WATER for the SEASONS

"A Program for Sustaining Water Resources in a Changing Climate"

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

Linnet Jose, EIT Precision Water Resources Engineering www.precisionwre.com





WATER for the SEASONS

"A Program for Sustaining Water Resources in a Changing Climate"

Project Background







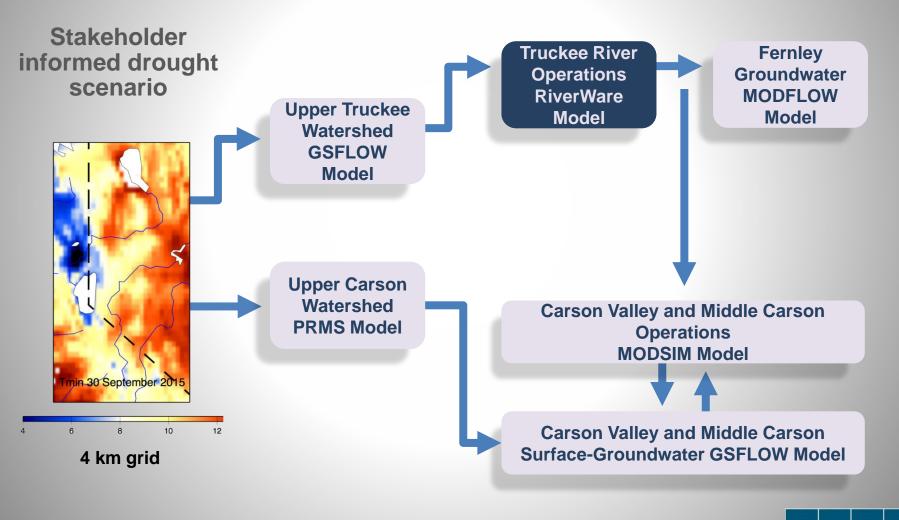
Outline

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



Integrated Modeling

How does a climate scenario feed into hydrologic models?



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RiverWare User Group Meeting

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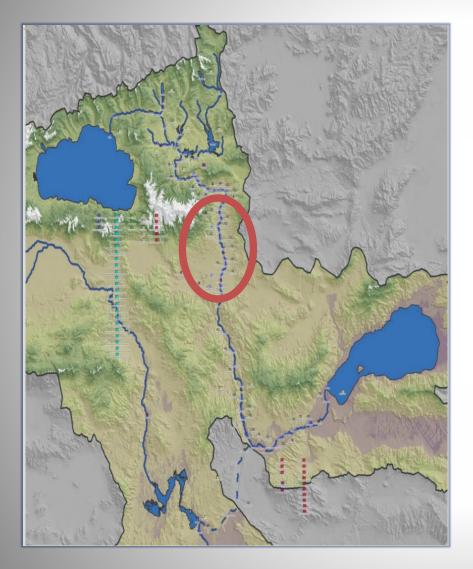
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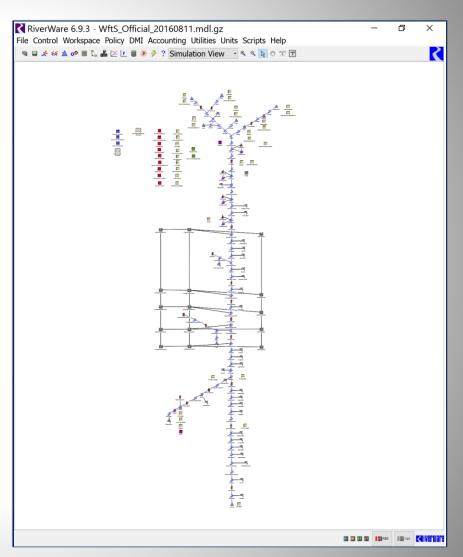
Climate Change Hydrology

- 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

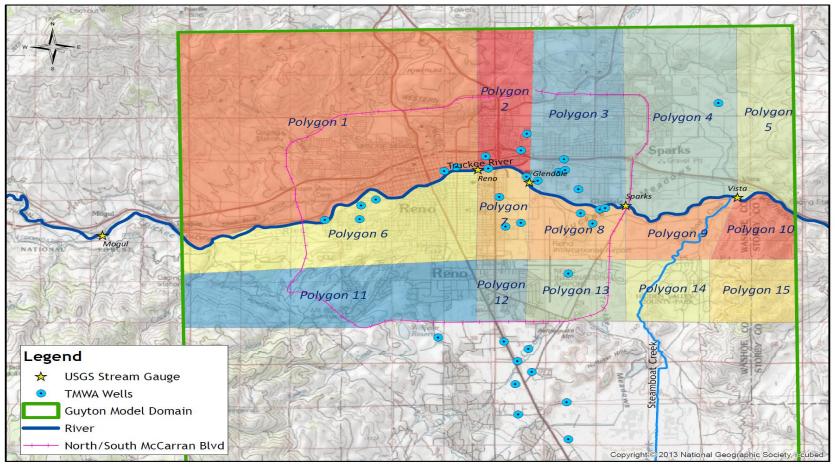




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Truckee Meadows Region



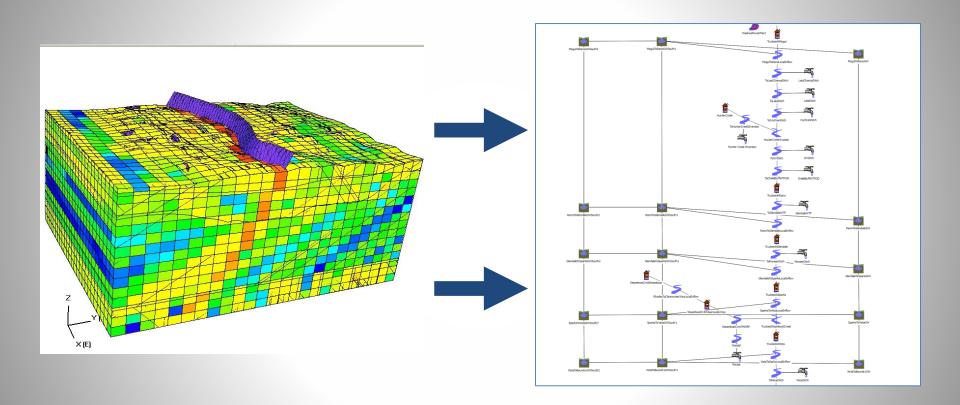
Author: Sterle Date Saved: 8/13/2015 Document Name: TM_AquiferPolygons Guyton Model Aquifer Polygons Truckee Meadows

0 100200 400 600 800 Kilometers

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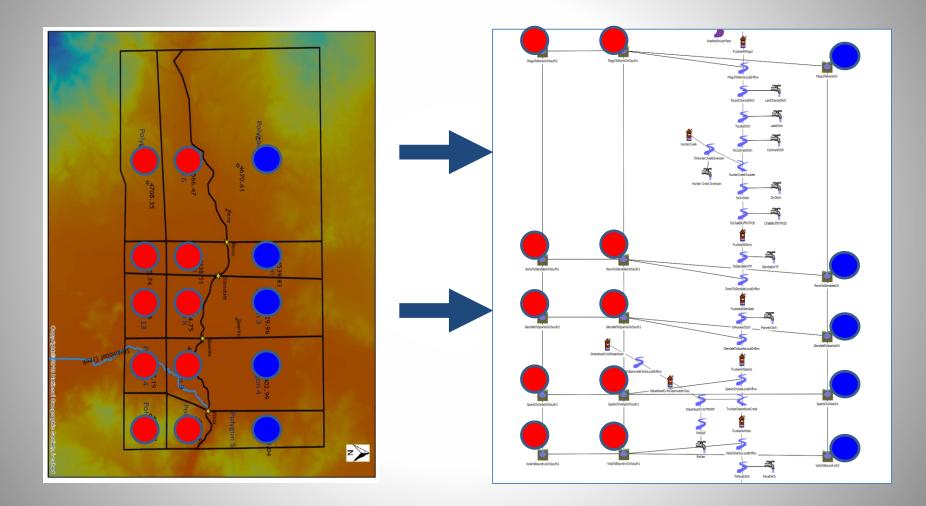
Truckee Meadows GW Modeling



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Groundwater System Representation





Model Setup and Methods

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

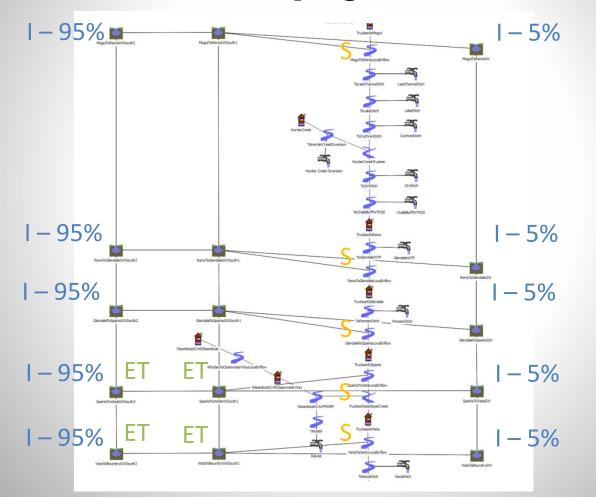
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Category > Solution Type > Lateral Link Direction > Groundwater Evapotranspiration Groundwater Evaporation Deep Percolation Groundwater Conductance Groundwater Pumping			Method Head Based Groundwate Upstream, Downstream, Elevation ET Table None None Specify Conductance None						
Restore	Default Order								

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Diversion from Reach			None					
> Stage			Inflow Stage Table Look Up					
Stage Adjustment			None					
Reach Seepage			Head Based Seepage					
Seepage Routing			No Routing					
Reach Conductance			Specify Conductance					
Gain Loss			None					
Reach Bank Storage			None					
Reach Evaporation			None					
Outflow Adjustment			None					
Alternative Routing on Subbasin			None					

Restore Default Order

Water Balance

• I - ET - P = Seepage



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GW Calibration

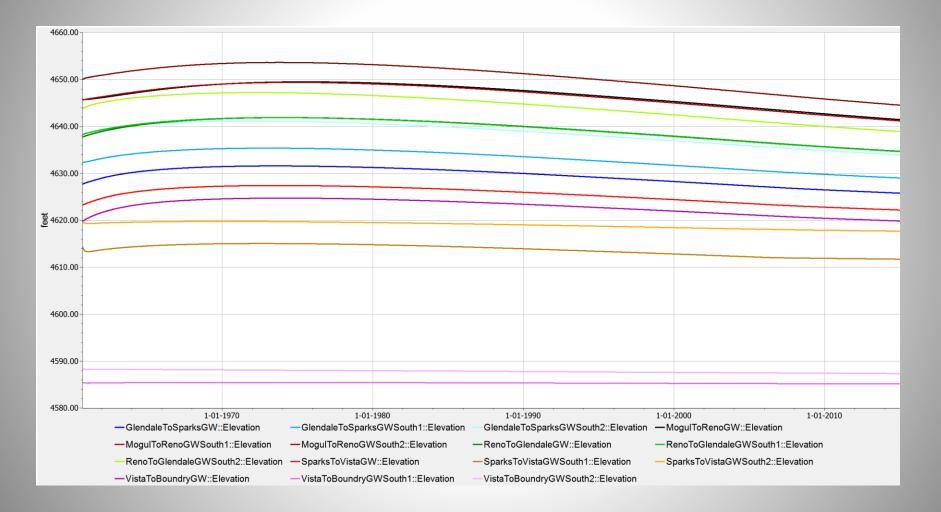
- Conductance calibrated
- Iterative process using simplified model
- Reinitialized elevation

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Truckee Meadows GW Modeling

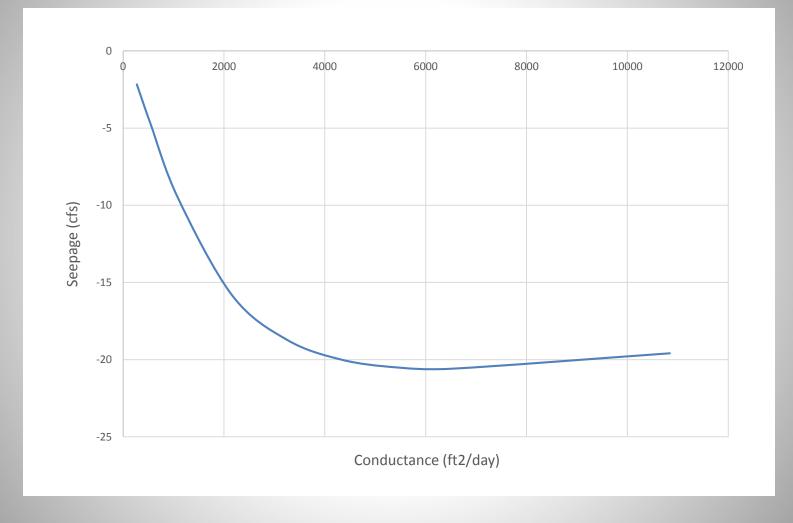


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Sensitivity to Conductance



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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



Thanks!

Questions?



August 23, 2016

