GEORGIA
WATER PLANNING

Regional Water Plan

# LOWER FLINT-OCHLOCKONEE

JUNE 2023

Prepared by:

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GEORGIA Water PLANNING & POLICY CENTER
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## Acronyms and Abbreviations

| | |
|---|---|
| ACF | Apalachicola-Chattahoochee-Flint |
| ASR | aquifer storage and recovery |
| BMP | best management practice |
| cfs | cubic feet per second |
| CSO | combined sewer overflow |
| DCA | Department of Community Affairs |
| DM | demand management |
| DNR | Georgia Department of Natural Resources |
| DO | dissolved oxygen |
| EPA | U.S. Environmental Protection Agency |
| FDEP | Florida Department of Environmental Protection |
| FERC | Federal Energy Regulatory Commission |
| GAEPD | Georgia Environmental Protection Division |
| GEFA | Georgia Environmental Finance Authority |
| GSWCC | Georgia Soil and Water Conservation Commission |
| GWPPC | Georgia Water Planning and Policy Center |
| HCP | Habitat Conservation Plan |
| HUC | hydrologic unit code |
| IBT | Interbasin transfer |
| LAS | land application system |
| mgd | million gallons per day |
| NRCS | Natural Resources Conservation Service (U.S. Department of Agriculture) |
| OCGA | Official Code of Georgia Annotated |
| OPB | Governor’s Office of Planning and Budget (Georgia) |
| SF | supply management and flow augmentation |

| | |
|---|---|
| TMDL | total maximum daily load |
| USACE | U.S. Army Corps of Engineers |
| USGS | U.S. Geological Survey |
| WQ | water quality |
| WRD | Wildlife Resources Division (Georgia) |
| 7Q10 | Lowest seven day average flow in a 10-year period |

## Acknowledgements

This Regional Water Plan reflects the commitment and contributions of the members of the Lower Flint-Ochlockonee Water Planning Council. The Council members volunteered their time, expertise, and talents before, during, and after numerous council meetings, joint council meetings, committee meetings, and conference calls during the review and revision of this Regional Water Plan.

| | |
|---|---|
| Richard Royal (Chairman) | Mitchell |
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The Council gratefully acknowledges Clete Barton and Jennifer Welte of the Georgia Environmental Protection Division and the Black & Veatch/Georgia Water Planning & Policy Center team for their efforts to support the Council.

# EXECUTIVE SUMMARY

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# Executive Summary

## Lower Flint-Ochlockonee Regional Water Plan

This document is the revised Regional Water Plan of the Lower Flint-Ochlockonee Regional Water Planning Council (the Council). The original Regional Water Plan of the Council was adopted in 2011. This updated Regional Water Plan (this Plan) was adopted in 2023. This Plan was developed by the Council and approved by the Georgia Environmental Protection Division (GAEPD). The Plan provides a roadmap to guide long-term use of this water planning region's water resources and is to be implemented by water users in the region along with state agencies and other partners. It will also help guide state agency decisions on water permitting and grants and loans for water and wastewater-related projects.

Regional Water Plans in Georgia are developed in accordance with the Georgia Comprehensive State-wide Water Management Plan (State Water Plan), which was adopted by the General Assembly in January 2008. The State Water Plan establishes ten water planning regions across the state, each guided by a regional water planning council, except for the Metropolitan North Georgia Water Planning District, which has a separate water planning process created by the Metropolitan North Georgia Water Planning District Act of 2001.


***Lower Flint-Ochlockonee Council, November 2022***

The State Water Plan calls for the preparation of Regional Water Plans designed to manage water resources in a sustainable manner. This Plan has a planning horizon that forecasts conditions to 2060. It provides a framework for regional planning consistent with the following policy statement:

> *Georgia manages water resources in a sustainable manner to support the state's economy, to protect public health and natural systems, and to enhance the quality of life for all citizens.*

The Lower Flint-Ochlockonee Water Planning Council is charged with developing this Plan. The Council includes up to 30 members from throughout the water planning region, which includes 14 counties and 50 towns and cities. Members are appointed by the Governor, the Lieutenant Governor, and the Speaker of the House.

## Vision and Goals

The Lower Flint-Ochlockonee Water Planning Council adopted the following statement to describe its vision for the future of this water planning region's water resources:

> *The Lower Flint-Ochlockonee Water Planning Council will manage water resources in a sustainable manner to support the region's economy, to protect public health and natural systems, and to enhance the quality of life for the region's citizens.*

The Council adopted the following goals to support its vision:

1. Ensure access to water resources for existing and future water users in the Lower Flint-Ochlockonee Water Planning Region.
2. Sustain the region's aquifers, the Floridan, the Claiborne, the Clayton, and the Cretaceous, in a healthy condition that will continue to support the natural systems and economic activities of the Lower Flint-Ochlockonee Water Planning Region.
3. Maintain the production-agriculture-based economy of the Lower Flint-Ochlockonee Water Planning Region.
4. Support sustainable economic growth in the Lower Flint- Ochlockonee Water Planning Region.

The regional vision and goals were used by the Council to guide the development of this Plan.

## Planning Process

The Lower Flint-Ochlockonee Water Planning Council has been active since 2009. It developed its original regional water plan between 2009 and 2011. The Council completed its first update of the regional water plan in 2017, and this document reflects the second review and revision of this plan, completed in 2023. In between planning periods, the Council focuses on

implementation of the plan and information-gathering to support future plan updates. The Council conducted its review and revision of this Plan between 2021 and 2023. During this time, Council members participated in meetings, committee work and teleconferences, and joint council meetings to review and revise this Plan. The Council gathers information from a variety of sources to provide a foundation for sound decision-making. Sometimes, the Council finds challenges or significant uncertainties that affected its ability to plan. The Council proceeds based on the best information available and makes recommendations to address information gaps and improve water planning and policies.

Since its inception, the Lower Flint-Ochlockonee Water Planning Council has sought input from a variety of stakeholders and implemented a public participation plan that provides opportunities for public input into the Council's planning process. The Council has interacted with state and federal agencies and local governments from throughout the region, and it has also coordinated with neighboring regional water councils, especially the Middle Chattahoochee and the Upper Flint Water Planning councils and the Metropolitan North Georgia Water Planning District. The Council uses a consensus-oriented approach in its decision-making.

## Lower Flint-Ochlockonee Water Planning Region

Most of the Lower Flint-Ochlockonee Water Planning Region is located in the Apalachicola-Chattahoochee-Flint (ACF) River Basin. Part of the region is located in the Ochlockonee River Basin, and a small part of the region is located in the Suwannee River Basin. The Lower Flint-Ochlockonee Water Planning Region is largely rural with 40% of the land in row crops and pasture and an additional 28% in forest.

## Water Use in the Region

Current water use in the Lower Flint-Ochlockonee Water Planning Region is approximately 793 million gallons per day (mgd). Water use in the region is projected to increase to 987 mgd in 2060. Agricultural water use accounts for the largest proportion of 2020 water use by a significant margin, and it is expected to continue to be the largest future water use in this water planning region. As a result, much of the Council's planning effort has been focused on the agricultural sector. The Council notes the importance of agriculture to the region's economy in its goals. Wastewater flows in the region are currently approximately 155 mgd and expected to decrease to 152 mgd in 2060. Around 90% of the wastewater in the region is discharged through point sources.

## Water Resource Assessments

To support the regional water planning process, GAEPD developed resource assessment models for surface water availability, groundwater availability, and water quality. The purpose of the resource assessments is to estimate the capacity of streams and aquifers to meet water consumption demands and the capacity of streams to meet wastewater discharge demands, within thresholds that indicate the potential for local or regional impacts. The resource assessments are modeling exercises that use several conservative assumptions. Results of the assessment models were compared against estimates of current and projected water use



and wastewater flows. The assessment models identified potential challenges in the capacity of water resources to meet water supply and wastewater demands, within thresholds GAEPD selected to indicate potential local or regional impacts. The Lower Flint-Ochlockonee Water Planning Council considered the assessment model results, this water planning region's water needs, and potential impacts on the water planning region, both environmental and economic. The Council developed the rest of this plan to address challenges identified by the models and meet the Council's vision and goals for this water planning region. The results of the assessments and the Council's approach to addressing the results are summarized in Table ES-1.

Addressing surface and groundwater availability challenges in the region could require reductions in water use in dry periods, especially by agriculture, or alternatively, they might be addressed with offsetting storage or augmentation. Limitations to agricultural water use could have severe economic impacts in this water planning region, and these management decisions should be made carefully to address water security for all users and instream needs. The Council's vision and goals call for sustainable management of water resources that ensures access for existing and future water uses, maintains the agriculture-based economy of the region, and supports sustainable economic growth, while also protecting public health, natural systems, and quality of life. The resource assessments are designed to help the regional water planning councils identify areas where management practices might be needed to ensure that a region's water resources can sustainably meet long-term demands for multiple uses. The assessments are designed to be highly conservative in identifying potential impacts. The Council recognizes both the value and the limitations of the resource assessment models and relies on them as one input for guidance in planning.

## Recommended Management Practices

The Lower Flint-Ochlockonee Water Planning Council developed a set of seventeen management practices, including seven Demand Management, seven Supply Management and Flow Augmentation, and four Water Quality practices. From this set, the Council selected three high priority management practices, which are highlighted in the box on the next page. For each management practice, this plan describes implementation steps, responsible parties, implementation schedules, cost estimates, and funding sources. The plan also identifies benchmarks by which implementation can be evaluated.

**Table ES-1: Resource Assessment Results – Lower Flint-Ochlockonee Water Planning Region**

| Resource Assessment | Summary of Model Results | Council Plan to Address Results |
|---|---|---|
| **Surface Water Availability** | The surface water availability assessment model identified moderate water supply and wastewater assimilation challenges in the Lower Flint-Ochlockonee Water Planning Region. The results indicated two facilities with water supply challenges (one each in the Flint Basin and the Ochlockonee Basin) and 13 facilities with wastewater assimilation challenges (9 in the Flint Basin and 4 in the Ochlockonee Basin). | Address streamflow challenges with demand management, supply management, flow augmentation, and drought response practices in the region. Challenges at specific facilities will be addressed by GAEPD in the permitting process. Address flow challenges specific to protected aquatic species with a habitat conservation plan. Better information to support more thorough evaluation of resource capacity will continue to improve the ability to manage surface water availability effectively and sustainably in this region. |
| **Groundwater Availability** | Groundwater use is below the estimated sustainable yield range identified by the model for the Claiborne Aquifer and for the Upper Floridan Aquifer in South-Central Georgia. It is above the sustainable yield range estimated by the model for the Upper Floridan Aquifer in the Dougherty Plain. The Council notes that this sustainable yield metric being exceeded is not necessarily indicative of overall aquifer health and resiliency for the Floridan Aquifer. Because of the interconnected nature of the Floridan aquifer and the surface water sources in this area, drawdowns in the aquifer in areas that intersect a stream will generally result in streamflows replenishing the aquifer. | Use of the Claiborne and Cretaceous Aquifers should be monitored to develop appropriate management strategies that address geographic and time-based variations in capacity and demands. In the Upper Floridan Aquifer in the Dougherty Plain, the impact of groundwater withdrawals on surface water flows in the Flint River Basin continues to be a determining factor in guiding the location and amount of groundwater use from this aquifer. Moreover, since 2012, there has been a moratorium on new and expanded withdrawals from the Floridan Aquifer in the Dougherty Plain. Better and more geographically specific information on groundwater resource capacity will improve our ability to evaluate aquifer use and management practices. |
| **Surface Water Quality** | Water quality model results indicated overall increasing availability of assimilative capacity in streams of the Flint River Basin due to assumed more stringent permit conditions where discharges increase in the future. However, some areas continue to model limited or exceeded availability of assimilative capacity under future conditions despite stringent permit conditions. | Implement practices targeted especially toward nonpoint sources of pollutants to improve assimilative capacity and reduce nutrient loading in the region's streams and lakes. It is expected that GAEPD will adjust point source permit limits over time as needed to address assimilative capacity constraints and nutrient criteria. Collect more complete information to confirm model results and to support the targeting of management practices for water quality in the future. |

## Other Recommendations from the Lower Flint-Ochlockonee Water Planning Council

This Plan includes recommendations to the state and other entities to address information needs and water policy issues. The Lower Flint-Ochlockonee Water Planning Council emphasizes the need for information to support better water planning in the future. The Council believes that water planning should be based on data reflecting actual water use and conditions as much as possible. The Council seeks several improvements in the water resource assessments to support improved planning. It also recommends more detailed evaluation of some of its current management practices and study of potential future management practices. With respect to water policy, the Council urges the General Assembly to provide funding to continue the work of the regional water councils in the future. It requests that the General Assembly and implementing agencies explore all possible funding sources to support implementation of this Plan. The Council also makes specific recommendations concerning drought management, interbasin transfers, imperiled species management, and coordination with other regional water planning councils and the Metropolitan North Georgia Water Planning District.

The Lower Flint-Ochlockonee Water Planning Council coordinated closely with neighboring water planning councils and developed a set of joint recommendations with the Middle Chattahoochee and Upper Flint Water Planning Councils to address shared concerns in the Apalachicola-Chattahoochee-Flint River System. These joint recommendations emphasize the need for more water storage capacity and more effective use of existing storage capacity in the ACF, continued improvement of the information base for water planning and management, and consideration of proactive coordinated interstate planning in the ACF.

### High Priority Management Practices

***Demand Management:***

- ***Continue to improve agricultural water use efficiency through innovation and technology.***

***Supply Management and Flow Augmentation:***

- ***Develop groundwater source alternatives to replace surface water withdrawals during drought, where site specific evaluation indicates that this practice is practical and will not harm environmental resources.***
- ***Encourage the development of a Habitat Conservation Plan (HCP) to provide habitat protection for endangered and threatened freshwater mussels in the Flint River Basin while improving water security for irrigation water supply needs within region.***

# SECTION 1

## Introduction

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*SUMMARY: The regional water planning process in Georgia was established by the State Water Plan. The Lower Flint-Ochlockonee Water Planning Council's vision and goals guided the Council in the development of this Regional Water Plan.*

# Section 1. Introduction

## 1.1 The Significance of Water Resources in Georgia

Of all Georgia's natural resources, none is more important to the future of our state than water. The wise use and management of water is critical to support the state's economy, to protect public health and natural systems, and to enhance the quality of life for all citizens.

Georgia has abundant water resources, with 14 major river systems (see Figure 1-1) and multiple groundwater aquifer systems. These waters are shared natural resources. Streams and rivers run through many political jurisdictions. The rain that falls in one part of Georgia may replenish the aquifers used by communities many miles away. While water in Georgia is abundant, it is not an unlimited resource. It must be carefully managed to meet long-term water needs.

Since water resources, their conditions, and their uses vary greatly across the state, selection and implementation of management practices on the regional and local levels are the most effective way to ensure that current and future needs for water supply and assimilative capacity are met.

Therefore, the Georgia Comprehensive State-wide Water Management Plan (State Water Plan) calls for the preparation of regional water development and conservation plans (Regional Water Plans) for the ten water planning regions depicted in Figure 1-1, not including the Metropolitan North Georgia Water Planning District, which has a separate water planning process created by the Metropolitan North Georgia Water Planning District Act of 2001. The District's planning process is aligned with those of the ten regional water planning councils, and the District and neighboring councils work together to coordinate on planning for shared water resources.[1]

This Regional Water Plan (this Plan) was prepared for the Lower Flint-Ochlockonee Water Planning Region by the Lower Flint-Ochlockonee Water Planning Council (the Council). It describes the regionally appropriate water management practices to be employed in Georgia's Lower Flint-Ochlockonee Water Planning Region over the next several decades.

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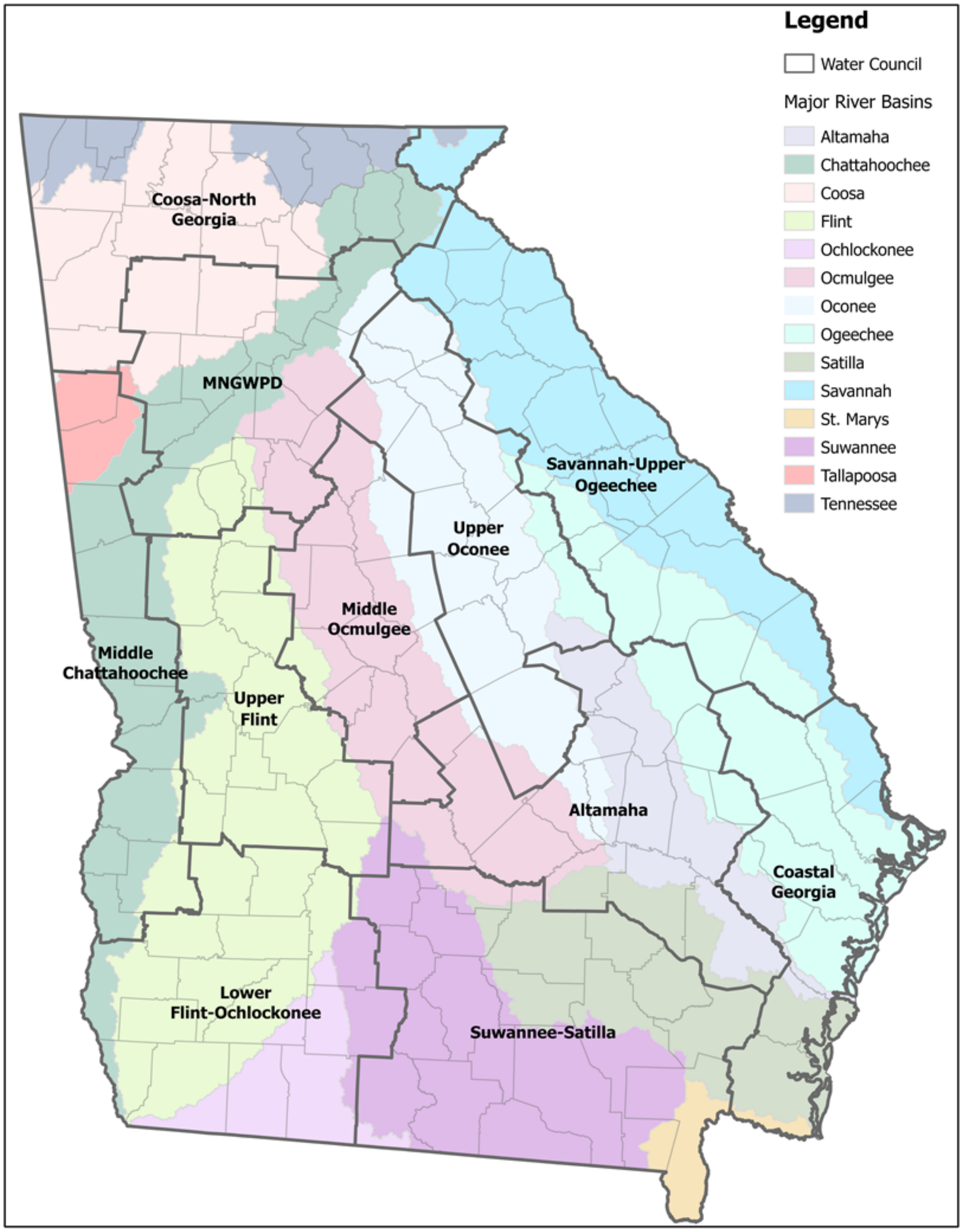
[1]Regional Water Plans and supporting information about the regional water planning councils can be found on the Georgia regional water planning website: https://waterplanning.georgia.gov/. This website includes information about the Metropolitan North Georgia Water Planning District. The full website for the District includes the District's plan and supporting materials (http://www.northgeorgiawater.org/).

*Figure 1-1: River Basins and Water Planning Regions of Georgia*



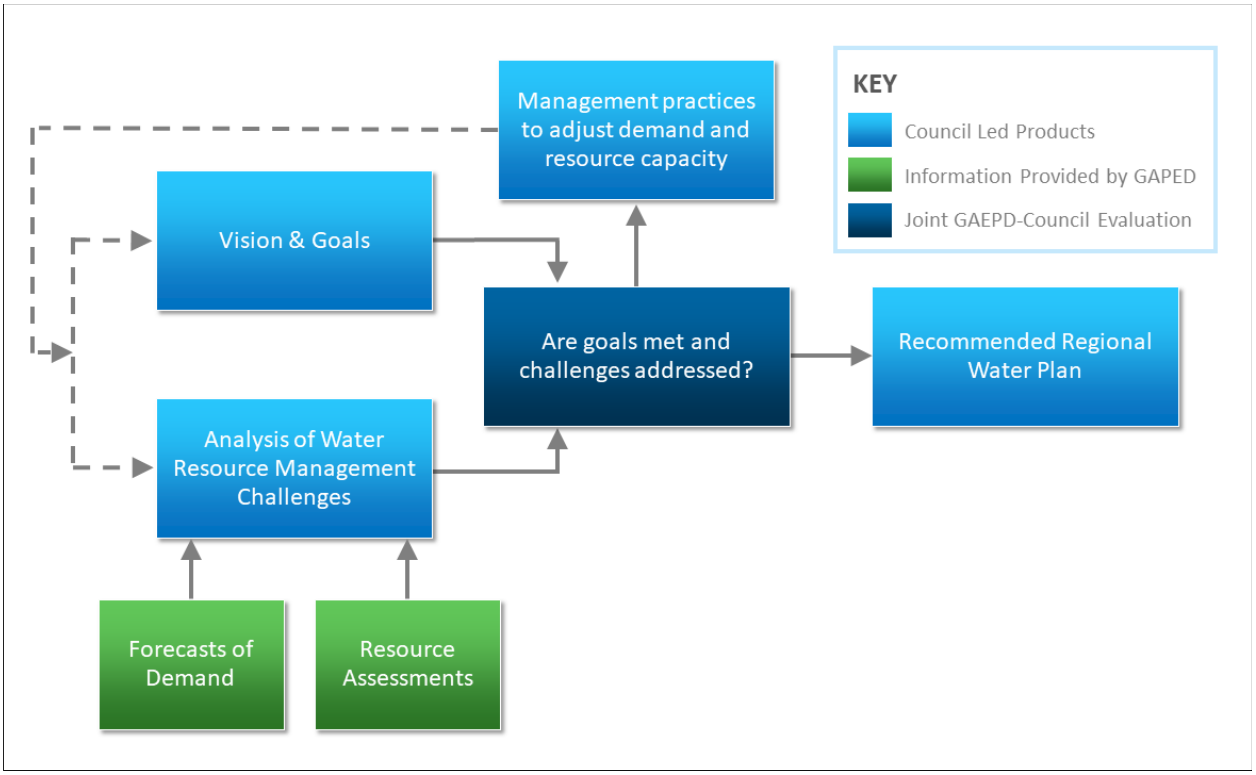
## 1.2 State and Regional Water Planning Process

The State Water Plan calls for the preparation of Regional Water Plans designed to manage water resources in a sustainable manner through 2060. It establishes ten regional water planning councils and provides a framework for regional planning consistent with the following policy statement:

> *Georgia manages water resources in a sustainable manner to support the state's economy, to protect public health and natural systems, and to enhance the quality of life for all citizens.*

This Regional Water Plan has been prepared following the planning process illustrated in Figure 1-2. As detailed in the Lower Flint-Ochlockonee Water Planning Council's Memorandum of Understanding with the Georgia Environmental Protection Division (GAEPD) and the Department of Community Affairs (DCA), the planning process required and benefited from the input of local governments, other regional water planning councils, and the public.[2]

***Figure 1-2: Water Planning Process***




[2] The Lower Flint-Ochlockonee Water Planning Council's Memorandum of Agreement, updated in 2016, can be found on the Council's website: https://waterplanning.georgia.gov/water-planning-regions/lower-flint-ochlockonee-water-planning-region/lower-flint-ochlockonee-0



The Lower Flint-Ochlockonee Water Planning Council adopted its first Regional Water Plan in 2011 after a public review period and approval by GAEPD. Since that time, the Council has conducted two cycles of review and revision to the Regional Water Plan in 2016-2017 and 2021-2023. Revised plans were adopted in June 2017 and June 2023, after a public review period and approval by GAEPD. This version of the document reflects the revised plan adopted in June 2023.

## 1.3 The Lower Flint-Ochlockonee Water Planning Council's Vision and Goals

In 2009, the Lower Flint-Ochlockonee Water Planning Council adopted the following statement to describe its vision for the future of the planning region's water resources:

> *The Lower Flint-Ochlockonee Water Planning Council will manage water resources in a sustainable manner to support the region's economy, to protect public health and natural systems, and to enhance the quality of life for the region's citizens.*

At the same time, the Council adopted the following goals to support its vision:

1. Ensure access to water resources for existing and future water users in the Lower Flint-Ochlockonee Water Planning Region.
2. Sustain the region's aquifers, the Floridan, the Claiborne, the Clayton, and the Cretaceous, in a healthy condition that will continue to support the natural systems and economic activities of the Lower Flint-Ochlockonee Water Planning Region.
3. Maintain the production-agriculture-based economy of the Lower Flint-Ochlockonee Water Planning Region.
4. Support sustainable economic growth in the Lower Flint-Ochlockonee Water Planning Region.

In 2017 and 2021, the Council reviewed and reaffirmed its vision and goals. The Council's vision and goals were adopted to guide the Council in developing this Regional Water Plan. While the Council does not directly manage water resources in the region, the vision and goals address resource management in order to describe the Council's priorities and inform Council decision-making in its planning process. The vision and goals are used by the Council to guide the selection of water management practices and recommendations, which are discussed in Section 6.

# SECTION 2

## The Lower Flint-Ochlockonee Planning Region

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*SUMMARY: The Lower-Flint Ochlockonee Water Planning Region is largely rural, and agriculture is the largest sector of the economy and the largest water use in this water planning region. State and federal policies are important components of water resource management in this water planning region.*

# Section 2. The Lower Flint-Ochlockonee Water Planning Region

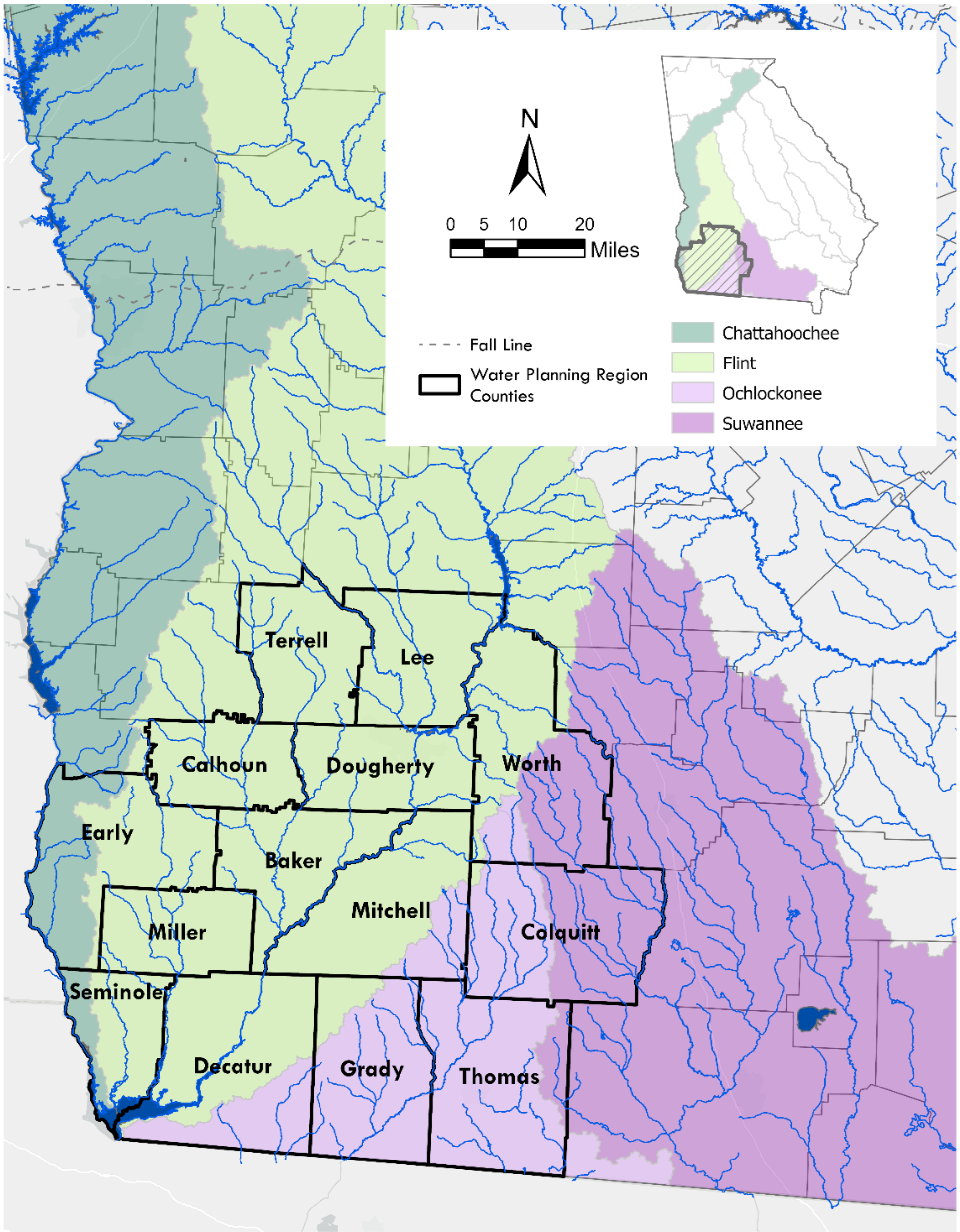
## 2.1 History and Geography

The Lower Flint-Ochlockonee Water Planning Region (Figure 2-1) encompasses over 6,014 square miles in southwest Georgia and includes 14 counties (Baker, Calhoun, Colquitt, Decatur, Dougherty, Early, Grady, Lee, Miller, Mitchell, Seminole, Terrell, Thomas and Worth counties) and 50 towns and cities partially or wholly within these counties. Major river basins in the region include the Chattahoochee, Flint, Ochlockonee, and Suwannee.

Agriculture is the leading economic sector and water user in this water planning region. According to the University of Georgia's 2019 Georgia Farm Gate Value Report, the counties of the Lower Flint-Ochlockonee Water Planning Region generated agricultural production with a value of $2.4 billion.[1] In the 19th century, agricultural development in southwest Georgia was driven by the development of the cotton gin, and major crop diversification began in the 1930's due to farm mechanization advances, New Deal policies, and cotton yield reductions caused by the Boll Weevil. Widespread use of irrigation began to develop in Southwest Georgia in the 1970's.

[1] 2019 Georgia Farm Gate Value Report (AR-20-01) Available on-line: https://caed.uga.edu/content/dam/caes-subsite/caed/publications/annual-reports-farm-gate-value-reports/2019%20Farm%20Gate%20Report.pdf

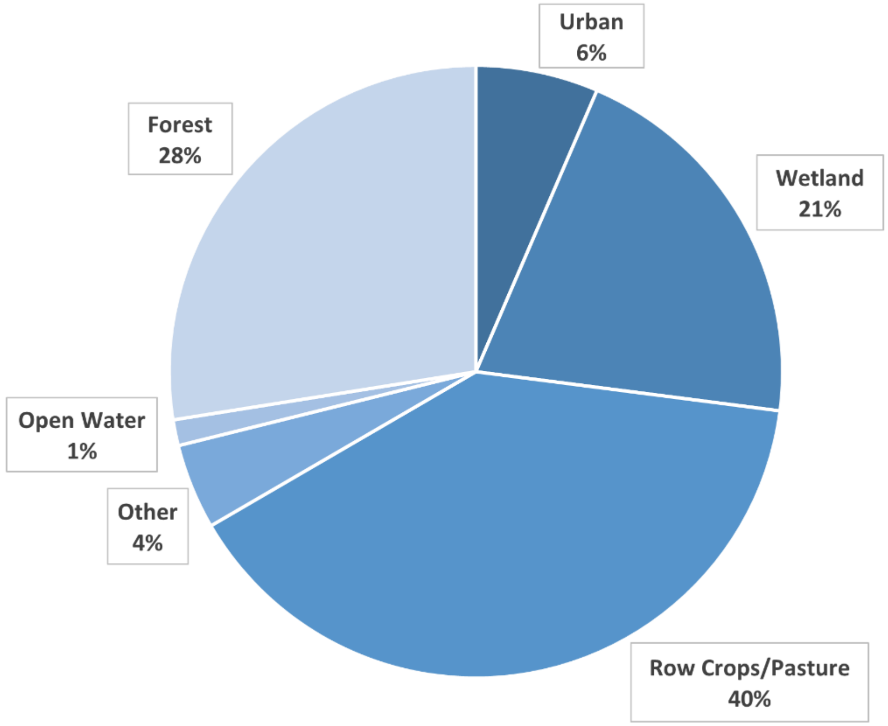
*Figure 2-1: Lower Flint-Ochlockonee Water Planning Region*



## 2.2 Characteristics of this Water Planning Region

The Lower Flint-Ochlockonee Water Planning Region is largely rural with 40% of the land in row crops and pasture and an additional 28% in forest. Land cover in this water planning region, based on data from the 2019 National Land Cover Data, is illustrated in Figure 2-2.

***Figure 2-2: Land Cover in the Lower Flint-Ochlockonee Water Planning Region, 2019***




*Source: Multi-Resolution Land Characteristics (MRLC) Consortium, National Land Cover Database, 2019*[2]

[2] There are many sources of land cover information. This graphic is based on 2019 data from the National Land Cover Database. The land cover information presented in this 2022 plan is not directly comparable to that in the 2017 plan, which was based on a different analysis, and the data presented in the two plans should not be used to evaluate land cover trends.



Natural features in the Lower Flint-Ochlockonee Water Planning Region provide habitat for an abundance of flora and fauna as well as areas critical for recharging the region's aquifers (see Figure 2-3 for a map of recharge areas in Georgia. This water planning region is located in Georgia's Coastal Plain physiographic region, south of the fall line. The Coastal Plain "is underlain by relatively soft, weakly consolidated rocks and unconsolidated sediments deposited by the sea or streams when the shoreline was at or near the fall line between 80 and 100 million years ago."[3] Major aquifers in this water planning region include the Clayton, Claiborne, and Floridan aquifer systems. A large area of the Upper Floridan aquifer in this region is in hydraulic connection with the Flint River. In this area, known as Subarea 4, surface water streams receive or lose water to the aquifer depending on the head difference between the streams and the aquifer. The major mechanisms of transfer include diffusion through streambeds or stream banks and discharge from in-channel springs, commonly known as blue-springs, which can discharge on the order of tens of millions of gallons per day. Subarea 4 includes the Flint River Basin south of Dooly County, part of the lower Chattahoochee River Basin, and a narrow strip on the eastern side of the Ochlockonee and Suwannee River Basins (see Figure 2-4 for a map of Subarea 4).

At the southern end of the Lower Flint-Ochlockonee Water Planning Region, Lake Seminole affects groundwater levels on a localized scale. A 2004 U.S. Geological Survey (USGS) hydrologic model mimicked pre- and post-impoundment, during drought conditions, to determine differences in the potentiometric surface and flow direction of the Floridan aquifer associated with Lake Seminole. The impoundment was shown to increase groundwater levels surrounding the lake by as much as 26 feet, but the overall impact was relatively localized, with groundwater level increases of "less than 2 feet beyond linear distances from Jim Woodruff Lock and Dam of about 35 miles along the Chattahoochee and Flint Rivers, and 20 miles along the Apalachicola River."[4]

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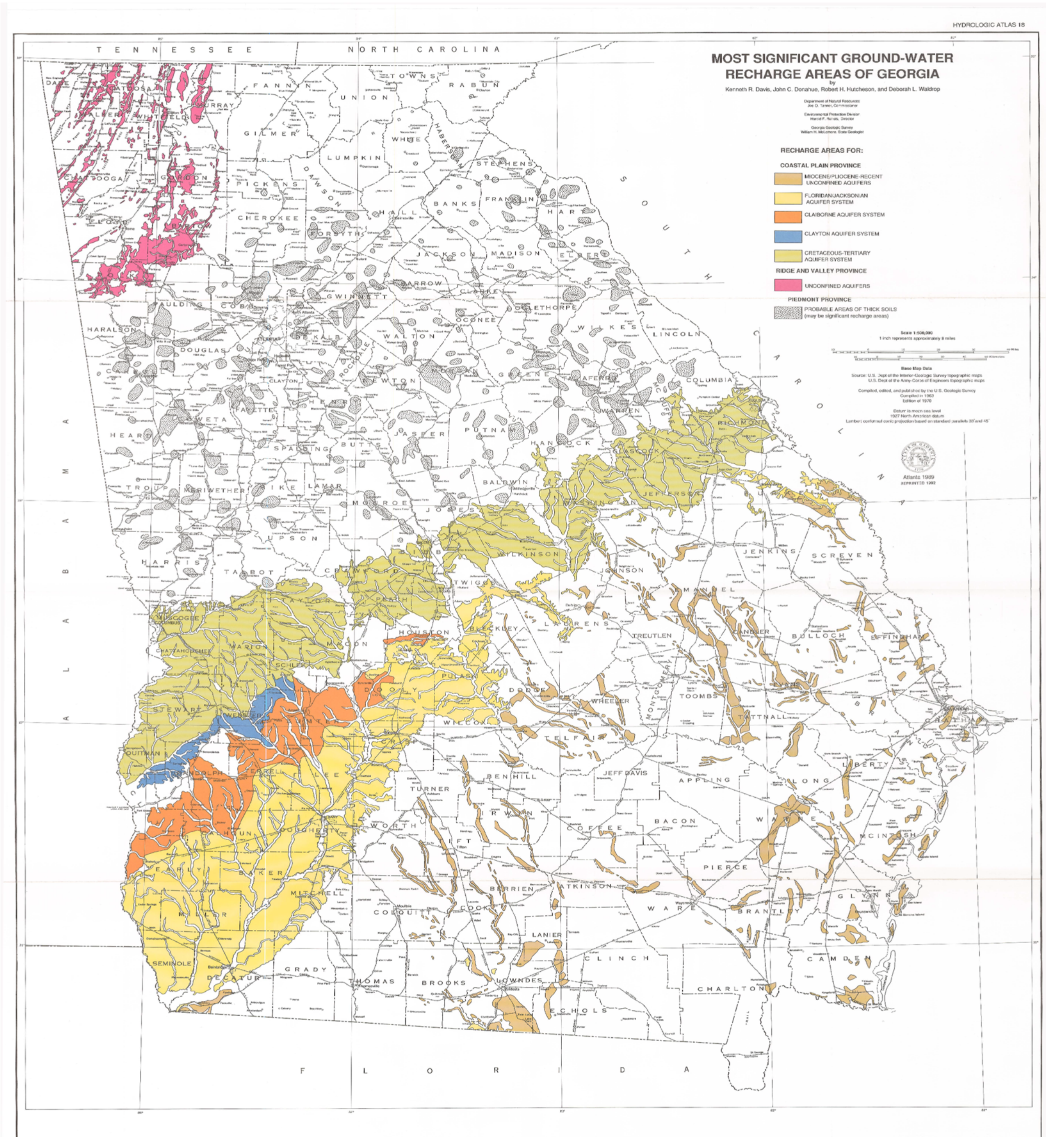
[3] GA, *Flint River Basin Regional Water Development and Conservation Plan*, March 20, 2006: https://epd.georgia.gov/georgia-river-basin-management-planning/georgia-flint-river-basin-plan
[4] Jones, L. Elliott, and Torak, Lynn J., 2004, Simulated Effects of Impoundment of Lake Seminole on Ground-Water Flow in the Upper Floridan Aquifer in Southwestern Georgia and Adjacent Parts of Alabama and Florida: U.S. Geological Survey, Scientific Investigations Report 2004-5077, p. 22.

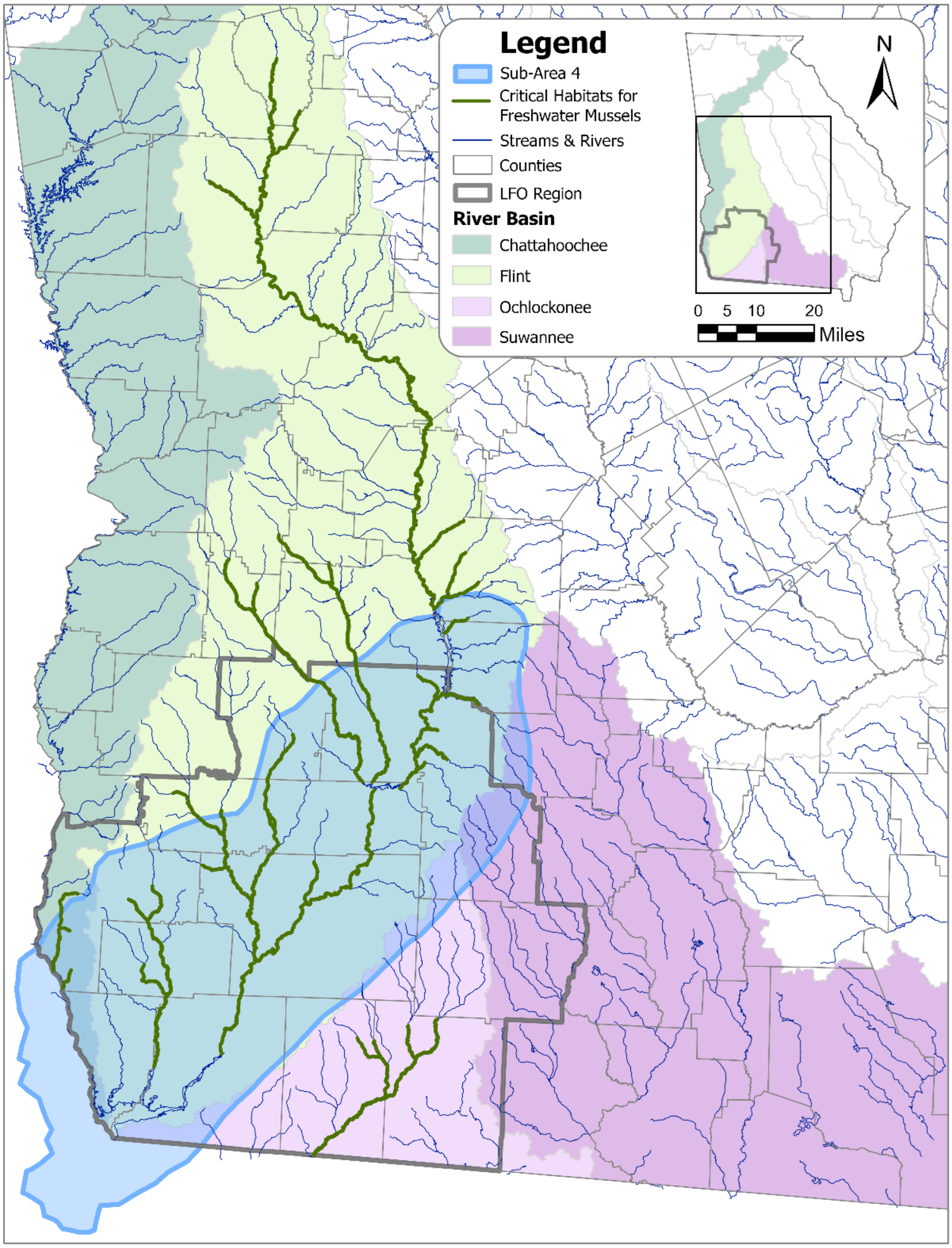
***Figure 2-3: Aquifer Recharge Areas in Georgia***




*Source: Most Significant Ground-Water Recharge Areas of Georgia, Hydrologic Atlas 18, Kenneth R. Davis, 1992*



***Figure 2-4: Subarea 4 and Critical Habitats for Freshwater Mussels of the Upper Floridan Aquifer***




*Source: USFWS. 2007. Endangered and threatened wildlife and plants: Designation of critical habitat for five endangered and two threatened mussels in four northeast Gulf of Mexico drainages. 50 CFR Part 17 Rin 1018-Au87 Final Rule. Federal Register 72: 64286-64293.*

## Policy Context for this Regional Water Plan

The Lower Flint-Ochlockonee Water Planning Region is subject to several overlapping layers of water resource management by state and federal agencies. State permitting programs for water withdrawals and wastewater dischargers affect all water users (OCGA §§12-5-32, 12-5-30(a), 12-5-30(b), 12-5-96, 12-5-105; Georgia Department of Natural Resources (DNR) Rules 391-3-6-.06, 391-3-6-.07, 391-3-2-.03). In this region, the following laws, regulations, and related issues are also directly relevant to water management:

- The Flint River Water Development and Conservation Plan of 2006 serves as guidance for the GAEPD for agricultural water use permit issuance in the Flint River Basin. The 2006 Flint River Water Development and Conservation Plan was developed under the authority of the Water Quality Act (OCGA § 12-5-31(h)) and Groundwater Use Act (OCGA § 12-5-96(e)) in response to a prolonged drought, increased agricultural irrigation in southwest Georgia since the 1970's, and scientific studies that predicted severe impacts on streamflow in the Flint River Basin due to withdrawals from streams and the Floridan Aquifer. The Lower Flint-Ochlockonee Regional Water Plan builds on the existing 2006 plan for the Flint River Basin. The 2006 plan provides a scientific and policy foundation for water resources planning in the Flint River Basin, and this Plan will be implemented in concert with it.[5]
- The Flint River Drought Protection Act (OCGA § 12-5-540) and its implementing rules (DNR Rule 391-3-28) provide for demand management through agricultural irrigation suspension in times of drought. The Act was amended in 2014. Among other things, the amended law set requirements for agricultural irrigation efficiency (OCGA § 12-5-546.1).
- Federal Energy Regulatory Commission (FERC) licensing requirements for privately-owned hydroelectric impoundments apply to Lake Chehaw in the Lower Flint-Ochlockonee Water Planning Region.
- The Florida Department of Environmental Protection (FDEP), with approval from the Environmental Protection Agency, adopted new nutrient criteria for free-flowing streams and lakes in Florida in 2013. These criteria may impact water quality management in this water planning region and other water planning regions with river systems that cross into Florida. At this time, Georgia is monitoring water quality and focused on the development of a nutrient strategy that is likely to include point source discharge limits and nonpoint source management to address these criteria.[6]

[5] The 2006 Flint River Basin Water Development and Conservation Plan is available on the GAEPD website: https://epd.georgia.gov/georgia-river-basin-management-planning/georgia-flint-river-basin-plan
[6] More information on Florida's nutrient criteria is available online: https://floridadep.gov/dear/water-quality-standards/content/numeric-nutrient-criteria-development

- Under the Federal Endangered Species Act, six species of freshwater mussels with critical habitat in the Lower Flint-Ochlockonee Water Planning Region have been listed as endangered or threatened (see Table 2-1). Additionally, the Gulf sturgeon is listed as threatened, and flow requirements for the Gulf sturgeon affect the management of the Apalachicola-Chattahoochee-Flint System as a whole.[7] The Endangered Species Act prohibits takings of these species and sets requirements for the protection of their critical habitats.[8]
- The U.S. Army Corps of Engineers (USACE) operates five federal reservoir projects on the Chattahoochee River (Lake Sidney Lanier, West Point Lake, Walter F. George Lake, George W. Andrews Lake, and Lake Seminole). The operation of these projects affects the parts of the Lower Flint-Ochlockonee Water Planning Region that are within the Chattahoochee Basin, and it also affects this water planning region as a key component of water management in the Apalachicola-Chattahoochee-Flint (ACF) Basin as a whole. On March 30, 2017, an updated Water Control Manual for the ACF was issued by the USACE.[9]
- The ACF Basin has been the subject of protracted litigation over the management and allocation of water resources among Florida, Georgia, and Alabama and other interested parties. In 2013, Florida filed a suit against Georgia in the U.S. Supreme Court in a case of original jurisdiction. Florida asked the court to impose equitable apportionment in the ACF. The US Supreme Court ultimately ruled in Georgia's favor on April 1, 2021, denying Florida's request for equitable apportionment.[10]

***Table 2-1: Federally Listed Endangered and Threatened Freshwater Mussels in the Lower Flint-Ochlockonee Water Planning Region***

| Common Name | Scientific Name | Status | More Information |
|---|---|---|---|
| Fat threeridge | *Amblema neislerii* | Endangered | https://ecos.fws.gov/ecp/species/2574 |
| Gulf moccasinshell | *Medionidus penicillatus* | Endangered | https://ecos.fws.gov/ecp/species/7663 |
| Shinyrayed pocketbook | *Hamiota subangulata* | Endangered | https://ecos.fws.gov/ecp/species/6517 |
| Ochlockonee moccasinshell | *Medionidus simpsonianus* | Endangered | https://ecos.fws.gov/ecp/species/8083 |
| Oval pigtoe | *Pleurobema pyriforme* | Endangered | https://ecos.fws.gov/ecp/species/4132 |
| Purple bankclimber | *Elliptoideus sloatianus* | Threatened | https://ecos.fws.gov/ecp/species/7660 |

[7] More information about Gulf sturgeon (*Acipenser oxyrinchus)* is available from the US Fish and Wildlife Service: https://ecos.fws.gov/ecp/species/651.
[8] Section 6 discusses how the Endangered Species Act affected the development of this Plan and includes a recommendation from the Council to address the Endangered Species Act concerns in the region.
[9] Information on the updated ACF Master Water Control Manual can be found on the following USACE website: http://www.sam.usace.army.mil/Missions/Planning-Environmental/ACF-Master-Water-Control-Manual-Update/.
[10] The decision of the U.S. Supreme Court in this case can be found at this link: https://www.supremecourt.gov/opinions/20pdf/22o142_m648.pdf

# SECTION 3

## Water Resources of the Lower Flint-Ochlockonee Region

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*SUMMARY: This section assesses the current use, capacity, and condition of water resources in the Lower Flint-Ochlockonee Water Planning Region.*

# Section 3. Current Assessment of Water Resources of the Lower Flint-Ochlockonee Water Planning Region

## 3.1 Major Water Uses in this Water Planning Region

Water use and wastewater treatment in the region presented in this plan is generally categorized in four sectors:

- **Municipal** - water withdrawn by public and private water suppliers and delivered for a variety of uses (e.g., residential, commercial, light industrial)
- **Industrial** - water withdrawn for fabrication, processing, washing, and cooling for facilities that manufacture products, including steel, chemical and allied products, paper, and mining
- **Energy** - water withdrawn primarily for cooling purposes in the production of electricity at thermoelectric plants (Hydroelectric energy uses water to produce energy, but because this use is nonconsumptive, hydroelectric water use is not included.)
- **Agriculture** - includes row and orchard crops as well as most vegetable and specialty crops (Nursery, animal livestock, and golf course irrigation water use estimates are also included.)

Water use in the region is estimated in a few different ways in this Plan. Section 4 discusses forecasts of water use and wastewater treatment demands in the region from 2020 to 2060 for the above sectors. The 2020 baseline use estimates for the forecasts are frequently cited in this plan in discussions of current use. The methods of estimating 2020 use for the baseline are described in Section 4. In this section, an initial snapshot of current water use in the region is provided based on USGS estimates of water withdrawals and returns for 2015 (Figure 3-1). The USGS data are not as current as the forecast baseline, and the methods of estimation are not the same as those used in the baseline forecasts in Section 4.

The USGS 2015 estimates are reported here because they provide an overview of water use in the region that is generally comparable to other regions of the state and the nation. The USGS estimates are generated every five years across the U.S. Figure 3-1 illustrates the USGS estimates of 2015 water withdrawals, by source, as well as the returns to surface water of treated wastewater. This figure illustrates the importance of groundwater as a source of water in the region (accounting for 69% of withdrawals) and the dominance of agriculture in water use in the region (accounting for 68% of withdrawals).

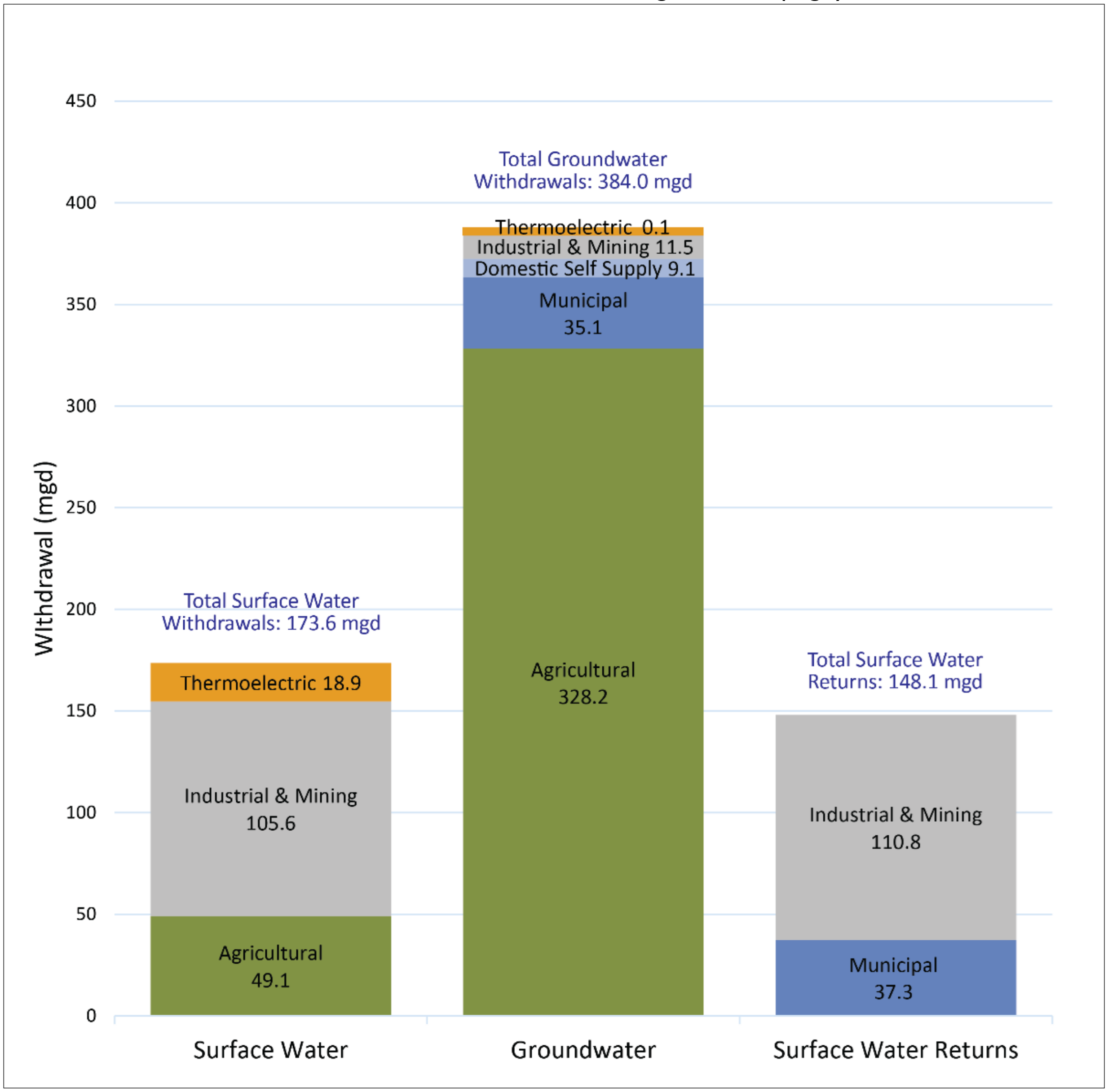


In Georgia, agricultural water use is monitored through the State Agricultural Water Conservation and Metering Program, which has installed over 17,000 water meters across the state. The USGS estimates of 2015 water use make use of 2015 meter data from this program as a primary source of data for estimating agricultural water use in this region.

The largest use sector for surface water in the region is industrial and mining, but this sector returns more to surface water than it withdraws within the region. While municipal systems returned over 37 million gallons per day (mgd) to surface water in 2015, this sector did not make withdrawals from surface water. Because these sectors (municipal & industrial) make use of groundwater for source water, but return treated wastewater to surface waters, they generally have a very limited consumptive use impact on the region's surface waters that is localized and time dependent.

This section describes the results of assessment of water resources in this region. Each assessment used slightly different estimates of water use, depending on the methods and assumptions for that assessment. While there are differences, most try to assess the region's water resources as a baseline that is close in time to 2020 and a future planning horizon of 2060. The estimates of water use for each assessment are described in the sub-sections that follow.

***Figure 3-1: USGS Estimates of Water Withdrawals and Surface Water Returns in the Lower Flint-Ochlockonee Region, 2015 (mgd)***




*Source: Painter, J.A., 2019, Estimated use of water in Georgia for 2015 and water-use trends, 1985–2015: U.S. Geological Survey Open-File Report 2019–1086, 216 p., https://doi.org/10.3133/ofr20191086.*

When discussing water use in the region, for planning purposes, it is important to understand the amount of water that is returned to the hydrologic system after it is used. Consumptive use is the difference between the total amount of water withdrawn from a defined hydrologic system and the total amount of the withdrawn water that is returned to the same hydrologic system. USGS estimates of surface water returns are included in Figure 3-1.

The resource assessments for this Plan are particularly concerned with the amount of water that is returned in a time frame that makes it available to support other uses. Consumptive use can be difficult to measure when returns to instream flows are not through a point source discharge. As a result, in this planning process, on-site sewage treatment and land application systems are considered to be 100 percent consumptive. Similarly, agricultural water use for irrigation is considered to be 100 percent consumptive. These conservative assumptions do not mean that no amount of water ever returns to the hydrologic system, but for the purposes of this assessment, they are treated as 100 percent consumptive.

Many members of the Lower Flint-Ochlockonee Water Planning Council expressed concern over the resource assessment model assumption that agricultural water use for irrigation is 100 percent consumptive. This assumption was applied in the surface water availability model (see Section 3.2 below). In the first planning cycle (2009-2011), a Technical Ad Hoc Committee of the Council discussed this issue in detail. The following points summarize their conclusions:

- The level of consumptive use by agricultural irrigation varies widely depending on field and other conditions.
- Timing of returns to the stream is important for the surface water availability model. While more water is returned over a longer period of time, for this effort, a shorter time frame must be evaluated.
- Without additional studies or information, the selection of an alternative estimate of consumptive use for agriculture would be arbitrary.

Based on the recommendation of the Technical Ad Hoc Committee, the Council decided to proceed based on the 100 percent consumptive use assumption for irrigated agriculture for this Plan. However, the Council notes concern that the assumption of 100 percent consumptive use by irrigated agriculture could lead to model results that are more extreme than an assumption that consumptive use is less than 100 percent. The Council also notes that great improvements in agricultural irrigation efficiency have been made in recent years. While efficiency gains can decrease the amount of water used, they also decrease the percentage of return flow from agriculture. Therefore, they also increase the level of consumptive use (as a percent of water withdrawn), because a greater proportion of the irrigation water is used by the plant and unavailable to return to the hydrologic system.

## 3.2 Current Conditions Resource Assessments

GAEPD has developed three resource assessments for the state's water resources: ***surface water availability, groundwater availability, and surface water quality.*** These assessments used models to analyze the capacity of streams and aquifers to meet water consumption demands and of streams to meet wastewater discharge assimilation capacity needs within thresholds selected by GAEPD to indicate the potential for local or regional impacts. The assessments were conducted on a resource basis (i.e., river basins and aquifers). The results of these assessments for ***current*** conditions in this water planning region are summarized in this section. Section 5 describes the ***future*** conditions projected by the resource assessment models. Full details of each resource assessment can be found in the resource assessment reports, which are available on the Council's website https://waterplanning.georgia.gov/resource-assessments.

### 3.2.1 Surface Water Availability

The purpose of the surface water availability resource assessment is to model the response of surface water bodies (streams and lakes) to meet current and forecasted consumptive water demands. In this planning cycle, a new model – the Basin Environmental Assessment Model (BEAM) – was developed for use in planning and permitting. The new model greatly improves our ability to evaluate surface water availability at a high level of resolution. Figure 3-2 is a schematic of the BEAM model domains in the Lower Flint-Ochlockonee region. Models for the Apalachicola-Chattahoochee-Flint (ACF) Basin, the Ochlockonee River Basin, and the Suwanee River Basin provided results for this region. Each point in the schematic represents a water resource facility, for which the BEAM model can generate results on surface water availability. In prior planning cycles, model results were only generated at a few nodes in each basin.[1]

Important inputs to the model include water supply demands, treated wastewater returns, reservoir operations, and instream flow requirements. The model was calibrated to stream gage data from the modeled river basins and using estimates of unimpaired flows for the modeling horizon. The unimpaired flow estimates were updated for this assessment.

In this planning cycle, the following baseline scenarios for current conditions were evaluated:

- Baseline: Water demands average for 2010-2018
- Baseline Drought: Water demands for 2011

The Baseline scenario includes a wide range of climatic conditions and water use levels. The Baseline Drought scenario reflects water use during an extremely dry year. The Baseline

[1] For more detail on the surface water availability resource assessment, see the May 2023 report: Development of Basin Environmental Assessment Models (BEAMs) for Georgia Surface Water Basins, forthcoming on the state water planning website: https://waterplanning.georgia.gov/resource-assessments/surface-water-availability.

Drought scenario uses water demand data that supports a conservative approach to assessing the availability of resources to meet peak water demands during drought.[2]

In these scenarios, the same levels of demand (monthly averages) are applied to the whole assessment period. For this assessment the period included 80 years: 1939-2018. This period represents a long range of historical stream flow conditions and a broad range of hydrologic conditions. The assessment incorporated instream flow protection requirements from existing water withdrawal permits.

Reservoir operations data used in the model were from the current Water Control Manual operations for the federal reservoirs. For other reservoirs, the resource assessment incorporates data from reservoir owners if they provided storage and operational data to GAEPD for this purpose. Storage and operational data were not available for Georgia Power reservoirs in the region, and these reservoirs were modeled as run-of-river projects.

For the ACF assessment, the BEAM model incorporates a groundwater component that assesses the impacts of  groundwater use in Subarea 4 of the Upper Floridan Aquifer in the Dougherty Plain, where interconnection of the aquifer with the surface water is high.[3] Subarea 4 includes the Flint River Basin south of Dooly County, part of the lower Chattahoochee River Basin, and a narrow strip on the eastern side of the Ochlockonee and Suwannee River Basins. An assessment of the Floridan Aquifer, including a specific assessment of the portion in the Dougherty Plan, is discussed in Section 3.2.2. The surface water results reported here incorporate the modeled impacts of groundwater withdrawals on baseflow to surface water streams.

For the Lower Flint-Ochlockonee region, GAEPD presented model results to the Council for the ACF and for the Ochlockonee river basins. Consumptive water demands in the scenarios included municipal, industrial, agricultural, and energy (thermoelectric power production) uses.

The assessment evaluated where water availability challenges were observed in the model results. GAEPD provided an assessment of where, when, and by how much surface water availability could not meet the following needs:

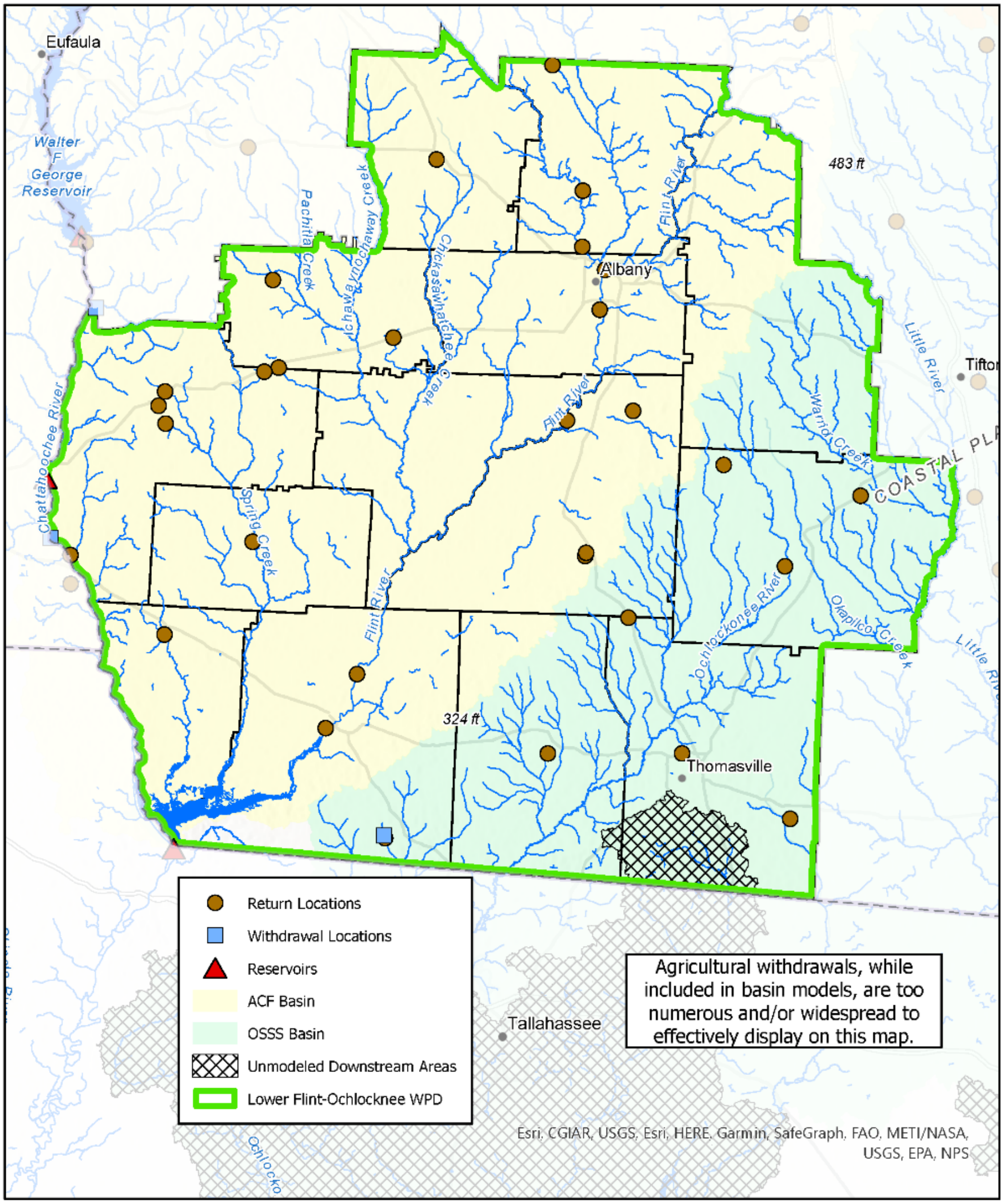
- Available water for a water withdrawal (municipal, industrial, energy)

[2] The Council notes a regional trend of increasing installation of solar energy facilities that are located on previously irrigated agricultural in the region. The baseline scenarios accounted for all solar conversion sites that were in place prior to 2020, but it is likely that additional acreage has been converted in the past few years. It is difficult to quantitatively assess the impact of these conversions on irrigated acreage. Landowners that convert irrigated acreage to solar energy facilities might not be retiring their agricultural water withdrawal permits. It is possible for them to shift those permits to inactive status rather than retiring the permits. Further quantification of the impacts of solar conversions in the region is needed to estimate the potential impacts on agricultural water demand.

[3] The groundwater model incorporated into BEAM for the ACF assessment is the USGS Modular Finite Element Model (Jones and Torak, 1993) https://doi.org/10.3133/twri06A3.

- Available water to assimilate a wastewater discharge (municipal, industrial) as measured against the low flow used to set the effluent limitations for the discharge (i.e., 7Q10 flow)[4]

***Figure 3-2: BEAM Model Schematic for the Lower Flint-Ochlockonee Region***




[4] 7Q10 is a commonly applied metric for assessing low flow conditions. It is the lowest 7-day average flow that occurs on average once every 10 years. Additional information about low flow metrics is available from the Environmental Protection Agency: https://www.epa.gov/ceam/definition-and-characteristics-low-flows

GAEPD asked the Council about additional metrics for which it would like to receive model results. The Council and GAEPD agreed to evaluate the instream flows at three points in the Lower Flint River Basin: Milford (Ichawaynochaway Creek), Iron City (Spring Creek), and Bainbridge (Flint River). Flow levels used in the metrics were selected to reflect low flow conditions. The metrics for the BEAM model assessment for this region are summarized in Table 3-1.

***Table 3-1: Lower Flint Ochlockonee Region Metrics Evaluated in BEAM Model Assessment***

| | |
|---|---|
| **Water Supply Availability** | % Model period with water supply challenge |
| | Total volume of shortage (for the model period) |
| | Shortage volume in 2007-2008 drought |
| | Shortage volume in 2011-2012 drought |
| **Wastewater Discharge Assimilation** | % Model period with wastewater assimilation challenge |
| **Lake Elevation** | None |
| **Streamflow** | Bainbridge: % model period < 1,400 cfs |
| | Iron City: % model period < 8 cfs |
| | Milford: % model period < 50 cfs |

The results for the water supply and wastewater discharge metrics in the ACF and Ochlockonee Basins are summarized in Table 3-2. All the ACF facilities listed in Table 3-2 are in the Flint River Basin except for one industrial withdrawal: Georgia Pacific LLC Cedar Springs, which is in the Chattahoochee River Basin. Part of the Lower Flint-Ochlockonee Water Planning Region falls in the Chattahoochee River Basin (see Figure 2-1). Additionally, a small portion of the Lower Flint-Ochlockonee Water Planning Region is in the Suwannee River Basin. Results for this basin are not included in this document but can be found in the Suwannee-Satilla Regional Water Plan. The Lower Flint-Ochlockonee Water Planning Council will continue to communicate with the Suwannee-Satilla Water Planning Council in evaluating assessment results to support coordination in their respective Regional Water Plans.

***Table 3-2: Summary of Water Supply and Wastewater Discharge Results for Lower Flint Ochlockonee Region (Current & Future Conditions)***

| | **Facility Type** | **ACF** | | **Ochlockonee** | |
|---|---|---|---|---|---|
| | | Analyzed | Challenge Indicated | Analyzed | Challenge Indicated |
| | | *# of Facilities* | | | |
| Water Withdrawals | Municipal | 0 | 0 | 0 | 0 |
| | Industrial | 1 | 1 | 1 | 1 |
| | Energy | 1 | 0 | 0 | 0 |
| Wastewater Discharges | Municipal | 17 | 9 | 7 | 4 |
| | Industrial | 3 | 0 | 1 | 0 |
| *Note: For each challenge indicated in the assessment results, the challenges were observed under both current and future conditions. Future assessment results are discussed in Section 5.1.* | | | | | |

Table 3-3 summarizes results for the two facilities where water supply challenges in the region were observed. Both facilities were industrial facilities, one in the Ochlockonee River Basin and one in the Chattahoochee River Basin (ACF).

***Table 3-3: Water Supply Challenges Indicated in Assessment Results: Lower Flint-Ochlockonee Region***

| **Facility** | **Metric** | | **Scenario** | |
|---|---|---|---|---|
| | | | Baseline | Baseline Drought |
| Georgia Pacific Cedar Springs, LLC *Chattahoochee* | % Time | | 0.8% | 0.8% |
| | Shortage *million gallons* | Model Period | 7,032 | 7,079 |
| | | *2007-08 Drought* | 1,427 | 1,908 |
| | | *2011-12 Drought* | 772 | 567 |
| BASF Corporation *Ochlockonee* | % Time | | 0.1% | 0.2% |
| | Shortage *million gallons* | Model Period | 10 | 19 |
| | | *2007-08 Drought* | 1 | 1 |
| | | *2011-12 Drought* | 0 | 0 |
| **% Time is calculated as a proportion of the full model period (1939-2018). Shortage is total volume for full model period or for the drought period indicated. Each drought period includes the full two years listed.* | | | | |



Tables 3-4 and 3-5 summarize the results for 9 facilities in the ACF Basin and the 4 facilities in the Ochlockonee Basin, respectively, where flows fell below the 7Q10 flow at some time(s) during the 80-year model period. Most of these low flow periods would not be considered to result in substantial wastewater assimilation challenges, as the percentage of time that the instream flow fell below the 7Q10 value is less than 10%. At a few municipal wastewater facilities, the percent of time exceeds 10% and indicates a wastewater assimilation challenge for the Blakeley Water Pollution Control Plant (WPCP), the Colquitt facilities in the ACF Basin, and the Doerun WPCP in the Ochlockonee Basin. All facilities in Table 3-4 and Table 3-5 are municipal wastewater treatment facilities. All the ACF facilities in Table 3-4 are in the Flint River Basin.

These challenges were reviewed by the Council. In general, they indicate where potential shortfalls may be a challenge in meeting the water and wastewater needs of the region. The amounts, locations, duration, and volume of the shortfalls, especially during dry periods, were examined where additional information was requested by the Council. GAEPD will use this information to guide communications with these facilities about future capacity and permit requirements.

***Table 3-4: Wastewater Assimilation Challenges Indicated in Assessment Results: ACF Basin in Lower Flint-Ochlockonee Region***

| Facility | % Time Flow Below 7Q10* | | Required Flow (7Q10) *cfs* |
|---|---|---|---|
| | Baseline Scenario | Baseline Drought Scenario | |
| Smithville WPCP | 2.1% | 5.7% | 2.87 |
| Leesburg Pond WPCP | 0.3% | 1.3% | 54.99 |
| Kinchafoo-nee Creek WPCP | 0.2% | 0.8% | 62.6 |
| Dawson WPCP | 1.1% | 2.0% | 0.02 |
| Leary WPCP | 0.8% | 1.1% | 0.002 |
| Arlington WPCP | 4.0% | 8.9% | 0.02 |
| Blakely WPCP | 5.2% | 10.8% | 0.09 |
| Colquitt | 7.3% | 12.7% | 9.06 |
| Donalsonville WPCP | 4.2% | 5.1% | 1.19 |

**% Time is calculated as a proportion of the full model period (1939-2018).*

***Table 3-5: Wastewater Assimilation Challenges Indicated in Assessment Results: Ochlockonee Basin in Lower Flint-Ochlockonee Region***

| Facility | % Time Flow Below 7Q10* | | Required Flow (7Q10) *cfs* |
|---|---|---|---|
| | Baseline Scenario | Baseline Drought Scenario | |
| Doerun WPCP | 18.5% | 23.9% | 0.01 |
| Moultrie WPCP | 7.7% | 8% | 0.09 |
| City of Thomasville Oquina Creek WPCP | 1% | 1% | 0.09 |
| Cairo WPCP | 3.9% | 5.4% | 0.05 |
| **% Time is calculated as a proportion of the full model period (1939-2018).* | | | |

Table 3-6 summarizes the results of the assessment for streamflows at three locations in the Lower Flint River Basin. As noted above, the streamflow metrics were selected to evaluate the frequency of low flows at these points in the basin under various scenarios. This information can be used by the Council to better understand the occurrence and severity of low flows, especially during drought periods. Additional metrics will be discussed by the Council for consideration in future planning cycles.

***Table 3-6: Surface Water Availability Streamflow Results for ACF Basin***

| Location | Streamflow Metric *cfs* | % Time Below Streamflow Metric* | |
|---|---|---|---|
| | | Scenario | |
| | | Baseline | Baseline Drought |
| Milford *Ichawaynochaway Creek* | 50 | 1.3% | 4.8% |
| Iron City *Spring Creek* | 8 | 4.0% | 8.5% |
| Bainbridge *Flint River* | 1,400 | 0.5% | 1.1% |
| **% Time is for calculated as a proportion of the full model period (1939-2018).* | | | |

In the last planning cycle, GAEPD extended the resource assessment to evaluate the potential impacts of farm ponds used for irrigation on surface water availability. To support this analysis, GAEPD collected data on the bathymetry of a set of farm ponds in South Georgia and gathered input from farmers on how farm ponds are managed. This information was limited in scope, but it provided enough data to support a preliminary analysis. This analysis used the model from the prior planning cycle, and it was not incorporated in the BEAM analysis in this planning cycle. However, the results of this analysis showed that farm ponds had a mitigating impact on the magnitude of availability shortfalls but not on their duration.

### 3.2.2 Groundwater Availability

For regional water planning, GAEPD prioritizes aquifers for assessment based on characteristics of the aquifer, availability and use of the aquifer, evidence of negative effects, and other considerations. The Council considers results of the groundwater availability assessment when selecting the management practices (Section 6.2) and recommendations to the state (Section 6.3).

In the Lower Flint-Ochlockonee Region, GAEPD prioritized assessment of portions of the Floridan and Claiborne Aquifers.

For this planning cycle, to provide more information related to the Council's Management Practice SF-2, GAEPD assessed additional groundwater use from the Claiborne and Cretaceous Aquifers. This analysis estimates potential new withdrawals from these aquifers at potential sites for the installation of new deep groundwater wells at existing surface water withdrawal sites in the region and evaluates potential impacts to the Claiborne and Cretaceous Aquifers.

Figure 3-3 illustrates the aquifers of Georgia, and Figure 3-4 illustrates a cross-section of the aquifers of the Coastal Plain of Georgia.

***Figure 3-3: Georgia's Aquifers***

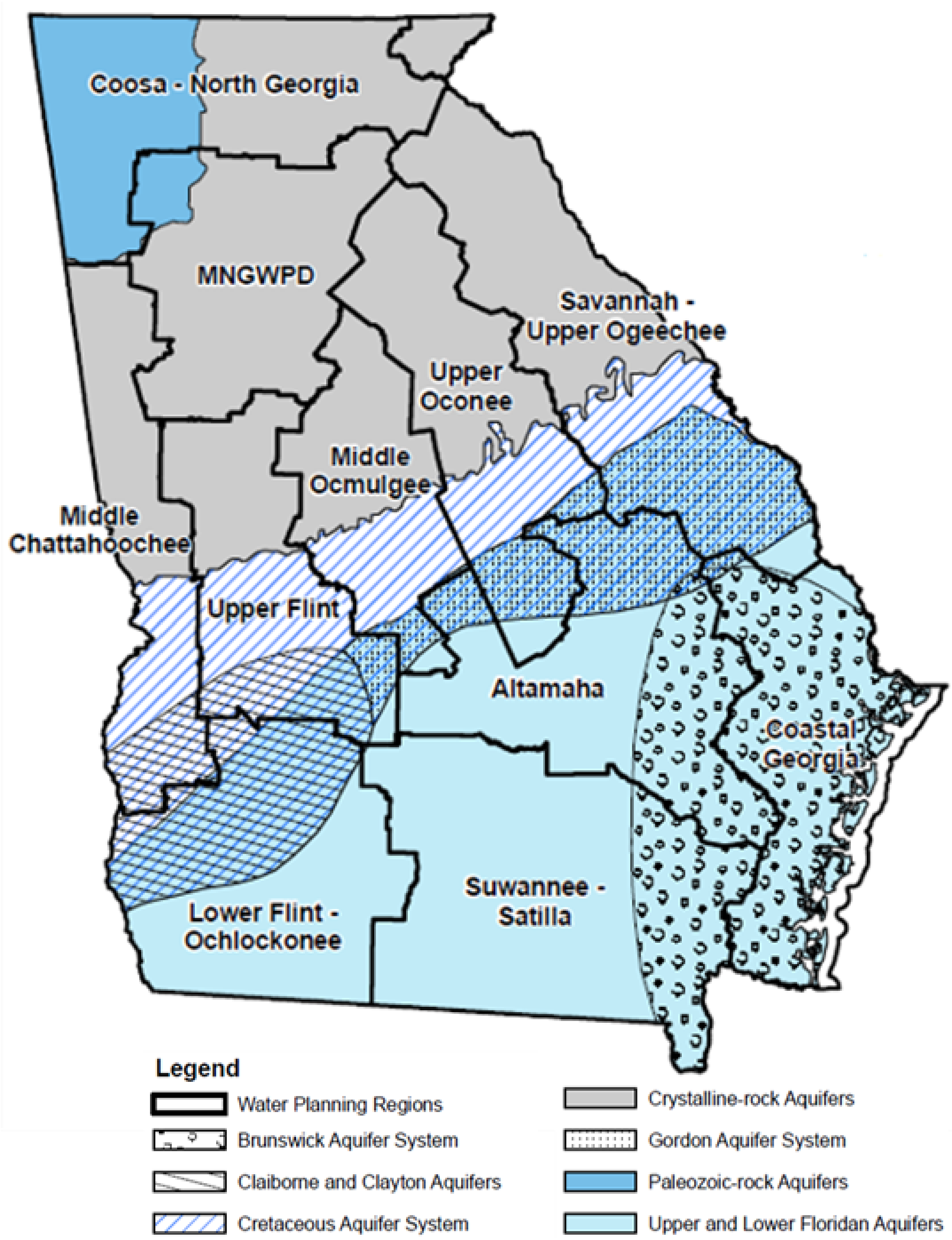
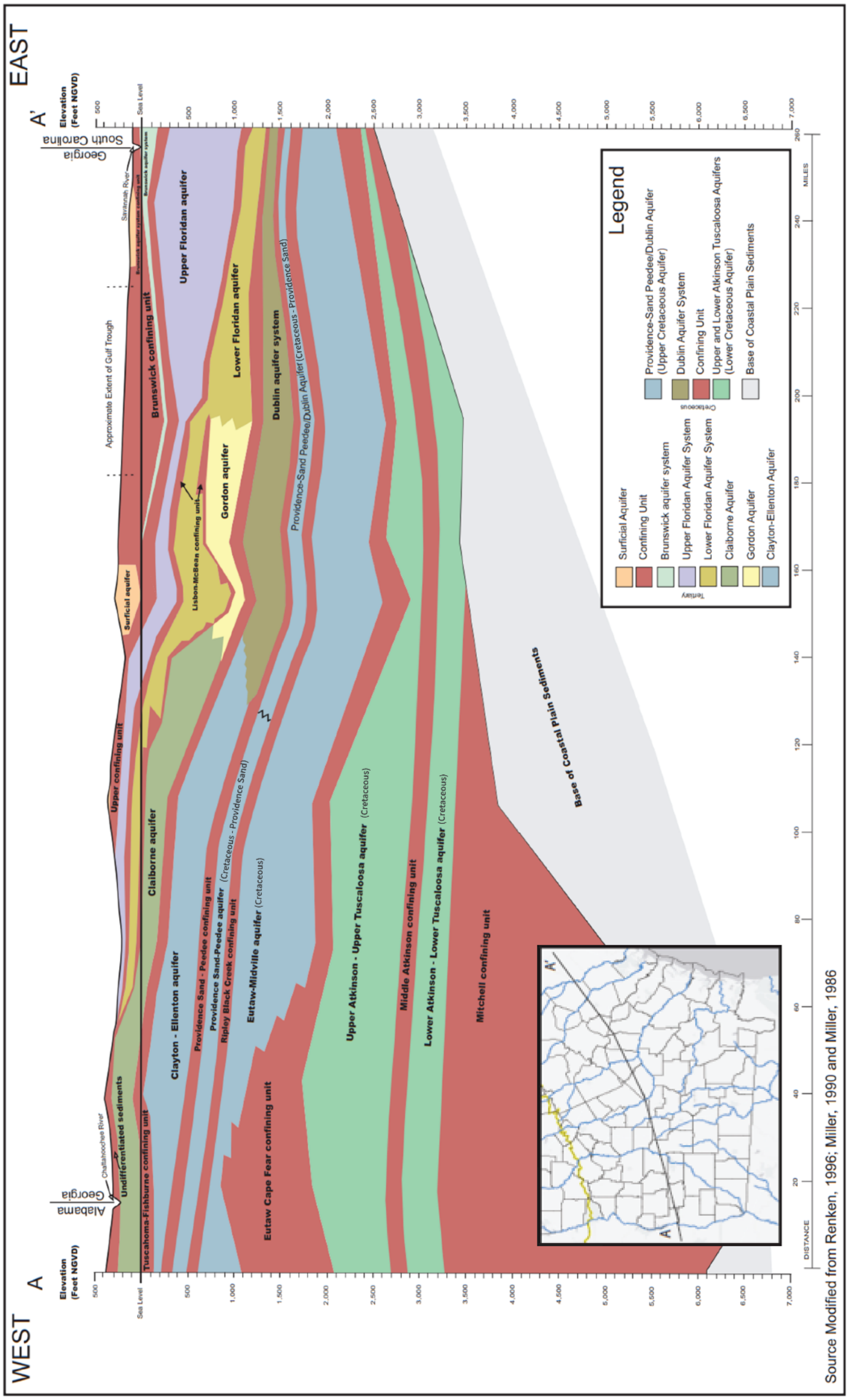


*Figure 3-4: Coastal Plain Aquifers Cross-Section*



***Groundwater Availability Assessment Approach***

The groundwater assessments estimate the sustainable yield range for the prioritized aquifers. For the purposes of this assessment, sustainable yield is the amount of groundwater that can be withdrawn without causing potential adverse impacts at the local or regional level by violating any of the following thresholds:

- Drawdown between pumping wells exceeds 30 feet
- Reduction in aquifer storage goes beyond a new base level
- Groundwater does not recover between periods of higher pumping
- Reduction in groundwater contribution to stream baseflow exceeds 40%
- Groundwater levels go below top of confining layer

The assessment estimates sustainable yield by simulating withdrawals until one of these thresholds is reached. The pumping level at that threshold is then used to estimate the sustainable yield range. There are areas of every aquifer in Georgia that are more sensitive than other areas because of factors, such as clusters of existing wells, areas of low transmissivity, and interconnections with the surface water systems. These are often the areas where sustainable yield thresholds are violated.

The sustainable yield model results for each aquifer are expressed as a range to encompass two model scenarios with different assumptions about groundwater use (low-end and high-end). In some cases, the estimated sustainable yield range (low-end to high-end) is large because of the different pumping assumptions used to estimate the range.

The low-end of the range is defined by a model scenario that assumes groundwater pumping will increase uniformly at existing permitted well locations. The low-end value is not necessarily the level at which impacts will be seen as uniform pumping increases are not often observed (i.e., pumping is often clustered in developed areas or agricultural regions).

The high-end of the range is defined by a model scenario that assumes groundwater use will increase in a non-uniform manner geographically. This scenario allows for a flexible distribution of water use that holds use constant in areas where adverse impacts are observed and increases use from hypothetical new well locations in other areas where adverse impacts are not observed. The high-end pumping scenario spreads the withdrawals out over the aquifer area to areas where there is less pumping, which yields potentially higher levels of use from the aquifer.

While important for planning purposes, the sustainable yield of an aquifer is difficult to assess on a broad scale, and preventing adverse impacts requires attention to location-specific conditions. When considering the estimated sustainable yield range, the Council acknowledged that (1) the range was a general guide for identifying potential wide-scale impacts and (2) adverse impacts could be observed at any specific location, even when use does not exceed the estimated sustainable yield range. When withdrawals are estimated or projected to exceed the estimated sustainable yield range, the results do not necessarily indicate that the aquifer is likely to be exhausted by use. Usually, this exceedance indicates a need for more information and implementation of management practices to address potential impacts. Aquifer responses in the future depend on pumping configurations, where wells are located, and how much pumping is applied at each location.[5]

The close connections between surface and ground water for the Floridan Aquifer in the Dougherty Plain were accounted for in estimating the sustainable yield. The method of estimating the sustainable yield for this part of the aquifer is described below.

***Groundwater Availability Assessment Results***

Figures 3-5, 3-6, and 3-10 show the estimated sustainable yields and current use for the assessed aquifers in this region. The figures include maps of the portion of each aquifer that was assessed. The estimates of current use can be compared to the estimated sustainable yield. The current use estimates are provided at two scales: (1) use that occurs in the portion of the assessed aquifer that is within this water planning region, and (2) aquifer wide use that occurs in the full assessed area of the aquifer (illustrated on the maps in Figures 3-5, 3-6, and 3-9). Current aquifer use is estimated for the year 2020 and incorporates municipal, industrial, and energy sector groundwater use, as well as agricultural use during dry year conditions (see Section 4 for details on estimated 2020 water use). Section 5 compares the estimated sustainable yield results to the forecasted 2060 demand.

In summary, the results in Figures 3-5, 3-6, and 3-10 indicate estimated 2020 use is below the estimated sustainable yield range in the Claiborne Aquifer and South-Central Georgia Floridan Aquifer but above the range for the portion of the Floridan aquifer in the Dougherty Plain.

*Floridan Aquifer Results:* The Floridan Aquifer was assessed in two areas that occur in the Lower Flint Ochlockonee Region: the Dougherty Plain and South-Central Georgia (see Figures 3-5 and 3-6). These two assessments overlap in the eastern part of the region. In the South-Central Georgia part of the aquifer, current use is below the level of the low-end sustainable yield.

The Dougherty Plain assessment provides a more detailed look at the unconfined portion of the aquifer where it is in close connection with surface water. In this area, the use of the Floridan Aquifer can have a significant negative effect on baseflow to surface water streams. Figure 3-7 illustrates the relationship between stream baseflow and an unconfined aquifer. To address this area of close interconnection, the Dougherty Plain assessment incorporates an additional model (i.e., USGS Modular Finite Model, Jones and Torak, 1993) to provide estimates of the impacts on baseflow in this region.[6] The Dougherty Plain assessment is especially important due to its high level of agricultural use in this region and the unique relationship the Floridan Aquifer has to the surface water sources in this area of the state.

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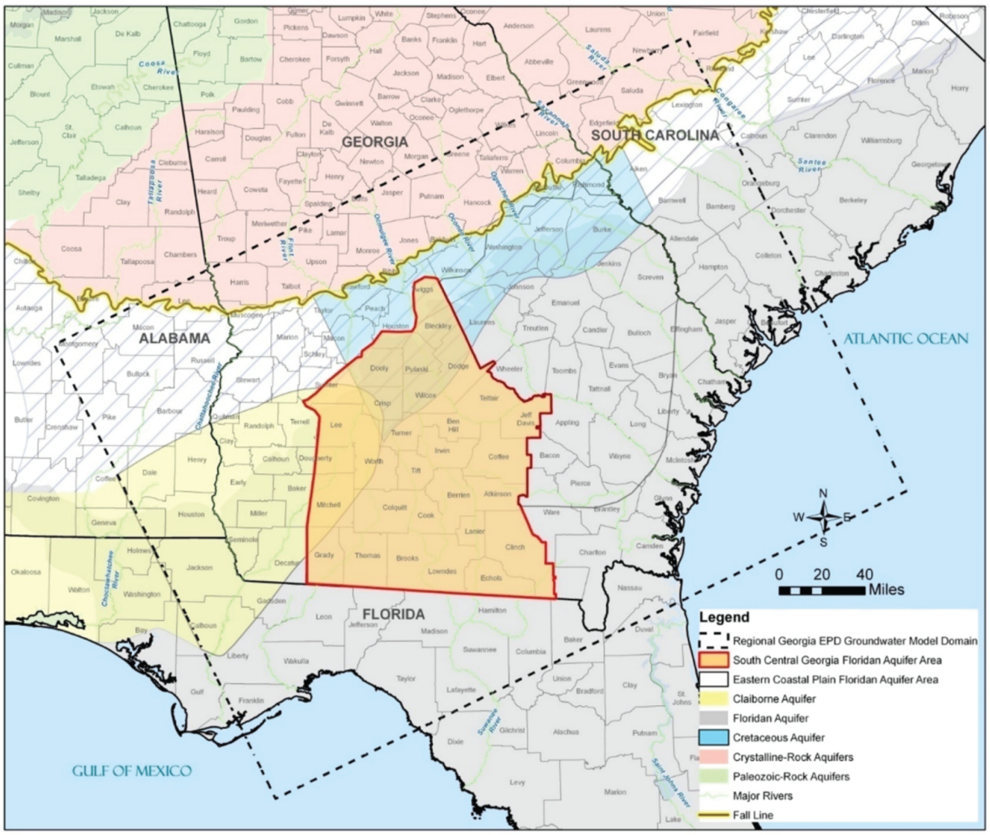
[5] For more detail on the groundwater availability resource assessment and results, see the March 2010 Synopsis Report: Groundwater Availability Resource assessment and the March 2017 Synopsis Report: Groundwater Availability Assessment Updates; both are available on the state water planning website: https://waterplanning.georgia.gov/resource-assessments/ground-water-availability.

[6] USGS Modular Finite Element Model (Jones and Torak, 1993) https://doi.org/10.3133/twri06A3

***Figure 3-5: Floridan Aquifer: South Central Georgia – Model Domain and Estimated Sustainable Yield Range***




Floridan Aquifer: South Central Georgia *

| **Estimated Sustainable Yield Range** | *Current Use (2020)* | |
|---|---|---|
| | **Lower Flint Ochlockonee Region** | **Aquifer-Wide** |
| 622 to 836 mgd | 421 mgd | 488 mgd |

** Also indicated are other aquifer regions modeled for regional water planning. The Claiborne (yellow) and Cretaceous (blue) are depicted in other figures and discussed in this plan.*

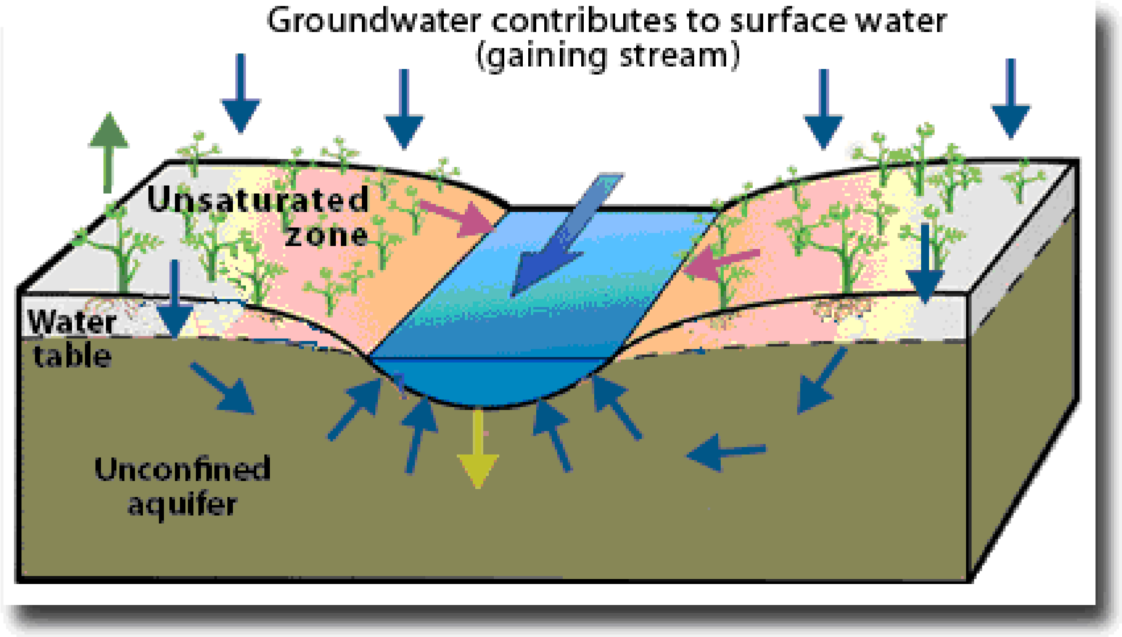
*Figure 3-6: Floridan Aquifer: Dougherty Plain – Model Domain & Sustainable Yield*


Floridan Aquifer in the Dougherty Plain*

| Estimated Sustainable Yield Range | Current Use (2020) | |
|---|---|---|
| | Lower Flint Ochlockonee Region | Aquifer-Wide |
| 237 to 328 mgd | 392 mgd | 441 mgd |

** Also indicated are other aquifer regions modeled for regional water planning. The Claiborne (yellow), Cretaceous(green), and Floridan South Central Georgia (orange line) are depicted in other figures and discussed in this plan.*

***Figure 3-7: Illustration of Groundwater Contribution to Stream Baseflow***




***Source: USGS***

The sustainable yield results for the Dougherty Plain (Figure 3-6) were driven by the model results related to the impact of groundwater withdrawals on groundwater contributions to stream baseflows. In other aquifer units that were evaluated, the change in baseflow contribution to streams was evaluated at the level of the whole aquifer unit, but for the Upper Floridan Aquifer in the Dougherty Plain, estimates of sustainable yield were determined by changes in baseflow to streams that were evaluated on a reach-by-reach basis. This finer-scale analysis represents a more conservative approach.

The low-end of the sustainable yield for the Floridan Aquifer in the Dougherty Plain was determined by modeling increasing pumping rates on a watershed scale (HUC-8) across the aquifer area. First, pumping in each watershed was increased independently until the pumping level resulted in a 40% reduction in the groundwater contribution to stream baseflow in that watershed. Next, pumping was reduced across all watersheds incrementally until the 40% baseflow metric was not violated in each watershed. Pumping in a watershed was held at the level of the 40% baseflow metric for that watershed while reductions were continued in the remaining watersheds. The low end of the sustainable yield was set to the level of pumping in each watershed for which none of the watersheds were violating the 40% baseflow metric.

The high-end of the sustainable yield for the Dougherty Plain was set by adding use in one watershed that crossed state lines (Alabama and Florida). This use was not included in the low-end sustainable yield because of potential impacts in neighboring states. It is included in the high-end sustainable yield estimate.



In the resource assessment model runs for this aquifer, localized thresholds for groundwater contributions to stream baseflows were reached when impacts on the aquifer itself were minimal. Because there is a significant degree of connection between the Floridan Aquifer and the rivers, drawdown in the aquifer is not a major concern because the rivers would recharge the aquifer under any increased withdrawal scenarios. The impacts of use of this portion of the aquifer are through the impacts to streamflow. Therefore, the Council considered the results of the groundwater assessment for this aquifer together with those for the surface water availability assessment and in the context of existing policy that affects groundwater and surface water use in this area. Since 2012, there has been a moratorium on new and expanded withdrawals from the Floridan Aquifer in the Dougherty Plain. Figure 3-8 provides a map of the moratorium area. Prior to the moratorium, and if the moratorium is lifted, withdrawals from the aquifer are managed per the 2006 Flint River Basin Plan, which sets geographic zones (restricted use, capacity use, and conservation use) with increasing levels of restrictions on aquifer withdrawals based on potential impacts on streamflow. Figure 3-9 is a map of these management zones. Specifically, no new agricultural withdrawals from the Floridan aquifer are permitted at this time in areas that are modeled to have the greatest impact on streamflow.

***Figure 3-8: Moratorium on New and Expanded Agricultural Water Withdrawal Permits***

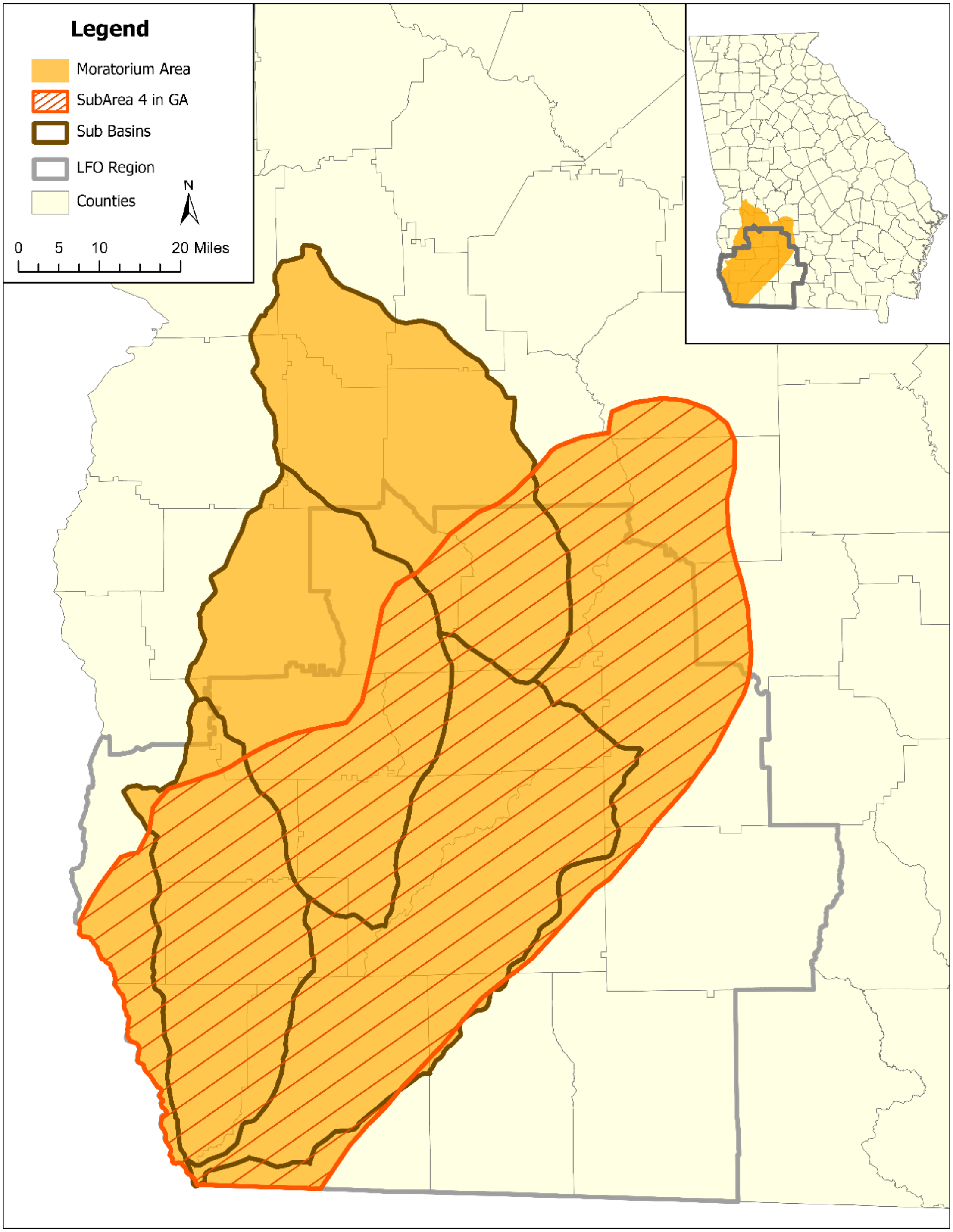
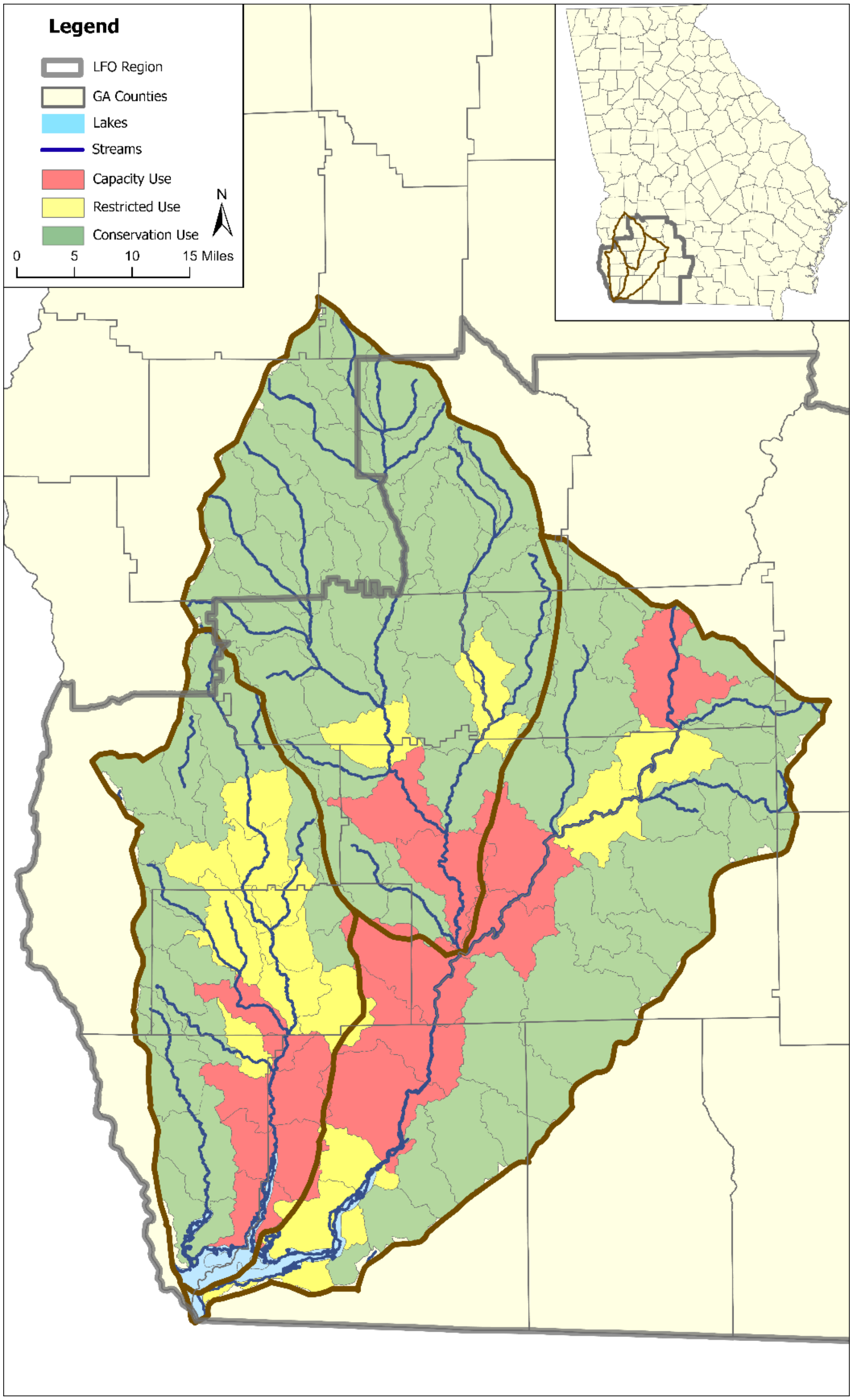


***Figure 3-9: Agricultural Water Withdrawal Permit Management Zones based on 2006 Flint Plan***

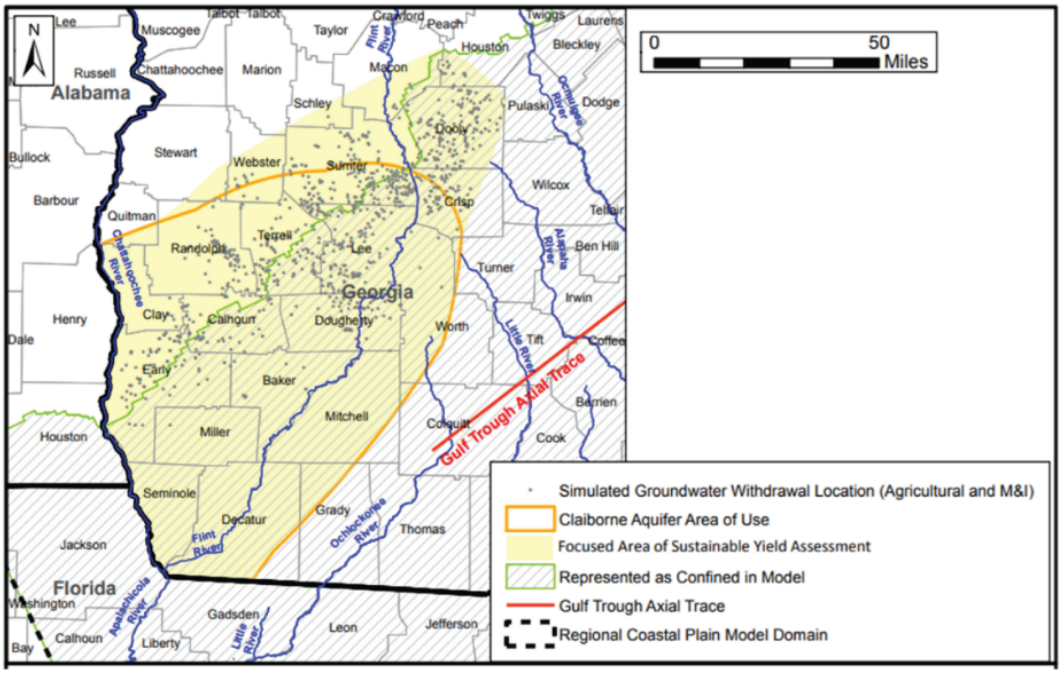


*Claiborne Aquifer Results:* For the Claiborne Aquifer, sustainable yield range estimates and 2020 use are presented in Figure 3-10. Figure 3-10 shows the area of the aquifer assessed in the yellow shaded area. In this planning cycle, the assessed portion of the aquifer was extended from the orange line to include the yellow shaded area to the north and northeast of the orange line. The assessed area was extended to the north and northeast to include portions of Webster, Schley, Stewart, Randolph, Macon, Houston, Dooly, and Crisp Counties where there are active Claiborne aquifer wells.

For the Claiborne Aquifer, the estimated sustainable yield results indicate that effects of use on this aquifer are dependent upon the location of withdrawals. The results indicate that some areas may have additional amounts of water that can be used sustainably, while other parts may show potential adverse impacts of use.[7] As a part of the Claiborne Aquifer assessment in this planning cycle, county level estimates of sustainable yield were developed. Table 3-7 lists the county level high end sustainable yields for the Claiborne Aquifer for counties in the Lower Flint-Ochlockonee region and includes an estimate of 2020 use of the aquifer in each listed county. These results highlight the need for location specific management of withdrawals from the Claiborne Aquifer and for more specific analysis directed at preventing future adverse impacts.

[7] These results are corroborated by those of a GEFA-funded study on characteristics of the Claiborne Aquifer (CDM Smith, *Claiborne Aquifer Specific Capacity and Transmissivity Analysis Draft Report*, December 2016).

*Figure 3-10: Claiborne Aquifer – Model Domain and Sustainable Yield*




| Estimated Sustainable Yield Range | *Current Use (2020)* | |
|---|---|---|
| | **Lower Flint Ochlockonee Region** | **Aquifer-Wide** |
| 141 to 803 mgd | 41 mgd | 71 mgd |

***Table 3-7: Claiborne Aquifer – High End of Sustainable Yield for the Counties in the Lower Flint Ochlockonee Region***

| County | 2020 Current Use *mgd* | High End Sustainable Yield *mgd* |
|---|---|---|
| Baker | 0.8 | 11.3 |
| Calhoun | 1.7 | 44.5 |
| Colquitt | 0 | 0.4 |
| Decatur | 1.5 | 4.6 |
| Dougherty | 4.7 | 22.7 |
| Early | 3.9 | 67.1 |
| Grady | 0 | 1.2 |
| Lee | 13.8 | 49.7 |
| Miller | 0.2 | 21.2 |
| Mitchell | 0.6 | 3.8 |
| Seminole | 2.0 | 3.7 |
| Terrell | 12.4 | 80.8 |
| Worth | 0.6 | 7.2 |

### 3.2.3 Surface Water Quality

The water quality assessment modeled the capacity of Georgia's surface waters to absorb pollutants without unacceptable degradation of water quality. The term assimilative capacity refers to the ability of a water body to naturally absorb pollutants via chemical and biological processes without exceeding state water quality standards or harming aquatic life.

The water quality assessment focused on available assimilative capacity for oxygen consuming wastes (affecting dissolved oxygen (DO)), nutrients (specifically total nitrogen and total phosphorus), and chlorophyll-*a* (a green pigment found in algae; the concentration of chlorophyll-*a* is used to assess lake water quality). Assessment of the ability to assimilate oxygen consuming wastes is important because aquatic life is dependent upon the amount of residual DO available in a stream. Two water quality model evaluations were performed:

1. River Model (Dissolved Oxygen Modeling) – This model evaluated DO due to existing point discharges under low-flow, high-temperature critical conditions. For the Flint River, a dynamic model was used that reflects varying conditions and incorporated potential effects from nonpoint source stormwater runoff based on varying land uses.

2. Lake and Watershed Models (Nutrient Modeling) – These models evaluated the impacts of nutrient loading from point and nonpoint sources, nutrient levels (specifically total nitrogen and total phosphorus), and chlorophyll-*a*. The watershed and lake models accounted for nutrient sources from both wastewater discharges and nonpoint source stormwater runoff based on various land uses.

The water quality assessment is not the same as the 303(d) list of impaired waters for two reasons. First, this assessment only looked at DO and nutrients; the 303(d) list includes stream reaches listed as impaired on the basis of DO and other parameters, such as metals, bacteria, and biota. Second, the 303(d) list is based on analytical results from stream monitoring, while the water quality assessment is based on model results. Waters in the Lower Flint-Ochlockonee Water Planning Region that are included on the 303(d) list of impaired waters are discussed in Section 3.3.1.

Determining assimilative capacity requires information on the stream flow, in-stream water quality, wastewater discharges, water withdrawals, land application systems, weather information, land use, stream hydrology, topography, and state water quality standards. The water quality models were developed to show the status of the available assimilative capacity based on wastewater discharges at currently permitted levels. They were also used to evaluate future conditions (see Section 5.3).[8]

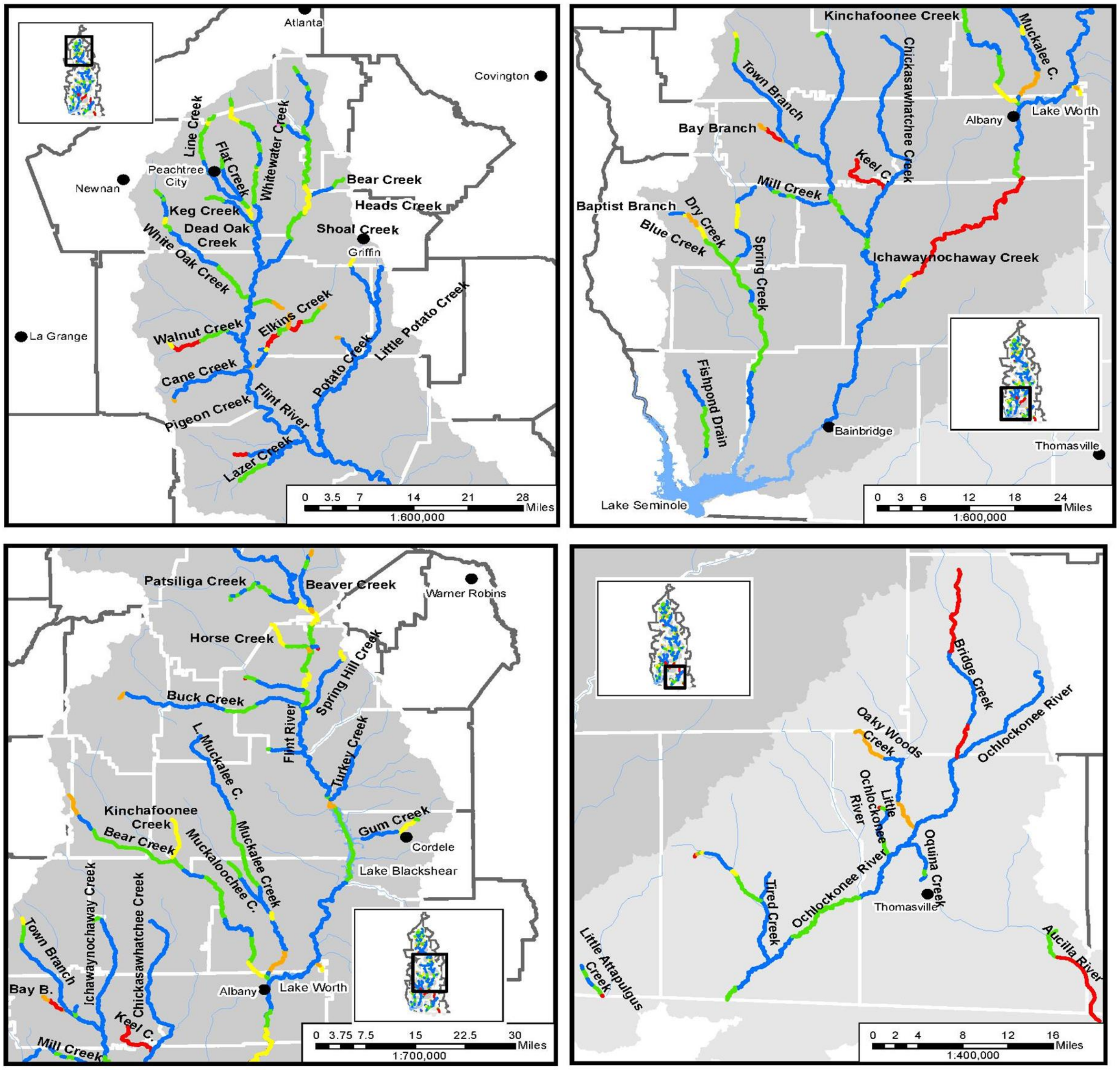
***Dissolved Oxygen Modeling***

Figure 3-11 shows the in-stream DO model results for current discharges given critical low flow (7Q10), high temperature conditions. The current conditions assimilative capacity analysis incorporated municipal and industrial wastewater facilities operating at their full permitted discharge levels (flow and effluent discharge limits as of 2019). Stream segments that were predicted by the model to exceed the available assimilative capacity are shown in red. Streams that are at the allowable DO levels are shown in pink, and those predicted to have very good DO levels relative to state water quality standards are shown in blue.

It is important to note that some streams are naturally low in DO, but these streams cannot necessarily be discerned in Figure 3-11 because the map indicates the effects of discharges as well as natural conditions for all streams. Assimilative capacity appears to be available in most stream reaches in the Lower Flint-Ochlockonee Water Planning Region based on DO modeling results. The number of stream miles where model results showed assimilative capacity as exceeded or unavailable under current conditions in the model was 56 miles in the Flint River Basin (as a whole) and 23 miles in the Ochlockonee River Basin.

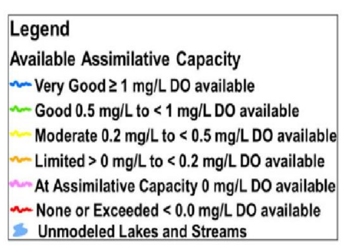
[8] For more detail on the water quality resource assessment, see the May 2023 report:, Dissolved Oxygen Assimilative Capacity Resource Assessment Report, forthcoming on the state water planning website: https://waterplanning.georgia.gov/resource-assessments/surface-water-quality .

*Figure 3-11: Assimilative Capacity Results from Dissolved Oxygen Assessment: Flint and Ochlockonee River Basins (Current)*




| | Flint Basin-Available Assimilative Capacity (Total Mileage) | | | | | |
|---|---|---|---|---|---|---|
| Model Run | Very Good | Good | Moderate | Limited | At Assimilative Capacity | Exceeded |
| Current | 664 | 267 | 72 | 32 | 0.51 | 56 |

| | Ochlockonee Basin-Available Assimilative Capacity (Total Mileage) | | | | | |
|---|---|---|---|---|---|---|
| Model Run | Very Good | Good | Moderate | Limited | At Assimilative Capacity | Exceeded |
| Current | 91 | 29 | 1 | 10 | 0 | 23 |




*Source: GAEPD, Synopsis Report – Surface Water Quality (Assimilative Capacity) Resource Assessment, July 2022.*



***Nutrient Modeling***

Watershed and lake models results assume water use and wastewater disposal data for 2022 and corresponding land use profiles as inputs. At the time of publication, the latest data inputs for nutrient loading from the contributing watershed utilize seventeen years of observed hydrology from 2005 through 2022. The results from the previous planning cycle will continue to be used to inform water quality related management practices.  The model results indicated that in the Flint River Basin, nonpoint sources currently contribute more total nitrogen than point sources, whereas point sources currently contribute more total phosphorus.

The lake models estimated the algal response, in terms of chlorophyll-*a* levels, to nutrient loading at current conditions over a multi-year modeling period. Three lakes in the Lower Flint-Ochlockonee Water Planning Region were modeled: Blackshear, Chehaw, and Seminole. However, nutrient standards have not been established for these lakes. The results indicated that in all three lakes, current total phosphorus loading is primarily from point sources, whereas current total nitrogen loading is primarily from nonpoint sources. While the lake model results cannot be compared against nutrient standards for these three lakes, the results do indicate how nutrient control efforts should be directed to manage current and future nutrient loading.[9]

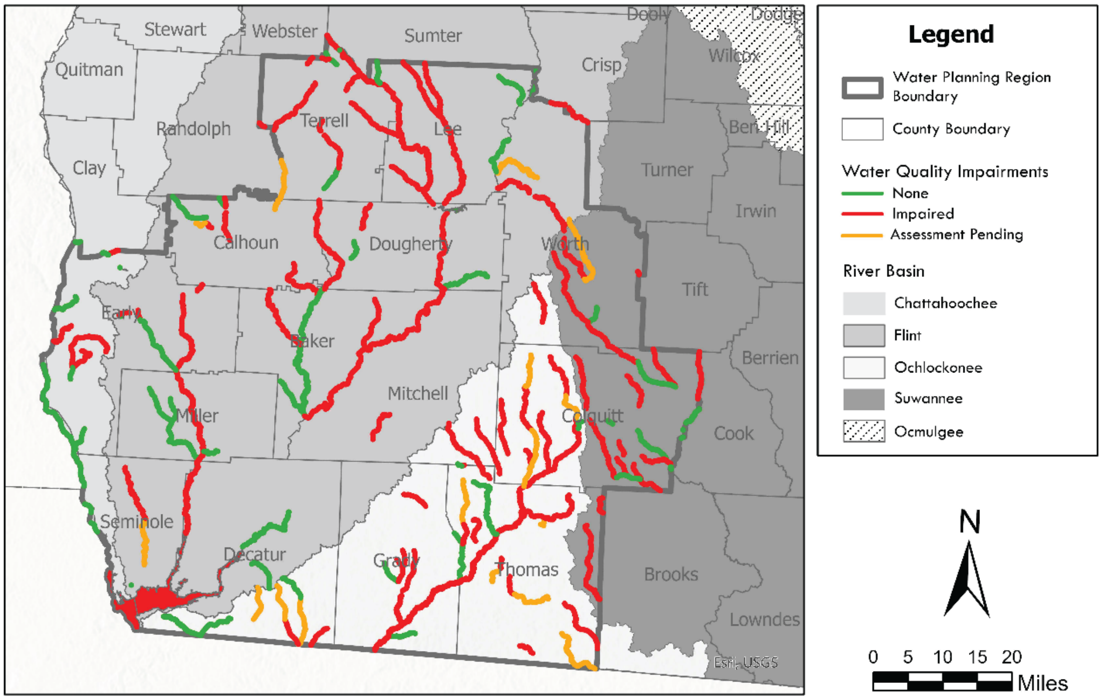
## 3.3 Ecosystem Conditions and In-stream Uses

### 3.3.1 303(d) List and TMDLs

Georgia assesses its water bodies for compliance with water quality standards, as required by the federal Clean Water Act. Waters of the state are monitored by GAEPD, USGS, and local authorities contracted by GAEPD. If an assessed water body is found not to meet standards, then it is considered “not supporting” its designated uses, and it is included on a list of impaired waters (303(d) list). Impairments must be addressed through the development of a Total Maximum Daily Load (TMDL), which sets a pollutant load and outlines a strategy for corrective action. Several stream reaches in the Lower Flint-Ochlockonee Water Planning Region are on the state’s list of impaired waters. A summary of impaired waters in this water planning region is provided in Figure 3-12.

[9] See Section 5.3 for a discussion of future water quality modeling results.

***Figure 3-12: Summary of Impaired Waters in the Lower Flint Ochlockonee Water Planning Region***




| River Basin | Total River Miles Impaired in the Lower Flint-Ochlockonee Region | | | |
|---|---|---|---|---|
| Chattahoochee | 0 | 6 | 0 | 21 |
| Flint | 27 | 171 | 164 | 104 |
| Ochlockonee | 49 | 137 | 69 | 17 |
| Suwannee | 70 | 64 | 0 | 6 |
| Criterion Violated | DO | Fecal Coliforms | Metal | Other |

Note: Stream reaches may have more than one criterion violated, i.e. the sum of DO, Fecal Coliform, Metals, and Other may be greater than the total number of stream miles listed as impaired. Metals include mercury trophic weighted residue value and fish consumptive guidance.

*Source: Georgia's 2022 305(b)/303(d) List Documents - Approved by U.S. EPA April 22, 2022*

GAEPD will be revising the standards based on the assessment of impaired waters (Triennial Review) in which the bacteria testing will include E. coli in addition to the current monitoring of fecal coliform.

Additional resources for water quality data can be found at GAEPD's Water Quality in Georgia page which includes downloadable data for 303(d) information (https://epd.georgia.gov/https%3A/epd.georgia.gov/assessment/water-quality-georgia), Georgia Environmental Monitoring and Assessment System (GOMAS) (https://gomaspublic.gaepd.org), and GAEPD Water Quality in Georgia Story Map (https://storymaps.arcgis.com/stories/67b7b29771b842268f878b94cb7c6d69).

### 3.3.2 Fisheries, Wildlife, and Recreational Resources

The Georgia Wildlife Resources Division (WRD) developed a broadly focused strategy that indicates areas of the state in which resources should be concentrated to facilitate the conservation of Georgia's animals, plants, and natural communities in the Georgia State Wildlife Action Plan, September 2015.[10] High priority species and habitats were identified and summarized at the ecoregion level, and a total of five ecoregions were designated for the state. Portions of the Lower Flint-Ochlockonee Water Planning Region fall within the Southeastern Plains Ecoregion, with the remainder in the Piedmont Ecoregion. The WRD plan identified 145 high priority animal species in the Southeastern Plains Ecoregion. These included 22 birds, 7 mammals, 11 reptiles, 10 amphibians, 13 mollusks, 22 fish, 9 aquatic arthropods, and 57 terrestrial arthropods.

Critical habitat areas have been identified for federally listed endangered and threatened species of freshwater mussels in the region as provided in Figure 2-4 in Section 2; more information can be found on the following U.S. Fish and Wildlife Service ECOS Environmental Conservation Online System website: https://ecos.fws.gov/ecp/report/table/critical-habitat.html.

The Lower Flint-Ochlockonee Water Planning Region provides boaters, fishermen, and other outdoor enthusiasts with a diverse and easily accessible river environment. Lake Blackshear offers boating and fishing opportunities. The crystal blue springs of the lower part of the region are a unique recreational resource. Camping, hunting, and hiking trails are recreational options across the region. Important recreational fisheries in the region include shoal bass, striped bass, and black bass. The Department of Natural Resources manages State Parks and Historic Sites, Public Fishing Areas, boat ramps, fish hatcheries, and Wildlife Management Areas throughout the Lower Flint-Ochlockonee Water Planning Region.

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[10] The Georgia State Wildlife Action Plan, September 2015 is available on-line: https://georgiawildlife.com/WildlifeActionPlan

# SECTION 4

## Forecasting Future Water Resource Needs

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*SUMMARY: This section summarizes future demand forecasts for water and wastewater treatment in the Lower Flint-Ochlockonee Water Planning Region. Between 2020 and 2060, water demands are forecasted to increase by 24% and wastewater treatment demands are forecasted to decrease by 2% in this water planning region.*

# Section 4. Forecasting Future Water Resource Needs

Water and wastewater demand forecasts, along with the resource assessments (Sections 3 and 5), form the foundation for water planning in the Lower Flint–Ochlockonee Water Planning Region and serve as the basis for the selection of water management practices (Section 6.2). Figures 4-5 and 4-6 included at the end of this section present the regional water and wastewater forecasts from 2020 through 2060 for four water use sectors: municipal, industrial, agriculture, and thermoelectric power generation. These forecasts provide estimates of baseline levels of water use in the region and illustrate how those levels are expected to change over the planning horizon. More details on demand forecasts for each water use sector can be found in the technical memorandums and Georgia Water Planning Forecast Dashboard, which are available on the Regional Water Planning website.[1]

## 4.1 Municipal Forecasts

Municipal forecasts include residential, commercial, and small industry demands. Municipal water and wastewater forecasts were based on population projections that were developed by the Governor's Office of Planning and Budget (OPB). In summary, the projections show that population in the Lower Flint-Ochlockonee Water Planning Region is expected to decrease from 344,710 in 2020 to 304,854 in 2060.The population forecasts for this planning cycle showed a decrease in growth rate compared to the previous planning cycle. The Lower Flint-Ochlockonee Water Planning Council notes concern that planning for a lower growth rate, which may change again in future planning cycles, could limit economic opportunities in this region. Therefore, the Council urges caution in interpretation of future water needs for the region and consideration of the need for water resources to support the regional economy. County-level population projections for the region are available in the water demand forecasting technical memorandum, which is cited below and available on the Regional Water Planning website.[2] Demands for major water using industries were projected separately and are discussed in Section 4.2.

### 4.1.1 Municipal Water Forecasts

The municipal water forecasts were calculated by multiplying an updated estimate of per capita water use by the population served. The per capita use estimates from the previous planning

[1] More information regarding Municipal, Industrial, Agricultural, and Energy forecasts can be found on the Regional Water Planning website: https://waterplanning.georgia.gov/forecasting

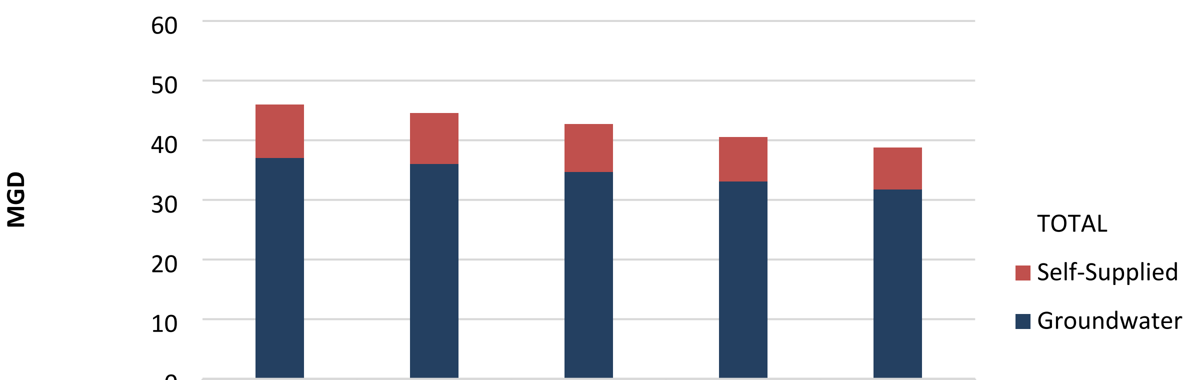
[2] More information regarding Municipal Forecasts can be found on the Regional Water Planning website at: https://waterplanning.georgia.gov/forecasting/municipal-water-use

cycle were updated and adjusted based on an analysis of withdrawals from 2015 to 2018 and estimated population served, which are reported to GAEPD by permitted municipal water systems.[3]

The per capita use rates also reflect adjustment for expected water savings over time from the transition to ultra-low flow toilets (1.28 gallons per flush maximum), as required by the Water Stewardship Act as of 2010. Additional details regarding development of the municipal water forecasts, including the per capita use rate, plumbing code savings, and results, are provided in the forecasting technical memorandum, which is cited below.

The resulting municipal water forecasts project that water demand for municipal water in the Lower Flint-Ochlockonee Water Planning Region (including publicly-supplied and self-supplied demand) is expected to decrease from 45.96 mgd in 2020 to 38.79 mgd in 2060. Of these amounts, estimated water withdrawals are expected to be 81% from groundwater by municipal systems and 19% from groundwater by private wells (self-supply) in 2020. There are no surface water withdrawals for municipal water systems in the region. Figure 4-1 illustrates the total municipal water demand separated by source.

***Figure 4-1: Total Municipal Water Demand (AAD-MGD)***




| | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|
| TOTAL | 45.96 | 44.61 | 42.71 | 40.51 | 38.79 |
| Self-Supplied | 8.95 | 8.55 | 8.02 | 7.45 | 6.98 |
| Groundwater | 37.01 | 36.06 | 34.69 | 33.06 | 31.81 |

*Source: Black and Veatch., 2017, Lower Flint-Ochlockonee Water Planning Region: Water and Wastewater Forecasting Technical Memorandum, https://waterplanning.georgia.gov/document/publication/water-and-wastewater-forecasting-technical-memorandum-lower-flint-ochlockonee/download*

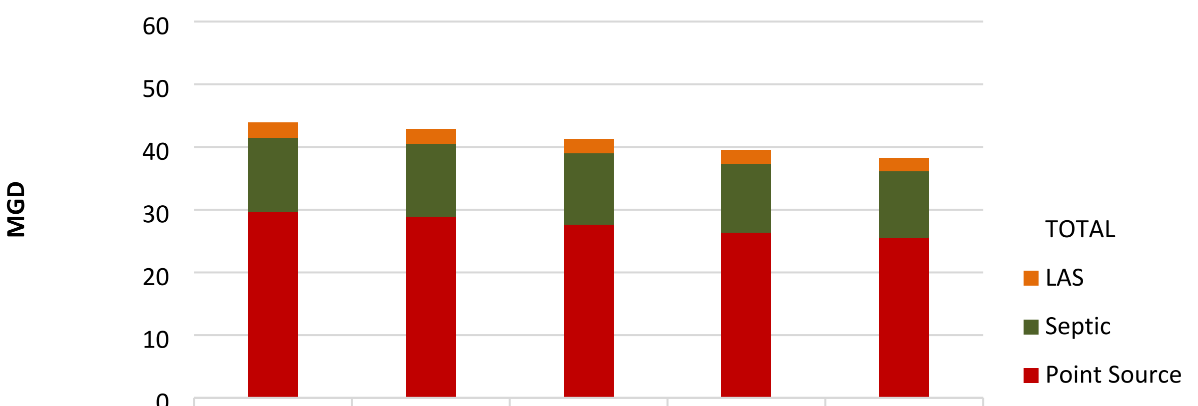
[3] Per capita water demand was calculated based on the data available. For most counties, the average per capita demand values from water loss audits submitted to GAEPD from 2015 to 2018 were used. For some counties, the demand was calculated using withdrawal data submitted to GAEPD and the population served in the Safe Drinking Water Information System database or other total population sources.

### 4.1.2 Municipal Wastewater Forecasts

Wastewater may be treated by one of three major disposal systems: municipal wastewater treatment plant to point source discharge, municipal wastewater treatment to land application system, or onsite sanitary sewage system, also called septic systems. Average daily discharge flows for 2019 were utilized for forecasting future municipal wastewater flows by county. The ratio of point source flows to land application system flows was generally held proportionate to the 2019 flow conditions. Manual adjustments were made where information was available on future facility flows. Any known (permitted) facility expansion plans were also considered. To calculate the projected wastewater flow to be treated by septic systems, the percent served by septic systems was multiplied by the county population then multiplied by the per capita use of 75 gallons per capita per day (gpcd) multiplied by 80 percent indoor water use return ratio. Further detail can be found in the forecasting technical memorandum, which is cited above and can be found on the Regional Water Planning website.

The demand for municipal wastewater treatment in the Lower Flint-Ochlockonee Water Planning Region is projected to decrease from 43.88 mgd in 2020 to 38.29 mgd in 2060 in the region. For these amounts, disposal of treated wastewater is expected to be 6% by land application systems, 67% by systems with point source discharges, and 28% by septic systems in 2060. Figure 4-2 illustrates the total municipal wastewater demand separated by discharge method.

***Figure 4-2: Total Municipal Wastewater Demand (AAD-MGD)***




| | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|
| TOTAL | 43.88 | 42.92 | 41.26 | 39.49 | 38.29 |
| LAS | 2.42 | 2.36 | 2.27 | 2.18 | 2.11 |
| Septic | 11.81 | 11.67 | 11.35 | 10.96 | 10.68 |
| Point Source | 29.65 | 28.89 | 27.64 | 26.35 | 25.49 |

*Source: Black and Veatch., 2017, Lower Flint-Ochlockonee Water Planning Region: Water and Wastewater Forecasting Technical Memorandum, https://waterplanning.georgia.gov/document/publication/water-and-wastewater-forecasting-technical-memorandum-lower-flint-ochlockonee/download*

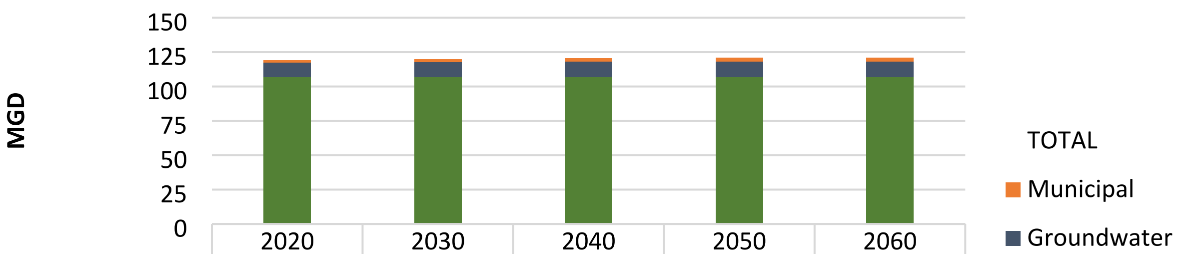
## 4.2 Industrial Forecasts

Industrial water and wastewater demand forecasts anticipate the future needs for major water-using industries in this water planning region. Industries require water for use in their production processes, sanitation, cooling, as well as employee use and consumption. The forecasts presented in this section are based upon the 10-year average withdrawals from 2010 to 2019 and inputs of relevant industry trade groups within the state. The industrial forecasts include major industrial water users and wastewater generators that supply their own water and/or treat their own wastewater. Some industries rely on municipal systems for water supply and wastewater treatment. Where data were available, municipally supplied or treated industrial water use was included in the industrial water and wastewater forecast. Other municipally-served industrial users, generally with lesser demands, were accounted for in the municipal forecast. Forecast demand graphs (Figures 4-3 and 4-4) shown in section 4.5 reflect sector water use by supply source. Further detail can be found in the industrial forecasting technical memorandum.[4]

### 4.2.1 Industrial Water Forecasts

Demand for water by major water using industries in the Lower Flint-Ochlockonee Water Planning Region is forecasted to increase from 119.02 mgd in 2020 to 121.12 mgd in 2060. Industrial water sources in the region are forecasted to be 88% from surface water and 12% from groundwater in 2060. Of this amount, municipally supplied industries account for 1.67 mgd in 2020 and 2.84 mgd in 2060. Figure 4-3 illustrates the total industrial water demand separated by source.

***Figure 4-3: Total Industrial Water Demand Forecast (AAD-MGD)***




| | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|
| TOTAL | 119.02 | 119.68 | 120.43 | 120.87 | 121.12 |
| Municipal | 1.67 | 2.04 | 2.46 | 2.70 | 2.84 |
| Groundwater | 10.43 | 10.72 | 11.05 | 11.25 | 11.36 |
| Surface Water | 106.92 | 106.92 | 106.92 | 106.92 | 106.92 |

*Source: Black and Veatch., 2017, Lower Flint-Ochlockonee Water Planning Region: Water and Wastewater Forecasting Technical Memorandum, https://waterplanning.georgia.gov/document/publication/water-and-wastewater-forecasting-technical-memorandum-lower-flint-ochlockonee/download*

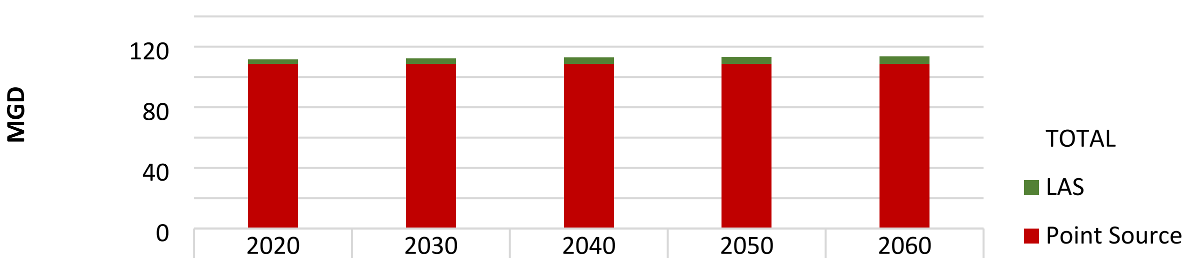
[4] More information regarding Industrial Forecasts can be found on the Regional Water Planning website at: https://waterplanning.georgia.gov/forecasting/industrial-water-use

### 4.2.2 Industrial Wastewater Forecasts

Industrial wastewater forecasts were calculated based on the facility wastewater permits reported discharge from 2015–2019. For some industrial facilities, water discharges may include stormwater runoff as well as the discharge of wastewater; thus, permitted discharges may be a greater volume than permitted withdrawals, and reported discharges may vary with weather conditions from year to year. Information provided by industrial stakeholder groups was used to project future increases within a region or industry.

The forecasts project that industrial wastewater treatment will increase from 111.43 mgd in 2020 to 113.34 mgd in 2060 in the Lower Flint-Ochlockonee Water Planning Region. Of these amounts, wastewater treatment is expected to change over time from 2% treated by land application systems and 98% treated by systems with point source discharges in 2020 to 4% treated by land application systems and 96% treated by systems with point source discharges in 2060. Figure 4-4 illustrates the total industrial wastewater demand separated by discharge method.

***Figure 4-4: Total Industrial Wastewater Demand Forecast (AAD-MGD)***




| | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|
| TOTAL | 111.43 | 112.03 | 112.71 | 113.11 | 113.34 |
| LAS | 2.72 | 3.31 | 4.00 | 4.39 | 4.62 |
| Point Source | 108.72 | 108.72 | 108.72 | 108.72 | 108.72 |

*Source: Black and Veatch., 2017, Lower Flint-Ochlockonee Water Planning Region: Water and Wastewater Forecasting Technical Memorandum, https://waterplanning.georgia.gov/document/publication/water-and-wastewater-forecasting-technical-memorandum-lower-flint-ochlockonee/download*

## 4.3 Agricultural Water Demand Forecasts

Agricultural water demands were prepared by the Georgia Water Planning & Policy Center at Albany State University (GWPPC), with support from the University of Georgia's College of Agricultural and Environmental Sciences. GWPPC was contracted by GAEPD to prepare estimates of water use by the agricultural sector in Georgia. The projections cover irrigation for row and orchard crops as well as most vegetable and specialty crops and account for more than 95% of Georgia's irrigated land. Additionally, estimates of current use were made for animal agriculture, horticultural nurseries, and greenhouses.

Agricultural water demands were estimated in two different ways. First, current water use levels were estimated based on data collected from the Agricultural Water Metering Program administered by GAEPD. Second, estimates of current and forecasted use were made for the



period 2020 to 2060 based on data on updated irrigated acreage, modeled crop water needs (informed by metering data), and economic models of future crop coverage.

With the agricultural water meter data, estimates of current agricultural demand were calculated from data collected from metered observations from the 2010 to 2019 growing seasons. Annual and monthly estimates were calculated and provided to members during the course of the plan review and revision process.

For the second method, agricultural irrigation water demand was projected for groundwater and surface water sources for the decades between 2020 and 2060. Each decade's projection included five climatic scenarios ranging from very wet to very dry to simulate a range of weather conditions. Irrigated acreage for each crop was projected from the baseline of year 2020 acres using economic models. Water withdrawal quantities were computed as the product of the projected irrigated area for a crop (acres), the predicted monthly irrigation application depth (inches), and the proportion of irrigation water derived from a source (fraction). For planning purposes, it was decided to use dry year values (75th percentile) for each water planning region since they represent a more conservative scenario than the normal (50th percentile) value.

In summary, the agricultural water use forecasts project that dry year agricultural water use in the Lower Flint-Ochlockonee Water Planning Region will increase by 32% from 2020 to 2060. The forecasts for agricultural water use for this water planning region by source type, as calculated using the second method described above, can be found in Table 4-1 below.

**Table 4-1: Lower Flint-Ochlockonee Agricultural Water Demand Forecast [MGD]**

| Source | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|
| Groundwater | 530.98 | 563.14 | 604.65 | 608.76 | 706.53 |
| Surface Water | 97.18 | 101.93 | 107.39 | 155.64 | 120.18 |
| **Total** | **628.16** | **665.07** | **712.04** | **764.4** | **826.71** |

## 4.4 Thermoelectric Power Production Water Demand Forecasts

Water demands forecasts in this section estimate water requirements for thermoelectric power generation. Water requirements for hydropower generation are not included in the energy sector water demand forecast as these facilities are designed to pass water through and do not entail consumptive use of water. Miscellaneous potable water demands associated with power generation facilities are included in the municipal water demand forecasts discussed in previous parts of Section 4.

The forecasts for this sector address both water withdrawal requirements and water consumption. Information related to water withdrawals is an important consideration in planning for the water needed for energy production. Water consumption is important to consider in assessment of net impacts on instream flows. Some power facilities that withdraw large volumes of water also return large portions of those withdrawals to the sources from which they were withdrawn.

The following factors were updated for the revised forecasts for water demand for thermoelectric power: statewide energy demand; existing facilities; facilities under construction; planned and permitted new facilities; facilities recently or to be retired; and changes in generating configuration. The water withdrawal and consumptive use factors that were estimated for each generating configuration were maintained from the previous planning cycle. A full discussion of the statewide water demands forecast methodology for this sector is provided in Update of Georgia Energy Sector Water Demand Forecast (2020).[5]

In the Lower Flint-Ochlockonee Water Planning Region, there are two thermoelectric power facilities identified in the forecasts. The two facilities are Gum Power Plant in Mitchell County and Crisp County Power Commission Plant in Worth County, and the forecasts address the water needs for these facilities. The withdrawal for these facilities in 2020 was 0.12 mgd. In 2060, water withdrawals are projected to be 0.19 mgd. Consumptive use by thermoelectric power facilities in the Lower Flint-Ochlockonee Water Planning Region is estimated at 0.10 mgd in 2020 and 0.16 mgd in 2060.

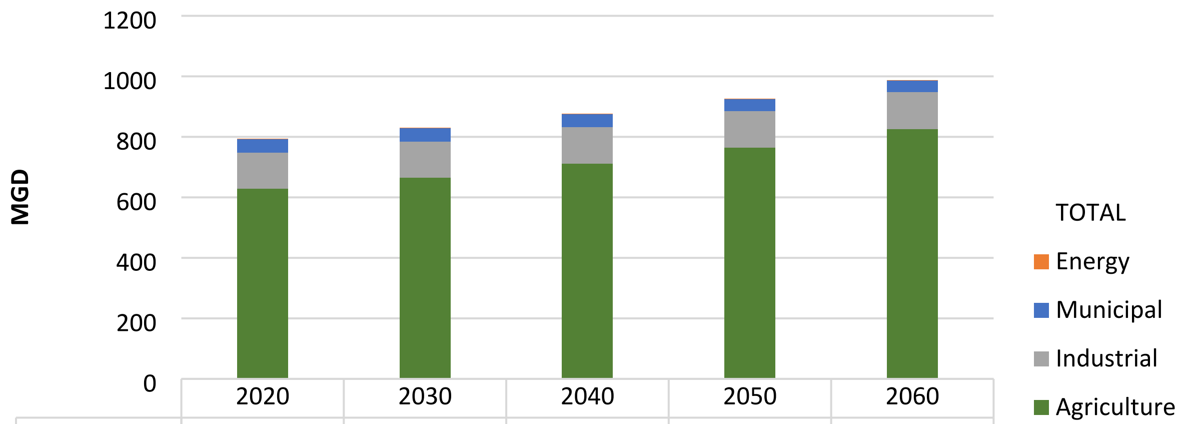
## 4.5 Total Water Demand Forecasts

In the Lower Flint-Ochlockonee Water Planning Region, estimated total 2020 water use is 793.24 mgd, and total 2060 water use is projected to increase to 986.78 mgd in 2060. As shown in Figure 4-5, agricultural water use accounts for the largest proportion of 2020 water use by a significant margin, and it is expected to continue to be the largest future water use in this water planning region. As a result, much of the Council's planning effort has been focused on the agricultural sector. The Council notes the importance of agriculture to the region's economy in its goals (Section 1.3). Access to water has made the region attractive for the development of the agricultural economy. Recent periods of drought have led to the need to better understand water use impacts and to plan for meeting the needs of water users and the natural system.

As shown in Figure 4-6, the forecasts project that wastewater flows in the Lower Flint-Ochlockonee Water Planning Region will decrease from 155.31 mgd in 2020 to 151.62 mgd in 2060.

[5] More information regarding Energy Forecasts can be found on the Regional Water Planning website at: https://waterplanning.georgia.gov/forecasting/energy-water-use

***Figure 4-5: Total Water Demand Forecast (AAD-MGD)***



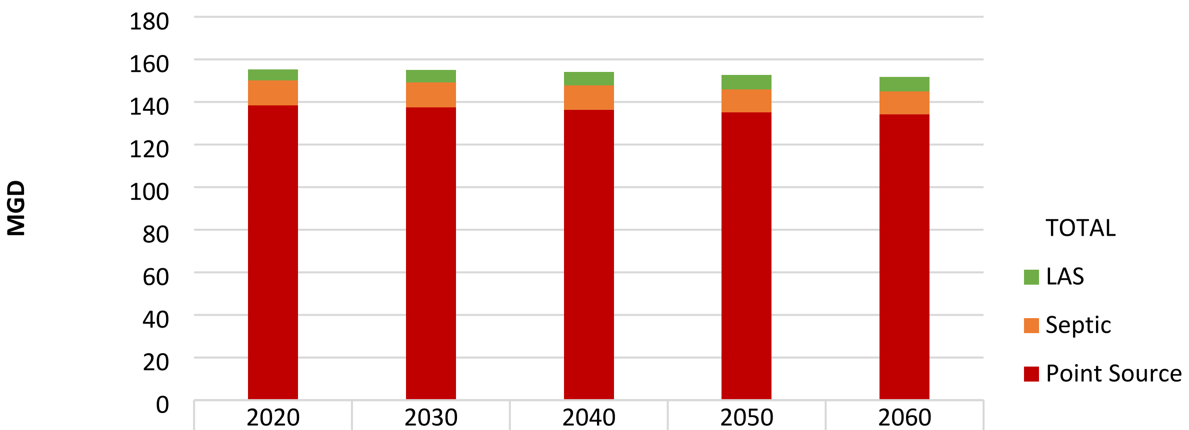

| | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|
| TOTAL | 793.24 | 829.46 | 875.32 | 925.93 | 986.78 |
| Energy | 0.10 | 0.10 | 0.14 | 0.15 | 0.16 |
| Municipal | 45.96 | 44.61 | 42.71 | 40.51 | 38.79 |
| Industrial | 119.02 | 119.68 | 120.43 | 120.87 | 121.12 |
| Agriculture | 628.16 | 665.07 | 712.04 | 764.40 | 826.71 |

*Sources:*

*a) Municipal Forecasting Methods Report (2022)*
*https://waterplanning.georgia.gov/forecasting/municipal-water-use*
*b) Industrial Water Demand Forecast (2020)*
*https://waterplanning.georgia.gov/forecasting/industrial-water-use*
*c) Energy Sector Water Demand Forecast (2020)*
*https://waterplanning.georgia.gov/forecasting/energy-water-use*

*Notes: The total shown above includes estimated energy withdrawals as well as dry year agricultural demands (75th percentile demands). Values represent forecasted annual average demand (AAD) in million gallons per day (MGD)*

***Figure 4-6: Total Wastewater Demand Forecast (AAD-MGD)***




| | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|
| TOTAL | 155.31 | 154.95 | 153.97 | 152.60 | 151.62 |
| LAS | 5.14 | 5.67 | 6.27 | 6.57 | 6.73 |
| Septic | 11.81 | 11.67 | 11.35 | 10.96 | 10.68 |
| Point Source | 138.37 | 137.61 | 136.36 | 135.07 | 134.21 |

*Sources:*

a) *Municipal Forecasting Methods Report (2022)*
*https://waterplanning.georgia.gov/forecasting/municipal-water-use*

b) *Industrial Water Demand Forecast (2020)*
*https://waterplanning.georgia.gov/forecasting/industrial-water-use*

c) *Energy Sector Water Demand Forecast (2020)*
*https://waterplanning.georgia.gov/forecasting/energy-water-use*

*Notes:* *The total shown above includes estimated energy discharges. Values represent forecasted annual average demand (AAD) in million gallons per day (MGD)*

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# SECTION 5

## Comparison of Available Resource Capacity and Future Needs

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*SUMMARY: This section discusses the results of the future resource assessments, which modeled how water resource capacities compare with future demands for water and wastewater treatment in the Lower Flint-Ochlockonee Water Planning Region. It also discusses how the Lower Flint-Ochlockonee Water Planning Council interpreted and considered the resource assessment models results.*

# Section 5. Comparison of Water Resource Capacities and Future Needs

This section discusses the results of the future surface water and groundwater resource assessments, which modeled how the forecasts of future water and wastewater needs in the Lower Flint-Ochlockonee Water Planning Region (Section 4) compare with the capacities of the region's water resources. The results of the surface water availability, groundwater availability, and surface water quality resource assessments under future conditions are summarized in this section. The current conditions are described in Section 3.2. The model results provided the Lower Flint-Ochlockonee Water Planning Council with an evaluation of potential challenges in regional water or wastewater needs and resource capacities. They supported the Council in selecting appropriate management practices (Section 6.2) that will help the region to meet its future water needs, protect water resources, and meet the Council's vision and goals for this water planning region.

Where potential challenges were identified by the resource assessment models, the Council considered the potential adverse impacts – environmental, economic, and other impacts – of the potential challenges. Management practice selection to address potential challenges was guided by the Council's interpretation of the model results in the context of regional conditions and the Council's vision and goals for the region (see Section 1.3).

## 5.1 Future Surface Water Availability Assessment

The surface water availability resource assessment models the response of surface water bodies to meeting current and forecasted consumptive water demands. The current condition results were described in Section 3.2.1, along with the approach and metrics evaluated by the BEAM model. This section covers the future conditions assessed by the BEAM model using two scenarios for evaluation. In this planning cycle, the following future scenarios were evaluated:

- Forecast (ag constant): 2060 water and wastewater needs with agricultural water demands held constant at baseline levels (average use for 2010-2018)
- Forecast (ag growth): 2060 water and wastewater needs with agricultural water deamnds set to 2060 forecast levels



The first scenario holds agricultural water demands at baseline levels as a result of uncertainty over future agricultural water demands in the region. Currently, agricutural water use from surface water sources and from the Floridan Aquifer in Subarea 4 of the Dougherty Plain is subject to a permit moratorium.[1] The moratorium currently limits increases in agricultural water demands in the region. While the moratorium may not continue for the full forecast period and does not affect all sources of water use in the region, it could dampen the projected increases forecasted for agricutlural water demands. These two scenarios provide the Council with results that bookend the range of potential change in forecasted agricultural use in the region from no increase to the full forecasted increase. The Future Ag Growth scenario is based on the forecasts which do not account for the current moratorium.

The assessment model evaluates surface water availability over the same model period used with the current conditions scenarios: 1939-2018. Therefore, all of the scenarios were subjected the same climatic conditions. The results for the current and future scenarios for the water facilities include specific results for the scenarios under the climatic conditions of the 2007-2008 and 2011-2012 droughts. The future surface water availabilty results are presented for the same river basins (Apalachicola-Chattahoochee-Flint and Ochlockonee) and the same metrics (see Table 3.1) assessed for current conditions (discussed in Section 3.2.1).[2]

The evaluation of water availability for water and wastewater facilities in the ACF Basin part of the region indicated challenges at one water facility (industrial) and nine wastewater facilities (all municipal). In the Ochlockonee River Basin part of the region, challenges were indcated at one water facility (industrial) and four wastewater facilitites (all municipal). Table 3-2 in Section 3.2.1 summarizes these results. All of these challenges were observed in the assessment results in the current and future scenarios.

Table 5-1 describes the future conditions assessment results for the two facilities where water supply challenges in the region were observed. The results for the future scenarios were similar to those for the current scenarios, especially in terms of percentage of days during the modeled period where water supply challeges were identified.

[1] Figure 3-7 is a map of the moratorium area.
[2] As described in Section 3, small portions of the Lower Flint-Ochlockonee Water Planning Region occur in the Suwannee and Chattahoochee River Basins. Chattahoochee resource assessment results are summarized in this Plan. Results for the Suwannee are not included in this Plan but can be found in the Regional Water Plan for the Suwannee-Satilla Water Planning Council. The Lower Flint-Ochlockonee Water Planning Council will continue to communicate with the Suwannee Satilla Water Planning Council in evaluating assessment results to support coordination in their respective Regional Water Plans.

***Table 5-1: 2060 Future Scenario Water Supply Challenges Indicated in Assessment Results: Lower Flint-Ochlockonee Region***

| Facility | Metric | | Scenario | |
|---|---|---|---|---|
| | | | Forecast (ag constant) | Forecast (ag growth) |
| Georgia Pacific Cedar Springs, LLC *Chattahoochee* | % Time | | 0.8% | 0.8% |
| | Shortage *million gallons* | Model Period | 7,266 | 6,673 |
| | | *2007-08 Drought* | 1,874 | 1,538 |
| | | *2011-12 Drought* | 614 | 490 |
| BASF Corporation *Ochlockonee* | % Time | | 0.1% | 0.4% |
| | Shortage *million gallons* | Model Period | 9 | 60 |
| | | *2007-08 Drought* | 1 | 3 |
| | | *2011-12 Drought* | 0 | 10 |

**% Time is calculated as a proportion of the full model period (1939-2018). Shortage is total volume for full model period or for the drought period indicated. Each drought period includes the full two years listed.*

Tables 5-2 and 5-3 summarize the results for the 9 facilities in the ACF Basin and the 4 facilities in the Ochlockonee Basin where flows fell below the 7Q10 flow at some time(s) during the 80-year model period. Most of these low flow periods would not be considered to result in substantial wastewater assimilation challenges, as the percent of time that the instream flow fell below the 7Q10 value is less than 10%. At a few municipal wastewater facilities, the percent of time exceeds 10% and indicates a wastewater assimilation challenge for the Doerun WPCP and Cairo WPCP in the Ochlockonee Basin. The future scenario results indciated similar results to that observed for 2020 conditions (Tables 3-4 and 3-5). The level of similarity is especially close for the Baseline 2020 and Future Ag Constant scenarios. The similarity of results for these two scenarios is not surprising, given that agricultural water demand is the same in both scenarios (average demands for 2010-2018). While the Future Ag Constant scenario includes non-agricultural demands, these uses are small relative to agricultural demands in this region.

In some cases, the Future Ag Constant scenario shows improved results over the Baseline scenario. These results are location specific but can result when upstream consumptive use decreases. Because some municipal systems in the region source water from groundwater and return treated wastewater to surface water, increases in water use by these systems can result in net decreases in total consumptive use of surface water.

***Table 5-2: 2060 Wastewater Assimilation Challenges Indicated in Assessment Results: ACF Basin in Lower Flint-Ochlockonee Region***

| **Facility** | **% Time Flow Below 7Q10*** | | **Required Flow (7Q10)** *cfs* |
|---|---|---|---|
| | **Forecast (ag constant) Scenario** | **Forecast (ag growth) Scenario** | |
| Smithville WPCP | 2.1% | 4.0% | 2.87 |
| Leesburg Pond WPCP | 0.3% | 0.8% | 54.99 |
| Kinchafoo-nee Creek WPCP | 0.2% | 0.6% | 62.6 |
| Dawson WPCP | 1.1% | 1.8% | 0.02 |
| Leary WPCP | 0.8% | 1.1% | 0.002 |
| Arlington WPCP | 4.0% | 7.8% | 0.02 |
| Blakely WPCP | 5.2% | 1.9% | 0.09 |
| Colquitt | 6.9% | 9.2 | 9.06 |
| Donalsonville WPCP | 4.2% | 4.9% | 1.19 |
| **% Time is calculated as a proportion of the full model period (1939-2018). WPCP: Water Pollution Control Plant* | | | |

***Table 5-3: 2060 Wastewater Assimilation Challenges Indicated in Assessment Results: Ochlockonee River Basin in Lower Flint-Ochlockonee Region***

| **Facility** | **% Time Flow Below 7Q10*** | | **Required Flow (7Q10)** *cfs* |
|---|---|---|---|
| | **Future (ag constant) Scenario** | **Future (ag growth) Scenario** | |
| Doerun WPCP | 18.6% | 24.3% | 0.01 |
| Moultrie WPCP | 6.9% | 4% | 0.09 |
| City of Thomasville Oquina Creek WPCP | 1% | 1% | 0.09 |
| Cairo WPCP | 3.9% | 12.7% | 0.05 |
| **% Time is calculated as a proportion of the full model period (1939-2018). WPCP: Water Pollution Control Plant* | | | |

Table 5-4 summarizes the results of the assessment for streamflow at three locations in the Lower Flint River Basin to better understand the occurrence and severity of low flows. The results indicate that low flow periods occur more frequently under the Ag Growth scenario relative to the Ag Constant scenario. However, the Ag Growth scenario resulted in low flows

less frequently than the Baseline Drought scenario discussed in Section 3.2.1. Streamflow results for the baseline scenarios are presented in Table 3-6. In general, the Baseline Drought scenario had the most severe results for all the metrics evaluated by the model. The Baseline Drought scenario applied water demand conditions from the 2011 drought year throughout the model period. Agricultural water demands in the baseline scenario are approximately 90$^{th}$ percentile demands and account for most of the water use in the scenario. In the Future Ag Growth scenario, agricultural water demands are assumed to be 75$^{th}$ percentile demands, which reflects use in a dry year but not a severe drought, such as that observed in 2011.

***Table 5-4: 2060 Surface Water Availability Streamflow Results for ACF Basin***

| Location | Streamflow Metric *cfs* | % Time Below Streamflow Metric* | |
|---|---|---|---|
| | | Scenario | |
| | | Forecast (ag constant) | Forecast (ag growth) |
| Milford *Ichawaynochaway Creek* | 50 | 1.3% | 2.3% |
| Iron City *Spring Creek* | 8 | 3.7% | 6.2% |
| Bainbridge *Flint River* | 1,400 | 0.4% | 1.4% |

**% Time is for calculated as a proportion of the full model period (1939-2018).*

## 5.2 Future Groundwater Availability Assessment

This section compares ***2060 forecasted demand,*** presented in Section 4***,*** with the estimated sustainable yield range for the assessed aquifers. See Section 3.2.2 for a comparison of the estimated sustainable yield range and ***current*** use and a description of the assessment approach. This section concludes with a discussion of a special assessment of expanded deep aquifer use in the region to inform implementation of Management Practice SF-2. As discussed in Section 3.2.2., an aquifer is not necessarily exhausted when use exceeds the estimated sustainable yield range. Instead, exceedances indicate a possible need for additional information or instances where management practices may help to address potential impacts. Additionally, while the resource assessment results provide a broad overview of the aquifer, interpretation of the results must also consider that aquifer conditions and impacts are highly site specific. The Council considered these results in selecting the Management Practices and Recommendations to the State presented in this Plan (see Sections 6.2 and 6.3).

***Future Groundwater Availability Assessment Results***

Results from the 2060 forecasts of aquifer demand for the three assessed aquifers are summarized in Tables 5-5 to 5-7. The results from the assessment for the Claiborne Aquifer include additional county-level forecasts (Table 5-8). More detail on the methods and results of



the groundwater availability resource assessment can be found in the Synopsis Report: Groundwater Availability Assessment (GAEPD, 2010) and Synopsis Report – Groundwater Availability Assessment Updates (GAEPD, 2017), both of which are available on the state water planning website.[3] The estimates in these tables are provided at two scales: (1) demand that occurs in the portion of the assessed aquifer that is within this water planning region, and (2) aquifer-wide demand that occurs in the full assessed area of the aquifer.

*Floridan Aquifer Results:* As described in Section 3.2.2, the Floridan Aquifer was assessed in two areas that occur in the Lower Flint Ochlockonee Region: South-Central Georgia and the Dougherty Plain (see Figures 3-5 and 3-6). The Dougherty Plain assessment incorporates an additional model to provide estimates of the impacts on baseflow in this region.

For the South-Central Georgia portion of the aquifer, demand from this aquifer that occurs in the Lower Flint Ochlockonee Region is forecasted to increase by 136 mgd from 421 mgd in 2020 to 557 mgd in 2060 (Table 5-5). Across the full area of the South-Central Georgia portion of the Floridan Aquifer, demand is forecasted to increase from 488 mgd in 2020 to 658 mgd in 2060. With this increase across this portion of the aquifer, 2060 demand will exceed the low end of the estimated sustainable yield range of 622 to 836 mgd.

The low-end of the sustainable yield range assumes increasing demand in existing permitted well locations. The high-end sustainable yield estimate allows for a more flexible and non-uniform distribution of water use in the region that holds use constant in areas where adverse impacts are observed and increases use from hypothetical new well locations in other areas where adverse impacts were not observed. In the high-end scenario, use is spread out over the aquifer area, which yields potential higher levels of use from the aquifer. These results indicate that the siting of future use of this aquifer will be important to maintaining sustainable yield.

***Table 5-5: Floridan Aquifer: South Central Georgia -- Sustainable Yield and Forecasted 2060 Water Demand***

| **Estimated Sustainable Yield Range** | **Forecasted 2060 Demand** | |
|---|---|---|
| | **Lower Flint Ochlockonee Region** | **Aquifer-Wide** |
| 622 to 836 mgd | 557 mgd | 658 mgd |

As noted in Section 3.2.2, the Dougherty Plain of the Floridan Aquifer is of particular importance because of its high level of agricultural use in this region. Sustainable yield estimates for this aquifer were completed on a reach-by-reach basis. The forecasted 2060 demand (518 mgd) indicates that, in the planning region, demand will exceed the estimated sustainable yield range (237-328 mgd) in the Dougherty Plain (Table 5-6). In the Lower Flint-Ochlockonee region, 2060 forecasted demand is 126 mgd higher than the estimated 2020 current use. The estimated sustainable yield range for this aquifer was determined based on the potential impact of groundwater withdrawals on groundwater contributions to stream baseflows rather than

[3] https://waterplanning.georgia.gov/resource-assessments/ground-water-availability

drawdown in the aquifer itself. Due to the lack of a significant confining unit above the Floridan in this region, the most significant concern is the reduction in baseflow to rivers and streams. The aquifer and surface water system are highly interconnected in this part of the aquifer (see discussion in Section 3.2.2).

At a broad scale, these results point to concern over use of this aquifer, but the Council notes the importance of existing policy in managing use of this aquifer. Since 2012, there has been a moratorium on new and expanded withdrawals from the Floridan Aquifer in the Dougherty Plain (see Figure 3-7 in Section 3.2.2.). Prior to the moratorium, and if the moratorium is lifted, withdrawals from the aquifer are managed per the 2006 Flint River Basin Plan, which sets geographic zones (restricted use, capacity use, and conservation use) with increasing levels of restrictions on aquifer withdrawals based on potential impacts on streamflow (see Figure 3-8 in Section 3.2.2.). Therefore, these results were considered in the context of existing policy and together with those observed in the surface water availability resource assessment as the Council developed its Management Practices and Recommendations to the State.[4] Specifically, no new agricultural withdrawals from the Floridan aquifer are permitted at this time in areas that are modeled to have the greatest impact on streamflow.

The Council also notes that the sustainable yield metric exceeded as part of the groundwater resource assessment, potential impact to baseflow, is not necessarily indicative of overall aquifer health and resiliency. Because of the interconnected nature of the Floridan aquifer and surface waters in this area, drawdowns in the aquifer in areas that intersect a stream will generally result in streamflows replenishing the aquifer. When aquifer drawdown occurs in this part of the Floridan Aquifer, the aquifer will draw from its storage and once the aquifer level drops below the bottom level of the nearest surface water body (under current use or increased withdrawals), the aquifer will then be replenished by that surface water body. To aid streamflow, the Council supports the development of groundwater source alternatives to replace surface water withdrawals, as stated in Management Practice SF-2. Because of the interconnection between the Floridan Aquifer and the surface water system in this area, efforts to support streamflows may also benefit the Floridan Aquifer in the Dougherty Plain.

***Table 5-6: Floridan Aquifer: Dougherty Plain – Sustainable Yield and Forecasted 2060 Water Demand***

| Estimated Sustainable Yield Range | Forecasted 2060 Demand | |
|---|---|---|
| | Lower Flint Ochlockonee Region | Aquifer-Wide |
| 237 to 328 | 518 | 576 |

*Claiborne Aquifer:* For the Claiborne Aquifer, sustainable yield range estimates and forecasted 2060 demands are presented in Table 5-7. Figure 3-12 shows the area of the aquifer assessed in the yellow shaded area. Forecasted 2060 demand for the Claiborne Aquifer of 52 mgd remain

[4] As noted in Section 3.2.2, for analysis of sustainable yield for the Upper Floridan Aquifer in the Dougherty Plain, changes in baseflow to streams were evaluated on a reach-by-reach basis, which is a relatively conservative approach to the analysis.

below the low-end of the estimated sustainable yield range of 140-635 mgd. Forecasted 2060 demands are 11 mgd higher than 2020 use.

***Table 5-7: Claiborne Aquifer—Sustainable Yield and Forecasted 2060 Water Demand***

| Estimated Sustainable Yield Range | Forecasted 2060 Demand | |
|---|---|---|
| | Lower Flint Ochlockonee Region | Aquifer-Wide |
| 141 to 803 mgd | 52 mgd | 94 mgd |

The estimated sustainable yield results indicate that effects of use on this aquifer are dependent upon the location of withdrawals. The results indicate that some areas may have additional amounts of water that can be used sustainably, while other parts may show potential adverse impacts of use. As a part of the Claiborne Aquifer assessment in this planning cycle, county-level estimates of sustainable yield were developed. Table 5-8 lists estimates of demand and the high end of the sustainable yield range for the Claiborne Aquifer for counties in the Lower Flint-Ochlockonee region. For comparison, Table 3-10 provides the 2020 county-level demand estimates for this aquifer. In Table 5-9, the difference between the high-end sustainable yield and the forecasted 2060 demand can provide a general indicator of where there may be more or less water available from this aquifer in this region.

***Table 5-8: Claiborne Aquifer – County-Level 2060 Forecasted Water Demand and High-End of Sustainable Yield: Lower Flint Ochlockonee Region***

| County | Forecasted 2060 Demand *mgd* | High-End Sustainable Yield *mgd* |
|---|---|---|
| Baker | 1.1 | 11.3 |
| Calhoun | 3.0 | 44.5 |
| Colquitt | 0 | 0.4 |
| Decatur | 1.7 | 4.6 |
| Dougherty | 6.9 | 22.7 |
| Early | 4.2 | 67.1 |
| Grady | 0 | 1.2 |
| Lee | 18.5 | 49.7 |
| Miller | 0.2 | 21.2 |
| Mitchell | 0.7 | 3.8 |
| Seminole | 2.3 | 3.7 |
| Terrell | 15.0 | 80.8 |
| Worth | 0.8 | 7.2 |

***Special Assessment of Potential Groundwater Conversion Sites***

Management Practice SF-2 supports evaluation and implementation of alternative groundwater sources to replace surface water withdrawals in the region during drought periods to reduce adverse impacts to surface water flows. As a part of this recommendation, the Council emphasizes the need for more information on the condition of these aquifers to support better understanding of their sustainable yields.

To address this Management Practice, in 2019 GAEPD completed an assessment of additional groundwater use from the Claiborne and Cretaceous Aquifers. The new assessment estimates potential impacts of new withdrawals from these aquifers. For this analysis, GAEPD evaluated the impacts of replacing agricultural surface water withdrawals in the Ichawaynochaway and Spring Creek watersheds with groundwater withdrawals. The analysis estimated that approximately 19,000 irrigated acres could be supplied from the Claiborne Aquifer and 24,000 irrigated acres could be supplied from the Cretaceous Aquifer (see Table 5-9). These acreages were estimated by analyzing where permitted surface water agricultural users were located and how many acres were irrigated from surface water sources in those two watersheds. Acreage and water use estimates were based on data from 2008-2012.

Agricultural water needs and withdrawals vary throughout the year based on the growing season. This analysis estimated that potential additional withdrawals for the acreages listed in Table 5-9 would range from 17 to 55 mgd for the Claiborne Aquifer and 22 to 70 mgd for the Cretaceous Aquifer (see Table 5-10).

***Table 5-9: Estimated Permitted Irrigated Acreage for Analysis of Potential Surface Water Conversion Sites in Ichawaynochaway and Spring Creek Basins***

| Aquifer | Baseline Irrigated Acreage* | | Potential Additional Acreage from Converted Surface Water Withdrawals* |
|---|---|---|---|
| | Agricultural Groundwater Withdrawal Permits | Agricultural Groundwater to Pond Withdrawal Permits† | Agricultural Surface Water Withdrawal Permits |
| Claiborne | 21,306 | 9,923 | 18,997 |
| Cretaceous | 1,107 | 367 | 23,904 |

**Acreages are estimated based on permitted acreage, which are usually greater than actual irrigated acreage. Estimates based on permit data from 2008-2012.*

*†Area is adjusted to 70% of irrigated acreage to account for surface water inputs to ponds.*



***Table 5-10: Water Use by Potential Surface Water Conversion Sites in Ichawaynochaway and Spring Creek Basins***

| Aquifer | Baseline Monthly Withdrawals (Average) *mgd* | | Potential Additional Monthly Agricultural Withdrawals (Average) *mgd* | | |
|---|---|---|---|---|---|
| | Agriculture | Municipal and Industrial | Average | Maximum | Minimum |
| Claiborne | 28 | 2.8 | 17 | 55 | 0 |
| Cretaceous | 1.3 | 2.8 | 22 | 70 | 0 |
| *Withdrawal estimates are based on meter data from 2009-2012. Where meter data was not available, estimates for 2010 withdrawals were used.* | | | | | |

Results of this analysis indicates a significant amount of drawdown could occur during peak irrigation periods in the Claiborne Aquifer when the estimated new potential demands in Table 5-10 are applied. However, the analysis shows that the Claiborne Aquifer levels fully recover during the non-growing season.

The model results for the Cretaceous Aquifer indicate substantial drawdown under the new potential demands estimated in Table 5-10. The results indicate that the aquifer may not fully recover during the non-growing season and simulated drawdown is likely to persist over multiple years. While the simulated response of the Cretaceous Aquifer indicates that the simulated drawdown may persist over multiple years, this result does not indicate that the capacity of the aquifer would be met or exceeded. Current water level data in the aquifer are limited, and the existing model was calibrated based on one location with transient data in the Cretaceous Aquifer. Planning for increased groundwater withdrawals from the Cretaceous aquifer in southwestern Georgia should include a robust monitoring program to establish baseline water levels and monitor for long-term changes in groundwater elevation.

As discussed in Section 6, Management Practice SF-2 is currently being implemented in the Lower Flint River Basin through a new project funded in 2022 by a grant from the Governor's Office of Planning and Budget via allocations established from the American Recovery Plan Act for infrastructure development. This new project, a part of the GA-FIT program, will install over 200 new deep groundwater wells to provide an alternative supply source at agricultural surface water withdrawal sites in the Lower Flint River Basin during drought. The analysis presented above provides an initial basis of information to support implementation of this practice. However, some important differences between the analysis and the GA-FIT implementation plans limit direct application of the results. The new project is targeting a smaller extent of acreage than that estimated in Table 5-9, and the project area for the GA-FIT project includes a larger area than the two tributary watersheds in this analysis. Furthermore, the new GA-FIT project plans to limit use of the new wells during drought years, while this analysis evaluated the new wells as a complete replacement for existing surface water withdrawals. Therefore, the model analysis presented here provides a conservative and general assessment of potential impacts, but additional analysis that more closely matches the GA-FIT project plans will be more informative. Additional data collected through the monitoring component of the GA-FIT project will expand the information base for assessment and management of these aquifers.

## 5.3 Surface Water Quality Comparisons

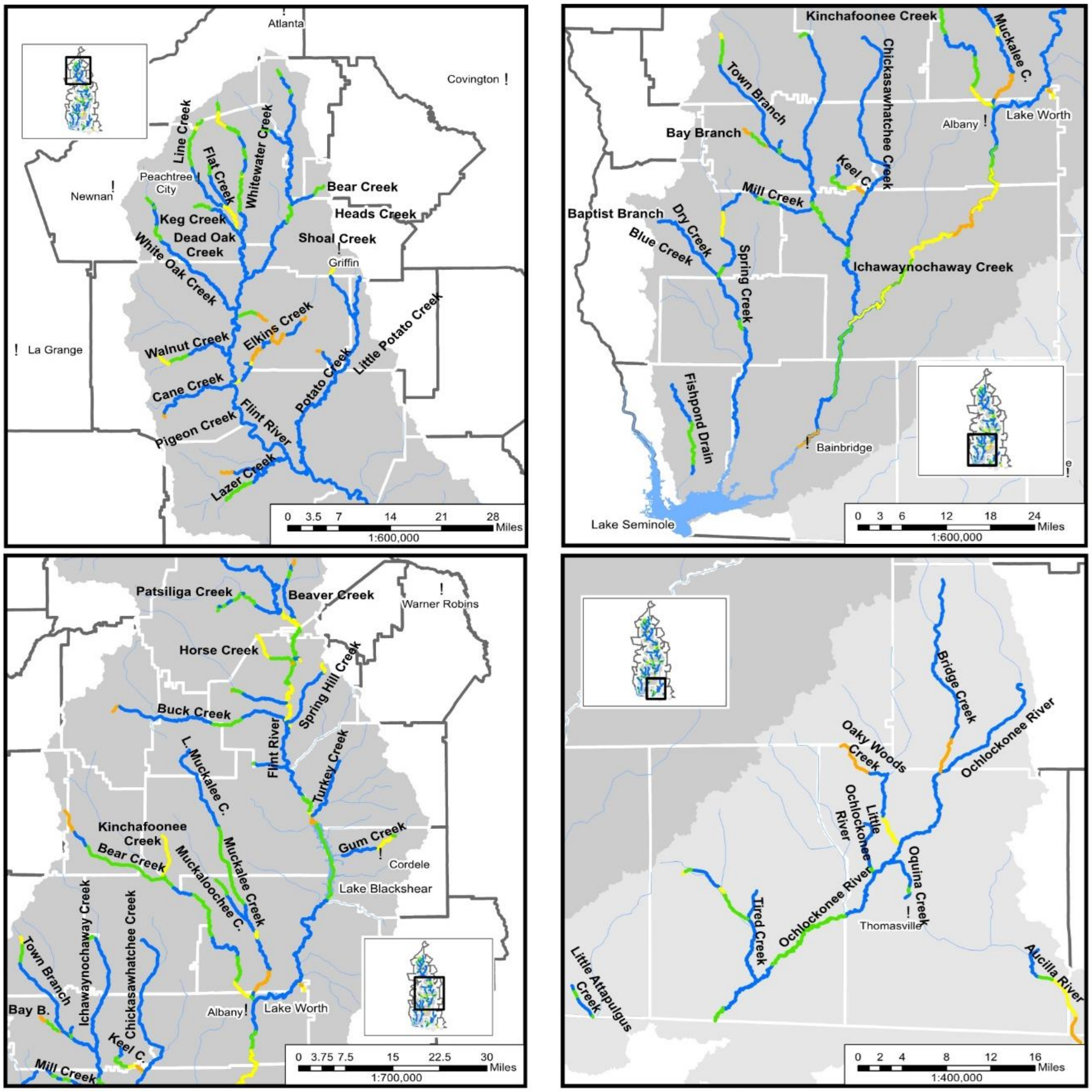
In Section 3, Figure 3-11 shows the water quality model results related to the availability of assimilative capacity under ***current*** conditions for flow and oxygen consuming wastes that affect levels of dissolved oxygen (DO). This section shows water quality model results regarding the availability of assimilative capacity for oxygen-consuming wastes under ***future*** (2060) conditions. Assimilative capacity evaluates how DO levels compare to the water quality standard of 5.0 mg/L (or natural conditions). For the future conditions modeling, areas that had shown limited or no assimilative capacity for DO in the current conditions modeling needed to be addressed. To do this, GAEPD incorporated some assumptions regarding future (2060) permitted flows and modifications to permit effluent limits in the future conditions modeling. Since GAEPD cannot issue permits that will violate water quality standards, GAEPD will continue to evaluate and modify future permit requests and adjust permit limits to avoid potential DO violations. The DO results under the future conditions reflect a utilized conservative approach used in the model results, including analysis under minimum instream flows and warm water temperatures.

Figure 5-1 shows the modeled assimilative capacity at assumed ***future*** (2060) permitted flow and effluent limits. Water quality model results indicate that while permit limits can address limitations on assimilative capacity, some streams are projected to experience increasing availability of assimilative capacity in the Flint River Basin as expected improvements in wastewater treatment are projected to improve available assimilative capacity under future conditions. Modeled DO levels for future conditions in 2060, as provided in Figure 3-6, are generally improved due to the modeling assumptions of more stringent permit conditions where discharge flows increase. The number of stream miles in the Flint River Basin where assimilative capacity is projected by the model to be exceeded or unavailable will decrease from 56 miles under current conditions to 0 miles by 2060, based on modeling assumptions. More information regarding the type of assumptions made under future conditions modeling is provided in the *Synopsis Report, Surface Water Quality (Assimilative Capacity) Resource Assessment* (July 2022), which is available on the state water planning website.

Watershed and lake models were developed at future conditions (2050). The model results indicated that in the Flint River Basin, future increases in total nitrogen loading will come more from point sources than nonpoint sources, while nonpoint sources currently contribute more total nitrogen than point sources. The lake model results indicated that in Lakes Blackshear and Chehaw, total phosphorus loading in the future will be primarily from point sources, as it is under current conditions. In Lake Seminole, the model results indicated that future increases in nutrient loadings will be primarily point source related. As noted in Section 3.3, these lakes do not have established nutrient standards, and therefore, the lake model results cannot be compared against standards for these lakes. However, the model results are useful as an indication of where management practices should be directed to control nutrient loading.

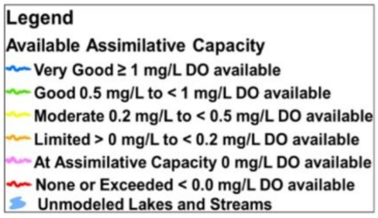
Water quality is also assessed by compliance with state water quality standards. Impaired waters where water quality standards are not met are discussed in Section 3.3.1.

*Figure 5-1: Assimilative Capacity Results from Dissolved Oxygen Assessment: Flint and Ochlockonee River Basins (Future - 2060)*




| | Flint Basin-Available Assimilative Capacity (Total Mileage) | | | | | |
|---|---|---|---|---|---|---|
| Model Run | Very Good | Good | Moderate | Limited | At Assimilative Capacity | Exceeded |
| 2060 | 712 | 229 | 102 | 43 | 0 | 0 |

| | Ochlockonee Basin-Available Assimilative Capacity (Total Mileage) | | | | | |
|---|---|---|---|---|---|---|
| Model Run | Very Good | Good | Moderate | Limited | At Assimilative Capacity | Exceeded |
| 2060 | 107 | 26 | 10 | 11 | 0 | 0 |




*Source: GAEPD, Synopsis Report – Surface Water Quality (Assimilative Capacity) Resource Assessment, July 2022.*

## 5.4 Summary of Future Resource Assessment Results

The resource assessment model results discussed in this section identified the following as potential water resource management challenges in the Lower Flint-Ochlockonee Water Planning Region:

- The surface water availability assessment model identified moderate water supply and wastewater assimilation challenges in the Lower Flint-Ochlockonee region. The results indicated two facilities with water supply challenges (one each in the Flint Basin and the Ochlockonee Basin) and 13 facilities with wastewater assimilation challenges (9 in the Flint Basin and 4 in the Ochlokconee Basin).
- Groundwater use is below the estimated sustainable yield range identified by the model for the Claiborne Aquifer and for the Upper Floridan Aquifer in South-Central Georgia. It is above the sustainable yield range estimated by the model for the Upper Floridan Aquifer in the Dougherty Plain. The Council notes that this sustainable yield metric being exceeded is not necessarily indicative of overall aquifer health and resiliency for the Floridan Aquifer. Because of the interconnected nature of the Floridan Aquifer and the surface water sources in this area, drawdowns in the aquifer in areas that intersect a stream will generally result in streamflows replenishing the aquifer.
- Water quality model results indicated overall increasing availability of assimilative capacity in streams of the Flint River Basin due to assumed more stringent permit conditions where discharges increase in the future. However, some areas continue to model limited or exceeded availability of assimilative capacity under future conditions despite stringent permit conditions.

The Lower Flint-Ochlockonee Water Planning Council considered these potential challenges and their potential adverse impacts in this water planning region, including environmental, health, and economic impacts. In order to meet the Council's vision and goals for the region and given the results considered in this section, the Council developed this Regional Water Plan to address these potential challenges as follows:

- <u>Surface water availability</u>: Challenges for water and wastewater facilities can continue to be addressed, at a broad scale, through demand management, supply management, flow augmentation, and drought response practices in the region. Challenges at specific facilities will be addressed by GAEPD in the permitting process. The assessment results indicate that drought conditions and future growth may result in more frequent occurrence of low flows in the region. Demand management, supply management, flow augmentation, and drought response practices are intended to address these flow challenges. Better information to support more thorough evaluation of resource capacity will continue to improve our ability to manage surface water availability effectively and sustainably in this region.



- Groundwater availability: Increased use of the Claiborne and Cretaceous Aquifers should continue to be evaluated to support appropriate management strategies that address geographic and time-based variations in capacity and demands. This information will be particularly relevant in guiding implementation of Management Practice SF-2 through the new GA-FIT project in this region. The new project will also improve our understanding of these aquifers through increased monitoring. In the Upper Floridan Aquifer in the Dougherty Plain, the impact of groundwater withdrawals on surface water flows in the Flint River Basin continues to be a determining factor in guiding the location and amount of groundwater use from this aquifer. Existing policy currently is directed at limiting impacts to streamflows, and a moratorium currently restricts increased use of this part of the Floridan Aquifer. In general, more geographically specific information on groundwater resource capacity will improve our ability to evaluate aquifer use and management practices.
- Surface water quality: Implement practices targeted especially toward nonpoint source of pollutants to improve assimilative capacity and reduce nutrient loading in the region's streams and lakes. It is expected that GAEPD will adjust point source permit limits over time as needed to address assimilative capacity constraints and nutrient criteria. More nonpoint source controls may be needed to address nutrient criteria. Collect more complete information to support the targeting of management practices for water quality in the future.

# SECTION 6

## Addressing Water Needs and Regional Goals

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*SUMMARY: This section presents the water management practices recommended by the Lower Flint-Ochlockonee Water Planning Council to address potential water resource management challenges identified by the resource assessment models and to fulfill the Council's vision and goals.*

# Section 6. Addressing Water Needs and Regional Goals

## 6.1 Identifying Water Management Practices

The Lower Flint-Ochlockonee Water Planning Council considered the following as it selected management practices for this Regional Water Plan:

- Existing plans and practices
- Potential water resource management challenges identified by the comparison of resource needs and resource capacities (see Sections 3 & 5)
- Council's vision and goals (see Section 1)
- Public input
- Coordination with local governments, neighboring water planning councils and the Metropolitan North Georgia Water Planning District

The Council's decision-making process to adopt management practices and recommendations was consensus-based, where possible, according to the Council's Operating Procedures and Rules for Meetings.[1] In cases where consensus could not be reached, decisions were approved by voting. In order to coordinate beyond the water planning region, Council members met with representatives of neighboring water planning councils and the Metropolitan North Georgia Water Planning District to discuss shared resources. In these meetings, the Council worked with its neighbors toward adoption of coordinated or complementary management practices. Within the region, the Council sought input from stakeholders and local governments through public outreach and provisions for public participation.

The Council identified uncertainties that could impact implementation of this Regional Water Plan, including:

- *Endangered Species Act concerning critical habitat for Endangered and Threatened freshwater mussels*: Critical habitat has been designated for federally listed endangered and threatened freshwater mussels in streams in the Lower Flint-Ochlockonee Water Planning Region. Local flow regimes needed to support these species have not yet been fully defined, and until a clear plan to resolve potential conflicts between water users and imperiled aquatic species is developed, concern about potential future enforcement or litigation over listed

[1] These documents are available with the Council's Memorandum of Agreement on the Council's website.

species creates uncertainty for water users over future water access in this water planning region. Through its work on this Plan, the Lower Flint-Ochlockonee Water Planning Council identified a need for more localized assessments in some areas to support future planning for these listed species and makes a recommendation about planning for listed species conservation in Section 6.3.[2]

- *Implementation of numeric nutrient criteria for Florida's lakes and flowing waters:* These water quality criteria have implications for water quality dischargers and other stakeholders in Georgia. As described in Section 2.3, at this time, Georgia is monitoring water quality and focused on the development of a nutrient strategy that may include point source discharge limits and nonpoint source management to address these criteria.[3]
- *Information needs to support improved water quality and quantity management*: The limits of available information constrain planning decisions, and the Lower Flint-Ochlockonee Water Planning Council has identified numerous information needs to support improved future planning and management. For more detail on recommendations to address information needs, see Section 6.3.

Despite uncertainties, the Council proceeded with plan development based on the best information currently available. The Council intends that future revisions of this Plan will improve upon the current plan, when possible, as conditions change and new information becomes available, and better promote the attainment of the Council's vision and goals for this water planning region.

## 6.2 Selected Water Management Practices for the Lower Flint-Ochlockonee Water Planning Region

The management practices selected by the Lower Flint-Ochlockonee Water Planning Council are summarized in Table 6-1. The table is organized by the type of practice: Demand Management (**DM**), Supply Management and Flow Augmentation (**SF**), and Water Quality (**WQ**). Three management practices were selected by the Council as most important to fulfilling the Council's vision and goals and addressing potential water resource challenges identified by consideration of the resource assessment models and forecasts of water and wastewater demands. These practices are marked as ***high priority management practices***. A discussion of the management practices follows the table.

Table 6-1 includes details addressing implementation including responsible parties and implementation timeframes. Short-term practices are those which will be implemented or encouraged over the five-year timeframe leading up to the next update of this Plan. Long-term management practices vary in duration and scope and will require further study and development to define time requirements.

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[2] More information on listed freshwater mussels in the region can be found in Section 2.

[3] More information on Florida's nutrient criteria is available on-line: https://floridadep.gov/dear/water-quality-standards/content/numeric-nutrient-criteria-development. *Georgia's Plan for the Adoption of Water Quality Standards for Nutrients* can be found here: https://epd.georgia.gov/document/publication/ganutrientcriteriaplanaug2013revpdf/download

**Table 6-1: Water Management Practices Selected for the Lower Flint-Ochlockonee Water Planning Region**

<table>
<tr><th colspan="3">WATER MANAGEMENT PRACTICES</th></tr>
<tr><th colspan="3">Demand Management (DM)</th></tr>
<tr><td>Issues Addressed</td><td colspan="2">Surface water and groundwater availability</td></tr>
<tr><td>Council Goals Addressed</td><td colspan="2">1, 2, 3, 4</td></tr>
<tr><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">DM1: Continue to improve agricultural water use efficiency through innovation and technology<br>**HIGH PRIORITY** MANAGEMENT PRACTICE</td></tr>
<tr><td colspan="3">• Irrigation efficiency has greatly improved over the past several decades as a result of the implementation of innovations in equipment and practices. Field verification of irrigation systems in the Lower Flint-Ochlockonee Water Planning Region completed between 2013 and 2017 confirmed that over 90% of center pivot irrigation systems (accounting for 93% of irrigated acreage in the region) utilize low pressure or low-pressure, drop nozzle technology. Approximately 84% of the center pivots field verified were also equipped with end-gun shutoff capabilities to prevent watering of non-cropped areas.<br>• The future viability of agricultural irrigation in this region requires continued efforts to improve agricultural water conservation. Further innovation in equipment, practices, and programs, as well as incentives to support adoption, are needed to support continued improvements.<br>• This trend is expected to continue, and economic, environmental, and regulatory pressures are expected to drive further innovation in water conservation for agriculture.<br>• This management practice addresses not only hardware and software technology (e.g., drop nozzles, end gun shutoffs, soil moisture sensors, variable rate irrigation), but also other approaches including crop choice, crop genetics, rotational practices, tillage practices, and voluntary or incentivized land-use practices, such as temporary irrigation suspension programs, crop conversions and land-cover conversions.<br>• While the benefits of specific innovations cannot be predicted at this time, the Council expects that the future benefits of innovation will be substantial.</td></tr>
<tr><td>Short-Term Actions</td><td>Long-Term Actions</td><td>Responsible Parties</td></tr>
<tr><td colspan="2">Continue research of irrigation technology and methods and adopt new technology and methods (on-going)</td><td>Agricultural irrigators<br>GSWCC<br>Soil and Water Conservation Districts<br>NRCS<br>University researchers</td></tr>
<tr><td colspan="3">DM2: Implement non-farm water conservation practices in the Lower Flint-Ochlockonee Water Planning Region</td></tr>
<tr><td colspan="3">• State laws and regulations require water conservation practices that address many water uses in this region, including: municipal water supply, industrial water use, landscape irrigation, and car washes. Building code requirements address high-efficiency plumbing fixtures, high-efficiency cooling towers, and submetering for multi-unit residential buildings and some industrial facilities. Water loss auditing requirements for public water systems are also required. Compliance with these requirements is important to the responsible management of water availability in the region.<br>• Beyond these requirements, the Council supports and encourages the adoption of voluntary water conservation measures and the use of existing incentive programs to support the adoption of these practices.</td></tr>
</table>

| WATER MANAGEMENT PRACTICES | | |
|---|---|---|
| ***Short-Term Actions*** | ***Long-Term Actions*** | ***Responsible Parties*** |
| Continue compliance with and implementation and enforcement of regulations (on-going)<br>Implement voluntary water conservation measures (on-going) | | GAEPD<br>Surface water and groundwater withdrawal permittees |
| **DM3:** Implement agricultural water conservation practices in the Lower Flint-Ochlockonee Water Planning Region | | |
| • Agricultural water conservation practices required by existing law include compliance with the Flint River Basin Water Development and Conservation Plan as well as the Water Stewardship Act of 2010 regarding active, inactive, and unused permits.<br>• Agricultural irrigation efficiency requirements and compliance schedules set by 2014 amendments to the Flint River Drought Protection Act (OCGA 12-5-546.1) set efficiency standards to be attained by 2020. The focus of these standards on a desired performance outcome supports increased conservation while allowing farmers to select what practices and approach will work best for their own operations.<br>• GAEPD and other state agencies should implement outreach to increase farmer awareness of agricultural water conservation requirements. The Council recommends that additional enforcement efforts be considered to support implementation and compliance. | | |
| **Short-Term Actions** | **Long-Term Actions** | **Responsible Parties** |
| Continue compliance with and implementation and enforcement of regulations (on-going)<br>Continue implementation of existing incentive programs and evaluate the need for new incentive programs (on-going) | | GAEPD<br>Agricultural irrigators<br>Soil and Water Conservation Districts<br>NRCS<br>GSWCC |
| **DM4:** Implement voluntary agricultural water conservation and efficiency practices in the Lower Flint-Ochlockonee Water Planning Region with the support of incentive programs | | |
| • Adoption of water conservation and efficiency hardware and software (e.g., drop nozzles, end gun shutoffs, soil moisture sensors, variable rate irrigation) helps a permit holder meet the agricultural irrigation requirement for 2020 that is incorporated into state law (OCGA § 12-5-546.1). Farmers, landowners, and producers are encouraged to adopt additional best management practices, to decrease water consumption. The Council especially supports adoption of soil moisture sensors for this purpose and the expansion of incentives available to support the use of soil moisture sensors.<br>• Continued implementation of voluntary agricultural water conservation practices should be supported with incentive funding, which is available from federal programs (Natural Resources Conservation Service) and Soil and Water Conservation Districts. State funding should continue to be pursued to expand support for conservation practice implementation.<br>• Soil and Water Conservation Districts should continue and expand public outreach to support and promote conservation practice implementation by farmers and landowners. Encourage farmers to access Natural Resources Conservation Service (NRCS) programs that provide funding to support adoption of conservation practices.<br>• Quantitative data collection on voluntary conservation practice adoption by farmers should be expanded to the rest of the Flint and Chattahoochee River Basins. Additionally, implementation data should be collected on other water conservation practices (in addition to hardware adoption). This information will help to identify areas where incentive funding or implementation assistance can have the most impact. (See Recommendation IN-3 in Section 6.3.) | | |

| WATER MANAGEMENT PRACTICES | | |
|---|---|---|
| **Short-Term Actions** | **Long-Term Actions** | **Responsible Parties** |
| Continue compliance with and implementation and enforcement of regulations (on-going)<br>Continue implementation of existing incentive programs and evaluate the need for new incentive programs (on-going) | | GAEPD<br>Agricultural irrigators<br>Soil and Water Conservation Districts<br>NRCS<br>GSWCC |
| **DM5:** Manage agricultural water withdrawal permits in the Flint River Basin according to state regulations based on the 2006 Flint River Basin Water Development and Conservation Plan and other applicable state regulations and policy | | |
| At this time, there is a moratorium on new or expanded agricultural surface water withdrawal permits in the Lower Flint River Basin and groundwater withdrawal permits in Subarea 4 of the Upper Floridan Aquifer in the Dougherty Plain.[4] If the moratorium is lifted or partially lifted, new and expanded permits should continue to be subject to the conservation provisions in existing law and regulation based on the 2006 Flint River Basin Water Development and Conservation Plan and the 2014 amendments to the Flint River Drought Protection Act. The 2006 plan limited new agricultural withdrawal permits based on expected impact on nearby wells and streams.[5] The 2006 plan applied the following requirements to new agricultural water withdrawal permits in the Flint River Basin:<br>• New permits require mandatory conservation measures, such as end-gun shut off switches and leak prevention and repair, as a condition of the permit.<br>• New surface water permits in Ichawaynochaway and Spring Creek sub-basins must suspend use when streamflow drops below 25% Average Annual Discharge instead of 7Q10.<br>• New permits in the Flint River Basin require a $250 application fee and are valid for 25 years.<br>The 2014 amendments to the Flint River Drought Protection Act also required all irrigation systems in the Flint River Basin to meet efficiency requirements by 2020 (OCGA § 12-5-546.1), as described in Management Practice DM3. | | |
| **Short-Term Actions** | **Long-Term Actions** | **Responsible Parties** |
| Continue implementation of Flint River Basin Water Development and Conservation Plan (2006) and other applicable regulations | | GAEPD<br>Agricultural surface water and groundwater withdrawal permittees |
| **DM6:** Research new tools for agricultural water demand management to determine their feasibility, costs, and benefits for Georgia | | |
| More study is needed to determine if alternative withdrawal permit and/or irrigation management structures would be appropriate and beneficial for water users and water resources in Georgia. The GA-FIT project (https://ga-fit.org/), active in this region, is exploring alternative approaches for drought response options by agricultural water users, and the new ARPA project described in Management Practice SF-2 is expected to further expand exploration of new management tools. | | |

[4] The moratorium announcement, including a map of the affected area, can be found at the following link: http://www.gawaterplanning.org/documents/20120730_Flint_Suspension_Announcement.pdf

[5] The 2006 Flint River Basin Water Development and Conservation Plan is available on the GAEPD website: https://epd.georgia.gov/georgia-flint-river-basin-plan.



| WATER MANAGEMENT PRACTICES | | |
|---|---|---|
| **Short-Term Actions** | **Long-Term Actions** | **Responsible Parties** |
| Conduct research into feasibility, costs and benefits of agricultural permit limit quantification and agricultural irrigation institutions<br>Present results for consideration to Council and GAEPD | Implement recommendations from research as appropriate (pending availability of funding) | University researchers<br>GAEPD<br>Permittees |
| **DM7:** Encourage implementation of conservation pricing and new meter technologies by public water systems in the Lower Flint-Ochlockonee Planning Region | | |
| • The Council encourages the adoption of conservation pricing rate structures and water meter technology by public water systems in the region.<br>• Conservation pricing generally implements an increasing block rate for water utility customers. The Council encourages adoption of this approach, especially for residential customers.<br>• Water meter technologies, including Automatic Meter Reading (AMR) and Advanced Metering Infrastructure (AMI) support water use monitoring and leak detection, as well as efficient meter reading and billing and enhanced customer service and communications. The use of these technologies will support improved demand management in this region.<br>• Implementation of conservation pricing and meter technology should be supported with incentive funding, which is available through local government programs (Georgia Environmental Finance Authority). The Georgia Rural Water Association has supported some utilities in the region in adopting these and other innovative practices that improve water and wastewater management. | | |
| **Short-Term Actions** | **Long-Term Actions** | **Responsible Parties** |
| Coordinate conservation pricing systems with local government programs | Implement water metering technologies such as AMR or AMI | GAEPD<br>Permittees<br>GEFA<br>Georgia Rural Water Association |

| Supply Management and Flow Augmentation (SF) | |
|---|---|
| **Issues Addressed** | Surface water and groundwater availability |
| **Council Goals Addressed** | 1, 2, 3, 4 |
| | |

| **SF1:** Develop distributed water storage as needed to support water users in managing water availability for water users and in-stream needs | | |
|---|---|---|
| • Water storage, such as farm ponds, can enhance the ability of water users (public water suppliers, industrial water users, agricultural water users) to manage water availability to meet their needs (see Management Practice SF5).<br>• The evaluation of reservoir options for the Flint River Basin should include assessment of feasibility, siting, costs, benefits, and environmental and economic impacts.<br>• Water release guidelines for existing reservoirs in the Flint River Basin should be evaluated to support potential increases in instream flows. | | |
| **Short-Term Actions** | **Long-Term Actions** | **Responsible Parties** |
| Identify funding for evaluation, conduct studies, and report to Council, GAEPD | Implement recommendations of study | Council |

<table>
<tr><th colspan="3">WATER MANAGEMENT PRACTICES</th></tr>
<tr><td>and other policymakers by next planning cycle</td><td></td><td>GAEPD<br>Neighboring councils<br>University researchers<br>Consulting firms<br>Georgia Environmental Finance Authority (GEFA)</td></tr>
<tr><td colspan="3">SF2: Develop groundwater source alternatives to replace surface water withdrawals during drought, where site specific evaluation indicates that this practice is practical and will not harm environmental resources<br>**HIGH PRIORITY** MANAGEMENT PRACTICE</td></tr>
<tr><td colspan="3"><ul>
<li>During drought, surface water withdrawals have a direct impact on streamflows that can be mitigated by switching to alternative sources. In this region, the groundwater resource assessment suggests that deeper aquifers (e.g., Claiborne, Cretaceous) may provide options for alternative sources with available sustainable yield to support water use during drought.</li>
<li>Source switching can support increased in-stream flows during drought in some places in this water planning region.</li>
<li>The cost of this practice is high for individual farmers, and costs may limit its feasibility. The Council recommends that this practice be implemented with incentives.</li>
<li>The practice should only be used where it will not adversely impact other environmental resources, especially groundwater. The resource assessment results indicate possible opportunities for application in the confined areas of the Claiborne and Cretaceous Aquifers, but the potential for site-specific and transient impacts requires further evaluation.</li>
<li>This practice will be implemented in this region through a grant from the Governor’s Office of Planning and Budget via allocations established from the American Recovery Plan Act (ARPA) for infrastructure in 2022 to a partnership of the Georgia Water Planning and Policy Center, the Georgia Environmental Protection Division, and the Golden Triangle Resource Conservation and Development Council. The project will be implemented as a part of the GA-FIT program. The grant aims to provide deep groundwater alternatives to surface water withdrawals for use only during drought periods to irrigators throughout the Lower Flint River Basin. The project will also monitor aquifer health and support regional planning for instream flow management and conservation of federally listed endangered and threatened freshwater mussels in the region through the development of a Habitat Conservation Plan (HCP) (see SF7 and Recommendation WP-7 in Section 6.3). A Project Advisory Board will guide implementation, make related policy recommendations, and support regional water resource planning and management. (See also Recommendation WP-7 in Section 6.3.)</li>
<li>The Council recommends that affected permits maintain their status prior to conversion; grandfathered surface water withdrawal permits that are supplemented by a new groundwater withdrawal permit for use during drought should have the same regulatory status with respect to conservation requirements, seniority, and potential interruption. If the practice is implemented only during drought periods, additional permitting considerations to address source switching and permit status will need to be addressed. The GA-FIT Project Advisory Board is expected to consider and make recommendations to address these policy questions.</li>
<li>The Council acknowledges efforts by the state to evaluate groundwater development as an alternative water source in the past several years and looks forward to the additional data on groundwater conditions to be developed through the new GA-FIT project. These studies provide an important base of information to support implementation of this practice.</li>
<li>A key feature of successfully implementing this strategy will be to make sure that the sustainable yield of groundwater sources is better understood and not overallocated. Connectivity between overlying and underlying aquifers should also be addressed. The most up to date aquifer models should be utilized and peer reviewed.</li>
</ul></td></tr>
</table>

<table>
<tr><th colspan="3">WATER MANAGEMENT PRACTICES</th></tr>
<tr><td>Short-Term Actions</td><td>Long-Term Actions</td><td>Responsible Parties</td></tr>
<tr><td>Continue to evaluate the feasibility of this practice and potential impacts on aquifers<br>Identify funding for conversion incentives</td><td>Implement if feasibility and impacts are found to be favorable<br>Provide incentives for conversions</td><td>GAEPD<br>GA-FIT project partners and Advisory Board<br>University researchers</td></tr>
<tr><td colspan="3">SF3: Evaluate streamflow augmentation via direct pumping from aquifers in order to support in-stream flows in dry periods</td></tr>
<tr><td colspan="3"><ul>
<li>In dry periods, streamflow might be augmented through direct pumping of groundwater into surface water streams.</li>
<li>Several factors could limit the potential use of this practice, including: groundwater yields, water quality, cost, aquifer impacts, and streamflow impacts of aquifer pumping.</li>
<li>Implementation of this practice could be beneficial but requires thorough evaluation to ensure that adverse environmental impacts are avoided and implementation is cost-effective.</li>
<li>A pilot project for streamflow augmentation is being implemented on Spring Creek near Colquitt in the Lower Flint River Basin. The GA-FIT project described in Management Practice SF2 will make repairs to this project and potentially seek to establish an additional augmentation pilot project site in the region. Continued evaluation of this project should inform future implementation of this management practice.</li>
<li>The Flint River Drought Protection Act addresses the conservation of flows from state funded augmentation projects and require notifications of downstream water withdrawal permittees regarding preservation of such flows (OCGA § 12-5-546.2).</li>
</ul></td></tr>
<tr><td>Short-Term Actions</td><td>Long-Term Actions</td><td>Responsible Parties</td></tr>
<tr><td>Continue to evaluate augmentation pilot project on Spring Creek<br>Report to Council and GAEPD<br>Identify funding sources to support practice if pilot project findings are favorable</td><td>Implement practice in other locations if pilot project findings are favorable</td><td>University researchers<br>GAEPD<br>GADNR<br>GA-FIT partners</td></tr>
<tr><td colspan="3">SF4: Continue to evaluate and consider Aquifer Storage and Recovery (ASR) with thorough evaluation of potential impacts</td></tr>
<tr><td colspan="3"><ul>
<li>The Council recognizes the need for further evaluation of specific proposals for ASR in this water planning region on a case-by-case basis.</li>
<li>ASR could be a tool for use at specific sites in this water planning region where it might benefit flow augmentation. It could be used to withdraw and store surface water during periods of high flow and provide augmentation for flows in dry periods.</li>
<li>The feasibility of ASR projects can vary greatly depending on location, condition of the receiving aquifer and water quality considerations.</li>
<li>The Council acknowledges the recent completion of a study on the potential for ASR development in Southwest Georgia to augment streamflows. This study found inadequate groundwater productivity to support project implementation, but the results were site specific.</li>
<li>The Council recommends that any ASR proposal be thoroughly evaluated for its environmental and other impacts.</li>
</ul></td></tr>
</table>

| WATER MANAGEMENT PRACTICES | | |
|---|---|---|
| **Short-Term Actions** | **Long-Term Actions** | **Responsible Parties** |
| Evaluate potential impacts of any ASR proposal thoroughly | | GAEPD<br>University researchers<br>Consulting firms<br>GEFA<br>Municipal and industrial water systems<br>Applicants for permits associated with ASR projects |
| **SF5:** Continue development of farm ponds in the Lower Flint-Ochlockonee Water Planning Region | | |
| • On-farm water storage that is filled in periods of high flow can replace or reduce direct pumping for irrigation from surface streams or wells during drought periods.<br>• Funding for farm pond development would greatly enhance implementation of this management practice.<br>• Future permits for farm pond withdrawals should include low flow protection requirements similar to those required in the Flint River Basin Water Development and Conservation Plan of 2006.<br>• GAEPD has advanced the understanding of how farm ponds are used in Georgia and how to incorporate them into the surface water availability resource assessment. However, better understanding of farm pond operation and impacts is needed to support more thorough evaluation. See Recommendation to the State IN-4.<br>• Additionally, more public education is needed surrounding the benefits and uses of farm ponds as an alternative water source for irrigation. | | |
| **Short-Term Actions** | **Long-Term Actions** | **Responsible Parties** |
| Encourage farm pond development<br>Continue to evaluate impacts of farm ponds and incorporation of farm ponds in the surface water availability assessment | Continue implementation (adjusted for assessment findings) | GSWCC<br>GAEPD<br>University researchers<br>Agricultural irrigators<br>Soil and Water Conservation Districts |
| **SF6:** Restrict the development of new land application systems (LAS) for municipal and industrial wastewater treatment | | |
| • The Council recommends that new LAS be used only as a last resort. Exceptions may apply for systems that demonstrate that use of new or expanded LAS is necessary due to economic and/or hydrologic reasons. Treatment systems that discharge back to surface waters to support increased return flows should be generally preferred whenever possible in this region.<br>• Treatment by LAS currently accounts for 5.1 mgd or 3.3% of the total treated wastewater volume in the Lower Flint-Ochlockonee Water Planning Region. In Section 4.1.2, this proportion was held constant in the wastewater treatment forecast to 2060. This management practice seeks to reduce the proportion treated by LAS in the future.<br>• The Council recommends a feasibility study on the retirement of LAS. The study should address flow restoration estimates and funding needs. | | |



**WATER MANAGEMENT PRACTICES**

| Short-Term Actions | Long-Term Actions | Responsible Parties |
|---|---|---|
| Preference for return flows via discharge as opposed to LAS should be considered in new and expanding permits for wastewater treatment facilities (on-going) | | Wastewater treatment facilities (existing and planned)<br>GAEPD |

**SF7:** Encourage the development of a Habitat Conservation Plan (HCP) to provide habitat protection for endangered and threatened freshwater mussels in the Flint River Basin while improving water security for irrigation water supply needs within region. ****HIGH PRIORITY** MANAGEMENT PRACTICE**

- The GA-FIT project described in SF2 seeks to resolve potential conflicts between agricultural water use and imperiled species in the region through an HCP. The Council encourages all appropriate state agencies to join in this process, including GAEPD.
- The Council supports continued consideration of an HCP as a tool that should be evaluated to provide for both habitat protection and irrigation supply needs in the region, while also reducing the liability and uncertainty associated with potential Endangered Species Act enforcement or litigation.
- An HCP feasibility study was conducted between 2011 and 2014 in response to a request from the Council. It was led by the Georgia Water Planning and Policy Center and involved numerous agencies and stakeholders from this region. The project provided information that can be used to advance consideration of alternative approaches to address imperiled species concerns in the region.
- See Recommendation to the State WP-7.

| Short-Term Actions | Long-Term Actions | Responsible Parties |
|---|---|---|
| Continue to evaluate and, if appropriate, develop an HCP for endangered and threatened freshwater mussels in the Flint River Basin | Implement the HCP and assess its impacts to support adaptive management of the HCP | GA-FIT partners<br>GAEPD<br>GADNR |

**Water Quality (WQ)**

| | |
|---|---|
| **Issues Addressed** | Point and nonpoint source water pollution |
| **Council Goals Addressed** | 1, 4 |
| | |

**WQ1:** Improve enforcement of existing permits and regulations and implementation of existing plans and practices

The Council recommends the following:

- Continue enforcement of existing discharge permits.
- Ensure continued enforcement of erosion and sediment control regulations.
- Encourage GAEPD to continue to implement existing management plans and practices, such as the TMDL plans for specific stream reaches to address specific parameters.
- Raise awareness of anticipated changes in nutrient standards among the regulated community.
- Develop new nutrient standards through a process with substantial stakeholder engagement and input.
- Accelerate efforts to comply with the 2024 deadline to address the combined sewer overflow (CSO) in Albany with a goal of zero discharge as a result of the CSO. Utilize Federal, State, and local funding toward improvements needed to attain this goal. The Council requests regular updates on implementation of the long-term control plan for the Albany CSO and efforts towards meeting the 2024 compliance requirement. The Council also requests the continued monitoring of the Albany CSO outfalls.

| WATER MANAGEMENT PRACTICES | | |
|---|---|---|
| **Short-Term Actions** | **Long-Term Actions** | **Responsible Parties** |
| Continue implementation of programs and plans<br>Raise awareness of anticipated changes in nutrient standards among the regulated community<br>Develop new nutrient standards through process with substantial stakeholder input<br>Accelerate efforts to address the Albany CSO<br>Evaluate coordination in water quality program implementation by next planning cycle | Continue implementation of programs and plans<br>Progress toward zero discharge goal for Albany CSO<br>Implement improvements in program coordination (per results of evaluation) | GAEPD<br>Albany Utilities<br>GSWCC<br>GEFA<br>Wastewater discharge permittees |

**WQ2:** Improve implementation of nonpoint source controls

The Council recommends the following:

- Encourage adoption of the Georgia Stormwater Management Manual by local municipalities.
- Increase implementation and documentation of Best Management Practices (BMPs) throughout this water planning region by all industries.
- Advocate for an assessment of agricultural BMP implementation.
- While recognizing that there is no one-size fits all approach, encourage and incentivize agricultural landowners to adopt water quality BMPs, including stream buffers, with a priority focus on nutrient removal. Encourage farmers to participate in NRCS programs such as the Conservation Stewardship Program and to complete farm conservation plans, which may include on-farm nutrient management. Encourage adoption of practices including nutrient management planning, cover crops, and animal waste management.
- Encourage delegation of erosion and sediment control review and inspection to local municipalities supported by professional engineering resources.
- Raise awareness of anticipated changes in nutrient standards among sectors that are sources of nonpoint source nutrient loading.
- Develop new nutrient standards through process with substantial stakeholder engagement and input.
- Better Back Roads: The Council encourages continued section 319(h) grant funding through GAEPD to Georgia Resource Conservation Development Councils for implementation of County Dirt Road BMP educational and demonstration programs. Consider partnering with the Association County Commissioners of Georgia (ACCG) to raise county government awareness of this program to support more effective implementation.
- Create a complaint response program, similar to that of the Georgia Forestry Commission for the silvicultural industry, to provide for the resolution of water quality concerns from agricultural sources through coordination, cooperation, and technical assistance with agricultural landowners. The program needs to include accommodations for flexibility in enforcement, and program responsibility needs to be established.

| Short-Term Actions | Long-Term Actions | Responsible Parties |
|---|---|---|
| Continue implementation of existing programs<br>Conduct baseline assessment of agricultural water quality BMPs and report results by next planning cycle | Continue implementation of existing programs (on-going) | Local governments<br>Farmers<br>Foresters<br>Georgia Forestry Commission |

| WATER MANAGEMENT PRACTICES | | |
|---|---|---|
| Raise awareness of the anticipated changes in nutrient standards and encourage adoption of nutrient management BMPs<br>Develop agricultural water quality complaint response program by next planning cycle<br>Encourage adoption of Revised Georgia Stormwater Management Manual and delegation of erosion and sediment control review and inspection to local authorities | | NRCS<br>GSWCC<br>GAEPD |
| **WQ3:** Continue to fund and implement water quality monitoring | | |
| Implement additional water quality monitoring in this water planning region to support resource assessments, planning, and management.<br>Encourage education about ground water quality for agricultural and residential wells and the availability of programs for homeowners with wells such as those offered by the Golden Triangle Resource Conservation and Development Council. | | |
| **Short-Term Actions** | **Long-Term Actions** | **Responsible Parties** |
| Continue implementation of and funding for water quality monitoring (on-going)<br>Implement additional water quality monitoring by wastewater dischargers per new permit requirements | Continue implementation of and funding for water quality monitoring (on-going) | GAEPD<br>Wastewater discharge permittees |
| **WQ4:** Improve collection, coordination, and utilization of water quality data | | |
| Coordinate water quality monitoring required by GAEPD and utilize data from Georgia Environmental Monitoring and Assessment System (GOMAS), Adopt-a-Stream, and USGS.<br>Encourage collection and submittal of water quality monitoring information to a single database, such as the Georgia Environmental Monitoring and Assessment System (GOMAS).<br>Encourage agencies (local, regional, and state) to utilize this information to improve water quality outcome of existing programs. | | |
| **Short-Term Actions** | **Long-Term Actions** | **Responsible Parties** |
| Evaluate coordination in water quality program implementation by next planning cycle | Implement improvements in program coordination (per results of evaluation) | GAEPD<br>GSWCC<br>GEFA |

The Lower Flint-Ochlockonee Water Planning Council selected these management practices to apply to the whole Lower Flint-Ochlockonee Water Planning Region. Although the water planning region's boundaries encompass multiple surface water and groundwater resources, the Council believes that the management practices will benefit all of these resources.

The selected management practices were adopted by the Council because they address potential water resource management challenges identified through evaluation of the resource

capacities and regional needs, discussed in Sections 3, 4, and 5. The practices were also selected to fulfill the Council's vision and goals for this water planning region (see Section 1.3).

The potential water resource management challenge identified by the groundwater availability assessment model in Upper Floridan Aquifer in the Dougherty Plain resulted from the impact of groundwater use on groundwater contributions to stream baseflows and does not reflect an adverse impact of groundwater use on aquifer levels. The model predicted drawdown in the aquifer of less than five feet. Moreover, the Upper Floridan Aquifer in this area is known to recover quickly as a result of recharge. Additionally, the Council notes that the Floridan Aquifer crosses state lines, and use of the Floridan Aquifer by Florida water users can have impacts on this important shared water resource. These impacts may not be reflected in the groundwater resource assessment.

As described above, the Lower Flint-Ochlockonee Water Planning Council selected management practices to address its vision and goals and potential challenges identified by the resource assessment models. Addressing surface and groundwater availability challenges in the region could require reductions in water use in dry periods, especially by agriculture, or alternatively, they might be addressed with offsetting storage or augmentation. Limitations to agricultural water use could have severe economic impacts in this water planning region, and these management decisions should be made carefully to address water security for all users and instream needs. The Council's vision and goals call for sustainable management of water resources that ensures access for existing and future water uses, maintains the agriculture-based economy of the region, and supports sustainable economic growth, while also protecting public health, natural systems, and quality of life. The resource assessments are designed to help the regional water planning councils identify areas where management practices might be needed to ensure that a region's water resources can sustainably meet long-term demands for multiple uses. The assessments are designed to be highly conservative in identifying potential impacts. The Council recognizes both the value and the limitations of the resource assessment models and relies on them as one input for guidance in planning.

The Lower Flint-Ochlockonee Water Planning Council included several demand management practices to address surface water and groundwater availability concerns. The Council recognizes and commends water users already practicing demand management in the region. Conservation is widely used in this water planning region by municipalities, farmers, industries, individuals, and others. Recent efforts to conduct field verification of conservation equipment adoption by farmers in the Lower Flint River Basin have initiated the development of a baseline dataset on adoption. However, without a more comprehensive understanding of baseline implementation of water conservation and efficiency, the ability to quantify the benefit of future conservation activities is substantially limited. The Council addresses the need for baseline conservation information in its Recommendations to the State in Section 6.3 (see Recommendations IN-2 and IN-3).

The Council recognizes that water resource planning should follow an integrated approach. Planning must consider the full range of water needs on a basinwide scale and consider and address how water quantity and quality management are directly linked and interdependent. For example, flow levels affect water quality conditions, and wastewater treatment methods have



important implications for return flows. The integrated nature of water resource management means that many of the Council's management practices have important implications for both water quantity and quality in this water planning region's water systems. These interdependencies were considered by the Council in plan development and should be considered in implementation of this Plan.

As the regional water planning process evolves, the Lower Flint-Ochlockonee Water Planning Council recommends the development of more precise measures of the health of the State's water resources. Moreover, the Council emphasizes that the resource assessment models developed and used for this plan are planning tools; they should not be relied upon as policy tools. The Council makes further recommendations about information needs and the resource assessment models in Section 6.3.

## 6.3 Recommendations to the State

In addition to the management practices described in Section 6.2, the Lower Flint-Ochlockonee Water Planning Council makes the following recommendations that seek to improve water resource management and planning in this water planning region and the state as a whole.

### Information Needs

Addressing the following information needs would support improved water resources management and future water planning. Implementation of research and assessments to fill these information needs will require funding (state, federal, other). In general, implementing actors are not indicated here; if funding is identified, qualified researchers from state universities, institutions, and agencies, as well as private sector firms, can fulfill these information needs. As new information is developed, it should be incorporated into future cycles of the regional water planning process and used in the resource assessments that are a part of the regional water planning process.

**IN-1:** Continue to implement the agricultural water withdrawal metering program administered by GAEPD. This program has provided important data on agricultural water use to support planning and drought response. Continued implementation will require inspections, maintenance, repair, and replacement to ensure functioning meters. Additional data collection, including monthly use data and information about crops and inputs, would enhance information available to support management and planning. Reporting on collected data to water users and the public (summary values to protect individual identities for public reporting) is also important to supporting public education and water resources planning and management.

**IN-2:** Continue to evaluate implementation, adoption, and effectiveness of water conservation practices and to research innovative conservation practices. Periodically, it will be important to assess the progress and benefit of the water conservation program. (See also: Management Practice DM1.)

**IN-3**: Complete a comprehensive assessment of baseline implementation of water conservation and water quality BMPs by agricultural producers. Field verification of conservation equipment adoption by farmers in the Lower Flint River Basin has initiated the development of a baseline dataset. The Council recommends that this survey be expanded to include a wider geographic range, including the entire Flint and Chattahoochee River Basins, and to assess the implementation of more conservation practices. More complete information on current levels of BMP implementation would support more informed and effective regional water planning, specifically in the estimation of potential benefits of future implementation, tracking of implementation progress, and BMP prioritization.

**IN-4:** Evaluate farm ponds' impacts on stream flows through intercepted drainage and evaporative loss (see Management Practice SF5), and regional water supplies, including their potential impacts to aquatic habitat, water quality, and water available for consumptive use.

**IN-5**: Evaluate the costs and benefits of reducing the minimum threshold at which permits are required for water withdrawals (surface water and groundwater). Support this evaluation with an estimate of the amount of water withdrawn by small, unpermitted withdrawals (<100,000 gallons per day).

**IN-6:** Promote additional studies that build on existing work related to drought, drought triggers and potential actions to maintain water quality in the Flint River Basin during dry periods.

**IN-7:** Evaluate alternative metrics for use in the resource assessment models. For the surface water availability resource assessment, the Council should provide input to GAEPD on preferences, values, and possible metrics related to desired flows and surface water availability in the region.

**IN-8:** Continue to evaluate opportunities for changes in the updated Water Control Manual for U.S. Army Corps of Engineers management in the Chattahoochee River Basin to enhance the capacity of the system to support all uses, including greater storage for water supply and flow augmentation.

**IN-9:** For wastewater treatment forecasts, update point source discharge and LAS treatment volumes in future forecasts and resource assessments. Management Practice SF6 generally recommends against expanding LAS practices. If SF6 is implemented, the forecast's assumption, that the current proportion among wastewater discharge to LAS will remain constant, may not be accurate.

**IN-10:** Evaluate the effectiveness of water quality management and pollution prevention tools, including BMPs for nonpoint sources. Continue to develop data on nutrient loading to support the development of effective nutrient management strategies, especially in the Ochlockonee River Basin because the watershed originates within this water planning region.



**IN-11:** Conduct periodic peer review on the resource assessment models used in regional water planning.

### *Water Policy Recommendations*

The following recommendations urge the Georgia General Assembly and other policymakers (e.g., Georgia Board of Natural Resources) to pursue actions to improve water resource management in the State and the Lower Flint-Ochlockonee Water Planning Region.

**WP-1:** The Council recommends that the General Assembly seek input from and consult with the regional water planning councils, including the Lower Flint-Ochlockonee Water Planning Council, in managing, planning, and providing oversight of water resources within each region around the state.

**WP-2:** The Council recommends that the General Assembly provide funding for continued planning by the regional water planning councils in order to ensure continued progress toward the vision and goals of the State Water Plan and Regional Water Plan. The Council also recommends that the General Assembly provide funding to support monitoring of plan implementation, data collection to support future planning by the regional water planning councils, and continued refinement of water resource assessments used in the development of the Regional Water Plans.

**WP-3:** The Council recommends that the General Assembly and implementing state and federal agencies, explore all possible funding sources to offset or pay for many of the management practices outlined in this Plan. Federal funding sources should be fully explored, particularly USDA funding for conservation research and implementation. Financial incentives and reimbursement for implementation of practices will expedite the progress needed to achieve the goals of this Plan.

**WP-4:** The Council urges the General Assembly and other state policymakers not to preclude interbasin transfer (IBT) as an option for future water management in the region, as needed and following thorough scientific evaluation. IBTs of water can provide supply or flows to a receiving basin where water is needed. IBTs are used in many places in Georgia at this time. However, the Council recommends against any new IBTs from any basin in this region for which the surface water availability resource assessment model indicated a potential challenge. Furthermore, the Council recommends that, where appropriate and reasonable to address instream flow concerns, existing IBTs be reversed to return water to its basin of origin.

**WP-5:** The Council recommends that any modifications to existing water withdrawal permitting should consider the updated surface water availability and groundwater availability resource assessment model results. However, the Council advises caution in interpretation of the sustainable yield levels for the Floridan Aquifer. Sustainable yield results for the Floridan Aquifer should be considered in light of the expected rate of recovery of aquifer levels between drought periods, impacts to surface water flows of Floridan aquifer withdrawals in the Dougherty Plain, and the site-specific nature of the impacts of the use of this aquifer in the Dougherty Plain. Floridan Aquifer levels

have historically recovered quickly after drought periods, but it should also be noted that the model did not evaluate the potential for drought longer than two years. For a more complete discussion of the Council's interpretation and use of the assessment modeling results, please see Section 5.4.

**WP-6:** The Council urges the state to continue developing improved tools for drought management and to adopt legislation as needed for their implementation. The Council believes that additional tools beyond those provided in the Flint River Drought Protection Act (OCGA §12-5-40) are needed to provide an adequate remedy in periods of drought, and adequate funding should be provided for implementation. The GA-FIT program (https://ga-fit.org/), active in this region, is exploring alternative approaches for drought response options by agricultural water users. A new GA-FIT project, described in Management Practice SF2, is expected to further expand exploration of new management tools.

**WP-7:** The Council supports efforts of the new GA-FIT project described in Management Practice SF2 and SF7 to seek to resolve potential conflicts between agricultural water use and imperiled species in the region through the development of an HCP. The Council urges all appropriate state agencies to join in this process, including the GAEPD. An HCP feasibility study was conducted between 2011 and 2014 in response to a request from the Council. It was led by the Georgia Water Planning and Policy Center and involved numerous agencies and stakeholders from this region. The project provided information that can be used to advance consideration of alternative approaches to address imperiled species concerns in the region. The Council supports continued consideration of an HCP as a tool that should be evaluated to provide for both habitat protection and irrigation supply needs in the region, while also reducing the liability and uncertainty associated with potential Endangered Species Act enforcement or litigation.

**WP-9:** The Council recommends continued coordination and cooperation among neighboring water councils. The Lower Flint-Ochlockonee Water Planning Council has worked closely with the Middle Chattahoochee and Upper Flint Water Planning Councils and the Metropolitan North Georgia Water Planning District, and our joint efforts will benefit our regions and the state as a whole.

**WP-10:** The Council recommends incentivization of BMPS, including the creation of a complaint response program, similar to that of the Georgia Forestry Commission for the silvicultural industry, to provide for the resolution of water quality concerns from agricultural sources through coordination, cooperation, and technical assistance with agricultural landowners.

### *Coordinated Recommendations with Neighboring Councils*

Since the beginning of regional water planning in Georgia in 2009, the Lower Flint-Ochlockonee Water Planning Council has ensured coordination with neighboring regional water planning councils to address shared water resources and topics of concern. The Lower Flint-

Ochlockonee Water Planning Council has met several times with the Upper Flint and Middle Chattahoochee Water Planning Councils and developed a collaborative relationship with these councils that led to their agreement on a set of joint recommendations in 2011, with revisions jointly adopted in 2017. In this planning cycle, the three councils reviewed and revised their joint recommendations again. In this planning cycle (2021-2023), the following joint recommendations were approved by all three councils: Upper Flint, Lower Flint-Ochlockonee, and Middle Chattahoochee. The agreement among these councils on these recommendations indicates the importance of these recommendations to the Apalachicola-Chattahoochee-Flint Basin, of which all three councils are a part, and to the State as a whole.

These joint recommendations overlap with some of the Lower Flint-Ochlockonee Water Planning Council's own management practices and recommendations. Where overlap does occur, the Council does not see any conflict; the Council's management practices and recommendations generally provide more detail than the joint recommendations. In all cases, the Council's own regional water plan takes precedence over the joint recommendations.

The Lower Flint-Ochlockonee, Upper Flint, and Middle Chattahoochee Water Planning Councils:

**JT-1:** Recognize the critical need for better use of existing storage and for more storage in the Apalachicola-Chattahoochee-Flint (ACF) System and recommend that a plan for additional storage be developed and implemented and that it considers the following: better utilization of existing storage in the Chattahoochee River Basin, new storage in the Flint River Basin, and enhancement of existing storage capacity.

**JT-2:** Urge GAEPD and those involved in the resource assessment modeling to continue to improve upon existing models for future regional water planning by further expanding use of actual and current data on water use and conditions and by continuing to refine assumptions that more closely approximate actual conditions.

**JT-3:** Recommend proactive engagement among Georgia, Alabama, and Florida to collaborate on opportunities to improve planning for shared water resources in the ACF Basin.

# SECTION 7

## Implementing Water Management Practices

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*SUMMARY: This section presents the Lower Flint-Ochlockonee Water Planning Council's roadmap for the implementation of the water management practices identified in Section 6. Implementation actions and responsible parties are described, and schedules and costs are specified, where appropriate. The Council's research and policy recommendations are also included in this section.*

# Section 7. Implementing Water Management Practices

This section presents the Council's roadmap for the implementation of the management practices identified in Section 6. It details schedules for implementation and responsible parties for implementation. It also describes the alignment of this Regional Water Plan with other plans that address or relate to water resources in this water planning region. It ends with recommendations from the Council related to information needed to improve future planning and water policy changes that would facilitate attainment of the Council's vision and goals for the Lower Flint-Ochlockonee Water Planning Region.

## 7.1 Fiscal Implications of Selected Water Management Practices

Table 7-1 provides planning-level funding guidance for implementation of the management practices in this Regional Water Plan as provided in Table 6-1. Current funding guidance has not been included as the development of cost estimates, for these management practices are variable and dependent on several factors including scope of work, market conditions, technological improvements and availability of supplies, equipment, and labor. GAEPD developed a "Supplemental Guidance for Planning Contractors: Water Management Practice Cost Comparison", last revised in April 2011, that provides guidance about the relative costs of various water management practices.[1]

The availability of funding is a critical determinant in the ability of the responsible parties to successfully implement the management practices identified in this Plan. In general, sources of funding for individuals, such as farmers, include investment by these individuals and grant and incentive programs. Sources of funding for implementing management practices at the local government or utility level include revenues generated by water and wastewater providers, local government general funds raised through property taxes, and service fees charged by local governments to citizens. Local governments and utilities can also apply for loans and grants to finance implementation. Affected authorities and individuals in the water planning region will be responsible for determining the best method for funding and implementing applicable management practices.

[1] Supplemental Guidance for Planning Contractors: Water Management Practice Cost Comparison, Revised April 2011 provided in Regional Water Planning Guidance: https://waterplanning.georgia.gov/document/publication/cost-guidance/download



**Table 7-1: Cost Considerations for Implementation Responsibilities**

| Management Practice | Potential Funding Sources | Notes and Sources |
|---|---|---|
| **DEMAND MANAGEMENT (DM)** | | |
| ***Issues Addressed*** | ***Surface water and groundwater availability*** | |
| ***Council Goals Addressed*** | ***1, 2, 3, 4*** | |
| ***DM1:*** *Continue to improve agricultural water use efficiency through innovation and technology*<br>*****HIGH PRIORITY** MANAGEMENT PRACTICE*** | Federal and state agencies<br>Private industry<br>Nongovernmental organizations | Costs of continuing research on agricultural water use practices are variable; dependent upon the extent of research conducted. |
| ***DM2:*** *Implement non-farm water conservation practices in the Lower Flint-Ochlockonee Water Planning Region* | State agencies<br>Water and wastewater revenues<br>Individuals as required by law | Lower cost WMPs include: residential water audits, leak response, training, rate structure modifications.<br>Higher cost WMPs include: rebate programs, facility upgrades, water line replacement, water reuse, and programs targeting high water users.[c] |
| ***DM3:*** *Implement agricultural water conservation practices in the Lower Flint-Ochlockonee Water Planning Region* | State agencies<br>Individual investment<br>Incentive programs administered through GSWCC, Soil and Water Conservation Districts, NRCS, USDA | Lower cost WMPs include: lower pressure irrigation retrofits<br>Higher cost WMPs include: variable rate irrigation.[c] |
| ***DM4:*** *Implement voluntary agricultural water conservation and efficiency practices in the Lower Flint-Ochlockonee Water Planning Region with the support of incentive programs* | Individual investment<br>Incentive programs (GSWCC; Soil and Water Conservation Districts; NRCS, USDA) | Lower cost WMPs include sod-based rotation with conservation tillage. Higher cost WMPs include variable rate irrigation. |
| ***DM5:*** *Manage agricultural water withdrawal permits in the region according to state regulations based on the 2006 Flint River Basin Water Development and Conservation Plan and other applicable state regulations and policy* | GAEPD | Withdrawal permits issued after the 2006 Flint Plan have a $250 application fee. |

| Management Practice | Potential Funding Sources | Notes and Sources |
|---|---|---|
| ***DM6:*** *Research new tools for agricultural water demand management to determine their feasibility, costs, and benefits for Georgia* | Federal or state agencies | Costs of continuing research on agricultural water policy are variable and depend upon the extent of research conducted. |
| ***DM7:*** *Encourage implementation of conservation pricing and new meter technologies by public water systems in the Lower Flint-Ochlockonee Planning Region* | GAEPD<br>GEFA | Costs include the preparation of a rate study with replacement of the billing system to accommodate tiers. Conservation pricing will vary between public water systems. |
| **SUPPLY MANAGEMENT AND FLOW AUGMENTATION (SF)** | | |
| ***Issues Addressed*** | ***Surface water and groundwater availability*** | |
| ***Council Goals Addressed*** | ***1, 2, 3, 4*** | |
| ***SF1:*** *Develop distributed water storage as needed to support water users in managing water availability for water users and in-stream needs* | Municipal or industrial capital investment<br>State and federal funding<br>Private investment<br>Water and wastewater revenues<br>GEFA | Evaluation may include costs for (but not limited to): development of yield and performance criteria; site selection; property assessments and appraisals; and addressing local permit requirements.<br>Reservoir cost is dependent on land value and costs of construction materials. Costs need to include piping, land acquisition, permitting, conveyance, and treatment . |
| ***SF2:*** *Develop groundwater source alternatives to replace surface water withdrawals during drought, where site specific evaluation indicates that this practice is practical and will not harm environmental resources*<br>*****HIGH PRIORITY** MANAGEMENT PRACTICE*** | Individual investment<br>Incentive programs (GSWCC, Soil and Water Conservation Districts, NRCS)<br>GEFA<br>State agencies<br>GA-FIT | Cost estimates to develop groundwater sources include: well costs and may include land acquisition.<br>Costs are dependent on well depth, soil conditions, piping size and distance, and number of pump stations.<br>Cost estimates for development of municipal supply wells may have added costs for treatment.<br>Costs of wells for irrigation, which does not require treatment, may be less.[c] |
| ***SF3:*** *Evaluate streamflow augmentation via direct pumping from aquifers in order to support in-stream flows in dry periods* | Federal or state agencies | See comments for SF2 above |

| Management Practice | Potential Funding Sources | Notes and Sources |
|---|---|---|
| ***SF4:*** *Continue to evaluate and consider Aquifer Storage and Recovery (ASR) with thorough evaluation of potential impacts* | Municipal or industrial capital investment<br>Water and wastewater revenues<br>GEFA | Costs are dependent on well depth, soil conditions, piping distance, and number of pump stations.[c] Costs of evaluation of impacts and feasibility should also be considered. |
| ***SF5:*** *Continue development of farm ponds in the Lower Flint-Ochlockonee Water Planning Region* | Individual investment<br>Prior incentive programs no longer available | Estimated cost is for earth excavation and grading. Estimate does not include pumping and piping costs. |
| ***SF6:*** *Restrict the development of new land application systems (LAS) for municipal and industrial wastewater treatment* | State agencies | The Council recommends that new LAS be used only as a last resort. The Council recommends a feasibility study on the retirement of LAS. The study should address flow restoration estimates and funding needs. |
| ***SF7:*** *Encourage the development of a Habitat Conservation Plan (HCP) to provide habitat protection for endangered and threatened freshwater mussels in the Flint River Basin while improving water security for irrigation water supply needs within region.*<br>*****HIGH PRIORITY** MANAGEMENT PRACTICE*** | GA-FIT<br>State and federal agencies | The GA-FIT program will monitor aquifer health and support regional planning for instream flow management and conservation of federally listed endangered and threatened freshwater mussels in the region through the development of a Habitat Conservation Plan. |
| **WATER QUALITY (WQ)** | | |
| ***Issues Addressed*** | ***Point and nonpoint source water pollution*** | |
| ***Council Goals Addressed*** | ***1, 4*** | |
| ***WQ1:*** *Improve enforcement of existing permits and regulations and implementation of existing plans and practices* | State and federal agencies<br>Permit fees | Need to evaluate whether implementation and enforcement can be improved without additional expenditures.<br>Costs could include (but not limited to): site visits, training, and enhanced tools and practices for measuring and monitoring sediment loading. |

| Management Practice | Potential Funding Sources | Notes and Sources |
|---|---|---|
| ***WQ2:** Improve implementation of nonpoint source controls* | NRCS<br>Soil and Water Conservation Districts<br>319(h) grants<br>Other state and federal funding and incentive programs<br>Private investment | Costs could include (but not limited to): WMP installation and maintenance; public education; new ordinances.[c] |
| ***WQ3:** Continue to fund and implement water quality monitoring* | State agencies<br>Wastewater rates | Grab sampling includes monitoring chemical water quality annually for fecal coliform bacteria and traditional stormwater parameters (no metals). Habitat and benthos monitoring includes monitoring biological water quality annually through assessment of habitat and macroinvertebrate populations.[c] |
| ***WQ4:** Improve collection, coordination, and utilization of water quality data* | State agencies | Costs of coordination among agencies. |

Notes and Sources:

a) Programmatic costs will vary widely depending on the specific actions selected. Further study and data are needed to refine the evaluation of costs and benefits of selected practices. . All values should be viewed as planning level numbers that can be updated through further study and data collection regarding the level of baseline implementation already in place and the corresponding benefits achieved

b) Cost per million gallons is a cost benefit metric, which is defined as the total 2010 costs divided by the total millions of gallons yielded or saved through conservation per year.

c) Source: GAEPD. Supplemental Guidance for Regional Planning Contractors: Water Management Practice Cost Comparison, Revised April 2011 Available on the state water planning website.

## 7.2 Alignment with Other Plans

The development of this Plan by the Lower Flint-Ochlockonee Water Planning Council builds upon a knowledge base developed in previous planning efforts by state and local governments and authorities. In the last planning cycle, the Council conducted a comprehensive review of existing local and regional plans and relevant related documents that concern water resources to frame the selection of management practices.

The Council also ensured alignment with other Regional Water Plans by coordinating with neighboring water planning councils and the Metropolitan North Georgia Water Planning District. The Council participated in a joint meeting with several other water planning councils, including the Upper Flint and Middle Chattahoochee Water Planning Councils. In this meeting, council members discussed shared issues relating to resource availability, quality, policy, regulatory, and funding issues.

The Lower Flint-Ochlockonee Water Planning Council included joint recommendations with the Upper Flint and Middle Chattahoochee Water Planning Councils in its 2011 and 2017 plans, and this revised plan updates the joint recommendations (see Section 6.3). The Council coordinated with these neighboring water planning councils with the support of the planning contractor to align the joint recommendations. Additionally, the Lower Flint-Ochlockonee Water Planning Council reviewed the draft water resources plan of the Metropolitan North Georgia Water Planning District in May 2022. Through these efforts, the Council has coordinated its plan with neighboring water planning councils and the Metropolitan North Georgia Water Planning District. No conflicts with these regional water plans have been identified.

## 7.3 Benchmarks

The benchmarks listed in Table 7-2 below will be used to assess the effectiveness of this Regional Water Plan's implementation and identify where revisions are needed. The Council selected both qualitative and quantitative benchmarks that will be used to assess whether the Plan's management practices address potential challenges identified by the resource assessment models between resource capacity and demand over time and whether the Council's vision and goals are being met (or progress is being made toward attainment). The benchmarks will be used to evaluate the effectiveness of this Plan at the next five-year plan review.

**Table 7-2: Benchmarks for Lower Flint-Ochlockonee Regional Water Plan**

| Management Practice | Benchmark | Measurement Tools | Time Period |
|---|---|---|---|
| ***All Management Practices*** | Revised resource assessments | Quantify the impacts of implemented management practices on the potential challenges identified by the resource assessments models for the Flint, Ochlockonee, Suwannee River Basins, the Upper Floridan Aquifer in the Dougherty Plain, and the Claiborne Aquifer | Next planning cycle (five years) |
| ***DEMAND MANAGEMENT (DM)*** | | | |
| ***Issues Addressed*** | ***Surface water and groundwater availability*** | | |
| ***Council Goals Addressed*** | ***1, 2, 3, 4*** | | |

| Management Practice | Benchmark | Measurement Tools | Time Period |
|---|---|---|---|
| ***All Demand Management Practices (DM1 through DM7)*** | Per capita water use; agricultural water use (interpretation of benchmark requires adjustment for climate and crops) | Update of per capita use estimates for next iteration of Regional Water Plan; agricultural water meter readings | Per capita water use: every five years; agricultural water meter readings: annually |
| ***DM2*** | Compliance with permit requirements | Progress reporting required for permittees | Annual |
| ***DM3 and DM4*** | Compliance with permit requirements and efficiency requirements of OCGA § 12-5-546.1 | Permit enforcement actions; incentive program implementation reporting; NRCS/ Extension agent estimates of practice implementation; continued and expanded survey of baseline implementation with updates | Enforcement: on-going; practice implementation: summary report for next planning cycle (five years) |
| ***DM6*** | Completion of research; implementation of recommendations | Final research reports; assessment of implementation of recommendations | Research results would be most useful if available for next planning cycle (five years) |
| ***DM7*** | Implementation of recommendations | GEFA Water and Wastewater Rates Dashboard[2] | Implementation on-going |
| ***SUPPLY MANAGEMENT AND FLOW AUGMENTATION (SF)*** | | | |
| ***Issues Addressed*** | ***Surface water and groundwater availability*** | | |
| ***Council Goals Addressed*** | ***1, 2, 3, 4*** | | |
| ***All Supply Management and Flow Augmentation Practices (SF1 through SF6)*** | Implementation of management practices | Perform regional survey to quantify implementation; gather details regarding implementation challenges and roadblocks where applicable | Next planning cycle (five years) |
| ***SF1*** | Completion of feasibility study; implementation of recommendations | Feasibility study; reservoir permitting, construction and improvement | Complete feasibility report by next planning cycle (five years) |

[2] GEFA maintains a website with Water and Wastewater Rates Dashboard: https://dashboards.efc.sog.unc.edu/ga

| Management Practice | Benchmark | Measurement Tools | Time Period |
|---|---|---|---|
| ***SF2*** | Number of surface water withdrawal conversions to groundwater withdrawals; evaluation of groundwater impacts; continued assessment of Claiborne Aquifer capacity to support this practice; cost estimates for conversions | Permit conversion records (GAEPD); groundwater availability resource assessment for next regional water planning cycle | Next planning cycle (five years) |
| ***WATER QUALITY (WQ)*** | | | |
| ***Issues Addressed*** | ***Point and nonpoint source water pollution*** | | |
| ***Council Goals Addressed*** | ***1, 4*** | | |
| ***All Water Quality Management Practices (WQ1 through WQ4)*** | Implementation of recommended management practices | Perform regional survey to determine the level of implementation; survey to gather details regarding implementation challenges and roadblocks where applicable | Next planning cycle (five years) |
| ***WQ1 and WQ2*** | De-listing of impaired streams | 303d/305b report | Biennial for impaired streams listing |
| ***WQ3*** | Continued availability of monitoring results that can be used in planning | GAEPD status update on monitoring data available for resource assessments; available monitoring data[3] | Next planning cycle (five years) |

## 7.4 Plan Updates

Meeting current and future water needs will require periodic review and revision of this Plan. The State Water Plan and associated rules provide that each Regional Water Plan will be subject to review by the appropriate regional water planning council every five years and in accordance with guidance provided by the Director of GAEPD, unless otherwise required by the Director for earlier review. These reviews and updates will allow an opportunity to adapt this Plan based on changed circumstances and new information arising in the five years after adoption of this Plan by the Lower Flint-Ochlockonee Water Planning Council and the GAEPD Director.

[3] GAEPD maintains a website with monitoring data and descriptions of monitoring programs: http://epd.georgia.gov/monitoring

## 7.5 Plan Amendments

Amendments to this Plan may be necessary as water resource policy conditions change in the Lower Flint-Ochlockonee Water Planning Region. Potential circumstances that may affect implementation include amendments to the list of endangered species and critical habitats, and implementation of water quality restrictions. The Lower Flint-Ochlockonee Water Planning Council intends that this Plan will be modified as necessary to address significant changes in this water planning region.

## 7.6 Conclusion

In this Plan, the Lower Flint-Ochlockonee Water Planning Council makes its recommendations to provide for a sustainable future for the Lower Flint-Ochlockonee Water Planning Region. While developing this Plan, the Council also identified information and water policy needs to support improved water resources planning and management in the future. The Council urges policy makers to act on its recommendations.

The Council sees this Plan as a starting point. The Council emphasizes the need for continued regional water planning to ensure that the water resources of the Lower Flint-Ochlockonee Water Planning Region and the state as a whole are managed in a sustainable manner that supports public health, natural ecosystems, and the economy and enhances the quality of life for all citizens.