



Upper Jefferson Groundwater Investigation

Montana Bureau of Mines and Geology (MBMG)
Ground Water Investigations Program (GWIP)

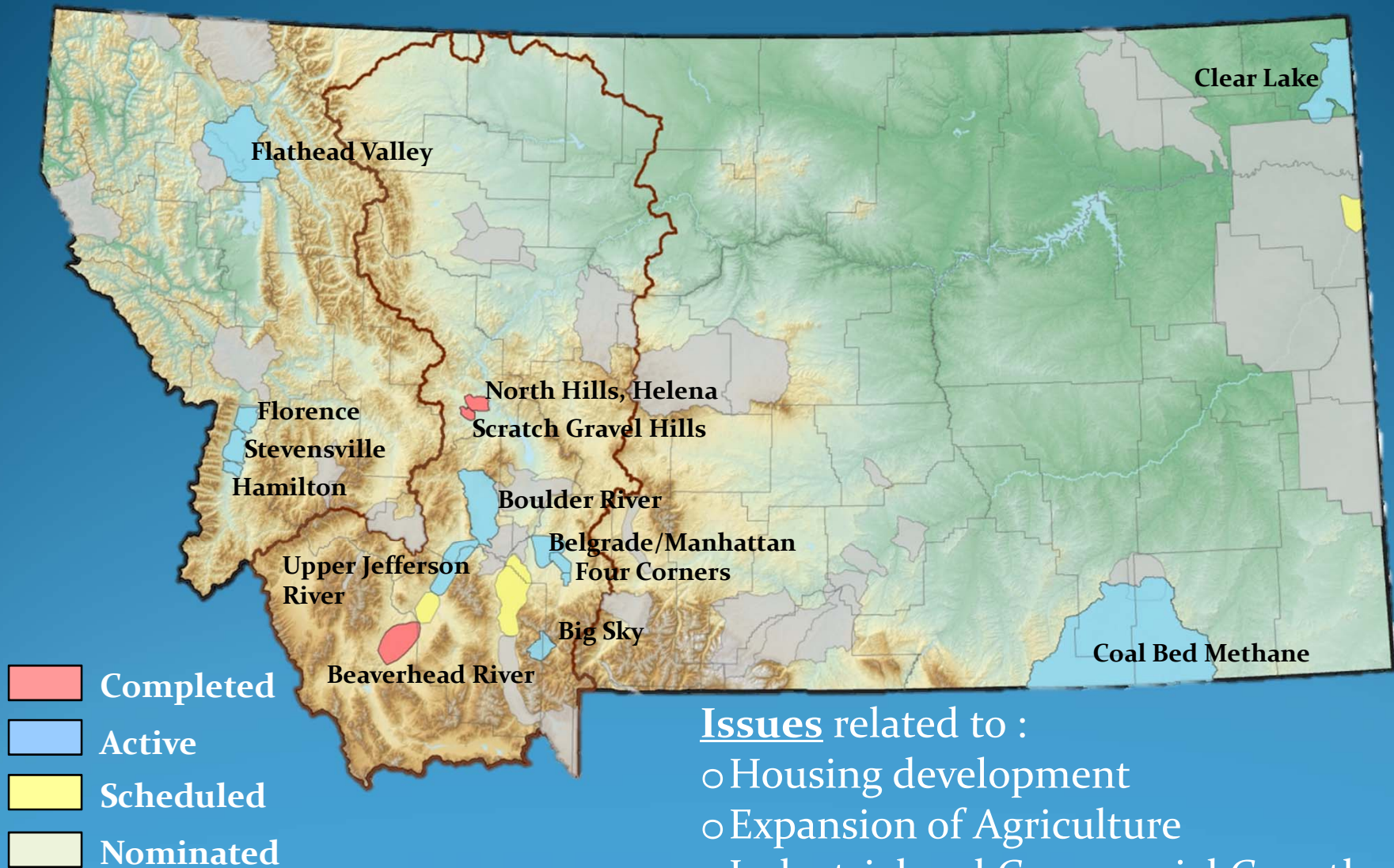
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JRWC Annual Meeting – 11/20/14

Ground Water Investigation Program

Research on specific issues in areas that are ranked as the most urgent within the State

Project Areas



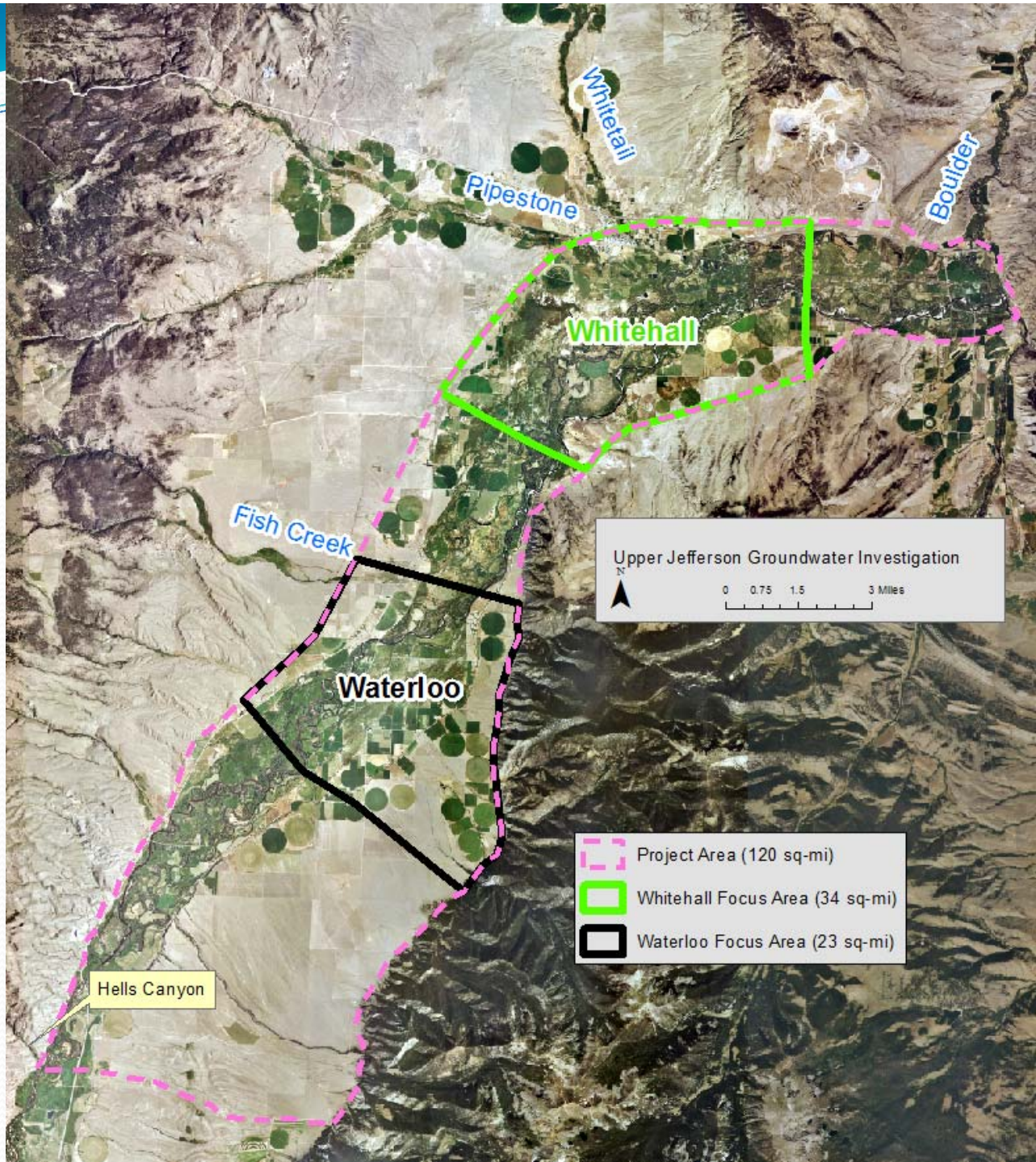
Issues related to :

- Housing development
- Expansion of Agriculture
- Industrial and Commercial Growth

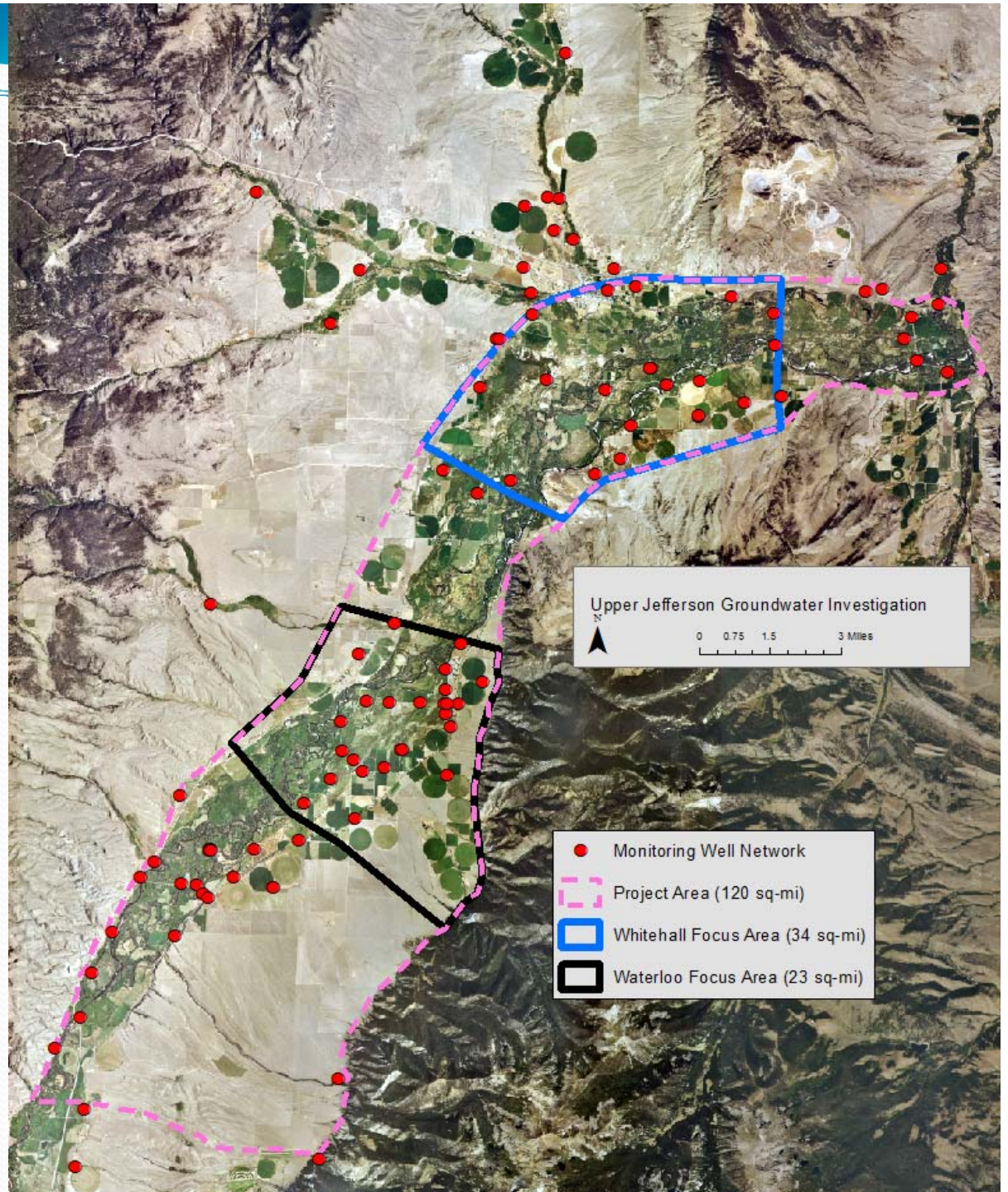


Upper Jefferson Major Groundwater Issues

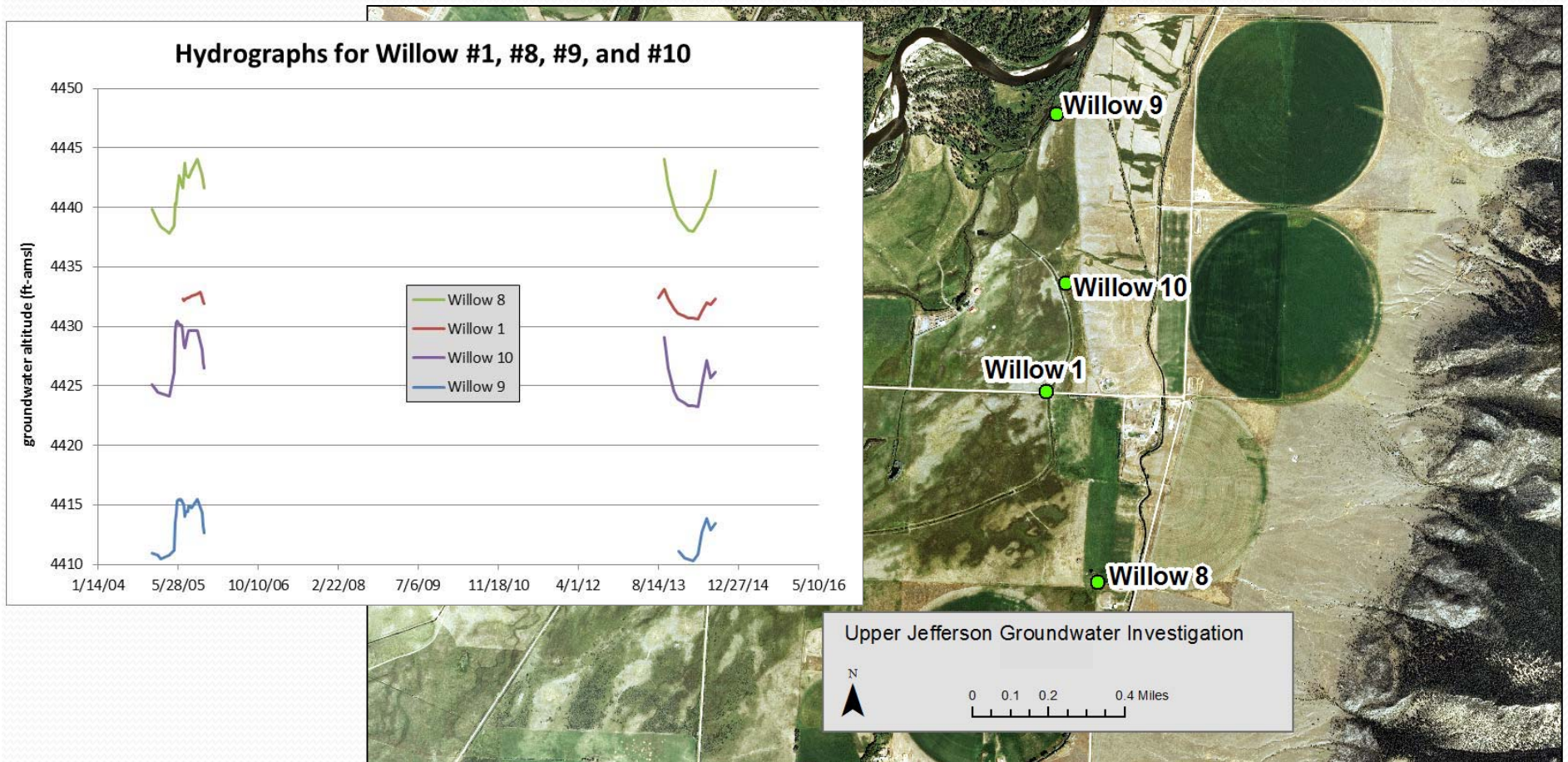
- Quantify likely effects to flow in Willow Springs and Parson's Slough from land use changes
 - Conversion from flood to pivot irrigation.
 - Installation of tile drains
- Evaluate the potential impacts to flow in the Jefferson River and Jefferson Slough, from hypothetical housing developments or irrigation wells withdrawing water from the alluvium in the area near Whitehall.



Groundwater Monitoring Network (98 wells)

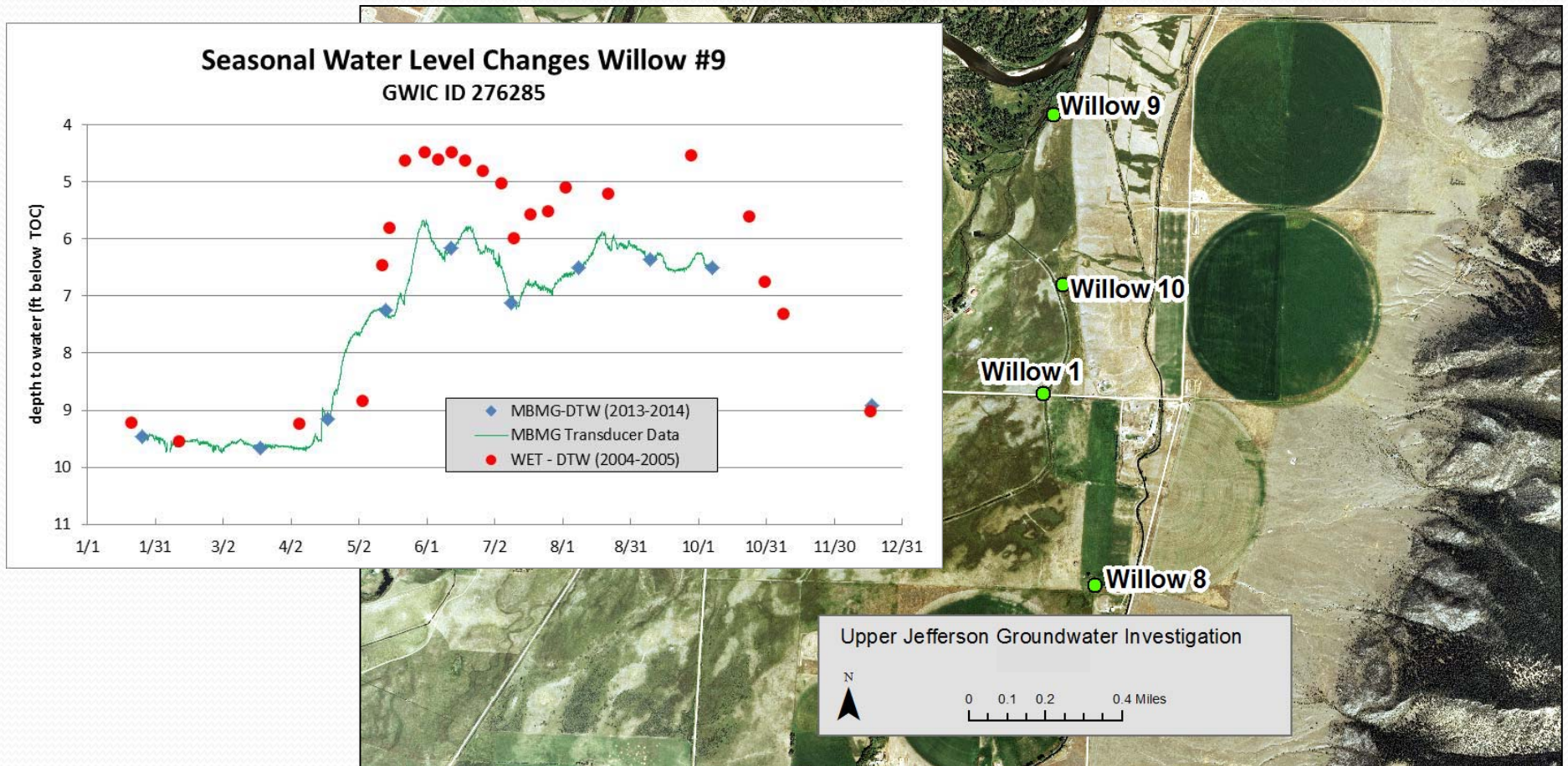


Selected sites near Willow Springs



Flow is toward the river
No noticeable change from 2005 to 2014

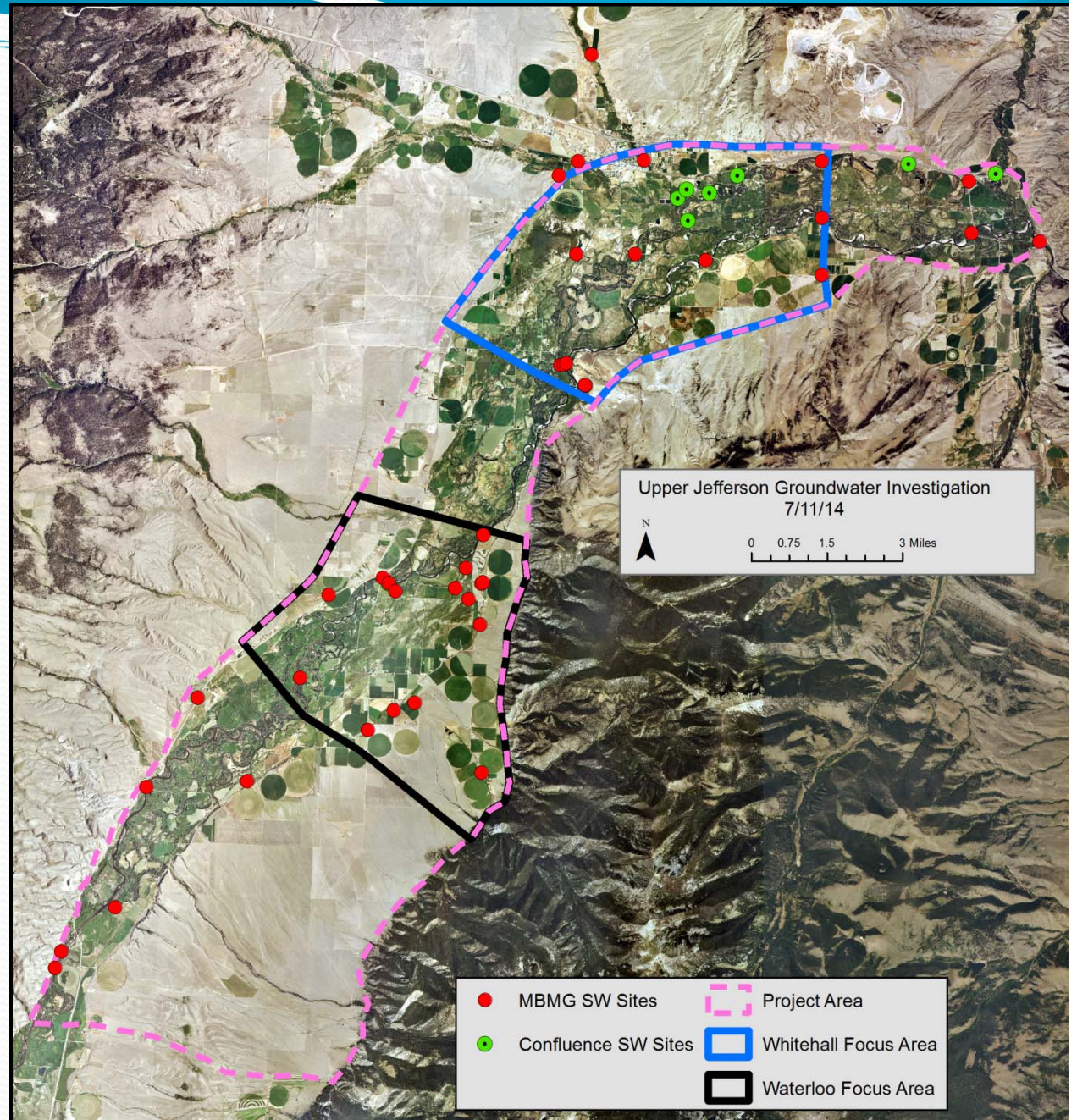
Selected sites near Willow Springs



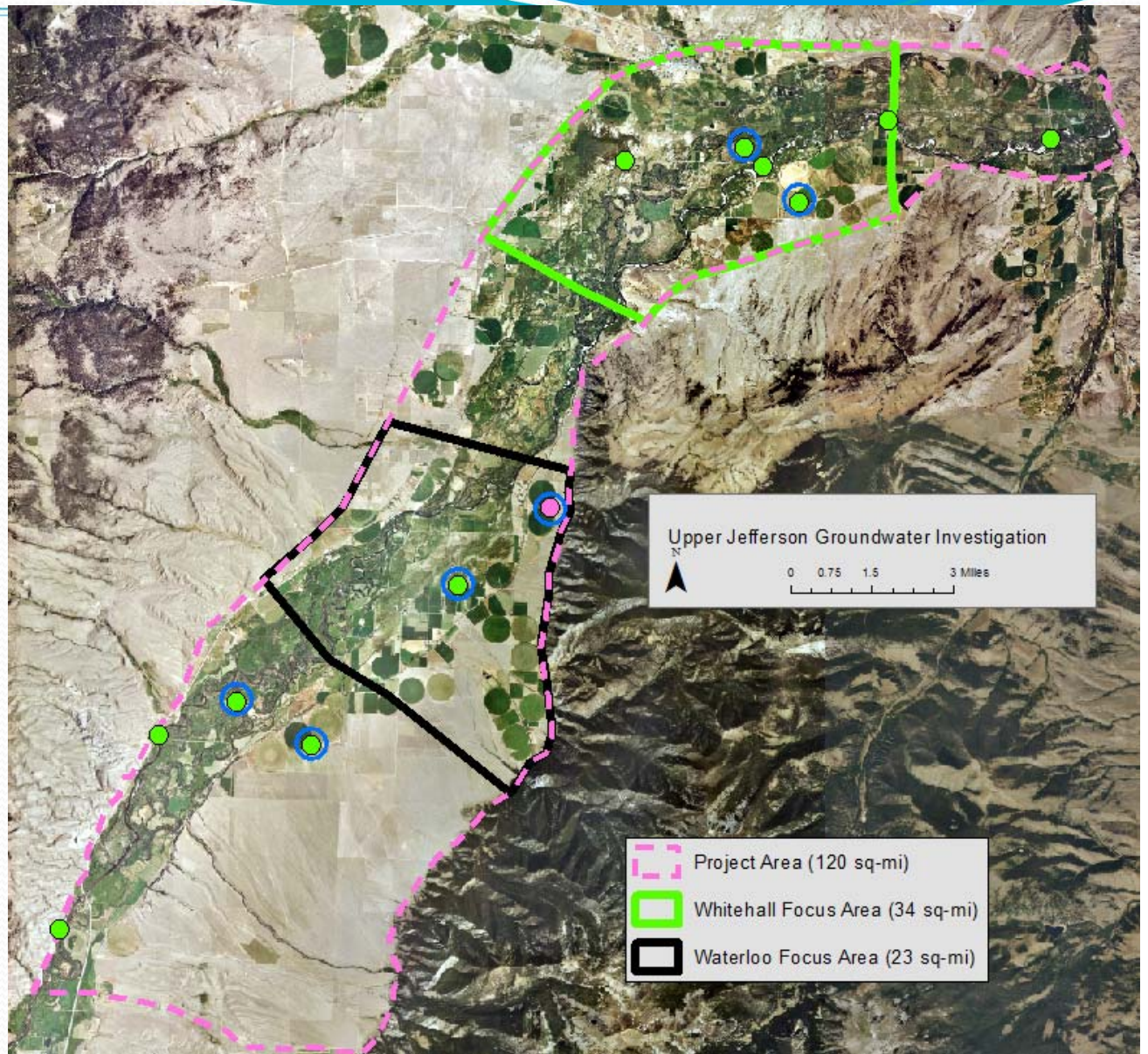
Levels peak in May through September
Lowest levels in

Surface-Water Monitoring Network

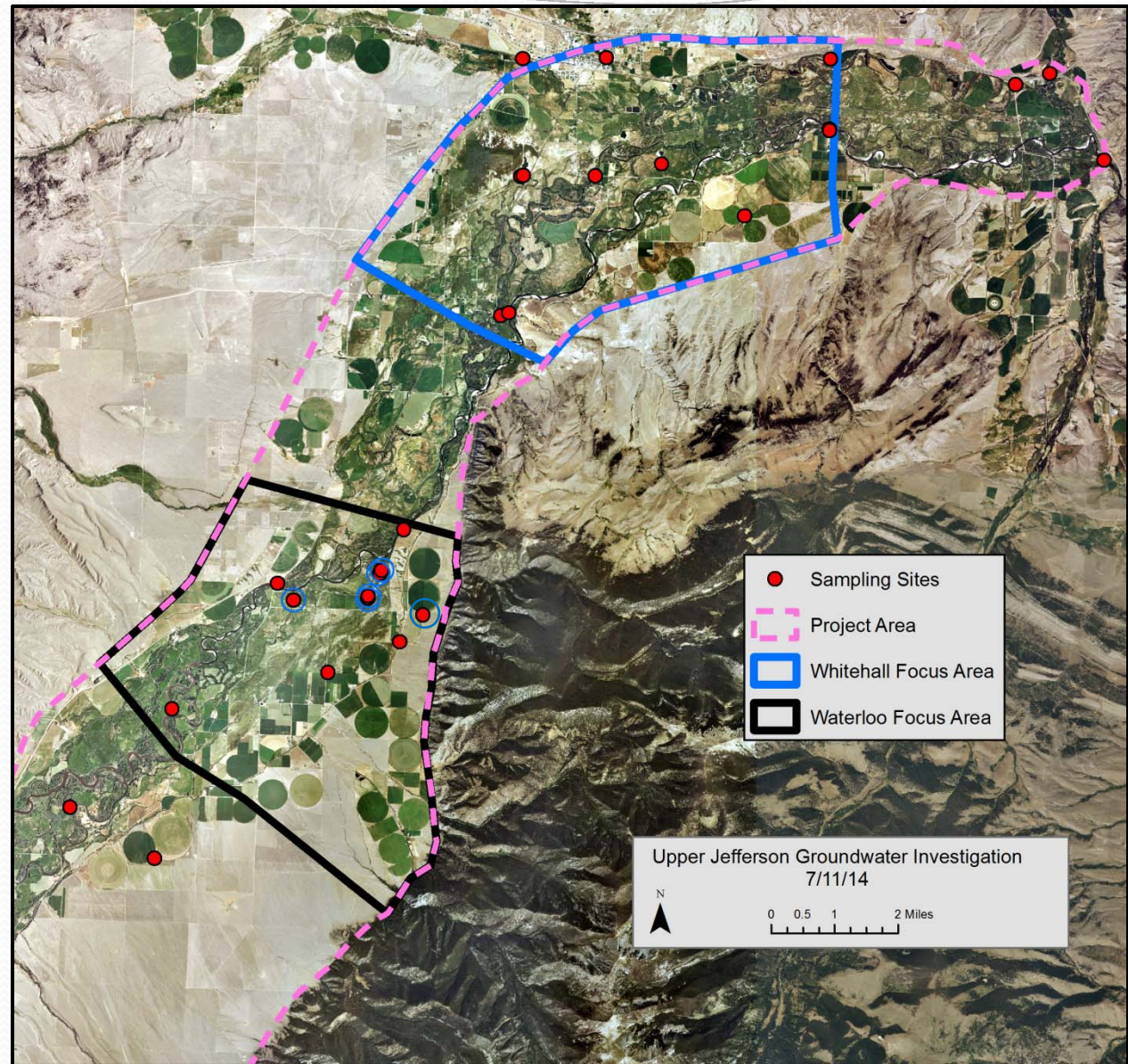
MBMG 39 sites
Confluence 7 sites
USGS 2 sites



Drilling and Aquifer Tests (22 wells)



Water Chemistry Samples



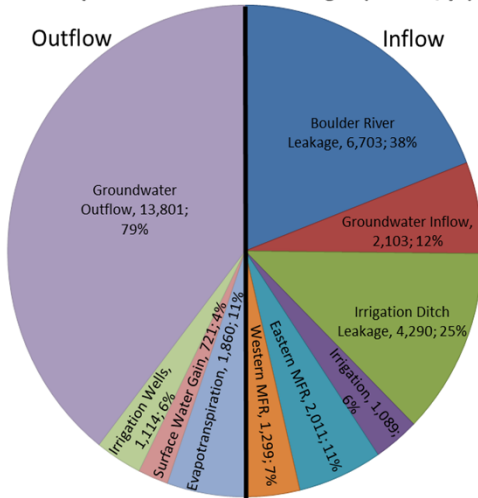


Groundwater Flow Modeling

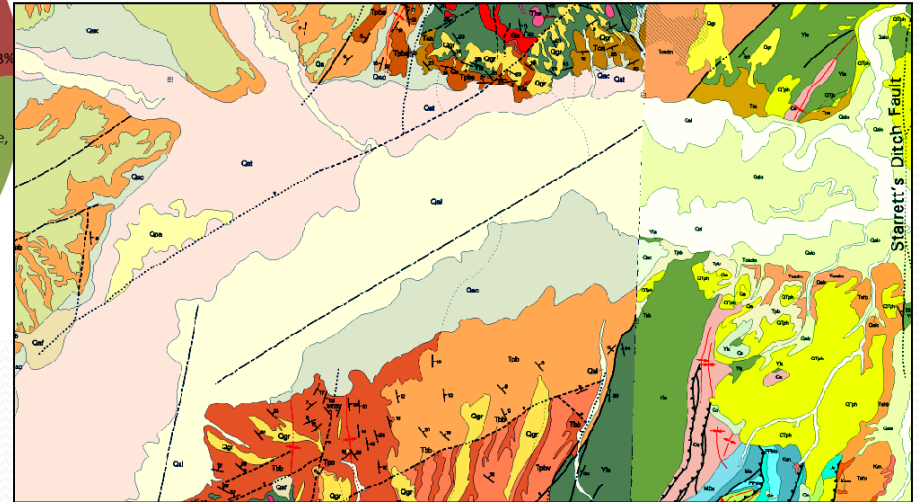
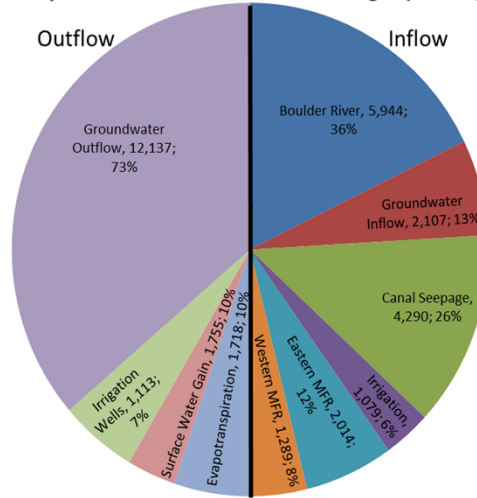
- Conceptual Model
 - Geology
 - Potentiometric Surface
 - Hydrographs
 - Seepage Rates
 - Water Quality
 - Budget
- Numerical Model
 - Develop a numerical representation of the system based on observations
 - Calibrate to groundwater levels and budget

Conceptual and Numerical Models

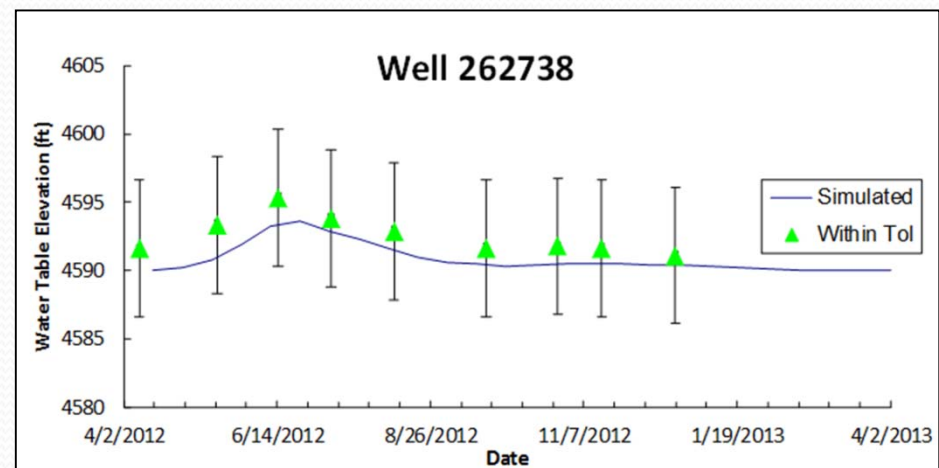
Conceptual Groundwater Budget (acre-ft/yr)



Steady State Model Groundwater Budget (acre-ft/yr)



Numerical models allow observations of stresses and groundwater levels to be used to construct a predictive model.

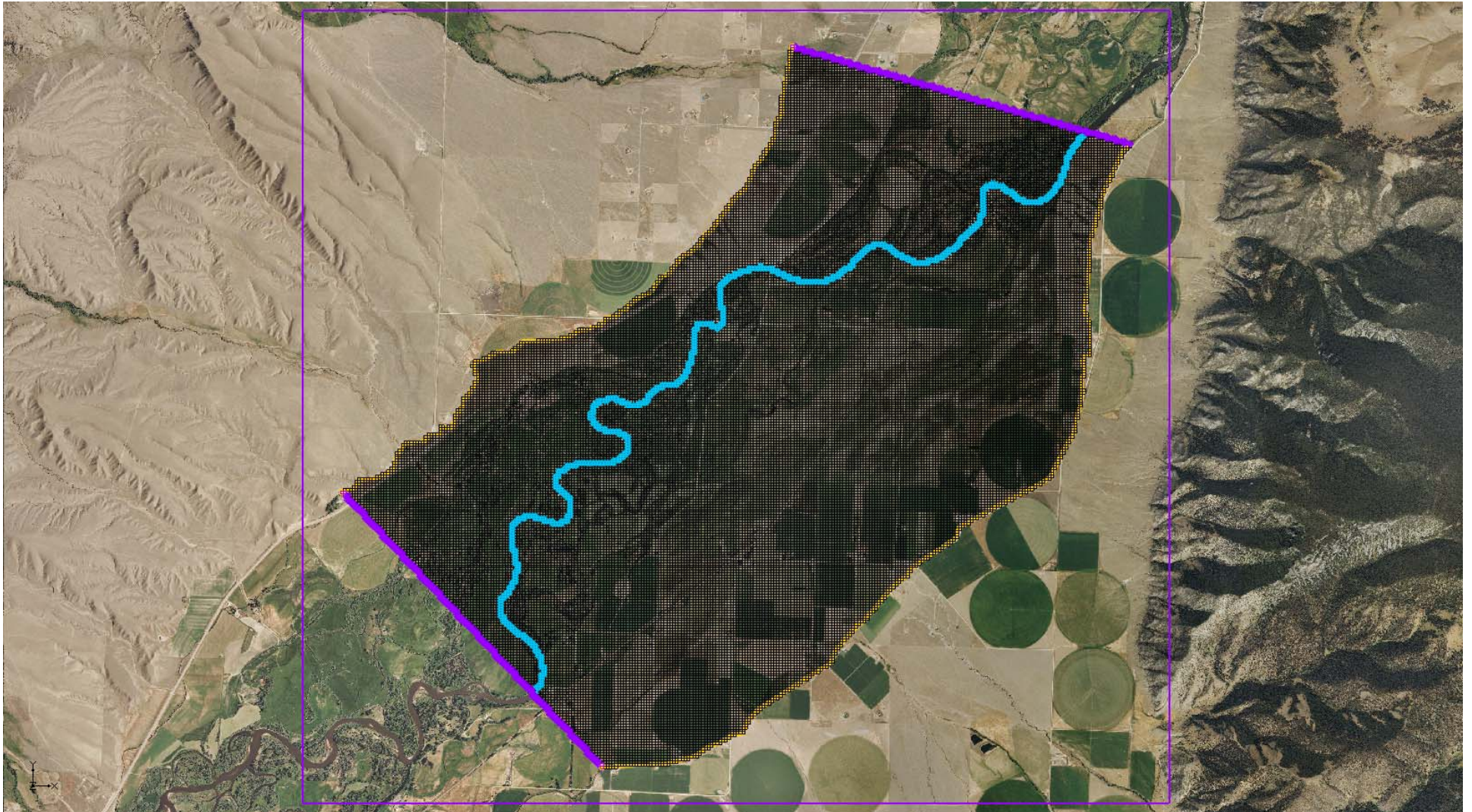


Planned Models

- Waterloo Area
 - Nicole Brancheau's Masters Thesis
 - Changes in Land Use – Flood to Pivot
 - Dependence of Willow Springs and Parson's Slough on Canal Leakage and Irrigation Recharge
 - Effects of Tile Drains
- Whitehall Area
 - Groundwater/Surface-Water Interactions
 - Jefferson River
 - Jefferson Slough
 - Piedmont Swamp
 - Impacts from increased groundwater development
 - Housing Developments
 - Irrigation Wells

Preliminary Waterloo Model

(39,490 active cells, each 100'x100')





Tentative Schedule

- Groundwater Monitoring – July 2013 - June 2015
- Surface-Water Monitoring – July 2013 – Nov 2014
- Install Bench Wells – October & November 2014
- Survey – December 2014
- Aquifer Tests (Non-Irrigation) – March 2015
- Preliminary Waterloo Model – December 2014
- Preliminary Whitehall Model – August 2015
- Modeling Report into Review – September 2015
- Interpretive Report into Review – December 2015

Questions?

