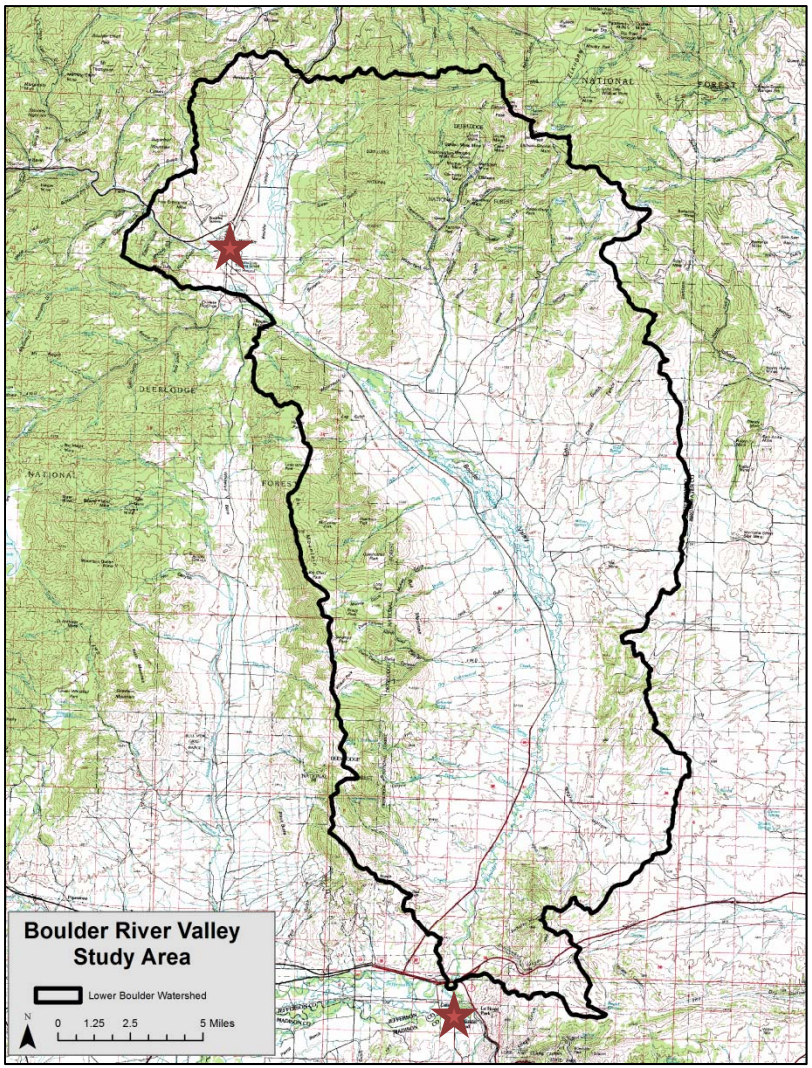
Boulder River Valley Groundwater Investigation



Observations:

- The Boulder River is over allocated.
  - There is not enough water to meet existing water rights.
  - Some parts of the river regularly run dry in the late summer.
- There are concerns that increased groundwater development will further reduce stream flows.
- It has been suggested that if spring peak flow were diverted to groundwater, it could enhance late summer flows.

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10/11/12

Objectives

- Primary Questions
  - Evaluate hydrogeologic effects of current and potential future groundwater development
  - Evaluate the potential for increasing late summer flows through enhanced groundwater recharge

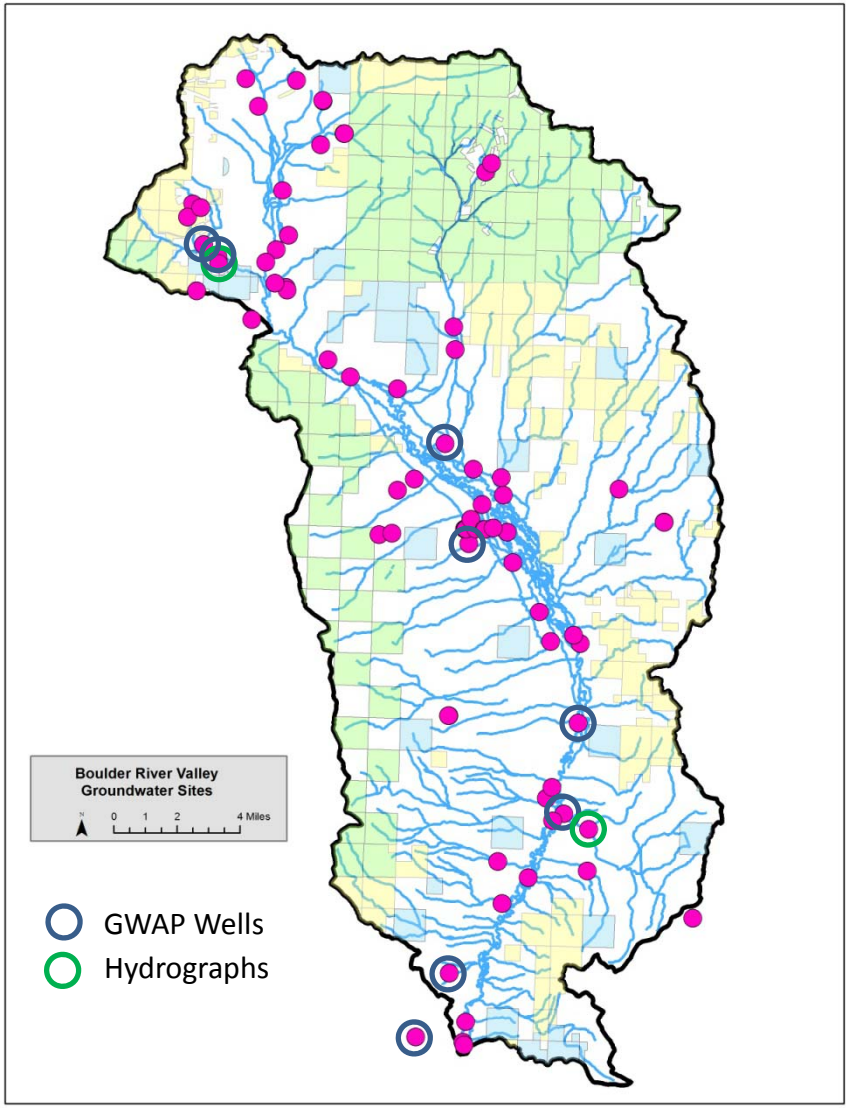
- Approaches:
  - Characterize the physical groundwater flow system
  - Quantify surface-water – groundwater interactions
  - Characterize water chemistry
  - Answer the questions through modeling

Field Work

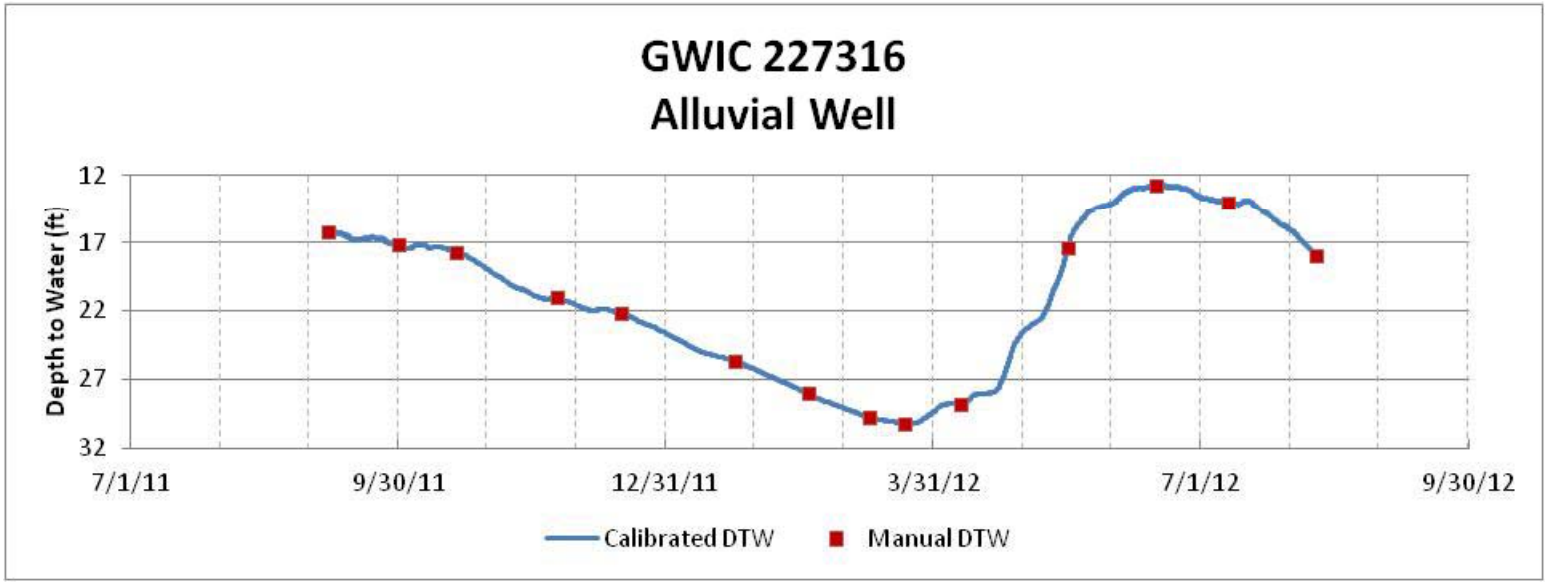
- Install Wells
  - 8 Bedrock Wells
  - 6 Alluvial Wells
  - 9 Transect Wells
- Monitor
  - Groundwater
  - Surface Water
  - Canals
  - Water Quality
- Aquifer Tests

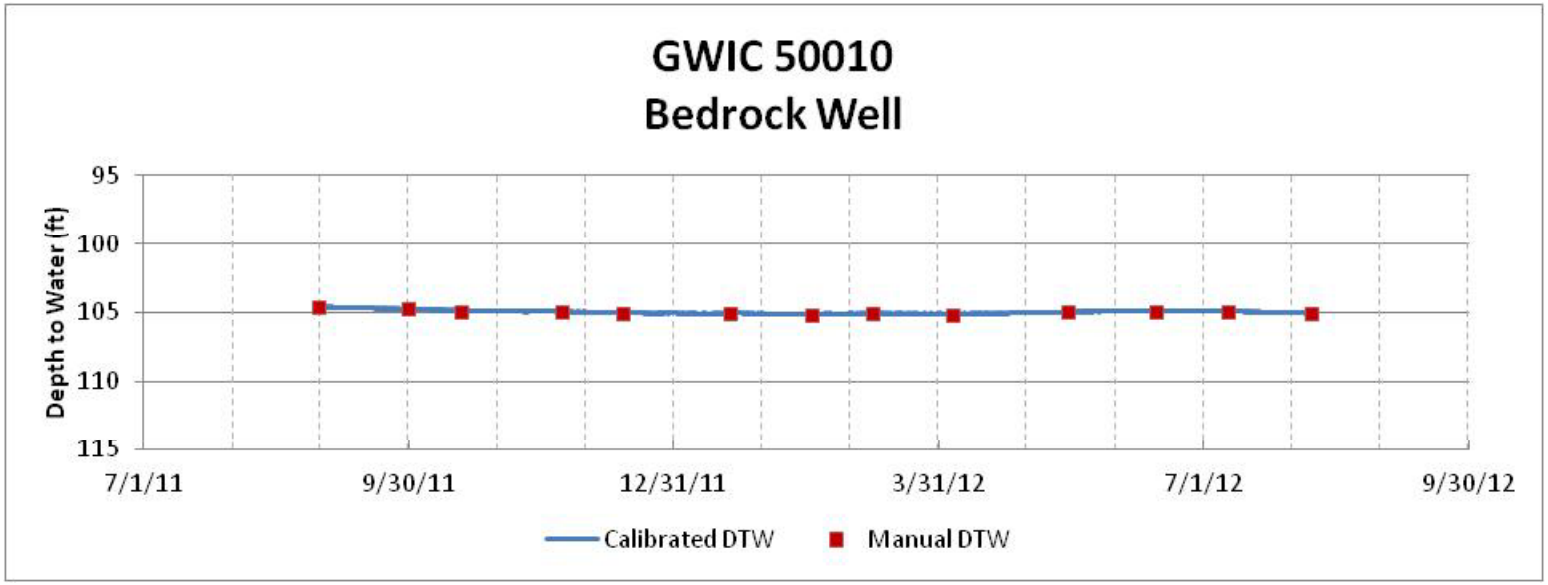
Groundwater Monitoring

- 79 Groundwater Sites
  - Monthly Monitoring
  - 28 with Transducers
  - 8 Sites with longer term records (GWAP)



Groundwater Hydrographs

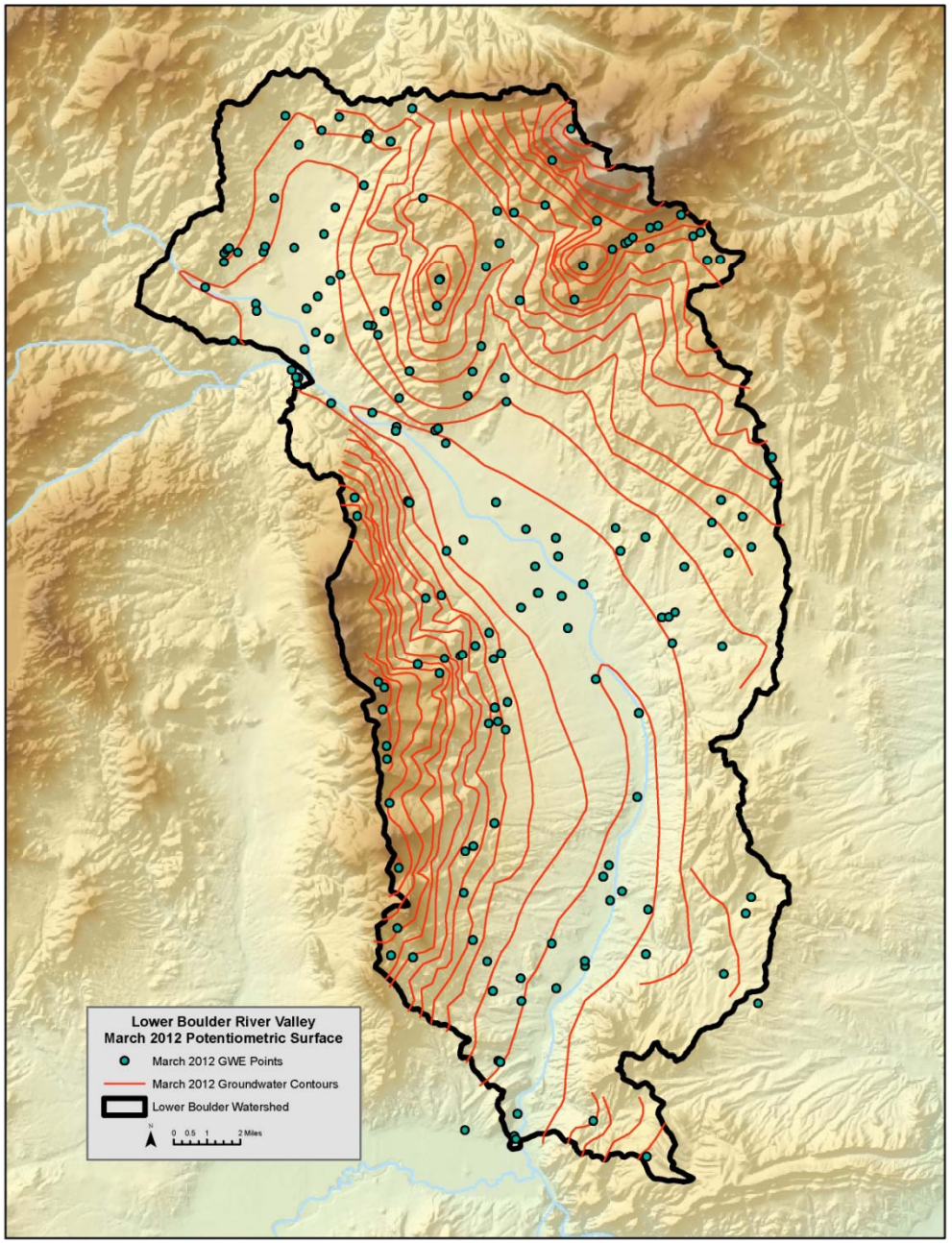




Potentiometric Surface Map (March, 2012)

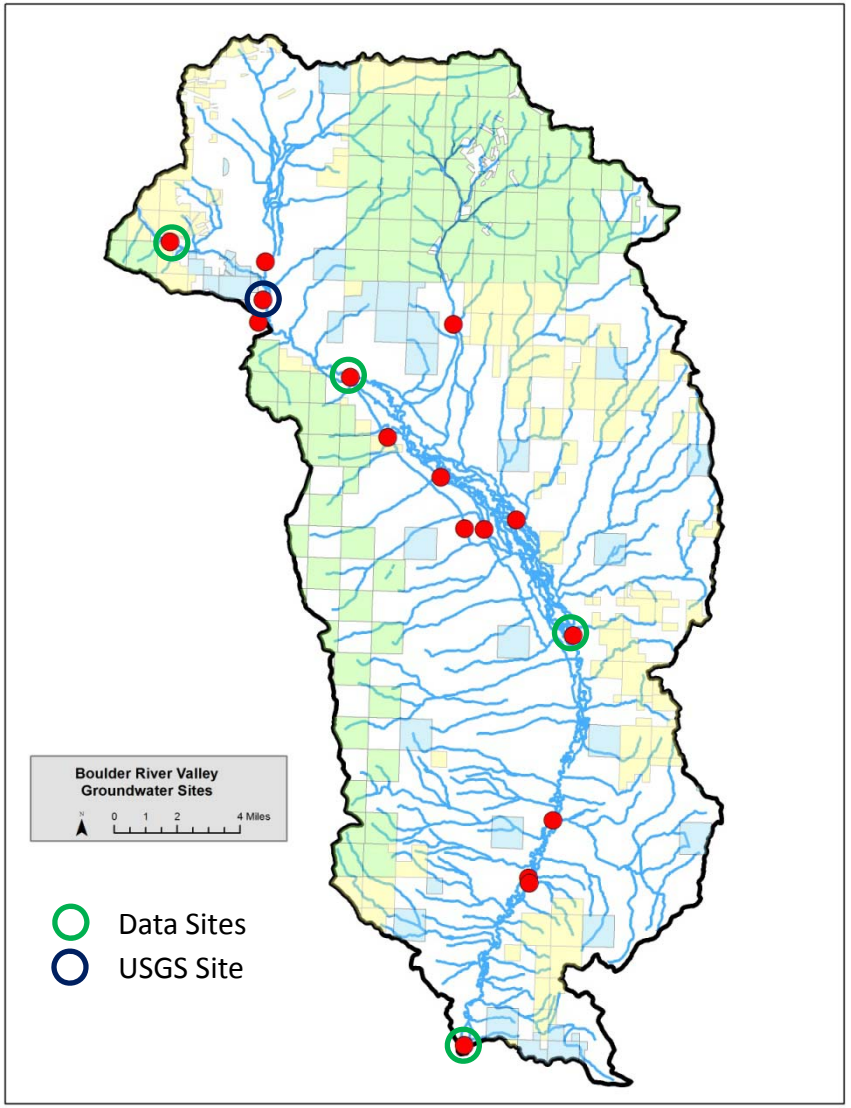
Contoured Groundwater Elevations

- Water flows down gradient
- Spacing of contours is indicative of permeability
- Gradient is used to calculate flux
- Provides data against which models will be calibrated

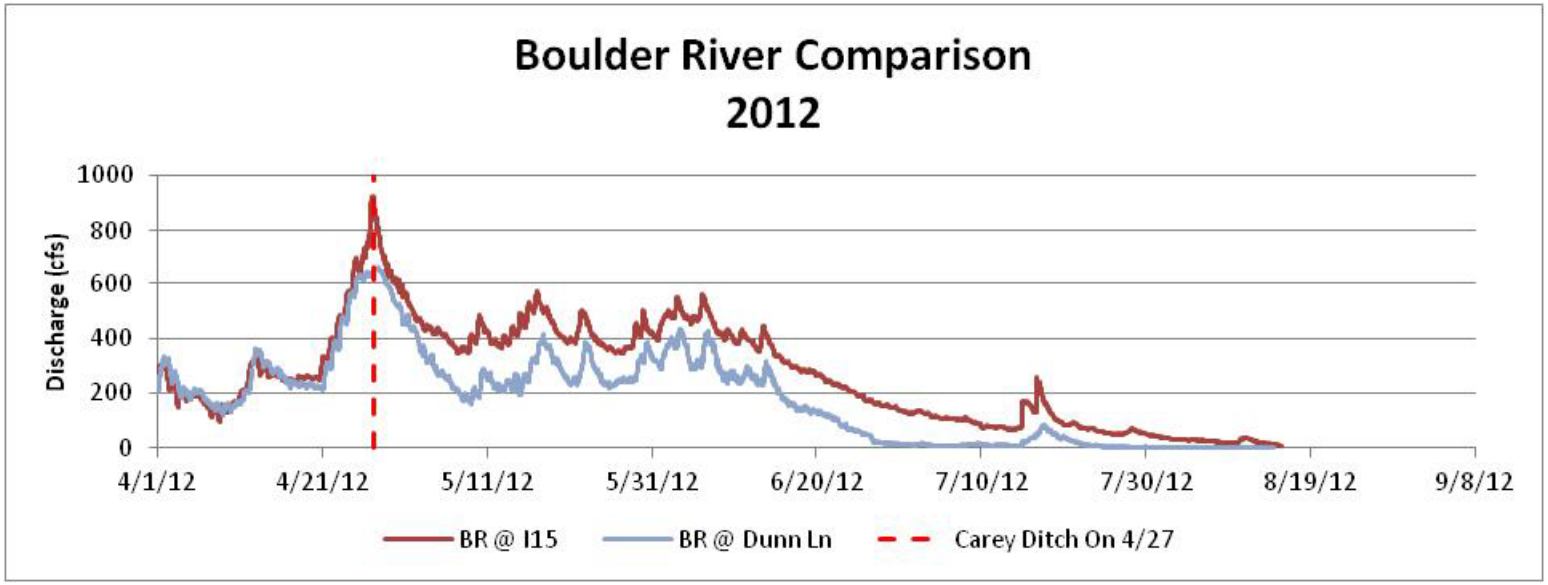


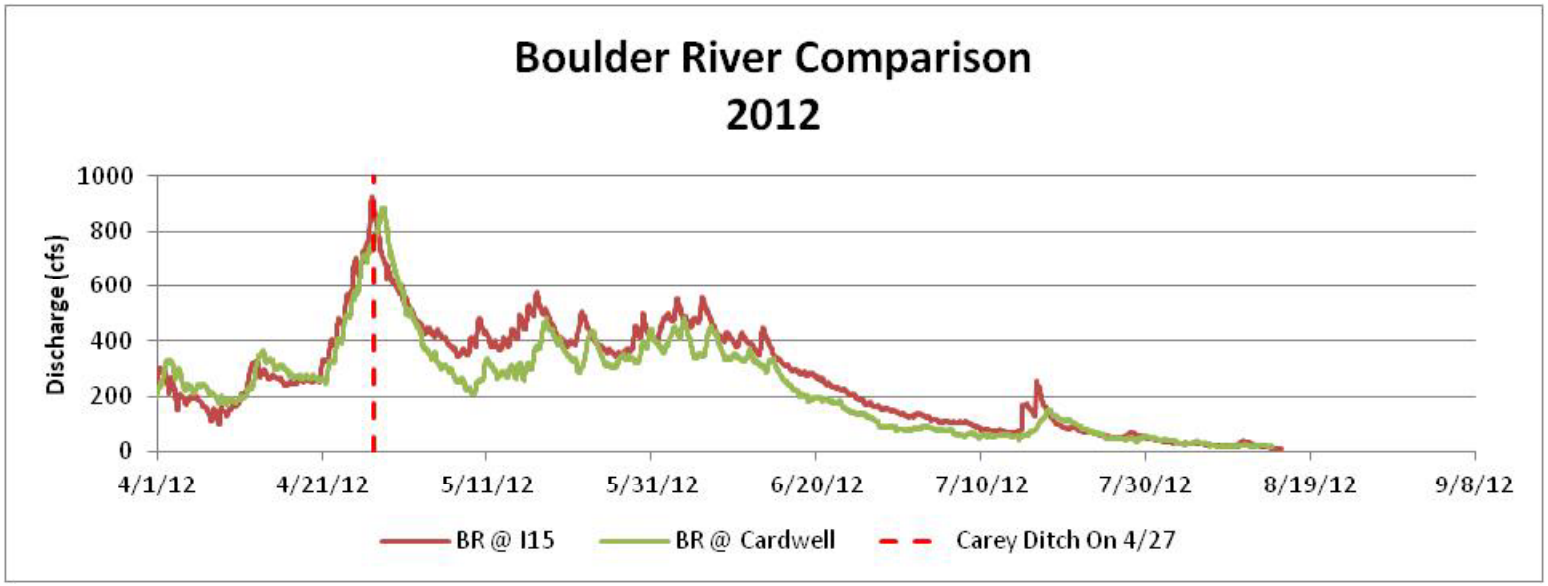
Surface-Water Monitoring

- 16 Surface-Water Sites
  - Streams and Canals
  - 6 Paired with wells

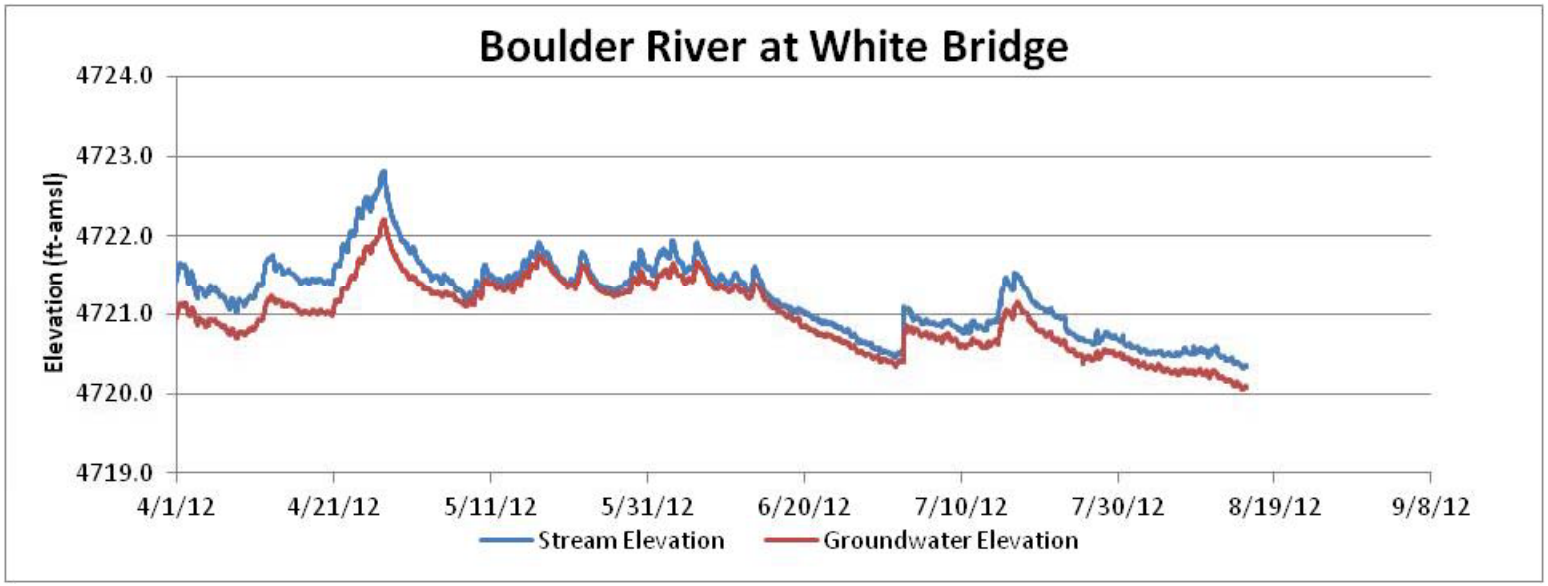


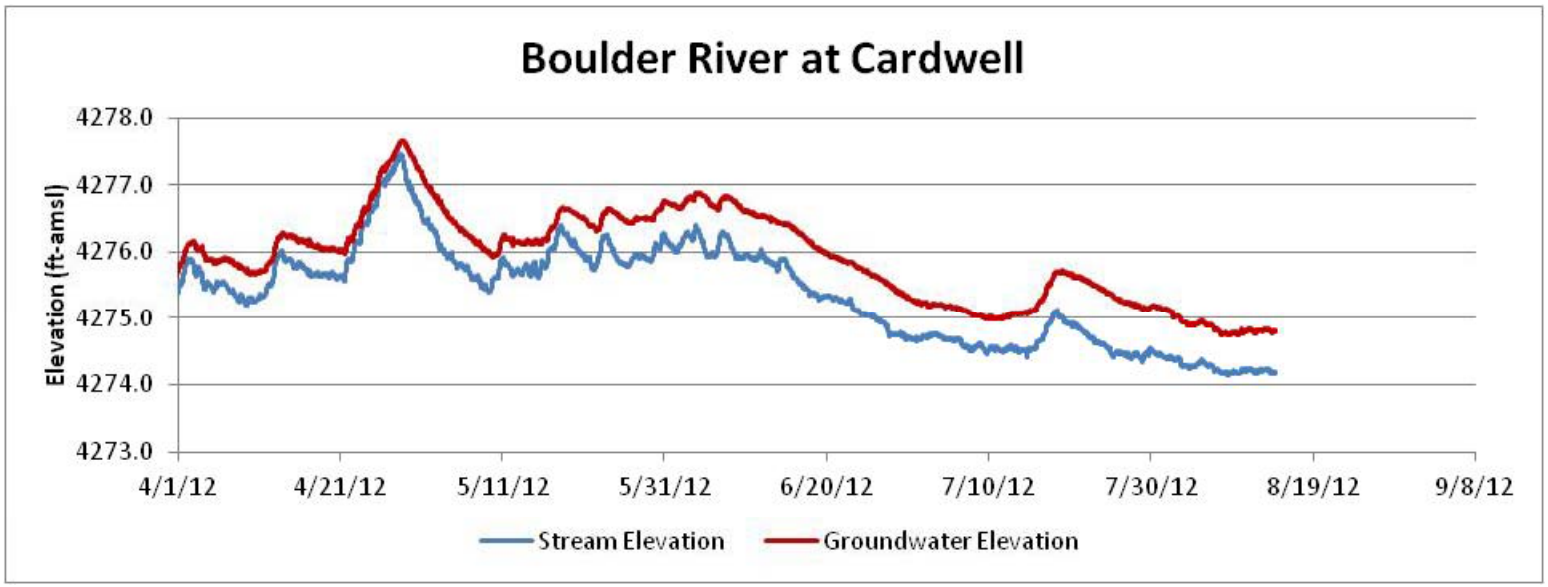
Surface-Water Hydrographs



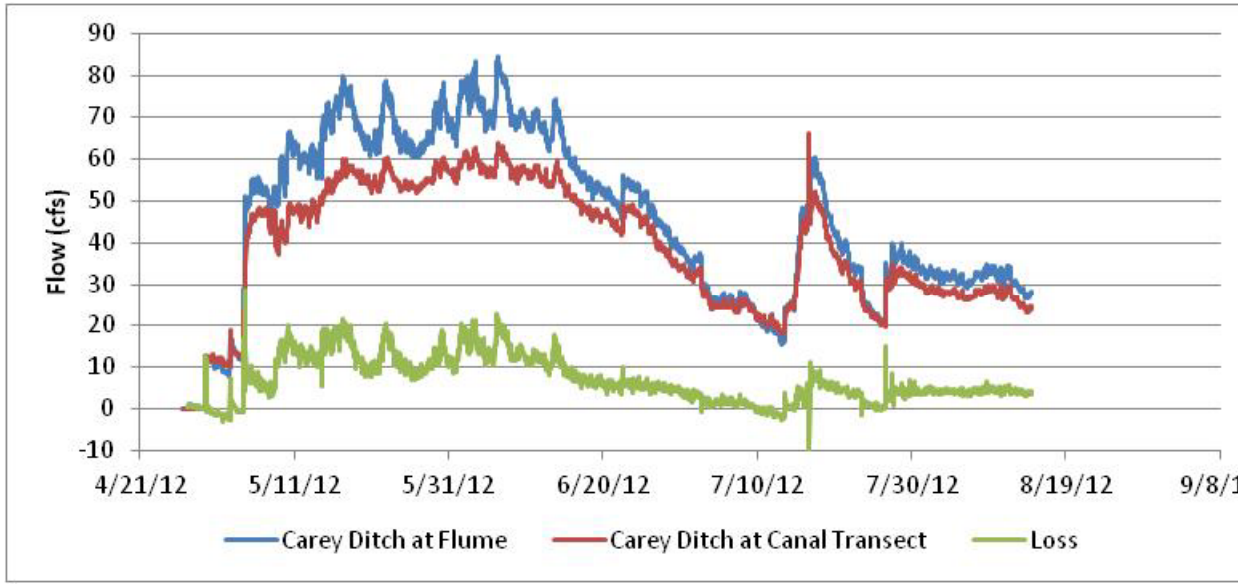


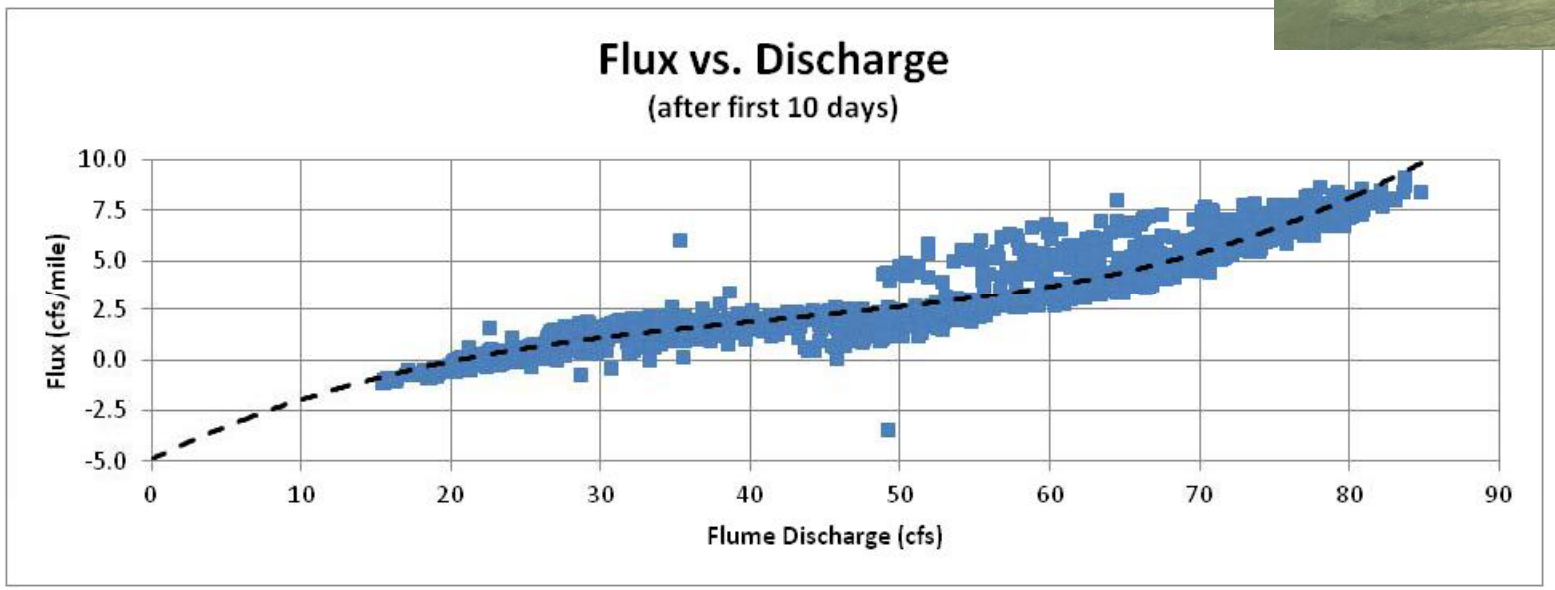
Surface-Water – Groundwater Interactions





Ditch Leakage





Transect is 2.47 miles from flume

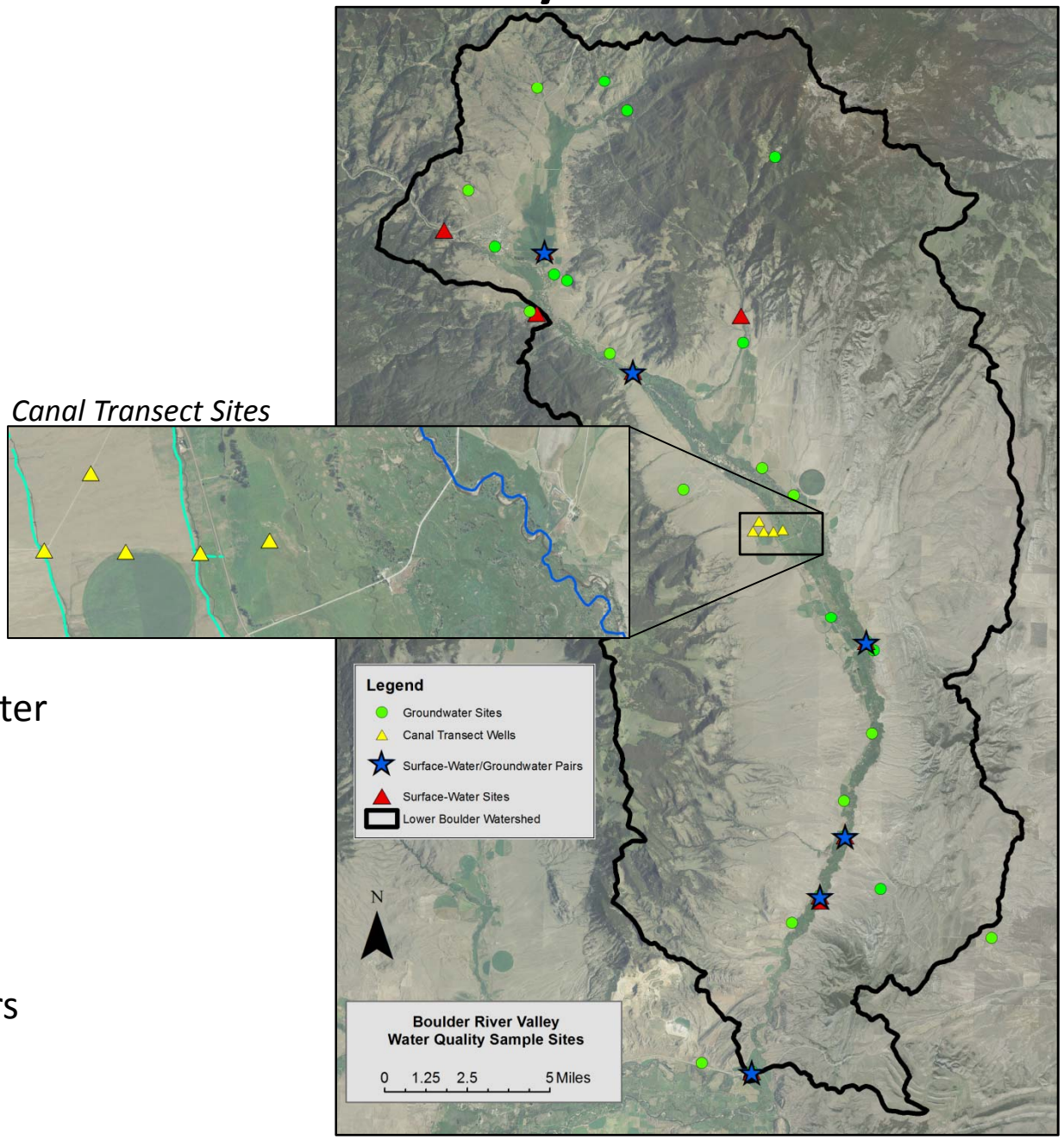
Max leakage of 9.2 cfs/mile; median 2.2 cfs/mile

Leaked water recharges groundwater & supplements stream flow.

Water Chemistry

Sampling Objectives

- Surface-water/groundwater interaction along river
- Canal recharge to groundwater
- Differences between aquifers



Modeling

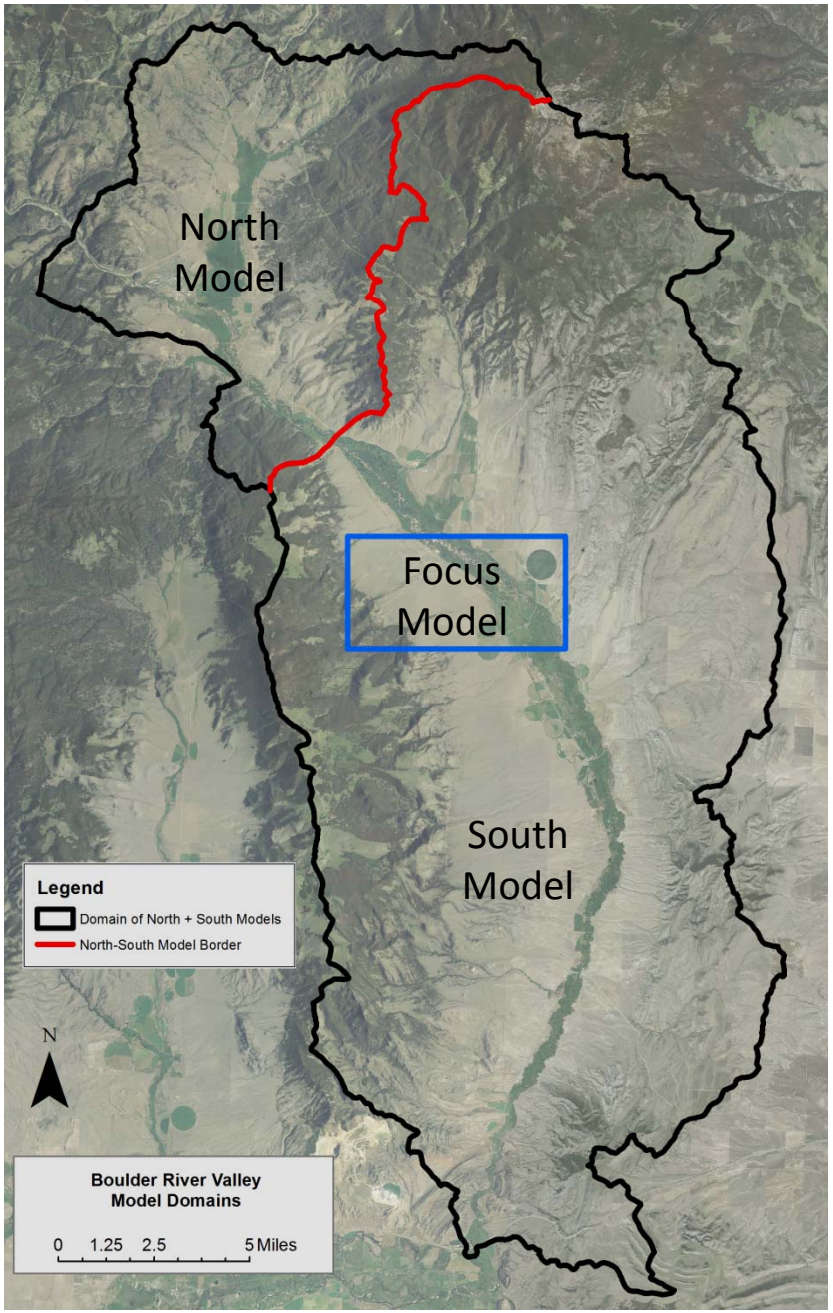
Numerical Modeling is an attempt to mathematically simulate the system.

Use observations and theoretical understanding of groundwater flow, to develop a model which replicates the past, then use it to forecast the future.

Objectives

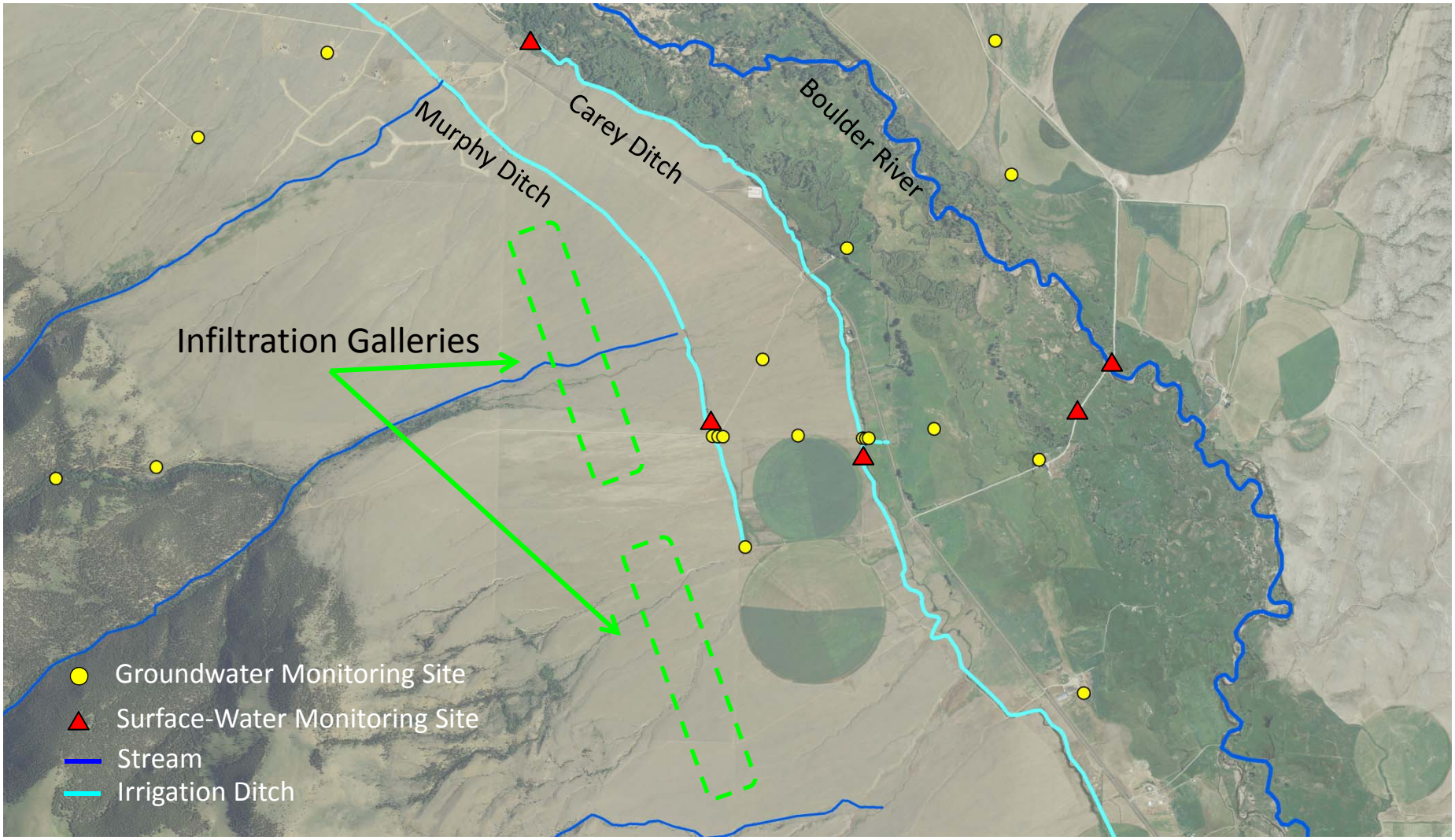
- Improve our understanding of the physical flow system

- Develop predictive tools
  - ➢ Effects of groundwater developments
  - ➢ Physical feasibility of managed recharge

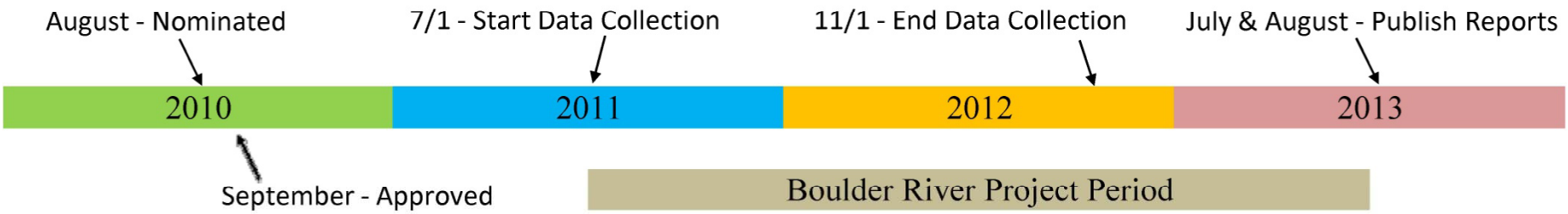


Modeling

Upcoming Work: Enhanced Recharge Model



Project Plans



- End most new data collection at end of October, 2012
- Anticipate interpretive report publication in July, 2013
- Anticipate model report publication in August, 2013


Questions?