



**SUPPORTING SCIENCE-BASED WATER  
MANAGEMENT FOR MONTANA**

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.

**Examples of GWIP topics:**

- ✓ Complex groundwater–surface-water interactions and stream depletion
- ✓ Changes to aquifer recharge from changes in irrigation methods
- ✓ Hydrologic effects of land-use changes (such as from agricultural to residential)
- ✓ Enhanced aquifer storage and recovery

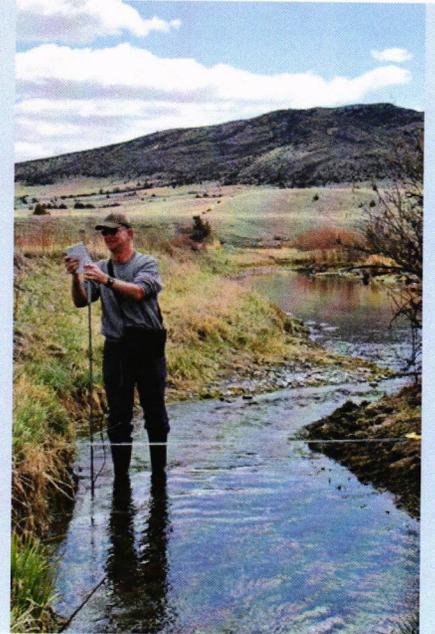
**GWIP in the Montana State Water Plan**

Water Supply and Demand

*“Ensuring an adequate supply of water to meet current beneficial uses and future demands is a theme echoed by the four Advisory Councils...”*

The following Recommendations from the 2015 State Water Plan demonstrate the applicability of the GWIP mission:

- Investigate impacts of changing irrigation methods
- Evaluate mitigations to offset impacts of groundwater use on surface water
- Investigate enhancing aquifer recharge through diverting high spring flows
- Ensure aquifer information and modeling tools are available for conjunctive use management
- Investigate the feasibility of aquifer storage and recovery

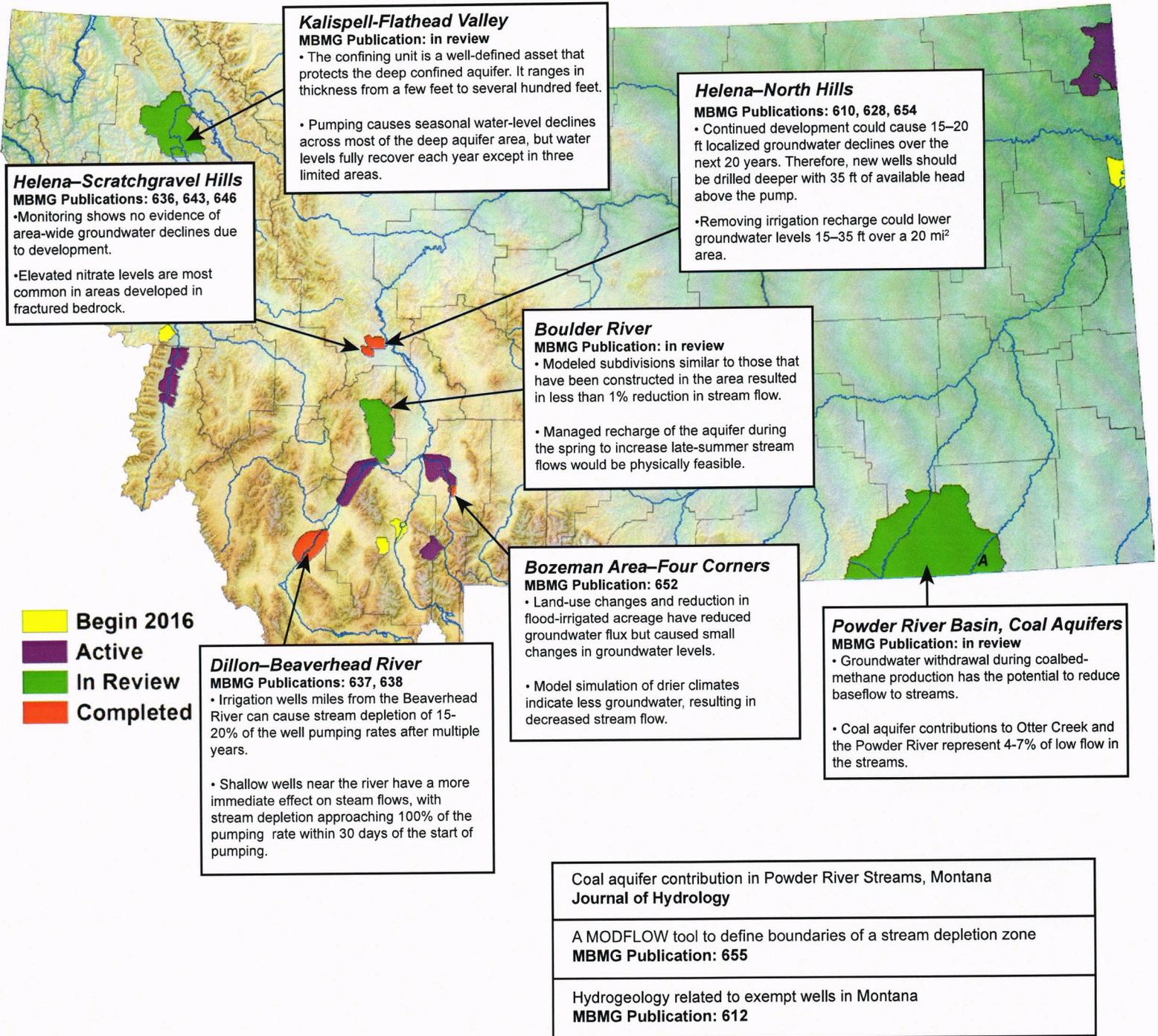


**2016 Projects**

The following projects were selected by the Groundwater Steering Committee.

- **Lolo Creek, Bitterroot Valley**—Determine why lower Lolo Creek is occasionally dry. Possible impacts include: surface-water diversions, groundwater withdrawals associated with residential development and climate.
- **Virginia City, Madison County**—Document the current and projected water availability for short-term and long-term community planning associated with commercial and residential growth.
- **Sidney, Eastern Montana**—Examine and model the physical availability of groundwater for community and industrial growth in the buried river channel deposits.
- **Madison Valley, Ennis area**—Investigate groundwater availability and quality to support residential growth in the terraces and valley floor east of Ennis.

# Water Management Tools for Montana



## Results are offered to the public through reports, presentations, and data:

Reports are available online: [http://www.mbm.mtech.edu/gwip/gwip\\_reports.asp](http://www.mbm.mtech.edu/gwip/gwip_reports.asp).  
 10 detailed, peer-reviewed MBMG reports have been published, with more in review.

Modeling files can be downloaded with associated modeling reports.  
 4 computer models of site-specific groundwater flow are now available to the public for continued use.

Data are available on GWIC: <http://mbm.gwic.mtech.edu>.  
 Comprehensive set of hydrogeologic data for each site are permanently stored online.

So far during the past year, over 1,200 people have attended GWIP presentations for the public.



# MONTANA BUREAU OF MINES AND GEOLOGY

## Ground Water Investigation Program

### PROJECT SUMMARIES

**Project:** Clear Lake Aquifer Investigation; Sheridan County  
**Purpose:** Evaluate Clear Lake aquifer response to groundwater withdrawals and provide analyses that will be used to assess development and wildlife decisions.  
**Status:** Data collection is complete. Data interpretation and report writing is in progress. The groundwater flow model is being calibrated to transient conditions which will be used to evaluate how increased groundwater withdrawals from irrigation impacts groundwater and wetlands.  
**Project Lead:** Jon Reiten

**Project:** Hamilton Area; Ravalli County  
**Purpose:** Examine the effects on groundwater and surface water of current and potential future groundwater withdrawals from residential/subdivision development including septic impacts.  
**Status:** Data collection is complete. Well drilling and aquifer testing was performed in 2015. Data interpretation and report writing will commence Summer 2016. Development of a groundwater flow model will commence Winter 2016. The model will be used to evaluate the effects of current and future housing development on water resources.  
**Project Lead:** Todd Myse, Ginette Abdo

**Project:** 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.  
**Status:** Groundwater and surface water monitoring is ongoing through Spring 2016. Water-quality samples were collected from 40-50 wells and surface water sites in 2015. Data collected from 15 monitoring wells installed for the project will be used to refine the sand and gravel aquifer numerical model, and to evaluate how current and future water demands will affect groundwater and surface-water availability.  
**Project Lead:** Kirk Waren

**Project:** Upper Jefferson River Valley; Jefferson, Madison, and Silver Bow Counties  
**Purpose:** Evaluate the effects of current and potential future groundwater withdrawals and changes in land-use on base-flow to Willow Springs, Parson's Slough, Jefferson Slough, and the Jefferson River.  
**Status:** Data collection is complete. Data interpretation, numerical modeling and report preparation are underway. Two groundwater models are being developed to assess the influence of land use change on groundwater and surface water.  
**Project Lead:** Andy Bobst

**Project:** Powder River Basin; Southeastern Montana  
**Purpose:** Quantify the coal aquifer contribution to Powder River Basin streams. Groundwater withdrawal during coalbed methane production reduces groundwater flow which has the potential to reduce base-flow to streams. The ability to quantify the impact to surface water from energy development will aid in acquisition of permits that will allow energy producers to use the coproduced water for beneficial purposes rather than treat it as a waste product.  
**Status:** Draft report in review, journal paper published.  
**Project Lead:** Liddi Meredith

**Project:** Stevensville Area; Ravalli County  
**Purpose:** Evaluate the feasibility of using groundwater to supplement or replace irrigation water currently being supplied by water diverted from the East Channel of the Bitterroot River.  
**Status:** Data collection is complete. Data interpretation, numerical modeling and report preparation are underway. This project may have implications for similar projects in the Bitterroot watershed.  
**Project Lead:** Kirk Waren

**Project:** Boulder River Valley; Jefferson County  
**Purpose:** Evaluate the effects of current and potential future groundwater withdrawals and the potential to use managed recharge to supplement late summer flows.  
**Status:** Draft interpretative and modeling reports in review.  
**Project Lead:** Andy Bobst

**Project:** Four Corners; Gallatin County  
**Purpose:** Examine the effects on groundwater recharge and aquifer sustainability of converting irrigated lands to urban uses. Develop a numerical groundwater model to evaluate potential future land-use changes on the hydrogeology.  
**Status:** Draft interpretative report in review. Modeling report has been published.  
**Project Lead:** Tom Michalek

**Project:** Manhattan/Belgrade; Gallatin County  
**Purpose:** Determine if groundwater levels or the annual groundwater flow is declining in response to pumping pressures and land use change over the past 60 years. Examine potential effects of future groundwater development on groundwater and surface water. Investigate changes in groundwater quality that may be related to increased wastewater disposal.  
**Status:** Data collection is complete. Data interpretation, numerical modeling and report preparation are underway.  
**Project Lead:** Tom Michalek

**Project:** Kalispell Area; Flathead County  
**Purpose:** The deep confined aquifer in the Flathead Valley is the most utilized aquifer in the valley, supplying high-capacity municipal and irrigation wells in addition to thousands of domestic wells. Continued population growth and localized water-level declines in the deep aquifer were evaluated in the context of long-term water level stability and groundwater/surface-water interaction.  
**Status:** Hydrogeologic report: in review. Geologic report: in review.  
**Project Lead:** John Wheaton, James Rose

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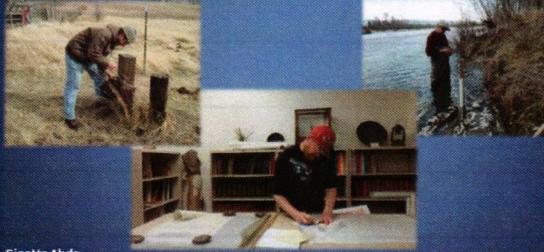
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**Ground Water Investigation Program**  
**Montana Bureau of Mines and Geology**



Ginette Abdo  
 Montana Bureau of Mines and Geology  
 July 11, 2016




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**HB 52**  
**61<sup>st</sup> Legislative Session**  
**2009**



The Montana Bureau of Mines and Geology shall develop and implement a groundwater investigation program for the purpose of compiling groundwater and aquifer data.

The **ground water assessment steering committee** shall prioritize subbasins for investigation based on current and anticipated growth of agriculture, industry, housing and commercial activity.

To keep the GWIP selection process and project activities transparent and available to the public, all of this and more is on our web page:  
<http://www.mbmgt.mtech.edu/gwip/gwip.asp>

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**Ground Water Steering Committee**

- Four voting Members
  - DNRC
  - DEQ
  - Dept. Of Agriculture
  - Montana State Library
- Ex-Officio members with Expertise or Management Responsibility related to Groundwater
  - Legislative Services Division
  - Board of Oil and Gas
  - MBMG
  - University system
  - County Government
  - City government
  - Federal Agencies - (such as EPA, US Forest Service, US BOR)
- Governor Appointees
  - Agricultural water users
  - Industrial water user
  - Conservation/ecological Protection
  - Development Community

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### Project Nominating and Ranking

2008 – Call goes out statewide for nominations  
GWSC develops initial ranking process

2009 – 39 nominations ranked; 7 selected  
July, 2009 – GWIP Officially Starts

2010 – 34 nominations ranked; 5 selected

2012 – 39 nominations ranked; 6 selected

2014 – Refocused nominating and ranking processes

2015 – 11 nominations ranked; 2 selected  
( plus 2 from 2012)




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### Standardized Nominations Format (2014)

Nominations actively sought from numerous local entities across the State

- 1) Define Project Purpose
- 2) Study Area Size
- 3) Overview and magnitude of the problem
- 4) Landowner cooperation and access
- 5) Uses of the Project Results
- 6) Technical Urgency
- 7) Complimentary Investigations and Project Support
- 8) Appendices

GWIP reviews the package with nominator and develops one-page project summaries

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### Ranking Criteria

- 1) Water issue related to current and anticipated growth of
  - ✓ housing/subdivisions,
  - ✓ agriculture,
  - ✓ industry, and
  - ✓ commercial activity
- 2) Designated Closed basin or Open basin with Closed basin issues
- 3) Controlled Groundwater Area
- 4) Impaired Groundwater and/or Surface Water Quality
- 5) Local Support
- 6) Unique topic
- 7) **Groundwater Steering Committee Input**

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### 2017/2018 Next GWIP Project Nominations

#### GWSC

- Prior to public meeting voting members discuss discretionary points (based on knowledge and agency directives)
- Incorporate ex-officio member project comments
- Preliminary project ranking
- Ex-officio members comment on ranking
- Preliminary ranking revised
- Public meeting and final ranking

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#### GWIP Topics

Some topics include:

- [Groundwater/surface water interaction](#)
- [Stream depletion by groundwater development \(mitigating impacts\)](#)
- [Groundwater availability --adequate water supplies](#)
- [Aquifer recharge from irrigation](#)
- [Impacts of changes in land uses](#)
- [Enhanced aquifer storage and artificial recharge](#)
- [Building predictive models](#)

[Highlighted topics are also included in the State Water Plan](#)

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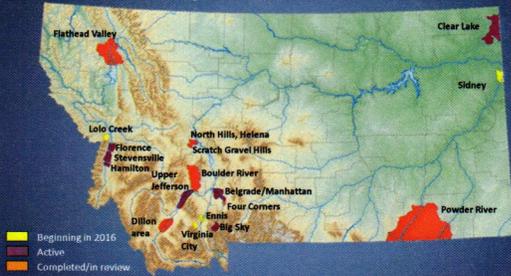
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#### GWIP adds to Montana's capability to deal with complex water resource issues




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### Uses of GWIP products

- Direct uses of results are not always known.
- GWIP reports are downloaded, attendance at presentations is high, we answer numerous calls.
- Water management decisions range from an irrigator or home owner turning water off and on, to permit review processes, to legislative actions.

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### GWIP results transferred to the public...

Water related education and outreach



**Groundwater study: State hydrogeologists continue research on Bitterroot Valley Aquifer**  
Perry Backus Feb 18, 2015



Dozens of newspaper articles have covered GWIP projects



Kalispell, April 2016

Over 1,200+ people have attended our public lectures in the past year



**HOW MUCH WATER ARE WE SITTING ON ANYWAY?**

**DEEP AQUIFER GEOLOGY IN FLATHEAD VALLEY**



**Groundwater model predicts less water in Gallatin River**

LAURA LANGOLLOTT, Chronicle Staff Writer May 16, 2014

Continued development could reduce the groundwater flowing beneath the Flathead area and more importantly, reduce flows in the stream.

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