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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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

GWIC 227316
Alluvial Well

GWIC 50010
Bedrock Well
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

Boulder River Comparison
2012

Discharge (cfs)

BR @ I15  BR @ Dunn Ln  Carey Ditch On 4/27

Boulder River Comparison
2012

Discharge (cfs)

BR @ I15  BR @ Cardwell  Carey Ditch On 4/27
Surface-Water – Groundwater Interactions

Boulder River at White Bridge

Boulder River at Cardwell
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