



Upper Niobrara-White Modeling

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Integrated Water Management Analyst

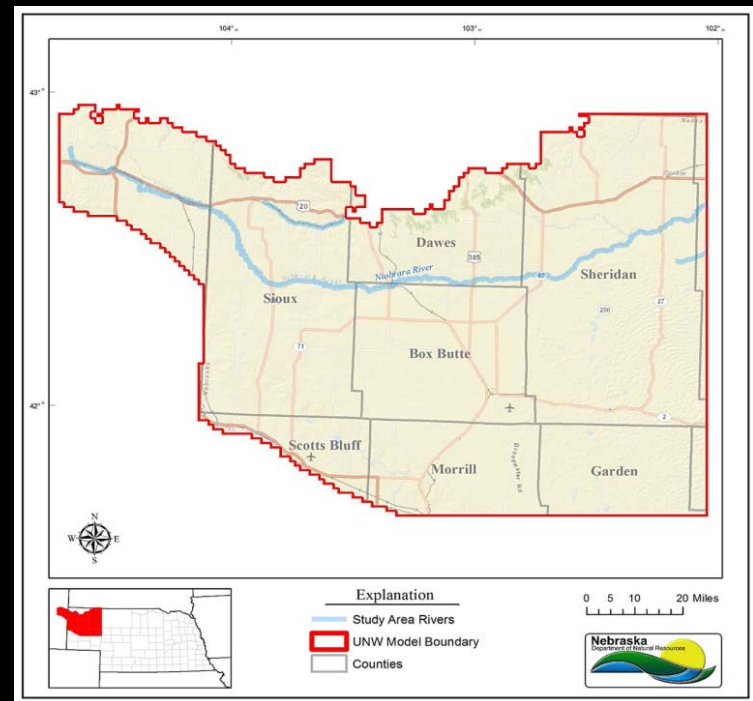
 **Nebraska**
Department of Natural Resources

UPPER NIOBRARA-WHITE GROUNDWATER MODEL



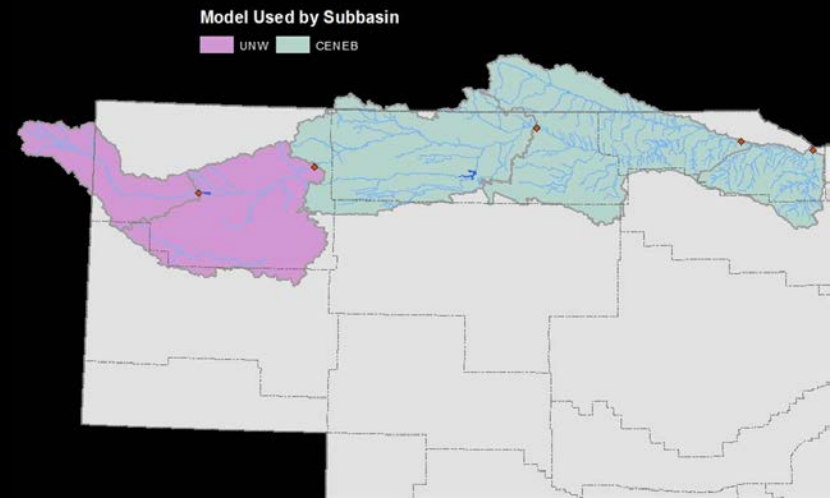
Upper Niobrara-White Groundwater Model

- UNW Model is up and running
- Will assist in the analysis of water supplies and uses in the UNWNRD
- A tool to assist in the integrated management planning (IMP) process
- Used to evaluate hydrologically connected areas and management scenarios



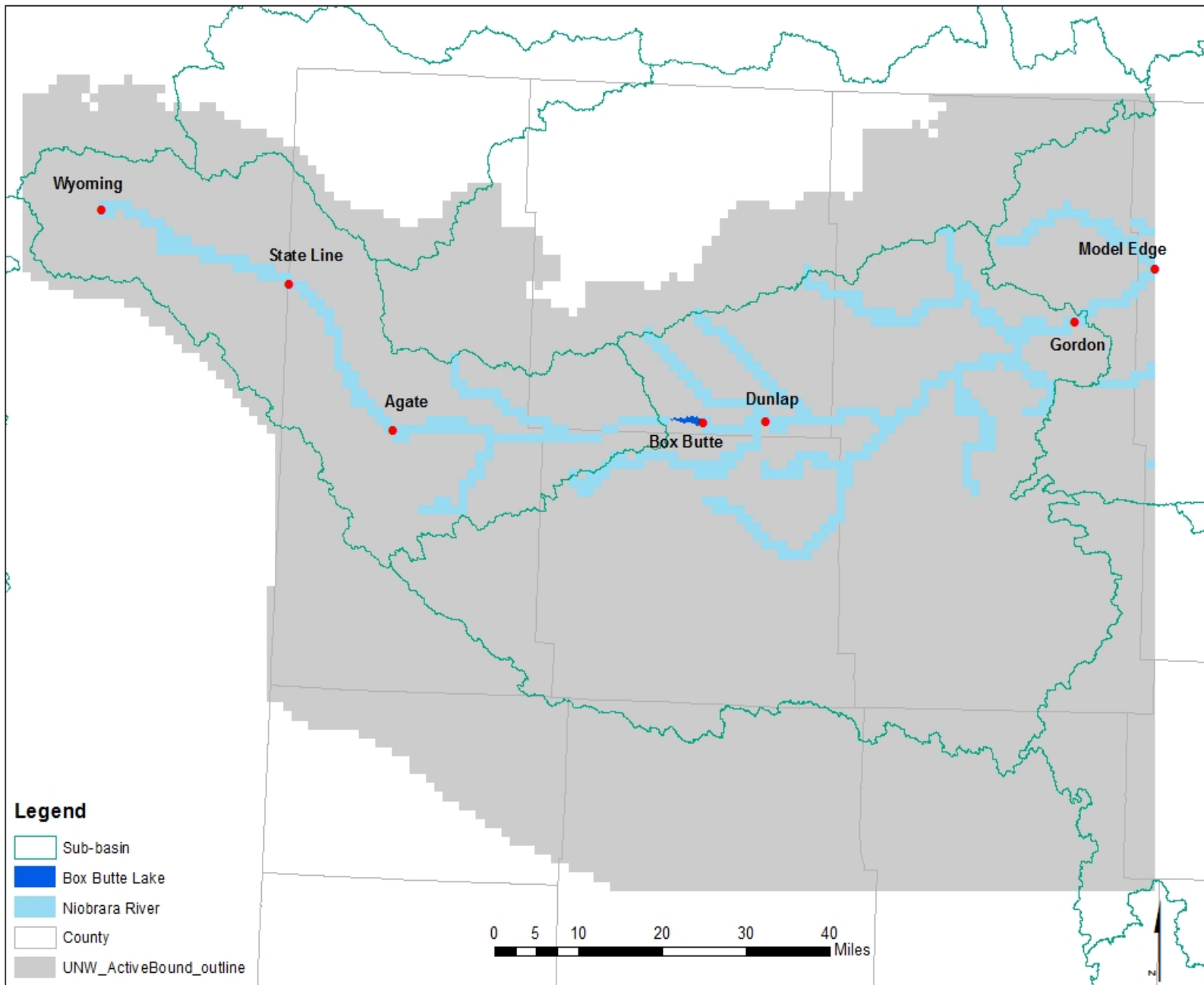
WaterSMART – Niobrara River Basin Study

- UNW model and CENEB model used to assess the impact of different conditions
- Help to define options for meeting future demands
- Under terms of the WaterSMART grant received from the Bureau of Reclamation in 2010, certain conditions must be evaluated:
 - ✓ Impact of climate change
 - ✓ Impact of alternative management scenarios



WaterSMART Scenario Results

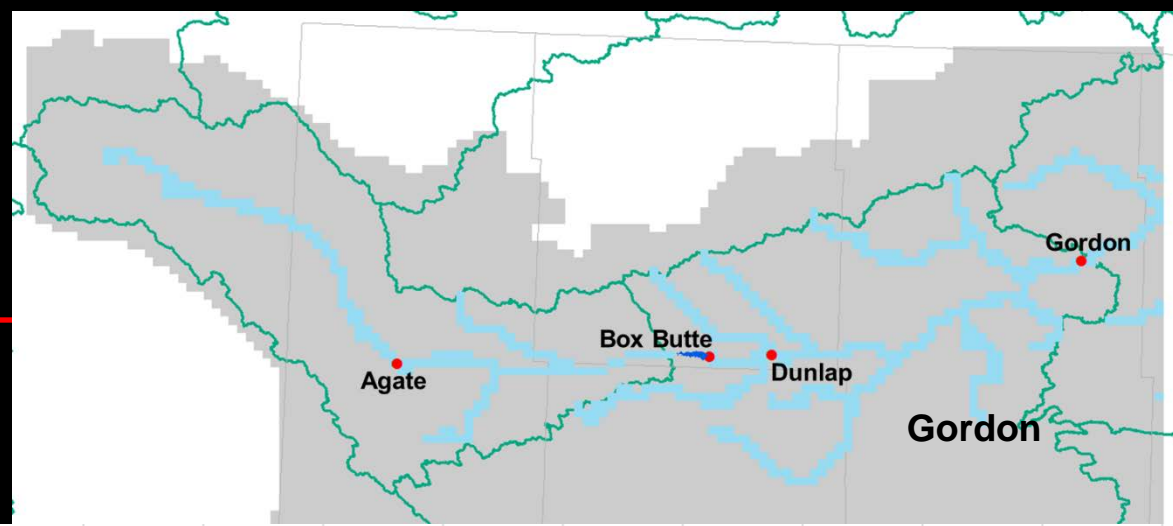
- Integrated model run – groundwater, watershed, and surface water operations model
- Groundwater model preliminary results
- Climate scenario
- Alternative scenarios
- Baseflow and water level draw down



WaterSMART Scenario Results

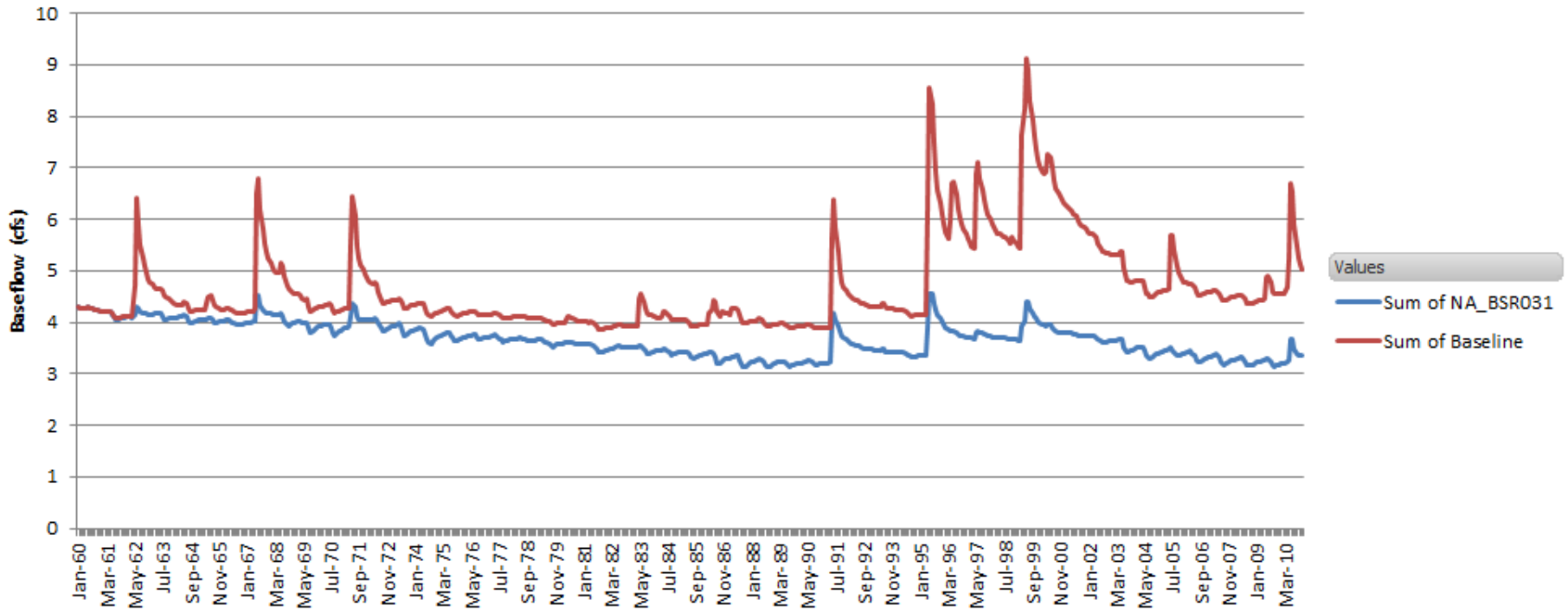
- Current calibrated model run and baseline run

WY to Stateline



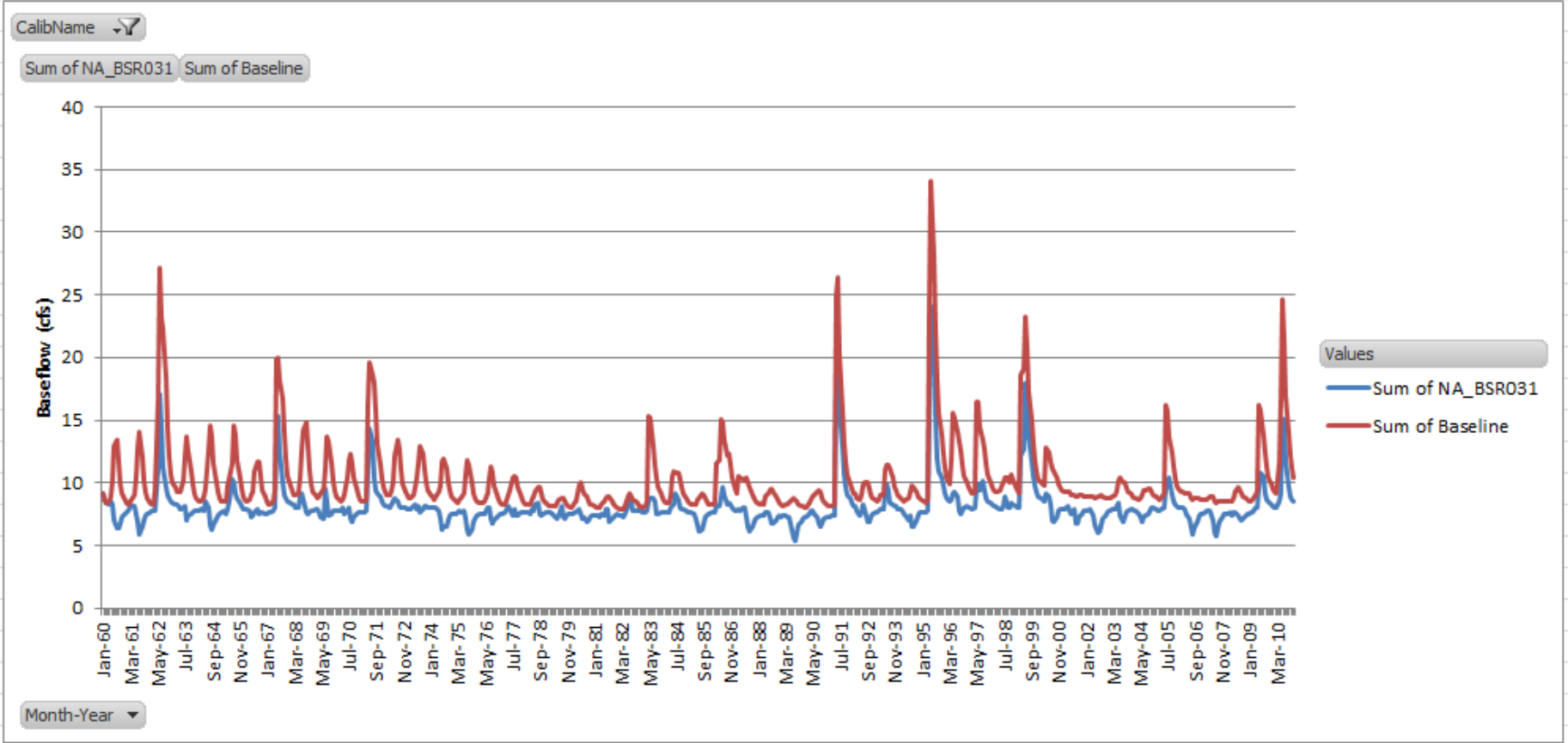
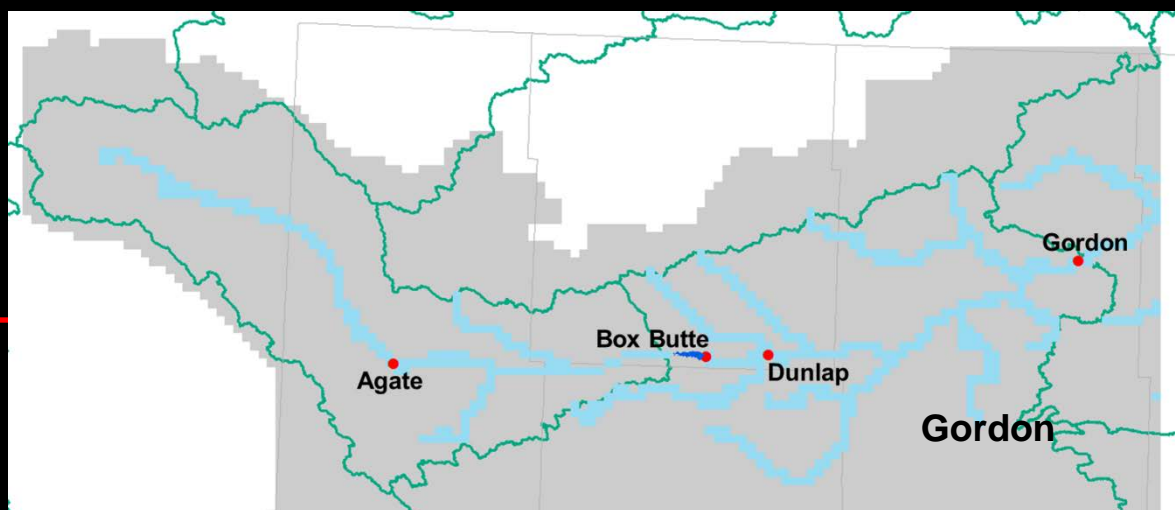
CalibName

Sum of NA_BSR031 Sum of Baseline

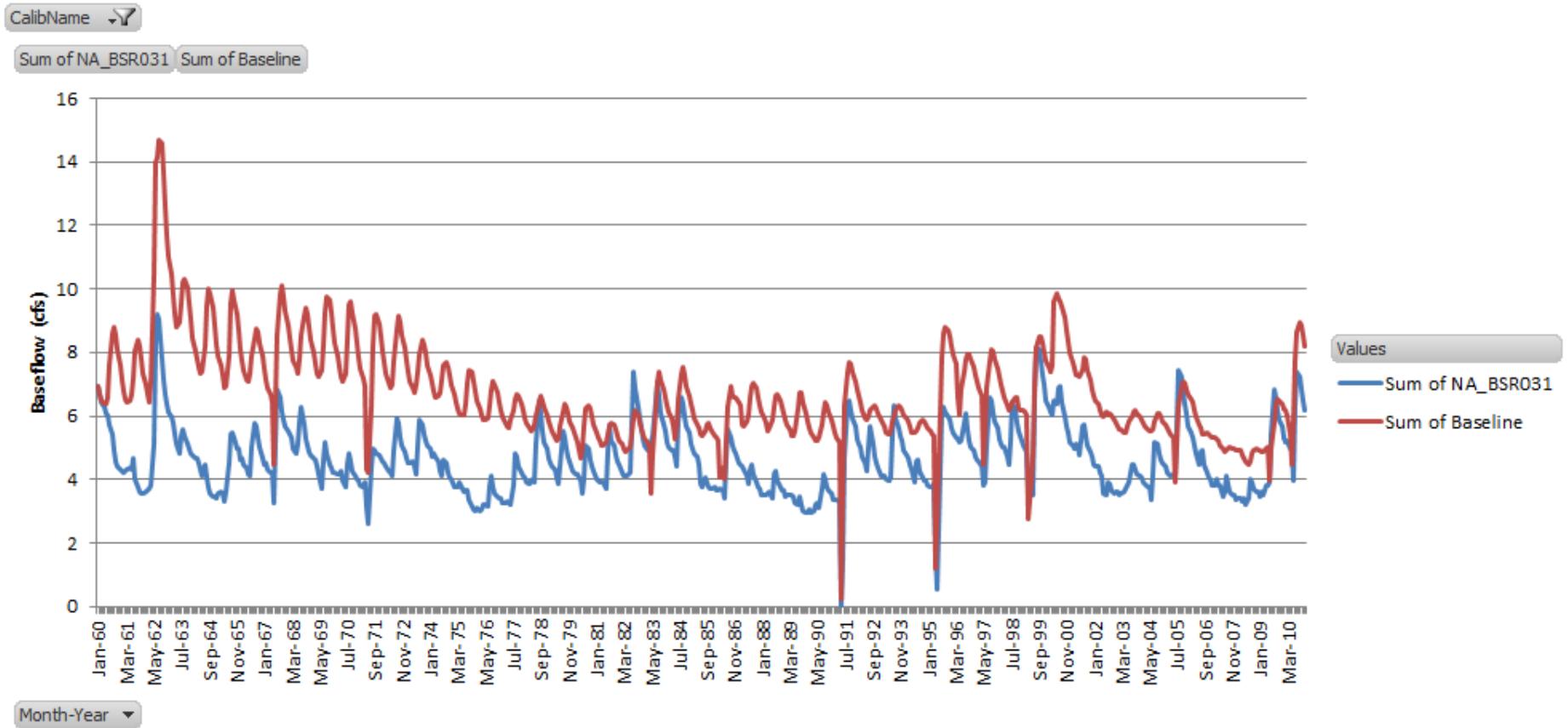
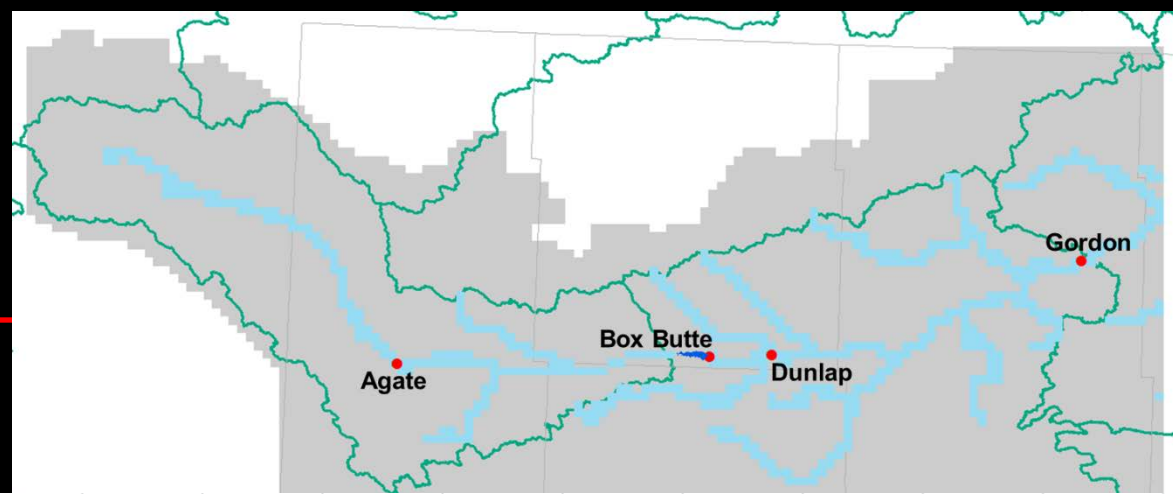


Month-Year

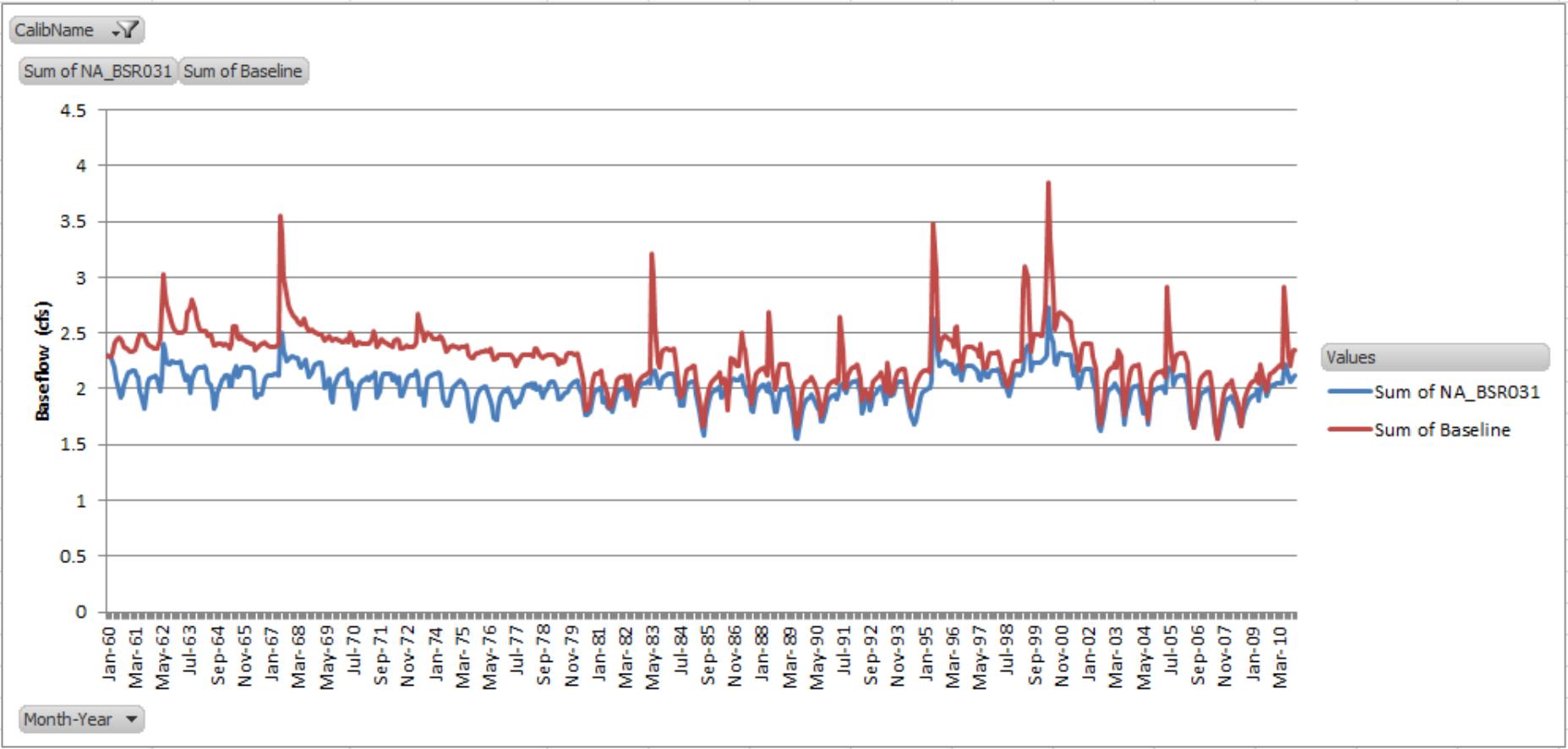
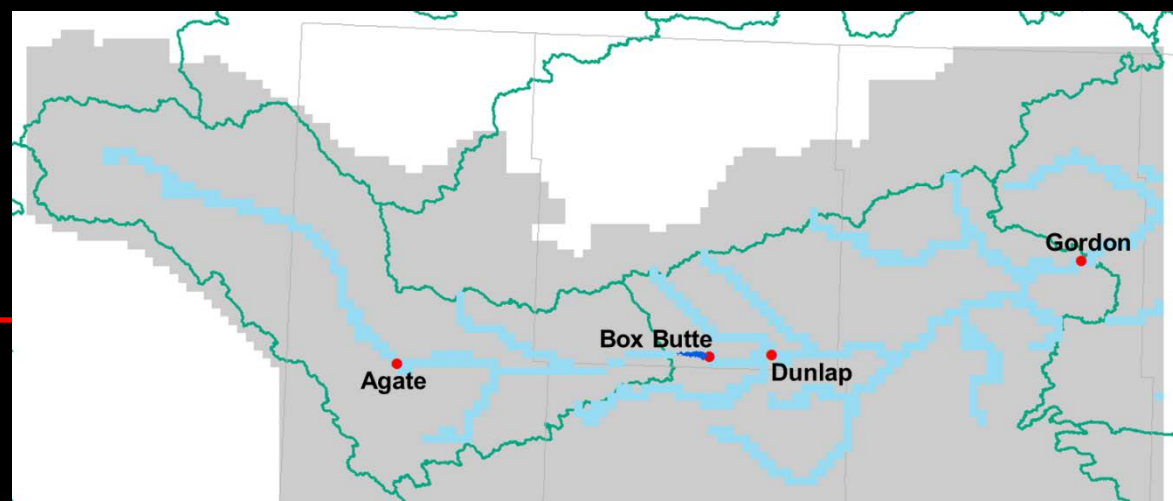
Stateline to Agate



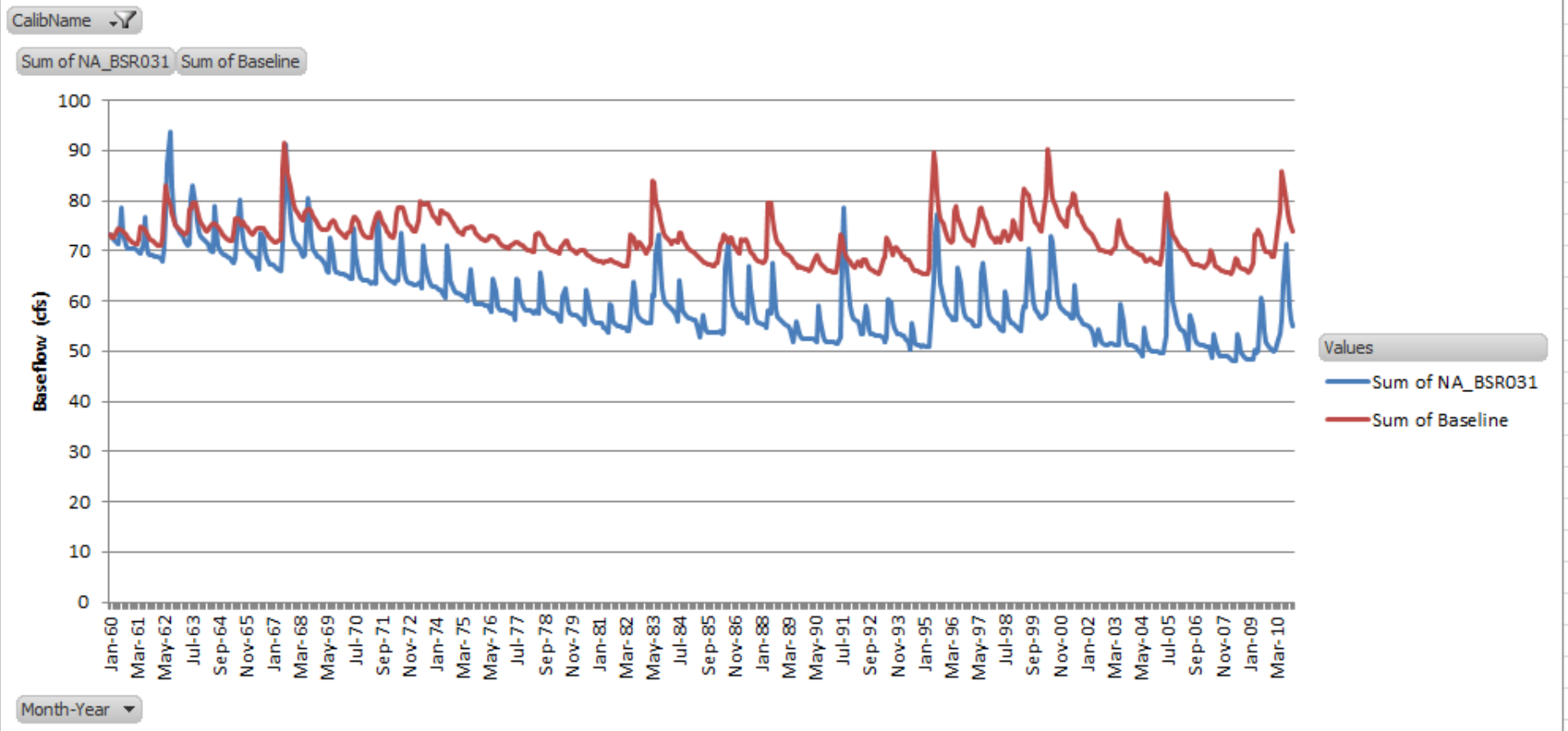
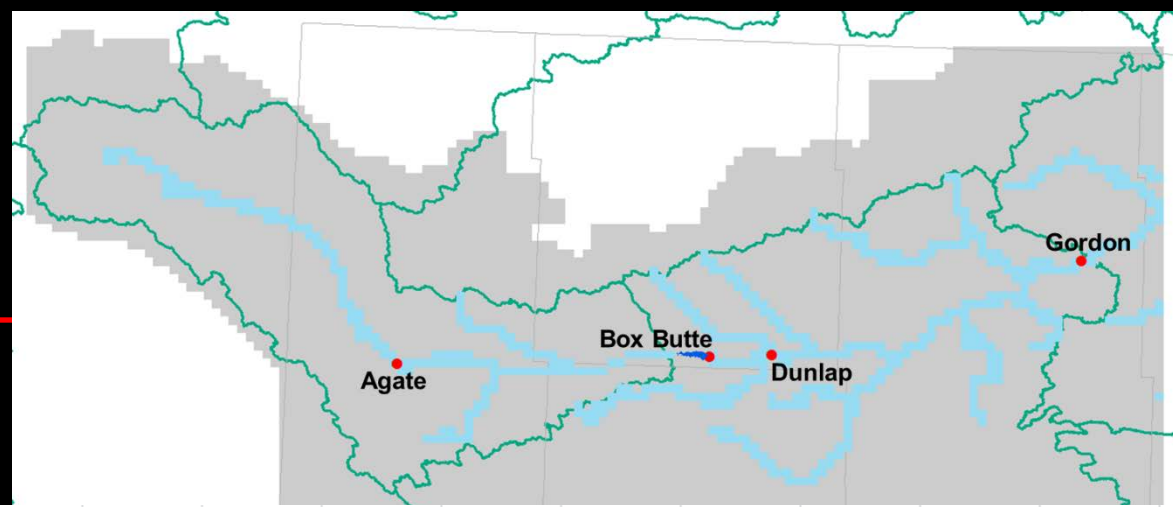
Agate to Box Butte



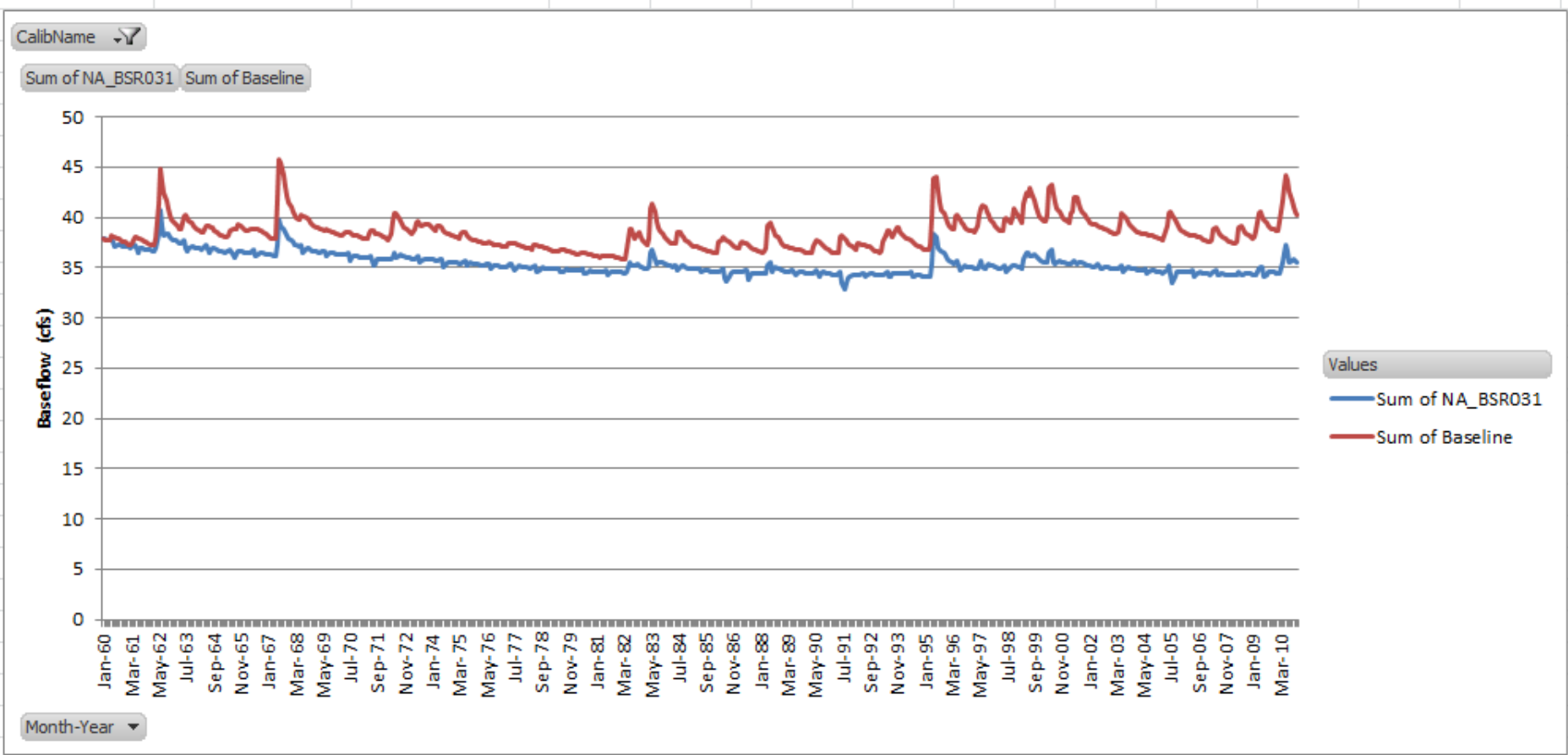
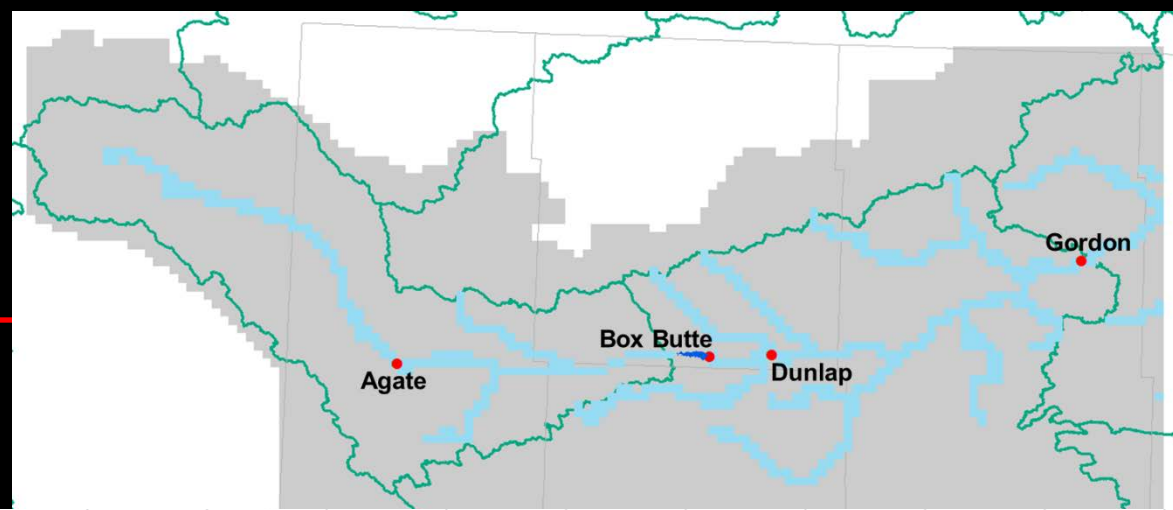
Box Butte to Dunlap



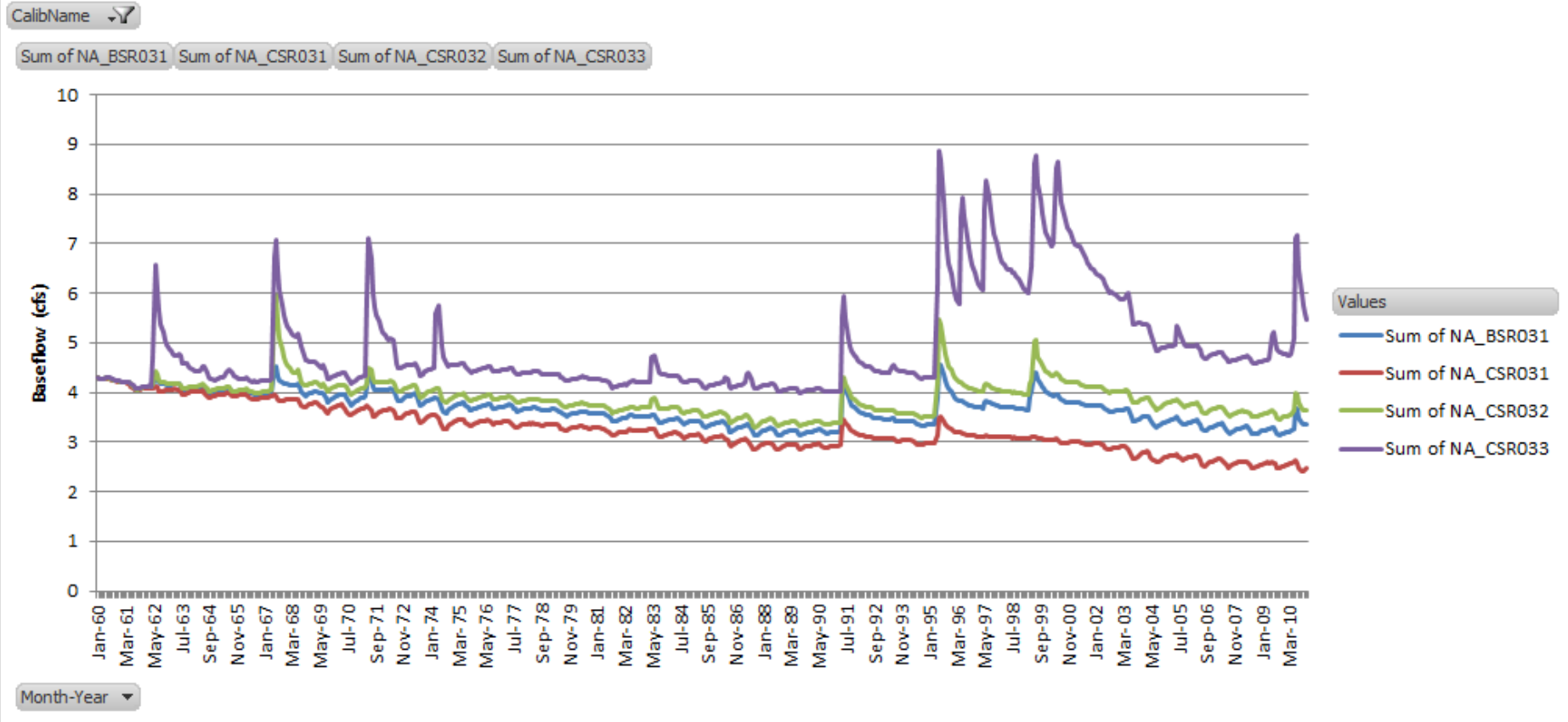
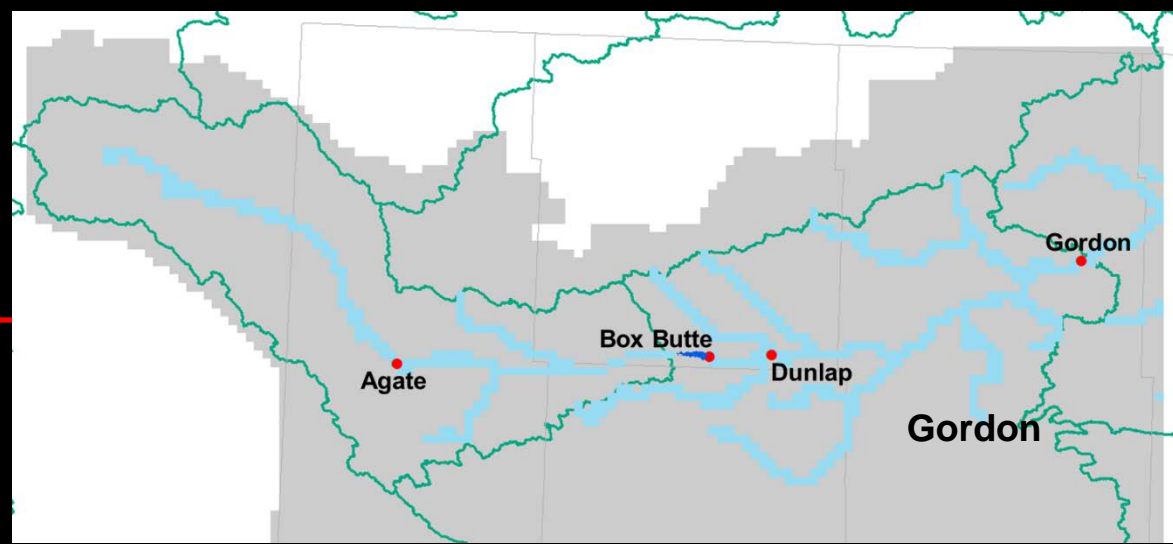
Dunlap to Gordon



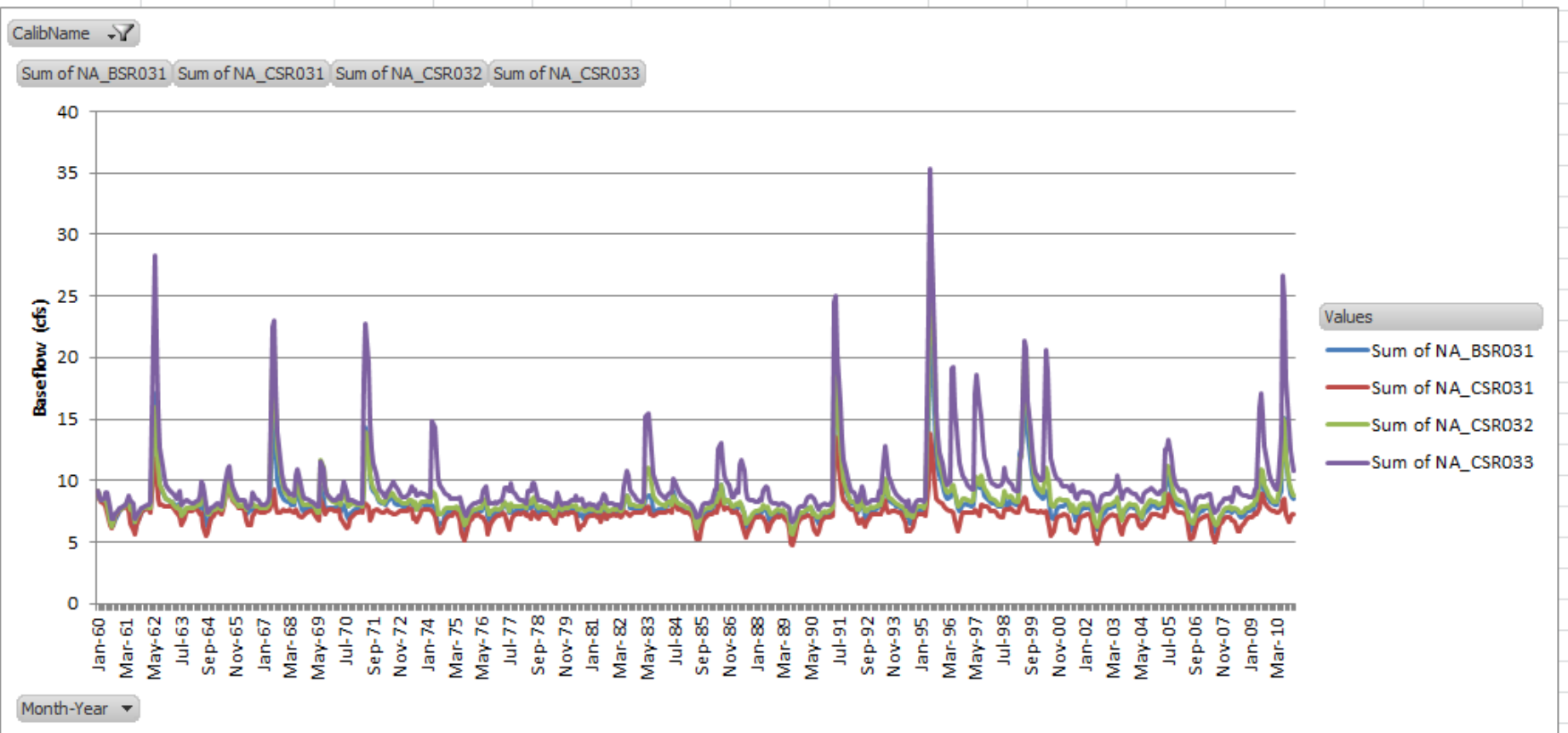
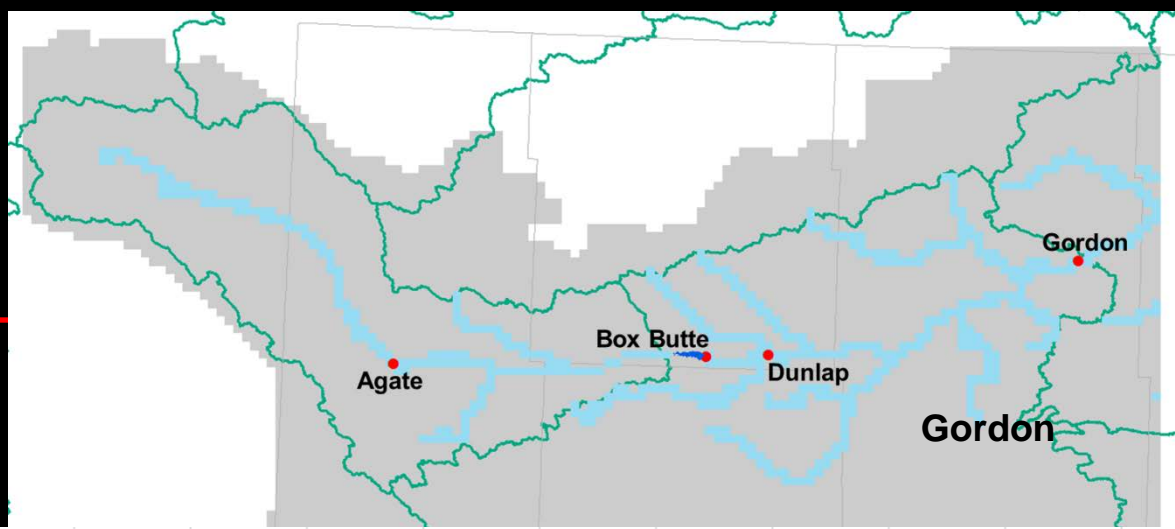
Gordon to Edge



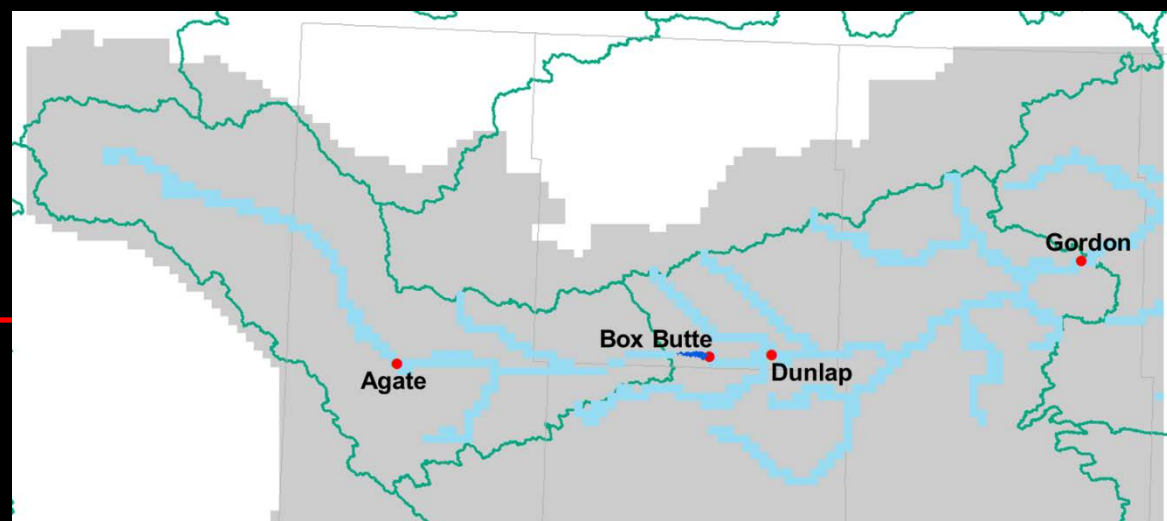
WY to Stateline



Stateline to Agate

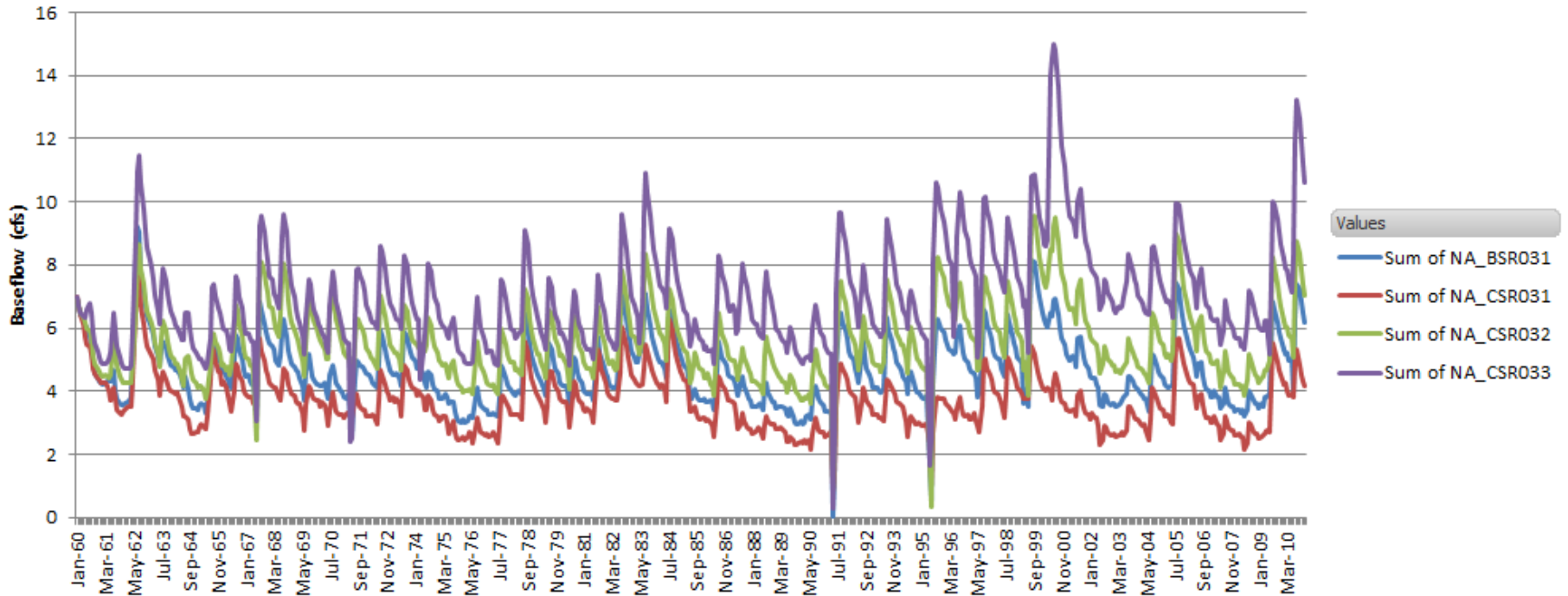


Agate to Box Butte



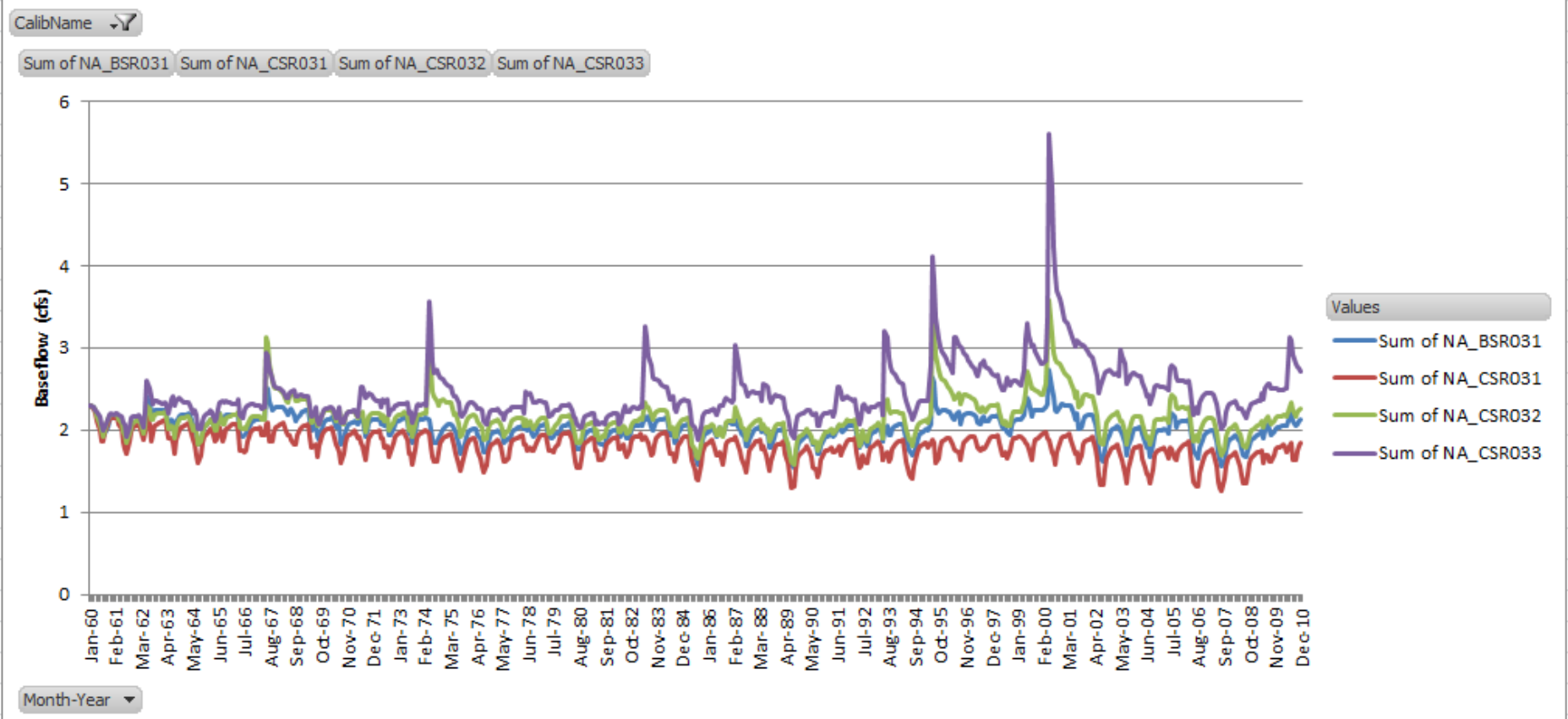
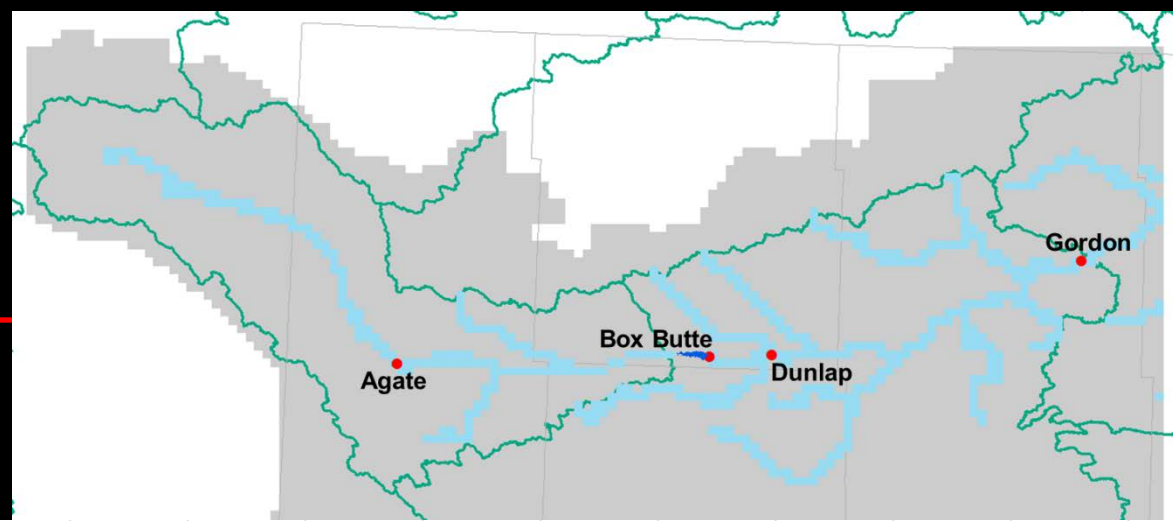
CalibName

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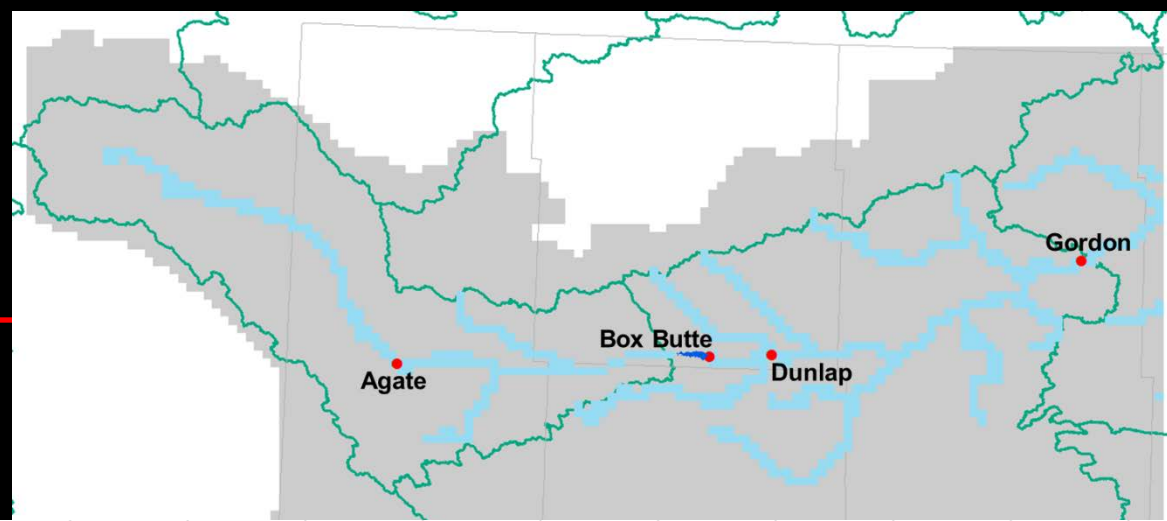


Month-Year

Box Butte to Dunlap

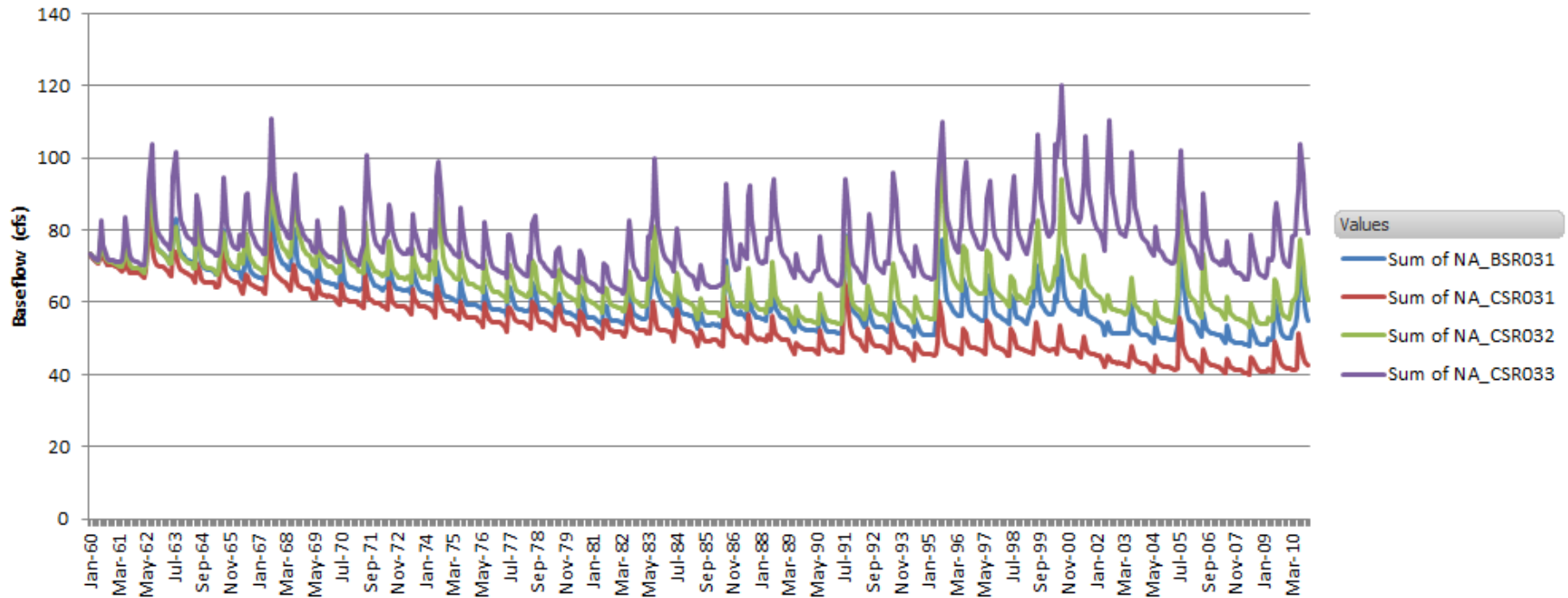


Dunlap to Gordon



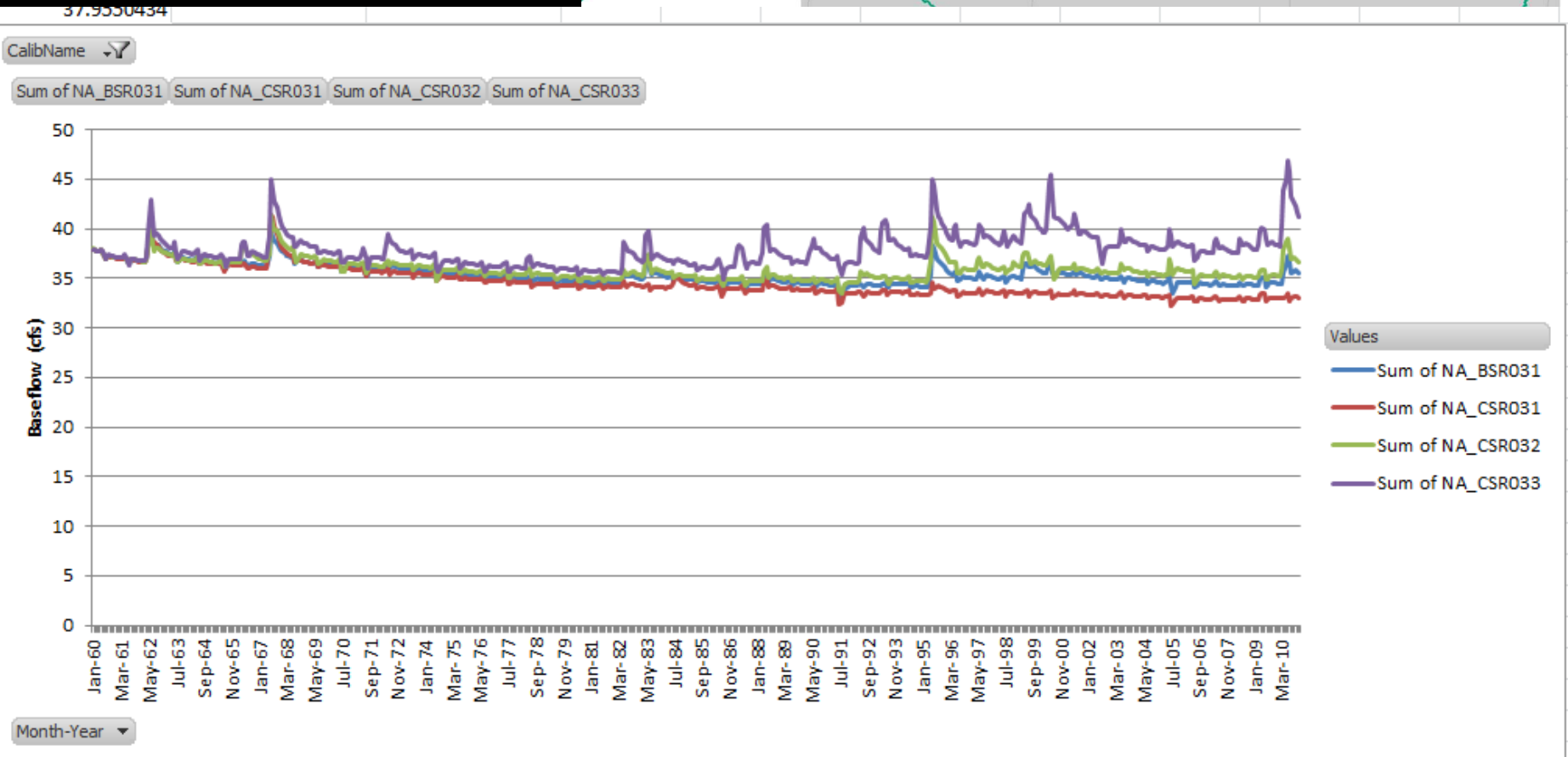
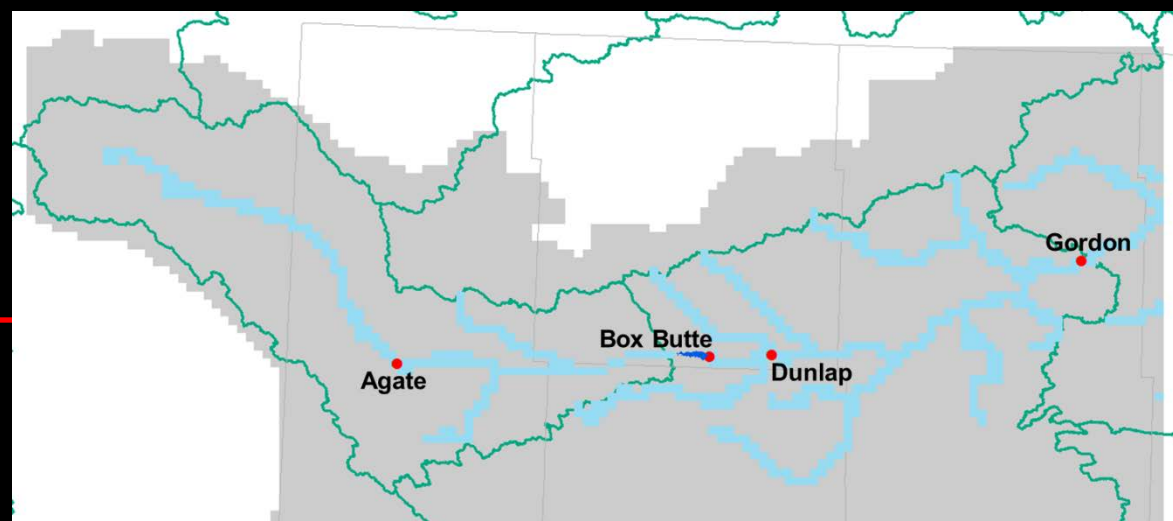
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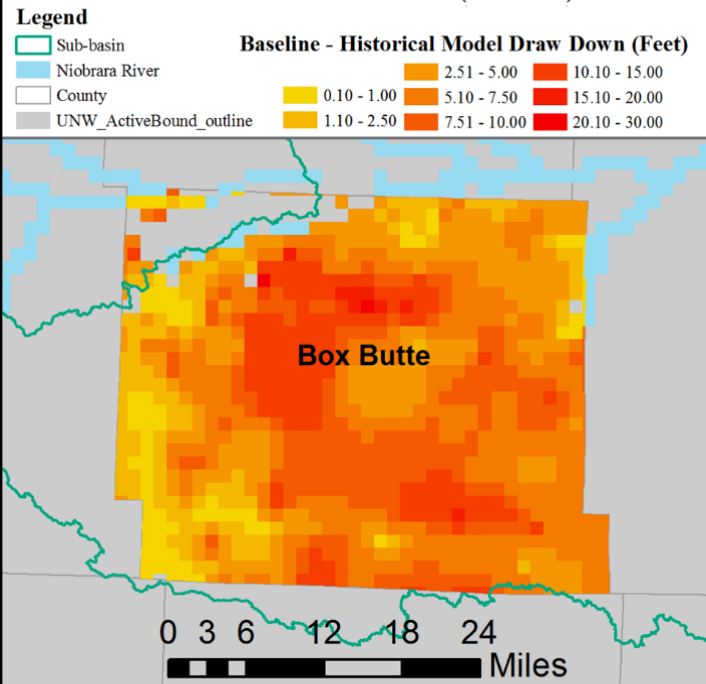


Month-Year

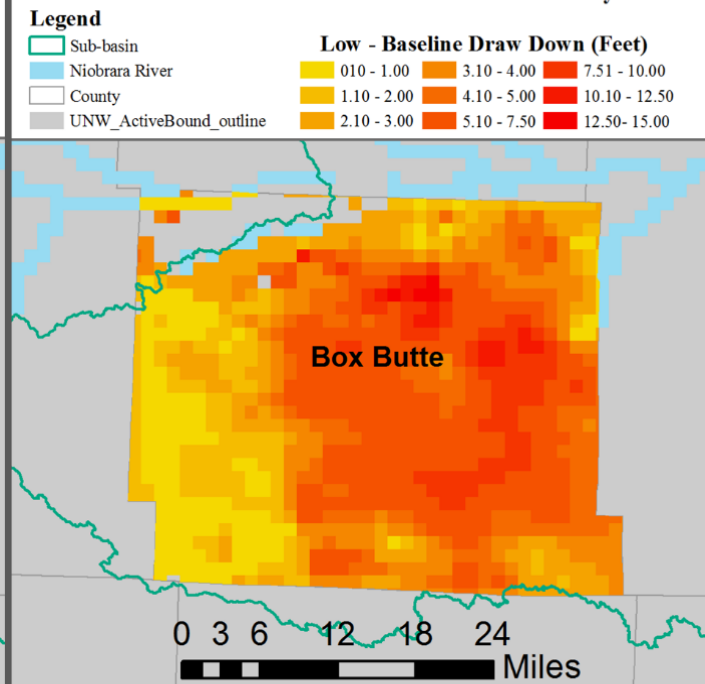
Gordon to Edge



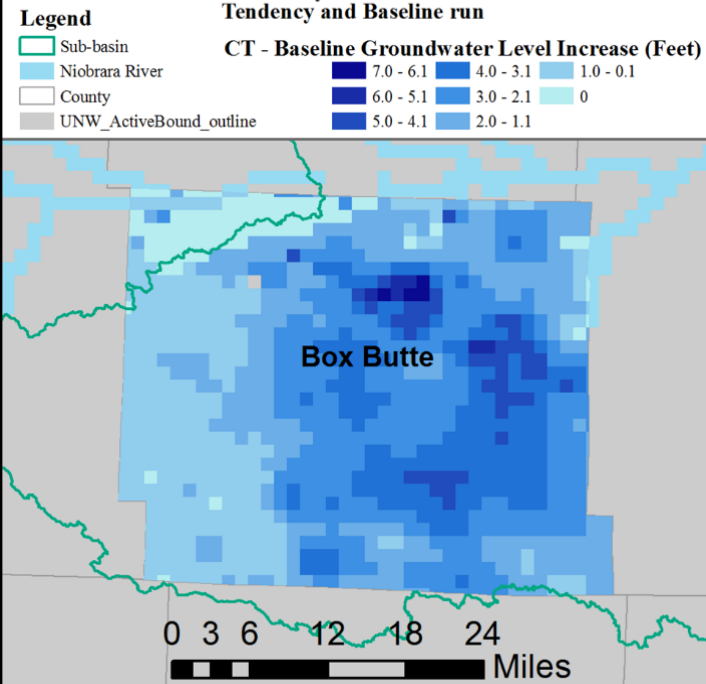
Baseline - Historical Draw down (1960-2010)



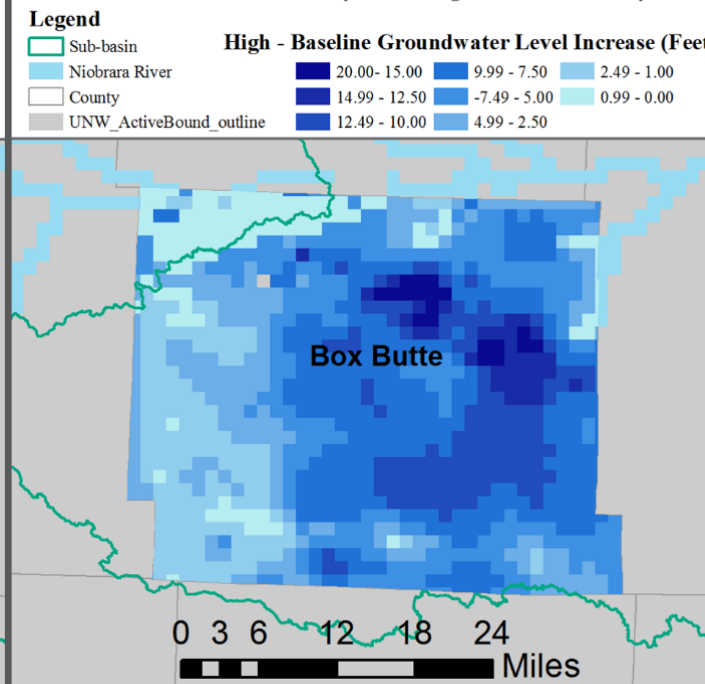
Increase in drawdown due to low water availability



Groundwater level recovery from difference between Central Tendency and Baseline run

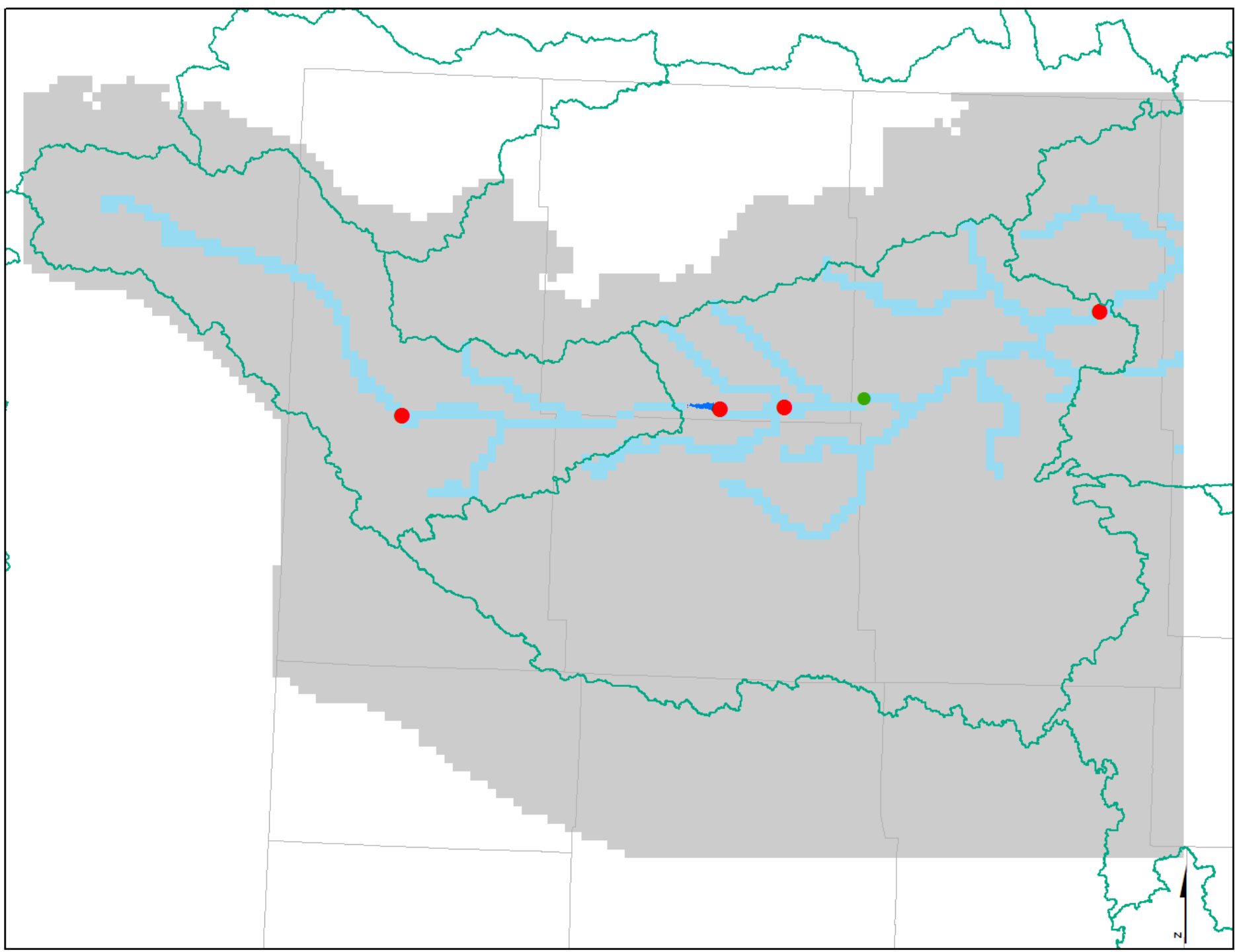


Groundwater level recovery due to High water availability



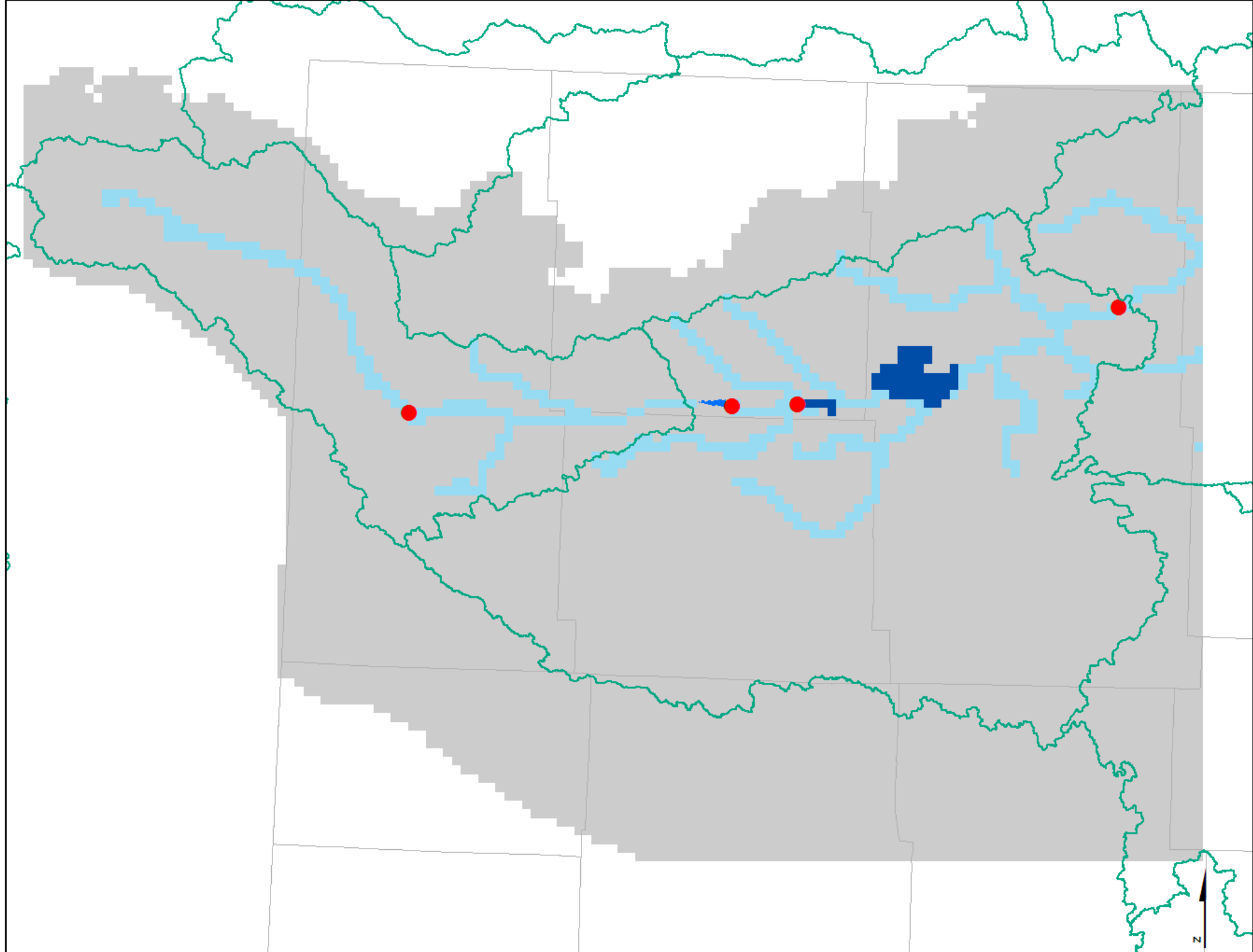
WaterSMART Scenario Results

- Alternative 1 scenario – Pumping station

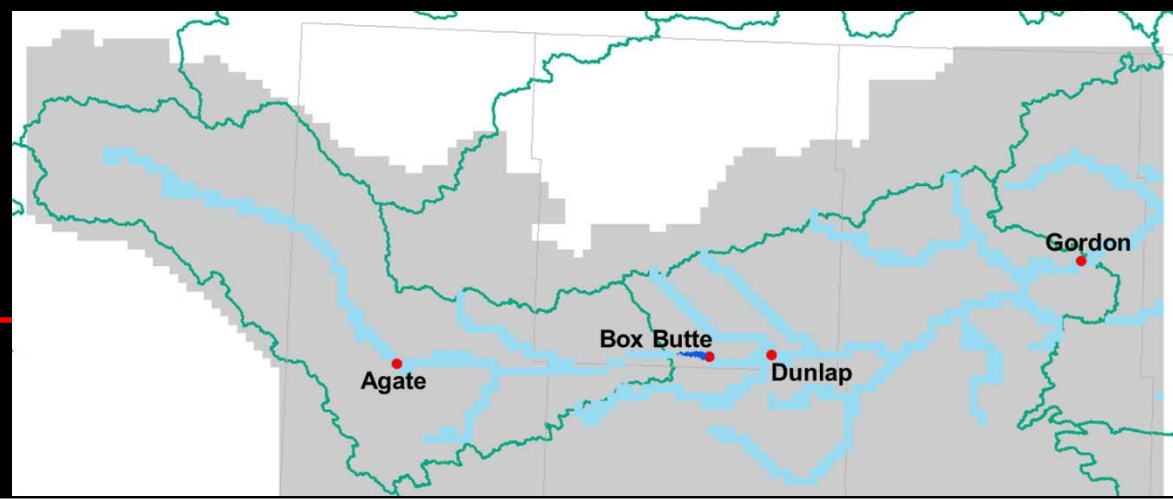


WaterSMART Scenario Results

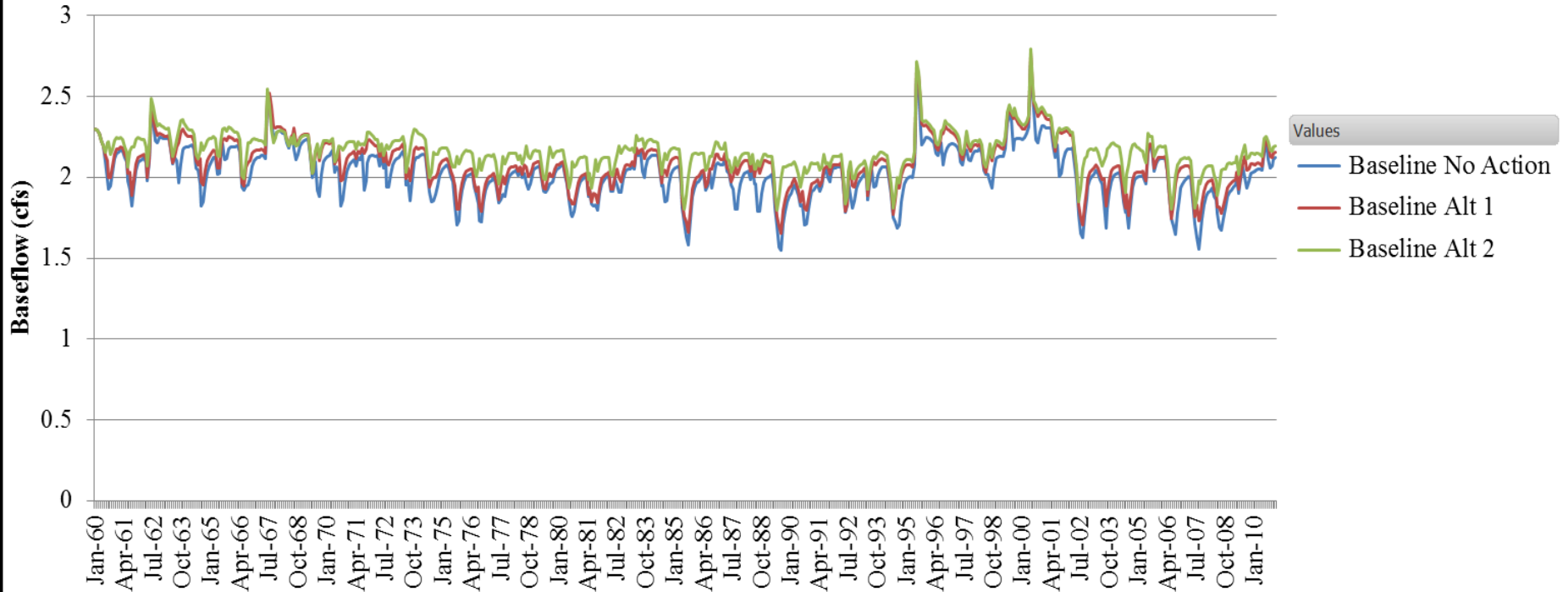
- Alternative 2 scenario – Canal Recharge



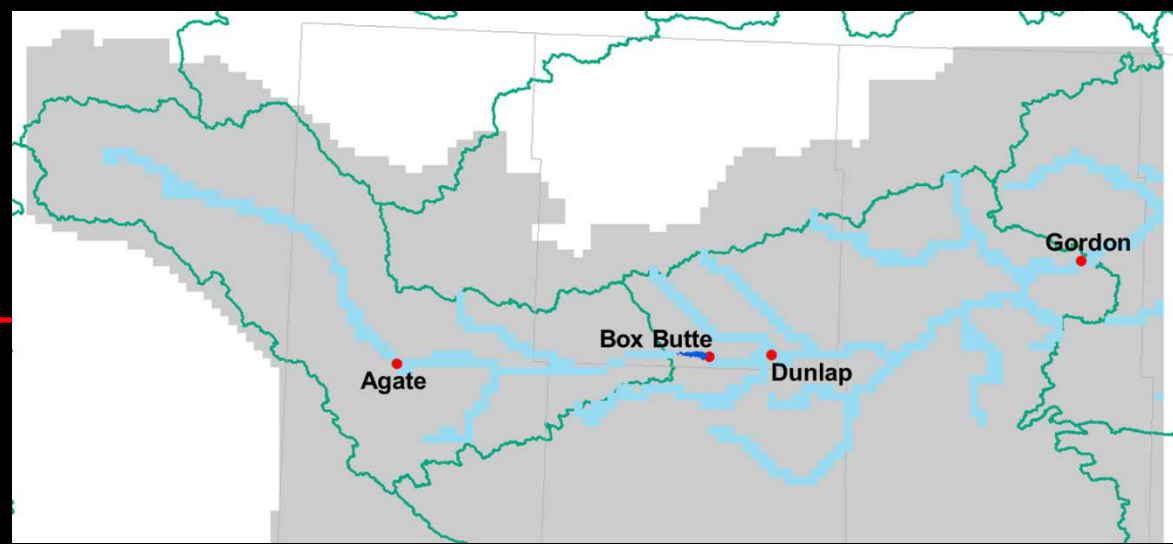
Box Butte to Donlap



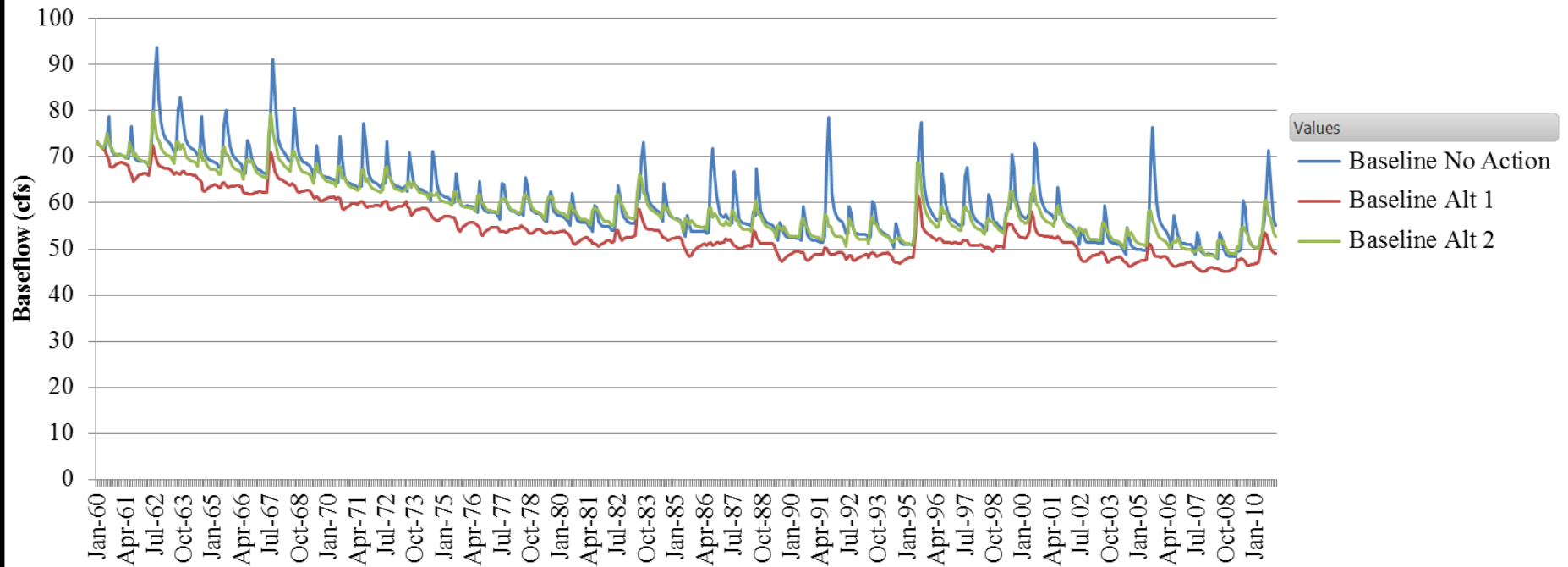
Box Butte to Dunlap Baseline No Action vs. Baseline Alternatives 1 and 2



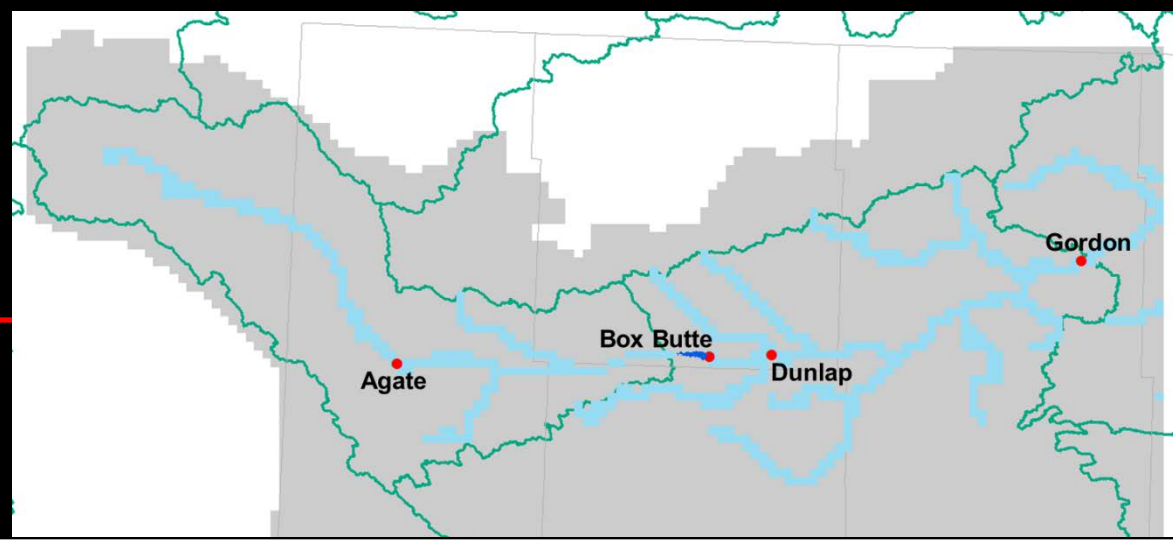
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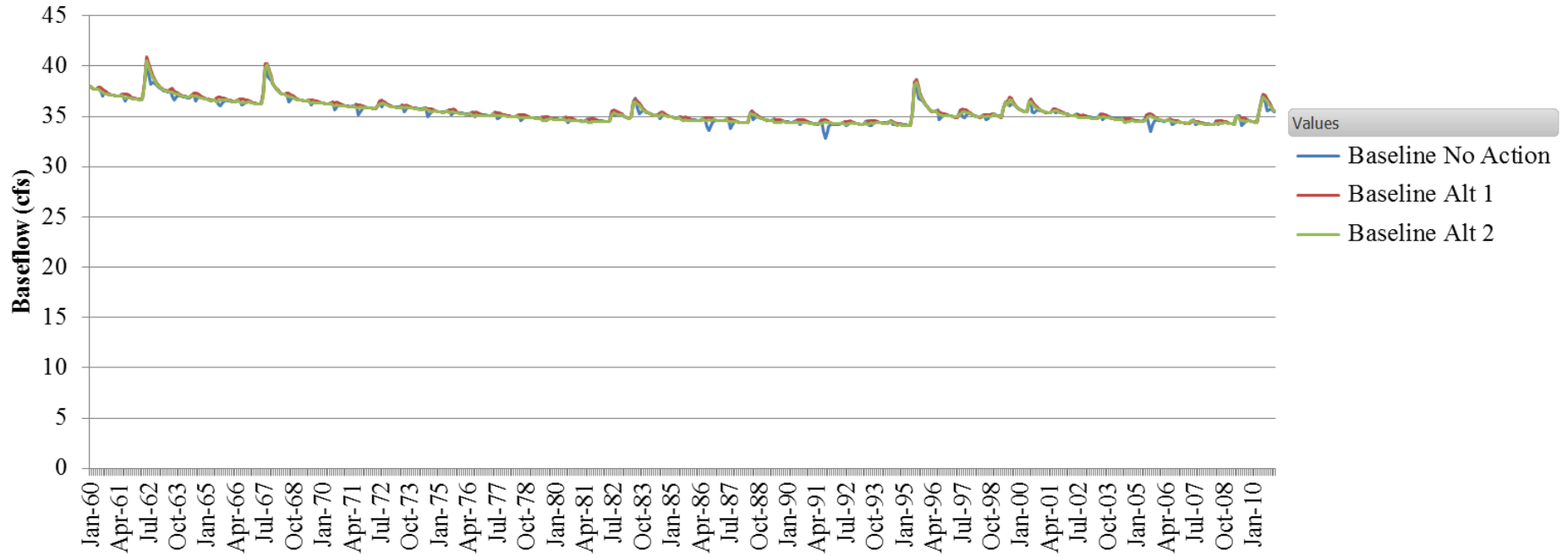
Dunlap to Gordon Baseline No Action vs. Baseline Alternatives 1 and 2



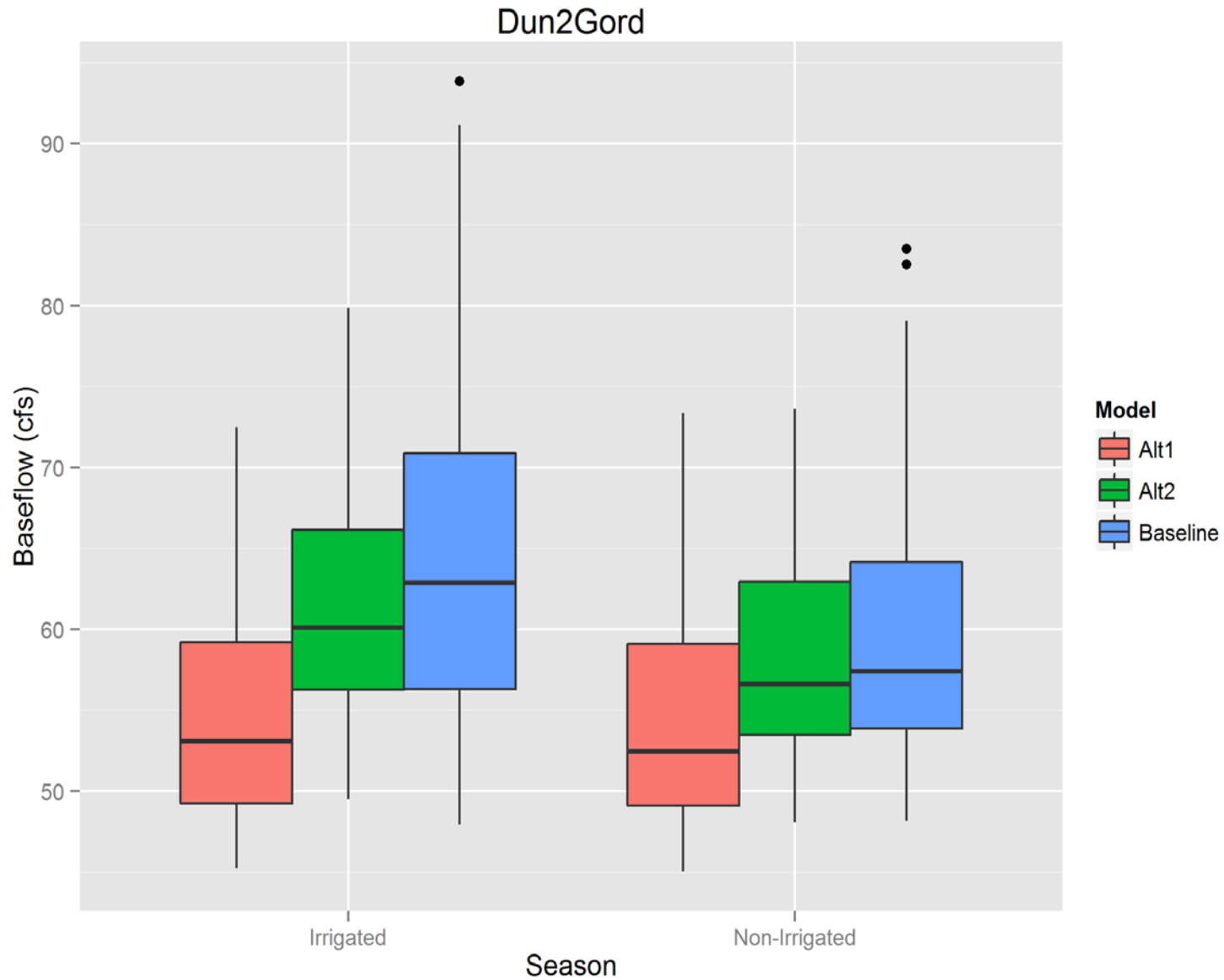
Gordon to Edge



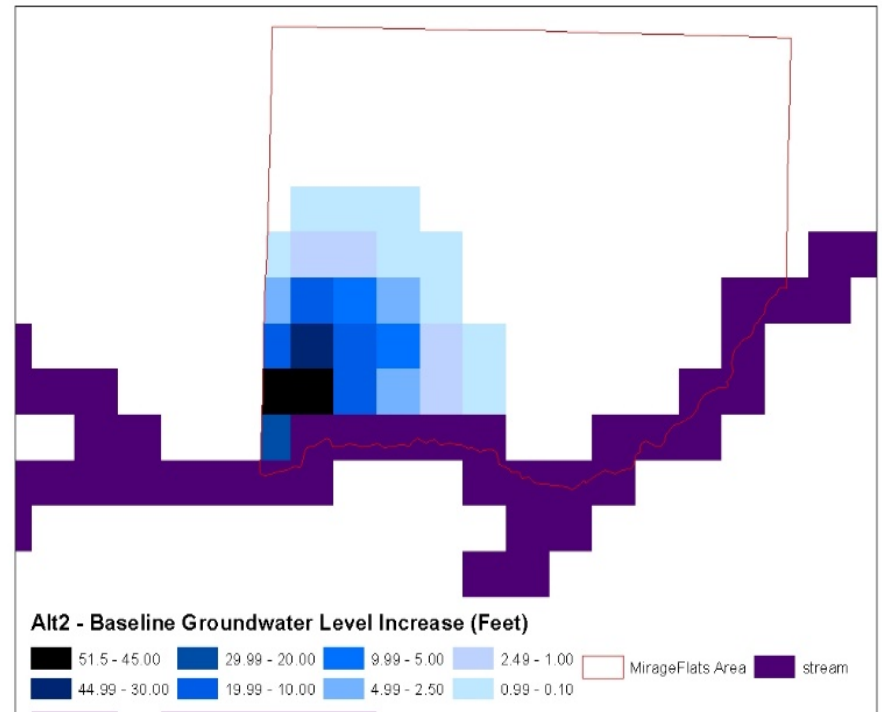
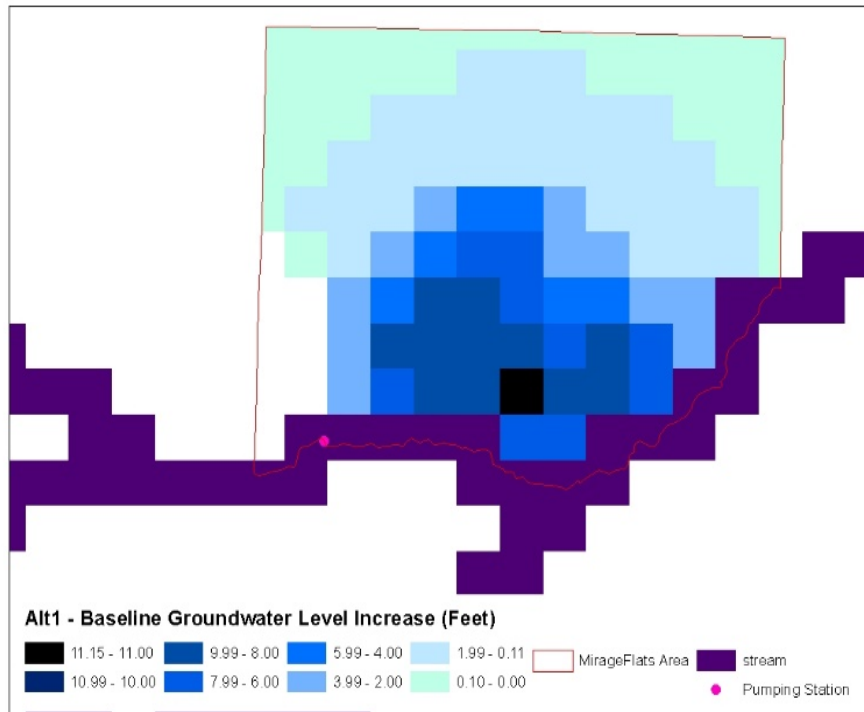
Gordon to Edge Baseline No Action vs. Baseline Alternatives 1 and 2



WaterSMART Scenario

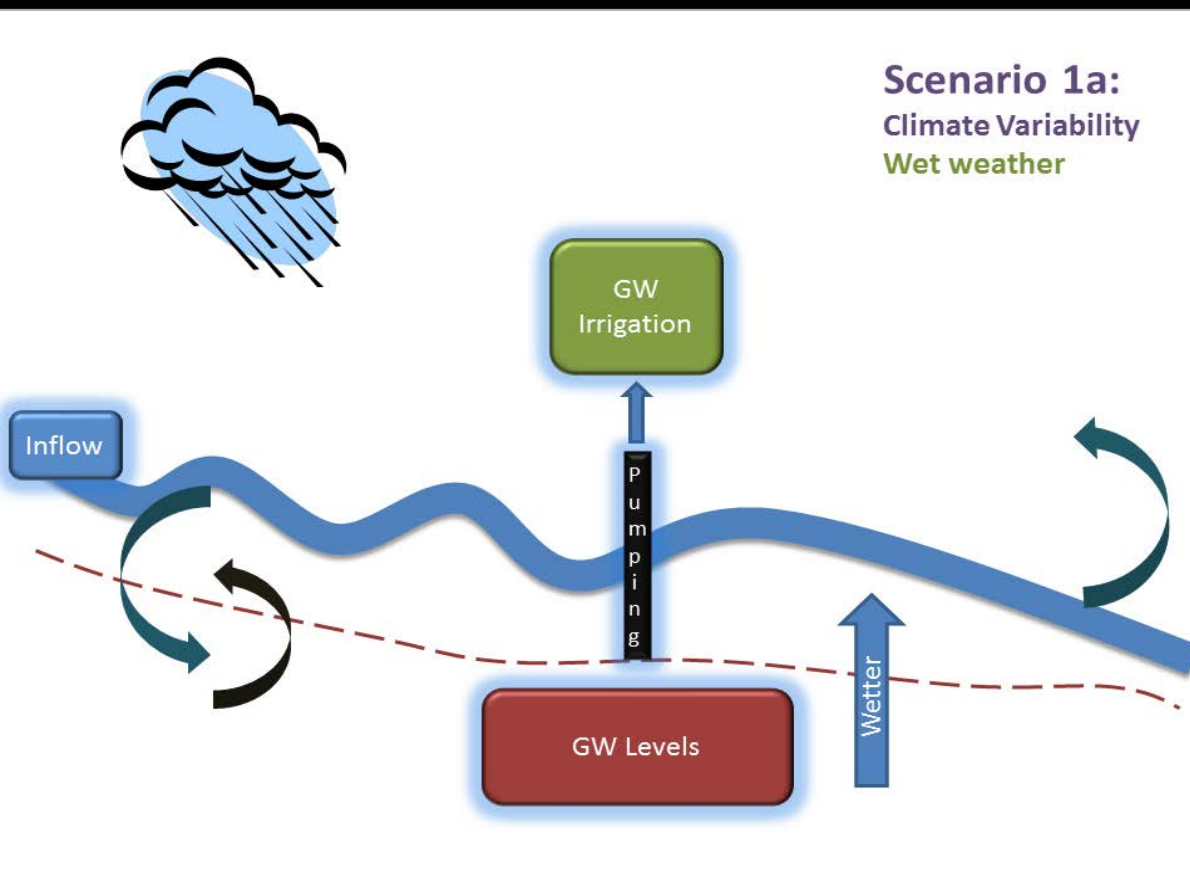


WaterSMART Scenario Results



Management Scenarios

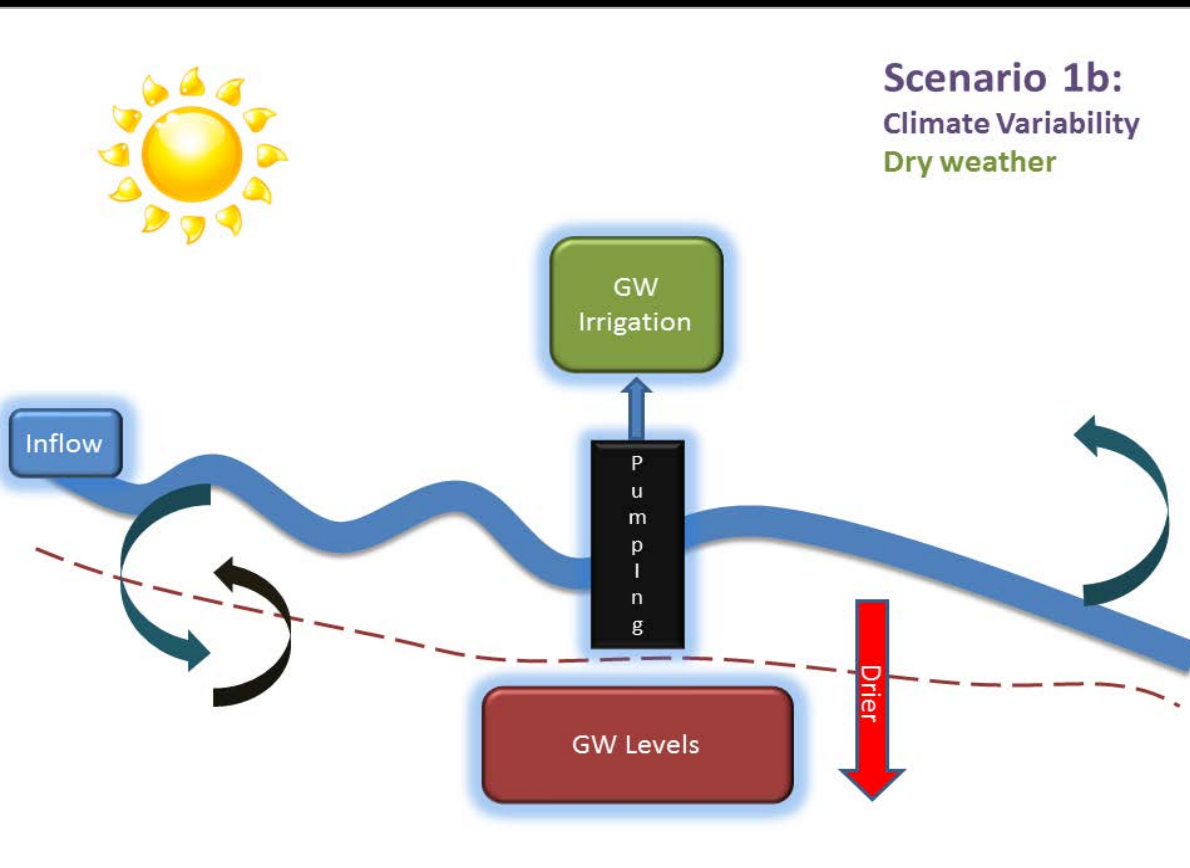
Scenario 1a: Wet Climate



Model
simulation of
wetter weather
condition

Management Scenarios

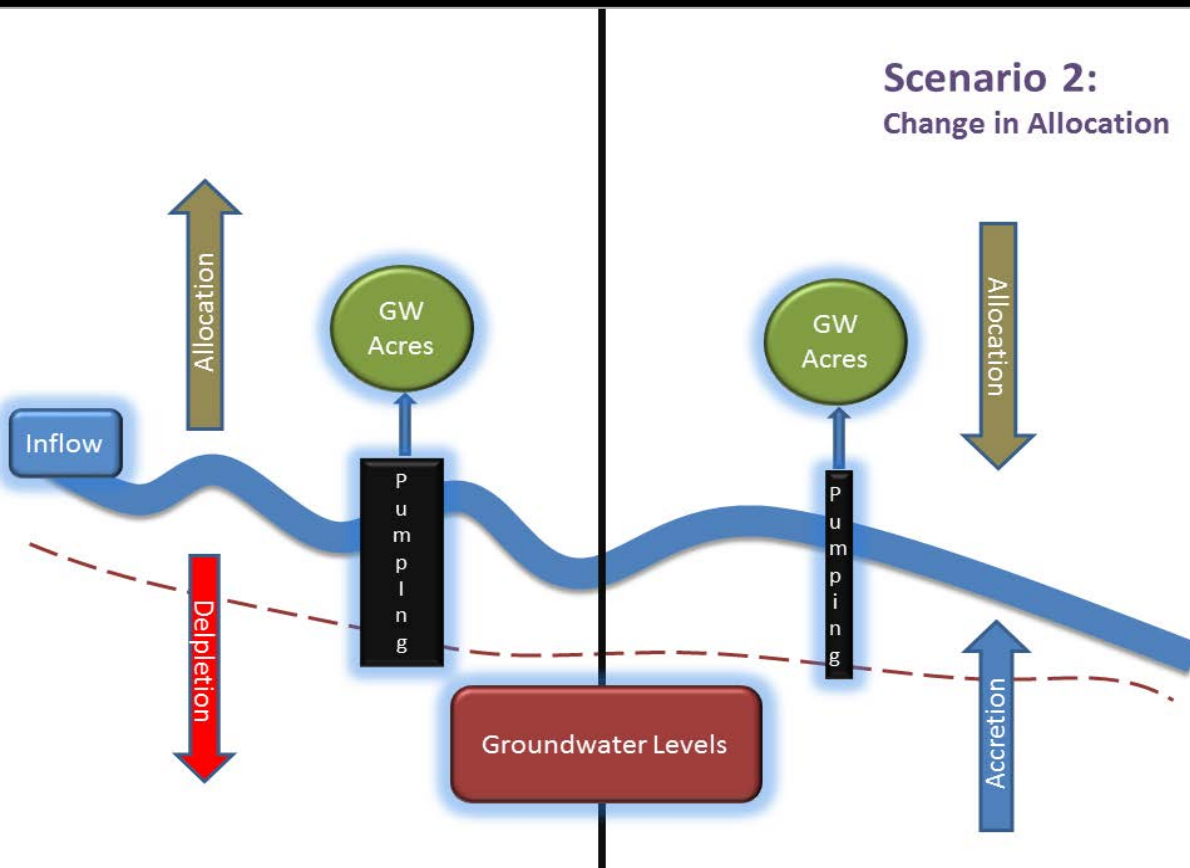
Scenario 1b: Dry Climate



Model
simulation of
drier weather
condition

Management Scenarios

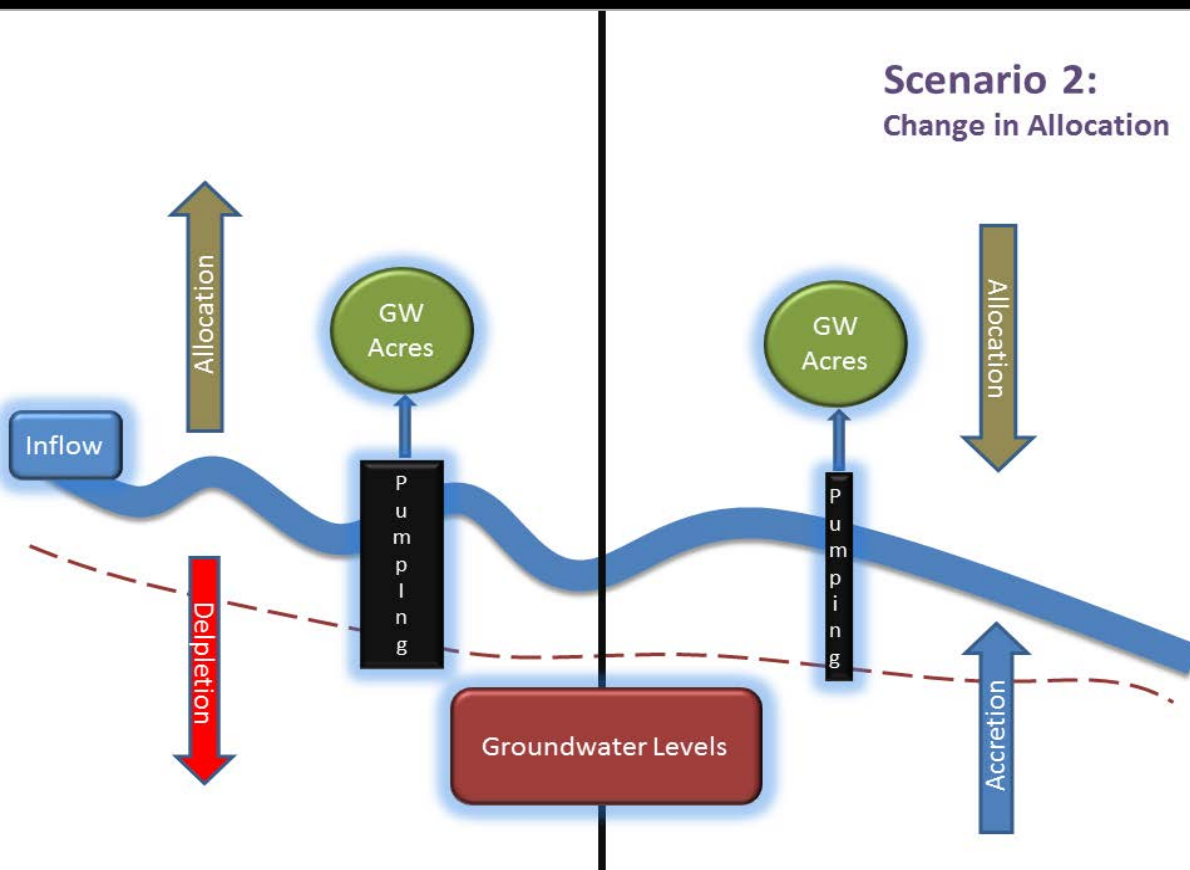
Scenario 2: Change in Allocation



Model simulation of change in allocated groundwater pumping condition

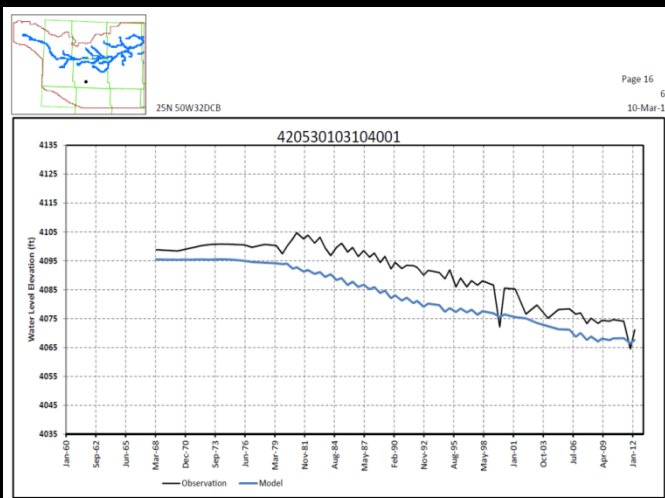
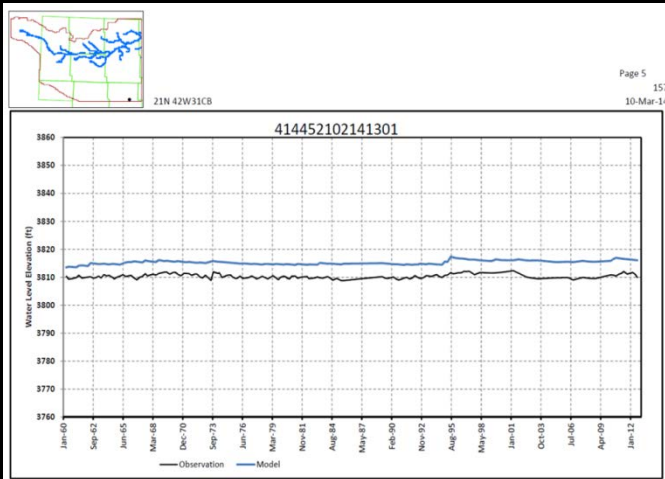
Management Scenarios

Scenario 3: Change in Cropland Condition



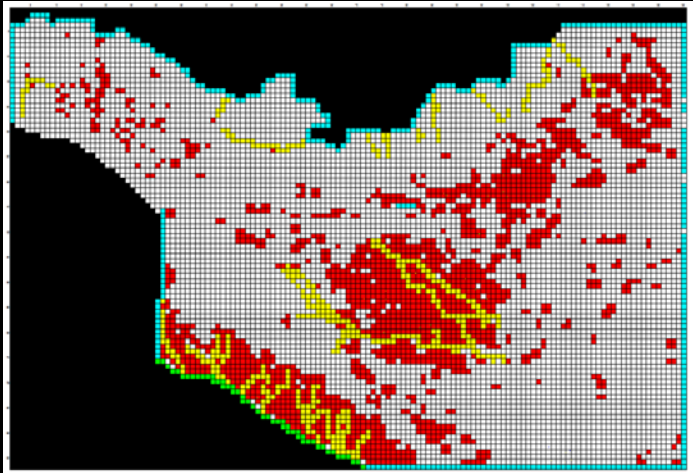
Model simulation of changes in irrigated acreage and crop type

Refinement of UNW Model



- Better data is now available
- Recalibration of model
 - Compare modeled data to updated meter data
 - Recalibrate model - modify model to more closely match observed conditions

Potential Scenarios



Please give us
your input after
the presentation!

- Future use of the UNW Model
 - What does the public want to know about potential future conditions?
 - What management actions have occurred and how can their impacts be analyzed?
 - What information would be useful to the UNW water users?



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&

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