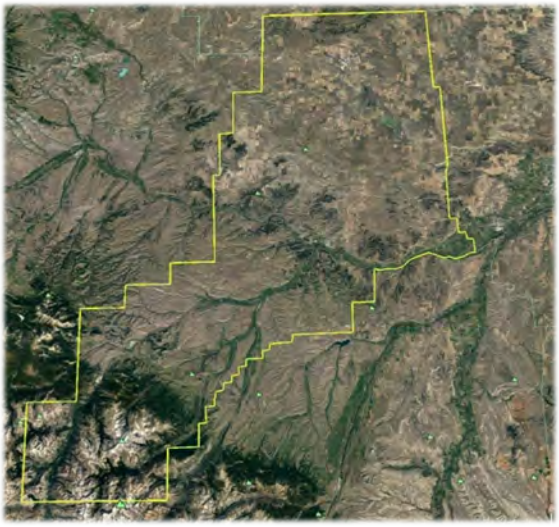
Strategic Private Lands Conservation in Stillwater County, MT

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Section I: Introduction

The purpose of this document is to develop a guideline that directs the use of technical and financial resources by strengthening partnerships to more effectively prioritize and address natural resource concerns in Stillwater County. The goals and objectives of this long-range plan are to cover a 10-year period beginning in the 2020 federal fiscal year and extending through fiscal year 2029. This strategic approach will involve local, state, and federal partners as well as local stakeholder participation. Partners include:

- Federal Partners: NRCS, US Forest Service (USFS), Bureau of Land Management (BLM)
- State Partners: Montana Fish Wildlife and Parks (FWP), Department of Natural Resources Conservation (DNRC)
- Local Partners: Stillwater Conservation District, Stillwater Valley Watershed Council (SVWC), Sibanye Stillwater Mine, Local Working Groups (LWG), Stillwater County Stockgrowers, Montana State University (MSU) Extension Service
- Independent Conservation Groups: Northern Great Plains Joint Venture

The goal of the participants is to provide detailed guidance in the identification of threats to local natural resources and opportunities for treatments to promote environmental and economic sustainability of the resource and the agricultural and industrial operations that utilize them. This approach requires the establishment of a vision statement and a mission statement.

Vision: Shared responsibility and commitment to local action and conservation achieves effective land stewardship.

Mission: To build alliances and strategically invest to effectively solve natural resource problems in Montana.

To achieve the Mission and realize the Vision, the following tasks will need to be completed:

1. A natural resources inventory will need to be conducted to establish a baseline for the following natural resources: Humans, Soil, Water, Air, Energy, Plants, and Animals.
2. An analysis of current conservation activity.
3. Identify natural resource problems and the desired future conditions.
4. Prioritization of natural resource problems and desired future outcomes.
5. Targeted Implementation Plans and Investment Portfolio Development. This task will detail actions and practices used to address problems, as well as plans for outreach to create awareness of the situation and garner interest in the project.

This Long-Range Plan is specifically designed to be a living document and easily adjustable to accommodate reprioritization of problems, additions, or adjustments to implementation strategies. This plan will serve as the foundation for future long-range plans and implementation of targeted conservation within Stillwater County.

Stillwater County Overview:

Stillwater County has a total area of 1,805 square miles (1,155,782 acres). Of that area, 809,443 privately owned acres are spread out over 593 farms (2012 NASS. 2018 MT Ag Statistics). Dryland farm acres are primarily in a Wheat/Fallow rotation or in dryland hay. However, dryland cropping is becoming more diverse and crops such as field peas, chickpeas, sunflowers, barley, and safflower are also being utilized in rotation. Irrigated land is used primarily for silage corn or hay production, but is also utilized for barley, sunflowers, grain corn, and some irrigated pasture. Remaining private land is utilized for cattle production. Acres not in farming operations are spread across State, BLM, urban areas, small acre land owners, and a large US Forest Service component. The county is comprised of several river drainages, most of which ultimately flow into the Yellowstone River. The far north part of the county has several enclosed basins that provide excellent migratory bird habitat, but due to water quality issues that are soil related, cannot support fish. Big Coulee Creek and Painted Robe Creek flow north out of the county. Elevations range from 3,400 feet near Park City, MT in the mid-eastern part of county to 12,807 feet at Granite Peak (elevation reference) in Park County near the Stillwater County line. Precipitation ranges from 12 inches in the northeast part of the county to 60 inches in the higher elevation mountainous terrain in the southern part of the county. There are 159 differently named soils in the county. The majority of these are a clay/loam texture but vary greatly with the differences in parent material across the county.

Section II: Natural Resources Inventory and Analysis

This section evaluates the major resources in the county and identifies the best opportunities for strategic investment for natural resource improvement. The resources are categorized as: Human, Soil, Water, Air, Energy, Plants, and Animals.

HUMAN RESOURCES

Census and Social Data: Stillwater County has just under 9,500 residents (US Census Bureau). The two largest employment sectors in Stillwater County are agriculture and the Sibanye-Stillwater Mine (largest Palladium producing mine in the world outside of Russia and South Africa). Stillwater County has many lakes, hiking trails, large amounts of Forest Service land, scenic drives, and prime trout streams. These features mean that tourism and recreation also play a large role in the economy. Columbus is the only incorporated town in Stillwater County and serves as the county seat. Other towns in the county include Rapelje, Molt, Park City, Absarokee, Fishtail, and Nye. The county is divided into three county commissioner districts. There are five high school districts spread across the county. This number reflects its high education level. Of the residents in Stillwater County, 95.3% have a high school graduate or higher degree (US Census Bureau).

2018 Census Data (US Census Bureau)	
White alone	95.9%
Black or African American alone	0.4%
American Indian or Alaskan Native alone	1.2%
Asian alone	0.7%
Native Hawaiian and other Pacific Islander alone	0.0%
Two or More Races	1.8%
Hispanic or Latino	3.7%
White alone, not Hispanic or Latino	93.1%

Avenues for Community Outreach: While several towns exist within the county, populations in those individual towns are not enough to support success of an individually printed newspaper for each town. Stillwater County News is a county-wide paper that is well read and has a website where local news can be followed. Several conservation-based groups within the county also have their own quarterly newsletters that are mailed out. In the last three years, social media has rapidly become a source for sharing local news and public bulletins. Businesses in each town also have bulletin boards where public notices and outreach fliers can be posted. While no local radio stations exist, KGHL in Billings, MT is a radio station with both AM and FM capabilities that is very agriculturally focused and followed daily by most Stillwater County agricultural producers. KGHL is very helpful in providing segments geared towards getting the word out on public meetings and notices for surrounding counties.

Land Cover/Land Use/ Ownership: Of the 1,155,782 acres in the county, approximately 30% of it is cropland or tame pasture and the remaining 70% is rangeland (National Agricultural Statistics Service). Dryland cropping acres historically followed a winter wheat/fallow rotation. Dryland producers have begun diversifying rotations and now utilize field peas, chickpeas, safflower, sunflower, and occasionally spring wheat and barley. Irrigated cropland is primarily silage corn, grain corn, or hay production. Barley is occasionally used, and sugar beets are sometimes grown on irrigated acres on the east edge of the county. Dryland acres that have proven too rocky to continue farming, or were marginal acres, have been converted to tame pasture grass mixes. Rangeland and tame pastureland are used for cattle production. Land ownership within Stillwater County is primarily privately owned. A large amount of

Stillwater County Land Ownership	1,155,782 Ac. Total
Private Land	904,815 ac.
-Conservation Easements	41,983 ac.
Forest Service	193,741 ac.
BLM	5,511 ac.
Other Federal Land	3,556 ac.
State Trust Lands	45,448 ac.
Other State Lands	2,710 ac.

Forest Service land exists in the southern part of the county against the face of the Beartooth Mountains. Due to the large number of recreational opportunities within the county, a lot of acreage along riverfronts is rapidly being converted to subdivisions by developers. Irrigated acres in the east part of the county are also being converted to subdivisions at a rapid rate due to proximity to Billings (largest city in Montana). Riverfront and irrigated acreage that is held by established, generations old family farms and ranches is likely not in any danger of being converted away from agricultural use.

Farm Size and Numbers: The average farm size in Stillwater County is 1,365 acres (2012 NASS. Montana Agricultural Statistics 2018). According to 2012 National Agricultural Statistics Service report referenced in the 2018 Montana Agricultural Statistics, there are 593 farms in the county. This equates to 809,443 acres within the county dedicated to agricultural production. That is 89.4% of the private land that is utilized for agricultural production. This number does not include Forest Service or State Land use allotments and leases for grazing and cropping with individual producers. Farm types include both dryland and irrigated cropland, as well as grazing land. See section "Land Cover/Land Use/ Ownership" for common crop/vegetation types for each land use.

Forestland/Woodland Owners: About 69,000 private acres of the county is forested. Roughly 90% of forested acres are grazed. The predominant forest type in the county is ponderosa pine. At the southwest end of the county, Ponderosa Pine forests merge with lodgepole pine and Douglas fir at higher elevations. Quaking aspen stands are found interspersed in lodgepole pine and Douglas fir forests. At lower elevations, especially along river corridors, an estimated 4,000 acres of Cottonwood forest is found.

CSP 5-Year Participation			
Year	Acres	Number of Contracts	Obligation
2014	22,042.5	7	$ 744,700
2015	66,830.5	14	$ 1,732,480
2016	24,381.6	6	$ 629,964
2017	17,328.4	4	$ 385,305
2018	37,049.2	9	$ 522,980

EQIP 5-Year Participation			
Year	Acres	Number of Contracts	Obligation
2014	1251.9	2	$ 127,282
2015	72.5	3	$ 210,434
2016	5,084	4	$ 314,723
2017	7,464	4	$ 250,945
2018	440	2	$ 163,375

Russian Olive, a highly invasive tree, has become a threat to Cottonwood forested areas especially along the Yellowstone River. One sawmill is in operation in the county. Due to lack of logging companies and sawmills, forestry is not a large economic component. Individual landowners do contract out-of-county loggers to thin forest stands, usually to open the canopy to benefit the grass/grazing resource. The US Forest Service does actively thin on Forest Service land in the county.

There are concerns in the county about conifer encroachment into desired plant communities. Within the county, encroachment of Douglas fir (southern third of the county), juniper, and ponderosa pine into cropland, historic native grassland, and pastureland is a concern. The areas that are being encroached by these tree species have not historically had those species present as evidenced by ranchers' historic photos of their property and their observations over many decades.

Conservation Participation and Activity: Producers in the county have shown a willingness to participate in programs and appreciate conservation that not only benefits the environment and wildlife, but also the bottom line on the operation. The average age of an agricultural producer in Montana, and in Stillwater County, according to 2017 Ag Statistics, is 59.8 years. However, the last two years Stillwater county has seen a marked increase in the amount of younger generation/beginning farmers as generational operations are transitioned. This younger group of producers tend to focus on improving the operations labor efficiency (center pivot irrigation, no-till farming, variable rate nutrient application, etc.…). This increase in labor efficiency goes hand in hand with improving the resource. Producers have actively participated in both the Conservation Stewardship Program (CSP) and the Environmental Quality Incentives Program (EQIP). The two tables on page 6 illustrate the number of EQIP and CSP contracts from 2014-2018. EQIP contracts have ranged from improving livestock infrastructure and developing grazing plans to improving irrigation efficiency with center pivot installation. The largest success story for Stillwater County's EQIP participation is the moving of corral systems off streams and rivers and getting them into compliance with the Department of Environmental Quality (DEQ).

Soil Resources

Soil Characteristics: Stillwater County has a wide variety of soils. This wide variety of soils lends itself to a very diverse range of land uses varying from grazing operations to timber management, and to dryland and irrigated cropland. There are 42 different soil series throughout the county that are comprised of 160 different soil types. The Stillwater County Soil Survey breaks these soils down into specific groups oriented towards area-wide planning purposes.

1. **Havre (35%)-Harlem (30%)-Glendive (25%):** Minor soils make up the remaining 10%. This map unit is in the Yellowstone River Valley and predominantly along the Yellowstone River. This map unit makes up a total of 1% of the soil survey area. All these soil types are level to gently sloping and are well drained. They all occupy stream terraces and floodplains and exhibit a loam/clay loam/sandy loam surface texture. Their land use is dryland/irrigated cropland and range.
2. **Yamac (50%)- Kobar (15%)- Attewan (25%):** Remaining 10% is minor soils. This map unit comprises 4% of the soil survey area. All soils are nearly level to moderately sloping and is found in the Yellowstone River Valley. These soils commonly occupy foot slopes, terraces, or alluvial fans. They are all well drained soil types. Surface layer is 5-12 inches of a loam/clay loam. These soils' land use is dryland/irrigated cropland and range.
3. **Lolo (40%)- Shawa (25%)- Nesda (20%):** Remaining 15% of soils are minor soils. This map unit takes up 2% of the soil survey area and is comprised of well drained gravelly loams and silty clay loams that are located on floodplains, terraces or alluvial fans. These are in the Stillwater River Valley and Rosebud Creek Valley. These soils are predominantly used for rangeland, however, some of these soils have been converted to be used for irrigated hay production.
4. **Lardell (45%)- McKenzie (40%):** Remaining 15% of soils are minor soils. These soils are deep, nearly level, and range from somewhat poorly drained to poorly drained. Surface textures are usually clay loams and clays. These soils are found in closed basins and on floodplains and terraces. This map unit is on the northeastern part of Stillwater County and comprises 2% of the total soil survey area. These soils are mainly used as rangeland, however some conversion to dryland farming has occurred.
5. **Yawdim (35%)- Lambeth (30%)- Birney (20%):** Remaining 15% of soils are minor soils. This map unit is characterized by moderately steep to very steep slopes. Soil depths range from deep to shallow. Soils are well drained and are clay loam/silt loam/channery loam. These soils are formed from weathered shale parent material. These soils are in the northern part of the county and make up 14% of the total soil survey area. These soils, due to their slopes and upland locations, are used strictly for range and may seem some use for forestry if tree populations are present.
6. **Absarokee (50%)- Sinnigam (20%)- Castner (15%):** Remaining 15% of soils are minor soils. This map unit is found in the south-central part of the county and is highly variable. Soils vary from moderately deep to shallow and gently sloping to steep. They are comprised of well drained loam and clay loams that formed from weathered shale and sandstone. These soils are found on hillsides, ridges, plains, and uplands. This map unit makes up 15% of the total soil survey area. This map unit is used for rangeland and dryland cropping.
7. **Tanna (40%)- Rentsac (20%)- Bonfri (15%):** The remaining 25% of soils are minor soils. This map unit is found north of the Yellowstone River Valley and is highly variable. Soils vary from moderately deep to shallow and gently sloping to steep. They are comprised of well drained loam

and clay loams that formed from weathered shale and sandstone. These soils are found on hillsides, ridges, plains, and uplands. This map unit makes up 44% of the total county soil survey area. This map unit is used for dryland cropping and rangeland.

8. **Hilger (35%)- Castner (30%)- Turner (20%):** The remaining 15% of soils are minor soils. This map unit is found mainly in the southwestern part of the county and makes up 16% of the total soil survey area. Soils in this map unit are variable, ranging from deep to shallow and gently sloping to steep. Soils are comprised of well drained cobbly sandy loams, loams, and clay loams. These soils formed from weathered sandstone and shale and gravelly alluvium. This map unit is found on hillsides, ridgetops, and broad divides and terraces on uplands. These soils are utilized for range and dryland farming.
9. **Sebud (50%)- Garlet (25%)- Rock Outcrop (15%):** The remaining 10% of soils are minor soils. This map unit makes up about 2% of the total soil survey area. This map unit is found in the southwestern part of the county in the Beartooth Mountains. This map unit is also highly variable and ranges from rock outcrop to deep soils that are moderately sloping to very steep. Soils are well drained stony loams and gravelly sandy loams. Soils formed from weathered sandstone, igneous rock, and glacial till. This map unit is found on foothills, mountainsides, and ridgetops. Due to the steepness of the slopes, this map unit is used for rangeland, woodland, and wildlife habitat.

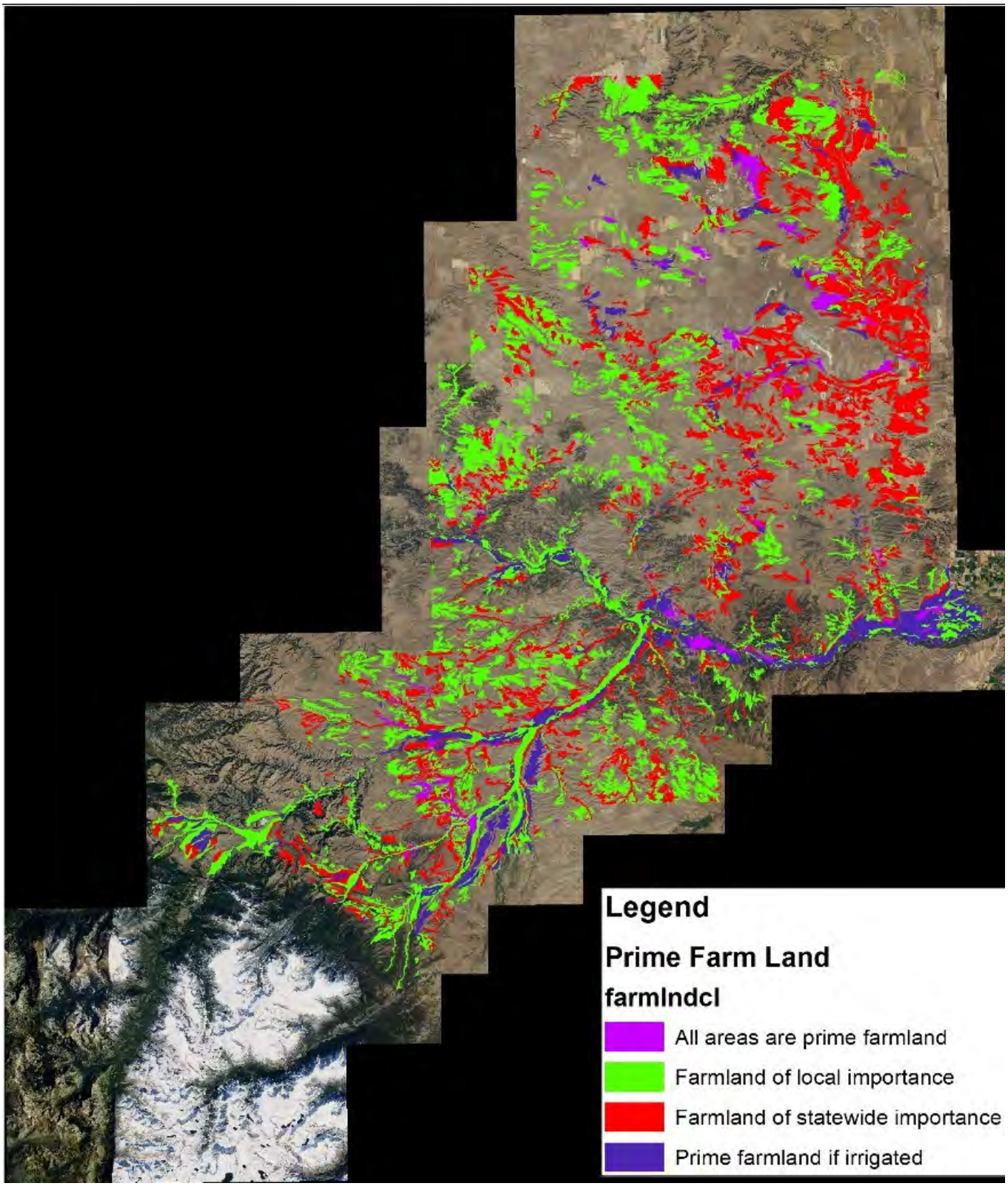

Fig. 1. Prime Agricultural Soils of National and Statewide Importance.

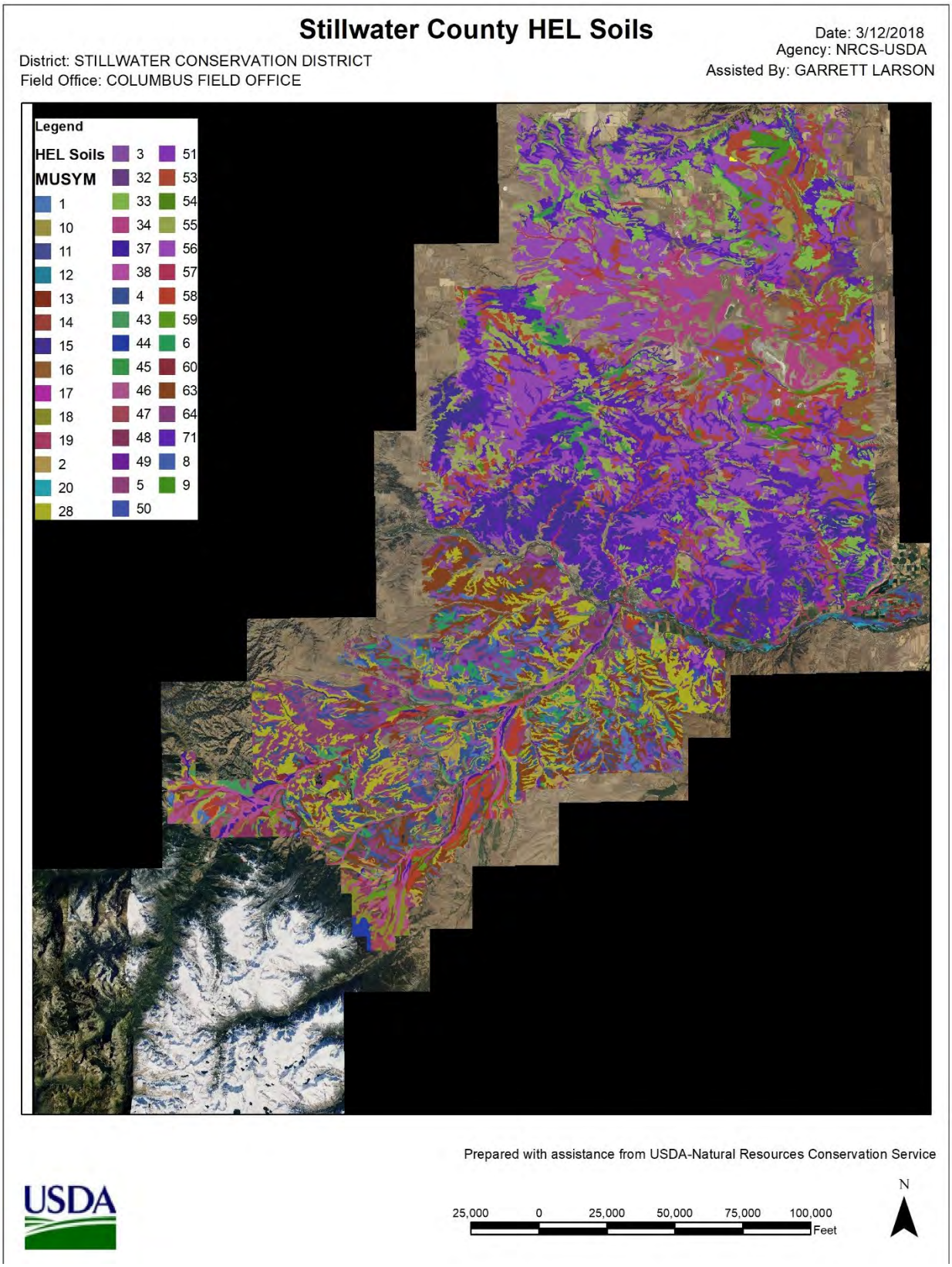

Fig. 2. The majority of Stillwater County is made up of Highly Erodible Soils (HEL).

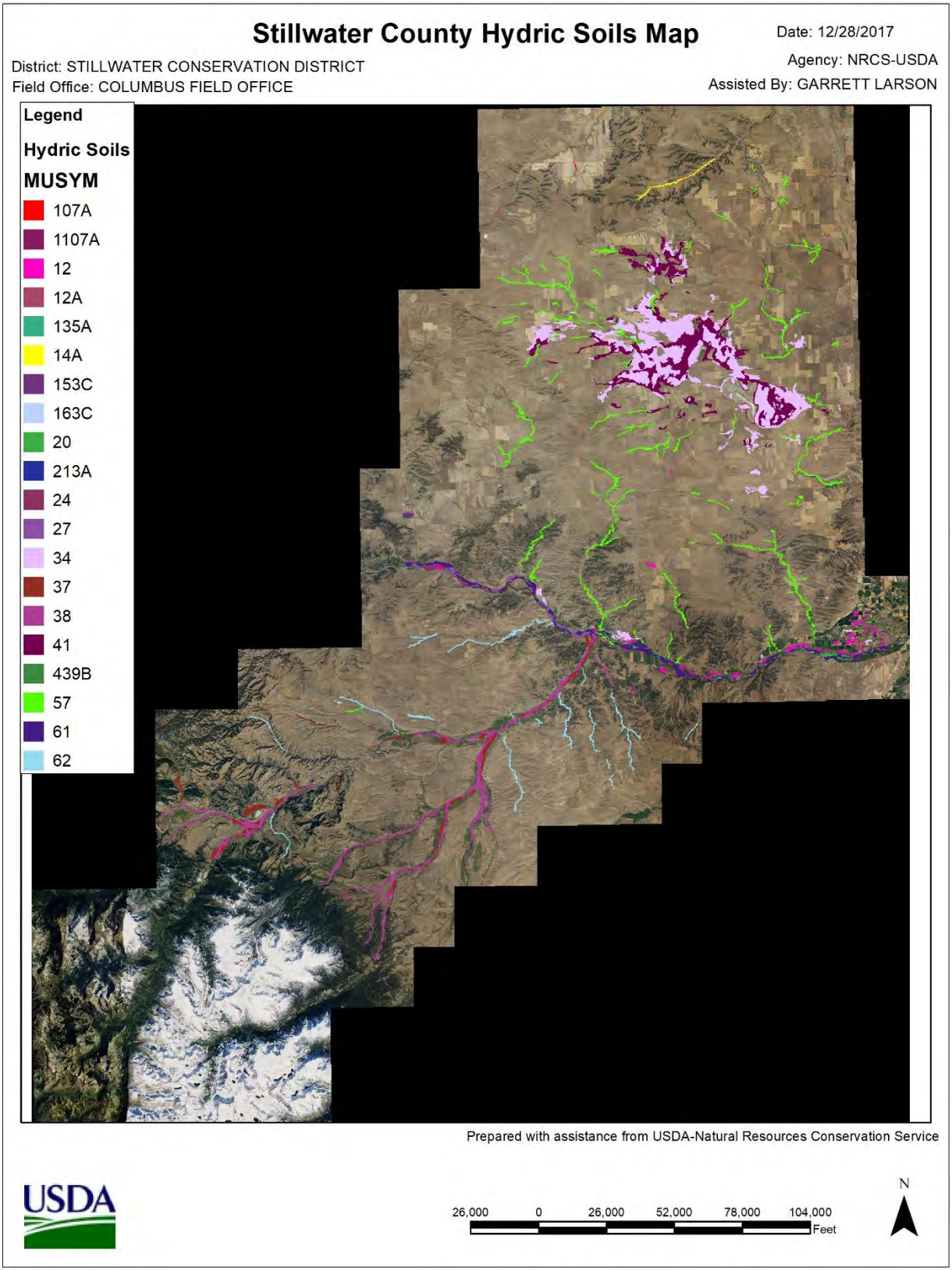

Fig. 3. Hydric Soils are mostly found in enclosed basins and along small spring-fed creeks to the north and along streams and rivers in the central and southern parts of the county.

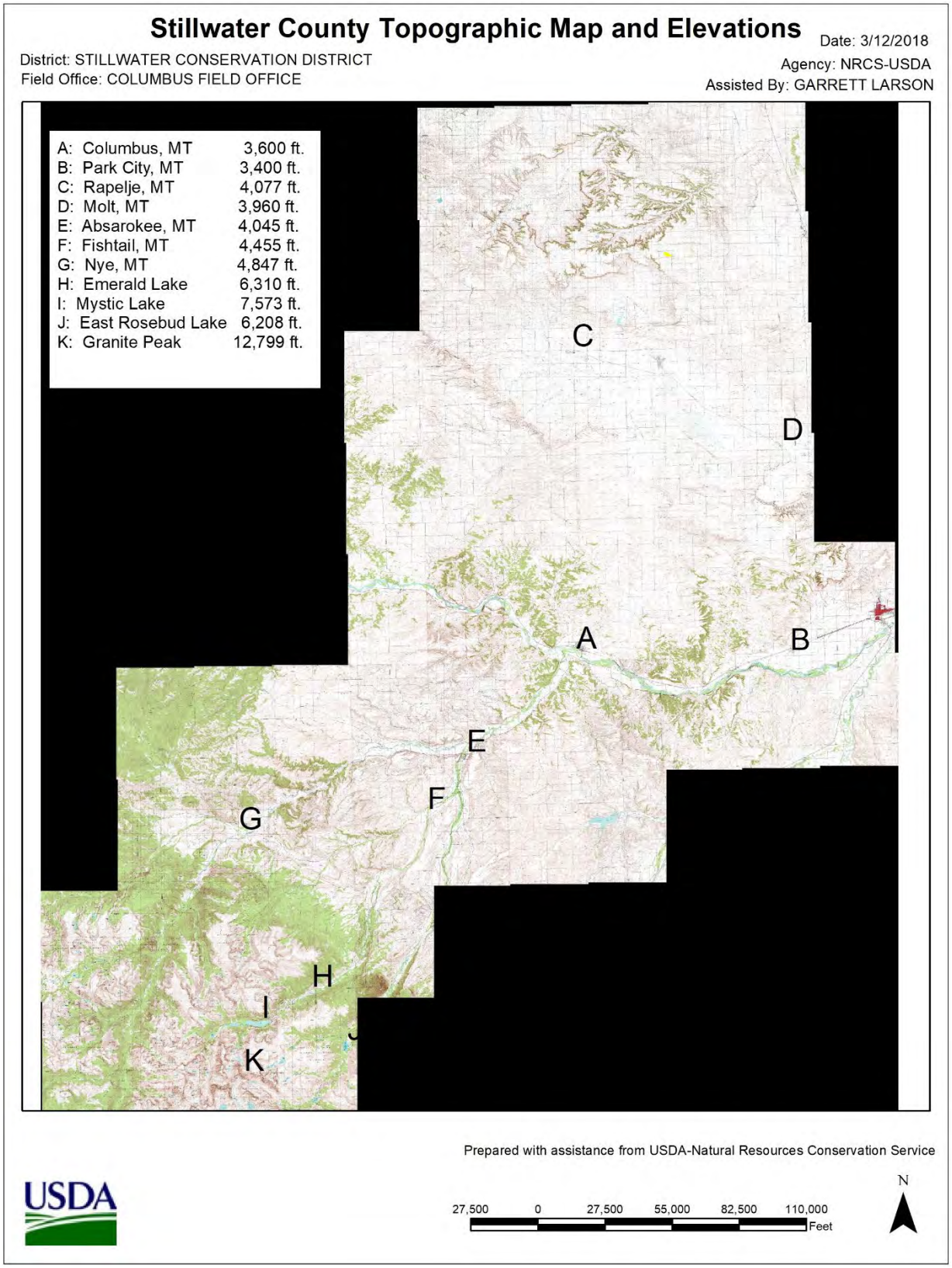

Fig. 4. Topographic Map of Stillwater County. Letters represent towns and tourist attractions within the county.

Water Resources

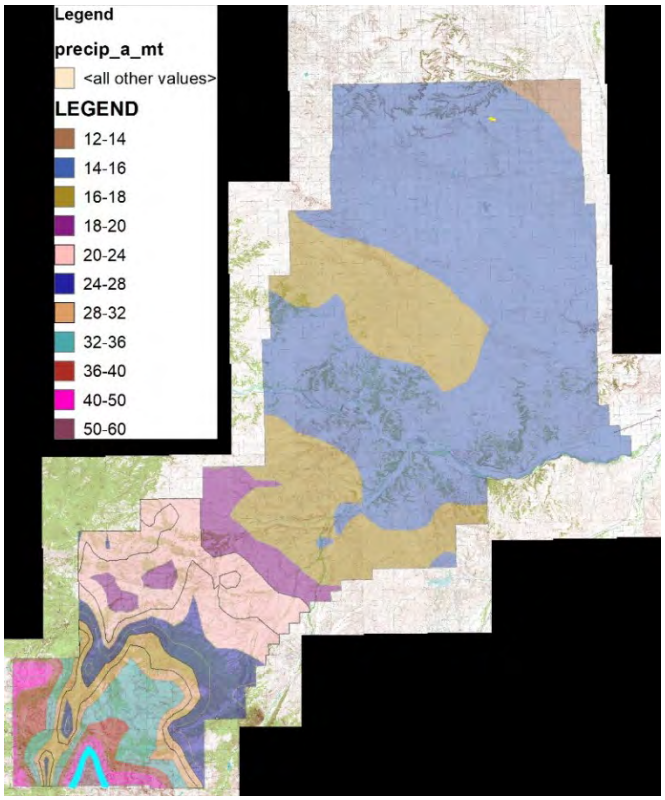

Fig. 5. Stillwater County precipitation zones. Units are in inches.

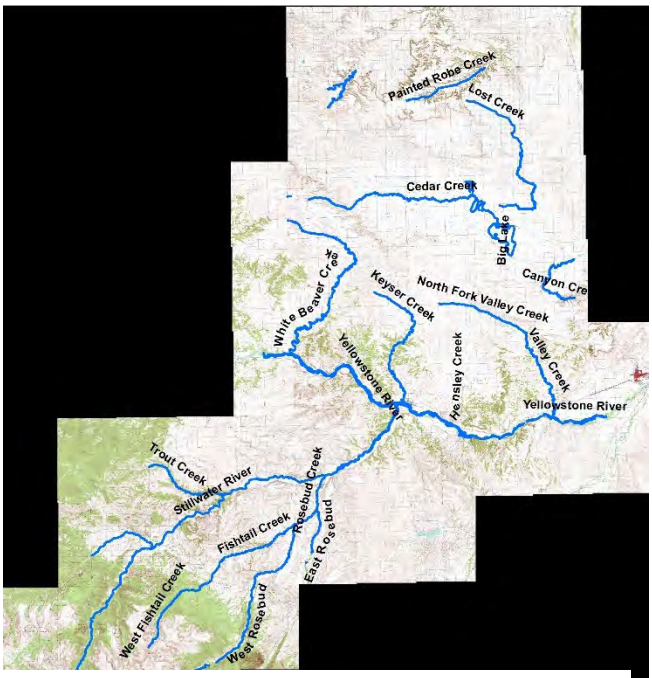

Fig. 6. Stillwater County Main Rivers and Streams.

Precipitation: Precipitation in Stillwater varies significantly, ranging from 12 inches in the northeast corner of the county to 50-80 inches at the highest mountain elevations. The average precipitation on areas where agriculture is the primary use is between 14 inches to the north and 18 inches further to the south. Mountainous areas are relied upon for snowpack every winter to support irrigated farming through the river valleys as well as maintain stream flows for livestock water and recreational purposes in the county.

Watersheds and Streams: The Yellowstone River is the main river in Stillwater County and is the endpoint for most streams and creeks within the county. The south half of the county is a watershed within the Yellowstone River basin. East and West Rosebud Creeks as well as the West Fork of the Stillwater River flow from south to north and empty into the Stillwater River. The Stillwater River flows south to north and empties into the Yellowstone River which flows west to east and bisects the county in about the middle. White Beaver Creek, Keyser Creek, Hensley Creek, and Valley Creek flow from north to south and empty into the Yellowstone River. One of the most unique features of Stillwater County is the large enclosed basin called Big Lake in the northern part of the county. Including an entire list of all waterbodies within the county is unrealistic considering that the topography of the county lends itself to large numbers of ephemeral creeks and streams. Figure 8 lists the waterbodies within the county that are under Conservation District jurisdiction and require a 310 permit to do any in-stream work. Figure 9 is a list of stream reaches where Total Maximum Daily Load (TMDL) assessments have been completed TMDLs assess pollutants present in a water body and compare them against water quality standards to determine stream reach level of pollution and the function that is impaired.

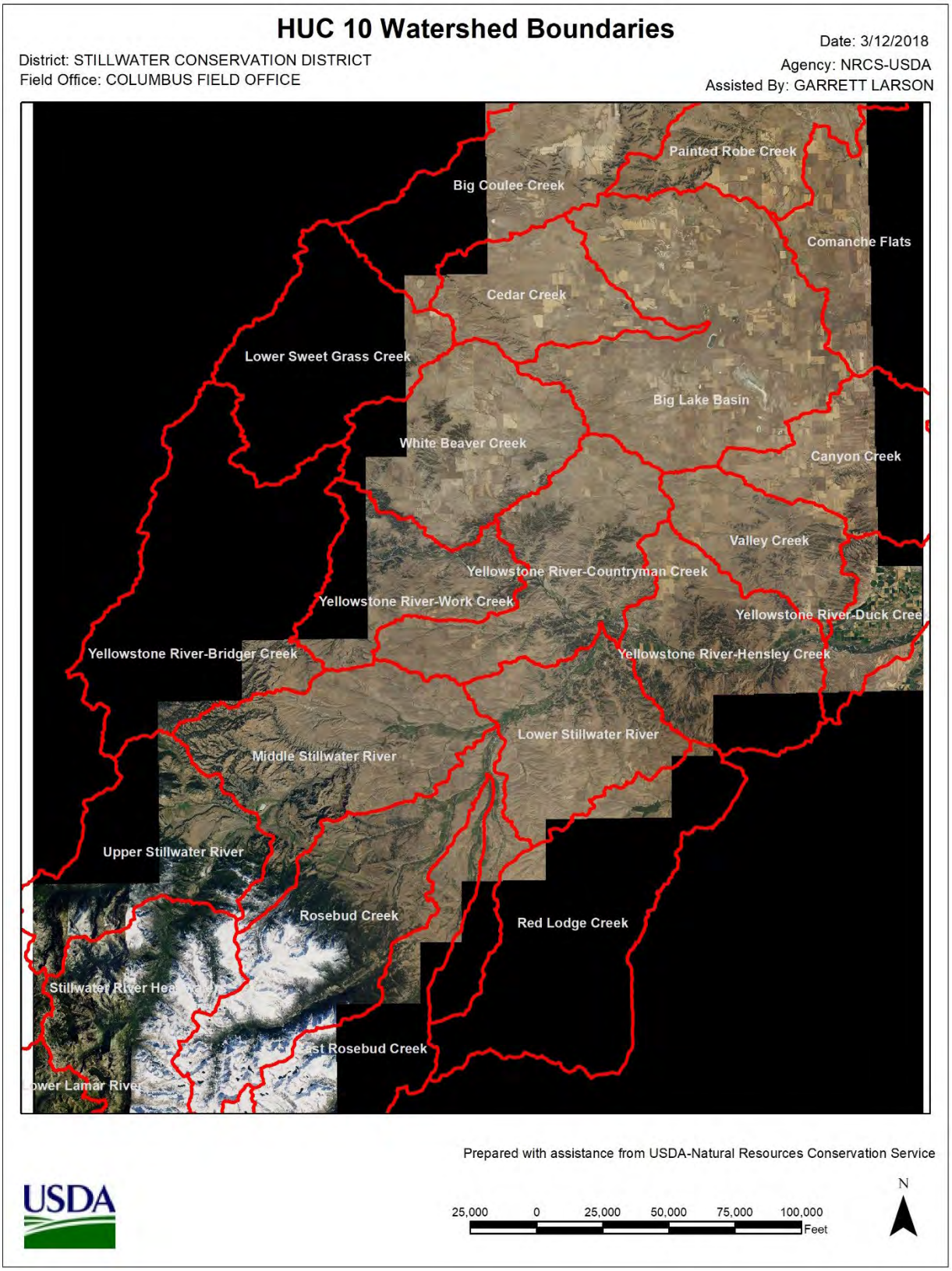

Fig. 7. Hydrologic Unit Code (HUC) 10 Watershed Boundaries. These boundaries are the most referred to when discussing geographical locations in the county.

Water Bodies Requiring a 310 Permit		
White Beaver Creek	Shane Creek	Spring Creek
Berry Creek	Mexican Joe Creek	Trout Creek
Countryman Creek	Buck Creek	Bad Canyon
Huntley Creek	Beaver Creek	Little Rocky Creek
Keyser Creek	Jackstone Creek	Prairie Creek
Stillwater River	Rosebud Creek	West Stillwater River
Tutt Creek	Grove Creek	Crazyman Creek
Valley Creek	Cow Creek	Castle Creek
Limestone Creek	Lodgepole Creek	Meyers Creek
Horseman Creek	East Rosebud Creek	West Rosebud Creek
Antelope Creek	Butcher Creek	Fishtail Creek
Ingersall Creek	Hensley Creek	Fiddler Creek
Yellowstone River		

Fig. 8. Stillwater County Water Bodies Requiring a 310 permit. This list is not exclusive since all-natural perennial flowing streams within the district are included within these rules. The District may from time to time add to or change this list, either upon its own motion or upon petition of an interested parties. In some cases, a seasonally dry channel may be covered if the lack of flow is caused by diversion or other human caused water uses.

Water Quality Impairment and TMDL Streams:

AUID	Water Body Name	HUC	HUC_NAME	CATEGORY	USE_CLASS
MT40A002_080	Painted Robe Creek	10040201	Upper Musselshell	5	C-3
MT40A002_130	Big Coulee Creek	10040201	Upper Musselshell	5	C-3
MT43C001_020	Stillwater River	10070005	Stillwater (Yellowstone)	5	B-1
MT43C002_010	Lodgepole Creek	10070005	Stillwater (Yellowstone)	5	B-1
MT43C002_020	Bad Canyon Creek	10070005	Stillwater (Yellowstone)	4C	B-1
MT43C002_030	Castle Creek	10070005	Stillwater (Yellowstone)	5	B-1
MT43C002_041	Grove Creek	10070005	Stillwater (Yellowstone)	5	B-1
MT43C002_042	Grove Creek	10070005	Stillwater (Yellowstone)	3	B-1
MT43C002_050	Fishtail Creek	10070005	Stillwater (Yellowstone)	5	B-1
MT43C002_061	East Rosebud Creek	10070005	Stillwater (Yellowstone)	1	B-1
MT43C002_062	East Rosebud Creek	10020002	Beaverhead	1	B-1
MT43C002_070	Joe Hill Creek	10070005	Stillwater (Yellowstone)	5	B-1
MT43C002_081	Butcher Creek	10070005	Stillwater (Yellowstone)	5	B-1
MT43C002_090	West Rosebud Creek	10070005	Stillwater (Yellowstone)	5	B-1
MT43C002_100	Rosebud Creek	10070005	Stillwater (Yellowstone)	5	B-1
MT43C002_130	Nye Creek	10070005	Stillwater (Yellowstone)	3	B-1
MT43F001_012	Yellowstone River	10070004	Upper Yellowstone-Lake Basin	2	B-1
MT43F002_022	Canyon Creek	10070004	Upper Yellowstone-Lake Basin	5	5N
MT43F002_030	Keyser Creek	10070004	Upper Yellowstone-Lake Basin	2	B-2
MT43F002_040	Valley Creek	10070004	Upper Yellowstone-Lake Basin	5	5N
MT43F003_010	Big Lake	10070004	Upper Yellowstone-Lake Basin	5	B-2
MT43F003_020	Hailstone Lake	10070004	Upper Yellowstone-Lake Basin	3	B-2
MT43F003_030	Halfbreed Lake	10070004	Upper Yellowstone-Lake Basin	5	B-2

Fig. 9. Stillwater County Water Bodies with impairments or TMDLs. Montana Department of Environmental Quality

Stream Flows:
All streams in Stillwater County generally follow the same trend for timing on peak flow rates. Being near the mountains, streams in Stillwater County begin to experience snowmelt runoff beginning May 15th. Then peak stream flow is usually between July 1st and July 15th. Due to the soil types and topography present in Stillwater County, streams are very susceptible to flash flood events.

There are three United States Geological Survey (USGS) stream gauges in the county. Two of the stream gauges are on West Rosebud Creek. One is near Roscoe, MT and the other is near the Emerald Lake Campground. The third stream gauge is on the Stillwater River near Absarokee, MT. There are no stream gauges on the Yellowstone Rive in Stillwater County. To monitor Yellowstone River flow, station 06214500 near Billings, MT needs to be referenced.

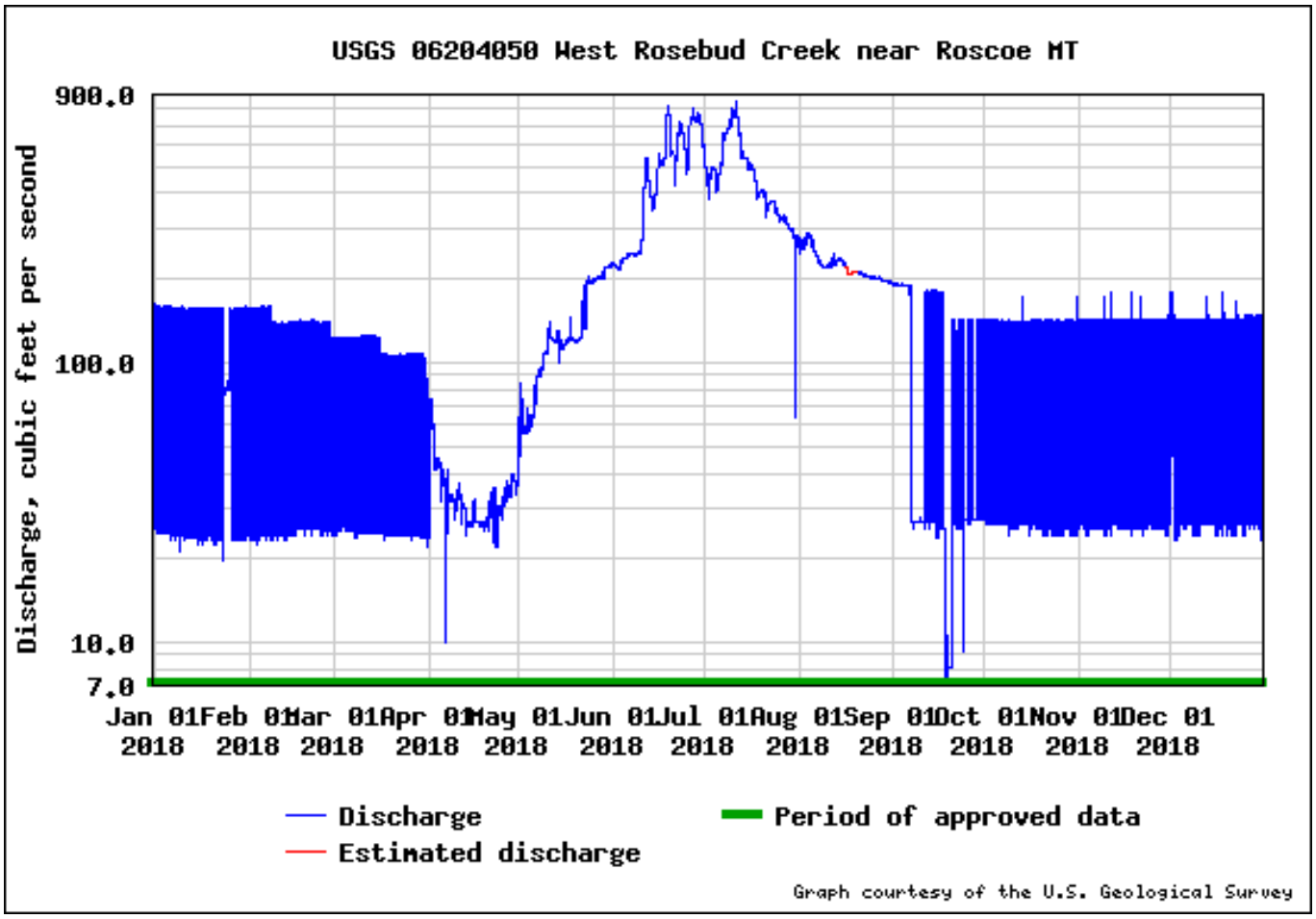

Fig. 10. 2018 USGS Stream Gauge readings for West Rosebud Creek near Roscoe, MT

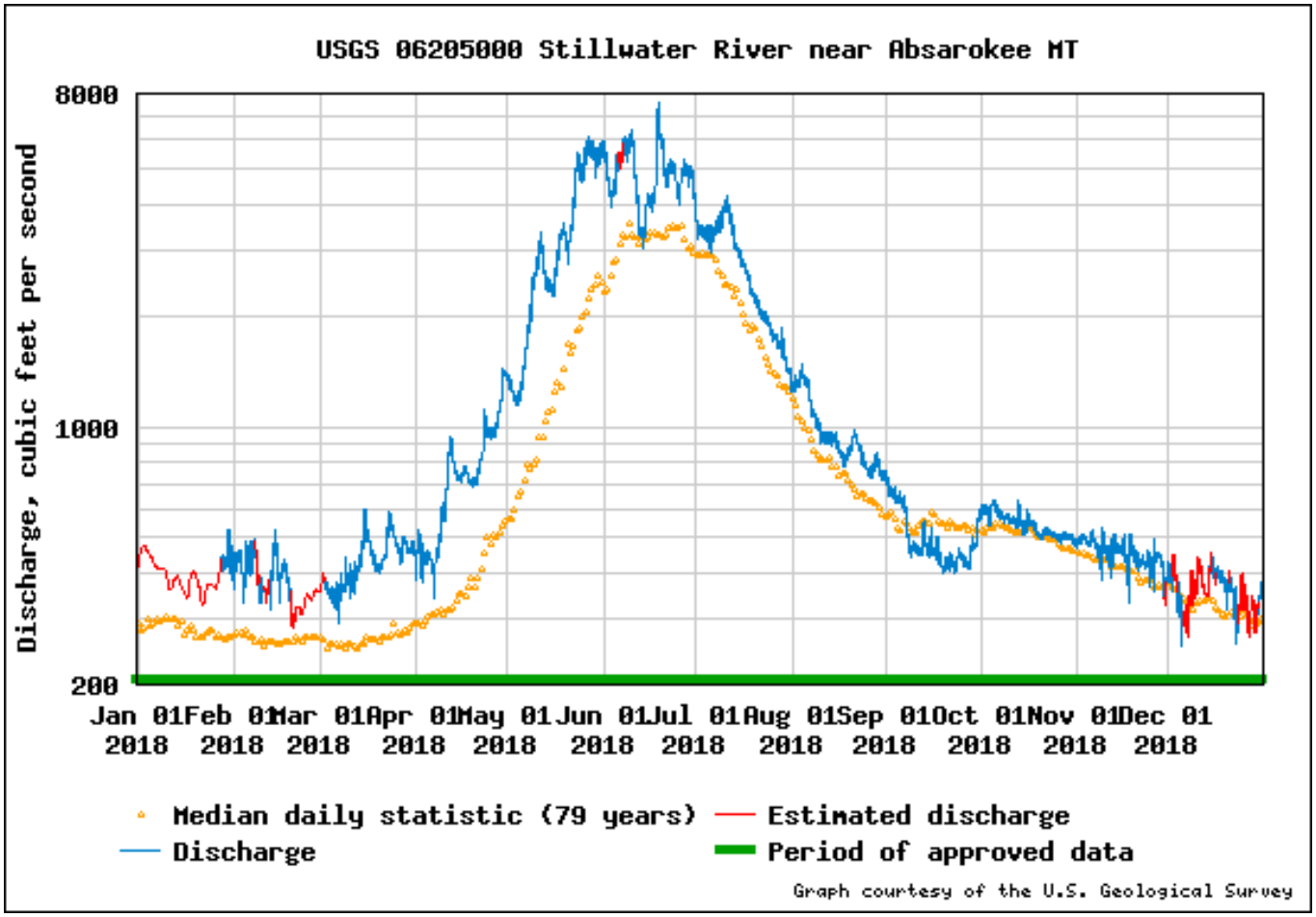

Fig. 11. 2018 USGS Stream Gauge readings for Stillwater River near Absarokee, MT

Irrigated Lands, Water Rights, and Irrigation Districts:

Irrigated land in Stillwater County gets its water from surface water bodies. There is no irrigation water in the county derived from deep wells outside of irrigation water for gardens. According to the 2017 County Data from the 2017 Agriculture Census from NASS, there are 177 farms in Stillwater County that utilize irrigation water. These 177 farms irrigate an estimated 23,213 acres. This shows a decrease of 11,508 irrigated acres since the Stillwater County Montana Water Resources Survey was conducted in 1946. This is due to three possible reasons. The largest reason is land development and subdivision creation has led to a decrease in irrigated acres. The second reason may be due to lack of responses in the 2017 Agriculture Census. The third reason is that dilapidation of irrigation and diversion structures has led to discontinuation of irrigation on some acres. Many of the ditches in Stillwater County are unincorporated with small acreages and few landowners utilizing the ditch. This results in difficulties finding funds for maintenance and improvements.

Irrigated/Potential Acres by Basin (1946 Water Resources Assessment)		
Basin	**Present Acres**	**Maximum Acres**
Musselshell River Basin	0.00	176.00
Rosebud River Basin	11,240.50	15,089.50
Stillwater River Basin	11,161.20	15,119.70
Yellowstone River Basin	11,819.55	15,638.05
Total	34,721.25	46,023.25

Fig. 12. Stillwater County Irrigation acres by River Basin

Basins and Associated Irrigation Districts/Ditch Companies/ Ditches:

- **Rosebud Basin:** Ross-Flanagan Ditch, as well as 17 other small private ditches
- **Stillwater Basin:** Garrigus Ditch, Larson & Johnson Ditch, Mendenhall Ditch, Phelps Ditch, Riddle Ditch, Scott or Lower Whitebird Ditch, Shane Ditch, Stillwater Ditch, Tintinger Ditch, and 29 other small private ditches.
- **Yellowstone Basin:** Big Ditch Co., Columbus Ditch, Merrill Ditch, Cove Ditch Co., Yellowstone Ditch, Flaherty Flat Ditch, Italian Ditch, Old Mill Ditch, Reed Point Ditch, and 11 other small private ditches.
- **Musselshell Basin:** Comprised of 3 different private ditches from 3 different sources.

Irrigated acres are located primarily near the Yellowstone River and other streams in the southern part of the county. The Musselshell River Basin is the lone area of potential irrigation in the northern part of the county with those drainages involved flowing north to the Musselshell River.

Groundwater/Drinking Water:

Groundwater has been thoroughly analyzed by Montana Bureau of Mines and Geology (MBMG) through a series of groundwater studies both north and south of the Yellowstone River. The studies looked at the geology of the rock layer below ground, what formations were conducive to carrying groundwater for domestic/livestock development and what the water quality was usually like associated with each. Kevin Chandler with MBMG was the lead on all the studies. The studies included water yield and quality testing and georeferencing it back to known and observed geology. The final reports include interactive maps where test locations can be clicked on and all monitoring data is instantly brought up for that well.

Groundwater quality issues are often due to naturally occurring mineral within the geology. Implementation of AFO/CAFO relocation projects off streams/creeks have been intensively pursued within the county over the past 15 years. Relocation of wells away from AFO/CAFO areas has also been closely monitored to prevent flow of pollutants down the well casing and into groundwater.

Air and Energy

Nonattainment and maintenance areas for air quality standards:
None present in Stillwater County. Due to the presence of several environmental groups within the county and the presence of the Sabanye-Stillwater mine, air quality is closely monitored for point source pollution.

Visibility Standards:
None present in Stillwater County. Due to the presence of several environmental groups within the county and the presence of the Sabanye-Stillwater mine, air quality is closely monitored for point source pollution.

Utility/Power Companies:
The two main electric companies in Stillwater County are Beartooth Electric Cooperative, and Northwestern Energy. Heating sources used within the county are natural gas, propane, electric, and wood. The natural gas providers in Stillwater County are Montana-Dakota Utilities and Northwestern Energy. There are four different propane providers in the county.
Telephone companies include: Triangle Telephone, Charter Spectrum, and Nemont. Internet providers in the county include Charter Spectrum, Triangle Telephone, several satellite internet providers, and Rural Broadband a line-of-sight internet provider that utilizes towers. Current high-speed internet distribution is questionable in the county.

Plants and Animals

Stillwater County has a high diversity of plant species throughout the county. This is mainly due to the county's drastic ranges in topography, growing season, and precipitation. Low-precipitation, flat grasslands with scatterings of ponderosa pine and juniper stands can be found at the northern end of the county. The topography gradually transitions to higher precipitation, foothill-grazed grassland/Ponderosa Pine/Juniper stands just south of the Yellowstone River. The southern end of the county is grazed-grassland Douglas Fir/Lodgepole forests and steep mountain valleys. Species of plants present are a key indicator as to what precipitation an area is receiving when doing assessments.

Riparian/Buffer Land Use:
Riparian areas in the county are usually well buffered. Buffer widths of 35 feet are usually found around riparian areas on annual cropping operations, even riparian areas on ephemeral streams and creeks. Producers in the county are growing more conscious of buffer/filter strips to maintain water quality every year. Buffer strips on annual cropping operations may be mowed on occasion but are often left untouched. The buffers/filter strips may be grazed if crop aftermath grazing is part of the operation. Grazing operations often utilize riparian buffers and streams. Riparian areas have been historically overutilized in many grazing operations as evidenced by a lack of diversity in tree and brush age groups. The concept of fencing out riparian areas into separate pastures to allow for grazing micromanagement is rapidly catching on in the county. This will allow for recovery of riparian species and establishment of more diverse age classes of trees, brush, and other deep-rooted species that maintain streambank stability.

Plant Species of Concern:
The Montana Natural Heritage Program (MTNHP) Plants Species of Concern Report was last updated on October 31st, 2019 and lists 20 plant species of concern in Stillwater County. Species of Concern are defined as native taxa that are at-risk due to declining population trends, threats to their habitats, restricted distribution, and/or other factors.

Common Name	Scientific Name
whitebark pine	*Pinus albicaulis*
musk-root	*Adoxa moschatellina*
thick-leaf Whitlow-grass	*Draba crassa*
white Arctic draba	*Draba fladnizensis*
hiker's gentian	*Gentianopsis simplex*
floriferous monkeyflower	*Mimulus floribundus*
thinsepal monkeyflower	*Mimulus hymenophyllus*
double bladderpod	*Physaria brassicoides*
Arctic buttercup	*Ranunculus grayi*
Arctic pearlwort	*Sagina nivalis*
slim-pod Venus'-looking-glass	*Triodanis leptocarpa*
glaucus beaked sedge	*Carex rostrate*
small-winged sedge	*Carex stenoptila*
Steven's Scandanavian sedge	*Carex stevenii*
long-sheath waterweed	*Elodea bifoliata*
three-flowered rush	*Juncus triglumis* var. *albescens*
wood lily	*Lilium philadelphicum*
ice grass	*Phippsia algida*
a windblown moss	*Paraleucobryum enerve*
limprichtia moss	*Scorpidium revolvens*

Fig. 13. Stillwater County Plant Species of Concern.

Threatened and Endangered Species:

The U.S. Fish and Wildlife Service (USFWS) has listed two birds and two mammals as threatened under the Endangered Species Act (ESA) in Stillwater County. The wolverine is proposed for listing.

USFWS Endangered, Threatened, Proposed and Candidate Species	
Canada Lynx	Listed Threated with Designated Critical Habitat
Piping Plover	Listed Threatened
Red Knot	Listed Threatened
Grizzly Bear	Listed Threatened
Wolverine	Proposed
Whitebark Pine	Candidate

Fig. 14. Stillwater County USFWS Endangered, Threatened, Proposed and Candidate Species

Canada lynx has designated critical habitat in the southern one-third of the county. This critical habitat is primarily managed by the U.S. Forest Service. This is the only area of the county that has the elevation combined with the necessary primary or secondary forest habitat types needed to sustain Canada lynx. A Canada Lynx Habitat Determination Screen (MT-CPA-186) is used for NRCS conservation projects to determine and document the effects of proposed actions on the lynx and designated critical habitat.

Animal Species of Concern:

The Montana Natural Heritage Program (MTNHP) Animal Species of Concern Report was last updated on October 31, 2019 and lists 48 species of concern in Stillwater County. Species of Concern are defined as native taxa that are at-risk due to declining population trends, threats to their habitats, restricted distribution, and/or other factors.

Montana State Animal Species of Concern in Stillwater County				
bison		black-tailed prairie dog		spotted bat
wolverine		hoary bat		Canada lynx
little brown myotis		grizzly bear		northern goshawk
Sprague's pipit		golden eagle		great blue heron
burrowing owl		ferruginous hawk		chestnut-collared longspur
veery		greater sage grouse		Baird's sparrow
brown creeper		evening grosbeak		yellow-billed cuckoo
black-billed cuckoo		bobolink		peregrine falcon
pinyon jay		Cassin's finch		black-necked stilt
black rosy-finch		Clark's nutcracker		long-billed curlew
sage thrasher		green-tailed towhee		McCown's longspur
Brewer's sparrow		Pacific wren		spiny softshell
snapping turtle		plains hog-nosed snake		western milksnake
greater short-horned lizard		great plains toad		northern redbelly dace
northern redbelly X finescale dace		sauger		Alberta snowfly
Yellowstone cutthroat trout		loggerhead shrike		Townsend's big-eared bat

Fig. 15. Stillwater County State identified Species of Concern

Greater sage grouse has designated general habitat within the county. The northeastern and northcentral part of the county as well as a small area south of the Yellowstone River is general sage grouse habitat according to current mapping. However, according to farmers and ranchers in the northern half of the county, sage grouse historically occupied an area that extended further west and south than current mapping indicates. Some producers can remember hunting sage grouse as recently as the 1970s, one in an area southwest of Rapelje, approximately 9 miles further west than estimated sage grouse habitat. Others can remember seeing them in their youth just northeast of Reed Point. This historic habitat has a history of being converted from native range to being intensively farmed. This area's plant communities are important to the conservation of sage grouse and providing them the habitat they need to be able to spread back into their historic range. Currently there is a trend in historic sage grouse habitat where cropped areas are being seeded back to native or medium/tall statured tame grass/legume mixes. This trend is fueled by multiple factors. The primary factor is the dramatic decrease in commodity prices. Other factors include the age of producers and proximity to retirement, cost of equipment, poor soils, and the need to fill a deficiency in their grazing operations. This will greatly benefit the sage grouse as well as other grouse and grassland bird species and mammals. This area represents a prime area for opportunities for wildlife conservation as well as other forms of conservation because so many of the

practices that benefit the Greater Sage Grouse also benefit all other aspects of the operation such as plant productivity and livestock health.

Confined Animal Feeding Operations (CAFOs):

Stillwater County NRCS has been very diligent in addressing AFO/CAFOs located near water bodies and working to bring them into compliance. To date, the NRCS has worked with 45 AFO/CAFOs to bring them into compliance and eliminated point source pollution from those sites. A few corral sites still exist next to water bodies in the county, however these sites are used to mainly work cattle and not hold them for more than a couple hours. While a little work remains, this is a potential resource concern that has been almost eliminated.

Invasive Species Priority Areas:

Due to the amount of tourism/recreation, wildlife, and water courses in the county, invasive species are very widespread, and in many areas to the point that control is economically infeasible. Common invasive species include: leafy spurge, knapweed, Canada thistle, houndstongue, Russian olive, sulfur cinquefoil, yellowflag iris, field bindweed, hoary alyssum, whitetop, cheatgrass, japanese brome, and many other common invasive species.

Leafy spurge is the most common of all the noxious weeds in Stillwater County especially in the southern part of the county. It is widespread across all water courses, pastures and rangeland. Methods of control include chemical, grazing (sheep/goats), and biological control insects (flea beetles). Due to how widespread it is, control can be tough, and eradication is impossible. Remote locations and proximity to water can make chemical application difficult. Biocontrol and grazing are a method of control but will ultimately not eliminate it. Another hindrance to weed control is lack of education on weed management or unwillingness to use chemical to control them among small landowners or subdivisions. The situation with Canada thistle, houndstongue, and spotted knapweed is similar.

One priority area is control of Russian olive along waterways. Currently there are few areas of Russian olive along the Stillwater River drainage. By beginning near the headwaters and working your way downstream, Russian Olive eradication may be feasible in that drainage. Another area where eradication may be feasible is a large infestation of Whitetop north of Reed Point. The infestation is still small enough that chemical application could result in total control.

Another area of weed management priority is small tract landowners/subdivisions. Due to the nature of most subdivisions, hunting is often not permitted. This means that these small tracts inevitably become wildlife sanctuaries and become exposed to every form of weed that can attach to a wild animal's fur. Because these small tracts are often not purchased with the intention of agricultural production, often there is less urgency for weed control if any at all.

Section III: Analysis of Conservation Activity

Producers in the county have shown a willingness to participate in programs and appreciate conservation that not only benefits the environment and wildlife, but also the bottom line of the operation. The average age of an agricultural producer in Montana according to 2017 Ag Statistics is 59.8 years. Stillwater county holds consistent with this. However, the last two years Stillwater county has seen a marked increase in the amount of younger generation/beginning farmers as the farm is transitioned. This younger group of producers tend to focus on improving the operations labor efficiency (center pivot irrigation, no-till farming, variable rate nutrient application, etc.…).

CSP 5-Year Participation			
Year	Acres	# of Contracts	Obligation
2014	22,042.5	7	$ 744,700
2015	66,830.5	14	$ 1,732,480
2016	24,381.6	6	$ 629,964
2017	17,328.4	4	$ 385,305
2018	37,049.2	9	$ 522,980

EQIP 5-Year Participation			
Year	Acres	# of Contracts	Obligation
2014	1251.9	2	$ 127,282
2015	72.5	3	$ 210,434
2016	5,084	4	$ 314,723
2017	7,464	4	$ 250,945
2018	440	2	$ 163,375

Integrated Data for Enterprise Analysis (IDEA) Data:

See Figure 17 for comprehensive data on practice instances contracted over the past 10 years in Stillwater County. Practices typically utilized within the county have varied from year to year and from farm bill to farm bill. Certain practices began to be utilized less as resource concerns were addressed and priority resource concerns and programs changed.

Fig. 16. 2019 Cover Crop

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	10-YEAR TOTAL
Brush Management	4	0	0	0	0	0	0	0	0	0	4
Herbaceous Weed Control	0	6	0	0	1	0	3	0	0	0	10
Residue and Tillage Management, No-Till/Strip Till/Direct Seed	0	0	0	0	0	3	0	0	0	0	3
Cover Crop (340)	1	2	0	0	0	1	1	3	5	68	81
Critical Area Planting (342)	1	4	0	5	2	3	0	0	0	0	15
Dam, Diversion (348)	0	0	1	0	0	0	0	0	0	0	1
Well Decommissioning (351)	0	0	0	1	0	0	0	0	0	0	1
Well Water Testing (355)	0	0	0	0	0	0	2	0	0	0	2
Diversion (362)	0	6	3	4	1	3	0	0	0	0	17
Fence (382)	3	6	6	6	2	2	5	6	0	6	42
Irrigation Water Conveyance (430)	0	1	1	0	0	0	4	2	3	0	11
Above Ground Multi-Outlet Pipeline (431)	3	0	0	0	0	0	0	0	0	0	3
Irrigation System, Microirrigation (441)	1	0	0	1	0	0	0	0	0	0	2
Irrigation System, Sprinkler (442)	1	1	1	0	0	1	3	2	2	0	11
Irrigation System, Surface and Subsurface (443)	0	3	0	0	0	0	0	0	0	0	3
Irrigation Water Management (449)	0	9	3	0	0	3	3	6	6	0	30
Precision Land Forming (462)	0	6	3	5	2	3	0	0	0	0	19
Use Exclusion (472)	0	6	0	0	0	0	0	0	0	0	6
Obstruction Removal (500)	0	6	3	6	2	8	0	0	0	0	25
Pasture and Hay Planting (512)	3	0	0	0	0	0	0	0	4	76	83
Pipeline (516)	2	7	4	9	1	2	2	4	0	2	33
Prescribed Grazing (528)	1	0	0	3	3	0	6	6	0	6	25
Pumping Plant (533)	3	2	4	5	1	2	6	7	2	5	37
Range Planting (550)	0	0	0	0	0	0	0	0	0	8	8
Access Road (560)	0	3	3	3	0	3	0	0	0	0	12
Heavy Use Area Protection (561)	0	17	3	7	2	3	0	0	0	0	32
Spring Development (574)	0	1	1	1	0	0	0	1	0	0	4
Animal Trails and Walkways (575)	0	0	1	3	0	0	0	0	0	0	4
Livestock Shelter Structure (576)	0	0	0	0	0	2	0	0	0	0	2
Stream Crossing (587)	0	2	0	2	0	1	0	0	0	0	5
Open Channel (582)	0	1	0	0	0	0	0	0	0	0	1
Structure for Water Control (587)	2	3	2	1	0	2	6	4	3	0	23
Nutrient Management (590)	0	3	0	0	0	0	0	0	0	0	3
Watering Facility (614)	3	8	4	9	1	2	4	10	0	11	52
Underground Outlet (620)	0	0	1	2	0	1	0	0	0	0	4
Wastewater Treatment Strip (635)	0	5	3	5	2	2	0	0	0	0	17
Water Well (642)	0	1	1	2	0	1	1	1	0	1	8
Upland Wildlife Habitat Management (645)	0	0	0	0	0	0	0	0	1	6	7
Structures for Wildlife (649)	0	0	0	0	0	0	0	0	0	5	5
Snow Fence (770)	0	0	0	5	2	3	0	0	0	0	10
Invasive Plant Species Control (797)	6	0	0	0	0	0	0	0	0	0	6
Seasonal High Tunnel System for Crops (798)	1	0	0	1	0	0	0	0	0	0	2

Fig. 17. 10-Year Practice Instances

Partner Conservation Efforts:

-Stillwater Valley Watershed Council (SVWC): The SVWC has been extremely active in utilizing grants to work with small and large landowners on weed control efforts within the Stillwater River watershed. Their small landowner weed control programs have been very successful in not only assisting with weed control, but also on the small landowner education front. They have also been active in organizing aerial spraying efforts in remote/hard-to-access sites for large landowners. Currently they are running a Wildland Urban Interface (WUI) grant focused on assisting small and large landowners with managing fuel loads on their property and preparing their property to maximize defensible space in the event of a wildfire. This involves not only consultation on the actions needed, but also assistance with tree thinning needed. They have also worked with the Stillwater Conservation District in procuring grants to address irrigation infrastructure concerns. These grants focus on dilapidated irrigation diversion structures, improving water delivery, and consequentially improving the safety for recreationists who float the Stillwater River drainages. Through grants the SVWC has funded 3 different river assessments: The Rosebud Rivers Assessment, The Upper Stillwater River Assessment, and the Lower Stillwater River Assessment.

-Stillwater County Conservation District: The Stillwater CD has been instrumental in local conservation efforts as well as the establishment of baseline data. The Conservation District has administered several Renewable Resource Grant and Loan (RRGL) grants through DNRC concentrating on the restoration or redesign of several dilapidated irrigation diversions/structures. The most recent of which is the Yanzick and Brey-Riddle Ditch diversion which focused on combining the diversion of the two ditches as well as designing the new diversion to be more friendly to recreationists on the Stillwater River, especially rafters and boaters. They have also administered two 223 grants that hired the Montana Bureau of Mines and Geology to conduct two different studies: one north of the Yellowstone River and one south of the Yellowstone River. These studies focused on assessing and mapping the different geologic formations and associated bedrock aquifers to determine feasibility of hitting water in different parts of the county as well as provide an approximation of expected groundwater quality in those areas. The study was headed by Kevin Chandler. The District is also currently running an Aquatic Invasive Species (AIS) grant which focuses on education efforts as well as rewriting/updating the AIS educational pamphlet for dissemination to public schools. They host Conservation Days annually for 4^{th}-6^{th} graders. They also annually host the Local Working Group Meeting (LWG). In 2018 and 2019 they also sponsored several outreach events such as a gardening workshop with Wayne and Connie Burleson, an annual invasive grasses workshop which was taught by Dr. Jane Mangold from MSU, and a live demonstration day at the community garden taught by Wayne Burleson that focused on composting and small plot soil building. They have also been instrumental in small scale demonstrations at the office such as cover crop and pollinator demonstration plots.

Changes Due to Conservation Activities

Over the last 5 to 10 years, a lot of changes on the landscape have occurred due to NRCS conservation activities. There have been 11 different Center Pivot Sprinkler Systems (442) and supporting infrastructure installed, all with corresponding Irrigation Water Management Plans (449) and conservation activities such as No-Till (329), Conservation Crop Rotation (328), and Cover Crop (340) to further

increase conservation benefit. These pivots and management plans were contracted with water savings in mind, but also resulted in a significant decrease in both wind and water erosion on irrigated cropland. This also had a positive impact on water quality by eliminating sediment and nutrient-laden tailwater from re-entering the river.

Animal Feeding Operations (AFO)/Confined Animal Feeding Operations (CAFO) relocation has been a priority of the Stillwater NRCS. In the past 10 years, 45 different corral systems have been relocated with supporting infrastructure practices. Almost 100% of AFO/CAFOs in the county that were along water bodies have been relocated, providing a direct positive impact to water quality in the county.

On average, the Columbus Field Office has written two grazing contracts are written per year with Prescribed Grazing plans (528) contracted. These grazing plans involve installation of Livestock Pipelines (516), Watering Facilities (614), Pumping Plants (533), and Water Wells (642). These contracts are on average 2,000 acres each. Due to increased interest in improving grazing operations and decreases in commodity prices, contracts for the purpose of converting cropland back to pastureland using EQIP SGI Cropland Seeding for the purpose of grazing are becoming more common. Interest in converting monoculture pastures to diverse pasture/native mixtures that allow for increased grazing windows and improved forage nutrition led to the writing of the Northern Stillwater Monoculture Pasture Renovation Targeted Implementation Plan (TIP) project.

Section IV: Natural Resources: What Conservation has Accomplished, Problems, and Desired Future Outcomes

NRCS Identified Resource Concerns:

Animals: Inadequate Feed and Forage, Inadequate Water, and several others…

Mismanagement of the Rangeland resource is one of the largest resource concerns in Stillwater County. This is not only due to rangeland being the largest land use in Stillwater County but also because this land use is so diverse. Mismanagement of one aspect can have negative effects that ripple through other resources closely associated with the rangeland. Lack of a balance between livestock and feed/forage and lack of a written grazing plan is the root cause of this resource concern. The mismanagement of this resource has directly led to the creation of concerns with other resources such as riparian health, plant community degradation, and riparian erosion. The lack of a prescribed grazing plan usually results in the same pastures being utilized at the same time every year. As the desired forage species are targeted at the same time annually, they begin to phase out of the range landscape. This leads to a resource concern with Inadequate Structure and Composition (Plants) of the range plant community and eventually the introduction of invasive species such as cheatgrass, Japanese brome, or even noxious weeds (Plants-Excessive Plant Pest Pressure). This ultimately will decrease the stocking rate of cattle on the operation as palatable desirable plants are replaced by less/non-palatable invader species. This will also have a negative impact on wildlife by decreasing habitat, cover, and food (Wildlife- Inadequate Food, Habitat, and Cover/Shelter). One glaring example of negative impacts to wildlife is in the northern part of the county. Woody species such as skunkbush sumac should be commonplace in draws and coulees to provide thermal cover for wildlife species. Due to tendencies of livestock to linger in those cooler sites in the hotter months, or to heavily graze the species in the fall and winter, woody draws are either seldom found on most operations, or are very unhealthy with a poor range of age diversity in the woody species.

Hurdles to Adoption: There can be several factors that can impact lack of adoption of a grazing plan for range management. These can include:

- Financial: Infrastructure such as livestock water systems and fences can be very expensive.
- Environmental: Sometimes the environment makes it very difficult to adopt a grazing system and associated practices. A common example of this in Stillwater County is the difficulty of hitting a viable water well in some parts of the county. Another aspect can be the topography of the operation. Some parts of the operation may be snow-covered and inaccessible in the winter, making following a prescribed grazing system difficult. Wildlife pressure can also make adopting a grazing system difficult. This is especially true in the southern parts of the county where large herds of elk, sometimes numbering greater that 300 head, can easily overuse a pasture prior to cattle being turned in, and especially after cattle have already utilized it. These large numbers of wildlife can make it difficult for an operation to maintain profitability and adopt conservation measures.
- Lack of Outreach: Some landowners may not be aware that assistance with grazing plan development exists or may not be familiar with principles of range health.

- Cultural: In some operations it is a case of "That's the way grandfather did it. That's the way father did it. That's the way I am going to do it".

Solutions:

- Outreach: Workshops and tours about the principles of range health, new science, new technology, and how NRCS can be of assistance.
- Financial Assistance: Financial assistance with livestock water system development, fence infrastructure, and written grazing plan development.
- Coincidentally, the largest resource concern in the county is also the most difficult for which to get producer buy-in.

Plants: Excessive Plant Pest Pressure:

Noxious weeds are a huge issue in Stillwater County. There is no part of the county where noxious weeds of some sort cannot be found. Noxious weeds are more competitive that native species and quickly outcompete native species for resources, eventually crowding them out. NRCS, Stillwater County Weed District, and Stillwater Valley Watershed Council efforts to combat noxious weeds have been significant. NRCS utilized a special initiative to combat Russian olives along water courses in Stillwater county and makes it a priority to address any noxious weed and regulated plant issues present on any acres contracted. The Stillwater Valley Watershed Council currently has grants in place to assist both small and large tract land owners with spraying noxious weeds and putting them in contact with commercial applicators. The Stillwater County Weed District has grants in effect on delineated problem areas within the county to assist landowners with noxious weed control. Efforts are made when possible to keep continuity in control efforts to maximize effectiveness. Noxious Weeds found throughout the county include:

- Common
  - leafy spurge
  - sulphur cinquefoil
  - spotted and Russian knapweed
  - whitetop
  - Canada thistle
  - field bindweed
  - houndstongue
  - hoary alyssum
  - Russian olive (non-noxious but a state regulated species)
- Less Common or New Invader
  - purple loosestrife
  - yellow flag iris
  - Dalmatian toadflax
  - ventenata
  - oxeye daisy
  - common tansy

Ventenata is a species that was recently discovered in Stillwater County, although, based on the extent that it has spread, it is theorized it has been present for some time but just recently identified. NRCS is currently working on a MFC TIP project to address ventenata before it can gain a further foothold in the county.

Hurdles to Adoption of Control Measures:

- Financial: Chemical and application can be costly. Depending on size of infestation and type of chemical required, chemical control can be a large economic burden.
- Noxious weed knowledge: Landowners may not be educated on weed identification or about the negative environmental and economic impacts of noxious weeds on their operations or property.
- Cultural: Some small landowners have an aversion to chemical use. Unfortunately, small landowner tracts can be some of the primary hotspots for noxious weed propagation due to the large level of disturbance that went in to residence building or due to overgrazing of the property by livestock in those subdivisions.

Solutions:

Possible solutions include:

- Increased Outreach/Education Efforts
- NRCS Montana Focused Conservation TIP projects to financially assist with noxious weed control.

Soil Erosion: Soil erosion has commonly been associated with agricultural activities. With expansion of subdivisions in the county, it has also become associated with overgrazing on small landowner tracts, especially those adjacent to streams and rivers within the county.

Due to the large amount of Highly Erodible Land (HEL) present, annual cropping technology has rapidly advanced within the county. No-Till/Minimum Till practices are now commonplace. Cropping rotations are now planned to maximize year-round residual cover. Cropping rotations are managed to be under T (annual erosion tolerance of a soil). Maximizing residue and minimizing tillage has resulted in a large decrease in ephemeral and classic gully erosion as well as sheet and rill erosion. Exceptionally wet

Wind Station Data

Station: US MT BILLINGS/LOGAN INTL Threshold: 8.0 m/s

Elevation: 1088 Avg Energy: 1,621

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Winds > Threshold	23.6	19,5	15.4	15.1	11.3	8.9	5.7	5.7	7.9	12.4	18.9	24.4
Energy kJ/m^2/say	2,776	2,175	1,852	1,987	1,449	974	632	656	810	1,253	2,011	2,873
Monthly Percent	14.3	11.2	9.5	10.2	7.4	5.0	3.2	3.4	4.2	6.4	10.3	14.8
Preponderance	2.3	1.8	1.3	1.4	1.6	1.4	1.4	1.3	1.2	1.2	1.7	2.1
PWED	WSW-24 >	WSW-24 >	WNW-29 >	NW-315	NW-315	NW-315	NNW-33 >	NNW-33 >	NW-315	W-270	WNW-24 >	WNW-24 >

Fig.18. Breakdown of wind for each month from Wind Erosion Prediction System (WEPS) model used by the NRCS.

springs can sometimes cause minor ephemeral gully erosion even on long term no-till fields. Irrigated fields in the river valleys have been slower to adopt these practices due to the soils not being HEL with higher T rates. Soils are also deeper; therefore, decreases in production are not as readily apparent or easily linked to an erosion resource concern.

Renovation of perennial cropped fields can still result in erosion as tillage implements are commonly utilized in the renovation process. As the number of no-till drills increases, this resource concern is beginning to decrease a little. Fall tillage is the biggest issue with the renovation. Fall through spring months in Stillwater County can be extremely windy. Fall tillage activities leaves the soil bare through these windy months leaving it open to erosion. Spring tillage is less prone to erosion in perennial forage rotations as cover is maintained on the soil through fall and into late March. Two years of small grains are commonly used to prepare the field and soil before seeding back to a perennial crop.

Streambank erosion and bank slumping is a resource concern that continues to be seen every year and can have a huge negative impact on water quality, specifically suspended sediments. This directly impacts aquatic species in these water bodies. Some of the best examples of this are identified in the Upper Stillwater River Assessment and the Lower Stillwater River Assessment that were conducted by the Stillwater Valley Watershed Council. This is a common issue along the Yellowstone River as well based on the number of 310 permit applications for riprap that are received by the Stillwater Conservation District each year. The streambank erosion is directly linked to loss of deep-rooted native riparian vegetation. This loss is linked to four main causes:

- Overgrazing of riparian area.
- Residential development adjacent to stream and removal of vegetation for aesthetic purposes.
- Farming/ historical farming to edge of stream bank or irrigation water saturating and weakening bank structure due to lack of tailwater ditches and buffer strips.
- Lack of control/introduction of invasive/noxious species results in loss of native species

Fig. 19. *Top*: Overgrazed horse pasture. Notice unmaintained riprap at toe of bank as well as lack of native woody deep-rooted vegetation. *Bottom*: Riverbank slumping/erosion due to saturation from irrigation water.
Source: Lower Stillwater River Assessment by Stillwater Valley Watershed Council.

Soil Quality Degradation: Soil quality continues to be a top priority among county agricultural producers. Farmers and ranchers have continued to realize the benefits of utilizing soil health practices such as:

- No-till/minimum-till
- Maintaining herbaceous residue on the soils surface to armor it from wind and water and increase soil organic matter (SOM).
- Diversifying and developing rotations to benefit soil biology, increase SOM, maintain year-round residual cover, and improve water and mineral cycling.
- Cover crops are being utilized where cropping rotation and growing season permit. Cover crops that are being grown are being integrated into livestock operations as a fall grazing option.
- Prescribed grazing systems, strategically feeding cattle on low production/fertility soils, and beginning to experiment with high stock density short duration grazing systems to increase soil fertility and plant health.

NRCS conservation outreach efforts and demonstrations, as well as communication between neighbors and soil health adopters, has resulted in the continued spread of soil health measures through the county's agricultural community. Despite the large advancements that have been made in the last 5 years, there is room for further improvement in soil health. There are several hurdles to the soil health movement in both farming and ranching. Some of these hurdles can be overcome, others are due to environment and must be worked around. Limitations include:

- *Moisture*: Due to moisture limitations in dryland farms, following a late July/early August harvest with a cover crop is not feasible. Moisture also limits the species of crops that can be utilized which has a large impact on crop rotation diversity. Moisture is also a catalyst. Limited moisture means it takes longer for soil health activities to show results. This is not an issue on irrigated acres.
- *Markets*: Markets for crops are limited in Stillwater county, hence the typical Winter Wheat/Fallow rotation on dryland. Field peas are commonly used in rotation. Barley markets began decreasing dramatically following 2016. Chickpeas and Safflower market availability have made them a feasible option in cropping rotations, especially since 2016.

- *Equipment Cost*: Cost of modern minimum/no-till and spray equipment is very expensive. When this cost is compared against the scale of the operation on which it is to be used (especially if the farm is the county average of 1,365 acres), it can be cost prohibitive. Farms have seen a trend where they need to increase acreage to stay in the black.
- *Growing Season*: Stillwater County's growing season is short with its frost-free dates beginning approximately May 31st and going through Sept 14th (~105 days). Growing season length also negatively impacts the ability to follow an August harvest with a cover crop.
- *Convincing Landlords/Family Members*: Adopting soil health related practices can be a large step in any operation. Sometimes the hardest step can be convincing the leaser/family members/corporation members. Soil health practices can often have the appearance of being a "messy" form of farming which may not appeal to others involved in the operation. Family/corporation members may also be opposed to the cost of adoption as well.
- *Lack of Education*: Lack of education can also play a part in not adopting soil health related practices. More public outreach events/ speakers/ publications could be the answer to this. Anytime that a speaker can be as relatable as possible to the demographic at the event, the better received they will be.
- *Land Prices*: Price of land and rental rates have a huge impact on a producer's ability to follow grazing plans that lend themselves to soil quality improvement. Land prices in Stillwater county, in many cases, are far higher than any level of production can pay for. This is due to all of Stillwater County's proximity to the mountains and high wildlife value. This makes it difficult for beginning farmers to get started in the agricultural industry especially if they plan on it being a full-time, family-supporting enterprise. The livestock must make the land payments, and if the carrying capacity does not equate to the number of head it takes to make the operation sustainable, that makes following soil-building and range-improving activities difficult.
- *Residue Issues*: Large amounts of residue when combined with flood irrigation, especially furrow irrigation, can result in irrigation issues. Residue can create dams in the furrows, causing irrigation water to jump into the next furrow. This not only creates erosion between furrows but may result in the rest of that row droughting out due to lack of water. This is not observed in every no-till irrigated furrow operation but has been observed in some. This can generate caution among furrow irrigators towards adopting no-till practices.
- *Pathogens*: Some crop pathogens carry over in stubble/residue of one crop and may impact the following crop (example: corn/barley rotations). Producers may deal with this through tillage to bury residue and let it decompose or through residue burning. A soil health conscious option is to diversify the rotation and follow the first crop up with a different crop that will not support the pathogen as a host to break the disease cycle. This issue is very rotation specific and will need to be evaluated on a case by case basis.

Soil Resource Concern Solutions:

Streambank Erosion Solutions*:* The go-to solution for most streambank erosion is to install riprap to the area and armor the bank. This solution, while usually effective, has several negative aspects to it. Riprap is very expensive and maintenance of it is also expensive. Riprap does armor the bank; however, it usually deflects the water's energy into the opposite side of the river, moving the problem further

downstream. Sometimes riprap is the only option. To minimize the need for riprap in the future, the following actions will help:

- Continued public education on the value of maintaining deep-rooted native plant communities to stabilize streambanks to protect land/property.
- Continued public education on the value of maintaining separate riparian pastures to allow the landowner to manage for the health of the riparian plant community and micromanage the grazing of their livestock/animals.
- Continued public education on the impact that noxious/invasive species have on native riparian plant communities.
- Continued public education on the value of maintaining tailwater ditches to return water to river rather than letting tailwater flow over existing river bank. Also continue education on the value in maintaining those native riparian buffers to stabilize banks to prevent sloughing from irrigation induced ground saturation.
- Continue to provide timely technical assistance. Investigate financial assistance when necessary.

***Soil Quality Degradation Solutions*:** The value of no-till/minimum-till methods and maintaining herbaceous residue continues to spread through conservation outreach and word-of-mouth in the county. New markets continue to open as producers begin to investigate local marketing options. Annual soil health workshops are seeing excellent attendance from Stillwater County producers. Dryland annual production continues to grasp soil health principles. Irrigated acres both annual and perennial are the common operations where traditional tillage is still utilized. Dryland perennial renovation also may utilize traditional tillage operations. The following actions will help to continue to improve soil quality in the county:

- Continue to help landowners understand the value of soil health principles both to their bottom line and the environment and how soil health principles can be utilized to overcome issues within their cropping rotations (fertility, soil water retention ability, breaking of disease cycles, water/wind erosion issues).
- Provide technical assistance to assist landowners in overcoming challenges on their operations and help provide tools to implement soil health related practices.
- Continue to help landowners understand the ability of no-till drills to cut through residue through workshops and putting them in contact with local producers currently implementing no-till.

Local Working Group Identified Resource Concerns:

Two Local Working Group meetings were held in 2019 to garner public input on resource concerns within the county and to gain public opinion on the direction that NRCS funding and Stillwater County Conservation District prioritization needs to go.

The first meeting was conducted on April 2, 2019. An outreach letter was emailed to 69 recipients and 99 letters were mailed out. The meeting was held at 5:00 p.m. at the Columbus Firehall and the Conservation District sponsored a spaghetti dinner. Participants discussed how the NRCS was moving

towards TIP projects for funding as opposed to the general fund pools they had been utilizing. Then participants began discussing resource concerns within the county. There were 21 attendees that signed the attendance sheet. Resource concerns that were discussed were written on chart paper. Due to time constraints, the meeting could not be completed in one night. Each participant was given 3 dot stickers to vote as they wanted for their top resource concerns. Following the first meeting the top 5 resource concerns were voted for in this order:

1. Stockwater Developments/Cross Fences
2. Pivot Irrigation
3. Conifer Encroachment
4. Invasive Species
5. Soil Health

2-4 received the same number of votes.

Other identified resource concerns currently non-priority:

1. Saline Seep Management
2. Russian Olive
3. Streambank Restoration/Analysis

The second Local Working Group Meeting was held on July 2, 2019. An outreach letter was emailed to 69 recipients and 99 letters were mailed out. The meeting was held at 5:00 p.m. at the Columbus Firehall and the Conservation District sponsored a pulled pork dinner. There were 20 attendees. The purpose of the meeting was to take the priority resource concerns that had been identified in the April meeting and identify what the exact resource concern was, how to address it, and the geographical area applicable to that priority resource concern. Keri Bilbo, NRCS Assistant State Conservationist for Field Operations, facilitated the meeting. The priority resource concern discussion produced the following consensuses:

1. Stockwater Developments/Cross Fences

1. There is a deficiency in number wells and tanks on most operations to have the property fully watered for livestock.
2. Many existing water tanks are not located in the right spots to maximize grazing efficiency.
3. Provide off-stream water to improve riparian health.
4. Facilitate an improvement in range health.

This was identified as a county-wide issue, but the northern and southern parts of the county were found to have different areas that needed to be focused on. North of the Yellowstone River was to focus on areas with no surface water, areas where spring developments were failing, areas with larger pastures, and areas without a good energy source and the best way to utilize any developed energy source. South of the Yellowstone River was to focus on areas where riparian health issues were present due to livestock overuse because of lack of off-stream water, areas where spring developments were failing, and areas without a good energy source and the best way to utilize any developed energy source.

2. Pivot Irrigation

1. Increase the efficiency of the irrigation system and decrease the amount of water being used so that it could stay in the stream.
2. Increased labor savings, which is one of the biggest selling points of a center pivot.
3. Decrease erosion due to overland flow of irrigation water as well as wind erosion from residue management activities that take place on flood irrigation acres such as plowing and disking.
4. Center pivots lend themselves towards increased implementation of soil health measures.
5. Increased profitability from yield increases due to more uniform water application.

The geographical areas where this can be implemented are along water courses and established canals within the county, predominantly along the Yellowstone and around the Park City area. The interest level of producers with this type of resource concern can be highly fluctuate depending on commodity prices, NRCS cost-share, pivot prices, and weather.

3. Conifer Encroachment

The species responsible for this in Stillwater County are primarily Ponderosa Pine, Juniper, and Fir species (southern part of county).

1. Research has linked conifer encroachment to the drying out of perennial springs essential for livestock water.
2. Loss of grassland and decrease in ranch carrying capacities.
3. Increased fire danger
4. Increase in pine needle abortions in encroached areas

The geographical locations where this would be applicable were identified as: Shane Creek, the breaks at Reed Point, and the southern end of the county.

4. Invasive Species

This priority resource concern was identified as a county-wide issue. An invasive species is defined as a plant, animal, or microbe, including its seeds, eggs, spores, or other biological material that is non-native to the ecosystem under consideration and whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health. Noxious weeds and non-noxious weeds have invaded every corner of the county. The species that were identified as most common and posed the biggest issue were: Leafy Spurge, Sulphur Cinquefoil, Knapweed species, Whitetop, Houndstongue, and Russian Olive. Ventenata was brought up because it is a species that producers and partners are very concerned about getting a foothold in the county. Since the LWG meeting took place and inventories on the extent of ventenata invasion have begun, NRCS has determined that they have a very good reason to be worried. At the time of the meeting, ventenata had not been reported in Stillwater County. Since then, it has been determined that a significant portion of the southern part of the county has verified infestations.

The primary areas of concern were:

1. The headwaters of water courses
2. Fishtail was specifically identified as a hotspot
3. Subdivisions

The idea of working more closely with FWP to manage wildlife numbers to decrease weed spreading was brought up.

5. Soil Health

1. Increase microbe populations
2. Fertility management
3. Increase soil organic matter (SOM)
4. Increase diversity as a goal and increase diversity as a tool to increase soil health
5. Increase productivity and profit

The geographical areas of where to address this tend to lean more towards grazing land. The areas to be targeted are:

1. Areas of low similarity index
2. Areas that need more diverse stands of grasses.

The subject of how to get producer involvement in this area was raised. NRCS has had soil health campaigns running for several years so the subject of how to improve participation was essential. The ideas brought forward were:

1. Education and soil health outreach
2. Financial assistance
3. Test plots throughout the county
4. Food at meetings

Resource Trends, Demand, Desired Future Conditions, and Objectives

1. Stockwater Developments/Cross Fences

Trend. This priority resource concern was addressed to an extent in the "NRCS Identified Resource Concerns" section as facilitating practices to implement prescribed grazing systems to balance forage availability and livestock demand, which addresses multiple resource concerns at once. The LWG identified these practices as a deficiency in their operations, not as a means of facilitating management. Since 2016, Stillwater NRCS has been contracting, on average, two operations per year that involved stockwater developments and cross fences in conjunction with a written prescribed grazing plan. The number of ranches with functional full-ranch water systems in on the rise. The idea of one good well to pump into a storage tank placed at a high point on the ranch and gravity flow into tanks in every pasture has begun to become commonplace in producer thinking. Advancements in solar panel technology have made this even more possible by being able to develop reliable water away from a source of electricity.

The lack of infrastructure development can be primarily linked to high cost of installation. The availability of NRCS financial assistance has made infrastructure installation more feasible.

Demand. The demand for these conservation practices is very high and ties in directly to the top NRCS identified resource concern. The installation of this infrastructure utilizing NRCS financial assistance requires several other aspects of NRCS services. The average operation that Stillwater NRCS assists with stockwater systems and cross fences is approximately 2,500 acres. For water tanks and cross fences to be placed to maximize grazing efficiency, an inventory is of carrying capacity needed. On a 2,500-acre operation this usually equates to approximately 5 days of field time by two office staff members. This field inventory is followed up by several days of data evaluation and input into Toolkit. The next step is sitting down with engineering staff and discussing what ideally the planner would like to see and what is hydraulically feasible given the lay of the operation. If the application becomes a contract the engineering designs will be finalized. There is a large amount of engineering field work that will go into the designs as well during installation. The contracts require frequent maintenance from the planner to make sure everything is running as scheduled.

As mentioned in the "NRCS Identified Resource Concerns", the stockwater and cross fence practices have historically been tied to following a written grazing plan. The reasoning is simple. If done right, a water system has the potential to increase the amount of AUMs that are available to livestock by decreasing the distance that livestock need to travel from any point in the field to reach water, thus improving grazing distribution. If a prescribed grazing plan has not been planned for the operation, it is possible that the operation could already be overstocked and upon installation of the water system and cross fences, more livestock could be added to utilize the now available AUMs. In this case adding a water system may have solved the resource concern of inadequate livestock water, but it created a new resource concern of rangeland overgrazing, and this resource concern can be far more detrimental and far reaching, impacting not only livestock but also range ecology, soil erosion, forage availability, and wildlife habitat by drastically altering the plant species and populations that are present and decreasing range condition and productivity over time. This can have a dramatic change on any watershed it occurs on because the scale of the resource concern is so large. This is why linking prescribed grazing to livestock water system development is so essential.

Brainstorming of how to effectively write and implement an MFC TIP project is being explored. Currently a general SGI fund pool is available for use in sage grouse habitat to implement livestock water systems, cross fences, and written grazing plans.

Desired Future Conditions and Objectives. Having every ranch in Stillwater County following a prescribed grazing plan with a functional full-ranch water system would be ideal, however, it is not realistic. The desired future condition of the resource condition is to implement livestock water systems and cross fences on operations and move the similarity indexes on said operations to an average of 40%. The long-range objective is to implement 25,000 acres of new written grazing plans in the next 10 years.

2. Pivot Irrigation

Trend. The trend of the installation of pivot irrigation has been steady over the past 10 years, with at least 2 applications per year for the Stillwater NRCS office. This is practice solves many priority resource

concerns and has a definite benefit on the operation's bottom line. It can directly address some resource concerns while easing the adoption of practices to address others (a prime example is the adoption of no-till to address wind and water erosion on furrow irrigated fields). These resource concerns are listed above under "Local Working Group Identified Resource Concerns".

Something that was not addressed in that section is the value of labor savings. As the average producer age in Stillwater County gets higher, the value of labor savings and ease of irrigation increases. This is essential to keep irrigated agricultural land in production and minimize residential development of the county's more productive ag land. Irrigation efficiency also came to the spotlight in the summer of 2017. The flow of the Yellowstone River was lower than normal, and a microbial parasite outbreak occurred among mountain whitefish. Agencies began to refocus on how to keep more water in the river. Another consideration that was not mentioned was the value of flood irrigation in the recharge of underground aquifers that feed residential and stockwater wells, as well as help to maintain stream flow throughout the year. Montana Bureau of Mines and Geology has conducted extensive studies of groundwater wells and can tell exactly the time that irrigation season begins based on the depth to the static level of the well.

Demand. Demand for pivots has remained steady. Irrigated annual cash crop acres are being converted to pivot irrigation at a steady rate. Irrigated forage acres are being converted less frequently but are also steady. The demand may also fluctuate from year to year based on commodity prices.

Desired Future Conditions and Objectives. While pivots are ideal for irrigation, they are not necessarily economically feasible on some areas where lesser value crops are grown. Many producers with irrigated acres dedicated to annual cash crop production have already converted most of those acres to center pivot irrigation. Some annual cash crop acres and many irrigated acres dedicated to forage production have not been converted to pivot irrigation. The long-term objective is to assist producers to convert 500 more irrigated acres to center pivot irrigation. The success of this objective will greatly hinge on commodity prices and whether pivot conversion is financially feasible given the prices on crops grown.

3. Conifer Encroachment

Trend. Interest in conifer encroachment is a newly voiced resource concern. Although it has been happening for many years, recent research into the negative aspects of it such as conifer encroachment infestations drying out perennial springs, has ignited a growing interest in tackling the problem. The increase in fire danger and loss of grass for grazing continue to pose a problem as well. The major contributing factor to the growth of this resource concern is the lack of fire cycle and the loss of the logging industry in the county.

Demand. The demand is there. The major setback to successful implementation is the economics. Bringing in a crew to remove trees is not cheap. The size of equipment and method of removal plays a large role in the overall cost. If the LWG's identified geographical areas were targeted, there would not be a shortage of interest. The level of commitment may pose an issue. There are contractors in the county to satisfy the demand though.

Desired Future Conditions and Objectives. The future conditions and objectives of addressing this resource concern will require further field investigation and discussion with those producers who are

affected to determine levels of interest and extent of resource concern. While inquiries into this resource concern have come into the Columbus field office on occasion, it has not been enough to establish a level of interest or an extent to the resource concern. Based on what data there is to work with, the Columbus NRCS is projecting that 200 acres of conifer encroachment is feasible as a long-term goal. Because this long-range plan is a living document, these figures can be updated as further information is obtained.

4. Invasive Species

Trend. This Priority Resource Concern was identified as well in the "NRCS Identified Resource Concerns" section. Due to its many waterways, healthy wildlife populations, small tract/absentee landowners, growing emotional aversion to use of chemicals for weed control, and large amounts of recreational activity, the trend of noxious weeds on the landscape have been upwards. Many of the noxious weed species listed are commonly found on the landscape. The extent of the invasion of noxious weeds have made it a major economic burden to landowners and the county. Due to how widespread the noxious weeds are and how difficult some landowner buy-in can be, it can be hard to develop a good weed management strategy that is oriented towards actual extermination rather than control. The easiest weeds to target are new outbreaks that are localized.

Demand. The demand for noxious weed control is high. It is an issue that every landowner deals with. Currently the highest priority invasion in the county is the recent discovery of ventenata. This noxious weed, which had been previously unknown, was discovered this year to be spottily spread through the southeast portion of the county. Current infestations are mostly localized in the identified geographic region, making treating them before further spread occurs essential but also very feasible. A TIP project is currently being developed to address Ventenata.

Other localized infestations of different species can be found in the county and can be addressed through further TIP projects. If NRCS and Stillwater County Weed District coordinate efforts, this will maximize effectiveness of projects and efficiency of program and grant dollars.

Desired Future Conditions and Objectives. The desired future condition of the county is to decrease the frequency of noxious weeds within the county and decrease the contribution of noxious weeds to natural resource degradation. Due to how widespread noxious weeds are in the county, this goal is difficult delineate geographically and define quantitatively.

NRCS objectives and projections over the next ten years are as follows:

- Ventenata control: 11,000 acres (Carbon and Stillwater Counties combined)
- Other noxious weed control: 2,000 acres.

A Ventenata control TIP project is currently being written, and acreage estimate is accurate. Estimate of other noxious weed control is based on current knowledge of interest and identified localized infestations.

5. Soil Health

Trend. This Priority Resource Concern was touched on as well in the "NRCS Identified Resource Concerns" section. The general trend in the county is towards soil health related practices. The demand for no-till drill custom work or rental availability is very high. The northern part of the county has embraced no-till and many are trying to diversify crop rotations as much as possible. Many in the northern part of the county have embraced no-till for a variety of reasons. Cropping operations in that part of the county are larger, so decreasing tillage equates to saving time and money. The northern part of the county is also very rocky and no-till does not turn up rocks. They have also observed the soil health benefits associated with less tillage and increased diversity in the form of yield increases, input decreases, and overall improved profitability. The southern part of the county also sees the value in soil health related practices but has been a bit slower in adoption. This is due predominantly to high cost of no-till drills not penciling out well with infrequency of use. Most operations south of the Yellowstone River are predominantly forage and cattle based. This means that annual cropping usually does not occur unless a perennial forage field is being renovated. Any no-till drill that is purchased will only be used to renovate forage and pasture stands, which is once every 10 years on average. This part of the county is seeing increased custom no-till seeding beginning to rise. The demand for this kind of service rises every year. Some producers are even utilizing cover crops as a means of renovation of forage stands rather than using a single species small grain crop.

The LWG also zeroed in on soil health on rangeland. It is well documented that improving soil health on rangeland is directly related to prescribed grazing systems which

Demand. The demand for soil health related practices and no-till drills is high.

Desired Future Conditions and Objectives. The desired future condition of the county is to eliminate deep tillage and utilize no-till and minimum till practices and rotations. Eliminating tillage in some flood irrigated operations where corrugations are needed will not be possible. The objective for the next ten years is to implement no-till and other soil health related practices on 300 new cropland acres. See Stockwater Development/Cross Fences for rangeland soil health goals.

Section V: Prioritization of Natural Resources

Predominantly, NRCS identification of priority resource concerns and the LWG identification of priority resource concerns rankings aligned well. All legislation and NEPA regulations will be observed and adhered to in project development and the addressing of natural resource concerns. Resource concerns II, III, and IV received equal prioritization through the LWG voting process.

I. Stockwater Developments, Cross Fences, and Grazing Plans:

Addressing this priority resource concern supports the NRCS vision and mission as well as meets national, state, and local objectives. Rangeland is the largest land use in Stillwater County and has the widest reaching impact on associated natural resources. Health of the rangeland is the most overlooked resource concern in the county. Proper grazing management is the most effective tool that can be used to manage for overall range health. Proper grazing management also is the most effective tool that can be used to improve rangeland soil health (#5 in LWG identified priority resource concerns). Besides balancing feed and forage with number of livestock, key facilitating practices to grazing plan implementation are water developments and cross fences. These practices coincidentally are also essential to maximizing operation profitability, grazing efficiency, grazing distribution, and animal health.

The ten-year objective related to this identified resource concern was to implement 25,000 acres of new written grazing plans complete with stockwater developments and cross fences. NRCS staff and partners are fully capable of achieving these goals and have been steadily working towards them for many years. This priority resource concern has a positive impact for all stakeholders in the community. Agricultural producers see improvements in range health, animal health, and operation profitability. Recreationists and the general public see decreases in wind and water erosion which improves water quality in runoff periods and improvements in wildlife habitat and aesthetics.

NRCS will provide the majority of the funding for the project. Stillwater County Conservation District will provide assistance with outreach and meetings. Other potential partners include Stillwater Valley Watershed Council, Northern Great Plains Joint Venture, DNRC, and FWP. TIP projects for specific geographic areas will be written. Outreach, meetings, and one-on-one phone calls will be the main tools used to recruit participants for the project to determine if enough interest is present to justify proceeding with the project.

The cost to implement the projects is feasible but progress will be slow. NRCS funding is limited and spread throughout the state. Geographic location can improve some chances of funding such as a project being in sage grouse habitat. Most partner funds are also limited. Many of those funds are tied to specific wildlife habitat and specific species as well. Effectively watering an operation can result in $100,000 worth of improvements very easily. Even with NRCS financial assistance involved, the producer portion of the installation cost can be high and can be a major hurdle to producer buy-in.

Success of objectives can be quantitatively measured by contracted/planned acres of grazing plan development which will also include stockwater systems and cross fences to facilitate it.

II. Invasive Species (Tied for prioritization with II, III, and IV):

Addressing this priority resource concern supports the NRCS vision and mission as well as meets national, state, and local objectives. Noxious weeds and invasive species can have a significant impact and cause a rapid degradation in a natural resource. Noxious weeds and invasive species can quickly displace desired species on a land use, resulting in degraded wildlife habitat, land use health, soil health, wildlife and livestock carrying capacity, and agricultural operation profitability.

The ten-year objective related to this identified resource concern was to implement 13,000 acres noxious weed/invasive species control (11,000 acres of which is in conjunction with Carbon County through a joint TIP project for ventenata control). NRCS staff and partners are fully capable of achieving these goals and have been steadily working towards them for many years. NRCS can monitor the progress of the objective through contracted/planned acres and ocular observations in field visits and certifications. Currently a TIP project for ventenata is being written to address the ventenata infestations in the southeast part of the county. Working with the Stillwater County Weed District will help provide additional insight into other areas where assistance with noxious weed control is needed. This priority resource concern has a positive impact for all stakeholders in the community. Agricultural producers see improvements in range and pasture health, riparian health, animal health, wildlife habitat, and operation profitability. Recreationists and the general public see improvements in riparian health, aesthetics, wildlife habitat, water quality, and quality of recreational opportunities.

The majority of financial assistance will come from NRCS. Stillwater County Conservation District will provide assistance with outreach and meetings. Other potential partners include Stillwater Valley Watershed Council, Northern Great Plains Joint Venture, and the Stillwater County Weed District. Coordination with the Stillwater County Weed District is a necessity to prevent overlap of NRCS federal dollars with other federal dollars in current grant programs that they are running. Producer and partner recruitment/participation will be determined through outreach, meetings, and one-on-one phone calls. Knocking on doors and making phone calls to individuals is going to be essential to successfully addressing this priority resource concern.

The cost to implement noxious weed control is feasible for NRCS and partners. The problem of level of producer buy-in may arise depending on the availability and level of NRCS financial assistance. NRCS pays a different rate for different types of application, varying from spot-spraying to aerial spraying. Depending on the type of application and cost of chemical, it may be that NRCS financial assistance is not adequate to assist producers with taking financial steps to control noxious weeds. The surrounding weed districts have found that if financial assistance does not reach a threshold of 50% recruiting producer involvement can be difficult. Input into NRCS cost list development is going to be essential to make sure that NRCS financial assistance not only accurately reflects what is taking place in the field, but also is sufficient to garner program interest.

III. Pivot Irrigation

Addressing this priority resource concern supports the NRCS vision and mission as well as meets national, state, and local objectives. Irrigation efficiency on cropland is having more of a spotlight shined on it all the time as consumer groups begin to demand that retailers be able to answer questions about the inputs going into the products that they are consuming. One of the major inputs being focused on by beer and sugar companies is the amount of irrigation water that goes into a can of beer or a pound of sugar. Irrigation efficiency also was brought into the public spotlight in 2016 when the Yellowstone River reached a very low flow and a microscopic parasite that causes Proliferative Kidney Disease (PKD) swept through the mountain whitefish population, leaving thousands of fish dead. Factors that contributed to the spread of the parasite were low stream flows, high water temperature, and recreational stressors. PKD may also affect trout. It was low stream flows that made the public begin to look more closely at more efficient irrigation infrastructure in agriculture. Pivots also improve water quality by eliminating irrigation tailwater from fields, reducing stream suspended sediments and reducing nutrients linked to irrigation tailwater. Pivots are also more conducive to the adoption of soil health related practices such as no-till and cover crops. This LWG identified resource concern directly ties into the NRCS identified resource concern of soil erosion. Pivot installation decreases sediment leaving a field by eliminating overland flow. It also decreases bank saturation in those field adjacent to a river or stream, reducing streambank sloughing and streambank erosion.

Producers who convert from flood to pivot irrigation will see increased yields due to more uniform water applications, reduced labor costs, and increased options within their cropping rotation. Recreationists and the general public will see improvements in water quality through decreases in sediment levels and a reduction in nutrients linked to irrigation tailwater.

The cost to implement the projects is feasible. NRCS will provide all project financial assistance. The Conservation District will assist with cost for outreach. NRCS has been providing financial assistance for flood to pivot irrigation conversions for many years. The project cost is feasible if a detailed project plan is compiled, a realistic timeline that balances NRCS available funding is established, and purposeful recruitment and outreach is organized.

A ten-year objective of 500 acres of flood to pivot irrigation conversion is set. The success of this objective can be monitored through contracted acres over the next ten years. Further success can be monitored by establishing baselines (FIRI, WEPS, etc.) prior to each project which is standard procedure for NRCS, and modeling and monitoring improvements in future conditions due to the conversions.

IV. Conifer Encroachment

This priority resource concern was identified by the LWG. This is a resource concern that NRCS was not as in touch with. This is predominantly because most conifer encroachment is occurring internally on a ranch and is not observable from a road. NRCS was aware that some of our participants were observing this to an extent on their own operations, but the LWG meetings brought in producers that do not participate in NRCS programs and whose ranches we had not been on before. This meeting showed that

this was a far bigger problem and of more concern than previously realized. The primary issues with conifer encroachment are loss of grass, and increased fire danger. Another negative to conifer encroachment that has been brought up by research guest speakers at outreach events is the linking of encroaching deep-rooted conifers to the drying up of reliable perennial springs (this has a direct impact on priority resource concern #1).

NRCS will provide the majority of project financial assistance. The Conservation District will assist with cost for outreach. Other partners who may be able to assist with outreach efforts and potential financial assistance include: Stillwater Valley Watershed Council, FWP, and Northern Great Plains Joint Venture. Producer and partner recruitment/participation will be determined through outreach, meetings, and one-on-one phone calls. Knocking on doors and making phone calls to individuals is going to be essential to successfully addressing this priority resource concern. ArcGIS can also be utilized to analyze multiple years of imagery overlaid with land ownership to help create a list of possible participants.

The cost to implement the projects is feasible as demonstrated by several counties within the Bozeman Area. The project cost is feasible if a detailed project plan is compiled, a realistic timeline that balances NRCS available funding is established, and purposeful recruitment and outreach is organized.

Producers will see benefits from this project through decreased fire hazard, improved grass and carrying capacity, keeping perennial springs producing, and increasing stream flow in rivers. Recreationists and the general public will see benefits from this project through decreased fire danger, wildlife habitat improvement, and increased stream flows.

A ten-year objective of addressing 200 acres of conifer encroachment is set. The success of this objective can be monitored through contracted acres over the next ten years. The extent of the problem is not thoroughly understood until more detailed field analysis is made. At that point it may be determined that a 200-acre objective is not sufficient. At that point the Stillwater County NRCS Long Range Plan will be updated to reflect the newfound data and why the decision was made.

V. Soil Health

Addressing this priority resource concern supports the NRCS vision and mission as well as meets national, state, and local objectives. Soil health has been heavily invested in by the NRCS for many years. This also encompasses the resource concern of Soil Quality Degradation under the section of "NRCS Identified Resource Concerns". The reason soil health was #5 in the ranking of Priority Resource Concerns is mainly because soil health principles and practices are being adopted frequently without NRCS financial assistance. Through education efforts, Stillwater County producers have become well educated in the principles and concepts that surround soil health. Economics is the driving factor behind soil health adoption (increased yields, decreased inputs, more efficient use of inputs, and soil drought resiliency). NRCS soil health outreach continues to be a priority and is a focus of every contract that is written.

NRCS will provide the majority of project financial assistance. The Conservation District will assist with cost for outreach. Other partners who may be able to assist with outreach efforts and potential financial assistance include: Stillwater Valley Watershed Council. Producer and partner recruitment/participation will be determined through outreach, meetings, one-on-one phone calls, and knocking on doors.

The cost to implement the projects is feasible. NRCS has been providing financial assistance for soil health adoption for many years. Unless a specific geographical area can be identified where a specific soil health component is lacking that can be addressed, it is more likely that soil health will continue to be integrated into different aspects of other projects. This is an overarching priority resource concern that impacts a wide range of natural resources. Producers will see soil health impacts in every aspect of their operation including an improved bottom line. Recreationists and the general public will see improvements in all kinds of resources they observe from water quality to aesthetics.

A ten-year objective of addressing 2,000 acres improving soil health is set. The success of this objective can be monitored through contracted/planned acres over the next ten years. This objective is very attainable due to the amount of self-education and practice adoption already occurring without NRCS financial aid. Soil health is integrated into every contract that NRCS writes.

Section VI: Targeted Implementation Plans and Investment Portfolio

Implementation Plans:

The NRCS is open to all information concerning ANY resource concern. TIP projects will be developed as needs, feasibility, and extents of the resource concerns are assessed. Development of multiple TIP projects may be occurring simultaneously. Because some resource concerns are easier to inventory than others, a proposed TIP project or Plan of Action of a lesser resource concern may be completed and ready for implementation prior to a resource concern of higher priority. Due to the unpredictability of nature, priority resource concerns can change. Local Working Group Meetings will convene annually to discuss current priority resource concerns and discuss if changes or reprioritizations need to take place. As this is a living document, these changes are welcome.

North Stillwater County Pasture Monoculture Diversification Project.

This TIP project is currently underway. The current projected timeframe for the project is 2019-2021 and covers a geographic area north of I-90 in Stillwater County. This timeframe may get expanded a year depending on the level of producer interest by 2021. This project concentrates on renovating monoculture pastures such as crested wheatgrass, smooth brome, or other monoculture species to a diverse mix of either tame or native species. The goal of this is to replace the narrow nutritional window of monoculture pastures with a wider nutritional window offered by a more diverse species mix. The end goal of the project is to offer producers more flexibility in their grazing rotations by letting sound range health and grazing principles dictate their rotation rather worries about forage nutritional quality. This TIP project lines up well with the county's #1 priority resource concern of Stockwater Systems/Cross Fences/Range Health. Phase 1 will increase the opportunity to improve grazing rotations and allow producer's more flexibility in their season of use changes on pastures from year to year. Phase 2 of this project is evaluation of grazing systems and implementation of stockwater systems/cross fences/prescribed grazing plans to improve range health and ranch profitability. See TIP proposal for a more details.

Carbon and Stillwater County Ventenata Invasive Annual Grass Control TIP.

This TIP is currently being written. The projected timeframe is 2020-2023. The project may be extended depending on degree of infestation and landowner interest. This project targets known ventenata infestations in northcentral Carbon County and Southcentral Stillwater County. This invasive annual grass is relatively new to this area and Columbus and Joliet NRCS field offices will work along with the Conservation Districts to provide outreach and education on identification, methods of control, and how proper grazing management can promote rangeland health and resiliency against unwanted invaders. The TIP will assist landowners with ventenata infestations by helping offset the cost of herbicide control and will assist with coordinating multi-landowner aerial chemical treatments as needed. Local Working Group meetings have identified invasive species as a resource concern, especially in the southern half of Stillwater County. With this being such a new infestation, immediate action provides the greatest chance of control and hopefully eradication.

Stockwater Development/ Cross Fences/ Grazing Plans.

Inventory and discussion with producers south of the Yellowstone River will need to occur to determine if there is a geographic area that needs to be priority, such as developing offsite water on a particular drainage to promote riparian health. This will require time in the field to develop this plan visiting as many producers as possible to determine needs, feasibility, geographic areas of priority, a timeline, and set up outreach meetings.

Pivot Irrigation.

The main geographic area of need is along the Yellowstone River Valley. This area tends to be an area where the most interest in pivots lies. This is because almost all the irrigated annual cash crop production is at in the county occurs along the Yellowstone River. The Stillwater River and other tributaries of the Yellowstone River are primarily focused on hay production. Hay production usually is not profitable enough for producers to justify pivot installation unless they project that they will see a large boost in yield through a more uniform irrigation application, or if their primary reason for pivot installation is labor savings or making irrigation physically easier. Outreach to assess extent of interest in conversion of flood irrigation to pivots would need to be assessed to determine the scope of the project. Primary resources that will be positively impacted by pivot installation are water quality (decreases in sedimentation and nutrients), water quantity (inefficient use of irrigation water, inefficient moisture management), plant productivity and health (improving yields), soil improvements (decreased erosion), and human benefits (increased profitability, labor savings, quality of life improvements). Other improvements that can piggyback on pivot installations are increased nutrient management, increased nutrient efficiency (especially if fertigation is utilized), and increased implementation of soil health practices (no-till, diverse crop rotations, etc.).

Conifer Encroachment.

Conifer encroachment is a resource concern that will require field visitations and GPSing to determine the extent of the resource problem and determine producer interest in addressing the problem. Addressing conifer encroachment can become very expensive depending on the means of how it is addressed (hand crews, masticators, etc..). The LWG has specified areas that are of concern. Field visits will determine if the problem is so large that specific geographic areas need to be addressed as individual TIP projects or can be addressed as a single TIP project. Due to current workload and TIP development, field visits for the purpose of determining extent of the concern will likely not begin with a concerted effort until 2023. Field visits will occur if opportunities arise and information gathering will be constant.

Invasive Species.

Currently a ventenata TIP project (mentioned above) is being written for 2020-2023. Due to how widespread noxious weeds are in the county and the amount of weed control currently taking place, any other TIPs that are written for noxious weed control will have to have a very focused objective like the ventenata project. Close communication with the Stillwater County Weed District to identify potential project areas is a good resource. A few areas with easily controllable Russian Olive trees have been

identified. Within the next 10 years, monitoring and information gathering for opportunities to address invasive species will constantly be occurring.

Soil Health.

Soil health is a facet that impacts many resources. NRCS has been educating on and developing plans integrating soil health into operations for many years. An individual TIP project will not likely be developed focusing solely on soil health, unless a defined geographic area with a blatant lack of soil health is identified. NRCS and the Stillwater Conservation District will proceed as we have in the past by implementing soil health assessments and improvements into all our plans and provide technical assistance wherever requested.

Technology Transfer and Outreach Plan:

Fiscal Year 2020

- Ventenata Outreach Meeting----------December 2019
- Ventenata Outreach and Recruitment----------February 2020
- Conservation Days Outdoor Classroom ----------May 2020
- Park City FFA Ag Days ----------May 2020
- Northern Stillwater Monoculture Diversification Tour----------July 2020
- Local Working Group Meeting----------July 2020
- Northern Stillwater Monoculture Diversification FY 2021 Recruitment -----July 2020
- Ventenata Outreach and Recruitment FY 2021 ----------August 2020

These are the identified current planned outreach events for FY 2020. In 2020 a new TIP project will begin to be developed. Outreach events may be added to this plan as opportunities arise. Conservation Days Outdoor Classroom and Park City FFA Ag Days are annual events that occur in the same months every year. Beginning in FY 2020, annual progress update tours/meetings will be held to disseminate observations, data, lessons learned, and other information on current TIP projects progress in the county. If some participants are willing, a producer panel for each TIP project may be feasible. CTA and information dissemination that adheres to PII restrictions will occur throughout the year.

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