Effectiveness of Demand-side Surface Water Management Strategies and Selection of Strategies for Feasibility Evaluation
Review of November Meeting

• Identified Issues from Surface Water availability modeling:
  
a. **Surface water shortages** for Aiken and CWS in the 2070 High Demand Scenario (with no surface water conditions)

b. **Low Flows during drought** – For all Scenarios, flow at Givhans Ferry and other locations drops below Minimum Instream Flow (20%, 30% and 40% of Mean Daily Flow)
Review of November Meeting

• **Guiding Principle #4**: River Basin Plans should utilize effective supply and demand strategies

• Demand strategies include:
  a. Water loss control programs
  b. Low flow fixtures and appliances
  c. Reclaimed water programs
  d. Conservation-based pricing structures
  e. Ag water audits and irrigation efficiency measures
  f. Soil moisture sensor/smart irrigation
Review of November Meeting

Our Plan was to:

• Investigate the effectiveness in-place and demand-side strategies using the SWAM model

• Subsequently, supply-side strategies may be identified by the RBC, and those, along with a proposed Low Flow Strategy, may be evaluated using the model.
Decision-Making Process for Selecting Water Management Strategies

**Identify Issues** (shortages, reaches of interest, groundwater areas of concern)

**RBC-Proposed Management Strategy to Address Issue**
Strategies should be deemed consistent with the RBC’s vision and goals for the basin before proceeding

RBC consensus is not needed to move to Step 1, but there should be at least majority support

**Can the strategy be evaluated using the models?**

**Use SWAM or Groundwater Model to Evaluate Effectiveness** (using performance measures)

**Evaluate Qualitatively**

Is the strategy effective in reducing or eliminating a shortage or increasing supply?

---

**Step 1**

**Step 2**

If CONSENSUS

**RBC Vote**

If no CONSENSUS, but majority approves

If no majority, remove strategy from consideration

**Evaluate Feasibility**
Cost-benefit
Consistency with Regulations
Reliability
Environmental Impacts
Socioeconomic Impacts
Interstate or Interbasin Impacts
Water Quality Impacts
Constructability

Is the strategy clearly feasible?

**Remove strategy from consideration**

Remove strategy from consideration

**Adopt Strategy**

If CONSENSUS

**Consider Scoring-Based Process**

**OR**

**YES**

**YES**

**NO**

**NO**

**OR**

**YES**

**NO**

**If no majority, remove strategy from consideration**

**YES**

**NO**

Remove strategy from consideration

---
SUMMARY - Demand Side Scenarios

• **Scenario 1** – Existing Drought Management Plan actions

• **Scenario 2** – Scenario 1 strategies, plus *agriculture* water efficiency strategies

• **Scenario 3** – Scenario 1 and 2 strategies, plus *municipal* water conservation strategies

Scenarios 1, 2 and 3 were run using **2070 water demands** from the **Business-as-Usual** and **High Demand Scenarios**
# Scenario 1
## Existing Municipal Drought Management Plan Triggers and Actions

<table>
<thead>
<tr>
<th>Drought Phase:</th>
<th>Moderate</th>
<th>Severe</th>
<th>Extreme</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water use reduction goals (Actions):</strong></td>
<td>15%</td>
<td>20%</td>
<td>25%</td>
</tr>
</tbody>
</table>

### Charleston Water System Triggers
- When the Edisto River at the CWS intake is 312 cfs, the CWS withdrawal should not exceed 80 mgd (72% reduction of permitted capacity)
- When the Edisto River at the CWS intake is 260 cfs, the CWS withdrawal should not exceed 60 mgd (79% reduction of permitted capacity)
- When the Edisto River at the CWS intake is 174 cfs, the CWS withdrawal should not exceed 40 mgd (86% reduction of permitted capacity). If the Edisto River at the CWS intake drops to 87 cfs, the CWS withdrawal should not exceed 25 mgd (91% reduction of permitted capacity)

### Orangeburg Triggers
1. North Fork Edisto River Elevation less than 151.6 ft. M.S.L. (as measured at the Water Plant)
2. Stream-flow less than 125 cfs (use Orangeburg gage)
3. Determination by the Manager of DPU
1. North Fork Edisto River Elevation less than 151.4 ft. M.S.L. (as measured at the Water Plant)
2. Stream-flow less than 110 cfs (use Orangeburg gage)
3. Determination by the Manager of DPU
1. North Fork Edisto River Elevation less than 151.3 ft. M.S.L. (as measured at the Water Plant)
2. Stream-flow less than 100 cfs (use Orangeburg gage)
3. Determination by the Manager of DPU

### Aiken Triggers
1. Aquifer levels falling 5 feet below historic static level.
2. Average daily use greater than 15.5 mgd for five consecutive days.
[For modeling: when flow in Shaw Creek at intake is less than 14 cfs]
1. Reservoir Valve 1 discharge required to maintain flow in Shaws Creek. [For modeling: when flow in Shaw Creek at intake is less than 11 cfs]
2. Aquifer levels falling 10 feet below historic static level.
3. Average daily use greater than 16.5 mgd for five consecutive days.
1. Reservoir Valve 2 discharge required to maintain flow in Shaws Creek. [For modeling: when flow in Shaw Creek at intake is less than 8 cfs]
2. Aquifer levels falling 12 feet below historic static level.
3. Average daily use greater than 17.5 mgd for five consecutive days.

### Batesburg-Leesville Triggers
1. Town Pond Reservoir 4/5 full
2. Brodie (Lightwood Knot) Creek flow below 5.0 cfs.
3. Sixty days of raw water supply available
4. Average daily use greater than 1.3 mgd for 45 consecutive days
5. Local average rainfall less than 6 inches for sixty days.
1. Town Pond Reservoir 3/5 full
2. Brodie (Lightwood Knot) Creek flow below 3.0 cfs
3. Forty-five days of raw water supply available
4. Average daily use greater than 1.5 mgd for 30 consecutive days
5. Local average rainfall less than 2 inches for ninety days.
1. Town Pond Reservoir 1/2 full
2. Brodie (Lightwood Knot) Creek flow below 1.5 cfs
3. Twenty-one days of raw water supply available
4. Average daily use greater than 1.5 mgd for 30 consecutive days
5. Local average rainfall less than 1 inch for one hundred twenty days.

Triggers listed in green were incorporated into the SWAM model.
Scenario 1
Other Water User’s Triggers and Actions

• Dominion Energy Cope Plant
  • **Trigger** – S. Fork Edisto Flow is 192 cfs or less
  • Action – Switch to 100% groundwater

• Walther Farms
  • **Trigger** – Edisto River flow at Givhans is 312 cfs or less
  • **Action** – Switch to meeting 20% of demand from groundwater (reduce surface water withdrawal by 20%)
  • **Note** – This trigger and action is **NOT** part of a drought plan
Do Voluntary Reductions Work?

California Example

• The Governor requested voluntary conservation following California’s second driest year on record, with a goal of 15% reduction in water use.

• Total water usage is down just 6% since July compared to the same period in 2020.

• Collectively, in October 2021, Californians reduced their water use by 13.2% compared to October 2020.

• Northern California had the greatest reduction compared to October 2020, dropping by as much as 22%, while the southern region that includes Los Angeles and San Diego dropped by about 12% in October compared to 2020.

Source: https://www.islandpacket.com/news/business/article256416331.html#storylink=cpy
Scenario 1 - Results
When are drought actions triggered in the model with Business as Usual 2070 demands?

<table>
<thead>
<tr>
<th>Drought Phase:</th>
<th>Moderate</th>
<th>Severe</th>
<th>Extreme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water use reduction goals (Actions):</td>
<td>15%</td>
<td>20%</td>
<td>25%</td>
</tr>
<tr>
<td>Charleston Water System</td>
<td>7 months</td>
<td>14 months</td>
<td>6 months</td>
</tr>
<tr>
<td>Orangeburg</td>
<td>Never</td>
<td>Never</td>
<td>Never</td>
</tr>
<tr>
<td>Orangeburg (lowest monthly flow at Orangeburg is 168 cfs vs. the trigger flow of 125 cfs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aiken</td>
<td>2 months</td>
<td>Never</td>
<td>Never</td>
</tr>
<tr>
<td>Batesburg-Leesville</td>
<td>Never</td>
<td>Never</td>
<td>Never</td>
</tr>
<tr>
<td>Batesburg-Leesville (lowest monthly flow at intake in Lightwood Knot Creek is 6 cfs vs. the trigger flow of 5 cfs)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total number of modeled months is 1,049
Scenario 1 - Results
When are drought actions triggered in the model with Business as Usual 2070 demands?

• Dominion Energy Cope Plant
  • 16 months
  • 1956 (2 months); 1986; 1990, 2002 (3 months); 2007 (2 months); 2008 (2 months); 2011 (3 months); 2012 (2 months)

• Walther Farms
  • Same as CWS (27 months)
  • Note – This trigger (and action) is NOT part of a drought plan

Total number of modeled months is 1,049
Scenario 1 - Results

When are drought actions triggered in the model with High Demand 2070 demands?

<table>
<thead>
<tr>
<th>Water use reduction goals (Actions)</th>
<th>Moderate</th>
<th>Severe</th>
<th>Extreme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charleston Water System</td>
<td>18 months</td>
<td>17 months</td>
<td>17 months</td>
</tr>
<tr>
<td>Orangeburg</td>
<td>Never</td>
<td>Never</td>
<td>Never</td>
</tr>
<tr>
<td></td>
<td>(lowest monthly flow at Orangeburg is 159 cfs vs. the trigger flow of 125 cfs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aiken</td>
<td>2 months</td>
<td>Never</td>
<td>Never</td>
</tr>
<tr>
<td>Batesburg-Leesville</td>
<td>Never</td>
<td>Never</td>
<td>Never</td>
</tr>
<tr>
<td></td>
<td>(lowest monthly flow at intake in Lightwood Knot Creek is 6 cfs vs. the trigger flow of 5 cfs)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total number of modeled months is 1,049
Scenario 1 - Results

When are drought actions triggered in the model with High Demand 2070 demands?

- Dominion Energy Cope Plant
  - 30 months

- Walther Farms
  - Same as CWS (52 months)
  - Note – This trigger (and action) is NOT part of a drought plan

Total number of modeled months is 1,049
**Scenario 2** – Scenario 1 strategies plus *agriculture water efficiency strategies*

**Conditions and Assumptions**

- 70% of existing and future irrigators achieve **15% reduction in projected demand** via water audits followed by nozzle retrofits and/or other measures, such as deployment of smart irrigation technologies, use of cover crops, and crop selection.

- The “70% of existing irrigators” were assumed to be those with the highest demand, excluding Walther Farms, which has performed a water audit and already employs water efficient practices.

- Combined average water savings of 1.6 mgd for *Business as Usual 2070* demands.
Basis for the “70% of Irrigators” Assumption

Source:
Calvin B. Sawyer, PhD (and others)
Clemson Cooperation Extension, 2018

Agricultural Water Use in South Carolina: Preliminary Results of the South Carolina Agricultural Water Use and Irrigation Survey
The projected, additional ag demands shown above were reduced by 10.5%

10.5% = 70% use center pivot/spray type irrigation X 15% reduction in water use due to water efficient practices
The projected, additional ag demands shown above were reduced by 10.5%.

10.5% = 70% use center pivot/spray type irrigation X 15% reduction in water use due to water efficient practices.
Scenario 2
Scenario 1 strategies, plus agriculture water efficiency strategies

Conditions and Assumptions

- Existing Ag water users assumed to have center pivot/spray type irrigation and were assigned a 15% reduction in 2070 project demand:

  IR: Millwood
  IR: Shady Grove
  IR: Thomas C. Fink
  IR: Walter P. Rawl & Sons
  IR: Rob Bates
  IR: Haigler
  IR: Williams & Sons

  IR: RRR Farms
  IR: Backman IR: Inabinet Farms
  IR: Shivers Trading
  IR: Phil Sandifer & Sons
  IR: Norway
  IR: Cotton Lane
  IR: Gray
Scenario 3 – Scenario 1 and 2 strategies plus municipal water conservation strategies

Conditions and Assumptions

• **Municipal water users** achieve a 15% reduction in demand by implementing a portfolio of **water conservation and water efficiency/loss strategies**, such as:
  • Low flow and water smart appliances and fixtures
  • Conservation-based pricing structures
  • Landscape irrigation ordinances
  • Residential water audits
  • Public education
  • Reclaimed water
  • Utility water efficiency and water loss programs
Water Conservation Strategies

Town of Cary, NC (pop. 175,000)

- Since 1999, the Town has implemented:
  - Three-tiered water rate structure
  - Landscape and irrigation codes
  - Toilet flapper rebates
  - Residential water audits
  - Points program for new construction with water efficient measures
  - Monthly water budgets for large irrigators
  - Public education
  - Reclaimed water program

- Conservation strategies reduced per capita water demand from 114 gpcd in 2001 to 81 gpcd in 2016 (29% reduction in per capita demand)
Water Conservation Strategies

Metro North Georgia Water Planning District

Example Water Conservation & Efficiency measures implemented:

- Conservation pricing structures
- Toilet rebate program
- Landscape irrigation program
- Leak detection and water loss control programs
- Car wash recycling ordinances
- Public education

Conservation strategies reduced per capita water demand from 131 gpcd in 2003 to 99 gpcd in 2018 (24% reduction in per capita demand)

Water Efficiency and Water Loss Programs

Georgia Water Stewardship Act of 2010

• The Act set water loss control requirements that include:
  • Completion of an Annual Water Loss Audit using AWWA M36 Methodology
  • Development and implementation of a Water Loss Control Program
  • Development of individual goals to set measures of water supply efficiency
  • Demonstration of progress toward improving water supply efficiency

• Requirements apply to public water systems serving populations over 3,300 (about 250 utilities)
## Water Efficiency and Water Loss Programs

<table>
<thead>
<tr>
<th>Own Sources</th>
<th>Total System Input</th>
<th>Water Supplied</th>
<th>Water Exported</th>
<th>Billed Authorized Consumption</th>
<th>Billed Metered Consumption</th>
<th>Billed Unmetered Consumption</th>
<th>Unbilled Metered Consumption</th>
<th>Unbilled Unmetered Consumption</th>
<th>Unauthorized Consumption</th>
<th>Customer Metering Inaccuracies</th>
<th>Systematic Data Handling Errors</th>
<th>Leakage on Mains</th>
<th>Leakage on Service Lines</th>
<th>Leakage &amp; Overflows at Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authorize Consumption</td>
<td>Water Losses</td>
<td>Real Losses</td>
<td>Apparent Losses</td>
<td>Non-Revenue Water</td>
<td>Revenue Water</td>
<td>Billed Water Exported</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Source:** AWWA M36 Methodology from Demonstrating Progress Toward Improving Water Supply Efficiency (presentation slides), GA EPD, T. Cash, B. Frechette, J. Smith, and W. Zeng, May 2019
Water Efficiency and Water Loss Programs

Real Losses

• Also called *Physical Losses* – Water that enters the distribution system, but never reaches a user

• Examples Include:
  • Leakage on transmission and distribution mains
  • Storage tank overflows
  • Service Line leakage up to customer meter

• Reducing real losses *extends* the water resource

Water Efficiency and Water Loss Programs

Histogram of Real Losses as a Percent of Total Water Supplied
10 Year Average for 263 Georgia Utilities

Water Efficiency and Water Loss Programs

Annual Real Losses as a Percent of Total Water Supplied
High Performers and Average for All Utilities

Demand Management Strategies Results

- Business as Usual 2070 Scenarios 1, 2 and 3
**Results for Business as Usual 2070 Scenarios**

Comparison to Minimum Instream Flows

Only the strategic nodes where there was a change in the percentage of months for Scenarios 1, 2 or 3 compared to the base Business as Usual 2070 scenario are listed.

<table>
<thead>
<tr>
<th>Strategic Node</th>
<th>Scenario</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDO05</td>
<td>Business as Usual (2070)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>BAU 2070 - Scenario 1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>BAU 2070 - Scenario 2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>BAU 2070 - Scenario 3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Outlet of Shaw Creek</td>
<td>Business as Usual (2070)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>BAU 2070 - Scenario 1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>BAU 2070 - Scenario 2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>BAU 2070 - Scenario 3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>EDO13</td>
<td>Business as Usual (2070)</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>22</td>
<td>29</td>
<td>21</td>
<td>20</td>
<td>19</td>
<td>11</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>BAU 2070 - Scenario 1</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>22</td>
<td>29</td>
<td>21</td>
<td>20</td>
<td>19</td>
<td>11</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>BAU 2070 - Scenario 2</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>22</td>
<td>29</td>
<td>21</td>
<td>20</td>
<td>18</td>
<td>11</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>BAU 2070 - Scenario 3</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>21</td>
<td>25</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>9</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>
Strategic nodes where there was a change in the percentage of months for Scenarios 1, 2 or 3 compared to the base Business as Usual 2070 scenario are outlined in black.
### Results for Business as Usual 2070 Scenarios

**Comparison of 5th percentile Flows**

<table>
<thead>
<tr>
<th>5th percentile flows (cfs)</th>
<th>EDO14 SOUTH FORK</th>
<th>EDO05 SOUTH FORK</th>
<th>EDO06 SOUTH FORK</th>
<th>EDO07 SOUTH FORK</th>
<th>EDO11 SOUTH FORK</th>
<th>EDO13 EDISTO</th>
<th>HUC601 OUTLET</th>
<th>HUC302 OUTLET</th>
<th>HUC303 OUTLET</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SOUTH FORK</td>
<td>EDISTO RIVER</td>
<td>NEAR SPRINGFIELD</td>
<td>EDISTO RIVER</td>
<td>NEAR DENMARK</td>
<td>EDISTO RIVER</td>
<td>NEAR COPE</td>
<td>NEAR BAMBERG</td>
<td>NEAR BRANCHVILLE</td>
</tr>
<tr>
<td>Business as Usual 2070</td>
<td>132</td>
<td>151</td>
<td>236</td>
<td>240</td>
<td>245</td>
<td>586</td>
<td>493</td>
<td>393</td>
<td>44</td>
</tr>
<tr>
<td>BAU 2070 - Scenario 1</td>
<td>132</td>
<td>151</td>
<td>236</td>
<td>240</td>
<td>245</td>
<td>585</td>
<td>492</td>
<td>392</td>
<td>44</td>
</tr>
<tr>
<td>BAU 2070 - Scenario 2</td>
<td>132</td>
<td>152</td>
<td>237</td>
<td>241</td>
<td>246</td>
<td>587</td>
<td>496</td>
<td>395</td>
<td>44</td>
</tr>
<tr>
<td>BAU 2070 - Scenario 3</td>
<td>135</td>
<td>154</td>
<td>240</td>
<td>244</td>
<td>249</td>
<td>591</td>
<td>499</td>
<td>422</td>
<td>46</td>
</tr>
</tbody>
</table>

Only the strategic nodes where there was a change in the percentage of flows for Scenarios 1, 2 or 3 compared to the base Business as Usual 2070 scenario are listed.
Strategic nodes where there was a change in the percentage of flows for Scenarios 1, 2 or 3 compared to the base Business as Usual 2070 scenario are outlined in black.
Results for **Business as Usual 2070 Scenarios**

2002 Drought Flows at Givhans Ferry

![Graph showing 2002 Drought Flows at Givhans Ferry (EDO13) for Business as Usual 2070 Scenarios]
Results for **Business as Usual 2070 Scenarios**

Comparison of Low Flows at Givhans Ferry

This graph compares flows for each Business as Usual scenario for the 50 lowest flow months at Givhans Ferry.
Demand Management Strategies Results

• High Demand 2070 Scenarios 1, 2 and 3
### Results for High Demand 2070 Scenarios

#### Comparison to Minimum Instream Flows

Only the strategic nodes where there was a change in the percentage of months for Scenarios 1, 2 or 3 compared to the base High Demand 2070 scenario are listed.

<table>
<thead>
<tr>
<th>Strategic Node</th>
<th>High Demand (2070)</th>
<th>HD 2070 - Scenario 1</th>
<th>HD 2070 - Scenario 2</th>
<th>HD 2070 - Scenario 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EDO05</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Outlet of Shaw Creek</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>EDO13</strong></td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td><strong>HUC 303</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>EDO11</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

#### Percentage of Months below 20/30/40 threshold (Mean)

<table>
<thead>
<tr>
<th>Strategic Node</th>
<th>High Demand (2070)</th>
<th>HD 2070 - Scenario 1</th>
<th>HD 2070 - Scenario 2</th>
<th>HD 2070 - Scenario 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EDO05</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Outlet of Shaw Creek</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>EDO13</strong></td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td><strong>HUC 303</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>EDO11</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Strategic nodes where there was a change in the percentage of months for Scenarios 1, 2 or 3 compared to the base High Demand 2070 scenario are outlined in black.
### Results for High Demand 2070 Scenarios

**Comparison of 5th percentile Flows**

Only the strategic nodes where there was a change in the percentage of flows for Scenarios 1, 2 or 3 compared to the base High Demand 2070 scenario are listed.

<table>
<thead>
<tr>
<th>5th percentile flow (cfs)</th>
<th>EDO14 SOUTH FORK EDISTO RIVER ABOVE SPRINGFIELD</th>
<th>EDO05 SOUTH FORK EDISTO RIVER NEAR DENMARK</th>
<th>EDO06 SOUTH FORK EDISTO RIVER NEAR COPE</th>
<th>EDO07 SOUTH FORK EDISTO RIVER NEAR BAMBERG</th>
<th>EDO11 EDISTO RIVER NEAR BRANCHVILLE</th>
<th>HUC601 OUTLET</th>
<th>EDO13 EDISTO RIVER NR GIVHANS</th>
<th>SHAW CREEK OUTLET</th>
<th>HUC301 OUTLET</th>
<th>HUC302 OUTLET</th>
<th>EDO10 NORTH FORK EDISTO RIVER AT ORANGEBURG</th>
<th>HUC303 OUTLET</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Demand 2070</td>
<td>123</td>
<td>134</td>
<td>219</td>
<td>223</td>
<td>226</td>
<td>541</td>
<td>452</td>
<td>299</td>
<td>38</td>
<td>104</td>
<td>194</td>
<td>292</td>
</tr>
<tr>
<td>HD 2070 - Scenario 1</td>
<td>123</td>
<td>134</td>
<td>220</td>
<td>224</td>
<td>226</td>
<td>543</td>
<td>453</td>
<td>359</td>
<td>38</td>
<td>104</td>
<td>194</td>
<td>292</td>
</tr>
<tr>
<td>HD 2070 - Scenario 2</td>
<td>125</td>
<td>136</td>
<td>223</td>
<td>227</td>
<td>229</td>
<td>550</td>
<td>458</td>
<td>363</td>
<td>38</td>
<td>105</td>
<td>194</td>
<td>293</td>
</tr>
<tr>
<td>HD 2070 - Scenario 3</td>
<td>128</td>
<td>140</td>
<td>227</td>
<td>231</td>
<td>232</td>
<td>555</td>
<td>464</td>
<td>371</td>
<td>42</td>
<td>105</td>
<td>195</td>
<td>297</td>
</tr>
</tbody>
</table>
Strategic nodes where there was a change in the percentage of flows for Scenarios 1, 2 or 3 compared to the base High Demand 2070 scenario are outlined in black.
Results for **High Demand 2070 Scenarios**

2002 Drought Flows at Givhans Ferry
Results for **High Demand 2070 Scenarios**

Comparison of Low Flows at Givhans Ferry

This graph compares flows for each High Demand scenario for the 50 lowest flow months at Givhans Ferry.
SUMMARY - Demand Side Scenarios

• Scenario 1 – Existing Drought Management Plan actions

• Scenario 2 – Scenario 1 strategies, plus agriculture water efficiency strategies

• Scenario 3 – Scenario 1 and 2 strategies, plus municipal water conservation strategies

Scenarios 1, 2 and 3 were run using 2070 water demands from the Business-as-Usual and High Demand Scenarios
SUMMARY - Demand Side Scenarios

Scenario 1 – Existing Drought Management Plan actions

• Only Aiken’s and Charleston Water System’s Drought Management Plans have actions that are triggered in the Business as Usual 2070 and High Demand 2070 scenarios

• Charleston Water Systems triggered reduction in withdrawals from the Edisto have the greatest impact on increasing flow at Givhans Ferry, during drought

  • During the 27 months where CWS Edisto withdrawals are reduced, flows increase from an average of 226 cfs to 300 cfs
SUMMARY - Demand Side Scenarios

Scenario 2 – Scenario 1 strategies, plus agriculture water efficiency strategies

• A 15% reduction in water demand for 70% of existing and new users has limited effect on increasing North and South Fork Edisto River flows during drought.

• More impact may be observed on the small tributaries with multiple ag withdrawals
SUMMARY - Demand Side Scenarios

• **Scenario 3** – Scenario 1 and 2 strategies, plus *municipal water conservation strategies*

• A 15% reduction in water demand for municipal users has a greater effect on increasing North and South Fork Edisto River flows during drought, especially in the **High Demand** set of Scenarios.
Decision-Making Process for Selecting Water Management Strategies

1. Identify Issues
   - Shortages, reaches of interest, groundwater areas of concern

2. RBC-Proposed Management Strategy to Address Issue
   - Strategies should be deemed consistent with the RBC’s vision and goals for the basin before proceeding

3. Can the strategy be evaluated using the models?
   - Yes: Use SWAM or Groundwater Model to Evaluate Effectiveness (using performance measures)
   - No: Evaluate Qualitatively

4. Step 1
   - Is the strategy effective in reducing or eliminating a shortage or increasing supply?

5. Step 2
   - Evaluate Feasibility
     - Cost-benefit
     - Consistency with Regulations
     - Reliability
     - Environmental Impacts
     - Socioeconomic Impacts
     - Interstate or Interbasin Impacts
     - Water Quality Impacts
     - Constructability

6. RBC Vote
   - Yes: Adopt Strategy
   - No: Consider Scoring-Based Process

7. If no CONSENSUS, but majority approves
   - If no majority, remove strategy from consideration

8. If CONSENSUS
   - Is the strategy clearly feasible?
     - Yes: RBC Vote
     - No: Consider Scoring-Based Process

9. Remove strategy from consideration

10. Scoring-Based Process
    - If no majority, remove strategy from consideration

11. If no CONSENSUS, but majority approves
    - If no majority, remove strategy from consideration

12. Remove strategy from consideration

13. Adopt Strategy

RBC consensus is not needed to move to Step 1, but there should be at least majority support.
Demand Side Scenarios

Questions and Decisions for the RBC:

1. Do you want to see any addition demand-side modeling, data or analysis?

2. Do you want to move to Step 2 with the “portfolio” of demand-side strategies
   a. Are there specific strategies from the portfolio that should be evaluated further?
   b. Are there specific strategies from the portfolio that should not be considered?