FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division of Water Resource Management, Bureau of Watershed Management

NORTHEAST DISTRICT • LOWER ST. JOHNS RIVER BASIN

TMDL Report

Fecal Coliform TMDL for the Ribault River (WBID 2224)

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Florida Department of Environmental Protection

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Web sites

Florida Department of Environmental Protection, Bureau of Watershed Management

TMDL Program

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

Identification of Impaired Surface Waters Rule

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

STORET Program

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

2004 305(b) Report

http://www.dep.state.fl.us/water/docs/2004_Integrated_Report.pdf

Criteria for Surface Water Quality Classifications

http://www.dep.state.fl.us/legal/rules/shared/62-302t.pdf

Basin Status Reports

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

Water Quality Assessment Reports

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

Allocation Technical Advisory Committee (ATAC) Report

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

U.S. Environmental Protection Agency

Region 4: Total Maximum Daily Loads in Florida

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

National STORET Program

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

Chapter 1: INTRODUCTION

1.1 Purpose of Report

This report presents the Total Maximum Daily Load (TMDL) for fecal coliforms for the Ribault River in the Trout River Planning Unit of the Lower St. Johns River Basin. The river was verified impaired for fecal coliforms, and was included on the Verified List of impaired waters for the Lower St. Johns River Basin that was adopted by Secretarial Order in May 2004. The TMDL establishes the allowable loadings to the Ribault River that would restore the waterbody so that it meets its applicable water quality criteria for fecal coliform.

1.2 Identification of Waterbody

Ribault River is located in Duval County, in northeast Florida, and has an approximate 9.71 square-mile (mi^2) drainage area that flows into the Trout River before reaching the St. Johns River (**Figures 1.1** and **1.2**). The creek is approximately 6.0 miles long and is a second order stream. The stream is being assessed as a Class III, predominately freshwater waterbody. There are two major tributaries to Ribault River – Six Mile Creek and Little Six mile Creek. The Ribault River watershed is located on the western edge of the City of Jacksonville and, as a result, is highly urbanized. Additional information about the river's hydrology and geology are available in the Basin Status Report for the Lower St. Johns River Basin (Florida Department of Environmental Protection [FDEP], 2004).

For assessment purposes, the Department has divided the St. Johns River Basin into water assessment polygons, with a unique **w**ater**b**ody **id**entification (WBID) number for each watershed or stream reach. The Ribault River lies within one WBID, 2224, as shown in **Figure 1.2**, which this TMDL addresses.

Ribault River is part of the Trout River Planning Unit (PU). Planning units are groups of smaller watersheds (WBIDs) that are part of a larger basin unit, in this case the Lower St. Johns Basin. The Trout River Planning Unit consists of 18 WBIDs. **Figure 1.3** shows the location of these WBIDs, Ribault River's location within the planning unit, as well as a list of the other WBIDs in the planning unit.

Figure 1.1. Location of the Ribault River and Major Geopolitical Features in the St. Johns River Basin

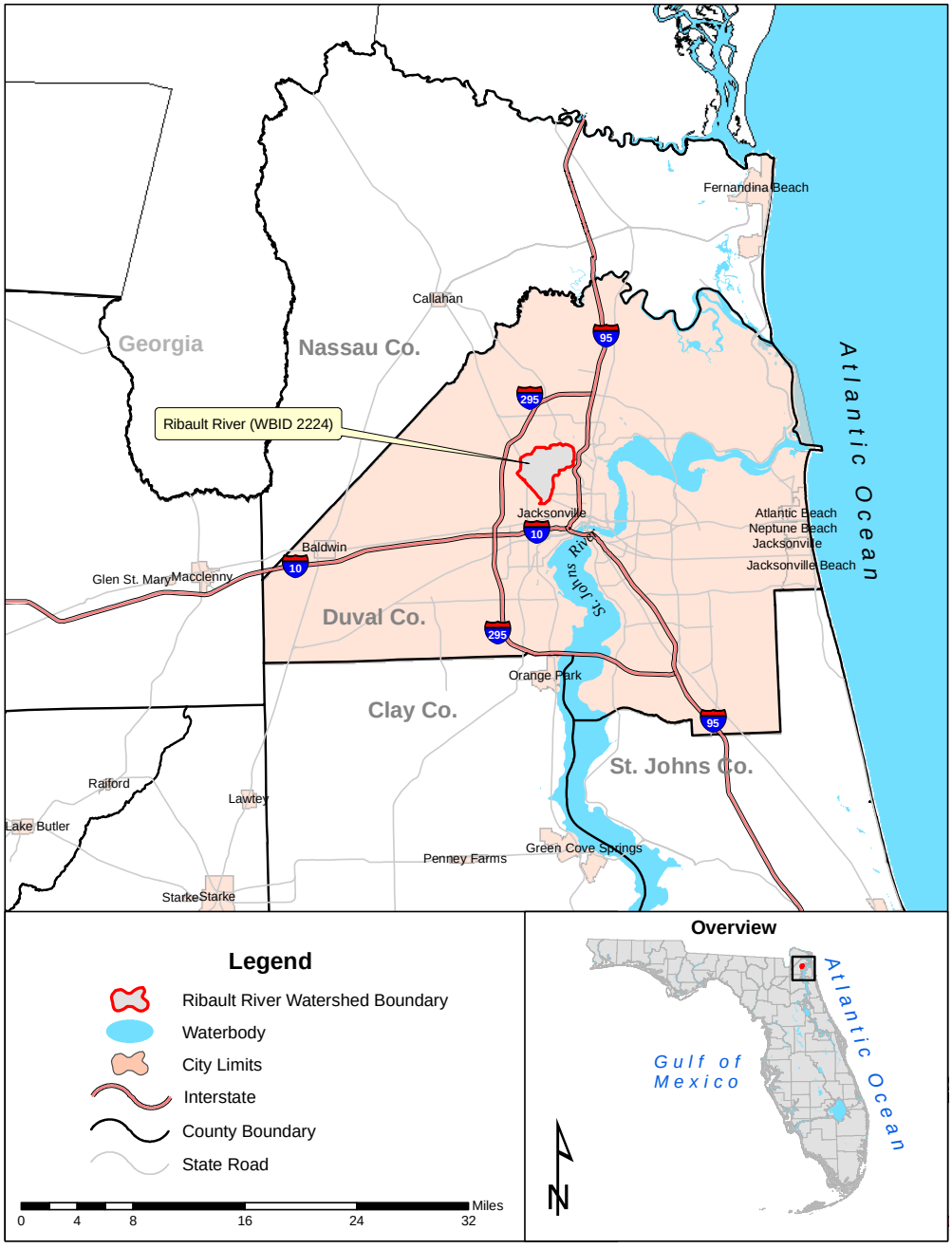


Figure 1.2. Overview of the Ribault River WBID

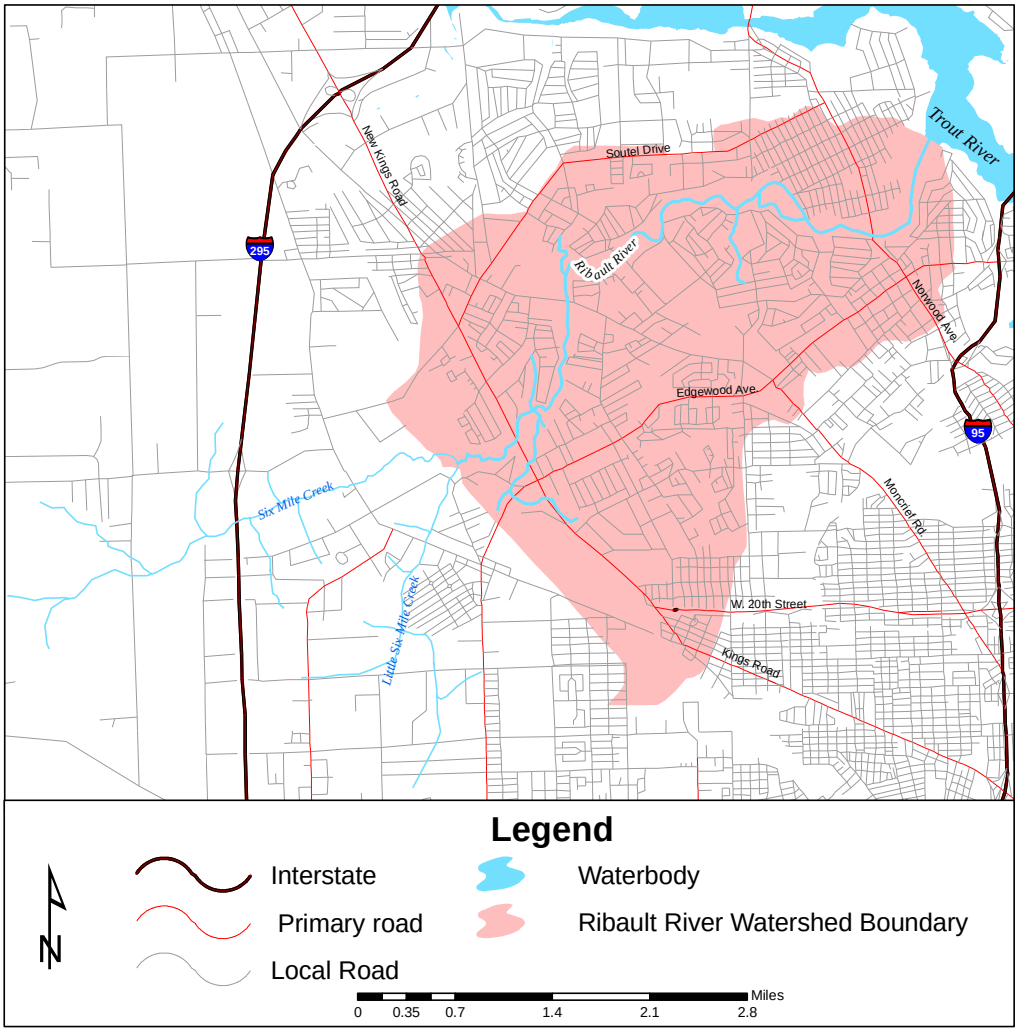
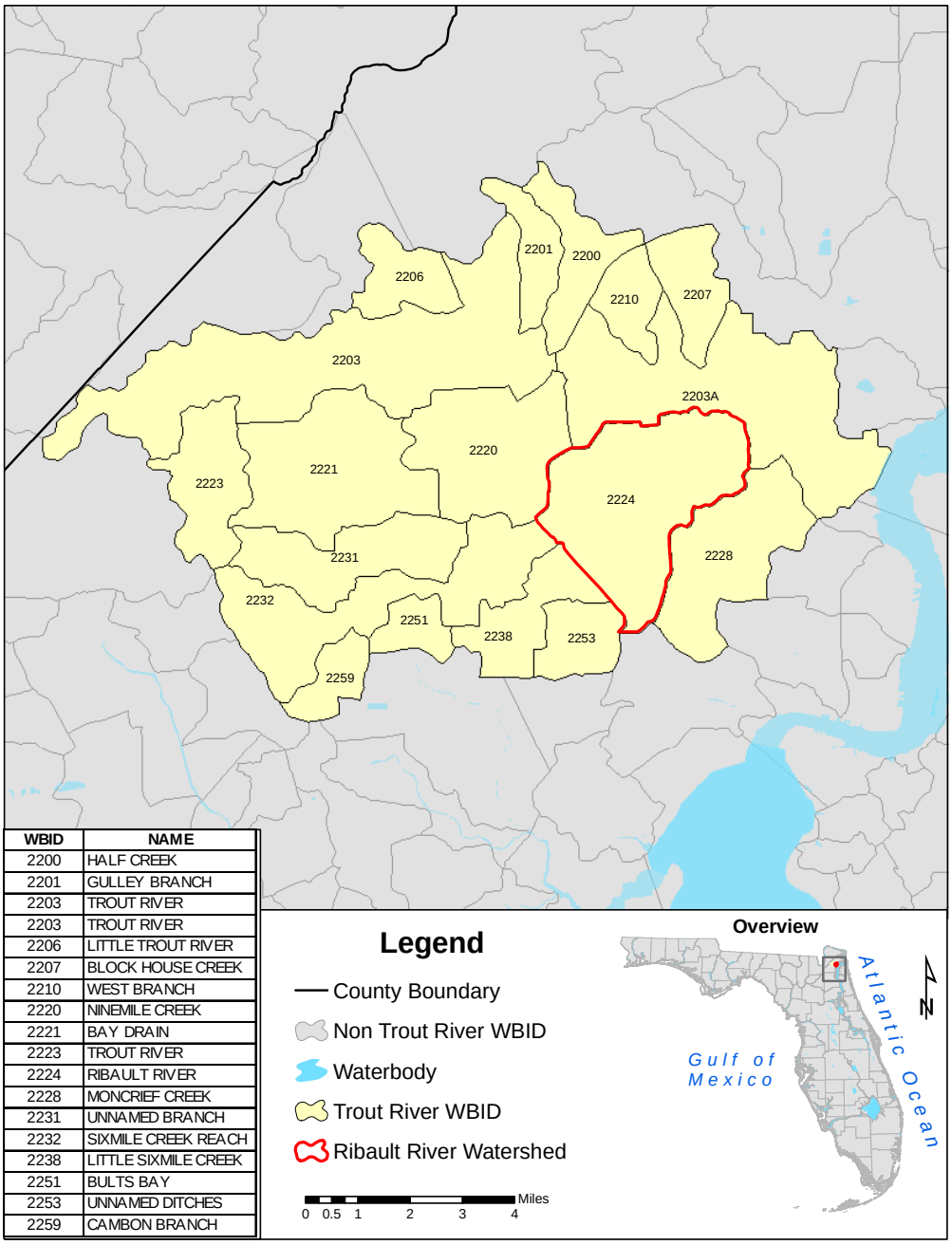


Figure 1.3. WBIDs in the Trout River Planning Unit



WBID	NAME
2200	HALF CREEK
2201	GULLEY BRANCH
2203	TROUT RIVER
2203	TROUT RIVER
2206	LITTLE TROUT RIVER
2207	BLOCK HOUSE CREEK
2210	WEST BRANCH
2220	NINEMILE CREEK
2221	BAY DRAIN
2223	TROUT RIVER
2224	RIBAULT RIVER
2228	MONCRIEF CREEK
2231	UNNAMED BRANCH
2232	SIXMILE CREEK REACH
2238	LITTLE SIXMILE CREEK
2251	BULTS BAY
2253	UNNAMED DITCHES
2259	CAMBON BRANCH

1.3 Background

This report was developed as part of the Florida Department of Environmental Protection's (Department or FDEP) 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 five-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. TMDLs 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 coliforms that caused the verified impairment of Ribault River. These activities will depend heavily on the active participation of the St. Johns River Water Management District (SJRWMD), the City of Jacksonville (COJ), Jacksonville Electric Authority (JEA), 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 EPA a list of surface waters that do not meet applicable water quality standards (impaired waters) and establish a TMDL for each pollutant causing impairment of these 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.]), and the state's 303(d) list is amended annually to include basin updates.

Florida's 1998 303(d) list included 55 waterbodies and 277 parameters in the Lower St. Johns River Basin, however, the Florida Watershed Restoration Act (FWRA - Section 403.067, F.S.) stated that all previous Florida 303(d) lists were for planning purposes only and directed the Department to develop, and adopt by rule, a new science-based methodology to identify impaired waters. After a long rulemaking process, the Environmental Regulation Commission adopted the new methodology as Chapter 62-303, Florida Administrative Code (F.A.C.) (Identification of Impaired Surface Waters Rule, or IWR), in April 2001.

2.2 Information on Verified Impairment

The Department used the IWR to assess water quality impairments in Ribault River and verified the river is impaired for fecal coliform based on the data in the Department's IWR database. **Tables 2.2** through **2.4** provide summary results for fecal coliforms for the verification period, which for Group 2 waters was January 1, 1996 – June 30, 2003, by month, season, and year, respectively. The overall exceedance rate is 41.7 percent, with exceedances occurring across all seasons and months (except for June).

The analyses show that the greatest percentage of exceedances occurred in September, but there is only one value from this month in the Verified Period, which was also the highest value (28,000 counts/100 mL). There were no exceedances during March, June, or July (**Table 2.1**). Seasonally, the greatest percentage of exceedances (33.33 percent) occurred in the spring (April – June); the fewest (16.67 percent) in the winter (January – March) (**Table 2.2**).

On an annual basis, the greatest percentage of exceedances occurred in 1992 (75.0 percent), and decreased through 2001 (**Table 2.3**).

Fecal coliform data in the IWR database goes back as far as 1991. However, only data in the database from January 1, 1996 – June 30, 2003 was used to verify the Moncrief Creek for fecal coliform.

Table 2.1. Summary of Fecal Coliform Data by Month for Verified Period (January 1, 1996 – June 30, 2003)

Month	N	Minimum	Maximum	Median	Mean	Number of Exceedances	% Exceedance	Mean Precipitation
January	4	130	2,200	235	700	1	25.00%	2.39
February	0	---	---	---	---	---	---	3.14
March	2	20	230	125	125	0	0.00%	3.95
April	6	4	700	110	203	1	16.67%	2.8
May	4	24	801	800	606	3	75.00%	1.61
June	2	230	270	250	250	0	0.00%	7.40
July	4	80	260	120	145	0	0.00%	6.72
August	6	96	800	240	334	2	33.33%	6.72
September	1	28,000	28,000	28,000	28,000	1	100.00%	9.94
October	4	130	2,400	235	750	1	25.00%	3.39
November	2	40	500	270	270	1	50.00%	1.81
December	8	20	420	152	197	2	25.00%	3.12

Coliform counts are #/100 mL
Exceedances represent values above 400 counts/100 mL
Mean precipitation is from Jacksonville International Airport (JIA) in inches. Mean precipitation is the long term (1955 – 2004) mean for the stated month

Table 2.2. Summary of Fecal Coliform Data by Season for Verified Period (January 1, 1996 – June 30, 2003)

Season	N	Minimum	Maximum	Median	Mean	Number of Exceedances	% Exceedance	Mean Precipitation
Winter	6	20	2,200	200	508	1	16.67%	10.72
Spring	12	4	801	225	345	4	33.33%	12.41
Summer	11	80	28,000	180	2,781	3	27.27%	21.15
Fall	14	20	2,400	161	365	4	28.57%	8.34

Coliform counts are #/100 mL
Winter = January – March; spring = April – June; summer = July – September; fall = October - December
Exceedances represent values above 400 counts/100 mL
Mean precipitation is from Jacksonville International Airport (JIA) in inches, and is the long term mean (1955 – 2004) for all three months of the season

Table 2.3. Summary of Fecal Coliform Data by Year for Verified Period (January 1, 1996 – June 30, 2003)

Year	N	Minimum	Maximum	Median	Mean	Number of Exceedances	% Exceedance	Total Precipitation
1996	2	40	500	270	270	1	50.00%	60.63
1998	7	110	800	170	420	3	42.86%	56.72
1999	8	110	2,400	300	598	3	37.50%	42.44
2000	8	20	2,200	130	394	1	12.50%	39.77
2001	9	20	28,000	176	3,262	1	11.11%	49.14
2002	9	4	801	105	236	3	33.33%	54.72

Coliform counts are #/100 mL
Exceedances represent values above 400 counts/100 mL
Total precipitation is from Jacksonville International Airport (JIA) in inches, and represents total precipitation for year shown

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)**

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

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 criteria for protection of Class III waters, as established by Chapter 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 criteria state that monthly averages shall be expressed as geometric means based on a minimum of ten samples taken over a thirty-day period. However, there were insufficient data (less than 10 samples in a given month) available to evaluate the geometric mean criterion for fecal coliform bacteria. Therefore, the criterion selected for the TMDLs were not to exceed 400 counts per 100 mL.

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 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 Program (NPDES). 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 Coliforms in Ribault River Watershed

4.2.1 Point Sources

There are 13 permitted wastewater and stormwater facilities in the Ribault River watershed. **Table 4.1** lists these facilities, and **Figure 4.1** shows the location of the facilities within the watershed and surrounding areas.

Of the 13 facilities in the watershed, only three (Ideal Mobile Home Park, Produce Terminal Jacksonville WWTF, and Centurion Truck Plaza WWTF) discharge wastewater into the Ribault River or Little Six Mile Creek, a tributary to the Ribault River. All three facilities are relatively small domestic wastewater facilities, and there have been several months since the mid 1990s where they have not discharged. Based on effluent data submitted to the Department, they are likely to be having minimal impacts on the Ribault River.

Ideal Mobile Home Park WWTF (permit #0023426) is permitted to discharge 0.011 MGD into the Ribault River. However, from September 1997 - December 2004, there were five months in which no measurable flow was discharged from the facility, and there were an additional 46 months when fecal coliforms were non-detectable. The average fecal coliform concentration was 20.7 coliforms/100 mL and the median was 3.08 coliforms/100 mL (both based on monthly geometric mean). The average flow was 0.0031 MGD - well below the permitted capacity. These data are presented in **Appendix B**. Based on information from September 1997 – December 2004, the average fecal coliform loading was 2.19×10^7.

Produce Terminal of Jacksonville WWTF (permit #FL0033405) is permitted to discharge 0.0042 MGD. Discharge is via a drainage ditch and Little Six Mile Creek. From January 1993 – December 2004, there were numerous months when fecal coliforms were either not detected or not reported. There is one month, November 1996, when the fecal coliform concentration was 6,000 counts/100 mL, which exceeds the permitted daily maximum of 800. The average fecal concentration discharged by the facility was 88 counts/100mL, with a median of 1 count/100 mL. The average flow for this time was 0.0014 MGD, which is well below the permitted capacity. Available effluent data are presented in **Appendix C**. Based on information from January 1993 – December 2004, the average fecal coliform loading was 1.97×10^7.

Centurion Truck Plaza WWTF (permit #FL0042421) is permitted to discharge 0.020 MGD into the Ribault River. From February 1993 – December 2004, there were three exceedances of the daily maximum effluent limit of 800 counts/100 mL, which include January 1998 (1,510), April 2004 (2,000) and September 2004 (2,000). During this time, the average fecal coliform concentration discharged was 149 counts/100 mL, with a median of 18 counts/100 mL. Monthly average flow has not exceeded the permitted 0.020 MGD during this time. The average flow, based on information shown in **Appendix D** is 0.011 MGD, which is approximately half the permitted flow. The average fecal coliform loading was 4.75×10^8 based on information from February 1993 – December 2004, which is shown in **Appendix D**.

Based on the information presented, the combined average fecal coliform loading from these three facilities is 5.16×10^8 colonies per day. This is considerably less than the estimated load from failing septic tanks, which is 2.12×10^{12} (see next section), Except for the occasional exceedance, the permitted facilities do not appear to be a significant load to the Ribault River.

There are several facilities that have been issued general stormwater permits authorizing discharges of stormwater within the watershed, including Georgia Southern and Florida Railway Company (permit #FLR05E174; the facility has two outfalls under this permit), Jacksonville Amtrak Station (permit #FLR05E231), Watkins Motor Lines Jacksonville (permit #FLR05B572), Florida Wilbert, Inc. (permit #FLR05B193), CSX Transportation Inc. (permit #FLR05D027), and St. Johns River Terminal Co. However, they are not required to perform effluent monitoring under the general permit, and current coliform loadings from these facilities cannot be quantified.

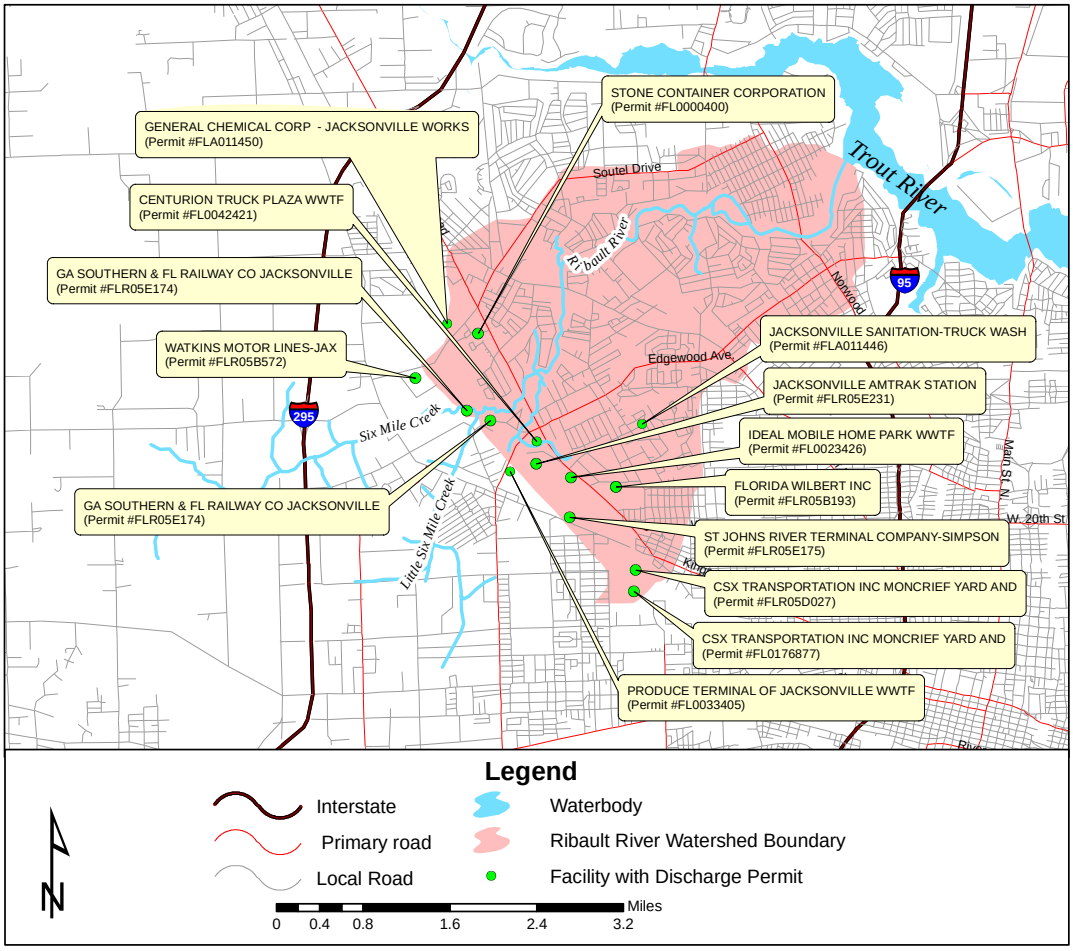
There are several other facilities located within the watershed, but they should not affect surface waters because they are not authorized to discharge to surface waters or do not discharge to the Ribault River. General Chemical Corp. (permit #FLA011450) is an aluminum sulfate manufacturing facility with a design capacity of 0.050 million gallons per day (MGD). The facility utilizes a 23 million gallon stormwater retention basin system, and has zero discharge to surface waters. The

Jacksonville Sanitation Truck Wash Facility (permit #FLA0011446) is a recycle facility with a city sewer connection. Stone Container Corp. (permit #FL0000400) is a paper manufacturing facility permitted for a 20 MGD discharge to the St. Johns River, and should not be affecting surface waters in the Ribault River watershed. CSX Transportation, Inc. (permit # FL0176877) is permitted for a 0.138 MGD discharge, but the actual permitted discharge is to McCoy's Creek, located in an adjacent WBID. Again, these facilities should not be affecting surface waters in the Ribault River watershed.

Table 4.1. Permitted Discharge Facilities located Within Ribault River Watershed

PERMIT #	FACILITY NAME	NPDES FAC.	PERMITTED SURFACE WATER DISCHARGE (MGD)	DESCRIPTION
FL0042421	CENTURION TRUCK PLAZA WWTF	YES	0.0200	DISCHARGE TO RIBAULT RIVER
FLR05D027	CSX TRANSPORTATION INC MONCRIEF	YES	0.0000	GENERAL STORMWATER PERMIT - NO MONITORING REQUIRED
FL0176877	CSX TRANSPORTATION INC MONCRIEF YARD	YES	0.1380	GROUNDWATER REMEDIATION - DISCHARGE TO MCCOY'S CR.
FLR05B193	FLORIDA WILBERT INC	YES	0.0000	GENERAL STORMWATER PERMIT - NO MONITORING REQUIRED
FLR05E174	GA SOUTHERN & FL RAILWAY CO JACKSONVILLE	YES	0.0000	GENERAL STORMWATER PERMIT - NO MONITORING REQUIRED
FLA011450	GENERAL CHEMICAL CORP - JACKSONVILLE WORKS	NO	0.0000	NO DISCHARGE - 2.35 MG RECIRCULATION POND
FL0023426	IDEAL MOBILE HOME PARK WWTF	YES	0.0110	DISCHARGE TO DRAINAGE DITCH THEN TO RIBAULT RIVER
FLR05E231	JACKSONVILLE AMTRAK STATION	YES	0.0000	GENERAL STORMWATER PERMIT - NO MONITORING REQUIRED
FLA011446	JACKSONVILLE SANITATION TRUCK WASH FACILITY	NO	0.0000	100% RECYCLE FACILITY AND CITY SEWER - NO DISCHARGE
FL0033405	PRODUCE TERMINAL OF JACKSONVILLE WWTF	YES	0.0042	DISCHARGE TO DITCH THEN TO LITTLE SIX MILE CREEK
FLR05E175	ST JOHNS RIVER TERMINAL COMPANY-SIMPSON	YES	0.0000	GENERAL STORMWATER PERMIT - NO MONITORING REQUIRED
FL0000400	STONE CONTAINER CORPORATION	YES	20.0000	TOTAL DISCHARGE TO ST. JOHNS RIVER
FLR05B572	WATKINS MOTOR LINES-JAX	YES	0.0000	GENERAL STORMWATER PERMIT - NO MONITORING REQUIRED

Figure 4.1. Location of Permitted Discharges in Ribault River Watershed



Municipal Separate Storm Sewer System Permittees

The entire City of Jacksonville and the Florida Department of Transportation (FDOT) District 2 are co-permittees for a Phase I NPDES municipal separate storm sewer system (MS4) permit (permit FLS000012) that covers the Ribault River watershed. Other co-permittees include the Cities of Neptune Beach and Atlantic Beach, but the Ribault River watershed is not included in these city boundaries.

4.2.2 Land Uses and Nonpoint Sources

Additional coliform loadings to the Ribault River are generated from nonpoint sources in the basin. Potential nonpoint sources of coliforms include loadings from surface runoff, wildlife, pets, leaking or overflowing sewer lines, and leaking septic tanks.

Land Uses

The spatial distribution and acreage of different land use categories were identified using the 2000 land use coverage contained in the Department's Geographic Information System (GIS) library, initially provided by the SJRWMD. Land use categories and acreages in the watershed were aggregated using the Level 3 codes tabulated in **Table 4.2. Figure 4.2** shows the principle Level 1 land uses in the watershed.

Being on the fringes of the City of Jacksonville, the Ribault River watershed is a highly urbanized area. As shown in **Table 4.2**, the majority of the land is high density residential (37.72 percent), followed by medium density residential (15.52 percent) and commercial and services (6.71 percent). Natural land use types (pine flatwoods, streams, marshes, mixed wetland hardwoods, and wetland forested mixed, etc.) comprise 1,370 acres or 22.04 percent of the land use in the watershed. Areas impacted by man comprise approximately 4,486 acres or 77.96 percent of the watershed.

Figure 4.2. Principle Level 1 Land Uses in the Ribault River Watershed

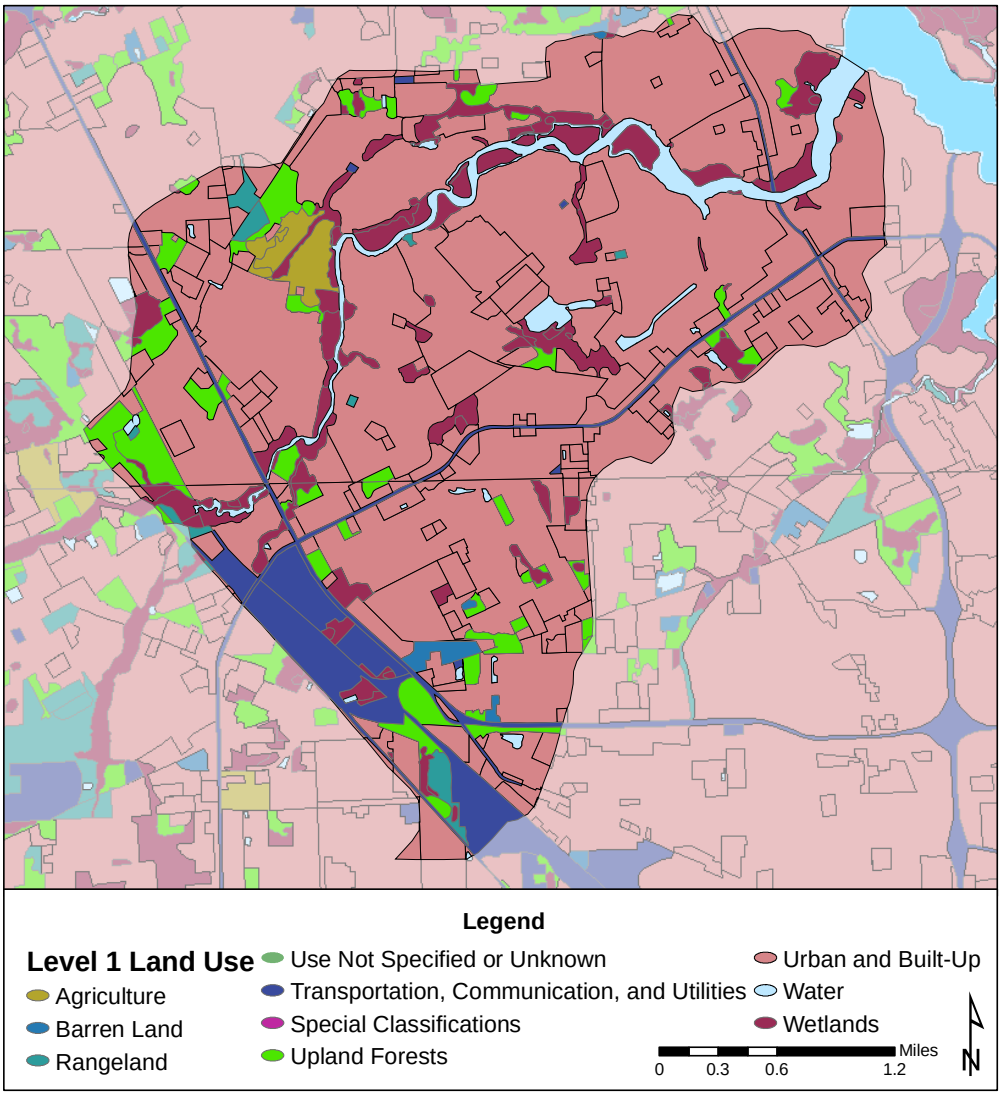


Table 4.2. Level 3 Land Use in the Ribault River Watershed

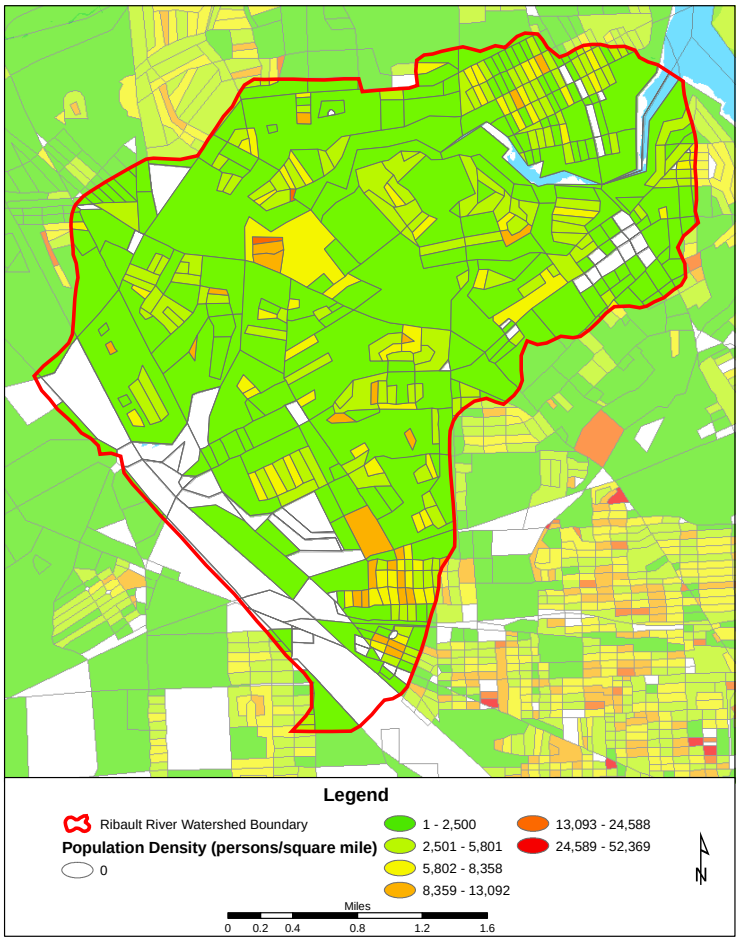
Level 3 Land Use Code	Attribute	Acres	Percent of Watershed
1300	Residential, high density - 6 or more dwelling units/acre	2,344.63	37.72%
1200	Residential, medium density - 2-5 dwelling units/acre	964.74	15.52%
1400	Commercial and services	417.27	6.71%
6170	Mixed wetland hardwoods	279.83	4.50%
1700	Institutional	258.95	4.17%
4340	Upland mixed coniferous/hardwood	211.28	3.40%
8120	Railroads	203.88	3.28%
5100	Streams and waterways	186.03	2.99%
6420	Saltwater marshes	159.69	2.57%
1550	Other light industrial	120.03	1.93%
1480	Cemeteries	113.59	1.83%
8140	Roads and highways (divided 4-lanes with medians)	109.25	1.76%
4110	Pine flatwoods	89.51	1.44%
1900	Open land	87.83	1.41%
8130	Bus and truck terminals	80.17	1.29%
1100	Residential, low density - less than 2 dwelling units/acre	71.15	1.14%
2150	Field crops	67.62	1.09%
6460	Mixed scrub-shrub wetland	63.01	1.01%
5300	Reservoirs - pits, retention ponds, dams	52.36	0.84%
6300	Wetland forested mixed	43.49	0.70%
4410	Coniferous pine	42.07	0.68%
1560	Other heavy industrial	37.95	0.61%
1860	Community recreational facilities	33.08	0.53%
1850	Parks and zoos	30.05	0.48%
7400	Disturbed land	29.28	0.47%
3200	Shrub and brushland	26.57	0.43%
1180	Rural residential	19.70	0.32%
3100	Herbaceous upland nonforested	17.18	0.28%
3300	Mixed upland nonforested	11.97	0.19%
2130	Woodland pastures	11.47	0.18%
6430	Wet prairies	8.62	0.14%
6410	Freshwater marshes	6.63	0.11%
6210	Cypress	3.41	0.05%
1840	Marinas & fish camps	3.17	0.05%
8330	Water supply plants	2.50	0.04%
8310	Electrical power facilities	2.37	0.04%
1600	Extractive	1.95	0.03%
8340	Sewage treatment	1.73	0.03%
4200	Upland hardwood forests	0.96	0.02%
8180	Auto parking facilities	0.15	0.00%
	Total:	**6,215.12**	**100.00%**

Population

According to the U.S Census Bureau, census block population densities in the Ribault River watershed in the year 2000 ranged from 0 – 18,920 persons per square mile, with an average of 2,319 persons per square mile in the watershed **(Figure 4.3).** Based on this population density, the estimated population in the Ribault River watershed would be 22,514. The Census Bureau reports that for all of Duval County, the total population for 2000 was approximately 780,000, with 329,778

housing units, and an average occupancy rate of 92.1 percent (303,747 units). For all of Duval County, the Bureau reported a housing density of 426 houses per square mile. This places Duval County seventh in housing densities and population in Florida (U.S. Census Bureau Web site, 2005). Based on the estimated population in the Ribault River watershed, the housing density is 869 units/mi², which is twice that of the county average.

Figure 4.3. Population Density in the Ribault River Watershed



Septic Tanks

Using data supplied by the Department of Revenue and Department of Health (DoH), it is estimated that approximately 57 percent of residences within Duval County are connected to a wastewater treatment plant, with the rest utilizing septic tanks (Department of Revenue cadastral data, 2003, and

DoH Website, 2005a). The DoH reports that as of fiscal year 2003-2004, there were 88,834 permitted septic tanks in Duval County (DoH Website, 2005b). From fiscal years 1994–2004, 4,954 permits for repairs were issued, or an average of approximately 450 repairs annually (DoH Website, 2005c) countywide.

As noted previously, there are an estimated 2,319 persons/mi^2 in the watershed, or 22,514 persons in the watershed area. The average household in the Ribault River watershed has 2.67 persons (see **Table 4.3**). According to the DoH, there is an annual average of 450 repairs (fiscal years 1994 – 2004) in Duval County. Based on this rate for the county, there is an average of approximately 6.1 failures in the Ribault River watershed annually.

To focus on the Ribault River watershed, the Department obtained septic tank repair permit data from JEA for their service area, which includes the Ribault River watershed. The data include septic tank repair permit records issued from March 1990 – April 2004, areas serviced by a wastewater treatment facility (WWTF), and areas where high numbers of failing septic tanks are present. This information is presented in **Figure 4.4** in map form. The data show there were 366 permits for repairs issued during this time in the watershed, or an average of 28.15 repairs per year. This estimate is considerably higher than that based on DoH countywide data.

Based on these data provided by JEA, which are more watershed specific than that of the countywide DoH data, there was an average of 28.15 permits issued in the watershed for septic tank repairs. If this estimate is rounded up to 30 (to allow for those septic tanks where failures may not be known or have not been repaired), and using 70 gallons/day/person (U.S. Environmental Protection Agency [USEPA], 2001), a loading of 2.12×10^{12} counts/day is derived, as shown in **Table 4.4.**

All of the watershed and surrounding areas are serviced by the Buckman Street WWTF. Approximately 20.4 percent (1.85 mi^2) of the septic tank repair permits are in a septic tank phase out area; mostly in the eastern portion of the watershed. These are areas where a historically high number of septic tanks have failed and therefore have the highest priority to be sewered to eliminate septic tanks. Of the 366 permits issued in the watershed, 266 (72.6 percent) are within a septic tank phase out area. As shown in **Table 4.4**, failing septic tanks present a potentially large load to the Ribault River.

Table 4.3. Estimation of Average Household Size in the Ribault River Watershed Area

Household Size	Number of Households	Percent of Total	Number of People
1-person household	2,081	24.65%	2,081
2-person household	2,503	29.65%	5,006
3-person household	1,642	19.45%	4,927
4-person household	1,184	14.02%	4,735
5-person household	597	7.08%	2,987
6-person household	264	3.12%	1,581
7-or-more-person household	171	2.03%	1,197
TOTAL:	**8,442**	**100.00%**	**22,514**
		AVERAGE HOUSEHOLD SIZE:	**2.67**

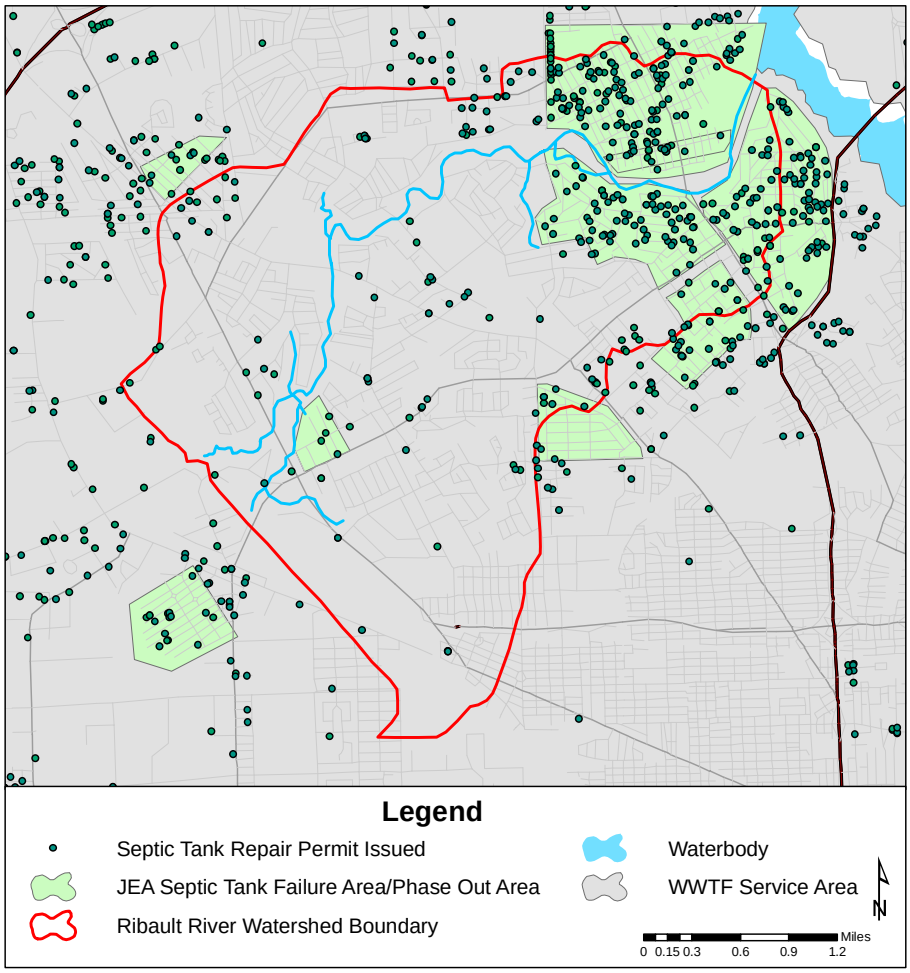
Data from U.S. Census Bureau web site, 2005, based on Duval County tracts which are present in the Ribault River watershed

Table 4.4. Estimation of Annual Fecal Coliform Loading from Failed Septic Tanks in the Ribault River Watershed

Estimated Population in Watershed	Estimated Number of Tank Failures[1]	Estimated Number Persons Per Household[3]	Gallons/ Person/ Day[2]	Estimated Load From Failed Tank[2]	Estimated Daily Load (counts/day)	Estimated Annual Load (counts/year)
22,514	30	2.67	70	1.00×10^4/mL	2.12×10^{11}	7.75×10^{13}

[1] Based on septic tank repair permits issued in the watershed from March 1990 – April 2004 (Fl. DoH and JEA information) – see text
[2] From EPA document "Protocol for Developing Pathogen TMDLs."
[3] From U.S Census Bureau, see Table 4.3 for more information on this estimate.

Figure 4.4. Septic Tank Repair Permits Issued March 1990 – April 2004 for Ribault River Area



Tributaries to the Ribault River

As mentioned in **Section 1.2**, there are two large tributaries to Ribault River – Six Mile Creek and Little Six Mile Creek (**Figure 1.2)**. The headwater of the Ribault River is the confluence of these two creeks.

The watershed for Six Mile Creek (WBID 3130) lies to the west of the Ribault River watershed (**Figure 1.3**). There were insufficient data to assess Six Mile Creek for fecal coliform impairment, but the available data for the creek are shown in Table 4.5, which also summarizes data for Little Six Mile Creek and for the Ribault. There were four values for Six Mile Creek, only one of which exceeded 400 counts/100 mL. Due to the lack of data, the impacts of Six Mile Creek on the Ribault River can not be assessed.

Little Six Mile Creek (WBID 2238) is also located to the west of the Ribault River watershed, below the Six Mile Creek watershed (see **Figure 1.3**). Unlike Six Mile Creek, there were sufficient data to assess Little Six Mile Creek for fecal coliforms, and Little Six Mile Creek was verified as impaired for fecal coliforms (and DO). Because Little Six Mile Creek was not on the 1998 303(d) list, it was assigned a lower priority for TMDL development, with a projected TMDL development date of 2008. However, due to the apparent effects of Little Six Mile Creek on the Ribault River, this TMDL may be completed ahead of schedule moved forward at the Department's discretion.

As shown in **Table 4.5**, the mean and median values, as well as the overall percent exceedance rate, are higher in Little Six Mile Creek than for the Ribault River. It is very likely that coliform levels in Little Six Mile Creek are impacting the Ribault River with respect to fecal coliforms, especially considering the overall percentage of exceedances is higher for Little Six Mile Creek. Six Mile Creek may also be impacting Ribault River, however, due to the lack of data its effect are harder to discern.

Table 4.5. Summary of Tributary Fecal Coliform Data

Station	N	Minimum	Maximum	Median	Mean	Exceedances	% Exceedances
SIXMILE CREEK	4	36	890	200	331	1	25.00%
LITTLE SIX MILE CREEK	48	92	340,000	500	9,814	32	66.67%
RIBAULT RIVER	84	0	160,000	300	3,384	35	41.67%

Values are #/100 mL, and represents all data from 1991 - 2004

Agricultural Sources

According to Level 3 land use there are no agricultural areas in the Ribault River watershed. As noted in **Section 4.2.2,** the majority of the land use (78 percent) consists of residential, commercial and services and other anthropogenic types.

Pets

While it is doubtful that agriculture has any influence on the basin, as the area is highly urbanized with a large number of people per square mile, it is very possible that pets, especially dogs, have an impact on the waterbody. The Department has been unable to obtain data on the numbers of dogs in the area; however, estimates can be made using literature based estimates of dog ownership rates (**Table 4.6)** using household-to-dog ratio estimates from the American Veterinary Medical

Association (AVMA). Assuming that coliforms from 10 percent of the estimated dog population reach the waterbody, and are viable upon reaching it, the approximate loading would be 1.52 x 10^{12} counts/day. This is an estimate, as the actual loading from dogs is not known.

Table 4.6. Estimated Loading from Dogs in the Ribault River Watershed

Estimated Number of Households	Estimated Household:Dog Ratio[1]	Estimated Total Dog Population in Watershed	Load Reaching Waterbody	Estimated Number of Pets with Impact to Creek	Estimated Counts/Pet/Day[2]	Estimated Daily Loading (counts/day)	Estimated Annual Loading (counts/year)
8,442	0.361	3,048	10%	305	5 x 10^{9}	1.52 X 10^{12}	5.56 X 10^{15}

[1] From the American Veterinary Medical Association website, which states the original source to be the "U.S Pet Ownership and Demographics Sourcebook," 2002.
[2] From EPA document, "Protocol for Developing Pathogen TMDLs," 2001.

Leaking or Overflowing Wastewater Collection Systems

As noted previously, it has been estimated that 57 percent of households in Duval County are connected to wastewater facilities. Assuming 8,442 homes in the watershed, with 2.67 people per household, and a 70 gallon per person per day discharge, and also assuming that the countywide average of 57 percent are connected to a WWTF applies in the Ribault River watershed, a daily flow of approximately 3.40 x 10^{6} L (0.899 MGD) is transported through the collection system. The EPA Protocol for Developing Pathogen TMDLs (EPA, 2001) suggests that a 5% leakage rate from collection systems is realistic. Based on this and EPA values for fecal coliforms in raw sewage, the potential loadings of fecal coliforms from leaking sewer lines are 8.51 x 10^{12} counts/day (**Table 4.7**).

Table 4.7. Estimated Loading from the Wastewater Collection Systems

Coliforms	Estimated Homes on Central Sewer	Estimated Daily Flow (L)	Daily Leakage (L)	Raw Sewage Counts/100ml	Estimated Daily Loading (counts/day)	Estimated Annual Loading (counts/year)
Fecal	4,812	3.39 x 10^{5}	1.70 x 10^{5}	5 x 10^{6}	8.51 X 10^{12}	3.11 X 10^{15}

4.3 Source Summary

Table 4.8 summarizes the various estimates from various 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, and temperature are just a few of the factors that could influence and determine the actual loadings from these sources that reach the Ribault River.

Table 4.8. Summary of Estimated Potential Coliform Loading From Various Sources in Miramar Creek Watershed

Source	Fecal Coliforms	
	Estimated Daily Load (counts/day)	Estimated Annual Load (counts/year)
Permitted Facilities	5.16 x 10^{9}	1.88x 10^{11}
Septic Tanks	2.12 x 10^{12}	7.75 x 10^{13}
Dogs	1.52 x 10^{12}	1.52 x 10^{14}
Wastewater Collection Systems	8.51 x 10^{12}	3.11 x 10^{15}

Chapter 5: DETERMINATION OF ASSIMILATIVE CAPACITY

5.1 Determination of Loading Capacity

This TMDL was developed using a "percent reduction" methodology. The Department generally prefers to use the load duration curve of "Kansas" method for coliform TMDLs. However, this method could not be used because there are no USGS stream gaging stations on the Ribault River. To determine the required reduction for this TMDL, the percent reduction that would be needed for each of the exceedances was determined using all available data, and the percent reduction needed to meet the state standard of 400 counts/100 mL was determined. The median value of all of these reductions determined the overall required reduction, and therefore the TMDL.

5.1.1 Data Used in the Determination of the TMDL

There are five sampling stations in the Ribault River watershed that have historical coliform observations **(Figure 5.1)**; however, two of the stations have only been visited once. The primary collector of historical data is the City of Jacksonville, which maintained a routine sampling sites at S.R. 115 (STORET ID: RR115) and on an unnamed tributary to the Ribault River at Palmdale Street (STORET ID: TR3). Some data were also collected by the Department. **Table 5.1** shows data collection information for each of the stations, and **Figure 5.1** shows the location of the sample sites. **Figure 5.2** is a chart showing the observed historical coliform data analysis, and **Appendix E** contains the historical fecal coliform observations from the sites. All data in the IWR database was considered in determining the TMDL.

Table 5.1. Sampling Station Summary for the Ribault River Watershed

Station	STORET ID	Station Owner[1]	Years With Data	N
*UNNAMED CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	21FLJXWQTR3	COJ	1991-1996; 1998-2002	39
RIBAULT R FERNANDO RD BR	21FLA 20030128	FDEP	2002	1
RIBAULT R MONCRIEF RD BR	21FLA 20030129	FDEP	1998	1
RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	21FLJXWQTR128	COJ	1991-1996; 1998-2002	39
RIBAULT RIVER AT SR 115 IN NORTH JAX	21FLSJWMRR115	SJRWMD	1993	4

[1]FDEP = Fl. Dept. of Env. Prot.; COJ = City of Jacksonville; SJRWMD = St. Johns River Water Management District
* This station is located on a tributary to Ribault River – see Figure 5.1

Table 5.2. Statistical Summary of Historical Data for Ribault River

Station	N	Minimum	Maximum	Median	Mean	Exceedances	% Exceedances
UNNAMED CREEK AT PALMDALE STREET NEAR RESTLAWN DR	39	20	160,000	152	4,690	10	25.64%
RIBAULT R FERNANDO RD BR	1	420	420	420	420	1	100.00%
RIBAULT R MONCRIEF RD BR	1	800	800	800	800	1	100.00%
RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	39	4	30,000	500	2,236	22	56.41%
RIBAULT RIVER AT SR 115 IN NORTH JAX	4	0	11,800	575	3,238	2	50.00%

Coliform concentrations are counts/100 mL

Figure 5.1. Historical Sample Sites in Ribault River Watershed

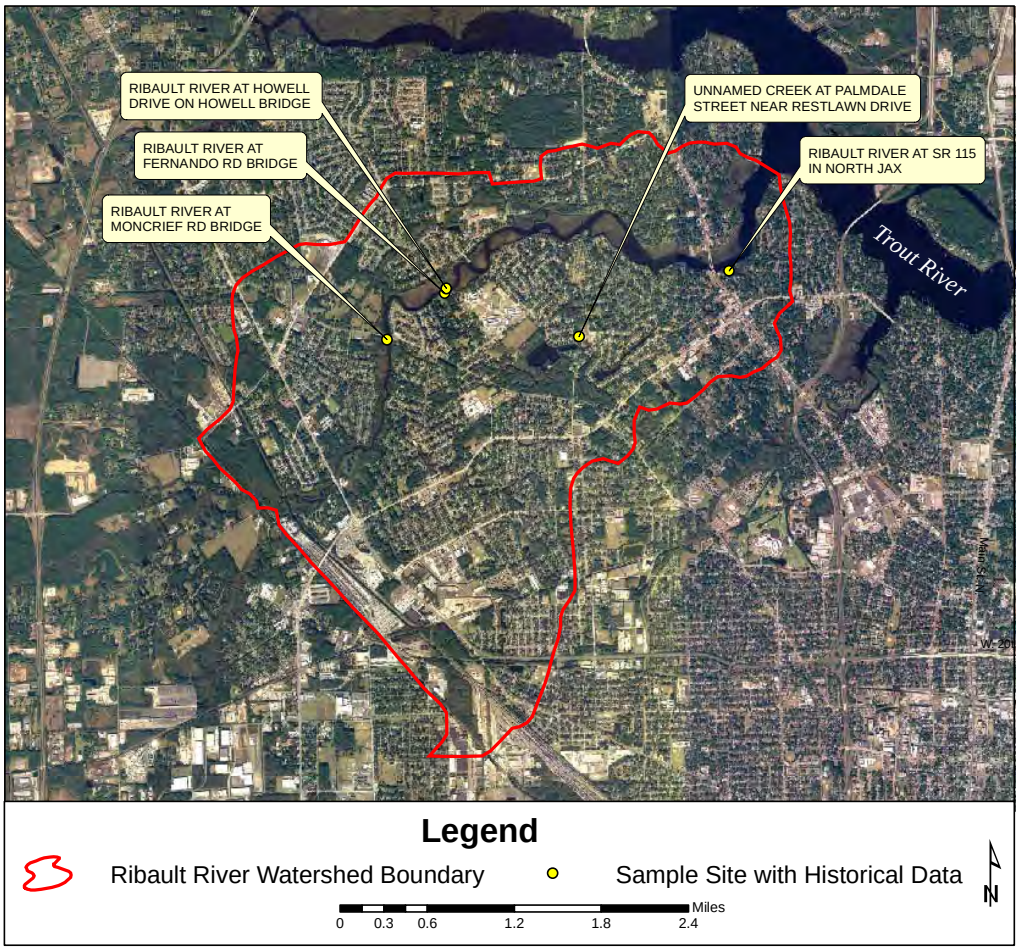
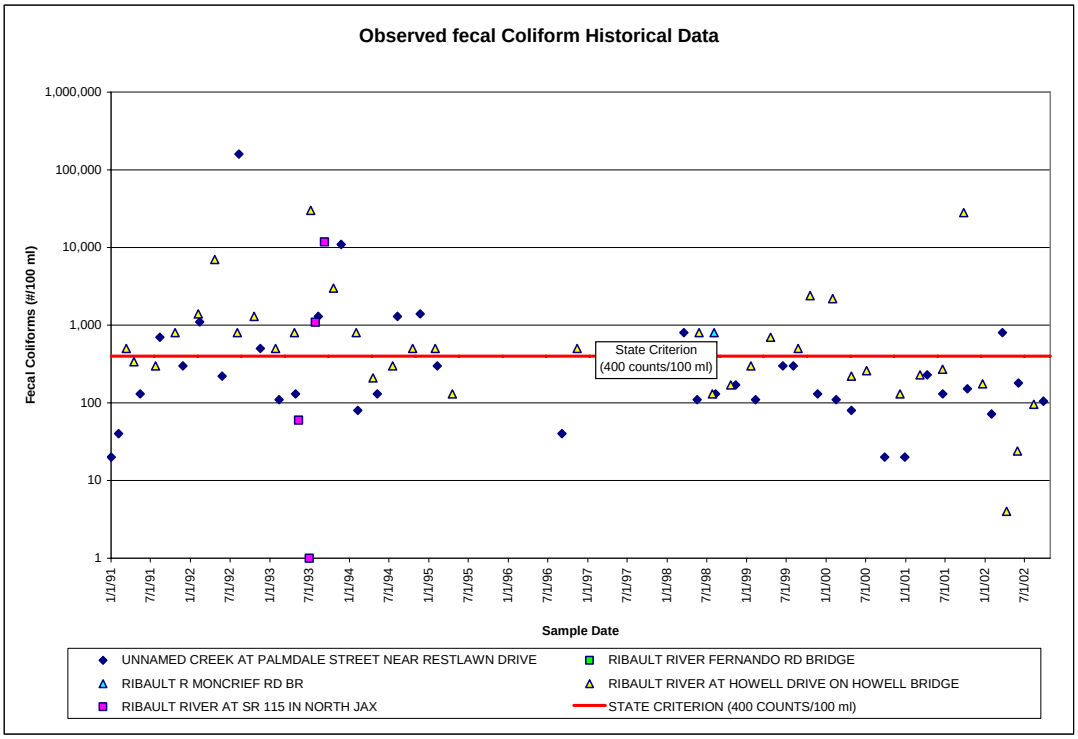


Figure 5.2. Historical Observations for Ribault River



5.1.2 TMDL Development Process

Due to the lack of supporting flow information, a simple calculation was performed to determine the needed reduction. Exceedances of the state criterion were compared to the criterion of 400 counts/100mL. For each individual exceedance, an individual required reduction was calculated using the following:

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

After the individual results were calculated, the median of the individual values was calculated, which is 50 percent. This means that, in order to meet the state criterion of 400 counts/100mL, a 50 percent reduction in current loadings are necessary, and is therefore the TMDL for the Ribault River. **Table 5.3** shows the individual calculations for the Ribault River, which includes all exceedances.

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

DATE	STATION	LOCATION	VALUE	REQUIRED REDUCTION
3/12/1991	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	500	20.00%
10/22/1991	21FLJXWQTR3	UNNAMED CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	700	42.86%
10/22/1991	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	800	50.00%
2/5/1992	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	1,400	71.43%
4/22/1992	21FLJXWQTR3	UNNAMED CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	1,100	63.64%
4/22/1992	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	7,000	94.29%
8/3/1992	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	800	50.00%
10/19/1992	21FLJXWQTR3	UNNAMED CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	160,000	99.75%
10/19/1992	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	1,300	69.23%
1/26/1993	21FLJXWQTR3	UNNAMED CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	500	20.00%
1/26/1993	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	500	20.00%
4/22/1993	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	800	50.00%
7/7/1993	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	30,000	98.67%
7/28/1993	21FLSJWMRR115	RIBAULT RIVER AT SR 115 IN NORTH JAX	1,090	63.30%
9/8/1993	21FLSJWMRR115	RIBAULT RIVER AT SR 115 IN NORTH JAX	11,800	96.61%
10/19/1993	21FLJXWQTR3	UNNAMED CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	1,300	69.23%
10/19/1993	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	3,000	86.67%
2/1/1994	21FLJXWQTR3	UNNAMED CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	11,000	96.36%
2/1/1994	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	800	50.00%
10/18/1994	21FLJXWQTR3	UNNAMED CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	1,300	69.23%
10/18/1994	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	500	20.00%
10/18/1994	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	500	20.00%
1/30/1995	21FLJXWQTR3	UNNAMED CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	1,400	71.43%
1/30/1995	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	500	20.00%
11/12/1996	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	500	20.00%
5/27/1998	21FLJXWQTR3	UNNAMED CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	800	50.00%
5/27/1998	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	800	50.00%
8/4/1998	21FLA 20030129	RIBAULT R MONCRIEF RD BR	800	50.00%
4/21/1999	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	700	42.86%
8/25/1999	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	500	20.00%
10/19/1999	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	2,400	83.33%
1/31/2000	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	2,200	81.82%
9/24/2001	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	28,000	98.57%
5/30/2002	21FLJXWQTR3	UNNAMED CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	801	50.06%
12/5/2002	21FLA 20030128	RIBAULT R FERNANDO RD BR	420	4.76%
12/5/2002	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	420	4.76%
		MEDIAN:	**800**	**50.00%**

5.1.3 Critical Conditions/Seasonality

Exceedances in the Ribault River cannot be associated with flows, as no flow data within the basin have been reported. Therefore, the effects of flow under various conditions cannot be determined or be considered as a critical condition. Historical fecal coliform observations in the Ribault River are provided in **Appendices E**. Coliform data have been presented by month, season, and year to determine whether certain patterns are evident in the data set.

A non-parametric test (Kruskal-Wallis) was applied to the fecal coliform dataset to determine whether there were significant differences among months or seasons. At an alpha (α) level of 0.05, there

were significant differences among months, but not among seasons (**Appendices F** and **G**). It is very difficult to evaluate possible patterns among months due to the small sample sizes. For example, the range in monthly observations varies from two to sixteen in a given month, with nine months having 10 or less observations. Grouping observations by season increased sample sizes for statistical comparison and, as seen in **Table 2.3**, fall (October – December) and winter (January – March) periods had the highest exceedance rates (both 56.25 percent), a likely factor that could contribute to these monthly or seasonal differences would be the pattern of rainfall. **Appendix H** shows these data visually.

Rainfall records for the Jacksonville International Airport (JIA) (**Appendix I** illustrates rainfall from 1990 – 2004) 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 two days (3D), the cumulative total for the day of and the previous six days (7D) were all paired with the respective coliform observation. A Spearman Correlation matrix was generated that summarizes the simple correlation coefficients between the various precipitation regimes and coliform values (**Appendix J**). The simple correlations (r values in the Spearman Correlation table) between coliforms and various rainfall totals were positive, suggesting that as rainfall (and possible runoff) increased, so did the number of coliforms.

Simple linear regressions were performed between coliform observations and rainfall to determine whether any of the relationships were significant at an α level of 0.05. Results indicate there is no significance to rainfall (**Appendix K**). As noted in the previous paragraph, the highest percentage of exceedances of fecal coliforms occurred between October and March. A table of monthly historical averaged rainfall (**Appendices L**) indicates that monthly rainfall totals increase in June and peak in September and by October return to levels observed in February and March. This appears to indicate that exceedances may not be rainfall driven to a great extent, as the least amount of rainfall typically occurs between October and March. **Appendix M** includes a chart of annual rainfall from 1955 – 2004 versus the long-term average (52.27 inches) over this period. The years of 1996 – 1998 represented above average rainfall years while the years 1999 – 2001 were below average and 2002 was again above average. In general, fecal coliform percent exceedances by year followed a similar pattern. The chart indicates that from 1993 – 2001 there was a general downward trend in the annual average rainfall and **Table 2.4** indicates that there was a downward trend in fecal coliform percent exceedances. Observations at individual stations were too limited to determine any spatial trends or patterns along the stream.

Since no flow data were available, hydrologic conditions were analyzed using rainfall instead. A loading curve type chart, that would normally be applied to flow events, was created using precipitation all data from JIA between 1990 – 2004. The chart was divided in the same manner as if flow was being analyzed, where extreme precipitation events represent the upper percentiles (0-5th percentile), followed by large precipitation events (5th – 15th percentile), medium precipitation events (15th – 40th percentile), small precipitation events (40th – 60th percentile), and no recordable precipitation events (60th – 100th percentile). Three day (day of and two days prior) precipitation accumulations were used in the analysis.

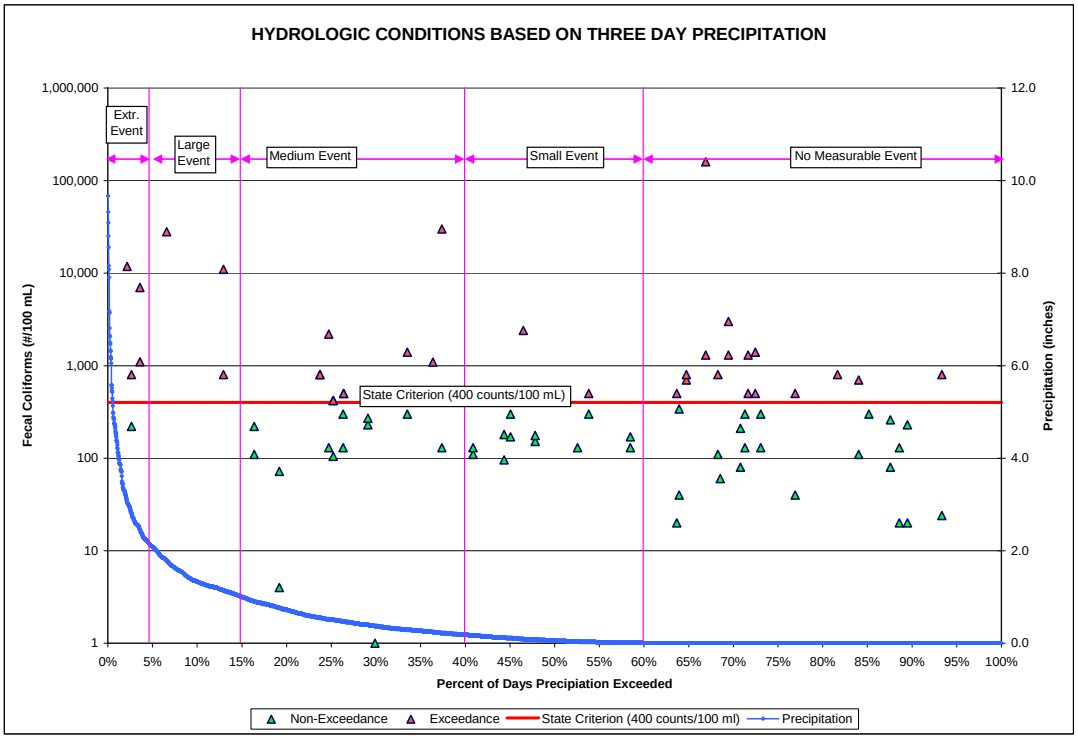
Data show that exceedances occurred over all hydrologic conditions; however, the least percentage of exceedances (14.29 percent) occurred under what would be considered medium precipitation events. The greatest percentage of exceedances (83.33 percent) occurred in extreme precipitation events. If a large percentage of exceedances occur during no measurable precipitation days, it is

suspected that point sources are contributing. Likewise, if a large percentage of exceedances are found to be occurring after large and extreme precipitation events, this may indicate that exceedances are more nonpoint source driven; perhaps from stormwater conveyance systems or various land uses. However, it is difficult to tell in the Ribault River, as there are a large number of exceedances at both ends of the chart, and fewer in the middle. This most likely indicates that there is a combination of factors contributing to exceedances. **Table 5.4** is a summary of data and hydrologic conditions, and **Figure 5.3** shows the same data visually.

Table 5.4. Summary of Fecal Coliform Data by Hydrologic Condition

Hydrologic Condition	Precipitation Range	Number of Values	Number of Exceedances	Percent Exceedance	Number of Non-Excedances	Percent Non-Exceedance
Extreme	>2.1"	5	4	80.00%	1	20.00%
Large	1.00" - 2.1"	1	1	100.00%	0	0.00%
Medium	0.18" - 1.00"	25	12	48.00%	13	52.00%
Small	0.01" - 0.18"	14	2	14.29%	12	85.71%
None/Not Measurable	<0.01"	37	16	43.24%	21	56.76%

Figure 5.3. Fecal Coliform Data by Hydrological Condition Based on Rainfall



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 (Waste Load 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:

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

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

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

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 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 Ribault River are expressed in terms of both counts per 100 mL and percent reduction, and represent the maximum daily fecal coliform load the creek can assimilate and maintain the applicable coliform criterion **(Table 6.1).**

Table 6.1. TMDL Components for the Ribault River

WBID	Parameter	TMDL (counts/100 mL)	WLA		LA (Percent Reduction)	MOS
			Wastewater (colonies/day)	NPDES Stormwater		
2224	Fecal Coliform	400	Point Sources Must Meet Permit Limits	50%	50%	Implicit

6.2 Load Allocation (LA)

A fecal coliform reduction of 50 percent is required from nonpoint sources. 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 (WLA)

6.3.1 NPDES Wastewater Discharges

As mentioned previously, there are three permitted wastewater facilities (Centurion Truck Plaza WWTF, Ideal Mobile Home Park WWTF, Produce Terminal of Jacksonville WWTF) with discharge permits allowing discharge to the Ribault River or waters that reach it. As part of this TMDL, these facilities, as well as any new facilities issued a discharge permit in the Ribault River watershed, will be required to meet state Class III criteria for fecal coliforms as well as the TMDL value, and therefore will not be allowed to exceed 200 counts/100 mL as a monthly average, or 400 counts/100 mL in more than 10 percent of the samples, or 800 at any given time.

6.3.2 NPDES Stormwater Discharges

The WLA for the City of Jacksonville and FDOT's MS4 permit is a 50 percent reduction in current anthropogenic fecal coliform loading. It should be noted that any MS4 permittee will only be responsible for reducing the loads associated with stormwater outfalls for which it owns or otherwise has responsible control, and is not responsible for reducing other nonpoint source loads within its jurisdiction.

WLAs are not provided for the facilities authorized to discharge stormwater under a general stormwater permit (Florida Wilbert, Inc., Georgia Southern and Florida Railway Company, Watkins Motor Lines Jacksonville, and the Jacksonville Amtrak Station) because they are not expected to be a significant source of coliforms.

6.4 Margin of Safety (MOS)

Consistent with the recommendations of the Allocation Technical Advisory Committee (FDEP, February 2001), an implicit margin of safety (MOS) was used in the development of this TMDL. A MOS was included in the TMDL by not allowing any exceedances of the state criterion, even though intermittent natural exceedances of the criterion would be expected and would be taken into account when determining impairment. Additionally, the TMDL calculated for fecal coliforms was based on meeting the water quality criterion of 400 counts/100 mL without any exceedances, while the actual criterion allows for 10 percent exceedances over the fecal coliform criterion.

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, which will be a component of the Basin Management Action Plan (BMAP) for Ribault 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:

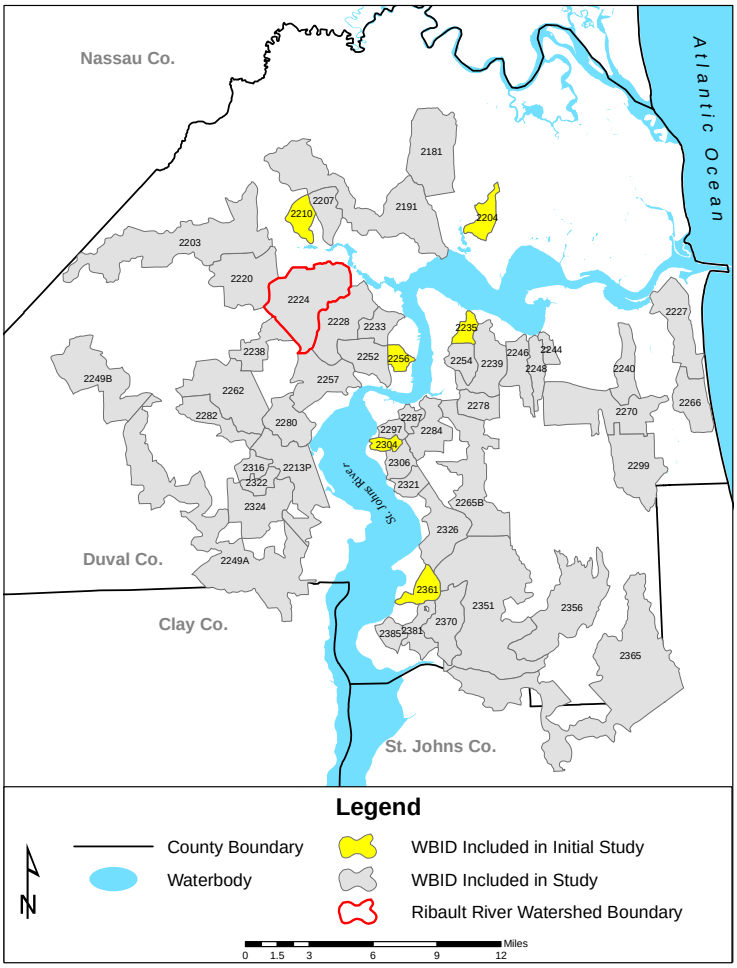
- Appropriate allocations among the affected parties,
- A description of the load reduction activities to be undertaken,
- Timetables for project implementation and completion,
- Funding mechanisms that may be utilized,
- Any applicable signed agreement,
- Local ordinances defining actions to be taken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

The BMAP for Ribault River will include the results of a project funded by JEA that will consider 51 drainage basins in the general area of the City of Jacksonville, which includes Ribault River. The project, known as the Tributary Pollution Assessment Project (TPAP), is directed by a Tributary Assessment Team (TAT) consisting of representatives from JEA, the Department, City of Jacksonville, Duval County Health Department, Water and Sewer Expansion Authority, U.S. Army Corps of Engineers, St. Johns River Keepers, and PBS & J, who is the primary contractor for the project.

The goal of the TPAP is to devise a standard manual that can be used for tributary sanitary surveys in the Duval County area. The manual will be developed by studying 6 of the 51 watersheds deemed to be of the highest priority by JEA and the contractors, along with a control watershed. After the manual has been developed, it will be applied to the remaining 45 watersheds, and may then be expanded to other watersheds in the Duval County area. The manual will be used to help better determine the health of these watersheds and to determine potential sources of contamination, especially with respect to fecal coliforms. This will help JEA, who is the sewer utility provider in the area, concentrate repair efforts and to identify those areas where failing septic tanks may be playing a role in contamination. The drainage basins included in this initial study are shown in **Figure 7.1**, and include:

- Big Davis Creek (2356)
- Big Fishwier Creek (2280)
- Blockhouse Creek (2207)
- Broward River (2191)
- Butcher Pen Creek (2322)
- Cedar River (2262)
- Christopher Branch (2321)
- Cormorant Branch (2381)
- Cow Head Creek (2244)
- Craig Creek (2297)
- Deep Bottom Creek (2361)
- Deer Creek (2256)
- Dunn Creek (2181)
- Durbin Creek (2365)
- Fishing Creek (2324)
- Gin House Creek (2248)
- Goodbys Creek (2326)
- Greenfield Creek (2240)
- Hogan Creek (2252)
- Hogpen Creek (2270)
- Hopkins Creek (2266)
- Jones Creek (2246)
- Julington Creek (2351)
- Little Potsburg Creek (2284)
- Little Sixmile Creek (2238)
- Long Branch (2233)
- Mandarin Drain (2385)
- McCoy Creek (2257)
- McGirts Creek (2249B)
- Miller Creek (2287)
- Miramar Creek (2304)
- Moncrief Creek (2228)
- New Castle Creek (2235)
- New Rose Creek (2306)
- Nine Mile Creek (2220)
- Oldfield Creek (2370)
- Open Creek (2299)
- Ortega River (2213P)
- Ortega River (2249A)
- Potsburg Creek (2265B)
- Red Bay Branch (2254)
- Ribault River (2224)
- Sherman Creek (2227)
- Silversmith Creek (2278)
- Sixmile Reach (2232)
- Strawberry Creek (2239)
- Terrapin Creek (2204)
- Trout River (2203)
- West Branch (2210)
- Williamson Creek (2316)
- Wills Branch (2282)

Figure 7.1. Map of WBIDs included in the TPAP study



The WBIDs included in this study have been categorized based on the primary land use (SJRWMD 2000 data) in the WBID – urban, suburban, or rural. Further efforts were made to identify potential sources of fecal coliform contamination based on land uses, JEA information, and survey data. The WBIDs were then prioritized based on this, as well as existing data. Six WBIDs of highest concern were selected for the initial study (3 urban, 2 suburban, and 1 rural). At the time this document was compiled, a control waterbody had yet to be selected.

Initial sampling for the study is set to begin on the six initial WBIDs on July 26, 2005 and end on February 1, 2006. The final deliverable (manual) will be submitted to JEA on June 1, 2006, and will be available for public review and comment on June 16, 2006. Four types of fecal indicators (fecal coliforms, *E. coli*., *Enterococci*, and coliphages) will be studied. *Enterococcus faecalis* will be studied in an attempt to further identify potential sources of sewage, and samples will be checked for human/ruminant primers. In addition, optical brighteners (using fluorometric techniques) will be included to bolster potential sewage sources input identification.

The executive summary submitted to the Department by JEA and PBS & J is attached as **Appendix N**. It is expected that the results of this study will be used to help guide identification of restoration projects during BMAP development. In addition to addressing failing septic tanks, BMAP plans may include some sort of public education in picking up after dogs. As shown in **Table 4.6**, potential impacts from dogs could be significant. If pet owners are educated on the potential impacts their pets are having on the Ribault River, and they are inclined to take action, this could potentially decrease a source load.

In addition, exceedances in Six Mile and Little Six Mile Creeks, both tributaries to Ribault River, will need to be addressed. This would most likely include data collection, and further analysis of the basin to identify potential sources of fecal coliforms. Although, Little Six Mile Creek is currently verified impaired for fecal coliforms, any TMDL would, at this time, not be addressed until 2008. The Department and EPA may use their discretion and address this issue before 2008, because it is a potentially significant load to the Ribault River.

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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 Chapter 62-40, F.A.C.

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

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

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

Appendix B: Fecal and Flow Data from Ideal Mobile Home Park WWTF

Facility ID	Facility Name	Monitoring Date	Monthly Average Flow (MGD)	Monthly Geometric Mean Fecal Coliform Count (#/100 mL)[1]	Maximum Estimated Loading (colonies/day)[1]
FL0023426	IDEAL TRL PARK-JAX	9/30/97			
FL0023426	IDEAL TRL PARK-JAX	10/31/97	0.006	<2	4.54E+07
FL0023426	IDEAL TRL PARK-JAX	11/30/97	0.005	3.08	5.83E+07
FL0023426	IDEAL TRL PARK-JAX	12/31/97	0.004	8	1.21E+08
FL0023426	IDEAL TRL PARK-JAX	1/31/98	0.004	1.99	3.01E+07
FL0023426	IDEAL TRL PARK-JAX	2/28/98	0.004	8.0	1.21E+08
FL0023426	IDEAL TRL PARK-JAX	3/31/98	0.004	2.0	3.03E+07
FL0023426	IDEAL TRL PARK-JAX	4/30/98	0.004	50	7.57E+08
FL0023426	IDEAL TRL PARK-JAX	5/31/98	0.004	<2	3.03E+07
FL0023426	IDEAL TRL PARK-JAX	6/30/98	0.003	<2	2.27E+07
FL0023426	IDEAL TRL PARK-JAX	7/31/98	0.003	<2	2.27E+07
FL0023426	IDEAL TRL PARK-JAX	8/31/98			
FL0023426	IDEAL TRL PARK-JAX	9/30/98	0.003	< 2	2.27E+07
FL0023426	IDEAL TRL PARK-JAX	10/31/98			
FL0023426	IDEAL TRL PARK-JAX	11/30/98	0.002	8.0	6.06E+07
FL0023426	IDEAL TRL PARK-JAX	12/31/98	0.002	<2	1.51E+07
FL0023426	IDEAL TRL PARK-JAX	1/31/99	0.004	130	1.97E+09
FL0023426	IDEAL TRL PARK-JAX	2/28/99	0.003	<2	2.27E+07
FL0023426	IDEAL TRL PARK-JAX	3/31/99	0.003		
FL0023426	IDEAL TRL PARK-JAX	4/30/99	0.003	<2	2.27E+07
FL0023426	IDEAL TRL PARK-JAX	5/31/99			
FL0023426	IDEAL TRL PARK-JAX	6/30/99	0.003	<2	2.27E+07
FL0023426	IDEAL TRL PARK-JAX	7/31/99	0.003	<2	2.27E+07
FL0023426	IDEAL TRL PARK-JAX	8/31/99	0.003	4.0	4.54E+07
FL0023426	IDEAL TRL PARK-JAX	9/30/99	0.003	<2	2.27E+07
FL0023426	IDEAL TRL PARK-JAX	10/31/99	0.003	30.0	3.41E+08
FL0023426	IDEAL TRL PARK-JAX	11/30/99	0.003		
FL0023426	IDEAL TRL PARK-JAX	12/31/99	0.003	23.0	2.61E+08
FL0023426	IDEAL TRL PARK-JAX	1/31/2000	0.004		0.00E+00
FL0023426	IDEAL TRL PARK-JAX	2/29/2000	0.002	2.0	1.51E+07
FL0023426	IDEAL TRL PARK-JAX	3/31/2000	0.003		
FL0023426	IDEAL TRL PARK-JAX	4/30/2000	0.003		
FL0023426	IDEAL TRL PARK-JAX	5/31/2000	0.004		
FL0023426	IDEAL TRL PARK-JAX	6/30/2000	0.003		
FL0023426	IDEAL TRL PARK-JAX	7/31/2000	0.003		
FL0023426	IDEAL TRL PARK-JAX	8/31/2000	0.004		
FL0023426	IDEAL TRL PARK-JAX	9/30/2000	0.004		
FL0023426	IDEAL TRL PARK-JAX	10/31/2000	0.003		
FL0023426	IDEAL TRL PARK-JAX	11/30/2000	0.003		
FL0023426	IDEAL TRL PARK-JAX	12/31/2000	0.003		
FL0023426	IDEAL TRL PARK-JAX	1/31/2001	0.003		
FL0023426	IDEAL TRL PARK-JAX	2/28/2001	0.003	7.0	7.95E+07
FL0023426	IDEAL TRL PARK-JAX	3/31/2001	0.002	4.0	3.03E+07
FL0023426	IDEAL TRL PARK-JAX	4/30/2001	0.003	0	0.00E+00
FL0023426	IDEAL TRL PARK-JAX	5/31/2001	0.003	30.0	3.41E+08
FL0023426	IDEAL TRL PARK-JAX	6/30/2001	0.003	0	0.00E+00
FL0023426	IDEAL TRL PARK-JAX	7/31/2001	0.003	2	2.27E+07
FL0023426	IDEAL TRL PARK-JAX	8/31/2001	0.003	0	0.00E+00
FL0023426	IDEAL TRL PARK-JAX	9/30/2001	0.003	0	0.00E+00
FL0023426	IDEAL TRL PARK-JAX	9/30/2001	0.003	0	0.00E+00

Appendix B: Fecal and Flow Data from Ideal Mobile Home Park WWTF (continued)

Facility ID	Facility Name	Monitoring Date	Monthly Average Flow (MGD)	Monthly Geometric Mean Fecal Coliform Count (#/100 mL)[1]	Maximum Estimated Loading (colonies/day)[1]
FL0023426	IDEAL TRL PARK-JAX	10/31/2001			
FL0023426	IDEAL TRL PARK-JAX	11/30/2001	0.002		
FL0023426	IDEAL TRL PARK-JAX	12/31/2001	0.002	4.0	3.03E+07
FL0023426	IDEAL TRL PARK-JAX	1/31/2002	0.003	1.99	2.26E+07
FL0023426	IDEAL TRL PARK-JAX	1/31/2002	0.003	1.99	2.26E+07
FL0023426	IDEAL TRL PARK-JAX	2/28/2002	0.002		
FL0023426	IDEAL TRL PARK-JAX	3/31/2002	0.002	4.0	3.03E+07
FL0023426	IDEAL TRL PARK-JAX	4/30/2002	0.002		
FL0023426	IDEAL TRL PARK-JAX	5/31/2002	0.003		
FL0023426	IDEAL TRL PARK-JAX	6/30/2002	0.003	2	2.27E+07
FL0023426	IDEAL TRL PARK-JAX	7/31/2002	0.003		
FL0023426	IDEAL TRL PARK-JAX	8/31/2002	0.003	2.0	2.27E+07
FL0023426	IDEAL TRL PARK-JAX	9/30/2002	0.203		
FL0023426	IDEAL TRL PARK-JAX	10/31/2002	0.003		
FL0023426	IDEAL TRL PARK-JAX	11/30/2002	0.002		
FL0023426	IDEAL TRL PARK-JAX	12/31/2002	0.003		
FL0023426	IDEAL TRL PARK-JAX	1/31/2003	0.002		
FL0023426	IDEAL TRL PARK-JAX	2/28/2003	0.003		
FL0023426	IDEAL TRL PARK-JAX	3/31/2003	0.003		
FL0023426	IDEAL TRL PARK-JAX	4/30/2003	0.002		
FL0023426	IDEAL TRL PARK-JAX	5/31/2003	0.003		
FL0023426	IDEAL TRL PARK-JAX	6/30/2003	0.003		
FL0023426	IDEAL TRL PARK-JAX	7/31/2003	0.003		
FL0023426	IDEAL TRL PARK-JAX	8/31/2003	0.003		
FL0023426	IDEAL TRL PARK-JAX	9/30/2003	0.003		
FL0023426	IDEAL TRL PARK-JAX	10/31/2003	0.003		
FL0023426	IDEAL TRL PARK-JAX	11/30/2003	0.002		
FL0023426	IDEAL TRL PARK-JAX	12/31/2003	0.003	7.0	7.95E+07
FL0023426	IDEAL TRL PARK-JAX	1/31/2004	0.002		
FL0023426	IDEAL TRL PARK-JAX	2/29/2004	0.002		
FL0023426	IDEAL TRL PARK-JAX	3/31/2004	0.002	4.0	3.03E+07
FL0023426	IDEAL TRL PARK-JAX	4/30/2004	0.003	400	4.54E+09
FL0023426	IDEAL TRL PARK-JAX	5/31/2004	0.003	4.0	4.54E+07
FL0023426	IDEAL TRL PARK-JAX	6/30/2004	0.003	4.0	4.54E+07
FL0023426	IDEAL TRL PARK-JAX	7/31/2004	0.003		
FL0023426	IDEAL TRL PARK-JAX	8/31/2004	0.003		
FL0023426	IDEAL TRL PARK-JAX	9/30/2004	0.003		
FL0023426	IDEAL TRL PARK-JAX	10/31/2004	0.003		
FL0023426	IDEAL TRL PARK-JAX	11/30/2004	0.003		
FL0023426	IDEAL TRL PARK-JAX	12/31/2004	0.003		

[1]This table represents data submitted to the Department and which was put into the Permit Compliance System (PCS). Empty cells represent missing data that were either not reported to the Department, or there was no measurable flow for that month.

Appendix C: Fecal and Flow Data from Produce Terminal of Jacksonville WWTF

Facility ID	Facility Name	Monitoring Date	Monthly Average Flow (MGD)[1]	Daily Maximum Fecal Coliform Count (#/100 mL)[1]	Maximum Estimated Loading (counts/day)[1]
FL0033405	PRODUCE TERM OF JAX	1/31/93	.001	< 1	3.79E+06
FL0033405	PRODUCE TERM OF JAX	3/31/93	.002	110	8.33E+08
FL0033405	PRODUCE TERM OF JAX	4/30/93	.002	4	3.03E+07
FL0033405	PRODUCE TERM OF JAX	5/31/93	.0018	< 1	6.81E+06
FL0033405	PRODUCE TERM OF JAX	6/30/93	.002	4	3.03E+07
FL0033405	PRODUCE TERM OF JAX	7/31/93	.002	< 1	7.57E+06
FL0033405	PRODUCE TERM OF JAX	8/31/93	.002	< 1	7.57E+06
FL0033405	PRODUCE TERM OF JAX	9/30/93	.0025	1	9.46E+06
FL0033405	PRODUCE TERM OF JAX	10/31/93	.0027	54	5.52E+08
FL0033405	PRODUCE TERM OF JAX	11/30/93	.0025	< 1	9.46E+06
FL0033405	PRODUCE TERM OF JAX	12/31/93	.0017	< 1	6.43E+06
FL0033405	PRODUCE TERM OF JAX	1/31/94	.0019	< 1	7.19E+06
FL0033405	PRODUCE TERM OF JAX	2/28/94	.0009	14	4.77E+07
FL0033405	PRODUCE TERM OF JAX	3/31/94	.0009	< 1	3.41E+06
FL0033405	PRODUCE TERM OF JAX	4/30/94	.0014	< 1	5.30E+06
FL0033405	PRODUCE TERM OF JAX	5/31/94	.0016	< 1	6.06E+06
FL0033405	PRODUCE TERM OF JAX	6/30/94	.0010	10	3.79E+07
FL0033405	PRODUCE TERM OF JAX	7/31/94	.0011	< 1	4.16E+06
FL0033405	PRODUCE TERM OF JAX	8/31/94	.0010	< 1	3.79E+06
FL0033405	PRODUCE TERM OF JAX	9/30/94	.0012	< 1	4.54E+06
FL0033405	PRODUCE TERM OF JAX	10/31/94	.0008	< 1	3.03E+06
FL0033405	PRODUCE TERM OF JAX	12/31/94	.001	< 1	3.79E+06
FL0033405	PRODUCE TERM OF JAX	1/31/95	.0010	< 1	3.79E+06
FL0033405	PRODUCE TERM OF JAX	3/31/95	.0014	< 1	5.30E+06
FL0033405	PRODUCE TERM OF JAX	4/30/95	.0013	< 1	4.92E+06
FL0033405	PRODUCE TERM OF JAX	5/31/95	.0010	<1	3.79E+06
FL0033405	PRODUCE TERM OF JAX	6/30/95	.0009	4.0	1.36E+07
FL0033405	PRODUCE TERM OF JAX	7/31/95	.0012	<1	4.54E+06
FL0033405	PRODUCE TERM OF JAX	8/31/95	.0011	<1	4.16E+06
FL0033405	PRODUCE TERM OF JAX	9/30/95	.0012	<1	4.54E+06
FL0033405	PRODUCE TERM OF JAX	10/31/95	.0012	<1	4.54E+06
FL0033405	PRODUCE TERM OF JAX	11/30/95	.0011	<1	4.16E+06
FL0033405	PRODUCE TERM OF JAX	12/31/95	.0011	<1	4.16E+06
FL0033405	PRODUCE TERM OF JAX	1/31/96	.0010	<1	3.79E+06
FL0033405	PRODUCE TERM OF JAX	2/29/96	.0009	2	6.81E+06
FL0033405	PRODUCE TERM OF JAX	3/31/96	.0008	1	3.03E+06
FL0033405	PRODUCE TERM OF JAX	4/30/96	.0019	5	3.60E+07
FL0033405	PRODUCE TERM OF JAX	5/31/96	.0009	7	2.38E+08
FL0033405	PRODUCE TERM OF JAX	6/30/96	.0023	<1	8.71E+06
FL0033405	PRODUCE TERM OF JAX	7/31/96			
FL0033405	PRODUCE TERM OF JAX	8/31/96			
FL0033405	PRODUCE TERM OF JAX	9/30/96			
FL0033405	PRODUCE TERM OF JAX	10/31/96			
FL0033405	PRODUCE TERM OF JAX	11/30/96	0.001	6000	2.27E+10
FL0033405	PRODUCE TERM OF JAX	12/31/96	0.0015		
FL0033405	PRODUCE TERM OF JAX	1/31/97		2	
FL0033405	PRODUCE TERM OF JAX	2/28/97	0.0015		
FL0033405	PRODUCE TERM OF JAX	3/31/97		6	
FL0033405	PRODUCE TERM OF JAX	4/30/97	.0012		
FL0033405	PRODUCE TERM OF JAX	5/31/97	.0009		
FL0033405	PRODUCE TERM OF JAX	6/30/97	.0011		

Appendix C: Fecal and Flow Data from Produce Terminal of Jacksonville WWTF (continued)

Facility ID	Facility Name	Monitoring Date	Monthly Average Flow (MGD)[1]	Daily Maximum Fecal Coliform Count (#/100 mL)[1]	Maximum Estimated Loading (colonies/day)[1]
FL0033405	PRODUCE TERM OF JAX	7/31/97	.0010		
FL0033405	PRODUCE TERM OF JAX	8/31/97	.0007		
FL0033405	PRODUCE TERM OF JAX	9/30/97	.0010		
FL0033405	PRODUCE TERM OF JAX	10/31/97	.0018		
FL0033405	PRODUCE TERM OF JAX	11/30/97	.0010		
FL0033405	PRODUCE TERM OF JAX	12/31/97	.0018		
FL0033405	PRODUCE TERM OF JAX	1/31/98	.0019		
FL0033405	PRODUCE TERM OF JAX	3/31/98	.0018		
FL0033405	PRODUCE TERM OF JAX	4/30/98	.0024		
FL0033405	PRODUCE TERM OF JAX	5/31/98	.0017		
FL0033405	PRODUCE TERM OF JAX	6/30/98	.0015		
FL0033405	PRODUCE TERM OF JAX	7/31/98	.0024		
FL0033405	PRODUCE TERM OF JAX	8/31/98	.0015		
FL0033405	PRODUCE TERM OF JAX	9/30/98	.0013	42	2.07E+08
FL0033405	PRODUCE TERM OF JAX	10/31/98	0.0006	21.5	4.88E+07
FL0033405	PRODUCE TERM OF JAX	11/30/98	.0008	11.25	3.41E+07
FL0033405	PRODUCE TERM OF JAX	12/31/98	.0015	6.12	3.47E+07
FL0033405	PRODUCE TERM OF JAX	1/31/99	.0007	2.81	7.45E+06
FL0033405	PRODUCE TERM OF JAX	2/28/99	.0007	3.56	9.43E+06
FL0033405	PRODUCE TERM OF JAX	3/31/99	.0006	2.78	6.31E+06
FL0033405	PRODUCE TERM OF JAX	4/30/99	.0032	1.89	2.29E+07
FL0033405	PRODUCE TERM OF JAX	5/31/99	.0006	1.44	3.27E+06
FL0033405	PRODUCE TERM OF JAX	6/30/99		1	
FL0033405	PRODUCE TERM OF JAX	7/31/99	.0005	60	1.14E+08
FL0033405	PRODUCE TERM OF JAX	8/31/99	.0005	1	1.89E+06
FL0033405	PRODUCE TERM OF JAX	9/30/99	.0011	13.68	5.70E+08
FL0033405	PRODUCE TERM OF JAX	10/31/99	.0012	<1	4.54E+06
FL0033405	PRODUCE TERM OF JAX	11/30/99	.0011	<1	4.16E+06
FL0033405	PRODUCE TERM OF JAX	12/31/99	.005	0	0.00E+00
FL0033405	PRODUCE TERM OF JAX	1/31/00	.0006	1.79	4.07E+06
FL0033405	PRODUCE TERM OF JAX	2/29/00	.0005	1	1.89E+06
FL0033405	PRODUCE TERM OF JAX	3/31/00	.00039	1	1.48E+06
FL0033405	PRODUCE TERM OF JAX	4/30/00	.00039	1	1.48E+06
FL0033405	PRODUCE TERM OF JAX	5/31/00	.00030	1	1.14E+06
FL0033405	PRODUCE TERM OF JAX	6/30/00	.0002	1	7.57E+05
FL0033405	PRODUCE TERM OF JAX	7/31/00	.0005	12	2.27E+07
FL0033405	PRODUCE TERM OF JAX	8/31/00	.0003	38	4.32E+07
FL0033405	PRODUCE TERM OF JAX	9/30/00	.0006		
FL0033405	PRODUCE TERM OF JAX	10/31/00	.0006		
FL0033405	PRODUCE TERM OF JAX	11/30/00	.0005		
FL0033405	PRODUCE TERM OF JAX	12/31/00	.0005		
FL0033405	PRODUCE TERM OF JAX	1/31/01	.0001		
FL0033405	PRODUCE TERM OF JAX	4/30/01	.0006		
FL0033405	PRODUCE TERM OF JAX	6/30/01	0.009		
FL0033405	PRODUCE TERM OF JAX	7/31/01	.0014		
FL0033405	PRODUCE TERM OF JAX	8/31/01	.001	1	3.79E+06
FL0033405	PRODUCE TERM OF JAX	9/30/01	.0012	12.74	5.79E+07
FL0033405	PRODUCE TERM OF JAX	9/30/01	.0012	12.74	5.79E+07
FL0033405	PRODUCE TERM OF JAX	10/31/01			
FL0033405	PRODUCE TERM OF JAX	11/30/01	.0007		

Appendix C: Fecal and Flow Data from Produce Terminal of Jacksonville WWTF (continued)

Facility ID	Facility Name	Monitoring Date	Monthly Average Flow (MGD)[1]	Daily Maximum Fecal Coliform Count (#/100 mL)[1]	Maximum Estimated Loading (colonies/day)[1]
FL0033405	PRODUCE TERM OF JAX	12/31/01	.0008		
FL0033405	PRODUCE TERM OF JAX	1/31/02	.001	100	3.79E+08
FL0033405	PRODUCE TERM OF JAX	2/28/02	.0009	26.25	8.94E+07
FL0033405	PRODUCE TERM OF JAX	3/31/02	.0007	2.85	7.55E+06
FL0033405	PRODUCE TERM OF JAX	4/30/02	.0005		
FL0033405	PRODUCE TERM OF JAX	5/31/02	.0012		
FL0033405	PRODUCE TERM OF JAX	6/30/02	.001		
FL0033405	PRODUCE TERM OF JAX	7/31/02	.0010		
FL0033405	PRODUCE TERM OF JAX	8/31/02	.0009	2.0	6.81E+06
FL0033405	PRODUCE TERM OF JAX	9/30/02	.0011	2.08	8.66E+06
FL0033405	PRODUCE TERM OF JAX	10/31/02	.001		
FL0033405	PRODUCE TERM OF JAX	11/30/02	.0006		
FL0033405	PRODUCE TERM OF JAX	12/31/02	.0003		
FL0033405	PRODUCE TERM OF JAX	1/31/03	.002		
FL0033405	PRODUCE TERM OF JAX	2/28/03	.0025	38	3.60E+08
FL0033405	PRODUCE TERM OF JAX	3/31/03	.0015		
FL0033405	PRODUCE TERM OF JAX	4/30/03	.0007		
FL0033405	PRODUCE TERM OF JAX	5/31/03	.0007	1.0	2.65E+06
FL0033405	PRODUCE TERM OF JAX	6/30/03	.0013		
FL0033405	PRODUCE TERM OF JAX	7/31/03	.0016		
FL0033405	PRODUCE TERM OF JAX	8/31/03	.0008		
FL0033405	PRODUCE TERM OF JAX	9/30/03	.0009		
FL0033405	PRODUCE TERM OF JAX	10/31/03	.003		
FL0033405	PRODUCE TERM OF JAX	11/30/03	.003		
FL0033405	PRODUCE TERM OF JAX	12/31/03	.0036		
FL0033405	PRODUCE TERM OF JAX	1/31/04	.0004		
FL0033405	PRODUCE TERM OF JAX	2/29/04	.0015		
FL0033405	PRODUCE TERM OF JAX	3/31/04	.0016		
FL0033405	PRODUCE TERM OF JAX	4/30/04	.0015		
FL0033405	PRODUCE TERM OF JAX	5/31/04	.001		
FL0033405	PRODUCE TERM OF JAX	6/30/04	.002		
FL0033405	PRODUCE TERM OF JAX	7/31/04	.0015		
FL0033405	PRODUCE TERM OF JAX	8/31/04			
FL0033405	PRODUCE TERM OF JAX	9/30/04			
FL0033405	PRODUCE TERM OF JAX	10/31/04	.0008		
FL0033405	PRODUCE TERM OF JAX	11/30/04			
FL0033405	PRODUCE TERM OF JAX	12/31/04			

Cells shade in gray represent exceedances of the permitted capacity

[1]This table represents data submitted to the Department and which was put into the Permit Compliance System (PCS). Empty cells represent missing data that were either not reported to the Department, or there was no measurable flow for that month.

Appendix D: Fecal and Flow Data from Centurion Truck Plaza WWTF

Facility ID	Facility Name	Monitoring Date	Flow (MGD)	Statistical Flow Base	Monthly Geometric Mean Fecal Coliform Count (#/100 mL)[1]	Maximum Estimated Loading (colonies/day)[1]
FL0042421	CENTURION TRUCK PLAZA	2/28/93	.033	MO AVG	100	1.25E+10
FL0042421	CENTURION TRUCK PLAZA	3/31/93		MO AVG		
FL0042421	CENTURION TRUCK PLAZA	4/30/93	.016	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	5/31/93	.014	MO AVG	100	5.30E+09
FL0042421	CENTURION TRUCK PLAZA	6/30/93		MO AVG		
FL0042421	CENTURION TRUCK PLAZA	7/31/93	.0084	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	8/31/93		MO AVG	10	
FL0042421	CENTURION TRUCK PLAZA	9/30/93	.0085	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	10/31/93	.010	MO AVG	10	3.79E+08
FL0042421	CENTURION TRUCK PLAZA	11/30/93	.0067	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	12/31/93	.0048	MO AVG	10	1.82E+08
FL0042421	CENTURION TRUCK PLAZA	1/31/94	.0065	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	2/28/94	.0050	MO AVG	10	1.89E+08
FL0042421	CENTURION TRUCK PLAZA	3/31/94	.0066	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	4/30/94	.0046	MO AVG	2	3.48E+07
FL0042421	CENTURION TRUCK PLAZA	5/31/94	.0055	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	6/30/94	.0051	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	7/31/94	.0053	MO AVG	2	4.01E+07
FL0042421	CENTURION TRUCK PLAZA	8/31/94	.0065	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	9/30/94	.0051	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	10/31/94	.0066	MO AVG	4	9.99E+07
FL0042421	CENTURION TRUCK PLAZA	11/30/94	.0059	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	12/31/94	.0008	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	1/31/95	.0043	MO AVG	87	1.42E+09
FL0042421	CENTURION TRUCK PLAZA	2/28/95	0.016	MO AVG	4	2.44E+08
FL0042421	CENTURION TRUCK PLAZA	3/31/95	.0095	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	4/30/95	.0088	MO AVG	4	1.33E+08
FL0042421	CENTURION TRUCK PLAZA	5/31/95	.0029	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	6/30/95	.0040	MO AVG	36	5.45E+08
FL0042421	CENTURION TRUCK PLAZA	7/31/95	.0072	MO AVG	4	1.09E+08
FL0042421	CENTURION TRUCK PLAZA	8/31/95		MO AVG		
FL0042421	CENTURION TRUCK PLAZA	9/30/95	.0070	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	7/31/96		ANNL AVG		
FL0042421	CENTURION TRUCK PLAZA	8/31/96	.0067	ANNL AVG	4	1.01E+08
FL0042421	CENTURION TRUCK PLAZA	9/30/96	.01	ANNL AVG	4	1.51E+08
FL0042421	CENTURION TRUCK PLAZA	10/31/96	.01	ANNL AVG	4	1.51E+08
FL0042421	CENTURION TRUCK PLAZA	11/30/96	.01	ANNL AVG	4	1.51E+08
FL0042421	CENTURION TRUCK PLAZA	12/31/96	.01	ANNL AVG	1	3.79E+07
FL0042421	CENTURION TRUCK PLAZA	1/31/97	.01	ANNL AVG		
FL0042421	CENTURION TRUCK PLAZA	2/28/97	.01	ANNL AVG		
FL0042421	CENTURION TRUCK PLAZA	3/31/97	.01	ANNL AVG		
FL0042421	CENTURION TRUCK PLAZA	4/30/97	.01	ANNL AVG		
FL0042421	CENTURION TRUCK PLAZA	5/31/97	.01	ANNL AVG		
FL0042421	CENTURION TRUCK PLAZA	6/30/97	.01	ANNL AVG		
FL0042421	CENTURION TRUCK PLAZA	7/31/97	.01	ANNL AVG		
FL0042421	CENTURION TRUCK PLAZA	8/31/97	.01	ANNL AVG		
FL0042421	CENTURION TRUCK PLAZA	9/30/97		ANNL AVG		
FL0042421	CENTURION TRUCK PLAZA	10/31/97	.01	ANNL AVG		
FL0042421	CENTURION TRUCK PLAZA	11/30/97	.01	ANNL AVG	20	7.57E+08
FL0042421	CENTURION TRUCK PLAZA	12/31/97		ANNL AVG		

Appendix D: Fecal and Flow Data from Centurion Truck Plaza WWTF (continued)

Facility ID	Facility Name	Monitoring Date	Flow (MGD)	Statistical Flow Base	Monthly Geometric Mean Fecal Coliform Count (#/100 mL)[1]	Maximum Estimated Loading (colonies/day)[1]
FL0042421	CENTURION TRUCK PLAZA	1/31/98	.01	ANNL AVG	1510	5.72E+10
FL0042421	CENTURION TRUCK PLAZA	2/28/98	.01	ANNL AVG	20	7.57E+08
FL0042421	CENTURION TRUCK PLAZA	3/31/98		ANNL AVG		
FL0042421	CENTURION TRUCK PLAZA	4/30/98		ANNL AVG		
FL0042421	CENTURION TRUCK PLAZA	5/31/98	.01	ANNL AVG	20	7.57E+08
FL0042421	CENTURION TRUCK PLAZA	6/30/98		ANNL AVG		
FL0042421	CENTURION TRUCK PLAZA	7/31/98		ANNL AVG		
FL0042421	CENTURION TRUCK PLAZA	8/31/98	.01	ANNL AVG	20	7.57E+08
FL0042421	CENTURION TRUCK PLAZA	9/30/98		ANNL AVG		
FL0042421	CENTURION TRUCK PLAZA	10/31/98	.01	ANNL AVG	20	7.57E+08
FL0042421	CENTURION TRUCK PLAZA	11/30/98	.01	ANNL AVG	20	7.57E+08
FL0042421	CENTURION TRUCK PLAZA	12/31/98		ANNL AVG		
FL0042421	CENTURION TRUCK PLAZA	1/31/99	.01	ANNL AVG	20	7.57E+08
FL0042421	CENTURION TRUCK PLAZA	2/28/99	.01	ANNL AVG	20	7.57E+08
FL0042421	CENTURION TRUCK PLAZA	3/31/99	.01	ANNL AVG	20	7.57E+08
FL0042421	CENTURION TRUCK PLAZA	4/30/99	.01	ANNL AVG	1	3.79E+07
FL0042421	CENTURION TRUCK PLAZA	5/31/99	.0092	MO AVG	20	6.96E+08
FL0042421	CENTURION TRUCK PLAZA	6/30/99	0.0098	MO AVG	20	7.42E+08
FL0042421	CENTURION TRUCK PLAZA	7/31/99	.0085	MO AVG	<20	6.43E+08
FL0042421	CENTURION TRUCK PLAZA	8/31/99	.0083	MO AVG	<20	6.28E+08
FL0042421	CENTURION TRUCK PLAZA	9/30/99	.0078	MO AVG	<20	5.90E+08
FL0042421	CENTURION TRUCK PLAZA	11/30/99	.0069	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	12/31/99	.0077	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	1/31/00	.0127	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	2/29/00	.0092	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	3/31/00	.0129	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	4/30/00	.0144	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	5/31/00	.0243	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	6/30/00	.0241	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	7/31/00	.0279	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	8/31/00	.0174	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	9/30/00	.0294	MO AVG	560	6.23E+10
FL0042421	CENTURION TRUCK PLAZA	10/31/00	.0139	MO AVG	15	7.89E+08
FL0042421	CENTURION TRUCK PLAZA	11/30/00	.0046	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	12/31/00	.014	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	1/31/01	.0185	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	2/28/01	0.0086	MO AVG	5	1.63E+08
FL0042421	CENTURION TRUCK PLAZA	3/31/01	.0131	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	4/30/01	0.0159	MO AVG	5	3.01E+08
FL0042421	CENTURION TRUCK PLAZA	6/30/01		MO AVG		
FL0042421	CENTURION TRUCK PLAZA	7/31/01	.0084	MO AVG	75	2.38E+09
FL0042421	CENTURION TRUCK PLAZA	8/31/01	.0127	MO AVG	0	
FL0042421	CENTURION TRUCK PLAZA	9/30/01	.0188	MO AVG	7	4.98E+08
FL0042421	CENTURION TRUCK PLAZA	9/30/01	.0188	MO AVG	7	4.98E+08
FL0042421	CENTURION TRUCK PLAZA	10/31/01	.0212	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	11/30/01	.0233	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	12/31/01	.0313	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	1/31/02	.0301	MO AVG	9	1.03E+09
FL0042421	CENTURION TRUCK PLAZA	2/28/02	.0286	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	3/31/02	.0094	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	4/30/02	.0096	MO AVG	400	1.45E+10

Appendix D: Fecal and Flow Data from Centurion Truck Plaza WWTF (continued)

Facility ID	Facility Name	Monitoring Date	Flow (MGD)	Statistical Flow Base	Monthly Geometric Mean Fecal Coliform Count (#/100 mL)†	Maximum Estimated Loading (colonies/day)†
FL0042421	CENTURION TRUCK PLAZA	5/31/02	.0115	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	6/30/02	.0271	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	7/31/02	.0196	MO AVG	36	2.67E+09
FL0042421	CENTURION TRUCK PLAZA	8/31/02	.0196	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	9/30/02	.017	MO AVG	400	2.57E+10
FL0042421	CENTURION TRUCK PLAZA	10/31/02	.016	MO AVG	800	4.85E+10
FL0042421	CENTURION TRUCK PLAZA	11/30/02	.016	MO AVG	13	7.87E+08
FL0042421	CENTURION TRUCK PLAZA	12/31/02	.0094	MO AVG	12	4.27E+08
FL0042421	CENTURION TRUCK PLAZA	1/31/03	.0105	MO AVG	496	1.97E+10
FL0042421	CENTURION TRUCK PLAZA	2/28/03	.0185	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	3/31/03	.0249	MO AVG	4	3.77E+08
FL0042421	CENTURION TRUCK PLAZA	4/30/03	.0137	MO AVG	4	2.07E+08
FL0042421	CENTURION TRUCK PLAZA	5/31/03	.0124	MO AVG	24	1.13E+09
FL0042421	CENTURION TRUCK PLAZA	6/30/03	.0018	MO AVG	4	2.73E+07
FL0042421	CENTURION TRUCK PLAZA	7/31/03	.0014	MO AVG	4	2.12E+07
FL0042421	CENTURION TRUCK PLAZA	8/31/03	.0033	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	9/30/03	.0052	MO AVG	4	7.87E+07
FL0042421	CENTURION TRUCK PLAZA	10/31/03	.0075	MO AVG	4	1.14E+08
FL0042421	CENTURION TRUCK PLAZA	11/30/03	.0058	MO AVG	16	3.51E+08
FL0042421	CENTURION TRUCK PLAZA	12/31/03	.0036	MO AVG	20	2.73E+08
FL0042421	CENTURION TRUCK PLAZA	1/31/04	.0051	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	2/29/04	.0040	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	3/31/04	.0012	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	4/30/04	.0010	MO AVG	2000	7.57E+09
FL0042421	CENTURION TRUCK PLAZA	5/31/04	0.006	MO AVG	390	8.86E+09
FL0042421	CENTURION TRUCK PLAZA	6/30/04	.0009	MO AVG	20	6.81E+07
FL0042421	CENTURION TRUCK PLAZA	7/31/04	0.006	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	8/31/04	0.0009	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	9/30/04	0.0008	MO AVG	2000	6.06E+09
FL0042421	CENTURION TRUCK PLAZA	10/31/04	0.0010	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	11/30/04	0.0010	MO AVG		
FL0042421	CENTURION TRUCK PLAZA	12/31/04	0.0013	MO AVG		

Cells shade in gray represent exceedances of the permitted capacity

[1]This table represents data submitted to the Department and which was put into the Permit Compliance System (PCS). Empty cells represent missing data that were either not reported to the Department, or there was no measurable flow for that month.

Appendix E: Historical Fecal Coliform Observations in Ribault River

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100 mL)	REMARK CODE
RIBAULT RIVER	2224	3/12/1991	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	20	
RIBAULT RIVER	2224	3/12/1991	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	20	
RIBAULT RIVER	2224	3/12/1991	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	500	
RIBAULT RIVER	2224	3/12/1991	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	500	
RIBAULT RIVER	2224	4/16/1991	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	40	
RIBAULT RIVER	2224	4/16/1991	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	40	
RIBAULT RIVER	2224	4/16/1991	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	340	
RIBAULT RIVER	2224	4/16/1991	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	340	
RIBAULT RIVER	2224	7/24/1991	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	130	
RIBAULT RIVER	2224	7/24/1991	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	130	
RIBAULT RIVER	2224	7/24/1991	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	300	
RIBAULT RIVER	2224	7/24/1991	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	300	
RIBAULT RIVER	2224	10/22/1991	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	700	
RIBAULT RIVER	2224	10/22/1991	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	700	
RIBAULT RIVER	2224	10/22/1991	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	800	
RIBAULT RIVER	2224	10/22/1991	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	800	
RIBAULT RIVER	2224	2/5/1992	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	300	
RIBAULT RIVER	2224	2/5/1992	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	300	
RIBAULT RIVER	2224	2/5/1992	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	1,400	
RIBAULT RIVER	2224	2/5/1992	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	1,400	
RIBAULT RIVER	2224	4/22/1992	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	1,100	
RIBAULT RIVER	2224	4/22/1992	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	1,100	
RIBAULT RIVER	2224	4/22/1992	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	7,000	
RIBAULT RIVER	2224	4/22/1992	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	7,000	
RIBAULT RIVER	2224	8/3/1992	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	220	
RIBAULT RIVER	2224	8/3/1992	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	220	
RIBAULT RIVER	2224	8/3/1992	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	800	
RIBAULT RIVER	2224	8/3/1992	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	800	
RIBAULT RIVER	2224	10/19/1992	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	1,300	
RIBAULT RIVER	2224	10/19/1992	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	1,300	
RIBAULT RIVER	2224	10/19/1992	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	160,000	
RIBAULT RIVER	2224	10/19/1992	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	160,000	
RIBAULT RIVER	2224	1/26/1993	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	500	
RIBAULT RIVER	2224	1/26/1993	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	500	
RIBAULT RIVER	2224	1/26/1993	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	500	
RIBAULT RIVER	2224	1/26/1993	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	500	
RIBAULT RIVER	2224	4/22/1993	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	110	
RIBAULT RIVER	2224	4/22/1993	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	110	
RIBAULT RIVER	2224	4/22/1993	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	800	
RIBAULT RIVER	2224	4/22/1993	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	800	
RIBAULT RIVER	2224	5/12/1993	21FLSJWMRR115	RIBAULT RIVER AT SR 115 IN NORTH JAX	60	K
RIBAULT RIVER	2224	6/30/1993	21FLSJWMRR115	RIBAULT RIVER AT SR 115 IN NORTH JAX	0	
RIBAULT RIVER	2224	7/7/1993	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	130	
RIBAULT RIVER	2224	7/7/1993	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	130	
RIBAULT RIVER	2224	7/7/1993	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	30,000	
RIBAULT RIVER	2224	7/7/1993	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	30,000	
RIBAULT RIVER	2224	7/28/1993	21FLSJWMRR115	RIBAULT RIVER AT SR 115 IN NORTH JAX	1,090	
RIBAULT RIVER	2224	9/8/1993	21FLSJWMRR115	RIBAULT RIVER AT SR 115 IN NORTH JAX	11,800	
RIBAULT RIVER	2224	10/19/1993	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	1,300	
RIBAULT RIVER	2224	10/19/1993	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	1,300	
RIBAULT RIVER	2224	10/19/1993	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	3,000	

Appendix E: Historical Fecal Coliform Observations in Ribault River (continued)

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100 mL)	REMARK CODE
RIBAULT RIVER	2224	10/19/1993	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	3,000	
RIBAULT RIVER	2224	2/1/1994	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	800	
RIBAULT RIVER	2224	2/1/1994	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	800	
RIBAULT RIVER	2224	2/1/1994	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	11,000	
RIBAULT RIVER	2224	2/1/1994	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	11,000	
RIBAULT RIVER	2224	4/19/1994	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	80	
RIBAULT RIVER	2224	4/19/1994	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	80	
RIBAULT RIVER	2224	4/19/1994	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	210	
RIBAULT RIVER	2224	4/19/1994	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	210	
RIBAULT RIVER	2224	7/18/1994	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	130	
RIBAULT RIVER	2224	7/18/1994	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	130	
RIBAULT RIVER	2224	7/18/1994	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	300	
RIBAULT RIVER	2224	7/18/1994	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	300	
RIBAULT RIVER	2224	10/18/1994	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	500	
RIBAULT RIVER	2224	10/18/1994	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	500	
RIBAULT RIVER	2224	10/18/1994	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	1,300	
RIBAULT RIVER	2224	10/18/1994	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	1,300	
RIBAULT RIVER	2224	1/30/1995	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	500	
RIBAULT RIVER	2224	1/30/1995	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	500	
RIBAULT RIVER	2224	1/30/1995	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	1,400	
RIBAULT RIVER	2224	1/30/1995	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	1,400	
RIBAULT RIVER	2224	4/19/1995	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	130	
RIBAULT RIVER	2224	4/19/1995	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	130	
RIBAULT RIVER	2224	4/19/1995	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	300	
RIBAULT RIVER	2224	4/19/1995	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	300	
RIBAULT RIVER	2224	11/12/1996	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	40	
RIBAULT RIVER	2224	11/12/1996	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	40	
RIBAULT RIVER	2224	11/12/1996	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	500	
RIBAULT RIVER	2224	11/12/1996	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	500	
RIBAULT RIVER	2224	5/27/1998	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	800	
RIBAULT RIVER	2224	5/27/1998	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	800	
RIBAULT RIVER	2224	5/27/1998	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	800	
RIBAULT RIVER	2224	5/27/1998	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	800	
RIBAULT RIVER	2224	7/27/1998	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	110	
RIBAULT RIVER	2224	7/27/1998	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	110	
RIBAULT RIVER	2224	7/27/1998	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	130	
RIBAULT RIVER	2224	7/27/1998	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	130	
RIBAULT RIVER	2224	8/4/1998	21FLA 20030129	RIBAULT R MONCRIEF RD BR	800	
RIBAULT RIVER	2224	10/19/1998	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	130	
RIBAULT RIVER	2224	10/19/1998	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	130	
RIBAULT RIVER	2224	10/19/1998	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	170	
RIBAULT RIVER	2224	10/19/1998	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	170	
RIBAULT RIVER	2224	1/20/1999	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	170	
RIBAULT RIVER	2224	1/20/1999	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	170	
RIBAULT RIVER	2224	1/20/1999	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	300	
RIBAULT RIVER	2224	1/20/1999	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	300	
RIBAULT RIVER	2224	4/21/1999	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	110	
RIBAULT RIVER	2224	4/21/1999	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	110	
RIBAULT RIVER	2224	4/21/1999	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	700	
RIBAULT RIVER	2224	4/21/1999	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	700	
RIBAULT RIVER	2224	8/25/1999	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	300	
RIBAULT RIVER	2224	8/25/1999	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	300	

Appendix E: Historical Fecal Coliform Observations in Ribault River (continued)

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100 mL)	REMARK CODE
RIBAULT RIVER	2224	8/25/1999	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	500	
RIBAULT RIVER	2224	8/25/1999	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	500	
RIBAULT RIVER	2224	10/12/1999	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	300	
RIBAULT RIVER	2224	10/12/1999	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	300	
RIBAULT RIVER	2224	10/19/1999	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	2,400	
RIBAULT RIVER	2224	10/19/1999	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	2,400	
RIBAULT RIVER	2224	1/31/2000	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	130	
RIBAULT RIVER	2224	1/31/2000	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	130	
RIBAULT RIVER	2224	1/31/2000	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	2,200	
RIBAULT RIVER	2224	1/31/2000	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	2,200	
RIBAULT RIVER	2224	4/26/2000	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	110	
RIBAULT RIVER	2224	4/26/2000	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	110	
RIBAULT RIVER	2224	4/26/2000	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	220	
RIBAULT RIVER	2224	4/26/2000	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	220	
RIBAULT RIVER	2224	7/5/2000	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	80	
RIBAULT RIVER	2224	7/5/2000	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	80	
RIBAULT RIVER	2224	7/5/2000	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	260	
RIBAULT RIVER	2224	7/5/2000	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	260	
RIBAULT RIVER	2224	12/5/2000	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	20	U
RIBAULT RIVER	2224	12/5/2000	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	20	K
RIBAULT RIVER	2224	12/5/2000	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	130	
RIBAULT RIVER	2224	12/5/2000	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	130	
RIBAULT RIVER	2224	3/7/2001	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	20	
RIBAULT RIVER	2224	3/7/2001	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	20	
RIBAULT RIVER	2224	3/7/2001	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	230	
RIBAULT RIVER	2224	3/7/2001	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	230	
RIBAULT RIVER	2224	6/19/2001	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	230	
RIBAULT RIVER	2224	6/19/2001	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	230	P
RIBAULT RIVER	2224	6/19/2001	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	270	P
RIBAULT RIVER	2224	6/19/2001	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	270	
RIBAULT RIVER	2224	8/29/2001	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	130	
RIBAULT RIVER	2224	8/29/2001	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	130	
RIBAULT RIVER	2224	9/24/2001	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	28,000	
RIBAULT RIVER	2224	9/24/2001	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	28,000	
RIBAULT RIVER	2224	12/20/2001	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	152	
RIBAULT RIVER	2224	12/20/2001	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	152	
RIBAULT RIVER	2224	12/20/2001	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	176	
RIBAULT RIVER	2224	12/20/2001	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	176	
RIBAULT RIVER	2224	4/10/2002	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	4	
RIBAULT RIVER	2224	4/10/2002	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	72	
RIBAULT RIVER	2224	5/30/2002	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	24	
RIBAULT RIVER	2224	5/30/2002	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	801	
RIBAULT RIVER	2224	8/12/2002	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	96	
RIBAULT RIVER	2224	8/12/2002	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	180	
RIBAULT RIVER	2224	12/5/2002	21FLJXWQTR3	CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	105	
RIBAULT RIVER	2224	12/5/2002	21FLA 20030128	RIBAULT R FERNANDO RD BR	420	
RIBAULT RIVER	2224	12/5/2002	21FLJXWQTR128	RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	420	

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

Remark Codes: P – Off-scale high. Actual value not known, but known to be greater then value shown
K – Off-scale low. Actual value not known, but known to be less than value shown
U – Material was analyzed for but was not detected. Value shown is the method detection limit (MDL)

NOTE: Some samples were seen as duplicates (i.e. 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 tables contained in the text.

Appendix F: Kruskall – Wallis Analysis of Fecal Coliform Observations versus Month in Ribault 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 84 cases
Dependent variable is VALUE
Grouping variable is MONTH

Group	Count	Rank Sum
1	8	411.500
2	4	262.500
3	4	100.000
4	16	537.500
5	5	211.000
6	3	78.500
7	11	399.000
8	8	331.000
9	2	163.000
10	13	785.000
11	2	62.000
12	8	229.000

Kruskal-Wallis Test Statistic = 26.166
Probability is 0.006 assuming Chi-square distribution with 11 df

Appendix G: Kruskall – Wallis Analysis of Fecal Coliform Observations versus Season in Ribault River

Categorical values encountered during processing are:
SEASON2 (4 levels)
1, 2, 3, 4

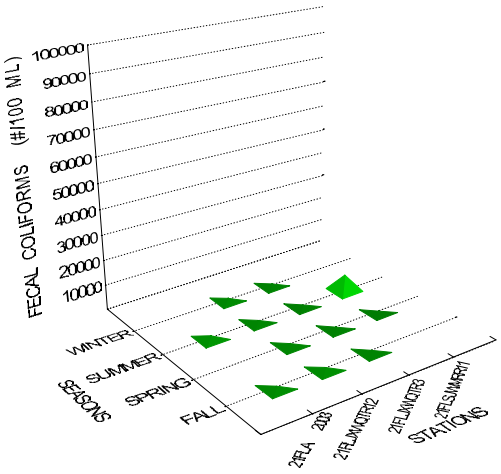
Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is SEASON2

Group	Count	Rank Sum
1	16	774.000
2	24	827.000
3	21	893.000
4	23	1076.000

Kruskal-Wallis Test Statistic = 4.260
Probability is 0.235 assuming Chi-square distribution with 3 df

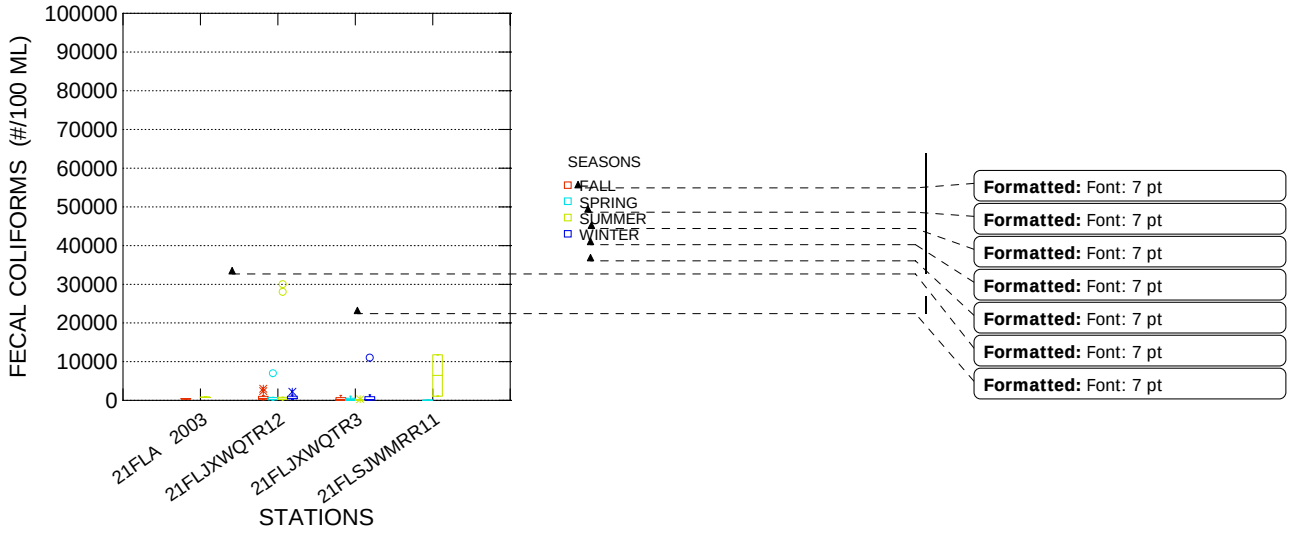
Appendix H: Fecal Coliform Observations versus Season and Station in Ribault River

Fecal Coliform Concentrations versus Season and Station



Station	STORET ID
CREEK AT PALMDALE STREET NEAR RESTLAWN DRIVE	21FLJXWQTR3
RIBAULT R FERNANDO RD BR	21FLA 20030128
RIBAULT R MONCRIEF RD BR	21FLA 20030129
RIBAULT RIVER AT HOWELL DRIVE ON HOWELL BRIDGE	21FLJXWQTR128
RIBAULT RIVER AT SR 115 IN NORTH JAX	21FLSJWMRR115

Fecal Coliform Concentrations versus Season and Station



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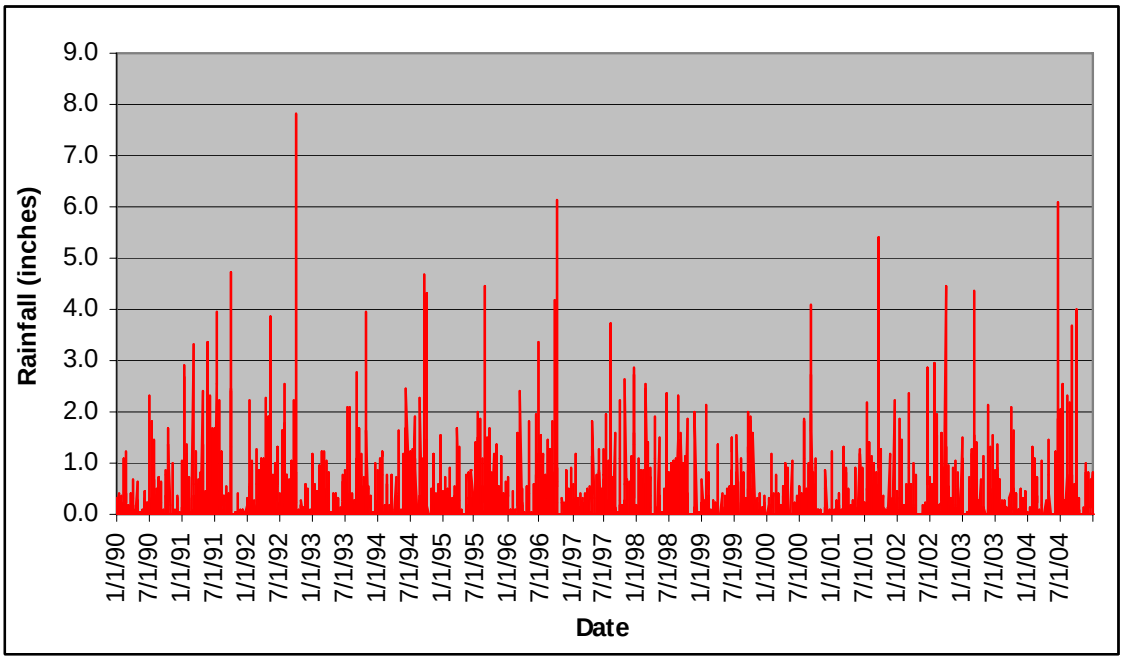
Appendix I: Chart of Rainfall for Jacksonville International Airport (JIA) from 1990 – 2004

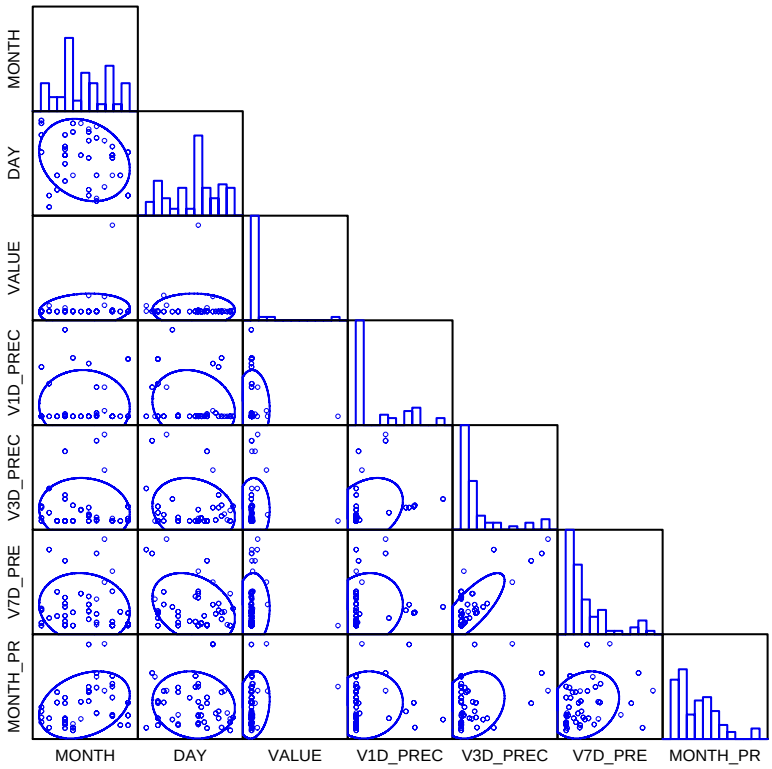


Appendix J: Spearman Correlation Matrix Analysis for Precipitation in Ribault River

Spearman correlation matrix

	MONTH	DAY	VALUE	V1D_PREC	V3D_PREC
MONTH	1.000				
DAY	-0.233	1.000			
VALUE	0.021	0.082	1.000		
V1D_PREC	0.003	-0.094	0.108	1.000	
V3D_PREC	-0.136	0.051	0.149	0.643	1.000
V7D_PRE	-0.165	-0.207	0.171	0.272	0.534
MONTH_PR	0.323	-0.190	0.217	0.115	0.060

	V7D_PRE	MONTH_PR
V7D_PRE	1.000	
MONTH_PR	0.259	1.000



Appendix K: Analysis of Fecal Coliform Observations versus Precipitation in Ribault River

FECAL COLIFORM DATA VERSUS DAY (1 day) OF SAMPLING PRECIPITATION

Dep Var: VALUE N: 84 Multiple R: 0.062 Squared multiple R: 0.004

Adjusted squared multiple R: 0.000 Standard error of estimate: 18000.012

Effect	Coefficient	Std Error	Std Coef	Tolerance	t	P(2 Tail)
CONSTANT	3903.169	2166.814	0.000	.	1.801	0.075
V1D_PREC	-5842.388	10307.316	-0.062	1.000	-0.567	0.572

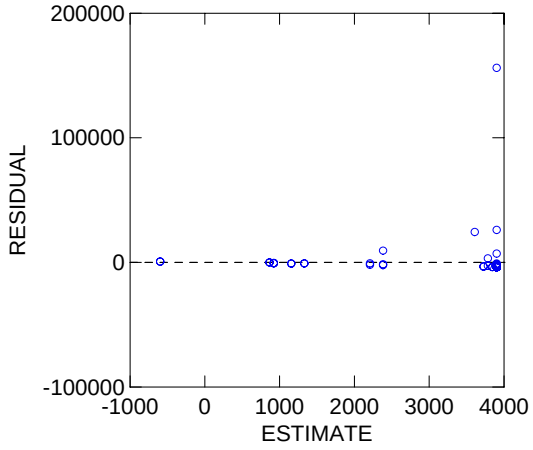
Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
Regression	1.04096E+08	1	1.04096E+08	0.321	0.572
Residual	2.65680E+10	82	3.24000E+08		

*** WARNING ***
Case 4 is an outlier (Studentized Residual = 32.960)
Case 44 has large leverage (Leverage = 0.164)
Case 45 has large leverage (Leverage = 0.164)

Durbin-Watson D Statistic 2.048
First Order Autocorrelation -0.025

Plot of residuals against predicted values



FECAL COLIFORM DATA VERSUS DAY OF SAMPLING AND TWO DAYS (3 day) PRIOR PRECIPITATION

Dep Var: VALUE N: 84 Multiple R: 0.031 Squared multiple R: 0.001

Adjusted squared multiple R: 0.000 Standard error of estimate: 18026.599

Effect	Coefficient	Std Error	Std Coef	Tolerance	t	P(2 Tail)
CONSTANT	3091.551	2226.755	0.000	.	1.388	0.169
V3D_PREC	813.219	2899.936	0.031	1.000	0.280	0.780

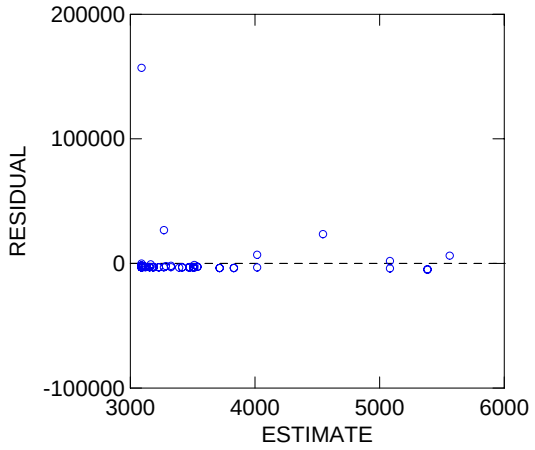
Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
Regression	2.55544E+07	1	2.55544E+07	0.079	0.780
Residual	2.66466E+10	82	3.24958E+08		

*** WARNING ***
Case 4 is an outlier (Studentized Residual = 35.089)
Case 50 has large leverage (Leverage = 0.169)
Case 51 has large leverage (Leverage = 0.169)
Case 55 has large leverage (Leverage = 0.198)

Durbin-Watson D Statistic 2.024
First Order Autocorrelation -0.012

Plot of residuals against predicted values



FECAL COLIFORM DATA VERSUS DAY OF SAMPLING AND SIX DAYS (7 day) PRIOR PRECIPITATION

Dep Var: VALUE N: 84 Multiple R: 0.003 Squared multiple R: 0.000

Adjusted squared multiple R: 0.000 Standard error of estimate: 18035.135

Effect	Coefficient	Std Error	Std Coef	Tolerance	t	P(2 Tail)
CONSTANT	3436.477	2588.883	0.000	.	1.327	0.188
V7D_PRE	-71.979	2321.163	-0.003	1.000	-0.031	0.975

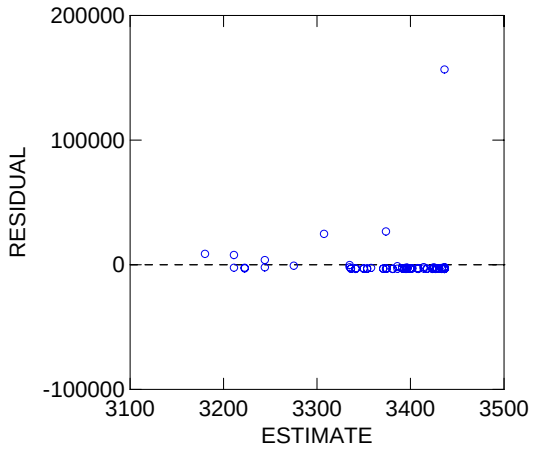
Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
Regression	312776.895	1	312776.895	0.001	0.975
Residual	2.66718E+10	82	3.25266E+08		

*** WARNING ***
Case 4 is an outlier (Studentized Residual = 35.116)
Case 55 has large leverage (Leverage = 0.145)

Durbin-Watson D Statistic 2.033
First Order Autocorrelation -0.017

Plot of residuals against predicted values

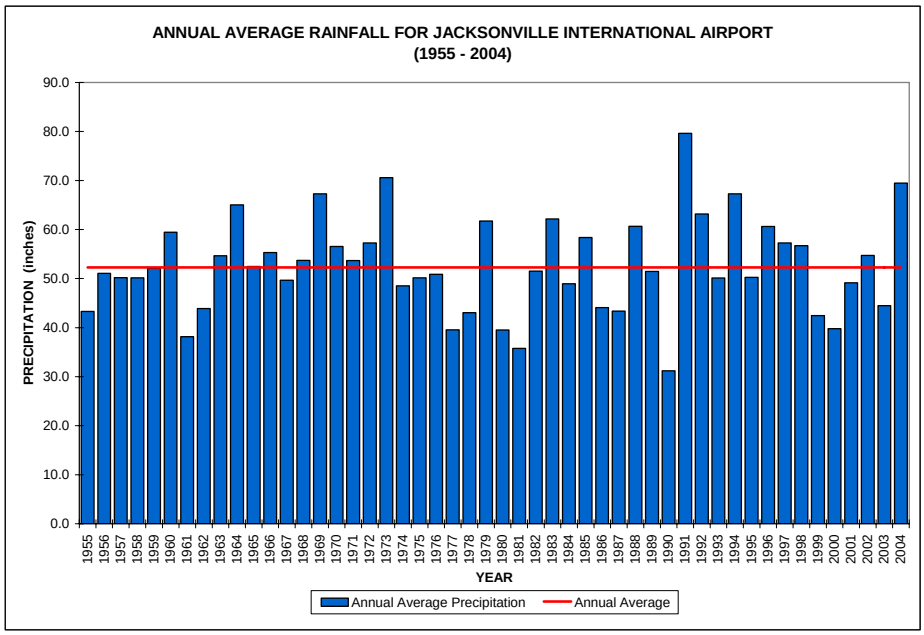


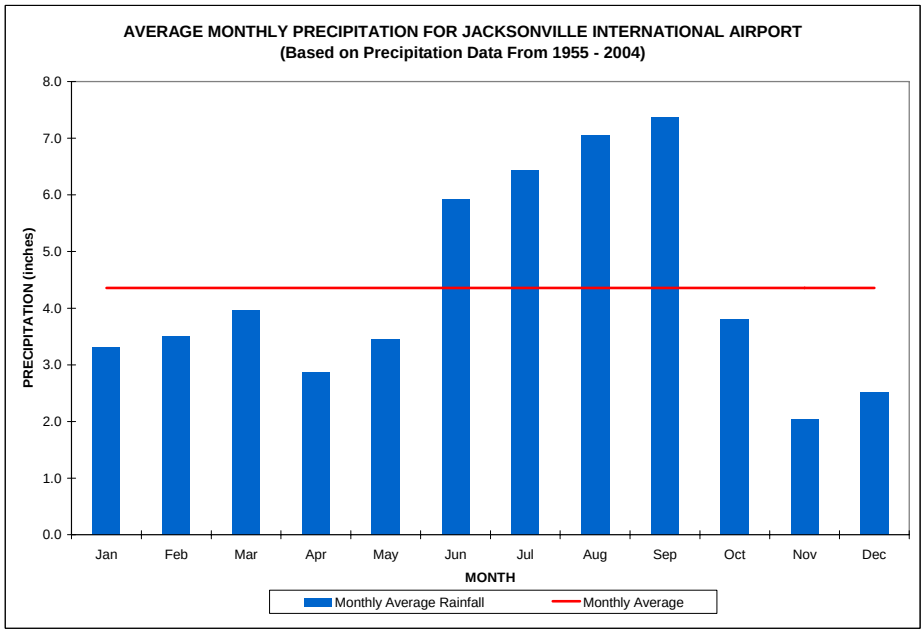
Appendix L: Fecal Coliform Observations versus Season and Station in Ribault River

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
1955	3.09	2.46	1.66	1.5	4.51	2.7	5.53	3.85	10.56	5.36	1.9	0.21	**43.33**
1956	2.91	2.94	0.81	2.33	3.98	7.87	8.25	5.24	2.89	13.44	0.38	0.04	**51.08**
1957	0.33	1.69	3.87	1.61	5.25	7.1	12.34	3.3	8.33	3.5	1.55	1.31	**50.18**
1958	3.39	3.74	3.38	8.24	3.79	3.96	4.37	4.67	4.75	5.07	2.02	2.76	**50.14**
1959	2.97	5.22	9.75	2.65	9.2	2.94	4.51	2.86	5.67	3.12	2.24	0.95	**52.08**
1960	2.07	5.17	6.94	3.54	1.18	4.7	16.21	6.5	8.57	2.95	0.11	1.51	**59.45**
1961	2.87	4.85	1.17	4.16	3.06	5.27	3.48	10.64	1.02	0.27	0.89	0.47	**38.15**
1962	2.16	0.52	3.1	2.36	1.12	8.22	6.31	10.07	4.37	1.13	2.08	2.46	**43.90**
1963	5.39	6.93	2.23	1.75	1.74	12.49	6.47	4.95	4.88	1.53	2.7	3.6	**54.66**
1964	7.29	6.55	1.76	4.65	4.8	4.67	6.12	5.63	10.31	5.09	3.33	4.83	**65.03**
1965	0.65	5.5	3.91	0.95	0.94	9.79	2.71	9.58	11.02	1.75	1.92	3.75	**52.47**
1966	4.56	5.97	0.71	2.25	10.43	7.74	11.09	3.88	5.94	1.38	0.21	1.14	**55.30**
1967	3.05	4.35	0.81	2	1.18	12.9	5.22	12.31	1.8	1.13	0.24	4.69	**49.68**
1968	0.82	3.05	1.2	0.99	2.17	12.25	6.84	16.24	2.68	5.09	1.3	1.09	**53.72**
1969	0.84	3.39	4.23	0.34	3.78	5.12	5.89	15.1	10.33	9.81	4.56	3.87	**67.26**
1970	4.18	8.85	9.98	1.77	1.84	2.65	7.6	10.96	3.2	3.95	0	1.57	**56.55**
1971	2.01	2.55	2.41	4.07	1.9	5.52	5.07	12.83	4.17	6.46	0.83	5.87	**53.69**
1972	5.77	3.48	4.43	2.98	8.26	6.75	3.15	9.76	2.6	4.46	4.22	1.43	**57.29**
1973	4.64	5.07	10.18	11.61	5.33	4.1	5.45	7.49	7.86	4.08	0.44	4.32	**70.57**
1974	0.28	1.28	3.47	1.53	4.14	5.53	9.83	11.23	8.13	0.34	1.03	1.73	**48.52**
1975	3.48	2.58	2.46	5.78	7	5.21	6.36	6.23	5.24	3.63	0.39	1.79	**50.15**
1976	2.29	1.05	3.41	0.63	10.02	4.26	5.41	6.37	8.56	1.63	2.43	4.81	**50.87**
1977	2.96	3.24	1.03	1.76	3.07	2.65	1.97	7.26	7.45	1.68	3.11	3.38	**39.56**
1978	4.64	4.17	2.83	2.24	9.18	2.62	6.67	2.39	4.4	1.26	0.8	1.84	**43.04**
1979	6.28	3.75	1	4.18	7.54	5.91	4.67	4.78	17.75	0.25	3.64	2.01	**61.76**
1980	2.61	1.06	6.83	3.91	3.02	4.59	5.29	3.97	3.03	2.69	2.32	0.21	**39.53**
1981	0.92	4.53	5.41	0.32	1.48	3.31	2.46	6.47	1.22	1.35	4.92	3.38	**35.77**
1982	3	1.67	4.26	3.6	3.55	8.06	3.81	6.93	9.32	3.37	1.93	2.02	**51.52**
1983	7.19	4.27	8.46	4.65	1.38	6.86	6.11	4.63	4.61	4.29	3.32	6.42	**62.19**
1984	2.13	4.67	5.77	3.14	1.46	4.76	6.01	3.78	12.28	1.53	3.3	0.13	**48.96**
1985	1.05	1.45	1.26	2.76	2.08	3.71	6.33	8.93	16.82	8.34	2.07	3.59	**58.39**
1986	4.19	4.72	5.44	0.93	2.13	2.53	3.27	9.6	1.99	1.8	2.85	4.65	**44.10**
1987	4.09	6.47	6.27	0.14	0.75	4.18	4.4	4.48	7.13	0.3	5.02	0.16	**43.39**
1988	6.36	6.08	2.65	3.44	1.35	3.71	4.5	8.48	16.36	2.35	4.27	1.13	**60.68**
1989	1.73	1.77	2.14	2.79	1.55	3.66	8.98	9.16	14.37	1.39	0.51	3.4	**51.45**
1990	1.84	4.07	1.59	1.34	0.18	1.59	6.53	3.81	2.6	4.54	1.17	1.94	**31.20**
1991	10.2	1.52	7.33	6.31	9.35	11.7	15.9	3.48	6.2	6.36	0.71	0.57	**79.63**
1992	5.79	2.64	4.09	5.33	5.97	7.04	3.32	10.76	7.33	8.34	1.92	0.65	**63.18**
1993	3.86	2.89	5.98	0.85	1.6	2.52	7.54	2.96	7.6	8.84	3.58	1.9	**50.12**
1994	6.58	0.92	2.14	1.51	3.15	13.96	8.26	3.29	9.79	10.23	3.49	3.94	**67.26**
1995	1.91	2.07	3.67	1.77	1.77	5.35	9.45	9.93	5.41	3.53	3.2	2.19	**50.25**
1996	1.11	1.11	6.83	2.85	0.72	11.41	4.2	7.83	8.49	11.46	1.39	3.23	**60.63**
1997	2.91	1.28	1.84	4.56	3.43	6.33	7.69	8.24	3.97	4.84	2.41	9.77	**57.27**
1998	3.49	11.12	2.64	4.71	0.96	2.95	7.29	10.09	7.65	3.01	2.39	0.42	**56.72**
1999	4.63	1.7	0.4	1.92	1.02	7.75	3.56	3.51	13	3.24	0.83	0.88	**42.44**
2000	2.77	1.17	1.79	2.6	1.15	2.43	5.69	7.38	11.64	0.23	1.55	1.37	**39.77**
2001	0.91	0.68	5.48	0.62	2.56	5.59	8.31	3.58	16.03	0.81	1.44	3.13	**49.14**
2002	4.48	0.82	4.38	2.41	0.47	6.24	7.8	8.14	9.31	2.58	2.68	5.41	**54.72**
2003	0.07	4.66	10.71	2.63	2.54	6.75	7.33	1.83	3.04	2.98	0.74	1.19	**44.47**
2004	1.64	4.47	1.36	2.02	1.24	17.15	8.6	9.85	16.31	1.32	2.85	2.66	**69.47**
AVG	**3.32**	**3.50**	**3.96**	**2.88**	**3.45**	**5.92**	**6.44**	**7.05**	**7.38**	**3.81**	**2.05**	**2.51**	**52.27**

Rainfall is in inches, and represents data from Jacksonville International Airport (JIA)

Appendix M: Annual and Monthly Average Precipitation Charts





Appendix N: Executive Summary of Tributary Pollution Assessment Project (TPAP)

Tributary Pollution Assessment
Executive Summary

The Tributary Pollution Assessment Project involves developing and evaluating a methodology for conducting tributary pollution assessments for listed water bodies in the Duval County area, as referenced in the Reasonable Assurance (RA) Plan. Duval County has approximately 100 tributary Water Body IDs (WBIDs), i.e. small to large tributaries of the St. Johns River, identified by the State. The RA Plan provides reasonable assurance that the fecal coliform levels of the 51 top-ranked WBIDs will be reduced sufficiently to restore them to their designated use for recreation. The 51 WBIDs are grouped into four priority groups in the RA Plan.

PBS&J was contracted by JEA to develop a methodology for conducting tributary pollution assessments for sources of fecal coliform contamination in the listed tributaries. This methodology will be field-verified by conducting sanitary surveys of selected tributary water body segments, and revised based on lessons learned from this process. The final product of this endeavor will be a *Tributary Pollution Assessment Manual* that can be used as a blueprint for conducting sanitary surveys.

The Tributary Pollution Assessment Project is a continuation of the effort started under the RA Plan. The RA Plan participants have been brought together to form the Tributary Assessment Team (TAT). The TAT will serve as an advisory committee to the PBS&J Project Team throughout the development of the *Tributary Pollution Assessment Manual*. The TAT is composed of representatives from:

- JEA
- City of Jacksonville Environmental Quality Division
- City of Jacksonville Public Works Department
- Duval County Health Department
- Florida Department of Environmental Protection
- St. Johns Riverkeeper
- Water and Sewer Expansion Authority
- US Army Corps of Engineers

Other representatives (from these and additional entities) may be included in the TAT activities in varying roles, as relevant.

Our approach for developing and evaluating a methodology for conducting tributary pollution assessments is divided into six major phases including:

1) Pre-planning;
2) Planning;
3) Development of *Tributary Pollution Assessment Manual*;
4) Evaluation of Methodology/Manual by Conducting Sanitary Surveys;
5) Summary Report; and
6) Public Workshop.

The Pre-Planning phase (Phase I) entailed four main goals:

1) to obtain and review all documents included in the RA Plan;
2) to develop categories for tributary classification and categorize the 51 priority WBIDs;
3) to overlay each WBID onto land use, infrastructure, and historical sampling maps to begin assessing probable sources and migration pathways; and
4) to develop the *Draft Work Plan*.

The Planning phase (Phase II) begins with the organization and initial meeting of the Tributary Assessment Team (TAT) with the ultimate goal of finalizing the *Work Plan*.

The Development of the *Tributary Pollution Assessment Manual* phase (Phase III) primarily involves the formulation of the assessment methodology for each tributary category described in the Pre-Planning phase, the use of a decision tree to determine which assessment methodology corresponds to each of the highest-ranked WBIDs, and the establishment of a model monitoring plan for each tributary category. This phase will be completed upon submitting the *Manual* to the TAT for review.

The next phase, Evaluation of Methodology/Manual by Conducting Sanitary Surveys (Phase IV), entails field-verification of the methodology described in the *Draft Tributary Pollution Assessment Manual* for the highest ranked water bodies for each category (or as determined to ensure adequate geographical representation of the study area) and applying the results to recommend generic corrective actions and revise the methodology, if necessary. The outcome of this phase would be the *Tributary Pollution Assessment Manual.*

The final two phases, Summary Report (Phase V) and Public Workshop (Phase VI), would entail providing a summary of the results of the tributary pollution assessments, including a discussion of lessons learned and site-specific corrective actions, to JEA and presenting the results from the *Tributary Pollution Assessment Manual* to the public. The final phase would also include a written summary of public input received at the workshop.

For additional information, please contact: Don Deis, PBS&J Project Manager, at (904) 363-8442 or drdeis@pbsj.com.

Appendix O: Departmental Responses to Comments Regarding this TMDL for the Ribault River

Deleted: ¶

1. Reference is made to total coliform loadings in the section on leaking sewer lines. This is probably a typographic error as the TMDL is for fecal coliform. A search for other references to total coliform should be done and deleted.

   RESPONSE: Text has been edited; references to total coliforms have been removed.

2. The loadings assigned to pet waste seem high and the calculations should include a decay rate.

   RESPONSE: Please refer to response 3 within the "general comments regarding coliform TMDLs developed in the Lower St. Johns River basin" section (below) as to why loads from leaking collection systems were calculated the way they were.

3. The WLA for the NPDES facilities should be expressed as a load and not as a concentration.

   RESPONSE: Please refer to response 1 within the "general comments regarding coliform TMDLs developed in the Lower St. Johns River basin" section (below) as to why the WLA is expressed as a concentration and not a load.

4. The TMDL (expressed as percent reduction) appear to be based on the median value of the data violating the water quality criteria using all data collected in the WBID (i.e., includes data collected prior to January 1996 for Group 2 waters). The resulting load reduction is 50%. As a check, the percent reduction was calculated using the median value of the data violations measured during the listing cycle and based on the 90th percentile concentration measured during the listing cycle. Both of these alternate methods resulting in a reduction of 50%; therefore, modification of the TMDL value is not necessary.

   RESPONSE: No response necessary by FDEP.

The following comments were general comments regarding coliform TMDLs developed in the Lower St. Johns River basin:

1. Specifying a load rather than a concentration for the TMDL WLA - The Department does not currently issue load limit permits for coliforms. The Department feels that concentration based permits for coliforms are more appropriate. Concentrations are flow independent, and therefore should meet state water quality criteria no matter what the discharge flow is. A load limit would be discharge flow dependent, and could allow higher concentrations of coliforms if the facility is not discharging at permitted flow. For example, a facility may be discharging at 50 percent of design flow. If a load based WLA was in effect, effluent coliform concentrations could be two-times the state criterion, and still be meeting the WLA. A concentration based WLA would not allow effluent coliform concentrations to exceed the state criteria, no matter what the discharge flow is. The Department feels that a concentration based WLA is more appropriate, and more protective of state water quality criteria.

2. The septic tank loading estimates are higher than those for leaking wastewater collection systems, or seem high in general - As discussed in the document, the estimates of loading from collection

systems are based on general information which is available to the Department. The document clearly states that these estimates are "potential" loads, and site specific information (such as soil types/characteristics, water level, proximity of drainfields to surface waters, etc.), which the Department does not have, would be required to calculate estimates closer to actual loading. The numbers used in the calculations are published numbers. The septic tank loading estimate is based on the number of failures, according to JEA data, which is much more site specific than that of collection systems.

As mentioned at the end of the document, the City of Jacksonville is currently developing a sanitary survey manual, which will be used to more accurately assess potential sources of coliforms in this and other basins. What the Department proposed are just estimates, and further analysis will be done as part of the BMAP phase as an attempt to better quantify individual source contributions.

3. It may be more appropriate to base leaking wastewater collection system estimates on the design flow of the WWTP adjusted for the percent that leaks out of the system and the percent of linear feet of collection lines within the WBID rather than population - The Department feels that the approach used to estimate potential loads from leaking wastewater systems is adequate. The Department does not have direct access to the linear feet of collection line in the basin, or for the service area. In addition, the wastewater facility services several industrial facilities, which if estimates were based on the method proposed above, would not fairly represent the true loads from the collection system. Even if the necessary data were available, the suggested approach would be very time intensive, but more importantly, would not be likely to produce better estimates.

   Furthermore, the design capacity of the Buckman WWTF, which services the majority of the coliform TMDL WBIDs in the basin, is 52.5 MGD. From 2000 – 2004 the average monthly flow was 30.6 MGD – 58 percent of the design flow. By basing calculations on the design flow, in this case, could severely over estimate the loading from leaking collection pipes. Even if the average flow was used to calculate the loading, non-domestic discharges to the system would still be included in the estimate, and would still result in an overestimation.

   The estimate proposed in the document is just that, an estimate, that the Department feels has been fairly calculated based on the estimated number of households in the basin and the number of people per household. The numbers used in the estimates (coliform concentrations and gallons/person/day) were based on numbers published by EPA in *Protocol for Developing Pathogen TMDLs.*

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