FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division of Water Resource Management, Bureau of Watershed Management

NORTHEAST DISTRICT • SUWANNEE BASIN

Final TMDL Report

Fecal Coliform TMDL for New River (WBID 3506) and Dissolved Oxygen TMDL for New River (WBIDs 3506, 3506A, and 3506B)

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TMDL Program

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

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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

2006 305(b) Report

http://www.dep.state.fl.us/water/tmdl/docs/2006_Integrated_Report.pdf

Criteria for Surface Water Quality Classifications

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

Basin Status Report for the Suwannee Basin

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

Water Quality Assessment Report for the Suwannee Basin

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

U.S. Environmental Protection Agency, National STORET Program

http://www.epa.gov/storet/

Region 4: Total Maximum Daily Loads in Florida

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

Chapter 1: INTRODUCTION

1.1 Purpose of Report

This report presents the Total Maximum Daily Loads (TMDL) for fecal coliform and dissolved oxygen (DO) for the New River watershed in the Santa Fe Planning Unit, within the Suwannee Basin. The river was verified as impaired for both parameters, and was included on the Verified List of impaired waters for the Suwannee Basin that was adopted by Secretarial Order on June 3, 2008. This TMDL establishes the allowable loadings to the New River that would restore the waterbody so that it meets its applicable water quality criteria for fecal coliform and DO.

1.2 Identification of Waterbody

The New River follows the county line between Bradford and Union Counties (**Figure 1.1**), in northeastern central Florida. A second-order stream, the river is approximately 28 miles long and drains approximately 191 square miles (mi^2) (U.S. Geological Survey [USGS] Website, 2008). Along with Olustee Creek, the New River is one of the two main tributaries to the Santa Fe River (**Figure 1.2**), flowing directly into it.

The uppermost portion of the New River begins near the city of Highland. Roughly 10 miles downstream, the river flows by the city of Raiford, and about 5 miles downstream from there, it passes south of Lake Butler. Near Worthington Springs, the New River flows into the Santa Fe River. The watershed is not located within a city limit and is therefore highly rural. Additional information about the river's hydrology and geology are available in the Basin Status Report for the Suwannee Basin (Florida Department of Environmental Protection [Department], 2003).

For assessment purposes, the Department has divided the Suwannee Basin into water assessment polygons with a unique **w**ater**b**ody **id**entification (WBID) number for each watershed or stream reach. The uppermost segment of the New River is WBID 3506B, followed by WBID 3506A, and ending with WBID 3506 where it merges into the Santa Fe River.

The New River is part of the Santa Fe Planning Unit. Planning units are groups of smaller watersheds (WBIDs) that are part of a larger basin unit, in this case the Suwannee Basin. The Santa Fe Planning Unit consists of 147 WBIDs. **Figure 1.3** shows the location of these WBIDs and the New River in the planning unit, and **Table 1.1** lists all of the WBIDs in the planning unit. This TMDL report addresses the impairment for fecal coliform in WBID 3506 and the impairment for DO in WBIDs 3506B, 3506A, and 3506.

Figure 1.1. Location of the New River Watershed (WBIDs 3506, 3506A, and 3506B) and Major Geopolitical Features in the Suwannee Basin

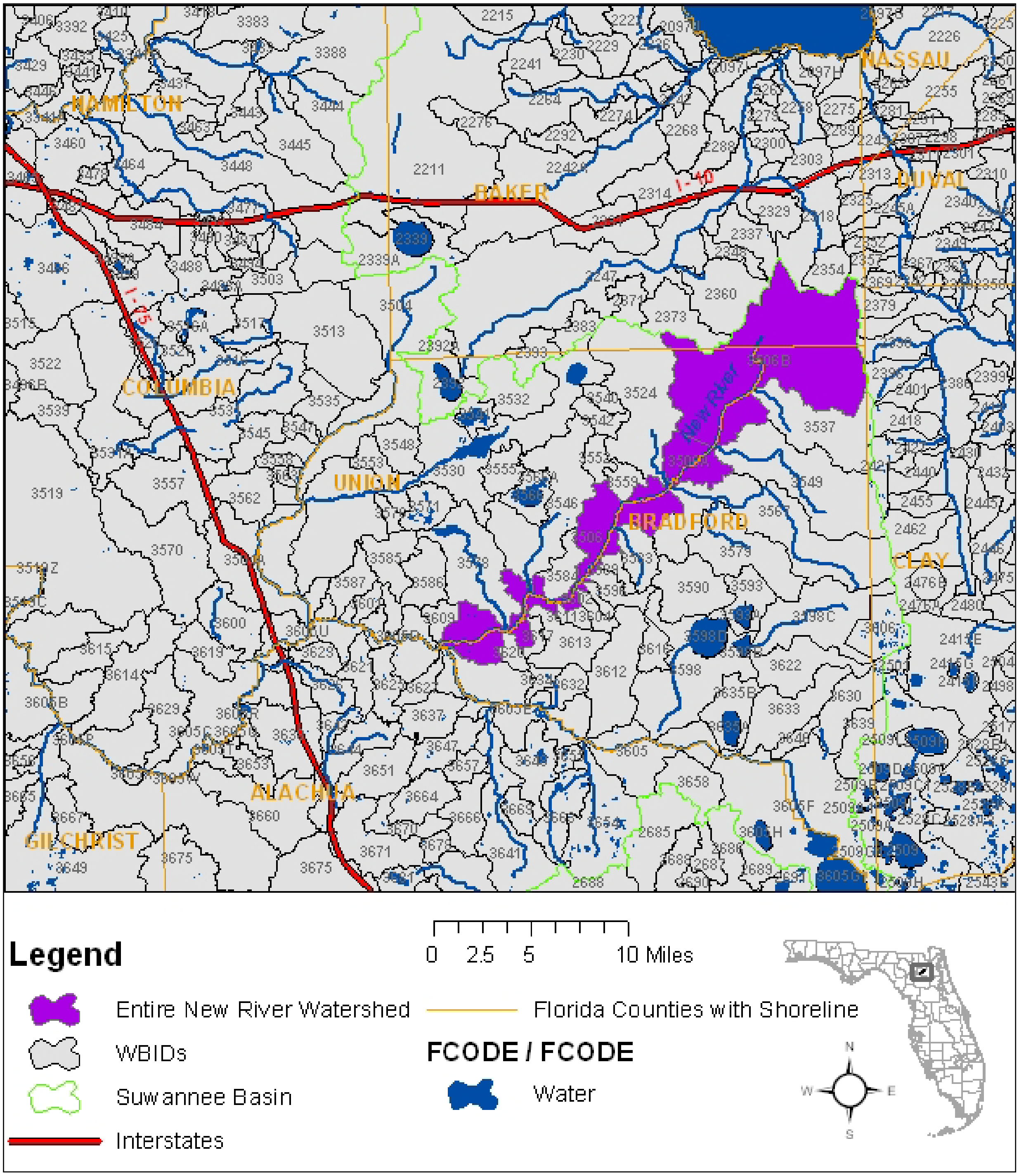


Figure 1.2. New River Watershed, WBIDs 3506, 3506A, and 3506B

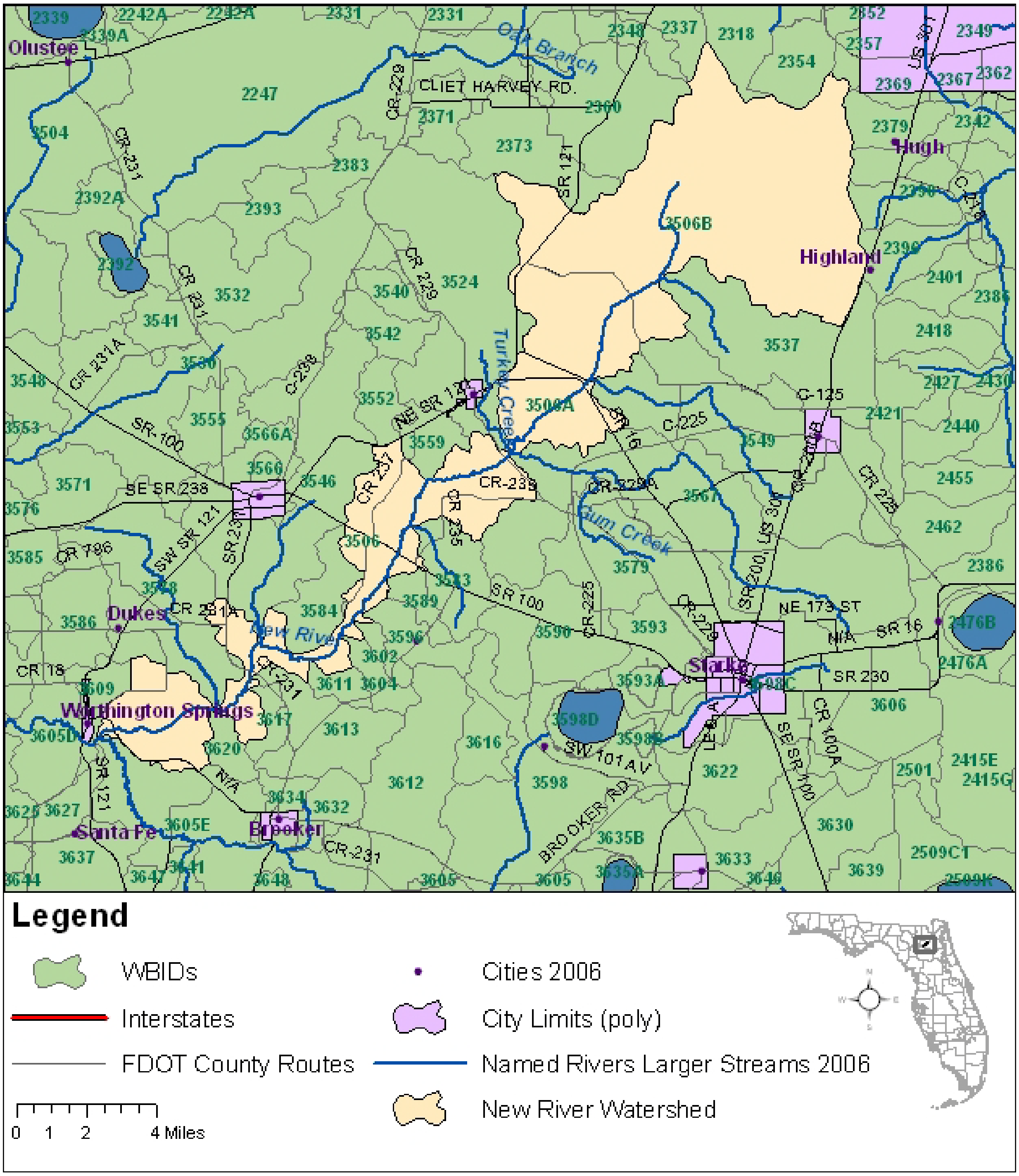


Figure 1.3. WBIDs in the Santa Fe Planning Unit

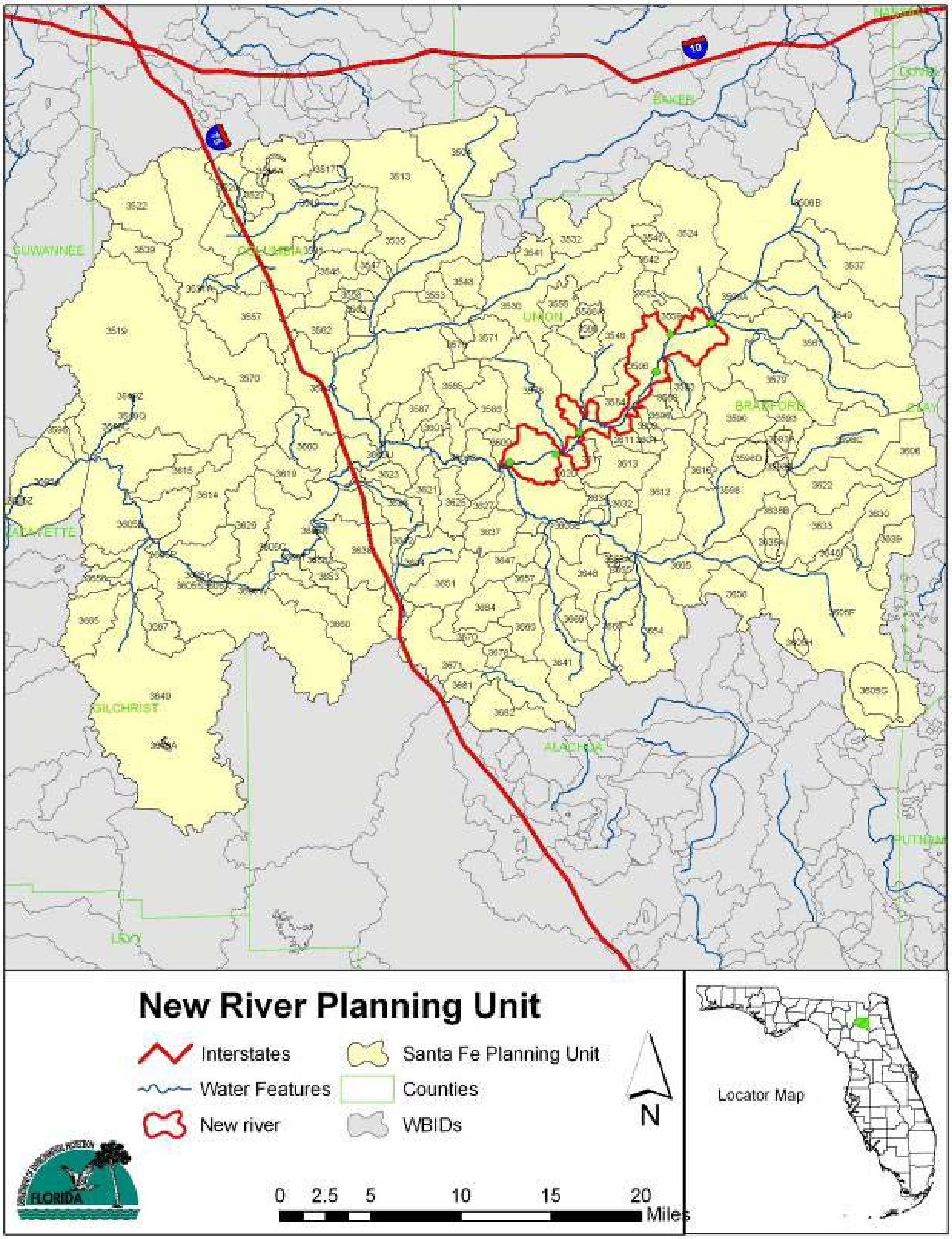


Table 1.1. Santa Fe River Planning Unit WBIDs

WBID	Waterbody Segment	WBID	Waterbody Segment	WBID	Waterbody Segment
3504	Olustee Creek	3598	Sampson River	3666	Unnamed Branch
3506	**New River**	3600	Hammock Branch	3667	Unnamed DRAIN
3513	Unnamed Slough	3601	Unnamed Creek	3669	Unnamed Branch
3516	Alligator Lake Outlet	3602	Unnamed Branch	3670	Burnetts Lake Drain
3517	Price Creek	3604	Unnamed Branch	3671	Turkey Creek
3519	Ichetucknee River	3605	Santa Fe River	3678	Hague Branch
3520	Cannon Creek	3606	Mined Area	3681	Turkey Creek
3522	Unnamed Slough	3609	Unnamed Branch	3682	Blue Creek
3524	Turkey Creek	3611	Unnamed Branch	3504A	Olustee Creek
3527	Unnamed Slough	3612	Unnamed Creek	**3506A**	**New River**
3530	Swift Creek	3613	Unnamed Branch	**3506B**	**New River**
3531	Rose Creek	3614	Unnamed Slough	3516A	Alligator Lake
3532	Grannybay Drain	3615	Unnamed Slough	3519C	Coffee Springs
3535	Unnamed Branch	3616	Unnamed Ditch	3519Q	Mill Pond Spring
3537	Unnamed Creek	3617	Unnamed Branch	3519R	Grassy Hole Spring
3539	Unnamed Slough	3619	Unnamed Slough	3519S	Mission Spring
3540	Unnamed Drain	3620	Unnamed Branch	3519T	Devil's Eye Spring
3541	Center Bay Drain	3621	Unnamed Creek	3519X	Blue Hole Spring
3542	Unnamed Branch	3622	Prevatt Creek	3519Y	Cedar Head Spring
3545	Unnamed Slough	3623	Unnamed Drain	3519Z	Ichetucknee Head Spring
3546	Richard Creek	3625	Unnamed Creek	3531A	Rose Creek Sink
3547	Unnamed Branch	3626	Pareners Branch	3566A	Lake Butler Outlet
3548	Unnamed Drain	3627	Unnamed Branch	3593A	Lake Crosby
3549	Alligator Creek	3629	Unnamed Slough	3598B	Lake Rowell
3552	Piney Bay Drain	3630	Double Run Creek	3598C	Alligator Creek
3553	Unnamed Drain	3632	Braggs Branch	3598D	Lake Sampson
3555	Unnamed Drain	3633	Hampton Ditch	3605A	Santa Fe River
3557	Unnamed Slough	3634	Unnamed Branch	3605B	Santa Fe River
3558	Unnamed Branch	3637	Unnamed Branch	3605C	Santa Fe River
3559	Unnamed Branch	3638	Unnamed Slough	3605D	Santa Fe River
3562	Unnamed Slough	3639	Theressa Slough	3605E	Santa Fe River
3563	Unnamed Branch	3641	Rocky Creek	3605F	Altho Drainage
3566	Lake Butler	3642	Townsend Branch	3605G	Santa Fe Lake
3567	Wateroak Creek	3644	Mill Creek Sink	3605H	Lake Altho
3570	Unnamed Slough	3646	Unnamed Slough	3605P	Siphon Creek Rise (Gilchrist)
3571	Cedar Hammock Drain	3647	Unnamed Branch	3605Q	ALA 112971
3576	Unnamed Branch	3648	Rhuda Branch	3605R	Santa Fe Rise
3578	Fivemile Creek	3649	Cow Creek	3605S	Devils Ear
3579	Gum Creek	3651	Unnamed Branch	3605T	Columbia Springs
3583	Mckinney Branch	3653	Hornsby Spring Run	3605U	Col 61981 (Spring)
3584	Unnamed Drain	3654	Monteocha Creek	3605W	Poe Spring
3585	Unnamed Branch	3655	Trout Pond Outlet	3605X	Blue Spring Gilchrist
3586	Fern Pond Drain	3656	Unnamed Drain	3605Y	Ginnie Spring
3587	Browns Still Run	3657	Unnamed Branch	3605Z	Trail Springs
3589	Unnamed Branch	3658	Unnamed Creek	3635A	Hampton Lake
3590	Cypress Run	3660	Unnamed Slough	3635B	Hampton Lake Outlet
3593	Lake Crosby Outlet	3663	Little Monteocha Creek	3649A	Waters Lake
3595	Unnamed Slough	3664	Unnamed Branch	3653Z	Hornsby Spring
3596	Unnamed Branch	3665	Unnamed Drain	3655A	Trout Pond

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 will be followed by the development and implementation of a Basin Management Action Plan, or BMAP, to reduce the amount of fecal coliform and reduce the amount of nutrients that caused the verified impairment of the New River. These activities will depend heavily on the active participation of the Suwannee River Water Management District (SRWMD); Union, Bradford, Baker, and Clay Counties; Florida Department of Transportation (FDOT); local 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) a list of surface waters that do not meet applicable water quality standards (impaired waters) and establish a TMDL for each pollutant source in each of these impaired 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 was divided into Hydrologic Unit Codes (HUCs). The Santa Fe River HUC included nine waterbodies and five parameters. The New River was listed as impaired for DO, coliform, and nutrients. In the first assessment cycle, in 2002, this segment of the New River was not impaired for fecal coliform.

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 rule-making 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 revised in 2006 and 2007.

2.2 Information on Verified Impairment

The Department used the IWR to assess water quality impairments in the New River and has verified that the creek is impaired for fecal coliform and DO based on data in the Department's IWR database. **Tables 2.1a** through **2.3d** provide summary results for fecal coliform and DO data for the verified period (which for Group 1 waters was January 1, 2000, through June 30, 2007), by month, season, and year, respectively. There is a 33.33 percent overall exceedance rate for fecal coliform in WBID 3506 during the verified period, and a total of 42 samples, ranging from 15 to 2,000 counts per 100 milliliters (counts/100mL).

For WBID 3506A, there is a 50 percent overall exceedance rate for DO during the verified period, and for WBID 3506B there is a 49 percent overall exceedance rate. There is a total of 26 samples, ranging from 0.83 to 9.7 milligrams per liter (mg/L) in WBID 3506A, and a total of 51 samples, ranging from 0.6 to 10.5 mg/L, in WBID 3506B. In WBID 3506, there are a total of 135 DO samples, ranging from 1.58 to 10.7 mg/L, with a 17.78 overall exceedance rate.

Fecal coliform exceedances occur in all but 4 months in which samples have been collected (**Table 2.1a**). In the months those exceedances occurred, the exceedance rates ranged from 25 to 66.67 percent. The sample size for each month is small, with all months having 6 or fewer samples, making interpretation difficult. When aggregating fecal coliform data by season, the summer season demonstrates the highest percentage of exceedances (46.15 percent) and also has the largest amount of rainfall (**Table 2.2a**). It is likely that exceedances are associated with rainfall events and nonpoint sources, as well as seasonal variation.

After the yearly fecal coliform data are examined, a possible pattern can be detected among the exceedance rates (**Table 2.3a**). From 2001 through 2004, the exceedance rates increase up to 100 percent but then sharply decrease in the last 3 years of the verified period. The last 2 years have a 0 percent exceedance rate. However, these last 2 years of data have only 5 samples, which provide only a limited representation. The pattern does suggest an overall trend towards lowered fecal coliform results. Furthermore, the years with higher mean precipitation values (2003, 2004, and 2005) have higher exceedance rates.

For WBID 3506A, DO exceedances occur in March, May, June, July, August, and September (**Table 2.1c**). This segment of the river was not sampled in October or November. May through September showed 100 percent exceedance rates, and these are also the months, excluding May, with the highest mean precipitation. This implies that rainfall contributes to the higher exceedance rate. This pattern is seen in WBID 3506B (**Table 2.1d**), except that the exceedance rate remains elevated through December, while the mean precipitation sharply decreases in October. For WBID 3506, DO exceedances occur in April, May, June, July, August, September, and November (**Table 2.1b**). In no month did exceedance rates surpass 50 percent. Like WBIDs 3506A and 3506B, May, July and August had the highest exceedance rate, while July and August also had some of the highest mean precipitation results.

When looking at the seasonal data (**Tables 2.2b** through **2.2d**), all 3 WBIDs gradually increase in exceedance rates from winter to summer and then decline in exceedances in the fall. WBID 3506A dramatically drops to a 0 percent exceedance rate in the fall, but it only has 1 sample to represent the season. This pattern follows the gradual increase in rainfall from winter to summer, followed by the least amount of precipitation in fall. For 2004, 2005, and 2006, all 3 segments of the river have corresponding increasing and decreasing exceedance rates (**Tables 2.3b** through **2.3d**). Both WBIDs 3506A and 3506B also maintain exceedance rates of 50 percent or above for 2006 and 2007. Generally, the DO data for the river follow the rainfall trend.

Data were collected during the verified period (January 1, 2000–June 30, 2007) at 9 fecal coliform sampling sites. Most of these samples were taken by the SRWMD and many by the Department. There are 3 DO sampling sites in WBID 3506A, 2 in WBID 3506B, and 12 in WBID 3506. The samples in WBID 3506A were taken by Biological Research Associates (BRA) and the Department; the SRWMD and the Department collected samples in WBID 3506B; and the SRWMD, Department, and BRA collected DO samples in WBID 3506. Sampling stations are discussed further in **Section 5.1,** which also contains a map depicting their locations.

Table 2.1a. Summary of Fecal Coliform Data by Month for the Verified Period (January 1, 2000–June 30, 2007), WBID 3506

Month	N	Minimum	Maximum	Median	Mean	No. of Exceedances	% Exceedance	Mean Precipitation
January	4	150	455	258	280	1	25.00	2.54
February	5	40	1,220	252	475	2	40.00	3.21
March	1	42	42	42	42	0	0.00	3.92
April	2	15	90	53	53	0	0.00	1.80
May	7	24	1,500	130	431	2	28.57	1.93
June	3	60	470	150	227	1	33.33	7.8
July	6	28	2,000	279	534	3	50.00	6.62
August	4	143	480	173	242	1	25.00	5.65
September	3	365	1,295	933	864	2	66.67	7.33
October	2	68	170	119	119	0	0.00	2.51
November	4	60	800	344	387	2	50.00	2.21
December	1	202	202	202	202	0	0.00	3.29

Coliform counts are #/100mL.
Exceedances represent values above 400 counts/100mL.
Mean precipitation is for Bradford and Union Counties, in inches.

Table 2.1b. Summary of DO Data by Month for the Verified Period (January 1, 2000–June 30, 2007), WBID 3506

Month	N	Minimum	Maximum	Median	Mean	No. of Exceedances	% Exceedance	Mean Precipitation
January	16	5.4	10.7	8	8	0	0.00	2.54
February	19	6.5	10.9	8	9	0	0.00	3.21
March	4	5.8	9.94	7	7	0	0.00	3.92
April	8	4.29	8.48	7	7	2	25.00	1.80
May	20	1.58	10.3	6	6	6	30.00	1.93
June	9	3.5	6.9	6	6	2	22.22	7.8
July	15	1.98	6.5	5	5	4	26.67	6.62
August	13	2.93	5.9	5	5	6	46.15	5.65
September	8	4.79	7	6	6	1	12.50	7.33
October	2	5.1	5.9	6	6	0	0.00	2.51
November	15	2.9	7.7	7	6	3	20.00	2.21
December	6	5.9	8.9	9	8	0	0.00	3.29

DO units are mg/L.
Exceedances represent values below 5 mg/L.
Mean precipitation is for Bradford and Union Counties, in inches.

Table 2.1c. Summary of DO Data by Month for the Verified Period (January 1, 2000–June 30, 2007), WBID 3506A

Month	N	Minimum	Maximum	Median	Mean	No. of Exceedances	% Exceedance	Mean Precipitation
January	1	9.3	9.3	9	9	0	0.00	2.54
February	1	8.4	8.4	8	8	0	0.00	3.21
March	6	4.98	8.1	7	7	1	16.67	3.92
April	5	5.6	6.7	6	6	0	0.00	1.80
May	7	1.21	4	4	3	7	100.00	1.93
June	2	0.83	4.7	3	3	2	100.00	7.8
July	1	2.8	2.8	3	6	1	100.00	6.62
August	1	4.2	4.2	4	4	1	100.00	5.65
September	1	3.8	3.8	4	4	1	100.00	7.33
October	0	-	-	-	-	-	-	2.51
November	0	-	-	-	-	-	-	2.21
December	1	9.7	9.7	10	10	0	0.00	3.29

- No data available.
DO units are mg/L.
Exceedances represent values below 5 mg/L.
Mean precipitation is for Bradford and Union Counties, in inches.

Table 2.1d. Summary of DO Data by Month for the Verified Period (January 1, 2000–June 30, 2007), WBID 3506B

Month	N	Minimum	Maximum	Median	Mean	No. of Exceedances	% Exceedance	Mean Precipitation
January	7	1.8	8.6	7	6	2	28.57	2.54
February	8	6.5	10.5	7	8	0	0.00	3.21
March	4	5.2	6.8	6	6	0	0.00	3.92
April	4	5.7	7.9	6	7	0	0.00	1.80
May	7	2.3	6.1	3	4	6	85.71	1.93
June	2	1.9	4.9	3	3	2	100.00	7.8
July	6	0.6	5	4	4	5	83.33	6.62
August	4	1.09	4.6	4	3	4	100.00	5.65
September	2	3.4	5	4	4	1	50.00	7.33
October	0	-	-	-	-	-	-	2.51
November	5	2.4	6.7	4	4	4	80.00	2.21
December	2	4.2	9.1	7	7	1	50.00	3.29

Table represents years for which data exist.
DO units are mg/L.
Exceedances represent values below 5 mg/L.
Mean precipitation is for Bradford and Union Counties, in inches.

Table 2.2a. Summary of Fecal Coliform Data by Season for the Verified Period (January 1, 2000–June 30, 2007), WBID 3506

Season	N	Minimum	Maximum	Median	Mean	No. of Exceedances	% Exceedance	Mean Precipitation
Winter	10	40	1,220	226	354	3	30.00	3.22
Spring	12	15	1,500	110	317	3	25.00	3.84
Summer	13	28	2,000	365	50	6	46.15	6.54
Fall	7	60	800	202	784	2	28.57	2.67

Coliform counts are #/100mL.
Exceedances represent values above 400 counts/100mL.
Mean precipitation is for Bradford and Union Counties, in inches.

Table 2.2b. Summary of DO Data by Season for the Verified Period (January 1, 2000–June 30, 2007), WBID 3506

Season	N	Minimum	Maximum	Median	Mean	No. of Exceedances	% Exceedance	Mean Precipitation
Winter	39	5.4	10.9	8	8	0	0.00	3.22
Spring	37	1.58	10.3	6	6	10	27.03	3.84
Summer	36	1.98	7	5	5	11	30.56	6.54
Fall	23	2.9	8.9	7	7	3	13.04	2.67

DO units are mg/L.
Exceedances represent values below 5 mg/L.
Mean precipitation is for Bradford and Union Counties, in inches.

Table 2.2c. Summary of DO Data by Season for the Verified Period (January 1, 2000–June 30, 2007), WBID 3506A

Season	N	Minimum	Maximum	Median	Mean	No. of Exceedances	% Exceedance	Mean Precipitation
Winter	8	4.98	9.3	7	7	1	12.50	3.22
Spring	14	0.83	6.7	4	4	8	57.14	3.84
Summer	3	2.8	4.2	4	4	3	100.00	6.54
Fall	1	9.7	9.7	10	10	0	0.00	2.67

DO units are mg/L.
Exceedances represent values below 5 mg/L.
Mean precipitation is for Bradford and Union Counties, in inches.

Table 2.2d. Summary of DO Data by Season for the Verified Period (January 1, 2000–June 30, 2007), WBID 3506B

Season	N	Minimum	Maximum	Median	Mean	No. of Exceedances	% Exceedance	Mean Precipitation
Winter	19	1.8	10.5	7	7	2	10.53	3.22
Spring	13	1.9	7.9	5	5	8	61.54	3.84
Summer	12	0.6	5	4	4	10	83.33	6.54
Fall	7	2.4	9.1	5	5	5	71.43	2.67

DO units are mg/L.
Exceedances represent values below 5 mg/L.
Mean precipitation is for Bradford and Union Counties, in inches.

Table 2.3a. Summary of Fecal Coliform Data by Year for the Verified Period (January 1, 2000–June 30, 2007), WBID 3506

Year	N	Minimum	Maximum	Median	Mean	No. of Exceedances	% Exceedance	Mean Precipitation
2000	5	40	480	170	202	1	20.00	2.83
2001	12	28	1,295	173	267	2	16.67	3.59
2002	8	55	933	198	293	2	25.00	4.91
2003	4	195	1,220	768	738	3	75.00	4.74
2004	5	431	1,500	665	773	5	100.00	5.11
2005	3	150	2,000	310	820	1	33.33	5.04
2006	1	48	48	48	48	0	0.00	2.98
2007	4	15	130	33	53	0	0.00	2.08

Coliform counts are #/100mL.
Exceedances represent values above 400 counts/100mL.
Mean precipitation is for Bradford and Union Counties, in inches.

Table 2.3b. Summary of DO Data by Year for the Verified Period (January 1, 2000–June 30, 2007), WBID 3506

Year	N	Minimum	Maximum	Median	Mean	No. of Exceedances	% Exceedance	Mean Precipitation
2000	6	3.5	10.2	5	5	3	50.00	2.83
2001	15	2.6	7.9	6	5	6	40.00	3.59
2002	17	3.4	10.7	7	7	3	17.65	4.91
2003	26	5	9	7	7	0	0.00	4.74
2004	13	4.12	8.3	6	6	3	23.08	5.11
2005	18	4.9	8.9	7	7	1	5.56	5.04
2006	29	1.98	10.7	7	7	5	17.24	2.98
2007	11	1.58	10.9	7	7	3	27.27	2.08

DO units are mg/L.
Exceedances represent values below 5 mg/L.
Mean precipitation is for Bradford and Union Counties, in inches.

Table 2.3c. Summary of DO Data by Year for the Verified Period (January 1, 2000–June 30, 2007), WBID 3506A

Year	N	Minimum	Maximum	Median	Mean	No. of Exceedances	% Exceedance	Mean Precipitation
2000	0	-	-	-	-	-	-	2.83
2001	1	4.2	4.2	4	4	1	100.00	3.59
2002	0	-	-	-	-	-	-	4.91
2003	10	3.8	8.4	7	7	1	10.00	4.74
2004	1	1.21	1.21	1	1	1	100.00	5.11
2005	1	9.7	9.7	10	10	0	0.00	5.04
2006	6	2.8	9.3	4	5	4	66.67	2.98
2007	7	0.83	6.08	4	4	6	85.71	2.08

DO units are mg/L.
Exceedances represent values below 5 mg/L.
Mean precipitation is for Bradford and Union Counties, in inches.

Table 2.3d. Summary of DO Data by Year for the Verified Period (January 1, 2000–June 30, 2007), WBID 3506B

Year	N	Minimum	Maximum	Median	Mean	No. of Exceedances	% Exceedance	Mean Precipitation
2000	0	-	-	-	-	-	-	2.83
2001	1	2.4	2.4	2	2	1	100.00	3.59
2002	6	0.6	7.6	5	5	3	50.00	4.91
2003	21	3	8.6	5	6	8	38.10	4.74
2004	6	2.4	8.3	4	4	5	83.33	5.11
2005	7	4	9.1	6	6	3	42.86	5.04
2006	8	1.09	10.5	4	5	4	50.00	2.98
2007	2	1.8	7.42	5	5	1	50.00	2.08

DO units are mg/L.
Exceedances represent values below 5 mg/L.
Mean precipitation is for Bradford and Union Counties, in inches.

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)**

The New River is a Class III fresh waterbody, with a designated use of recreation, propagation, and the maintenance of a healthy, well-balanced population of fish and wildlife. The Class III water quality criteria applicable to the impairment addressed by this TMDL are for fecal coliform and DO.

3.2 Applicable Water Quality Standards and Numeric Water Quality Target

3.2.1 Fecal Coliform Criterion

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 that monthly averages shall be expressed as geometric means based on a minimum of 10 samples taken over a 30-day period. 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 for the TMDL is not to exceed 400 in 10 percent of the samples.

3.2.2 DO Criterion

The New River is a Class III fresh waterbody, with a designated use of recreation, propagation, and the maintenance of a healthy, well-balanced population of fish and wildlife. Numeric criteria for DO are expressed in terms of minimum and daily average concentrations. The water quality criterion for the protection of Class III fresh water, as established by Subsection 62-302.530(30), F.A.C., states the following:

Dissolved Oxygen Criteria:

The Class III water quality criterion applicable to the impairment addressed by this TMDL is that dissolved oxygen shall not be less than 5.0 mg/L, with normal daily and seasonal fluctuations above these levels maintained.

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 pollutants in the New River 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, 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, including 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 Coliform in the New River Watershed

4.2.1 Point Sources

The fecal coliform impairment discussed in this report concerns only the most downstream portion of the New River (WBID 3506), before it flows into the Santa Fe River. Other tributaries and the two upstream portions of the New River (WBIDs 3506A and 3506B) may affect water quality in the most downstream portion.

There is only one facility with an NPDES permit in WBID 3506 (**Figure 4.1,** in bold). Pritchett Trucking, Inc. (Permit #FLR05A301) has been issued a general stormwater permit. This facility is a 100 percent recycle truck wash facility that is unlikely to contribute many coliform bacteria to the river.

WBID 3506A has several other permitted facilities with general stormwater permits (Union Tag FLR05B310, Union Metal Furniture FLR05B305, Union Forestry FLR05B308, and Union Food FLR05B303). However, coliform are not required to be monitored under general permits such as these, and therefore the coliform contribution to the river by these types of facilities is unknown but is also considered negligible.

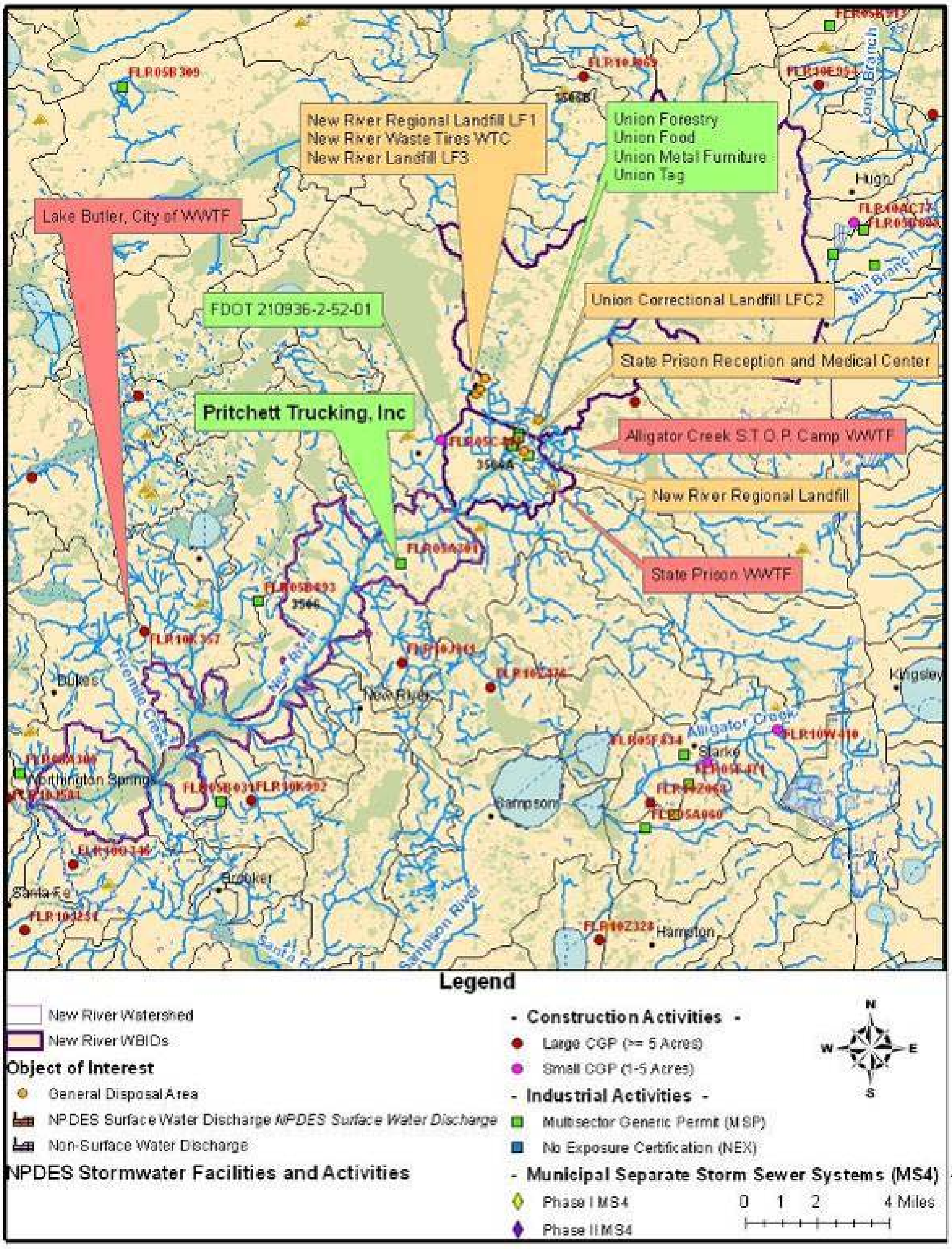
There are no wastewater treatment facilities or solid waste sites in WBID 3506, but it is downstream from three active wastewater treatment facilities: Alligator S.T.O.P. Camp WWTF, Florida State Prison WWTF, and City of Lake Butler WWTF. Thus these dischargers may contribute to the fecal load. The Alligator S.T.O.P. Camp (FLA011344) facility is an extended aeration wastewater treatment plant with a chlorinated holding pond, a spray irrigation system, and a 0.005-million-gallon-per-day (mgd) permitted flow. The Florida State Prison facility (FLA113450) has a 1.78 mgd permitted flow with a 20-million-gallon storage pond, a 40-million-gallon high-density polyethelene (HDPE)-lined effluent storage pond, and a 766-acre sprayfield divided into 15 center pivot irrigation zones. The Lake Butler facility (FLA118338) is an extended aeration activated sludge WWTF with a discharge to a holding pond (0.7 mgd holding capacity). These WWTFs do not have a direct discharge site to the New River, but the facilities are upstream from WBID 3506 and therefore may contribute to the fecal load of the river through surface water runoff.

Effluent data from the Florida State Prison WWTF were further examined (**Appendix L**). The effluent data obtained consist of monthly averages from June 30, 1999, through June 30, 2008, in which no monthly averages exceeded 32 colonies/100mL.

In WBID 3506B, there are four solid waste sites (New River Regional Landfill LF1, New River Waste Tires WTC, New River Landfill LF3, and Union Correctional Landfill LFC2); and in WBID 3506A there is one (State Prison Reception and Medical Center). Union Correctional Landfill LFC2 and State Prison Reception and Medical Center are closed, but with maintained ground water monitoring. The other solid waste sites are active and possible sources of fecal coliform. It is known that enteric bacterial indicators can be present and even grow in landfills (Palmisano et al., 1996). These bacteria tends to have a quick die-off rate, due to the high temperatures found in landfills (Palmisano et al., 1996), and may not actually be a viable source of bacteria in the New River watershed. **Figure 4.1** shows the location of these facilities in the watershed.

The permitted discharges discussed should not be greatly altering the water quality of the creek. Most of the facilities are not required to perform effluent monitoring under the general permit, and current coliform loadings from these facilities cannot be quantified. However, coliform may be running off into the New River from some of the upstream solid waste and wastewater facilities during precipitation events.

Figure 4.1. Location of Permitted Discharges in the New River Watershed



Note: Bold type indicates that the facility is in WBID 3506.

Municipal Separate Storm Sewer System Permittees

There are no NPDES Phase 1 or Phase 2 municipal separate storm sewer system (MS4) permits covering the New River watershed.

4.2.2 Land Uses and Nonpoint Sources

Additional pollutant loadings to the New River are generated from nonpoint sources in the watershed. Potential nonpoint sources of coliform and nutrients include loadings from surface runoff, wildlife, pets, leaking or overflowing sewage lines, and leaking septic tanks.

Land Uses

The spatial distribution and acreage of different land use categories were identified using the 2004 land use coverage contained in the Department's Geographic Information System (GIS) library, initially provided by the SRWMD. Land use categories and acreages in the watershed were aggregated using the Level 3 codes tabulated in **Tables 4.1a** through **4.1c. Figure 4.2** shows the principal land uses.

The New River watershed lies outside any city limits and is therefore highly rural. As **Table 4.1a** shows, the majority of the land in WBID 3506 is mixed wetland hardwoods (25.59 percent), followed by coniferous plantations (17.14 percent) and improved pastures (12.18 percent). Natural land use types (shrub and brushland, pine flatwoods, and forest regeneration areas) comprise roughly 6,686 acres, or 38.42 percent of land use in the watershed. Agricultural land use types consist of approximately 4,007 acres, or 23.03 percent of the total watershed. Low- and medium-density residential areas (Level 3 Codes 1110, 1120, 1130, and 1210) add up to only about 768.01 acres, or 4.41 percent of the watershed.

Agriculture is a significant land use category in WBID 3506A, comprising 1,796 acres, or 41 percent of overall land use (**Table 4.1b**). The largest portion of land use (approximately 1,336 acres, or 31 percent) in this WBID is attributed to field crops, with much smaller percentages in row crops (4.03 percent), unimproved pasture (3.30 percent), improved pasture (3.17 percent), and other groves (0.11 percent). The field crop category contains land devoted primarily to wheat, oats, hay, and grasses. Improved pasture consists of cleared land that has been tilled, reseeded with specific grass types, and is periodically fertilized. The second largest land use is coniferous plantations (1,184 acres or 27 percent), while the third is wetland forested mixed (349 acres, or 8 percent).

The land use dominating WBID 3506B (**Table 4.1c**) is coniferous plantations, at 12,570 acres, or 36 percent of the total WBID. The second largest land use category is forest regeneration areas (7,083 acres or 20 percent), and the third largest is wetland forested mixed (2,800 acres, or 8 percent). There is also land devoted to agriculture in WBID 3506B, but it is not a significant percentage of overall land use (4.37 percent).

Table 4.1a. Land Use Categories in the New River Watershed, WBID 3506

Level 3 Land Use Code	Attribute	Acres	% of Total
1110	MDC - Low Density, Fixed Single Family Units	327.28	1.88
1120	MDC - Low Density, Mobile Home Units	7.15	0.04
1130	MDC - Low Density, Mixed Units (Fixed and Mobile Home Units)	407.67	2.34
1210	Medium Density, Fixed Single Family Units	25.91	0.15
1480	Cemeteries	14.84	0.09
1850	ODC - Parks and Zoos	11.18	0.06
2110	Improved Pastures	2,118.58	12.18
2120	Unimproved Pastures	358.52	2.06
2130	Woodland Pastures	235.81	1.36
2140	Row Crops	328.79	1.89
2150	Field Crops	944.83	5.43
2310	ODC - Cattle Feeding Operations	19.56	0.11
2320	ODC - Poultry Feeding Operations	0.77	0.00
3100	Range Land, Herbaceous (Dry Prairie)	15.76	0.09
3200	Shrub and Brushland	222.82	1.28
3300	Mixed Rangeland	10.08	0.06
4100	Upland Coniferous Forests	183.43	1.05
4110	Pine Flatwoods	92.22	0.53
4140	Pine-Mesic Oak	18.23	0.10
4200	Upland Hardwood Forests	45	0.26
4210	Xeric Oak	3.1	0.02
4340	Hardwood Coniferous - Mixed	1,075.25	6.18
4410	Coniferous Plantations	2,981.99	17.14
4430	Forest Regeneration Areas	2,037.89	11.71
5100	Streams and Waterways	0.04	0.00
5200	Lakes	5.05	0.03
5300	Reservoirs	14.01	0.08
6140	Titi Swamps	1.89	0.01
6170	Mixed Wetland Hardwoods	4,453.18	25.59
6210	Cypress	64.34	0.37
6250	Hydric Pine Flatwoods	13.09	0.08
6300	Wetland Forested Mixed	829.76	4.77
6410	Freshwater Marshes	19.4	0.11
6430	Wet Prairies	66.96	0.38
6460	Mixed Scrub-Shrub Wetland	369.23	2.12
8110	Airports	30.63	0.18
8170	Oil, Water or Gas Long Distance Transmission Lines	44.48	0.26
8200	Communications	1.06	0.01
	TOTAL:	**17,399.78**	**100.00**

Table 4.1b. Land Use Categories in the New River Watershed, WBID 3506A

Level 3 Land Use Code	Attribute	Acres	% of Total
1110	MDC - Low Density, Fixed Single Family Units	40.59	0.94
1130	MDC - Low Density, Mixed Units (Fixed and Mobile Home Units)	41.71	0.96
1210	Medium Density, Fixed Single Family Units	164.52	3.79
1230	Medium Density, Mixed Units	4.09	0.09
1400	Commercial and Services	31.71	0.73
1520	Timber Processing	1.03	0.02
1700	ODC - Institutional (Education, Religious, Health, Military)	224.81	5.18
1890	Other Recreational (Riding Stables, Go Cart Tracks, Skeet Ranges)	15.63	0.36
2110	Improved Pastures	137.66	3.17
2120	Unimproved Pastures	143.30	3.30
2140	Row Crops	174.84	4.03
2150	Field Crops	1,335.72	30.79
2230	Other Groves (Pecan, Avocado, Coconut, Mango, etc.)	4.81	0.11
3200	Shrub and Brushland	21.16	0.49
4100	Upland Coniferous Forests	29.47	0.68
4110	Pine Flatwoods	9.77	0.23
4340	Hardwood Coniferous - Mixed	44.17	1.02
4410	Coniferous Plantations	1,183.61	27.28
4430	Forest Regeneration Areas	153.15	3.53
5200	Lakes	1.27	0.03
5300	Reservoirs	22.26	0.51
6170	Mixed Wetland Hardwoods	87.91	2.03
6250	Hydric Pine Flatwoods	5.48	0.13
6300	Wetland Forested Mixed	349.48	8.05
6430	Wet Prairies	34.64	0.80
6460	Mixed Scrub-Shrub Wetland	31.49	0.73
7410	Rural Land in Transition without Positive Indicators of Intended Activity	4.68	0.11
8310	Electric Power Facilities	0.90	0.02
8340	MDC - Sewage Treatment	38.83	0.89
	TOTAL:	**4,338.69**	**100.00**

Table 4.1c. Land Use Categories in the New River Watershed, WBID 3506B

Level 3 Land Use Code	Attribute	Acres	% of Total
1100	Residential, Low Density - Less than 2 Dwelling Units/Acre	3.85	0.01
1110	MDC - Low Density, Fixed Single Family Units	285.92	0.81
1120	MDC - Low Density, Mobile Home Units	7.57	0.02
1130	MDC - Low Density, Mixed Units (Fixed and Mobile Home Units)	45.23	0.13
1200	Residential, Medium Density - 2-5 Dwelling Units/Acre	63.32	0.18
1210	Medium Density, Fixed Single Family Units	10.94	0.03
1230	Medium Density, Mixed Units	17.42	0.05
1400	Commercial and Services	7.84	0.02
1520	Timber Processing	26.93	0.08
1610	Heavy Metals	105.07	0.30
1650	MDC - Reclaimed Lands	1,413.03	4.02
1660	Holding Ponds	363.72	1.04
1700	ODC - Institutional (Education, Religious, Health, Military)	15.54	0.04
2110	Improved Pastures	692.47	1.97
2120	Unimproved Pastures	227.40	0.65
2130	Woodland Pastures	138.28	0.39
2140	Row Crops	124.42	0.35
2150	Field Crops	336.88	0.96
2230	Other Groves (Pecan, Avocado, Coconut, Mango, etc.)	9.47	0.03
2320	ODC - Poultry Feeding Operations	7.06	0.02
3100	Range Land, Herbaceous (Dry Prairie)	16.99	0.05
3200	Shrub and Brushland	157.02	0.45
3300	Mixed Rangeland	154.87	0.44
4100	Upland Coniferous Forests	34.54	0.10
4110	Pine Flatwoods	277.16	0.79
4200	Upland Hardwood Forests	9.16	0.03
4340	Hardwood Coniferous - Mixed	167.83	0.48
4410	Coniferous Plantations	12,570.43	35.78
4430	Forest Regeneration Areas	7,082.83	20.16
5200	Lakes	28.89	0.08
5300	Reservoirs	20.81	0.06
6110	Bay swamp (if Distinct)	746.10	2.12
6170	Mixed Wetland Hardwoods	1,915.63	5.45
6210	Cypress	425.41	1.21
6220	Pond pine	15.59	0.04
6250	Hydric Pine Flatwoods	1,209.73	3.44
6300	Wetland Forested Mixed	2,800.03	7.97
6410	Freshwater Marshes	46.35	0.13
6430	Wet Prairies	706.84	2.01
6460	Mixed Scrub-Shrub Wetland	2,746.72	7.82
7410	Rural Land in Transition without Positive Indicators of Intended Activity	11.09	0.03
7430	Spoil Areas	4.34	0.01
8140	Roads and Highways	16.58	0.05

Level 3 Land Use Code	Attribute	Acres	% of Total
8170	Oil, Water or Gas Long Distance Transmission Lines	15.33	0.04
8200	Communications	4.50	0.01
8320	Electrical Power Transmission Lines	30.81	0.09
8340	MDC - Sewage Treatment	13.98	0.04
	TOTAL:	**35,131.92**	**100.00**

Population

According to the U.S. Census Bureau, census block population densities in the New River watershed in the year 2000 ranged from 0 to 1,602.4 persons per acre (see **Figure 4.3**). There is an average of 27 persons per square mile in WBID 3506 alone (calculated with U.S. Census Bureau information). Based on this average, the estimated population in WBID 3506 is 738.

The New River watershed is practically split down the middle between Bradford and Union Counties. The Census Bureau reports that, for all of Bradford County, the total population for 2000 was approximately 26,088, with 8,497 households. Union County had a total population of 13,442 in 2000, with 3,367 households. For Bradford County, the Bureau reported a housing density of 29 houses per square mile, and for Union County, 14 houses per square mile. This places Bradford County 50th and Union County 59th in housing densities and population in Florida (U.S. Census Bureau Website, 2008). The estimated average housing density in WBID 3506 is 10 residences per square mile, based on population, which is lower than that of Bradford and Union Counties, but a close representation of what occurs on the county scale.

Figure 4.2. Principal Land Uses in the New River Watershed

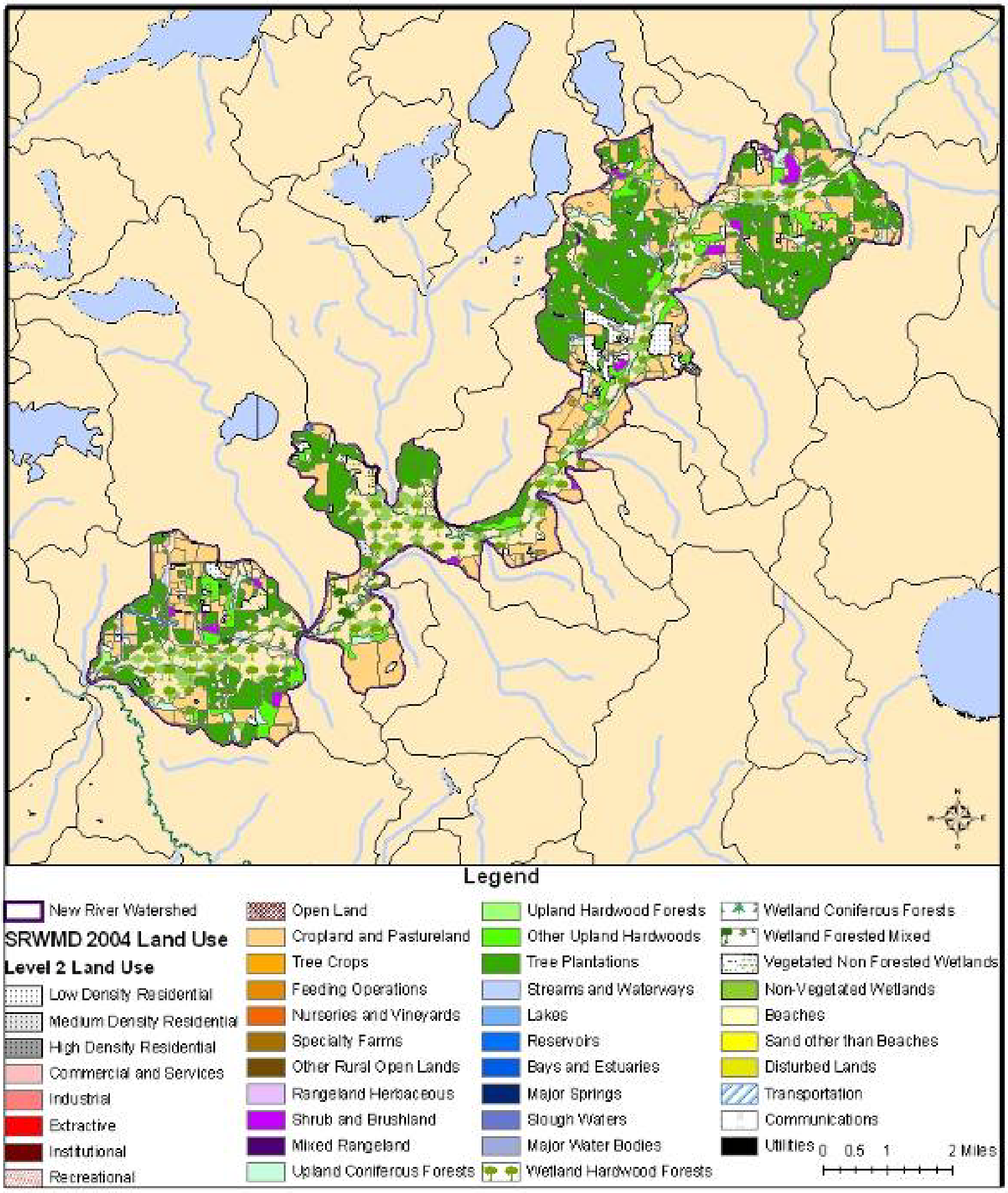
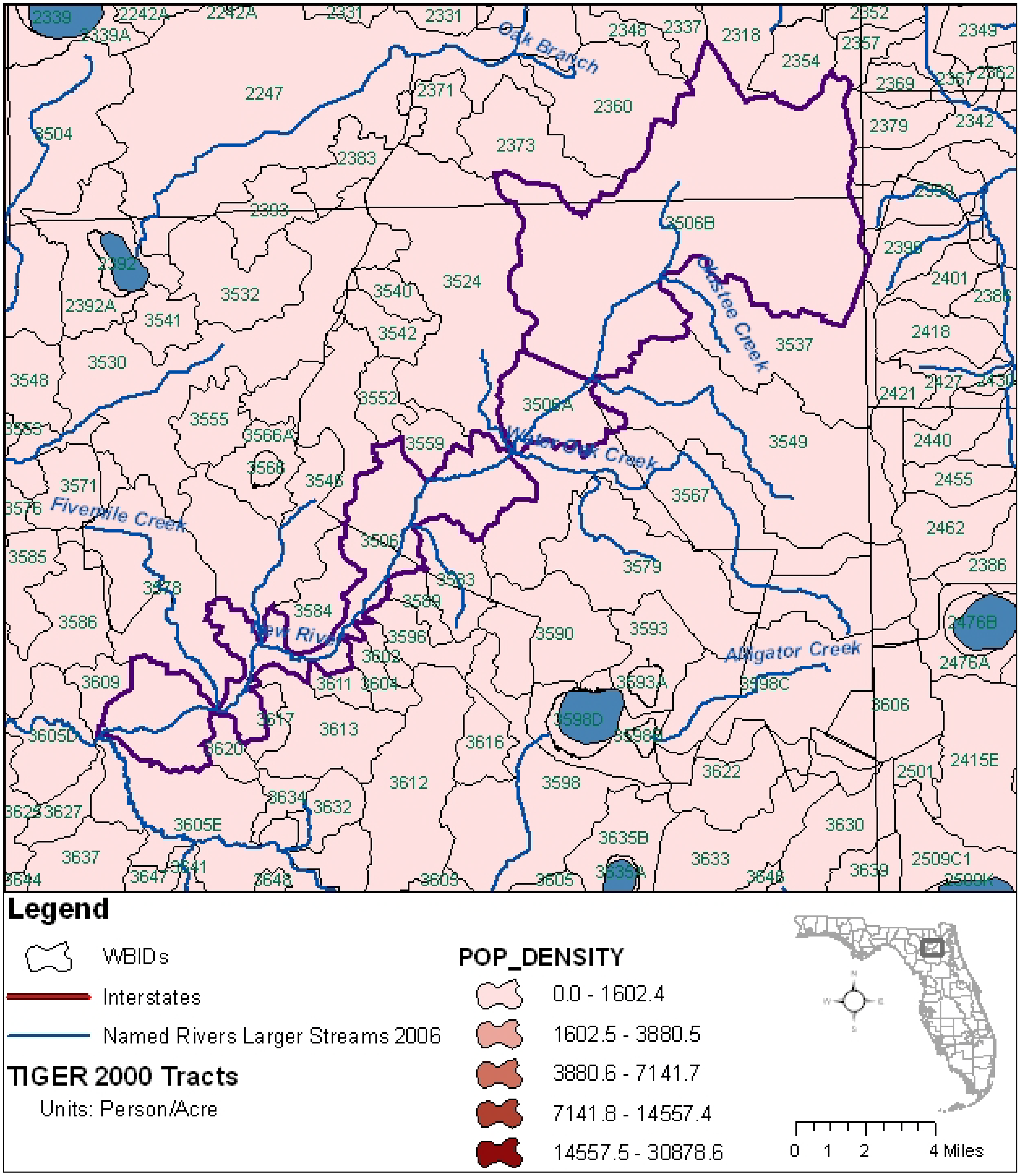


Figure 4.3. Population Density (Persons/Acre) in the New River Watershed



Septic Tanks

The Florida Department of Health (FDOH) reports that as of fiscal year 2006–07, there were 9,883 permitted septic tanks in Bradford County and 4,375 permitted septic tanks in Union County (FDOH Website, 2008). From fiscal years 1991–2007 (missing 1992–1993), 698 permits for repairs were issued in Bradford County and 347 in Union County, or an average of approximately 47 and 23 repairs annually countywide, respectively. Simply dividing the number of septic tank repairs by the total number of septic tanks yields an estimated failure rate of 7 percent in Bradford County and 8 percent in Union County. Assuming that this failure rate is representative of the 15-year period for which data are available, this suggests approximately 1 septic tank failure per year for both counties (the estimate is rounded up to allow for those septic tanks where failures may not be known or have not been repaired).

As noted previously, there are an estimated 738 persons and 269 households in the New River watershed area. The average household in the watershed has 2.74 persons (see **Table 4.2**). There are no permitted domestic wastewater facilities in the watershed, and so it is assumed that all households are using septic tanks. Assuming 1 failure each year and 70 gallons/day/person (EPA, January 2001) as the load for each septic tank, a loading of 7.26×10^9 colonies/day is derived. **Table 4.3** shows the estimated septic tank failure rate in Bradford and Union Counties, and **Table 4.4** shows the estimated annual fecal coliform loading from failed septic tanks in WBID 3506.

Using 70 gallons/day/person (EPA, January 2001), and drainfield total nitrogen (TN) and total phosphorus (TP) concentrations of 36 and 15 mg/L, respectively, potential annual ground water loads of TN and TP were calculated for the entire New River watershed. As with earlier estimates, this is a screening level calculation, and soil types, the age of the system, vegetation, proximity to a receiving water, and other factors will influence the degree of attenuation of this load (**Table 4.5**).

Table 4.2. Estimation of Average Household Size in WBID 3506

Household Size	No. of Households	% of Total	No. of People
1-person household	44	16.22	44
2-person household	94	34.94	188
3-person household	56	20.73	167
4-person household	49	18.30	197
5-person household	19	7.21	97
6-person household	4	1.61	26
7-or-more-person household	3	0.99	19
TOTAL:	**269**	**100.00**	**738**
AVERAGE HOUSEHOLD SIZE:			**2.74**

Table 4.3. Estimation of Septic Tank Failure Rate in Bradford and Union Counties

County	Households (2000 Census)	FDOH Permitted Septic Tanks 1970–2007	FDOH Repair Permits 1991–2007 (missing 1992–93), 15 years data	Repairs Annually (calculated)	Estimated Failure Rate	Estimated Failure Rate per Year*
Bradford	8,497	9,883	698	47	7	1
Union	3,367	4,375	347	23	8	1

*Rounded to the nearest whole number.

Table 4.4. Estimation of Annual Fecal Coliform Loading from Failed Septic Tanks in WBID 3506

Estimated Population Density and Area	WBID Area (mi^2)	Estimated Population in Watershed	Estimated Number of Tank Failures[1]	Estimated Load from Failed Tanks[2]	Gallons/ Person/ Day[2]	Estimated Number of Persons per Household[3]	Estimated Daily Load from Failing Tanks	Estimated Annual Load from Failing Tanks
27 persons/mi^2 in WBID 3506	27.19	738	1	1.00×10^4 /mL	70	2.74	7.26×10^9	2.65×10^{12}

[1] Based on septic tank repair permits issued in the watershed from 1991–2007 (FDOH)—see text.
[2] EPA, January 2001.
[3] U.S. Census Bureau Website, 2008; see **Table 4.2** for more information on this estimate.

Table 4.5. Estimation of Annual TN and TP Loading from Failed Septic Tanks in the New River Watershed

WBID	Estimated Number of Households on Septic	Estimated Number Persons per Household[1]	Gallons/ Persons/ Day[2]	TN in Drainfield (mg/L)	TP in Drainfield (mg/L)	Estimated Annual TN Load (lbs/yr)	Estimated Annual TP Load (lbs/yr)
3506	269	2.74	70	36	15	5,658	2,358
3506A	330	2.68	70	36	15	6,789	2,829
3506B	228	2.8	70	36	15	4,901	2,042
TOTAL:	**827**					**17,348**	**7,228**

[1] U.S. Census Bureau Website, 2008; see **Table 4.2** for more information on this estimate.
[2] EPA, January 2001.

4.3 Source Summary

4.3.1 Agriculture in WBID 3506

According to Level 3 land use coverage, the New River watershed contains agricultural areas. Areas with cattle are the main type of agriculture that may be affecting water quality in the New River. Cattle are found in improved pastures, woodland pastures, and cattle feeding operations, which account for approximately 2,374 acres of the watershed (13.65 percent). Between these land use categories, there are approximately 16,313 acres of land containing cows in Bradford County and 15,844 acres in Union County.

According to the Florida Department of Agriculture and Consumer Services (2007), there are 11,000 cows in Bradford County and 8,000 cows in Union County; therefore, there are 0.67 cows per acre in Bradford County and 0.50 cows per acre in Union County. Using these ratios, the New River watershed has about 1,350 cows (adding the number of cows in the Bradford County portion of the WBID to the number of cows in the Union County portion). The following calculation is only an estimate (**Table 4.6**) and possibly a high estimate. Improved and woodland pastures have strong evidence of cattle activity, but are not likely to be as high in cow density as a cattle feeding operation. The estimated fecal coliform loading from cows was determined to be 1.35×10^{14} organisms/day.

Table 4.6. Estimated Loading from Cows in the New River Watershed

Number of Cows in Bradford County[1]	**Pasture Acreage in Bradford County[2]**	**Cattle/Acre in Bradford County**	**Pasture Acreage in Bradford County Portion of WBID 3506[3]**	**Number of Cows in Bradford County Portion of WBID 3506[4]**	**Total Number of Cows in WBID 3506**	**Estimated Counts/ Cow/Day[5]**	**Estimated Counts/ Day**	**Estimated Counts/ Year**
11,000	16,313	0.67	894	603	1,350	1.00×10^{11}	1.35×10^{14}	4.93×10^{16}
Number of Cows in Union County[1]	**Pasture Acreage in Union County[2]**	**Cattle/Acre in Union County**	**Pasture Acreage in Union County Portion of WBID 3506[3]**	**Number of Cows in Union County Portion of WBID 3506[4]**				
8,000	15,844	0.50	1,480	747				

[1] FDACS, 2007.
[2] Pasture acreage found in 2004 land use coverage, including improved pasture, woodland pastures, and cattle feeding operations.
[3] WBID 3506 was split into the area in Bradford County and the area in Union County. Pasture acreage was found in the 2004 land use coverage for each county portion, including improved pasture, woodland pastures, and cattle feeding operations.
[4] The calculated number of cows was rounded to the nearest whole number.
[5] EPA, January 2001.

4.3.2 Agriculture in the New River Watershed

Harper (2007) summarized a number of stormwater studies conducted in Florida and, based on those studies, provided mean stormwater water quality parameters and hydrologic characteristics for a variety of land uses, including pastureland. According to Harper (2007), mean stormwater concentrations for TN, TP, and biological oxygen demand (BOD) from pastureland are 3.47, 0.616, and 5.1 mg/L, respectively. A more detailed loading analysis could be performed based on soil types, annual rainfall amounts, and specific agricultural activities in the watershed. However, as a screening analysis, annual loads taken from the *BASINS 3.0 User Manual (Appendix IV)* (EPA, June 2001) for pasturelands in Florida were used as preliminary estimates (**Table 4.7**).

Table 4.7. Estimated Annual Average TN and TP Loads from Agriculture in the New River Watershed

Agricultural Acreage in the New River Watershed[1]	TN (lbs/ac/yr)	TN Load (lbs/yr)	TP (lbs/ac/yr)	TP Load (lbs/yr)
4,052	5.6	22,691	0.5	2,026

[1] This acreage is a sum of all of the pastureland acreage for WBIDs 3506, 3506A, and 3506B.
lbs/ac/yr – Pounds per acre per year.
lbs/yr– Pounds per year.

Source: EPA, June 2001; **Appendix IV**.

4.3.3 Urban Areas

There are 1,167 acres under the Level 1 urban and built-up category in the watershed and 17 acres (all in WBID 3506B) of highways. According to Harper (2007), mean stormwater concentrations for TN, TP, and BOD from single-family residential lands are 2.07, 0.327, and 7.9 mg/L, respectively. A mean runoff coefficient of 0.33 was also given in the report. Mean stormwater concentrations for TN, TP, and BOD from multiple-family residential lands are 2.32 0.520, and 11.3 mg/L, respectively.

A more detailed loading analysis could be performed based on soil types, annual rainfall amounts, and specific agricultural activities in the watershed. However, as a screening analysis, annual TN and TP loads taken from the *BASINS 3 User Manual (Appendix IV)* (EPA, June 2001) for urban and built-up lands in Florida were used (**Table 4.8**). Medium- and high-density land uses were combined into the multifamily category, and some land uses in Level 1 were not included in the loading estimate (for example, cemeteries).

Table 4.8. Estimated Annual TN and TP Loading in the New River Watershed for Urban and Built-up Lands

Urban Category	Acreage[1]	TN (lbs/ac/yr)	TN load (lbs/yr)	TP (lbs/ac/yr)	TP load (lbs/yr)
Low-Density Residential	1,166.97	4.43	5,170	0.47	548
Multifamily Residential	268.78	7.07	1,900	1.97	529
Commercial	39.55	9.48	375	2.05	81
Highway	16.58	6.25	104	2.5	41
TOTAL:	**1,491.88**		**7,549**		**1,201**

[1] This acreage is a sum of all of the pastureland acreage for WBIDs 3506, 3506A, and 3506B.

Source: EPA, June 2001; **Appendix IV**.

4.3.4 Pets

Pets, especially dogs, may be having an impact on the New River. The Department has been unable to obtain data on the number of dogs in the area; however, estimates can be made using literature-based values of dog ownership rates (**Table 4.9**). For example, using household-to-dog ratio estimates from the American Veterinary Medical Association (AVMA), the approximate loading is 7.80×10^{11} organisms/day. This is an estimate, as the actual loading from dogs is not known.

Table 4.9. Estimated Loading from Dogs in the New River Watershed

Estimated Number of Households in WBID 3506	Estimated Dog: Household Ratio[1]	Estimated Number of Dogs in WBID 3506	Estimated Fecal Coliform (counts/dog/day[2])	Estimated Fecal Coliform (counts/day)	Estimated Fecal Coliform (counts/yr)
269	0.58	156	5×10^{9}	7.80×10^{11}	2.85×10^{14}

[1] From the AVMA Website, which states the original source to be the *U.S. Pet Ownership and Demographics Sourcebook,* 2002.
[2] EPA, January 2001.

4.3.5 Leaking or Overflowing Wastewater Collection Systems

Because there is no domestic wastewater facility in the watershed, leaking or overflowing wastewater collection systems do not represent a possible source of fecal coliform to the New River.

4.3.6 Summary

Table 4.10 summarizes the estimates from various sources of coliform, while **Table 4.11** summarizes the various nutrient sources. It is important to note that this is not a complete list (wildlife, for example, is missing) and represents estimates of potential loadings. Proximity to the waterbody, rainfall frequency and magnitude, soil characteristics, and temperature are just a few of the factors that could influence and determine the actual loadings from these sources that reach the New River. For instance, where are cattle, pets, and pastureland in relation to the river? Do cattle or pets have access to the river, and can they excrete directly into the water? What percentage of pet owners actually pick up after their pet's waste? Is there a riparian buffer area or some other barrier separating pastures and homes from the river? Also, with all homes using septic systems, how many are old and in disrepair? What percentage of citizens makes sure that their septic systems remain in good condition?

Table 4.10. Summary of Estimated Potential Fecal Coliform Loading from Various Sources in the New River Watershed

Source	Fecal Coliform (counts/day)	Fecal Coliform (counts/yr)
Septic Tanks	7.26×10^{9}	2.65×10^{12}
Agriculture	1.35×10^{14}	4.93×10^{16}
Dogs	7.80×10^{11}	2.85×10^{14}

Table 4.11. Summary of Estimated Potential TN and TP Loading from Various Sources in the New River Watershed

Source	TN (lbs/yr)	TP (lbs/yr)
Septic Tanks	17,348	7,229
Urban and Built-up	7,549	1,201
Agriculture	22,691	2,026

Chapter 5: DETERMINATION OF ASSIMILATIVE CAPACITY

Note: To simplify the TMDL between the fecal coliform and DO impairments, Chapter 5 is split into two parts: Part A: Fecal Coliform, and Part B: Dissolved Oxygen.

Part A: Fecal Coliform

A–5.1 Determination of Fecal Coliform Loading Capacity

Because there is a USGS stream gaging station on the New River, both the "percent reduction" methodology and the "load duration curve" method were applied. To determine the required reduction for this TMDL, the required percent reduction that would be required for each of the exceedances was determined using all available data, and the percent reduction required to meet the state standard of 400 counts/100mL was determined. The median value of all of these reductions determined the overall required reduction, and therefore the TMDL.

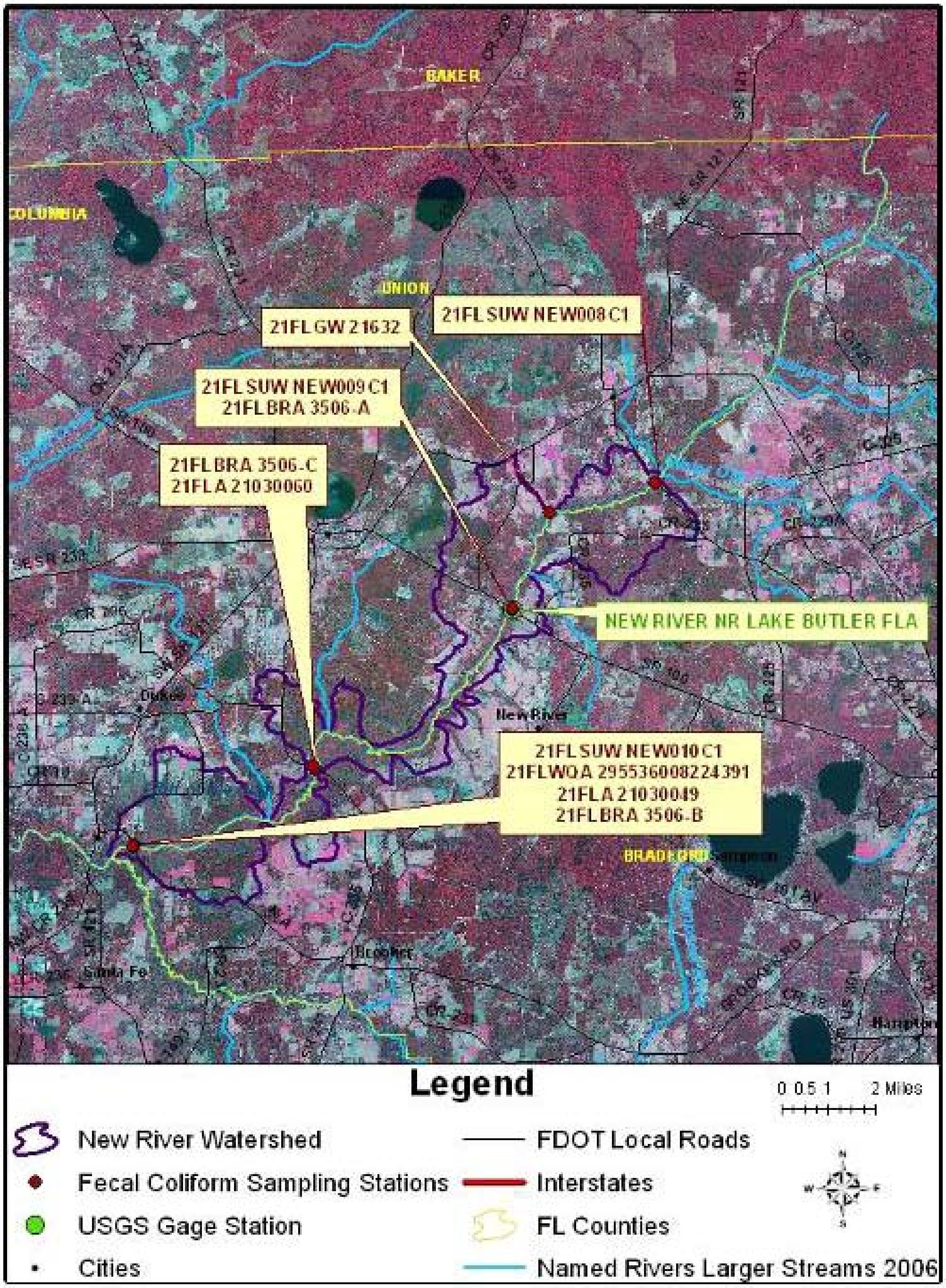
The load duration curve is also known as the "Kansas Approach" because it was developed by the state of Kansas (Stiles, 2002); this method is well-documented in the literature, with improved modifications used by EPA Region 4 (Davis, 2004). Basically, the method relates the pollutant concentration to the flow of the stream to establish the existing loading capacity and the allowable pollutant load (TMDL) under a spectrum of flow conditions. The maximum allowable pollutant load and load reduction requirement are then determined based on the analysis of the critical flow conditions. Using this method, it takes five steps to develop the TMDL and establish the required load reduction:

1. *Identify available flow and water quality data;*
2. *Develop the flow duration curve;*
3. *Develop the load duration curve for the existing loading;*
4. *Define the critical conditions; and*
5. *Establish the needed load reduction by comparing the existing loading with the allowable load under critical conditions.*

A–5.1.1 Data Used in the Determination of the TMDL

There are 10 sampling stations in WBID 3506 with historical fecal coliform observations. From upstream to downstream, they are as follows: New River at State Road 229 near Raiford (21FLSUW NEW008C1), SR1-SS-2132 New River (21FLGW 21632), New River near Lake Butler Florida at State Road 100 (21FLSUW NEW009C1), 3506 – New River - Bridge at Highway 100 (21FLBRA 3506-A), 3506 - New River – Bridge at Country Road 231 (21FLBRA 3506-C), New River 200 Yards North of State Road 231 (21FLA 21030060), New River near Worthington Springs at C-18 (21FLSUW NEW010C1), New River at Country Road 18 (21FLWQA 295536008224391), New River at State Road 18 (21FLA 21030049), and 3506–New River – at Bridge on Highway 18 (21FLBRA 3506-B) (**Figure 5.1**).

Figure 5.1. Historical Fecal Coliform Sample Sites in the New River Watershed



The primary collector of historical data is the SRWMD, which maintained routine sampling sites at State Roads 100 (21FLSUW NEW009C1) and 18 (21FLSUW NEW010C1). For the most part, the SRWMD sampled the river quarterly from 1995 to 2005. **Table 5.1** shows data collection information for each of the stations. **Figure 5.1** shows the locations of the sample sites. **Table 5.2** provides statistical information for the historical fecal coliform sampling at each of these stations. **Figure 5.2** is a chart summarizing the observed historical data analysis, and **Appendix B** contains the historical fecal coliform observations from these sites.

Flow measurements for the New River were obtained from a USGS gaging station (02321000) located on the New River near Lake Butler, Florida, Latitude: 29°59'53", Longitude:87°16'27" (**Figure 5.1**).

Table 5.1. Fecal Coliform Sampling Station Summary, WBID 3506

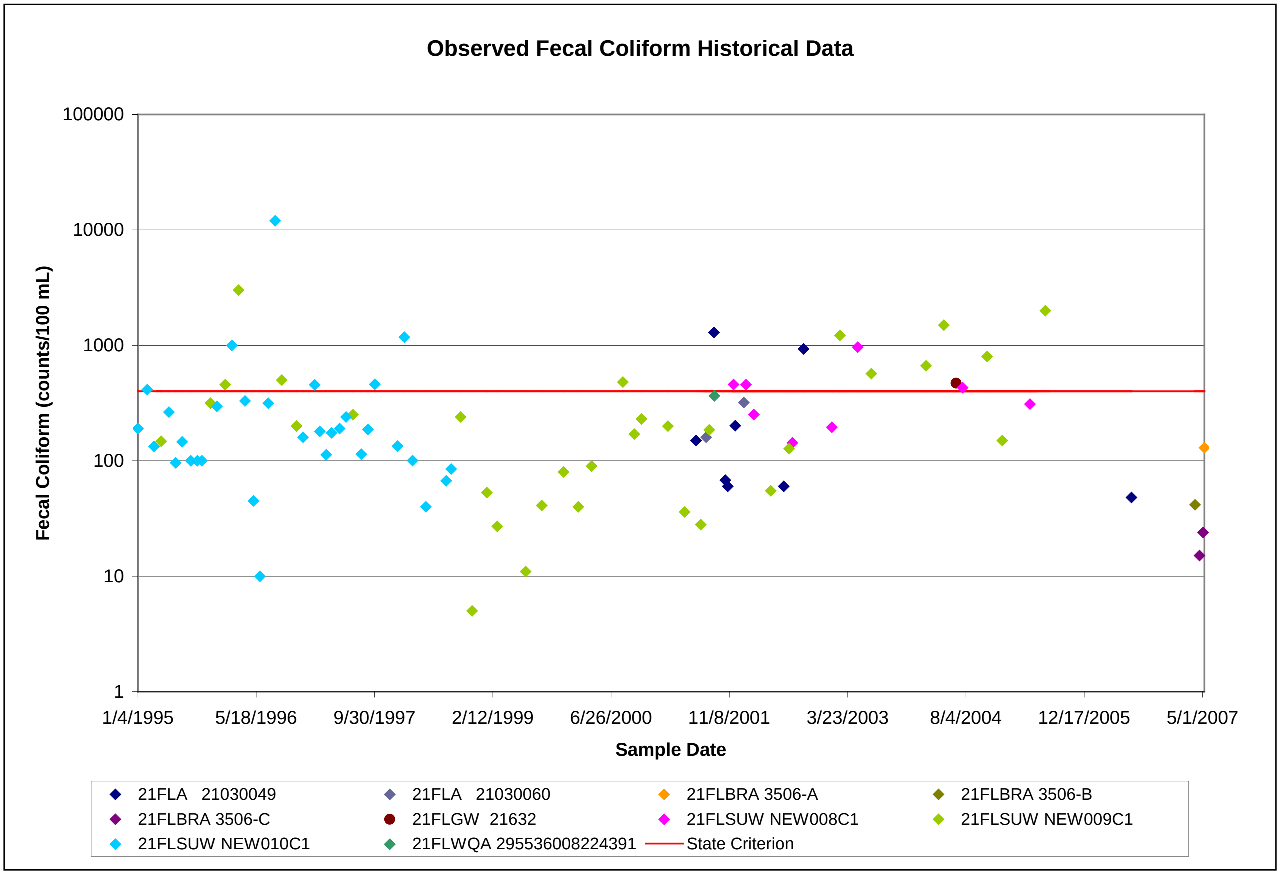
Station	STORET ID	Station Owner	Years with Data	N
New River at SR-229 near Raiford	21FLSUW NEW008C1	SRWMD	2001–05	8
SR1-SS-2132 New River	21FLGW 21632	Department	2004	1
New River near Lake Butler FL at SR-100	21FLSUW NEW009C1	SRWMD	1995–2005	32
3506 - New River - Bridge at Hwy 100	21FLBRA 3506-A	BRA	2007	1
3506 - New River - Bridge at CR-231	21FLBRA 3506-C	BRA	2007	2
New R. 200 Yds N SR 231	21FLA 21030060	Department (Northeast District)	2001–02	2
New River near Worthington Springs at C-18	21FLSUW NEW010C1	SRWMD	1995–98	32
New River at CR 18	21FLWQA 295536008224391	Department (Water Quality Assessment Section)	2001	1
New River at SR 18	21FLA 21030049	Department (Northeast District)	2001–02, 2006	8
3506 - New River - Bridge on Hwy 18	21FLBRA 3506-B	BRA	2007	1

Table 5.2. Statistical Table of Observed Historical Fecal Coliform Data, WBID 3506

Station	STORET ID	N	Minimum	Maximum	Median	Mean	Exceedances	% Exceedance
New River at SR-229 near Raiford	21FLSUW NEW008C1	8	143	965	371	401	4	50.00
SR1-SS-2132 New River	21FLGW 21632	1	470	470	470	470	1	100.00
3506 - New River - Bridge at Hwy 100	21FLBRA 3506-A	1	130	130	130	130	0	0.00
New River near Lake Butler FL at SR-100	21FLSUW NEW009C1	32	5	3,000	193	434	10	31.25
New R. 200 Yds N SR 231	21FLA 21030060	2	160	320	240	240	0	0.00
3506 - New River - Bridge at CR-231	21FLBRA 3506-C	2	15	24	20	20	0	0.00
New River at SR 18	21FLA 21030049	8	48	1,295	109	352	2	25.00
New River at CR 18	21FLWQA 295536008224391	1	365	365	365	365	0	0.00
3506 - New River - Bridge on Hwy 18	21FLBRA 3506-B	1	42	42	42	42	0	0.00
New River near Worthington Springs at C-18	21FLSUW NEW010C1	32	10	12,000	168	607	6	18.75

Coliform concentrations are counts/100mL

Figure 5.2. Historical Fecal Coliform Observations for the New River



A–5.1.2 TMDL Development Process

Determination of Flow Duration Curve

The first step in the development of load duration curves is to create *flow duration curves*. A flow duration curve displays the cumulative frequency distribution of daily flow data over the period of record. The duration curve relates flow values measured at a monitoring station to the percent of time the flow values were equalled or exceeded. Flows are ranked from low, which are exceeded nearly 100 percent of the time, to high, which are exceeded less than 1 percent of the time.

The flow duration curve was developed based on flow records from USGS Gage 02321000, located on the New River near Lake Butler, Florida (see **Figure 5.3** and **Appendix K**).

Determination of Load Duration Curve for Existing Loading

Using the flows from the flow duration curve, a load duration curve for fecal coliform (**Figure 5.4**) was calculated using the following equation:

(1) (observed flow) x (conversion factor) x (state criteria) = ([fecal coliform quantity]/day or daily load)

where:
(conversion factor) = 24468480 colony-forming units (cfu)/day, and
(state criterion) = 400 cfu/100mL.

The above equation yields the load duration curve or allowable load curve (**Figure 5.4**). Using **Equation 1** (above), a table was calculated (**Table 5.3a**), substituting the observed data for the state criterion value. Fecal coliform observations were then plotted, noting where the samples are in relation to the allowable load curve (above or below the curve). Those above the curve (**Figure 5.4**) are noted as exceedances to the state criterion and are indicated by green triangles.

Figure 5.3. Flow Duration Curve for USGS Gage 02321000 (New River near Lake Butler Fla)

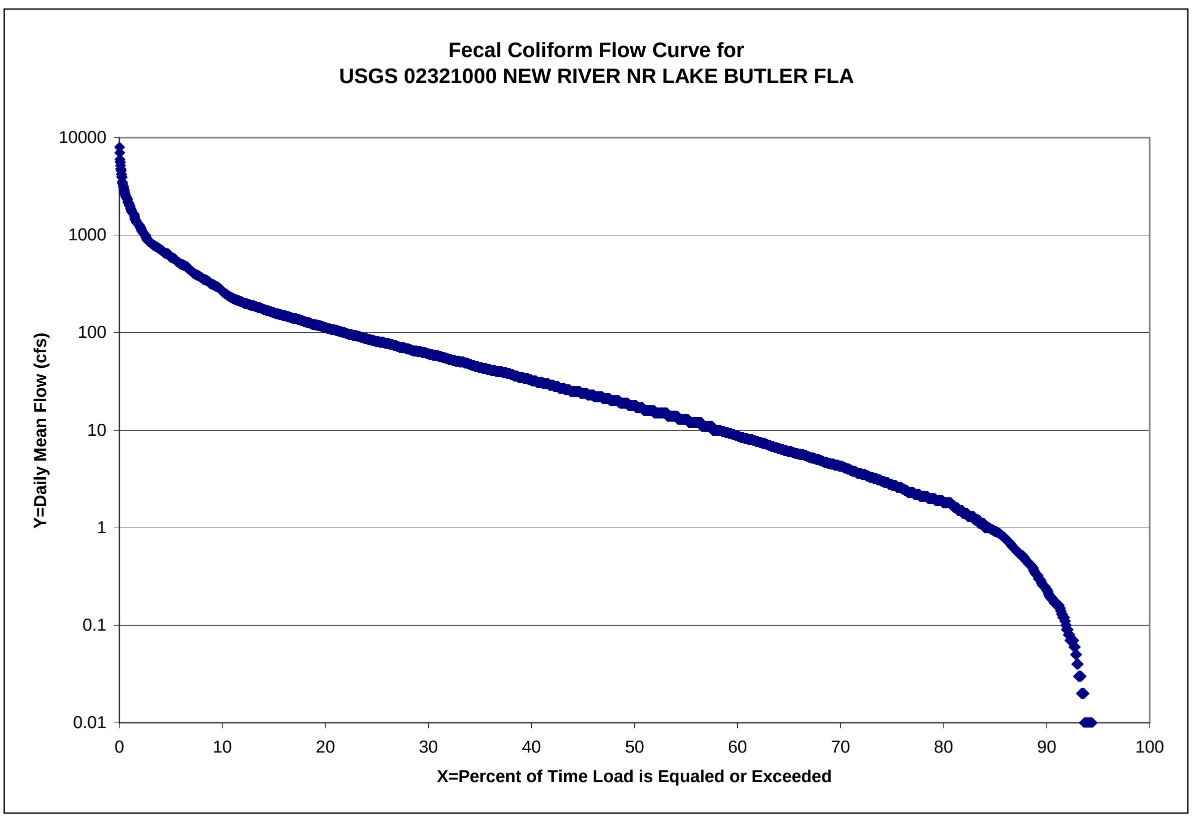


Figure 5.4. Load Duration Curve for Fecal Coliform in the New River Watershed with Line of Best-Fit (Exponential Curve) for Exceedances

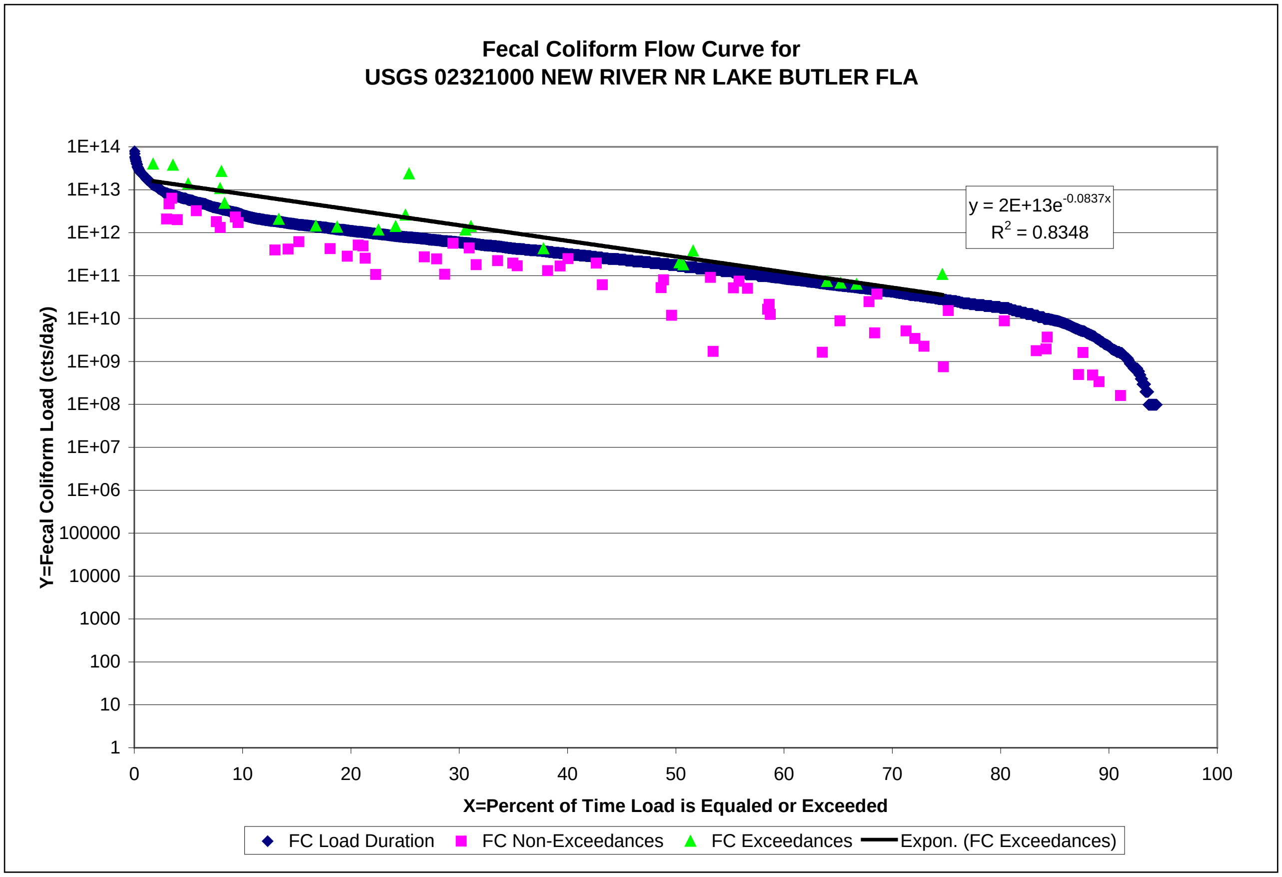
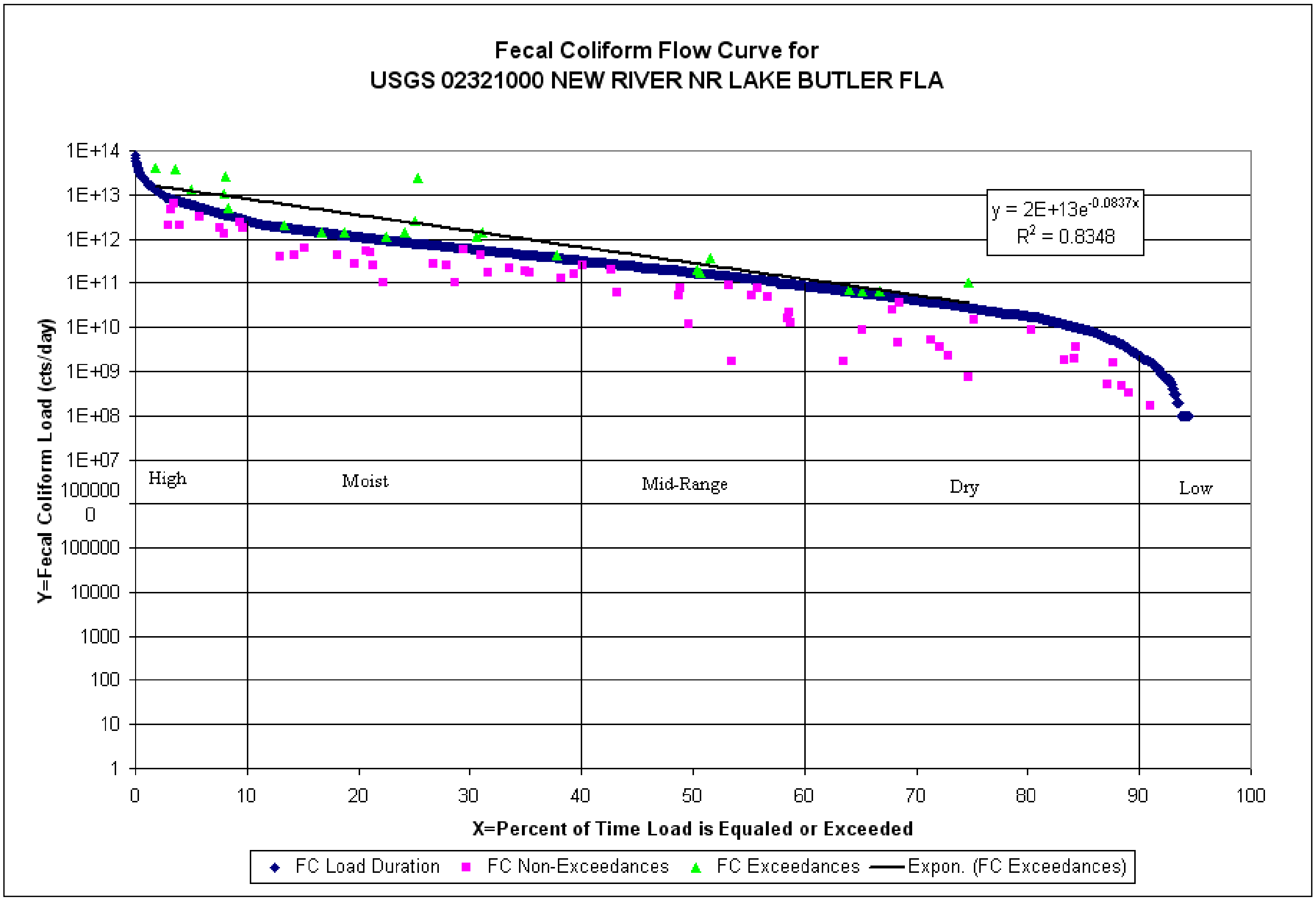


Figure 5.5. Loading Curve Showing Hydrologic Conditions for Fecal Coliform



Develop the Loading Capacity

To determine the loading capacity, a trendline of best-fit was applied through the exceedances (**Figure 5.4**). The best-fitting trend line was determined by evaluating different functions until the highest R^2 value was found. In this case, an exponential function was determined to be the best fit, and took the following form:

(2) $Y_{FC} = (2\text{ E}+13) * (e^{(-0.0837*x)})$

where:
Y_{FC} = fecal coliform load (cfu/day), and
x =% duration interval.

This function (**Equation 2**) was used to determine the predicted loads by substituting different percentile numbers (from the 10th to 90th, in increments of 5; see **Table 5.3a**, Column 1) for "x." The result yields a predicted load within each 5th percentile (**Table 5.3a**, Column 3). The "high flow" (<10th percentile flow exceedance) and "low flow" (> 90th percentile flow exceedance) hydrologic conditions were not used as critical conditions because these extreme flows are not representative of typical conditions (EPA, 2007). Furthermore, the number of observations during these flow regimes is usually too few to reliably estimate loads under these conditions.

Finally, the percent reduction in loading needed for compliance with the state criterion was calculated. This calculation involved both the allowable load and predicted loads previously computed (**Table 5.3a**). Using percentile increments of 5 (ranging from 10 to 90; see **Table 5.3a**, Column 1), the needed reduction of daily load was computed using the following formula:

$$(3)\ \frac{\text{(predicted load)} - \text{(allowable load)}}{\text{(predicted load)}} \times 100$$

The New River TMDL is then calculated as the median of the percent reductions needed over the data range where exceedances occurred, which in this case was over the entire range of flow conditions. As shown in **Table 5.3a**, the source loadings for fecal coliform discussed in Chapter 4 would need to be reduced by 45.35 percent for the New River to meet the TMDL.

Develop the Percent Reduction for the New River

The second approach, performed in conjunction with the load duration curve to determine the needed reduction in the New River watershed, was the percent reduction method. Exceedances of the state criterion were compared with the criterion of 400 counts/100mL. For each individual exceedance, an individual required reduction was calculated using the following:

$$(4)\ \frac{[\text{(observed value)} - \text{(state criterion)}] \times 100}{\text{(observed value)}}$$

After the individual results were calculated, the median of the individual values was calculated, which is 39.85 percent. This means that in order to meet the state criterion of 400 counts/100mL, a 39.85 percent reduction in current loading is necessary, and this would therefore be the TMDL for the New River. **Table 5.3b** shows the individual reduction calculations for the New River, including all exceedances, and **Table 5.4** shows annual summaries of historical data used in the calculation of the TMDL. The load duration percent reduction of 45.35 is used for this particular watershed because it is based on the watershed-specific flows and can be used as a margin of safety (MOS), since it is the more conservative value.

Table 5.3a. Table for Calculating Needed Reduction of Fecal Coliform

Fecal Coliform			
% of Days Load Exceeded	**Allowable Load (#colonies/day)**	**Predicted Load (#colonies/day)**	**Load Reduction Needed for Compliance (%)**
10	2.85792E+12	8.660E+12	67.00
15	1.52683E+12	5.699E+12	73.21
20	1.12555E+12	3.750E+12	69.98
25	7.92779E+11	2.468E+12	67.87
30	6.16606E+11	1.624E+12	62.03
35	4.20858E+11	1.068E+12	60.61
40	3.13197E+11	7.031E+11	55.45
45	2.54472E+11	4.627E+11	45.00
50	1.66386E+11	3.044E+11	45.35
55	1.17449E+11	2.003E+11	41.37
60	93958963200	1.318E+11	28.73
65	58724352000	8.675E+10	32.30
70	37192089600	5.708E+10	34.84
75	26425958400	3.756E+10	29.65
80	17617305600	2.472E+10	28.72
85	9787392000	1.626E+10	39.82
90	1565982720	1.070E+10	85.37
MEDIAN:	**1.664E+11**	**3.044E+11**	**45.35**

Table 5.3b. Calculation of Reductions for the Fecal Coliform TMDL for the New River

Sample Date	Location	Observed Value (Exceedance) (counts/mL)	Required Reduction (%)
2/13/1995	New River near Worthington Springs at C-18	414	3.38
1/8/1996	New River near Lake Butler FL at SR-100	455	12.09
2/5/1996	New River near Worthington Springs at C-18	1,000	60.00
3/4/1996	New River near Lake Butler FL at SR-100	3,000	86.67
8/6/1996	New River near Worthington Springs at C-18	12,000	96.67
9/3/1996	New River near Lake Butler FL at SR-100	500	20.00
1/20/1997	New River near Worthington Springs at C-18	455	12.09
10/1/1997	New River near Worthington Springs at C-18	460	13.04
2/3/1998	New River near Worthington Springs at C-18	1,180	66.10
8/15/2000	New River near Lake Butler FL at SR-100	480	16.67
9/4/2001	New River at SR 18	1,295	69.11
11/26/2001	New River at SR-229 near Raiford	458.5	12.76
1/17/2002	New River at SR-229 near Raiford	455	12.09
9/18/2002	New River at SR 18	933	57.13
2/18/2003	New River near Lake Butler FL at SR-100	1,220	67.21
5/5/2003	New River AT SR-229 near Raiford	965	58.55
7/1/2003	New River near Lake Butler FL at SR-100	570	29.82
2/17/2004	New River near Lake Butler FL at SR-100	665	39.85
5/3/2004	New River near Lake Butler FL at SR-100	1,500	73.33
6/24/2004	SR1-SS-2132 New River	470	14.89
7/21/2004	New River AT SR-229 near Raiford	431	7.19
11/2/2004	New River near Lake Butler FL at SR-100	800	50.00
7/6/2005	New River near Lake Butler FL at SR-100	2,000	80.00
	MEDIAN:	**665**	**39.85**

Table 5.4. Annual Summary of Historical Observed Fecal Coliform Data in the New River

Year	N	Minimum	Maximum	Median	Mean
1995	12	96	414	147	192
1996	11	10	12,000	330	1,638
1997	10	113	460	189	236
1998	8	5	1,180	93	231
1999	5	11	80	41	42
2000	5	40	480	170	202
2001	12	28	1,295	173	267
2002	8	55	933	198	293
2003	4	195	1,220	768	738
2004	5	431	1,500	665	773
2005	3	150	2,000	310	820
2006	1	48	48	48	48
2007	4	15	130	33	53

Coliform counts are #/100mL and represent years for which data exist.

A–5.1.3 Critical Conditions/Seasonality

The critical condition for coliform loadings in a given watershed depends on many factors, including the presence of point sources and the land use pattern in the watershed. Typically, the critical condition for nonpoint sources is an extended dry period followed by a rainfall runoff event. During the wet weather period, rainfall washes off coliform bacteria that have built up on the land surface under dry conditions, resulting in the wet weather exceedances. However, significant nonpoint source contributions can also appear under dry conditions without any major surface runoff event. This usually happens when nonpoint sources contaminate the surficial aquifer, and fecal coliform bacteria are brought into the receiving waters through baseflow. In addition, as described above, livestock that have direct access to the receiving water can also contribute to the exceedance during dry weather. The critical condition for point source loading typically occurs during periods of low stream flow, when dilution is minimized.

As **Figure 5.5** shows, the “High” and “Moist” flow regimes have the highest occurrence of exceedances in the New River watershed, with the period of low flow having no exceedances at all. **Table 5.5** displays a summary of fecal coliform data by hydrologic condition, showing the extreme and medium precipitation events to correspond with the most exceedances. Because agriculture (in particular, land with cattle) is one of the main types of land use and a probable source of fecal coliform in the watershed, it is likely that many of the exceedances in each of the flow intervals are from nonpoint sources entering the water through surface water runoff.

Table 5.5. Summary of Fecal Coliform Data by Hydrologic Condition

Precipitation Event	Event Range	Total Samples	Number of Exceedances	% Exceedance	Number of Nonexceedances	% Nonexceedance
Extreme	>2.1"	4	2	50.00	2	50.00
Large	1.33" - 2.1"	0	0	0.00	0	0.00
Medium	0.18" - 1.33"	16	8	50.00	8	50.00
Small	0.01" - 0.18"	8	1	12.50	7	87.50
None/ No Measurable	<0.01"	17	3	17.65	14	82.35

The fecal coliform loads increase slightly with increased flow, possibly indicating that there are additional exceedances during higher flow conditions, caused by fecal coliform built up on the land during dry periods being washed into local waters by rain. Critical conditions are accounted for in the load curve analysis by using the flow records and water quality data available in the 10^{th} to 90^{th} percentile flow duration interval.

Kruskall–Wallis tests were used to analyze significance between fecal coliform and month and season. There was no significance found between fecal coliform and month or season for the New River watershed (**Appendices C** and **D**) at the 0.05 alpha (α) level. Exceedances occurred in all seasons in which data exist and across all months, except for April and December. **Appendix E** presents comparisons by station and season. **Appendix B** provides historical fecal coliform observations for the New River. Coliform data are presented by month, season, and year to determine whether certain patterns are evident in the dataset.

A factor that could contribute to monthly or seasonal differences is the pattern of rainfall. Rainfall records for Bradford and Union Counties (**Appendix F** illustrates rainfall from 1999 to 2008) were used to determine rainfall amounts associated with individual sampling dates. Rainfall recorded on the day of sampling (1D), the cumulative total for the day of and the previous 2 days (3D), the cumulative total for the day of and the previous 6 days (7D), and the cumulative total for the day of sampling and 29 days prior (30D) were all paired with the respective coliform observation based on date.

A Spearman Correlation matrix was generated that summarized the simple correlation coefficients between the various rainfall and coliform values (**Appendix G**). The simple correlations (r values in the Spearman Correlation table) between both fecal coliform and the various rainfall totals were all positive. This suggests that as rainfall (and possible runoff) increased, so did the number of coliform observed in the river.

Simple linear regressions were performed between coliform observations and rainfall totals to determine whether any of the relationships were significant at an α level of 0.05. Only the r^2 value between fecal coliform and the cumulative total for the day of and the previous 6 days of rainfall was significant (see **Appendix H**). This significance could be due to the size of the watershed and the possibility of some delay between rainfall and the time it takes to flow through the system. Once the rainfall that occurred thoroughly flows through the system, there is a significant relationship with the fecal coliform present.

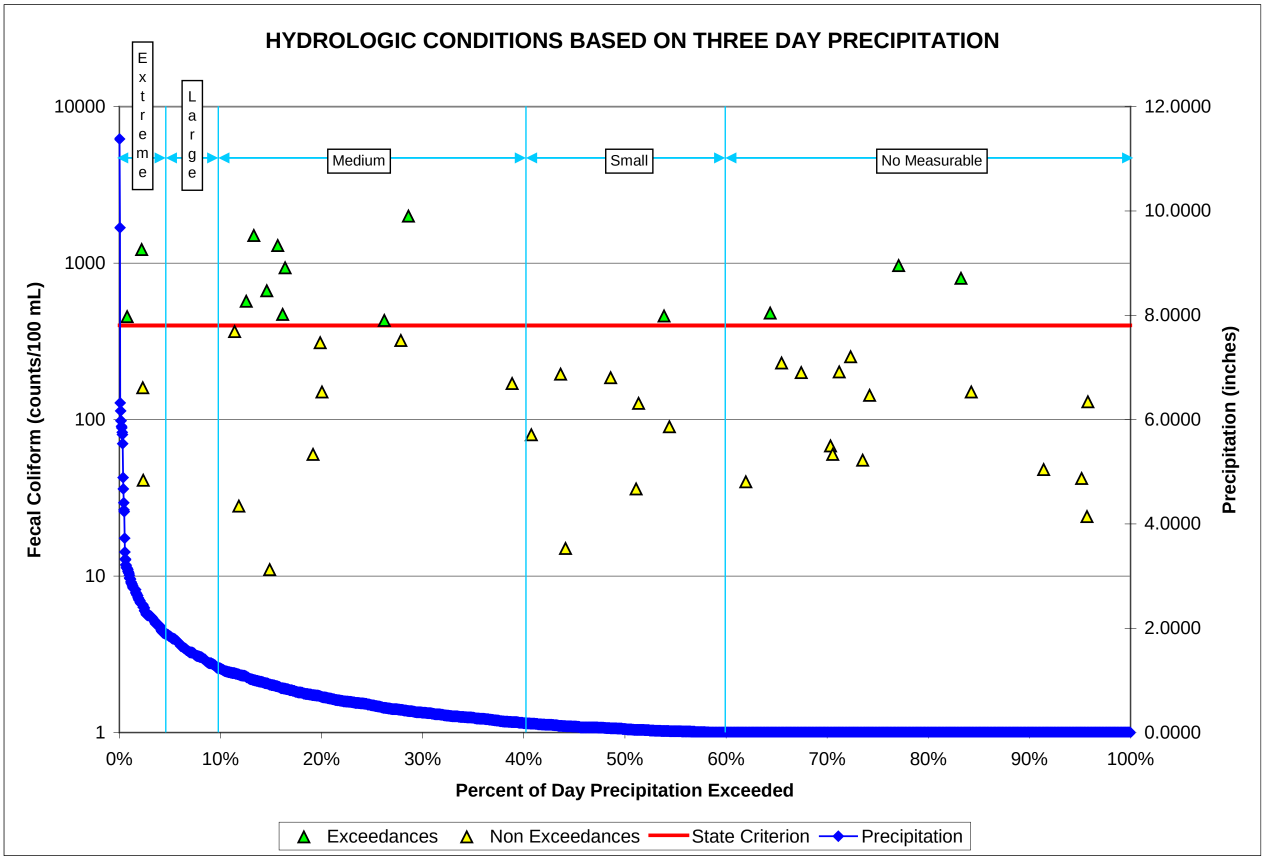
A table of historical monthly average rainfall from 1999 to 2008 (**Appendix I**) indicates that monthly rainfall totals fluctuate from month to month but peak in June and return to a fairly regular level by October. **Appendix J** provides a graph of annual rainfall from 1999 to the beginning of 2008 versus the long-term average (47.64 inches) over this period. The years from 2002 to 2005 represented above-average rainfall years, while all other years remained below average. Data exceedances occur almost all of the time, making it difficult to correlate them to rainfall patterns.

Even though current flow data were available, hydrologic conditions were analyzed using rainfall. A loading curve type chart, which would normally be applied to flow events, was created using precipitation data from the **CL**imate **I**nformation for **M**anagement and **O**perational **D**ecisions (CLIMOD) Website (2008), from May 12, 1999, to March 10, 2008. The chart was divided in the same manner as if flow were being analyzed, where extreme precipitation events represent the upper percentiles (0 - 5^{th} percentile), followed by large precipitation events (5^{th}–10^{th} percentile), medium precipitation events (10^{th}–40^{th} percentile), small precipitation events (40^{th}–60^{th} percentile), and no recordable precipitation events (60^{th}–100^{th} percentile). The analysis used 3-day (day of and 2 days prior to sampling) precipitation accumulations (**Figure 5.6**). **Table 5.5** summarizes the data by hydrologic conditions; **Figure 5.6** shows the same data visually.

The data show that fecal coliform exceedances occurred over all hydrologic conditions for which data exist, except during a large rainfall event (for which there were no samples). Extreme and medium rainfall events have a 50 percent exceedance rate. There were only 4 samples collected within 3 days of an extreme precipitation event and none within 3 days of a large precipitation event.

If a high percentage of exceedances occurs after large and extreme precipitation events, this can indicate that exceedances are nonpoint source driven, perhaps from stormwater conveyance systems or various land uses. However, it is difficult to draw conclusions with so few samples representing these precipitation events. There is only one permitted point source in WBID 3506. Impacts from upstream point sources (i.e., wastewater and solid waste facilities in WBIDs 3506B, 3506A, and tributaries) should be of minimal concern and would likely need a rainfall event to reach the watershed. It would be necessary to collect more samples during extreme and large precipitation events to pinpoint the most likely source (point or nonpoint) of coliform in the watershed. Overall, with the data provided, fecal coliform exceedances increase with increased precipitation and flow, suggesting that nonpoint sources are the main contributor to fecal coliform loads in the New River watershed.

Figure 5.6. Fecal Coliform Data by Hydrological Condition Based on Rainfall



Part B: Dissolved Oxygen

B–5.1 Determination of DO Loading Capacity

The verified DO impairment in the New River was linked to TN. As part of the ongoing effort to develop numeric nutrient criteria for Florida streams, the Department has used a reference approach that considers bioregions (Department, 2007). Annual geometric means of TN and TP are calculated for WBIDs based on a minimum of 4 samples per year. In the document referenced above (Department, 2007), additional verification procedures were followed that supported the use of a 90th percentile from the reference sample dataset. In the absence of this additional verification, the EPA guidance documents support the use of a 75th percentile of the reference sample dataset.

The New River is within the Northeast bioregion. The Department has compiled a distribution of potential reference WBIDs but has not completed the additional verification process to set a target at the 90th versus the 75th percentile. Consequently, the 75th percentiles for TN and TP are being used in this TMDL. The annual targets for TN and TP are 1.3 and 0.13 mg/L, respectively.

Annual geometric mean concentrations based on nitrogen and phosphorus measurements from WBIDs 3506, 3506A, and 3506B from January 1995 to December 2006 were calculated. Geometric means were compared with the target concentrations, and a percent reduction method was used to determine whether reductions were necessary. **Tables 5.3a, 5.3b, 5.4,** and **5.5** present geometric means and reductions.

B–5.1.1 Data Used in the Determination of the TMDL

Three sampling stations in WBID 3506A have historical DO observations. From upstream to downstream, they are as follows: 3506A - New River - Bridge on Highway 16 (21FLBRA 3506A-A), New River at State Road 16 (21FLA 21030120), and SR1-SS-2074 New River (21FLGW 21628) (**Figure 5.7**). The Department was the primary historical data collector, with BRA collecting all of the samples in 2007.

There are two historical DO sampling stations in WBID 3506B. It was mostly sampled by the SRWMD but also by the Department (**Table 5.7c**). DO was sampled at 13 stations in WBID 3506. From upstream to downstream, they are as follows: New River at State Road 229 near Raiford (21FLSUW NEW008C1), New River downstream of CR229 (WBID 3506) (21FLWQXPBRA244LR), New River at SR 100 (21FLA 21030053), 3506 – New River - Bridge at Highway 100 (21FLBRA 3506-A), New River near Lake Butler Florida at State Road 100 (21FLSUW NEW009C1), New River at SR 100 (21FLWQA 295954108216263), New River at State Road 18 (21FLA 21030049), New River near Worthington Springs at C-18 (21FLSUW NEW010C1), New River at Country Road 18 (21FLWQA 295536008224391), 3506 – New River – at Bridge on Highway 18 (21FLBRA 3506-B), New River 200 yards North of State Road 231 (21FLA 21030060), 3506 - New River – Bridge at Country Road 231 (21FLBRA 3506-C), and SR1-SS-2132 New River (21FLGW 21632). **Tables 5.6a** through **5.6c** provide statistical information for the DO sampling at each of these sites. **Figure 5.7** shows the locations of the sample sites.

Table 5.6a. DO Sampling Station Summary, WBID 3506

Station	STORET ID	Station Owner	Years with Data	N
New River at SR-229 near Raiford	21FLSUW NEW008C1	SRWMD	2001–07	33
New River Downstream of CR229 (WBID 3506)	21FLWQSPBRA244LR	Department	2005	4
New River @ SR 100	21FLA 21030053	Department	2003	4
3506 - New River - Bridge at Hwy 100	21FLBRA 3506-A	BRA	2007	3
New River near Lake Butler FL at SR-100	21FLSUW NEW009C1	SRWMD	1995–2007	71
New River at SR 100	21FLWQA 295954108216263	Department	2001	1
New River at SR 18	21FLA 21030049	Department	1999, 2001–03, 2005–06	26
New River near Worthington Springs at C-18	21FLSUW NEW010C1	SRWMD	1995–98	39
New River at CR 18	21FLWQA 295536008224391	Department	2001	1
3506 - New River - Bridge on Hwy 18	21FLBRA 3506-B	BRA	2007	1
New R. 200 Yds N SR 231	21FLA 21030060	Department	2001–06	18
3506 - New River - Bridge at CR-231	21FLBRA 3506-C	BRA	2007	3
SR1-SS-2132 New River	21FLGW 21632	Department	2004	1

Table 5.6b. DO Sampling Station Summary, WBID 3506A

Station	STORET ID	Station Owner	Years with Data	N
3506A - New River - Bridge on Hwy 16	21FLBRA 3506A-A	BRA	2007	7
New River @ SR 16	21FLA 21030120	Department/ Department (Northeast District)	2001, 2003, 2006	18
SR1-SS-2074 New River	21FLGW 21628	Department	2004	1

Table 5.6c. DO Sampling Station Summary, WBID 3506B

Station	STORET ID	Station Owner	Years with Data	N
New River at SR-125	21FLSUW NEW007C1	SRWMD	1995–98, 2001–07	55
New River at SR-125	21FLA 21030082	Department/ Department (Northeast District)	2003, 2005, 2006	19

Table 5.7a. Statistical Table of Observed Historical DO Data, WBID 3506

Station	STORET ID	N	Minimum	Maximum	Median	Mean	Exceedances	% Exceedance
New River at SR-229 near Raiford	21FLSUW NEW008C1	26	5	10.7	6.95	7.26	0	0.00
New River Downstream of CR229 (WBID 3506)	21FLWQSPBRA244LR	4	5.01	7.54	5.76	6.02	0	0.00
New River @ SR 100	21FLA 21030053	4	5.8	7.7	7.08	6.91	0	0.00
3506 - New River - Bridge at Hwy 100	21FLBRA 3506-A	3	1.58	4.29	2.94	2.94	3	100.00
New River near Lake Butler FL at SR-100	21FLSUW NEW009C1	71	1.98	11.4	5.6	5.94	22	30.99
New River at SR 100	21FLWQA 295954108216263	1	4.79	4.79	4.79	4.79	1	100.00
New River at SR 18	21FLA 21030049	26	5	10.7	6.95	7.26	0	0.00
New River near Worthington Springs at C-18	21FLSUW NEW010C1	39	4.7	10.9	6.2	6.51	4	10.26
New River at CR 18	21FLWQA 295536008224391	1	5.42	5.42	5.42	5.42	0	0.00
3506 - New River - bridge on Hwy 18	21FLBRA 3506-B	1	6.63	6.63	6.63	6.63	0	0.00
New R. 200 Yds N SR 231	21FLA 21030060	18	4.6	10.4	6.2	6.89	2	11.11
3506 - New River - Bridge at CR-231	21FLBRA 3506-C	3	8.48	10.3	9.94	9.58	0	0.00
SR1-SS-2132 New River	21FLGW 21632	1	4.12	4.12	4.12	4.12	1	100.00

DO units are mg/L.

Table 5.7b. Statistical Table of Observed Historical DO Data, WBID 3506A

Station	STORET ID	N	Minimum	Maximum	Median	Mean	Exceedances	% Exceedance
3506A - New River - Bridge on Hwy 16	21FLBRA 3506A-A	7	0.80	6.1	3.76	3.81	5	71.43
New River @ SR 16	21FLA 21030120	18	2.8	9.7	6.35	6.14	6	33.33
SR1-SS-2074 New River	21FLGW 21628	1	1.20	1.2	1.21	1.21	1	100.00

DO units are mg/L.

Table 5.7c. Statistical Table of Observed Historical DO Data, WBID 3506B

Station	STORET ID	N	Minimum	Maximum	Median	Mean	Exceedances	% Exceedance
New River at SR-125	21FLSUW NEW007C1	32	0.6	11.3	5.7	5.8	25	78.13
New River at SR-125	21FLA 21030082	19	1.9	9.1	5.1	5.4	6	31.58

DO units are mg/L.

Figure 5.7. Historical DO Sample Sites in the New River Watershed

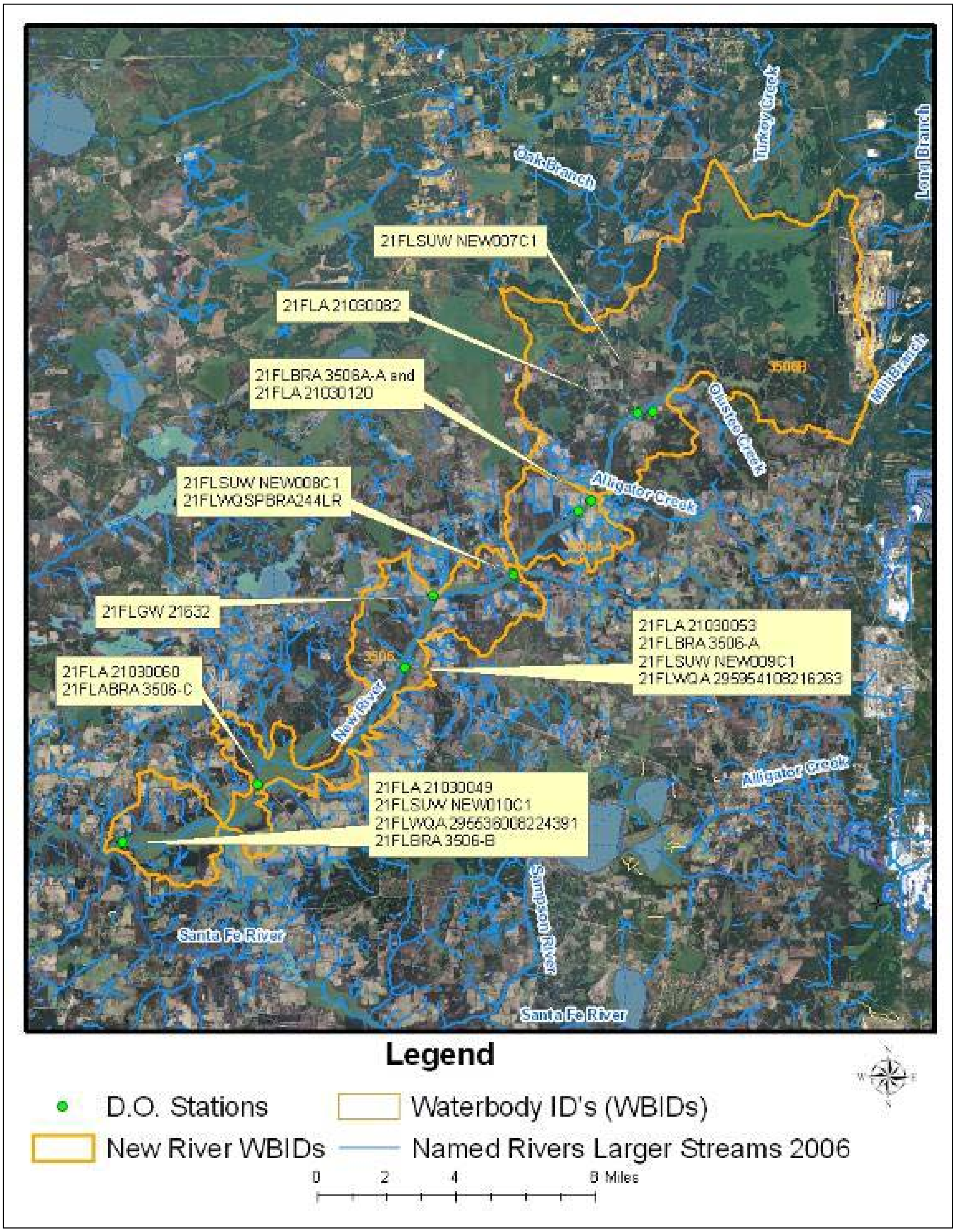


Table 5.8. Annual Geometric TN and TP Means for the New River Watershed, WBIDs 3506, 3506A, and 3506B, 1995–2006

Year	WBID 3506		WBID 3506A		WBID 3506B	
	TN (mg/L)	TP (mg/L)	TN (mg/L)	TP (mg/L)	TN (mg/L)	TP (mg/L)
1995	1.374	0.243			1.289	0.008
1996	1.352	0.270			1.362	0.038
1997	1.281	0.301			1.254	0.016
1998	0.932	0.150			0.856	0.020
1999	0.623	0.210				
2000	1.033	0.213				
2001	1.489	0.212				
2002	1.442	0.175			2.705	0.050
2003	1.741	0.182			2.326	0.078
2004	1.737	0.156			2.711	0.085
2005	1.649	0.083			1.923	0.040
2006	0.943	0.147	0.696	0.050	1.461	0.057

Table 5.9. TN Percent Reduction Calculation for the New River Watershed, WBIDs 3506 and 3506B, 1995–2006

Year	WBID 3506		WBID 3506B	
	TN (mg/L)	% Reduction	TN (mg/L)	% Reduction
1995	1.374	5.42%		
1996	1.352	3.86%	1.362	4.55%
1997				
1998				
1999				
2000				
2001	1.489	12.70%		
2002	1.442	9.86%	2.705	51.94%
2003	1.741	25.32%	2.326	44.12%
2004	1.737	25.14%	2.711	52.04%
2005	1.649	21.18%	1.923	32.38%
2006			1.461	11.05%
	MEDIAN:	**12.70%**		**38.25%**

Table 5.10. TP Percent Reduction Calculation for the New River Watershed, WBID 3506, 1995–2006

Year	WBID 3506	
	TP (mg/L)	**% Reduction**
1995	0.243	46.52%
1996	0.270	51.82%
1997	0.301	56.83%
1998	0.150	13.59%
1999	0.210	38.15%
2000	0.213	39.03%
2001	0.212	38.81%
2002	0.175	25.82%
2003	0.182	28.77%
2004	0.156	16.47%
2006	0.147	11.48%
	MEDIAN:	**38.15%**

B–5.1.2 Critical Conditions/Seasonality

Generally, the peaks in DO exceedances found in the New River watershed follow the peaks in rainfall. As seen in **Tables 2.2b** through **2.2d**, all three segments of the river rise in exceedances from winter to summer and then drop in exceedances in fall. This directly corresponds to the peak in rainfall in summer which then drops again in the fall. For 2004, 2005, and 2006, all three segments of the river have corresponding increasing and decreasing exceedance rates (**Tables 2.3b** through **2.3d**). Both WBIDs 3506A and 3506B also maintain exceedance rates of 50 percent or above for 2006 and 2007.

The annual geometric TN and TP means for the entire New River watershed, from 1995 to 2006, are displayed in **Table 5.8**. The percent reduction in TN calculated for WBID 3506 is 13 percent and is 38 percent for WBID 2506B (**Table 5.9**). WBID 3506 also has a 38 percent reduction in TP (**Table 5.10**). Reductions in TN and TP are expected to reduce any pollutant impacts to DO in these segments of the New River. Achieving the reference-based approach nutrient targets in the New River is expected to improve both the DO and biological conditions in the river.

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:

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

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

$$\textbf{TMDL} \cong \sum \textbf{WLAs}_{\textbf{wastewater}} + \sum \textbf{WLAs}_{\textbf{NPDES Stormwater}} + \sum \textbf{LAs} + \textbf{MOS}$$

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**. TMDLs for the New River are expressed in terms of counts/100mL, and represent the maximum daily fecal coliform load the creek can assimilate and maintain the fecal coliform criterion (**Table 6.1**). Also, TMDLs for the New River watershed are expressed in terms of a percent reduction in TN (WBID 3506B and 3506) and TP (WBID 3506), to meet the DO criterion (**Table 6.2**).

Table 6.1. Fecal Coliform TMDL Components for the New River

WBID	Parameter	TMDL (colonies/ 100mL)	WLA		LA (% Reduction)	MOS
			Wastewater (colonies/day)	NPDES Stormwater		
3506	Fecal Coliform	400	N/A	N/A	45%	Implicit

N/A – Not applicable

Table 6.2. TN and TP TMDL Components for the New River

WBID	Parameter	TMDL (% Reduction)	WLA		LA (% Reduction)	MOS
			Wastewater (mg/L/yr)	NPDES Stormwater		
3506B	TN	38%	N/A	N/A	38%	Implicit
3506	TN	13%	N/A	N/A	13%	Implicit
3506	TP	38%	N/A	N/A	38%	Implicit

N/A – Not applicable

6.2 Load Allocation

For WBID 3506, the fecal coliform reduction of 45 percent is required from nonpoint sources. To increase the DO in the river, the uppermost segment, WBID 3506B, must have a TN reduction of 38 percent from nonpoint sources. For WBID 3506, the TN reduction of 13 percent and the TP reduction of 38 percent are required from nonpoint sources. By achieving the reductions in WBID 3506B, which is upstream of WBID 3506A, we believe it will address any anthropogenic impacts in WBID 3506A. It should be noted that the load allocation includes loading from stormwater discharges that are not part of the NPDES Stormwater Program.

6.3 Wasteload Allocation

6.3.1 NPDES Wastewater Discharges

There are no facilities permitted to discharge wastewater to surface waters in WBID 3506. Any future discharge permits issued in the watershed will be required to meet the state Class III criterion for fecal coliform as well as the TMDL value, and therefore will not be allowed to exceed 200 counts/100mL as a monthly average, 400 counts/100mL in more than 10 percent of the samples, or 800 counts/100mL at any given time.

6.3.2 NPDES Stormwater Discharges

There is no NPDES MS4 permit covering the New River watershed.

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 this TMDL. An MOS was included in the TMDL by not allowing any exceedances of the state criterion, even though the actual criterion allows for 10 percent exceedances over the fecal coliform criterion of 400 counts/100mL. In addition, the more conservative percent reduction determined from the load duration method was used.

Chapter 7: NEXT STEPS: IMPLEMENTATION PLAN DEVELOPMENT AND BEYOND

7.1 Basin Management Action Plan

Following the adoption of this TMDL by rule, the next step in the TMDL process is to develop an implementation plan for the TMDL that will be a component of the BMAP for the New River. This document will be developed over the next year in cooperation with local stakeholders and will attempt to reach consensus on more detailed allocations and on how load reductions will be accomplished. The BMAP will include the following:

- *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 agreement;*
- *Local ordinances defining actions to be taken or prohibited;*
- *Local water quality standards, permits, or load limitation agreements; and*
- *Monitoring and follow-up measures.*

As **Table 4.7** shows, cattle, pets, and septic tanks could be significant contributors of fecal coliform to the river. If livestock and pet owners are educated on the potential impacts their animals are having on the New River, and they are inclined to take action, this could potentially decrease a source load.

Table 2.3 shows that in the last years of the verified period, exceedances declined to zero. Perhaps local government has already implemented changes that are reflected in the data. The BMAP should recognize implementation measures that reduce stormwater impacts to both water quantity and water quality in the New River watershed. An element of the BMAP should be the additional monitoring of fecal coliform to better refine the potential source estimates presented in Chapter 4, as well the effectiveness of specific actions to reduce those loads.

The land use tables (**Tables 4.1a** through **4.1c**) for the New River watershed show that a large portion of the three WBIDs is dedicated to agriculture. Whether land use consists of pastureland with fertilized grass for cows to eat or fertilized cropland, the nitrogen and phosphorous found in fertilizers can become surface water runoff during a rain event. As shown in **Tables 2.1b** through **2.1d**, **2.2b** through **2.2d**, and **2.3b** through **2.3d**, DO exceedances correspond to higher precipitation periods. The likely cause of low DO in the New River is nutrient additions from fertilizers and animal waste, washed into the water by rainfall.

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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. In 1994, the Department's stormwater treatment requirements were integrated with the stormwater flood control requirements of the state's water management districts, along with wetland protection requirements, into the Environmental Resource Permit regulations

Rule 62-40, F.A.C., also requires the 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.

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. The EPA promulgated regulations and began implementing the Phase I NPDES stormwater program in 1990. 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 FDOT throughout the 15 counties meeting the population criteria. The EPA authorized the Department to implement the NPDES Stormwater Program (except for Indian lands) in October 2000.

An important difference between the federal and the state's stormwater/environmental resource permitting programs is that the NPDES Program covers both new and existing discharges, while the state's program focuses on new discharges only. Additionally, Phase II of the NPDES Program, implemented in 2003, expands the need for these permits to construction sites between 1 and 5 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 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. It should be noted that all MS4 permits issued in Florida include a reopener clause that allows permit revisions to implement TMDLs when the implementation plan is formally adopted.

Appendix B: Historical Fecal Coliform Observations in the New River, 1995–2007

Waterbody	WBID	Sample Date	Station	Location	Value (#/100mL)	Remark Code
New River	3506	1/4/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	180	L
New River	3506	1/4/1995	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	200	
New River	3506	1/4/1995	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	200	
New River	3506	2/13/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	414	
New River	3506	2/13/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	414	
New River	3506	3/13/1995	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	120	
New River	3506	3/13/1995	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	120	
New River	3506	3/13/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	147	
New River	3506	3/13/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	147	
New River	3506	4/12/1995	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	77	L
New River	3506	4/12/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	219	L
New River	3506	5/15/1995	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	34	
New River	3506	5/15/1995	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	34	
New River	3506	5/15/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	495	L
New River	3506	6/12/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	96	
New River	3506	6/12/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	96	
New River	3506	7/10/1995	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	12	
New River	3506	7/10/1995	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	12	
New River	3506	7/10/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	280	
New River	3506	7/10/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	280	
New River	3506	8/15/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	100	U
New River	3506	8/15/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	100	K
New River	3506	9/12/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	100	
New River	3506	9/12/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	100	
New River	3506	10/2/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	100	
New River	3506	10/2/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	100	
New River	3506	11/6/1995	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	128	
New River	3506	11/6/1995	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	128	
New River	3506	11/6/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	504	
New River	3506	11/6/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	504	L
New River	3506	12/4/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	296	
New River	3506	12/4/1995	21FLSUW NEW010C1	New River near Worthington Springs at C-18	296	
New River	3506	1/8/1996	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	200	
New River	3506	1/8/1996	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	200	
New River	3506	1/8/1996	21FLSUW NEW010C1	New River near Worthington Springs at C-18	710	
New River	3506	1/8/1996	21FLSUW NEW010C1	New River near Worthington Springs at C-18	710	
New River	3506	2/5/1996	21FLSUW NEW010C1	New River near Worthington Springs at C-18	1,000	
New River	3506	2/5/1996	21FLSUW NEW010C1	New River near Worthington Springs at C-18	1,000	
New River	3506	3/4/1996	21FLSUW NEW010C1	New River near Worthington Springs at C-18	1,400	
New River	3506	3/4/1996	21FLSUW NEW010C1	New River near Worthington Springs at C-18	1,400	
New River	3506	3/4/1996	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	4,600	
New River	3506	3/4/1996	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	4,600	

Appendix B: Historical Fecal Coliform Observations in the New River, 1995–2007 (continued)

Waterbody	WBID	Sample Date	Station	Location	Value (#/100mL)	Remark Code
New River	3506	4/1/1996	21FLSUW NEW010C1	New River near Worthington Springs at C-18	330	
New River	3506	4/1/1996	21FLSUW NEW010C1	New River near Worthington Springs at C-18	330	
New River	3506	5/6/1996	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	30	
New River	3506	5/6/1996	21FLSUW NEW010C1	New River near Worthington Springs at C-18	60	
New River	3506	6/3/1996	21FLSUW NEW010C1	New River near Worthington Springs at C-18	10	
New River	3506	6/3/1996	21FLSUW NEW010C1	New River near Worthington Springs at C-18	10	
New River	3506	7/8/1996	21FLSUW NEW010C1	New River near Worthington Springs at C-18	230	
New River	3506	7/8/1996	21FLSUW NEW010C1	New River near Worthington Springs at C-18	230	
New River	3506	7/8/1996	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	400	
New River	3506	7/8/1996	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	400	
New River	3506	8/6/1996	21FLSUW NEW010C1	New River near Worthington Springs at C-18	12,000	
New River	3506	8/6/1996	21FLSUW NEW010C1	New River near Worthington Springs at C-18	12,000	
New River	3506	9/3/1996	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	500	
New River	3506	9/3/1996	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	500	
New River	3506	11/4/1996	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	200	Q
New River	3506	11/4/1996	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	200	
New River	3506	11/4/1996	21FLSUW NEW010C1	New River near Worthington Springs at C-18	200	
New River	3506	11/4/1996	21FLSUW NEW010C1	New River near Worthington Springs at C-18	200	Q
New River	3506	12/2/1996	21FLSUW NEW010C1	New River near Worthington Springs at C-18	160	
New River	3506	12/2/1996	21FLSUW NEW010C1	New River near Worthington Springs at C-18	160	
New River	3506	1/20/1997	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	230	
New River	3506	1/20/1997	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	230	
New River	3506	1/20/1997	21FLSUW NEW010C1	New River near Worthington Springs at C-18	680	
New River	3506	1/20/1997	21FLSUW NEW010C1	New River near Worthington Springs at C-18	680	
New River	3506	2/10/1997	21FLSUW NEW010C1	New River near Worthington Springs at C-18	180	
New River	3506	3/10/1997	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	85	B
New River	3506	3/10/1997	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	85	
New River	3506	3/10/1997	21FLSUW NEW010C1	New River near Worthington Springs at C-18	140	B
New River	3506	3/10/1997	21FLSUW NEW010C1	New River near Worthington Springs at C-18	140	
New River	3506	4/1/1997	21FLSUW NEW010C1	New River near Worthington Springs at C-18	175	
New River	3506	4/1/1997	21FLSUW NEW010C1	New River near Worthington Springs at C-18	175	
New River	3506	5/5/1997	21FLSUW NEW010C1	New River near Worthington Springs at C-18	180	
New River	3506	5/5/1997	21FLSUW NEW010C1	New River near Worthington Springs at C-18	180	
New River	3506	5/5/1997	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	200	
New River	3506	5/5/1997	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	200	
New River	3506	6/2/1997	21FLSUW NEW010C1	New River near Worthington Springs at C-18	240	
New River	3506	7/1/1997	21FLSUW NEW010C1	New River near Worthington Springs at C-18	200	
New River	3506	7/1/1997	21FLSUW NEW010C1	New River near Worthington Springs at C-18	200	
New River	3506	7/1/1997	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	300	
New River	3506	7/1/1997	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	300	
New River	3506	8/5/1997	21FLSUW NEW010C1	New River near Worthington Springs at C-18	114	

Appendix B: Historical Fecal Coliform Observations in the New River, 1995–2007 (continued)

Waterbody	WBID	Sample Date	Station	Location	Value (#/100mL)	Remark Code
New River	3506	8/5/1997	21FLSUW NEW010C1	New River near Worthington Springs at C-18	114	
New River	3506	9/2/1997	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	54	
New River	3506	9/2/1997	21FLSUW NEW010C1	New River near Worthington Springs at C-18	320	
New River	3506	10/1/1997	21FLSUW NEW010C1	New River near Worthington Springs at C-18	460	
New River	3506	10/1/1997	21FLSUW NEW010C1	New River near Worthington Springs at C-18	460	
New River	3506	1/6/1998	21FLSUW NEW010C1	New River near Worthington Springs at C-18	110	
New River	3506	1/6/1998	21FLSUW NEW010C1	New River near Worthington Springs at C-18	110	
New River	3506	1/6/1998	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	158	
New River	3506	1/6/1998	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	158	
New River	3506	2/3/1998	21FLSUW NEW010C1	New River near Worthington Springs at C-18	220	
New River	3506	2/3/1998	21FLSUW NEW010C1	New River near Worthington Springs at C-18	220	
New River	3506	2/3/1998	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	2,140	B
New River	3506	2/3/1998	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	2,140	
New River	3506	3/10/1998	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	10	Z
New River	3506	3/10/1998	21FLSUW NEW010C1	New River near Worthington Springs at C-18	191	
New River	3506	3/10/1998	21FLSUW NEW010C1	New River near Worthington Springs at C-18	191	
New River	3506	5/5/1998	21FLSUW NEW010C1	New River near Worthington Springs at C-18	34	
New River	3506	5/5/1998	21FLSUW NEW010C1	New River near Worthington Springs at C-18	34	
New River	3506	5/5/1998	21FLSUW NEW010C1	New River near Worthington Springs at C-18	40	
New River	3506	5/5/1998	21FLSUW NEW010C1	New River near Worthington Springs at C-18	40	B
New River	3506	5/5/1998	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	46	
New River	3506	5/5/1998	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	46	
New River	3506	7/30/1998	21FLSUW NEW010C1	New River near Worthington Springs at C-18	66	
New River	3506	7/30/1998	21FLSUW NEW010C1	New River near Worthington Springs at C-18	66	
New River	3506	1/17/2002	21FLSUW NEW008C1	New River at SR-229 near Raiford	330	
New River	3506	1/17/2002	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	580	
New River	3506	2/19/2002	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	114	
New River	3506	2/19/2002	21FLSUW NEW008C1	New River at SR-229 near Raiford	390	
New River	3506	5/2/2002	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	0	U
New River	3506	5/2/2002	21FLSUW NEW008C1	New River at SR-229 near Raiford	110	
New River	3506	6/26/2002	21FLA 21030049	New River at SR 18	60	B
New River	3506	7/18/2002	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	44	
New River	3506	7/18/2002	21FLSUW NEW008C1	New River at SR-229 near Raiford	210	
New River	3506	8/1/2002	21FLSUW NEW008C1	New River at SR-229 near Raiford	116	
New River	3506	8/1/2002	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	170	
New River	3506	9/18/2002	21FLA 21030049	New River at SR 18	933	
New River	3506	1/15/2003	21FLSUW NEW008C1	New River at SR-229 near Raiford	160	
New River	3506	1/15/2003	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	230	
New River	3506	2/18/2003	21FLSUW NEW008C1	New River at SR-229 near Raiford	960	
New River	3506	2/18/2003	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	1,480	
New River	3506	5/5/2003	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	530	

Appendix B: Historical Fecal Coliform Observations in the New River, 1995–2007 (continued)

Waterbody	WBID	Sample Date	Station	Location	Value (#/100mL)	Remark Code
New River	3506	5/5/2003	21FLSUW NEW008C1	New River at SR-229 near Raiford	1,400	
New River	3506	7/1/2003	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	510	
New River	3506	7/1/2003	21FLSUW NEW008C1	New River at SR-229 near Raiford	630	
New River	3506	2/17/2004	21FLSUW NEW008C1	New River at SR-229 near Raiford	510	
New River	3506	2/17/2004	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	820	
New River	3506	5/3/2004	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	600	
New River	3506	5/3/2004	21FLSUW NEW008C1	New River at SR-229 near Raiford	2,400	
New River	3506	6/24/2004	21FLGW 21632	SR1-SS-2132 New River	470	Q
New River	3506	7/21/2004	21FLSUW NEW008C1	New River at SR-229 near Raiford	242	
New River	3506	7/21/2004	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	620	
New River	3506	11/2/2004	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	200	
New River	3506	11/2/2004	21FLSUW NEW008C1	New River at SR-229 near Raiford	1,400	
New River	3506	1/5/2005	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	100	
New River	3506	1/5/2005	21FLSUW NEW008C1	New River at SR-229 near Raiford	200	
New River	3506	5/2/2005	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	200	
New River	3506	5/2/2005	21FLSUW NEW008C1	New River at SR-229 near Raiford	420	
New River	3506	7/6/2005	21FLSUW NEW009C1	New River near Lake Butler FL at SR-100	2,000	
New River	3506	7/5/2006	21FLA 21030049	New River at SR 18	48	B
New River	3506	3/30/2007	21FLBRA 3506-C	3506 - New River - Bridge at CR-231	31	
New River	3506	3/30/2007	21FLBRA 3506-B	3506 - New River - Bridge on Hwy 18	52	
New River	3506	4/18/2007	21FLBRA 3506-C	3506 - New River - Bridge at CR-231	5.2	
New River	3506	4/18/2007	21FLBRA 3506-A	3506 - New River - Bridge at Hwy 100	25	
New River	3506	5/3/2007	21FLBRA 3506-C	3506 - New River - Bridge at CR-231	3	
New River	3506	5/3/2007	21FLBRA 3506-A	3506 - New River - Bridge at Hwy 100	45	
New River	3506	5/9/2007	21FLBRA 3506-A	3506 - New River - Bridge at Hwy 100	130	

Shaded cells are values that exceed the state criterion of 400 counts/100mL.

Remark Codes:

B – Results based on colony counts outside the acceptable range.

K – Less than.

L – Off-scale high. Actual value not known, but known to be greater than value shown.

Q – Held beyond holding time.

U – Not detected.

Z – Too many colonies present (too numerous to count [TNTC]).

NOTE: Some samples were seen as duplicates (i.e., the same date and location) and were averaged, per the IWR, for TMDL determination. **Appendix B** includes all data contained in the IWR database. For this reason, some discrepancies may exist between **Appendix B** and the tables in the text.

Appendix C: Kruskall–Wallis Analysis of Fecal Coliform Observations versus Month in the New River

Categorical values encountered during processing are:
SEASON$ (4 levels)
FALL, SPRING, SUMMER, WINTER

Kruskal-Wallis One-Way Analysis of Variance for 88 cases
Dependent variable is FECALS
Grouping variable is SEASON$

Group	Count	Rank Sum
FALL	15	665.500
SPRING	22	794.500
SUMMER	27	1257.000
WINTER	24	1199.000

Kruskal-Wallis Test Statistic = 3.642
Probability is 0.303 assuming Chi-square distribution with 3 df

Appendix D: Kruskall–Wallis Analysis of Fecal Coliform Observations versus Season in the New River

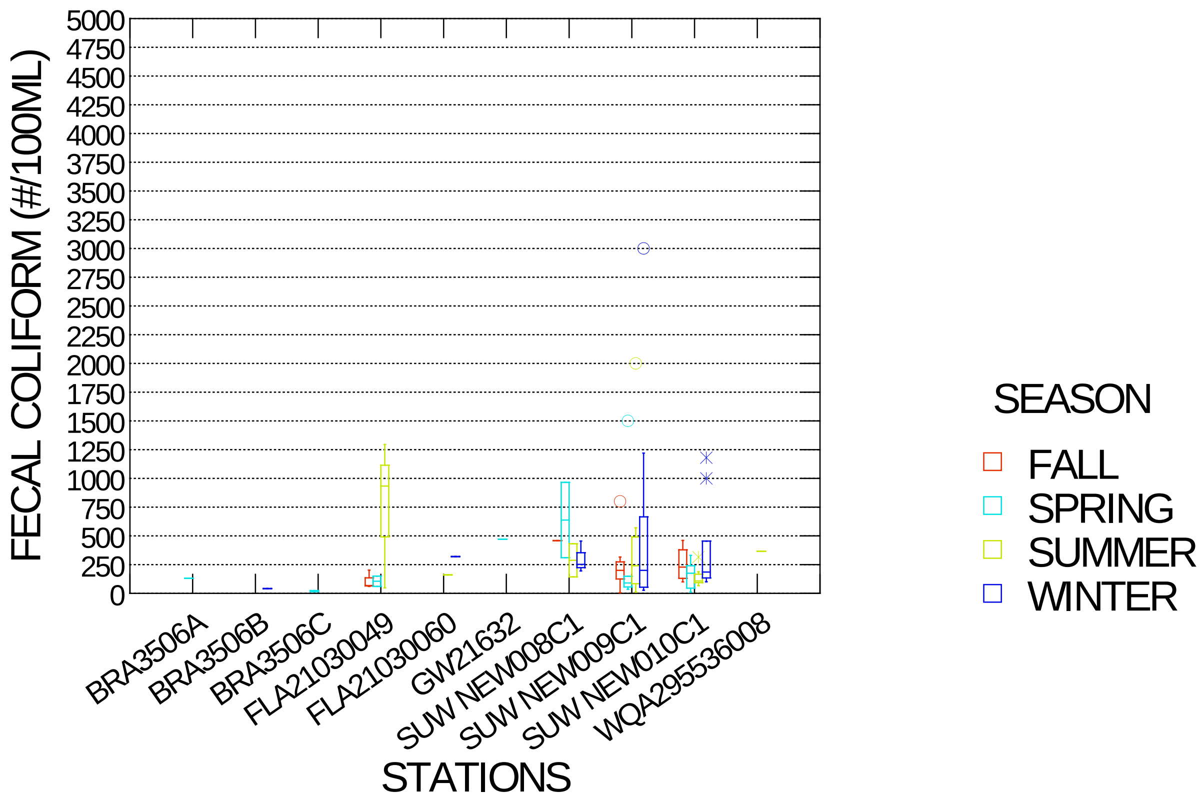
Categorical values encountered during processing are:
MONTH (12 levels)
1, 2, 3, 4, 5, 6, 7,
8, 9, 10, 11, 12

Kruskal-Wallis One-Way Analysis of Variance for 88 cases
Dependent variable is FECALS
Grouping variable is MONTH

Group	Count	Rank Sum
1	9	454.000
2	9	550.000
3	6	195.000
4	5	171.000
5	11	414.000
6	6	209.500
7	11	456.000
8	8	360.500
9	8	440.500
10	4	160.000
11	7	333.000
12	4	172.500

Kruskal-Wallis Test Statistic = 9.833
Probability is 0.545 assuming Chi-square distribution with 11 df

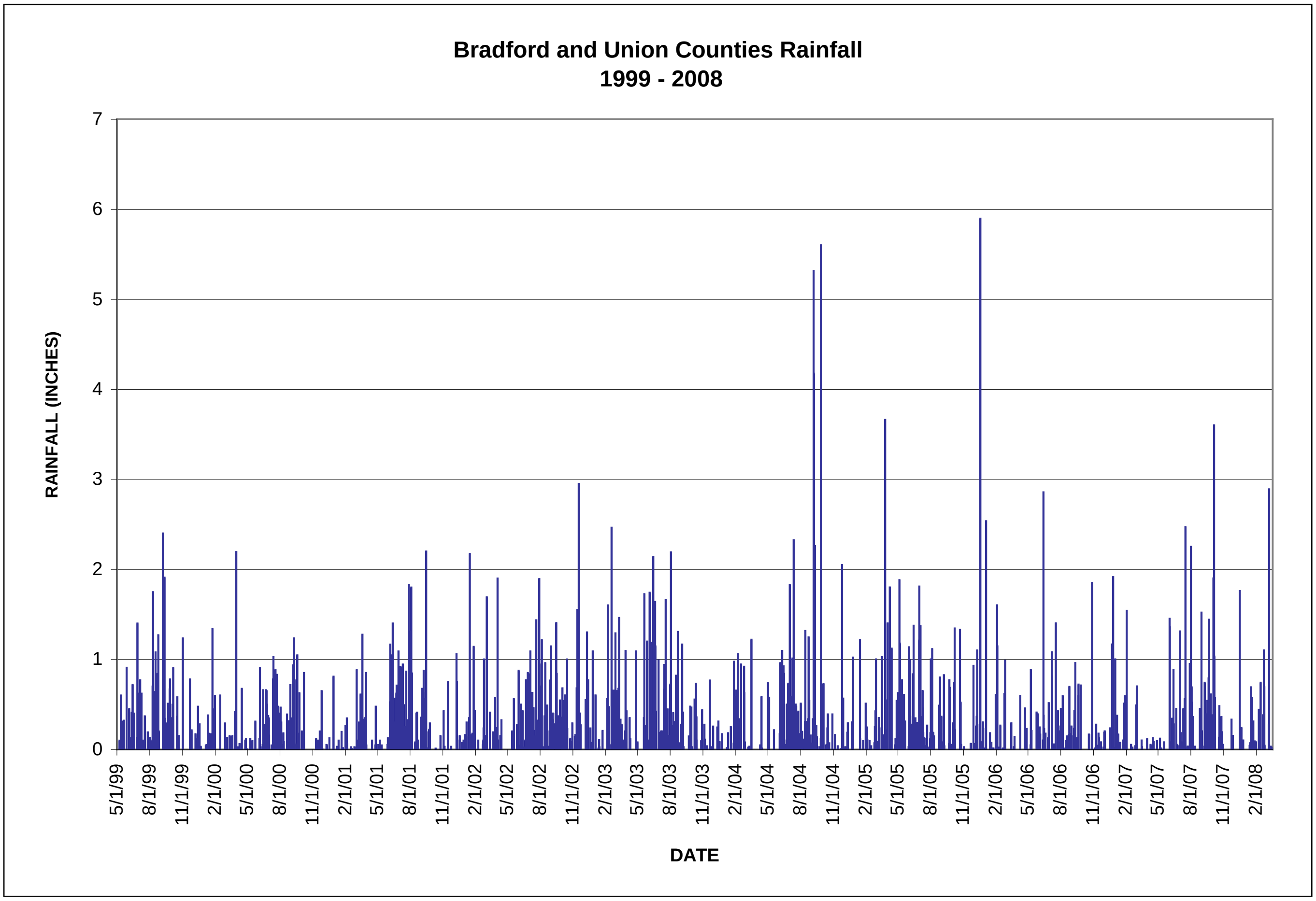
Appendix E: Chart of Fecal Coliform Observations by Season and Station in the New River



Of 88 cases, 1 was excluded by making graph range less than data range.

Station	STORET ID
New River at SR 18	21FLA 21030049
New R. 200 Yds N SR 231	21FLA 21030060
3506 - New River - Bridge at Hwy 100	21FLBRA 3506-A
3506 - New River - Bridge on Hwy 18	21FLBRA 3506-B
3506 - New River - Bridge at CR-231	21FLBRA 3506-C
SR1-SS-2132 New River	21FLGW 21632
New River at SR-229 near Raiford	21FLSUW NEW008C1
New River near Lake Butler FL at SR-100	21FLSUW NEW009C1
New River near Worthington Springs at C-18	21FLSUW NEW010C1
New River at CR 18	21FLWQA 295536008224391

Appendix F: Chart of Rainfall for Bradford and Union Counties, 1999–2008

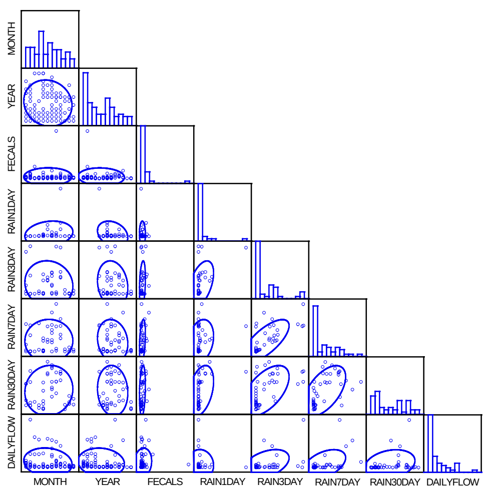


Appendix G: Spearman Correlation Matrix Analysis for Precipitation and Fecal Coliform in the New River

Spearman correlation matrix

	MONTH	YEAR	FECALS	RAIN1DAY	RAIN3DAY
MONTH	1.000				
YEAR	-0.098	1.000			
FECALS	-0.025	0.022	1.000		
RAIN1DAY	0.140	-0.196	0.018	1.000	
RAIN3DAY	-0.024	-0.091	0.266	0.576	1.000
RAIN7DAY	0.013	-0.051	0.278	0.396	0.781
RAIN30DAY	0.149	0.016	0.338	0.517	0.595
DAILYFLOW	-0.104	-0.398	0.453	-0.010	0.321

	RAIN7DAY	RAIN30DAY	DAILYFLOW
RAIN7DAY	1.000		
RAIN30DAY	0.603	1.000	
DAILYFLOW	0.373	0.315	1.000



Appendix H: Analysis of Fecal Coliform Observations and Precipitation in the New River

FECAL COLIFORM DATA VERSUS DAY OF SAMPLING PRECIPITATION

43 case(s) deleted due to missing data.

Dep Var: FECALS   N: 45   Multiple R: 0.034   Squared multiple R: 0.001

Adjusted squared multiple R: 0.000   Standard error of estimate: 447.467

Effect	Coefficient	Std Error	Std Coef	Tolerance	t	P(2 Tail)
CONSTANT	365.185	69.793	0.000	.	5.232	0.000
RAIN1DAY	-39.565	178.542	-0.034	1.000	-0.222	0.826

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
Regression	9832.390	1	9832.390	0.049	0.826
Residual	8609750.193	43	200226.749		

*** WARNING ***

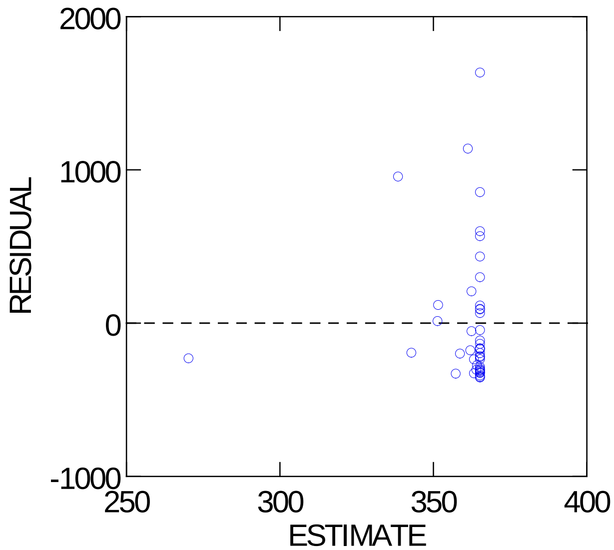
Case 45 has large leverage (Leverage = 0.853)

Case 83 is an outlier (Studentized Residual = 4.427)

Durbin-Watson D Statistic 1.674

First Order Autocorrelation 0.152

Plot of residuals against predicted values



FECAL COLIFORM DATA VERSUS DAY OF SAMPLING AND TWO DAYS PRIOR PRECIPITATION

43 case(s) deleted due to missing data.

Dep Var: FECALS   N: 45   Multiple R: 0.257   Squared multiple R: 0.066

Adjusted squared multiple R: 0.044   Standard error of estimate: 432.671

Effect	Coefficient	Std Error	Std Coef	Tolerance	t	P(2 Tail)
CONSTANT	280.192	79.285	0.000	.	3.534	0.001
RAIN3DAY	160.602	92.055	0.257	1.000	1.745	0.088

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
Regression	569800.935	1	569800.935	3.044	0.088
Residual	8049781.648	43	187204.224		

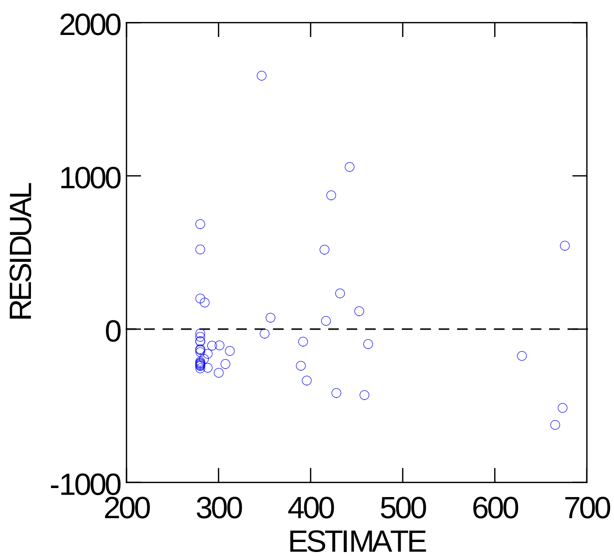
*** WARNING ***

Case 83 is an outlier (Studentized Residual = 4.728)

Durbin-Watson D Statistic 1.674

First Order Autocorrelation 0.151

Plot of residuals against predicted values



FECAL COLIFORM DATA VERSUS DAY OF SAMPLING AND SIX DAYS PRIOR PRECIPITATION

43 case(s) deleted due to missing data.

Dep Var: FECALS   N: 45   Multiple R: 0.335   Squared multiple R: 0.112

Adjusted squared multiple R: 0.091   Standard error of estimate: 421.910

Effect	Coefficient	Std Error	Std Coef	Tolerance	t	P(2 Tail)
CONSTANT	233.988	83.149	0.000	.	2.814	0.007
RAIN7DAY	125.753	54.004	0.335	1.000	2.329	0.025

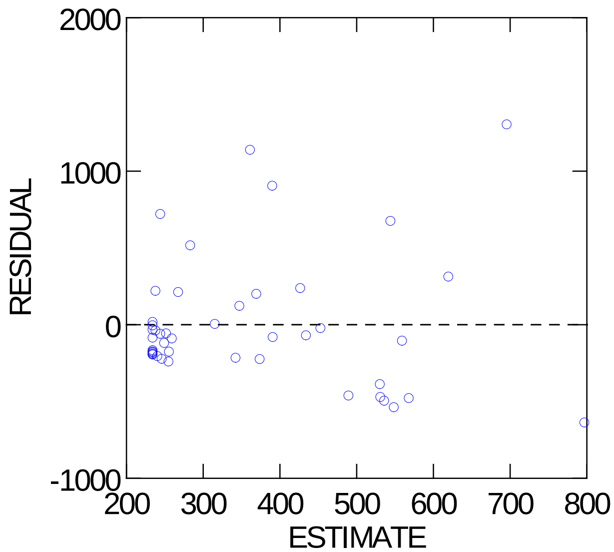
Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
Regression	965225.330	1	965225.330	5.422	0.025
Residual	7654357.253	43	178008.308		

*** WARNING ***
Case 83 is an outlier (Studentized Residual = 3.822)

Durbin-Watson D Statistic 1.525
First Order Autocorrelation 0.218

Plot of residuals against predicted values



FECAL COLIFORM DATA VERSUS DAY OF SAMPLING AND TWENTY NINE DAYS PRIOR PRECIPITATION

43 case(s) deleted due to missing data.

Dep Var: FECALS N: 45 Multiple R: 0.217 Squared multiple R: 0.047

Adjusted squared multiple R: 0.025 Standard error of estimate: 437.006

Effect	Coefficient	Std Error	Std Coef	Tolerance	t	P(2 Tail)
CONSTANT	233.162	108.884	0.000	.	2.141	0.038
RAIN30DAY	32.846	22.481	0.217	1.000	1.461	0.151

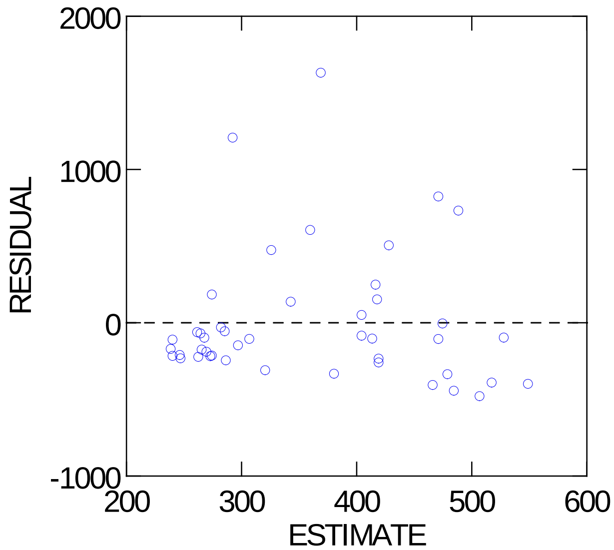
Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
Regression	407683.149	1	407683.149	2.135	0.151
Residual	8211899.434	43	190974.405		

*** WARNING ***
Case 77 is an outlier (Studentized Residual = 3.075)
Case 83 is an outlier (Studentized Residual = 4.563)

Durbin-Watson D Statistic 1.777
First Order Autocorrelation 0.105

Plot of residuals against predicted values



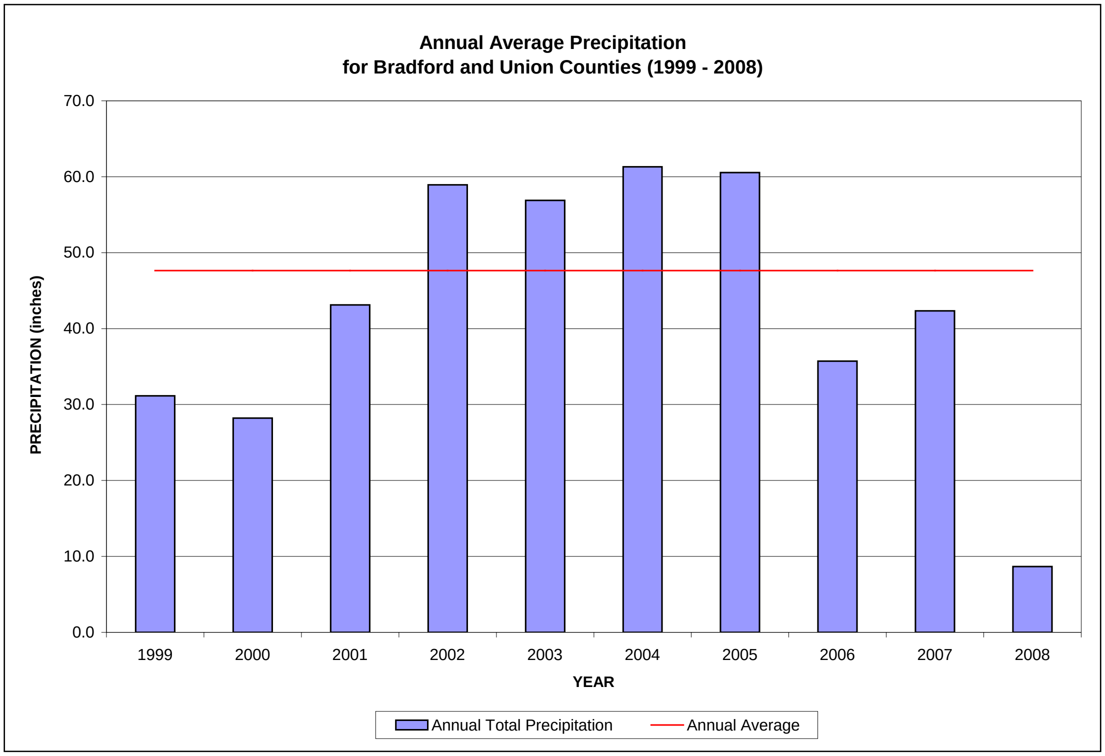
Appendix I: Monthly and Annual Precipitation, 1999–2008, from CLIMOD

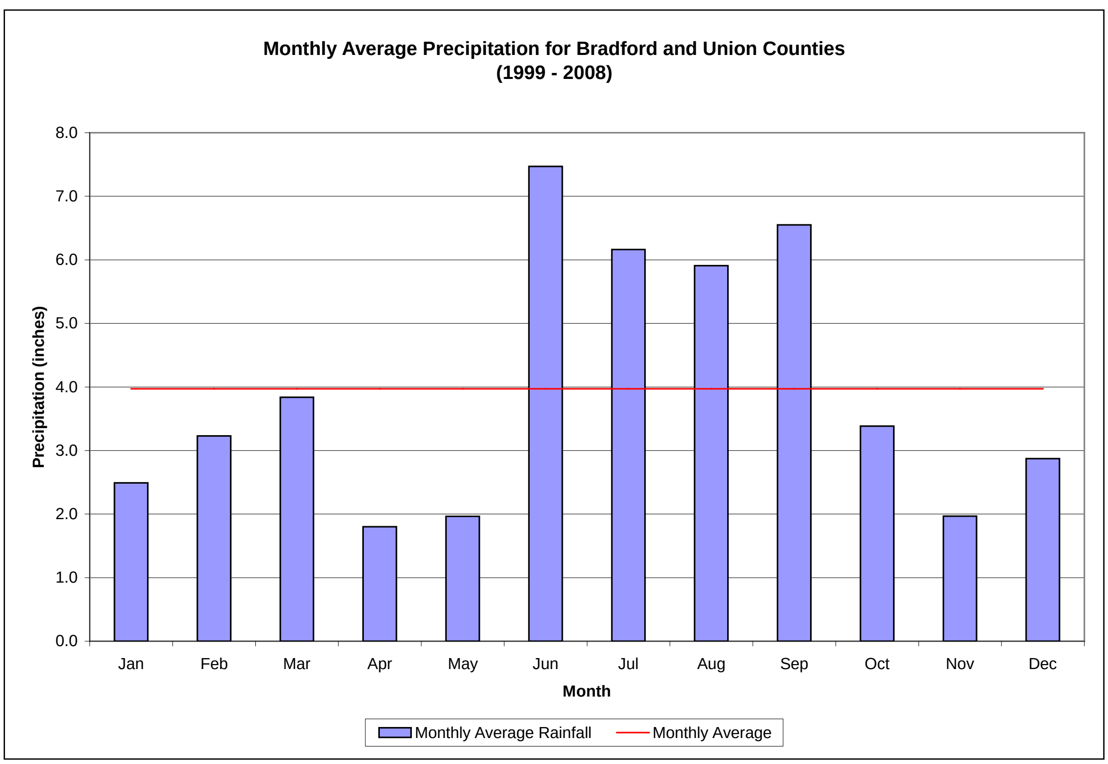
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
1999					2.26	4.78	2.66	7.75	7.65	2.64	2.31	1.11	31.15
2000	3.20	0.89	3.62	0.98	0.53	5.21	6.20	3.34	1.05	1.59	1.03	0.60	28.21
2001	0.60	0.86	6.19	0.62	0.40	9.61	8.33	5.66	7.24	0.16	1.25	2.24	43.13
2002	5.21	1.49	4.01	3.01	1.21	7.09	8.65	7.48	5.93	3.84	6.38	4.65	58.93
2003	0.95	7.77	7.43	1.56	3.85	12.45	5.62	8.96	3.52	2.40	1.57	0.81	56.89
2004	1.51	5.58	1.27	0.64	1.80	7.35	8.97	5.32	21.37	2.69	2.82	2.00	61.32
2005	1.94	2.30	6.74	5.53	5.49	10.89	4.13	5.92	2.97	5.23	1.14	8.28	60.56
2006	3.77	4.65	0.46	1.66	1.95	4.92	4.48	2.89	3.99	2.18	0.73	4.05	35.73
2008	3.19	2.14	1.62	0.42	0.21	4.93	6.43	5.86	5.23	9.72	0.48	2.11	42.34
2008	2.07	3.39	3.21										8.67
AVG	**2.49**	**3.23**	**3.84**	**1.80**	**1.97**	**7.47**	**6.16**	**5.91**	**6.55**	**3.38**	**1.97**	**2.87**	**47.64**

Rainfall is in inches, and represents data from both Bradford and Union Counties.

(hatched cells) There are no rainfall data in either county for these dates.

Appendix J: Annual and Monthly Average Precipitation in Bradford and Union Counties, 1999–2008





Appendix K: USGS Gage Flow Data

USGS Gage Number	Gage Name	Latitude	Longitude	Daily Streamflow Period of Record[1]	
				Beginning	End
02321000	New River near Lake Butler, Florida	29°59'53"	87°16'27"	1/1/1950	3/9/2008

[1] Data used in TMDL date from January 1, 1995, through March 13, 2008.

Appendix L: Public Comments

At the Public Meeting on July 10, 2008, there was a concern that the loading from cats was not considered. Many cat owners keep their pets inside, using a litter box to dispose of their pets' waste, and cats tend to bury their feces. If, however, the majority of cats in the watershed were kept outside, the estimated fecal coliform loading from them would be 3.24×10^{14} annually.

Estimated Number of Households in WBID 3506	Estimated Cat: Household Ratio[1]	Estimated Number of Cats in WBID 3506	Estimated Fecal Coliform Counts/Cat/Day[2]	Estimated Fecal Coliform Counts/Day	Estimated Fecal Coliform Counts/Year
269	0.66	178	5×10^{9}	8.88×10^{11}	3.24×10^{14}

[1] From the AVMA Website, which states the original source to be the *U.S. Pet Ownership and Demographics Sourcebook,* 2002.

[2] EPA, January 2001.

Also at the Public Meeting on July 10, 2008, it was suggested that the Florida State Prison WWTF (FLA 113450) should be re-examined as a possible fecal coliform contributor. The Department downloaded the effluent data before the land application (Site ID R-001). The data is in monthly geometric means from June 30, 1999, to June 30, 2008. No monthly average exceeded 32 counts/100mL; none of the samples was above 400 counts/100mL; and 96 of the 100 samples were under 10 counts/100mL. Therefore, the prison, which is not a permitted surface water discharger, does not seem to be a contributor to the fecal coliform exceedances found in WBID 3506. A statistical summary is provided below.

N	Min*	Max*	Mean*	Median*
100	1.00	31.6	2.57	1.80

*In counts/100mL.

Florida Department of Transportation

CHARLIE CRIST
GOVERNOR

1109 South Marion Avenue
Lake City, FL 32025

STEPHANIE C. KOPELOUSOS
SECRETARY

July 21, 2008

Mr. Wayne Magley
Florida Department of Environmental Protection
Bureau of Watershed Management
Watershed Assessment Section
2600 Blair Stone Road, Mail Station 3565
Tallahassee, FL 32399

Dear Mr. Magley:

District 2 of the Florida Department of Transportation (FDOT) has reviewed the June 2008 draft Fecal Coliform TMDL Report for New River and submits the following comments for the Florida Department of Environmental Protection (FEDP) to address.

1. FDEP should not consider pollution reduction levels that exceed the levels required by EPA.

2. FDOT controls less than 1% of the area in the basin and should not be considered a stakeholder for the following: (1) Table 4.1 does not include roads; (2) Table 4.1.b. lists roads as 0.05% of the WBID, which most likely includes county roads; (3) Baker County has a portion of a WBID, but is not mentioned as a stakeholder (page 6); and (4) FDOT is not a generator of fecal coliform or a source of fecal coliform mentioned in this document.

3. FDOT could not determine from the report if the data collection was a statistically appropriate data set and the methodology used for obtaining the fecal coliform data set was an appropriate peer reviewed and EPA or FDEP approved scientific method?

4. The methodology used to estimate nonpoint source loads needs to distinguish between NPDES discharges and non-NPDES discharges. (Section 4.1, page 15, paragraph 3)

5. Stormwater conveyance systems are stated as a potential cause of fecal coliform exceedances occurring after large and extreme precipitation events according to Sections 4.2.2 and 5.2. It should be emphasized that stormwater conveyance systems are not potential sources and origin of, stormwater conveyances only transport thus the BMAP should focus on removal of source.

6. Wasteload allocations need to be distinguished between nonpoint MS4s and nonpoint non-MS4s. (Section 6.1, page 46)

7. In Section 4.2.1 (page 15), it is stated that "...coliforms are not required to be monitored under general permits such as theses and therefore the contribution of coliforms to the river by these types of facilities is unknown, but also considered negligible". Conclusions should not be drawn without sufficient supporting information.

8. Page 42 states "If a high percentage of exceedances are found to be occurring after large and extreme precipitation events, this can indicate that exceedances tend to be nonpoint source driven, perhaps from stormwater conveyance systems or various land uses. However, it is difficult to draw conclusions with so few samples representing these precipitation events". If there is not a sufficient sample set to demonstrate a connection, conclusions should not be stated.

9. Section 7.1 Basin Management Action Plans (BMPAs) indicates that implementation measures to reduce stormwater impacts should be recognized. FDOT is not a source or generator of fecal coliform and should not be given a reduction allocation in a future BMAP.

10. On page 48, under Margin of Safety, two margins were used (no exceedances of state criteria for fecal coliform and the reduction used from the load duration method). This results in a more aggressive approach to a margin of safety and should be analyzed to determine the impact to future stakeholders in the reduction allocation phase of the BMAP.

FDOT is committed to working with FDEP to resolve these issues. If you have any questions, please contact me or Jim Knight at (386) 758-3700.

Sincerely,

Hillary King
Environmental Permits Coordinator

Response to Comment 1. It is unclear what level of reduction required by the EPA you are referring to in this comment. EPA has not established pollutant reduction levels for the New River. Once the state adopts a TMDL under the FWRA, the TMDL is submitted to the EPA for its review and approval. The EPA is responsible for ensuring that the TMDL is sufficient to restore the waterbody such that designated uses and their associated water quality standards will be met.

Response to Comment 2. Based on 2004 land use GIS coverages, roads and highways in the New River watershed (WBIDs 3506, 3506A, and 3506B) represent less than 1 percent of the acreage. However, as required by the FWRA, pollutant load reduction allocations must be equitable and assure that all parties that contribute pollutants are part of the solution. There are certain very intensive land use activities that could represent a small percentage of a watershed yet contribute a significant fraction of a pollutant to a receiving water. The document will be amended to include Baker County as a stakeholder. *It is well known that stormwater from all* *land uses, including roads, contains coliform bacteria. Additionally, please remember that the stormwater within FDOT's stormwater systems is not just from roads, but also from adjacent land uses. Accordingly, FDOT has an obligation to be a partner in reducing these pollutant loadings.*

Response to Comment 3. The data were used to designate the New River as a verified impaired water in accordance with the procedures within Rule 62-302, F.A.C. (Impaired Surface Waters Rule). This rule included requirements to assess data sufficiency, data quality, etc.

Response to Comment 4. As described in **Section 4.1**, the source assessment section does not make a distinction between NPDES stormwater discharges and non-NPDES stormwater discharges. The purpose of this section is to identify potential sources that might contribute the pollutant(s) of concern that need to be reduced to achieve designated uses. A more detailed evaluation of sources and specific allocations will be developed as part of the BMAP. In the case of the New River watershed, there currently are no NPDES MS4 permittees.

Response to Comment 5. Under both federal and state law and regulations, stormwater discharges are sources of pollution, are subject to regulation, and their pollutant loadings must be reduced once a TMDL is established. Development of the BMAP will focus approaches to achieve pollutant source reductions in an equitable and cost-effective manner.

Response to Comment 6. Section 6.1 describes how NPDES stormwater discharges are part of the WLA fraction of the TMDL, while non-NPDES stormwater discharges are represented by the LA. These categories are also reflected in the TMDL components of **Tables 6.1** and **6.2.** There may be some confusion with respect to the draft TMDL document that indicated reductions would be required in fecal coliform and nutrients from NPDES stormwater under the WLA. Since there are no permitted MS4s in the watershed, it was noted during the public meetings held on July 10, 2008, that this would be revised in the document.

Response to Comment 7. Generic permits are developed to regulate a category of wastewater facilities or activities based on the same or substantially similar types of operations; the same types of wastes, and the same disposal practices. An NPDES generic permit is approved by the EPA. Based on the specific activities, waste characteristics, and disposal practices, generic permits issued for the point sources identified in **Section 4.2.1** of the documents did not consider fecal coliform a constituent that required monitoring as part of the generic permit.

Response to Comment 8. As discussed in the document, fecal coliform exceedances increased with increased precipitation and flow. This was supported by both graphically and by positive correlation coefficients between coliform and various cumulative rainfall totals.

Response to Comment 9. Comments regarding the BMAP should be directed to Terry Hansen, (850) 245–8561, who is the Department's basin coordinator facilitating the BMAP.

Response to Comment 10. The load duration curve method yielded a reduction of 45 percent compared with a 40 percent reduction based on the percent reduction method. This comment may be best addressed during the BMAP process as sources are identified and BMPs are evaluated with regard to the respective reduction efficiencies and costs associated with implementation.

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