Technical Memorandum

From: Surface Water Availability Resource Assessment Team – Yi Zhang
To: Regional Planning Councils, EPD Planning Team, Planning Contractors, File
Date: July 20, 2010

Subject: Summary Future (2050) Resource Assessment in Apalachicola – Chattahoochee – Flint (ACF) River Basins Scenario MidChat-SWFA0001

Introduction

The purpose of this memorandum is to summarize the results of future Resource Assessment Scenario MidChat-SWFA0001 in the ACF Basins with projected 2050 water use conditions. The projected water use conditions (including municipal, industrial, thermal energy, and agricultural) were provided by EPD Planning Team in May 2010 and revised in June 2010.

We used Hec-5 model in both Current Resource Assessment and 2050 Future Resource Assessment Scenario MidChat-SWFA0001. The objective of 2050 Future Resource Assessment Scenario MidChat-SWFA0001 is to provide Regional Planning Councils and their Planning Contractors an estimate of the amount of storage needed to meet both the off-stream and instream needs at the Bainbridge Planning Node, where a significant gap between available resource and the needs exist, as indicated by the 2050 Future Resource Assessment without additional Management Practices.

Model Settings and Key Assumptions

The ACF Basin model contains 6 Planning Nodes and corresponding sub-basins (or 15 Basic Nodes and corresponding Local Drainage Areas). (See Figure 1.)

The hydrological conditions incorporated in the model include unimpaired incremental flow on daily basis for the period between 1939 and 2007. The flow data have been incorporated at all 15 Basic Nodes.

Forecast annual average withdrawal and discharge of each Sub-basin has been temporally distributed to monthly values according to intra-annual patterns of current conditions. The Sub-basins are the finest spatial resolution in the planning models. The water use data do not reflect any single individual facilities, existing or planned.

We assumed continued operation of the ACF system per the Army Corps of Engineers' Revised Interim Operation Plan (RIOP), as we have modeled under Current Resource Assessment.

In unregulated portion of the basin, Flow Regime is defined by the State's Interim Instream Flow Protection Policy, which calls for the protection of monthly 7Q10 or

natural inflow, whichever is lower. In the ACF Basins, this applies to the Montezuma and Bainbridge Nodes.

In regulated portion of the basin, Flow Regime is limited to locations where an explicit flow requirement is specified by the Army Corps of Engineers, Tennessee Valley Authority, or Federal Energy Regulatory Commission (FERC). In the ACF Basins, this applies to the Whitesburg, Columbus, Columbia, and Jim Woodruff Nodes.

The modeling request states that the modeling team should develop incremental storage at each LDA (we assume that this means sub-basin) that facilitates bridging of resource gaps. Since the most significant gap takes place at the Bainbridge Node, under both Current and 2050 with no additional Management Practice, we placed a large amount of storage in the Bainbridge sub-basin. If the storage is large enough, the gap identified in the Current Resource Assessment as well as in the 2050 Future Assessment without additional Management Practices will be closed. The necessary storage to achieve bridging the gap is then the maximum drawdown in the simulated storage change. This is how we determine the amount of storage needed.

Summary of Results

Montezuma Planning Node:

With projected 2050 water use and no additional MP's, there is almost no gap between simulated flow and Flow Regime. The percentage of time when there is a flow shortage is almost 0%, with an average shortfall of 1 cfs. This trivial gap only exist for a few days from the modeling results, and we believe truncation of insignificant digits contributed to the shortfalls.

Under Scenario MidChat-SWFA0001, there is no change to the results at the Montezuma Node, as shown in Table 1.

Table 1. Summary of Montezuma Node

	Length of Shortfall(% of time)	Average Shortfall (cfs)	Long-term Average Flow (cfs)	Maximum Shortfall (cfs)	Corresponding Flow Regime (cfs)
Current	0%	<1 0.6 mgd	3421 2211 mgd	1 0.6 mgd	593 383 mgd
2050	0%	<1 0.6 mgd	3409 2203 mgd	1 0.6 mgd	593 383 mgd
MidChat-SWFA0001	0%	<1 0.6 mgd	3409 2256 mgd	1 0.6 mgd	593 383 mgd

Bainbridge Planning Node:

With projected 2050 water use and no additional MP's, we do see a significant gap between the simulated flow and the flow regime at this node as shown in Table 2. The percent of time when there is a flow shortage is 13%, with an average shortfall of 355 cfs.

Under Scenario MidChat-SWFA0001, a large amount of storage was added to the Bainbridge sub-basin. This storage serves to meet water supply needs and eliminate any Flow Regime shortage. The storage is replenished when inflows are above monthly 7Q10 levels. Storage changes over time because of the two types of operations described above. Going through the most critical period, the largest drawdown in storage is what is needed in storage to bridge the gap between available resource and the total needs. The model results show that 162,223 ac-ft of storage is needed in order to eliminate the gap under projected 2050 demand. The statistics are shown in Table 2.

Table 2. Summary of Bainbridge Node

	Length of Shortfall(% of time)	Average Shortfall (cfs)	Long-term Average Flow (cfs)	Maximum Shortfall (cfs)	Corresponding Flow Regime (cfs)
Current	13%	352 227 mgd	7910 5113 mgd	1376 890 mgd	2506 1620 mgd
2050	13%	355 229 mgd	7904 5108 mgd	1295 837 mgd	2506 1620 mgd
MidChat-SWFA0001	0%	1 0.6 mgd	7906 5110 mgd	1 0.6 mgd	2008 1298 mgd

Whitesburg Planning Node:

With projected 2050 water use and no additional MP's, our model was able to meet all consumptive water demand in this Sub-basin, as shown by Table 3.

In comparison to the scenario with projected 2050 water demand without additional Management Practices, the lowest storage at Lanier under Scenario MidChat-SWFA0001 is slightly better. The storage in the Flint River Basin does not change the fact that all water use needs as well as at-site release requirements are met. Flow requirement of 750 cfs at the Peachtree Creek gage is also met at all time.

Table 3. Summary of gap at Whitesburg Node

	Demand Shortage (cfs)	At-site Flow Requirement Shortage (cfs)	Minimum Reservoir Conservation Storage at Lake Lanier (acre-feet)	Minimum Percentage Reservoir Conservation Storage Lake Lanier	Basin-wide Flow Requirement Shortage
Current	0	0	540,021	50%	None
2050	0	0	424,998	39%	None
MidChat-SWFA0001	0	0	426,383	39%	None

Columbus Planning Node:

With projected 2050 water use and no additional MP's, our model was able to meet all consumptive water demand in this Sub-basin, as shown by Table 4.

In comparison to the scenario with projected 2050 water demand without additional Management Practices, the lowest storage at West Point Lake under Scenario MidChat-SWFA0001 is slightly better. The storage in the Flint River Basin does not change the fact that all water use needs as well as at-site release requirements are met. Release requirement of 675 cfs at the West Point Dam is also met at all time.

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Table 4. Summary of gap at Columbus Node

	Demand Shortage (cfs)	At-site Flow Requirement Shortage (cfs)	Minimum Reservoir Conservation Storage at West Point (acre-feet)	Minimum Percentage Reservoir Conservation Storage West Point	Basin-wide Flow Requirement Shortage
Current	0	0	14,310	5%	None
2050	0	0	14,269	5%	None
MidChat-SWFA0001	0	0	14,446	5%	None

Columbia Planning Node:

With projected 2050 water use and no additional MP's, there is no shortage in meeting water demand in this Sub-basin, as shown by Table 5.

In comparison to the scenario with projected 2050 water demand without additional Management Practices, the lowest storage at Walter F. George under Scenario MidChat-SWFA0001 is about 5% better. The storage in the Flint River Basin does not

change the fact that all water use needs are met. There is not a minimum release requirement at Walter F. George.

Table 5. Summary of gap at Columbia Node

	Demand Shortage (cfs)	At-site Flow Requirement Shortage (cfs)	Minimum Reservoir Storage Conservation at W.F. George (acre-feet)	Minimum Percentage Reservoir Conservation Storage W.F. George	Basin-wide Flow Requirement Shortage
Current	0	0	41,076	17%	None
2050	0	0	45,770	19%	None
MidChat-SWFA0001	0	0	59,607	24%	None

Jim Woodruff Planning Node:

With projected 2050 water use and no additional MP's, there is no shortage in our model meeting water demand in this Sub-basin, as shown by Table 6. The additional storage in the Flint River Basin has some minor beneficial effects on the storage in the Chattahoochee River Basin, as shown in Table 6.

Table 6. Summary of gap at Jim Woodruff Node

	Demand Shortage (cfs)	At-site Flow Requirement Shortage (cfs)	Minimum Composite Conservation Storage (acre-feet)	Minimum Percentage Composite Conservation Storage	Basin-wide Flow Requirement Shortage
Current	0	0	652,974 at Buford, WP, & WFG	40% at Buford, WP, & WFG	None
2050	0	0	565,765 at Buford, WP, & WFG	35% at Buford, WP, & WFG	None
MidChat-SWFA0001	0	0	592,039 at Buford, WP, & WFG	36% at Buford, WP, & WFG	None

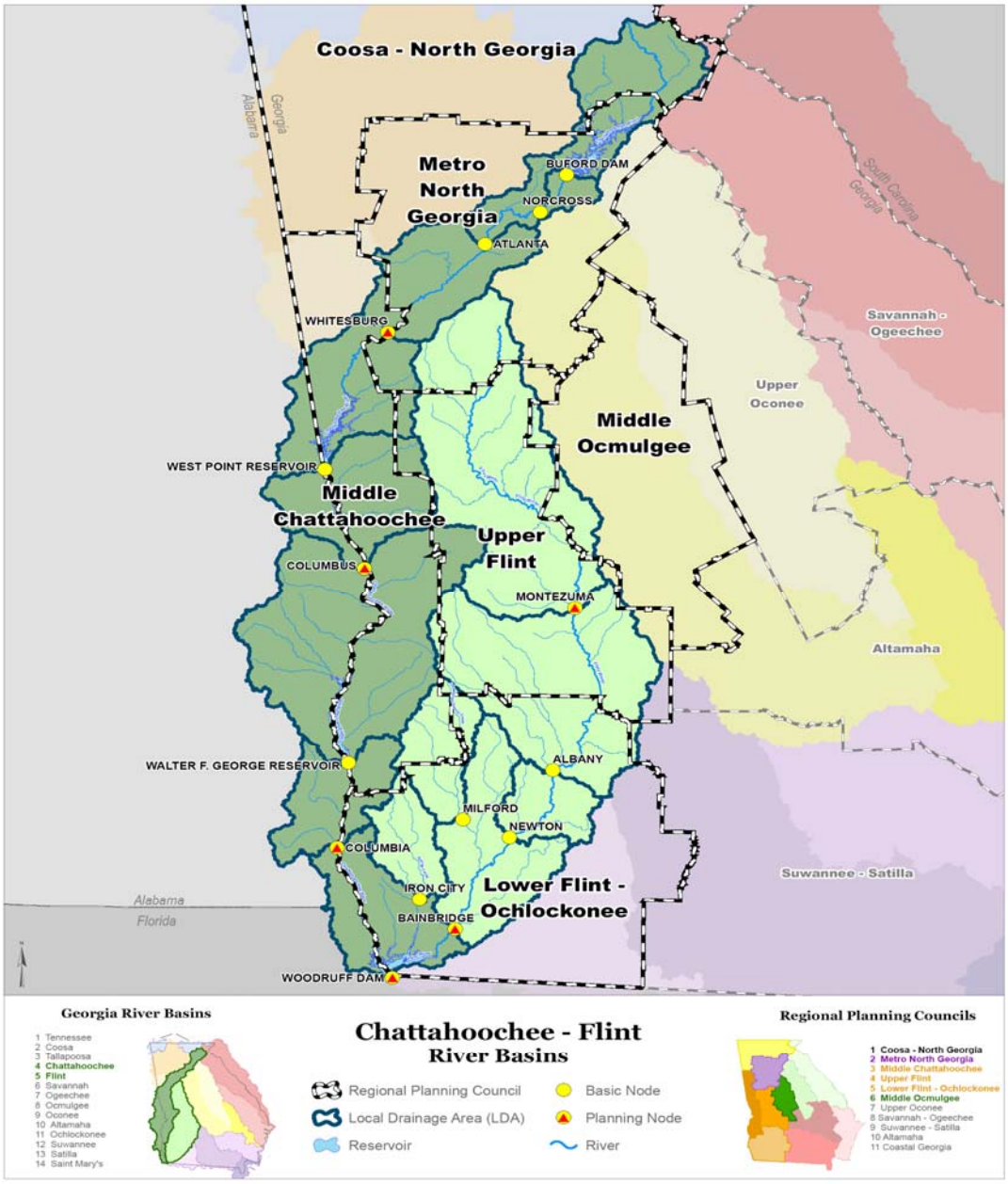

Figure 1. The Chattahoochee – Flint River Basins