

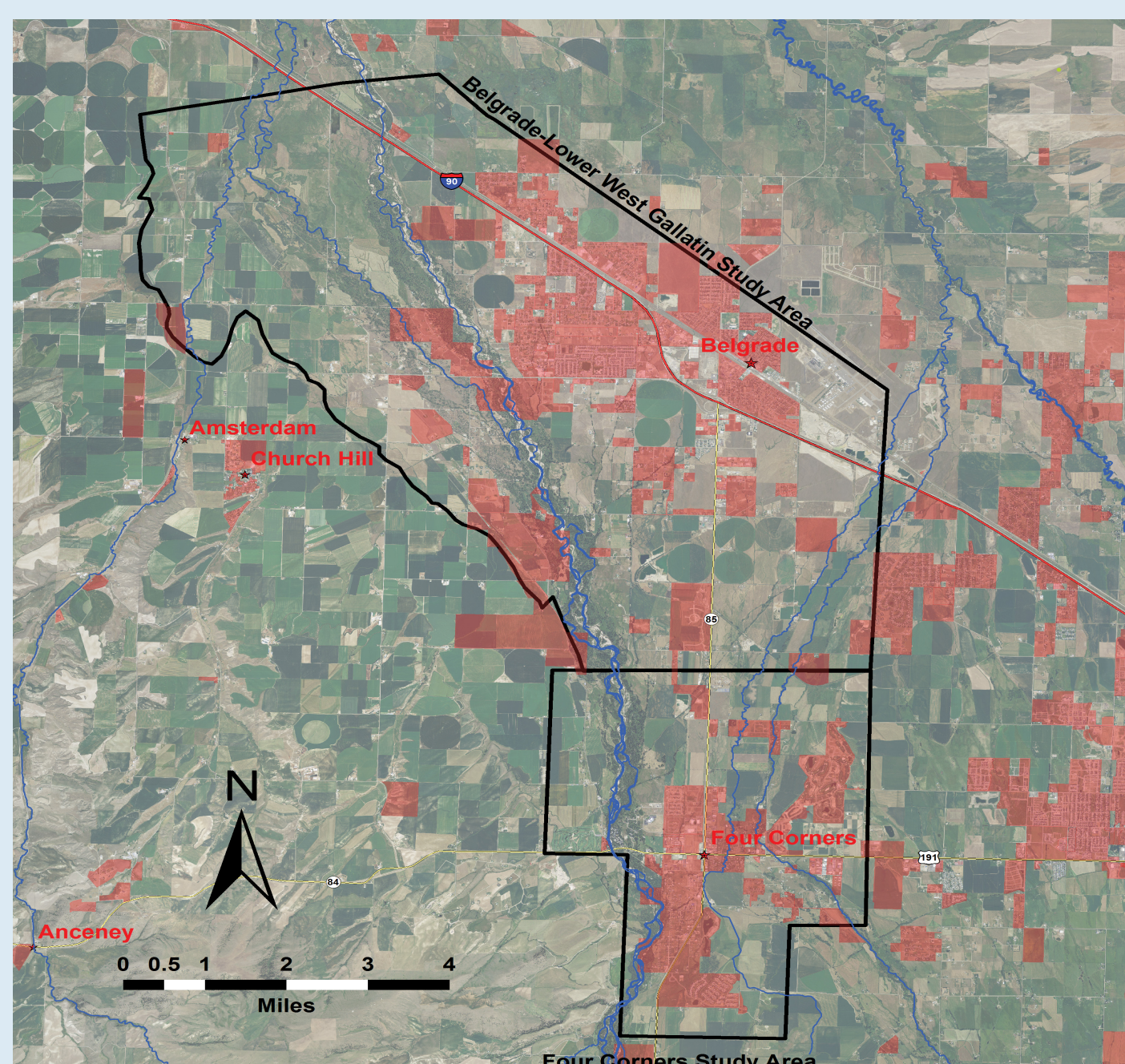
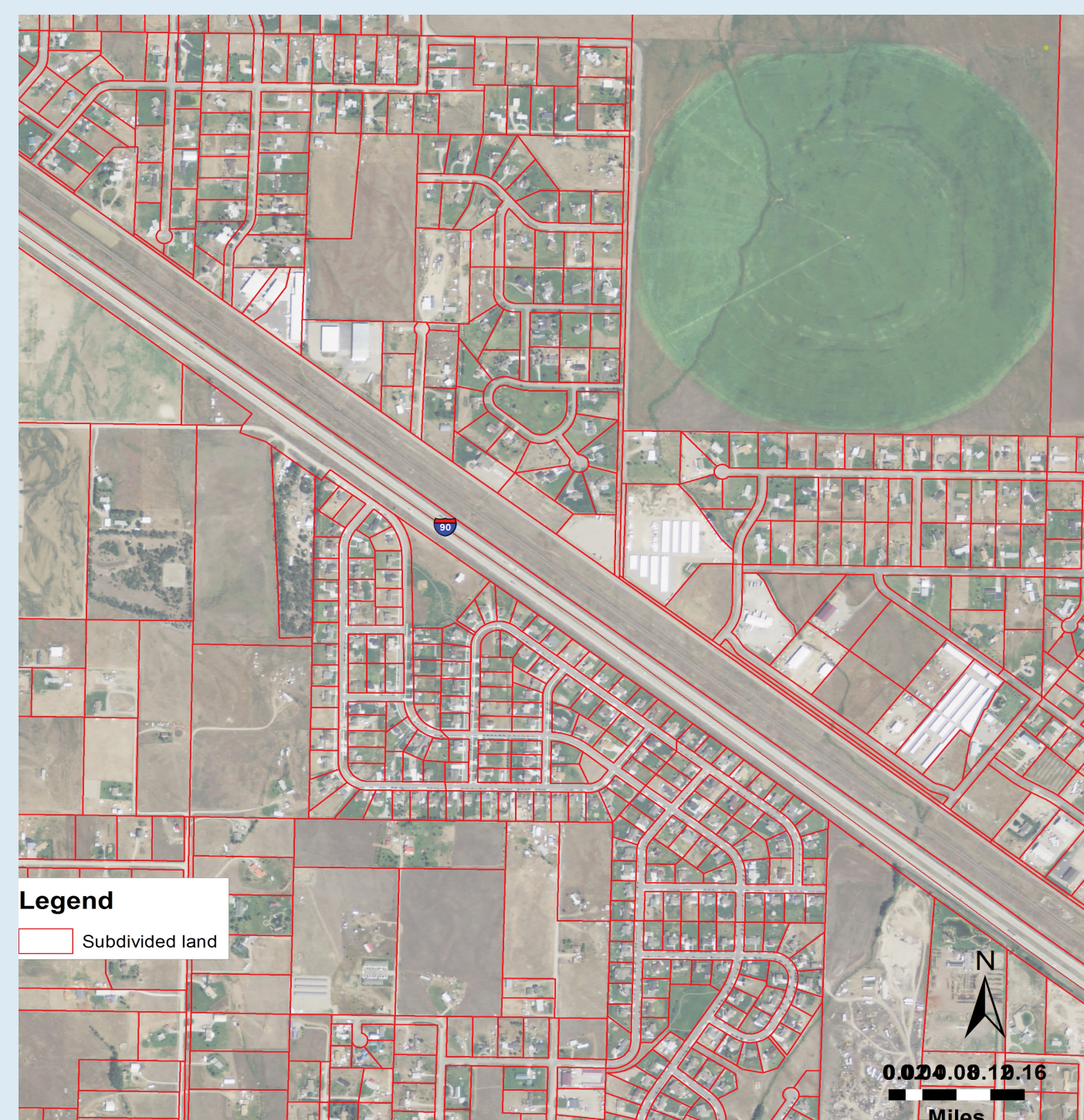
Purpose

Population growth results in conversion of agricultural land and water to residential and commercial use. More detailed understanding of groundwater flow system and its relationship with streams and irrigation water is needed.

Major Concerns

Change in water use may have unforeseen effects on water quality and water availability.

Potential negative impacts to senior (surface) water rights inhibit development of groundwater sources. Can mitigation be effective?



Previous Studies

Custer, Stephan G. and Mark A.Schaffer. Assessment of the interaction between ground water and the Gallatin River in the Four Corners area, Gallatin County, Montana Final Report for DNRC Grant RRG 06-1242, December 31, 2008.

Hackett, O.M., Visher, F.N., McMurtrey, R.G. and W.L. Steinhilber, 1960, Geology and ground-water resources of the Gallatin Valley, Gallatin County, Montana: U.S. Geological Survey Water Supply Paper 1482, 282 p.

Slagle, S.E., 1995, Geohydrologic conditions and land use in the Gallatin Valley, southwestern Montana, 1992-93: U.S. Geological Survey Water-Resources Investigations Report 95-4034.

GROUND WATER INVESTIGATION PROGRAM

FOUR CORNERS and BELGRADE-LOWER WEST GALLATIN STUDY AREAS

Tom Michalek, Project Manager, Senior Research Hydrogeologist
406-599-3079. tmichalek@mtech.edu

Mary Sutherland, Assistant Research Hydrogeologist

Jen Wilson, Assistant Research Hydrogeologist

Mark Schaffer, Research Hydrogeologist

Bill Henne, Montana Tech Graduate Assistant

Josh Gelfendaum, MSU Undergraduate Assistant

Interpretations

Hydrogeologic System

Principal Geologic Units:

Recent alluvium (sand, gravel, cobbles)

Older alluvium (sand, gravel, cobbles)

Older fine-grained valley-fill (sand, silt, clay)

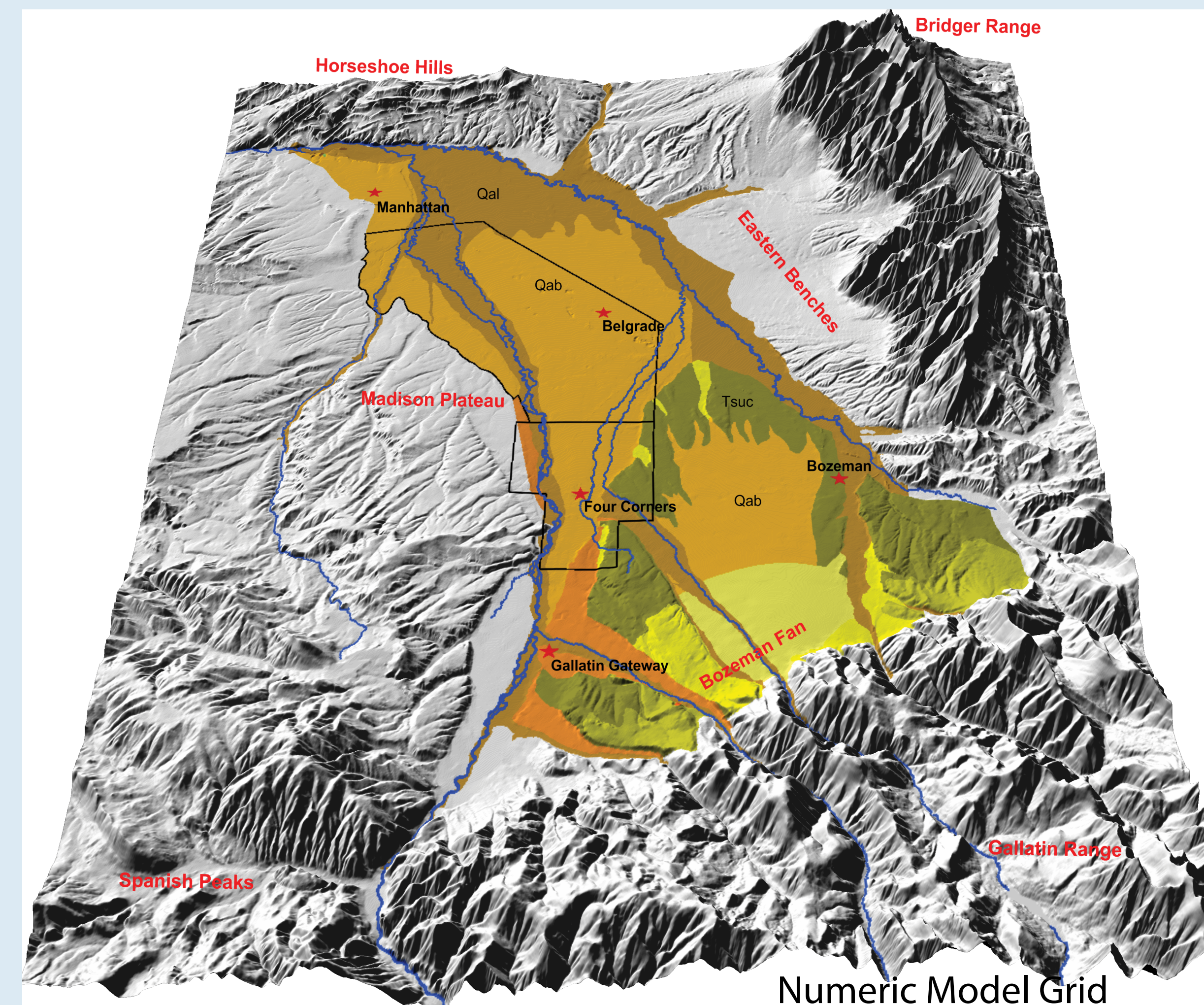
Significant Hydrologic Features:

West Gallatin shallow aquifer

Bozeman Fan layered aquifer

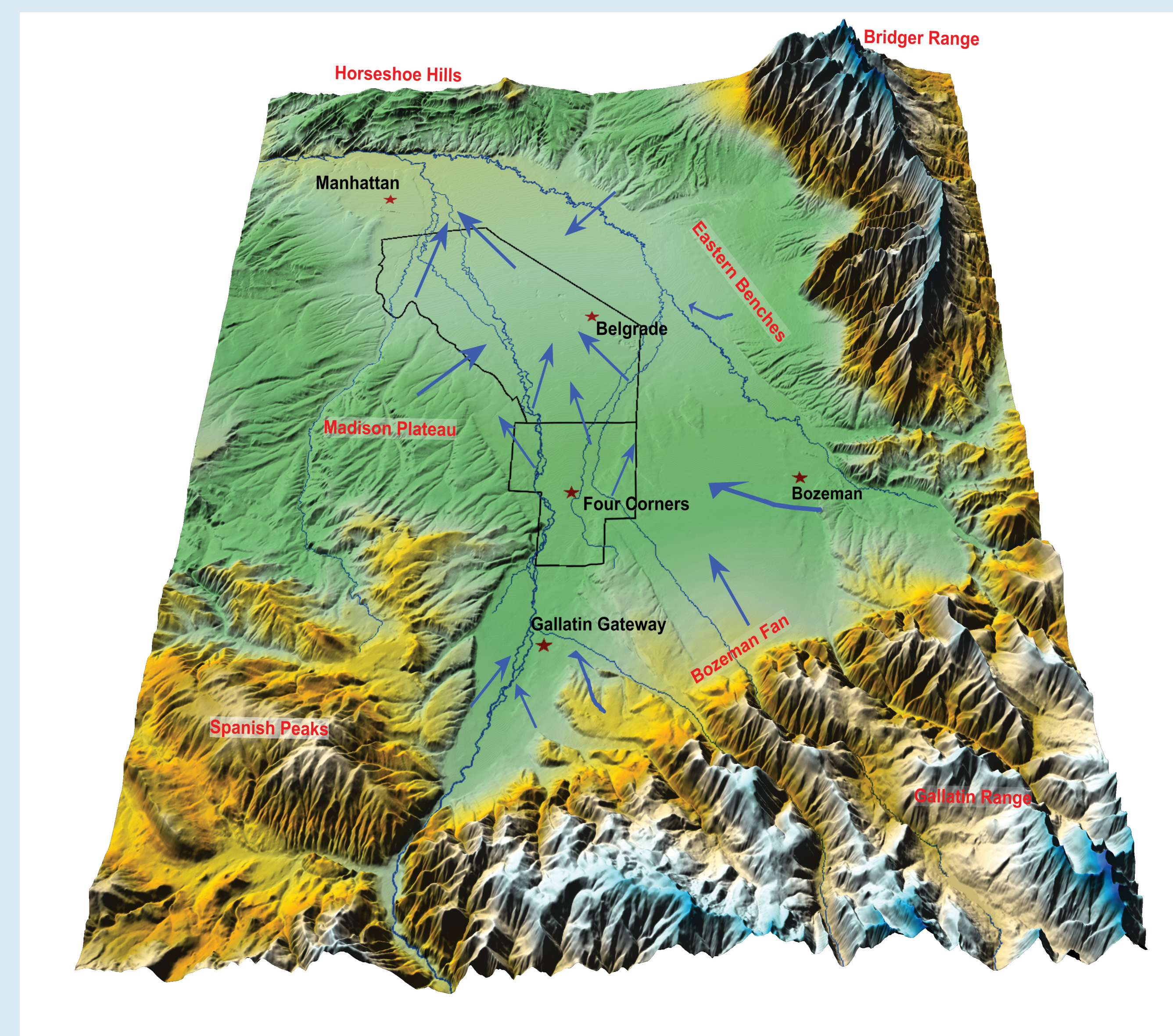
Aquifer recharge from snowpack and irrigation

Rivers and streams may receive or contribute flow to aquifers.



Numeric Model Grid

Gallatin Valley Sedimentary Geology



Interpreted groundwater flow through the Gallatin Valley.

Methods

Four locations: monitoring well networks and aquifer testing

35 locations: stream stage monitoring and flow measurement, including irrigation canals

60 locations: existing monitoring wells added to project

Over 50 new water-level recorders installed

Water-quality and isotope sampling

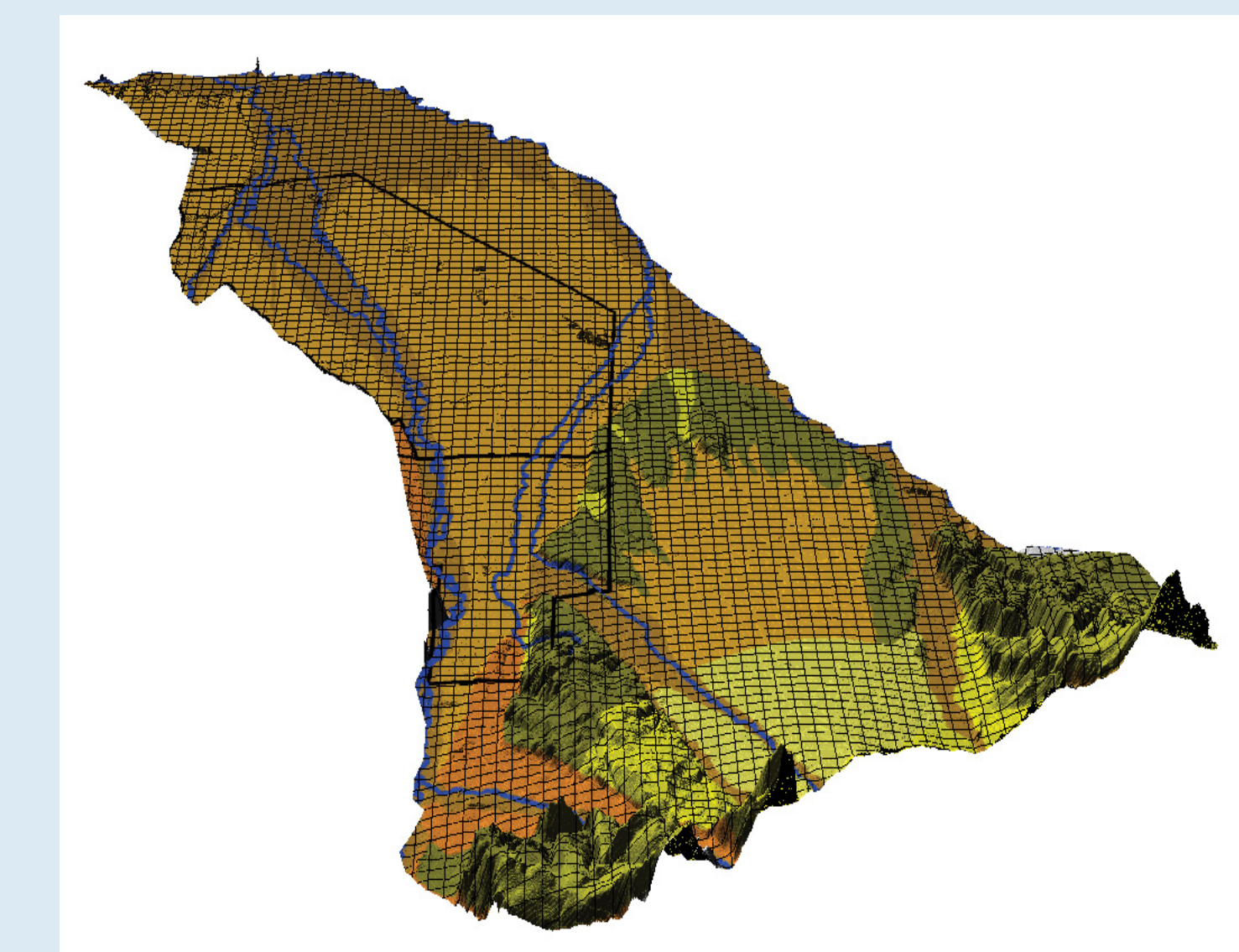
Numeric modeling



Stream gauging and flow measuring



Monitoring Well Drilling

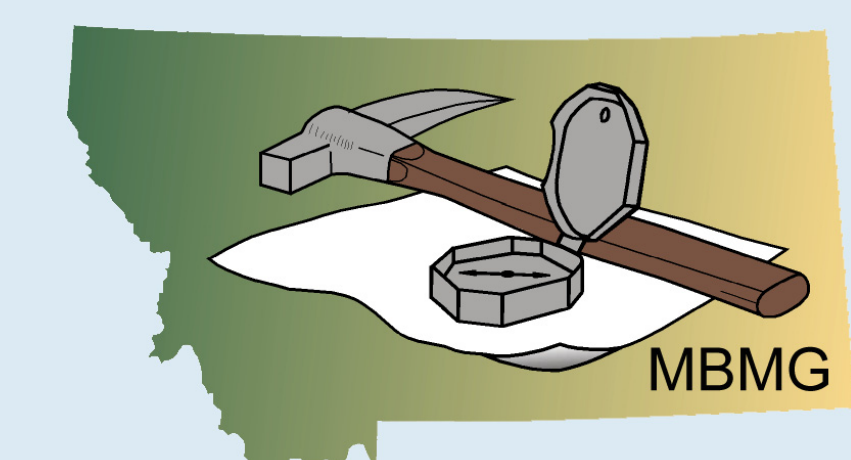


Numeric Model Grid

Acknowledgments

This important work would not be possible without the co-operation and collaboration of:

- Local landowners, developers and the agricultural community.
- Gallatin Local Water Quality District.
- City of Bozeman.
- DNRC, FWP, DEQ and MSU



Visit the website

<http://www.mbm.mtech.edu/gwip/gwip.asp>
for more details about the GWIP program