



## Draft Technical Memorandum

**Prepared For:** Middle Ocmulgee Water Planning Council and  
Georgia Environmental Protection Division

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**Subject:** **Agricultural Water Demand Forecasts**  
Section 4 Supplemental Document  
Middle Ocmulgee Regional Water Plan

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### Introduction

The Georgia Comprehensive State-wide Water Management Plan requires development of long-range forecasts of agricultural water demand for 10, 20, 30, and 40-year planning horizons. These forecasts were prepared by the University of Georgia's College of Agricultural and Environmental Sciences under contract with Georgia Environmental Protection Division (EPD). This document summarizes the forecasting results for the Middle Ocmulgee Water Planning Region and supplements Section 4 of the Middle Ocmulgee Water Development and Conservation Plan (Regional Water Plan). Detailed forecast methodology and data can be found on the following website: <http://www.nespal.org/SIRP/waterinfo/State/AWD/AqWaterDemand.htm>.

For the Middle Ocmulgee Region, the bulk of existing agricultural water needs is located in the southern part of the region, in Crawford, Houston, Peach, and Pulaski counties. Groundwater is the primary source for agricultural irrigation. In 2005, the Middle Ocmulgee Region withdrew approximately 38 million gallons per day (MGD) for agricultural irrigation based on data provided in "Water Use in Georgia by County for 2005; and Water-Use Trends, 1980-2005" (U.S. Geological Survey).

### Agricultural Water Demand Forecasts

The agricultural water demand forecasts were prepared for the following categories for the State of Georgia by region and by county:

- *Crop Demand:* This category includes irrigation water demand for cover row and orchard crops, as well as vegetable and specialty crops. These crops currently cover more than 95 percent of Georgia's irrigated land.
- *Non-Crop Demand:* This category includes water uses for agricultural practices other than irrigation, such as livestock and other animal-related operations, nurseries, greenhouses, and golf course irrigation. These operations generally fall below 100,000 gallons per day (gpd) and

do not require a water withdrawal permit (therefore sometimes termed “non-permitted” demand). State regulations require that farmers who withdraw more than 100,000 gpd from streams and aquifers obtain a permit from the EPD.

### Crop Demand

Crop demand includes irrigation water demand for major crops and for vegetable and specialty crops. Agricultural irrigation water demand for crop production was projected for the years 2011 (2010), 2020, 2030, 2040, and 2050. Three scenarios, including wet, median and dry years were projected to simulate a range of weather conditions. Water withdrawal quantities were estimated based on the projected irrigated area for a crop (in acres) and the predicted monthly irrigation application rate (application depth in inches). The water sources (groundwater or surface water) for future demand are assumed based on existing water sources identified in existing permits and the location of the irrigated area.

The current irrigated areas were measured using 2007-2008 aerial imagery; visible irrigated field areas were delineated and labeled by location using standard Geographical Information System (GIS) tools. The proportion of existing irrigated area of each major rotation crop was taken from the 2008 UGA Cooperative Extension Irrigation Survey and it was ensured that the irrigated crop types were consistent with those observed in 2008. The projected annual growth rate for each crop was based on the arithmetic average of projections from three economics-based models developed by UGA. The models predicted the total production area for each crop based on data gathered in Georgia, the Southeast Region, and the United States. Five major crops, including corn, cotton, peanut, soybean, and pecan, were included in these three models because they make up 85 percent of Georgia's irrigated crop area.

Because there is insufficient long-term water use data for vegetables, specialty crops, and ornamental nurseries, irrigated area for these crops were assumed to remain constant through the planning horizon; the growth rates were assumed to equal the aggregate growth rate of the five major crops.

A range of agricultural irrigation demand scenarios were considered to address the potential climate extremes, including the 10<sup>th</sup>, 25<sup>th</sup>, 50<sup>th</sup>, 75<sup>th</sup>, and 90<sup>th</sup> percentiles. The 50<sup>th</sup> percentile value represents the average rainfall conditions and the median water demand, while the 75<sup>th</sup> percentile represents the dry year conditions when higher irrigation demands are expected. The 50<sup>th</sup> percentile values have been used for Middle Ocmulgee Region in Section 4 of the Regional Water Plan (for consistency with other demand categories expressed in annual average daily basis). In addition, UGA developed estimated monthly irrigation demand distribution to highlight the difference in water needs between growing and non-growing seasons during wet, average, and dry-year conditions. For Groundwater Availability Resource Assessments, both the 50<sup>th</sup> and 75<sup>th</sup> percentile values have been evaluated for gap analysis. For Surface Water Availability Resource Assessments, the 75<sup>th</sup> percentile values have been evaluated for conservative planning purpose. Table 1 summarizes the median-year crop demand forecast for each county.

**Table 1: Median Year Crop Demand for 2010 and 2050 (MGD)**

County	Groundwater		Surface Water		Total	
	2010	2050	2010	2050	Total 2010	Total 2050
Bibb	0.30	0.30	0.03	0.03	0.33	0.33
Butts	0.07	0.09	0.00	0.00	0.07	0.09
Crawford	5.95	6.55	0.14	0.16	6.09	6.71
Houston	11.45	12.72	0.45	0.53	11.9	13.25
Jasper	0.33	0.38	0.04	0.05	0.37	0.43
Jones	0.00	0.00	0.02	0.02	0.02	0.02
Lamar	1.02	1.15	0.00	0.00	1.02	1.15
Monroe	0.09	0.10	0.01	0.01	0.1	0.11
Newton	0.01	0.01	0.02	0.03	0.03	0.04
Peach	15.85	16.52	0.20	0.21	16.05	16.73
Pulaski	11.11	12.79	3.11	3.61	14.22	16.4
Twiggs	1.29	1.50	0.16	0.19	1.45	1.69
<b>Total</b>	<b>47.47</b>	<b>52.11</b>	<b>4.18</b>	<b>4.84</b>	<b>51.65</b>	<b>56.95</b>

Source: UGA Agricultural Demand Forecasts (April 2010)

### Non-Crop Demand

For planning purposes, the non-crop demand includes forecasts for

- Livestock and other animal-related operations
- Nurseries and greenhouse, and
- Golf courses irrigation

With help from the industry associations, EPD developed a “snap shot” of current (at or around 2008) water usage for the three types of non-crop demand listed above; however, future water demand forecasts were not developed due to lack of available data. Table 2 summarizes the total non-crop demand. For the purpose of this plan, the current non-crop demand was assumed to remain constant throughout the 40-year planning horizon.

**Table 2: Estimated Non-Crop Demand for 2010-2050 (MGD)**

County	Nursery	Golf	Livestock	Total
Bibb	0.01	0.19	0.05	0.24
Butts	0.38	0.06	0.03	0.47
Crawford	0.59	0.00	0.10	0.69
Houston	0.07	0.44	0.11	0.62
Jasper	0.28	0.00	0.25	0.53
Jones	0.04	0.16	0.14	0.34
Lamar	1.39	0.08	0.24	1.71
Monroe	0.16	0.32	0.23	0.71
Newton	0.01	0.50	0.14	0.65
Peach	0.16	0.00	0.02	0.18
Pulaski	0.16	0.00	0.02	0.18
Twiggs	0.02	0.00	0.06	0.07
<b>Total</b>	<b>3.27</b>	<b>1.75</b>	<b>1.38</b>	<b>6.40</b>

Source: UGA Agricultural Demand Forecasts (April 2010)

Note: Assumed to remain constant at 2008 values through planning period

Table 3 summarizes the six major categories of livestock water use based on best available data gathered by industry association in 2008.

**Table 3: Estimated Livestock Water Use 2010-2050 (MGD)**

County	Beef	Dairy	Goat/Sheep	Horse	Swine	Poultry	Total
Bibb	0.013	0.019	0.000	0.000	0.000	0.015	<b>0.048</b>
Butts	0.029	0.000	0.000	0.000	0.000	0.000	<b>0.029</b>
Crawford	0.024	0.000	0.000	0.002	0.000	0.072	<b>0.099</b>
Houston	0.025	0.061	0.001	0.003	0.000	0.021	<b>0.112</b>
Jasper	0.137	0.105	0.002	0.002	0.001	0.000	<b>0.248</b>
Jones	0.076	0.046	0.000	0.002	0.000	0.014	<b>0.138</b>
Lamar	0.086	0.015	0.003	0.005	0.001	0.132	<b>0.242</b>
Monroe	0.111	0.025	0.003	0.001	0.000	0.089	<b>0.228</b>
Newton	0.120	0.010	0.003	0.002	0.000	0.006	<b>0.140</b>
Peach	0.015	0.000	0.000	0.002	0.000	0.000	<b>0.018</b>
Pulaski	0.019	0.000	0.000	0.003	0.001	0.000	<b>0.024</b>
Twiggs	0.046	0.000	0.002	0.001	0.007	0.000	<b>0.055</b>
<b>Total</b>	<b>0.702</b>	<b>0.281</b>	<b>0.016</b>	<b>0.023</b>	<b>0.009</b>	<b>0.350</b>	<b>1.382</b>

Source: UGA Agricultural Demand Forecasts (Nov 2009)

Note: Assumed to remain constant at 2008 values through planning period

## Summary

Total agricultural demand for the planning period is summarized in Table 4. For the Middle Ocmulgee Region, crop irrigation in the southern part of the region will continue to be significant. In 2050, it is projected that total agricultural demand will reach approximately 63 MGD, with 90 percent (57 MGD) of this projected demand for crop irrigation and 10 percent (6 MGD) for other non-crop agricultural

practices. Peach, Pulaski, Houston, and Crawford counties have the highest crop irrigation water demand. Non-crop demand represents the majority of agricultural water demand in the following counties in the northern and central parts of the region: Butts, Jasper, Lamar, Jones, Monroe, and Newton.

**Table 4: Agricultural Water Forecasts by County (in AAD-MGD)**

County	Median Year Crop Demand					Non-Crop Demand
	2010	2020	2030	2040	2050	2010-2050
Bibb	0.33	0.33	0.33	0.33	0.33	0.24
Butts	0.07	0.08	0.08	0.08	0.09	0.47
Crawford	6.09	6.21	6.36	6.53	6.71	0.69
Houston	11.90	12.17	12.50	12.87	13.25	0.62
Jasper	0.37	0.39	0.40	0.41	0.43	0.53
Jones	0.02	0.02	0.02	0.02	0.02	0.34
Lamar	1.02	1.04	1.08	1.11	1.15	1.71
Monroe	0.10	0.10	0.11	0.11	0.11	0.71
Newton	0.03	0.03	0.03	0.04	0.04	0.65
Peach	16.05	16.16	16.33	16.53	16.73	0.18
Pulaski	14.22	14.65	15.19	15.77	16.40	0.18
Twiggs	1.45	1.49	1.55	1.62	1.69	0.07
Total	51.65	52.67	53.98	55.42	56.95	6.40

Source: UGA Agricultural Demand Forecasts (April 2010)