FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division of Environmental Assessment and Restoration, Bureau of Watershed Restoration

NORTHEAST DISTRICT • LOWER ST. JOHNS BASIN

FINAL TMDL Report

Lead TMDLs for Black Creek (WBIDs 2415B and 2415C) and Peters Creek (WBID 2444)

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Florida Department of Environmental Protection, Bureau of Watershed Management

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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
2008 305(b) Report
http://www.dep.state.fl.us/water/docs/2008_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 Basin
http://www.dep.state.fl.us/water/basin411/sj_lower/status.htm
Water Quality Assessment Report for the Lower St. Johns Basin
http://www.dep.state.fl.us/water/basin411/sj_lower/assessment.htm

U.S. Environmental Protection Agency, National STORET Program

Region 4: Total Maximum Daily Loads in Florida
http://www.epa.gov/region4/water/tmdl/florida/
National STORET Program
http://www.epa.gov/storet/

Chapter 1: INTRODUCTION

1.1 Purpose of Report

This report presents the Total Maximum Daily Loads (TMDLs) for lead (Pb) for three waterbody segments in the Black Creek watershed: Black Creek; South Fork Black Creek; and Peters Creek. All three segments lie within the Lower St. Johns Basin, with Black Creek and South Fork Black Creek contiguously located in the Black Creek Planning Unit, with Peters Creek located downstream. Both South Fork Black Creek and Peters Creek are tributaries to Black Creek, which is a major tributary to the St. Johns River.

All three segments were on the 1998 303(d) list submitted by the state of Florida to the U.S. Environmental Protection Agency (EPA). In conjunction with the Cycle 2 assessments of Group 2 waters, these listings were subsequently verified as being impaired, and were all included on the State of Florida Verified List of Impaired Waters (Verified List), which was adopted by Secretarial Order on May 19, 2009. The Verified List identifies those waters of the state that do not meet water their quality standards due to a pollutant and for which a TMDL will be developed.

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 designated uses. TMDLs are developed for those waterbodies that have been verified as not meeting water quality standards and provide important water quality restoration goals that can be used to guide restoration activities.

This TMDL report establishes the percent reductions in lead necessary for these three segments to meet applicable water quality standards for lead and thus support their designated uses.

1.2 Identification of Waterbodies

Black Creek is a major tributary of the St. Johns River located primarily in Clay County, Florida. It is approximately 13 miles long, with a 479-square-mile drainage area. Rising in the Jennings State Forest from the north fork, and from Kingsley Lake from the south and east forks, Black Creek passes near the communities of Middleburg, Asbury Lake, Hibernia, and Green Cove Springs (**Figure 1.1**).

Black Creek forms the southern boundary of the peninsula of Fleming Island, which is situated between the St. Johns River and Doctors Inlet (**Figure 1.2**). Tributaries to Black Creek include North Fork Black Creek, South Fork Black Creek, Little Black Creek, Greens Creek, Peters Creek, and Grog Branch. The combined discharge enters the St. Johns River at Doctor's Inlet (a gauging site).

Figure 1.1. Location of Black Creek (WBID 2415B), South Fork Black Creek (WBID 2415C), and Peters Creek (WBID 2444) in the Lower St. Johns Basin and Major Hydrologic and Geopolitical Features in the Area

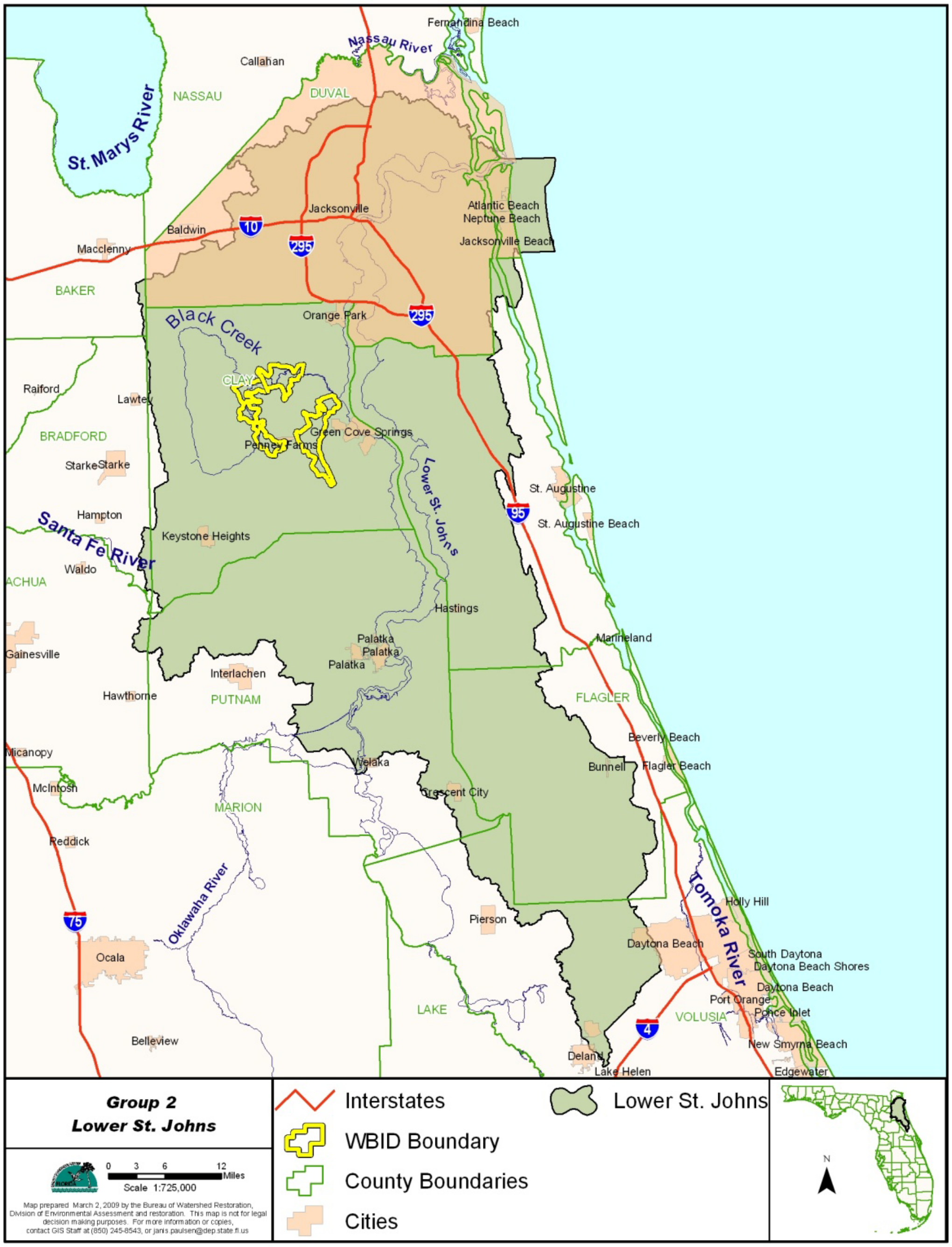
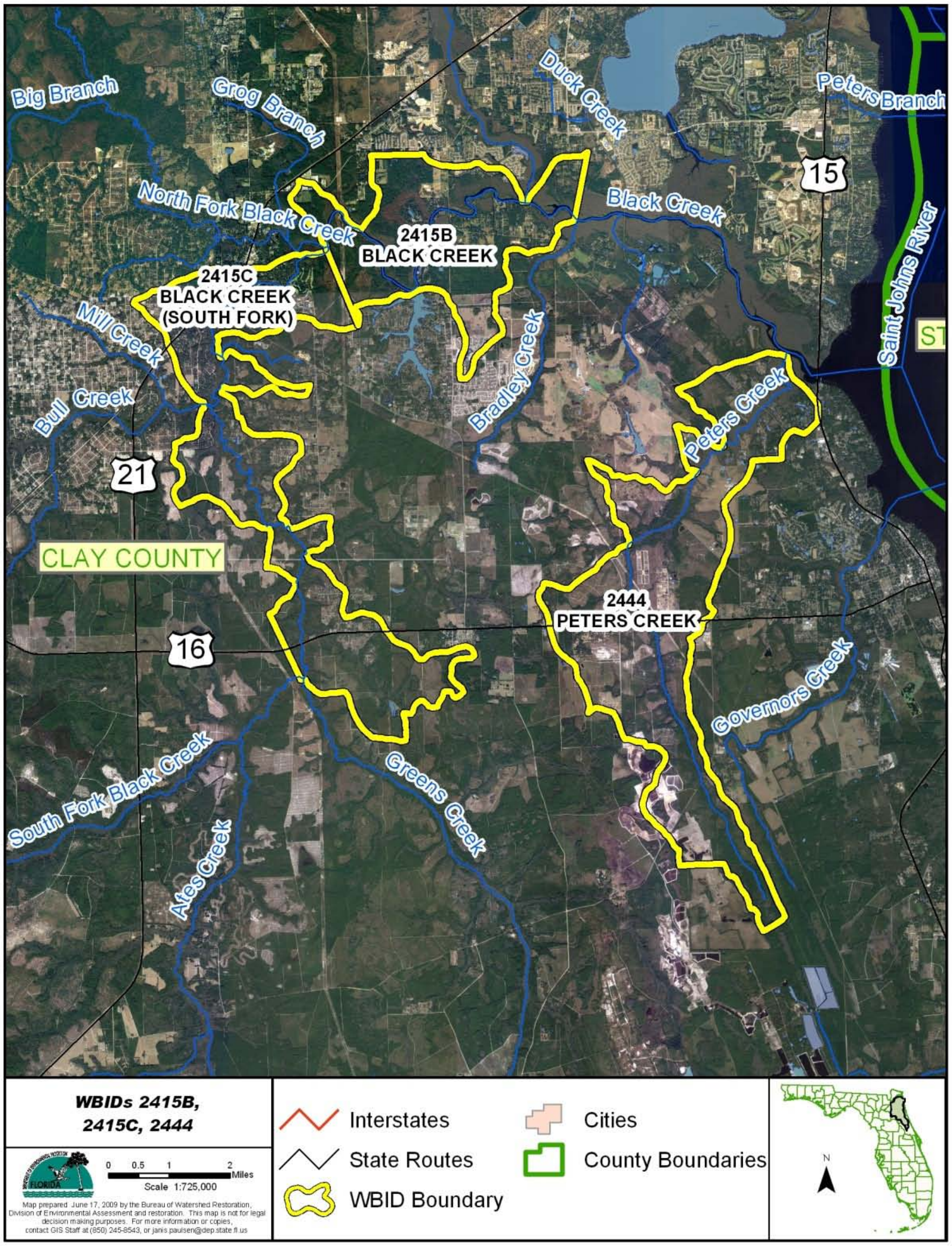


Figure 1.2. Location of Black Creek (WBID 2415B), South Fork Black Creek (WBID 2415C), and Peters Creek (WBID 2444) in Clay County and Major Hydrologic Features in the Area



The segments that are the focus of this report are all located in eastern Clay County bordered by the St Johns River, which forms the county's boundary with Duval County (the city of Jacksonville, the second most populated urban area of the state). Clay County is located in northeast Florida and covers approximately 644 square miles.

Based on the 2000 census, although the population of Duval County in 2000 was 778,900; in contrast, the population of Clay County in 2000 was 140,800 (University of Florida, Bureau of Economic and Business Research, 2002). Major industries in Clay County historically have included mineral mining, silviculture, dairy farming, recreation, and miscellaneous manufacturing. The northeast portion of Clay County (the Orange Park area) is highly developed, with residential and commercial activities tied to the metropolitan Jacksonville area (Marella, 1984).

According to a National Oceanic and Atmospheric Administration (NOAA) survey (NOAA, N.D.) prepared in conjunction with Naval Air Station (NAS) Cecil Field restoration activities, *"Black Creek and the St. Johns River provide numerous habitats for marine, estuarine, and anadromous fish and invertebrates, including several commercially important species and one endangered species. . . . It is not known to what extent these species utilize the tributary streams leading from the site to Black Creek. Striped bass and blue crab spawn throughout Black Creek. The West Indian manatee, a federally endangered species, is found in the St. Johns River and has been reported in Black Creek on several occasions, as far upstream as Middleburg. . . ."*

1.3 Background

This report was developed as part of the Florida Department of Environmental Protection's (Department) watershed management approach for restoring and protecting state waters and addressing TMDL Program requirements.

The watershed approach is based on a 5-year basin rotation that assesses one-fifth of all of the waters of the state each year. This approach ensures that at the completion of any 5-year cycle, all 52 river basins in the state will have been assessed. It also provides a framework for the implementation of TMDL Program–related requirements as described in the 1972 federal Clean Water Act and the 1999 Florida Watershed Restoration Act (FWRA) (Chapter 99-223, Laws of Florida).

For assessment purposes, the Department has organized and catalogued the waters of the state into assessment units (segments), each of which has a unique **w**ater**b**ody **id**entification (WBID) number. The three segments addressed in this TMDL report for lead include WBID 2415B (Black Creek), WBID 2415C (South Fork Black Creek), and WBID 2444 (Peters Creek). All three segments lie within the Black Creek watershed (**Figure 1.3**).

Chapter 2: DESCRIPTION OF WATER QUALITY PROBLEM

2.1 Statutory Requirements and Rulemaking History

Section 303(d) of the federal Clean Water Act (CWA) requires states to develop and submit to the EPA lists of surface waters that do not meet applicable water quality standards and, for each of those waters listed, to establish a TMDL for the pollutants identified as causing the impairment(s), based on a priority ranking schedule.

The development of basin-specific lists of impaired waters is also required by the FWRA (Subsection 403.067[4], Florida Statutes [F.S.]). Although 55 waterbodies in the Lower St. Johns Basin were included on Florida's 1998 303(d),the FWRA specified that all previous 303(d) lists were to be used only for planning purposes; and directed the Department to develop, and adopt by rule, a new science-based methodology to identify impaired waters of the state.

After an extensive rulemaking process, the Environmental Regulation Commission adopted the new methodology. Rule 62-303, Florida Administrative Code (F.A.C.) (Identification of Impaired Surface Waters Rule, or IWR), was adopted in April 2001; the rule was subsequently revised in both 2006 and 2007.

The methodology described in the IWR provides the legal framework by which the Department develops the required lists of impaired waters: As described by and currently implemented through the IWR, lists of impaired segments are included on the Verified List, which is adopted by rule; the Verified List is also submitted to the EPA as the required 303(d) list.

Although the IWR was adopted in 2001, 303(d) lists have been developed by the state and submitted to the EPA since 1992.

2.2 Information on Verified Impairment

Consistent with statutory requirement of the FWRA, that segments previously included on the 1998 303(d) list be verified as impaired using the methodology of the IWR before TMDLs could be developed, the Department these three Black Creek watershed segments were assessed in conjunction with the statewide assessment of Group 2 waters, which include these segments in the Lower St. Johns Basin.

To verify the lead impairments for these three Black Creek watershed segments, assessments were performed based on data obtained from the IWR assessment database: The verified assessment period for Cycle 2 waters was January 1, 2001, through June 30, 2008; based on data available for that assessment cycle, the impairments for lead for the three segments addressed in this TMDL report (Black Creek, South Fork Black Creek, and Peters Creek) were verified.

Since the criteria values for lead are expressed as a function of hardness,**Table 2.1** presents summary statistics for all lead data, as well as all hardness data, that was available for the verified period and was used to verify the impairments for lead for the three segments addressed by this TMDL report.

Tables 2.2 through **2.4**, and **Figures 2.1** through **2.3**, summarize the same information by month, season, and year, respectively:

- *For Black Creek (WBID 2415B), of the 27 reported result records for lead, 11 exceeded the hardness-based water quality criterion values for lead. The exceedance rate for the entire verified period was 40.74 percent. During the verified period, lead values ranged from a minimum reported value of 1 microgram per liter (μg/L) to a maximum reported value of 6.68 μg/L for Black Creek; reported values for hardness over the same period ranged from a minimum of 15 milligrams per liter (mg/L) to a maximum of 823 mg/L.*

- *For South Fork Black Creek (WBID 2415C), there were 11 reported result records for lead. Although data sufficiency was not met for this segment, 8 of the 11 reported results were exceedances, sufficient to meet the listing threshold as described in Paragraph 62-303.420(7)(a), F.A.C., and having an exceedance rate of 72.73 percent over the entire verified period. During the verified period, lead values in South Fork Black Creek ranged from a minimum reported value of 0.2 μg/L to a maximum reported value of 6.78 μg/L; reported values for hardness over the same period ranged from a minimum of 12 mg/L to a maximum of 372.06 mg/L.*

- *For Peters Creek (WBID 2444), there were a larger number of reported result values for lead. Off 43 such values, 11 exceeded the hardness-specific criterion value calculated from the Florida water quality standards, corresponding to an exceedance rate of 25.58 percent. During the verified period, lead values in Peters Creek ranged from a minimum reported value of 0.22 μg/L to a maximum reported value of 4.13 μg/L; during the same period, the hardness values ranged from a minimum of 17 mg/L to a maximum reported value of 845 mg/L.*

Despite some suggestion of a decreasing trend over time, there were few usable result records available for assessment purposes from the latter years of the verified period: although sampling had been performed and data had been generated for these years, the analytic methods used were such that, due to the extremely low paired values for hardness, the reported method detection limits were not sufficiently sensitive to measure below hardness-specific criterion values from the Florida standards.

It appears that the greater number of exceedances observed during the third quarter of the year, across all years in the verified period, may be real. While the fewest exceedances were observed during the second quarter, it appears that this was not an artifact due to fewer result records being available for that quarter (either as a result of reduced sampling, or the inability to measure below the appropriate criterion value). In fact, the quarter with the fewest result records available across the verified period was generally the first quarter.

For all three of the segments addressed in this report, the lead concentrations that exceeded the criterion from the Florida standards were, in fact, quite low. The corresponding hardness values, however, were also quite low, which resulted in particularly low, and easily exceeded, criterion values. Consequently, despite the relatively low lead concentrations observed in these segments, this suggests that theimpairment status for these three segments may be driven more by particularly low values of hardness rather than by the actual in-stream lead concentrations.

Since the relationships between lead concentrations and other water quality parameters, including e.g., hardness, conductivity, and flow, in the entirety of the Lower St Johns Basin is complex and dynamic; a more complete understanding of these factors and their relationship to impairment status needs to be further considered.

2.2.1 Data Handling and Verification Procedures

Prior to performing the assessments required to verify lead impairments for the three segments in the Black Creek watershed, data were first unduplicated, and then and to subject the data to quality assurance (QA) procedures to cull out result values that were reported at or below detection limits, where the method detection limits could not quantify results as low as the hardness-based criterion value from the Florida standards (Paragraph 62-303.320[10][a], F.A.C.).

Also culled out were those result values that were reported below quantification limits, when the calculated value of the criterion was between the detection limit and the quantification limit. Because the criterion for lead is expressed as a function of hardness, comparison of reported result values for lead with the applicable criterion value required hardness values to be paired with each of the results for lead.

Result records in the culled assessment dataset for lead were matched against result records for hardness based on location and date (matching time and depth were not required when pairing these values) to create the final assessment dataset. Where result records for hardness were either missing or not reported, hardness values were calculated if sufficient matching component species for calcium and magnesium were available. Lead results having no matching hardness data available were excluded from the assessment.

For those result records reporting at or below detection limits, the method detection limit was compared with the hardness-specific value of the criterion from the Florida standards. Where the detection limit could not measure as low as the calculated value of the criterion, as specified in Paragraph 62-303.320(10)(a), F.A.C., the result record could not be used in the assessment. Similarly, those result records reporting below quantification limits, where the calculated value of the criterion was between the detection limit and the quantification limit, also could not be used, since for these results it was not possible to determine the relationship between the criterion and the result value.

The final dataset available for assessment purposes to verify lead impairments for Black Creek included a total of 27 paired result records for lead and hardness; for South Fork Black Creek there were 11 paired records available; and for Peters Creek there was a total of 43 pairs that could be used. Having confirmed that data sufficiency was met for each of the segments, exceedance rates were calculated and compared with the tabled values in Subsection 62-303.420(2), F.A.C.

Table 2.1. Summary Statistics for Lead Data Used in the Assessment of Black Creek (WBID 2415B), South Fork Black Creek (WBID 2415C), and Peters Creek (WBID 2444) for the Cycle 2 Verified Period (January 1, 2001–June 30, 2008)

	Black Creek (WBID 2415B) Lead (µg/L)	Black Creek (WBID 2415B) Hardness (mg/L)	South Fork Black Creek (WBID 2415C) Lead (µg/L)	South Fork Black Creek (WBID 2415C) Hardness (mg/L)	Peters Creek (WBID 2444) Lead (µg/L)	Peters Creek (WBID 2444) Hardness (mg/L)
Total number of samples	27	-	11	-	43	-
IWR-required number of water quality standard exceedances to meet listing threshold for the Verified List	6	-	5	-	8	-
Number of observed exceedances	11	-	8	-	11	-
Observed exceedance rate (%)	40.74%	-	72.73%	-	25.58%	-
Number of observed nonexceedances	16	-	3	-	32	-
Number of seasons during which samples were collected	4	4	4	4	4	4
Maximum of observed result values	6.68	823.00	6.78	372.06	4.13	845.00
Minimum of observed result values	1.00	15.00	0.20	12.00	0.22	17.00
Median of observed result values	2.00	93.00	2.00	22.65	2.00	86.00
Mean of observed result values	2.02	181.93	2.12	52.44	1.98	190.11
FINAL ASSESSMENT:	**Impaired**	-	**Impaired**	-	**Impaired**	-

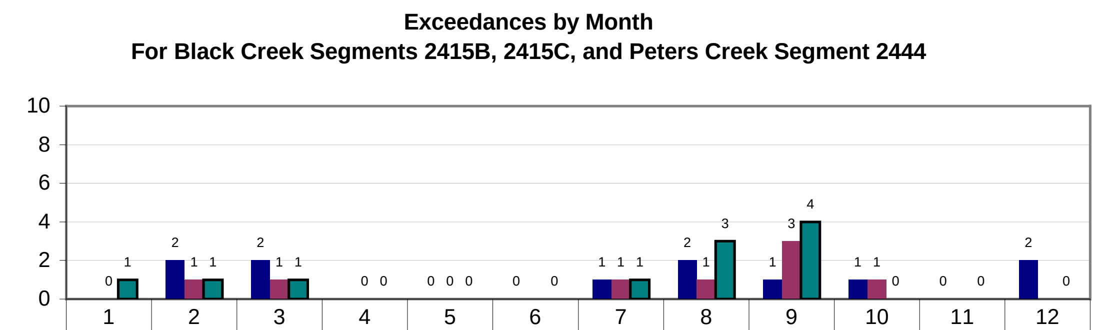
- = Empty cell/no data

Table 2.2. Summary Statistics by Month for Lead and Hardness Data Used in the Assessment of Black Creek (WBID 2415B), South Fork Black Creek (WBID 2415C), and Peters Creek (WBID 2444) for the Cycle 2 Verified Period (January 1, 2001–June 30, 2008)

WBID	Month	N	Minimum Lead (µg/L)	Minimum Hardness (mg/L)	Maximum Lead (µg/L)	Maximum Hardness (mg/L)	Median Lead (µg/L)	Median Hardness (mg/L)	Mean Lead (µg/L)	Mean Hardness (mg/L)	Number of Observed Exceedances	Exceedance Rate (%)
2415B	Jan	0	-	-	-	-	-	-	-	-	-	-
2415B	Feb	2	1	21	2.86	34	1.42	27.5	1.76	27.5	2	100%
2415B	Mar	2	1.15	15	6.67	17	3.91	16	3.91	16	2	100%
2415B	Apr	0	-	-	-	-	-	-	-	-	-	-
2415B	May	2	2	93	2	587.4	2	340.2	2	340.2	0	0%
2415B	Jun	5	1	114.41	2	823	2	373	1.8	418.29	0	0%
2415B	Jul	4	1	25	2.67	577.02	2	79.3	1.92	190.15	1	25%
2415B	Aug	3	1.07	21	2.59	76.3	2	33	1.89	43.43	2	67%
2415B	Sep	3	1.28	23	2	96.54	2	93.66	1.76	71.07	1	33%
2415B	Oct	2	2	29	2.55	505.41	2.28	267.21	2.28	267.21	1	50%
2415B	Nov	1	2	254.71	2	254.71	2	254.71	2	254.71	0	0%
2415B	Dec	3	1.2	24.82	2.03	105.76	2	29.35	1.74	53.31	2	67%
2415C	Jan	1	0.2	29.6	0.8	48.3	0.5	38.95	0.5	38.95	0	0%
2415C	Feb	1	2.41	23	2.41	23	2.41	23	2.41	23	1	100%
2415C	Mar	1	3.45	12	3.45	12	3.45	12	3.45	12	1	100%
2415C	Apr	1	0.2	22.3	2	22.3	1.1	22.3	1.1	22.3	0	0%
2415C	May	1	2	372.06	2	372.06	2	372.06	2	372.06	0	0%
2415C	Jun	0	-	-	-	-	-	-	-	-	-	-
2415C	Jul	1	6.78	22.05	6.78	22.05	6.78	22.05	6.78	22.05	1	100%
2415C	Aug	1	1.11	16	1.11	16	1.11	16	1.11	16	1	100%
2415C	Sep	3	1.3	17	3.53	25	1.48	17	2.1	19.67	3	100%
2415C	Oct	1	2.29	25	2.29	25	2.29	25	2.29	25	1	100%
2415C	Nov	0	-	-	-	-	-	-	-	-	-	-
2415C	Dec	0	-	-	-	-	-	-	-	-	-	-
2444	Jan	2	0.22	17	2.02	28	2.02	28	1.42	24.33	1	50%
2444	Feb	1	1	27	2.36	27	1.68	27	1.68	27	1	100%
2444	Mar	1	4.13	18	4.13	18	4.13	18	4.13	18	1	100%
2444	Apr	0	2	-	2	-	2	-	2	-	-	-
2444	May	7	1	56	2	809.52	2	81.5	1.63	177.03	0	0%
2444	Jun	10	1	58.61	2	845	2	131.76	1.7	313.01	0	0%
2444	Jul	5	1	31.5	2.07	639.82	2	125.33	1.81	254.54	1	20%
2444	Aug	5	1.63	17	3.4	112.04	2	47.79	2.29	58.4	3	60%
2444	Sep	8	1.1	25	4.09	573.26	2	90.67	2.58	176	4	50%
2444	Oct	2	2	182.5	2	391.35	2	286.92	2	286.92	0	0%
2444	Nov	1	2	146.82	2	415.81	2	281.32	2	281.32	0	0%
2444	Dec	1	2	103.39	2	103.39	2	103.39	2	103.39	0	0%

- = Empty cell/no data

Figure 2.1. Distribution of Lead Exceedances by Month for Black Creek (WBID 2415B), South Fork Black Creek (WBID 2415C), and Peters Creek (WBID 2444) for the Cycle 2 Verified Period (January 1, 2001–June 30, 2008)



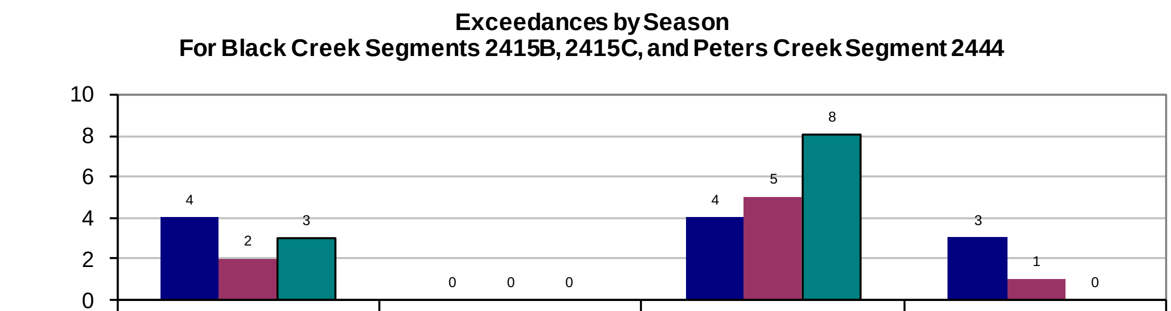
	1	2	3	4	5	6	7	8	9	10	11	12
2415B		2	2		0	0	1	2	1	1	0	2
2415C	0	1	1	0	0		1	1	3	1		
2444	1	1	1	0	0	0	1	3	4	0	0	0

Table 2.3. Summary Statistics by Season[a] for the Lead and Hardness Data Used in the Assessment of Black Creek (WBID 2415B) South Fork Black Creek (WBID 2415C), and Peters Creek (WBID 2444) for the Cycle 2 Verified Period (January 1, 2001–June 30, 2008)

WBID	Season[1]	N	Minimum Lead (µg/L)	Minimum Hardness (mg/L)	Maximum Lead (µg/L)	Maximum Hardness (mg/L)	Median Lead (µg/L)	Median Hardness (mg/L)	Mean Lead (µg/L)	Mean Hardness (mg/L)	Number of Observed Exceedances	Exceedance Rate (%)
2415B	1	4	1	15	6.67	34	1.42	19	2.62	21.75	4	100%
2415B	2	7	1	93	2	823	2	373	1.86	395.98	0	0%
2415B	3	10	1	21	2.67	577.02	2	64.65	1.86	110.41	4	40%
2415B	4	6	1.2	24.82	2.55	505.41	2	67.55	1.96	158.18	3	50%
2415C	1	3	0.2	12	3.45	48.3	1.61	26.3	1.71	28.23	2	67%
2415C	2	2	0.2	22.3	2	372.06	2	197.18	1.4	197.18	0	0%
2415C	3	5	1.11	16	6.78	25	1.48	17	2.84	19.41	5	100%
2415C	4	1	2.29	25	2.29	25	2.29	25	2.29	25	1	100%
2444	1	4	0.22	17	4.13	28	2.02	27	1.96	23.6	3	75%
2444	2	17	1	56	2	845	2	93.1	1.68	252.58	0	0%
2444	3	18	1	17	4.09	639.82	2	70.59	2.29	159.53	8	44%
2444	4	4	4	2	0	2	2	415.81	2	247.97	0	0%

\- = Empty cell/no data
[a] Seasons are as follows: 1 = January, February, March; 2 = April, May, June; 3 = July, August, September; 4 = October, November, December

Figure 2.2. Distribution of Lead Exceedances by Season[a] for Black Creek (WBID 2415B), South Fork Black Creek (WBID 2415C), and Peters Creek (WBID 2444) for the Cycle 2 Verified Period (January 1, 2001–June 30, 2008)



	1	2	3	4
2415B	4	0	4	3
2415C	2	0	5	1
2444	3	0	8	0

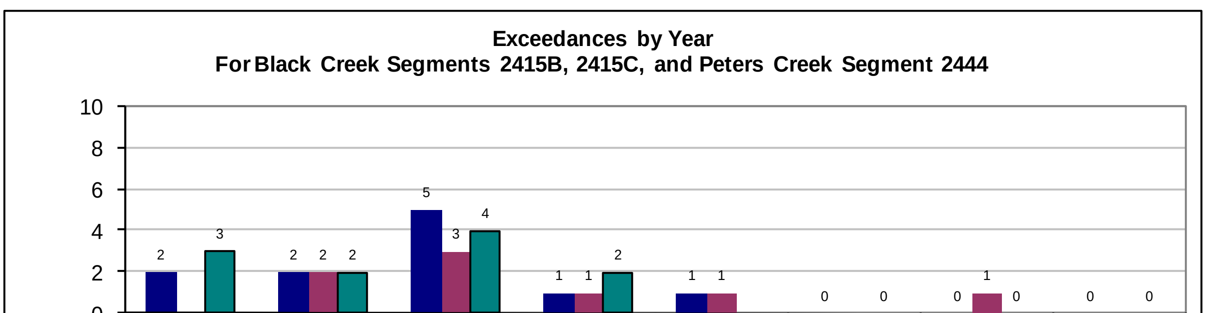
[a] Seasons are as follows: 1 = January, February, March; 2 = April, May, June; 3 = July, August, September; 4 = October, November, December

Table 2.4. Summary Statistics by Year for the Lead and Hardness Data Used in the Assessment of Black Creek (WBID 2415B), South Fork Black Creek (WBID 2415C), and Peters Creek (WBID 2444) for the Cycle 2 Verified Period (January 1, 2001–June 30, 2003)

WBID	Year	N	Minimum Lead (µg/L)	Minimum Hardness (mg/L)	Maximum Lead (µg/L)	Maximum Hardness (mg/L)	Median Lead (µg/L)	Median Hardness (mg/L)	Mean Lead (µg/L)	Mean Hardness (mg/L)	Number of Observed Exceedances	Exceedance Rate (%)
2415B	2001	4	2	29	2.59	373	2.28	63	2.29	132	2	50
2415B	2002	4	1	23	2.86	823	1.14	43.5	1.54	233.25	2	50
2415B	2003	5	1.07	15	6.67	29.35	1.2	21	2.3	20.67	5	100
2415B	2004	1	1	24.82	2.03	24.82	1.51	24.82	1.51	24.82	1	100
2415B	2005	1	2.67	25	2.67	25	2.67	25	2.67	25	1	100
2415B	2006	6	2	93.66	2	505.41	2	110.08	2	196.59	0	0
2415B	2007	5	2	76.3	2	638.15	2	577.02	2	395.09	0	0
2415B	2008	1	2	142.88	2	142.88	2	142.88	2	142.88	0	0
2415B	2001	0	-	-	-	-	-	-	-	-	-	0
2415C	2002	2	1.3	17	2.41	23	1.86	20	1.86	20	2	100
2415C	2003	3	1.11	12	3.53	17	3.45	16	2.7	15	3	100
2415C	2004	1	1.48	25	1.48	25	1.48	25	1.48	25	1	100
2415C	2005	2	2	25	2.29	372.06	2.14	198.53	2.14	198.53	1	50
2415C	2006	0	2	-	2	-	2	.	2	.	.	-
2415C	2007	3	0.2	22.05	6.78	48.3	0.5	25.95	2	30.57	1	33
2415C	2008	0	-	-	-	-	-	-	-	-	-	0
2444	2001	7	2	17	3.76	151	2.01	49.75	2.32	60.81	3	43
2444	2002	8	0.22	17	2.36	845	1.5	56.5	1.46	240.19	2	25
2444	2003	4	3.4	17	4.13	40	3.88	25.5	3.82	27	4	100
2444	2004	5	1	25	1.63	70.16	1	62.97	1.1	52.71	2	40
2444	2005	0	-	-	-	-	-	-	-	-	-	0
2444	2006	9	2	70.59	2	573.26	2	164.66	2	237.86	0	0
2444	2007	8	2	108.78	2	809.52	2	297.54	2	371.08	0	0
2444	2008	2	2	112.52	2	272.25	2	192.38	2	192.38	0	0

- = Empty cell/no data

Figure 2.3. Distribution of Lead Exceedances by Year for Black Creek (WBID 2415B), South Fork Black Creek (WBID 2415C), and Peters Creek (WBID 2444) for the Cycle 2 Verified Period (January 1, 2001–June 30, 2003)



	2001	2002	2003	2004	2005	2006	2007	2008
2415B	2	2	5	1	1	0	0	0
2415C		2	3	1	1		1	
2444	3	2	4	2		0	0	0

Chapter 3. DESCRIPTION OF APPLICABLE WATER QUALITY STANDARDS AND TARGETS

3.1 Waterbody Classification 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)**

All three segments considered in this TMDL report are classified as Class III freshwater waterbodies, with a designated use of recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife.

The Class III water quality criterion applicable to the impairment addressed by this TMDL is that for lead. This criterion can be found in Rule 62-302, F.A.C.

3.2 Applicable Water Quality Standards and Numeric Water Quality Target

The IWR provides the guidance for determining whether the three Black Creek watershed segments addressed by this TMDL report are impaired:

Section 62-303.400, F.A.C. establishes that *"a waterbody that fails to meet the minimum criteria for surface waters established in Rule 62-302.500, F.A.C.; any of its designated uses, as described in this part; or applicable water quality criteria, as described in this part, shall be determined to be impaired."* Under Paragraph 62.302.500(2)(a), F.A.C., the criteria for surface water quality provided in Subsection 62-302.500(2) and Section 62-302.530, shall apply to all surface waters outside zones of mixing. Paragraph 62.302.500(2)(d), specifies that criteria for metals in Section 62-302.530 and Paragraph 62-302.500(1)(c), are measured as total recoverable metal.

For the three segments addressed by this TMDL report, the applicable water quality criterion for lead for the protection of Class III fresh waters, as established by Section 62-302.530, F.A.C., further specifies that the *"maximum concentration [for lead] that shall not be exceeded at any time for Class III freshwater waters as e(1.273[LnH]-4.705) ug/L (where LnH denotes the natural logarithm of hardness expressed as mg/L of $CaCO_3$,"* and e represents the exponential base) for reported values of hardness between 25 and 400. For reported values of hardness less than 25, the criteria evaluated at a hardness value of 25 is used; analogously, for reported values of hardness greater than 400, the criteria evaluated at a hardness value of 400 is used (Paragraph 62-303.320[9][b], F.A.C.).

The IWR also describes data sufficiency requirements for the assessment, and verification of impairments, of waters of the state as well as which data can be used: In particular, Subsection 62-303.400(2), F.A.C., requires that to determine whether a waterbody is impaired, it generally is necessary to meet a minimum sample size requirement of 20 samples (however, in the presence of sufficiently large number of exceedances of an appropriate water quality criterion, a segment can be determined to be impaired based on fewer than 20 samples) (Paragraph 62.303.400[7][a], F.A.C.). This paragraph also specifies that segments will be placed on the Verified List when at least 10 percent of the samples do not meet the applicable criteria, with a minimum of a 90 percent confidence level, using the binomial distribution.

Chapter 4: ASSESSMENT OF SOURCES

4.1 Types of Sources

An important part of the TMDL analysis is the identification of pollutant source categories, source subcategories, or individual sources of pollutants in the watershed, and the amount of pollutant loading contributed by each of these sources. Sources are broadly classified as either "point sources" or "nonpoint sources."

Historically, the term "point sources" has referred to discharges to surface waters that typically 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" has been used to describe intermittent, rainfall-driven, or diffuse sources of pollution, including runoff from urban land uses, agriculture, silviculture, and mining; discharges from failing septic systems; and atmospheric deposition.

The 1987 amendments to the CWA included language that redefined certain nonpoint sources of pollution as point sources, subject to regulation under the EPA's National Pollutant Discharge Elimination System (NPDES) Program. These sources encompassed certain urban stormwater discharges, including those from local government master drainage systems, construction sites over five acres, and a wide variety of industries (see **Appendix A** for background information on the federal and state stormwater programs).

To maintain consistency with the CWA definitions, the term "point source" will be used to describe traditional point sources (such as domestic and industrial wastewater discharges, as well as well as solid waste landfills) **AND** stormwater systems requiring an NPDES stormwater permit when allocating pollutant load reductions required by a TMDL (see **Section 6.1**). However, the methodologies used to estimate nonpoint source loads do not distinguish between NPDES stormwater discharges and non-NPDES stormwater discharges, and as such, this source assessment section does not make any distinction between the two types of stormwater.

4.2 Potential Sources of Lead in the Black Creek Watershed

4.2.1 Point Sources

There are nine NPDES permitted facilities in the Black Creek watershed (**Table 4.1**): six are domestic wastewater facilities and three are industrial wastewater facilities.

Of the six domestic wastewater facilities, only Fang (Camp Blanding; FL0022853) and the town of Penney Farms (FL0032557) are located in the three segments that are addressed by this TMDL report. However, since these segments are the farthest downstream among all segments in the Black Creek watershed, all facilities in the entire watershed are included in the review of point sources.

Clay County Utilities wastewater treatment plant (WWTP) operates locations at Ravines and Mid-Clay within the Black Creek watershed (WBID 2415B). Both are land application systems with no discharge into surface waters. The Ravines is located in the Black Creek segment, and Mid-Clay is located just beyond the Black Creek segment boundary, between Bradley Creek and Black Creek. The Ridaught Landing WWTF is located in the Little Black Creek segment (WBID 2368), just upstream of its confluence with the Black Creek segment. Middleburg Bluffs WWTF is located in the North Fork Black Creek segment (WBID 2428) upstream of its confluence with Black Creek.

Effluent from Ridaught Landing WWTP is transported through a transmission pipeline to the Fleming Island Regional WWTF for reuse at the Eagle Harbor Community and at the Centrex Developments. Effluent that does not meet the requirements for the public access reuse system at Fleming Island Regional WWTF is then treated further with filtration, chlorination, and dechlorination before being discharged into the Class III fresh waters of the St. Johns River via Little Black Creek (upstream of its confluence with Black Creek).

There are two additional facilities with physical plants located in the Black Creek watershed (the Fleming Island WWTP [FL0043834] and one other). Although those facilities discharge directly to the St Johns River (Fleming Island has not discharged for a number of years [W. Magley, Department, personal communication]), and downstream from the segments that are the focus of this report, they are noted here due to the frequent low-flow conditions, and occasional reversals in flow, that have been observed for Black Creek near Doctors Inlet.

Industrial wastewater sites in the Black Creek watershed include the E.I. Dupont De Nemours – Maxville Mine (FL0040274) and the Trailridge Mine (FL0000051), as well as Tarmac – Orange Park Concrete Batch Plant (CBP) (FLG110262). The Maxville Mine facility is a heavy mineral mining operation with a wastewater treatment system permitted to discharge into the fresh waters of Gum Branch, with authorized emergency discharge permitted to the New River Swamp, and for intermittent discharges consisting of contact stormwater and incidental process wastewater to existing drainage paths with eventual discharge to the North Fork Black Creek (Department, 2006).

A survey of the Maxville Mine on July 11, 2005, found that all metals in the mine's effluent complied with Class III freshwater quality criteria and facility permit limits (Department, 2006).

Table 4.1. NPDES Facilities Permitted in the Black Creek Watershed

[1] MGD = Million gallons per day

Watershed	Facility ID	Facility Name	Facility Type	Design Capacity (MGD)[1]
Little Black Creek	FL0039721	Ridaught Landing WWTF	Domestic Wastewater	1.8750
Little Black Creek	FLG110262	Tarmac – Orange Park CBP	Industrial Wastewater	0.0000
Little Black Creek	FL0173371	Spencer WWTF	Domestic Wastewater	0.2500
North Fork Black Creek	FL0113743	Middleburg Bluffs WWTF	Domestic Wastewater	0.0099
North Fork Black Creek	FL0040274	E.I. Dupont De Nemours – Maxville Mine	Industrial Wastewater	4.0000
North Fork Black Creek	FL0115231	Bailey's Mobile Home Park WWTF	Domestic Wastewater	0.0030
South Fork Black Creek	FL0022853	Fang – Camp Blanding WWTF	Domestic Wastewater	0.9000
South Fork Black Creek	FL0032557	Penney Farms, Town of WWTF	Domestic Wastewater	0.0900
North Fork Black Creek	FL0000051	E.I. DuPont – Trailridge Mine	Industrial Wastewater	30.000

The Rose Mary Hill landfill is located in the Peters Creek watershed; although this facility is currently closed, a solid waste transfer station and a waste tire station are currently active. There is also a yard trash processing center located in the South Fork Black Creek watershed (L. Banks, Department, personal communication).

Municipal Separate Storm Sewer System Permittees

There are two Phase II municipal separate storm sewer system (MS4) permits issued in the Black Creek watershed, as follows:

- *Clay County (FLR04E045); and*
- *Florida Department of Transportation (FDOT) District 2 (Jacksonville UA: FLR04E020).*

4.2.2 Land Uses and Nonpoint Sources

Nonpoint sources to Black Creek, South Fork Black Creek, and Peters Creek may include surface runoff, ground water inflow, sediments, air deposition, and occasional flow reversals. Although lead impairments have not been observed to be caused by air deposition—for example, in segments of the Lower St Johns River—it appears that the amounts of lead contributed by air deposition to the three segments addressed in this TMDL may not differ much from the amounts contributed by air deposition in nearby segments that have not been found to have lead concentrations that exceeded their corresponding water quality criteria; and that the impairment observed in these segment may be driven more by changes in hardness.

Because lead can potentially be found in surface runoff, ground water, and/or resuspended sediments, it may also be important to consider historical land uses in this area, such as mining and military activities, as well as specific consideration of the National Priority List (NPL) sites at NAS Cecil Field: unlike organic compounds, metals cannot be degraded, and the cleanup typically requires the physical removal of contaminated materials (Lasat, 2002). **Table 4.2** lists the representative concentration of lead found in ground water and surface water in the NPL survey site at NAS Cecil Field.

According to the NOAA survey document (NOAA, N.D.), *"Runoff from these sites is conveyed to local streams, including Yellow Water Creek, Rowell Creek, and Sal Taylor Creek, by a system of storm sewers and unlined ditches. The confluence of Rowell and Sal Taylor Creeks lies on the western edge of the main station boundary. Sal Taylor continues southwest for 3 km [kilometers] before meeting Yellow Water Creek, the receiving stream for all surface waters leaving the site. Yellow Water Creek flows south from the Sal Taylor Creek tributary for 13 km to join Black Creek. Black Creek then flows southeast for 27 km to the St Johns River.".*

"Both surface water and groundwater movement represent potential pathways of contamination from NAS Cecil Field to nearby streams. The majority of the contaminated areas identified at Cecil Field are close to Rowell Creek and Lake Fretwell. Both of these surface waters serve as the receiving points for groundwater discharge and surface water flow emanating from the sites. Known sites of contamination are also situated along the other creeks."

Table 4.2. Representative Concentration of Lead in Ground Water and Surface Water in NPL Survey Site at NAS Cecil Field

Maximum concentration of major contaminants in the vicinity of the site compared with applicable screening levels.

	Water			Soil		Sediment	
	Ground Water µg/L	Surface Water µg/L	AWQC[1] µg/L	Soil mg/kg	Average[2] U.S. Soil mg/kg	Sediment mg/kg	ER-L[3] mg/kg
INORGANIC SUBSTANCES							
cadmium	12	ND	1.1+	17	0.06	20	5
chromium	425	ND	11	16	100	9	80
lead	573	ND	3.2+	599	10	14	35
mercury	0.8	0.3	0.012	NT	0.03	NT	
ORGANIC COMPOUNDS							
PCBs	NT	NT	0.014	0.58	NA	ND	0.05

1: Ambient water quality criteria for the protection of aquatic organisms. Freshwater chronic criteria presented (EPA 1986)

2: Lindsay (1979)

3: Effective range-low; the concentration representing the lowest 10 percentile value for the data in which effects were observed or predicted in studies compiled by Long and Morgan (1990).

\+ Hardness-dependent criteria; 100 mg/L CaCO3 used.

NT Not analyzed

ND Not detected at method detection limit. Detection limit not available

Source: NOAA, N.D.

Land Uses

Figure 4.1 shows the acreage of the principal land uses in the watershed;the watershed is approximately 75 percent forest and wetlands, with only 12 percent urban and 3 percent agriculture. The wetlands along the streams consist of wetland hardwood species, with some cypress. Urban areas include the town of Middleburg, which accounts for the majority of the high-density residential land use.

Tables 4.3 through **4.5** list land uses for the individual segments in the Black Creek, South Fork Black Creek, and Peters Creek watersheds addressed by this TMDL report.

Figure 4.1. Principal Land Uses in the Black Creek Watershed (WBID 2415B), South Fork Black Creek Watershed (WBID 2415C), and Peters Creek Watershed (WBID 2444).

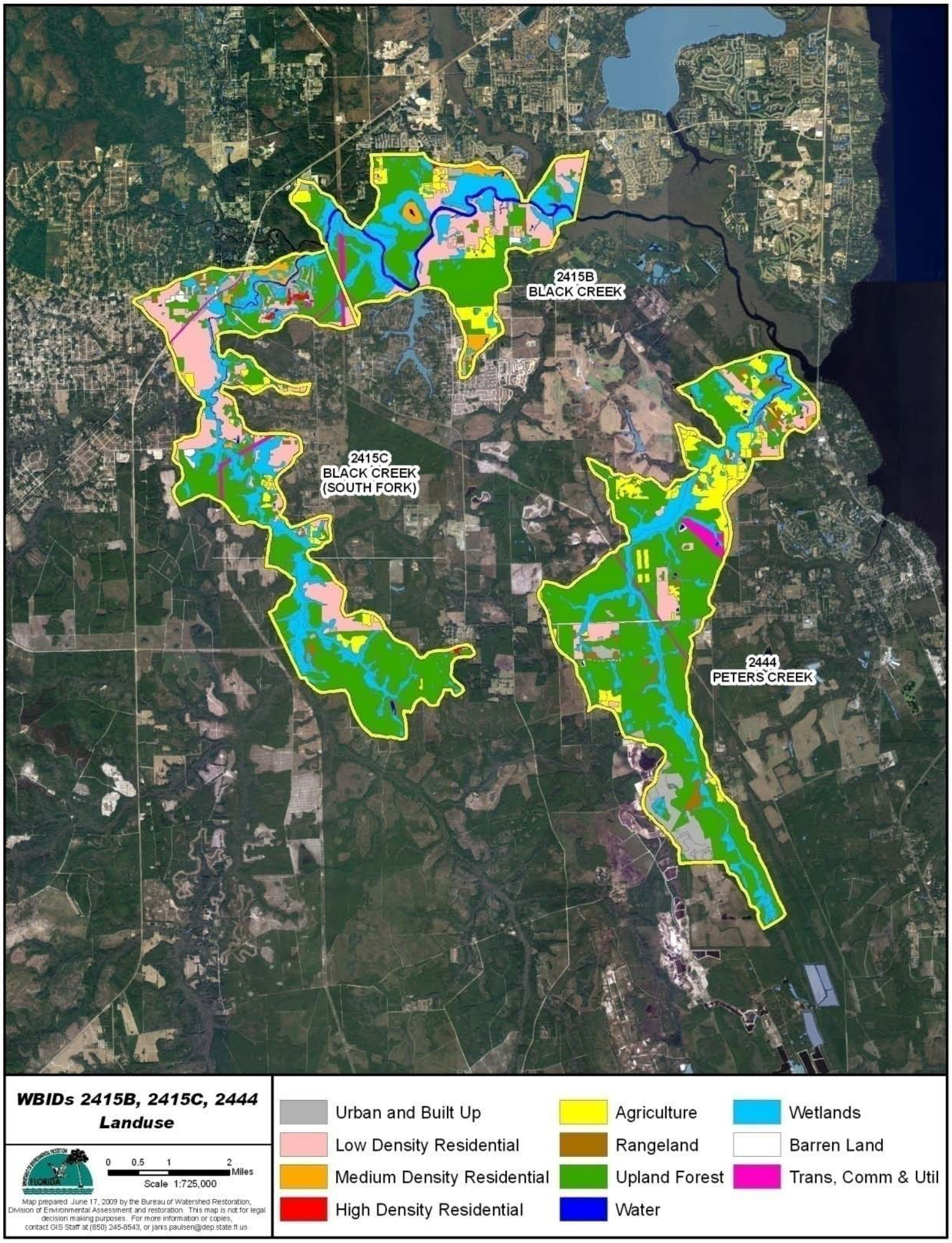


Table 4.3. Classification of Land Use Categories in the Black Creek Watershed (WBID 2415B).

- = Empty cell

Level 1 Land Use Code	Land Use	Acreage	% of Total
1000	Urban and Built-Up	7,660	2.50%
1100	Low-Density Residential	24,559	8.02%
1200	Medium-Density Residential	4,464	1.46%
1300	High-Density Residential	881	0.29%
2000	Agriculture	10,636	3.47%
3000	Rangeland	11,852	3.87%
4000	Upland Forest	165,730	54.10%
5000	Water	4,362	1.42%
6000	Wetlands	66,257	21.63%
7000	Barren Land	4,241	1.38%
8000	Transportation, Communication, and Utilities	5,743	1.87%
9000	Special Classifications	0	0%
-	**TOTAL:**	**306,369**	**100%**

Table 4.4. Classification of Land Use Categories in the South Fork Black Creek Watershed (WBID 2415C).

- = Empty cell

Level 1 Land Use Code	Land Use	Acreage	% of Total
1000	Urban and Built-Up	1,863	1.99%
1100	Low-Density Residential	7,922	8.48%
1200	Medium-Density Residential	234	0.25%
1300	High-Density Residential	150	0.16%
2000	Agriculture	3,387	3.63%
3000	Rangeland	4,810	5.15%
4000	Upland Forest	54,585	58.43%
5000	Water	863	0.92%
6000	Wetlands	18,476	19.78%
7000	Barren Land	488	0.52%
8000	Transportation, Communication, and Utilities	648	0.69%
9000	Special Classifications	0	0%
-	**TOTAL:**	**93,426**	**100%**

Table 4.5. Classification of Land Use Categories in the Peters Creek Watershed (WBID 2444).

- = Empty cell

Level 1 Land Use Code	Land Use	Acreage	% of Total
1000	Urban and Built-Up	425	3.23%
1100	Low-Density Residential	447	3.40%
1200	Medium-Density Residential	12	0.09%
1300	High-Density Residential	0	0%
2000	Agriculture	2,049	15.60%
3000	Rangeland	340	2.59%
4000	Upland Forest	6,949	52.91%
5000	Water	105	0.80%
6000	Wetlands	2,328	17.72%
7000	Barren Land	62	0.47%
8000	Transportation, Communication, and Utilities	418	3.18%
9000	Special Classifications	0	0%
-	**TOTAL:**	**13,135**	**100%**

According to reports in the Jacksonville Business Journal (December 13, 2000), the St. Johns River Water Management District (SJRWMD) board voted to conserve 1,525 acres in the upper Black Creek watershed, adjacent to Jennings State Forest and former NAS Cecil Field. The district owns 8,000 acres within the 20,885-acre state forest, which protects the headwaters of Black Creek and its tributaries, North Fork and Yellow Water Creeks.

In 2001, the board also voted to conserve an additional 1,830 acres in the upper Black Creek watershed, adjacent to Jennings State Forest, with the goal of protecting the resources of Black Creek and ultimately the St Johns River. The land purchase has enhanced the water resource protection of the St Johns River, Black Creek, and its tributaries (Jacksonville Business Journal; May 10, 2001).

More recently, in 2005, the SJRWMD voted to purchase 3,030 acres bordering Camp Blanding; that acquisition will protect the headwaters of Bull Creek and the south branch of Black Creek, and provide wetland protection for the upper Black Creek watershed. In 2007, the governing board further voted to purchase 6,237 acres in western Clay County; that purchase will also protect the headwaters of Bull Creek and the south prong of Black Creek; and protect wetlands in the upper Black Creek watershed (Jacksonville Business Journal, February 14, 2007).

Soil Characteristics

The Soil Survey Geographic (SSURGO) Database in the Department's geographic information system (GIS) database from the SJRWMD was accessed to provide coverage of hydrologic soil groups in the Black Creek and Peters Creek watersheds (**Figure 4.3**). **Table 4.6** briefly describes the major hydrology soil classes, and **Figure 4.2** provides a physiographic map of Clay County.

Table 4.6. Description of Hydrologic Soil Classes from the SSURGO Database

Hydrology Class	Description
A	High infiltration rates. Soils are deep, well-drained to excessively drained sands and gravels.
A/D	Drained/undrained hydrology class of soils that can be drained and are classified.
B	Moderate infiltration rates. Deep and moderately deep, moderately well- and well-drained soils that have moderately coarse textures.
B/D	Drained/undrained hydrology class of soils that have moderately coarse textures.
C	Slow infiltration rates. Soils with layers impeding downward movement of water, or soils that have moderately fine or fine textures.
C/D	Drained/undrained hydrology class of soils that can be drained and classified.
D	Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Figure 4.2. Physiographic Map of Clay County, Florida

Source: U.S. Department of Agriculture, 1989

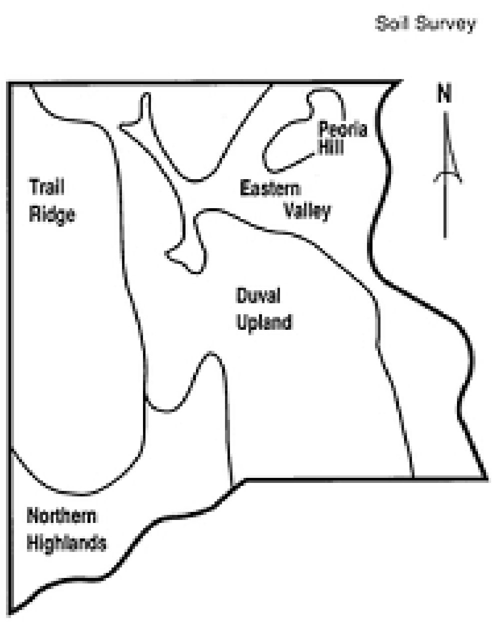
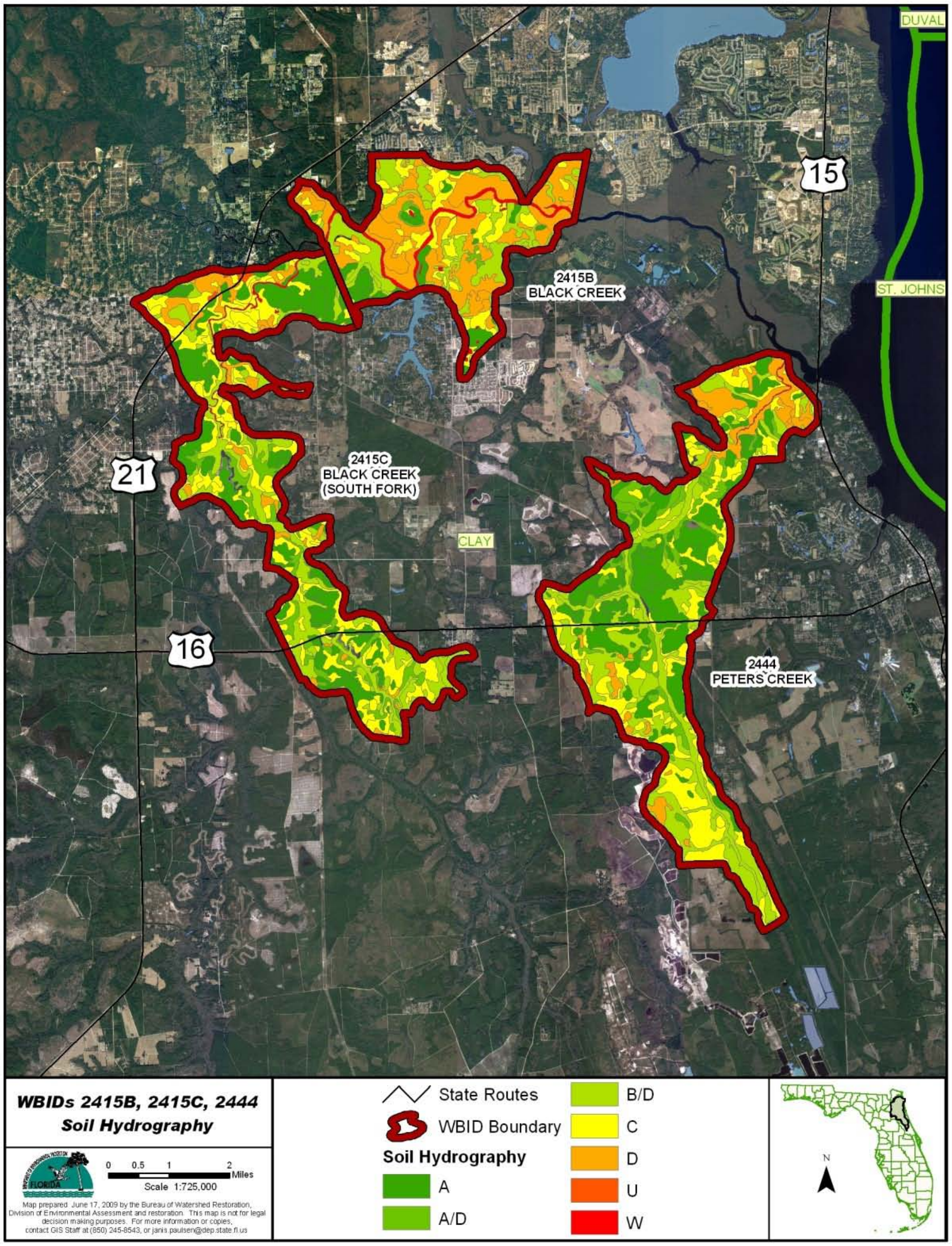


Figure 4.3. Hydrologic Soil Groups Distribution in the Black Creek Watershed (WBID 2415B), South Fork Black Creek Watershed (WBID 2415C), and Peters Creek Watershed (WBID 2444)



4.3 Source Summary

The sources discussed in this section do not comprise a complete list of all the possible sources of lead to the three impaired segments in the Black Creek watershed. In addition to the large number of potential sources of lead, there are complex relationships between lead concentrations, hardness, flow regimes, and the relative contributions from various potential sources of lead to the watershed which warrant further reveiw.

In addition, the dynamics of the flow regime, tidal fluctuations, and sediment characteristics throughout the entire Lower St. Johns Basin and how these factors may affect the lead concentrations in the segments addressed by this TMDL report are not yet well-understood.

Chapter 5: DETERMINATION OF ASSIMILATIVE CAPACITY

5.1 Determination of Loading Capacity

Typically, modeling results based on land use category parameters, soil and hydrologic characteristics, and observed metal and hardness concentrations are used in the development of a TMDL. However, as available resources did not permit the development of a model that incorporates all of the complex interactions of these factors, this TMDL was developed using a "percent reduction" approach.

Using this method, the target concentration for lead was first determined based on the median concentration of the observed exceedances. Based on this target concentration, percent reductions necessary to meet water quality standards were calculated for each of the three impaired segments. In each of the three segments, the percent reductions that were calculated include an implicit margin of safety (MOS).

5.1.1 Data Used in the Determination of the TMDL

Table 5.1 summarizes the spatial distribution of results data used in this report; **Table 5.2** summarizes the distribution of those data by sampling location within each of the segments. **Figure 5.1** displays the locations of the sample sites where lead (and hardness) samples used to develop the TMDLs were collected.

The data used to develop the TMDLs were collected at the following locations:

- *Black Creek (WBID 2415B): 21FLSJRWMBLC;*
- *South Fork Black Creek (WBID 2415C): 21FLSJWMBSF; 21FLA 20030247*
- *Peters Creek (WBID 2444): 21FLSJWMPTC; 21FLA 20030244.*

The SJRWMD and the Department collected these data between January 1, 2001, and June 30, 2008.

Table 5.1. Stations in Black Creek (WBID 2415B), South Fork Black Creek (WBID 2415C), and Peters Creek (WBID 2444) Sampled for Lead, January 1, 2001–June 30, 2008

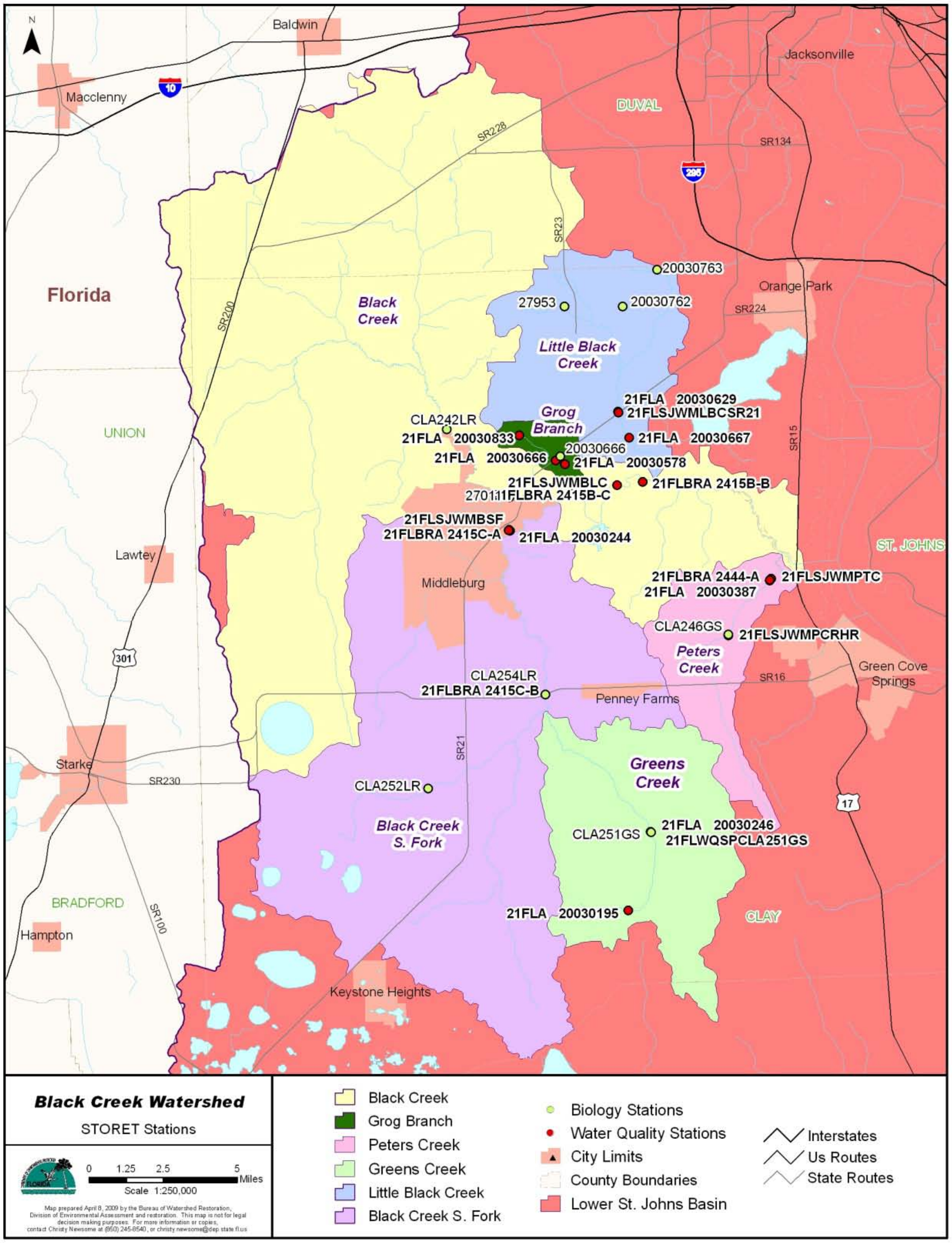
[a] Nobs = Number of assessable results
[b] Nobs2 = Total number of samples

Station	Name	WBID	Lat	Long	Nobs[a]	Nobs2[b]
21FLSJWMBLC	Black Creek at Hwy 209	2415B	30.081944	-81.809722	27	96
21FLSJWMBSF	South Fork of Black Creek at Hwy 218	2415C	30.060833	-81.871389	8	8
21FLA 20030247	Black Cr South Fork @ SR 16	2415C	29.979639	-81.85225	1	1
21FLA 20030244	Black Cr South Fork @ CR218	2415C	30.060278	-81.870833	2	3
21FLSJWMPTC	Peters Creek at Hwy 209	2444	30.034444	-81.723333	43	49

Table 5.2. Summary of Exceedances Observed for Black Creek (WBID 2415B), South Fork Black Creek (WBID 2415C), and Peters Creek (WBID 2444) by Sampling Location

WBID	Sampling Location	N	Maximum Lead Concentration (µg/L)	Minimum Lead Concentration (µg/L)	Mean Lead Concentration (µg/L)	Median Lead Concentration (µg/L)	Number of Exceedances Observed	Observed Exceedance Rate (%)
2415B	21FLSJWMBLC	27	6.675	1.00	2.06	2.00	11	40.74%
2415C	21FLA 20030244	3	6.78	0.20	2.39	0.20	1	33.33%
2415C	21FLSJWMBSF	8	3.533	1.11	2.20	2.14	7	87.50%
2444	21FLSJWMPCRHR	2	2.733	0.22	1.48	1.48	1	50.00%
2444	21FLSJWMPTC	41	4.126	1.00	2.05	2.00	10	24.39%

Figure 5.1. Sampling Locations in the Black Creek Watershed, Including Black Creek (WBID 2415B), South Fork Black Creek (WBID 2415C), and Peters Creek (WBID 2444)



Because the verified impairments were based on reported results having values reflective of relatively low concentrations of lead (in the presence of also relatively low reported values for hardness), it was considered important, for the purposes of this analysis, to have reliable information available for the method detection limits, and practical quantification limits.

Although data were available from a somewhat lengthier period of record for both lead and hardness, the older data included a large number of results that were reported at or below the method detection limits; notwithstanding,for many of these older data, the reported detection limit information was generally either not available; or not sufficient to support measuring below the hardness-specific criterion from Rule 62-302, F.A.C.; particularly when the corresponding hardness results reported were from the lower end of the hardness range.

In addition, the extent to which these older data may actually still be representative of current conditions for these three segments is not known; consequently, the data used to develop the TMDLs for these three segments were restricted to include only those data from the current verified assessment period (January 1, 2001, through June 30, 2008).

Tables 5.3 and **5.4** present the percentile distributions for the lead and hardness data for the entire period of record (some of the results included in these distributions ultimately were culled from the assessment dataset), used to determine the percent reductions necessary to meet the hardness-based criterion for lead from Rule 62-302, F.A.C.

Where results were reported below detection limits, the detection limit was used (this ensures that the most conservative estimates are used and contributes to the MOS). In **Tables 5.5** the effect of the relatively high detection limits for lead in the larger dataset on the percentile distribution is apparent.

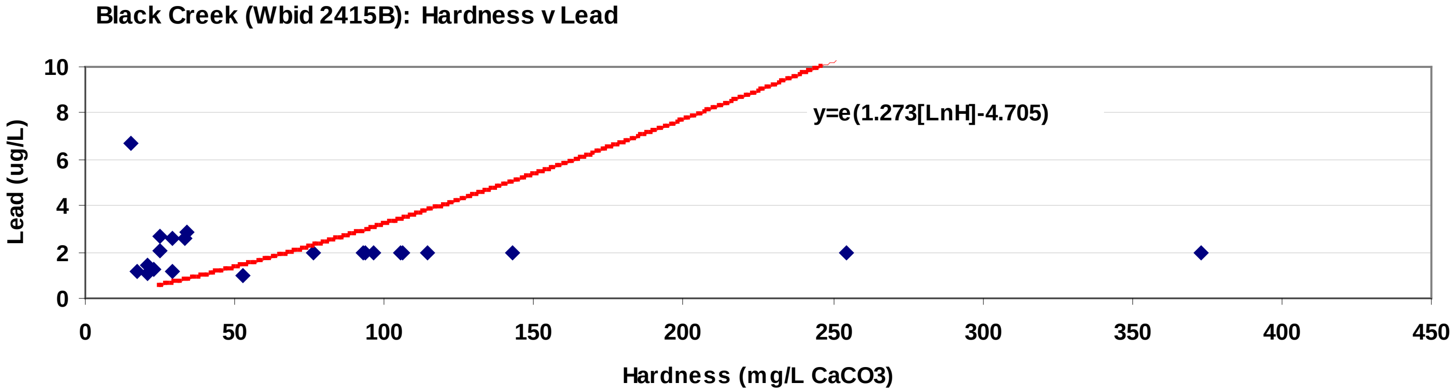
Table 5.3. Percentile Distribution for Period of Record—Lead Results for Black Creek (WBID 2415B), South Fork Black Creek (WBID 2415C), and Peters Creek (WBID 2444)

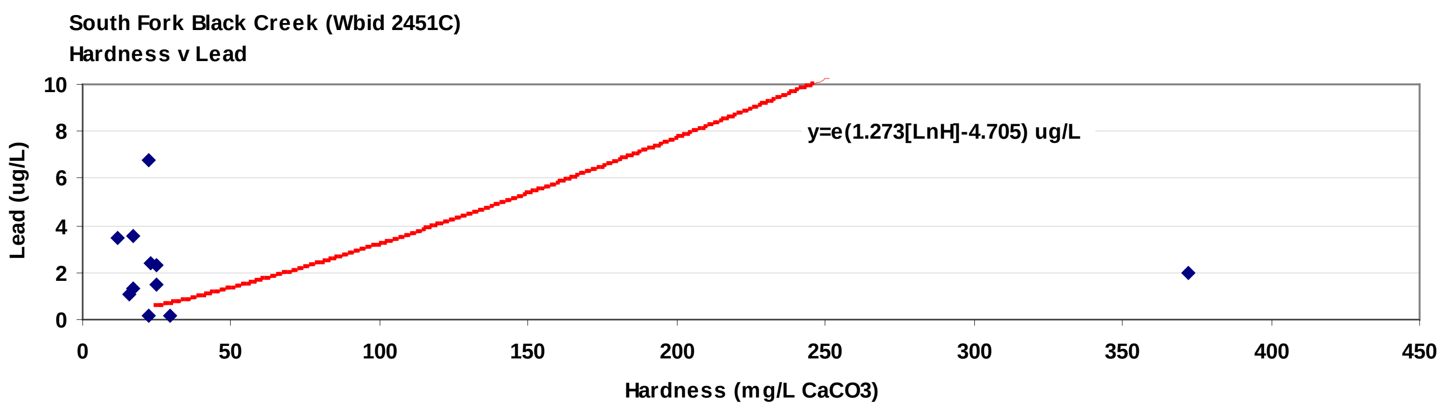
WBID	N	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th
2415B	280	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	4
2415C	272	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	4
2444	524	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3

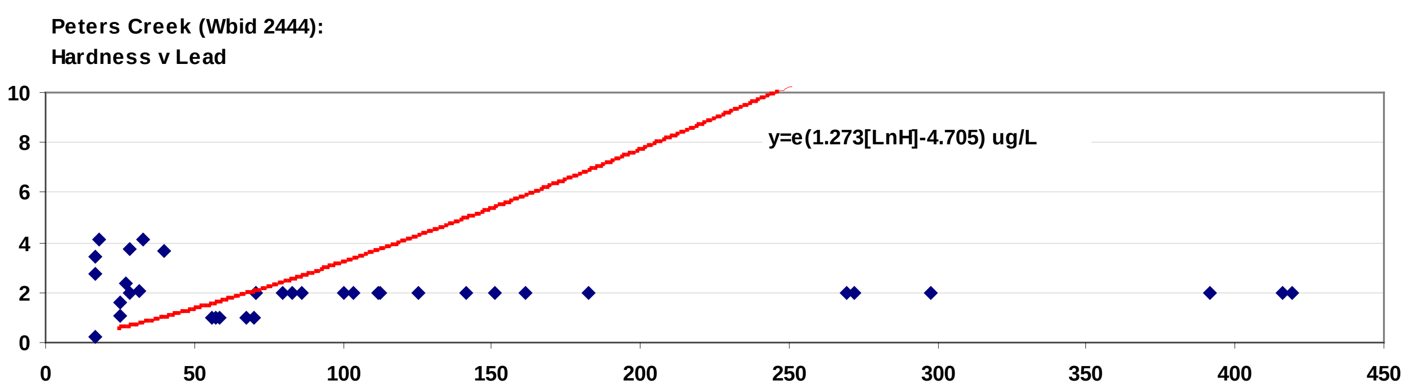
Table 5.4. Percentile Distribution for Period of Record—All Hardness Results for Black Creek (WBID 2415B), South Fork Black Creek (WBID 2415C), and Peters Creek (WBID 2444)

WBID	N	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th
2415B	360	14.86	17	19	20	21	22	22.45	24	24.1	25.09	27	28.79	29.6	31	32	34	35	44	105.7
2415C	474	10	12	12	13	14	14	15	16	16	16.66	17	18	19	20	21	22	23	25	29.6
2444	691	12	13.76	15.52	17	18	19.16	20.79	22	23	24	25	26	28	29	33	39.61	49.71	70	161.4

Figure 5.2. Hardness v Lead Concentrations for Black Creek (WBID 2415B), South Fork Black Creek (WBID 2415C), and Peters Creek (WBID 2444)







5.1.2 TMDL Development Process

The TMDLs, including the required MOS, were developed by selecting *e(1.273[Ln25]-4.705)* µg/L as the target concentration for lead. This value was selected based on a review of the historical percentile distributions, which demonstrated that the median hardness value for each of the three segments was less than 25.09 mg/L $CaCO_3$ (**Tables 5.5A** through **5.5C**): for Black Creek, the median of the historical hardness values was 25.09; for South Fork Black Creek, it was 16.66; and for Peters Creek, it was 23.

The selected target lead concentration corresponds to the functional value of the criterion at the minimal value of the hardness range defined in the Florida standards (Rule 62-302, F.A.C.). At higher values of hardness, and with appropriate quantification levels, this target concentration ensures that water quality standards will not be exceeded (since the criterion for lead is a monotone increasing function of hardness).

Based on these observations, the selection of the target concentration corresponding to the lead concentration derived from the criterion curve at a hardness value of 25 was considered to be an achievable objective. Further, the selected target concentration provides the maximum protection possible (under Rule 62-302, F.A.C.) for aquatic life. In addition, this concentration uniquely ensures that water quality standards will be met for any other (i.e., higher) value for hardness.

5.1.3 Critical Conditions/Seasonality

During the development of the TMDLs, it was observed that the highest lead concentrations occurred in either the same month as, or the month following, extremely high monthly total rainfall amounts. This observation was based on rainfall data from Jacksonville International Airport (JIA) (**Table 5.6**). **Figure 5.3** displays the annual average rainfall at JIA from 1995 to 200; and **Appendix B** displays rainfall from 1948 to 2008.

It was not possible to develop any correlations between either lead or hardness concentrations and rainfall amounts, since all of the nonexceedance results were actually nondetects, represented by their corresponding detection limits in the dataset (e.g., 2 µg/L); in addition, a more precise and location-specific set of rainfall data was not available in-house at the time when these TMDLs were developed (although daily values from JIA were available).

Due to reporting level considerations, and to a somewhat lesser extent, the necessity to have paired hardness result values both for the assessment process, as well as for the development of the TMDLs, the sample size of the dataset used for the development of these TMDLs was somewhat less than ideal. Other data concerns include the absence of hardness data for ground water monitored in the general area of Black Creek; as well as sediment data for the three segments.

A variety of other ancillary datasets that might have been useful in a more detailed analysis of potential sources were also not available when the TMDLs were developed.

Figure 5.3. Annual Average Precipitation at JIA, 1995–2008

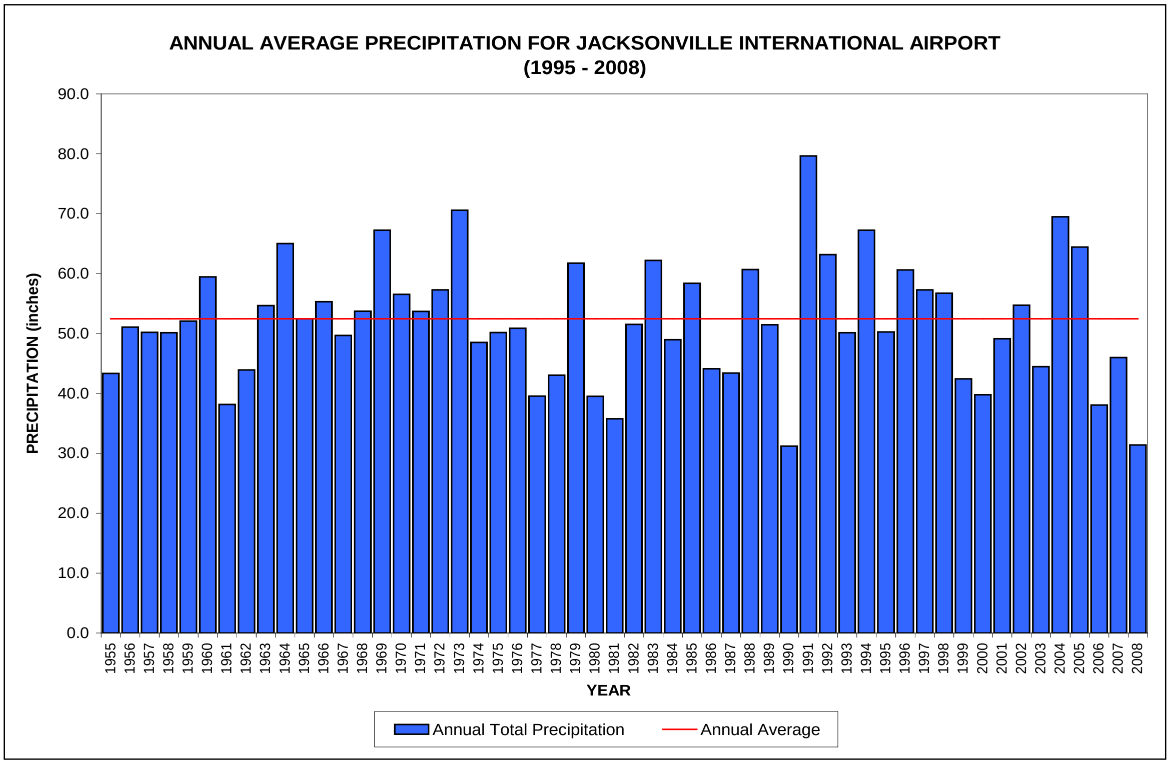


Table 5.5. Exceedance Results Used To Determine Median Exceedances for Black Creek (WBID 2415B), South Fork Black Creek (WBID 2415C), and Peters Creek (WBID 2444)

(A) Black Creek (WBID 2415B)

sta	year	month	day	time	DEPTH	param	result	the median, hardness	Standard 25	standard	Standard 400	Use Flag	criterion Used
21FLSJWMBLC	2001	8	7	925	0.5	1114	2.5949	33	0.544781	0.775734	18.5809	1	0.775734
21FLSJWMBLC	2001	10	10	1040	0.5	1114	2.554	29	0.544781	0.658078	18.5809	1	0.658078
21FLSJWMBLC	2002	2	13	1105	0.5	1114	2.864	34	0.544781	0.805781	18.5809	1	0.805781
21FLSJWMBLC	2002	9	9	1430	0.5	1114	1.28	23	0.544781	0.489919	18.5809	1	0.544781
21FLSJWMBLC	2003	2	12	1015	0.5	1114	1.421	21	0.544781	0.436345	18.5809	1	0.544781
21FLSJWMBLC	2003	3	10	935	0.5	1114	6.675	15	0.544781	0.284321	18.5809	1	0.544781
21FLSJWMBLC	2003	3	18	1405	0.5	1114	1.147	17	0.544781	0.333431	18.5809	1	0.544781
21FLSJWMBLC	2003	8	14	1320	0.5	1114	1.073	21	0.544781	0.436345	18.5809	1	0.544781
21FLSJWMBLC	2003	12	29	1215	0.5	1114	1.2	29.35173	0.544781	0.668255	18.5809	1	0.668255
21FLSJWMBLC	2004	12	6	1130	0.5	1114	2.0269	24.82285	0.544781	0.539872	18.5809	1	0.544781
21FLSJWMBLC	2005	7	7	1010	0.5	1114	2.674	25	0.544781	0.544781	18.5809	1	0.544781

(B) South Fork Black Creek (WBID 2415C)

sta	year	month	day	time	DEPTH	result	the median, hardness	standard 25	standard	standard 400	use Flag	criterion Used
21FLA 20030244	2007	7	26	1030	0.2	6.78	22.0533	0.544781	0.464394	18.5809	1	0.544781
21FLSJWMBSF	2002	2	13	1215	0.5	2.413	23	0.544781	0.489919	18.5809	1	0.544781
21FLSJWMBSF	2002	9	9	1350	0.5	1.3	17	0.544781	0.333431	18.5809	1	0.544781
21FLSJWMBSF	2003	3	10	1120	0.5	3.445	12	0.544781	0.214014	18.5809	1	0.544781
21FLSJWMBSF	2003	8	14	1255	0.5	1.107	16	0.544781	0.308666	18.5809	1	0.544781
21FLSJWMBSF	2003	9	11	1400	0.5	3.533	17	0.544781	0.333431	18.5809	1	0.544781
21FLSJWMBSF	2004	9	15	1210	0.5	1.4783	25	0.544781	0.544781	18.5809	1	0.544781
21FLSJWMBSF	2005	10	5	1055	0.5	2.286	25	0.544781	0.544781	18.5809	1	0.544781

(C) Peters Creek (WBID 2444)

sta	year	month	day	time	DEPTH	result	the median, hardness	standard 25	standard	standard 400	use Flag	criterion Used
21FLSJWMPCRHR	2001	8	10	935	0.25	2.733	17	0.544781	0.333431	18.5809	1	0.544781
21FLSJWMPTC	2001	1	10	1030	.	2.015	28	0.544781	0.629327	18.5809	1	0.629327
21FLSJWMPTC	2001	1	10	1030	0.5	2.015	28	0.544781	0.629327	18.5809	0	0.629327
21FLSJWMPTC	2001	9	7	1146	.	3.758	28.5	0.544781	0.643668	18.5809	1	0.643668
21FLSJWMPTC	2002	2	13	1020	0.5	2.363	27	0.544781	0.600856	18.5809	1	0.600856
21FLSJWMPTC	2002	7	12	1055	1	2.068	31.5	0.544781	0.731129	18.5809	1	0.731129
21FLSJWMPTC	2003	3	10	840	0.5	4.126	18	0.544781	0.358597	18.5809	1	0.544781
21FLSJWMPTC	2003	8	7	1040	1	3.401	17	0.544781	0.333431	18.5809	1	0.544781
21FLSJWMPTC	2003	9	5	1050	0.5	3.679	40	0.544781	0.990984	18.5809	1	0.990984
21FLSJWMPTC	2003	9	11	1230	0.5	4.089	33	0.544781	0.775734	18.5809	1	0.775734
21FLSJWMPTC	2004	8	10	1110	0.5	1.6291	25	0.544781	0.544781	18.5809	1	0.544781
21FLSJWMPTC	2004	9	15	1105	0.5	1.1005	25	0.544781	0.544781	18.5809	1	0.544781

Table 5.6. Monthly and Annual Precipitation at JIA, 1955–2008

Rainfall is in inches, and represents data from JIA.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
1955	3.1	2.46	1.66	1.5	4.51	2.7	5.53	3.85	10.6	5.36	1.9	0.2	**43.33**
1956	2.9	2.94	0.81	2.33	3.98	7.87	8.25	5.24	2.89	13.4	0.4	0	**51.08**
1957	0.3	1.69	3.87	1.61	5.25	7.1	12.3	3.3	8.33	3.5	1.6	1.3	**50.18**
1958	3.4	3.74	3.38	8.24	3.79	3.96	4.37	4.67	4.75	5.07	2	2.8	**50.14**
1959	3	5.22	9.75	2.65	9.2	2.94	4.51	2.86	5.67	3.12	2.2	1	**52.08**
1960	2.1	5.17	6.94	3.54	1.18	4.7	16.2	6.5	8.57	2.95	0.1	1.5	**59.45**
1961	2.9	4.85	1.17	4.16	3.06	5.27	3.48	10.6	1.02	0.27	0.9	0.5	**38.15**
1962	2.2	0.52	3.1	2.36	1.12	8.22	6.31	10.1	4.37	1.13	2.1	2.5	**43.9**
1963	5.4	6.93	2.23	1.75	1.74	12.5	6.47	4.95	4.88	1.53	2.7	3.6	**54.66**
1964	7.3	6.55	1.76	4.65	4.8	4.67	6.12	5.63	10.3	5.09	3.3	4.8	**65.03**
1965	0.7	5.5	3.91	0.95	0.94	9.79	2.71	9.58	11	1.75	1.9	3.8	**52.47**
1966	4.6	5.97	0.71	2.25	10.4	7.74	11.1	3.88	5.94	1.38	0.2	1.1	**55.3**
1967	3.1	4.35	0.81	2	1.18	12.9	5.22	12.3	1.8	1.13	0.2	4.7	**49.68**
1968	0.8	3.05	1.2	0.99	2.17	12.3	6.84	16.2	2.68	5.09	1.3	1.1	**53.72**
1969	0.8	3.39	4.23	0.34	3.78	5.12	5.89	15.1	10.3	9.81	4.6	3.9	**67.26**
1970	4.2	8.85	9.98	1.77	1.84	2.65	7.6	11	3.2	3.95	0	1.6	**56.55**
1971	2	2.55	2.41	4.07	1.9	5.52	5.07	12.8	4.17	6.46	0.8	5.9	**53.69**
1972	5.8	3.48	4.43	2.98	8.26	6.75	3.15	9.76	2.6	4.46	4.2	1.4	**57.29**
1973	4.6	5.07	10.2	11.6	5.33	4.1	5.45	7.49	7.86	4.08	0.4	4.3	**70.57**
1974	0.3	1.28	3.47	1.53	4.14	5.53	9.83	11.2	8.13	0.34	1	1.7	**48.52**
1975	3.5	2.58	2.46	5.78	7	5.21	6.36	6.23	5.24	3.63	0.4	1.8	**50.15**
1976	2.3	1.05	3.41	0.63	10	4.26	5.41	6.37	8.56	1.63	2.4	4.8	**50.87**
1977	3	3.24	1.03	1.76	3.07	2.65	1.97	7.26	7.45	1.68	3.1	3.4	**39.56**
1978	4.6	4.17	2.83	2.24	9.18	2.62	6.67	2.39	4.4	1.26	0.8	1.8	**43.04**
1979	6.3	3.75	1	4.18	7.54	5.91	4.67	4.78	17.8	0.25	3.6	2	**61.76**
1980	2.6	1.06	6.83	3.91	3.02	4.59	5.29	3.97	3.03	2.69	2.3	0.2	**39.53**
1981	0.9	4.53	5.41	0.32	1.48	3.31	2.46	6.47	1.22	1.35	4.9	3.4	**35.77**
1982	3	1.67	4.26	3.6	3.55	8.06	3.81	6.93	9.32	3.37	1.9	2	**51.52**
1983	7.2	4.27	8.46	4.65	1.38	6.86	6.11	4.63	4.61	4.29	3.3	6.4	**62.19**
1984	2.1	4.67	5.77	3.14	1.46	4.76	6.01	3.78	12.3	1.53	3.3	0.1	**48.96**
1985	1.1	1.45	1.26	2.76	2.08	3.71	6.33	8.93	16.8	8.34	2.1	3.6	**58.39**
1986	4.2	4.72	5.44	0.93	2.13	2.53	3.27	9.6	1.99	1.8	2.9	4.7	**44.1**
1987	4.1	6.47	6.27	0.14	0.75	4.18	4.4	4.48	7.13	0.3	5	0.2	**43.39**
1988	6.4	6.08	2.65	3.44	1.35	3.71	4.5	8.48	16.4	2.35	4.3	1.1	**60.68**
1989	1.7	1.77	2.14	2.79	1.55	3.66	8.98	9.16	14.4	1.39	0.5	3.4	**51.45**
1990	1.8	4.07	1.59	1.34	0.18	1.59	6.53	3.81	2.6	4.54	1.2	1.9	**31.2**
1991	10	1.52	7.33	6.31	9.35	11.7	15.9	3.48	6.2	6.36	0.7	0.6	**79.63**
1992	5.8	2.64	4.09	5.33	5.97	7.04	3.32	10.8	7.33	8.34	1.9	0.7	**63.18**
1993	3.9	2.89	5.98	0.85	1.6	2.52	7.54	2.96	7.6	8.84	3.6	1.9	**50.12**
1994	6.6	0.92	2.14	1.51	3.15	14	8.26	3.29	9.79	10.2	3.5	3.9	**67.26**
1995	1.9	2.07	3.67	1.77	1.77	5.35	9.45	9.93	5.41	3.53	3.2	2.2	**50.25**
1996	1.1	1.11	6.83	2.85	0.72	11.4	4.2	7.83	8.49	11.5	1.4	3.2	**60.63**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
1997	2.9	1.28	1.84	4.56	3.43	6.33	7.69	8.24	3.97	4.84	2.4	9.8	**57.27**
1998	3.5	11.1	2.64	4.71	0.96	2.95	7.29	10.1	7.65	3.01	2.4	0.4	**56.72**
1999	4.6	1.7	0.4	1.92	1.02	7.75	3.56	3.51	13	3.24	0.8	0.9	**42.44**
2000	2.8	1.17	1.79	2.6	1.15	2.43	5.69	7.38	11.6	0.23	1.6	1.4	**39.77**
2001	0.9	0.68	5.48	0.62	2.56	5.59	8.31	3.58	16	0.81	1.4	3.1	**49.14**
2002	4.5	0.82	4.38	2.41	0.47	6.24	7.8	8.14	9.31	2.58	2.7	5.4	**54.72**
2003	0.1	4.66	10.7	2.63	2.54	6.75	7.33	1.83	3.04	2.98	0.7	1.2	**44.47**
2004	1.6	4.47	1.36	2.02	1.24	17.2	8.6	9.85	16.3	1.32	2.9	2.7	**69.47**
2005	1.9	3.56	3.67	4.53	3.51	14.8	7.37	4.43	5.76	6.49	1.1	7.4	**64.44**
2006	2.30	3.91	0.68	1.22	2.01	7.25	3.97	7.08	4.55	1.81	0.39	2.90	**38.07**
2007	2.29	2.40	2.22	1.02	1.12	6.68	9.48	3.57	5.44	8.85	0.17	2.74	**45.98**
2008	2.63	5.22	3.50	2.34	0.66	8.21	8.73	16.83	5.84	1.62	1.01	0.59	**46.01**
AVG	**3.21**	**3.54**	**3.81**	**2.82**	**3.29**	**6.37**	**6.55**	**6.99**	**7.43**	**3.87**	**1.98**	**2.62**	**52.32**

Chapter 6: DETERMINATION OF THE TMDL

6.1 Expression and Allocation of the TMDL

The objective of a TMDL is to provide a basis for allocating acceptable loads among all of the known pollutant sources in a watershed so that appropriate control measures can be implemented and water quality standards achieved. A TMDL is expressed as the sum of all point source loads (wasteload allocations, or WLAs), nonpoint source loads (load allocations, or LAs), and an appropriate MOS, which takes into account any uncertainty concerning the relationship between effluent limitations and water quality:

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

The WLA is broken out into separate subcategories for wastewater discharges and stormwater discharges regulated under the NPDES Program:

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

It is 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**.

The TMDLs for the impaired segments that are addressed in this TMDL are expressed in terms of a percent reduction in the total recoverable fraction of lead necessary to meet Florida water quality standards (Section 62-302.500, F.A.C.) (**Table 6.1**).

Table 6.1. TMDL Components for Black Creek Segments

- = Empty cell
As the TMDL represents a percent reduction, it also complies with EPA requirements to express the TMDL on a daily basis.

WBID	TMDL	WLA for Wastewater (µg/L)	WLA for NPDES Stormwater (% Reduction)	Median of Exceedance Values (µg/L)	Target Concentration (µg/L)	LA (% Reduction Using Median of Exceedances for Each WBID)	MOS
2415B	-	Permit limits	73.12244427%	2.0269	0.544781177	73.12244427	Implicit
2415C	-	Permit limits	76.81288883%	2.3495	0.544781177	76.81288883	Implicit
2444	-	Permit limits	80.06655042%	2.733	0.544781177	80.06655042	Implicit

6.2 Load Allocation

Reductions of lead concentrations ranging from 73 to 80 percent will be required from all sources. It should be noted that the load allocation may include loading from stormwater discharges that are not part of the NPDES Stormwater Program.

6.3 Wasteload Allocation

6.3.1 NPDES Wastewater Discharges

There are currently eight permitted NPDES discharges in the Black Creek watershed; future discharge permits issued in the watershed will be required to meet the state's Class III criterion for lead concentrations.

6.3.2 NPDES Stormwater Discharges

There are two Phase II MS4 permits for areas covered by these TMDLs (Clay County: FLR04E045; FDOT District 2 [Jacksonville UA: FLR04E020]). Reductions of lead concentrations of 73.2, 76.8, and 80.1 percent will be required from all MS4 sources in the Black Creek, South Fork Black Creek, and Peters Creek watersheds, respectively. It should be noted that any future MS4 permittee is only responsible for reducing the loads associated with stormwater outfalls that it owns or otherwise has responsible control over, and it is not responsible for reducing other nonpoint source loads in its jurisdiction.

6.4 Margin of Safety

Consistent with the recommendations of the Allocation Technical Advisory Committee (Department, 2001), an implicit MOS was used in the development of this TMDL.

In addition to the factors that contribute to the MOS already discussed in this document, the lead criterion from the Florida standards is expressed in terms of the total recoverable fraction for lead. Since the dissolved fraction is the most toxic, and available, fraction to aquatic life, the target concentration determined by the TMDLs should provide additional protection for aquatic species.

It has also been noted that the range of hardness values for the data used to develop these TMDLs may not have been representative of the expanded full range of hardness for these segments. Higher values for hardness have historically been known to occur (**Table 5.3**); and at these higher values, the lead criterion from water quality standards, designed to be protective of aquatic life, would not be exceeded at these target concentrations, further ensuring support for the designated uses of these waters.

Chapter 7: TMDL IMPLEMENTATION

7.1 TMDL Implementation

Following the adoption of this TMDL by rule, the Department will determine the best course of action regarding its implementation:

Depending on the pollutant(s) causing the waterbody impairment and the significance of the waterbody, the Department will select the best course of action leading to the development of a plan to restore the waterbody. Often this will be accomplished in cooperation with stakeholders by creating a Basin Management Action Plan, referred to as a BMAP.

BMAPs are the primary mechanism through which TMDLs are implemented in Florida (see Subsection 403.067[7], F.S.). A single BMAP may provide the conceptual plan for the restoration of one or many impaired waterbodies. If the Department determines that a BMAP is needed to support the implementation of this TMDL, a BMAP will be developed through a transparent, stakeholder-driven process intended to result in a plan that is cost-effective, technically feasible, and meets the restoration needs of the applicable waterbodies.

Once adopted by order of the Department Secretary, BMAPs are enforceable through wastewater and municipal stormwater permits for point sources and through BMP implementation for nonpoint sources. Among other components, BMAPs typically include the following:

- *Water quality goals (based directly on the TMDL);*
- *Refined source identification;*
- *Load reduction requirements for stakeholders (quantitative detailed allocations, if technically feasible);*
- *A description of the load reduction activities to be undertaken, including structural projects, nonstructural BMPs, and public education and outreach;*
- *A description of further research, data collection, or source identification needed in order to achieve the TMDL;*
- *Timetables for implementation;*
- *Implementation funding mechanisms;*
- *An evaluation of future increases in pollutant loading due to population growth;*
- *Implementation milestones, project tracking, water quality monitoring, and adaptive management procedures; and*
- *Stakeholder statements of commitment (typically a local government resolution).*

BMAPs are updated through annual meetings and may be officially revised every five years. Completed BMAPs in the state have improved communication and cooperation among local stakeholders and state agencies; improved internal communication within local governments; applied high-quality science and local information in managing water resources; clarified the obligations of wastewater point source, MS4, and non-MS4 stakeholders in TMDL implementation; enhanced transparency in the Department's decision making; and built strong relationships between the Department and local stakeholders that have benefited other program areas.

7.2 Other TMDL Implementation Tools

In some basins and for some parameters, particularly for those basins with fecal coliform impairments, the development of a BMAP using the process described above will not be the most efficient way to restore a waterbody, such that it meets its designated uses. This is because fecal coliform impairments result from the cumulative effects of a multitude of potential sources, both natural and anthropogenic. Addressing these problems requires good old-fashioned detective work that is best done by those in the area.

A multitude of assessment tools is available to assist local governments and interested stakeholders in this detective work. The tools range from the simple (such as Walk the WBIDs and GIS mapping) to the complex (such as bacteria source tracking). Department staff will provide technical assistance, guidance, and oversight of local efforts to identify and minimize fecal coliform sources of pollution.

Based on work in the Lower St Johns River tributaries and in the Hillsborough River Basin, the Department and local stakeholders have developed a logical process and tools that provide a foundation for this detective work. In the near future, the Department will be releasing these tools to assist local stakeholders with the development of local implementation plans to address fecal coliform impairments. In such cases, the Department will rely on these local initiatives as a more cost-effective and simplified approach to identify the actions needed to put in place a road map for restoration activities, while still meeting the requirements of Subsection 403.067(7), F.S.

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Appendices

Appendix A: Background Information on Federal and State Stormwater Programs

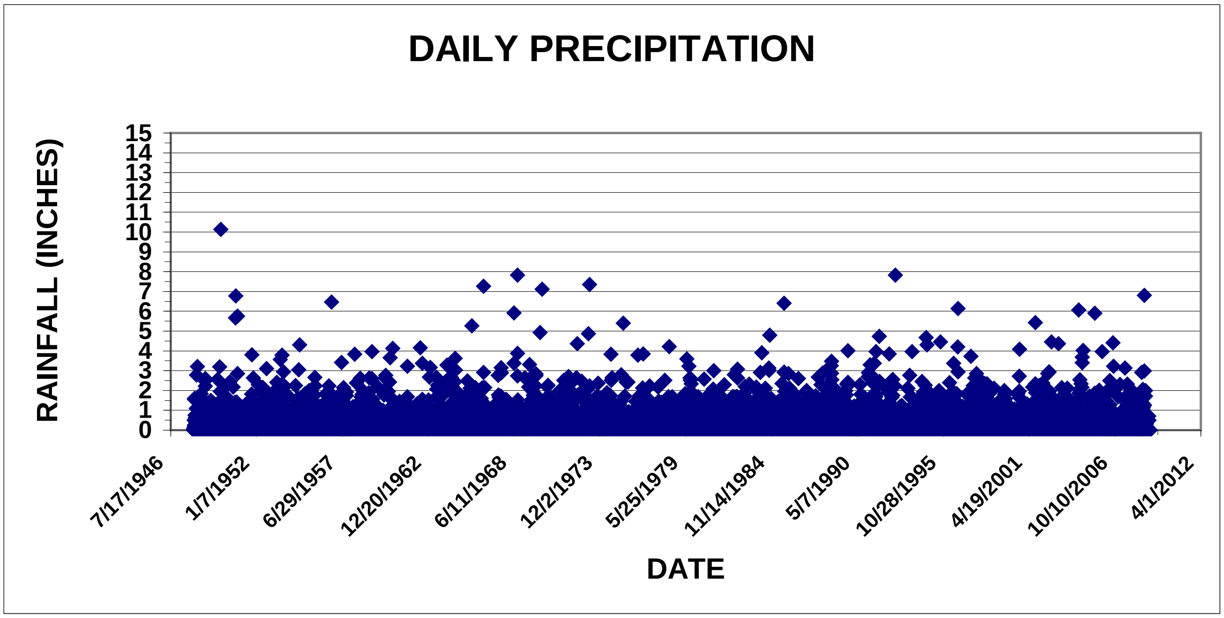
In 1982, Florida became the first state in the country to implement statewide regulations to address the issue of nonpoint source pollution by requiring new development and redevelopment to treat stormwater before it is discharged. The Stormwater Rule, as authorized in Chapter 403, F.S., was established as a technology-based program that relies on the implementation of BMPs that are designed to achieve a specific level of treatment (i.e., performance standards) as set forth in Rule 62-40, F.A.C. In 1994, the Department's stormwater treatment requirements were integrated with the stormwater flood control requirements of the water management districts, along with wetland protection requirements, into the Environmental Resource Permit regulations.

Rule 62-40, F.A.C., also requires the state's water management districts to establish stormwater Pollutant Load Reduction Goals (PLRGs) and adopt them as part of a Surface Water Improvement and Management (SWIM) plan, other watershed plan, or rule. Stormwater PLRGs are a major component of the load allocation part of a TMDL. 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.

In 1987, the U.S. Congress established Section 402(p) as part of the federal CWA Reauthorization. This section of the law amended the scope of the federal NPDES permitting program to designate certain stormwater discharges as "point sources" of pollution. The EPA promulgated regulations and began implementing the Phase I NPDES Stormwater Program in 1990. These stormwater discharges include certain discharges that are associated with industrial activities designated by specific standard industrial classification (SIC) codes, construction sites disturbing 5 or more acres of land, and the 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 implemented Phase I of the MS4 permitting program on a countywide basis, which brought in all cities (incorporated areas), Chapter 298 urban water control districts, and the FDOT throughout the 15 counties meeting the population criteria. The Department received authorization to implement the NPDES Stormwater Program in 2000.

An important difference between the federal NPDES and the state's stormwater/environmental resource permitting programs is that the NPDES Program covers both new and existing discharges, while the state's program focus on new discharges only. Additionally, Phase II of the NPDES Program, implemented in 2003, expands the need for these permits to construction sites between 1 and 5 acres, and to local governments with as few as 1,000 people. While these urban stormwater discharges are now technically referred to as "point sources" for the purpose of regulation, they are still diffuse sources of pollution that cannot be easily collected and treated by a central treatment facility, as are other point sources of pollution such as domestic and industrial wastewater discharges. It should be noted that all MS4 permits issued in Florida include a reopener clause that allows permit revisions to implement TMDLs when the implementation plan is formally adopted.

Appendix B: Chart of Rainfall for JIA, 1948–2008



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