SUMMARY: This section presents the water management practices recommended by the Upper Flint Council to address gaps identified by the resource assessment models between resource needs and capacities and to fulfill the Council's vision and goals.

Section 6. Addressing Water Needs and Regional Goals

6.1 Identifying Water Management Practices

The Upper Flint Regional Water Council considered the following as it selected management practices for this Plan:

- Existing plans and practices
- Gaps identified by the resource assessment models in the comparison of resource needs and resource capacities (see Sections 3 and 5)
- Council's Vision and Goals (see Section 1)
- ~~Results of a survey of Council members on management practices and criteria for evaluation~~
- Public input
- Coordination with local governments, neighboring councils, and the Metropolitan North Georgia Water Planning District

The Council's decision making process to adopt management practices and ~~sets of~~ 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 region, Council members met with representatives of neighboring councils and the Metropolitan North Georgia Water Planning District to discuss shared resource issues on multiple occasions. In these meetings, the Council worked with its neighbors toward adoption of coordinated or complementary management practices. Within the region, the Council sought to coordinate with local governments and build support for this plan through implementation of the Council's Public Involvement Plan.[2]

The Council identified several uncertainties that could impact plan implementation, including:

[1] These documents are available with the Council's Memorandum of Agreement in Supplemental Document 1 on the Upper Flint Council's website: http://www.upperflint.org/pages/our_plan/index.php [NEED TO UPDATE WHEN REVISED VERSION IS POSTED]

[2] ~~The process of selecting management practices is discussed in more detail in Supplemental Document 14 - Management Practice Selection Technical Memorandum, and the Council's public involvement plan is described in Supplemental Document 2 - Public Participation Technical Memorandum. Both documents are a~~Available on the Upper Flint Council's website: http://www.upperflint.org/pages/our_plan/Upper_Flint_Supplemental_Material.php

- ~~*Update of the Master Water Control Manual for the Apalachicola-Chattahoochee-Flint (ACF) River Basin by the U.S. Army Corps of Engineers:* This process is ongoing. More information can be found at the following website: http://www.sam.usace.army.mil/pa/acf-wcm/index.htm~~
- ~~*Consultation regarding the 2008 Biological Opinion provided to the U.S. Army Corps of Engineers by the U.S. Fish and Wildlife Service:* This process has been reinitiated pursuant to provisions of the Endangered Species Act as of September 20, 2010. The consultation will continue on-going depth distribution data collection and analysis to determine the minimum flows needed to protect listed species. More information on the process can be found at the following website: http://www.sam.usace.army.mil/ACF.htm[3]~~
- *Outcome of litigation in Florida v. Georgia No.142 by the U.S. Supreme Court:* A decision by the Supreme Court is expected in late 2017 or early 2018. The outcome of the case could have substantial implications for ACF management and implementation of regional water plans, but the impacts of the case are difficult to predict. The Council expects to be able to revise this Plan, if necessary, pending the outcome of this decision.
- *Implementation of ~~recently adopted~~ federal nutrient criteria for Florida's lakes and flowing waters:* These ~~new~~ water quality criteria have implications for water quality dischargers and other stakeholders in Georgia, because Georgia must meet the criteria at the state line. More information on the nutrient criteria is available on the following website: http://water.epa.gov/lawsregs/rulesregs/florida_index.cfm
- ~~*Potential state regulatory changes:* The State Water Plan proposed several changes to water management regulations, such as modifying the dissolved oxygen water quality standard and developing new water conservation requirements. Proposed rule-making will be considered by the Board of Natural Resources. Public notice of rule-making by the Board is provided on the following website: http://www.gadnr.org/board[4]~~
- *Information needs to support improved water quality and quantity management:* ~~Throughout~~ Since the regional water planning process began, ~~the planning process,~~ the limits of available information constrain~~ed~~ planning decisions, and the Council has identified numerous information needs to support improved future planning and management. For more detail on recommendations to address information needs, see Section 7.4.

~~[3] The Council does not believe that the current flow target at Woodruff Dam has adequate scientific justification, and it states its position and recommendation regarding the flow target in Section 7.4 of this plan.~~

~~[4] On January 26, 2011, the DNR Board adopted new rules addressing permits for interbasin transfers of water based on a recommendation in the State Water Plan (see DNR Rules Chapter 391-3-6).~~

- ~~*On-going litigation over ACF Basin water management and allocation with neighboring states:* The on-going litigation casts substantial uncertainty over future water resource management in the ACF and this water planning region.~~

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 the region.

Several supplemental documents were developed for the previous planning cycle that provided supporting information and analysis that was used to inform the Council in management practice selection. These documents were included as supplemental documents for the 2011 version of this Plan. While the documents are several years old, they still provide information that supported plan review and revision. These documents include the following, which can be found on Supplemental Material page of the Council's website:

- Public Participation Technical Memorandum
- Existing Regulatory and Local Plan Summary
- Agricultural Water Use Technical Memorandum
- EPD Technical Memorandum Flow Gap Analysis
- Management Practice Selection Technical Memorandum
- Water Conservation Technical Memorandum
- EPD Technical Memorandum Summary Future Resource Assessment

6.2 Selected Water Management Practices for the Upper Flint Region

The management practices selected by the 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**), Water Returns Management (**RM**), and Water Quality (**WQ**). Two management practices were selected by the Council as most important to fulfilling the Council's vision and goals and addressing gaps identified by the resource assessment models. These practices are marked as "high priority" management practices. A discussion of the management practices follows the table.

Table 6-1: Water Management Practices Selected for the Upper Flint Region	
Management Practice	**Description/Definition of Action**
DEMAND MANAGEMENT (DM) [5]	
Issues Addressed	***Surface water and groundwater availability ~~sustainability criteria; groundwater sustainable yields~~***
Gaps Addressed	***Surface water availability modeled ~~shortfalls~~ gaps at Bainbridge (Flint) and Alapaha (Suwannee); groundwater availability modeled ~~shortfalls~~ gap in Upper Floridan (Dougherty Plain) ~~and Claiborne~~***
Council Goals Addressed	***1, 3, 4, 5, 6***
DM1: *Continue to improve the agricultural water withdrawal metering program* *****HIGH PRIORITY** MANAGEMENT PRACTICE***	• The Council recommends continued improvement in the implementation of the agricultural water metering program to ensure that the data collected is as comprehensive, accurate, and useful as possible. • The Council recommends additional investment by the state in the metering program to ensure these outcomes. • The Council also recommends that the program continue to provide annual reporting to the public on collected data (while recognizing the confidentiality constraints on the use of the data).
DM2: *Implement non-farm water conservation practices in the region*	State regulations address the following water conservation practices~~Tier 1 and 2 Wwater conservation practices include those required by existing law or anticipated in upcoming state rule-making~~: • Submittal of water conservation plans by withdrawal permittees and demonstration by water withdrawal permittees of progress toward water conservation goals or water efficiency standards (Ga. Comp. R. & Regs R. 391-3-6-.07(4) and 391-3-2-.04(11)) • ~~(DNR Rule 391-3-6-.07 and 391-3-2-.04(11))~~ • Landscape irrigation limits based on Drought Response Level and as required by Ga. Comp. R. & Regs R. 391-3-30-.03 (with exemptions) ~~(4pm to 10am), as required by Water Stewardship Act of 2010, Section 4 (with exemptions) (OCGA §12-5-7)~~ • Even-odd watering restrictions for non-irrigation outdoor water uses during Drought Response Level 2 and 3 (Ga. Comp. R. & Regs R. ~~(DNR Rule~~ 391-3-30)

[5] ~~Supplemental Document 15 - Water Conservation Technical Memorandum reviews the information that the Council considered in selecting water conservation management practices. This document is available on the Upper Flint Council's website: http://www.upperflint.org/pages/our_plan/index.php~~

Table 6-1: Water Management Practices Selected for the Upper Flint Region	
Management Practice	**Description/Definition of Action**
	• ~~Public c~~Car wash best management practices and certification requirements (Ga. Comp. R. & Regs R. ~~facility regulations, which require best management practices (DNR Rule~~ 391-31-.03~~)~~) • ~~Demonstration by water withdrawal permittees of progress toward water conservation goals or water efficiency standards (State Water Plan, Section 8)~~ • Water loss auditing requirements for public water systems (serving more than 3,300 individuals), according to IWA/AWWA Water Audit Method[6] (Ga. Comp. R. & Regs R. 391-3-33, ~~International Water Association standards and practices required for drinking water providers (Water Stewardship Act, Section 3,~~ OCGA §12-5-4.1)Installation of submeters in multiunit residential buildings and certain retail and light industrial buildings granted a permit for construction after July 1, 2012 (OCGA 12-5-180.1) • Building code standards for high efficiency plumbing fixtures in new construction after July 1, 2012 (OCGA 8-2-3) • Building code standards for high efficiency cooling towers in new construction permitted after July 1, 2012 (OCGA 8-2-23) Additionally, the Council supports and encourages the adoption of voluntary water conservation measures. The Water Conservation Implementation Plan provides guidance to Georgia's seven major water use sectors on water conservation measures that can be adopted by water users.[7] ~~Amendment of local building codes to require sub-metering in multi-tenant buildings, installation of high-efficiency plumbing fixtures in all new construction, and installation of high-efficiency cooling towers in new construction (Water Stewardship Act, Sections 7, 8, and 9, OCGA §§ 12-5-180.1, 8-2-3, 8-2-23)~~
DM3: Encourage all water providers to implement education and outreach programs~~*Implement Tier 3 and 4 non-farm water conservation practices*~~	Raise awareness about the value of local water resources and the need to conserve; empower individuals and businesses to make informed decisions about their water using behavior and the fixtures and appliances they employ.~~Utilize incentive programs to support the use of these practices.~~

[6] American Water Works Association/International Water Association, *IWA/AWWA Water Audit Method*, Manual 36, 2009. <http://www.awwa.org/resources-tools/water-knowledge/water-loss-control.aspx>

[7] Water Conservation Implementation Plan: http://www.georgiawaterplanning.org/pages/technical_guidance/water_conservation_implementation_plan.php

Table 6-1: Water Management Practices Selected for the Upper Flint Region	
Management Practice	**Description/Definition of Action**
~~*with the support of incentive programs*~~	
DM4: *Implement ~~Tier 1 and 2~~ agricultural water conservation practices in the region*	Agricultural ~~Tier 1 and 2~~ water conservation practices required by existing law ~~or anticipated in upcoming state rule-making~~include: • Implementation of conservation requirements under the Flint River Basin Water Development and Conservation Plan (2006); see Management Practice DM6 • Agricultural irrigation efficiency requirements and schedule (OCGA § 12-5-546.1) • Compliance with ~~forthcoming requirement (~~the ~~established by~~Water Stewardship Act of 2010 (OCGA §12-5-31) regarding active, inactive, and unused permits The efficiency requirements adopted by OCGA 12-5-546.1 reflect benchmarks recommended by the Council in its 2011 plan, with some modifications. Additionally, the Council recommends the following as a long-term efficiency benchmarks:~~The Council endorses the following benchmarks for this practice:~~ ~~• By January 2012, all new, and by January 2020, all existing agricultural irrigation systems will have application efficiencies of 80% or greater.~~ • By January 2050, all irrigation systems will have application efficiencies of 90% or greater. • ~~By January 2015, 25% of farmers using irrigation on their fields will adopt irrigation scheduling based on crop needs and available water supplies.~~ By January 2020, 50% of farmers using irrigation on their fields will adopt irrigation scheduling based on crop needs and available water supplies. A focus on a desired performance outcome will support increased conservation while allowing farmers to select what practices and approach will work best for their own operations. Practices that farmers can use to attain this benchmark include low-pressure/full-drop nozzle irrigation systems, Variable Rate Irrigation, conservation tillage, irrigation scheduling, drip irrigation, as well as other conservation measures not listed here that best suit an individual farmer's operation.

Table 6-1: Water Management Practices Selected for the Upper Flint Region	
Management Practice	**Description/Definition of Action**
DM5: *~~Encourage~~Implement ~~incentive programs to support~~ Implement Tier 3 and 4 voluntary agricultural water conservation practices in the region with the support of incentive programs*	Incentive funding is available from the Soil and Water Conservation Districts and the Georgia Soil and Water Conservation Commission. ~~The Council endorses the following benchmarks for this practice:~~ ~~***By January 2012, all new, and by January 2020, all existing agricultural irrigation systems will have application efficiencies of 80% or greater.***~~ ~~***By January 2050, all irrigation systems will have application efficiencies of 90% or greater.***~~ ~~***By January 2015, 25% of farmers using irrigation on their fields will adopt irrigation scheduling based on crop needs and available water supplies.***~~ ~~***By January 2020, 50% of farmers using irrigation on their fields will adopt irrigation scheduling based on crop needs and available water supplies.***~~ ~~A focus on a desired performance outcome will support increased conservation while allowing farmers to select what practices and approach will work best for their own operations.~~ ~~Practices that farmers can use to attain this benchmark include low-pressure/full-drop nozzle irrigation systems, Variable Rate Irrigation, conservation tillage, irrigation scheduling, drip irrigation, as well as other conservation measures not listed here that best suit an individual farmer's operation.~~
DM6: *Manage agricultural water withdrawal permits in the Flint River Basin according to state regulations based on the 2006 Flint River Basin Water*	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.[8] If the moratorium is lifted, new and expanded permits should continue to be subject to the conservation in existing law and regulations based on the 2006 Flint River Basin Water Development and Conservation Plan and the 2014 amendments to the Flint River

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

Table 6-1: Water Management Practices Selected for the Upper Flint Region	
Management Practice	**Description/Definition of Action**
Development and Conservation Plan and other applicable state regulations and policy.~~Manage new agricultural water withdrawal permits in the region according to the 2006 Flint River Basin Water Development and Conservation Plan~~	Drought Protection Act.~~The 2006 Flint River Basin Water Development and Conservation Plan~~ The 2006 plan ~~limits~~ limited new agricultural withdrawal permits based upon expected impact on nearby wells and streams.[9] ~~Under t~~The 2006 plan applied the following requirements ~~apply~~ to new agricultural water withdrawal permits in the Flint River Basin: • New permits require mandatory conservation measures, such as end-gun shut off switches and leak prevention and repair, as a condition of the permit. • 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. • New permits in the Flint River Basin ~~have~~ require a $250 application fee and are valid for 25 years. The 2014 amendments to the Flint River Drought Protection Act require all irrigation systems in the Flint River Basin to meet certain efficiency requirements by 2020 (OCGA § 12-5-546.1).
***DM7**: Create an awards program to recognize agricultural irrigators for exemplary implementation of best management practices (BMPs) for water conservation*	• Program to be modeled after Georgia Forestry Commission awards program for BMP implementation. • This program should be coordinated with existing Georgia Soil and Water Conservation Commission programs.
SUPPLY MANAGEMENT AND FLOW AUGMENTATION (SF)	
Issues Addressed	***Surface water and groundwater availability ~~sustainability criteria; groundwater sustainable yields~~***
Gaps Addressed	***Surface water availability modeled ~~shortfalls gaps~~ at Bainbridge (Flint) and Alapaha (Suwannee); groundwater availability modeled ~~shortfalls~~ gap in Upper Floridan (Dougherty Plain) ~~and Claiborne~~***
Council Goals Addressed	***1, 2, 3, 4, 5***
***SF1:** Evaluate storage options in the Upper Flint Region that can provide for supply and*	• Eliminating the modeled gap for surface water availability at Bainbridge ~~will~~ would require the addition of storage that can be used to augment supply and flows in the Flint River Basin. • The Council recommends creation of a study commission to

[9] The 2006 Flint River Basin Water Development and Conservation Plan is available as Supplemental Document 6 on the Upper Flint Council's website: http://www.upperflint.org/pages/our_plan/index.php

Table 6-1: Water Management Practices Selected for the Upper Flint Region	
Management Practice	**Description/Definition of Action**
flow augmentation in dry periods *****HIGH PRIORITY** MANAGEMENT PRACTICE***	evaluate storage options within the Upper Flint Region. • A full range of storage and reservoir options should be evaluated. • The study commission's evaluation should assess potential locations, viability, cost, and implementation.
SF2: *Evaluate streamflow augmentation via direct pumping from aquifers in order to support in-stream flows in dry periods*	• In dry periods, streamflow might be augmented through direct pumping of groundwater into surface water streams. • Several factors could limit the potential use of this practice, including: groundwater yields, water quality, cost, aquifer impacts, and streamflow impacts of aquifer pumping. • A pilot project for streamflow augmentation is being implemented in the Lower Flint River Basin and continued evaluation of this project should inform future implementation of this management practice. • Recent revisions to the Flint River Drought Protection Act address the conservation of flows from state funded augmentation projects and require notification of downstream water withdrawal permittees regarding preservation of such flows (OCGA § 12-5-546.2).
SF3: *Replace surface water withdrawals with groundwater withdrawals, where feasible*	• This practice could support increased in-stream flows in some places in the region. • The Council recommends that this practice be implemented with incentives. • The Council recognizes that environmental and financial factors may limit the implementation of this practice. However, the Council supports reducing pressure on in-stream flows through an emphasis on increased use of groundwater in the region – for new and existing withdrawals. • The practice should only be used where site specific evaluation indicates that it is practical and it will not adversely impact environmental resources, especially groundwater. • The Council recommends further evaluation of the feasibility of this practice and its potential impacts on groundwater aquifers in the region. The Council acknowledges efforts by the state to evaluate groundwater development as an alternative water source in the past six years. These studies provide an important base of information, but do not support a comprehensive strategy for such groundwater development. The Council recommends continued efforts to support implementation of this management practice.

Table 6-1: Water Management Practices Selected for the Upper Flint Region	
Management Practice	**Description/Definition of Action**
SF4: *Use Aquifer Storage and Recovery (ASR) as needed for future water supplies in the region, with thorough evaluation of potential impacts*[10]	• ASR could be used in the region to withdraw and store surface water during periods of high flow and provide augmentation for flows or supply in dry periods. • The feasibility of an ASR project can vary greatly depending on location, condition of the receiving aquifer and water quality considerations. • ~~ASR is probably best suited to provide water supply storage; its capability to provide for in-stream flow augmentation has not been directly evaluated.~~ • The Council recognizes the need for further evaluation of specific proposals for ASR in the region on a case-by-case basis. 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. Further investigation of this practice should fully evaluate water quality and aquifer impacts.
SF5: *Encourage continued development of farm ponds in the region ~~through existing incentive programs~~*	• On-farm water storage filled in periods of high flow can replace direct pumping for irrigation from surface streams or wells during drought periods. • Impacts on flows through intercepted drainage and evaporative loss should be considered to minimize adverse impacts on surface water availability. • ~~Incentive funding is available from the Soil and Water Conservation Districts and the Georgia Soil and Water Conservation Commission.~~ • 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. EPD 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.
WATER RETURNS MANAGEMENT (RM)	

[10] COUNCIL MEMBERS: At the January meeting, some but not all members wanted to delete the management practice regarding ASR. Need to discuss at February meeting.

Table 6-1: Water Management Practices Selected for the Upper Flint Region	
Management Practice	**Description/Definition of Action**
Issues Addressed	***Surface water availability ~~sustainability criteria~~***
Gaps Addressed	***Surface water availability modeled ~~shortfalls~~ gap at Bainbridge (Flint) and Alapaha (Suwannee)***
Council Goals Addressed	***1, 3, 4***
RM1: *Restrict the development of new land application systems for wastewater treatment*	• A preference for treatment systems that discharge to surface water over land application of wastewater supports increased return flows to the surface water. • The Council recommends that new Land Application Systems be used only as an option of last resort. • Treatment by land application systems currently accounts for 14.5~~11~~% of total wastewater volume in the region. In Section 4.1.2, this proportion held constant in the wastewater treatment forecast. This management practice would seek to reduce the proportion treated by land application systems in the future.
WATER QUALITY (WQ)	
Issues Addressed	***Point and nonpoint source water pollution***
Gaps Addressed	***Water quality violations***
Council Goals Addressed	***1, 2, 3, 5, 6***
WQ1: *Improve enforcement of existing permits and regulations and implementation of existing plans and practices*	• Increase technical assistance from EPD to local communities for improved education and improved enforcement of erosion and sediment control.
WQ2: *Improve implementation of nonpoint source controls*	The Council recommends the following: • Encourage use of the Georgia Stormwater Management Manual or alternative equivalent stormwater management throughout the region. • Increase implementation of best management practices throughout the region for all industries. • Investigate and promote best management practices for water quality for all industries. • Encourage use of wastewater treatment systems with point source discharges where practicable and consider additional land application systems discharges only as a last resort (see management practice RM1). • Encourage local communities to increase stream buffer quality in the region.

The water quality management practices will be revised after the Feb meeting.

Table 6-1: Water Management Practices Selected for the Upper Flint Region	
Management Practice	**Description/Definition of Action**
	• Create a conservation land program that targets voluntary acquisition of stream buffers for water quality.
WQ3: *Increase education directed toward improving water quality*	• Improve education of local governments, industries, and individuals regarding the impact of activities on water quality in the region through multiple activities such as training courses for government staff and leaders focused on water quality and periodic water summits to highlight the water quality impacts challenges, and solutions shared by separate government agencies. • Establish a speakers' bureau to assist in educating local communities. • Encourage increased education on best management practices for dirt road maintenance; use of the Georgia Better Back Roads Field Manual should be encouraged.[11] • Encourage local communities to increase stream buffer quality in the region.
WQ4: *Improve water quality monitoring*	• Develop a better information base on water quality conditions to support improved resource assessment in the future. • Increase sampling sites in the riverine portion of the basin, where data was limited in the water quality resource assessment for this plan. • Include more wet weather samples to support evaluation of nonpoint source impacts. • Increase parameters sampled at each sampling location as needed to improve water quality database and future assessments.
WQ5: *Utilize technology to improve water resource management information*	Use tools such as computer mapping and database systems to: • Identify water quality "hot spots". • Document ongoing activities, such as existing monitoring programs.

The Council selected these management practices to apply to the whole Upper Flint Region. Although the 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 gaps identified by the resource assessment models between resource

[11] The Georgia Better Back Roads Field Manual (2009) is available from the Georgia Resource Conservation & Development Council, Inc. Electronic copies are available on the Internet: http://www.tworiversrcd.org/GABBR.htm

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

The Council has extensively discussed the gaps identified by the surface water availability and groundwater availability assessment models. The model results indicated ~~substantial~~ gaps for these resources at the Bainbridge node of the Flint River Basin and in the Upper Floridan aquifer in the Dougherty Plain (the latter only has a small amount of overlap with the Upper Flint Region). The identified gap in the Flint at Bainbridge relates to the depletion of surface water flows in drought periods, as a result of consumptive use of surface water and groundwater (from Subarea 4 of the Upper Floridan aquifer). ~~It also results from model assumptions used to project water diversions to upstream reservoirs.[12]~~ At many points in the period of record, the surface water availability gap identified by the model at Bainbridge is sufficiently large that it cannot be addressed without drastic suspension of consumptive water use, construction of large-scale storage, or both.

In 2010, the Council and neighboring councils (Lower Flint-Ochlockonee and Middle Chattahoochee) requested additional modeling from EPD to determine the scale of storage that would be needed to offset the gap at Bainbridge identified by the 2010 surface water availability resource assessment. The Council did not make this modeling request with the intention of proposing storage as the only management practice to address the gap, but rather, it made this request to aid Council members and others in understanding the magnitude of the gap and the potential management practices (storage or otherwise) needed to address it.[13]

The resource assessment model was run with this objective, and it was determined that the amount of storage needed to completely offset potential gaps ~~flow shortfalls~~ identified by the model in the 2010 resource assessment at Bainbridge is 162,223 acre-feet. The resource assessment model was updated in 2017, and the model indicates different results for potential gaps at Bainbridge, but in amounts of similar magnitude to the gap analysis from the 2010 resource assessment.

This storage offset estimate ~~amount~~ accounts only for the volume needed to offset the modeled ~~flow shortfall~~gap. It does not include additional volume that would be necessary (e.g., to offset evaporation, seepage, and other loss factors) or that might be added to provide for additional purposes (e.g., recreation). According to the model results, in 2007, a reservoir of 162,223 acre-feet would have been emptied completely to address the modeled gap at the Bainbridge node. Furthermore, it would not have completely offset the modeled flow shortfall because of evaporation and seepage losses. Therefore, this estimate is not a design estimate for a reservoir.

~~[12] As discussed in Sections 3 and 5, the Council questions the validity of these model assumptions and believes that they resulted in an overestimation of flow shortfalls in the Flint River Basin.~~

[13] The Council urges implementation of management practice SF1 in this plan. The Council has ranked this management practice as one of its highest priorities. This management practice calls for the evaluation of storage options in the Upper Flint Region to provide for supply and flow augmentation in dry periods.

It does, however, indicate that a reservoir, or reservoirs, of significant size would be needed to fully offset the ~~close the modeled~~ gap identified by the resource assessment model at Bainbridge.[14]

As described above, the Council selected management practices to address its vision and goals and gaps identified by the resource assessment models. However, the implications of the modeled gaps for other users, in-stream needs, and aquifer health are not fully understood; evaluation is needed to delineate and quantify the impacts of the modeled gaps. Without a more complete understanding of severity of these impacts, the Council would violate its own vision and goals if it were to recommend complete closing of the modeled gaps ~~at this time~~. The Council's vision and goals call for sustainable management of water resources that ensures that the welfare and needs of the region are met. They call for providing for the needs of all users, while protecting the economy, public health, and natural systems, and they specifically call for protection of the forestry and agricultural sectors of the regional economy. Complete closure of the modeled gaps would require complete cessation of water withdrawals by agriculture in dry periods unless and until offsetting storage or augmentation are implemented. Even with complete cessation of water withdrawal by agriculture in dry periods, the entire modeled gap cannot be closed. The complete cessation of consumptive use would have severe economic impacts for water users in the region, especially agriculture, and the economic impact on the state would be devastating. It would be a major water policy shift with extraordinary implications for the region's economy and quality of life. Such drastic action is not justified. Construction of large-scale storage or augmentation will ~~close~~ address gaps identified by the model. Therefore, it is the Council's position that the only way to satisfy the modeled gap at Bainbridge is to build one or more reservoirs in the Flint River Basin.[15]

The Council recognizes that the gaps identified in the resource assessments need further examination with regards to instream flow protection and environmental impacts and that construction of large-scale storage would require thorough evaluation to quantify environmental impacts and cost-effectiveness. Further, the assessments are designed to help the regional water councils identify areas where management practices might be needed to ensure that region's resources can sustainably meet long-term demands for multiple uses. The assessments are designed to be highly conservative in identifying potential impacts. The modeling exercise that was completed to determine how to fully offset the modeled flow shortfall informed the Council's selection of management practices, but it did not determine management practice selection. The Council recognizes both the value

[14] The results of the storage estimate model run for the Bainbridge node are described in Supplemental Document 16 - EPD Technical Memorandum: Summary Future (2050) Resource Assessment in ACF River Basins Scenario MidChat_SWFA0001, available on the Upper Flint Council's website: http://www.upperflint.org/pages/our_plan/index.php

[15] COUNCIL MEMBERS: Given the new paragraph that follows this sentence and provides further context to the gap analysis, do you want to edit this sentence or its under-lining?

and the limitations of the resource assessment model and relies on them as one input for guidance in planning.

Water conservation is a top priority management practice in this Plan. The Upper Flint Council recognizes that water users have already invested in and implemented a substantial portfolio of conservation practices in the region. Their prior conservation efforts should be taken into account and given credit toward compliance in the design of conservation programs and policies.[16]

Water quality is another priority for the Council. The Council recognizes that a large investment has been made in the region in Best Management Practices that have been implemented by municipalities, agriculture, forestry, and industry to protect and improve water quality. These prior efforts should be taken into account and given credit toward compliance in the design of water quality programs and policies.

As the planning process evolves, the Council recommends the development of more precise measures of the health of its water resources. This recommendation is explored further in Section 7.4.

[16] See Section 7.4 for a related recommendation on water conservation policy.

7.3 Alignment with Other Plans

The development of this plan by the Upper Flint Council builds upon a knowledge base developed in previous planning efforts by state and local governments and authorities. In the last planning cycle, the Upper Flint Regional Water Planning 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. A document summarizing this efforts is available on the Council's website: Existing Regulatory and Local Plan Summary. The Council considered known plan updates in the review and revision process for this Plan.

~~Numerous existing water resources related plans and information sources were consulted in the development of this plan. More information on these documents can be found in Supplemental Document 5 - Existing Regulatory and Local Plan Review and Supplemental Document 14 - Management Practice Selection Technical Memorandum, which are available on the Upper Flint Council's website (http://www.upperflint.org/pages/our_plan/index.php).~~

The Council also ensured alignment with other Regional Water Plans ~~was achieved~~ by coordinating with neighboring councils and the Metropolitan North Georgia Water Planning District. The Council participated in a joint meeting with several councils, including the ~~participating in a series of joint meetings, especially with the~~ Lower Flint-Ochlockonee, Middle Chattahoochee, and Coosa-North Georgia Councils and the Metropolitan North Georgia Water Planning District. In this meeting, council members discussed shared issues relating to resource availability and quality and policy, regulatory, and funding issues.

The Council included joint recommendations with the Lower Flint-Ochlockonee and Middle Chattahoochee Councils in its 2011 plan, and this revised plan updates the joint recommendations (see Section 7.4). The Council coordinated with these neighboring councils with the support of the planning contractor to align the joint recommendations. Additionally, the Council reviewed the draft water resources plan of the Metropolitan North Georgia Water Planning District [and submitted comments to the District on the draft plan]. The Council's region also includes a small part of the Suwannee River Basin, and therefore, the planning contractor supported the council in reviewing the Satilla-Suwannee Water Council's plan to ensure plan alignment for shared resources. ~~As a result of this collaboration~~Through these efforts, ~~where possible,~~ the ~~c~~Councils ~~has~~ coordinated ~~their~~ its P~~p~~lans ~~s~~ with the plans of neighboring councils and the Metropolitan North Georgia Water Planning District. No conflicts ~~between~~ with these other regional water plans have been identified.

Alignment with the existing Flint River Basin Regional Water Development and Conservation Plan (2006) was considered by the Council. While the Council's

recommendations improve upon the 2006 plan, none of its recommendations conflict with that plan.[1]

7.4 Recommendations to the State

The Upper Flint Council has identified several recommended actions that would improve water resource management and planning in this 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). Implementing agencies 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 becomes available, it should be incorporated into future cycles of this regional water planning process, and the resource assessment models should be modified to reflect up-to-date information as it is developed.

- Improve resource assessment models used in the regional water planning process through increased use of actual water use and resource conditions data. The incorporation of agricultural water meter data in the forecasts and resource assessments was a notable improvement in this planning cycle. The Council urges continued adoption of actual data, where possible. The Council recommends expanded use of data collected by local governments and water and wastewater systems in the region in the forecasts and resource assessments.
- Evaluate the environmental and other impacts of low flow conditions modeled at the Bainbridge planning node; determine a low flow criteria below which adverse ecosystem impacts are predicted.
- Increase the number of surface water availability model planning nodes (used as evaluation points) in the Flint River Basin to support more detailed geographic understanding of water resource conditions. The addition of the planning node at Carsonville in this planning cycle provides valuable information to support the resource assessment. To support more refined analysis of the modeled flow gap at Bainbridge, the Council recommends the addition of a new planning node between Montezuma and Bainbridge on the Flint River.
- Improve assessment of groundwater use and recharge to support better understanding of impacts of use on aquifers and streamflow and to support

[1] The 2006 Flint River Basin Regional Water Development and Conservation Plan is described in Section 2.3 and a copy of the 2006 plan is provided as Supplemental Document 6 on the Upper Flint Council's website: http://www.upperflint.org/pages/our_plan/index.php

protection for aquifer recharge areas. The Council recognizes improvements in this planning cycle to assess groundwater availability, and it urges continued efforts to improve our understanding of aquifer health. In particular, very little information is available to the Council on aquifer recharge areas. This information would support planning for enhanced aquifer protection.

- The Council recommends that the state evaluate the costs and benefits of reducing the minimum threshold at which permits are required for water withdrawals (surface water and groundwater) to 10,000 gallons per day (from 100,000 gallons per day).
- Conduct a comprehensive assessment of baseline implementation of water conservation and water quality Best Management Practices (BMPs) by agricultural producers. The Council recognizes that state and federal agencies have existing programs that measure BMP implementation, but at this time, a comprehensive baseline assessment is lacking. A comprehensive field survey of BMP implementation, such as the one conducted periodically by the forestry industry, would support estimation of potential benefits of future implementation, tracking of implementation progress, and BMP prioritization.
- Evaluate the full water cycle impacts of irrigation and evaporative losses from reservoirs to support better understanding of these factors in water resource planning.
- ~~Encourage State and Federal agencies to reevaluate the scientific justification for the minimum flow requirements for maintaining healthy aquatic ecosystems below Jim Woodruff Lock and Dam in the Apalachicola River. It is the opinion of this Council that the 5,000 cubic feet per second instantaneous flow target in the 1989 Water Control Manual (current operating plan when this plan was published) does not have sound scientific justification.~~
- Improve implementation of the agricultural water withdrawal metering program of the Georgia ~~Soil and Water Conservation Commission~~Environmental Protection Division by:
    - Completing comprehensive installation of meters
    - Ensuring the meters are functioning properly through regular maintenance inspection
    - Increasing data collection on parameters including monthly use, crops, inputs
    - Continuing to r~~R~~eport~~ing~~ aggregate results annually to permittees and policymakers
    - Continuing to p~~P~~repare~~ing~~ collected data in a manner that will facilitate use in future resource assessments
- Evaluate implementation and effectiveness of water conservation practices. Water conservation is a priority focus of the management practices in this plan, but there are currently several practical limitations to measuring

progress and impact in conservation implementation, such as inconsistent terminology, lack of available data and the need to identify practical ways of collecting data. Periodically, it will be important to assess the progress and benefit of the water conservation program.

- Evaluate the impacts of farm ponds and amenity ponds on stream flows through intercepted drainage and evaporative loss. ~~Also~~Continue to improve how farm pond withdrawals are incorporated into the resource assessment models. More information on the potential for evaporative loss is needed to assess the impacts of farm and amenity ponds.

- Evaluate the use designations assigned to stream reaches in the Upper Flint Region as a part of the Triennial Review of Georgia Water Quality Standards. This review is intended to ensure that water quality performance criteria reflect actual conditions, in terms of both use and quality.

These two recommendations will be revised after the Feb meeting.

- Conduct a peer review of the lake and watershed water quality assessment models to better understand the methodology as it relates to the output and calibration. Pending the review, the Council recommends that the model outputs not be utilized for setting water quality standards in-stream or for any other regulatory purposes including point source permitting in the region.

Water Policy Recommendations:

The following recommendations urge the General Assembly and other policymakers in Georgia (e.g., Board of Natural Resources) to pursue actions to improve water resource management in the state and in the Upper Flint Region.

- The Council recommends that the Georgia General Assembly provide funding for continued planning by the regional water councils, as described in Section 14 of the State Water Plan, in order to ensure continued progress toward the vision and goals of the state and regional water plans. 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 councils, and continued refinement of water resource assessments used in the development of the regional water plans.

- The Council recommends that the Georgia General Assembly and implementing agencies, such as EPD, explore all possible funding sources to offset or pay for many of the management practices outlined in the Plan. Financial incentives and reimbursement for implementation of practices will expedite the progress needed to achieve the goals of the Plan.

- The Council recommends that EPD and other agencies with water policy responsibilities should design water conservation policy and regulations to recognize and credit water users for conservation practices that they have already implemented. Conservation policies and regulations should prioritize addressing consumptive over nonconsumptive uses. Additionally,

conservation policy and regulations should be designed with an emphasis on cost-effectiveness as a key criterion.

- The Council urges the Georgia General Assembly and other state policymakers not to preclude interbasin transfer as an option for future water management in the region, as needed and following thorough scientific evaluation. Interbasin transfers of water exist in many places in Georgia at this time. The Council recognizes that interbasin transfers (existing or future) can play an important role in water resource management. Interbasin transfers of water can provide supply or flows to a receiving basin where water is needed. Rules ~~recently~~ adopted by the Georgia Board of Natural Resources in January 2011 will help to ensure that future permits for interbasin transfers are thoroughly evaluated.[2]

- The Council recommends that irrigation suspension be used only through implementation of the Flint River Drought Protection Act, only by voluntary means, with notification to farmers before March 1 when possible, and only as a last resort when other options are not available to address severe flow depletions. The Council supports voluntary implementation of the Flint River Drought Protection Act (OCGA §12-5-40) by EPD through an irrigation suspension auction, when absolutely necessary in abnormally dry periods and when other options are not available to address severe flow depletions. When possible, EPD should provide notification of use of the Flint River Drought Protection Act before the March 1 drought declaration deadline. Earlier notification to farmers would inform planting decisions and help reduce the cost to farmers and to the state for irrigation suspension. The Council acknowledges ~~the need~~ efforts to improve drought prediction tools to support earlier notification and supports EPD efforts to develop better predictive tools. The Flint River Drought Protection Act has not had adequate funding in recent years, and a reliable source of funding is needed.

This recommendation will be revised after the Feb meeting.

- The Council recommends that the Georgia General Assembly legislate authority to the regional water councils, including the Upper Flint Council, to manage, plan and provide oversight of water resources within each region around the State. Funding should be provided to the councils from State appropriations. Revenue raising authority should be considered for these councils (similar to the Metropolitan North Georgia Water Planning District). Funding raised should be used to provide for coordination and implementation of regional and state water plans and for studies, assessments and future plan updates within the respective regions.

- The Council urges the State to seek a timely resolution of current interstate water issues that directly affect the Apalachicola-Chattahoochee-Flint Basin. The Council recommends the development of a tri-state framework designed to address interstate water issues in the future and the inclusion of the

[2] See DNR Rules Chapter 391-3-6-.07.

regional water councils within this framework. The Council requests that it be supported in making any updates to this Plan as needed to address changes in ACF Basin management as a result of the settlement, resolution, or decision in on-going inter-state litigation or similar events that have the potential to substantially change how the Basin is managed.

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

Coordinated Recommendations with Neighboring Councils:

Since the beginning of regional water planning in Georgia in 2009, ~~Throughout the process of developing this plan,~~ the Upper Flint Regional Water Council has met several times with neighboring regional water councils to discuss shared water resources and topics of concern. The Council met several times with the Lower Flint-Ochlockonee and Middle Chattahoochee Councils and developed a collaboration with these councils that led to their agreement on a set of joint recommendations in 2011. In this planning cycle, the three councils reviewed and revised their joint recommendations. The following joint recommendations were approved by all three councils in 2017. 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 Upper Flint 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 Upper Flint, Lower Flint-Ochlockonee, and Middle Chattahoochee Councils:

- Recognize the critical need 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 consider the following: better utilization of existing storage in the Chattahoochee, new storage in the Flint, and enhancement of existing storage capacity.
- Urge EPD and those involved in the resource assessment modeling to improve upon existing models for future regional water planning by further expanding ~~making greater~~ use of actual and current data on water use and

conditions and ~~by developing~~continuing to refine modeling assumptions ~~that~~ to more closely approximate actual conditions.

- ~~Request that state and federal agencies reevaluate the scientific justification for the minimum flow requirements at Woodruff Dam that are intended to maintain healthy aquatic ecosystems.~~