Water-Demand Projections for the Edisto River Basin, 2020–2070

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STATE OF SOUTH CAROLINA

The Honorable Henry D. McMaster, Governor

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1.0 Executive Summary

In 2019, permitted and registered water users in the Edisto basin reported total water withdrawals of 53.6 billion gallons per year (BGY), for an average of 147 million gallons per day (MGD). By the year 2070, total withdrawals are projected to reach 84.4 to 121.6 BGY (231 to 333 MGD), an increase of 57% to 127% over approximately 50 years. The total annual withdrawal in 2019 includes 24.6 BGY (68 MGD) of groundwater and 29.0 BGY (79 MGD) of surface water. By the year 2070, groundwater withdrawals are projected to reach 35.8 to 53.2 BGY (98 to 146 MGD), and surface water withdrawals are projected to reach 48.5 to 68.4 BGY (133 to 187 MGD). This is an increase of 45% to 116% for groundwater and 68% to 136% for surface water over the 50-year planning horizon.

These estimates of water demand are calculated using the water withdrawal database maintained by the South Carolina Department of Health and Environmental Control (SCDHEC). The projected estimates are based on statistical models which incorporate various datasets related to the major categories of water use: thermoelectric, public supply, manufacturing, and agriculture. The projections are based on two scenarios of future conditions: Business-As-Usual and High-Demand.

2.0 Introduction

The South Carolina Department of Natural Resources (SCDNR) is legislatively mandated to formulate a water plan for South Carolina. The *South Carolina Water Plan*[1] was last published in 2004, and SCDNR has initiated a multi-year project to update the plan. As part of this effort, SCDNR convened the South Carolina Planning Process Advisory Committee (PPAC) in 2018 to develop a guidance document for updating the State Water Plan. Work of the PPAC culminated in the publication of the *South Carolina State Water Planning Framework*[2] in October 2019. Under the new Planning Framework, water management plans, or River Basin Plans, will be developed for each of the eight major planning basins in the state, starting with the Edisto basin. The eight River Basin Plans will form the foundation of the new State Water Plan. River Basin Plans will include an evaluation of current and future water availability and will consider water-demand projections over a fifty-year planning horizon from 2020 to 2070 (Planning Horizon). Potential water shortages will be evaluated by using the water-demand projections as inputs for hydrologic models.

The methods used to calculate the projections were devised by SCDNR over the course of several years (2016–2019) within a collaborative project including partners at the SC Water Resources Center at Clemson University and the US Army Corps of Engineers. During that time, the ongoing progress was presented and discussed with stakeholders at meetings of the SC Water Works Association Water Utility Council, SC Farm Bureau Water Committee, SC Chamber of Commerce Environmental Committee, SC Water Quality Association, and the SCDNR PPAC. In the

[1] Badr, A. W., Wachob, A., and Gellici, J.A., 2004, South Carolina Water Plan, second edition: South Carolina Department of Natural Resources, 120 p. (http://dnr.sc.gov/lwc/pubs/pdfs/SCWaterPlan2.pdf)

[2] South Carolina State Water Planning Framework: South Carolina Department of Natural Resources Staff and the Water Planning Process Advisory Committee, 2019, 95 p. (http://hydrology.dnr.sc.gov/pdfs/basin-planning/SC_Water_Planning_Framework.pdf)

fall of 2018, stakeholders and experts participated in teleconferences to discuss the proposed methods in more detail. The first complete draft of the methods was distributed in spring 2019, followed by a public comment period. The report, *Projection Methods for Off-stream Water Demand in South Carolina*, was published in October 2019 and is available online.[3] A summary of results for the Edisto basin was presented to the Edisto River Basin Council, and SCDNR adjusted the projection scenarios based on feedback from members of the Council. Appendix A of this report describes the several adjustments that have been made to the methods since October 2019.

The methods were applied to each water-use system that withdraws surface or groundwater in the Edisto basin. Water-use systems are defined by one or more associated permits or registrations for the withdrawal, distribution, or discharge of water. Sales of water among water distributors are not currently modeled explicitly. Instead, interconnected water distributors are considered as a single water-use system. Individual water-demand projection reports were distributed to all permitted and registered water users in the basin. These reports presented the specific data and methods used to project water demand for each water-use system, and recipients were requested to respond with any questions, comments, or corrections. An in-person meeting was held in January 2020 at the Clemson University Research and Education Center in Blackville, SC to provide water users in the Edisto basin an opportunity to discuss the draft water-demand projections face-to-face, and stakeholders provided additional feedback through February 2020.

SCDNR has strived to put together the best available input data. The process begins with quality control and corrections to the SCDHEC water use database. Other available datasets, including geographic and weather information, were also researched and reviewed. New state-wide datasets of irrigation and water service areas have been developed to support the water-demand projections. All of this information has been incorporated into a single database, and stakeholders were given the opportunity to review the specific information relevant to SCDNR projections of their water demand.

The input data are used to calibrate a quantitative model for the water demand of each water-use system. The model design is intended to balance interpretability and accuracy. However, there is significant uncertainty in projections of future water-demand, regardless of the input data and methods used. Even if the calibration data and models are perfect, future conditions are unlikely to proceed exactly as planned or projected. These projections are presented with the understanding that they will be revised and updated as part of an iterative water-planning process.

Each major category of water use is associated with a driver variable: the driver for thermoelectric water-demand is electricity demand; the driver for public supply water-demand is population; the driver for agricultural water-demand is irrigated acreage; and the driver for manufacturing water-demand is economic production. Projections of the driver variables are available from published sources. Two scenarios of future conditions are assessed using the calibrated water-demand models. The Business-As-Usual scenario takes projections of future

[3] Pellett, A., 2019, Projection Methods for Off-Stream Water Demand in South Carolina: South Carolina Department of Natural Resources, 55 p. (http://hydrology.dnr.sc.gov/pdfs/basin-planning/Projection_Methods.pdf)

conditions of the driver variables from the cited sources and assumes other conditions are at moderate (median) levels. The High-Demand scenario uses elevated projections of driver variables and also assumes that other variables cause the rate of water demand for each water-use system to be at its 90th percentile level, calculated using monthly data. On a case-by-case basis, the 90th percentile rate of water demand could be caused by weather, leakage, etc. It is highly unlikely that the High-Demand scenario would occur for an extended period of time and for all water users in an entire basin at the same time. These two scenarios are intended to define a range from moderate growth to extreme circumstances with the High-Demand scenario serving as an upper bound for projected demand.

The following sections of this report summarize current and projected water demand for the Edisto basin as a whole and for different categories of water use within the basin. Projection results are presented as a range spanning the Business-As-Usual and High-Demand scenarios. Appendix B includes tables summarizing the results for each category and for both scenarios, including annual total demands and peak monthly demands.

3.0 Summary of Projected Water Demands

In 2019, permitted and registered water users in the Edisto basin reported total water withdrawals of 53.6 billion gallons per year (BGY), for an average of 147 million gallons per day (MGD). By the year 2070, total withdrawals are projected to reach 84.4 BGY (231 MGD) under the Business-As-Usual scenario to 121.6 BGY (333 MGD) under the High-Demand scenario, an increase of 57% to 127%, respectively, over the Planning Horizon. The total annual withdrawal in 2019 includes 24.6 BGY (68 MGD) of groundwater and 29.0 BGY (79 MGD) of surface water. By the year 2070, groundwater withdrawals are projected to reach 35.8 to 53.2 BGY (98 to 146 MGD) and surface water withdrawals are projected to reach 48.5 to 68.4 BGY (133 to 187 MGD). This is an increase of 45% to 116% for groundwater and 68% to 136% for surface water over the Planning Horizon. Demand for surface water is projected to increase faster than demand for groundwater over the Planning Horizon. This trend is present in both the Business-As-Usual (Figure 1) and High-Demand (Figure 2) scenarios.

In 2019, agriculture is the largest category of water demand by volume in the Edisto basin (52%), with public supply a close second (44%). Over the course of the Planning Horizon, public supply is projected to grow faster than the other categories of water demand (Figure 3). The growth in public supply water demand is driven by the projected populations of counties in which water from the Edisto basin is used for public supply (Figure 4 and Table 1). Population growth outside of the Edisto basin impacts water demand in the basin as water withdrawals are distributed over public supply service areas which are outside of the basin, most notably Charleston Water System. In counties with larger populations—Charleston, Berkeley, Dorchester, Lexington, and Aiken—the Business-As-Usual scenario projects continued population growth. The High-Demand scenario projects even greater population growth in the later years of the Planning Horizon, approximately doubling the populations of these counties by 2070.

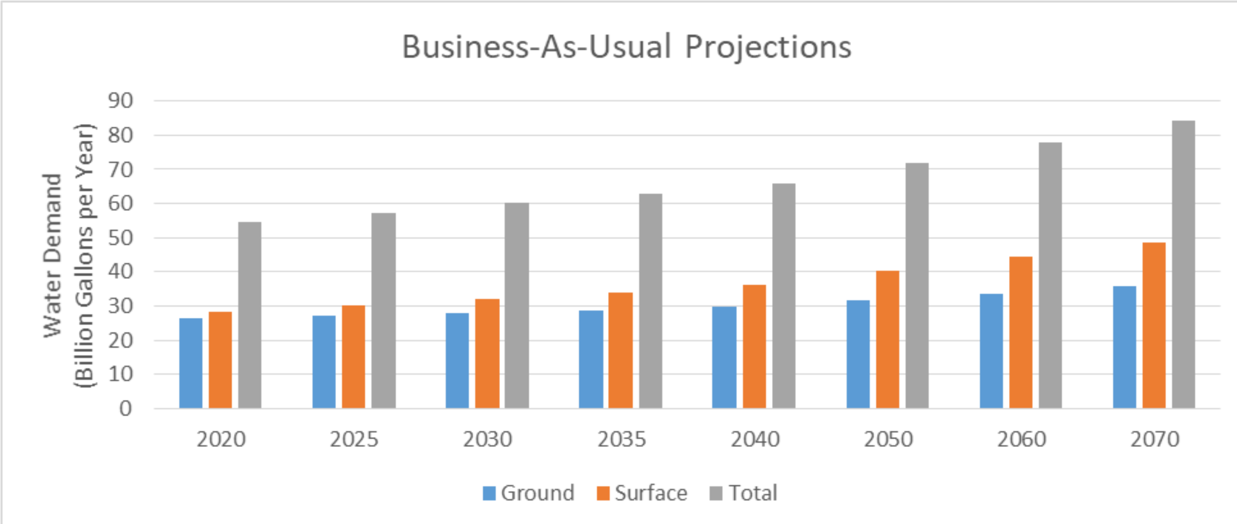

Figure 1. Water-demand projections for the Edisto basin under the Business-As-Usual scenario from 2020 to 2070.

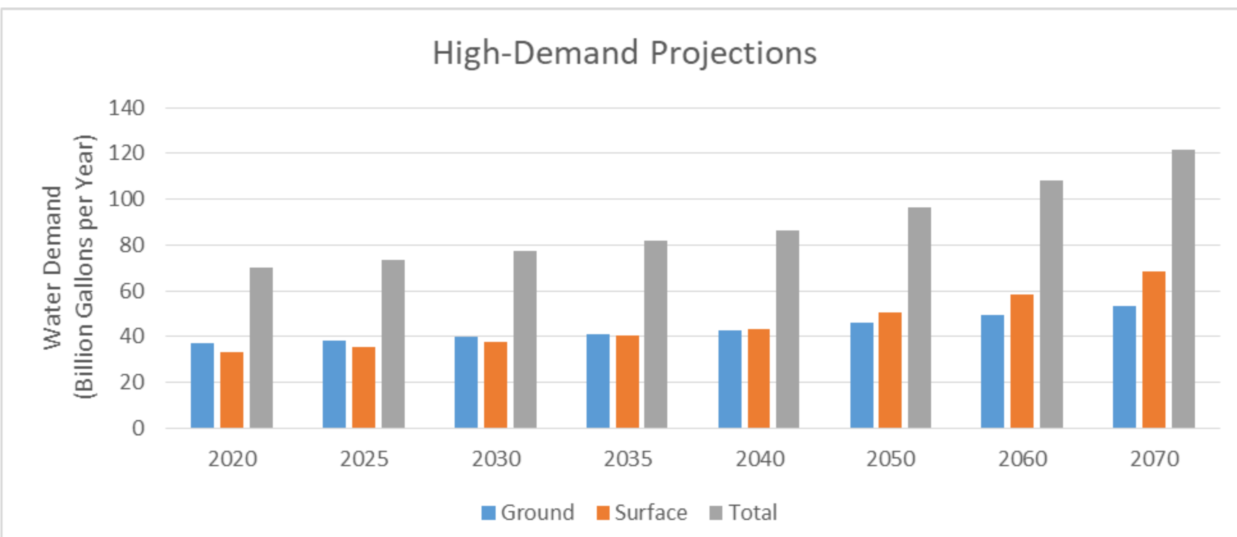

Figure 2. Water-demand projections for the Edisto basin under the High-Demand scenario from 2020 to 2070.

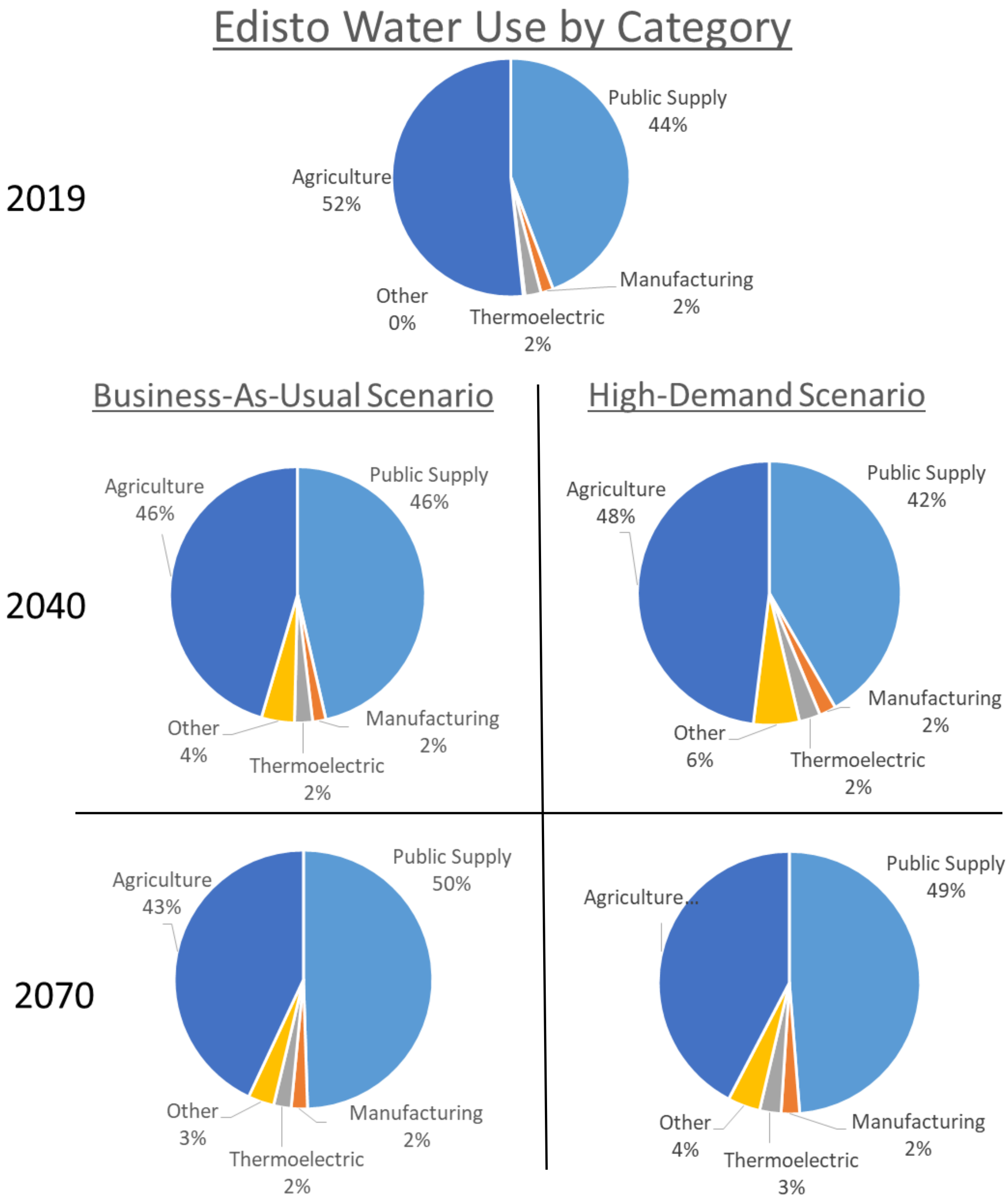

Figure 3. Distribution of total water demand within each major category of water use for 2019, 2040 and 2070.

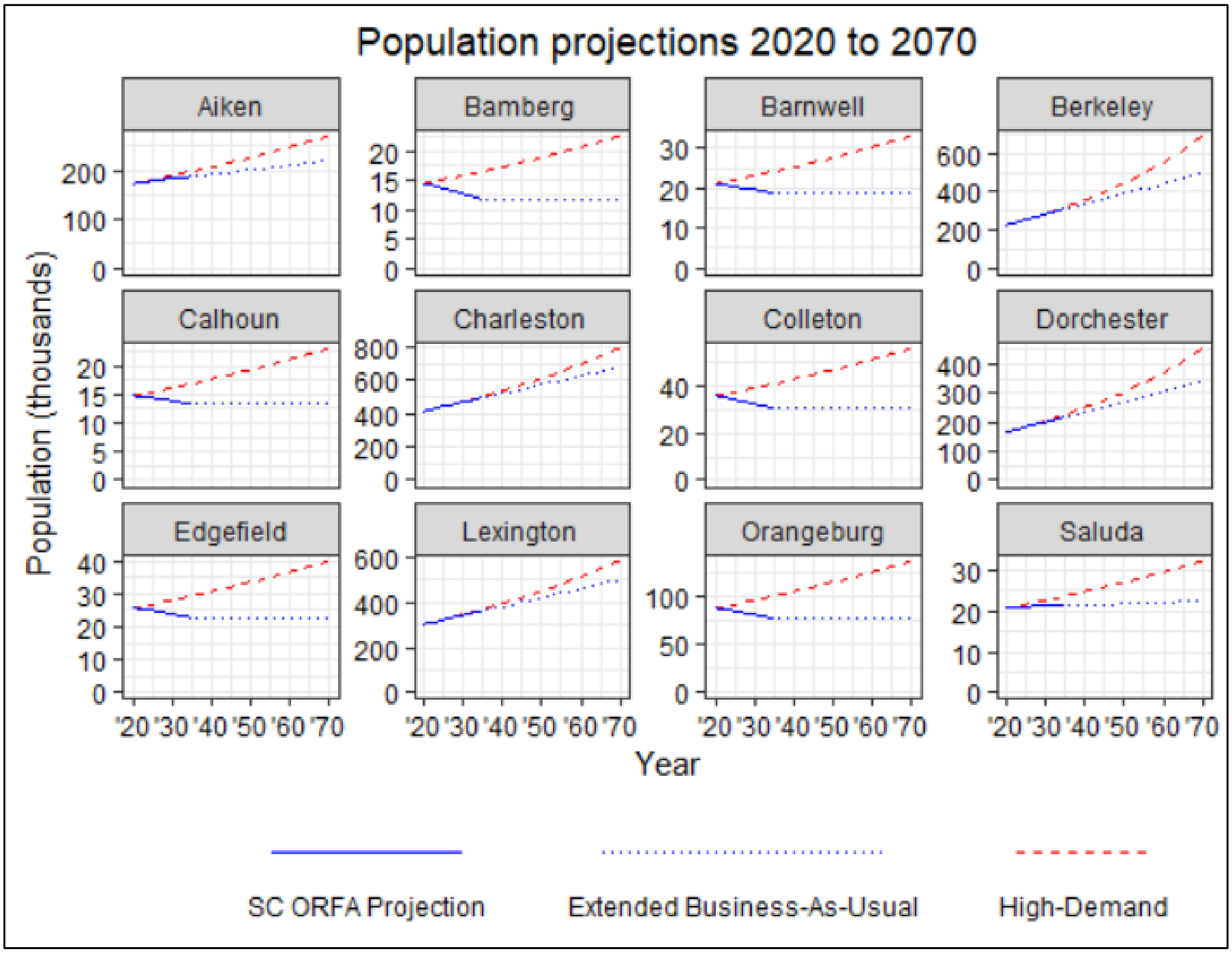

Figure 4. Population projections for counties using water from the Edisto basin. Population projections are adapted from the SC Office of Revenue and Fiscal Affairs (SC ORFA).

Table 1. Projected population (in thousands) for each scenario and for each county that uses water from the Edisto Basin.

Scenario	County	2020	2025	2030	2035	2040	2050	2060	2070
Business-As-Usual	Aiken	173.5	179.2	183.9	187.5	192.2	201.5	210.9	220.3
	Bamberg	14.4	13.6	12.8	11.8	11.8	11.8	11.8	11.8
	Barnwell	21.2	20.4	19.6	18.7	18.7	18.7	18.7	18.7
	Berkeley	228.0	253.7	280.6	308.4	335.2	388.8	442.4	496.0
	Calhoun	14.8	14.4	13.9	13.2	13.2	13.2	13.2	13.2
	Charleston	415.2	443.8	470.2	494.9	521.5	574.6	627.7	680.8
	Colleton	35.9	34.3	32.5	30.5	30.5	30.5	30.5	30.5
	Dorchester	167.3	184.1	201.7	219.8	237.3	272.3	307.3	342.3
	Edgefield	25.7	25.0	24.1	22.9	22.9	22.9	22.9	22.9
	Lexington	302.8	323.3	343.1	362.1	381.9	421.4	461.0	500.5
	Orangeburg	87.5	84.3	80.7	76.8	76.8	76.8	76.8	76.8
	Saluda	20.8	21.1	21.3	21.3	21.5	21.8	22.2	22.5
High-Demand	Aiken	173.5	181.3	189.5	198.1	207.0	226.2	247.1	270.0
	Bamberg	14.4	15.1	15.8	16.5	17.2	18.8	20.6	22.5
	Barnwell	21.2	22.1	23.1	24.2	25.3	27.6	30.2	33.0
	Berkeley	228.0	254.7	284.5	317.8	354.9	442.8	552.4	689.2
	Calhoun	14.8	15.4	16.1	16.8	17.6	19.2	21.0	23.0
	Charleston	415.2	442.8	472.2	503.6	537.1	610.8	694.6	790.0
	Colleton	35.9	37.5	39.2	41.0	42.9	46.8	51.2	55.9
	Dorchester	167.3	184.9	204.3	225.8	249.6	304.8	372.3	454.7
	Edgefield	25.7	26.9	28.1	29.4	30.7	33.6	36.7	40.1
	Lexington	302.8	323.3	345.2	368.6	393.6	448.7	511.6	583.3
	Orangeburg	87.5	91.4	95.6	99.9	104.4	114.1	124.7	136.2
	Saluda	20.8	21.7	22.7	23.7	24.8	27.1	29.6	32.4

4.0 Water-Demand Projections by Category

4.1 Thermoelectric

Water is used for steam generation and cooling at thermoelectric power plants. All of the thermoelectric water use in the Edisto basin is met with groundwater. The Cope Generating Station, owned and operated by Dominion Energy, accounts for the large majority of thermoelectric water demand in this basin. The only other thermoelectric water use is for Dorchester Biomass, which is relatively small in comparison.

Projections of thermoelectric water demand are based on the "base forecast" (Business-As-Usual) and "high scenario" (High-Demand) projections of electricity demand from the Integrated Resource Plan published by Dominion Energy.[4] The original electricity-demand

[4] 2020 Integrated Resource Plan: Dominion Energy South Carolina, Inc. Revised May 29, 2020. 59 p. (https://www.sceg.com/docs/librariesprovider5/pdfs/desc-2020-integrated-resource-plan.pdf?sfvrsn=0)

projections span to 2034. They are extended to 2070 by fitting a line from 2028 to 2034. The High-Demand scenario represents the 90th percentile high demand, and the Business-As-Usual scenario represents median conditions. Thermoelectric water demand in the Edisto basin is projected to increase from a range of 1.3–1.7 BGY (3.7–4.6 MGD) in 2020 to 1.8–3.6 BGY (5.1–8.8 MGD) in 2070 for the Business-As-Usual and High-Demand scenarios, respectively (Figures 5 and 6). All current thermoelectric water demand in the Edisto basin is met with groundwater, and all projected thermoelectric demand is assumed to be initially supplied by groundwater, although the Cope Generating Station is planning to switch to surface water by 2030.

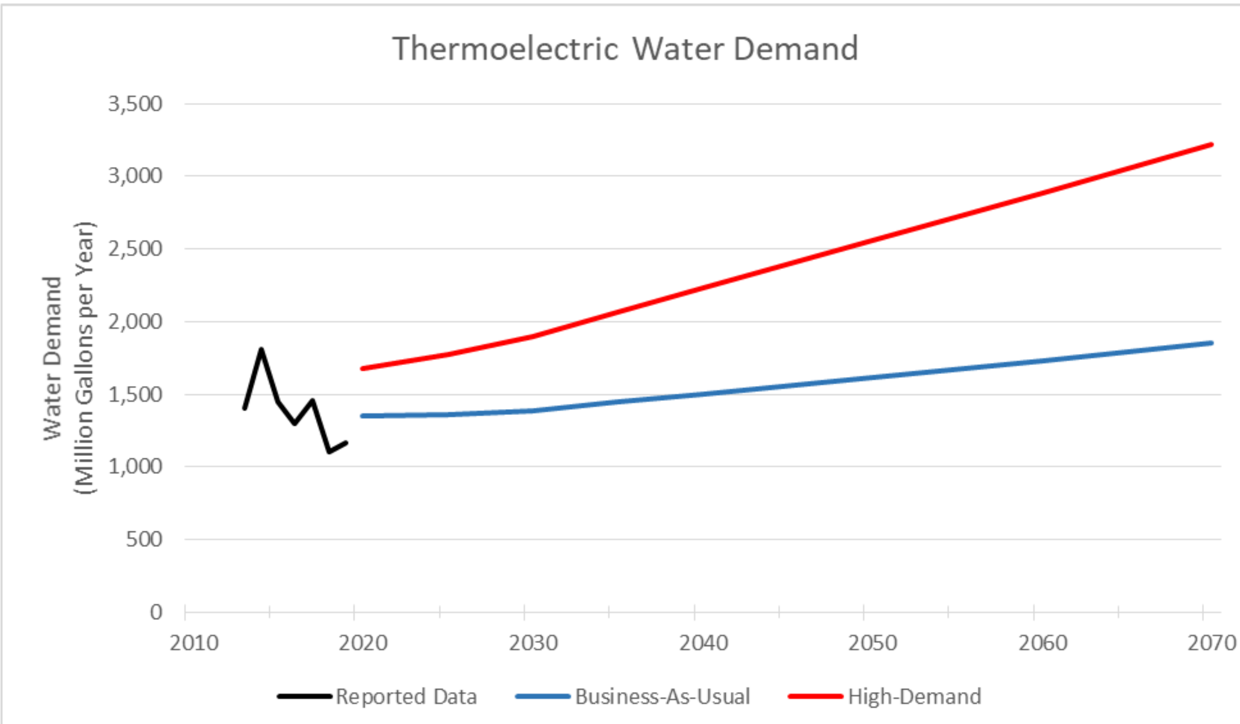

Figure 5. Baseline data and projected thermoelectric water demand under the two planning scenarios.

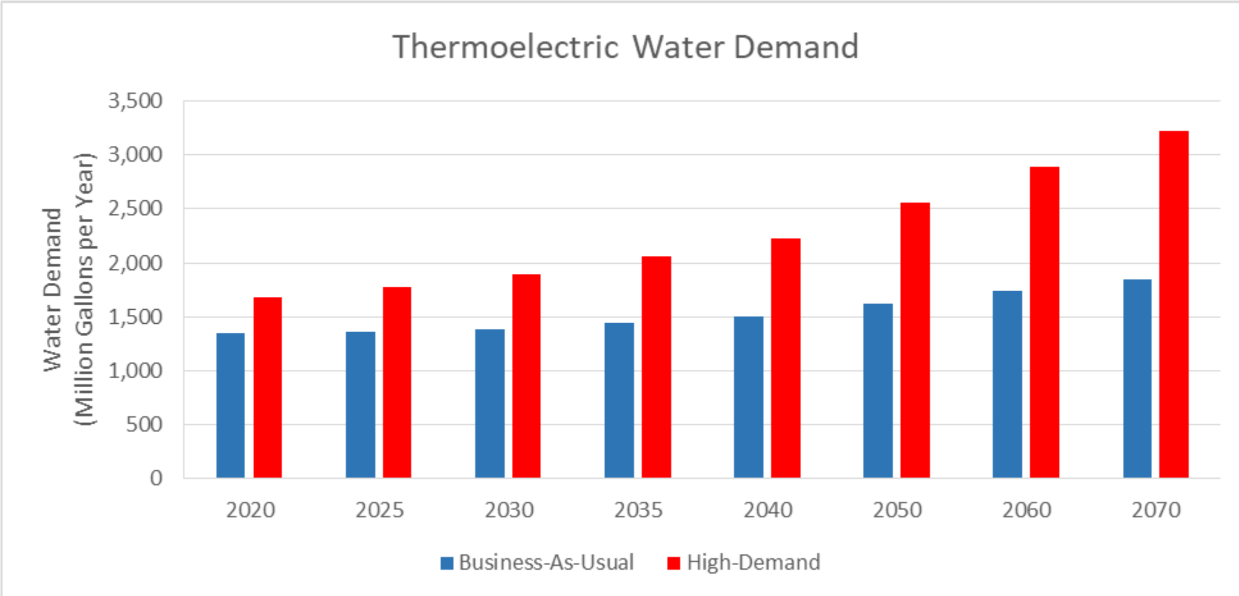

Figure 6. Projections of thermoelectric water demand under the two planning scenarios.

4.2 Public Supply

Public supply distributors provide water for residential, commercial, and some industrial uses in South Carolina. Projections of public supply water demand are based on county population projections from the SC Office of Revenue and Fiscal Affairs (SC ORFA). The High-Demand scenario assumes exponential population growth at a rate 10% higher than the SC ORFA population projections. Water demand for public supply in the Edisto Basin is projected to increase from a range of 23.5–26.3 BGY (64.3–72.0 MGD) in 2020 to 41.7–59.2 BGY (114–162 MGD) in 2070 (Figure 7). This is an increase from the 2013–2019 baseline average of 76% to 149% over the Planning Horizon for the Business-As-Usual and High-Demand scenarios, respectively. The use of surface water, from which most public supply water demand is met, is projected to increase from 21.5–24 BGY (59.0–65.7 MGD) in 2020 to 39.3–55.5 BGY (108–152 MGD) in 2070. Groundwater is also used for some public supply and its use is projected to increase from about 1.9–2.3 BGY (5.3–6.3 MGD) in 2020 to 2.4–3.7 BGY (6.6–10.1 MGD) in 2070 (Figures 8 and 9).

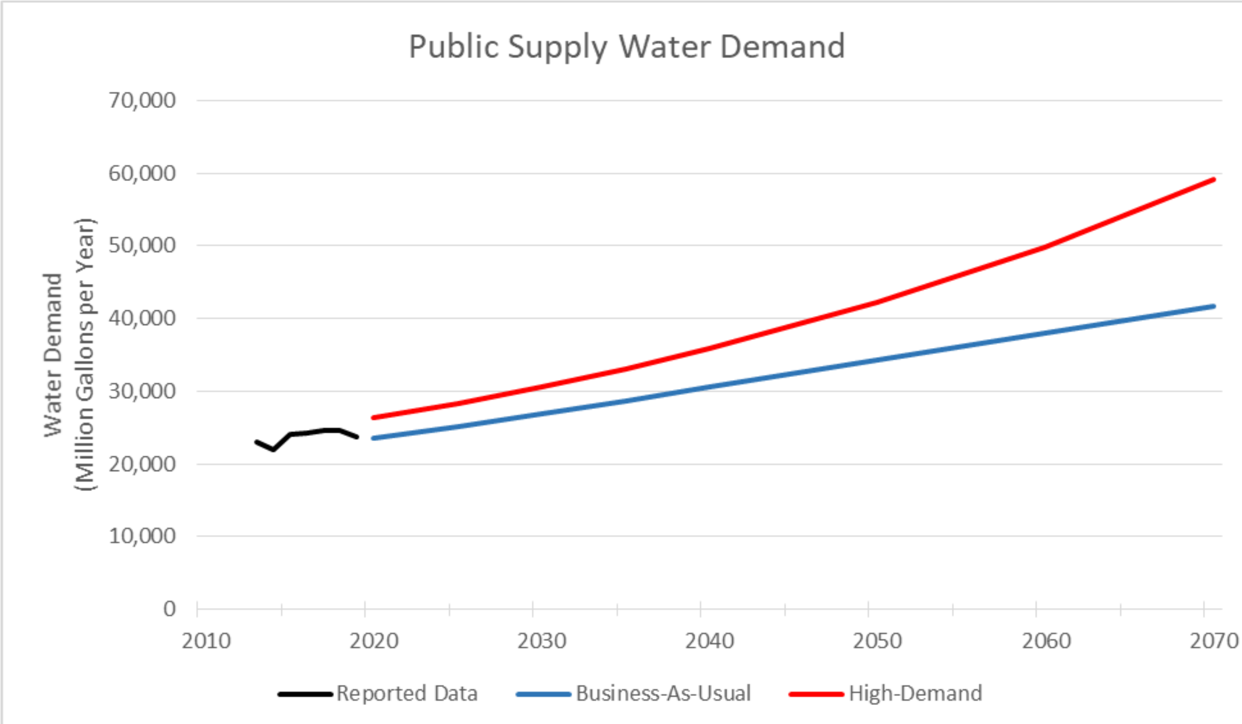

Figure 7. Baseline data and projected public supply water demand under the two planning scenarios.

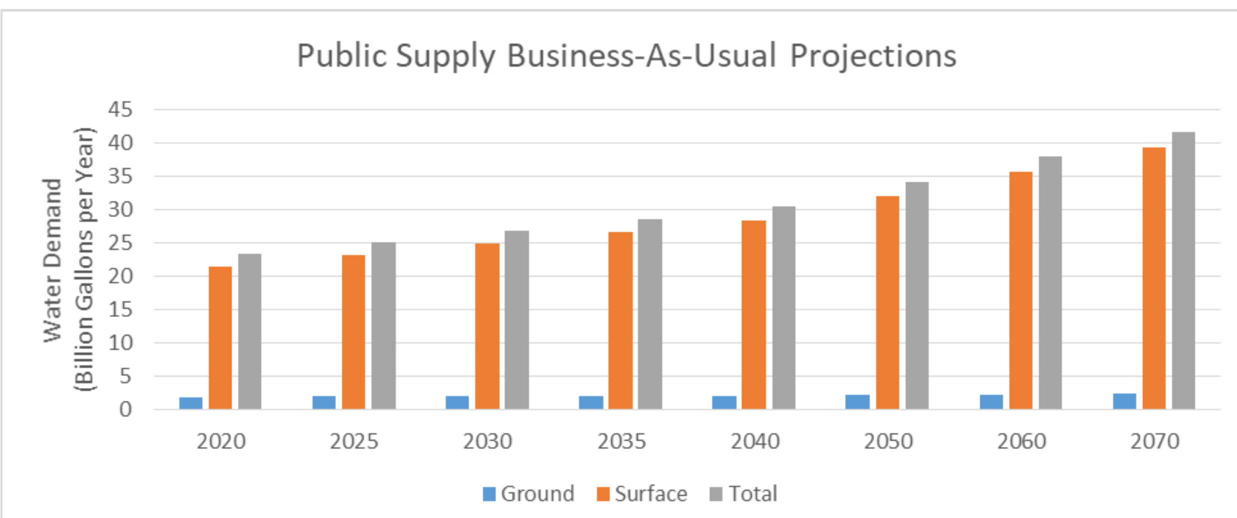

Figure 8. Projections of public supply water demand in the Edisto basin under the Business-As-Usual scenario.

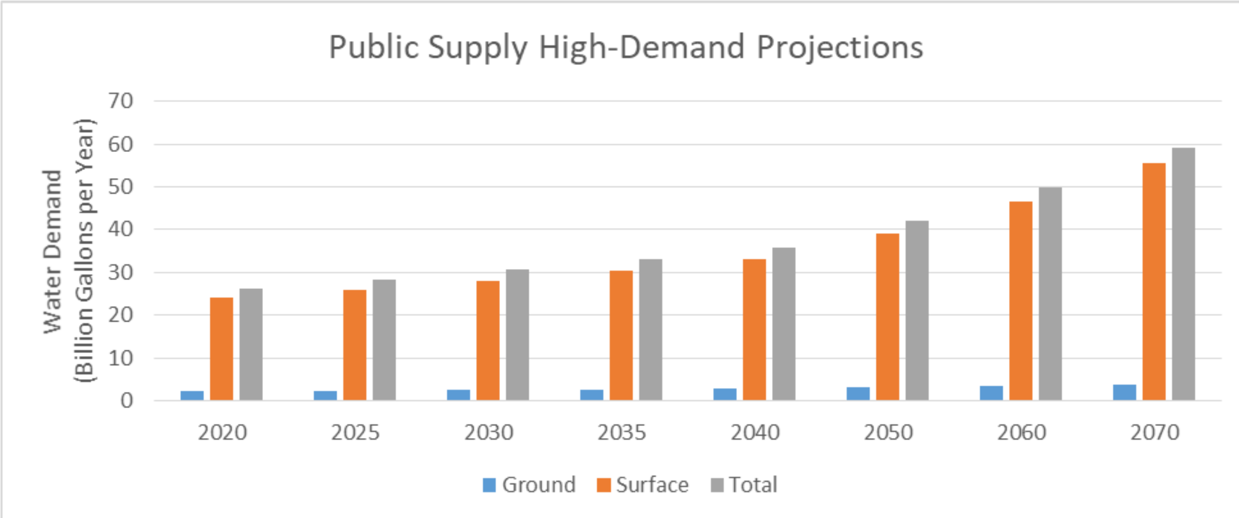

Figure 9. Projections of public supply water demand in the Edisto basin under the High-Demand scenario.

Water demand for the three largest public supply systems in the Edisto basin (the Charleston Water System, City of Aiken, and Orangeburg City Department of Public Utilities) is graphed separately in the following figures. The Charleston Water System is interconnected with other public supplies outside of the Edisto basin. Figure 10 shows water demand from the Edisto basin for the Charleston Water System. The Charleston Water System withdraws surface water from the Edisto River for about half (49%) of its total water demand. The Charleston withdrawal from the Edisto is projected to increase from a range of 17.7–19.5 BGY (48.6–53.3 MGD) in 2020 to 35.4–48.8 BGY (97.1–133.6 MGD) in 2070.

The City of Aiken (Figure 11) meets about a third (31%) of its total demand using water from the Edisto basin, using both groundwater and surface water. The City of Aiken withdrawals from the Edisto basin are projected to increase from a range of 0.91–1.0 BGY (about 2.5–2.7 MGD) in 2020 to 1.2–1.5 BGY (3.2–4.1 MGD) in 2070.

Orangeburg City Department of Public Utilities (Figure 12) meets all of its demand using water from the Edisto basin, mostly surface water (97%). Orangeburg City Department of Public Utilities water demand is projected to increase from a range of 3.0–3.3 BGY (8.1–9.0 MGD) in 2020 to 2.6–4.9 BGY (7.1–13.6 MGD) in 2070.

Average per capita water demand in these systems ranges from about 160 to 260 gallons per day. Per capita rates are not directly comparable between systems because not all of the water is used for residential supply. Industrial use and water loss can vary widely between different public supply systems.

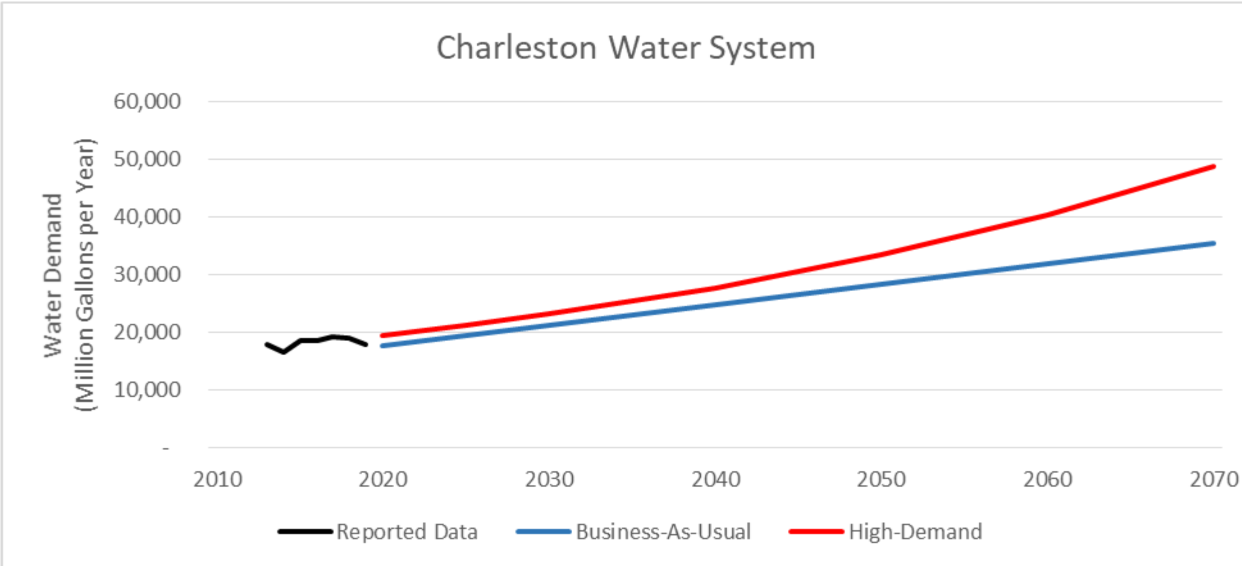

Figure 10. Baseline and projected water demand from the Edisto Basin for the Charleston Water System and connected water distributors.

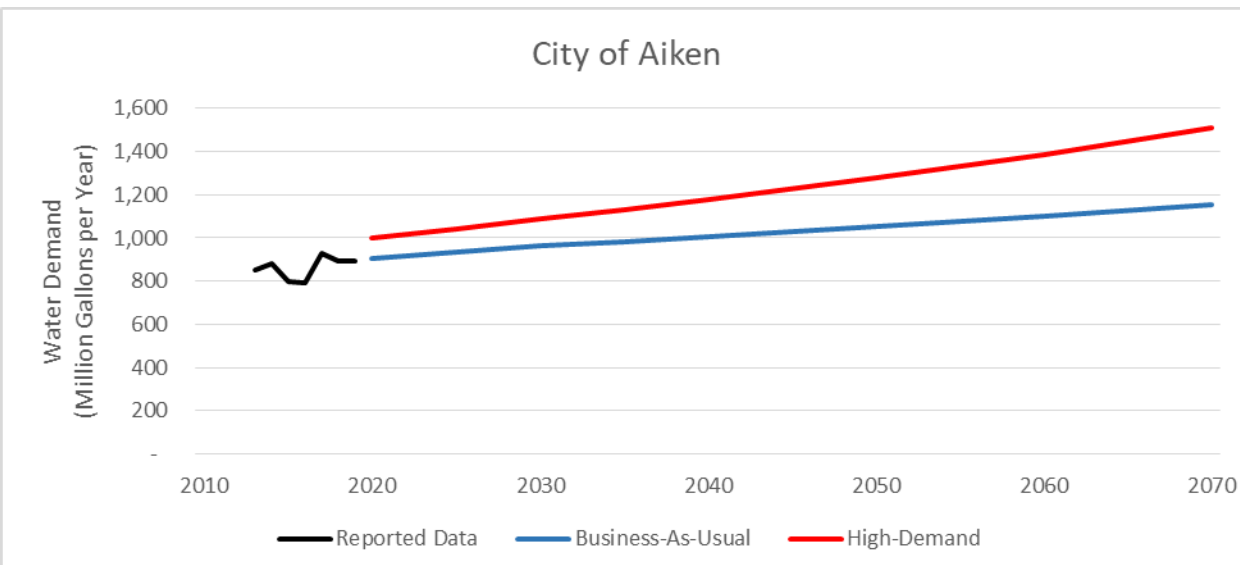

Figure 11. Baseline and projected water demand from the Edisto Basin for the City of Aiken and connected water distributors.

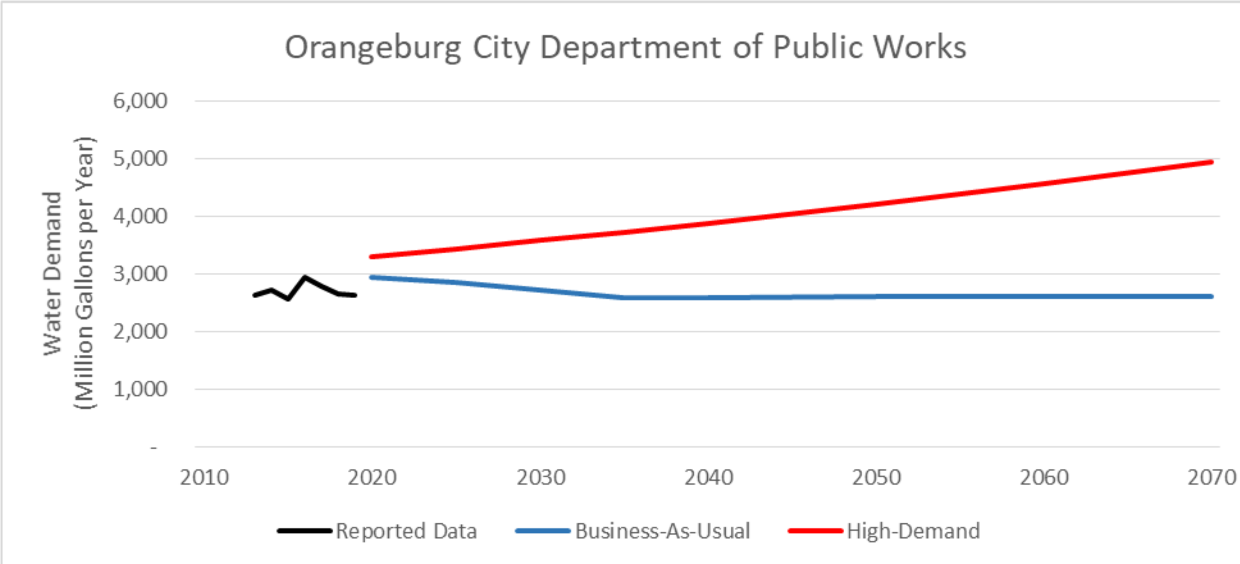

Figure 12. Baseline and projected water demand from the Edisto Basin for Orangeburg City Department of Public Works and connected water distributors.

4.3 Manufacturing

Water demand for manufacturing is projected to grow according to economic growth rates projected by the US Energy Information Agency for each economic subsector.[5] Manufacturing subsectors in the Edisto basin include the production of Cement, Organic Chemicals, Carbon and Graphite, and Fluid Power Valve and Hose Fittings. These subsectors are projected to grow from 1.9 to 2.3% per year in the Business-As-Usual scenario. The High-Demand scenario uses increased growth rates and also assumes an increased rate of use based on the 90th percentile over the calibration period. Water demand for manufacturing in the Edisto basin is projected to increase from 0.8–1.4 BGY (2.2–3.7 MGD) in 2020 to 1.7–2.8 BGY (4.7–7.6 MGD) in 2070 (Figure 13). Groundwater demand is projected to increase from 0.8–1.2 BGY (2.1–3.4 MGD) in 2020 to 1.6–2.6 BGY (4.5–7.0 MGD) in 2070. Surface water demand is projected to increase from 0.05-0.14 BGY (0.1–0.4 MGD) in 2020 to 0.08-0.19 BGY (0.2–0.6 MGD) in 2070 (Figures 14 and 15).

[5] Annual Energy Outlook 2020: United States Energy Information Agency, January 2020. 161 p. Table 23. Industrial Sector Macroeconomic Indicators (https://www.eia.gov/outlooks/aeo/)

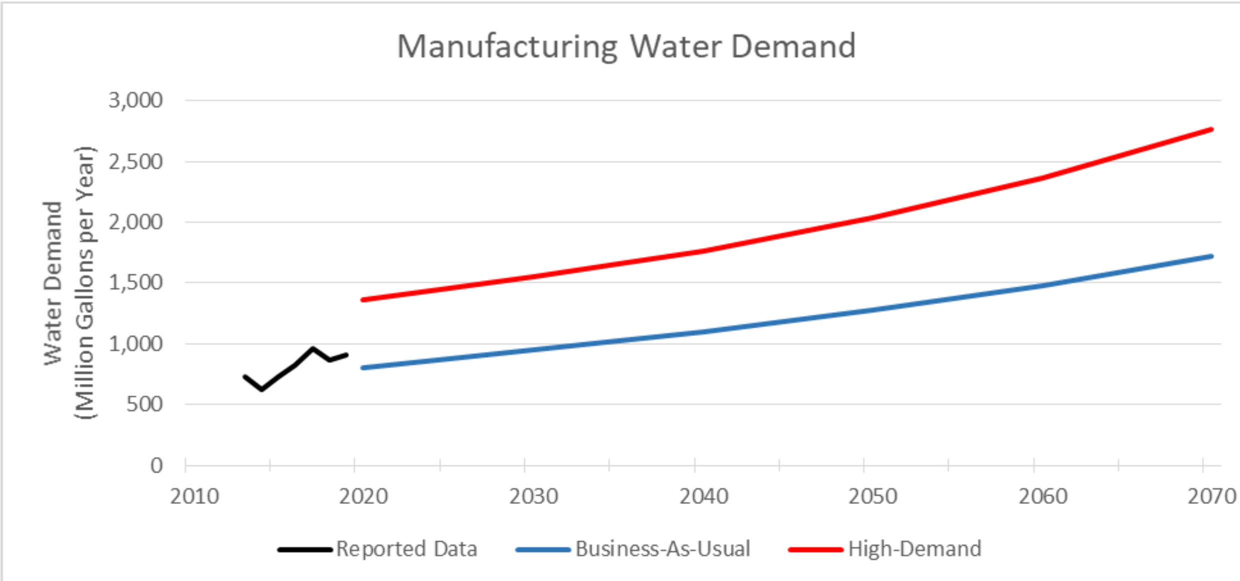

Figure 13. Baseline data and projected manufacturing water demand under the two planning scenarios.

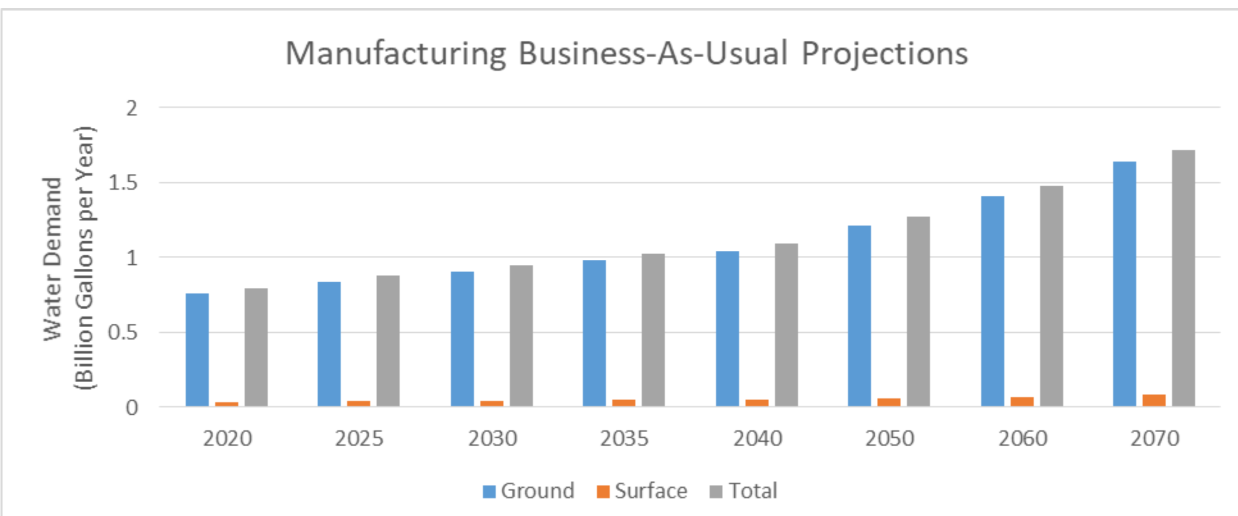

Figure 14. Projections of manufacturing water demand in the Edisto basin under the Business-As-Usual scenario.

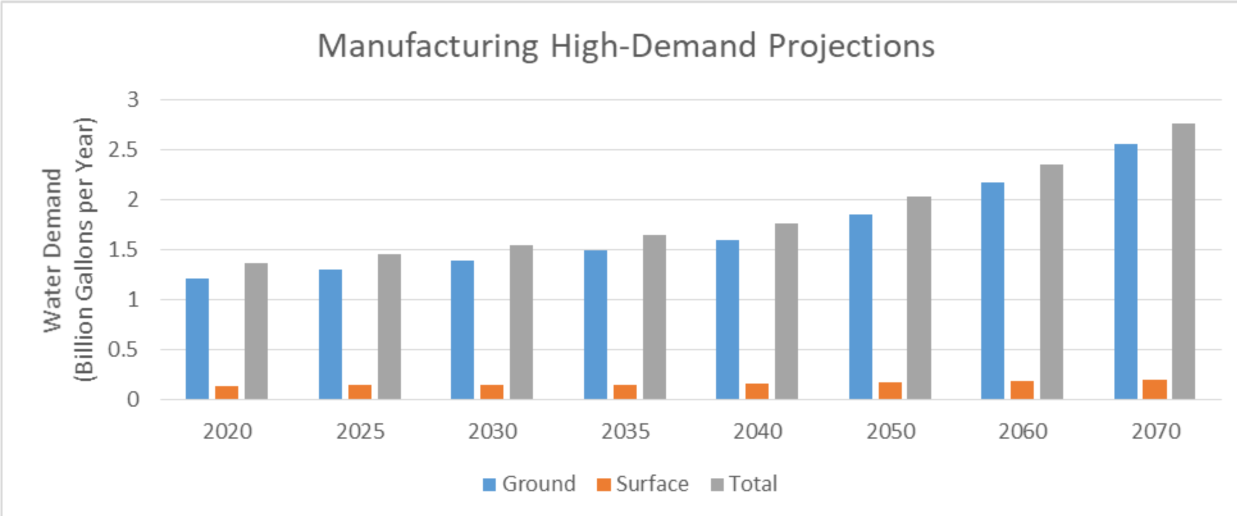

Figure 15. Projections of manufacturing water demand in the Edisto basin under the High-Demand scenario.

4.4 Agriculture

Water demand for agriculture is projected based on irrigated area. The Business-As-Usual scenario assumes an annual growth rate for irrigated area of 0.65%, based on historical expansion of irrigation in the Southeast region[6]. The High-Demand scenario assumes an annual growth rate of 0.73%, based on a study of potential impacts of climate change[7]. Consistent with the other categories of water use, water demands for agriculture have been projected for each individual water-use system (farm). However, it is doubtful that each individual farm will increase irrigated area according to the regional average projected growth. As the water-demand projections are input to surface water and groundwater models, the projections for specific withdrawal-intakes will be adapted to best conform with the underlying assumptions of the water availability models.

Water demand for agriculture in the Edisto basin is projected to increase from 26–36 BGY (72–98 MGD) in 2020 to 36–51 BGY (99–141 MGD) in 2070 (Figure 16). This is an increase of 76% to 150% over the Planning Horizon for the Business-as-Usual and High-Demand scenarios, respectively. Over 75% of agricultural water-demand in the Edisto basin is met with groundwater. Groundwater demand for agriculture is projected to increase from a range of 20–27 BGY (54–74 MGD) in 2020 to 27–39 BGY (75–107 MGD) in 2070. Agricultural demand for surface water is projected to increase from a range of 6.5–8.7 BGY (18–24 MGD) in 2020 to 9–13 BGY (25–34 MGD) in 2070 (Figures 17 and 18).

The projected growth of agricultural water demands is notably lower than the growth rate over the baseline period from 2013–2018. Over this period, there have been a number of newly registered irrigators who were likely withdrawing water prior to their registration. This

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[6] Brown, Thomas C., Romano Foti, and Jorge A. Ramirez, 2013. Projected freshwater withdrawals in the United States under a changing climate, Water Resources Research, Vol. 49, 1259–1276.

[7] Crane-Droesch, Andrew, Elizabeth Marshall, Stephanie Rosch, Anne Riddle, Joseph Cooper, and Steven Wallander. *Climate Change and Agricultural Risk Management Into the 21st Century*, ERR-266, U.S. Department of Agriculture, Economic Research Service, July 2019.

would result in an artificially inflated rate of growth for irrigation, as agricultural water demand was likely under-reported in the early years of the baseline period. Without data to quantify this effect, there is some uncertainty in the reported agricultural water demand across the basin.

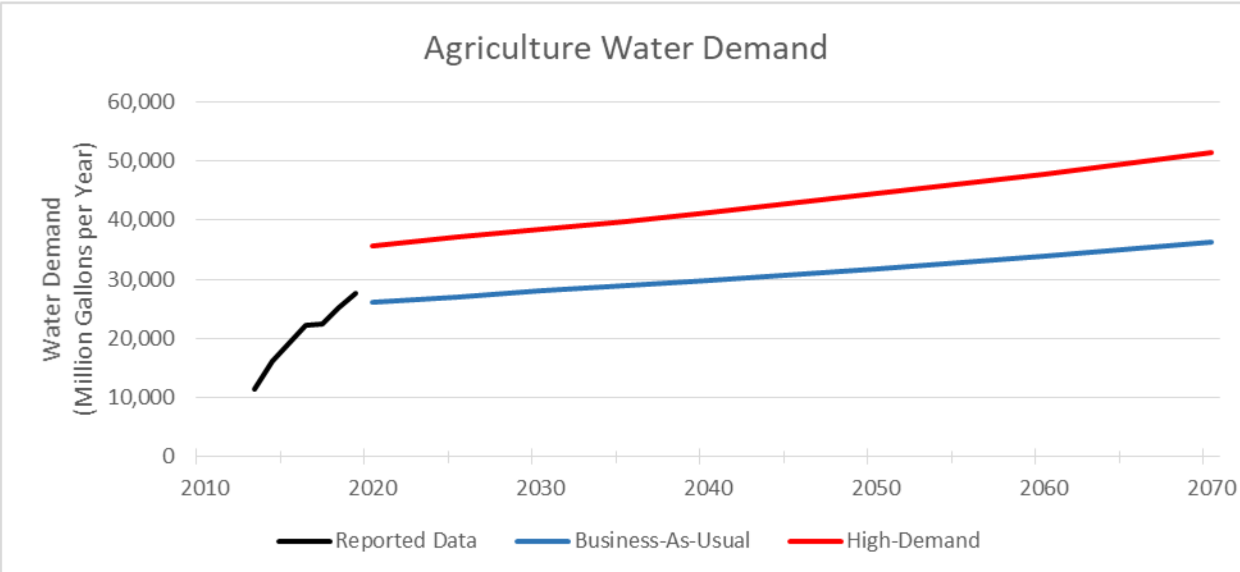

Figure 16. Baseline data and projected agricultural water demand under the two planning scenarios.

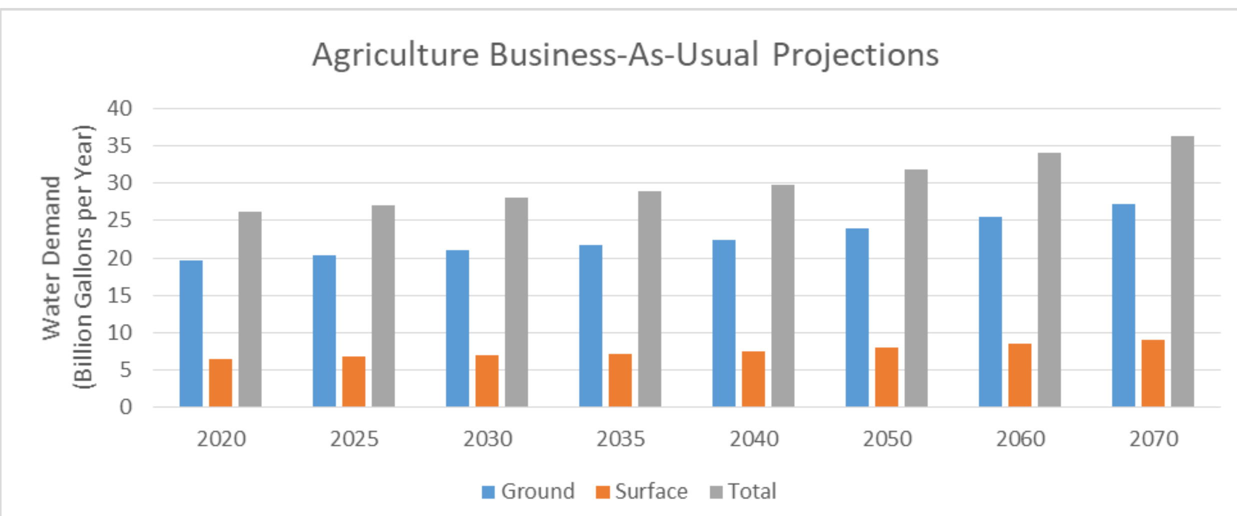

Figure 17. Projections of agricultural water demand in the Edisto basin under the Business-As-Usual scenario.

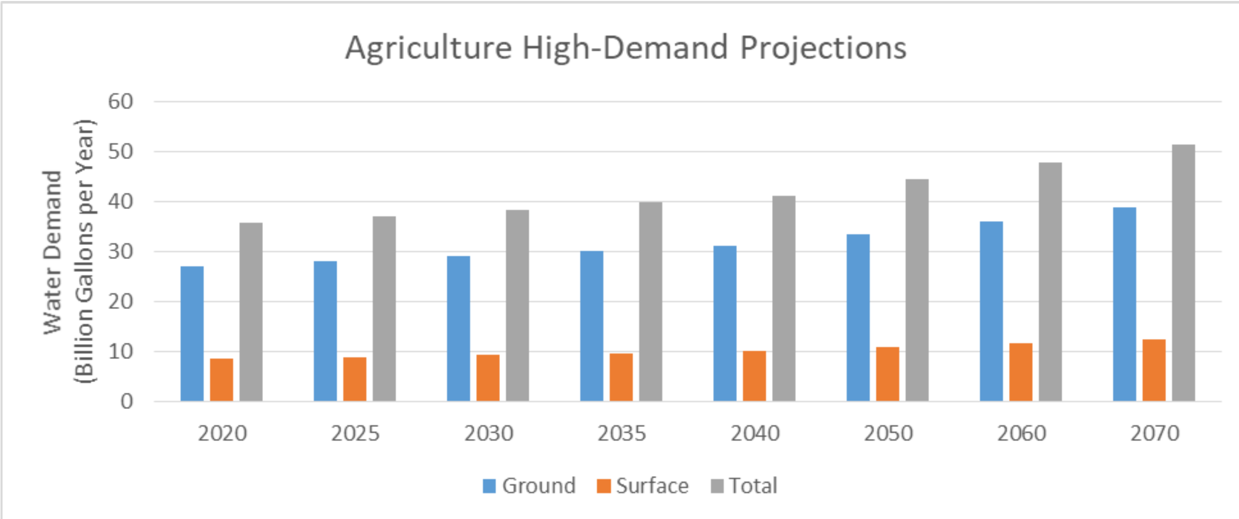

Figure 18. Projections of agricultural water demand in the Edisto basin under the High-Demand scenario.

4.5 Other

Other, minor categories of water demand in the Edisto basin include mining, golf, and aquaculture. All of these water use systems are small (each uses less than 100 million gallons per year), with the exception of Martin Marietta Aggregates, a mining operation which has pumped as much as 500 million gallons per month, but has reported substantially lower pumping in recent years. None of these water demands are projected to change.

Appendix A. Updates to the Water-Demand Projection Methods

While drafting the initial draft for water-demand projections for the Edisto basin, SCDNR made the following adjustments to the methods outlined in the report “Projection Methods for Off-stream Water Demand in South Carolina”:

1. Population Projections. For the High-Demand scenario, population had been depicted as diverging from the Business-As-Usual scenario beginning in 2013 (Figure 3.2 p17). Now, High-Demand population projections begin diverging from Business-As-Usual in 2020. Figure 4 (above in this report) illustrates the updated population projections.

2. Weather Impacts. The High-Demand scenario had originally included an estimate of the impact of weather on water demand. The impacts of weather on water demand vary widely among different water users, even among water users of the same category. Also, the effects of weather can easily be overshadowed by other dynamics, such as expanding operations. The statistical methods applied did not provide reliable estimates of weather impacts on water demand, and so the weather impact variable is not used to calculate the water-demand projection results.

3. Peaker Generators. The methodology report includes the following statement on page 12: “Increases in summer and winter demands are assigned preferentially to peaker generators.” Because there is only one major power generation station currently operating in the Edisto basin (Cope Station), no such preferential assignment of peak summer and winter demands has been implemented.

A summary of the first draft water-demand projection results was presented to the Edisto River Basin Council on September 30, 2020. The inputs, methods, and results were discussed and several ways to potentially improve the projections were proposed. Based on the feedback from that discussion, SCDNR staff revised the water-demand projections using updated input datasets and the following modifications to the methods:

1. High-Impact Factor. The High-Demand Scenario is based on elevated projections of driver variables and also high-impact factors which increase the rate of water demand. The high-impact factors were calibrated originally using a multiplicative model:

   Water Demand = Driver * Rate * Seasonality * High Impact Factor

   The high-impact factors were calculated by comparing the Business-As-Usual model calibration results with reported water withdrawals over the baseline period. The deviation of the model from the reported values was calculated as modelled value divided by reported value, for each month. For non-seasonal water demands, the high-impact factor is simply the 90th percentile of the deviation values over the baseline period. For seasonal water demands, the high-impact factor is calculated for each month as the 90th percentile of deviation values from that month, the month prior, and the month after, for each year of the baseline period.

For some water-use systems, the high-impact factors calculated using the multiplicative model yielded unreasonably high water demands. This was caused by high variability in reported water withdrawals over time. To provide more reasonable values for the high-impact factor, the multiplicative model was replaced with an additive high-impact factor:

Water Demand = Driver * Rate * Seasonality + High Impact Factor

The calibration of the additive high-impact factor uses the same method as the calibration of the multiplicative high-impact factor, except that monthly deviation is calculated as the modelled value *minus* the reported value (instead of *divided by*). The water-demand projections were recalculated using the additive high-impact factor and the updated input datasets, and a summary of the results was presented to the Edisto RBC on October 21, 2020. The RBC members then discussed the projection methods and results in break-out groups formed for the different major categories of water demand. There was a general consensus that the revised projections were suitable, with the exception of stakeholders representing agricultural water demand. The agriculture stakeholders agreed that the second draft of the High-demand scenario projections were too high.

The results for agriculture summarized to annual water demand, based on an additive high-impact factor, are too high because agricultural irrigation is highly seasonal. That makes the multiplicative high-impact factor more appropriate for the agricultural sector. Consider that in the winter, monthly irrigation volume often falls to zero. Zero, multiplied by a high-impact factor, is still zero; this is reasonable if, even in a High-Demand scenario, irrigation simply does not occur outside of the growing season. In contrast, the calibration with an additive high-impact factor can result in inflated irrigation demands in the winter months of the high-demand scenario: it is not reasonable to assume that deviations in the late fall or early spring growing seasons would apply in the winter. Therefore, the multiplicative high-impact factor is used for the High-Demand scenario for agriculture.

2. <u>Limits on Irrigable Area.</u> RBC members from the Agriculture, Forestry, and Irrigation Interests category noted that irrigated areas cannot continue to expand indefinitely. There are constraints, such as developed areas, conservation easements, wetlands, and slopes, which limit the expansion of irrigation. In collaboration with the RBC members representing the agricultural sector, SCDNR conducted a simplified analysis of constraints to irrigable areas. The results did not indicate that the constraints would limit the

projected growth rate of irrigated areas in either the Business-As-Usual or High-Demand scenarios.

There are additional constraints which could limit the continued expansion of irrigation, such as the logistics of cultivating smaller, scattered fields and the actual availability of water for irrigation. The logistics issue would presumably be less of a consideration for smaller operations, growing specialty crops for example, and the logistical constraints of larger agricultural operations were determined to be outside the scope of this analysis. Water availability is assessed in a subsequent step in the planning process.

Appendix B. Edisto Basin Water-Demand Projections

Table B1. Business-As-Usual Annual Water Demand (Million Gallons per Year) by Category

Year	Agriculture	Manufacturing	Other	Thermoelectric	Water Supply
2020	26,224	798	2,823	1,348	23,477
2025	27,087	880	2,823	1,357	25,191
2030	27,979	952	2,823	1,386	26,913
2035	28,900	1,028	2,823	1,446	28,640
2040	29,852	1,095	2,823	1,504	30,508
2050	31,850	1,274	2,823	1,619	34,244
2060	33,982	1,480	2,823	1,734	37,980
2070	36,257	1,721	2,823	1,849	41,715

Table B2. High-Demand Annual Water Demand (Million Gallons per Year) by Category

Year	Agriculture	Manufacturing	Other	Thermoelectric	Water Supply
2020	35,738	1,366	4,996	1,676	26,283
2025	37,062	1,458	4,996	1,771	28,346
2030	38,434	1,553	4,996	1,896	30,612
2035	39,858	1,655	4,996	2,064	33,103
2040	41,334	1,768	4,996	2,229	35,842
2050	44,452	2,035	4,996	2,558	42,173
2060	47,806	2,363	4,996	2,887	49,855
2070	51,413	2,765	4,996	3,216	59,196

Table B3. Business-As-Usual Peak Monthly Water Demand (Million Gallons per Month) by Category

Year	Agriculture (Jul)	Manufacturing (Aug)	Other (May)	Thermoelectric (May)	Water Supply (Aug)
2020	5,507	80	368	126	2,315
2025	5,689	89	368	127	2,487
2030	5,876	96	368	130	2,660
2035	6,070	104	368	135	2,833
2040	6,269	110	368	141	3,019
2050	6,689	129	368	152	3,391
2060	7,137	150	368	162	3,763
2070	7,615	174	368	173	4,136

Table B4. High-Demand Peak Monthly Water Demand (Million Gallons per Month) by Category

Year	Agriculture (Jul)	Manufacturing (Aug)	Other (May)	Thermoelectric (May)	Water Supply (Aug)
2020	7,562	128	549	154	2,549
2025	7,842	137	549	162	2,754
2030	8,132	147	549	174	2,978
2035	8,433	157	549	190	3,225
2040	8,746	169	549	205	3,497
2050	9,406	196	549	236	4,125
2060	10,115	229	549	267	4,887
2070	10,878	269	549	298	5,815