FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division of Water Resource Management, Bureau of Watershed Management

Total Maximum Daily Loads for Total and Fecal Coliform Bacteria for Tumblin' Creek, Alachua County, Florida
WBID 2718A

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Florida Department of Environmental Protection
Watershed Assessment Section
September 19, 2003

1.0 INTRODUCTION

1.1 Purpose of Report

This report presents a Total Maximum Daily Load (TMDL) for Total and Fecal Coliforms for Tumblin' Creek. Using the methodology to identify and verify water quality impairments described in the Impaired Waters Rule (IWR), Chapter 62-303, Florida Administrative Code (FAC), the creek was verified as impaired by Total and Fecal Coliforms, and was included on the verified list of impaired waters for the Ocklawaha Basin that was adopted by Secretarial Order on August 28, 2002.

1.2 Identification of Waterbody

For assessment purposes, the watersheds within the Ocklawaha River Basin have been broken out into smaller watersheds, with a unique **w**ater**b**ody **id**entification (WBID) number for each watershed. Tumblin' Creek has been assigned WBID 2718A.

Tumblin' Creek is located in Gainesville, Florida, in the Orange Creek planning unit of the Ocklawaha River basin (Figure 1). The Orange Creek Planning Unit contains many creeks and lakes in an area of approximately 602 square miles. Tumblin' Creek is approximately 2.3 miles long and is one of the larger creeks in the Orange Creek planning unit. Though there are no permitted domestic wastewater discharges to Tumblin' Creek, the creek watershed is entirely contained within the limits of the City of Gainesville. Urban and residential runoff appear to be the significant sources of bacterial contamination.

Tumblin' Creek flows through the Tumblin' Creek watershed, located in southwest Gainesville to Bivens Arm Lake. The outflow of the lake then travels to Paynes Prairie where it enters the Floridan Aquifer via Alachua Sink. As the main stream channel flows southwest, elevations decrease exposing recent sands as well as Plio-Pleistocene Terrace deposits (comprised of sands and clays) and miocene age units of the Hawthorn Group (Spangler, 1985). The Hawthorn Group sediments are extremely variable, but generally consist of sands, clays, carbonates (limestone and dolomite), and phosphates (Scott, 1988).

The Tumblin' Creek watershed encompasses about 8.9 square miles of urban Gainesville. CH2M HILL (1985) reported 60% of this area to be impervious. The entire basin, except for the Bivens Arm floodplain, has been developed. In many cases, the development stops only inches from the creek channel. The elevation above National Geodetic Vertical Datum (NGVD) in the vicinity of the Tumblin' Creek headwaters is near 170 feet and falls to 65 feet near Bivens Arm. The elevation decreases further as it flows to Alachua Sink. The watershed is located along the southwestern margin of the Northern Highlands physiographic province (White adjacent to SW 16th Avenue and U.S. Highway 441 (US 441).

The headwaters of the creek, which extend north from SW 5th Avenue to NW 8th Avenue, west to 13th Street, and east to Main Street, are channelized through underground concrete culverts. Sources of baseflow include springs and seeps at the base of the surficial aquifer and, lower in the basin, permeable units within the intermediate aquifer system.

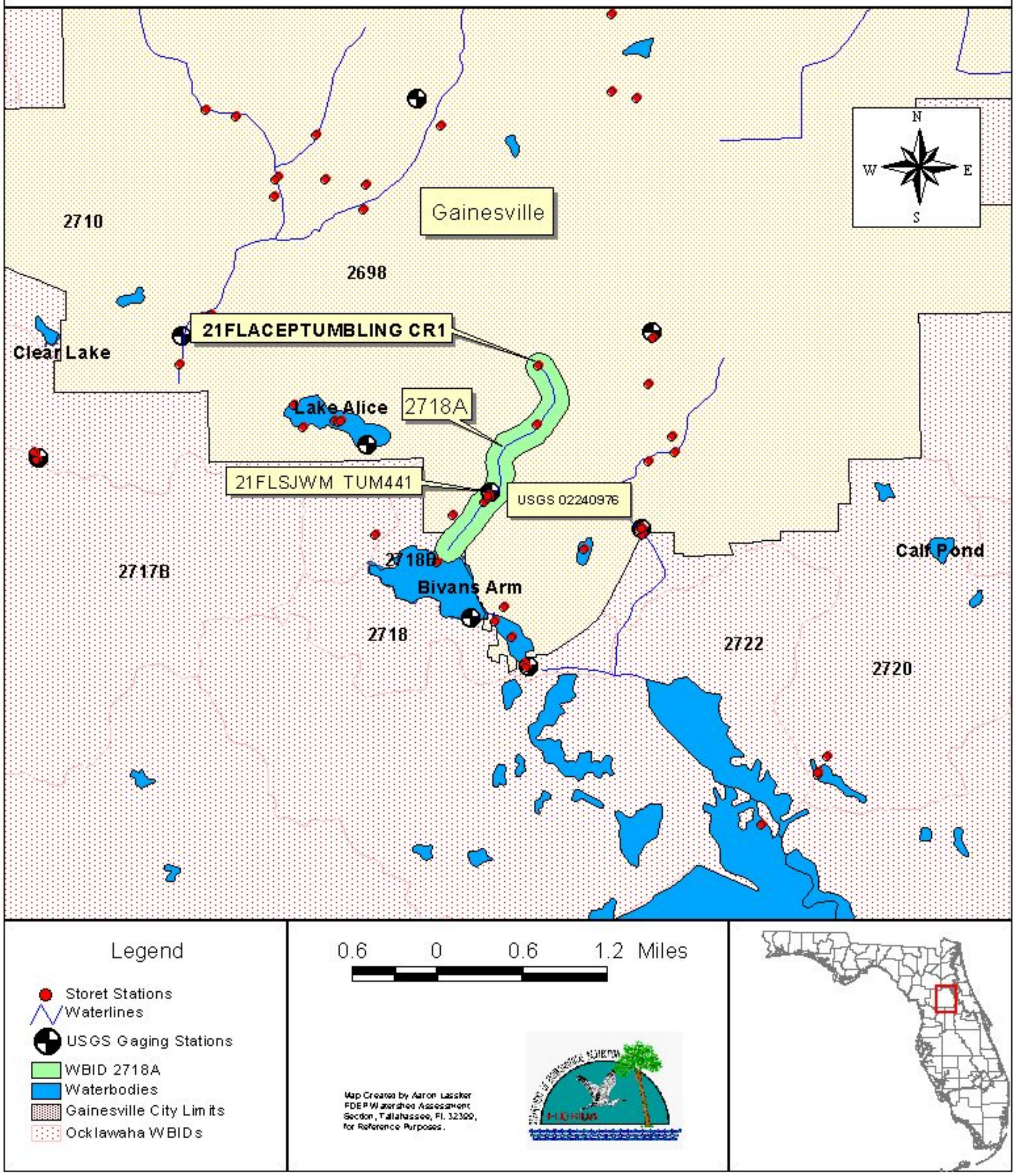
As part of the urbanized Gainesville area, the Tumblin' Creek watershed has undergone extensive urbanization, and now residential and commercial areas around Gainesville account for the majority of land use in the impaired WBID. The distribution of land cover for Tumblin' Creek is based on the National Land Cover Dataset (NLCD) of 1995 and is tabulated in **Table 1**.

Table 1. Land Cover Distribution

Land Cover For Tumblin' Creek	Total Acres	% Distribution
Urban	755	41
Transport., Commercial, Utilities, Public[2]	624.2	38
Agriculture	0	0
Barren Land	0	0
Rangeland[3]	22	1
Forest	219.9	12
Wetlands	138.1	7
Water	22.5	1
Total	1853.8	100

1. Acreage represents the land use distribution in the impaired WBID and not the entire drainage area.
2. Public lands include urban and recreational areas.
3. Rangeland includes shrubland, grassland, and herbaceous land covers.

Figure 1: Tumblin' Creek WBID 2718A



2.0 STATEMENT OF PROBLEM

Florida's 1998 Section 303(d) list identified Tumblin' Creek (WBID 2718A) in the Ocklawaha River Basin as not supporting water quality standards (WQS) for coliform bacteria. Through analysis of water quality data per Chapter 62-303, F.A.C., (Identification of Impaired Surface Waters or IWR), Tumblin' Creek was verified as impaired for both total and fecal coliform bacteria. The creek was included on the list of impaired surface waters adopted by Secretarial Order on August 28, 2002, and then submitted to EPA as part of the 2002 update to Florida 303(d) list.

During the verified period (1995-2002), 18 out of the 24 fecal coliform samples from station 21FLACEPTUMBLIN CR1 exceeded the FDEP criterion of 800 counts/100 ml (75% exceedance rate). There was slight seasonal variability in the fecal coliform values, with higher averages in the spring (average of 6,686 counts/100 ml), followed by fall (average of 5,525 counts/100 ml), summer (average of 5,208 counts/100 ml), and winter (average of 3,833 counts/100 ml). For total coliforms, 12 out of 13 samples exceeded the FDEP criterion of 2,400 counts/100ml (92% exceedance). There was notable seasonal variability in the total coliform values, with higher averages in the spring (average of 66,286 counts/100 ml), followed by fall (average of 36,667 counts/100 ml), summer (average of 24,000 counts/100 ml), and winter (average of 3,000 counts/100 ml).

3.0 DESCRIPTION OF APPLICABLE WATER QUALITY STANDARDS AND NUMERIC WATER QUALITY TARGET

Tumblin' Creek is classified as a Class III waterbody, with a designated use of recreation, propagation and maintenance of a healthy, well-balanced population of fish and wildlife. The Class III water quality criteria applicable to the observed impairment are the numeric criteria for bacterial quality for fecal and total bacteria counts (Rule 62-302.530(7), F.A.C.). Both criteria have three separate components, expressed as follows:

Fecal Coliform Bacteria:

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

Total Coliform Bacteria:

> The MPN or MF per 100 milliliters (ml) shall be less than or equal to 1000 as a monthly average nor exceed 1000 in more than 20 percent of the samples examined during any month; and less than or equal to 2400 at any time.

The rule also states that, for both fecal and total coliform bacteria, monthly averages shall be expressed as geometric means based on a minimum of 10 samples taken over a 30-day period.

Insufficient data were collected to base existing loads on the geometric mean criterion for either fecal coliform or total coliform bacteria. As such, the target for the fecal coliform TMDL is the one-day maximum criterion of 800 counts per 100 ml, and the target for the total coliform TMDL is the one-day maximum criterion of 2400 counts per 100 ml. The one-day maximum criteria is appropriate for TMDL development as this criterion was typically violated during and/or after storm events. For coliforms, an extended dry period followed by a storm event is usually identified as the critical period when coliform levels in waterbodies exceed the water quality criteria.

4.0 ASSESSMENT OF SOURCES

4.1 Types of Sources

An important part of the TMDL analysis is the identification of source categories, source subcategories, or individual sources of coliforms in the watershed 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, runoff from agriculture, runoff from silviculture, runoff from 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 EPA’s National Pollutant Discharge Elimination Program (NPDES). These nonpoint sources included certain urban stormwater discharges, including those from local government master drainage systems, construction sites over five acres, and from a wide variety of industries (see **Appendix A** for background information about the State and Federal 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). 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 Nonpoint Sources in the Watershed

Nonpoint sources of coliform bacteria generally, but not always, involve accumulation of coliform bacteria on land surfaces and wash off as a result of storm events. Typical nonpoint sources of coliform bacteria include:

- Wildlife
- Agricultural animals

- Onsite Sewer Treatment and Disposal Systems (septic tanks)
- Urban development (outside of Phase I or II MS4 discharges)

The Watershed Characterization System (WCS), a geographic information system (GIS) tool, was used to display, analyze, and compile available information to characterize potential bacteria sources in the Tumblin' Creek watershed. Potential sources of impairment include leaking collection lines or leaking septic systems ; livestock having access to streams; and rainfall events when surface and stormwater runoff and infiltration/interflow dominate.

For Tumblin' Creek, there are two primary methods of loading or transport for nonpoint source total and fecal coliform bacteria. First, loading from failing septic systems and animals in the stream are considered direct sources to the stream, as they are independent of precipitation. The second mode involves loading resulting from total and fecal coliform accumulation on land surfaces that is transported to the stream during storm events.

4.2.1 Wildlife

Wildlife deposit coliform bacteria with their feces onto land surfaces where it can be transported during storm events to nearby streams. The bacteria load from wildlife is typically assumed background, as the contribution from this source is usually small relative to the load from urban areas.

4.2.2 Agricultural Animals

Agricultural animals can be the source of several types of coliform loading to streams. Livestock data from the 1997 Census of Agriculture for Alachua County where Tumblin' Creek is located are listed in **Table 2**. The US Department of Agriculture is currently in the process of updating the agricultural census for 2002. Data from the 2002 Census will be released to the public in the Spring of 2004. As shown in **Table 2**, cattle, including beef and dairy, are the predominate livestock in WBID 2718A. There are no known Confined Animal Feeding Operations (CAFOs) operating in the impaired WBID.

Table 2. Livestock Distribution by County (source: NASS, 1997)

Livestock Distribution	Alachua County
Cattle	49,567
Beef	27,324
Dairy	3,341
Swine	1,292
Poultry (broilers sold)	(D[1])
Sheep	716
Horses	1,731

(D) – data withheld to avoid disclosing data for individual farms.

4.2.3 Onsite Sewage Treatment and Disposal Systems (Septic Tanks)

Onsite sewage treatment and disposal systems (OSTDs or septic tanks) are commonly used where providing central sewer is not cost effective or practical. When properly sited, designed, constructed, maintained, and operated, OSTDs are a safe means of disposing of domestic waste. The effluent from a well-functioning OSTD is comparable to secondarily treated wastewater for a sewage treatment plant. When not functioning properly, OSTDs can be a source of nutrients (nitrogen and phosphorus), pathogens, and other pollutants to both ground water and surface water. **Table 3** summarizes the number of septic systems in Alachua County and provides estimates of countywide failure rates and total daily discharge of wastewater from septic tanks.

Table 3. County Estimates of Septic Tanks (FDEP, 2001)

County	Number of Septic Tanks[1]	Percent of 1995 Population Using Septic Tanks[2]	Failure Rate per 1000[3]	Estimated Discharge (MGD)[4]
Alachua	37,208	32.7	9.67	5.02

1. Total number per county is based on 1970 census figures plus the number of systems installed since 1970 through June 30, 2000. Numbers do not reflect the removal of septic systems by connection to central sewers.
2. Source: St Johns River Water Management District, May 2000, p. 97, cited in FDEP 2001.
3. Defined as the number of repairs divided by the number of installed systems for July 1, 1999 to June 30, 2000.
4. Based on value of 135 gallons per tank per day (FDEP, 2001).

4.2.4 Urban Development

Total and fecal coliform loadings from urban areas is attributable to multiple sources including storm water runoff, leaks and overflows from sanitary sewer systems, illicit discharges of sanitary waste, runoff from improper disposal of waste materials, leaking septic systems, and domestic animals.

4.3 Point Sources

There are no NPDES permitted domestic wastewater discharges to Tumblin' Creek. All of the Tumblin' Creek watershed lies within an area covered under Gainesville's NPDES Stormwater Program Phase II Municipal Separate Storm Sewer System (MS4) Permit.

5.0 LOADING CAPACITY – LINKING WATER QUALITY AND POLLUTANT SOURCES

The TMDL process quantifies the amount of a pollutant that can be assimilated in a waterbody, identifies the source of the pollutant, and recommends regulatory or other actions to be taken to achieve compliance with applicable water quality standards based on a relationship between pollution sources and in-stream water quality conditions.

5.1 Determination of Assimilative Capacity

The percent reduction methodology was used to establish the Tumblin' Creek TMDL. To determine the maximum daily concentration the stream can assimilate and maintain water quality standards, target concentrations of 800 counts/100 ml for fecal coliform and 2,400 counts/100 ml for total coliform were utilized. The TMDL target criterion for fecal and total coliform bacteria cannot exceed a concentration of 800 and 2,400 counts/100 ml, respectively, as specified in the Class III WQS.

5.2 Percent Reduction Approach

Coliform TMDLs are commonly developed using load duration curves. However, this method requires flow data to calculate coliform and loads, and continuous flow data were not available for Tumblin' Creek for the period when coliform data were available. When flow data are not available, the approach used to estimate a TMDL is based on the average percent reduction required to reduce the observed concentration to the water quality standard.

A statistical summary of the coliform data used in developing the fecal and total coliform TMDLs for Tumblin' Creek is shown in **Tables 4 and 5**. Locations of monitoring stations for the creek are shown in **Figure 1**. Water quality data collected at station 21FLACEPTUMBLIN CR1 were used to estimate the fecal and total coliform TMDLs for Tumblin' Creek. This station has the largest number of samples for both fecal and coliform data. Data used to compile the statistics shown in **Tables 4 and 5** are included in **Appendix B.**

Table 4. Summary of Fecal Coliform Monitoring Data

WBID	Total Number Samples	30-Day Geometric Mean	% Samples > 800 counts/100mL	Minimum Concentration (counts/100mL)	Maximum Concentration (counts/100mL)
2718A	24	N/A	75	90	14,000

Table 5. Summary of Total Coliform Monitoring Data

WBID	Total Number Samples	30-Day Geometric Mean	% Samples > 2,400 counts/100mL	Minimum Concentration (counts/100mL)	Maximum Concentration (counts/100mL)
2718A	13	N/A	92.3	1,600	160,000

To derive/establish an average percent reduction, the State's maximum criterion for total coliform (2,400 counts/100ml) and fecal coliform (800 counts/100ml) were subtracted from each sample violation respectively and then divided by the sample violation and multiplied by 100. This value provides the percent reduction required to achieve the instream concentration criterion established for total and fecal coliform. The percent reduction values for each sample violation for fecal and total coliform where then "averaged" providing an overall percentage reduction for that water quality variable to meet standards.

It should be noted that there is a discontinued flow gage located in the watershed and attempts were made to extend the record of the gage to correspond with the sampling time period. However, given the karst topography and the size of the Tumblin' Creek watershed relative to the nearest USGS gage on Hogtown Creek (about 42 square miles), the drainage area ratio was too small to extend the Tumblin' Creek flow record. According to USGS methods the flow at a discontinued gage can be accurately estimated from a record at a nearby long-term site when the drainage ratios of the two sites are within 0.5 to 1.5.

When flow data are not available, it is also common practice to estimate flows using drainage area ratios to a nearby gaged stream. However, this option was again not appropriate for Tumblin' Creek because the drainage area for Tumblin' Creek is too small relative to the drainage area of Hogtown Creek to use a weighted drainage area ratio for estimating flows.

Given the lack of flow data, it is not possible to correlate exceedances of the water quality with flow events. Without a means for estimating flow, it is not possible to calculate a load. As a result, the fecal and total coliform TMDLs for Tumblin' Creek are concentration based and expressed as a percent reduction water quality criterion.

6.0 CRITICAL CONDITIONS

The critical condition for the coliform loading from nonpoint sources is an extended dry period followed by a rainfall runoff event. During the dry weather period, coliform bacteria builds up on the land surface and are washed off by rainfall. The critical condition for point source loading occurs during periods of low stream flow when dilution is minimized. Water quality data were collected during both time periods with violations occurring during both time periods.

7.0 DETERMINATION OF 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 (Waste Load Allocations), nonpoint source loads (Load Allocations), and an appropriate margin of safety (MOS), which takes into account any uncertainty concerning the relationship between effluent limitations and water quality:

$$TMDL = \sum WLAs + \sum LAs + MOS$$

As mentioned in Section 4.1, the WLA is broken out into separate subcategories for wastewater discharges and stormwater discharges regulated under the NPDES Program:

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

It should be noted that the various components of the 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 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 a 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 is also different than 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.

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**. TMDLs for Tumblin' Creek are expressed in terms of the average percent reduction required to achieve water quality criteria (**Table 6**).

The total and fecal coliform TMDLs for Tumblin' Creek are expressed as the "average percent reduction" required to reduce the observed water quality violations to the one-day maximum water quality criterion. The percent reduction value for fecal coliform and total coliform were determined by averaging the percent reduction based on the individual concentrations for each water quality variable. For total coliform, a 91 percent reduction is required to achieve an instream concentration of 2,400 counts/100ml. For fecal coliform, a 74 percent reduction is required to achieve an instream concentration of 800 counts/100ml.

Table 6. TMDL Components

WBID	Parameter	WLA		LA (lbs/year)	MOS	TMDL (% Reduction)
		Wastewater (lbs/year)	NPDES Stormwater (% Reduction)			
2718A	Fecal Coliform	NA	74	74	Implicit	74
2718A	Total Coliform	NA	91	91	Implicit	91

7.1 Load Allocations (LA)

All of the Tumblin' Creek watershed lies within an area covered under Gainesville's Phase II MS4 permit. However, sources of impairment include leaking septic systems and stormwater runoff where infiltration/inflow dominate. These are considered to be nonpoint sources and are not covered under the under the MS4 permit. As a result, the LA values have been assigned a percent reduction similar to the TMDL and $WLA_{Stormwater}$ reductions. 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.

7.2 Wasteload Allocations (WLAs)

There are no NPDES permitted facilities that discharge coliform bacteria to surface waters in the Tumblin' Creek basin, and as such, the wasteload allocation for wastewater facilities is zero. Any future wastewater facility permitted to discharge coliform bacteria in the Tumblin' Creek watershed will be required to meet permit limits and must not exceed the established TMDL values. For future facilities discharging into the basin, nonpoint source loads shall to be reduced such that the combined WLA and LA do not exceed the established TMDLs.

Municipal Separate Storm Sewer Systems (MS4s) typically discharge bacteria to waterbodies in response to storm events. Large and medium MS4s serving populations greater than 100,000 people were required to obtain a NPDES storm water permit under "Phase 1" of the program. As of March 2003, small MS4s serving urbanized areas are now required to obtain a permit under the Phase II storm water regulations. An urbanized area is defined as an entity with a residential population of at least 50,000 people and an overall population density of 1000 people per square mile.

The City of Gainesville will be covered under Phase II of the NPDES Storm Water Program. Tumblin' Creek is located within the Gainesville area and the calculated percent reduction applies to the MS4. It should be noted that any MS4 permittee will only be responsible for reducing the loads associated with stormwater outfalls for which it owns or otherwise has responsible control, and is not responsible for reducing other nonpoint source loads within its jurisdiction.

7.3 Margin of Safety (MOS)

There are two methods for incorporating a MOS in the Tumblin' Creek TMDL analysis: (1) by implicitly incorporating the MOS using conservative model assumptions to develop allocations, or (2) by explicitly specifying a portion of the TMDL as the MOS and using the remainder for allocations. In this TMDL, an implicit MOS was incorporated. The percent reduction necessary to achieve water quality standards is based on the monitoring stations having the largest number of samples and the highest water quality violations. Due to dilution and decay, not all stations require the same reduction to meet standards. By selecting the highest reduction, an implicit MOS is incorporated in the analysis. Additionally, the TMDL sets the water quality standard at the edge of the waterbody/point of discharge. If the allocation is met, dilution and decay could result in instream water quality samples below the numerical criteria and an implicit MOS would be realized.

8.0 IMPLEMENTATION PLAN DEVELOPMENT AND BEYOND

Following adoption of this TMDL by rule, the next step in the TMDL process is to develop an implementation plan for the TMDL, which will be a component of the Basin Management Action Plan for the Tumblin' Creek basin. This document will be developed in cooperation with local stakeholders and will attempt to reach consensus on more detailed allocations and on how load reductions will be accomplished.

The Basin Management Action Plan (B-MAP) will include:

- Appropriate allocations among the affected parties.
- A description of the load reduction activities to be undertaken.
- Timetables for project implementation and completion.
- Funding mechanisms that may be utilized.
- Any applicable signed agreements.
- Local ordinances defining actions to be taken or prohibited.
- Local water quality standards, permits, or load limitation agreements.
- Monitoring and follow-up measures.

It should be noted that TMDL development and implementation is an iterative process, and this TMDL will be re-evaluated during the BMAP development process and subsequent Watershed Management cycles. The Department acknowledges the uncertainty associated with TMDL development and allocation, particularly in estimates of nonpoint source loads and allocations for NPDES stormwater discharges, and fully expects that it may be further refined or revised over time. If any changes in the estimate of the assimilative capacity AND/OR allocation between point and nonpoint sources are required, the rule adopting this TMDL will be revised, thereby providing a point of entry for interested parties.

9.0 SEASONAL VARIATION

Seasonality was addressed by using water quality data associated with the impaired stream and collected during multiple seasons.

Appendix A

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, Florida Statutes (F.S.), was established as a technology-based program that relies upon the implementation of BMPs that are designed to achieve a specific level of treatment (i.e., performance standards) as set forth in Chapter 62-40, Florida Administrative Code (F.A.C.).

The rule requires Water Management Districts (WMDs) to establish stormwater pollutant load reduction goals (PLRGs) and adopt them as part of a 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, Winter Haven Chain of Lakes, the Everglades, Lake Okeechobee, and Lake Apopka. No PLRG has been developed for Newnans Lake at the time this study 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 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 five or more acres of land, and master drainage systems of local governments with a population above 100,000 [which are better known as “municipal separate storm sewer systems” (MS4s)]. However, because the master drainage systems of most local governments in Florida are interconnected, EPA has implemented Phase 1 of the MS4 permitting program on a county-wide basis, which brings in all cities (incorporated areas), Chapter 298 urban water control districts, and the DOT (Department of Transportation) throughout the 15 counties meeting the population criteria.

An important difference between the federal and the 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 stormwater permitting program will expand the need for these permits to construction sites between one and five acres, and to local governments with as few as 10,000 people. These 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 can not be easily collected and treated by a central treatment facility similar to other point sources of pollution, such as domestic and industrial wastewater discharges. The DEP recently accepted delegation from EPA for the stormwater part of the NPDES program. It should be noted that most MS4 permits issued in Florida include a re-opener clause that allows permit revisions to implement TMDLs once they are formally adopted by rule.

Appendix B – Water Quality Data

Tumblin' Creek Fecal Coliform TMDL Data Statistics				
WBID	Basin/Waterbody	Station ID	Date	Fecal Coliform
				(counts/100 ml)
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	7-Jun-90	10300
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	24-Jul-90	13700
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	31-Oct-90	2500
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	8-Jan-91	200
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	27-Mar-91	1800
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	13-Aug-91	2533
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	17-Dec-91	1600
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	10-Feb-92	300
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	26-Jan-94	1800
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	19-Apr-95	240
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	19-Apr-95	240
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	20-Jul-95	1600
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	7-Sep-99	3000
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	26-Oct-99	90
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	22-Nov-99	13000
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	2-Dec-99	5000
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	27-Jan-00	1700
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	29-Feb-00	8000
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	20-Mar-00	1700
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	3-May-00	14000
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	18-May-00	3000
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	30-May-00	500
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	12-Jun-00	5000
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	8-Jan-02	11000
Data Analysis				
Station		# Samples Collected	Samples >800	% Exceedances
21FLACEPTUMBLIN CR1		24	18	75

Fecal Coliform Sample Violations at Station 21FLACEPTUMBLING CR1		
Date	Concentration	% Reduction
6/7/90	10300	92.2
7/24/90	13700	94.2
10/31/90	2500	68.0
3/27/91	1800	55.6
8/13/91	2533	68.4
12/17/91	1600	50.0
1/26/94	1800	55.6
7/20/95	1600	50.0
9/7/99	3000	73.3
11/22/99	13000	93.8
12/2/99	5000	84.0
1/27/00	1700	52.9

2/29/00	8000	90.0
3/20/00	1700	52.9
5/3/00	14000	94.3
5/18/00	3000	73.3
6/12/00	5000	84.0
1/8/02	11000	92.7
Average Percent Reduction Value for Fecal Coliform		**73.6 %**

Tumblin' Creek Total Coliform TMDL Data Statistics				
WBID	Basin/Waterbody	Station ID	Date	Total Coliform
				(counts/100 ml)
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	20-Jul-95	1600
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	7-Sep-99	24000
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	26-Oct-99	50000
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	22-Nov-99	30000
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	2-Dec-99	30000
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	27-Jan-00	30000
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	20-Mar-00	30000
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	3-May-00	160000
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	18-May-00	7000
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	18-May-00	160000
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	30-May-00	7000
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	12-Jun-00	50000
2718A	Tumblin' Creek	21FLACEPTUMBLIN CR1	12-Jun-00	50000
Data Analysis:				
Station		# Samples Collected	# Samples > 2400	% Exceedances
21FLACEPTUMBLING CR1		13	12	92

Total Coliform Sample Violations at Station 21FLACEPTUMBLING CR1		
Date	Concentration	% Reduction
9/7/1999	24000	90.0
10/26/1999	50000	95.2
11/22/1999	30000	92.0
12/2/1999	30000	92.0
1/27/2000	30000	92.0
3/20/2000	30000	92.0
5/3/2000	160000	98.5
5/18/2000[1]	33466.40	92.8
5/30/2000	7000	65.7
6/12/2000[1]	50000	95.2
Average Percent Reduction Value for Total Coliform		**90.5 %**
Notes:		
1. Concentrations represent geometric mean of two samples collected one minute apart		

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