

Investigating Groundwater and Surface-water Interaction Using Stable Water Isotopes in the Bitterroot Valley, Montana

Ground-Water Investigation Program



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Columbine Logging

**2014 GSA Joint Rocky Mtn/Cordilleran
Section Meeting**
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Ground-Water Investigation Program (GWIP)

Montana Bureau of Mines and Geology

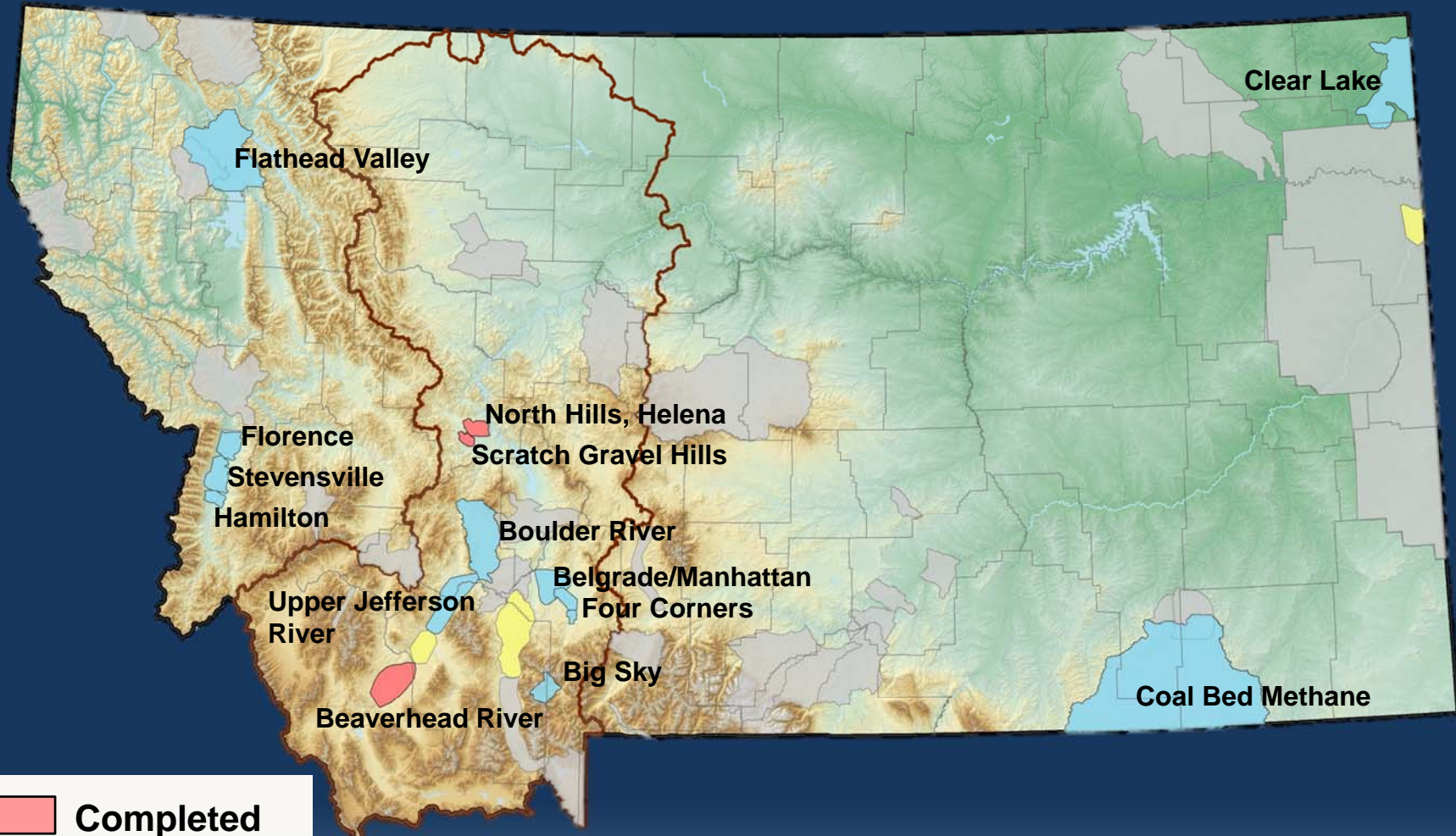
- Specific groundwater research questions
- Local
- Sub-basin
- Study Intervals - one to three year duration

Questions Researched

- Groundwater/Surface-Water Interaction
- Stream Depletion
- “Incidental” Recharge
- “Managed” Recharge
- Land-Use Changes (e.g., changes in irrigation practices, cumulative effects of existing and proposed water development)

GWIP Project Areas

GWIP adds to Montana's capability to deal with complex water resource issues

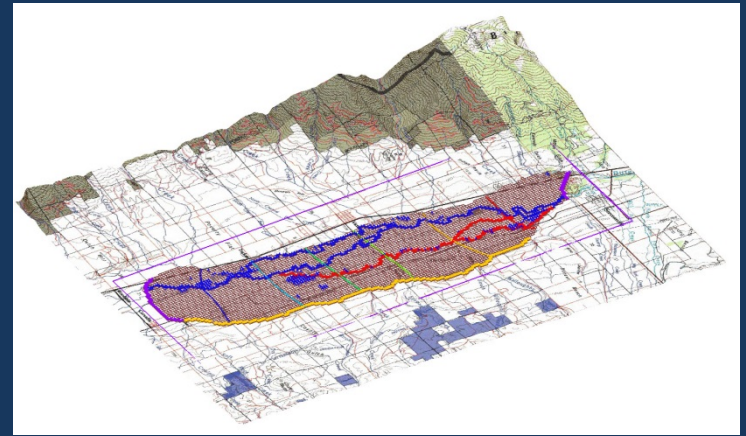


- Completed
- Active
- Scheduled
- Nominated

GWIP Products

Montana Bureau of Mines and Geology

- **Interpretive Report**
- **Modeling Report** (if appropriate)
Model files available on-line
- **Technical Data Report** (if appropriate)
- **A Comprehensive Set of Hydrogeologic Data**
Available through MBMG Ground-Water Information Center (GWIC), which is archived forever.



Shallow Aquifer Investigation

Stevensville Area

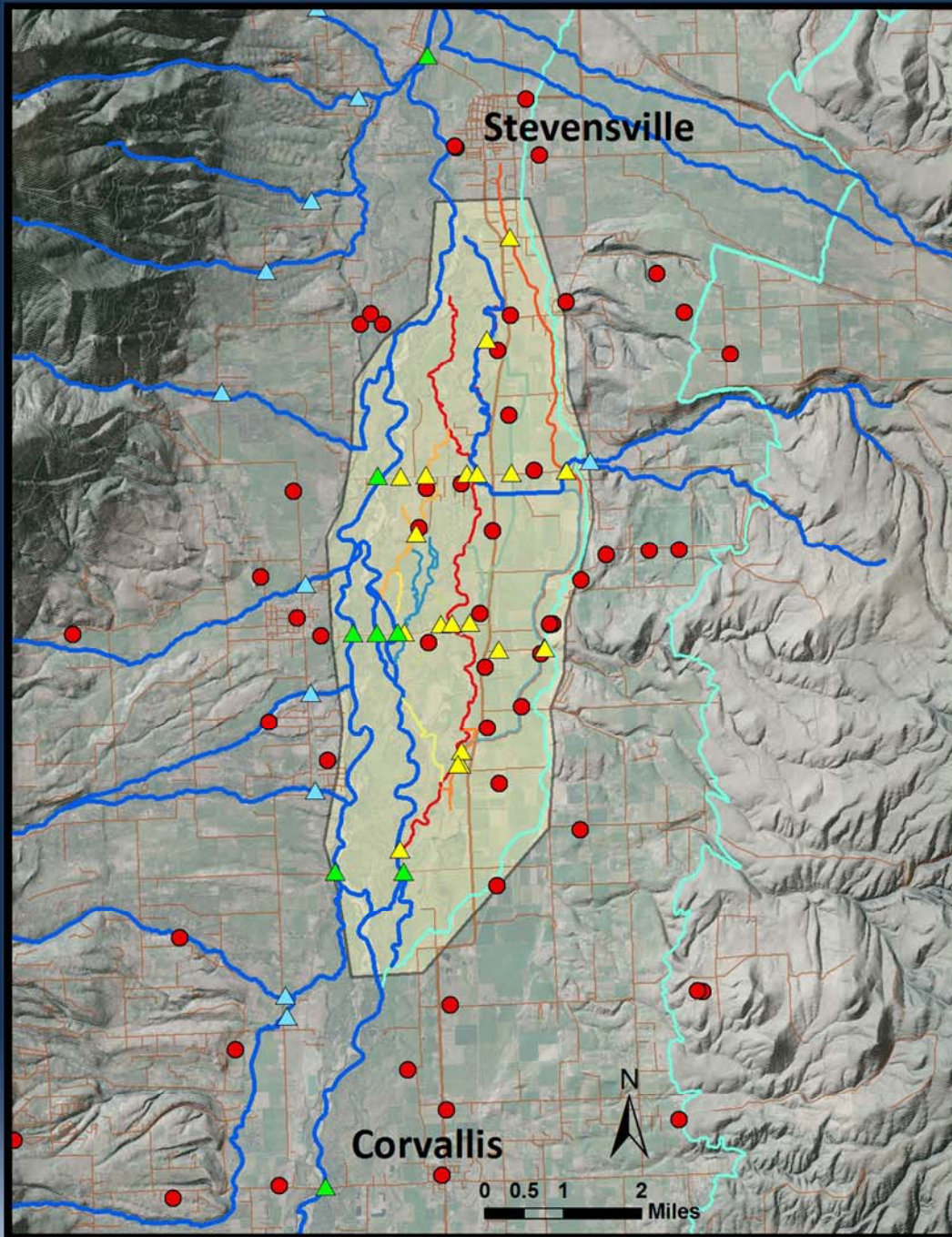


Purpose

Examine the feasibility of supplementing surface water irrigation supplies with groundwater.

- Find and use Existing information
- Collect groundwater and surface-water elevations to characterize the groundwater flow regime
- Groundwater Flow Model

Monitoring Network

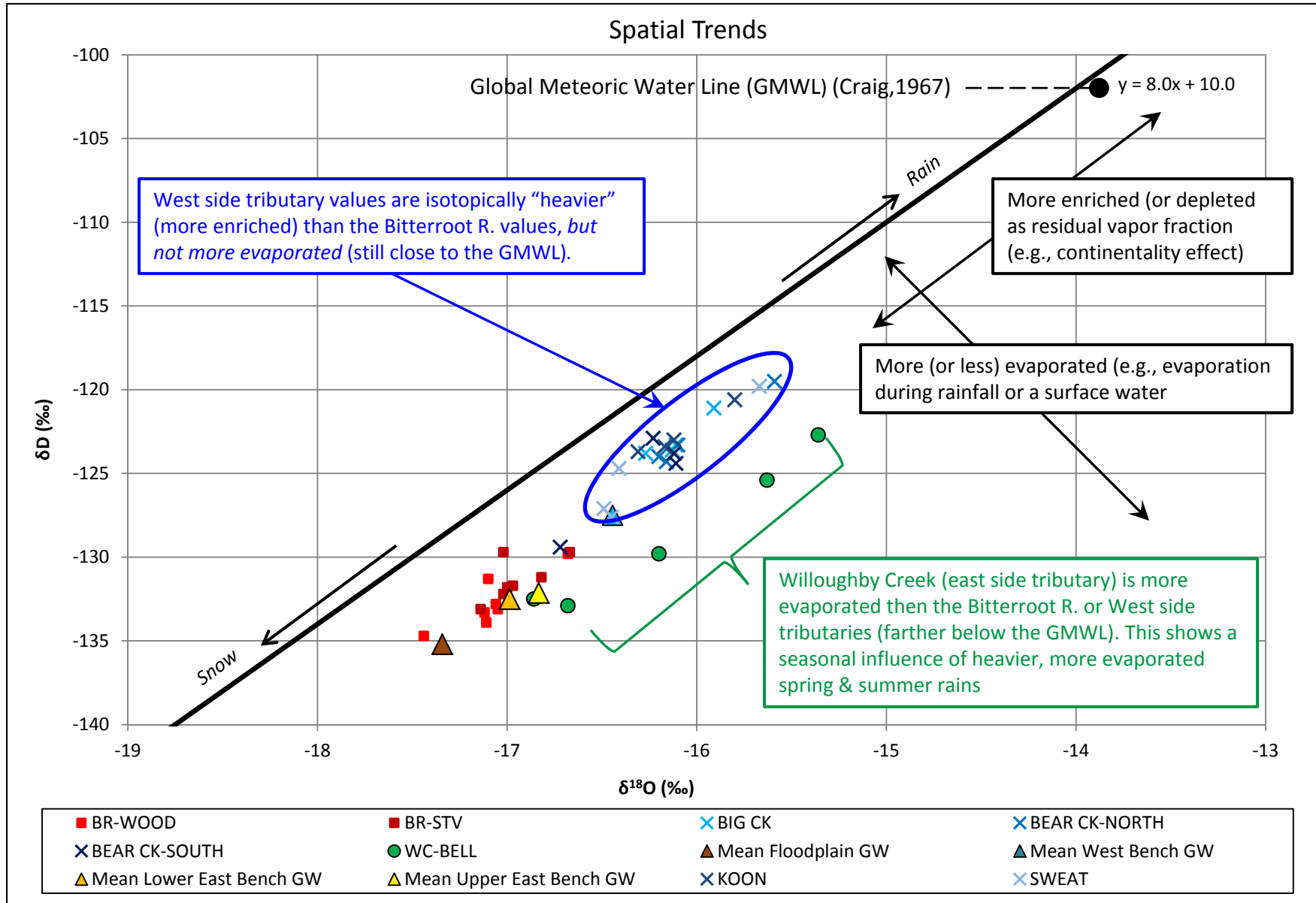


Data Collection Efforts

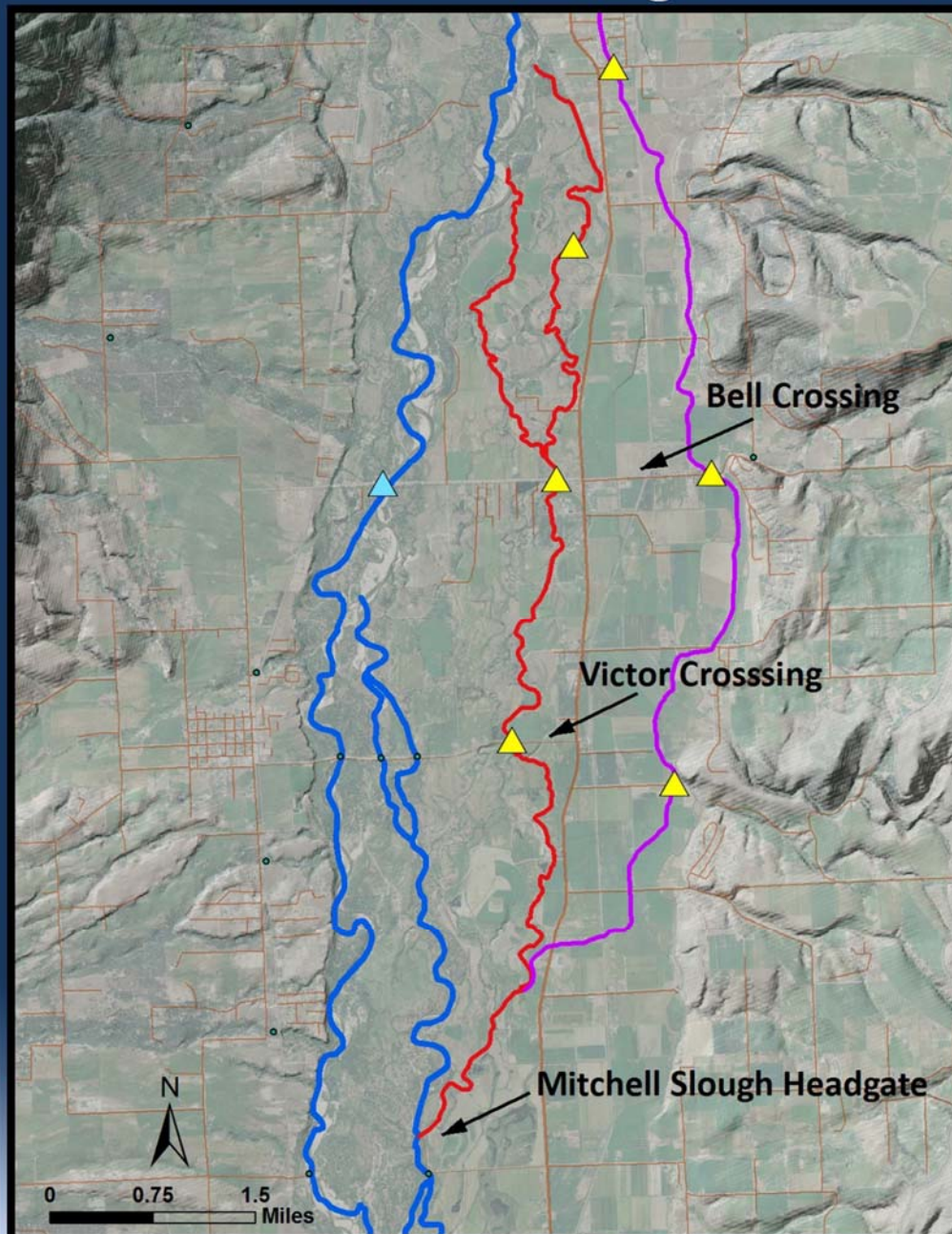


- Groundwater Data
- Surface-Water Data
- Installation of Wells
- Groundwater Sampling
- Isotope Sampling
- Canal Losses/Gains

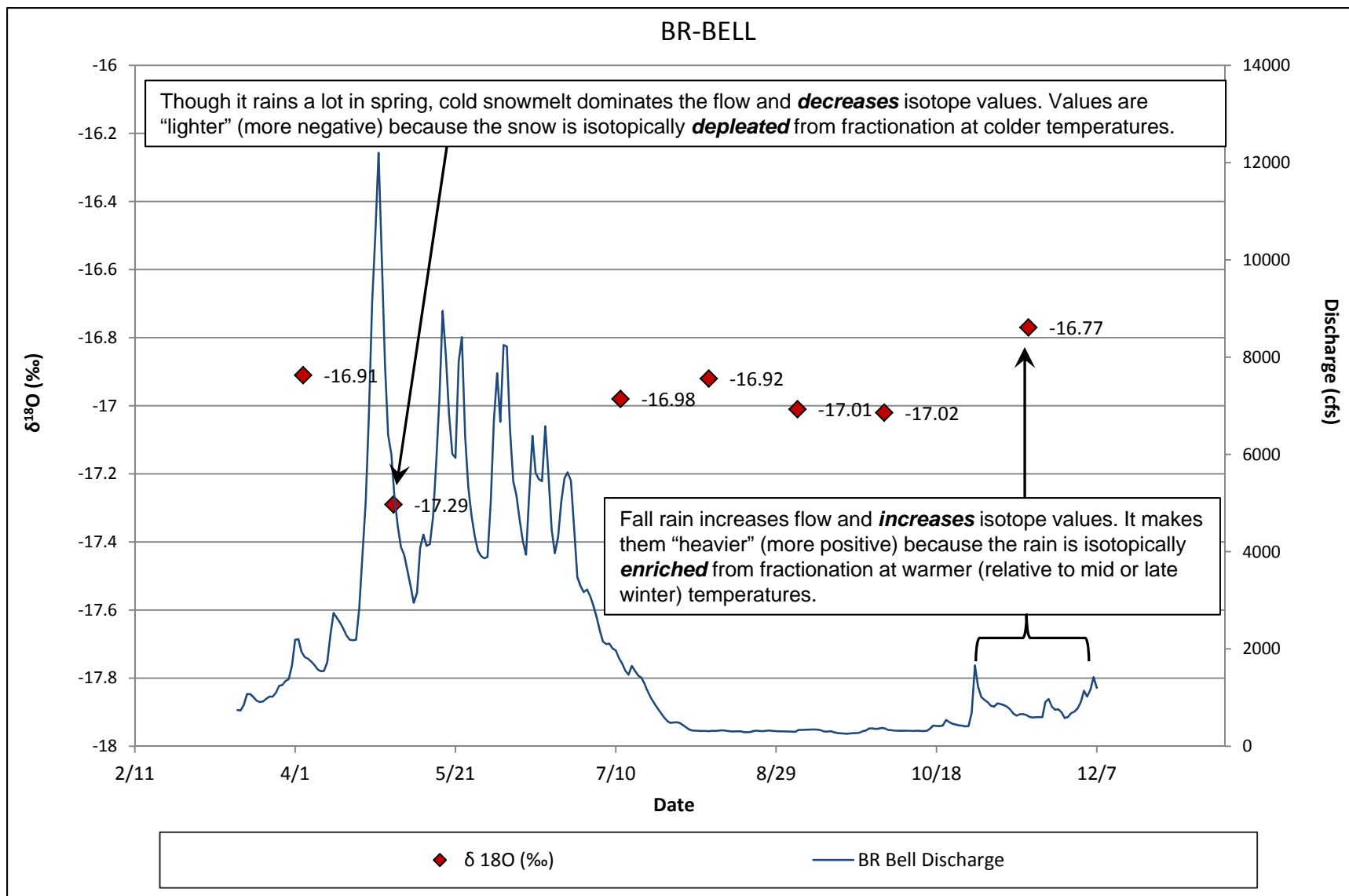
Bitterroot Valley East-West Spatial Isotope Trends



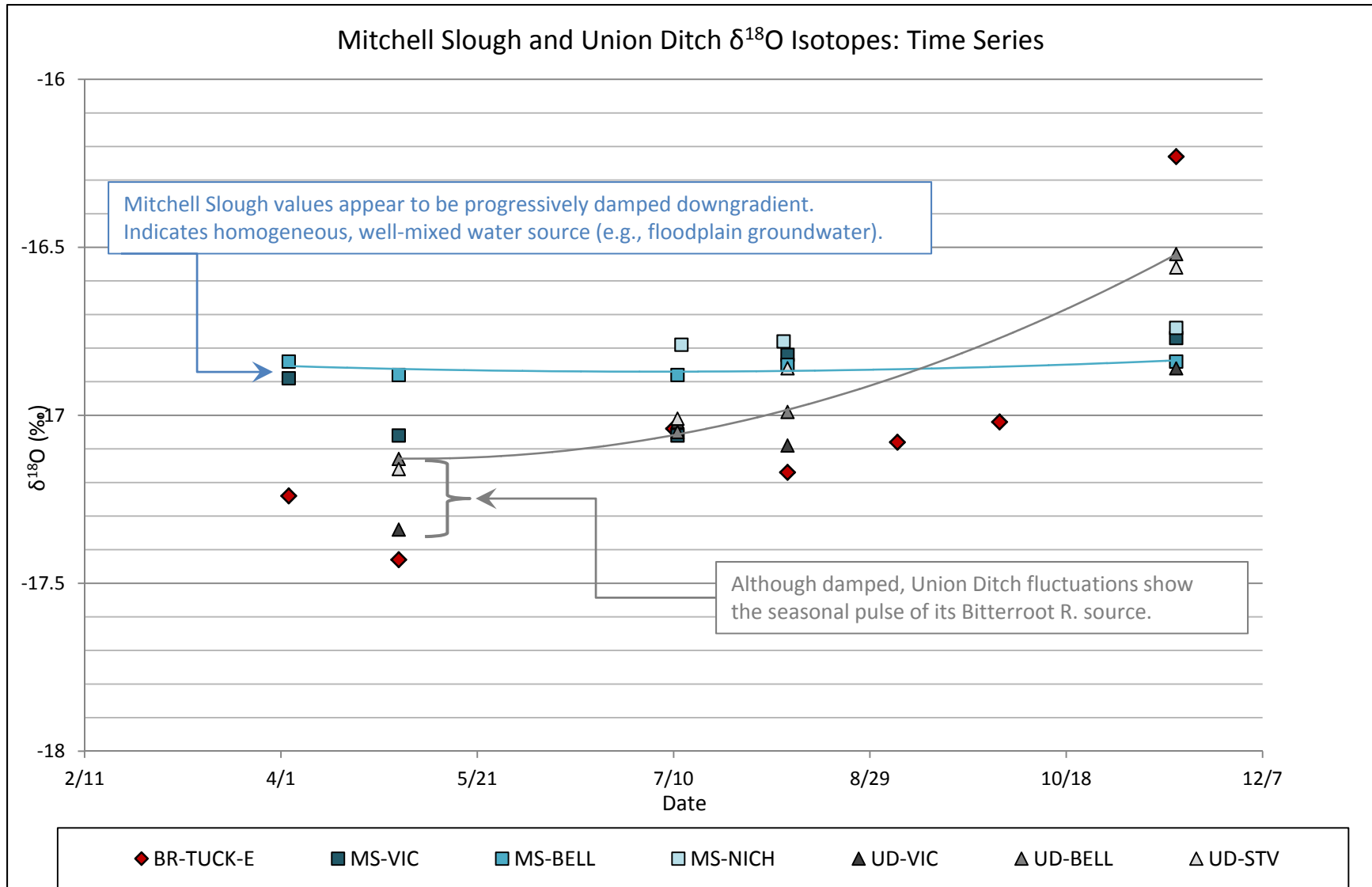
Bitterroot River, Mitchell Slough, and Union Ditch



Seasonality: $\delta^{18}\text{O}$ vs. Flow



Bitterroot Valley North-South Spatial and Temporal Trends



Acknowledgments

- Local land and well owners
- Area Ditch Companies
- Bitterroot Water Forum
- Al Pernichele – Water Commissioner
- Local Natural Resources Conservation Service Office
- Kirk Waren – MBMG
- Dean Snyder – MBMG
- Ginette Abdo – MBMG
- Patrick Haley – MTECH Graduate Student
- Allison Brown – MTECH Student



Questions?



