

2019

FALLON COUNTY LONG RANGE PLAN



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USDA NRCS Baker Field Office

Baker, Montana

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Contents

SECTION I: INTRODUCTION	4
SECTION II: NATURAL RESOURCE INVENTORY	4
General Information	4
People	5
Agriculture	5
Agricultural Producers	5
LANDCOVER/LAND USE.....	7
LRRs and MLRAs	7
Landcover Types	9
Land Ownership	10
SOILS	11
Geology	11
Petroleum Resources	12
Cedar Creek Anticline.....	13
Highly Erodible Soils.....	14
Soil Series	14
Prime Farmland, Farmland of Statewide Importance and Prime Farmland if Irrigated	14
Hydric Soils.....	15
WATER.....	16
Hydrology.....	16
303(d) Listed Streams	17
Surface Water	19
Ground Water	20
AIR AND ENERGY.....	20
Air Quality	20
Utilities	21
PLANTS AND ANIMALS.....	21
South Sandstone Reservoir	21
Animal Species of Concern.....	22
USFWS Listed Species	22
Ground Nesting Songbirds	Error! Bookmark not defined.
Greater Sage-grouse	25

Plant Species of Concern.....	26
Wetlands/ Riparian Areas.....	27
SECTION III: CONSERVATION ACTIVITY ANALYSIS	29
USDA Farm Bill Programs.....	29
Conservation Reserve Program	29
Conservation Stewardship Program (CStwP).....	30
Conservation Technical Assistance	31
Wildlife Habitat Incentives Program.....	32
Environmental Quality Incentives Program (EQIP)	32
Information and Education	33
Workshops	34
Partner efforts.....	36
Summarizing the Key Ideas of Past Educational Workshops	36
SECTION IV: NATURAL RESOURCE PROBLEMS AND DESIRED FUTURE OUTCOMES.....	38
Fallon County Resource Concerns and Prospective Targeted Implementation Plans.....	38
Monocultures of Crested Wheat Grass and Other Species	38
Weeds	Error! Bookmark not defined.
Soil Health on Cropland	39
Soil Health on Grazing Land	39
Human Capital.....	40
How Opportunities will Benefit the Resources:.....	40
SECTION V: PRIORITIZE NATURAL RESOURCE OPPORTUNITIES AND DESIRED FUTURE OUTCOMES.....	42
1. Soil Health on Grazing Land	42
2. Soil Health on Cropland	43
3. Monocultures of Crested Wheat Grass and Other Species	43
4. Invasive Weeds	44
5. Human Capital.....	44
REFERENCES.....	45
APPENDIX A.....	47
A1 Fallon County	47
A2 Annual Precipitation	48
A3 Relative Annual Effective Precipitation	49
A4 Land Resource Regions	50

A5 Major Land Resource Areas	51
A6 Landcover.....	52
A7 Land Ownership	53
A8 Geology	54
A9 Farmland of Statewide Importance and Prime Farmland if Irrigated	55



Michelle Gorder

SECTION I: INTRODUCTION

The Fallon County Long-Range Plan represents a palette of the landscape, environmental and economic conditions of the county; it describes the actions we have taken and the partners who have helped us achieve past goals and objectives. The results of our work are documented in the Long-Range Plan. Current and future conservation activities will address resource concerns identified by the Field Office, members of the agricultural community and our partners.

This Long-Range Plan articulates our vision to enhance the county's natural resources; it is a blueprint for prioritization of conservation efforts and funding investments. Realizing the integrated and interconnected relationships between the natural resources and community, the Long-Range Plan also considers local, regional and national needs and partnerships.

Our partners are other Natural Resources Conservation Service (NRCS) offices, the Little Beaver Conservation District (LBCD), Farm Services Agency (FSA), Montana State University Extension, Fallon County Weed Board, Fallon County Commissioners, Montana Department of Fish, Wildlife & Parks and others.

The Plan will focus on priorities for conservation in Fallon County over the next five to ten years. It will be reviewed annually and updated as needed by identifying trends and forces shaping natural resources in the county. The Field Office will work with the public and stakeholders to develop a collective vision for conservation in Fallon County and to develop strategies to put it into action.

Implementing the Plan is a continuing effort carried forward through the mission of NRCS, our natural resource conservation partners, other government entities, non-government organizations (NGOs) stakeholders, and members of our community.

SECTION II: NATURAL RESOURCE INVENTORY

General Information

Fallon County is in the southeast corner of Montana, bordering Carter County to the south, Custer County to the west, and Prairie and Wibaux Counties to the north. The eastern side borders North Dakota and about six miles of the South Dakota state line. The area of the county is 1,619 square miles or about 1,037,387 acres. It ranks 46th of the 56 counties in Montana for size.

Elevation ranges from 2,395 feet above sea level to 3,642 feet on the unnamed high point on the southern border (Appendix A1). Average elevation is 2,910 feet. The growing season usually lasts for about 136 days, from around the

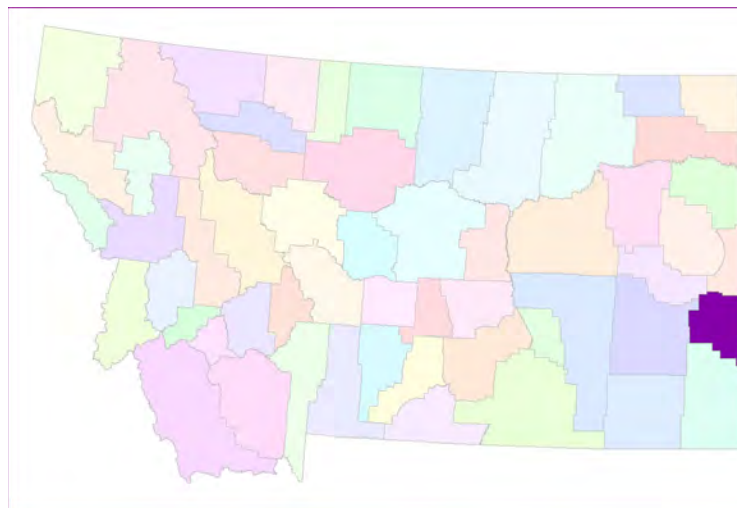


Figure 1 Fallon County, Montana

middle of May to the third week of September. The wind is most often from the west, with the high average windspeed of 13.3 miles per hour occurring in January. Most precipitation occurs as rain between April and October; snowfall is greatest in February, March and April. Average annual precipitation for most of the county is fourteen to fifteen inches per year; small areas on the north and south edges receive slightly more (Appendix A2). Relative effective precipitation can be thought of as usable rainfall, the portion of the total precipitation which becomes available for plant growth (Appendix A3).

Nearly all the county is within USDA Plant Hardiness Zone 4a, meaning low temperatures fall between -25 to -30 degrees Fahrenheit. Some small areas along the Little Beaver Creek valley and Fletcher Creek are in Zone 4b, where temperatures may drop as low as -20 to -25 degrees.

People

Fallon County was created by legislation on December 9, 1913. The town of Baker grew up around a reservoir built by the Milwaukee Railroad to provide water for its steam locomotives. Baker is the Fallon County seat, located at the junction of Montana Highway 7 and US Highway 12. The only other incorporated community in the county is the town of Plevna, although early in the twentieth century the small towns of Kingmont and Westmore were located along the Chicago, Milwaukee & St. Paul Railway. At that time there were also several rural schools in the County; the population of the county was 4,548 in 1921 (Stout, 1921).

Currently the population of Fallon County is 3,009. Nearly 60% of the county's residents live in Baker; another 154 people live in Plevna. County-wide, nearly 96% of adults have graduated high school and 16% hold a Bachelor's degree or higher. The poverty rate is around 5.78%; unemployment is low at 1.7% (US Census Bureau, 2019).

Agriculture

According to the USDA National Agriculture Statistics Service (NASS), there were 289 farms in Fallon County in 2017, a slight decrease from the 2012 Census tally. The census definition of a farm is any place from which \$1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year. The average farm size is 3,121 acres. Roughly 87% of the land in the county is in farms. Of this, 78 % is range or pasture and 21 %, 191,780 acres, is cropland (USDA NASS, 2019).

Agricultural Producers

NASS data shows that there are 499 agriculture producers in Fallon County, roughly 16.4 % of the population. Forty percent of producers are female. Three hundred three producers list farming or ranching as their primary occupation; 323 producers have lived on their present farm for over ten years. The average length of time living on the present farm in Fallon County is 21.3 years.

Young farmers are those who are 35 years old or younger. Fifty-four farms' primary producers are young farmers; 72 farms are operated by beginning farmers or ranchers, defined as those who have been in the business for 10 years or less. Fifty-five percent of Fallon county producers are age 55 or older. (USDA NASS, 2019).

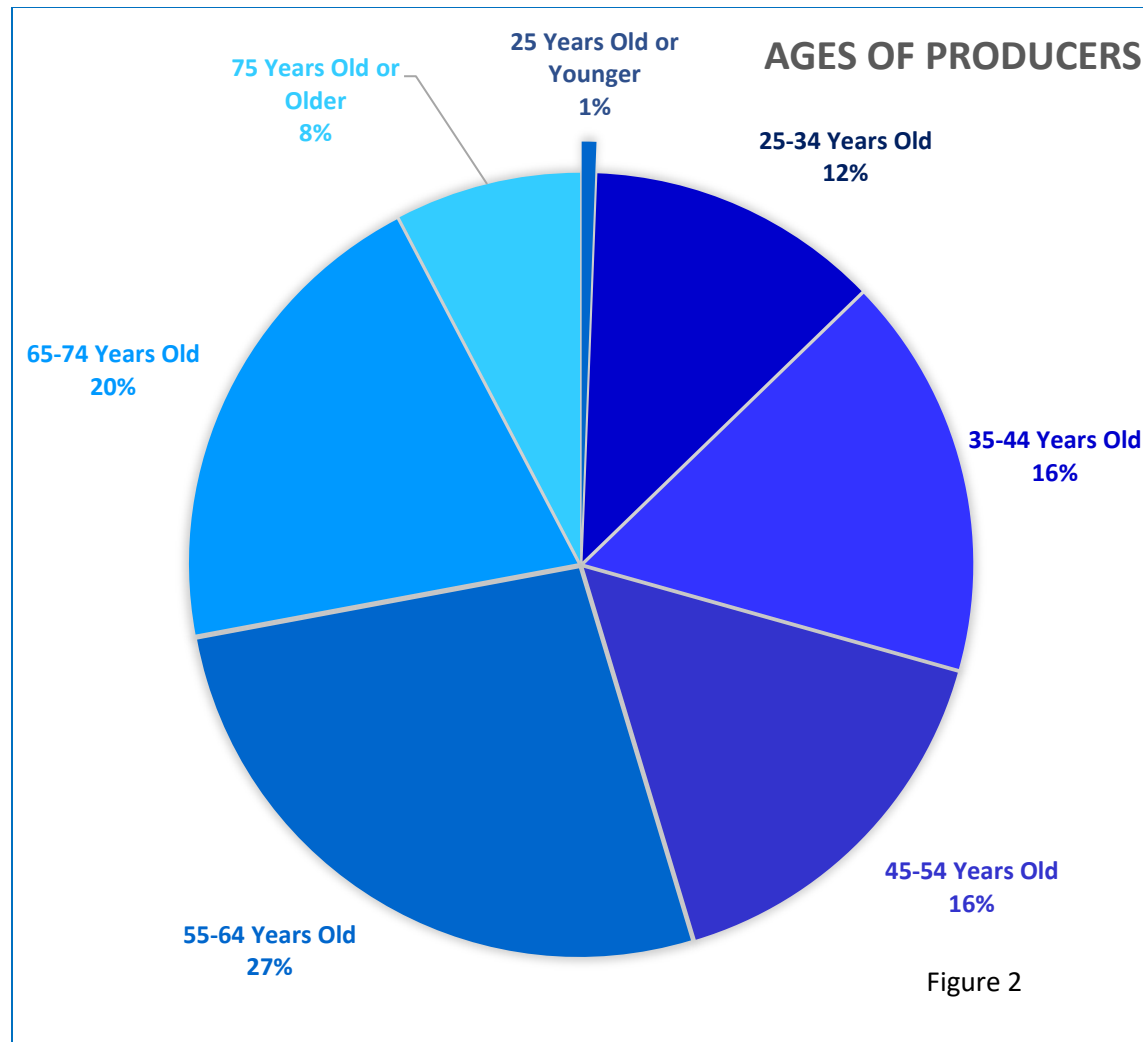


Figure 2 Age Groups of Producers and Age Group Percent of All

Land in crop production and the number of farms raising each of the seven principal crops in calendar year 2017 is shown in Figure 3. The chart illustrates that Fallon County's agriculture is typical of the rural counties in eastern Montana. A great deal of cropland is dedicated to producing feed and forage for livestock. Alfalfa for hay is grown on 74 % of all land used to raise forage crops. Among annual crops, dryland wheat continues in the lead.

Conservation practices reported in the census include cover crops on 12 farms and no-till on 47 farms. Intensive tillage is used on 28 farms. In 2017 there were 46,066 head of cattle and 2,201 sheep in Fallon County (USDA NASS, 2019).

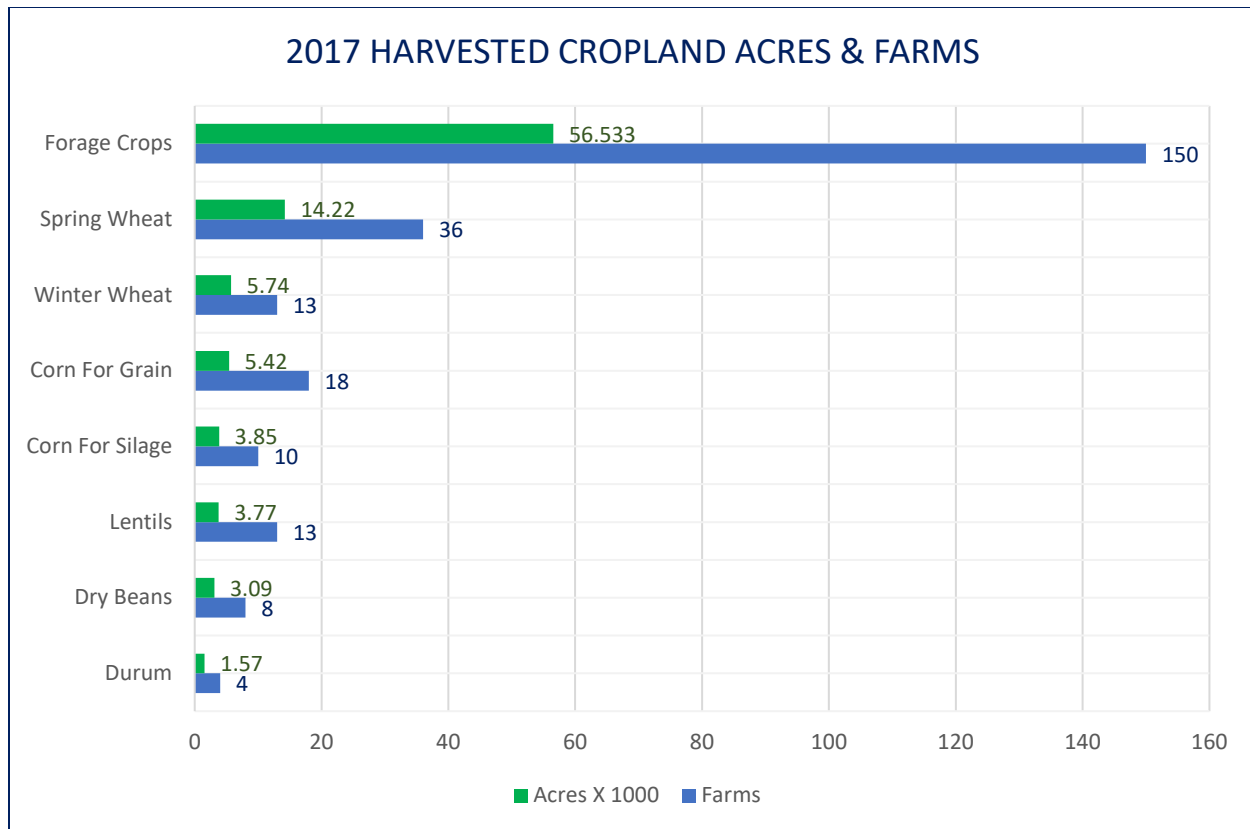


Figure 3 Crops Harvested, Number of Acres and Number of Farms Producing Each Crop in 2017 (USDA NASS, 2019)

LANDCOVER/LAND USE

LRRs and MLRAs

Land Resource Regions (LRR) are large geographic areas that are characterized by a pattern of soils, climate, water resources and land uses. Fallon County and adjacent counties in Montana, South Dakota and Wyoming lie within the Western Great Plains Range and Irrigated Land Resource Region, LRR G. (Appendix A4).

Major Land Resource Areas (MLRAs) are subregions of the Land Resource Regions and comprise smaller, homogeneous areas. MLRAs represent landscape-level areas with distinct physiography, geology, climate, water, soils, biological resources and land uses. These features are incorporated into the distinctions between ecological sites.

Most of Fallon County is included in MLRA 58A, Northern Rolling High Plains, Northern Part. Appendix A5 shows the relative locations of MLRA 58A, MLRA 54, Rolling Soft Shale Plain, MLRA 58B; Northern Rolling High Plains Eastern Part, MLRA 58C, Northern Rolling High Plains Northeastern Part, and 60B, Pierre Shale Plains, Northern Part (NRCS, 2006). All the Major Land Resource Areas are in the Missouri Plateau, Unglaciaded, Section of the Great Plains Proving of the Interior Plains.

MLRA 54, Rolling Soft Shale Plain, is predominantly unglaciaded, but the eastern and northern edges were once covered by glaciers. The area is on an old, moderately dissected, rolling plain with some local badlands, buttes, and isolated hills. Terraces are adjacent to broad flood plains along most of the major drainages. Dominant Soil orders in this MLRA are Mollisols and Entisols.

MLRA 58A, Northern Rolling High Plains, Northern Part is an area of what were plateaus and terraces; these have been eroded over time. High flat-top buttes are prominent features of the landscape in some areas. Badlands are found along some reaches of the major rivers. The principal sources of groundwater are the soft, calcareous shales, sandstones and silt stones of the Fort Union, Fox Hills and Hell Creek Formations. Dominant soil orders in this MLRA are Mollisols and Entisols.

MLRA 58B, Northern Rolling High Plains, Southern Part, is ancient terraces and plateaus that are now deeply eroded. Slopes range from gently rolling to steep. Badlands occur along some of the river valleys. Terraces are common along most of the major river systems. This MLRA is said to have the largest deposits of coal in the United States. Coal and uranium mining and petroleum extraction are important industries in the area. Water is typically hard to very hard and often the level of dissolved solids exceeds drinking water standards. Mollisols and Entisols are the dominant soil orders in MLRA 58B.

MLRA 58C, Northern Rolling High Plains, North Eastern Part, is known as the Missouri Badlands. It is old terraces and plateaus that have been eroded by the Missouri River and its tributaries. Most of the groundwater comes from the Fort Union Aquifer. The water is soft, containing high levels of selenium, total dissolved solids and salinity. It can be used for domestic purposes and for livestock but is unsuitable for irrigation. Entisols and Mollisols are the dominant soil orders.

MLRA 60B, Pierre Shale Plains, Northern Part, is also an area of ancient terraces and plateaus that have been deeply eroded. Shale plains are a unique feature of this MLRA. They typically have long, smooth, gentle to strong slopes. Dominant soils orders are Alfisols, Entisols and Vertisols; soils typically have smectitic mineralogy, meaning the soils are typically two parts clay to one part other. Water for livestock in the upland is available only in small, man-made dams. Groundwater is found only in small deposits of sand and gravel in the Fox Hills Sandstone and Hell Creek Formation. The water is generally hard or very hard due to sodium bicarbonate or sulfate. Practically all the land in MLRA 60B is used for livestock production (NRCS, 2006).

Soil Orders Definitions:

Alfisols are found in semiarid to moist areas. These soils result from weathering processes that leach clay minerals and other elements out of the surface layer and into the subsoil. The soils formed primarily under forest or mixed vegetative cover and are productive for most crops.

Entisols are soils that show little or no evidence of development. They occur in areas of recently deposited parent materials or in areas where erosion or deposition rates are faster than the rate of soil development, such as dunes, steep slopes, and flood plains.

Mollisols are soils that have a dark-colored surface horizon containing relatively high amounts of organic material. These soils are very fertile. They form under grass in regions that experience seasonal moisture deficit, such as the Great Plains.

Vertisols have a high content of expanding clay minerals. They swell in volume when they are wet and shrink as they dry. Cracks open and close periodically and show evidence of soil movement in the profile. These soils transmit water very slowly and have undergone little leaching. They tend to be high in natural fertility.

Landcover Types

According to Montana Natural Heritage Program Ecological Systems Field Guide, there are seven predominant landcover types in the county.

The Great Plains Sand Prairie is considered a unique ecological system due to coarse textured soils with exposed caprock sandstone formations occurring across the landscape. Native plant communities are dominated by needle and thread (*Hesperostipa comata*) with little bluestem (*Schizachyrium scoparium*) and threadleaf sedge (*Carex filifolia*) on the finer textured soils. Rhizomatous warm season grasses prairie sand reed (*Calamovilfa longifolia*), sand bluestem (*Andropogon hallii*) and big bluestem (*Andropogon gerardii*) occur intermittently on coarser soils.

The Great Plains Mixedgrass Prairie ecosystem covers much of the eastern two-thirds of Montana. Soils are primarily fine and medium-textured. Grasses typically comprise the greatest canopy cover, and western wheatgrass (*Pascopyrum smithii*) is usually dominant. Other species include thickspike wheatgrass (*Elymus lanceolatus*), green needlegrass (*Nassella viridula*), blue grama (*Bouteloua gracilis*), and needle and thread. Forb diversity is typically high. In areas where sagebrush steppe borders the mixed grass prairie, common plant associations include Wyoming big sagebrush (*Artemisia tridentata* ssp. *Wyomingensis*)—western wheatgrass. Fire and grazing are the primary drivers of this system. Drought can also impact it, in general favoring the shortgrass component at the expense of the mid-height grasses.

Cool season exotics such as Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis*), and Japanese brome (*Bromus japonicus*) increase in dominance because of their early spring growth that provides an advantage in acquiring resources over seeds that sprout and grow later. Thoughtful planned grazing is necessary to curb their invasion in these ecosystems (Fischer, 2019).

Big Sagebrush Steppe occurs throughout much of central and eastern Montana. The system is characterized by soils that are typically deep and non-saline and dominated by perennial grasses and forbs with a shrub cover of less than 10%. Wyoming big sagebrush is the most common shrub component. Sagebrush typically increases in the system following heavy grazing and fire suppression.

Cultivated cropland is used to produce crops, such as small grains, corn, peas and safflower. Agricultural plant cover is variable depending on the season and type of farming.

Pasture/Hay land typically has perennial herbaceous cover used for livestock grazing or hay production. CRP lands are included in this landcover type.

Great Plains Badlands are areas containing highly eroded, rugged and often colorful landforms with sparse vegetation. Soils formed from highly erosive parent material often contain marine and other fossils. Badlands areas provide habitat for mule deer and other wildlife but support only intermittent grazing.

Woodland vegetation is uncommon in the semi-arid grasslands of eastern Montana and the Northern Great Plains. Native deciduous woodlands occur as isolated islands or stringers along rivers, streams and drainageways or other areas where moisture relations are improved over that of surrounding grasslands. On the broad floodplains of major rivers and streams forests are dominated by cottonwood and green ash. Upland woodlands dominated by green ash, elm (*Ulmus Americana*), box elder (*Acer negundo*) and chokecherry occur on cool slopes and along drainageways of small order streams. These

woodlands are often referred to as hardwood draws or woody draws. Hardwood draws are important habitats on the Northern Great Plains. Although they occupy only one to four percent of the landscape, they are critical habitat for many wildlife species. They are also important to livestock for providing shade in summer and thermal cover in winter.

Evidence throughout the Northern Great Plains suggests that most hardwood draws are declining. Woodland communities, once having dense stratified canopies and undergrowth dominated by shrubs and native graminoids and forbs, are being replaced by open canopy forests with little or no tree regeneration, few shrubs in the understory and a ground layer dominated by introduced sod-forming grasses. Restoration of declining hardwood draws hinges on regeneration of green ash, the dominant tree in most stands (Lesica, 2009).

Appendix A6 shows landcover data provided by the Montana State Library. Several additional landcover types appear in this illustration. The scale of the map makes it difficult to discern small areas of certain types such as Great Plains Ponderosa Pine Woodland and Savanna (abbreviated in the legend) and Great Plains Wooded Draws and Ravines. However, the map provides a clear visual of the extent of cultivated land throughout the county, and the location of the grasslands, badlands, sagebrush steppe and introduced vegetation.

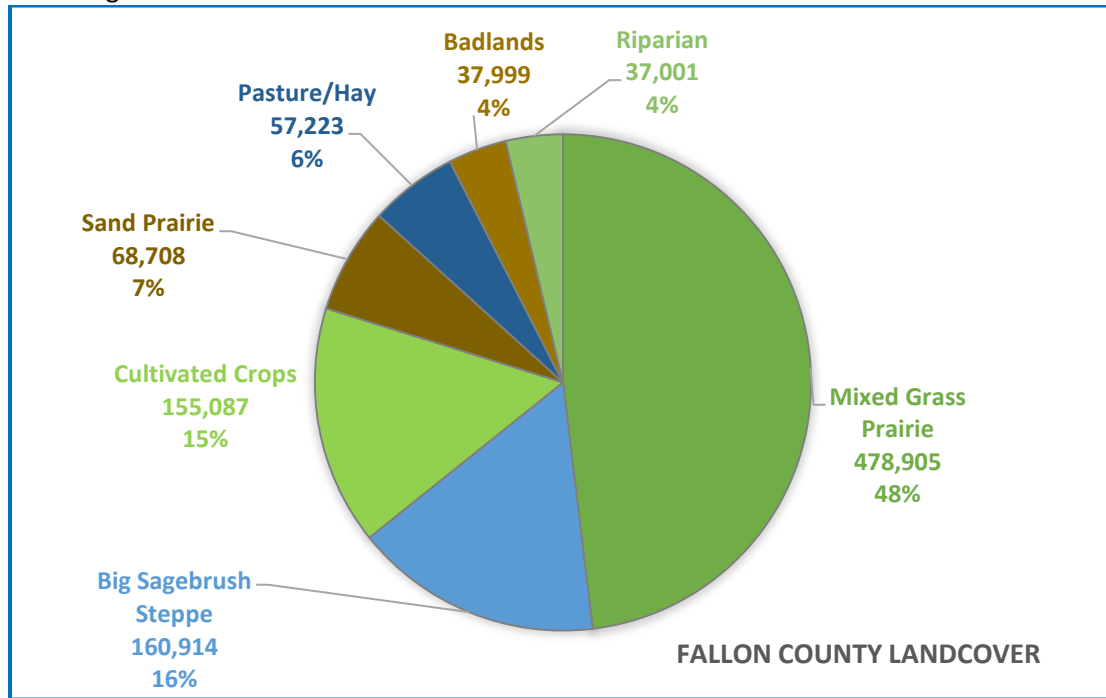


Figure 4 Landcover Types, Acres of Each and Percent of Total Landcover, Fallon County, Montana

Land Ownership

Most of the land in Fallon County is privately owned. Montana Department of Resources and Conservation (DNRC) administers 70,427.63 acres of State Trust lands, about six percent of the land in the county. The US Department of the Interior, Bureau of Land Management holds about 216,900 acres (about 21%) and Montana Fish Wildlife and Parks maintains 581 acres around South Sandstone Reservoir, discussed further in Plants and Animals. Local government owns just a little more than 1,080 acres in two parcels north of Plevna Road South and two others on County Road E525 (Appendix A7).

SOILS

Geology

The geologic formations and members that underlie Fallon County are depicted in Appendix A8. A formation in this context is a rock unit that has a distinctive appearance compared to surrounding rock layers and is of enough thickness and extension to be plotted on a map. Formations often contain a variety of related or interlayered rock types; they are sometimes divided into smaller units known as members.

Kfh. Fox Hills Formation. Fox Hills Sandstone consists of marine and brackish water deposits of cross-bedded sandstone, shale, and siltstone. It is 100 to 150 feet thick and crops out in a relatively narrow band. In this part of Montana, the upper member of the Fox Hills Sandstone is identified as the Colgate Member.

Kfhc. Colgate Member of the Fox Hills Formation (Cretaceous). White to yellowish, fine- to medium-grained, porous sandstone. Brackish to marine shoreline. Only present near Glendive and in several other isolated areas in eastern Montana. Thickness can be up to 130 feet.

Kfft. Timber Lake Member of the Fox Hill Formation. Brownish-gray siltstone and fine-grained sandstone that weathers medium brown. Hummocky bedding and trough crossbedding are characteristic of the member. Thickness can be up to 70 feet.

Kftc. Trail City Member of the Fox Hill Formation—Interbedded light-gray siltstone and dark gray shale. The member is a transition interval between the underlying Pierre Shale and the sandy Timber Lake Member. Thickness ranges from fifteen to thirty-five feet.

Khc. Hell Creek Formation. Upper Cretaceous. Dominantly gray and gray-brown sandstone, smectitic (two parts clay to one part other) silty shale and mudstone, with a few thin beds of lignite or carbonaceous shale. The Hell Creek Formation consists of nonmarine and brackish water deposits of sandstone, shale, and lignite and is the last layer to contain dinosaur fossils. The formation becomes sandier with depth and, together with the underlying Colgate Member, forms a relatively thick and continuous regional aquifer. This aquifer supplies much of the domestic water and stock water in the region. Typical soils derived from this formation include the Archin, Eapa, and Ynot series. The formation ranges from 260 to 330 feet thick.

Kp. Pierre Formation. Marine. Dark gray, partly silty shale with abundant bentonite beds and zones of gray, calcareous concretions. Pierre Shale is the oldest formation exposed in the county and crops out only in the center of the Cedar Creek Anticline. It is approximately 1,100 feet thick and consists primarily of impure, dark gray marine shale. Typical soils derived from this formation include the Bascovy, Gerdrum, and Neldore series.

Qtat. Alluvial terrace deposit (Pleistocene and Pliocene epochs). Light-brown, yellowish-brown, brown, and light-gray gravel, sand, silt, and clay at elevations higher than Qat. Nearly all rock fragments are well rounded and composed dominantly of quartzite, chert, volcanic rocks, ironstone concretions, sandstone, and siltstone with minor amounts of shale, agate, silicified wood, jasper, chalcedony, and clinker. Thickness is about 30 feet.

Qal. Alluvium. Sedimentary. Gravel, sand, silt, and clay deposits of stream and river channels, and floodplains.

Qat. Light-gray to light-brown, stratified, moderately well-sorted sand and gravel at elevations above present floodplain. Thickness is generally less than 30 feet.

Tfe. The Ekalaka Member of the Fort Union Formation represents transitions from the Ludlow Member and possibly part of the lower Tongue River Member. Orange, yellow or tan, fine- to medium-grained sandstone with some thin mud-rock and shale interbeds that locally contain thin lignite beds, sandstone and clays. Thickness ranges up to 180 feet.

Tfld. Ludlow Member of Fort Union Formation. Gray and brown shale, siltstone, silty or bentonitic claystone, sandstone, and coal. Alluvial plain with marine-influenced tongues. Weathers to badlands topography. Thickness may be as much as 755 feet.

Tftr. Tongue River Member of Fort Union Formation. This member is composed of yellowish orange sandstone, sandy and silty carbonaceous shale, and coal from ancient alluvial plains. Locally contains plant and small vertebrate fossils and several prominent lignite beds. Orange silty limestone beds form flat-topped caprocks. Thickness can be as much as 984 feet. The Tongue River Member contains many thick coal beds. Typical soils derived from this formation include the Cabbart, Cambeth, and Eapa series. The Kirby soil developed on baked shale (Vuke, 2007).

Petroleum Resources

Petroleum and agriculture have been the primary drivers of the economy in Fallon County since the early 1900s. Oil and gas exploration, production, and support industries continue to play a significant role in the development and economy of Fallon County.

The county produces 17.05 % of all oil in Montana, ranking second in the state for production behind Richland County. There are 485 active oil wells in the county. Fallon County ranks eighth in Montana for natural gas, producing about one percent of the state total (ShaleXP, 2019).

Figure 5 displays oil and gas production from 1986 to present. Note that production peaked in 2006 and 2008, respectively, and the petroleum industry is currently in decline (MT DNRC BOGC, 2019). One barrel of oil is equivalent to forty-two US gallons. MCF is an abbreviation where the Roman numeral 'M' stands for a thousand and CF for cubic feet. A well that generates 400 MCF of gas per day produces 400,000 cubic feet of natural gas.

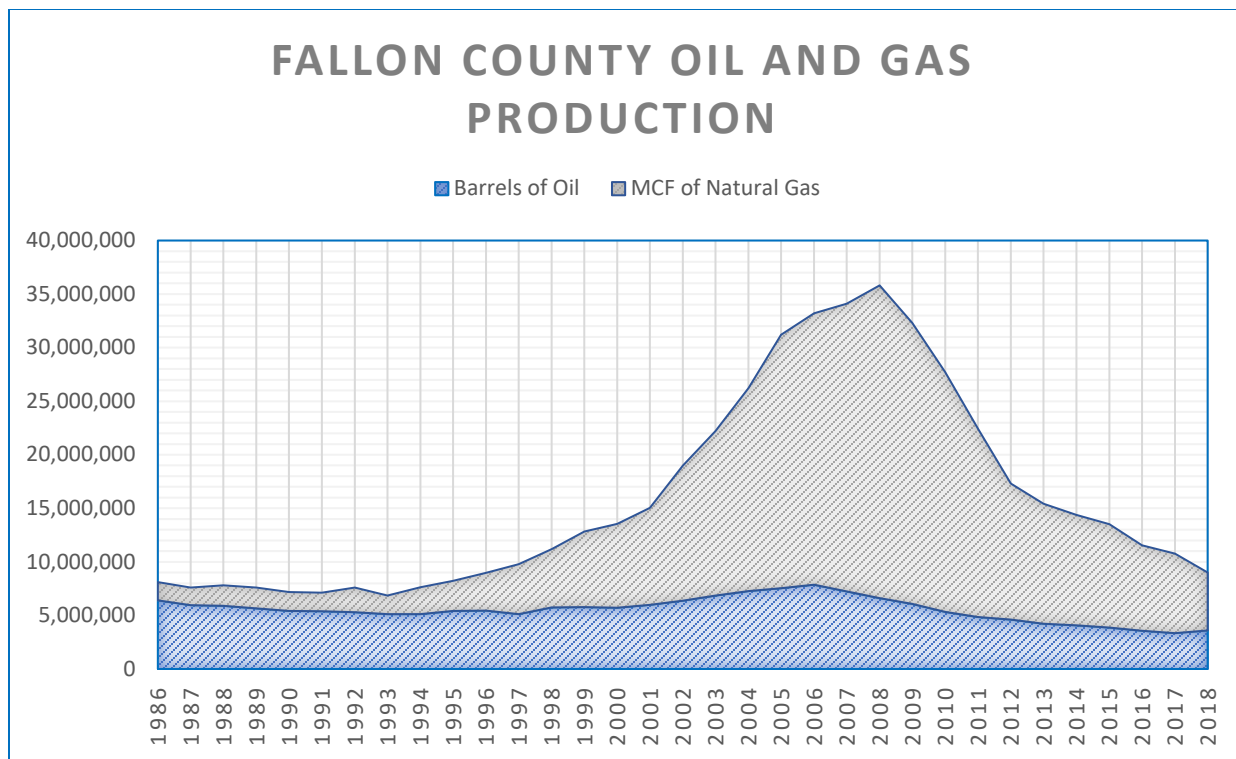


Figure 5 Petroleum Production, Fallon County Montana

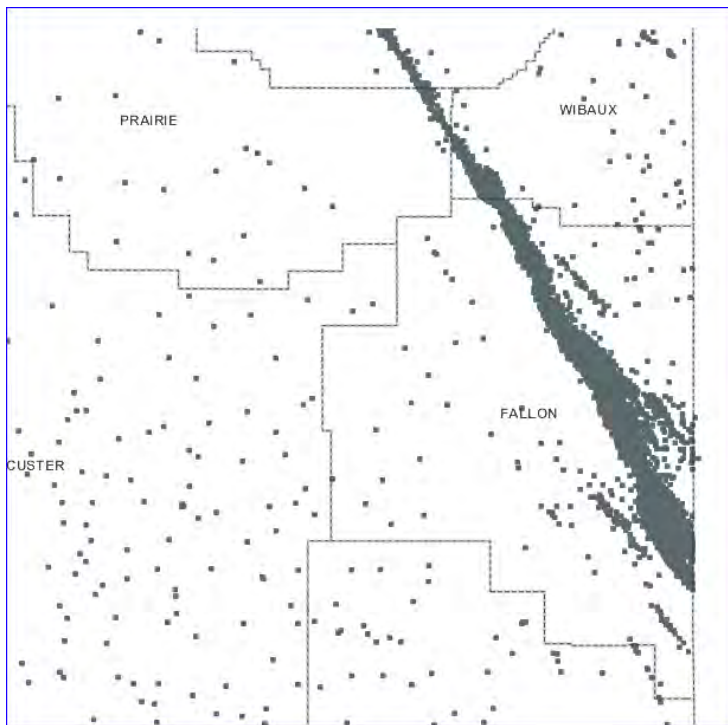


Figure 6 Wells Along the Cedar Creek Anticline

Figure 6 shows the relative locations of all wells in the county and surrounding area. Some of these are injection wells, water wells and test wells, but the vast majority are oil, and to a lesser extent, gas wells. When compared to the map of the geologic formations in Appendix A7, it is apparent that most of the petroleum lies beneath the Pierre Shale Formation, located along the Cedar Creek anticline.

Cedar Creek Anticline

Anticlines are folded rock formations that have an upward convex shape with the oldest rock at the core or the center of the arch. They are formed from rock that was originally relatively flat but was subjected to pressure from local faulting or plate tectonics causing the rock to wrinkle, compress and fold. Major uplift and granitic intrusions in the Black Hills occurred approximately fifty million years ago,

accompanied by regional folding and faulting. The Cedar Creek Anticline was formed concurrently with the processes that created the Black Hills.

Anticline formations, especially those formed of sedimentary rock layers, can form structural traps that capture pockets of hydrocarbon. Impermeable rock beds above and surrounding the pockets trap the hydrocarbons, causing oil and natural gas to build up in the pore spaces in the reservoir rock at the core of the arch. The lower part of the reservoir rock often fills with salty water, sealing the hydrocarbons into the arch.

The Cedar Creek Anticline is a collection of structural traps, inter-connected by faulting. Located in southeast Montana, the Cedar Creek anticline is a northwest trending structure stretching 115 miles southeast from Glendive, Montana through Dawson, Prairie and Fallon Counties to Buffalo, South Dakota. The feature is found on the flank of the Williston basin. The structure is expressed at the surface in beds of Upper Cretaceous and Early Tertiary age; it is an asymmetric fold with the steep side on the west. This structure was discovered officially by members of the United States Geological Survey while mapping the coal deposits of Eastern Montana. Oil was discovered on the Cedar Creek Anticline in the Gas City Oil Field in 1951. Thirteen fields on the anticline have produced over a half billion barrels of oil from approximately 2,700 wells (Davis, John, Denbury Resources Inc. , 2013).

Highly Erodible Soils

Soils are designated as highly erodible based on their susceptibility to movement caused by the actions of wind or water. Soils that erode at rates that cannot sustain continued crop production or are in poor health which restricts what crops can be planted or what activities can occur are considered highly erodible (HEL). Soils that NRCS designates as highly erodible are subject to conservation compliance provisions regarding USDA Farm Bill programs participation. According to the NRCS Frozen Soils list for Fallon county, about 73% of the 165 soils are highly erodible, or HEL.

Soil Series

Soil series are made up of soils with profiles that are almost alike. Except for differences in the texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement. There are 62 soil series, or taxonomic units, in Fallon County.

A pdf version of the Fallon County soil survey is available on line at:

https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/montana/MT025/0/Fallon_Part1.pdf

Prime Farmland, Farmland of Statewide Importance and Prime Farmland if Irrigated

Prime farmland is a designation assigned by U.S. Department of Agriculture defining land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these land uses. Fallon County has no Prime Farmland.

Soils of Statewide Importance

These are soils that have been determined to be of significance for production of food, feed, fiber, forage, and oilseed crops. These soils have an adequate and dependable water supply from precipitation or irrigation, favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air, are not excessively erodible or saturated with water for a prolonged period, and either do not flood frequently

or are protected from flooding. They are available for farming, but could currently be cropland, pastureland, rangeland, forestland, or other land.

These soils occur on 247,269 acres, or just over 23.8 % of the county as shown in Appendix A9. Altogether, there are 43 soils with this designation. Table 1 lists the six soils that make up over 49% of the county's Soils of Statewide Importance and their relative proportions.

Table 1 Farmland of Statewide Importance

Map Unit	Name	Acres	Percent of Farmland of Statewide Importance	Percent of Land in Fallon County
70C	Busby Fine Sandy Loam, 2-8% slopes	9,186	3.7	0.8
193C	Lonna Cambeth Silt Loam, 2-8% slopes	13,039	5.3	1.2
93C	Lonna Silt Loam, 2-8% slopes	19,265	7.8	1.8
83C	Chinook Silt Loam, 2-8% slopes	20,882	8.4	2.0
72C	Kremlin Loam, 2-8% slopes	23,447	9.5	2.2
84C	Eapa Loam, 0-2% slopes	35,453	14.3	3.4

Prime if Irrigated Farmland

Prime if irrigated soils are those with the best combination of physical and chemical characteristics for agriculture such as the soil quality and adequate growing season necessary to produce high yields of crops suited to the region but occur in areas of limited rainfall. These soils cover about 37,874 acres in Fallon County and are also shown on the map in Appendix A9. Three soils comprise nearly 73% of the Prime if Irrigated Farmland in the county.

Table 2 Prime if Irrigated Farmland

Map Unit	Name	Acres	Percent of Prime if Irrigated Farmland	Percent of Soils in Fallon County
56A	Havre Loam, 0-2% slopes	20,376	53.8	1.96
43B	Grail Silt Loam 0-4% slopes	4,088	10.8	0.4
84A	Eapa Loam, 0-2% slopes	3,349	8.9	0.32

Hydric Soils

Hydric soils are characterized by frequent, prolonged saturation and low oxygen content, which lead to anaerobic chemical environments where reduced iron is present. This definition includes soils that developed under anaerobic conditions in the upper part but no longer experience these conditions due to hydrologic alteration such as artificial drainage or protection by ditches or levees.

Fallon County has sixteen soils that meet the criteria for hydric soils totaling 2,425.6 acres or just over 0.2% of soils in the county. Hydric Criteria are:

Criteria 1--All Histels except Folistels and Histosols except Folists.

Criteria 2--Map unit component that, based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or show evidence that the soil meets the definition of a hydric soil.

Criteria 3--Map unit components that are frequently *ponded* for long duration during the growing season that, based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States or show evidence that the soil meets the definition of a hydric soil.

Criteria 4--Map unit components that are frequently *flooded* for long duration during the growing season that, based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or show evidence that the soils meet the definition of a hydric soil.

Table 3 Hydric Soils of Fallon County, Montana

Map Unit Symbol	Name	Description	Acres	Landform	Hydric Criteria
386E	Yamacall-Cabbart loams, 15 to 35 % slopes	Poorly drained soils	129.9	draws	2
57A	Harlake silty clay, saline, 0 to 2 % slopes	Poorly drained & ponded soils	151.7	flood plains	2, 3
7B	Hanly-Ryell fine sandy loams, 0 to 4 % slopes	Poorly drained & ponded soils	116.1	flood plains	2, 3
E4121A	Havrelon loam, 0 to 2 % slopes, occasionally flooded	Fluvaquents, channeled, frequently flooded	1080.3	channels	2, 3, 4
E4121A	Havrelon loam, 0 to 2 % slopes, occasionally flooded	Lallie, occasionally flooded	648.2	oxbows	2

WATER

Hydrology

The Hydrologic Unit Code (HUC) is a numbering system for watersheds developed by the U.S. Geological Survey (USGS) to provide a common coding system for state and federal agencies. Each unique HUC is attached to a specific watershed, enabling different agencies to have common terms of reference and to agree on the boundaries of the watershed. The entire country has been mapped with three levels of Hydrologic Unit Codes: 8-digit codes for large watersheds known as sub-regions, 10-digit codes for watersheds, and 12-digit codes for smaller or sub-watersheds.

Portions of six sub-regions occur in Fallon County. These are shown in Figure 5 as polygons with brown labels and thick boundaries. Waters in the Lower Yellowstone and O'Fallon subregions flow northwest to the Yellowstone River. The subregions on the east side of the county drain into the Little Missouri

River to the north and east. Within each of the subregions are 10-digit watersheds labeled in black. These are divided into sub-watersheds, shown on the map as tan or rose-colored polygons without labels.

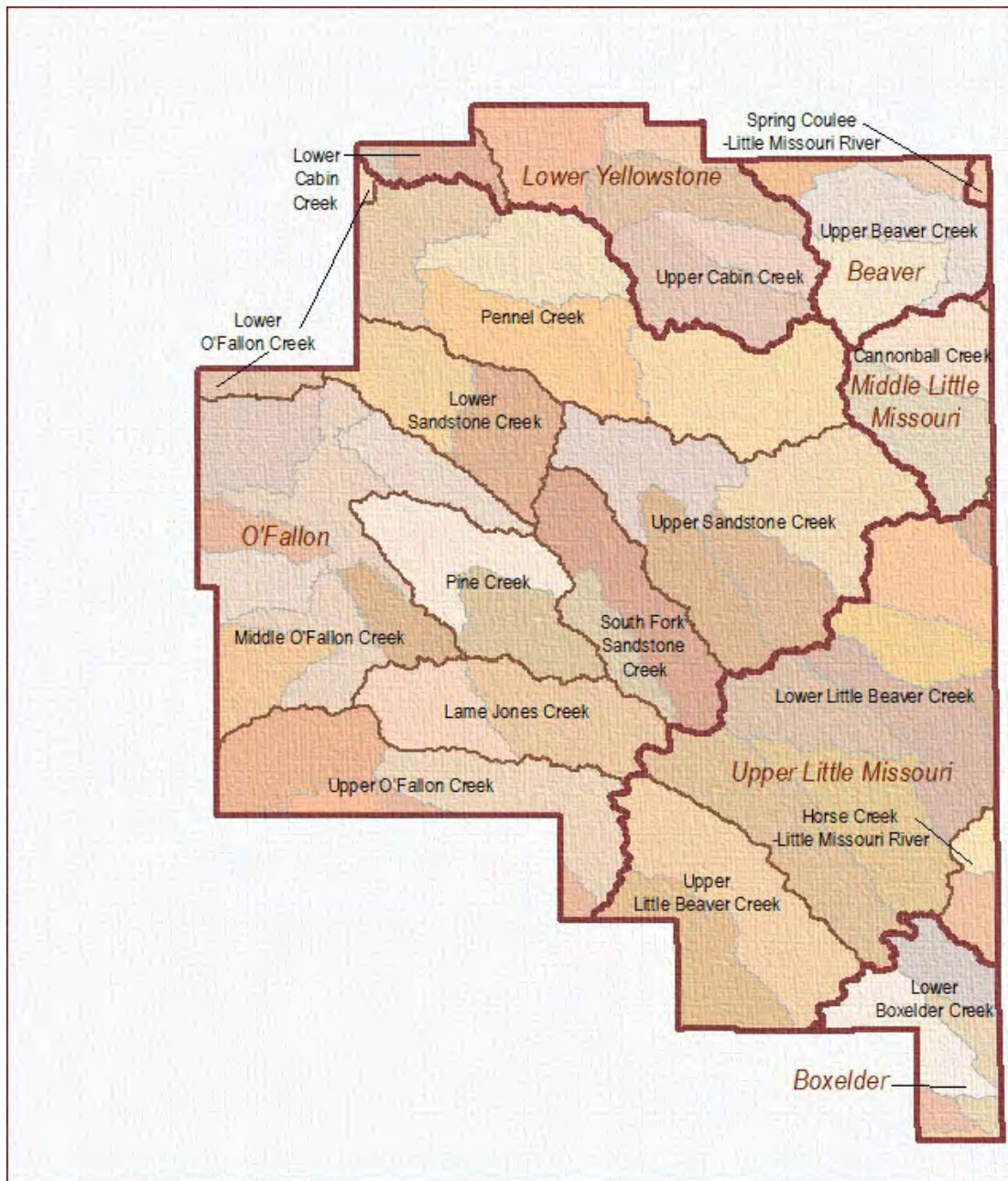


Figure 7 Hydrology of Fallon County, Montana

303(d) Listed Streams

Section 303(d) of the Clean Water Act requires states, territories and authorized tribes to develop, and update every two years, lists of water that are impaired or threatened by one or more pollutants. Impaired waters are those that don't meet one or more Water Quality Standards.

A TMDL is the calculation of the maximum amount of a pollutant allowed to enter a waterbody for the waterbody to meet water quality standards for that pollutant. Information about the Clean Water Act, impaired waters, TMDL calculations and other topics pertaining to water quality can be found on the Environmental Protection Agency's Impaired Waters and TMDLs website at:

<https://www.epa.gov/tmdl/overview-total-maximum-daily-loads-tmdls#1>

Six Fallon County waterbodies appear on the Montana Department of Environmental Quality 303(d) list of impaired waters.

Category 1: Waters for which all applicable beneficial uses have been assessed and all uses are determined to be fully supported.

- Beaver Creek, all stream reaches.

Category 2: Available data and/or information indicate that some, but not all the beneficial uses are supported.

- O'Fallon Creek from the Carter County Border to Mildred, Montana. There is insufficient information to determine whether primary contact recreation is or is not impaired.

Category 3: Insufficient or no data available to determine whether any beneficial use is attained.

- Boxelder Creek from Corral Creek to the South Dakota border. This stream reach has not been assessed.

Category 5: Waters where one or more applicable beneficial uses are impaired or threatened and a TMDL is required to address the factors causing the impairment or threat.

- Pennell Creek, all stream reaches. The stream does not fully support aquatic life due to Total Dissolved Solids from unknown sources.
- Sandstone Creek, all stream reaches. The stream does not fully support aquatic life due to nitrate-nitrite and total nitrogen from agriculture and municipal point source discharges.
- Cabin Creek, all stream reaches. The stream does not fully support aquatic life due to dissolved oxygen and sedimentation-siltation from natural sources, rangeland grazing and dams or impoundments, and total nitrogen from grazing (MT DEQ, 2019).

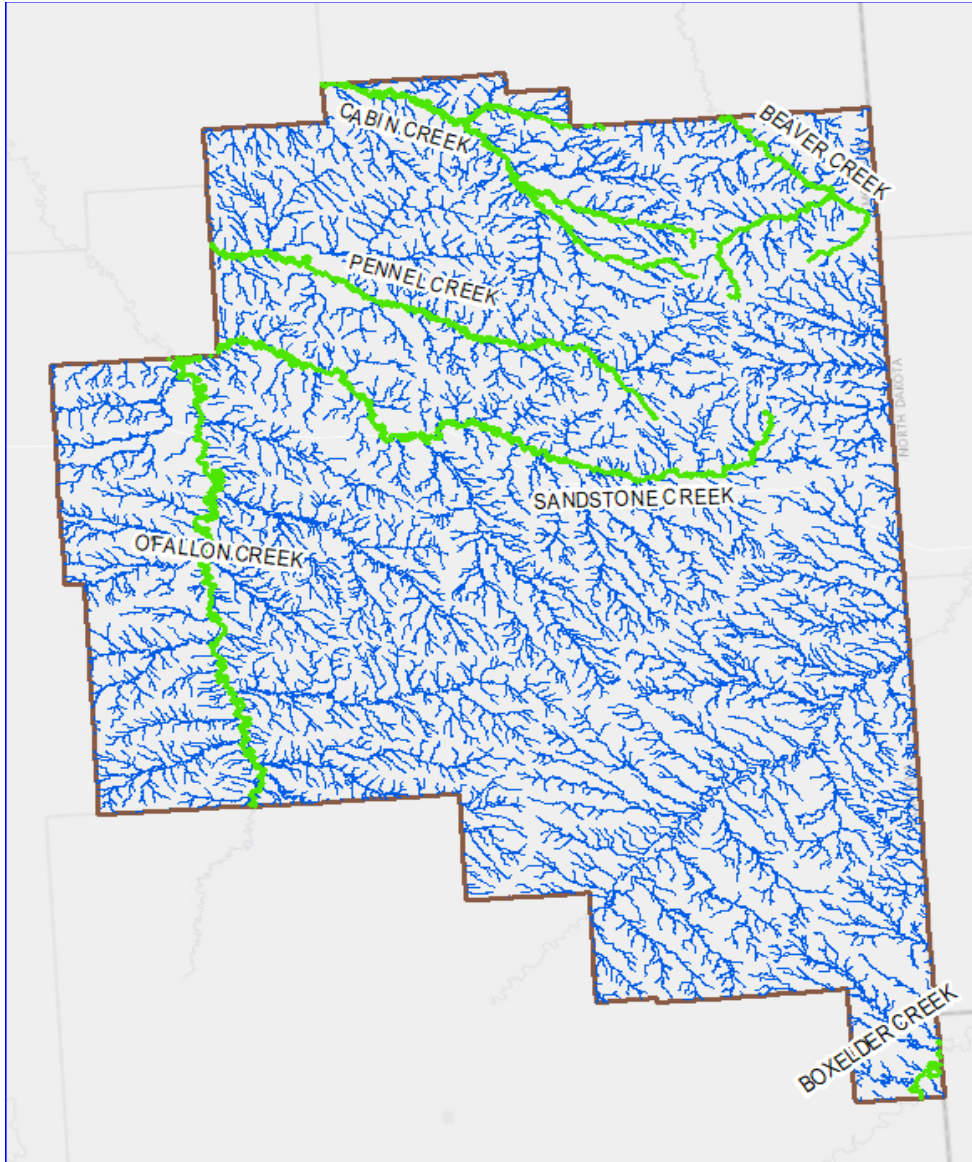


Figure 8 Impaired or Listed Waters

Surface Water

USGS Wyoming-Montana Water Science Center in Cooperation with U.S. Army Corps of Engineers maintains stream gauges in various locations throughout eastern Montana as part of the Groundwater and Streamflow Information Program network of Federal Priority Streamgages (FPS). There are no stream gauges in Fallon County.

Little Beaver and O'Fallon Creeks are considered perennial streams, but none of the streams in the county are perennial for their entire length. Numerous small reservoirs and ponds have been installed to provide water for livestock.

Ground Water

Montana Bureau of Mines and Geology Ground Water Information Center (GWIC) maintains two monitoring wells in Fallon County. Ground-water level and water-quality measurements are collected over time to determine normal water levels in wells, changes in water levels relative to climatic conditions, responses of water levels to development, and long-term water-quality trends. Locations, histograms of static water level and other information can be accessed at:

<http://mbmgwic.mtech.edu/sqlserver/v11/data/dataProject.asp?MTCounty=FALLON&project=GWAAMON&datatype=swl&>

MBMG provides statistics for the 1,850 wells in wells in Fallon County (MBMG GWIC, 2019).

Table 4 Ground Water Well Data

SOURCE	
Fort Union Formation	38.4%
Hell Creek Formation	21.3%
Fox Hills-Hell Creek Aquifer	18.4%
Fox Hills/Sandstone	13.8%
Other	8.1%
DEPTH	
0-99 feet	29.5%
100-199 feet	24.8%
200-299 feet	13.8%
300-399 feet	7.6%
400-499 feet	4.7%
> 500 feet	19.6%

Ground water in Fallon County is obtained primarily from the Fox Hills-Lower Hell creek Aquifer in locations where the overlying Fort Union Formation is not too thick. Because of the controlling structure of the Cedar Creek Anticline, many of these wells flow at the surface. In the Fort Union Formation, the Tongue River Member typically yields eight to fifteen gallons per minute (gpm) and the Ludlow Member typically three to eight gpm. The water is produced from sandstone and baked shale beds. Shallow wells often fail after years of use when the limited sandstone lens is completely drained (USDA NRCS, 2003).

AIR AND ENERGY

Air Quality

Montana DEQ Air Quality Bureau maintains air quality monitoring stations in Malta, Broadus and Sidney, Montana. Ambient temperature, wind speed and direction and pollutants including NO, NO₂, NO_x, ozone and particulate matter are monitored. There are no areas of non-attainment in Fallon County (MT DEQ, 2019).

Utilities

Southeast Electric Cooperative serves areas of Carter, Custer, Fallon, and Powder River Counties in Montana, Harding County, South Dakota and Crook County, Wyoming. The co-operative has 948 members on 1,718 miles of line. Much of Fallon County, including the City of Baker, is serviced by Montana Dakota Utilities which provides retail natural gas and electric services to parts of Montana, North Dakota, South Dakota and Wyoming in an area covering more than 168 thousand square miles.

GoldenWest Electric Co-operative also serves rural customers in areas of Dawson, Fallon and Wibaux Counties. The co-op includes 658 members and operates 1,120 miles of power lines.

PLANTS AND ANIMALS

South Sandstone Reservoir

South Sandstone is a man-made reservoir built at the confluence of Coon Creek and the South Fork of Sandstone Creek, south and west of Baker and south of Plevna. The reservoir covers approximately 288 acres; the entire property is 580.93 acres, owned by the State and administered by Montana Fish, Wildlife and Parks. It lies within FWP Region 7, Eastern Fishing District. As one of only two appreciably large water bodies in the county, Sandstone is particularly important to recreationists and waterfowl. The site is shown in Appendix A7 as the small green shape near the center of the map.

South Sandstone is maintained as a public fishing access site. It is stocked with game fish and supports populations of large and smallmouth bass, bullhead catfish, bass, crappie, walleye and northern pike. One native fish, Brook Stickleback (*Culaea inconstans*), lives in the reservoir as well.

Brook sticklebacks are members of the Percidae (perch) family. Stickleback have smooth bodies without scales. Adults have large heads, large eyes, sides covered with a row of bony plates, five well-defined spines on their backs, and tiny pelvic fins with one spine and one soft ray. Their bodies are olive-green with mottling or light spots on the sides; their undersides are light yellow to silver.

During breeding season the males are black with tinges of red; females may be dusky. Sticklebacks feed on small crustaceans and insects and can reach a length of about three inches.

In Montana, this species is found east of the continental divide in streams of the northern prairies and northwestern Great Plains. It has been introduced upstream in the Yellowstone River basin and the west side of the divide. Preferred habitat is slow streams and lakes with submerged plants. They spawn in the spring in nests built from pieces of vegetation glued together with a special kidney secretion.

Brook Stickleback are listed as a Potential Species of Concern in Montana with State Rank of S4 "Apparently secure, though it may be quite rare in parts of its range, and/or suspected to be declining". Intensive agriculture, overgrazing, road crossings, dams, and exotic species (northern pike in particular) all represent threats to brook stickleback (MNHP, 2019).



Figure 9 Brook Stickleback

Animal Species of Concern

USFWS Listed Species

The United States Fish & Wildlife Service has listed two species of native birds and one animal as endangered or threatened under the Endangered Species Act in Fallon County (USFWS, 2019).

Whooping Crane (*Grus americana*)—Listed Endangered.

Whooping Cranes are the world's rarest crane and the tallest birds in North America. Adult height is about five feet, wingspan can be up to seven- and one-half feet. Average adult weight is about fifteen pounds. Once found throughout North America, the last wild flock of Whooping Cranes had been reduced to fewer than twenty birds by the 1940's due to habitat loss and hunting. Intensive conservation efforts and international cooperation between Canada and the United States rescued the species from extinction, but they remain extremely rare.

Habitat loss remains one of the biggest threats facing wild Whooping Cranes. Collisions with wind turbines and power lines are an ongoing threat. Whooping crane utilize migratory habitat in eastern Montana. They are not known to breed in the state (Audubon, 2019).

Piping Plover (*Charadrius melodus*)—Listed Threatened, Designated Critical Habitat.

Piping Plover populations are also in decline due to habitat loss caused by alterations to river systems. These small shorebirds are distinguished by a single black band around their necks and short yellow-to-orange bills with black tips. Piping Plovers nest on shorelines and islands of alkali lakes in North Dakota and Montana and on sandbar islands and reservoir shorelines along the Missouri River. Dam construction, water diversion and water withdrawals change river flow and drastically reduce the amount of available nesting habitat. Human activity has increased predation which decreases nest success and chick survival (NRCS, 2015). Montana Natural Heritage Program range map of breeding and wintering habitat shows no Piping Plover habitat in Fallon County (MNHP, 2019).

Northern Long-Eared Bat (*Myotis septentrionalis*)—Listed threatened.

In Montana this species is known to occupy specific habitat within a limited range along the Missouri and Yellowstone river drainages near the North Dakota border, as shown in Figure 10 from the MNHP Northern Myotis Field Guide. These small, light brown bats are most often found hibernating in abandoned mines in the river breaks in Richland County. In the summer they roost in riparian forested areas dominated by cottonwood trees. They emerge to feed at dusk using echolocation to hunt moths, flies, leaf hoppers and beetles (MNHP, 2019).

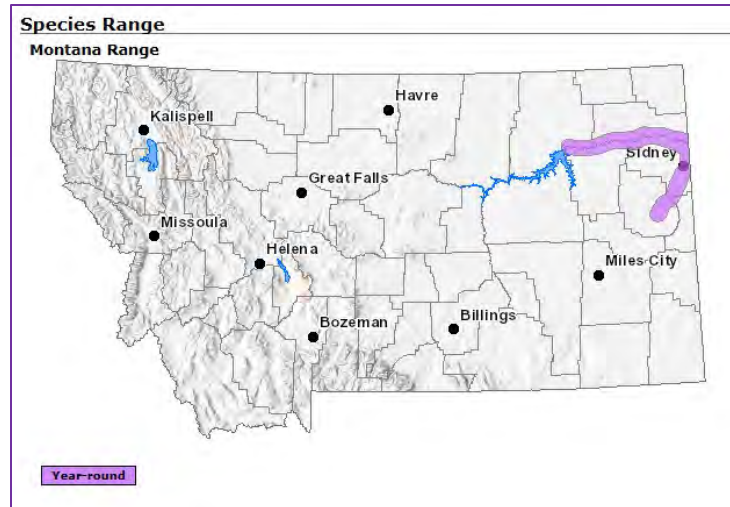


Figure 10 Range of The Northern Long-Eared Bat

Long-Eared Bat populations in other areas of the country have suffered tremendous losses due to white nose syndrome. Regional extinction has occurred in some locations. White-nose syndrome is caused by a fungus, (*Pseudogymnoascus destructans*). It attacks the bare skin of bats while they're hibernating. As it grows it causes changes in bats' behavior, causing them to become active during hibernation, using up the stored fat that they need to survive the winter. White-nose syndrome continues to spread rapidly across the United States and Canada, mostly through bat-to-bat contact.

According to the White-Nose Syndrome Response Team, there were no reported occurrences of the disease in long-eared bats in Montana as of August 2019 (WNS Response Team, 2019).

Grassland Birds

Four species of grassland birds are Montana Species of Concern in Fallon County: Baird's Sparrow (*Centronyx bairdii*), Chestnut-Collared Longspur (*Calcarius ornatus*), Sprague's Pipit (*Anthus spragueii*), and Long-billed Curlew (*Numenius americanus*).

Vickery, et al. (2000) explain the recent decline of grassland nesting bird, probable causes of their decline and in *Grassland Birds: An Overview of Threats and Recommended Management Strategies*.

"During the past quarter century, grassland birds have experienced steeper, more consistent, and more widespread population declines than any other avian guild in North America. While some grassland species are Neotropical migrants, most are short-distance migrants that winter primarily in the southern United States and northern Mexico. The winter ecology of most grassland birds is poorly known; winter survivorship could be a critically important factor in the long-term declines that some species have experienced.

Shortgrass prairies evolved under intense grazing by prairie dogs and bison. Consequently the shortgrass prairie bird fauna evolved to select a variety of different site characteristics, created within landscapes receiving grazing pressure ranging from light to severe. Unfortunately, current range management practices strive to graze rangelands uniformly. These practices remove or inhibit heterogeneous grazing impacts across landscapes, and do not favor the specific habitat requirements of many species. For example, Mountain Plovers require heavily grazed sites for breeding, but Lark Buntings prefer denser vegetation. Thus, moderate grazing everywhere is unlikely to result in suitable habitat for either species.

In many locales, insufficient grazing has led to the invasion of grasslands by shrubs and forbs. Rather than opposing grazing as a management tool in all grasslands, conservation groups should encourage grazing that imitates natural conditions as closely as possible.” (Vickery, 2000)

Baird’s Sparrow



- Prefers to nest in native prairie; requires a relatively complex plant structure including areas of light to no grazing. Feeds on seeds, insects and spiders.
- Migrates from winter habitat in Mexico to the grasslands of the northern plains in Montana, North Dakota and Canada.
- Loss of native prairie habitat due to agricultural conversion and loss of winter habitat due to overgrazing are thought to be causes of population decline (MNHP, 2019).

Chestnut-collared Longspur



- Prefers open, sparse vegetation in native pastures with short-to-medium grasses that have been recently disturbed (grazed, mowed or burned).
- Summer diet includes insects, especially grasshoppers, caterpillars, spiders and seeds. In the winter it eats seeds from grain, sunflowers and grasses.
- Winter habitat is the grasslands of the southwestern United States and north-central Mexico. Breeding grounds are grasslands in Montana and North Dakota and southern Canada.
- Conversion of native prairie to agriculture and urban development has eliminated the Chestnut-collared Longspur from much of its historical breeding range (MNHP, 2019).

Sprague's Pipit

- Do not nest in cropland and are uncommon or absent in non-native grasslands. They tolerate some grazing of their habitat but do not nest where it is overgrazed. They prefer scattered shrubs and relatively little bare ground.
- Summer diet is mostly insects and other arthropods, with some seeds. Little is known about the winter ecology and diet of Sprague's Pipit.
- Breeds in the north-central United States in Minnesota, Montana, North Dakota and South Dakota as well as south-central Canada. Wintering occurs in the southern US.
- Conversion from prairie to cropland and pasture along with excessive grazing are identified as the cause of this species' decline (MNHP, 2019).

Long-billed Curlew

- Breeds in Areas with sparse, short grasses, including shortgrass and mixed-grass prairies and agricultural fields.
- Outside of the breeding season it is found in wetlands, tidal estuaries, mudflats and beaches (The Cornell Lab, 2019).
- Degradation or loss of grassland breeding habitat to agricultural and residential development is the greatest threat to the Long-billed Curlew. Additionally, other human disturbances such as off-road vehicle travel and agricultural practices such as chaining or dragging to remove sagebrush can destroy nests if done in the spring. (MNHP, 2019)

Figure 11 Montana Species of Concern, Grassland Birds of Fallon County, Montana

Greater Sage-grouse

Montana, along with several other western states, has been the focus of multiple recent petitions to list the Greater Sage-grouse (*Centrocercus urophasianus*) under the Federal Endangered Species Act. The primary concerns for sage-grouse are loss and fragmentation of their habitat. In Montana habitat loss

due to conversion of sagebrush steppe to cropland and energy development is thought to be the biggest threats to Greater Sage-grouse.

On September 22, 2015 the U.S. Fish and Wildlife Service determined that the Greater Sage-Grouse did not warrant listing protections under the Endangered Species Act. It was decided that the primary threats to populations had been ameliorated by conservation efforts implemented by Federal, State, and private land owners (USFWS, 2015).

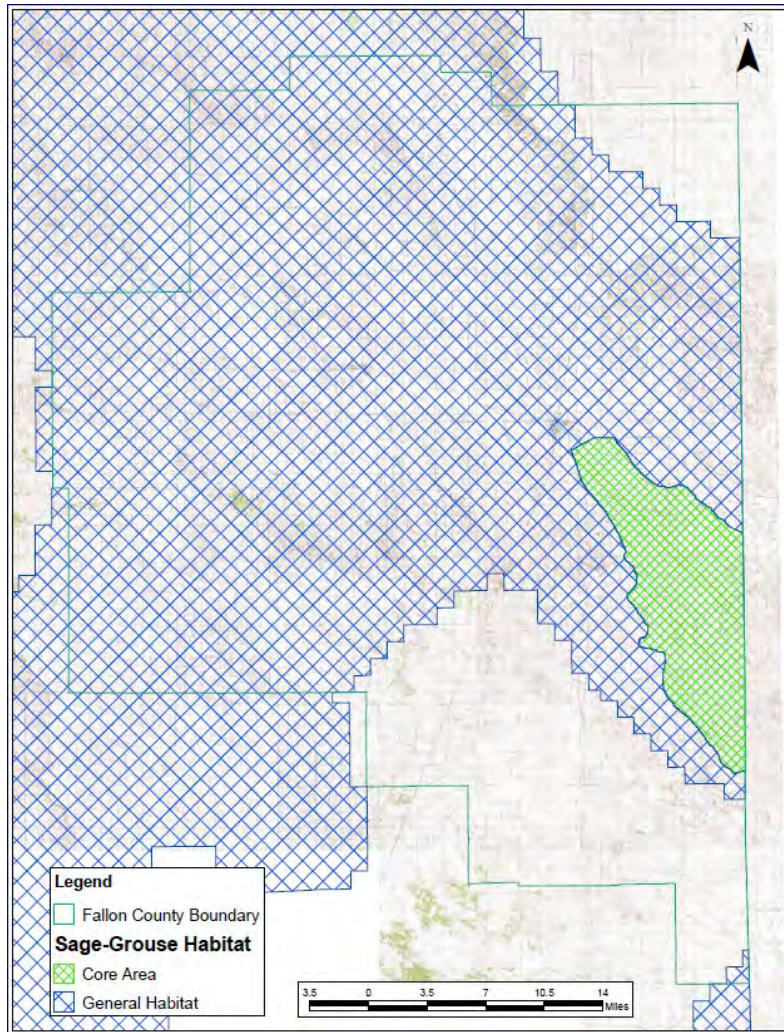


Figure 12 Greater Sage-Grouse Habitat in Fallon County, Montana

The Montana Natural Heritage Species of Concern Report lists the species category S2: At risk because of very limited and/or potentially declining population numbers, range and/or habitat, making it vulnerable to global extinction or extirpation in the state (MNHP, 2019).

Although of Fallon County has been determined to be ‘General Habitat’ for Greater Sage-grouse, there is only one area in the county designated as part of the species’ core area. In Figure 12 on the left, core area is depicted in green cross-hatch and general habitat in orange.

Core area is defined as the area that contains the species of concern, having, exemplary natural plant and animal communities, or exceptional native diversity. Core areas delineate essential habitat that would not be able to absorb significant levels of disturbance without substantial impact to the species of concern. Sage-grouse core

areas provide habitat for 75% of all known breeding sage-grouse in Montana and represent landscapes of greatest biological importance to the long-term persistence of the species (USDA NRCS, 2019).

Plant Species of Concern

Montana Natural Heritage Program Field Guide describes plant Species of Concern as, “Native taxa that are at-risk due to declining population trends, threats to their habitats, restricted distribution, and/or other factors”. The Montana Natural Heritage Program Species of Concern Report last updated on September 25, 2018 lists seven plant species of concern in Fallon County (MNHP, 2019), shown in

Table 5. These plants are very rare and all exhibit traits of environmental specificity allowing them to survive only in very particular niches.

State Ranking is categorized as follows:

S1: At high risk because of extremely limited and/or rapidly declining population numbers, range and/or habitat, making it *highly vulnerable* to global extinction or extirpation in the state.

S2: At risk because of very limited and/or potentially declining population numbers, range and/or habitat, making it *vulnerable* to global extinction or extirpation in the state.

S3: Potentially at risk because of limited and/or declining numbers, range and/or habitat, even though it may be abundant in some areas.

Table 5 Plant Species of Concern

Scientific Name	Common Name	Family	State Rank	Habitat
<i>Astragalus racemosus</i>	Raceme Milkvetch	Pea Family	S2, S3	Grasslands (Clay soils)
<i>Dalea enneandra</i>	Nine-anther prairie clover	Pea Family	S2, S3	Grasslands (Plains)
<i>Dalea villosa</i>	Silky prairie clover	Pea Family	S2	Sandy sites
<i>Penstemon angustifolius</i>	Narrowleaf Penstemon	Plantain Family	S2, S3	Sandy sites
<i>Physaria ludoviciana</i>	Silver Bladderpod	Mustards	S2, S3	Sandy sites
<i>Prunus pumila</i>	Sand Cherry	Rose Family	S1, S3	Sandy or rocky soils
<i>Carex gravida</i>	Heavy Sedge	Sedges	S3	Wetland/Riparian

Wetlands/ Riparian Areas

Wetlands are areas where water covers the soil or is present at or near the surface of the soil all year or for periods of time during the year, including during the growing season. The prolonged presence of water creates conditions that favor the growth of specially adapted plants and promotes the development of characteristic wetland (hydric) soils.

Wetlands play an integral role in the ecology of the landscape. The combination of shallow water, elevated levels of nutrients and primary productivity is ideal for the development of organisms that form the base of the food web. Many species of birds and mammals rely on wetlands for food, water and shelter, especially during migration and breeding. Wetlands also function as sponges, retaining water on the landscape through periods of drought, and as a source of recharge for aquifers. They act as filters where sediment often containing fertilizer or chemicals can settle out before reaching creeks and streams; they absorb rain, snowmelt and floodwaters, reducing the risk of downstream flooding (MT NHP, 2019).

Montana Natural Resources Conservation Service (NRCS)'s State Biologist Pilar Ziglar writes, "Montana's State Wildlife Action Plan (SWAP) identifies all streams, rivers, floodplain and riparian and wetland

community types across the state as Community Types of Greatest Conservation Need. The plan defines this as meaning there is a clear obligation to use resources to implement conservation actions that provide direct benefit to these community types. The plan also provides lists of (species of concern) associated with each community type.” (Ziglar, 2019) The State Wildlife Action Plan can be viewed at <http://fwp.mt.gov/fishAndWildlife/conservationInAction/actionPlan.html>.

There are 27,725 acres of wetlands and riparian areas in the county, about 2.7% of the land. Wetlands and riparian areas occur in overflow areas, along creeks and around man-made waterbodies. Baker Lake and South Sandstone Reservoir are considered lakes in this context.

The acres and proportions of the seven wetland/riparian types that cover more than a few acres are shown in Figure 13.

Emergent wetlands are those that are dominated by erect, rooted, water-loving plants. They may be persistent or ephemeral. These occur on just over 12,200 thousand acres in small areas scattered throughout the county. These areas share the characteristics of temporary, seasonal or semi-permanent flooding. They appear primarily in creek bottoms, around livestock water reservoirs and in some cases, areas that were diked or otherwise modified for agriculture.

Riverine areas are perennial streams comprised of the deep-water habitat contained within a channel; they do not include adjacent floodplains.

Riparian forested areas are wetlands, bogs, swamps or floodplains dominated by large-stature deciduous trees greater than twenty feet tall.

Riparian Emergent areas have erect, rooted herbaceous vegetation during most of the growing season.

Riparian Scrub-Shrub areas are dominated by woody vegetation that is less than twenty feet tall (US EPA, 2019).

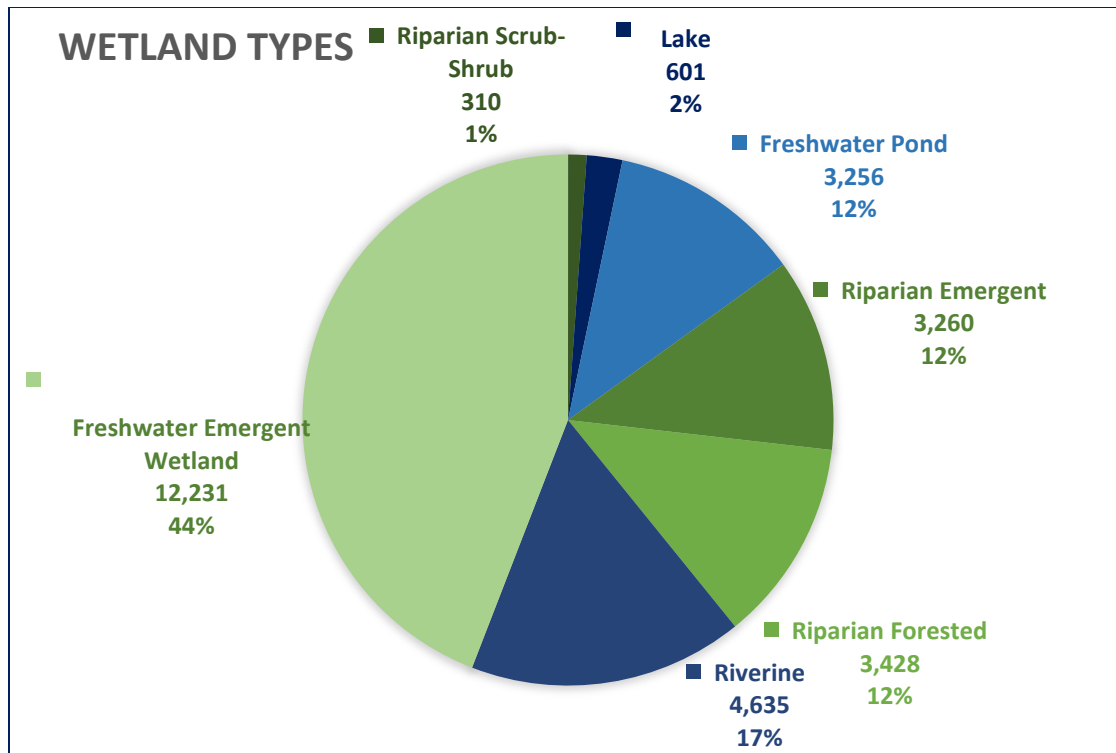


Figure 13 Wetland/Riparian Area Types, Acres of Each Type and Percent of all Types in Fallon County, Montana

Montana Natural Heritage Program offers an interactive map of wetlands and riparian areas across the state. It is available at <http://mtnhp.org/mapviewer/>.

SECTION III: CONSERVATION ACTIVITY ANALYSIS

The assessment of resource activities in Fallon County over the past ten years can be documented by Farm Bill programs, educational activities and benefits to the landscape. The first two are easy to document but benefits to the landscape can be highly subjective. However, the increase in understanding of the multiple benefits of a thriving, resilient ecosystem to the county's soil, plants, wildlife and economics has taken hold as demonstrated by many of the farms and ranches in the county. Some of the following information will also attest to that.

A look at some of the Farm Bill programs shows some of the activity that has taken place.

USDA Farm Bill Programs

Conservation Reserve Program

The Conservation Reserve Program (CRP) is a soil conservation program administered by the Farm Service Agency (FSA). In exchange for a yearly rental payment, producers enrolled in the program agree to remove environmentally sensitive land from agricultural production and plant species that will

improve environmental health and quality. The long-term goal of the program is to re-establish valuable land cover to help improve water quality, prevent soil erosion, and reduce loss of wildlife habitat.

Figure 14 illustrates changes in the number of acres enrolled in CRP in Fallon County from 1996 to 2014 (EWG Farm Subsidy Database, 2019). The number of acres in CRP in 2014 is just a little over one-fifth of what it was in 1996. Farm Services Agency, Baker Office, reports that most of the acres no longer enrolled in the program have been kept in perennial vegetation rather than broken out for cropland.

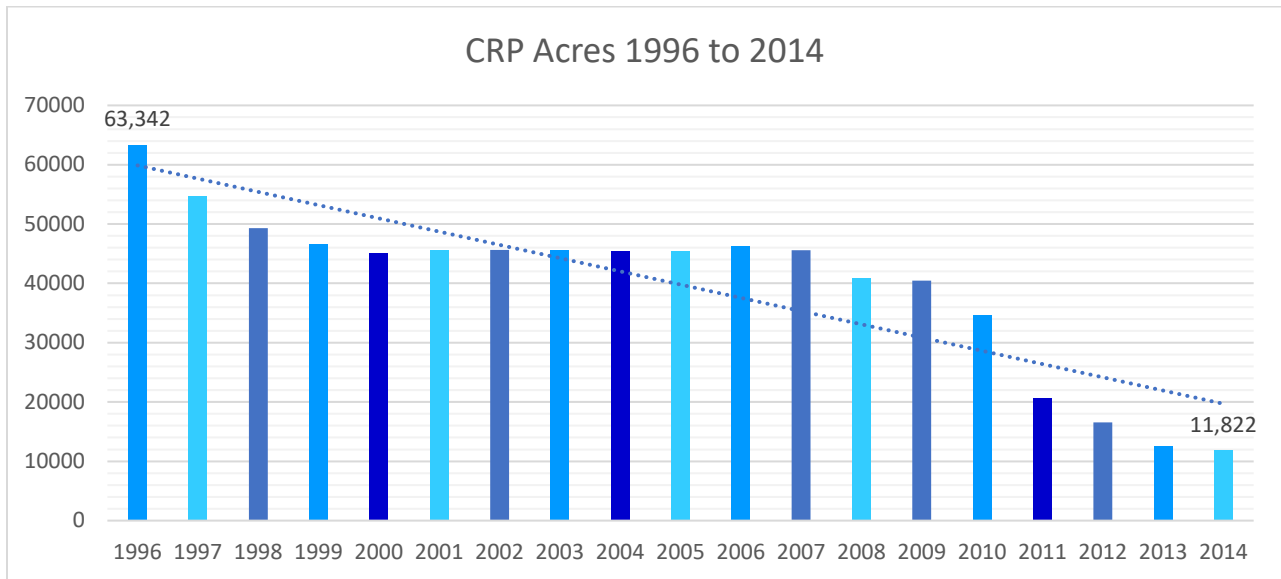


Figure 14 Conservation Reserve Program Enrolled Acres, 1996 to 2014, Fallon County Montana

Conservation Stewardship Program (CStwP)

CStwP is a program to help producers who enhance or advance their existing conservation plan and improve their business operation. Participants maintain their current level of stewardship for resource concerns met at the time of application and apply activities to meet or exceed at least one additional resource concern on each land use in their operation.

There are fourteen active CStwP contracts in Fallon County; another fourteen are completed. Altogether, the program has assisted conservation on 159,528 acres in the county since 2008.

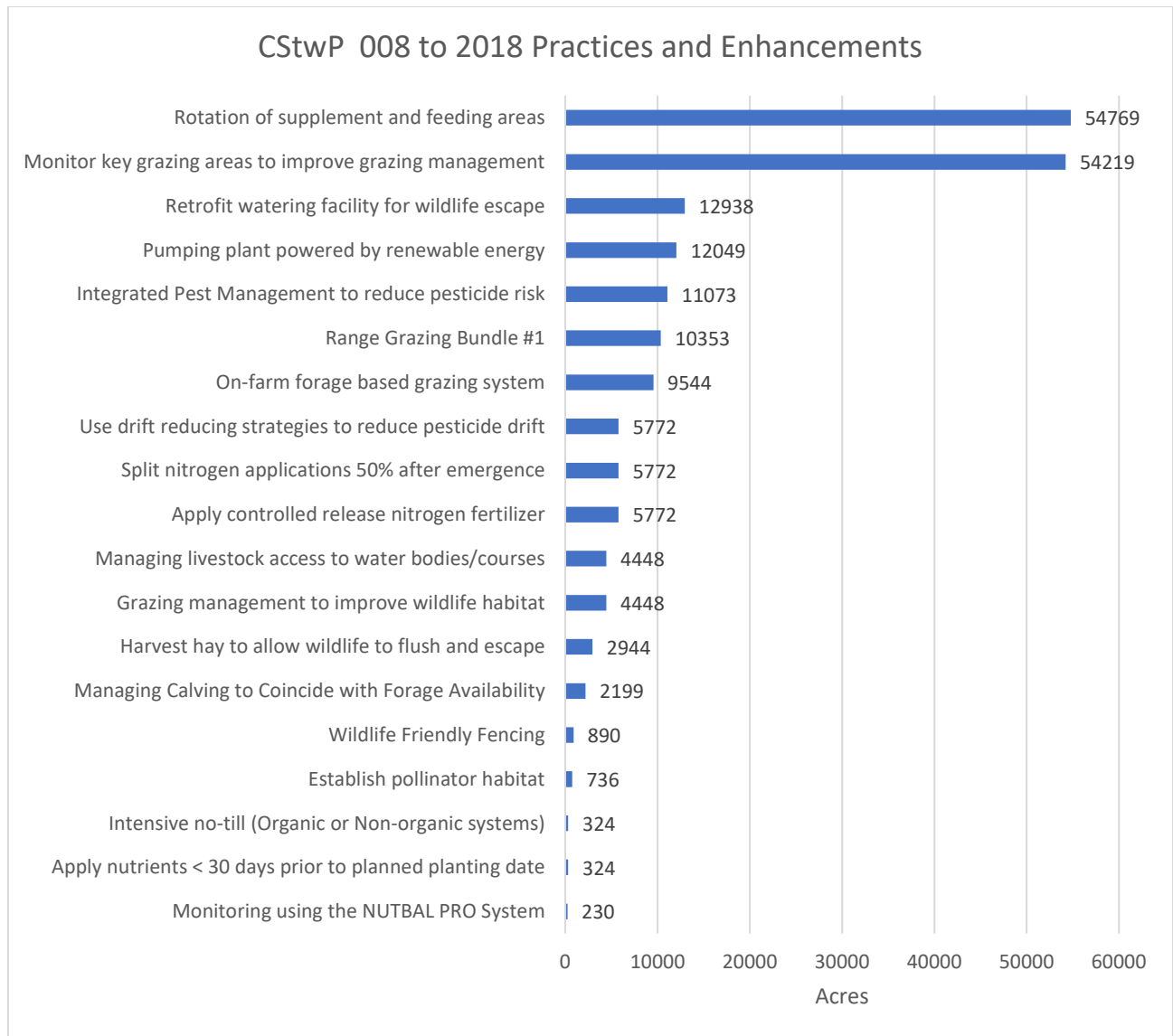


Figure 15 Conservation Stewardship Program Practices and Enhancements

Conservation Technical Assistance

Conservation Technical Assistance (CTA) is the help provided by NRCS, employees of other entities or agencies under the technical supervision of NRCS, to clients to address natural resources opportunities, concerns, and problems. CTA provides land users with proven conservation technology and the delivery system needed to achieve the benefits of a healthy and productive landscape (NRCS (CTA), 2019).

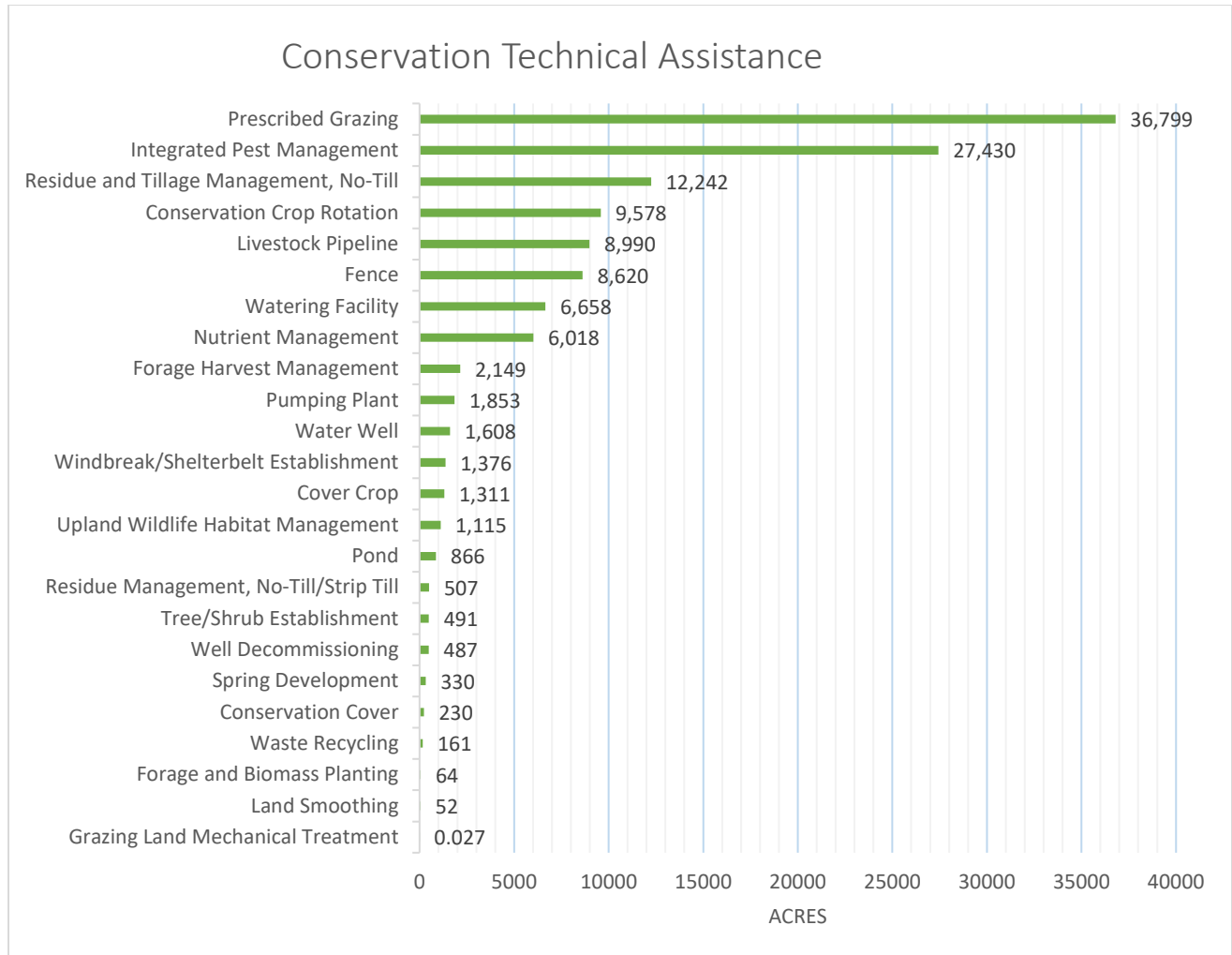


Figure 16 Conservation Technical Assistance Program Acres Applied 2008-2018

Wildlife Habitat Incentives Program

The Wildlife Habitat Incentive Program (WHIP) was a voluntary program for conservation-minded landowners who wanted to develop and improve wildlife habitat on agricultural land, nonindustrial private forest land, and Indian land. It has been folded into EQIP.

One conservation plan was implemented under WHIP in Fallon County from 2008 to 2018; livestock watering facilities and pipeline were installed in the interest of improving wildlife habitat. Better water distribution reduced the incidence of trailing and insect pest problems and allowed more frequent moves, reducing the occurrence of “re-biting” of plants during the growing season. This improved health and vigor of the plant community. A vigorous plant community can supply more habitat for more wildlife (Fischer, 2019).

Environmental Quality Incentives Program (EQIP)

The Environmental Quality Incentives Program (EQIP) is a voluntary conservation program that helps agricultural producers in a manner that promotes agricultural production and environmental quality as compatible goals. Through EQIP, agricultural producers receive financial and technical assistance to

implement structural and management conservation practices that optimize environmental benefits on working agricultural land.

From Fiscal Year 2008 through Fiscal Year 2018, Fallon County wrote and administered 55 EQIP contracts with 47 participants.

Practice	Number	Amount	Units
Livestock Watering Facilities	98	98	number
Residue/Tillage Management	69	9,235	acres
Livestock Water Pipeline	67	232,291	feet
Fence	69	222,139	feet
Cover Crop	53	3,635	acres
Pumping Plant	28	28	number
Prescribed Grazing	22	36,799	Acres
Nutrient Management	21	5,481	Acres
Water Well	20	20	number
Windbreak/Shelterbelt	13	8,670	feet
Conservation Crop Rotation	6	2,607	acres
Obstruction Removal	5	1,250	acres
Livestock Shelter	5	5	number
Structure for Water Control	5	5	number
Well Decommissioning	4	4	number
Water Well Testing	3	3	number
Pond Sealing	1	211	acres
Critical Area Planting	1	211	acres
Range Planting	1	78	acres
Windbreak Renovation	1	29	acres
Tree/Shrub Establishment	1	0.7	acres
Micro-irrigation System	1	0.1	number

Figure 17 Environmental Quality Incentives Program Common Practices and Units Applied

Information and Education

Often Farm Bill program dollars are spent to get people to change their behavior regarding their resources. Over time NRCS has noticed that if the producer did not fully understand what the change meant, it wasn't a beneficial endeavor for any of the parties involved. So, we have been focusing heavily on education and outreach over the past 10 to 15 years.

Looking at resources and resource concerns from outside of the NRCS, it seems there are simple solutions. However, it is never that simple when looking at those same items from the inside.

Time was spent visiting with producers about what they needed to make a change and it often came back to hearing from or seeing another producer who had successfully made that change. It was determined that those conversations happen in both formal and informal settings, so we have tried to accommodate those needs with our workshops and tours.

Workshops

Soil Health and Cover crop Tour, September 9 & 10, 2009. The Fallon County portion of this tour was hosted by Dan Buerkle, Dan O'Connor, Kalyn Bohle, Dirk O'Connor, and Jerry Sikorski. Glen Bauer, Marlyn Richter and Gabe Brown spoke at the Rhame, North Dakota site.

Agronomy Workshop, November 10, 2009. Luke Dighans gave a talk entitled *In the Field*. Dr. Kent McVay spoke on successful cropping systems in eastern Montana, Clain Jones presented *Soil Fertility in Cropping Systems*. Dr. Kevin Sedevic talked about livestock utilization of alternative crops and Ken Miller presented *Building Soil Health with Cover Crops*.

Range Workshop, January 13, 2010. Leo Barthelmess presented *Undaunted Stewardship/Ranchers Stewardship Alliance/Stock growers Association*. Roland Kroos and Lee Manske shared information about holistic management and twice over grazing. Local cattleman Ray Bannister described high intensity, low frequency grazing strategies and Cliff Merriman spoke about the importance of monitoring.

Agronomy Workshop, November 10, 2010. Jane Holzer with Montana Salinity Control presented information on saline seeps. *Take a Peek Underneath* was the presentation given by Jon Stika, Area Resource Soil Scientist, and Mark Henning, Area Agronomist. Ted Burkle gave an update on *What's Rockin' in the Bakken*. A discussion of no-till planters was led by Paul Jasa of the University of Nebraska with Mark Watson, a no-till producer and educator also from Nebraska.

Range Workshop Jan 4, 2011. Marni Thompson presentation *Cows Eating Weeds*. Neil Dennis contributed information on building soil health with high stock density. NRCS State Rangeland Conservationist Jon Siddoway spoke about managing and monitoring grazing lands in eastern Montana and Gabe Brown presented *Building Soil Health with Livestock*.

Menoken Farms Tour, June 16, 17-2011. Marlyn Richter and Jerry Doan hosted.

Soil Health & Soil Pit Tour, July 15, 2011. Jill Clapperton was the featured speaker.

Power Fence and Water Development Tour, October 7 & 8 2011. Day one featured speakers Chester Meyers, Dave Hayden and Ann Fischer with guest speaker Paul Brown. Day two was a range tour and information at Ray Bannister's ranch.

Soil Health Workshop, November 18, 2011. Ray Archuleta and Ann Fischer spoke; a producer panel discussed relevant issues.

Workshop January 17, 2012. Doug Peterson gave a presentation on building soil health with high stock density. Little Beaver Conservation District gave a water quality update regarding how to prevent streams from being listed on DEQ's Impaired Streams list. Kim Overcast provided information on Montana water rights and a producer panel discussed rotational grazing, bale grazing and water systems.

Low Stress Livestock Handling Workshop February 7 & 8, 2012. Featured Richard McConnell and Tina Williams with Hand 'n Hand Livestock Solutions.

Bus tour of South Dakota and North Dakota Operations June 13, 14 and 15, 2012.

Range Workshop February 21, 2013. Speakers were Gregg Simonds with Open Range Consulting, Phil Jerde with the Great Plains Buffalo Ranch and Jerry Doan, owner and operator of Black Leg Ranch.

Ranch Planning Workshop January 15 & 16, 2014. Eighteen ranches participated. Discussions on water developments, fencing, rotation, nutrition, and range health took place. Producers were each given a laminated operation map, one-on-one help with their planned grazing rotation, and new ideas.

French Group Soil Health Tour in Fallon County June 19, 2014

Range Tour in Fallon County, June 26, 2014, at Dave Hayden's Ranch, featuring information on high stock density systems, innovative watering systems, electric fence, cover crop grazing, and fabricated and living livestock shelters.

Agronomy Tour in Fallon County, July 2, 2014. Dwayne Beck discussed equipment, rotations, and cover crops.

Range workshop, 2015. Derrell Peel gave a presentation on market situation and outlook. Rusty Knuths spoke about accounting on livestock operations. Walt Davis presented *How to Not go Broke Ranching*. Eric Bringham described *Building a Ranch through Sustainable Management*, and Derrell Peel offered *Taking Advantage of Cattle Market Opportunities*.

Soil Health workshop, February 3, 2015. The agenda included a talk on alternative crops for supplementation by Doug Landblom and a presentation on applications for agriculture by Baker Field Office District Conservationist Ann Fischer. A producer panel was present to discuss no-till sugar beets with Brett Nedens and North 40 Ag representative Mark Vogel.

Shifting to Soil Biology, August 30 & 31, 2016. Presenters and speakers were Dr. Will Brinton, founder of Woods End Lab, Hayes Goosey, MSU entomologist, Heather Nenninger, NRCS, Jay Fuhrer, NRCS North Dakota State Soil Scientist, Elin Kittleman, MSU Extension, Fallon County, and Randy Pierce, NRCS Montana State Engineer.

Bale Grazing and Strategic Planning for the Ranch, January 5, 2017. Speakers were Kalyn Bohle and Burke Teichert.

Range Walk, July 31, 2017. Topics included cows eating weeds, native plant identification, electric fence, and pollinator planting. A tour of bale grazed areas provided a comparison of plants. The Walk included a rainfall simulator demonstration.

Ranch Planning Workshop, November 28, 29 & 30, 2017. The featured speaker was Dallas Mount. This was a three-day workshop; 17 ranches participated. Producers were each given a binder with grazing planning information, a laminated operation map, and one-on-one help to come up with a grazing plan for the coming year.

Connecting Soil Health with Productivity with Dr. Christine Jones. June 15, 2018.

Ranch Economic Series, January 28, February 4 & 11, 2019 with Tris Munsick.

Composting Workshop, Static Pile Inoculated Compost, June 21, 2019 with Gerry Gillespie

Montana Grazing Land Soil Health Tour September 10, 11 and 12, 2019.

Rainfall Simulator demonstrations were provided for the 2013 Youth Range Camp, the Dickinson Research Extension Center, the McCone County 2015 Soil Health Tour, Bowman and Slope Conservation Day, Baker and Plevna 6th grade Conservation Days, and various workshop events.

Youth Education: Kindergarten through sixth grade curriculum and demonstrations in Baker and Plevna schools.

Partner efforts

A partial list of the recent collaborative activities of the Little Beaver Conservation District and the NRCS Field Office includes the following:

- In 2012, LBCD monitored seven streams in Fallon County with the goal of preventing these streams from being placed on the Montana Impaired Streams List.
- LBCD assists the Field office to collect and process soil and tissue samples
- Partner with Fallon and Carter County Weed Boards and the Carter County Conservation District to organize the Fallon County Weed Pull
- Hosting Soil to Skillet Workshops with MSU Extension to reach out to the urban population
- Assist Montana DEQ with stream assessment, collecting baseline data and conducting monitoring
- Conservation District Newsletter

Partners who assisted with and participated in workshops are The American Bird Conservancy, MSU Extension Service, the Soil and Water Conservation Society, Montana DNRC, Bird Conservancy of the Rockies, Montana Rangelands Partnership and the Plank Stewardship Initiative.

The changes observed by spending time on the *why* and *how* have been significant. More producers have a better understanding about how their farm or ranch ecosystems function and generally want to know more. There are more open conversations between neighbors about their operations and between producers outside of county lines, sometimes across several states. Those conversations keep challenging the boundaries and encouraging individuals to find new ways to make their systems resilient, productive and economically viable.

Keeping education at the forefront encourages producers to continue to invest in changes they are making by defining short- and long-term benefits and showing how to maximize those benefits. While tools such as water developments, fences and shelters can help build infrastructure to make positive changes in grazing management, it takes understanding the resources and the potential to utilize those tools in a positive way.

Summarizing the Key Ideas of Past Educational Workshops

- Harnessing the power of the soil to build environmental and economic resilience. Outreach focused on building a working knowledge of soil health principles and how to make the soil work for you. Promoting the concept of building equity in your soil.
- Interconnected systems approach to looking at the resource base. Taking a closer look at how management decisions can impact the function and sustainability of ecological processes.
- Providing technical information on various grazing systems: high stock density, twice over rotation, cows eating weeds, bale grazing, holistic management and the use of portable water and fences.

- Investing in human capital. Inspiring innovative ideas for agriculture production through education. Connecting people and ideas through workshops featuring producer panels and organizing farm tours that feature new and innovative ideas in farming & ranching.
- Hosting educational events that feature experts and educators in the professions of holistic management, ranch economics, marketing and value-added agriculture.
- Continuing the conversation about how producers can address the growing consumer demand for increased plant nutrient density through management that promotes soil health.

In cropland, moving from a predominantly wheat/fallow rotation to systems with increased diversity, and reduced in tillage that keeping living roots in the soil as much as possible has resulted in more resilient cropping systems. Productivity and economic opportunities have increased. By regulating the soil temperature and keeping more cover on the surface of the ground there is more habitat for a large array of beneficial insects, birds and other wildlife.

Table 6 is a compilation of data provided by Fallon County FSA.

Table 6 Comparison of Crops Grown and Acres Harvested in Fallon County, Montana, 2008 and 2019

Crops 2008	Acres 2008	Crops 2019	Acres 2019	Changes
Spring Barley	5655	Spring Barley	3719.5	-1935.5
Yellow Corn	1887	Yellow Corn	6645	4758
Fallow	21,627	Fallow	10644	-10983
Spring Oats	1066	Spring Oats	930	-136
Green Peas	1,706	Green Peas	774	-932
Yellow Peas	140	Yellow Peas	1592	1452
Safflower	2,775	Safflower	2860	85
Triticale	36.9	Triticale	1716	1679.1
Hard Red Spring Wheat	23,236	Hard Red Spring Wheat	14484	-8752
Hard Red Winter Wheat	22149	Hard Red Winter Wheat	7678	-14471
Amber Durum	1050			-1050
Austrian Winter Peas	136			-136
		Sorghum Sudan	1746	1746
		Soybeans	5071	5071
		Confectionery Sunflowers	282	282
		Sunflowers for Oil	507	507
		Buckwheat	152	152
		Spring Canola	80	80
		Flax	53	53
		Hemp	200	200
		Lentils	761	761
		Mixtures	2304	2304
		Rye	16	16
Total Acres	81463.9		62214.5	19249.4

Fallow acres in 2019 are nearly half what they were in 2008, indicating that more Fallon County producers understand the importance of three of the dynamics of cropland soil health: diversity, reduced disturbance and keeping the soil covered. The array of crops planted in 2019 is much more diverse. Twelve crops were planted in 2008 compared to 21 in 2019. Throughout the county, nearly 24% fewer acres were used for crop production.

SECTION IV: NATURAL RESOURCE PROBLEMS AND DESIRED FUTURE OUTCOMES

Fallon County Resource Concerns and Prospective Targeted Implementation Plans

We have been mainly looking at soil health as the basis to improve all our natural resources: soil, water, air, plants, animals. Focusing on the soil has a bottoms up approach to improving the other resources. Improving soil health will improve water quality and quantity, improve health, structure and biomass of plants and improve the habitat and diet quality for domestic and wild animal populations. Investing in soil health will ultimately reduce energy inputs thereby reducing expenditures and increasing capital on farms and ranches.

The following resource concerns were developed through the Local Working Group meeting. The concerns occur throughout the county. Using best management approaches can impact the initial target concern and will have many secondary and tertiary benefits. Choosing the right practices can beneficially impact many of the resource concerns listed below using a holistic approach.

Monocultures of Crested Wheat Grass and Other Species

The issues associated with this resource concern are:

- Low soil fertility.
- Monocultures are more susceptible to insect pests, disease and climatic threats.
- Monocultures lower the value of wildlife food and cover and decrease nutritional value of forage for livestock.

Opportunities for improvement may be to increase diversity by planting mixes of introduced grasses and forbs in tame grass pastures and including more species diversity in native plantings. Options for reseeding may include one or two years of cover crops to regenerate the soil. High stock density grazing could increase soil fertility, promote plant health and vigor and reduce soil moisture loss.

Invasive Plant Species

The issues connected to this resource concern involve:

- Infestations of weeds new to Fallon County such as hounds tongue (*Cynoglossum L.*) and Ventenata (*Ventenata dubia*).
- Infestations of weeds already established in Fallon County including Canada thistle (*Cirsium arvense*), leafy spurge (*Euphorbia virgata*¹) and spotted knapweed (*Centaurea stoebe L.*).

¹Until recently the scientific name for leafy spurge was given as *Euphorbia esula*. According to Montana Natural Heritage Program (2019), "The true *Euphorbia esula* Linnaeus is restricted to certain parts of Europe where it shows little tendency to weediness. *Euphorbia virgata* retains the common name Leafy Spurge".

Opportunities to address the issues could incorporate biological control strategies, grazing management strategies for rangeland and riparian areas, and working to teach cows to eat some types of weeds. Both innovative and proven weed control practices could be applied as part of integrated weed management plans. Continuing education could be provided in newsletters, workshops and field days.

Soil Health on Cropland

The resource concern issues of soil health on cropland include:

- Costs of crop production
- Potential concerns with soil acidity and other soil issues
- Bare ground
- Poor infiltration
- Decreased effectiveness in efforts to control weeds, pests and diseases.

Leveraging existing soil fertility and buffering against weather extremes provide opportunities to improve current soil health conditions. Employing techniques which use fewer synthetic amendments including intercropping, composting, and implementing systems-based approaches may improve soil health without negatively impacting the bottom line. We would follow management changes with soil analysis to both determine the effects of our efforts and to find ways to improve even further.

Soil Health on Grazing Land

The issues are:

- Costs associated with livestock production
- Weeds and invasive species
- Soil erosion, head cutting
- Areas of lower forage production
- Less desirable forage
- Decreased grazing land health including
 - Susceptibility to pests such as grasshoppers
 - Decreased rainfall capture and storage and increased runoff leading to diminished plant health and production, increased headcutting and higher probability of downstream flooding.
- Declining riparian area health.

There are many opportunities to improve soil health on our grazing land. Integrating crop and livestock production will increase soil organic matter and enhance nutrient cycling. Creating flexible cropping systems that alternate between grain and forage crops will boost soil health while also providing greater adaptability to changes in the markets and weather. We hope to pioneer incorporation of flexible grazing systems using mobile infrastructure such as portable water systems and temporary fence.

Opportunities exist to demonstrate how we can improve grassland systems by incorporating intensive management on a small scales before moving on to projects of greater extent.

Education could include brainstorming sessions, workshops, range tours, and news articles. We would gather information to measure the outcomes of rangeland soil health improvement projects to share with our producers and partners.

Human Capital

The concerns associated with the human component of agriculture in Fallon County have to do with a lack of adequate human capital. Many operations do not have enough people to match the labor required to do the work. Young people often choose not to stay on the family farm and many producers are unable to afford hired workers. These issues become more relevant as the County's producers continue to advance in age.

Farm succession is an imminent concern in our farm and ranch families.

How Opportunities will Benefit the Resources:

Expected improvements of creating more diversity, reducing bare ground and allowing more recovery are:

- Diverse root structures will feed a wider array of soil micro fauna, creating synergistic relationships among soil microbiology and plants.
- Soil structure will be enhanced by the creation of more pore spaces for water and air movement.
- Plants will be able to access nutrients and minerals in different areas and layers in the soil.
- Improved soil structure.

Shorter grazing periods with high stock density will show the following benefits:

- Leave more biomass on the soil surface.
- Provide nutrients to a growing biological community.
- Moderate extreme temperatures to benefit soil biology, extending the growing period.
- Reduce impacts of rain and wind on the soil.
- Increase organic matter above ground.
- Subsurface soil organic matter enhanced by root exudates.
- Beneficial insect habitat Improved by providing additional food sources.
- Wildlife habitat improved by increased standing cover.
- Decrease potential for invasive weed species to flourish.

Flexible water and fence developments will facilitate adaptable grazing. Anticipated benefits are:

- Reduce trailing.
- Reduce wildlife deaths from permanent watering facilities and fences.
- Eliminate the cost of installing permanent water in areas that get little use.
- Increase ability to graze each year as appropriate for changing circumstances.

Diversifying cropping systems should:

- Reduce pesticide use, thereby reducing negative effects on soil biology and input costs.
- Reduce input costs by facilitating planting two or more crops in one pass.
- Increase beneficial insect population, which will increase bird and wildlife populations and diversity.
- Diversify root systems creating more synergistic and diverse soil biology.
- Increase soil biological levels, increase nutrient cycling and decrease dependency on synthetic fertilizers.
- Increase soil organic matter by increasing above ground biomass and below ground root exudates.
- Increase water infiltration capacity by improving soils structure, building soil organic matter and increasing root channels.
- Include complementary crops which provide a denser canopy resulting in lower soil temperature, improved soil water holding capacity and increased soil organic matter.
- Allow us to track improvements by monitoring with soils tests, the microscope and other methods.

The expected benefits of making and utilizing covered compost are:

- Composting is relatively easy and will likely be a process that many producers can adopt.
- Composted manure is more beneficial to soil and plants than raw manure fertilizer.
- Uses an existing on-farm resource to increase nutrients and organic matter in cropland soils.
- Decrease expenses associated with application of synthetic fertilizers.
- Reduced on and off-farm energy expenditures.
- Leaching and volatilization from manure piles will decrease.
- Soil organic matter and microbial diversity will increase.

Education and Outreach will:

- Continue to demonstrate that best management practices are beneficial for profitability, production and the community.
- Allow exchanges of ideas between producers.
- Continue to promote new opportunities and ideas.
- Reinforce the importance of holistic management.

Over the past fifteen years the Baker NRCS Field Office and Little Beaver Conservation District have worked diligently to provide education and outreach to the community. Our partners include Fallon-Carter County Montana State University Extension Service, Montana Department of Natural Resources & Conservation, the American Bird Conservancy, Bank of Baker and others. We continue to collaborate to bring in innovative ideas, build on existing practices and move toward the goal of a regenerative model of agriculture production.

We have seen a significant reduction in summer fallow acres, a considerable change in crop diversity and an increased appreciation of the principles of soil health. Our goal is to continue education into the next generation. We will continue to build with the current producers. We will identify who is the next group in the adoption bell curve and work with them to implement innovative conservation strategies. We will push the current cadre of innovators to the next level.

With that in mind, goals for the next five years are:

Adopting multi-cropping on 5% of the cropland in the county.

Making and utilizing compost on four farms.

Adopting adaptable intensive grazing systems on 10 % of the ranches in the county.

Educating an additional twenty producers about grazing management and biological control as part of integrated weed management.

Continue to have discussions, host workshops and provide opportunities to share information about Farm and ranch management and succession.

SECTION V: PRIORITIZE NATURAL RESOURCE OPPORTUNITIES AND DESIRED FUTURE OUTCOMES

All the resource concerns considered by the field office and the Local Work Group circle back to some of the same principles. Each of the proposed solutions include a suite of practices that can be used in the county to address resource concerns. Our goal is to adopt more progressive techniques to improve the natural resources in Fallon County. They will build on what has already been developed in the county to date.

The following is the order in which we plan to address these concerns.

1. Soil Health on Grazing Land

To further address this resource priority we want to create systems that can demonstrate how much we can improve our grassland systems. Enabling producers to move into and integrate intense systems to achieve goals on small scales before moving on to the next pasture or paddock and monitoring results will give examples and data collected can be used to encourage others.

As more producers in the county are recognizing the value of nutrients in their systems, they are looking for more ways to make their existing land base more productive and profitable. We have been discussing this possibility with several of the most proactive producers that are ready to move into an adaptable system with some financial assistance to build some infrastructure.

This will primarily build on the principles of recovery, keeping the ground covered and diversity. By utilizing these principles water infiltration and pore space will increase, which will provide habitat for

microorganisms. That will help build soil aggregates, moderate soil temperatures and provide better habitat for below ground soil life. The more the microorganism population builds the more nutrients will cycle and produce more biomass. This cycle will build if the principles continue to be applied.

A tour by the MT NRCS State Leadership Team (SLT) and later a soil health rangeland tour triggered an appreciation for and interest in flexible water and fencing systems and their usefulness in treating resource issues in an adaptable, cost-effective manner. A teleconference that included NRCS State Office program and technical staff and Miles City Area office staff followed to discuss the opportunities for some of these practices and all supported the efforts.

The suite of practices to make this system possible is:

- (642) Well
- (533) Pump/pump test
- (516) Pipeline
- (614) Storage Tank (Scenario # 6)
- (528) Prescribed Grazing (Scenarios #8 & #10)

2. Soil Health on Cropland

This plan was developed last year, but there is some infrastructure and partners we need to develop before moving forward. Intercropping and poly-cropping are proven to increase overall productivity and resiliency when used with other soil health practices. Some challenges to overcome are lack of insurance when growing two or more crops at the same time, equipment changes and additions such as a mobile seed cleaner. We would like to include composting to further benefit the production and resiliency of the cropping system. That also includes some equipment purchases and developing knowledge base.

Intercropping increases diversity and interaction between plants, microorganisms, arthropods, birds and mammals, resulting in a more stable cropland ecosystem.

- Fewer pest outbreaks
- Improved nutrient cycling and crop uptake
- Increased water infiltration and moisture retention
- Reduced use of pesticides, fungicides, herbicides and synthetic fertilizers
- More economically and ecologically sustainable systems

The suite of practices is to be determined based on what we can make work with partners and NRCS EQIP practice scenarios.

3. Monocultures of Crested Wheat Grass and Other Species

This is an issue we would like to address by reducing bare ground and diversifying our tame grass pastures. We would approach this with plantings and grazing management.

The suite of practices we would use is:

- (340) Cover Crops
- (512) Forage and Biomass Planting
- (550) Range Planting
- (528) Prescribed Grazing

4. Invasive Weeds

5. Human Capital

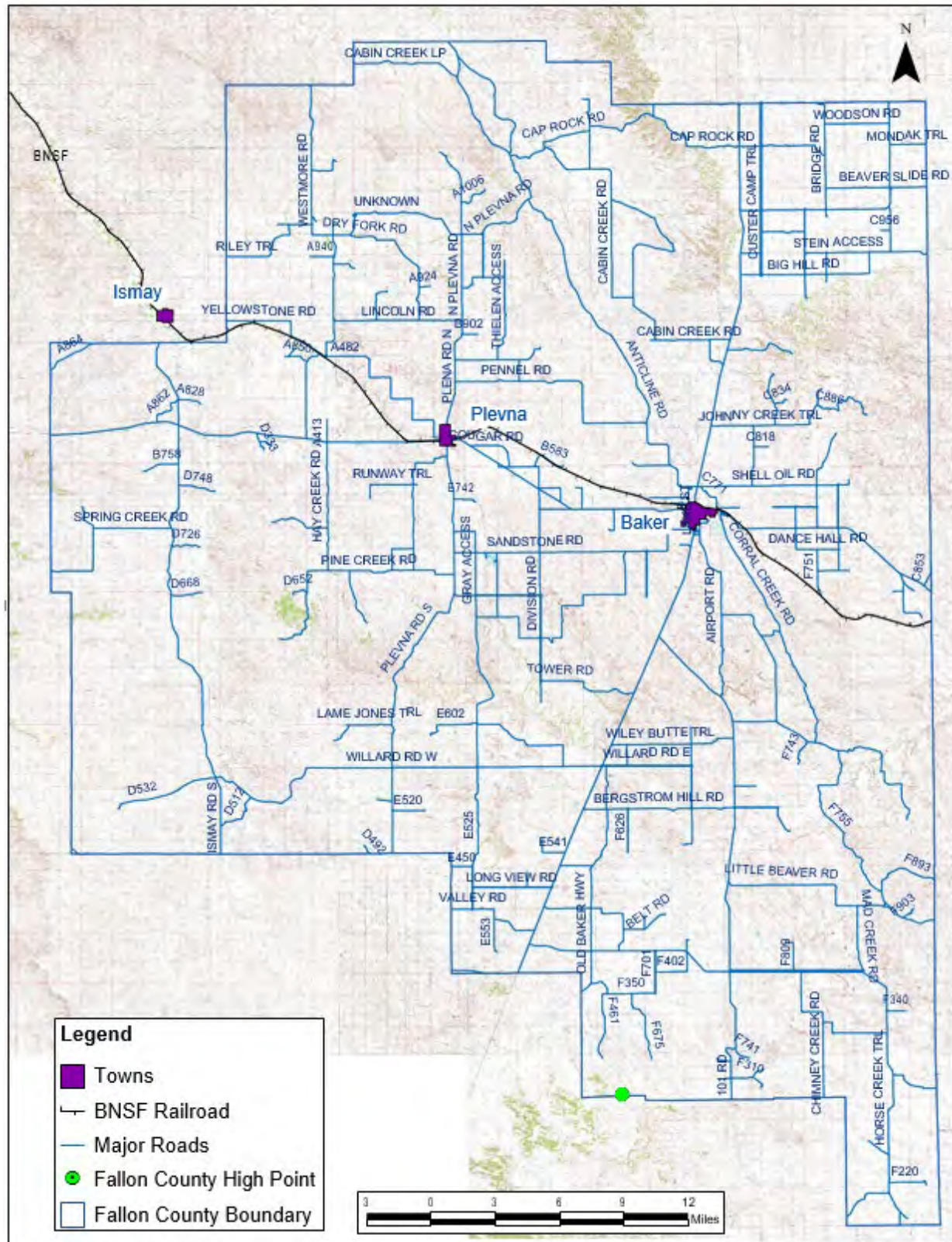
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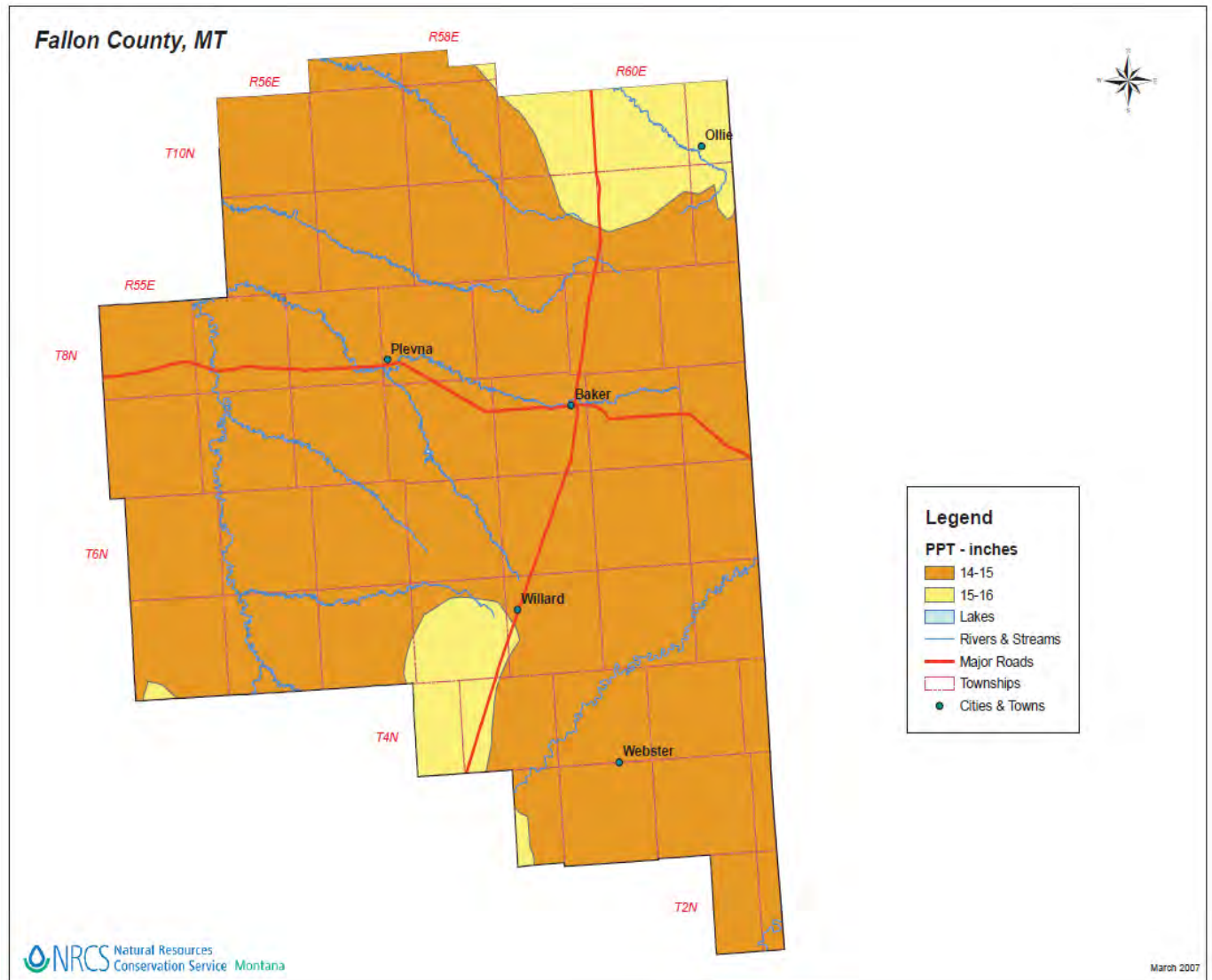
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APPENDIX A

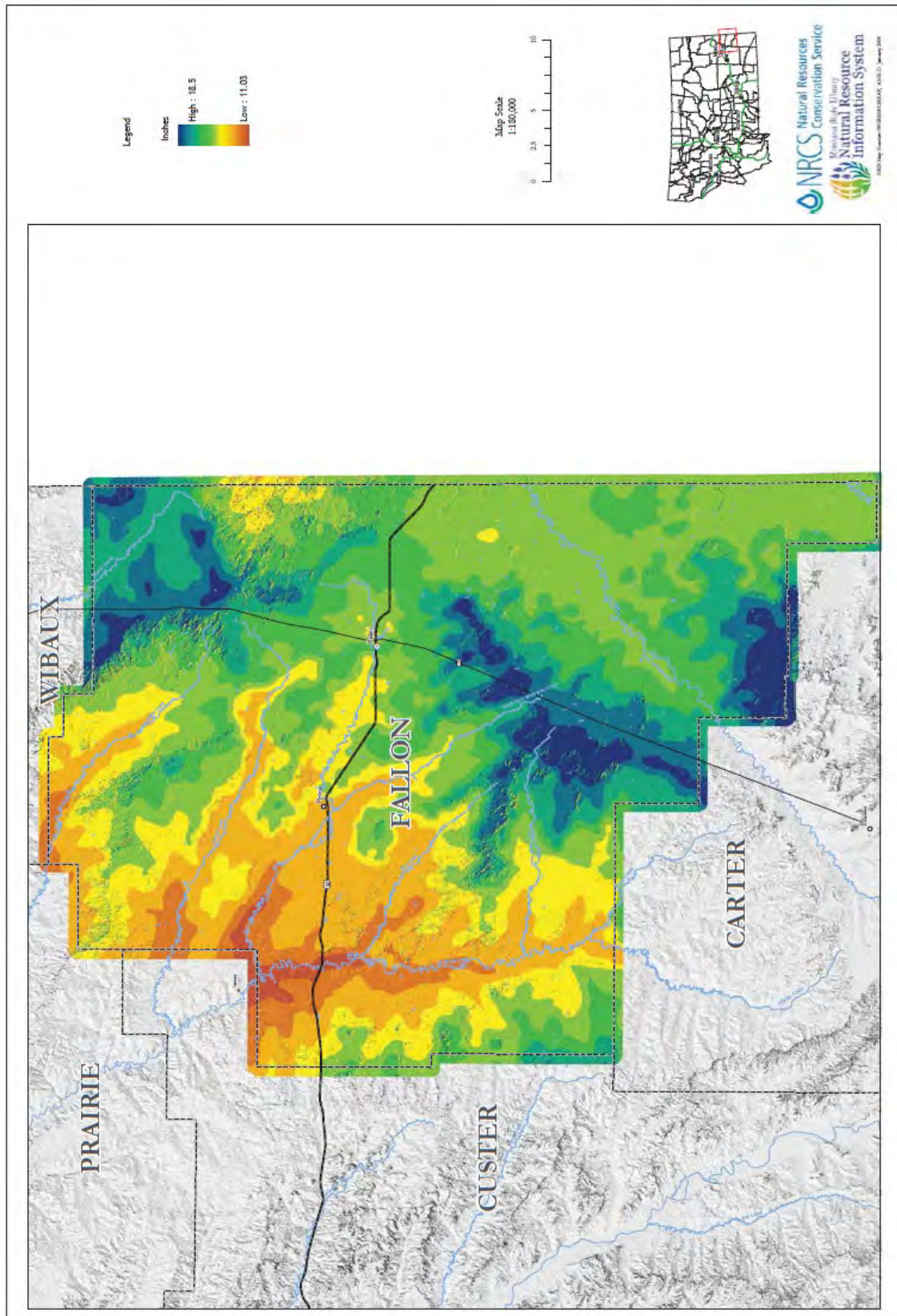
A1 Fallon County



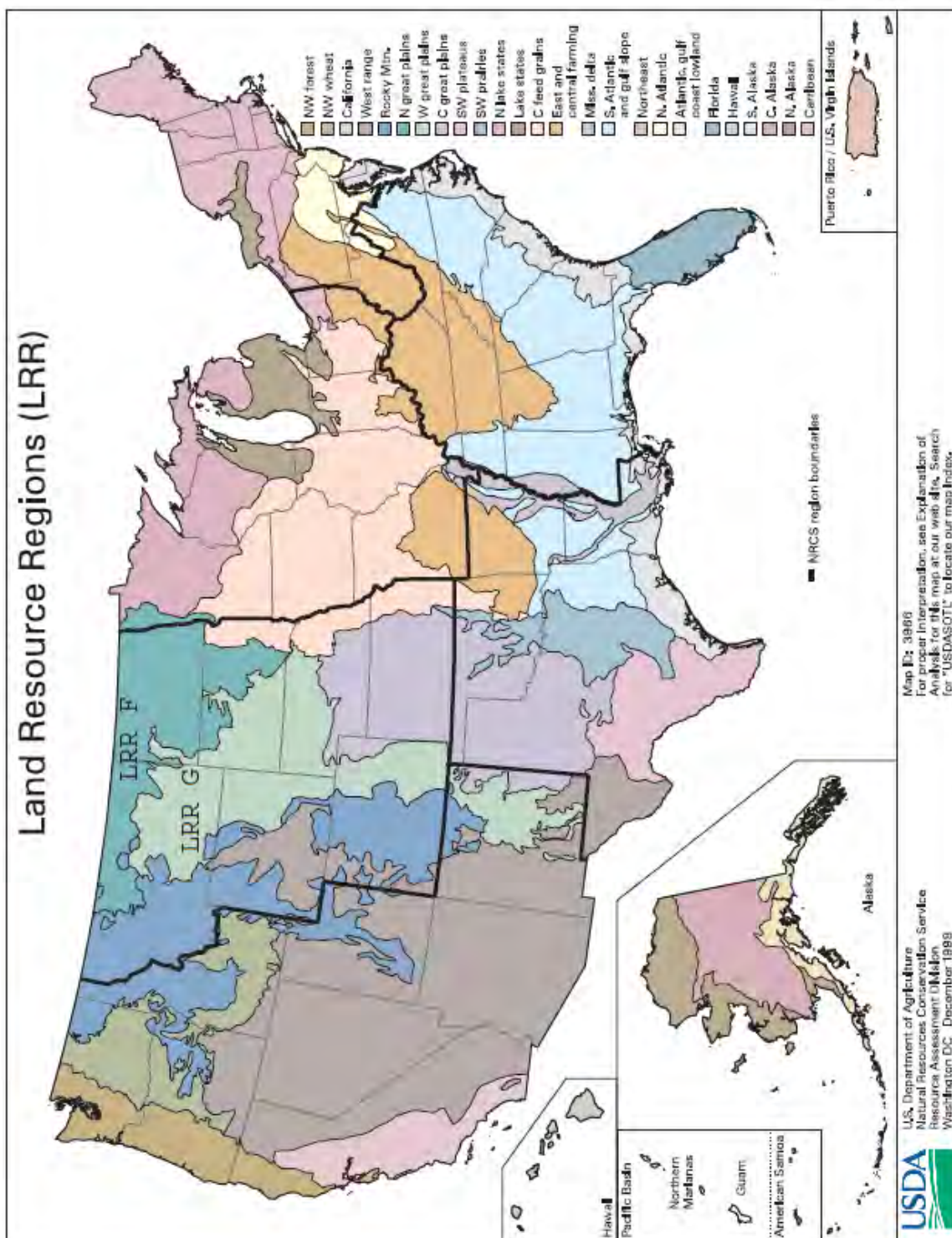
A2 Annual Precipitation



A3 Relative Annual Effective Precipitation



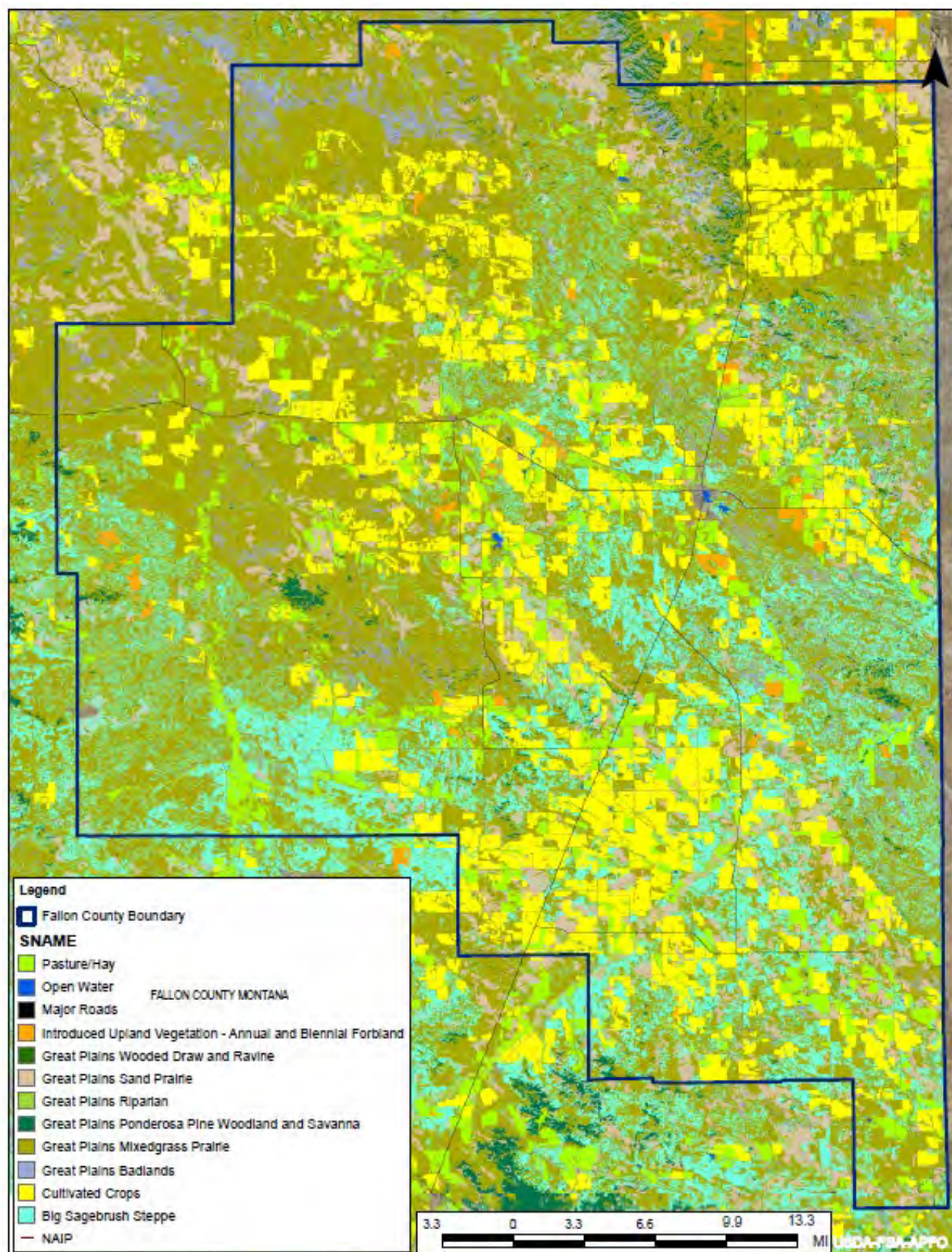
A4 Land Resource Regions



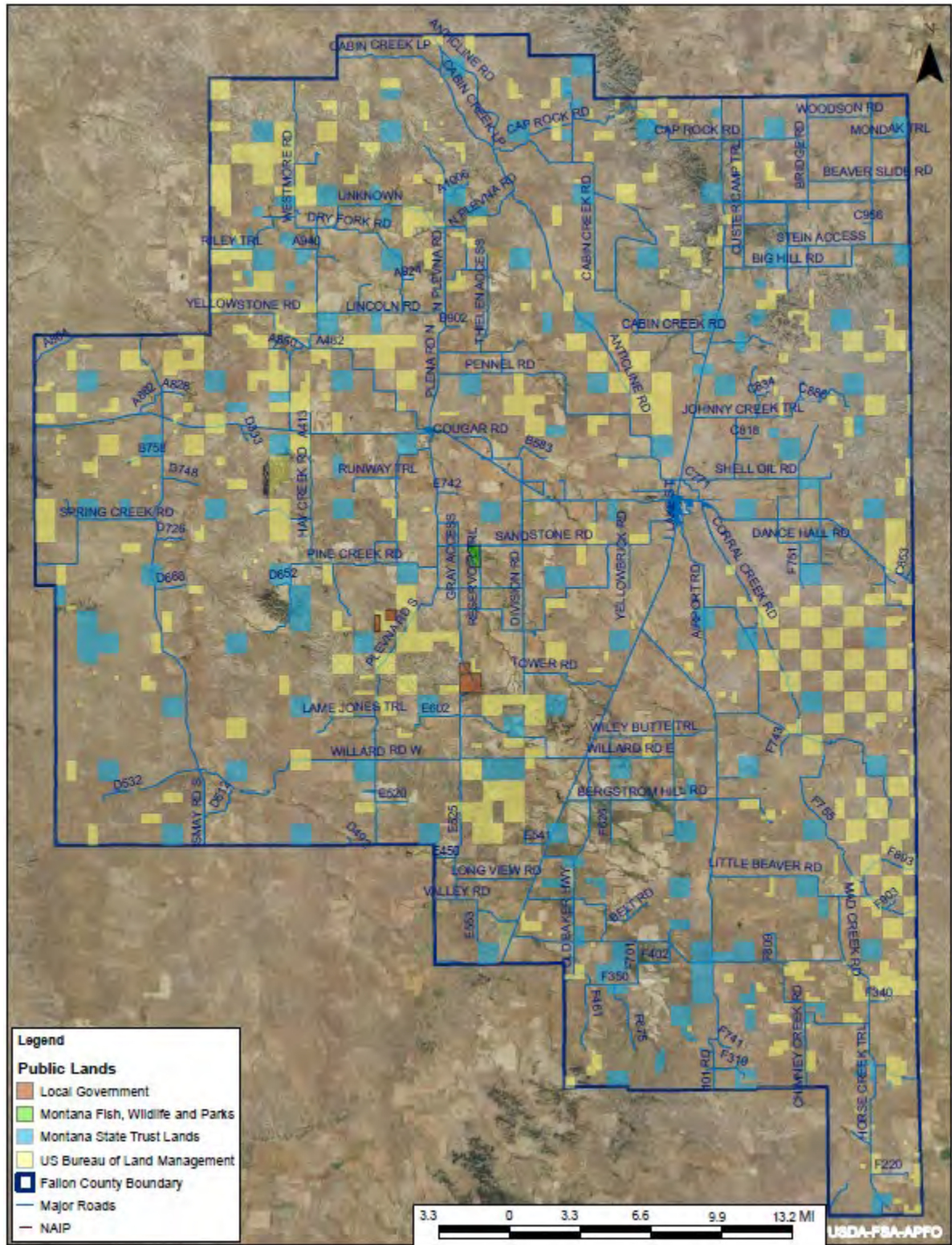
A5 Major Land Resource Areas



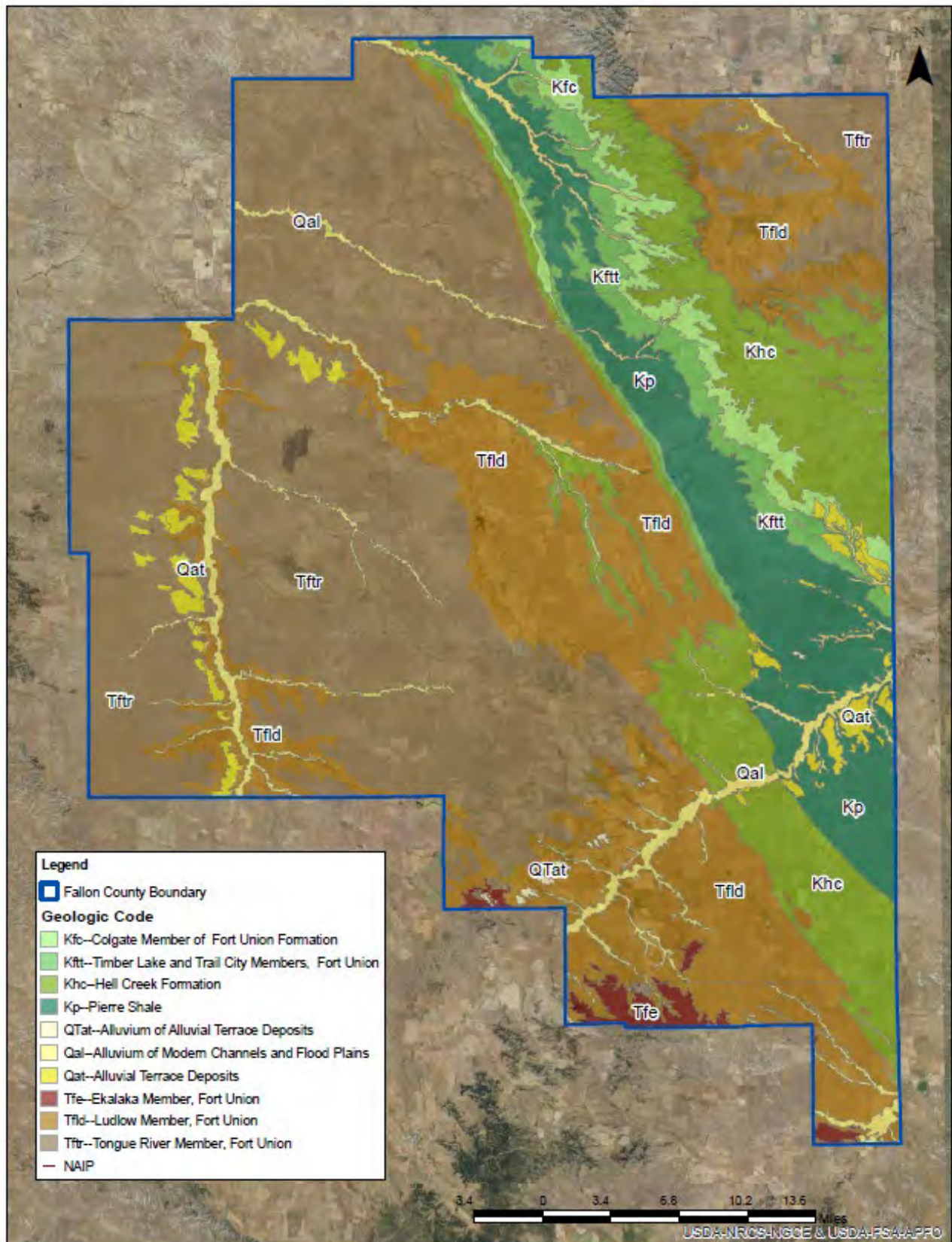
A6 Landcover



A7 Land Ownership



A8 Geology



A9 Farmland of Statewide Importance and Prime Farmland if Irrigated

