GROUND WATER INVESTIGATION PROGRAM

Lower Beaverhead River Basin

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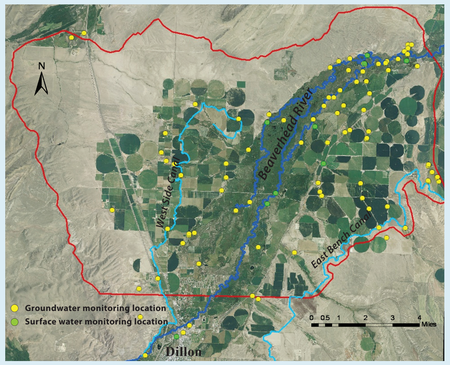
Purpose

As a result of drought and increasing irrigation demands, the number of high yield wells has increased since the mid-1990's. This has led to conflicts between senior and junior water rights holders. The primary concern is that groundwater withdrawals will induce stream depletion and infringe on existing water rights.

Ranked 5th by the Steering committee, this project was designed to look at the interaction between groundwater and surface water and to assess the potential impacts of pumping high capacity wells on the hydrogeologic system.



Study area showing groundwater and surface water monitoring locations.

Key Questions

Will groundwater withdrawals deplete the Beaverhead River and/or its tributaries? If so, to what extent?

Previous Studies

2007, Weight, W.D. and Snyder, D., Beaverhead Valley Groundwater Study: Butte, Montana, Montana Tech, Submitted to the U.S. Bureau of Reclamation. Submitted to tthe USBR.

2008., Case Study Report to the 60th Legislatiure Water Policy Interim Committee, MBMG.

Hydrogeologic System

Three aquifers:
- Valley-fill alluvium
- Tertiary sediments
- Volcanic bedrock

Volcanic bedrock is very high-producing relative to surrounding Tertiary sediments

Clay in floodplain locally confines Tertiary aquifer

Irrigation canals and ditches are a major source of groundwater recharge

Products

The final report will provide an interpretation the hydrogeology including how the shallow and deeper aquifer systems interact with surface water.

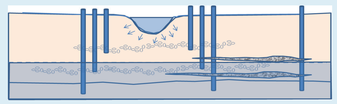
The report and computer model will provide scientific information that can be used by regulatory personnel, landowners, and other interested stake holders to make informed water-management decisions.

View of the Beaverhead River from Beaverhead Rock.

Canal Study

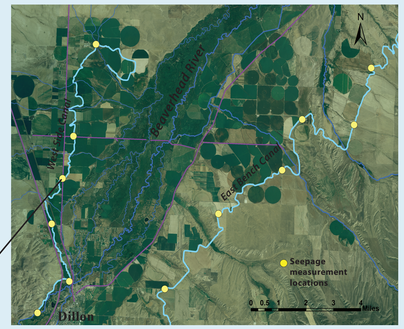
A piece of the puzzle

The East Bench and West Side Canals strongly influence the hydrogeology of the study area. Understanding the hydraulic connection between the canals and groundwater is a key piece of the hydrogeologic puzzle. Results will be used to best represent the canal-groundwater interaction in the computer model.



Two sites along both the West Side and East Bench Canals were instrumented with wells to examine groundwater response to the canal.

Specific conductivity and isotopes are being collected weekly/bimonthly to examine changes in groundwater.

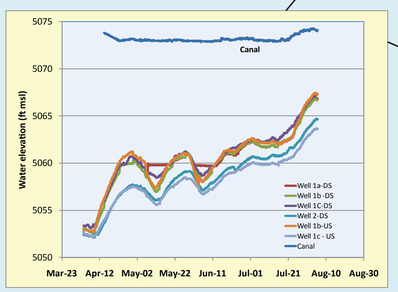


Preliminary Seepage estimates

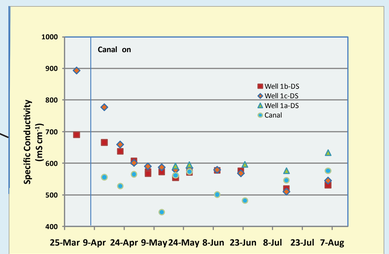
Average Seepage Losses

East Bench Canal
About 2 - 2.5 cfs/mile

West Side Canal
About 1.5 - 3 cfs/mile



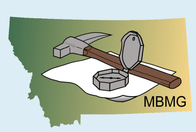
Since the West Side Canal was turned on, groundwater levels have been rising. Note that the water elevation in the canal is higher than the groundwater indicating that the canal at this location is a source of recharge.



As the irrigation season has progressed, specific conductivity levels in the canal and the grounwater have become increasingly similar. This shows the strong influence of canal recharge.

Acknowledgments

Landowners
Beaverhead Watershed Committee
US Bureau of Reclamation
East Bench Irrigation District
West Side Canal Company
Beaverhead County Health Department



Visit the website
http://www.mbmg.mtech. edu/gwip/gwip.asp
for more details about the GWIP program

Data Collection

- **Groundwater monitoring**

Groundwater levels in 60 wells are being monitored continuously/bimonthly.

- **Streamflow and surface water elevations**

Surface water is being monitored continuously/monthly in the tributaries and the Beaverhead River.

- **Groundwater and surface water chemistry**

Samples were collected from over 30 groundwater and surface water locations to examine water chemistry and surface water-groundwater interaction.

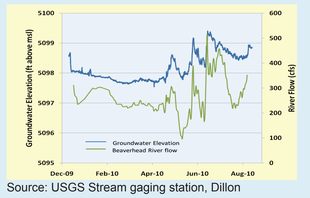
- **Drilling**

Six wells were drilled to investigate aquifer properties.

Sixteen wells were completed to examine the influence of the East Bench and West Side Canals on groundwater.

- **Aquifer testing**

Two aquifer tests were performed to determine hydraulic properties for the volcanic bedrock and Tertiary sediments.



Groundwater levels in a 32 foot deep well respond to changes in stream flow/stage. This well is located less then 25 feet from the river near the USGS stream gaging site in Dillon.

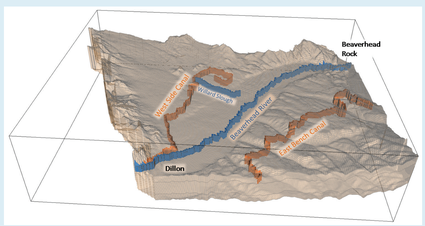
Source: USGS Stream gaging station, Dillon

Model

Purpose:

Assess effects of groundwater withdrawals from high capacity irrigation wells on groundwater and surface water.

Evaluate mitigation scenarios to offset stream depletion.



Project Status:

Data is currently being analyzed and will continue to be collected through Spring 2011. A geophysical survey will be performed this fall to estimate the extent of the volcanic bedrock aquifer.

The preliminary groundwater flow model was constructued in 2008. The conceptual model is being refinded so that the computer model's input parameters are as accurate as possible.