ATTACHMENT 7

Oostanaula River Basin Profile

The Oostanaula River Basin is located in the northwest corner of Bartow County and the Metropolitan North Georgia Water Planning District (Metro Water District), representing only one percent of the total Metro Water District area and six percent of the overall Oostanaula River HUC-8 Basin. The City of Adairsville and a segment of Interstate 75 are located within this 35-square-mile drainage area that flows to the north. Lewis Springs, a drinking water source for the City of Adairsville, is the only water supply source within the Oostanaula River Basin.

Physical and Natural Features

Geography

The Oostanaula River Basin has its headwater in the Blue Ridge Mountains north of the Metro Water District (Figure OO-1). The Oostanaula River Basin is entirely within the Valley Ridge and Piedmont province, which consists of a series of rolling hills and occasional isolated mountains that are within the Great Valley physiographic districts (Metro Water District, 2002). In the Great Valley district, which includes much of Bartow County, the topography is generally broad and open with scattered ridges and hills. Elevations throughout the area range from 700 to 800 feet mean sea level. On land north of the Etowah River, the intervening streams drain relatively narrow valleys that extend southwestward. To the south of the Etowah River, the topography consists of a heterogeneous mix of upland mountains characterized by steep terrain in the north (Cherokee County) and rolling topography further south (Paulding County) (Clark and Zisa, 1976). The floor of the valley is underlain by shales, dolomites and limestones of the Cambrian and Ordovician ages. The eastern boundary of the Great Valley follows the escarpment of the Great Smoky-Cartersville Fault (Clark and Zisa, 1976).

Hydrology and Soils

The Oostanaula River is one of three 8-digit HUCs within the Coosa River Basin, with the others being the Etowah River and the Coosawattee River. The Oostanaula River Basin within the Metro Water District includes portions of two 10-digit HUCs and three 12-digit HUCs. The Oostanaula River begins at the confluence of the Coosawattee River and the Conasauga River northeast of Calhoun, Georgia in Gordon County. It then flows southwest towards the confluence with the Etowah River in Rome, Georgia in Floyd County. The river basin within the District includes a portion of Oothkalooga Creek, a tributary to the Oostanaula, which is designated for fishing. None of the waterways in this portion of Bartow County are designated as primary or secondary trout streams.

An assessment of the availability of groundwater resources in select prioritized aquifers of Georgia was completed as part of Georgia's Comprehensive State-wide Water Management Plan (Georgia EPD, 2010). None of the Oostanaula River Basin within the Metro Water District was selected as a priority aquifer for assessment. The Georgia Geologic Survey Hydrologic Atlas 18 database identifies approximately 28 areas, representing about 4 percent of the Metro Water District, likely to contain unconfined aquifers and 79 areas, representing about 12 percent of the Metro Water District, likely to contain thick soils considered to be an indicator of significant groundwater recharge areas. There are approximately 6 square miles of potential recharge areas within Bartow County in the District (Table OO-1). Only a limited portion of this recharge area is within the Oostanaula River Basin.

Figure OO-1
Oostanaula Basin Within the Metro Water District

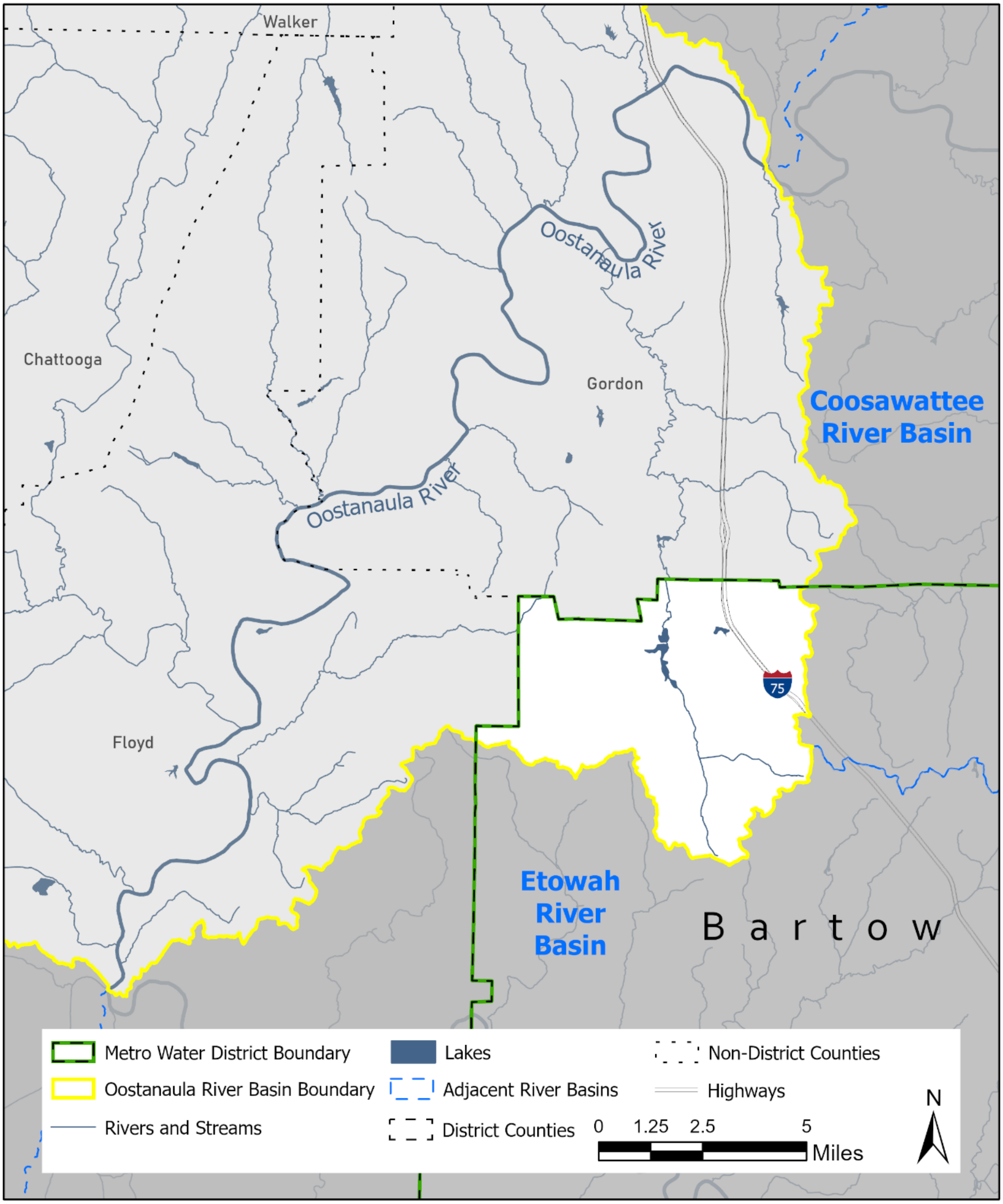


Table OO-1. Groundwater Recharge Areas within the Oostanaula River Basin

Recharge Area Type	County [a]	Square Miles of Recharge Area Type within County
Unconfined Aquifer	Bartow	6
Total Recharge Areas		6 [b]

[a] Portions of Bartow County overlap the basin boundary.

[b] Minor differences in mapping methodologies may cause basin totals to vary slightly from county totals.

There are three soil associations that describe the soil types in the Oostanaula River Basin: Shack-Fullerton-Bodine, Townley Fullerton Montevallo and Fullerton-Shack-Chewacla. These soil types are dominant in north Bartow County (Table OO-2). The Shack-Fullerton-Bodine and Townley-Fullerton-Montevallo associations were the most abundant, associated with side slopes and upland ridges. These soils are moderate to well drained and highly weathered, (Brock, 1977; Jordan et al., 1973; Murphy, 1979; Thomas and Tate, 1973; USDA, 1976; Thomas, 1982; Wells, 1961; Robertson et al., 1960; USDA, 1958; Tate, 1967; Thomas and Tate, 1964).

Table OO-2. Major Soil Associations within the Oostanaula River Basin

Soil Association	Significance to Watershed Management
Fullerton-Shack-Chewacla	Characteristics: Associated with very deep, moderately to poorly drained, moderately permeable soils located on side slopes and valleys. Significance to Watershed Management: Poorly drained soils may be less permeable, which increases runoff rates and decreases infiltration capacity in areas without impervious cover. Deep soils have the capacity to store more water for potential groundwater recharge.
Shack-Fullerton-Bodine	Characteristics: Associated with very deep, moderately to excessively well drained, moderately permeable soils located mainly on uplands. Significance to Watershed Management: Well-drained soils may be more permeable, which increases infiltration capacity in areas without impervious cover, also may improve feasibility for infiltration practices. Deep soils have the capacity to store more water for potential groundwater recharge.
Townley-Fullerton-Montevallo	Characteristics: Moderately deep, well-drained, slowly permeable soils on upland ridgetops and side slopes. They formed in clayey residuum weathered from shale or interbedded sandstone and shale. Slope ranges from 2 to 45%. Significance to Watershed Management: Well-drained soils may increase infiltration capacity in areas without impervious cover, also may improve feasibility for infiltration practices. Deep soils have the capacity to store more water for potential groundwater recharge.

Protected Species

Protected species include all species listed as threatened or endangered by the USFWS or National Marine Fisheries Service, and those listed as endangered, threatened, rare or unusual by the state of Georgia. The USFWS also may designate critical habitat for a federally listed species, which provides protection for the habitat as well as the species itself. The current listings of these endangered species, including their status, range and habitat, can be accessed via the USFWS's automated Information, Planning and Conservation System (IPaC, http://ecos.fws.gov/ipac/).

The Metro Water District is home to a number of species that are considered threatened or endangered. Protecting watershed health is more than protecting water quality; it also includes protection of biological resources. Within the District, there are a number of protected animal species that spend all or part of their life cycle in rivers and streams or depend on streams for a significant portion of their life history. In addition, there are protected plants that are either aquatic or semi-aquatic and grow within or along the margins of rivers and streams. Table OO-3 lists the 11 protected species potentially found within Bartow County.

Table OO-3. Aquatic and Semi-Aquatic Protected Species in the Metro Water District

Fauna Type	Common Name	Status^	Bartow
Fish	Blue Shiner	E	X
Fish	Etowah Darter	E	X
Fish	Cherokee Darter	T	X
Mammal	Gray Bat	E	X
Mammal	Northern Long-eared Bat	T	X
Bird	Bald Eagle	T	X
Fish	Coldwater Darter	E	X
Fish	Rock Darter	R	X
Fish	Lined Chub	R	X
Invertebrate	Etowah Crayfish	T	X
Reptile	Northern Map Turtle	R	X

^Status that is not underlined is listed in Georgia. Underlined status is Federally listed.

R = Rare, E = Endangered, T = Threatened

Trout Streams

Trout streams are classified in accordance with the primary and secondary designations and criteria defined in Section 15 of Georgia's Water Use Classifications and Water Quality Standards (391-3-6-.03). Streams designated as primary trout streams are waters supporting a self-sustaining population of Rainbow, Brown or Brook Trout. Streams designated as secondary trout streams are those with no evidence of natural trout reproduction but are capable of supporting trout throughout the year. While there are multiple segments in adjacent watersheds, this portion of Bartow County has no streams designated as trout streams.

Land Use and Surface Water Quality

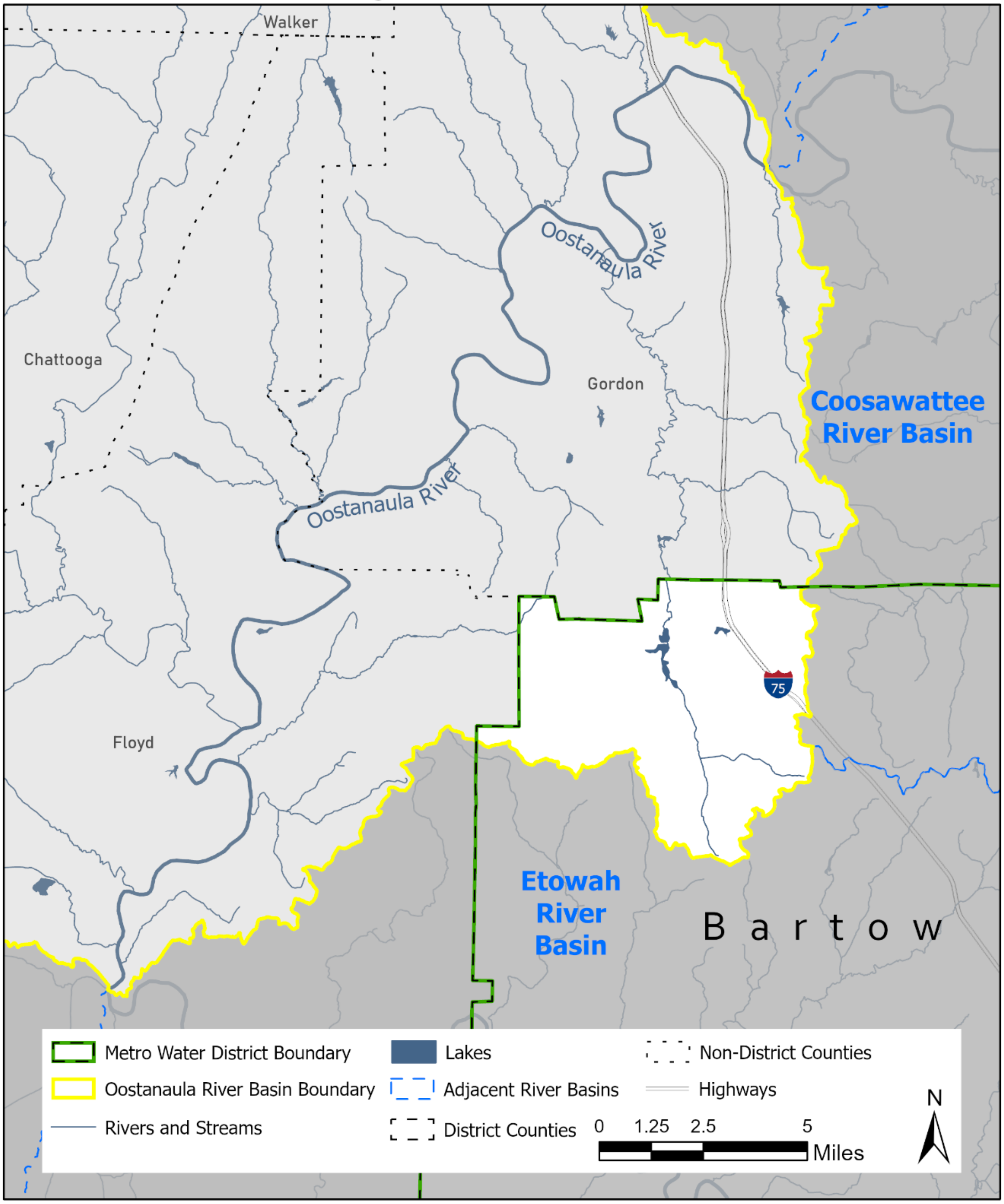
Drinking Water Supply

As described in the Water Supply and Water Conservation Plan, the Coosa River Basin is the primary drinking water supply source for the Metro Water District, providing water to Cobb, Bartow and Cherokee Counties; however, this portion of the Coosa only serves as a limited water supply source to the City of Adairsville. Table OO-4 notes this water supply source while Figure OO-2 illustrates that there are no waters that are designated to meet state drinking water criteria within the Oostanaula River Basin.

Table OO-4. Coosa River Basin Drinking Water Supply Sources

Water Supply Source	Owner/Operator Using Source
Lewis Spring	City of Adairsville

Figure OO-2
Oostanaula Basin Drinking Water*



*The only Metro Water District drinking water source is a spring and is not shown

Land Cover/Land Use

Table OO-5 summarizes the land use / land cover characteristics of the Oostanaula River Basin portion of the Metro Water District in Bartow County. As illustrated by Figure OO-3, the 2019 land cover indicates the ongoing growth along Interstate 75 near Adairsville. Overall, 21 percent of the Oostanaula River Basin within the Metro Water District is developed, 43 percent of the area is forested, and 36 percent of the area falls within the remaining cover classes (Table OO-5, Figure OO-3).

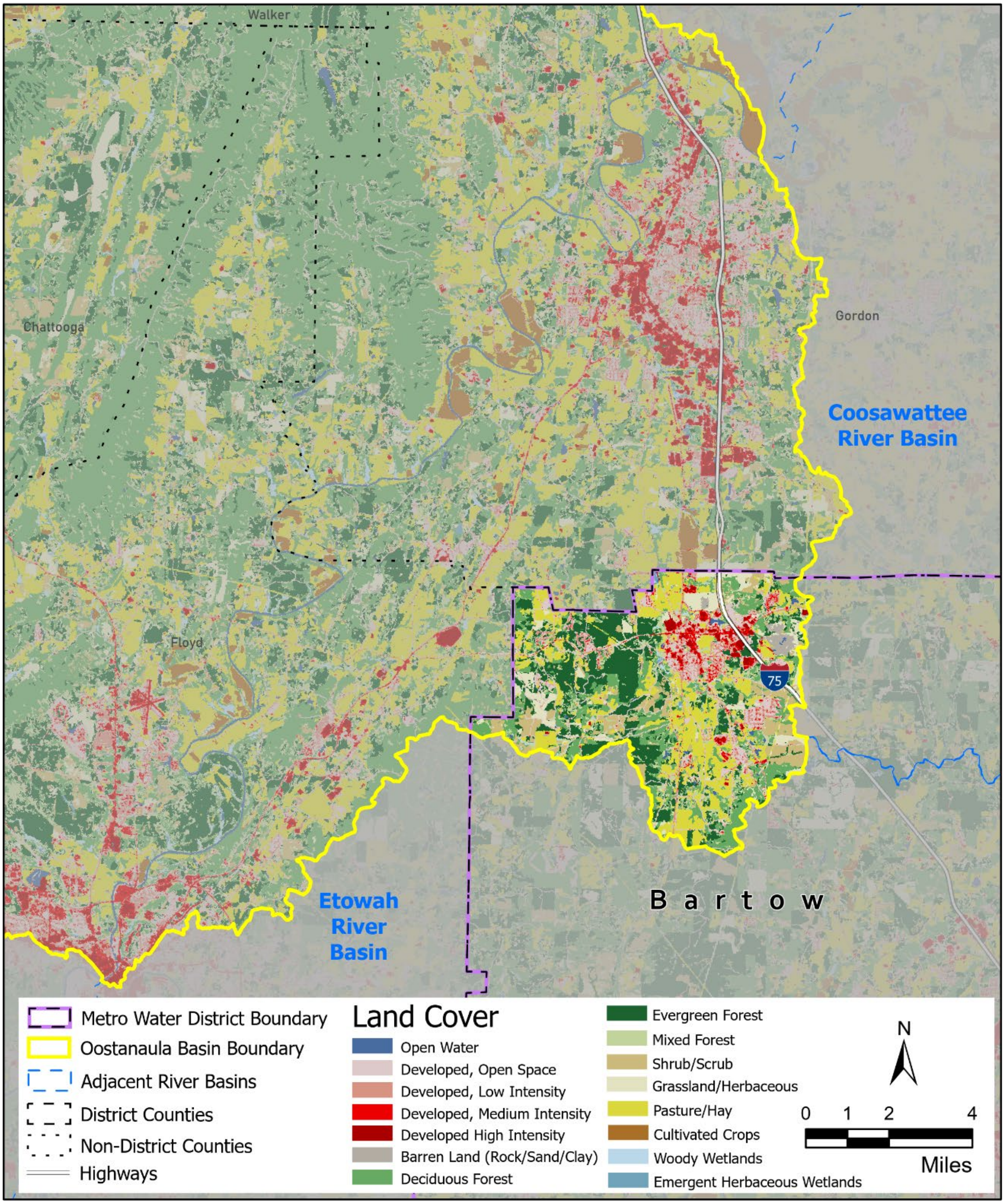
Table OO-5. Oostanaula River Basin Land Cover / Land Use within the Metro Water District

Land Cover/Land Use	Area (Square Miles)	2019 Existing (%)
Barren Land (Rock/Sand/Clay)	0.43	1.24
Deciduous Forest	5.65	16.33
Developed High Intensity	0.47	1.35
Developed, Low Intensity	2.13	6.16
Developed, Medium Intensity	0.92	2.67
Developed, Open Space	3.70	10.69
Emergent Herbaceous Wetlands	0.05	0.14
Evergreen Forest	6.69	19.34
Grassland/Herbaceous	2.41	6.98
Mixed Forest	2.49	7.20
Open Water	0.19	0.55
Pasture/Hay	6.56	18.96
Shrub/Scrub	2.80	8.10
Woody Wetlands	0.10	0.29
Undeveloped	27.37	79.13
Developed	7.22	20.87

Notes: Developed = High Intensity, Low Intensity, Medium Intensity, and Open Space. Undeveloped = land cover classes not described as Developed.

Data Source: Aggregated Land Cover categories from USGS National Land Cover Database 2019.

Figure OO-3
Oostanaula Land Cover



Source: 2019 NLCD

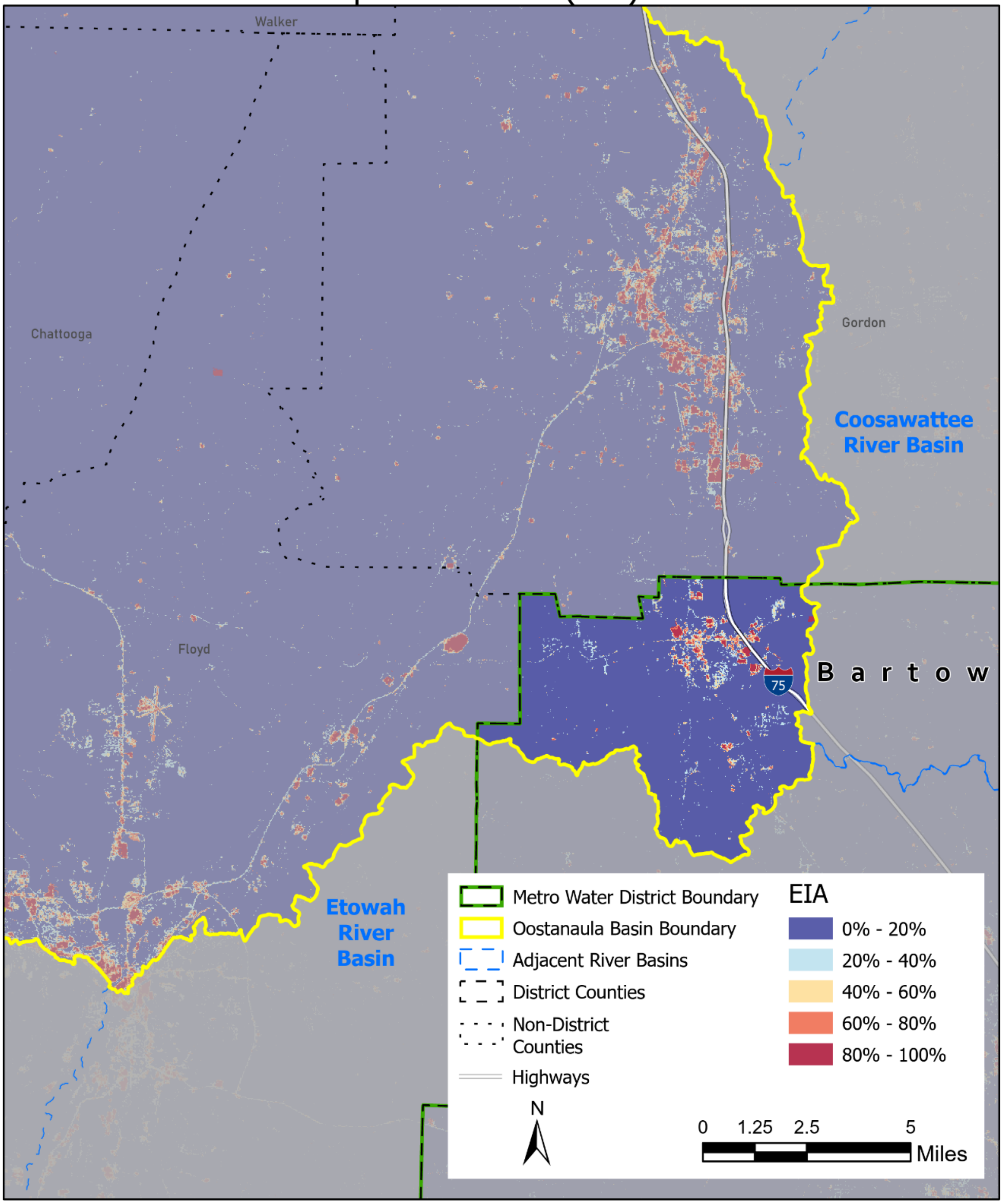
Effective Impervious Areas

The level of watershed imperviousness has long been linked to impacts on changes in hydrologic regimes that lead to increased intensity and frequency of peak stormwater flows, which affect stream stability, water quality and aquatic habitat and biotic community integrity. In general, the most sensitive aquatic organisms are affected at impervious levels greater than 10 percent. Between 11 and 25 percent of most stream communities become impacted, and over 25 percent of streams are generally no longer able to support viable biotic communities (Schueler, 2001).

Impervious surfaces (such as roofs, streets, parking lots) have a significantly different hydrologic response from pervious surfaces (lawns, forests); therefore, it is important to clearly define terms and assumptions related to the calculation of pervious and impervious areas for the purposes of watershed management. "Total impervious area" quantifies all of the land surfaces impervious to rainfall for the particular land cover category while "effective impervious area" (EIA) refers to the directly connected impervious area used for water quality and stormwater conveyance modeling. For the 2003 District-wide Plan, EIA values were initially defined based on previous studies, including the local watershed assessments, and then further refined based on calibration using available water quality data. For the 2022 District-wide Plan, the EIA of the HUC-12 subwatersheds within the Metro Water District was calculated using a mathematical model developed by Sutherland for EPA based on land cover data from the 2019 USGS National Land Cover Database.

Of the three HUC-12s within the Metro Water District portion of Oostanula River Basin, one has an effective impervious area (EIA) greater than 10 percent: the Middle Oothkalooga Creek portion of the river basin, which straddles the major transportation corridor of Interstate 75 (Figure OO-4).

Figure OO-4
Oostanaula Effective Impervious Area (EIA)



Combined-sewer Overflow Areas

There are no combined-sewer overflow areas in the Oostanaula River Basin.

Impaired Waterbodies

The Georgia EPD establishes water quality standards for the state's surface waters. Section 303(d) of the federal Clean Water Act requires that all states list waterbodies that do not meet water quality standards. The Georgia EPD publishes a biennial list of streams that do not meet State water quality standards, referred to as the 303(d)/305(b) list. If a water body does not support its designated use (drinking, recreation, fishing, wild/scenic rivers or coastal fishing) because conditions violate water quality standards, it is considered an "impaired" stream or water body.

The Georgia EPD determines whether a waterbody is supporting its designated uses by collecting water quality data and comparing it against State water quality criteria. Georgia EPD describes their listing methodology and "preferred minimum dataset" at http://epd.georgia.gov/georgia-305b303d-list-documents. This methodology is important to understand the sample size, extent and timeframe of the dataset that was used to list a waterbody. Feedback can be given to Georgia EPD if additional data or information are known that may affect future sampling or listing evaluations.

The Metro Water District portion of the Upper Chattahoochee River Basin contains 77 stream miles, five of which were assessed for impairments. A total of one stream mile, one percent or 20 percent of total and assessed streams respectively, not meet state water quality standards based on the 2020 303(d) list. The streams listed as not supporting are summarized in Table OO-6 by parameter and graphically shown in Figure OO-5.

Table OO-6. Oostanaula River Basin Summary of Impaired Streams

Criterion Violated	Miles of Stream	% of 2020 Assessed Streams	% of Total Stream Mileage
Fecal Coliform Bacteria	1	12	1
Biota (Macroinvertebrate Community)	1	12	1
Total Impaired Stream Mileage[a]	1	20	1
Total Mileage Assessed for Possible Impairment	5		
Total Stream Mileage in Basin	77		

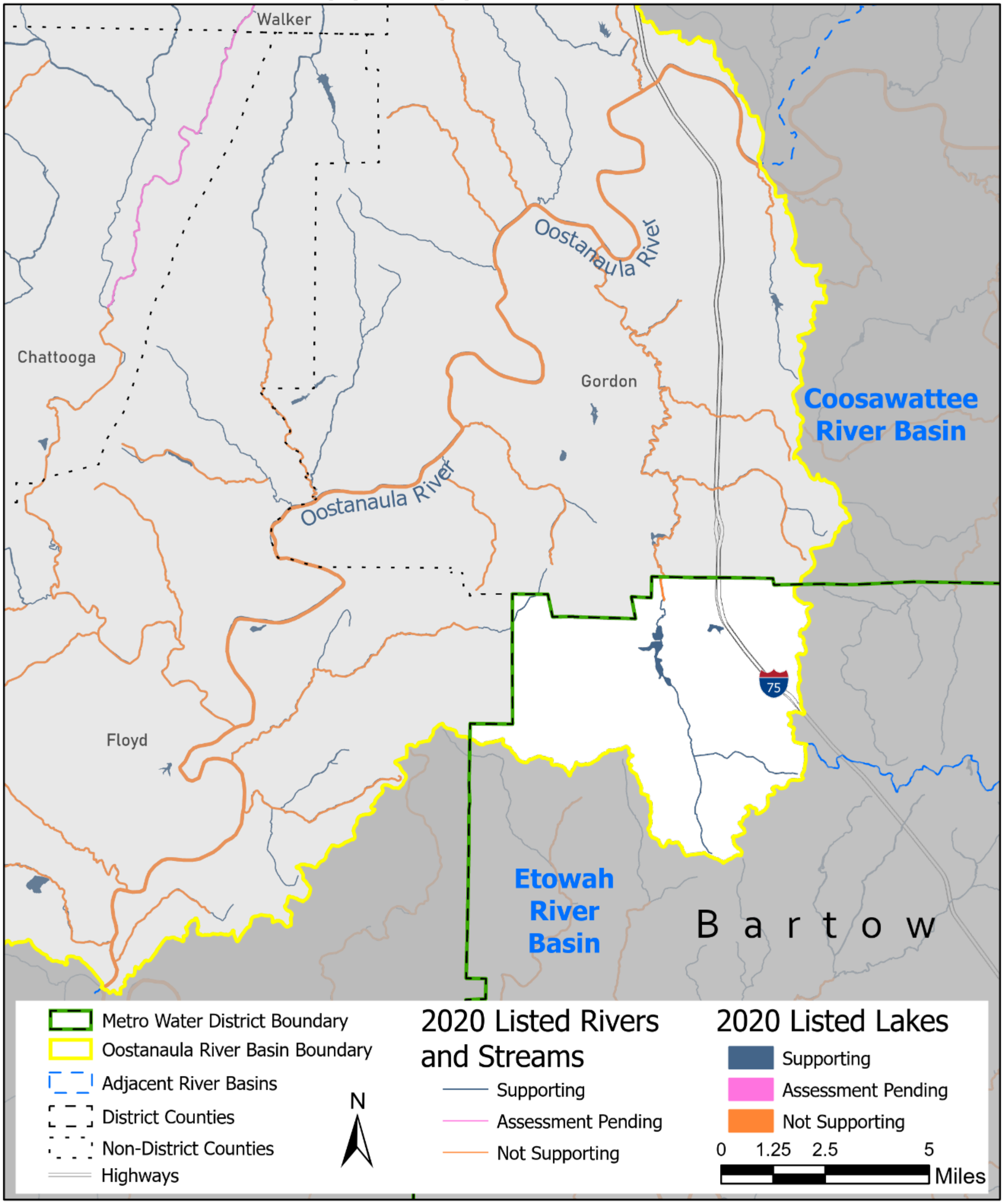
[a] Several streams are listed for violations of multiple parameters within the same stream segment; therefore, the total of impaired miles by parameter will not equal the total stream mileage of impaired streams.

The Metro Water District portion of the Oothkalooga Creek stream segment in the Oostanaula River Basin does not meet water quality standards for fecal coliform bacteria or biota (macroinvertebrate communities) as a result of nonpoint source pollution. Fecal coliform is used for water quality purposes as a Fecal Indicator Bacteria (FIB). FIBs are used to provide an approximation of the potential risk a water body poses to human health. These bacteria enter the stream from both human and non-human sources, including sanitary sewer overflows, leaking sewer lines, failing septic systems and pet/wildlife waste. Fecal coliform typically is found in both developed and undeveloped watersheds, and monitoring programs in Georgia have found levels that exceed state standards in urban, agricultural and forested areas (Georgia EPD, 2011). While fecal coliform is ubiquitous in streams across the country (Georgia EPD, 2011), concentrations of bacteria can increase as a result of the higher density of potential pollutant sources and decreased stormwater filtration and stormwater treatment from population growth and development. Biota listings typically indicate high sediment loads in streams, which decrease habitat quality for benthic macroinvertebrates and fish.

Sediment sources include runoff from construction sites as well as from streambank erosion due to accelerated streamflow velocities from impervious cover associated with urbanization.

Total maximum daily loads (TMDLs) and TMDL Implementation Plans have been developed to help jurisdictions address impaired streams and specific parameters of concern. More information on specific TMDLs in the Oostanaula River Basin can be found on the Georgia EPD website https://epd.georgia.gov/total-maximum-daily-loadings.

Figure OO-5
Oostanaula Basin 305(b)/303(d) Listed Waters



Management Issues and Recommendations

BASIN-LEVEL SUMMARY

Land development affects the physical, chemical, and biological conditions of the District's watersheds, waterways, and water resources. Based on the Stormwater Forecast analysis, development patterns in the District over the past century have resulted in substantial changes to watershed characteristics. Developed area is projected to increase from 4,610 acres in the current (2019) condition to 7,512 acres in 2040, a 63 percent increase. If current land use policy and recent development patterns continue, future estimates of land use are expected to intensify, with the weighted average CN value potentially reaching approximately 86 and total imperviousness potentially reaching nearly 50 percent by 2040, based on the future developed area.

Precipitation rates are also expected to increase based on the future precipitation study results for the District. By 2040, the Basin-wide weighted average 85th percentile annual rainfall; 1-year, 24-hour rainfall; and 25-year, 24-hour rainfall events are estimated to potentially increase by 14 percent, 11 percent, and 16 percent, respectively. These changes to watershed characteristics and rainfall intensity will have a direct impact on the total potential runoff management volume generated from development that may require additional management from structural control measures.

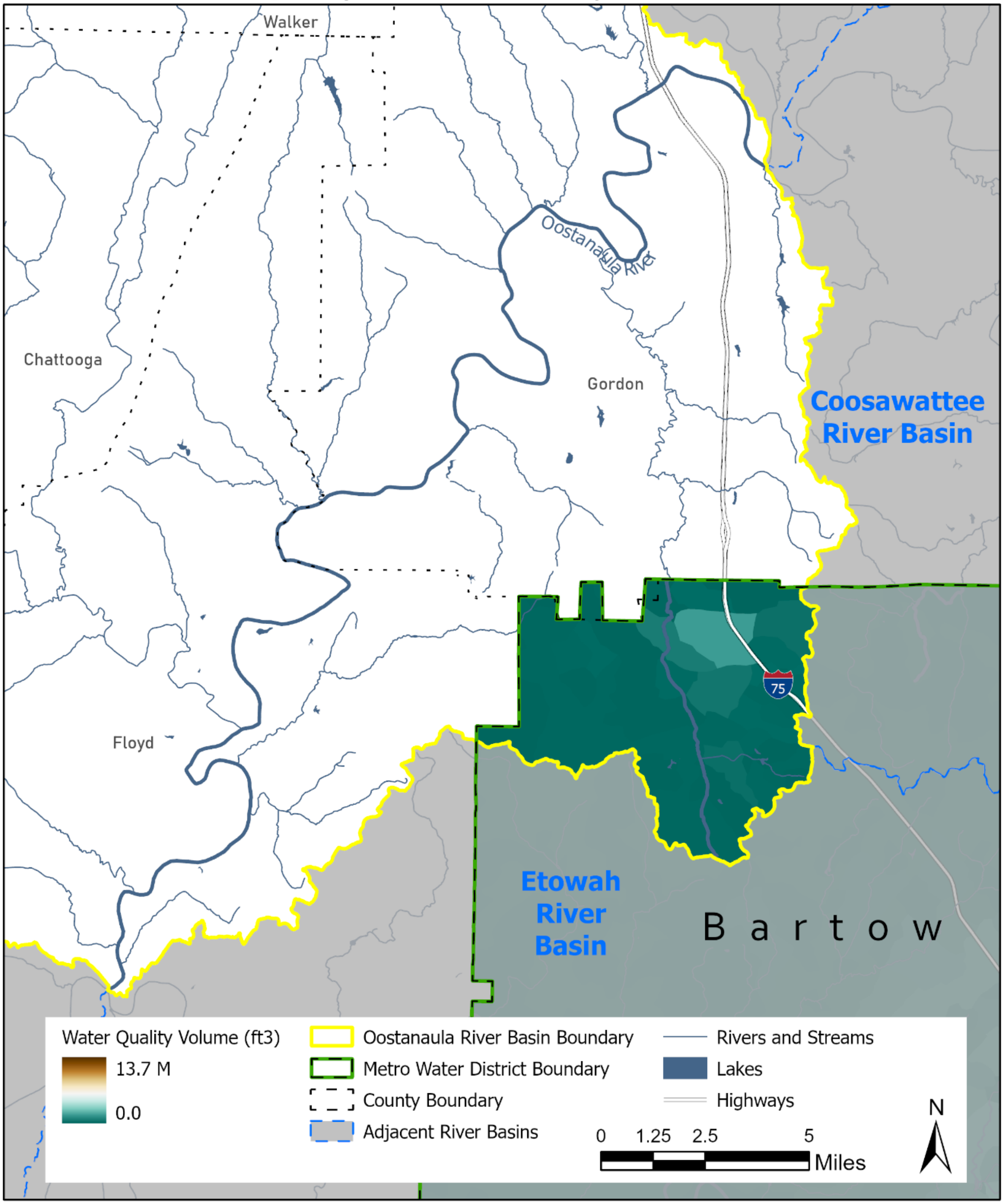
Runoff for the three post-construction volumes (WQv, CPv, and OFPv) were calculated for 77 individual subcatchments in the Basin. In 2019, a total of 5.9 million cubic feet of runoff was estimated in the Basin for the Water Quality (WQv), 18.89 million cubic feet for the Channel Protection Volume (CPv), and 93.43 million cubic feet for the Overbank Flood Protection Volume (OFPv), based on 4,610 acres of development. See additional information in the following summary table and a figure of the 2019 WQv for the Basin.

Table OO-7. Oostanaula River Basin Watershed Characteristics at and Total Potential Runoff Management Volumes

	Predevelopment	2019	2030	2040
Subcatchments (count)	77	77	77	77
Total Area (acres)	22,514	22,514	22,514	22,514
Developed Area (acres)	4,610	4,610	6,153	7,512
Total Imperviousness (percent)	1.0	27.2	39.4	49.6
CN	67	84	85	86
Slope (percent)	6.6	6.6	6.6	6.6
85th Percentile Annual Rainfall (inches)	1.20	1.20	1.32	1.37
1-Year, 24-Hour Rainfall (inches)	3.31	3.31	3.55	3.67
25-Year, 24-Hour Rainfall (inches)	6.10	6.10	6.74	7.06
WQv (cubic feet)	1.18 M	5.91 M	11.94 M	18.54 M
CPv (cubic feet)	7.67 M	18.89 M	29.39 M	38.52 M
OFPv (cubic feet)	-	93.43 M	159.70 M	220.02 M

M = Million

Figure OO-6
Estimated Water Quality Runoff Volume per Subcatchment - 2019*



Management Issues and Recommended Strategies

Table OO-8 outlines management issues and strategies for the Oostanaula River Basin within the Metro Water District. These issues and strategies were used to inform and guide the more specific management measures and requirements found in Sections 5, 6 and 7. The recommended strategies presented in Table OO-8 are based on data presented within this River Basin Profile. These strategies are provided to further describe the commonality of causes and potential solutions to the watershed issues. They provide a foundation for guidance but are not presented here as mandatory requirements.

Table OO-8. Oostanaula River Basin Management Issues and Recommended Strategies

Management Issue	Description	Recommended Strategies
Source water quality	Source water watershed protection of small water supply watersheds.	• Implement source water protection measures in all small water supply subwatersheds. • Continue collaborative efforts in small drinking water supply watersheds, such as Lewis Springs, to protect the viability of these supplies.
Increases in impervious cover (new development)	Increases in impervious cover can lead to a change in the hydrologic regime of a watershed by causing more intense, high-velocity stormwater flows and increased erosion and sedimentation.	• Manage nonpoint source pollution. • Adopt and enforce the post-construction stormwater control ordinance and use of Georgia Stormwater Management Manual design standards. • Recommend watershed improvement projects, such as stream restoration and streambank stabilization, in areas with failing streambanks to reduce instream sediment load contributions.
Inadequate stormwater controls on existing impervious cover	Limited resources and cost of maintaining and repairing stormwater infrastructure. Varying local strategies of funding stormwater management.	• Identify opportunities for watershed improvement projects to retrofit or install updated stormwater controls, green infrastructure, stormwater treatment or other controls. • Consider dedicated funding sources such as stormwater utilities and seek out opportunities for grants, loans and partnerships.
Aquatic resources	Several streams located in Bartow County are designated secondary trout streams.	• Balancing nonpoint source temperature inputs from tributaries with background cool water temperatures to meet secondary trout stream criteria. • Participate in efforts to educate agricultural stakeholders about the importance of implementing Best Management Practices for Georgia Agriculture Manual for animal production facilities (poultry) and grazing operations. • Coordinate with Georgia Department of Agriculture Livestock/Poultry Section on inspections, complaint investigations, nutrient management plan reviews, permit administrative support and enforcement assistance (Georgia EPD, 2014).
Biota TMDLs	Oothkalooga Creek is listed for impaired benthic macroinvertebrate communities. Biota impairment in this basin are the result of high sediment loads, primarily associated with existing development with inadequate stormwater controls,	• Enforce post-construction stormwater ordinance on new development and seek opportunities to retrofit stormwater controls to maximize water quality and channel protection. • Watershed improvement projects, such as stream restoration and streambank stabilization are recommended in areas with failing streambanks to reduce instream sediment load contributions.

Table OO-8. Oostanaula River Basin Management Issues and Recommended Strategies

Management Issue	Description	Recommended Strategies
	which is a concern for drinking water source supplies, biota and recreation.	
Bacteria TMDLs	Oothkalooga Creek is listed as not supporting its designated use of fishing due to fecal coliform bacteria.	• Identify bacteria sources through inspections, monitoring, source tracing and stream walks. • Educate public on pollution prevention, proper septic system maintenance and reporting a potential illicit discharge. • Perform regular maintenance to ensure proper functioning of decentralized systems (that is, septic tanks). • Participate in efforts to educate agricultural stakeholders about the importance of implementing the *Best Management Practices for Georgia Agriculture Manual* for animal production facilities (poultry) and grazing operations. • Coordinate with Georgia Department of Agriculture Livestock/Poultry Section on inspections, complaint investigations, nutrient management plan reviews, permit administrative support and enforcement assistance (Georgia EPD, 2014).
Lake management	While there are no major lakes or reservoirs within the District in this basin, there are other public and privately-held and managed lakes that play a significant role in meeting designated uses and downstream hydrologic regimes and water quality.	• Develop a central inventory of lakes, ownership and management practices to facilitate pollutant source identification both up and downstream of the lake. • Coordinate available water quality data and management activities for inventoried lakes. • Implement shoreline protection and upstream sediment management to prevent excessive nutrients and sedimentation within the lake. • Facilitate proper maintenance and management, particularly of small lakes by providing resources, links or other materials to assist with periodic activities such as inspections, water quality sampling or dredging. • Conduct public education and involvement activities to promote watershed stewardship to protect lake quality.

Identify Indicators and Monitoring to Measure Implementation Success

A critical component of any watershed management program is the ability to assess progress and determine if management strategies are effectively addressing issues. The Plan includes implementation actions related to watershed monitoring and conducting conditions assessments to evaluate implementation success. These implementation actions include long-term ambient trend monitoring (Watershed-10), as well as resource-specific implementation actions for Watershed Improvement (Watershed-8). Communities may choose to conduct project-specific monitoring associated with a watershed improvement project, such as biological or geomorphological monitoring to evaluate success.

As included in EPA (2008), a monitoring program should "…track progress in meeting load reduction goals and attaining water quality standards and other goals. Measurable progress is critical to ensuring continued support of watershed projects, and progress is best demonstrated with the use of monitoring data that accurately reflect water quality conditions relevant to the identified problems. Monitoring programs should include baseline (before), project-specific (during) and post-project (after) monitoring."

Some potential indicators to measure implementation success for the Oostanaula River Basin are listed as follows, but this list is not exhaustive:

- Select representative monitoring stations within the watershed to monitor for pollutants of concern and other water quality or biological parameters.
- Use U.S. Geological Survey stream gage data or collect data to establish stream stage-discharge relationships and calculate or model water quality pollutant loads and potential reductions.
- Calculate or model improvements to hydrologic and hydraulic conditions based on structural project implementation.
- Estimate streambank stability and habitat improvement based on annual stream cross section surveys and bank erosion monitoring.
- Conduct stream walks or structure inspections to inventory structure condition and performance, streambank stability and riparian condition over time.
- Conduct project monitoring to establish pre-, during- and post-project conditions, as well as upstream/downstream monitoring during the same time period to reduce the effects of environmental variability.
- To determine if water quality degradation is being prevented, conduct GIS analysis to identify high-activity areas of a watershed using aerial overlays, work orders, facility inspection, erosion and sedimentation control or new construction inspection data. Identify if monitoring data and GIS data follow similar patterns.
- Track number, location, size or features (that is, drainage area treated or linear feet of restored stream) of watershed improvement, green infrastructure or other nonpoint source reduction projects.
- Compare percentage of TMDL stream segments over time.
- Track implementation actions by jurisdiction within the basin, and their measured effectiveness.
- Track enforcement actions by category and location.
- Track stream buffer variances and local permits issued.
- Conduct public surveys for pollution prevention awareness or education effectiveness, particularly pre- and post-data associated with an education event.
- Compare existing water quality modeled loads against future water quality modeled loads.