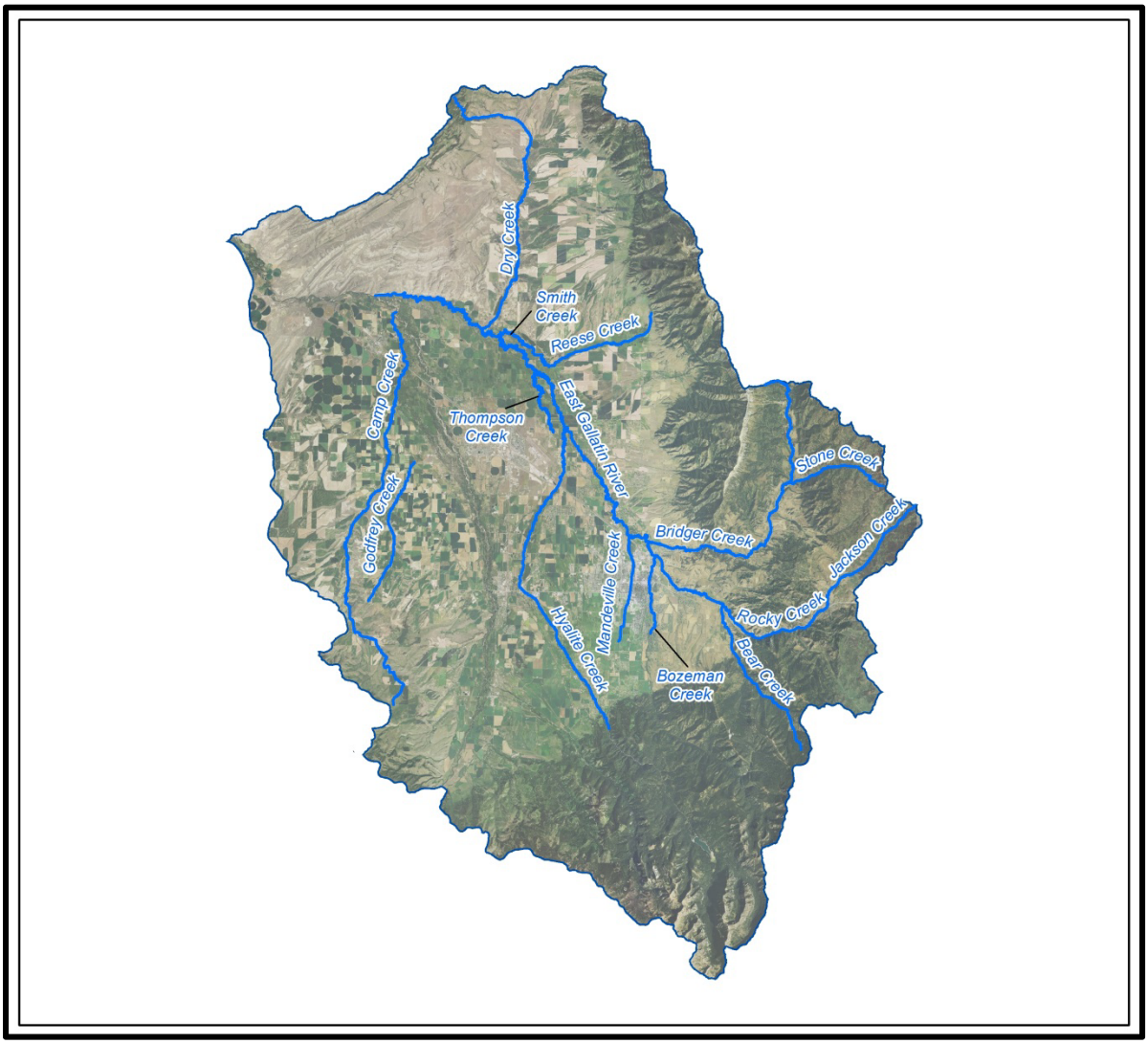
Lower Gallatin
Watershed Restoration Plan



GREATER GALLATIN
Watershed
COUNCIL

LOWER GALLATIN

WATERSHED RESTORATION PLAN

prepared by

Jeff Dunn, Watershed Hydrologist
Karen Filipovich, Independent Consultant
Katherine Boyk, Big Sky Watershed Corps

RESPEC
3810 Valley Commons Drive, Suite 4
Bozeman, Montana 59718

prepared for

Greater Gallatin Watershed Council
P.O. Box 751
300 North Willson Avenue, Basement Suite E
Bozeman, Montana 59715

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RESPEC
CONSULTING & SERVICES

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1.0 INTRODUCTION

The Greater Gallatin Watershed Council (GGWC) works with the community in the Lower Gallatin Watershed to develop and implement stream and wetland improvement projects that address identified water quality impairments. The goal of these projects is to improve water quality so the addressed streams are no longer considered impaired by the Montana Department of Environmental Quality (DEQ). Between 2009 and 2012, GGWC provided assistance to DEQ to develop Total Maximum Daily Loads (TMDLs) for impaired stream segments in the Lower Gallatin TMDL Planning Area. This includes the entire East Gallatin River watershed along with the mainstem of the Gallatin River downstream of Spanish Creek and tributaries that enter the Gallatin River downstream of Spanish Creek. Following the completion of the Lower Gallatin TMDL document in 2013, GGWC has been actively involved in the development of this Watershed Restoration Plan (WRP) for the Lower Gallatin Watershed. The goal of the Lower Gallatin WRP is to provide a blueprint for GGWC to identify and implement restoration projects that lead to improved water quality and the eventual removal of streams from DEQ's List of Impaired Waters. Completion of the Lower Gallatin WRP will enable GGWC and other groups within the Lower Gallatin Watershed to obtain funding through the Montana Department of Environmental Quality's (DEQ) 319 program for the implementation of water quality improvement projects on impaired stream segments.

The Lower Gallatin WRP provides a framework for implementing water-quality improvements for sediment, nutrient, and *E. coli* pollutants on the 15 streams identified in the *Lower Gallatin Planning Area TMDLs and Framework Water Quality Improvement Plan* (DEQ 2013):

- Bear Creek
- Bozeman Creek
- Bridger Creek
- Camp Creek
- Dry Creek
- Godfrey Creek
- Hyalite Creek
- Jackson Creek
- Mandeville Creek
- Reese Creek
- Rocky Creek
- Smith Creek
- Stone Creek
- Thompson Creek
- East Gallatin River

To help identify potential restoration projects on these 15 streams and their tributaries, GGWC held a series of community meetings with the theme of "Community-Based Stream Improvement" in January and February of 2014. These WRP community meetings allowed the public to provide input on potential stream and wetland restoration projects within the watershed that would lead to improved water quality.

1.1 EPA's Nine Minimum Elements

The U.S. Environmental Protection Agency (EPA) has developed the following minimum elements that all WRPs must address to be accepted by Montana DEQ for the 319 program. The Lower Gallatin WRP addresses each of these elements in the following sections:

1. Identification of causes of impairment: SECTION 4

2. An estimate of the load reductions expected from management measures: SECTION 4

3. A description of the nonpoint source management measures that need to be implemented to achieve load reductions: SECTION 3

4. Estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that may be relied upon to implement this plan: SECTION 5 and SECTION 8

5. An information and education component to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the nonpoint source management measures that are to be implemented: SECTION 7

6. Schedule for implementing the nonpoint source management measures identified in this plan that is reasonably expeditious: SECTION 5

7. A description of interim measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented: SECTION 5

8. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards: SECTION 6

9. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established: SECTION 6

1.2 Progress Evaluation

The goal of the Lower Gallatin WRP is to provide a blueprint for GGWC to identify and implement restoration projects that lead to improved water quality and the eventual removal of streams from DEQ's List of Impaired Waters. To ensure that GGWC is effectively working towards this goal, staff and the board subcommittee will review the Milestones (Section 5.5) outlined in the Lower Gallatin WRP annually to evaluate progress and revisit the established goals. Every five years, GGWC will update the Lower Gallatin WRP to account for projects completed and to guide future activities as impaired streams are restored and removed from DEQ's List of Impaired Waters.

2.0 WATERSHED CHARACTERIZATION

A detailed characterization of the Lower Gallatin Watershed was prepared during the TMDL development process and is presented in Section 2 of the *Lower Gallatin Planning Area TMDLs & Framework Water Quality Improvement Plan* (DEQ 2013). The Lower Gallatin Watershed covers approximately 997 square miles and includes both urban and agricultural stakeholders. To facilitate communication with these diverse stakeholders, GGWC divided the Lower Gallatin Watershed into four areas: North, East, West, and Bozeman. GGWC conducted community meetings in Belgrade (North), Manhattan (West), Bridger Canyon (East) and Bozeman to provide stakeholders throughout the watershed with the opportunity to present ideas for restoration projects that may lead to improved stream conditions (**Figure 2-1**). Varying land ownership and land use patterns along with varying stream types and conditions between these areas provide an opportunity for GGWC to implement restoration measures that address the concerns of individual stakeholder groups, the unique stream conditions across the Lower Gallatin Watershed, and the pollutants of concern identified by DEQ.

2.2.1 Lower Gallatin Watershed – Bozeman

The area in and around Bozeman is highly urbanized and includes impaired segments on Bozeman Creek, Bridger Creek, Mandeville Creek, and the East Gallatin River (**Figure 2-2**). Impairments include total nitrogen, nitrate+nitrite, total phosphorus, *E. coli,* and sediment. Primary stakeholders in this area include the City of Bozeman, Montana State University, Gallatin Conservation District, Gallatin County, United States Forest Service, agricultural producers, private landowners, local residents, businesses, and non-profit organizations. In the area around Bozeman, GGWC will take a lead role in watershed restoration efforts in partnership with the City of Bozeman, Gallatin Local Water Quality District, Gallatin Conservation District, Montana State University, Montana Department of Natural Resources and Conservation, and non-profit organizations.

2.2.2 Lower Gallatin Watershed – East

The eastern portion of the Lower Gallatin Watershed includes impaired segments on Bear Creek, Bozeman Creek, Bridger Creek, Hyalite Creek, Jackson Creek, Mandeville Creek, Rocky Creek, Stone Creek, and the East Gallatin River (**Figure 2-3**). Impairments include total nitrogen, nitrate+nitrite, total phosphorus, *E. coli*, and sediment. Primary stakeholders in this area include the City of Bozeman, Montana State University, Gallatin Conservation District, Gallatin County, United States Forest Service, agricultural producers, private landowners, local residents, businesses, and non-profit organizations, including the Gallatin Valley Land Trust and Montana Land Reliance. In the eastern portion of the Lower Gallatin Watershed, GGWC will take a lead role in watershed restoration efforts in partnership with the City of Bozeman, Gallatin Local Water Quality District, Gallatin Conservation District, Montana State University, United States Forest Service, Gallatin Valley Land Trust, Montana Land Reliance, agricultural producers, irrigation ditch operators, interested landowners, and non-profit organizations.

2.2.3 Lower Gallatin Watershed – North

The northern portion of the Lower Gallatin Watershed includes impaired segments on Dry Creek, Reese Creek, Smith Creek, Thompson Creek, and the East Gallatin River (**Figure 2-4**). Impairments include total nitrogen, nitrate+nitrite, total phosphorus, *E. coli,* and sediment. Primary stakeholders in this area include the Gallatin Conservation District, Gallatin County, United States Forest Service, Gallatin Valley Land Trust, Montana Land Reliance, agricultural producers, and private landowners. In the northern portion of the Lower Gallatin Watershed, GGWC envisions taking a role in watershed restoration efforts

by partnering with the Gallatin Conservation District, Gallatin Local Water Quality District, Natural Resources Conservation Service, United States Forest Service, Gallatin Valley Land Trust, Montana Land Reliance, agricultural producers, irrigation ditch operators, interested landowners, and non-profit organizations.

2.2.4 Lower Gallatin Watershed – West

The western portion of the Lower Gallatin Watershed includes impaired segments on Camp Creek and Godfrey Creek (**Figure 2-5**). Impairments include total nitrogen, total phosphorus, *E. coli,* and sediment. Primary stakeholders in this area include Gallatin Conservation District, Gallatin County, Gallatin Valley Land Trust, Montana Land Reliance, agricultural producers, and private landowners. In the western portion of the Lower Gallatin Watershed, GGWC envisions taking a role in watershed restoration efforts by partnering with the Gallatin Conservation District, Gallatin Local Water Quality District, Natural Resources Conservation Service, United States Forest Service, Gallatin Valley Land Trust, Montana Land Reliance, agricultural producers, irrigation ditch operators, interested landowners, and non-profit organizations.

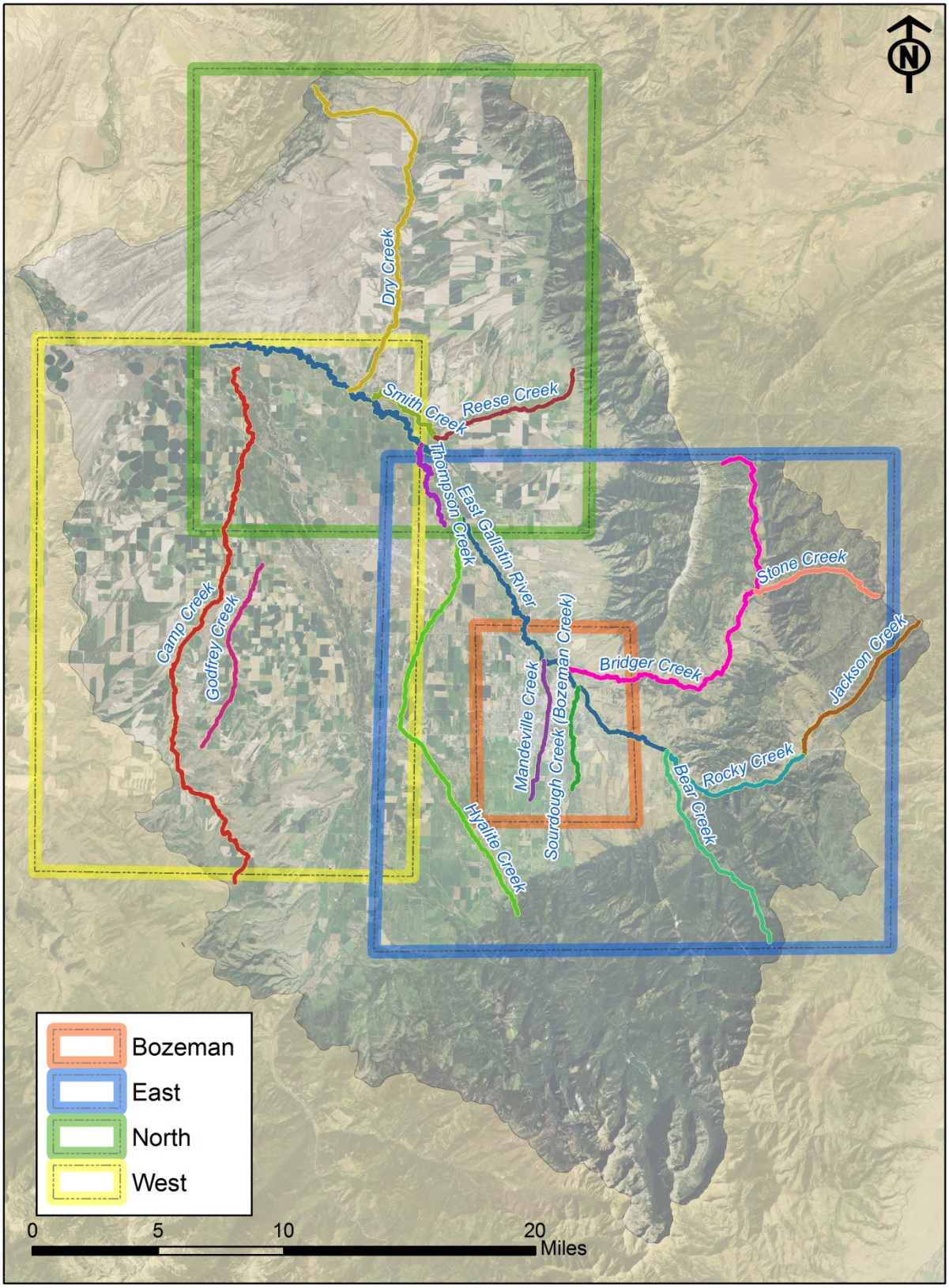


Figure 2-1. Lower Gallatin Watershed – Bozeman, East, North and West

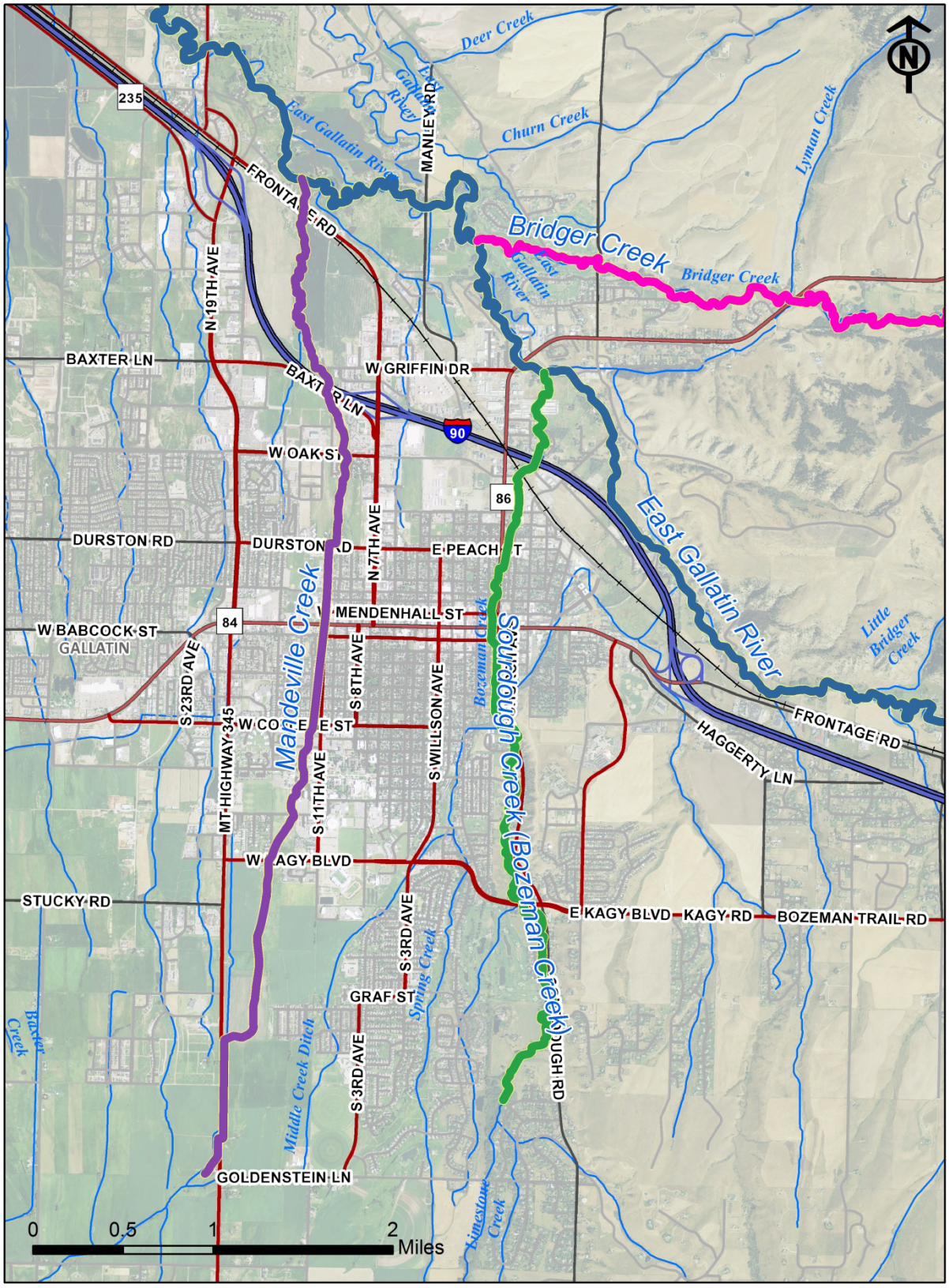


Figure 2-2. Lower Gallatin Watershed – Bozeman

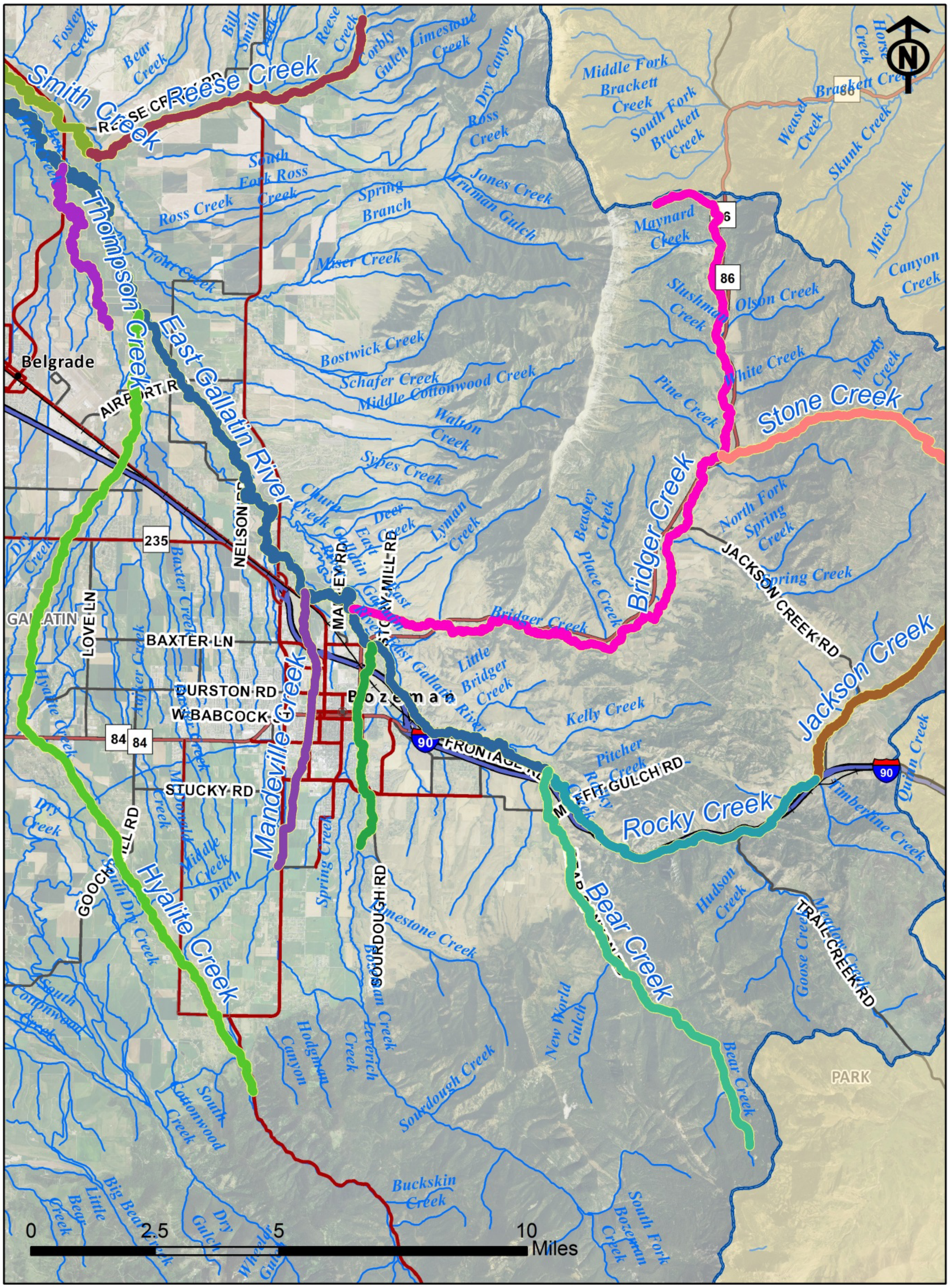


Figure 2-3. Lower Gallatin Watershed – East

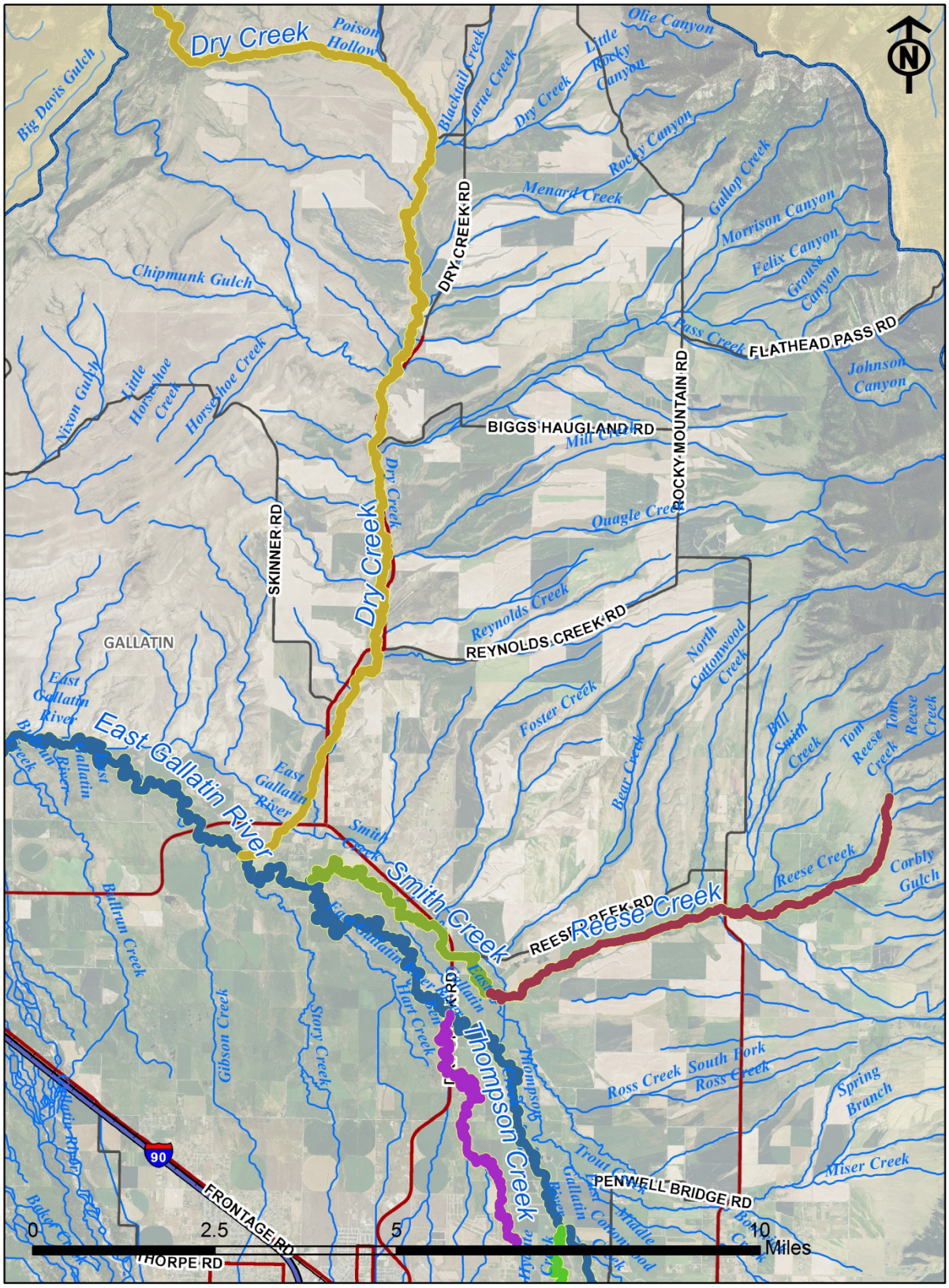


Figure 2-4. Lower Gallatin Watershed – North

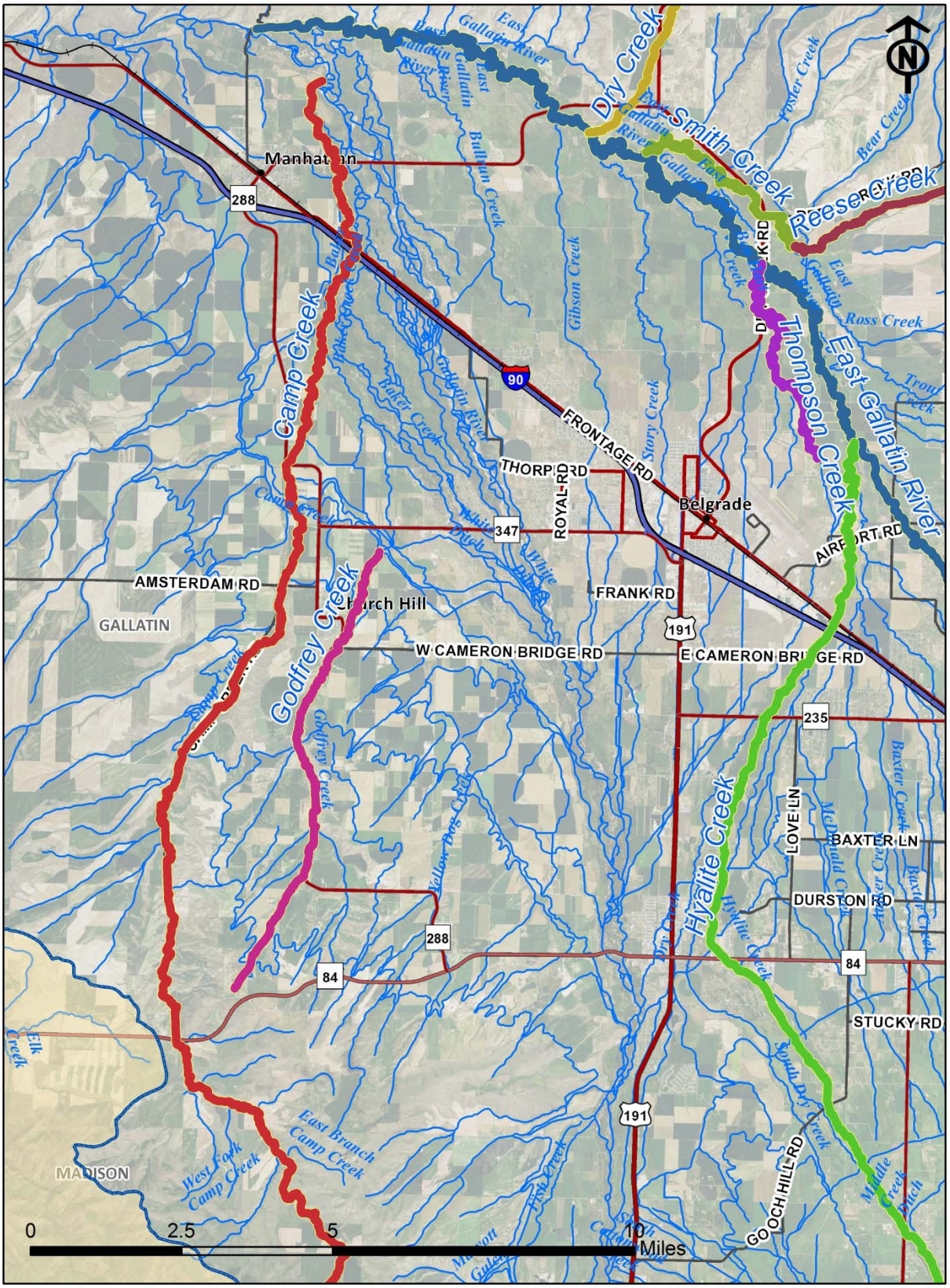


Figure 2-5. Lower Gallatin Watershed – West

3.0 RESTORATION ACTIVITIES AND BEST MANAGEMENT PRACTICES

Non-point source management measures, Best Management Practices (BMPs), and restoration projects will be implemented to reduce pollutant loads to the impaired stream segments and their tributary streams in the Lower Gallatin Watershed. Potential projects include: streambank stabilization and revegetation, riparian buffer enhancement, unpaved road improvements, traction sand management, residential and urban BMPs, forestry BMPs, agricultural BMPs, stormwater BMPs, and on-site subsurface wastewater treatment system upgrades.

3.1 STREAMBANK STABILIZATION AND REVEGETATION

Streambank bioengineering techniques reduce sediment inputs from eroding streambanks and restore natural channel migration rates through streambank revegetation. Bioengineered streambanks are designed to eliminate the sediment load from bank erosion in the short-term. Over the long-term, bioengineered streambanks are designed to erode naturally, allowing for natural rates of lateral channel migration and restoration of natural sediment transport processes. Streambank bioengineering techniques include the use of woody material, biodegradable coir fabric, gravel, cobbles, soil and willows, which are layered to produce a stable bank that will quickly develop riparian vegetation. Streambank bioengineering is typically accompanied by the creation of a vegetated riparian buffer on the floodplain, which is intended to provide long-term stability as the channel continues to migrate.

3.2 RIPARIAN BUFFER ENHANCEMENT

Riparian buffer enhancement involves the creation and widening of the riparian buffer, which helps naturally stabilize streambanks, provides a filter for the runoff of sediment and nutrients from upland areas, and improves the utilization of nutrients which would otherwise leach below the root zone and contaminate groundwater. Riparian buffer enhancement can be achieved by actively replanting the floodplain or enacting grazing management strategies that limit the amount of time that livestock have access to the riparian zone. Riparian plantings include willow stakes, willow transplants and containerized riparian vegetation. Grazing management strategies can include fencing, off-stream water development, water gaps, and management of the timing of grazing. In urban and suburban settings, riparian buffer enhancement can reduce the input of lawn fertilizer and stormwater runoff. The enhancement of riparian buffers can greatly reduce the input of sediment and nutrients into impaired stream segments.

3.3 UNPAVED ROAD IMPROVEMENTS

Sediment loads from unpaved roads can be reduced by creating rolling dips or water bars, adding gravel, paving the road, enhancing vegetative filter strips, installing ditch relief culverts, or replacing culverts. Three-sided arch culverts, where the natural stream bottom is retained, allow for improved fish passage and more complex aquatic habitat. The hydrology of the contributing area should also be considered when determining the necessary culvert size. Following these principals will help improve the stream system, increase fish habitat, and reduce potential sediment loads from failed culverts. Proper management of unpaved roads by eliminating preferential flow pathways can greatly reduce sediment loading from this source.

3.4 TRACTION SAND MANAGEMENT

Traction sand management involves cleaning up traction sand applied to icy roads during the winter before it is washed into a stream during snowmelt or rain events. This should generally occur in March, April, and early May, prior to spring runoff. Traction sand can be actively removed from the roadway, shoulders, and borrow ditches, as well as from in-between guardrails by loading the material into trucks and hauling it to a designated stockpile location (MDT 2013). Sediment basins can also be constructed to capture traction sand before it enters the stream channel, while vegetated filter strips can help prevent the overland transport of traction sand into an adjacent stream channel. Proper management of traction sand can greatly reduce the sediment load from this source.

3.5 RESIDENTIAL AND URBAN BEST MANAGEMENT PRACTICES

Residential and urban BMPs can help reduce the input of sediment, nutrients, and *E. coli* to impaired stream segments and include the following projects:

- Capturing stormwater runoff from impervious surfaces
- Employing proper pet waste management in yards and open spaces
- Employing proper lawn fertilizer application and mowing practices
- Creating enhanced riparian buffers
- Regularly maintaining individual septic systems

3.6 AGRICULTURAL BEST MANAGEMENT PRACTICES

Agricultural BMPs can help reduce the input of sediment, nutrients, and *E. coli* to impaired stream segments and include the following projects:

- Improving grazing management with fencing
- Developing off-stream water sources
- Developing water gaps and hardened stream crossings
- Improving irrigation water management
- Creating enhanced riparian buffers
- Practicing rotational grazing
- Employing proper manure management

3.7 FORESTRY BEST MANAGEMENT PRACTICES

Forestry BMPs can help reduce the input of sediment and nutrients to impaired stream segments and include the following projects:

- Timely maintenance of erosion control practices on unpaved roads
- Creating enhanced riparian buffers
- Properly sizing culverts and replacing undersized culverts
- Adhering to Montana's Streamside Management Zone (SMZ) rule

3.8 STORMWATER BEST MANAGEMENT PRACTICES

Stormwater BMPs can help reduce the input of sediment, nutrients, and *E. coli* to impaired stream segments and include the following projects:

- Developing bioretention treatment areas and media filters
- Creating enhanced riparian buffers
- Creating wetland areas throughout the urban and suburban environment

3.9 ON-SITE SUBSURFACE WASTEWATER TREATMENT SYSTEM UPGRADES

On-site subsurface wastewater treatment upgrades can help reduce the input of nutrients and *E. coli* to impaired stream segments and include the following projects:

- Regularly maintaining individual septic systems
- Connecting individual septic systems to a centralized wastewater treatment system
- Installing type II (advanced wastewater treatment) septic systems in new developments

4.0 RESTORATION PROJECTS FOR IMPAIRED STREAM SEGMENTS

Non-point source management measures and potential restoration projects that will address the causes of impairment on individual stream segments and their tributaries are discussed in the following sections. Much of this information, including the necessary percent reduction in pollutant loading needed to meet Montana's water quality standards, is derived from the *Lower Gallatin Planning Area TMDLs & Framework Water Quality Improvement Plan* (DEQ 2013). Ideas for potential projects received from the public during the WRP community meetings are included in this discussion. In addition, specific projects identified on impaired stream segments in the 2010 *Gallatin Watershed Restoration Prioritization Planning* (DTM and AGI 2010) report are included in this assessment.

4.1 BEAR CREEK

Bear Creek has a TMDL for sediment and total phosphorus, though total phosphorus is currently achieving the TMDL during mid-summer baseflow conditions and no reduction is required (**Table 4-1**). In 2007 and 2008, the Forest Service decommissioned five miles of road in the Bear Creek watershed, which addressed a long-standing source of sediment to Bear Creek. The TMDL document indicates that total phosphorus is tied to sediment, so reducing the sediment load should reduce the total phosphorus load.

Table 4-1. Bear Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction	Project Types / Treatments
Bear Creek - headwaters to mouth (Rocky Creek)	Sediment	48%	Streambank Stabilization and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Stormwater BMPs
			Traction Sand Management
	Total Phosphorus	0%	No Reduction Required

Focus areas for water quality improvements along Bear Creek identified during the WRP public meetings and in the TMDL document include:

- Unpaved road improvements on Bear Canyon Road, including culvert replacements on driveways crossing the creek
- Streambank stabilization and revegetation in the lower reaches
- Riparian buffer enhancement in the lower reaches
- Traction sand management on Interstate 90
- Monitoring total phosphorus to evaluate the potential to delist Bear Creek for this pollutant

4.2 BOZEMAN CREEK DOWNSTREAM OF LIMESTONE CREEK

Bozeman (Sourdough) Creek has a TMDL for sediment, total nitrogen, and *E. coli* (**Table 4-2**). Downstream of Limestone Creek, Bozeman Creek is an urban stream flowing through neighborhoods and downtown Bozeman. Sediment concerns for Bozeman Creek include channelization, channel entrenchment, and a loss of channel complexity, including a reduction in the amount of pools and large woody debris. Sources of nitrogen include agriculture, development, and loading from on-site subsurface wastewater treatment systems. Total nitrogen reductions can be achieved through residential and urban BMPs, agricultural BMPs, forestry BMPs, and on-site subsurface wastewater treatment upgrades. In addition, tributaries to Bozeman Creek, including Mathew Bird Creek and Nash Spring Creek, are cited as sources of total nitrogen to Bozeman Creek. *E. coli* sources appear to be primarily related to residential and recreational land uses within the developed areas of the city of Bozeman, including contributions from Nash Creek and Mathew Bird Creek. A major effort is currently underway to improve the conditions of Bozeman Creek through the Bozeman Creek Enhancement Project, which extends from Goldenstein Road downstream to the confluence with the East Gallatin River. In addition, restoration at the future Story Mill Community Park, located at the confluence of Bozeman Creek and the East Gallatin River, includes the development of a backwater slough on Bozeman Creek. Wetland and riparian restoration at Story Mill Community Park is intended to filter sediment and increase nutrient uptake at the confluence of Bozeman Creek and the East Gallatin River.

Table 4-2. Bozeman Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction	Project Types / Treatments
Bozeman Creek - confluence of Limestone Creek and Bozeman Creek to the mouth (East Gallatin River)	Sediment	37%	Streambank Stabilization and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Stormwater BMPs
	Total Nitrogen	63%	Residential and Urban BMPs
			Agricultural BMPs
			Forestry BMPs
			On-Site Subsurface Wastewater Treatment System Upgrades
	E. coli	15%	Residential and Urban BMPs
			Agricultural BMPs

Focus areas for water quality improvements along Bozeman Creek identified during the WRP community meetings and in the TMDL document include:

- Bozeman Creek Enhancement Project
- Wetland and floodplain restoration at future Story Mill Community Park
- Habitat improvements including decreased channel entrenchment and increased pool frequency
- Removal of concrete, trash, and debris, including in Tuckerman Park
- Reduce stormwater discharges within the City of Bozeman
- Traction sand management on city streets

- Mathew Bird Creek wetland and stream restoration on Montana State University property and along the urban trail system
- Riparian buffer enhancement along Bozeman Creek, Nash Creek, and Mathew Bird Creek
- Education and outreach about proper management of yard waste and pet waste
- Education and outreach about riparian management along small acreage properties
- Irrigation water management, infrastructure improvements, and irrigation network mapping, including Mill Ditch
- Fertilizer management on Valley View Golf Course
- Septic system upgrades and/or connection to centralized wastewater treatment system

4.3 BRIDGER CREEK

Bridger Creek has a TMDL for nitrate+nitrite, though it is currently achieving the TMDL during mid-summer baseflow conditions and no reduction is presently required for nitrate+nitrite (**Table 4-3**). Water quality data indicate that the nitrate+nitrite impairment is limited to the lower reaches of Bridger Creek below the mouth of the canyon and downstream of the confluence with Lyman Creek (DEQ 2013). In addition, Bridger Creek is considered chronically dewatered by Montana Fish, Wildlife and Parks.

Table 4-3. Bridger Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction	Project Types / Treatments
Bridger Creek - headwaters to mouth (East Gallatin River)	Nitrate+ Nitrite	0%	No Reduction Required

Focus areas for water quality improvements along Bridger Creek identified during the WRP community meetings and in the TMDL document include:

- Removal of car bodies from streambanks near the mouth of the canyon between Bridger Canyon Road and Story Mill Road and re-naturalization of streambanks
- Streambank stabilization and riparian restoration in the Creekwood and Longwood subdivisions
- Manage pollutant loading from ongoing development surrounding Bridger Bowl Ski Area
- Fertilizer management on Bridger Creek Golf Course
- Septic system upgrades and/or connection to centralized wastewater treatment system
- Monitor nitrate+nitrite to evaluate the potential to delist Bridger Creek for this pollutant

4.4 CAMP CREEK

Camp Creek has a TMDL for sediment, total nitrogen, total phosphorus, and *E. coli* (**Table 4-4**). The primary land use activities in the Camp Creek watershed include irrigated and dryland farming. The channel is also used for conveyance of irrigation water from the Gallatin River. Altered flow regimes, including high flows observed during field data collection in August 2009, are leading to accelerated streambank erosion and entrenched channel conditions along much of Camp Creek, particularly between the Highway 84/Norris Road crossing and Interstate 90. Thus, irrigation water management is a key component to reducing sediment loading to Camp Creek as increased streamflows lead to accelerated rates of streambank erosion within the entrenched portions of Camp Creek. Nitrogen in groundwater from irrigated agriculture and fertilizer transport are suggested in the TMDL document as the primary source of nitrogen to Camp Creek. *E. coli* loading to Camp Creek occurs from residential and agricultural sources, including irrigation canal inputs into Camp Creek from Valley Ditch and an un-named canal identified in the TMDL document. Agricultural and residential BMPs will also help reduce total phosphorus loads to Camp Creek.

Table 4-4. Camp Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction	Project Types / Treatments
Camp Creek - headwaters to mouth (Gallatin River)	Sediment	63%	Streambank Stabilization and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Grazing Management
			Irrigation Water Management
	Total Nitrogen	77%	Residential and Urban BMPs
			Agricultural BMPs
	Total Phosphorus	71%	Residential and Urban BMPs
			Agricultural BMPs
	E. coli	65%	Residential and Urban BMPs
			Agricultural BMPs
			Irrigation Water Management

Focus areas for water quality improvements along Camp Creek identified during the WRP community meetings and in the TMDL document include:

- Fencing, off-stream water development, water gaps, and grazing management to enhance the riparian buffer
- Streambank stabilization and restoration of entrenched channel conditions
- Irrigation water management, infrastructure improvements, and irrigation network mapping, including High Line Canal, Low Line Canal, and Valley Ditch
- Reduce sediment inputs due to erosion in areas where irrigation water is transferred from High Line Canal to Camp Creek
- Education and outreach about irrigation practices and ditch maintenance

In addition, the TMDL document indicates that Camp Creek appears to be a spring-fed system, augmented by irrigation return flows. Thus, a better understanding of surface water and groundwater interactions and connections between the stream and the irrigation network are imperative to developing strategies for reducing pollutant loads.

4.5 DRY CREEK

Dry Creek has a TMDL for sediment, total nitrogen, and total phosphorus, though total phosphorus is currently achieving the TMDL during mid-summer baseflow conditions (**Table 4-5**). The TMDL document indicates that Dry Creek is in a state of recovery, but areas lacking riparian vegetation remain prone to accelerated rates of streambank erosion. Irrigated agriculture in Pass Creek is identified in the TMDL document as the most significant source of total nitrogen in the watershed (DEQ 2013).

Table 4-5. Dry Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction	Project Types / Treatments
Dry Creek - headwaters to mouth (East Gallatin River)	Sediment	53%	Streambank Stabilization and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Grazing Management
	Total Nitrogen	29%	Residential and Urban BMPs
			Agricultural BMPs
	Total Phosphorus	0%	No Reduction Required

Focus areas for water quality improvements along Dry Creek identified during the WRP community meetings and in the TMDL document include:

- Fencing, off-stream water development, water gaps, and grazing management to enhance the riparian buffer
- Streambank stabilization and restoration of entrenched channel conditions
- Irrigation water management, infrastructure improvements, and irrigation network mapping
- Agricultural BMPs in Pass Creek watershed
- Monitor total phosphorus to evaluate the potential to delist Dry Creek for this pollutant

4.6 EAST GALLATIN RIVER FROM THE CONFLUENCE OF ROCKY CREEK AND BEAR CREEK TO BRIDGER CREEK

The upper stream segment of the East Gallatin River extends from the confluence of Rocky Creek and Bear Creek downstream to the confluence with Bridger Creek. This segment is divided into two reaches in the TMDL document: Reach 1 – upstream of Bozeman Creek, and Reach 2 – downstream of Bozeman Creek.

4.6.1 East Gallatin River upstream of Bozeman Creek

The East Gallatin River upstream of Bozeman Creek has a TMDL for total nitrogen and total phosphorus, though it is currently achieving the TMDL during mid-summer baseflow conditions and no reduction is required for total nitrogen or total phosphorus upstream of Bozeman Creek (**Table 4-6**).

Table 4-6. East Gallatin River Restoration Strategies - Upstream of Bozeman Creek

Stream Segment	Pollutant	Percent Reduction	Project Types / Treatments
East Gallatin River - confluence of Rocky and Bear Creeks to Bridger Creek (Reach 1 - upstream of Bozeman Creek)	Total Nitrogen	0%	No Reduction Required
	Total Phosphorus	0%	No Reduction Required

Focus areas for water quality improvements along the East Gallatin River upstream of Bozeman Creek identified during the WRP community meetings and in the TMDL document include:

- Streambank stabilization on the East Gallatin River just downstream of the confluence with Rocky Creek
- Restoration at future Story Mill Community Park including streambank stabilization, floodplain re-connection, and riparian restoration upstream of the confluence with Bozeman Creek
- Monitor total nitrogen and total phosphorus to evaluate the potential to delist this segment of the East Gallatin River for these pollutants

4.6.2 East Gallatin River between Bozeman Creek and Bridger Creek

The East Gallatin River between Bozeman Creek and Bridger Creek has a TMDL for total nitrogen and total phosphorus (**Table 4-7**). It is currently achieving the TMDL for total phosphorus during mid-summer baseflow conditions and no reduction is presently required for total phosphorus between Bozeman Creek and Bridger Creek. The TMDL document indicates that Bozeman Creek is the primary source of total nitrogen to this reach of the East Gallatin River and that reducing total nitrogen loads in Bozeman Creek will lead the East Gallatin River to meet its total nitrogen TMDL for the segment upstream of Bridger Creek.

Table 4-7. East Gallatin River Restoration Strategies - Bozeman Creek to Bridger Creek

Stream Segment	Pollutant	Percent Reduction	Project Types / Treatments
East Gallatin River - confluence of Rocky and Bear Creeks to Bridger Creek (Reach 2 - between Bozeman Creek and Bridger Creek)	Total Nitrogen	17%	Residential and Urban BMPs
			Agricultural BMPs
	Total Phosphorus	0%	No Reduction Required

Focus areas for water quality improvements along the East Gallatin River between Bozeman Creek and Bridger Creek identified during the WRP community meetings and in the TMDL document include:

- Reduce nitrogen loading from the Bozeman Creek watershed (see Section 4.2)
- Riparian buffer enhancement
- Removal of debris (concrete blocks, old car bodies) from streambanks
- Monitor total phosphorus to evaluate the potential to delist this segment of the East Gallatin River for this pollutant

4.7 EAST GALLATIN RIVER BETWEEN BRIDGER CREEK AND SMITH CREEK

The middle stream segment of the East Gallatin River extends from the confluence with Bridger Creek downstream to the confluence with Smith Creek. This segment is divided into two reaches in the TMDL document: Reach 1 – Bridger Creek to Hyalite Creek, and Reach 2 – Hyalite Creek to Smith Creek.

4.7.1 East Gallatin River between Bridger Creek and Hyalite Creek

The East Gallatin River between Bridger Creek and Hyalite Creek has a TMDL for total nitrogen and total phosphorus (**Table 4-8**). The City of Bozeman Water Reclamation Facility (WRF) is located on the East Gallatin River between Bridger Creek and Hyalite Creek and is the primary point source of total nitrogen and total phosphorus loading to this reach of the East Gallatin River. Reductions in total nitrogen can be achieved through residential and urban BMPs, along with upgrades to the City of Bozeman WRF. Reductions in total phosphorus can be achieved primarily through upgrades to the City of Bozeman WRF according to the TMDL document.

Table 4-8. East Gallatin River Restoration Strategies - Bridger Creek to Hyalite Creek

Stream Segment	Pollutant	Percent Reduction	Project Types / Treatments
East Gallatin River - Bridger Creek to Smith Creek (Reach 1 - between Bridger Creek and Hyalite Creek)	Total Nitrogen	78%	Agricultural BMPs
			Residential and Urban BMPs
			City of Bozeman WRF Upgrades
	Total Phosphorus	76%	City of Bozeman WRF Upgrades

Focus areas for water quality improvements along the East Gallatin River between Bridger Creek and Hyalite Creek identified during the WRP community meetings and in the TMDL document include:

- Upgrades to the City of Bozeman Water Reclamation Facility
- Fencing, off-stream water development, water gaps, and grazing management to enhance the riparian buffer
- Streambank stabilization and revegetation
- Removal of debris (concrete blocks, old car bodies) from streambanks
- Flow augmentation and flow monitoring
- Irrigation water management, infrastructure improvements, and irrigation network mapping, with an emphasis on identifying irrigation infrastructure that ensures return flows to the East Gallatin River and quantifying the re-distribution of water from the mainstem of the Gallatin River through six ditches, including: Farmers Canal, West Gallatin Canal, Beck and Border Ditch, Lower Middle Creek Supply Canal, Spain-Ferris Ditch, and Mammoth Ditch
- Education and outreach about irrigation practices and ditch maintenance
- Weed control

Streamflow in this section of the East Gallatin River is supported by irrigation return flows and aquifer recharge from six ditches that divert water from the mainstem of the Gallatin River eastward across the Gallatin Valley (**Table 4-9**, **Attachment A**). Ongoing urban and suburban development, along with changes in irrigation methods on agricultural lands, has the potential to reduce irrigation return flows to the East Gallatin River and reduce aquifer recharge. An improved understanding of the relationship between natural streamflows and the contribution of water transferred through irrigation ditches is a critical component to ensuring adequate baseflows in the East Gallatin River.

Table 4-9. East Side Diversions from the West (Mainstem) Gallatin River

Irrigation Canal	Point of Diversion	Priority Date	Water Right (Miner's Inches)*	Water Right (Cubic Feet per Second)**
West Gallatin Canal (Kleinschmidt)	mouth of the Gallatin Canyon	pre-1890	3,000	75
		1890-1910	3,040	76
Farmers Canal	Gallatin Gateway	pre-1890	40	1
		1890-1910	11,160	279
Lower Middle Creek Supply Canal	south of Four Corners	pre-1890	3,135	78
		post-1910	1,765	44
Beck and Border Ditch	south of Four Corners	pre-1890	568	14
		1890-1910	1,460	36
		post-1910	115	3
Spain-Ferris Ditch	south of Four Corners	pre-1890	1,200	30
		1890-1910	3,620	91
Mammoth Ditch	south of Four Corners	pre-1890	2,940	74
		post-1910	20	1
Total			**32,062**	**802**

*Estimated based on West Gallatin Decree Case No. 3850 Bell vs. Armstrong 1909

**1 cfs = 40 miner's inches

4.7.2 East Gallatin River between Hyalite Creek and Smith Creek

The East Gallatin River between Hyalite Creek and Smith Creek has a TMDL for total nitrogen and total phosphorus (**Table 4-10**). The City of Bozeman Water Reclamation Facility (WRF) is located on the East Gallatin River upstream of Hyalite Creek. Reductions to total nitrogen can be achieved through residential and urban BMPs, along with upgrades to the City of Bozeman WRF according to the TMDL. Within this reach, the TMDL document indicates that Hyalite Creek is the primary source of nitrogen, with additional loading from irrigated agriculture, residential/developed areas, and subsurface wastewater disposal in areas with a high density of septic systems. Groundwater upwelling within this reach potentially adds nutrient loads from medium and long-distance groundwater flow paths (DEQ 2013). For total phosphorus, reductions can be achieved primarily through upgrades to the City of Bozeman WRF according to the TMDL document.

Table 4-10. East Gallatin River Restoration Strategies - Hyalite Creek to Smith Creek

Stream Segment	Pollutant	Percent Reduction	Project Types / Treatments
East Gallatin River - Bridger Creek to Smith Creek (Reach 2 - between Hyalite Creek and Smith Creek)	Total Nitrogen	75%	Agricultural BMPs
			Residential and Urban BMPs
			On-Site Subsurface Wastewater Treatment System Upgrades
			City of Bozeman WRF Upgrades
	Total Phosphorus	27%	City of Bozeman WRF Upgrades

Focus areas for water quality improvements along the East Gallatin River between Hyalite Creek and Smith Creek identified during the WRP community meetings and in the TMDL document include:

- Upgrades to the City of Bozeman Water Reclamation Facility
- Fencing, off-stream water development, water gaps, and grazing management to enhance the riparian buffer
- Streambank stabilization and revegetation
- Removal of debris (concrete blocks, old car bodies) from streambanks
- Reduce nitrogen inputs from the Hyalite Creek watershed
- Flow augmentation and flow monitoring
- Irrigation water management, infrastructure improvements, and irrigation network mapping, with an emphasis on identifying irrigation infrastructure that ensures return flows to the East Gallatin River
- Education and outreach about irrigation practices and ditch maintenance
- Restoration of spring creek tributaries, including Gibson Creek, Story Creek, and Trout Creek
- Septic system upgrades and/or connection to centralized wastewater treatment system
- Weed control

As with the segment of the East Gallatin River upstream of Hyalite Creek, streamflow in this section of the East Gallatin River is supported by irrigation return flows and aquifer recharge from ditches that divert water from the mainstem of the Gallatin River eastward across the Gallatin Valley (**Attachment**

A). Ongoing urban and suburban development, along with changes in irrigation methods on agricultural lands, has the potential to reduce irrigation return flows to the East Gallatin River and reduce aquifer recharge. An improved understanding of the relationship between natural streamflows and the contribution of water transferred through irrigation ditches is a critical component to ensuring adequate baseflows in the East Gallatin River. In addition, the TMDL document highlights the need for additional study on the influence of groundwater nitrogen loading to Hyalite Creek and the East Gallatin River.

4.8 EAST GALLATIN RIVER DOWNSTREAM OF SMITH CREEK

The East Gallatin River downstream of Smith Creek has a TMDL for total nitrogen and total phosphorus (**Table 4-11**). It is currently achieving the TMDL for total phosphorus during mid-summer baseflow conditions and no reduction is presently required for total phosphorus downstream of Smith Creek. Reductions to the total nitrogen load can be achieved through residential and agricultural BMPs, along with upgrades to the City of Bozeman Water Reclamation Facility (WRF).

Table 4-11. East Gallatin River Restoration Strategies - Downstream of Smith Creek

Stream Segment	Pollutant	Percent Reduction	Project Types / Treatments
East Gallatin River - Smith Creek to mouth (Gallatin River)	Total Nitrogen	50%	Agricultural BMPs
			Residential and Urban BMPs
			City of Bozeman WRF Upgrades
	Total Phosphorus	0%	City of Bozeman WRF Upgrades

Focus areas for water quality improvements along the East Gallatin River downstream of Smith Creek identified during the WRP community meetings and in the TMDL document include:

- Upgrades to the City of Bozeman Water Reclamation Facility
- Fencing, off-stream water development, water gaps, and grazing management to enhance the riparian buffer
- Streambank stabilization and revegetation
- Irrigation water management, infrastructure improvements, and irrigation network mapping
- Education and outreach about irrigation practices and ditch maintenance
- Restoration of spring creek tributaries, including Story Creek and Gibson Creek
- Weed control
- Monitor total phosphorus to evaluate the potential to delist this segment of the East Gallatin River for this pollutant

4.9 GODFREY CREEK

Godfrey Creek has a TMDL for sediment, total nitrogen, total phosphorus and *E. coli* (**Table 4-12**). In the mid-1990's, a 319 project was undertaken in the Godfrey Creek watershed that included riparian fencing, grazing and manure management, and improved irrigation water management. Water quality data indicate that Godfrey Creek is currently most heavily impaired for nutrients in the upper portion of the watershed, with water quality improving downstream of Churchill. Sources of nutrients include

agricultural land uses, irrigation return flows, and elevated nutrients in groundwater. Sediment monitoring in 2009 indicated channel over-widening, a lack of riparian vegetation, and streambank erosion at the outsides of meander bends. For *E. coli*, significant loads were measured in an un-named tributary in 2009 (identified as monitoring site GD04 in the TMDL document), while the irrigation network also appears to contribute *E. coli* to Godfrey Creek.

Table 4-12. Godfrey Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction	Project Types / Treatments
Godfrey Creek - headwaters to mouth (Moreland Ditch)	Sediment	68%	Streambank Stabilization and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Grazing Management
			Irrigation Water Management
	Total Nitrogen	79%	Residential and Urban BMPs
			Agricultural BMPs
	Total Phosphorus	44%	Residential and Urban BMPs
			Agricultural BMPs
	E. coli	84%	Residential and Urban BMPs
			Agricultural BMPs
			Irrigation Water Management

Focus areas for water quality improvements along Godfrey Creek identified during the WRP community meetings and in the TMDL document include:

- Fencing, off-stream water development, water gaps, and grazing management to enhance the riparian buffer, particularly in a three-mile section downstream of the confluence of the east and west forks
- Streambank stabilization and revegetation
- Reduce channel over-widening in the lower reaches
- Irrigation water management, infrastructure improvements, and irrigation network mapping, including High Line Canal, Low Line Canal, Valley Ditch, Lewis Ditch, and Moreland Ditch
- Education and outreach about irrigation practices and ditch maintenance
- Reduce *E. coli* loading from tributary streams and the irrigation network

In addition, the TMDL document indicates that Godfrey Creek appears to be a spring-fed system, augmented by irrigation return flows. Thus, a better understanding of surface water and groundwater interactions and connections between the stream and the irrigation network are imperative to developing strategies for reducing pollutant loads.

4.10 HYALITE CREEK DOWNSTREAM OF THE BOZEMAN WATER SUPPLY INTAKE

Hyalite Creek has a TMDL for total nitrogen (**Table 4-13**). Sources of nitrogen to Hyalite Creek include irrigated agriculture, residential/developed areas, and subsurface wastewater disposal from areas with high septic densities. Downstream of the forest boundary, Hyalite Creek is considered chronically dewatered by Montana Fish, Wildlife and Parks. Reduced stream flow downstream of the forest boundary decreases the dilution efficiency and exacerbates the effects of nonpoint source nutrient additions (DEQ 2013).

Table 4-13. Hyalite Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction	Project Types / Treatments
Hyalite Creek - Bozeman water supply diversion dam to mouth (East Gallatin River)	Total Nitrogen	40%	Residential and Urban BMPs
			Agricultural BMPs

Focus areas for water quality improvements along Hyalite Creek identified during the WRP community meetings and in the TMDL document include:

- Irrigation water management, infrastructure improvements, and irrigation network mapping, with an emphasis on quantifying the re-distribution of water from the Gallatin River to Hyalite Creek via Lower Middle Creek Supply Canal, Spain-Ferris Ditch, and Mammoth Ditch, as well as water transferred from the East Gallatin River to Hyalite Creek via Buster Gulch
- Construction of a syphon on Farmers Canal where it crosses Hyalite Creek
- Flow augmentation and flow monitoring
- Fencing, off-stream water development, water gaps, and grazing management to enhance the riparian buffer
- Education and outreach about riparian management along small acreage properties
- Septic system upgrades and/or connection to centralized wastewater treatment system

In addition, the TMDL document highlights the need for additional study on the influence of groundwater nitrogen loading to Hyalite Creek and the East Gallatin River.

4.11 JACKSON CREEK

Jackson Creek has a TMDL for sediment and total phosphorus, though it is currently achieving the TMDL for total phosphorus during mid-summer baseflow conditions and no reduction is required for total phosphorus at this time (**Table 4-14**). According to the TMDL document, this stream may still be recovering from increased sediment loads and water yields due to historic logging. While forest road density has been reduced in recent years through road decommissioning projects, the remaining road network is a potential source of sediment.

Table 4-14. Jackson Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction	Project Types / Treatments
Jackson Creek - headwaters to mouth (Rocky Creek)	Sediment	56%	Streambank Stabilization and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Grazing Management
	Total Phosphorus	0%	No Reduction Required

Focus areas for water quality improvements along Jackson Creek identified during the WRP community meetings and in the TMDL document include:

- Unpaved road improvements
- Fencing, off-stream water development, water gaps, and grazing management to enhance the riparian buffer on Forest Service grazing allotments
- Monitor total phosphorus to evaluate the potential to delist Jackson Creek for this pollutant

4.12 MANDEVILLE CREEK

Mandeville Creek has a TMDL for total nitrogen and total phosphorus (**Table 4-15**). In the lower reaches, Mandeville Creek receives flow from the Farmers Canal where the canal terminates. Residential and Agricultural BMPs with an emphasis on irrigation water management are recommended for Mandeville Creek.

Table 4-15. Mandeville Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction	Project Types / Treatments
Mandeville Creek - headwaters to the mouth (East Gallatin River)	Total Nitrogen	81%	Residential and Urban BMPs
			Agricultural BMPs
	Total Phosphorus	65%	Residential and Urban BMPs
			Agricultural BMPs

Focus areas for water quality improvements along Mandeville Creek identified during the WRP community meetings and in the TMDL document include:

- Riparian buffer enhancement
- Stream restoration and revegetation on Montana State University property
- Stream restoration and revegetation along Bozeman High School
- Stream restoration and revegetation on DNRC state lands near the mouth
- Irrigation water management, infrastructure improvements, and irrigation network mapping, including Farmers Canal

In addition, the TMDL document indicates that Mandeville Creek appears to be a spring-fed system, augmented by irrigation return flows. Thus, a better understanding of surface water and groundwater interactions and connections between the stream and the irrigation network are imperative to developing strategies for reducing pollutant loads.

4.13 REESE CREEK

Reese Creek has a TMDL for sediment, total nitrogen, nitrate+nitrite, and *E. coli* (**Table 4-16**). The TMDL document identifies a large nitrogen load coming from forested land in the Bridger Mountains, along with agricultural lands in the foothills. Best management practices for forest lands, residential areas, and agricultural areas are recommended with an emphasis on irrigation water management. *E. coli* sources include agricultural and residential areas, with North Cottonwood Creek a potential source of *E. coli* to Reese Creek.

Table 4-16. Reese Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction	Project Types / Treatments
Reese Creek - headwaters to mouth (Smith Creek)	Sediment	49%	Streambank Stabilization and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
	Total Nitrogen	60%	Residential and Urban BMPs
			Agricultural BMPs
			Forestry BMPs
	Nitrate+ Nitrite	83%	Residential and Urban BMPs
			Agricultural BMPs
	E. coli	3%	Residential and Urban BMPs
			Agricultural BMPs

Focus areas for water quality improvements along Reese Creek identified during the WRP community meetings and in the TMDL document include:

- Fencing, off-stream water development, water gaps, and grazing management to enhance the riparian buffer
- Irrigation water management, infrastructure improvements, and irrigation network mapping
- Education and outreach about irrigation practices and ditch maintenance
- Reduce *E. coli* loading from the North Cottonwood Creek watershed
- Forestry BMPs

In addition, the TMDL document indicates that Reese Creek appears to be a spring-fed system, augmented by irrigation return flows. Thus, a better understanding of surface water and groundwater interactions and connections between the stream and the irrigation network are imperative to developing strategies for reducing pollutant loads.

4.14 ROCKY CREEK DOWNSTREAM OF JACKSON CREEK AND TIMBERLINE CREEK

Rocky Creek has a TMDL for sediment. Rocky Creek is partially confined by Interstate 90 and the railroad, which have led to channel straightening and streambank erosion (**Table 4-17**). In addition, the application of traction sand to Interstate 90 during the winter months contributes sediment to Rocky Creek.

Table 4-17. Rocky Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction	Project Types / Treatments
Rocky Creek - confluence of Jackson and Timberline Creeks to mouth (East Gallatin River)	Sediment	56%	Streambank Stabilization and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Grazing Management
			Stormwater BMPs
			Traction Sand Management

Focus areas for water quality improvements along Rocky Creek identified during the WRP community meetings and in the TMDL document include:

- Address channel entrenchment in reaches channelized by Interstate 90 and the railroad
- Traction sand management along Interstate 90
- Streambank stabilization and revegetation
- Fencing, off-stream water development, water gaps, and grazing management to enhance the riparian buffer
- Address the observed decrease in baseflows due to reduced beaver populations

4.15 SMITH CREEK DOWNSTREAM OF ROSS CREEK AND REESE CREEK

Smith Creek has a TMDL for sediment, total nitrogen, nitrate+nitrite, and *E. coli*, though no reduction is currently required for *E. coli* in Smith Creek (**Table 4-18**). Smith Creek starts at the confluence of Ross Creek and Reese Creek. Streambank erosion due to livestock grazing and a lack of riparian buffer in places is an ongoing source of sediment to Smith Creek. Nutrient loading to Smith Creek comes from three primary sources: 1) the Smith Creek watershed downstream of the Ross Creek and Reese Creek confluences, 2) the Ross Creek watershed, and 3) the Dry Creek Irrigation Company Canal that diverts water from the East Gallatin River downstream of the City of Bozeman Water Reclamation Facility and the confluence of Hyalite Creek (DEQ 2013). The Dry Creek Irrigation Company Canal intercepts Ross Creek and Reese Creek and water intermixes between the Dry Creek Irrigation Company Canal and Reese Creek before flowing downstream into Smith Creek. Thus, through the Dry Creek Irrigation Company Canal, Smith Creek receives nutrient loading from the City of Bozeman Water Reclamation Facility and the Hyalite Creek watershed. In addition to irrigation return flows, groundwater upwelling is likely in this area. Livestock grazing along Smith Creek and in the Ross Creek watershed is the primary source of *E. coli* to Smith Creek.

Table 4-18. Smith Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction	Project Types / Treatments
Smith Creek - confluence of Ross and Reese Creeks to mouth (East Gallatin River)	Sediment	46%	Streambank Stabilization and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Grazing Management
			Irrigation Water Management
			Stormwater BMPs
	Total Nitrogen	33%	Forestry BMPs
			Agricultural BMPs
	Nitrate+ Nitrite	78%	Forestry BMPs
			Agricultural BMPs
	E. coli	0%	Residential and Urban BMPs
			Agricultural BMPs
			Irrigation Water Management

Focus areas for water quality improvements along Smith Creek identified during the WRP community meetings and in the TMDL document include:

- Fencing, off-stream water development, water gaps, and grazing management to enhance the riparian buffer
- Streambank stabilization and revegetation
- Irrigation water management, infrastructure improvements, and irrigation network mapping, including the Dry Creek Irrigation Company Canal
- Additional research examining contributions of water from the East Gallatin River into Smith Creek through the Dry Creek Irrigation Company Canal
- Education and outreach about irrigation practices and ditch maintenance
- Reduce *E. coli* loading from the Ross Creek watershed
- Forestry BMPs
- Monitor *E. coli* to evaluate the potential to delist Smith Creek for this pollutant

4.16 STONE CREEK

Stone Creek has a TMDL for sediment (**Table 4-19**). The TMDL document indicates Stone Creek is recovering from historic land use activities including logging, unpaved roads, and grazing, though they all continue to be potential sources of sediment within the watershed.

Table 4-19. Stone Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction	Project Types / Treatments
Stone Creek - headwaters to mouth (Bridger Creek)	Sediment	46%	Streambank Stabilization and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Grazing Management

Focus areas for water quality improvements along Stone Creek identified during the WRP community meetings and in the TMDL document include:

- Unpaved road improvements
- Fencing, off-stream water development, water gaps, and grazing management to enhance the riparian buffer
- Forestry BMPs

4.17 THOMPSON CREEK

Thompson Creek has a TMDL for sediment and total nitrogen (**Table 4-20**). Thompson Creek is a spring creek with an over-widened channel and substrate comprised of fine-grained material. Livestock grazing and agricultural production are the primary sources of sediment to Thompson Creek. Due to the nature of this spring creek, active channel restoration is likely required in combination with grazing management to reduce channel over-widening. Agricultural and residential BMPs are recommended to reduce total nitrogen loads. Because this is an area of groundwater recharge, TMDL pollutant load reduction measures throughout the Lower Gallatin Watershed will likely benefit Thompson Creek.

Table 4-20. Thompson Creek Restoration Strategies

Stream Segment	Pollutant	Percent Reduction	Project Types / Treatments
Thompson Creek (Thompson Spring) - headwaters to mouth (East Gallatin River)	Sediment	61%	Streambank Stabilization and Revegetation
			Riparian Buffer Enhancement
			Unpaved Road Improvements
			Grazing Management
	Total Nitrogen	72%	Residential and Urban BMPs
			Agricultural BMPs

Focus areas for water quality improvements along Thompson Creek identified during the WRP community meetings and in the TMDL document include:

- Fencing, off-stream water development, water gaps, and grazing management to enhance the riparian buffer
- Reduce channel over-widening through active channel restoration
- Cultivate landowner support for a stream restoration plan that has been developed for the entire length of the creek

Since Thompson Creek is a spring-fed system, a better understanding of surface water and groundwater interactions and connections between the stream and the irrigation network are imperative to developing strategies for reducing pollutant loads.

5.0 PROJECT PRIORITIZATION AND IMPLEMENTATION

During the Lower Gallatin WRP community meetings, a total of 41 potential projects and restoration activities were identified. Additionally, several potential project partners were identified, including landowners, the Gallatin Conservation District (GCD), Natural Resource Conservation Service (NRCS), Montana State University (MSU), City of Bozeman, Department of Natural Resources and Conservation (DNRC), Gallatin Valley Land Trust (GVLT), and The Trust for Public Land (TPL). GGWC plans to take the lead on implementing projects proposed in this plan and facilitate the development of other projects with partner organizations that are working toward the same goal of water quality improvement in the Lower Gallatin Watershed and removal of impaired stream segments from Montana's List of Impaired Waters.

5.1 PRIORITIZING PROJECTS

GGWC has developed a project screening tool to evaluate the merits of each potential project relative to overall watershed goals and ability to address the sources of pollution to impaired streams. For each potential improvement project, successful implementation depends on: 1) stream and watershed improvement potential, 2) landowner and community support and 3) availability of necessary resources, as depicted in **Figure 5-1.**

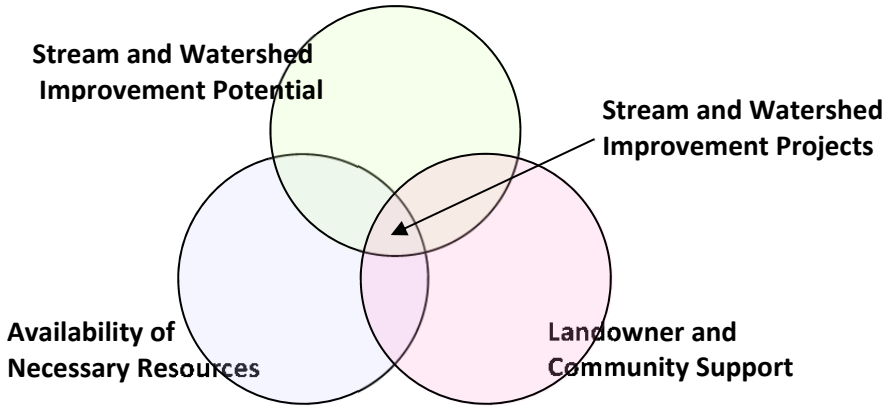


Figure 5-1. Watershed Restoration Project Implementation

During the WRP community meetings and online survey conducted by GGWC in January and February 2014, over 100 people offered input on the value of streams in the Lower Gallatin Watershed and provided ideas for stream and watershed improvement. All but two of the streams – Reese Creek and Stone Creek – that do not meet water quality standards for one or more pollutants in the Lower Gallatin Watershed were mentioned during the WRP community meetings (**Figure 5-2**). Several tributaries to impaired streams were identified as well.

Though the impaired stream segments and sources of pollutants are a major concern in the watershed, these pollutants were not the community's only concern. Participants cited many other impacts to streams and the watershed which affect agriculture, fisheries, recreation, aesthetics, and other uses of the streams and wetlands throughout the watershed. Community members also valued preventing future degradation and maintaining clean and healthy headwater streams.

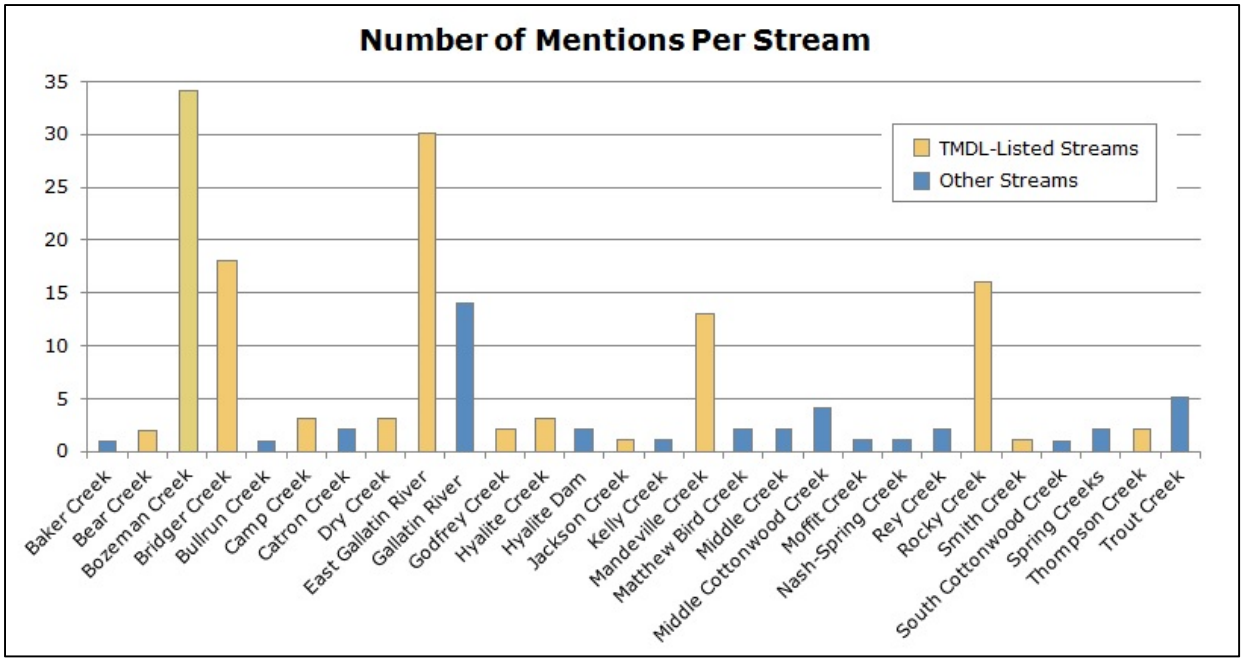


Figure 5-2. Number of Mentions per Stream during the WRP Community Outreach Effort

Based on community input and information in the recently completed TMDL for the Lower Gallatin Watershed, it is clear that focusing on streams that do not meet water quality standards and their tributaries will have major short-term and long-term benefits. Additionally, there are opportunities for projects that provide other significant steam and watershed improvement benefits. Given limited time and resources, GGWC has developed a prioritization process for projects, giving highest priority to projects that provide stream and watershed improvement to help meet a state water quality standard (**Figure 5-3**).

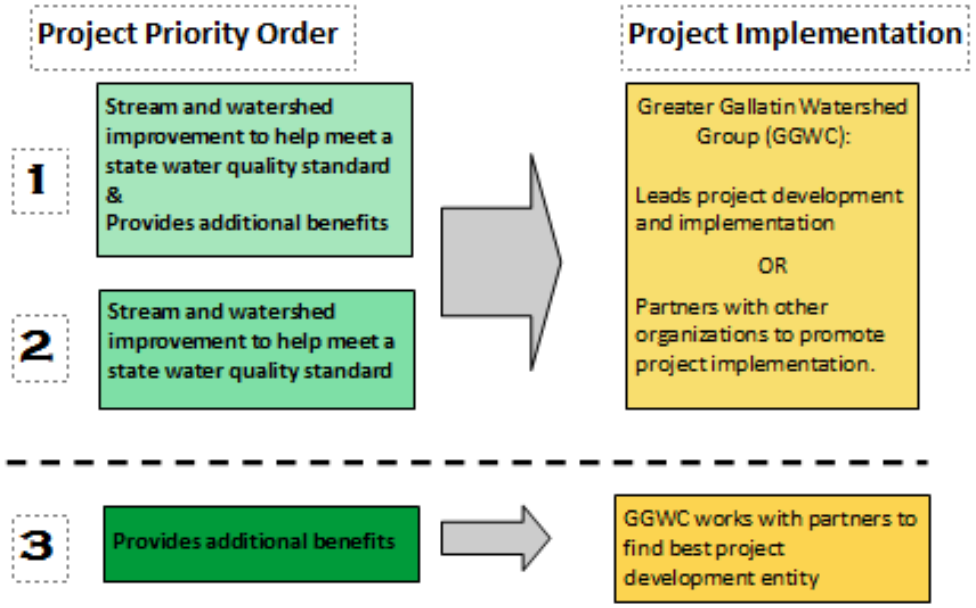


Figure 5-3. Watershed Prioritization and Implementation Process

Stream and watershed improvements that help meet a state water quality standard are those listed on Montana's List of Impaired Waters. For instance, in the East Gallatin River, nutrients (nitrogen & phosphorus) are listed as impairments. In this prioritization, a high-priority project might be a nutrient reduction project in a non-TMDL-listed tributary to the East Gallatin River. In that same location or even on the East Gallatin River, a project with significant sediment reduction and fisheries improvement would be a lower-priority project since the East Gallatin River is not considered impaired for sediment. Additional benefits that projects may provide include:

- Promote community values for streams and wetlands, as evidenced by the community input from interested participants (**Figure 5-4**).

- Provide significant educational and outreach opportunities to help inform the community about water quality issues and Best Management Practices and/or have high visibility.

- Can be replicated and maintained. Projects that can be replicated can lead to significant water quality improvements over time and have the potential to be more cost-effective. Projects that can be maintained easily and have strong, long-term management agreements in place also will help ensure the success and continuity of water quality improvements over time.

- Expand on benefits of previous projects. Implementing multiple restoration projects on an impaired waterbody can lead to greater cumulative water quality improvements.

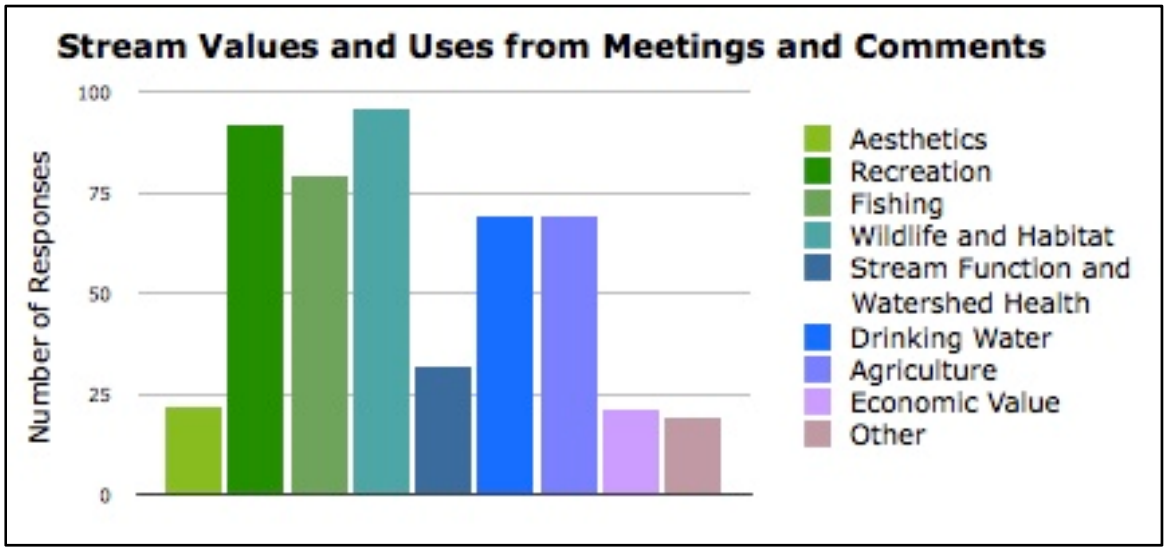


Figure 5-4. Stream Values and Uses Identified during the WRP Community Meetings

5.2 WATERSHED RESTORATION PLAN (WRP) COMMITTEE

GGWC has established a committee focused on watershed restoration. The WRP Committee is a sub-committee of the GGWC Board of Directors. The GGWC Board and WRP Committee will:

- Develop and implement projects based on priorities identified through the community input process.
- Assess progress on developing projects and determine next steps. A project development screening tool has been developed to ensure that all necessary components of the project are considered. This screening tool is included as **Attachment B**.
- Work with partners to gather the appropriate technical and financial resources needed to successfully complete projects.

5.3 TECHNICAL PARTNERS

GGWC's Board of Directors represents a wide range of interests, including:

- Agricultural community
- City governments
- Citizen landowners
- Water and natural resource experts

In addition to those who serve on the Board of Directors, GGWC works with many partners, including:

- **Agricultural Community**
    - Association of Gallatin Agricultural Irrigators (AGAI)
    - Irrigation ditch operators
    - Agricultural producers
    - Farm Bureau
- **Businesses**
    - Commercial and retail Businesses
    - Developers and building associations
    - Downtown Bozeman Association
    - Industrial and manufacturing businesses
    - Recreational businesses
- **City and County Governments**
    - City of Bozeman
    - City of Belgrade
    - City of Manhattan
    - Churchill/Amsterdam
    - Gallatin County
    - Gallatin Local Water Quality District
- **Gallatin Conservation District**

- **State and Federal Governmental agencies**
    - Department of Environmental Quality
    - Department of Fish, Wildlife and Parks
    - Department of Natural Resources and Conservation
    - Montana Bureau of Mines and Geology
    - Environmental Protection Agency
    - National Park Service – Rivers, Trails, and Conservation Assistance Program
    - Natural Resource Conservation Service
    - United States Bureau of Land Management
    - United States Bureau of Reclamation
    - United States Fish and Wildlife Service
    - United States Forest Service
- **Nonprofit groups and collaborations focused on conservation and natural resources**
    - Blue Water Task Force
    - Bozeman Creek Enhancement Project
    - Bozeman High School (BHS) Creek Project
    - Bridger Creek Clean-Up and Enhancement
    - Ducks Unlimited
    - Gallatin/Big Sky Noxious Weed Committee
    - Gallatin County Weed District
    - Gallatin Valley Land Trust
    - Montana Conservation Corps/ Big Sky Watershed Corps
    - Trout Unlimited
    - The Trust for Public Land
- **Natural resources experts and consultants**
    - Private wetland, water, and other natural resources consultants
    - Montana State University Extension Water Quality and local extension agents
    - Montana State University professors, researchers and graduate students
- **Urban and suburban interests**
    - Home Owner Associations
    - Landowners
    - School Districts
- **Montana State University**

5.4 IMPLEMENTATION SCHEDULE

Table 5-1 presents a schedule for the implementation of restoration projects that GGWC has identified as important for meeting the goal of improving water quality on impaired stream segments. Project development will depend on the three components identified in **Figure 5-1**, including stream and watershed improvement potential, landowner and community support, and availability of necessary resources. Thus, additional projects will be added and timeframes will be adjusted using an adaptive management approach as projects with landowner and community support are identified and funding is secured. As a first step toward improving water quality in the Lower Gallatin Watershed, GGWC plans to pursue projects on Bozeman Creek and the East Gallatin River at the future Story Mill Community Park and on a private ranch along Camp Creek beginning in 2015.

5.5 MILESTONES

The goal of the Lower Gallatin WRP is to provide a blueprint for GGWC to identify and implement restoration projects that lead to improved water quality and the eventual removal of streams from DEQ's list of impaired streams. Milestones measuring implementation of nonpoint-source management projects include:

Short-term milestones:

- Complete at least one restoration project before January 1, 2017.
- Work with stakeholders and partners to begin developing at least one restoration project every year.
- Hold at least one outreach event each year to inform the community of recently completed projects and/or projects underway, as well as the availability of GGWC's assistance and 319 funds and other funding sources to implement restoration projects in the Lower Gallatin Watershed. These events may be in conjunction with GGWC's Annual Meeting, Fall Tour, or Stream Team data presentation.
- Develop and implement a program for education and outreach to home owners associations.

Mid-term milestones:

- Develop a flow monitoring network for the East Gallatin River, Hyalite Creek and the major irrigation ditches off the West (mainstem) Gallatin River.
- Complete at least one restoration project in conjunction with Montana State University on land owned by the university.
- Complete a series of stormwater retention projects with the City of Bozeman.
- Complete a traction sand reduction project on Rocky Creek with the Montana Department of Transportation.
- Complete at least one riparian enhancement project on Bozeman Creek, Camp Creek, Dry Creek, Godfrey Creek, Thompson Creek, and the East Gallatin River.

Long-term milestones:

- Engage urban and suburban communities in neighborhood-scaled projects to reduce the transport of sediment, nutrients, and *E. coli* to local waterways.
- Engage agricultural community in riparian buffer enhancement projects and projects to reduce channel entrenchment.

- Improve irrigation infrastructure on irrigation ditches to increase streamflow in impaired streams.
- Improve irrigation infrastructure at all of the intersections between irrigation ditches and impaired stream segments.
- Establish a monitoring network for water quality and water quantity throughout the Lower Gallatin Watershed.
- Successfully restore the East Gallatin River spring creek tributaries.
- Reduce the number of on-site subsurface wastewater treatment systems in the Lower Gallatin Watershed.

Due to limited capacity and resources, GGWC, in coordination with partners, expects to implement a portion of these projects in the 2-, 5-, 10- and 20-year timeframe, extending from 2015 through 2035 (**Table 5-1**).

Table 5-1. Schedule for Implementation of Restoration Activities

Activity Description	Technical Needs	Cost Estimate
2-Year Timeframe (2015-2017)		
Story Mill Community Park - Bozeman Creek and East Gallatin River	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High
Riparian Buffer Enhancement - Camp Creek	Revegetation planning, wetland ecology, grazing management plan, landowner education and outreach	Low
Monitoring Pollutants with a 0% reduction in the TMDL to evaluate the potential to delist	Hydrology, monitoring	Low
5-Year Timeframe (2015-2020)		
Bozeman Creek Enhancement Project - Bogert Park	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High
Homeowners Association Education and Outreach	Graphic design, printing, radio spot, video spot	Low
Irrigation Practices and Ditch Maintenance Education and Outreach	Graphic design, printing, radio spot, video spot	Low
Traction Sand Management - Rocky Creek	Engineering, hydrology, construction, monitoring	Low
Stream and Wetland Restoration - Mandeville Creek on MSU Property	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	Medium
Stream and Wetland Restoration - Matthew Bird Creek on MSU Property	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	Medium
Streambank Stabilization and Revegetation - Bridger Creek	Engineering, hydrology, permitting, construction, monitoring	Medium
Streambank Stabilization and Revegetation - Rocky Creek	Engineering, hydrology, permitting, construction, monitoring	Medium
Stormwater BMPs - Bozeman Creek	Engineering, hydrology, construction, monitoring	High
Quantify water transfers from the Gallatin River to the East Gallatin River through Farmers Canal, West Gallatin Canal, Beck and Border Ditch, Lower Middle Creek Supply Canal, Spain-Ferris Ditch, and Mammoth Ditch through development of a flow monitoring program	Hydrology, monitoring	Medium

Table 5-1. Schedule for Implementation of Restoration Activities

Activity Description	Technical Needs	Cost Estimate
Groundwater and surface water interaction assessment and modeling for Camp Creek, Godfrey Creek, Hyalite Creek, Mandeville Creek, Reese Creek, Smith Creek, Thompson Creek and the East Gallatin River to evaluate nutrient loading	Hydrology, monitoring	Medium
10-Year Timeframe (2015-2025)		
Irrigation Infrastructure Improvements - Buster Gulch	Engineering, hydrology, permitting, construction	Medium
Irrigation Infrastructure Improvements - High Line Canal/Camp Creek Irrigation Water Transfers	Engineering, hydrology, permitting, construction	Medium
Irrigation Infrastructure Improvements - Dry Creek Irrigation Canal	Engineering, hydrology, permitting, construction	Medium
Irrigation Infrastructure Improvements - Farmers Canal	Engineering, hydrology, permitting, construction	Medium
Irrigation Infrastructure Improvements - ditches that cross Godfrey Creek	Engineering, hydrology, permitting, construction	Medium
Irrigation Infrastructure Improvements - Valley Ditch	Engineering, hydrology, permitting, construction	Medium
Riparian Buffer Enhancement - Bozeman Creek	Revegetation planning, wetland ecology, landowner education and outreach	High
Riparian Buffer Enhancement - Camp Creek	Revegetation planning, wetland ecology, grazing management plan, landowner education and outreach	High
Riparian Buffer Enhancement - Dry Creek	Revegetation planning, wetland ecology, grazing management plan, landowner education and outreach	High
Riparian Buffer Enhancement - East Gallatin River	Revegetation planning, wetland ecology, grazing management plan, landowner education and outreach	High
Riparian Buffer Enhancement - Godfrey Creek	Revegetation planning, wetland ecology, grazing management plan, landowner education and outreach	High

Table 5-1. Schedule for Implementation of Restoration Activities

Activity Description	Technical Needs	Cost Estimate
Stream and Wetland Restoration - Thompson Creek	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High
Stream and Wetland Restoration - East Gallatin River spring creek tributaries: Story Creek, Gibson Creek, and Trout Creek	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High
Streambank Stabilization and Revegetation - East Gallatin River	Engineering, hydrology, permitting, construction, monitoring	High
Unpaved Road Improvements - Bear Creek	Engineering, construction, monitoring	Medium
Unpaved Road Improvements - Jackson Creek	Engineering, construction, monitoring	Medium
Unpaved Road Improvements - Stone Creek	Engineering, construction, monitoring	Medium
20-Year Timeframe (2015-2035)		
Bozeman Creek Enhancement Project	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High
Restore Entrenched Channels - Camp Creek	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High
Restore Entrenched Channels - Dry Creek	Engineering, hydrology, wetland ecology, permitting, construction, monitoring	High
Subsurface Wastewater Treatment Upgrades throughout the Lower Gallatin Watershed	Engineering, hydrology, construction, monitoring	High
Streamflow Augmentation - East Gallatin River	Engineering, hydrology, monitoring	Medium
Streamflow Augmentation - Hyalite Creek	Engineering, hydrology, monitoring	Medium

High = $300K-$1Million; Medium = $100K-$299K; Low = $1K-$99K

6.0 MONITORING

The *Lower Gallatin Planning Area TMDLs & Framework Water Quality Improvement Plan* (DEQ 2013) outlines a monitoring strategy that includes a discussion of adaptive management, outlines the tracking and monitoring of restoration activities and effectiveness, and describes the ongoing need for baseline and impairment status monitoring for sediment, nutrient, and *E. coli* impairments. GGWC partnered with DEQ to conduct impairment status monitoring during the development of the TMDL and coordinates annual monitoring on several streams through the Gallatin Stream Team volunteer program. This includes monitoring on Bozeman Creek and the East Gallatin River at the future Story Mill Community Park site to assess the effectiveness of floodplain and wetland restoration activities. For projects funded by the 319 program, GGWC will oversee monitoring and/or modeling to assess the effectiveness of the restoration project and to help identify water quality improvements for TMDL-impaired streams. Monitoring data will be used to estimate pollutant load reductions, which will help identify where substantial progress is being made toward attaining water quality goals.

6.1 THE GALLATIN STREAM TEAM PROGRAM

The Gallatin Stream Team program is a collaborative effort between GGWC and the Gallatin Local Water Quality District (GLWQD) to monitor local waterways. The Gallatin Stream Team engages trained citizen scientist volunteers to collect data in July, August, and September each year. The streams and sampling locations vary from year to year depending on stakeholder interest and funding sources, along with requests for specific data by DEQ, the City of Bozeman, and GLWQD. In the 2014 field season, the four streams monitored were Bozeman Creek, Mandeville Creek, Mathew Bird Creek, and the East Gallatin River. Two sampling sites on each stream were monitored. The Sampling and Analysis Plan (SAP) for the Gallatin Stream Team program has been approved by DEQ and is updated annually to account for changes to sampling sites or parameters. In previous years, monitoring has also been conducted on Bridger Creek, Hyalite Creek, and Thompson Creek. Data collected by the Gallatin Stream Team program is used by DEQ to document baseline conditions and for impairment status monitoring.

6.2 STORY MILL COMMUNITY PARK GROUNDWATER MONITORING

At the future Story Mill Community Park site, groundwater monitoring has been a joint effort between GGWC, Big Sky Watershed Corps (BSWC), GLWQD and Montana State University. The summer of 2014 was the second year of measuring water levels in groundwater wells, with sampling conducted on a weekly basis between May and June and every other week in July, August and September. Currently, there are 15 wells that are sampled at the site by GGWC's Big Sky Watershed Corps member with assistance from Montana State University students. Data collected at the future Story Mill Community Park site will help document the effectiveness of restoration activities to remove nutrients from the groundwater, which has the potential to reduce nutrient loads in surface water in Bozeman Creek and the East Gallatin River. A formal Sampling and Analysis Plan for the wetland monitoring at the future Story Mill Community Park site is currently under development.

6.3 TOTAL PHOSPHORUS MONITORING

In the Lower Gallatin TMDL document, several streams are considered impaired for total phosphorus with the caveat that additional samples may lead to removal of these streams from the List of Impaired Waters. Streams which could potentially be delisted for total phosphorus if additional samples remain below the water quality target include:

- Bear Creek
- Jackson Creek
- Dry Creek

Thus, GGWC intends to work with DEQ to collect additional total phosphorus samples on these three streams.

6.4 BOZEMAN CREEK *E. COLI* MONITORING

GGWC considers the Bozeman Creek *E. coli* impairment a top priority because it impacts many residents of the Lower Gallatin Watershed. GLWQD performed *E. coli* monitoring in 2013 that included one round of sample collection for microbial source tracking of *E. coli*. GLWQD plans to conduct additional sampling for microbial source tracking analysis in the future to help identify specific sources and source areas. GGWC intends to work with GLWQD and the City of Bozeman to identify sources of *E. coli* to Bozeman Creek and to help develop strategies to reduce the amount of *E. coli* in Bozeman Creek.

6.5 EFFECTIVENESS MONITORING FOR 319 FUNDED PROJECTS

Monitoring of 319 funded projects will be conducted to help evaluate the effectiveness of specific practices and projects. Monitoring will target the specific pollutants for which the project is intended to address. Monitoring criteria will be based on Montana's water quality standards and the water quality targets presented in *Lower Gallatin Planning Area TMDLs & Framework Water Quality Improvement Plan* (DEQ 2013). Monitoring techniques for the various pollutant types are presented in **Table 6-1**, with a more broad set of criteria to evaluate the effectiveness of various project types and restoration treatments presented in **Table 6-2**.

Table 6-1. Monitoring Techniques for Nutrients, Pathogens and Sediment

Pollutant Type	Monitoring Technique
Nutrients	Water samples and stream discharge measurements
Pathogens	Water samples and stream discharge measurements
Sediment	Riffle pebble counts, riffle and pool tail-out 49-point grid toss measurements, channel cross-sections, residual pool depths, pool and large woody debris frequency, streambank erosion assessments, riparian greenline assessments, macroinvertebrate indices

Table 6-2. Criteria to Evaluate the Effectiveness of Various Project Types and Restoration Treatments

Project Types / Treatments	Evaluation Criteria
Streambank Stabilization and Revegetation	Length of Eroding Bank Stabilized and Revegetated
Riparian Buffer Enhancement	Length of Channel with Improved Riparian Conditions, Increased Riparian Vegetation Densities
Unpaved Road Improvements	Documentation of Sites Addressed and the Techniques Applied
Traction Sand Management	Documentation of Sites Addressed and the Techniques Applied
Stormwater Management	Documentation of Sites Addressed and the Techniques Applied
Residential and Urban BMPs	Documentation of Sites Addressed and the Techniques Applied
Agricultural BMPs	Documentation of Sites Addressed and the Techniques Applied
Forestry BMPs	Documentation of Sites Addressed and the Techniques Applied
Subsurface Wastewater Treatment	Education and Outreach Conducted, Number of Residences added to the Sewer System
Irrigation Water Management	Education and Outreach Conducted, Documentation of Improved In-stream Flows

6.6 Evaluating Pollutant Load Reductions

Pollutant load reductions will be evaluated using DEQ-approved methodologies for the specific pollutant of concern, with the recently prepared *Load Reduction Estimate Guide – A Guide for Estimating Pollutant Load Reductions Achieved Through Implementation of Best Management Practices* (DEQ 2014) providing the foundation for calculating load reductions. When appropriate, the same methods and models will be used to evaluate progress toward the goal of improved water quality and achievement of the required percent reductions that were used during the development of the *Lower Gallatin Planning Area TMDLs & Framework Water Quality Improvement Plan* (DEQ 2013). Pollutant load reduction calculations will help GGWC and DEQ determine whether or not load reductions are being achieved over time and document where substantial progress is being made toward attaining water-quality standards.

7.0 EDUCATION AND OUTREACH STRATEGY

GGWC works with the community to identify and prioritize projects that are the most appropriate for the Lower Gallatin Watershed. The Lower Gallatin WRP has been developed with input from four community meetings and responses to an online survey. Over 100 people from diverse backgrounds throughout the watershed participated. The *Community Meetings & Online Comments Summary* contains extensive information about community values, watershed concerns, and ideas for stream improvements (**Attachment C**). The summary is publically available on GGWC's website at www.greatergallatin.org.

7.1 BROAD COMMUNITY ENGAGEMENT

GGWC works to engage a broad spectrum of watershed citizens. The Lower Gallatin Watershed is a rapidly developing area with a strong agricultural heritage. With over 70,000 urban and rural residents, public outreach about stream and watershed health requires an approach that embraces this diversity. To engage a broad spectrum of stakeholders, GGWC's outreach activities include:

- Monthly board meetings open to the public
- Annual meeting in January focused on topics of importance to this watershed
- Workshops and meetings with individual stakeholder groups
- Education for students on water resource issues through volunteer opportunities, classroom instruction, and field trip activities
- Informational outreach at events, such as the Sustainability Fair and Watershed Festival
- Annual Fall Tour to view restoration projects or highlight specific watershed topics
- Monthly electronic newsletter to diverse residents throughout the Gallatin Valley, local water-related professionals, other conservation professionals, GGWC volunteers, and MSU faculty and students
- Information available through GGWC's website and Facebook page
- Volunteer opportunities with the Gallatin Stream Team water quality monitoring program and presentation of data

7.2 TARGETED EDUCATION STRATEGY

Input received during the WRP community meetings helped identify several opportunities for education and outreach. Developing and implementing effective stream improvement projects will often require the support of one or multiple landowners. Working with partner organizations to contact landowners will help GGWC reach broader groups of stakeholders. GGWC will work to build an effective outreach approach for each group. Priorities for education include:

- Agricultural community members
- Landowners within specific sub-watersheds
- Landowners with small acreages along impaired streams, their tributaries, and the associated irrigation ditch networks
- Ditch managers and landowners along ditches

- Urban residents, particularly through homeowners associations

8.0 POTENTIAL FUNDING SOURCES

GGWC will investigate funding options appropriate for each specific project. Several potential funding sources are highlighted in **Table 8-1**. In addition, the DEQ non-point source management program has also prepared a list of Montana natural resources grant programs, which is available at: http://montananps319grants.pbworks.com/w/page/21640327/319%20Projects%20Home

Table 8-1. Potential Funding Sources

Agency	Program Name	Assistance	Project Types	Maximum Financial Award							
				None	Under $10,000	Under $25,000	Under $50,000	Under $100,000	Over $100,000	Varies widely	Match Required
LOCAL											
Gallatin Conservation District	**N/A**	Technical	Liaisons between landowners and government agencies, in-kind administrative and technical assistance, program coordination/partnering	X							
STATE											
Montana Department of Environmental Quality	**Nonpoint Source Implementation Grants - 319 Program**	Financial, technical	Non-point source pollution reduction							X	X
Montana Fish, Wildlife & Parks	**Future Fisheries Improvement Program**	Financial, technical	River, stream, and lake projects to improve and restore wild fish habitats							X	X
Montana Department of Natural Resources and Conservation	**Reclamation and Development Grants Program (RDG)**	Financial	Serve the public interest and the State of Montana. Develop natural resources and promote and protect Montana's total environment and the general health, safety, welfare, and public resources of Montana's citizens and communities						X		
	Renewable Resource Grant and Loan Program (RRGL)	Financial	Fund conservation, management, development and preservation of Montana's renewable resources						X		

Table 8-1. Potential Funding Sources

Agency	Program Name	Assistance	Project Types	Maximum Financial Award							
				None	Under $10,000	Under $25,000	Under $50,000	Under $100,000	Over $100,000	Varies widely	Match Required
FEDERAL											
Natural Resources Conservation Service	**Agricultural Conservation Easement Program (ACEP)**	Financial, technical	For Agricultural lands and wetland reserves							x	
	Environmental Quality Incentive Program (EQIP)	Financial, technical	Implement conservation practices or activities like conservation planning							X	
	Regional Conservation Partnership Program (RCPP)	Financial, technical	Promotes coordination between NRCS and its partners to deliver conservation assistance to producers and landowners							X	
U.S. Environmental Protection Agency	**Targeted Watershed Grants Program**	Financial	Aquatic, wetland, riparian and upland habitat improvement and protection							X	X
	Wetland Program Development Grants	Financial, technical	Promote research/studies to prevent/eliminate water pollution						X	X	X
	Urban Waters Grant	Financial	Support and build partnerships with a variety of federal, state, tribal, and local partners that foster increased connection, understanding, and stewardship of local waterways					X			
U.S. Fish and Wildlife Service	**Partners for Fish and Wildlife**	Financial, technical	Habitat restoration to benefit federal trust species, conservation programs, and various fish and wildlife restoration projects							X	X

Table 8-1. Potential Funding Sources

Agency	Program Name	Assistance	Project Types	Maximum Financial Award							
				None	Under $10,000	Under $25,000	Under $50,000	Under $100,000	Over $100,000	Varies widely	Match Required
	North American Wetlands Conservation Act Program	Financial	Variety of wetland conservation projects					X		X	X
PRIVATE OR NON-PROFIT ORGANIZATIONS											
National Fish and Wildlife Foundation (NFWF)	**Pulling Together Initiative (PTI)**	Financial, technical	Long-term invasive species weed control							X	X
	Five-Star Restoration Program	Financial, technical	Wetland and wildlife habitat restoration							X	
	Bring Back the Natives Grant Program	Financial	Riverine habitat and aquatic species restoration projects				X				X
	National Plant Conservation Initiative (NPCI)	Financial	Restoration of native plant communities							X	
Trout Unlimited	**Watershed Restoration**	Financial	Erosion control, fish habitat, structures, willow and other riparian plantings							X	
	Habitat Protection and Enhancement Fund	Financial	Improve water quality, riparian protection, enhance stream flows and watershed health, protect important trout habitat							X	

9.0 PERMITTING REQUIREMENTS

GGWC will ensure that appropriate permits will be obtained prior to the implementation of any project. These permits may include:

Montana Natural Streambed and Land Preservation Act ("The 310 Law")

- Administered by local Conservation District with input from Montana Fish, Wildlife & Parks (FWP); SPA 124 Permit is required in lieu of a 310 permit for projects proposed by a public entity

County Floodplain Development Permit

- Required for projects within FEMA-designated floodplains/floodways

Short-term Water Quality Standard for Turbidity (318 Authorization)

- Administered by Montana Department of Environmental Quality; permit may be waived by FWP during their review of a project

Federal Clean Water Act (Section 404 Authorization)

- Administered by the U.S. Army Corps of Engineers; authorizes placement of fill material below the ordinary high water mark

Montana Stream Mitigation Procedure (U.S. Army Corps of Engineers)

- Compensatory mitigation to ensure minimal individual and cumulative adverse impacts to aquatic resources
- Part of an overall sequence in project evaluation that dictates avoidance of impacts first, followed by minimization of impacts, and then compensation for remaining impacts
- Mitigation for impacts typically consists of natural revegetation, bioengineered bank stabilization, natural buffers, aquatic habitat improvements, floodplain re-connection, weed removal/management, fencing, and allowing for natural channel migration
- Based on a system of debits and credits that are applied to each project to determine if, and to what extent, mitigation will be required
- *Magnitude*: Individual projects > 300 feet in length typically require mitigation; cumulative projects > 1,000 feet in length increases debit responsibility
- *Location*: Mitigation activities can occur on-site, off-stream, or outside of watershed
- *Timing*: Mitigation activities can occur prior to the impacts, concurrent with the impacts, or after the impacts

Montana Department of Natural Resources and Conservation

- Water rights

10.0 REFERENCES

DTM Consulting and Applied Geomorphology, Inc. 2010. *Gallatin Watershed Restoration Prioritization Planning.* Prepared for Gallatin Conservation District and the Greater Gallatin Watershed Council.

Montana Department of Environmental Quality (DEQ 2013). *Lower Gallatin Planning Area TMDLs & Framework Water Quality Improvement Plan*. Water Quality Planning Bureau, Montana Department of Environmental Quality.

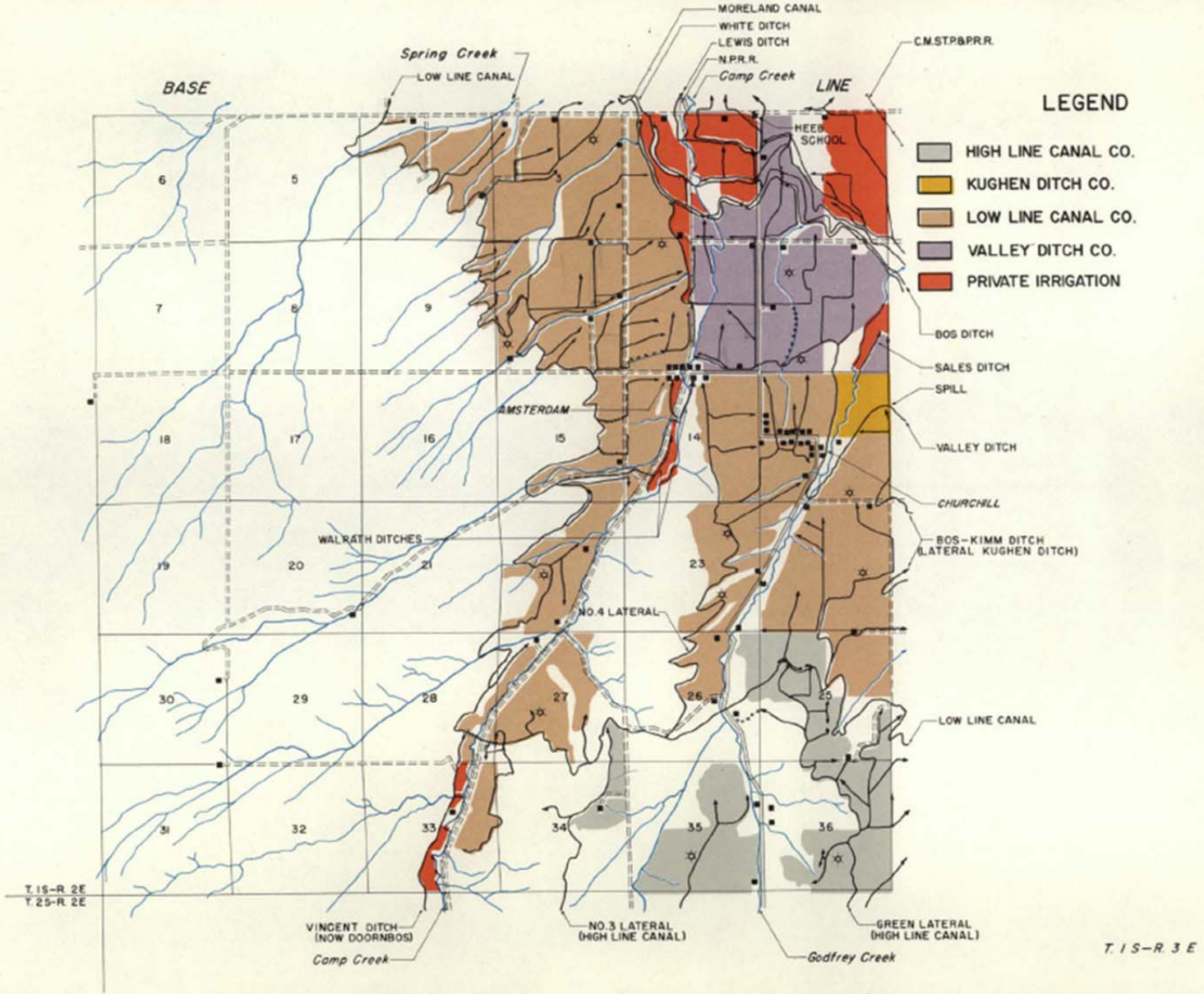
Montana Department of Environmental Quality (DEQ 2014). *Load Reduction Estimate Guide – A Guide for Estimating Pollutant Load Reductions Achieved Through Implementation of Best Management Practices.* Water Quality Planning Bureau, Montana Department of Environmental Quality.

Montana Department of Transportation (MDT 2013). *Testing and Evaluation of Recovered Traction Sanding Material.* Montana Department of Transportation, Research Programs Implementation Report, Project No: 8213.

Attachment A

1953 Water Resources Survey Maps Showing Irrigated Areas*

*Excerpt from Water Resources Survey, Gallatin County, Montana, published by State Engineer's Office, 1953


MORELAND CANAL
WHITE DITCH
LEWIS DITCH
N.P.R.R.
Camp Creek
C.M.ST.P&P.R.R.
Spring Creek
LOW LINE CANAL
BASE
LINE
HEEB SCHOOL
LEGEND
HIGH LINE CANAL CO.
KUGHEN DITCH CO.
LOW LINE CANAL CO.
VALLEY DITCH CO.
PRIVATE IRRIGATION
BOS DITCH
SALES DITCH
SPILL
VALLEY DITCH
CHURCHILL
BOS-KIMM DITCH
(LATERAL KUGHEN DITCH)
AMSTERDAM
WALRATH DITCHES
NO.4 LATERAL
LOW LINE CANAL
6
5
7
8
9
18
17
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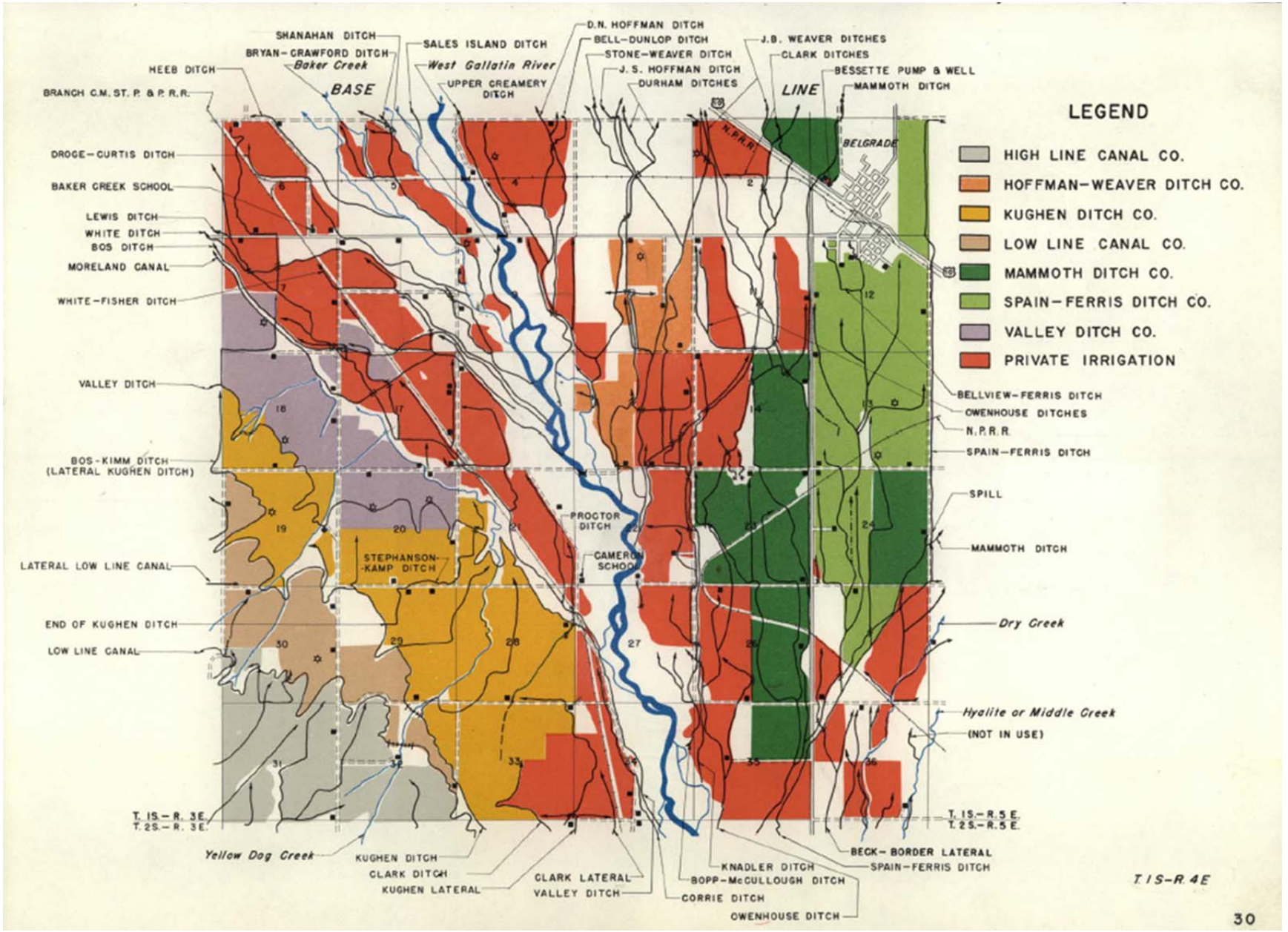
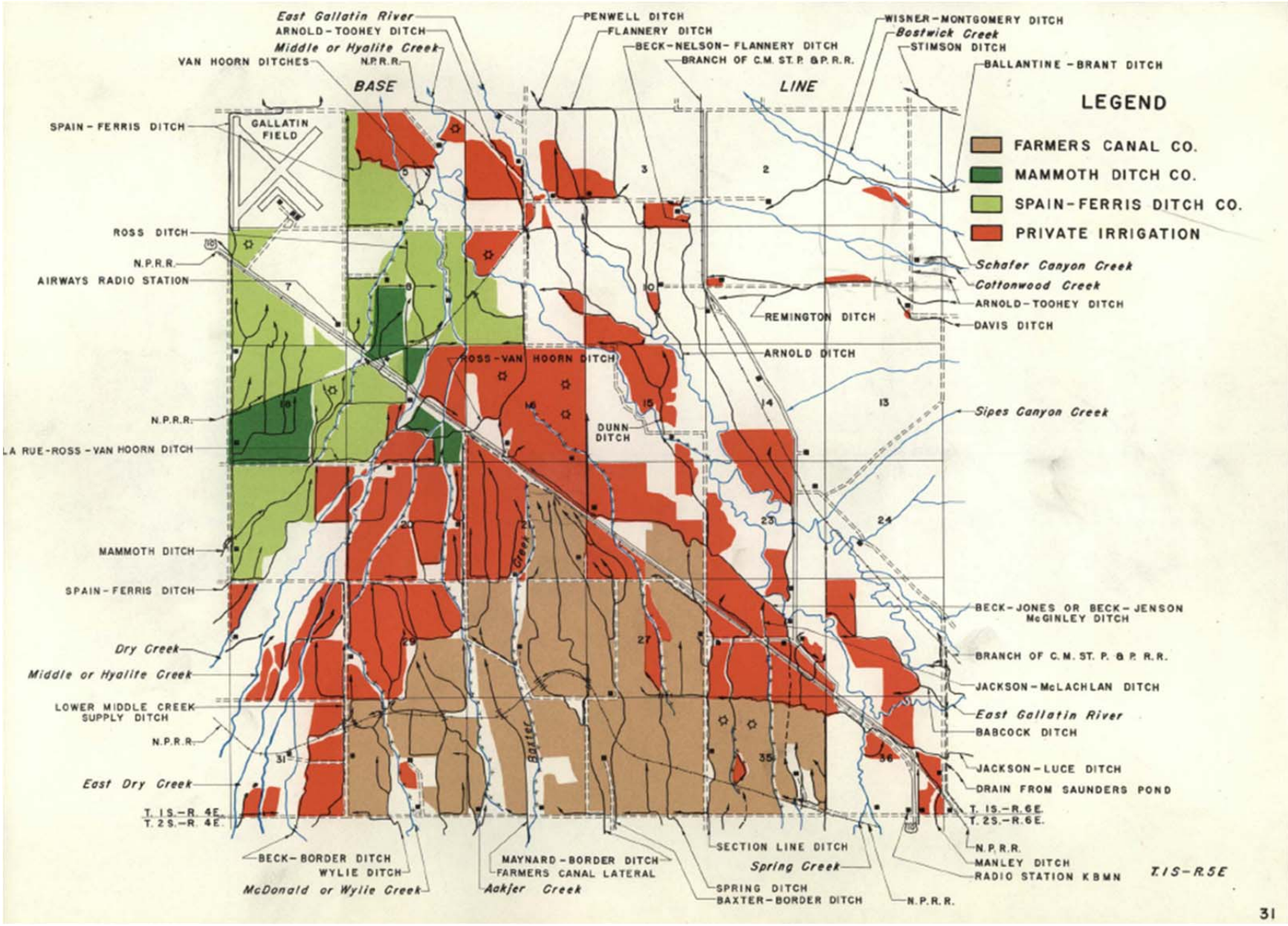
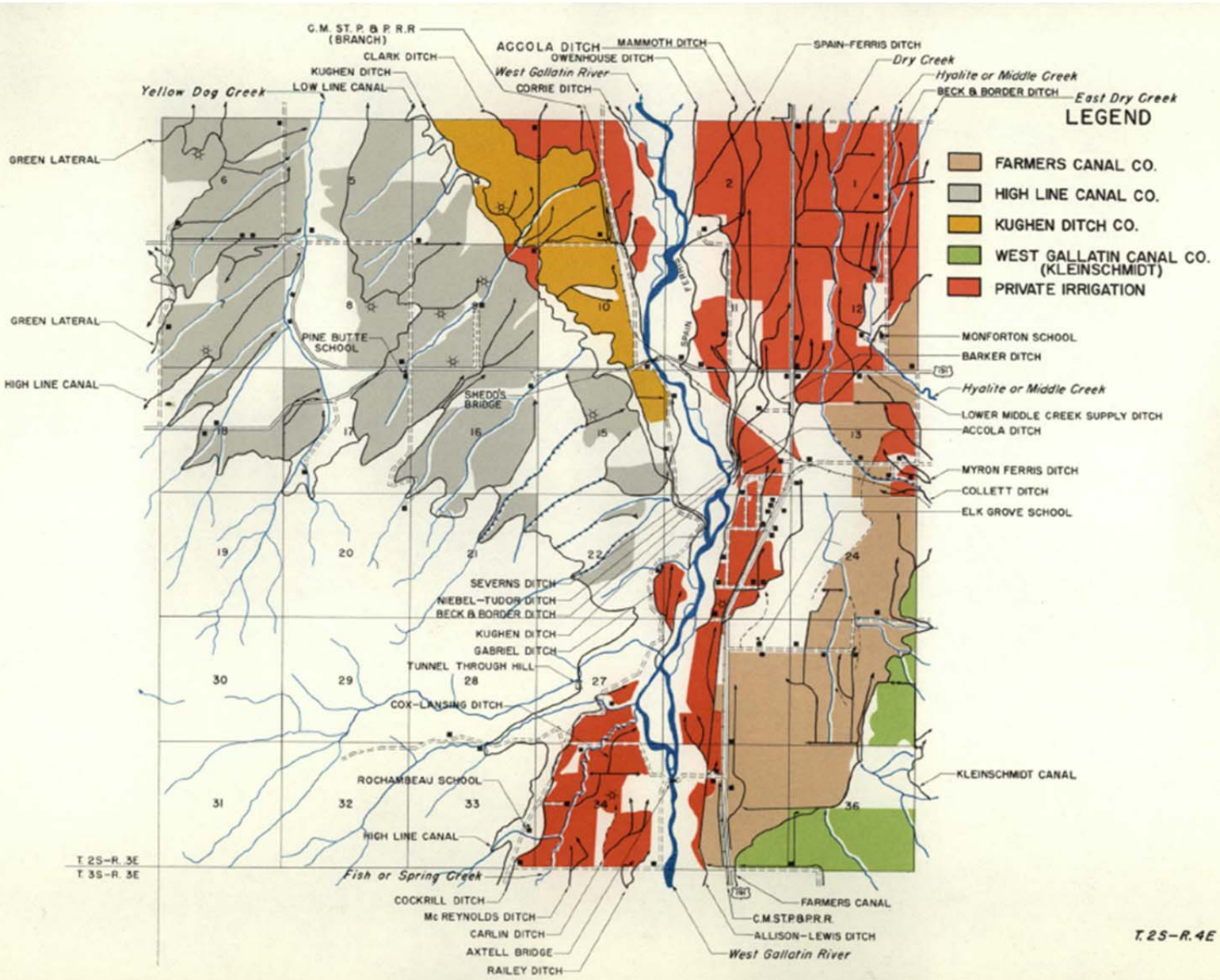
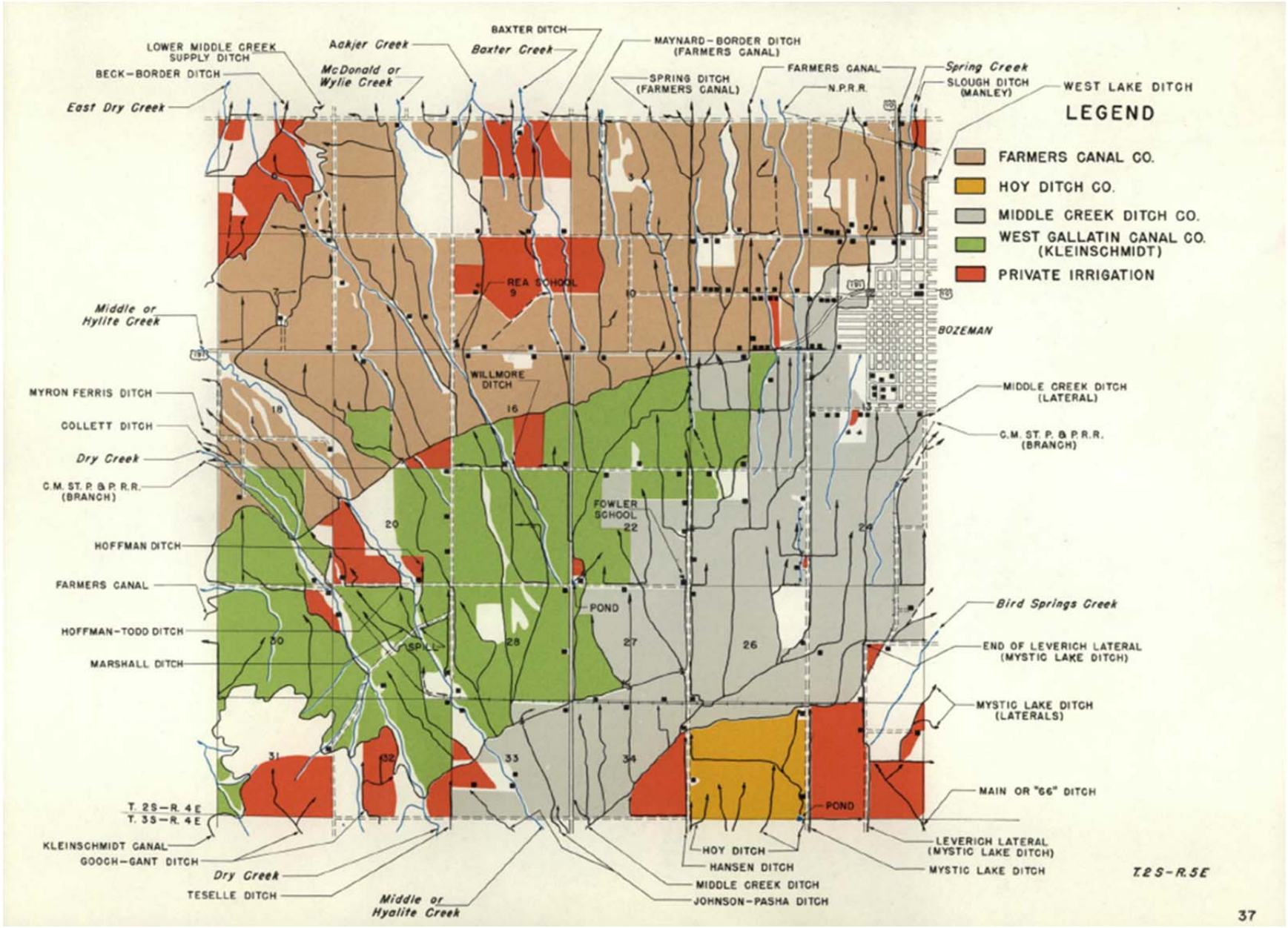
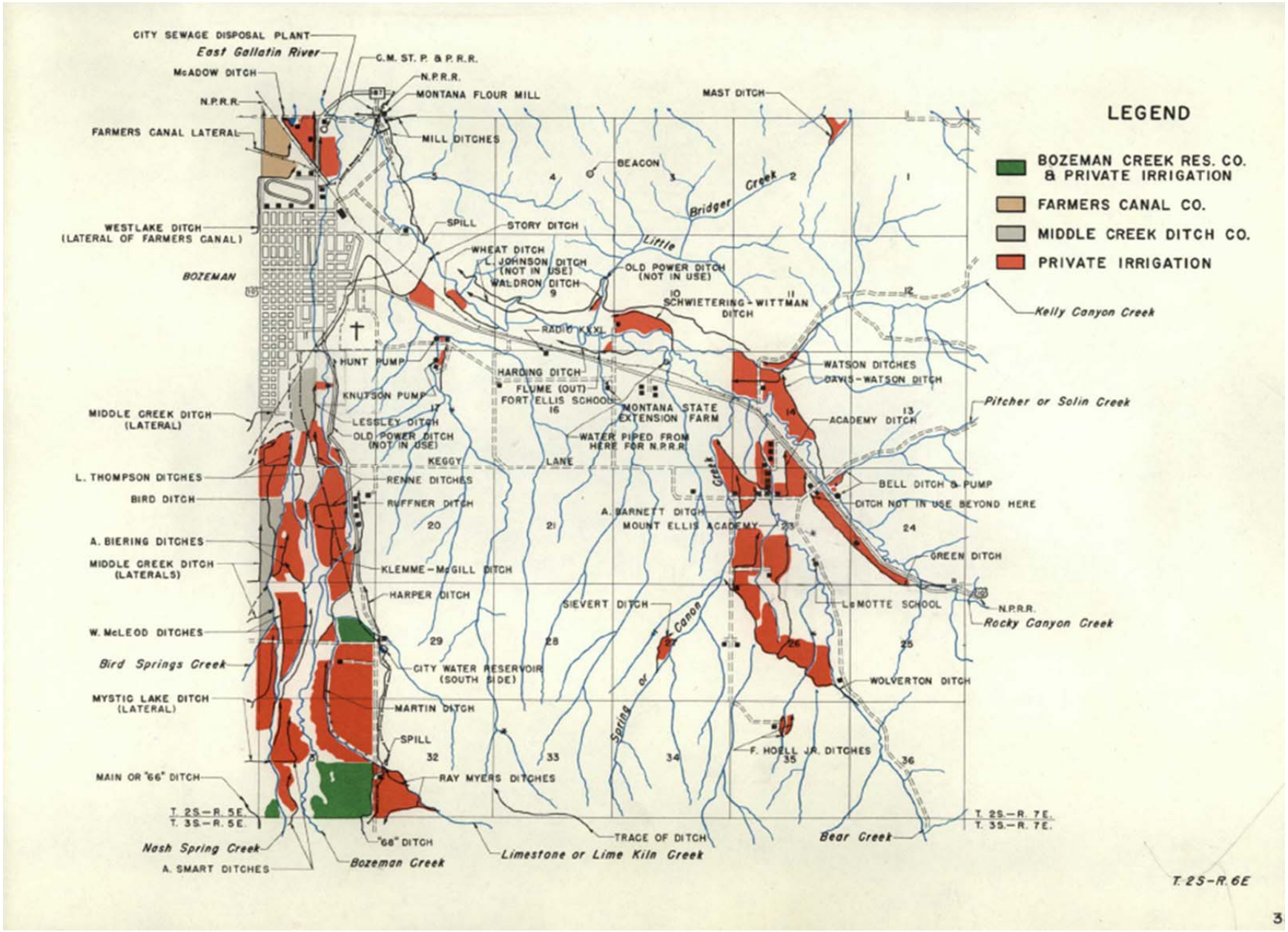
35
36
T.1S-R.2E
T.2S-R.2E
VINCENT DITCH
(NOW DOORNBOS)
Camp Creek
NO.3 LATERAL
(HIGH LINE CANAL)
Godfrey Creek
GREEN LATERAL
(HIGH LINE CANAL)
T.1S-R.3E

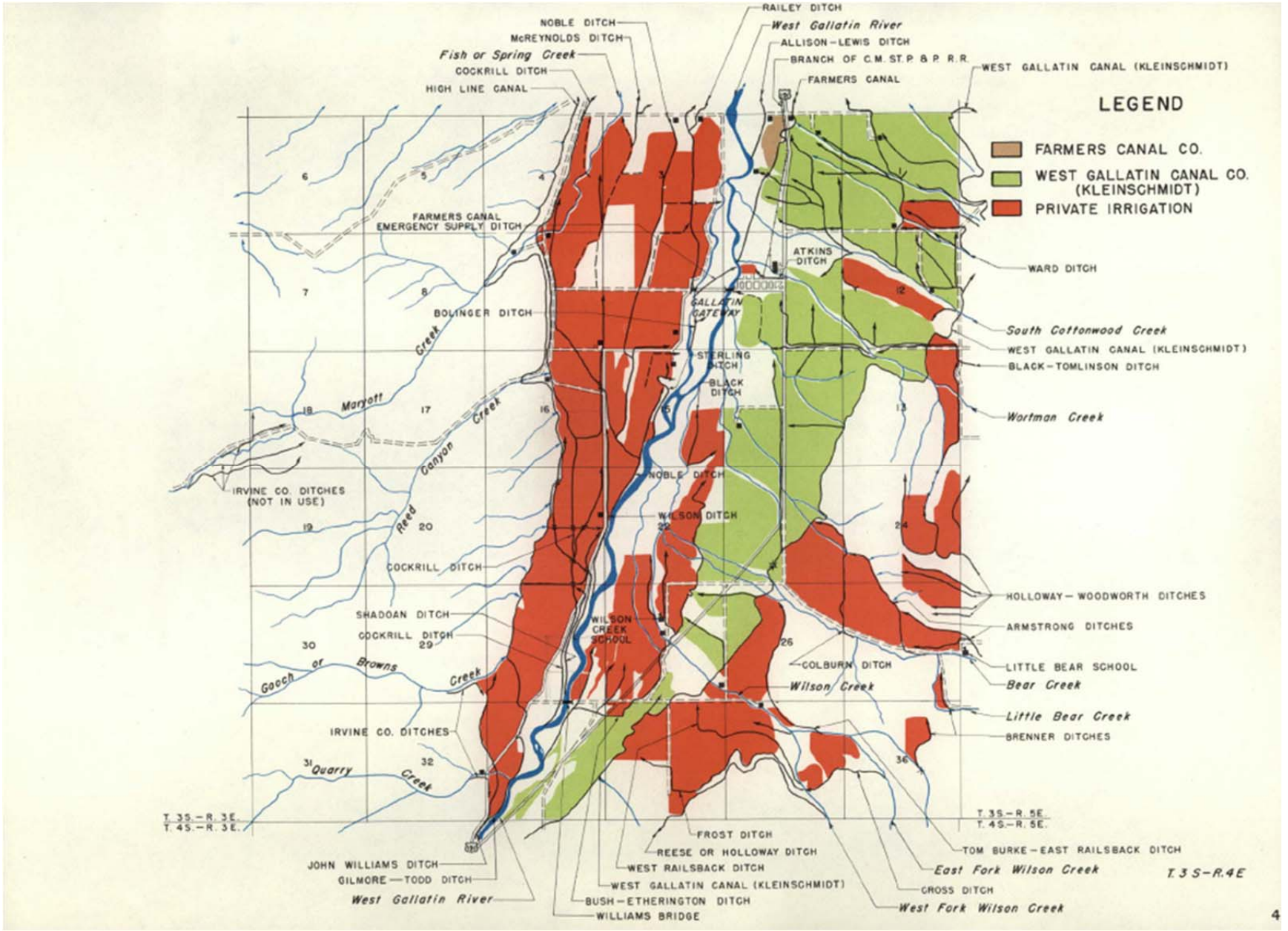

SHANAHAN DITCH
BRYAN-CRAWFORD DITCH
Baker Creek
HEEB DITCH
BRANCH C.M. ST. P. & P. R.R.
BASE
SALES ISLAND DITCH
West Gallatin River
UPPER CREAMERY DITCH
D.N. HOFFMAN DITCH
BELL-DUNLOP DITCH
STONE-WEAVER DITCH
J. S. HOFFMAN DITCH
DURHAM DITCHES
J.B. WEAVER DITCHES
CLARK DITCHES
BESSETTE PUMP & WELL
MAMMOTH DITCH
LINE
N.P.R.R.
BELGRADE
DROGE-CURTIS DITCH
BAKER CREEK SCHOOL
LEWIS DITCH
WHITE DITCH
BOS DITCH
MORELAND CANAL
WHITE-FISHER DITCH
VALLEY DITCH
BOS-KIMM DITCH
(LATERAL KUGHEN DITCH)
LATERAL LOW LINE CANAL
END OF KUGHEN DITCH
LOW LINE CANAL
STEPHANSON-KAMP DITCH
PROCTOR DITCH
CAMERON SCHOOL
BELLVIEW-FERRIS DITCH
OWENHOUSE DITCHES
N.P.R.R.
SPAIN-FERRIS DITCH
SPILL
MAMMOTH DITCH
Dry Creek
Hyalite or Middle Creek
(NOT IN USE)
T. 1S.-R. 3E.
T. 2S.-R. 3E.
T. 1S.-R. 5 E.
T. 2S.-R. 5 E.
Yellow Dog Creek
KUGHEN DITCH
CLARK DITCH
KUGHEN LATERAL
CLARK LATERAL
VALLEY DITCH
KNADLER DITCH
BOPP-McCULLOUGH DITCH
CORRIE DITCH
OWENHOUSE DITCH
BECK-BORDER LATERAL
SPAIN-FERRIS DITCH
T 1S-R 4E
LEGEND
HIGH LINE CANAL CO.
HOFFMAN-WEAVER DITCH CO.
KUGHEN DITCH CO.
LOW LINE CANAL CO.
MAMMOTH DITCH CO.
SPAIN-FERRIS DITCH CO.
VALLEY DITCH CO.
PRIVATE IRRIGATION

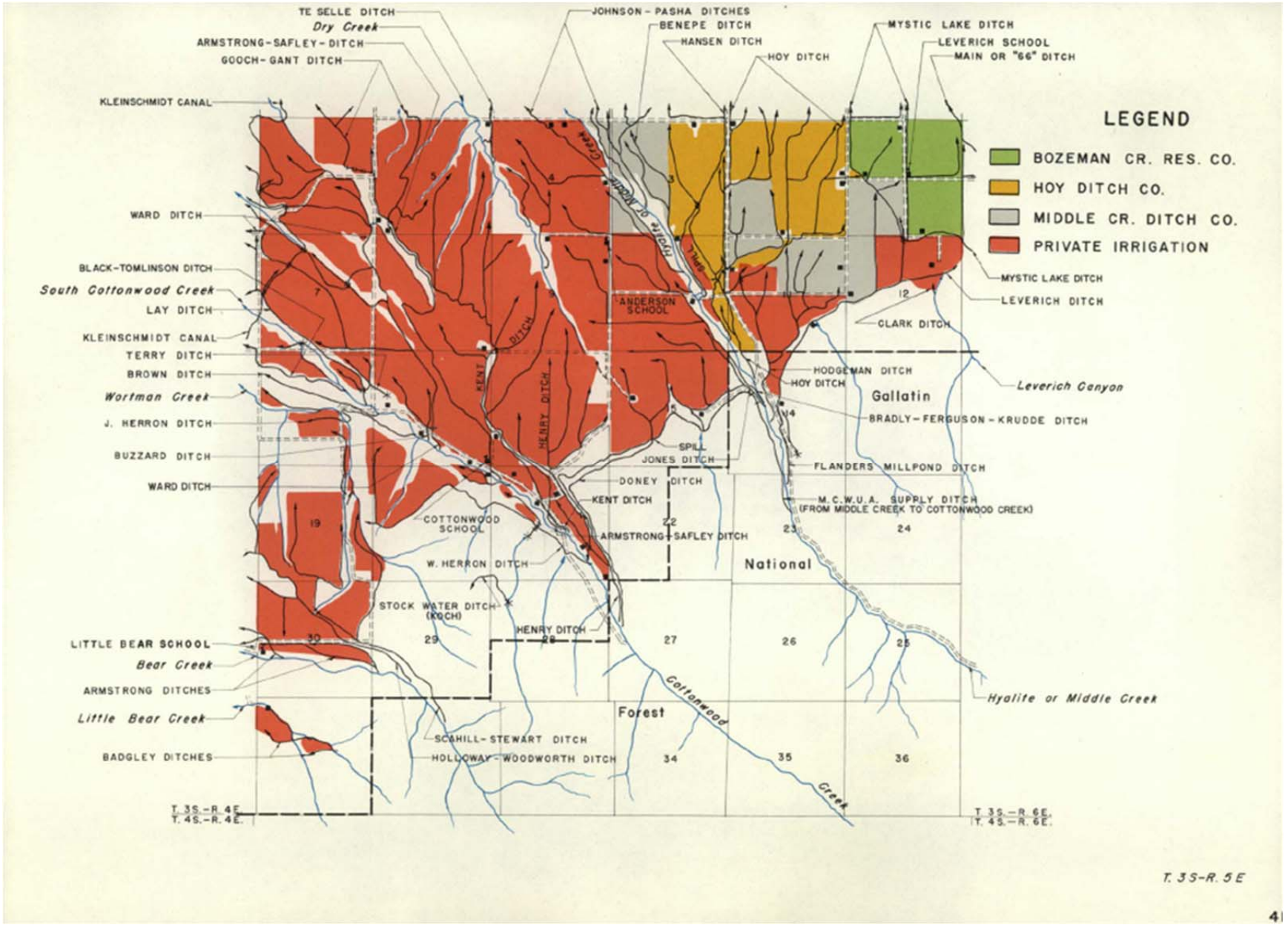

East Gallatin River
ARNOLD - TOOHEY DITCH
Middle or Hyalite Creek
VAN HOORN DITCHES
N.P.R.R.
BASE
LINE
PENWELL DITCH
FLANNERY DITCH
BECK - NELSON - FLANNERY DITCH
BRANCH OF C.M. ST. P. & P. R.R.
WISNER - MONTGOMERY DITCH
Bostwick Creek
STIMSON DITCH
BALLANTINE - BRANT DITCH
LEGEND
FARMERS CANAL CO.
MAMMOTH DITCH CO.
SPAIN - FERRIS DITCH CO.
PRIVATE IRRIGATION
SPAIN - FERRIS DITCH
GALLATIN FIELD
ROSS DITCH
N.P.R.R.
AIRWAYS RADIO STATION
Schafer Canyon Creek
Cottonwood Creek
ARNOLD - TOOHEY DITCH
DAVIS DITCH
REMINGTON DITCH
ARNOLD DITCH
ROSS - VAN HOORN DITCH
Sipes Canyon Creek
DUNN DITCH
LA RUE - ROSS - VAN HOORN DITCH
MAMMOTH DITCH
SPAIN - FERRIS DITCH
BECK - JONES OR BECK - JENSON McGINLEY DITCH
Dry Creek
Middle or Hyalite Creek
BRANCH OF C.M. ST. P. & P. R.R.
JACKSON - McLACHLAN DITCH
LOWER MIDDLE CREEK SUPPLY DITCH
East Gallatin River
BABCOCK DITCH
East Dry Creek
JACKSON - LUCE DITCH
DRAIN FROM SAUNDERS POND
T. 1S. - R. 4E.
T. 2S. - R. 4E.
T. 1S. - R. 6E.
T. 2S. - R. 6E.
N.P.R.R.
MANLEY DITCH
RADIO STATION KBMN
T.1S - R.5E
BECK - BORDER DITCH
WYLIE DITCH
McDonald or Wylie Creek
MAYNARD - BORDER DITCH
FARMERS CANAL LATERAL
Aakjer Creek
SECTION LINE DITCH
Spring Creek
SPRING DITCH
BAXTER - BORDER DITCH
N.P.R.R.


G.M. ST. P. & P. R.R (BRANCH)
AGGOLA DITCH
MAMMOTH DITCH
SPAIN-FERRIS DITCH
CLARK DITCH
OWENHOUSE DITCH
Dry Creek
KUGHEN DITCH
West Gallatin River
Hyalite or Middle Creek
Yellow Dog Creek
LOW LINE CANAL
CORRIE DITCH
BECK & BORDER DITCH
East Dry Creek
LEGEND
FARMERS CANAL CO.
HIGH LINE CANAL CO.
KUGHEN DITCH CO.
WEST GALLATIN CANAL CO. (KLEINSCHMIDT)
PRIVATE IRRIGATION
GREEN LATERAL
GREEN LATERAL
PINE BUTTE SCHOOL
MONFORTON SCHOOL
BARKER DITCH
HIGH LINE CANAL
SHEDD'S BRIDGE
Hyalite or Middle Creek
LOWER MIDDLE CREEK SUPPLY DITCH
ACCOLA DITCH
MYRON FERRIS DITCH
COLLETT DITCH
ELK GROVE SCHOOL
SEVERNS DITCH
NIEBEL-TUDOR DITCH
BECK & BORDER DITCH
KUGHEN DITCH
GABRIEL DITCH
TUNNEL THROUGH HILL
COX-LANSING DITCH
KLEINSCHMIDT CANAL
ROCHAMBEAU SCHOOL
HIGH LINE CANAL
T. 2S-R. 3E
T. 3S-R. 3E
Fish or Spring Creek
COCKRILL DITCH
Mc REYNOLDS DITCH
CARLIN DITCH
AXTELL BRIDGE
RAILEY DITCH
FARMERS CANAL
C.M.ST.P.&P.R.R.
ALLISON-LEWIS DITCH
West Gallatin River
T. 2S-R. 4E


LOWER MIDDLE CREEK SUPPLY DITCH
BECK-BORDER DITCH
East Dry Creek
Ackjer Creek
McDonald or Wylie Creek
BAXTER DITCH
Baxter Creek
MAYNARD-BORDER DITCH (FARMERS CANAL)
SPRING DITCH (FARMERS CANAL)
FARMERS CANAL
N.P.R.R.
Spring Creek
SLOUGH DITCH (MANLEY)
WEST LAKE DITCH
LEGEND
FARMERS CANAL CO.
HOY DITCH CO.
MIDDLE CREEK DITCH CO.
WEST GALLATIN CANAL CO. (KLEINSCHMIDT)
PRIVATE IRRIGATION
REA SCHOOL
Middle or Hylite Creek
BOZEMAN
WILLMORE DITCH
MYRON FERRIS DITCH
COLLETT DITCH
Dry Creek
C.M. ST. P. & P. R.R. (BRANCH)
MIDDLE CREEK DITCH (LATERAL)
C.M. ST. P. & P.R.R. (BRANCH)
FOWLER SCHOOL
HOFFMAN DITCH
FARMERS CANAL
HOFFMAN-TODD DITCH
MARSHALL DITCH
POND
SPILL
Bird Springs Creek
END OF LEVERICH LATERAL (MYSTIC LAKE DITCH)
MYSTIC LAKE DITCH (LATERALS)
MAIN OR "66" DITCH
T. 2S-R. 4E
T. 3S-R. 4E
KLEINSCHMIDT CANAL
GOOCH-GANT DITCH
Dry Creek
TESELLE DITCH
Middle or Hyalite Creek
HOY DITCH
HANSEN DITCH
MIDDLE CREEK DITCH
JOHNSON-PASHA DITCH
POND
LEVERICH LATERAL (MYSTIC LAKE DITCH)
MYSTIC LAKE DITCH
T.2S-R.5E


CITY SEWAGE DISPOSAL PLANT
East Gallatin River
C.M. ST. P. & P.R.R.
McADOW DITCH
N.P.R.R.
MONTANA FLOUR MILL
MAST DITCH
N.P.R.R.
FARMERS CANAL LATERAL
MILL DITCHES
BEACON
Bridger Creek
WESTLAKE DITCH (LATERAL OF FARMERS CANAL)
SPILL
STORY DITCH
Little
WHEAT DITCH
L. JOHNSON DITCH (NOT IN USE)
WALDRON DITCH
OLD POWER DITCH (NOT IN USE)
BOZEMAN
SCHWIETERING - WITTMAN DITCH
Kelly Canyon Creek
RADIO KXXL
HUNT PUMP
HARDING DITCH
WATSON DITCHES
DAVIS - WATSON DITCH
KNUTSON PUMP
FLUME (OUT) FORT ELLIS SCHOOL
MONTANA STATE EXTENSION FARM
Pitcher or Solin Creek
MIDDLE CREEK DITCH (LATERAL)
LESSLEY DITCH
OLD POWER DITCH (NOT IN USE)
WATER PIPED FROM HERE FOR N.P.R.R.
ACADEMY DITCH
KEGGY
LANE
Creek
L. THOMPSON DITCHES
RENNE DITCHES
BELL DITCH & PUMP
BIRD DITCH
RUFFNER DITCH
A. BARNETT DITCH
DITCH NOT IN USE BEYOND HERE
MOUNT ELLIS ACADEMY
A. BIERING DITCHES
GREEN DITCH
MIDDLE CREEK DITCH (LATERALS)
KLEMME - McGILL DITCH
HARPER DITCH
SIEVERT DITCH
LaMOTTE SCHOOL
N.P.R.R.
Rocky Canyon Creek
W. McLEOD DITCHES
Bird Springs Creek
CITY WATER RESERVOIR (SOUTH SIDE)
Canon
WOLVERTON DITCH
MYSTIC LAKE DITCH (LATERAL)
MARTIN DITCH
Springs or
SPILL
F. HOELL JR. DITCHES
MAIN OR "66" DITCH
RAY MYERS DITCHES
T. 2S.—R. 5E.
T. 3S.—R. 5E.
T. 2S.—R. 7E.
T. 3S.—R. 7E.
Nash Spring Creek
"66" DITCH
TRACE OF DITCH
Bear Creek
A. SMART DITCHES
Bozeman Creek
Limestone or Lime Kiln Creek
T. 2S.—R. 6E.
LEGEND
BOZEMAN CREEK RES. CO. & PRIVATE IRRIGATION
FARMERS CANAL CO.
MIDDLE CREEK DITCH CO.
PRIVATE IRRIGATION


RAILEY DITCH
NOBLE DITCH
West Gallatin River
McREYNOLDS DITCH
ALLISON-LEWIS DITCH
Fish or Spring Creek
BRANCH OF C.M. ST.P. & P. R.R.
WEST GALLATIN CANAL (KLEINSCHMIDT)
COCKRILL DITCH
FARMERS CANAL
HIGH LINE CANAL
LEGEND
FARMERS CANAL CO.
WEST GALLATIN CANAL CO. (KLEINSCHMIDT)
PRIVATE IRRIGATION
FARMERS CANAL EMERGENCY SUPPLY DITCH
ATKINS DITCH
WARD DITCH
BOLINGER DITCH
GALLATIN GATEWAY
South Cottonwood Creek
WEST GALLATIN CANAL (KLEINSCHMIDT)
STERLING DITCH
BLACK-TOMLINSON DITCH
BLACK DITCH
Wortman Creek
Maryott Creek
Reed Canyon Creek
NOBLE DITCH
IRVINE CO. DITCHES (NOT IN USE)
WILSON DITCH
COCKRILL DITCH
HOLLOWAY-WOODWORTH DITCHES
SHADOAN DITCH
ARMSTRONG DITCHES
WILSON CREEK SCHOOL
COCKRILL DITCH
LITTLE BEAR SCHOOL
Gooch or Browns Creek
COLBURN DITCH
Bear Creek
Wilson Creek
Little Bear Creek
IRVINE CO. DITCHES
BRENNER DITCHES
Quarry Creek
T. 3S.-R. 3E.
T. 4S.-R. 3E.
T. 3S.-R. 5E.
T. 4S.-R. 5E.
FROST DITCH
REESE OR HOLLOWAY DITCH
TOM BURKE-EAST RAILSBACK DITCH
JOHN WILLIAMS DITCH
WEST RAILSBACK DITCH
East Fork Wilson Creek
GILMORE-TODD DITCH
WEST GALLATIN CANAL (KLEINSCHMIDT)
T.3S-R.4E
CROSS DITCH
West Gallatin River
BUSH-ETHERINGTON DITCH
West Fork Wilson Creek
WILLIAMS BRIDGE


TE SELLE DITCH
Dry Creek
ARMSTRONG-SAFLEY-DITCH
GOOCH-GANT DITCH
KLEINSCHMIDT CANAL
WARD DITCH
BLACK-TOMLINSON DITCH
South Cottonwood Creek
LAY DITCH
KLEINSCHMIDT CANAL
TERRY DITCH
BROWN DITCH
Wortman Creek
J. HERRON DITCH
BUZZARD DITCH
WARD DITCH
LITTLE BEAR SCHOOL
Bear Creek
ARMSTRONG DITCHES
Little Bear Creek
BADGLEY DITCHES
T. 3S.-R. 4E.
T. 4S.-R. 4E.
JOHNSON-PASHA DITCHES
BENEPE DITCH
HANSEN DITCH
HOY DITCH
MYSTIC LAKE DITCH
LEVERICH SCHOOL
MAIN OR "66" DITCH
Middle Creek
Hyalite
ANDERSON SCHOOL
KENT DITCH
HENRY DITCH
COTTONWOOD SCHOOL
W. HERRON DITCH
STOCK WATER DITCH (KOCH)
HENRY DITCH
SCAHILL-STEWART DITCH
HOLLOWAY-WOODWORTH DITCH
Forest
Cottonwood Creek
MYSTIC LAKE DITCH
LEVERICH DITCH
CLARK DITCH
HODGEMAN DITCH
HOY DITCH
Gallatin
Leverich Canyon
BRADLY-FERGUSON-KRUDDE DITCH
SPILL
JONES DITCH
DONEY DITCH
KENT DITCH
ARMSTRONG-SAFLEY DITCH
National
FLANDERS MILLPOND DITCH
M.C.W.U.A. SUPPLY DITCH
(FROM MIDDLE CREEK TO COTTONWOOD CREEK)
Hyalite or Middle Creek
T. 3S.-R. 6E.
T. 4S.-R. 6E.
LEGEND
BOZEMAN CR. RES. CO.
HOY DITCH CO.
MIDDLE CR. DITCH CO.
PRIVATE IRRIGATION
T. 3S-R. 5E

Attachment B

Project Development Screening Tool

Greater Gallatin Watershed Council Project Development Screen

Projects require three elements: stream and watershed improvement potential, landowner and community support and the resources necessary to implement the project. This screen is designed as a tool to evaluate whether a project is ready for implementation, needs additional development, or is not suitable.

Project Summary and Stream Improvements

Project Name			
Project Location			
Landowner or Landowners		**Sector (public or private)**	
Project is or involves (check all that apply)	____In/on a stream Wetland ___Off stream ___Ditch or Head gate ____Targeted information/education Other (list):		
Proposed BMPs			
Expected Water Quality Improvements (TMDL)	__Sediment ___Phosphorus _Nitrogen/Nitrates ___E. coli	**Which water quality impairments exist on this stream or a stream downstream?**	
Stream & Wetland Degradation to be addressed (check all that apply)	___Channel over-widening ____Channel entrenchment ____Excessive stream bank erosion ___Fine sediment accumulation in pools ___Fine sediment accumulation in riffles ___Lack of spawning sized substrate ___Lack of pools ___Lack of woody debris ___Lack of riparian vegetation ___ Trash/debris in stream ___ Wetland degradation Other (list):		
Summary of Project Characteristics			

Project Support and Resources

Estimated Cost	___>$2,000 ___$5,000-10,000 ___$10,000-25,000 ____$50,000-100,000 ____>$100,000								
State of Project Development (check all that apply)	_____ Idea stage only _____ Site Visit Completed _____ Feasibility Assessment or Formal Design completed _____Permits in place _____ Funding secured ____ Contractor identified								
Partners				**Are all needed partners supporting the project?**					
Does this project qualify for 319 funding?				**Is match secured? If so, what is it?**					
Other funding sources									
Community Priorities Met (underline all that apply)	Aesthetics	Agriculture	Drinking Water	Economic Value	Fishery	Recreation	Stream Function & Watershed Health	Wildlife & Habitat	Other

Project Next Steps

State of Project Development (circle or underline answer)	**Stream or Wetland Improvement:** Yes No Not Determined	**Landowner and Community Support:** Yes No	**Necessary Resources Secured:** Yes No
Next Steps for each area:			
Next Steps Assigned to:			
Proceed with Project? Yes	No	**If yes, Board Approval Date:**	

Further Landowner Leads:

Stream and Watershed Improvement Potential

This project is likely to improve stream health in the following ways:					
Area of watershed	__ Bozeman	__ Subdivision/small acreage	__ Rural – E. Gallatin watershed	__ Rural – W. Gallatin watershed	__ Rural Gallatin below the confluence

Significant Improvement is expected in the following areas: (check all that apply)	
	Nitrogen/Nitrates
	Phosphorus
	Sediment reduction
	E. coli reduction
	In-stream habitat improvement
	Riparian and upland habitat improvement
	Thermal alteration
	Flow alteration
	Other Stream/Wetland Improvements

This project falls within a priority area or areas (check all that apply)	
	Stream does not meet water quality standards in the area that this project will improve
	Stream is a tributary to a stream that does not meet water quality standards for an impairment this project will improve.
	This is a wetland priority area identified in the DEQ wetland integration.
	This is a project identified in the 2010 prioritization. It was ranked at number ___.
	This project will likely improve this stream for one or more community values, as demonstrated in the community prioritization.
	This project falls within other priority (list – NRCS, FWP, etc.)
	This project will protect a rare or unique area/type (list).

Existing plans, assessments, or other design or historical materials	
Where are these materials?	
Monitoring Plan (idea, developed, or approved?)	
Project Details (phases, further site description, monitoring plan, etc.)	

Does this project have high-value stream and/or wetland improvement potential?	__ Yes, addresses TMDL impairments	__ Yes, addresses non-TMDL stream and wetland improvements	__ No, not significant stream or wetland improvements	__ Need more information. Next steps:

Landowner and Community Support

Project Landowner Characteristics

Landowner or Landowners		**Sector (public or private)**	
A willing landowner is on board __ yes ___ no.			
Landowner Contact		**Phone(s)**	
		Email(s)	

If a landowner is not yet on board, what is the state of landowner interest?	
	Landowner interested, but the following conditions much be met:
	Landowner interested, but needs more information to make a decision.
	Landowner contacted, but not yet sure of interest.
	Landowner identified, but no contact yet.
	Landowner not interested.
	Are there other active or potential landowners?

This project or projects involves multiple landowners: __ yes ___ no	
If the answer is "yes" describe the state of the landowners:	
	All landowners interested and committed.
	Most landowners committed. Landowners that are not ready have the following reservations or conditions:
	One or few landowners committed. Remaining landowners have the following conditions or reservations:
	Landowners contacts, but not sure of interest
	Landowners not yet identified.
Are there other potential or interested landowners near this project? If so, describe.	

Other Community Project Characteristics

Potential for replication	None	Low	Medium	High
Community Partner(s) involved with project (list –CD, GVLT, etc.)				
Potential to influence other landowners (describe type of influence- landowner type, etc.)				
Education Potential				
Potential for long term security of project (easements, management agreements, etc.)				

Are all landowners and partners on board?	__ Yes, landowner(s) on board.	__ Yes, partner(s) on board.	__ No, landowner(s) missing:	__ No, partners missing:

Necessary Resources Available

Landowner accepts the following terms and conditions:			
Landowner can contribute the following funds/in-kind:			
Project characteristics are good to excellent for the following funding sources:			**Ability to complete the project:**
	DEQ 319	Funding status:	
	CD funding (list):	Funding status:	
	DEQ/Wetland funding	Funding status:	
	DNRC RGL grants	Funding status:	
	Future Fisheries (FWP)	Funding status:	**Project cost details (phases, extent, total targeted stream improvement, etc.):**
	NRCS program:	Funding status:	
	City of Bozeman funding	Funding status:	
	Corps In Lieu-Fee mitigation funds	Funding status:	
	Ducks Unlimited	Funding status:	
	Trout Unlimited	Funding status:	
	Private Funding Sources (list):	Funding status:	**Project cost, compared to other potential projects:**
	Other Public Funding Sources (list):	Funding status:	
Other funding notes or considerations:			
Further notes on any other project leads, landowner leads or next steps:			

Are all resources secured?	__ Yes, funding is secured.	__ Yes, technical resources are available.	__ No, funding is not secured. Next steps:	__ No, technical resources missing. Next Steps:

Attachment C

Community-Based Stream Improvement Meetings and Comment Summary

Lower Gallatin Watershed

COMMUNITY-BASED STREAM IMPROVEMENT MEETINGS & COMMENTS SUMMARY

2014

OVERALL SUMMARY

The Greater Gallatin Watershed Council (GGWC) hosted a series of four community meetings and gathered comments through an online survey. The purpose of these meetings and comment surveys is to:

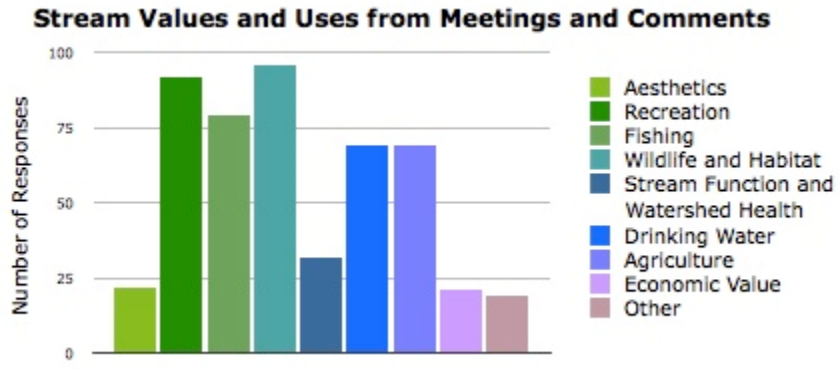
Identify community priorities regarding health of the watershed
Hear specific concerns and ideas about local streams
Identify potential projects to improve stream and watershed health

This community input serves as the basis for the Lower Gallatin Watershed Restoration Plan (WRP) which will be completed by the end of 2014. The plan will guide watershed-wide restoration efforts based on community priorities over the next three to five years.

PARTICIPANTS

60 people participated in one of four community meetings in January and February 2014: 12 in Belgrade, 8 in Manhattan, 35 in Bozeman, and 5 in Bridger Canyon. 62 people participated in the comment survey from mid-January through late February. This includes several individuals who submitted comments after attending a meeting. A wide variety of stakeholders attended the meetings and submitted comments, including agricultural producers, urban and suburban landowners, land managers, and representatives of governmental and nonprofit organizations.

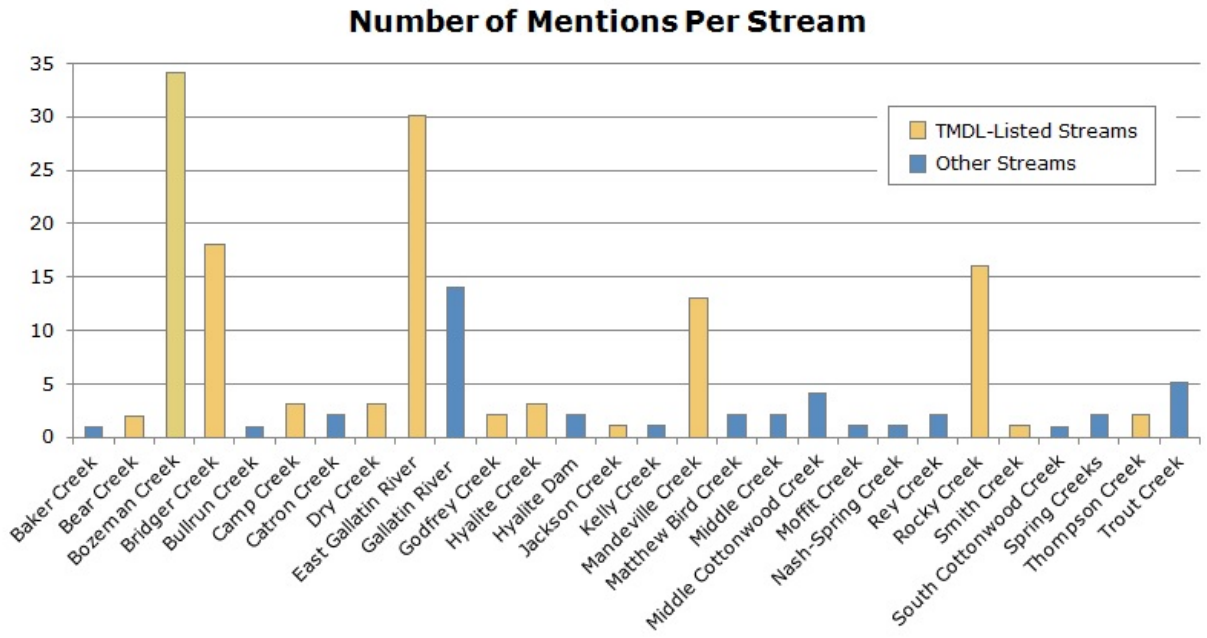
COMMUNITY STREAM VALUES



Participants were asked how they use and value streams within the watershed. The graph above shows the overall responses from the meetings and comment surveys. However, at each meeting, the relative importance of these values varied based on location and stakeholder interest.

Streams of Interest in the Lower Gallatin Watershed

Many streams were mentioned in the meetings and comment surveys, as well as Hyalite Dam and several ditches within the Lower Gallatin Watershed.



In the above graph, the number of mentions per stream generally reflects the population near the stream. The streams that do not meet state water quality standards appear in yellow. Two of the fifteen streams that do not meet state water quality standards (TMDL-listed streams) were not mentioned: Reese Creek and Stone Creek. Most of the non-listed streams that were mentioned are tributaries to TMDL-listed streams.

Potential Projects

Number of Potential Projects Identified	Area of Watershed
14	Bozeman
5	Eastern Region (Bridger Canyon, Bear Creek, Rocky Creek, East Gallatin down to Spring Hill, and areas east and south of Bozeman)
11	Northern Region (Belgrade and adjacent areas, plus area north and east of Belgrade, including: Spring Hill, Dry Creek and numerous spring and freestone creeks and ditch areas)
8	Western Region (Manhattan, Lower East Gallatin, Camp and Godfrey Creeks, north and west of Manhattan and the area below the confluence of the West and East Gallatin.
3	Southern Region (West Gallatin to the mouth of Gallatin Canyon, South Cottonwood, Middle Creek and the surrounding area)

In addition to potential restoration projects and project leads, community members provided ideas for best management practices, targeted education, and other ways to address stream and watershed improvement and community values in the Lower Gallatin Watershed. More detail on these ideas can be found in the individual community meeting and the comment survey summaries.

MAJOR THEMES

Stream and watershed values are similar across the watershed. In every community, streams are valued for many reasons. These include supporting recreation, agriculture, fisheries, habitat, and drinking water. The relative balance between these stream uses and values varied by community, but overall there is widespread interest in supporting multiple beneficial uses. As one participant said, "Nobody wants to be screwing up the creek."

Individualized solutions to stream concerns are necessary based on land use, ownership, and stream type. Streams within the watershed vary greatly, from small spring creeks to freestone creeks to relatively large rivers. Urban streams and rural streams also differ in the types of impacts and the number and type of landowners. Private landowners vary in the way they use their land; their goals for their property; the resources they have available; their comfort with various funding sources; and their history of interaction with agencies, government, and other entities. Each improvement project will need to be tailored to fit all of these considerations.

Targeted education and outreach is essential to success. The need for education was discussed frequently, and participants suggested targeting a wide variety of stakeholders including new landowners, developers, and agricultural producers. More than ten different stakeholder types were mentioned. Participants felt that ongoing outreach to these groups, using information, education and social events, is necessary for fostering project ideas and participation.

Community members are aware of and interested in the Gallatin as a headwaters watershed. The Lower Gallatin Watershed's status as the headwaters of the Missouri was frequently noted and valued. Participants appreciated the privilege of living upstream and of receiving clean water. Several participants commented that it is important to keep this, the upper reach of the Missouri Watershed, clean.

Community interest is widespread in improving and protecting streams, wetlands and the watershed. Many participants identified maintaining stream, wetland and watershed health as a top priority. People value healthy steams and want to preserve stream health. Protecting all streams is considered as important as restoring streams of concern.

NEXT STEPS

The Greater Gallatin Watershed Council is using the information gathered from the community to help build an approach that reflects community values and priorities.

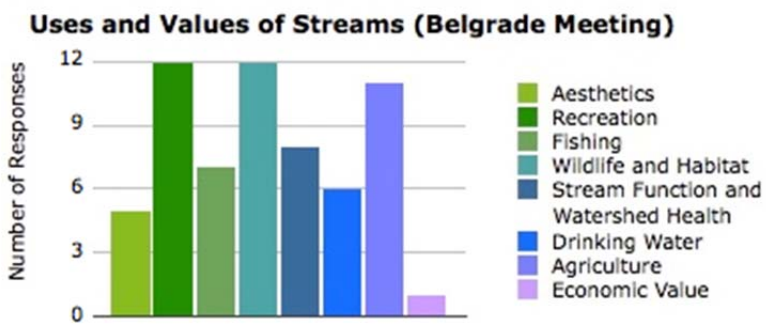
- A **prioritization process** is being developed to identify voluntary projects that meet community values, improve watershed health, and have a strong likelihood of being funded through DEQ 319 grants or other funding sources.
- A few **projects will be selected** for DEQ 319 funding consideration this year and in the next two to three years.
- The Lower Gallatin **Watershed Restoration Plan** will be completed by the end of 2014. The plan will identify restoration projects and best management practices that align with community values, establish education and outreach approaches, and outline expected stream and watershed improvements.
- GGWC will **build further partnerships** with landowners and other stakeholders across the Lower Gallatin Watershed in order to foster support and develop projects that will result in improved stream and watershed health.

BELGRADE · JANUARY 22

Participants: 12

Rivers and Streams Mentioned:

- Bullrun Creek
- Middle Cottonwood Creek
- Dry Creek
- East Gallatin River
- West Gallatin River
- Gallatin River
- Hyalite Dam
- Middle Creek
- Smith Creek
- Thompson Creek
- Trout Creek



CONCERNS, IMPROVEMENT IDEAS, AND DISCUSSION

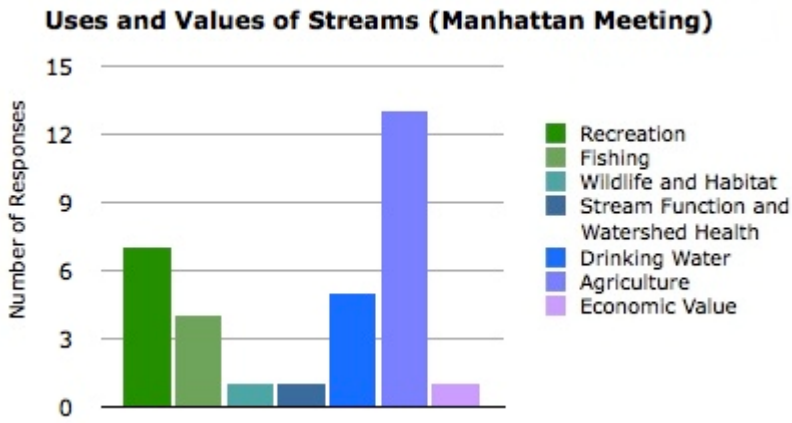
Concern	Improvement Ideas and Discussion
Agriculture	Ensure adequate water
Fisheries	Fish ladder on Trout Creek. Fish habitat improvement on Bullrun Creek.
Water flow	No specific ideas, but participants noted a need to maintain and increase flow for both agriculture and habitat. Irrigation timing and management was also noted as an opportunity for further discussion and investigation.
Development	Landowner education, especially improving understanding of effects of changes in land use and development.
Invasive weeds	Education on invasive weed management, especially for small acreage landowners. Targeted weed management.
Lack of riparian vegetation	Fencing. Streamside revegetation. Wetland restoration on Trout Creek.
Sediment	Fencing. Revegetation.
Pet waste	Pet waste stations and pet owner education.
Nutrients in the East Gallatin sub-watershed	Further investigation and discussion of water quality impacts and potential solutions throughout the East Gallatin River sub-watershed, including tributaries.
Lack of awareness	Education on water flow and water rights. Education on natural stream characteristics and dynamics. Further education and discussion along the East Gallatin on upstream effects. A Channel Migration Zone map was identified as a tool to increase understanding of stream dynamics on both the East and West Gallatin Rivers.

MANHATTAN · JANUARY 23

Participants: 8

Streams and Rivers Mentioned:

- Baker Creek
- Camp Creek
- Dry Creek
- East Gallatin
- Godfrey Creek
- Rey Creek
- Thompson Creek
- Story Creek
- Smith Creek



CONCERNS, IMPROVEMENT IDEAS, AND DISCUSSION

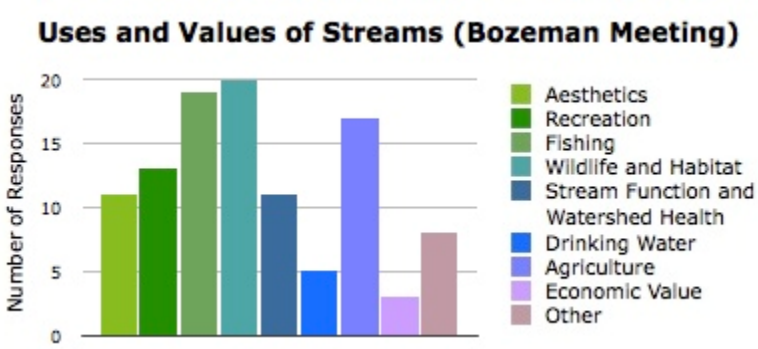
Concern	Improvement Ideas and Discussion
Implementing effective riparian projects	Ensure that proven stream and wetland restoration methods are used is important. Ensure that all funding conditions are known from the outset when working with landowners, since additional conditions late in the process have undone more than one local project.
Protecting property rights	Voluntary projects that do not interfere with land or water rights are important.
Lack of riparian vegetation and sediment	Fencing, riparian planting, and stream bank restoration were identified as possible improvements. However, some mixed history with projects in the past led participants to stress that proven practices are important.
Fisheries	Spawning areas on Rey, Thompson, and Baker Creek had identified sediment problems. Ideas with fencing, riparian replanting, or possible irrigation management.
Development	Find ways to education and work with developers early in process, so projects that are developed do not impact streams.
Water management & water rights	Water management is intensive and intricately connected. Any solution must take water rights into consideration.
Lack of knowledge	Education was considered one of the most important ways to work with many targeted audiences. Engagement with neighbors on individual streams and through community-based events to build understanding and trust over time was also important.

BOZEMAN · FEBRUARY 5

Participants: 35

Streams and Rivers Mentioned:

- Bear Creek
- Bozeman Creek
- Bridger Creek
- Catron Creek
- East Gallatin River
- Hyalite Creek
- Mandeville Creek
- Moffitt Creek
- Rocky Creek
- West Gallatin River



CONCERNS, IMPROVEMENT IDEAS, AND DISCUSSION

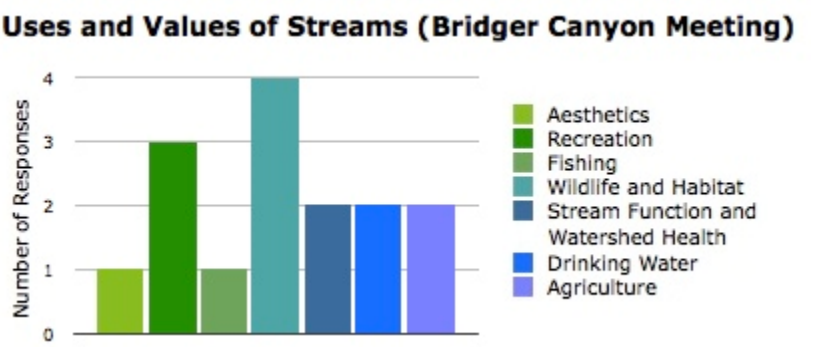
Concern	Improvement Ideas and Discussion
Renaturalizing streams	Naturalize straightened sections of Rocky and Bozeman Creeks. Add riparian vegetation.
Wetland loss	Wetland restoration within urban areas along Bozeman Creek and in surrounding stream areas.
Stormwater effluent	Pervious pavement, sediment filtration system or wetlands in urban areas. Maintenance and effectiveness of stormwater control measures.
E. coli	No specific ideas, but managing pathogens did come up as a concern.
Fisheries	Improving aquatic organism passage at Mill Ditch Diversion. Other practices to reduce sediment and nutrients would also be beneficial to fisheries.
Sediment	Riparian vegetation, storm water filtration and structures, grazing practices, no-mow zones and riparian buffer. Flushing sediments on Catron and Mandeville Creeks.
Invasive weeds	Weed management on Catron Creek.
Trash and debris in streams	Remove concrete debris in Bozeman Creek between Story and Peach streets and other areas. Remove trash and other debris.
Erosion and stream bank loss	Riparian planting, bank stabilization and channel work, grazing practices changes. Bank loss on a property on the East Gallatin has accelerated, perhaps due to changes upstream. Bear Creek, Bridger Creek, and the East Gallatin were mentioned.
Head gate improvements	Aquatic fisheries passage management, stabilizing erosion and other improvements on Spain and Ferris Ditch. Ditch access and management, as well as lack of awareness of ditch laws and management issues also were mentioned.
Nutrients	No mow zones, riparian revegetation, storm water infiltration, wetland infiltration, implement no-mow zones.
Lack of awareness	Target MSU students and Bozeman High School students as well as the larger community.

BRIDGER CANYON · FEBRUARY 6

Participants: 5

Streams and Rivers Mentioned:

- Bear Creek
- Bozeman Creek
- Bridger Creek
- East Gallatin River
- Jackson Creek
- Kelly Creek
- Mandeville Creek
- Mathew Bird Creek
- Rocky Creek
- Trout Creek



CONCERNS, IMPROVEMENT IDEAS, AND DISCUSSION

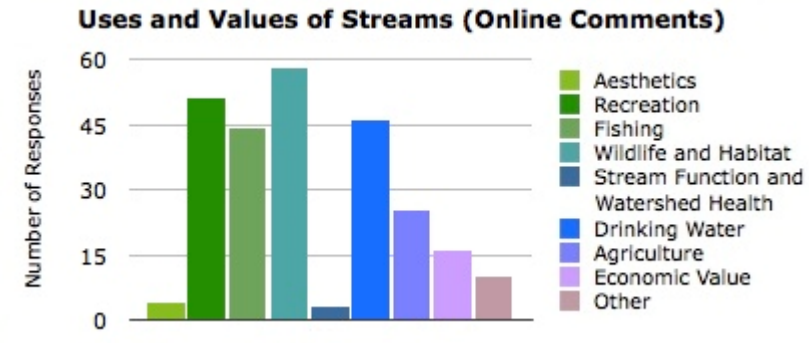
Concern	Improvement Ideas and Discussion
Effects of roads and trains on Rocky Creek	Dept. of Transportation has installed some sediment control measures. Further control structures, changes in road and rail management, and/or vegetative filters could be helpful.
Beavers	Using a "scare-beaver" to keep beavers from building in undesirable locations; beaver control (Both too many and too few were cited as concerns. Finding a balance is important.)
Development in Bridger Canyon	Educate public and contractors about stream concerns and best practices when building houses and installing roads. Change zoning laws and increase knowledge of existing zoning. Further investigation and discussion of effects of groundwater and septic systems on Bridger Creek. Promote conservation easements.
Bank erosion	Bank stabilization and revegetation. Slow water in straightened, high-velocity areas.
Septic systems	Sub-standard septic systems were identified as concern. However, it was thought that landowners avoid upgrading septic tanks until failure occurs because of the cost of upgrades to meet the current standards.
Flooding and channel velocity	Look for ways or places to slow water, possibly with beaver dams, changing stream structure or wetland restoration. Change floodplain codes.
Nutrients	Substandard septic systems, development, and lack of riparian vegetation were mentioned as potential contributors. Landowner education was thought to be useful.
Lack of knowledge	Provide on-site surveys for landowners to identify specific problems and suggest solutions. Educate public and contractors about stream concerns and best practices when building houses and installing roads. Share historical pictures and other history with decision-makers and landowners. Use the LIDAR map of Bridger Canyon that the Craighead Institute is developing could be used for stream and water purposes. Discuss potential effects of snow-making and ground water use on Bridger Creek.

COMMENTS SUMMARY

Participants: 62

Streams and Rivers Mentioned:

- Bozeman Creek
- Bridger Creek
- Camp Creek
- Dry Creek
- East Gallatin River
- West Gallatin River
- Gallatin River
- Godfrey Creek
- Hyalite Creek
- Mandeville Creek
- Mathew Bird Creek
- Middle Creek
- Nash Springs Creek
- Rocky Creek
- Thompson Creek



CONCERNS, IMPROVEMENT IDEAS, AND DISCUSSION

Concern	Improvement Ideas and Discussion
Development and Urban Impacts	Restrict growth and development in floodplains and stream corridors by enforcing existing setback regulations implementing new regulations, or voluntary methods. Management of impacts to stream corridors from pets, landscaping, trash and debris. Restore Bozeman and Mandeville Creeks.
Water Management	Enforce existing water rights, examine ditch/stream mixing and possible options, and educate landowners and leaders on ditch laws and management.
Nutrients	Fencing, livestock grazing and waste management, pet waste management, nutrient input reduction from both urban and agricultural sources, and vegetative buffers.
Sediment and Silt	Fencing, stream bank restoration, grazing management, riparian buffers.
Degradation of Public Access Points	Weed management, revegetation and stream bank improvement, signage and education about watershed issues.
Storm Water	Reduce run-off from streets and developed areas (specifically in Bozeman and Manhattan); use pervious pavement, landscaping and other means of enhancing infiltration; improve wetland restoration; educate on how to reduce debris, organic matter and sediment into the storm water and waste water; storm water treatment options.
Missing Connections to Streams	Education and signage on stream locations and type and education on stream dynamics. Improve and expand public access to streams.
Invasive Weeds	Control and management along all stream corridors. Public access sites seem particularly vulnerable.
Fisheries and Habitat	Riparian area and stream bank restoration. Thompson, Bridger, and Bozeman Creeks and East Gallatin River were mentioned.
Lack of Information	Water quality monitoring in several locations for sediment, nutrients, pathogens, chemicals and other pollutants. Concern about potential impacts of quicker snowmelt and climate change was also mentioned.
Lack of Awareness	Education on impacts of development and agriculture and on specific improvement practices. Improve opportunities for discussion between different stakeholders.