FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division of Environmental Assessment and Restoration, Bureau of Watershed Restoration

NORTHWEST DISTRICT • APALACHICOLA–CHIPOLA BASIN

FINAL TMDL Report

Fecal Coliform TMDL for Flat Creek (WBID 487) and Sweetwater Creek (WBID 728)

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Acknowledgments

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TMDL Program

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http://www.dep.state.fl.us/legal/Rules/shared/62-303/62-303.pdf

STORET Program

http://www.dep.state.fl.us/water/storet/index.htm

2008 305(b) Report

http://www.dep.state.fl.us/water/docs/2008_Integrated_Report.pdf

Criteria for Surface Water Quality Classifications

http://www.dep.state.fl.us/water/wqssp/classes.htm

Basin Status Report for the Apachicola-Chipola Basin

http://www.dep.state.fl.us/water/basin411/apalach/status.htm

Water Quality Assessment Report for the Apalachicola-Chipola Basin

http://www.dep.state.fl.us/water/basin411/apalach/assessment.htm

U.S. Environmental Protection Agency

Region 4: Total Maximum Daily Loads in Florida

http://www.epa.gov/region4/water/tmdl/florida/

National STORET Program

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Chapter 1: INTRODUCTION

1.1 Purpose of Report

This report presents the Total Maximum Daily Loads (TMDLs) for fecal coliform for Flat Creek and Sweetwater Creek, located in the Apalachicola–Chipola Basin within the Apalachicola River Planning Unit (**Figure 1.1**). These streams were verified as impaired for fecal coliform, and were included on the Verified List of impaired waters for the Apalachicola–Chipola Basin that was adopted by Secretarial Order on May 19, 2009. The TMDLs establish the allowable loadings to Flat Creek and Sweetwater Creek that would restore these waterbodies so that they meet their applicable water quality criterion for fecal coliform.

1.2 Identification of Waterbody

To provide a larger-scale geographic basis for assessing, reporting, and documenting water quality improvement projects, the Florida Department of Environmental Protection (Department) divides basin groups into smaller areas called planning units. Planning units help organize information and management strategies around prominent sub-basin characteristics and drainage features. To the extent possible, planning units were chosen to reflect sub-basins that were previously defined by the Northwest Florida Water Management District (NWFWMD). Flat Creek and Sweetwater Creek are located within the Apalachicola River Planning Unit. Both creeks are tributaries to the Apalachicola River.

For assessment purposes, the Department has divided the Apalachicola River Planning Unit into water assessment polygons with a unique **w**ater**b**ody **id**entification (WBID) number for each watershed or stream reach. Flat Creek is WBID 487, and Sweetwater Creek is WBID 728 (**Figure 1.1**).

1.2.1 Flat Creek (WBID 487)

The Flat Creek watershed encompasses 9,470 acres. The two predominant land uses are upland forests (covering approximately 7,655 acres) and agriculture (covering 788 acres). Flat Creek is located in Gadsden County (**Figure 1.1**). The climate in the county, specifically areas surrounding the creek, is temperate. Annual rainfall averages approximately 53.65 inches, although rainfall amounts can vary greatly from year to year (CLimate Information for Management and Operational Decisions [CLIMOD], 2008). Based on data from a 30-year period (1971–2000), the average summer temperature is 89.9^{o}F, and the average winter temperature is 64.6^{o}F (CLIMOD, 2008).

The topography of the Flat Creek watershed reflects its location in the Tifton Upland or Southeastern Plains ecoregion. Elevations range from 60 to 70 feet above sea level in the downstream portion or western part of the watershed, and 275 to 300 feet above sea level in the upstream portion or eastern part of the watershed (Department, 2008). The predominant soil type is clayey sand (Department, 2008). There are no major human population centers in the watershed.

1.2.2 Sweetwater Creek (WBID 728)

The Sweetwater Creek watershed encompasses 3,525 acres. The two predominant land uses are upland forests (covering approximately 2,936 acres) and rangeland (covering 297 acres). Sweetwater Creek is located in Liberty County (**Figure 1.1**). The climate in the county, specifically areas surrounding the creek, is temperate. Annual rainfall averages approximately 58.64 inches, although rainfall amounts can vary greatly from year to year (CLIMOD, 2008). Based on data from a 30-year period (1971–2000), the average summer temperature is 91.1°F, and the average winter temperature is 65.7°F (CLIMOD, 2008).

The topography of the Sweetwater Creek watershed reflects its location in the Tifton Upland or Southeastern Plains ecoregion. Elevations range from 50 to 60 feet above sea level in the downstream portion or western part of the watershed, and from 250 to 275 feet above sea level in the upstream portion or eastern part of the watershed (Department, 2008). The predominant soil type in the downstream portion is clayey sand, and the upstream portion consists of medium fine sand and silt (Department, 2008). There are no major human population centers in the watershed.

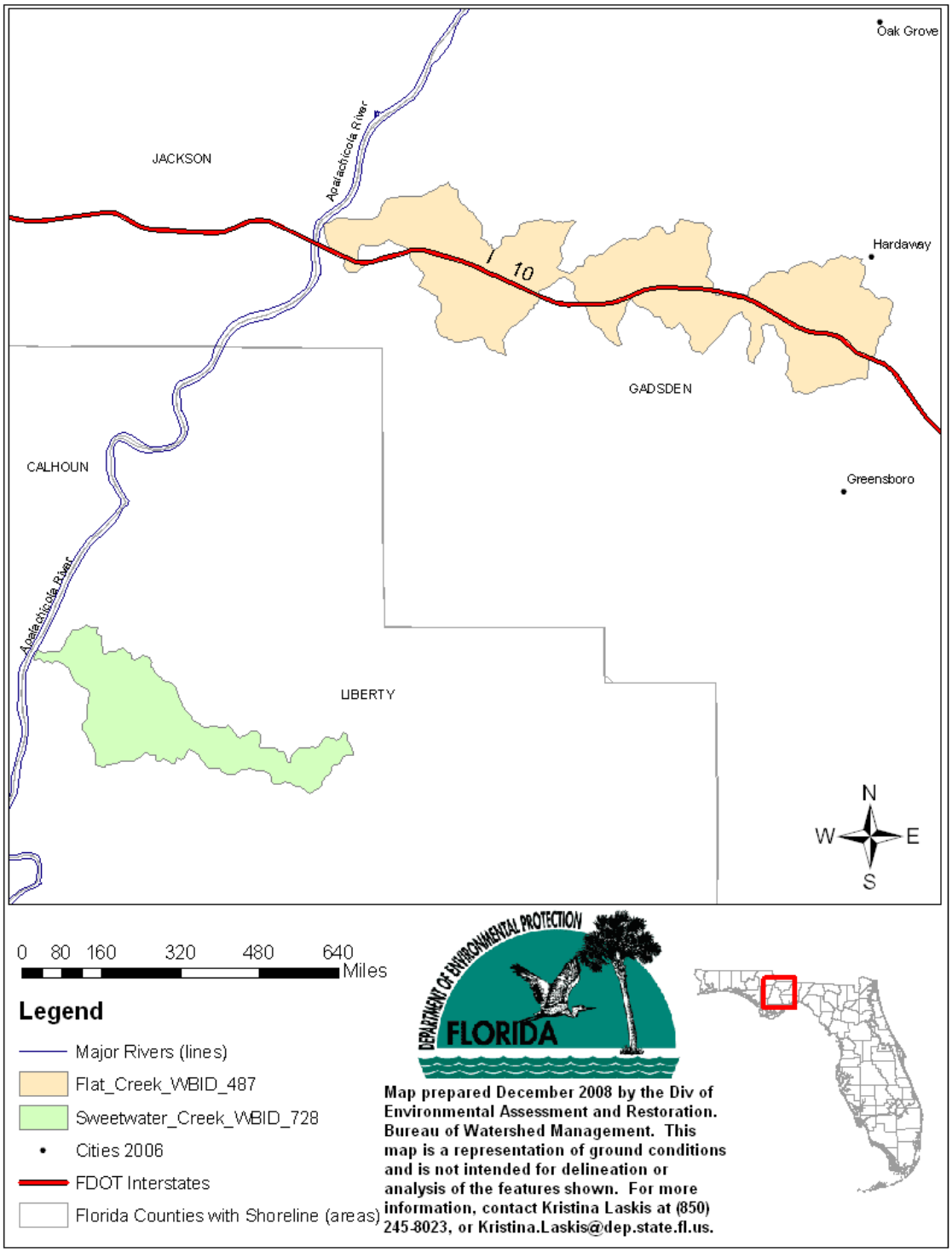

Figure 1.1. Locations of the Flat Creek (WBID 487) and Sweetwater Creek (WBID 728) Watersheds with Major Geopolitical Features in the Apalachicola River Planning Unit

1.3 Background

This report was developed as part of the Department's watershed management approach for restoring and protecting state waters and addressing TMDL Program requirements. The watershed approach, which is implemented using a cyclical management process that rotates through the state's 52 river basins over a 5-year cycle, provides a framework for implementing the TMDL Program–related requirements of the 1972 federal Clean Water Act and the 1999 Florida Watershed Restoration Act (FWRA) (Chapter 99-223, Laws of Florida).

A TMDL represents the maximum amount of a given pollutant that a waterbody can assimilate and still meet water quality standards, including its applicable water quality criteria and its designated uses. TMDLs are developed for waterbodies that are verified as not meeting their water quality standards. They provide important water quality restoration goals that will guide restoration activities.

This TMDL report may be followed by the development and implementation of a Basin Management Action Plan, or BMAP, to reduce the amount of fecal coliform that caused the verified impairment of Flat Creek and Sweetwater Creek. These activities will depend heavily on the active participation of the NWFWMD, local governments, businesses, and other stakeholders. The Department will work with these organizations and individuals to undertake or continue reductions in the discharge of pollutants and achieve the established TMDLs for impaired waterbodies.

Chapter 2: DESCRIPTION OF WATER QUALITY PROBLEM

2.1 Statutory Requirements and Rulemaking History

Section 303(d) of the federal Clean Water Act requires states to submit to the U.S. Environmental Protection Agency (EPA) lists of surface waters that do not meet applicable water quality standards (impaired waters) and establish a TMDL for each pollutant causing the impairment of listed waters on a schedule. The Department has developed such lists, commonly referred to as 303(d) lists, since 1992. The list of impaired waters in each basin, referred to as the Verified List, is also required by the FWRA (Subsection 403.067[4], Florida Statutes [F.S.]); the state's 303(d) list is amended annually to include basin updates.

Florida's 1998 303(d) list contained several waterbodies in the Apalachicola–Chipola Basin, including Flat Creek and Sweetwater Creek. However, the FWRA (Section 403.067, F.S.) stated that all previous Florida 303(d) lists were for planning purposes only and directed the Department to develop, and adopt by rule, a new science-based methodology to identify impaired waters. After a long rulemaking process, the Environmental Regulation Commission adopted the new methodology as Rule 62-303, Florida Administrative Code (F.A.C.) (Identification of Impaired Surface Waters Rule, or IWR), in April 2001; the rule was modified in 2006 and 2007.

2.2 Information on Verified Impairment

The Department used the IWR to assess water quality impairments in Flat Creek and Sweetwater Creek, and verified the impairments for fecal coliform (**Table 2.1**). **Table 2.2** summarizes the data collected during the verified period (January 2001–June 2008). As shown in **Table 2.1**, the projected year for the fecal coliform bacteria TMDLs was 2008, but the Settlement Agreement between EPA and Earthjustice, which drives the TMDL development schedule for waters on the 1998 303(d) list, allows an additional nine months to complete the TMDLs. As such, these TMDLs must be adopted and submitted to the EPA by September 30, 2009.

These waterbodies were verified as impaired for fecal coliform because, using the IWR methodology, more than 10 percent of the values exceeded the Class III freshwater criterion of 400 counts per 100 milliliters (counts/100mL) for fecal coliform: in Flat Creek, 12 exceedances out of 16 samples exceeded the criterion in the verified period; and in Sweetwater Creek, there were 9 exceedances out of 19 samples.

The verified impairments were based on data collected by the Department's Northwest District and Biological Research Associates (BRA). **Figures 5.1** and **5.2** show the locations of the STORET stations in Flat and Sweetwater Creeks, respectively. **Figures 2.1** and **2.2** display the fecal coliform data collected during the verified period (January 2001–June 2008) for Flat and Sweetwater Creeks, respectively. The majority of the data were collected from 2007 to 2008 for each watershed.

Table 2.1. Verified Impairments for Flat Creek (WBID 487) and Sweetwater Creek (WBID 728)

NOTE:
*The projected year for the fecal coliform bacteria TMDLs was 2008, but the Settlement Agreement between EPA and Earthjustice, which drives the TMDL development schedule for waters on the 1998 303(d) list, allows an additional nine months to complete the TMDLs. As such, these TMDLs must be adopted and submitted to EPA by September 30, 2009.

WBID	Waterbody Segment Name	Parameters Included on the 1998 303(d) List	Parameter Causing Impairment	Projected Year for TMDL Development*
487	Flat Creek	Fecal Coliform	Fecal Coliform	2008
728	Sweetwater Creek	Fecal Coliform	Fecal Coliform	2008

Table 2.2. Summary of Fecal Coliform Data Collected During the Verified Period (January 2001–June 2008) for Flat Creek (WBID 487) and Sweetwater Creek (WBID 728)

NOTES:
Coliform counts are #/100mL.
Exceedances represent values above 400 counts/100mL.

Waterbody Segment	Total Number of Samples	IWR-Required Number of Exceedances for the Verified List	Number of Observed Exceedances	Number of Observed Nonexceedances	Number of Seasons Data Were Collected	Mean	Median	Min	Max
Flat Creek	16	5	12	4	4	654.5	590	132	1,600
Sweetwater Creek	19	5	9	10	4	446.5	395	33	960

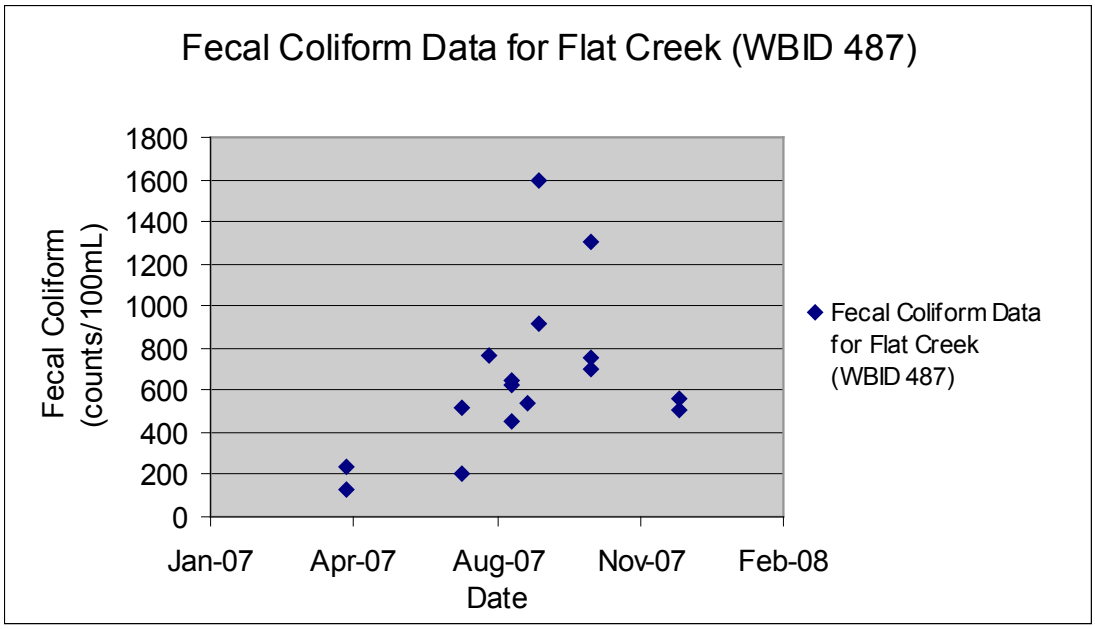

Figure 2.1. Fecal Coliform Measurements for Flat Creek (Verified Period: January 2001–June 2008)

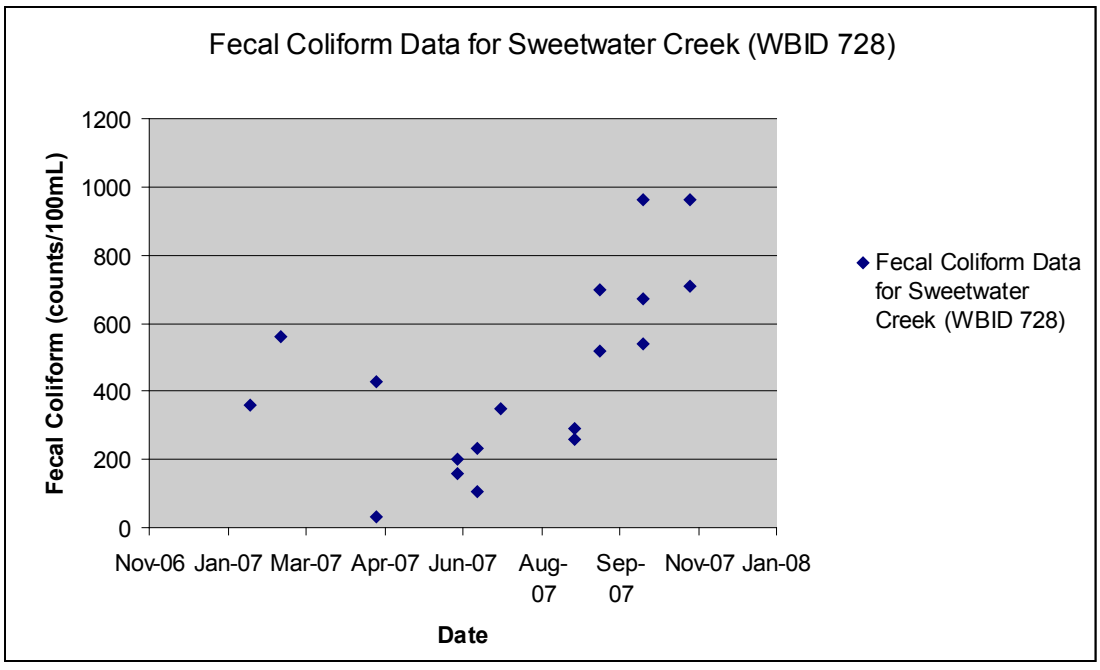

Figure 2.2. Fecal Coliform Measurements for Sweetwater Creek (Verified Period: January 2001–June 2008)

Chapter 3. DESCRIPTION OF APPLICABLE WATER QUALITY STANDARDS AND TARGETS

3.1 Classification of the Waterbody and Criteria Applicable to the TMDL

Florida's surface waters are protected for five designated use classifications, as follows:

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 (there are no state waters currently in this class)**

Flat Creek and Sweetwater Creek are Class III waterbodies, with a designated use of recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife. The Class III water quality criterion applicable to the impairment addressed by this TMDL is for fecal coliform.

3.2 Applicable Water Quality Standards and Numeric Water Quality Target

Numeric criteria for bacterial quality are expressed in terms of fecal coliform bacteria concentrations. The water quality criterion for the protection of Class III waters, as established by Rule 62-302, F.A.C., states the following:

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

The criterion states state that monthly averages shall be expressed as geometric means based on a minimum of 10 samples taken over a 30-day period. During the development of these TMDLs, there were insufficient data (fewer than 10 samples in a given month) available to evaluate the geometric mean criterion for fecal coliform bacteria. Therefore, the criterion selected was not to exceed 400 MPN/100mL in any sampling event for fecal coliform. The 10 percent exceedance allowed by the water quality criterion for fecal coliform bacteria was not used directly in estimating the target load but was included in the TMDLs' margin of safety (MOS) (as described in subsequent chapters).

Chapter 4: ASSESSMENT OF SOURCES

4.1 Types of Sources

An important part of the TMDL analysis is the identification of pollutant source categories, source subcategories, or individual sources of nutrients in the Flat Creek and Sweetwater Creek watersheds, and the amount of pollutant loading contributed by each of these sources. Sources are broadly classified as either "point sources" or "nonpoint sources." Historically, the term "point sources" has meant discharges to surface waters that typically have a continuous flow via a discernable, confined, and discrete conveyance, such as a pipe. Domestic and industrial wastewater treatment facilities (WWTFs) are examples of traditional point sources. In contrast, the term "nonpoint sources" was used to describe intermittent, rainfall-driven, diffuse sources of pollution associated with everyday human activities, including runoff from urban land uses, agriculture, silviculture, and mining; discharges from failing septic systems; and atmospheric deposition.

However, the 1987 amendments to the Clean Water Act redefined certain nonpoint sources of pollution as point sources subject to regulation under the EPA's National Pollutant Discharge Elimination System (NPDES) Program. These nonpoint sources included certain urban stormwater discharges, such as those from local government master drainage systems, construction sites over five acres, and a wide variety of industries (see **Appendix A** for background information on the federal and state stormwater programs).

To be consistent with Clean Water Act definitions, the term "point source" will be used to describe traditional point sources (such as domestic and industrial wastewater discharges) **AND** stormwater systems requiring an NPDES stormwater permit when allocating pollutant load reductions required by a TMDL (see **Section 6.1**). However, the methodologies used to estimate nonpoint source loads do not distinguish between NPDES stormwater discharges and non-NPDES stormwater discharges, and as such, this source assessment section does not make any distinction between the two types of stormwater.

4.2 Potential Sources of Fecal Coliform in the Flat Creek and Sweetwater Creek Watersheds

4.2.1 Point Sources

NPDES Wastewater Facilities

There are no NPDES-permitted wastewater facilities in the Flat Creek or Sweetwater Creek watersheds.

Municipal Separate Storm Sewer System Permittees

There are no NPDES Phase 1 or Phase 2 municipal separate storm sewer system (MS4) permits in the Flat Creek or Sweetwater Creek watersheds.

4.2.2 Land Uses and Nonpoint Sources

Additional fecal coliform loadings to Flat Creek and Sweetwater Creek are generated from nonpoint sources in these watersheds. Potential nonpoint sources of coliform include loadings from surface runoff, wildlife, livestock, pets, leaking septic tanks, and leaking sewer lines.

Nonpoint source pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources and is caused by rainfall moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even underground sources of drinking water (EPA, 1994).

No major point sources were identified discharging fecal coliform into Flat Creek and Sweetwater Creek. An exceedance under dry weather conditions could stem primarily from baseflow, which carries the pollutant from the surficial aquifer. Baseflow pollution could result from many different sources, including failed septic tanks, which are covered in more detail later in this chapter. However, the prominent land uses for the Flat Creek and Sweetwater Creek watersheds are upland forests, rangeland, and agriculture. In addition to livestock, wildlife such as birds, raccoons, bobcats, rabbits, deer, and feral hogs could also contribute to the fecal coliform exceedances in both watersheds. These animals have direct access to the stream, especially under low-flow conditions.

According to Brian Kreiter and David Printiss from the Nature Conservancy–Apalachicola Bluffs and Ravines Preserve (ABRP), which includes approximately 1,785 acres in the lower Sweetwater Creek watershed, feral hog populations are prominent. In addition, in the Flat Creek watershed, Scott and Donna Wright, who are local stakeholders (landowners with approximately 500 acres), have also documented feral hog populations.

Land Uses

The spatial distribution and acreage of different land use categories were identified using the Florida Land Use, Cover, and Forms Classification System (FLUCCS) and the NWFWMD 1995 land use coverage contained in the Department's geographic information system (GIS) library. Land use categories in the Flat Creek and Sweetwater Creek watersheds were aggregated using the simplified Level 1 codes tabulated in **Tables 4.1** and **4.2**, respectively. The Flat Creek watershed encompasses 9,470 acres. The two predominant land uses are upland forests (covering approximately 7,655 acres) and agriculture (covering 788 acres). The Sweetwater Creek watershed encompasses 3,525 acres. The two predominant land uses are upland forests (covering about 2,936 acres) and rangeland (covering 297 acres).

Table 4.1 Classification of Land Use Categories in the Flat Creek Watershed (WBID 487) in 1995

Note: - = Empty cell

Level 1 Code	Land Use	Acreage	% Acreage
1000	Urban and Built-Up	128.32	1.35%
2000	Agriculture	788.06	8.32%
3000	Rangeland	159.67	1.69%
4000	Upland Forest/Rural Open	7,654.97	80.83%
5000	Water	19.89	0.21%
6000	Wetlands	388.65	4.10%
7000	Barren Land	0.00	0.00%
8000	Transportation, Communication, and Utilities	330.55	3.49%
-	**TOTAL:**	**9,470.11**	**100.00%**

Table 4.2 Classification of Land Use Categories in the Sweetwater Creek Watershed (WBID 728) in 1995

Note: - = Empty cell

Level 1 Code	Land Use	Acreage	% Acreage
1000	Urban and Built-Up	47.90	1.36%
2000	Agriculture	89.20	2.53%
3000	Rangeland	296.92	8.42%
4000	Upland Forest/Rural Open	2,935.60	83.27%
5000	Water	12.88	0.37%
6000	Wetlands	104.88	2.98%
7000	Barren Land	0.00	0.00%
8000	Transportation, Communication, and Utilities	38.05	1.08%
-	**TOTAL:**	**3,525.43**	**100.00%**

Urban Development

Pets (especially dogs) could be a significant source of coliform pollution through surface runoff in the Flat Creek and Sweetwater Creek watersheds. In addition to pets, other animal fecal coliform contributors commonly seen in urban areas include rats, pigeons, and sometimes raccoons.

Studies report that up to 95 percent of the fecal coliform found in urban stormwater can come from nonhuman origins (Alderiso et al., 1996; Trial et al., 1993). The most important nonhuman fecal coliform contributors appear to be dogs and cats. In a highly urbanized Baltimore catchment, Lim and Olivieri (1982) found that dog feces were the single greatest source for fecal coliform and fecal streptococcus bacteria. Trial et al. (1993) also reported that cats and dogs were the primary source of fecal coliform in urban watersheds. Using bacteria source tracking techniques, Watson (2002) found that the amount of fecal coliform bacteria contributed by dogs in Stevenson Creek in Clearwater, Florida, was as important as that from septic tanks.

According to the American Pet Products Manufacturers Association (APPMA), about 4 out of 10 U.S. households include at least one dog. A single gram of dog feces contains about 23 million fecal coliform bacteria (Van der Wel, 1995). Unfortunately, statistics show that about 40 percent of American dog owners do not pick up their dogs' feces.

Table 4.3 shows the fecal coliform concentrations of surface runoff measured in two urban areas (Bannerman et al., 1993; Steuer et al., 1997). While bacteria levels differed widely in the two studies, both indicated that residential lawns, driveways, and streets were the major source areas for bacteria.

Table 4.3 Concentrations (Geometric Mean Colonies/100mL) of Fecal Coliform from Two Urban Source Areas (Steuer et al., 1997; Bannerman et al., 1993)

Geographic Location	Marquette, Michigan	Madison, Wisconsin
Number of storms sampled	12	9
Commercial parking lot	4,200	1,758
High-traffic street	1,900	9,627
Medium-traffic street	2,400	56,554
Low-traffic street	280	92,061
Commercial rooftop	30	1,117
Residential rooftop	2,200	294
Residential driveway	1,900	34,294
Residential lawns	4,700	42,093
Basin outlet	10,200	175,106

The number of dogs in the Flat Creek and Sweetwater Creek watersheds is not known. Therefore, this analysis used the statistics produced by APPMA to estimate the possible fecal coliform loads contributed by dogs. Using county census (population density, housing units, etc.) and area (mi^2) information, the census information was extrapolated for each watershed. The human population in Gadsden and Liberty County calculated from the U.S. Census Bureau in 2000 was approximately 45,087 and 7,021, respectively. The extrapolated human population in the Flat Creek and Sweetwater Creek watersheds was approximately 1,195 (about 87 people/square mile [mi^2]) and 42 (about 8 people/mi^2), respectively. According to the U.S. Census Bureau, in 2000 there were 2.79 people per household in Gadsden County and 2.51 people per household in Liberty County. Assuming that 40 percent of the households in this area have 1 dog, the total number of dogs in the Flat Creek and Sweetwater Creek watersheds is about 171 and 7, respectively.

According to the waste production rate for dogs and the fecal coliform counts per gram of dog wastes listed in **Table 4.4**, and assuming that 40 percent of dog owners do not pick up dog feces, the total waste produced by dogs and left on the land surface of residential areas is 577,080 grams/day. The total fecal coliform load produced by dogs for the Flat Creek watershed is 6.8×10^{10} counts/day, and for the Sweetwater Creek watershed it is 2.8×10^{9} counts/day.

It should be noted that this load only represents the fecal coliform load created in each of the watersheds and is not intended to be used to represent a part of the existing load that reaches

the receiving waterbodies. The fecal coliform load that eventually reaches the receiving waterbodies could be significantly less than this value due to attenuation in overland transport.

Table 4.4. Dog Population Density, Wasteload, and Fecal Coliform Density

Note: * Number from APPMA.
Source: Weiskel et al., 1996.

Type	Population density (household)	Wasteload (grams/an-day)	Fecal coliform density (fecal coliform/grams)
Dog	0.4*	450	2,200,000

Septic Tanks

Septic tanks are another potentially important source of coliform pollution in urban watersheds. When properly installed, most of the coliform from septic tanks should be removed within 50 meters of the drainage field (Minnesota Pollution Control Agency, 1999). However, in areas with a relatively high ground water table, the drainage field can be flooded during the rainy season, and coliform bacteria can pollute the surface water through stormwater runoff. Septic tanks may also cause coliform pollution when they are built too close to irrigation wells. Any well that is installed in the surficial aquifer system will cause a drawdown. If the septic tank system is built too close to the well (e.g., less than 75 feet), the septic tank discharge will be within the cone of influence of the well. As a result, septic tank effluent may go into the well and, once the polluted water is used to irrigate lawns, coliform bacteria may reach the land surface and wash into surface waters during the rainy season.

A rough estimate of fecal coliform loads from failed septic tanks in each watershed can be made using **Equation 4.1**:

$$L = 37.85^* N * Q * C * F \qquad \textbf{(Equation 4.1)}$$

Where,

L is the fecal coliform daily load (counts/day);
N is the total number of septic tanks in the watershed (septic tanks);
Q is the discharge rate for each septic tank;
C is the fecal coliform concentration for the septic tank discharge; and
F is the septic tank failure rate.

Based on 2007 Florida Department of Health (FDOH) onsite sewage GIS coverage (http://www.doh.state.fl.us/environment/programs/EhGis/EhGisDownload.htm), about 39 and 3 housing units (*N*) were identified as being on septic tanks in the Flat Creek and Sweetwater Creek watersheds, respectively (**Figures 4.1** and **4.2**). The discharge rate from each septic tank (*Q*) was calculated by multiplying the average household size by the per capita wastewater production rate per day. Based on the information published by the U.S. Census Bureau in 2000, the average household size for Gadsden and Liberty Counties is about 2.79 and 2.51 people/household, respectively. The same population density was assumed for the Flat Creek and Sweetwater Creek watersheds. A commonly cited value for per capita wastewater production rate is 70 gallons/day/person (EPA, 2001). The commonly cited concentration (*C*) for septic tank discharge is $1x10^6$ counts/100mL for fecal coliform (EPA, 2001).

No measured septic tank failure rate data were available for the watersheds when this TMDL analysis was conducted. Therefore, the failure rate was derived from the number of septic tank and septic tank repair permits for Gadsden and Liberty Counties published by FDOH (http://www.doh.state.fl.us/environment/OSTDS/statistics/ostdsstatistics.htm). The number of septic tanks in the two counties was calculated assuming that none of the installed septic tanks will be removed after being installed (**Tables 4.5** and **4.6**). The reported number of septic tank repair permits was also obtained from the FDOH Website (**Tables 4.5** and **4.6**).

Based on this information, a discovery rate of failed septic tanks for each year between 2002 and 2007 was calculated and listed in **Tables 4.5** and **4.6**. Using the tables, the average annual septic tank failure discovery rate for Gadsden County is about 0.61 percent, and for Liberty County about 0.55 percent. Assuming that failed septic tanks are not discovered for about 6 years, the estimated annual septic tank failure rate is about 5 times the discovery rate, or 3.05 percent for Gadsden County and 2.74 percent for Liberty County. Based on **Equation 4.1**, the estimated fecal coliform loading from failed septic tanks in the Flat Creek and Sweetwater Creek watersheds is approximately 8.8 x 109 and 7.1 x 109 counts/day, respectively.

Table 4.5 Estimated Septic Numbers and Septic Failure Rates for Gadsden County, 2002–07

Notes: * The failure rate is 5 times the failure discovery rate.
- = Empty cell

-	2002	2003	2004	2005	2006	2007	Average
New installations (septic tanks)	206	242	270	303	414	236	279
Accumulated installations (septic tanks)	14,946	15,152	15,394	15,664	15,967	16,381	15,584
Repair permits (septic tanks)	102	110	89	76	108	83	95
Failure discovery rate (%)	0.68%	0.73%	0.58%	0.49%	0.68%	0.51%	0.61%
Failure rate (%)*	3.41%	3.63%	2.89%	2.43%	3.38%	2.53%	3.05%

Table 4.6 Estimated Septic Numbers and Septic Failure Rates for Liberty County, 2002–07

Notes: * The failure rate is 5 times the failure discovery rate.
- = Empty cell

-	2002	2003	2004	2005	2006	2007	Average
New installations (septic tanks)	50	68	69	70	45	7	52
Accumulated installations (septic tanks)	2,736	2,786	2,854	2,923	2,993	3,038	2,888
Repair permits (septic tanks)	23	22	22	19	6	1	16
Failure discovery rate (%)	0.84%	0.79%	0.77%	0.65%	0.20%	0.03%	0.55%
Failure rate (%)*	4.20%	3.95%	3.85%	3.25%	1.00%	0.16%	2.74%

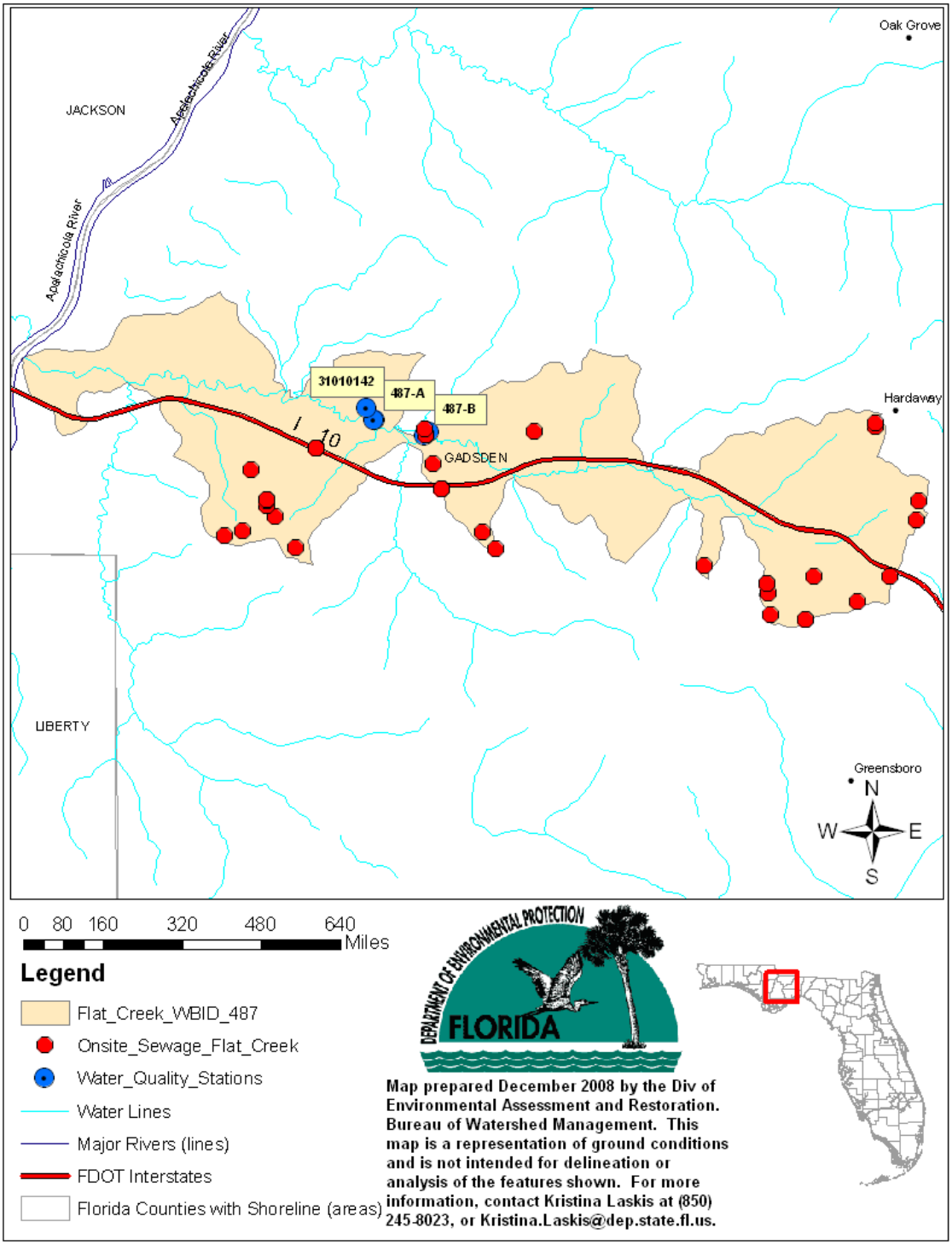

Figure 4.1. Distribution of Water Quality Stations and Onsite Sewage Systems (Septic Tanks) in the Flat Creek Watershed (WBID 487)

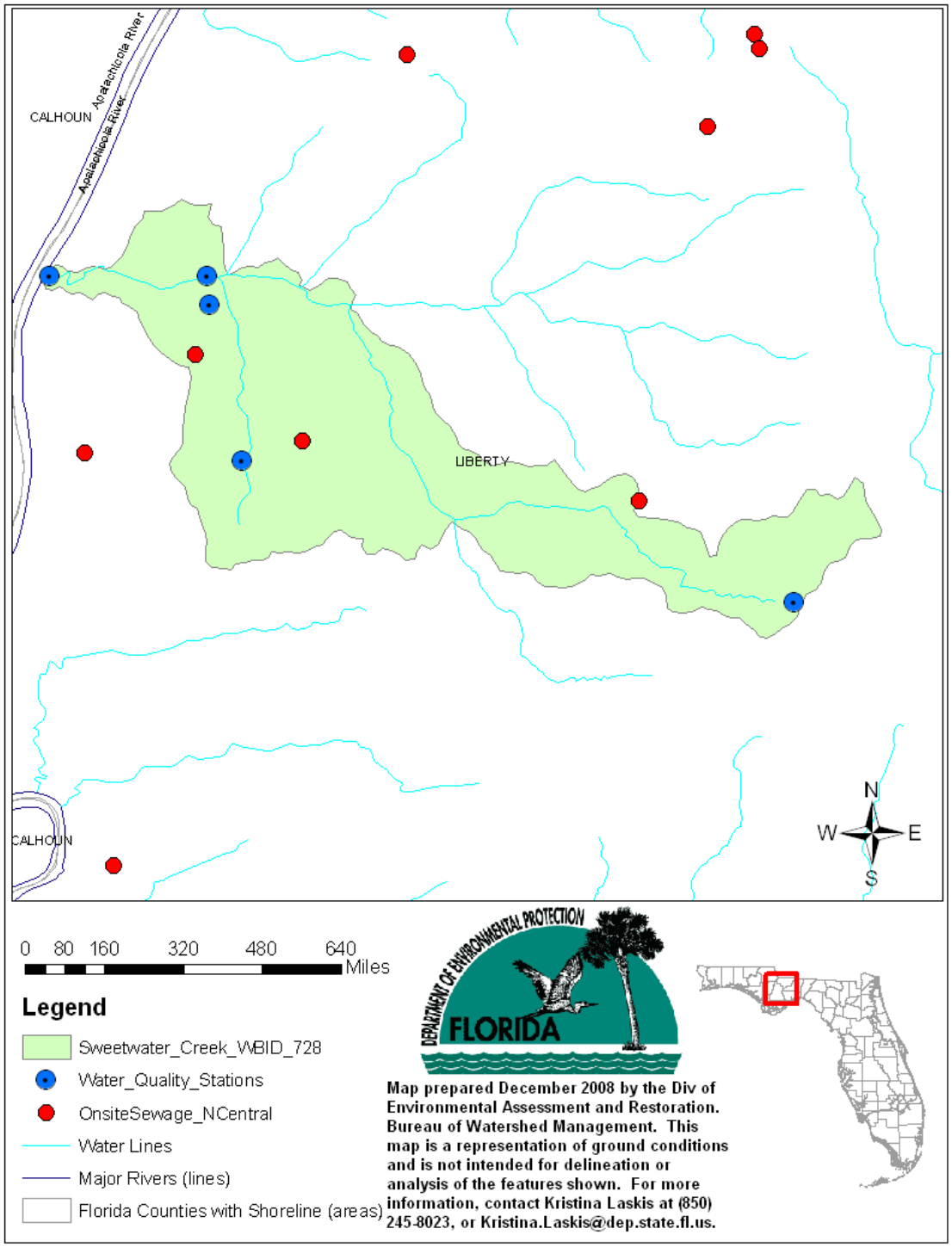

Figure 4.2. Distribution of Water Quality Stations and Onsite Sewage Systems (Septic Tanks) in the Sweetwater Creek Watershed (WBID 728)

Chapter 5: DETERMINATION OF ASSIMILATIVE CAPACITY

5.1 Determination of Loading Capacity

Typically, continuous flow measurements in a watershed can be used to develop a fecal coliform TMDL. However, no continuous flow measurements exist for the Flat Creek and Sweetwater Creek watersheds. Therefore, these fecal coliform TMDLs were developed using the "percent reduction" method. For this method, the percent reduction needed to meet the applicable criterion is calculated for each value above the criterion, and then a median percent reduction is calculated.

5.1.1 Data Used in the Determination of the TMDL

The data used to develop this TMDL were mainly provided by the Department's Northwest District Office (Stations: 21FLPNS 31010051, 21FLPNS 31017282, 21FLPNS 303742908450048, 21FLPNS 303736108449269, AND 21FLPNS 31014873) and BRA (Stations: 21FLBRA 487-A, 21FLBRA 487-B, 21FLBRA 728-A, 21FLBRA 728-B, AND 21FLBRA 728-C). **Figures 5.1** and **5.2** show the locations of the water quality stations from which fecal coliform data were collected for Flat Creek and Sweetwater Creek, respectively. **Figures 2.1** and **2.2** display the fecal coliform data used in this analysis for each watershed, respectively.

5.1.2 TMDL Development Process

As described in **Section 5.1**, the percent reduction needed to meet the fecal coliform criterion was determined for each individual exceedance using the following equation:

$$\textbf{(2)}\ \frac{\textbf{[measured exceedance – criterion]*100}}{\textbf{measured exceedance}}$$

The fecal coliform TMDL was calculated as the median of the percent reductions needed over the data range where exceedances occurred (see **Tables 5.1** and **5.2** for data). The median percent reduction for this data period (January 2001–June 2008) was 38.46 percent for Flat Creek (WBID 487) and 40.30 percent for Sweetwater Creek (WBID 728).

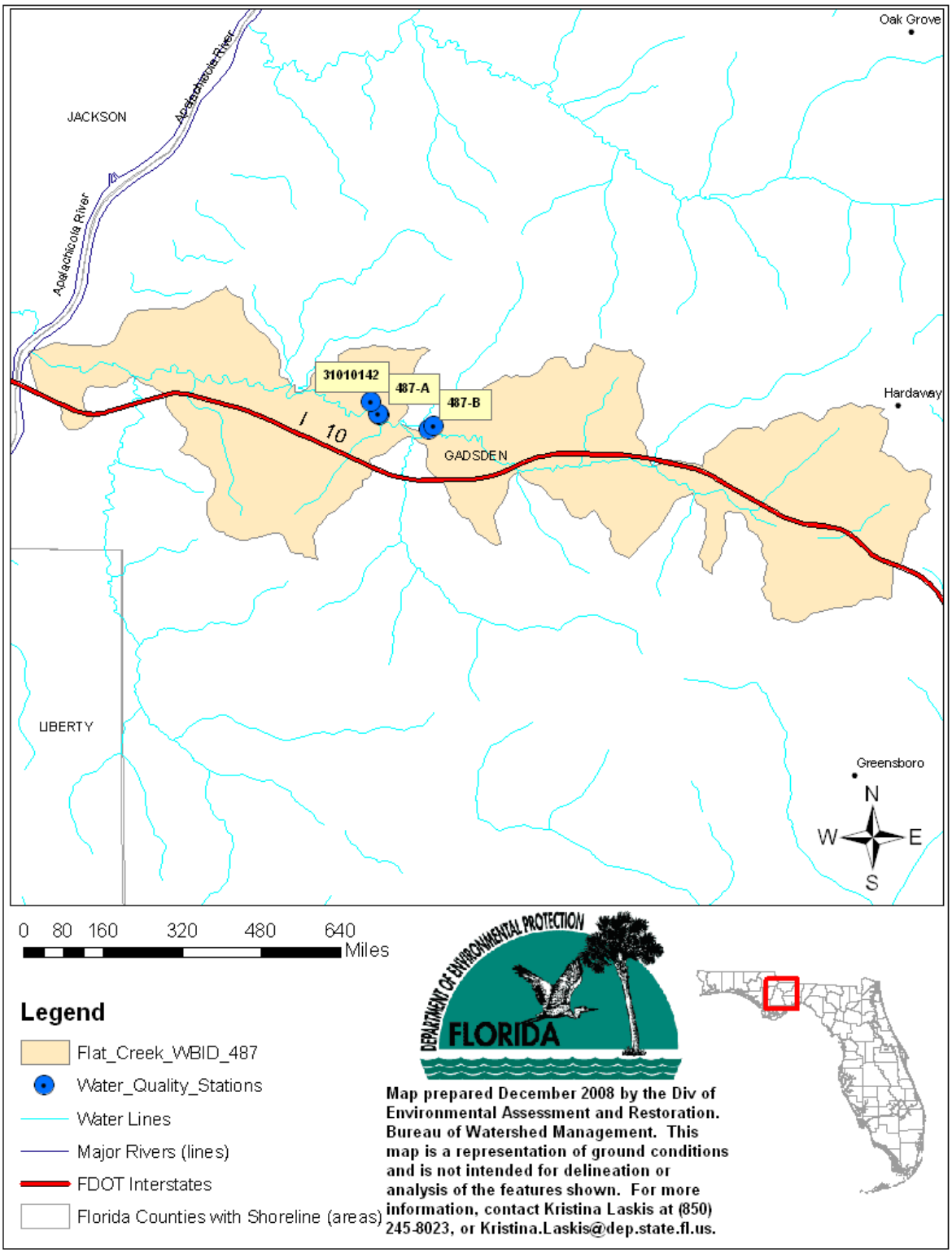

Figure 5.1. Water Quality Sampling Stations in Flat Creek (WBID 487)

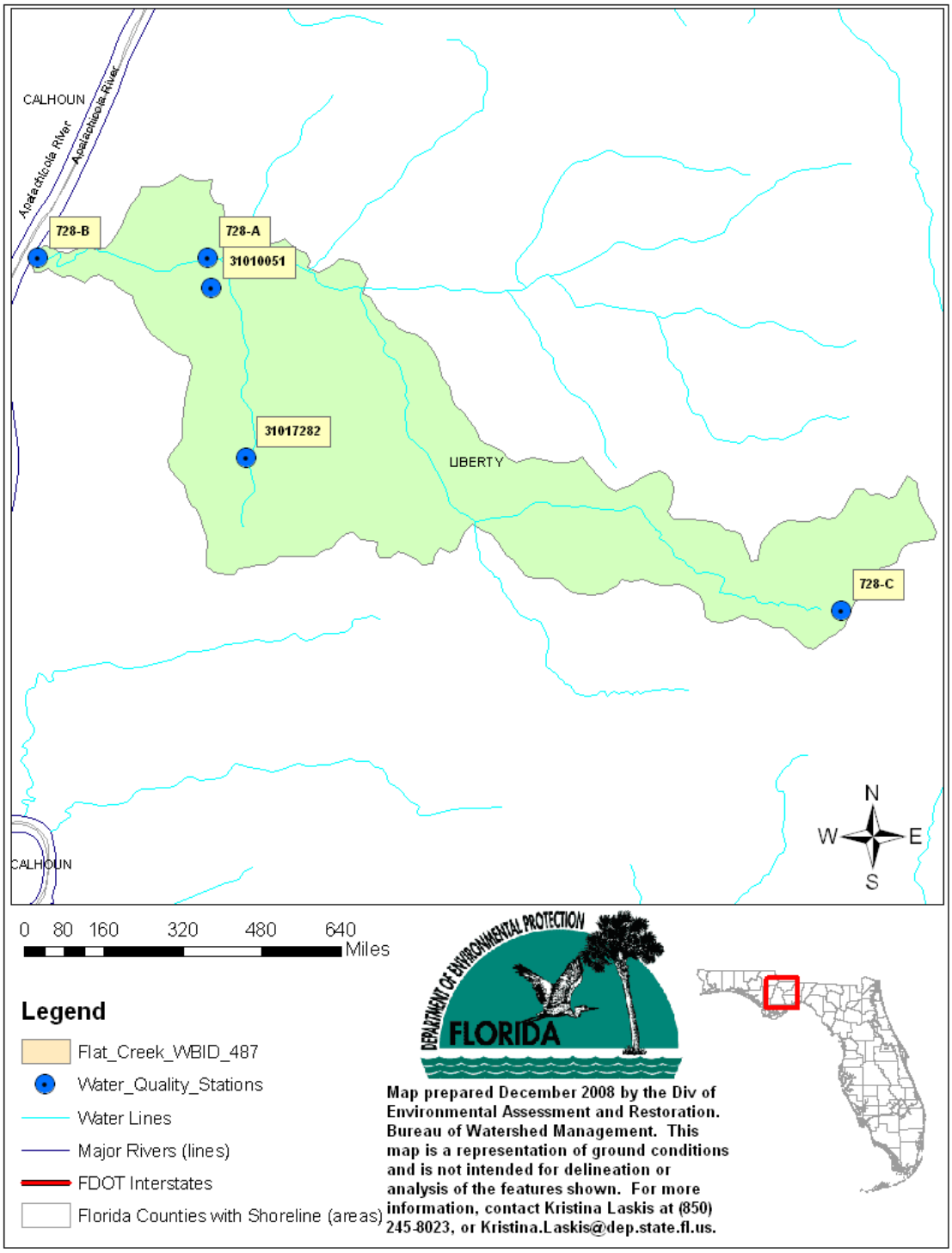

Figure 5.2. Water Quality Sampling Stations in Sweetwater Creek (WBID 728)

Table 5.1. Calculation of Percent Reduction in Fecal Coliform Necessary To Meet the Water Quality Standard of 400 Colonies/100mL in Flat Creek (WBID 487)

Notes: - = No data/empty cell
* Observed values are #/100mL.

WBID	Station	Date	Result*	Standard*	% Reduction
487	21FLPNS 303742908450048	4/23/2007	132	400	-
487	21FLPNS 303736108449269	4/23/2007	240	400	-
487	21FLPNS 303736108449269	7/12/2007	210	400	-
487	21FLPNS 31014873	7/12/2007	520	400	23.08%
487	21FLPNS 303742908450048	8/1/2007	770	400	48.05%
487	21FLPNS 303736108449269	8/16/2007	450	400	11.11%
487	21FLPNS 31014873	8/16/2007	620	400	35.48%
487	21FLPNS 303742908450048	8/16/2007	650	400	38.46%
487	21FLBRA 487-A	8/28/2007	540	400	25.93%
487	21FLBRA 487-B	9/5/2007	920	400	56.52%
487	21FLBRA 487-B	9/5/2007	1,600	400	75.00%
487	21FLPNS 303742908450048	10/10/2007	700	400	42.86%
487	21FLPNS 303736108449269	10/10/2007	750	400	46.67%
487	21FLPNS 31014873	10/10/2007	1,300	400	69.23%
487	21FLPNS 303742908450048	12/12/2007	510	400	21.57%
487	21FLPNS 303736108449269	12/12/2007	560	400	28.57%
-	**Median:**	**-**	**-**	**-**	**38.46%**

Table 5.2. Calculation of Percent Reduction in Fecal Coliform Necessary To Meet the Water Quality Standard of 400 Colonies/100mL in Sweetwater Creek (WBID 728)

Note: - = No data/empty cell
* Observed values are #/100mL

WBID	Station	Date	Result*	Standard*	% Reduction
728	21FLPNS 31017282	2/1/2007	360	400	-
728	21FLPNS 31010051	2/21/2007	560	400	28.57%
728	21FLPNS 31017282	4/23/2007	33	400	-
728	21FLPNS 31010051	4/23/2007	430	400	6.98%
728	21FLPNS 31017282	6/14/2007	158	400	-
728	21FLPNS 31010051	6/14/2007	200	400	-
728	21FLPNS 31017282	6/26/2007	106	400	-
728	21FLPNS 31010051	6/26/2007	230	400	-
728	21FLBRA 728-A	7/11/2007	350	400	-
728	21FLPNS 31010051	8/27/2007	260	400	-
728	21FLPNS 31017282	8/27/2007	290	400	-
728	21FLPNS 31010051	9/12/2007	520	400	23.08%
728	21FLPNS 31017282	9/12/2007	700	400	42.86%
728	21FLBRA 728-A	10/10/2007	540	400	25.93%
728	21FLPNS 31017282	10/10/2007	670	400	40.30%
728	21FLPNS 31010051	10/10/2007	960	400	58.33%
728	21FLPNS 31017282	11/9/2007	710	400	43.66%
728	21FLPNS 31010051	11/9/2007	960	400	58.33%
-	**Median:**				**40.30%**

5.1.3 Critical Conditions/Seasonality

The critical conditions for coliform loadings in a given watershed depend on the existence of point sources and land use patterns in the watershed. Typically, the critical condition for nonpoint sources is an extended dry period, followed by a rainfall runoff event. During wet weather periods, coliform bacteria that have built up on the land surface under dry weather conditions are washed off by rainfall, resulting in wet weather exceedances. However, significant nonpoint source contributions could also occur under dry weather conditions without any major surface runoff event. This usually happens when nonpoint sources contaminate the surficial aquifer, and coliform bacteria are brought into the receiving waters through baseflow. Livestock or wildlife with direct access to the receiving water could also contribute to the exceedances during dry weather.

Measurements were sorted by month to determine whether there was a temporal pattern of exceedances. Monthly average rainfall data from Woodruff Dam (089795) for Flat Creek and Blountstown (080804) for Sweetwater Creek were obtained and included in the analysis. **Tables 5.3** and **5.4** present the summary statistics by month for fecal coliform and rainfall measurements. **Figures 5.3** and **5.4** display this information graphically.

Table 5.3. Summary Statistics of Fecal Coliform and Rainfall Data for Flat Creek (WBID 487), by Month

Note: * Observed values are #/100mL

Month	Number of Cases	Minimum	Maximum	Median	Mean	Number of Exceedances	% Fecal Exceedances	Rainfall Mean
1	0	0	0	0	0	0	0.00%	5.72
2	0	0	0	0	0	0	0.00%	4.33
3	0	0	0	0	0	0	0.00%	4.89
4	2	132	240	186	186	0	0.00%	4.59
5	0	0	0	0	0	0	0.00%	5.29
6	0	0	0	0	0	0	0.00%	4.49
7	2	210	520	365	365	1	23.08%	5.32
8	5	450	650	580	565	5	31.81%	5.19
9	2	920	1,600	1,260	1,260	2	65.76%	3.85
10	3	700	1,300	750	917	3	52.92%	2.44
11	0	0	0	0	0	0	0.00%	3.14
12	2	510	560	535	535	2	25.07%	4.38

Table 5.4. Summary Statistics of Fecal Coliform and Rainfall Data for Sweetwater Creek (WBID 728), by Month

Note: * Observed values are #/100mL

Month	Number of Cases	Minimum	Maximum	Median	Mean	Number of Exceedances	% Fecal Exceedances	Rainfall Mean
1	0	0	0	0	0	0	0.00%	5.74
2	2	360	560	460	460	1	28.57%	4.47
3	0	0	0	0	0	0	0.00%	5.22
4	2	33	430	231.5	231.5	1	6.98%	4.26
5	0	0	0	0	0	0	0.00%	5.28
6	4	106	230	179	173.5	0	0.00%	5.43
7	1	350	350	350	350	0	0.00%	6.86
8	2	260	290	275	275	0	0.00%	6.34
9	2	520	700	610	610	2	32.97%	4.85
10	3	540	960	670	723	3	41.52%	3
11	2	710	960	835	835	2	51.00%	3.07
12	0	0	0	0	0	0	0.00%	4.14

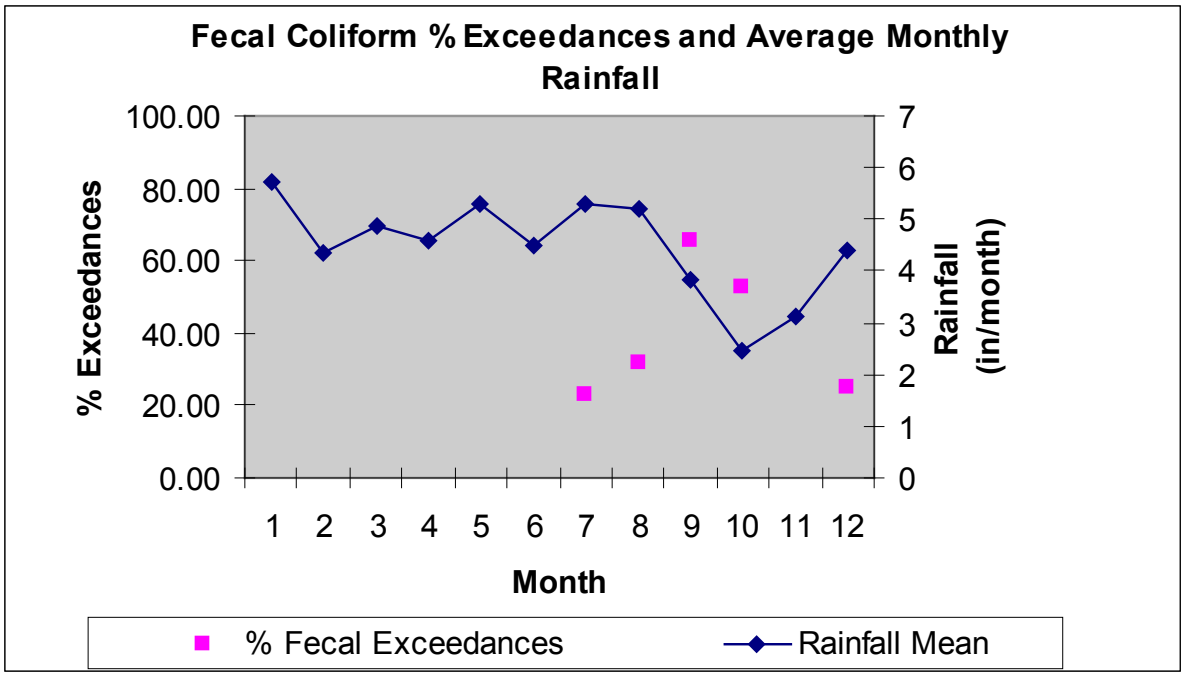

Figure 5.3. Fecal Coliform Exceedances and Rainfall for Flat Creek (WBID 487), by Month

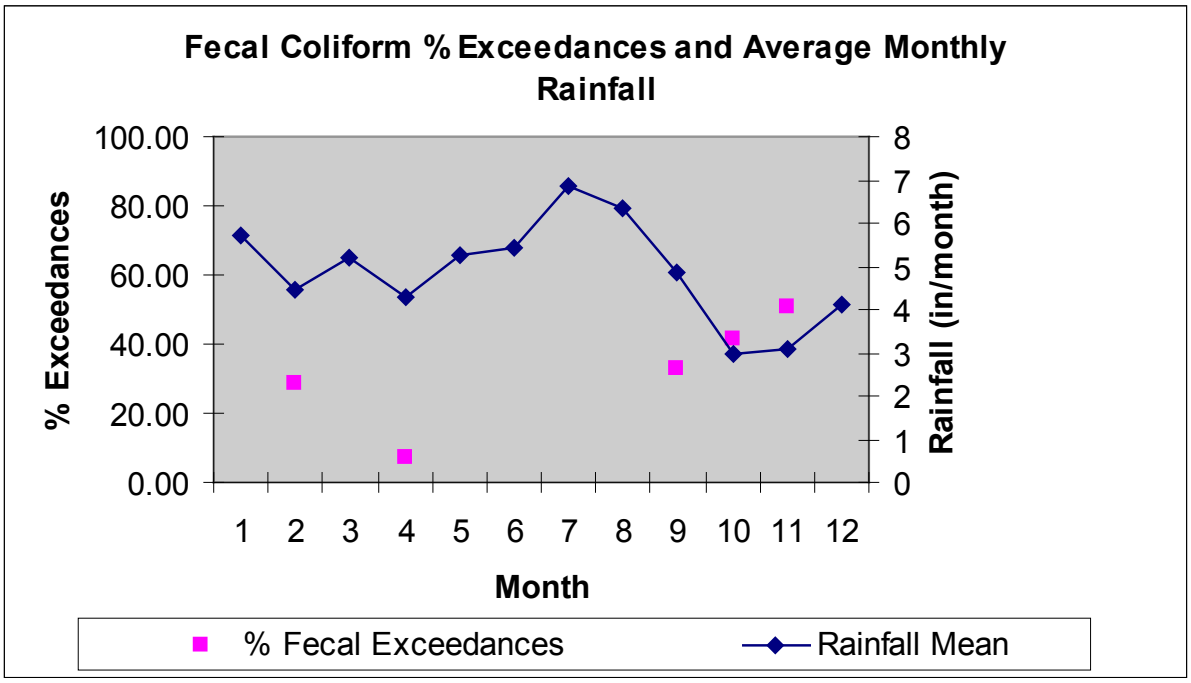

Figure 5.4. Fecal Coliform Exceedances and Rainfall for Sweetwater Creek (WBID 728), by Month

Chapter 6: DETERMINATION OF THE TMDL

6.1 Expression and Allocation of the TMDL

The objective of a TMDL is to provide a basis for allocating acceptable loads among all of the known pollutant sources in a watershed so that appropriate control measures can be implemented and water quality standards achieved. A TMDL is expressed as the sum of all point source loads (wasteload allocations, or WLAs), nonpoint source loads (load allocations, or LAs), and an appropriate margin of safety (MOS), which takes into account any uncertainty concerning the relationship between effluent limitations and water quality:

$$\mathbf{TMDL = \sum WLAs + \sum LAs + MOS}$$

As discussed earlier, the WLA is broken out into separate subcategories for wastewater discharges and stormwater discharges regulated under the NPDES Program:

$$\mathbf{TMDL \cong \sum WLAs_{wastewater} + \sum WLAs_{NPDES\ Stormwater} + \sum LAs + MOS}$$

It should be noted that the various components of the revised TMDL equation may not sum up to the value of the TMDL because (a) the WLA for NPDES stormwater is typically based on the percent reduction needed for nonpoint sources and is also accounted for within the LA, and (b) TMDL components can be expressed in different terms (for example, the WLA for stormwater is typically expressed as a percent reduction, and the WLA for wastewater is typically expressed as mass per day).

WLAs for stormwater discharges are typically expressed as "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). The permitting of stormwater discharges also differs from the permitting of most wastewater point sources. Because stormwater discharges cannot be centrally collected, monitored, and treated, they are not subject to the same types of effluent limitations as wastewater facilities, and instead are required to meet a performance standard of providing treatment to the "maximum extent practical" through the implementation of best management practices (BMPs).

This approach is consistent with federal regulations (40 CFR § 130.2[I]), which state that TMDLs can be expressed in terms of mass per time (e.g., pounds per day), toxicity, or **other appropriate measure**. The TMDLs for Flat Creek and Sweetwater Creek are expressed in terms of MPN/day and percent reduction, and represent the maximum daily fecal coliform and total coliform loads each of these creeks can assimilate and maintain the fecal coliform criterion (**Table 6.1**).

Table 6.1. TMDL Components for Fecal Coliform in Flat Creek (WBID 487) and Sweetwater Creek (WBID 728)

Note: N/A – Not applicable

WBID	Parameter	TMDL (counts/day)	Wasteload Allocation for Wastewater (counts/day)	Wasteload Allocation for NPDES Stormwater (% reduction)	LA (% reduction)	MOS
487	Fecal Coliform	400 #/100mL	N/A	N/A	38.40%	Implicit
728	Fecal Coliform	400 #/100mL	N/A	N/A	40.30%	Implicit

6.2 Load Allocation

A fecal coliform reduction of 38.40 percent for Flat Creek and 40.30 percent for Sweetwater Creek is needed from nonpoint sources. It should be noted that the LA includes loading from stormwater discharges regulated by the Department and the water management districts that are not part of the NPDES Stormwater Program (see **Appendix A).**

6.3 Wasteload Allocation

6.3.1 NPDES Wastewater Discharges

No NPDES-permitted wastewater facilities with fecal coliform limits were identified in the Flat Creek and Sweetwater Creek watersheds. The state already requires all NPDES point source dischargers to meet bacteria criteria at the end of the pipe. It is the Department's current practice not to allow mixing zones for bacteria. Any possible future point sources that may discharge in the watershed will also be required to meet end-of-pipe standards for coliform bacteria.

6.3.2 NPDES Stormwater Discharges

There are no NPDES Phase 1 or Phase 2 permits in the Flat Creek or Sweetwater Creek watersheds. It should be noted that any future 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.

6.4 Margin of Safety

Consistent with the recommendations of the Allocation Technical Advisory Committee (Department, 2001), an implicit MOS was used in the development of these TMDLs by meeting the water quality criterion of 400 colonies/100mL, while the actual criterion allows for a 10 percent exceedance over that level.

Chapter 7: NEXT STEPS: IMPLEMENTATION PLAN DEVELOPMENT AND BEYOND

7.1 Basin Management Action Plan

Following the adoption of these TMDLs by rule, the next step in the TMDL process is to develop an implementation plan for the TMDLs, referred to as the BMAP. This document will be developed over the next year in cooperation with local stakeholders, who will attempt to reach consensus on detailed allocations and on how load reductions will be accomplished. The BMAP will include, among other things:

- *Appropriate load reduction allocations among the affected parties;*
- *A description of the load reduction activities to be undertaken, including structural projects, nonstructural BMPs, and public education and outreach;*
- *A description of further research, data collection, or source identification needed in order to achieve the TMDLs;*
- *Timetables for implementation;*
- *Confirmed and potential funding mechanisms;*
- *Any applicable signed agreement(s);*
- *Local ordinances defining actions to be taken or prohibited;*
- *Any applicable local water quality standards, permits, or load limitation agreements;*
- *Milestones for implementation and water quality improvement; and*
- *Implementation tracking, water quality monitoring, and follow-up measures.*

An assessment of progress toward the BMAP milestones will be conducted every five years, and revisions to the plan will be made as appropriate, in cooperation with basin stakeholders.

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Appendices

Appendix A: Background Information on Federal and State Stormwater Programs

In 1982, Florida became the first state in the country to implement statewide regulations to address the issue of nonpoint source pollution by requiring new development and redevelopment to treat stormwater before it is discharged. The Stormwater Rule, as authorized in Chapter 403, F.S., was established as a technology-based program that relies on the implementation of BMPs that are designed to achieve a specific level of treatment (i.e., performance standards) as set forth in Rule 62-40, F.A.C.

The rule requires the state's water management districts to establish stormwater pollutant load reduction goals (PLRGs) and adopt them as part of a Surface Water Improvement and Management (SWIM) plan, other watershed plan, or rule. Stormwater PLRGs are a major component of the load allocation part of a TMDL. To date, stormwater PLRGs have been established for Tampa Bay, Lake Thonotosassa, the Winter Haven Chain of Lakes, the Everglades, Lake Okeechobee, and Lake Apopka. No PLRG had been developed for Newnans Lake at the time this analysis was conducted.

In 1987, the U.S. Congress established Section 402(p) as part of the federal Clean Water Act Reauthorization. This section of the law amended the scope of the federal NPDES stormwater permitting program to designate certain stormwater discharges as "point sources" of pollution. These stormwater discharges include certain discharges that are associated with industrial activities designated by specific standard industrial classification (SIC) codes, construction sites disturbing 5 or more acres of land, and master drainage systems of local governments with a population above 100,000, which are better known as MS4s. However, because the master drainage systems of most local governments in Florida are interconnected, the EPA has implemented Phase 1 of the MS4 permitting program on a countywide basis, which brings in all cities (incorporated areas), Chapter 298 urban water control districts, and the Florida Department of Transportation throughout the 15 counties meeting the population criteria.

An important difference between the federal and state stormwater permitting programs is that the federal program covers both new and existing discharges, while the state program focuses on new discharges. Additionally, Phase 2 of the NPDES Program will expand the need for these permits to construction sites between 1 and 5 acres, and to local governments with as few as 10,000 people. The revised rules require that these additional activities obtain permits by 2003. While these urban stormwater discharges are now technically referred to as "point sources" for the purpose of regulation, they are still diffuse sources of pollution that cannot be easily collected and treated by a central treatment facility, as are other point sources of pollution, such as domestic and industrial wastewater discharges. The Department recently accepted delegation from the EPA for the stormwater part of the NPDES Program. It should be noted that most MS4 permits issued in Florida include a reopener clause that allows permit revisions to implement TMDLs once they are formally adopted by rule.

Appendix B: TMDL Public Comments for Flat Creek (WBID 487) from Donna and Scott Wright

-----Original Message-----
From: woodley555@yahoo.com [mailto:woodley555@yahoo.com]
Sent: Monday, July 20, 2009 8:35 PM
To: Gorham, Bonita
Subject: Comments and questions on proposed fecal coliform TMDL for Flat Creek (WBID 487)

Bonita,

I intended to email Jan Mandrup-Poulsen and copy you but I do not have Jan's email. Will you please forward?

Jan,

I read The Nature Conservancy's letter to DEP concerning the fecal coliform counts on Sweetwater and Flat Creeks. I absolutely agree that hogs are a fast-growing problem; hogs are beginning to impact both the uplands and the creekbed on our 500 acres on Flat Creek. I have attached a video that was taken the end of June '09. The video documents one group of hogs. On July 18 we encountered 3 such groups. I suspect we have at least 60 hogs on this one 500-acre tract. When we bought this tract in March, 2007, there were no signs of hog activity.

Please consider us your partners in solving the coliform problem on this very important steephead creek. DEP may certainly have access to the creek through our property. We welcome any opportunity to help.

I will begin to talk with other landowners about your findings. We are already aggressively trying to eliminate the hogs on our 500 acres since, even apart from coliform, they are destructive. Progress is slow. Hogs are fast.

A few questions on the TMDL Report:

1)Sweetwater Creek had 19 water quality tests; Flat Creek had 16. Flat Creek has (roughly)3X the acreage, 4X the wetlands and 6 more acres of water. Is there any intention behind the higher number of samples for Sweetwater? Is one creek considered more crucial than the other?

2)The monitoring stations listed in Table 5.2 correspond to the stations named on Sweetwater's water quality sampling map. The Flat Creek table/map doesn't seem to cross-reference as easily. Three of the stations in table 5.1 are not listed on Flat Creek's water quality sampling map. One that is listed on the map (31010132) is not in Table 5.1. Can you clarify where the sampling stations are on Flat Creek and what their results were?

3)Last sentence on page 5 states that the majority of water samples were collected in 2007-2008. Only data from 2007 is included in this report. Am I right in assuming data collection was begun and completed in 2007?

A final comment: I am aware of habits of landowners on approximately 2000 acres. No dogs. No full-time residences. If this pattern continues down the watershed, domestic animals are probably not the problem.

Thank you for your work on both Sweetwater and Flat Creeks. If you'd like to see Flat Creek first hand, let us know.

Donna Wright

FDEP Response:
FDEP addressed Donna Wright's TMDL public comments with several follow-up emails and a teleconference on July 27, 2009 from 10:00 – 11:15 am. During the teleconference Donna and Scott Wright were provided TMDL program and water quality sampling knowledge. Refer below for copies of the follow-up emails.

-----Original Message-----
From: Bridger, Kristina
Sent: Tuesday, July 21, 2009 2:26 PM
To: 'Woodley555@yahoo.com'; Gilbert, Douglas; Gorham, Bonita; Peets, Rhonda; 'bkreiter@tnc.org'
Subject: Contact at the TMDL public mtg who spoke about wild hogs

Donna Wright,

Brian Kreiter spoke about wild hog populations at the TMDL public workshop in Bristol, FL. I believe he would also be interested in your information. It was a pleasure speaking with you!

Cheers,
Kristina Bridger
Environmental Specialist III
Watershed Evaluation and TMDL Section, FDEP
2600 Blair Stone Rd. MS #3555
Tallahassee, FL 32399
(850) 245-8023

-----Original Message-----
From: Bridger, Kristina
Sent: Monday, July 27, 2009 11:49 AM
To: Woodley555@yahoo.com; Gorham, Bonita
Subject: Silviculture BMP

Donna and Scott Wright,

Below is the link regarding Silviculture Best Management Practices. I spoke with Bonita Gorham and she provided me the information. Thank you, Bonita.
http://www.fl-dof.com/forest_management/bmp/index.html

Cheers,
Kristina Bridger
Environmental Specialist III

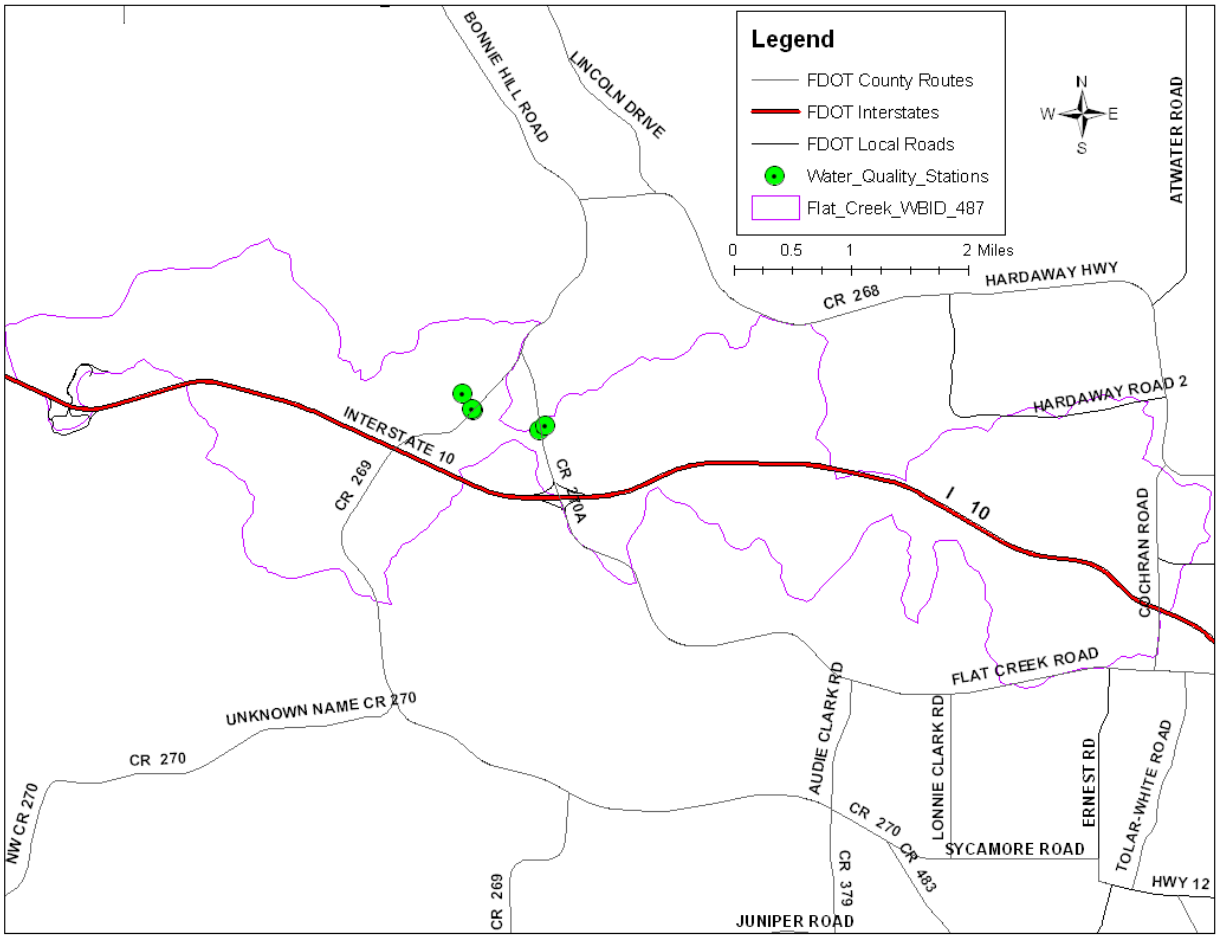
Watershed Evaluation and TMDL Section, FDEP
2600 Blair Stone Rd. MS #3555
Tallahassee, FL 32399
(850) 245-8023

-----Original Message-----
From: Bridger, Kristina
Sent: Thursday, July 30, 2009 3:14 PM
To: 'Woodley555@yahoo.com'
Cc: Gorham, Bonita
Subject: Map of Flat Creek Watershed Boundaries

Donna and Scott Wright,

Attached is a map of the Flat Creek watershed boundaries. The WBID boundaries, water quality stations, and FDOT (Florida Department of Transportation) roads. Enjoy! If you have any questions please call.

Cheers,
Kristina Bridger
Environmental Specialist III
Watershed Evaluation and TMDL Section, FDEP
2600 Blair Stone Rd. MS #3555
Tallahassee, FL 32399
(850) 245-8023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CR 269
CR 269A
COCHRAN ROAD
FLAT CREEK ROAD
AUDIE CLARK RD
LONNIE CLARK RD
ERNEST RD
TOLAR-WHITE ROAD
UNKNOWN NAME CR 270
CR 270
NW CR 270
CR 270
CR 483
SYCAMORE ROAD
HWY 12
CR 379
JUNIPER ROAD
CR 269

Appendix C: TMDL Public Comments for Sweetwater Creek (WBID 728) from the Nature Conservancy

August 4, 2009

David Printiss
Northwest Florida Program Director
The Nature Conservancy
10394 NW Longleaf Drive
Bristol, FL 32321

Dear Mr. Printiss:

The Florida Department of Environmental Protection's Watershed Evaluation and TMDL Section is very appreciative of The Nature Conservancy's comments on the proposed fecal coliform TMDL for Sweetwater Creek (WBID 728), which provided local information we would have not known otherwise. As a result of your written comments and comments made during the TMDL Public Workshop by Brian Kreiter, also on behalf of The Nature Conservancy, regarding feral hog populations within the Sweetwater Creek watershed (specifically, the Apalachicola Bluffs and Ravines Preserve), FDEP has added the following section to the TMDL document:

Feral Hog Populations within the Flat Creek and Sweetwater Creek Watersheds Based on personal communications from Brian Kreiter and David Printiss representing The Nature Conservancy's Apalachicola Bluffs and Ravines Preserve (ABRP), which includes approximately 1,785 acres in the lower Sweetwater Creek watershed, feral hog populations are prominent. In addition, within the Flat Creek watershed, Scott and Donna Wright who are local stakeholders (landowners with approximately 500 acres) have also documented the presence of feral hog populations.

Thank you once again. Your comments are greatly appreciated. Please contact Kristina Bridger at 850/245-8023 if you have any further comments.

Sincerely,

Jan Mandrup-Poulsen, Administrator
Watershed Evaluation and TMDL Section
Florida Department of Environmental Protection

Florida Department of Environmental Protection
Division of Environmental Assessment and Restoration
Bureau of Watershed Restoration
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