Modeling Groundwater in Truckee Meadows using RiverWare and calibrating it to a MODFLOW model

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Project Background

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NSF

USDA
United States
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PARTNERS

University of Nevada, Reno

DRI
Desert Research Institute

USGS
science for a changing world

OHIO
UNIVERSITY
Voinovich School of
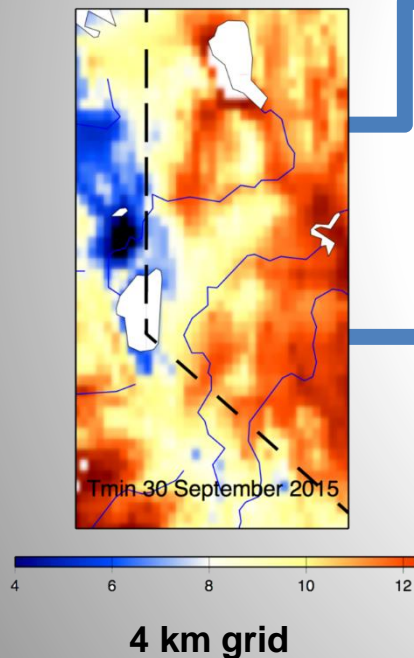Leadership and Public Affairs

Outline

- Water for the Seasons project overview
- Groundwater setup
- Calibrating to MODFLOW model
- Results and findings

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Integrated Modeling

How does a climate scenario feed into hydrologic models?

Stakeholder informed drought scenario

Tmin 30 September 2015

4 km grid

Upper Truckee Watershed GSFLOW Model

Truckee River Operations RiverWare Model

Fernley Groundwater MODFLOW Model

Upper Carson Watershed PRMS Model

Carson Valley and Middle Carson Operations MODSIM Model

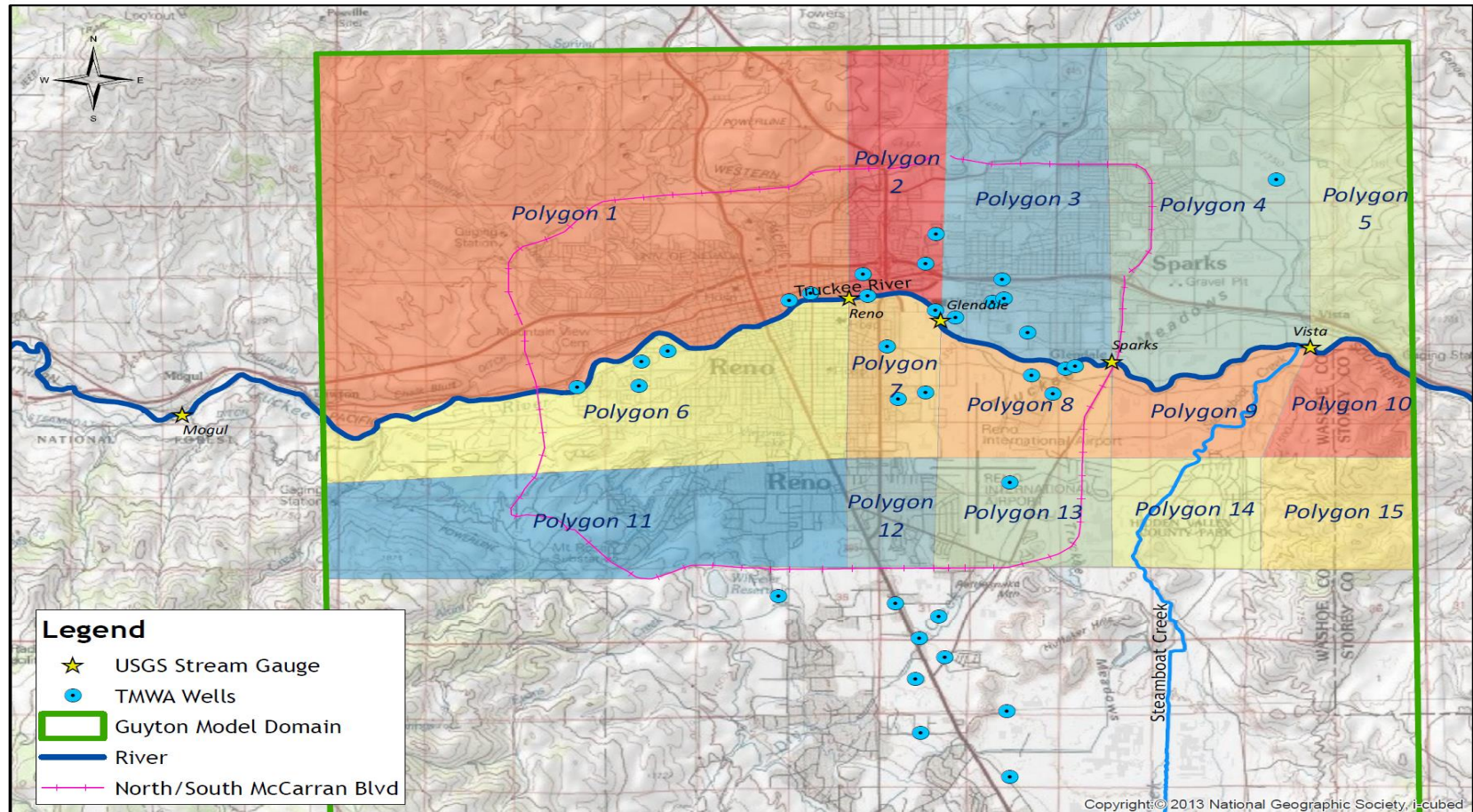**Carson Valley and Middle Carson Surface-Groundwater GSFLOW Model**

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Climate Change Hydrology

- 13 year hydrology 2012-2015 & 1987 - 1995
  - Scenario 1a – temperature nudge for 1987 – 1995 by 2° F
  - Scenario 1b – temperature increase by 4.5° F
- Calibration – historical hydrology from 1961 - 2014

TROA Planning Modeling Structure
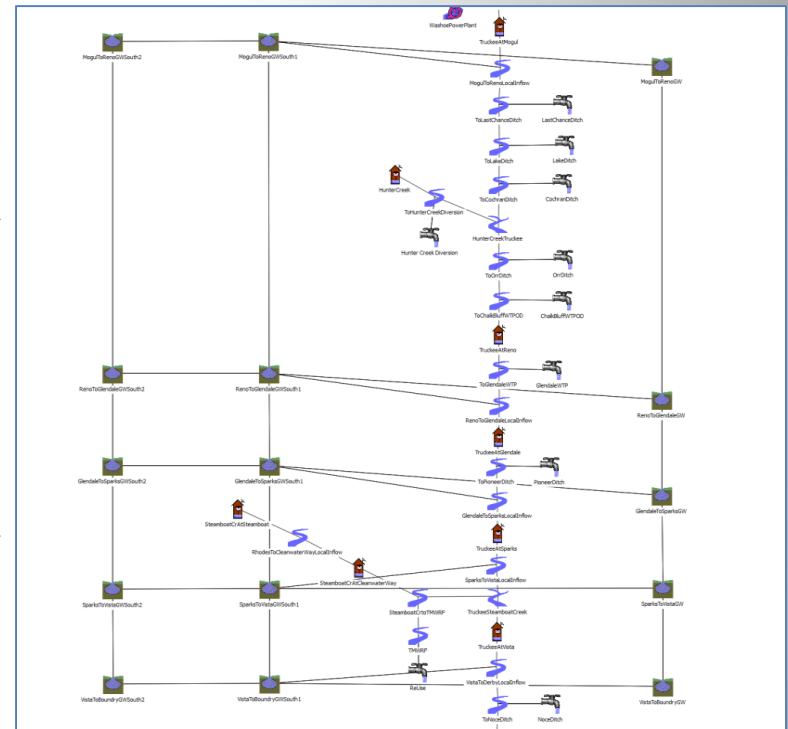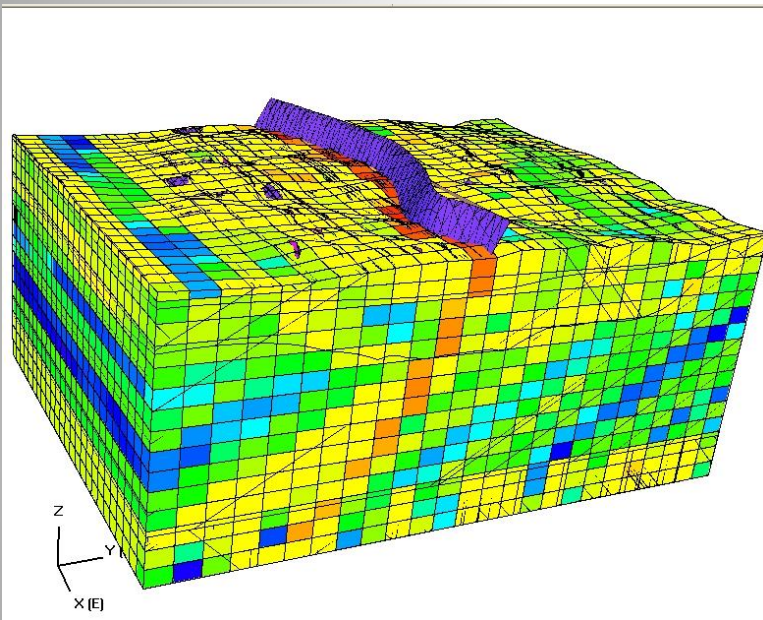
Truckee Meadows Region

Guyton Model Aquifer Polygons
Truckee Meadows

Legend
- ★ USGS Stream Gauge
- TMWA Wells
- Guyton Model Domain
- River
- North/South McCarran Blvd
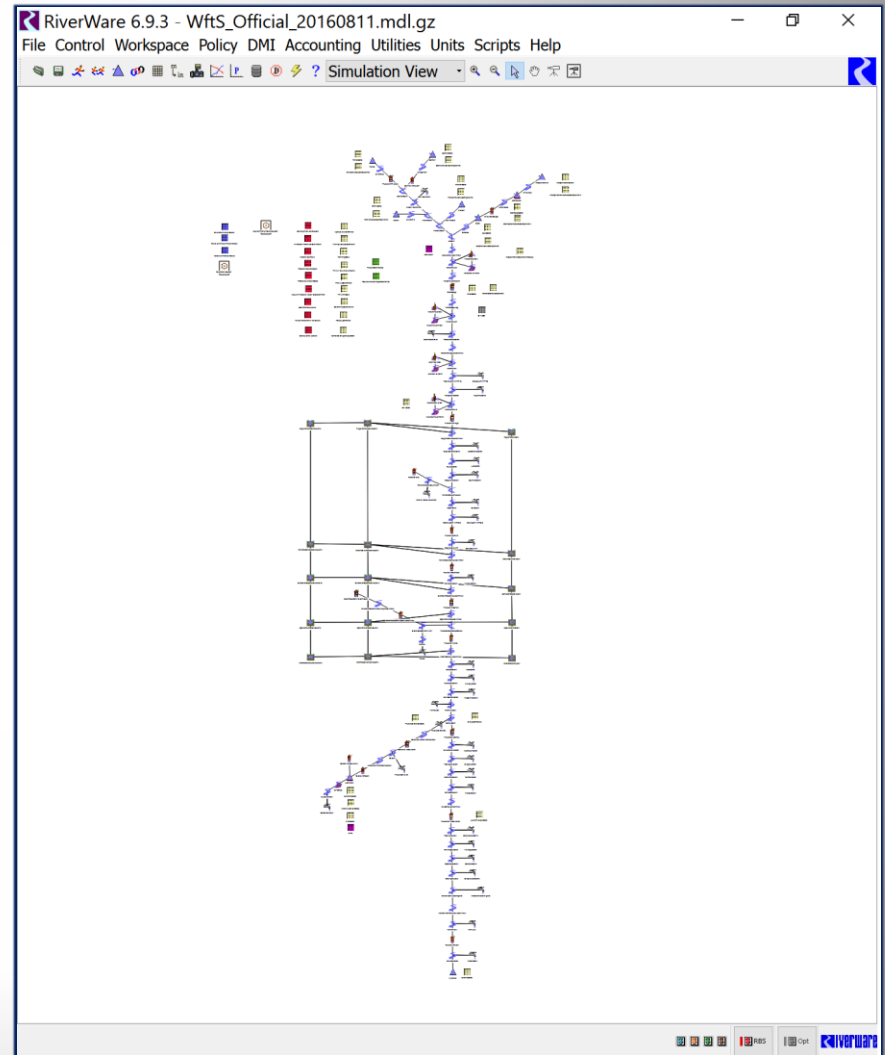
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Date Saved: 8/13/2015
Document Name: TM_AquiferPolygons

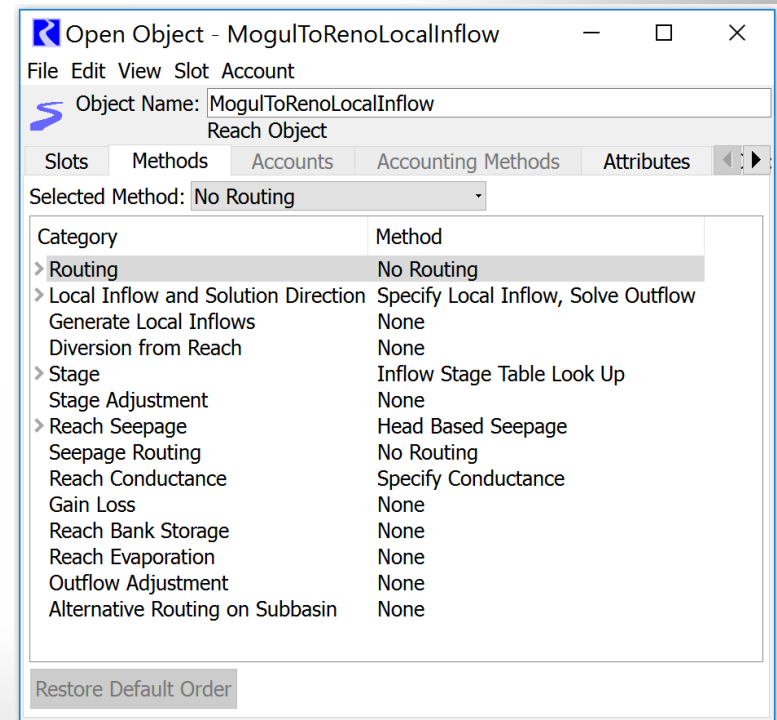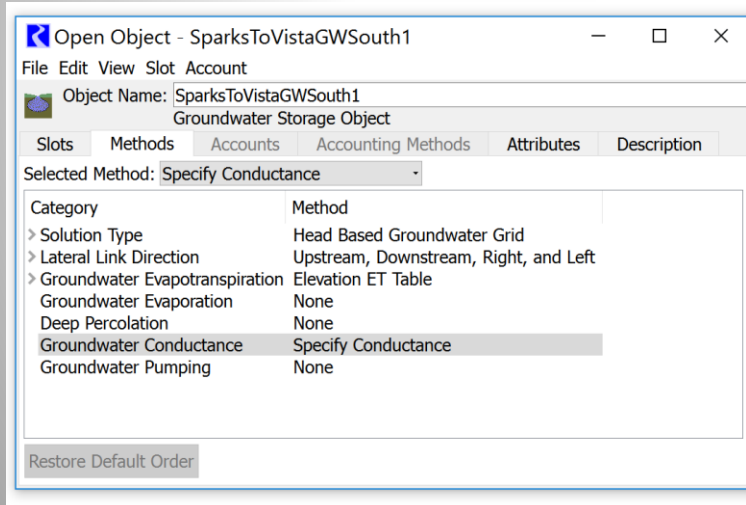0 100 200 400 600 800 Kilometers

Truckee Meadows GW Modeling

Groundwater System Representation
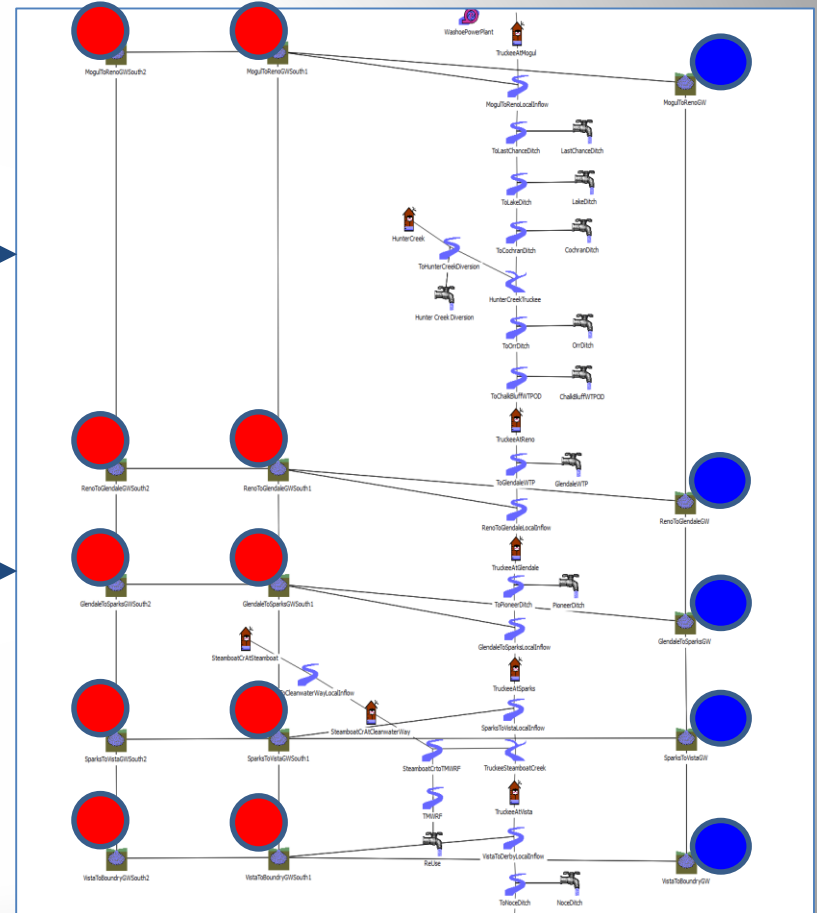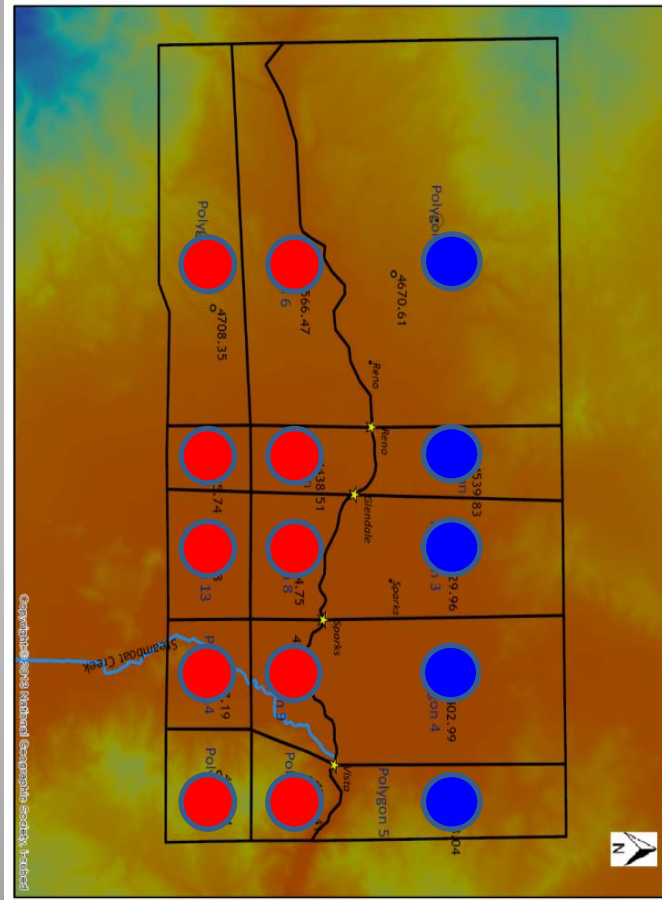
Model Setup and Methods

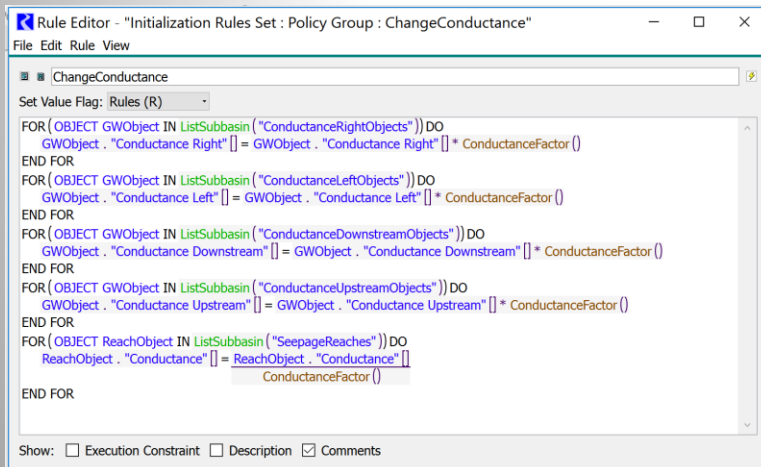- Head Based Groundwater Grid solution type
- Head Based Seepage on reach

Water Balance

- $I - ET - P = Seepage$
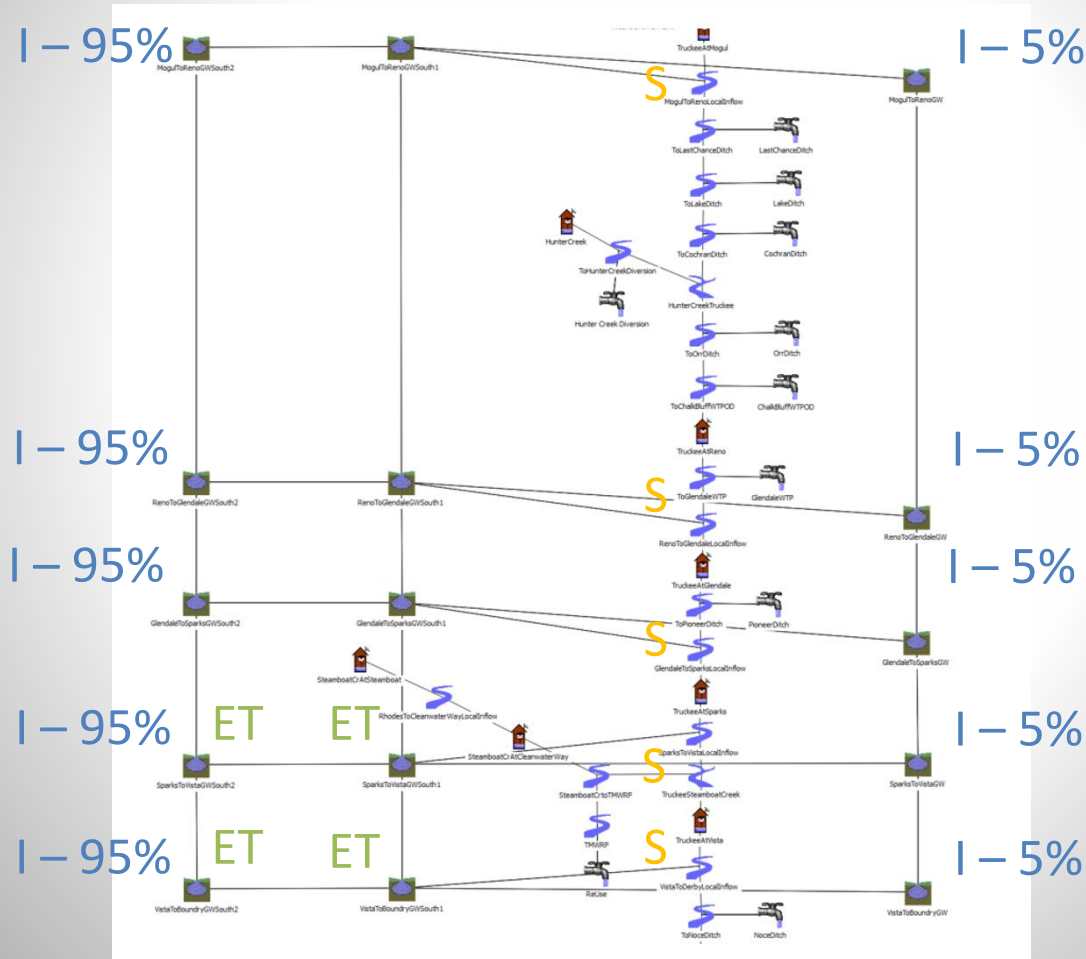
GW Calibration

- Conductance calibrated
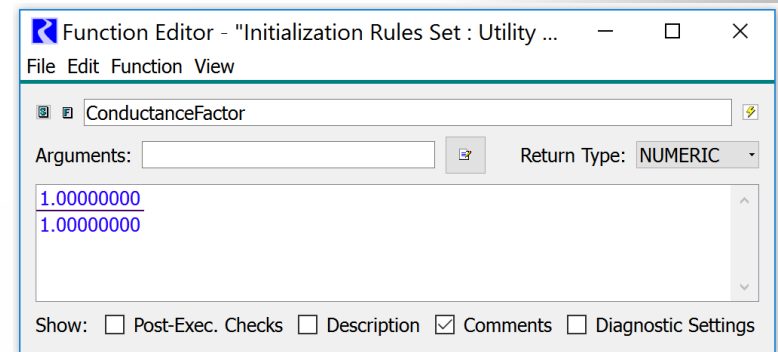- Iterative process using simplified model
- Reinitialized elevation

Truckee Meadows GW Modeling

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Sensitivity to Conductance
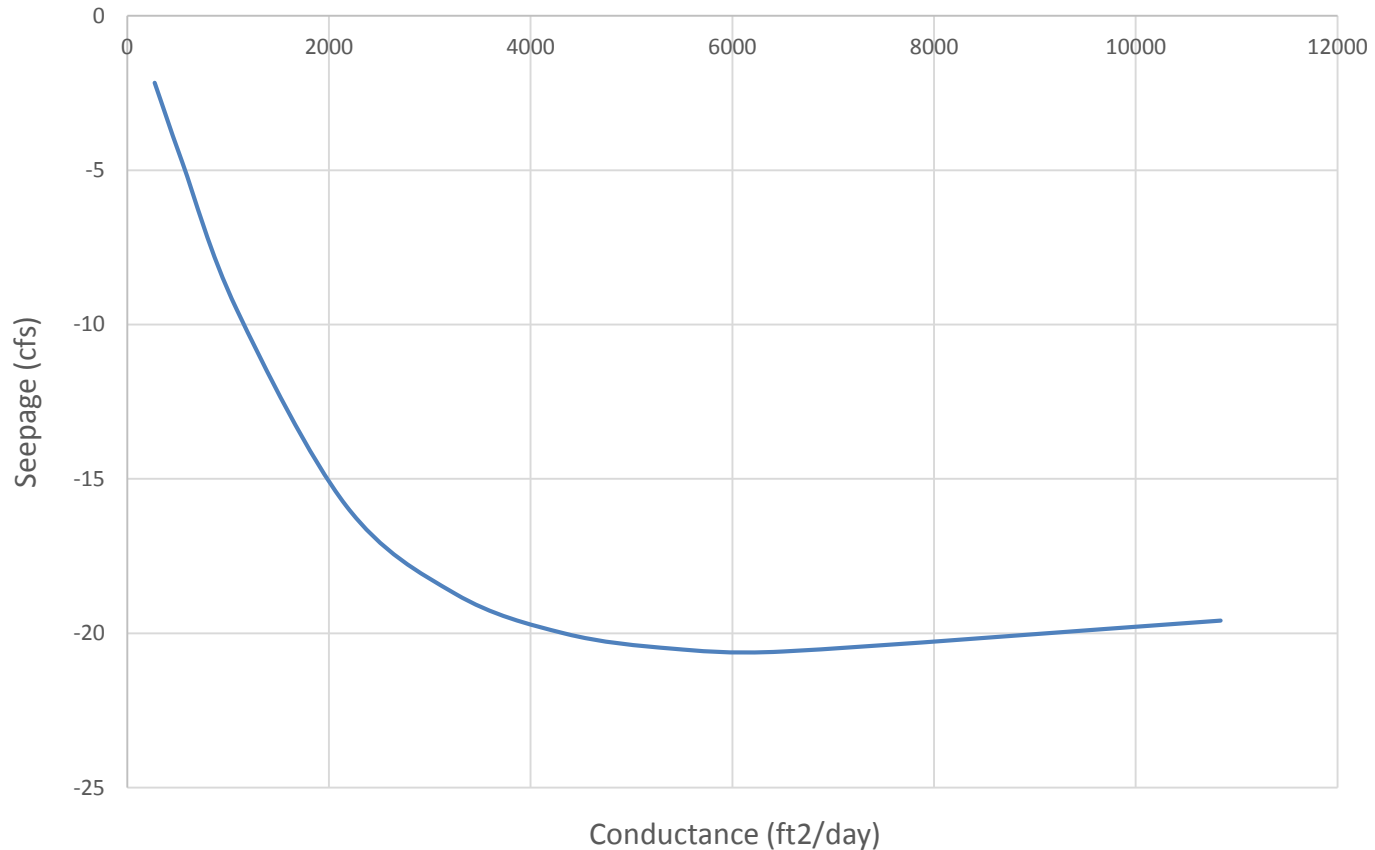
Comparison to MODFLOW model

- RiverWare can capture large scale, long term interaction between surface and groundwater systems
- Especially suited for climate change studies
- No significant run time increase
- Does not capture spatial variations since RW uses nodes instead of grids
- RW has no methods to model Infiltration except as an input in the Inflow from Surfacewater slot

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Thanks!

Questions?

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