Total Maximum Daily Load

Evaluation

for

Two Segments

in the

Ocmulgee River Basin

for

Copper

Submitted to:
The U.S. Environmental Protection Agency
Region 4
Atlanta, Georgia

Submitted by:
The Georgia Department of Natural Resources
Environmental Protection Division
Atlanta, Georgia

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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 two (2) stream segments located in the Ocmulgee River Basin as impaired for copper. 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 copper load at any point in a stream requires the copper 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 copper load and TMDL. The copper load and required reduction for the listed streams are summarized in the table below.

Total Dissolved Copper TMDL Summary for the Impaired Stream Segments in the Ocmulgee River Basin

Stream Segment	Criteria	Current Load	WLA	WLA_{SW}*	LA	MOS	TMDL	Reduction
Stone Mountain Creek	Acute	Q x 2.86 µg/L	-	ΣQ_{WLASW} x 2.81 µg/L for all conditions and flows	8.51×10^{-4} kg/day for the 7Q10 ΣQ_{LA} x 2.81 µg/L for all conditions and flows	Implicit	8.51×10^{-4} kg/day + WLA for the 7Q10 Q_{total} x 2.81 µg/L for all conditions and flows	1.75%
	Chronic	Q x 2.86 µg/L	-	ΣQ_{WLASW} x 2.17 µg/L for all conditions and flows	9.03×10^{-4} kg/day for the 1Q10 ΣQ_{LA} x 2.17 µg/L for all conditions and flows	Implicit	9.03×10^{-4} kg/day + WLA for the 1Q10 Q_{total} x 2.17 µg/L for all conditions and flows	13.6%
Yellow River	Acute	Q x 3.33 µg/L	-	ΣQ_{WLASW} x 3.09 µg/L for all conditions and flows	1.27×10^{-1} kg/day for the 7Q10 ΣQ_{LA} x 3.09 µg/L for all conditions and flows	Implicit	1.27×10^{-1} kg/day + WLA for the 7Q10 Q_{total} x 3.09 µg/L for all conditions and flows	7.2%
	Chronic	Q x 3.33 µg/L	-	ΣQ_{WLASW} x 2.36 µg/L for all conditions and flows	1.12×10^{-1} kg/day for the 1Q10 ΣQ_{LA} x 2.36 µg/L for all conditions and flows	Implicit	1.12×10^{-1} kg/day + WLA for the 1Q10 Q_{total} x 2.36 µg/L for all conditions and flows	29.1%

* 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…"

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 two segments in the Ocmulgee River Basin as not supporting their designated use due to exceedances of water quality standards for copper. Table 1 presents the streams in the Ocmulgee River Basin included on the 2014 303(d) list for exceedance of the copper criteria.

Table 1. Water Bodies Listed for Copper in the Ocmulgee River Basin

Reach ID	Water body	Segment	County	Segment Length (miles)	Designated Use
R030701030320	Stone Mountain Creek	Headwaters to Stone Mountain Lake	DeKalb	4	Fishing
R030701030433	Yellow River	Centerville Creek to Hammock Creek	Gwinnett/ DeKalb/ Rockdale	8	Fishing

1.2 Watershed Description

The Ocmulgee River Basin is located in central Georgia, occupying an area of 6,102 square miles, originating in the eastern edges of the City of Atlanta (EPD, 2003). The Ocmulgee River basin falls within the Level III Piedmont and Southeastern Plains Ecoregions.

The Upper Ocmulgee Basin is made up of the South River, Yellow River, and Alcovy River subwatersheds. These converge at Lake Jackson to form the Ocmulgee River. The Ocmulgee River flows south and southeast, runs through the northeast side of the City of Macon, and then travels approximately 115 miles until it finally joins the Oconee River near the City of Hazlehurst,

to form the Altamaha River. The Altamaha River then continues in a southeastern direction to the Atlantic Ocean.

Stone Mountain Creek is located in Gwinnett County. Its headwaters are located immediately north of the City of Stone Mountain, Gwinnett County, Georgia. The creek flows southeast approximately four miles into Stone Mountain Lake. From the lakes dam, Stone Mountain Creek continues approximately two miles southeast where it goes into a small residential lake. From this lake, it continues southeast for two and one-half miles where it joins the Yellow River, south of SR 124.

The Yellow River originates in north-central Gwinnett County, east of the City of Suwannee, Georgia. From its headwaters the river flows generally south approximately eight miles where it passes the west side of the City of Lawrenceville, Georgia. It continues south for another eighteen miles where it enters DeKalb County, then flows a short distance into Rockdale County, where if passes through the north side of Conyers. It continues southward into Newton County flowing past the west side of the City of Covington, Georgia, continues for approximately 20 miles where it finally meets the South River at the Butts County-Newton County line. Approximately the upper two-thirds of the segment listed for copper is in Gwinnett County, while the downstream third occurs in Rockdale County.

The Ocmulgee River Basin includes three United States Geologic Survey (USGS) eight-digit hydrologic units, HUC 03070103 (Upper Ocmulgee River watershed), HUC 03070104 (Lower Ocmulgee River watershed), and HUC 03070105 (Little Ocmulgee River watershed). Figure 1 shows the location of the Ocmulgee River Basin in the State of Georgia. Figure 2 shows the locations of the three hydrologic units within the Ocmulgee River Basin, and Figure 3 indicates the locations of the two 303(d) listed stream segments in the Ocmulgee River Basin.

The land use characteristics of the Ocmulgee 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 Ocmulgee 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."

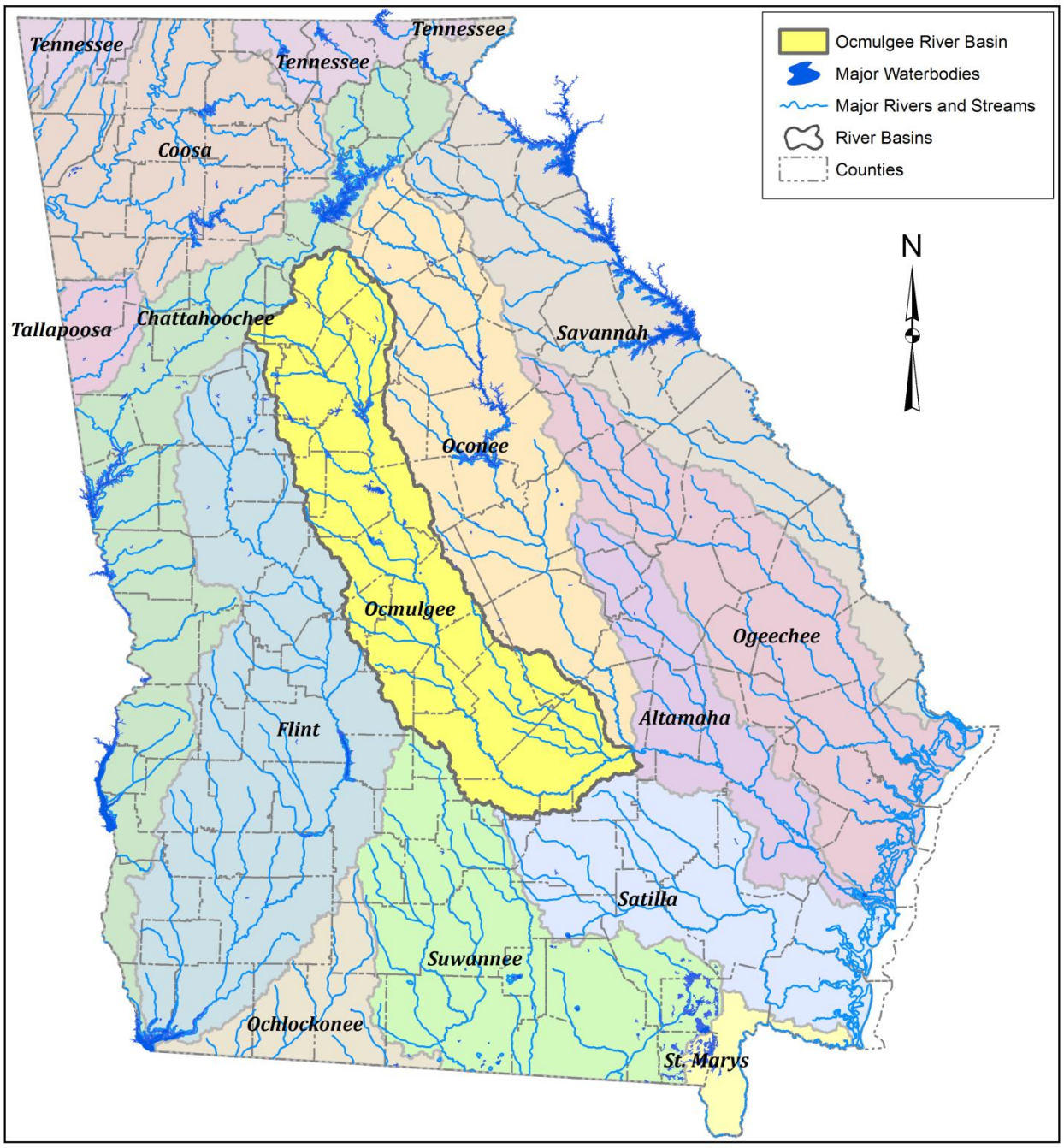

Figure 1. Location of the Ocmulgee River Basin in the State of Georgia

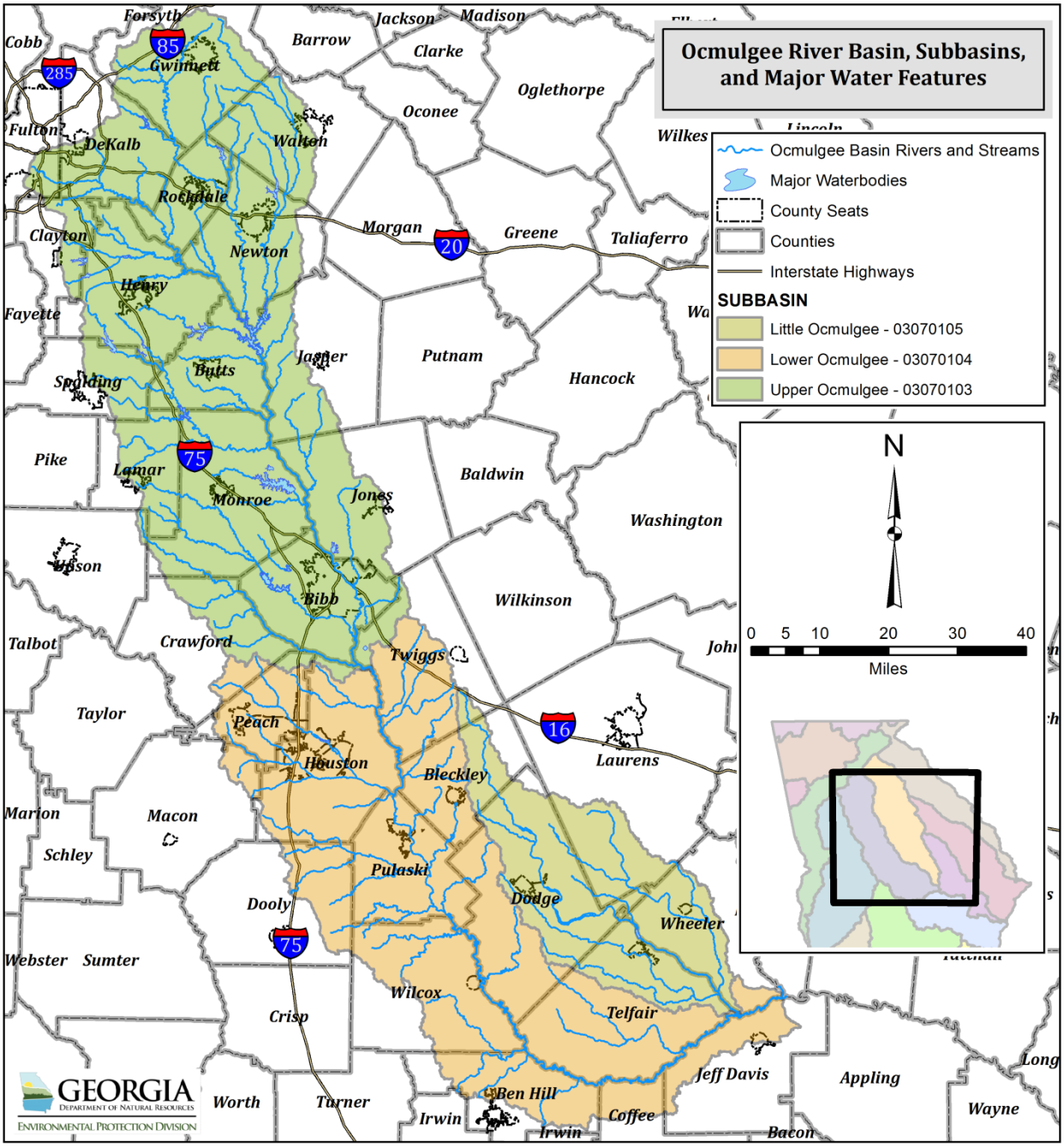

Figure 2. Location the Three USGS 8-Digit Hydrologic Units of the Ocmulgee River Basin

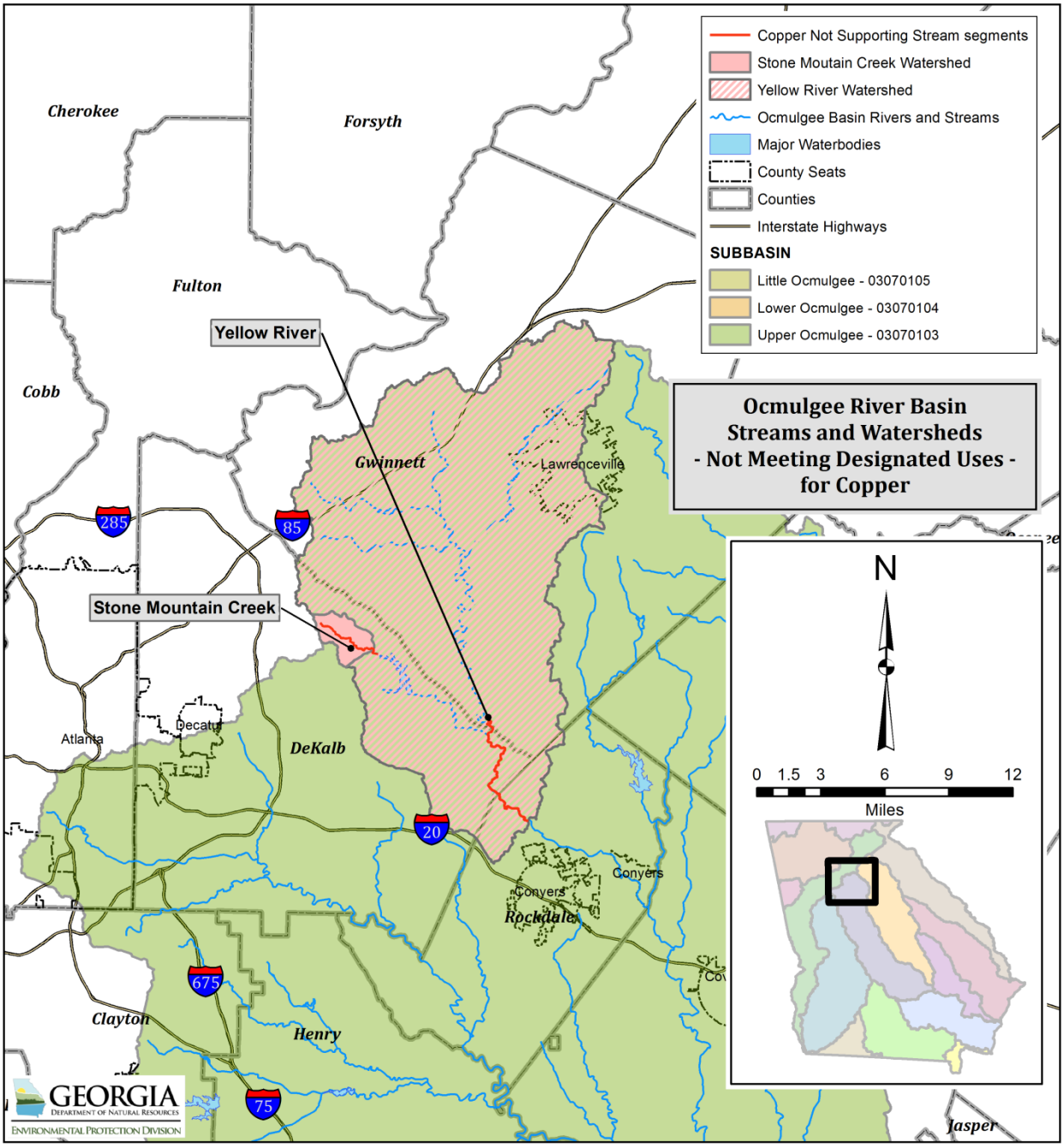

Figure 3. Location of the Two 303(d) Stream Segments Listed for Copper in the Ocmulgee River Basin

Table 2. Ocmulgee 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
Stone Mountain Creek	5	580	264	306	1	0	15	774	0	17	661	9	0	2,632
	0.2%	22.0%	10.0%	11.6%	0.0%	0.0%	0.6%	29.4%	0.0%	0.6%	25.1%	0.3%	0.0%	100.0%
Yellow River	1,520	43,480	18,855	10,342	355	1,376	2,785	34,826	0	4,355	26,573	2,514	12	146,992
	1.0%	29.6%	12.8%	7.0%	0.2%	0.9%	1.9%	23.7%	0.0%	3.0%	18.1%	1.7%	0.0%	100.0%

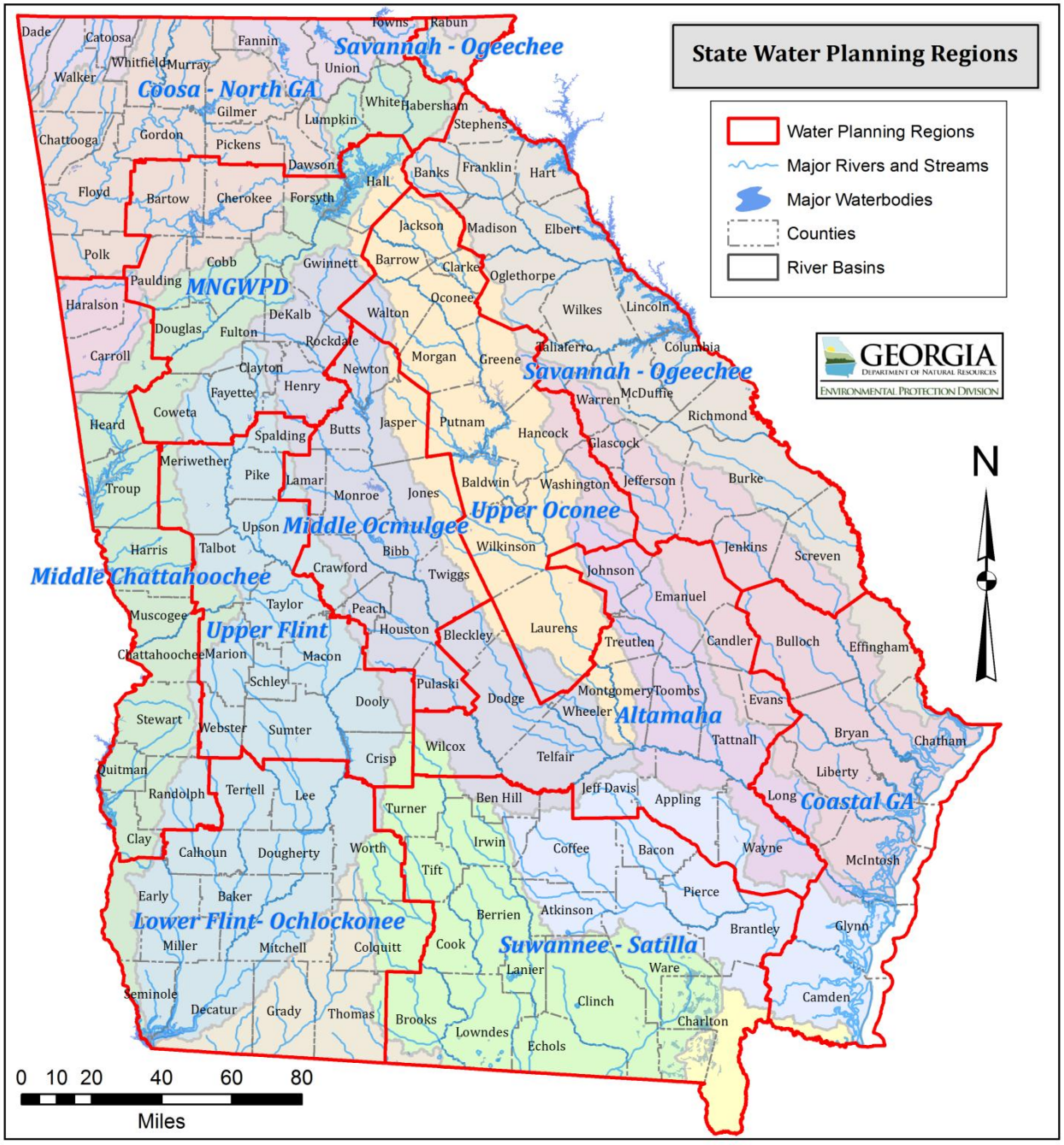

Figure 4. Boundaries of the Regional Water Planning Councils and the Metropolitan North Georgia Water Planning District.

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 copper are as follows:

$$\text{acute criteria for dissolved copper} = (e^{(0.9422[\ln(\text{hardness})] - 1.700)})(0.96)\ \mu g/L$$
$$\text{chronic criteria for dissolved copper} = (e^{(0.8545[\ln(\text{hardness})] - 1.702)})(0.96)\ \mu g/L$$

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.

In accordance with Georgia Rules and Regulations for Water Quality Control 391-3-6-.03(5)(e)(ii), guidance found in EPA's "Guidance Document of Dynamic Modeling and Translators August 1993" may be used to determine the relationship between the total recoverable concentration of a metal and the dissolved form of a metal. The metals translator is determined using default linear partition coefficient values found in an EPA document entitled, "Technical Guidance Manual for Performing Waste Load Allocations – Book II: Streams and Rivers."

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). Therefore, the TMDL will be expressed as both the TMDL of total recoverable copper that will be protective of the dissolved copper chronic criterion and the TMDL of total recoverable copper that will be protective of the dissolved copper acute criterion.

1.5 Background Information for Copper

Copper is a naturally occurring metal. It is used in electronics, household plumbing fixtures, in pigments and dyes, pharmaceuticals, fertilizers, and pesticides. Copper alloys include bronze (with tin) and brass (with zinc) (CCME, 1999; USEPA, 2008).

Copper is an essential nutrient for the human body in trace amounts. However, consumption of water containing elevated levels over many years can cause liver or kidney damage (USEPA, 2008). Humans are most often exposed to copper through corrosion of copper household pipes.

The copper (II) ion, which is commonly found in natural waters, is potentially toxic to aquatic life, both acutely and chronically. Copper is known to bioaccumulate in fish tissues. It can be introduced to surface waters through runoff from paved roads and parking areas where motor vehicles are used, from industrial areas as air emissions, where copper products are produced, urban and agricultural areas where fertilizers and pesticides are applied, and copper mining and smelting areas (USEPA, 2008).

2.0 WATER QUALITY ASSESSMENT

The impaired stream segments in the Ocmulgee River Basin designated use support determination was made for copper based on water quality samples taken by the Georgian Environmental Protection Division (EPD) Watershed Planning and Monitoring Program for years 2011 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 copper 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 copper will be in dissolved form. The sample results presented in Table 3 include total recoverable copper, TSS, and the translated dissolved copper concentrations. It also shows the sample hardness values, and the calculated acute and chronic copper criteria for Georgia's instream water quality standards, which are based on the hardness using the equations presented in Section 1.3.

Table 3. Copper Data Collected from Ocmulgee River Basin

Location	Date	Measured Total Recoverable Copper (μg/L)	Total Hardness (mg/L as $CaCO_3$)	TSS (mg/L)	Corresponding Dissolved Copper (μg/L)	Acute Criterion (μg/L)	Chronic Criterion (μg/L)
Stone Mountain Creek							
Silver Hill Road Near Stone Mountain, GA	3/9/2011	15.0	19	240	2.86	2.81	2.17
	6/15/2011	ND	41	1.4	ND	5.80	4.18
	9/6/2011	ND	44	2.4	ND	6.20	4.44
	12/6/2011	ND	37	1.3	ND	5.27	3.83
Yellow River							
Pleasant Hill Road Near Lithonia, GA	3/9/2011	18.0	21	280	3.33	3.09	2.36
	6/15/2011	ND	41	3.4	ND	5.80	4.18
	9/6/2011	ND	80	5.4	ND	10.9	7.40
	12/6/2011	ND	46	2.2	ND	6.47	4.61
	3/21/2012	ND	50	2.7	ND	6.99	4.95
	6/25/2012	ND	48	4	ND	6.73	4.78
	9/20/2012	ND	35	9.8	ND	5.00	3.65
	12/10/2012	ND	57	2.8	ND	7.91	5.54

ND = Not Detected

Four samples were collected from Stone Mountain Creek in 2011 at Silver Hill Road Near Stone Mountain, GA. The first sample was collected following a significant storm event which caused the stream flow to increase from its base flow of approximately 8 cubic feet per second (cfs) to over 60 cfs. This resulted in a large increase in the total suspended solids (TSS) carried by the stream, and a rise in copper levels, causing an exceedance of the instream acute and chronic criteria for copper. The remaining samples were collected during dry-weather periods, where observed TSS values were much lower, and copper concentrations were below detection limits.

Eight samples were collected from the Yellow River during 2011 and 2012 at Pleasant Hill Road near Lithonia, GA. The first sample was collected following the same storm event that impacted Stone Mountain Creek, with observed stream flows for the Yellow River increasing from a base flow of approximately 125 cubic feet per second (cfs) to over 640 cfs. As a result, a large increase in the total suspended solids (TSS) in the river was observed, and a rise in copper levels occurred, causing an exceedance of the instream acute and chronic criteria for copper. The remaining seven samples were collected during dry-weather periods or when only small storms occurred, resulting in lower observed TSS values and copper concentrations below detection limits.

The observed exceedances of the copper acute and chronic criteria by samples collected in Stone Mountain Creek and the Yellow River resulted in the placement of these two stream segments on Georgia's 2014 303(d) list.

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 copper 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 three NPDES permitted wastewater treatment facilities located within the Yellow River watershed. None of these facilities have permit limits that include copper or copper compounds, and are not considered sources of copper for the impaired stream segments. There are no permitted NPDES permitted wastewater treatment facilities in the Stone Mountain Creek watershed.

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 Yellow River watershed covered under the Industrial General Permit that are considered to have the potential for discharging copper based on their SIC Codes, Sector designations, and required benchmark sampling. There are no facilities covered under the Industrial General Permit that are located within the Stone Mountain Creek drainage area.

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

Facility Name	Subsector No.	SIC Code	NOI Type (1)	Type of Business	Facility Status	Watershed
JACO Environmental, Inc.	N1, N2	5093	NEE	Scrap Recycling and Liquid Recycling Facilities	active	Yellow River
Encore Recycling, LLC	N1, N2	5093	NOI	Scrap Recycling and Liquid Recycling Facilities	active	Yellow River
Progressive Recycling, LLC	N1, N2	5093	NOI	Scrap Recycling and Liquid Recycling Facilities	active	Yellow River
Newell South, LLC	N1, N2	5093	NOI	Scrap Recycling and Liquid Recycling Facilities	active	Yellow River
West Rock Lawrenceville Recycle Plant	N1, N2	5093	NOI	Scrap Recycling and Liquid Recycling Facilities	active	Yellow River
Tristar Recycling And Metals	N1, N2	5093	NOI	Scrap Recycling and Liquid Recycling Facilities	active	Yellow River
Globix LLc	N1, N2	5093	NEE	Scrap Recycling and Liquid Recycling Facilities	active	Yellow River

Source: Nonpoint Source Program, GA DNR, 2016
(1) NOI Type: NOI – Notice of Intent
NEE – No Exposure Exclusion

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 counties, fifty-six communities, seven 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 eleven MS4 permittees that discharge to the Yellow River and one that discharges to Stone Mountain Creek (Table 5).

Table 5. Permitted MS4s in the Ocmulgee River Basin

Stream Segment	MS4 Permittees	MS4 Phase
Stone Mountain Creek	DeKalb County	1
Yellow River	City of Duluth	1
	City of Norcross	1
	City of Lilburn	1
	City of Lithonia	1
	City of Lawrenceville	1
	City of Snellville	1
	City of Stone Mountain	1
	City of Suwanee	1
	DeKalb County	1
	Gwinnett County	1
	Rockdale County	2

Source: Nonpoint Source Program, GA DNR, 2015

Table 6 provides the total drainage areas of the not supporting segments of the Yellow River and Stone Mountain Creek, and the percentage of urbanized areas in the permitted MS4 areas contained within the watersheds. 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.

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

Stream Segment	Total Area (sq. mi.)	% In MS4 Urbanized Area
Stone Mountain Creek	4.1	68.8
Yellow River	213.0	72.2

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;

An assessment of the potential sources of copper 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 recycling or disposal facilities.

Facilities included on the TRI that are located within the watersheds of the copper-impaired stream segments in the Ocmulgee River Basin are provided in Table 7. These facilities have had releases of copper or copper 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 Copper Within the Impaired Stream Segments Watersheds in the Ocmulgee River Basin

Facility Name	Watershed	Form of Release	Type of Business	Production Status
Lonza America, Inc. (Frm Arch Wood Protection Inc.)	Yellow River	air, soil, water	Agricultural Chemical Manufacturing.	Active
Carlyle Compressor	Yellow River	recovered from air, off-site disposal	Air-Conditioning And Heating Equipment Manufacturing	Active
Essex Group, Inc.	Yellow River	recycled off-site	Copper Rolling, Drawing, And Extruding	Active
Cooper B-Line Norcross	Yellow River	air, soil, water, Recycled, off-site treatment/ disposal	Fabricated Structural Metal Manufacturing	Active
Georgian Art Lighting Design Inc.	Yellow River	air	Electroplating, Plating, Polishing, Anodizing, Coloring.	Closed
Ge Energy Airfoils Llc	Yellow River	off-site recycle, land disposal,	Turbine Generator Manufacturing	Active
Harimatec Inc	Yellow River	off-site recycle, off-site treatment/disposal	Chemical Product And Preparation Manufacturing.	Active
Heatcraft Inc.	Yellow River	off-site recycle	Motor And Generator Manufacturing	Closed
Heatcraft Refrigeration Products Llc	Yellow River	air, off-site recycled	Air-Conditioning And Heating Equipment Manufacturing	Active
Hussmann Corp	Yellow River	recovered from air, water,	Air-Conditioning And Heating	Active

Facility Name	Watershed	Form of Release	Type of Business	Production Status
		recycled	Equipment Manufacturing	
Rentokil Supatimber Inc.	Yellow River	off-site disposal	Agricultural Chemical Manufacturing.	Closed
Ricoh Electronics Inc	Yellow River	off-site treatment, off-site disposal;	Paper Bag And Coated, Laminated, Treated Paper, Printing Ink Manufacturing,	Active
Wika Instrument Lp	Yellow River	off-site recycle	Industrial Instruments For Measurement, Display, And Control Of Process Variables	Active
York Hardware	Yellow River	recovered from air, off-site disposal	Burial Casket Manufacturing, Nonferrous (Except Aluminum) Die-Casting .	Closed

USEPA Toxic Release Inventory, 2016

The inclusion of the above facilities on the TRI does not imply that they are a significant source of copper or copper 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. One site with copper contamination is included on the CERCLIS that is in the Yellow River watershed (Table x). This site is still under active cleanup. There are no CERCLIS sites within the Stone Mountain Creek drainage.

Table 7. CERCLA Sites in the Yellow River Watershed with Releases of Copper

Facility Name	Watershed	Media Contaminated	Type of Business	Facility Status	CERCLA Status
Crymes Landfill	Yellow River	soil	sanitary landfill	closed	active site

EPA CERCLIS, 2016

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. There are four sites on the HSI located within the Yellow River watershed that are known to have released copper or copper compounds above reportable quantities as determined by EPD (Table 8). There are no sites on the HIS within the Stone Mountain Creek watershed.

Table 8. Industrial Sites on the Hazardous Site Index (HSI) for Releases of Copper within the Impaired Stream Segments Watersheds in the Ocmulgee River Basin

Site Name	Watershed	HSI Number	Class (1)	Medium of Contamination	Facility Status	Status of Cleanup Activities
York Casket Hardware (Aka Piedmont Metals)	Yellow River	10137	IV	soil	operating	closed
Button Gwinnett Landfill	Yellow River	10286	IV	groundwater	closed	closed
Crymes Landfill	Yellow River	10292	I	soil	closed	active
Ben Gober Landfill	Yellow River	10297	II	groundwater, soil	closed	pending

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.

There are no Brownfields with contamination of copper or copper compounds listed on either EPA's Brownfields list or Georgia's Brownfield public record that are located within the Yellow River or Stone Mountain Creek drainage areas.

3.2.5 Solid Waste Disposal Facilities

Leachate from landfills may contain dissolved copper or copper 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 sixteen known landfills located within the impaired stream segment watersheds (Table 9). Of these, two are active landfills, and fourteen are inactive or closed.

Table 9. Landfills Upstream of 303(d) Listed Segments in the Savannah River Basin

Name	303(d) Listed Stream Segment	Landfill Type	Permit No.	Status
BFI-East DeKalb Landfill, Inc.	Yellow River	Construction And Demolition	044-049D(C&D)	Closed
Britt - Bermuda Rd., Stone Mtn.	Yellow River	Industrial	044-030D(L)	Inactive
Land Reclamation -Rogers Lake Rd.	Yellow River	Construction And Demolition	044-041D(L)	Operating
Lithonia	Yellow River	NA	-	Inactive
Patillo - Mtn. Ind. Blvd PH2&3	Yellow River, Stone Mountain Creek	Construction And Demolition	044-032D(L)	Closed
Patillo Const. Co.	Yellow River, Stone Mountain Creek	Construction And Demolition	044-021D(L)	Inactive
Phillips Bros.	Yellow River	NA	-	Inactive
Phillips-Scales Road C&D (L)	Yellow River	Construction And Demolition	044-046D(C&D)	Operating
Rogers Lake Road	Yellow River	Construction And Demolition	044-038C(TS)	Inactive
Button Gwinnett - Arnold Rd. PH1	Yellow River	Municipal Solid Waste Landfill	067-021D(SL)	Closed
Button Gwinnett - Arnold Rd. PH3	Yellow River	Municipal Solid Waste Landfill	067-037D(SL)	Closed
Crymes	Yellow River	Municipal Solid Waste Landfill	067-024D(SL)	Inactive
Crymes Enterprises US 29 Sanitary	Yellow River	Municipal Solid Waste Landfill	067-017D(SL)	Closed
Gartrell A. Nash	Yellow River	NA	-	Inactive
Tom Arnold	Yellow River	Municipal Solid Waste Landfill	067-011D(SL)	Inactive
Sunrise Lakes	Yellow River	NA	-	Inactive

Source: Land Protection Branch, GA DNR, 2015 NA = Not Available

3.3 Additional Potential Sources

A wide range of products that contain copper are produced and commonly used in our modern society. Some of the more familiar examples include:

- Electronics, electrical wiring
- Household plumbing
- Pigments, dyes
- Pharmaceuticals
- Fertilizers, pesticides
- Bronze, brass fixtures, decorative items

There are several routes by which copper may be introduced into waterways. In general, runoff from parking lots and streets can contain elevated levels as a result of residuals left by motor vehicles. Sanitary sewer line breaks and overflows can contain copper from household products containing and copper plumbing. Runoff from landscaped areas and agricultural areas treated with excessive amounts of fertilizers and pesticides containing copper can be a significant source.

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 10 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 10. Minimum Flows Associated with Copper Impaired Segments in the Ocmulgee River Basin

Stream Segment	1Q10		7Q10	
	cfs	MGD	cfs	MGD
Stone Mountain Creek	0.13	0.08	0.17	0.11
Yellow River	16.8	10.9	19.3	12.5

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 copper concentrations to estimated dissolved copper 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 copper (L/kg)
TSS = total suspended solids concentration (mg/L)

The partition coefficient for copper:

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

Where: K_{po} * = 1.04×10^6
a * = -0.7436

* 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 11 shows the TSS and corresponding translator, and hardness for the samples taken from Stone Mountain Creek and the Yellow River where exceedances of the copper acute and chronic criteria were observed. It also includes the calculated acute and chronic criteria based on the hardness values.

Table 11. Instream Dissolved Acute and Chronic Criteria for Copper the Impaired Stream Segments in the Ocmulgee River Basin

Stream Segment	TSS (mg/L)	Translator	Total Hardness (mg/L as $CaCO_3$)	Dissolved Cu Acute Criterion (µg/L)	Dissolved Cu Chronic Criterion (µg/L)
Stone Mountain Creek	240	0.1909	19	2.81	2.17

Stream Segment	TSS (mg/L)	Translator	Total Hardness (mg/L as $CaCO_3$)	Dissolved Cu Acute Criterion (µg/L)	Dissolved Cu Chronic Criterion (µg/L)
Yellow River	280	0.1848	21	3.09	2.36

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).

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 copper 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 copper 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 copper into the impaired streams. In the future, if any wastewater treatment facilities are permitted to discharge copper to the impaired stream segments in the Ocmulgee 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 waste load 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 copper 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 copper 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 copper criteria, along with historical low-flow data, are used to determine the load allocations for the impaired stream segments under critical conditions. 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 = $(e^{(0.9422[\ln(\text{hardness})] - 1.700)})(0.96)$ 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 = $(e^{(0.8545[\ln(\text{hardness})] - 1.702)})(0.96)$ µg/L

The critical conditions load allocations for copper, using the representative instream hardness values given in Table 11, are presented in Table 12.

Table 12. Load Allocations (LA) for Dissolved Copper under Critical Conditions for the Impaired Stream Segments in the Ocmulgee River Basin

Stream Segment	Criteria	Dissolved Cu Concentration (µg/L)	Critical Flow (MGD)	Allowable Load Allocation (kg/day)
Stone Mountain Creek	Acute	2.81	0.08	8.51×10^{-4}
	Chronic	2.17	0.11	9.03×10^{-4}
Yellow River	Acute	3.09	10.9	1.27×10^{-1}
	Chronic	2.36	12.5	1.12×10^{-1}

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:

$LA = Q_{LA}$ x 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 copper are summarized in Table 13.

Table 13. Total Dissolved Copper TMDL Summary for the Impaired Stream Segments in the Ocmulgee River Basin

Stream Segment	Criteria	Current Load	WLA	WLA_{SW}*	LA	MOS	TMDL	Reduction
Stone Mountain Creek	Acute	Q x 2.86 µg/L	-	ΣQ_{WLASW} x 2.81 µg/L for all conditions and flows	8.51×10^{-4} kg/day for the 7Q10 ΣQ_{LA} x 2.81 µg/L for all conditions and flows	Implicit	8.51×10^{-4} kg/day + WLA for the 7Q10 Q_{total} x 2.81 µg/L for all conditions and flows	1.75%
	Chronic	Q x 2.86 µg/L	-	ΣQ_{WLASW} x 2.17 µg/L for all conditions and flows	9.03×10^{-4} kg/day for the 1Q10 ΣQ_{LA} x 2.17 µg/L for all conditions and flows	Implicit	9.03×10^{-4} kg/day + WLA for the 1Q10 Q_{total} x 2.17 µg/L for all conditions and flows	13.6%
Yellow River	Acute	Q x 3.33 µg/L	-	ΣQ_{WLASW} x 3.09 µg/L for all conditions and flows	1.27×10^{-1} kg/day for the 7Q10 ΣQ_{LA} x 3.09 µg/L for all conditions and flows	Implicit	1.27×10^{-1} kg/day + WLA for the 7Q10 Q_{total} x 3.09 µg/L for all conditions and flows	7.2%
	Chronic	Q x 3.33 µg/L	-	ΣQ_{WLASW} x 2.36 µg/L for all conditions and flows	1.12×10^{-1} kg/day for the 1Q10 ΣQ_{LA} x 2.36 µg/L for all conditions and flows	Implicit	1.12×10^{-1} kg/day + WLA for the 1Q10 Q_{total} x 2.36 µg/L for all conditions and flows	29.1%

* 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 copper 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 copper 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 copper to meet water quality standards in the Ocmulgee 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

EPD collected water quality samples during 2011 from Stone Mountain Creek at Silver Hill Road near the City of Stone Mountain Samples were collected from the Yellow River during 2011 and 2012 at Pleasant Hill Road near the City of Lithonia

The first sampling event for both streams took place on the same day in September 2011 immediately following a significant storm event. Substantial increases in flow occurred in both streams as a result of the storm, resulting in elevated levels of TSS and exceedances of the acute and chronic instream criteria for copper. As a result, Stone Mountain Creek from its headwaters down to Stone Mountain Lake, and the Yellow River form Centerville Creek to Hammock Creek were placed on the 303(d) list. Results from the other sampling events taken from Stone Mountain Creek during 2011 and from the Yellow River during 2011 and 2012 showed low TSS levels and copper concentrations below detection limits.

It is recommended that sampling be continued on Stone Mountain Creek and the Yellow River to monitor copper concentrations. Efforts should be focused on conducting further wet-weather sampling events, as the occurrence of excessive levels of copper in both streams is apparently the result of stormwater runoff. If exceedances of the copper 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 copper 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 potential point source and nonpoint source loads for copper to the impaired stream segments. There are numerous potential nonpoint source loads for copper to both impaired stream segments. These are discussed in more detail in Section 3. Potential point sources primarily include permitted storm water runoff from industrial sites, commercial properties, and from MS4 structures. 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.

Management practices are recommended to reduce copper 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 *Metropolitan North Georgia Water Planning District Watershed Management Plan* (2009);
- 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 stormwater into rivers and streams at discrete locations. The NPDES permit program provides a basis for municipal, industrial, and stormwater permits, monitoring and compliance with permit 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 copper. The Stone Mountain Creek watershed is covered under an NPDES MS4 Phase 1 permit, and the Yellow River is covered under both Phase 1 and Phase 2 NPDES MS4 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 Stormwater 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 Ocmulgee River Basin that handle copper compounds will continue to be monitored under these programs.

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 result in reducing nonpoint source loads of copper and copper 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 copper.

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. Industrial sites within impaired stream segment watersheds are 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 with the owners towards cleanup of the sites, and implementing BMPs that will minimize these releases.

6.2.2.3 Agricultural Sources

The primary agricultural source of copper is the use and disposal of fertilizers and pesticides containing copper compounds. The following three organizations have primary responsibility for working with farmers to promote soil and water conservation, and proper use of agricultural chemicals:

- The University of Georgia - Cooperative Extension Service
- Georgia Soil and Water Conservation Commission
- Natural Resources Conservation Service

The University of Georgia (UGA) has faculty, County Cooperative Extension Agents, and technical specialists who provide services in several key areas relating to agricultural impacts on water quality. These include classroom instruction, basic and applied research, consulting assistance, and information on nonpoint source water quality impacts. These services are also available to urban landscapers and gardeners.

The GSWCC develops nonpoint source management programs and conducts educational activities to promote conservation and protection of land and water devoted to agricultural uses. In September 1994, the GSWCC developed a BMP manual, *Agricultural Best Management Practices for Protecting Water Quality in Georgia,* for the agricultural community (GSWCC, 1994). To incorporate advances in BMP technology and evaluation of effectiveness, the GSWCC has published a BMP document titled *Best Management Practices for Georgia Agriculture* (GSWCC, 2013) that includes information sources for fertilizer and pesticide uses and disposal.

The Natural Resources Conservation Service (NRCS) cooperates with Federal, State, and local governments to provide financial and technical assistance to farmers. NRCS develops standards and specifications for BMPs that are to be used to improve, protect, or maintain our State's natural resources. Some of these BMPs may be used for farming operations to manage fertilizer and pesticide use.

EPD should coordinate with other agencies that are responsible for rural and urban agricultural activities in the state to address issues concerning the use of fertilizers and pesticides containing copper and copper compounds. Much of the current emphasis in the agricultural community is directed towards minimizing soil loss through erosion control and nutrient management. Many of the BMPs employed to address these issues will also result in the reduction of copper introduced to in nearby waterways. It is recommended that structural BMPs (e.g., adequate buffer zones) and nonstructural BMPs (e.g., education regarding fertilizer application rates) be utilized to reduce the amount of copper transported to surface waters from agricultural sources.

6.2.2.4 Urban Sources

Nonpoint sources of copper and copper compounds can be significant in the Ocmulgee 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 Stone Mountain Creek and Yellow River watersheds are primarily urban in nature, and are predominately residential in nature. However, both watersheds contain commercial and industrial properties. 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 *Metropolitan North Georgia Water Planning District Watershed Management Plan* (2009);

- 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 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 copper or copper 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 copper 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.

The Stone Mountain Creek and Little River watersheds are covered under NPDES MS4 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 was provided for this TMDL. During that time, the TMDL was available on the GA EPD website, a copy of the TMDL was provided on request, and the public was 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 copper loads for the impaired stream segments in the Ocmulgee 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 copper impaired stream segments in the Ocmulgee 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 Copper in the Ocmulgee River Basin

Reach ID	Water body	Segment	County	Segment Length (miles)	Designated Use
R030701030320	Stone Mountain Creek	Headwaters to Stone Mountain Lake	DeKalb	4	Fishing
R030701030433	Yellow River	Centerville Creek to Hammock Creek	Gwinnett/ DeKalb/ Rockdale	8	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:

$$\text{acute criteria for dissolved copper} = (e^{(0.9422[\ln(\text{hardness})] - 1.700)})(0.96)\ \mu g/L$$

$$\text{chronic criteria for dissolved copper} = (e^{(0.8545[\ln(\text{hardness})] - 1.702)})(0.96)\ \mu g/L$$

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 copper 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 copper 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 copper loads to the impaired stream segments include contributions from NPDES permitted storm water discharges from current and former industrial sites and from MS4 systems. Many of the industrial facilities have been involved in the manufacture of products or use of compounds containing copper.

Potential nonpoint sources for copper 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.

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 copper 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 *Metropolitan North Georgia Water Planning District Watershed Management Plan* (2009);

- 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 copper and copper 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 copper, total hardness, and TSS be continued for Stone Mountain Creek and the Yellow 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 future wasteload 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 copper 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 Stone Mountain Creek and Yellow River

Calculation of Average 1Q10 and 7Q10 Estimates for Streams in the Ocmulgee River Basin

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)	1Q10 (cfs)	Productivity Factor (cfs/sq miles)	7Q10 (cfs)	Productivity Factor (cfs/sq miles)
No Business Creek At Lee Road, d/s from Snellville,Ga	02207185	10.1	0.32	0.032	0.41	0.041
Stone Mountain Creek	-	4.1	0.13	-	0.17	-
Yellow River At Pleasant Hill Road, Near Lithonia,Ga	02207220	213	16.8	0.079	19.3	0.091
Yellow River	-	213	16.8	-	19.3	-

(1) Using the reported 1Q10 and 7Q10 for the No Business Creek gage to calculate the 1Q10 and 7Q10 of the 303(d) listed segment of Stone Mountain Creek using productivity factors.
(2) Using the reported 1Q10 and 7Q10 for the Yellow River gage to calculate the 1Q10 and 7Q10 of the 303(d) listed segments of Yellow River at the same location.