Georgia's
State Water Plan

Regional Water Plan Review and Revision
Savannah Upper Ogeechee
Regional Water Planning Council
Council Meeting 1
March 9, 2016

www.georgiawaterplanning.org

Introduction

- Welcome from Chair Cross
- Acknowledge Elected Officials
- Council and Contractor Introductions
- Review Agenda

Introduction

- Registration and Public Comment sign in
  - Sign up for public comments during morning registration period (to ensure enough time is allotted)
  - Please limit comments to 3 minutes total
  - Council encourages written submission of comments as well, to ensure meeting summaries accurately reflect comments

Introduction

Georgia EPD Contacts

- Jeff Larson – Point of Contact, Savannah Upper Ogeechee
- Jennifer Welte – Project Manager for Review & Revision Process

- Dr. Elizabeth Booth – Surface Water Quality Resource Assessment
- Dr. Wei Zeng - Surface Water Quality Resource Assessment
- Dr. Jim Kennedy – Groundwater Resource Assessment

Introduction

Planning Contractor – CDM Smith/Jacobs Team

- Primary Council Support – Katherine Atteberry, Jacobs

- Overall Project Manager - Shayne Wood, CDM Smith
- Technical Advisor - Rick Brown

Project Area Leads:

- Demand Forecasting – Bill Davis, CDM Smith
- Water Availability Resource Assessments – Lee Wiseman, CDM Smith
- Management Practices – Dale Jones, Jacobs

Georgia

Georgia's
State Water Plan

Review and Revision (Round 2 Planning)
Overview and Schedule

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Review and Revision Overview and Schedule

THANK YOU to Interim Planning Contractors:

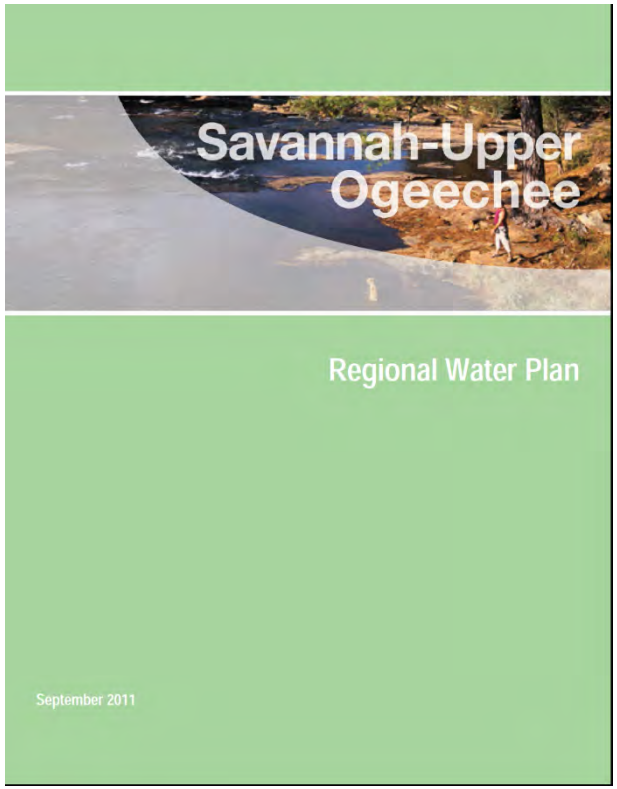
- Carl Vinson Institute of Government, University of Georgia
  - Altamaha; Coastal; Savannah-Upper Ogeechee; Suwannee-Satilla
- Middle Georgia Regional Commission
  - Upper Oconee; Middle Ocmulgee
- North Georgia Regional Commission
  - Coosa
- Georgia Water Planning and Policy Center
  - Middle Chattahoochee; Lower Flint-Ochlockonee; Upper Flint

Review and Revision Process will incorporate, as needed, the findings and conclusions that Council arrived at during the interim planning period

Georgia

Review and Revision Overview and Schedule

- Councils will focus on:
  - Evaluating updated water demand and wastewater forecasts
  - Evaluating updated energy and agricultural forecasts
  - Reviewing existing Industrial forecasts
  - Evaluating updated Surface Water and Ground Water Availability Resource Assessments (**Quantity**); and updated Surface Water **Quality** Resource Assessment
  - Evaluating and refining Management Practices, if needed



Review and Revision Overview and Schedule

15 Month Process

Meeting One
1st Quarter 2016
(Today)

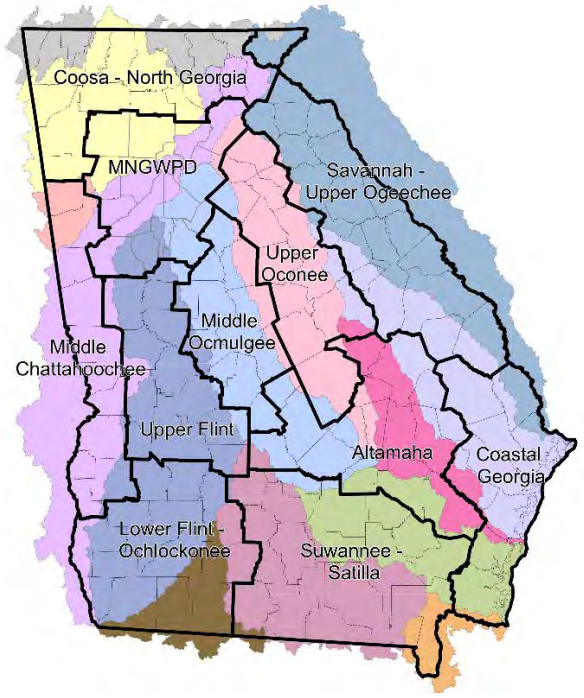
Meeting Two
Joint Council Meeting
2nd Quarter 2016

Meeting Three
3rd Quarter 2016

Meeting Four
4th Quarter 2016
Draft Plan

Meeting Five (Final)
1st Quarter 2017
Incorporate Comments

Water Planning Regions



EPD adoption of revised Regional Water Plan by March 31, 2017

Georgia

Review and Revision Overview and Schedule

Revisions to Regional Water Plans will be submitted in sections

Section 1 *Due: April 2016*	Section 2 *Due: July 2016*	Section 3 *Due: October 2016*
• M & I Forecasts • Energy Forecast	• Agricultural Forecast • Resource Assessment/ Gap Updates	• Response to Council Modeling Scenario Requests • Management Practices

FINAL DRAFT – DECEMBER 2016

- 45-day comment period / concurrent review (EPD)
- **Feb 2017** Review and incorporate comments / changes (Council)
- **Feb 28, 2017** Council submits final plan to EPD

FINAL PLAN – EPD TO ADOPT MARCH 31, 2017

Georgia

2011 Regional Water Plans

How were the 2011 Plans used?

- Used by EPD to Guide Permitting Decisions
- Used by EPD and GEFA to inform funding decisions
- Facilitated improvement to Resource Assessment Methods
- Facilitated additional research and data gathering for agricultural water use

- Select Projects/Activities Associated with Water Planning
  - Priority grant funding (Section 319(h) nonpoint source grant)
  - Aquifer Storage and Recovery pilot project in Flint River Basin
  - Ground water to surface water pilot project in Flint River Basin
  - Cretaceous well feasibility study to address Salt Water Intrusion
  - Water Quality Improvement projects in Coosa and Upper Savannah and Coastal Regions

Georgia

Georgia's

State Water Plan

Vision and Goals

www.georgiawaterplanning.org

Vision and Goals

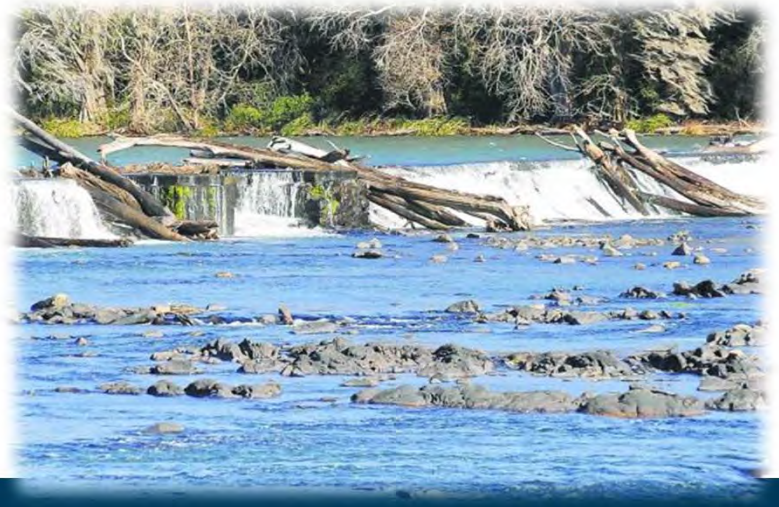
- In Round 1, each Council went through an extensive visioning process to develop Vision and subsequent supporting Goals
  - Goals and Vision are required by State Water Plan, Section 14
  - Council Vision will guide and frame the selection of management practices

Vision and Goals

Savannah Upper Ogeechee Adopted Vision

as adopted by the Council 10.10.09

The Savannah and Ogeechee Rivers along with the region's groundwater resources will provide high quality and quantity water supplies for balanced growth while protecting the natural and built environments. The Savannah – Upper Ogeechee Regional Water Planning Council, through collaboration with stakeholders, will formulate river basin policies based on current and developing technologies and conservation methods. Because of the results of our council and other council's efforts Georgia will be recognized across the country as the leader in water resource management.



Source: Augusta Chronicle

Georgia

Vision and Goals


Source: Ogeechee River Mill

Savannah Upper Ogeechee Adopted Goals

as adopted by the Council 10.10.09

1. Plan for sufficient water supplies to support planned economic development and residential, industrial, agricultural, recreational, and utility services in a sustainable manner.
2. Prohibit interbasin transfers. (See also resolution passed by the Council, November 10, 2009).
3. Work with EPD to establish ongoing relationships with South Carolina stakeholders and other Water Planning Councils to equitably address water sharing issues.
4. Work to enhance the public's understanding of regional water issues and the need for support of new policies to protect future resources.
5. Identify opportunities for water reuse and conservation in the region.
6. Maintain and strive to improve the quality and quantity of the water of the region to protect species and habitat while balancing the needs of humans.
7. Form a permanent Savannah-Upper Ogeechee Water Council as the conduit for bringing together all stakeholders and assisting the State with implementation of water resource goals.

Georgia

Vision and Goals

Discussion:

1. Have any new major water issues developed in the region?

2. Has your vision for this region regarding water resources changed substantially over the last 5 years?

3. Are there any emerging issues on the planning horizon that would warrant changing your goals for the region?

- If answers are substantively no, revisions to your Vision and Goals may not be necessary.

Georgia's

State Water Plan

Memorandum of Agreement
Operating Procedures
Meeting Rules
Public Involvement Plan

www.georgiawaterplanning.org

Council Responsibilities and Operations

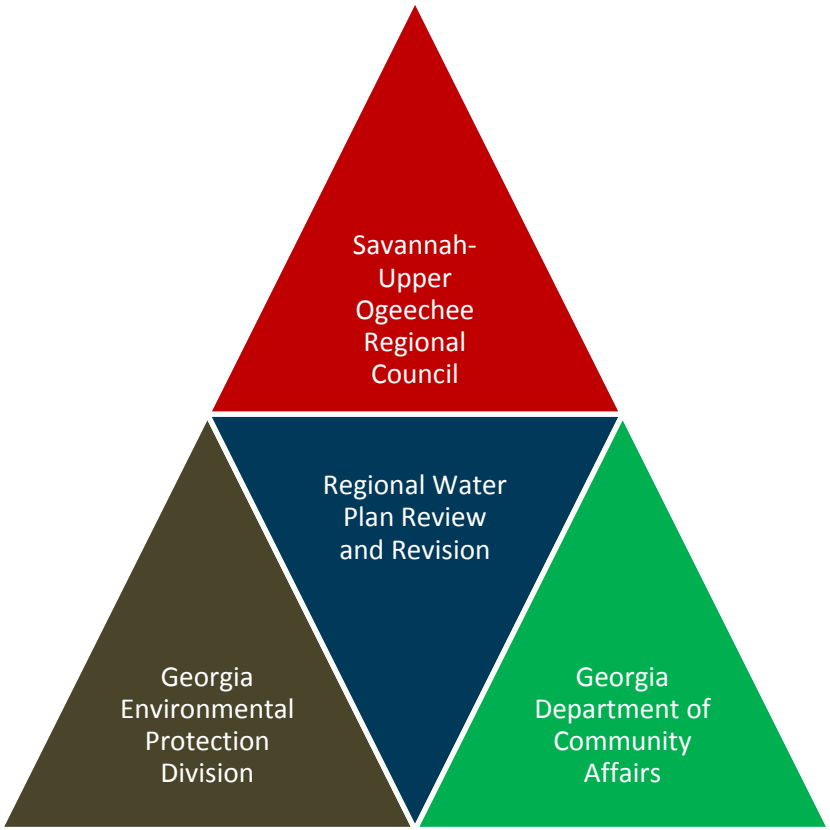
Documents to:

- Guide Council deliberations
- Provide common approaches across councils
- Support Council development of adoptable and implementable plan

1. Memorandum of Agreement (MOA)
   a. Operating Procedures
   b. Rules for Meetings
2. Public Involvement Plan

Memorandum of Agreement

- Defines Georgia EPD, Georgia Department of Community Affairs (DCA) and Water Planning Council responsibilities
- Establishes operating procedures, goals and objectives to govern actions and decisions for the Council

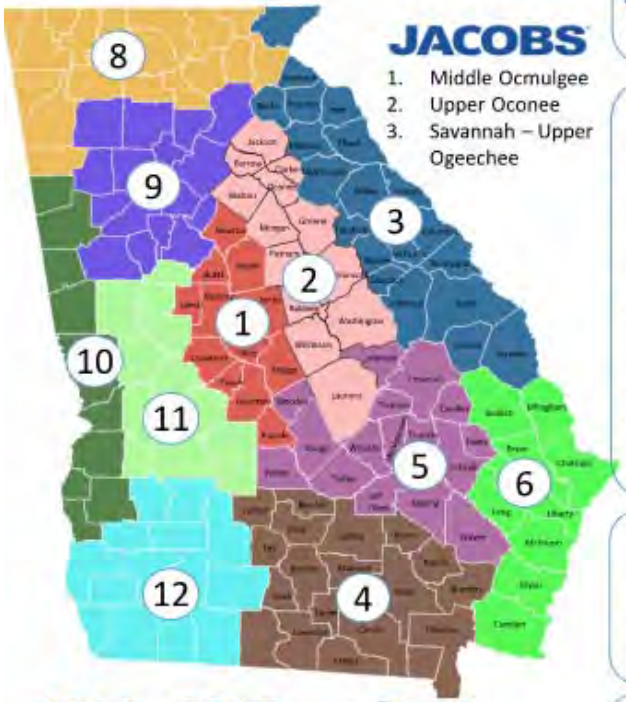


Public Involvement Plan

- Maintains transparency of the planning process
- Seeks input from key stakeholders
- Establishes communications with neighboring councils
- Includes mechanisms for public comments

Georgia's
State Water Plan
Regional Water Planning

Georgia's Water Planning Regions



JACOBS

1. Middle Ocmulgee
2. Upper Oconee
3. Savannah – Upper Ogeechee

2016 - 2017 Plan Review and Revision

CDM Smith

4. Suwannee – Satilla
5. Altamaha
6. Coastal

1 Middle Ocmulgee

Chair: Elmo A. Richardson
- Email:
- Phone: (478) 747-9476
- Title: Owner, Elmo A. Richardson, Jr., PE, LLC

EPD Lead: Ted Hendrickx
- Email: ted.hendrickx@dnr.ga.gov
- Phone: (404) 463-4952

Jacobs Lead: Michelle Vincent
- Email: Michelle.Vincent@jacobs.com
- Phone: (404) 751-2160

2 Upper Oconee

Chair: Melvin Davis
- Email: mdavis@oconee.ga.us
- Phone: (706) 769-5120
- Title: Chairman, Oconee County Board of Commissioners

EPD Lead: Lebone Moeti
- Email: lebone.moeti@dnr.ga.gov
- Phone: (404) 232-7834

Jacobs Lead: Dale Jones (Interim)
- Email: Dale.Jones@jacobs.com
- Phone: (678) 520-6944

3 Savannah-Upper Ogeechee

Chair: Ron C. Cross
- Email: rcross@columbiacountyga.gov
- Phone: (706) 868-3379
- Title: Chairman, Columbia County Board of Commissioners

EPD Lead: Jeff Larson
- Email: jeff.larson@dnr.ga.gov
- Phone: (404) 308-8062

Jacobs Lead: Katherine Atteberry
- Email: Katherine.Atteberry@jacobs.com
- Phone: (404) 978-7430

4 Suwannee- Satilla

Chair: Scott Downing
- Email: sdi1@windstream.net
- Phone:
- Title: Chairman, Ben Hill County Commission

EPD Lead: Cliff Lewis
- Email: cliff.lewis@dnr.ga.gov
- Phone: (229) 894-2554

CDM Lead: Shayne Wood
- Email: woodsh@cdmsmith.com
- Phone: (904) 993-5568

5 Altamaha

Chair: Edward S. Jeffords
- Email: ed.jeffords@rayonieram.com
- Phone: (912) 427-5155
- Title: Sr. Engineer, Rayonier Advanced Materials

EPD Lead: Jennifer Welte
- Email: jennifer.welte@dnr.ga.gov
- Phone: (404) 463-1694

CDM Lead: Danielle Honour
- Email: honourdm@cdmsmith.com
- Phone: (407) 660-2552

6 Coastal

Chair: Benjamin Thompson
- Email: benjy.thompson@advantagebulloch.com
- Phone: (912) 489-9115
- Title: CEO Development Authority of Bulloch County

EPD Lead: Jeff Larson
- Email: jeff.larson@dnr.ga.gov
- Phone: (404) 463-1694

CDM Lead: Shayne Wood
- Email: woodsh@cdmsmith.com
- Phone: (904) 527-6703

8 Coosa-N. Georgia

EPD Lead: Becky Champion

Planning Contractor: CH2M

9 MNGWPD

Lead: ARC

Planning Contractor: Black & Veatch/CH2M

10 Middle Chatahoochee

EPD Lead: Christine Voudy

Planning Contractor: Black & Veatch

11 Upper Flint

EPD Lead: Glen Behrend

Planning Contractor: GWPPC

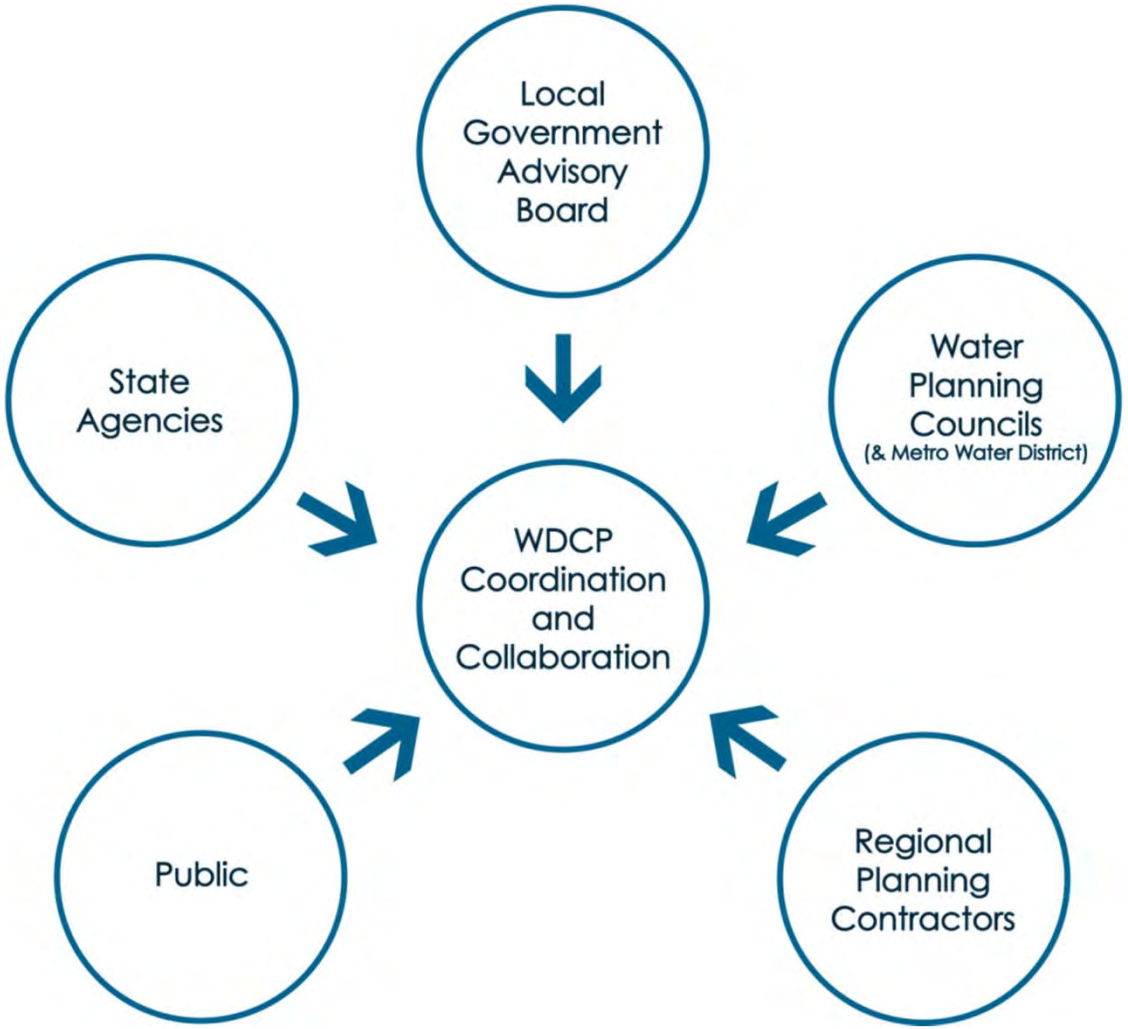
12 Lower Flint- Ochlockonee

EPD Lead: Gail Cowie

Planning Contractor: GWPPC

Georgia

Council Responsibilities and Operations



Questions and Discussion?

Georgia

Georgia's
State Water Plan

Updated Population Projections

www.georgiawaterplanning.org

- State and County population projections are prepared by the Governor's Office of Planning and Budget (OPB). https://opb.georgia.gov/

- These projections are used throughout the State for multiple purposes: Transportation Planning, Education Funding Allocation, and other Publicly Funded Projects.

- Updated population projections will be used in Regional Water Planning.

Updated Population Projections

Population Projections Calculations:

Future Population =

Base Year Population + Births - Deaths + Net Migration

While the population projection <u>model</u> has remained the same, the <u>data inputs</u> have changed based on new/updated information.

Updated Data Inputs

Base Year Population

Census Bureau Vintage 2013 Population Estimates (Age x Sex)

Births

GA Dept. of Public Health Fertility Rates 2008-2012 (Age x Sex)

Deaths

GA Dept. of Public Health Survival Rates 2008-2012 (Age x Sex)

Net Migration

Census Bureau Annual Population Estimates & Change Components 1990-2014

- County Net Migration: 2006-2014

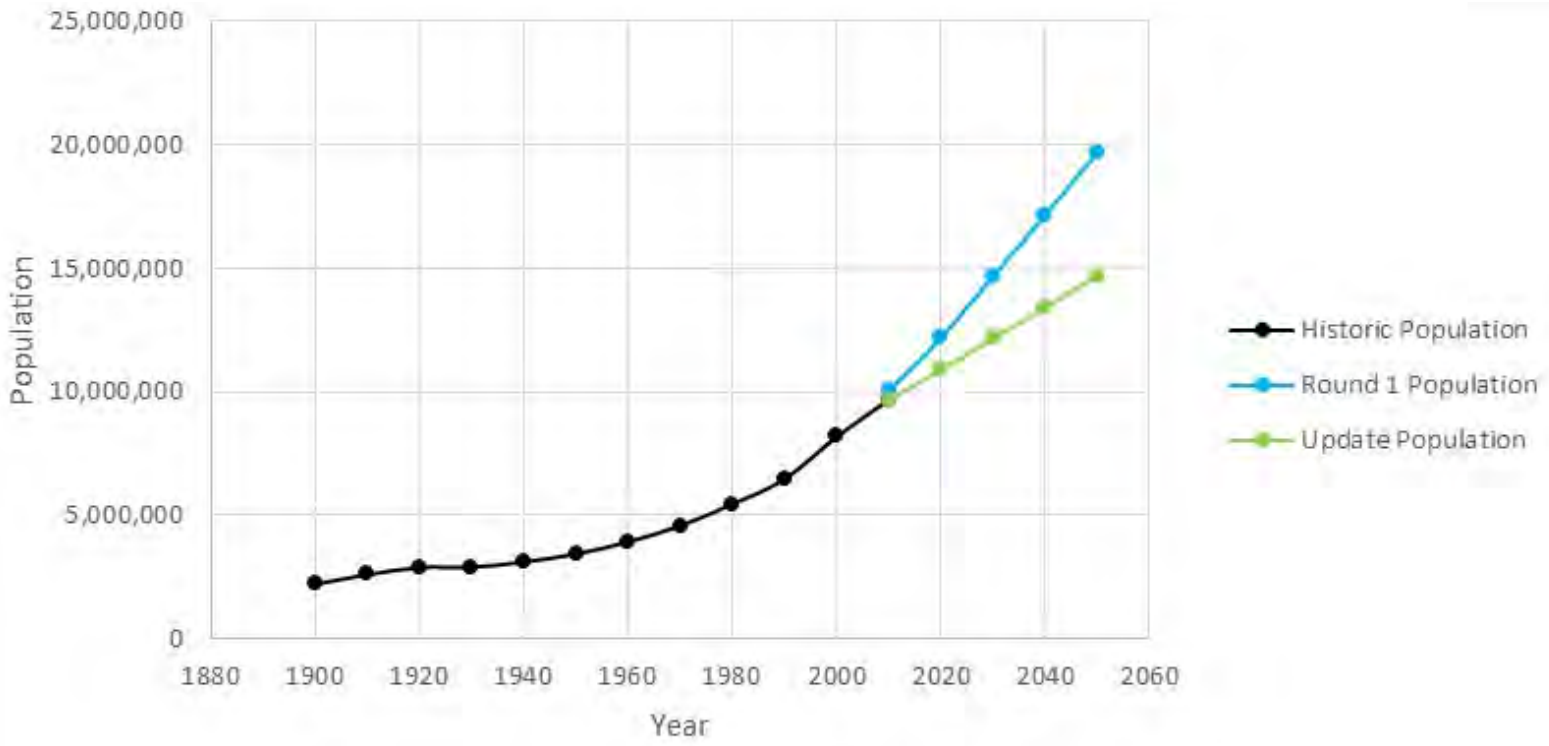
American Community Survey 2006-2010

Georgia

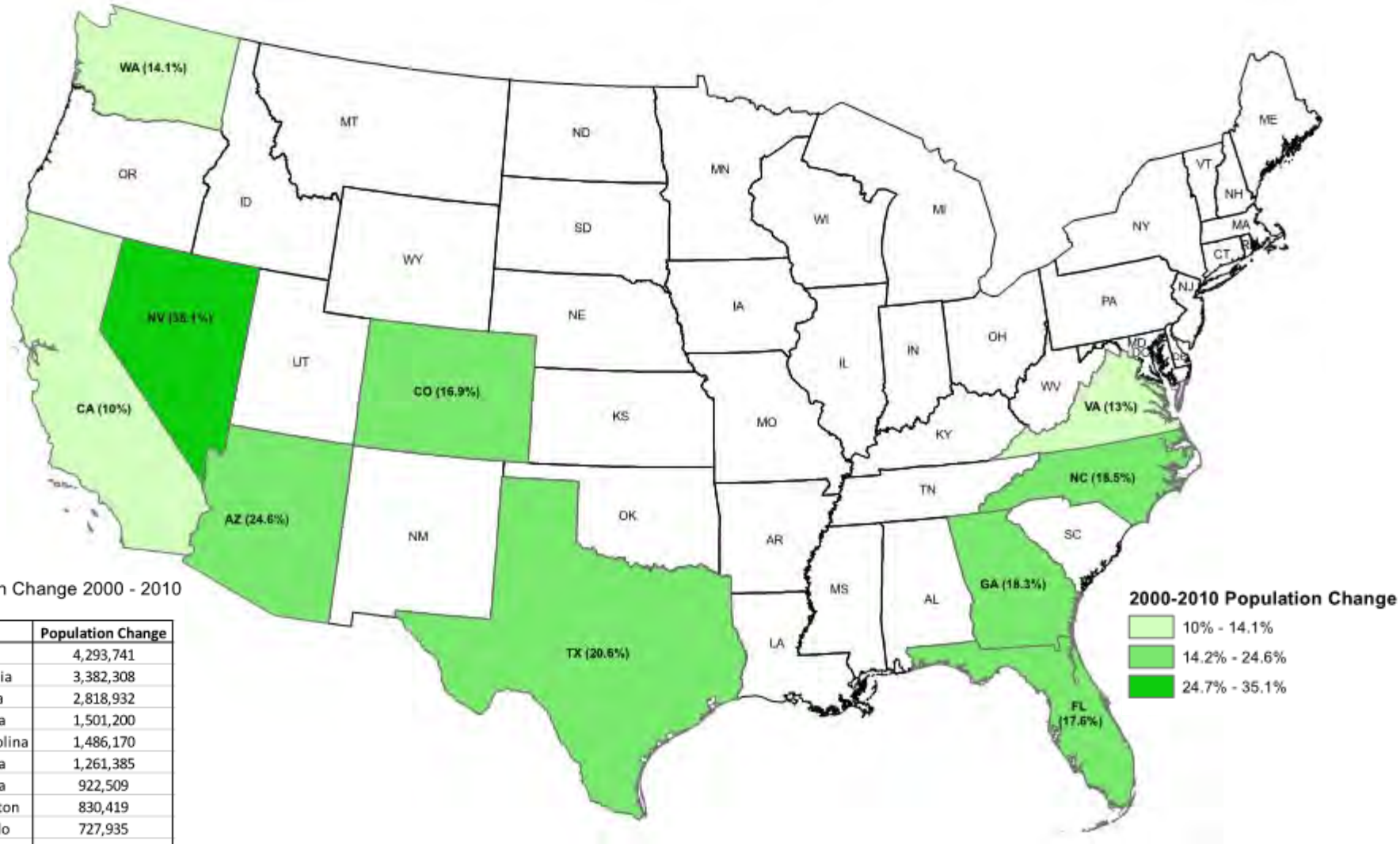
Georgia's Historic Population Growth and Projections

Overall projected growth of the state population is slower than estimated in Round 1 Projections

Statewide Annual Growth Rate
Round 1: 1.69% Update : 1.05%



Top 10 States with Highest Population Growth



Population Change 2000 - 2010

State	Population Change
Texas	4,293,741
California	3,382,308
Florida	2,818,932
Georgia	1,501,200
North Carolina	1,486,170
Arizona	1,261,385
Virginia	922,509
Washington	830,419
Colorado	727,935
Nevada	702,294

Georgia

Georgia continues to grow, but current population projections are more in line with historic trends

Concentrated Growth 50% of Georgia's population growth from 2010-2013 occurred in Fulton, Gwinnett, and Cobb Counties

Migration Patterns In migration of people that are retirees and/or have associated low birth rates and tend to experience declining or flat population projections

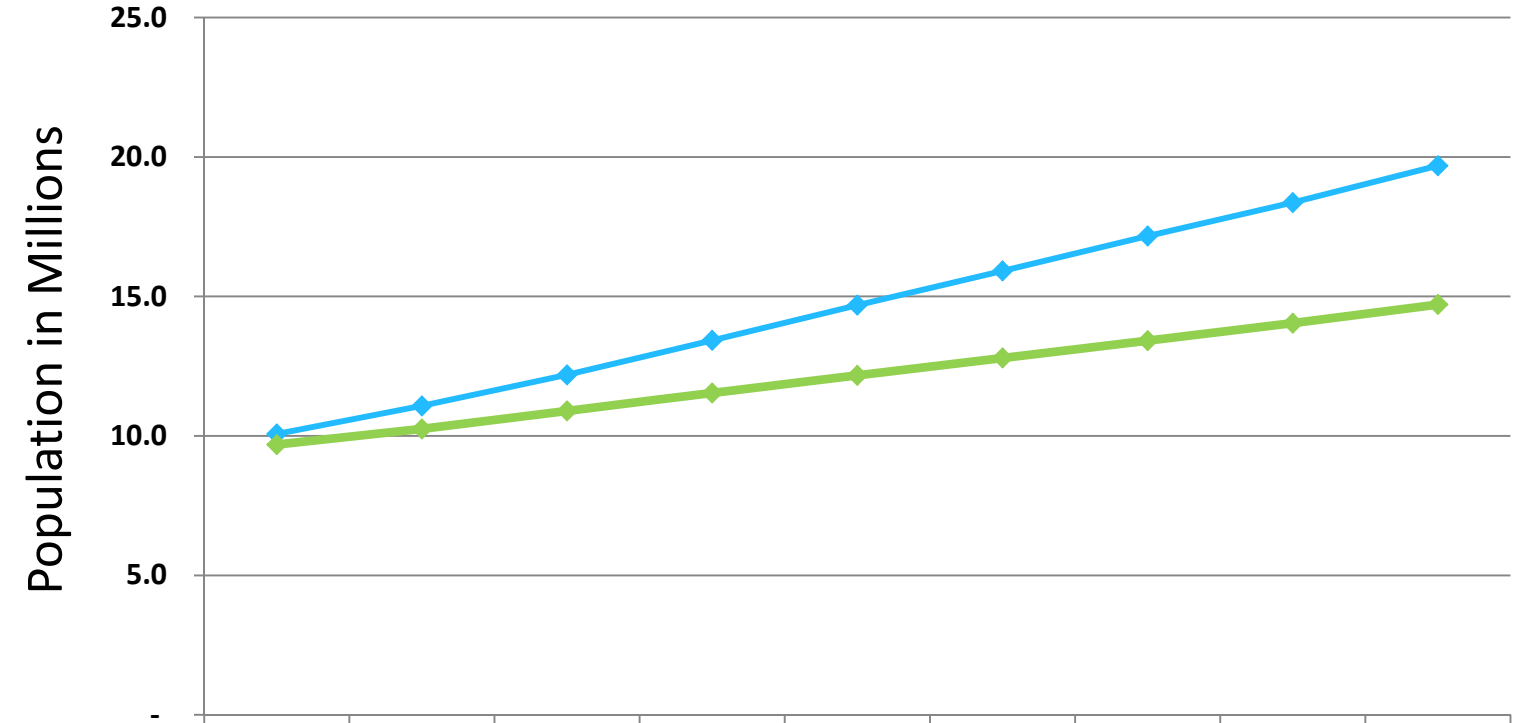
Rural Counties Since the 2010 Census, approximately half of Georgia's counties have experienced a decline in population and those are primarily rural counties

Georgia

Updated Population Projections

This update and future revisions are needed to appropriately plan for Georgia's water needs.

State Population Projections



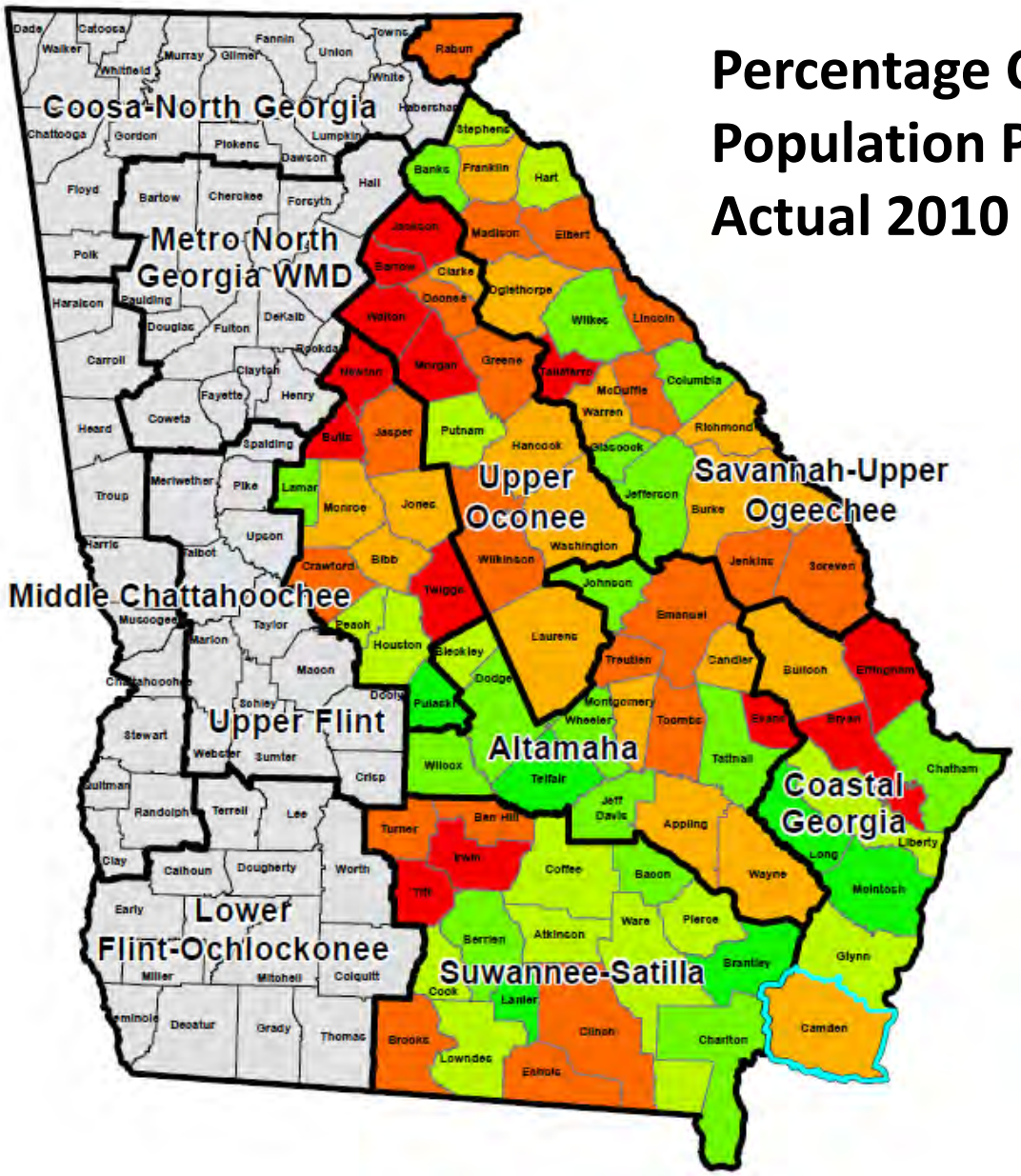
	2010	2015	2020	2025	2030	2035	2040	2045	2050
Round 1	10.07	11.08	12.19	13.43	14.69	15.91	17.17	18.37	19.69
Update	9.69	10.25	10.90	11.54	12.17	12.80	13.41	14.04	14.71

Georgia

Georgia 2010 Population Projection Change

2010 Population Change

- -14% to -7%
- -7% to -2%
- -2% to <0%
- Data Unavailable
- >0% to 2%
- 2% to 10%
- 10% to 22%



Percentage Change in 2010 Population Projections vs. Actual 2010 Census data

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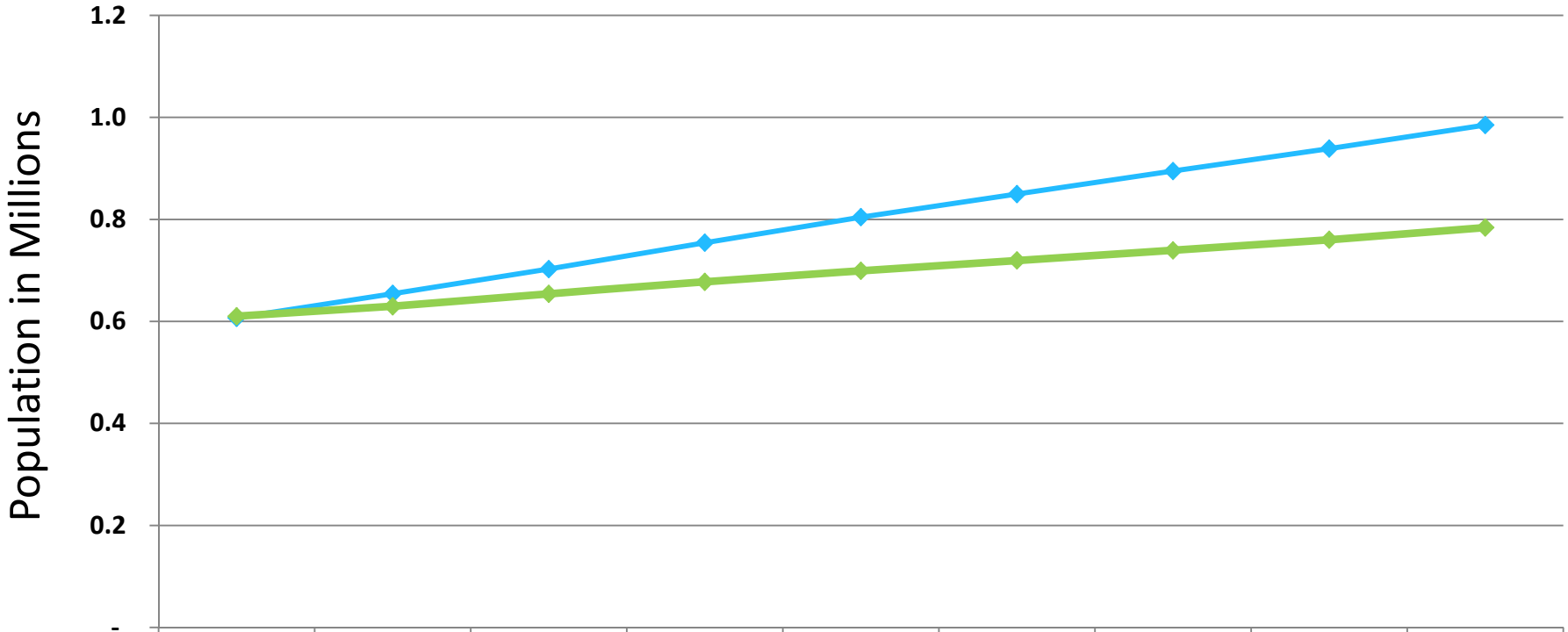
Savannah-Upper Ogeechee Population Projections



	2010	2015	2020	2025	2030	2035	2040	2045	2050
Round 1	0.61	0.65	0.70	0.75	0.80	0.85	0.89	0.94	0.99
Update	0.61	0.63	0.65	0.68	0.70	0.72	0.74	0.76	0.78

Questions & Discussion

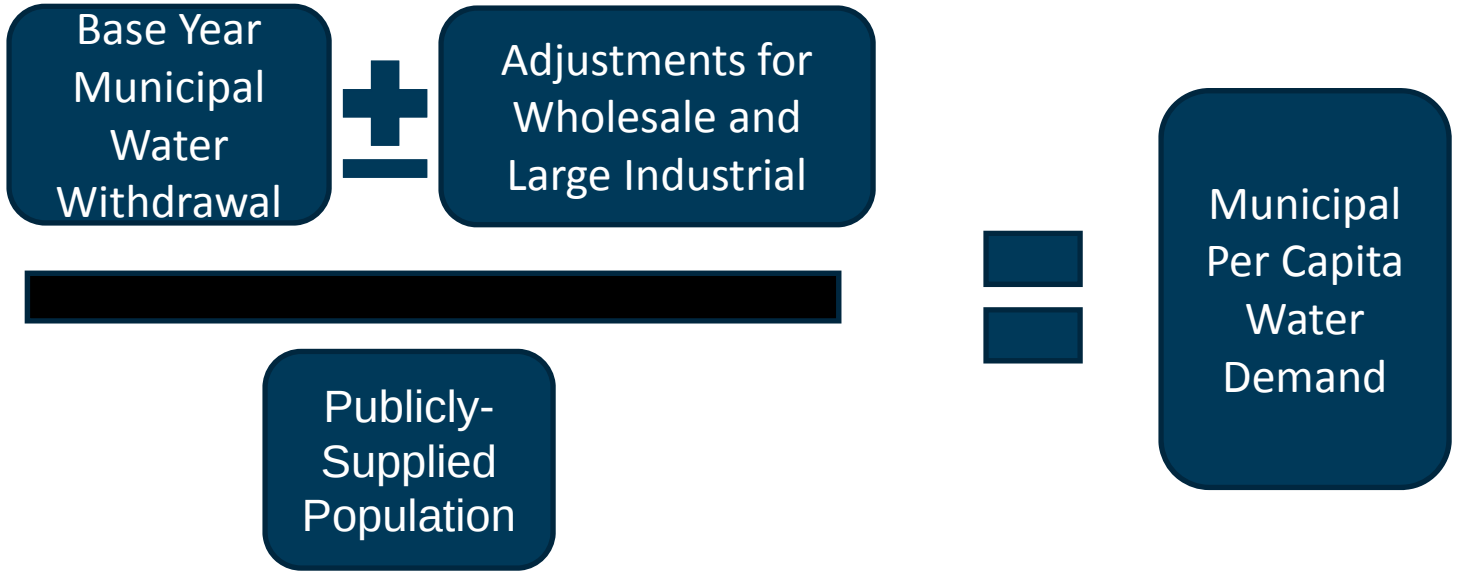
Georgia's State Water Plan

Municipal Water Demand Forecast Update

www.georgiawaterplanning.org

Calculating Per Capita Demand

- Municipal
  - public/private water systems
  - adjustment for wholesale and large industrial
  - Council feedback for region specific adjustment
- Self-Supply (i.e. private wells)
  - 75 gpcd demand (USGS)
  - Council feedback for region specific adjustment



Georgia

Projecting Municipal Water Demand

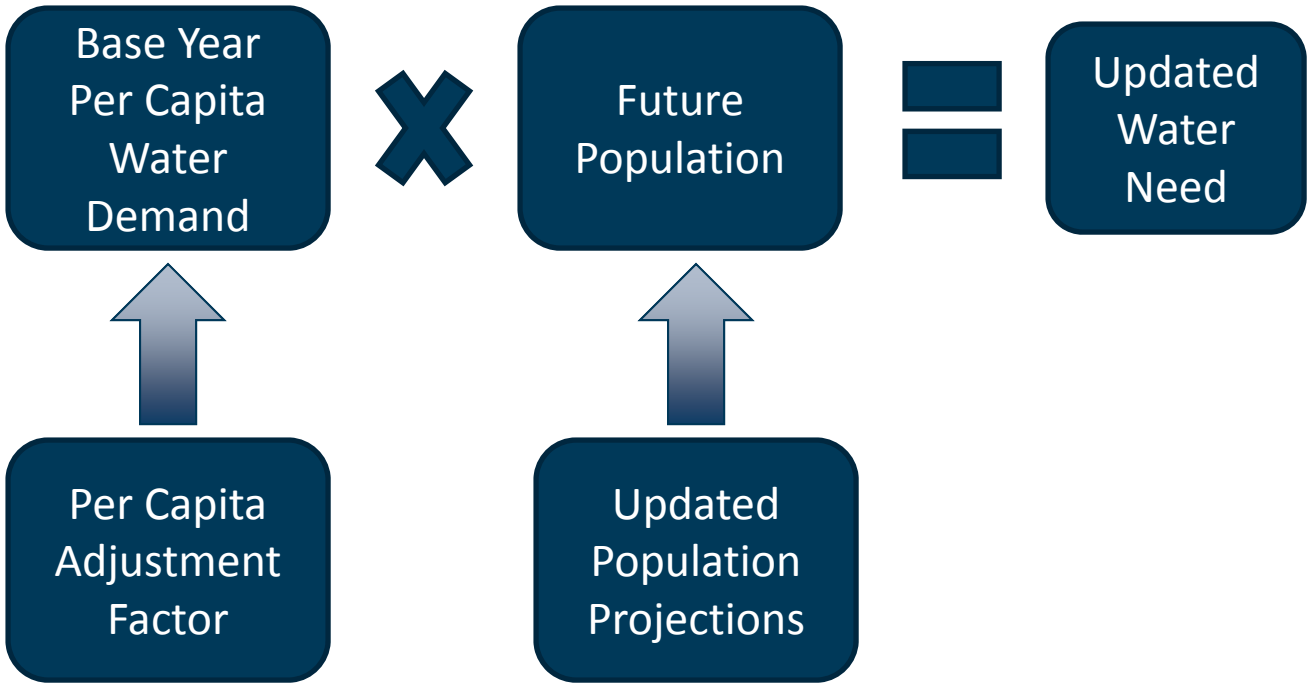
Future Water Need:

Round 1 Methodology

- Estimated municipal water use and population served by municipalities in each county
- Calculated a weighted average (weighted by population served) for each county
- Reconciled the county average with USGS estimates
- Refined the county gpcd values given comments from regional councils

Projecting Municipal Water Demand

Updated Municipal Water Need with Adjustment Factor:



WDCP Updated Adjustment to GPCD

- EPD collected municipal water use and population served by municipalities and water systems from 2010 to 2014 (5 years)
- The % change was calculated for each year interval (2010 to 2011, 2011 to 2012, 2012 to 2013, and 2013 to 2014), and the average of those was calculated as the ***per capita water use adjustment factor***
- The adjustment factor was applied to the Round 1 gpcd values

Update Methodology

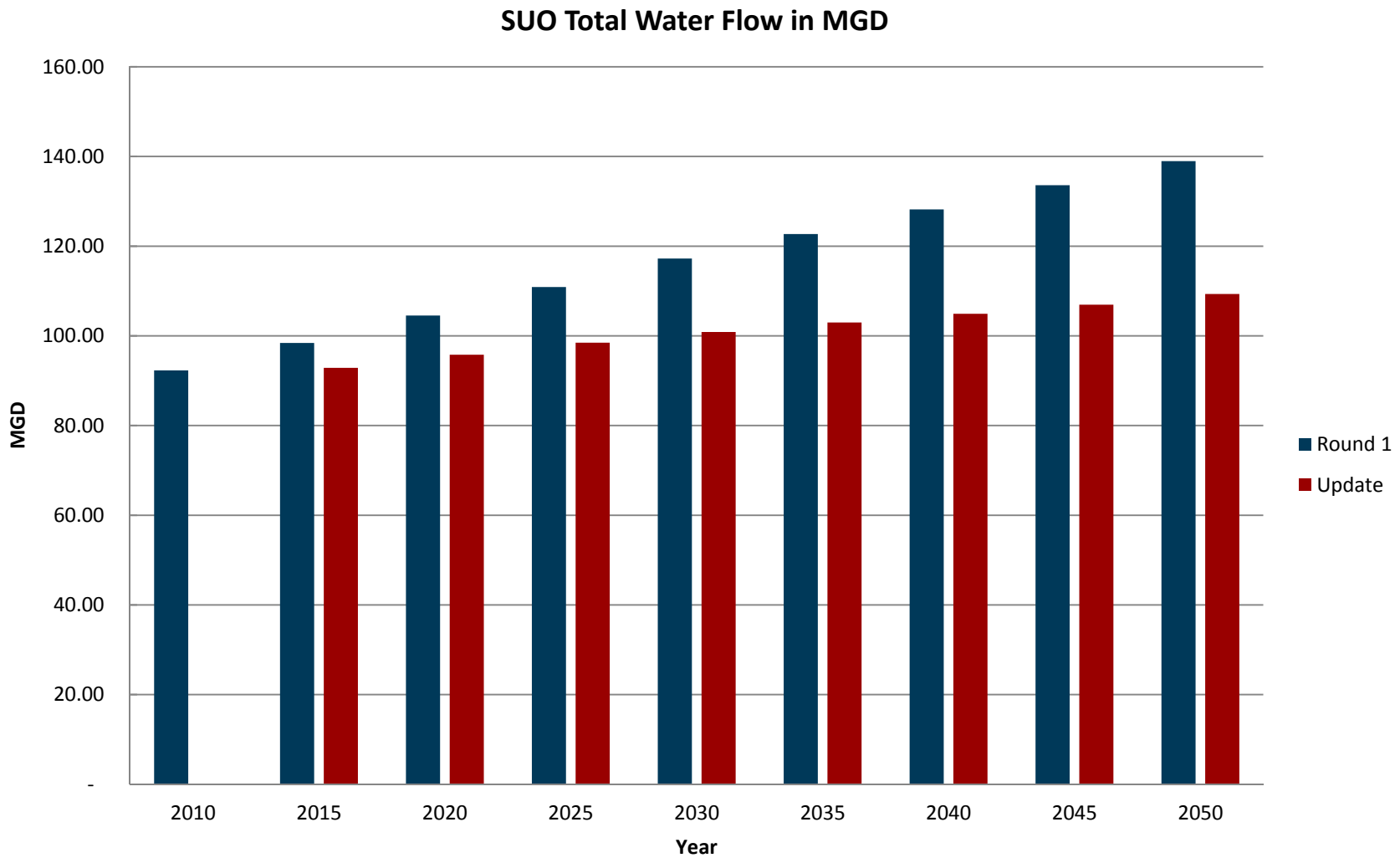
- New population projections
- Each county has the "municipal" water demand split between publicly-supplied (i.e., water provider) and self-supplied (i.e., private wells).
- The ratio of public-supplied to self-supplied water use in each county for Round 1 were maintained for update

County	Round 1 GPCD	Updated GPCD	GPCD Δ	% GPCD Change
Banks	101	102	1.0	1.3%
Burke	132	129	-3.0	-2.4%
Columbia	153	134	-19.0	-12.6%
Elbert	102	105	3.0	2.9%
Franklin	164	161	-3.0	-1.7%
Glascock	73	73	0	0%
Hart	154	158	4.0	2.6%
Jefferson	169	163	-6.0	-3.1%
Jenkins	101	107	6.0	5.3%
Lincoln	67	66	-1.0	-0.7%
Madison	107	104	-3.0	-3.3%
McDuffie	139	141	2.0	1.8%
Oglethorpe	94	100	6.0	6.1%
Rabun	168	164	-4.0	-2.3%
Richmond	221	217	-4.0	-2.1%
Screven	161	160	-1.0	-0.5%
Stephens	144	146	2.0	1.4%
Taliaferro	71	71	0	0%
Warren	73	72	-1.0	-1.3%
Wilkes	156	156	0	0.3%

Municipal GPCD Change: Savannah-Upper Ogeechee

Georgia

Water Forecast Update Results



Information on this slide has been updated since being presented at the meeting

Summary: Savannah – Upper Ogeechee Region

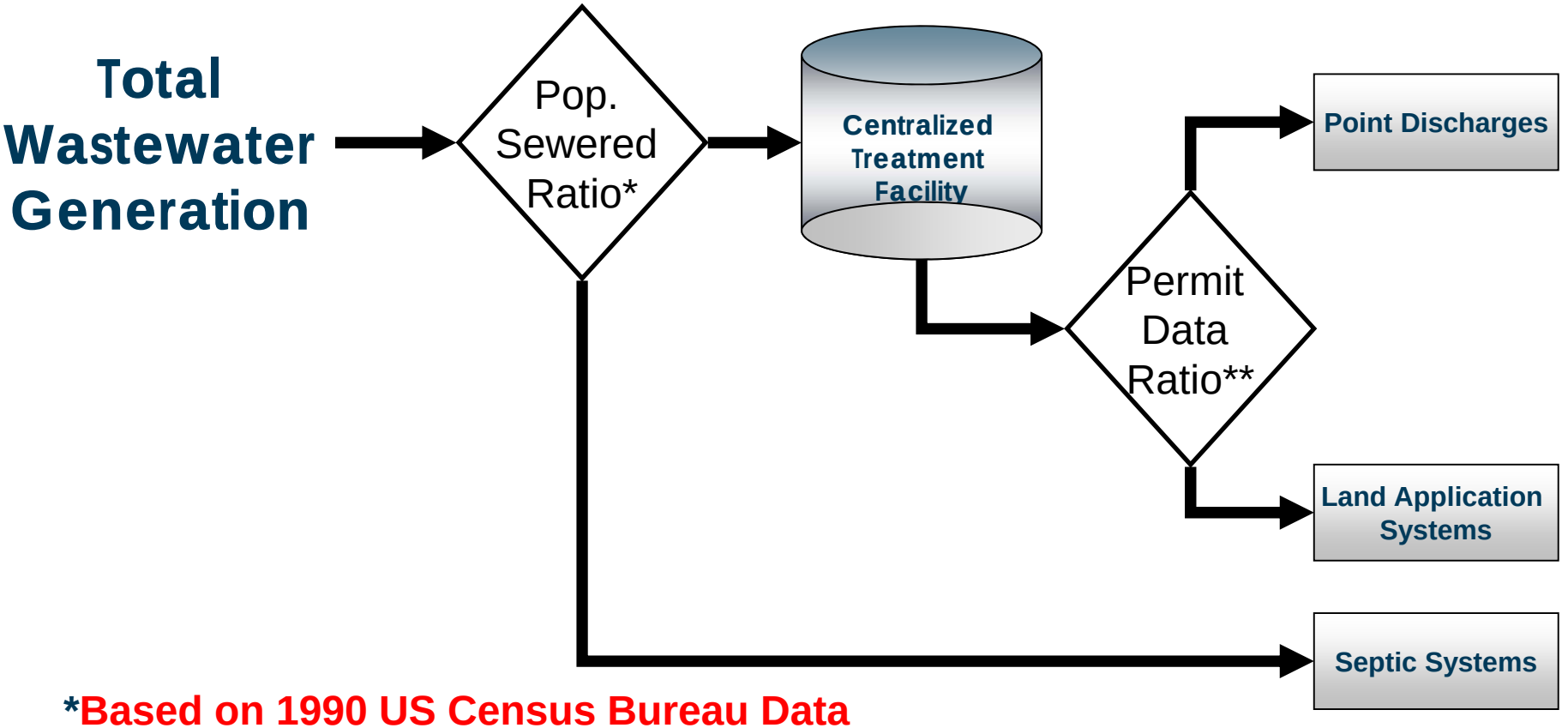
- Small relative change
- Less than 6% change across most counties
- 16 out of 20 counties have less than 4 GPCD change
- Round 1 Regional Average GPCD: 127.5
- Updated Regional Average GPCD: 126.5
- Average change across region is 0.42%

Georgia's
State Water Plan

Municipal Wastewater Demand Forecast Update

www.georgiawaterplanning.org

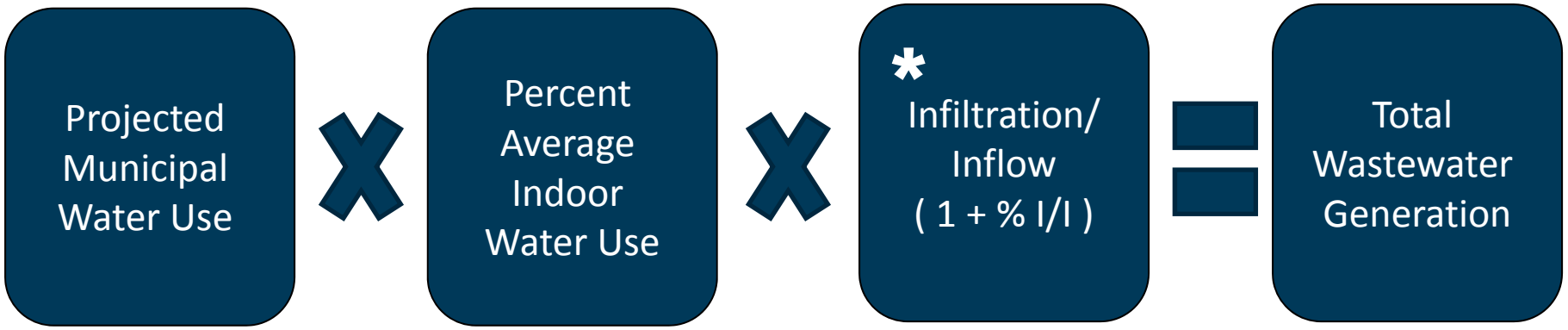
Municipal Wastewater Discharges



*Based on 1990 US Census Bureau Data

**Based on Existing GA EPD Permit Data

Round 1 Municipal Wastewater Calculation

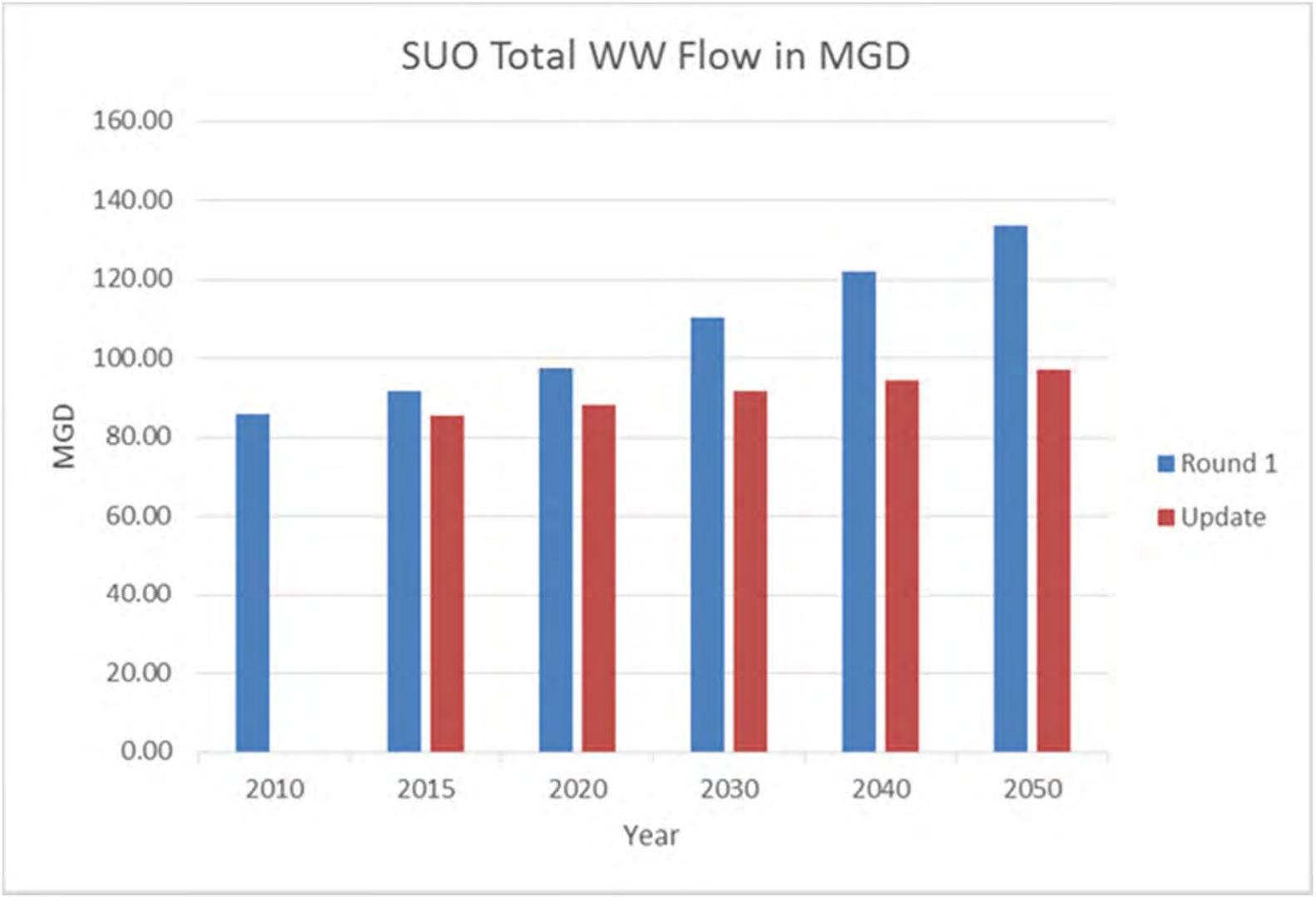


* Water Planning Region-specific values were determined with Regional Councils:
  - All sanitary sewer systems experience I&I
  - Inflow is stormwater entering at points of direct connection
  - Infiltration is groundwater entering through cracks and/or leaks
  - Average I&I percentage estimated for each water planning region based on input from water users

Municipal Wastewater Forecast Update

- In Round 1 the municipal water demand served as the basis for estimating the municipal wastewater (WW) flows for each county
- **New** methodology based on:
  - 2014 discharges by county
  - % increase in population
  - Future wastewater changes at the rate of population change
  - Incorporates the trend in ratio of centralized/septic to determine the predicted change in centralized flows by county

Municipal Wastewater Forecast Update Results



Information on this slide has been updated since being presented at the meeting

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Georgia's
State Water Plan

Industrial Water and Wastewater Demand Forecast Review

www.georgiawaterplanning.org

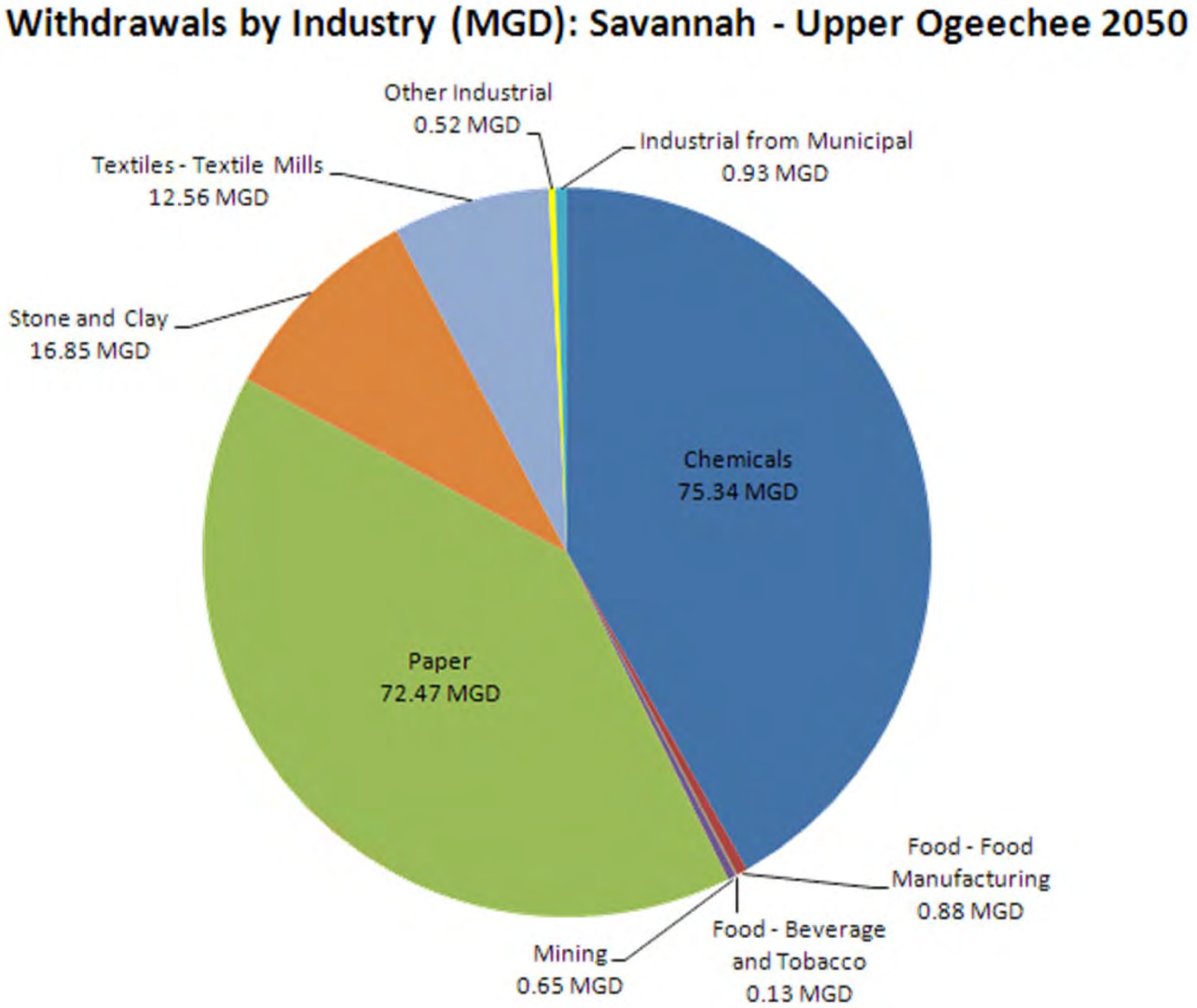
Industrial Water Needs

- Water is needed for industrial processes, sanitation, cooling and some domestic (employee) use
- Water need is linked to production
- Employment is linked to production
- Updates of employment data are not available, therefore industrial forecasts are not being updated at this time

Industrial Water & Wastewater Demand

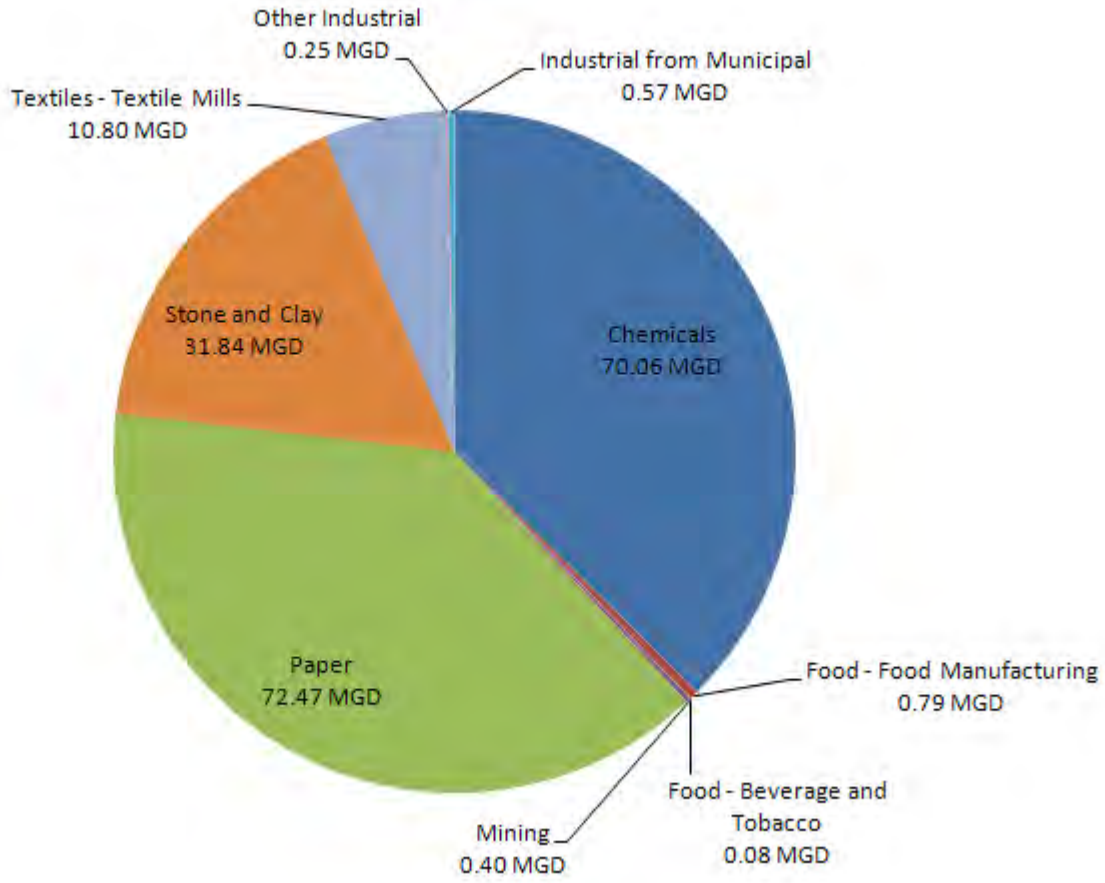
- EPD recommends maintaining Round 1 estimates of industrial water & wastewater forecasts
- Regional Councils are encouraged to review Round 1 projections and identify any significant changes that may have occurred

Region Industrial Water Demand Forecast



Savannah-Upper Ogeechee Region Industrial Wastewater Forecast

2050 Wastewater by Industry



CURRENT AGRICULTURAL DEMAND ESTIMATES – METHODS FOR UPDATE

Savannah-Upper Ogeechee Regional Water Planning Council

March 9, 2016

Overview of Presentation

- Background
  - Project Team
  - How the estimates and forecasts will be used
- Methods
  - Animal agriculture and horticultural sector water demands
  - Current agricultural use estimates
  - Agricultural demand forecasts
- Results
  - Current use
  - Forecasts

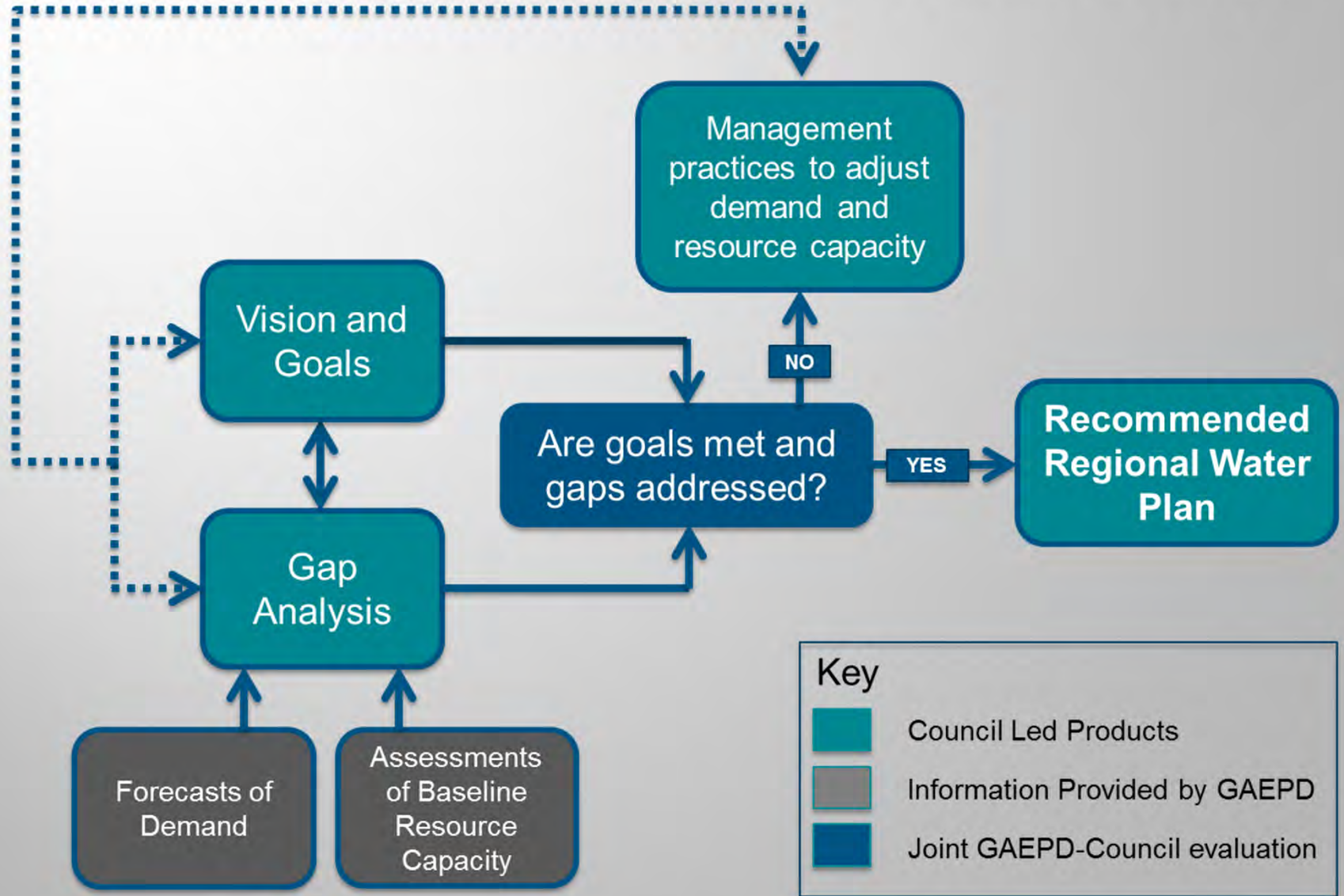
Project Team

- Albany State University – Georgia Water Planning and Policy Center (Lead)
- University of Georgia Agricultural and Applied Economics

GEORGIA Water PLANNING & POLICY CENTER ALBANY STATE UNIVERSITY

THE UNIVERSITY OF GEORGIA
COLLEGE OF AGRICULTURAL & ENVIRONMENTAL SCIENCES

How the Results will be Used

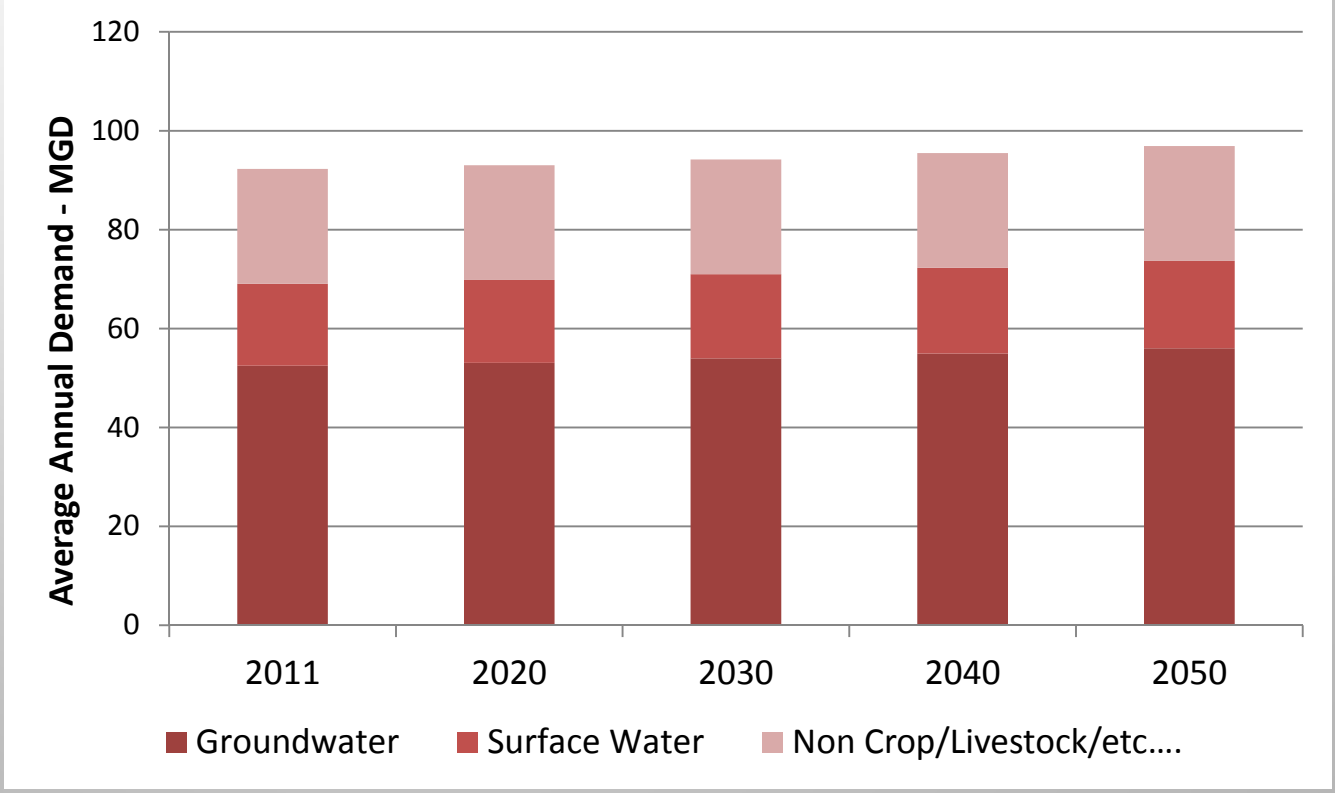


Agricultural Water Demand Estimates: 2009-2010

- Acreage
  - EPD Wetted Acreage Database
  - Refined with meter data from Georgia Water Planning and Policy Center
  - Desktop analysis of 2007 imagery to identify center pivots
- Water Use
  - Estimation of crop mix by county through 2050
  - Crop water demand by crop, county and soil type
- Other Ag Demand (demand that deviates from traditional irrigated agriculture – i.e. livestock, nursery, golf course)

Agricultural Water Demand Estimates: 2009-2010

- Acreage
- Water Use
- Other Ag Demand (livestock, nursery, golf course)



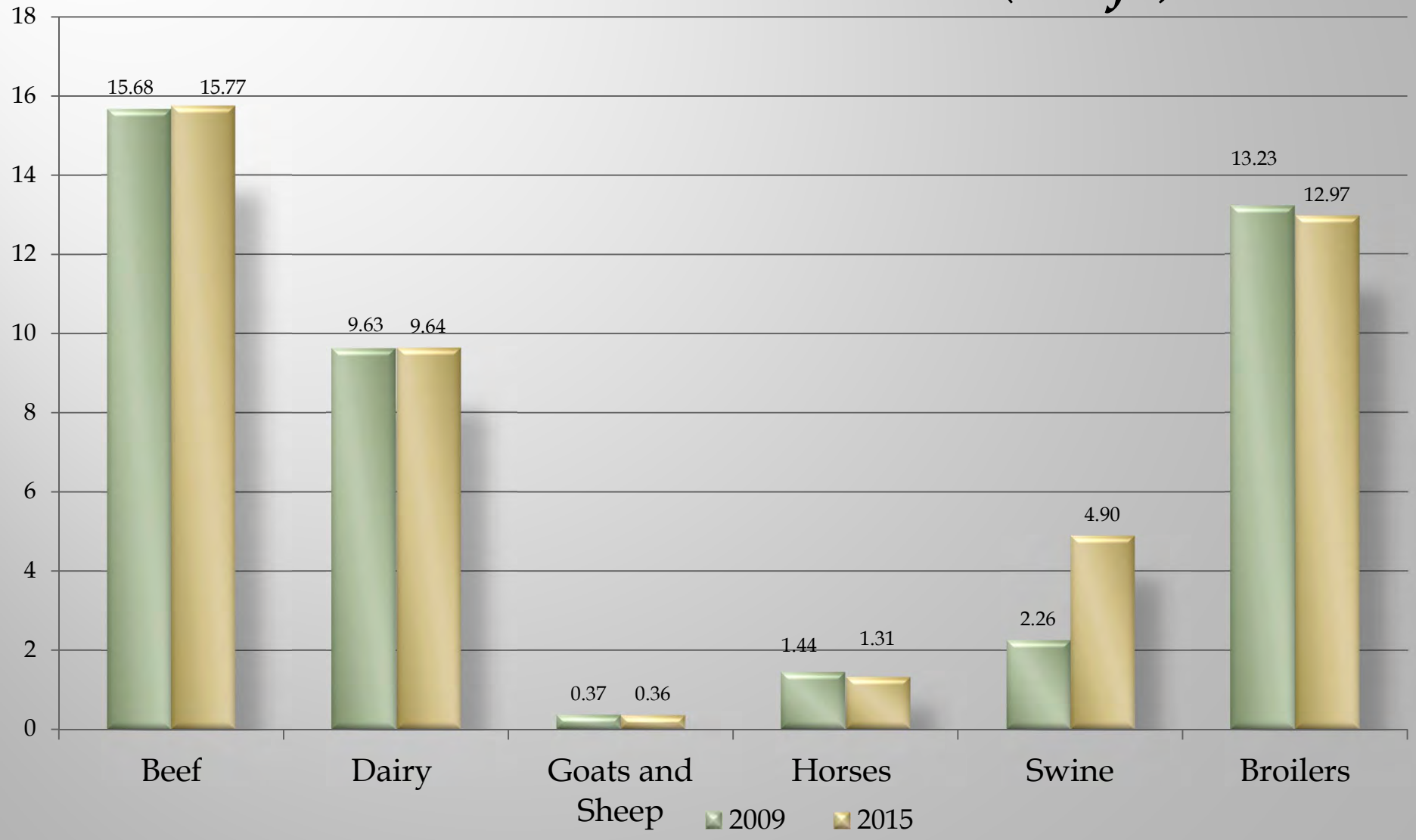
2015-2016 Ag Water Demand Update Components

- Animal Agriculture and Horticultural Sector Water Use
- Current Agricultural Water Use Estimates
- Agricultural Water Demand Forecasts

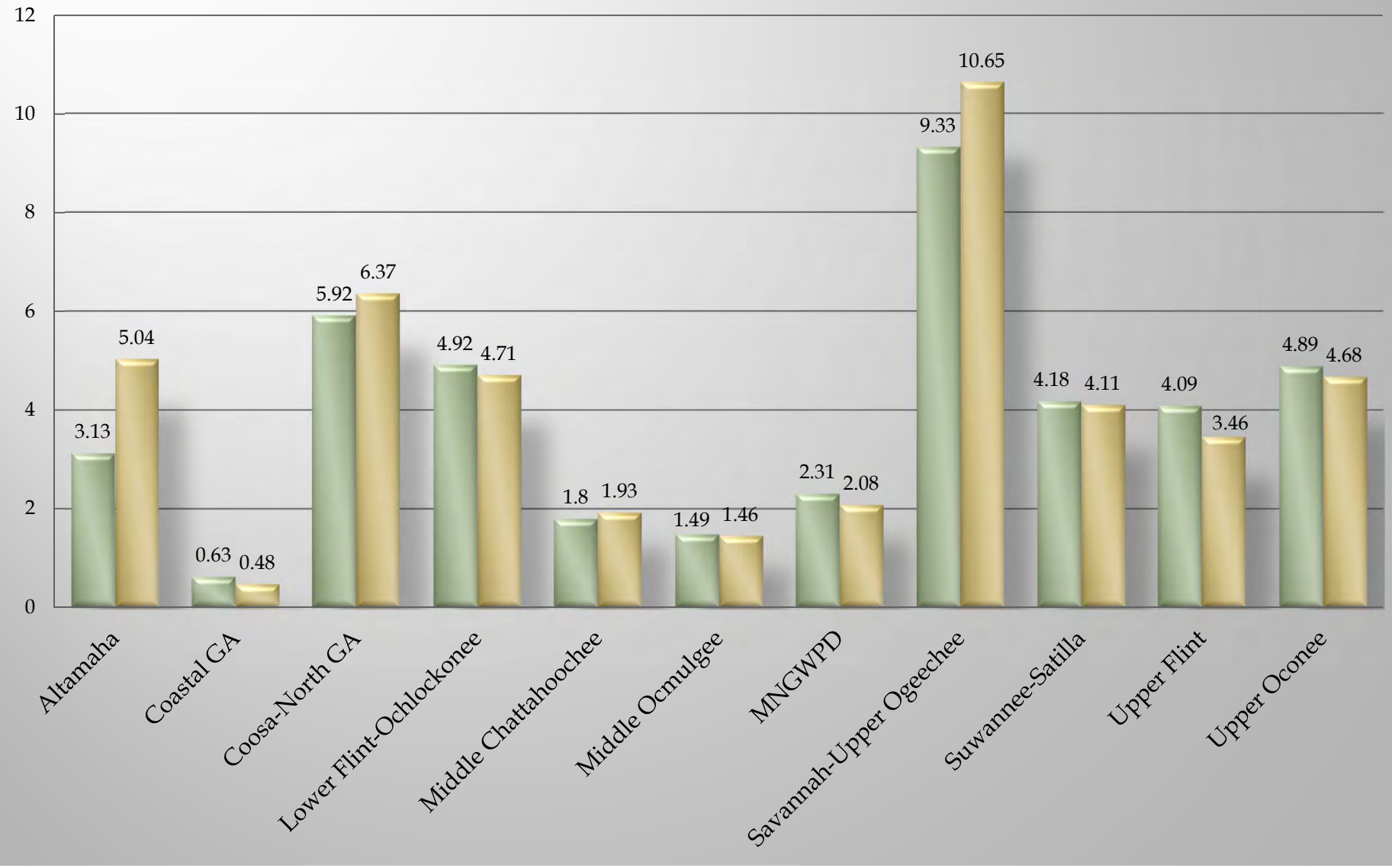
2015-16 Animal Agriculture and Horticultural Sector Water Use - Methods

- **Update current water use estimates based same methods used for 2009-2010 estimates**
- **Animal Agriculture**
  - Head per county x Water needs per head
  - Data sources: GA Farm Gate Survey, USDA NASS
- **Horticultural Sector**
  - Area per county (nursery/greenhouse) x Water needs per unit area
  - Data sources: GA Farm Gate Survey
- **Review by industry experts**

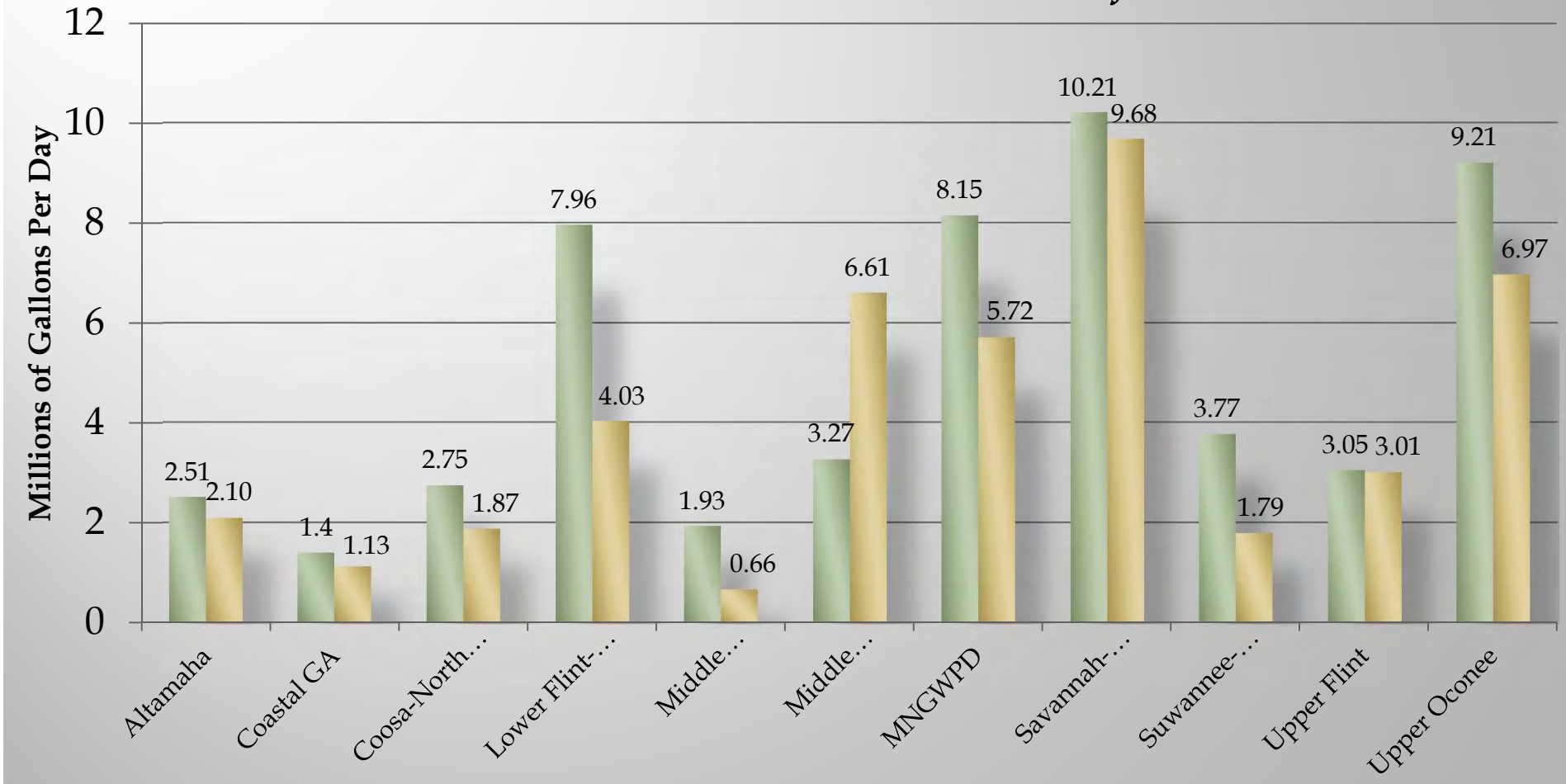
Animal Agriculture - Daily Water Use by Type of Animal Statewide Total: 45 MGD (*draft)*



Animal Agriculture - Daily Water Use by Water Planning Region
Statewide Total: 45 MGD *(draft)*

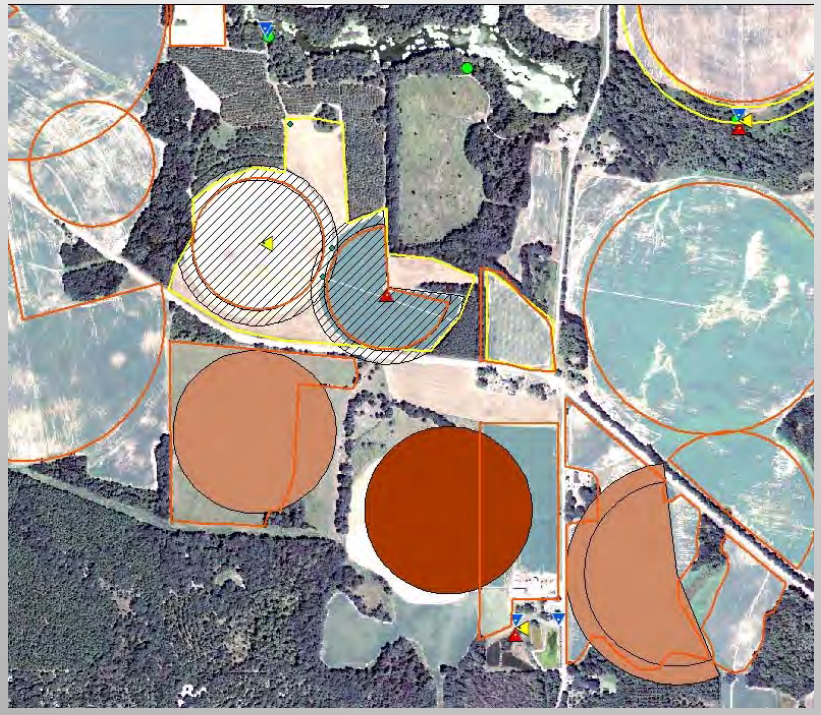


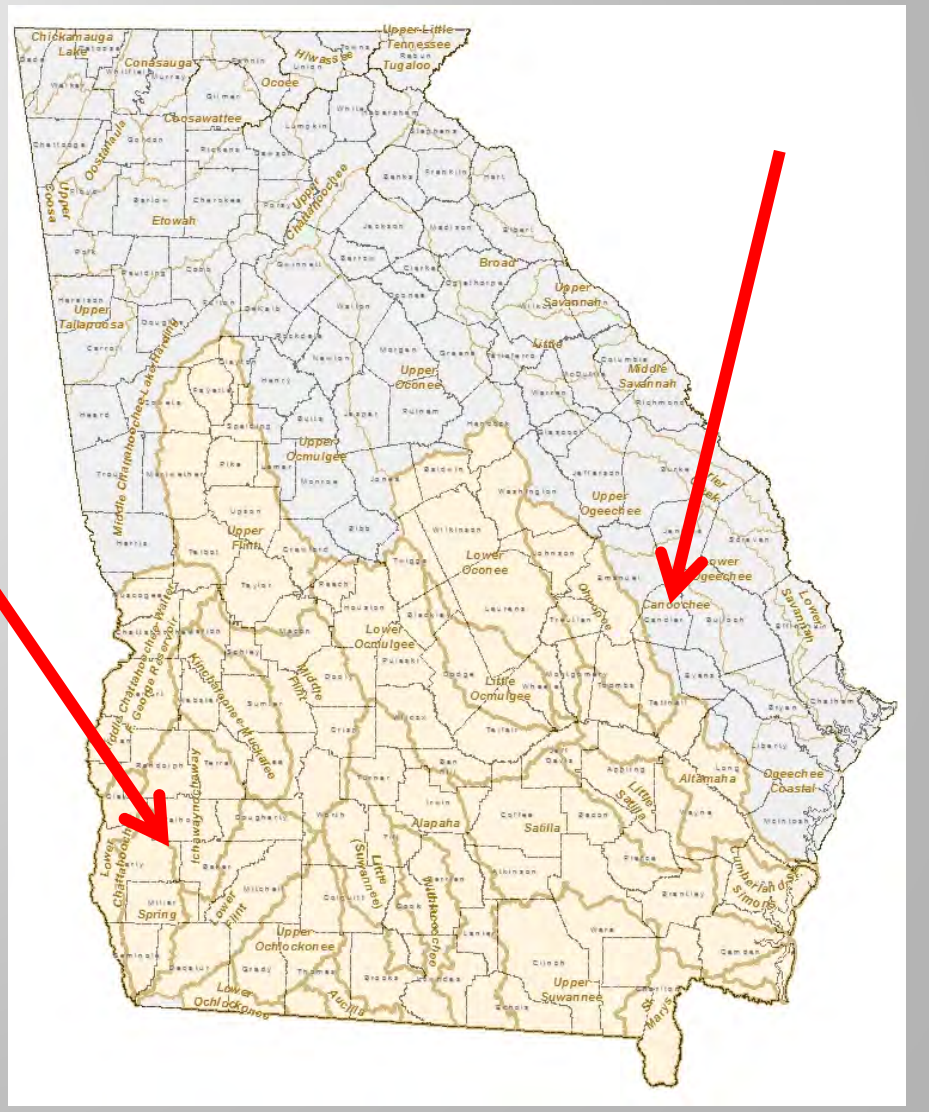
Daily Water Use by Horticultural Nurseries (Container, In-Ground, and Greenhouse), Millions of Gallons Per Day Statewide Total: 43.56 MGD *(draft)*

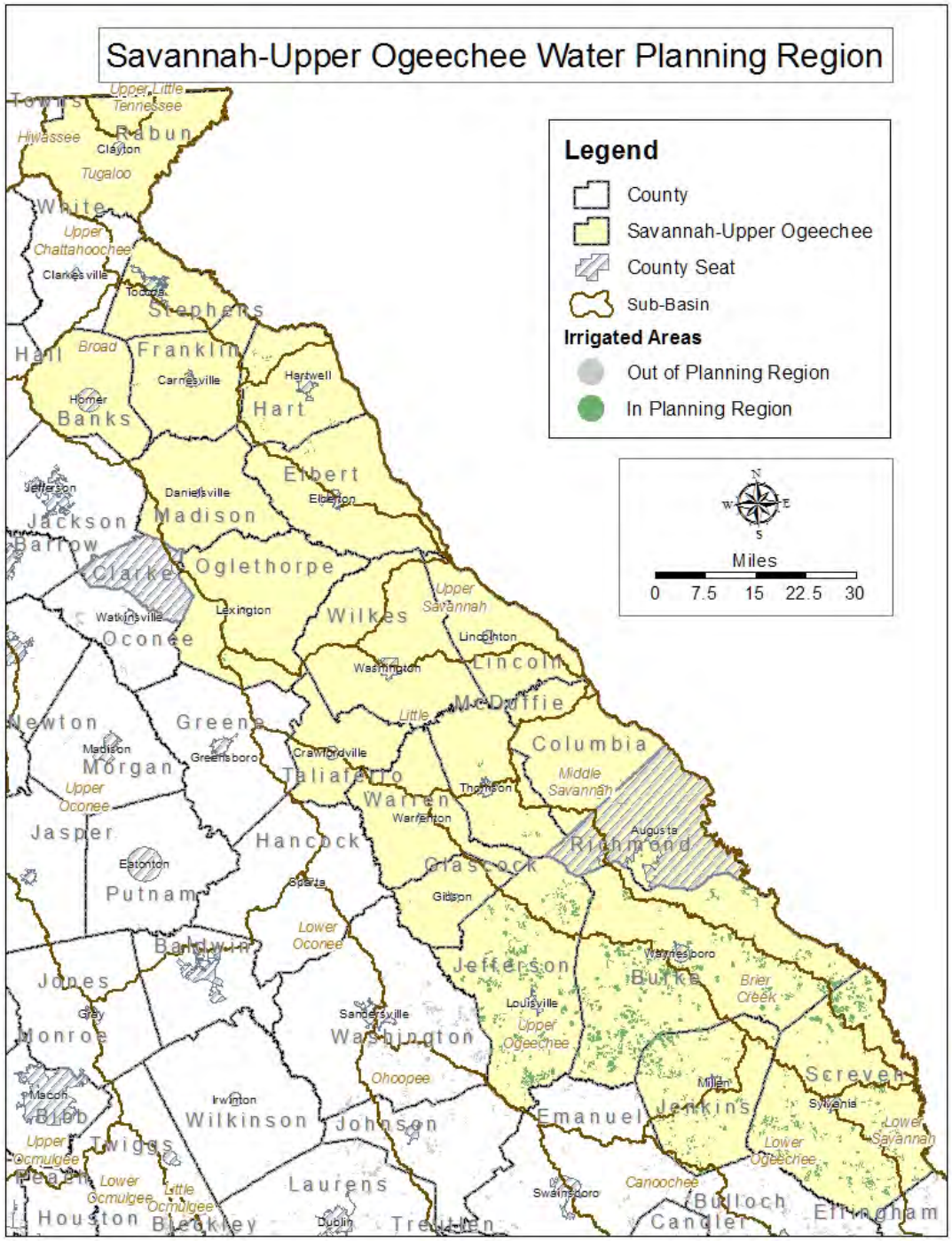


2015-16 Current Agricultural Water Use Estimates - Methods

- **Wetted Acreage Mapping**
  - Detailed mapping
  - Desktop survey
  - Review source assumptions







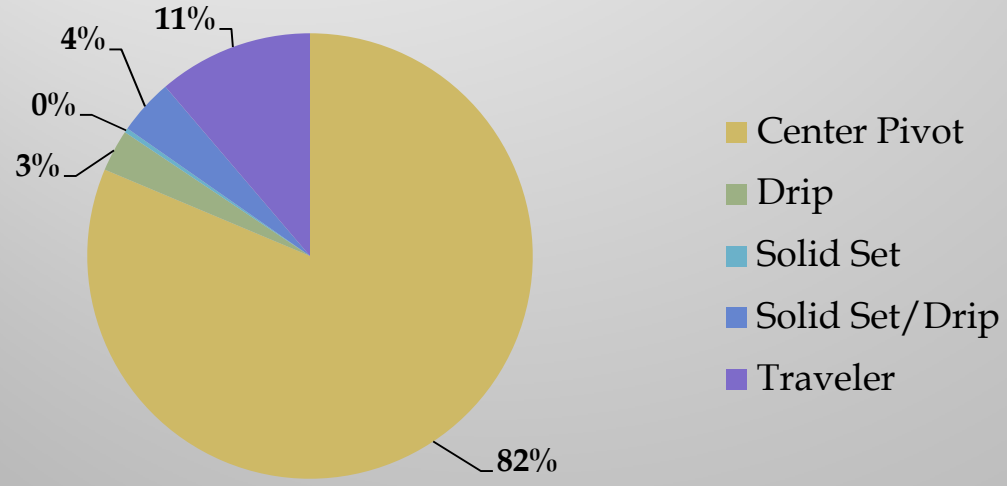
Irrigated Acres

County	2009	2014
Banks	6	6
Burke	24,840	40,244
Columbia	45	141
Elbert	444	311
Franklin	161	161
Glascock	89	294
Hart	779	911
Jefferson	19,803	26,688
Jenkins	8973	13,084
McDuffie	811	793
Oglethorpe	349	341
Rabun	21	0
Richmond	114	851
Screven	21,899	27,117
Taliaferro	0	33
Warren	0	99
Wilkes	27	0

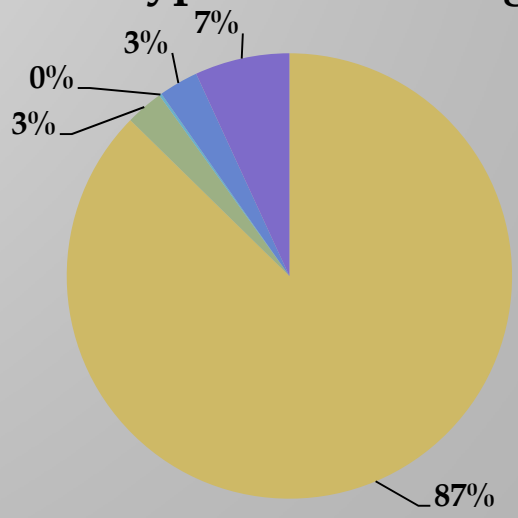
Savannah-Upper Ogeechee RWPC

	2009	2014	% Change
Total # of Fields	1,313	1,876	+ 42.9%
Total Acreage	83,247	111,075	+ 33.4%
Total GW Acreage	54,444	87,466	+ 60.7%
Total SW Acreage	28,803	23,609	- 18.0%
Total Center Pivots	922	1,525	+ 65.4%
Center Pivot Acreage	66,179	96,999	+ 46.6%

System Type - % of Systems



System Type - % of Acreage



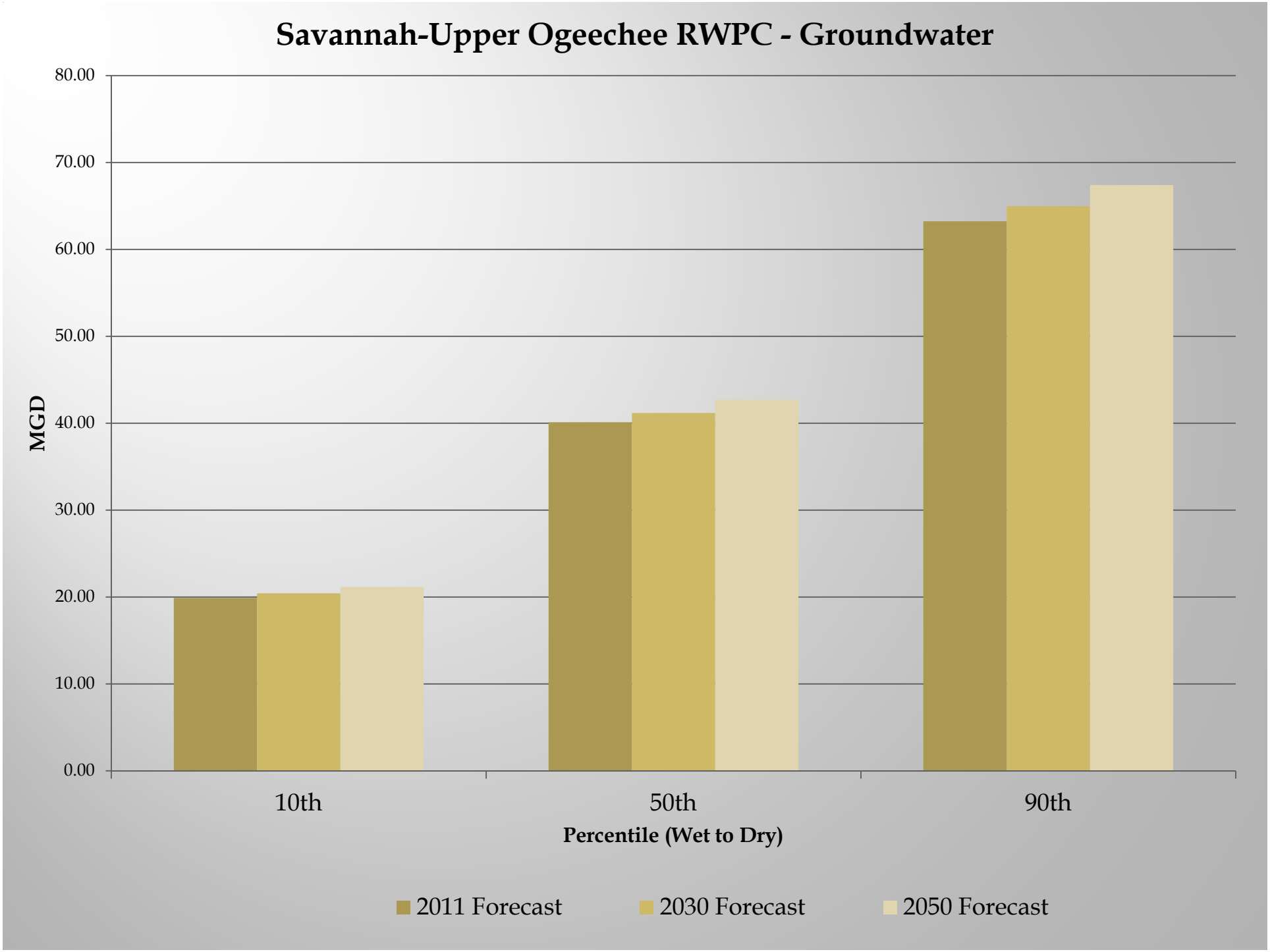
2015-16 Current Agricultural Water Use Estimates - Methods

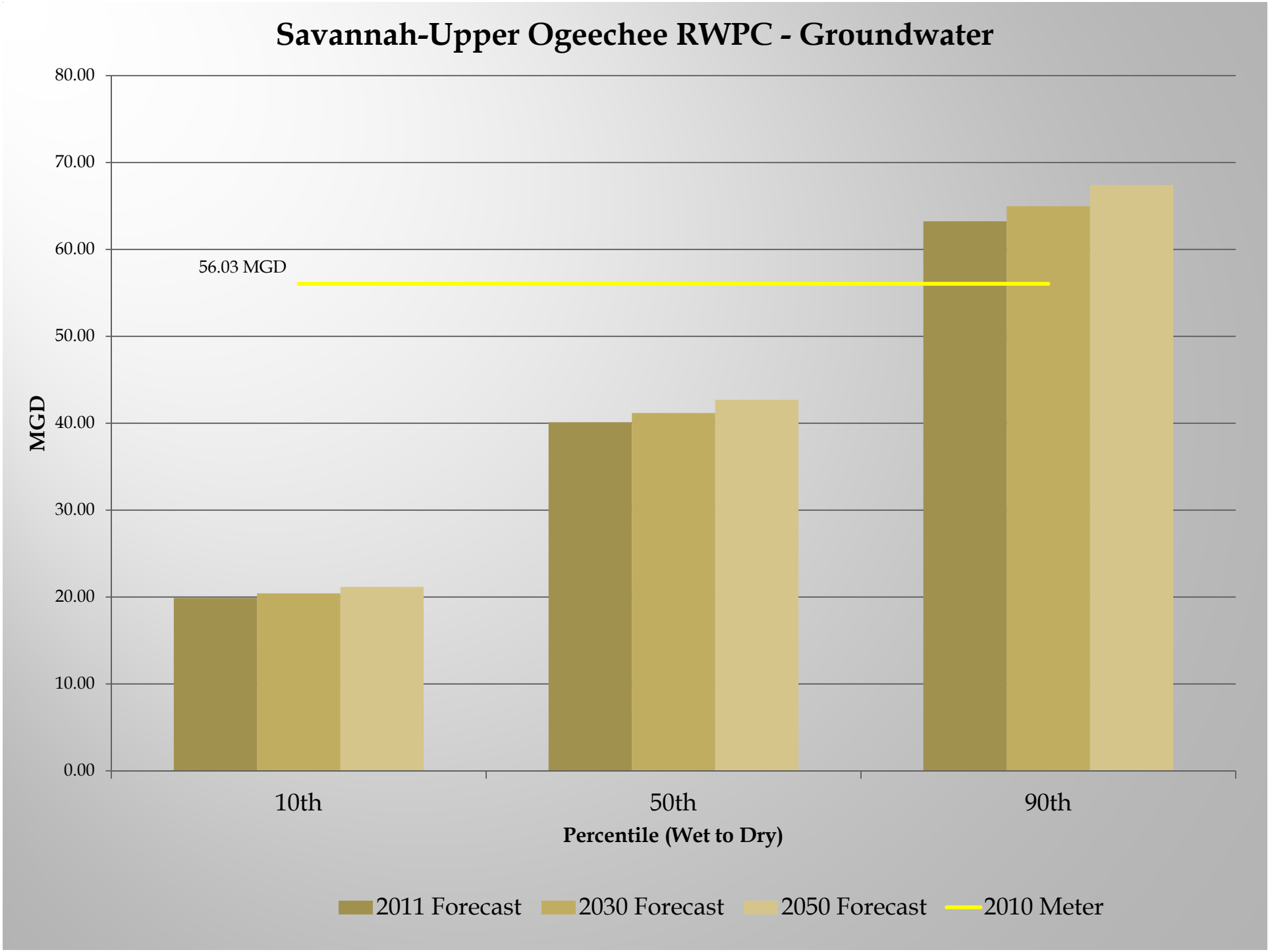
- **Wetted Acreage Mapping**
  - Detailed mapping
  - Desktop survey
  - Review source assumptions
- **Water Use**
  - Use of meter data for current demand (2010 – 2013)
  - Replication of 2009-10 methods with revised acres

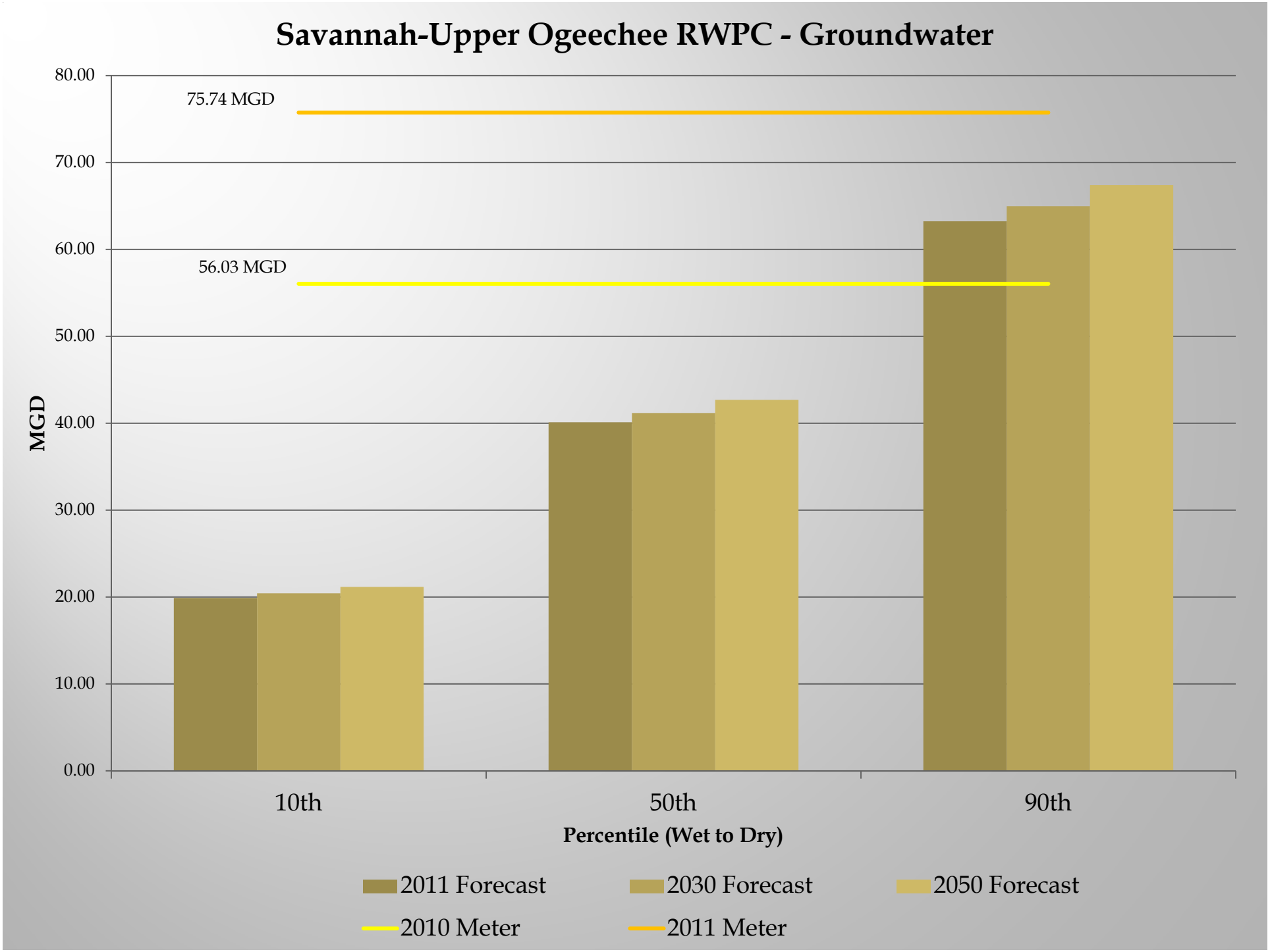
Average Meter Application Rates (inches)				
	2010	**2011**	**2012**	**2013**
Groundwater	8.61	11.64	8.14	5.63
Surface Water	9.26	11.33	9.18	6.32

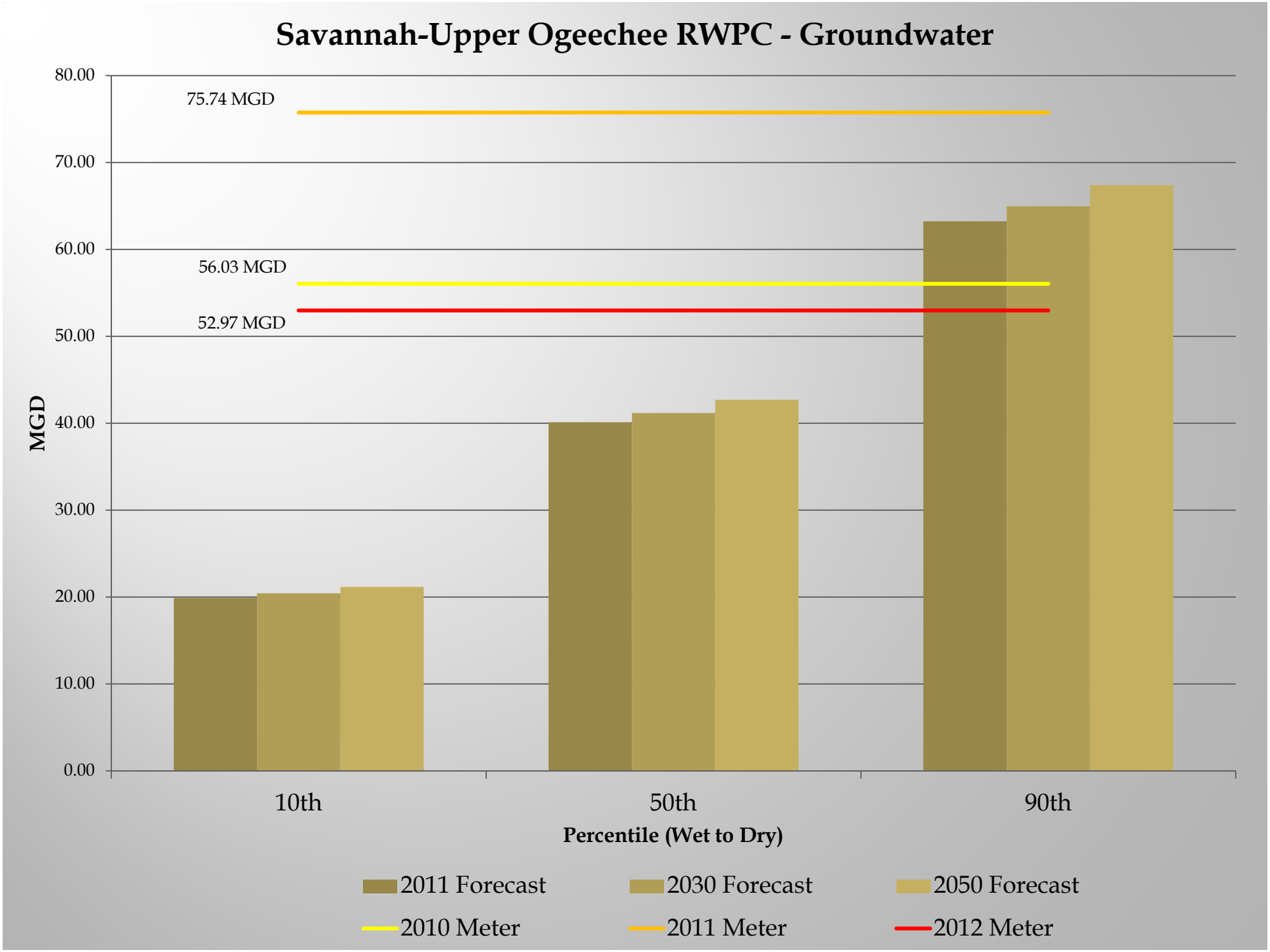
Results

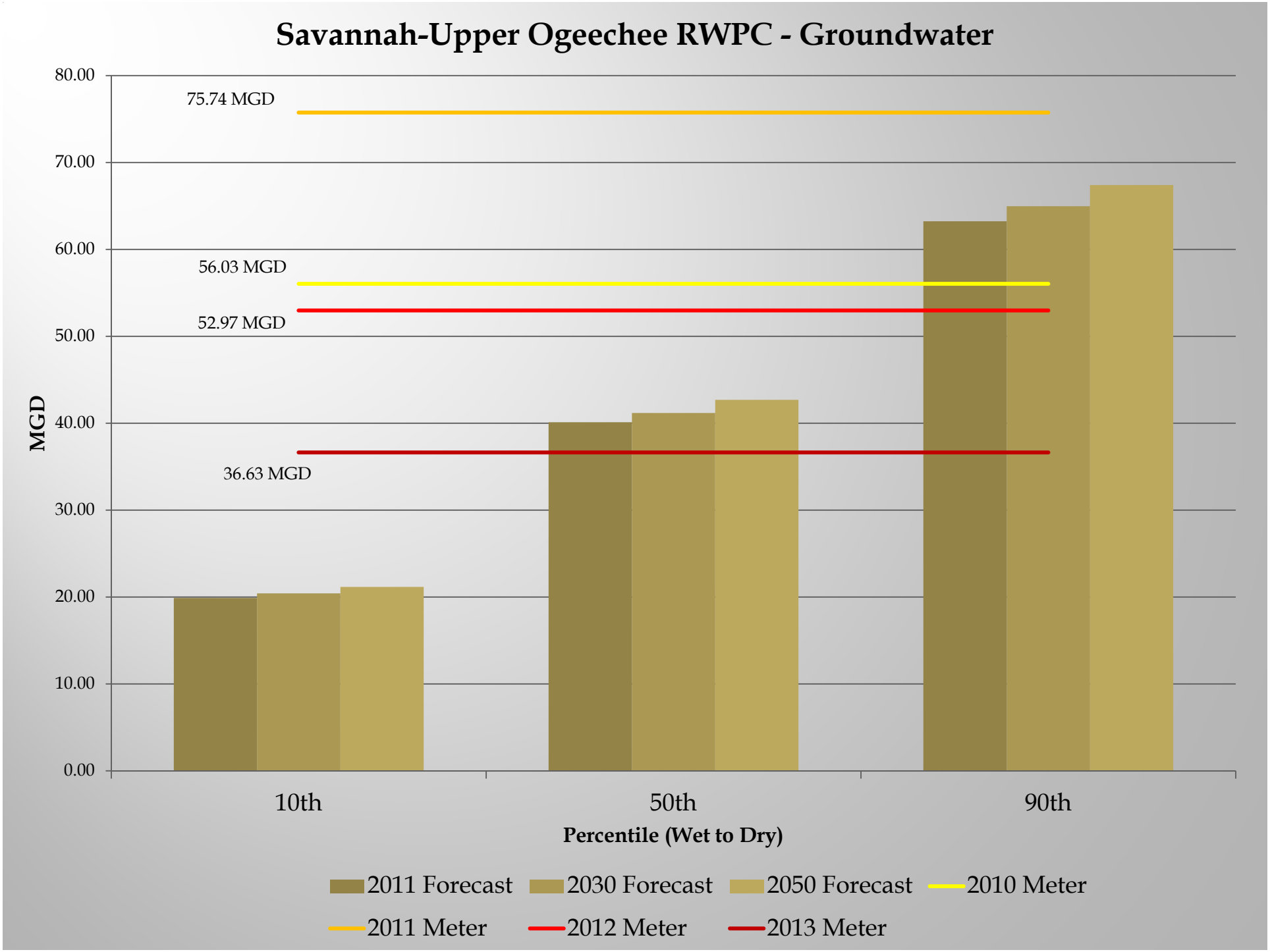
Current Demand Estimate from Meter Data

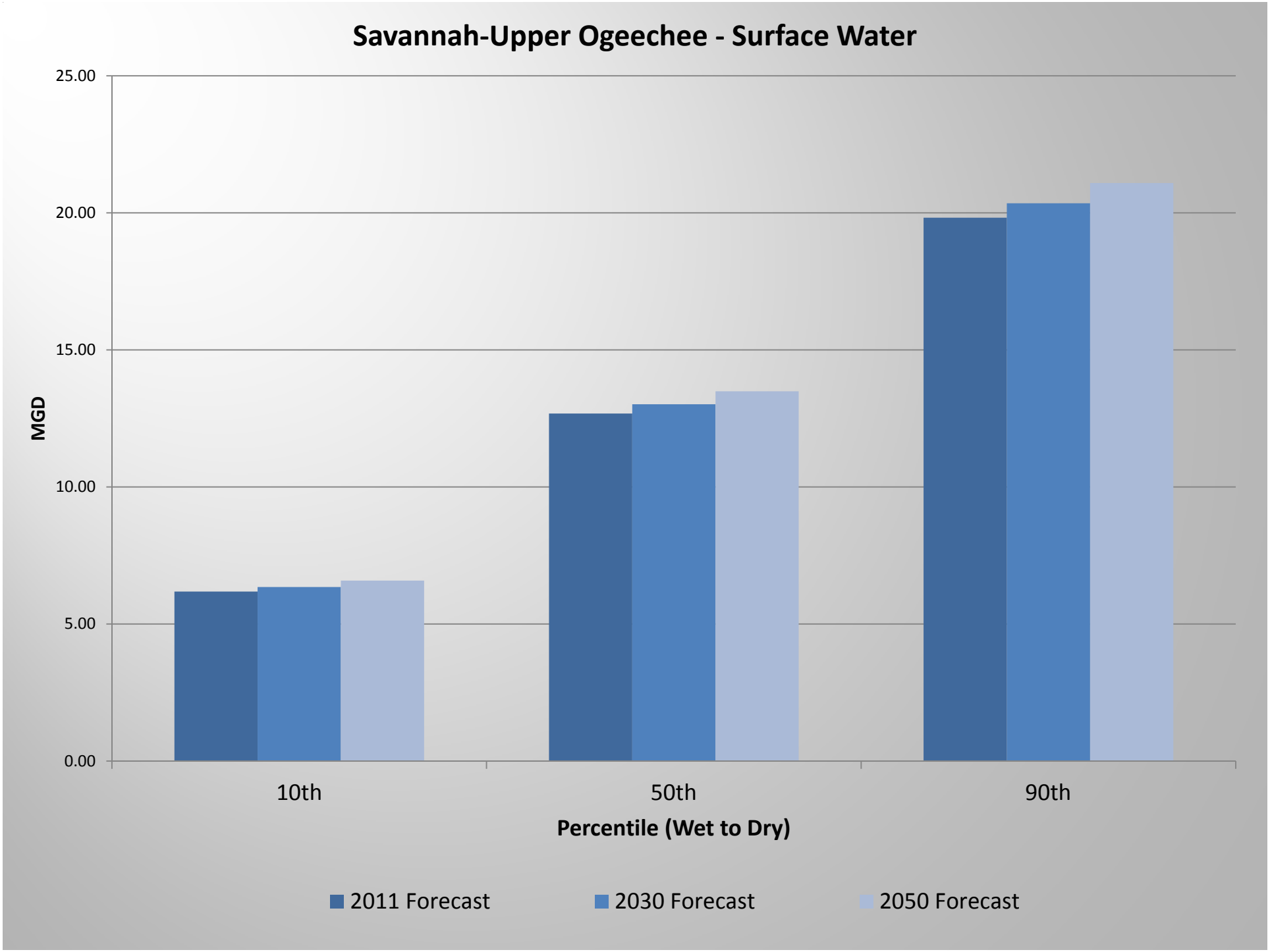

Savannah-Upper Ogeechee RWPC - Groundwater
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
MGD
10th
50th
90th
Percentile (Wet to Dry)
2011 Forecast
2030 Forecast
2050 Forecast

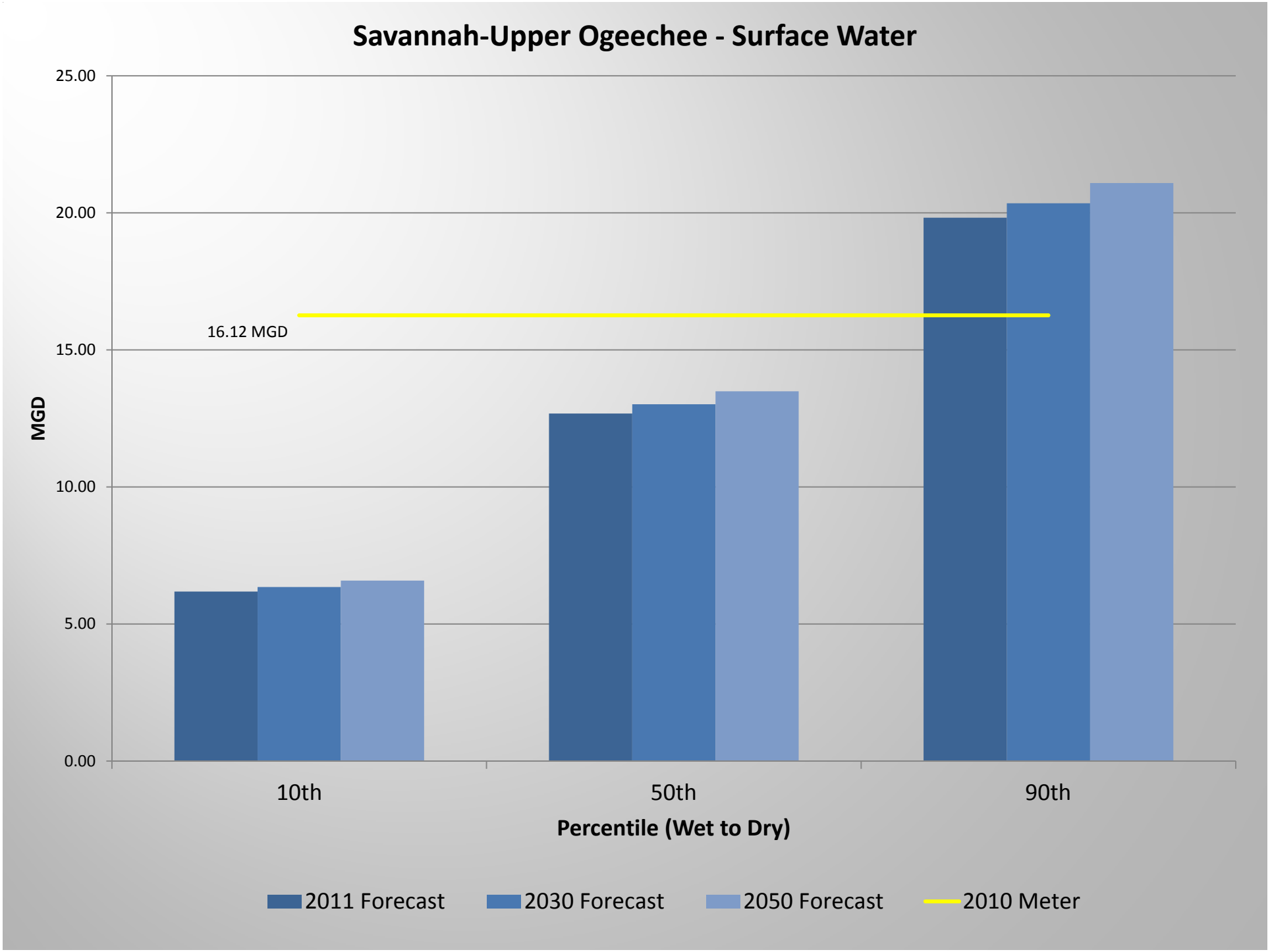

Savannah-Upper Ogeechee RWPC - Groundwater
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
MGD
56.03 MGD
10th
50th
90th
Percentile (Wet to Dry)
2011 Forecast
2030 Forecast
2050 Forecast
2010 Meter

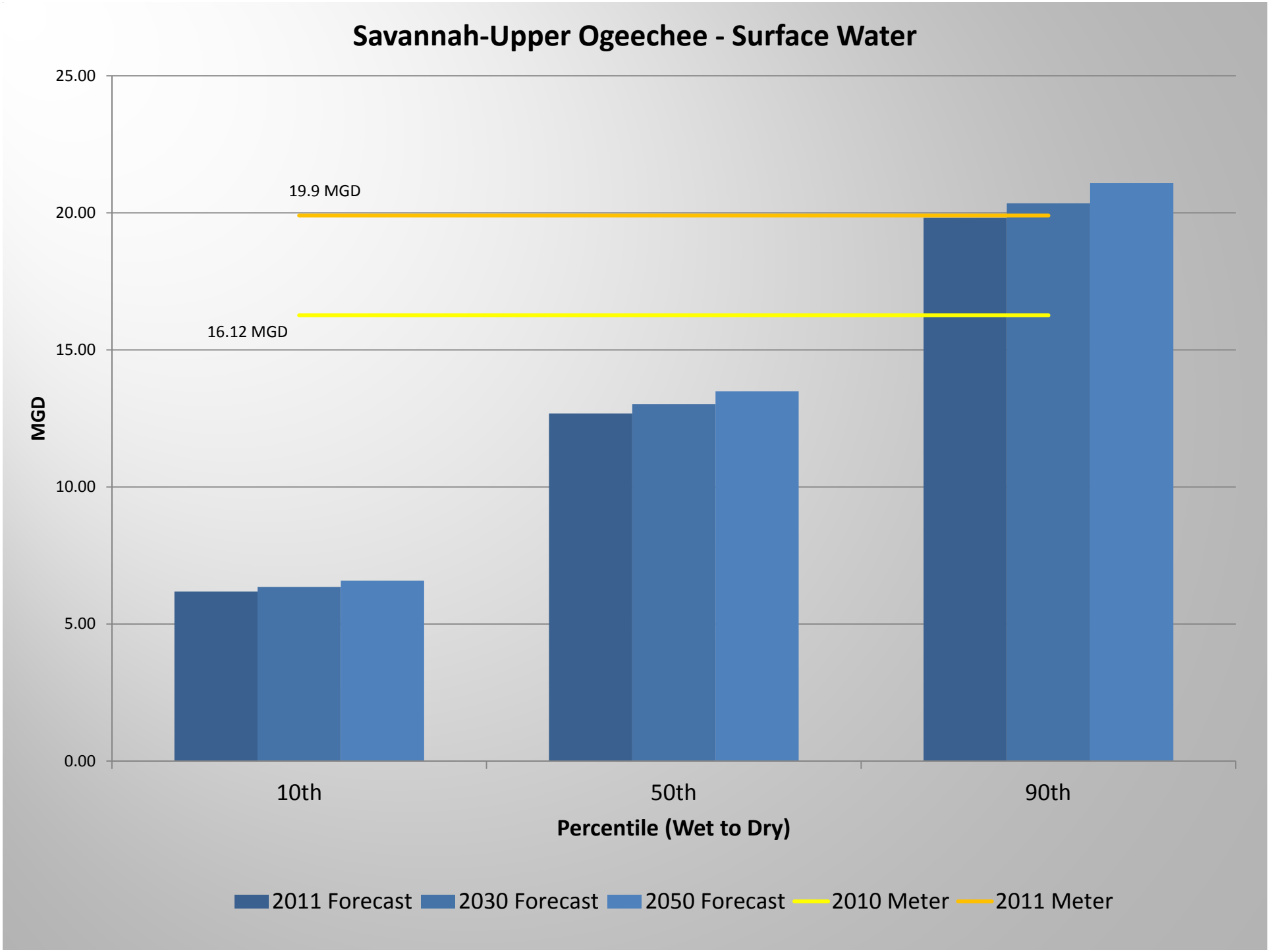

Savannah-Upper Ogeechee RWPC - Groundwater
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
MGD
75.74 MGD
56.03 MGD
10th
50th
90th
Percentile (Wet to Dry)
2011 Forecast
2030 Forecast
2050 Forecast
2010 Meter
2011 Meter

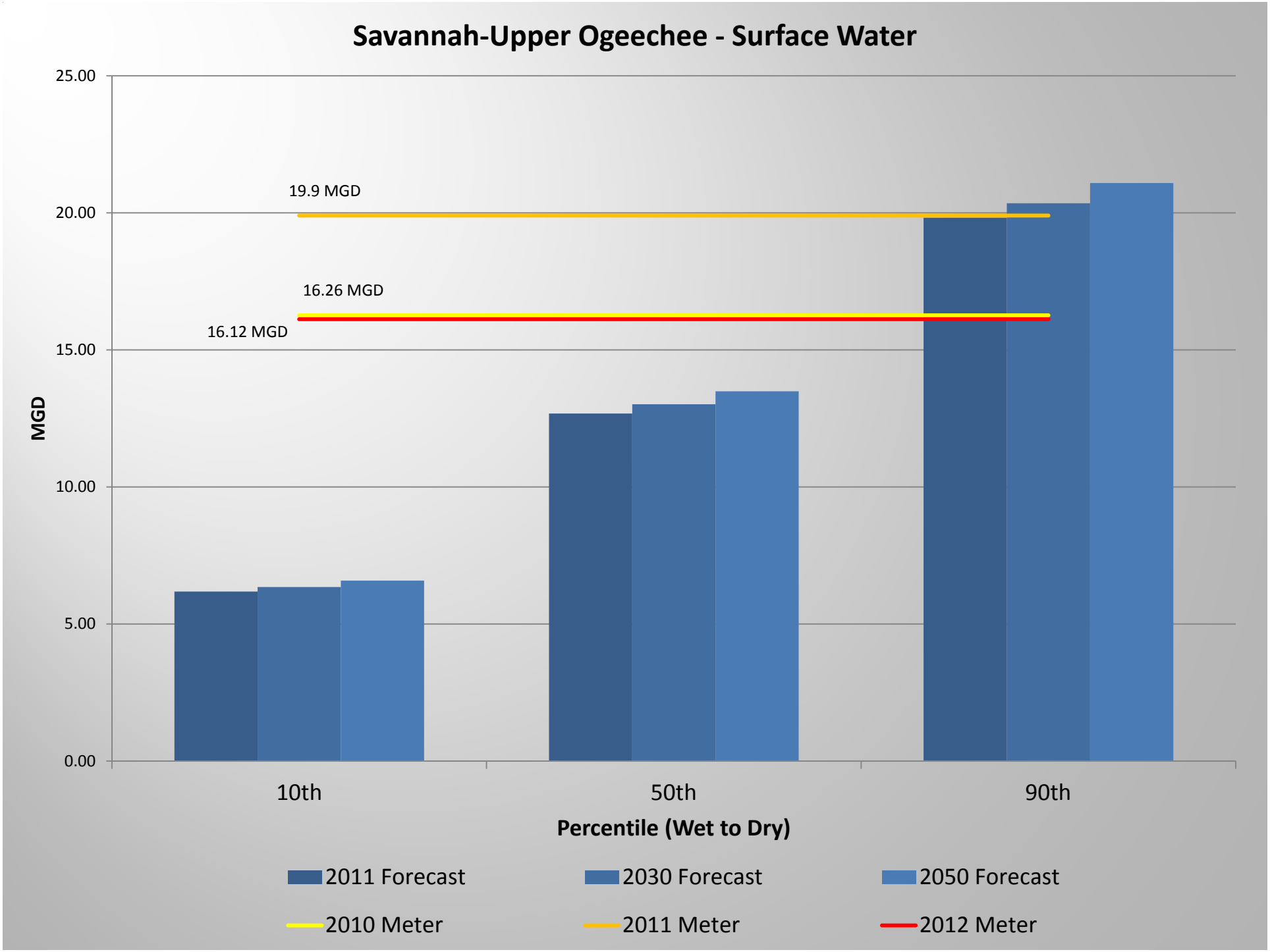

Savannah-Upper Ogeechee RWPC - Groundwater
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
MGD
75.74 MGD
56.03 MGD
52.97 MGD
10th
50th
90th
Percentile (Wet to Dry)
2011 Forecast
2030 Forecast
2050 Forecast
2010 Meter
2011 Meter
2012 Meter

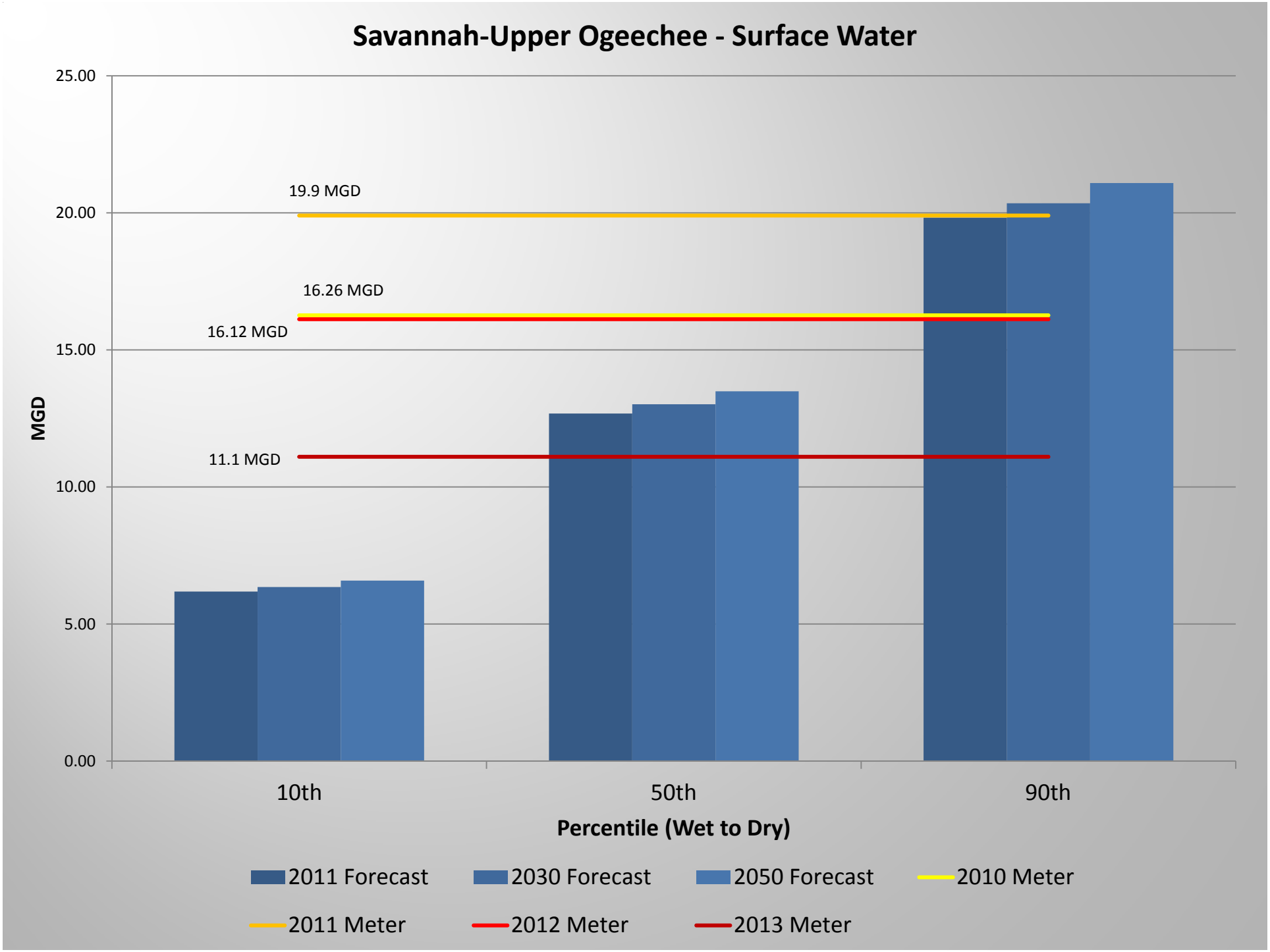

Savannah-Upper Ogeechee RWPC - Groundwater
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
MGD
75.74 MGD
56.03 MGD
52.97 MGD
36.63 MGD
10th
50th
90th
Percentile (Wet to Dry)
2011 Forecast
2030 Forecast
2050 Forecast
2010 Meter
2011 Meter
2012 Meter
2013 Meter


Savannah-Upper Ogeechee - Surface Water
25.00
20.00
15.00
10.00
5.00
0.00
MGD
10th
50th
90th
Percentile (Wet to Dry)
2011 Forecast
2030 Forecast
2050 Forecast


Savannah-Upper Ogeechee - Surface Water
25.00
20.00
15.00
10.00
5.00
0.00
MGD
16.12 MGD
10th
50th
90th
Percentile (Wet to Dry)
2011 Forecast
2030 Forecast
2050 Forecast
2010 Meter


Savannah-Upper Ogeechee - Surface Water
25.00
20.00
15.00
10.00
5.00
0.00
MGD
19.9 MGD
16.12 MGD
10th
50th
90th
Percentile (Wet to Dry)
2011 Forecast
2030 Forecast
2050 Forecast
2010 Meter
2011 Meter


Savannah-Upper Ogeechee - Surface Water
25.00
20.00
15.00
10.00
5.00
0.00
MGD
19.9 MGD
16.26 MGD
16.12 MGD
10th
50th
90th
Percentile (Wet to Dry)
2011 Forecast
2030 Forecast
2050 Forecast
2010 Meter
2011 Meter
2012 Meter


Savannah-Upper Ogeechee - Surface Water
25.00
20.00
15.00
10.00
5.00
0.00
MGD
19.9 MGD
16.26 MGD
16.12 MGD
11.1 MGD
10th
50th
90th
Percentile (Wet to Dry)
2011 Forecast
2030 Forecast
2050 Forecast
2010 Meter
2011 Meter
2012 Meter
2013 Meter

2015-16 Agricultural Water Demand Forecasts - Methods

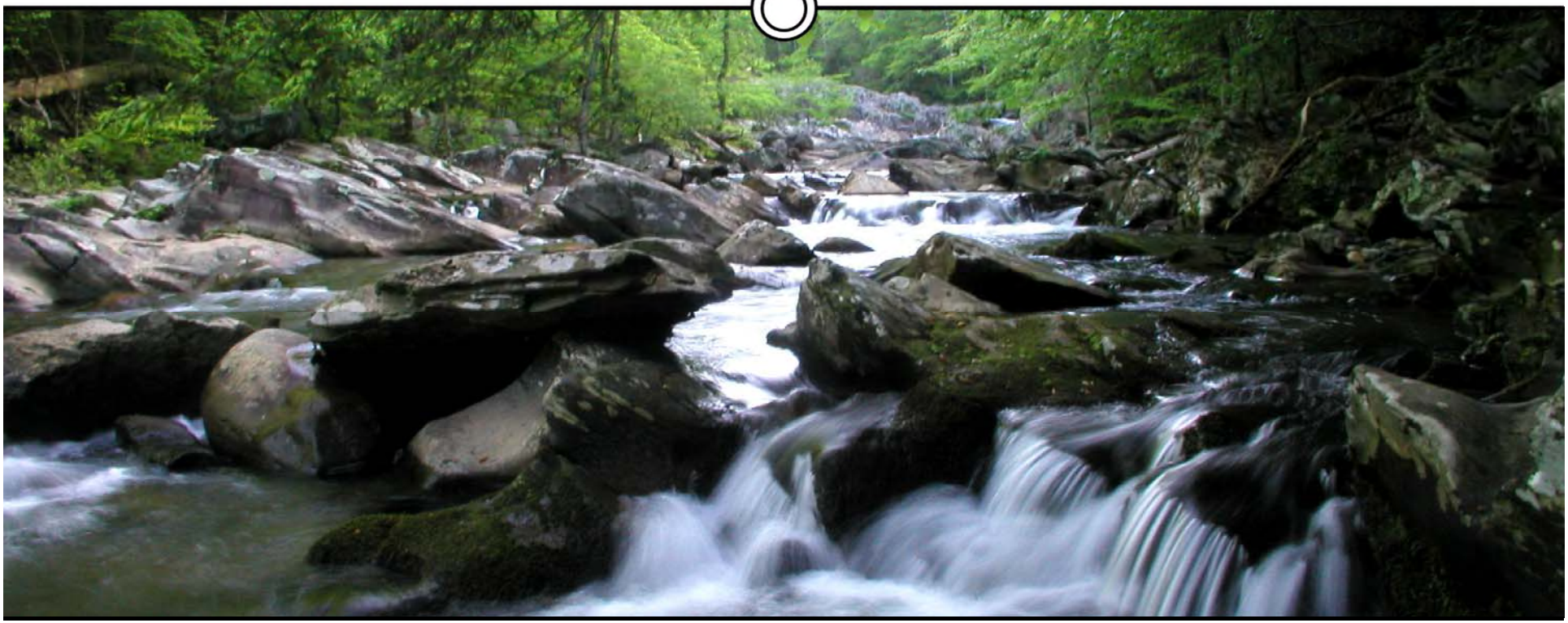
- **Approach:** Look to past trends and consider foreseeable changes
- **Acreage**
- **Crop projections through 2050** - modeled based on multiple data sources:
  - USDA Projections, Southeast Model, Georgia Model, Data Trends
- **Crop water needs** - wet, normal, dry years
  - Review estimates used in 2009-2010 and revise if needed

Current and Forecast Agricultural Water Use

- Current and forecast use by basin, water planning region, drainage area (node), county and aquifer.
- Use in dry, normal and wet years
- Used to support resource assessment modeling and water planning council plan development
  - Forecasts will be available during second water planning council meetings of 2016

GEORGIA
DEPARTMENT OF NATURAL RESOURCES

Regional Water Planning

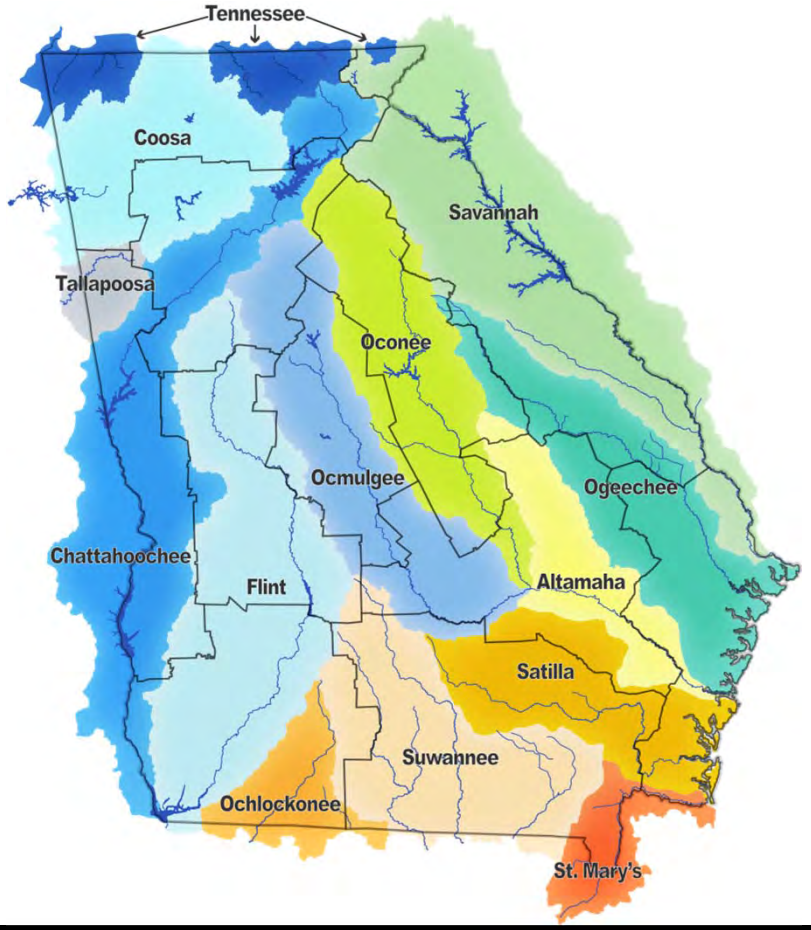


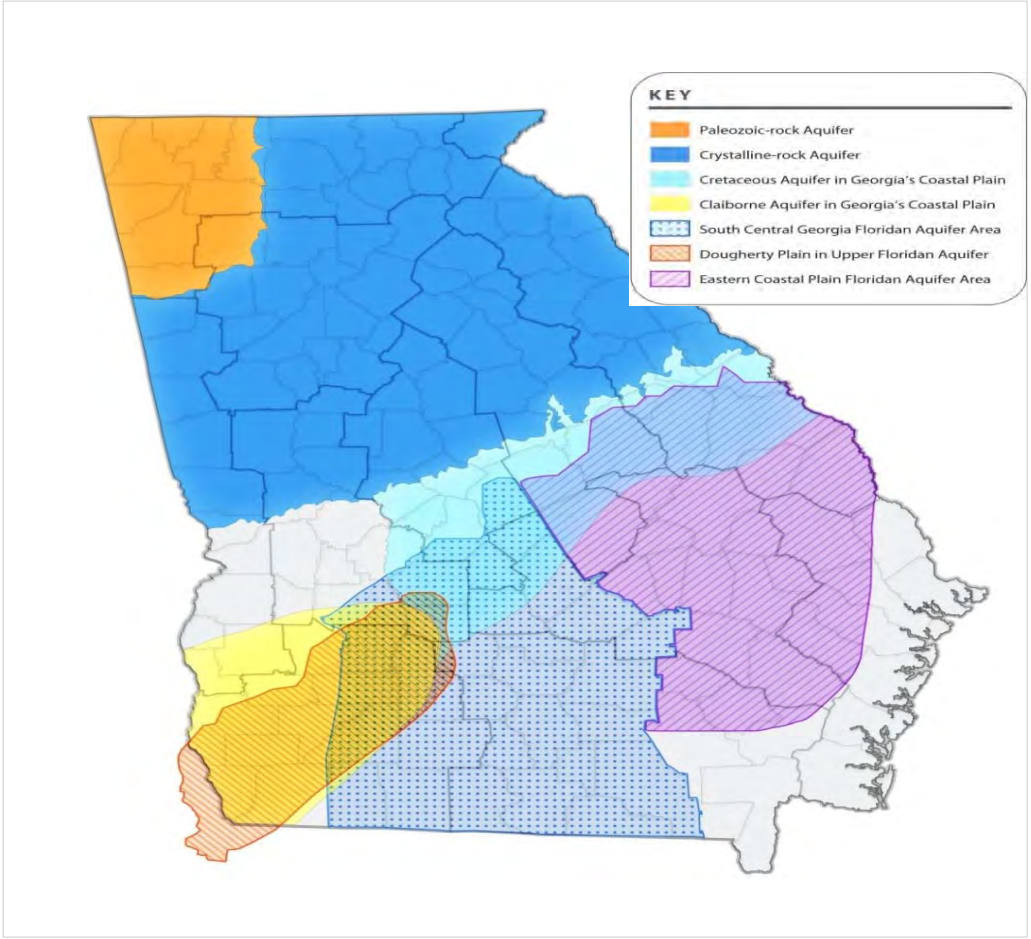
March, 2016

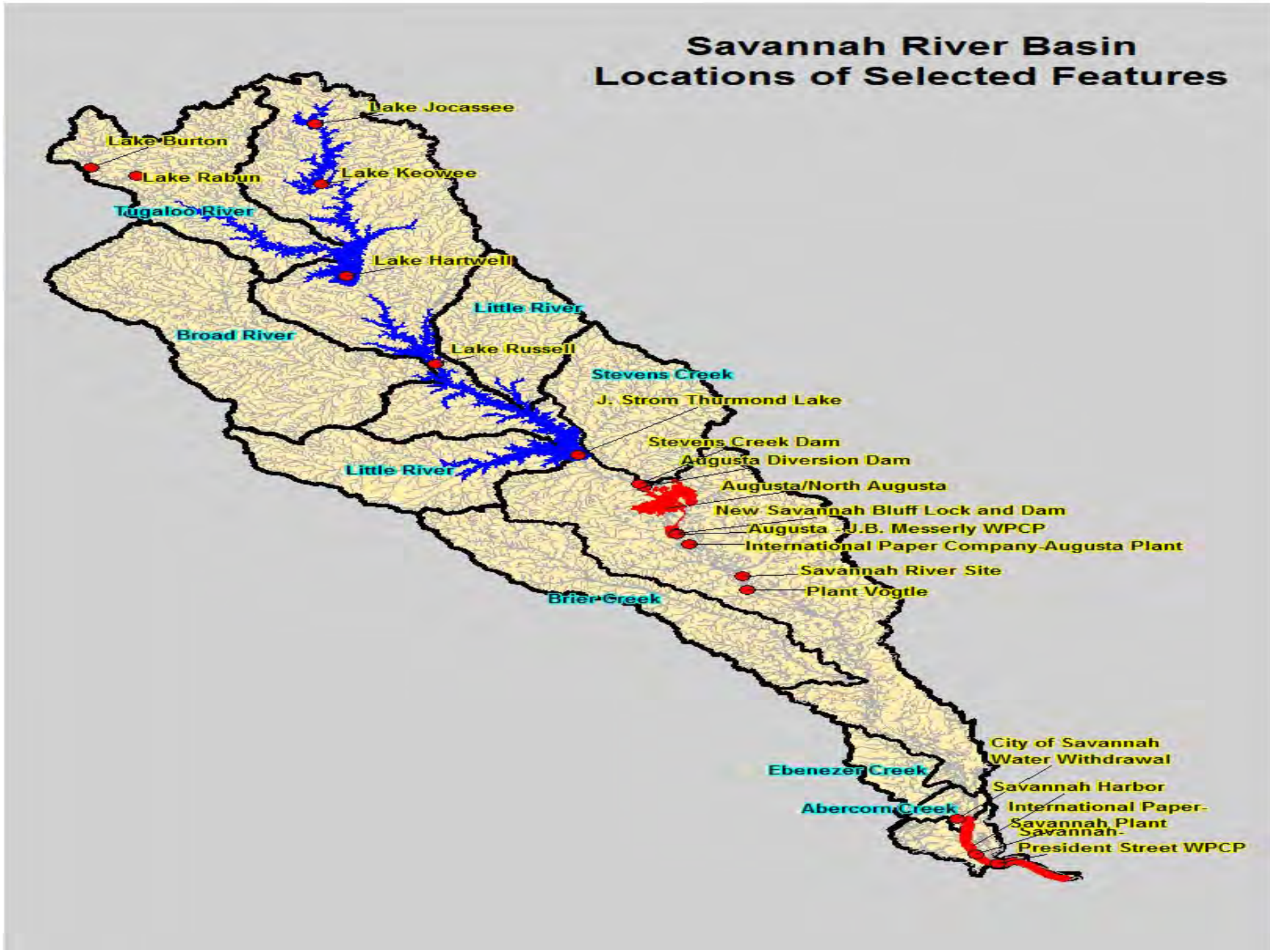
Jeff Larson

Major River Basins and Aquifers

- 14 major river basins & 7 major aquifer systems



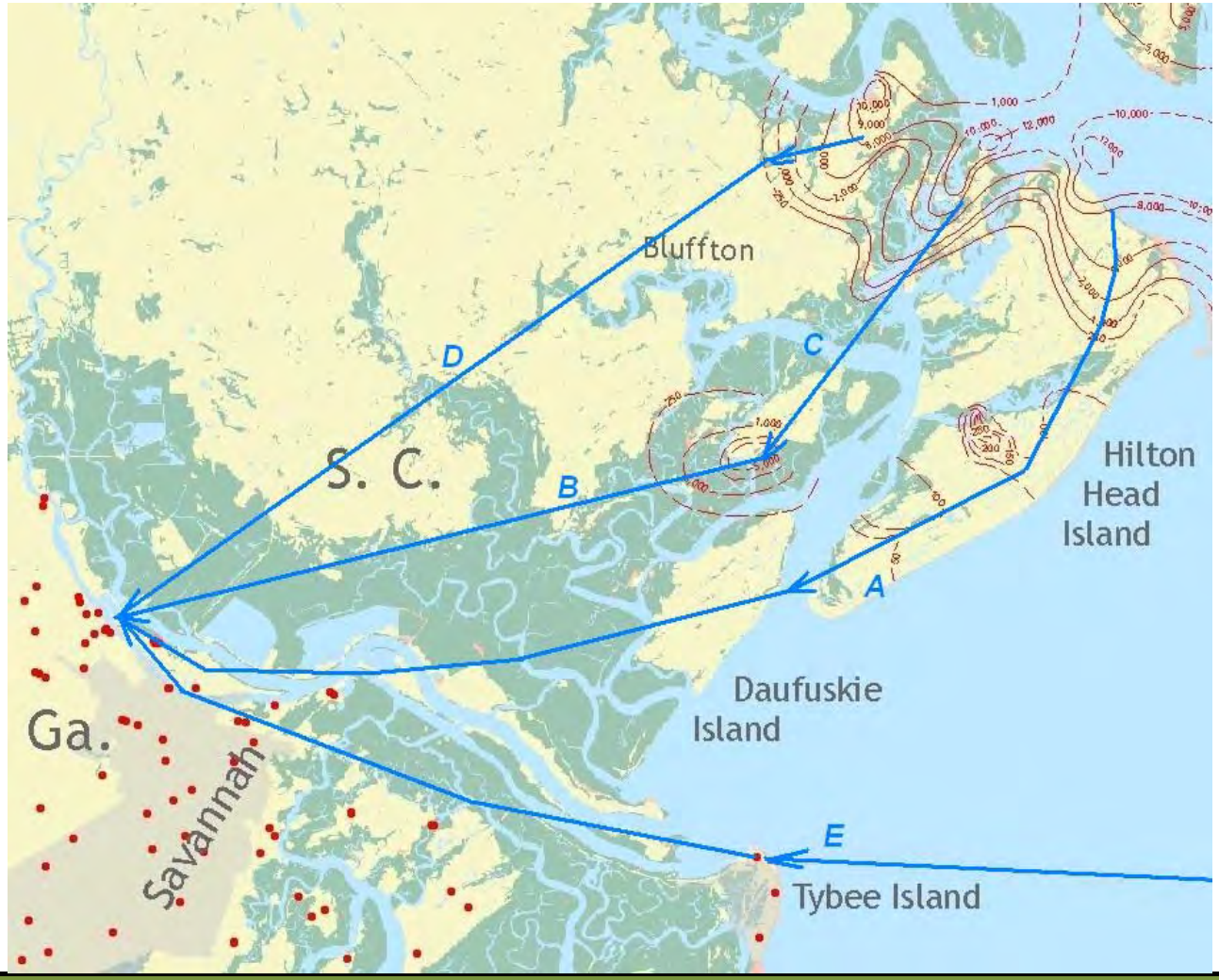



Savannah River Basin
Locations of Selected Features
Lake Jocassee
Lake Burton
Lake Rabun
Lake Keowee
Tugaloo River
Lake Hartwell
Little River
Broad River
Lake Russell
Stevens Creek
J. Strom Thurmond Lake
Stevens Creek Dam
Augusta Diversion Dam
Little River
Augusta/North Augusta
New Savannah Bluff Lock and Dam
Augusta - J.B. Messerly WPCP
International Paper Company-Augusta Plant
Savannah River Site
Plant Vogtle
Brier Creek
City of Savannah
Water Withdrawal
Ebenezer Creek
Savannah Harbor
Abercorn Creek
International Paper-
Savannah Plant
Savannah-
President Street WPCP

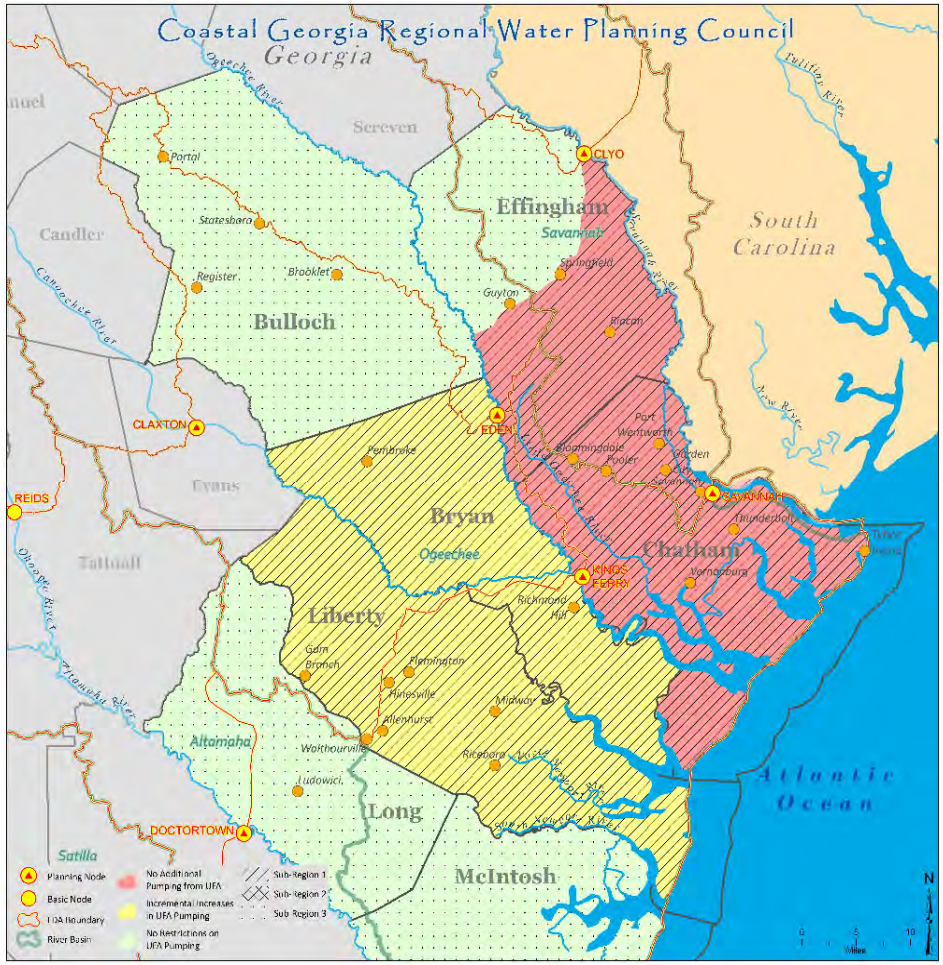
Updates

- Red and Yellow Zone Groundwater Withdrawal Permit Reductions;
- Governor's Water Supply Program/Deep Well Tybee Island;
- Savannah Harbor 5R process

Saltwater Plume Migration



GW Permit Limit Reductions



- Reductions implemented where available alternate water supplies exist.
- Groundwater withdrawal permit limits (annual average) were reduced on December 31, 2015.
- In RED zone, reductions were staged for 2020 and 2025
- In YELLOW Zone, reductions were staged for 2025.

Red Zone Reduction Strategy

- Annual Average Permit Limits were to be reduced 10 MGD by 2020 and an additional 5 MGD by 2025.

- Off the top permit limit reductions were implemented for:
  - GA Power Co - closing Plant Kraft – some water was transferred
  - Hunter Army Airfield – EPD revoking unused LF permit
  - Tybee Island – reductions contingent upon productive Cretaceous well
  - City of Savannah – Genesis Point in Yellow Zone transferring to Bryan County

- Permits with no alternative water supply were unaffected:
  - Skidaway Institute of Oceanography
  - Skidaway Island Utilities

- Pro-rata reductions to reach the targets were applied to all others after incorporating the above reductions

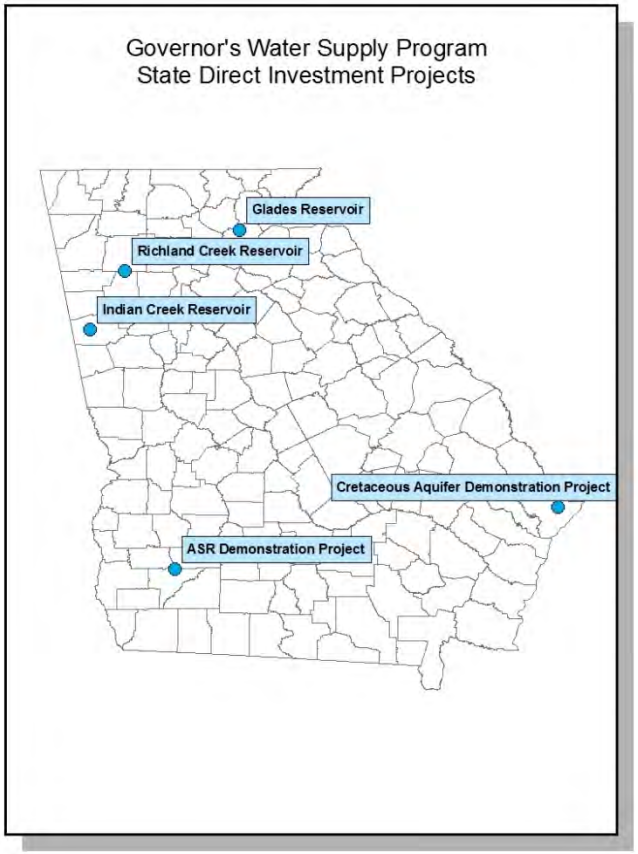
Yellow Zone Reduction Strategy

- To reach the 1.000 MGD reduction target for annual average permit limits in the year 2025, a Pro-rata reduction was applied to all Yellow Zone permit holders.

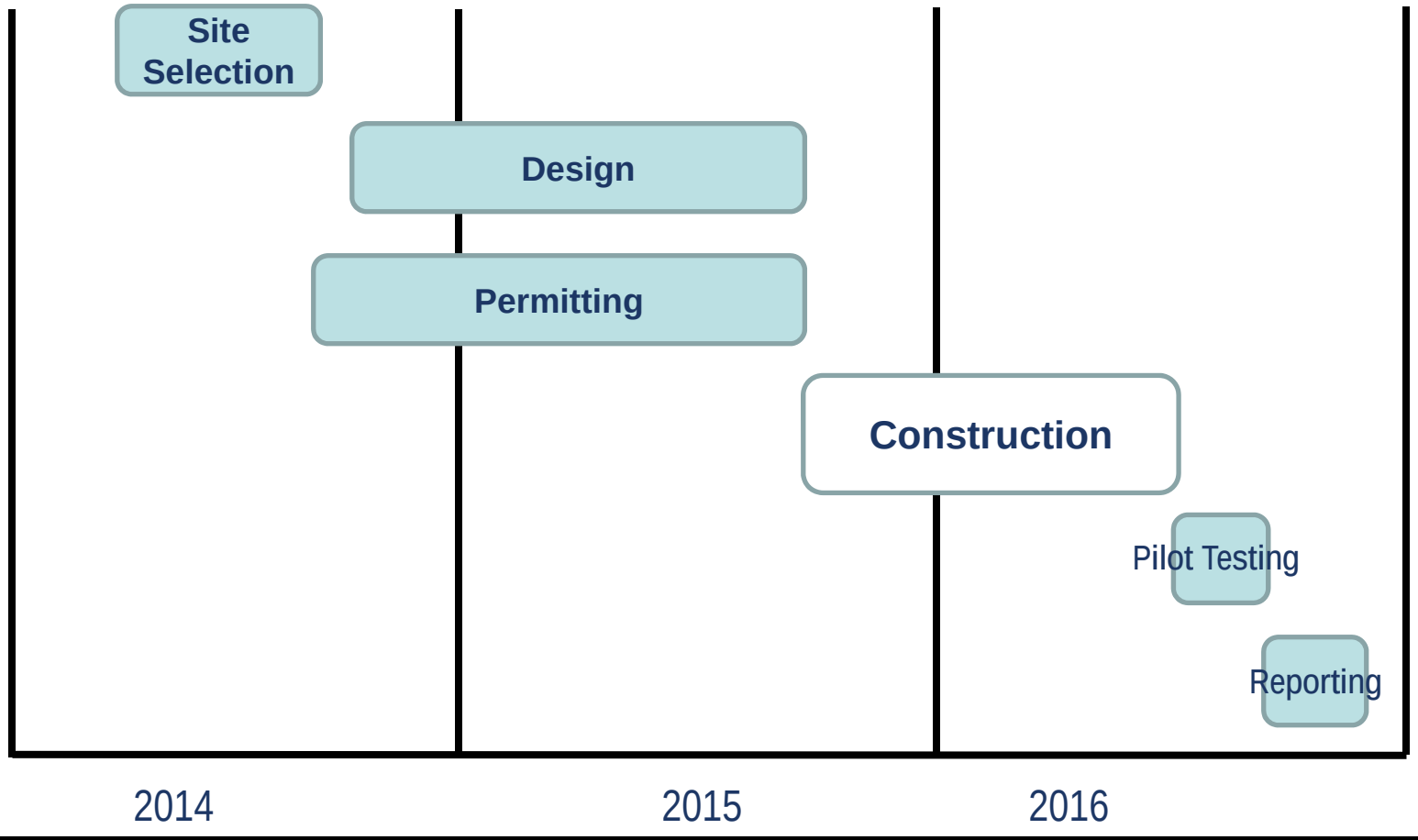
- When it occurs, 1.000 MGD will be added to Bryan County's permit to account for the transfer of the Genesis Point development and their respective Floridan wells.

Governor's Water Supply Program

- Funding to assist development of new water supply projects
- Applications to GEFA
  - Loans for local projects to meet projected local demand
  - State Direct Investment
    - Innovative projects or project enhancements to meet state interests
    - ASR demonstration; Reservoirs; Coastal deep well
- EPD activities
  - Assist in project development; issue permits



Deep Well Project Schedule



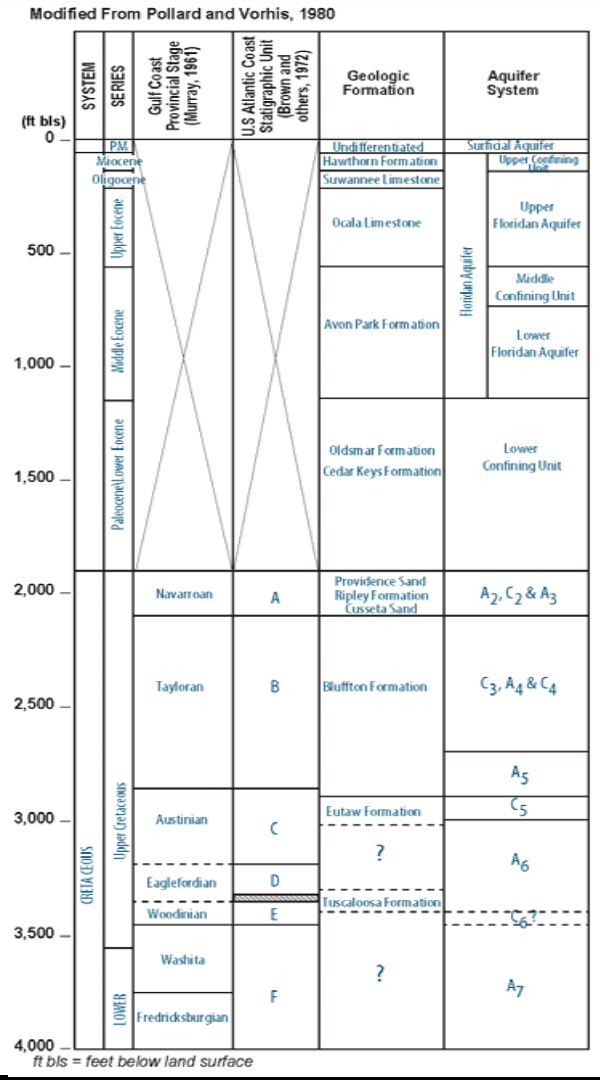
Why Explore the Cretaceous Aquifer?

Long pipelines to coastal regions would have large environmental footprint and be costly to construct

Filtration and desalination of ocean water is costly and energy-intensive

There is no available water in surficial aquifers

GEFA's test well project will explore use of Cretaceous aquifer as an alternative to the Floridan aquifer



Test Well Project Description

Test use of Cretaceous aquifer by drilling a 4,000 ft. well and pumping for 30 days at a rate of 650 gallons per minute

Purpose of the Test Well Project

- Confirm water quality and availability
- Evaluate treatment technologies needed if used as a drinking water well in the future
- Summarize technical, environmental, and cost implications

Pump Test Water:

- Blended with final effluent from the Tybee Island Water Pollution Control Plant
- Discharged via an existing pipe to an existing outfall near the mouth of the Savannah River

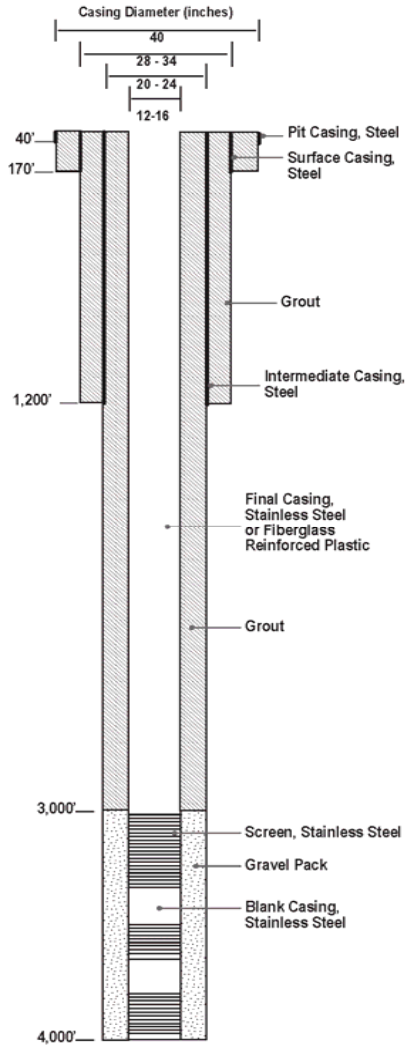
Environmental Resource Assessment

Water Supply

- Well design protects the Floridan aquifer from Cretaceous aquifer groundwater
- Avoidance of existing water supply infrastructure

Water Quality

- Groundwater may have low oxygen levels and elevated temperature based on Cretaceous aquifer well on South Island
- Installation of a course bubble aeration system in abandoned post aeration basin
- Blend pump test groundwater with City of Tybee Island discharge to lower temperature
- Water quality monitoring for temporary discharge permit



Temporary Discharge Permit

South Island, SC data used as closest representative data for the Cretaceous aquifer

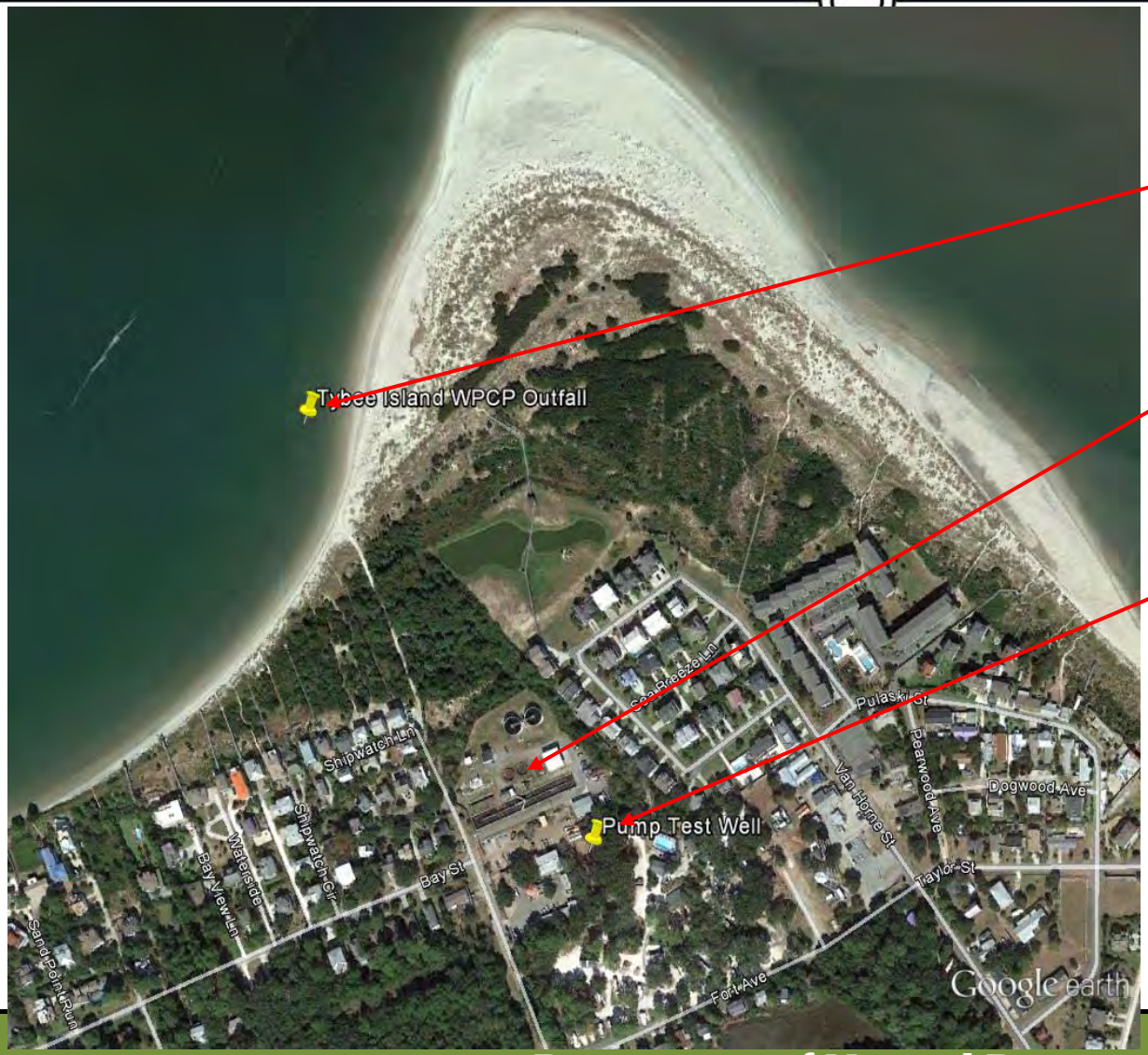
- Maximum of 118 ºF
- Low-dissolved oxygen
- No metals or other constituents of concern found

Demonstration project discharge permit:

- Compliance monitoring for:
  - Temperature (mixing zone)
  - Dissolved oxygen
  - Flow rate
- Collect temperature measurements for mixing zone
  - Collect instantaneous temperature values at edge, inside, outside of mixing zone
  - Based on EPA-approved modeling software, mixing zone is anticipated to be 21 feet by 23 feet (480 square feet);

Pilot Test permitting to follow (RO temporary installation)

Pump Test Location

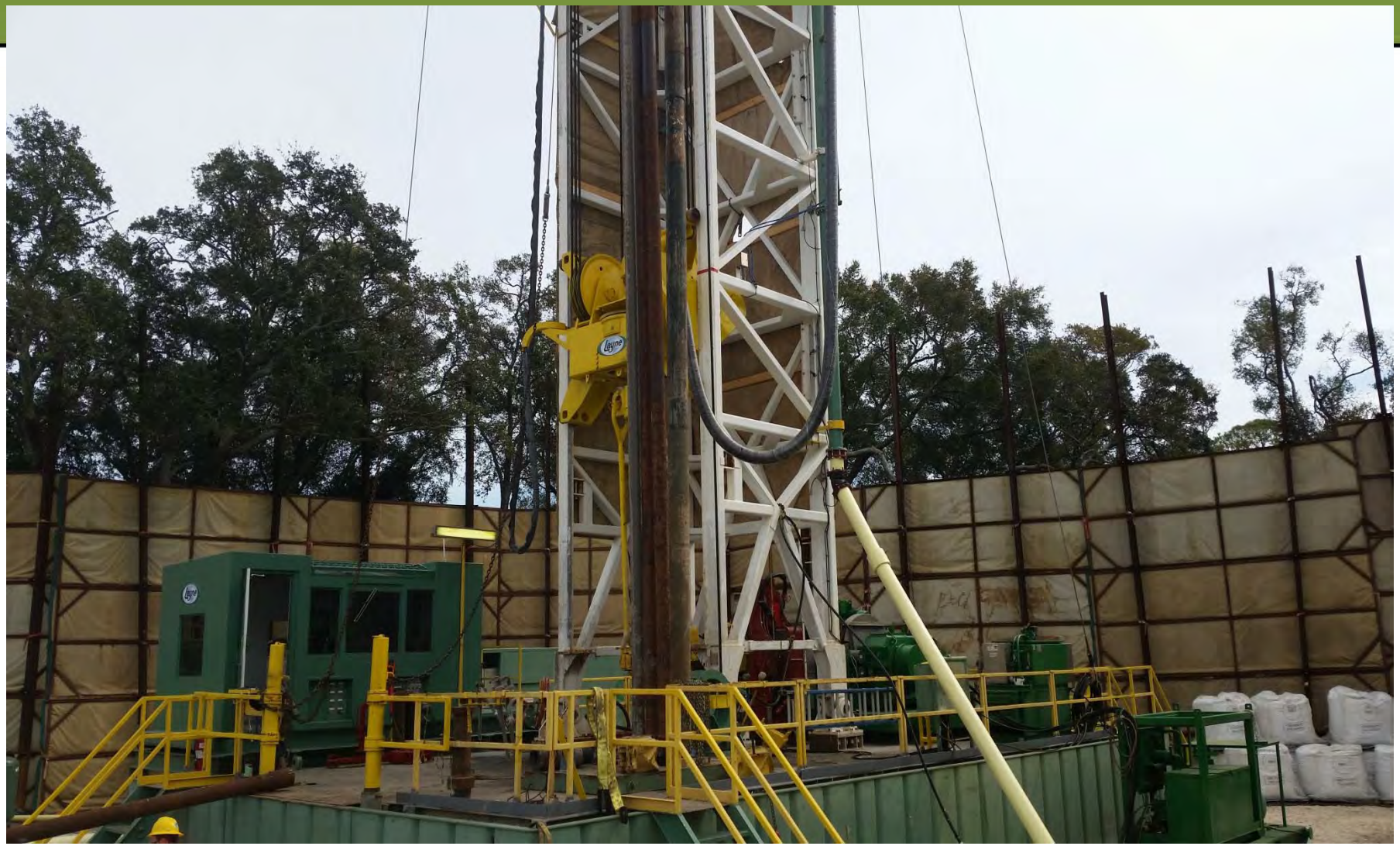


Tybee Island WPCP Outfall

Tybee Island WPCP

Cretaceous Well

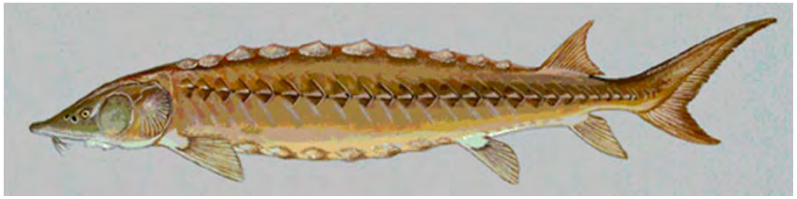
Department of Natural Resources



Department of Natural Resources

Current TMDL Status

- Stakeholder group convened of NPDES permit holders from GA and SC to discuss allocation of reduced assimilative capacity through use of a TMDL calculator;
- 98% of the available assimilative capacity has been distributed on paper; remaining 2% through Plant Vogtle Oxygen Injection;
- States, EPA and discharger stakeholder group currently discussing use of a water quality restoration plan as a means to memorialize reduction requirements in lieu of a TMDL



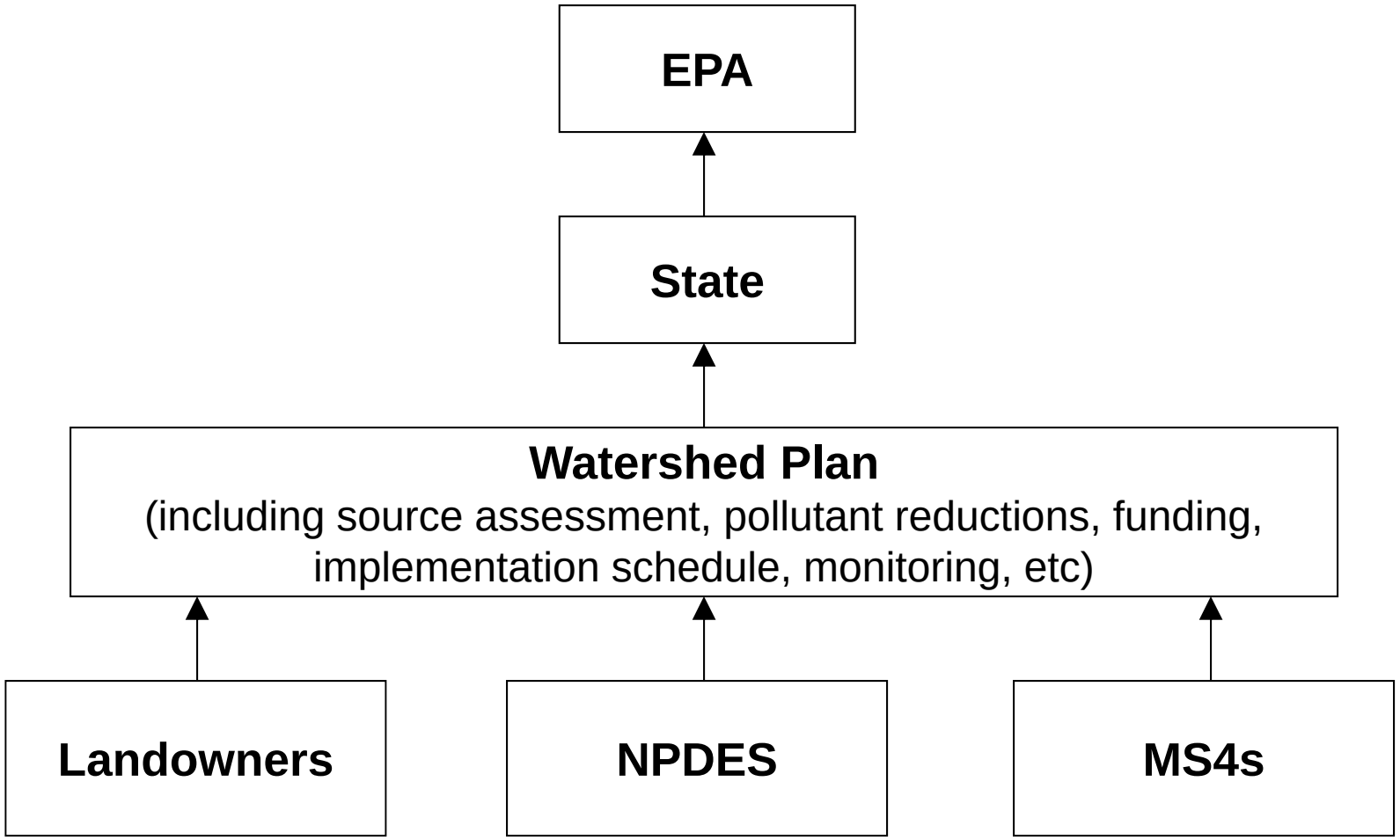
Savannah Modeling

- The Savannah River and Harbor models were used in conjunction to simulate and predict water quality in the Savannah River from Thurmond Dam to the ocean;

- The results from these models were used to develop the TMDL calculator which is an easier and quicker tool for predicting dissolved oxygen concentrations in Savannah Harbor for varying wasteload allocation scenarios;

- The proposed total wasteload allocation to Savannah Harbor is 154,290 pounds in which 69,950 and 84,340 pounds are allocated to facilities discharging to the River and Harbor, respectively.

Bottom-up 5R Approach



5R Context: State's 303(d) List

Category	Description
1	All designated uses (DU) met
2	Some, but not all, DUs met
3	Can not determine if any DUs met
4	*Impaired/threatened* –TMDL not needed
4a	TMDL completed
4b	TMDL alternative
4c	Non-pollutant causes
5	*Impaired/threatened* by pollutant –TMDL needed

Section 303(d) List

Water Quality Restoration Plan Approach

- Waters placed in 5R on a State's 303(d) list may defer a TMDL while water quality restoration plans are implemented to attain water quality standards;
- The water quality restoration plans should be developed by the stakeholders in conjunction with the State;
- Water quality restoration plans should follow an adaptive management approach, with "course corrections" based on new data and information;
- If the state is able to demonstrate the adequacy of the WQ restoration plan through the 5R approach, then the waters may be reviewed for acceptance under 4b and removed from the State's 303(d) list;
- If waters show no improvement, 5R waters would be returned to category 5 and re-prioritized for TMDL development;
- Savannah Harbor 5R plan currently at EPA for concurrence/November 2006 TMDL then replaced/NPDES Permitting follows

Savannah River Projects

Stan Simpson

Water Control Manager

Savannah District

09 March 2016

US Army Corps of Engineers

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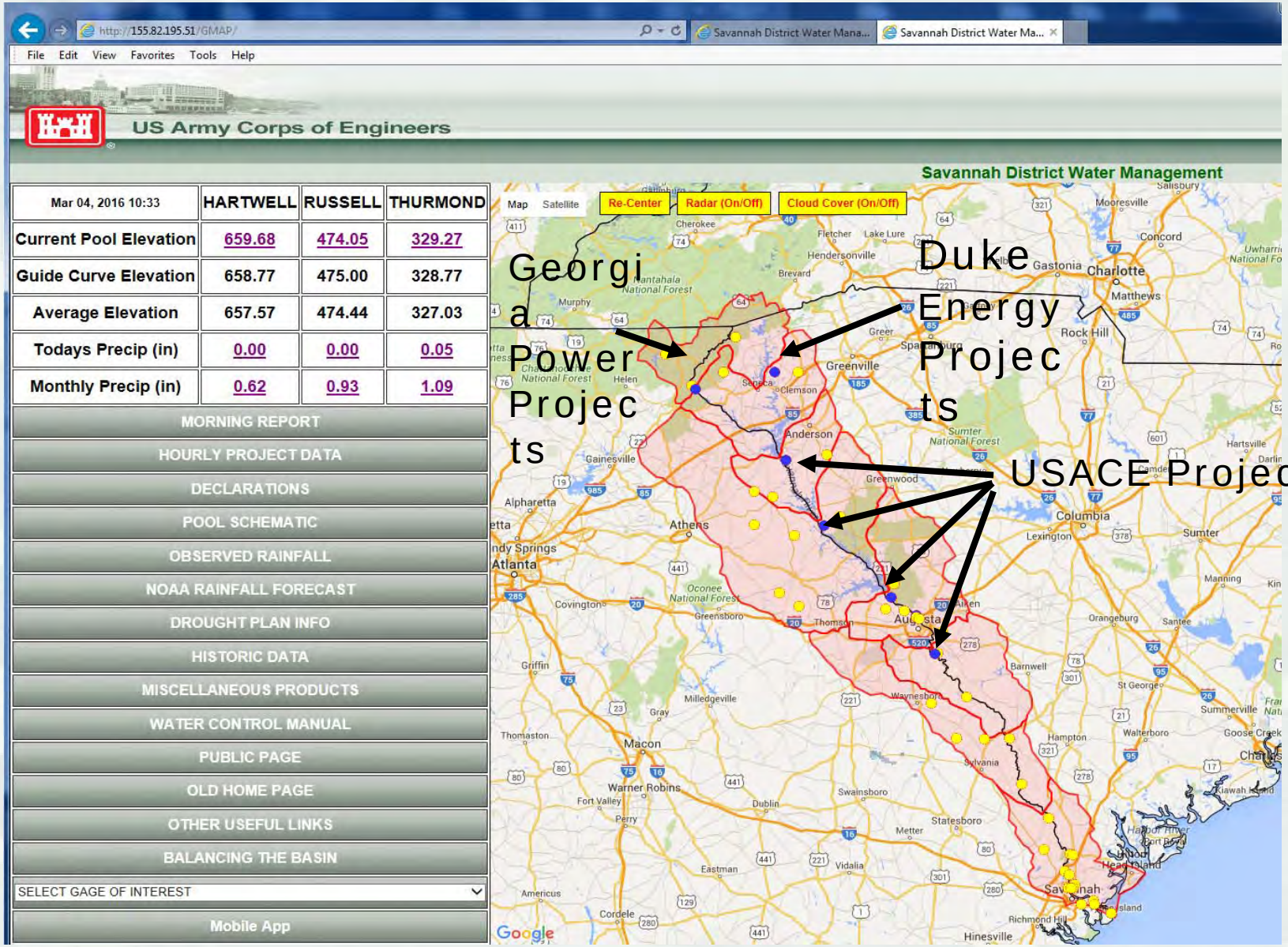

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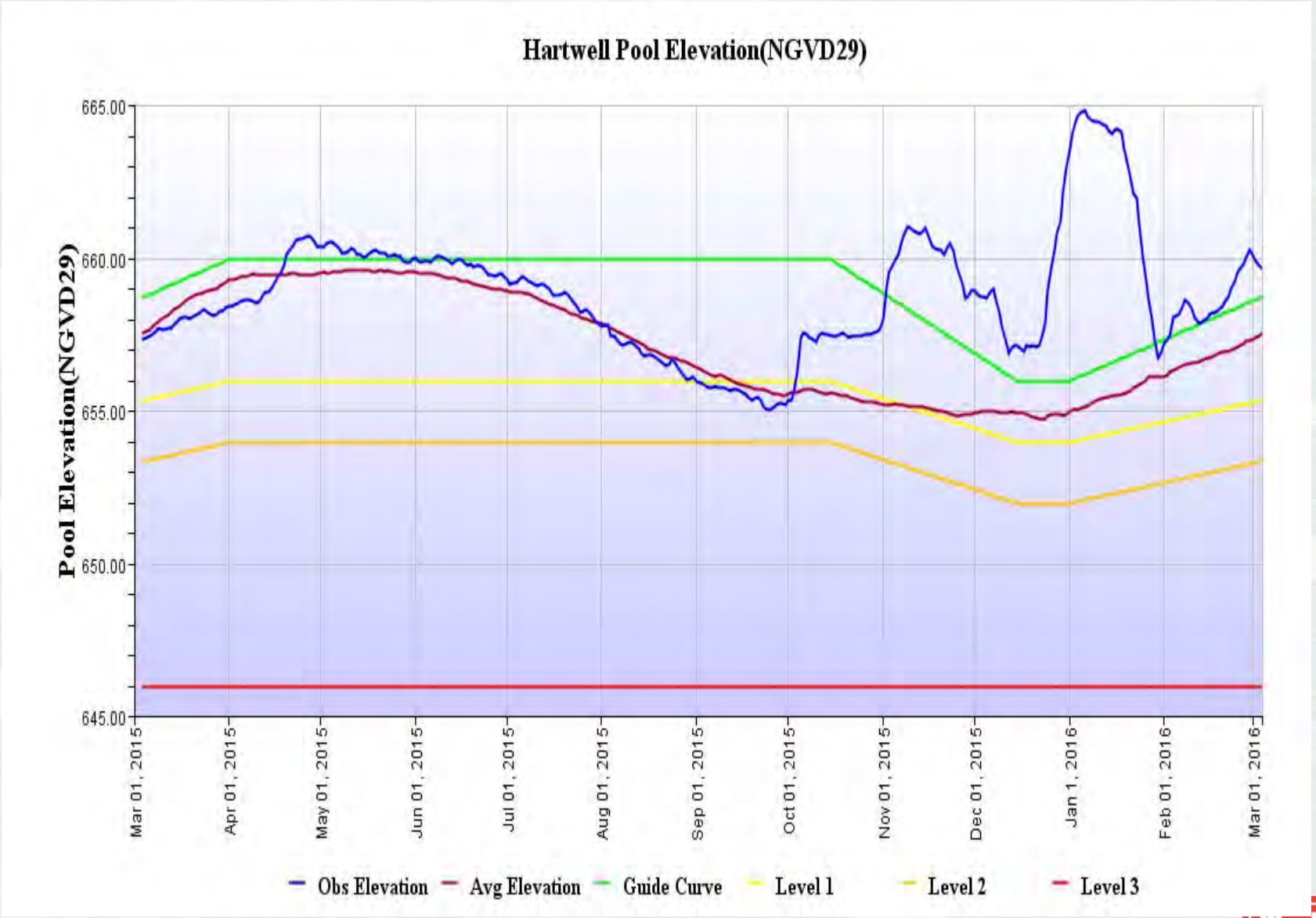
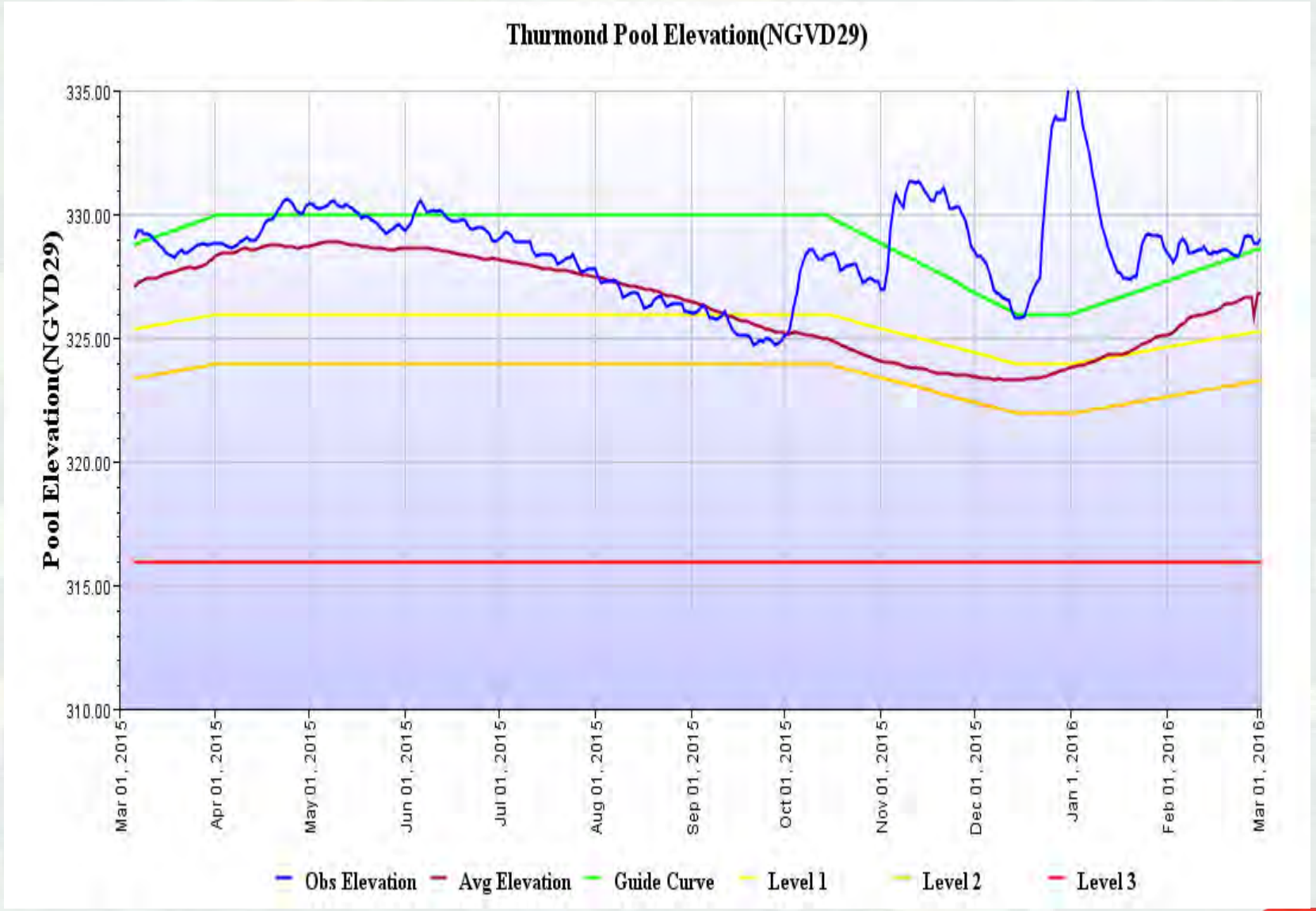

Hartwell Pool Elevation(NGVD29)
Pool Elevation(NGVD29)
665.00
660.00
655.00
650.00
645.00
Mar 01, 2015
Apr 01, 2015
May 01, 2015
Jun 01, 2015
Jul 01, 2015
Aug 01, 2015
Sep 01, 2015
Oct 01, 2015
Nov 01, 2015
Dec 01, 2015
Jan 1, 2016
Feb 01, 2016
Mar 01, 2016
Obs Elevation
Avg Elevation
Guide Curve
Level 1
Level 2
Level 3


Thurmond Pool Elevation(NGVD29)
Pool Elevation(NGVD29)
335.00
330.00
325.00
320.00
315.00
310.00
Mar 01, 2015
Apr 01, 2015
May 01, 2015
Jun 01, 2015
Jul 01, 2015
Aug 01, 2015
Sep 01, 2015
Oct 01, 2015
Nov 01, 2015
Dec 01, 2015
Jan 1, 2016
Feb 01, 2016
Mar 01, 2016
Obs Elevation
Avg Elevation
Guide Curve
Level 1
Level 2
Level 3

Multi-Purpose Projects

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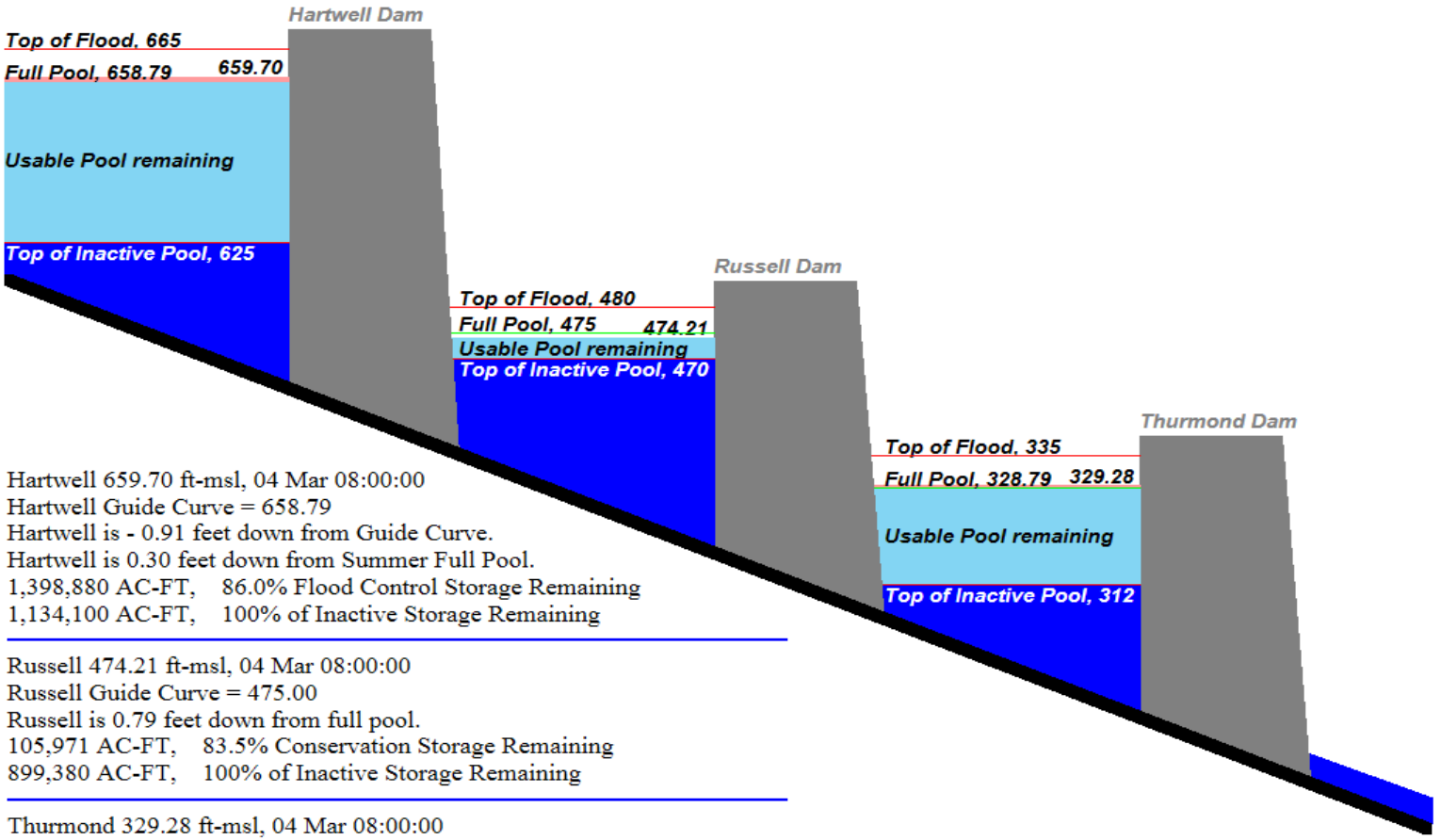
Friday Mar 04, 2016

Savannah River System
Pool Schematic



Hartwell 659.70 ft-msl, 04 Mar 08:00:00
Hartwell Guide Curve = 658.79
Hartwell is - 0.91 feet down from Guide Curve.
Hartwell is 0.30 feet down from Summer Full Pool.
1,398,880 AC-FT, 86.0% Flood Control Storage Remaining
1,134,100 AC-FT, 100% of Inactive Storage Remaining

Russell 474.21 ft-msl, 04 Mar 08:00:00
Russell Guide Curve = 475.00
Russell is 0.79 feet down from full pool.
105,971 AC-FT, 83.5% Conservation Storage Remaining
899,380 AC-FT, 100% of Inactive Storage Remaining

Thurmond 329.28 ft-msl, 04 Mar 08:00:00
Thurmond Guide Curve = 328.79
Thurmond is - 0.49 feet down from Guide Curve.
Thurmond is 0.72 feet down from Summer Full Pool.
1,003,600 AC-FT, 92.8% Flood Control Storage Remaining
1,465,000 AC-FT, 100% of Inactive Storage Remaining

2,508,451 AC-FT, 97% Total System Conservation Storage Remaining
3,498,480 AC-FT, 100% Total System Inactive Storage Remaining
6,006,931 AC-FT, 99% Total System Storage Remaining

Hartwell Lake

- 3rd most-visited Corps project in Nation - 10.1M Visitors
- Constructed in 1962
- 56,000 acre water surface (660 msl) 962-mile shoreline
- 5 Turbines with a 422 MW Generating capacity
- Largest shoreline management program in the Corps with 47,523 permitted activities

Richard B. Russell Project

- Largest Corps power plant east of Mississippi River
- Completed in 1984
- 26,653 acre water surface (475 ft msl) 540-mile shoreline
- Four conventional turbines 328 MW Generating Capacity
- Four pump turbines 320 MW Generating Capacity
- 27 recreation sites
- 4 state parks

J. Strom Thurmond Project

- 8th most-visited Corps project in the Nation-6M Visitors/Yr
- Completed in 1952
- 71,100 acre water surface (330 ft msl)
- Seven turbines capable of generating 364 MW
- 1,200 miles of shoreline
- 76 recreation sites

Savannah River Basin Users

- Lakes Region
  - J. Strom Thurmond - 2,300 Lake Permits
  - Hartwell – 11,737 Lake Permits
  - 3 Lake Total – 25 Million Visitors – FY06
  - 3 Lake Total Water Supply Users
    - 13 Municipalities
    - 1 State Park
    - 1 University
    - 5 Industries
  - 20 Hydropower Units – 1,434 MW Capacity

Savannah River Basin Users

- River Below Thurmond Dam
  - ► Water Supply Users
    - 3 Cities * 2 Counties
    - 1 Army Base * 12 Industries
  - ❖ Heavy Recreational Use
  - ❖ Coastal Zone Environmental Concerns
    - Augusta Shoals – Endangered Species
    - Salt Water Intrusion
    - Savannah River Fish & Wildlife Refuge

Savannah River at Augusta (Augusta Levee)

Savannah River Basin Collaboration of Partners

US Army Corps of Engineers
Savannah District

USGS science for a changing world

The Nature Conservancy
Protecting nature. Preserving life.™

ASU Augusta State University

Southeastern Natural Sciences Academy

Savannah State University 1890 Savannah Georgia

Georgia Dept of Natural Resources Wildlife Resources Division

South Carolina Department of Natural Resources

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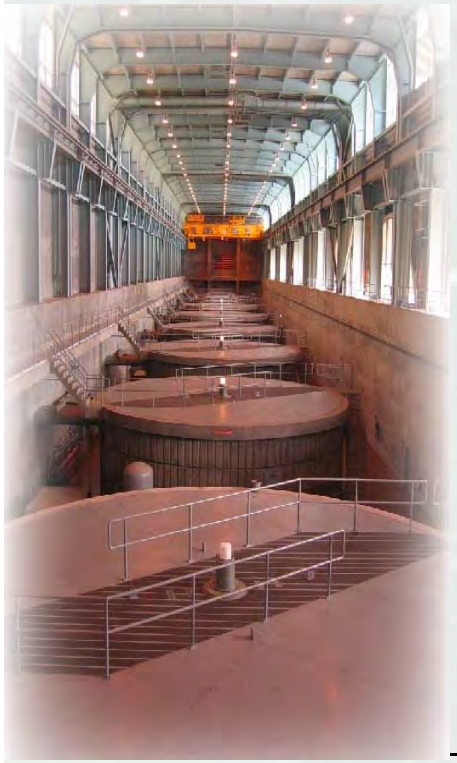
Focus changes with time…



BUILDING STRONG®

Ecologically Sustainable Water Management:

- **Protect the ecological integrity of affected ecosystems**
- **Meet long-term human needs for water**
- **Sustain the full array of other products and services provided by natural freshwater ecosystems.**

Shortnose Sturgeon

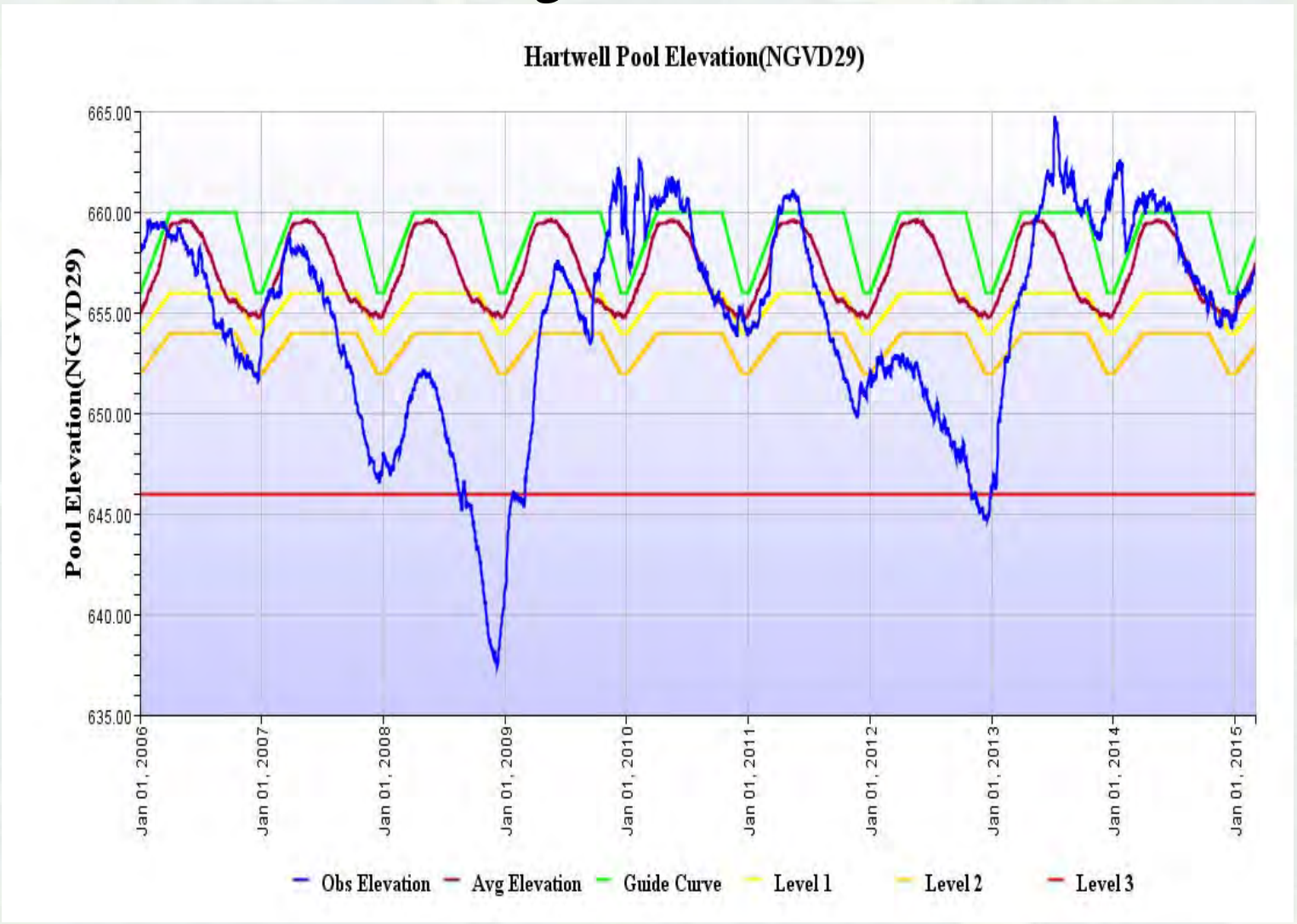
Acipenser brevirostrum (brevi – short, Rostrum – beak, snout

Spawning may occur 1-16 years after reaching maturity (females at age 6) and may skip 3-10 years between spawning

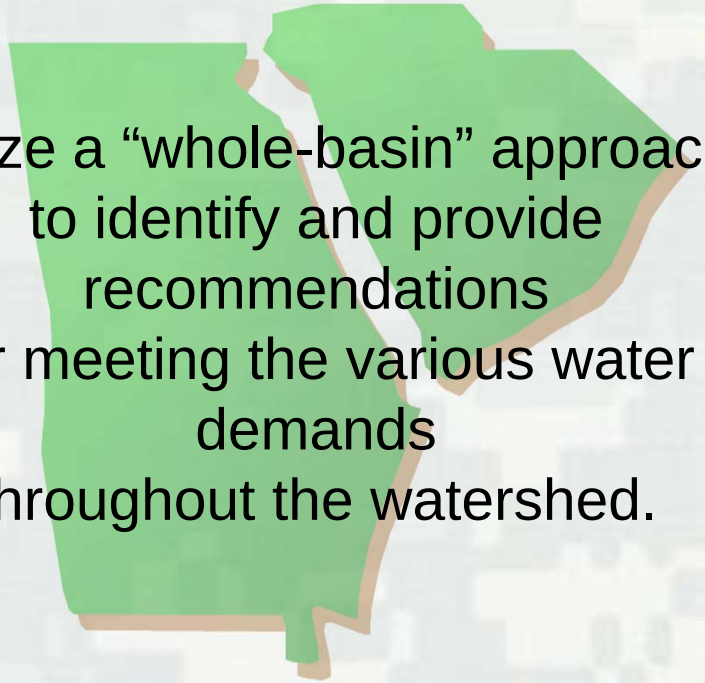
Amphidromous – spawn in freshwater but move between fresh and saltwater to feed

- Spawning takes place in February in swift moving freshwater rocky or gravel substrates

Savannah River Basin Drought Concerns



Savannah River Basin
Comprehensive Water Resources Study



Utilize a “whole-basin” approach
to identify and provide
recommendations
for meeting the various water
demands
throughout the watershed.

Georgia's

State Water Plan

Energy Forecast Updates

www.georgiawaterplanning.org

Energy Water Use Forecast Updates

Energy generation facilities contribute uniquely to the entire Statewide power portfolio

Each power facility has a unique water to power production signature

- Fuel Type (coal, natural gas, nuclear)
- Prime Mover (thermal energy into mechanical energy)
- Cooling Type (single pass vs. evaporative)

The relative contribution of each facility can change over time as facilities retire or units are brought on-line

Energy water needs are forecasted based upon facility type and total power production (est. from population projections)

Baseline: Expected energy need based on regression analysis & new population projections

High Demand: Standard error from the regression analysis is used to estimate 95% upper limit

Georgia

Energy Water Use Forecast Updates

Energy Water Use Calculations are based upon:

Energy Water Use (per generating unit) =

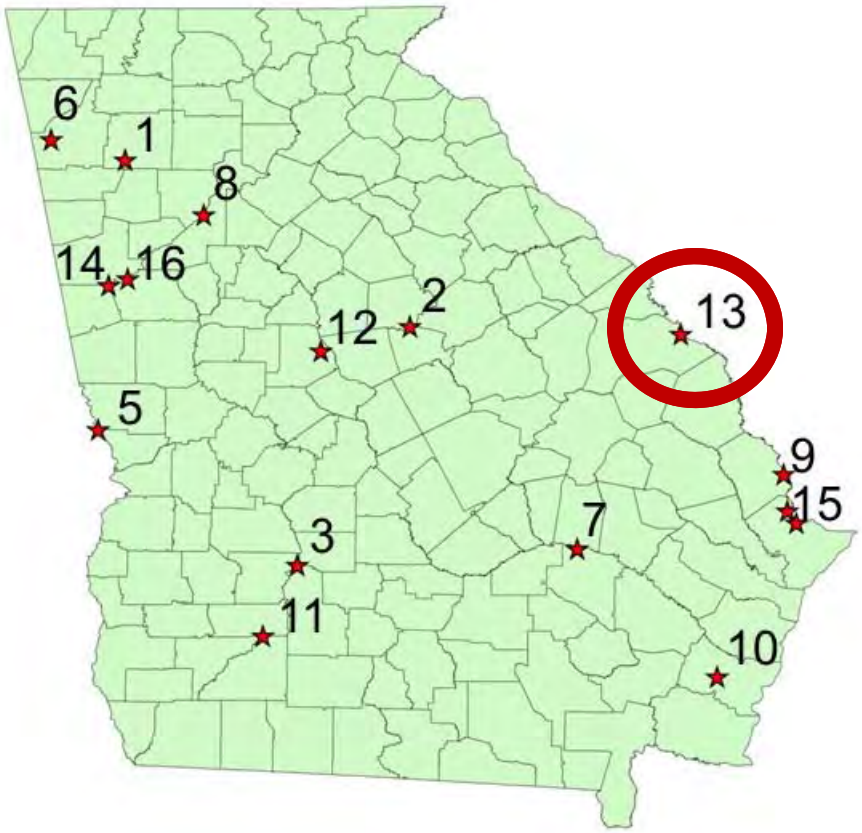
Water Withdrawal Requirements [gal/MWh]	X	Power Generation [MWh]
Water Consumption Requirements [gal/MWh]		Power Generation [MWh]

While the energy water use calculations are still based upon the previous relationship between population and energy needs, the energy needs have changed based on new population projections.

Georgia

Energy Water Use Forecast Updates

Thermoelectric Power Facilities in Georgia with Water Withdrawal Permits



Facility Name	County
1. Plant Bowen	Bartow
2. Plant Branch	Putnam
3. Crisp County Power Comm-Steam	Worth
4. Gum Power Plant LLC	Mitchell
5. H Allen Franklin[1]	Lee (Alabama)
6. Plant Hammond	Floyd
7. Plant Hatch	Appling
8. Plant Jack McDonough	Cobb
9. Plant McIntosh	Effingham
10. Plant McManus	Glynn
11. Plant Mitchell	Dougherty
12. Plant Scherer	Monroe
13. Voglte	Burke
14. Plant Wansley	Heard
15. Plant Wentworth (Kraft)	Chatham
16. Plant Yates	Coweta

[1] Plant is physically located in Alabama; water withdrawal permit from Georgia EPD

Georgia

Energy Water Use Forecast Updates

Water and Power Results are not complete yet

Energy forecast still under development with input from the Energy Ad Hoc group

Assumptions:

- Hydropower generation is constant
- Small percentage of the energy needs will be met through renewable (wind & solar) energy

One major power generating facility in the Savannah – Upper Ogeechee Region (Plant Voglte in Burke County)

The addition of two new units at Voglte will increase both water withdrawals and consumption

Georgia

Water Use Factors by Generating Combination

WATER WITHDRAWALS	
Power Generation Combination	**Gal/MWh**
Fossil Fuel/Biomass, Steam Turbine, Once-Through Cooling	41,005
Fossil Fuel/Biomass, Steam Turbine, Cooling Tower	1,153
Fossil Fuel/Biomass, Gas (Combustion) Turbine	0
Natural Gas, Combined-Cycle, Cooling Tower	225
Nuclear, Steam Turbine, Cooling Tower	1,372
WATER CONSUMPTION	
Power Generation Combination	**Gal/MWh**
Fossil Fuel/Biomass, Steam Turbine, Once-Through Cooling	0
Fossil Fuel/Biomass, Steam Turbine, Cooling Tower	567
Fossil Fuel/Biomass, Gas (Combustion) Turbine	0
Natural Gas, Combined-Cycle, Cooling Tower	198
Nuclear, Steam Turbine, Cooling Tower	880

Back to the presentation

Section 319(h) NPS Grant Special Award: Regional Water Councils

February 2016

Jeff Linzer, Unit Coordinator

Georgia EPD, NonPoint Source Program Grants Unit

Special Award: Regional Water Councils

- Dedicated funding to develop or revise a 9-element WMP
- Council must select one applicant for funding
- Project must be in a Priority Watershed
- $35,000 Federal, $33,333 Match (in-kind or cash)
- Complete by June 2018

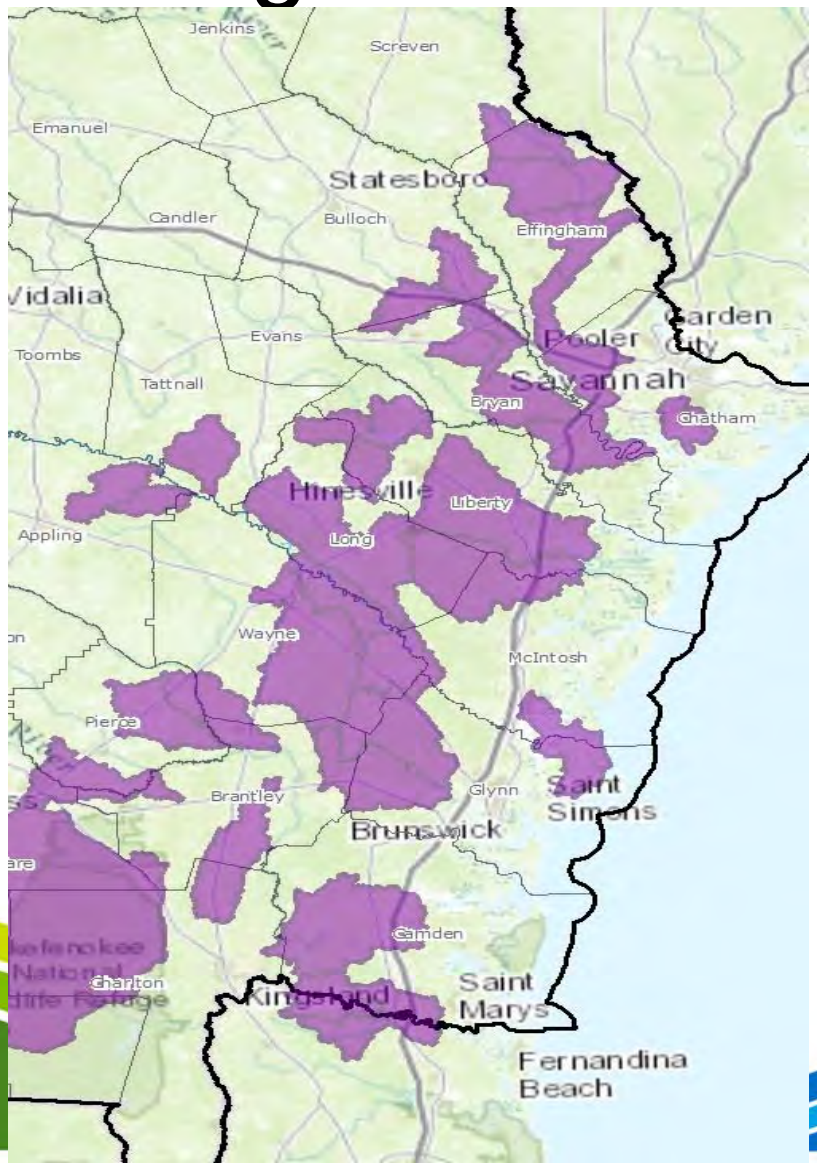
Why A Watershed Management Plan?

- Address nonpoint sources of water pollution
- First step towards improving water quality
- Uses a stakeholder process
- Can leverage other watershed needs
- Is eligible for additional future funding

Next Steps

- Council to pick a watershed and subgrantee
- Subgrantees must be public entities or local governments
- Contact GAEPD with workplan
- GAEPD will provide assistance if needed
- Contact to start June 2016

Priority Watershed in Coastal Georgia



- Ecological Value
- Pollutant impact
- Social readiness of waters for NPS management activities for restoration.

What is in a WMP?

1. **Stream Selection:** Define scope of watershed planning efforts.
2. **Formation of Stakeholder Committee:** Identify & engage relevant stakeholders in watershed.
3. **Source Assessment:** Explain techniques & methods that will be applied to effectively detect & prioritize impairment sources.
4. **Characterization of Current Conditions:** Describe current water quality concerns & ongoing management practices in the watershed.

What is in a WMP?

5. **Recommended Management Practices:** Classify solutions that best control water quality impairments.
6. **Working with Public:** Recommend strategies to engage the public & maximize plan implementation.
7. **Activity Schedule** & **Measures of Success:** Develop schedule of activities & measures of success for plan.
8. **Long-Term Monitoring:** Establish monitoring plan to collect & analyze water quality data.
9. **Implementation, Evaluation & Revision:** Propose tactics on moving forward with plan implementation.

What is in a WMP?

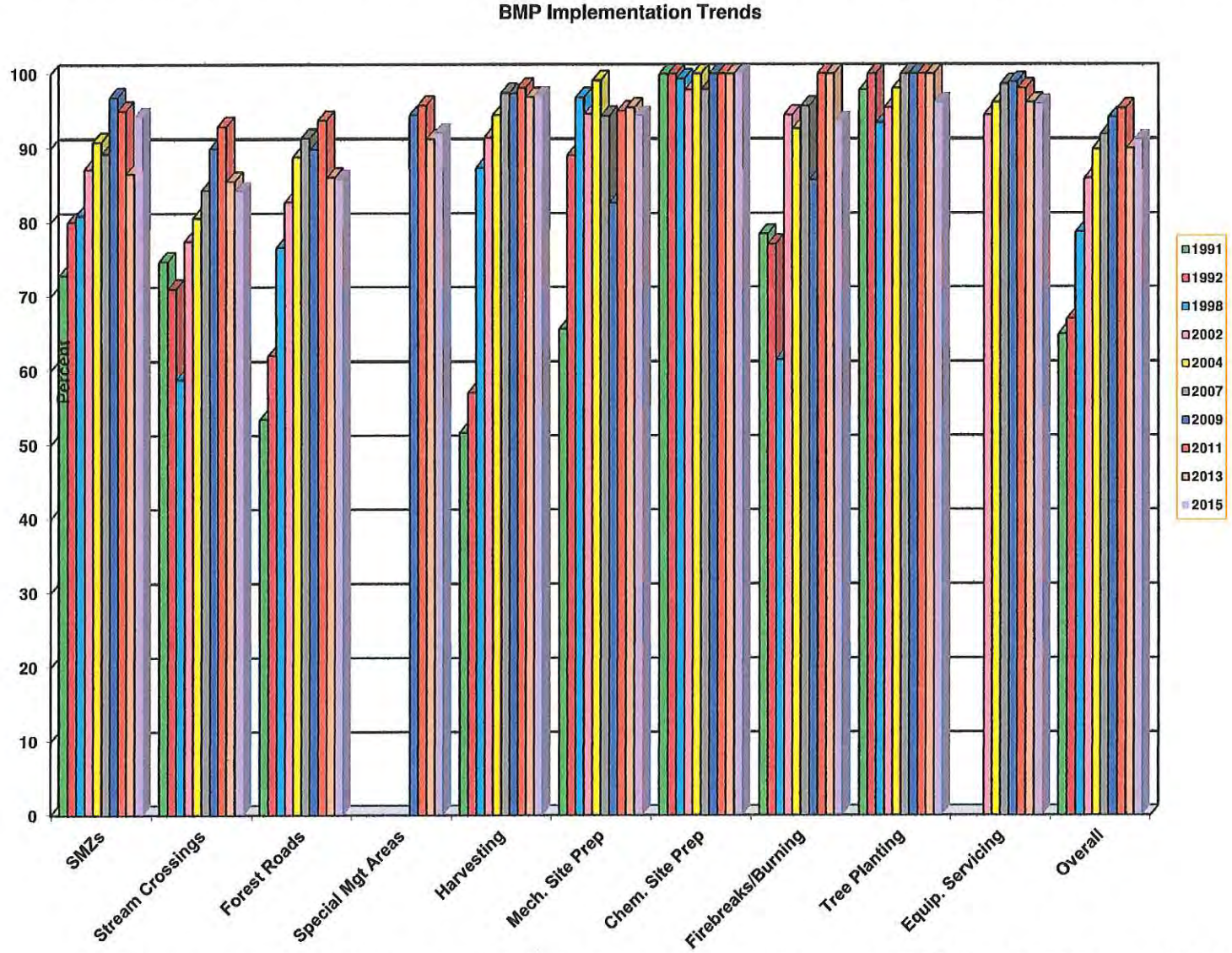
- Training workshop on how to do a 9-element WMP -> TBD
  - Cliff Lewis (229)391-2410

- For additional information:
  - Mary Gazaway (404) 651-8522

2015 Forestry Best Management Practices Implementation Survey Highlights

General Best Management Practices (BMP)Survey Results

The Georgia Forestry Commission (GFC) has completed its 2015 Forestry BMP Implementation Survey covering 213 randomly selected sites statewide. These 213 sites involve 34,932 acres with 204 miles of forest roads and 113 stream crossings. By ownership, 131 of the sites occurred on non-industrial private forest land (NIPF), 58 sites were on forest industry / corporate land and 24 sites were on public land. The survey also included an additional 152 state firebreak inspection sites. Overall statewide BMP implementation for GFC's 2015 BMP Survey is 91.13 percent. BMP Implementation is simply the percentage of fully implemented BMPs compared to the total number of necessary or applicable BMPs at the tract, practice, and overall levels. This represents an approximate 1.20 percentage point improvement from GFC's 2013 BMP Survey result of 89.93 percent. BMP implementation results were also calculated for each applicable category of practice for each tract. Categories of practice include Streamside Management Zones (SMZs), Stream Crossings, Forest Roads, Special Management Areas, Harvesting (outside SMZs), Mechanical Site Prep, Chemical Site Prep, Firebreaks/Burning, Tree Planting, and Equipment Servicing, as well as an overall category. BMP implementation results for each category are shown in this chart along with the results from the last nine BMP surveys for comparison where available.



BMP implementation for 2015, shown in purple in the chart, improved significantly for SMZs from the 2013 survey by 7.7 percentage points, to a score of 94.20 percent in 2015. Improvements were also found in the categories of both Special Management Areas and Harvesting. BMP implementation for 2015 declined slightly in the categories of Stream Crossings, Forest Roads, Mechanical Site Prep, Firebreaks/Burning, Tree Planting, and Equipment Servicing, representing BMP educational opportunities going forward. However, Stream Crossings and Forest Roads represent the areas needing the most attention due to their relatively lower scores.

Educational Opportunities

As we can see from the chart, BMP implementation for stream crossings and forest roads are the two lowest categories. Therefore, our educational opportunities will be focused on those categories. Also we will continue to push for improvements in all categories where possible and for continued good compliance in those categories near or at the top. In particular, educational opportunities in these categories include:

- For Stream Crossings
  - ✓ Culvert crossing design and installation information
  - ✓ Basic stream crossing design needs, including storm flow and aquatic migration requirements
  - ✓ Stream crossing approach design and stabilization
  - ✓ Temporary portable bridge use
- For Forest Roads
  - ✓ Stormwater control structure design and placement
  - ✓ Proper closeout needs following harvest activities

- In addition, for Streamside Management Zones (SMZs)
  - ✓ Continued information on stormwater control structure design needs for roads in SMZs
  - ✓ Continued information on SMZ width and residual forest cover requirements
  - ✓ Continued information on stream classification for proper recognition of stream types
  - ✓ Continued information on logging slash removal and rehab in stream channels and SMZs following harvest
- In addition, for Special Management Areas
  - ✓ Continued information on minimizing soil disturbance
  - ✓ Continued information on avoiding road/firebreak turn-outs tying into ephemeral areas
- In addition, for Harvesting
  - ✓ Continued information on basic timber harvesting BMPs, including log deck and skid trail stabilization
- In addition, for Mechanical Site Prep
  - ✓ Continued information on avoiding bedding that directs runoff into roads or road-ditches
- In addition, for Chemical Site Prep
  - ✓ Continued information on proper application, storage, and clean-up
- In addition, for Firebreaks/Burning
  - ✓ Continued information on proper construction and spacing of water diversions in firebreaks and proper tie-in
- In addition, for Tree Planting
  - ✓ Continued information on planting on the contour for machine planting
- In addition, for Equipment Servicing
  - ✓ Continued information on proper clean-up of containers

Where's the room for improvement, and why the relatively lower numbers for stream crossings and roads?

The results from the survey seem to indicate a continuation of some issues with stream crossings and roads. Scores for those two categories remain around 85%. Those issues are likely intensified by smaller tracts, parcelization, and access needs.

- The 2013 Survey was the first survey carried out since large segments of forest industry lands were fully divested and no longer under corporate management. The 2015 Survey appears to mirror some of the same issues associated with those changes. The divestiture potentially resulted in:
  - ✓ Change of management levels and objectives
  - ✓ "Parcelization" --- tracts broken up into smaller parcels with multiple landowners with a range of knowledge, personal resources, and objectives for ownership
- Smaller properties result in more roads and stream crossings for access for multiple landowners

GFC BMP Survey results show that as tract size decreases, so does the percentage of BMP Implementation. For the 2015 Survey, BMP Implementation for tracts over 200 acres is almost 93 percent; for tracts between 100 and 200 acres, BMP implementation is 92.55 percent; and for tracts less than 100 acres, BMP implementation is 90.41 percent. Also telling is the fact that all the water quality risks (WQRs) found during the 2015 Survey occurred on tracts less than 100 acres.

What's the good news from the 2015 Survey, and why?

The good news includes a small improvement in overall BMP Implementation to 91.13%. This includes a significant improvement of 7.7 percentage points in BMP Implementation for SMZs to 94.2%. Also, there was a good improvement in the total number of WQRs going down 37%. Finally, while there were slight declines in some individual categories, there were improvements in others, and all individual categories except for stream crossings and roads scored above 92% for BMP Implementation, with four of the ten individual categories shown scoring above 95%. In conclusion, the overall trend seems to be on the good side.