Draft

Total Maximum Daily Load

Evaluation

for

Three Segments

in the

Suwannee River Basin

for

Lead

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The U.S. Environmental Protection Agency
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EXECUTIVE SUMMARY

The State of Georgia assesses its water bodies for compliance with water quality criteria established for their designated uses as required by the Federal Clean Water Act (CWA). Assessed water bodies are placed into one of three categories, supporting designated use, not supporting designated use, or assessment pending, depending on water quality assessment results. These water bodies are found on Georgia's 305(b) list, as required by that section of the CWA that defines the assessment process, and are published in *Water Quality in Georgia* (EPD, 2012-2013).

Some of the 305(b) not supporting water bodies are also assigned to Georgia's 303(d) list, named after that section of the CWA. Water bodies on the 303(d) list are denoted by a Category of 5, and are required to have a Total Maximum Daily Load (TMDL) evaluation for the water quality constituent(s) in violation of the water quality criteria. The TMDL process establishes the allowable pollutant loadings or other quantifiable parameters for a water body based on the relationship between pollutant sources and in-stream water quality conditions. This allows water quality-based controls to be developed to reduce pollution and restore and maintain water quality.

The State of Georgia has identified three (3) stream segments located in the Suwannee River Basin as impaired for lead. The water use classification of the impacted streams is Fishing. The general and specific water quality criteria for Fishing streams are stated in Georgia's *Rules and Regulations for Water Quality Control*, Chapter 391-3-6-.03, Sections (5) and (6).

The calculation of the lead load at any point in a stream requires the lead concentration and stream flow. The availability of water quality and flow data varies considerably among the listed segments. The Mass Balance Approach was used to determine the current lead load and TMDL. The lead load and required reduction for the listed streams are summarized in the table below.

Total Dissolved Lead TMDL Summary for the Impaired Stream Segments in the Suwannee River Basin

Stream Segment	Criteria	Current Load	WLA	WLA_{SW}*	LA	MOS	TMDL	Reduction
Jones Creek (aka Tatum Creek)	Chronic	Q x 0.55 µg/L	-	-	6.81×10^{-5} kg/day for the 7Q10 ΣQ_{LA} x 0.1 µg/L for all conditions and flows	Implicit	6.81×10^{-5} kg/day + WLA for the 7Q10 Q_{total} x 0.1 µg/L for all conditions and flows	84.3%
	Acute	Q x 0.55 µg/L	-	-	1.36×10^{-3} kg/day for the 1Q10 ΣQ_{LA} x 2.57 µg/L for all conditions and flows	Implicit	1.36×10^{-3} kg/day + WLA for the 1Q10 Q_{total} x 2.57 µg/L for all conditions and flows	0%
Suwannoochee Creek	Chronic	Q x 0.42 µg/L	-	-	1.86×10^{-4} kg/day for the 7Q10 ΣQ_{LA} x 0.12 µg/L for all conditions and flows	Implicit	1.86×10^{-4} kg/day + WLA for the 7Q10 Q_{total} x 0.12 µg/L for all conditions and flows	79.5%
	Acute	Q x 0.42 µg/L	-	-	3.56×10^{-3} kg/day for the 1Q10 ΣQ_{LA} x 2.94 µg/L for all conditions and flows	Implicit	3.56×10^{-3} kg/day + WLA for the 1Q10 Q_{total} x 2.94 µg/L for all conditions and flows	0%
Withlacoochee River	Chronic	Q x 1.72 µg/L	-	ΣQ_{WLASW} x 1.08 µg/L for all conditions and flows	2.4×10^{-2} kg/day for the 7Q10 ΣQ_{LA} x 1.08 µg/L for all conditions and flows	Implicit	2.4×10^{-2} kg/day + WLA for the 7Q10 Q_{total} x 1.08 µg/L for all conditions and flows	46.7%
	Acute	Q x 1.72 µg/L	-	ΣQ_{WLASW} x 27.8 µg/L for all conditions and flows	5.03×10^{-1} kg/day for the 1Q10 ΣQ_{LA} x 27.8 µg/L for all conditions and flows	Implicit	5.03×10^{-1} kg/day + WLA for the 1Q10 Q_{total} x 27.8 µg/L for all conditions and flows	0%

* Based on the Draft EPA Interoffice Memorandum on "*Estimating Water Quality Loadings from MS4 Areas,*" dated 12/19/2002: "If the critical period is a low flow event, the load from the MS4 does not have to be quantified and a WLA for the storm water sources is not necessary…"

1.0 INTRODUCTION

1.1 Background

The State of Georgia assesses its water bodies for compliance with water quality standards criteria established for their designated uses as required by the Federal Clean Water Act (CWA). Assessed water bodies are placed into one of three categories, supporting designated use, not supporting designated use, or assessment pending, depending on water quality assessment results. These water bodies are found on Georgia's 305(b) list, as required by that section of the CWA that defines the assessment process, and are published in *Water Quality in Georgia* (EPD, 2012 – 2013).

A subset of the water bodies that do not meet designated uses on the 305(b) list are also assigned to Georgia's 303(d) list, named after that section of the CWA. Although the 305(b) and 303(d) lists are two distinct requirements under the CWA, Georgia reports both lists in one combined format called the Integrated 305(b)/303(d) List, which is found in Appendix A of *Water Quality in Georgia* (EPD, 2012-2013). Water bodies included in the 303(d) list are denoted by Category 5, and are required to have a Total Maximum Daily Load (TMDL) evaluation for the water quality constituent(s) in violation of the water quality criteria. The TMDL process establishes the allowable loading of pollutants or other quantifiable parameters for a water body based on the relationship between pollution sources and in-stream water quality conditions. This allows water quality-based controls to be developed to reduce pollution and restore and maintain water quality.

The State of Georgia has identified three segments in the Suwannee River Basin as not supporting their designated use due to exceedances of water quality standards for lead. Table 1 presents the streams in the Suwannee River Basin included on the 2014 303(d) list for exceedance of the lead criteria.

Table 1. Water Bodies Listed for Lead in the Suwannee River Basin

Reach ID	Water body	Segment	County	Segment Length (miles)	Designated Use
R031102010203	Jones Creek (aka Tatum Creek)	Dry Branch to the Suwannee River	Clinch	5	Fishing
R031102010301	Suwannoochee Creek	Lees Bay to Suwannee River	Clinch	11	Fishing
R031102030806	Withlacoochee River	Little River to Okapilco Creek	Brookes/ Lowndes	15	Fishing

1.2 Watershed Description

The Suwannee River Basin is located primarily in south-central Georgia, occupying nearly 10,000 square miles with approximately 5,560 square miles of the basin within Georgia (EPD, 2002). The headwaters of the Suwannee River begin in the southeastern portion of Georgia in the Okefenokee National Wildlife Refuge, located south of Waycross. Other major cities in the Suwannee River Basin include Valdosta, Adel, Tifton, Nashville, Fitzgerald, Quitman, Moultrie, Sylvester and Ashburn. The Suwannee River is made up of Little River, Withlacoochee, Willacoochee, and Alapaha Rivers in Georgia and the Santa Fe River in Florida. The Suwannee River flows south through Florida and eventually drains into the Gulf of Mexico through Apalachee Bay.

The Suwannee River basin includes four United States Geologic Survey (USGS) four-digit hydrologic units, HUCs 03110201-03110204. Figure 1 shows the location of the Suwannee River Basin in the State of Georgia. Figure 2 shows the locations of these four hydrologic units within the Suwannee River Basin. Figure 3 shows the locations of the three 303(d) listed stream segments in the Suwannee River Basin. The watershed is in the Coastal Plain Physiographic Province.

The land use characteristics of the Suwannee River Basin watersheds were determined using data from the Georgia Land Use Trends (GLUT) for year 2008, which was developed by the University of Georgia – Natural Resources Spatial Analysis Laboratory (NARSAL). Table 2 lists the watershed land use distribution for each watershed.

1.3 Regional Water Planning Councils

The 2008 Comprehensive State-wide Water Management Plan established Georgia's ten Regional Water Planning Councils (RWPCs). The boundaries of these ten RWPCs, in addition to the Metropolitan North Georgia Water Planning District or MNGWPD, established under a separate statute, are shown in Figure 4. In 2011, each RWPC developed and adopted Regional Water Plans, which identify ranges of actions or management practices to help meet the State's water quality challenges. Implementation of these plans is critical to meeting Georgia's water resource challenges. The specific regional plan(s) applicable to this TMDL are discussed in Sections 6 and 7.

1.4 Water Quality Standards

The water use classification for the listed stream segments in the Suwannee River Basin is Fishing. The Fishing classification, as stated in Georgia's Rules and Regulations for Water Quality Control Chapter 391-3-6-.03(6)(a) (EPD, 2015), is established to protect "Propagation of Fish, Shellfish, Game and Other Aquatic Life; secondary contact recreation in and on the water; or for any other use requiring water of a lower quality."

Chapter 391-3-6-.03(5)(e)(ii) of Georgia's Rules and Regulations establishes criteria for metals that apply to all waters in the State. The established chronic criterion and acute criterion for dissolved lead are as follows:

$$\text{acute criteria for dissolved lead} = (e^{(1.273[\ln(\text{hardness})] - 1.460)})(1.46203 - [\ln \text{hardness})(0.145712)])\ \mu g/L$$

$$\text{chronic criteria for dissolved lead} = (e^{(1.273[\ln(\text{hardness})] - 4.705)})(1.46203 - [\ln \text{hardness})(0.145712)])\ \mu g/L$$

The hardness of the water body is used in the above equations, and is expressed in mg/L as $CaCO_3$.

The regulation cited above requires that instream concentrations of the dissolved metals shall not exceed the acute criteria, under 1Q10 or higher stream flow conditions, and shall not exceed the chronic criteria indicated above, under 7Q10 or higher stream flow conditions.

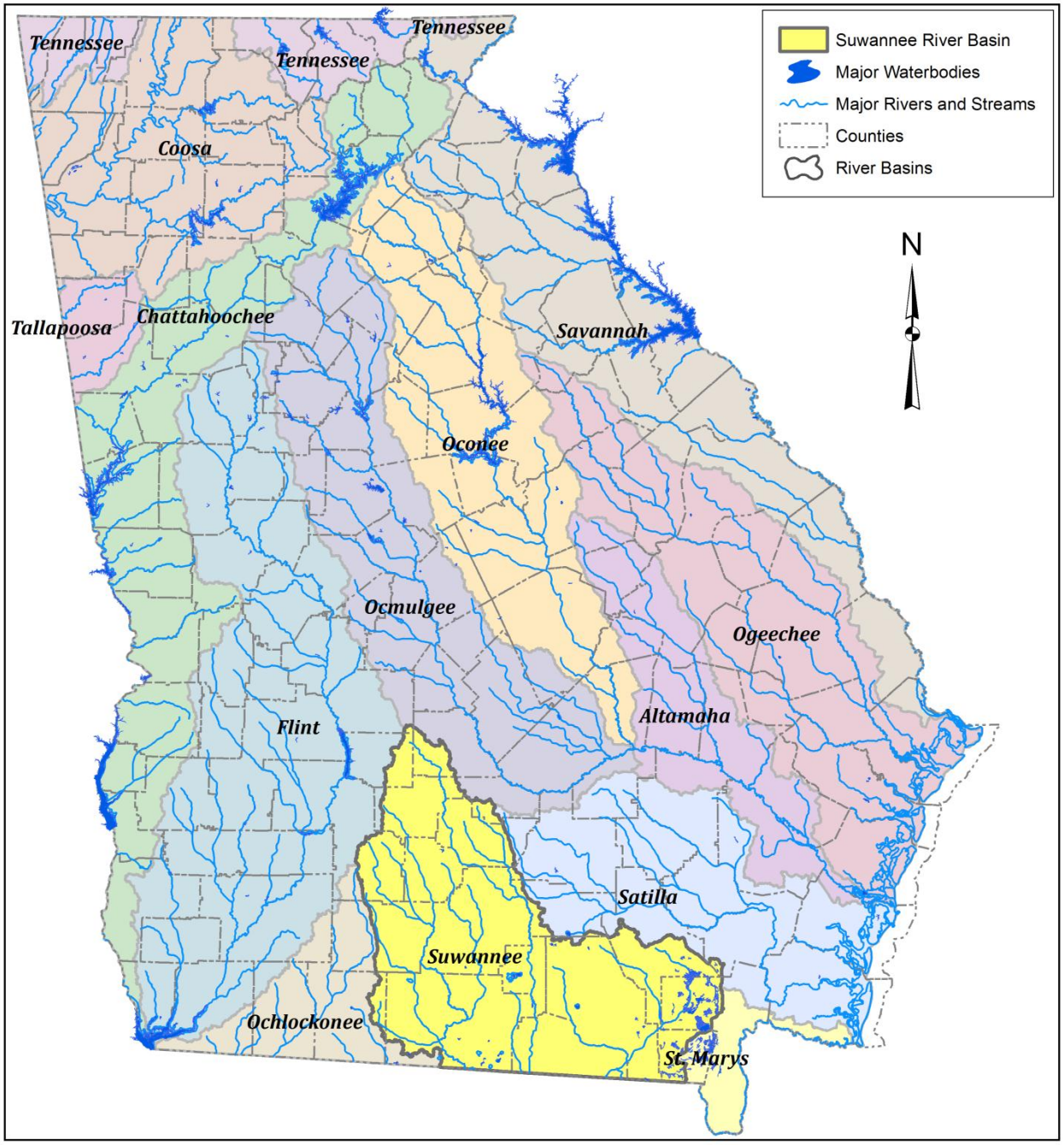

Figure 1. Location of the Suwannee River Basin in the State of Georgia

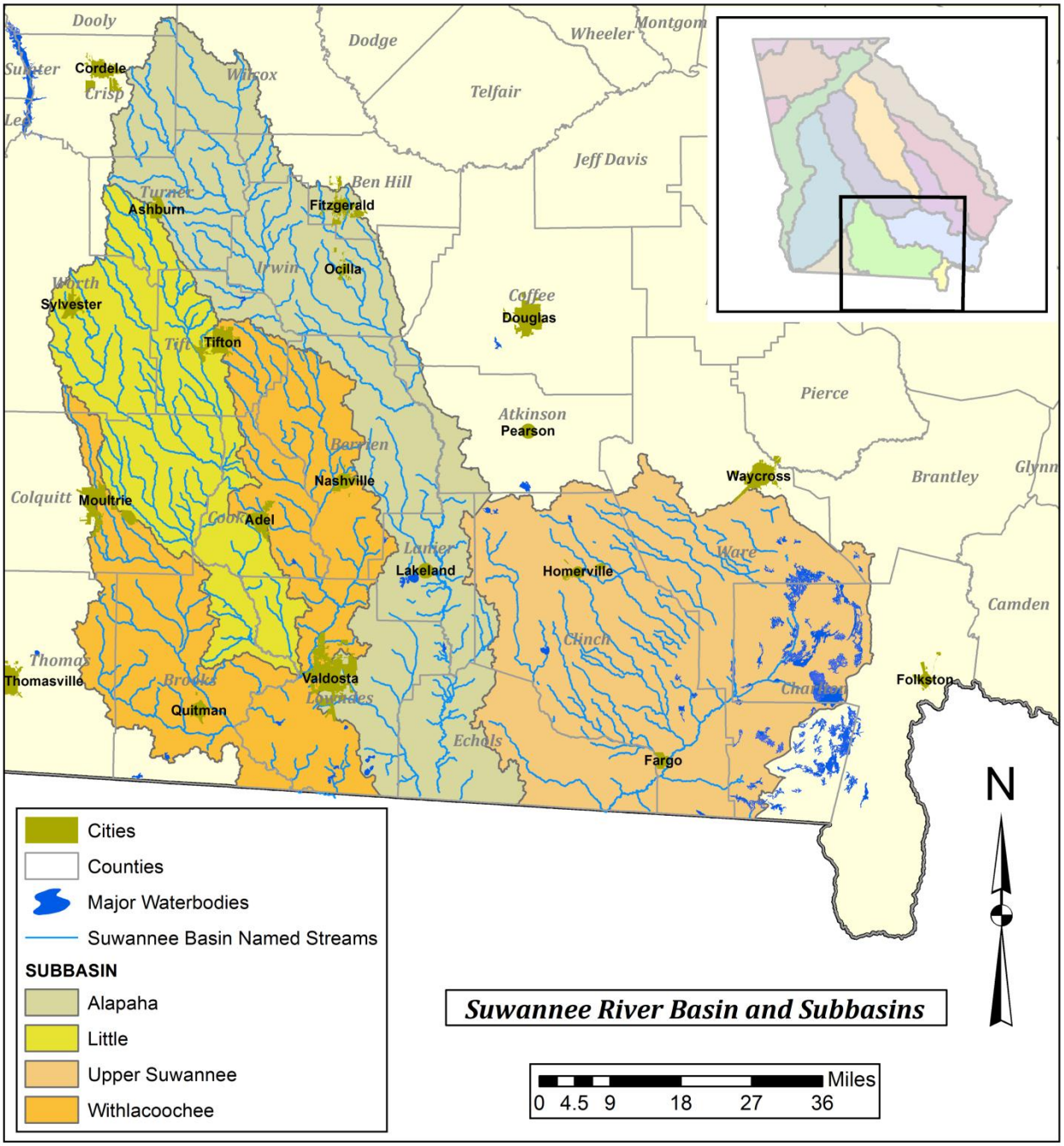

Figure 2. Location of the Four USGS 8-Digit HUCs of the Suwannee River Basin

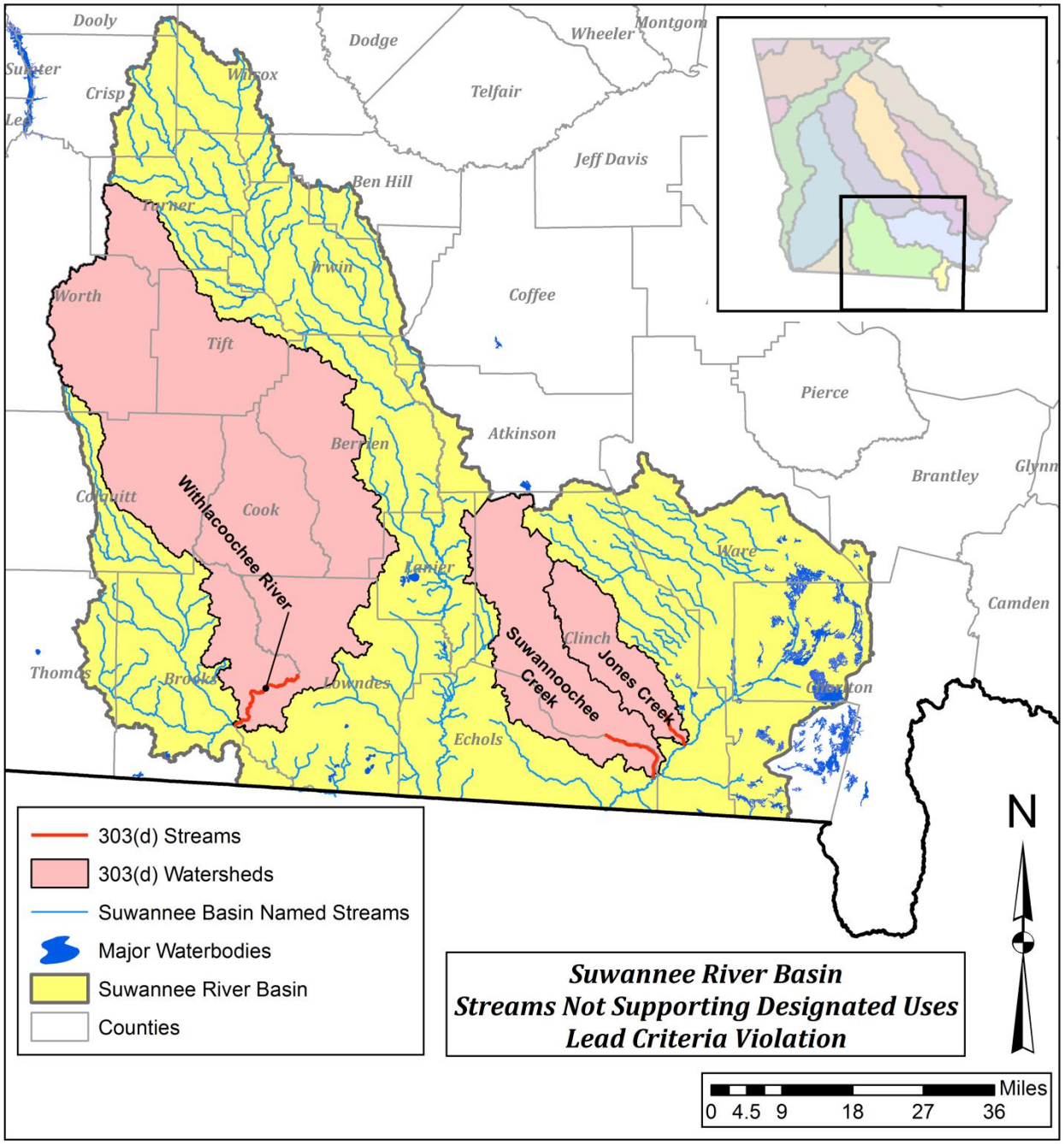

Figure 3. Location of the Three 303(d) Stream Segments Listed for Lead in the Suwannee River Basin.

Table 2. Suwannee River Watersheds Land Cover Distribution, Acres (Percentage)

Stream/Segment	Land Use Categories - Acres (Percent)													
	Open Water	Low Intensity Residential	High Intensity Residential	High Intensity Commercial, Industrial, Transportation	Bare Rock, Sand, Clay	Quarries, Strip Mines, Gravel Pits	Transitional	Forest	Row Crops	Pasture, Hay	Other Grasses (Urban, recreational; e.g. parks, lawns)	Woody Wetlands	Emergent Herbaceous Wetlands	Total
Jones Creek (aka Tatum Creek)	14	2,204	238	142	7	0	6,633	52,142	1,254	526	4,165	31,893	292	99,508
	0.0%	2.2%	0.2%	0.1%	0.0%	0.0%	6.7%	52.4%	1.3%	0.5%	4.2%	32.1%	0.3%	100.0%
Suwannoochee Creek	608	3,509	144	12	49	83	12,445	120,859	3,792	479	8,422	77,106	1,025	228,533
	0.3%	1.5%	0.1%	0.0%	0.0%	0.0%	5.4%	52.9%	1.7%	0.2%	3.7%	33.7%	0.4%	100.0%
Withlacoochee River	11,740	26,970	6,630	5,014	3,412	41	13,556	292,097	353,653	47,491	49,611	156,918	3,801	970,933
	1.2%	2.8%	0.7%	0.5%	0.4%	0.0%	1.4%	30.1%	36.4%	4.9%	5.1%	16.2%	0.4%	100.0%

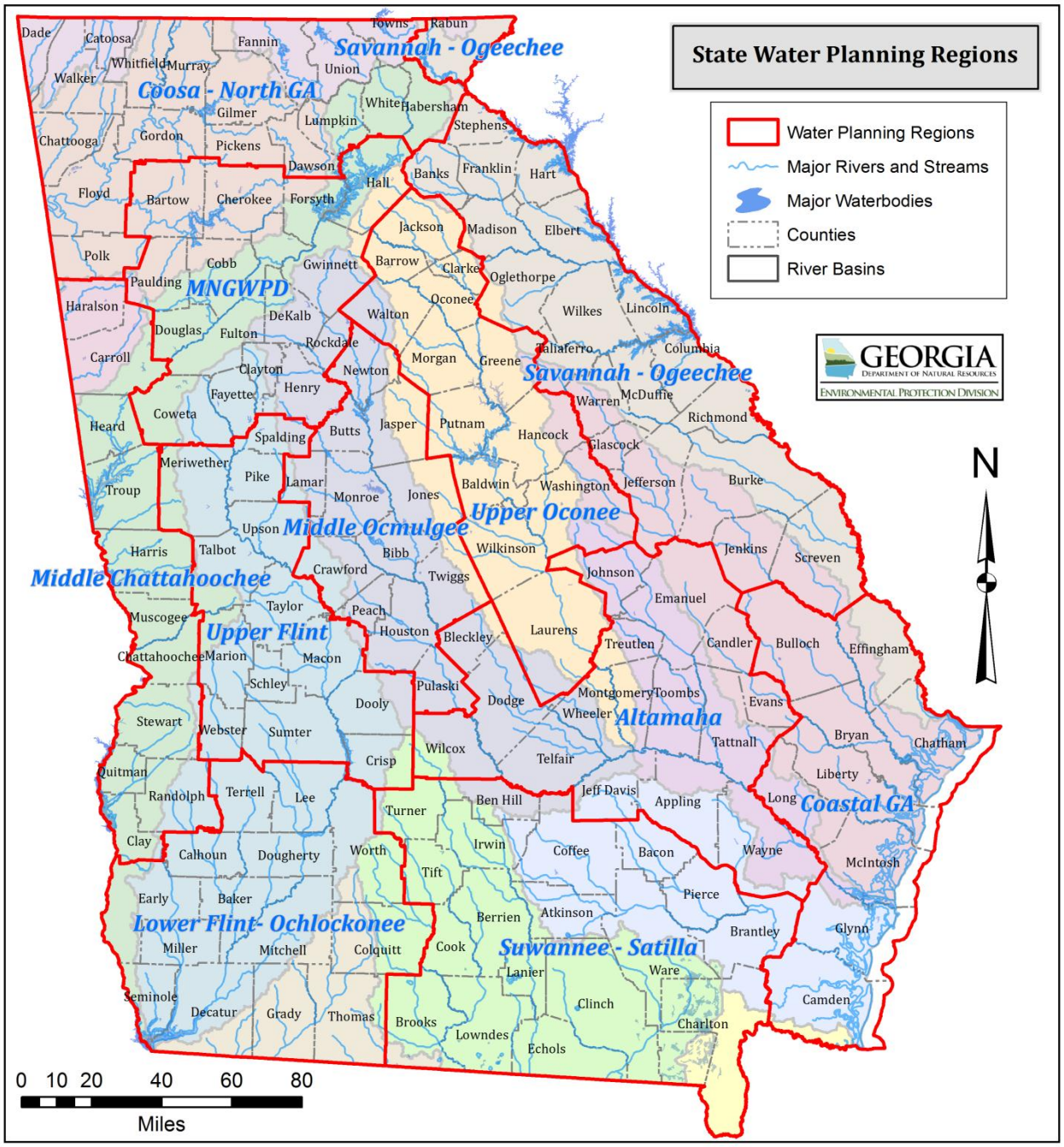

Figure 4. Boundaries of the Regional Water Planning Councils and the Metropolitan North Georgia Water Planning District.

1.5 Background Information for Lead

Lead is a naturally occurring element. The most common man-made sources of lead include lead-based paint in homes and buildings built before 1978, air emissions from industrial sources, plumbing materials, and leaded aviation gasoline. Although commercial and industrial uses of lead have been greatly curtailed, it is still commonly used in batteries, ammunition, metal products (solder and pipes), and for radiation shielding in TV screens and computer monitors, and for devices to shield against X-rays (CCME, 1999; NRC, 1980).

Long term human exposure to low levels of lead can cause anemia, loss of appetite, stomach pain, fatigue, effects on the nervous system, behavioral problems and learning disabilities, seizures, and even death. Young children absorb the metal more easily than adults, and even low level exposure may harm intellectual development, behavior, size and hearing of infants (CCME, 1999).

Prior to the banning of lead as an automobile fuel additive in1996, it commonly entered waterways through settling of particulate exhausts from motor vehicles and runoff from pavements. Lead also enters waterways through corrosion of leaded pipelines, corrosion of leaded paints, and runoff from industrial facilities manufacturing lead products. Aquatic ecosystems exposed to elevated levels of lead demonstrate losses in biodiversity. Decreases in growth and reproductive rates of aquatic animals and plants have been observed. Fish exposed to lead have exhibited blood and neurological changes. Lead shot and sinkers left from recreational hunting and fishing activities can be fatal to waterfowl and other wildlife that ingest these items (CCME, 1999; NRC, 1980).

2.0 WATER QUALITY ASSESSMENT

The impaired stream segments in the Suwannee River Basin designated use support determination was made for lead based on water quality samples taken by the Georgia Environmental Protection Division (EPD) Watershed Planning and Monitoring Program for years 2010 and 2012.

The water quality data for all the listed segments are provided in Table 3. For comparison with Georgia's instream water quality standards, the total recoverable lead values must be converted to estimated equivalent dissolved concentrations using a calculated translator. The translation is based on total suspended solids (TSS). As the TSS increases, less of the total lead will be in dissolved form. The sample results presented in Table 3 include total recoverable lead, TSS, and the translated dissolved lead concentrations. It also shows the sample hardness values, and the calculated acute and chronic lead criteria for Georgia's instream water quality standards, which are based on the hardness using the equations presented in Section 1.3.

Table 3. Lead Data Collected from Suwannee River Basin

Location	Date	Measured Total Recoverable Lead (μg/L)	Total Hardness (mg/L as $CaCO_3$)	TSS (mg/L)	Corresponding Dissolved Lead (μg/L)	Acute Criterion (μg/L)	Chronic Criterion (μg/L)
Jones Creek (aka Tatum Creek)	3/10/10	2.1	5.5	<1.0	0.55	2.47	0.10
	6/22/10	1.6	5.9	1.4	0.40	2.68	0.10
Suwannoochee Creek	3/10/10	1.3	6.0	<1.0	0.34	2.73	0.11
	6/22/10	1.6	5.2	1.0	0.42	2.31	0.09
	9/28/10	1.5	8.0	4.0	0.32	3.80	0.15
Withlacoochee River	3/22/12	6.9	39	2.8	1.55	22.86	0.89
	6/21/12	7.4	42	2.3	1.72	24.83	0.97
	9/17/12	1.2	38	4.8	0.25	22.20	0.87
	12/10/12	<1.0	67	1.6	<0.25	41.65	1.62

Two samples were collected on Jones Creek in 2010 at EPD Site 0901020202, located at Williamsburg Road near Fargo, Georgia. Both samples exceeded the chronic criterion for lead. There were no exceedances of the acute criterion.

Three samples were collected on Suwannoochee Creek in 2010 at EPD Site 0901030502, located at U.S. Highway 441 near Fargo, Georgia. Both samples exceeded the chronic criterion for lead. There were no exceedances of the acute criterion.

Four samples were collected on Suwannoochee Creek in 2012 at EPD Site 0903080101, located at U.S. Highway 84 near Fargo, Georgia. Two samples exceeded the chronic criterion for lead. There were no exceedances of the acute criterion.

3.0 SOURCE ASSESSMENT

An important part of the TMDL analysis is the identification of the potential sources of pollutants. A source assessment characterizes the known and suspected sources of lead in the watershed for use in the development of the TMDL. Sources are broadly classified as either point or nonpoint sources. A point source is defined as a discernable, confined, and discrete conveyance from which pollutants are or may be discharged to surface waters. Nonpoint sources are diffuse, and generally, but not always, involve accumulation of pollutants on land surfaces that wash off as a result of storm events.

3.1 Point Source Assessment

Title IV of the Clean Water Act establishes the National Pollutant Discharge Elimination System (NPDES) permit program. There are two basic categories of NPDES permits: 1) municipal and industrial wastewater treatment facilities, and 2) regulated storm water discharges.

3.1.1 Wastewater Treatment Facilities

In general, municipal and industrial wastewater treatment facilities have NPDES permits with effluent limits. These permit limits are either based on Federal and State effluent guidelines (technology-based limits) or on water quality standards (water quality-based limits).

The United States Environmental Protection Agency (USEPA) has developed technology-based guidelines, which establish a minimum standard of pollution control for municipal and industrial discharges without regard for the quality of the receiving waters. These are based on Best Practical Control Technology Currently Available (BPT), Best Conventional Control Technology (BCT), and Best Available Technology Economically Achievable (BAT). The level of control required by each facility depends on the type of discharge and the pollutant.

The USEPA and the States have also developed numeric and narrative water quality standards. Typically, these standards are based on the results of aquatic toxicity tests and/or human health criteria and include a margin of safety. Water quality-based effluent limits are set to protect the receiving stream. These limits are based on water quality standards that have been established for a stream based on its intended use and the prescribed biological and chemical conditions that must be met to sustain that use.

For purposes of this TMDL, NPDES permitted wastewater treatment facilities are considered point sources, and include municipal, industrial, private, and Federal facilities. Currently, there are 14 NPDES permitted wastewater treatment facilities located within the impaired stream segments watersheds. None of these facilities have permit limits that include lead or lead compounds, and are not considered sources of lead for the impaired stream segments.

Combined sewer systems convey a mixture of raw sewage and storm water in the same conveyance structure to a wastewater treatment plant. These are considered a component of municipal wastewater treatment facilities. When the combined sewage exceeds the capacity of the wastewater treatment plant, the excess is diverted to a combined sewage overflow (CSO) discharge point. There are no CSO outfalls located within the impaired stream segment watersheds.

3.1.2 Regulated Storm Water Discharges

Certain sources of storm water runoff are covered under the NPDES Permit Program. It is considered a diffuse source of pollution. Unlike other NPDES permits that establish end-of-pipe pollutant limits, storm water NPDES permits establish controls that are intended to reduce the quantity of pollutants that storm water picks up and carries into storm sewer systems during rainfall events. Currently, regulated storm water discharges include those associated with industrial activities, construction sites one acre or greater, large and medium municipal separate storm sewer systems (MS4s), and small MS4s serving urbanized areas.

3.1.2.1 Industrial General Storm Water NPDES Permit

Storm water discharges associated with industrial activities are currently covered under Georgia's General Industrial Storm Water NPDES Permit (GAR050000). This permit requires visual monitoring of storm water discharges, site inspections, implementation of Best Management Practices (BMPs), preparation of a Storm Water Pollution Prevention Plan (SWPPP), and annual reporting (EPD, 2014a). The Industrial General Permit requires that storm water discharging into an impaired stream segment or within one linear mile upstream of, and within the same watershed as, any portion of an impaired stream segment identified as "not supporting" its designated use(s), must satisfy the requirements of Appendix C of the permit if the pollutant(s) of concern for which the impaired stream segment has been listed may be exposed to storm water as a result of industrial activity at the site. If a facility is covered under Appendix C of the Industrial General Permit, then benchmark monitoring for the pollutant(s) of concern is required. Table 4 provides a list of those facilities in the Suwannee River Basin covered under the Industrial General Permit that are considered to have the potential for discharging lead based on their SIC Codes, Sector designations, and required benchmark sampling.

Table 4. Industrial General Permit Facilities That Are Potential Sources for Lead in Storm Water Runoff

Facility Name	SIC Code	Sector No.	Type of Business	Watershed	Facility Status
ACS of Tifton, GA	5015, 5093	M1, N1, N2	industrial and auto paint distributor	Withlacoochee	closed
Bold Corporation	2879	C1	industrial-agricultural chemicals manufacture	Withlacoochee	active
Micro Chem Company, LLC	2879	C1	agricultural chemicals manufacture	Withlacoochee	active
Southern Recycling Industries, Inc.	5093	N1, N2	household, paper, electronics recycler	Withlacoochee	active
Tifton Aluminum Extrusions, Inc.	3354	F3	Aluminum extrusion, fabrication, anodizing	Withlacoochee	active

Source: Nonpoint Source Program, GA DNR, 2016

Moody Air Force Base, located in the northeast part of Lowndes County, is covered under the Industrial General Permit with SIC Code 9711 for National Security. Under this Code, benchmark monitoring is not required. Moody Air Force Base has reported fugitive and nonpoint air releases of lead at the small arms and Grand Bay Ranges, and has the potential for lead in their storm water runoff.

3.1.2.2 MS4 NPDES Permits

The collection, conveyance, and discharge of diffuse storm water to local water bodies by a public entity are regulated in Georgia by the NPDES MS4 permits. These MS4 permits have been issued under two phases. Phase I MS4 permits cover medium and large cities, and counties with populations over 100,000. Each individual Phase I MS4 permit requires the prohibition of non-storm water discharges (i.e., illicit discharges) into the storm sewer systems and controls to reduce the discharge of pollutants to the maximum extent practicable, including the use of management practices, control techniques and systems, as well as design and engineering methods (Federal Register, 1990). A site-specific Storm Water Management Plan (SWMP) outlining appropriate controls is required by and referenced in the permit. A program to monitor and control pollutants in storm water discharges from industrial facilities, construction sites, and highly visible pollutant sources that exist within the MS4 area must be implemented under the permit. Additionally, monitoring of not supporting streams, public education and involvement, post-construction storm water controls, low impact development, and annual reporting requirements must all be addressed by the permittee on an ongoing basis.

Small MS4s serving urbanized areas are required to obtain a storm water permit under the Phase II storm water regulations. An urbanized area is defined as an area with a residential population of at least 50,000 people and an overall population density of at least 1,000 people per square mile. Thirty (30) counties, fifty-six (56) communities, seven (7) Department of Defense facilities, and the Georgia Department of Transportation (GDOT) are permitted under the Phase II regulations in Georgia. All municipal Phase II permitees are authorized to discharge under Storm Water General Permit GAG610000. Department of Defense facilities are authorized to discharge under Storm Water General Permit GAG480000. GDOT owned or operated facilities are authorized to discharge under Storm Water General Permit GAG410000. Under these general permits, each permittee must design and implement a SWMP that incorporates BMPs that focus on public education and involvement, illicit discharge detection and elimination, construction site runoff control, post-construction storm water management, and pollution prevention in municipal operations. There are four MS4 permittees that discharge to the Withlacoochee River. These are listed in Table 5.

Table 5. Permitted MS4s in the Suwannee River Basin

Stream Segment	MS4 Permittees	MS4 Phase
Withlacoochee River	City of Hahira	2
	City of Remerton	2
	City of Valdosta	2
	Lowndes County	2

Source: EPD Nonpoint Source Program, 2015

Table 6 provides the total drainage area of the not supporting segment of the Withlacoochee River, and the percentage of urbanized area in the permitted MS4 area contained within the watershed.

Table 6. Percentage of Watersheds Located in MS4 Areas or Urban Areas

Stream Segment	Total Area (sq. mi.)	% In MS4 Urbanized Area
Withlacoochee River	1,517	1.2

The land use types that are considered urbanized include 1) developed open space, 2) developed low intensity, 3) developed medium intensity, 4) developed high intensity, 5) utility swaths, and 6) golf courses.

There are no MS4 permittees located within the Suwannoochee Creek or Jones Creek drainages.

3.2 Nonpoint Source Assessment

In general, nonpoint sources cannot be identified as entering a water body through a discrete conveyance at a single location. In urban areas, a large portion of the storm water contribution may enter waterways as point sources from MS4 NPDES permitted outfalls, or from industrial sites covered under the Georgia Industrial General Permit. The remainder of the storm water runoff will come from nonpoint sources.

Potential nonpoint sources include the following:

- Storm water runoff as overland flow from improper disposal of waste materials;
- Deposition of particulates from air emissions;
- Contaminated groundwater seepage;
- Leaking or overflowing sanitary sewer lines;
- Failing septic systems;
- Leachate from landfills within the watershed;
- Storm water runoff from private outfalls not covered under NPDES MS4 permits;
- Storm water runoff from industrial sites not currently included under the Georgia General Industrial Permit;
- Residual from banned leaded gasoline
- Lead from banned and legal sources related to hunting and fishing activities

An assessment of the potential sources of lead in impaired stream segments was performed using available resources, which included the following databases:

- USEPA Toxics Release Inventory (TRI)
- USEPA List of Superfund Sites (CERCLIS)
- USEPA Brownfields Program
- EPD Brownfields Public Record
- EPD Hazardous Site Inventory (HSI)
- EPD Inventory of Permitted Solid Waste Disposal Facilities

3.2.1 Toxic Release Inventory (TRI)

The TRI is a database maintained by the USEPA that provides information about facilities that handle toxic chemicals. Facilities in certain industry sectors that manufacture, process, or

otherwise use these chemicals in amounts above established levels, must report how each chemical is managed. The TRI contains information about releases of these chemicals to the environment, including air emissions, surface water discharges, releases to the land, and off-site transport to disposal facilities.

Facilities included on the TRI that are located within the watersheds of the lead-impaired stream segments in the Suwannee River Basin are provided in Table 7. These facilities have had releases of lead or lead compounds into the environment through air stack emissions, water discharges, and land disposal above established reportable levels.

Table 7. Facilities on the Toxics Release Inventory (TRI) with Reported Releases of Lead within the Impaired Stream Segments Watersheds in the Suwannee River Basin

Facility Name	Watershed	Form of Release	Type of Business	Facility Status
Bway Corp	Jones	On-site Treated	Metal Can Manufacturing	Operating
Langboard OSB	Withlacoochee	stack emissions, landfill disposal	reconstituted wood product manufacturing	Operating
Hood Packaging Corp. (formerly Dowling Bag Corp.)	Withlacoochee	off-site disposal	paper, plastic packaging manufacture	Closed
Moultrie Die Cast	Withlacoochee	air releases, on-site recycled, off-site disposal	Aluminum Die-Casting Foundry	Operating
Propex Fabrics Inc Nashville Mills	Withlacoochee	air release	Broadwoven Fabric Mills	Operating
Tifton Aluminum Extrusions Inc	Withlacoochee	air releases, off-site disposal, off-site recycled, water discharge	Aluminum Rolling, Drawing, and Extruding	Operating
US DoD USAF Moody Afb Small Arms & Grand Bay Ranges	Withlacoochee	Off-site disposal, recycled,	U.S. Air Force Base	Operating

USEPA Toxic Release Inventory, 2016

The inclusion of the above facilities on the TRI does not imply that they are a significant source of lead or lead compounds to the impaired stream segments. The reported releases occur where proper controls are in place, and where applicable, meet specific permit limits.

3.2.2 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Sites

The Comprehensive Environmental Response, Compensation, and Liability Act, otherwise known as CERCLA or Superfund, along with the Superfund Amendments and Reauthorization Act (SARA) of 1986, provides a Federal "Superfund" to clean up uncontrolled or abandoned hazardous-waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment. EPA maintains CERLCIS, which is a list of Superfund sites for all States in the U.S. A total of three sites with lead contamination were included in CERCLIS that are located within the impaired stream segment watersheds in the Suwannee River Basin. Information for these sites is provided in Table 8.

Table 8. CERCLA Sites in the Yellow River Watershed with Releases of Lead

Facility Name	Watershed	Media Contaminated	Type of Business	Facility Status	CERCLA Status
G. C. Lee Site	Suwannoochee Creek	groundwater	Engineering and Construction	closed	Non-NPL closed
Marzone/Chevron - NPL Site OU1	Withlacoochee River	Groundwater, soil	fertilizer manufacture	closed	NPL active
Parramore Fertilizer	Withlacoochee River	soil	fertilizer manufacture	closed	Non-NPL active

USEPA CERCLIS, 2016
NPL = Nation Priority List

3.2.3 Hazardous Site Index (HSI)

The HSI is maintained by EPD. Industrial sites are placed on the list by EPD when there has been a known release into the environment of a regulated substance above a reportable quantity that may pose a risk to human health and the environment. Thirteen industrial sites within the impaired stream segment watersheds are included on the HSI that are known to have released lead or lead compounds above a reportable quantity as determined by EPD (Table 9).

Table 9. Industrial Sites on the Hazardous Site Index (HSI) for Releases of Lead within the Impaired Stream Segments Watersheds in the Suwannee River Basin

Site Name	Watershed	HSI Number	Class (1)	Medium of Contamination	Facility Status
Brockway Standard - Homerville Plant	Jones	10032	II	soil, groundwater	Operating
G. C. Lee Site	Suwannoochee	10005	IV	soil, groundwater	Operating
Hydro Aluminum	Withlacoochee	10838	I	soil, groundwater	Closed
Production Anodizing Corp./D. H. Farms	Withlacoochee	10311	I	soil, groundwater	Operating
Specialty Stampings, L.L.C.	Withlacoochee	10707	V	groundwater	Operating
Hood Packaging, Corp. (formerly Southern Bag Corp.)	Withlacoochee	10089	II	soil, groundwater	Closed
Coastal Plains Treating Company	Withlacoochee	10628	II	groundwater	Closed
Marzone/Chevron - NPL Site OU1	Withlacoochee	10056	IV	soil, groundwater	Closed
Marzone/Chevron - NPL Site OU2 (Formerly Golden Seed Site)	Withlacoochee	10353	IV	soil	Closed
Parramore Fertilizer	Withlacoochee	10143	II	soil	Closed
S&M Scrap Metal Company	Withlacoochee	10233	I	soil	Closed

Site Name	Watershed	HSI Number	Class (1)	Medium of Contamination	Facility Status
South Green Waste Pile	Withlacoochee	10142	IV	soil, groundwater	Closed
Worth County - SR 112 MSWLF	Withlacoochee	10853	IV	groundwater	Closed

EPD Land Protection Branch, 2016
(1) Class: I Site has resulted in human exposure, has continuing releases, or is causing serious environmental problems
II Further evaluation needed to determine if corrective action needed
IV Corrective action is being conducted or has been completed

3.2.4 Brownfields

A brownfield is a property on which activities, often by former owners or tenants, have resulted in the presence or potential presence of a hazardous substance, pollutant, or contaminant. EPA maintains a list of known brownfields that have been identified as potential candidates for cleanup activities through its Brownfields program, and for sites where cleanup operations are underway or have been completed. Georgia has developed a public record of Brownfields located within the State through funding provided by the EPA. The Brownfield public record is maintained by EPD's Land Protection Branch Brownfield Development Unit.

EPA's Brownfields list and EPD's Brownfield Public Record include three properties that have shown lead contamination, which are located within the impaired stream segment watersheds in the Suwannee River Basin. These properties are presented in Table 10. In all cases, the lead contamination levels were considered to be low and no cleanup actions were necessary.

Table 10. Brownfields contaminated with lead or lead compounds located within the Impaired Stream Segments Watersheds in the Suwannee River Basin

Property Description	Watershed	Type of Business	Contaminated Media	Property Status
South Ashley Street Properties Valdosta, GA	Withlacoochee	filling station, auto repair, auto storage	soil, groundwater	No cleanup needed
South Patterson Street Property Valdosta, GA	Withlacoochee	auto repair, auto storage	soil, groundwater	No cleanup needed
E. Hill Avenue Property Valdosta, GA	Withlacoochee	filling station, auto repair	soil, groundwater	No cleanup needed

USEPA, Brownfields Program; 2016;
EPD Brownfields Public Record, 2016

3.2.5 Solid Waste Disposal Facilities

Leachate from landfills may contain dissolved lead or lead compounds that could at some point reach surface waters. Sanitary landfills receive household wastes that may include household and yard chemicals and relatively small amounts of construction and demolition wastes generated from private homeowner activities. The large portion of waste generated from construction and demolition activities are sent to landfills designated for these materials. Designated construction/demolition landfills receive the vast majority of wastes from these activities. Older sanitary landfills were not lined and most have been closed. Those landfills that are not lined and remain active, operate as construction/demolition landfills. Currently,

active sanitary landfills are lined and have leachate collection systems. All landfills, excluding inert landfills, are now required to install environmental monitoring systems for groundwater and methane sampling. There are forty-three known landfills located within the impaired stream segment watersheds (see Table 11). Of these, four (5) are active landfills, one is in the process of closing, and thirty-eight are inactive or closed.

Table 11. Landfills Upstream of 303(d) Listed Segments in the Suwannee River Basin

Name	Permit No.	Landfill Type	County	Status	Watershed
Clinch Co.- US 441 N	-	NA	Clinch	Inactive	Jones Creek
Homerville	-	NA	Clinch	Inactive	Jones Creek
DuPont	-	NA	Clinch	Inactive	Suwannoochee Creek
Fargo	-	NA	Clinch	Inactive	Suwannoochee Creek
Berrien Co. - CR48/CR28 Nashville	010-009P(RM)(C	NA	Berrien	Inactive	Withlacoochee River
Berrien Co. - SR547	-	NA	Berrien	Inactive	Withlacoochee River
Berrien County - Brogdon Road	010-007D(L)	Dry Trash Landfill	Berrien	Closed	Withlacoochee River
Berrien County - CR 48/CR 28 PH1	010-008D(L)	Construction/ Demolition	Berrien	Closed	Withlacoochee River
Berrien County - SR 76W	010-004D(SL)	Sanitary Landfill	Berrien	Closed	Withlacoochee River
Nashville	-	NA	Berrien	Inactive	Withlacoochee River
Ray City Landfill	010-003D(L)	Dry Trash Landfill	Berrien	Inactive	Withlacoochee River
Morven	-	NA	Brooks	Inactive	Withlacoochee River
Cool Springs	-	NA	Colquitt	Inactive	Withlacoochee River
Crosland	-	NA	Colquitt	Inactive	Withlacoochee River
Ellenton	-	NA	Colquitt	Inactive	Withlacoochee River
Industrial Park	-	NA	Colquitt	Inactive	Withlacoochee River
Norman Park	-	NA	Colquitt	Inactive	Withlacoochee River
Omega	-	NA	Colquitt	Inactive	Withlacoochee River
Adel - Cook Co.	-	NA	Cook	Inactive	Withlacoochee River
Cecil	-	NA	Cook	Inactive	Withlacoochee River
Cook Co.	-	NA	Cook	Inactive	Withlacoochee River
Cook Co. - C.R. 216 Construction/	037-011D(C&D)	Construction/ Demolition	Cook	Operating	Withlacoochee River
Cook County - Taylor Road Adel (L	037-008D(L)	Construction/ Demolition	Cook	Closed	Withlacoochee River
Cook County - Taylor Road PH1	037-006D(SL)	Sanitary Landfill	Cook	Closed	Withlacoochee River

Name	Permit No.	Landfill Type	County	Status	Watershed
Cook County - Taylor Road Site 2	037-010D(MSWL)	Sanitary Landfill	Cook	Operating	Withlacoochee River
Lenox	-	NA	Cook	Inactive	Withlacoochee River
Sparks	-	NA	Cook	Inactive	Withlacoochee River
Hahira	-	NA	Lowndes	Inactive	Withlacoochee River
Hahira - Friendship Church Road	092-003D(SL)	Sanitary Landfill	Lowndes	Closed	Withlacoochee River
Pecan Row MSWL	092-019D(MSWL)	Sanitary Landfill	Lowndes	In Closure	Withlacoochee River
Valdosta - SR 94	092-001D(SL)	Sanitary Landfill	Lowndes	Closed	Withlacoochee River
Valdosta - Wetherington Lane	092-014D(SL)	Sanitary Landfill	Lowndes	Closed	Withlacoochee River
Veolia E.S. Evergreen MSWL	092-022D(MSWL)	Sanitary Landfill	Lowndes	Operating	Withlacoochee River
Tift Co. - Omega - Eldorado Rd.	137-013P(INC)	NA	Tift	Inactive	Withlacoochee River
Tifton - Ferry Lake Rd.	-	NA	Tift	Inactive	Withlacoochee River
Tifton - Maple Street	137-014D(L)	Dry Trash Landfill	Tift	Closed	Withlacoochee River
Tifton - Omega-Eldorado Road PH 1	137-007D(SL)	Sanitary Landfill	Tift	Closed	Withlacoochee River
Tifton - Omega-Eldorado Road PH 3	137-007D(SL)(3	Sanitary Landfill	Tift	Operating	Withlacoochee River
Tifton - Tift County US 82 East	137-001D(SL)	Sanitary Landfill	Tift	Inactive	Withlacoochee River
Tifton - U.S. 82 E. - E. 2nd Stre	137-008D(L)	Dry Trash Landfill	Tift	Closed	Withlacoochee River
Old Ashburn Dump	-	NA	Turner	Inactive	Withlacoochee River
Sycamore	-	NA	Turner	Inactive	Withlacoochee River
SR 112 Sylvester PH1	159-004D(SL)	Sanitary Landfill	Worth	Closed	Withlacoochee River

Source: EPD Land Protection Branch – Solid Waste Management Program, 2015
NA = Not Available

3.3 Additional Potential Sources

There are other potential sources of lead that can sometimes be significant. Former sources of lead that have since been banned by Federal mandates include:

- Lead-based paints
- Lead water lines
- Leaded gasoline
- Lead shot used for waterfowl hunting

Although these materials are no longer produced, many still exist in the environment and may continue to act as nonpoint sources. Fishing tackle products and ammunition other than that used for hunting waterfowl are still allowed to contain lead and are considered not to be significant sources.

4.0 TMDL DEVELOPMENT APPROACH

An important component of TMDL development is to establish relationships between source loadings and in-stream water quality. In this section, the mathematical modeling techniques used to develop the TMDL are discussed.

4.1 Steady-State Approach

Steady-state models are applied for "critical" environmental conditions that represent extremely low assimilative capacity. Critical environmental conditions correspond to drought flows. The assumption behind steady-state modeling is that point and nonpoint source discharge concentrations that protect water quality during low-flow critical conditions will be protective for the large majority of environmental conditions that occur. Mass balance equations are used to model the critical conditions and calculate allocations.

4.2 Critical Conditions

The critical flow conditions for these TMDLs occur when the ratio of effluent or contaminated storm water to stream flow is the greatest. The TMDLs are presented in two ways: first, as total daily mass loads for the low flow conditions; and second, loads as a function of the total flow at any given time.

In the first case, total daily mass loads for the low flow conditions of 1Q10 and 7Q10 are given. It is assumed that these are the critical conditions for aquatic life. The 1Q10 and the acute criteria provide protection of the acute standard, and the 7Q10 and chronic criteria provide protection of the chronic standard.

Available flow data for the impaired stream segments is limited. Therefore, the critical 1Q10 and 7Q10 flows were developed using 1Q10 and 7Q10 data determined by the USGS for several nearby streams (Gotvald, 2016). These streams had relatively similar watershed characteristics, including land use, slope, and drainage area. The critical stream flows for the impaired stream segments were estimated by first calculating the average productivity values (i.e., ratio of flow and drainage area) for the 1Q10 and 7Q10 flows of the nearby streams. The 1Q10 and 7Q10 critical flows for impaired stream segments were estimated by determining the product of the average productivity values and impaired stream segments drainage areas. These calculations are presented in Appendix A.

Table 12 provides the 1-day, 10-year minimum (1Q10) statistical flow value and 7-day, 10-year minimum (7Q10) statistical flow associated with each this segment.

Table 12. Minimum Flows Associated with Lead Impaired Segments in the Suwannee River Basin

Stream Segment	1Q10		7Q10	
	cfs	MGD	cfs	MGD
Jones Creek (aka Tatum Creek)	0.22	0.14	0.28	0.18
Suwannoochee Creek	0.50	0.32	0.64	0.41
Withlacoochee River	7.39	4.78	9.09	5.87

In the second case, the TMDLs are expressed as equations that show the loads as a function of the total flow at any given time. Since instantaneous samples are used to evaluate compliance with the standards, as well as the need for a TMDL, this flow dependent load, or concentration approach, is more meaningful. This approach takes into account seasonal variability and makes it easier to evaluate compliance with the TMDL.

The acute and chronic criteria for metals are expressed as the dissolved fraction. The criteria are calculated based on the hardness of the receiving stream (see Section 1.3 for equations). A lower hardness results in a higher proportion of metal in the dissolved form, resulting in a more conservative criterion.

In order to convert measured total recoverable lead concentrations to estimated dissolved lead concentrations, a translator is calculated. This translator is dependent on the instream TSS concentration. As the TSS concentration increases, a smaller percent of the metal is in the dissolved form. The equations used to calculate the translator are taken from EPA guidance (USEPA, 1994; USEPA, 1996). The ratio of the total measured metal concentration (C_t) to the calculated dissolved concentration (C_d) is the translator. The equations are provided below for reference.

$$C_t/C_d = 1 + K_d \times TSS \times (10^{-6}\ kg/mg)$$

Where: K_d = partition coefficient for lead (L/kg)
TSS = total suspended solids concentration (mg/L)

The partition coefficient for lead:

$$K_d = K_{po} \times TSS^a$$

Where: K_{po} * = 2.8×10^6
a * = -0.8

* Note: It is important to note that the authors of EPA's "*Technical Guidance Manual*" derived the above values for the 'K_{po}' coefficient and the 'a' exponent based on the statistical analysis of 2,253 data records collected from rivers and streams distributed throughout the United States.

Instream TSS data are also available for the listed segments. Table 13 shows the average TSS and corresponding translator, average hardness, and dissolved acute and chronic criterion for the each of the impaired stream segments.

Results for sample analyses of metals are commonly reported as a total (or total recoverable) concentration. Because the criteria are for the dissolved fraction of the metals, Georgia Regulation 391-3-6-.03(5)(e)(ii) (EPD, 2015) allows USEPA's "Guidance Document of Dynamic Modeling and Translators, August 1993" (USEPA, 1994) to be used for "translating" the total recoverable concentration to the dissolved form. In addition, Georgia Regulation 391-3-6-.06(4)(d)5.(ii)(b)(2) allows methods from this EPA guidance document to be used to translate dissolved criteria concentrations into total recoverable permit limits. Metals effluent permit limitations are required to be expressed as total recoverable metal per 40 CFR §122.45(c).

Table 13. Instream Dissolved Acute and Chronic Criteria for Lead for the Impaired Stream Segments in the Suwannee River Basin

Stream Segment	TSS (mg/L)	Translator	Total Hardness (mg/L as $CaCO_3$)	Dissolved Pb Acute Criterion (µg/L)	Dissolved Pb Chronic Criterion (µg/L)
Jones Creek (aka Tatum Creek)	1.2	0.256	5.7	2.57	0.1
Suwannoochee Creek	2.0	0.237	6.4	2.94	0.12
Withlacoochee River	2.9	0.225	46.5	27.8	1.08

5.0 ALLOCATIONS

A TMDL is the amount of a pollutant that can be assimilated by the receiving water body without exceeding the applicable water quality standard. The TMDLs for lead are based on the acute and chronic instream standards for these metals. A TMDL is the sum of the individual waste load allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources, as well as natural background (40 CFR 130.2) for a given water body. The TMDL must also include a margin of safety (MOS), either implicitly or explicitly, which accounts for the uncertainty in the relationship between pollutant loads and the water quality response of the receiving water body. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measures. For lead the TMDLs are expressed as mass per day and as a concentration. A TMDL is expressed as:

$$TMDL = \Sigma WLAs + \Sigma LAs + MOS$$

The TMDL calculates the WLAs and LAs with margins of safety to meet the stream's water quality standards. The allocations are based on estimates that use the best available data and provide the basis to establish or modify existing controls so that water quality standards can be achieved. In developing a TMDL, it is important to consider whether adequate data exists to identify the sources, fate, and transport of the pollutant to be controlled.

TMDLs may be developed using a phased approach. Under a phased approach, the TMDL includes: 1) WLAs that confirm existing limits and controls or result in new limits, and 2) LAs that confirm existing controls or include implementing new controls (USEPA, 1991). A phased TMDL requires that additional data be collected to determine if load reductions required by the TMDL are leading to the attainment of water quality standards.

The TMDL Implementation Plan establishes a schedule or timetable for the installation and evaluation of point and nonpoint source control measures, data collection, assessment of water quality standard attainment, and if needed, additional modeling. Future monitoring of the listed segment's water quality will then be used to evaluate this phase of the TMDL, and if necessary, to reallocate the loads.

5.1 Waste Load Allocations

5.1.1 Wastewater Treatment Facilities

The waste load allocation (WLA) is the portion of the receiving water's loading capacity that is allocated to existing or future point sources represented by municipal and industrial wastewater treatment systems that have NPDES effluent limits. Currently, there are no NPDES-permitted wastewater treatment facilities that discharge lead into the impaired streams. In the future, if any wastewater treatment facilities are permitted to discharge lead to the impaired stream segments in the Suwannee River Basin, the WLA loads will be calculated using the effluent design flow. Since some NPDES permits do not have a flow limitation, a TMDL expressed only in mass per day is not appropriate. It is more accurate and conservative to assign a wasteload allocation as a concentration. The mass limit for any value of flow (Q) will then be calculated by multiplying flow times concentration. The WLA requires that the effluent concentration from each point source not exceed the allowable instream metal concentration at the end of pipe without

any dilution. The WLA is represented by the equation:

$$WLA = \Sigma Q_{WLA} \times \text{metal criterion (acute or chronic)}$$

where: ΣQ_{WLA} = sum of all current, potential, and future NPDES permitted wastewater treatment discharges

5.1.2 Regulated Storm Water Discharges

State and Federal Rules define storm water discharges covered by NPDES permits as point sources. However, storm water discharges are from diffuse sources and there are multiple storm water outfalls. Storm water sources (point and nonpoint) are different than traditional NPDES permitted sources in four respects: 1) they do not produce a continuous (pollutant loading) discharge; 2) their pollutant loading depends on the intensity, duration, and frequency of rainfall events, over which the permittee has no control; 3) the activities contributing to the pollutant loading may include various allowable activities of others, and control of these activities is not solely within the discretion of the permittee; and 4) they do not have wastewater treatment plants that control specific pollutants to meet numerical limits.

The intent of storm water NPDES permits is not to treat the water after collection, but to reduce the exposure of storm water to pollutants by implementing various controls. It would be infeasible and prohibitively expensive to try to control pollutant discharges from each storm water outfall. Therefore, storm water NPDES permits require the establishment of controls or BMPs to reduce pollutants from entering the environment.

The waste load allocations from storm water discharges associated with MS4s (WLAsw) are estimated based on the percentage of urban area in each watershed covered by the MS4 storm water permit. At this time, the portion of each watershed that goes directly to a permitted storm sewer and that which goes through non-permitted point sources, or is sheet flow or agricultural runoff, has not been clearly defined. Thus, it is assumed that approximately 70 percent of storm water runoff from the regulated urban area is collected by the municipal separate storm sewer systems. This can be represented by the following equation:

$$Q_{WLASW} = \Sigma Q_{urban} \times 0.7$$

$$WLA_{SW} = Q_{WLASW} \times \text{metal criterion (acute or chronic)}$$

where:
WLA_{SW} = Wasteload Allocation for permitted storm water runoff from all MS4 urban areas
Q_{WLASW} = runoff from all MS4 urban areas conveyed through permitted storm water structures
ΣQ_{urban} = sum of all storm water runoff from all MS4 urban areas

For stormwater permits, compliance with the terms and conditions of the permit is effective implementation of the WLA to the Maximum Extent Practicable (MEP), and demonstrates consistency with the assumptions and requirements of the TMDL. EPD acknowledges that progress with the assumptions and requirements of the TMDL by stormwater permittees may take one or more permit iterations. Achieving the TMDL reductions may constitute compliance with a storm water management plan (SWMP) or a storm water pollution prevention plan (SWPPP), provided the MEP definition is met, even where the numeric percent reduction may not be achieved so long as reasonable progress is made toward attainment of water quality standards using an iterative BMP process.

5.2 Load Allocations

The load allocation (LA) is the portion of the receiving water's loading capacity that is attributed to existing or future nonpoint sources or to natural background sources. Nonpoint sources are identified in 40 CFR 130.6 as follows:

- Residual waste
- Land disposal
- Agricultural and silvicultural
- Mines
- Construction
- Saltwater intrusion
- Urban storm water (non-permitted)

It is not known how much of the lead contributions to the impaired stream segments are from nonpoint sources. Generally, there are two types of load allocations in the creek: 1) loads associated with the accumulation of metals on land surfaces that are washed off during storm events, and; 2) loads independent of precipitation, such as seepage of contaminated groundwater, leachate from landfills, failing septic systems, leaking sewer system collection lines, and background loads. Available data suggests that lead introduced to the impaired stream segments are both from storm water runoff and from other sources not related to storm events. At this time, it is not possible to partition the various sources of load allocations. In the future, after additional data has been collected, it may be possible to partition the load allocation by source.

The instream concentrations of hardness used to determine the lead criteria, along with historical low-flow data, are used to determine the load allocations for the impaired stream segments under critical conditions. Jones Creek and Suwannoochee Creek tend to have very soft water with a water hardness around 5 mg/L as $CaCO_3$; whereas, the Withlacoochee River tends to have water with a higher hardness around 40 mg/L as $CaCO_3$. The load allocations during 1Q10 and 7Q10 flow conditions are calculated as follows:

To protect against the acute effects of dissolved metals:

allowable loading (kg/d) = dissolved acute criterion (µg/L) x 1Q10 (MGD) x units conversion

where: units conversion = 3.785 L/gallon x 10^{-9} kg/µg

dissolved acute criterion = $(e^{(1.273[\ln(\text{hardness})] - 1.460)})(1.46203 - [\ln \text{hardness})(0.145712)])$ µg/L

To protect against the chronic effects of dissolved metals:

allowable loading (kg/d) = dissolved chronic criterion (µg/L) x 7Q10 (MGD) x units conversion

where: units conversion = 3.785 L/gallon x 10^{-9} kg/µg

dissolved chronic criterion = $(e^{(1.273[\ln(\text{hardness})] - 4.705)})(1.46203 - [\ln \text{hardness})(0.145712)])$ µg/L

The critical conditions load allocations for lead, using the representative instream hardness values given Table 13, are presented in Table 14.

Table 14. Load Allocations (LA) for Dissolved Lead under Critical Conditions for the Impaired Stream Segments in the Suwannee River Basin

Stream Segment	Criteria	Dissolved Pb Concentration (µg/L)	Critical Flow (MGD)	Allowable Load Allocation (kg/day)
Jones Creek (aka Tatum Creek)	Acute	2.57	0.14	1.36×10^{-3}
	Chronic	0.1	0.18	6.81×10^{-5}
Suwannoochee Creek	Acute	2.94	0.32	3.56×10^{-3}
	Chronic	0.12	0.41	1.86×10^{-4}
Withlacoochee River	Acute	27.8	4.78	5.03×10^{-1}
	Chronic	1.08	5.87	2.4×10^{-2}

5.3 Seasonal Variation

The low flow critical conditions incorporated in this TMDL are assumed to represent the most critical design conditions and provide year-round protection of water quality. The base flow of a stream will generally range from low flows during critical conditions to higher flows at other times. Runoff from storm events will contribute additional flow to the stream. Seasonal variability in flow is addressed by expressing the TMDL as a concentration, as well as a load associated with different flows. The LA for all flows and conditions can be described by the following equation:

$$LA = Q_{LA} \times \text{metal criterion (acute or chronic)}$$

$$Q_{LA} = [Q_{Total} - (\Sigma Q_{WLA} + \Sigma Q_{WLASW})]$$

where:
- LA = load allocation
- Q_{LA} = flow from all nonpoint sources
- Q_{Total} = total flow in the creek
- ΣQ_{WLA} = sum of all current, potential, and future NPDES permitted wastewater treatment discharges
- ΣQ_{WLASW} = sum of all permitted storm water runoff from MS4 urban areas

5.4 Margin of Safety

The MOS is a required component of TMDL development. As specified by section 303(d) of the CWA, the margin of safety must account for any lack of knowledge concerning the relationship between effluent limitations and water quality. There are two basic methods for incorporating the MOS: 1) implicitly incorporate the MOS using conservative model assumptions to develop allocations, or 2) explicitly specify a portion of the TMDL as the MOS and use the remainder for allocations.

The MOS was implicitly incorporated into the TMDLs through the use of the critical conditions established in Section 4.2 of this report. Through the use of low flow conditions and conservative hardness values the margin of safety for these TMDLs adequately accounts for the lack of knowledge concerning the relationship between effluent limitations and water quality.

5.5 TMDL Results

The TMDL for any condition will be based on the flow of creek, instream hardness, as well as the discharge flow of a permitted discharger. The TMDLs for lead are summarized in Table 15.

Table 15. Total Dissolved Lead TMDL Summary for the Impaired Stream Segments in the Suwannee River Basin

Stream Segment	Criteria	Current Load	WLA	WLA_{SW}*	LA	MOS	TMDL	Reduction
Jones Creek (aka Tatum Creek)	Chronic	Q x 0.55 µg/L	-	-	6.81×10^{-5} kg/day for the 7Q10 ΣQ_{LA} x 0.1 µg/L for all conditions and flows	Implicit	6.81×10^{-5} kg/day + WLA for the 7Q10 Q_{total} x 0.1 µg/L for all conditions and flows	84.3%
	Acute	Q x 0.55 µg/L	-	-	1.36×10^{-3} kg/day for the 1Q10 ΣQ_{LA} x 2.57 µg/L for all conditions and flows	Implicit	1.36×10^{-3} kg/day + WLA for the 1Q10 Q_{total} x 2.57 µg/L for all conditions and flows	0%
Suwannoochee Creek	Chronic	Q x 0.42 µg/L	-	-	1.86×10^{-4} kg/day for the 7Q10 ΣQ_{LA} x 0.12 µg/L for all conditions and flows	Implicit	1.86×10^{-4} kg/day + WLA for the 7Q10 Q_{total} x 0.12 µg/L for all conditions and flows	79.5%
	Acute	Q x 0.42 µg/L	-	-	3.56×10^{-3} kg/day for the 1Q10 ΣQ_{LA} x 2.94 µg/L for all conditions and flows	Implicit	3.56×10^{-3} kg/day + WLA for the 1Q10 Q_{total} x 2.94 µg/L for all conditions and flows	0%
Withlacoochee River	Chronic	Q x 1.72 µg/L	-	ΣQ_{WLASW} x 1.08 µg/L for all conditions and flows	2.40×10^{-2} kg/day for the 7Q10 ΣQ_{LA} x 1.08 µg/L for all conditions and flows	Implicit	2.40×10^{-2} kg/day + WLA for the 7Q10 Q_{total} x 1.08 µg/L for all conditions and flows	46.7%
	Acute	Q x 1.72 µg/L	-	ΣQ_{WLASW} x 27.8 µg/L for all conditions and flows	5.03×10^{-1} kg/day for the 1Q10 ΣQ_{LA} x 27.8 µg/L for all conditions and flows	Implicit	5.03×10^{-1} kg/day + WLA for the 1Q10 Q_{total} x 27.8 µg/L for all conditions and flows	0%

* Based on the Draft EPA Interoffice Memorandum on "*Estimating Water Quality Loadings from MS4 Areas,*" dated 12/19/02: "If the critical period is a low flow event, the load from the MS4 does not have to be quantified and a WLA for the storm water sources is not necessary…"

6.0 RECOMMENDATIONS

The TMDL process consists of an evaluation of the sub-watersheds for each 303(d) listed stream segment to identify, as best as possible, the sources of lead causing the stream to exceed instream standards. The TMDL analysis was performed using the best available data to specify WLAs and LAs that will meet lead water quality criteria so as to support the use classification specified for each listed segment.

This TMDL represents part of a long-term process to reduce loading of lead to meet water quality standards in the Suwannee River Basin. Implementation strategies will be reviewed and the TMDLs will be refined as necessary. The phased approach will support progress toward water quality standards attainment in the future. In accordance with USEPA TMDL guidance, these TMDLs may be revised based on the results of future monitoring and source characterization data efforts. The following recommendations emphasize further source identification and involve the collection of data to support the current allocations and subsequent source reductions.

6.1 Monitoring

Jones Creek was sampled by EPD in 2010 at Williamsburg Road near Fargo, Georgia, for metals. Exceedances of the chronic criteria for lead were observed and Jones Creek from Dry Branch to the Suwannee River was placed on the 303(d) list.

Water quality monitoring was conducted by the U.S. Geological Survey on Suwannoochee Creek at State Route 94 near Fargo, Georgia, between 1998 and 2003, which included collecting samples for metals analysis. No exceedances of the instream water quality standards for lead were observed during this period. EPD sampled for metals in 2010 and exceedances of the chronic criteria for lead were observed. As a result, Suwannoochee Creek from Lees Bay to Suwannee River was placed on the 303(d) list.

The Withlacoochee River was sampled at U.S. Highway 84 for metals by EPD in 2011, and no exceedances of the instream lead standard were observed. In 2012, EPD again collected samples for metals, and results showed exceedances of the chronic criteria for lead. This resulted in the Withlacoochee River from the Little River to Okapilco Creek being placed on the 303(d) list.

It is recommended that sampling be continued on Jones Creek, Suwannoochee Creek, and the Withlacoochee River to monitor lead concentrations. If exceedances of the lead chronic criteria continue, then the sources should be determined and corrective actions may be needed. In the case where a watershed based plan has been developed for a listed stream segment, an appropriate water quality monitoring program will be outlined. The monitoring program will be developed to help identify the various lead sources. The monitoring program may be used to verify the 303(d) stream segment listings. This will be especially valuable for those segments where limited data resulted in the listing.

6.2 Management Practices

Based on findings of the source assessment, there are several potential point source and nonpoint source loads for lead to the impaired stream segments. These are discussed in more detail in Section 3. Potential point sources primarily include permitted storm water runoff from industrial sites and commercial properties discharging to the impaired stream

segments. Potential nonpoint sources include non-permitted storm runoff from industrial sites, runoff from improper disposal of waste materials, illicit discharges into storm sewer systems, leachate from open and closed landfills, leakage or overflows from sanitary sewer lines, and contributions from failing septic systems. Former potential sources of lead that are currently under Federal bans include lead-based paints, lead water lines, leaded gasoline, and lead shot from waterfowl hunting.

Management practices are recommended to reduce lead source loads to the impaired stream segments, with the result of achieving the instream standard criteria for these metals. These recommended management practices include:

- Compliance with NPDES MS4 permit requirements;
- Implementation of recommended Water Quality management practices in the *Suwannee-Satilla Regional Water Plan* (2011);
- Compliance with NPDES Industrial General Permit requirements, including where applicable, achieving benchmarks for monitored constituents;
- Application of Best Management Practices (BMPs) appropriate to both urban and rural land uses, where applicable.

6.2.1 Point Source Approaches

Point sources are defined as discharges of treated wastewater or storm water into rivers and streams at discrete locations. The NPDES permit program provides a basis for municipal, industrial, and storm water permits, monitoring and compliance with permits limitations, and appropriate enforcement actions for violations. In accordance with EPD rules and regulations, all discharges from point source facilities are required to be in compliance with the conditions of their NPDES permit at all times.

For stormwater permits, compliance with the terms and conditions of the permit is effective implementation of the WLA to the Maximum Extent Practicable (MEP), and demonstrates consistency with the assumptions and requirements of the TMDL. EPD acknowledges that progress with the assumptions and requirements of the TMDL by stormwater permittees may take one or more permit iterations. Achieving the TMDL reductions may constitute compliance with a storm water management plan (SWMP) or a storm water pollution prevention plan (SWPPP), provided the MEP definition is met, even where the numeric percent reduction may not be achieved so long as reasonable progress is made toward attainment of water quality standards using an iterative BMP process.

As previously noted, there are currently no NPDES permitted wastewater treatment facilities discharging to the impaired stream segment watersheds that are considered potential sources of lead. A small portion of the Withlacoochee River watershed is covered under NPDES MS4 Phase 2 Permits (see Section 3.1.2.2 MS4 NPDES Permits). These permits prohibit illicit discharges into storm sewer systems, and require that BMPs be put in place to reduce the discharge of pollutants to the maximum extent possible. Stormwater discharges from industrial sites are covered under the Industrial General Permit. Under this permit implementation of BMPs are required. Storm water from industrial sites that discharge within one linear mile of a 303(d) listed stream and that potentially might contain the listed constituent must be monitored to determine that benchmarks are met.

6.2.2 Nonpoint Source Approaches

The Resource Conservation and Recovery Act (RCRA) gives EPA the authority to control hazardous waste from the "cradle-to-grave." In general, all generators, transporters, treaters, storers, and disposers of hazardous waste are required to provide information about their activities to state environmental agencies. These agencies, in turn pass on the information to regional and national EPA offices. In 1984, RCRA was amended by the Federal Hazardous and Solid Waste Amendments (HSWA). These amendments focused on waste minimization and phasing out land disposal of hazardous waste as well as corrective action for releases. Some of the other mandates of this law include increased enforcement authority for EPA. EPA maintains the Toxics Release Inventory, a database of industrial facilities that have had releases of hazardous chemicals at reportable quantities (TSI). Commercial and industrial facilities located within the watersheds of the impaired stream segments of the Suwannee River Basin that handle lead compounds will continue to be monitored under these programs.

CERCLA and SARA provide a Federal "Superfund" to clean up uncontrolled or abandoned hazardous-waste sites. Three sites with lead contamination were included in CERCLIS that are located within the impaired stream segment watersheds in the Suwannee River Basin. One site has been cleaned up and requires no further action. Two sites, one of which is on the National Priority List (NPL), are still under active cleanup.

EPD is the lead agency for implementing the State's Nonpoint Source Management Program, as described in Georgia's *Statewide Nonpoint Source Management Plan* (EPD, 2014b). The *Statewide Nonpoint Source Management Plan* combines regulatory and nonregulatory approaches, in cooperation with other State and Federal agencies, local and regional governments, State colleges and universities, businesses and industries, nonprofit organizations, and individual citizens. Regulatory responsibilities include establishing water quality criteria and use classifications, assessing and reporting water quality conditions, issuing point source permits, issuing water withdrawal and ground water permits, and regulating land-disturbing activities. Georgia is working with local governments, agricultural, and forestry agencies such as the Natural Resources Conservation Service, the Georgia Soil and Water Conservation Commission, and the Georgia Forestry Commission to foster the implementation of BMPs that address nonpoint source pollution. The following sections describe programs in place and recommendations which should minimize the potential for nonpoint source loads of lead and lead compounds in Georgia's surface waters.

6.2.2.1 Waste Management

The Land Protection Branch (LPB) of EPD manages the disposal and treatment of solid waste through the permitting of municipal and industrial solid waste landfills, and oversees surface mining permitting and reclamation. Government and businesses that generate or store hazardous waste are regulated through the Hazardous Waste Management Programs of the LPB.

The Industrial and Municipal Solid Waste Unit of the LPB is responsible for the permitting, review of site suitability reports, construction, and closure of all publicly and privately owned solid waste handling facilities. It also reviews spill investigations and corrective action plans. Owners and/or operators of municipal solid waste landfills must conduct groundwater monitoring and evaluate the data to determine if established standards have been exceeded. All exceedances must be reported to EPD. The monitoring reports must be accompanied by a statement certifying that constituents which have established standards have been complied with or are non-compliant. It is recommended that monitoring of the groundwater

continues to include periodic analysis for the presence of metals including lead.
Government and businesses that generate or store hazardous waste are regulated by the Hazardous Waste Management Programs of the LPB. These Programs also investigate spills and releases involving hazardous waste and determine the impact to soil and water. Several industrial sites within impaired stream segment watersheds have been placed on the Georgia Hazardous Site Inventory as a result of releases of regulated substances in reportable quantities considered hazardous to human health and the environment. EPD's Response and Remediation Program works has been working with the owners towards cleanup of the sites, and implementing BMPs that will minimize these releases.

6.2.2.2 Brownfields

EPAs Brownfields program identifies properties as candidates for cleanup activities that potentially have the presence of hazardous substances. EPD's Land Protection Branch Brownfield Development Unit maintains a Public Record of brownfields located within the State. Some properties in the Withlacoochee River watershed were designated as brownfields due to the presence of lead contamination in the soils. It was determined that no cleanup action was required for these properties. In the future, EPA will designate properties as brownfields when appropriate and determine whether cleanup actions are necessary prior to their future use.

6.2.2.4 Urban Sources

Nonpoint sources of lead and lead compounds can be significant in the Suwannee River Basin urban areas. Urban sources can best be addressed using a strategy that involves public participation and intergovernmental coordination to reduce the discharge of pollutants to the maximum extent practicable. Management practices, control techniques, public education, and other appropriate methods and provisions may be employed. In addition to water quality monitoring programs, discussed in Section 6.1, the following activities and programs conducted by cities, counties, and state agencies are recommended:

- Uphold requirements that all new and replacement sanitary sewage systems be designed to minimize discharges into storm sewer systems;

- Further develop and streamline mechanisms for reporting and correcting illicit connections, breaks, surcharges, and general sanitary sewer system problems;

- Continue efforts to increase public awareness and education towards the impact of human activities in urban settings on water quality, ranging from the consequences of industrial and municipal discharges to the activities of individuals in residential neighborhoods.

6.2.3 Summary of Source Management Practices

As indicated by the summary of land uses in Section 1 (Table 2), the watersheds of the impaired stream segments in the Suwannee River Basin are primarily rural in nature. However, the upstream end of the listed segment of the Withlacoochee River receives drainage from the west side of the City of Valdosta, Georgia, a medium size city with a population of approximately 55,000 people. Several smaller urban communities exist in the watersheds of all three impaired streams. All the watersheds contain some commercial and industrial properties. Both rural and urban sources can best be addressed using a strategy

that involves public participation and intergovernmental coordination to reduce the discharge of pollutants to the maximum extent practicable. Management practices, control techniques, public education, and other appropriate methods and provisions may be employed. In addition to water quality monitoring programs, discussed in Section 6.1, the following activities and programs conducted by cities, counties, and State agencies are recommended:

- Sustain compliance with storm water NPDES MS4 and Industrial General Permit for Storm Water requirements;

- Implementation of recommended Water Quality management practices in the *Suwannee-Satilla Regional Water Plan* (2011);

- Ensure that storm water management plans are in place and being implemented by the local governments, and by the industrial facilities located in the watershed. These Plans are designed to control storm water runoff and to identify and implement BMPs to reduce the discharge of pollutants associated with storm water;

- EPD should continue working with Federal, State, and local agencies and owners of sites where further cleanup measures are necessary, and in developing control measures to prevent future releases of the metals of concern.

- Further develop and streamline mechanisms for reporting and correcting illicit discharges, breaks, surcharges, and general sanitary sewer system problems;

- Uphold requirements that all new and replacement sanitary sewage systems be designed to minimize discharges into storm sewer systems;

- Continue efforts to increase public awareness and education towards the impact of human activities in urban settings on water quality, ranging from the consequences of industrial and municipal discharges to the activities of individuals in residential neighborhoods.

6.3 Reasonable Assurance

Currently, there are no NPDES permitted wastewater treatment facilities with permit limits that include lead or lead compounds discharging in the impaired stream segment watersheds. Should there, in the future, be applicants for discharge permits, EPD will determine whether the applicants have a reasonable potential of discharging lead levels equal to or greater than the allocated loads. The results of this reasonable potential analysis will determine the specific type of requirements in an individual facility's NPDES permit. As part of its analysis, EPD will use its EPA approved 2003 NPDES Reasonable Potential Procedures to determine whether monitoring requirements or effluent limitations are necessary.

If effluent limitations are determined to be necessary, they should be established in accordance with *Georgia Rules and Regulations for Water Quality Control*, Section 391-3-6-.06(4)(d)5.(ii)(b)(2) (EPD, 2015), to protect against chronic and acute effects.

All industrial sites that have a storm water discharge associated with their primary industrial activity are required to submit a Notice of Intent under the NPDES General Industrial Permit.

This authorizes them to discharge storm water in accordance with the conditions and monitoring requirements established in the Industrial General Permit. Storm water from industrial sites that discharge within one linear mile of a 303(d) listed stream and that potentially might contain the listed constituent must be monitored to determine that benchmarks are met. Also, this permit requires implementation of BMPs.

A portion of the Withlacoochee River watershed is covered under NPDES MS4 Phase 2 Permits. These permits prohibit illicit discharges into storm sewer system, and require that BMPs be put in place to reduce the discharge of pollutants to the maximum extent possible.

EPD is working with local governments to foster the implementation of best management practices to address nonpoint sources. In addition, public education efforts will be targeted to individual stakeholders to provide information regarding the use of best management practices to protect water quality.

6.4 Public Participation

A thirty day public notice is being provided for this TMDL. During this time, the availability of the TMDL will be public noticed, a copy of the TMDL will be provided on request, and the public is invited to provide comments on the TMDL.

7.0 INITIAL TMDL IMPLEMENTATION PLAN

7.1 Initial TMDL Implementation Plan

This plan identifies applicable State-wide programs and activities that may be employed to manage point and nonpoint sources of lead loads for the impaired stream segments in the Suwannee River Basin. Local watershed planning and management initiatives will be fostered, supported, or developed through a variety of mechanisms. Implementation may be addressed by watershed improvement projects, assessments for Section 319 (h) grants, the local development of watershed protection plans, or "Targeted Outreach" initiated by EPD. These initiatives will supplement or possibly replace this initial implementation plan. Implementation actions should also be guided by the recommended management practices and actions contained within each applicable Regional Water Plan developed as part of Georgia's Comprehensive State-wide Water Management Plan implementation (Georgia Water Council, 2008).

7.2 Impaired Segments

This initial plan is applicable to the lead impaired stream segments in the Suwannee River Basin, which were added to Georgia's 303(d) list available on EPD's website (www.gaepd.org). The following table summarizes the descriptive information provided in the 303(d) list.

Water Bodies Listed for Lead in the Suwannee River Basin

Reach ID	Water body	Segment	County	Segment Length (miles)	Designated Use
R031102010203	Jones Creek (aka Tatum Creek)	Dry Branch to the Suwannee River	Clinch	5	Fishing
R031102010301	Suwannoochee Creek	Lees Bay to Suwannee River	Clinch	11	Fishing
R031102030806	Withlacoochee River	Little River to Okapilco Creek	Brookes/ Lowndes	15	Fishing

The current water quality standard [*State of Georgia's Rules and Regulations for Water Quality Control*, Chapter 391-3-6-.03(6)(c)(iii) (EPD, 2015) states that instream concentrations shall not exceed the acute criteria under 1-day, 10-year minimum flow (1Q10) or higher stream flow conditions, and shall not exceed the chronic criteria under 7-day, 10-year minimum flow (7Q10) or higher stream flow conditions. The acute and chronic criteria for these metals are determined using the following equations:

$$\text{acute criteria for dissolved lead} = (e^{(1.273[\ln(\text{hardness})] - 1.460)})(1.46203 - [\ln \text{hardness})(0.145712)])\ \mu g/L$$
$$\text{chronic criteria for dissolved lead} = (e^{(1.273[\ln(\text{hardness})] - 4.705)})(1.46203 - [\ln \text{hardness})(0.145712)])\ \mu g/L$$

These criteria are expressed in terms of the dissolved fraction in the water column and are a function of total hardness. Exceedances of these criteria are violations of the water quality standards for these metals, and are the basis for adding a stream segment to the 303(d) listing.

7.3 Potential Sources

An important part of the TMDL analysis is the identification of potential source categories. A source assessment characterizes the known and suspected sources for lead in the watershed. Sources are broadly classified as either point or nonpoint sources. A point source is defined as a discernable, confined, and discrete conveyance from that pollutants are or may be discharged to surface waters. Point sources of lead include storm water discharges through permitted storm water systems. Nonpoint sources of these metals are diffuse and cannot be identified as entering the water body at a single location. These sources generally involve land use activities that contribute the metals to streams during rainfall events. However, other potential nonpoint sources exist such as deposition of particulates from air emissions, and seepage of contaminated groundwater.

Potential point sources for the lead loads to the impaired stream segments include contributions from NPDES permitted storm water discharges from current and former industrial sites. Many of the industrial facilities have been involved in the manufacture of products or use of compounds containing lead.

Potential nonpoint sources for lead include: non-permitted storm runoff from industrial sites, runoff from improper disposal of waste materials, illicit discharges into storm sewer systems, leachate from operating and closed landfills, overflows from sanitary sewer lines, and leaking septic systems. Residual sources of lead that have since been banned by Federal mandates include lead-based paints, lead water lines, and leaded gasoline. Also, in rural areas outdoor activities that can be sources include fishing tackle products and hunting ammunition.

7.4 Management Practices and Activities

The NPDES permit program provides a basis for municipal, industrial, and storm water permits, monitoring and compliance with limitations, and appropriate enforcement actions for violations. In accordance with EPD rules and regulations, all discharges from point source facilities are required to be in compliance with the conditions of their NPDES permit at all times.

EPD is responsible for administering and enforcing laws to protect the waters of the State and is the lead agency for implementing the State's Nonpoint Source Management Program. Georgia is working with federal, county, and local governments, and other State and county agencies to foster implementation of BMPs that address nonpoint source pollution. The following management practices are recommended to reduce lead loads to the impaired stream segments:

- Sustain compliance with storm water NPDES MS4 and Industrial General Permit requirements;

- Implementation of recommended Water Quality management practices in the *Suwannee-Satilla Regional Water Plan* (2011);

- Ensure that storm water management plans are in place and being implemented by the local governments, and by the industrial facilities located in the watershed. These Plans are designed to control storm water runoff and to identify and implement BMPs to reduce the discharge of pollutants associated with storm water;

- EPD should continue working with Federal, State, and local agencies and owners of sites where further cleanup measures are necessary, and in developing control measures to prevent future releases of lead or lead compounds.

- Further develop and streamline mechanisms for reporting and correcting illicit discharges, breaks, surcharges, and general sanitary sewer system problems;

- Uphold requirements that all new and replacement sanitary sewage systems be designed to minimize discharges into storm sewer systems;

- Adoption of local ordinances (i.e. septic tanks, storm water, etc.) that address local water quality;

- Continue efforts to increase public awareness and education towards the impact of human activities in urban settings on water quality, ranging from the consequences of industrial and municipal discharges to the activities of individuals in residential neighborhoods.

Public education efforts target individual stakeholders to provide information regarding the use of BMPs to protect water quality. EPD will continue efforts to increase awareness and educate the public about the impact of human activities on water quality.

7.5 Monitoring

EPD encourages local governments and municipalities to develop water quality monitoring programs. These programs can help pinpoint various pollutant sources, as well as verify the 303(d) stream segment listings. EPD recommends that monitoring of lead, total hardness, and TSS be continued for Jones Creek, Suwannoochee Creek, and the Withlacoochee River to determine if implementation of BMPs results in the improvement of water quality over time. EPD is available to assist in completing a monitoring plan, preparing a Sampling Quality Assurance Plan (SQAP), and/or providing necessary training as needed.

7.6 Future Action

This Initial TMDL Implementation Plan includes a general approach to pollutant source identification, as well as management practices to address pollutants. In the future, EPD will continue to determine and assess the appropriate point and non-point source management measures needed to achieve the TMDLs and also to protect and restore water quality in impaired water bodies.

For point sources, any waste load allocations for wastewater treatment plant facilities will be implemented in the form of water-quality based effluent limitations in NPDES permits. Any wasteload allocations for regulated storm water will be implemented in the form of best management practices in the NPDES permits. Contributions of lead from regulated communities may also be managed using permit requirements such as watershed assessments, watershed protection plans, and long term monitoring. These measures will be directed through current point source management programs.

EPD will work to support watershed improvement projects that address non-point source pollution. This is a process whereby EPD and/or Regional Commissions or other agencies or

local governments, under a contract with EPD, will develop a Watershed Management Plan intended to address water quality at the small watershed level (HUC 10 or smaller). These plans will be developed as resources and willing partners become available. The development of these plans may be funded via several grant sources, including but not limited to, Clean Water Act Section 319(h), Section 604(b), and/or Section 106 grant funds. These plans are intended for implementation upon completion.

Any Watershed Management Plan that specifically address water bodies contained within this TMDL will supersede the Initial TMDL Implementation Plan once EPD accepts the plan. Future Watershed Management Plans intended to address this TMDL and other water quality concerns, written by EPD and for which EPD and/or the EPD Contractor are responsible, will contain at a minimum the USEPA's 9 Elements of Watershed Planning:

1) An identification of the sources or groups of similar sources contributing to nonpoint source pollution to be controlled to implement load allocations or achieve water quality standards. Sources should be identified at the subcategory level with estimates of the extent to which they are present in the watershed (e.g., X numbers industrial sites needing upgrading, Y acres of contaminated soils needing remediation, or Z linear miles of eroded stream bank needing restoration);

2) An estimate of the load reductions expected for the management measures;

3) A description of the NPS management measures that will need to be implemented to achieve the load reductions established in the TMDL or to achieve water quality standards;

4) An estimate of the sources of funding needed, and/or authorities that will be relied upon, to implement the plan;

5) An information/education component that will be used to enhance public understanding of and participation in implementing the plan;

6) A schedule for implementing the management measures that is reasonably expeditious;

7) A description of interim, measurable milestones (e.g., amount of load reductions, improvement in biological or habitat parameters) for determining whether management measures or other control actions are being implemented;

8) A set of criteria that can be used to determine whether substantial progress is being made towards attaining water quality standards and, if not, the criteria for determining whether the plan needs to be revised; and;

9) A monitoring component to evaluate the effectiveness of the implementation efforts, measured against the criteria established under item 8.

The public will be provided an opportunity to participate in the development of Watershed Management Plans that address impaired waters and to comment on them before they are finalized.

EPD will continue to offer technical and financial assistance (when and where available) to complete Watershed Management Plans that address the impaired water bodies listed in this and other TMDL documents. Assistance may include but will not be limited to:

- Assessments of pollutant sources within watersheds;
- Determinations of appropriate management practices to address impairments;
- Identification of potential stakeholders and other partners;
- Developing a plan for outreach to the general public and other groups;
- Assessing the resources needed to implement the plan upon completion; and
- Other needs determined by the lead organization responsible for plan development.

EPD will also make this same assistance available, if needed, to proactively address water quality concerns. This assistance may be in the way of financial, technical, or other aid and may be requested and provided outside of the TMDL process or schedule.

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Appendix A

Estimation of 1Q10 and 7Q10 Flows for Jones Creek, Suwannoochee Creek, Withlacoochee River

Calculation of Average 1Q10 and 7Q10 Estimates for Streams in the Suwannee River Basin based on USGS reported 1Q10 and 7Q10 values for nearby stream gages with known drainage areas.

Source: Anthony J. Gotvald, 2016, Provisional Draft Selected Low-Flow Frequency Statistics for Continuous- Record Stream Gages in Georgia, 2013, Scientific Investigations Report 2016-####, U.S. Geological Survey, Reston, Virginia

Stream	Gage No	Drainage Area (sq miles)	7Q10 (cfs)	Productivity Factor (cfs/sq miles)	1Q10 (cfs)	Productivity Factor (cfs/sq miles)
Withlacoochee River At US 84, Near Quitman, Ga	02318500	1480	8.87	0.005993	7.21	0.004872
Withlahoochee River (1)	-	1517	9.09	-	7.39	-
Suwannee River At US 441, At Fargo, Ga	02314500	1130	2.02	0.001788	1.58	0.001398
Suwannoochee Creek (2)	-	357	0.64	-	0.50	-
Jones Creek (2)	-	155.5	0.28	-	0.22	-

(1) Using the reported 1Q10 and 7Q10 for the Withlacoochee River gage to calculate the 1Q10 and 7Q10 of the 303(d) listed segment of the Withlacoochee River using productivity factors.
(2) Using the reported 1Q10 and 7Q10 for the Suwannee River gage to calculate the 1Q10 and 7Q10 of the 303(d) listed segments of Jones Creek and Suwannoochee Creek using productivity factors.