

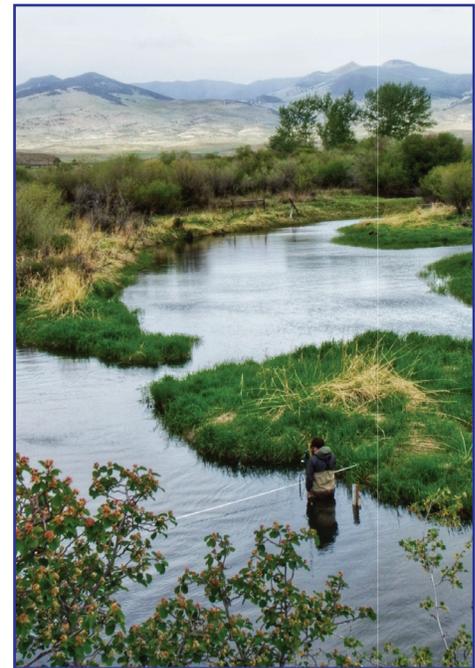
Ground Water Investigation Program

The **Montana Bureau of Mines and Geology (MBMG)** serves as Montana's geologic survey, addressing topics ranging from geologic mapping, earthquakes, groundwater, environmental quality, and energy. Our mission is to provide information for the sound use of Montana's geological and water resources.

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.

Topics of investigation include evaluating:

- Groundwater availability to sustain increased residential, agriculture and commercial development
- The effects of increased pumping on groundwater levels and stream depletion
- Changes in irrigation practices and effects on groundwater and surface water
- Reduction in irrigated acreage and related groundwater recharge resulting from land-use changes
- Water quality impacts associated with land-use change and climatic factors
- Hydrogeologic suitability for Managed Aquifer Recharge to enhance water resources



GWIP in action: Measuring surface-water discharge



GWIP in action: Groundwater monitoring

Publicly Available Results Include:

- Detailed, peer-reviewed MBMG published reports
- Computer models of site-specific groundwater flow available for use
- Answers to public inquiries regarding the hydrogeology of GWIP areas
- Comprehensive sets of hydrogeologic data for each investigation available in the GWIC database
- Presentations to stakeholders and other interest groups

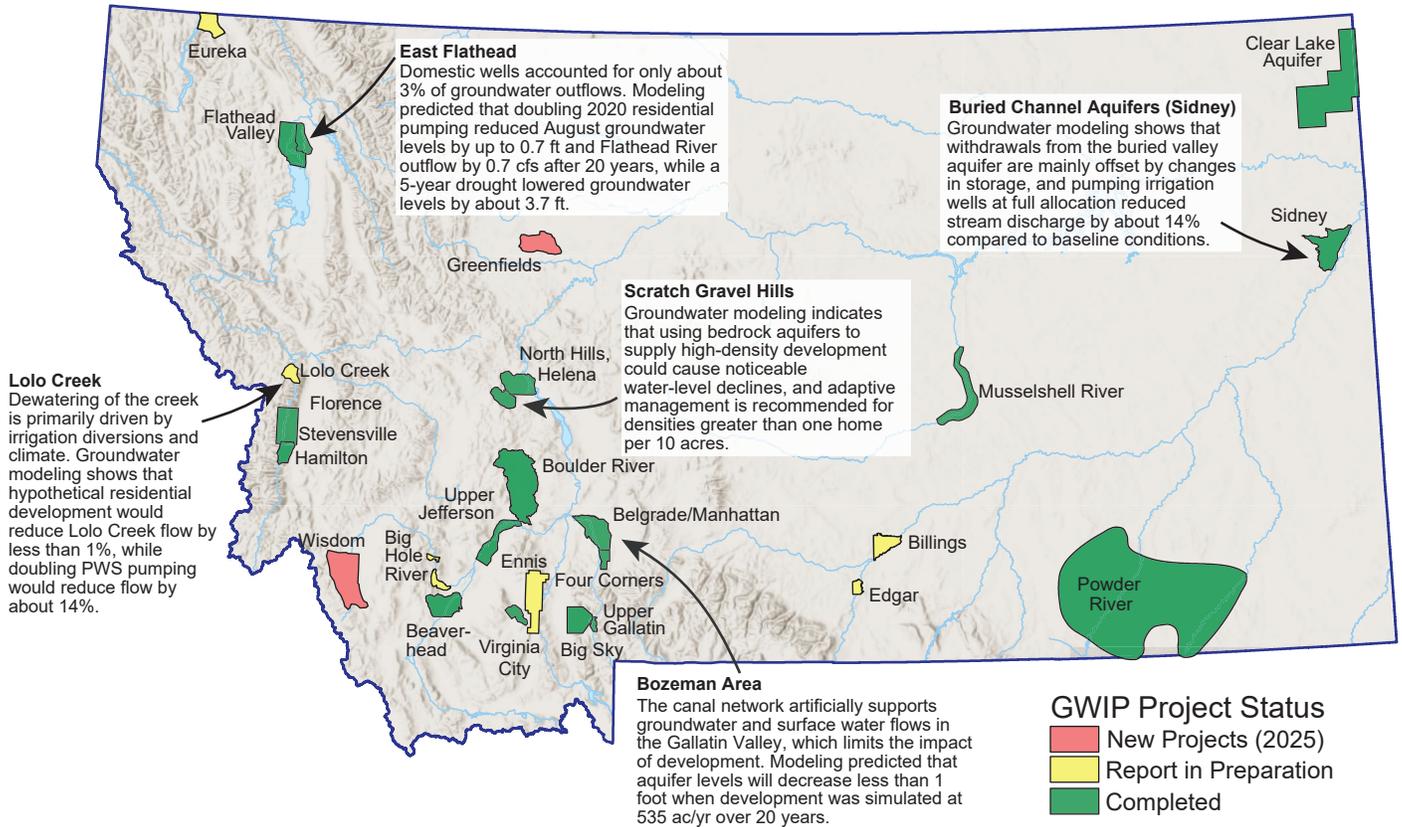
FOR MORE INFORMATION:

Contact:
Ginette Abdo
Program Manager
(406) 496-4152
gabdo@mtech.edu



Supporting Science-Based Water Management for Montana

PROJECTS AREAS



NEW PROJECTS (2025)

Greenfields Bench, Fairfield area Teton County

Purpose: Evaluate the effects on groundwater and surface water by changes to the irrigation infrastructure and water delivery within the Greenfields Irrigation District.

Status: Seventy-six groundwater monitoring sites and 23 surface-water sites were monitored in 2025 on the Fairfield Bench northwest of Great Falls. The preliminary water budget is being developed. A groundwater model will be constructed in 2026 to simulate the effects of changing irrigation infrastructure within the Greenfields Irrigation District.

Upper Big Hole River, Wisdom Beaverhead County

Purpose: Evaluate options for Managed Aquifer Recharge (MAR) to supplement late season flows in the Upper Big Hole River.

Status: Groundwater and surface-water data are being collected to support a GIS-based MAR suitability analysis, which will identify areas with high water infiltration potential in the spring for late-summer return flows. Three exploration wells have been installed to evaluate aquifer storage and recovery (ASR) potential, and additional wells are planned at the most promising site to support aquifer testing.

PROJECTS IN REPORT PREPARATION

Lower Big Hole River, Glen area

Beaverhead and Madison Counties

- Purpose:** Investigate the effects of irrigation return flows on the Big Hole River regarding quantity and temperature. Evaluate how changes in irrigation infrastructure could affect groundwater and surface water.
- Status:** Groundwater and surface-water monitoring and analysis are complete. The draft report is pending the results of groundwater modeling planned for 2026. The groundwater model will test how the groundwater and surface water respond to changes in irrigation infrastructure. A temperature study on the Big Hole River found solar radiation to be the primary driver of river temperatures with no clear link to irrigation practices.

Eureka

Lincoln County

- Purpose:** Evaluate how groundwater development will affect the availability of groundwater and surface water in the Tobacco Valley, Eureka.
- Status:** Groundwater and surface-water monitoring are complete. A groundwater budget has been developed for the study area. A calibrated groundwater flow model has been constructed to test various scenarios, such as evaluating where new groundwater pumping could cause changes in groundwater discharge to the Tobacco River.

Irrigation Recharge

Carbon and Beaverhead Counties

- Purpose:** Quantify the infiltration of groundwater beneath fields subjected to flood and pivot irrigation. The project focuses on direct measurement of infiltration through the unsaturated zone to determine the potential for irrigation-derived groundwater recharge under different operational conditions.
- Status:** Multi-year field data of soil moisture measurements and lysimeter data at the Edgar and Melrose sites show that precipitation and pivot irrigation infiltrates only the upper soil layers. In contrast, unsaturated zone modeling indicates that over 50% of flood-irrigation water percolates below the root zone, greatly increasing deep infiltration and groundwater recharge.

Billings

Yellowstone County

- Purpose:** Identify and quantify recharge sources and controls on groundwater quantity and quality in the Billings area to support future development decisions.
- Status:** The groundwater model is being developed and will simulate groundwater availability as population growth expands west of Billings. Groundwater-level monitoring continues at approximately a dozen key sites. Two reports summarizing the water quality and chemistry findings are in review. Groundwater nitrate concentrations in subdivisions are generally increasing.



Site visit to public water supply well.



Building groundwater models.

PUBLISHED REPORTS (2024–2025)

Hydrogeologic investigation of the East Flathead Valley, Report of Investigation 38

An Approach for Identifying River Reaches Sensitive to Warming from Daily Solar Radiation, Hydrological Processes Journal

Temperature and site data for the Big Hole River near Glen, Open-File 775

Groundwater model of the West Crane aquifer, Richland County, Open-File 774

Analyses of three constant-rate aquifer tests in the lower Big Hole watershed, Open-File 773

Hydrogeologic investigation of the Upper Gallatin River Corridor, Big Sky, Montana, Open-File 772

Groundwater model of the Upper Gallatin aquifer at Big Sky, Montana, Open-File 771

Evaluation of roto-sonic cores and a lithologic cross section in the East Flathead Valley, Open-File 770

A groundwater flow model for the East Flathead Valley, Report of Investigation 36

Three aquifer tests in the Tobacco Valley near Eureka, Open-File 764

Groundwater inputs to rivers and streams: Using temperature and visual cues on the Big Hole River Information Pamphlet 17

Analyses of constant-rate aquifer tests near Ennis, Montana, Open-File 763

COMMUNICATING RESULTS TO THE PUBLIC



WPIC Field Trip, Melrose, 2023



Panel Discussion, Dillon, 2025



Public Meeting, Eureka, 2024