage), and (2) high-density residential (103.6 acres; 16.5% of total coverage). Upland forests and wetland habitat accounted for less than 5% of land use (PBS&J, May 2008).

According to the 2000 Census, there are 1,618 households in the watershed, averaging 1.93 people per household. Areas with the highest population densities are not located directly adjacent to the creek, except for one area (population density 16 to 25 people per acre) adjacent to the east side of the creek, between Beach and Atlantic Boulevards (PBS&J, May 2008). In addition, assuming that 40% of households have 1 dog (Tyler, 2006), there are an estimated 647 dogs in the watershed.

TABLE 49: LAND USES IN THE MILLER CREEK WATERSHED

2004 LAND USE	ACRES	% OF TOTAL
Medium-Density Residential Total	212.8	33.8
Commercial/ Utility/Institutional Total	169.7	27.0
High-Density Residential Total	103.6	16.5
Low-Density Residential Total	61.8	9.8
Transportation Total	36.9	5.9
Wetlands Total	13.8	2.2
Water Total	12.8	2.0
Upland Forest Total	7.2	1.1
Recreational Total	6.9	1.1
Open Land Total	3.8	0.6
TOTAL:	**629.3**	**100**

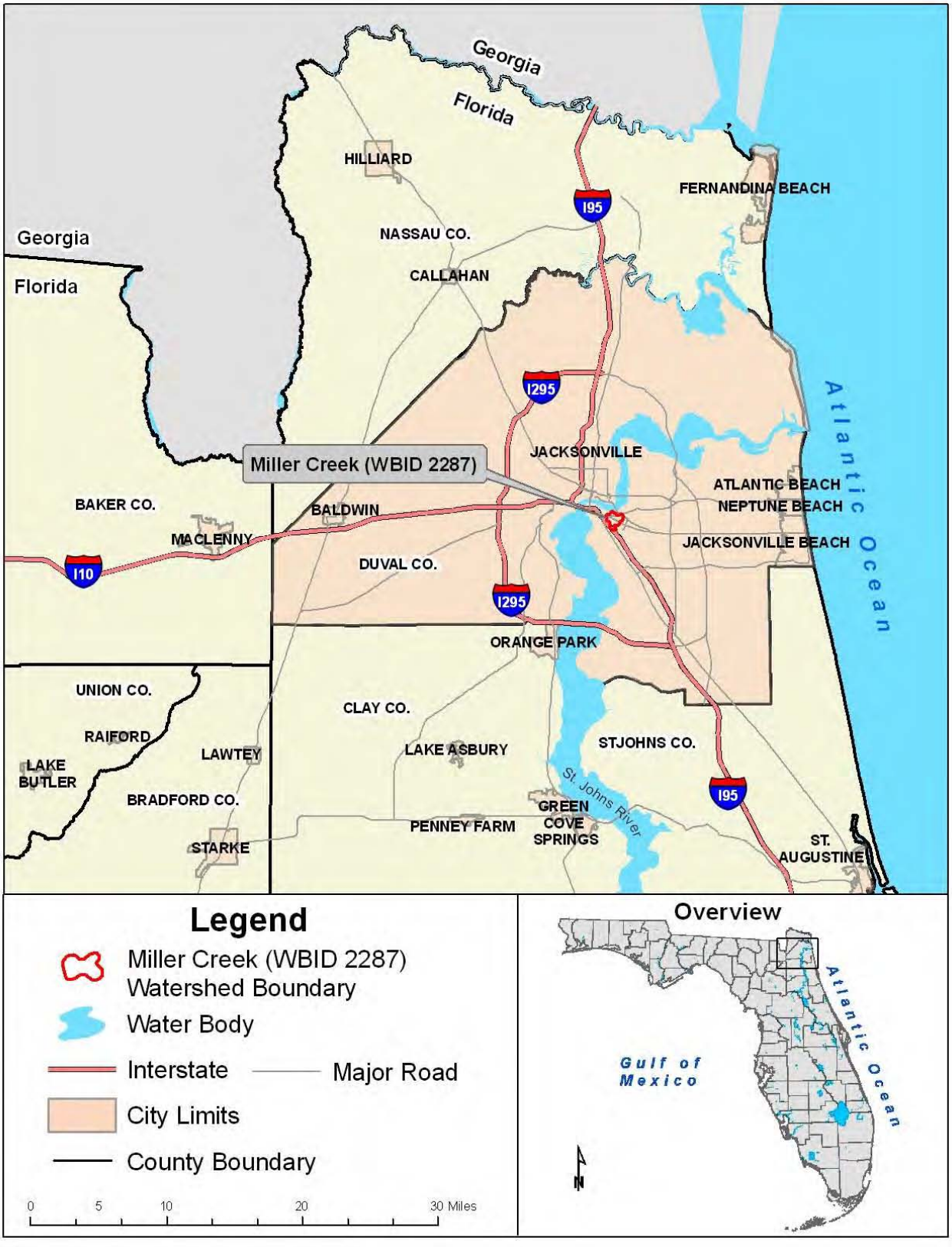

FIGURE 8: LOCATION OF THE MILLER CREEK WATERSHED

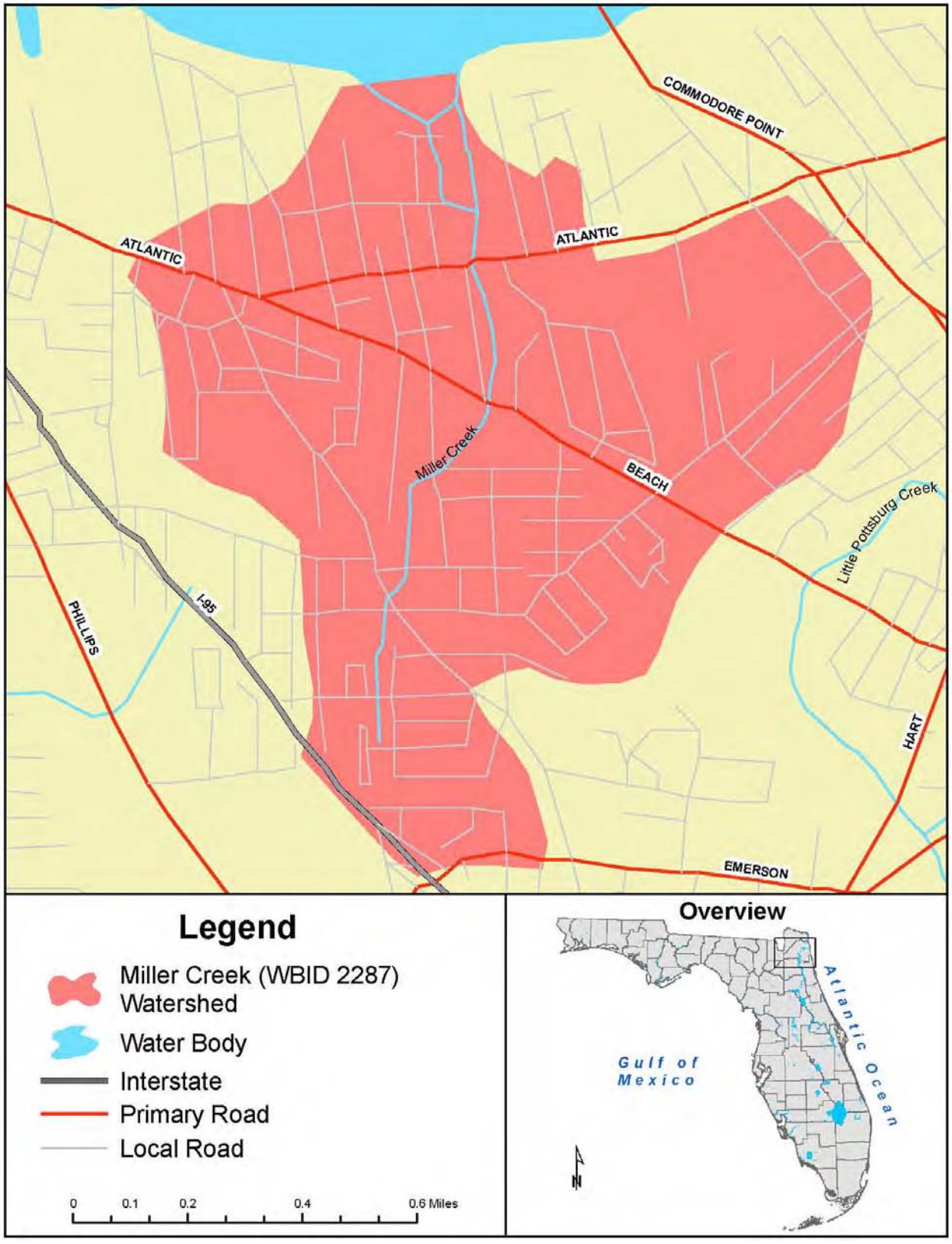

FIGURE 9: MILLER CREEK WBID LOCATOR MAP

9.2 Potential Sources

9.2.1 Point Sources

There are no industrial or domestic wastewater facilities, CAFOs, application sites for septic residuals, or landfills permitted to discharge to Miller Creek. The COJ/FDOT MS4 permit includes the Miller Creek watershed (PBS&J, May 2008).

9.2.2 Illicit Discharges

COJ EQD is continuing a program to identify, confirm and respond to illicit connection issues in Jacksonville. A total of 13 PICs were identified in the Miller Creek watershed between 1998 and 2004. Of these, 1 connection was determined to be illicit and was removed from the system. The program did not include the inspection of closed conveyance systems; therefore, unidentified illicit connections may be present within this watershed.

9.2.3 Centralized Sewer Infrastructure and Overflows

An estimated 986 households (approximately 61% of households) are connected to the sanitary sewer system in the Miller Creek watershed. The associated sewer lines, sanitary sewer lift stations, and other infrastructure (e.g., manholes) have the potential to contribute fecal contamination to surface waters. JEA has reported a total of 4 SSOs within the WBID boundaries (**Table 50**). The estimated volume of spill associated with these overflows ranged from 30 to 540 gallons and averaged 180 gallons; however, all SSOs were contained at spill sites and did not have any potential to impact surface waters.

As such, it is unlikely that the occurrences of reported SSOs in the Miller Creek watershed have contributed to the overall contamination of the watershed; moreover, these incidents do not explain the persistently elevated levels of fecal coliform detected at water quality monitoring stations. It is possible, however, that unidentified sewer infrastructure leaks and SSOs from privately owned infrastructure in the area are contributing to this pollution. For example, signs of prior sewer overflows were observed (e.g., soil erosion from a wet well and an associated manhole approximately 200 feet to the west, both leading in the direction of Miller Creek) by COJ EQD (January 31, 2008) during an investigation of a privately owned and operated lift station (PBS&J, May 2008).

Table 50: SSOs Reported in the Miller Creek Watershed, 2001–07

WBID Name (Number)	Date of Overflow	Estimated Volume of Spill (Gallons)
Miller Creek (2287)	22-Jan-02	540
Miller Creek (2287)	16-Apr-02	100
Miller Creek (2287)	10-Mar-03	30
Miller Creek (2287)	8-Nov-05	50

9.2.4 OSTDS

WSEA estimates that there are approximately 386 OSTDS in the Miller Creek watershed. According to DCHD, 37 septic tank repair permits were issued in this area. All of the repair permits, and presumably failed septic systems, were located east of Miller Creek's main channel in the northern corner and central portion of the WBID. Parcels with prior septic tank repair permits are closest to the surface waters (within approximately 275 feet or less) of Miller Creek north of Atlantic Boulevard, and are approximately 700 feet from surface waters in the segment of the creek extending from Atlantic Boulevard south to Beach Boulevard (PBS&J, May 2008).

Approximately 38% of the DCHD-designated St. Nicholas Septic Tank Failure Area is located in the Miller Creek watershed.

9.2.5 Nonpoint Sources

An analysis of impervious surface indicates that the Miller Creek WBID contains predominately 10 to 25% and greater than 25% impervious surface. Areas with greater than 25% impervious surface are primarily located along Atlantic and Beach Boulevards and in the eastern corners of the WBID. Furthermore, the potential for stormwater runoff analysis demonstrates that the majority of the WBID contains a moderate-to-high potential for runoff, especially near the creek. Areas with the highest stormwater runoff coefficients correspond to regions with greater than 25% impervious surface and are located along Beach and Atlantic Boulevards and in the easternmost corner of the WBID (PBS&J, May 2008).

The storm sewer network in the Miller Creek watershed includes a total of 10 permitted stormwater treatment areas, encompassing approximately 8.1% of the WBID area. Stormwater infrastructure in the WBID includes 20 outfalls by receiving waters (none classified by FDEP as a major outfall) and 309 inlets. Although closed conveyances are common throughout the WBID, there are few ditch systems, including 2 that form segments of the southern and northern branches (PBS&J, May 2008).

Fecal coliform concentrations were not found differ significantly between seasons, suggesting a constant source of fecal coliform bacteria to Miller Creek through nonpoint source discharges, failing wastewater conveyance systems, or septic systems independent of rainfall. It is possible that higher loadings occur in the "wet" (June through October) season (e.g., from nonpoint sources) and are diluted by increased volumes of water, resulting in fecal coliform concentrations that appear to be independent of rainfall (PBS&J, May 2008).

9.3 Projects To Address Fecal Coliform Loading

9.3.1 JEA Activities in the Miller Creek Watershed

9.3.1.1 Ongoing JEA Programs and Activities

JEA is currently implementing a number of countywide specific improvement programs, as follows, to address the sanitary sewer system as a source of fecal coliform contamination: (1) FOG Reduction Program; (2) SSO Root Cause Program; (3) Pop-Top Program; (4) Non-Destructive Testing and ARV Programs; (5) SCADA; (6) Third Party Education and Enforcement Program; (7) Manhole Monitoring; (8) Force Main Discharge Manholes; and (9) CMOM Program. **Appendix E** describes each of these programs.

JEA has conducted maintenance activities in the watershed that have resulted in pipe bursting of 66.17% of the sewer lines and CIPP of 1.14% of the lines. In addition, it inspected 1,642 LF of pipe and cleaned 11,106 LF of pipe in FY07. These activities will continue in the future to maintain the sanitary sewer system and prevent future problems. **Table 51** provides additional information on JEA's activities in the Miller Creek watershed.

TABLE 51: JEA ACTIVITIES IN THE MILLER CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	ESTIMATED COST	FUNDING SOURCE	PROJECT STATUS	START DATE OF PROJECT
Sewer Upgrades							
JEA – 50	Pipe Bursting – Increase Carrying Capacity	Replace failing/leaking infrastructure	Total footage of pipe burst in watershed since 2001: 49,689	$3,764,798	JEA	Ongoing	FY00
JEA – 51	CIPP – Install New Inner Lining	Rehabilitate failing/leaking infrastructure	Total footage of CIPP in watershed since 2001: 832	$34,780	JEA	Ongoing	FY00
Other Sewer Infrastructure Upgrades							
JEA – 52	Manhole Linings Rehabbed	Repair deteriorating manhole linings	Not applicable	$330,469*	JEA	Ongoing	FY01
JEA – 53	ARV Inspection and Rehab	See **Appendix E**	1 ARVs replaced within 200 feet of tributary (1 ARV total in watershed)	$481,873*	JEA	Ongoing	Ongoing
JEA – 54	Pump Station SCADA Upgrades	Retrofitting completed in 2004; all stations constructed since have SCADA installed. See **Appendix E.**	Not applicable	Unknown	JEA	Complete	Complete
JEA – 55	Inspect Force Main Discharge Manholes, Repair/Rehab as Necessary	See **Appendix E**	Not applicable	$466,576*	JEA	Ongoing	FY07
Programs To Reduce Sewer Problems							
JEA – 56	FOG Reduction Program	See **Appendix E**	Not applicable	Unknown	JEA	Ongoing	Current FOG Program initiated in 2004
JEA – 57	Pipe TV Inspection	Inspect existing infrastructure through use of closed-circuit television	1,642 LF of pipe inspected (FY07)	$163,099*	JEA	Ongoing	Carried over from city operation (1997)
JEA – 58	Pipe Cleaning	Clean existing pipes to avoid blockages	11,106 LF of pipe cleaned (FY07)	$743,054*	JEA	Ongoing	Carried over from city operation (1997)
JEA – 59	Implement CMOM Program	See **Appendix E**	Not applicable	$ 163,269*	JEA	Ongoing	Ongoing
JEA – 60	Manhole Monitoring	See **Appendix E**	1 manhole monitor installed in watershed as of January 2009	$ 137,526*	JEA	Ongoing	August 2007
JEA – 61	SSO Root Cause Program	See **Appendix E**	Not applicable	Unknown	JEA	Ongoing	February 2007
JEA – 62	Pop-Top Program	See **Appendix E**	Not applicable	$64,324*	JEA	Ongoing	February 2007
JEA – 63	Non-Destructive Testing Program/Pipe Integrity Testing	See **Appendix E**	Not applicable	$74,284*	JEA	Ongoing	Ongoing

* Costs provided are total systemwide costs for the program because WBID-specific costs are currently unavailable.

9.3.2 DCHD Activities in the Miller Creek Watershed

9.3.2.1 Ongoing DCHD Programs and Activities

Currently, DCHD is implementing a variety of countywide specific improvement programs and restoration activities to address OSTDS as sources of fecal coliform contamination. These include (1) the OSTDS Program, (2) training programs, and (3) the designation of septic tank failure and nuisance areas for transfer to central sewer. **Appendix E** describes each of these programs.

Failure and nuisance areas were first identified in 1999–2000, and, as of July 28, 2008, DCHD updated the listing of failure and nuisance areas. There is currently one designated failure area, St. Nicholas, in the Miller Creek watershed. Approximately 38% of the failure area is located in the WBID.

As part of the OSTDS Program, DCHD has issued 34 new construction permits, 37 repair permits, and 12 abandonment permits in the watershed. In addition, 5 annual operating permits have been issued for PBTS in the watershed. DCHD has also performed 84 plan reviews and 22 complaint investigations. It will continue these efforts in the future to reduce and prevent issues related to OSTDS. **Table 52** lists DCHD's projects in the Miller Creek watershed.

TABLE 52: DCHD ACTIVITIES IN THE MILLER CREEK WATERSHED

Project Number	Project Name	Project Description	Level of Effort	Estimated Cost	Funding Source	Project Status
DCHD – 20	OSTDS Program	Implementation of programs to address septic systems as potential sources	Approximately 34 new construction permits, 37 repair permits, and 12 abandonment permits issued	$31,000	FDOH	Ongoing
DCHD – 21	Annual Operating Permits	Annual operating permits issued for PBTS, systems located in IMZ, and commercial systems	5 operating permits issued for PBTS/IMZ in WBID	$12,500	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 22	SWIM Project	Implementation of broad-ranging septic tank ordinance	Approximately 38% of St. Nicholas Septic Tank Failure Area is in WBID	$6,000	FDOH/ LSJR SWIM Grant	Completed
DCHD – 23	DCHD-Sponsored Training Programs	Annual training programs held for septic tank contractors, certified plumbers, maintenance entities, and environmental health professionals	1 to 2 trainings per year providing up to 12 contact hours	$2,500	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 24	Application/Plan Review/ Site Evaluations	DCHD performs plan review and site evaluation for each application received for OSTDS new construction, repair, or modification of existing system	Approximately 84 plan reviews and site evaluations have been performed in WBID based on permitting history	$18,000	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 25	Septic Tank Failure Area Ranking	Septic tank failure area scored and prioritized on an annual basis	Less than 1 year since previous update	Not applicable		Ongoing

Project Number	Project Name	Project Description	Level of Effort	Estimated Cost	Funding Source	Project Status
DCHD – 26	Complaint Investigations	DCHD investigates all complaints received, performs site visit, and initiates enforcement action on sanitary nuisance violations	22 complaint investigations have been performed in WBID	$2,500	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 27	Intensive Inspection Program	Intensive geospecific inspections in selected WBIDs based on repair permit applications, water quality information, and site conditions; additional WBIDs may be identified in future based on assessment efforts	Approximately 60 OSTDS located south of Interstate 10, between Mayfair Village Road and Executive Center Drive	$9,300	Unknown	Planned – pending funding

9.3.3 COJ Activities in the Miller Creek Watershed

9.3.3.1 Completed COJ Projects

COJ EQD discovered an intermittent but persistent overflow of a private lift station manhole at an apartment complex directly adjacent to Miller Creek. The lift station and manhole were not up to code; thus enforcement action was initiated to ensure that corrective actions were performed to bring the facility into compliance. Correcting the problems at this private lift station has reduced the number of SSOs and decreased fecal coliform loading to the creek.

9.3.3.2 Ongoing COJ Programs and Activities

COJ has also established a monitoring plan to evaluate the effectiveness of the SWMP and the associated pollutant reduction from MS4 systems to waters of the state. In Miller Creek, COJ has 1 routine monitoring station that is sampled quarterly. A total of 42 samples were collected at this station between 1995 and 2008. In addition to the routine sampling, COJ EQD has also collected 15 samples at 8 sites as part of the TAT effort.

COJ PWD's Streets and Drainage Division is responsible for maintaining its stormwater conveyance systems in Jacksonville. This maintenance includes 45 work orders for ditch and creek regrading, erosion control, and cleaning; and 77 work orders for the repair of blocked structures and measures to prevent flooding. These work orders were completed between 2005 and 2008. PWD will continue a level of effort to maintain the MS4 conveyances based on CARE requests.

In addition, COJ has implemented the PIC Program, which keeps track of reported PICs in a database for COJ inspector follow-up. Thirteen PICs have been identified in the Miller Creek watershed, with 1 PIC confirmed as illicit and removed. As part of the PIC Program, COJ EQD provides public outreach through educational pamphlets, informational door hangers, and the storm drain–stenciling program.

COJ PWD also conducts inspections that are initiated through the CARE database. In the Miller Creek watershed, between 2000 and 2008, these included two investigations into illicit water discharges, three illegal discharges, two sewer lines that drained into a yard or ditch, nine SSOs, and five private lift stations. PWD will maintain a future level of effort for these investigations based on requests, which are logged and tracked through the CARE database.

Table 53 provides additional details on COJ's activities in the watershed.

TABLE 53: COJ ACTIVITIES IN THE MILLER CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	COST	FUNDING SOURCE	PROJECT STATUS
MS4 Maintenance Activities						
COJ – 61	Ditch/Creek Regrade/Erosion/Clean	Completed in response to CARE requests. Costs limited to activities completed after release of work order system.	45 (for 2005–08)	$1,830.65	COJ	Ongoing
COJ – 62	Structure Blocked/Repair/General Flooding		77 (for 2005–08)	$7,569.21	COJ	Ongoing
COJ – 63	Thin Vegetation at Mayfair Road and Bridgewater Road	Thin vegetation at Mayfair Road and Bridgewater Road	Clear vegetation (for 2009–10)	Unknown	COJ	Planned
Inspection, Enforcement, and Sampling						
COJ – 64	Illicit Water Discharge	CARE-initiated Inspection	2 (for 2000–08)	$424	COJ	Ongoing
COJ – 65	Pollution – Water – Illegal Discharge	CARE-initiated Inspection	3 (for 2000–08)	$636	COJ	Ongoing
COJ – 66	Sewer Drains into Yard/Ditch	CARE-initiated Inspection	2 (for 2000–08)	$424	COJ	Ongoing
COJ – 67	Sewer Overflow	CARE-initiated Inspection	9 (for 2000–08)	$1,908	COJ	Ongoing
COJ – 68	Private Lift Station Inspection	First lift station installed in 1992 with 71 total annual inspections	5 (for 1992–2008)	$1,060	COJ	Ongoing
COJ – 69	Enforcement at The Preserve at St. Nicholas Apartments	Provide status of enforcement for annual progress report	Status of enforcement (for 2009–10)	$3,000	COJ	Ongoing
COJ – 70	Illicit Discharge Detection and Elimination	1 illicit, no open	13 (for 1998–2004)	$2,756	COJ	Ongoing
COJ – 71	Routine Surface Water Sampling	NPDES permit-related quarterly water quality sampling – 1 sampling station in WBID	42 (for 1995–2008)	$18,774	COJ	Ongoing
COJ – 72	TAT Sampling	Conducted by EQD to assess bacteria levels in creek and identify potential fecal bacteria sources	8 sites/15 samples	$6,705	COJ	Ongoing
Septic Tank Phase-Out Program						
COJ – 73	Saint Nicholas Failure Area – Septic Tank Phase-Out	Phase-out of septic tanks in failure areas (also listed as part of larger LSJR Main Stem BMAP project)[1]	359 total tanks, 0 connected	Unknown	COJ	Ongoing
COJ – 74	Outside Failure Areas – Septic Tank Phase-Out	Phase out program as provided by COJ ordinance	27 total tanks, 0 connected	Unknown	COJ	Ongoing
COJ – 75	Septic Tank Maintenance Public Education	Public service announcements	Ongoing	Unknown	COJ	Ongoing
Management and Reduction of Pet and Animal Waste						
COJ – 76	Pet/Animal Management Public Education	Public service announcements	Ongoing	Unknown	COJ	Ongoing

Note: Inspection unit cost = $212; sampling event unit cost = $447; and septic tank per connection = $35.

[1] COJ has committed to removing septic tanks in failure areas that are within 300 meters of a surface waterbody in the 2008 LSJR Main Stem BMAP. COJ must submit a plan to FDEP for removing septic tanks within 6 months of completion of the septic tank study, or by June 30, 2011, whichever is earlier. At a minimum, COJ will accomplish a 50% implementation of the septic tank phase-out projects by July 31, 2015, with the phase-outs completed by December 31, 2023. For the 10 tributaries addressed in this BMAP, a total of 1,167 septic tanks are located in failure areas, although not all of them may be located within 300 meters of a surface waterbody. The failing tanks within 300 meters of a surface waterbody will be included in the COJ plan and schedule to phase out tanks and will be identified as Tributaries BMAP-related tanks in the plan.

9.3.4 FDOT Activities in the Miller Creek Watershed

9.3.4.1 Ongoing FDOT Programs and Activities

Under Subsection 334.044(15), F.S., and Rule 14-86, F.A.C., FDOT implements a Drainage Connection Program. The program does not issue water quality permits but requires the connecting entity to certify that the discharge is of acceptable water quality. Connecting entities are required to maintain the discharge of acceptable water quality for the duration of the FDOT permit. If connecting entities fail to meet this requirement after sufficient warning by FDOT, they will be reported to FDEP, SJRWMD, and, if applicable, to the local municipality; these entities regulate stormwater quality through state rules, ordinances, and codes. FDOT performs periodic site inspections as part of the MS4 NPDES permit. FDOT supports the Adopt-A-Highway Program in the watershed, in which trash is collected from 23 acres for an average annual removal of 1,225 pounds. Street sweeping also occurs monthly on 28 miles of roadways, reducing the amount of trash and sediment entering the stormwater conveyance system. As part of the maintenance program, FDOT removes sediment, trash, and debris from the system, as needed. This maintenance occurs in 130 inlets and 5 miles of piping in the WBID.

FDOT also works with COJ on several efforts related to the MS4 permit. FDOT participates in the PIC Program in conjunction with COJ. FDOT has instructed staff to be alert for illicit connections during routine maintenance activities, and investigates observances found in the right of way. Those located outside the right of way are reported to the applicable municipality for further investigation and enforcement action. FDOT maintains a toll-free number to be used for reporting illicit connections. FDOT also contributes funding for one monitoring station in the Miller Creek watershed that is sampled quarterly as part of the routine monitoring program. FDOT will continue these activities in the future to support the maintenance of the MS4 system. **Table 54** *lists* FDOT's activities in the watershed.

TABLE 54: FDOT ACTIVITIES IN THE MILLER CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	ESTIMATED COST	FUNDING SOURCE	LEVEL OF EFFORT	PROJECT STATUS
Identification and Removal of Illicit Connections					
FDOT – 19	PIC Program – Search for Illicit Connections	See Note 1	State of Florida (FDOT)/COJ	Effort is continuous in WBID	Ongoing
FDOT – 20	PIC Program – Illicit Connections Identified and Removed in WBID if Found To Be Truly Illicit	See Note 1	State of Florida (FDOT)/COJ	No illicit connection found to date	Ongoing
Surface Water Sampling To Assess Conditions and Identify Sources					
FDOT – 21	Routine Tributary Monitoring as Part of MS4 Permit	See Note 2	State of Florida (FDOT)/COJ	1 station quarterly	Ongoing
Drainage Connection Program (DCP)					
FDOT – 22	DCP – Connecting Entity Must Certify that All Discharges to FDOT MS4 Are Treated Prior to Connection	See Note 3	State of Florida (FDOT)	Ongoing effort	Ongoing
Adopt-A-Highway Program					
FDOT – 23	Adopt-A-Highway Program	See Note 4	Not applicable	Trash collected from 23 acres. Trash collected annually averages 1,225 pounds.	Ongoing

Project Number	Project Name	Estimated Cost	Funding Source	Level of Effort	Project Status
Catch Basin/Inlet and Closed Loop MS4 Cleaning					
FDOT – 24	Sediment Accumulation, Trash, and Debris Removed as Needed	$25,982	State of Florida (FDOT)	Approximately 130 inlets/catch basins and about 5 miles of piping	Ongoing
Street Sweeping Program					
FDOT – 25	Street Sweeping Program	$7,670	State of Florida (FDOT)	28 miles of roadway swept monthly	Ongoing
Routine Maintenance Activities					
FDOT – 26	Maintain FDOT Stormwater Systems	See Note 5	State of Florida (FDOT)	Clean drainage structures, replace/repair storm/cross/side drains, clean/reshape roadside ditches, clear/repair outfall ditches, mowing, roadside litter removal, respond to citizen complaints	Ongoing

[1] Countywide Program – Average cost is $37,605 per year contribution to COJ.
[2] Countywide Program – Average cost is $22,546 per year contribution to COJ.
[3] Countywide Program – Average cost is $27,151 per year.
[4] Associated cost unknown. Program is voluntary.
[5] Countywide Program – Average cost is $2,750,735 per year.

9.4 Summary of Restoration Activities and Sufficiency of Efforts

Table 51 through **Table 54** list the projects and programs to reduce fecal coliform loading in the Miller Creek watershed. Several key efforts completed in the WBID are summarized below, as well as activities that are expected to continue or to be implemented in future years. The efforts outlined in the project tables, including the activities highlighted below, will reduce fecal coliform loading and improve water quality in Miller Creek based on the best information available about fecal coliform sources. As water quality improves in response to these actions and the bacteria source information is refined, future BMAPs may recommend different activities or levels of effort. For this BMAP, the full implementation of the projects and programs listed in the project tables for the Miller Creek watershed is sufficient to significantly reduce fecal coliform sources and make substantial progress towards meeting the TMDL.

9.4.1 OSTDS

Failure Area – WSEA estimates that there are approximately 386 OSTDS in the watershed, with 359 of these systems are located in the St. Nicholas failure area. According to DCHD, 37 septic tank repair permits were issued in the watershed, all located in the failure area. Many of these parcels are close to either surface waters or stormwater inlets. COJ has committed to removing septic tanks in failure areas that are within 300 meters of surface waters in the 2008 LSJR Main Stem BMAP. The failing tanks in the St. Nicholas failure area that are in the Miller Creek watershed within 300 meters of surface waters will be included in the COJ phase-out plan and schedule, as described in the Main Stem BMAP, and will be identified in the plan as Tributaries BMAP-related efforts.

Program Implementation – Twelve abandonment permits issued since 1996, 5 annual operating permits, and ongoing plan reviews indicate continuous activity in the watershed. As DCHD has performed 84 site evaluations and 22 complaint investigations, inspectors are in the watershed relatively frequently, which assists in the proactive identification of potentially failing systems.

However, a discrete portion of the WBID has a higher probability of OSTDS-related problems based on the number of repair permits issued, water quality data, and site conditions. DCHD will seek to secure funding for a new program to intensively inspect a specific geographic area within the WBID boundary and, upon obtaining funding, will report the results of the inspection in an annual BMAP progress report.

Additional areas may be identified for intensive inspections based on the assessment efforts discussed in the BMAP. If additional areas are designated in the future for inclusion in the program, these areas will also be inspected as funding becomes available. Currently, COJ ordinances, the septic tank failure program in partnership with WSEA, and DCHD program implementation address OSTDS as a source of fecal coliform loading. Inspections need to be continued and fully enforced to manage potential impacts from existing systems in the nonfailure areas and to prevent new sources from reaching surface waters.

9.4.2 Sewer Infrastructure

Private Infrastructure – According to the COJ database, there are 5 private lift stations within the WBID boundaries and 3 situated on the boundary line in the northeastern portion of the WBID. COJ EQD has performed 71 annual inspections on private lift stations since 1992 and will continue to inspect these stations annually.

Currently, COJ has one lift station and one manhole at The Preserve at St. Nicholas Apartments under enforcement. COJ TAT sampling in this area has continued to show high fecal coliform counts, and MST sampling confirmed a human source. EQD will work with the apartment complex to address any identified structural problems and will provide information on enforcement status in the annual BMAP progress report.

Sewer Infrastructure Projects – The watershed has had few JEA SSOs and none that reached surface waters. JEA pipe bursted over 60% of the infrastructure and has replaced the 1 ARV in the watershed. JEA has 1 lift station near surface waters and, during the Walk the WBIDs exercise in September 2008, there were no observed problems at this station. The continuation of these maintenance activities and program implementation is sufficient to address sewer infrastructure as a source of fecal coliform at this time.

Program Implementation – Program implementation, including inspections and line cleaning coupled with the Root Cause Program, are proactive measures preventing fecal coliform loading. In addition, the implementation of systemwide SSO prevention programs, such as FOG and CMOM, should be continued. JEA will report its inspection, prevention, and maintenance efforts in the WBID as part of the annual BMAP reporting process to demonstrate that the system is monitored and maintained.

9.4.3 Stormwater

Illicit Connection Removal – COJ, as part of its efforts with the PIC Program, identified and removed one illicit connection. COJ and FDOT have committed to continue the PIC Program, including identifying additional illicit connections and removing those connections in a timely manner.

FDOT Program Implementation – In accordance with Rule 14-86, F.A.C., FDOT requires any new connections to its MS4 stormwater conveyance systems to be evaluated and permitted to prevent the introduction of new sources to its conveyances. This permit program will continue, and FDOT will continue to periodically inspect its conveyances to prevent unpermitted connections. There is a significant amount of stormwater infrastructure in the watershed, and FDOT will continue stormwater infrastructure maintenance, as these efforts prevent potential

regrowth in the MS4 conveyances. Additionally, 28 miles of roads are swept monthly and over 1,200 pounds of trash are collected annually through the Adopt-A-Highway Program, proactively preventing fecal coliform loading to the stormwater system. This effort is expected to continue if the Adopt-A-Highway volunteers continue to be active in the WBID.

COJ Program Implementation – COJ PWD conducts activities to maintain the MS4 system. In the last 4 years, COJ completed 45 work orders for ditch maintenance and cleaning, and performed 77 infrastructure repairs on closed conveyances. It will continue its maintenance activities in the watershed to prevent future problems and fecal coliform loadings.

Walk the WBID – The Walk the WBID exercise in Miller Creek identified an open conveyance at Mayfair Road and Bridgewater Road that is very heavily vegetated. COJ PWD will schedule maintenance to thin the vegetation within one year of BMAP adoption and report on activities in the first annual BMAP progress report. This activity will allow UV light to penetrate the creek, which should reduce fecal coliform in the area, since it is suspected that bacteria grow and persist in low-light conditions.

9.4.4 Wildlife and Other Anthropogenic Sources

During the Walk the WBID exercise, there was evidence of dog feces and cat litter in the northern fork of the waterbody, indicating fecal coliform sources that could be addressed through public education activities. Additionally, there is evidence of homeless populations on the main channel of the creek, and it is suspected that the southern fork of the creek occasionally has homeless camps. COJ should be aware of this potentially significant source and prepare some recommendations on how to address the situation in the annual reports until it is resolved.

TABLE 55: SUMMARY OF RESTORATION ACTIVITIES FOR THE MILLER CREEK WATERSHED

SOURCE/ACTION	COJ	DCHD	FDOT	JEA
OSTDS				
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 (PSA)	√	X	X	X
Surface Water Sampling for Conditions and Trends	√	X	X	X
Sewer System				
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	-
Air Release Valve (ARV) Inspection and Rehab	X	X	X	√
Program Implementation	X	X	X	√
Private Lift Station Inspections and Enforcement	√	X	X	X
Private Non-NPDES Wastewater Facility Inspections and Enforcement	*	X	X	X
Sanitary Sewer Overflow (SSO) Investigations	√	X	X	√
Surface Water Sampling for Conditions and Trends	X	X	X	√
Stormwater				
Flood Control Capital Projects	-	X	-	X
Capital Projects/Stormwater Water Quality BMPs	-	X	-	X
Stormwater System Ditch and Canal Maintenance	√	X	√	X

SOURCE/ACTION	COJ	DCHD	FDOT	JEA
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
Pet Waste Management				
Ordinances and Enforcement	√	X	X	X
Public Education and Outreach	√	X	X	X
Special Source Assessment Activities				
Intensive Water Quality Sampling To Track Sources	√	X	X	
Tributary Assessment Team (TAT)	√	X	X	√
Microbial Source Tracking (MST)	√	X	X	√
Thermal Imagery To Identify PICs		X	X	X

Note: Shaded cells (marked with an X) represent activities that do not apply to the associated entity.
* Activity is not applicable for the waterbody due to a lack of infrastructure.
+ FDOT participation in these activities is provided by funding in the NPDES MS4 agreements with COJ.

CHAPTER 10: MIRAMAR CREEK (WBID 2304)

10.1 WBID DESCRIPTION

Miramar Creek, WBID 2304, is located in Duval County, east of the LSJR within the North Mainstem Planning Unit, as designated by SJRWMD (**Figure 10**). The headwaters of Miramar Creek presumably comprise stormwater runoff originating just north of Thomas Court (**Figure 11**). The entire creek flows north and then westward in a single channel, except for three branches joining Miramar Creek from the north and south. The southern branch is located just east of San Jose Boulevard and extends south to Eutaw Place. The northern branch, located just east of Gadsden Road, originates at Colonial Pond, a waterbody situated between Mapleton and Northwood Road, and merges with the main channel just north of Woodward Avenue. The branch located farthest east ("eastern branch") extends west from Miramar Creek just south of Emerson Street and takes a sharp bend to the northeast, extending towards Parkwood Street. The waters of Miramar Creek eventually flow into the St Johns River just west of Rio Lindo Drive (PBS&J, June 2008a).

The spatial distribution and acreage of different land use categories in the Miramar Creek watershed were identified using 2004 land use coverage data from SJRWMD (**Table 56**). The dominant land use (648.6 acres; 66.7% of total coverage) in the watershed, and directly adjacent to the creek itself, is high-density residential, which extends throughout the watershed. The next two most abundant land cover categories are (1) medium-density residential areas (64.9 acres; 12.4% of total coverage), primarily located in the northwestern corner of the watershed; and (2) commercial/utility/institutional areas (47.7 acres; 9.1% of total coverage), located predominantly along Emerson Street and Hendricks Avenue. Upland forests and wetland habitat accounted for less than 5% of land use (PBS&J, June 2008a).

According to the 2000 Census, there are 1,246 households in the watershed, averaging 2.2 people per household. It should be noted that there are high-density residential areas (16 to 25 people per acre) that extend along nearly the entire southern portion of the watershed, as well as parts of the northeastern section (PBS&J, June 2008a). In addition, assuming that 40% of households have 1 dog (Tyler, 2006), there are an estimated 498 dogs in the watershed.

TABLE 56: LAND USES IN THE MIRAMAR CREEK WATERSHED

2004 LAND USE	ACRES	% OF TOTAL
Commercial/Utility/Institutional	47.7	9.1
High-Density Residential	348.6	66.7
Medium-Density Residential	64.9	12.4
Open Land	0.0000010	0.0000002
Recreational	16.7	3.2
Transportation	20.7	4.0
Upland Forest	10.0	1.9
Water	12.1	2.3
Wetlands	1.7	0.3
TOTAL:	**522.3**	**100**

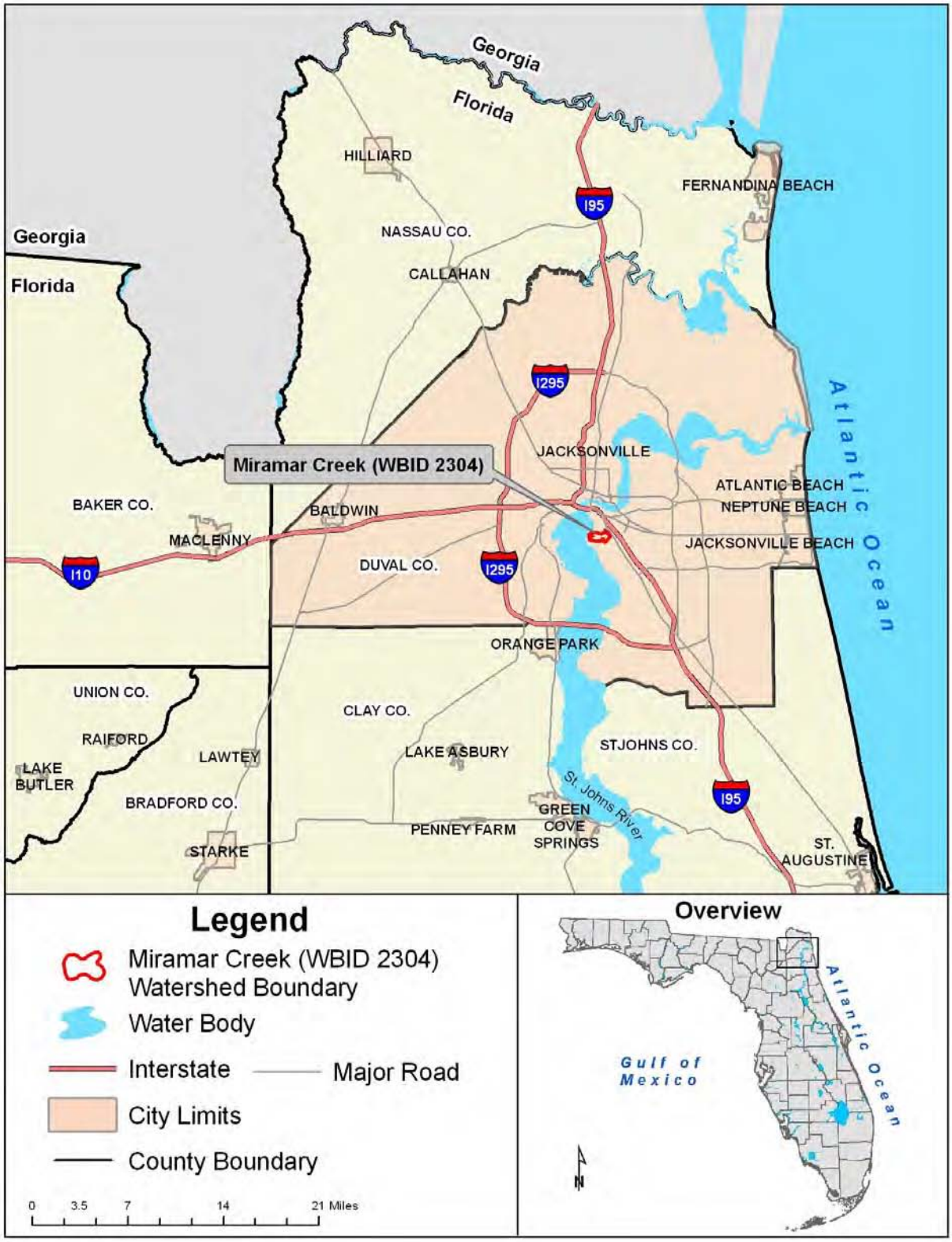

FIGURE 10: LOCATION OF THE MIRAMAR CREEK WATERSHED

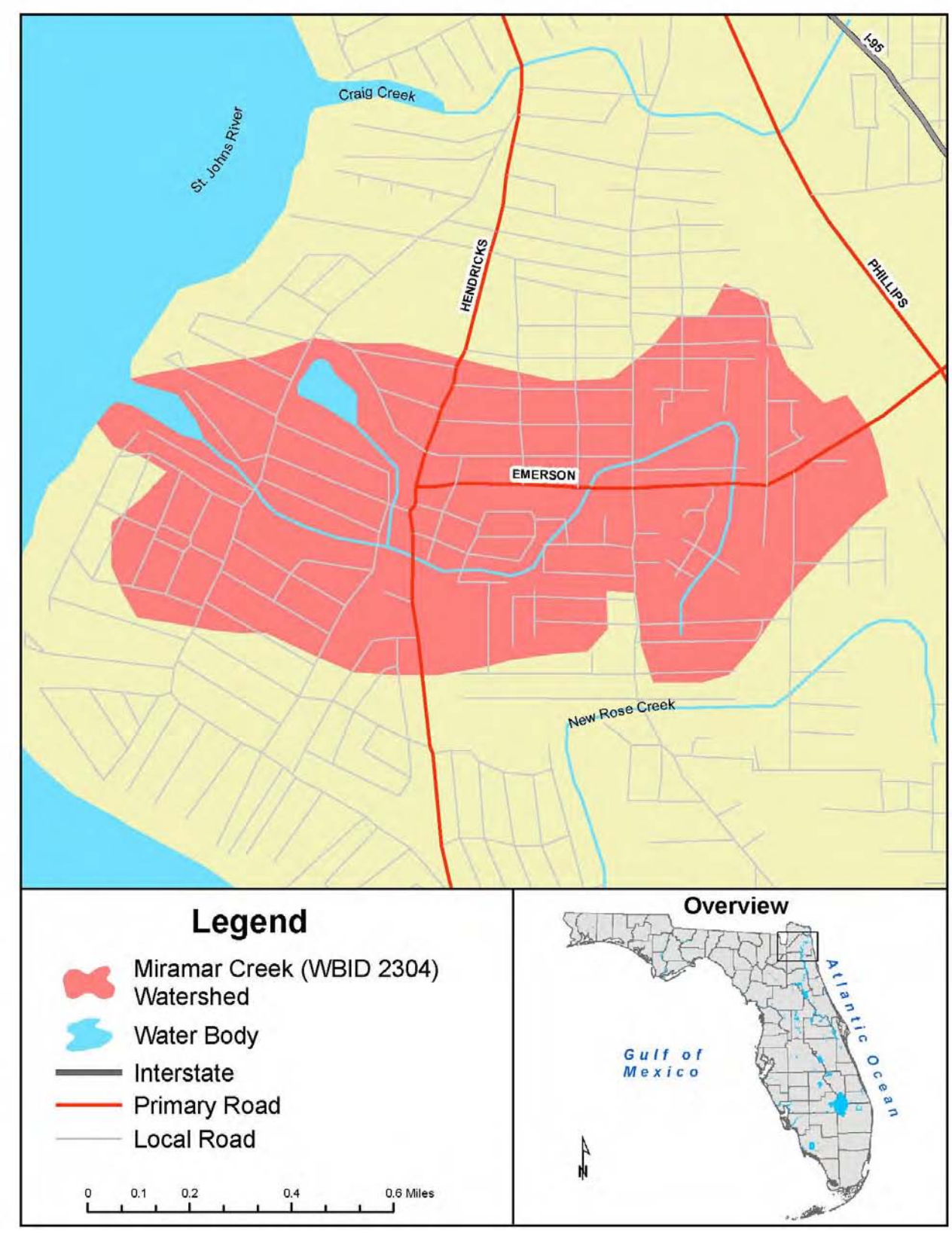

FIGURE 11: MIRAMAR CREEK WBID LOCATOR MAP

10.2 Potential Sources

10.2.1 Point Sources

There are no industrial or domestic wastewater facilities, CAFOs, application sites for septic residuals, or landfills permitted to discharge to Miramar Creek. The COJ/FDOT MS4 includes the Miramar Creek watershed (PBS&J, June 2008a).

10.2.2 Illicit Discharges

COJ EQD is continuing a program to identify, confirm, and respond to illicit connection issues in Jacksonville. A total of 28 PICs were identified in the Miramar Creek watershed through this effort from 1998 to 2003. Of these, 6 connections were determined to be illicit and were removed. In addition, during the October 31, 2005, JEA MST project sampling event, a black discharge flowing from an illicit OSTDS pipe was observed. The elevated levels of fecal coliform observed at several monitoring stations indicate that the OSTDS was contributing to the bacteriological loading of Miramar Creek. COJ and DCHD took enforcement action, and the illicit OSTDS pipe and associated sewage discharge were removed in late 2005 (PBS&J, June 2008a).

10.2.3 Centralized Sewer Infrastructure and Overflows

An estimated 376 households (approximately 30% of households) are connected to the sanitary sewer system in the Miramar Creek watershed. Sewer infrastructure (e.g., sewer mains, lift stations, manholes) is primarily located in downstream areas of the watershed from Hendricks Avenue (including the northern branch) extending west to the confluence of Miramar Creek and the St. Johns River. Sewer mains run parallel to and span the width of the creek either above or below surface waters in these segments, as well as upstream between St. Augustine Road and Freeman Road, increasing the likelihood that possible spills and/or unidentified sewer infrastructure leaks will impact surface waters.

JEA has reported a total of two SSOs within the Miramar Creek WBID boundaries (**Table 57**). Both SSOs were contained at the spill sites and did not have any potential to impact surface waters; therefore, it is unlikely that these SSOs, which occurred over a span of seven years, were responsible for the extreme levels of fecal coliform bacteria observed at Miramar Creek. Other sources, such as unidentified sewer infrastructure leaks and/or faulty OSTDS, may be contributing to the overall pollution of the Miramar Creek watershed (PBS&J, June 2008a).

TABLE 57: SSOs REPORTED IN THE MIRAMAR CREEK WATERSHED, 2001–07

WBID Name (Number)	Date of Overflow	Estimated Volume of Spill (Gallons)	Potentially Impacted Surface Waters
Miramar Creek (2304)	5-Nov-01	30	No
Miramar Creek (2304)	11-Jul-05*	15,000	No

*Reportable SSOs that spilled > 1,000 gallons of sewage and/or affected surface waters.

10.2.4 OSTDS

WSEA estimates that there are approximately 659 OSTDS in the Miramar Creek watershed. According to DCHD, 68 septic tank repair permits were issued in this area. The majority of the permits, and presumably failed septic systems, were located in (1) the southwestern corner of the WBID between San Jose Boulevard and London Road, extending north to Eutaw Place; (2) the center of the WBID from Hendricks Avenue east to St. Augustine Road; and (3) the eastern portion of the WBID from Inwood Terrace south to Sessions Lane.

In addition, four DCHD-designated septic tank failure areas (Emerson, Point La Vista, Freeman, and Inwood Terrace) are located in the central, southwestern, and eastern portions of the watershed. Miramar Creek's surface waters are located within or near to the Point La Vista Septic Tank Failure Area from midstream at Hendricks Avenue to the confluence of Miramar Creek and the St. Johns River. The Inwood Terrace and Freeman Septic Tank Failure Areas are located just west of Drew Road and extend south from Inwood Terrace to Sessions Lane. The surface waters of Miramar Creek run adjacent to this area from the intersection of Freeman Road and Cato Road south to Sessions Lane (PBS&J, June 2008a).

Considering the estimated number of OSTDS and the four DCHD-designated septic tank failure areas within the WBID boundaries, in addition to the number of repair permits that have been filed by property owners throughout the watershed, it is likely that OSTDS contribute to the overall bacterial loading of Miramar Creek. This is especially true in the midstream section of the watershed, as the potential for failing septic systems was observed in this area (e.g., old residential neighborhood; unmounded OSTDS; trees growing in mounded drainfields).

Moreover, fecal coliform results from the JEA Tributary Pollution Assessment Project (the October 31, 2005 sampling event) confirmed that an illicit OSTDS pipe was discharging sewage-contaminated water in this area. Leaky sewer infrastructure (e.g., from underground sewer mains) may also contribute to fecal pollution in the upstream segments of Miramar Creek between St. Augustine Road and Freeman Road, and downstream between Hendricks Avenue and the confluence of Miramar Creek and the St. Johns River (PBS&J, June 2008a).

10.2.5 Nonpoint Sources

An analysis of impervious surface indicates that the Miramar Creek WBID contains predominantly 10 to 25% impervious surface. The watershed also contains land with greater than 25% impervious surface that corresponds to commercial/utility/institutional land uses located along Hendricks Avenue, St. Augustine Road, and Emerson Street. An analysis was also conducted demonstrating that the majority of the WBID contains a moderate-to-high potential for stormwater runoff, including areas near the creek. The highest runoff coefficients correspond to areas with greater than 25% impervious surface located on either side of Hendricks Avenue and Emerson Street, and in areas along St. Augustine Road (PBS&J, June 2008a).

The storm sewer network in the Miramar Creek watershed includes 9 permitted stormwater treatment areas, encompassing approximately 8.29% of the WBID area. Stormwater infrastructure in the WBID includes 25 outfalls by receiving water (1 classified by FDEP as a major outfall) and 213 inlets. Although closed conveyances are common throughout the WBID, ditch systems primarily run parallel to and form segments of Miramar Creek extending west from San Jose Boulevard to St. Augustine Road (including the eastern branch), and south from Emerson Street to Caljon Road (PBS&J, June 2008a).

Higher concentrations of fecal coliform were identified in the "wet" season (June through October), suggesting that the majority of bacterial loading was delivered to Miramar Creek through nonpoint source discharges, failing wastewater conveyance systems, or septic systems during high rainfall. Considering the possibility for dilution during the "wet" season, it is possible that loadings observed during this time of the year were even higher than they appeared to be (PBS&J, June 2008a).

10.3 Projects To Reduce Fecal Coliform Loading

10.3.1 JEA Activities in the Miramar Creek Watershed

10.3.1.1 Ongoing JEA Programs and Activities

JEA is currently implementing a number of countywide specific improvement programs, as follows, to address the sanitary sewer system as a source of fecal coliform contamination: (1) FOG Reduction Program; (2) SSO Root Cause Program; (3) Pop-Top Program; (4) Non-Destructive Testing and ARV Programs; (5) SCADA; (6) Third Party Education and Enforcement Program; (7) Manhole Monitoring; (8) Force Main Discharge Manholes; and (9) CMOM Program. **Appendix E** describes each of these programs.

As of June 7, 2007, JEA has completed sewer infrastructure rehabilitation and provided new regional service for existing developed areas in the Miramar Creek watershed. JEA also conducted pipe bursting in the watershed in (1) the eastern portion of the WBID, west of the intersection of Hendricks Avenue and Orlando Circle south to the confluence of Miramar Creek and the St. Johns River, north to the WBID boundaries; and (2) the north-central portion of the WBID, east of the Hendricks Avenue and Lakewood Road intersection to St. Augustine Road, north to the limits of the WBID boundary (PBS&J, June 2008a). A total of 4.10% of the sewer lines in the watershed have been pipe bursted.

JEA has also replaced or repaired components on 1 of the 3 (33%) lift stations in the WBID. In addition, it has cleaned 2,542 LF of pipe in the watershed to help prevent future infrastructure problems. These activities will continue in the future to maintain the sanitary sewer system and prevent future problems. **Table 58** provides additional information on JEA's activities in the Miramar Creek watershed.

TABLE 58: JEA ACTIVITIES IN THE MIRAMAR CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	ESTIMATED COST	FUNDING SOURCE	PROJECT STATUS	START DATE OF PROJECT
Sewer Upgrades							
JEA – 64	Pipe Bursting – Increase Carrying Capacity	Replace failing/leaking infrastructure	Total footage of pipe burst in watershed since 2001: 5,497	$844,984	JEA	Ongoing	FY00
Other Sewer Infrastructure Upgrades							
JEA – 65	Manhole Linings Rehabbed	Repair deteriorating manhole linings	Not applicable	$330,469*	JEA	Ongoing	FY01
JEA – 66	ARV Inspection and Rehab	See **Appendix E**	0 ARVs replaced within 200 feet of tributary (only 2 ARVs total in watershed)	$481,873*	JEA	Ongoing	Ongoing
JEA – 67	Pump Station SCADA Upgrades	Retrofitting completed in 2004; all stations constructed since have SCADA installed. See **Appendix E.**	Not applicable	Unknown	JEA	Complete	Complete
JEA – 68	Inspect Force Main Discharge Manholes; Repair/Rehab as Necessary	See **Appendix E**	Not applicable	$466,576*	JEA	Ongoing	FY07
JEA – 69	Pump Station Class I/II Rebuilding	Repair or replace components of existing pump stations	Projects in watershed since 2002: 1	$18,503	JEA	Ongoing	Ongoing
JRA – 70	Confirm Locations of Lift Stations on Boundary	Confirm locations of lift stations on boundary for first annual progress report	2 lift stations on boundary	Unknown	JEA	Planned	2009
JEA – 71	Follow Up on Seep under Sewer Line on Northern Branch	Follow up on seep under sewer line on northern branch as part of Walk the WBID	Follow up on seep	Unknown	JEA	Planned	2009
Programs To Reduce Sewer Problems							
JEA – 72	FOG Reduction Program	See **Appendix E**	Not applicable	Unknown	JEA	Ongoing	Current FOG Program initiated in 2004
JEA – 73	Pipe Cleaning	Clean existing pipes to avoid blockages	2,542 LF of pipe cleaned (FY07)	$743,054*	JEA	Ongoing	Carried over from city operation (1997)
JEA – 74	Implement CMOM Program	See **Appendix E**	Not applicable	$ 163,269*	JEA	Ongoing	Ongoing
JEA – 75	Manhole Monitoring	See **Appendix E**	Not applicable	$ 137,526*	JEA	Ongoing	August 2007
JEA – 76	SSO Root Cause Program	See **Appendix E**	Not applicable	Unknown	JEA	Ongoing	February 2007
JEA – 77	Pop-Top Program	See **Appendix E**	Not applicable	$64,324*	JEA	Ongoing	February 2007
JEA – 78	Non-Destructive Testing Program/Pipe Integrity Testing	See **Appendix E**	Not applicable	$74,284*	JEA	Ongoing	Ongoing

* Costs provided are total systemwide costs for the program because WBID-specific costs are currently unavailable.

10.3.2 DCHD Activities in the Miramar Creek Watershed

10.3.2.1 Ongoing DCHD Programs and Activities

Currently, DCHD is implementing a variety of countywide specific improvement programs and restoration activities to address OSTDS as sources of fecal coliform contamination. These include (1) the OSTDS Program, (2) training programs, and (3) the designation of septic tank failure and nuisance areas for transfer to central sewer. **Appendix E** describes each of these programs.

As of July 28, 2008, DCHD updated the listing of failure and nuisance areas. There are currently 4 designated failure areas (Emerson, Point La Vista, Freeman, and Inwood Terrace) in the Miramar Creek watershed (PBS&J, June 2008a). Fifty-nine percent of the Emerson failure area, 25% of the Point La Vista area, and 77.2% of the Freeman and Inwood Terrace areas are located in the WBID.

As part of the OSTDS Program, DCHD has issued 35 new construction permits, 68 repair permits, and 44 abandonment permits in the watershed. In addition, 7 annual operating permits have been issued for PBTS. DCHD has also performed 148 plan reviews and site evaluations and 106 investigations in response to complaints received. It will continue these efforts in the future to reduce and prevent issues related to OSTDS. **Table 59** list DCHD's projects in the Miramar Creek watershed.

TABLE 59: DCHD ACTIVITIES IN THE MIRAMAR CREEK WATERSHED

Project Number	Project Name	Project Description	Level of Effort	Estimated Cost	Funding Source	Project Status
DCHD – 28	OSTDS Program	Implementation of programs to address septic systems as potential sources	Approximately 35 new construction permits, 68 repair permits, and 44 abandonment permits issued	$47,500	FDOH	Ongoing
DCHD – 29	Annual Operating Permits	Annual operating permits issued for PBTS, systems located in IMZ, and commercial systems	7 annual operating permits issued for PBTS/IMZ in WBID	$17,500	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 30	SWIM Project	Implementation of broad-ranging septic tank ordinance	59% of Emerson, 77.2% of Freeman/Inwood Terrace, and 24.7% of Point La Vista Septic Tank Failure Areas are located in WBID	$235,000	FDOH/ LSJR SWIM Grant	Completed
DCHD – 31	DCHD-Sponsored Training Programs	Annual training programs held for septic tank contractors, certified plumbers, maintenance entities, and environmental health professionals	1 to 2 trainings per year providing up to 12 contact hours	$2,500	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 32	Application/ Plan Review/ Site Evaluations	DCHD performs plan review and site evaluation for each application received for OSTDS new construction, repair, or modification of existing system	Approximately 148 plan reviews and site evaluations have been performed in WBID based on permitting history	$32,000	FDOH/ LSJR SWIM Grant	Ongoing

Project Number	Project Name	Project Description	Level of Effort	Estimated Cost	Funding Source	Project Status
DCHD – 33	Septic Tank Failure Area Ranking	Septic tank failure area scored and prioritized on annual basis	Less than 1 year since previous update	Not applicable		Ongoing
DCHD – 34	Complaint Investigations	DCHD investigates all complaints received, performs site visit, and initiates enforcement action on sanitary nuisance violations	106 complaint investigations have been performed in WBID	$10,500	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 35	OSTDS on Brooker Road	Investigate home on Brooker Road with potential OSTDS issues	Inspect and report findings in annual progress report			Planned
DCHD – 36	Intensive Inspection Program	Intensive geospecific inspections in selected BMAP WBIDs based on repair permit applications, water quality information, and site conditions; additional WBIDs may be identified in future based on ongoing assessment efforts	Approximately 150 OSTDS located south of Davidson Street to Orlando Terrace, east of Hendricks Avenue and west of Fleet Street	$23,250	Unknown	Planned – pending funding

10.3.3 COJ Activities in the Miramar Creek Watershed

10.3.3.1 Completed COJ Projects

COJ has completed three projects to capture and store stormwater in the Miramar Creek watershed: (1) the Inwood Terrace area, which treats 5 acres; (2) Miramar Tributary Improvements, a flood improvement project that encompasses 23 acres; and (3) a regional pond at St. Augustine Road from Emerson to U.S. Highway 1, which treats 167 acres. These projects are helping to reduce stormwater-associated fecal coliform loading to Miramar Creek. In addition, in the Pine Forest/Larson Acres area, COJ is building a wet detention pond for flood improvement on 22 acres. Once completed, the project will also reduce bacterial loading to the creek.

10.3.3.2 Ongoing COJ Programs and Activities

COJ has also established a monitoring plan to evaluate the effectiveness of the SWMP and the associated pollutant reduction from MS4 systems to waters of the state. In Miramar Creek, COJ has 1 routine monitoring station that is sampled quarterly; a total of 53 samples were collected at this station between 1995 and 2008. In addition to the routine sampling, COJ EQD has collected 70 samples at 12 sites as part of the TAT.

COJ PWD's Streets and Drainage Division is responsible for maintaining its stormwater conveyance systems in Jacksonville. This maintenance includes 57 work orders for ditch and creek regrading, erosion control, and cleaning; 15 work orders for lake and pond maintenance; and 31 work orders for the repair of blocked structures and measures to prevent flooding. These work orders were completed between 2005 and 2008. PWD will continue a level of effort to maintain the MS4 conveyances based on CARE requests.

In addition, COJ has implemented the PIC Program, which keeps track of reported PICs in a database for COJ inspector follow-up. There were 28 PICs identified in Miramar Creek, of which 6 were confirmed as illicit and removed. As part of the PIC Program, COJ EQD provides

public outreach through educational pamphlets, informational door hangers, and the storm drain–stenciling program.

In the Miramar Creek watershed, COJ PWD conducted inspections between 2000 and 2008 that included two investigations into illicit water discharges, three illegal discharges, two sewer lines that drained into a yard or ditch, four SSOs, and two private lift stations. PWD will maintain a future level of effort for these investigations based on requests, which are logged and tracked through the CARE database.

Table 60 provides additional detail on COJ's activities in the Miramar Creek watershed.

TABLE 60: COJ ACTIVITIES IN THE MIRAMAR CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	TOTAL COST	FUNDING SOURCE	PROJECT STATUS
Capital Improvement Projects						
COJ – 77	Inwood Terrace Area	Relieve flooding by improving conveyances	5 acres	$572,000	COJ	Complete
COJ – 78	Miramar Tributary Improvements	Flood improvement	23 acres	$1,200,000	COJ	Complete
COJ – 79	Pine Forest/Larson Acres Area	Flood improvement, wet detention	22 acres	$5,015,000	COJ	Construction
COJ – 80	St Augustine Rd (Emerson to U.S. 1)	Regional pond	167 acres	Unknown	COJ	Complete
MS4 Maintenance Activities						
COJ – 81	Ditch/Creek Regrade/Erosion/Clean	Completed in response to CARE requests. Costs limited to activities completed after release of work order system.	57 (for 2005–08)	$9,057	COJ	Ongoing
COJ – 82	Lake or Pond Problem		15 (for 2005–08)	$1,516	COJ	Ongoing
COJ – 83	Structure Blocked/Repair/ General Flooding		31 (for 2005–08)	$2,510	COJ	Ongoing
Inspection, Enforcement, and Sampling						
COJ – 84	Illicit Water Discharge	CARE-initiated inspection	2 (for 2000–08)	$424	COJ	Ongoing
COJ – 85	Pollution – Water – Illegal Discharge	CARE-initiated inspection	3 (for 2000–08)	$636	COJ	Ongoing
COJ – 86	Sewer Drains into Yard/Ditch	CARE-initiated inspection	2 (for 2000–08)	$424	COJ	Ongoing
COJ – 87	Sewer Overflow	CARE-initiated inspection	4 (for 2000–08)	$848	COJ	Ongoing
COJ – 88	Private Lift Station Inspection	No lift stations prior to 2007 with 2 total annual inspections	2 (for 2007)	$424	COJ	Ongoing
COJ – 89	Illicit Discharge Detection and Elimination	6 illicit, no open	28 (for 1998–2003)	$5,936	COJ	Ongoing
COJ – 90	Routine Surface Water Sampling	NPDES permit-related quarterly water quality sampling – 1 sampling station in WBID	53 (for 1995–2008)	$23,691	COJ	Ongoing
COJ – 91	TAT Sampling	Conducted by EQD to assess bacteria levels in creek and identify potential fecal bacteria sources	12 sites/70 samples	$31,290	COJ	Ongoing
Septic Tank Phase-Out Program						
COJ – 92	Point La Vista Failure Area – Septic Tank Phase-Out	Phase out septic tanks in failure areas (also listed as part of larger LSJR Main Stem BMAP project)[1]	134 total tanks, 0 connected	Unknown	COJ	Ongoing
COJ – 93	Freeman Road Failure Area – Septic Tank Phase-Out	Phase out septic tanks in failure areas (also listed as part of larger LSJR Main Stem BMAP project)[1]	83 total tanks, 0 connected	Unknown	COJ	Ongoing
COJ – 94	Inwood Terrace Failure Area – Septic Tank Phase-Out	Phase out septic tanks in failure areas (also listed as part of larger LSJR Main Stem BMAP project)[1]	10 total tanks, 0 connected	Unknown	COJ	Ongoing
COJ – 95	Emerson Failure Area – Septic Tank Phase-Out	Phase out septic tanks in failure areas (also listed as part of larger LSJR Main Stem BMAP project)[1]	418 total tanks, 0 connected	Unknown	COJ	Ongoing

Project Number	Project Name	Project Description	Level of Effort	Total Cost	Funding Source	Project Status
COJ – 96	Outside Failure Areas – Septic Tank Phase-Out	Phase out program as provided by COJ ordinance	14 total tanks, 0 connected	Unknown	COJ	Ongoing
COJ – 97	Septic Tank Maintenance Public Education	Public service announcements	Ongoing	Unknown	COJ	Ongoing
Management and Reduction of Pet and Animal Waste						
COJ – 98	Pet/Animal Management Public Education	Public service announcements	Ongoing	Unknown	COJ	Ongoing

Note: Inspection unit cost = $212; sampling event unit cost = $447; and septic tank per connection = $35.

[1] COJ has committed to removing septic tanks in failure areas that are within 300 meters of a surface water in the 2008 LSJR Main Stem BMAP. COJ must submit a plan to FDEP for removing septic tanks within 6 months of completion of the septic tank study, or by June 30, 2011, whichever is earlier. At a minimum, COJ will accomplish a 50% implementation of the septic tank phase-out projects by July 31, 2015, with the phase-outs completed by December 31, 2023. For the 10 tributaries addressed in this BMAP, a total of 1,167 septic tanks are located in failure areas, although not all of them may be located within 300 meters of a surface water. The failing tanks within 300 meters of a surface water will be included in the COJ plan and schedule to phase out tanks and will be identified as Tributaries BMAP-related tanks in the plan.

10.3.4 FDOT Activities in the Miramar Creek Watershed

10.3.4.1 Ongoing FDOT Programs and Activities

Under Subsection 334.044(15), F.S., and Rule 14-86, F.A.C., FDOT implements a Drainage Connection Program. The program does not issue water quality permits but requires the connecting entity to certify that the discharge is of acceptable water quality. Connecting entities are required to maintain the discharge of acceptable water quality for the duration of the FDOT permit. If connecting entities fail to meet this requirement after sufficient warning by FDOT, they will be reported to FDEP, SJRWMD, and, if applicable, to the local municipality; these entities regulate stormwater quality through state rules, ordinances, and codes. FDOT performs periodic site inspections as part of the MS4 NPDES permit. FDOT also supports the Adopt-A-Highway program in the watershed, in which trash is collected from 29 acres, for an average annual removal of 2,515 pounds. Street sweeping occurs monthly on 10 miles of roadways, reducing the amount of trash and sediment entering the stormwater conveyance system. As part of the maintenance program, FDOT removes sediment, trash, and debris from the system as needed. This maintenance occurs in 178 inlets and 7 miles of piping in the WBID.

FDOT also works with COJ on several efforts related to the MS4 permit. FDOT participates in the PIC Program in conjunction with COJ; five illicit connections to FDOT conveyances have been removed. FDOT has instructed staff to be alert for illicit connections during routine maintenance activities, and investigates observances found in the right of way. Those located outside the right of way are reported to the applicable municipality for further investigation and enforcement action. FDOT maintains a toll-free number to be used for reporting illicit connections. FDOT also contributes funding for one monitoring station in the Miramar Creek watershed that is sampled quarterly as part of the routine monitoring program. FDOT will continue these activities in the future to support the maintenance of the MS4 system. **Table 61** lists FDOT's activities in the watershed.

TABLE 61: FDOT ACTIVITIES IN THE MIRAMAR CREEK WATERSHED

Project Number	Project Name	Estimated Cost	Funding Source	Level of Effort	Project Status
Identification and Removal of Illicit Connections					
FDOT – 27	PIC Program – Search for Illicit Connections	See Note 1	State of Florida (FDOT)/COJ	Effort is continuous in WBID	Ongoing
FDOT – 28	PIC Program - Illicit Connections Identified and Removed in WBID if Found To Be Truly Illicit	See Note 1	State of Florida (FDOT)/COJ	5 illicit connections removed	Ongoing
Surface Water Sampling To Assess Conditions and Identify Sources					
FDOT – 29	Routine Tributary Monitoring as Part of MS4 Permit	See Note 2	State of Florida (FDOT)/COJ	1 station quarterly	Ongoing
Drainage Connection Program (DCP)					
FDOT – 30	DCP – Connecting Entity Must Certify that All Discharges to FDOT MS4 Are Treated Prior to Connection	See Note 3	State of Florida (FDOT)	Ongoing effort	Ongoing
Adopt-A-Highway Program					
FDOT – 31	Adopt-A-Highway Program	See Note 4	Not applicable	Trash collected from 29 acres. Trash collected annually averages 2,515 pounds.	Ongoing

Project Number	Project Name	Estimated Cost	Funding Source	Level of Effort	Project Status
Catch Basin/Inlet and Closed Loop MS4 Cleaning					
FDOT – 32	Sediment Accumulation, Trash, and Debris Removed as Needed	$44,482	State of Florida (FDOT)	Approx 178 inlets/catch basins and about 7 miles of piping	Ongoing
Street Sweeping Program					
FDOT – 33	Street Sweeping Program	$2,739	State of Florida (FDOT)	10 miles of roadway swept monthly	Ongoing
Routine Maintenance Activities					
FDOT – 34	Maintain FDOT Stormwater Systems	See Note 5	State of Florida (FDOT)	Clean drainage structures, replace/repair storm/cross/side drains, clean/reshape roadside ditches, clear/repair outfall ditches, mowing, roadside litter removal, respond to citizen complaints	Ongoing

[1] Countywide Program – Average cost is $37,605 per year contribution to COJ.
[2] Countywide Program – Average cost is $22,546 per year contribution to COJ.
[3] Countywide Program – Average cost is $27,151 per year.
[4] Associated cost unknown. Program is voluntary.
[5] Countywide Program – Average cost is $2,750,735 per year.

10.4 Summary of Restoration Activities and Sufficiency of Efforts

Table 58 through **Table 61** list the projects and programs to reduce fecal coliform loading in the Miramar Creek watershed. Several key efforts completed in the WBID are summarized below, as well as activities that are expected to continue or to be implemented in future years. The efforts outlined in the project tables, including the activities highlighted below, will reduce fecal coliform loading and improve water quality in Miramar Creek based on the best information available about fecal coliform sources. As water quality improves in response to these actions and the bacteria source information is refined, future BMAPs may recommend different activities or levels of effort. For this BMAP, the full implementation of the projects and programs listed in the project tables for the Miramar Creek watershed is sufficient to significantly reduce fecal coliform sources and make substantial progress towards meeting the TMDL.

10.4.1 OSTDS

Failure Areas – OSTDS are a significant source of loading in the Miramar Creek WBID. Many of the estimated 659 septic tanks in the watershed are located near surface waters or inlets to the stormwater conveyance system. The majority of the OSTDS and repair permits are located in the 4 failure areas. COJ has committed to removing septic tanks in failure areas that are within 300 meters of surface waters in the 2008 LSJR Main Stem BMAP. The failing tanks in the 4 failure areas in the Miramar Creek watershed within 300 meters of surface waters will be included in the COJ phase-out plan and schedule, as described in the Main Stem BMAP, and will be identified as Tributaries BMAP-related efforts.

Program Implementation – DCHD has issued 68 repair permits and 44 abandonment permits, conducted 148 site evaluations and 106 complaint investigations, and issued 7 annual operating permits in the watershed. This level of activity indicates that DCHD inspectors perform investigations regularly in the watershed. However, a discrete portion of the WBID has a higher probability of OSTDS-related problems based on the number of repair permits issued, water quality data, and site conditions. DCHD will seek to secure funding for a new program to intensively inspect a specific geographic area within the WBID boundary and, upon obtaining

funding, will report the results of the inspection in an annual BMAP progress report. Additional areas may be identified for intensive inspections based on the assessment efforts discussed in the BMAP. If additional areas are designated in the future for inclusion in the program, these areas will also be inspected as funding becomes available. Inspections need to be continued and fully enforced to manage potential impacts from existing systems and to prevent new sources from reaching surface waters.

Walk the WBID – During the Walk the WBID effort in Miramar Creek, a black corrugated pipe located on Orlando Avenue, and potentially discharging into the creek, was found to have high fecal coliform values. COJ is investigating this pipe. Additionally, DCHD is investigating a home on Brooker Road with potential OSTDS-related problems. These investigations must be completed within one year of BMAP implementation and their status reported in the BMAP annual progress report. Additionally, any issues identified during the remaining Walk the WBID efforts must be investigated and rectified where appropriate. All activities should be complete and their status reported in the first annual BMAP progress report.

10.4.2 Sewer Infrastructure

Private Infrastructure – According to the COJ database, there are two private lift stations in the watershed that were inspected by EQD in 2008. COJ will continue to inspect the private lift stations annually to ensure they are operating properly and should take enforcement action when necessary.

Sewer Infrastructure Projects – JEA has rebuilt 1 pump station, near surface waters, in the watershed and cleaned 2,542 LF of pipe in FY07. These efforts rehabilitated older infrastructure, helping to prevent future problems. During the Walk the WBID, the field team identified a bowed sewer line crossing the northern branch. JEA inspected and dye tested the line and did not find any leaks; therefore, a repair was unnecessary. Clay sewer lines near Greenridge Avenue were replaced with polyvinyl chloride (PVC) piping, which will prevent potential failures and problems associated with older, porous clay piping. Two lift stations are located on the WBID boundary: (1) north of Emerson and west of Basil; and (2) Grant and Gattis Lane. JEA will confirm if these stations are reported in Miramar Creek or if they are reported in Craig Creek and New Rose Creek, respectively, in the first annual BMAP progress report. The continuation of maintenance activities, program implementation, and the confirmation of reporting boundaries is sufficient to address private lift stations in the watershed at this time.

Walk the WBID – JEA is currently investigating a seep under a sewer line on the northern branch of Miramar Creek, identified during the Walk the WBID. The dye test and inspection revealed no leaks, yet water quality samples indicate high counts. JEA will continue to investigate this area and provide information on its status in the first annual BMAP progress report. The seep follow-up, combined with program implementation, previous source removal, and continued TAT sampling, is addressing known sources of fecal coliform loading and attempting to locate unidentified sources.

10.4.3 Stormwater

Illicit Connection Removal – The PIC Program has resulted in the removal of six illicit connections by COJ and FDOT. Both entities have committed to continue the program, which includes identifying additional illicit connections and removing those connections in a timely manner.

FDOT Program Implementation – In accordance with Rule 14-86, F.A.C., FDOT requires any new connections to its MS4 stormwater conveyance systems to be evaluated and permitted to prevent the introduction of new sources to its conveyances. This permit program will continue, and FDOT will continue to periodically inspect its facilities as part of its MS4 permit to prevent unpermitted connections. The FDOT Adopt-A-Highway Program removes over 2,500 pounds of trash annually from the WBID, and street sweeping is performed monthly on 10 miles of roadway. FDOT also maintains 178 inlets and 7 miles of piping. These activities constitute a significant proactive effort to prevent sources of fecal coliform from entering the conveyance system. FDOT will continue stormwater infrastructure maintenance to help prevent potential regrowth in the MS4 conveyances. The trash removal efforts are expected to continue if the Adopt-A-Highway volunteers continue to be active in the WBID.

COJ Program Implementation – COJ has completed 15 work orders to repair stormwater pond problems, in addition to 88 work orders for other MS4 maintenance activities. The stormwater outfall behind the JEA lift station is no longer active, preventing fecal coliform loadings from any incidents at the lift station from entering the creek. As part of the Walk the WBID follow-up, COJ PWD determined that the outfall at the Better Jacksonville Plan Pond is situated at Orlando Terrace and Gila Lane. Additional assessment activities are under way, and any stormwater issues identified as a part of these efforts should be investigated, rectified where appropriate, and reported in the annual BMAP progress report. The continuation of maintenance activities and Walk the WBID follow-up are sufficient to address stormwater in the watershed at this time.

10.4.4 Wildlife and Other Anthropogenic Sources

The Colonial Park pond on the northern branch is home to numerous ducks and waterfowl, which may be contributing to the fecal coliform loading in the northern branch. A weir is in place to allow water to discharge in high-water conditions but other, alternative corrective actions to address wildlife sources are extremely limited. During the Walk the WBID, JEA lift station S505 had evidence of homeless populations. COJ should be aware of this potentially significant human source and prepare recommendations on how to address the situation in the annual reports until it is resolved.

TABLE 62: SUMMARY OF RESTORATION ACTIVITIES FOR THE MIRAMAR CREEK WATERSHED

SOURCE/ACTION	COJ	DCHD	FDOT	JEA
OSTDS				
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 (PSA)	√	X	X	X
Surface Water Sampling for Conditions and Trends	√	X	X	X
Sewer System				
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	√
Air Release Valve (ARV) Inspection and Rehab	X	X	X	√

SOURCE/ACTION	COJ	DCHD	FDOT	JEA
Program Implementation	X	X	X	√
Private Lift Station Inspections and Enforcement	√	X	X	X
Private Non-NPDES Wastewater Facility Inspections and Enforcement	*	X	X	X
Sanitary Sewer Overflow (SSO) Investigations	√	X	X	√
Surface Water Sampling for Conditions and Trends	X	X	X	√
Stormwater				
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
Pet Waste Management				
Ordinances and Enforcement	√	X	X	X
Public Education and Outreach	√	X	X	X
Special Source Assessment Activities				
Intensive Water Quality Sampling To Track Sources	√	X	X	X
Tributary Assessment Team (TAT)	√	X	X	√
Microbial Source Tracking (MST)	√	X	X	√
Thermal Imagery To Identify PICs	√	X	X	X

Note: Shaded cells (marked with an X) represent activities that do not apply to the associated entity.
* Activity is not applicable for the waterbody due to a lack of infrastructure.
+ FDOT participation in these activities is provided by funding in the NPDES MS4 agreements with COJ.

CHAPTER 11: BIG FISHWEIR CREEK (WBID 2280)

11.1 WBID DESCRIPTION

Big Fishweir Creek, WBID 2280, is located in Duval County, west of the LSJR within the Ortega River Planning Unit, as designated by SJRWMD (**Figure 12**). The headwaters of Big Fishweir Creek presumably comprise stormwater that originates at the upper reaches of its three branches and Little Fishweir Creek (**Figure 13**). Big Fishweir Creek splits into two major branches, the southern and northern forks. The southern fork extends west to Neva Street and merges with the main channel at Roosevelt Boulevard. The northern fork stretches northwest to the intersection of Cassat Avenue and Kingsbury Street and joins the main channel just west of Roosevelt Boulevard. A third branch ("middle branch") diverges from the southern fork at Glenwood Avenue and continues north to Ulmer Street. Little Fishweir Creek, a minor tributary located north of Big Fishweir Creek, extends northwest to Bethwood Circle and flows into Big Fishweir Creek's main channel south of Greenwood Avenue. Little Fishweir Creek also branches slightly at Herschel Street and continues northeast to Dancy Street. The waters of Big Fishweir Creek eventually flow into the St. Johns River just east of Woodmere Drive (PBS&J, June 2008b).

The spatial distribution and acreage of different land use categories in the Big Fishweir Creek watershed were identified using 2004 land use coverage data from SJRWMD (**Table 63**). The dominant land use (1,376.8 acres; 58.7% of total coverage) in the Big Fishweir Creek watershed, and directly adjacent to the majority of the creek itself, is high-density residential, which extends throughout the watershed. The next 2 most abundant land cover categories are (1) medium-density residential areas (353 acres; 15.1% of total coverage), primarily located in the central portion and in patches in the western corner of the watershed; and (2) commercial/utility/institutional areas (307.2 acres; 13.1% of total coverage), located predominantly along Cassat Avenue and in the northern corner of the watershed. Upland forests and wetland habitat accounted for less than 5% of land use (PBS&J, June 2008b).

According to the 2000 Census, there are 6,757 households in the watershed, averaging 2.07 people per household. It should be noted that there are high-density residential areas (16 to 25 people per acre) located adjacent to surface waters at the upper reaches of the northern fork (PBS&J, June 2008b). In addition, assuming that 40% of households have 1 dog (Tyler, 2006), there are an estimated 2,703 dogs in the watershed.

TABLE 63: LAND USES IN THE BIG FISHWEIR CREEK WATERSHED

LAND USE	ACRES	% OF TOTAL
High-Density Residential	1,376.8	58.7
Medium-Density Residential	353.0	15.1
Commercial/ Utility/Institutional	307.2	13.1
Recreational	129.4	5.5
Transportation	97.8	4.2
Water	33.0	1.4
Wetlands	20.1	0.9
Upland Forest	15.7	0.7
Industrial	6.1	0.3
Nonforested Upland	4.4	0.2
TOTAL:	**2,343.5**	**100**

FIGURE 12: LOCATION OF THE BIG FISHWEIR CREEK WATERSHED

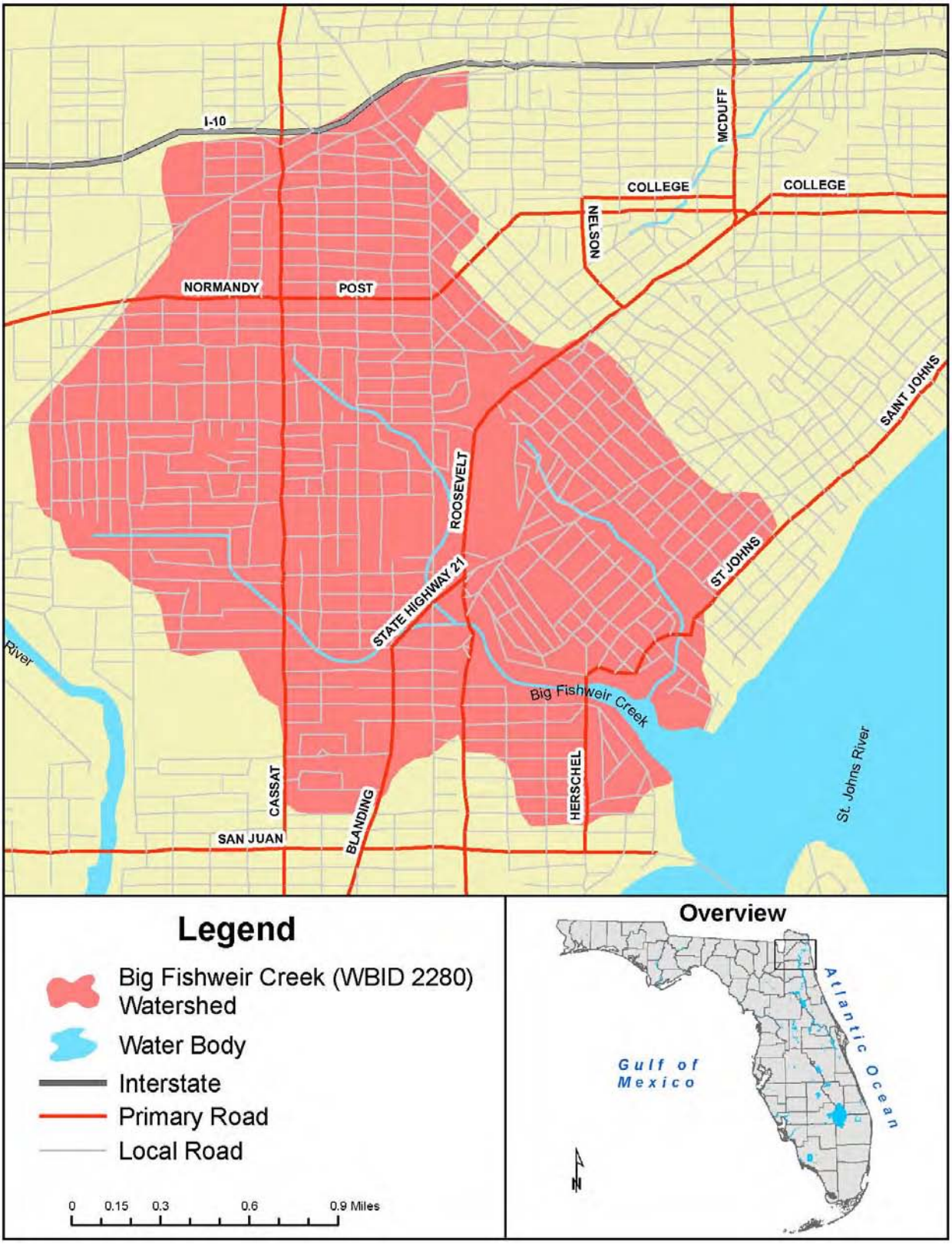

FIGURE 13: BIG FISHWEIR CREEK WBID LOCATOR MAP

11.2 Potential Sources

11.2.1 Point Sources

There is one industrial wastewater facility located in the Big Fishweir Creek watershed, Riverside Plaza, which is permitted to discharge industrial wastewater to Little Fishweir Creek near the intersection of Montgomery Place and St. Johns Avenue. The COJ/FDOT MS4 permit includes the Big Fishweir Creek watershed (PBS&J, June 2008b).

11.2.2 Illicit Discharges

A total of 61 PICs were identified in the Big Fishweir Creek watershed between 2000 and 2006, primarily in the southwest corner of the WBID. Of these, 6 were determined to be illicit and were removed. The status of 6 of the PICs is still pending investigation.

11.2.3 Centralized Sewer Infrastructure and Overflows

The role of collection system influences on bacterial abundance in Big Fishweir Creek was assessed by reviewing the amount of sewer infrastructure in the watershed and the information provided by JEA on recent SSOs in COJ. The Big Fishweir Creek watershed is situated in the Buckman WWTF service area.

An estimated 5,307 households (approximately 79% of households) are connected to the sanitary sewer system in the Big Fishweir Creek watershed. Sewer infrastructure (e.g., sewer mains, lift stations, manholes) is located throughout the watershed and near the surface waters of Big Fishweir and Little Fishweir Creeks, increasing the likelihood that possible spills and/or unidentified sewer infrastructure leaks will impact surface waters. JEA has reported a total of 20 SSOs within the Big Fishweir Creek WBID boundaries (**Table 64**). The estimated volume of spill associated with these overflows ranged from 2 to 15,000 gallons and averaged 1,094 gallons; however, only 4 SSOs were reported to have potentially impacted surface waters (PBS&J, June 2008b).

Table 64: SSOs reported in the Big Fishweir Creek Watershed, 2001–07

WBID Name (Number)	Date of Overflow	Estimated Volume of Spill (Gallons)	Potentially Impacted Surface Waters
Big Fishweir Creek (2280)	16-Jan-02	100	N
Big Fishweir Creek (2280)	2-Feb-02	100	N
Big Fishweir Creek (2280)	6-Feb-02	400	N
Big Fishweir Creek (2280)	21-May-02*	1,000	Y
Big Fishweir Creek (2280)	20-Mar-03	2	N
Big Fishweir Creek (2280)	14-May-04*	15,000	Y
Big Fishweir Creek (2280)	19-Oct-04	50	N
Big Fishweir Creek (2280)	11-Apr-05	50	N
Big Fishweir Creek (2280)	14-May-05	200	N
Big Fishweir Creek (2280)	18-May-05	30	N
Big Fishweir Creek (2280)	6-Jul-05	400	N
Big Fishweir Creek (2280)	11-Jul-05	20	N
Big Fishweir Creek (2280)	18-Jul-05	200	N
Big Fishweir Creek (2280)	23-Jul-05	200	N
Big Fishweir Creek (2280)	28-Jul-05	100	N
Big Fishweir Creek (2280)	8-Aug-05	200	N
Big Fishweir Creek (2280)	10-Dec-05	50	N

WBID Name (Number)	Date of Overflow	Estimated Volume of Spill (Gallons)	Potentially Impacted Surface Waters
Big Fishweir Creek (2280)	10-Jan-06	25	N
Big Fishweir Creek (2280)	13-Mar-06*	3,750	Y
Big Fishweir Creek (2280)	10-Jul-06*	50	Y

*Reportable SSOs that spilled > 1,000 gallons of sewage and/or affected surface waters.

11.2.4 OSTDS

WSEA estimates that there are approximately 1,416 OSTDS in the Big Fishweir Creek watershed. According to DCHD, 87 septic tank repair permits were issued in this area. The majority of the permits, and presumably failed septic systems, were located in the center of the WBID between Hamilton Street and Cassat Avenue and from Melrose Avenue north to Kingsbury Street. Septic systems in this area are located near the surface waters of both the southern and northern forks of Big Fishweir Creek, increasing the likelihood that OSTDS failure may be contributing to the fecal pollution observed in these areas. In addition, two previously DCHD-designated septic tank failure areas (Murray Hill A and Murray Hill B) are located within the watershed. Only the western edge of Murray Hill A, situated at the far northeast corner of the WBID at the Lennox Avenue and Interstate 10 intersection, is within the WBID boundaries. The vast majority of septic tank repair permits were filed in the Murray Hill B septic tank failure area, located in the center of the watershed from Hamilton Street east to Cassat Avenue, and from Melrose Avenue north to Post Street (PBS&J, June 2008b). Both areas have been sewered and are no longer listed as failure areas.

Considering that an estimated 22% of households utilize OSTDS and that a previous DCHD-designated septic tank failure area is near surface waters, in addition to the extensive number of repair permits that have been filed by property owners throughout the watershed, it is likely that OSTDS contribute to the overall bacterial loading of Big Fishweir Creek. This is especially true in the center of the watershed, in the Murray Hill B area, where the majority of parcels were issued septic tank repair permits. Due to the prevalence of sewer infrastructure (e.g., sewer mains, lift stations, manholes) located throughout the watershed, there is also a potential for leaky sewer infrastructure (e.g., from underground sewer mains) to contribute to fecal pollution in this portion of the WBID. Of course, it is also possible that failing septic systems that have not been issued repair permits are located near Big Fishweir and Little Fishweir Creeks and may contribute to bacterial contamination in the receiving waters in other areas of the watershed as well (PBS&J, June 2008b).

11.2.5 Nonpoint Sources

An analysis of impervious surface indicates that the Big Fishweir Creek WBID contains predominantly 10 to 25% impervious surface. The watershed also contains land with greater than 25% impervious surface. These areas generally correspond to commercial/utility/ institutional land use classifications located along Cassat Avenue, in the northern corner of the watershed, and in areas along the main channel between the confluence of the north and south forks and the junction with Little Fishweir Creek. An analysis was also conducted that demonstrates that the majority of the WBID contains a moderate-to-high potential for stormwater runoff, including areas near the creek. The highest runoff coefficients are located on either side of Cassat Avenue, Blanding Boulevard, and Emerson Boulevard Road; and in the north corner of the watershed (PBS&J, June 2008b).

The storm sewer network in the Big Fishweir Creek watershed includes a total of 32 permitted stormwater treatment areas, encompassing approximately 70.23% of the WBID area.

Stormwater infrastructure in the WBID includes 97 outfalls by receiving water (1 classified by FDEP as a major outfall) and 1,161 inlets. Although closed conveyances are common throughout the WBID, ditch systems primarily form segments of Big Fishweir Creek at (1) the southern fork from Placid Place extending west to Neva Street, and (2) the northern fork from Merson Lane north to Cassat Avenue (PBS&J, June 2008b).

Fecal coliform concentrations did not differ during the "wet" and "dry" season near Hershel Street and Greenwood Avenue, suggesting a constant source of fecal coliform bacteria to Big Fishweir Creek through nonpoint source discharges, failing wastewater conveyance systems, or septic systems independent of rainfall. Higher loadings were identified in the "wet" season near North Park Street, suggesting that the majority of bacterial loading was delivered to Little Fishweir Creek through nonpoint source discharges, failing wastewater conveyance systems, or septic systems during high rainfall (PBS&J, June 2008b).

11.3 Projects to Address Fecal Coliform Loadings

11.3.1 JEA Activities in the Big Fishweir Creek Watershed

11.3.1.1 Ongoing JEA Programs and Activities

JEA is currently implementing a number of countywide specific improvement programs, as follows, to address the sanitary sewer system as a source of fecal coliform contamination: (1) FOG Reduction Program; (2) SSO Root Cause Program; (3) Pop-Top Program; (4) Non-Destructive Testing and ARV Programs; (5) SCADA; (6) Third Party Education and Enforcement Program; (7) Manhole Monitoring; (8) Force Main Discharge Manholes; and (9) CMOM Program. **Appendix E** describes each of these programs.

As part of the TAT, JEA proposed monthly or bimonthly intensive localized sampling of 4 locations for 6 months in the Big Fishweir WBID. To date, these efforts have included the collection of 180 samples from 5 different locations throughout the watershed, with nearly all values (83%) exceeding the 400 cfu/100mL criterion (PBS&J, June 2008b).

JEA conducts activities to maintain the sanitary sewer infrastructure in the watershed, including pipe bursting 7.89% of the sewer lines, CIPP on 0.86%, and open cut repair of 0.20%. In addition, JEA conducts activities to help prevent future infrastructure problems. In the Big Fishweir Creek watershed, 7,257 LF of pipe were inspected and 23,980 LF of pipe were cleaned in FY07. These activities will continue in the future to maintain the sanitary sewer system and prevent future problems. **Table 65** contains additional information on JEA's activities in the watershed.

TABLE 65: JEA ACTIVITIES IN THE BIG FISHWEIR CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	ESTIMATED COST	FUNDING SOURCE	PROJECT STATUS	START DATE OF PROJECT
Sewer Upgrades							
JEA – 79	Pipe Bursting – Increase Carrying Capacity	Replace failing/leaking infrastructure	Total footage of pipe burst in watershed since 2001: 104,277	$13,791,000	JEA	Ongoing	FY00
JEA – 80	CIPP – Install New Inner Lining	Rehabilitate failing/leaking infrastructure	Total footage of CIPP in watershed since 2001: 11,378	$592,517	JEA	Ongoing	FY00
JEA – 81	Open Cut - Removal and Replacement	Replace failing/leaking infrastructure	Total footage of open cut replacement in watershed since 2001: 222	$55,500	JEA	Ongoing	Ongoing
Other Sewer Infrastructure Upgrades							
JEA – 82	Manhole Linings Rehabbed	Repair deteriorating manhole linings	Not applicable	$330,469*	JEA	Ongoing	FY01
JEA – 83	ARV Inspection and Rehab	See **Appendix E**	2 ARVs replaced within 200 feet of tributary (21 ARVs total in Big Fishweir Creek watershed)	$481,873*	JEA	Ongoing	Ongoing
JEA – 84	ARV Inspection	Inspect all ARVs in watershed to ensure integrity	21 ARVs in watershed – report status in annual progress report (within 5 years)	Unknown	JEA	Planned	2009
JEA – 85	Pump Station SCADA Upgrades	Retrofitting completed in 2004; all stations constructed since have SCADA installed. See **Appendix E.**	Not applicable	Unknown	JEA	Complete	Complete
JEA – 86	Inspect Force Main Discharge Manholes, Repair/Rehab as Necessary	See **Appendix E**	Not applicable	$466,576*	JEA	Ongoing	FY07
JEA – 87	Lift Station Inspection	Inspect lift stations near surface waters	6 stations near surface waters – report status in annual progress report (within 5 years)	Unknown	JEA	Planned	2009
JEA – 88	Merimac Avenue Lift Station Repair	Repaired lift station at Merimac Avenue as part of Walk the WBID follow-up	1 station	Unknown	JEA	Complete	2009
Programs To Reduce Sewer Problems							
JEA – 89	FOG Reduction Program	See **Appendix E**	Not applicable	Unknown	JEA	Ongoing	Current FOG Program initiated in 2004
JEA – 90	Pipe TV Inspection	Inspect existing infrastructure through use of closed-circuit TV system	7,257 LF of pipe inspected (FY07)	$163,099*	JEA	Ongoing	Carried over from city operation (1997)
JEA – 91	Pipe Cleaning	Clean existing pipes to avoid blockages	23,980 LF of pipe cleaned (FY07)	$743,054*	JEA	Ongoing	Carried over from city operation (1997)

Project Number	Project Name	Project Description	Level of Effort	Estimated Cost	Funding Source	Project Status	Start Date of Project
JEA – 92	Implement CMOM Program	See **Appendix E**	Not applicable	$ 163,269*	JEA	Ongoing	Ongoing
JEA – 93	Manhole Monitoring	See **Appendix E**	Not applicable	$ 137,526*	JEA	Ongoing	August 2007
JEA – 94	SSO Root Cause Program	See **Appendix E**	Not applicable	Unknown	JEA	Ongoing	February 2007
JEA – 95	Pop-Top Program	See **Appendix E**	Not applicable	$64,324*	JEA	Ongoing	February 2007
JEA – 96	Non-Destructive Testing Program/Pipe Integrity Testing	See **Appendix E**	Not applicable	$74,284*	JEA	Ongoing	Ongoing

* Costs provided are total systemwide costs for the program because WBID-specific costs are currently unavailable.

11.3.2 DCHD Activities in the Big Fishweir Creek Watershed

11.3.2.1 Ongoing DCHD Programs and Activities

Currently, DCHD is implementing a variety of countywide specific improvement programs and restoration activities to address OSTDS as sources of fecal coliform contamination. These include (1) the OSTDS Program, (2) training programs, and (3) the designation of septic tank failure and nuisance areas for transfer to central sewer. **Appendix E** describes each of these programs.

As of July 28, 2008, DCHD updated the listing of failure and nuisance areas. There are currently no designated septic tank failure areas in the Big Fishweir Creek watershed; however, two previous failure areas (Murray Hill A and Murray Hill B) have since been sewered.

As part of the OSTDS Program, DCHD has issued 80 new construction permits, 87 repair permits, and 741 abandonment permits in the WBID. In addition, 16 annual operating permits have been issued for PBTS in the watershed. DCHD has also performed 916 plan reviews and 151 investigations in response to complaints received. It will continue these efforts in the future to reduce and prevent issues related to OSTDS. **Table 66** lists DCHD's projects in the Big Fishweir Creek watershed.

Table 66: DCHD Activities in the Big Fishweir Creek Watershed

Project Number	Project Name	Project Description	Level of Effort	Estimated Cost	Funding Source	Project Status
DCHD – 37	OSTDS Program	Implementation of programs to address septic systems as potential sources	Approximately 80 new construction permits, 87 repair permits, and 741 abandonment permit issued	$138,000	FDOH	Ongoing
DCHD – 38	Annual Operating Permits	Annual operating permits issued for PBTS, systems located in IMZ, and commercial systems	16 annual operating permits issued for PBTS/IMZ in WBID	$45,000	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 39	SWIM Project	Implementation of broad-ranging septic tank ordinance	100% of Murray Hill B Septic Tank Failure Area is located in WBID	$155,000	FDOH/ LSJR SWIM Grant	Completed
DCHD – 40	DCHD-Sponsored Training Programs	Annual training programs held for septic tank contractors, certified plumbers, maintenance entities, and environmental health professionals	1 to 2 trainings per year providing up to 12 contact hours	$2,500	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 41	Application/ Plan Review/ Site Evaluations	DCHD performs plan review and site evaluation for each application received for OSTDS new construction, repair, or modification of existing system	Approximately 916 plan reviews and site evaluations have been performed in WBID based on permitting history	$197,000	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 42	Septic Tank Failure Area Ranking	Septic tank failure area scored and prioritized on annual basis	Less than 1 year since previous update	N/A		Ongoing

Project Number	Project Name	Project Description	Level of Effort	Estimated Cost	Funding Source	Project Status
DCHD – 43	Complaint Investigations	DCHD investigates all complaints received, performs site visit, and initiates enforcement action on sanitary nuisance violations	151 complaint investigations have been performed in WBID	$15,000	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 44	Intensive Inspection Program	Intensive geospecific inspections in selected BMAP WBIDs based on repair permit applications, water quality information, and site conditions; additional WBIDs may be identified in future based on ongoing assessment efforts	Approximately 70 OSTDS located south of Big Fishweir Creek, east of Blanding Blvd, west of U.S. 17, and north of Melrose Avenue	$10,850	Unknown	Planned – pending funding

11.3.3 COJ Activities in the Big Fishweir Creek Watershed

11.3.3.1 Completed COJ Projects

COJ has completed 3 projects to capture and/or treat stormwater in the Big Fishweir Creek watershed: (1) Lakeshore Woodcrest Drainage project, which includes a wet detention pond that treats 296 acres; (2) Murray Hill Phase 1, which is also a wet detention pond that treats 219 acres; and (3) a second-generation baffle box on Riverside Avenue that treats 70 acres. These projects reduce stormwater-associated fecal coliform loading to the creek.

In addition, COJ has worked with WSEA to extend sewer lines to remove 781 septic tanks in the watershed, helping to reduce fecal coliform loading from septic tanks along the creek. WSEA uses the septic tank failure and nuisance areas ranking information for justification when seeking funding for phasing out septic tanks and transferring homes to central sewer (PBS&J, June 2008b). The WBID contains the Murray Hill B failure area, which has since been removed from the ranking list due to the sewering efforts. JEA takes these lines over once they have been installed.

11.3.3.2 COJ Projects in Design or Construction

COJ also currently has three projects under construction in the WBID: (1) drainage improvements on Arden Street to reduce flooding in the area; (2) Jersey Street Drainage project to pipe the roadside ditch; and (3) Fairfax Manor Creek project to regrade the ditch in this area. COJ is also designing a project to improve the outfall on Hamilton at Jersey Street to relieve flooding in the area. These projects, once completed, will help control flooding in the project areas, reducing the amount of fecal coliform loading that goes into the creek from stormwater.

11.3.3.3 Ongoing COJ Programs and Activities

COJ has also established a monitoring plan to evaluate the effectiveness of the SWMP and the associated pollutant reduction from MS4 systems to waters of the state. As part of this monitoring plan, COJ has 3 sampling stations in the Big Fishweir Creek watershed and collected 118 samples from these sites between 1995 and 2008. In addition to the routine sampling, COJ EQD collected 4 samples from 4 sites as part of the TAT effort and also collected 1 sample as a follow up on a high fecal coliform count to help with source identification.

COJ PWD's Streets and Drainage Division is responsible for maintaining its stormwater conveyance systems in Jacksonville. This maintenance includes 308 work orders for ditch and creek regrading, erosion control, and cleaning; 6 work orders for lake and pond maintenance; and 246 work orders for the repair of blocked structures and measures to prevent flooding. These work orders were completed between 2005 and 2008. PWD will continue a level of effort to maintain the MS4 conveyances based on CARE requests.

In addition, COJ has implemented the PIC Program, which keeps track of reported PICs in a database for COJ inspector follow-up. Of the 61 PICs identified by the COJ in the Big Fishweir Creek watershed, 6 were confirmed as illicit connections and were removed by March 2006; the status of 6 of the PICs is currently pending. There were no PICs identified as potential sources of bacterial contamination (PBS&J, June 2008b).

COJ PWD also conducts inspections, which are initiated through the CARE database. In the Big Fishweir Creek watershed, these inspections between 2000 and 2008 included 16 investigations into illicit water discharges, 20 illegal discharges, 22 sewer lines that drained into a yard or ditch, 522 SSOs, 244 septic tanks, and 5 private lift stations. PWD will maintain a future level of effort for these investigations based on requests, which are logged and tracked through the CARE database.

Table 67 provides additional detail on COJ's activities in the watershed.

TABLE 67: COJ ACTIVITIES IN THE BIG FISHWEIR CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	TOTAL COST	FUNDING SOURCE	ESTIMATED COMPLETION	PROJECT STATUS
Capital Improvement Projects							
COJ – 99	Hamilton at Jersey Outfall	Improve outfall to relieve flooding	Improve outfall	$2,900,000	COJ	2012	Design
COJ – 100	Lakeshore Woodcrest	Wet detention	296 acres	Unknown	COJ	Complete	Complete
COJ – 101	Murray Hill Phase 1	Wet detention	219 acres	Unknown	COJ	Complete	Complete
COJ – 102	Riverside Avenue	Second-generation baffle box	70 acres	Unknown	COJ	Complete	Complete
Drainage System Rehab Projects							
COJ – 103	Drainage Improvements to Arden Street	Arden Street floods private property	Arden Street	Unknown	COJ	Construction	Construction
COJ – 104	Jersey St Drainage	Pipe roadside ditch	Jersey Street	$75,000	COJ	Construction	Construction
COJ – 105	Fairfax Manor Creek	Regrade ditch	Fairfax Manor Creek	$65,000	COJ	Construction	Construction
MS4 Maintenance Activities							
COJ – 106	Ditch/Creek Regrade/Erosion/Clean	Completed in response to CARE requests. Costs limited to activities completed after release of work order system.	308 (for 2005–08)	$37,454	COJ	Ongoing	Ongoing
COJ – 107	Lake or Pond Problem		6 (for 2005–08)	$543	COJ	Ongoing	Ongoing
COJ – 108	Structure Blocked/Repair/General Flooding		246 (for 2005–08)	$48,646	COJ	Ongoing	Ongoing
Inspection, Enforcement, and Sampling							
COJ – 109	Illicit Water Discharge	CARE-initiated inspection	16 (for 2000–08)	$3,392	COJ	Ongoing	Ongoing
COJ – 110	Pollution – Water – Illegal Discharge	CARE-initiated inspection	20 (for 2000–08)	$4,240	COJ	Ongoing	Ongoing
COJ – 111	Sewer Drains into Yard/Ditch	CARE-initiated inspection	22 (for 2000–08)	$4,664	COJ	Ongoing	Ongoing
COJ – 112	Sewer Overflow	CARE-initiated inspection	52 (for 2000–08)	$11,024	COJ	Ongoing	Ongoing
COJ – 113	Sewer Repairs at The Loop Restaurant	Follow-up and enforcement of sewer repairs at restaurant	Follow-up on repairs	$1,500	COJ	Complete	Complete
COJ – 114	Septic Tank Inspection	CARE initiated. Enforcement action if required by DCHD.	244 (for 2005–08)	$51,728	COJ	Ongoing	Ongoing
COJ – 115	Private Lift Station Inspection	First lift station installed in 1991 with 42 total annual inspections	5 (for 1991–2008)	$1,060	COJ	Ongoing	Ongoing
COJ – 116	Verify Location of Private Lift Stations	Verify that stations on boundary are reported in associated WBIDs (Cedar River and McCoy Creek)	5 (for 2009–10)	$1,060	COJ	2010	Planned
COJ – 117	Illicit Discharge Detection and Elimination	6 illicit, 6 open	61 (for 2000–06)	$12,932	COJ	Ongoing	Ongoing
COJ – 118	Follow Up on Outstanding PICs	Follow up on 6 open PIC in watershed	6 (for 2009–10)	$1,270	COJ	2010	Planned

Project Number	Project Name	Project Description	Level of Effort	Total Cost	Funding Source	Estimated Completion	Project Status
COJ – 119	Walk the WBID PIC Investigations	Inspect 5 PICs between Cassat and Plymouth Avenue and black corrugated pipe on central branch	6 (for 2009–10)	$1,272	COJ	Ongoing	Ongoing
COJ – 120	Routine Surface Water Sampling	NPDES permit-related quarterly water quality sampling – 3 sampling stations in WBID	118 (for 1995–2008)	$52,746	COJ	Ongoing	Ongoing
COJ – 121	TAT Sampling	Conducted by EQD to assess bacteria levels in creek and identify potential fecal bacteria sources	4 sites/4 samples	$1,788	COJ	Ongoing	Ongoing
COJ – 122	Source ID Sampling	Conducted when high levels of fecal coliform bacteria are noted	1	$1,000	COJ	Ongoing	Ongoing
Septic Tank Phase-Out Program							
COJ – 123	Outside Failure Areas – Septic Tank Phase-Out	Phase-out program as provided by COJ ordinance	1,416 total tanks, 781 connected (for 2004–08)	$27,335	COJ	Ongoing	Ongoing
COJ – 124	Septic Tank Maintenance Public Education	Public service announcements	Ongoing	Unknown	COJ	Ongoing	Ongoing
Management and Reduction of Pet and Animal Waste							
COJ – 125	Pet/Animal Management Public Education	Public service announcements	Ongoing	Unknown	COJ	Ongoing	Ongoing

Note: Inspection unit cost = $212; sampling event unit cost = $447; and septic tank per connection = $35.

11.3.4 FDOT Activities in the Big Fishweir creek Watershed

11.3.4.1 Ongoing FDOT Programs and Activities

Under Subsection 334.044(15), F.S., and Rule 14-86, F.A.C., FDOT implements a Drainage Connection Program. The program does not issue water quality permits but requires the connecting entity to certify that the discharge is of acceptable water quality. Connecting entities are required to maintain the discharge of acceptable water quality for the duration of the FDOT permit. If connecting entities fail to meet this requirement after sufficient warning by FDOT, they are reported to FDEP, SJRWMD, and, if applicable, to the local municipality; these entities regulate stormwater quality through state rules, ordinances, and codes. FDOT periodically performs site inspections as part of the MS4 NPDES permit. FDOT sweeps 21 miles of roadways in the watershed monthly, reducing the amount of trash and sediment entering the stormwater conveyance system. As part of the maintenance program, FDOT removes sediment, trash, and debris from the system as needed. This maintenance occurs in 305 inlets and 14 miles of piping.

FDOT also works with COJ on several efforts related to the MS4 permit. FDOT It participates in the PIC Program in conjunction with COJ. FDOT has instructed staff to be alert for illicit connections during routine maintenance activities, and investigates observances found in the right of way. Those located outside the right of way are reported to the applicable municipality for further investigation and enforcement action. FDOT maintains a toll-free number to be used for reporting illicit connections. FDOT also contributes funding for one monitoring station in the Big Fishweir Creek watershed that is sampled quarterly as part of the routine monitoring program. FDOT will continue these activities in the future to support the maintenance of the MS4 system. **Table 68** lists FDOT's activities in the watershed.

TABLE 68: FDOT ACTIVITIES IN THE BIG FISHWEIR CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	ESTIMATED COST	FUNDING SOURCE	LEVEL OF EFFORT	PROJECT STATUS
Identification and Removal of Illicit Connections					
FDOT – 35	PIC Program – Search for Illicit Connections	See Note 1	State of Florida (FDOT)/COJ	Effort is continuous in WBID	Ongoing
FDOT – 36	PIC Program – Illicit Connections Identified and Removed in WBID if Found To Be Truly Illicit	See Note 1	State of Florida (FDOT)/COJ	2 illicit connections removed	Ongoing
Surface Water Sampling To Assess Conditions and Identify Sources					
FDOT – 37	Routine Tributary Monitoring as Part of MS4 Permit	See Note 2	State of Florida (FDOT)/ COJ	1 station quarterly	Ongoing
Drainage Connection Program (DCP)					
FDOT – 38	DCP – Connecting Entity Must Certify that All Discharges to FDOT MS4 Are Treated Prior to Connection	See Note 3	State of Florida (FDOT)	Ongoing effort	Ongoing
Catch Basin/Inlet and Closed Loop MS4 Cleaning					
FDOT – 39	Sediment Accumulation, Trash, and Debris Removed as Needed	$87,947	State of Florida (FDOT)	Approximately 305 inlets/catch basins and 14 miles of piping	Ongoing
Street Sweeping Program					
FDOT – 40	Street Sweeping Program	$5,752	State of Florida (FDOT)	21 miles of roadway swept monthly	Ongoing

Project Number	Project Name	Estimated Cost	Funding Source	Level of Effort	Project Status
Routine Maintenance Activities					
FDOT – 41	Maintain FDOT Stormwater Systems	See Note 5	State of Florida (FDOT)	Clean drainage structures, replace/repair storm/cross/side drains, clean/reshape roadside ditches, clear/repair outfall ditches, mowing, roadside litter removal, respond to citizen complaints	Ongoing

[1] Countywide Program – Average cost is $37,605 per year contribution to COJ.
[2] Countywide Program – Average cost is $22,546 per year contribution to COJ.
[3] Countywide Program – Average cost is $27,151 per year.
[5] Countywide Program – Average cost is $2,750,735 per year.

11.4 Summary of Restoration Activities and Sufficiency of Efforts

Table 65 through **Table 68** list the projects and programs to reduce fecal coliform loading in the Big Fishweir Creek watershed. Several key efforts completed in this WBID are summarized below, as well as activities that are expected to continue or to be implemented in future years. The efforts outlined in the project tables, including the activities highlighted below, will reduce fecal coliform loading and improve water quality in Big Fishweir Creek based on the best information available about fecal coliform sources. As water quality improves in response to these actions and the bacteria source information is refined, future BMAPs may recommend different activities or levels of effort. For this BMAP, the full implementation of the projects and programs listed in the project tables for the Big Fishweir Creek watershed is sufficient to significantly reduce fecal coliform sources and make substantial progress towards meeting the TMDL.

11.4.1 OSTDS

Failure Area – The Murray Hill B Septic Tank Failure Area is situated entirely in the Big Fishweir WBID. This area encompasses the vast majority of septic tank repair permits issued in the watershed. Since 2001, 781 septic systems have been converted to sewer, and DCHD has issued 741 abandonment permits. In addition, 1,416 septic tanks remain within the WBID boundaries. Some are near surface waters, especially in the southeastern portion of the WBID. DCHD should continue its inspection efforts to ensure that the OSTDS outside the failure area do not become a problem. The continuation of the COJ CARE system to report and follow up with public complaints, as well as the inspections and permit programs at DCHD, are vital to identifying improperly functioning OSTDS. COJ and DCHD have committed to continuing these programs, documenting problems, and requiring property owners to fix them. COJ and DCHD are also committed to the continued coordination of their efforts so their respective roles and legal authorities are used properly in these situations.

Program Implementation – The recent connection of so many septic tanks to the sewer system should help to improve water quality in the watershed, especially since these systems were located near surface waters and stormwater conveyance inlets. However, a discrete portion of the WBID has a higher probability of OSTDS-related problems based on the number of repair permits issued, water quality data, and site conditions. DCHD will seek to secure funding for a new program to intensively inspect a specific geographic area within the WBID boundary and, upon obtaining funding, will report the results of the inspection in an annual BMAP progress report. Additional areas may be identified for intensive inspections based on

the assessment efforts discussed in the BMAP. If additional areas are designated in the future for inclusion in the program, these areas will also be inspected as funding becomes available.

Walk the WBID – On the western fork of Big Fishweir Creek, the Walk the WBID effort identified a recent septic tank failure at Park Street. DCHD investigated but did not find a repair permit on file. It is unknown if this was a failing system; however, it appears that the issue has been resolved. DCHD also investigated a system on Eloise Street in a very low-lying area and determined that there was no sanitary nuisance. Any additional issues identified during the remaining Walk the WBID efforts must be investigated and rectified where appropriate. All activities should be completed and their status reported in the first annual BMAP progress report.

11.4.2 Sewer Infrastructure

Private Infrastructure – According to the COJ database, there are 5 private lift stations in the watershed and 5 stations on the WBID boundary along Lenox Avenue, located in the northeastern corner of the WBID. COJ EQD performed 42 annual lift station inspections in the watershed and will continue inspections annually. To ensure that the 5 private lift stations on the WBID boundary are reported correctly, COJ EQD needs to confirm if these stations are included in the neighboring WBIDs (Cedar River and McCoy Creek), or if they should be included in future Big Fishweir Creek annual BMAP progress reports. The Loop Restaurant, located at 4000 St. Johns Avenue, is the site of repetitive sewer repairs, with the most recent reported by FDEP on January 27, 2009. COJ followed up and confirmed the repair, and any future incidents will be reported to the Department of Business and Professional Regulation. COJ will report any additional incidents occurring at this location in future annual BMAP progress reports. COJ's inspections and confirmation of reporting boundaries are sufficient to address private infrastructure in the watershed at this time.

Sewer Infrastructure Projects – SSOs have decreased dramatically since 2005 due to JEA's efforts in the watershed. JEA has replaced 1 ARV within 200 feet of surface waters and cleaned 23,980 LF of pipe. There are 6 lift stations near surface waters and 21 ARVs in the watershed. JEA should inspect these stations and confirm ARV integrity over the course of the 5-year BMAP cycle to ensure there are no problems. The schedule will be set by JEA, in accordance with its other planned inspection activities, and the status of this sewer infrastructure will be provided in the annual BMAP progress reports. JEA will continue these efforts and its systemwide programs, and this will be sufficient to address potential sewer sources in the WBID at this time.

Walk the WBID – During the Walk the WBID exercise, the lift station at Merrimac Avenue had severe soil erosion due to stormwater runoff. JEA has since completed the repair of the lift station. Any issues identified during the remaining Walk the WBID efforts must be investigated and rectified where appropriate. All activities should be completed and their status reported in the first annual BMAP progress report.

11.4.3 Stormwater Infrastructure

Illicit Connection Removal – COJ and FDOT have removed six illicit connections in the Big Fishweir Creek watershed. They have committed to continue the PIC Program, which includes identifying additional illicit connections and removing those connections in a timely manner. In addition, as part of the Walk the WBID follow-up, COJ inspected five PICs between Cassat and Plymouth Avenue and found that those pipes were dry; therefore, these continue to be under investigation. COJ also investigated a black corrugated pipe on the central branch and determined the pipe was a swimming pool discharge. However, the PIC Program currently has

six open investigations. For stormwater efforts in the watershed to be sufficient, COJ must complete these investigations, remove any illicit discharges, and report the actions in the annual BMAP progress report.

FDOT Project Implementation – In accordance with Rule 14-86, F.A.C., FDOT requires any new connections to its MS4 stormwater conveyance systems to be evaluated and permitted to prevent the introduction of new sources to its conveyances. This permit program will continue and FDOT will continue to periodically inspect its facilities as part of its MS4 permit to prevent unpermitted connections.

COJ Project Implementation – Since 1996, COJ has added 515 acres of wet detention treatment in the watershed and 70 acres of treatment from a second-generation baffle box. In addition, COJ PWD has worked extensively in the watershed, completing 308 work orders for ditch maintenance, repairing 6 stormwater pond problems, and addressing 246 work orders for improperly operating stormwater infrastructure. This reflects a significant amount of effort in the watershed that should result in water quality improvements in the creek.

11.4.4 Wildlife and Other Anthropogenic Sources

In the western fork of Big Fishweir Creek and in Boone Park, there is evidence of dog feces that can contribute to fecal coliform nonpoint pollution, indicating fecal coliform sources that could be addressed through public education activities. The headwaters of Big Fishweir Creek comprise very densely forested areas, which could contain wildlife populations that also contribute to the fecal coliform loading into the creek.

TABLE 69: SUMMARY OF RESTORATION ACTIVITIES FOR THE BIG FISHWEIR CREEK WATERSHED

SOURCE/ACTION	COJ	DCHD	FDOT	JEA
OSTDS				
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 (PSA)	√	X	X	X
Surface Water Sampling for Conditions and Trends	√	X	X	X
Sewer System				
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	-
Air Release Valve (ARV) Inspection and Rehab	X	X	X	√
Program Implementation	X	X	X	√
Private Lift Station Inspections and Enforcement	√	X	X	X
Private Non-NPDES Wastewater Facility Inspections and Enforcement	*	X	X	X
Sanitary Sewer Overflow (SSO) Investigations	√	X	X	√
Surface Water Sampling for Conditions and Trends	X	X	X	√
Stormwater				
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

SOURCE/ACTION	COJ	DCHD	FDOT	JEA
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
Pet Waste Management				
Ordinances and Enforcement	√	X	X	X
Public Education and Outreach	√	X	X	X
Special Source Assessment Activities				
Intensive Water Quality Sampling To Track Sources	√	X	X	X
Tributary Assessment Team (TAT)	√	X	X	√
Microbial Source Tracking (MST)	√	X	X	√
Thermal Imagery To Identify PICs	√	X	X	X

Note: Shaded cells (marked with an X) represent activities that do not apply to the associated entity.
* Activity is not applicable for the waterbody due to a lack of infrastructure.
+ FDOT participation in these activities is provided by funding in the NPDES MS4 agreements with COJ.

CHAPTER 12: DEER CREEK (WBID 2256)

12.1 WBID DESCRIPTION

Deer Creek, WBID 2256, is located in Duval County, west of the LSJR within the North Mainstem Planning Unit, as designated by SJRWMD (**Figure 14**). The headwaters of Deer Creek appear to comprise stormwater runoff originating at the northern branch, just east of Haines Street and the adjacent Martin Luther King (MLK) Jr. Expressway (**Figure 15**). The mainstem of the creek flows southeast in a single channel, with four branches that join Deer Creek from the west, north, south, and southwest. The southwest branch diverges from the main channel at Talleyrand Avenue and stretches approximately 0.3 miles southwest. The northern, southern, and western branches are located at the most upstream extent of the main channel, just east of Haines Street and immediately south of Tilden Street.

The northern branch parallels the MLK Jr. Expressway and extends approximately 200 yards north from the main channel. The southern branch is located immediately south of the northern branch and main channel confluence and is primarily responsible for draining surface flow from the expressway into the Upper Deer Creek Wet Detention Pond through several roadway inlets. The western branch stretches from Haines Street west to the East 7th and Franklin Street intersection. Flood control boxes, located at the MLK Jr. Expressway, divert the waters of the southern and western branches directly into the Upper Deer Creek Wet Detention Pond, primarily through an underground conveyance system that runs approximately 550 feet to the southeast. According to COJ EQD, stormwater from the flood control box, located at the DR2 South Box COJ TAT supplemental station, occasionally spills over into Deer Creek after significant rainfall events. Under normal circumstances, the water level in the pond is maintained via a control structure that diverts flow away from Deer Creek and into the St. Johns River (PBS&J, July 2008).

The Upper Deer Creek Wet Detention Pond, situated east of Haines Street and west of railroad lines that traverse the WBID, covers 8 acres and serves approximately 537 acres of the watershed (Camp Dresser & McKee [CDM], 2006). The waters of Deer Creek eventually flow into the St. Johns River, approximately 0.3 miles east of Talleyrand Avenue.

The spatial distribution and acreage of different land use categories in the Deer Creek watershed were identified using 2004 land use coverage data from SJRWMD (**Table 70**). The dominant land use (226 acres; 33.4% of total coverage) in the Deer Creek watershed, predominantly located west of Haines Street and north of East 8th Street, is high-density residential. The next two most abundant land cover categories are (1) transportation areas (101.4 acres; 15.0% of total coverage), primarily located in the east corner of the WBID and along Haines Street and nearby railroad tracks that traverse the southeast corner of the watershed; and (2) industrial areas (99.3 acres; 14.7% of total coverage), situated predominantly northwest of the Haines Street and East 8th Street intersection and in the southeast portion of the watershed.

In 2004, upland forest and wetland habitat accounted for over 10% of total land use; however, much of the wetland area, specifically just east of Haines Street and south of Deer Creek, was recently replaced by the Upper Deer Creek Wet Detention Pond (October 2006). Wetlands form a boundary around the main channel and southern branch, and in areas south of the Upper Deer Creek Wet Detention Pond. As wetlands serve as habitat for various species of wildlife and are near surface waters, there is a potential for wildlife to contribute to the fecal pollution of Deer Creek (PBS&J, July 2008).

According to the 2000 Census, there are 1,005 households in the watershed, averaging 1.90 people per household (PBS&J, July 2008). In addition, assuming that 40% of households have 1 dog (Tyler, 2006), there are an estimated 402 dogs in the watershed.

TABLE 70: LAND USES IN THE DEER CREEK WATERSHED

LAND USE	ACRES	% OF TOTAL
High-Density Residential	226.0	33.4
Transportation	101.4	15.0
Industrial	99.3	14.7
Commercial/Utility/Institutional	89.9	13.3
Recreational	68.4	10.1
Wetlands	66.2	9.8
Open Land	16.4	2.4
Medium-Density Residential	4.1	0.6
Nonforested Upland	2.5	0.4
Upland Forest	2.4	0.4
Water	0.3	0.05
TOTAL:	**676.9**	**100**

Note: Wetland and water land use classifications do not reflect current values due to the recent construction of the Upper Deer Creek Wet Detention Pond (October 2006).

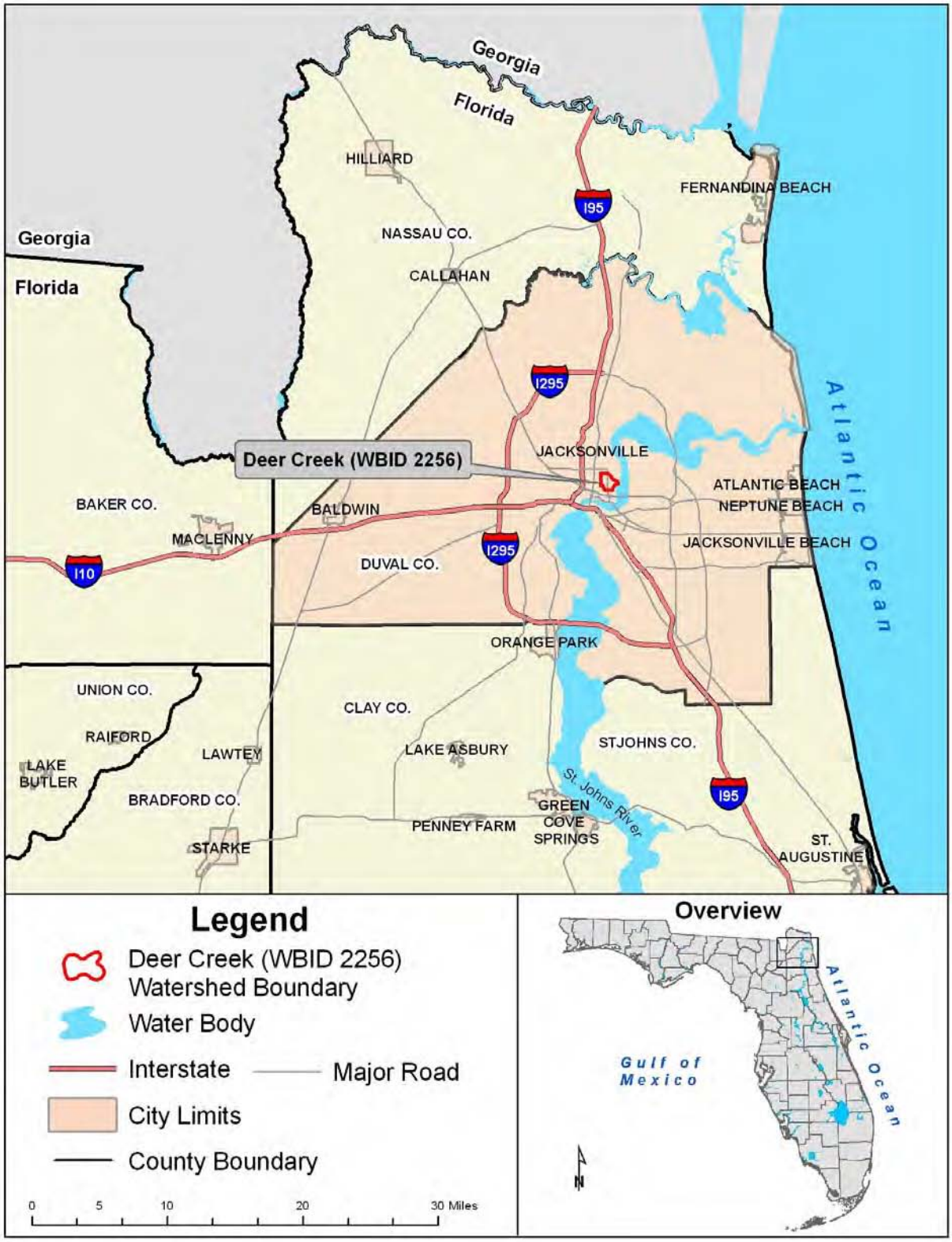

FIGURE 14: LOCATION OF THE DEER CREEK WATERSHED

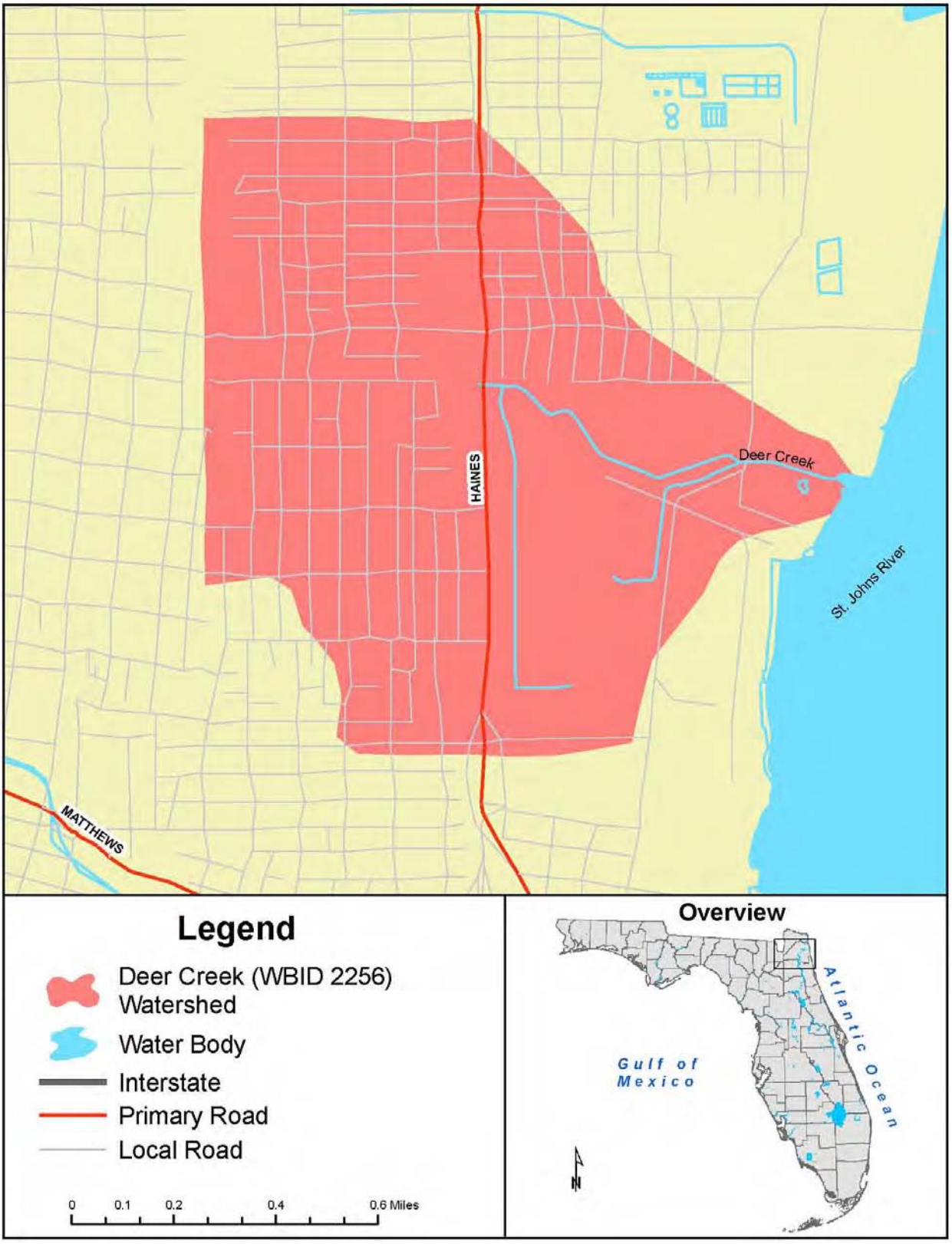

FIGURE 15: DEER CREEK WBID LOCATOR MAP

12.2 Potential Sources

12.2.1 Point Sources

There are two industrial wastewater facilities located in the Deer Creek watershed: (1) Aramark Uniform Services Inc., which is permitted to discharge industrial wastewater in the northwest corner of the WBID at East 11th Street; and (2) Crowley Liner Services, which has an underground injection well. There are no domestic wastewater facilities, CAFOs, application sites for septic residuals, or landfills permitted to discharge to the Deer Creek watershed. The COJ/FDOT MS4 permit includes the Deer Creek watershed (PBS&J, July 2008).

12.2.2 Illicit Discharges

COJ EQD identified five PICs in the Deer Creek watershed between 1998 and 2006. Two of these were considered potential sources of bacterial contamination and were confirmed by COJ PWD as wastewater discharges. One illicit connection was identified as a septic tank discharge, while the nature of the wastewater effluent at the second illicit connection was not determined. It is unlikely that the septic tank discharge impacted water quality in Deer Creek due to its distance from surface waters, while discharges from the unknown source likely had a direct impact on surface waters of the southwest branch near Talleyrand Avenue. Both illicit connections were ultimately removed from the watershed (PBS&J, July 2008).

12.2.3 Centralized Sewer Infrastructure and Overflows

The Deer Creek watershed is located in the Buckman WWTF Service Area. An estimated 1,110 households (approximately 100% of households) are connected to the sanitary sewer system in the watershed. Sewer infrastructure (e.g., sewer mains, lift stations, manholes) is primarily located west of Haines Street and north of East 8th Street and, to a lesser extent, along Jessie Street and Talleyrand Avenue. There is an increased likelihood of possible spills and/or unidentified sewer infrastructure leaks that could impact surface waters in areas west of the junction of Deer Creek and Haines Street, and along Talleyrand Avenue; sewer infrastructure is located near surface waters in these areas. JEA has reported a total of 7 SSOs within the Deer Creek WBID boundaries (**Table 71**). The estimated volume of spill associated with these overflows ranged from 25 to 468,750 gallons and averaged 69,196 gallons; however, only 4 SSOs were reported to have potentially impacted surface waters (PBS&J, July 2008).

Table 71: SSOs Reported in the Deer Creek, 2001–07

WBID Name (Number)	Date of Overflow	Estimated Volume of Spill (Gallons)	Potentially Impacted Surface Waters
Deer Creek (2256)	29-Apr-02*	10,000	Y
Deer Creek (2256)	12-May-02*	468,750	Y
Deer Creek (2256)	16-Sep-02	50	N
Deer Creek (2256)	8-Feb-03*	500	Y
Deer Creek (2256)	1-Dec-03*	5,000	Y
Deer Creek (2256)	19-Dec-05	25	N
Deer Creek (2256)	22-Mar-06	50	N

*Reportable SSOs that spilled >1,000 gallons of sewage and/or affected surface waters.

Sampling data did not correspond with SSO events, and therefore associated impacts on surface waters could not be determined. Sediments provide UV radiation protection and key nutrient sources (e.g., carbon, nitrogen, and phosphorus) that allow bacteria to grow and survive, thus facilitating the development of reservoirs for fecal bacteria (Mallin et al., 2007). The inoculation of sediments following an SSO event or unknown infrastructure leak may lead to

the persistence and likely regrowth of indicator bacteria in sediments, possibly allowing an influx of high levels of bacteria to receiving waters for an unspecified period (Davies et al., 1995; Anderson et al., 2005; Mallin et al., 2007). However, it is more likely that other sources, such as unidentified sewer infrastructure leaks (e.g., from underground sewer mains), are responsible for the more recent pollution of the Deer Creek watershed, as no reported SSOs have reached surface waters in the watershed since 2003 (PBS&J, July 2008).

12.2.4 OSTDS

As noted above, almost all the homes in the Deer Creek watershed are connected to the sanitary sewer system; therefore, few (about 38) septic tanks are located in the watershed. According to DCHD, no septic system repair permits were issued in this area. Considering that few households utilize OSTDS, it is unlikely that OSTDS play a major role in the fecal loading of Deer Creek (PBS&J, July 2008).

12.2.5 Nonpoint Sources

An analysis of impervious surface indicates that the Deer Creek WBID contains predominantly greater than 25% impervious surface. These areas generally correspond to commercial/utility and institutional; industrial; and transportation land uses, which are primarily located in the northwest and southeast corners of the watershed. Impervious surface areas of greater than 25% are also located near surface waters extending from the headwaters of the main channel east to Talleyrand Avenue and along areas of the southwest branch. In addition, large areas with 10 to 25% impervious surface, mainly associated with high-density residential communities, are situated in the southwestern and northeastern portions of the watershed.

Additionally, an analysis was conducted demonstrating that the majority of the WBID contains a moderate-to-high potential for stormwater runoff, including areas near the creek. Land surfaces with the lowest stormwater runoff coefficients were also located near the surface waters of Deer Creek and correlated with wetland areas. As stated previously, the wetland land use classifications have changed due to the recent completion of the Upper Deer Creek Wet Detention Pond, likely altering the stormwater runoff coefficients in this area as well (PBS&J, July 2008).

The storm sewer network in the Deer Creek watershed includes 12 permitted stormwater treatment areas, encompassing approximately 100% of the WBID area. Stormwater infrastructure in the WBID includes 4 outfalls by receiving water and 390 inlets. Although closed conveyances are common throughout the developed portion of the WBID, ditch systems primarily form segments of Deer Creek (1) at the headwaters from the intersection of East 7th Street and Harrison Street, east to Haines Street; and (2) extending approximately 275 feet west from the Talleyrand Avenue and Deer Creek juncture (PBS&J, July 2008).

Higher fecal coliform loadings were identified in the “wet” season (June through October) closer to the creek, suggesting that the majority of bacterial loading was delivered to Deer Creek through nonpoint source discharges, failing wastewater conveyance systems, or septic systems during high rainfall at this location. Fecal coliform concentrations did not differ during the “wet” and “dry” seasons near Talleyrand Avenue, suggesting a constant source of fecal coliform bacteria to Deer Creek through nonpoint source discharges, failing wastewater conveyance systems, or septic systems independent of rainfall.

12.3 Projects To Reduce Fecal Coliform Loading

12.3.1 JEA Activities in the Deer Creek Watershed

12.3.1.1 Ongoing JEA Programs and Activities

JEA is currently implementing a number of countywide specific improvement programs, as follows, to address the sanitary sewer system as a source of fecal coliform contamination: (1) FOG Reduction Program; (2) SSO Root Cause Program; (3) Pop-Top Program; (4) Non-Destructive Testing and ARV Programs; (5) SCADA; (6) Third Party Education and Enforcement Program; (7) Manhole Monitoring; (8) Force Main Discharge Manholes; and (9) CMOM Program. **Appendix E** describes each of these programs.

In the Deer Creek watershed, JEA has pipe bursted 18.43% of the sewer lines, repaired the inner lining through CIPP for 1.54% of the lines, and repaired 1.22% through open cut. In addition, it inspected 2,602 LF of pipe and cleaned 14,764 LF of pipe in FY07 to help prevent future infrastructure problems. These activities will continue in the future to maintain the sanitary sewer system and prevent future problems.

Table 72 contains additional information on JEA's activities in the watershed.

TABLE 72: JEA ACTIVITIES IN THE DEER CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	ESTIMATED COST	FUNDING SOURCE	PROJECT STATUS	START DATE OF PROJECT
Sewer Upgrades							
JEA – 97	Pipe Bursting – Increase Carrying Capacity	Replace failing/leaking infrastructure	Total footage of pipe burst in watershed since 2001: 66,493	$6,009,870	JEA	Ongoing	FY00
JEA – 98	CIPP – Install New Inner Lining	Rehabilitate failing/leaking infrastructure	Total footage of CIPP in watershed since 2001: 5,550	$115,928	JEA	Ongoing	FY00
JEA – 99	Open Cut – Removal and Replacement	Replace failing/leaking infrastructure	Total footage of open cut replacement in watershed since 2001: 4,412	$281,581	JEA	Ongoing	Ongoing
Other Sewer Infrastructure Upgrades							
JEA – 100	Manhole Linings Rehabbed	Repair deteriorating manhole linings	Not applicable	$330,469*	JEA	Ongoing	FY01
JEA – 101	Pump Station SCADA Upgrades	Retrofitting completed in 2004; all stations constructed since have SCADA installed. See **Appendix E.**	Not applicable	Unknown	JEA	Complete	Complete
JEA – 102	Inspect Force Main Discharge Manholes, Repair/Rehab as Necessary	See **Appendix E**	Not applicable	$466,576*	JEA	Ongoing	FY07
JEA – 103	Inspect Lift Station on Jesse Street	Inspect lift station and report in first annual BMAP report	1 station	Unknown	JEA	Planned	2009
Programs To Reduce Sewer Problems							
JEA – 104	FOG Reduction Program	See **Appendix E**	Not applicable	Unknown	JEA	Ongoing	Current FOG Program initiated in 2004
JEA – 105	Pipe TV Inspection	Inspect existing infrastructure through use of closed-circuit TV system	2,602 LF of pipe inspected (FY07)	$163,099*	JEA	Ongoing	Carried over from city operation (1997)
JEA – 106	Pipe Cleaning	Clean existing pipes to avoid blockages	14,764 LF of pipe cleaned (FY07)	$743,054*	JEA	Ongoing	Carried over from city operation (1997)
JEA – 107	Implement CMOM Program	See **Appendix E**	Not applicable	$ 163,269*	JEA	Ongoing	Ongoing
JEA – 108	Manhole Monitoring	See **Appendix E**	Not applicable	$ 137,526*	JEA	Ongoing	August 2007
JEA – 109	SSO Root Cause Program	See **Appendix E**	Not applicable	Unknown	JEA	Ongoing	February 2007
JEA – 110	Pop-Top Program	See **Appendix E**	Not applicable	$64,324*	JEA	Ongoing	February 2007
JEA – 111	Non-Destructive Testing Program/ Pipe Integrity Testing	See **Appendix E**	Not applicable	$74,284*	JEA	Ongoing	Ongoing

* Costs provided are total systemwide costs for the program because WBID-specific costs are currently unavailable.

12.3.2 DCHD Activities in the Deer Creek Watershed

Currently, DCHD is implementing a variety of countywide specific improvement programs and restoration activities to address OSTDS as sources of fecal coliform contamination. These include (1) the OSTDS Program, (2) training programs, and (3) the designation of septic tank failure and nuisance areas for transfer to central sewer. **Appendix E** describes each of these programs.

As part of the OSTDS Program, DCHD has issued 1 new construction permit, 1 abandonment permit, 3 plan reviews, and 20 complaint investigations in the WBID. It will continue these efforts in the future to reduce and prevent issues related to OSTDS. **Table 73** lists DCHD's projects in the Deer Creek watershed.

TABLE 73: DCHD ACTIVITIES IN THE DEER CREEK WATERSHED

Project Number	Project Name	Project Description	Level of Effort	Estimated Cost	Funding Source	Project Status
DCHD – 45	OSTDS Program	Implementation of programs to address septic systems as potential sources	Approximately 1 new construction permit and 1 abandonment permit issued	Not applicable	FDOH	Ongoing
DCHD – 46	DCHD-Sponsored Training Programs	Annual training programs held for septic tank contractors, certified plumbers, maintenance entities, and environmental health professionals	1 to 2 trainings per year providing up to 12 contact hours	$2,500	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 47	Application/ Plan Review/ Site Evaluations	DCHD performs plan review and site evaluation for each application received for OSTDS new construction, repair, or modification of existing system	Approximately 3 plan reviews and site evaluations have been performed in WBID based on permitting history	$1,000	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 48	Septic Tank Failure Area Ranking	Septic tank failure area scored and prioritized on annual basis	Less than 1 year since previous update	Not applicable		Ongoing
DCHD – 49	Complaint Investigations	DCHD investigates all complaints received, performs site visit, and initiates enforcement action on sanitary nuisance violations	20 complaint investigations have been performed in WBID	$2,000	FDOH/ LSJR SWIM Grant	Ongoing

12.3.3 COJ Activities in the Deer Creek Watershed

12.3.3.1 Completed COJ Projects

COJ has completed the Upper Deer Creek Regional Project in the watershed. The project, a wet detention pond that treats 537 acres, has helped to reduce the amount of stormwater-associated bacterial loading to Deer Creek.

12.3.3.2 COJ Projects in Design

In addition, COJ has two projects in the watershed under design: (1) the Lower Eastside Drainage Improvements – Phase 3, which will eliminate flooding in the area bordered by 7th Street, the MLK Jr. Expressway, 1st Street, and Spearing Street; and (2) the Lower Eastside

Pond Expansion, which will provide compensating treatment for the Jacksonville library, courthouse, and other downtown improvements. Once these projects are completed, additional stormwater will be captured and treated, reducing fecal coliform loading to the creek from stormwater runoff.

12.3.3.3 Ongoing COJ Programs and Activities

COJ has also established a monitoring plan to evaluate the effectiveness of the SWMP and the associated pollutant reduction from MS4 systems to waters of the state. As part of this monitoring plan, COJ has established 2 monitoring sites in the watershed and collected 92 samples between 1995 and 2008. In addition, COJ EQD collected 21 samples as part of the TAT and an additional 9 samples at 3 sites to aid in source identification.

COJ PWD's Streets and Drainage Division is responsible for maintaining its stormwater conveyance systems in Jacksonville. This maintenance includes 18 work orders for ditch and creek regrading, erosion control, and cleaning; and 42 work orders for the repair of blocked structures and measures to prevent flooding. These work orders were completed between 2005 and 2008. PWD will continue a level of effort to maintain the MS4 conveyances based on CARE requests.

In addition, COJ has implemented the PIC Program, which keeps track of reported PICs in a database for COJ inspector follow-up. Of the five PICs identified by COJ in the Deer Creek watershed, two were confirmed as illicit connections and were recognized as potential sources of bacterial contamination. These two were ultimately removed from the watershed in July 2005 and October 2006 (PBS&J, July 2008).

Between 2000 and 2008, COJ PWD conducted inspections that included four investigations into illicit water discharges, one illegal discharge, four sewer lines that drained into a yard or ditch, and seven SSOs. PWD will maintain a future level of effort for these investigations based on requests, which are logged and tracked through the CARE database.

Table 74 provides additional details on COJ's activities in the watershed.

TABLE 74: COJ ACTIVITIES IN THE DEER CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	TOTAL COST	FUNDING SOURCE	ESTIMATED COMPLETION	PROJECT STATUS
Capital Improvement Projects							
COJ – 126	Lower Eastside Drainage Improvements – Phase 3	Eliminate flooding area bordered by 7th Street, MLK Jr. Expressway, 1st Street, Spearing Street	Lower Eastside	$6,500,000	COJ	2013	Design
COJ – 127	Lower Eastside Pond Expansion	Pond expansion to provide compensating treatment for library, courthouse, and other downtown improvements	Lower Eastside	$4,250,000	COJ	2012	Design
COJ – 128	Upper Deer Creek Regional BMP	Wet detention	537 acres	Unknown	COJ	Complete	Complete
MS4 Maintenance Activities							
COJ – 129	Ditch/Creek Regrade/Erosion/Clean	Completed in response to CARE requests. Costs limited to activities completed after release of work order system.	18 (for 2005–08)	$7,699	COJ	Ongoing	Ongoing
COJ – 130	Structure Blocked/Repair/ General Flooding		42 (for 2005–08)	$3,327	COJ	Ongoing	Ongoing
Inspection, Enforcement, and Sampling							
COJ – 131	Illicit Water Discharge	CARE-initiated inspection	4 (for 2000–08)	$848	COJ	Ongoing	Ongoing
COJ – 132	Pollution – Water – Illegal Discharge	CARE-initiated inspection	1 (for 2000–08)	$212	COJ	Ongoing	Ongoing
COJ – 133	Sewer Drains into Yard/Ditch	CARE-initiated inspection	4 (for 2000–08)	$848	COJ	Ongoing	Ongoing
COJ – 134	Sewer Overflow	CARE-initiated inspection	7 (for 2000–08)	$1,484	COJ	Ongoing	Ongoing
COJ – 135	Private Lift Station Inspection	No lift stations in WBID; inspect as ID stations or new stations constructed	Not applicable	Not applicable	COJ	Ongoing	Ongoing
COJ – 136	Illicit Discharge Detection and Elimination	2 illicit, no open	5 (for 1998–2006)	$1,060	COJ	Ongoing	Ongoing
COJ – 137	Routine Surface Water Sampling	NPDES permit-related quarterly water quality sampling – 2 sampling stations in WBID	92 (for 1995–2008)	$41,124	COJ	Ongoing	Ongoing
COJ – 138	TAT Sampling	Conducted by EQD to assess bacteria levels in creek and identify potential fecal bacteria sources	3 sites/21 samples	$9,387	COJ	Ongoing	Ongoing
COJ – 139	Source ID Sampling	Source ID sampling conducted when high levels of fecal coliform are noted	3 sites/9 samples	$9,000	COJ	Ongoing	Ongoing
COJ – 140	Investigate High Fecal Coliform Counts in Downstream Portion of Watershed	Investigate and report results in first annual BMAP report; Walk the WBID may be needed	Investigate high counts (for 2009–10)	Unknown	COJ	Ongoing	Ongoing
Septic Tank Phase-Out Program							
COJ – 141	Outside Failure Areas – Septic Tank Phase-Out	Phase out program as provided by COJ ordinance	38 total tanks, 0 connected	Unknown	COJ	Ongoing	Ongoing
COJ – 142	Septic Tank Maintenance Public Education	Public service announcements	Ongoing	Unknown	COJ	Ongoing	Ongoing
Management and Reduction of Pet and Animal Waste							
COJ – 143	Pet/Animal Management Public Education	Public service announcements	Ongoing	Unknown	COJ	Ongoing	Ongoing

Note: Inspection unit cost = $212; sampling event unit cost = $447; and septic tank per connection = $35.

12.3.4 FDOT Activities in the Deer Creek Watershed

12.3.4.1 Ongoing FDOT Programs and Activities

Under Subsection 334.044(15), F.S., and Rule 14-86, F.A.C., FDOT implements a Drainage Connection Program. The program does not issue water quality permits but requires the connecting entity to certify that the discharge is of acceptable water quality. Connecting entities are required to maintain the discharge of acceptable water quality for the duration of the FDOT permit. If connecting entities fail to meet this requirement after sufficient warning by FDOT, they will be reported to FDEP, SJRWMD, and, if applicable, to the local municipality; these entities regulate stormwater quality through state rules, ordinances, and codes. FDOT performs periodic site inspections as part of the MS4 NPDES permit. FDOT also sweeps eight miles of roadways monthly, reducing the amount of trash and sediment entering the stormwater conveyance system. As part of the maintenance program, FDOT removes sediment, trash, and debris from the system as needed. This maintenance occurs in 42 inlets and 4 miles of piping in the watershed.

FDOT also works with COJ on several efforts related to the MS4 permit. FDOT participates in the PIC Program in conjunction with COJ. FDOT has instructed staff to be alert for illicit connections during routine maintenance activities, and investigates observances found in the right of way. Those located outside the right of way are reported to the applicable municipality for further investigation and enforcement action. FDOT maintains a toll-free number to be used for reporting illicit connections. FDOT also contributes funding for two monitoring stations in the Deer Creek watershed that are sampled quarterly as part of the routine monitoring program. FDOT will continue these activities in the future to support the maintenance of the MS4 system. **Table 75** lists FDOT's activities in the watershed.

TABLE 75: FDOT ACTIVITIES IN THE DEER CREEK WATERSHED

Project Number	Project Name	Estimated Cost	Funding Source	Level of Effort	Project Status
Identification and Removal of Illicit Connections					
FDOT – 42	PIC Program – Search for Illicit Connections	See Note 1	State of Florida (FDOT)/COJ	Effort is continuous in WBID	Ongoing
FDOT – 43	PIC Program – Illicit Connections Identified and Removed in WBID if Truly Illicit	See Note 1	State of Florida (FDOT)/COJ	No true illicit connection identified to date	Ongoing
Surface Water Sampling To Assess Conditions and Identify Sources					
FDOT – 44	Routine Tributary Monitoring and BMP Effectiveness Project as Part of MS4 Permit	See Note 2	State of Florida (FDOT)/COJ	2 stations quarterly. BMP wet detention pond effectiveness	Ongoing
Drainage Connection Program (DCP)					
FDOT – 45	DCP – Connecting Entity Must Certify that All Discharges to FDOT MS4 Are Treated Prior to Connection	See Note 3	State of Florida (FDOT)	Ongoing effort	Ongoing
Catch Basin/Inlet and Closed Loop MS4 Cleaning					
FDOT – 46	Sediment Accumulation, Trash, and Debris Removed as Needed	$24,228	State of Florida (FDOT)	Approximately 42 inlets/catch basins and 4 miles of piping	Ongoing
Street Sweeping Program					
FDOT – 47	Street Sweeping Program	$2,191	State of Florida (FDOT)	8 miles of roadway swept monthly	Ongoing

Project Number	Project Name	Estimated Cost	Funding Source	Level of Effort	Project Status
Routine Maintenance Activities					
FDOT – 48	Maintain FDOT Stormwater Systems	See Note 5	State of Florida (FDOT)	Clean drainage structures, replace/repair storm/cross/side drains, clean/reshape roadside ditches, clear/repair outfall ditches, mowing, roadside litter removal, respond to citizen complaints	Ongoing

[1] Countywide Program – Average cost is $37,605 per year contribution to COJ.
[2] Countywide Program – Average cost is $22,546 per year contribution to COJ.
[3] Countywide Program – Average cost is $27,151 per year.
[5] Countywide Program – Average cost is $2,750,735 per year.

12.4 Summary of Restoration Activities and Sufficiency of Efforts

Table 72 through **Table 75** list the projects and programs to reduce fecal coliform loading in the Deer Creek watershed. Several key efforts completed in the WBID are summarized below, as well as activities that are expected to continue or to be implemented in future years. The efforts outlined in the project tables, including the activities highlighted below, will reduce fecal coliform loading and improve water quality in Deer Creek based on the best information available about fecal coliform sources. As water quality improves in response to these actions and the bacteria source information is refined, future BMAPs may recommend different activities or levels of effort. For this BMAP, the full implementation of the projects and programs listed in the project tables for the Deer Creek watershed is sufficient to significantly reduce fecal coliform sources and make substantial progress towards meeting the TMDL.

12.4.1 OSTDS

Program Implementation – Almost all of the homes in the Deer Creek watershed are connected to the sanitary sewer system and, according to DCHD, no septic system repair permits were issued in this area. Considering that few households utilize OSTDS, it is unlikely that OSTDS contribute a significant amount of fecal loading to Deer Creek. DCHD will continue its inspection and program implementation efforts to ensure that the 38 septic tanks in the watershed are operating properly.

12.4.2 Sewer Infrastructure

Private Infrastructure – The COJ database does not indicate that there are private sewer lift stations in the watershed; however, the database only includes private lift stations permitted by COJ since 1991 or lift stations with repair permit applications filed since that time. It is likely that private lift stations are located in the watershed but have not been identified. As private stations are identified or new private lift stations are constructed, COJ will include these stations in the BMAP annual progress report and implement annual inspections.

Sewer Infrastructure Projects – The number of SSOs has declined since 2002 due to JEA activities in the watershed. Of the three JEA lift stations in the watershed, one is located close to surface waters and one is near stormwater inlets. During the five-year BMAP cycle, JEA will inspect the lift station on Jesse Street to ensure that the station is operating properly due to its close proximity to surface waters. JEA will schedule the inspection in accordance with other system activities and report the investigation status in the first annual BMAP progress report. It

will continue maintenance efforts and systemwide programs, and this will be sufficient to address potential sewer sources in the WBID at this time.

12.4.3 Stormwater

Illicit Connection Removal – The PIC Program removed two illicit connections in the watershed. COJ and FDOT have committed to continue the PIC Program, which includes identifying additional illicit connections and removing those connections in a timely manner.

FDOT Program Implementation – In accordance with Rule 14-86, F.A.C., FDOT requires any new connections to its MS4 stormwater conveyance systems to be evaluated and permitted to prevent the introduction of new sources to its conveyances. This permit program will continue and FDOT will continue to periodically inspect its facilities as part of its MS4 permit to prevent unpermitted connections. In addition, FDOT maintains 4 miles of piping and 42 inlets, preventing materials from entering the stormwater system that could promote bacteria growth. FDOT will continue stormwater infrastructure maintenance, as these efforts prevent potential regrowth in the MS4 conveyances.

COJ Capital Improvement Projects – COJ constructed a regional wet detention pond to treat 537 acres that only discharges into the creek during extreme rain events. The pond eliminated fecal coliform loading by preventing a significant amount of stormwater runoff from flushing into the creek during storm events, and provided treatment to reduce the amount of sediments discharging into the creek. Currently, construction is planned for two additional stormwater improvement projects in the watershed during the BMAP five-year cycle. This construction depends on funding; however, COJ will provide updates on the projects' status in the annual BMAP progress reports.

12.4.4 Additional Assessments

COJ EQD is following up on high fecal coliform counts in the downstream portion of the watershed in partnership with TAT entities. It will report the results of the current investigations in the first annual BMAP progress report. If no sources are identified and coliform counts continue to be high, FDEP will require a Walk the WBID in the second year of the BMAP (see **Appendix F** for guidelines on conducting a Walk the WBID exercise). At that time, the BWG will agree on the lead entity and implementation time frame. The exercise must be completed within the specified BMAP year, and all problems identified from this effort must be resolved or under investigation within the following BMAP year. The results of the Walk the WBID will be reported in the annual BMAP progress report.

Table 76: Summary of Restoration Activities for the Deer Creek Watershed

Source/Action	COJ	DCHD	FDOT	JEA
OSTDS				
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 (PSA)	√	X	X	X
Surface Water Sampling for Conditions and Trends	√	X	X	X

Source/Action	COJ	DCHD	FDOT	JEA
Sewer System				
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	-
Air Release Valve (ARV) Inspection and Rehab	X	X	X	*
Program Implementation	X	X	X	√
Private Lift Station Inspections and Enforcement	*	X	X	X
Private Non-NPDES Wastewater Facility Inspections and Enforcement	*	X	X	X
Sanitary Sewer Overflow (SSO) Investigations	-	X	X	√
Surface Water Sampling for Conditions and Trends	X	X	X	√
Stormwater				
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
Pet Waste Management				
Ordinances and Enforcement	√	X	X	X
Public Education and Outreach	√	X	X	X
Special Source Assessment Activities				
Intensive Water Quality Sampling To Track Sources	√	X	X	-
Tributary Assessment Team (TAT)	√	X	X	-
Microbial Source Tracking (MST)	-	X	X	-
Thermal Imagery To Identify PICs	-	X	X	X

Note: Shaded cells (marked with an X) represent activities that do not apply to the associated entity.
* Activity is not applicable for the waterbody due to a lack of infrastructure.
+ FDOT participation in these activities is provided by funding in the NPDES MS4 agreements with COJ.

CHAPTER 13: TERRAPIN CREEK (WBID 2204)

13.1 WBID DESCRIPTION

Terrapin Creek, WBID 2204, is located in Duval County, north of the LSJR within the North Mainstem Planning Unit, as designated by SJRWMD (**Figure 16**). The headwaters of Terrapin Creek presumably comprise stormwater that originates on the south side of Port Jacksonville Parkway just west of New Berlin Road (**Figure 17**). Prior to the development of a new office park and the associated Port Jacksonville Parkway in 2005, Terrapin Creek continued farther north. Development in this area resulted in major transitions to the landscape that ultimately severed the most northern section of Terrapin Creek from the section below Port Jacksonville Parkway. This portion of the WBID included a small branch that once connected a pond serving M&M Dairy Inc. from the west (approximately 575 feet north of Port Jacksonville Parkway) to the main channel of Terrapin Creek. M&M Dairy Inc. has since closed, though breeding bulls and other cattle remain on the property. Currently, the entire creek flows southward in a single channel, merges with Dunn Creek nearly 1,000 feet east of Alta Drive, and eventually joins the St. Johns River at Heckscher Drive (PBS&J, August 2008a).

The spatial distribution and acreage of different land use categories in the Terrapin Creek watershed were identified using 2004 land use coverage data from SJRWMD (

Table 77). The dominant land use (427.4 acres; 35.7% of total coverage) in the watershed, and directly adjacent to the majority of the creek itself, is upland forest, which extends throughout the watershed. The next two most abundant land cover categories are (1) wetland areas (169.3 acres; 14.2% of total coverage), which form a boundary around the entire length of the creek; and (2) commercial/utility and institutional areas (154.1 acres; 12.9% of total coverage), located predominantly along the eastern portion of the WBID at Faye Road, on either side of Highway 9A, and at a narrow power line utility strip that traverses the watershed south of Port Jacksonville Parkway.

As upland forests and wetlands serve as habitat for various species of wildlife and are located near surface waters, there is a potential for wildlife to contribute to the fecal pollution of Terrapin Creek. A dairy farm (M&M Dairy Inc.) situated in the upper reaches of Terrapin Creek, in the vicinity of the New Berlin Road and Port Jacksonville Parkway intersection, has closed. Although pasturelands located in the upstream portion of the watershed still support cattle, it appears that this source is now separated from receiving waters (PBS&J, August 2008a).

According to the 2000 Census, there are 39 households in the watershed, averaging 1.05 people per household (PBS&J, August 2008a). In addition, assuming that 40% of households have 1 dog (Tyler, 2006), there are an estimated 16 dogs in the watershed.

TABLE 77: LAND USES IN THE TERRAPIN CREEK WATERSHED

LAND USE	ACRES	% OF TOTAL
Upland Forest Total	427.4	35.7
Wetlands Total	169.3	14.2
Commercial/Utility/Institutional Total	154.1	12.9
Industrial Total	86.4	7.2
Water Total	64.6	5.4
Nonforested Upland Total	60.6	5.1
Feeding Operations Total	50.6	4.2
Low-Density Residential Total	49.5	4.1
Cropland and Pastureland Total	35.4	3.0
Transportation Total	32.2	2.7
Open Land Total	24.5	2.0
Disturbed Land Total	17.5	1.5
Recreational Total	15.4	1.3
Extractive Total	9.2	0.8
TOTAL:	**1,196.6**	**100**

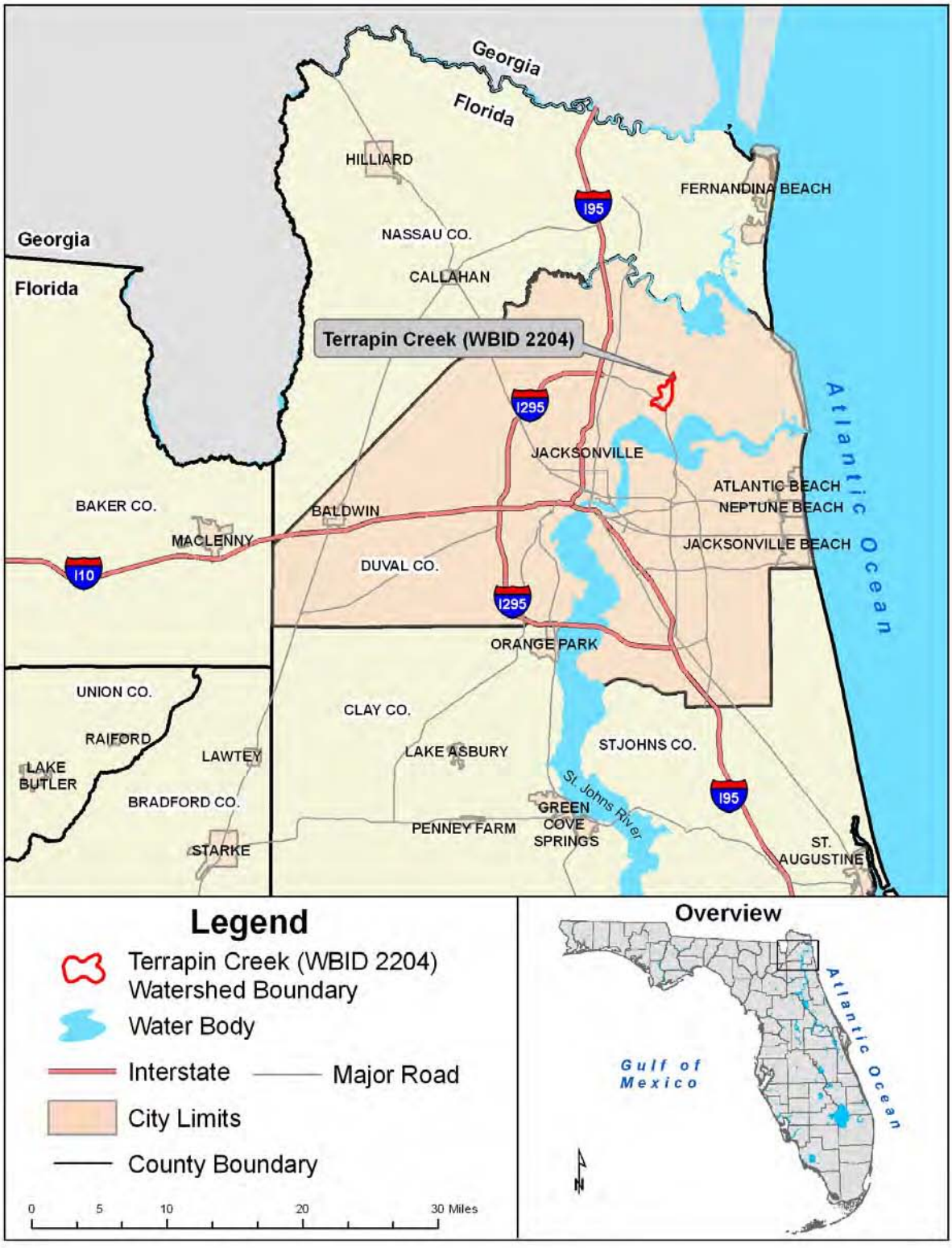

FIGURE 16: LOCATION OF THE TERRAPIN CREEK WATERSHED

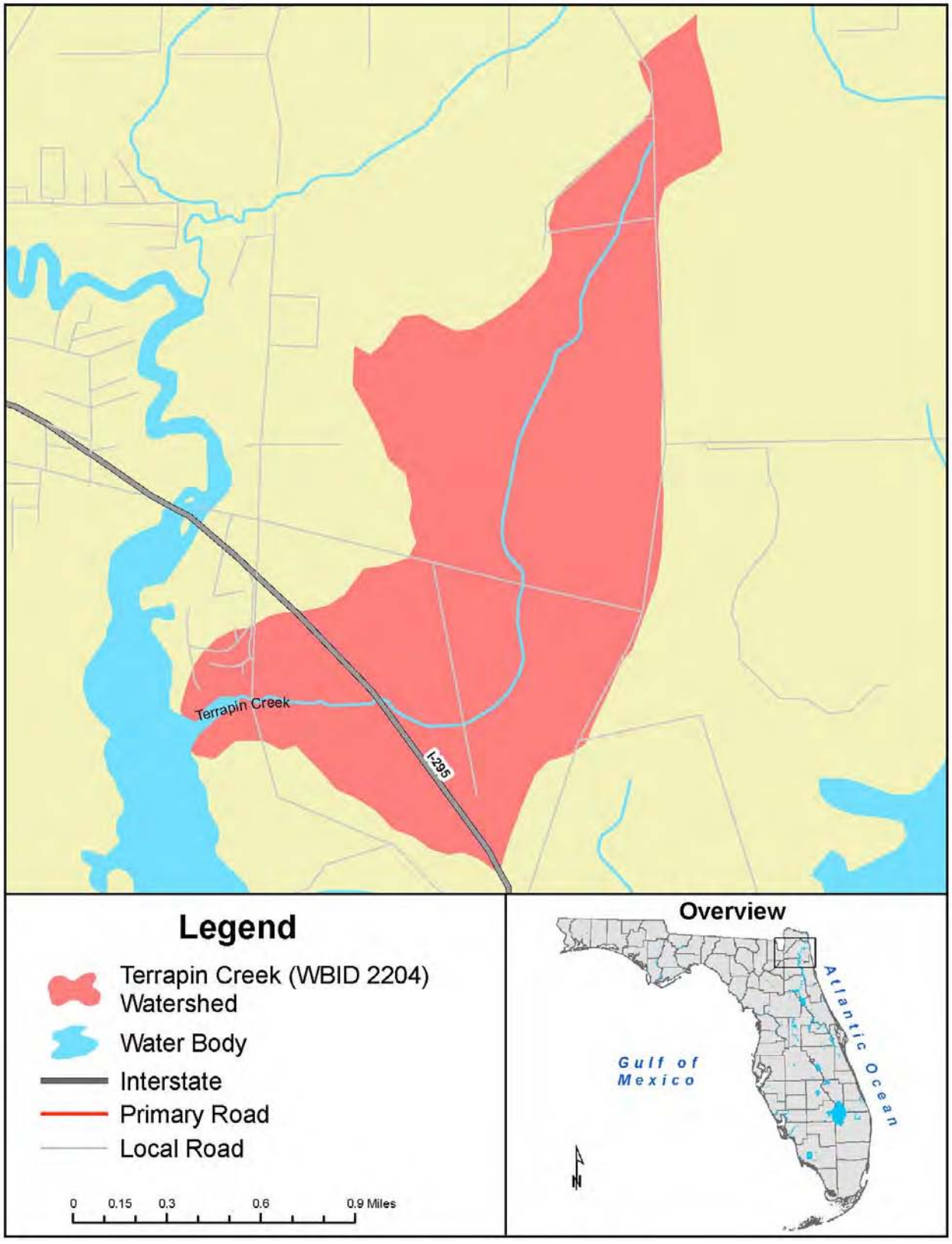

FIGURE 17: TERRAPIN CREEK WBID LOCATOR MAP

13.2 Potential Sources

13.2.1 Point sources

Florida Rock-New Berlin Road Concrete Batch Plant (CBP) (FLG110329), the only industrial wastewater facility located in the Terrapin Creek watershed, is permitted to discharge wastewater in the southeastern portion of the WBID. In addition, the COJ/FDOT MS4 permit includes the Terrapin Creek watershed. There were feeding operations at a dairy farm, M&M Dairy Inc., which has since closed, though cattle remain in the area (PBS&J, August 2008a).

13.2.2 Illicit Discharges

COJ EQD identified nine PICs in the Terrapin Creek watershed in 2007. Their status is pending investigation. One of the PICs, an unverified illicit discharge identified on private property, was found during the JEA Tributary Pollution Assessment Project (January 2006). The program did not include the inspection of closed conveyance systems; therefore, additional illicit connections may be present in the watershed (PBS&J, August 2008a).

13.2.3 Centralized Sewer Infrastructure and Overflows

The Terrapin Creek watershed is located in the District II WWTF Service Area. An estimated 7 households (approximately 18% of households) are connected to the sanitary sewer system in the watershed. Available GIS data indicate that sewer infrastructure (e.g., sewer mains, lift stations, manholes) is only found in one location in the watershed, parallel to Faye Road. A sewer main spans the width of the creek, either above or below surface waters, at Faye Road, increasing the likelihood that possible spills and/or unidentified sewer infrastructure leaks will impact surface waters at this location. Although not confirmed, sewer infrastructure may have been installed in the upstream segment of Terrapin Creek to accommodate the newly constructed office park in 2005. JEA has not reported any sanitary sewer overflows within the Terrapin Creek WBID boundaries (PBS&J, August 2008a).

13.2.4 OSTDS

WSEA estimates that approximately 57 OSTDS are located in the Terrapin Creek watershed. According to DCHD, 6 septic system repair permits were issued in this area. The majority of the permits, and presumably failed septic systems, were located in the southwest corner of the WBID west of Alta Drive in a low-density residential area, supporting the contention that failing OSTDS may contribute to the fecal pollution in this area. No DCHD-designated septic system failure areas are located near the boundary of the watershed (PBS&J, August 2008a).

13.2.5 Nonpoint Sources

An analysis of impervious surface indicates that the Terrapin Creek WBID contains predominantly less than 10% impervious surface corresponding to the upland forest and wetland land use classifications. The watershed also contains land with 10% to greater than 25% impervious surface. Areas with greater than 25% impervious surface generally correspond to industrial, commercial/utility, and institutional land uses located along Faye Road, and south of Faye Road at the eastern extent of the WBID boundaries.

An analysis was also conducted demonstrating that the majority of the WBID contains a moderate-to-high potential for stormwater runoff, including areas near the creek. Low stormwater runoff coefficients are primarily located in the southwest corner of the WBID. The highest runoff coefficients are found along Highway 9A, at the power line utility strip that transverses the watershed south of the Port Jacksonville Parkway, just south of the Blasius

Road and Faye Road intersection, and west of the Faye Road station location (PBS&J, August 2008a).

The storm sewer network in the Terrapin Creek watershed includes 21 permitted stormwater treatment areas, encompassing approximately 65.88% of the WBID area. Stormwater infrastructure in the WBID includes 6 outfalls by receiving water (none classified by FDEP as a major outfall) and 16 inlets. Closed conveyances and ditch systems are primarily located in the southeast corner of the WBID near Alta Drive. One ditch system extends south from a stormwater control structure at a pond situated at the Alta Drive and Highway 9A feeder road intersection, and merges with Terrapin Creek at Alta Drive (PBS&J, August 2008a).

Fecal coliform concentrations did not differ during the "wet" and "dry" seasons at the Faye Road monitoring station, suggesting a constant source of fecal coliform bacteria to Terrapin Creek through nonpoint source discharges, failing wastewater conveyance systems, or septic systems independent of rainfall. It is possible that higher loadings occur in the "wet" season and are diluted by increased volumes of water, resulting in fecal coliform concentrations that appear to be independent of rainfall. Higher loadings were identified in the "wet" season at the Alta Drive station, suggesting that the majority of bacterial loading was delivered to Terrapin Creek through nonpoint source discharges, failing wastewater conveyance systems, or septic systems during high rainfall (PBS&J, August 2008a).

13.3 Projects To Reduce Fecal Coliform Loading

13.3.1 JEA Activities in the Terrapin Creek Watershed

13.3.1.1 Ongoing JEA Programs and Activities

JEA is currently implementing a number of countywide specific improvement programs, as follows, to address the sanitary sewer system as a source of fecal coliform contamination: (1) FOG Reduction Program; (2) SSO Root Cause Program; (3) Pop-Top Program; (4) Non-Destructive Testing and ARV Programs; (5) SCADA; (6) Third Party Education and Enforcement Program; (7) Manhole Monitoring; (8) Force Main Discharge Manholes; and (9) CMOM Program. **Appendix E** describes each of these programs.

Table 78 lists JEA's projects in the Terrapin Creek watershed.

TABLE 78: JEA ACTIVITIES IN THE TERRAPIN CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	ESTIMATED COST	FUNDING SOURCE	PROJECT STATUS	START DATE OF PROJECT
Other Sewer Infrastructure Upgrades							
JEA – 112	Manhole Linings Rehabbed	Repair deteriorating manhole linings	Not applicable	$330,469*	JEA	Ongoing	FY01
JEA – 113	ARV Inspection and Rehab	See **Appendix E**	0 ARVs replaced within 200 feet of tributary (1 ARV total in watershed)	$481,873*	JEA	Ongoing	Ongoing
JEA – 114	ARV Inspection	Inspect 1 ARV in watershed and report in annual progress report	1 ARV	Unknown	JEA	Planned	2009
JEA – 115	Pump Station SCADA Upgrades	Retrofitting completed in 2004; all stations constructed since have SCADA installed. See **Appendix E.**	Not applicable	Unknown	JEA	Complete	Complete
JEA – 116	Inspect Force Main Discharge Manholes, Repair/Rehab as Necessary	See **Appendix E**	Not applicable	$466,576*	JEA	Ongoing	Ongoing
Programs To Reduce Sewer Problems							
JEA – 117	FOG Reduction Program	See **Appendix E**	Not applicable	Unknown	JEA	Ongoing	Current FOG Program initiated in 2004
JEA – 118	Implement CMOM Program	See **Appendix E**	Not applicable	$ 163,269*	JEA	Ongoing	Ongoing
JEA – 119	Manhole Monitoring	See **Appendix E**	Not applicable	$ 137,526*	JEA	Ongoing	August 2007
JEA – 120	SSO Root Cause Program	See **Appendix E**	Not applicable	Unknown	JEA	Ongoing	February 2007
JEA – 121	Pop-Top Program	See **Appendix E**	Not applicable	$64,324*	JEA	Ongoing	February 2007
JEA – 122	Non-Destructive Testing Program	See **Appendix E**	Not applicable	$74,284*	JEA	Ongoing	Ongoing

* Costs provided are total systemwide costs for the program because WBID-specific costs are currently unavailable.

13.3.2 DCHD Activities in the Terrapin Creek Watershed

13.3.2.1 Ongoing DCHD Programs and Activities

Currently, DCHD is implementing a variety of countywide specific improvement programs and restoration activities to address OSTDS as sources of fecal coliform contamination. These include (1) the OSTDS Program, (2) training programs, and (3) the designation of septic tank failure and nuisance areas for transfer to central sewer. **Appendix E** describes each of these programs.

As part of the OSTDS Program, DCHD has issued 44 new construction permits, 6 repair permits, and 3 abandonment permits in the WBID. In addition, 15 annual operating permits have been issued for PBTS in the watershed. DCHD has also performed 56 plan reviews and 15 complaint investigations. It will continue these efforts in the future to reduce and prevent issues related to OSTDS. **Table 79** lists DCHD's projects in the Terrapin Creek watershed.

Table 79: DCHD Activities in the Terrapin Creek Watershed

Project Number	Project Name	Project Description	Level of Effort	Estimated Cost	Funding Source	Project Status
DCHD – 50	OSTDS Program	Implementation of programs to address septic systems as potential sources	Approximately 44 new construction permits, 6 repair permits, and 3 abandonment permit issued	$44,500	FDOH	Ongoing
DCHD – 51	Annual Operating Permits	Annual operating permits issued for PBTS, systems located in IMZ, and commercial systems	15 annual operating permits for PBTS/IMZ located in WBID	$37,500	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 52	DCHD-Sponsored Training Programs	Annual training programs held for septic tank contractors, certified plumbers, maintenance entities, and environmental health professionals	1 to 2 trainings per year providing up to 12 contact hours	$2,500	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 53	Application/ Plan Review/ Site Evaluations	DCHD performs plan review and site evaluation for each application received for OSTDS new construction, repair, or modification of existing system	Approximately 56 plan reviews and site evaluations have been performed in WBID based on permitting history	$12,000	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 54	Septic Tank Failure Area Ranking	Septic tank failure area scored and prioritized on annual basis	Less than 1 year since previous update	Not applicable		Ongoing
DCHD – 55	Complaint Investigations	DCHD investigates all complaints received, performs site visit, and initiates enforcement action on sanitary nuisance violations	15 complaint investigations have been performed in WBID	$1,500	FDOH/ LSJR SWIM Grant	Ongoing

13.3.3 COJ Activities in the Terrapin Creek Watershed

13.3.3.1 Completed COJ Projects

COJ has completed a flood control project along Faye Road that has helped reduce flooding in the area and, in turn, the amount of fecal coliform loading to the creek from stormwater runoff.

13.3.3.2 Ongoing COJ Programs and Activities

The COJ MS4 permit requires COJ and its co-permittees to implement a Stormwater Monitoring Plan. As part of this plan, COJ has 2 monitoring stations in the watershed and collected 66 samples between 1995 and 2008.

COJ PWD's Streets and Drainage Division is responsible for maintaining its stormwater conveyance systems in Jacksonville. This maintenance includes one work order for ditch and creek regrading, erosion control, and cleaning; and three work orders for the repair of blocked structures and measures to prevent flooding. These work orders were completed between 2005 and 2008. PWD will continue a level of effort to maintain the MS4 conveyances based on CARE requests.

In addition, COJ has implemented the PIC Program, which keeps track of reported PICs in a database for COJ inspector follow-up. COJ identified nine PICs in the Terrapin Creek watershed in 2007; their status is currently pending.

COJ PWD also conducts inspections in the watershed that are initiated through the CARE database. In the Terrapin Creek watershed, these inspections between 2000 and 2008 included one investigation into an illicit water discharge, one illegal discharge, and six private lift stations. PWD will maintain a future level of effort for these investigations based on requests, which are logged and tracked through the CARE database.

Table 80 provides additional details on COJ's activities in the watershed.

TABLE 80: COJ ACTIVITIES IN THE TERRAPIN CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	TOTAL COST	FUNDING SOURCE	PROJECT STATUS
Drainage System Rehab Project						
COJ – 144	Faye Road – Area Floods	Faye Road drainage system rehab	Faye Road	$40,000	COJ	Complete
MS4 Maintenance Activities						
COJ – 145	Ditch/Creek Regrade/Erosion/Clean	Completed in response to CARE requests. Costs limited to activities completed after release of work order system.	1 (for 2005–08)	Unknown	COJ	Ongoing
COJ – 146	Structure Blocked/Repair/General Flooding		3 (for 2005–08)	$790	COJ	Ongoing
Inspection, Enforcement, and Sampling						
COJ – 147	Illicit Water Discharge	CARE-initiated Inspection	1 (for 2000–08)	$212	COJ	Ongoing
COJ – 148	Pollution – Water – Illegal Discharge	CARE-initiated Inspection	1 (for 2000–08)	$212	COJ	Ongoing
COJ – 149	Private Lift Station Inspection	No lift stations in WBID prior to 2006 17 total annual inspections	6 (for 2006–08)	$1,272	COJ	Ongoing
COJ – 150	Determine Lift Station Location	1 lift station is located on boundary, verify that it is reported in Browns Creek for first annual report	1 (for 2009–10)	$212	COJ	Planned
COJ – 151	Illicit Discharge Detection and Elimination	0 illicit, 9 open	9 (for 2007)	$1,908	COJ	Ongoing
COJ – 152	Follow Up on Outstanding PICs	Follow up on 9 open PICs in watershed	9 (for 2009–10)	$1,908	COJ	Planned
COJ – 153	Routine Surface Water Sampling	NPDES permit-related quarterly water quality sampling – 2 sampling stations in WBID	66 (for 1995–2008)	$29,502	COJ	Ongoing
Septic Tank Phase-Out Program						
COJ – 154	Outside Failure Areas – Septic Tank Phase-Out	Phase out program as provided by COJ ordinance	57 total tanks, 0 connected	Unknown	COJ	Ongoing
COJ – 155	Septic Tank Maintenance Public Education	Public service announcements	Ongoing	Unknown	COJ	Ongoing
Management and Reduction of Pet and Animal Waste						
COJ – 156	Pet/Animal Management Public Education	Public service announcements	Ongoing	Unknown	COJ	Ongoing

Note: Inspection unit cost = $212; sampling event unit cost = $447; and septic tank per connection = $35.

13.3.4 FDOT Activities in the Terrapin Creek Watershed

13.3.4.1 Ongoing FDOT Programs and Activities

Under Subsection 334.044(15), F.S., and Rule 14-86, F.A.C., FDOT implements a Drainage Connection Program. The program does not issue water quality permits but requires the connecting entity to certify that the discharge is of acceptable water quality. Connecting entities are required to maintain the discharge of acceptable water quality for the duration of the FDOT permit. If connecting entities fail to meet this requirement after sufficient warning by FDOT, they will be reported to FDEP, SJRWMD, and, if applicable, to the local municipality; these entities regulate stormwater quality through state rules, ordinances, and codes. FDOT performs periodic site inspections as part of the MS4 NPDES permit.

FDOT also works with COJ on several efforts related to the MS4 permit. FDOT participates in the PIC Program in conjunction with COJ. FDOT has instructed staff to be alert for illicit connections during routine maintenance activities, and investigates observances found in the right of way. Those located outside the right of way are reported to the applicable municipality for further investigation and enforcement action. FDOT maintains a toll-free number to be used for reporting illicit connections. FDOT also contributes funding for one monitoring station in the Terrapin Creek watershed that is sampled quarterly as part of the routine monitoring program. FDOT will continue these activities in the future to support the maintenance of the MS4 system. **Table 81** lists FDOT activities in the watershed.

Table 81: FDOT Activities in the Terrapin Creek Watershed

Project Number	Project Name	Estimated Cost	Funding Source	Level of Effort	Project Status
Identification and Removal of Illicit Connections					
FDOT – 49	PIC Program – Search for Illicit Connections	See Note 1	State of Florida (FDOT)/COJ	Effort is continuous in WBID	Ongoing
FDOT – 50	PIC Program – Illicit Connections Identified and Removed in WBID if Truly Illicit	See Note 1	State of Florida (FDOT)/COJ	No truly illicit connection identified to date	Ongoing
Surface Water Sampling To Assess Conditions and Identify Sources					
FDOT – 51	Routine Tributary Monitoring as Part of MS4 Permit	See Note 2	State of Florida (FDOT)/COJ	1 station quarterly	Ongoing
Drainage Connection Program (DCP)					
FDOT – 52	DCP – Connecting Entity Must Certify that All Discharges to FDOT MS4 are Treated Prior to Connection	See Note 3	State of Florida (FDOT)	Ongoing effort	Ongoing
Routine Maintenance Activities					
FDOT – 53	Maintain FDOT Stormwater Systems	See Note 5	State of Florida (FDOT)	Clean drainage structures, replace/repair storm/cross/side drains, clean/reshape roadside ditches, clear/repair outfall ditches, mowing, roadside litter removal, respond to citizen complaints	Ongoing

[1] Countywide Program – Average cost is $37,605 per year contribution to COJ.
[2] Countywide Program – Average cost is $22,546 per year contribution to COJ.
[3] Countywide Program – Average cost is $27,151 per year.
[5] Countywide Program – Average cost is $2,750,735 per year.

13.3.5 Florida Department of Agriculture and Consumer Services Activities in the Terrapin Creek Watershed

A dairy facility in the Terrapin Creek watershed, M&M Dairy, Inc., closed three years ago, and some of the pastureland was sold for development. The construction changed the pond from the dairy to a closed wetland system that no longer flows to the creek. While the pond is no longer a source of fecal coliform, the remaining 200 acres are now a cow/calf operation with approximately 80 head of cattle. The Florida Department of Agriculture and Consumer Services (FDACS) visited this operation in 2008 because it will be subject to the FDACS Cow/Calf BMP Manual, once adopted. The property owner has committed to signing a Notice of Intent (NOI) to implement the applicable BMPs once the manual is adopted. FDACS will follow up with the owner to obtain the NOI and to assist in implementing the BMPs.

13.4 Summary of Restoration Activities and Sufficiency of Efforts

Table 78 through **Table 81** list the projects and programs to reduce fecal coliform loading in the Terrapin Creek watershed. Several key efforts completed in the WBID are summarized below, as well as activities that are expected to continue or be implemented in future years. The efforts outlined in the project tables, including the activities highlighted below, will reduce fecal coliform loading and improve water quality in Terrapin Creek based on the best information available about fecal coliform sources. As water quality improves in response to these actions and the bacteria source information is refined, future BMAPs may recommend different activities or levels of effort. For this BMAP, the full implementation of the projects and programs listed in the project tables for the Terrapin Creek watershed is sufficient to significantly reduce fecal coliform sources and make substantial progress towards meeting the TMDL.

13.4.1 OSTDS

Program Implementation – Out of approximately 57 septic systems in the Terrapin Creek watershed, only a few are located near surface waters. DCHD has performed 15 complaint investigations and 56 plan reviews, and issued 6 repair permits, 3 abandonment permits, and 44 new construction permits in the watershed. Continued program implementation will adequately address OSTDS in the watershed.

13.4.2 Sewer Infrastructure

Private Infrastructure – According to the COJ database, there are 6 private lift stations in the watershed. COJ EQD has performed 17 inspections of these stations and will continue to inspect annually. One private lift station, located at 11400 New Berlin Road, is situated on the WBID boundary. COJ will confirm that this station is included in the Browns Creek WBID to ensure that potential overflows are reported in the correct WBID. The continuation of the inspection program and the confirmation of reporting boundaries are sufficient to address private infrastructure in the watershed at this time.

Sewer Infrastructure Projects – There is one ARV in Terrapin Creek that JEA will inspect within the first year after BMAP adoption. This inspection will ensure that corrosive gases have not compromised the integrity of the pipe, leading to potential SSOs, and proactively prevents fecal coliform loading. JEA will schedule the inspection in accordance with its operations and maintenance schedule, and the results will be reported in the first annual BMAP progress report. JEA will continue its maintenance efforts and systemwide programs, and this will be sufficient to address potential sewer sources in the WBID at this time.

13.4.3 Stormwater

Illicit Connection Removal – There is very little stormwater infrastructure in the WBID. The PIC Program currently has nine open cases, and in order for the stormwater efforts to be sufficient, these PICs must be investigated and the connections eliminated or the cases closed. COJ will provide information on their status, including why a particular PIC may still be open, in the first annual BMAP progress report.

FDOT Program Implementation – In accordance with Rule 14-86, F.A.C., FDOT requires any new connections to its MS4 stormwater conveyance systems to be evaluated and permitted to prevent the introduction of new sources to its conveyances. The permit program will continue, and FDOT will continue to periodically inspect its facilities as part of its MS4 permit to prevent unpermitted connections.

COJ Program Implementation – COJ has completed one drainage system rehabilitation project, on Faye Road, that has reduced flooding in an area with private and JEA lift stations, thus preventing stormwater-related fecal coliform loading to Terrapin Creek. In addition, since 2005, COJ PWD has cleaned one ditch and repaired three stormwater inlets. COJ will continue maintenance activities in the watershed to prevent additional fecal coliform loading to the creek.

13.4.4 Agriculture

The cow/calf operation located in the watershed could be a potential source of fecal coliform loading to the creek during wet-weather conditions due to stormwater runoff. FDACS will meet with the property owner once the Cow/Calf BMP Manual has been adopted to obtain a NOI to implement the applicable BMPs. FDACS will also visit the property to ensure that BMPs are properly implemented and to provide assistance with the BMPs, if needed.

Table 82: Summary of Restoration Activities for the Terrapin Creek Watershed

Source/Action	COJ	DCHD	FDOT	JEA
OSTDS				
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 (PSA)	√	X	X	X
Surface Water Sampling for Conditions and Trends	√	X	X	X
Sewer System				
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	-
Air Release Valve (ARV) Inspection and Rehab	X	X	X	√
Program Implementation	X	X	X	√
Private Lift Station Inspections and Enforcement	√	X	X	X
Private Non-NPDES Wastewater Facility Inspections and Enforcement	*	X	X	X
Sanitary Sewer Overflow (SSO) Investigations	√	X	X	√
Surface Water Sampling for Conditions and Trends	X	X	X	√

SOURCE/ACTION	COJ	DCHD	FDOT	JEA
Stormwater				
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
Pet Waste Management				
Ordinances and Enforcement	√	X	X	X
Public Education and Outreach	√	X	X	X
Special Source Assessment Activities				
Intensive Water Quality Sampling to Track Sources	-	X	X	-
Tributary Assessment Team (TAT)	√	X	X	√
Microbial Source Tracking (MST)	√	X	X	√
Thermal Imagery to Identify PICs	-	X	X	X

Note: Shaded cells (marked with X) represent activities that do not apply to the associated entity.
* Activity is not applicable for the waterbody due to a lack of infrastructure.
+ FDOT participation in these activities is provided by funding in the NPDES MS4 agreements with COJ.

CHAPTER 14: GOODBYS CREEK (WBID 2326)

14.1 WBID DESCRIPTION

Goodbys Creek, WBID 2326, is located in Duval County, east of the LSJR within the North Mainstem Planning Unit, as designated by SJRWMD (**Figure 18**). The "headwaters" of Goodbys Creek presumably comprise stormwater that originates at the northernmost terminus of the WBID just north of Toledo Road (**Figure 19**). The entire creek flows southwest in a single channel, except for four branches that join the main portion of Goodbys Creek. The most northern branch ("northern branch") flows from the west into Goodbys Creek from north of the WBID boundary. According to COJ EQD, this small, unnamed, first-order stream leads into Goodbys Creek and is not hydraulically connected to Christopher Branch to the north. The unnamed stream appears to merge with Goodbys Creek just south of Hernando Road.

Two additional branches join the main channel from the east ("northeastern branch" and "southeastern branch") and one from the west ("western branch"). The northeastern branch extends just south from Oxford Forest Drive northeast to South Old Kings Road. The southeastern branch is a very small tributary that merges with the main channel approximately 50 meters (164 feet) north of San Clerc Road. The western branch appears to originate at a pond just east of La Vista Circle and merges with the main channel just south of San Clerc Road.

The creek enters a wetland area south of Baymeadows Road that extends from just east of San Jose Boulevard west to Barrington Oaks Drive. Upon entering the wetland, the creek bends to the west and flows westward until it eventually reaches the St. Johns River, just west of Holly Grove Avenue. An artificial channel just south of the wetland area continues southeast through residential communities and appears to terminate near a closed landfill. This channel may transport water into Goodbys Creek (PBS&J, August 2008b).

The spatial distribution and acreage of different land use categories in the Goodbys Creek watershed were identified using 2004 land use coverage data from SJRWMD (**Table 83**). The dominant land use (1,179.2 acres; 36.2% of total coverage) in the watershed, and directly adjacent to the majority of the creek itself, is medium-density residential, which extends throughout the watershed. The next two most abundant land cover categories are (1) high-density residential areas (706 acres; 21.7% of total coverage), located adjacent to surface waters (i) at the northernmost corner of the WBID, (ii) from Lake Woodbourne Drive north to Praver Drive South, (iii) between Baymeadows Road and San Clerc Road, and (iv) just east of Phillips Highway at the Beauclerc Bay Apartments; and (2) commercial/utility and institutional areas (382.7 acres; 11.7% of total coverage), located predominantly east of Phillips Highway in the eastern corner of the WBID and in patchy areas in the southeastern and northernmost portions of the watershed.

Upland forests and wetland habitat accounted for 11% of land use in the watershed. The largest wetland area forms a portion of Goodbys Creek and is located south of Baymeadows Road, extending from San Jose Boulevard east to Barrington Oaks Drive. As wetlands serve as habitat for various species of wildlife and are located near surface waters, there is a potential for wildlife to contribute to the fecal pollution of Goodbys Creek. It is worth mentioning that a marina is located on the north side of the creek, immediately west of San Jose Boulevard (PBS&J, August 2008b).

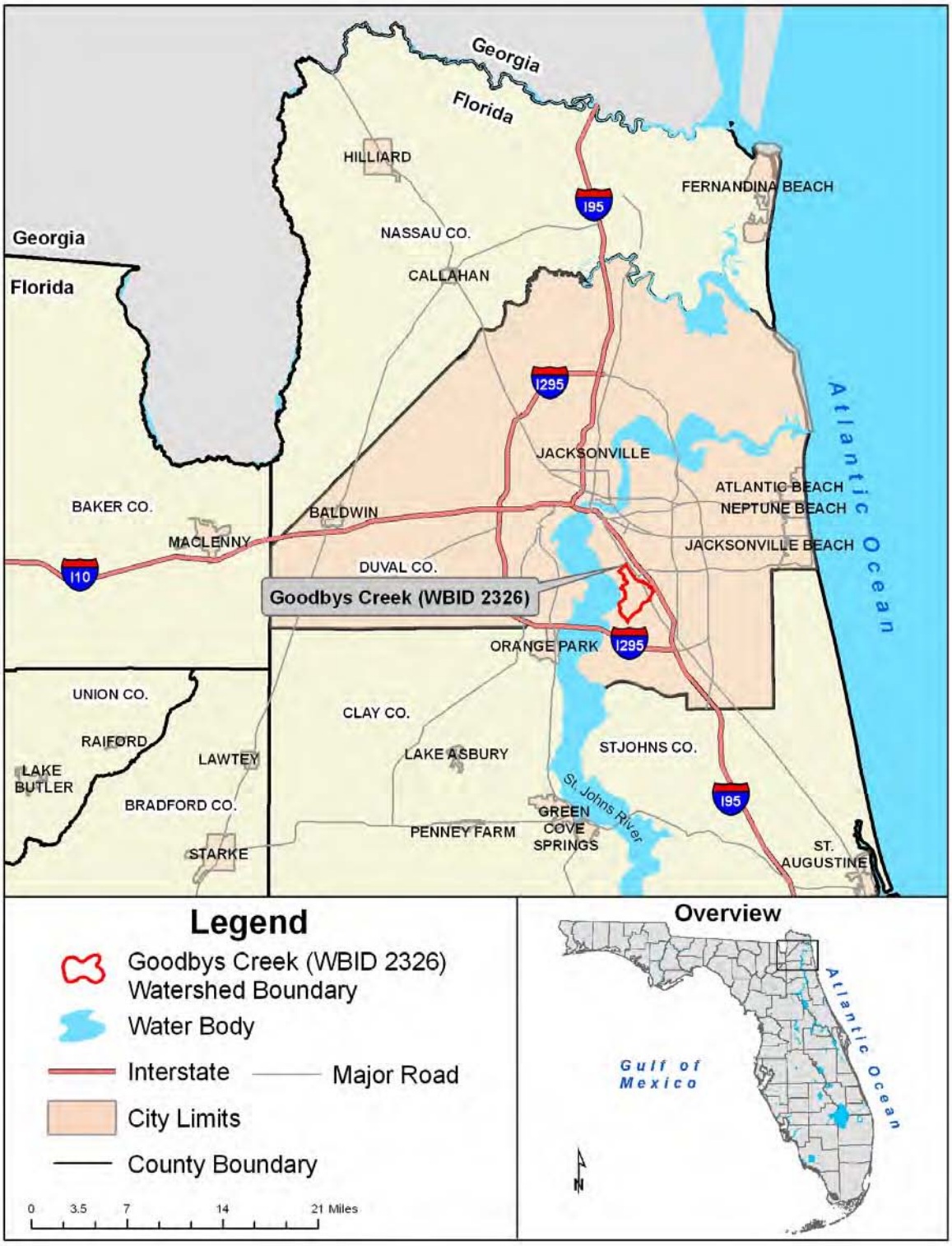

FIGURE 18: LOCATION OF THE GOODBYS CREEK WATERSHED

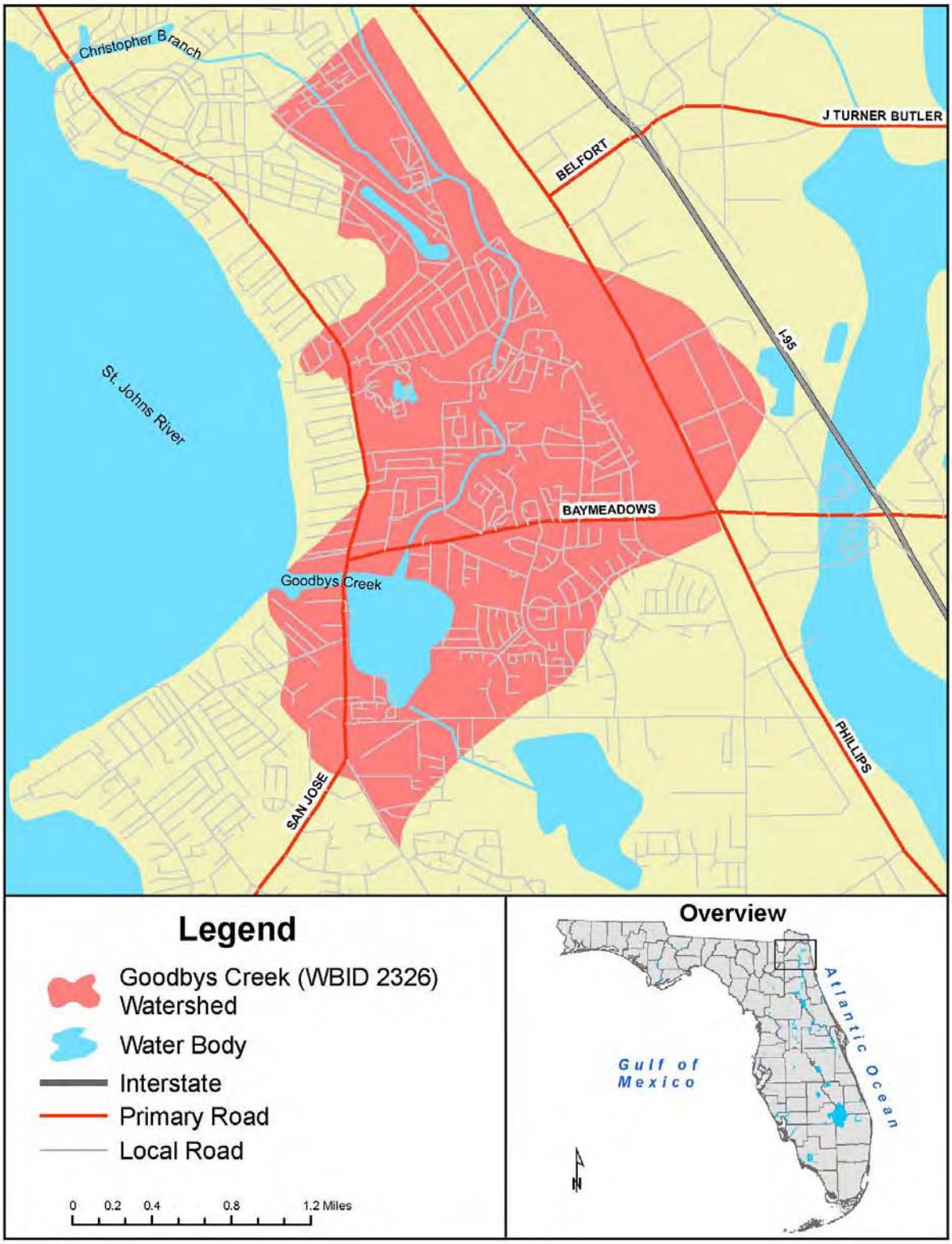

FIGURE 19: GOODBYS CREEK WBID LOCATOR MAP

According to the 2000 Census, there are 8,392 households in the watershed, averaging 2.12 people per household. High-density residential areas (16 to 25 people per acre) are located adjacent to surface waters throughout the watershed, especially in the center and northeast corner of the WBID (PBS&J, August 2008b). In addition, assuming that 40% of households have 1 dog (Tyler, 2006), there are an estimated 3,357 dogs in the watershed.

TABLE 83: LAND USES IN THE GOODBYS CREEK WATERSHED

LAND USE	ACRES	% OF TOTAL
Medium-Density Residential	1,179.2	36.2
High-Density Residential	706.0	21.7
Commercial/Utility/Institutional	382.7	11.7
Wetlands	225.5	6.9
Upland Forest	167.2	5.1
Industrial	161.6	5.0
Recreational	145.2	4.5
Transportation	113.1	3.5
Water	111.5	3.4
Low-Density Residential	37.1	1.1
Nonforested Upland	15.3	0.5
Open Land	14.9	0.5
TOTAL:	**3,259.2**	**100**

14.2 POTENTIAL SOURCES

14.2.1 POINT SOURCES

Rinker Materials and Duval Asphalt Products Inc. are the only facilities permitted to discharge industrial wastewater and stormwater associated with industrial activity, respectively, in the Goodbys Creek watershed. Both facilities are located just west of Phillips Highway in the eastern portion of the WBID. In addition, the COJ/FDOT MS4 permit includes the Goodbys Creek watershed. A closed landfill that is no longer in use is situated outside the WBID boundaries south of the Sunbeam Road and Craven Road intersection. There is a potential for stormwater from the landfill to flow into an artificial channel that merges into Goodbys Creek (PBS&J, August 2008b).

14.2.2 ILLICIT DISCHARGES

COJ EQD is continuing a program to identify, confirm, and respond to illicit connection issues in Jacksonville. A total of 94 PICs were identified in the Goodbys Creek watershed between 1999 and 2006. Of these, 13 connections were confirmed to be illicit and were removed. There are 16 PICs currently pending investigation.

14.2.3 CENTRALIZED SEWER INFRASTRUCTURE AND OVERFLOWS

The Goodbys Creek watershed is predominantly located in the Mandarin WWTF Service Area, with smaller portions of the watershed extending into the Buckman and Arlington East WWTF service areas. An estimated 4,547 households (approximately 54% of households) are connected to the sanitary sewer system in the watershed. Sewer infrastructure is located throughout the watershed and near the surface waters of Goodbys Creek, increasing the likelihood that possible spills and/or unidentified sewer infrastructure leaks will impact surface waters. JEA has reported a total of 18 SSOs within the WBID boundaries (**Table 84**). The estimated volume of spill associated with these overflows ranged from 10 to 36,000 gallons and averaged 3,752 gallons; however, only 8 SSOs were reported to have potentially impacted surface waters. More recently, on July 22, 2008, a SSO from a lift station at 8938 San Jose

Boulevard resulted in an estimated 1,000-gallon discharge of raw sewage to the adjacent ground and into the surface waters of Goodbys Creek. Also, according to FDEP, alleged illegal discharges of untreated/improperly treated wastewater were suspected at a WWTF for an apartment complex at Goodbys Creek near San Jose Boulevard (PBS&J, August 2008b).

Monitoring results demonstrate the consistency of elevated levels of fecal coliform bacteria throughout the period of record (April 1984–May 2007). As such, it is unlikely that the eight reported SSOs that potentially affected surface waters were responsible for the consistent fecal coliform exceedances observed throughout the Goodbys Creek watershed. Additionally, the highest levels of fecal coliform observed at all IWR stations did not correspond with the reported SSO incidents. This demonstrates that other sources, such as unidentified sewer infrastructure leaks and/or failing OSTDS, may be contributing to the overall pollution of the Goodbys Creek watershed (PBS&J, August 2008b).

TABLE 84: SSOS REPORTED IN THE GOODBYS CREEK WATERSHED, 2001–07

WBID NAME (NUMBER)	DATE OF OVERFLOW	ESTIMATED VOLUME OF SPILL (GALLONS)	POTENTIALLY IMPACTED SURFACE WATERS
Goodbys Creek (2326)	24-Jan-02	10	N
Goodbys Creek (2326)	20-Apr-02	900	N
Goodbys Creek (2326)	19-Sep-02	20	N
Goodbys Creek (2326)	14-Nov-02*	2,000	Y
Goodbys Creek (2326)	23-Nov-02	300	N
Goodbys Creek (2326)	17-Dec-02	100	N
Goodbys Creek (2326)	30-Dec-02*	2,500	Y
Goodbys Creek (2326)	12-Feb-03*	15,000	Y
Goodbys Creek (2326)	14-Feb-03*	36,000	Y
Goodbys Creek (2326)	11-Apr-03*	2,000	Y
Goodbys Creek (2326)	18-Apr-03	300	N
Goodbys Creek (2326)	23-Oct-03	100	N
Goodbys Creek (2326)	26-Feb-04*	4,500	Y
Goodbys Creek (2326)	23-Nov-04	50	N
Goodbys Creek (2326)	14-Dec-04*	3,600	Y
Goodbys Creek (2326)	18-Dec-04	50	N
Goodbys Creek (2326)	9-Mar-05	50	N
Goodbys Creek (2326)	3-Oct-05*	50	Y

*Reportable SSOs that spilled > 1,000 gallons of sewage and/or affected surface waters.

14.2.4 OSTDS

WSEA estimates that there are approximately 349 OSTDS in the Goodbys Creek watershed. According to DCHD, 46 septic system repair permits were issued in this area. The majority of the permits, and presumably failed septic systems, were located (1) from Regina Road southeast to the Craven Road West and Craven Road intersection, and (2) in the southwestern corner of the WBID, west of San Jose Boulevard, between Cardinal Point Drive and Goodbys Creek. Parcels with septic system repair permits in these areas are located near the surface waters of Goodbys Creek, increasing the likelihood that OSTDS failure may be contributing to the fecal pollution observed in these locations. In addition, one DCHD-designated septic system failure area (Beauclerc Gardens) is located in the watershed. This failure area was placed on the WSEA planning list, and the transition from septic to sewer has since been completed. The vast majority of septic system repair permits for the watershed were filed in this septic system failure area in the southwestern corner of the WBID, west of San Jose Boulevard between Cardinal Point Drive and Goodbys Creek (PBS&J, August 2008b).

14.2.5 Nonpoint Sources

An analysis of impervious surface indicates that the Goodbys Creek WBID contains predominantly 10 to 25% impervious surface. The watershed also contains land with greater than 25% impervious surface. These areas generally correspond to commercial/utility and institutional and industrial land use classifications, and are located primarily east of railroad lines that parallel Phillips Highway and in the southwest corner of the WBID. Furthermore, the potential for stormwater runoff was analyzed and demonstrates that the majority of the WBID contains a moderate-to-high potential for stormwater runoff, including areas near the creek. The highest runoff coefficients are located primarily (1) in the northernmost corner of the WBID, (2) on either side of Phillips Highway in the eastern corner of the WBID, (3) in areas surrounding the Baymeadows and San Jose Boulevard intersection, and (4) in the south corner of the WBID at the Old St. Augustine Road and San Jose Boulevard intersection (PBS&J, August 2008b).

The storm sewer network in the Goodbys Creek watershed includes 55 permitted stormwater treatment areas, encompassing approximately 21.8% of the WBID area. Stormwater infrastructure in the WBID includes 141 outfalls by receiving water (1 classified by FDEP as a major outfall) and 1,258 inlets. Although closed conveyances are common throughout the WBID, ditch systems primarily form segments of Goodbys Creek (1) throughout the northern portion of the watershed, north of Naranja Drive South; and (2) from just north of Philrose Drive south to Latimer Road East (PBS&J, August 2008b).

Higher fecal coliform concentrations were identified in the "wet" season at the Sanchez Road station, suggesting that the majority of bacterial loading was delivered to this area of Goodbys Creek through nonpoint source discharges, failing wastewater conveyance systems, or septic systems during high rainfall. In contrast, concentrations did not differ at the stations near the confluence, indicating that a constant source (or sources) of fecal coliform bacteria, apparently independent of rainfall, is contributing to the creek in this area. Considering the possibility for dilution during the "wet" season, it is possible that loadings observed during this time of the year were even higher than they appeared to be (PBS&J, August 2008b).

14.3 Projects To Reduce Fecal Coliform Loading

14.3.1 JEA Activities in the Goodbys Creek Watershed

14.3.1.1 Ongoing JEA Programs and Activities

JEA is currently implementing a number of countywide specific improvement programs, as follows, to address the sanitary sewer system as a source of fecal coliform contamination: (1) FOG Reduction Program; (2) SSO Root Cause Program; (3) Pop-Top Program; (4) Non-Destructive Testing and ARV Programs; (5) SCADA; (6) Third Party Education and Enforcement Program; (7) Manhole Monitoring; (8) Force Main Discharge Manholes; and (9) CMOM Program. **Appendix E** describes each of these programs.

JEA has pipe bursted 0.16% of the sewer lines in the watershed and open cut 0.14%. It has also replaced or repaired components on 3 of the 53 (5.7%) lift stations in the WBID. In the Goodbys Creek watershed, JEA inspected 3,455 LF of pipe and cleaned 16,686 LF of pipe in FY07. These activities will continue in the future to maintain the sanitary sewer system and prevent future problems.

Table 85 contains additional information on JEA's activities in the watershed.

TABLE 85: JEA ACTIVITIES IN THE GOODBYS CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	ESTIMATED COST	FUNDING SOURCE	PROJECT STATUS	START DATE OF PROJECT
Sewer Upgrades							
JEA – 123	Pipe Bursting – Increase Carrying Capacity	Replace failing/leaking infrastructure	Total footage of pipe burst in watershed since 2001: 2,364	$246,276	JEA	Ongoing	FY00
JEA – 124	Open Cut – Removal and Replacement	Replace failing/leaking infrastructure	Total footage of open cut replacement in watershed since 2001: 2,016	$24,427	JEA	Ongoing	Ongoing
Other Sewer Infrastructure Upgrades							
JEA – 125	Manhole Linings Rehabbed	Repair deteriorating manhole linings	Not applicable	$330,469*	JEA	Ongoing	FY01
JEA – 126	ARV Inspection and Rehab	See **Appendix E**	2 ARVs replaced within 200 feet of tributary	$481,873*	JEA	Ongoing	Ongoing
JEA – 127	Pump Station SCADA Upgrades	Retrofitting completed in 2004; all stations constructed since have SCADA installed. See **Appendix E**.	Not applicable	Unknown	JEA	Complete	Complete
JEA – 128	Inspect Force Main Discharge Manholes, Repair/Rehab as Necessary	See **Appendix E**	Not applicable	$466,576*	JEA	Ongoing	FY07
JEA – 129	Pump Station Class I/II Rebuilding	Repair or replace components of existing pump stations	Projects in watershed since 2002: 3	$236,805	JEA	Ongoing	Ongoing
Programs To Reduce Sewer Problems							
JEA – 130	FOG Reduction Program	See **Appendix E**	Not applicable	Unknown	JEA	Ongoing	Current FOG Program initiated in 2004
JEA – 131	Pipe TV Inspection	Inspect existing infrastructure through use of closed-circuit TV system	3,455 LF of pipe inspected (FY07)	$163,099*	JEA	Ongoing	Carried over from city operation (1997)
JEA – 132	Pipe Cleaning	Clean existing pipes to avoid blockages	16,686 LF of pipe cleaned (FY07)	$743,054*	JEA	Ongoing	Carried over from city operation (1997)
JEA – 133	Implement CMOM Program	See **Appendix E**	Not applicable	$163,269*	JEA	Ongoing	Ongoing
JEA – 134	Manhole Monitoring	See **Appendix E**	Not applicable	$137,526*	JEA	Ongoing	August 2007
JEA – 135	SSO Root Cause Program	See **Appendix E**	Not applicable	Unknown	JEA	Ongoing	February 2007
JEA – 136	Pop-Top Program	See **Appendix E**	Not applicable	$64,324*	JEA	Ongoing	February 2007
JEA – 137	Non-Destructive Testing Program/Pipe Integrity Testing	See **Appendix E**	Not applicable	$74,284*	JEA	Ongoing	Ongoing

* Costs provided are total systemwide costs for the program because WBID-specific costs are currently unavailable.

14.3.2 DCHD Activities in the Goodbys Creek Watershed

14.3.2.1 Ongoing DCHD Programs and Activities

Currently, DCHD is implementing a variety of countywide specific improvement programs and restoration activities to address OSTDS as sources of fecal coliform contamination. These include (1) the OSTDS Program, (2) training programs, and (3) the designation of septic tank failure and nuisance areas for transfer to central sewer. **Appendix E** describes each of these programs.

As of July 28, 2008, DCHD updated the listing of failure and nuisance areas. There is currently 1 designated septic system failure area, Beauclerc Gardens, in the Goodbys Creek watershed. Approximately 16.3% of the failure area is located in the watershed.

As part of the OSTDS Program, DCHD has issued 26 new construction permits, 46 repair permits, and 23 abandonment permits in the WBID. In addition, 13 annual operating permits have been issued for PBTS in the watershed. DCHD has also performed 102 plan reviews and 133 complaint investigations. It will continue these efforts in the future to reduce and prevent issues related to OSTDS. **Table 86** lists DCHD's projects in the Goodbys Creek watershed.

Table 86: DCHD Activities in the Goodbys Creek Watershed

Project Number	Project Name	Project Description	Level of Effort	Estimated Cost	Funding Source	Project Status
DCHD – 56	OSTDS Program	Implementation of programs to address septic systems as potential sources	Approximately 26 new construction permits, 46 repair permits, and 23 abandonment permits issued	$32,500	FDOH	Ongoing
DCHD – 57	Annual Operating Permits	Annual operating permits issued for PBTS, systems located in IMZ, and commercial systems	13 annual operating permits for PBTS/IMZ located in WBID	$32,500	FDOH/ LJSR SWIM Grant	Ongoing
DCHD – 58	SWIM Project	Implementation of broad-ranging septic tank ordinance	16.3% of Beauclerc Gardens Septic Tank Failure Area located in WBID	$34,000	FDOH/ LJSR SWIM Grant	Completed
DCHD – 59	DCHD-Sponsored Training Programs	Annual training programs held for septic tank contractors, certified plumbers, maintenance entities, and environmental health professionals	1 to 2 trainings per year providing up to 12 contact hours	Not applicable	Not applicable	Ongoing
DCHD – 60	Application/Plan Review/Site Evaluations	DCHD performs plan review and site evaluation for each application received for OSTDS new construction, repair, or modification of existing system	Approximately 102 plan reviews and site evaluations have been performed in WBID based on permitting history	$22,000	FDOH/ LJSR SWIM Grant	Ongoing
DCHD – 61	Septic Tank Failure Area Ranking	Septic tank failure area scored and prioritized on annual basis	Less than 1 year since previous update	Not applicable	Not applicable	Ongoing

Project Number	Project Name	Project Description	Level of Effort	Estimated Cost	Funding Source	Project Status
DCHD – 62	Complaint Investigations	DCHD investigates all complaints received, performs site visit, and initiates enforcement action on sanitary nuisance violations	13 complaint investigations have been performed in WBID	$1,500	FDOH/ LJSR SWIM Grant	Ongoing
DCHD – 63	Walk the WBID Effort	Conduct Walk the WBID in central portion of watershed to identify sources	Walk the WBID	Unknown	DCHD/ COJ	Planned
DCHD – 64	Intensive Inspection Program	Intensive geospecific inspections in selected BMAP WBIDs based on repair permit applications, water quality information, and site conditions; additional WBIDs may be identified in future based on ongoing assessment efforts	Approximately 50 OSTDS located near San Servera Drive, Sanchez Road, Baymeadows Road, Craven Road, and San Rae Road	$7,750	Unknown	Planned – pending funding

14.3.3 COJ Activities in the Goodbys Creek Watershed

14.3.3.1 Completed COJ Projects

COJ has completed two projects in the watershed: (1) a regional wet detention pond at Powers Avenue and Old Kings Road, which treats 520 acres; and (2) a project at Sierra Madre Drive to prevent erosion and flooding. The projects have treated stormwater runoff and controlled flooding in these two areas, reducing the amount of stormwater-associated fecal coliform loading to Goodbys Creek.

14.3.3.2 Ongoing COJ Programs and Activities

The COJ MS4 permit requires COJ and its copermittees to implement a Stormwater Monitoring Plan. As part of this plan, COJ has 1 routine monitoring station in the watershed that is sampled quarterly. A total of 38 samples were taken at this station between 1995 and 2008.

COJ PWD's Streets and Drainage Division is responsible for maintaining its stormwater conveyance systems in Jacksonville. This maintenance includes 241 work orders for ditch and creek regrading, erosion control, and cleaning; 11 work orders for lake and pond maintenance; and 145 work orders for the repair of blocked structures and measures to prevent flooding. These work orders were completed between 2005 and 2008. PWD will continue a level of effort to maintain the MS4 conveyances based on CARE requests.

In addition, COJ has implemented the PIC Program, which keeps track of reported PICs in a database for COJ inspector follow-up. Of the 94 PICs identified by the COJ in the Goodbys Creek watershed, 13 were confirmed as illicit connections and were removed; the status of 16 PICs is currently pending investigation (PBS&J, August 2008b). Also as part of the PIC Program, COJ EQD provides public outreach through educational pamphlets, informational door hangers, and the storm drain–stenciling program.

COJ PWD also conducts inspections, which included 11 investigations into illicit water discharges, 7 illegal discharges, 3 sewer lines that drained into a yard or ditch, 19 SSOs, and 20 private lift stations in the watershed. PWD will maintain a future level of effort for these investigations based on requests, which are logged and tracked through the CARE database.

Table 87 provides additional detail on COJ's activities in the watershed.

TABLE 87: COJ ACTIVITIES IN THE GOODBYS CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	TOTAL COST	FUNDING SOURCE	PROJECT STATUS
Capital Improvement Projects						
COJ – 157	Powers Avenue at Old Kings Road	Regional pond	520 acres	Unknown	COJ	Complete
Drainage System Rehab Projects						
COJ – 158	Repair Erosion at Sierra Madre Drive	Bank repairs failed to prevent erosion	Sierra Madre Drive	$ 106,262	COJ	Complete
MS4 Maintenance Activities						
COJ – 159	Ditch/Creek Regrade/Erosion/Clean	Completed in response to CARE requests. Costs limited to activities completed after release of work order system.	241 (for 2005–08)	$18,300	COJ	Ongoing
COJ – 160	Lake or Pond Problem		11 (for 2005–08)	$374	COJ	Ongoing
COJ – 161	Structure Blocked/Repair/General Flooding		145 (for 2005–08)	$20,284	COJ	Ongoing
Inspection, Enforcement, and Sampling						
COJ – 162	Illicit Water Discharge	CARE-initiated Inspection	11 (for 2000–08)	$2,332	COJ	Ongoing
COJ – 163	Pollution – Water – Illegal Discharge	CARE-initiated Inspection	7 (for 2000–08)	$1,484	COJ	Ongoing
COJ – 164	Sewer Drains into Yard/Ditch	CARE-initiated Inspection	3 (for 2000–08)	$636	COJ	Ongoing
COJ – 165	Sewer Overflow	CARE-initiated Inspection	19 (for 2000–08)	$4,028	COJ	Ongoing
COJ – 166	Private Lift Station Inspection	First lift station installed in 1993 with 233 annual inspections	20 (for 1993–2008)	$4,240	COJ	Ongoing
COJ – 167	Verify Locations of Private Lift Stations on Boundary	Verify location of 3 stations on boundary and report in first annual progress report	3 (for 2009–10)	$636	COJ	Planned
COJ – 168	Illicit Discharge Detection and Elimination	13 illicit, 16 open	94 (for 1999–2006)	$19,928	COJ	Ongoing
COJ – 169	Follow Up on Outstanding PICs	Follow up on 16 open PICs in watershed	16 (for 2009–10)	$3,392	COJ	Planned
COJ – 170	Routine Surface Water Sampling	NPDES permit-related quarterly water quality sampling – 1 sampling station in WBID	38 (for 1995–2008)	$16,986	COJ	Ongoing
Septic Tank Phase-Out Program						
COJ – 171	Beauclerc Gardens Failure Area – Septic Tank Phase-Out	Phase-out of septic tanks in failure areas (also listed as part of larger LSJR Main Stem BMAP project)[1]	84 total tanks, 0 connected	Unknown	COJ	Ongoing
COJ – 172	Outside Failure Areas – Septic Tank Phase-Out	Phase out program as provided by COJ ordinance	265 total tanks, 0 connected	Unknown	COJ	Ongoing
COJ – 173	Walk the WBID Effort	Conduct Walk the WBID in central portion of watershed to identify sources	Walk the WBID	Unknown	COJ/DCHD	Planned
COJ – 174	Septic Tank Maintenance Public Education	Public service announcements	Ongoing	Unknown	COJ	Ongoing
Management and Reduction of Pet and Animal Waste						
COJ – 175	Pet/Animal Management Public Education	Public service announcements	Ongoing			Ongoing

Note: Inspection unit cost = $212; sampling event unit cost = $447; and septic tank per connection = $35.

[1] COJ has committed to removing septic tanks in failure areas that are within 300 meters of a surface water in the 2008 LSJR Main Stem BMAP. COJ must submit a plan to FDEP for removing septic tanks within 6 months of completion of the septic tank study, or by June 30, 2011, whichever is earlier. At a minimum, COJ will accomplish a 50% implementation of the septic tank phase-out projects by July 31, 2015, with the phase-outs completed by December 31, 2023. For the 10 tributaries addressed in this BMAP, a total of 1,167 septic tanks are located in failure areas, although not all of them may be located within 300 meters of a surface water. The failing tanks within 300 meters of a surface water will be included in the COJ plan and schedule to phase out tanks and will be identified as Tributaries BMAP-related tanks in the plan.

14.3.4 FDOT Activities in the Goodbys Creek Watershed

14.3.4.1 Completed FDOT Projects

FDOT has completed the Baymeadows Project in the watershed; this wet detention pond treats 35 acres from east of U.S. 1 to Baymeadows Road. The project has helped to reduce fecal coliform loading to the creek by capturing and treating stormwater runoff.

14.3.4.2 Ongoing FDOT Programs and Activities

Under Subsection 334.044(15), F.S., and Rule 14-86, F.A.C., FDOT implements a Drainage Connection Program. The program does not issue water quality permits but requires the connecting entity to certify that the discharge is of acceptable water quality. Connecting entities are required to maintain the discharge of acceptable water quality for the duration of the FDOT permit. If connecting entities fail to meet this requirement after sufficient warning by FDOT, they will be reported to FDEP, SJRWMD, and, if applicable, to the local municipality; these entities regulate stormwater quality through state rules, ordinances, and codes. FDOT performs periodic site inspections as part of the MS4 NPDES permit. FDOT supports the Adopt-A-Highway program in the watershed, in which trash is collected from 80 acres, for an average annual removal of 6,706 pounds. Street sweeping also occurs monthly on 36 miles of roadways, reducing the amount of trash and sediment entering the stormwater conveyance system. As part of the maintenance program, FDOT removes sediment, trash, and debris from the system as needed. This maintenance occurs in 195 inlets and 8 miles of piping.

FDOT also works with COJ on several efforts related to the MS4 permit. FDOT participates in the PIC Program in conjunction with COJ. FDOT has instructed staff to be alert for illicit connections during routine maintenance activities, and investigates observances found in the right of way. Those located outside the right of way are reported to the applicable municipality for further investigation and enforcement action. FDOT maintains a toll-free number to be used for reporting illicit connections. FDOT also contributes funding for one monitoring station in the Goodbys Creek watershed that is sampled quarterly as part of the routine monitoring program. FDOT will continue these activities in the future to support the maintenance of the MS4 system. **Table 88** lists FDOT's activities in the watershed.

TABLE 88: FDOT ACTIVITIES IN THE GOODBYS CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	ESTIMATED COST	FUNDING SOURCE	LEVEL OF EFFORT	PROJECT STATUS
Identification and Removal of Illicit Connections					
FDOT – 54	PIC Program – Search for Illicit Connections	See Note 1	State of Florida (FDOT)/COJ	Effort is continuous in WBID	Ongoing
FDOT – 55	PIC Program – Illicit Connections Identified and Removed in WBID if Found To Be Truly Illicit	See Note 1	State of Florida (FDOT)/COJ	5 illicit connections removed	Ongoing
Surface Water Sampling To Assess Conditions and Identify Sources					
FDOT – 56	Routine Tributary Monitoring as Part of MS4 Permit	See Note 2	State of Florida (FDOT)/COJ	1 station quarterly	Ongoing
Roadway Projects with Structural BMPs					
FDOT – 57	Baymeadows Project from East of U.S. 1 to Baymeadows Rd	$1,496,472	State of Florida (FDOT)	35 acres, wet detention	Completed

Project Number	Project Name	Estimated Cost	Funding Source	Level of Effort	Project Status
Drainage Connection Program (DCP)					
FDOT – 58	DCP – Connecting Entity Must Certify that All Discharges to FDOT MS4 Are Treated Prior to Connection	See Note 3	State of Florida (FDOT)	Ongoing effort	Ongoing
Adopt-A-Highway Program					
FDOT – 59	Adopt-A-Highway Program	See Note 4	Not applicable	Trash collected from 80 acres annually averages 6,706 lbs	Ongoing
Catch Basin/Inlet and Closed Loop MS4 Cleaning					
FDOT – 60	Sediment Accumulation, Trash, and Debris Removed As Needed	$48,375	State of Florida (FDOT)	Approximately 195 inlets/catch basins and about 8 miles of piping	Ongoing
Street Sweeping Program					
FDOT – 61	Street Sweeping Program	$9,861	State of Florida (FDOT)	36 miles of roadway swept monthly	Ongoing
Routine Maintenance Activities					
FDOT – 62	Maintain FDOT Stormwater Systems	See Note 5	State of Florida (FDOT)	Clean drainage structures, replace/repair storm/cross/side drains, clean/reshape roadside ditches, clear/repair outfall ditches, mowing, roadside litter removal, respond to citizen complaints	Ongoing

[1] Countywide Program – Average cost is $37,605 per year contribution to COJ.
[2] Countywide Program – Average cost is $22,546 per year contribution to COJ.
[3] Countywide Program – Average cost is $27,151 per year.
[4] Associated cost unknown. Program is voluntary.
[5] Countywide Program – Average cost is $2,750,735 per year.

14.4 Summary of Restoration Activities and Sufficiency of Efforts

Table 85 through **Table 88** list the projects and programs to reduce fecal coliform loading in the Goodbys Creek watershed. Several key efforts completed in the WBID are summarized below, as well as activities that are expected to continue or to be implemented in future years. The efforts outlined in the project tables, including the activities highlighted below, will reduce fecal coliform loading and improve water quality in Goodbys Creek based on the best information available about fecal coliform sources. As water quality improves in response to these actions and the bacteria source information is refined, future BMAPs may recommend different activities or levels of effort. For this BMAP, the full implementation of the projects and programs listed in the project tables for the Goodbys Creek watershed is sufficient to significantly reduce fecal coliform sources and make substantial progress towards meeting the TMDL.

14.4.1 OSTDS

Failure Area – The completed sewer installation in the Beauclerc Gardens failure area should eliminate fecal coliform loading into the creek from septic systems, because repair permits were heavily concentrated in this area. Eighty-four septic tanks are eligible for sewering due to their inclusion in the failure area. COJ has committed to removing septic tanks in failure areas that are within 300 meters of surface waters in the 2008 LSJR Main Stem BMAP. The failing tanks in the Beauclerc Gardens failure area in the Goodbys Creek watershed within 300 meters of surface waters will be included in the COJ phase-out plan and schedule, as described in the Main Stem BMAP, and will be identified in the plan as Tributaries BMAP-related efforts.

Repair Permits – There are an additional 265 systems outside the failure area; many of these OSTDS are in the central portion of the waterbody and located near surface waters or stormwater inlets. DCHD issued repair permits for the systems in this area mostly between 1998 and 2005. To sufficiently address these systems in the central portion of the WBID, a Walk the WBID event should occur in the 5-year BMAP cycle (see **Appendix F**). COJ should lead the event in partnership with DCHD to inspect parcels with OSTDS near surface waters. In addition, DCHD will seek to secure funding for a new program to intensively inspect a specific geographic area within the WBID boundary and, upon obtaining funding, will report the results of the inspection in an annual BMAP progress report. Additional areas may be identified for intensive inspections based on the assessment efforts discussed in the BMAP. If additional areas are designated in the future for inclusion in the program, these areas will also be inspected as funding becomes available.

Program Implementation – City ordinances, inspections, and program implementation combined with DCHD permit review processes and inspections proactively address potential sources. Program implementation ensures the proper review of new OSTDS sites and ensures the maintenance of existing systems. These activities need to be continued and fully enforced to manage potential impacts from existing systems in the nonfailure areas and to prevent the creation of new OSTDS sources.

14.4.2 Sewer Infrastructure

Private Infrastructure – According to the COJ database, COJ inspects 20 private lift stations in the watershed annually. An additional 3 stations are located along the WBID boundary. COJ should verify that (1) the station located at U.S. 1, north of Cypress Plaza Drive, is reported in Pottsburg Creek; (2) the station on Sunbeam Road, west of Craven, is reported in Julington Creek; and (3) the station on Baymeadows Way, north of Baypine Road, is reported in Pottsburg Creek. If any of these stations are not reported in those WBIDs, they should be assigned to Goodbys Creek. The first annual BMAP progress report will include confirmation of the locations.

Sewer Infrastructure Projects – There have been significant reductions in SSOs since 2004. One lift station located at 8520 San Jose Blvd is on the Goodbys Creek boundary, and JEA must confirm if this lift station is reported in the adjacent WBID.

Program Implementation – Continued inspection, repair, and maintenance activities in conjunction with the systemwide programs are sufficient to address potential sewer sources in the WBID at this time. The Root Cause Program and other SSO prevention efforts, such as FOG and CMOM implementation, should be continued so that any additional infrastructure problems that develop will be identified and repaired. JEA will be expected to report its inspection, prevention, and maintenance efforts in the WBID as part of the annual BMAP reporting process to ensure that the system is being monitored and maintained.

14.4.3 Stormwater

Illicit Connection Removal – The PIC Program, implemented by COJ and FDOT, has removed 13 illicit connections. Both entities have committed to continue the PIC Program, which includes identifying additional illicit connections and removing those connections in a timely manner. For the stormwater activities to be sufficient, COJ must resolve the 16 open PIC investigations. COJ will provide information on the confirmed illicit discharges and their resolution or confirm that the cases were closed for the annual BMAP progress report. COJ will provide information on any cases that are still open.

Capital Improvement Projects – FDOT constructed a wet detention pond that treats 35 acres between Baymeadows Road and U.S. 1, and COJ has a regional pond that treats 520 acres at Powers Avenue and Old Kings Road. These projects capture and treat stormwater runoff, reducing fecal coliform loading to Goodbys Creek from stormwater in these areas. COJ also repaired erosion in the ditch at Sierra Madre Drive, preventing sediment loading into the creek.

FDOT Program Implementation – In accordance with Rule 14-86, F.A.C., FDOT requires any new connections to its MS4 stormwater conveyance systems to be evaluated and permitted to prevent the introduction of new sources to its conveyances. This permit program will continue, and FDOT will continue to periodically inspect its facilities as part of its MS4 permit to prevent unpermitted connections. The FDOT Adopt-A-Highway Program prevents over 6,700 pounds of trash every year from entering the tributary. This effort is expected to continue if the Adopt-A-Highway volunteers continue to be active in the WBID. FDOT will continue stormwater infrastructure maintenance, as these efforts prevent potential bacteria regrowth in the MS4 conveyances. In addition, FDOT sweeps 36 miles of roadway every month, helping to reduce sediments entering the stormwater conveyance systems.

COJ Program Implementation – COJ PWD has invested an immense amount of time in work orders since 2005 to clean ditches, rectify stormwater pond problems, and repair blocked structures. Program implementation, including TAT sampling, is addressing stormwater sources at this time.

TABLE 89: SUMMARY OF RESTORATION ACTIVITIES FOR THE GOODBYS CREEK WATERSHED

SOURCE/ACTION	COJ	DCHD	FDOT	JEA
OSTDS				
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 (PSA)	√	X	X	X
Surface Water Sampling for Conditions and Trends	√	X	X	X
Sewer System				
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	√
Air Release Valve (ARV) Inspection and Rehab	X	X	X	√
Program Implementation	X	X	X	√
Private Lift Station Inspections and Enforcement	√	X	X	X
Private Non-NPDES Wastewater Facility Inspections and Enforcement	*	X	X	X
Sanitary Sewer Overflow (SSO Investigations	√	X	X	√
Surface Water Sampling for Conditions and Trends	X	X	X	√
Stormwater				
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

SOURCE/ACTION	COJ	DCHD	FDOT	JEA
Public Education and Outreach	√	X	+	X
Surface Water Sampling for Conditions and Trends	√	X	+	X
Program Implementation	√	X	√	X
Pet Waste Management				
Ordinances and Enforcement	√	X	X	X
Public Education and Outreach	√	X	X	X
Special Source Assessment Activities				
Intensive Water Quality Sampling To Track Sources	-	X	X	-
Tributary Assessment Team (TAT)	-	X	X	-
Microbial Source Tracking (MST)	-	X	X	-
Thermal Imagery To Identify PICs	-	X	X	X

Note: Shaded cells (marked with an X) represent activities that do not apply to the associated entity.
* Activity is not applicable to the waterbody due to a lack of infrastructure.
+ FDOT participation in these activities is provided by funding in the NPDES MS4 agreements with COJ.

CHAPTER 15: OPEN CREEK (WBID 2299)

15.1 WBID DESCRIPTION

Open Creek, WBID 2299, is primarily located in Duval County (a very small portion of the southeast corner of the WBID is in St. Johns County), southeast of the LSJR within the Intracoastal Waterway Planning Unit, as designated by SJRWMD (**Figure 20**). The "headwaters" of Open Creek presumably comprise stormwater runoff that originates in the northern reaches of the watershed at Beach Boulevard (**Figure 21**). A total of six branches join Open Creek from the east ("eastern branch"), south ("southwestern branch," "south central branch," and "southeastern branch") and north ("northwestern branch" and "northeastern branch"). The most upstream branch, eastern branch, begins just south of Beach Boulevard and flows southwest into the main channel at Wexford Hollow Road East. Farther downstream, the southwestern branch, an artificial channel, extends from John Turner Butler Boulevard and courses north through the Windsor Parke Golf Club to the main channel just east of Richmond Park Drive North. A pond at Middleton Park Circle appears to be the origin of the south-central branch, which flows north to join the main channel north of East Windsor Park Drive. The northwestern branch flows south from Beach Boulevard and reaches the main channel at Deer Chase Place; a fork in the branch, just west of Bentwood Avenue, extends northwest immediately south of Beach Boulevard. A closed conveyance system forms the majority of the northeastern branch, which originates at a pond east of Washburn Road and flows due south into the main channel just west of Stacey Road. The most downstream branch, southeastern branch, extends from John Turner Butler Boulevard north to the confluence with the main channel at Tradewinds Drive.

The creek is joined from the north by five artificial channels that run through residential areas between Cordgrass Inlet Drive and Seabreeze Drive. Open Creek flows into the ICWW just east of Seabreeze Drive; the ICWW eventually merges with the St. Johns River in Chicopit Bay (PBS&J, September 2008).

The spatial distribution and acreage of different land use categories in the Open Creek watershed were identified using 2004 land use coverage data from SJRWMD (**Table 90**). The dominant land use (1,343.2 acres; 32.2% of total coverage) in the Open Creek watershed, and directly adjacent to the majority of the creek itself, is upland forest, which extends throughout the watershed. The next two most abundant land cover categories are (1) wetlands (700.8 acres; 16.8% of total coverage), which form a boundary around the majority of surface waters of the main channel and associated branches; and (2) medium-density residential areas (610.9 acres; 14.7% of total coverage), located (i) west of Hodges Boulevard at the Jacksonville Golf and Country Club, (ii) east of Hodges Boulevard at the Windsor Parke Golf Club, (iii) east of the utility strip that traverses the watershed south of Beach Boulevard, and (iv) in the far eastern corner of the WBID. High-density residential areas are located adjacent to the surface waters of Open Creek's main channel and southwestern branch, just east of Hodges Boulevard at the Windsor Parke Golf Club, and adjacent to the south-central branch at Corton Courts.

Upland forest and wetlands, which form the majority of land use (49%) in the Open Creek WBID, serve as habitat for various species of wildlife and are located near surface waters. As a result, although there are no known areas of concentrated wildlife (e.g., bird rookeries) in the watershed, there is considerable potential for wildlife to contribute to the fecal pollution of Open Creek. Recent development, most notably in the northwestern portion of the watershed along

Beach Boulevard and Hodges Boulevard, has altered the landscape and possibly the hydrology of Open Creek since 2004 (PBS&J, September 2008).

According to the 2000 Census, there are 3,333 households in the watershed, averaging 2.05 people per household (PBS&J, September 2008). In addition, assuming that 40% of households have 1 dog (Tyler 2006), there are an estimated 1,333 dogs in the watershed.

TABLE 90: LAND USES IN THE OPEN CREEK WATERSHED

LAND USE	ACRES	% OF TOTAL
Upland Forest	1,343.2	32.2
Wetlands	700.8	16.8
Medium-Density Residential	610.9	14.7
Recreational	411.3	9.9
High-Density Residential	310.5	7.5
Transportation	236.3	5.7
Water	236.0	5.7
Commercial/Utility/Institutional	187.1	4.5
Nonforested Upland	94.1	2.3
Open Land	20.2	0.5
Low-Density Residential	13.0	0.3
Disturbed Land	2.8	0.1
TOTAL:	**4,166.3**	**100**

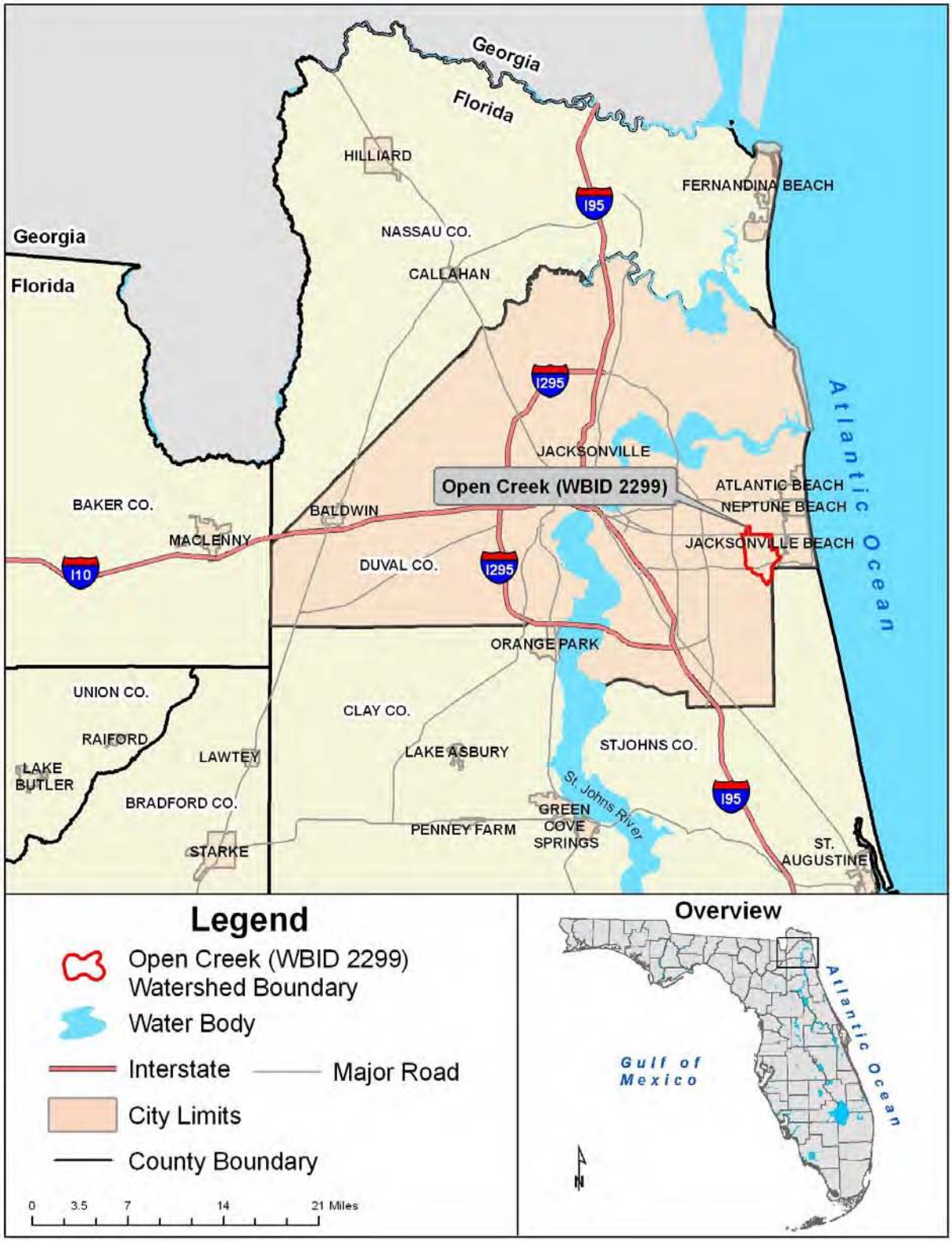

FIGURE 20: LOCATION OF THE OPEN CREEK WATERSHED

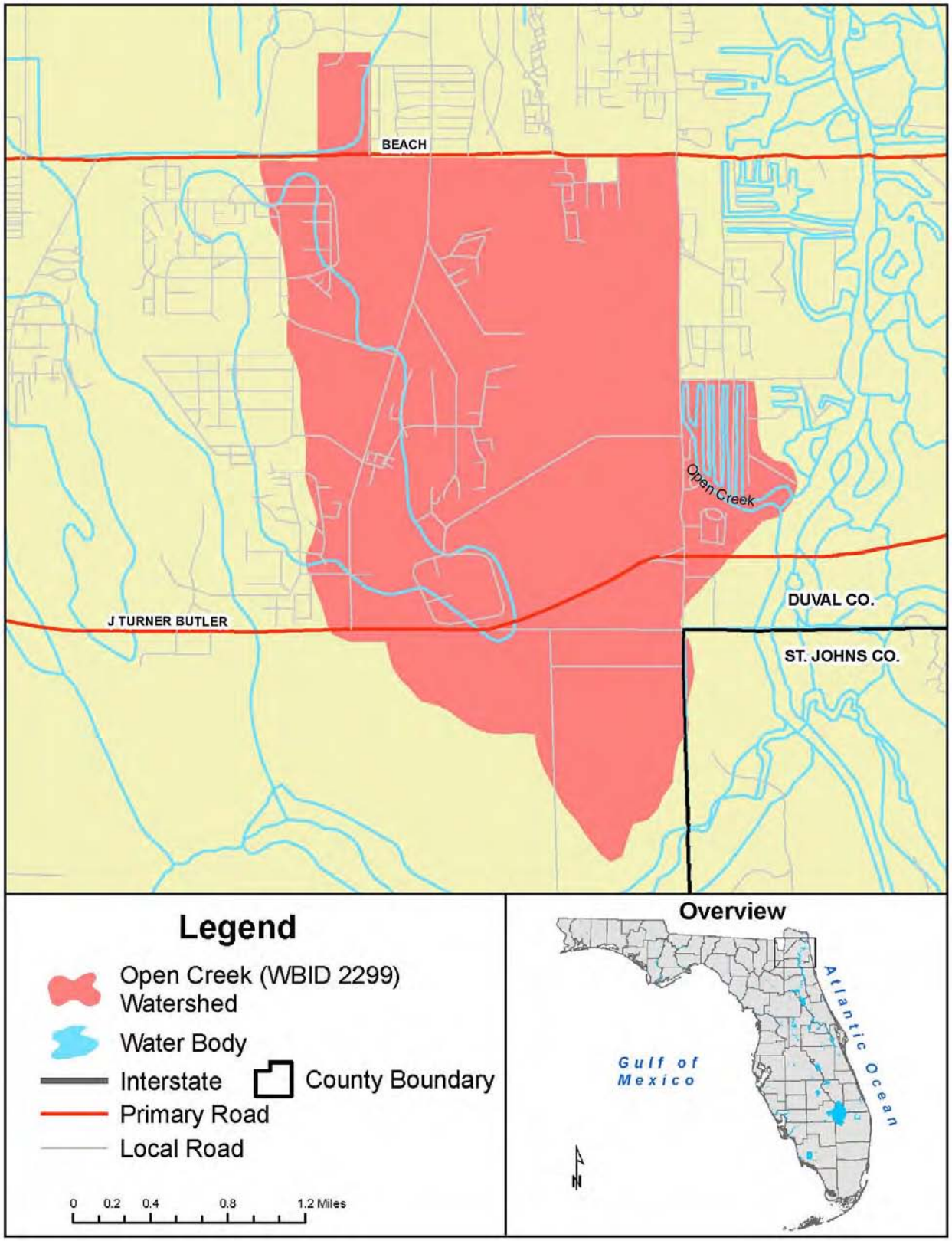

FIGURE 21: OPEN CREEK WBID LOCATOR MAP

15.2 Potential Sources

15.2.1 Point Sources

There are no industrial or domestic wastewater facilities, CAFOs, application sites for septic residuals, or landfills permitted to discharge to Open Creek. The COJ/FDOT MS4 permit includes the Open Creek watershed. A very small area of the southeastern portion of the WBID is located in the St. Johns County urban non-MS4 area (PBS&J, September 2008).

15.2.2 Illicit Discharges

The COJ EQD PIC Program has identified seven PICs in the Open Creek watershed, one of which was confirmed to be illicit and was removed. The status of five of the PICs is currently pending investigation. Despite an effort to identify all PICs connected to MS4 ditches, it is not guaranteed that all PICs were found. In addition, the program did not include the inspection of closed conveyance systems, and additional illicit connections may be present in the watershed (PBS&J, September 2008).

15.2.3 Centralized Sewer Infrastructure and Overflows

The Open Creek watershed is located in the Arlington East WWTF Service Area. An estimated 3,400 households (approximately 100% of households) are connected to the sanitary sewer system in the watershed. The WBID supports 220 kilometers (137 miles) of sewer line and 19 sanitary sewer lift stations, as well as associated infrastructure (e.g., manholes) that comprise the central sanitary sewer system and have the potential to contribute fecal contamination to surface waters. Sewer infrastructure (e.g., sewer mains, lift stations, manholes) is generally located north of John Turner Butler Boulevard, concentrated on the southwestern and eastern sides of Hodges Boulevard and to the east of San Pablo Road. In many cases, the sewer infrastructure is near the surface waters of Open Creek, increasing the likelihood that possible spills and/or unidentified sewer infrastructure leaks will impact surface waters.

JEA has reported a total of 5 SSOs within the Open Creek WBID boundaries (**Table 91**). The estimated volume of spills associated with these overflows ranged from 20 to 7,200 gallons and averaged 1,794 gallons; however, only 3 SSOs were reported to have potentially impacted surface waters (PBS&J, September 2008).

TABLE 91: SSOS REPORTED IN THE OPEN CREEK WATERSHED, 2001–07

WBID Name (Number)	Date of Overflow	Estimated Volume of Spill (Gallons)	Potentially Impacted Surface Waters
Open Creek (2299)	26-Dec-01*	100	Yes
Open Creek (2299)	19-Nov-02*	7,200	Yes
Open Creek (2299)	19-Oct-03	20	No
Open Creek (2299)	27-Jan-05	50	No
Open Creek (2299)	14-Feb-06*	1,600	Yes

*Reportable SSOs that spilled > 1,000 gallons of sewage and/or affected surface waters.

Monitoring results demonstrate the consistency of elevated levels of fecal coliform bacteria throughout the period of record (March 1985–May 2007) at the San Pablo Road station. As such, it is unlikely that the three reported SSOs that potentially affected surface waters were responsible for the consistent fecal coliform exceedances observed. Additionally, the highest levels of fecal coliform at all IWR stations did not correspond with the SSO incidents reported from 2001 through 2007. This demonstrates that other sources, such as unidentified sewer

infrastructure leaks and/or failing OSTDS or wildlife sources, may be contributing to the overall pollution of the Open Creek watershed (PBS&J, September 2008).

15.2.4 OSTDS

WSEA estimates that there are 260 septic systems in the Open Creek watershed. According to DCHD, only 4 septic system repair permits were issued in this area. The proximity of parcels with repair permits to surface waters suggests that septic systems potentially affect the water quality of Open Creek in these areas. No DCHD-designated septic system failure areas are located near the boundary of the watershed. Considering that few households utilize OSTDS, it is unlikely that OSTDS play a major role in the fecal loading of Open Creek. However, it is also possible that failing septic systems that have not been issued repair permits are located near surface waters and may contribute to the bacterial contamination of Open Creek (PBS&J, September 2008).

15.2.5 Nonpoint Sources

An analysis of impervious surface indicates that the Open Creek WBID contains predominantly less than 10% impervious surface. This correlates with the prevalent land use classifications of upland forests and wetlands in the watershed. The watershed also contains land with 10 to 25% and greater than 25% impervious surface. Land areas of greater than 25% impervious surface generally correspond to commercial/utility and institutional land uses and are located (1) at the southwest corner of the WBID adjacent to the southwestern branch, (2) at the northeast corner of the WBID near the "headwaters" of the northeastern branch, (3) just south of the San Pablo Road and WM Davis Parkway West intersection at the Mayo Clinic, and (4) just south of the San Pablo Road and John Turner Butler Boulevard interchange.

Furthermore, the potential for stormwater runoff analysis demonstrates that the majority of the WBID contains a low-to-moderate potential for stormwater runoff, including areas near the creek. The highest runoff coefficients are located primarily (1) along Hodges Boulevard in the southwestern corner of the WBID, (2) in the northeast corner of the WBID, (3) at the San Pablo Road and WM Davis Parkway West intersection, and (4) at the San Pablo Road and John Turner Butler Boulevard interchange. As stated previously, land use classifications have recently changed due to the recent development along Beach Boulevard, likely altering the stormwater runoff coefficients in this area as well (PBS&J, September 2008).

The storm sewer network in the Open Creek watershed includes 44 permitted stormwater treatment areas, encompassing approximately 79.2% of the WBID area. Stormwater infrastructure in the WBID includes 61 outfalls by receiving water (1 classified by FDEP as a major outfall) and 704 inlets. Although closed conveyances are common throughout the WBID, ditch systems are primarily located at Beach Boulevard along the most northern extent of the WBID boundaries. According to COJ EQD, an open stormwater ditch that parallels WM Davis Parkway appears to service a portion of the road as it passes the Mayo Clinic. The ditch flows east along the parkway and turns north at San Pablo Road, underneath WM Davis Parkway, into a stormwater pond located immediately northwest of the San Pablo Road and WM Davis Parkway intersection. The pond has an overflow structure that discharges to the east, underneath San Pablo Road, into a marshy area that merges with the main channel of Open Creek (PBS&J, September 2008).

In the watershed, fecal coliform concentrations did not differ during the "wet" and "dry" seasons at the San Pablo Road station, suggesting a constant source of fecal coliform bacteria to Open Creek through nonpoint source discharges, failing wastewater conveyance systems, or septic systems independent of rainfall. It is possible that higher loadings occur in the "wet" season and

are diluted by increased volumes of water, resulting in fecal coliform concentrations that appear to be independent of rainfall (PBS&J, September 2008).

15.3 Projects To Reduce Fecal Coliform Loading

15.3.1 JEA Activities in the Open Creek Watershed

15.3.1.1 Ongoing JEA Programs and Activities

JEA is currently implementing a number of countywide specific improvement programs, as follows, to address the sanitary sewer system as a source of fecal coliform contamination: (1) FOG Reduction Program; (2) SSO Root Cause Program; (3) Pop-Top Program; (4) Non-Destructive Testing and ARV Programs; (5) SCADA; (6) Third Party Education and Enforcement Program; (7) Manhole Monitoring; (8) Force Main Discharge Manholes; and (9) CMOM Program. **Appendix E** describes each of these programs.

JEA conducts maintenance activities to replace or rehabilitate failing or leaking infrastructure. In the Open Creek watershed, JEA has pipe bursted 0.13% of the sewer lines and open cut 1.57%. In addition, JEA conducts activities to help prevent future infrastructure problems and, as part of this effort, inspected 882 LF of pipe and cleaned 2,670 LF of pipe in FY07. These activities will continue in the future to maintain the sanitary sewer system and prevent future problems. **Table 92** provides additional information on JEA's activities in the watershed.

TABLE 92: JEA ACTIVITIES IN THE OPEN CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	ESTIMATED COST	FUNDING SOURCE	PROJECT STATUS	START DATE OF PROJECT
Sewer Upgrades							
JEA – 138	Pipe Bursting – Increase Carrying Capacity	Replace failing/leaking infrastructure	Total footage of pipe burst in watershed since 2001: 933	$116,473	JEA	Ongoing	FY00
JEA – 139	Open Cut – Removal and Replacement	Replace failing/leaking infrastructure	Total footage of open cut replacement in watershed since 2001: 11,354	$980,000	JEA	Ongoing	Ongoing
Other Sewer Infrastructure Upgrades							
JEA – 140	Manhole Linings Rehabbed	Repair deteriorating manhole linings	Not applicable	$330,469*	JEA	Ongoing	FY01
JEA – 141	ARV Inspection and Rehab	See **Appendix E**	2 ARVs replaced within 200 feet of tributary (15 ARVs total in watershed)	$481,873*	JEA	Ongoing	Ongoing
JEA – 142	Pump Station SCADA Upgrades	Retrofitting completed in 2004; all stations constructed since have SCADA installed. See **Appendix E.**	Not applicable	Unknown	JEA	Complete	Complete
JEA – 143	Inspect Force Main Discharge Manholes, Repair/Rehab as Necessary	See **Appendix E**	Not applicable	$466,576*	JEA	Ongoing	FY07
JEA – 144	Verify Lift Station Location on Boundary	Verify which WBID Marsh Island station is reported in for first annual progress report	1 station on boundary	Unknown	JEA	Planned	2209
JEA – 145	Inspect Lift Stations near Surface Waters	Inspect 11 stations near surface waters and report in annual progress reports	11 stations near surface waters	Unknown	JEA	Planned	2009
Programs To Reduce Sewer Problems							
JEA – 146	FOG Reduction Program	See **Appendix E**	Not applicable	Unknown	JEA	Ongoing	Current FOG Program initiated in 2004
JEA – 147	Pipe TV Inspection	Inspect existing infrastructure through use of closed-circuit television	882 LF of pipe inspected (FY07)	$163,099*	JEA	Ongoing	Carried over from city operation (1997)
JEA – 148	Pipe Cleaning	Clean existing pipes to avoid blockages	2,670 LF of pipe cleaned (FY07)	$743,054*	JEA	Ongoing	Carried over from city operation (1997)
JEA – 149	Implement CMOM Program	See **Appendix E**	Not applicable	$ 163,269*	JEA	Ongoing	Ongoing
JEA – 150	Manhole Monitoring	See **Appendix E**	1 manhole monitor installed in watershed as of January 2009	$ 137,526*	JEA	Ongoing	August 2007
JEA – 151	SSO Root Cause Program	See **Appendix E**	Not applicable	Unknown	JEA	Ongoing	February 2007
JEA – 152	Pop-Top Program	See **Appendix E**	Not applicable	$64,324*	JEA	Ongoing	February 2007
JEA – 153	Non-Destructive Testing Program/Pipe Integrity Testing	See **Appendix E**	Not applicable	$74,284*	JEA	Ongoing	Ongoing

* Costs provided are total systemwide costs for the program because WBID-specific costs are currently unavailable.

15.3.2 DCHD Activities in the Open Creek Watershed

15.3.2.1 Ongoing DCHD Programs and Activities

Currently, DCHD is implementing a variety of countywide specific improvement programs and restoration activities to address OSTDS as sources of fecal coliform contamination. These include (1) the OSTDS Program, (2) training programs, and (3) the designation of septic tank failure and nuisance areas for transfer to central sewer. **Appendix E** describes each of these programs.

As part of the OSTDS Program, DCHD has issued 23 new construction permits, 4 repair permits, and 4 abandonment permits in the WBID. In addition, 1 annual operating permit has been issued for a PBTS. DCHD has also performed 49 plan reviews and 4 complaint investigations. It will continue these efforts in the future to reduce and prevent issues related to OSTDS. **Table 93** lists DCHD's projects in the Open Creek watershed.

TABLE 93: DCHD ACTIVITIES IN THE OPEN CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	ESTIMATED COST	FUNDING SOURCE	PROJECT STATUS
DCHD – 65	OSTDS Program	Implementation of programs to address septic systems as potential sources	Approximately 23 new construction permits, 4 repair permits, and 4 abandonment permits issued	$12,000	FDOH	Ongoing
DCHD – 66	Annual Operating Permits	Annual operating permits issued for PBTS, systems located in IMZ, and commercial systems	1 annual operating permit for PBTS/IMZ located in WBID	$2,500	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 67	DCHD-Sponsored Training Programs	Annual training programs held for septic tank contractors, certified plumbers, maintenance entities, and environmental health professionals	1 to 2 trainings per year providing up to 12 contact hours	$2,500	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 68	Application/ Plan Review/ Site Evaluations	DCHD performs plan review and site evaluation for each application received for OSTDS new construction, repair, or modification of existing system	Approximately 49 plan reviews and site evaluations have been performed in WBID based on permitting history	$10,500	FDOH/ LSJR SWIM Grant	Ongoing
DCHD – 69	Septic Tank Failure Area Ranking	Septic tank failure area scored and prioritized on annual basis	Less than 2 years since previous update	Not applicable		Ongoing
DCHD – 70	Complaint Investigations	DCHD investigates all complaints received, performs site visit, and initiates enforcement action on sanitary nuisance violations	4 complaint investigations have been performed in WBID	$500	FDOH/ LSJR SWIM Grant	Ongoing

15.3.3 COJ Activities in the Open Creek Watershed

15.3.3.1 COJ Projects under Construction

COJ currently has one project under construction in the watershed, to improve drainage along Pine Tree Road. Once completed, the project will reduce flooding in this area, which will, in turn, reduce the amount of fecal coliform entering the creek through stormwater runoff.

15.3.3.2 Ongoing COJ Programs and Activities

The COJ MS4 permit requires COJ and its co-permittees to implement a Stormwater Monitoring Plan. As part of this plan, COJ has 1 routine monitoring station that is sampled quarterly in the Open Creek watershed. A total of 43 samples were collected at this station between 1995 and 2008.

COJ PWD's Streets and Drainage Division is responsible for maintaining its stormwater conveyance systems in Jacksonville. This maintenance included 12 work orders for ditch and creek regrading, erosion control, and cleaning; 1 work order for lake and pond maintenance; and 34 work orders for the repair of blocked structures and measures to prevent flooding. These work orders were completed between 2005 and 2008. PWD will continue a level of effort to maintain the MS4 conveyances based on CARE requests. As part of the PIC Program, COJ EQD provides public outreach through educational pamphlets, informational door hangers, and the storm drain–stenciling program.

In addition, COJ has implemented the PIC Program, which keeps track of reported PICs in a database for COJ inspector follow-up. Seven PICs were identified in the Open Creek watershed; one was determined to be illicit and removed, and the status of five PICs is still pending.

COJ PWD also conducts inspections in the watershed, including two investigations into illicit water discharges, two sewer lines that drained into a yard or ditch, four SSOs, and eight private lift stations. PWD will maintain a future level of effort for these investigations based on requests, which are logged and tracked through the CARE database.

Table 94 provides additional details on COJ's activities in the watershed.

TABLE 94: COJ ACTIVITIES IN THE OPEN CREEK WATERSHED

PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	LEVEL OF EFFORT	TOTAL COST	FUNDING SOURCE	PROJECT STATUS
Drainage System Rehab Projects						
COJ – 176	Improve Drainage Pine Tree Road	Road does not drain adequately	Pine Tree Road	$20,142	COJ	Construction
MS4 Maintenance Activities						
COJ – 177	Ditch/Creek Regrade/Erosion/Clean	Completed in response to CARE requests. Costs limited to activities completed after release of work order system.	12 (for 2005–08)	$2,731	COJ	Ongoing
COJ – 178	Lake or Pond Problem		1 (for 2005–08)	$5,752	COJ	Ongoing
COJ – 179	Structure Blocked/Repair/General Flooding		34 (for 2005–08)	$4,162	COJ	Ongoing
Inspection, Enforcement, and Sampling						
COJ – 180	Illicit Water Discharge	CARE-initiated Inspection	2 (for 2000–08)	$424	COJ	Ongoing
COJ – 181	Sewer Drains into Yard/Ditch	CARE-initiated Inspection	2 (for 2000–08)	$424	COJ	Ongoing
COJ – 182	Sewer Overflow	CARE-initiated Inspection	4 (for 2000–08)	$848	COJ	Ongoing
COJ – 183	Private Lift Station Inspection	First lift station installed in 1991 with 68 total annual inspections	8 (for 1991–2008)	$1,696	COJ	Ongoing
COJ – 184	Verify Location of Lift Stations on Boundary	Verify that 2 stations on boundary are reported in Hogpen Creek	2 (for 2009–10)	$424	COJ	Planned
COJ – 185	Illicit Discharge Detection and Elimination	1 illicit, 5 open	7 (for 2004)	$1,484	COJ	Ongoing
COJ – 186	Follow Up on Outstanding PICs	Follow up on 5 open PICs in watershed	5 (for 2009–10)	$1,060	COJ	Planned
COJ – 187	Routine Surface Water Sampling	NPDES permit-related quarterly water quality sampling – 1 sampling station in WBID	43 (for 1995–2008)	$19,221	COJ	Ongoing
Septic Tank Phase-Out Program						
COJ – 188	Outside Failure Areas	Phase out program as provided by COJ ordinance	260 total tanks, 0 connected	Unknown	COJ	Ongoing
COJ – 189	Septic Tank Maintenance Public Education	Public service announcements	Ongoing	Unknown	COJ	Ongoing
Management and Reduction of Pet and Animal Waste						
COJ – 190	Pet/Animal Management Public Education	Public service announcements	Ongoing	Unknown	COJ	Ongoing

Note: Inspection unit cost = $212; sampling event unit cost = $447; and septic tank per connection = $35.

15.3.4 FDOT Activities in the Open Creek Watershed

15.3.4.1 Completed FDOT Projects

FDOT has completed 1 roadway project in the watershed, Beach Boulevard Widening, which includes a wet detention pond that treats 39 acres. The project captures and treats stormwater runoff from the roadway and surrounding area, helping to reduce the amount of fecal coliform loading to Open Creek.

15.3.4.2 Ongoing FDOT Programs and Activities

Under Subsection 334.044(15), F.S., and Rule 14-86, F.A.C., FDOT implements a Drainage Connection Program. The program does not issue water quality permits but requires the connecting entity to certify that the discharge is of acceptable water quality. Connecting entities are required to maintain the discharge of acceptable water quality for the duration of the FDOT permit. If connecting entities fail to meet this requirement after sufficient warning by FDOT, they will be reported to FDEP, SJRWMD, and, if applicable, to the local municipality; these entities regulate stormwater quality through state rules, ordinances, and codes. FDOT performs periodic site inspections as part of the MS4 NPDES permit.

FDOT also works with COJ on several efforts related to the MS4 permit. FDOT participates in the PIC Program in conjunction with COJ. FDOT has instructed staff to be alert for illicit connections during routine maintenance activities, and investigates observances found in the right of way. Those located outside the right of way are reported to the applicable municipality for further investigation and enforcement action. FDOT maintains a toll-free number to be used for reporting illicit connections. FDOT also contributes funding for one monitoring station in the Open Creek watershed that is sampled quarterly as part of the routine monitoring program. FDOT will continue these activities in the future to support the maintenance of the MS4 system.

Table 95 lists FDOT's activities in the watershed.

TABLE 95: FDOT ACTIVITIES IN THE OPEN CREEK WATERSHED

Project Number	Project Name	Estimated Cost	Funding Source	Level of Effort	Project Status
Identification and Removal of Illicit Connections					
FDOT – 63	PIC Program – Search for Illicit Connections	See Note 1	State of Florida (FDOT)/COJ	Effort is continuous in WBID	Ongoing
FDOT – 64	PIC Program – Illicit Connections Identified and Removed in WBID if Found To Be Truly Illicit	See Note 1	State of Florida (FDOT)/COJ	No true illicit connection identified to date	Ongoing
Surface Water Sampling To Assess Conditions and Identify Sources					
FDOT – 65	Routine Tributary Monitoring as Part of MS4 Permit	See Note 2	State of Florida (FDOT)/COJ	1 station quarterly	Ongoing
Roadway Projects with Structural BMPs					
FDOT – 66	Beach Boulevard Widening from Intracoastal Waterway to East of Penman	$230,910	State of Florida (FDOT)	39 acres, wet detention	Completed
Drainage Connection Program (DCP)					
FDOT – 67	DCP– Connecting Entity Must Certify that All Discharges to FDOT MS4 are Treated Prior to Connection	See Note 3	State of Florida	Ongoing effort	Ongoing

Project Number	Project Name	Estimated Cost	Funding Source	Level of Effort	Project Status
Catch Basin/Inlet and Closed Loop MS4 Cleaning					
FDOT – 68	Sediment Accumulation, Trash, and Debris Removed on As-Needed Basis	$17,782	State of Florida	Approximately 12 inlets/catch basins and 2.7 miles of piping	Ongoing
Routine Maintenance Activities					
FDOT – 69	Maintain FDOT Stormwater Systems	See Note 5	State of Florida (FDOT)	Clean drainage structures, replace/repair storm/cross/side drains, clean/reshape roadside ditches, clear/repair outfall ditches, mowing, roadside litter removal, respond to citizen complaints	Ongoing

[1] Countywide Program – Average cost is $37,605 per year contribution to COJ.
[2] Countywide Program – Average cost is $22,546 per year contribution to COJ.
[3] Countywide Program – Average cost is $27,151 per year.
[5] Countywide Program – Average cost is $2,750,735 per year.

15.4 Summary of Restoration Activities and Sufficiency of Efforts

Table 92 through **Table 95** list the projects and programs to reduce fecal coliform loading in the Open Creek watershed. Several key efforts completed in this WBID are summarized below, as well as activities that are expected to continue or to be implemented in future years. The efforts outlined in the project tables, including the activities highlighted below, will reduce fecal coliform loading and improve water quality in Open Creek based on the best information available about fecal coliform sources. As water quality improves in response to these actions and the bacteria source information is refined, future BMAPs may recommend different activities or levels of effort. For this BMAP, the full implementation of the projects and programs listed in the project tables for the Open Creek watershed is sufficient to significantly reduce fecal coliform sources and make substantial progress towards meeting the TMDL.

15.4.1 OSTDS

Program Implementation – There are approximately 260 septic tanks in the watershed. Four repair permits have been issued; 2 of these permits were located on parcels near surface waters and could therefore have impacted the creek. DCHD will continue its programs, inspections, and enforcement efforts, which will be sufficient to address OSTDS as a source in the watershed at this time.

15.4.2 Sewer Infrastructure

Private Infrastructure – According to the COJ database, COJ inspects eight private lift stations in the watershed annually. There are two additional stations located along the boundary of Hogpen Creek, and COJ will verify that these stations are located in the Hogpen Creek watershed. The continuation of the inspection program and confirmation of reporting boundaries are sufficient to address private lift stations in the watershed at this time.

Sewer Infrastructure Projects – JEA has 19 lift stations in the watershed, 11 of which are located near surface waters. There is 1 lift station, Marsh Island, located at 14463 Stacy Road, which is near the WBID boundary. JEA must verify the WBID in which this station is reported. During the 5-year BMAP cycle, JEA will inspect all 11 lift stations near surface waters to ensure

they are operating properly and report on the status of the investigations in the annual BMAP progress report. JEA placed a manhole in the watershed on the Manhole-Monitoring Program in January 2007 to help reduce fecal coliform loading: an alarm is sent if the levels in the manhole are rising, so JEA can respond before an overflow occurs. JEA will continue these efforts and its systemwide programs, and this will be sufficient to address potential sewer sources in the WBID at this time.

Program Implementation – Continued inspection, repair, and maintenance activities in conjunction with the systemwide programs are sufficient to address potential sewer sources in the WBID at this time. The Root Cause Program and other SSO prevention efforts, such as FOG and CMOM, should be continued so that any additional infrastructure problems that develop will be identified and repaired. JEA will be expected to report its inspection, prevention, and maintenance efforts in the WBID as part of the annual BMAP reporting process to ensure that the system is being monitored and maintained.

15.4.3 STORMWATER

Illicit Connection Removal – COJ has confirmed and removed one illicit connection to the MS4; however, there are five outstanding PIC investigations. COJ will investigate these PICs and remove any connections that are confirmed illicit or close the case during the first year after BMAP adoption. The results of these investigations will be reported in the annual BMAP progress report. The removal of confirmed illicit connections removes sources of fecal coliform to the MS4 conveyance system and, in turn, the creek. COJ and FDOT have committed to continue the PIC Program, including identifying additional illicit connections and removing those connections in a timely manner.

Capital Improvement Projects – COJ has one project under construction in the watershed, to improve drainage along Pine Tree Road, which is an area concentrated with OSTDS. This project will help reduce flooding in the area and reduce fecal coliform loading to the creek. In addition, FDOT has completed the Beach Boulevard Widening project, which includes a wet detention pond that treats 39 acres and helps reduce fecal coliform loading to Open Creek.

FDOT Program Implementation – In accordance with Rule 14-86, F.A.C., FDOT requires any new connections to its MS4 stormwater conveyance systems to be evaluated and permitted to prevent the introduction of new sources to its conveyances. This permit program will continue, and FDOT will continue to periodically inspect its facilities as part of its MS4 permit.

COJ Program Implementation – COJ completed 12 work orders for ditch maintenance, 1 work order for pond problems, and 34 repairs of closed conveyance systems. The continuation of current programs and maintenance activities in the watershed will help reduce and eliminate potential sources of fecal coliform loading.

TABLE 96: SUMMARY OF RESTORATION ACTIVITIES FOR THE OPEN CREEK WATERSHED

SOURCE/ACTION	COJ	DCHD	FDOT	JEA
OSTDS				
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

SOURCE/ACTION	COJ	DCHD	FDOT	JEA
Septic Tank Phase-Out	-	-	X	X
Public Education (PSA)	√	X	X	X
Surface Water Sampling for Conditions and Trends	√	X	X	X
Sewer System				
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	-
Air Release Valve (ARV) Inspection and Rehab	X	X	X	√
Program Implementation	X	X	X	√
Private Lift Station Inspections and Enforcement	√	X	X	X
Private Non-NPDES Wastewater Facility Inspections and Enforcement	*	X	X	X
Sanitary Sewer Overflow (SSO) Investigations	√	X	X	√
Surface Water Sampling for Conditions and Trends	X	X	X	√
Stormwater				
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
Pet Waste Management				
Ordinances and Enforcement	√	X	X	X
Public Education and Outreach	√	X	X	X
Special Source Assessment Activities				
Intensive Water Quality Sampling To Track Sources	-	X	X	-
Tributary Assessment Team (TAT)	-	X	X	-
Microbial Source Tracking (MST)	-	X	X	-
Thermal Imagery To Identify PICs	-	X	X	X

Note: Shaded cells (marked with an X) represent activities that do not apply to the associated entity.
* Activity is not applicable for the waterbody due to a lack of infrastructure.
+ FDOT participation in these activities is provided by funding in the NPDES MS4 agreements with COJ.

APPENDICES

Appendix A: TMDL Basin Rotation Schedule

TMDLs are developed, allocated, and implemented through a watershed management approach (managing water resources within their natural boundaries) that addresses the state's 52 major hydrologic basins in five groups, on a rotating schedule. **Table A-1** shows the hydrologic basins within each of the five groups, with the FDEP District office of jurisdiction. **Table A-2** illustrates the repeating five-year basin rotation schedule.

TABLE A-1: MAJOR HYDROLOGIC BASINS BY GROUP AND FDEP DISTRICT OFFICE

FDEP District	Group 1 Basins	Group 2 Basins	Group 3 Basins	Group 4 Basins	Group 5 Basins
NW	Ochlockonee–St. Marks	Apalachicola–Chipola	Choctawhatchee–St. Andrews Bay	Pensacola Bay	Perdido Bay
NE	Suwannee	Lower St. Johns	Not applicable	Nassau–St. Marys	Upper East Coast
Central	Ocklawaha	Middle St. Johns	Upper St. Johns	Kissimmee	Indian River Lagoon
SW	Tampa Bay	Tampa Bay Tributaries	Sarasota Bay–Peace–Myakka	Withlacoochee	Springs Coast
S	Everglades West Coast	Charlotte Harbor	Caloosahatchee	Fisheating Creek	Florida Keys
SE	Lake Okeechobee	St. Lucie–Loxahatchee	Lake Worth Lagoon–Palm Beach Coast	Southeast Coast–Biscayne Bay	Everglades

Each group will undergo a cycle of five phases on a rotating schedule:

Phase 1: Preliminary evaluation of water quality
Phase 2: Strategic monitoring and assessment to verify water quality impairments
Phase 3: Development and adoption of TMDLs for waters verified as impaired
Phase 4: Development of basin management action plan (BMAP) to achieve the TMDL
Phase 5: Implementation of the BMAP and monitoring of results

TABLE A-2: BASIN ROTATION SCHEDULE FOR TMDL DEVELOPMENT AND IMPLEMENTATION

Year	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15
	Phases of the Cycle					Phases of the Cycle					Phases of the Cycle				
Group 1	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Group 2	-	1	2	3	4	5	1	2	3	4	5	1	2	3	4
Group 3	-	-	1	2	3	4	5	1	2	3	4	5	1	2	3
Group 4	-	-	-	1	2	3	4	5	1	2	3	4	5	1	2
Group 5	-	-	-	-	1	2	3	4	5	1	2	3	4	5	1
	1st 5-year Cycle – High-priority Waters					2nd 5-year Cycle – Medium-Priority Waters					3rd 5-year Cycle – Low-Priority Waters				

* Projected years for Phases 3, 4, and 5 may change due to accelerated local activities, length of plan development, legal challenges, etc.

TMDL development and implementation are ongoing, cyclical processes, as illustrated in **Table A-2**. FDEP will re-evaluate impaired waters every five years to determine whether improvements are being achieved, and to refine loading estimates and TMDL allocations using new data. If any changes in a TMDL are required, the applicable TMDL rule will be revised, thereby providing a point of legal entry for interested parties. Changes to a TMDL would prompt revisions to the applicable BMAP, which will be revisited at least every five years and modified as necessary.

Appendix B: Summary of Statutory Provisions Guiding BMAP Development and Implementation

SECTIONS 403.067(6) AND (7), FLORIDA STATUTES - *Summary of Excerpts*

ALLOCATIONS

- The TMDL shall include reasonable and equitable allocations of the TMDL between or among point and nonpoint sources that will alone, or in conjunction with other management and restoration activities, provide for the attainment of pollutant reductions established pursuant to paragraph (a) to achieve applicable water quality standards.
- The allocations may establish the maximum amount of the pollutant that may be discharged or released in combination with other discharges or releases.
- Allocations may also be made to individual basins and sources or as a whole to all basins and sources or categories of sources of inflow to the water body or water body segments.
- An initial allocation of allowable pollutant loads may be developed as part of the TMDL; in such cases detailed allocations to specific point sources and categories of nonpoint sources shall be established in the basin management action plan.
- The initial and detailed allocations shall be designed to attain pollutant reductions established pursuant to paragraph (a) and shall be based on consideration of:
    1. Existing treatment levels and management practices;
    2. Best management practices established and implemented pursuant to paragraph (7)(c);
    3. Enforceable treatment levels established pursuant to state or local law or permit;
    4. Differing impacts pollutant sources may have on water quality;
    5. The availability of treatment technologies, management practices, or other pollutant reduction measures;
    6. Environmental, economic, and technological feasibility of achieving the allocation;
    7. The cost benefit associated with achieving the allocation;
    8. Reasonable timeframes for implementation;
    9. Potential applicability of any moderating provisions such as variances, exemptions, and mixing zones; and
    10. The extent to which non-attainment of water quality standards is caused by pollution sources outside of Florida, discharges that have ceased, or alterations to water bodies prior to the date of this act.

GENERAL IMPLEMENTATION

- **DEP is the lead agency** in coordinating TMDL implementation, through existing water quality protection programs.
- **Application of a TMDL by a water management** district does not require WMD adoption of the TMDL.
- **TMDL implementation may include**, but is not limited to:
    - Permitting and other existing regulatory programs
    - Non-regulatory and incentive-based programs
    - Other water quality management and restoration activities, such as Surface Water Improvement and Management (SWIM) plans or **basin management action plans**
    - Pollutant trading or other equitable economically based agreements
    - Public works
    - Land acquisition

BASIN MANAGEMENT ACTION PLAN DEVELOPMENT

- DEP may develop a basin management action plan that addresses some or all of the watersheds and basins tributary to a TMDL waterbody.
- A basin management action plan **shall**:
  - Integrate appropriate management strategies available to the state through existing water quality protection programs.
  - Equitably allocate pollutant reductions to individual basins, all basins, each identified point source, or category of nonpoint sources, as appropriate.
  - Identify the mechanisms by which potential future increases in pollutant loading will be addressed.
  - Specify that for nonpoint sources for which BMPs have been adopted, the initial requirement shall be BMPs developed pursuant to paragraph (c).
  - Establish an implementation schedule.
  - Establish a basis for evaluating plan effectiveness.
  - Identify feasible funding strategies.
  - Identify milestones for implementation and water quality improvement, and an associated water quality monitoring component to evaluate reasonable progress over time.
  - Be adopted in whole or in part by DEP Secretarial Order, subject to chapter 120.
- A basin management action plan **may**:
  - Give load reduction credits to dischargers that have implemented load reduction strategies (including BMPs) prior to the development of the BMAP. (*Note: this assumes the related reductions were not factored into the applicable TMDL*.)
  - Include regional treatment systems or other public works as management strategies.
  - Provide for phased implementation to promote timely, cost-effective actions.
- An assessment of progress in achieving milestones shall be conducted every 5 years and the basin management action plan revised, as appropriate, in cooperation with basin stakeholders, and adopted by secretarial order.
- DEP shall assure that key stakeholders are invited to participate in the basin management action plan development process, holding at least one noticed public meeting in the basin to receive comments, and otherwise encouraging public participation to the greatest practicable extent.
- A basin management action plan shall not supplant or alter any water quality assessment, TMDL calculation, or initial allocation.

BASIN MANAGEMENT ACTION PLAN IMPLEMENTATION

- NPDES Permits
  - Management strategies related to a discharger subject to NPDES permitting shall be included in subsequent applicable NPDES permits or permit modifications when the permit expires (is renewed), the discharge is modified (revised), or the permit is reopened pursuant to an adopted BMAP.
  - Absent a detailed allocation, TMDLs shall be implemented through NPDES permit conditions that include a compliance schedule. The permit shall allow for issuance of an order adopting the BMAP within five years. (***Note**: Intended to apply to individual wastewater permits – not MS4s*)
  - Once the BMAP is adopted, the permit shall be reopened, as necessary, and permit conditions consistent with the BMAP shall be established.
  - Upon request by a NPDES permittee, DEP may establish individual allocations prior to the adoption of a BMAP, as part of a permit issuance, renewal, or modification (revision).
  - To the maximum extent practicable, MS4s shall implement a TMDL or BMAP through the use of BMPs or other management measures.
  - A BMAP does not take the place of NPDES permits or permit requirements.
  - Management strategies to be implemented by a DEP permittee shall be completed

according to the BMAP schedule, which may extend beyond the 5-year term of an NPDES permit.
    - Management strategies are not subject to challenge under chapter 120 when they are incorporated in identical form into a NPDES permit or permit modification (revision).
- Management strategies assigned to nonagricultural, non-NPDES permittees (state, regional, or local) shall be implemented as part of the applicable permitting programs.
- Nonpoint source dischargers (e.g., agriculture) included in a BMAP shall demonstrate compliance with the applicable TMDLs by either implementing appropriate BMPs established under paragraph 7(c), or conducting water quality monitoring prescribed by **DEP or a WMD**. (***Note**: this is not applicable to MS4s, as they are considered point sources under the federal Clean Water Act and TMDL Program*.)
    - Failure to implement BMPs or prescribed water quality monitoring may be subject to **DEP or WMD** enforcement action.
- Responsible parties who are implementing applicable BMAP strategies shall not be required to implement additional pollutant load reduction strategies, and shall be deemed in compliance with this section. However, this does not limit DEP's authority to amend a BMAP.

BEST MANAGEMENT PRACTICES

- DEP, in cooperation with WMDs and other interested parties, may develop interim measures, BMPs, or other measures for non-agricultural nonpoint sources to achieve their load reduction allocations.
    - These measures may be adopted by **DEP or WMD** rule. If adopted, they shall be implemented by those responsible for non-agricultural nonpoint source pollution.
- DACS may develop and adopt by rule interim measure, BMPs, or other measures necessary for agricultural pollutant sources to achieve their load reduction allocations.
    - These measures may be implemented by those responsible for agricultural pollutant sources. **DEP, the WMDs, and DACS** shall assist with implementation.
    - In developing and adopting these measures, DACS shall consult with DEP, DOH, the WMDs, representatives of affected farming groups, and environmental group representatives.
    - The rules shall provide for a notice of intent to implement the practices and a system to ensure implementation, including recordkeeping.
- Verification of Effectiveness and Presumption of Compliance -
    - DEP shall, at representative sites, verify the effectiveness of BMPs and other measures adopted by rule in achieving load reduction allocations.
    - DEP shall use best professional judgment in making the initial verification of effectiveness, and shall notify **DACS and the appropriate WMD** of the initial verification prior to the adoption of a rule proposed pursuant to this paragraph.
    - Implementation of rule-adopted BMPs or other measures initially verified by DEP to be effective, or verified to be effective by monitoring at representative sites, provides a presumption of compliance with state water quality standards for those pollutants addressed by the practices.
- Reevaluation –
    - Where water quality problems are demonstrated despite implementation, operation, and maintenance of rule-adopted BMPs and other measures, **DEP, a WMD, or DACS**, in consultation with DEP, shall reevaluate the measures. If the practices require modification, the revised rule shall specify a reasonable time period for implementation.

Appendix C: Stakeholder Involvement in BMAP Development

LOWER ST. JOHNS RIVER TRIBUTARIES BASIN WORKING GROUP

The LSJR Tributaries Basin Working Group (BWG) is made up of responsible stakeholders in the tributaries. The BWG was formed in October 2007 and has advised FDEP on issues related to the BMAP process. The BWG played a critical role in the development of the BMAP to implement the tributaries TMDLs.

The BWG's mission statement is as follows: *"The mission of the Lower St. Johns River Tributaries Basin Working Group is to encourage participation of all interested parties in working to restore impaired waterbodies through recommendations for an equitable and cost-effective Basin Management Action Plan to achieve Total Maximum Daily Load reduction goals in the tributaries of the Lower St. Johns River."*

During BMAP development, the BWG met in Jacksonville on the following dates:

- December 18, 2008;
- May 7, 2009; and
- July 9, 2009.

In addition to the input from the BWG, the stakeholders involved in the technical meetings provided valuable information during the BMAP process. The technical meetings began in July 2006 to organize and review the technical information that is the basis of the BMAP. The technical stakeholders also identified management actions to improve water quality in the tributaries. The technical meetings were held regularly throughout the BMAP development process.

The Tributaries Assessment Team (TAT) was formed in 2005 to investigate potential sources of fecal coliform in the LSJR tributaries. The TAT membership comprises several agencies and organizations, including FDEP, COJ EQD, COJ PWD, DCHD, and JEA. The TAT has collected much of the water quality data in the tributaries. The interagency, coordinated effort of the TAT has identified and eliminated fecal coliform sources in the tributaries, helping to achieve water quality improvements.

Members of the TAT from FDEP, COJ EQD, and JEA, participated in an intensive assessment effort between 2008 and 2009 to gather additional information about 11 tributaries to aid in source identification. That TAT conducted a "Walk the WBID" effort, which was a detailed field assessment of the 11 tributaries. During this effort, the TAT identified key monitoring locations in 10 of the tributaries and spent 8 months intensively monitoring these WBIDs; the monitoring included microbial source tracking (MST) sampling and sediment analysis. In addition, 4 of the WBIDs received thermal imaging to identify potential fecal coliform sources to the creeks. Of the BMAP WBIDs, Miller Creek, Miramar Creek, Hogan Creek, and Big Fishweir Creek were assessed using all or part of these tools.

PROCESS FOR PLAN RECOMMENDATION DEVELOPMENT

BASIN WORKING GROUP MEETING PROCESS

The BWG was asked to endorse the BMAP, since the members have been actively involved in the BMAP process. The BWG's endorsement of the BMAP was used to move forward with the BMAP adoption process. FDEP will also ask for letters of commitment or resolutions of support

for the BMAP from the entities. These letters and resolutions will provide an additional level of support for the BMAP efforts as staff and board members change over time. The process to submit letters and resolutions of support will occur during and after BMAP adoption. The written statements of commitment will be added to the BMAP as they are received.

CONSENSUS

The technical stakeholder meetings were operated on an informal basis where the purpose of the discussions was to provide technical input. As such, there was no formal voting or measures of consensus during these meetings. The BWG, however, made specific recommendations to FDEP on BMAP issues and used a voting procedure to make these recommendations. Votes were held only in circumstances when a quorum of at least 75% of the voting members (or their designated alternates) was present at a publicly noticed meeting. Consensus was defined as a vote where more than 50% of the BWG members could support, agree to, or accept the motion.

PUBLIC PARTICIPATION IN BASIN WORKING GROUP MEETINGS

All BWG and technical meetings were open to the public and noticed in the *Florida Administrative Weekly* (FAW). BWG meetings were also noticed in the *Florida Times-Union.* Public comment was invited during the BWG meetings and the technical meetings were open to anyone interested in participating in the technical discussions. In addition, public meetings were held on the verified lists, the adoption of the TMDLs, and the BMAP document.

PUBLIC MEETING(S)

Meetings on the tributaries TMDLs and BMAP were held at the following dates and times:

- Review and seek comments on the proposed verified list of impaired waters: May 14, 2003; June 25, 2003; November 2008; and April 2, 2009.
- Review and seek comments on the proposed TMDLs: August 17, 2005, and February 20, 2009.
- Meeting on the BMAP: July 30, 2009.

PLAN RECOMMENDATION APPROVAL AND ADOPTION

The Basin Working Group approved the final recommended BMAP at its July 9, 2009 meeting. The final BMAP is to be adopted by FDEP Secretarial Order.

Appendix D: Summary of EPA-Recommended Elements of a Comprehensive Watershed Plan

The following is an excerpt on the nine elements of a watershed plan from the EPA's *Draft Handbook for Developing Watershed Plans to Restore and Protect Our Waters.* Additional information regarding these elements can be found in the full version of the handbook located online at: http://www.epa.gov/owow/nps/watershed_handbook/.

NINE MINIMUM ELEMENTS TO BE INCLUDED IN A WATERSHED PLAN FOR IMPAIRED WATERS FUNDED USING INCREMENTAL SECTION 319 FUNDS

Although many different components may be included in a watershed plan, EPA has identified a minimum of nine elements that are critical for achieving improvements in water quality. EPA requires that these nine elements be addressed for watershed plans funded using incremental Section 319 funds and strongly recommends that they be included in all other watershed plans that are intended to remediate water quality impairments.

The nine elements are provided below, listed in the order in which they appear in the guidelines. Although they are listed as *a* through *i*, they do not necessarily take place sequentially. For example, element *d* asks for a description of the technical and financial assistance that will be needed to implement the watershed plan, but this can be done only after you have addressed elements *e* and *i*.

Explanations are provided with each element to show you what to include in your watershed plan.

NINE ELEMENTS

a. Identification of causes of impairment and pollutant sources or groups of similar sources that need to be controlled to achieve needed load reductions, and any other goals identified in the watershed plan. *Sources that need to be controlled should be identified at the significant subcategory level along with estimates of the extent to which they are present in the watershed (e.g., X number of dairy cattle feedlots needing upgrading, including a rough estimate of the number of cattle per facility; Y acres of row crops needing improved nutrient management or sediment control; or Z linear miles of eroded streambank needing remediation)*.

What does this mean?
Your watershed plan should include a map of the watershed that locates the major sources and causes of impairment. Based on these impairments, you will set goals that will include (at a minimum) meeting the appropriate water quality standards for pollutants that threaten or impair the physical, chemical, or biological integrity of the watershed covered in the plan.

b. An estimate of the load reductions expected from management measures.

What does this mean?
You will first quantify the pollutant loads for the watershed. Based on these pollutant loads, you'll determine the reductions needed to meet the water quality standards.

You will then identify various management measures (see element *c* below) that will help to reduce the pollutant loads and estimate the load reductions expected as a result of these management measures to be implemented, recognizing the difficulty in precisely predicting the performance of management measures over time.

Estimates should be provided at the same level as that required in the scale and scope component in paragraph *a* (e.g., the total load reduction expected for dairy cattle feedlots, row crops, or eroded streambanks). For waters for which EPA has approved or established TMDLs, the plan should identify and incorporate the TMDLs.

Applicable loads for downstream waters should be included so that water delivered to a downstream or adjacent segment does not exceed the water quality standards for the pollutant of concern at the water segment boundary. The estimate should account for reductions in pollutant loads from point and nonpoint sources identified in the TMDL as necessary to attain the applicable water quality standards.

c. A description of the management measures that will need to be implemented to achieve load reductions in paragraph 2, and a description of the critical areas in which those measures will be needed to implement this plan.

What does this mean?
The plan should describe the management measures that need to be implemented to achieve the load reductions estimated under element *b*, as well as to achieve any additional pollution prevention goals called out in the watershed plan. It should also identify the critical areas in which those measures will be needed to implement the plan. This can be done by using a map or a description.

d. Estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement this plan.

What does this mean?
You should estimate the financial and technical assistance needed to implement the entire plan. This includes implementation and long-term operation and maintenance of management measures, information and education (I/E) activities, monitoring, and evaluation activities. You should also document which relevant authorities might play a role in implementing the plan. Plan sponsors should consider the use of federal, state, local, and private funds or resources that might be available to assist in implementing the plan. Shortfalls between needs and available resources should be identified and addressed in the plan.

e. An information and education (I/E) component used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the nonpoint source management measures that will be implemented.

What does this mean?
The plan should include an I/E component that identifies the education and outreach activities or actions that will be used to implement the plan. These I/E activities may support the adoption and long-term operation and maintenance of management practices and support stakeholder involvement efforts.

f. Schedule for implementing the management measures identified in this plan that is reasonably expeditious.

What does this mean?
You need to include a schedule for implementing the management measures outlined in your watershed plan. The schedule should reflect the milestones you develop in *g*.

g. A description of interim measurable milestones for determining whether management measures or other control actions are being implemented.

What does this mean?
You'll develop interim, measurable milestones to measure progress in implementing the management measures for your watershed plan. These milestones will measure the implementation of the management measures, such as whether they are being implemented on schedule, whereas element *h* (see below) will measure the effectiveness of the management measures, for example, by documenting improvements in water quality.

h. 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.

What does this mean?
Using the milestones you developed above, you'll develop a set of criteria (or indicators) with interim target values to be used to determine whether progress is being made toward reducing pollutant loads. These interim targets can be direct measurements (e.g., fecal coliform concentrations) or indirect indicators of load reduction (e.g., number of beach closings). You must also indicate how you'll determine whether the watershed plan needs to be revised if interim targets are not met and what process will be used to revise the existing management approach. Where a nonpoint source TMDL has been established, interim targets are also needed to determine whether the TMDL needs to be revised.

i. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item h immediately above.

What does this mean?
The watershed plan must include a monitoring component to determine whether progress is being made toward attainment or maintenance of the applicable water quality standards. The monitoring program must be fully integrated with the established schedule and interim milestone criteria identified above. The monitoring component should be designed to determine whether loading reductions are being achieved over time and substantial progress in meeting water quality standards is being made. Watershed-scale monitoring can be used to measure the effects of multiple programs, projects, and trends over time. In stream monitoring does not have to be conducted for individual BMPs unless that type of monitoring is particularly relevant to the project.

Appendix E: Programs To Achieve the TMDL

PROGRAMS TO ADDRESS THE SANITARY SEWER SYSTEM AS A SOURCE OF FECAL COLIFORM CONTAMINATION

Beginning in the late 1990s, the regional utility provider, JEA, undertook a comprehensive program of pipeline rehabilitation focusing on larger line throughout the service area. To date the utility has spent more than $500 million in pipeline rehabilitation alone. Since the large-scale replacements of existing systems have large capital costs, it is necessary to routinely conduct investigations, including, but not limited to, infiltration and inflow studies to evaluate the integrity of the infrastructure and use this type of assessment to locate severe problem areas with a high probability of impacts related to the utility.

Examples of investigations and maintenance procedures include regularly (1) using remote camera equipment to inspect the lines, (2) cleaning lines, (3) inspecting manholes, and (4) testing pumps at lift stations to ensure proper function. Local utilities should also use "mean time to failure" estimates to replace pumps at lift stations prior to failing, as well as warning systems for utility failures to help minimize impacts when failures occur. JEA has implemented these systems. In addition to performing remedial maintenance on an as-needed basis, JEA has routinely implemented a variety of corrective actions performed on a prioritized schedule. These include, but are not limited to, the following:

- *Pipe bursting (to replace existing failing infrastructure);*
- *Slip lining (to replace existing failing infrastructure when capacity is not an issue);*
- *Open cut (removal and replacement of failing infrastructure);*
- *Manhole liners (modify polymer to rehabilitate failing manholes);*
- *Fiberglass-line manholes (to rehabilitate existing failing manholes);*
- *Replace manholes;*
- *Line wet wells (corrosion prevention and control); and*
- *Replace force mains (replace failing infrastructure).*

Spills of untreated sewage from the regional sewer system in Duval County are immediately addressed and investigated thoroughly. When an SSO occurs, the cause is usually listed as a recent, immediately traceable condition, such as a pipe blockage or pump failure. However, merely addressing the immediate cause without understanding the underlying cause of the overflow may not protect against future SSOs.

In every case of an untreated wastewater discharge, JEA conducts a two-part investigation into the cause of the spill. The first is to address the immediate cause, and the second is conducted to address any underlying causes. Historically, pipe breaks, cave-ins, and grease have been the major causes of spill events.

Significant investments in pipe replacement, focused on areas with the highest occurrence of events, have significantly reduced the number of events related to breaks and cave-ins. The

introduction of an effective Fats, Oils and Grease (FOG) Program has reduced the number of spills associated with grease stoppages. Continual focus on actions to reduce the causes of the events is the primary assignment of the Wastewater Preventive Maintenance team at JEA.

SPECIFIC CITYWIDE IMPROVEMENT PROGRAMS BY JEA

FATS, OILS, AND GREASE REDUCTION 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 the occurrence of SSOs. JEA has an EPA award–winning FOG Program that regulates commercial grease dumped into the sewer system. Grease is a major cause of SSOs for utilities, and JEA's Industrial Pretreatment Group is nationally recognized for its preventive program. To help reduce these events, JEA requires that all food service establishments (FSEs) ("FOG generators") connected to JEA sewer participate in the FOG Program: http://www.jea.com/about/pub/downloads/fog/FOGTrainingSlideShow.pdf.

To help FOG generators meet the program requirements, JEA has developed the Preferred Hauler Program (PHP). The preferred haulers are vendors, approved by JEA, that pump, haul, and properly dispose of FOG materials for food service establishments. To meet JEA's expectations, these haulers must demonstrate, both initially and continually, that they are able to meet the following criteria (abbreviated version obtained from: http://www.jea.com/about/pub/downloads/fog/FOGProgramPreferredHaulerRequestforParticipation.pdf):

1. *Satisfactorily pump out grease traps/interceptors;*
2. *Attend waste hauler education meeting;*
3. *Accept limited regulatory responsibility for the generator.*
4. *Submit manifest document for the disposal of all trap contents generated in JEA's service area on a quarterly basis.*

JEA monitors compliance monthly. Food service establishments that miss their required interceptor pump out are indentified and brought into the enforcement process. Escalating enforcement measures consist of an initial notice of violation, followed by a cease and desist order, and finally the emergency suspension of service for FSEs that fail to comply with previous actions.

SSO ROOT CAUSE PROGRAM

The SSO Root Cause Program began in January 2007 and is run by a group of first responders, who meet 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 action to prevent reoccurrence. It also identifies any improvements that can be made to reporting procedures. As indicated in the following table, the Root Cause Program has revealed that in many cases, the identified preliminary cause is not the true root cause of the overflow.

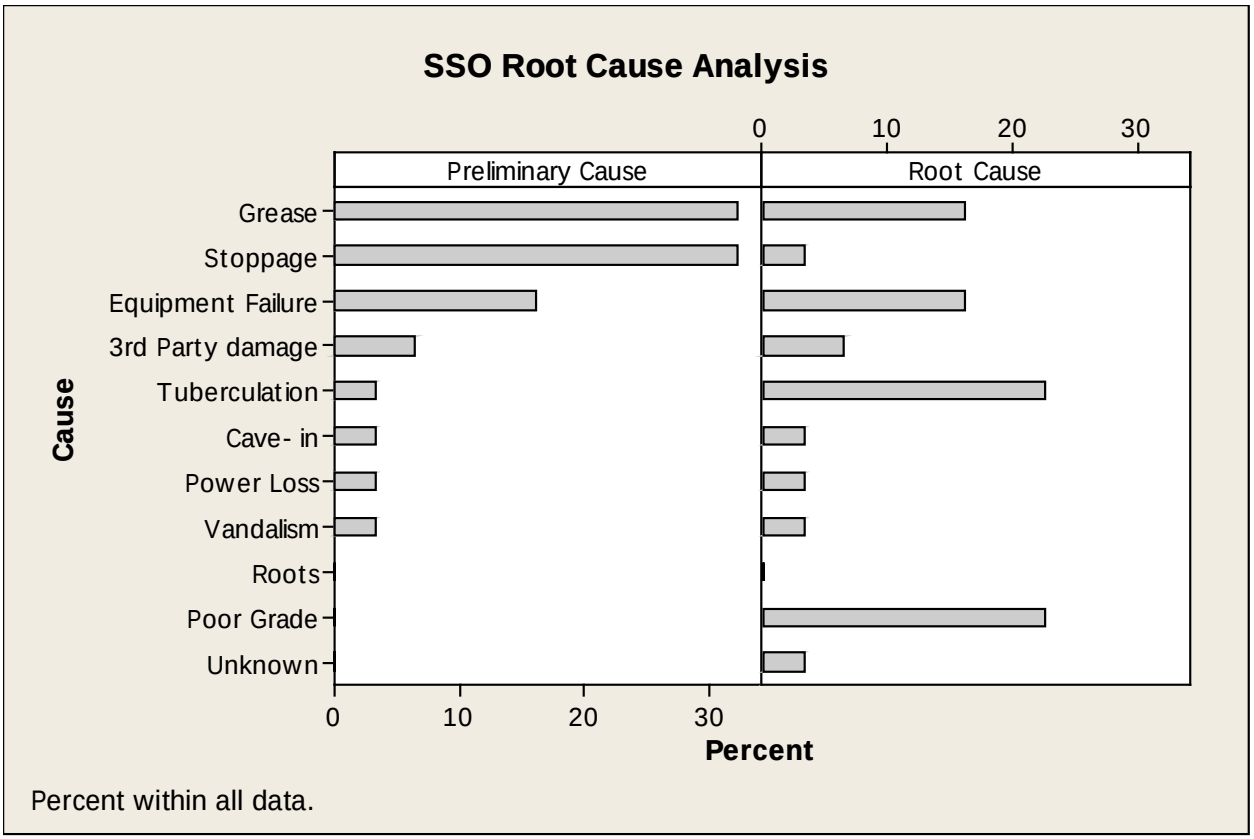

FIGURE E-1. SSO ROOT CAUSE ANALYSIS

This program is ongoing, and some benefits have already become apparent:

- *Prior to the implementation of the Root Cause Program, blockages in gravity lines would typically be dealt with by simply resolving the obvious immediate cause: the blockage, which often was caused by grease. Under the Root Cause Program, a significantly more detailed analysis is performed, which has shown that poor grade (sags or bellies) in existing pipes are often the primary reason for the accumulation of grease that caused the blockage. Under previous procedures, the blockage would be cleared and the line placed back into service. Under the program, the blockage is cleared, the line is cleaned, and a closed-circuit television camera is run through the impacted line. The video will reveal the existence of poor grade, if present. When poor grade is identified under the Root Cause Program, the affected line segment is either replaced or added to a scheduled cleaning list to be cleaned quarterly, semi-annually, or annually.*
- *The Root Cause Program has identified tuberculated iron pipe as a significant concern. Tuberculated pipe refers to the buildup of iron deposits and other materials in the interior periphery of a pipe, resulting in a reduced carrying capacity in the line and greater potential for blockage. The discovery of a pattern of tuberculated iron pipe by the Root Cause Program has resulted in a program to deal with tuberculated pipe through replacement or Cured in Place Pipe (CIPP) lining. For FY09, $600,000 has been budgeted to address tuberculated pipe.*

- *When the preliminary cause of grease is confirmed as the root cause, JEA personnel will survey the system upstream of a grease blockage to identify a potential source such as a restaurant. JEA Industrial Pretreatment (IP) personnel will visit and evaluate any potential sources to verify compliance with JEA's IP Program and undertake enforcement as necessary to reduce or eliminate the source of grease to the system.*
- *JEA operates with a continuous improvement philosophy. A design change for odor control had the unintended consequence of causing SSOs through the buildup of grease. After identification of the problem by the Root Cause Committee, this particular design configuration was removed from JEA specifications and is no longer approved for construction. Where identified, these installations will be retrofitted to the current JEA standard.*

In general, the Root Cause Program has allowed JEA to better prioritize limited repair and replacement (R&R) resources to optimize JEA's limited financial resources.

POP-TOP PROGRAM

JEA implemented the Pop-Top Program in early 2007 to open and inspect all accessible manholes in the service territory (approximately 54,000 manholes), with the objective of preventing future SSOs. Since April 2007, JEA crews have inspected more than 30,000 manholes to detect potential problems in the collection system. Generally, the problems of greatest concern are manifested through surcharged conditions (backups of flow to varying degrees) that typically result from a restriction in flow downstream of the surcharged manhole. In some cases, the discovery of a surcharged condition has resulted in an immediate response to prevent a potential SSO. In many more cases, the pop-top inspections have identified conditions that, if unresolved, could result in an SSO sometime in the future. These lines are placed on a cleaning schedule to avoid the possibility of an eventual SSO. **Figure E-2** shows the problems identified in manholes (M/H) and main lines (M/L) to date as the result of the pop-top inspections, including 140 instances of surcharged lines.

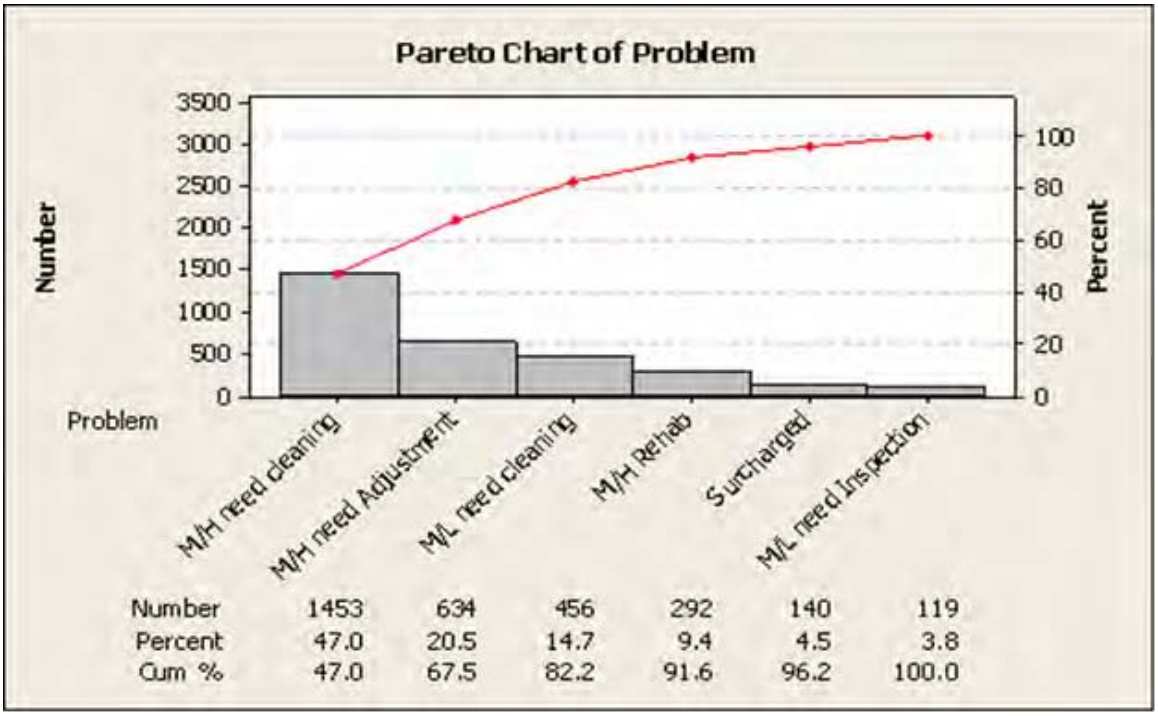

FIGURE E-2. PROBLEMS IDENTIFIED THROUGH THE POP-TOP PROGRAM

NON-INTRUSIVE PIPE TESTING AND AIR RELEASE VALVE PROGRAMS

The Pipe Integrity Testing and Air Release Valve (ARV) Programs are both incorporated under this larger entity, focusing on known critical force mains, iron pipes, and air valves that are located near waterbodies.

- *Pipe integrity testing, initiated in 2006, utilizes sonar to test the wall thickness of sanitary sewer iron or ductile iron pipes while maintaining the integrity of the structures. Sewer gases are corrosive and may over time reduce the wall thickness of sewer lines to unacceptable levels, in some cases causing pipe ruptures. The testing program allows JEA to assess the condition of the pipe and replace pipe with unacceptable pipe wall thickness before it fails. To date, 130 sites have been tested.*
- *The purpose of an ARV is to reduce static head pressure in force main systems caused by air in the pipe. If the valves are not working properly, air cannot escape and can prevent the associated pumps from pumping, causing overflows at lift stations. Periodic inspection is required to ensure the valves are working properly. Over time, sewer gases deteriorate the ARV and the associated galvanized piping attached to the force main that support the valve. These failures often result in overflows, since they are attached to pressure systems. Under this program, ARVs are inspected and replaced as necessary. All metal ARVs are now replaced with plastic corrosion-resistant valves that are easily cleaned and reused. Also, all galvanized support piping is replaced with stainless steel pipe to eliminate pipe failures. JEA standards have been modified to reflect the improved materials for construction above. To date, 362 ARVs have been replaced. The inspection and replacement program is prioritized based on proximity to tributaries, with valves within 200 feet of tributaries given highest priority.*

SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA)

The SCADA Program was implemented at JEA lift stations. Alarms sound if the sewer in a wet well rises above a specific level, and triggers an alert to the JEA lift station Operations and Maintenance Group. They respond immediately to avoid an SSO. Currently, 1,230 lift stations have been retrofitted with SCADA telemetry systems at a cost of more than $22 million. With SCADA, JEA can respond to a comprehensive list of alarms, including high wet-well levels, power outages, and pump failures. During a typical week, there are between 40 and 50 wet-well high alarms received from the 1,230 stations on SCADA.

The implementation of SCADA monitoring at JEA's lift stations has resulted in a significant decrease in lift station-related SSOs, as shown in **Figure E-3**.

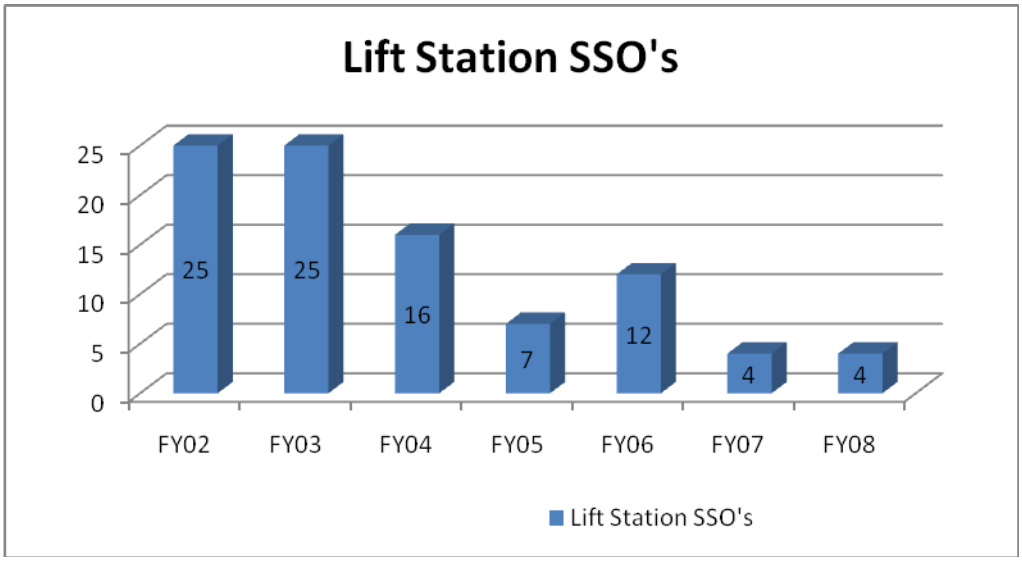

FIGURE E-3. LIFT STATION SSOS, FY02–FY08

THIRD PARTY EDUCATION AND ENFORCEMENT PROGRAM

In 2003, JEA implemented a program to address SSOs caused by third-party contractors. The program involves an increased emphasis on both education and enforcement of the contractors who routinely perform excavations in the vicinity of JEA infrastructure. The program has been successful in dramatically reducing the SSOs caused by third-party hits on JEA sewage lines, as shown in **Figure E-4**.

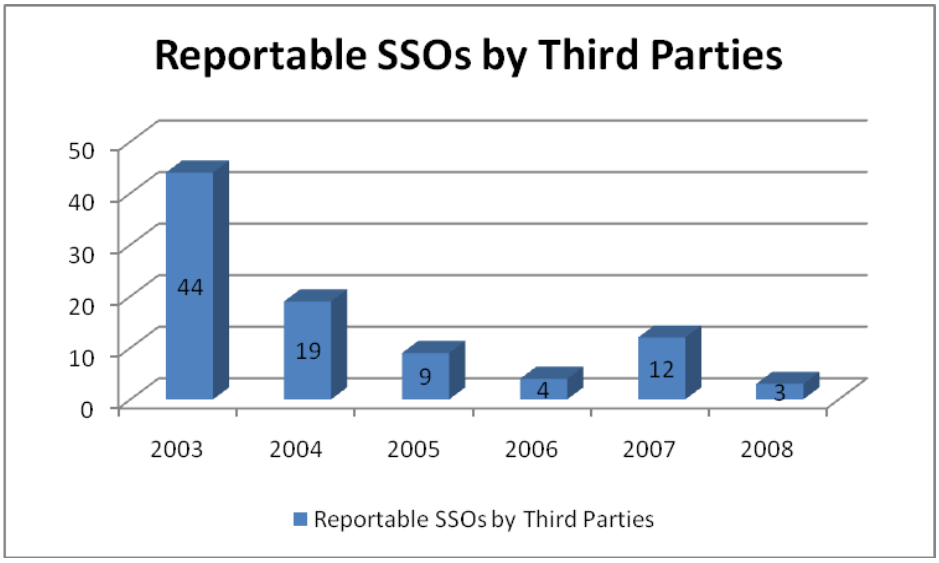

FIGURE E-4. REPORTABLE SSOS BY THIRD PARTIES, 2003–08

MANHOLE MONITORING

The Manhole Monitoring Program, which was initiated in 2007, involves the placement of fluid level measurement devices under manhole covers. Under the first phase of the project (completed before the end of 2007), 17 monitors were installed at a cost of over $130,000. The devices transmit alarms when the water level in the manhole is elevated, denoting a surcharged condition. Upon receiving an alarm, JEA personnel are dispatched to the site to address the situation and take action as necessary. As conditions at the monitored sites improve, the monitors can be moved on short notice to address more critical situations elsewhere.

JEA has avoided at least 12 SSOs as the result of the first phase of the program. In addition, the monitors have allowed JEA to more effectively utilize other resources, as personnel are no longer required to make frequent inspections of potential problem sites to constantly assess changing conditions. JEA currently has plans to expand the program with the acquisition of an additional 10 monitors in the second phase.

FORCE MAIN DISCHARGE MANHOLES

This program was implemented at manholes into which force mains discharge. The structure of these manholes is subjected to increased deterioration due to a higher concentration of corrosive sewer gases associated with the pressurized discharges of sewage. Under this program, all force main discharge manholes were inspected in 2007. Those found in need of repair have been rehabilitated.

TRIBUTARY POLLUTION ASSESSMENT MANUAL

JEA contracted with a consultant, PBS&J, to develop a methodology for conducting tributary pollution assessments for sources of fecal coliform contamination in the listed tributaries. This methodology will be field-verified by conducting sanitary surveys of selected tributary waterbody segments, and revised based on lessons learned from this process. The final product of this endeavor was a *Tributary Pollution Assessment Manual* that can be used as a blueprint for conducting sanitary surveys.

CAPACITY, MANAGEMENT, OPERATIONS, AND MAINTENANCE (CMOM) PROGRAM

JEA's Water and Wastewater Systems Group is spearheading a voluntary EPA program aimed at reducing SSOs and preserving wastewater infrastructure. Considering that SSOs can lead to disease, water quality violations, the contamination of drinking water supplies, and beach closures, the importance of a well-maintained wastewater collection system cannot be overstated.

CMOM is a standardized system of continuous improvement to track numerous elements that contribute to a successful wastewater collection system. JEA has tracked similar information for years, but formalized and consolidated it in January 2008. In JEA's CMOM program, there are 152 elements tracked in the following three areas:

1. ***Management*** *– Includes areas such as complaint management tracking, sewer system design and construction standards, and public notification.*
2. ***Operations*** *– Examples include pump station operations, pretreatment monitoring, and grease trap monitoring.*
3. ***Maintenance*** *– Collection system maintenance includes pump station inspections and sewer line cleaning.*

Documentation, measurement, and reporting in this standardized fashion will lead to more informed decisions based on hard data, allowing JEA to identify and address system priorities, detect trends, and proactively address problems both internally and cooperatively with local partners.

COJ LOCAL POLLUTION CONTROL PROGRAM

COJ's local pollution control program has helped to address fecal coliform problems in the tributaries of the St. Johns River through several innovative programs. COJ began a regionalization program for small WWTFs (package plants) in 1989 that has resulted in phasing out over 400 plants. Currently, there are approximately 20 package plants in the city.

Before the regionalization effort began in 1989, COJ had hundreds of small private sanitary lift stations serving the area. Recognizing that the number of sanitary lift stations would significantly increase because of phasing out package plants and the need for reducing the potential sewage overflow, the local pollution control program has implemented a sanitary lift station inspection program requiring all lift stations constructed after August 1991, to have operator attendance. The COJ Environmental Protection Board (EPB) Rule 3 established the basic requirements for lift station design, construction, and operation by adopting Rule 62-604, F.A.C. The rule also requires that all lift station must have monthly operator visits, a logbook, and an emergency contact number posted at the site.

Today there are more than 900 privately owned lift stations, and EQD's goal is to inspect all private lift stations at least annually. Citizens' reports of sewage overflow or self-reports by lift station owners are entered and tracked in COJ's CARE system. All overflow events from a lift station are investigated and enforced using EPB guidelines. COJ's proactive efforts to reduce SSOs are well documented.

EQD has recently recognized and begun addressing the problem of old above-ground sand filter onsite sewage treatment systems. These systems previously were not under the jurisdiction of existing regulatory programs because of their hybrid design. The sand filters recently examined

are nonfunctional due to a lack of maintenance. In addition, bypass pipes (around the sand filter) have been installed in some of the systems, causing inadequately treated sewage to be discharged to the MS4. EQD has embarked on a program to identify, map, and sample these systems to bring them into compliance through enforcement and connection to the municipal sanitary sewer system, or to use other means if connection is not possible.

PROGRAMS TO ADDRESS OSTDS AS SOURCES OF FECAL COLIFORM CONTAMINATION

DCHD OSTDS PROGRAM

The objective of the OSTDS Program is to provide safe and sanitary treatment and disposal of domestic and commercial sewage waste in the areas not served by public sewerage systems. Generally, OSTDS present no public health problems when they are properly designed, installed, and maintained on sites having satisfactory soil and drainage features. However, where an installation site is unsuitable, and where no modification of the property is possible or practical, the use of an OSTDS may contaminate ground or surface waters. The primary goals of DCHD are to protect public health by eliminating the potential for the spread of infectious disease caused by improperly built or maintained OSTDS, and to protect ground and surface water from OSTDS discharge.

DCHD is responsible for all operational aspects of the OSTDS Program, as described in Rule 64E-6, F.A.C. To accomplish its program goals and objective, DCHD utilizes the expertise of one field supervisor, eight field inspectors, and three administrative support staff. In addition, the DCHD office has a field inspector to perform complaint investigations and an enforcement officer to address legal cases.

During the permitting process, the OSTDS staff provides many services including, but not limited to, the following:

- *Application/plan review;*
- *Site evaluation;*
- *System construction permitting; and*
- *Installation inspection.*

DCHD must review all applications for construction permits relating to the installation, modification, replacement, or repair of OSTDS and determine within the time limitations prescribed by the Florida Administrative Procedures Act, Section 120.60, F.S., whether to issue or deny a permit. The goal for the average number of days to issue a new construction permit is eight days and two days for a repair permit.

The review process involves a determination as to whether the site location and installation will comply with standards set forth in Chapter 381, F.S. and Rule 64E-6, F.A.C. DCHD also inspects and evaluates all new installations, repairs, abandonments, or modifications of OSTDS; inspections are made to ensure adequate tank construction and capacity, fill material if needed, drainfield size, elevation, cover, dosing system construction, distance from surface water and potable wells, and other regulatory requirements. DCHD also inspects existing OSTDS for compliance when there is a change of use or occupancy. When COJ's Building and Zoning Department receives an application for a building permit, when a zoning change is requested or

when COJ receives an application for occupational license, the applicant will be referred to the DCHD office for OSTDS review.

When a building served by an OSTDS is located in an area zoned or used for industrial/manufacturing purposes, or where a business generates commercial sewerage waste, DCHD issues an annual operating permit and requires at least one compliance inspection per year. The updated listings of these properties are identified by DCHD staff, who cross-reference JEA and COJ data.

In addition to the actual permitting process for OSTDS systems, DCHD also regulates the OSTDS maintenance industries. Service permits are issued to the following facilities annually, and DCHD performs one to two compliance inspections each year, as follows, depending on the type of facility:

- *Septic disposal services;*
- *Lime stabilization facilities;*
- *Land application facilities;*
- *Portable or temporary toilet services; and*
- *Septic tank manufacturers.*

When an inspection determines that a DCHD-issued OSTDS permit is out of compliance, the inspector notifies the appropriate parties in writing. Proper documentation, in the following sequence, is required for any type of inspection:

Step i. Written notice (i.e. inspection report);
Step ii. Official notice;
Step iii. Legal notice or corrective notice; and
Step iv. Case referred to State Attorney's Office.

It should be noted that a complaint investigation begins at Step ii, with the issue of the official notice. By law, two versions of the notice are required prior to enforcement. Depending on the severity of the case, the timeline between steps of this sequence may vary. For example, for more serious occurrences, the timeframe between Step i and Step iii can be under 24 hours.

Approximately 90% of cases in Duval County are corrected after Steps i and ii. For those cases that require enforcement, DCHD has its own Enforcement Officer to take cases to court. FDEP law enforcement becomes involved in cases of willful pollution. The DCHD computer database includes a record of all complaints and investigations. This database is updated daily and may include approximately 16 to 20 complaints per week.

Florida Onsite Wastewater Association (FOWA) Proposed Legislation

FOWA proposed legislation for a state statute requiring that OSTDS be inspected every five years. Although the goal was to have the bill voted on during the 2007 legislative session, the bill failed in committee and was not brought to the full legislature. According to Mike McInarny, FOWA (personal communication, June 5, 2007), it is currently the organization's goal to educate legislators in the upcoming year with the objective of resubmitting the bill during the 2008 legislative session.

At this point, the focus has temporarily shifted to legislation on the local level. FOWA proposed a similar bill before the Jacksonville City Council. Mr. McInarny stated it will be the goal of FOWA to educate officials on the local level in order to increase support for the ordinance.

DCHD-Sponsored Training Programs

On April 25, 2006, First Coast District Florida Environmental Health Association (FEHA) hosted its first advanced OSTDS training opportunity, *Perspectives on the use of OSTDS in Florida.* The course was approved for 6 hours of continuing education for registered septic tank contractors and certified environmental health professionals. Approximately 70 people were in attendance. Speakers included representatives from associations such as FDOH, EPA, St. Johns Riverkeeper, WSEA, FOWA, and DCHD. Those in attendance included personnel from JEA and FDEP, as well as certified plumbers, septic tank contractors, and environmental health professionals from 7 county health units.

DCHD and FDOH hosted another training program, entitled *Onsite Management: Alternative for a Better Community*, on November 16, 2006, in Jacksonville. The course was originally presented at the 2006 FEHA Annual Education Meeting in Sarasota, Florida. This training provided 6 contact hours for all septic tank contractors and certified environmental health professionals. It was an introduction to Onsite Wastewater Management and EPA's Voluntary Management Guidelines. In addition, the speakers provided consideration for existing and future development and the opportunity for discussion of local issues that affect our community.

DCHD intends to continue other such efforts in the future; however, the themes may change. One idea is to include a DCHD public outreach endeavor as a part of the COJ's annual environmental workshop.

DCHD Intensive Inspection Program

In the Miller Creek, Miramar Creek, Big Fishweir Creek, and Goodbys Creek watersheds, a discrete portion of each WBID was identified as having a higher probability of OSTDS-related problems. This determination was made based on the number of repair permit applications, water quality information, and the site conditions of these areas. DCHD is proposing to add an intensive inspection program to focus on these areas to proactively prevent issues from septic tanks in these watersheds.

As part of this first five-year BMAP cycle, DCHD will seek to secure funding for the new program and will begin inspections as funding is available. DCHD will provide the findings from the inspections and any corrective actions taken in the annual BMAP progress reports. Assessment efforts that are also occurring in these WBIDs may identify additional areas where intensive inspections would be beneficial. DCHD will also look to secure funding to include other areas in the inspection program, as necessary.

COJ Septic Tank Phase-Out Program

The purpose of the Septic Tank Phase-Out Program is to improve the quality of surface waters and ground waters by connecting properties located in the septic tank failure areas to JEA public sewer service. In May 2000, COJ enacted Ordinance Code 2000-119-E, which amended Chapter 751 Ordinance, to establish sources of funding for constructing public sewer service lines, adopt the FDOH priority list for septic tank failure areas, and provide an enforcement mechanism for EQD.

Based on an analysis completed by WSEA, there are a total of 64,837 OSTDS in Duval County. WSEA concludes that 23,944 systems are contained within the 39 failure areas identified to date. The number of septic tanks connected to JEA in future years depends on the construction of sewer collection systems in each failure area and DCHD enforcement actions for septic tanks located outside identified failure areas.

DCHD/COJ Septic Tank Failure Area Ranking

The TAT is the sampling subcommittee for the LSJR tributaries. The DCHD and EQD mutually agreed that it would be beneficial for the TAT to make a recommendation for revisions to the procedure used to determine the "sanitary conditions" portion of the DCHD/COJ Septic Tank Failure Area ranking.

The state has adopted WBIDs as the hydrologic unit for determining whether waterbodies are in compliance with designated uses as adopted in state rule. WBIDs are also the hydrologic unit within the tributaries BMAP that management efforts are directed towards to bring various waterbodies into compliance that may be verified as impaired for fecal coliform bacteria. The TAT has adopted a protocol for ranking the various WBIDs for degree of severity. Using the ranking procedure, WBIDs that rank highest (worst water quality for fecal coliform bacteria) are prioritized for BMAP development and investigative studies to complete the required technical reports and BMAPs.

The TAT fecal coliform ranking for impaired WBIDs is as follows:

1. *For a selected WBID, all fecal coliform data from the most recent five-year period are retrieved from FL STORET.*
2. *This procedure is repeated for all WBIDs to be ranked.*
3. *Once fecal coliform data for the WBIDs of interest are assembled, each WBID is scored using the following protocol: determine the percent of samples that exceed 800 cfu/100mL, then determine the percent of samples that exceed 5,000 cfu/100mL, and lastly the percent of samples that exceed 10,000 cfu/100mL.*
4. *The above calculations are completed for each WBID.*
5. *All of the WBIDs are then ranked for each percent exeedance category. The WBID with the highest percent exceeding 800 cfu/100mL ranks as number one, then the WBIDS are ranked for percent exceedance of 5,000, and finally percent exceedance of 10,000 are ranked. In this manner, a WBID that ranked with the highest percent exceedances for 800, 5,000, and 10,000 cfu/100mL would score a 1st, 1st, and 1st ranking. The WBID would then have a combined ranking score of 3, and would be the worst WBID in the group in terms of fecal coliform violations.*
6. *After a combined score is determined for each of the WBIDs, all WBIDs are ranked based on the combined rank score.*
7. *The ranking by the combined rank score becomes the final fecal coliform rank for that WBID, as determined by the TAT protocol.*

On June 17, , the TAT met to discuss an appropriate method to calculate the sanitary condition index score, which is based on the fecal coliform determination that is used for ranking the DCHD septic tank failure areas. Three options were considered, as follows:

1. *Continue to use a ranking based on fecal coliform geometric mean for the most recent five-year period for a selected group of surface water monitoring sites near the septic tank area of interest.*
2. *Use a percent violation of the 400 or 800 cfu/100mL fecal coliform standards for the same set of data as used in the first option.*
3. *Adopt the TAT fecal coliform WBID ranking protocol and apply it individually to the different WBIDs in each septic tank failure area.*

Option 3 was selected in large part for the consistency it introduces in the methodology used throughout the tributaries regarding prioritization.

WSEA provided COJ with a comprehensive list of the WBIDs for each of the existing and proposed septic tank failure areas and the percent of each WBID that was within the boundaries for a given failure area. COJ and FDEP used the TAT protocol to rank the list of WBIDs provided by WSEA. For each failure area, the WBID rank score was then multiplied by the percent that WBID constituted in the failure area. Sanitary condition points (1 to 10) were then assigned based on total WBID scores for each of the failure areas. The lower the total WBID score for a failure area, the worse the fecal coliform conditions resulting in a high sanitary conditions point value.

CITY OF JACKSONVILLE ORDINANCE CHAPTER 751 SEPTIC TANK SUPERFUND

Sec. 751.101. Declaration of legislative intent and public policy.

The Council finds and declares that the publicly owned water and sewer system must be expanded into those neighborhoods and subdivisions where septic tank systems have failed so as to create a sanitary nuisance or other conditions affecting the environment and the health, safety and general welfare of the inhabitants of the City. It is further declared that in an area having failing septic tank systems, but which has not been declared a sanitary nuisance by the Director of the Environmental and Compliance Department after consulting with the Director of Duval County Health Department, water and/or sewer service will not be provided unless at least 60% of the property owners signify their desire for the system by signing a letter of intent to make payment of the sewer tap charge, the water pollution control charge, water meter tap fee and water capital recovery fee, if applicable. It is further declared that the costs of constructing sewer collection lines and water distribution lines to septic tank system failure areas, which are declared to be sanitary nuisances are to be borne by all taxpayers since the problems are City-wide. It is further declared that any existing Water and Sewer Enterprise Fund, managed and controlled by JEA, which is being financed by current City utility customers should not be used to rectify septic tank system failure area problems without reimbursement.
(Ord. 87-485-660, § 1; Ord. 91-992-399, § 1; Ord. 93-138-148, § 56; Ord. 2000-119-E, § 1; Ord. 2008-513-E, § 1)

Sec. 751.102. Definitions.

When used in this chapter, unless the context otherwise clearly indicates a different meaning, the following terms shall have the meaning contained below:

(a) *Available as applied to a publicly owned or investor-owned sewerage system* means that the publicly owned or investor-owned sewerage system is capable of being connected to the plumbing of an establishment or residence, is not under a Department of Environmental Protection moratorium, and has adequate permitted capacity to accept the sewage to be generated by the establishment or residence; and

(1) For a residential subdivision lot, a single-family residence, or an establishment, any of which has an estimated sewage flow of 1,000 gallons per day or less, a gravity sewer line to maintain gravity flow from the property's drain to the sewer line, or a low pressure or vacuum sewage collection line in those areas approved for low pressure or vacuum sewage collection, exists in a public easement or right-of-way that abuts the property line of the lot, residence, or establishment.
(2) For an establishment with an estimated sewage flow exceeding 1,000 gallons per day, a sewer line, force main, or lift station exists in a public easement or right-of-way that abuts the property of the establishment or is within 50 feet of the property line of the establishment as accessed via existing rights-of-way or easements.
(3) For proposed residential subdivisions with more than 50 lots, for proposed commercial subdivisions with more than five lots, and for areas zoned or used for an industrial or manufacturing purpose or its equivalent, a sewerage system exists within one-fourth mile of the development as measured and accessed via existing easements or rights-of-way.
(4) For repairs or modifications within areas zoned or used for an industrial or manufacturing purpose or its equivalent, a sewerage system exists within 500 feet of an establishment's or residence's sewer stub-out as measured and accessed via existing rights-of-way or easements.
(b) *Criteria factors* means a prescribed listing of criteria to be applied to the Failed Area List to determine priority of providing service pursuant to Section 751.107.
(c) *Director* means the person directing the water and sewer distribution and collection systems for JEA, or his deputy, division chief, agent or representative, unless a specific reference is made to a named City department.
(d) *EPB* means the Environmental Protection Board.
(e) *Failed Area List* means the most current list of septic tank system failure areas pursuant to Section 751.106.
(f) *Sanitary nuisance* shall have the meaning given in Section 386.01, F.S., and as further defined and interpreted in the criteria factors specified herein.
(g) *Septic tank system* has the same meaning as provided in Section 64E-6, Florida Administrative Code.
(h) *Septic tank system failure areas* means a subdivision or platted subdivision with five or more failing septic tank systems, and which meets a minimum score of 70 percent of the criteria factors, from evaluation of those criteria factors specified herein, by the Director of the Environmental and Compliance Department after consulting with the Director of the Duval County Health Department or designee.
(i) *Sewage lines* means any of the publicly owned regional sewerage system and connections, fittings, collection and pumps including force mains and gravity flow lines.
(j) *STS Fund* means the Septic Tank Superfund.
(k) *Water lines* means any part of the publicly owned water system together with all connections, fittings, valves and pipes.
(Ord. 87-485-660, § 1; Ord. 91-992-399, § 1; Ord. 93-138-148, § 57; Ord. 94-903-552, § 61; Ord. 97-229-E, § 28; Ord. 2000-119-E, § 1; Ord. 2008-513-E, § 1)

Sec. 751.103. Septic Tank Superfund (STS), establishment of.
There is hereby established a *Septic Tank Superfund* (known as the *STS Fund*) of monies collected and received from various sources, as specified in Section 751.104, to be used to provide water and/or sewer service to septic tank system failure areas, that have been declared sanitary nuisances as provided herein and are noted on a Failed Area List.
(Ord. 87-485-660, § 1; Ord. 91-992-399, § 1; Ord. 2000-119-E, § 1)

Sec. 751.104. Sources of funding.

The STS Fund may acquire monies from the Environmental Protection Fund, federal or State grant funds, monies that may be appropriated from revenue bonds and any other monies appropriated by Council.
(Ord. 87-485-660, § 1)

Sec. 751.105. Administration of STS Fund.
The Director of Finance is authorized and directed to make disbursements from this fund upon the written recommendation of the Director of the Environmental and Compliance Department after consulting with the Director of the Duval County Health Department for the sole purpose of providing water or sewer service to areas on the Failed Area List which are presently served or will be served by the city in priority as determined in accordance with the criteria factors.
(Ord. 87-485-660, § 1; Ord. 91-992-399, § 1; Ord. 93-138-148, § 58; Ord. 2000-119-E, § 1; Ord. 2008-513-E, § 1)

Sec. 751.106. Failed Area List.
The Director of the Environmental and Compliance Department shall be responsible for assembling and maintaining a prioritized listing of Septic Tank System Failure Areas (Failed Area List) based upon the criteria factors specified herein, after consulting with the Director of the Duval County Health Department. The Failed Area List shall be submitted to City Council for its review as part of the annual budget process. The Failed Area List shall be updated at least annually. The list shall be promulgated and shall be made available to the public in the Office of the Director of the Environmental and Compliance Department. Any area on the list which has been designated a sanitary nuisance by the Director of the Environmental and Compliance Department after consulting with the Director of the Duval County Health Department shall be identified as such on the list.
(Ord. 87-485-660, § 1; Ord. 93-138-148, § 59; Ord. 2000-119-E, § 1; Ord. 2008-513-E, § 1)

Sec. 751.107. Criteria factors.
Priority of providing sewage lines or water lines to a Septic Tank System Failure Area shall be determined by the Director of the Environmental and Compliance Department in consultation with the Director of the Duval County Health Department, or designee, in accordance with criteria factors developed by the Director of the Environmental and Compliance Department after consulting with the Director Duval County Health Department, or designee, and the Director of the Public Works Department. The criteria factors developed shall include:
1. The number of septic tank system repair permits issued in the area.
2. Average lot size in the area.
3. Soil potential in the area.
4. Seasonal highwater table in the area.
5. Threat to potable water in the area.
6. Sanitary conditions in the area.
7. Proximity of the area to any surface water body.
8. Potential for flooding in the area.

If a Septic Tank System Failure Area has been declared a sanitary nuisance by the Director of the Environmental and Compliance Department after consulting with the Director of the Duval County Health Department, that area automatically shall be given the highest priority for the provision of service. If two or more areas are so declared sanitary nuisances, then the developed criteria factors shall be applied to determine the priority amongst them.
(Ord. 87-485-660, § 1; Ord. 93-138-148, § 60; Ord. 2000-119-E, § 1; Ord. 2008-513-E, § 1)

Sec. 751.108. Provision of sewage service to Septic Tank System Failure Areas.

(a) When the Director of the Environmental and Compliance Department, in consultation with the Director of the Duval County Health Department have ranked the Septic Tank System Failure Areas in accordance with Section 751.107 and sufficient STS Funds are available, the Director shall contact the property owners in the Septic Tank System Failure Area having the highest priority. When at least 60 percent of the property owners in the Septic Tank System Failure Area have agreed to have service provided to their area and each of those property owners has signed a letter of intent to make payment of the sewer tap charge, water pollution control charge, water meter tap fee and capital recovery fee, the Director shall prepare and implement a plan for providing sewage lines to the Septic Tank System Failure Area in accordance with Chapter 122, Part 6.
(b) If, however, a Septic Tank System Failure Area has been declared a sanitary nuisance by the Director of the Environmental and Compliance Department after consultation with the Director of the Duval County Health Department, the Director shall prepare and implement a plan for providing sewage lines without first having to contact the owners in the Septic Tank System Failure Area.
(c) For a failure area where the threat is to drinking water supplies (wells), when notified by the Director of the Environmental and Compliance Department after consultation with the Director of the Duval County Health Department, the Director or designee shall prepare and implement a plan for providing water lines only to the failure area where installation of water lines would be more cost effective than installation of sewage lines to failure area.
(Ord. 87-485-660, § 1; Ord. 91-992-399, § 1; Ord. 93-138-148, § 61; Ord. 2000-119-E, § 1; Ord. 2008-513-E, § 1)

Sec. 751.109. Variances.
Variances to the procedure for the provision of service to a Septic Tank System Failure Area established by this Chapter may be granted as provided in Section 360.111.
(Ord. 87-485-660, § 1; Ord. 2000-119-E, § 1; Ord. 2000-119-E, § 1)

Sec. 751.110. Appeals.
Appeals shall be heard as prescribed in Part 4, Chapter 360.
(Ord. 87-485-660, § 1)

Sec. 751.111. Reimbursement of Water and Sewer Enterprise Fund.
When the STS Fund is created and sufficient funds are available, the first use of the monies available shall be for reimbursement of the Water and Sewer Enterprise Fund, managed and controlled by JEA for the costs of providing water and sewer service.
(Ord. 87-485-660, § 1; Ord. 94-903-552, § 62; Ord. 2000-119-E, § 1)

Sec. 751.112. Mandatory and deferred connections.
(a) The owner of a septic tank system shall connect to a publicly owned or investor-owned sewerage system within 365 days after written notification by the owner of the publicly owned or investor-owned sewerage system that the system is available for connection. In the alternative, said owner may defer such connection as provided in subsection (b) of this Section. The publicly owned or investor-owned sewerage system must notify the owner of the septic tank of the availability of the central sewerage system. No less than one year prior to the date the sewerage system will become available, the publicly owned or investor-owned sewerage system shall notify the affected owner of the septic tank of the anticipated availability of the sewerage system and shall also notify the owner that the owner may be required to connect to the sewerage system within one year of the actual availability. The owner shall have the option of prepaying the amortized value of required connection charges in equal monthly installments over a period of time determined by JEA, based upon sewerage system costs. Nothing in this

Section shall operate to impair contracts or other binding obligations relating to payment schedules in existence as of May 31, 2000.
(b) If the owner has a properly functioning septic tank system and wishes to defer connection to the available publicly owned or investor owned sewerage system in subsection (a), of this Section, such connection may be deferred until such time as the title to the owner's property is sold, conveyed or otherwise transferred. In consideration for such deferral, the owner shall execute an agreement with the City, under which the owner agrees to have a covenant placed upon the deed to owner's property that restricts the sale, conveyance or other transfer of title to the property until such time as connection to the available publicly owned or investor owned sewerage system is made. Said agreement shall also provide that the deferral relates only to connection under this ordinance and that it in no way binds the State of Florida from enforcing mandatory connections to available systems pursuant to Florida law, including Section 381.00655, F.S. Said contract shall be filed in the Official Records of Duval County as notice of such connection requirement. The Director of Public Works is hereby authorized to sign such agreements for the City; provided however that such agreement shall bear attestation from the Corporation Secretary, review and approval from the Director of Administration and Finance and form approval by the Office of General Counsel.
(c) If the owner's septic tank system has failed and the Duval County Health Department will not issue a permit for repair, the owner shall connect to the available publicly owned or investor owned sewerage system within 90 days after notification, by the Duval County Health Department, that the permit will not be issued.
(Ord. 2000-119-E, § 1)

Sec. 751.113. Penalty.
Any person who violates any provision of this Chapter or shall be assessed a civil penalty not to exceed $500 per violation. Each day a violation continues shall constitute a separate violation.
(Ord. 2000-119-E, § 1)

Sec. 751.114. Enforcement.
This Chapter shall be enforced by the Environmental and Compliance Department and Environmental Protection Board pursuant to the provisions of Chapter 360, Part 4 and rules promulgated pursuant thereto.
(Ord. 2000-119-E, § 1; Ord. 2008-513-E, § 1)

Sec. 751.115. Assessment and recovery of civil penalties.
Civil penalties provided for in Section 751.113 may be assessed by the administrative process in Chapter 360, Part 4 and rules promulgated pursuant thereto or, in the alternative, by judicial process in a civil action filed in the name of the City in a court of competent jurisdiction. A civil penalty assessed and owed under this Chapter shall be paid to the Tax Collector for deposit in the Septic Tank Superfund established by Section 751.103. An administratively assessed civil penalty under this Section and Chapter 360, Part 4, may be recovered in a civil action in the name of the City. The City shall be entitled to reasonable attorney’s fees and costs, including appellate fees and costs in actions where the City is successful in recovering civil penalties.
(Ord. 2000-119-E, § 1)

Sec. 751.116. Other relief.
In addition to any penalties assessed and collected under this Chapter, the City, through the Office of General Counsel, may seek injunctive or other appropriate relief in a court of competent jurisdiction to enforce this Chapter or administrative orders issued pursuant to this Chapter and Chapter 360, Part 4.
(Ord. 2000-119-E, § 1)

Sec. 751.117. Interpretation.

Whenever the titles "Director of Environmental and Compliance," "Director of Duval County Health Department," "Director" as the person directing the water and sewer distribution systems for JEA, or "Director of Public Works" are used in this chapter, those titles include the deputies, division chiefs, agents, representatives or designees of each respective director.

(Ord. 2000-119-E, § 1; Ord. 2008-513-E, § 1)

PROGRAMS TO ADDRESS STORMWATER AS SOURCES OF FECAL COLIFORM CONTAMINATION

MS4 CAPITAL AND DRAINAGE SYSTEM REPAIR (DSR) PROJECTS

Between 1997 and 2008, COJ completed numerous MS4 capital improvements at a cost of over $182 million. COJ's current 5-year Capital Improvement Plan (CIP) lists 19 MS4 projects with a total estimated cost of over $95 million, with an additional $167 million in proposed funding beyond FY2012/2013.

In addition to constructing new drainage CIP projects, between 1997 and 2008, COJ has completed over 60 DSR projects at a total cost of over $5 million. It is anticipated that continuing investments will average $500,000 annually for DSR projects.

As demonstrated above the COJ has, is, and will, within approved annual budget limits, construct stormwater collection and treatment facilities.

MS4 MAINTENANCE ACTIVITIES

COJ maintains its MS4 via response to requests received through the Citizen Action Response Effort (CARE) system, as well as through an allocation of approximately $6 million annually for street sweeping, structure and closed conveyance cleaning, and spot repair/replacement projects.

The Department of Public Works' Right-of-Way and Grounds Division responds to an average of 10,000 CARE requests per year. A work order management system to track labor equipment and material costs for each CARE-related work order was implemented in 2007. To date, the work order management system database contains over 9,000 CARE drainage work orders at an average total cost of $550 per work order. This translates into an annual cost of approximately $5.5 million.

In summary, COJ invests approximately $11.5 million annually to maintain its stormwater drainage system. Based on the historical number of CARE-related cases, it is projected that the average annual maintenance costs will remain at the historic levels summarized above. The type and volume of CARE-related maintenance activities and their locations assist DPW in defining future capital improvement and DSR projects.

INSPECTION, SAMPLING, AND ENFORCEMENT ACTIVITIES

Between January 1, 2000, and December 1, 2008, COJ EQD completed 2,876 CARE-initiated inspections citywide. EQD anticipates conducting an annual average of 350 CARE-initiated inspections, described in the *Inspection, Sampling, and Enforcement Activities Report,* for the foreseeable future.

EQD maintains 100 ambient tributary water quality trends and conditions sampling sites citywide. EQD has established a goal of conducting quarterly sampling for these sites.

SSO inspections are initiated via a CARE request or referral by FDEP or JEA. Where the SSO inspection determines the source is from an NPDES-permitted facility, inspection findings are forwarded to FDEP. SSOs found to originate from a private lift station or non-NPDES permitted WWTF are addressed by EQD.

Stormwater Management Plan

Since 2006, COJ, via a contract with a consultant, is updating the Master Stormwater Management Plan (MSMP). The update includes the following:

- *Update stormwater models;*
- *Develop master plan level designs for regional and neighborhood Best Management Plans to reduce flow and improve water quality; and*
- *Develop a Stormwater Utility fee structure and operating budget.*

To date, COJ has invested $3 million in the MSMP. The current CIP includes $2 million to update the MSMP during FY2012/2013. Although this funding is planned, the proposed MSMP update requires budget approval.

MS4 NPDES Program

In conjunction with the MSMP above, COJ had established a Stormwater Compliance Inspection Program to ensure all construction activities comply with its preapproved BMPs. In 1997, COJ along with its copermittees (FDOT, Atlantic Beach, and Neptune Beach) was issued the first MS4 NPDES permit. The permit is now in its third cycle and currently under review by FDEP. Between 1997 and 2007, FDOT has invested approximately $3 to $3.5 million in its NPDES Program. Between 1996 and 2008 COJ has invested approximately $10.9 million in its NPDES Program. Key elements of the work completed during this period include the following:

- *Inventory and mapping of all COJ and FDOT MS4 infrastructure.*
- *Between 1998 and 2007 a citywide Illicit Discharge Detection and Elimination field survey/inspection was conducted to identify all discharges into the watershed.*
- *Implementation of a High Priority Industry Inspection Program.*
- *Development of field inspection tools and protocols to support ongoing illicit discharge and detection by COJ staff.*

During the next 5 years (2009–13) an additional investment of $2.7 million is planned for the NPDES Program. Using the latest GIS and handheld technology, COJ plans to develop and implement tools and practices to enhance current private lift station, septic tank, and high-priority industry inspections and enforcement procedures. In addition, COJ will integrate existing data systems to more effectively address NPDES permit administration as well as comply with LSJR main stem and tributaries BMAP reporting requirements.

Outreach and Education

COJ is actively engaged in many public awareness activities, including the following:

- *Public service announcements on septic tank maintenance and pet waste management;*
- *Educational materials and newsletters to provide a better understanding of ordinances; and*

- *Presentations to groups such as homeowner's associations and Citizen Policy Advisory Committees (CPACs) on the impact of fecal coliform generated by pet waste entering and affecting our waterways.*

Pet Waste Management

In 2004, Sec.462.301 Jacksonville Ordinance Code (JOC) and 2007, Sec. 28.716 JOC, COJ enacted ordinances for the removal and proper disposal of solid waste from pets and animals on private and public properties. Enforcement provisions include monetary penalties up to $250 per violation and imprisonment.

Special Projects and Investigations

In 2005, COJ funded $8,000 to conduct a trial thermal imaging project. The trial project covered three tributary segments: Hogan Creek, Fishing Creek, and Little Pottsburg Creek. Follow-up ground truthing revealed much information on the potential hot spots indentified via thermal imagery. However, water quality information was not collected to substantiate the hot spots as positive fecal coliform sources.

Leveraging the lessons learned during the 2005 study, in conjunction with FDEP, another study was conducted. Using $50,000 in special funding from the Legislature, the study involved the thermal imaging of four creeks routinely contaminated with fecal coliform. This study included preflight and postflight sampling for fecal coliform bacteria by the EQD/FDEP contractor and MST analysis by the University of South Florida. Field verifications and ground truthing will be completed on four WBIDs. The WBIDs included in this study are McCoy Creek, Miramar Creek, Craig Creek, and Big Fishweir Creek.

COJ Potential Illicit Connection Program

The keys to COJ's PIC Program are education and the elimination of illicit discharges. In June 2007, the consulting firm of England-Thims & Miller (ETM), under contract with COJ PWD, began to develop an inventory of PICs while mapping the MS4 system in Duval County. ETM has examined the permits, beginning in 1997, for the cities of Jacksonville, Atlantic Beach, and Neptune Beach, and FDOT. The entire MS4 system was inventoried; however, with constant growth comes constant change. New technologies are being used to make inventory maintenance less time consuming and more economical.

On October 1, 2007, the PIC Program was shifted from PWD to COJ EQD. EQD is currently following up on and resolving the PICs found by ETM during its inventory. EQD is using several handheld Trimble units and a dedicated computer to track progress. ETM created the computer programming, set up the system, and trained EQD staff on its operation.

EQD has the authority to conduct detailed investigations and take enforcement action, if necessary, to resolve the PIC. There are daily reports of new PICs from COJ's CARE system, which is a database that allows anyone to report a PIC or any other problem to COJ. The reports coming in from the CARE system vary greatly, and the PIC staff looks into each one of them.

A typical PIC investigation includes talking to the property owner to gather as much information as possible about the pipe and to formulate a plan and timetable for its removal. If the property owners are cooperative, EQD works in conjunction with them to remove the pipe. If the property owners are not cooperative, EQD is prepared to bring about compliance through the enforcement process. Many of the reported PICs involve swimming pools or washing machines

and are fairly easy to resolve. A small percentage involves an illegal discharge of wastewater, usually from a failing septic system. EQD works with the State Health Department to resolve these issues.

EQD also conducts over 200 industrial inspections a year of high-priority sites. One full-time inspector visits these industries and checks the facilities for areas that might be prone to illegal runoff. After a comprehensive site visit, the inspector will share his findings with facility personnel.

Educational outreach is an essential part of the PIC Program. EQD distributes pamphlets, door hangers, and other educational materials in a variety of ways, including to an individual during an inspection, at homeowner's association meetings, during Earth Day events, and anywhere else where there is an opportunity to get the message across. EQD also works in conjunction with SJRWMD's WAV Program. Information about the program can be found online at www.sjrwmd.com/education/wav/index.html.

FDOT Drainage Connection Program

14-86.001 Purpose. The purpose of this rule chapter is to regulate and prescribe conditions for the transfer of stormwater to the Department of Transportation's right of way as a result of manmade changes to adjacent property(ies), through a permitting process designed to ensure the safety and integrity of the Department of Transportation's facilities and to prevent an unreasonable burden on lower properties. This rule chapter does not regulate dewatering activities.
Specific Authority 334.044(2), (15) FS. Law Implemented 334.044(15) FS. History - New 11-12-86, Amended 1-20-09.

14-86.002 Definitions. As used in this rule chapter the following terms shall have the following meanings:
(1) "Adjacent Property" means any real property or easement with a shared boundary to the Department's right of way.
(2) "Applicant" means the owner of adjacent property or the owner's authorized representative.
(3) "Applicable Water Quality Standards" means rules and regulations of state or federal governmental entity(ies) pertaining to stormwater discharges from the Department's facilities to which the drainage connection is made.
(4) "Approved Stormwater Management Plan" or "Master Drainage Plan" means a plan adopted or approved by a city, county, water management district, or other agency with specific drainage or stormwater management authority provided that:
(a) Such plan is actively being implemented;
(b) Any required construction is substantially complete;
(c) Downstream mitigation measures have been provided for in the plan; and
(d) The use of any Department facilities either existing or planned, which are part of such plan, have been approved by the Department.
(5) "Closed Basin" means a basin without any positive outlet, for the design storms applicable to this rule.
(6) "Critical Duration" means the length of time of a specific storm frequency which creates the largest volume or highest rate of net stormwater runoff (post-improvement runoff less pre-improvement runoff) for typical durations up through and including the 10-day duration for closed basins and up through the 3-day duration for basins with positive outlets. The critical duration for a given storm frequency is determined by calculating the peak rate and volume of stormwater runoff for various storm durations and then comparing the pre-improvement and post-improvement conditions for each of the storm durations. The duration resulting in the

highest peak rate or largest net total stormwater volume is the "critical duration" storm (volume is not applicable for basins with positive outlets).
(7) "Department" means the Florida Department of Transportation.
(8) "Discharge" means the event or result of stormwater draining or otherwise transferring from one property to another or into surface waters.
(9) "Drainage Connection" means any structure, pipe, culvert, device, paved or unpaved area, swale, ditch, canal, or other appurtenance or feature, whether naturally occurring or created, which is used or functions as a link to convey stormwater.
(10) "Facility" or "Facilities" means anything built, installed, or maintained by the Department within the Department's right of way.
(11) "Impervious Area" means surfaces which do not allow, or minimally allow, the penetration of water. Examples of impervious areas are building roofs, all concrete and asphalt pavements, compacted traffic-bearing areas such as limerock roadways, lakes, wet ponds, pond liners, and other standing water areas, including some retention/detention areas.
(12) "Improvement" means any man-made change(s) to adjacent property.
(13) "Licensed Professional" means an individual licensed by a Florida professional licensing board, authorized by law to design and certify the stormwater management system under review.
(14) "Man-made Change" means any intentional physical change to or upon adjacent property resultant from an intentional physical change, which establishes or alters the rate, volume, or quality of stormwater.
(15) "Permit" or "Drainage Connection Permit" means an authorization to establish or alter a drainage connection to the Department's right of way issued pursuant to this rule chapter.
(16) "Permittee" means the individual or entity to which a Drainage Connection Permit is issued.
(17) "Positive Outlet" means a point of stormwater runoff into surface waters which under normal conditions would drain by gravity through surface waters ultimately to the Gulf of Mexico, or the Atlantic Ocean, or into sinks, closed lakes, or recharge wells provided the receiving waterbody has been identified by the appropriate Water Management District as functioning as if it recovered from runoff by means other than transpiration, evaporation, percolation, or infiltration.
(18) "Post-improvement" means the condition of property after improvement.
(19) "Pre-improvement" means the condition of property:
(a) Before November 12, 1986; or
(b) On or after November 12, 1986, with connections which have been permitted under this rule chapter or permitted by another governmental entity based on stormwater management requirements equal to or more stringent than those in this rule chapter.
(20) "Right of Way" means land in which the Department owns the fee or less than the fee, or for which the Department has an easement, devoted to or required for use as a transportation or stormwater management facility.
(21) "Stormwater" or "Stormwater Runoff" means the flow of water which results from and occurs immediately following a rainfall event.
(22) "Stormwater Management System" means a system which is designed and constructed or implemented to control stormwater, incorporating methods to collect, convey, store, infiltrate, treat, use, or reuse stormwater to prevent or reduce flooding, overdrainage, pollution, and otherwise affect the quantity or quality of stormwater in the system.
(23) "Surface Water" means water upon the surface of the earth whether contained in bounds created naturally or artificially or diffused. Water from natural springs shall be classified as surface water when it exits onto the earth's surface.
(24) "Watershed" means the region draining or contributing water to a common outlet, such as a stream, lake, or other receiving area.

Specific Authority 334.044(2), (15) FS. Law Implemented 334.044(15) FS. History - New 11-12-86, Amended 1-20-09.

14-86.003 Permit, Assurance Requirements, and Exceptions.

(1) Permit.

(a) No permits are required for properties without improvements on or after November 12, 1986.

(b) All improvements on or after November 12, 1986, require a Drainage Connection Permit, Form 850-040-06 (10/08), whether or not the work is done in conjunction with a driveway connection, and whether or not the improvement retains stormwater runoff on the adjacent property up to and including the 100 year event of critical duration.

(2) Assurance Requirements.

(a) The applicant for a drainage connection permit shall provide reasonable assurances that:

1. The peak discharge rates and total volumes of stormwater discharging from the adjacent property to the Department's right of way are those provided for in an approved stormwater management plan or master drainage plan; otherwise the post-improvement stormwater runoff discharging from the adjacent property to the Department's right of way shall not exceed the more stringent of the following:

a. The peak discharge rates and total volumes allowed by applicable local regulation; or

b. The improvement shall not increase stormwater discharge rate above the pre-improvement discharge rate, and in watersheds which do not have a positive outlet, the post-improvement total volume of stormwater runoff shall not be increased beyond the pre-improvement volume considering worst case storms for up to the frequencies and durations contained in paragraph 14-86.003(2)(c), F.A.C.

2. Any discharge pipe establishing or constituting a drainage connection to the Department's right of way is limited in size based on the pre-improvement discharge rate, downstream conveyance limitations, downstream tailwater influences, and design capacity restrictions imposed by other governmental entities.

3. If the improvement changes the inflow pattern of stormwater or method of drainage connection to the Department's right of way, post-improvement discharge will not exceed the pre-improvement discharge to the Department's right of way, any new drainage connection will not threaten the safety or integrity of the Department's right of way, and will not increase maintenance costs to the Department. At a minimum pavement hydraulics, ditch hydraulics, storm drain hydraulics, cross drain hydraulics, and stormwater management facilities shall be analyzed. The analysis must follow the methodology used in the design of the Department's facilities receiving the discharge and meet the criteria in chapters 2, 3, 4, and 6 of the Department's *Drainage Manual*, Topic Number 625-040-002-c, May 2008, incorporated herein by reference. The *Drainage Manual* is available from the Department at: http://www.dot.state.fl.us/rddesign/dr/Manualsandhandbooks.shtm.

4. The quality of water conveyed by the connection meets all applicable water quality standards, and such assurance shall be certified in writing. In the event the discharge is identified causing or contributing to a violation of applicable water quality standards, the permittee will be required to incorporate such abatement as necessary to bring the permittee's discharge into compliance with applicable standards.

(b) If the requirements set forth in paragraph 14-86.003(2)(a), F.A.C., cannot be fully complied with, the applicant may submit alternative drainage connection designs. The analysis supporting the proposed alternative connection must follow the methodology used in the design of the Department's facilities receiving the proposed alternative drainage connection and meet the criteria in chapters 2, 3, 4, and 6 of the Department's *Drainage Manual*. Deviation from a standard in the *Drainage Manual* must be approved by the District Drainage Engineer. Acceptance of any alternative design must serve the purpose of this rule chapter and shall be based upon consideration of the following:

1. The type of stormwater management practice proposed;
2. The efficacy and costs of alternative controls;
3. The impact upon the operation and maintenance of the Department's facilities; and
4. The public interest served by the drainage connection.
(c) In providing reasonable assurances, the applicant shall:
1. Use a methodology which is compatible with the methodology employed in the design of the Department's facilities receiving the stormwater;
2. Determine the peak discharge rates considering various rainfall event frequencies up to and including a 100 year event of critical duration of up to three days; and
3. In watersheds without a positive outlet, determine the stormwater runoff total volumes considering various rainfall amounts up to a 100 year rainfall frequency of critical durations of up to ten days. The pond retention volume must recover at a rate such that one-half of the volume is available in seven days with the total volume available in 30 days, with a sufficient amount recovered within the time necessary to satisfy applicable water treatment requirements.
(3) Exceptions. The following exceptions do not require a Drainage Connection Permit:
(a) Improvements to adjacent properties not draining to the Department's right of way in the pre-improvement and post-improvement condition.
(b) Single-family residential improvements which are not part of a larger common plan of improvement or larger common plan of sale.
(c) Agricultural and silvicultural improvements that:
1. Are subject to regulation by the Department of Environmental Protection or regional Water Management Districts;
2. Are exempt under the provisions of Section 373.406, F.S.; or
3. Are implementing applicable best management practices adopted by the Florida Department of Agriculture and Consumer Services in Rule Chapter 5M, F.A.C., or Rule Chapter 5I-6, F.A.C.
(d) Any other improvement, provided that all of the following apply:
1. The total impervious area, after improvement, is less than 5,000 square feet of cumulative impervious area and is less than 40% of that portion of the property that naturally drained to the Department's right of way;
2. The improvement does not create or alter a drainage connection;
3. The improvement does not change flow patterns of stormwater to the Department's right of way, and does not increase the surface area draining to the Department's right of way;
4. The property is located in a watershed which has a positive outlet; and
5. The site or improvement is not part of a larger common plan of improvement or larger common plan of sale. (4) An exception provided in subsection 14-86.003(3), F.A.C., shall not apply if any drainage connection from the adjacent property threatens the safety and integrity of the Department's facilities or creates an unreasonable burden on lower properties, including violations of applicable water quality standards.
Specific Authority 334.044(2), (15) FS. Law Implemented 334.044(15) FS. History - New 11-12-86, Amended 1-20-09.

14-86.004 Permit Application Procedure.
(1) An applicant shall submit a Drainage Connection Permit, Form 850-040-06 (10/08), incorporated herein by reference. This form may be obtained from any of the Department's local area Maintenance Offices, District Offices, or on the internet at the Department's website: http://www.dot.state.fl.us/onestoppermitting/.
(2) The applicant shall submit four completed Drainage Connection Permits packages. Each completed Drainage Connection Permit package shall include all applicable attachments. All applicable plans and supporting documentation shall be submitted on no larger than 11" X 17" multipurpose paper and included in PDF format on a compact disk.
(3) The Drainage Connection Permit shall be accompanied by:

(a) A location map, included in the construction plans, sufficient to show the location of the improvement and any drainage connection to the Department's right of way, and shall include the state highway number, county, city, and section, range, and township.
(b) A grading plan drawn to scale showing pre-improvement and post-improvement site conditions including all pervious and impervious surfaces, land contours, spot elevations, and all drainage facilities of the Department and of the adjacent property. The bench mark datum for the plans (whether NGVD 29 or NAVD 88) shall be noted on the plans. Contour information shall extend 50 feet beyond the property boundaries or be sufficient to clearly define the portion of the watershed which drains through the property to the Department's right of way.
(c) Photographs which accurately depict pre-improvement and present conditions.
(d) Soil borings and water table data and, where percolation or infiltration is utilized in the design, appropriate percolation test methodology and results.
(e) Computations as required by subsection 14-86.003(2), F.A.C.
(f) The Drainage Connection Certification, Part 2 of the permit must be certified by a Licensed Professional that the complete set of plans and computations comply with either paragraph 14-86.003(2)(a) or 14-86.003(2)(b), F.A.C.
(4) Improvements which otherwise meet the criteria of subparagraphs 14-86.003(3)(d)1. and 14-86.003(3)(d)4., F.A.C., but which create or alter a drainage connection to the Department's right of way, will not require submittal of the information required by paragraphs 14-86.004(3)(d) through (f), F.A.C., but will otherwise require the submittal of all other required information.
(5) The Department recognizes that regulatory and permitting programs exist or may be developed in the future by local units of government, and state or federal agencies which may overlap with some or all of the requirements of this rule chapter. In order to avoid duplication the Department will:
(a) In lieu of the requirements in Rule 14-86.003 and subsection 14-86.004(3), F.A.C., accept a permit that accomplishes the purposes of this rule chapter so long as the permit is issued by a governmental entity with specific stormwater management authority and is based on requirements equal to or more stringent than those in Rule 14-86.003, F.A.C.; or
(b) Accept any form, plans, specifications, drawings, calculations, or other data developed to support an application for a permit required by a governmental entity, pursuant to any rule which establishes requirements equal to or more stringent than Rule 14-86.003, F.A.C.
(6) The Drainage Connection Permit serves as the application. Once approved by the Department, the form and supporting documents become the Drainage Connection Permit.
Specific Authority 334.044(2), (15) FS. Law Implemented 334.044(15) FS. History - New 11-12-86, Amended 1-20-09.

14-86.005 General Conditions for a Drainage Permit.
(1) A Drainage Connection Permit does not exempt the permittee from meeting all other applicable regulations and ordinances governing stormwater management.
(2) All work done in conjunction with the drainage connection permit shall meet and adhere to all general and specific conditions and requirements contained on the Permit.
(3) Within 15 working days after completion of the work authorized by an approved Drainage Connection Permit, the permittee shall notify the Department in writing of the completion; and for all design work that originally required certification by a Licensed Professional, this notification shall contain the As Built Certification, Part 8 of the Permit. The certification shall state that work has been completed in substantial compliance with the Drainage Connection Permit.
(4) The permittee or property owner, will be required to reimburse the Department for any fines, penalties and costs, e.g., abatement costs, mitigation costs, remediation costs, etc. incurred by the Department in the event the permittee's discharge fails to meet the applicable water

quality standards or minimum design and performance standards contrary to the permittee's assurances provided in subsection 14-86.003(2), F.A.C.
Specific Authority 334.044(2), (15) FS. Law Implemented 334.044(15) FS. History - New 11-12-86, Amended 1-20-09.

14-86.006 Permit Suspension or Revocation. A permit will be suspended or revoked if:
(1) The permitted drainage connection is not constructed, operated, or maintained in accordance with the permit;
(2) Emergency conditions or hazards exist;
(3) False or misleading information is submitted to the Department in the Drainage Connection Permit package;
(4) Another governmental entity revokes or suspends a permit which was the basis upon which a Department Drainage Connection Permit was obtained;
(5) The As-built Certificate required for the Drainage Connection Permit is not submitted in accordance with subsection 14-86.005(3), F.A.C.
(6) Any discharge above the permitted design discharge.
Specific Authority 334.044(2), (15) FS. Law Implemented 334.044(15) FS. History - New 11-12-86, Amended 1-20-09.

14-86.007 Forms.
Specific Authority 334.044(2) FS. Law Implemented 120.53(1)(b), 120.60, 334.03(17), (22), 334.035, 334.044(1), (12), (13), (27), 335.04(2), 335.10(2), 339.155(2)(a), (f) FS. History - New 11-12-86, Repealed 1-20-09.

Appendix F: Walk the WBID Guidelines

Walk the WBIDs is a field reconnaissance effort to gain a better understanding of a watershed, including the hydrology of the creek and its 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 WBIDs in which the source(s) of the fecal coliform loading are not readily apparent. The following provides guidelines, based on past efforts, for organizing and conducting a Walk the WBID exercise to gain additional information for the tributaries in this BMAP.

Initial Steps

Before going into the field, the lead entity should hold a data review meeting with other entities. Each entity provides available information about the WBID to better acquaint themselves with the conditions in the watershed. This information includes GIS data, infrastructure maps, and the WBID-specific technical report (available from FDEP). After this review, the lead entity conducts a preliminary reconnaissance of the WBID to identify areas of focus and to determine appropriate routes for the Walk the WBID effort.

Once the lead entity has gained a better understanding of the WBID, the Walk the WBID 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 OSTDS are common in the WBID (based on the number of repaired permits issued), it would be beneficial to include DCHD on the team, since it can access private property to inspect a septic tank. Depending on the potential sources, not all entities need to participate in the field exercise and should 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 entities in case an incident is observed while in the field that should be reported.

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 WBID. Based on past efforts, a maximum of two WBIDs can be walked in one day.

Walk the WBID Field Reconnaissance

The Walk the WBID team should have large-format WBID maps while conducting the field investigations, including WBID boundary, roads, stormwater infrastructure, sewer infrastructure, potential septic tank locations, National Hydrography Dataset (NHD), and jurisdictional boundaries when appropriate. A GPS unit, camera, and notepad are essential for obtaining the coordinate 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 creek above and below ground, where the creek branches or is piped underground. The team should look in the banks for exposed pipes and along the vicinity of the creek for potential sources. Canals/ditches that intersect the waterbody should also be walked to ensure that the waterbody and its associated branches are all included within the WBID boundary.

The team should also investigate any potential sources. This can include identifying sewer infrastructure (manholes and pump stations) and inspecting for signs of recent overflows, MS4 conveyances that need cleaning, failing septic tanks, evidence of wildlife, heavy tree cover or

vegetated ditches, evidence of homeless populations, and pet and livestock sources. Care should be taken to ensure that only appropriate entity representatives access private property, unless the property owner has offered access to the entire team.

Any potential sources identified while in the field should be properly reported. The lead entity will keep a record of major findings during the Walk the WBID effort, including observations about the waterbody, potential sources, followed-up items and the responsible entity, as well as any areas that should be added to the monitoring plan.

FOLLOW-UP ACTIVITIES

After the Walk the WBID field visit, the lead entity will provide a write-up to FDEP summarizing the findings, which should include the following components:

1. *Identification of the WBID 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 will be used in the BMAP annual progress report. In addition, the lead entity should hold a meeting with the data review team to determine the status of issues identified in the field that other entities were responsible for addressing. The resolutions for these follow-up activities will be included in the Walk the WBID write-up.

The Walk the WBID team should also review the monitoring plan for the tributary and determine if adjustments need to be made to the sampling locations based on the field observations. Updated station locations and monitoring responsibilities will also be reported to FDEP.

Appendix G: Glossary of Terms

303(d) List: The list of Florida's waterbodies that do not meet or are not expected to meet applicable water quality standards with technology-based controls alone.

305(b) Report: Section 305(b) of the federal Clean Water Act requires states to report biennially to the EPA on the quality of the waters in the state.

Allocation Technical Advisory Committee (ATAC): The Watershed Restoration Act of 1999 required FDEP to form a Technical Advisory Committee to address issues relating to the allocation of load reductions among point source and nonpoint source contributors. The ATAC was therefore formed in order to develop recommendations for a report to the legislature on the process for allocating TMDLs.

Background: The condition of waters in the absence of human-induced alterations.

Baffle box: An underground stormwater management device that uses barriers (or baffles) to slow the flow of untreated stormwater, allowing particulates to settle out in the box before the stormwater is released into the environment.

Baseline period: A period of time used as a basis for later comparison.

Baseline loading: The quantity of pollutants in a waterbody, used as a basis for later comparison.

Basin Management Action Plan (BMAP): The document that describes how a specific TMDL will be implemented; the plan describes the specific load and wasteload allocations as well as the stakeholder efforts that will be undertaken to achieve an adopted TMDL.

Basin Status Report: For the LSJR Basin, this document was published in June 2002 by FDEP. The report documents the water quality issues, list of water segments under consideration for a TMDL and data needs in the basin.

Best Available Technology (BAT) Economically Achievable: As defined by 40 CFR, §125.3, outlines technology-based treatment requirements in permits.

Best Management Practices (BMPs): Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from nonpoint sources.

City of Jacksonville (COJ): An incorporated city in northeast Florida, some of which lies in the St. Johns River Basin.

Coliforms: Bacteria that live in the intestines (including the colon) of humans and other animals, used as a measure of the presence of feces in water or soil.

Clean Water Act (CWA): The Clean Water Act is a 1977 amendment to the Federal Water Pollution Control Act of 1972, which set the basic structure for regulating discharges of pollutants to waters of the United States.

Continuous deflective separation (CDS) Unit: A patented stormwater management device that uses the available energy of the storm flow to create a vortex to cause a separation of

solids from fluids. Pollutants are captured inside the separation chamber, while the water passes out through the separation screen.

Designated use: Uses specified in water quality standards for each waterbody or segment (such as drinking water, swimmable, fishable).

Detention Pond: A stormwater system that delays the downstream progress of stormwater runoff in a controlled manner, typically by using temporary storage areas and a metered outlet device.

Domestic Wastewater: Wastewater derived principally from dwellings, business buildings, institutions and the like; sanitary wastewater; sewage.

Dry Season: The dry part of the year when rainfall is low; in the LSJR Basin the dry season is defined as November through May.

Effluent: Wastewater that flows into a receiving stream by way of a domestic or industrial discharge point.

Environmental Protection Agency (EPA): The agency was created in December 1970 to address the nation's urgent environmental problems and to protect the public health. The majority of FDEP's regulatory programs has counterparts at the EPA or is delegated from the EPA.

Event mean concentration: The flow-weighted mean concentration of an urban runoff pollutant measured during a storm event.

Exfiltration: Loss of water from a drainage system as the result of percolation or absorption into the surrounding soil.

External loading: Pollutants originating from outside a waterbody that contribute to the pollutant load of the waterbody.

Flocculent: A liquid that contains loosely aggregated, suspended particles.

Florida Department of Environmental Protection (FDEP): FDEP is Florida's principal environmental and natural resources agency. The Florida Department of Natural Resources and the Florida Department of Environmental Regulation were merged together to create FDEP effective July 1, 1993.

Ground Water or Groundwater: Water below the land surface in the zone of saturation where water is at or above atmospheric pressure.

Impairment: The condition of a waterbody that does not achieve water quality standards (designated use) due to pollutants or an unknown cause.

Jacksonville Electric Authority (JEA): A large electric and water utility that operates in Duval and St. Johns Counties.

Load Allocations (LA): The portions of a receiving water's loading capacity that are allocated to one of its existing or future nonpoint sources of pollution.

Load Capacity: The greatest amount of loading that a waterbody can receive without violating water quality standards.

Loading: The total quantity of pollutants in stormwater runoff that contributes to the water quality impairment.

Lower Basin: When used in northeast Florida, commonly refers to the LSJR Basin.

Margin of safety (MOS): An explicit or implicit assumption used in the calculation of a TMDL, which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality. An explicit MOS is typically a percentage of the assimilative capacity or some other specific amount of pollutant loading (e.g., the loading from an out-of-state source). Most FDEP-adopted TMDLs include an implicit MOS based on the fact that the predictive model runs incorporate a variety of conservative assumptions (they examine worst-case ambient flow conditions, worst-case temperature, and assume that all permitted point sources discharge at their maximum permittable amount).

National Pollutant Discharge Elimination System (NPDES): The permitting process by which technology based and water quality–based controls are implemented.

Nonpoint Source (NPS): Diffuse runoff without a single point of origin that flows over the surface of the ground by stormwater and is then introduced to surface or ground water. NPS includes atmospheric deposition and runoff or leaching from agricultural lands, urban areas, unvegetated lands, OSTDS, and construction sites.

Nonpoint Source Pollution: Nonpoint source pollution is created by the flushing of pollutants from the landscape by rainfall and the resulting stormwater runoff, or by the leaching of pollutants through the soils into the ground water.

Organic Matter: Carbonaceous waste contained in plant or animal matter and originating from domestic or industrial sources.

Outfall: The place where a sewer, drain, or stream discharges.

Particulate: A minute separate particle, as of a granular substance or powder.

Pollutant Load Reduction Goals (PLRGs): PLRGs are defined as the estimated numeric reductions in pollutant loadings needed to preserve or restore designated uses of receiving waterbodies and maintain water quality consistent with applicable state water quality standards. PLRGs are developed by the water management districts.

Point Source: An identifiable and confined discharge point for one or more water pollutants, such as a pipe, channel, vessel, or ditch.

Pollutant: Generally any substance, such as a chemical or waste product, introduced into the environment that adversely affects the usefulness of a resource.

Pollution: An undesirable change in the physical, chemical, or biological characteristics of air, water, soil, or food that can adversely affect the health, survival, or activities of humans or other living organisms.

Removal efficiency: A description of how much of a given substance (metals, sediment, etc.) has been extracted from another substance.

Retention Pond: A stormwater management structure whose primary purpose is to permanently store a given volume of stormwater runoff, releasing it by infiltration and /or evaporation.

Reuse: The deliberate application of reclaimed water for a beneficial purpose. Criteria used to classify projects as "reuse" or "effluent disposal" are contained in Subsection 62-610.810, F.A.C.

Runoff curve: A calculated number representing the percentage of rainfall that becomes runoff for a given area.

Quality Assurance (QA): An integrated system of management activities involving planning, implementation, documentation, assessment, reporting, and quality improvement to ensure that a process, product, or service meets defined standards of quality.

Quality Control (QC): The overall system of technical activities that measures the attributes and performance of a process, product, or service against defined standards to verify that they meet the established data quality objectives.

Septic Tank: A watertight receptacle constructed to promote the separation of solid and liquid components of wastewater, to provide the limited digestion of organic matter, to store solids, and to allow clarified liquid to discharge for further treatment and disposal in a soil absorption system.

STORET: The EPA's STOrage and RETrieval database, used nationally for water quality data storage.

Stormwater: Water that results from a rainfall event.

Stormwater runoff: The portion of rainfall that hits the ground and is not evaporated, percolated, or transpired into vegetation, but rather flows over the ground surface seeking a receiving water body.

Submersed: Growing or remaining under water.

Surface Water: Water on the surface of the earth, whether contained in bounds created naturally or artificially or diffused. Water from natural springs is classified as surface water when it exits the spring onto the earth's surface.

Surface Water Improvement and Management (SWIM) Waterbody: A waterbody designated by statute or by a water management district for priority management to restore and maintain water quality, habitat, and other natural features of the waterbody. The LSJR Basin has this special designation.

Total Maximum Daily Load (TMDL): The sum of the individual wasteload allocations for point sources and the load allocations for nonpoint sources and natural background. Prior to determining individual wasteload allocations and load allocations, the maximum amount of a pollutant that a waterbody or waterbody segment can assimilate from all sources while still

maintaining its designated use must first be calculated. TMDLs are based on the relationship between pollutants and instream water quality conditions.

Wasteload Allocations (WLAs): Pollutant loads allotted to existing and future point sources, such as discharges from industry and sewage facilities.

Wastewater: The combination of liquid and pollutants from residences, commercial buildings, industrial plants, and institutions, together with any ground water, surface runoff, or leachate that may be present.

Waterbody Identification (WBID) Numbers: WBIDs are numbers assigned to hydrologically based drainage areas in a river basin.

Water column: The water within a waterbody between the surface and sediments.

Water Quality Index: Determines the quality of Florida's streams, blackwaters, and springs. Categories include water clarity, dissolved oxygen, oxygen-demanding substances, nutrients, bacteria, and macroinvertebrate diversity.

Water Quality Standards (WQSs): (1) Standards that comprise the designated most beneficial uses (classification of water), the numeric and narrative criteria applied to the specific water use or classification, the Florida Anti-degradation Policy, and the moderating provisions contained in Rules 62-302 and 62-4, F.A.C. (2) State-adopted and EPA-approved ambient standards for waterbodies. The standards prescribe the use of the waterbody (such as drinking, fishing and swimming, and shellfish harvesting) and establish the water quality criteria that must be met to protect designated uses.

Watershed: Topographic area that contributes or may contribute runoff to specific surface waters or an area of recharge.

Watershed management approach: The process of addressing water quality concerns within their natural boundaries, rather than political or regulatory boundaries. The process draws together all the participants and stakeholders in each basin to decide what problems affect the water quality in the basin, which are most important, and how they will be addressed.

Wet Season: The rainy part of the year; in the LSJR Basin the wet season is defined as June through October.

Appendix H: Bibliography of Key References and Websites

KEY REFERENCES:

Amick, R., and E. Burgess. March 2003. *Exfiltration in sewer systems.* Cincinnati, OH: U.S. Environmental Protection Agency, National Risk Management Research Laboratory. EPA/600/SR-01/034. Available: http://www.epa.gov/nrmrl/pubs/600r01034/600sr01034.pdf.

Anderson, K.L., J.E. Whitlock, and V.J. Harwood. 2005. Persistence and differential survival of fecal indicator bacteria in subtropical waters and sediments. *Applied and Environmental Microbiology 71:3041-3048.*

Bergman, M.J. 1992. *Lower St. Johns River Basin reconnaissance: Surface water hydrology.* Vol. 2. St. Johns River Water Management District. Technical Publication SJ 92–1.

Brown and Caldwell. September 2005. *Status report on the development of a reporting methodology for surface discharges of sewage.* Irvine, CA. Prepared for the Orange County Sanitation District.

Brownell, M.J., V.J. Harwood, R.C. Kurz, S.M. McQuaig, J. Lukasik, and T.M. Scott. 2007. Confirmation of putative stormwater impact on water quality at a Florida beach by microbial source tracking methods and structure of indicator organism populations. *Water Research 41:3747-3757.*

CDM. 2006. Quality Assurance Project Plan, *Stormwater monitoring program for Upper Deer Creek Wet Detention Pond, Jacksonville, FL.*

Davies, C.M., J.A. Long, M. Donald, and N.J. Ashbolt. 1995. Survival of fecal microorganisms in marine and freshwater sediments. *Applied and Environmental Microbiology 61:1888-1896.*

Eleria, A., and R.M. Vogel. 2005. Predicting fecal coliform bacteria levels in the Charles River, Massachusetts, USA. *Journal of the American Water Resources Association 1769 41:1195-1209,*

FDEP. 2002. *Basin status report: Lower St. Johns*. Tallahassee, FL: Bureau of Watershed Management.

FDEP and SJRWMD. 2001. *Development of Total Maximum Daily Loads and Pollutant Load Reduction Goals for the Lower St. Johns River Basin: Plan of Study*. Palatka, FL.

Mallin, M.A., L.B. Cahoon, B.R. Toothman, D.C. Parsons, M.R. McIver, M.L. Ortwine, and R.N. Harrington. 2007. Impacts of a raw sewage spill on water and sediment quality in an urbanized estuary. *Marine Pollution Bulletin 54:81-88.*

McDowell, W., C. Brick, M.Clifford, M. Frode-Hutchins, J. Harvala, and K. Knudsen. 2005. *Septic system impact on surface waters: A review for the inland Northwest*. Tri-State Water Quality Council.

National Environmental Service Center. 2006. *Community onsite options: Wastewater management in the new millennium and approaches to onsite management. Community perspectives.* Morgantown, WV: West Virginia University.

Nicosia, L., J.B. Rose, L. Stark, and M. Stewart. 2001. Ground water quality. *Journal Environmental Quality 30:1933-1939.*

PBS&J. November 2007. *Newcastle Creek technical report (WBID 2235).* Prepared for the Florida Department of Environmental Protection, Tallahassee, FL.

PBS&J. March 2008. *Hogan Creek technical report (WBID 2252).* Prepared for the Florida Department of Environmental Protection, Tallahassee, FL.

PBS&J. April 2008. *Butcher Pen Creek technical report (WBID 2322).* Prepared for the Florida Department of Environmental Protection, Tallahassee, FL.

PBS&J. May 2008. *Miller Creek technical report (WBID 2287).* Prepared for the Florida Department of Environmental Protection, Tallassee, FL.

PBS&J. June 2008a. *Miramar Creek technical report (WBID 2304).* Prepared for the Florida Department of Environmental Protection, Tallassee, FL.

PBS&J. June 2008b. *Big Fishweir Creek technical report (WBID 2280).* Prepared for the Florida Department of Environmental Protection, Tallassee, FL.

PBS&J. July 2008. *Deer Creek technical report (WBID 2256).* Prepared for the Florida Department of Environmental Protection, Tallassee, FL.

PBS&J. August 2008a. *Terrapin Creek technical report (WBID 2204).* Prepared for the Florida Department of Environmental Protection, Tallassee, FL.

PBS&J. August 2008b. *Goodbys Creek technical report (WBID 2326).* Prepared for the Florida Department of Environmental Protection, Tallassee, FL.

PBS&J. September 2008. *Open Creek technical report (WBID 2299).* Prepared for the Florida Department of Environmental Protection, Tallassee, FL.

Tyler, D. 2006. *Draft fecal and total coliform TMDL for Wagner Creek (WBID 3288A).* Tallassee, FL: Florida Department of Environmental Protection, Division of Water Resource Management, Bureau of Watershed Management.

U.S. Soil Conservation Service. 1986. *Urban hydrology for small watersheds*. Report No. Technical Release 55, U.S. Department of Agriculture.

Stormwater and Water Quality Protection Websites:

Table H-1: Stormwater and Water Quality Protection Websites

Entity/Program	URL
Local and Regional Sites	
SJRWMD WAV Program	http://www.sjrwmd.com/education/wav/index.html
JEA *JEA FOG Program Workshop*	http://www.jea.com/ http://www.jea.com/about/pub/downloads/fog/FOGTrainingSlideShow.pdf
COJ	http://www.coj.net/Departments/Environmental+and+Compliance/Environmental+Quality/Water+Quality.htm
LSJR Technical Advisory Committee	http://www.lsjr.org/
State Sites	
General Portal for Florida	http://www.myflorida.com
FDEP *Watershed Management* *TMDL Program* *BMPs, public information* *NPDES Stormwater Program* *NPS funding assistance* *Surface Water Quality Standards* *LSJR Basin Water Quality Assessment Report*	http://www.dep.state.fl.us/ http://www.dep.state.fl.us/water/watersheds/index.htm http://www.dep.state.fl.us/water/tmdl/index.htm http://www.dep.state.fl.us/water/nonpoint/pubs.htm http://www.dep.state.fl.us/water/stormwater/npdes/index.htm http://www.dep.state.fl.us/water/nonpoint/319h.htm http://www.dep.state.fl.us/legal/Rules/shared/62-302/62-302.pdf http://www.dep.state.fl.us/water/basin411/sj_lower/assessment.htm
FDOH *Standards for OSTDS*	http://www.doh.state.fl.us http://www.doh.state.fl.us/environment/ostds/pdfiles/forms/64e620070924.pdf
National Sites	
Center for Watershed Protection	http://www.cwp.org/
EPA Office of Water *EPA Region 4 (southeast United States)* *EPA SSO Fact Sheet*	http://www.epa.gov/water http://www.epa.gov/region4 http://www.epa.gov/npdes/sso/control/