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 and Total Coliform TMDL for Moncrief Creek (WBID 2228)

David Wainwright

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Florida Department of Environmental Protection

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Editorial assistance provided by: Wayne Magley, Ph.D., Jan Mandrup-Poulsen, Daryll Joyner, and Linda Lord.

For additional information on the watershed management approach and impaired waters in the Northeast Basin, contact:

Jennifer Gihring
Florida Department of Environmental Protection
Bureau of Watershed Management
Watershed Planning and Coordination Section
2600 Blair Stone Road, Mail Station 3565
Tallahassee, FL 32399-2400
jennifer.gihring@dep.state.fl.us
Phone: (850) 245-8418; Suncom: 205-8418
Fax: (850) 245-8434

Access to all data used in the development of this report can be obtained by contacting:

David Wainwright
Florida Department of Environmental Protection
Bureau of Watershed Management
Watershed Assessment Section
2600 Blair Stone Road, Mail Station 3555
Tallahassee, FL 32399-2400
david.wainwright@dep.state.fl.us
Phone: (850) 245-8469; Suncom: 205-8469
Fax: (850) 245-8536

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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

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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 and total coliforms for the Moncrief Creek watershed in the Trout River Planning Unit. The creek has been verified impaired for fecal and total coliform, 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 Moncrief Creek that would restore the waterbody so that it meets its applicable water quality criteria for coliforms.

1.2 Identification of Waterbody

Moncrief Creek is located in the City of Jacksonville, Duval County, in northeast Florida (Figure 1.1). The creek, which is a second order stream with marine characteristics, is approximately 1.8 miles long and has an approximate 5.92 square-mile (mi^2) drainage area that flows into the Trout River, which flows into the St. Johns River (**Figures 1.1 and 1.2**). The Moncrief Creek watershed is located on the western edge of the City of Jacksonville and, as a result, is highly urban. Additional information about the stream'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. Moncrief Creek lies within one WBID, 2228, as shown in **Figure 1.2**, which this TMDL addresses.

Moncrief Creek is part of the Trout River Planning Unit (PU). Planning units are groups of WBIDs, which in turn are part of a larger basin, in this case the Lower St. Johns River Basin. The Trout River planning unit consists of 18 WBIDs. **Figure 1.3** shows the location of these WBIDs, Moncrief Creek's location in the planning unit, and a list of other WBIDs in the PU.

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

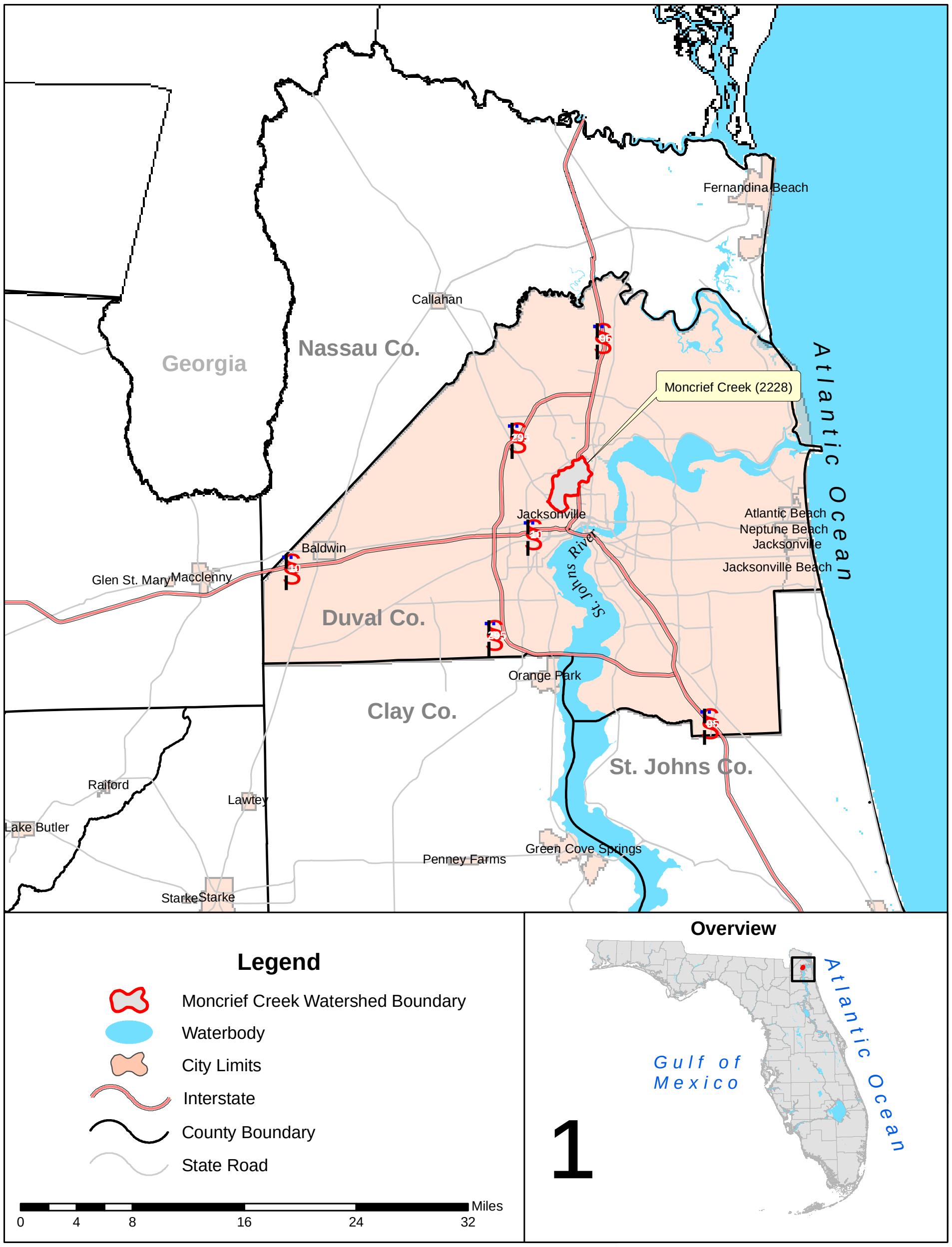


Figure 1.2. Overview of Moncrief Creek Watershed

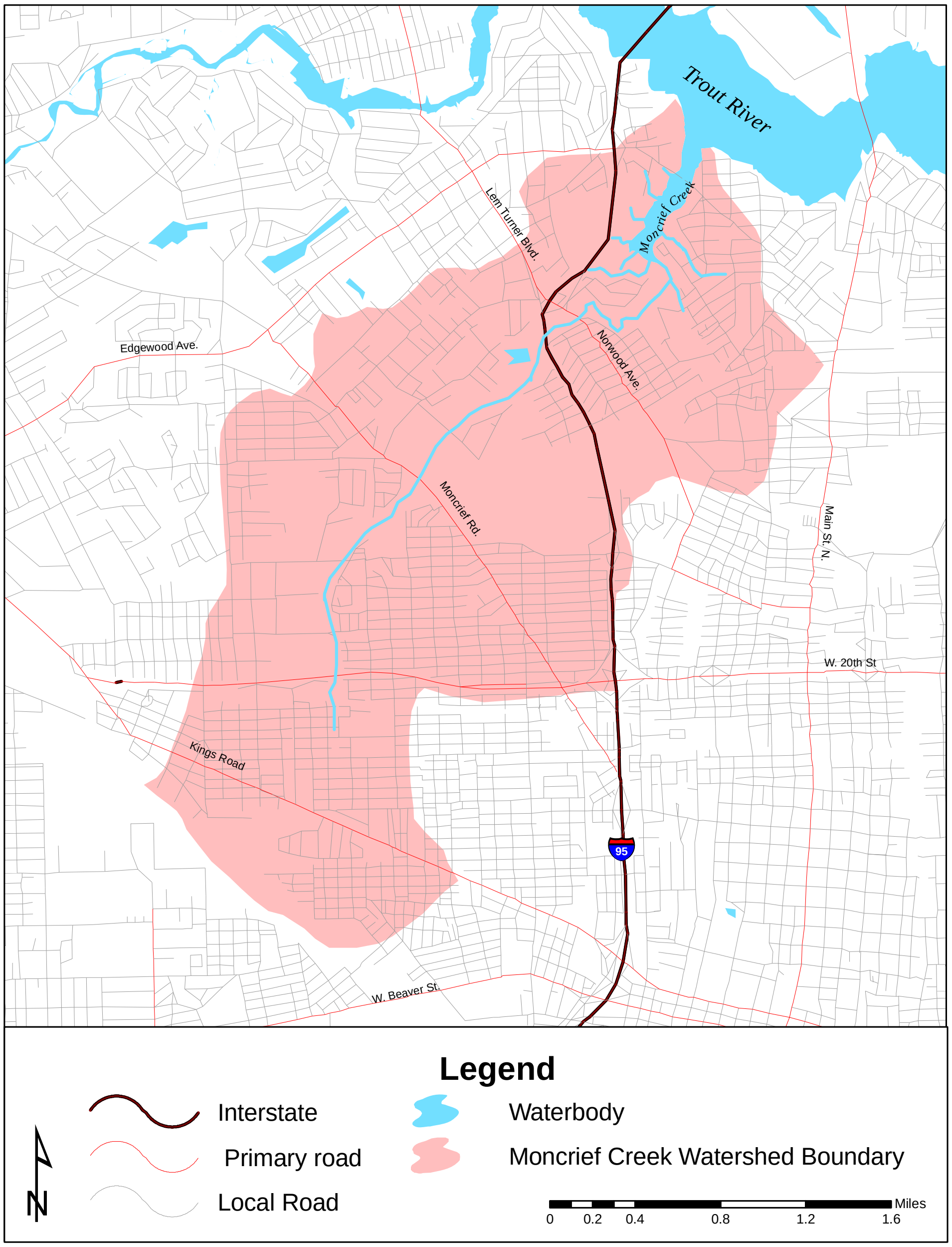
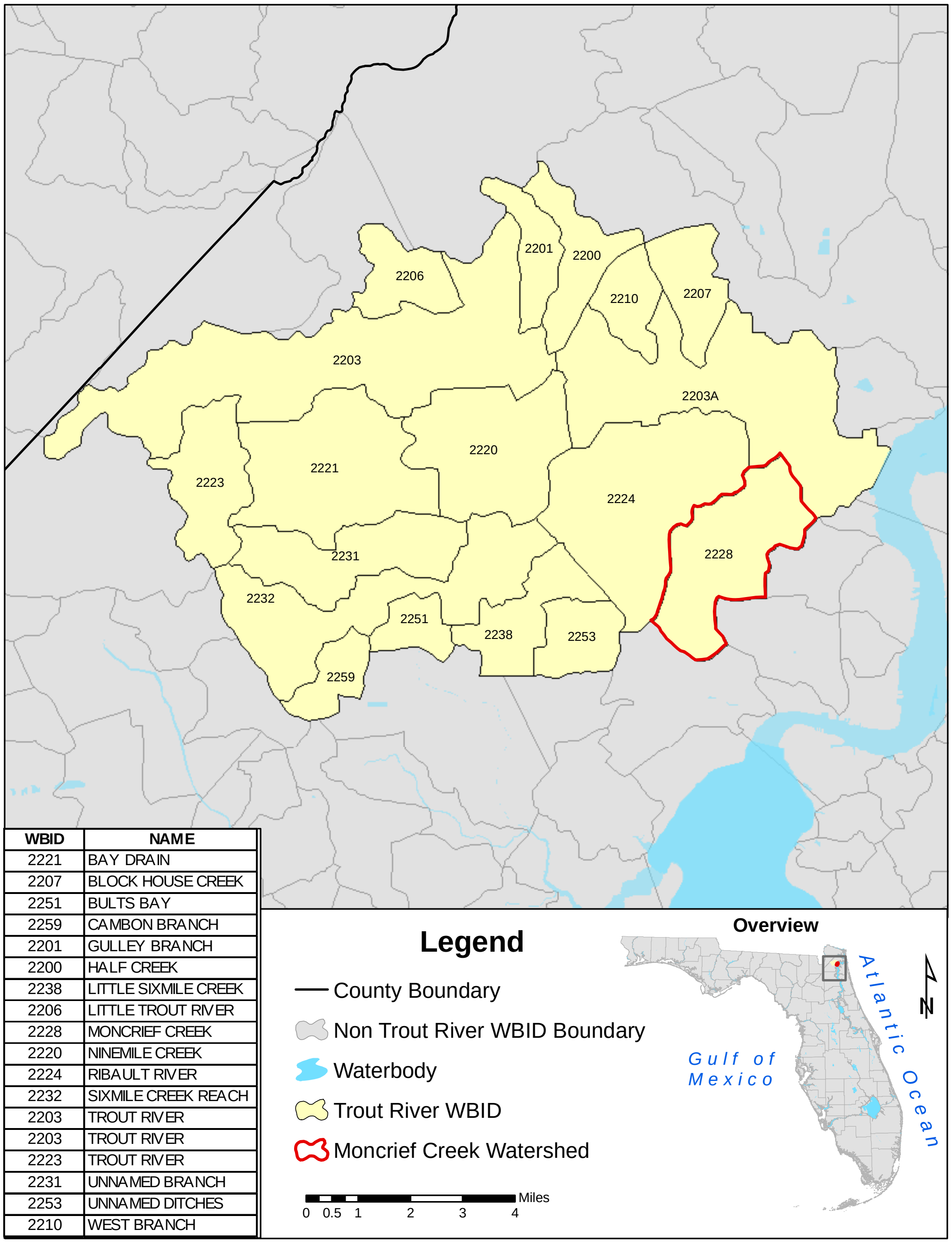


Figure 1.3. WBIDs in the Trout River Planning Unit



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

1.3 Background

This report was developed as part of the Florida Department of Environmental Protection's (Department) 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 fifty-two 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 and total coliform that caused the verified impairment of Moncrief Creek. These activities will depend heavily on the active participation of the St. Johns River Water Management District, the City of Jacksonville, 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 source in each of these impaired waters on a schedule. The Department has developed such lists, commonly referred to as 303(d) lists, since 1992. The list of impaired waters in each basin, referred to as the Verified List, is also required by the FWRA (Subsection 403.067[4)] Florida Statutes [F.S.]), 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 Moncrief Creek and has verified the creek is impaired for both fecal and total coliforms based on data in the Department's IWR database. **Tables 2.1** through **2.3** provide summary results for fecal and total coliform for the verification period, which for Group 2 waters is January 1, 1996 – June 30, 2003, by month, season, and year, respectively.

There is a 74.1 percent overall exceedance rate for fecal coliforms and a 65.0 percent overall exceedance rate for total coliforms. The greatest percent of exceedances occurred during the month of August; the least in February (**Table 2.1**). Fecal coliform exceedances occur in all seasons as well, however as shown in **Table 2.2**, a greater number occur in the summer months (July – September), and the least occurred in the winter (January - March).The highest counts occurred during September (25,875 counts/100 mL). February was the only month for which data exist and no exceedances occurred.

Total coliform data show there were 100% exceedances for the months of May, September, and December. Additionally, exceedances occurred in the spring (April – June), summer (July – September), and fall (October – December). The highest number of exceedances occurred in the spring season. No exceedances occurred during the winter season.

With respect to sampling stations, many stations do not have but a few samples, which make it difficult to do too much analysis. For fecal coliforms, there are three stations which have more than five samples. When considering fecal coliforms, even using all the data, coliform values seem to decrease going downstream. The trend also appears to exist with the total coliform data, but again, many of the station have limited data, and overall there is less data than for fecal coliform. Sampling stations are discussed further in **Section 5.1**.

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

FECAL COLIFORMS[1]								
Month	N	Minimum	Maximum	Median	Mean	Number of Exceedances	% Exceedance	Mean Precipitation
January	6	120	13,000	1,960	4,702	4	66.67%	2.39
February	2	80	130	105	105	0	0.00%	3.14
March	4	120	500	436	373	2	50.00%	3.95
April	7	70	50,000	500	7,617	4	57.14%	2.8
May	6	180	32,000	500	5,767	4	66.67%	1.61
June	4	36	5,000	1,900	2,209	3	75.00%	7.40
July	5	36	24,000	7,000	7,767	4	80.00%	6.72
August	10	90	5,000	700	1,303	7	70.00%	6.72
September	4	500	89,600	6,700	25,875	4	100.00%	9.94
October	6	40	1,300	400	525	3	50.00%	3.39
November	1	1,300	1,300	1,300	1,300	1	100.00%	1.81
December	8	40	12,000	1,249	4,493	4	50.00%	3.12
TOTAL COLIFORMS[2]								
Month	N	Minimum	Maximum	Median	Mean	Number of Exceedances	% Exceedance	Mean Precipitation
January	2	300	667	484	484	0	0.00%	2.39
February	2	80	300	190	190	0	0.00%	3.14
March	1	900	900	900	900	0	0.00%	3.95
April	2	170	800	485	485	0	0.00%	2.8
May	2	2,833	157,000	79,917	79,917	2	100.00%	1.61
June	2	1,000	2,400	1,700	1,700	0	0.00%	7.40
July	1	240	240	240	240	0	0.00%	6.72
August	4	1,167	21,800	3,150	7,317	2	50.00%	6.72
September	1	7,500	7,500	7,500	7,500	1	100.00%	9.94
October	2	40	800	420	420	0	0.00%	3.39
November	0	---	---	---	---	---	---	1.81
December	2	2,500	74,800	38,650	38,650	2	100.00%	3.12

Coliform counts are #/100 mL
[1]Exceedances represent values above 400 counts/100 mL
[2]Exceedances represent values above 2,400 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)

FECAL COLIFORMS[1]								
Season	N	Minimum	Maximum	Median	Mean	Number of Exceedances	% Exceedance	Mean Precipitation
Winter	12	80	13,000	500	2,493	6	50.00%	10.72
Spring	17	36	50,000	500	5,692	11	64.71%	12.41
Summer	19	36	89,600	800	8,177	15	78.95%	21.15
Fall	15	40	12,000	500	2,693	8	53.33%	8.34
TOTAL COLIFORMS[2]								
Season	N	Minimum	Maximum	Median	Mean	Number of Exceedances	% Exceedance	Mean Precipitation
Winter	5	80	900	300	449	0	0.00%	10.72
Spring	6	170	157,000	1,700	27,367	2	33.33%	12.41
Summer	5	240	21,800	1,300	5,901	2	40.00%	21.15
Fall	5	40	74,800	2,500	17,128	3	60.00%	8.34

Coliform counts are #/100 mL
Winter = January – March; spring = April – June; summer = July – September; fall = October - December
[1]Exceedances represent values above 400 counts/100 mL
[2]Exceedances represent values above 2,400 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. Annual Summaries of Fecal and Total Coliform Data for Verified Period (January 1, 1996 – June 30, 2003)

FECAL COLIFORMS[1]								
Year	N	Minimum	Maximum	Median	Mean	Number of Exceedances	% Exceedance	Total Precipitation
1996	6	40	2,400	400	778	3	50.00%	60.63
1997	5	70	2,100	210	548	1	20.00%	57.27
1998	12	36	24,000	500	3,543	7	58.33%	56.72
1999	8	170	50,000	1,050	8,696	7	87.50%	42.44
2000	10	40	32,000	2,350	7,314	9	90.00%	39.77
2001	9	180	5,000	700	1,381	7	77.78%	49.14
2002	13	90	89,600	398	9,029	6	46.15%	54.72
TOTAL COLIFORMS[2]								
Year	N	Minimum	Maximum	Median	Mean	Number of Exceedances	% Exceedance	Total Precipitation
1996	5	300	2,400	800	1,120	0	0.00%	60.63
1997	4	40	2,500	125	698	1	25.00%	57.27
1998	5	240	5,000	900	1,488	1	20.00%	56.72
2000	2	7,500	157,000	82,250	82,250	2	100.00%	39.77
2001	1	667	667	667	667	0	0.00%	49.14
2002	4	1,167	74,800	12,317	25,150	3	75.00%	54.72

Coliform counts are #/100 mL
[1]Exceedances represent values above 400 counts/100 mL
[2]Exceedances represent values above 2,400 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)**

Moncrief Creek is a Class III marine 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 fecal and total coliform.

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 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.*
>
> ***Total Coliform Bacteria:***
> *The MPN per 100 ml shall be less than or equal to 1,000 as a monthly average nor exceed 1,000 in more than 20 percent of the samples examined during any month; and less than or equal to 2,400 at any time.*

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 was not to exceed 400 for fecal coliform, nor exceed 2,400 for total coliform.

Chapter 4: ASSESSMENT OF SOURCES

4.1 Types of Sources

An important part of the TMDL analysis is the identification of pollutant source categories, source subcategories, or individual sources of nutrients in the 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 Moncrief Creek Watershed

4.2.1 Point Sources

There are four permitted industrial wastewater facilities in the Moncrief Creek watershed. However, only one of the facilities (Millennium Specialty Chemicals, discussed in the next several paragraphs) discharges into Moncrief Creek. Two of the other three facilities are car wash businesses (Speed Wash, permit #FLA011464, and Jax Car Wash, permit #FLA011552),that recycle their wash water and are not permitted to discharge into surface waters. A third facility, First Student, Incorporated (permit #FLR05F474), is located within the watershed, but the outfall for this facility is located in McCoy Creek, an adjoining watershed.

Millennium Specialty Chemicals (permit #FL0000884) is an organic chemicals manufacturing facility. The facility is permitted to discharge 0.600 million gallons per day (MGD) boiler and cooling tower (non-contact) blowdown, steam condensate wastewater, and stormwater (treated separately from other waste) into Moncrief Creek. In addition to the surface water discharge, a permit issued Millennium Specialty Chemicals in 2003 allows the First-Tee Golf Course to use 1.3 MGD of the facility's stormwater for course irrigation water, but does not appear to have a discharge permit. Beginning in 1998, the Millennium permit required monitoring for both total and fecal coliform, and the Department has fecal and total coliform monitoring data beginning in August 1998.

Due to facility construction, an exemption from the fecal coliform state criterion of 800 counts/100 mL daily maximum was granted in 1998, and ended April 2001. The exemption allowed for a daily limit of 4,500 counts/100 mL. During this time, the 4,500 counts/100 mL was exceeded twice (in August and September 1999, daily maximum counts were 6,500 and 7,000 counts/100 mL, respectively). These are the only two reported exceedances of the permitted effluent limits.

An exemption from the state criterion was also granted for total coliform until April 2001, which allowed a daily maximum of 5,000 counts/100 mL. During this time, the permit limit was exceeded eight times, with the highest discharge concentration of 67,000 counts/100 mL recorded in April 1999. In April 2001, permit limits reverted back to the state criterion of 2,400 counts/100 mL as a daily maximum. From April 2001 through December 2004, that criterion was exceeded seven times, with a maximum discharge concentration of 22,000 counts/100 mL in March 2004. As a result of the earlier exceedances, a warning letter was issued in April 1999, and a Consent Order (#97-1188) and an Administrative Order (#041-NE) were subsequently issued for copper, iron, fecal coliform, and total coliform.

Discharge flow from the facility averaged 0.392 MGD from August 1998 – December 2004. Annual summaries of fecal coliform, total coliform, and flow monitoring results from August 1998 – December 2004 for the Millennium facility are presented in **Table 4.1**. Data for these parameters from this time for the facility are presented in **Appendix B**. Using the data from August 1998 – December 2004 (as presented in **Appendix B**), the average fecal coliform loading from the facility is 1.21×10^{11} counts/day and the average total coliform loading is 7.49×10^{11} counts/day. Loading estimates based on this data are included in **Appendix C**. From April 2001 – December 2004, which is after the plant upgrades, the average fecal coliform loading was 1.72×10^{10} counts/day and 9.88×10^{11} counts/day for total coliform. There isn't enough sample data to correlate with facility discharge data to determine a potential link between discharge and exceedances. For fecal coliform, there are only seven months in which both facility discharge data and sample data exist. Of those seven months, the highest monthly average discharge for fecal coliform was 50 counts/100 mL. Total coliforms only had two months in which data overlap, making it all the more difficult to make a correlation.

Table 4.1. Annual Summary of Millennium Specialty Chemicals Discharge Monitoring Data

	Fecal Coliform (#/100 mL)			Total Coliform (#/100 mL)			Flow (MGD)		
Year	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
1998*	8	58	30	56	500	270	0.574	0.761	0.689
1999	3	7,000	1,750	100	67,000	12,633	0.451	0.864	0.612
2000	27	3,000	673	300	30,000	6,383	0.163	0.890	0.568
2001	2	240	38	50	30,000	4,286	0.102	0.365	0.259
2002	2	17	7	17	900	471	0.105	0.400	0.298
2003	7	79	33	27	6,300	626	0.145	0.394	0.247
2004	2	70	28	8	22,000	2,221	0.123	0.920	0.258

* Data from 1998 only represents August through December

Municipal Separate Storm Sewer System Permittees

The 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 Moncrief Creek watershed. Responsibility for the permit is shared among FDOT, and the Cities of Jacksonville, Neptune Beach, and Atlantic Beach.

4.2.2 Land Uses and Nonpoint Sources

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

Land Uses

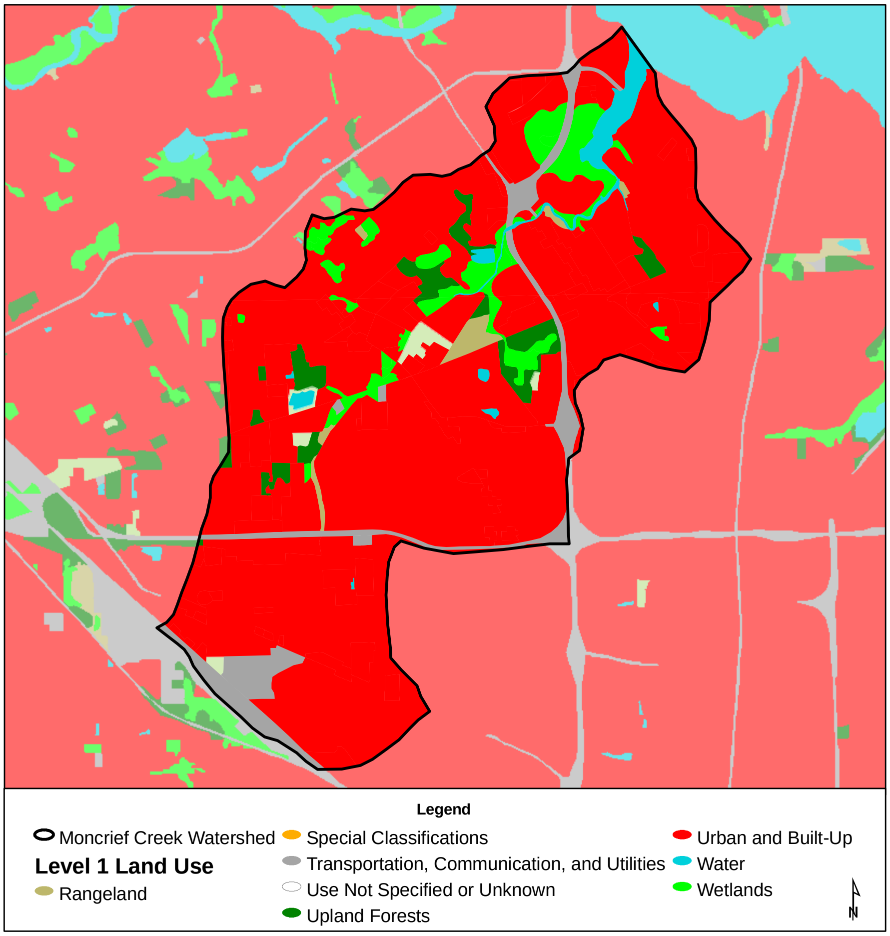
The spatial distribution and acreage of different land use categories were identified using the 2000 land use coverage contained in the Department's Geographic Information System (GIS) library, initially provided by the SJRWMD. Land use categories and acreages in the watershed were aggregated using the Level 3 codes tabulated in **Table 4.2. Figure 4.1** shows the principle Level1 land uses in the watershed.

The Moncrief Creek watershed is a highly urban area, occupying approximately 5.92 mi^2. As shown in **Table 4.2**, the majority of the land is high density residential (42.23 percent), followed by medium density residential (15.44 percent). Non-natural land uses, including residential areas (high, medium, and low), institutional uses, commercial services, golf courses, etc., comprise 86.5 percent of the watershed area or 3,281 acres. Natural land use types, such as mixed wetland hardwoods, upland mixed coniferous/hardwoods, streams, mixed scrub-shrub wetlands, etc., comprise 13.5 percent, or 510 acres. According to the land use, there are no livestock agriculture land use types.

Table 4.2. Classification of Land Use Categories in the Moncrief Creek Watershed

Level 3 Land Use Code	Attribute	Acres	Percent of Total Area
1300	Residential, high density - 6 or more dwelling units/acre	1,600.57	42.23%
1200	Residential, medium density - 2-5 dwelling units/acre	585.15	15.44%
1400	Commercial and services	412.92	10.90%
1700	Institutional	256.50	6.77%
8140	Roads and highways (divided 4-lanes with medians)	118.08	3.12%
6170	Mixed wetland hardwoods	101.42	2.68%
4340	Upland mixed coniferous/hardwood	73.31	1.93%
5100	Streams and waterways	61.74	1.63%
6420	Saltwater marshes	57.10	1.51%
4200	Upland hardwood forests	55.11	1.45%
1900	Open land	53.99	1.42%
8120	Railroads	47.32	1.25%
8130	Bus and truck terminals	44.67	1.18%
1540	Oil & gas processing	40.82	1.08%
3100	Herbaceous upland nonforested	37.98	1.00%
1510	Food processing	35.88	0.95%
6300	Wetland forested mixed	29.72	0.78%
7400	Disturbed land	28.17	0.74%
1860	Community recreational facilities	23.49	0.62%
1100	Residential, low density - less than 2 dwelling units/acre	20.16	0.53%
5300	Reservoirs - pits, retention ponds, dams	17.74	0.47%
1550	Other light industrial	16.80	0.44%
1480	Cemeteries	13.46	0.36%
6460	Mixed scrub-shrub wetland	12.27	0.32%
1520	Timber processing	11.73	0.31%
6210	Cypress	8.46	0.22%
1800	Recreational	6.16	0.16%
7430	Spoil areas	5.52	0.15%
1180	Rural residential	4.98	0.13%
8340	Sewage treatment	3.38	0.09%
8310	Electrical power facilities	2.38	0.06%
8200	Communications	1.95	0.05%
6410	Freshwater marshes	1.01	0.03%
	Total:	**3,789.94**	**100.00%**

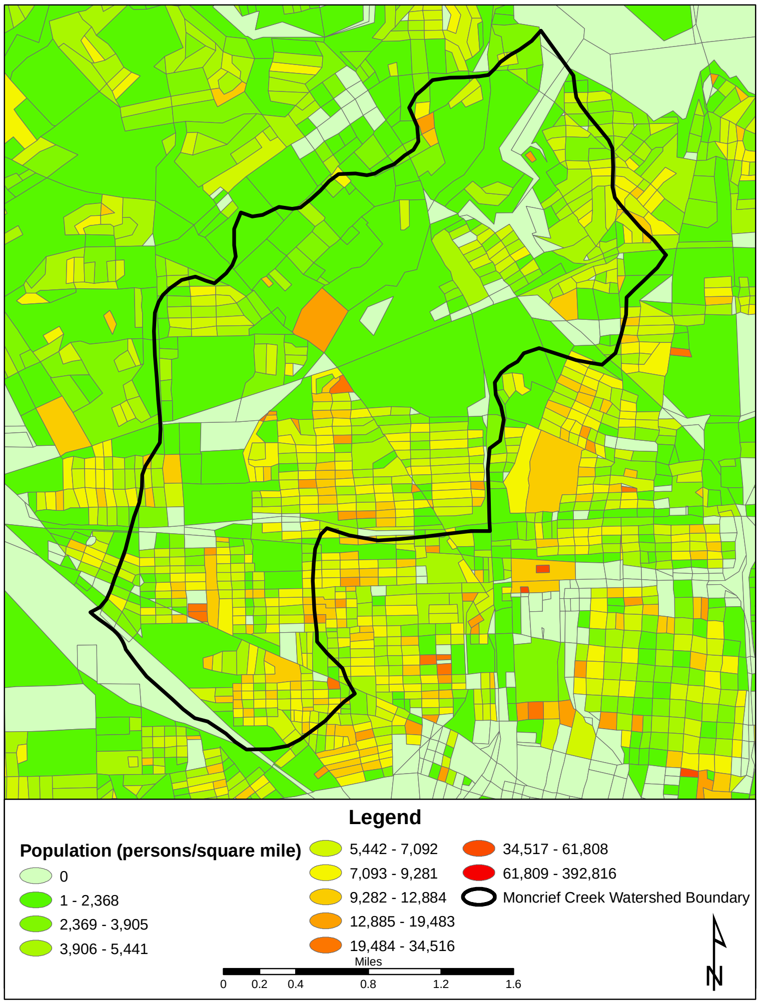
Figure 4.1. Principle Land Uses in the Moncrief Creek Watershed



Population

According to the U.S Census Bureau, census block population densities in the Moncrief watershed in the year 2000 ranged from 0 – 61,808 persons per square mile, with an average of 3, 360 persons per square mile in the watershed **(Figure 4.2).** 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).

Figure 4.2. Population Density in the Moncrief Creek 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 3,360 persons/mi^2 in the WBID, or 19,891 persons in the watershed area. The average household in the Moncrief Creek watershed has 2.59 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, there is an average of approximately 4 failures in the Moncrief Creek watershed.

To focus on the Moncrief Creek watershed, the Department obtained septic tank repair permit data from JEA for their service area, which includes the Moncrief Creek 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 4.3** in map form. The data show there were 114 permits for repairs issued during this time in the watershed, or an average of 8.1 repairs per year. This estimate is twice than estimates based on DoH countywide data.

Some areas of the watershed, mostly in the northern portion, are in septic tank phase out areas, or areas that have the highest priority to be sewered to eliminate septic tanks due to high failure rates. Approximately 8.78 percent of the watershed is included in one of these areas. Of the 114 repair permits issued, 37 (32.46 percent) are within a septic tank phase out area, as shown in **Figure 4.3**.

Based on this data provided by JEA, which is more watershed specific than that of the countywide DoH data, there was an average of 8.1 permits issued in the watershed for septic tank repairs. If this estimate is rounded up to 10 (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 6.86×10^{10} counts/day is derived for fecal coliform, and 6.86×10^{15} counts/day for total coliform. This estimation is shown in **Table 4.4.**

Table 4.3. Estimation of Average Household Size in the Moncrief Creek Watershed

Household Size	No. of Households	Percentage of Total	Number of People
1-person household	2,275	29.61%	2,275
2-person household	2,079	27.05%	4,158
3-person household	1,394	18.14%	4,182
4-person household	979	12.74%	3,916
5-person household	548	7.13%	2,740
6-person household	247	3.22%	1,482
7-or-more-person household	162	2.11%	1,134
TOTAL:	**7,685**	**100.00%**	**19,887**
		AVERAGE HOUSEHOLD SIZE:	**2.59**

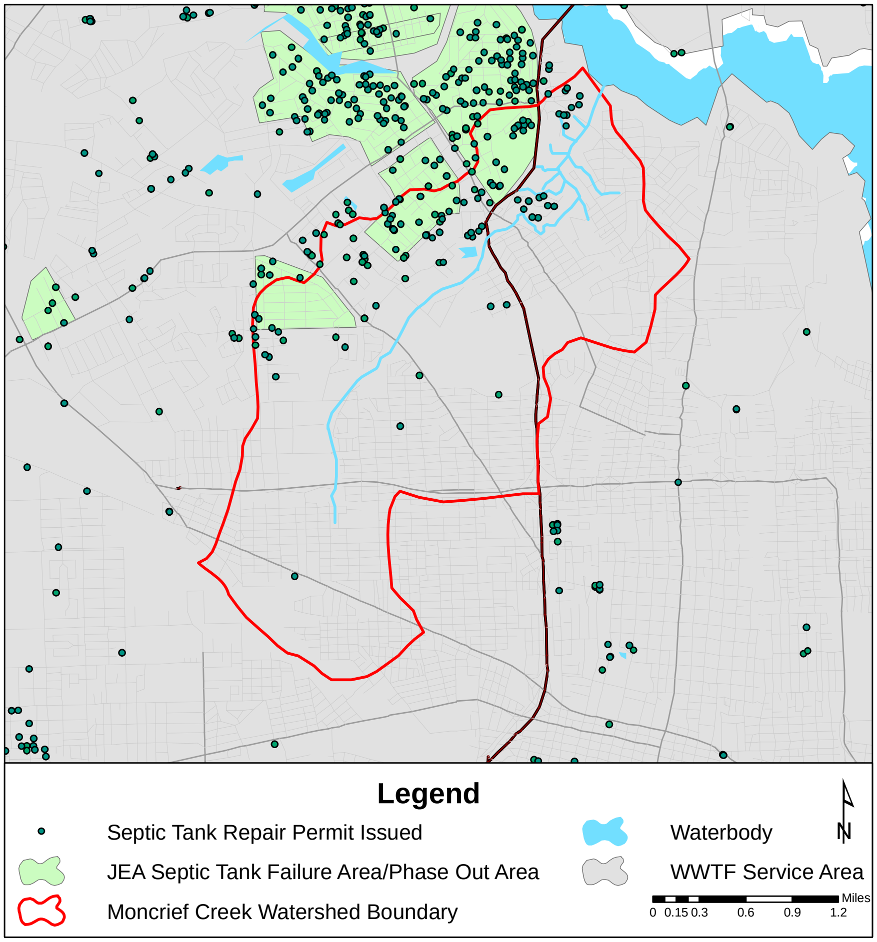
Data from U.S. Census Bureau web site, 2005, based on Duval County tracts which are present in the Moncrief Creek watershed

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

Coliform Type	Estimated Population in Watershed	Estimated Number of Tank Failures[1]	Gallons/ Person/ Day[2]	Estimated Number Persons Per Household[3]	Counts/Person/ Day[2]	Estimated Daily Load (counts/day)	Estimated Annual Load (counts/year)
Fecal	19,891	10	70	2.59	1.00×10^4/mL	6.86×10^{10}	2.50×10^{13}
Total	19,891	10	70	2.59	1.00×10^9/mL	6.86×10^{15}	2.50×10^{18}

[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 4.3. Septic Tank Repair Permits Issued March 1990 – April 2004 for the Moncrief Creek Area



Agricultural Sources

According to Level 3 land use, there are no agricultural type land uses in the Moncrief Creek watershed. As noted in **Section 4.2.2**, the majority of the land use (86.5 percent) consists of residential and commercial and services, and other non-natural categories.

Pets

While it is doubtful that agriculture has very little, if any, influence on the basin, it is very possible that pets, especially dogs, are having an impact on the waterbody. The Department has been unable to obtain information on the specific numbers of dogs in the area; however, estimates can be made using literature based values of dog ownership rates (**Table 4.5)**. For example, using household-to-dog ratio estimates from the American Veterinary Medical Association (AVMA), and assuming that coliforms from10 percent of dogs reach the waterbody and are viable upon reaching it, the approximate fecal coliform loading would be 1.39 x 10^{12} counts/day. Total coliform concentrations from dogs is not known, but would be more than that for fecal coliform. These are estimates, as the actual loading from dogs is not known.

Table 4.5. Estimated Loading from Dogs in the Moncrief Creek Watershed

Coliform Type	Estimated Number of Households in 2322	Estimated Household:Dog Ratio[1]	Estimated Dog Population in Watershed	Load Reaching Waterbody	Estimated Number of Pets with Impact to Creek	Counts/ Dog/Day[2]	Estimated Daily Load (counts/day)	Estimated Annual Load (counts/day)
Fecal	7,685	0.361	2,774	10%	277	5 x 10^9	1.39 X 10^{12}	1.39 X 10^{12}
Total	7,685	0.361	2,774	10%	277	>5 x 10^9	>1.39 X 10^{12}	>1.39 X 10^{12}

[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 7,685 homes in the watershed, with 2.59 people per home, 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 Moncrief Creek, a daily flow of approximately 3.00 x 10^6 L (0.794 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 and total coliforms in raw sewage, the potential loadings of fecal and total coliforms from leaking sewer lines are 7.51 x 10^{12} and 1.50 x 10^{15} counts/day, respectively (**Table 4.6**).

Table 4.6. Estimated Loading from the Wastewater Collection Systems

Coliform Type	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)
Fecals	4,380	3.00 x 10^6	1.50 x 10^5	5 x 10^6	7.51 X 10^{12}	2.74 X 10^{15}
Totals	4,380	3.00 x 10^6	1.50 x 10^5	1 x 10^9	1.50 X 10^{15}	5.49 X 10^{17}

Table 4.7 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 Cedar River.

Table 4.7. Summary of Estimated Potential Coliform Loading From Various Sources the Moncrief Creek Watershed

Source	Fecal Coliforms		Total Coliforms	
	Estimated Daily Loading (counts/day)	Estimated Annual Loading (counts/day)	Estimated Daily Loading (counts/day)	Estimated Annual Loading (counts/day)
NPDES Facilities	1.72×10^{10}	6.26×10^{12}	9.88×10^{10}	3.61×10^{14}
Septic Tanks	6.86×10^{11}	2.50×10^{13}	6.86×10^{15}	2.50×10^{18}
Pets	1.39×10^{12}	5.06×10^{14}	$>1.39 \times 10^{12}$	$>5.06 \times 10^{14}$
Collection Systems	7.50×10^{12}	2.74×10^{15}	1.50×10^{15}	5.49×10^{17}

Chapter 5: DETERMINATION OF ASSIMILATIVE CAPACITY

5.1 Determination of Loading Capacity

The methodology used for this TMDL was the "percent reduction" methodology. The Department generally prefers to use the load duration curve or "Kansas" method for coliform TMDLs, but this method could not be used because there are no stream gauging stations on Moncrief Creek. To determine the TMDL, the percent reduction that would be required for each of the exceedances to meet applicable criteria was determined, and the median value of all of these reductions for both fecal and total coliforms determined the overall required reduction, and therefore the TMDL.

5.1.1 Data Used in the Determination of the TMDL

There are seven sampling stations in Moncrief Creek that have historical coliform observations. The primary data collector of historical data is the City of Jacksonville, with some data being collected by the Department and the SJRWMD. **Table 5.1** shows summaries, by station, of the Department's data inventory for Moncrief Creek. **Figure 5.1** shows the location of the sample sites, and **Table 5.2** provides a brief overview data from each site. **Figures 5.2** and **5.3** are charts showing the observed historical data over time, and **Appendices D** and **E** contain all historical observations for fecal and total coliforms from all sites. **Table 4.5** shows average coliform counts by year.

Table 5.1. Sampling Station Summary for the Moncrief Creek Watershed

FECAL COLIFORMS				
Station	**STORET ID**	**Station Owner[1]**	**Year(s) with Data**	**N**
MONCRIEF CR @ 26TH ST.	21FLA 20030576	FDEP	1998	1
MONCRIEF CR AT MONCRIEF ROAD	21FLA 20030726	FDEP	2000-2001	3
MONCRIEF CR N OF 33RD ST BRID	21FLA 20030316	FDEP	2002	2
MONCRIEF CREEK AT 33RD. STREET	21FLJXWQTR316	COJ	1991-1995; 1998-2002	41
MONCRIEF CREEK AT HWY 111	21FLSJWMLSJ907	SJRWMD	1992-1993	4
MONCRIEF CREEK AT LEM TURNER RD	21FLJXWQTR114	COJ	1991-1996; 1998-2002	4
MONCRIEF CREEK NEAR MOUTH	21FLSJWM20030115	SJRWMD	1995-1998	17
TOTAL COLIFORMS				
Station	**STORET ID**	**Station Owner[1]**	**Year(s) with Data**	**N**
MONCRIEF CR @ 26TH ST.	21FLA 20030576	FDEP	1998	1
MONCRIEF CR AT MONCRIEF ROAD	21FLA 20030726	FDEP	2000-2001	3
MONCRIEF CR N OF 33RD ST BRID	21FLA 20030316	FDEP	2002	3
MONCRIEF CREEK AT 33RD. STREET	21FLJXWQTR316	COJ	1991-1995	18
MONCRIEF CREEK NEAR MOUTH	21FLSJWM20030115	SJRWMD	1995-1998	16

[1]FDEP = FL. Dept. of Env. Protection; COJ = City of Jacksonville; SJRWMD = St. Johns River Water Management District

Figure 5.1. Sampling Sites with Historical Data in Moncrief Creek Watershed

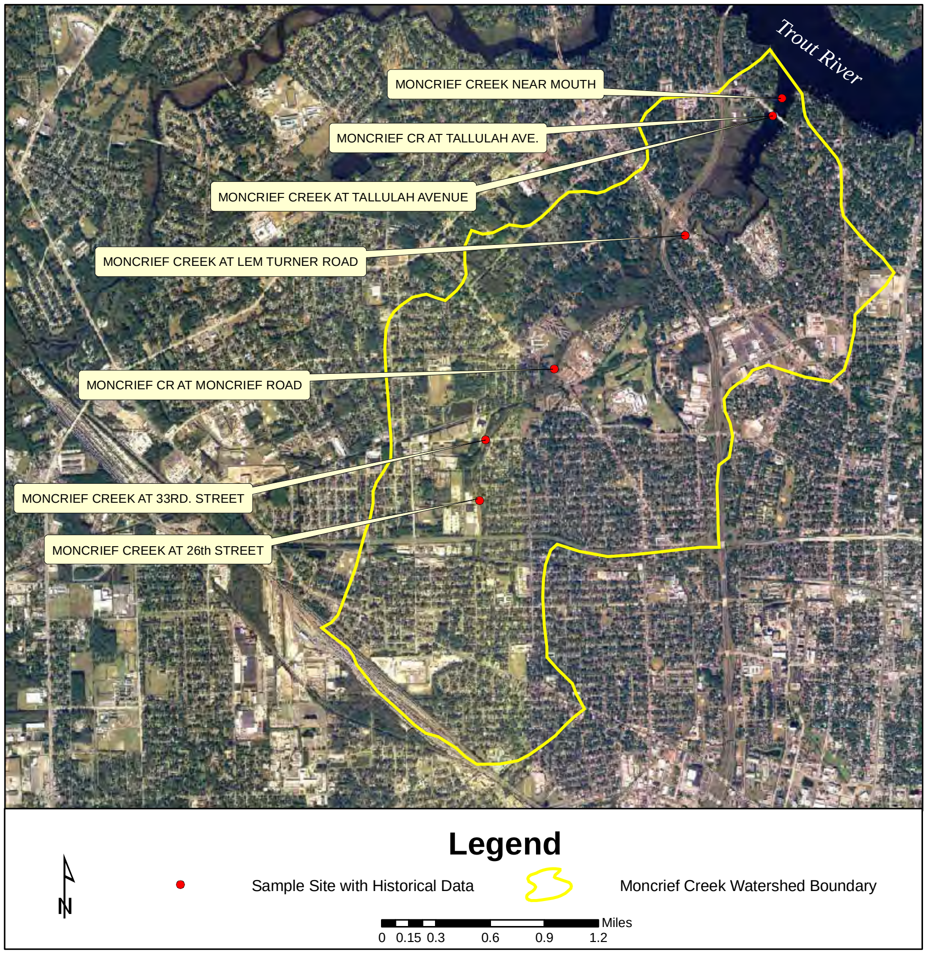


Table 5.2. Statistical Table of Observed Historical Coliform Data for Moncrief Creek

FECAL COLIFORMS							
Station	**N**	**Minimum**	**Maximum**	**Median**	**Mean**	**Exceedances**	**% Exceedance**
MONCRIEF CR @ 26TH ST.	1	1,800	1,800	1,800	1,800	1	100.00%
MONCRIEF CR AT MONCRIEF ROAD	3	920	32,000	11,440	1,400	3	100.00%
MONCRIEF CR N OF 33RD ST BRIDGE	2	12,000	89,600	50,800	50,800	2	100.00%
MONCRIEF CREEK AT 33RD. STREET	42	40	28,000	4,714	2,350	36	85.71%
MONCRIEF CREEK AT HWY 111	4	20	835	505	582	3	75.00%
MONCRIEF CREEK AT LEM TURNER ROAD	39	90	160,000	9,442	1,300	30	76.92%
MONCRIEF CREEK NEAR MOUTH	17	36	2,400	562	130	5	29.41%
TOTAL COLIFORMS							
Station	**N**	**Minimum**	**Maximum**	**Median**	**Mean**	**Exceedances**	**% Exceedance**
MONCRIEF CR @ 26TH ST.	1	5,000	5,000	5,000	5,000	1	100.00%
MONCRIEF CR AT MONCRIEF ROAD	3	667	157,000	55,056	7,500	2	66.67%
MONCRIEF CR N OF 33RD ST BRID	3	2,833	74,800	33,144	21,800	3	100.00%
MONCRIEF CREEK AT 33RD. STREET	18	2,300	160,000	57,794	26,000	17	94.44%
MONCRIEF CREEK AT LEM TURNER ROAD	18	800	160,000	33,661	9,000	13	72.22%
MONCRIEF CREEK NEAR MOUTH	16	40	5,000	1,221	850	2	12.50%

Coliform concentrations are #/100 mL

Figure 5.2. Historical Fecal Coliform Observations for Moncrief Creek

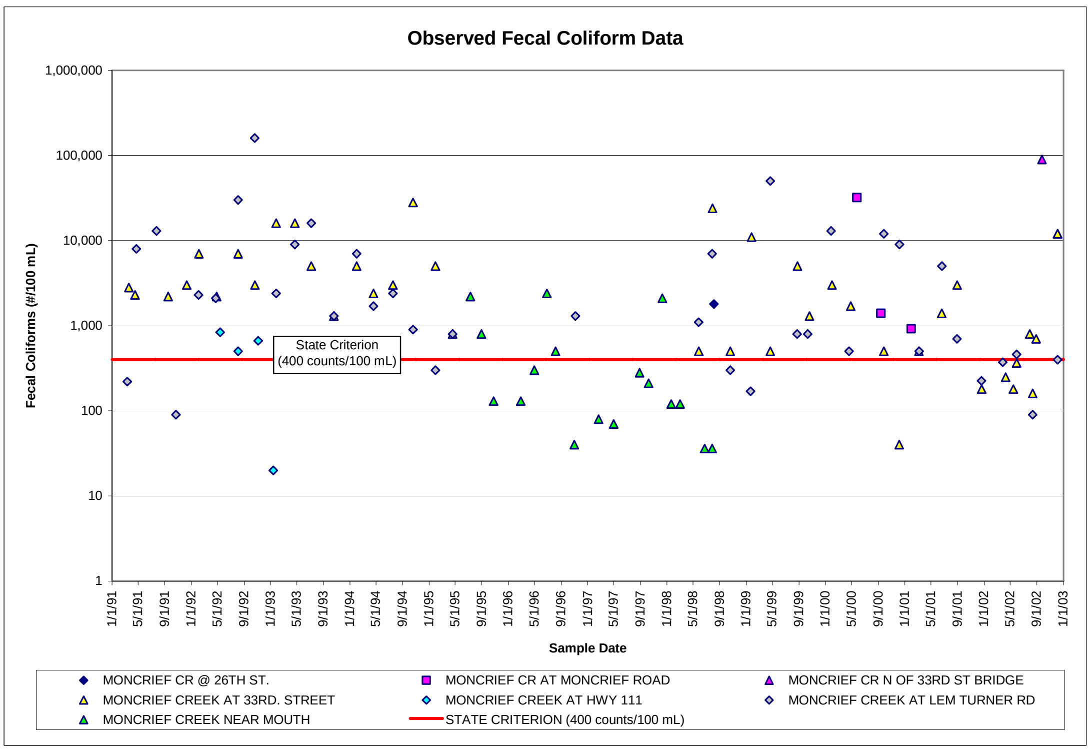
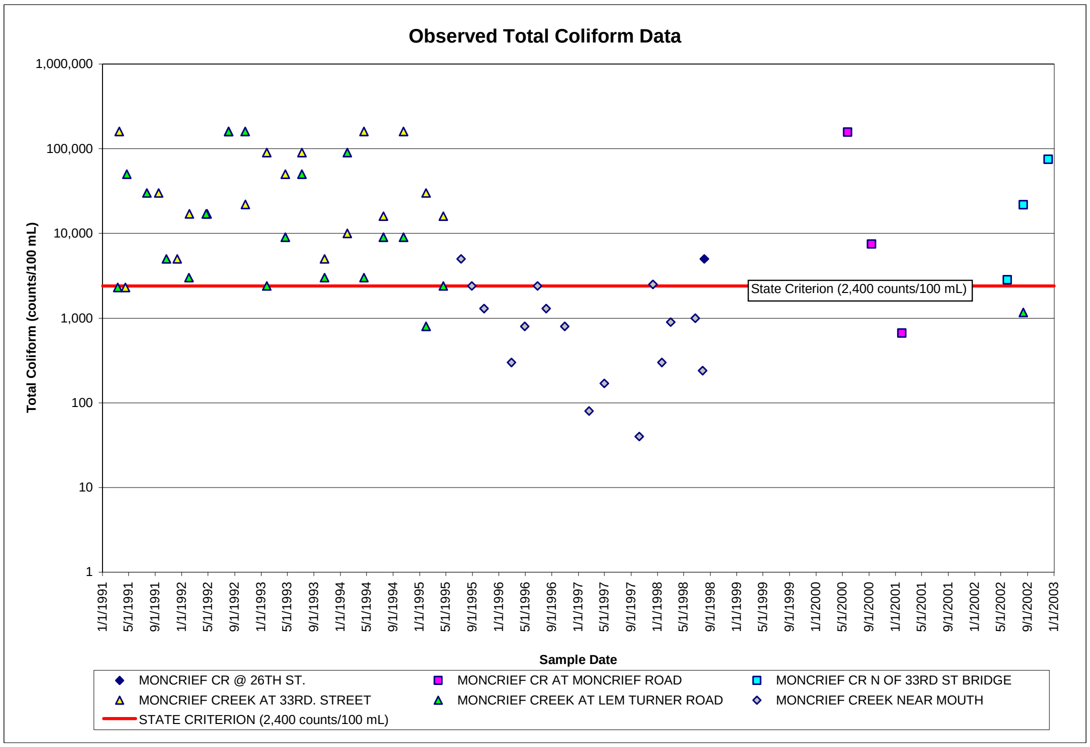


Figure 5.3. Historical Observations Total Coliforms for Moncrief Creek



5.1.2 TMDL Development Process

Due to the lack of flow data, a simple calculation was performed to determine the needed reduction. Exceedances of the state criterion for fecal coliforms were compared to the criterion of 400 counts/100mL and exceedances of the total coliforms criterion were compared to 2,400 counts/100 mL. For each individual exceedance, the 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 83 percent for fecal coliforms and 97 percent for total coliforms. This means that in order to meet the applicable state criteria, an 83 percent reduction in current loading for fecal coliforms and a 98 percent reduction in current loading for total coliforms are necessary, and are therefore the TMDLs for Moncrief Creek. **Table 5.3** shows the individual reduction calculations for fecal coliforms, and **Table 5.4** shows them for total coliforms.

Table 5.3. Calculation of Reductions for the Fecal Coliform TMDL for Moncrief Creek

DATE	LOCATION	VALUE	REQUIRED REDUCTION
3/19/91	MONCRIEF CREEK AT 33RD. STREET	2,800	85.71%
4/16/91	MONCRIEF CREEK AT 33RD. STREET	2,300	82.61%
4/23/91	MONCRIEF CR. AT LEM TURNER RD	8,000	95.00%
7/24/91	MONCRIEF CR. AT LEM TURNER RD	13,000	96.92%
9/16/91	MONCRIEF CREEK AT 33RD. STREET	2,200	81.82%
12/11/91	MONCRIEF CREEK AT 33RD. STREET	3,000	86.67%
2/3/92	MONCRIEF CR. AT LEM TURNER RD	2,300	82.61%
2/5/92	MONCRIEF CREEK AT 33RD. STREET	7,000	94.29%
4/22/92	MONCRIEF CR. AT LEM TURNER RD	2,100	80.95%
4/27/92	MONCRIEF CREEK AT 33RD. STREET	2,200	81.82%
5/13/92	MONCRIEF CREEK AT HWY 111	835	52.10%
8/3/92	MONCRIEF CREEK AT HWY 111	500	20.00%
8/3/92	MONCRIEF CR. AT LEM TURNER RD	30,000	98.67%
8/3/92	MONCRIEF CREEK AT 33RD. STREET	7,000	94.29%
10/19/92	MONCRIEF CR. AT LEM TURNER RD	160,000	99.75%
10/20/92	MONCRIEF CREEK AT 33RD. STREET	3,000	86.67%
11/4/92	MONCRIEF CREEK AT HWY 111	664	39.76%
1/26/93	MONCRIEF CREEK AT 33RD. STREET	16,000	97.50%
1/26/93	MONCRIEF CR. AT LEM TURNER RD	2,400	83.33%
1/26/93	MONCRIEF CREEK AT 33RD. STREET	16,000	97.50%
4/22/93	MONCRIEF CR. AT LEM TURNER RD	9,000	95.56%
4/22/93	MONCRIEF CREEK AT 33RD. STREET	16,000	97.50%
7/7/93	MONCRIEF CREEK AT 33RD. STREET	5,000	92.00%
7/7/93	MONCRIEF CR. AT LEM TURNER RD	16,000	97.50%
10/19/93	MONCRIEF CR. AT LEM TURNER RD	1,300	69.23%
10/19/93	MONCRIEF CREEK AT 33RD. STREET	1,300	69.23%
2/1/94	MONCRIEF CREEK AT 33RD. STREET	5,000	92.00%
2/1/94	MONCRIEF CR. AT LEM TURNER RD	7,000	94.29%
4/19/94	MONCRIEF CREEK AT 33RD. STREET	2,400	83.33%
4/19/94	MONCRIEF CR. AT LEM TURNER RD	1,700	76.47%
4/19/94	MONCRIEF CREEK AT 33RD. STREET	2,400	83.33%
7/18/94	MONCRIEF CR. AT LEM TURNER RD	2,400	83.33%
7/18/94	MONCRIEF CREEK AT 33RD. STREET	3,000	86.67%
10/18/94	MONCRIEF CR. AT LEM TURNER RD	900	55.56%
10/18/94	MONCRIEF CREEK AT 33RD. STREET	28,000	98.57%
1/30/95	MONCRIEF CREEK AT 33RD. STREET	5,000	92.00%
4/19/95	MONCRIEF CR. AT LEM TURNER RD	800	50.00%
4/19/95	MONCRIEF CREEK AT 33RD. STREET	800	50.00%
7/10/95	MONCRIEF CREEK NEAR MOUTH	2,200	81.82%
8/29/95	MONCRIEF CREEK NEAR MOUTH	800	50.00%
6/26/96	MONCRIEF CREEK NEAR MOUTH	2,400	83.33%
8/5/96	MONCRIEF CREEK NEAR MOUTH	500	20.00%
11/5/96	MONCRIEF CR. AT LEM TURNER RD	1,300	69.23%
12/10/97	MONCRIEF CREEK NEAR MOUTH	2,100	80.95%
5/26/98	MONCRIEF CR. AT LEM TURNER RD	1,100	63.64%
5/27/98	MONCRIEF CREEK AT 33RD. STREET	500	20.00%
7/27/98	MONCRIEF CR. AT LEM TURNER RD	7,000	94.29%
7/27/98	MONCRIEF CR. AT LEM TURNER RD	7,000	94.29%
7/29/98	MONCRIEF CREEK AT 33RD. STREET	24,000	98.33%
8/4/98	MONCRIEF CR @ 26TH ST.	1,800	77.78%
10/19/98	MONCRIEF CREEK AT 33RD. STREET	500	20.00%
1/25/99	MONCRIEF CREEK AT 33RD. STREET	11,000	96.36%
4/21/99	MONCRIEF CREEK AT 33RD. STREET	500	20.00%
4/21/99	MONCRIEF CR. AT LEM TURNER RD	50,000	99.20%
8/23/99	MONCRIEF CR. AT LEM TURNER RD	800	50.00%
8/25/99	MONCRIEF CREEK AT 33RD. STREET	5,000	92.00%
10/11/99	MONCRIEF CR. AT LEM TURNER RD	800	50.00%
10/19/99	MONCRIEF CREEK AT 33RD. STREET	1,300	69.23%
1/26/00	MONCRIEF CR. AT LEM TURNER RD	13,000	96.92%
1/31/00	MONCRIEF CREEK AT 33RD. STREET	3,000	86.67%
4/18/00	MONCRIEF CR. AT LEM TURNER RD	500	20.00%
4/26/00	MONCRIEF CREEK AT 33RD. STREET	1,700	76.47%
5/25/00	MONCRIEF CR AT MONCRIEF ROAD	32,000	98.75%
9/12/00	MONCRIEF CR AT MONCRIEF ROAD	1,400	71.43%
9/25/00	MONCRIEF CR. AT LEM TURNER RD	12,000	96.67%
9/25/00	MONCRIEF CREEK AT 33RD. STREET	500	20.00%
12/6/00	MONCRIEF CR. AT LEM TURNER RD	9,000	95.56%
1/30/01	MONCRIEF CR AT MONCRIEF ROAD	920	56.52%
3/6/01	MONCRIEF CREEK AT 33RD. STREET	500	20.00%
3/7/01	MONCRIEF CR. AT LEM TURNER RD	500	20.00%
6/19/01	MONCRIEF CREEK AT 33RD. STREET	1,400	71.43%
6/20/01	MONCRIEF CR. AT LEM TURNER RD	5,000	92.00%
8/28/01	MONCRIEF CR. AT LEM TURNER RD	700	42.86%
8/29/01	MONCRIEF CREEK AT 33RD. STREET	3,000	86.67%
5/30/02	MONCRIEF CR. AT LEM TURNER RD	460	13.04%
7/30/02	MONCRIEF CREEK AT 33RD. STREET	800	50.00%
8/28/02	MONCRIEF CREEK AT 33RD. STREET	700	42.86%
9/24/02	MONCRIEF CR N OF 33RD ST BRID	89,600	99.55%
12/5/02	MONCRIEF CR N OF 33RD ST BRID	12,000	96.67%
12/5/02	MONCRIEF CREEK AT 33RD. STREET	12,000	96.67%
	MEDIAN:	**2,600**	**84.52%**

Table 5.4. Calculation of Reductions for the Total Coliform TMDL for Moncrief Creek

DATE	LOCATION	VALUE	REQUIRED REDUCTION
3/19/1991	MONCRIEF CREEK AT 33RD. STREET	160,000	99.75%
4/23/1991	MONCRIEF CREEK AT LEM TURNER ROAD	50,000	99.20%
7/24/1991	MONCRIEF CREEK AT LEM TURNER ROAD	30,000	98.67%
9/16/1991	MONCRIEF CREEK AT 33RD. STREET	30,000	98.67%
10/22/1991	MONCRIEF CREEK AT LEM TURNER ROAD	5,000	92.00%
12/11/1991	MONCRIEF CREEK AT 33RD. STREET	5,000	92.00%
2/3/1992	MONCRIEF CREEK AT LEM TURNER ROAD	3,000	86.67%
2/5/1992	MONCRIEF CREEK AT 33RD. STREET	17,000	97.65%
4/22/1992	MONCRIEF CREEK AT LEM TURNER ROAD	17,000	97.65%
4/27/1992	MONCRIEF CREEK AT 33RD. STREET	17,000	97.65%
8/3/1992	MONCRIEF CREEK AT 33RD. STREET	160,000	99.75%
8/3/1992	MONCRIEF CREEK AT LEM TURNER ROAD	160,000	99.75%
10/19/1992	MONCRIEF CREEK AT LEM TURNER ROAD	160,000	99.75%
10/20/1992	MONCRIEF CREEK AT 33RD. STREET	22,000	98.18%
1/26/1993	MONCRIEF CREEK AT 33RD. STREET	90,000	99.56%
4/22/1993	MONCRIEF CREEK AT 33RD. STREET	50,000	99.20%
4/22/1993	MONCRIEF CREEK AT LEM TURNER ROAD	9,000	95.56%
7/7/1993	MONCRIEF CREEK AT 33RD. STREET	90,000	99.56%
7/7/1993	MONCRIEF CREEK AT LEM TURNER ROAD	50,000	99.20%
10/19/1993	MONCRIEF CREEK AT 33RD. STREET	5,000	92.00%
10/19/1993	MONCRIEF CREEK AT LEM TURNER ROAD	3,000	86.67%
2/1/1994	MONCRIEF CREEK AT 33RD. STREET	10,000	96.00%
2/1/1994	MONCRIEF CREEK AT LEM TURNER ROAD	90,000	99.56%
4/19/1994	MONCRIEF CREEK AT 33RD. STREET	160,000	99.75%
4/19/1994	MONCRIEF CREEK AT LEM TURNER ROAD	3,000	86.67%
7/18/1994	MONCRIEF CREEK AT 33RD. STREET	16,000	97.50%
7/18/1994	MONCRIEF CREEK AT LEM TURNER ROAD	9,000	95.56%
10/18/1994	MONCRIEF CREEK AT 33RD. STREET	160,000	99.75%
10/18/1994	MONCRIEF CREEK AT LEM TURNER ROAD	9,000	95.56%
1/30/1995	MONCRIEF CREEK AT 33RD. STREET	30,000	98.67%
4/19/1995	MONCRIEF CREEK AT 33RD. STREET	16,000	97.50%
7/10/1995	MONCRIEF CREEK NEAR MOUTH	5,000	92.00%
12/10/1997	MONCRIEF CREEK NEAR MOUTH	2,500	84.00%
8/4/1998	MONCRIEF CR @ 26TH ST.	5,000	92.00%
5/25/2000	MONCRIEF CR AT MONCRIEF ROAD	157,000	99.75%
9/12/2000	MONCRIEF CR AT MONCRIEF ROAD	7,500	94.67%
5/30/2002	MONCRIEF CR N OF 33RD ST BRID	2,833	85.88%
8/12/2002	MONCRIEF CR N OF 33RD ST BRID	21,800	98.17%
12/5/2002	MONCRIEF CR N OF 33RD ST BRID	74,800	99.47%
	MEDIAN:	**17,000**	**97.65%**

5.1.3 Critical Conditions/Seasonality

Exceedances in Moncrief Creek 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 and total coliform observations in Moncrief Creek are provided in **Appendices D** and **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 both the fecal and total coliform datasets to determine whether there were significant differences among months or seasons. At an alpha (α) level of 0.05, neither fecal nor total coliforms had significant differences among months or seasons (**Appendices F, G, H,** and **I**). It is very difficult to evaluate possible patterns among months due to the small sample sizes. For example, the range in monthly observations for fecal coliforms varies from 2 to 17 in a given month, with seven months having less than 10 observations. The sample sizes for total coliforms were even smaller, with only two months having more than seven samples. Grouping observations by season increased sample sizes for statistical comparison and, as seen in **Table 2.3**, for fecal coliforms the summer (July – September) season had the highest exceedance rate (79 percent). For total coliforms, the highest exceedances rate occurred in fall (October – December), with a 60 percent exceedance rate. A likely factor that could contribute to these monthly or seasonal differences would be the pattern of rainfall. Comparisons of station and seasons are presented in **Appendices J** and **K**.

Rainfall records for the Jacksonville International Airport (**Appendix L** 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 summarized the simple correlation coefficients between the various rainfall and coliform measures (**Appendices M** and **N**). The simple correlations (r values in the Spearman Correlation table) between both fecal and total coliforms and the 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 the coliform observation and rainfall total to determine whether any of the relationships were significant at an α level of 0.05. Although the r^2 values were low, the correlations between fecal coliforms and the 3D and 7D precipitation were not significant, but when compared to the 1D rainfall totals, there is some significance (**Appendix O**). In the case of total coliforms, the 3D rainfall totals were significant, where as the 1D and 7D totals were not significant at α=0.05 (**Appendices P**). As noted previously, the highest percentage of exceedances of fecal coliforms occurred in September and November. For total coliforms, the greatest percentage of exceedances occurred in May, September, and December. The historical plot of monthly average rainfall (**Appendix Q**) indicates that monthly rainfall totals increase in June and peak in September and by October return to levels observed in February and March. **Appendix R** includes a graph of annual rainfall over the 1955 – 2004 period 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. Higher percentages of fecal coliform exceedances occurred from 1999 – 2001 than did 1996 - 1998. This seems to indicate an overall inverse relationship to precipitation with fecal coliforms, which may indicate point sources may be contributing to exceedances more than nonpoint sources; but exceedances are most likely due to a combination of factors from both types of sources. There are fewer total coliform samples, and no year has over five samples; therefore it is more difficult to determine a trend with precipitation, and does not appear to be an obvious trend.

Hydrologic conditions were analyzed using rainfall, since no flow data was available. A loading curve type chart, that would normally be applied to flow events, was created using precipitation data from JIA from 1990 – 2004 instead. 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 fecal coliform exceedances occurred over all hydrologic conditions; however, the least percentage of exceedances (63.64 percent) occurred under what would be considered small precipitation events. The greatest percentage of exceedances (100 percent) occurred within 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. With respect to fecal coliforms in Moncrief Creek, there is a downward trend is exceedances with decreasing precipitation, with exception of the no measurable precipitation range. This most likely indicates that exceedances are being influenced by nonpoint sources.

Total coliforms have a high number of exceedances in the extreme and large event ranges, which decrease in the medium event range and increases again in the small and no measurable precipitation event ranges. Such a pattern may indicate that there is a combination of point and nonpoint sources affecting exceedances. **Table 5.4** is a summary of data and hydrologic conditions. **Figure 5.3** shows the same data visually.

Table 5.5. Summary of Fecal Coliform Data by Hydrological Condition

Precipitation Event	Event Range	Total Values	Number of Exceedances	Percent Exceedance	Number of Non-Excedances	Percent Non-Exceedance
Extreme	>2.1"	10	10	100.00%	0	0.00%
Large	1.33" - 2.1"	7	6	85.71%	1	14.29%
Medium	0.18" - 1.33"	24	17	70.83%	7	29.17%
Small	0.01" - 0.18"	22	14	63.64%	8	36.36%
None/Not Measurable	<0.01"	43	30	69.77%	13	30.23%

Table 5.6. Summary of Total Coliform Data by Hydrological Condition

Precipitation Event	Event Range	Total Values	Number of Exceedances	Percent Exceedance	Number of Non-Excedances	Percent Non-Exceedance
Extreme	>2.1"	5	5	100.00%	0	0.00%
Large	1.33" - 2.1"	5	4	80.00%	1	20.00%
Medium	0.18" - 1.33"	14	6	42.86%	8	57.14%
Small	0.01" - 0.18"	7	4	57.14%	3	42.86%
None/Not Measurable	<0.01"	29	20	68.97%	9	31.03%

Figure 5.4. Fecal Coliform Data by Hydrological Condition Based on Rainfall

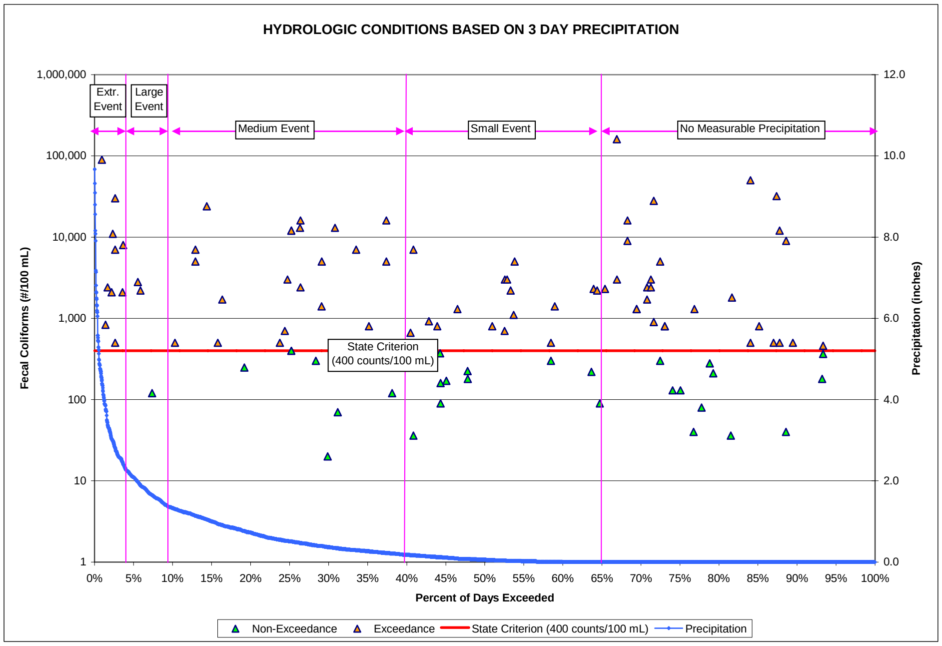
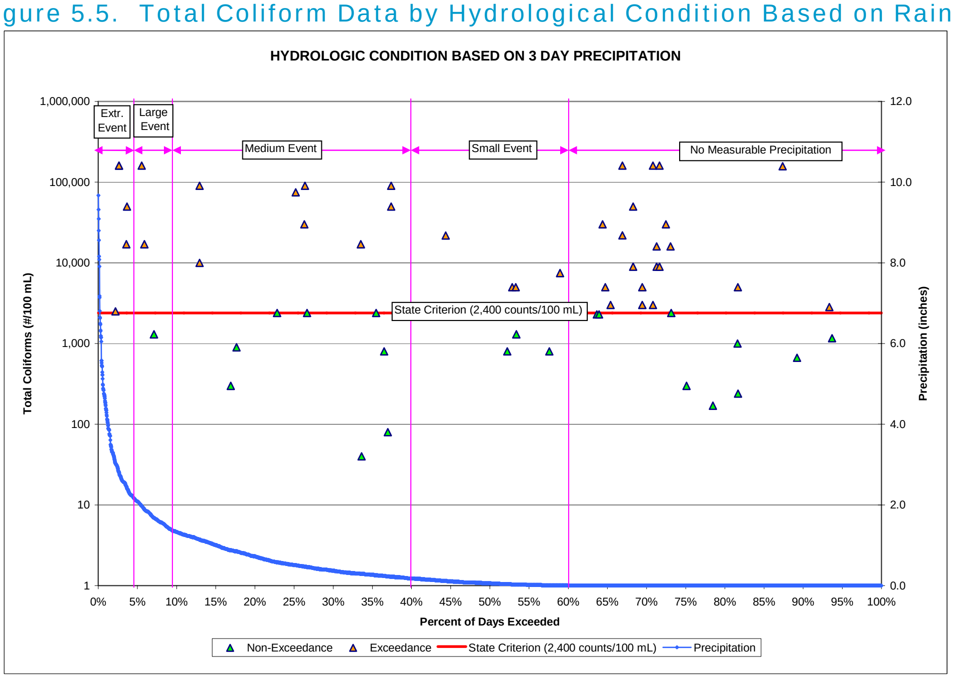


Figure 5.5. Total Coliform Data by Hydrological Condition Based on Rainfall



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:

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

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

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

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

WLAs for stormwater discharges are typically expressed as “percent reduction” because it is very difficult to quantify the loads from MS4s (given the numerous discharge points) and to distinguish loads from MS4s from other nonpoint sources (given the nature of stormwater transport). The permitting of stormwater discharges also differs from the permitting of most wastewater point sources. Because stormwater discharges cannot be centrally collected, monitored, and treated, they are not subject to the same types of effluent limitations as wastewater facilities, and instead are required to meet a performance standard of providing treatment to the “maximum extent practical” through the implementation of 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 Moncrief Creek are expressed in terms of counts per 100 mL and percent reduction, and represent the maximum fecal and total coliform load the creek can assimilate and maintain the applicable coliform criteria **(Table 6.1).**

Table 6.1. TMDL Components for Moncrief Creek

WBID	Parameter	TMDL (counts/100 mL)	WLA		LA (Percent Reduction)	MOS
			Wastewater	NPDES Stormwater		
2228	Fecal Coliform	400	Point sources must meet permit limits	83%	83%	Implicit
2228	Total Coliform	2,400	Point sources must meet permit limits	98%	98%	Implicit

6.2 Load Allocation (LA)

A fecal coliform reduction of 83 percent and a total coliform reduction of 98 percent are 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

The WLA for fecal coliforms for the Millennium Specialty Chemicals (permit #FL0000884) is to meet the applicable fecal coliform criterion. This facility, as well as any future facilities permitted to discharge wastewater to the Moncrief Creek watershed, will be required to meet state Class III criteria for fecal coliforms and therefore will not be allowed to exceed 200 counts/100 mL as a monthly average or 400 counts/100 mL at any given time for fecal coliforms.

Similarly, the WLA for total coliforms for Millennium Specialty Chemicals is to meet the applicable total coliform criterion. Total coliform values shall not exceed 1,000 counts/100mL as a monthly average, exceed 1,000 counts/100 mL in 20 percent of the samples examined during any month, or exceed 2,400 counts/100 mL at any time.

6.3.2 NPDES Stormwater Discharges

The WLA for the City of Jacksonville and FDOT's MS4 permit (permit FL000012) is an 83 percent reduction in current anthropogenic fecal coliform loading and a 98 percent reduction in current anthropogenic total coliform loading from the MS4. It should be noted that any MS4 permittee will only be responsible for reducing the loads associated with stormwater outfalls for which it owns or otherwise has responsible control, and is not responsible for reducing other nonpoint source loads within its jurisdiction.

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 criterion. Likewise, the TMDL calculated for total coliform was based on meeting the water quality criterion of 2,400 counts/100 mL without any exceedances, while the actual criterion allows for 10 percent exceedances over the 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 Moncrief Creek. 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:

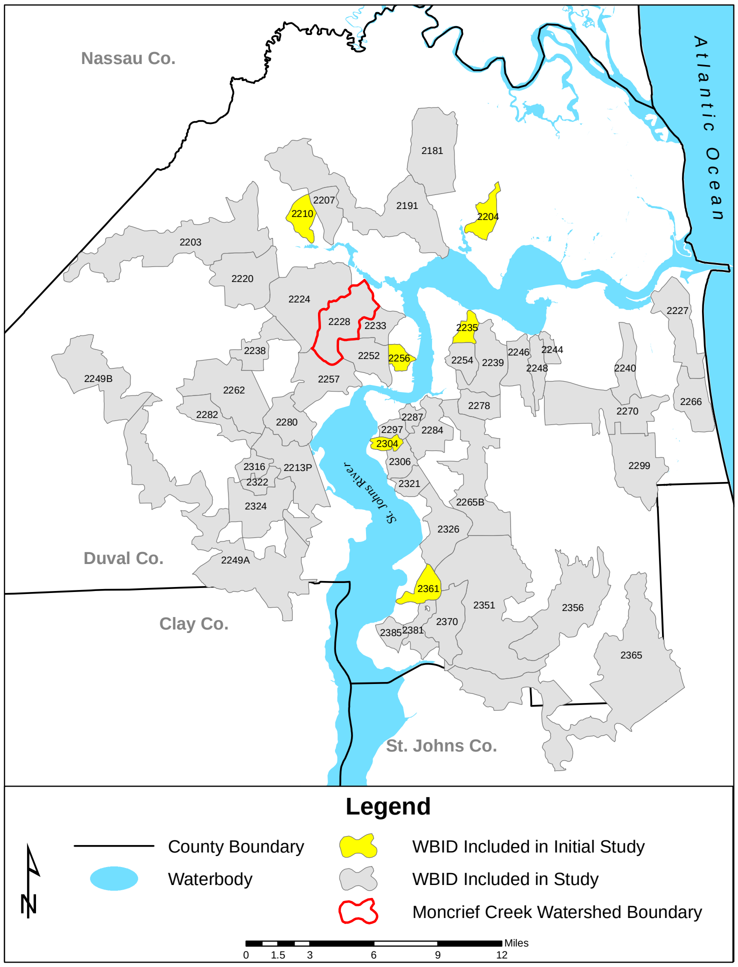
- Appropriate allocations among the affected parties,
- A description of the load reduction activities to be undertaken,
- Timetables for project implementation and completion,
- Funding mechanisms that may be utilized,
- Any applicable signed agreement,
- Local ordinances defining actions to be taken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

The BMAP for Moncrief Creek 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 Moncrief Creek. 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 (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 S**. 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 **Table 4.6** shows, potential impacts from dogs could be significant. It pet owners are educated on the potential impacts their pets are having on Moncrief Creek, and they are inclined to take action, this could potentially decrease a source load.

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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: Historical Discharge Data (August 1998 – December 2004) for Millennium Specialty Chemicals

			Fecal Coliform			Total Coliform			Flow	
Facility ID	Facility Name	Report Date	Value (#/100 mL)	Limit (#/100 mL)	Limit Type	Value (#/100 mL)	Limit (#/100 mL)	Limit Type	Flow (MGD)	Limit Type
FL0000884	MILLENNIUM SPEC. CHEM.	8/31/98	30	4500	DAILY MX	60	5000	DAILY MX	0.740	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	9/30/98	8	4500	DAILY MX	56	5000	DAILY MX	0.682	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	10/31/98	22	4500	DAILY MX	464	5000	DAILY MX	0.761	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	11/30/98	58	4500	DAILY MX	500	5000	DAILY MX	0.574	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	1/31/99	3200	4500	DAILY MX		5000	DAILY MX	0.486	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	2/28/99	3	4500	DAILY MX		5000	DAILY MX	0.520	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	3/31/99	45	4500	DAILY MX	>6000	5000	DAILY MX	0.451	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	4/30/99	18	4500	DAILY MX	67000	5000	DAILY MX	0.460	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	5/31/99	18	4500	DAILY MX	100	5000	DAILY MX	0.570	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	6/30/99	90	4500	DAILY MX	480	5000	DAILY MX	0.533	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	7/31/99	400	4500	DAILY MX	1000	5000	DAILY MX	0.864	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	8/31/99	6500	4500	DAILY MX	5250	5000	DAILY MX	0.780	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	9/30/99	7000	4500	DAILY MX	38000	5000	DAILY MX	0.697	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	10/31/99	1900	4500	DAILY MX	3000	5000	DAILY MX	0.673	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	11/30/99	130	4500	DAILY MX	500	5000	DAILY MX	0.650	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	12/31/99	1700	4500	DAILY MX	5000	5000	DAILY MX	0.657	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	1/31/00	27	4500	DAILY MX	1600	5000	DAILY MX	0.562	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	2/29/00	3000	4500	DAILY MX	24000	5000	DAILY MX	0.517	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	3/31/00	170	4500	DAILY MX	9000	5000	DAILY MX	0.495	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	4/30/00	130	4500	DAILY MX	3000	5000	DAILY MX	0.543	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	5/31/00	900	4500	DAILY MX	1600	5000	DAILY MX	0.540	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	6/30/00	170	4500	DAILY MX	500	5000	DAILY MX	0.618	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	7/31/00	80	4500	DAILY MX	300	5000	DAILY MX	0.163	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	8/31/00	220	4500	DAILY MX	1400	5000	DAILY MX	0.694	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	9/30/00	2800	4500	DAILY MX	2800	5000	DAILY MX	0.690	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	10/31/00	300	4500	DAILY MX	800	5000	DAILY MX	0.638	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	11/30/00	110	4500	DAILY MX	30000	5000	DAILY MX	0.890	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	12/31/00	170	4500	DAILY MX	1600	5000	DAILY MX	0.465	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	1/31/01	240	4500	DAILY MX	30000	5000	DAILY MX	0.331	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	2/28/01	30	4500	DAILY MX	2200	5000	DAILY MX	0.297	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	3/31/01	4	4500	DAILY MX	50	5000	DAILY MX	0.102	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	4/30/01	21	800	DAILY MX	14000	2400	DAILY MX	0.132	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	5/31/01	2	800	DAILY MX	170	2400	DAILY MX	0.142	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	6/30/01	4	800	DAILY MX	320	2400	DAILY MX	0.361	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	7/31/01		800	DAILY MX	2.400	2400	DAILY MX	0.365	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	8/31/01	50	800	DAILY MX	170	2400	DAILY MX	0.255	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	9/30/01	4	800	DAILY MX	350	2400	DAILY MX	0.354	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	9/30/01	4	800	DAILY MX	350	2400	DAILY MX	0.354	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	10/31/01	50	800	DAILY MX	170	2400	DAILY MX	0.250	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	11/30/01		800	DAILY MX	4900	2400	DAILY MX	0.246	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	12/31/01	4	800	DAILY MX	2800	2400	DAILY MX	0.283	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	1/31/02	2	800	DAILY MX	840	2400	DAILY MX	0.330	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	2/28/02	2	800	DAILY MX	95	2400	DAILY MX	0.299	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	3/31/02	2	800	DAILY MX	80	2400	DAILY MX	0.338	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	4/30/02		800	DAILY MX	210	2400	DAILY MX	0.337	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	5/31/02	8	800	DAILY MX		2400	DAILY MX	0.365	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	6/30/02	7.8	800	DAILY MX	900	2400	DAILY MX	0.215	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	7/31/02		800	DAILY MX	900	2400	DAILY MX	0.207	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	8/31/02	13	800	DAILY MX	430	2400	DAILY MX	0.385	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	9/30/02	4	800	DAILY MX	700	2400	DAILY MX	0.400	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	10/31/02	17	800	DAILY MX	110	2400	DAILY MX	0.306	MO AVG

Appendix B: Historical Discharge Data (August 1998 – December 2004) for Millennium Specialty Chemicals (continued)

Facility ID	Facility Name	Report Date	Fecal Coliform Value (#/100 mL)	Fecal Coliform Limit (#/100 mL)	Fecal Coliform Limit Type[1]	Total Coliform Value (#/100 mL)	Total Coliform Limit (#/100 mL)	Total Coliform Limit Type	Flow (MGD)	Flow Limit Type[2]
FL0000884	MILLENNIUM SPEC. CHEM.	11/30/02	7	800	DAILY MX	900	2400	DAILY MX	0.105	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	12/31/02		800	DAILY MX	17	2400	DAILY MX	0.285	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	1/31/03		800	DAILY MX	49	2400	DAILY MX	0.330	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	2/28/03		800	DAILY MX	45	2400	DAILY MX	0.394	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	3/31/03		800	DAILY MX	49	2400	DAILY MX	0.355	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	4/30/03	33	800	DAILY MX	49	2400	DAILY MX	0.379	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	5/31/03	13	800	DAILY MX	140	2400	DAILY MX	0.270	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	6/30/03		800	DAILY MX	180	2400	DAILY MX	0.190	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	7/31/03	79	800	DAILY MX	6300	2400	DAILY MX	0.199	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	8/31/03	33	800	DAILY MX	350	2400	DAILY MX	0.237	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	9/30/03	7	800	DAILY MX	27	2400	DAILY MX	0.154	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	10/31/03		800	DAILY MX	49	2400	DAILY MX	0.158	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	11/30/03		800	DAILY MX	220	2400	DAILY MX	0.155	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	12/31/03		800	DAILY MX	49	2400	DAILY MX	0.145	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	1/31/04	9	800	DAILY MX	11	2400	DAILY MX	0.122	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	2/29/04		800	DAILY MX	8	2400	DAILY MX	0.166	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	3/31/04		800	DAILY MX	22000	2400	DAILY MX	0.128	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	4/30/04	17	800	DAILY MX	920	2400	DAILY MX	0.155	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	5/31/04		800	DAILY MX		2400	DAILY MX	0.190	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	6/30/04		800	DAILY MX	140	2400	DAILY MX	0.920	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	7/31/04	2	800	DAILY MX	110	2400	DAILY MX	0.466	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	8/31/04	17	800	DAILY MX	49	2400	DAILY MX	0.204	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	9/30/04	70	800	DAILY MX	170	2400	DAILY MX	0.199	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	10/31/04	33	800	DAILY MX	70	2400	DAILY MX	0.180	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	11/30/04	8	800	DAILY MX	33	2400	DAILY MX	0.175	MO AVG
FL0000884	MILLENNIUM SPEC. CHEM.	12/31/04	70	800	DAILY MX	920	2400	DAILY MX	0.185	MO AVG

Values shaded in yellow exceed permitted limits for parameter

This table represents data available in the Departments Permit Compliance System (PCS) database. Some values are blank, as they may not have been reported to the Department

[1] DAILY MX = Daily Maximum

[2] MO AVG = Monthly Average

NOTE: As discussed in the text, the facility was granted an exemption for fecal and total coliforms from August 1998 – March 2001 due to plant upgrades.

Appendix C: Estimates of Coliform Loadings to Moncrief Creek from Millennium Specialty Chemicals (August 1998 – December 2004)

Report Date	Flow (MGD)	Fecal Coliform Value (#/100 mL)	Fecal Coliform Estimated Loading (organisms/day)	Total Coliform Value (#/100 mL)	Total Coliform Estimated Loading (organisms/day)
8/31/98	0.740	30	8.40E+10	60	1.68E+11
9/30/98	0.682	8	2.07E+10	56	1.45E+11
10/31/98	0.761	22	6.34E+10	464	1.34E+12
11/30/98	0.574	58	1.26E+11	500	1.09E+12
1/31/99	0.487	3,200	5.90E+12	---	---
2/28/99	0.520	3	5.90E+09	---	---
3/31/99	0.451	45	7.68E+10	6,000	1.02E+13
4/30/99	0.460	18	3.13E+10	67,000	1.17E+14
5/31/99	0.570	18	3.88E+10	100	2.16E+11
6/30/99	0.533	90	1.82E+11	480	9.68E+11
7/31/99	0.864	400	1.31E+12	1,000	3.27E+12
8/31/99	0.780	6,500	1.92E+13	5,250	1.55E+13
9/30/99	0.697	7,000	1.85E+13	38,000	1.00E+14
10/31/99	0.673	1,900	4.84E+12	3,000	7.64E+12
11/30/99	0.650	130	3.20E+11	500	1.23E+12
12/31/99	0.657	1,700	4.23E+12	5,000	1.24E+13
1/31/00	0.562	27	5.74E+10	1,600	3.40E+12
2/29/00	0.517	3,000	5.87E+12	24,000	4.70E+13
3/31/00	0.495	170	3.19E+11	9,000	1.69E+13
4/30/00	0.543	130	2.67E+11	3,000	6.17E+12
5/31/00	0.540	900	1.84E+12	1,600	3.27E+12
6/30/00	0.618	170	3.98E+11	500	1.17E+12
7/31/00	0.163	80	4.94E+10	300	1.85E+11
8/31/00	0.694	220	5.78E+11	1,400	3.68E+12
9/30/00	0.690	2,800	7.31E+12	2,800	7.31E+12
10/31/00	0.638	300	7.24E+11	800	1.93E+12
11/30/00	0.890	110	3.71E+11	30,000	1.01E+14
12/31/00	0.465	170	2.99E+11	1,600	2.82E+12
1/31/01	0.331	240	3.01E+11	30,000	3.76E+13
2/28/01	0.297	30	3.37E+10	2,200	2.47E+12
3/31/01	0.102	4	1.54E+09	50	1.93E+10
4/30/01	0.132	21	1.05E+10	14,000	7.00E+12
5/31/01	0.142	2	1.08E+09	170	9.16E+10
6/30/01	0.361	4	5.47E+09	320	4.37E+11
7/31/01	0.365	---	---	240	3.32E+11
8/31/01	0.255	50	4.83E+10	170	1.64E+11
9/30/01	0.354	4	5.36E+09	350	4.69E+11
9/30/01	0.254	4	3.85E+09	350	3.37E+11
10/31/01	0.250	50	4.73E+10	170	1.61E+11
11/30/01	0.246	---	---	4,900	4.56E+12
12/31/01	0.283	4	4.28E+09	2,800	3.00E+12
1/31/02	0.330	2	2.50E+09	840	1.05E+12
2/28/02	0.300	2	2.27E+09	95	1.08E+11
3/31/02	0.338	2	2.56E+09	80	1.02E+11
4/30/02	0.337	---	---	210	2.68E+11
5/31/02	0.365	8	1.11E+10	---	---
6/30/02	0.216	8	6.37E+09	900	7.34E+11

Appendix C: Estimates of Coliform Loadings to Moncrief Creek from Millennium Specialty Chemicals (August 1998 – December 2004) (continued)

		Fecal Coliform		Total Coliform	
Report Date	Flow (MGD)	Value (#/100 mL)	Estimated Loading (organisms/day)	Report Date	Estimated Loading (organisms/day
7/31/02	0.207	---	---	900	7.05E+11
8/31/02	0.385	13	1.89E+10	430	6.27E+11
9/30/02	0.400	4	6.06E+09	700	1.06E+12
10/31/02	0.306	17	1.97E+10	110	1.27E+11
11/30/02	0.105	7	2.78E+09	900	3.58E+11
12/31/02	0.285	---	---	17	1.83E+10
1/31/03	0.330	---	---	49	6.12E+10
2/28/03	0.394	---	---	45	6.71E+10
3/31/03	0.355	---	---	49	6.58E+10
4/30/03	0.379	33	4.73E+10	49	7.03E+10
5/31/03	0.270	13	1.33E+10	140	1.43E+11
6/30/03	0.190			180	1.29E+11
7/31/03	0.200	79	5.98E+10	6,300	4.77E+12
8/31/03	0.237	33	2.96E+10	350	3.14E+11
9/30/03	0.154	7	4.08E+09	27	1.57E+10
10/31/03	0.159	---	---	49	2.94E+10
11/30/03	0.155	---	---	220	1.29E+11
12/31/03	0.145	---	---	49	2.69E+10
1/31/04	0.123	9	4.18E+09	11	5.10E+09
2/29/04	0.167	---	---	8	5.05E+09
3/31/04	0.129	---	---	22,000	1.07E+13
4/30/04	0.156	17	1.00E+10	920	5.43E+11
5/31/04	0.190	---	---	---	---
6/30/04	0.920	---	---	140	4.88E+11
7/31/04	0.466	2	3.53E+09	110	1.94E+11
8/31/04	0.205	17	1.32E+10	49	3.80E+10
9/30/04	0.200	70	5.29E+10	170	1.28E+11
10/31/04	0.180	33	2.25E+10	70	4.78E+10
11/30/04	0.176	8	5.32E+09	33	2.20E+10
12/31/04	0.186	70	4.92E+10	920	6.47E+11
AVERAGE:	**0.389**	**493**	**1.21E+12**	**4,066**	**7.49E+12**
MEDIAN:	**0.338**	**30**	**4.73E+10**	**430**	**4.88E+11**

NOTE: This table represents data available in the Departments Permit Compliance System (PCS) database. Some values are blank, as they may not have been reported to the Department, and is based on the data in Appendix B.

Appendix D: Historical Fecal Coliform Observations in Moncrief Creek

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100mL)	REMARK CODE
MONCRIEF CREEK	2228	3/12/1991	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	2,300	
MONCRIEF CREEK	2228	3/12/1991	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	2,300	
MONCRIEF CREEK	2228	3/19/1991	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	160,000	
MONCRIEF CREEK	2228	3/19/1991	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	160,000	
MONCRIEF CREEK	2228	4/16/1991	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	2,300	
MONCRIEF CREEK	2228	4/16/1991	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	2,300	
MONCRIEF CREEK	2228	4/23/1991	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	50,000	
MONCRIEF CREEK	2228	4/23/1991	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	50,000	
MONCRIEF CREEK	2228	7/24/1991	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	30,000	
MONCRIEF CREEK	2228	7/24/1991	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	30,000	
MONCRIEF CREEK	2228	9/16/1991	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	30,000	
MONCRIEF CREEK	2228	9/16/1991	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	30,000	
MONCRIEF CREEK	2228	10/22/1991	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	5,000	
MONCRIEF CREEK	2228	10/22/1991	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	5,000	
MONCRIEF CREEK	2228	12/11/1991	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	5,000	
MONCRIEF CREEK	2228	12/11/1991	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	5,000	
MONCRIEF CREEK	2228	2/3/1992	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	3,000	
MONCRIEF CREEK	2228	2/3/1992	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	3,000	
MONCRIEF CREEK	2228	2/5/1992	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	17,000	
MONCRIEF CREEK	2228	2/5/1992	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	17,000	
MONCRIEF CREEK	2228	4/22/1992	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	17,000	
MONCRIEF CREEK	2228	4/22/1992	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	17,000	
MONCRIEF CREEK	2228	4/27/1992	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	17,000	
MONCRIEF CREEK	2228	4/27/1992	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	17,000	
MONCRIEF CREEK	2228	8/3/1992	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	160,000	L
MONCRIEF CREEK	2228	8/3/1992	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	160,000	L
MONCRIEF CREEK	2228	8/3/1992	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	160,000	
MONCRIEF CREEK	2228	8/3/1992	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	160,000	
MONCRIEF CREEK	2228	10/19/1992	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	160,000	L
MONCRIEF CREEK	2228	10/19/1992	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	160,000	L
MONCRIEF CREEK	2228	10/20/1992	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	22,000	
MONCRIEF CREEK	2228	10/20/1992	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	22,000	
MONCRIEF CREEK	2228	1/26/1993	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	2,400	
MONCRIEF CREEK	2228	1/26/1993	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	90,000	
MONCRIEF CREEK	2228	1/26/1993	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	2,400	
MONCRIEF CREEK	2228	1/26/1993	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	90,000	
MONCRIEF CREEK	2228	4/22/1993	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	50,000	
MONCRIEF CREEK	2228	4/22/1993	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	9,000	
MONCRIEF CREEK	2228	4/22/1993	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	50,000	
MONCRIEF CREEK	2228	4/22/1993	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	9,000	
MONCRIEF CREEK	2228	7/7/1993	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	50,000	
MONCRIEF CREEK	2228	7/7/1993	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	50,000	
MONCRIEF CREEK	2228	7/7/1993	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	90,000	
MONCRIEF CREEK	2228	7/7/1993	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	90,000	
MONCRIEF CREEK	2228	10/19/1993	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	5,000	
MONCRIEF CREEK	2228	10/19/1993	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	5,000	
MONCRIEF CREEK	2228	10/19/1993	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	3,000	
MONCRIEF CREEK	2228	10/19/1993	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	3,000	
MONCRIEF CREEK	2228	2/1/1994	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	10,000	
MONCRIEF CREEK	2228	2/1/1994	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	90,000	
MONCRIEF CREEK	2228	2/1/1994	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	90,000	
MONCRIEF CREEK	2228	2/1/1994	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	10,000	
MONCRIEF CREEK	2228	4/19/1994	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	160,000	

Appendix D: Historical Fecal Coliform Observations in Moncrief Creek (continued)

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100mL)	REMARK CODE
MONCRIEF CREEK	2228	4/19/1994	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	160,000	
MONCRIEF CREEK	2228	4/19/1994	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	3,000	
MONCRIEF CREEK	2228	4/19/1994	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	3,000	
MONCRIEF CREEK	2228	7/18/1994	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	9,000	
MONCRIEF CREEK	2228	7/18/1994	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	16,000	
MONCRIEF CREEK	2228	7/18/1994	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	16,000	
MONCRIEF CREEK	2228	7/18/1994	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	9,000	
MONCRIEF CREEK	2228	10/18/1994	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	160,000	
MONCRIEF CREEK	2228	10/18/1994	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	9,000	
MONCRIEF CREEK	2228	10/18/1994	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	9,000	
MONCRIEF CREEK	2228	10/18/1994	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	160,000	
MONCRIEF CREEK	2228	1/30/1995	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	30,000	
MONCRIEF CREEK	2228	1/30/1995	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	30,000	
MONCRIEF CREEK	2228	1/30/1995	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	800	
MONCRIEF CREEK	2228	1/30/1995	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	800	
MONCRIEF CREEK	2228	4/19/1995	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	2,400	
MONCRIEF CREEK	2228	4/19/1995	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	2,400	
MONCRIEF CREEK	2228	4/19/1995	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	16,000	
MONCRIEF CREEK	2228	4/19/1995	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	16,000	
MONCRIEF CREEK	2228	7/10/1995	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	5,000	Q
MONCRIEF CREEK	2228	7/10/1995	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	5,000	
MONCRIEF CREEK	2228	8/29/1995	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	2,400	Q
MONCRIEF CREEK	2228	8/29/1995	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	2,400	
MONCRIEF CREEK	2228	10/24/1995	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	1,300	Q
MONCRIEF CREEK	2228	10/24/1995	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	1,300	
MONCRIEF CREEK	2228	2/27/1996	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	300	Q
MONCRIEF CREEK	2228	2/27/1996	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	300	Q
MONCRIEF CREEK	2228	4/29/1996	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	800	Q
MONCRIEF CREEK	2228	4/29/1996	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	800	Q
MONCRIEF CREEK	2228	6/26/1996	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	2,400	Q
MONCRIEF CREEK	2228	6/26/1996	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	2,400	Q
MONCRIEF CREEK	2228	8/5/1996	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	1,300	Q
MONCRIEF CREEK	2228	8/5/1996	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	1,300	Q
MONCRIEF CREEK	2228	10/30/1996	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	800	Q
MONCRIEF CREEK	2228	10/30/1996	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	800	Q
MONCRIEF CREEK	2228	2/19/1997	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	80	Q
MONCRIEF CREEK	2228	2/19/1997	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	80	Q
MONCRIEF CREEK	2228	4/30/1997	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	170	Q
MONCRIEF CREEK	2228	4/30/1997	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	170	Q
MONCRIEF CREEK	2228	10/8/1997	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	40	
MONCRIEF CREEK	2228	10/8/1997	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	40	
MONCRIEF CREEK	2228	12/10/1997	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	2,500	
MONCRIEF CREEK	2228	12/10/1997	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	2,500	
MONCRIEF CREEK	2228	1/20/1998	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	300	
MONCRIEF CREEK	2228	1/20/1998	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	300	Q
MONCRIEF CREEK	2228	3/2/1998	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	900	
MONCRIEF CREEK	2228	3/2/1998	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	900	Q
MONCRIEF CREEK	2228	6/23/1998	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	1,000	
MONCRIEF CREEK	2228	6/23/1998	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	1,000	Q
MONCRIEF CREEK	2228	7/27/1998	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	240	
MONCRIEF CREEK	2228	7/27/1998	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	240	
MONCRIEF CREEK	2228	8/4/1998	21FLA 20030576	MONCRIEF CR @ 26TH ST.	5,000	

Appendix D: Historical Fecal Coliform Observations in Moncrief Creek (continued)

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100mL)	REMARK CODE
MONCRIEF CREEK	2228	5/25/2000	21FLA 20030726	MONCRIEF CR AT MONCRIEF ROAD	157,000	
MONCRIEF CREEK	2228	9/12/2000	21FLA 20030726	MONCRIEF CR AT MONCRIEF ROAD	7,500	
MONCRIEF CREEK	2228	1/30/2001	21FLA 20030726	MONCRIEF CR AT MONCRIEF ROAD	667	
MONCRIEF CREEK	2228	5/30/2002	21FLA 20030316	MONCRIEF CR N OF 33RD ST BRID	2,833	
MONCRIEF CREEK	2228	8/12/2002	21FLA 20030316	MONCRIEF CR N OF 33RD ST BRID	21,800	
MONCRIEF CREEK	2228	8/12/2002	21FLA 20030114	MONCRIEF CR LEM TURNER RD BR	1,167	
MONCRIEF CREEK	2228	12/5/2002	21FLA 20030316	MONCRIEF CR N OF 33RD ST BRID	74,800	

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

Remark Codes:

Q – Sample held beyond normal holding time

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

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 E: Historical Total Coliform Observations in Moncrief Creek

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100mL)	REMARK CODE
MONCRIEF CREEK	2228	3/12/1991	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	2,300	
MONCRIEF CREEK	2228	3/12/1991	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	2,300	
MONCRIEF CREEK	2228	3/19/1991	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	160,000	
MONCRIEF CREEK	2228	3/19/1991	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	160,000	
MONCRIEF CREEK	2228	4/16/1991	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	2,300	
MONCRIEF CREEK	2228	4/16/1991	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	2,300	
MONCRIEF CREEK	2228	4/23/1991	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	50,000	
MONCRIEF CREEK	2228	4/23/1991	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	50,000	
MONCRIEF CREEK	2228	7/24/1991	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	30,000	
MONCRIEF CREEK	2228	7/24/1991	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	30,000	
MONCRIEF CREEK	2228	9/16/1991	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	30,000	
MONCRIEF CREEK	2228	9/16/1991	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	30,000	
MONCRIEF CREEK	2228	10/22/1991	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	5,000	
MONCRIEF CREEK	2228	10/22/1991	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	5,000	
MONCRIEF CREEK	2228	12/11/1991	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	5,000	
MONCRIEF CREEK	2228	12/11/1991	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	5,000	
MONCRIEF CREEK	2228	2/3/1992	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	3,000	
MONCRIEF CREEK	2228	2/3/1992	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	3,000	
MONCRIEF CREEK	2228	2/5/1992	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	17,000	
MONCRIEF CREEK	2228	2/5/1992	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	17,000	
MONCRIEF CREEK	2228	4/22/1992	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	17,000	
MONCRIEF CREEK	2228	4/22/1992	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	17,000	
MONCRIEF CREEK	2228	4/27/1992	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	17,000	
MONCRIEF CREEK	2228	4/27/1992	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	17,000	
MONCRIEF CREEK	2228	8/3/1992	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	160,000	L
MONCRIEF CREEK	2228	8/3/1992	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	160,000	L
MONCRIEF CREEK	2228	8/3/1992	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	160,000	
MONCRIEF CREEK	2228	8/3/1992	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	160,000	
MONCRIEF CREEK	2228	10/19/1992	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	160,000	L
MONCRIEF CREEK	2228	10/19/1992	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	160,000	L
MONCRIEF CREEK	2228	10/20/1992	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	22,000	
MONCRIEF CREEK	2228	10/20/1992	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	22,000	
MONCRIEF CREEK	2228	1/26/1993	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	2,400	
MONCRIEF CREEK	2228	1/26/1993	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	90,000	
MONCRIEF CREEK	2228	1/26/1993	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	2,400	
MONCRIEF CREEK	2228	1/26/1993	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	90,000	
MONCRIEF CREEK	2228	4/22/1993	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	50,000	
MONCRIEF CREEK	2228	4/22/1993	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	9,000	
MONCRIEF CREEK	2228	4/22/1993	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	50,000	
MONCRIEF CREEK	2228	4/22/1993	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	9,000	
MONCRIEF CREEK	2228	7/7/1993	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	50,000	
MONCRIEF CREEK	2228	7/7/1993	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	50,000	
MONCRIEF CREEK	2228	7/7/1993	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	90,000	
MONCRIEF CREEK	2228	7/7/1993	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	90,000	
MONCRIEF CREEK	2228	10/19/1993	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	5,000	
MONCRIEF CREEK	2228	10/19/1993	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	5,000	
MONCRIEF CREEK	2228	10/19/1993	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	3,000	
MONCRIEF CREEK	2228	10/19/1993	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	3,000	
MONCRIEF CREEK	2228	2/1/1994	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	10,000	
MONCRIEF CREEK	2228	2/1/1994	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	90,000	
MONCRIEF CREEK	2228	2/1/1994	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	90,000	
MONCRIEF CREEK	2228	2/1/1994	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	10,000	
MONCRIEF CREEK	2228	4/19/1994	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	160,000	

Appendix E: Historical Total Coliform Observations in Moncrief Creek (continued)

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100mL)	REMARK CODE
MONCRIEF CREEK	2228	4/19/1994	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	160,000	
MONCRIEF CREEK	2228	4/19/1994	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	3,000	
MONCRIEF CREEK	2228	4/19/1994	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	3,000	
MONCRIEF CREEK	2228	7/18/1994	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	9,000	
MONCRIEF CREEK	2228	7/18/1994	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	16,000	
MONCRIEF CREEK	2228	7/18/1994	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	16,000	
MONCRIEF CREEK	2228	7/18/1994	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	9,000	
MONCRIEF CREEK	2228	10/18/1994	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	160,000	
MONCRIEF CREEK	2228	10/18/1994	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	9,000	
MONCRIEF CREEK	2228	10/18/1994	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	9,000	
MONCRIEF CREEK	2228	10/18/1994	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	160,000	
MONCRIEF CREEK	2228	1/30/1995	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	30,000	
MONCRIEF CREEK	2228	1/30/1995	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	30,000	
MONCRIEF CREEK	2228	1/30/1995	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	800	
MONCRIEF CREEK	2228	1/30/1995	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	800	
MONCRIEF CREEK	2228	4/19/1995	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	2,400	
MONCRIEF CREEK	2228	4/19/1995	21FLJXWQTR114	MONCRIEF CREEK AT LEM TURNER ROAD	2,400	
MONCRIEF CREEK	2228	4/19/1995	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	16,000	
MONCRIEF CREEK	2228	4/19/1995	21FLJXWQTR316	MONCRIEF CREEK AT 33RD. STREET	16,000	
MONCRIEF CREEK	2228	7/10/1995	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	5,000	Q
MONCRIEF CREEK	2228	7/10/1995	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	5,000	
MONCRIEF CREEK	2228	8/29/1995	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	2,400	Q
MONCRIEF CREEK	2228	8/29/1995	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	2,400	
MONCRIEF CREEK	2228	10/24/1995	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	1,300	Q
MONCRIEF CREEK	2228	10/24/1995	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	1,300	
MONCRIEF CREEK	2228	2/27/1996	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	300	Q
MONCRIEF CREEK	2228	2/27/1996	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	300	Q
MONCRIEF CREEK	2228	4/29/1996	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	800	Q
MONCRIEF CREEK	2228	4/29/1996	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	800	Q
MONCRIEF CREEK	2228	6/26/1996	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	2,400	Q
MONCRIEF CREEK	2228	6/26/1996	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	2,400	Q
MONCRIEF CREEK	2228	8/5/1996	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	1,300	Q
MONCRIEF CREEK	2228	8/5/1996	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	1,300	Q
MONCRIEF CREEK	2228	10/30/1996	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	800	Q
MONCRIEF CREEK	2228	10/30/1996	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	800	Q
MONCRIEF CREEK	2228	2/19/1997	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	80	Q
MONCRIEF CREEK	2228	2/19/1997	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	80	Q
MONCRIEF CREEK	2228	4/30/1997	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	170	Q
MONCRIEF CREEK	2228	4/30/1997	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	170	Q
MONCRIEF CREEK	2228	10/8/1997	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	40	
MONCRIEF CREEK	2228	10/8/1997	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	40	
MONCRIEF CREEK	2228	12/10/1997	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	2,500	
MONCRIEF CREEK	2228	12/10/1997	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	2,500	
MONCRIEF CREEK	2228	1/20/1998	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	300	
MONCRIEF CREEK	2228	1/20/1998	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	300	Q
MONCRIEF CREEK	2228	3/2/1998	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	900	
MONCRIEF CREEK	2228	3/2/1998	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	900	Q
MONCRIEF CREEK	2228	6/23/1998	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	1,000	
MONCRIEF CREEK	2228	6/23/1998	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	1,000	Q
MONCRIEF CREEK	2228	7/27/1998	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	240	
MONCRIEF CREEK	2228	7/27/1998	21FLSJWM20030115	MONCRIEF CREEK NEAR MOUTH	240	
MONCRIEF CREEK	2228	8/4/1998	21FLA 20030576	MONCRIEF CR @ 26TH ST.	5,000	

Appendix E: Historical Total Coliform Observations in Moncrief Creek (continued)

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100mL)	REMARK CODE
MONCRIEF CREEK	2228	5/25/2000	21FLA 20030726	MONCRIEF CR AT MONCRIEF ROAD	157,000	
MONCRIEF CREEK	2228	9/12/2000	21FLA 20030726	MONCRIEF CR AT MONCRIEF ROAD	7,500	
MONCRIEF CREEK	2228	1/30/2001	21FLA 20030726	MONCRIEF CR AT MONCRIEF ROAD	667	
MONCRIEF CREEK	2228	5/30/2002	21FLA 20030316	MONCRIEF CR N OF 33RD ST BRID	2,833	
MONCRIEF CREEK	2228	8/12/2002	21FLA 20030316	MONCRIEF CR N OF 33RD ST BRID	21,800	
MONCRIEF CREEK	2228	8/12/2002	21FLA 20030114	MONCRIEF CR LEM TURNER RD BR	1,167	
MONCRIEF CREEK	2228	12/5/2002	21FLA 20030316	MONCRIEF CR N OF 33RD ST BRID	74,800	

Shaded cells are values which exceed the state criterion of 2,400 counts/100 mL

Remark Codes:

Q – Sample held beyond normal holding time

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

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 Moncrief Creek

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 106 cases
Dependent variable is VALUE
Grouping variable is MONTH

Group	Count	Rank Sum
1	12	702.500
2	6	335.000
3	6	197.500
4	17	965.500
5	7	310.000
6	4	208.500
7	10	710.000
8	14	689.000
9	5	351.500
10	15	722.000
11	2	94.000
12	8	385.500

Kruskal-Wallis Test Statistic = 9.684
Probability is 0.559 assuming Chi-square distribution with 11 df

Appendix G: Kruskall – Wallis Analysis of Fecal Coliform Observations versus Season in Moncrief Creek

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

Kruskal-Wallis One-Way Analysis of Variance for 106 cases
Dependent variable is VALUE
Grouping variable is SEASON2

Group	Count	Rank Sum
1	24	1235.000
2	28	1484.000
3	29	1750.500
4	25	1201.500

Kruskal-Wallis Test Statistic = 2.344
Probability is 0.504 assuming Chi-square distribution with 3 df

Appendix H: Kruskall – Wallis Analysis of Total Coliform Observations versus Month in Moncrief Creek

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

Kruskal-Wallis One-Way Analysis of Variance for 60 cases
Dependent variable is VALUE
Grouping variable is MONTH

Group	Count	Rank Sum
1	6	138.000
2	6	160.500
3	3	85.000
4	12	378.000
5	2	77.000
6	2	31.500
7	7	249.500
8	7	233.000
9	2	77.000
10	10	299.500
12	3	101.000

Kruskal-Wallis Test Statistic = 4.641
Probability is 0.914 assuming Chi-square distribution with 10 df

Appendix I: Kruskall – Wallis Analysis of Total Coliform Observations versus Season in Moncrief Creek

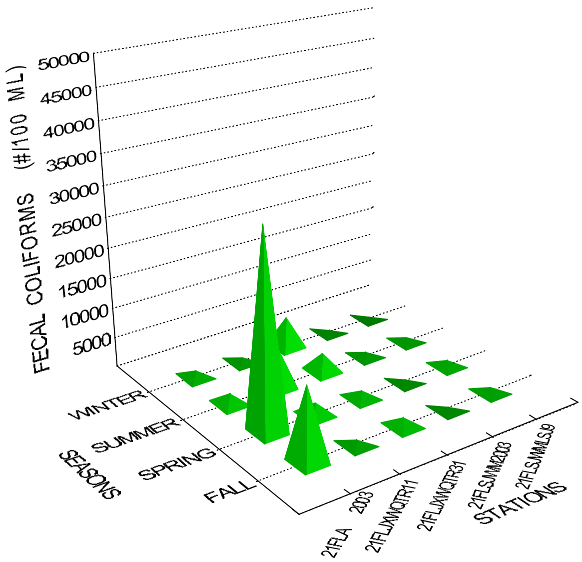
Categorical values encountered during processing are:
SEASON (4 levels)
1, 2, 3, 4

Kruskal-Wallis One-Way Analysis of Variance for 60 cases
Dependent variable is VALUE
Grouping variable is SEASON

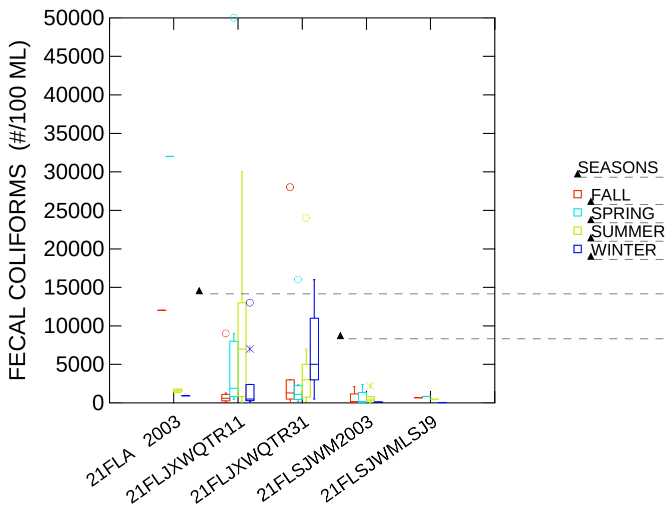
Group	Count	Rank Sum
1	15	383.500
2	16	486.500
3	16	559.500
4	13	400.500

Kruskal-Wallis Test Statistic = 2.255
Probability is 0.521 assuming Chi-square distribution with 3 df

Appendix J: Fecal Coliform Observations by Station and Season in Moncrief Creek



Station	STORET ID
MONCRIEF CR @ 26TH ST.	21FLA 20030576
MONCRIEF CR AT MONCRIEF ROAD	21FLA 20030726
MONCRIEF CR N OF 33RD ST BRID	21FLA 20030316
MONCRIEF CREEK AT 33RD. STREET	21FLJXWQTR316
MONCRIEF CREEK AT LEM TURNER ROAD	21FLJXWQTR114
MONCRIEF CREEK NEAR MOUTH	21FLSJWM20030115



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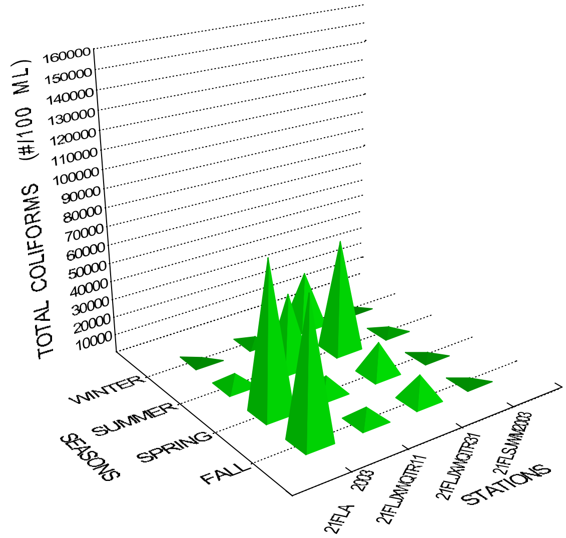
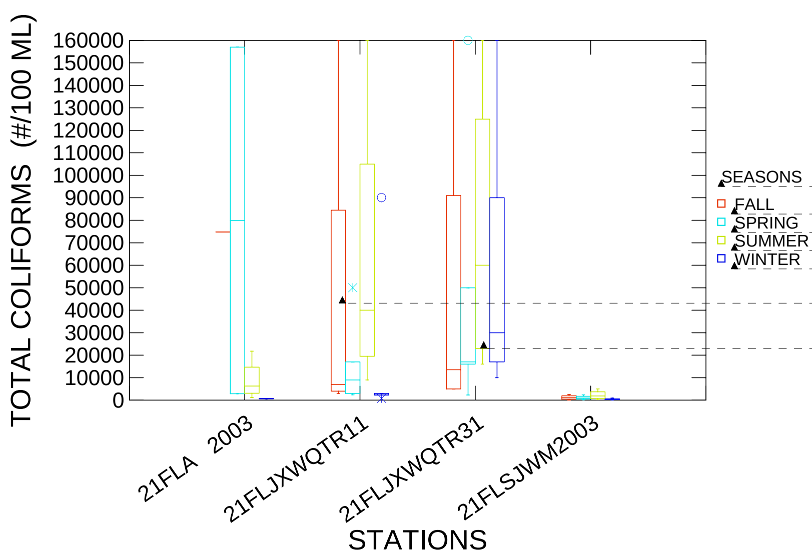
Appendix K: Total Coliform Observations by Station and Season in Moncrief Creek



Station	STORET ID
MONCRIEF CR @ 26TH ST.	21FLA 20030576
MONCRIEF CR AT MONCRIEF ROAD	21FLA 20030726
MONCRIEF CR N OF 33RD ST BRID	21FLA 20030316
MONCRIEF CREEK AT 33RD. STREET	21FLJXWQTR316
MONCRIEF CREEK AT HWY 111	21FLSJWMLSJ907
MONCRIEF CREEK AT LEM TURNER ROAD	21FLJXWQTR114
MONCRIEF CREEK NEAR MOUTH	21FLSJWM20030115



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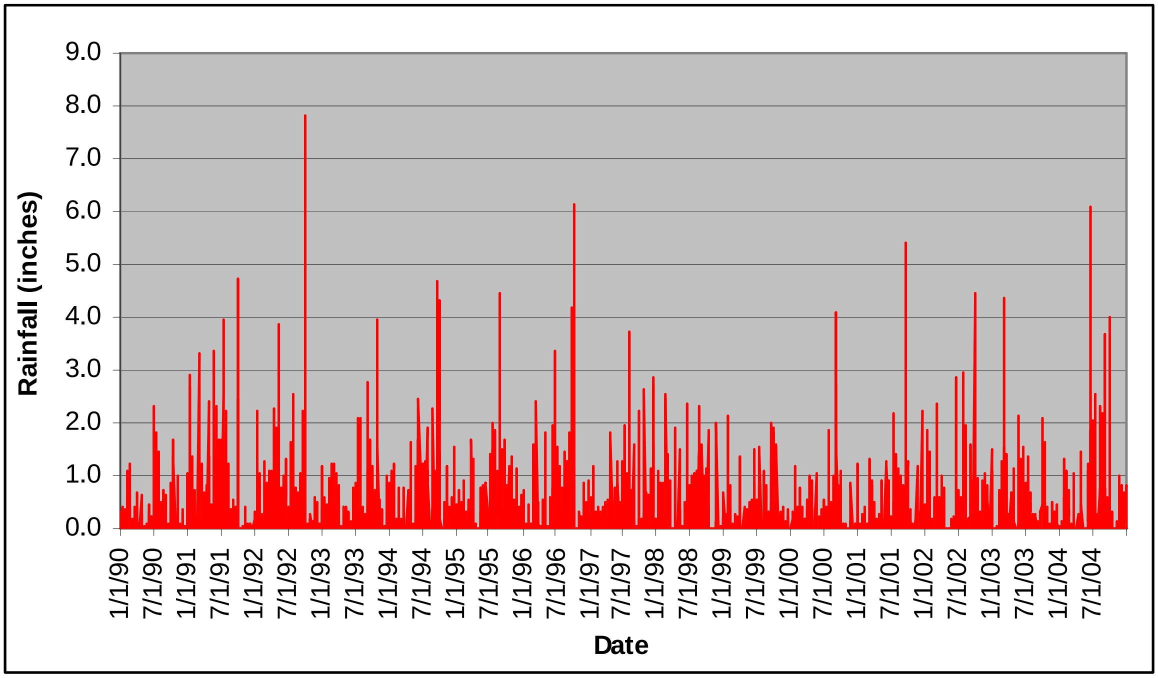
Appendix L: Chart of Rainfall for Jacksonville International Airport (JIA) from 1990 – 2004

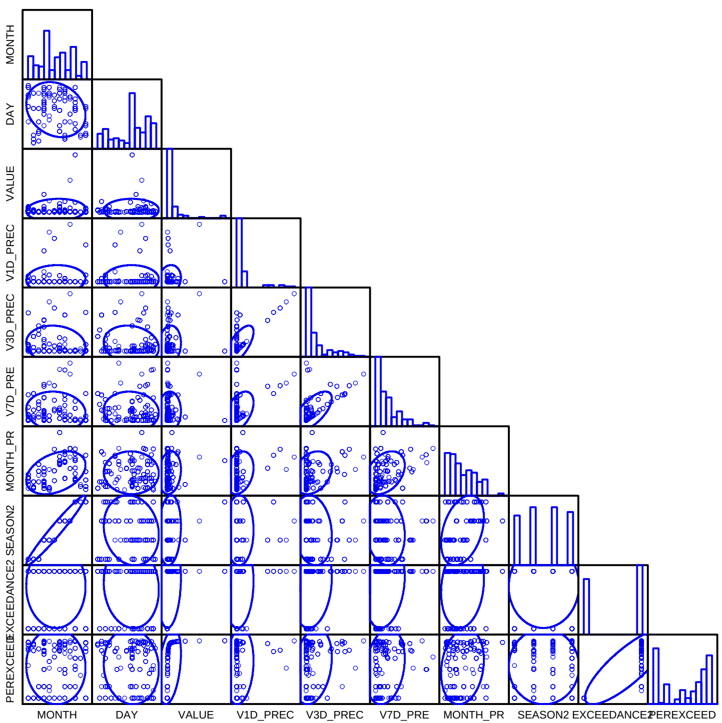


Appendix M: Spearman Correlation Matrix Analysis for Precipitation and Fecal Coliforms in Moncrief Creek

The following results are for:
WBID$ = 2228
Spearman correlation matrix

	MONTH	DAY	VALUE	V1D_PREC	V3D_PREC
MONTH	1.000				
DAY	-0.226	1.000			
VALUE	-0.047	-0.072	1.000		
V1D_PREC	-0.020	0.005	0.167	1.000	
V3D_PREC	-0.204	-0.007	0.205	0.543	1.000
V7D_PRE	-0.236	-0.116	0.208	0.253	0.619
MONTH_PR	0.359	-0.045	0.135	0.181	0.183
SEASON2	0.975	-0.178	-0.017	-0.045	-0.233
EXCEEDANCE2	-0.000	-0.113	0.755	0.127	0.156
PEREXCEED	-0.048	-0.075	0.992	0.157	0.203

	V7D_PRE	MONTH_PR	SEASON2	EXCEEDANCE2	PEREXCEED
V7D_PRE	1.000				
MONTH_PR	0.367	1.000			
SEASON2	-0.263	0.374	1.000		
EXCEEDANCE2	0.282	0.124	0.012	1.000	
PEREXCEED	0.220	0.144	-0.017	0.761	1.000

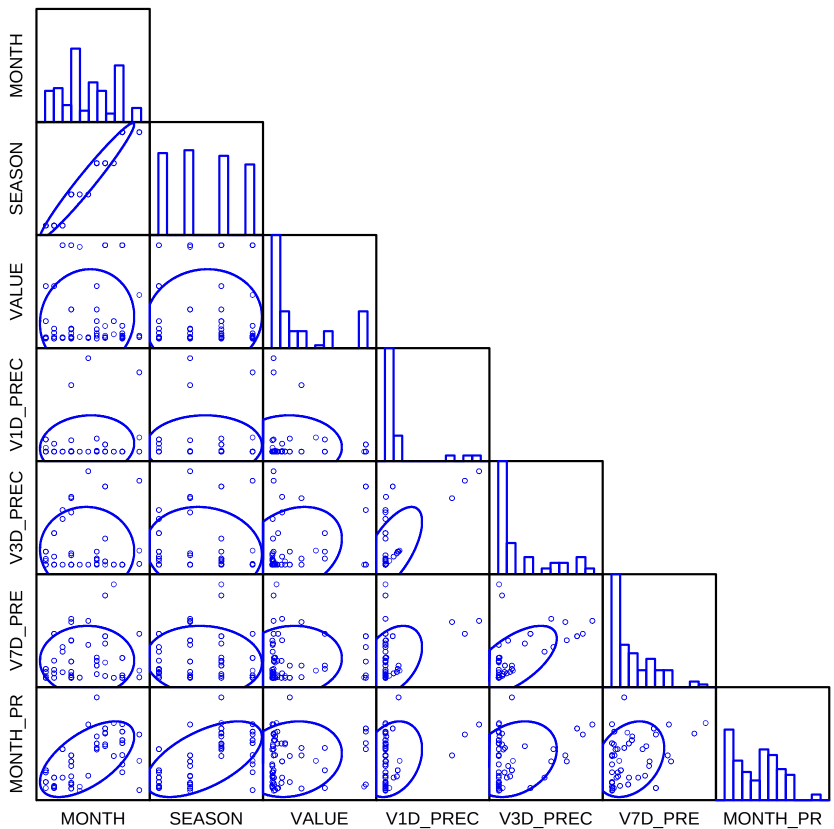


Appendix N: Spearman Correlation Matrix Analysis for Precipitation and Fecal Coliforms in Moncrief Creek

The following results are for:
WBID$ = 2228
Spearman correlation matrix

	MONTH	SEASON	VALUE	V1D_PREC	V3D_PREC
MONTH	1.000				
SEASON	0.978	1.000			
VALUE	0.115	0.121	1.000		
V1D_PREC	-0.047	-0.055	0.158	1.000	
V3D_PREC	-0.142	-0.188	0.181	0.645	1.000
V7D_PRE	-0.081	-0.138	0.141	0.312	0.673
MONTH_PR	0.604	0.607	0.168	0.268	0.194

	V7D_PRE	MONTH_PR
V7D_PRE	1.000	
MONTH_PR	0.290	1.000



Appendix O: Analysis of Fecal Coliform Observations versus Precipitation in Moncrief Creek

Analysis of sample day precipitation (1 day)

Dep Var: VALUE N: 106 Multiple R: 0.216 Squared multiple R: 0.047

Adjusted squared multiple R: 0.038 Standard error of estimate: 18599.759

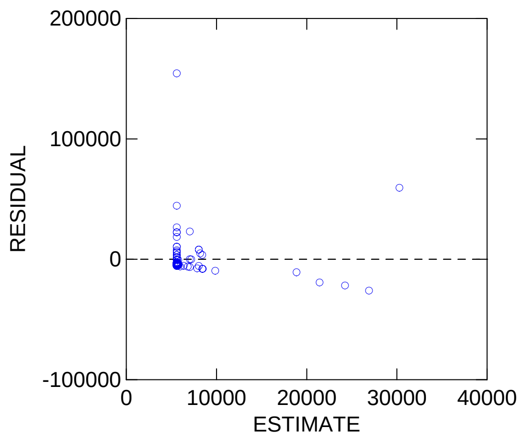
Effect	Coefficient	Std Error	Std Coef	Tolerance	t	P(2 Tail)
CONSTANT	5597.196	1883.877	0.000	.	2.971	0.004
V1D_PREC	5535.692	2448.910	0.216	1.000	2.260	0.026

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
Regression	1.76772E+09	1	1.76772E+09	5.110	0.026
Residual	3.59789E+10	104	3.45951E+08		

Durbin-Watson D Statistic 2.084
First Order Autocorrelation -0.043

Plot of residuals against predicted values



Analysis of sample day and two days prior precipitation (3 day)

Dep Var: VALUE   N: 106   Multiple R: 0.168   Squared multiple R: 0.028

Adjusted squared multiple R: 0.019   Standard error of estimate: 18780.439

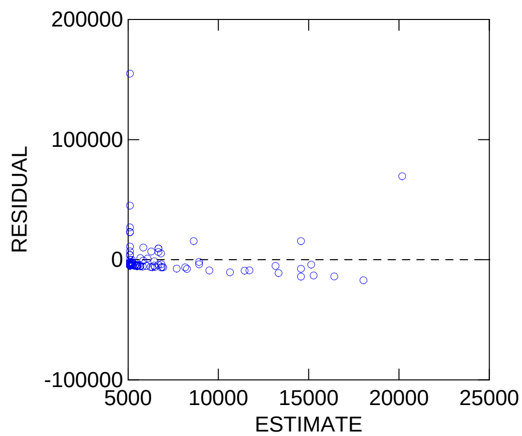
Effect	Coefficient	Std Error	Std Coef	Tolerance	t	P(2 Tail)
CONSTANT	5108.041	2068.903	0.000	.	2.469	0.015
V3D_PREC	3357.021	1931.614	0.168	1.000	1.738	0.085

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
Regression	1.06532E+09	1	1.06532E+09	3.020	0.085
Residual	3.66813E+10	104	3.52705E+08		

Durbin-Watson D Statistic   2.090
First Order Autocorrelation   -0.046

Plot of residuals against predicted values



Analysis of sample day and six days prior precipitation (7 day)

Dep Var: VALUE N: 106 Multiple R: 0.052 Squared multiple R: 0.003

Adjusted squared multiple R: 0.000 Standard error of estimate: 19025.731

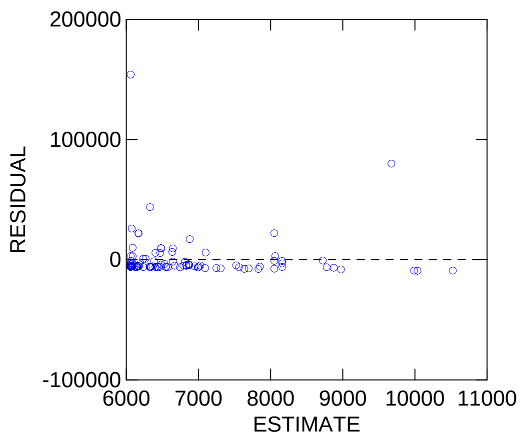
Effect	Coefficient	Std Error	Std Coef	Tolerance	t	P(2 Tail)
CONSTANT	6061.651	2322.870	0.000	.	2.610	0.010
V7D_PRE	670.238	1269.673	0.052	1.000	0.528	0.599

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
Regression	1.00869E+08	1	1.00869E+08	0.279	0.599
Residual	3.76458E+10	104	3.61978E+08		

Durbin-Watson D Statistic 2.115
First Order Autocorrelation -0.059

Plot of residuals against predicted values



Appendix P: Analysis of Total Coliform Observations versus Precipitation in Moncrief Creek

Analysis of sample day precipitation (1 day)

Dep Var: VALUE N: 60 Multiple R: 0.034 Squared multiple R: 0.001

Adjusted squared multiple R: 0.000 Standard error of estimate: 52292.798

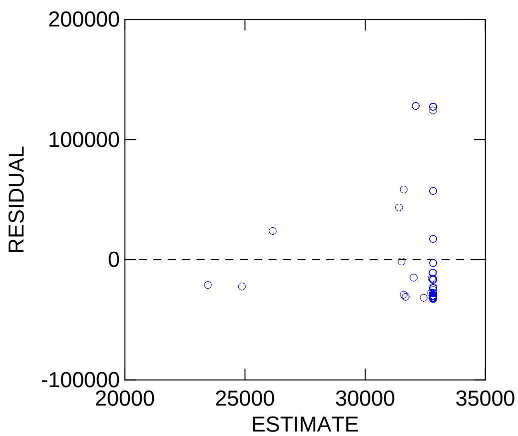
Effect	Coefficient	Std Error	Std Coef	Tolerance	t	P(2 Tail)
CONSTANT	32827.360	7073.507	0.000	.	4.641	0.000
V1D_PREC	-2780.586	10628.904	-0.034	1.000	-0.262	0.795

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
Regression	1.87146E+08	1	1.87146E+08	0.068	0.795
Residual	1.58603E+11	58	2.73454E+09		

Durbin-Watson D Statistic 1.966
First Order Autocorrelation 0.008

Plot of residuals against predicted values



Analysis of sample day and two days prior precipitation

Dep Var: VALUE N: 60 Multiple R: 0.257 Squared multiple R: 0.066

Adjusted squared multiple R: 0.050 Standard error of estimate: 50569.825

Effect	Coefficient	Std Error	Std Coef	Tolerance	t	P(2 Tail)
CONSTANT	24931.000	7469.912	0.000	.	3.338	0.001
V3D_PREC	14702.603	7267.514	0.257	1.000	2.023	0.048

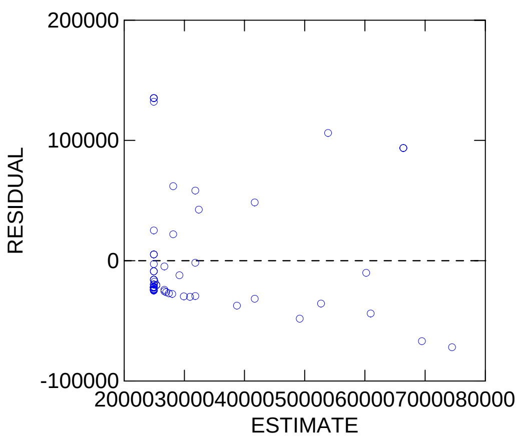
Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
Regression	1.04665E+10	1	1.04665E+10	4.093	0.048
Residual	1.48324E+11	58	2.55731E+09		

*** WARNING ***
Case 27 has large leverage (Leverage = 0.187)

Durbin-Watson D Statistic 1.965
First Order Autocorrelation 0.010

Plot of residuals against predicted values



Analysis of sample day and six days prior precipitation (7 day)

Dep Var: VALUE   N: 60   Multiple R: 0.039   Squared multiple R: 0.002

Adjusted squared multiple R: 0.000   Standard error of estimate: 52282.903

Effect	Coefficient	Std Error	Std Coef	Tolerance	t	P(2 Tail)
CONSTANT	30645.113	8656.598	0.000	.	3.540	0.001
V7D_PRE	1335.385	4440.949	0.039	1.000	0.301	0.765

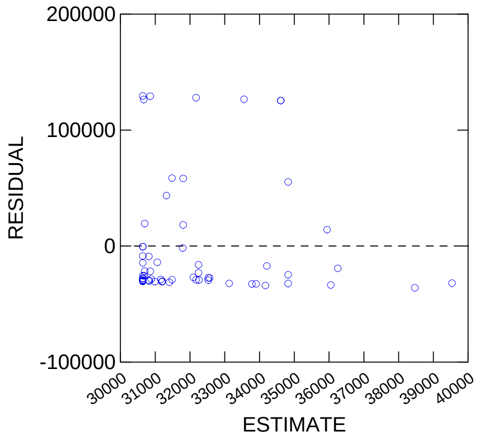
Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
Regression	2.47161E+08	1	2.47161E+08	0.090	0.765
Residual	1.58543E+11	58	2.73350E+09		

*** WARNING ***
Case 45 has large leverage (Leverage = 0.230)

Durbin-Watson D Statistic 1.955
First Order Autocorrelation 0.014

Plot of residuals against predicted values

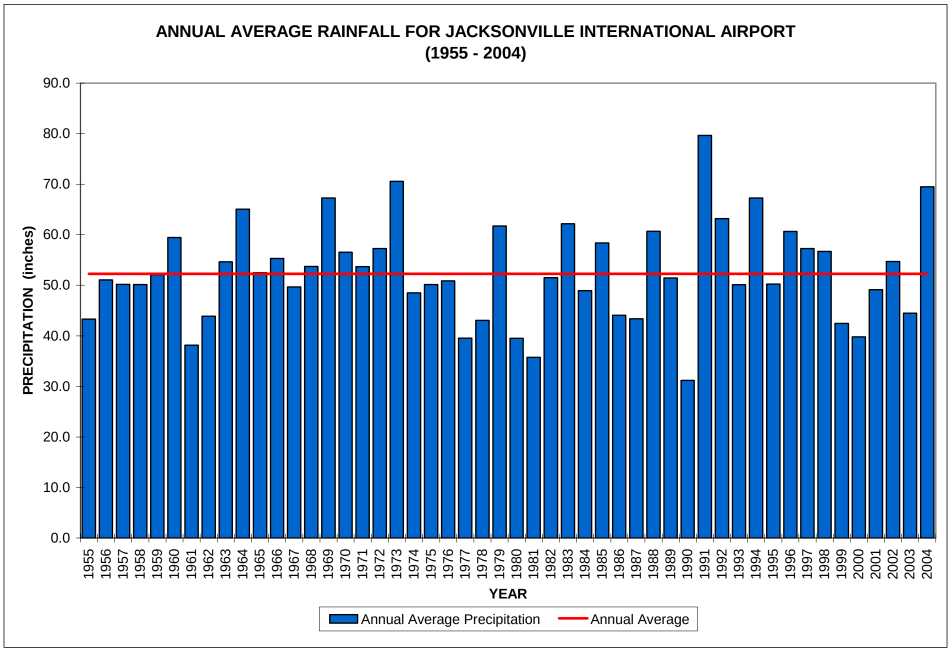


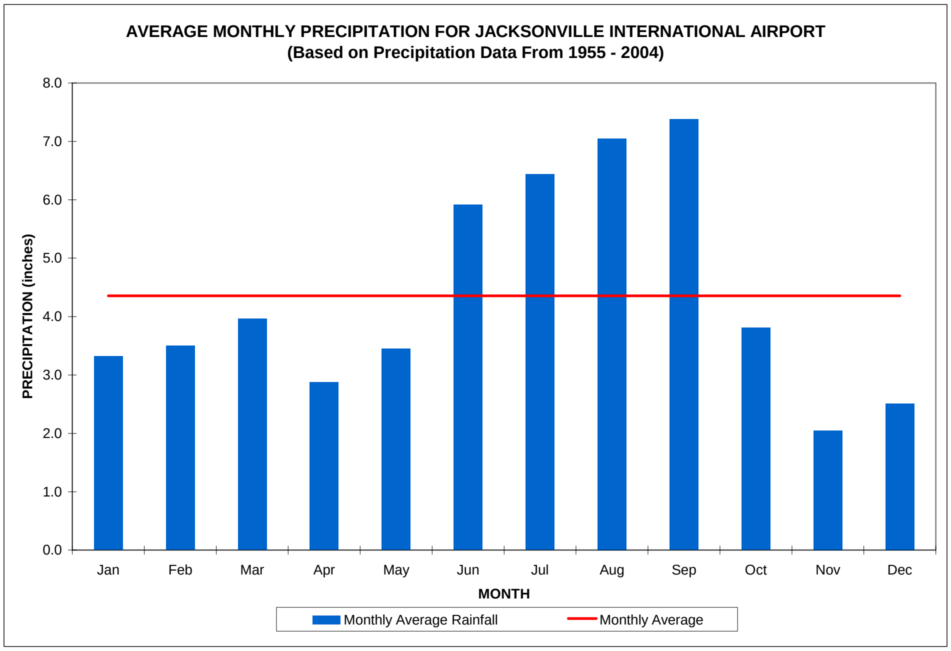
Appendix Q: Monthly and Annual Precipitation 1955 – 2004 from JIA

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 R: Annual and Monthly Average Precipitation at JIA





Appendix S: 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 T: Departmental Responses to Comments Regarding this TMDL for Moncrief Creek

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1. The WLA for the NPDES facility (Millennium Specialty Chemicals, #FL0000884) should be expressed as a load for both fecal and total coliform and not as a percent reduction. By expressing the WLA as a percent reduction this implies permit limits below the water quality criteria and this is probably not the intent of the TMDL. Although DMR data indicate the facility has violated the permit, the TMDL should require compliance with the limits given in the permit.

   RESPONSE: The WLA box in Table 6.1 of the document has been edited to "Point sources must meet permit limits." Please see response number 1 in "general comments regarding coliform TMDLs developed in the Lower St. Johns River basin" below for more detailed explanation as to why the Department uses a concentration rather than a load for WLAs in coliform TMDLs.

2. The loading from leaking septic systems reported in Table 4.4 (6.86E+10 counts/day) does not match the loading given in the text (6.98E+10 counts/day). This is probably a typographic error.

   RESPONSE: The loading from failing septic tanks was re-calculated and found to be 6.86 x 10^{10}. The text has been edited to correct this discrepancy.

3. The total coliform loadings reported for leaking sewers reported In Table 4.7 (1.5E+15 counts/day) does not match the loading reported in the text (1.5E+16 counts/day). In addition, the estimated daily flow values reported in this table (3.0E+5L) does not match the text (3.0E+6 L). These discrepencies are probably typographic errors,

   RESPONSE: The loading from leaking wastewater collection systems has been re-calculated. The estimated daily flow was 3.00 x 10^6, and the estimated loading was found to be 1.50 x 10^{15}. The text has been edited to correct these discrepancies.

4. The loadings from the wastewater collection system seem too high. Although the loadings presented in the report could be conservative estimates and are not used to develop the TMDL the relative magnitude of this source compared to other sources in the watershed provide guidance during implementation. The calculations use similar assumptions as failing septic systems (calculate loading transported to the system from each household connected to the system using literature values for coliform concentrations). It may be more appropriate to base leaking sewer loads on the design flow of the WWTP adjusted for the percent that leaks out of the system (5%) and the percent of linear feet of collection lines within the WBID rather than on population.

   RESPONSE: The calculations used to determine potential impacts from septic tanks is based on the percentage that is believed to be failing, based on data obtained by JEA. The estimates from leaking collection systems were not based on watershed specific data as the septic tanks estimates were.

   Based on considerations used to calculate the estimates, it does not seem unreasonable for the estimate from leaking collection lines to be higher than that for septic systems. According to

JEA data, there were only an annual average of 10 septic tank failures, and as explained, loading from failing septic tanks were based on this. However, there are 7,685 estimated households in the watershed. As discussed in the text, it is estimated that 57 percent of residences in Duval County are connected to a sewer system, so this estimate is based on 4,380 households. Due to the high number of residences estimated to be connected to the sewer system versus the number of failing septic tanks, it seems reasonable that the estimates for collections systems should be expected to be higher.

It is suggested in the comments that loads for each septic tank be calculated based on the total number of residences in the watershed using literature values. This seems unrealistic to the Department. The Department assumed that if a septic tank was not failing (and, as explained in the text, allowance was made for additional failure of septic tanks) it was working correctly, and loadings from properly functioning septic systems was expected to be very minimal. According to the EPA, their *Onsite Wastewater Treatment Systems Manual* (table 3-17), 99 – 99.99 percent of fecal coliforms are removed via soil infiltration. Therefore, the loadings from the non-failing septic tanks would be very minimal, and were not considered a significant source of coliform loading.

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

5. The pet waste loadings seem too high. The calculations assume 10% of the load reaches the stream but decay is not factored into the calculations. The calculations could be considered conservative but the relative magnitude compared to the other loads in the watershed could be an issue during implementation as controlling this load is voluntary.

RESPONSE: The Department did not consider decay rates when calculating the estimates from pets, thereby making it a conservative estimate. The Department used published data in its calculation. The Department does not have the site specific data that would be required to take decay into consideration (i.e. the size of the dog, how many owners pick up after their dog, disposal practices of collected waste, proximity of waste to stream or collection system, etc.).

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 is just an estimate, and further analysis will be done as part of the BMAP phase.

6. In the absence of flows, critical conditions can be related to rainfall. The analysis provided in Table 2.1 indicates months with the greatest number of exceedances occur during months with highest rainfall.

RESPONSE: Precipitation as a critical condition is discussed in Section 5.1.3, “Critical Conditions/Seasonality.” Simple statistical analyses were performed and there was some correlation to both fecal and total coliforms to precipitation, which are discussed in the text.

7. The TMDL (expressed as percent reduction) appears 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 for fecal coliform is 83% and for total coliform the reduction is 98%. As a check, the percent reductions proposed in the TMDL were compared to those calculated using the 90th percentile concentration of samples collected during the listing cycle (EPA's group 3 approach for estimating the TMDL when expressed as a percent reduction) and resulted in a 99% reduction for fecal coliform and an 89% reduction for total coliform. The difference in reductions for total coliform is not significant. The fecal coliform reduction using the 90th percentile concentration is much higher; however, a 99% reduction is not realistically achievable and the strategies used to implement the fecal coliform TMDL (83% reduction) will likely achieve improvements in water quality. Modification of the TMDL value to address the different approach EPA is using to calculate the percent reduction 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.*

Florida Department of Environmental Protection
Division of Water Resource Management
Bureau of Watershed Management
2600 Blair Stone Road, Mail Station 3565
Tallahassee, Florida 32399-2400
(850) 245-8561
www.dep.state.fl.us/water/