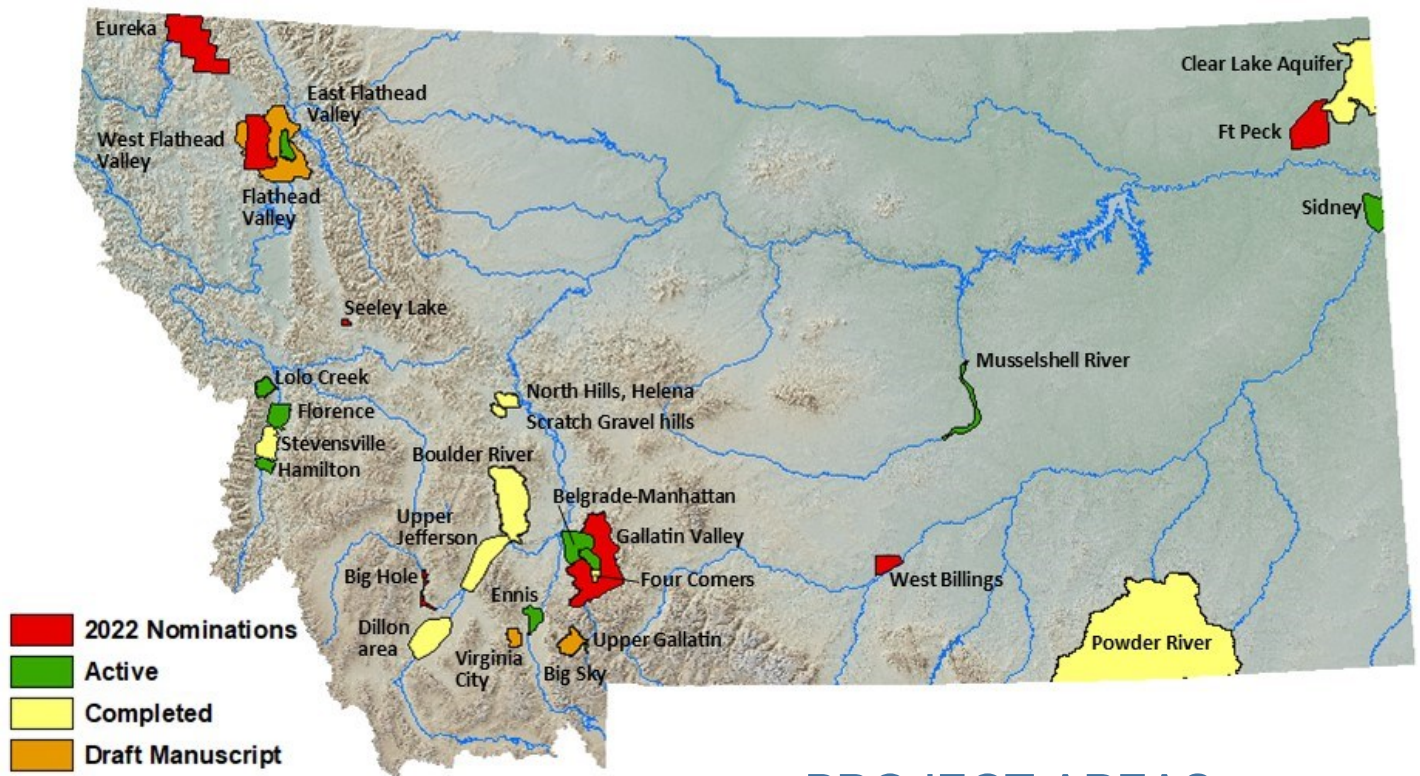


Montana Bureau of Mines and Geology

Ground Water Investigation Program



October 2021



PROJECT AREAS

PUBLICLY AVAILABLE RESULTS INCLUDE

- ⇒ Detailed, peer-reviewed MBMG published reports, with more in review.
- ⇒ Computer models of site-specific groundwater flow are available for use.
- ⇒ Each project's scientific teams answer public inquiries regarding the hydrogeology of GWIP areas.
- ⇒ Comprehensive sets of hydrogeologic data for each investigation are publicly available in GWIC database.
- ⇒ Presentations to stakeholders and other interest groups.

The *Ground Water Investigation Program (GWIP)* answers locally identified, site-specific questions prioritized by the Montana Ground Water Steering Committee (MCA 85-2-525). As mandated by the Montana Legislature, GWIP conducts research on the most urgent water issues in the state.

FOR MORE INFORMATION CONTACT:
GINETTE ABDO (PROGRAM MANAGER)
(406) 496-4152
gabdo@mtech.edu
www.mbm.bmg.mtech.edu/WaterEnvironment/GWIP/main.asp

PUBLISHED REPORTS (2020-2021)

Hydrogeologic investigation of the Upper Jefferson River Valley, Madison and Jefferson Counties, Montana: Waterloo groundwater modeling report, Report of Investigations, RI29

Hydrogeologic investigation of the Upper Jefferson Valley, Montana--Interpretive report, Report of Investigations, RI28

West Crane Aquifer Test Summaries, Richland County, 2021, Open-File MBMG 737

Hydrology and Water Management of the Clear Lake aquifer, 2021, Open-File MBMG 738

Aquifer Tests completed in the Bitterroot Valley, Hamilton area, 2021, Open-File MBMG 739

Groundwater Model of the Meadow Village aquifer at Big Sky, 2021, Open-File MBMG 742

Hydrogeologic Investigation of the Four Corners area, Gallatin County, 2020, Open-File MBMG 735

Hydrologic Investigation of the Upper Jefferson River Valley, Whitehall Groundwater Modeling Report, 2020, Report of Investigations, RI 27

Aquifer Tests in the Upper Jefferson Valley, 2020, Open-File MBMG 727

Virginia City, Montana, Aquifer Test, 2020, Open-File MBMG 726

West Crane Buried Valley aquifer: A Hidden Resource, 2020, Information Pamphlet, IP 13

Hydrogeologic Investigation of the Stevensville area Ravalli County, 2020, Open-File MBMG 733

ACTIVE PROJECT SUMMARIES (2021)

Musselshell River Musselshell, Rosebud and Petroleum Counties

Purpose: Determine the sources of salinity in the lower Musselshell River and in the Horse Creek Coulee near Melstone. High salinity irrigation water can result in crop yield loss, degraded soils and groundwater.

Status: Groundwater and surface water monitoring is ongoing through October 2021. Preliminary results show that groundwater salinity at 20 locations illustrates a variety of responses to canal leakage: mobilizing salts into the groundwater (Fort Union and Fox Hills Formations) or diluting high-salinity groundwater (Bearpaw shale).

Personnel: Liddi Meredith (Lead), Shawn Kuzara

East Flathead Valley Flathead County

Purpose: Determine the connection between the shallow aquifer, deep alluvial aquifer and surface water. This information will be used to evaluate the effects of pumping on these aquifers and on surface water.

Status: Groundwater and surface-water monitoring is ongoing through September 2021. Drilling and aquifer testing will occur August-November 2021. Groundwater model development is underway.

Personnel: Andy Bobst (Lead), Jim Berglund, Carly Peach

ACTIVE PROJECTS (CONT.)

Upper Gallatin Gallatin County

Purpose: Evaluate the effects of existing and future residential/commercial development in the Upper Gallatin Valley on water quantity and quality.

Status: Groundwater and surface-water monitoring is ongoing through August 2021. Aquifer tests are planned for October 2021. Groundwater model development is underway to predict groundwater availability and quality from increased residential development.

Personnel: James Rose (Lead), Ron Breitmeyer, Carly Peach

Lolo Creek Missoula County

Purpose: Determine the cause of changes in streamflow character that occur in the lowest reaches of Lolo Creek, resulting in the channel occasionally being dry.

Status: Groundwater model development and report preparation are underway. The geologic framework and water budget are complete. The model will help quantify the water budget and the effects of hydrologic stresses on Lolo Creek.

Personnel: Ali Gebril (Lead)

Sidney Area-West Crane Buried Valley Aquifer Richland County

Purpose: Determine the availability of water from the buried channel aquifer in the Sidney area and the aquifer's ability to meet the needs for future municipal, irrigation, and oil and gas development.

Status: Data collection is complete. A numerical groundwater model is being developed to simulate hydrogeologic conditions and make predictions on the effects of irrigation pumping on groundwater and surface-water. Report preparation is underway.

Personnel: Jon Reiten (Lead), Kevin Chandler

Hamilton Area Ravalli County

Purpose: Provide detailed hydrogeologic information that can be used to examine the effects of land use changes on groundwater and surface-water. Evaluate nitrate concentrations as an indication of residential growth and associated increase in septic systems.

Status: Data interpretation is complete and the draft report is in review.

Personnel: Todd Myse (Lead)

Ennis Area Madison County

Purpose: Investigate the effects of increased residential development and groundwater withdrawals in the bedrock aquifer on the west side of the Ennis Valley. Implications for increased withdrawals on adjacent aquifers will be considered.

Status: Data collection is complete. Data interpretation and report preparation will commence in 2022.

Personnel: Mary Sutherland (Lead)



Developing the hydrogeologic framework, monitoring, and communicating results to the public.

IN REVIEW

Belgrade/Manhattan Gallatin County

Purpose: Assess the effects of pumping from high capacity wells for a municipality or subdivision on groundwater and surface-water resources.

Results: The valley geology dictates the ideal location of a high yield water supply. Thick sediments in the central valley are conducive to development with the distance to surface water and the timing of mitigation considered for minimizing effects.

Personnel: Mary Sutherland (Lead)

Big Sky Gallatin and Madison Counties

Purpose: Evaluate the sustainability and production capacity of the Meadow Village Aquifer and the feasibility of groundwater withdrawals from bedrock aquifers in the Big Sky area.

Results: Geology and structure have an influence on aquifer productivity (report in review). A second report (Open-File MBMG 742) showed that as much as 20% of baseflow to the Middle Fork of the West Fork Gallatin River is contributed by groundwater discharge and that increased well withdrawals may result in a 1:1 relationship between increased pumping and decreased streamflow gain by the Middle Fork.

Personnel: James Rose (Lead)

Flathead Valley Flathead County

Purpose: Determine whether withdrawals from the deep aquifer affect surface-water resources; and if current stresses are creating declining water-level trends.

Results: Pumping has created water-level declines in some areas, but not valley-wide. The deep sand and gravel aquifer is protected from surface activities by an overlying confining unit. This unit also constrains pumping drawdown to the deep aquifer. A 3-dimensional hydrostratigraphic model (MBMG Open-File 703) allows future users to access lithologic information for any location in the valley.

Personnel: James Rose (Lead)

Virginia City Madison County

Purpose: Estimate sustainability of the public water supply springs under scenarios of increasing demand and adjacent future development. Investigate potential of augmenting the municipal springs with a well(s).

Results: The municipal springs emanate from the contact between overlying lava flow deposits and tuffs. Preliminary results indicate that the springs are susceptible to effects from surface activities and septic systems.

Personnel: Andy Bobst (Lead)