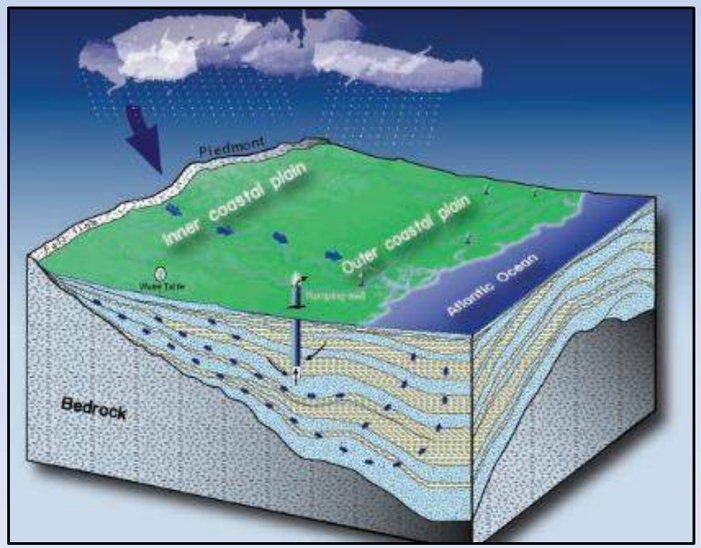
Simulation of Groundwater Flow in the Edisto River Basin, South Carolina

Greg Cherry, Matt Petkewich, and Andrea Hughes

US Geological Survey – South Atlantic Water Science Center



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Overview of Scenarios

Base Scenario	Modifications
Moderate Growth	Irrigation Efficiency: Based on an assumption of a continued increase in irrigation efficiency, water use from all irrigation wells was reduced by 15%.
High Growth	Relocate Future Pumping Demand: Projected increases in water use for the Crouch Branch aquifer wells in Calhoun County were moved to the McQueen Branch aquifer.
High Growth	Increased Recharge: Beginning in 2021, recharge to the model was increased by 20%.

Overview of Simulation Results

Potentiometric Maps • Breach of Aquifer Maps • Hydrographs of Index Wells

Potentiometric Maps: Gordon aquifer maps were excluded because they are largely unchanged. Increased recharge scenario maps were excluded because at map scale, the slight changes are not visible. New scenario results are presented side-by-side with the base scenario from which they were produced.

Breach of Aquifer Maps: Breach of aquifer maps from the newest scenario results are compared side-by-side with the base scenario from which they were produced.

Hydrographs: hydrographs for all the new scenarios are presented for all 9 of the index wells (3 wells for each of the 3 aquifers).

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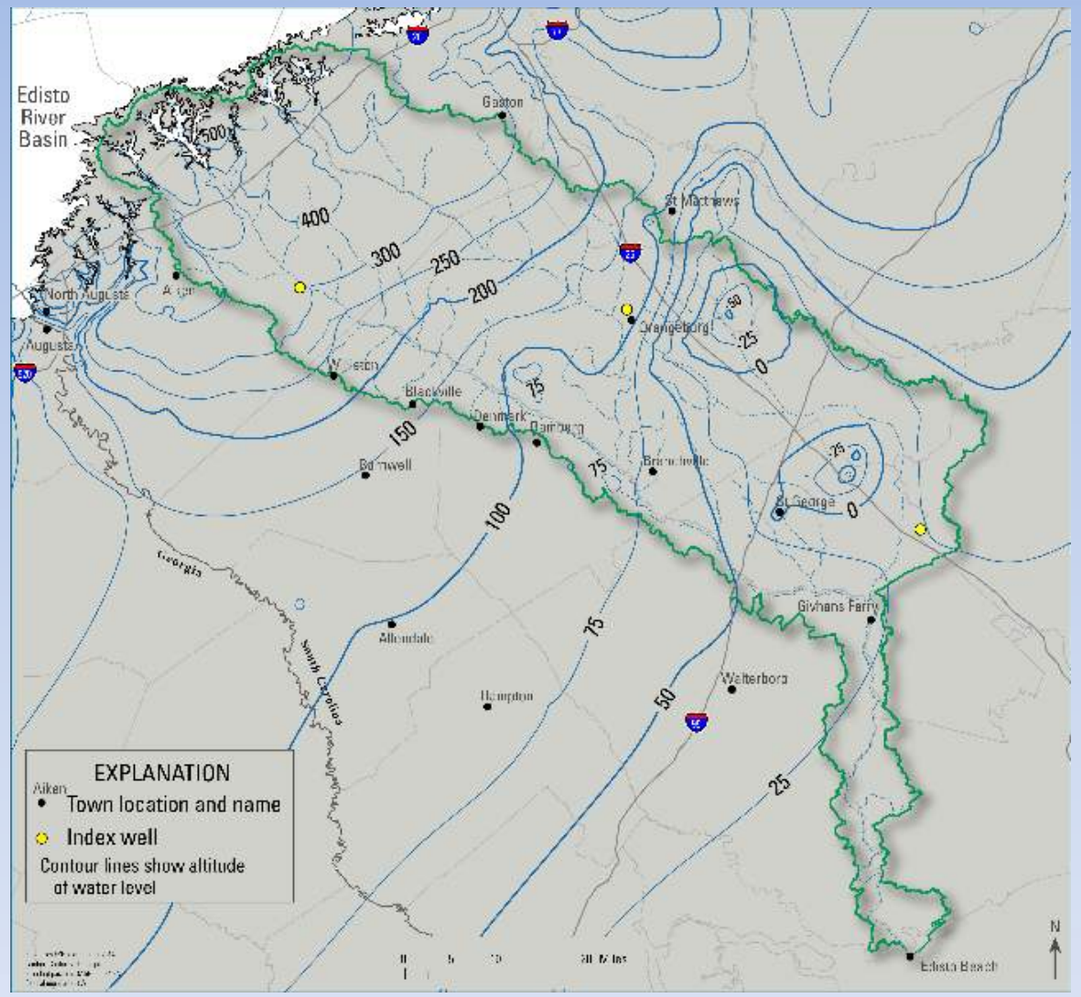
Moderate Growth Scenario – **Crouch Branch** aquifer (layer 9)

2070 (69 MGD)



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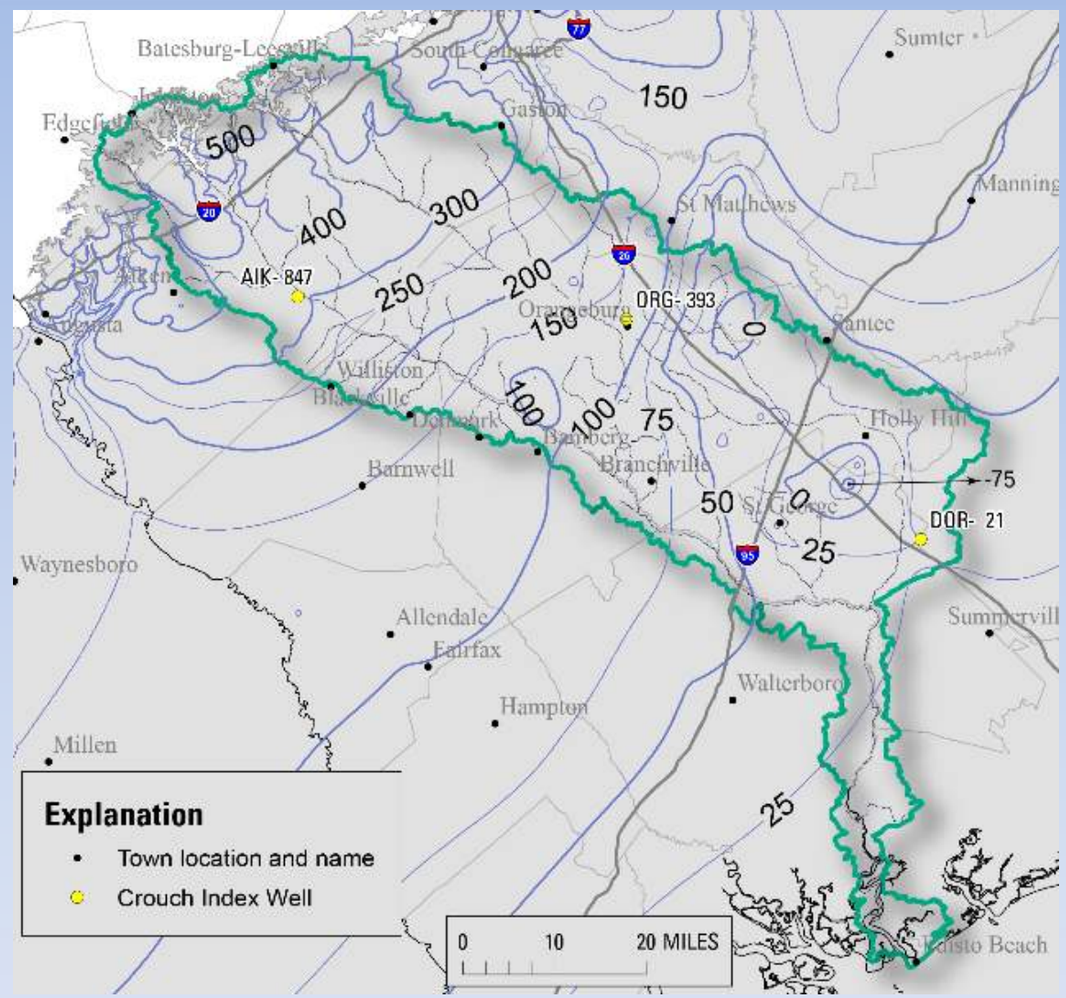
2070: Irrigation Reduced by 15%*



*Reduction based on assumption of improved irrigation efficiency.

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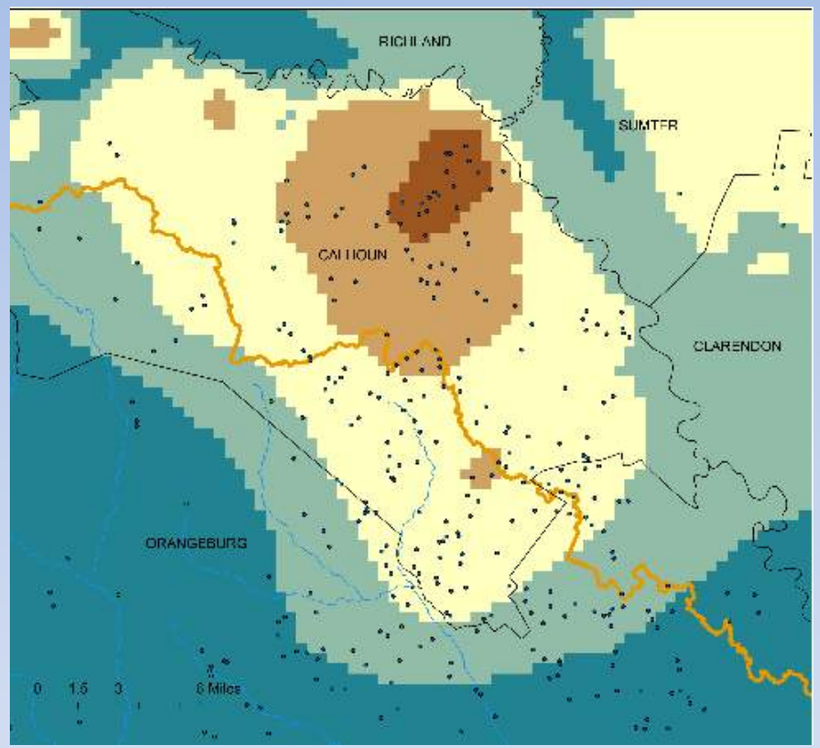
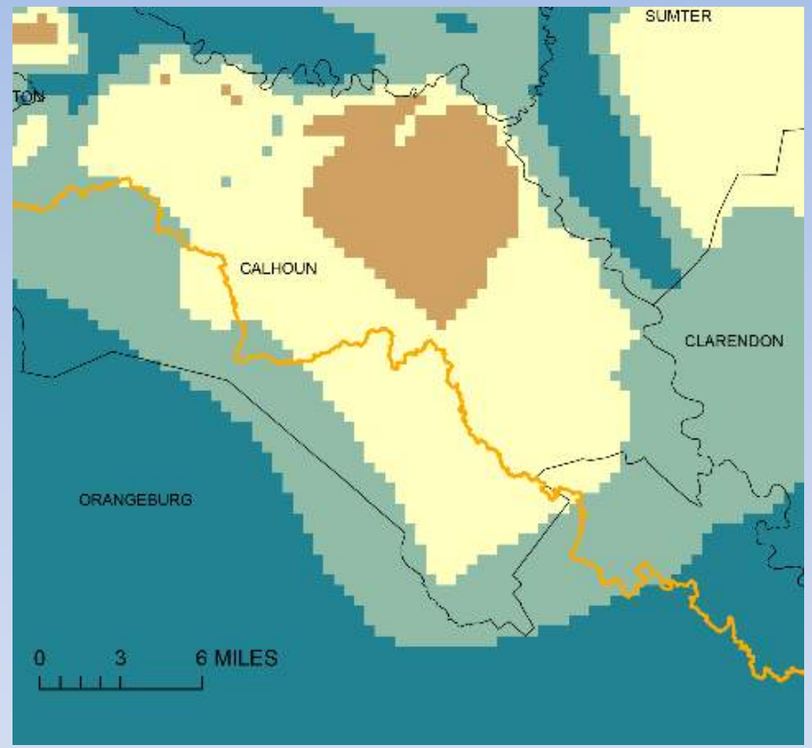
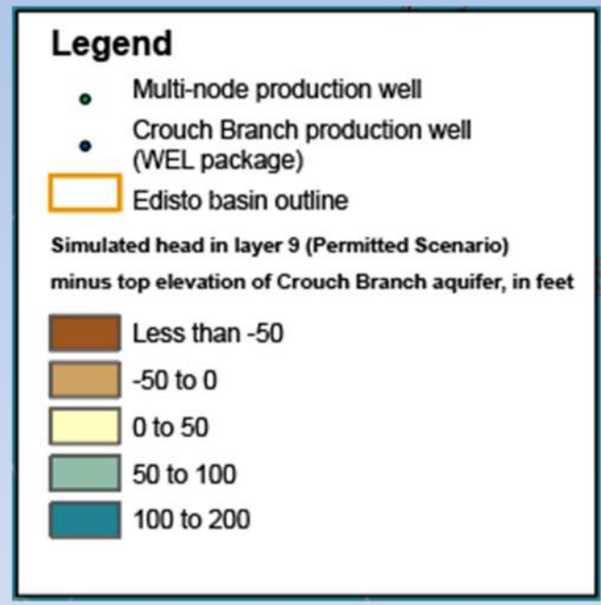
Simulated Heads Relative to Top of **Crouch Branch** aquifer (L9)



2070 Moderate Growth Scenario



2070: Irrigation Reduced by 15%*



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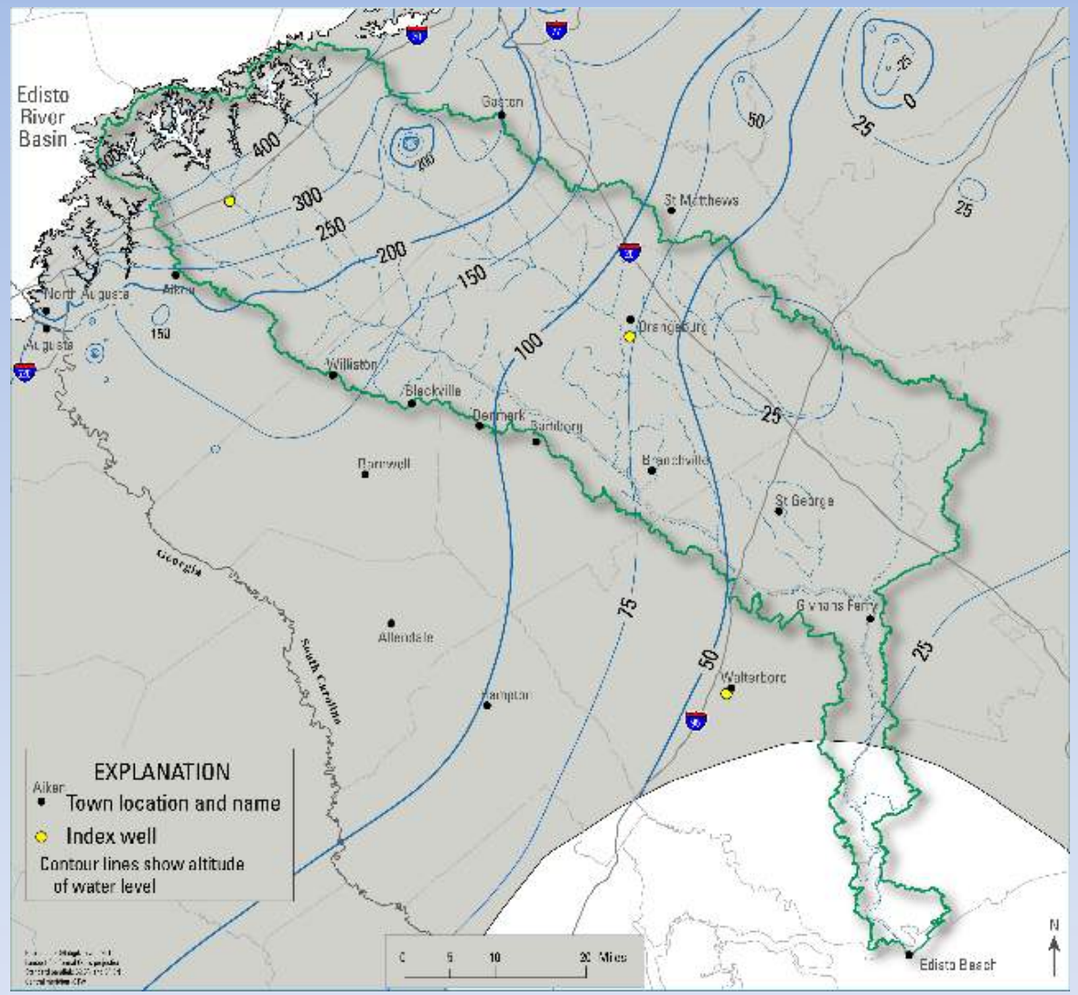
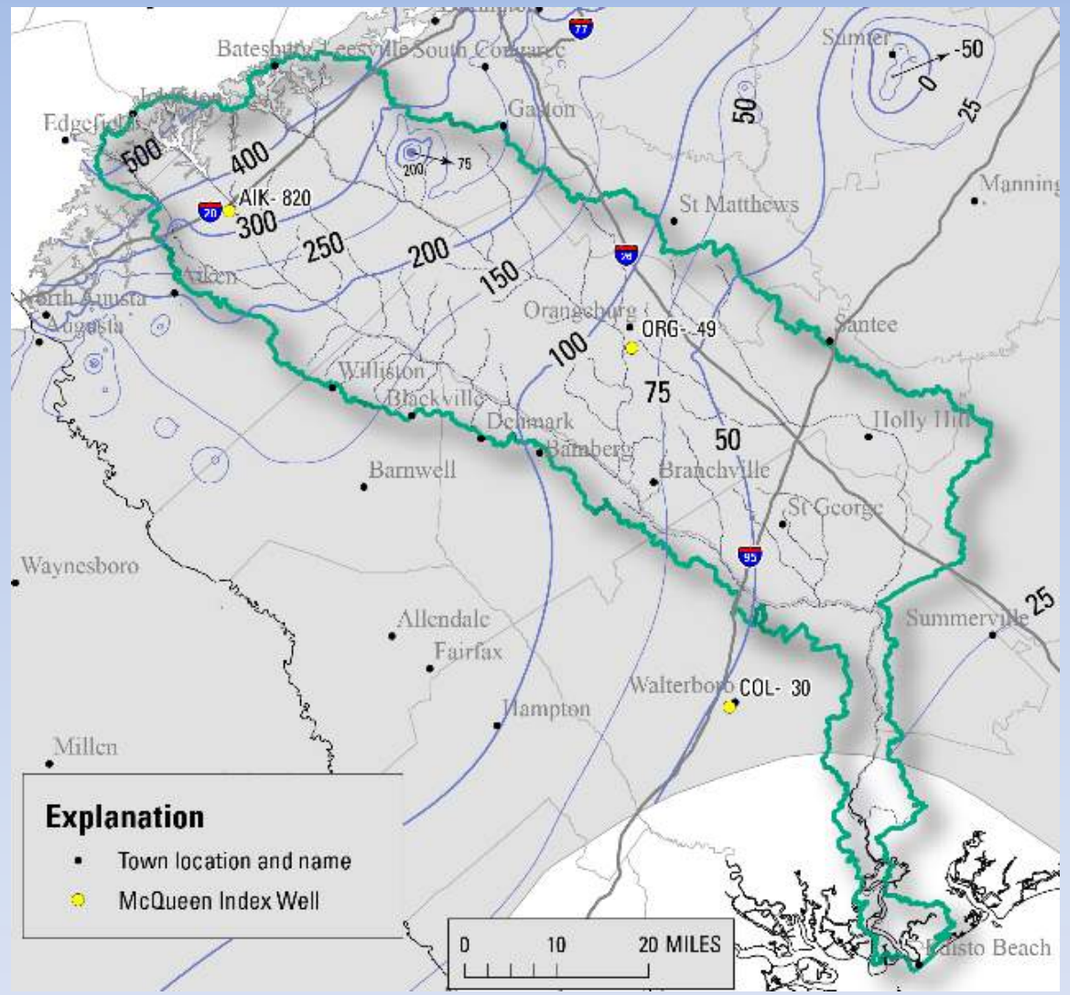
Moderate Growth Scenario – **McQueen Branch** aquifer (layer 11)

2070 (20 MGD)



2070: Irrigation Reduced by 15%*



*Reduction based on assumption of improved irrigation efficiency.

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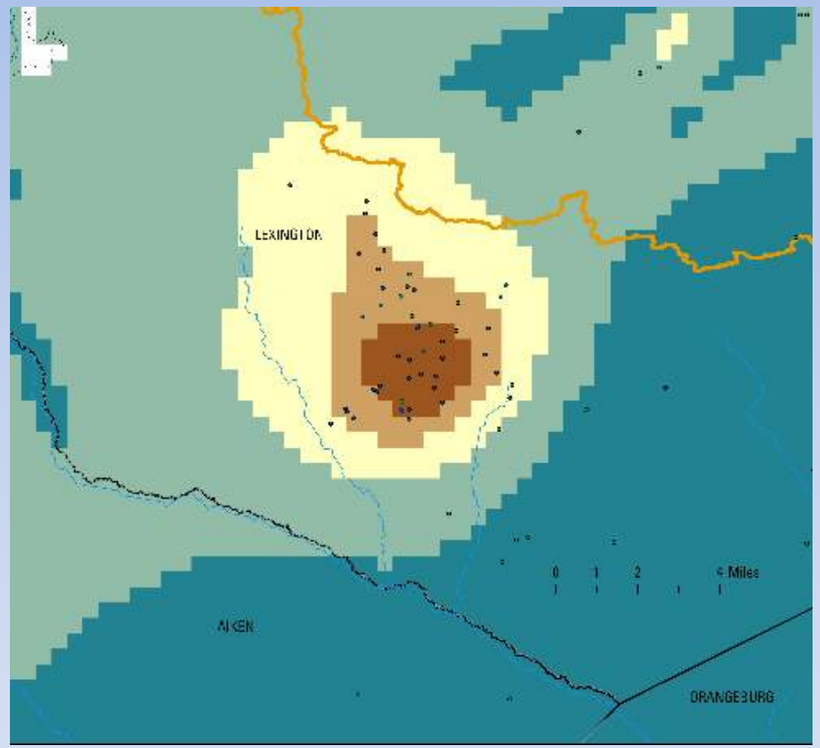
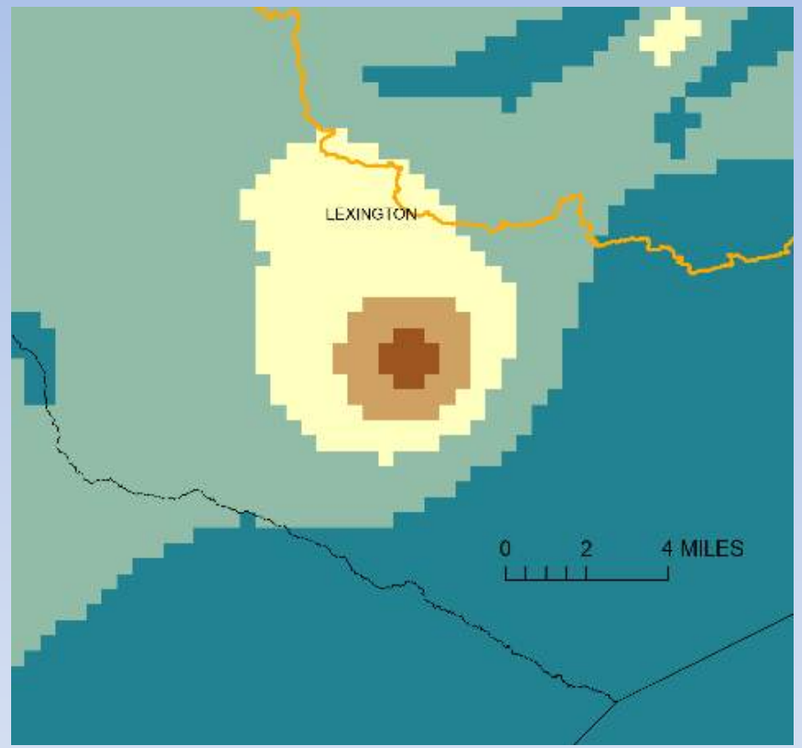
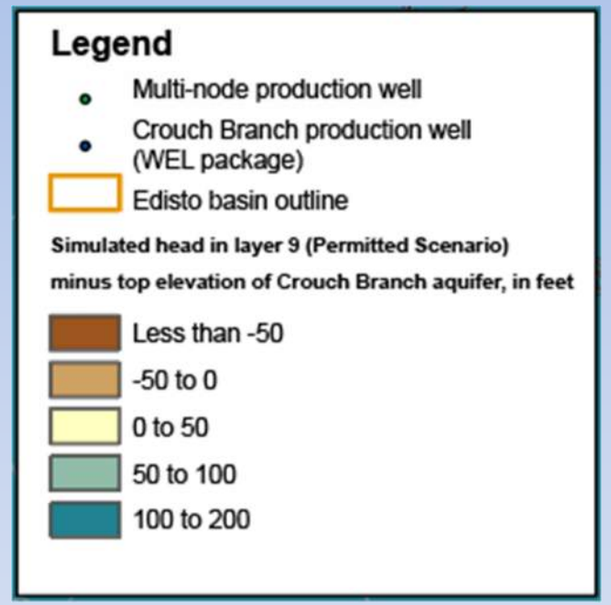
Simulated Heads Relative to Top of **McQueen Branch** aquifer (L11)



2070 Moderate Growth Scenario



2070: Irrigation Reduced by 15%*



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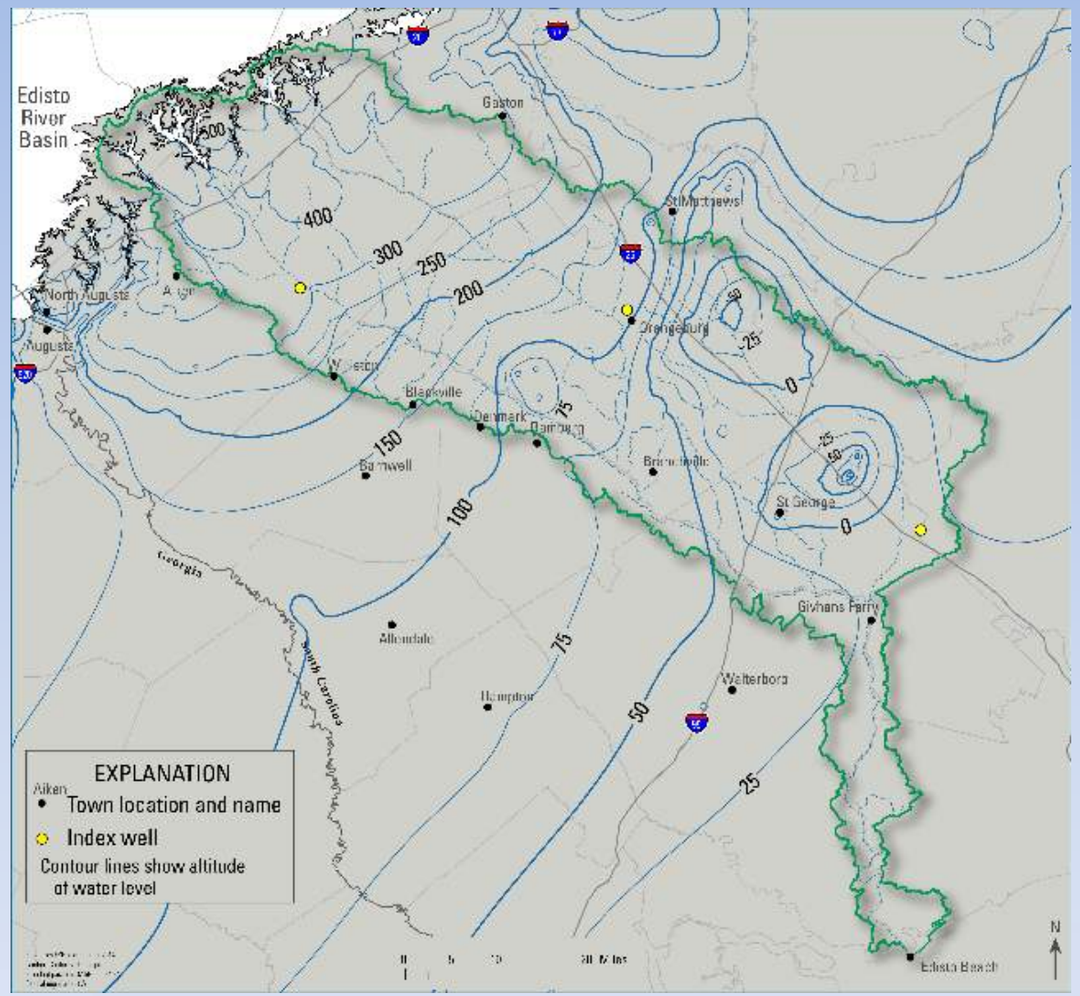
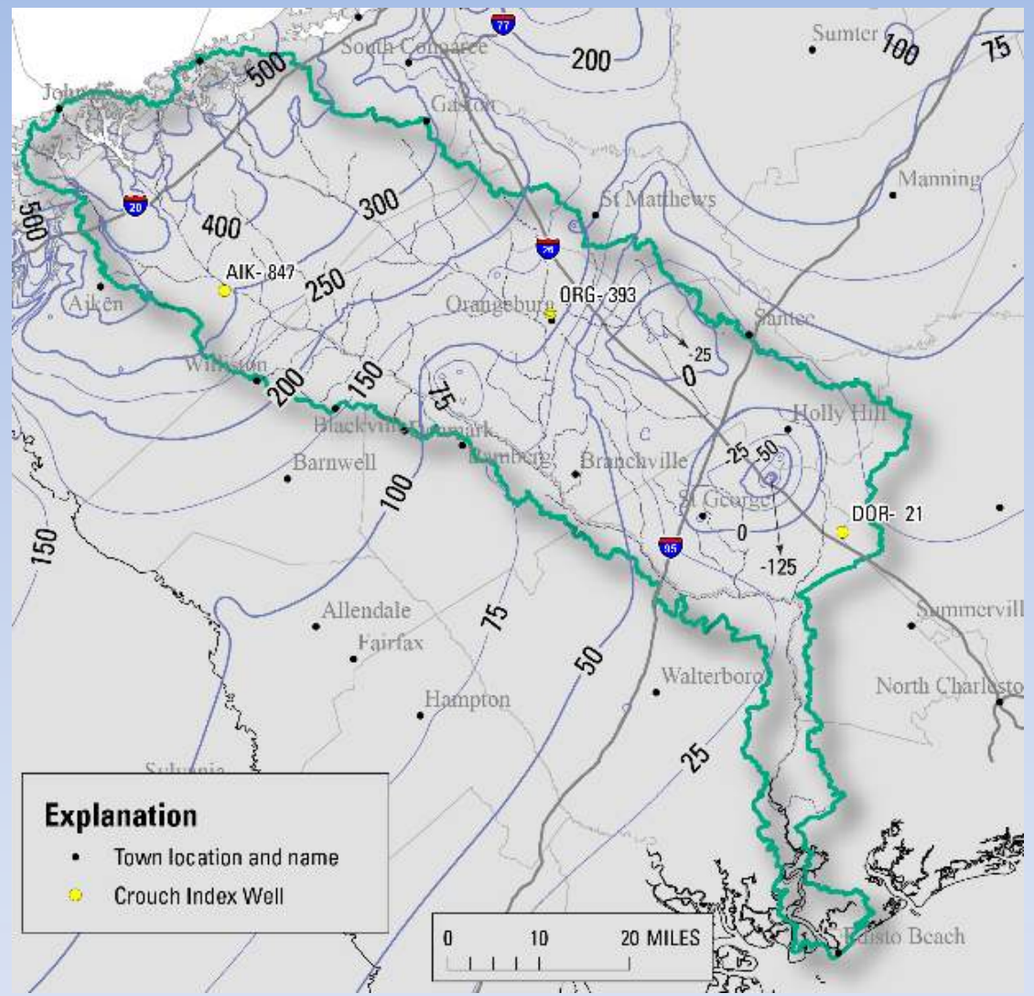
High Growth Scenario – **Crouch Branch** aquifer (layer 9)

2070 (75 MGD)



2070: Relocate New Pumping*



*Projected increases in groundwater withdrawal (2021 – 2070) moved from Crouch Branch to McQueen Branch in Calhoun Co.

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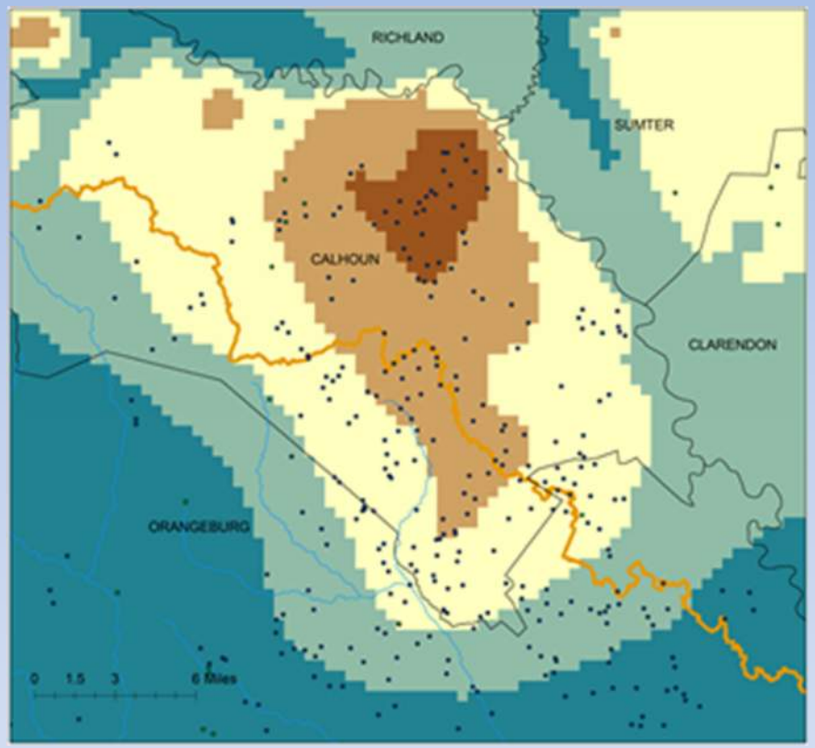
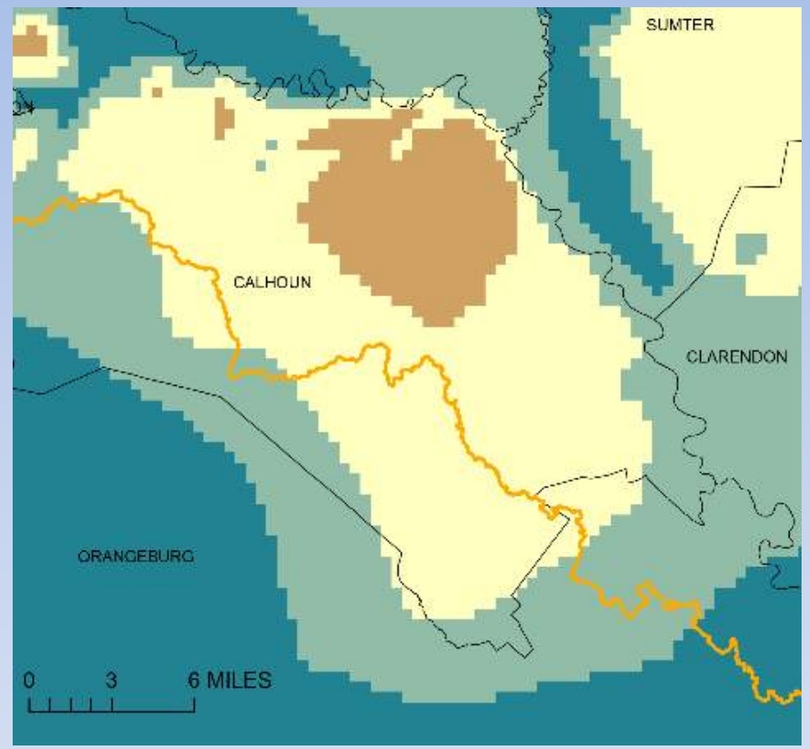
Simulated Heads Relative to Top of **Crouch Branch** aquifer (L9)



2070 High Growth Scenario



2070: Projected Growth relocated to McQueen Branch

Legend

- Multi-node production well
- Crouch Branch production well (WEL package)
- Edisto basin outline

Simulated head in layer 9 (Permitted Scenario) minus top elevation of Crouch Branch aquifer, in feet

- Less than -50
- -50 to 0
- 0 to 50
- 50 to 100
- 100 to 200

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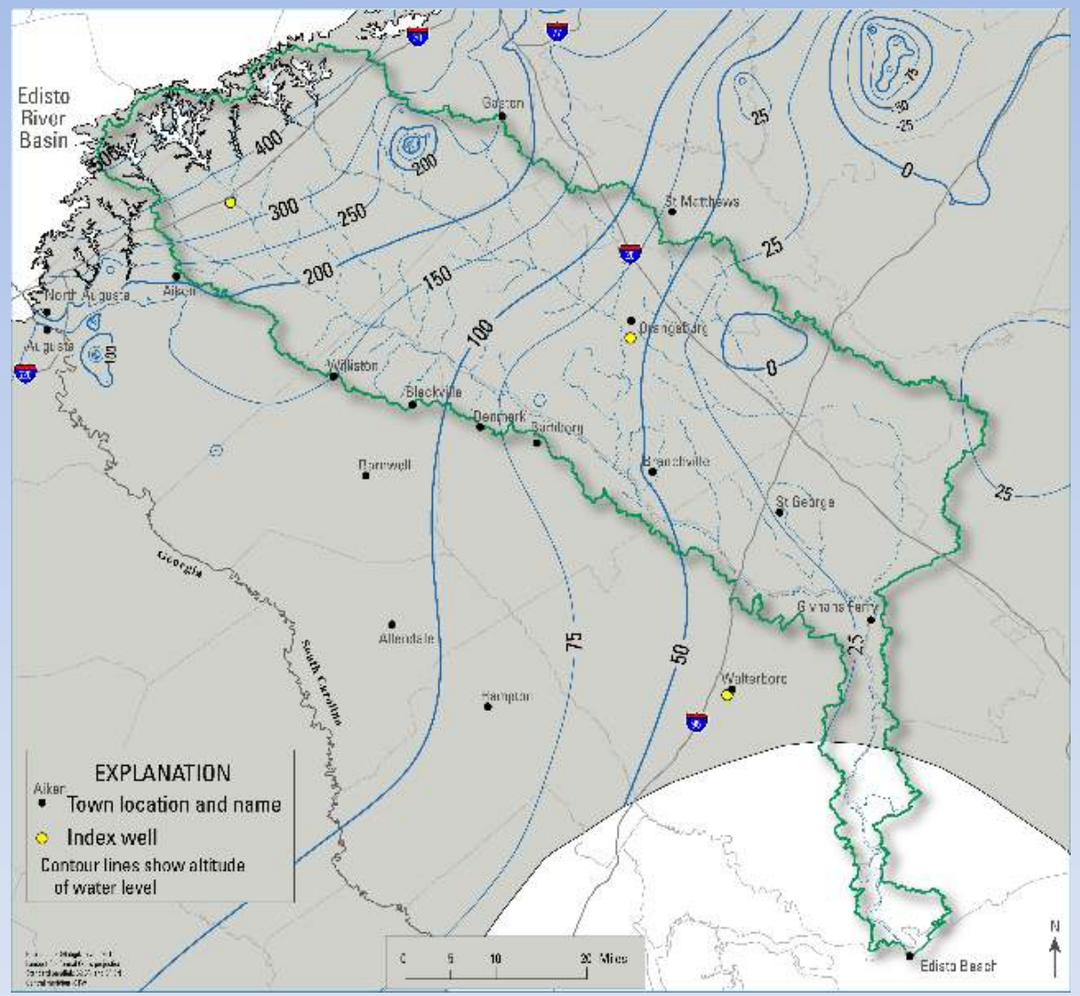
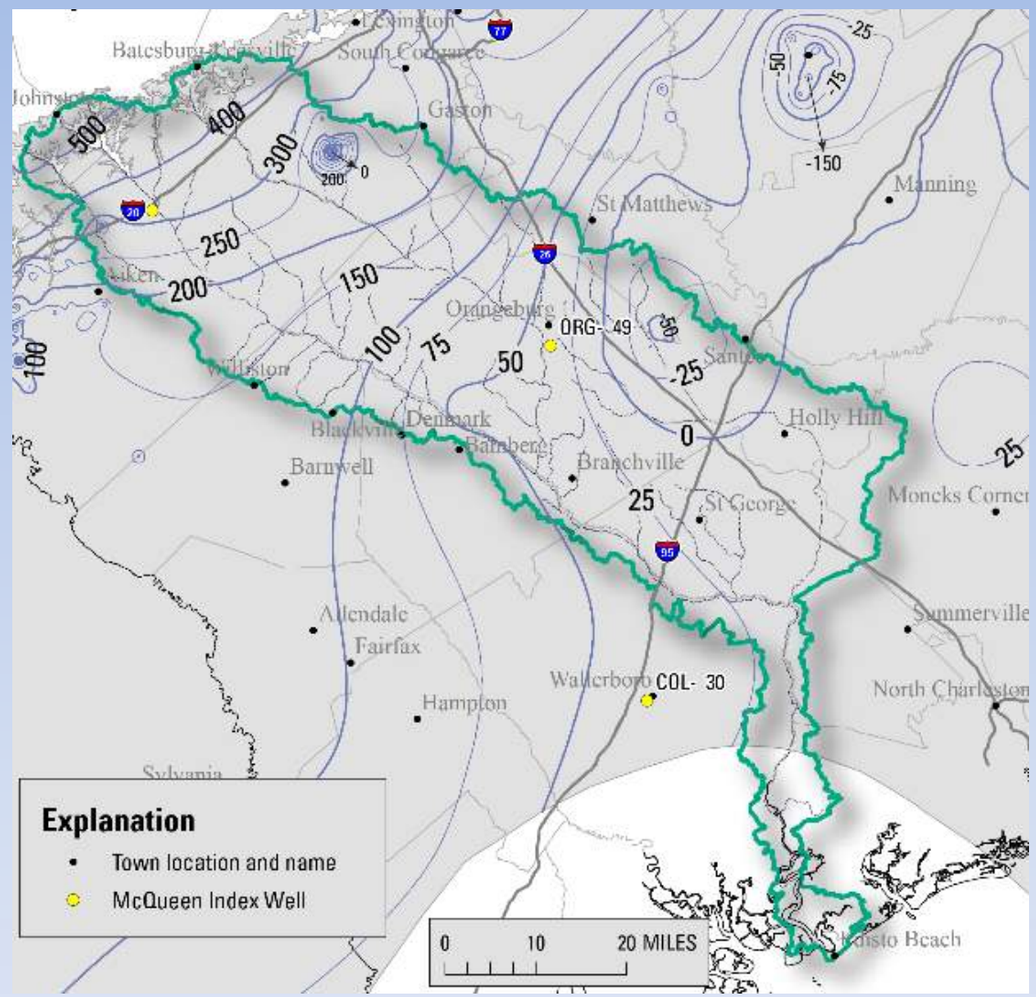
High Growth Scenario – **McQueen Branch** aquifer (layer 11)

2070 (23 MGD)



2070: Relocate New Pumping*



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*Projected increases in groundwater withdrawal (2021 – 2070) moved from Crouch Branch to McQueen Branch in Calhoun Co.

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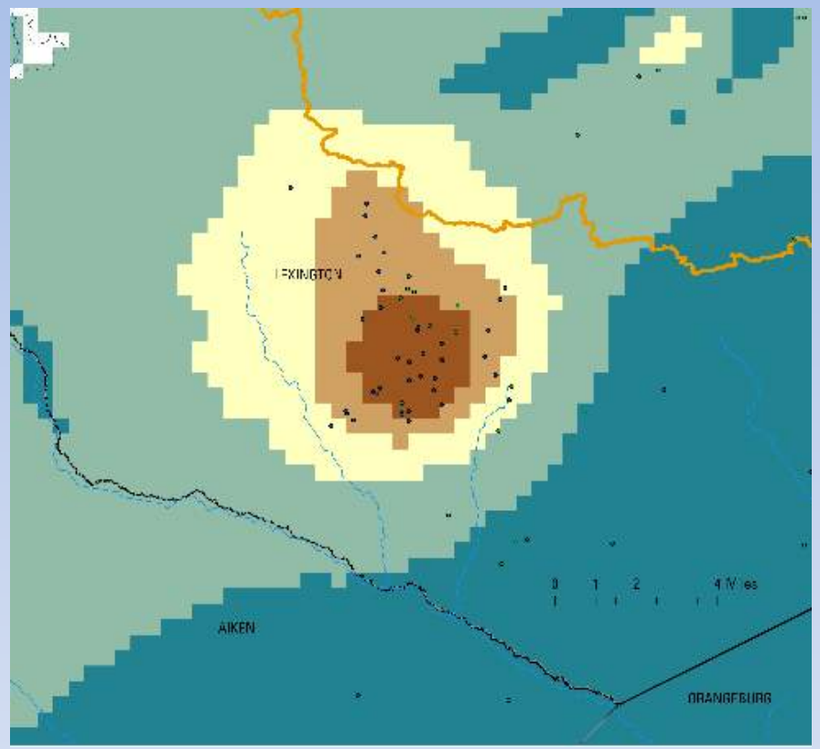
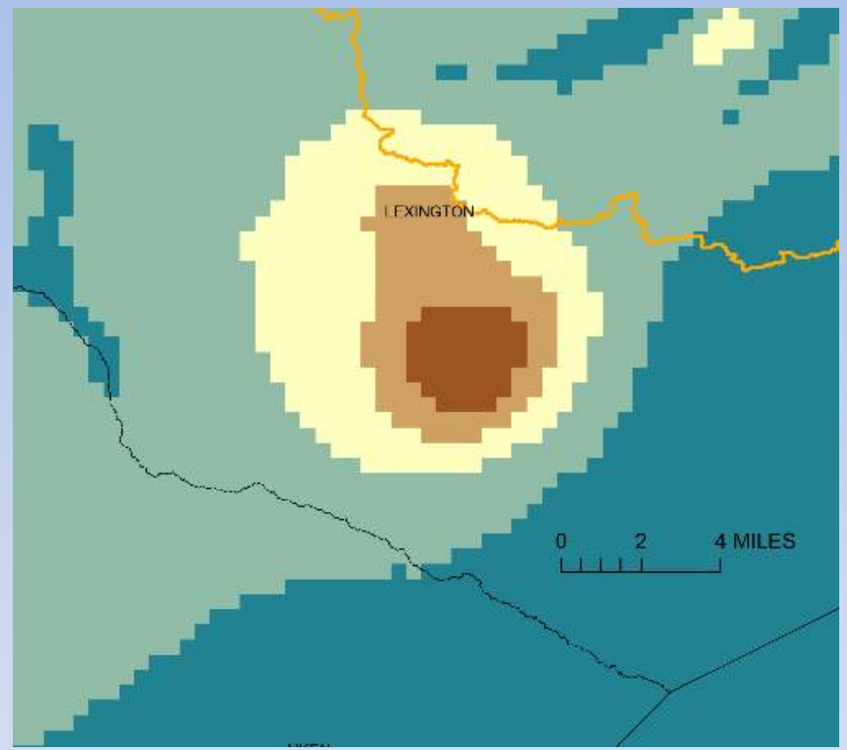
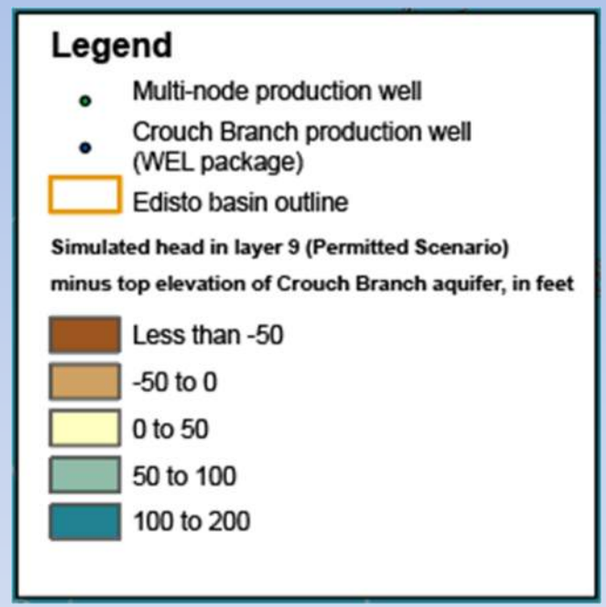
Simulated Heads Relative to Top of **McQueen Branch** aquifer (L11)



2070 High Growth Scenario



2070: Projected Growth relocated to McQueen Branch



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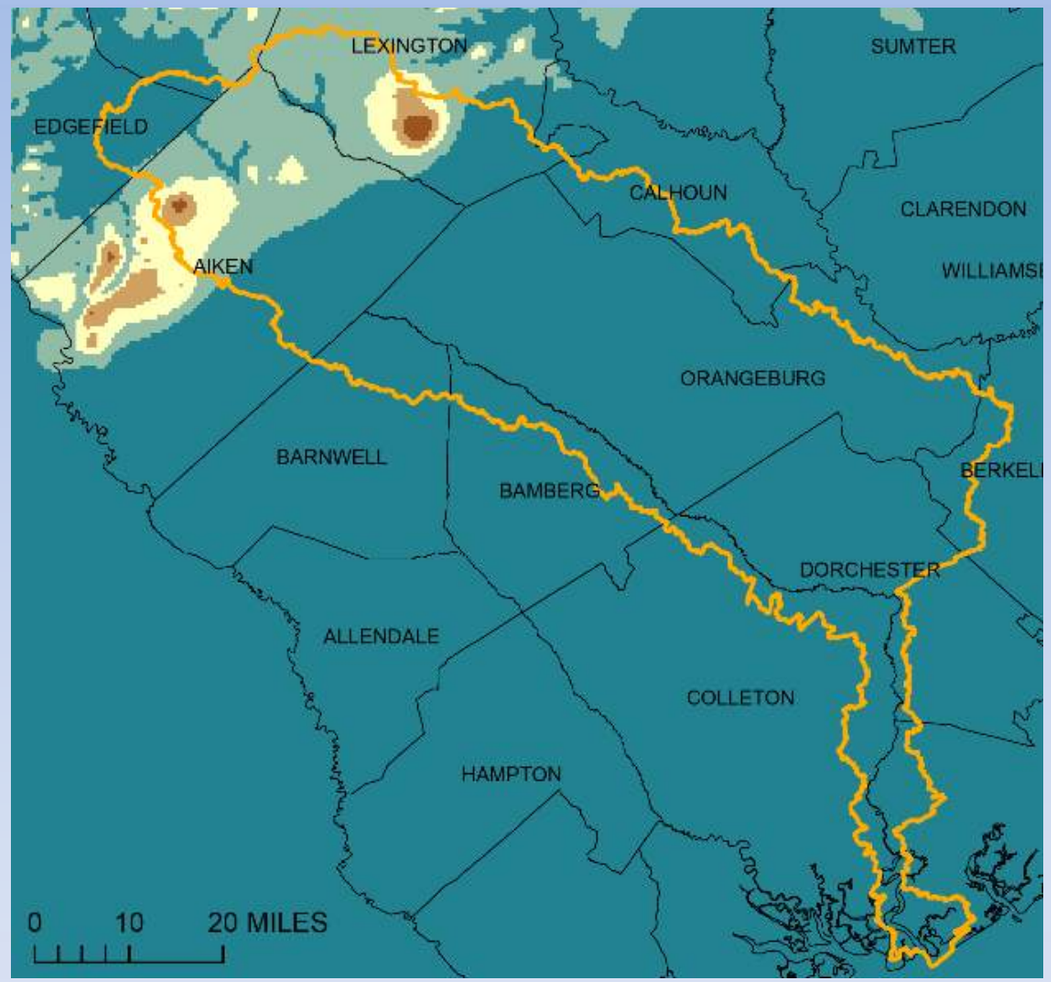

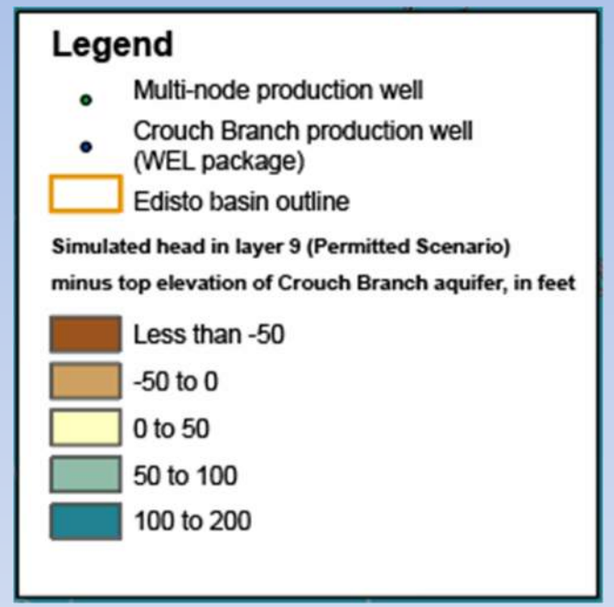

2070: Projected Growth relocated to McQueen Branch

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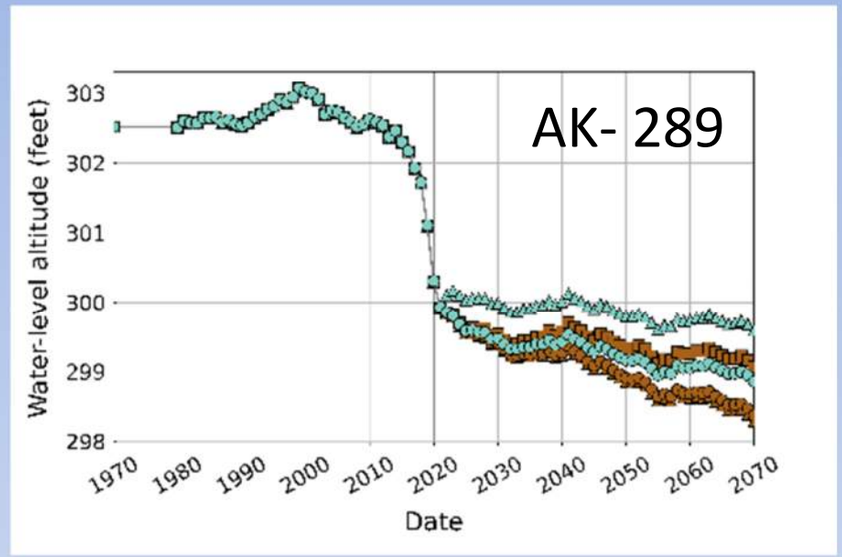
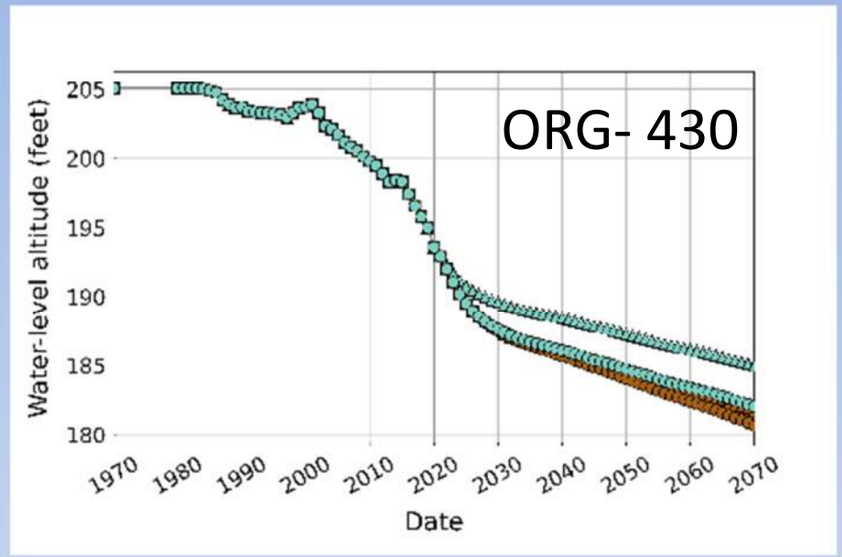
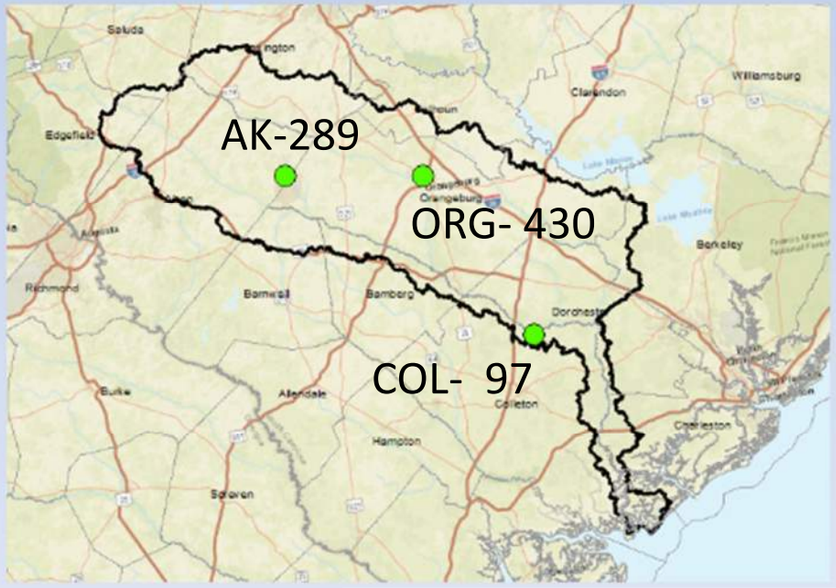
Simulated water levels in the Gordon aquifer

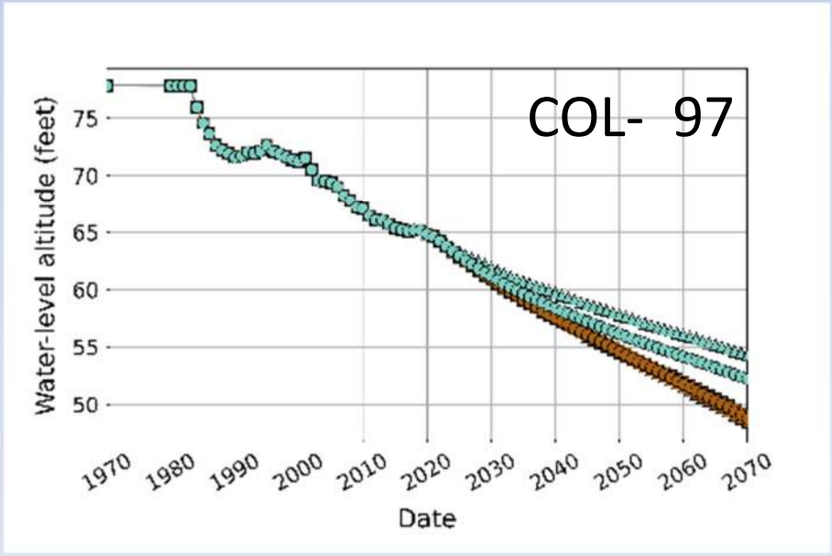




EXPLANATION

- Moderate Growth
- Reduce Irrigation
- High Growth
- Relocate Pumping
- Increase Recharge





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Simulated water levels in the Crouch Branch aquifer

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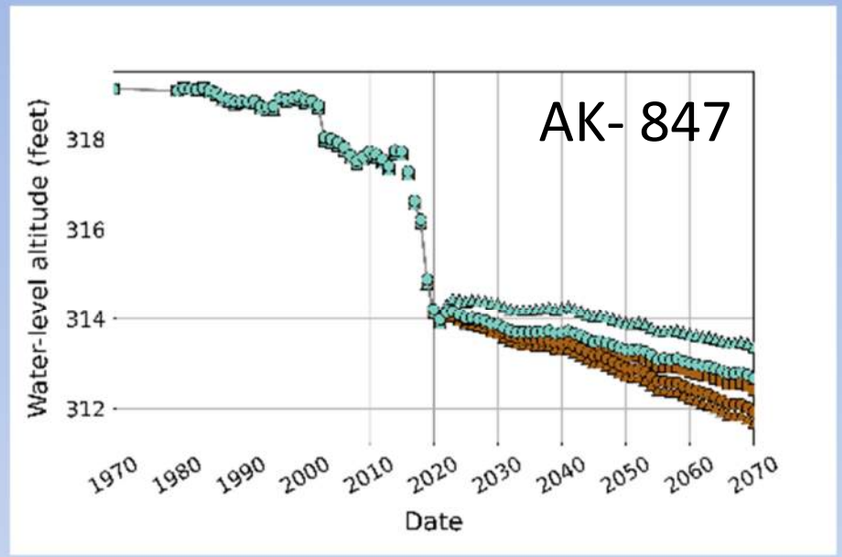

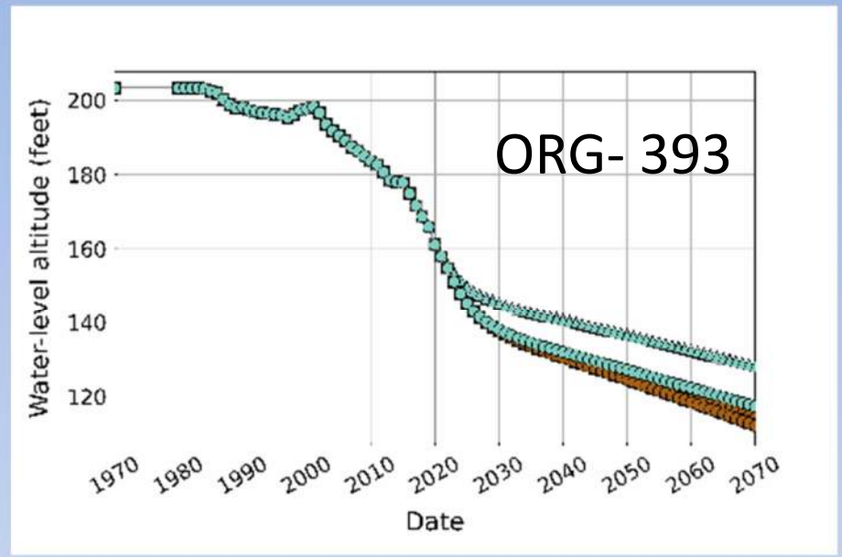

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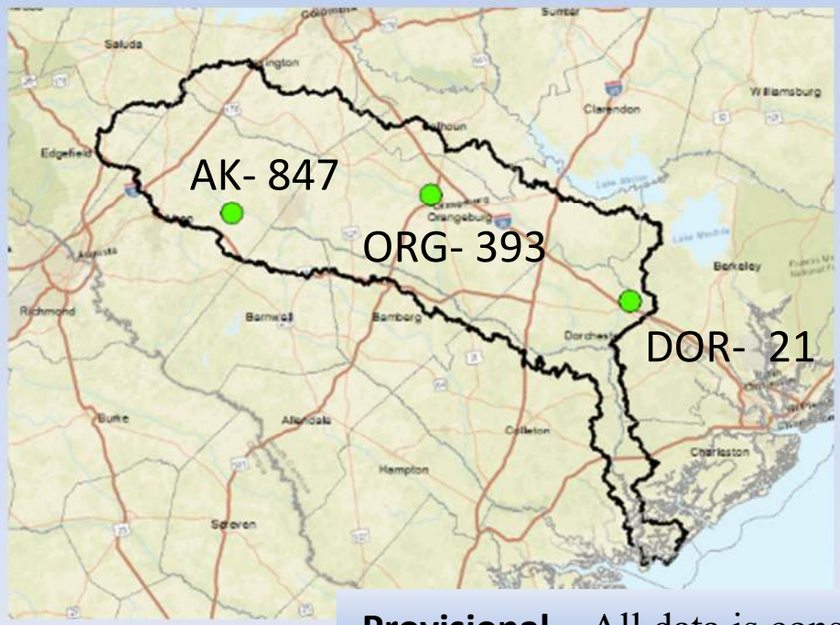

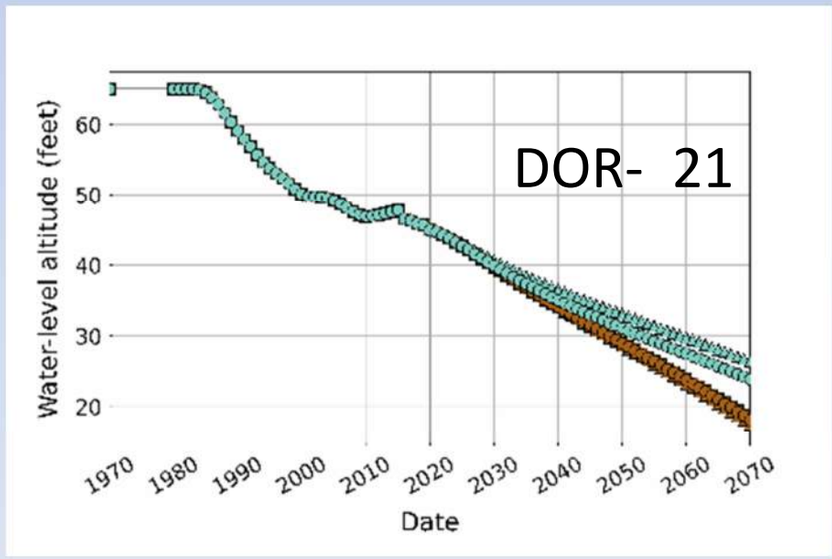

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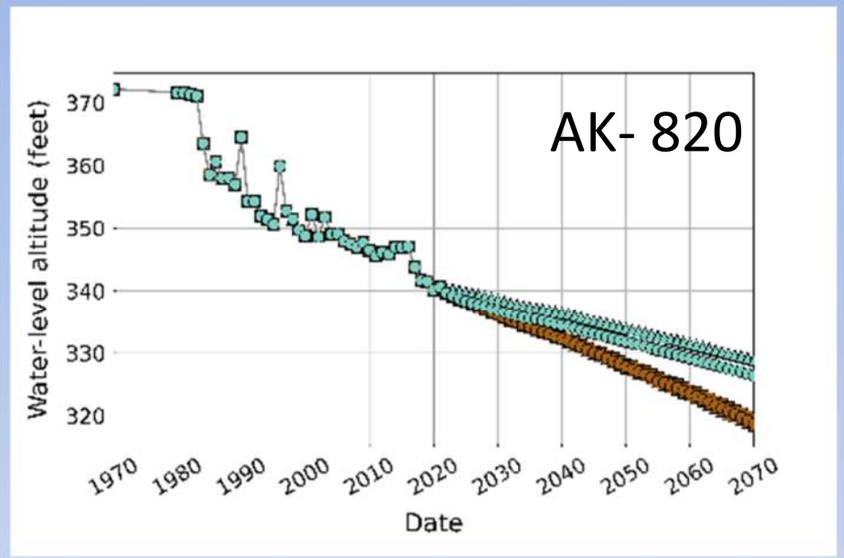
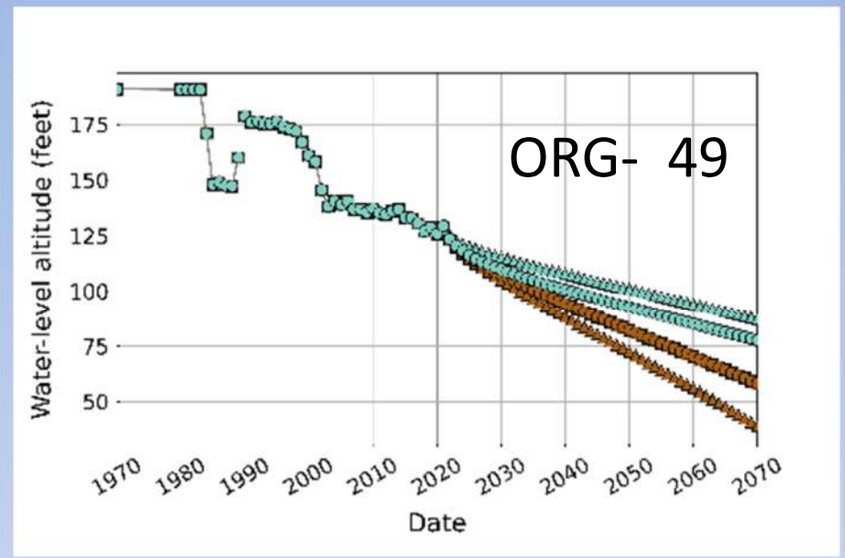
Simulated water levels in the McQueen Branch aquifer





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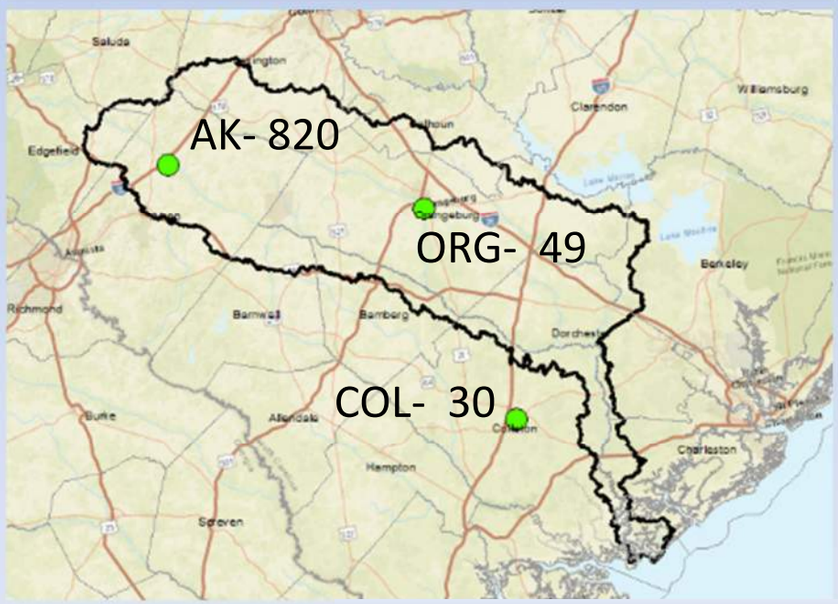

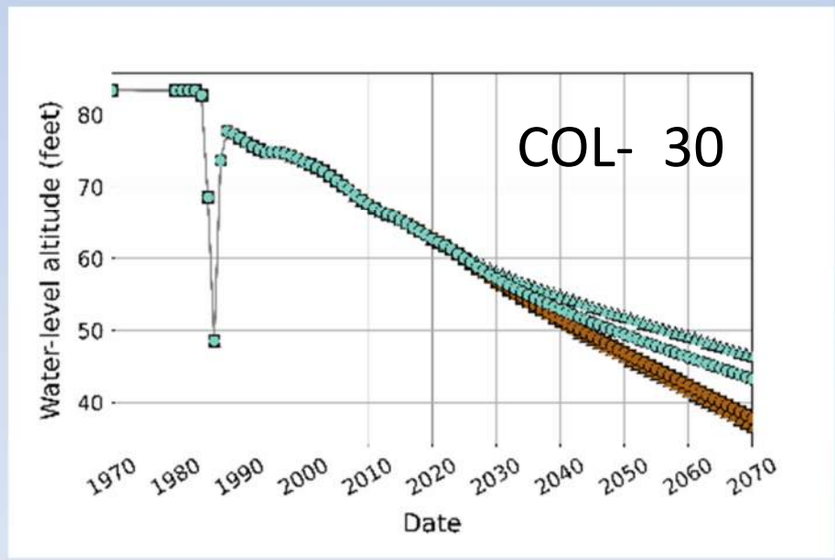

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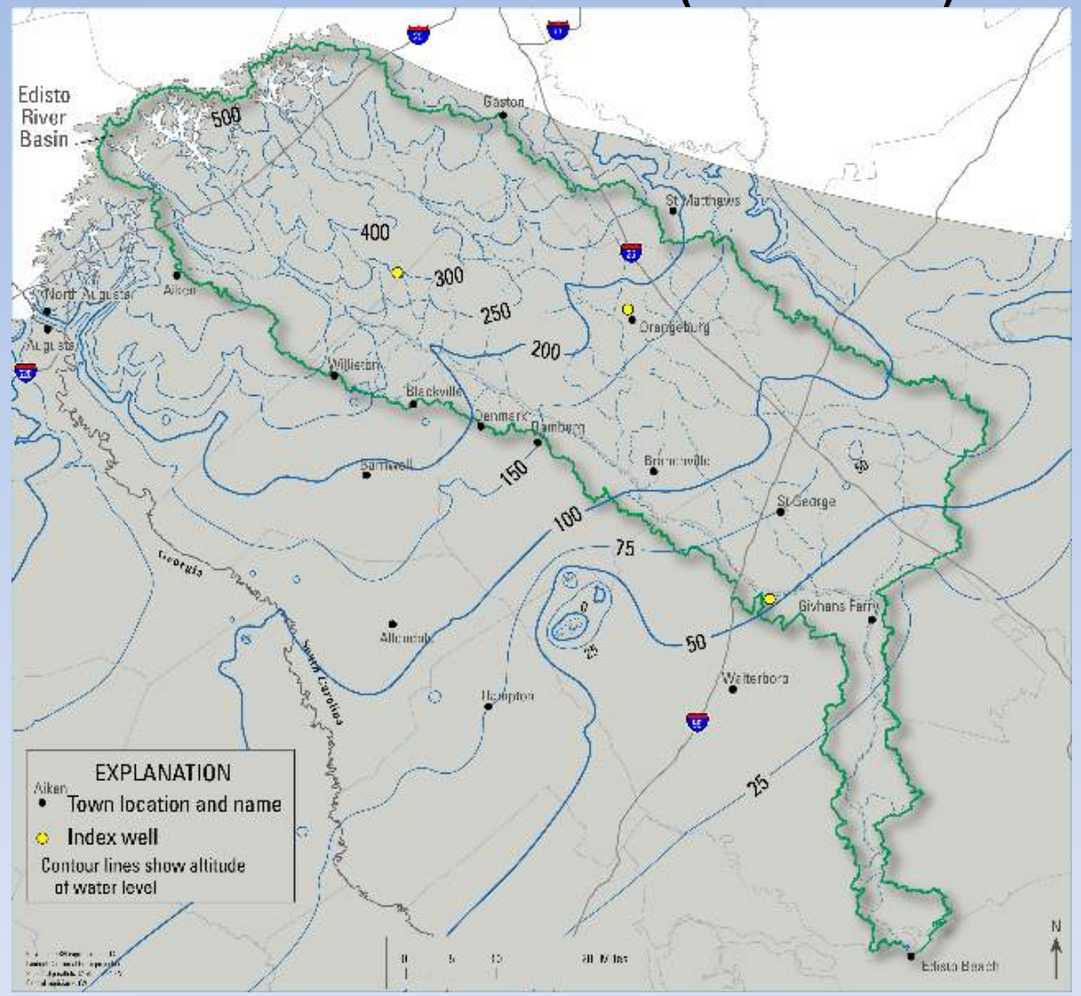
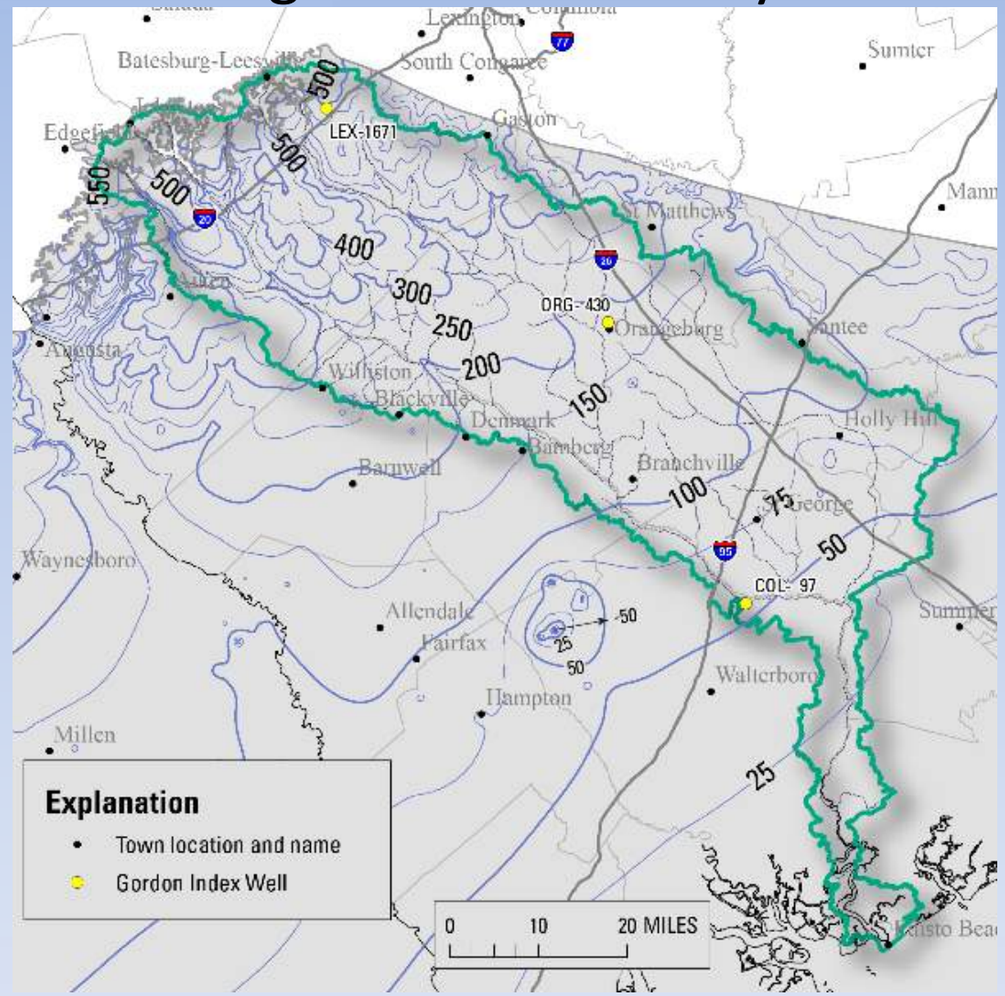
Moderate Growth Scenario - Gordon aquifer (layer 7)

2070 (8.9 MGD)



2070: Irrigation Reduced by 15%*



*Reduction based on assumption of improved irrigation efficiency.

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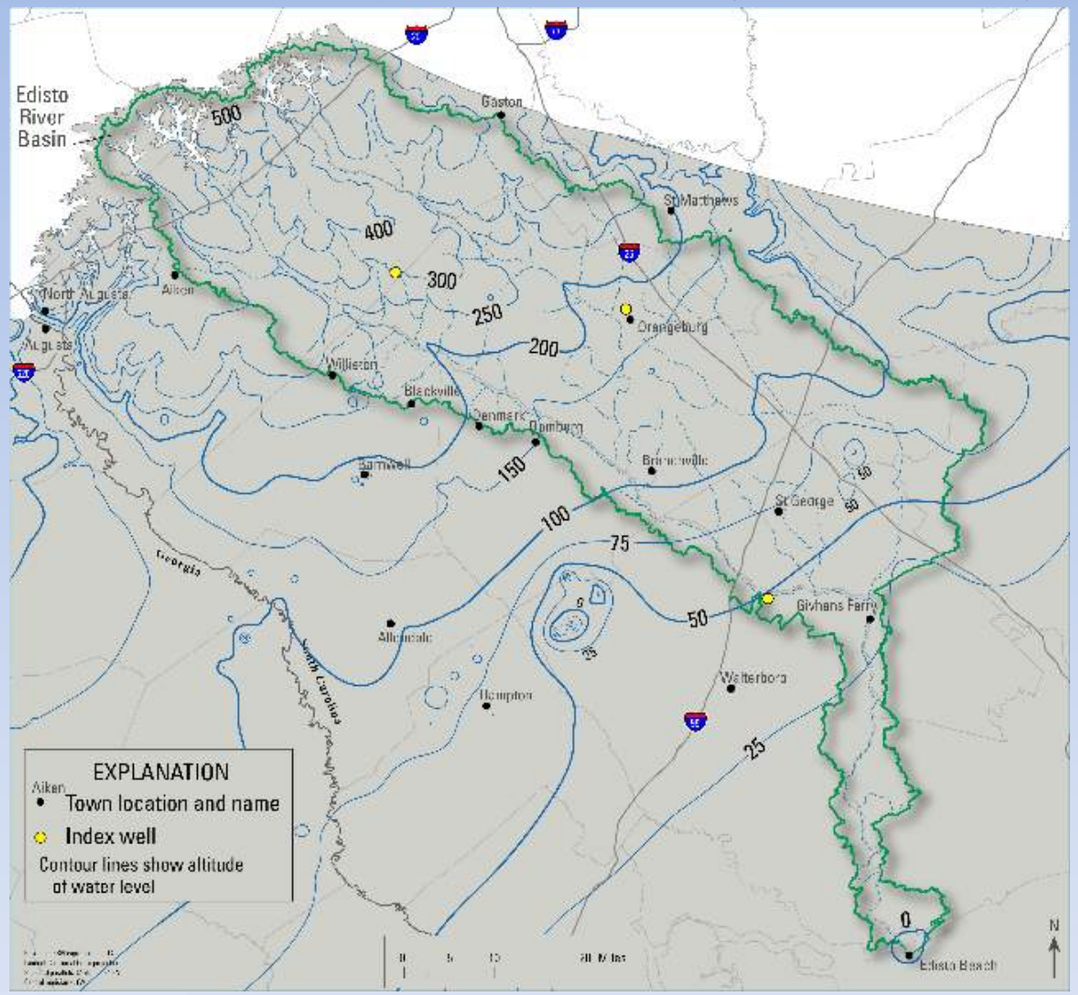
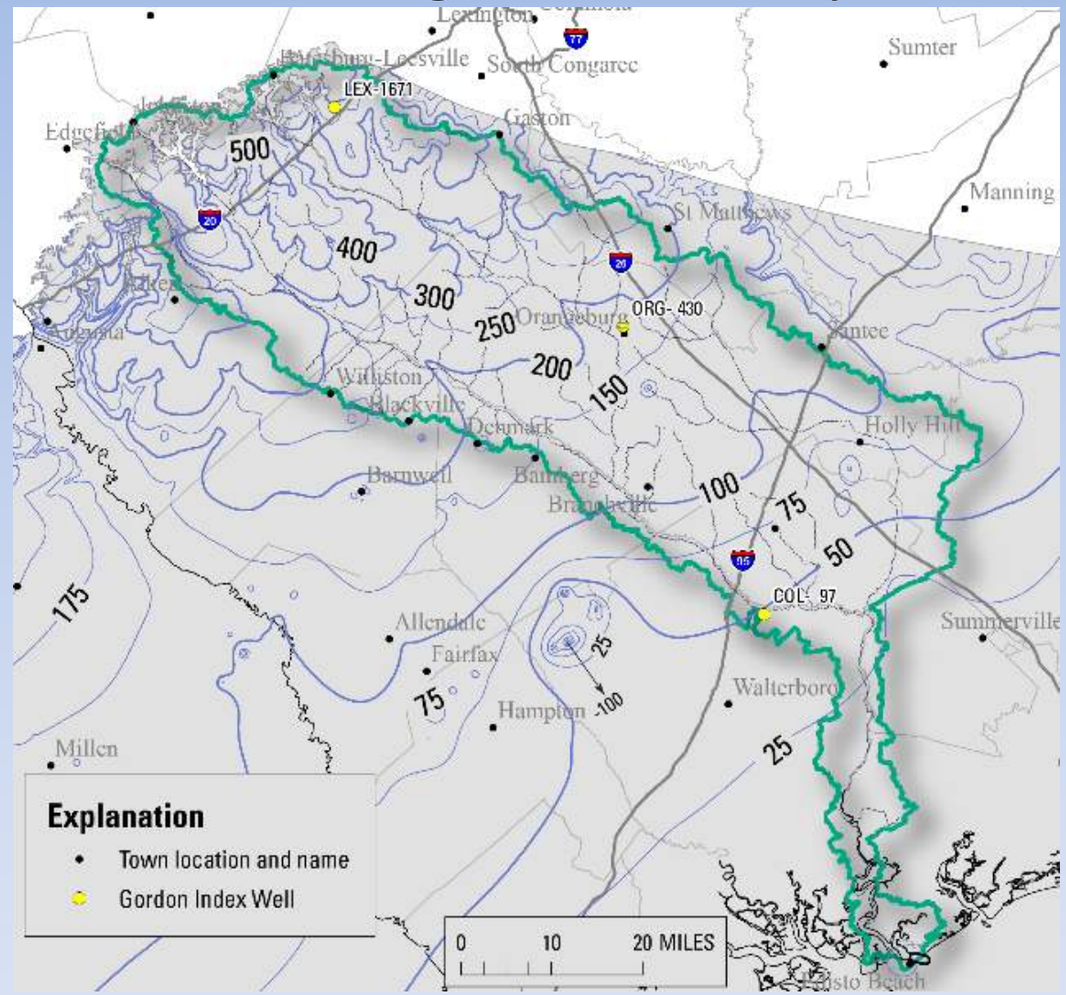
High Growth Scenario - Gordon aquifer (layer 7)

2070 (10.0 MGD)



2070: Recharge increased by 20%*



*Increased recharge for 2021 – 2070 by 20%.

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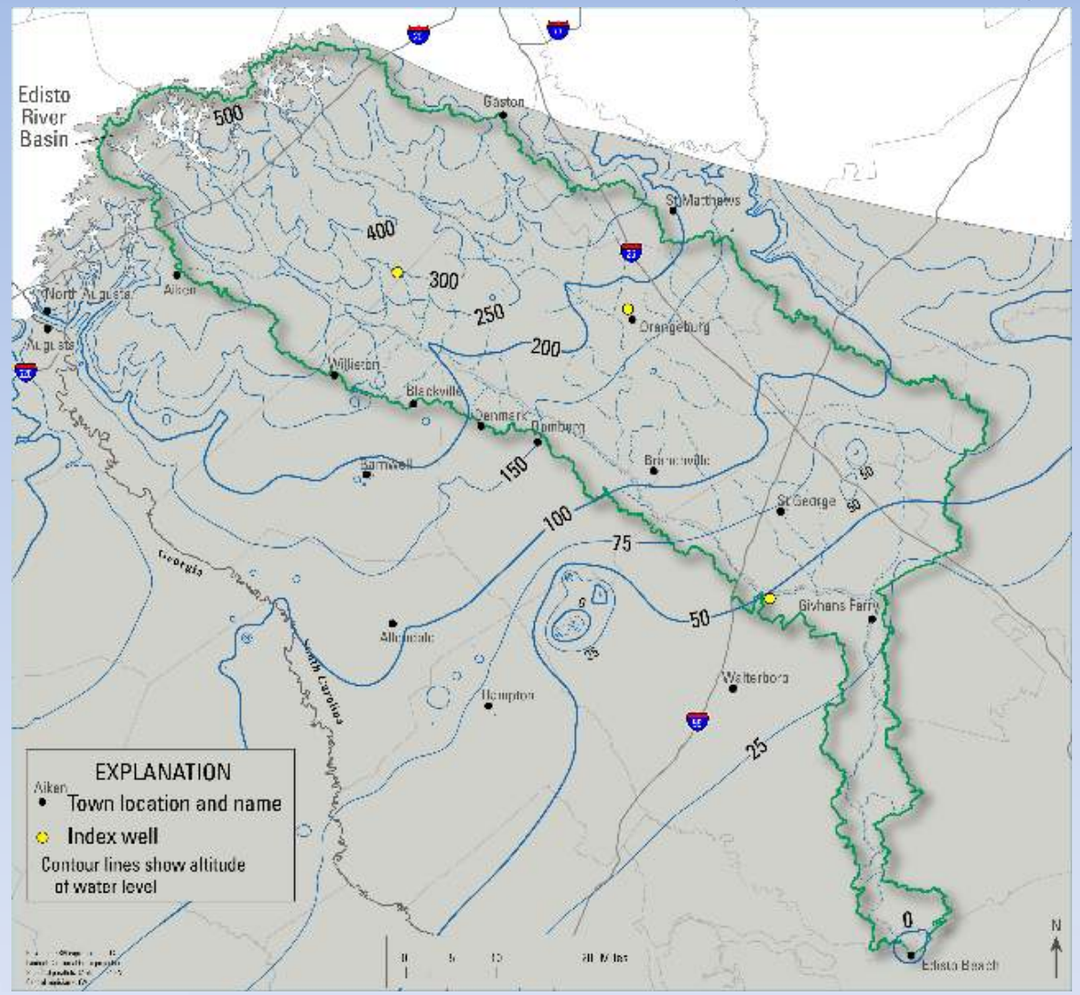
High Growth Scenario - Gordon aquifer (layer 7)

2070 (10.0 MGD)



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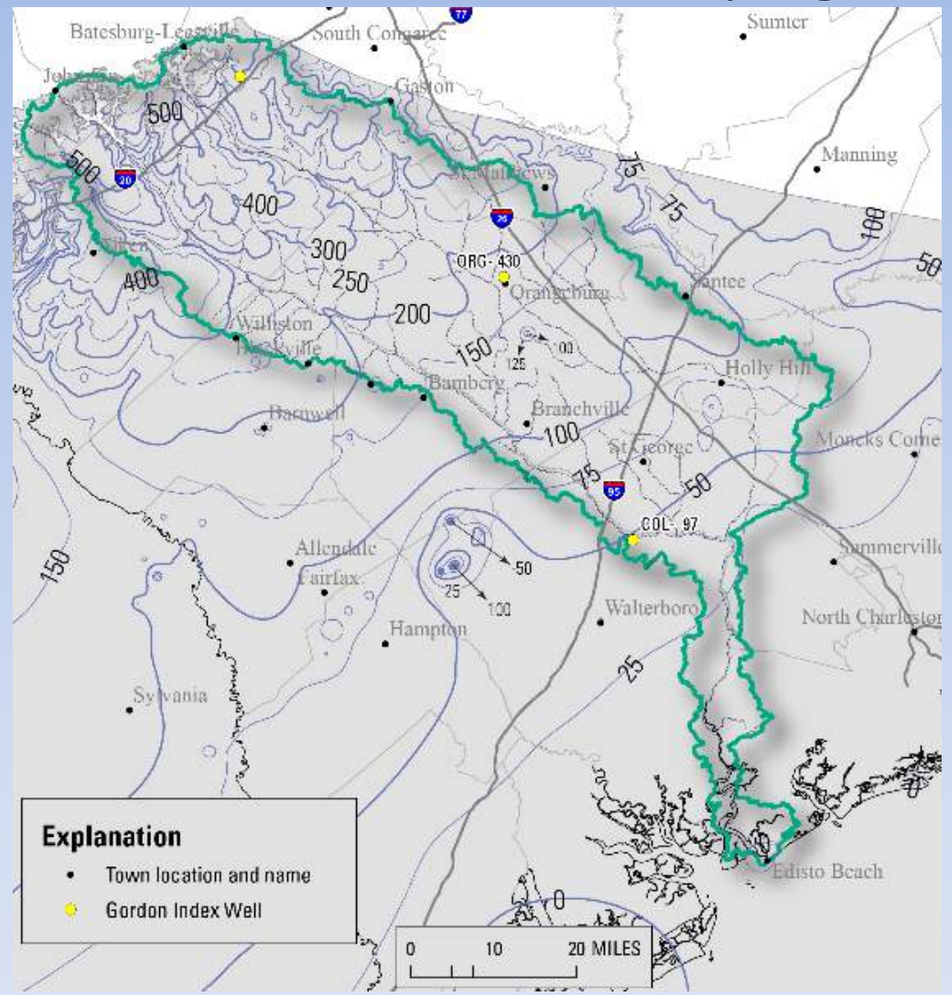
2070: Relocate New Pumping*



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High Growth Scenario – Crouch Branch aquifer (layer 9)

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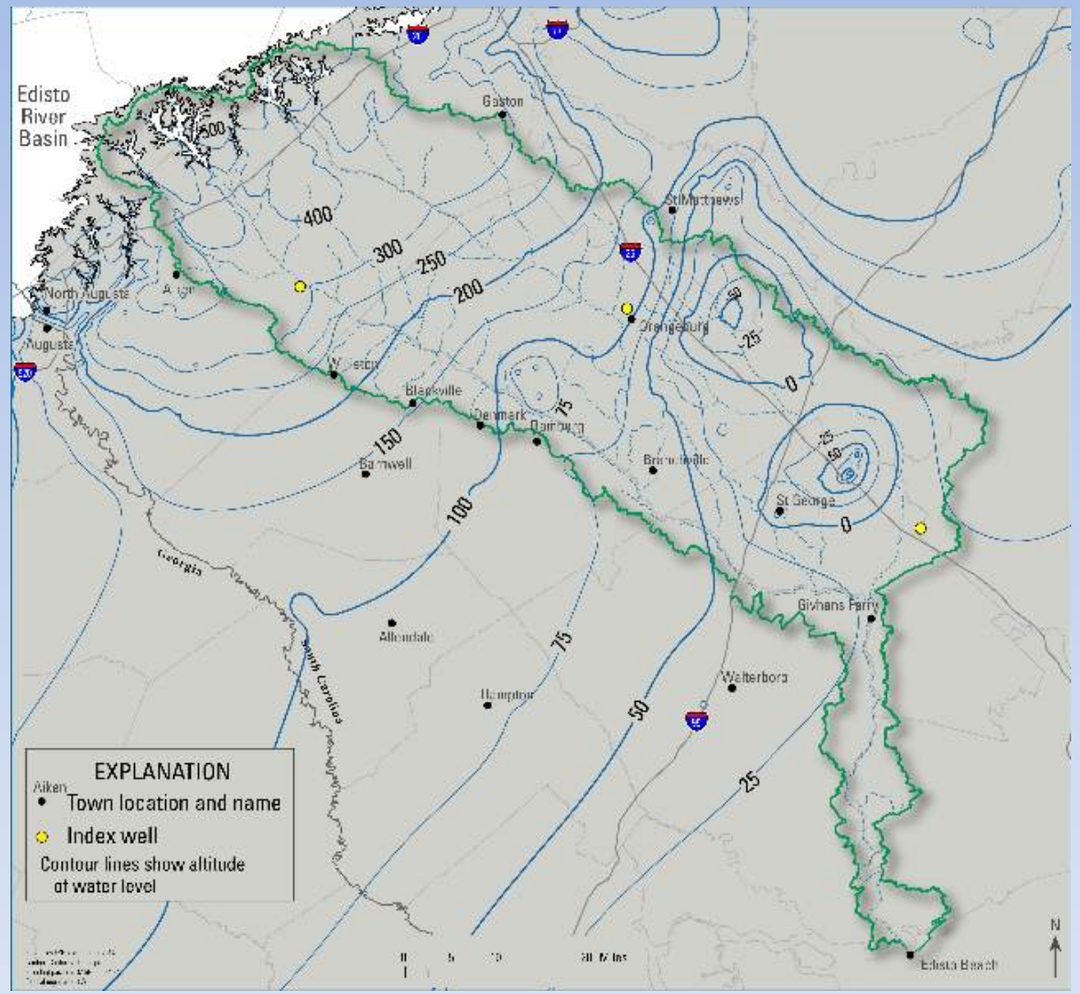
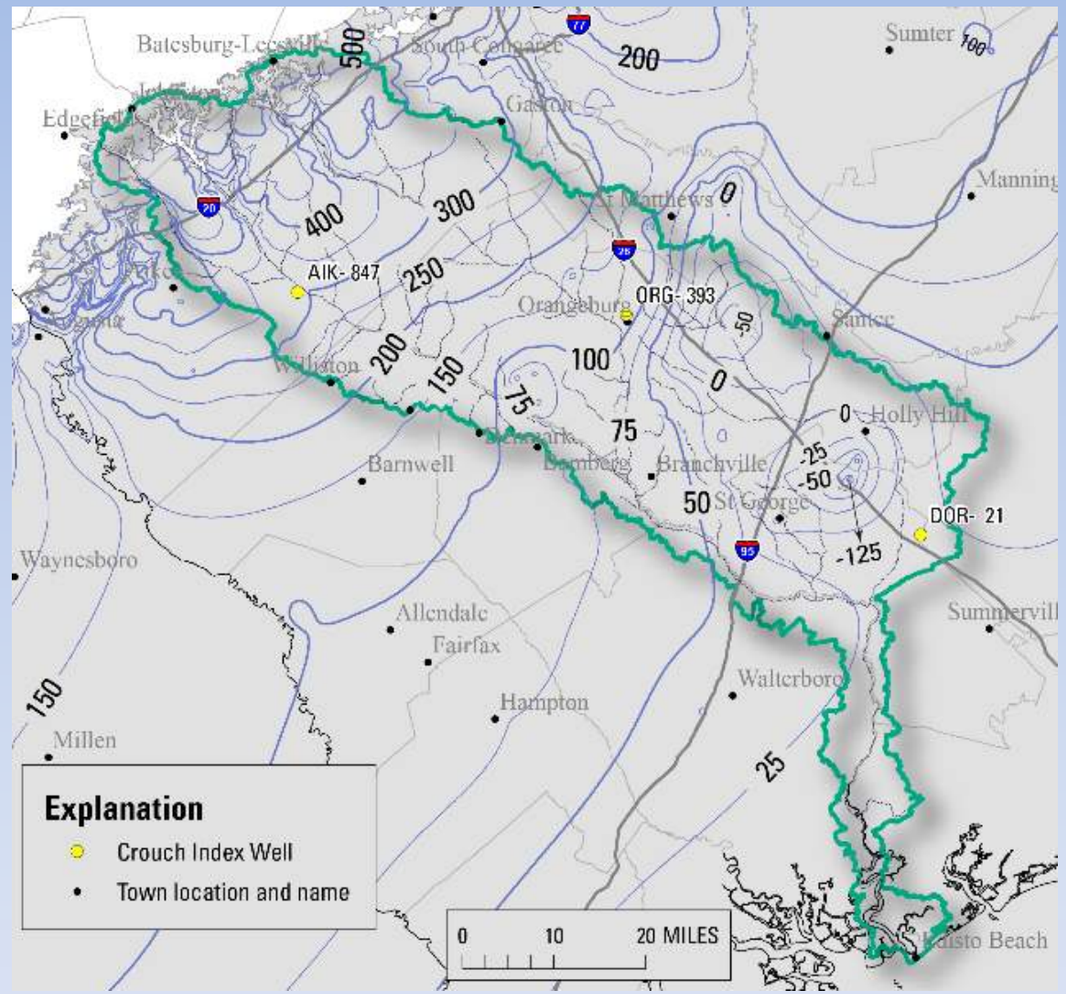


2070: Recharge increased by 20%*



*Increased recharge for 2021 – 2070 by 20%.

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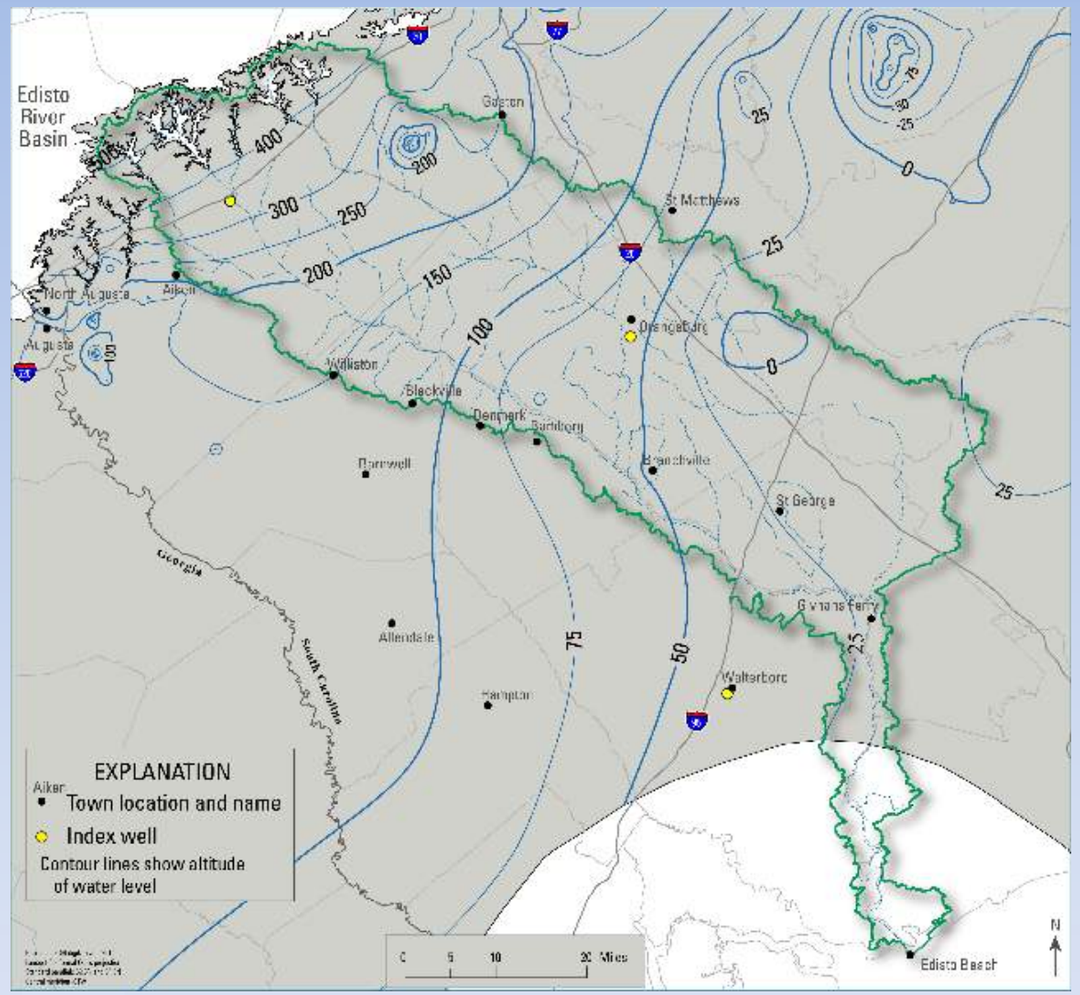
High Growth Scenario – McQueen Branch aquifer (layer 11)

2070 (23 MGD)



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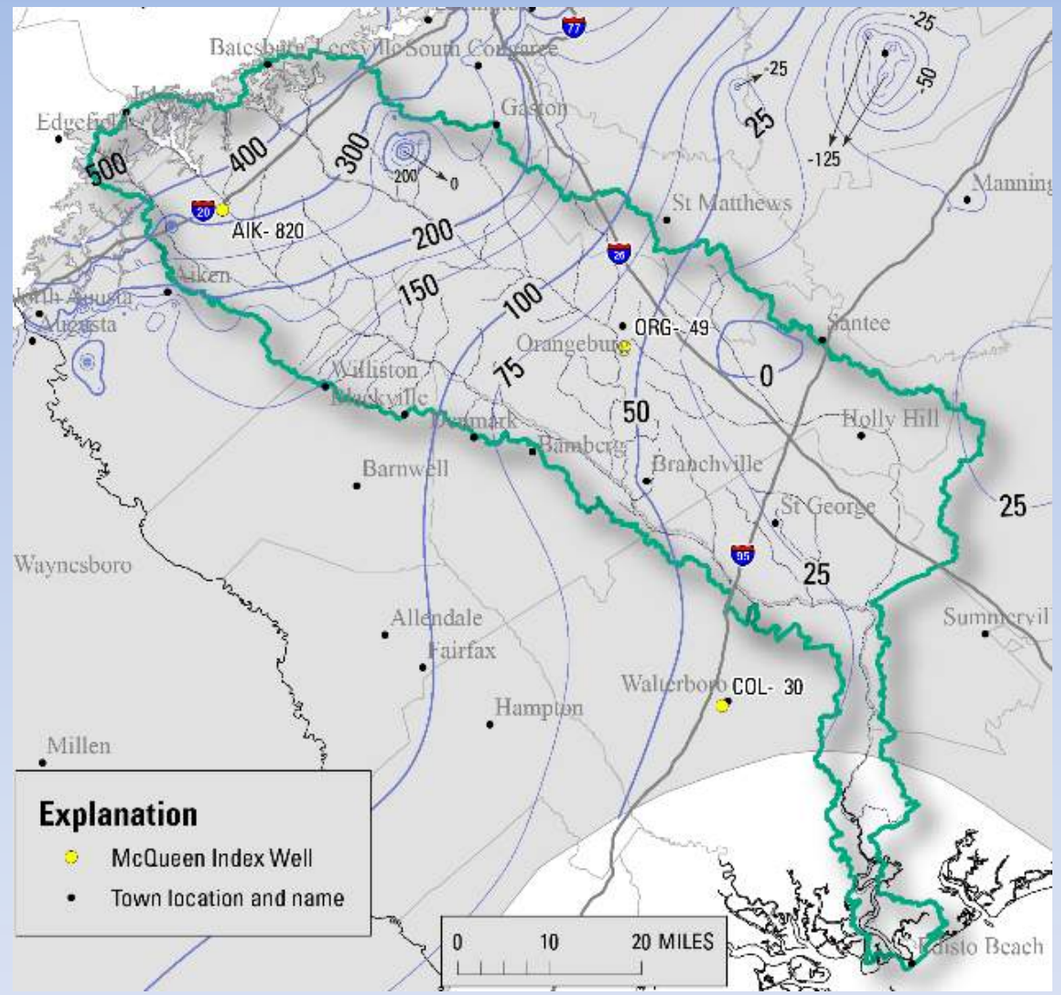

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High Growth Scenario – McQueen Branch aquifer (layer 11)

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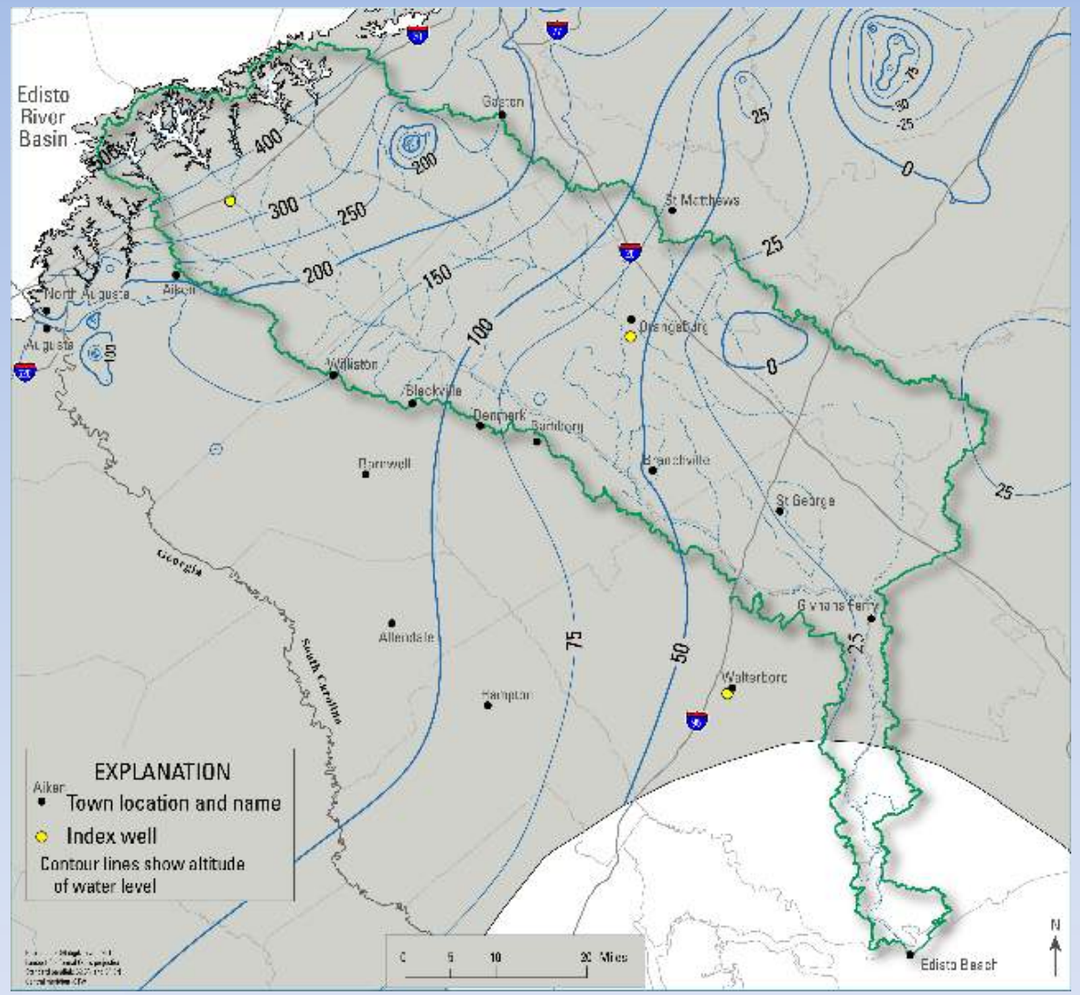

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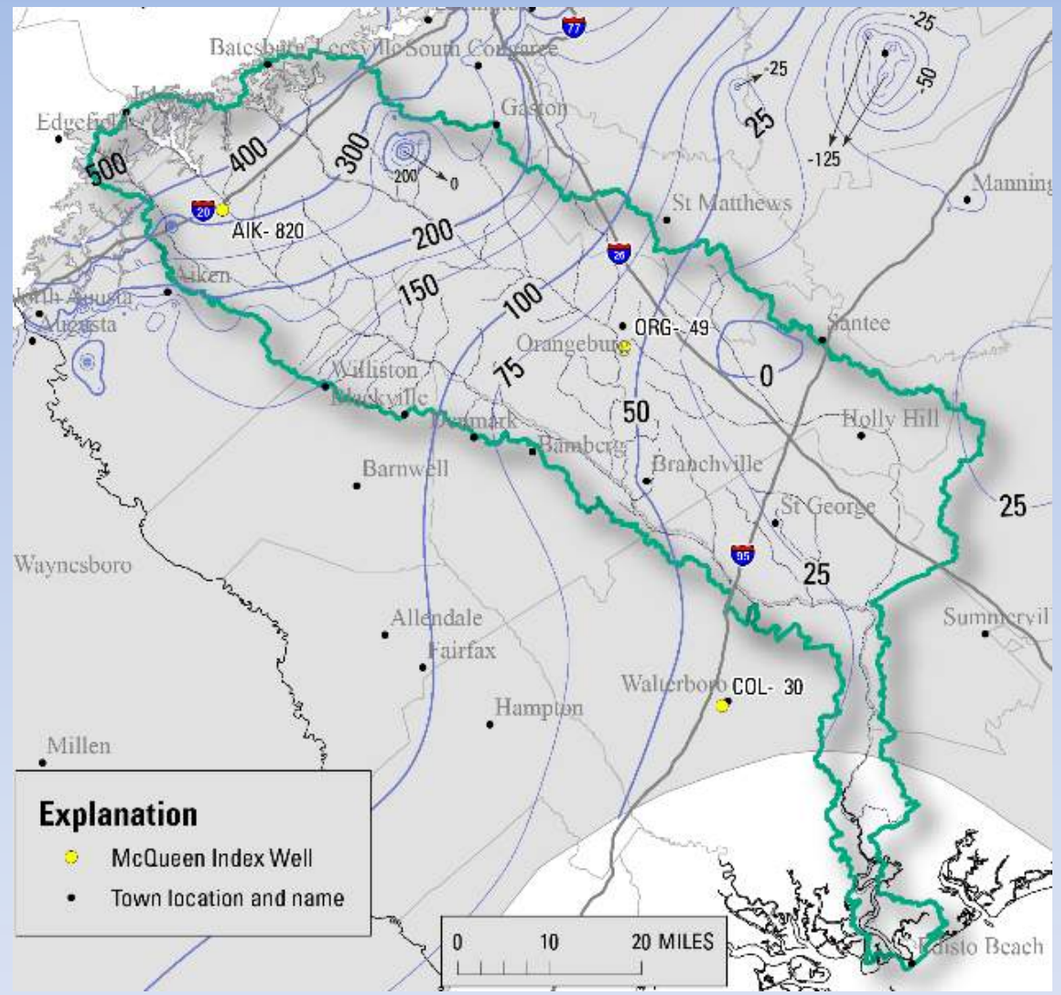

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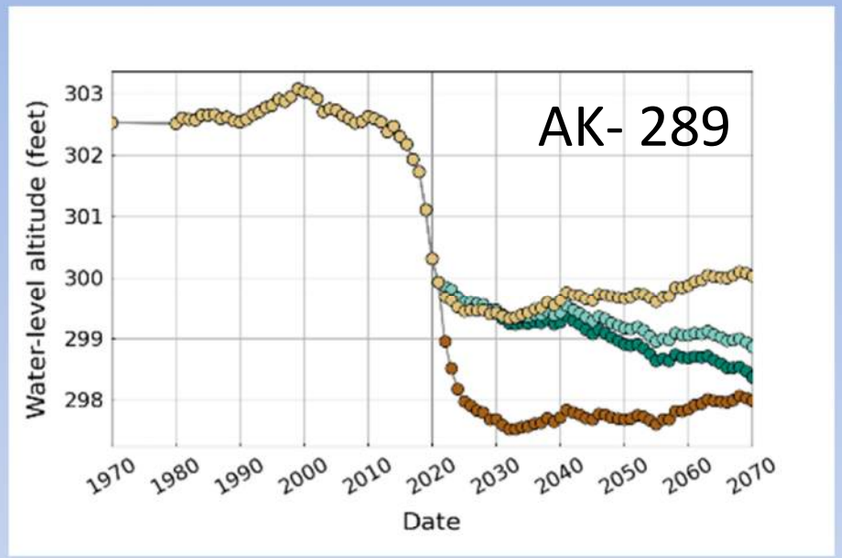
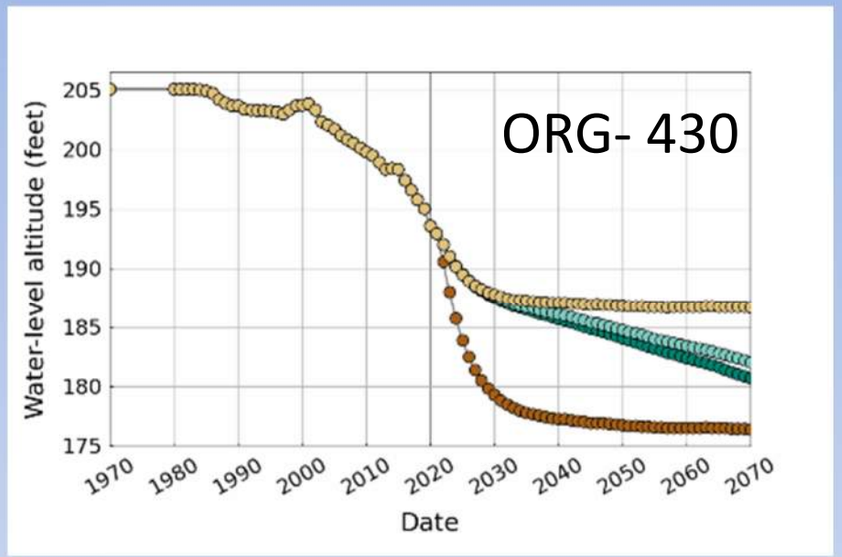
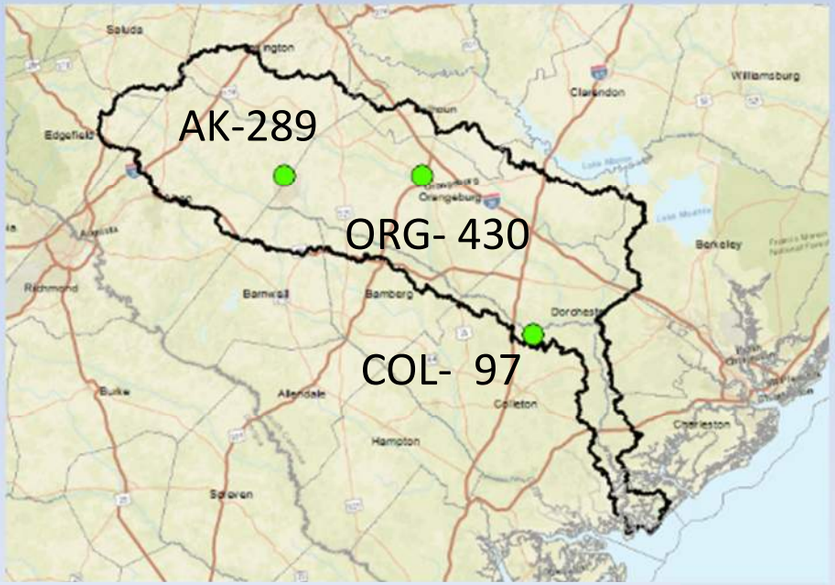
Simulated water levels in the Gordon aquifer

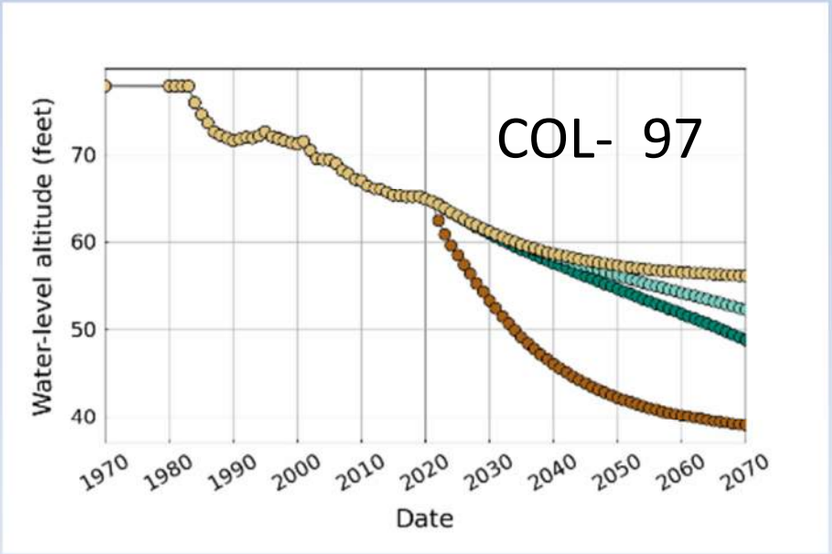




EXPLANATION

- Current
- Permitted
- Moderate Growth
- High Growth





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Provisional – All data is considered provisional and subject to revision.