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

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Groundwater Model Area

Model Area

EXPLANATION

- GW Model Area Boundary
- Grid Outline

Objectives

- Overall update the 2015 groundwater flow model
- Add recent groundwater use data (2016-2020)
- Include recharge from SWB Model (2016-2020)
- Apply the updated model to a series of scenarios
New GW Water-Use Data

Groundwater Model

Framework

Recharge Model

Potentiometric Maps

Groundwater Levels

Modifications to Original Model

- Well and water-use data from SCDHEC database
  - 1900 – 2015 (original model)
  - 2016-2020 (updated well and water use)
- Recharge rates from Soil Water Balance model (2016 – 2020)
Primary inputs:
- Model Grid
- Hydrogeologic Framework
- Aquifer Properties
- Observation Data
- Boundaries
- Wells – Water Use Data

Primary Outputs:
- Groundwater Levels
- Budgets

Representative GW Flow Model
Groundwater Simulations

Predevelopment Conditions
Remove withdrawals and simulate levels prior to GW development
• Recharge rates from SWB model
• Focused on Edisto Basin

Current Groundwater Conditions
• Simulated current groundwater conditions from 1900-2020
Groundwater Flow Model Limitations

- Based on limited data
- Simplification of the actual groundwater flow system
- Can limit the ability of the model to predict actual hydraulic conditions over time
- Accuracy and prediction capabilities of this model are affected by the finite-difference discretization, boundary conditions, hydraulic properties, and observations used in the model calibration
- Groundwater withdrawals simulated in the model underrepresent actual historical water use because pumping rates less than 3 million gallons per month are not required to be reported to the State agencies and, therefore, are unknown.
SWB Model Input
Hydrogeologic Framework
Edisto Basin wells – original and updated model

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

Pre-development 2020

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Crouch Branch aquifer – pre-development simulation

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Crouch Branch aquifer

Pre-development 2015

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Crouch Branch aquifer

Pre-development 2020

Provisional – All data is considered provisional and subject to revision.
McQueen Branch aquifer – pre-development simulation

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McQueen Branch aquifer

Pre-development 2015

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

Pre-development 2020

Provisional – All data is considered provisional and subject to revision.
Simulated water levels in the Gordon aquifer

Provisional – All data is considered provisional and subject to revision.
Simulated water levels in the Crouch Branch aquifer

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Simulated water levels in the McQueen Branch aquifer

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Groundwater Scenarios

Current groundwater use
• Constant pumping rates from 2021-2070 using average pumping rates derived from groundwater use from 2015-2019

Permitted groundwater use
• Constant pumping rates from 2021-2070 using fully permitted pumping rates

Business-as-usual water demand
• Projections from 2021-2070 based on assumption moderate population and economic growth

High water demand trend
• Projections from 2021-2070 based on assumption high population and economic growth
Questions?

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