FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

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RICK SCOTT
GOVERNOR

CARLOS LOPEZ-CANTERA
LT. GOVERNOR

JONATHAN P. STEVERSON
SECRETARY

Sent via ePost

July 15, 2016

Shauna Jones
MS4 Project Coordinator
3363 West Park Place
Pensacola, FL 32505

Subject: Escambia County Municipal Separate Storm Sewer System (MS4)
NPDES Permit Nos. FLS000019 (Cycle 3)
Escambia County Request for Approval of Bacteria Pollution Control Plan (BPCP)
Approval of BPCP for Carpenter Creek (WBID 676)

Thank you for submitting for approval the Bacteria Pollution Control Plan (BPCP) for Carpenter Creek (WBID 676) for fecal coliform impairment as required by Part VIII.B.4 of your current NPDES MS4 stormwater permit. We are pleased to approve the BPCP for Carpenter Creek, as submitted June 29, 2016. A copy of the approved plan is enclosed.

This permit TMDL activity approval also applies to the co-permittees The City of Pensacola and Florida Department of Transportation District 3, which collaborated in the development of this BPCP.

If you have any questions or need any assistance, please contact me at (850) 245-8568 or Stephen.Cioccia@dep.state.fl.us

Sincerely,

Stephen Cioccia

Stephen Cioccia
NPDES Stormwater Program

Enclosure: Bacteria Pollution Control Plan (BPCP) for Carpenter Creek (WBID 676)

Addressee: Joy Blackmon, P.E., Escambia County
Ashton J. Hayward, III, Mayor of Pensacola
James T. Barfield, P.E., District Three Secretary

Ccs: Shauna Jones, Escambia County
Taylor (Chips) Kirschenfeld, Escambia County
Dana Morton, Escambia County
L. Derrik Owens, P.E., City of Pensacola
Windle Tharp, P.E., FDOT District 3 NPDES Coordinator
Borja Crane-Amores, DEP

Board of County Commissioners • Escambia County, Florida

June 15, 2016

Steve Cioccia
NPDES Stormwater Program
Phase 1 MS4 Coordinator
Florida Department of Environmental Protection
2600 Blair Stone Road, MS 3565
Tallahassee, FL 32399

RE: BACTERIA POLLUTION CONTROL PLAN FOR CARPENTER CREEK (WBID 676) FOR NPDES PERMIT NUMBER FL000019-003. PARTICIPATING CO-PERMITTEES: ESCAMBIA COUNTY, FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 3 AND THE CITY OF PENSACOLA

Dear Mr. Cioccia:

Escambia County has performed a TMDL Prioritization as required in the County's MS4 Permit Number FLS000019-003, Part VIII. B.3. This prioritization report was approved by FDEP on June 10, 2015. Our TMDL prioritization report ranks the Carpenter Creek fecal coliform TMDL as the top priority.

Part VIII.B.4. requires the development and implementation of a bacteria pollution control plan (BPCP) for water bodies with approved fecal coliform TMDLs with no BMAP. Carpenter Creek is such a water body, approved fecal coliform TMDL with no BMAP.

Escambia County and its co-permittees are submitting the attached BPCP for Carpenter Creek in compliance with Parts VIII.B.3 and 4.

If you have any questions for me, please contact me at (850) 595-3451. If you have specific questions related to the BPCP, please contact Mr. Dana Morton, Environmental Analyst, Water Quality and Land Management Division, at (850) 595-1865.

Sincerely,

Joy Jones for

Joy D. Blackmon, P.E.
Public Works Director, County Engineer

cc: Jack Brown, County Administrator
Chips Kirschenfeld, Natural Resources Management Director
Joy Jones, P.E., Engineering Division Manager, Assistant County Engineer

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BACTERIA POLLUTION CONTROL PLAN

CARPENTER CREEK (WBID 676)

Escambia County MS4 Permit

Permit Number FLS000019-003

Co-Permittees:

Escambia County

Florida Department of Transportation, District Three

Town of Century

City of Pensacola

TABLE OF CONTENTS

LIST OF ACRONYMS

BARC: Bay Area Resource Council
BMAP: Basin Management Action Plan
BMPs: Best Management Practices
BPCP: Bacteria Pollution Control Plan
CFU/100mL: colony forming units per 100 milliliters
ECHD: Escambia County Health Department
ECUA: Emerald Coast Utility Authority
FDEP: Florida Department of Environmental Protection
FDOT: Florida Department of Transportation
GIS: Geographic Information System
IWR: Impaired Waters Rule
MEP: Maximum Extent Possible
MS4: Municipal Separate Storm Sewer System
NPDES: National Pollutant Discharge Elimination System
NWFWMD: Northwest Florida Water Management District
SSO: Sanitary Sewer Overflow
STORET: STOrage and RETrieval database
TMDL: Total Maximum Daily Load
WWTP: Waste Water Treatment Plant
WBID: Water Body ID
UWF: University of West University

EXECUTIVE SUMMARY

The Carpenter Creek watershed (WBID 676) is approximately 6,760 acres in size and flows into Bayou Texar (WBID 738). The Bayou Texar watershed is approximately 5,266 acres in size. Both Carpenter Creek and Bayou Texar have been verified as impaired for fecal coliform bacteria. In 2012 FDEP adopted a fecal coliform TMDL for both of the waterbodies. Fecal coliform reductions assigned to the waterways are 49 % for Bayou Texar 28 % for Carpenter Creek. As part of the requirements of Escambia County's NPDES/MS4 permit Escambia County prepared a "TMDL Prioritization Report". This report names the Carpenter Creek fecal coliform TMDL as the top priority TMDL to be addressed in the County's and co-permittees NPDES/MS4 permit. The Bayou Texar fecal coliform TMDL is ranked number two. The NPDES/MS4 permit requires that a Bacteria Pollution Control Plan (BPCP) be prepared and implemented to achieve fecal coliform load reductions allocated in the TMDL. With the cooperation of FDEP and area stakeholders the BPCP will: establish a water quality monitoring program for Carpenter Creek, assess the watershed using a "Walk the WBID" field assessment approach, identify and track existing projects with potential to reduce fecal coliform loading, identify new projects to reduce fecal coliform loading, track water quality and project implementation, meet as needed and make regular reports.

Chapter 1: Plan Purpose and Approach

Escambia County has performed a TMDL Prioritization as required in the County's MS4 Permit Number FLS000019-003. The purpose of the requirement is to select a waterbody which is impaired with a TMDL, yet has no BMAP. The permitee is required to essentially develop a plan to implement the TMDL. In the instance of waterbodies that are impaired for fecal coliform bacteria the recommended strategy is to prepare a "Bacteria Pollution Control Plan" (BPCP). Permittees participating in this BPCP are: Escambia County, the Florida Department of Transportation District 3 and the City of Pensacola. The goal of the BPCP is to bring the impaired waterbody into compliance, i.e., meeting its designated use criteria. At a minimum the BPCP will address, as appropriate, the following elements:

a. Identification of potential sources of bacteria discharged into and from the MS4 system.

b. Bacteria source tracking or other assessment techniques, including monitoring, to better refine the identification of bacterial sources to the MS4 system and prioritize them for implementation of activities to reduce fecal coliform loadings.

c. Adoption and implementation of a pet waste management ordinance or program.

d. Implementation of an educational program directed at reducing bacterial pollution.

e. Identification of additional structural or nonstructural BMPs or program activities needed to reduce bacterial loadings discharged from the MS4 into water bodies with an adopted fecal coliform TMDL to the MEP. This shall include a summary of BMPs and other activities to be implemented, the schedule for their implementation, and the anticipated load reductions from the implemented activities.

f. The permittee shall include in each NPDES/MS4 annual report a status report on the implementation of the requirements in this section of the permit and on the estimated load reductions that have occurred.

Plan Scope

Through the TMDL prioritization process Escambia County has selected Carpenter Creek (WBID 676) as the waterbody for which it will prepare a BPCP. The final fecal coliform TMDL report for this waterbody was prepared by the FDEP in September 2012; a BMAP has not been developed.

The Carpenter Creek watershed has an approximately 10.5-square-mile (mi2) drainage area that reaches from East Johnson Ave. to 12th Ave. at the upstream border of Bayou Texar's WBID (**Figure 1.**). The creek is approximately 5 miles long and lies within the political boundaries of both the City of Pensacola and Escambia County. This BPCP addresses Carpenter Creek. However, reductions in fecal coliform in Carpenter Creek will also mean reductions in fecal coliforms for Bayou Texar.

Escambia County's approach to preparing the BPCP will be to use the framework provided by the FDEP in the "Fecal Coliform TMDL Guidance On-Line Tool Kit". Escambia County will tailor efforts to meet the unique and specific needs for Carpenter Creek. The BPCP will:

- Utilize stakeholder expertise and involvement;
- Evaluate existing data and reports to build on past efforts;
- Employ the "walk the WBID" approach to accurately assess potential sources of fecal coliform contamination;
- Build on existing structural and non-structural BMPs to reduce concentrations of fecal coliform bacteria;
- Track implementation of BMPs; and
- Design and implement an effective water quality monitoring program to determine the effectiveness of the BPCP.

Stakeholder Involvement

Escambia County is committed to assembling the appropriate group of watershed stakeholders to successfully implement this BPCP. The list of stakeholders may include but not be limited to:

- Escambia County
- City of Pensacola
- Florida Department of Environmental Protection (FDEP)
- Escambia County Health Department (ECHD)
- Florida Department of Transportation (FDOT)
- Emerald Coast Utility Authority (ECUA)
- Northwest Florida Water Management District (NWFWMD)
- Bay Area Resource Council (BARC)
- University of West University (UWF)
- Bream Fisherman's Association (BFA)
- Panhandle Watershed Alliance (PWA)
- East Hill Neighborhood Association (EHNA)
- Bayou Texar Foundation
- Private Utilities

Ideally stakeholders will be represented by "executive" members with the authority required to commit resources to specific BMPs. Additionally, there will be "working group" members that will have hands-on knowledge and technical resources specific to their areas of responsibility.

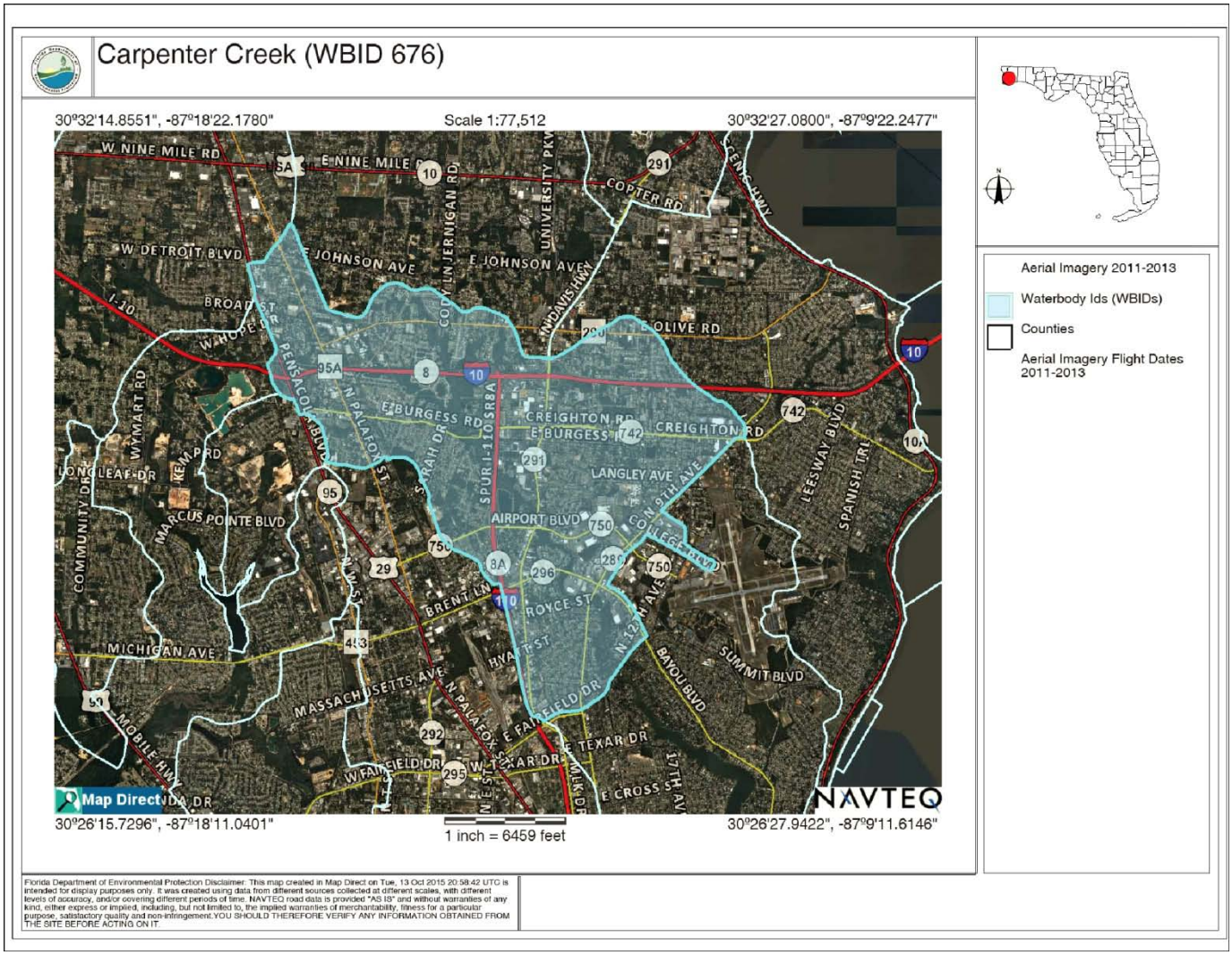

Figure 1. Carpenter Creek watershed WBID 676

TMDL(s) Being Implemented

Escambia County's BPCP will be implementing the fecal coliform TMDL for Carpenter Creek, WBID 676. The FDEP TMDL water quality assessment is based on 28 samples collected in 2006 and 2012. Six samples exceeded the 400 cfu/100 mL limit out a total of 28 samples. This is a 21 percent violation rate. When a waterbody exceeds 10 percent violations, it is designated as impaired. Though not included in FDEP's water quality assessment for the Carpenter Creek TMDL, Escambia County collected 45 fecal coliform samples between May 2014 and August

2014. The number of these 2014 samples exceeding the 400 cfu/100mL criteria was 27 or 60 percent.

The fecal coliform TMDL prepared for Carpenter Creek assigns a reduction of 28% for stormwater discharges to bring the creek into compliance. There are no permitted domestic wastewater discharges into Carpenters Creek.

Assumptions and Considerations for TMDL Implementation

The water quality benefits of TMDL implementation are based on several fundamental assumptions about the targeted pollutants, modeling approaches, waterbody response, and natural processes. In addition, there are a number of important assumptions and considerations to keep in mind about the nature of the BMAP and its long-term implementation. The BPCP is a less formal means of implementing a TMDL specifically for bacteria. It is hoped for and anticipated that stakeholders will be as committed to implementing the BPCP as is required for the BMAP process. A BPCP is very similar to a BMAP; therefore similar assumptions will be made during implementation of this BPCP. These assumptions include:

• Load reductions for stormwater discharges are typically expressed as a percent reduction because it is difficult to quantify the loads from MS4s (given the numerous discharge points) and to distinguish MS4 loads from other nonpoint sources (given the diffuse nature of stormwater transport).

• Bacteria loads from specific sources cannot be quantified because they are highly variable and not well understood. Thus it is not possible to calculate a specific bacterial 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 will evaluate the known sources of bacteria contributing to the impairment in each waterbody and whether there is strong evidence of responsibility. Affected stakeholders will then determine which projects would help to address the problems and include these projects in the BPCP.

• In cases where the sources are unknown, stakeholder groups determine appropriate assessment programs to investigate the sources of bacteria loadings.

• Due to a lack of literature values and high variability, it is difficult to determine the quantitative load reductions expected from management actions to decrease fecal coliform; therefore, the benefits of these actions will be evaluated on a qualitative basis by matching elimination, reduction, and prevention activities to known or potential sources.

• Flood control projects are included as BPCP activities because these projects help to reduce flooding after a storm event, decreasing the amount of fecal coliform loading to nearby waterbodies through stormwater runoff. Programs such as Adopt–A-Highway, drainage connection permits, and street sweeping and inspection programs are also important because they remove trash, sediment, debris, and pollutants from roadways and conveyance systems 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 will be given credit

in this BPCP as actions that may reduce fecal coliform.

• The penetration of ultraviolet (UV) light into waters and sediments may aid fecal coliform die-off and prevent bacteria regrowth. Therefore, attention will be paid to any restoration efforts that included the maintenance of stormwater ditches, ponds, and closed conveyance systems. Activities such as preventing the accumulation of debris, removing vegetation or dense tree canopy, and controlling sediment erosion help to eliminate conditions that would encourage the growth of potential new sources of fecal coliform bacteria.

This BPCP will ask stakeholders to implement projects and programs to achieve fecal coliform load reductions as soon as practicable. While project funding can be an issue, such limitations do not affect TMDL implementation requirements; thus, stakeholders or entities will be asked to make every reasonable effort to secure funding and implement the activities listed in the BPCP. Since BPCP implementation is a long-term process, the TMDL targets established for the watershed may not be achieved in the next five years. It is understood that all waterbodies can respond differently to the implementation of reduced loadings in order to meet applicable water quality standards. Regular follow-up and continued coordination and communication by stakeholders will be essential to ensure the implementation of management strategies and assessment of their incremental effects. Any additional management actions required to meet the target load fecal coliform reductions in the TMDL will, if necessary, be developed as part of BPCP follow-up.

As part of this BPCP, stakeholders will be asked to commit to a wide variety of management actions/projects. Generally, the projects or activities fall into the following categories:

• Public education and outreach;

• Wastewater infrastructure management, including sanitary sewer expansion programs;

• Stormwater management and the installation of new or retrofitted stormwater treatment;

• Regulations, ordinances, and guidelines (including local, state, and federal);

• Restoration, land acquisition, and water quality improvements; and

• Special studies, planning, monitoring, and assessment.

Future Growth in the Watershed

The total area of the Carpenter Creek WBID is 6,760 acres. Based on the Northwest Florida Water Management District's (NWFWMD) 2009-10 land use coverage maps the dominant land use category in the Carpenter Creek basin is urban land (urban and built up, low-, medium-, and high-density residential; and transportation, communications, and utilities). This urban land category accounts for approximately 87% of the total watershed area. Low-impact land use categories including: rangeland, water, wetlands, upland forest, and barren land, make up approximately 13% of the WBID area. Thus the possibility for significant future growth in the watershed is limited.

To minimize the creation of future pollution sources, the BPCP will:

- Encourage sanitary sewer to be provided for new development.
- Where sanitary sewer service is not available, ECHD will be asked to review septic tank plans and evaluate sites before issuing new permits, so that the new systems are correctly designed, placed, and operated to prevent further fecal coliform loading.
- All new development will also have to meet all local, state, and federal requirements for stormwater management.

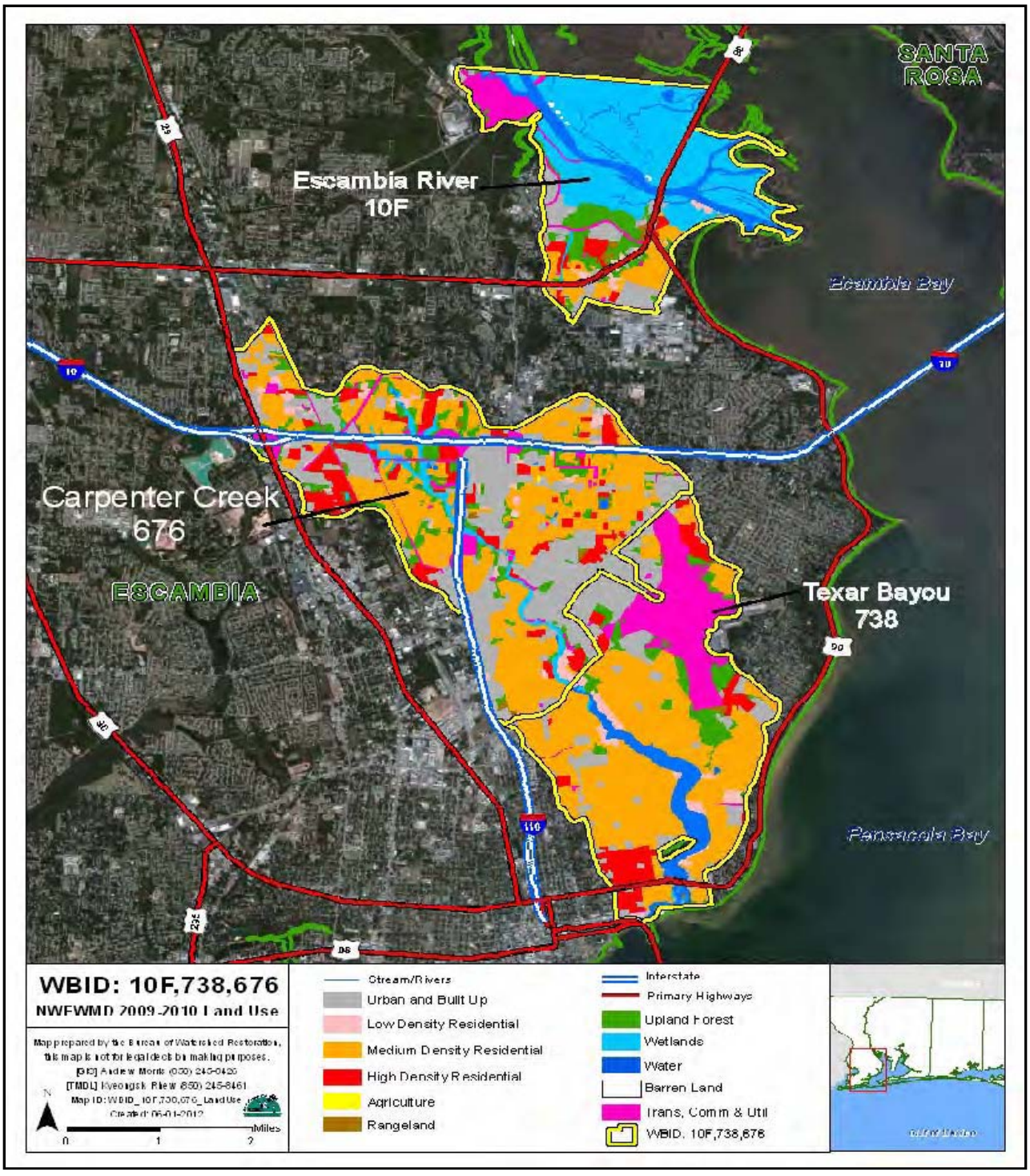

Figure 2. Carpenter Creek Land –Use. NWFWMD 2009-10.

Chapter 2: Water Quality Trends and Anticipated Outcomes

Figure 3 is a satellite image with five proposed water quality monitoring stations for the Carpenter Creek BPCP. Maps, data and discussion of data for follow.

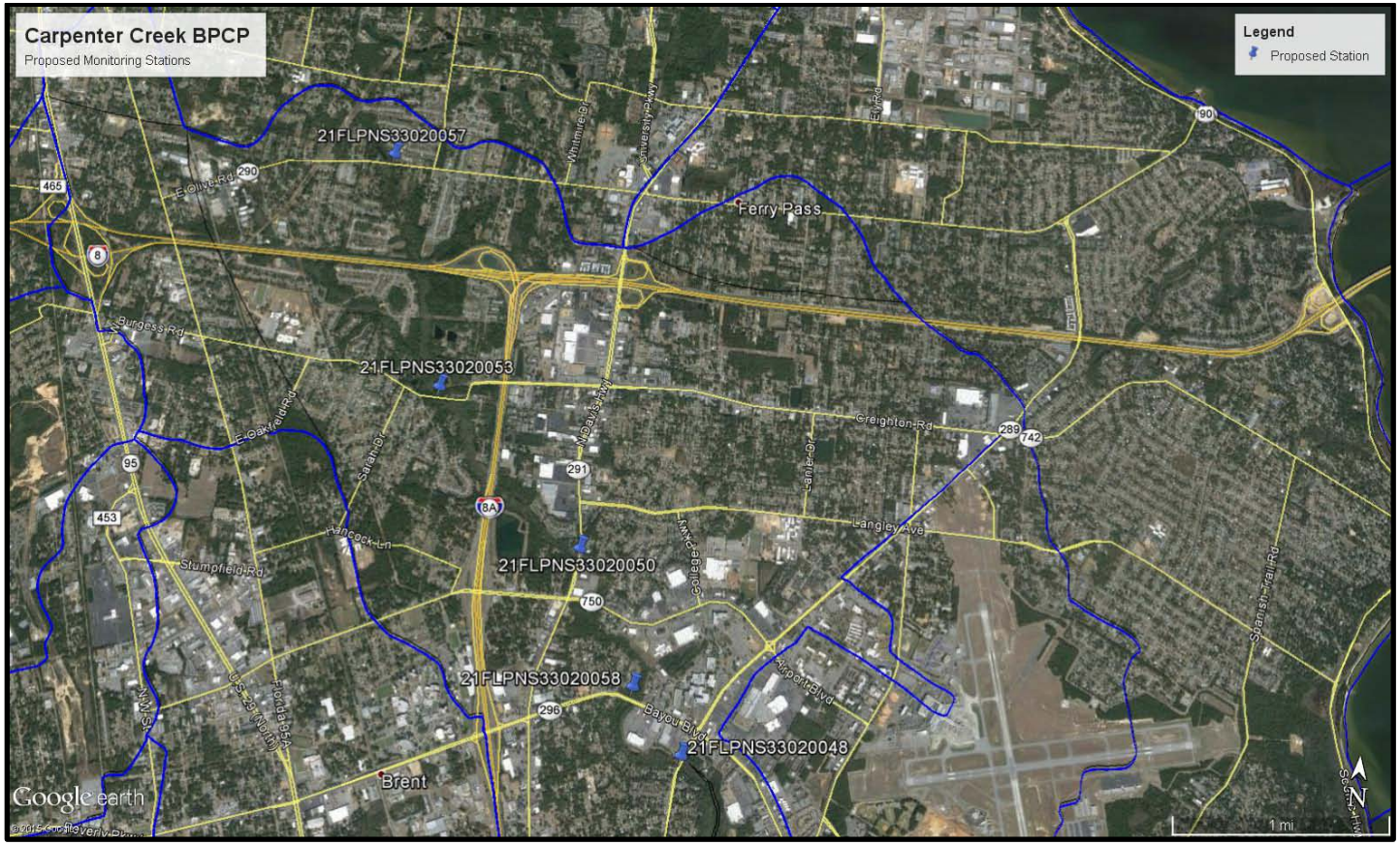

Figure3. Carpenter Creek and proposed water quality monitoring stations.

Table 1. Carpenter Creek proposed monitoring stations

NAME/WBID	STATION	DESCRIPTION	LATITUDE	LONGITUDE
Carpenter Creek (676)	33020057	@ Olive Rd.	30° 30' 39.5"	87° 14' 31.5"
Carpenter Creek (676)	33020053	@ Burgess Rd.	30° 29' 38.61"	87° 14' 6.32"
Carpenter Creek (676)	33020050	@ Davis Hwy.	30° 29' 2.9248"	87° 13' 21.2649"
Carpenter Creek (676)	33020058	@ Brent Lane	30° 28' 31.01"	87° 13' 2.8"
Carpenter Creek (676)	33020048	@ 9th Ave.	30° 28' 16.3228"	87° 12' 48.02"

Carpenter Creek WBID 676 Fecal Coliform Data Summary

The data used to develop the Carpenter Creek TMDL is a very limited dataset. It is established based on 4 data point in 2006 and 24 data points in 2012. There were 6 exceedances of the 400cfu/100mL standard out of the total of 28 data points, or 25 percent. This data is presented in Figure 4. Also included in Figure 4 is the fecal coliform data that Escambia County collected in Carpenter Creek during 12 week post flood sampling effort from May through July 2014. The county collected 45 samples, 27 exceeded the 400 cfu/100mL standard resulting in 60 percent violation of the standard. Based on the available data; looking at Carpenter Creek as whole, fecal coliform levels have increased from 2006 to 2014. Though no specific sanitary sewer infrastructure issues were noted in the Carpenter Creek watershed as a result of the April 2014 floods, the floods may still have contributed to the elevated fecal coliform levels.

Table 2 summarizes Carpenter Creek for the five stations responsible for most of the data. As noted in the TMDL document, there is a significant increase in fecal coliform levels at the Davis Highway crossing. Carpenter Creek at Burgess Rd., the next upstream station has a geometric mean of 118 cfu/100mL and 18 percent of the 17 samples exceed the 400 cfu/100mL criteria. The Davis Hwy. station has a geometric mean of 909 cfu/100mL with 88 percent of the 17 samples exceeding the 400 cfu/100mL criteria. Interstate I-110 and a large stormwater treatment pond are between the two stations and may contribute to the increased counts.

Figures 5 – 9 graphically present the fecal coliform data set from 2006 – 2014 for the five most frequently sampled stations.

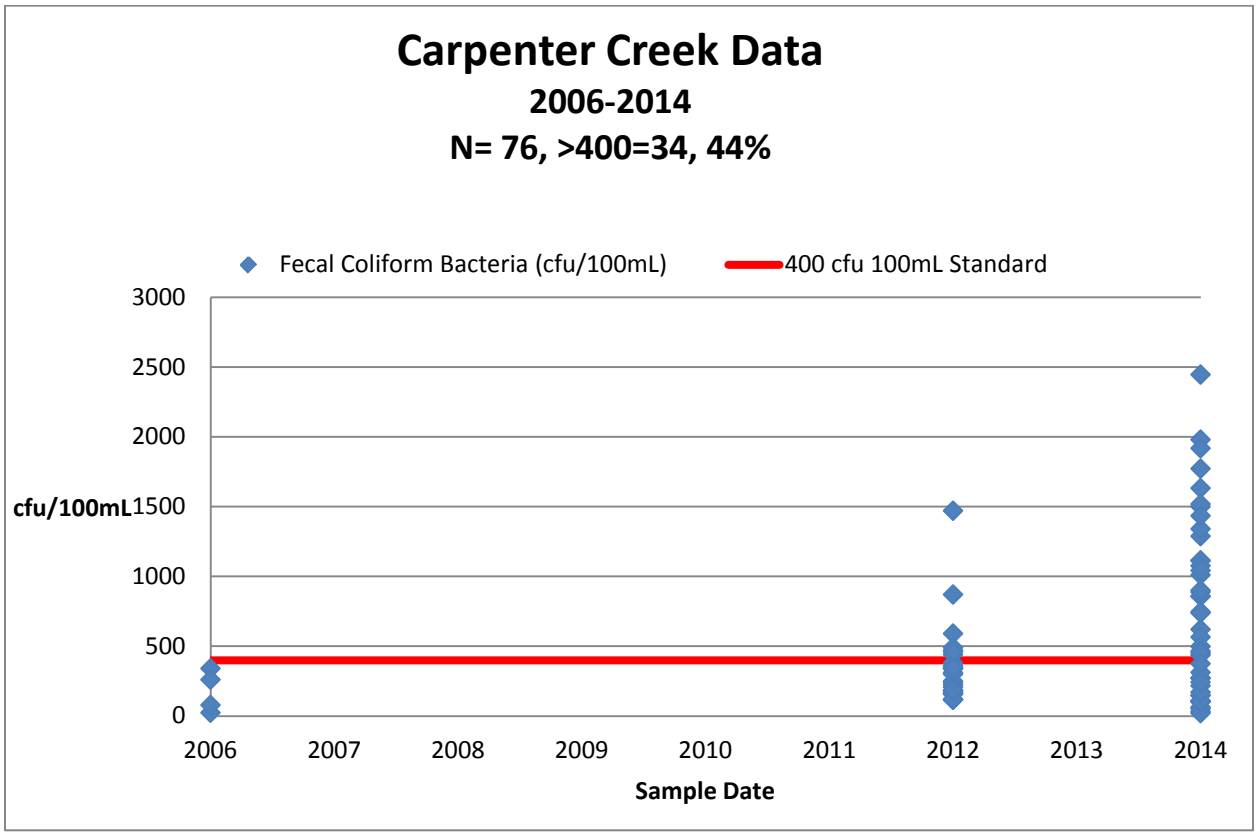

Figure 4. Fecal coliform data for Carpenter Creek, 2006 – 2014.

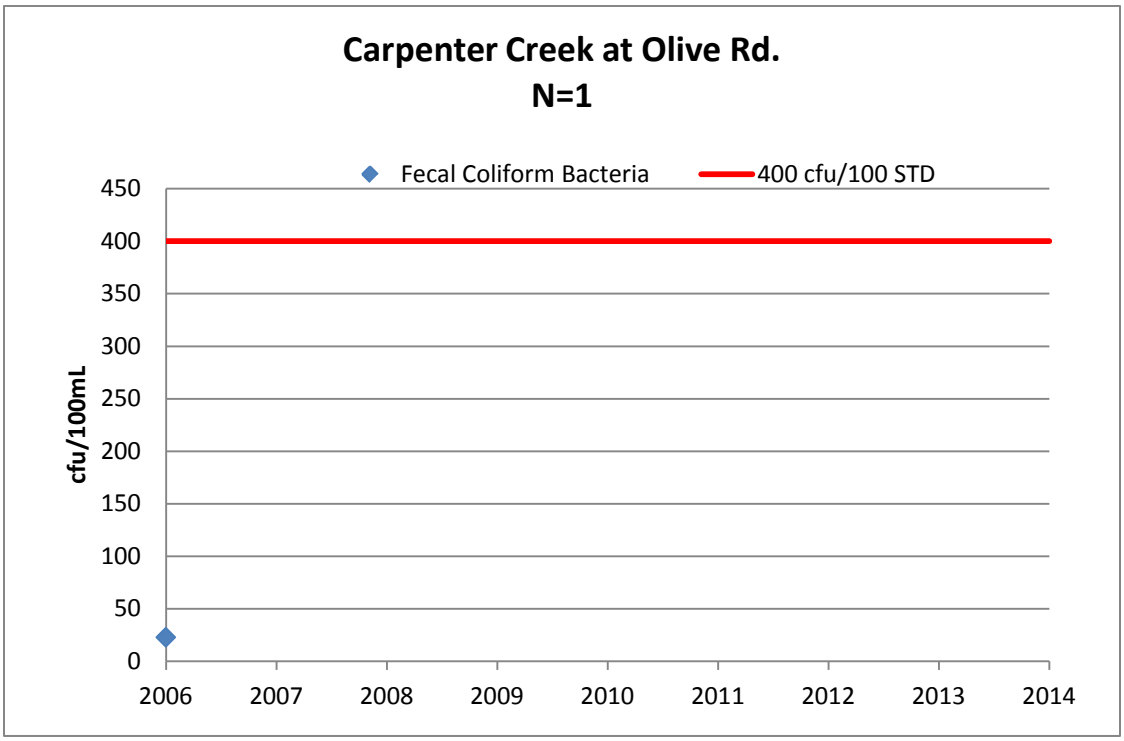

Figure 5. Fecal coliform data for Carpenter Creek at Olive Rd., 2006 – 2014.

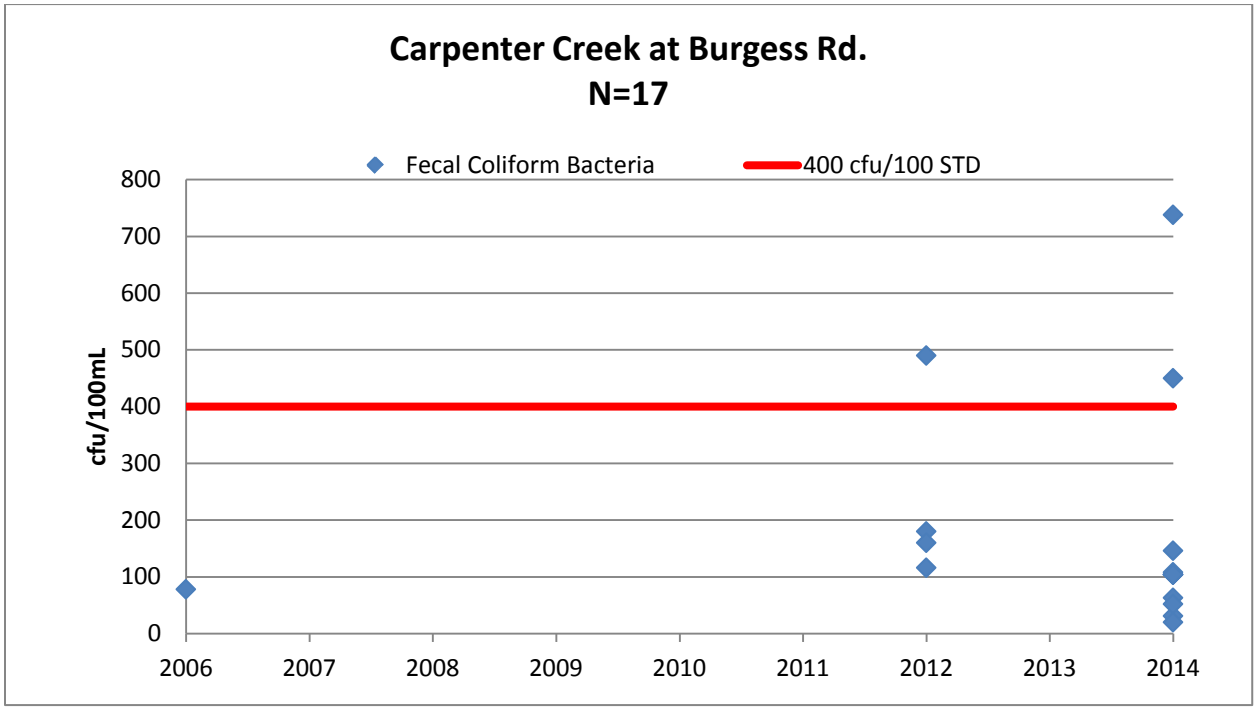

Figure 6. Fecal coliform data for Carpenter Creek at Burgess Rd., 2006 – 2014.

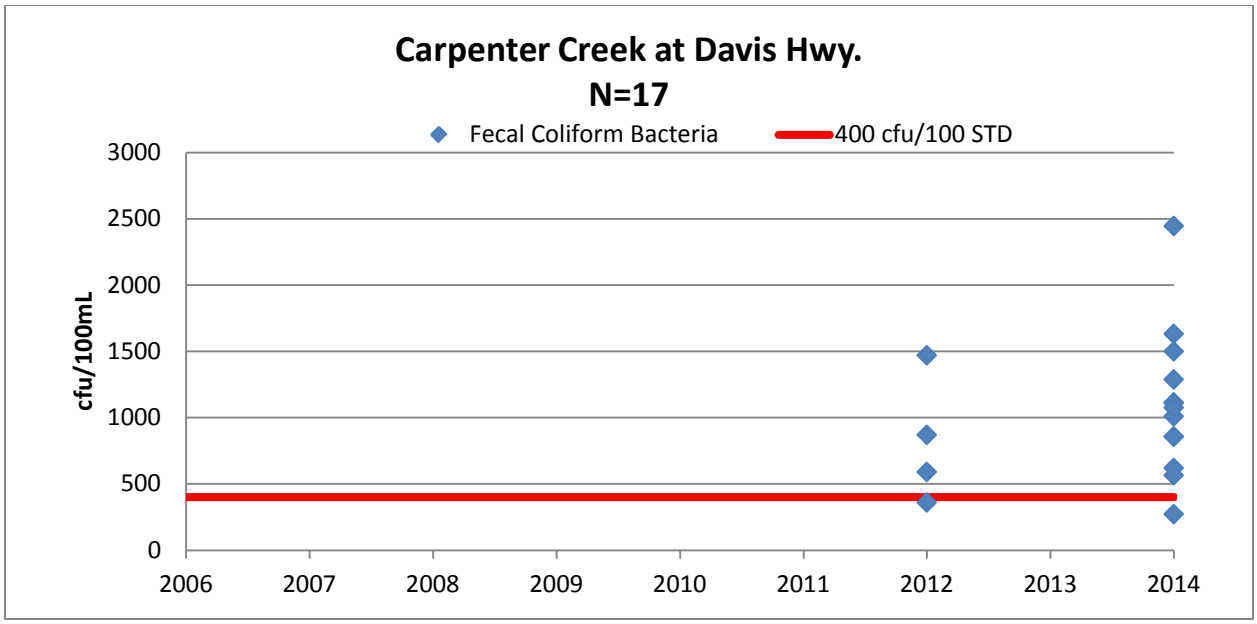

Figure 7. Fecal coliform data for Carpenter Creek at Davis Hwy., 2006 – 2014.

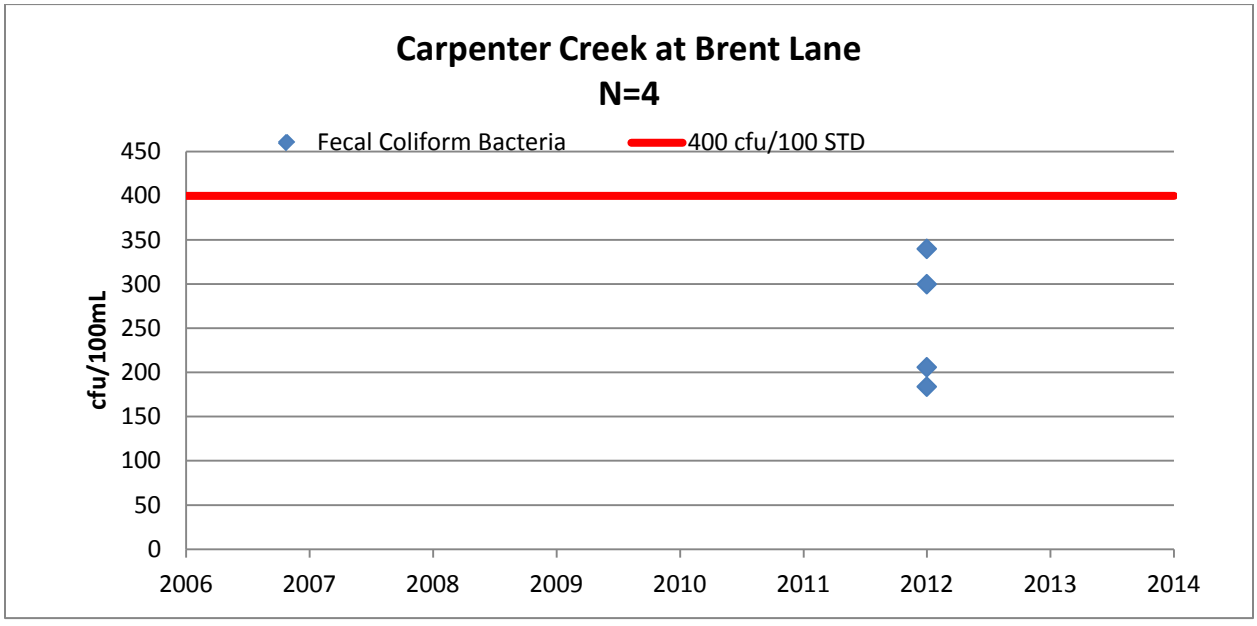

Figure 8. Fecal coliform data for Carpenter Creek at Brent Lane, 2006 – 2014.

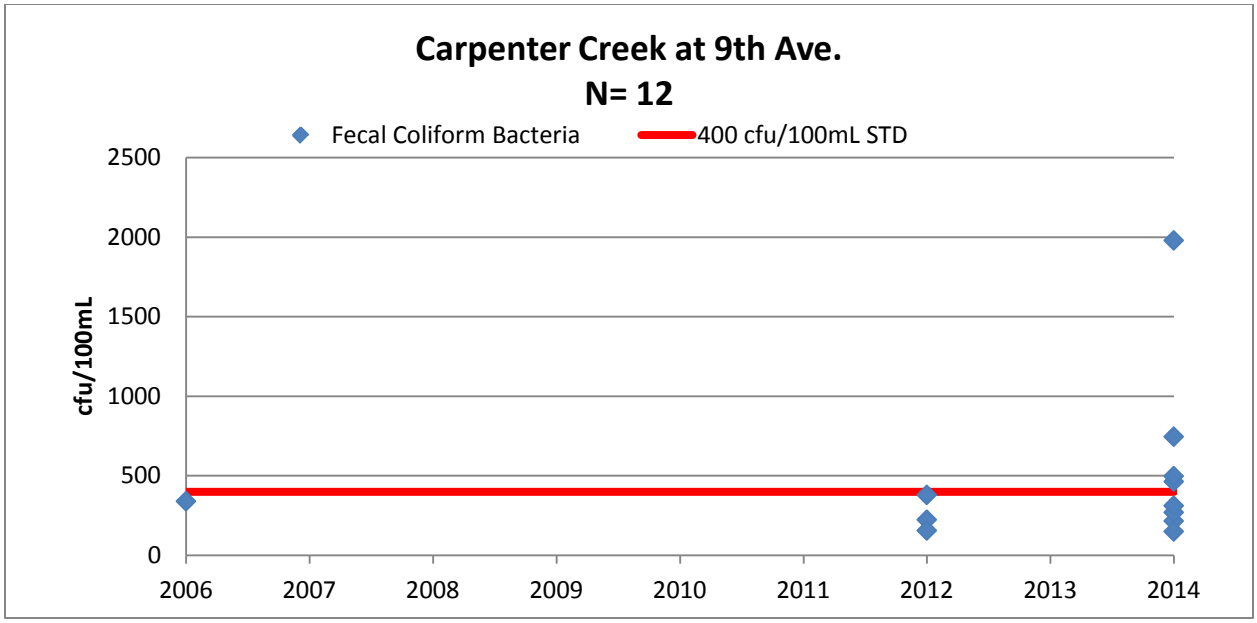

Figure 9. Fecal coliform data for Carpenter Creek at 9th Ave., 2006 – 2014.

Table 2. Carpenter Creek fecal coliform summary for five stations, TMDL data plus Escambia County April flood data.

NAME/WBID	STATION	DESCRIPTION	LATITUDE	LONGITUDE	Number Samples	%> 400 cfu/100mL	F C Geomean cfu/100mL
Carpenter Creek (676)	33020057	@ Olive Rd.	30° 30' 39.5"	87° 14' 31.5"	1	0	23
Carpenter Creek (676)	33020053	@ Burgess Rd.	30° 29' 38.61"	87° 14' 6.32"	17	18	118
Carpenter Creek (676)	33020050	@ Davis Hwy.	30° 29' 2.9248"	87° 13' 21.2649"	17	88	909
Carpenter Creek (676)	33020058	@ Brent Lane	30° 28' 31.01"	87° 13' 2.8"	4	0	249
Carpenter Creek (676)	33020048	@ 9th Ave.	30° 28' 16.3228"	87° 12' 48.02"	12	33	356

Progress will be assessed through water quality monitoring at the five primary existing stations, Table 1 and Figure 3. The proposed sampling frequency will be monthly, with follow-up sampling within 24 hours for samples exceeding 5000 cfu/100mL.

Field Parameters will include:

Air Temperature (°C)
Cloud Cover
Rainfall
Tide Stage
Canopy Cover
Water Flow Condition
Wind
Field Measured Water Quality Parameters:
Conductivity (micromhos per centimeter [umhos/cm])
Dissolved Oxygen (milligrams per liter [mg/L])
Dissolved Oxygen Saturation (%)
pH (standard units [SU])
Salinity (parts per thousand [ppt])
Temperature (°C)
Turbidity nephelometric turbidity units (NTU)

Laboratory parameter:

Escherichia coli bacteria, colony forming units (cfu)/100mL

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 BPCP progress but also for future TMDL evaluations and other purposes. Water quality data will be collected 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 http://www.dep.state.fl.us/water/sas/ sop/sops.htm. All stakeholders contributing data in support of the BPCP will agree to follow these SOPs.

DATA MANAGEMENT AND ASSESSMENT

To be useful in support of the BPCP, data collected as part of this monitoring plan will need to be tracked, compiled, and analyzed. 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 will be asked 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.

Chapter 4: Stakeholder Commitment to Plan Implementation

After approval of the Carpenter Creek BPCP, Escambia County will invite stakeholders to a "kick-off" meeting to discuss the plan and establish a regular meeting schedule. Meetings will be held at least once every twelve months after plan adoption to discuss assessment results and project implementation. A "bi-annual" report will be prepared to discuss water quality trends and project implementation status.

Stakeholders will be asked to prepare specific project lists for currently planned and projects completed since 2006. Projects listed should be those which may contribute to the reduction of fecal coliform levels. In years 3-5, as a more thorough understanding of fecal coliform in the watershed is developed, stakeholders may consider implementation of more projects to reduce fecal coliform loading.

Chapter 5: TMDL Implementation Plan

POTENTIAL SOURCES

After the initial kick-off meeting, working group members will be asked to convene and discuss a strategy for a "Walk the WBID" style assessment of the Carpenter Creek watershed. This effort will begin with a "maps on the table" roundtable discussion of recent fecal coliform data and areas of known or suspected sources of fecal coliform bacteria. Participants will include stakeholder working group members with knowledge and authority to investigate potential sources and conveyances within their respective jurisdictions. Microbial source tracking techniques will be utilized to assist in identifying human sources as deemed necessary. Investigations of this nature are often valuable in identifying or confirming sources of fecal coliform bacteria. These actions will be iterative process as sources are identified, actions taken, reduction success monitored and adjustments made to meet TMDL reductions.

Point Sources

There is one permitted point source in the Carpenter Creek watershed. The concrete batch plant Argos USA- Pensacola Plant on Olive Road (permit FLG110354). They are a point source discharge of "industrial activity stormwater" under the concrete batch plant generic permit. The discharge is in to wetlands on the north side of Olive Road. Though the discharge is not expected to be a source of fecal coliform bacteria, the facility will be inspected as part of the BPCP.

Non-Point Sources

The Carpenter's Creek fecal coliform TMDL assigns a Waste Load Allocation (WLA) for stormwater discharges with an MS4 permit a 28% reduction in the current load of fecal coliform loadings into Carpenter Creek. It should be noted that any MS4 permittee is only responsible for reducing the anthropogenic loads associated with stormwater outfalls that it owns or otherwise has responsible control over, and it is not responsible for reducing other nonpoint source loads in its jurisdiction.

PROJECTS TO REDUCE FECAL COLIFORM LOADING

Projects to reduce fecal coliform loading will be categorized to the potential source categories. These are: sanitary sewer, OSTDS and stormwater. Agriculture and wildlife sources will not be addressed in this BPCP.

The "Stakeholder Project Tables" are found in Appendix 1. These tables will be completed by stakeholders after the initial "kick-off" meeting. Projects to be listed at this time are those projects that have been: recently completed (last 5 years), planned projects with funding for implementation or ongoing efforts. New projects will be considered by stakeholders after the "walk the WBIDs" exercise and first two years of monthly sampling has been completed and evaluated. Data will be evaluated looking at "hot spots" and potential sources, bacteria concentrations will also be correlated with recent rainfall amounts.

A discussion of anthropogenic bacteria loading categories follows below. Current and potential projects are listed that will reduce bacteria loading to Carpenter Creek. Projects will be evaluated for their effectiveness through the monitoring program; adjustments will be made as necessary to meet the TMDL reduction target.

SANITARY SEWER SYSTEMS

A sanitary 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 WWTPs, and sanitary sewer overflows "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, roots, rags; 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 may not be readily transported to nearby surface waters, there are no known local data related to bacterial transport in the soil types and ground water conditions in the Carpenter Creek watershed. 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, it is possible that wastewater in the sanitary sewer pipes can exfiltrate out through the leaks in the pipes and 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 or breakages in sanitary sewer pipes. In older infrastructure areas, manholes and lift stations may have "over flow" pipes. When a blockage or equipment failure occurs the sewage levels rises to the illegal over flow pipe, discharging into the stormwater system or directly into surface waters.

Few comprehensive data are available to quantify SSO frequency and bacteria loads in most watersheds. The Carpenter Creek TMDL estimated the possible fecal coliform load contributed by sewer line

leakage based on an empirical leakage rate of 0.5% of the total raw sewage created within the WBID by the households connected to the sewer system. Fecal coliform loading from sewer line leakage can be calculated based on the number of people in the watershed, typical per household generation rates, and typical fecal coliform concentrations in domestic sewage, assuming a leakage rate of 0.5%. Based on these assumptions, a rough estimate of fecal coliform loads from leaks and SSOs within the Carpenter Creek WBID boundaries can be made. The Carpenter Creek TMDL report estimates the number of households served by sanitary sewer in the WBID at 9,059. Using 2006-10 U.S. Census Bureau data and wastewater per capita production rate of 70 gallons/day the report estimates a daily loading of $2.93x10^{11}$ colony forming units per day.

In Escambia County the Emerald Coast Utilities Authority (ECUA) owns and maintains the sanitary sewer system that serves the Carpenter Creek watershed. In 2012 ECUA entered into a consent order with FDEP as a result of several sanitary sewer overflows. The consent order requires the development of a "Comprehensive Evaluation Plan" followed up with the implementation of a "Corrective Action Plan". It is anticipated the Carpenter Creek will see water quality improvements as a result of the full implementation of the Corrective Action Plan when it is approved. As part of the Carpenter Creek BPCP, ECUA will identify specific corrective actions that will be implemented in the basin. Additionally, ECUA staff and resources will be fully utilized during the "Walk the WBID" effort.

Summary of Restoration Activities: Sanitary Sewer

- Sewer Line Upgrades
- Manhole Inspection Rehab
- Pump Station Inspection & Maintenance
- Pump Station Rebuild
- ARV Inspection and Rehab
- Private Lift Station Inspections and Enforcement
- SSO Investigation
- Fatty Oils and Grease Program
- Illicit Discharge Detection and Elimination (IDDE) Activities
- Public Education

<u>OSTDS</u>

On-site sewage treatment disposal systems (OSTDS) including septic tanks are an effective means of treating sanitary waste when "off-site" treatment at a wastewater treatment facility is not an option. However, OSTDS's can become another potential source of fecal coliform bacteria if not properly maintained or installed. The Carpenter Creek TMDL report estimates that there may be as many as 1,934 OSTDS's in the Carpenter Creek watershed. Figure 9 is a map including the septic tanks in the Carpenter Creek watershed based on FDOH's 2012 onsite sewage GIS coverage. The average annual septic tank failure discovery rate is about 0.72% for Escambia County. Assuming that failed septic tanks are not discovered for about 5 years, the estimated annual septic tank failure rate is about 5 times the discovery rate, or 3.59%. Using this information the Carpenter Creek TMDL report estimated fecal coliform loadings from failed septic tanks within the Carpenter Creek WBID boundaries at about 4.5×10^{11} counts per day. The OSTDS threat to water quality in Carpenter Creek will primarily be addressed during the "Walk the WBID" effort. Appropriate Escambia County Health Department (ECHD) personnel will be utilized during walk through inspection of known septic tank areas. When feasible, all

storm water conveyances and wet ditches will be inspected for signs of illicit discharges and septic tank leachate.

Summary of Restoration Activities: OSTDS

- Ordinances
- Enforcement
- Permit Review (new and repair permits)
- Failure Area Evaluation
- Failure Area Ranking
- Septic Tank Phase-Out
- Septic Tank Inspection
- Illicit Discharge Detection and Elimination (IDDE) Activities
- Public Education

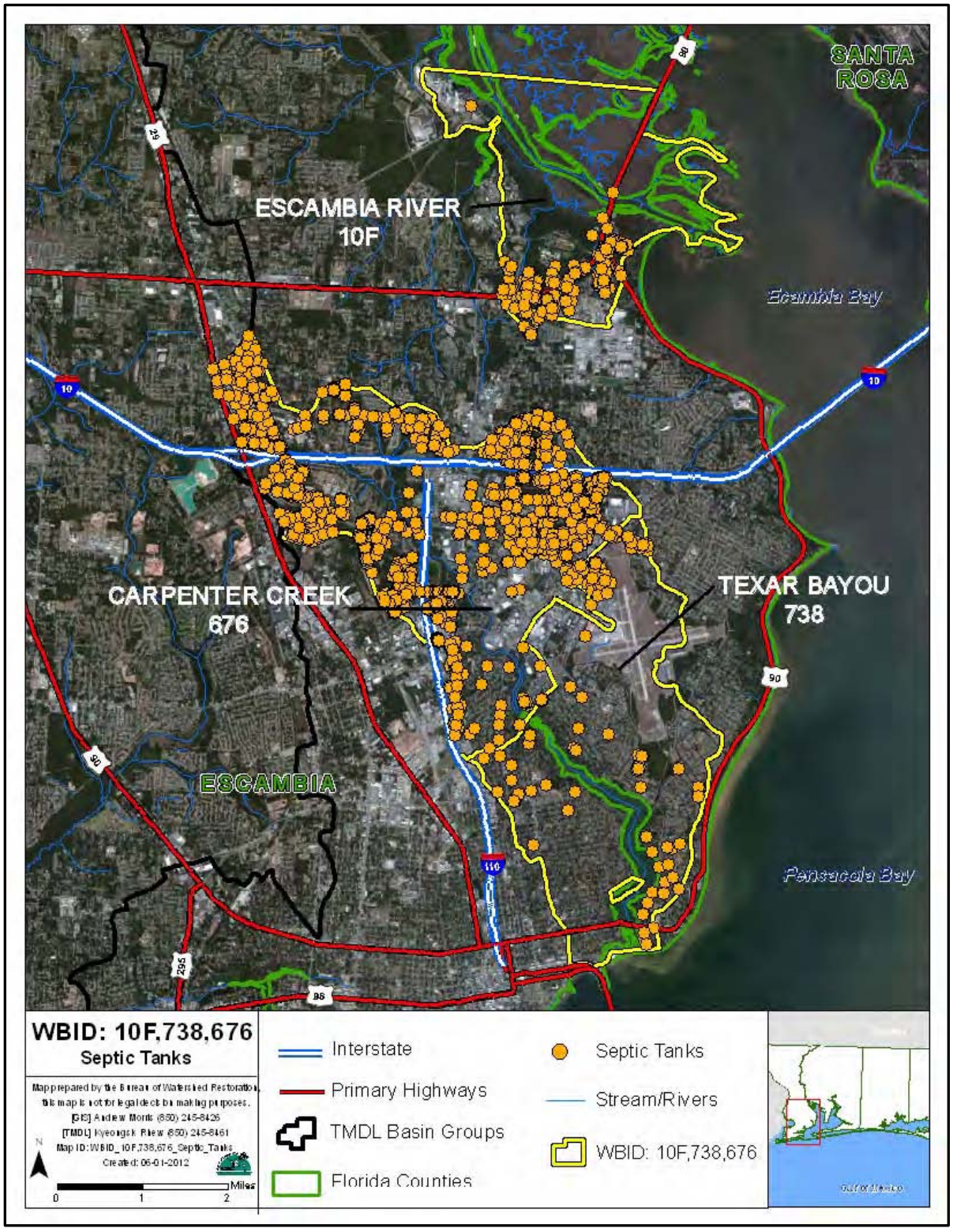

Figure 9. Septic Tanks in Carpenter Creek Watershed.

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, discharges or overflow from failing septic systems; concentrated wildlife (e.g., bird sanctuaries) or domestic animals (e.g., dog parks or improper pet waste disposal). The Carpenter Creek TMDL estimates the number of residences in the Carpenter Creek watershed at 10,993. Estimates are that 40% of U. S. household includes at least 1 dog; this would yield an estimated 4,397 dogs within the Carpenter Creek WBID boundaries. Using these estimates the TMDL report estimates potentially 791,496 grams/day of dog waste left on the ground surface resulting in an approximate daily loading of 1.74×10^{12} counts per day. Escambia County has had a pet waste ordinance in place since 2011. The ordinance may be enforced by the county sheriff or county animal control officers.

Sediments in streambeds or stormwater conveyance systems can act as reservoirs for contamination as bacteria persist and possibly regrow in the sediments. These sediment bacteria sources can periodically result in the influx of high levels of bacteria to receiving waters. Bacteria from sediments could potentially be an issue in of Carpenter Creek. Current source identification methodologies cannot quantify the exact amount of fecal coliform loading from sediment sources.

Illicit connections to stormwater conveyance systems can also contribute to fecal coliform loading. Escambia County and FDOT have ongoing programs to identify illicit discharges to MS4 conveyances and to waterbodies. As part of this program, Escambia County, the city of Pensacola, and FDOT can verify discharges to the MS4 and remove illicit connections through their existing regulatory programs. The number of open illicit discharge cases for Escambia County and FDOT is unknown, but the results of any investigations into illicit discharges are typically reported in the MS4 annual monitoring information and will also be reported in BPCP progress reports.

Summary of Restoration Activities: Stormwater

- Flood Control Capital Projects
- Capital Projects/Stormwater Water Quality BMPs
- Stormwater System Ditch and Canal Maintenance
- Stormwater Pond Maintenance
- Stormwater Pipe Cleaning and Maintenance
- Illicit Discharge Detection and Elimination (IDDE) Program
- Pet Waste Ordinance
- Public Education

AGRICULTURE

The 2009 – 2010 NWFWMD land us map does not identify any agricultural land use within the Carpenter Creek WBID boundary. Therefore the TMDL report assigns no fecal coliform load to this land use category.

WILDLIFE

Wildlife is another possible source of fecal coliform bacteria within the Carpenter Creek WBID boundaries. However, as these represent natural inputs, no reductions are assigned to these sources by the TMDL.

SUMMARY OF RESTORATION EFFORTS AND SUFFICIENCY OF EFFORT

The preliminary list of recent City of Pensacola and Escambia County stormwater projects in the Carpenter Creek watershed has the potential to have significantly reduced fecal coliform loading. The available data are insufficient to determine fecal coliform reductions that may be attributed to these projects. A more thorough summary and evaluation of level of effort will be prepared in an updated BPCP after stakeholder input.

References

1. Florida Department of Environmental Protection. 2011. Implementation Guidance for the Fecal Coliform Total Maximum Loads Adopted by the Florida Department of Environmental Protection.
2. Florida Department of Environmental Protection. 2011. Basin Management Action Plan for the Implementation of the Total Maximum Daily Loads for Fecal Coliform Adopted by the Florida Department of Environmental Protection in “Bayou Chico (Pensacola Basin)”.
3. Florida Department of Environmental Protection. 2012. Final TMDL Report, Fecal Coliform TMDL for Escambia River (WBID10F), Texar Bayou (WBID 738) and Carpenter Creek (WBID 676).

Table 8. Proposed Implementation Schedule for Bacteria Pollution Control Plan

Task	Start Date	End Date
Develop Approved Carpenter Creek BPCP	2016	May 2016
Implementation of Initial Monitoring Plan. (microbial source tracking techniques will be employed to identify human sources when necessary)	January 2016	ongoing
Public Education/Outreach	January 2016	ongoing
Pet Waste Ordinance	2010	ongoing
Stakeholder Meeting	February 2017	
2016 Annual Data Evaluation Monitoring Report	February 2017	
Identification of Existing and Needed Activities to Reduce Bacterial Loading	March 2017	April 2017
Draft Stakeholder Projects and Activities Submitted	April 2017	May 2017
Completion of Summary Table of Activities to Reduce Bacterial Loading	June 2017	ongoing
Stakeholder Commitment to Projects and Activities	June 2017	ongoing
Maps on the Table Meeting	July 2017	
Walk the WBID	July 2017	
Implement action items developed during Walk the WBID	July 2017	ongoing
Follow-up on Walk the WBID Action Items		ongoing
2017 Annual Data Evaluation Monitoring Report	February 2018	
First Bi-Annual Restoration Activity Update/Status Report	February 2018	
Second Stakeholder Meeting	February 2018	

Appendix 1: Stakeholder Projects to Reduce Fecal Coliform Loading

Table 1. Stakeholder Projects and Activities to Reduce Fecal Coliform Loadings from Sanitary Sewer Sources.

Project Number	Project Name	Project Description	Level of Effort	Estimated Cost	Funding Source	Project Status
To be filled out at a later time by stakeholder						

Table 2. Stakeholder Projects and Activities to Reduce Fecal Coliform Loadings from OSTDS Sources.

Project Number	Project Name	Project Description	Level of Effort	Estimated Cost	Funding Source	Project Status
To be filled out at a later time by stakeholder						

Table 3. Stakeholder Projects and Activities to Reduce Fecal Coliform Loadings from Stormwater Sources.

Project Number	Project Name	Project Description	Level of Effort	Estimated Cost	Funding Source	Project Status
Escambia County and FDOT-1	Illicit Discharge Detection	Carry out inspections associated with NPDES permit	Sampling to assess conditions and identify sources. Enforcement action taken if illicit discharges identified	$50,000	Escambia County	Ongoing
Escambia County-2	Stormwater Pond Inspection and Maintenance Program	County maintains and inspects > 300 ponds countywide	Stormwater inspections and maintenance continually ongoing	$300,000	Escambia County	Ongoing
Escambia County and BARC-3	Public Education and Outreach	Carry out miscellaneous public education activities	Stormwater and pollution prevention brochures and information distributed to public in Carpenter Creek watershed	$10,000	Escambia County	Ongoing
Escambia County-4	Pet Waste Ordinance, Part 1, Article 1, Section 10-11(f)	Pass ordinance to define the handling and removal of domestic pet waste countywide	Countywide, ongoing	Unknown	Escambia County	Adopted April 8, 2010

Table 4. Stakeholder Projects and Activities to Reduce Fecal Coliform Loadings from Stormwater Sources.

Project Number	Project Name	Project Description	Level of Effort	Estimated Cost	Funding Source	Project Status
More projects to be added						