FINAL

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division of Water Resource Management, Bureau of Watershed Management

NORTHEAST DISTRICT • LOWER ST. JOHNS BASIN

TMDL Report

Fecal and Total Coliform TMDLs for the Cedar River (WBID 2262)

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Contents

List of Tables

List of Figures

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/legal/Rules/shared/62-303/62-303.pdf

STORET Program

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

2006 305(b) Report

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

Criteria for Surface Water Quality Classifications

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

Basin Status Report for the Lower St. Johns River Basin

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

Water Quality Assessment Report for the Lower St. Johns River Basin

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

U.S. Environmental Protection Agency, 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 Cedar River watershed in the Ortega River Planning Unit. The creek was verified as impaired for fecal and total coliforms, and was included on the Verified List of impaired waters for the Lower St. Johns River Basin that was adopted by Secretarial Order in May 2004. The TMDL establishes the allowable loadings to Cedar River that would restore the waterbody so that it meets its applicable water quality criteria for fecal and total coliforms.

1.2 Identification of Waterbody

The Cedar River is located in south-central Duval County, on the west side of the St. Johns River (**Figure 1.1**). The creek, which is a second order stream, is approximately 3.6 miles long and has an approximate 8.32 square-mile (mi^2) drainage area that drains directly into the Ortega River (**Figure 1.2**). The Cedar River basin is located on the southwestern edge of the City of Jacksonville (in an area known as Cedar Hills) and, as a result, is moderately urbanized. The Cedar River is the largest tributary of the Ortega River and flows predominantly southeast. Additional information about the creek's hydrology and geology are available in the Basin Status Report for the Lower St. Johns River Basin (Florida Department of Environmental Protection [Department], 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. Cedar River consists of segment 2262 as shown in **Figure 1.2**, which this TMDL addresses.

Cedar River is part of the Ortega River Planning Unit (PU). Planning units are groups of WBIDs, which are part of a larger basin unit, in this case the Lower St. Johns Basin. The Ortega River Planning Unit consists of 30 WBIDs. **Figure 1.3** shows the location of these WBIDs, Cedar River's location in the planning unit, and a list of the other WBIDs in the Ortega River Planning Unit.

Figure 1.1. Location of Cedar River (WBID 2262) and Major Geopolitical Features in the St. Johns River Basin

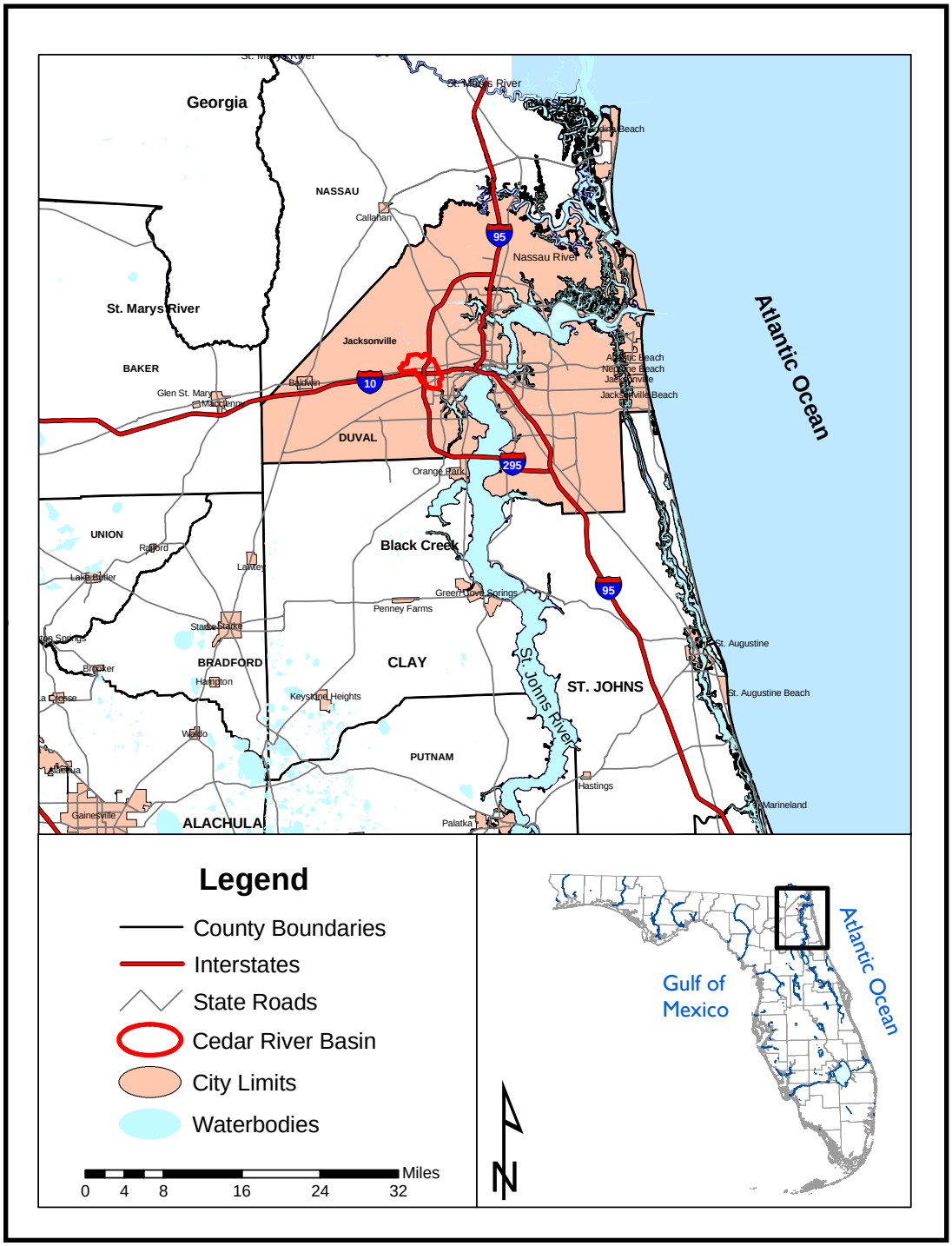


Figure 1.2. Cedar River WBID

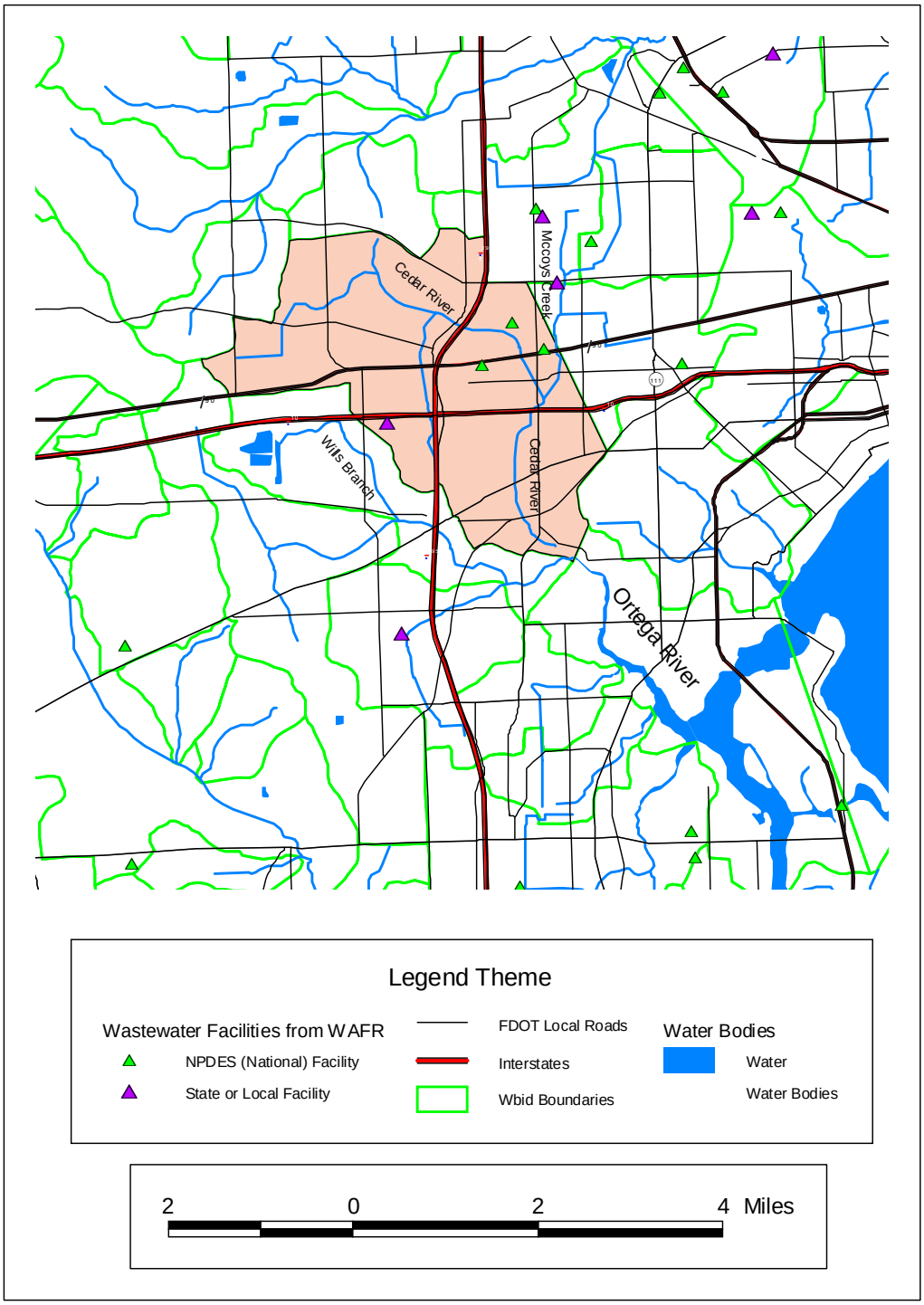
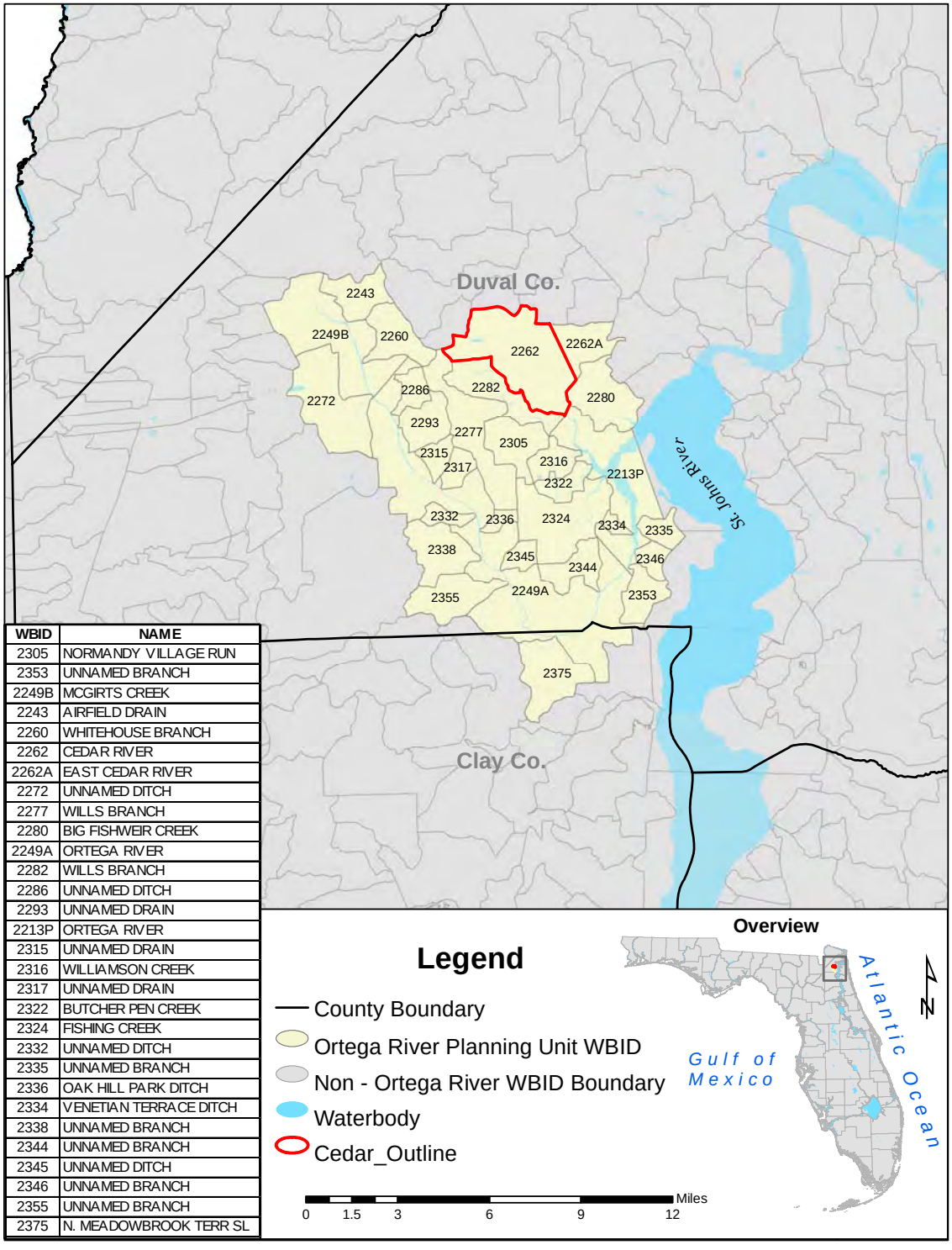


Figure 1.3. WBIDs in the Ortega River Planning Unit



WBID	NAME
2305	NORMANDY VILLAGE RUN
2353	UNNAMED BRANCH
2249B	MCGIRTS CREEK
2243	AIRFIELD DRAIN
2260	WHITEHOUSE BRANCH
2262	CEDAR RIVER
2262A	EAST CEDAR RIVER
2272	UNNAMED DITCH
2277	WILLS BRANCH
2280	BIG FISHWEIR CREEK
2249A	ORTEGA RIVER
2282	WILLS BRANCH
2286	UNNAMED DITCH
2293	UNNAMED DRAIN
2213P	ORTEGA RIVER
2315	UNNAMED DRAIN
2316	WILLIAMSON CREEK
2317	UNNAMED DRAIN
2322	BUTCHER PEN CREEK
2324	FISHING CREEK
2332	UNNAMED DITCH
2335	UNNAMED BRANCH
2336	OAK HILL PARK DITCH
2334	VENETIAN TERRACE DITCH
2338	UNNAMED BRANCH
2344	UNNAMED BRANCH
2345	UNNAMED DITCH
2346	UNNAMED BRANCH
2355	UNNAMED BRANCH
2375	N. MEADOWBROOK TERR SL

1.3 Background

This report was developed as part of the Department's watershed management approach for restoring and protecting state waters and addressing TMDL Program requirements. The watershed approach, which is implemented using a cyclical management process that rotates through the state's 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 coliforms that caused the verified impairment of the Cedar River. These activities will depend heavily on the active participation of the St. Johns River Water Management District (SJRWMD), 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 U.S. Environmental Protection Agency (EPA) a list of surface waters that do not meet applicable water quality standards (impaired waters) and establish a TMDL for each pollutant source in each of these impaired waters on a schedule. The Department has developed such lists, commonly referred to as 303(d) lists, since 1992. The list of impaired waters in each basin, referred to as the Verified List, is also required by the FWRA (Subsection 403.067[4], Florida Statutes [F.S.]), 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 rule-making 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 the Cedar River and has verified the impairments listed in **Table 2.1**. As shown in **Table 2.1**, the projected year for both fecal coliform and total coliform bacteria TMDLs were 2004, but the Settlement Agreement between EPA and Earthjustice, which drives the TMDL development schedule for waters on the 1998 303(d) list, allows an additional nine months to complete the TMDLs. As such, this TMDL must be adopted and submitted to EPA by September 30, 2005.

Tables 2.2 through **2.4** provide summary results for fecal and total coliforms for the verification period, which for Group 2 waters is January 1, 1996 – June 30, 2003, by month, season, and year, respectively.

Table 2.1. Cedar River Verified Impaired Parameters

WBID	Waterbody Segment	Parameters of Concern	Priority for TMDL Development	Projected Year for TMDL Development
2262	Cedar River	Fecal Coliforms	High	2004
2262	Cedar River	Total Coliforms	High	2004

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

Fecal Coliforms

Month	N	Minimum	Maximum	Median	Mean	No. of Exceedances	% Exceedance	Mean Precipitation
January	9	83	17,000	500	3,158	5	55.56%	2.39
February	7	10	800	116	332	3	42.86%	3.14
March	1	108	108	108	108	0	0.00%	3.95
April	16	20	1,300	75	298	3	18.75%	2.8
May	12	28	5,000	139	883	5	41.67%	1.61
June	0	---	---	---	---	---		7.40
July	7	90	90,000	90	20,623	3	42.86%	6.72
August	8	800	17,000	2,700	4,813	8	100.00%	6.72
September	14	20	54,200	563	4,800	11	78.57%	9.94
October	9	40	9,000	800	2,337	6	66.67%	3.39
November	0	---	---	---	---	---	---	1.81
December	12	14	38,000	824	4,968	10	83.33%	3.12

Total Coliforms

Month	N	Minimum	Maximum	Median	Mean	No. of Exceedances	% Exceedance	Mean Precipitation
January	1	180	180	180	180	0	0.00%	2.39
February	0	---	---	---	---	---	---	3.14
March	2	340	1,067	704	704	0	0.00%	3.95
April	1	640	640	640	640	0	0.00%	2.8
May	6	600	11,800	1,617	3,300	2	33.33%	1.61
June	2	130	1,100	615	615	0	0.00%	7.40
July	1	1,367	1,367	1,367	1,367	0	0.00%	6.72
August	2	14,600	24,600	19,600	19,600	2	100.00%	6.72
September	4	2,033	6,400	2,767	3,492	2	50.00%	9.94
October	1	200	200	200	200	0	0.00%	3.39
November;	3	370	5,000	933	2,101	1	33.33%	1.81
December	3	13,400	29,200	15,400	19,333	3	100.00%	3.12

Coliform counts are #/100 mL
Exceedances represent values above 400 counts/100 mL for fecal coliforms, and 2,400 counts/100 mL for total coliforms
Mean precipitation is for Jacksonville International Airport (JIA) in inches

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

FECAL COLIFORMS								
Season	**N**	**Minimum**	**Maximum**	**Median**	**Mean**	**No. of Exceedances**	**% Exceedance**	**Mean Precipitation**
WINTER	17	10	17,000	330	1,815	8	47.06%	3.16
SPRING	28	20	5,000	88	549	8	28.57%	3.82
SUMMER	29	20	90,000	1,100	8,623	22	75.86%	7.79
FALL	21	14	38,000	800	3,840	16	76.19%	2.77
TOTAL COLIFORMS								
Season	**N**	**Minimum**	**Maximum**	**Median**	**Mean**	**No. of Exceedances**	**% Exceedance**	**Mean Precipitation**
WINTER	3	180	1,067	340	529	3	0.00%	3.16
SPRING	9	130	11,800	1,100	2,408	9	22.22%	3.82
SUMMER	7	1,367	24,600	3,134	7,791	7	57.14%	7.79
FALL	7	200	29,200	5,000	9,215	7	57.14%	2.77

Coliform counts are #/100 mL
Exceedances represent values above 400 counts/100 mL for fecal coliforms, and 2,400 counts/100 mL for total coliforms
Mean precipitation is for Jacksonville International Airport (JIA) in inches

Table 2.4. Summary of Coliform Data by Year for Verified Period (January 1, 1996 – June 30 2003)

FECAL COLIFORMS								
Year	**N**	**Minimum**	**Maximum**	**Median**	**Mean**	**No. of Exceedances**	**% Exceedance**	**Mean Precipitation**
1996	1	800	800	800	800	1	100.00%	5.05
1997	4	500	1,700	1,350	1,225	4	100.00%	4.77
1998	11	60	90,000	2,400	14,842	10	90.91%	4.73
1999	16	20	9,000	850	2,381	11	68.75%	3.54
2000	18	20	38,000	465	3,753	10	55.56%	3.31
2001	21	10	17,000	80	1,211	7	33.33%	4.10
2002	24	28	54,200	153	3,204	11	45.83%	4.56
TOTAL COLIFORMS								
Year	**N**	**Minimum**	**Maximum**	**Median**	**Mean**	**No. of Exceedances**	**% Exceedance**	**Mean Precipitation**
2000	2	1,700	2,400	2,050	2,050	0	0.00%	3.31
2001	1	180	180	180	180	0	0.00%	4.10
2002	23	130	29,200	1,533	6,001	10	43.48%	4.56

Table represents years for which data exist
Coliform counts are #/100 mL
Exceedances represent values above 400 counts/100 mL for fecal coliforms and 2,400 counts/100 mL for total coliforms
Mean precipitation is for Jacksonville International Airport (JIA) in inches

Historical fecal and total coliform observations in the Cedar River are provided in **Appendices A** and **B**. Coliform data have been presented by month, season, and year to determine whether certain patterns are evident in the data set. For example, are coliform levels elevated during certain months or seasons that are historically wetter periods of the year? Is there a trend over time in coliform levels?

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, both fecal and total coliforms had significant differences among months and seasons (**Appendices C, D, E,** and **F**). 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 0 to 16 in a given month, with 8 months having 9 or less observations. The sample sizes for total coliforms were even smaller. Grouping observations by season increased sample sizes for statistical comparison and as seen in the above tables the summer (July – September) and fall (October – December) periods had the highest exceedance rates for both fecal and total coliforms. A likely factor that could contribute to these monthly or seasonal differences would be the pattern of rainfall.

Rainfall records for the Jacksonville International Airport (**Appendix G** 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), as well as the total rainfall for the month that sampling occurred 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 H** and **I**). The simple correlations (r values in the Spearman Correlation table) between coliforms and various rainfall totals were positive, suggesting that as rainfall (and possible runoff) increased, so did the number of coliforms.

Simple linear regressions were performed between 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 1D and 3D rainfall total were significant. In the case of the total coliforms, none of the total coliforms versus rainfall totals were significant at α=0.05 (**Appendices J** and **K**). As noted in the previous paragraph, the highest percentage of exceedances of both fecal and total coliforms occurred during the July – December period. The historical plot of monthly average rainfall (**Appendix G**) indicates that monthly rainfall totals increase in June and peak in September and by October return to levels observed in February and March.

Appendix G also includes a graph of annual rainfall over the 1949 – 2003 period versus the long-term average (52.41 inches) over this period. The years of 1996 – 1998 represented above average rainfall years while the years 1999 – 2001 were below average and 2002 was again above average. In general, the fecal and total coliform percent exceedances by year followed a similar pattern with higher percent exceedance occurring during the above average rainfall years and lower exceendance percentages during below average rainfall years. Observations at individual stations were too limited to determine any spatial trends or patterns along the stream.

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)**

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

3.2 Applicable Water Quality Standards and Numeric Water Quality Target

3.2.1 Fecal Coliform Criterion

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

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

For both parameters, the criteria state that monthly averages shall be expressed as geometric means based on a minimum of 10 samples taken over a 30-day period. However, there were insufficient data (less than 10 samples in a given month) available to evaluate the geometric mean criterion for either fecal or total coliform bacteria. Therefore, the criterion selected for the fecal coliform TMDL was not to exceed 400, and the criterion selected for the total coliform TMDL was not to exceed 2,400 per 100 mL.

Chapter 4: ASSESSMENT OF SOURCES

4.1 Types of Sources

An important part of the TMDL analysis is the identification of pollutant source categories, source subcategories, or individual sources of pollutants in the watershed and the amount of pollutant loading contributed by each of these sources. Sources are broadly classified as either "point sources" or "non-point 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 non-point sources of pollution as point sources subject to regulation under the EPA's National Pollutant Discharge Elimination System (NPDES) Program. These nonpoint sources included certain urban stormwater discharges, including those from local government master drainage systems, construction sites over five acres, and a wide variety of industries (see **Appendix L**) for background information on the federal and state stormwater programs).

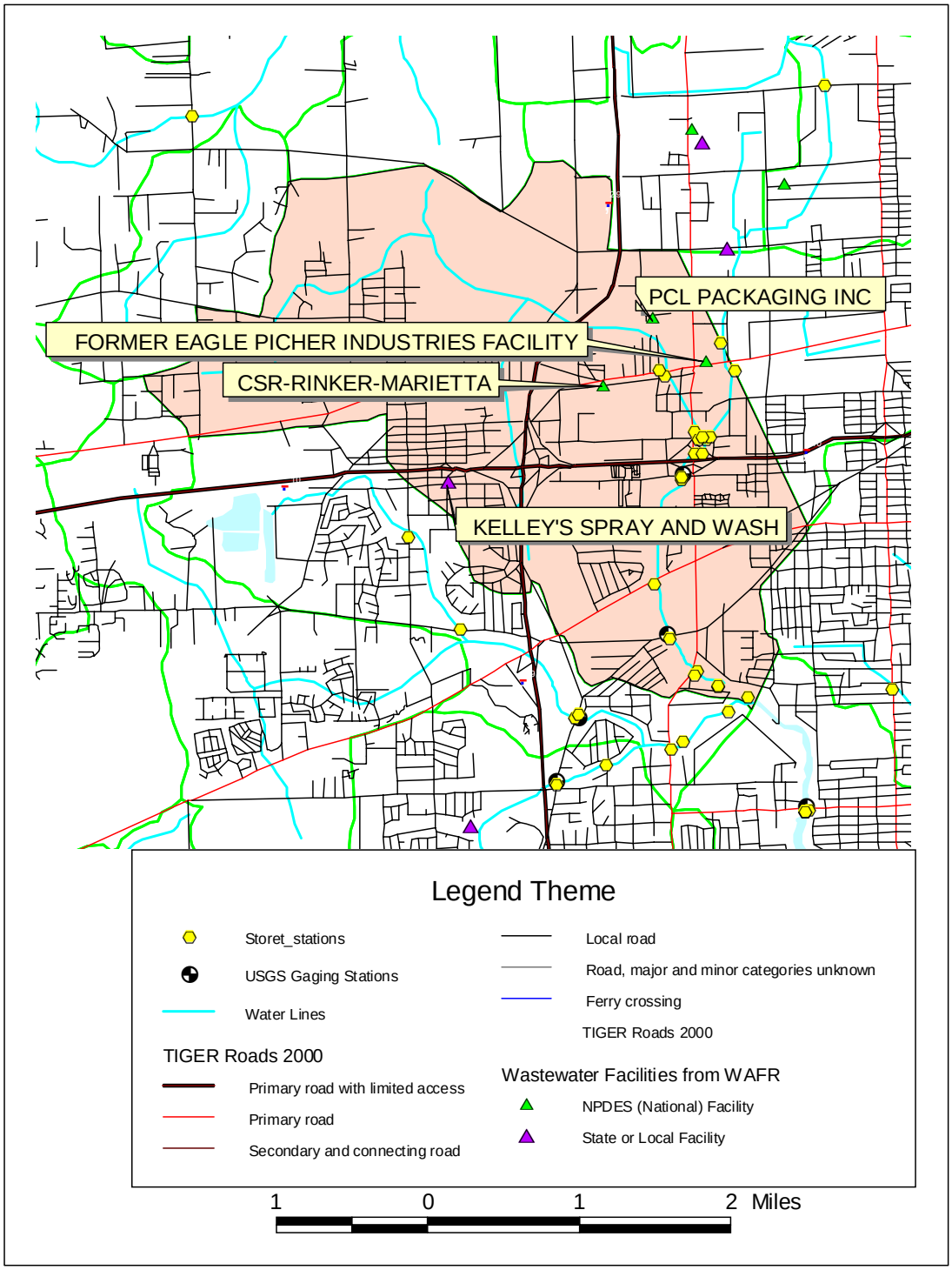
To be consistent with Clean Water Act definitions, the term "point source" will be used to describe traditional point sources (such as domestic and industrial wastewater discharges) **AND** stormwater systems requiring an NPDES stormwater permit when allocating pollutant load reductions required by a TMDL (see **Section 6.1**). However, the methodologies used to estimate non-point 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 Cedar River Watershed

4.2.1 Point Sources

There are three NPDES permitted facilities that discharge into ditches that flow into the Cedar River. However, none of these facilities are required to monitor for coliforms (**Figure 4.1**). The former Eagle Picher Industries Facilities permit (FL0167061) is for air stripping and activated carbon treatment, with a design capacity discharge of 0.018 MGD. Based upon information in the Permit Compliance System (PCS), the discharge has averaged 0.003 MGD over the 3/1/96 – 3/31/2001 period. Based upon the compliance graph, this average includes a period during 2000 and 2001 when there was no discharge. The CSR-Rinker-Marietta Facility (a concrete batch plant) has a general permit (FLG110283). The PCL Packaging Inc. facility has a general stormwater discharge permit (FLRNEE027). There is a fourth permitted facility within the watershed (Kelley's Spray and Wash) that has a state permit (FLA011571) for a ground water discharge, with a design capacity of 0.023 MGD.

Figure 4.1. Location of Permitted Facilities within the Cedar River Watershed



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 (FLS000012) that covers the Cedar River watershed. A stormwater utility has not been established at this time in Duval County or the City of Jacksonville. 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 Cedar River 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

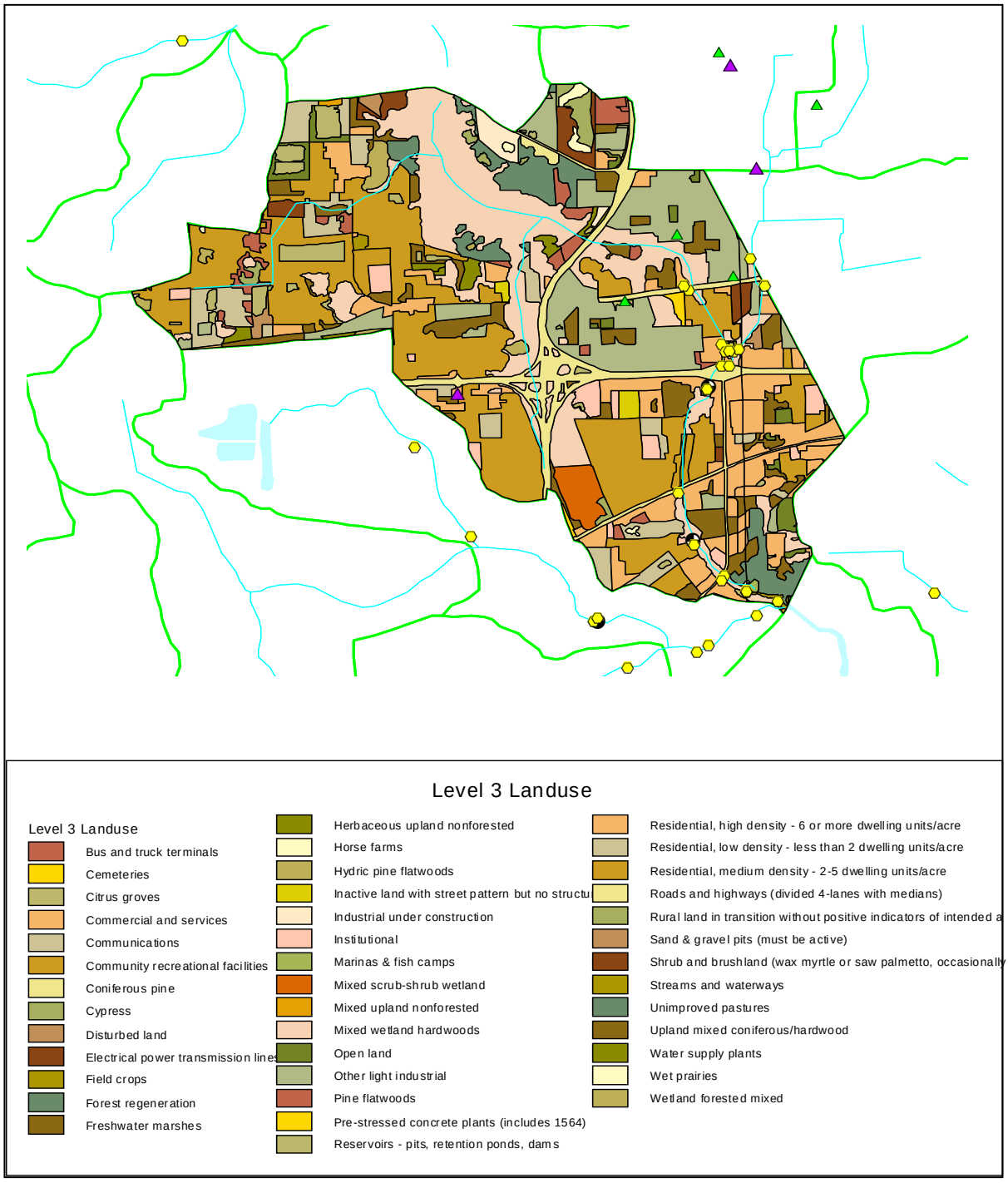
The spatial distribution and acreage of different land use categories were identified using the 2000 land use coverage contained in the Department's Geographic Information System (GIS) library, initially provided by the SJRWMD. Land use categories and acreages in the watershed were aggregated using the Level 3 codes as illustrated in **Figure 4.2**. For ease of presentation, land use based on Level 1 codes are tabulated in **Table 4.1.**

The Cedar River watershed is a small and moderately urbanized area. As shown in **Table 4.1**, over half of the land is urban and built up (55.9 percent), followed by wetlands (19.2 percent) and upland forest (11.4 percent). Wetlands, water, and upland forest areas comprise nearly 25 percent of the watershed.

Table 4.1. Classification of Land Use Categories in the Cedar River Watershed

Level 1 Land Use Code	Attribute	Area (mi^2)	% of Total
1000	Urban and built-up	4.66	55.98%
2000	Agriculture	0.11	1.34%
3000	Upland nonforested	0.21	2.51%
4000	Upland forests	0.95	11.41%
5000	Water	0.14	1.70%
5300	Reservoirs	0.05	0.64%
6000	Wetlands	1.60	19.23%
7000	Barren land	0.08	0.91%
8000	Transportation, communication, and utilities	0.52	6.28%
	TOTAL:	**8.32**	100.00%

Figure 4.2. Principal Land Uses in the Cedar River Watershed



Population

According to the U.S Census Bureau, census block population densities in the Cedar River watershed in the year 2000 ranged from 0 – 36,720 persons per square mile, with an average of 1,014 persons per square mile in the watershed (**Figure 4.3**). Based on this density and the watershed area, the estimated population in the Cedar River watershed would be 8,437. The Census Bureau reports that, for all of Duval County, 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).

Septic Tanks

The Department of Revenue and Department of Health (DoH) estimate 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). The DoH reports that, as of fiscal year 2003-2004, there were 88,834 permitted septic tanks in Duval County (Florida Department of Health Web site). From fiscal years 1994–2004, 4,954 permits for repairs were issued, and 369 permits were issued for repair in fiscal year 2003-2004 (Florida Department of Health Web site).

The Department obtained septic tank repair permit data from JEA and the DoH for the JEA service area, which includes the Cedar River watershed. The data include septic tank repair permits issued from August 1993 – April 2004, areas serviced by a wastewater treatment facility (WWTF), and areas where high numbers of failing septic tanks are present. Information on septic tank installation and repair permits is presented in **Figure 4.4** The data show there were 97 permits for repairs issued during this time and 129 permits for septic tank installation, or an annual average of approximately 9 repairs and 13 installations. Portions of the Cedar River watershed and surrounding areas are serviced by the Buckman and Southwest WWTFs.

The Cedar River watershed comprises 8.32 mi^2, an extremely small portion of Duval County, which occupies 744 mi^2. While the actual number of residences in the Cedar River watershed is not known, an estimate was obtained by identifying the 2000 Census tracts that covered the watershed and estimating the fraction of each tract within the WBID. Using this approach, there were an estimated 3,334 households in the Cedar River watershed. The average household in the Cedar River watershed has 2.53 persons (see **Table 4.2** [based on 2000 Census Bureau statistics]). According to the DoH, there is an annual average of 498 repairs (fiscal years 1993 – 2004) in Duval County. Based on this and the ratio of acreages, there would be less than one failure in the Cedar River watershed annually. In contrast, based on more site-specific information from JEA, there were approximately nine repairs annually in this area. Consequently, this area was well about the countywide average for septic tank failures.

Figure 4.3. Population Density in the Cedar River Watershed

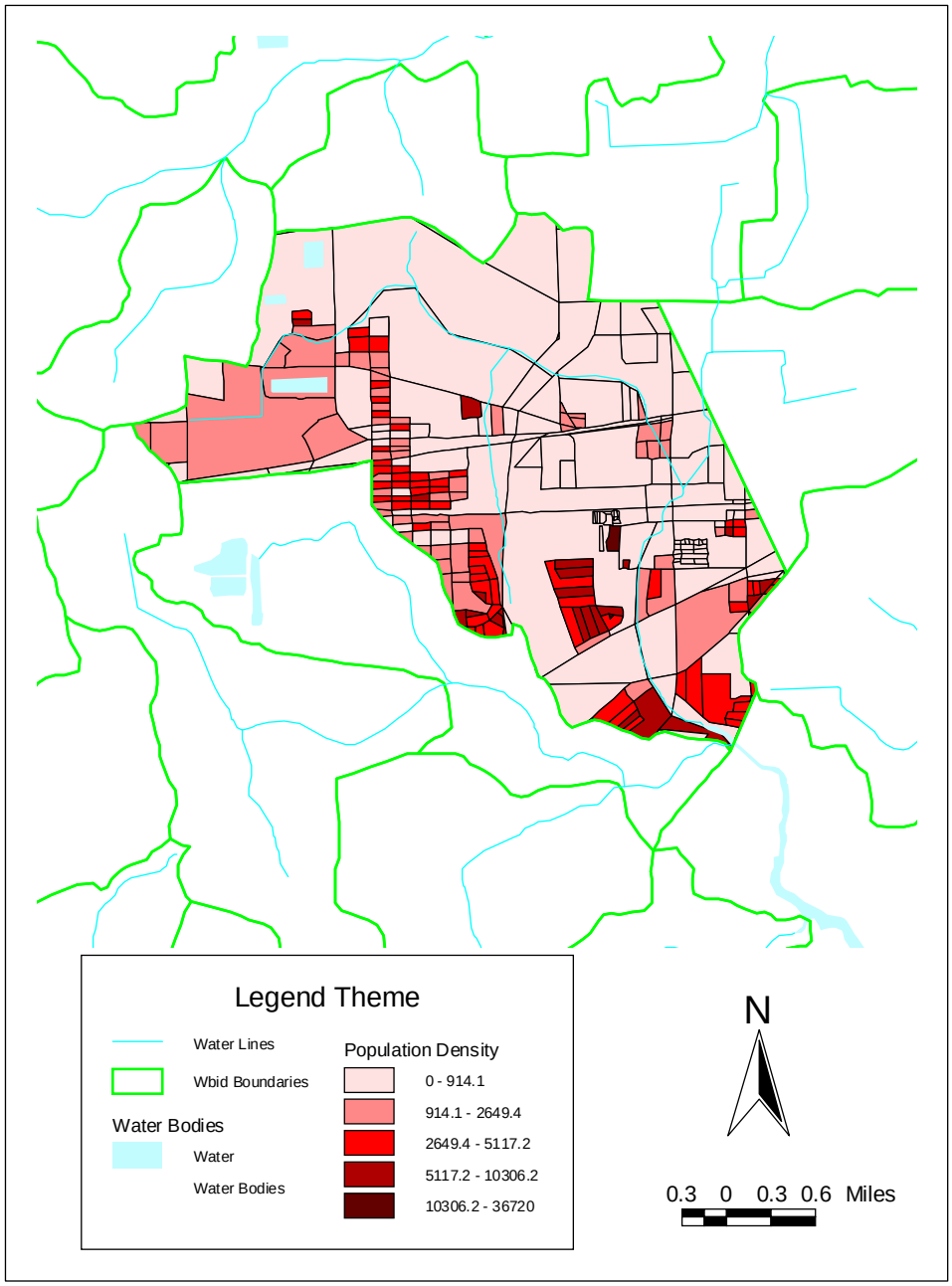
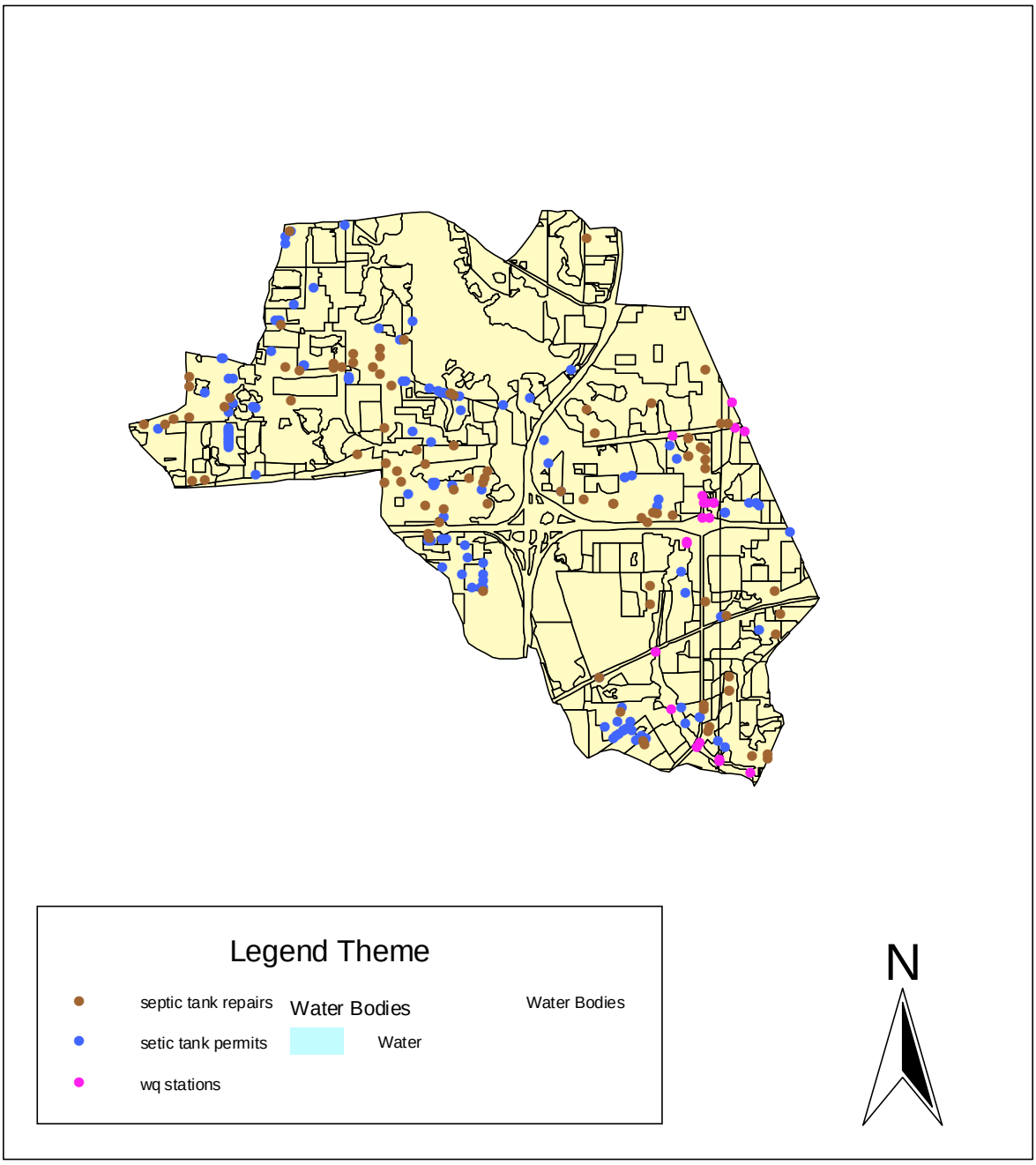


Figure 4.4. Septic Tank Installation and Repair Permits Issued August 1993 – April 2004 for Cedar River Area



Based on data provided by JEA for the period between August 1993 and April 2004, an average of 9 permits was 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 (EPA, 2001), a potential loading of 6.70×10^{10} fecal colonies/day is derived. This estimation is shown in **Table 4.3.** Estimates of total coliforms would be equal or greater than the fecal coliform estimate.

Table 4.2. Estimation of Average Household Size in the Cedar River Watershed

Household Size	No. of Households	% of Total	Number of People
1-person household	852	25.55%	852
2-person household	1,113	33.38%	2,226
3-person household	596	17.87%	1,787
4-person household	453	13.58%	1,811
5-person household	200	5.99%	1,002
6-person household	76	2.27%	454
7-or-more-person household	44	1.31%	305
TOTAL:	**3,334**	**100.00%**	**8,437**
		AVERAGE HOUSEHOLD SIZE:	**2.53**

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

Table 4.3. Estimation of Daily Fecal Coliform Contribution (Counts/Day) from Failed Septic Tanks in the Cedar River Watershed

Estimated Population Density and Area	WBID Area (mi^2)	Estimated Population in Watershed	Estimated Number of Tank Failures[1]	Estimated Load from Failed Tanks[2]	Gallons/ Person/ Day[2]	Estimated Number Persons Per Household[3]	Estimated Contribution from Failing Tanks
1,014 persons/mi^2 in WBID 2262	8.32	8,437	10	1.00×10^4/mL	70	2.53	6.70×10^{10}

[1] Based on septic tank repair permits issued in the watershed from August 1993 – 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 4.2** for more information on this estimate.

4.3 Source Summary

4.3.1 Agriculture

At the Level 3 land use category, four agricultural codes were identified in the Cedar River watershed. Field crops represented less than 0.10 percent of the watershed area, while citrus groves and horse farms represented less than 0.05 percent and 0.002 percent of the watershed area, respectively. Unimproved pasture represented approximately 1.18 percent of the watershed or 63.1 acres. Assuming 1 beef cattle per 3 acres, this could represent potential fecal and total coliform loadings of 2.10×10^{12} and 4.83×10^{12} organisms/day (**Table 4.4**).

Table 4.4. Estimated Agricultural Contribution (Counts/Day) in the Cedar River Watershed

Coliforms	Unimproved Pasture Acreage	Beef Cattle per Acre	Estimated No. of Cattle	Estimated Counts/Cow/Day	Estimated Counts/Day
Fecals	63.1	1/3	21	1×10^{11}	2.10×10^{12}
Totals	63.1	1/3	21	2.3×10^{11}	4.83×10^{12}

4.3.2 Pets

The Department has been unable to obtain data on the specific numbers of dogs in the area; however, estimates can be made based upon information from the American Veterinary Medical Association (AVMA). Using this information yields a potential fecal coliform loading from dogs of 6.02×10^{12} organisms/day (**Table 4.5**). The total coliform contribution would be equal to or greater than the fecal loading. Actual loads to the Cedar River would be lower and dependent upon factors such as proximity to the receiving water, whether the pet owner "picks up" after their pet, and the frequency and intensity of rainfall events that would transport the fecal material to the receiving water.

Table 4.5. Estimated Contribution (Counts/Day) From Dogs in the Cedar River Watershed

Pet	Estimated No. of Households in WBID 2262	Estimated Person:Pet Ratio[1]	Estimated No. of Pets	Estimated Counts/Pet/Day	Estimated Counts/Day
Dogs	3,334	0.361	1,205	5×10^{9}	6.02×10^{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.

4.3.3 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 3,334 homes in the watershed, with 2.53 people per home, and a 70 gallon per person per day discharge, a daily flow of approximately 1.27×10^6 L is transported through the collection system. The EPA Protocol for Developing Pathogen TMDLs (EPA, 2001) suggests that a 5 percent 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 3.18×10^{12} and 6.37×10^{14} organisms/day, respectively (**Table 4.6**).

Table 4.6. Estimated Contribution (Counts/Day) from the Wastewater Collection Systems

Coliforms	Estimated Homes on Central Sewer	Estimated Daily Flow (L)	Daily Leakage (L)	Raw Sewage Counts/100mL	Estimated Counts/Day
Fecals	1,900	1.27×10^6	6.37×10^4	5×10^6	3.18×10^{12}
Totals	1,900	1.27×10^6	6.37×10^4	1×10^9	6.37×10^{14}

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. For example, where are the improved pasture areas relative to Cedar River, is there a riparian buffer area between the pasture and the stream, can cattle directly access the stream, or is there some type of surface conveyance where animal waste can be transported to Cedar River? Similarly, what percentage of pet owners pick up their pet's waste, or what percentage of homes with pets are located adjacent to the Cedar River or a drainage ditch to the river? Finally, what is the age of the collection system, has it been monitored for structural integrity, does the collection system cross the Cedar River, or is it adjacent to portions of the Cedar River?

Table 4.7. Summary of Estimated Potential Coliform Contribution (Counts/Day) from Various Sources in the Cedar River Watershed

Source	Fecal Coliforms Counts/Day	Total Coliforms Counts/Day
Septic Tanks	6.70×10^{10}	$>6.70 \times 10^{10}$
Agriculture	2.10×10^{12}	4.83×10^{12}
Pets	6.02×10^{12}	$>6.02 \times 10^{12}$
Collection Systems	3.18×10^{12}	6.37×10^{14}

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 limited stream flow information available for the Cedar River. . 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 determined the overall required reduction, and therefore the TMDL.

5.1.1 Data Used in the Determination of the TMDL

There are 11 sampling stations in the Cedar River watershed that have historical coliform observations. The primary collector of historical data is the City of Jacksonville, which maintained routine sampling sites at Stuart Avenue (STORET IDs: CR427 and CR 428) and Chuck's Boatyard (STORET ID: CR86). Some data were also collected by the SJRWMD and the Department. The creek was sampled quarterly for the most part from 1991 – 2002 by the City of Jacksonville. **Table 5.1** shows data collection information for each of the stations, and **Table 5.2** is summary information from the stations. **Figure 5.1** shows the location of the sample sites. **Figures 5.2** and **5.3** are charts showing the observed historical data analysis, and **Appendices A** and **B** contains the historical fecal coliform observations from the sites.

Table 5.1. Summary of Sampling Stations for Cedar River, WBID 2262

Station	STORET ID	Station Owner[1]	Years With Data	N
FECAL COLIFORM				
CEDAR CR LENOX AVE BR	21FLA 20030096	FDEP	2000	1
CEDAR CR ROMONA BLVD BR	21FLA 20030092	FDEP	200-2001	3
CEDAR CR STUART E FORK	21FLA 20030297	FDEP	2002	2
CEDAR CR W BRID ON STUART AVE	21FLA 20030353	FDEP	2002	1
CEDAR RIVER 1 BLK BELOW LENOX AVE NEAR MARINA	21FLSJWMLSJ909	SJRWMD	1992-1993	4
CEDAR RIVER AT CHUCK'S BOATYARD	21FLJXWQCR86	COJ	1991-1995	20
CEDAR RIVER AT LENOX AVENUE	21FLJXWQCR430	COJ	1991-2002	40
CEDAR RIVER EAST BRANCH AT STUART AVENUE	21FLJXWQCR427	COJ	1991-1995; 1997-2002	41
CEDAR RIVER EAST BRANCH AT U.S. 90	21FLJXWQCR93	COJ	1991-1995; 1997-2001	32
CEDAR RIVER WEST BRANCH AT STUART AVENUE	21FLJXWQCR428	COJ	1991-1995; 1997-2002	39

Station	STORET ID	Station Owner[1]	Years With Data	N
TOTAL COLIFORM				
CEDAR CR BLANDING BLVD BR RT 21	21FLA 20030083	FDEP	2002	6
CEDAR CR LANE AVE BR N BRANCH	21FLA 20030087	FDEP	2002	4
CEDAR CR LENOX AVE BR	21FLA 20030096	FDEP	2002	3
CEDAR CR ROMONA BLVD BR	21FLA 20030092	FDEP	2000-2002	7
CEDAR CR STUART E FORK	21FLA 20030297	FDEP	2002	2
CEDAR CR W BRID ON STUART AVE	21FLA 20030353	FDEP	2002	2
CEDAR RIVER AT CHUCK'S BOATYARD	21FLJXWQCR86	COJ	1991-1995	20
CEDAR RIVER AT LENOX AVENUE	21FLJXWQCR430	COJ	1991-1995	19
CEDAR RIVER EAST BRANCH AT STUART AVENUE	21FLJXWQCR427	COJ	1991-1995	19
CEDAR RIVER EAST BRANCH AT U.S. 90	21FLJXWQCR93	COJ	1991-1995	19
CEDAR RIVER WEST BRANCH AT STUART AVENUE	21FLJXWQCR428	COJ	1991-1995	19

[1]FDEP = Florida Department of Environmental Protection; COJ = City of Jacksonville; SJRWMD = St. Johns River Water Management District

Table 5.2. Statistical Table of Observed Historical Data for Cedar River

FECAL COLIFORM							
Station	**N**	**Minimum**	**Maximum**	**Median**	**Mean**	**Exceedances**	**% Exceedances**
CEDAR CR ROMONA BLVD BR	7	83	54,200	770	10,036	6	85.71%
CEDAR RIVER EAST BRANCH AT U.S. 90	78	20	160,000	1,217	11,575	56	71.79%
CEDAR RIVER AT LENOX AVENUE	39	14	160,000	1,400	15,406	31	79.49%
CEDAR RIVER AT LENOX AVENUE	20	300	160,000	2,850	29,070	19	95.00%
CEDAR RIVER EAST BRANCH AT U.S. 90	32	10	160,000	1,700	18,830	25	78.13%
CEDAR RIVER	4	40	3,300	1,230	1,450	3	75.00%
TOTAL COLIFORM							
Station	**N**	**Minimum**	**Maximum**	**Median**	**Mean**	**Exceedances**	**% Exceedances**
CEDAR RIVER EAST BRANCH AT U.S. 90	38	1,300	160,000	17,000	43,045	36	94.74%
CEDAR RIVER AT LENOX AVENUE	20	5,000	160,000	23,000	59,150	20	100.00%
CEDAR RIVER AT LENOX AVENUE	20	1,300	160,000	14,000	47,515	19	95.00%
CEDAR RIVER EAST BRANCH AT U.S. 90	19	2,700	160,000	50,000	68,879	19	100.00%
CEDAR CR ROMONA BLVD BR	26	130	29,200	1,617	5,473	10	38.46%

Coliform concentrations are counts/100 mL

Figure 5.1. Historical Sample Sites in Cedar River Watershed

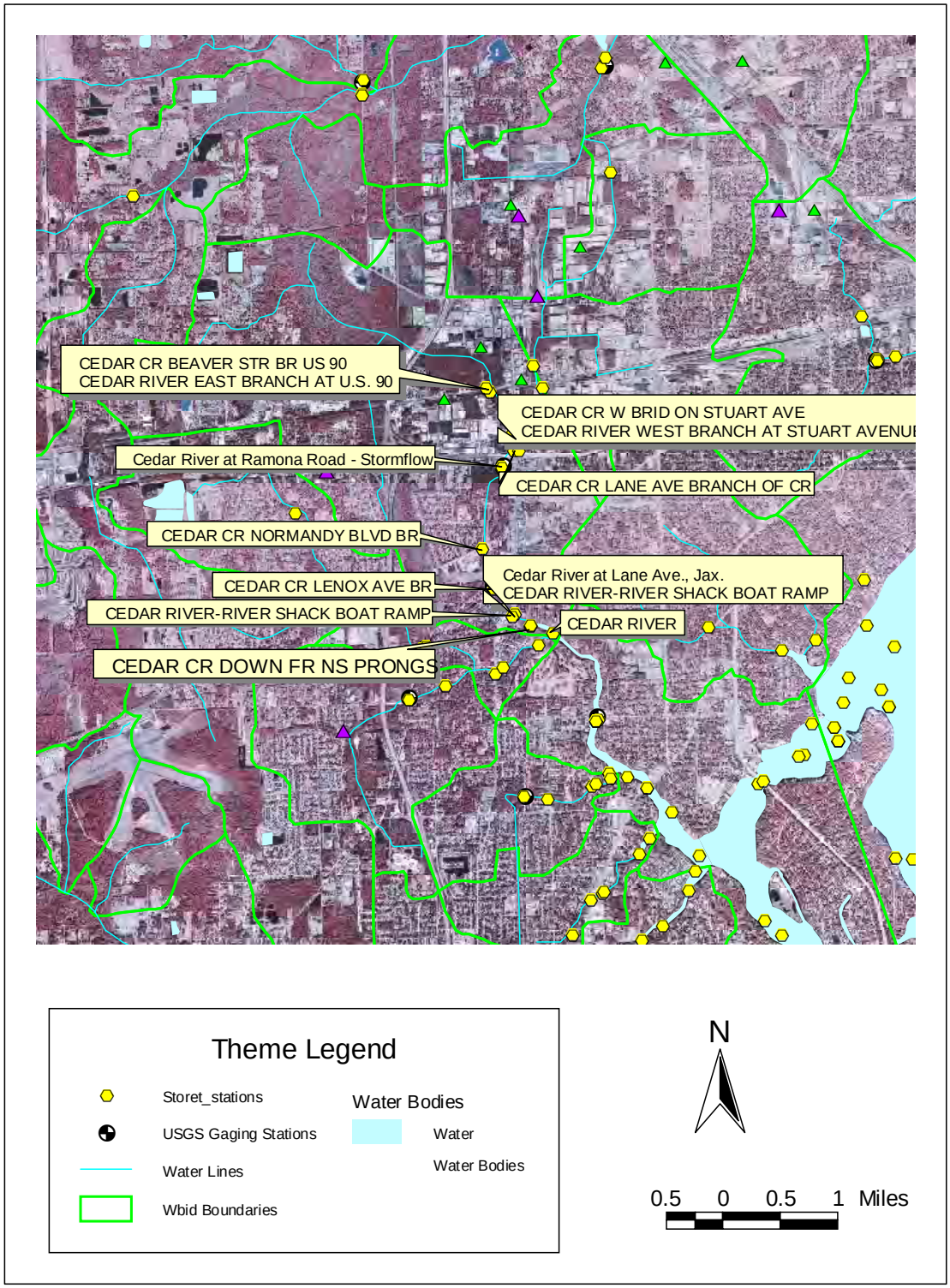


Figure 5.2. Fecal Coliform Historical Observations for Cedar River, WBID 2262

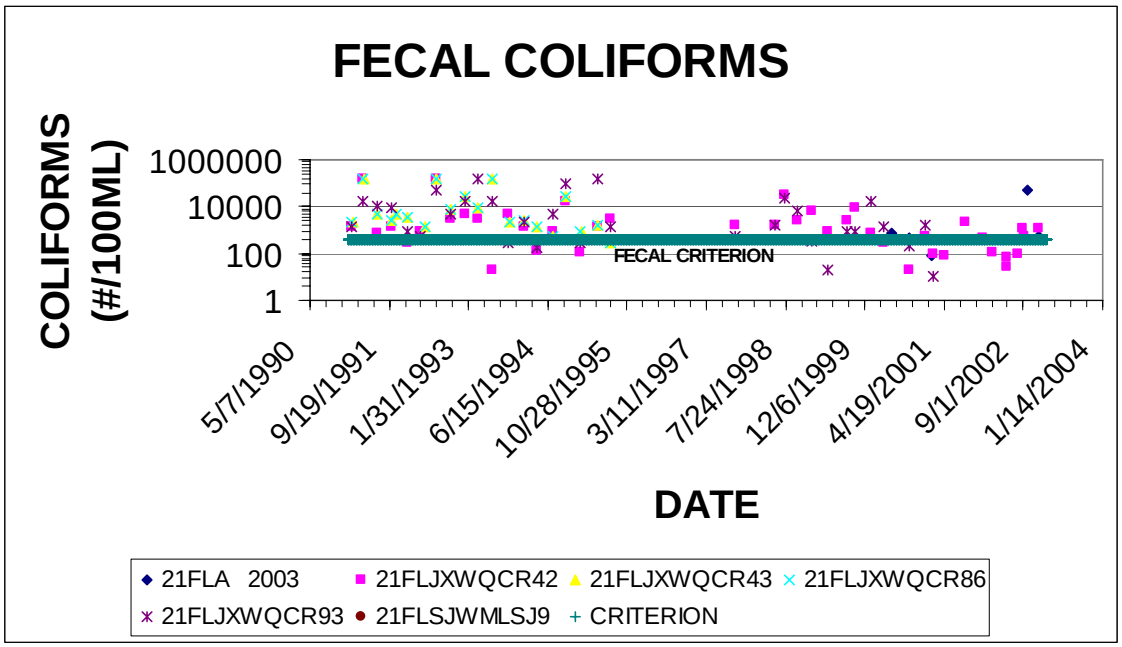
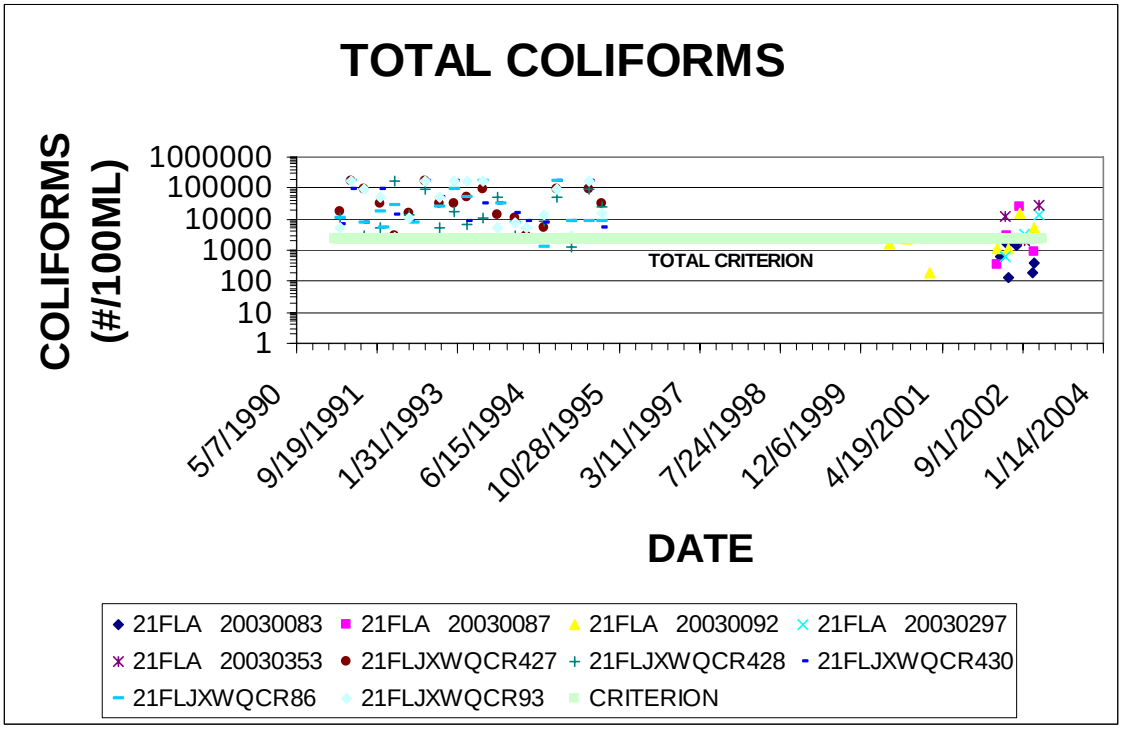


Figure 5.3. Total Coliform Historical Observations for Cedar River, WBID 2262



5.1.2 TMDL Development Process

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

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

After the individual results were calculated, the median of all the individual values was calculated because there was no critical condition (see next section). **Table 5.3** shows the individual reduction calculations for fecal coliforms. The median reduction was 83.3 percent. **Table 5.4** shows the individual reduction calculations for total coliforms in the Cedar River, which yielded a median reduction of 80.9 percent.

Table 5.3. Calculation of Fecal Coliform Reductions for the TMDL for the Cedar River, WBID 2262

Sample Date	Location	Observed Value (Exceedance)	Required Reduction
1/29/1991	CEDAR RIVER AT STUART AVENUE	1,700	76.47%
1/29/1991	CEDAR RIVER EAST BRANCH AT U.S. 90	90,000	99.56%
1/29/1991	CEDAR RIVER AT CHUCK'S BOATYARD	5,000	92.00%
1/29/1991	CEDAR RIVER AT STUART AVENUE	8,000	95.00%
1/29/1991	CEDAR RIVER AT LENOX AVENUE	900	55.56%
4/9/1991	CEDAR RIVER EAST BRANCH AT U.S. 90	50,000	99.20%
4/9/1991	CEDAR RIVER AT LENOX AVENUE	2,100	80.95%
4/9/1991	CEDAR RIVER AT STUART AVENUE	5,000	92.00%
4/9/1991	CEDAR RIVER AT STUART AVENUE	600	33.33%
4/9/1991	CEDAR RIVER AT CHUCK'S BOATYARD	160,000	99.75%
7/2/1991	CEDAR RIVER AT STUART AVENUE	1,200	66.67%
7/2/1991	CEDAR RIVER AT LENOX AVENUE	1,700	76.47%
7/2/1991	CEDAR RIVER AT CHUCK'S BOATYARD	550	27.27%
7/2/1991	CEDAR RIVER EAST BRANCH AT U.S. 90	3,000	86.67%
7/2/1991	CEDAR RIVER AT STUART AVENUE	3,000	86.67%
10/7/1991	CEDAR RIVER AT STUART AVENUE	800	50.00%
10/7/1991	CEDAR RIVER AT STUART AVENUE	5,000	92.00%
10/7/1991	CEDAR RIVER AT CHUCK'S BOATYARD	24,000	98.33%
10/7/1991	CEDAR RIVER EAST BRANCH AT U.S. 90	17,000	97.65%
10/7/1991	CEDAR RIVER AT LENOX AVENUE	5,000	92.00%
10/31/1991	CEDAR RIVER AT CHUCK'S BOATYARD	3,000	86.67%
1/7/1992	CEDAR RIVER EAST BRANCH AT U.S. 90	5,000	92.00%
1/7/1992	CEDAR RIVER AT LENOX AVENUE	800	50.00%
1/7/1992	CEDAR RIVER AT CHUCK'S BOATYARD	500	20.00%
1/7/1992	CEDAR RIVER AT STUART AVENUE	90,000	99.56%
4/6/1992	CEDAR RIVER EAST BRANCH AT U.S. 90	1,735	76.95%
4/6/1992	CEDAR RIVER AT STUART AVENUE	9,000	95.56%
4/6/1992	CEDAR RIVER AT STUART AVENUE	2,300	82.61%
4/6/1992	CEDAR RIVER AT LENOX AVENUE	2,400	83.33%
5/4/1992	CEDAR RIVER AT CHUCK'S BOATYARD	3,000	86.67%
5/11/1992	CEDAR RIVER	1,300	69.23%

Sample Date	Location	Observed Value (Exceedance)	Required Reduction
7/15/1992	CEDAR RIVER AT STUART AVENUE	1,700	76.47%
7/15/1992	CEDAR RIVER EAST BRANCH AT U.S. 90	2,400	83.33%
7/15/1992	CEDAR RIVER AT STUART AVENUE	4,800	91.67%
7/15/1992	CEDAR RIVER AT LENOX AVENUE	6,000	93.33%
7/15/1992	CEDAR RIVER AT CHUCK'S BOATYARD	1,100	63.64%
8/4/1992	CEDAR RIVER	500	20.00%
10/6/1992	CEDAR RIVER AT STUART AVENUE	1,425	71.93%
10/6/1992	CEDAR RIVER AT STUART AVENUE	492	18.70%
10/6/1992	CEDAR RIVER EAST BRANCH AT U.S. 90	460	13.04%
10/6/1992	CEDAR RIVER AT LENOX AVENUE	1,867	78.58%
12/10/2002	CEDAR RIVER AT CHUCK'S BOATYARD	5,200	92.31%
10/6/1992	CEDAR RIVER AT CHUCK'S BOATYARD	8,000	95.00%
11/4/1992	CEDAR RIVER	1,364	70.70%
1/6/1993	CEDAR RIVER AT STUART AVENUE	3,000	86.70%
1/6/1993	CEDAR RIVER AT STUART AVENUE	5,000	92.00%
1/6/1993	CEDAR RIVER AT LENOX AVENUE	14,000	97.10%
1/6/1993	CEDAR RIVER EAST BRANCH AT U.S. 90	16,000	97.50%
1/6/1993	CEDAR RIVER AT CHUCK'S BOATYARD	28,000	98.60%
4/1/1993	CEDAR RIVER AT STUART AVENUE	1,700	76.50%
4/1/1993	CEDAR RIVER AT STUART AVENUE	3,000	86.70%
4/1/1993	CEDAR RIVER AT LENOX AVENUE	5,000	92.00%
4/1/1993	CEDAR RIVER AT CHUCK'S BOATYARD	9,000	95.60%
4/1/1993	CEDAR RIVER EAST BRANCH AT U.S. 90	160,000	99.80%
7/1/1993	CEDAR RIVER EAST BRANCH AT U.S. 90	17,000	97.60%
7/1/1993	CEDAR RIVER AT LENOX AVENUE	30,000	98.70%
7/1/1993	CEDAR RIVER AT STUART AVENUE	50,000	99.20%
7/1/1993	CEDAR RIVER AT CHUCK'S BOATYARD	160,000	99.80%
10/6/1993	CEDAR RIVER AT STUART AVENUE	5,000	92.00%
10/6/1993	CEDAR RIVER AT LENOX AVENUE	24,000	98.30%
10/6/1993	CEDAR RIVER AT STUART AVENUE	50,000	99.20%
10/18/1993	CEDAR RIVER AT CHUCK'S BOATYARD	2,200	81.80%
1/19/1994	CEDAR RIVER AT STUART AVENUE	800	50.00%
1/19/1994	CEDAR RIVER AT STUART AVENUE	1,300	69.20%
1/19/1994	CEDAR RIVER EAST BRANCH AT U.S. 90	2,300	82.60%
1/19/1994	CEDAR RIVER AT CHUCK'S BOATYARD	2,400	83.30%
4/5/1994	CEDAR RIVER AT STUART AVENUE	1,100	63.60%
4/5/1994	CEDAR RIVER AT CHUCK'S BOATYARD	1,300	69.20%
4/5/1994	CEDAR RIVER AT LENOX AVENUE	3,000	86.70%
7/19/1994	CEDAR RIVER AT CHUCK'S BOATYARD	500	20.00%
7/19/1994	CEDAR RIVER AT STUART AVENUE	800	50.00%
7/19/1994	CEDAR RIVER AT LENOX AVENUE	1,300	69.20%
7/19/1994	CEDAR RIVER EAST BRANCH AT U.S. 90	5,000	92.00%
10/4/1994	CEDAR RIVER AT STUART AVENUE	17,000	97.60%
10/4/1994	CEDAR RIVER AT LENOX AVENUE	17,000	97.60%
10/4/1994	CEDAR RIVER AT CHUCK'S BOATYARD	28,000	98.60%
10/4/1994	CEDAR RIVER EAST BRANCH AT U.S. 90	90,000	99.60%
1/9/1995	CEDAR RIVER AT STUART AVENUE	500	20.00%
1/9/1995	CEDAR RIVER AT CHUCK'S BOATYARD	800	50.00%
4/25/1995	CEDAR RIVER AT STUART AVENUE	1,400	71.40%
4/25/1995	CEDAR RIVER AT CHUCK'S BOATYARD	1,700	76.50%
4/25/1995	CEDAR RIVER AT LENOX AVENUE	160,000	99.80%
4/25/1995	CEDAR RIVER EAST BRANCH AT U.S. 90	160,000	99.80%

Sample Date	Location	Observed Value (Exceedance)	Required Reduction
7/11/1995	CEDAR RIVER AT LENOX AVENUE	500	20.00%
7/11/1995	CEDAR RIVER AT STUART AVENUE	1,300	69.20%
7/11/1995	CEDAR RIVER EAST BRANCH AT U.S. 90	1,300	69.20%
7/11/1995	CEDAR RIVER AT STUART AVENUE	3,000	86.70%
10/16/1996	CEDAR RIVER AT LENOX AVENUE	800	50.00%
9/10/1997	CEDAR RIVER EAST BRANCH AT U.S. 90	500	20.00%
9/10/1997	CEDAR RIVER AT STUART AVENUE	1,300	69.20%
9/10/1997	CEDAR RIVER AT LENOX AVENUE	1,400	71.40%
9/10/1997	CEDAR RIVER AT STUART AVENUE	1,700	76.50%
5/20/1998	CEDAR RIVER AT STUART AVENUE	1,700	76.50%
5/20/1998	CEDAR RIVER EAST BRANCH AT U.S. 90	1,700	76.50%
5/20/1998	CEDAR RIVER AT STUART AVENUE	5,000	92.00%
5/26/1998	CEDAR RIVER AT LENOX AVENUE	900	55.60%
7/13/1998	CEDAR RIVER AT LENOX AVENUE	24,000	98.30%
7/13/1998	CEDAR RIVER EAST BRANCH AT U.S. 90	24,000	98.30%
10/6/1998	CEDAR RIVER AT LENOX AVENUE	500	20.00%
10/6/1998	CEDAR RIVER AT STUART AVENUE	2,400	83.30%
10/6/1998	CEDAR RIVER EAST BRANCH AT U.S. 90	7,000	94.30%
1/4/1999	CEDAR RIVER AT LENOX AVENUE	500	20.00%
1/4/1999	CEDAR RIVER AT STUART AVENUE	2,400	83.30%
1/4/1999	CEDAR RIVER AT STUART AVENUE	7,000	94.30%
4/14/1999	CEDAR RIVER AT STUART AVENUE	800	50.00%
4/14/1999	CEDAR RIVER AT LENOX AVENUE	1,300	69.20%
8/11/1999	CEDAR RIVER EAST BRANCH AT U.S. 90	800	50.00%
8/11/1999	CEDAR RIVER AT STUART AVENUE	2,400	83.30%
8/11/1999	CEDAR RIVER AT LENOX AVENUE	3,000	86.70%
8/11/1999	CEDAR RIVER AT STUART AVENUE	9,000	95.60%
10/5/1999	CEDAR RIVER EAST BRANCH AT U.S. 90	900	55.60%
10/5/1999	CEDAR RIVER AT STUART AVENUE	9,000	95.60%
1/18/2000	CEDAR RIVER AT STUART AVENUE	700	42.90%
1/18/2000	CEDAR RIVER EAST BRANCH AT U.S. 90	17,000	97.60%
4/3/2000	CEDAR RIVER EAST BRANCH AT U.S. 90	1,300	69.20%
5/25/2000	CEDAR CR LEN	770	48.10%
9/12/2000	CEDAR CR LEN	430	7.00%
9/13/2000	CEDAR RIVER AT STUART AVENUE	800	50.00%
9/25/2000	CEDAR RIVER AT LENOX AVENUE	5,000	92.00%
12/18/2000	CEDAR RIVER AT STUART AVENUE	500	20.00%
12/18/2000	CEDAR RIVER EAST BRANCH AT U.S. 90	1,700	76.50%
12/18/2000	CEDAR RIVER AT LENOX AVENUE	38,000	98.90%
2/8/2001	CEDAR RIVER AT STUART AVENUE	600	33.30%
2/8/2001	CEDAR RIVER AT LENOX AVENUE	800	50.00%
8/29/2001	CEDAR RIVER AT STUART AVENUE	2,200	81.80%
8/29/2001	CEDAR RIVER AT STUART AVENUE	3,000	86.70%
8/29/2001	CEDAR RIVER AT LENOX AVENUE	17,000	97.60%
12/19/2001	CEDAR RIVER AT STUART AVENUE	481	16.80%
8/28/2002	CEDAR RIVER AT STUART AVENUE	1,100	63.60%
9/9/2002	CEDAR RIVER AT STUART AVENUE	480	16.70%
9/9/2002	CEDAR RIVER AT STUART AVENUE	520	23.10%
9/9/2002	CEDAR RIVER AT LENOX AVENUE	605	33.90%
9/24/2002	CEDAR CR LEN	54,200	99.30%
12/10/2002	CEDAR CR LEN	515	22.30%
12/10/2002	CEDAR RIVER AT LENOX AVENUE	515	22.30%

Sample Date	Location	Observed Value (Exceedance)	Required Reduction
12/10/2002	CEDAR RIVER AT STUART AVENUE	1,133	64.70%
12/10/2002	CEDAR CR LEN	2,457	83.70%
12/10/2002	CEDAR RIVER AT STUART AVENUE	2,457	83.70%
12/10/2002	CEDAR CR LEN	11,800	96.60%
	MEDIAN:	**2,300**	**83.30%**

Table 5.4. Calculation of Total Coliform Reductions for the TMDL for the Cedar River

Sample Date	Location	Observed Value (Exceedance)	Required Reduction
5/16/2002	CEDAR CR W BRID ON STUART AVE	11,800	79.70%
5/30/2002	CEDAR CR LANE AVE BR N BRANCH	3,100	22.60%
8/14/2002	CEDAR CR ROMONA BLVD BR	14,600	83.60%
8/14/2002	CEDAR CR LANE AVE BR N BRANCH	24,600	90.20%
9/9/2002	CEDAR CR STUART E FORK	3,134	23.40%
9/9/2002	CEDAR CR LENOX AVE BR	6,400	62.50%
11/7/2002	CEDAR CR ROMONA BLVD BR	5,000	52.00%
12/10/2002	CEDAR CR STUART E FORK	13,400	82.10%
12/10/2002	CEDAR CR LENOX AVE BR	15,400	84.40%
12/10/2002	CEDAR CR W BRID ON STUART AVE	29,200	91.80%
	MEDIAN:	**12,600**	**80.90%**

Coliform counts are #/100 mL.

5.2.3 Critical Conditions/Seasonality

Exceedances in the Cedar River cannot be associated with flows, as no flow data within the basin have been reported. Therefore, the effects of flow under various conditions cannot be determined or be considered as a critical condition.

A Kruskall – Wallace analysis indicated that there were significant differences among months and seasons for both fecal and total coliforms. Although the relationship between fecal coliforms and rainfall on the day of sampling and the cumulative three day total was significant, the r^2 value was low. Total coliform data (much smaller sample size) did not show significant relationships with rainfall. Fecal coliform exceedances occurred in every season and year. Plots of fecal and total coliforms by station and season can be found in **Appendices M** and **N**. A detailed discussion of fecal and total coliform exceedances related to season and rainfall can be found in **Section 2.2**.

Hydrologic conditions were analyzed using rainfall, since limited flow data were available. A loading curve type chart was created using precipitation data from the Jacksonville International Airport from 1990 – 2004. The same hydrological conditions were applied to the precipitation curve as would be applied to a flow-based loading curve – high flows for the upper percentiles (0-10th percentiles), moist conditions (10th – 40th percentile), mid-range flows (40th – 60th percentile), dry conditions (60th – 90th percentile), and low flow (90th – 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 (46.88 percent) occurred under what would be considered dry conditions, and the greatest *percentage* of exceedances occurred in the high flow conditions area (100 percent). The fact that all data in the low flow range exceed 400 counts/100 mL may indicate influences from septic tank and sewage line leakage as the point sources in the basin are not expected to be sources of coliforms. Despite no rain, discharge may still be finding its way to the creek. **Table 5.4** is a summary of data and hydrologic conditions for fecal coliforms. **Figure 5.4** shows the same data visually.

Total coliform exceedances also occurred over all hydrologic conditions. However, the least percentage of exceedances (33.33 percent) occurred within the low flow range, and the greatest percentage of exceedances occurred in the high (95.24 percent) and moist conditions (94.00 percent), respectively. **Table 5.5** is a summary of data and hydrologic conditions for total coliforms, and **Figure 5.5** shows the same data visually.

Table 5.5. Summary of Coliform Data by Hydrologic Condition

FECAL COLIFORMS					
Hydrologic Condition	**Total Values**	**No. of Exceedances**	**% Exceedance**	**No. of Nonexceedances**	**% Nonexceedance**
High Flow	26	26	100.00%	0	0.00%
Moist Conditions	66	52	78.79%	14	21.21%
Mid Range Flows	44	37	84.09%	7	15.91%
Dry Conditions	32	15	46.88%	17	53.13%
Low Flow	11	10	90.91%	1	9.09%
TOTAL COLIFORMS					
Hydrologic Condition	**Total Values**	**No. of Exceedances**	**% Exceedance**	**No. of Nonexceedances**	**% Nonexceedance**
High Flow	21	20	95.24%	1	4.76%
Moist Conditions	50	47	94.00%	3	6.00%
Mid Range Flows	29	19	65.52%	10	34.48%
Dry Conditions	16	15	93.75%	1	6.25%
Low Flow	6	2	33.33%	4	66.67%

Figure 5.4. Fecal Coliform Data by Hydrologic Condition

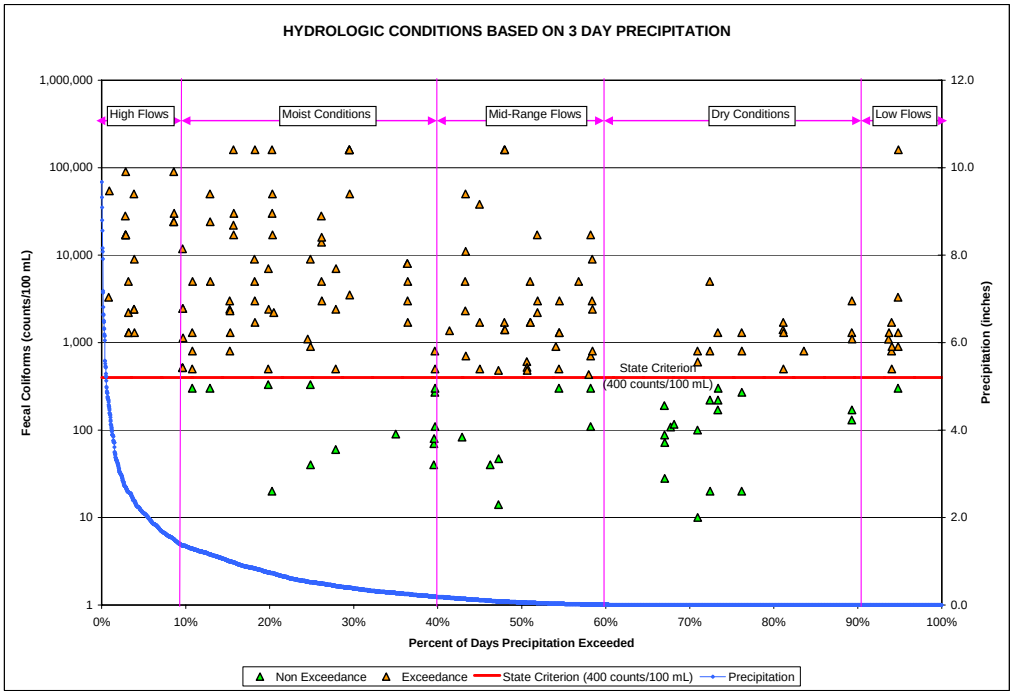
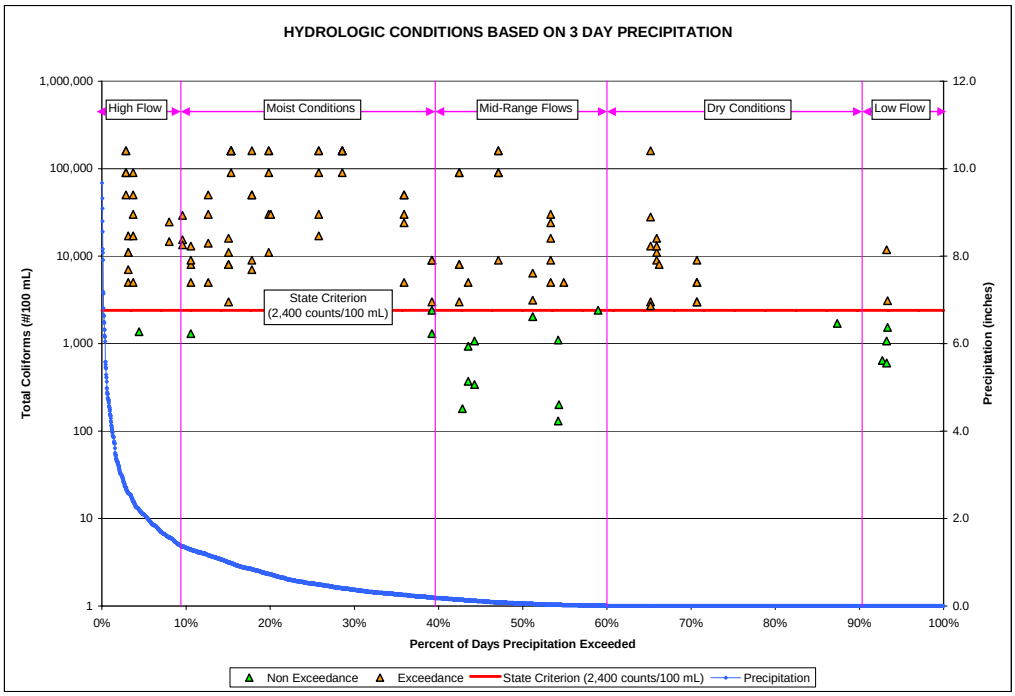


Figure 5.5. Total Coliform Data by Hydrologic Condition



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:

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

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

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

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

WLAs for stormwater discharges are typically expressed as "percent reduction" because it is very difficult to quantify the loads from MS4s (given the numerous discharge points) and to distinguish loads from MS4s from other nonpoint sources (given the nature of stormwater transport). The permitting of stormwater discharges also differs from the permitting of most wastewater point sources. Because stormwater discharges cannot be centrally collected, monitored, and treated, they are not subject to the same types of effluent limitations as wastewater facilities, and instead are required to meet a performance standard of providing treatment to the "maximum extent practical" through the implementation of best management practices (BMPs).

This approach is consistent with federal regulations (40 CFR § 130.2[I]), which state that TMDLs can be expressed in terms of mass per time (e.g., pounds per day), toxicity, or **other appropriate measure**. TMDLs for the Cedar River are expressed in terms of counts per 100 mL and percent reduction, and represent the maximum fecal or total coliform load the creek can assimilate and maintain the coliform criteria (**Table 6.1**).

Table 6.1. TMDL Components for Cedar River

WBID	Parameter	TMDL (colonies/100 mL)	WLA		LA (% Reduction)	MOS
			Wastewater (colonies/day)	NPDES Stormwater		
2262	Fecal Coliform	400	NA	83%	83	Implicit
2322	Total Coliform	2,400	NA	81%	81%	Implicit

6.2 Load Allocation (LA)

Fecal and total coliform reductions of 83 and 81 percent, respectively, 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

There are no permitted wastewater facilities with a discharge permit in the Cedar River watershed that are expected to be a source of coliform and therefore do not need a WLA**.** Any new potential dischargers would be expected to comply with the Class III criteria for coliform bacteria.

6.3.2 NPDES Stormwater Discharges

The WLA for the City of Jacksonville and FDOT's Municipal Separate Storm Sewer System (MS4) permit (FL000012) is an 83 percent reduction in current anthropogenic fecal coliform loading from the MS4 and a 81 percent reduction in anthropogenic total coliforms. It should be noted that any MS4 permittee is only responsible for reducing the loads associated with stormwater outfalls that it owns or otherwise has responsible control over, and is not responsible for reducing other nonpoint source loads in its jurisdiction.

6.4 Margin of Safety (MOS)

Consistent with the recommendations of the Allocation Technical Advisory Committee (Department, 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.

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 Cedar River. This document will be developed over the next year in cooperation with local stakeholders and will attempt to reach consensus on more detailed allocations and on how load reductions will be accomplished. The BMAP will include the following:

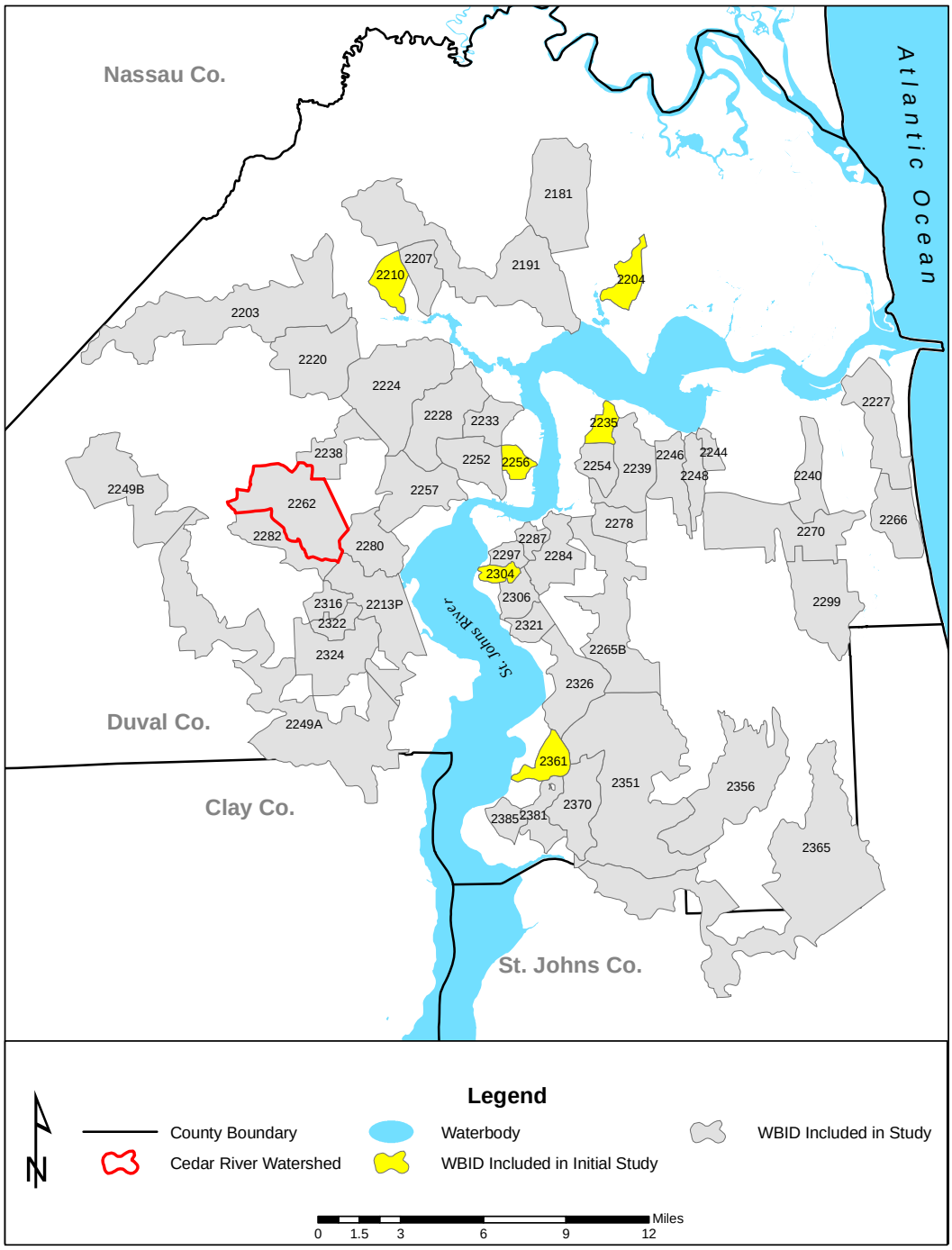
- Appropriate allocations among the affected parties,
- A description of the load reduction activities to be undertaken,
- Timetables for project implementation and completion,
- Funding mechanisms that may be utilized,
- Any applicable signed agreement,
- Local ordinances defining actions to be taken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

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

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

- Big Davis Creek (2356)
- Big Fishwier Creek (2280)
- Blockhouse Creek (2207)
- Broward River (2191)
- Butcher Pen Cr. (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 analysis 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 O**. 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 4.7** shows, potential impacts from dogs could be significant. If pet owners are educated on the potential impacts their pets are having on the Cedar River, and they are inclined to take action, this could potentially decrease a source load. When considering the significance of the seven day rainfall, this could be a potentially significant load to the stream.

Again, considering the significance of the rainfall to exceedances, a closer look at current stormwater management practices may be warranted. This is further supported when considering the highest concentrations of coliforms are, by far, found in the summer months when precipitation can occur nearly every day, with occasional significant amounts of rainfall. The BMAP for the Cedar River may include improved stormwater management.

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Appendices

Appendix A: Historical Fecal Coliform Data for Cedar River

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100mL)	REMARK CODE
Cedar River	2262	1/29/1991	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	2,200	
Cedar River	2262	1/29/1991	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	2,200	L
Cedar River	2262	1/29/1991	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	5,000	
Cedar River	2262	1/29/1991	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	5,000	
Cedar River	2262	1/29/1991	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	3,000	
Cedar River	2262	1/29/1991	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	3,000	
Cedar River	2262	1/29/1991	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	1,300	
Cedar River	2262	1/29/1991	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	1,300	
Cedar River	2262	1/29/1991	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	1,300	
Cedar River	2262	1/29/1991	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	1,300	
Cedar River	2262	4/9/1991	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	160,000	
Cedar River	2262	4/9/1991	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	160,000	
Cedar River	2262	4/9/1991	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	22,000	
Cedar River	2262	4/9/1991	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	22,000	
Cedar River	2262	4/9/1991	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	160,000	
Cedar River	2262	4/9/1991	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	160,000	
Cedar River	2262	4/9/1991	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	17,000	
Cedar River	2262	4/9/1991	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	17,000	
Cedar River	2262	4/9/1991	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	30,000	
Cedar River	2262	4/9/1991	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	30,000	
Cedar River	2262	7/2/1991	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	5,000	
Cedar River	2262	7/2/1991	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	5,000	
Cedar River	2262	7/2/1991	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	2,300	L
Cedar River	2262	7/2/1991	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	2,300	L
Cedar River	2262	7/2/1991	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	50,000	
Cedar River	2262	7/2/1991	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	50,000	
Cedar River	2262	7/2/1991	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	11,000	
Cedar River	2262	7/2/1991	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	11,000	
Cedar River	2262	7/2/1991	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	700	
Cedar River	2262	7/2/1991	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	700	
Cedar River	2262	10/7/1991	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	2,400	L
Cedar River	2262	10/7/1991	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	2,400	
Cedar River	2262	10/7/1991	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	50,000	
Cedar River	2262	10/7/1991	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	50,000	
Cedar River	2262	10/7/1991	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	2,400	
Cedar River	2262	10/7/1991	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	2,400	
Cedar River	2262	10/7/1991	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	9,000	
Cedar River	2262	10/7/1991	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	9,000	
Cedar River	2262	10/7/1991	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	1,300	
Cedar River	2262	10/7/1991	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	1,300	
Cedar River	2262	10/31/1991	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	5,000	
Cedar River	2262	10/31/1991	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	5,000	
Cedar River	2262	1/7/1992	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	3,300	
Cedar River	2262	1/7/1992	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	3,300	
Cedar River	2262	1/7/1992	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	1,300	
Cedar River	2262	1/7/1992	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	1,300	
Cedar River	2262	1/7/1992	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	300	
Cedar River	2262	1/7/1992	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	300	
Cedar River	2262	1/7/1992	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	900	

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100mL)	REMARK CODE
Cedar River	2262	1/7/1992	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	900	
Cedar River	2262	1/7/1992	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	160,000	
Cedar River	2262	1/7/1992	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	160,000	
Cedar River	2262	4/6/1992	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	1,700	
Cedar River	2262	4/6/1992	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	1,700	
Cedar River	2262	4/6/1992	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	800	
Cedar River	2262	4/6/1992	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	800	
Cedar River	2262	4/6/1992	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	500	
Cedar River	2262	4/6/1992	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	500	
Cedar River	2262	4/6/1992	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	900	
Cedar River	2262	4/6/1992	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	900	
Cedar River	2262	5/4/1992	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	1,300	
Cedar River	2262	5/4/1992	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	1,300	
Cedar River	2262	5/11/1992	21FLSJWMLSJ909	Cedar River 1 Blk Below Lenox Ave Near Marina	1,095	
Cedar River	2262	7/15/1992	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	160,000	
Cedar River	2262	7/15/1992	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	160,000	
Cedar River	2262	7/15/1992	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	160,000	
Cedar River	2262	7/15/1992	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	160,000	
Cedar River	2262	7/15/1992	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	160,000	
Cedar River	2262	7/15/1992	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	160,000	
Cedar River	2262	7/15/1992	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	50,000	
Cedar River	2262	7/15/1992	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	50,000	
Cedar River	2262	7/15/1992	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	3,500	
Cedar River	2262	7/15/1992	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	3,500	
Cedar River	2262	8/4/1992	21FLSJWMLSJ909	Cedar River 1 Blk Below Lenox Ave Near Marina	3,300	
Cedar River	2262	10/6/1992	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	8,000	
Cedar River	2262	10/6/1992	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	8,000	
Cedar River	2262	10/6/1992	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	8,000	
Cedar River	2262	10/6/1992	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	8,000	
Cedar River	2262	10/6/1992	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	3,000	
Cedar River	2262	10/6/1992	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	3,000	
Cedar River	2262	10/6/1992	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	5,000	
Cedar River	2262	10/6/1992	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	5,000	
Cedar River	2262	10/6/1992	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	1,700	
Cedar River	2262	10/6/1992	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	1,700	
Cedar River	2262	11/4/1992	21FLSJWMLSJ909	Cedar River 1 Blk Below Lenox Ave Near Marina	1,364	
Cedar River	2262	1/6/1993	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	28,000	
Cedar River	2262	1/6/1993	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	28,000	
Cedar River	2262	1/6/1993	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	14,000	B
Cedar River	2262	1/6/1993	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	14,000	L
Cedar River	2262	1/6/1993	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	5,000	
Cedar River	2262	1/6/1993	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	5,000	
Cedar River	2262	1/6/1993	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	16,000	
Cedar River	2262	1/6/1993	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	16,000	
Cedar River	2262	1/6/1993	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	3,000	
Cedar River	2262	1/6/1993	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	3,000	
Cedar River	2262	1/20/1993	21FLSJWMLSJ909	Cedar River 1 Blk Below Lenox Ave Near Marina	40	
Cedar River	2262	4/1/1993	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	9,000	
Cedar River	2262	4/1/1993	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	9,000	
Cedar River	2262	4/1/1993	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	5,000	L
Cedar River	2262	4/1/1993	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	5,000	L
Cedar River	2262	4/1/1993	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	3,000	
Cedar River	2262	4/1/1993	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	3,000	
Cedar River	2262	4/1/1993	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	160,000	
Cedar River	2262	4/1/1993	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	160,000	
Cedar River	2262	4/1/1993	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	1,700	
Cedar River	2262	4/1/1993	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	1,700	

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100mL)	REMARK CODE
Cedar River	2262	7/1/1993	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	160,000	
Cedar River	2262	7/1/1993	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	160,000	
Cedar River	2262	7/1/1993	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	30,000	
Cedar River	2262	7/1/1993	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	30,000	
Cedar River	2262	7/1/1993	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	50,000	
Cedar River	2262	7/1/1993	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	50,000	
Cedar River	2262	7/1/1993	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	17,000	
Cedar River	2262	7/1/1993	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	17,000	
Cedar River	2262	7/1/1993	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	20	
Cedar River	2262	7/1/1993	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	20	
Cedar River	2262	10/6/1993	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	24,000	
Cedar River	2262	10/6/1993	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	24,000	L
Cedar River	2262	10/6/1993	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	5,000	
Cedar River	2262	10/6/1993	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	5,000	
Cedar River	2262	10/6/1993	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	300	
Cedar River	2262	10/6/1993	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	300	
Cedar River	2262	10/6/1993	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	50,000	
Cedar River	2262	10/6/1993	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	50,000	
Cedar River	2262	10/18/1993	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	2,200	
Cedar River	2262	10/18/1993	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	2,200	
Cedar River	2262	1/19/1994	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	2,400	
Cedar River	2262	1/19/1994	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	2,400	
Cedar River	2262	1/19/1994	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	3,000	
Cedar River	2262	1/19/1994	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	3,000	
Cedar River	2262	1/19/1994	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	800	
Cedar River	2262	1/19/1994	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	800	
Cedar River	2262	1/19/1994	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	2,300	
Cedar River	2262	1/19/1994	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	2,300	
Cedar River	2262	1/19/1994	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	1,300	
Cedar River	2262	1/19/1994	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	1,300	
Cedar River	2262	4/5/1994	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	1,300	
Cedar River	2262	4/5/1994	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	1,300	
Cedar River	2262	4/5/1994	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	3,000	
Cedar River	2262	4/5/1994	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	3,000	
Cedar River	2262	4/5/1994	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	130	
Cedar River	2262	4/5/1994	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	130	
Cedar River	2262	4/5/1994	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	170	
Cedar River	2262	4/5/1994	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	170	
Cedar River	2262	4/5/1994	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	1,100	
Cedar River	2262	4/5/1994	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	1,100	
Cedar River	2262	7/19/1994	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	500	
Cedar River	2262	7/19/1994	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	500	
Cedar River	2262	7/19/1994	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	1,300	
Cedar River	2262	7/19/1994	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	1,300	
Cedar River	2262	7/19/1994	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	800	
Cedar River	2262	7/19/1994	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	800	
Cedar River	2262	7/19/1994	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	5,000	
Cedar River	2262	7/19/1994	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	5,000	
Cedar River	2262	7/19/1994	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	300	
Cedar River	2262	7/19/1994	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	300	
Cedar River	2262	10/4/1994	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	28,000	
Cedar River	2262	10/4/1994	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	28,000	
Cedar River	2262	10/4/1994	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	17,000	
Cedar River	2262	10/4/1994	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	17,000	
Cedar River	2262	10/4/1994	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	17,000	
Cedar River	2262	10/4/1994	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	17,000	
Cedar River	2262	10/4/1994	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	90,000	

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100mL)	REMARK CODE
Cedar River	2262	10/4/1994	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	90,000	
Cedar River	2262	10/4/1994	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	17,000	
Cedar River	2262	10/4/1994	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	17,000	
Cedar River	2262	1/9/1995	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	800	
Cedar River	2262	1/9/1995	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	800	
Cedar River	2262	1/9/1995	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	270	
Cedar River	2262	1/9/1995	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	270	
Cedar River	2262	1/9/1995	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	110	
Cedar River	2262	1/9/1995	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	110	
Cedar River	2262	1/9/1995	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	300	
Cedar River	2262	1/9/1995	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	300	
Cedar River	2262	1/9/1995	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	500	
Cedar River	2262	1/9/1995	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	500	
Cedar River	2262	4/25/1995	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	1,700	
Cedar River	2262	4/25/1995	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	1,700	
Cedar River	2262	4/25/1995	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	160,000	
Cedar River	2262	4/25/1995	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	160,000	
Cedar River	2262	4/25/1995	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	1,400	
Cedar River	2262	4/25/1995	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	1,400	
Cedar River	2262	4/25/1995	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	160,000	
Cedar River	2262	4/25/1995	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	160,000	
Cedar River	2262	4/25/1995	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	1,400	
Cedar River	2262	4/25/1995	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	1,400	
Cedar River	2262	7/11/1995	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	300	
Cedar River	2262	7/11/1995	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	300	
Cedar River	2262	7/11/1995	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	500	
Cedar River	2262	7/11/1995	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	500	
Cedar River	2262	7/11/1995	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	1,300	
Cedar River	2262	7/11/1995	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	1,300	
Cedar River	2262	7/11/1995	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	1,300	
Cedar River	2262	7/11/1995	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	1,300	
Cedar River	2262	7/11/1995	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	3,000	
Cedar River	2262	7/11/1995	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	3,000	
Cedar River	2262	10/16/1996	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	800	
Cedar River	2262	10/16/1996	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	800	
Cedar River	2262	9/10/1997	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	1,400	B
Cedar River	2262	9/10/1997	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	1,400	
Cedar River	2262	9/10/1997	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	1,700	
Cedar River	2262	9/10/1997	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	1,700	
Cedar River	2262	9/10/1997	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	500	
Cedar River	2262	9/10/1997	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	500	
Cedar River	2262	9/10/1997	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	1,300	
Cedar River	2262	9/10/1997	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	1,300	
Cedar River	2262	5/20/1998	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	5,000	
Cedar River	2262	5/20/1998	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	5,000	
Cedar River	2262	5/20/1998	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	1,700	
Cedar River	2262	5/20/1998	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	1,700	
Cedar River	2262	5/20/1998	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	1,700	
Cedar River	2262	5/20/1998	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	1,700	
Cedar River	2262	5/26/1998	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	900	
Cedar River	2262	5/26/1998	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	900	
Cedar River	2262	7/13/1998	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	24,000	L
Cedar River	2262	7/13/1998	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	24,000	L
Cedar River	2262	7/13/1998	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	90,000	
Cedar River	2262	7/13/1998	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	90,000	
Cedar River	2262	7/13/1998	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	24,000	
Cedar River	2262	7/13/1998	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	24,000	

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100mL)	REMARK CODE
Cedar River	2262	7/13/1998	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	30,000	
Cedar River	2262	7/13/1998	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	30,000	
Cedar River	2262	10/6/1998	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	500	
Cedar River	2262	10/6/1998	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	500	
Cedar River	2262	10/6/1998	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	2,400	
Cedar River	2262	10/6/1998	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	2,400	
Cedar River	2262	10/6/1998	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	7,000	
Cedar River	2262	10/6/1998	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	7,000	
Cedar River	2262	10/6/1998	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	60	
Cedar River	2262	10/6/1998	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	60	
Cedar River	2262	1/4/1999	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	500	
Cedar River	2262	1/4/1999	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	500	
Cedar River	2262	1/4/1999	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	7,000	
Cedar River	2262	1/4/1999	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	7,000	
Cedar River	2262	1/4/1999	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	330	
Cedar River	2262	1/4/1999	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	330	
Cedar River	2262	1/4/1999	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	2,400	
Cedar River	2262	1/4/1999	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	2,400	
Cedar River	2262	4/14/1999	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	1,300	
Cedar River	2262	4/14/1999	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	1,300	
Cedar River	2262	4/14/1999	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	270	
Cedar River	2262	4/14/1999	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	270	
Cedar River	2262	4/14/1999	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	20	
Cedar River	2262	4/14/1999	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	20	
Cedar River	2262	4/14/1999	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	800	
Cedar River	2262	4/14/1999	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	800	
Cedar River	2262	8/11/1999	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	3,000	
Cedar River	2262	8/11/1999	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	3,000	
Cedar River	2262	8/11/1999	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	9,000	
Cedar River	2262	8/11/1999	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	9,000	
Cedar River	2262	8/11/1999	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	800	
Cedar River	2262	8/11/1999	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	800	
Cedar River	2262	8/11/1999	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	2,400	
Cedar River	2262	8/11/1999	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	2,400	
Cedar River	2262	10/5/1999	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	330	
Cedar River	2262	10/5/1999	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	330	
Cedar River	2262	10/5/1999	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	9,000	
Cedar River	2262	10/5/1999	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	9,000	
Cedar River	2262	10/5/1999	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	900	
Cedar River	2262	10/5/1999	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	900	
Cedar River	2262	10/5/1999	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	40	
Cedar River	2262	10/5/1999	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	40	
Cedar River	2262	1/18/2000	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	300	
Cedar River	2262	1/18/2000	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	300	
Cedar River	2262	1/18/2000	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	110	
Cedar River	2262	1/18/2000	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	110	
Cedar River	2262	1/18/2000	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	17,000	
Cedar River	2262	1/18/2000	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	17,000	
Cedar River	2262	1/18/2000	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	700	
Cedar River	2262	1/18/2000	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	700	
Cedar River	2262	4/3/2000	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	170	
Cedar River	2262	4/3/2000	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	170	
Cedar River	2262	4/3/2000	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	220	
Cedar River	2262	4/3/2000	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	220	
Cedar River	2262	4/3/2000	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	1,300	
Cedar River	2262	4/3/2000	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	1,300	
Cedar River	2262	4/3/2000	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	300	

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100mL)	REMARK CODE
Cedar River	2262	4/3/2000	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	300	
Cedar River	2262	5/25/2000	21FLA 20030092	CEDAR CR ROMONA BLVD BR	770	
Cedar River	2262	9/12/2000	21FLA 20030092	CEDAR CR ROMONA BLVD BR	430	
Cedar River	2262	9/13/2000	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	800	
Cedar River	2262	9/13/2000	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	800	
Cedar River	2262	9/13/2000	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	220	
Cedar River	2262	9/13/2000	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	220	K
Cedar River	2262	9/13/2000	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	20	
Cedar River	2262	9/13/2000	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	20	
Cedar River	2262	9/25/2000	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	5,000	
Cedar River	2262	9/25/2000	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	5,000	
Cedar River	2262	12/18/2000	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	38,000	
Cedar River	2262	12/18/2000	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	38,000	
Cedar River	2262	12/18/2000	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	1,700	U
Cedar River	2262	12/18/2000	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	1,700	
Cedar River	2262	12/18/2000	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	500	
Cedar River	2262	12/18/2000	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	500	
Cedar River	2262	1/30/2001	21FLA 20030092	CEDAR CR ROMONA BLVD BR	83	
Cedar River	2262	2/8/2001	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	800	
Cedar River	2262	2/8/2001	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	800	
Cedar River	2262	2/8/2001	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	100	
Cedar River	2262	2/8/2001	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	100	
Cedar River	2262	2/8/2001	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	10	
Cedar River	2262	2/8/2001	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	10	
Cedar River	2262	2/8/2001	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	600	
Cedar River	2262	2/8/2001	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	600	
Cedar River	2262	4/26/2001	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	40	
Cedar River	2262	4/26/2001	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	40	
Cedar River	2262	4/26/2001	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	70	
Cedar River	2262	4/26/2001	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	70	
Cedar River	2262	4/26/2001	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	80	
Cedar River	2262	4/26/2001	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	80	F
Cedar River	2262	8/29/2001	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	17,000	
Cedar River	2262	8/29/2001	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	17,000	L
Cedar River	2262	8/29/2001	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	2,200	
Cedar River	2262	8/29/2001	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	2,200	
Cedar River	2262	8/29/2001	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	3,000	
Cedar River	2262	8/29/2001	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	3,000	
Cedar River	2262	12/19/2001	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	14	
Cedar River	2262	12/19/2001	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	14	L
Cedar River	2262	12/19/2001	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	481	
Cedar River	2262	12/19/2001	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	481	
Cedar River	2262	12/19/2001	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	47	F
Cedar River	2262	12/19/2001	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	47	
Cedar River	2262	2/13/2002	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	116	L
Cedar River	2262	2/13/2002	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	116	F
Cedar River	2262	3/20/2002	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	108	
Cedar River	2262	5/15/2002	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	72	
Cedar River	2262	5/16/2002	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	190	
Cedar River	2262	5/16/2002	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	88	
Cedar River	2262	5/16/2002	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	28	
Cedar River	2262	7/30/2002	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	90	
Cedar River	2262	8/28/2002	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	1,100	L
Cedar River	2262	9/9/2002	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	605	
Cedar River	2262	9/9/2002	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	520	
Cedar River	2262	9/9/2002	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	480	
Cedar River	2262	9/24/2002	21FLA 20030297	CEDAR CR STUART E FORK	54,200	

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100mL)	REMARK CODE
Cedar River	2262	12/10/2002	21FLA 20030096	CEDAR CR LENOX AVE BR	515	
Cedar River	2262	12/10/2002	21FLA 20030297	CEDAR CR STUART E FORK	11,800	
Cedar River	2262	12/10/2002	21FLA 20030353	CEDAR CR W BRID ON STUART AVE	2,457	
Cedar River	2262	12/10/2002	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	515	
Cedar River	2262	12/10/2002	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	1,133	
Cedar River	2262	12/10/2002	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	2,457	

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

Remark Codes: L – Off-scale high. Actual value not known, but known to be greater then value shown

B – Results based on colony counts outside the acceptable range

F –

K – Off scale low. Actual value not known, but known to less than value shown

U -

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 B: Historical Total Coliform Data for Cedar River

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100mL)	REMARK CODE
CEDAR RIVER	2262	1/29/1991	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	11,000	
CEDAR RIVER	2262	1/29/1991	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	11,000	
CEDAR RIVER	2262	1/29/1991	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	7,000	
CEDAR RIVER	2262	1/29/1991	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	7,000	
CEDAR RIVER	2262	1/29/1991	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	17,000	
CEDAR RIVER	2262	1/29/1991	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	17,000	
CEDAR RIVER	2262	1/29/1991	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	5,000	
CEDAR RIVER	2262	1/29/1991	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	5,000	
CEDAR RIVER	2262	1/29/1991	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	11,000	
CEDAR RIVER	2262	1/29/1991	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	11,000	
CEDAR RIVER	2262	4/9/1991	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	160,000	L
CEDAR RIVER	2262	4/9/1991	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	160,000	L
CEDAR RIVER	2262	4/9/1991	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	90,000	
CEDAR RIVER	2262	4/9/1991	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	90,000	
CEDAR RIVER	2262	4/9/1991	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	160,000	L
CEDAR RIVER	2262	4/9/1991	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	160,000	L
CEDAR RIVER	2262	4/9/1991	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	160,000	L
CEDAR RIVER	2262	4/9/1991	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	160,000	L
CEDAR RIVER	2262	4/9/1991	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	160,000	L
CEDAR RIVER	2262	4/9/1991	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	160,000	L
CEDAR RIVER	2262	7/2/1991	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	8,000	
CEDAR RIVER	2262	7/2/1991	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	8,000	
CEDAR RIVER	2262	7/2/1991	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	8,000	
CEDAR RIVER	2262	7/2/1991	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	8,000	
CEDAR RIVER	2262	7/2/1991	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	90,000	
CEDAR RIVER	2262	7/2/1991	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	90,000	
CEDAR RIVER	2262	7/2/1991	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	90,000	
CEDAR RIVER	2262	7/2/1991	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	90,000	
CEDAR RIVER	2262	7/2/1991	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	3,000	
CEDAR RIVER	2262	7/2/1991	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	3,000	
CEDAR RIVER	2262	10/7/1991	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	17,000	
CEDAR RIVER	2262	10/7/1991	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	17,000	
CEDAR RIVER	2262	10/7/1991	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	90,000	L
CEDAR RIVER	2262	10/7/1991	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	90,000	L
CEDAR RIVER	2262	10/7/1991	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	30,000	
CEDAR RIVER	2262	10/7/1991	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	30,000	
CEDAR RIVER	2262	10/7/1991	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	50,000	
CEDAR RIVER	2262	10/7/1991	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	50,000	
CEDAR RIVER	2262	10/7/1991	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	5,000	
CEDAR RIVER	2262	10/7/1991	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	5,000	
CEDAR RIVER	2262	10/31/1991	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	5,000	
CEDAR RIVER	2262	10/31/1991	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	5,000	
CEDAR RIVER	2262	1/7/1992	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	28,000	
CEDAR RIVER	2262	1/7/1992	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	28,000	
CEDAR RIVER	2262	1/7/1992	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	13,000	
CEDAR RIVER	2262	1/7/1992	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	13,000	
CEDAR RIVER	2262	1/7/1992	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	3,000	
CEDAR RIVER	2262	1/7/1992	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	3,000	

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100mL)	REMARK CODE
CEDAR RIVER	2262	1/7/1992	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	2,700	
CEDAR RIVER	2262	1/7/1992	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	2,700	
CEDAR RIVER	2262	1/7/1992	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	160,000	L
CEDAR RIVER	2262	1/7/1992	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	160,000	L
CEDAR RIVER	2262	4/6/1992	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	9,000	
CEDAR RIVER	2262	4/6/1992	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	9,000	
CEDAR RIVER	2262	4/6/1992	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	16,000	L
CEDAR RIVER	2262	4/6/1992	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	16,000	L
CEDAR RIVER	2262	4/6/1992	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	11,000	
CEDAR RIVER	2262	4/6/1992	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	11,000	
CEDAR RIVER	2262	4/6/1992	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	13,000	
CEDAR RIVER	2262	4/6/1992	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	13,000	
CEDAR RIVER	2262	5/4/1992	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	8,000	
CEDAR RIVER	2262	5/4/1992	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	8,000	
CEDAR RIVER	2262	7/15/1992	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	160,000	
CEDAR RIVER	2262	7/15/1992	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	160,000	
CEDAR RIVER	2262	7/15/1992	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	160,000	L
CEDAR RIVER	2262	7/15/1992	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	160,000	L
CEDAR RIVER	2262	7/15/1992	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	160,000	L
CEDAR RIVER	2262	7/15/1992	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	160,000	L
CEDAR RIVER	2262	7/15/1992	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	160,000	L
CEDAR RIVER	2262	7/15/1992	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	160,000	L
CEDAR RIVER	2262	7/15/1992	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	90,000	
CEDAR RIVER	2262	7/15/1992	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	90,000	
CEDAR RIVER	2262	10/6/1992	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	24,000	
CEDAR RIVER	2262	10/6/1992	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	24,000	
CEDAR RIVER	2262	10/6/1992	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	50,000	
CEDAR RIVER	2262	10/6/1992	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	50,000	
CEDAR RIVER	2262	10/6/1992	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	30,000	
CEDAR RIVER	2262	10/6/1992	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	30,000	
CEDAR RIVER	2262	10/6/1992	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	50,000	
CEDAR RIVER	2262	10/6/1992	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	50,000	
CEDAR RIVER	2262	10/6/1992	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	5,000	
CEDAR RIVER	2262	10/6/1992	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	5,000	
CEDAR RIVER	2262	1/6/1993	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	90,000	
CEDAR RIVER	2262	1/6/1993	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	90,000	
CEDAR RIVER	2262	1/6/1993	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	160,000	L
CEDAR RIVER	2262	1/6/1993	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	160,000	L
CEDAR RIVER	2262	1/6/1993	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	30,000	
CEDAR RIVER	2262	1/6/1993	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	30,000	
CEDAR RIVER	2262	1/6/1993	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	160,000	L
CEDAR RIVER	2262	1/6/1993	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	160,000	L
CEDAR RIVER	2262	1/6/1993	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	17,000	
CEDAR RIVER	2262	1/6/1993	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	17,000	
CEDAR RIVER	2262	4/1/1993	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	50,000	
CEDAR RIVER	2262	4/1/1993	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	50,000	
CEDAR RIVER	2262	4/1/1993	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	9,000	
CEDAR RIVER	2262	4/1/1993	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	9,000	
CEDAR RIVER	2262	4/1/1993	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	50,000	
CEDAR RIVER	2262	4/1/1993	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	50,000	
CEDAR RIVER	2262	4/1/1993	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	160,000	L
CEDAR RIVER	2262	4/1/1993	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	160,000	L

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100mL)	REMARK CODE
CEDAR RIVER	2262	4/1/1993	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	7,000	
CEDAR RIVER	2262	4/1/1993	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	7,000	
CEDAR RIVER	2262	7/1/1993	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	160,000	L
CEDAR RIVER	2262	7/1/1993	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	160,000	L
CEDAR RIVER	2262	7/1/1993	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	30,000	
CEDAR RIVER	2262	7/1/1993	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	30,000	
CEDAR RIVER	2262	7/1/1993	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	90,000	
CEDAR RIVER	2262	7/1/1993	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	90,000	
CEDAR RIVER	2262	7/1/1993	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	160,000	
CEDAR RIVER	2262	7/1/1993	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	160,000	
CEDAR RIVER	2262	7/1/1993	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	11,000	
CEDAR RIVER	2262	7/1/1993	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	11,000	
CEDAR RIVER	2262	10/6/1993	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	30,000	
CEDAR RIVER	2262	10/6/1993	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	30,000	
CEDAR RIVER	2262	10/6/1993	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	14,000	
CEDAR RIVER	2262	10/6/1993	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	14,000	
CEDAR RIVER	2262	10/6/1993	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	5,000	
CEDAR RIVER	2262	10/6/1993	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	5,000	
CEDAR RIVER	2262	10/6/1993	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	50,000	
CEDAR RIVER	2262	10/6/1993	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	50,000	
CEDAR RIVER	2262	10/18/1993	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	30,000	
CEDAR RIVER	2262	10/18/1993	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	30,000	
CEDAR RIVER	2262	1/19/1994	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	8,000	
CEDAR RIVER	2262	1/19/1994	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	8,000	
CEDAR RIVER	2262	1/19/1994	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	16,000	
CEDAR RIVER	2262	1/19/1994	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	16,000	
CEDAR RIVER	2262	1/19/1994	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	11,000	
CEDAR RIVER	2262	1/19/1994	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	11,000	
CEDAR RIVER	2262	1/19/1994	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	8,000	
CEDAR RIVER	2262	1/19/1994	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	8,000	
CEDAR RIVER	2262	1/19/1994	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	3,000	
CEDAR RIVER	2262	1/19/1994	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	3,000	
CEDAR RIVER	2262	4/5/1994	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	3,000	
CEDAR RIVER	2262	4/5/1994	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	3,000	
CEDAR RIVER	2262	4/5/1994	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	9,000	
CEDAR RIVER	2262	4/5/1994	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	9,000	
CEDAR RIVER	2262	4/5/1994	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	3,000	
CEDAR RIVER	2262	4/5/1994	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	3,000	
CEDAR RIVER	2262	4/5/1994	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	5,000	
CEDAR RIVER	2262	4/5/1994	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	5,000	
CEDAR RIVER	2262	4/5/1994	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	5,000	
CEDAR RIVER	2262	4/5/1994	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	5,000	
CEDAR RIVER	2262	7/19/1994	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	1,300	
CEDAR RIVER	2262	7/19/1994	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	1,300	
CEDAR RIVER	2262	7/19/1994	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	8,000	
CEDAR RIVER	2262	7/19/1994	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	8,000	
CEDAR RIVER	2262	7/19/1994	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	5,000	
CEDAR RIVER	2262	7/19/1994	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	5,000	
CEDAR RIVER	2262	7/19/1994	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	13,000	
CEDAR RIVER	2262	7/19/1994	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	13,000	

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100mL)	REMARK CODE
CEDAR RIVER	2262	7/19/1994	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	9,000	
CEDAR RIVER	2262	7/19/1994	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	9,000	
CEDAR RIVER	2262	10/4/1994	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	160,000	L
CEDAR RIVER	2262	10/4/1994	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	160,000	L
CEDAR RIVER	2262	10/4/1994	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	160,000	
CEDAR RIVER	2262	10/4/1994	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	160,000	
CEDAR RIVER	2262	10/4/1994	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	90,000	
CEDAR RIVER	2262	10/4/1994	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	90,000	
CEDAR RIVER	2262	10/4/1994	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	90,000	
CEDAR RIVER	2262	10/4/1994	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	90,000	
CEDAR RIVER	2262	10/4/1994	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	50,000	
CEDAR RIVER	2262	10/4/1994	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	50,000	
CEDAR RIVER	2262	1/9/1995	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	9,000	
CEDAR RIVER	2262	1/9/1995	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	9,000	
CEDAR RIVER	2262	1/9/1995	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	9,000	
CEDAR RIVER	2262	1/9/1995	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	9,000	
CEDAR RIVER	2262	1/9/1995	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	2,400	
CEDAR RIVER	2262	1/9/1995	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	2,400	
CEDAR RIVER	2262	1/9/1995	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	3,000	
CEDAR RIVER	2262	1/9/1995	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	3,000	
CEDAR RIVER	2262	1/9/1995	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	1,300	
CEDAR RIVER	2262	1/9/1995	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	1,300	
CEDAR RIVER	2262	4/25/1995	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	9,000	
CEDAR RIVER	2262	4/25/1995	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	9,000	
CEDAR RIVER	2262	4/25/1995	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	160,000	L
CEDAR RIVER	2262	4/25/1995	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	160,000	L
CEDAR RIVER	2262	4/25/1995	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	90,000	
CEDAR RIVER	2262	4/25/1995	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	90,000	
CEDAR RIVER	2262	4/25/1995	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	160,000	L
CEDAR RIVER	2262	4/25/1995	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	160,000	L
CEDAR RIVER	2262	4/25/1995	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	90,000	
CEDAR RIVER	2262	4/25/1995	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	90,000	
CEDAR RIVER	2262	7/11/1995	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	9,000	
CEDAR RIVER	2262	7/11/1995	21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD	9,000	
CEDAR RIVER	2262	7/11/1995	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	5,000	
CEDAR RIVER	2262	7/11/1995	21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE	5,000	
CEDAR RIVER	2262	7/11/1995	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	30,000	
CEDAR RIVER	2262	7/11/1995	21FLJXWQCR427	CEDAR RIVER EAST BRANCH AT STUART AVENUE	30,000	
CEDAR RIVER	2262	7/11/1995	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	16,000	
CEDAR RIVER	2262	7/11/1995	21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90	16,000	
CEDAR RIVER	2262	7/11/1995	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	24,000	
CEDAR RIVER	2262	7/11/1995	21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE	24,000	
CEDAR RIVER	2262	5/25/2000	21FLA 20030092	CEDAR CR ROMONA BLVD BR	1,700	
CEDAR RIVER	2262	9/12/2000	21FLA 20030092	CEDAR CR ROMONA BLVD BR	2,400	
CEDAR RIVER	2262	1/30/2001	21FLA 20030092	CEDAR CR ROMONA BLVD BR	180	
CEDAR RIVER	2262	3/26/2002	21FLA 20030087	CEDAR CR LANE AVE BR N BRANCH	340	
CEDAR RIVER	2262	3/26/2002	21FLA 20030092	CEDAR CR ROMONA BLVD BR	1,067	
CEDAR RIVER	2262	4/18/2002	21FLA 20030083	CEDAR CR BLANDING BLVD BR RT 21	640	
CEDAR RIVER	2262	5/16/2002	21FLA 20030096	CEDAR CR LENOX AVE BR	1,067	
CEDAR RIVER	2262	5/16/2002	21FLA 20030297	CEDAR CR STUART E FORK	600	
CEDAR RIVER	2262	5/16/2002	21FLA 20030353	CEDAR CR W BRID ON STUART AVE	11,800	

WATERBODY	WBID	SAMPLE DATE	STATION	LOCATION	VALUE (#/100mL)	REMARK CODE
CEDAR RIVER	2262	5/30/2002	21FLA 20030083	CEDAR CR BLANDING BLVD BR RT 21	1,533	
CEDAR RIVER	2262	5/30/2002	21FLA 20030087	CEDAR CR LANE AVE BR N BRANCH	3,100	
CEDAR RIVER	2262	6/6/2002	21FLA 20030083	CEDAR CR BLANDING BLVD BR RT 21	130	
CEDAR RIVER	2262	6/6/2002	21FLA 20030092	CEDAR CR ROMONA BLVD BR	1,100	
CEDAR RIVER	2262	7/24/2002	21FLA 20030083	CEDAR CR BLANDING BLVD BR RT 21	1,367	
CEDAR RIVER	2262	8/14/2002	21FLA 20030087	CEDAR CR LANE AVE BR N BRANCH	24,600	
CEDAR RIVER	2262	8/14/2002	21FLA 20030092	CEDAR CR ROMONA BLVD BR	14,600	
CEDAR RIVER	2262	9/9/2002	21FLA 20030096	CEDAR CR LENOX AVE BR	6,400	
CEDAR RIVER	2262	9/9/2002	21FLA 20030297	CEDAR CR STUART E FORK	3,134	
CEDAR RIVER	2262	9/9/2002	21FLA 20030353	CEDAR CR W BRID ON STUART AVE	2,033	
CEDAR RIVER	2262	10/29/2002	21FLA 20030083	CEDAR CR BLANDING BLVD BR RT 21	200	
CEDAR RIVER	2262	11/7/2002	21FLA 20030083	CEDAR CR BLANDING BLVD BR RT 21	370	
CEDAR RIVER	2262	11/7/2002	21FLA 20030087	CEDAR CR LANE AVE BR N BRANCH	933	
CEDAR RIVER	2262	11/7/2002	21FLA 20030092	CEDAR CR ROMONA BLVD BR	5,000	
CEDAR RIVER	2262	12/10/2002	21FLA 20030096	CEDAR CR LENOX AVE BR	15,400	
CEDAR RIVER	2262	12/10/2002	21FLA 20030297	CEDAR CR STUART E FORK	13,400	
CEDAR RIVER	2262	12/10/2002	21FLA 20030353	CEDAR CR W BRID ON STUART AVE	29,200	

Shaded cells are values which exceed the state criterion of 400 counts/100 mL
Remark Codes: L – Off-scale high. Actual value not known, but known to be greater then 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 C: Kruskall – Wallis Analysis of Fecal Coliform Observations and Month in the Cedar River

The following results are for:
WBID$ = 2262

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

Kruskal-Wallis One-Way Analysis of Variance for 796 cases
Dependent variable is VALUE
Grouping variable is MONTH

Group	Count	Rank Sum
1	145	56513.000
2	32	4810.000
3	4	382.000
4	157	58039.500
5	41	11361.000
7	120	61940.000
8	46	23441.000
9	59	18489.000
10	124	61020.500
11	2	809.000
12	66	20401.000

Kruskal-Wallis Test Statistic = 139.290
Probability is 0.000 assuming Chi-square distribution with 10 df

Appendix D: Kruskall – Wallis Analysis of Fecal Coliform Observations and Season in the Cedar River

The following results are for:
WBID$ = 2262
Categorical values encountered during processing are:
SEASON2 (4 levels)
1, 2, 3, 4

Kruskal-Wallis One-Way Analysis of Variance for 796 cases
Dependent variable is VALUE
Grouping variable is SEASON2

Group	Count	Rank Sum
1	181	61705.000
2	198	69400.500
3	225	103870.000
4	192	82230.500

Appendix E: Kruskall – Wallis Analysis of Total Coliform Observations and Month in the Cedar River

The following results are for:
WBID$ = 2262
Categorical values encountered during processing are:
MONTH (11 levels)
1, 3, 4, 5, 6, 7, 8,
9, 10, 11, 12

Kruskal-Wallis One-Way Analysis of Variance for 218 cases
Dependent variable is VALUE
Grouping variable is MONTH

Group	Count	Rank Sum
1	51	4707.000
3	2	13.500
4	49	6183.000
5	8	325.500
6	2	12.000
7	51	6257.000
8	2	240.000
9	4	136.000
10	43	5584.000
11	3	61.000
12	3	352.000

Kruskal-Wallis Test Statistic = 46.327
Probability is 0.000 assuming Chi-square distribution with 10 df

Appendix F: Kruskall – Wallis Analysis of Total Coliform Observations and Season in the Cedar River

The following results are for:
WBID$ = 2262

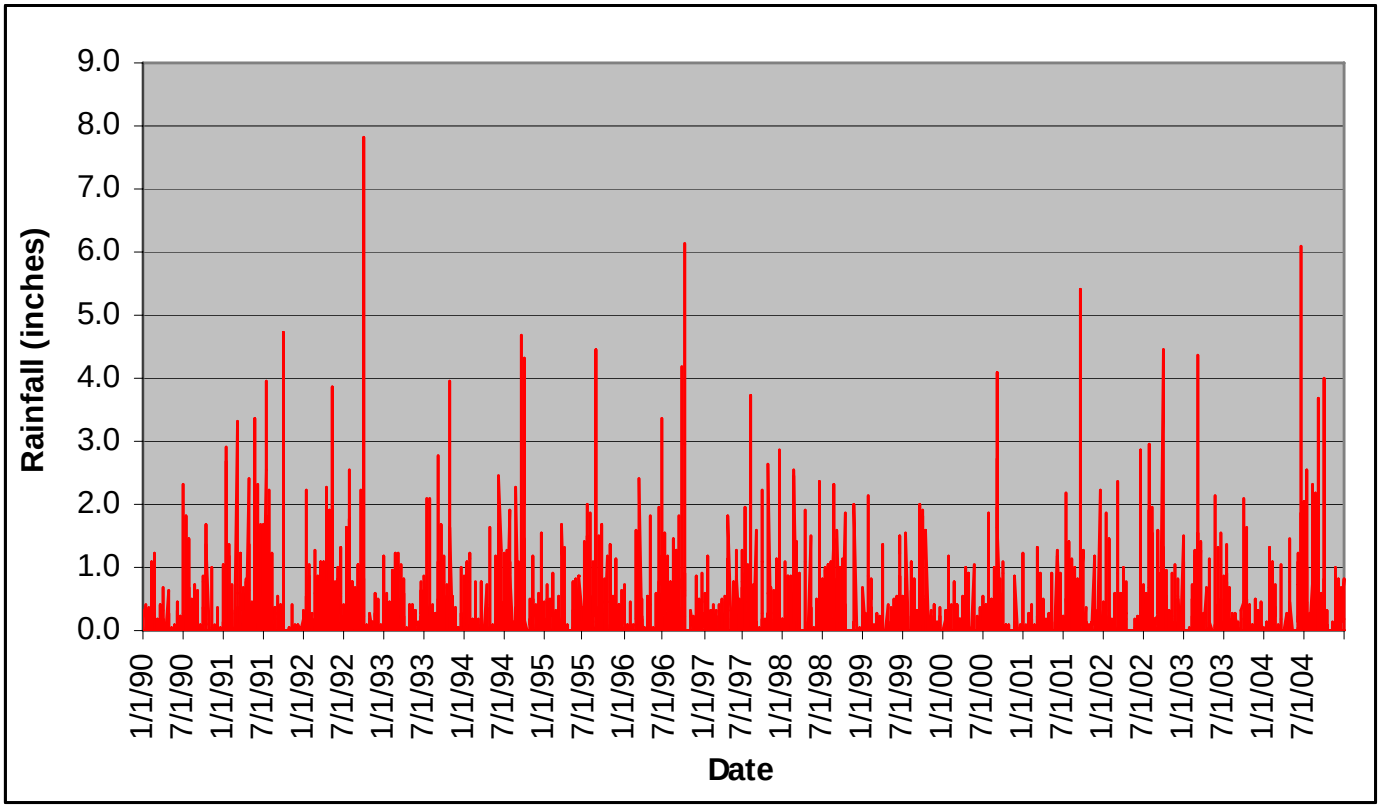
Categorical values encountered during processing are:
SEASON (4 levels)
1, 2, 3, 4

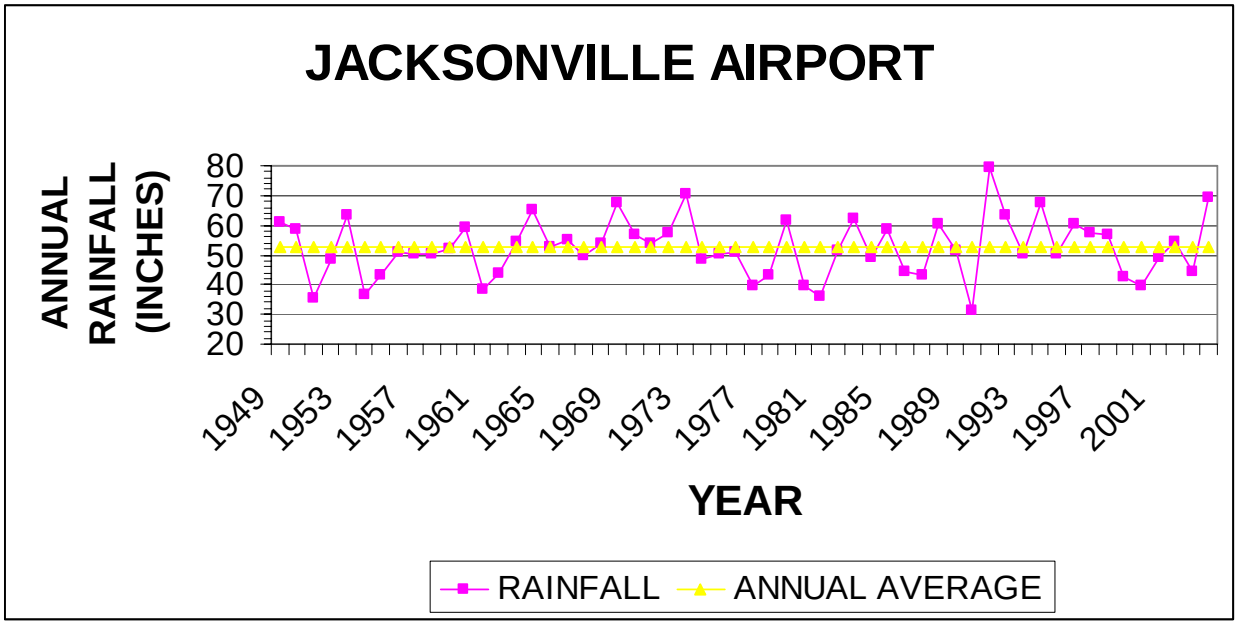
Kruskal-Wallis One-Way Analysis of Variance for 218 cases
Dependent variable is VALUE
Grouping variable is SEASON

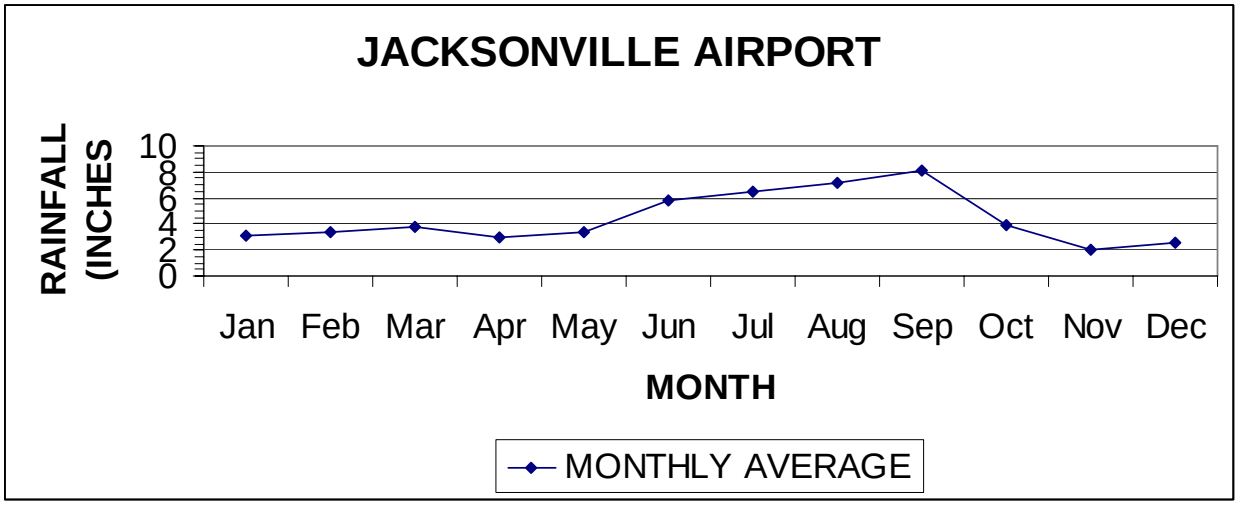
Group	Count	Rank Sum
1	53	4720.500
2	59	6520.500
3	57	6633.000
4	49	5997.000

Kruskal-Wallis Test Statistic = 8.363
Probability is 0.039 assuming Chi-square distribution with 3 df

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






JACKSONVILLE AIRPORT
RAINFALL (INCHES)
10
8
6
4
2
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
MONTH
MONTHLY AVERAGE

Appendix H: Spearman Correlation Matrix Analysis of Fecal Coliform Observations and Rainfall in the Cedar River

WBID$ = 2262

Spearman correlation matrix

	MONTH	DAY	VALUE	V1D_PREC	V3D_PREC
MONTH	1.000				
DAY	-0.034	1.000			
VALUE	0.112	-0.160	1.000		
V1D_PREC	0.156	-0.013	0.228	1.000	
V3D_PREC	0.206	-0.072	0.449	0.614	1.000
V7D_PRE	0.230	-0.229	0.311	0.439	0.683
MONTH_PR	0.289	-0.118	0.336	0.345	0.388
SEASON2	0.979	-0.100	0.182	0.214	0.299
EXCEEDANCE2	0.157	-0.073	0.745	0.112	0.301
PEREXCEED	0.129	-0.139	0.993	0.223	0.451

	V7D_PRE	MONTH_PR	SEASON2	EXCEEDANCE2	PEREXCEED
V7D_PRE	1.000				
MONTH_PR	0.578	1.000			
SEASON2	0.297	0.348	1.000		
EXCEEDANCE2	0.224	0.344	0.183	1.000	
PEREXCEED	0.309	0.326	0.195	0.751	1.000

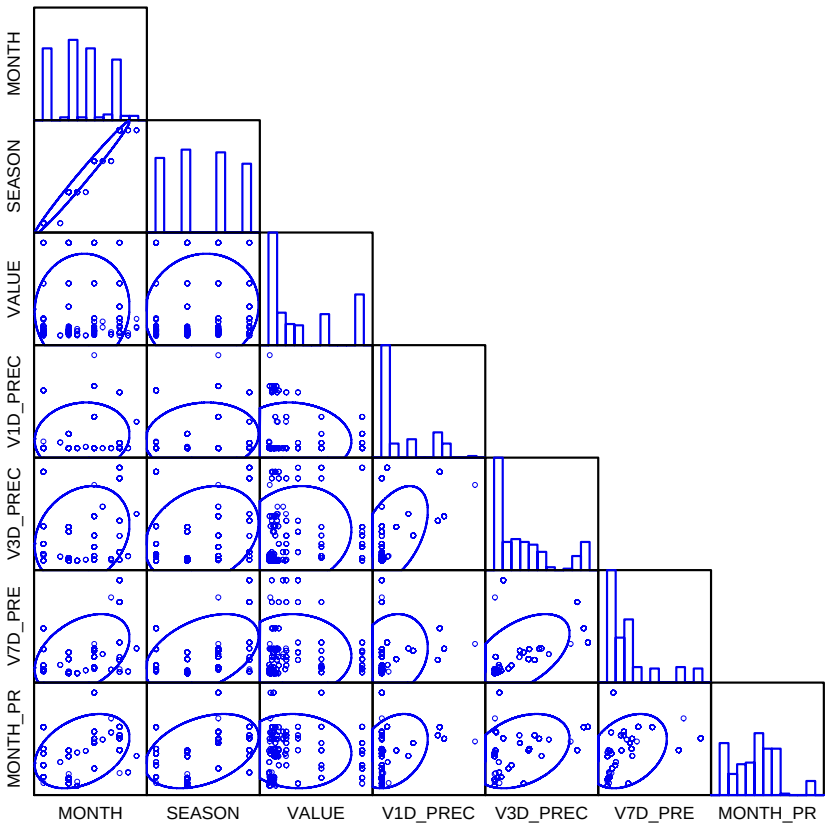
Appendix I: Spearman Correlation Matrix Analysis of Total Coliform Observations and Rainfall in the Cedar River

The following results are for:
WBID$ = 2262

Spearman correlation matrix

	MONTH	SEASON	VALUE	V1D_PREC	V3D_PREC
MONTH	1.000				
SEASON	0.990	1.000			
VALUE	0.130	0.184	1.000		
V1D_PREC	0.151	0.157	0.059	1.000	
V3D_PREC	0.235	0.263	0.304	0.600	1.000
V7D_PRE	0.345	0.372	0.219	0.424	0.789
MONTH_PR	0.413	0.429	0.082	0.416	0.427

	V7D_PRE	MONTH_PR
V7D_PRE	1.000	
MONTH_PR	0.606	1.000



Appendix J: Regression Analysis of Fecal Coliform Observations and Rainfall in the Cedar River

Analysis of sample day precipitation (1 day)

The following results are for:
WBID$ = 2262.000000

Dep Var: VALUE N: 796 Multiple R: 0.081 Squared multiple R: 0.007

Adjusted squared multiple R: 0.005 Standard error of estimate: 36070.965

Effect	Coefficient	Std Error	Std Coef	Tolerance	t	P(2 Tail)
CONSTANT	13139.681	1370.695	0.000	.	9.586	0.000
V1D_PREC	6359.962	2763.718	0.081	1.000	2.301	0.022

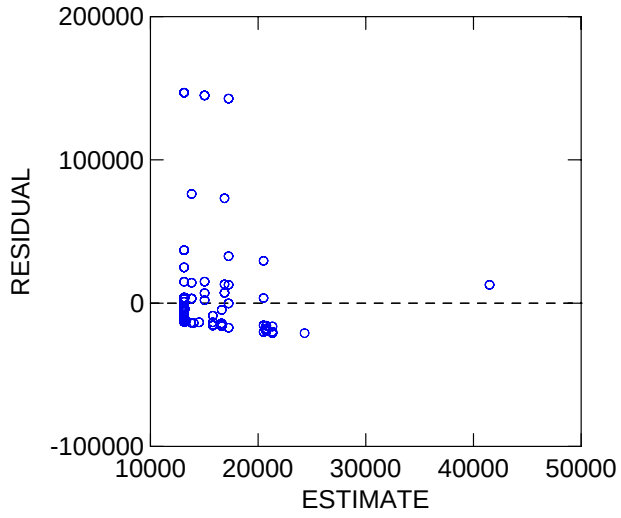
Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
Regression	6.89028E+09	1	6.89028E+09	5.296	0.022
Residual	1.03308E+12	794	1.30111E+09		

*** WARNING ***
Case 1265 has large leverage (Leverage = 0.109)
Case 1266 has large leverage (Leverage = 0.109)
Case 1267 has large leverage (Leverage = 0.109)
Case 1268 has large leverage (Leverage = 0.109)

Durbin-Watson D Statistic 1.010
First Order Autocorrelation 0.495

Plot of residuals against predicted values



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

The following results are for:
WBID$ = 2262

Dep Var: VALUE N: 796 Multiple R: 0.136 Squared multiple R: 0.018

Adjusted squared multiple R: 0.017 Standard error of estimate: 35855.089

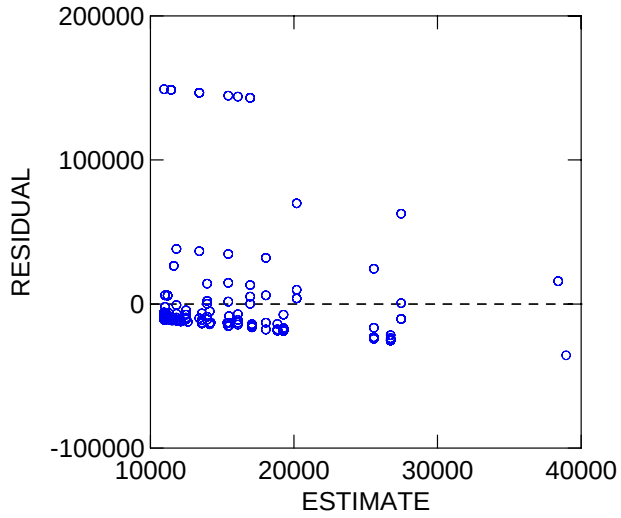
Effect	Coefficient	Std Error	Std Coef	Tolerance	t	P(2 Tail)
CONSTANT	10966.525	1532.361	0.000	.	7.157	0.000
V3D_PREC	6112.241	1580.840	0.136	1.000	3.866	0.000

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
Regression	1.92188E+10	1	1.92188E+10	14.949	0.000
Residual	1.02076E+12	794	1.28559E+09		

Durbin-Watson D Statistic 1.025
First Order Autocorrelation 0.487

Plot of residuals against predicted values



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

The following results are for:
WBID$ = 2262

Dep Var: VALUE N: 796 Multiple R: 0.004 Squared multiple R: 0.000

Adjusted squared multiple R: 0.000 Standard error of estimate: 36190.784

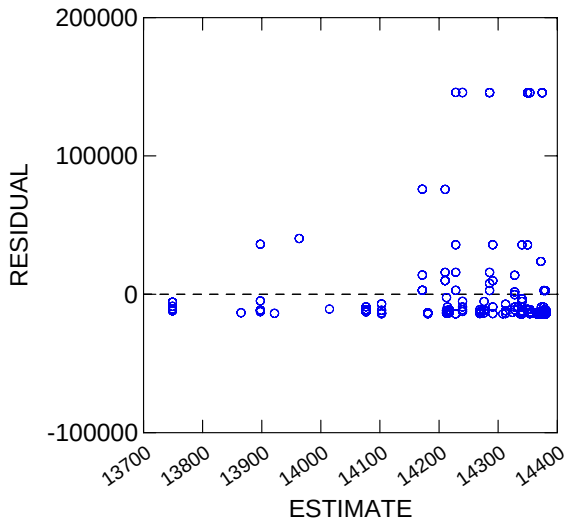
Effect	Coefficient	Std Error	Std Coef	Tolerance	t	P(2 Tail)
CONSTANT	14380.815	1597.273	0.000	.	9.003	0.000
V7D_PRE	-77.411	709.434	-0.004	1.000	-0.109	0.913

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
Regression	1.55946E+07	1	1.55946E+07	0.012	0.913
Residual	1.03996E+12	794	1.30977E+09		

Durbin-Watson D Statistic 1.004
First Order Autocorrelation 0.498

Plot of residuals against predicted values



Appendix K: Regression Analysis of Total Coliform Observations and Rainfall in the Cedar River

Analysis of sample day precipitation (1 day)

The following results are for:
WBID$ = 2262.000000

Dep Var: VALUE N: 218 Multiple R: 0.114 Squared multiple R: 0.013

Adjusted squared multiple R: 0.008 Standard error of estimate: 56788.204

Effect	Coefficient	Std Error	Std Coef	Tolerance	t	P(2 Tail)
CONSTANT	49113.373	4331.166	0.000	.	11.340	0.000
V1D_PREC	-14929.782	8890.775	-0.114	1.000	-1.679	0.095

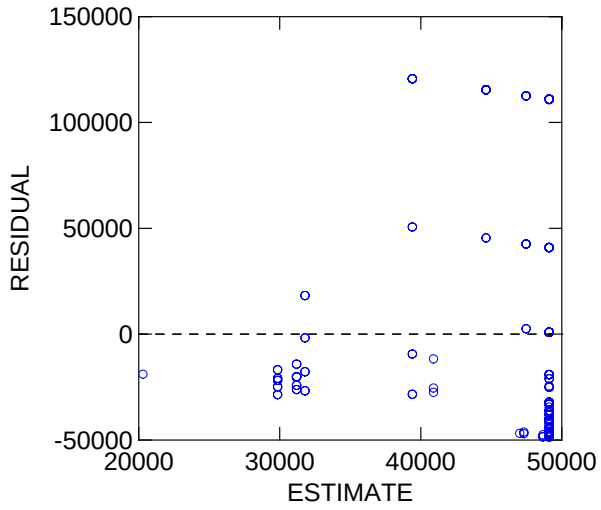
Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
Regression	9.09377E+09	1	9.09377E+09	2.820	0.095
Residual	6.96578E+11	216	3.22490E+09		

*** WARNING ***
Case 881 has large leverage (Leverage = 0.076)

Durbin-Watson D Statistic 0.860
First Order Autocorrelation 0.569

Plot of residuals against predicted values



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

The following results are for:
WBID$ = 2262

Dep Var: VALUE N: 218 Multiple R: 0.109 Squared multiple R: 0.012

Adjusted squared multiple R: 0.007 Standard error of estimate: 56815.025

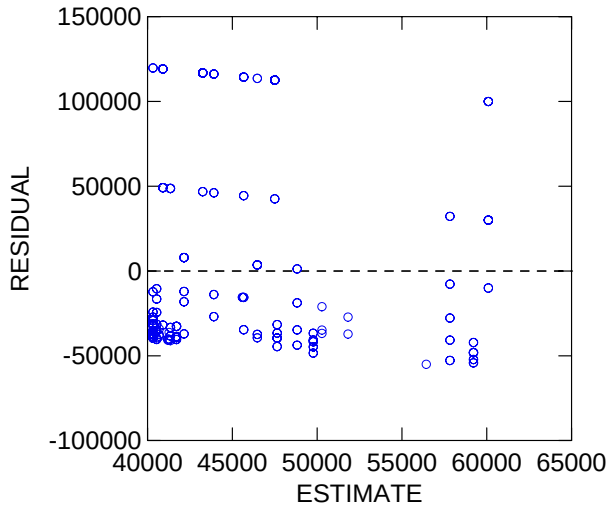
Effect	Coefficient	Std Error	Std Coef	Tolerance	t	P(2 Tail)
CONSTANT	40321.653	5114.966	0.000	.	7.883	0.000
V3D_PREC	7326.179	4531.917	0.109	1.000	1.617	0.107

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
Regression	8.43563E+09	1	8.43563E+09	2.613	0.107
Residual	6.97237E+11	216	3.22795E+09		

Durbin-Watson D Statistic 0.869
First Order Autocorrelation 0.563

Plot of residuals against predicted values



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

The following results are for:
WBID$ = 2262

Dep Var: VALUE N: 218 Multiple R: 0.057 Squared multiple R: 0.003

Adjusted squared multiple R: 0.000 Standard error of estimate: 57064.964

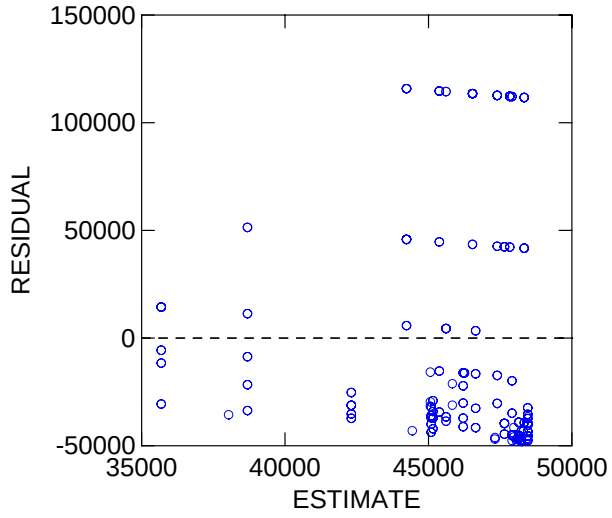
Effect	Coefficient	Std Error	Std Coef	Tolerance	t	P(2 Tail)
CONSTANT	48464.183	5027.540	0.000	.	9.640	0.000
V7D_PRE	-1565.742	1868.096	-0.057	1.000	-0.838	0.403

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
Regression	2.28761E+09	1	2.28761E+09	0.702	0.403
Residual	7.03385E+11	216	3.25641E+09		

Durbin-Watson D Statistic 0.861
First Order Autocorrelation 0.568

Plot of residuals against predicted values



Appendix L: 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.

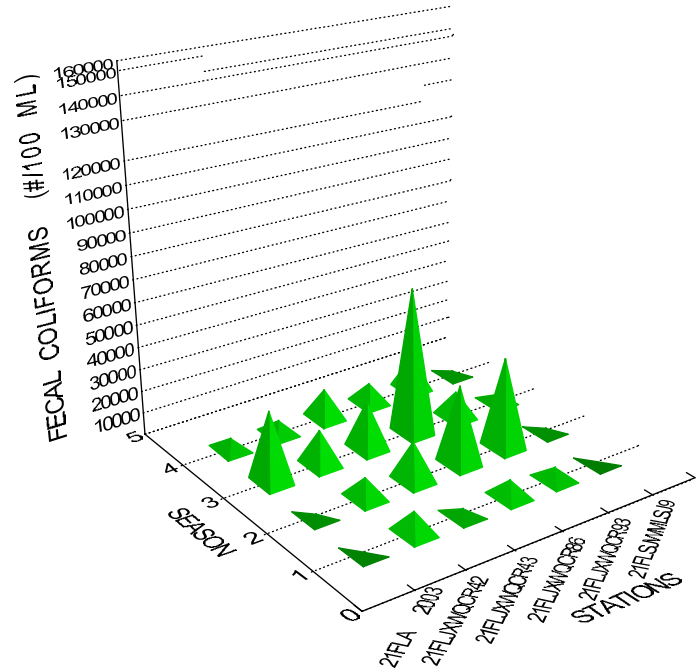
The rule requires the state's water management districts (WMDs) to establish stormwater pollutant load reduction goals (PLRGs) and adopt them as part of a Surface Water Improvement and Management (SWIM) plan, other watershed plan, or rule. Stormwater PLRGs are a major component of the load allocation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

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

An important difference between the federal and state stormwater permitting programs is that the federal program covers both new and existing discharges, while the state program focuses on new discharges. Additionally, Phase 2 of the NPDES Program will expand the need for these permits to construction sites between 1 and 5 acres, and to local governments with as few as 10,000 people. 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 M: Fecal Coliform Observations by Season and Station in the Cedar River

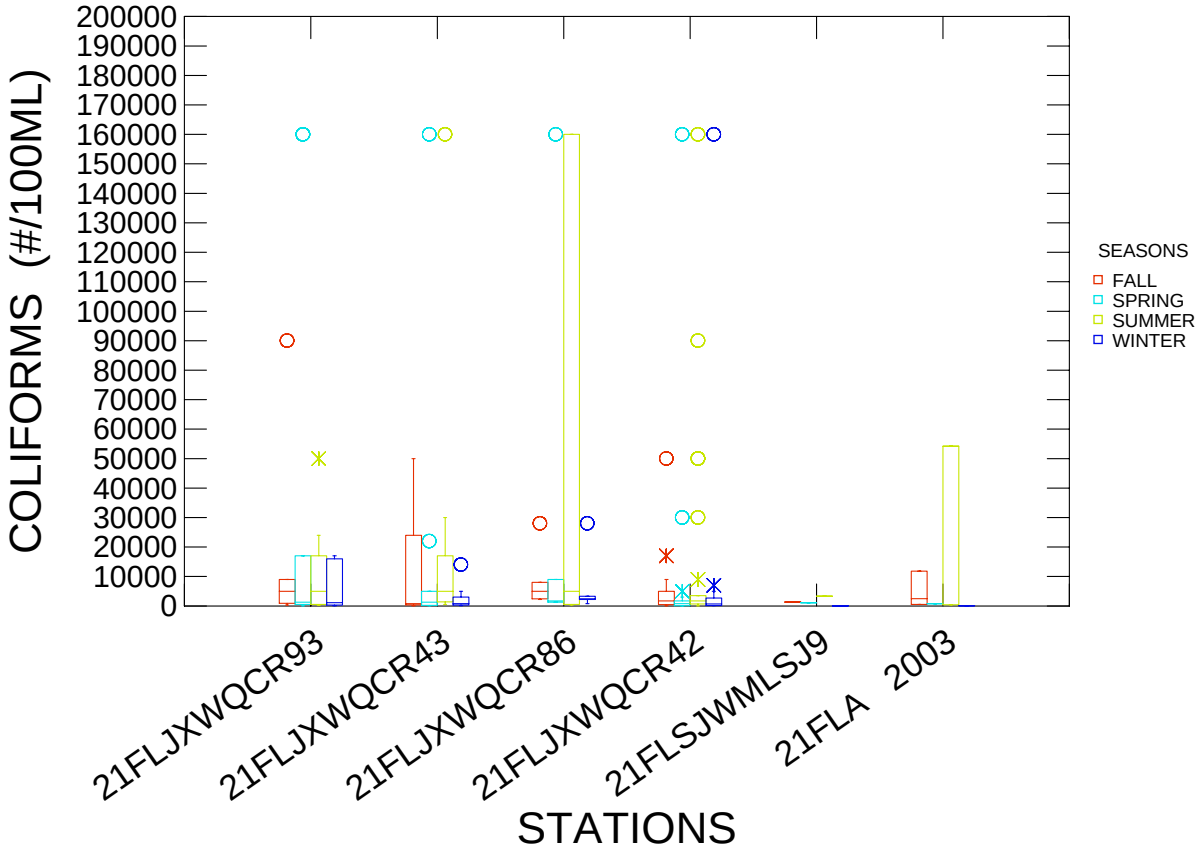
FECAL COLIFORMS BY SITE AND SEASON



PYRAMID PEAK BASED ON MEDIAN VALUE

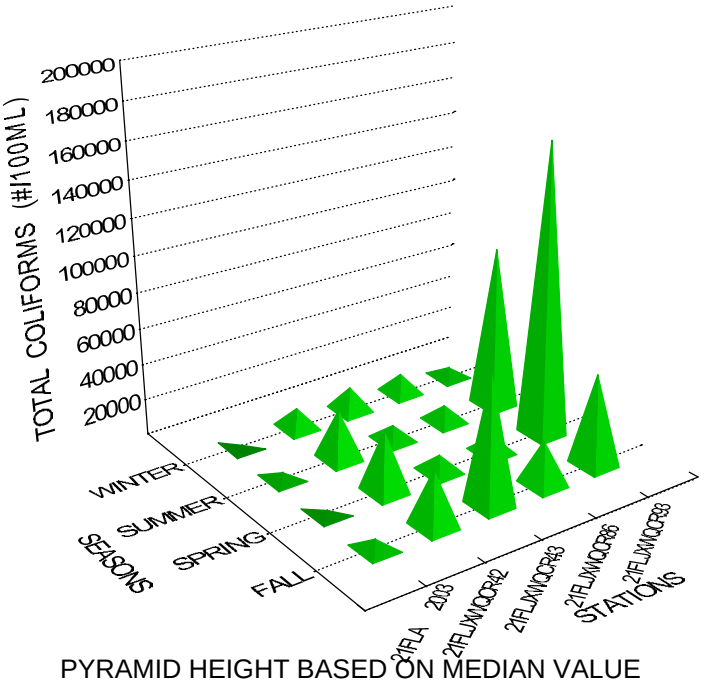
STORET ID	Station
21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE
21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE
21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD
21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90
21FLa 20030297	CEDAR RIVER AT STUART EAST FORK
21FLSJWMLSJ909	CEDAR RIVER 1 BLOCK BELOW LENOX AVE

FECAL COLIFORMS BY SITE AND SEASON



Appendix N: Total Coliform Observations by Season and Station in the Cedar River

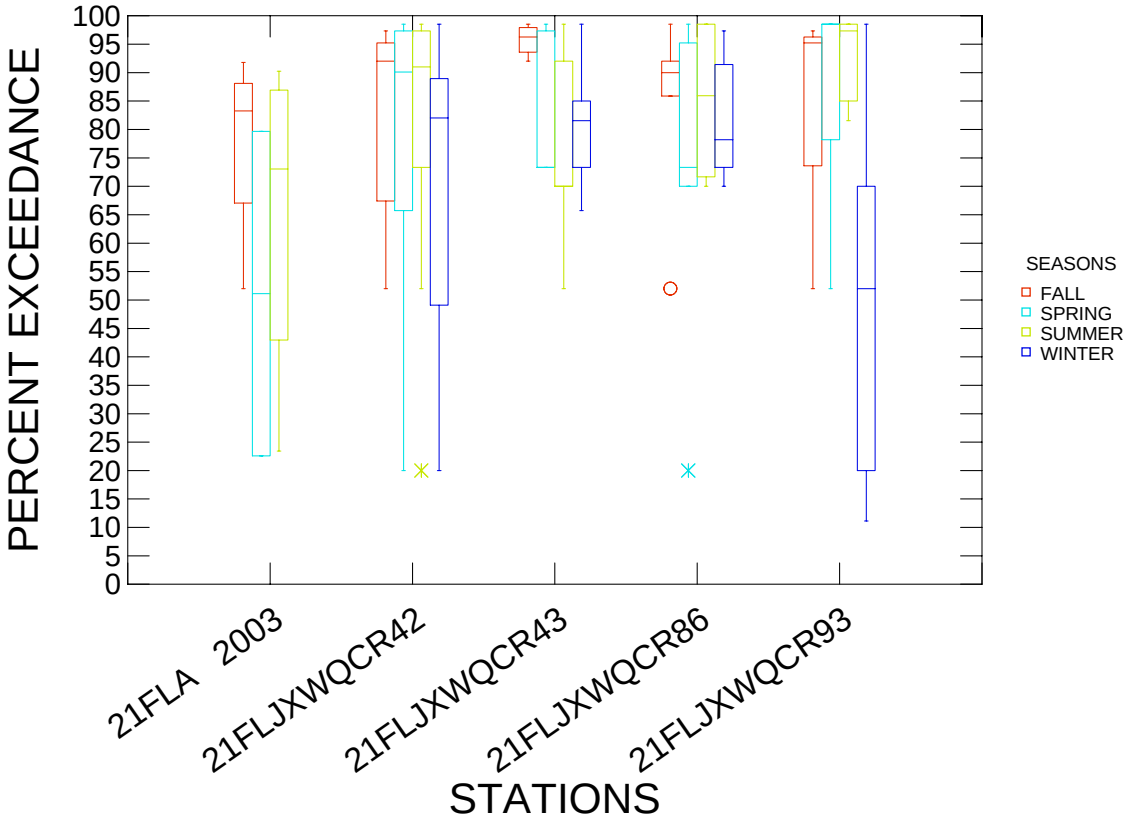
TOTAL COLIFORMS BY SITE AND SEASON



PYRAMID HEIGHT BASED ON MEDIAN VALUE

STORET ID	Station
21FLJXWQCR428	CEDAR RIVER WEST BRANCH AT STUART AVENUE
21FLJXWQCR430	CEDAR RIVER AT LENOX AVENUE
21FLJXWQCR86	CEDAR RIVER AT CHUCK'S BOATYARD
21FLJXWQCR93	CEDAR RIVER EAST BRANCH AT U.S. 90
21FLA 20030092	CEDAR CR ROMONA BLVD BR

TOTAL COLIFORMS BY SITE AND SEASON



Appendix O: 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 P: Responses to Comments Received on the Draft TMDL Document

Comments received from EPA Region 4

Cedar River (WBID 2262) – fecal and total coliform

1. 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 1997). The resulting load reductions are: 83% (Fecal Coliform) and 81% (Total Coliform). As a check, the percent reductions were calculated using the median value of the data violations measured during the listing cycle and the following reductions are needed: 77% (Fecal Coliform) and 81% (Total Coliform). The fecal coliform reductions proposed by FDEP would be considered conservative.

Response: No response required.

2. The pecent reductions calculated in the TMDL were compared to the reduction calculated using the 90th percentile concentration (EPA's group 3 approach for estimating the TMDL when expressed as a percent reduction). The 90th percentile concentration for Fecal Coliform is 11,500 counts/100mL, requiring a reduction of 96% to achieve the water quality criteria of 400 counts/100mL. The 90th percentile concentration for Total Coliform is 15,000 counts/100mL, requiring a reduction of 84% to achieve the water quality criteria of 2400 counts/100mL. The reduction for fecal coliform using the 90th percentile concentration is higher than the reduction proposed by FDEP, but the value is not significant and will not result in how the TMDL will be implemented.

Response: No response required.

3. Do we want to add the disclaimer requiring any future point sources that may discharge in the watershed to meet end-of-pipe standards for fecal and total coliform. This is a comment in all TMDLs.

Response: Text added to the document.

4. Are all Phase 1 MS4 jurisdictions required to have a stormwater utility? It is unclear why Duval County and the City of Jacksonville do not one. Doesn't Jacksonville Electric Authority (JEA) oversee the NPDES permit?

Response: Phase one MS4 jurisdictions are not required to have a stormwater utility. The Phase I Master Stormwater Plan recommended a stormwater utility in 1989 as a mechanism to fund stormwater improvements, however, the county has not established it at this time.

5. In Table 4-3, the column header for the concentration should read "Estimated Concentration from Failed Tanks" and not "Estimated Loads from Failed Tanks" as the value reported in this column is a concentration in units of counts/ml. **This correction should be fixed in all the TMDLs.**

Response: Text changed in document.

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
www2.dep.state.fl.us/water/