

DECEMBER 3, 2019



GARFIELD COUNTY LONG RANGE PLAN

USDA NRCS JORDAN FIELD OFFICE

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SECTION I INTRODUCTION

- Vision: Empowering land managers and communities by improving their resiliency and by emphasizing regeneration of working lands.
- Mission: To build partnerships and to strategically invest for long-term solutions and actions that will address natural resource concerns in Garfield County.
- Purpose: The Garfield County Long-Range Plan is a living document that continually guides strategic investment in natural resources across our landscape to better regenerate soil, water, air, plants, animals and human resources.
- Partnerships: Garfield County Conservation District (GCCD)
 - Northern Great Plains Joint Venture (NGPJV)
 - Ranchers' Stewardship Alliance (RSA)
 - Montana Fish, Wildlife & Parks (FWP)
 - Montana State University Extension, American Bird Conservancy (ABC)
 - Bird Conservancy of the Rockies (BCR)
 - Montana Sage-Grouse Oversight Team (MSGOT)
 - Rocky Mountain Elk Foundation
 - Bureau of Land Management (BLM)
 - Fish & Wildlife Service (USFWS)
 - Montana Department of Natural Resources and Conservation (DNRC)
- Time-Frame: This is a five-plus year plan covering years 2020 through 2025. The plan will be reviewed in November and April every year and will be revised or amended as needed.

SECTION II NATURAL RESOURCE INVENTORY

General Information

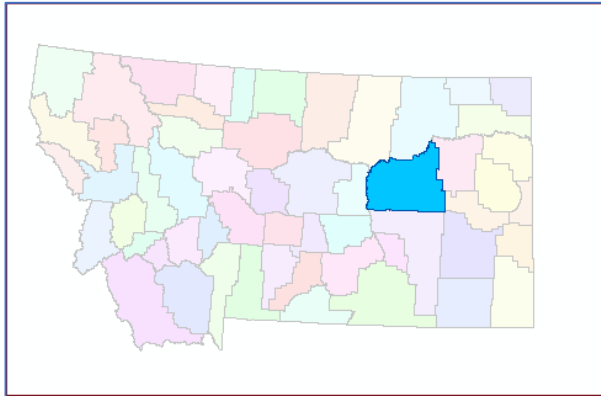


Figure 1 Garfield County, Montana

Garfield County is in central Eastern Montana. The Musselshell River is the boundary between Garfield and Petroleum County to the west; Fort Peck Reservoir separates Garfield from Phillips and Valley County to the north. McCone and Prairie Counties lie to the east and Rosebud County shares a boundary to the south. Garfield County encompasses 4,849.2 square miles or a little more than 3.1 million acres.

According to the United States Census Bureau the population of Garfield County was 1,286 on July 1, 2018, an increase of 6% from the 2010 Census. About 332 people live in Jordan, the county seat. Mosby is located along Highway 200 in the southwestern part of the county. Formerly known as Half-Breed Crossing, Mosby had a gas station and repair shop from 1950 to 1983 and a post office from 1904 to 2015. Mosby is now an unincorporated community along with Brusset in the north western part of the county, Haxby in the northeast, Sand Springs in the southwest, and Cohagen, which is southeast of Jordan. See Appendix A1.

Elevation ranges from 2,185 feet to 3,570 at Mosby Dome in southwest corner of the county west of Calf Creek. Average annual precipitation ranges from eleven to fourteen inches, as shown in Appendix A-2. Most precipitation falls as rain between April and July, with convective storms common during the summer. Relative Effective Annual Precipitation (REAP) is the amount of rainfall that will be available for plants. REAP varies greatly across the landscape, as shown in Appendix A-3. Average high temperatures around 87°F occur in August; lows average around 4° to 6° F in December and January.

People

In 1921 the population of Garfield County was 5,368; 813 people lived in Jordan and there were ninety-five schools in the county. In the early part of the twentieth century it was expected that the population and economy would grow rapidly following the construction of the Great Northern Railway line and the expansion of agriculture. Prospectors had discovered oil reserves and it was hoped that the “romantic scenery” of Hell Creek Canyon would support tourism (Stout, 1921).

Garfield County did not experience growth and prosperity as predicted. Drought, economic hardship and the limitations imposed on small-scale dryland farming by the climate and the distance to market would soon prove to be more than the homesteaders could overcome.

Throughout the county, ninety-four percent of adults have graduated high school; 17.5 percent have acquired a bachelor’s or higher degree. Around 11% of the population live in poverty (US Census Bureau, 2019), but unemployment is low at 2.7% (April 2019) compared to 3.9% percent for the state and 3.6% nationally (BestPlaces.net, 2019).

Agricultural Producers

The National Agricultural Statistic Service (NASS) *Census of Agriculture* data discloses that there are 500 producers in Garfield County; roughly 40% of the population. This number would not include family members or employees, so it may be safe to say that a great many, if not most, of the residents of the county are involved in crop and livestock production. A little over one third of producers are female. Three hundred seventy producers list farming or ranching as their primary occupation; 80% of producers have lived on their present farm for over ten years and the average length of time living on the present farm in Garfield County is 24.6 years.

Young farmers are those who are thirty-five years old or younger. Thirty-seven farms' primary producers are young farmers. Forty-nine farms are operated by beginning farmers or ranchers, defined as those who have been in the business for ten years or less.

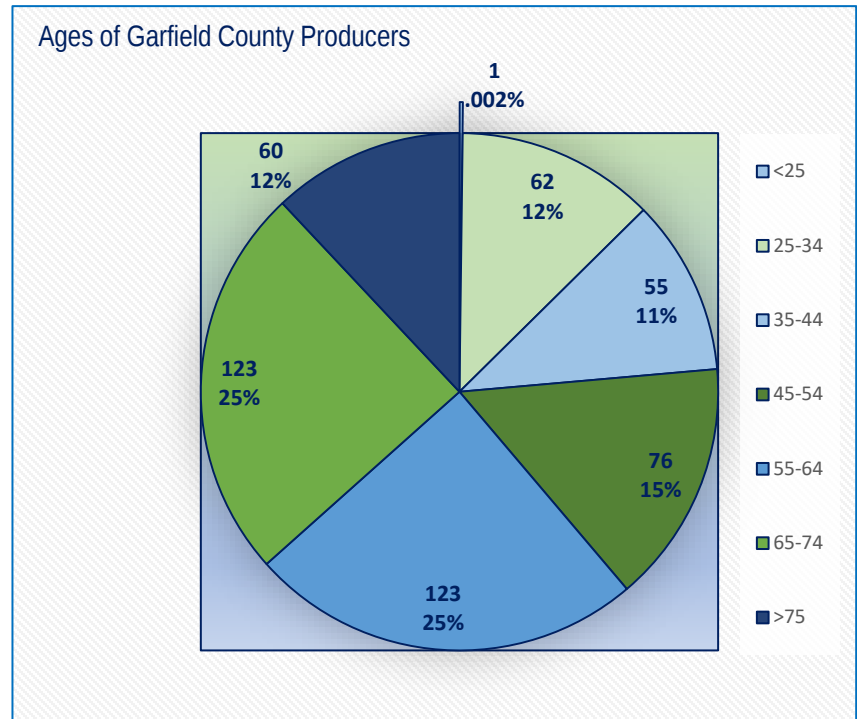


Figure 2 Age Groups of Garfield County Producers

A breakdown of the ages of Garfield County Producers is given in Figure 2.

The average age of producers in the county is 56.8 years; nearly two-thirds are age fifty-five or more (USDA NASS, 2019).

Agriculture

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 term is used to include all crop and livestock operations. There are 260 farms in Garfield County on over 2.2 million acres. Average farm size is 8,519 acres; about seventy-three percent of the farms are one thousand acres or more. In calendar year 2017, 126 farms harvested crops on 118 thousand acres of cropland.

Nineteen farms are at least partly irrigated, totaling 2,774 irrigated acres. One hundred eighty-two farms produce cattle. In 2017 cattle and calves inventory was 74,262 head; 48,448 head were sold. Thirty-four farms raise sheep, down from 50 in 2012. Sales dropped from 13,225 sheep sold in 2012 to 9,655 in 2017.

Figure 3 shows eight major crops grown in Garfield County in calendar year 2017. Forage for livestock includes hay, haylage, silage, and greenchop. In this case, eighty-six percent of forage crops are hay, and nearly half of the hay is alfalfa (USDA NASS, 2019).

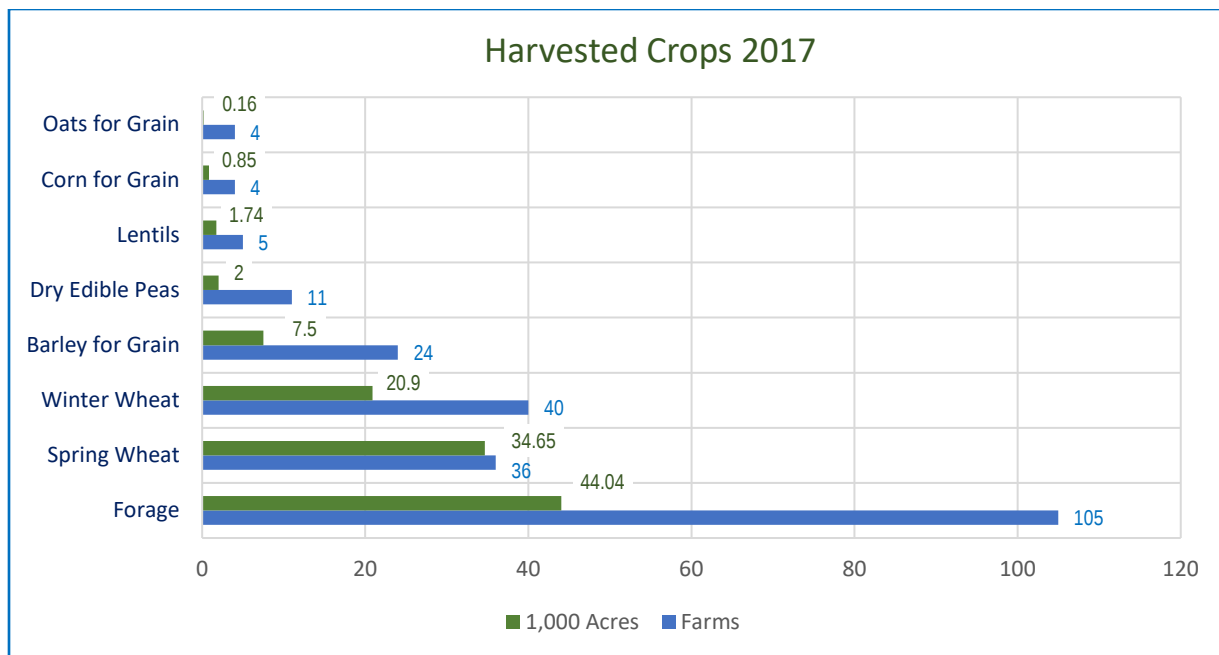


Figure 3 Number of Farms Growing Main Crops, Acres of Each Crop Harvested in Garfield County, 2017 (USDA NASS, 2019).

Landcover/Land Use

Landcover Types

Montana Natural Heritage Program (NHP) is a program of the Montana State Library's Natural Resource Information System, operated by the University of Montana. NHP's Land Cover Report for Garfield County describes 10 landcover types systems in the county. The relative proportions of these systems are shown in Figure 4. Appendix A-4 is a landcover map of the entire county, with data from 2016.

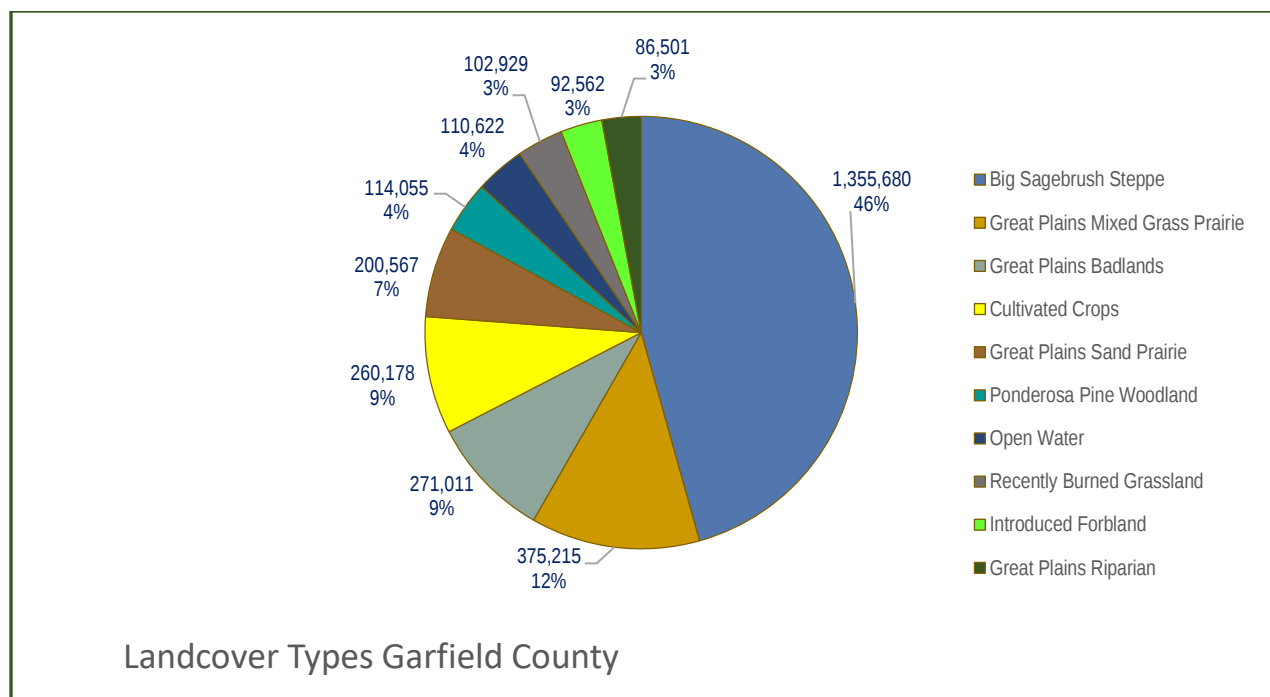


Figure 4 Relative Amounts of Major Landcover Types (MNHP, 2019)

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 ten percent. Wyoming big sagebrush (*Artemisia tridentata* ssp. *Wyomingensis*) is the most common shrub component. Sagebrush typically increases in the system following heavy grazing and fire suppression.

Great Plains Mixedgrass Prairie ecosystem covers much of the eastern two-thirds of Montana. Soils are primarily fine and medium-textured. Canopy cover is mostly grasses; 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 (*Hesperostipa comata*). Forb diversity is typically high. In areas where sagebrush steppe borders the mixed grass prairie, common plant associations include Wyoming big sagebrush—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. With over grazing, cool season exotics such as Kentucky bluegrass (*Poa pratensis*), crested wheatgrass (*Agropyron cristatum*) and field brome (*Bromus arvense*) increase in dominance.

Cultivated cropland is used to produce crops, such as forage crops, wheat, pulse crops, and corn typically on an annual cycle. Agricultural plant cover is variable depending on season and type of farming.

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.

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 with little bluestem (*Schizachyrium scoparium*) and threadleaf sedge (*Carex filifolia*) on the finer textured soils. Rhizomatous warm season grasses prairie sandreed (*Calimovilfa longifolia*), sand bluestem (*Andropogon hallii*) and big bluestem (*Andropogon gerardii*) occur intermittently on coarser soils.

Ponderosa pine (*Pinus ponderosa*) is the distinguishing plant species of the **Great Plains Ponderosa Pine Woodland and Savannah** system. Ponderosa pines prefer sites with higher soil moisture and coarse, rocky soil. Stands appear in a mosaic pattern on the landscape with grassland plant communities in the open spaces and downslope.

Recently Burned Grassland vegetation is a mixture of herbaceous and shrub species modified by recent fires. Montana Spatial Data Infrastructure provides a landcover data layer that shows the extent of the areas burned during the drought of 2017, shown as the dark areas in the southwest corner of the county in Figure 5, page 4.

Introduced Upland vegetation system is described as significantly altered and disturbed by introduced species. Natural vegetation types are no longer recognizable. Typical species that dominate these areas are crested wheatgrass, smooth brome, field brome (*Bromus arvense*), cheatgrass brome (*Bromus tectorum*), knapweed (*Centaurea spp.*), Canada thistle (*Cirsium arvense*), leafy spurge (*Euphorbia virgata*¹), and sweetclover (*Melilotus spp.*).

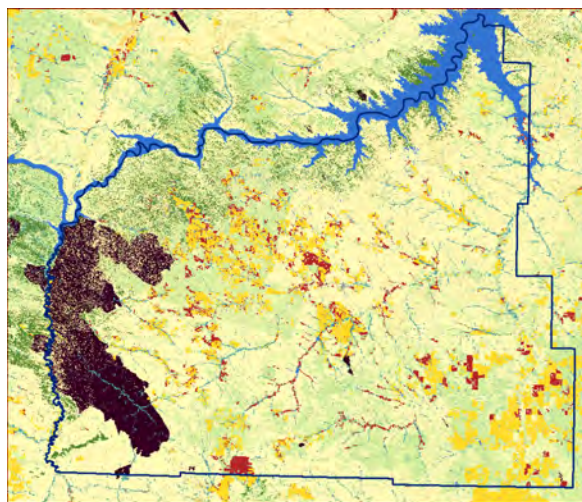


Figure 5 Recently Burned Areas in Garfield County

Areas of the Great Plains Riparian system occur along the Musselshell River, and intermittently along all major drainages. Plains cottonwood (*Populus deltoides*) and narrowleaf cottonwood (*Populus angustifolia*) dominate areas of higher soil water content or higher water tables; an understory of willow (*Salix spp*) is common. While riparian areas cover only around three percent of the land in the county, they are important for forage production as well as wildlife cover and habitat (MNHP, 2019).

Appendix A4 shows the county landcover with 2016 data provided by the Montana Digital Library. Many other landcover types appear in this more sophisticated depiction. The scale of the map makes it difficult to discern small areas of certain types such as Mat Saltbush Shrubland and Greasewood Flats. However, the map provides a clear visual of the extent of cultivated land throughout the county, and the location of the grasslands, badlands and introduced vegetation.

¹ Until 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".

Land Ownership

Land ownership in Garfield County is shown in Appendix A5. Table 1 shows the acres and the percent of total land in Garfield county owned or administered by each resource management entity, and the acres of privately-owned land.

Table 1 Land Ownership in Garfield County

Owner	Acres	Percent of Total
Montana DNRC	153,369.11	5
Bureau of Land Management	722,913.41	23
US Fish & Wildlife Service	369,616.18	12
Garfield County Government	312.24	0.0001
Total Public Lands	1,256,300.44	40
Private Landowners	1,847,709.61	60

SOILS

Geology

Geologic formations underlying Garfield County are shown in **Appendix A-6: Garfield County Geology**. A formation in this context is a rock unit that has a distinctive appearance compared to surrounding 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 and are sometimes divided into smaller units called members.

The relative proportion of the eight geologic formations or members that each cover more than one percent of the land in Garfield County is below in Figure 6. Together these add up to 97% of the county. Several formations are not included due to their small presence on the landscape.

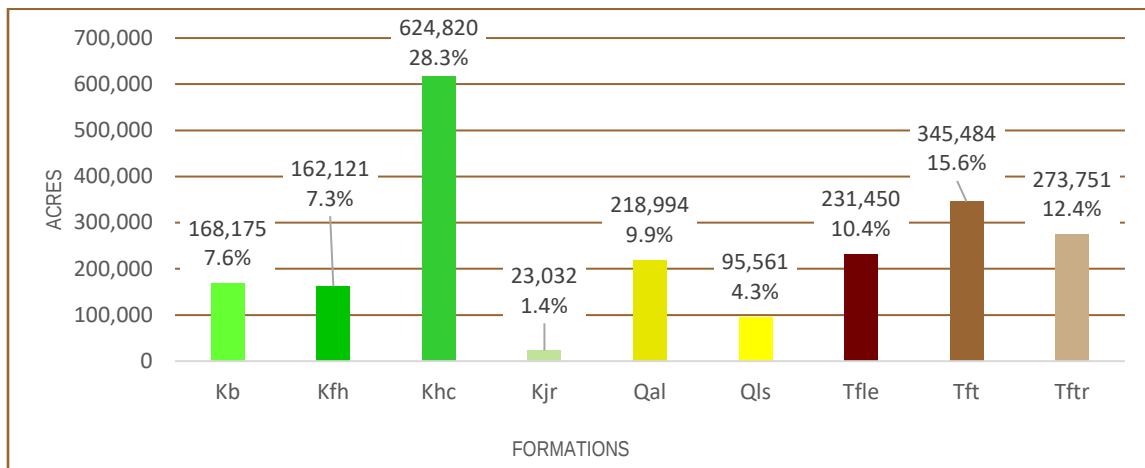


Figure 6 Major Geologic Formations in Garfield County

Kb. Bearpaw Formation. Dark gray shale with several zones of calcareous concretions,

a basal zone of ferruginous concretions, and numerous thin bentonite beds. The Bearpaw Shale is composed of 900 to 1,100 feet of gray to black, bentonitic marine shales. Where it is exposed at the surface, it forms either relatively subdued badlands or a terrain of small hills with gentle slopes. The upper part of the formation weathers to a brownish color and is fossiliferous. It includes thin beds of sandstone, cherty material, and a variety of concretions including fossiliferous ironstone, limestone, and septarian concretions ranging from a few inches up to eight feet in diameter. (Septarian concretions are large, roughly spheroidal nodules, traversed within by a network of cracks filled with calcite and other minerals.) Some ironstone concretions are oval-shaped and contain bits of lustrous shell material, which formed in and around the shells of flat-coiled ammonites. Clear and smoky gray colored barite fills cracks and cavities in a few of the concretions. Bentonite is found disseminated throughout the formation and in discrete beds up to six feet thick. Typical soils derived from this formation include the Neldore, Abor, Marvan, Weingart, and Gerdrum series (Vuke, 2007).

Kfh. Fox Hills Formation. The Fox Hills Formation is the youngest unit of the Montana Group. While there is a great deal of variability in its degree of cementation, much of the formation is poorly consolidated. It often forms foothills to the more consolidated cliffs in the overlying Hell Creek Formation, so it is not well exposed. The lower portion of the Fox Hills Formation consists of sandstone, siltstone, and shale interbeds, which are transitional from the underlying shales of the Bearpaw Formation, to the overlying sandstones of the middle and upper portions of the formation. The upper portion of the formation is an old shoreline deposit that is composed of fine- to medium-grained tan sandstone which appears to be massive, but also contains some crossbedding, and characteristically becomes coarser upward. It is used extensively as an aquifer. The formation varies in thickness from thirty-five to 150 feet depending on whether the white-weathering unit is included in the Fox Hills or included at the base of the overlying Hell Creek Formation. Typical soils derived from the Fox Hills Formation include the Blacksheep, Chinook, and Twilight series (Vuke, 2007).

Khc: Hell Creek Formation. This is an enormous deposit which extends up from New Mexico through Colorado and Wyoming, across Montana, and into North Dakota, South Dakota, Saskatchewan, and Manitoba. The formation was named for exposures in Hell Creek, in northern Garfield County, where its type section (the sequence of strata that constitute a stratigraphic unit in the location where it was originally recognized and described) is exposed in its full thickness. The formation characteristically erodes into spectacular badlands where relatively hard concretions and sandstone lenses have protected softer, underlying shales and mudstones from erosion (Vuke, 2007).

The Hell Creek Formation varies in thickness in the area from two hundred to three hundred feet. It is composed primarily of soft shale, siltstone, and silty sandstone, and characteristically has a banded appearance in shades of purple, green, and gray. Thin, discontinuous coal seams, carbonaceous shales, and bentonite are also common. Large-scale crossbedding is common in the sandstone lenses, all of which are lenticular (shaped like lentils, having a double-convex lens) (Vuke, 2007).

Late Cretaceous fossil plants and dinosaur bones are common in the Hell Creek Formation. Typical soils formed on sandstone bedrock of the Hell Creek Formation include the Chinook, Twilight, and Eapa series. Typical soils formed on the shale bedrock of the Hell Creek Formation include the Yawdim and Sonnett series (Vuke, 2007).

Kjr. Judith River Formation: Light brown to light gray, fine-to coarse-grained sandstone with interbeds of gray to black carbonaceous shale, silty shale, and thin coal. Estuarine, brackish, and nearshore marine. Thickness as much as 305 m (1000 ft). The Judith River Formation consists of carbonaceous mudstone with some interbedded coal and sandstone channels. These sandstone channels are used as aquifers in some areas, where they are large and continuous. The formation is up to 500 feet thick in the western part of the county, thinning to 100 to 200 feet in the eastern part. As the formation thins to the east, it grades into a predominantly marine sandstone with thin shale and siltstone interbeds. It grades upward into the Bearpaw Shale. Typical soils derived from this formation include the Cabbart, Yawdim, Twilight, and Busby series (Vuke, 2007).

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

Qls. Quaternary Landslide.

Fort Union Formation. The central and southeastern portions of Garfield County are covered by the Fort Union Formation. It is more than 2,000 feet thick where uneroded and has been subdivided based on color, rock type, and the occurrence of coal. The members in this area are the basal Tullock Member, the Lebo Shale, and the upper Tongue River Member. The **Tullock Member (Tft)** is exposed in the central part of the county, including the area around Jordan. It consists of 180 to 280 feet of light yellow, fine-grained sandstone and siltstone, interbedded with gray, sandy or silty shale. Many of the sandstone beds are cross-bedded and the member frequently contains aquifers. It contains thin but laterally persistent coal beds that grade upward into light gray, carbonaceous shale. Fossil wood, tree stumps, and plant fragments are abundant. It also contains prominent, bright-orange clinker beds which formed when burning coal baked the surrounding sediments. Typical soils derived from the Tullock Member include the Megonot, Cabbart, Brushton, Kobase, and Cambeth series (Vuke, 2007).

The **Lebo Member (Tfle)** has a significant outcrop area in central Garfield County, particularly in the area between Cohagen and Sand Creek. It consists of 200 to 300 feet of dark gray shale with thin interbeds of fine-grained sandstone, sandy shale, and coal. In most areas the Lebo Member is easily distinguished from the other members of the Fort Union Formation by its darker color and increased shale content; however, in Garfield County the lithologies are similar. Sparsely vegetated badlands are commonly formed in Lebo outcrops. Typical soils derived from the Lebo Member include the Cambeth, Cabbart, Yawdim, and Weingart series (Vuke, 2007).

Much of the **Tongue River Member (Tftr)** has been removed by erosion; it occurs only in the southeastern portion of the county. It consists of soft, light colored sandstone with carbonaceous shale and siltstone interbeds. The Tongue River Member contains coal seams that are thicker and more persistent than those in the Tullock Member, some of which are of economic importance in other areas. The sandstone beds represent old stream channels, and most grade laterally into siltstone and shale. Typical soils that developed on the sandstone bedrock include the Busby, Twilight, and Blacksheep series. Typical soils developed on shale bedrock include the Lonna, Cambeth, and Cabbart series (Wilde, 2004).

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. Major Land Resource Areas (MLRAs) are subregions of the land resource regions and comprise smaller, homogeneous areas. MLRA's 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.

Garfield County is entirely within This area is in the Missouri Plateau, Unglaciaded section of the Great Plains Province of the Interior Plains. Within this is the Western Great Plains Range and Irrigated LRR, which covers the whole county. Most of the county is within MLRA 58A; a small area on the far south is in MLRA 60B as shown in Figure 7.

MLRA 58A—Northern Rolling High Plains Northern Part. It is an area of old plateaus and terraces that have been eroded. Slopes generally are gently rolling to steep, and wide belts of steeply sloping badlands border a few of the larger river valleys. Local relief is mainly 10 to 100 feet. In some areas flat-topped, steep-sided buttes rise sharply above the general level of the plains.

Ground water is scarce in most of this area, but local sand and gravel deposit and coalbeds in the Fort Union formation and in the alluvial and terrace deposits along the Missouri River yield small to moderate amounts of water. Ground water is a sodium bicarbonate or sulfate type and generally hard or very hard. The dominant soil orders in the MLRA are Entisols and Inceptisols. They are generally shallow to very deep, well drained, and clayey or loamy.

Saline seeps are a problem in areas of cropland in this MLRA. Management practices promote infiltration of precipitation into shallow aquifers. As the shallow water table rises to the ground surface, evaporation leaves concentrations of salts behind (NRCS, 2006).

MLRA 60 B—Pierre Shale Plains, Northern Part. Like MLRA 58A, this is an area of old plateaus and eroded terraces. The dominant soil orders in this MLRA are Alfisols, Entisols, and Vertisols. The soils are shallow to very deep, generally well drained, and clayey.

Ground water is scarce in most of the MLRA, but local deposits of sand and gravel in the Fox Hills Sandstone and Hell Creek Formation yield small to moderate amounts of domestic and livestock water. This ground water is a sodium bicarbonate or sulfate type and generally is hard or very hard. The level of total dissolved solids, typically more than 1,000 parts per million (milligrams per liter), exceeds the standards for drinking water. The water from alluvial deposits in areas of flood plains and terraces is of much better quality than the water in the bedrock aquifers. Shallow wells provide a limited amount of water for irrigation, domestic use, and livestock (NRCS, 2006).

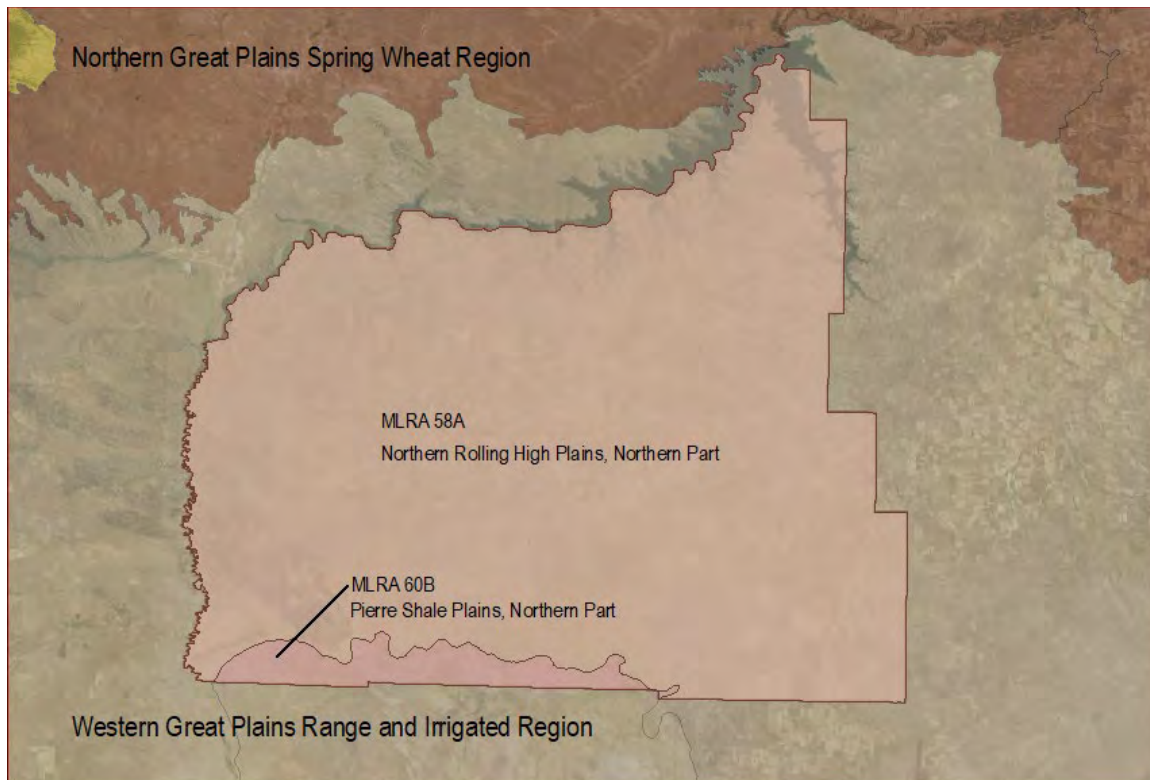


Figure 7 Land Resource Regions and Major Land Resource Areas in Garfield County, Montana

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

Prime farmland

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. There are no Prime Farmland Soils in Garfield County.

Farmland 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 long period of time, and either do not flood frequently or are protected from flooding. These soils are available for farming, but could currently be cropland, pastureland, rangeland, forestland, or other land.

There are 29 soil map units that make up about 553,117 acres of Farmland of Statewide Importance, just under eighteen percent of all the land in the county. The five most common soils, which compose 87.3 % of all Garfield County Farmland of Statewide Importance, are shown in Table 2 with the soil name, the acres of each and the percent of total Farmland of Statewide Importance.

Table 2 Farmland of Statewide Importance Soils, Garfield County, Montana

Soil Map Unit	Name	Acres	%
30B	Brushton Silt Loam, 0-4% slope	61,846	11.18
373C	Cambeth, non-calcareous-Megonot Complex, 2-8% slopes	128,440	23.21
382D	Chinook-Twilight fine sandy loams, 2-15% slopes	47,924	8.66
66B	Kobase silty clay loam, 0-4%	48,614	8.79
841C	Ralph-Brushton silt loams, 2-8% slopes	86,126	15.57

Prime if Irrigated

Soils designated Prime Farmland if Irrigated 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.

There are 24,480 acres of Prime Farmland if Irrigated soils in Garfield County. Table 3 shows the Map Unit Symbols, names, acres and percent of total for each of the four soils of this designation.

Table 3 Prime if Irrigated Farmland Soils, Garfield County, Montana

Soil Map Unit	Name	Acres	%
481A	Eapa loam, 0-2% slope	337	1.37
48B	Eapa loam, 0-4% slopes	23660	96.65
622A	Havre loam, moist, 0-2% slopes	361	1.47
672B	Kremlin loam, 0-4% slopes	122	0.49

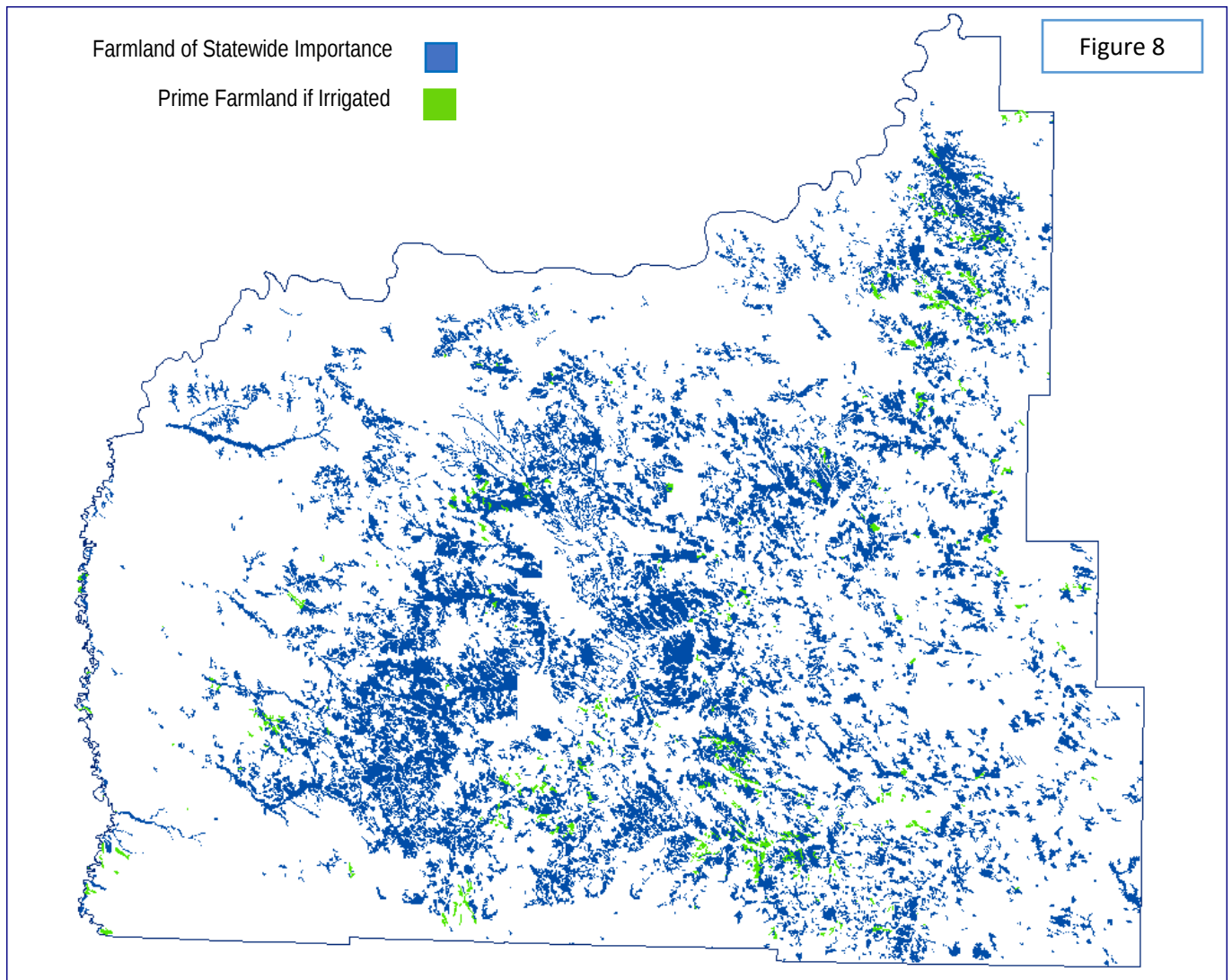


Figure 8 Location and Extent of Prime Farmland if Irrigated and Farmland of Statewide Importance, Garfield County, Montana

HEL Soils

Soils are designated as highly erodible (HEL) based on their susceptibility to movement caused by the actions of wind or water. The Garfield County Soil Survey includes 222 individual soil map units. Of these, 70.7% are highly erodible by wind; 66 percent are also highly susceptible to water erosion.

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 those hydric soils that have been artificially drained or are protected by ditches or levees.

The NRCS Field Office Technical Guide lists twenty-three hydric soils covering 4,672 acres in Garfield County. Table 4 lists the eleven hydric soils that occur on one hundred acres or more. These add up to 4,336.8 acres (93%) of all hydric soils.

Table 4 Hydric Soils

Map Unit Symbol	Map Unit Name	Component	Map Unit Acres County-wide	Acres of Hydric Soil	Landform	Hydric Criteria
4A	Ismay silty clay loam, 0 to 2 percent slopes, occasionally flooded	Bigsandy	4,186	125.6	drainageways	2, 4
561A	Glendive fine sandy loam, 0 to 2 percent slopes, rarely flooded	Bigsandy	4,170	125.1	drainageways, flood plains	2, 4
562A	Glendive fine sandy loam, 0 to 2 percent slopes, occasionally flooded	Bigsandy	9,445	283.4	drainageways, flood plains	2, 4
563A	Glendive-Havre complex, 0 to 2 percent slopes, occasionally flooded	Bigsandy	6,632	132.6	drainageways, flood plains	2, 4
564A	Glendive loam, 0 to 2 percent slopes, rarely flooded	Lallie	7,300	146	flood plains	2, 3, 4
611A	Havre loam, 0 to 2 percent slopes, occasionally flooded	Bigsandy	23,443	468.9	drainageways, flood plains	2, 4
613A	Havre and Glendive soils, frequently flooded, channeled	Bigsandy	3,821	114.6	drainageways, flood plains	2, 4
703A	Lonna-Havre-Glendive complex, 0 to 2 percent slopes	Bigsandy	28,646	859.4	drainageways, flood plains	2, 4
72A	McKenzie silty clay, 0 to 2 percent slopes	McKenzie	183	155.6	depressions	3
941E	Cabbart-Havre loams, 0 to 35 percent slopes	Bigsandy	76,840	1,536.8	drainageways	2, 4
942A	Havre-Bigsandy loams, 0 to 2 percent slopes, frequently flooded	Bigsandy	972	388.8	drainageways	2, 4

Definitions of Hydric Criteria:

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

Criteria 2--Map unit components 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 or very 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 or very 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 (USDA NRCS Montana, 2019).

WATER

Surface Water

Streamflow

USGS Wyoming-Montana Water Science Center in cooperation with U.S. Army Corps of Engineers maintains stream gauges on most major streams throughout the state as part of the Groundwater and Streamflow Information Program network of Federal Priority Streamgages (FPS). There is only one

stream gauge in Garfield County. When searching the USGS National Water Information System, this site, located near Van Norman, Montana, appears in the list of stations for McCone County.

Mean Annual output (stream flow) for the gauging station is shown on in Figure 9. The highest and lowest values are indicated. Following the **mean annual** stream-flow graph is the same gauging station's record for annual **peak** streamflow, shown in Figure 10. The highest value is labeled, indicating the date of the highest discharge and the amount of water in cubic feet per second². (USGS, 2019)

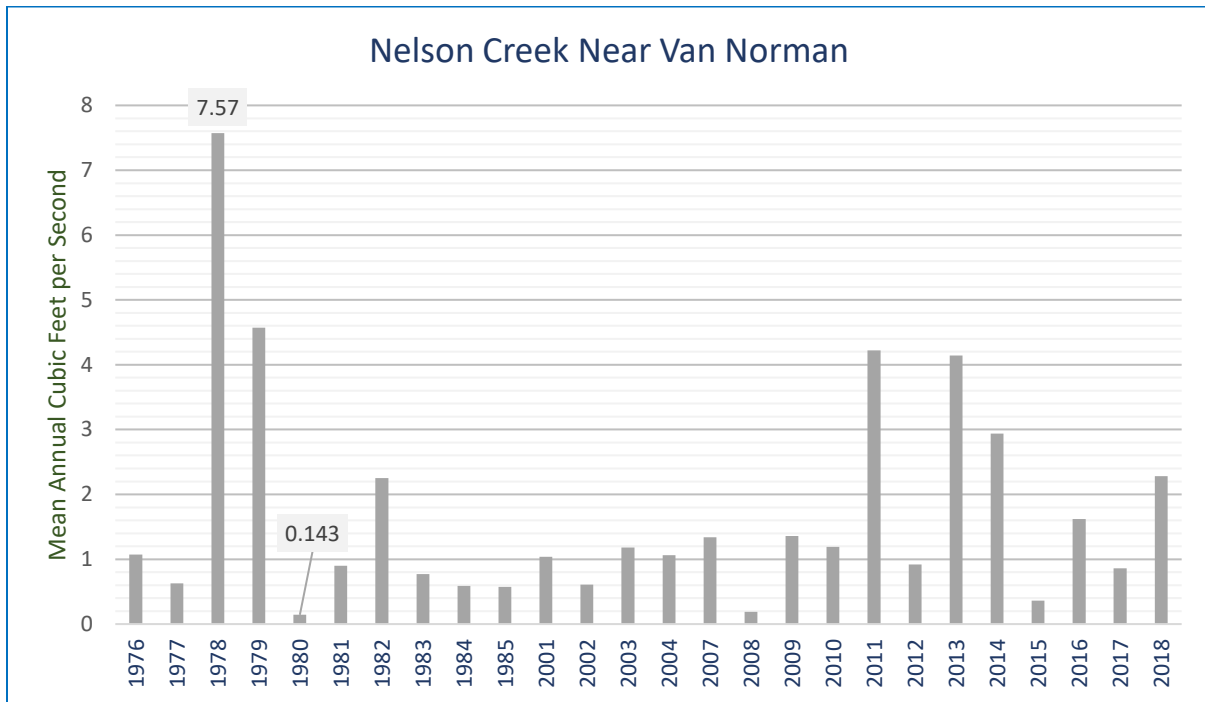


Figure 9 Mean Annual Discharge at Nelson Creek, Garfield County

² One cubic foot of water is a little less than 7.5 US gallons. One cubic foot per second is a little less than 449 gallons per minute.

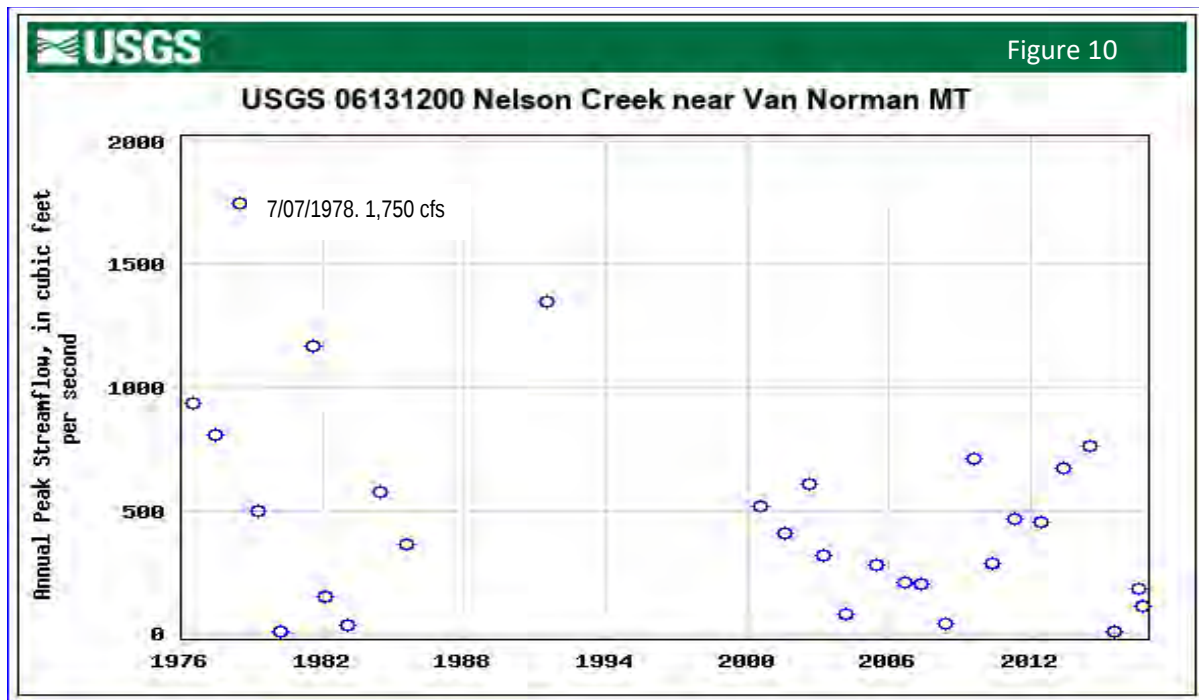


Figure 10 Annual Peak Streamflow on Nelson Creek, Garfield County

Major streams are shown in Appendix A7. Most of Garfield County is drained by Big Dry Creek, which, prior to the construction of Fort Peck Dam, joined the Missouri River in the northeast corner of the county. The creek is often intermittent after about mid-July, although it contains pools of water in the channel throughout the year. The Missouri Breaks are drained by numerous short, deeply incised streams which flow to the north. The western quarter of the county is drained by the Musselshell River; the southeastern portion of the county drains into Little Dry Creek. Calf and Lodgepole Creeks are the major tributaries to the Musselshell River in Garfield County. Major tributaries to Big Dry Creek are Lone Tree, Frazier, Sand and Little Dry Creeks.

Subregions, Watersheds and Sub-watersheds

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 HUCs: 8-digit HUCs for large watersheds known as sub-regions, 10-digit HUCs for watersheds, and 12-digit HUCs for smaller or sub-watersheds.

Garfield County hydrography is shown in Figure 11. Portions of the Big Dry, the Lower and Middle Musselshell, Lower Yellowstone-Sunday and Fort Peck Reservoir sub-regions are drawn with thick black borders. Within the subregions are 10-digit watersheds labeled and bordered in brown. These are divided into 12-digit sub-watersheds, shown on the map as colored polygons.

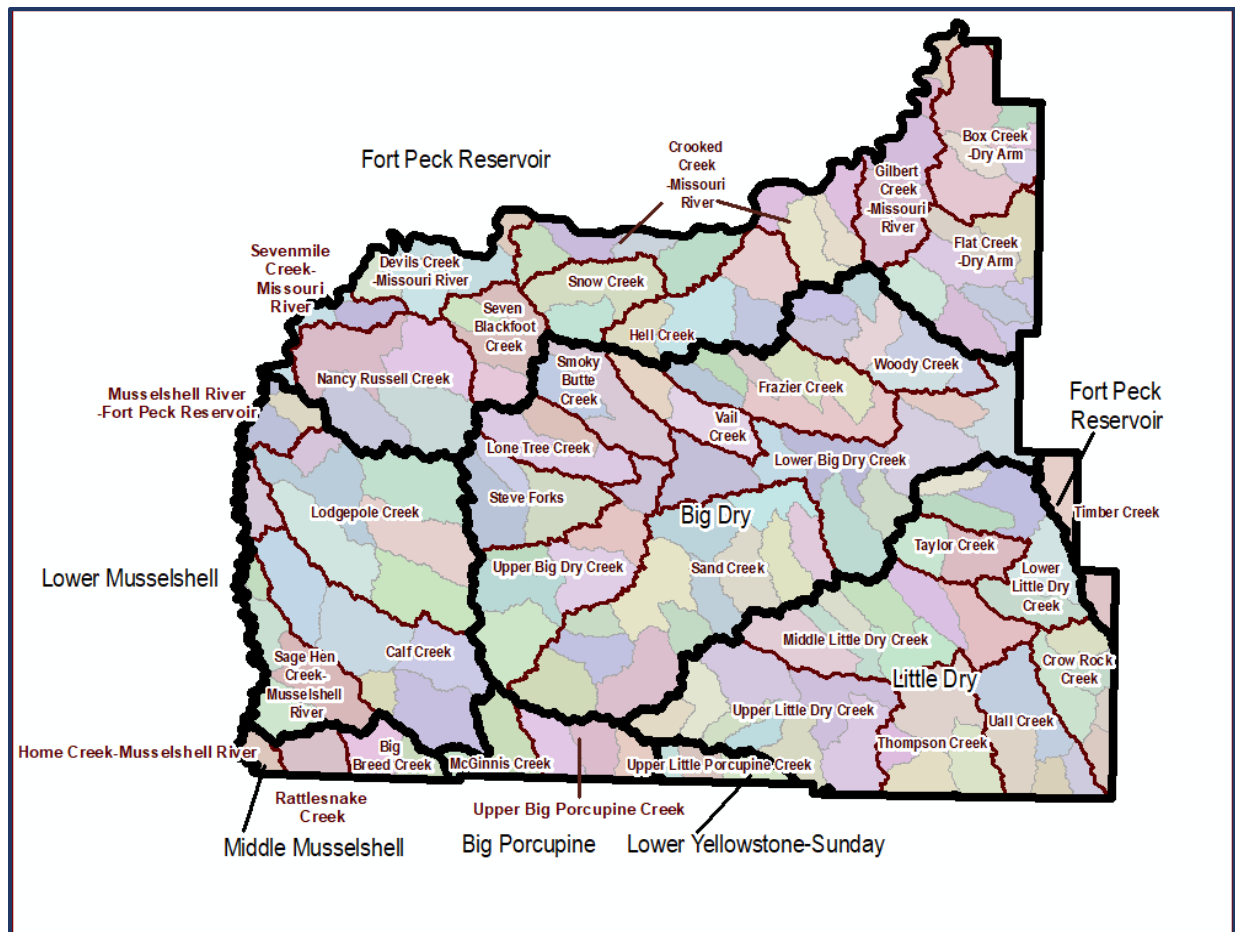


Figure 11, Subregions, Watersheds and Sub-watersheds, Garfield County, Montana

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>

Garfield County has nine stream reaches and one water body that appear on the Montana Department of Environmental Quality list of impaired streams in one of four water quality categories.

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

- Lodge Pole Creek
- Little Dry Creek

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

- Calf Creek
- Big Porcupine Creek

Category 4A: All TMDLs needed to rectify all identified threats or impairments have been completed and approved.

- Timber Creek does not fully support aquatic life. Probable causes are total nitrogen from agriculture, and total phosphorus and total Kjeldahl nitrogen (TKN) from unknown or natural sources.

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

- The Musselshell River from Roundup to Flatwillow Creek does not fully support aquatic life. Probable causes are alteration in stream-side or littoral vegetative covers from grazing, crop production, and hydrostructure flow regulation as well as channelization and streambank modifications. Probable causes of flow regime modification are agriculture and the impacts from hydrostructure flow regulation. Habitat alterations are likely from the same sources; iron is probably from abandoned mines.
- The Musselshell River from Flatwillow Creek to Fort Peck Reservoir does not fully support aquatic life due to the same impairments and probable causes described for the previous reach of the river. Municipal point source discharges, on-site treatment systems and grazing impair primary contact recreation on this reach.
- Big Dry Creek Does not fully support aquatic life. Probable causes are alteration in stream-side or littoral vegetative covers and nitrate-nitrite from agriculture. Ammonia, nitrate-nitrite, total nitrogen and total phosphorus from municipal point source discharges impair primary contact recreation.
- Fort Peck Reservoir. Aquatic life and drinking water are impaired by lead and mercury, probably from historic bottom deposits, impacts from abandoned mines and atmospheric deposition.
- Little Porcupine Creek does not fully support aquatic life or primary contact recreation due to impairments probably caused by chlorophyll-a, nitrate-nitrite, total nitrogen, total phosphorus that are the result of grazing, and total dissolved solids from unknown sources (Montana DEQ, 2019).

DryRedwater Regional Water Authority

DryRedwater Regional Water Authority (DRWA) was formed in 2005 to provide a reliable source of safe, high quality drinking water to small communities and rural homes in the rural areas. The project includes an intake and water treatment plant on Fort Peck Reservoir and extensive water pipeline systems. DRWA is owned by the McCone, Dawson, Garfield and Richland County Conservation Districts. The DRWA coverage area includes 11,791 square miles in McCone, Dawson, Garfield, Richland, and Prairie Counties in Montana, and McKenzie County, North Dakota.

DWRA has assessed the need for improved drinking systems for the Town of Jordan. DWRA states, “The Town of Jordan has a municipal water distribution system which consists of two water wells and a 200,000 gallon on-ground water storage reservoir. There is no treatment of the water, but it is disinfected by being chlorinated. The quality of the water exceeds many of the secondary limits, such as sodium and total dissolved solids, of the Clean Water Act. The potential for increased regulations of the Groundwater Rule (GWR) and Disinfection Byproducts Rule would require further treatment and create additional cost for each user in Jordan.”

In the Town of Jordan 374 water users have signed up to participate in DWRA developments, in total 671 Garfield County individuals and entities have signed up for rural water through DWRA; the number of sign-ups continues to increase (DWRA, 2019).

Ground Water

Quantities of water suitable for livestock use can be developed from most of the sandstone bedrock in Garfield County. Unconsolidated alluvium is also a reliable source of small to moderate amounts of water, and in general it has lower total dissolved solids (TDS) concentrations than most bedrock wells. Most of the water developed from bedrock sources is high in calcium and magnesium and unsatisfactory for domestic use or irrigation. The water can be used for livestock. Water in the Fox Hills Formation is generally softer with smaller TDS concentration than water from sandstone beds in the Hell Creek and Fort Union Formations. In some areas near the lower contact of the Fort Union Formation, deep wells are drilled to the Fox Hills Formation for better water quality.

The Tullock Member of the Fort Union Formation yields water to flowing wells along Big Dry Creek between Jordan and Van Norman. Downstream from Van Norman, flowing wells can be developed from the Fox Hills aquifer.

According to the Ground Water Information Data Center for the Montana Bureau of Mines and Geology, (MBMG) there are 2,212 water wells in Garfield County. Twelve are unused; 1,742 are for livestock water, and 589 are for domestic use. Seventeen wells provide irrigation water, 12 are used for public water supply, and 51 are monitoring wells. Numbers may differ from county total since one well may have several reported water uses. The oldest well on record was drilled in 1904; the deepest well is 2,286 feet.

MBMG lists the groundwater sources and depths for some of the wells in Garfield County. These are shown in Table 5. No correlation is given between source and depth.

MBMG maintains seven monitoring wells in the county to measure 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 (MBMG, 2019). Information about the location, static water levels and more is available from MBMG at

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

Table 5 Sources of Groundwater and Well Depth Ranges, Garfield County, Montana

Source	Number	Depth (feet)	Number	Percent at This Depth
Fox Hills Aquifer	135	0-99	497	27.7
Hell Creek Formation	61	100-199	757	42.2
Fort Union Formation	34	200-299	475	26.5
Judith River Formation	10	300-399	261	15
Fox-Hills Formation	7	400-499	110	6.1
Tongue River Member of Ft Union Formation	4	500-1000	85	4.7
Tulloch Member of Fort Union Formation	3	>1000	27	1.5
Lebo Member of Fort Union Formation	2	Total	1792	
Other	15			

Air and Energy

Oil and Natural Gas

Garfield County is located at the edge of the Williston Basin, which is one of the most important oil- and gas-producing regions in North America. There are significant reserves to the southwest, however only the Cat Creek oil field extends into the county itself. The Cat Creek oil field is a collective name for four small oil fields, three of which are in Garfield County. The anticline contains ten separate domes; however, oil has only been produced from West Dome, Mosby Dome, Antelope Dome, and East Dome. The Mosby Dome was the first producing oil field in Montana. Its first production well was completed in 1920 at a depth of 998 feet, and by the end of the year there were eleven producing wells nearby. By July 1926, there were 190 producing wells. In 1922, oil production reached its peak and has been slowly declining since then.

Garfield County ranks twenty-seventh in Montana for oil production and twenty-eighth for gas. It accounts for around four percent of all the oil produced in Montana. While the industry is active in the county, it does not play as great a role in the economy as in other areas of eastern Montana (ShaleXP, 2019).

Data provided by Montana Department of Resources & Conservation Board of Oil and Gas Conservation shows peak production for Richland County (ranked first for oil production in the state) occurred in 2014 when 15.9 million barrels of oil were extracted. By contrast, Garfield County produced 10.3 thousand barrels in 2014. The chart on page 18 shows DNRC data for oil production from 1986 to 2018 (MT DNRC BOGC, 2019).

Production data are labeled in 1986 and 2018 (highest and lowest, respectively). In the oil industry, one barrel, or BBL, is equivalent to forty-two US gallons at sixty degrees Fahrenheit.

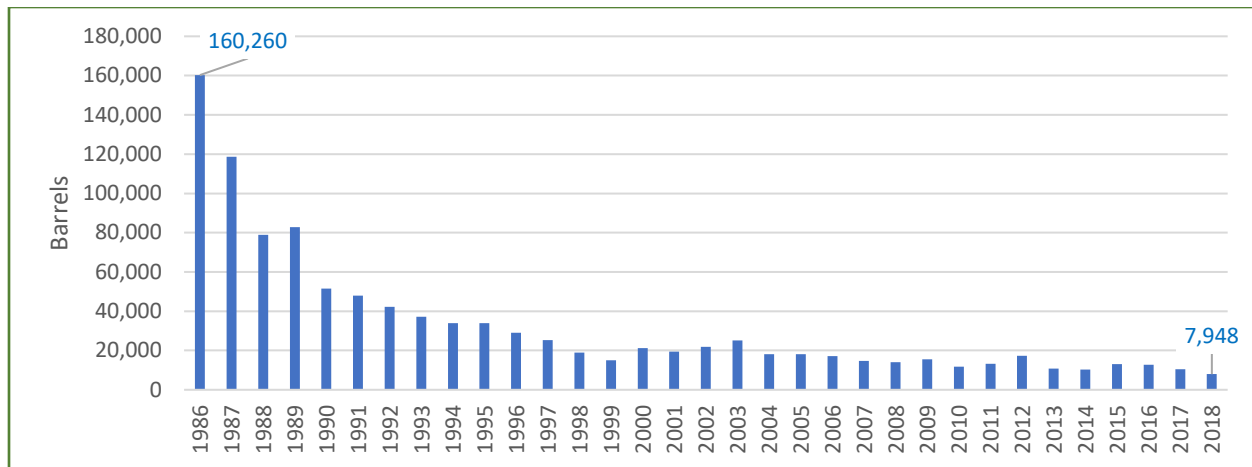


Figure 12 Crude Oil Production in Garfield County 1986 to 2018 (Shale XP, 2019)

Coal

Interbeds of coal are present in the Fort Union and Judith River Formations. Small mines in the vicinity of Haxby Point and Seven Blackfoot Creek produced minor volumes of coal between the 1920s and 1940s, which was used primarily by ranchers and homesteaders who excavated small outcrops for their own use.

There are potential reserves of lignite coal in the Tongue River Member of the Fort Union Formation and the Judith River Formation. The coal beds are variable in thickness and in the amount of shale beds and other impurities they contain. Locally, some of these beds are thick enough to be of economic value, but no commercial volumes of coal have been mined in Garfield County (USDA NRCS, 2000).

Air Quality

Montana Department of Environmental Quality Air Quality Bureau maintains air quality monitoring stations in Malta 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 Garfield County (MT DEQ, 2019).

Utilities

McCone Electric is a rural electrical cooperative that serves 14,000 square miles in McCone, Garfield and Dawson Counties. Most of Garfield County, including the Town of Jordan, is serviced by McCone Electric.

Drinking water is supplied to residents by the Town of Jordan. Some homes in Jordan and most rural homes have private wells.

Plants and Animals

Animal Species of Concern

MNHP lists 36 animals, birds and fish as State Species of Concern (SOC). The list is included as Appendix B1. Information about each species is available as a separate Montana Field Guide, also from MNHP, at <http://fieldguide.mt.gov/displayClasses.aspx?Kingdom=Animalia>.

The United States Department of the Interior Fish & Wildlife Service has determined that there are four species of native animals designated as listed endangered or listed threatened under the Endangered Species Act in Garfield County (USFWS MT, 2019).

Pallid Sturgeon (*Scaphirhynchus albus*). Listed Endangered.

Pallid Sturgeon are bottom dwelling, slow growing fish that feed primarily on small fish and immature aquatic insects. Adults have a flattened snout, a long slender tail and are armored with lengthwise rows of bony plates instead of scales. Pallid Sturgeon can grow up to six feet long and weigh up to 80 pounds. The species is adapted to living close to the bottom of large, silty rivers; their preferred habitat has a diversity of depths and velocities formed by braided channels, sand bars, sand flats and gravel bars. The Pallid Sturgeon is one of the rarest fishes in North America; only about 200 adults remain in the upper Missouri River. It was federally listed as endangered in 1990 due to population decline caused by human alterations of the environment: impoundments, channelization and altered river hydrography, turbidity and temperature. The Pallid Sturgeon is currently listed as “S1” in Montana due to extremely limited or rapidly declining population numbers, range or habitat, making it highly vulnerable to global extinction or extirpation in Montana (MNHP, 2019). Any NRCS undertaking that impacts the Missouri River bank below the ordinary high-water mark will require a consultation with the Corp of Engineers as well as a consultation with USFWS (Ellenburg, 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)

Least Tern (*Sternula antillarum*)—Listed Endangered.

Least Tern are North America’s smallest tern. These little shorebirds are easily recognized by their yellow bills and legs. Although the species is widespread and common in places, the interior population has been classified as threatened, endangered or as a species of concern for most states because of loss of habitat. The interior population declined by about 88% between 1966 and 2015; Interior Least Tern have been federally listed as endangered since 1985.

Least Tern often nest in colonies; nesting sites are shallow scrapes on open ground near lake shores, on sandbars or along the riverside. Unfortunately, prime nesting habitat is often used by humans for recreation or residential development. Additionally, alterations to stream flows caused by dams, reservoirs, water diversion and other changes to river systems have eliminated most historic Least Tern nesting habitat. Wide channels dotted with sandbars, which are preferred by Least Terns, have been replaced by narrow, armor-banked rivers with highly altered flows. Fluctuating water levels from reservoir releases often destroy nesting sites (MNHP, 2019). According to NRCS Montana State Wildlife Biologist Pilar Ziegler, the interior least tern is endangered wherever it occurs (Ziegler, 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. USFWS Range map of breeding and wintering habitat shows Piping Plover may use part of the eastern area of the county for breeding habitat (NRCS, 2015).

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 (ESA). 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). Although Greater Sage-Grouse are no longer listed as a Candidate Species under ESA, the Montana Natural Heritage –Species of Concern Report lists the species category S2 in Montana: *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.*

Much of Garfield County has been determined to be ‘General Habitat’ for Greater Sage-grouse; there are only two areas in the county designated as part of the species’ core area. In Figure 13, Core Area is depicted in green cross-hatch and General Habitat in blue.

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 seventy-five percent 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).

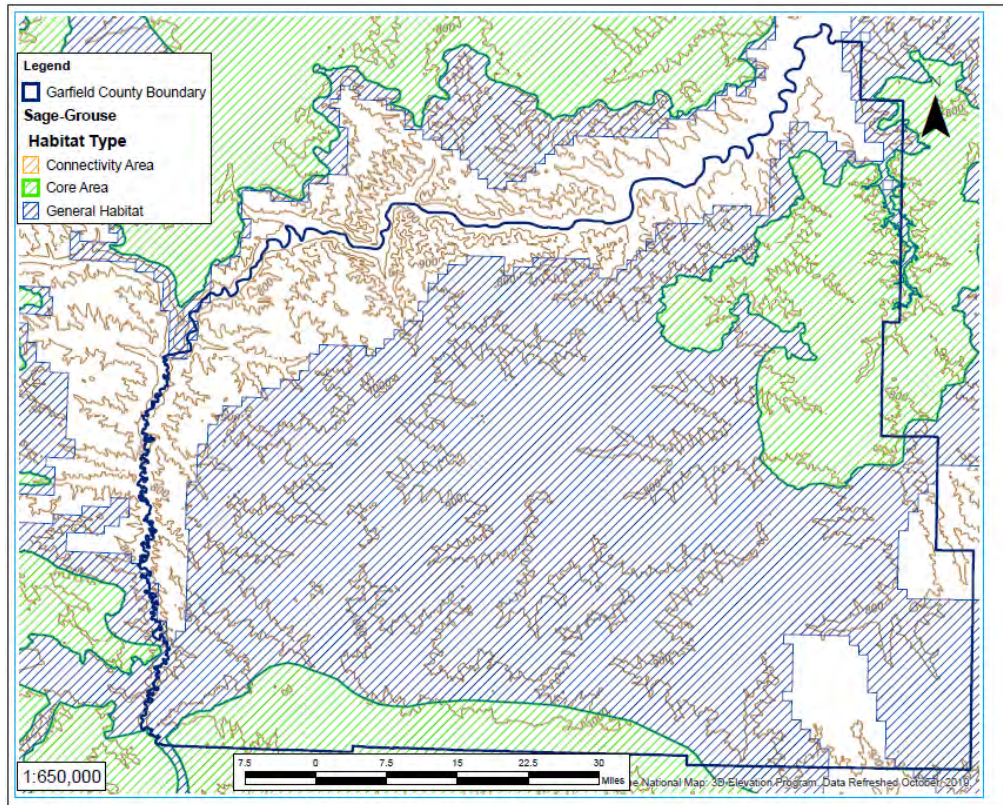


Figure 13 Greater Sage-Grouse General Habitat and Core Area Habitat in Garfield County, Montana

Grassland Birds

Four species of grassland birds are Montana species of concern in Garfield County: Baird's Sparrow, Chestnut-Collared Longspur, Sprague's Pipit, and McCown's Longspur.

Vickery explains 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 U.S. 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

Centronyx bairdii



- 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

Calcarius ornatus



- 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 US 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
Anthus spragueii



- Do not nest in cropland and are uncommon or absent in non-native grasslands. They tolerate some grazing of this habitat but do not nest where it is overgrazed. 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).

McCown's Longspur
Rhynchophanes mccownii



- Prefers semi-arid shortgrass steppe, open with sparse vegetation.
- Migrates in large flocks between breeding ground in the Canadian Prairie Provinces and northwestern Great Plains and wintering grounds in the southwestern US and northern Mexico.
- Decreasing range-wide abundance can be attributed to conversion of short-grass prairie to agriculture and urban development (MNHP, 2019).

Figure 14 Garfield County Grassland Birds Species of Concern

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 five plant species of concern for Garfield County.

Table 6 Garfield County Plant Species of Concern

Scientific Name	Common Name	Family	State Rank	Habitat
<i>Astragalus geyeri</i>	Geyer's Milkvetch	Pea Family	S2	Sandy sites
<i>Bacopa rotundifolia</i>	Roundleaf Water-hyssop	Plantain Family	S3?	Wetland/Riparian
<i>Chenopodium subglabrum</i>	Smooth Goosefoot	Amaranth (Pigweed) Family	S2	Sandy sites
<i>Phacelia thermalis</i>	Hot Spring Phacelia	Waterleaf Family	S1S3	Barren clay slopes
<i>Carex sychnocephala</i>	Many-headed Sedge	Sedges	S1S2	Wetland/Riparian

- State Ranking **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.
- State Ranking **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.
- State Ranking **S3**: Potentially at risk because of limited and/or declining numbers, range and/or habitat, even though it may be abundant in some areas.
- State Ranking **S4**: Apparently secure, though it may be quite rare in parts of its range, and or suspected to be declining (MNHP, 2019).

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.

Riparian areas are ecosystems that occur along watercourses or water bodies. They are distinctly different from the surrounding lands because of unique soil and vegetation characteristics that are strongly influenced by free or unbound water in the soil. Riparian ecosystems occupy the transitional area between the terrestrial and aquatic ecosystems. Typical examples would include floodplains, stream banks, and lake shores.

In Garfield County, Fort Peck Reservoir covers about 202.5 thousand acres. The other wetland and riparian system types, acres of each type and the percent of total (excluding Fort Peck Reservoir) are shown in Figure 15.

'Other' includes three systems that each cover less than one thousand acres in the county (MT NHP , 2019).

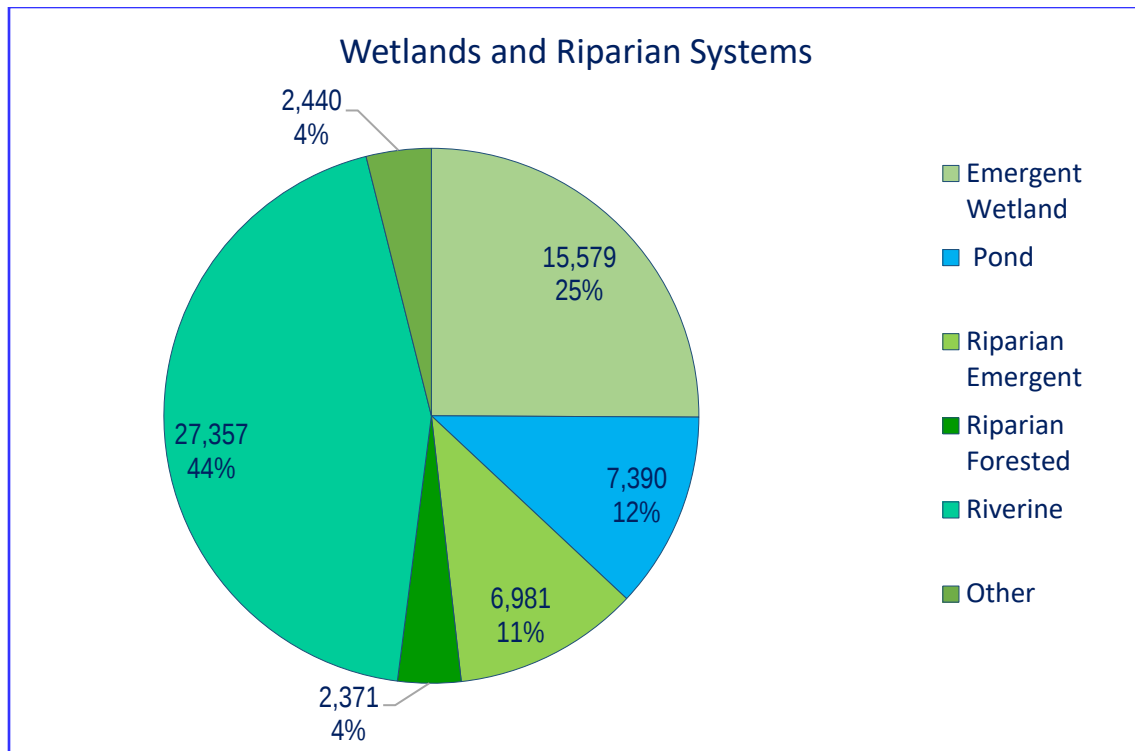


Figure 15 Wetlands and Riparian Systems, Excluding Lakes, Garfield County, Montana (MT NHP , 2019)

- Emergent Wetlands and Riparian Emergent systems are those with erect, rooted herbaceous vegetation present during most of the growing season.
- Ponds are bodies of water less than twenty acres in size.
- Riparian Forested systems occur along rivers and streams and are dominated by woody species that are greater than twenty feet tall.
- Riverine areas are perennial streams comprised of the deep-water habitat contained within a channel; they do not include adjacent floodplains.

Figure 16 depicts the wetlands and riparian areas at the confluence of Calf Creek (on the right) and the Musselshell River. Most of the larger wetland and riparian areas occur along the Musselshell River and the shores of Fort Peck Reservoir. Small areas of riparian systems occur on the major creeks; emergent wetlands tend to be found adjacent to livestock water reservoirs throughout the county.

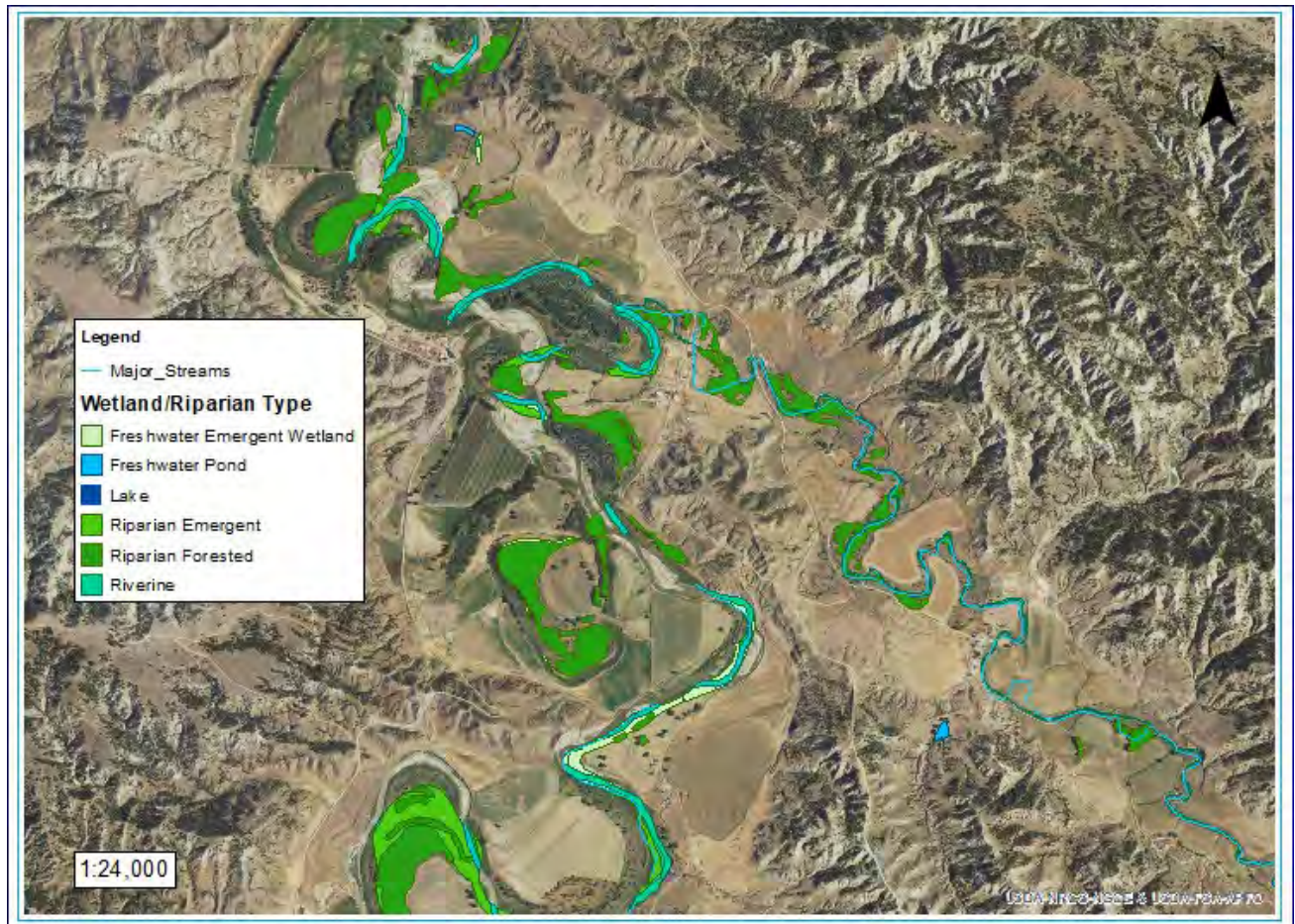


Figure 16 Wetland Areas at the Confluence of Calf Creek and the Musselshell River

Noxious Weeds

Garfield County MSU Extension Agent Eric Miller serves as the County Weed District Coordinator. According to Miller, spotted knapweed (*Centaurea stoebe*) and Canada thistle (*Cirsium arvense*) occur along the Highway 200 corridor from one county line to the other. Spotted knapweed is also found in scattered locations, totaling an estimated 500 acres.

Leafy spurge is known to be in areas in the west-central areas of the county; hounds tongue (*Cynoglossum officinale*) is invading areas from Pine Grove south to Steve's Fork road. The Fort Peck Reservoir shoreline is a problem area for salt cedar (*Tamarix ramosissima*) and Canada thistle.

Attempts to establish insectaries for biological control of Canada thistle have had disappointing results, but the District intends to participate in collections of beetles to apply to leafy spurge sites in the future (Miller, 2019).

Aquatic Invasive Species

Aquatic invasive species (AIS) are those that impact water bodies and wetlands. Several non-native invasive species such as Eurasian watermilfoil (*Myriophyllum spicatum* L) and New Zealand mud snails (*Potamopyrgus antipodarum*) are now found in Montana. Their presence can cause severe damage to local ecosystems, agriculture and industry. Montana FWP's Aquatic Invasive Species Distribution-Plants

map indicates that Eurasian watermilfoil and Curly-leaf pondweed are known to exist in Fort Peck Reservoir. FWP's Aquatic Invasive Species Distribution-Invertebrates map shows the Montana waterbodies infested with New Zealand mudsnail and faucet snail (*Bithynia tentaculata*) and those known or suspected to have zebra mussel (*Dreissena polymorpha*) or quagga mussel (*Dreissena rostriformis*) larvae. None of these species were known to be in Garfield County as of November 20, 2018 (Montana FWP, 2019). The map is included as Appendix A8.

Montana Fish, Wildlife & Parks, with assistance from local Conservation Districts, maintains watercraft inspection stations throughout the state to prevent the occurrence of aquatic invasive species in Montana waters. Any persons towing or carrying any watercraft or water-based equipment must stop at all watercraft inspection stations encountered in Montana. Garfield County Conservation District assists with operating the inspection stations at Flowing Wells and Wibaux, Montana. The Flowing Wells station inspects around 800 watercraft per month. Mussels were identified on a vessel from Michigan in 2019; other non-native snails and aquatic plants are found frequently.

Hell Creek State Park

Montana Fish, Wildlife & Parks maintains Hell Creek State Park on the Hell Creek Arm of Fort Peck Lake about twenty-five miles north of Jordan. The park provides facilities for most water sports, as well as excellent walleye fishing. Hell Creek also serves as a launching point for boat camping in the wild and scenic Missouri Breaks. The campground offers RV hookups, public restrooms, running water, electricity, a playground and campsites with fire rings (MT FWP, 2019). The location of the Park is shown in Figure 17.

Charles M. Russell National Wildlife Refuge

Charles M. Russell National Wildlife Refuge (NWR) was established in 1936. It is managed by the U.S. Fish and Wildlife Service. The Refuge is one of over 550 refuges in the National Wildlife Refuge System, a system of lands set aside to conserve wildlife and habitat for people today and generations to come. It is the second largest national wildlife refuge in the lower 48 states.

The UL Bend National Wildlife Refuge was established in 1967 as a sanctuary for the nesting, resting, and feeding of migratory birds. UL Bend is a large peninsula created by a hairpin turn in the Missouri River. The peninsula is a flat basin which provides a marked contrast to the breaks topography common within the Charles M. Russell NWR. The basin and rugged ridges and coulees along the river itself contain grassland-sagebrush, marsh-meadows, and conifer vegetation types. UL Bend NWR provides important prairie dog and black-footed ferret habitat. It also serves as an important winter migration corridor for pronghorn antelope (Clark, 2011).

Managed as one refuge, the Charles M. Russell NWR and the UL Bend NWR encompass an area of 1.1 million acres from Fort Peck Dam to the eastern boundary of the Upper Missouri River Breaks National Monument.

USFWS's CMR webpage notes, "Given the size and remoteness of CMR, the area has changed very little from the historic voyage of the Lewis and Clark expedition, through the era of outlaws and homesteaders, to the present time. Elk, mule deer, pronghorn, bighorn sheep, sage and sharp-tailed grouse, and bald eagles make the Refuge home. Visitors will find spectacular examples of native prairie, forested coulees, river bottoms, and "breaks" badlands so often portrayed in the paintings of the

colorful artist for whom this Refuge is named” (US FWS, 2019). Camping, hiking, horseback riding, photography and hunting draw visitors to the refuge.

The Figure 17 is a map of the CMR and UL Bend NWRs. It shows the location of the CMR and UL Bend National Wildlife Refuges and Hell Creek State Park in relation to the towns and roads in Garfield County.

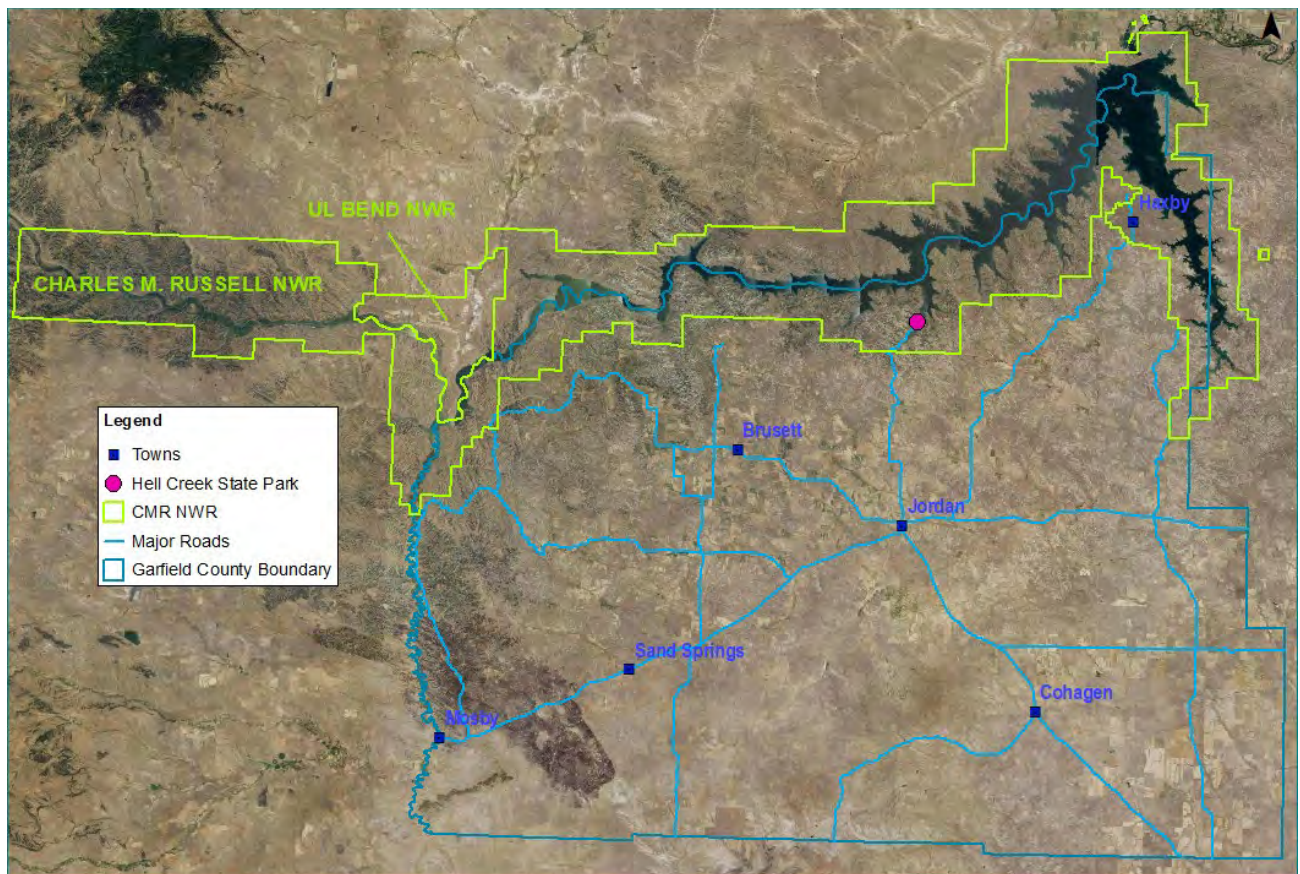


Figure 17 The Charles M. Russel NWR, UL Bend NWR and Hell Creek State Park

SECTION III. CONSERVATION ACTIVITY ANALYSIS

Garfield County NRCS Conservation Practice Application and Extent (2009 to 2019)

EQIP Activities Summarized			
Practice Code	Practice Name	Unit	Amount
472	ACCESS CONTROL	ac	1,594.0
340	COVER CROP	ac	1,965.0
382	FENCE (Additional ECP fence following fire)	mi	189.7 (108)
666	FOREST STAND IMPROVEMENT	ac	38.5
548	GRAZING LAND MECHANICAL TREATMENT	ac	2,066.0
388	IRRIGATION FIELD DITCH	ft	6,986.0
464	IRRIGATION LAND LEVELING	ac	61.2
430	IRRIGATION PIPELINE	ft	6,866.0
443	IRRIGATION SYSTEM, SURFACE AND SUBSURFACE	ac	321.7
516	LIVESTOCK PIPELINE	mi	77.3
590	NUTRIENT MANAGEMENT	ac	376.8
500	OBSTRUCTION REMOVAL	ea	119.0
512	PASTURE AND HAY PLANTING	ac	2,889.0
595	PEST MANAGEMENT	ac	40.0
378	POND	no	3.0
528	PRESCRIBED GRAZING	ac	178,936.0
533	PUMPING PLANT	no	45.0
550	RANGE PLANTING	ac	1,655.0
329	RESIDUE & TILLAGE MGMT, NO-TILL/STRIP TILL/DIRECT SEED	ac	6,318.0
649	STRUCTURES FOR WILDLIFE	no	17.0
612	TREE/SHRUB ESTABLISHMENT	ac	1.0
645	UPLAND WILDLIFE HABITAT MANAGEMENT	ac	18,361.0
642	WATER WELL	no	29.0
614	WATERING FACILITY	no	165.0
351	WELL DECOMMISSIONING	no	4.0
380	WINDBREAK/SHELTERBELT ESTABLISHMENT	ft	1,100.0

CSP Activities Summarized (22 Participants)	Amount	Unit
Biological suppression and other non-chemical techniques to manage brush, herbaceous weeds and invasive species	41.5	ac
Conservation crop rotation	7903.0	ac
Conversion of cropped land to grass-based agriculture	2001.4	ac
Establish pollinator and/or beneficial insect habitat	94.6	ac
Forage harvest management	856.7	ac
Fuel use reduction for field operations	1087.5	ac
GPS, targeted spray application (SmartSprayer), or other chemical application electronic control technology	10061.2	ac
Harvest crop in a manner that allows wildlife to flush and escape	5487.6	ac
Incorporate native grasses and/or legumes into 15% or more of the forage base	123.1	ac
Intensive no-till (Organic or Non-organic systems)	3773.2	ac
Irrigation pump planting evaluation	1	no
Leave standing grain crops unharvested to benefit wildlife	23.5	ac
Managing calving to coincide with forage availability	9953.5	ac
Monitor key grazing areas to improve grazing management	40631.5	ac
Monitoring nutritional status of livestock using the NUTBAL PRO system	89678.2	ac
Non-forested riparian zone enhancement for fish and wildlife	2159	ln ft
Precision application technology to apply nutrients	2870.7	ac
Pump plant powered by renewable energy	1	no
Recycle 100% of farm lubricants	1	no
Remote monitoring and notification of irrigation pumping plant operation	1	no
Residue management, seasonal	374.9	ac
Restoration of a windbreak, shelter belt, or hedgerow for wildlife habitat	0.7	ac
Retrofit watering facility for wildlife escape and enhanced access for bats and bird species	79	no
Rotation of supplement and feeding areas	70700.1	ac
Solar powered electric fence charging systems	1	no
Split nitrogen application, 50% after crop emergence or pasture green up	6175.8	ac
Use drift reducing nozzles, low pressure, lower boom height and adjuvants to reduce pesticide drift	4150.8	ac
Use of cover crop mixes	7875.9	ac
Wildlife friendly fencing	122769	ft

Emergency Conservation Program Drought Assistance 2017

The NRCS Jordan Field Office provided technical assistance on 81 Emergency Conservation Program livestock water development projects

Partner Conservation Efforts

- Montana Fish, Wildlife & Parks has a *Working Grasslands Initiative* which includes voluntary conservation tools (i.e. range infrastructure, restorations, leases/easements) for landowners that are directed towards preserving grasslands in Montana.
- The Garfield County Conservation District (GCCD) is working on various local conservation projects including addressing invasive species through a boat check station, salt cedar removal and weed control and monitoring as well as mitigation efforts related to wildfire.
- The Northern Great Plains Joint Venture has an implementation plan for bird habitat conservation in the area that provides strategic guidance for investments on private lands through various grant opportunities.
- The Rocky Mountain Elk Foundation has been working in partnership with private landowners to complete habitat improvement projects and preservation of elk habitat within the county.
- Bird Conservancy of the Rockies previously had a partner biologist in the county and has provided funding for habitat projects on private lands in the county as well as an easement workshop, which has led to 4 projects being completed.

Changes from the Last Five to Ten Years of Conservation Efforts

- Recent restoration of cropland to grass-based agriculture on 5300 ac ~ 3% of cropland
- Improved grazing management on ~ 178,936 ac, 7% of rangeland
- Rangeland recovery on 65,812 ac (full season rest) of 103,1705 ac contracted
- Introduction and use of cover crops on ~ 2% of cropland
- More widespread adoption of no-till planting ~ 4% documented on cropland
- Greater crop diversity on operations

Resource Concerns Remaining

Soil Health on Cropland and Grazinglands

- Wind, sheet and rill and gully soil erosion on cropland
- Degraded plant condition (inadequate structure and composition) on grazing land
- Wildlife habitat for sage-grouse

New Resource Concerns

- Loss of pollinators
- Invasion by annual grasses such as field brome and cheatgrass
- Expansion of noxious weeds including salt cedar and houndstongue
- Flooding on the Musselshell River
- Inadequate livestock water with loss of reservoir functioning
- Declines in shrub steppe & grassland bird populations due to loss of habitat continuity and habitat degradation
- A need for education and training in agricultural economics and soil health

SECTION IV. NATURAL RESOURCE PROBLEMS AND DESIRED FUTURE OUTCOMES

The Garfield County Conservation District (GCCD) convened five Local Working Group (LWG) meetings representing five areas of the county to determine priority resource concerns. Twenty people attended the meetings. Degraded plant condition, livestock production limitations, and soil quality degradation on cropland were the identified top resource concerns with the lack of livestock water being the top contributing issue. An informal 'Focused Conservation Questionnaire' was handed out to LWG participants, given to office walk-ins, and included in the GCCD newsletter. The results of this questionnaire are discussed further later in this document. The conservation practices needed most are water developments, grass plantings, and fencing.

Lack of livestock Water with Loss of Reservoirs as a Contributing Factor

Resource Concern

Informal customer surveys and EQIP applications indicate that the lack of livestock water is a recurring resource concern contributing to livestock production and management limitations. The failure of many reservoirs in the county has been identified as another contributor to inadequate livestock water. Often poor water quality often compounds the issue. By taking no action, water will continue to be limited in many areas. If reservoirs are rehabilitated, they may still only provide poor-quality, seasonal water for livestock and wildlife.

Resource Trend

The drought in 2017 and subsequent ECP project load indicates that inadequate water can be part of a widespread resource concern within the county. Many older reservoirs have been lost or have lost storage capacity. Furthermore, meetings, surveys and prior technical assistance have identified that many reservoirs have reached their lifespan and are filling with silt. Many land owners have opted to rehabilitate dams on their own, but there is also interest in developing alternative water sources such as wells with solar plants and tanks.

Analysis of Products and Services Needed

The first need is to identify potential participants who would be interested in installing alternative water sources. This would be accomplished by providing a public announcement to determine interest and potential target areas. A suite of approved practices would be provided; landowners could select the practices that best suit their need for alternatives to replace failing reservoirs. The Field Office staff will request assistance from NRCS engineers as well as the Montana Bureau of Mines and Geology to determine the feasibility of wells, pipelines, power sources and livestock water tanks.

Statement of Desired Future Condition

Establish reliable, good quality livestock water at one-mile intervals (per NRCS practice specifications) where feasible. In addition, use the new water sources to facilitate grazing management changes, specifically changing season of use of those areas that have previously relied on these seasonal water sources.

Objectives

Objective 1. Determine the area in the county with the greatest need and where the land managers are ready, willing, and able to participate in the Targeted Implementation Plan.

Objective 2. Conduct resource inventories on the operations of those who are interested in participating to identify where water is most needed, where implementation is feasible, and where the additional water sources would have the greatest impact.

Objective 3. Treat 25,000 acres within the focus area, establishing reliable, good quality livestock water at one-mile intervals relative to topography.

Degraded Plant Condition Resulting from Historic Grazing Practices

Resource Concern

Historic grazing practices such as season long grazing and same season grazing are contributing to widespread declining range condition. The resource concern causes that have resulted from historic grazing practices are degraded plant condition due to selective re-grazing, inadequate plant structure and composition, and excessive pest pressure on grazing land. No action will result in further loss of plant community health and reduction in forage production for livestock. Degraded plant condition is related to grazing management, which can be due to a lack of facilitating practices such as livestock water and cross fencing. This can result in uneven grazing, long periods of use, re-grazing, and no grazing in some upland areas. The ability to improve grazing management may require the installation of the facilitating practices such as fences and livestock water and just as importantly, an understanding of proper grazing management.

Resource Trend

Inadequate structure and composition in plant communities is an issue that has continued due to historic grazing practices and is characterized by the loss of perennial desirable species and the increase in undesirable species (increasers and invaders). Excessive pest pressure is a related resource concern and is characterized by the invasion of annual grasses and expansion of noxious weeds. Both causes are widespread within the county and have increased over time. Historic season-long grazing practices can also be a factor related to declines in suitable habitat for shrubland birds such as sage-grouse and grassland birds.

Analysis of Products and Services Needed

EQIP and CSP applications and the focused conservation questionnaire survey (2019) are good indications of interest in rangeland facilitating practices. Locating the resource concerns on the operations that belong to applicants and respondents will provide a good starting point to determine greatest interest for addressing this natural resource issue. Once an area of concern is identified, Field Office personnel will interview the producers to determine their level of interest. From there, we will start with planning steps 1 through 4.

Statement of Desired Future Condition

Following the installation of facilitating practices, land managers will adopt grazing management techniques in order to reduce the impacts of the stated resource concerns and facilitate an upward trend in range health.

Objectives

Objective 1 – Develop partnerships to provide local educational opportunities including well known speakers like Jerry Doan and Steve Kenyon as well as more local producers Joe and Ryan Bruski, and Chester and Chet Meyers.

Objective 2 – Develop partnerships to provide multi-day workshops where land managers can work on developing their own grazing system based on sound resource management principles.

Objective 3 – Within the focus area, work with land managers to develop grazing systems on 25,000 acres, increasing the number of pastures and herds, shortening the grazing periods, and reducing bare ground.

Depleted Monoculture Grass Stands

Resource Concern

Monocultures lack diversity, not only above-ground, but also in their underlying soil biology. Consequently, they can be less resilient and more susceptible to the detrimental effects of drought and pests. Crested wheatgrass or smooth brome grass were intentionally planted during the early Conservation Reserve Program (CRP) in the late 1980s to early 1990s. There has been documented loss of vigor in older stands. Crested wheatgrass and smooth brome grass have also spread into degraded native rangeland. If no action is taken the result will be further loss of production and reduced profitability.

Resource Trend

Soil quality degradation is a widespread resource concern within the county. Organic matter depletion continues with monoculture grass stands including aging Conservation Reserve Program (CRP) plantings. Some crested wheatgrass and smooth brome stands are surrounded by native range or in such places that they can't be grazed when they are palatable. Other stands are so degraded from hay harvest, drought and soil degradation that they require renovation and higher levels of management which focuses on soil health principles.

Analysis of Products and Services Needed

Improvements to nutrient cycling and plant composition are necessary but will take time. The Field Office has had numerous requests for assistance in reclaiming crested wheatgrass and smooth brome stands. Research is needed to identify methods that work to improve nutrient cycling and renovate or replace the monoculture with a diverse plant community that fits the grazing system. Gabe Brown's book, *From Dirt to Soil*, includes a section about enhancing nutrient cycling. This method could be adapted to most operations in Garfield County. We have also seen renovation of smooth brome through a high intensity, short duration grazing system. Developing a fact sheet for these methods would help with information transfer. Once these have been developed, we can determine which practices or opportunities are needed to address this natural resource issue and design a Targeted Implementation Plan (TIP), to be followed by outreach.

On Pasture magazine provides information on renovating decadent grass stands. The article, *Twelve Steps to Amazing Grazing, Part 1* can be accessed at :

<https://onpasture.com/2019/05/13/twelve-steps-to-amazing-grazing-part-1/>

Developing an information resource guide and a fact sheet for these methods would help with information transfer.

Statement of Desired Future Condition

The desired outcomes would be to improve nutrient cycling and plant vigor in depleted monocultures or to replace the monoculture with a diverse plant community with proper nutrient cycling, depending on the goals of the land manager.

Objectives

Objective 1. Develop a demonstration project involving cover crops and grazing.

Objective 2. Document current projects already being implemented that are increasing nutrient cycling and improving and increasing plant vigor.

Objective 3. Co-host an annual educational event showcasing success stories that improve the vigor of monocultures or increase diversity.

Objective 4. Within the focus area, treat 75% of the depleted monocultures by improving plant vigor and diversity.

Degrading Cropping Systems, Cropland

Resource Concern

Wind and gully erosion have been symptoms of deeper concerns on cropland for decades and continue to be within the county, even though greater adoption of no-till has been supported by both NRCS and Conservation District efforts such as the no-till drill rental. No other action will result in ongoing loss of soil resources across the county. Depletion of organic matter, soil structure, and soil biology on cropland has led to reduction in water infiltration and a need for higher inputs. Therefore, no further action will result in continued reduced profitability as well as other resource concerns.

Resource Trend

Soil erosion and soil quality degradation are widespread resource concerns on cropland within the county, despite adoption of no-till farming. This has to do in part with its use as only a stand-alone conservation practice instead of as part of a comprehensive management system. A lack of crop diversity, fallow practices, limited crop rotations and, in some cases, unsuitability of cropland for farming contribute to the ongoing degradation of soil resources within the county.

Analysis of Products and Services Needed

The first step will be to identify potential participants who are implementing no-till practices on their cropland and to determine what their interests are in diversifying through implementation of other practices. A targeted questionnaire can be used to determine what practices could be included in a Targeted Implementation Plan (TIP) as well as what educational opportunities may be needed. A subsequent step would be to take information from these systems and provide outreach to individuals who currently use conventional tillage, providing them the opportunity to develop a comprehensive plan that includes more practices and greater prospect of success. Thus, a Targeted Implementation Plan could consist of two phases.

Statement of Desired Future Condition

The adoption of a systems approach on all cropland, including three of the five soil health principles (soil armor, minimizing soil disturbance, plant diversity, continual live plant/root, livestock integration) and other identified conservation practices for improving soil resources.

Objectives

Objective 1. Develop a demonstration project involving a cropping system incorporating five soil health principles.

Objective 2. Document local cropping systems already implementing three or more soil health principles.

Objective 3. Present an annual educational event showcasing success stories.

Objective 4. Within the focus area, 25% of the no-till producers will adopt a systems approach by integrating practices that align with one or more additional soil health principles.

Aging Agricultural Community

Resource Concern

An aging agricultural community presents challenges because of resistance to new ideas and adaptive behaviors. This issue may also present additional challenges as younger farmers and ranchers return and adopt similar practices, behaviors and attitudes. If the next generation sees the farm or ranch as unprofitable, they are less likely to want to be a part of the family operation. Therefore, no action may result in the continuation of status quo wherein our youth do not return to the land.

Resource Trend

As our producers continue to age, adoption of modern conservation practices diminishes.

Analysis of Products and Services Needed

Garfield County producers require assistance in transferring the farm or ranch to the next generation. This can be a difficult process. There are financial road blocks that often prevent the transfer. Hands-on courses in the transfer of farm or ranch and estate planning are needed to assist and encourage the process.

Statement of Desired Future Condition

Family farms and ranches could be transferred from one generation to another by practical, feasible processes. Families stay together.

Objectives

Objective 1. With the help of partners the Field Office will sponsor listening sessions and workshops to walk families through the process of transferring the farm or ranch to the next generation.

Objective 2. Provide information on how conservation practices can make farming and ranching financially stable.

Focused Conservation Questionnaire, Results of 25 Surveys Returned

Grazing Land Health, as addressed by:

Water development	21
Grass Planting	16
Fencing	16
Grazing Monitoring and Rotation	12
Riparian Area Protection	3
Sagebrush encroachment, soil erosion, pasture renovation, reseeding expired CRP	1 each

Crop Health, as addressed by

Weed Control	10
No-Till Equipment	7
Continuous Cover	6
Crop Rotations	6
Soil Testing	5
Intercropping	2
Residue Management	2
Precision Ag	2
Planting cropland back to grass	1

Wildlife Habitat, as addressed by

Grass Planting	13
Pollinator Planting	5
Tree Planting	5
Wetland Restoration	3
Woven wire fence removal	1

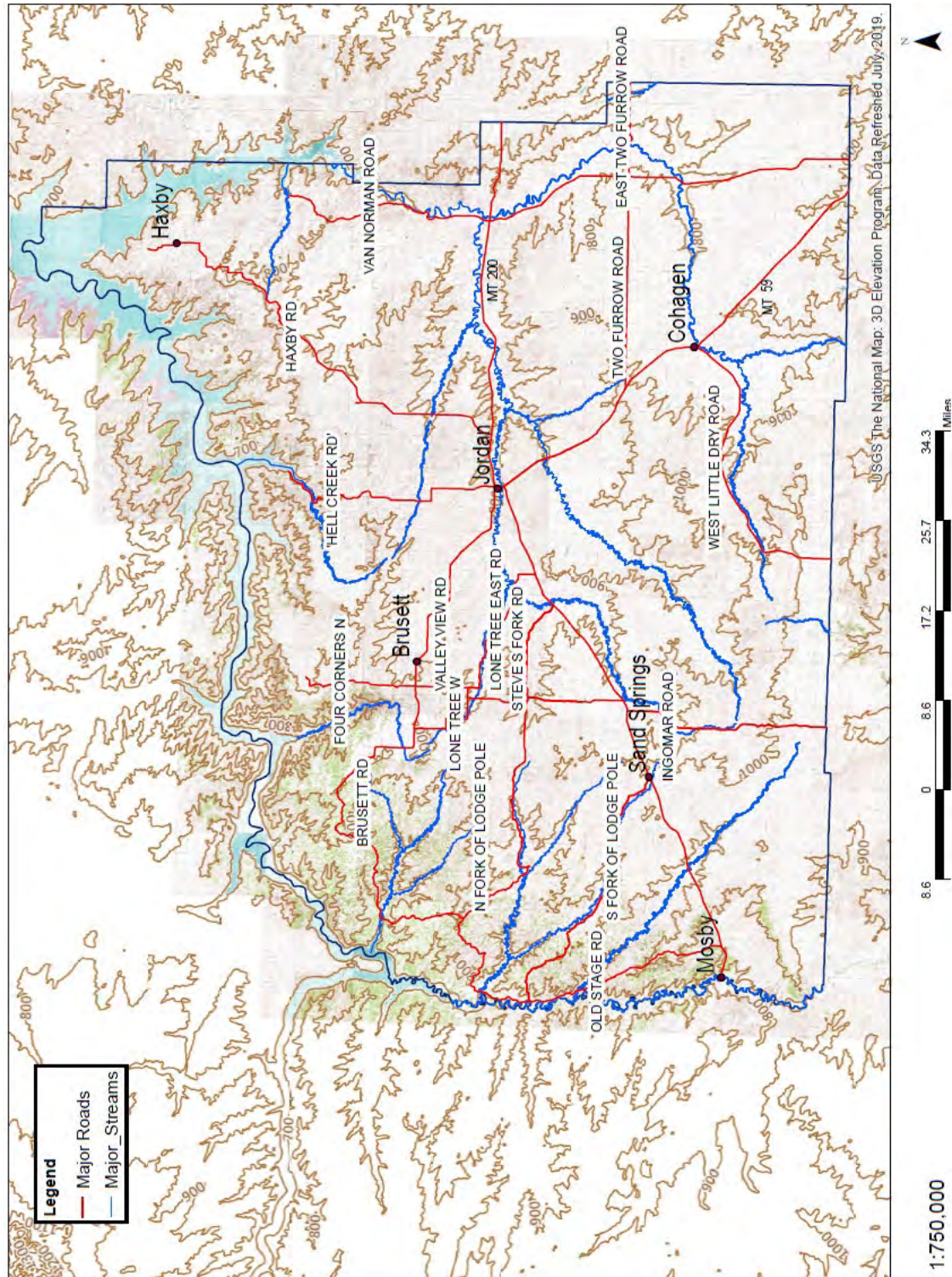
Sixty four percent of the respondents are interested in EQIP.

Fifty-two percent of the respondents are interested in educational events or workshops, including the following topics:

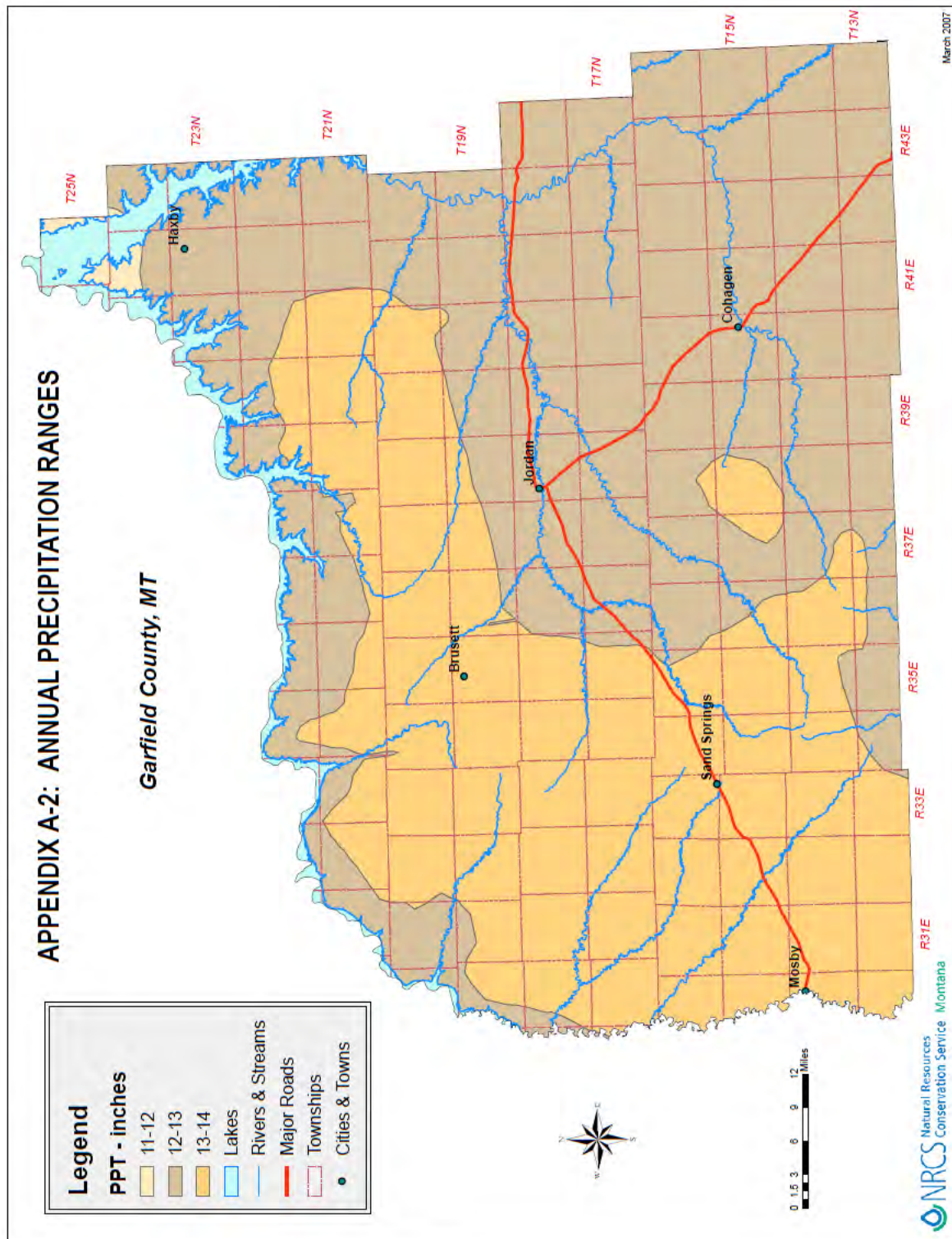
- Ranch bookkeeping
- Grazing consultants
- Grazing (2)
- Business planning
- Mob grazing
- Soil health (2)
- Land management
- Holistic management
- Electric fence
- Water developments (2)
- Continuous cropping systems
- Speakers
 - Steve Kenyon (2)
 - Graziers
 - Ranching for Profit

APPENDIX A

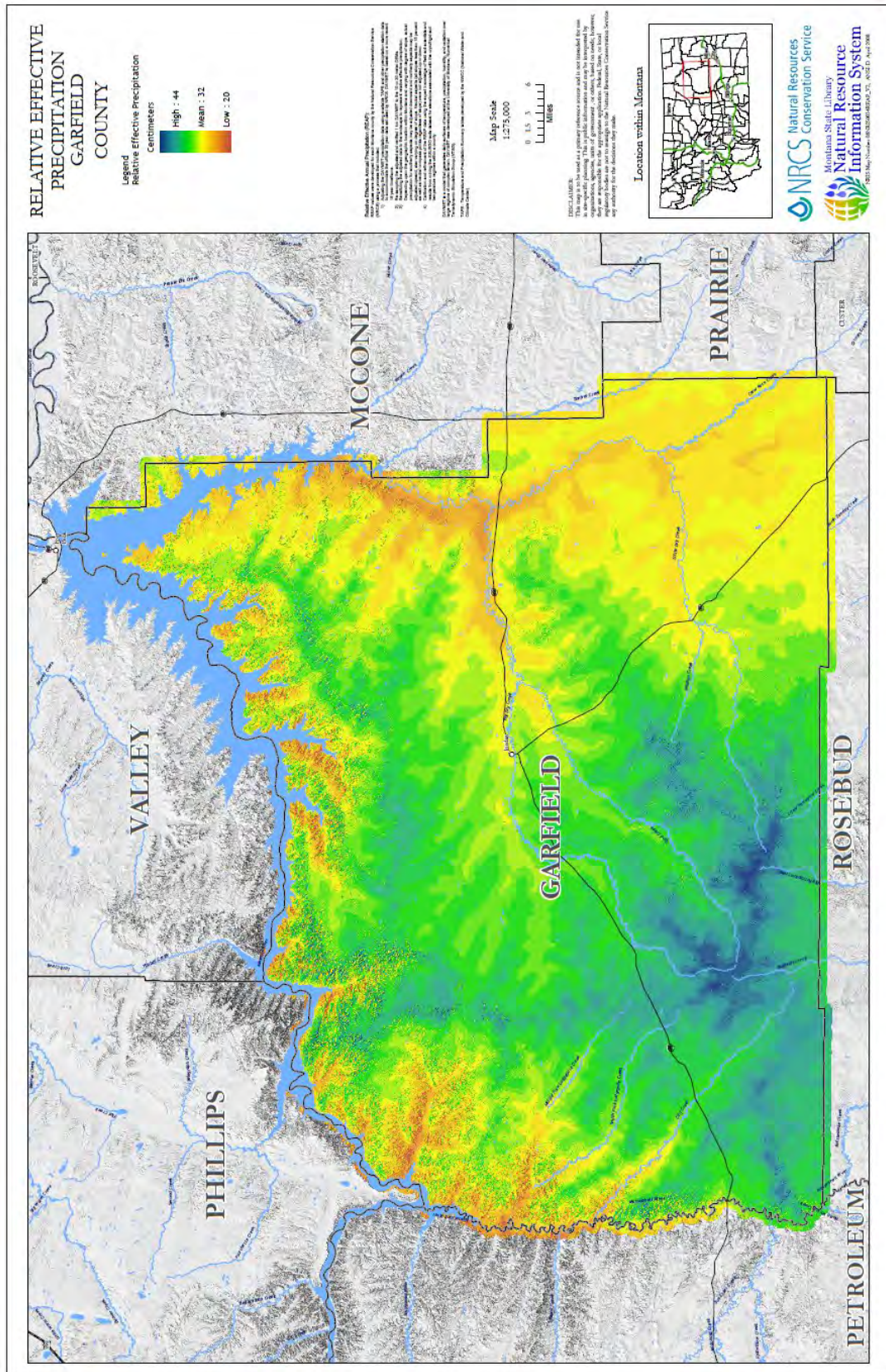
A1 Garfield County



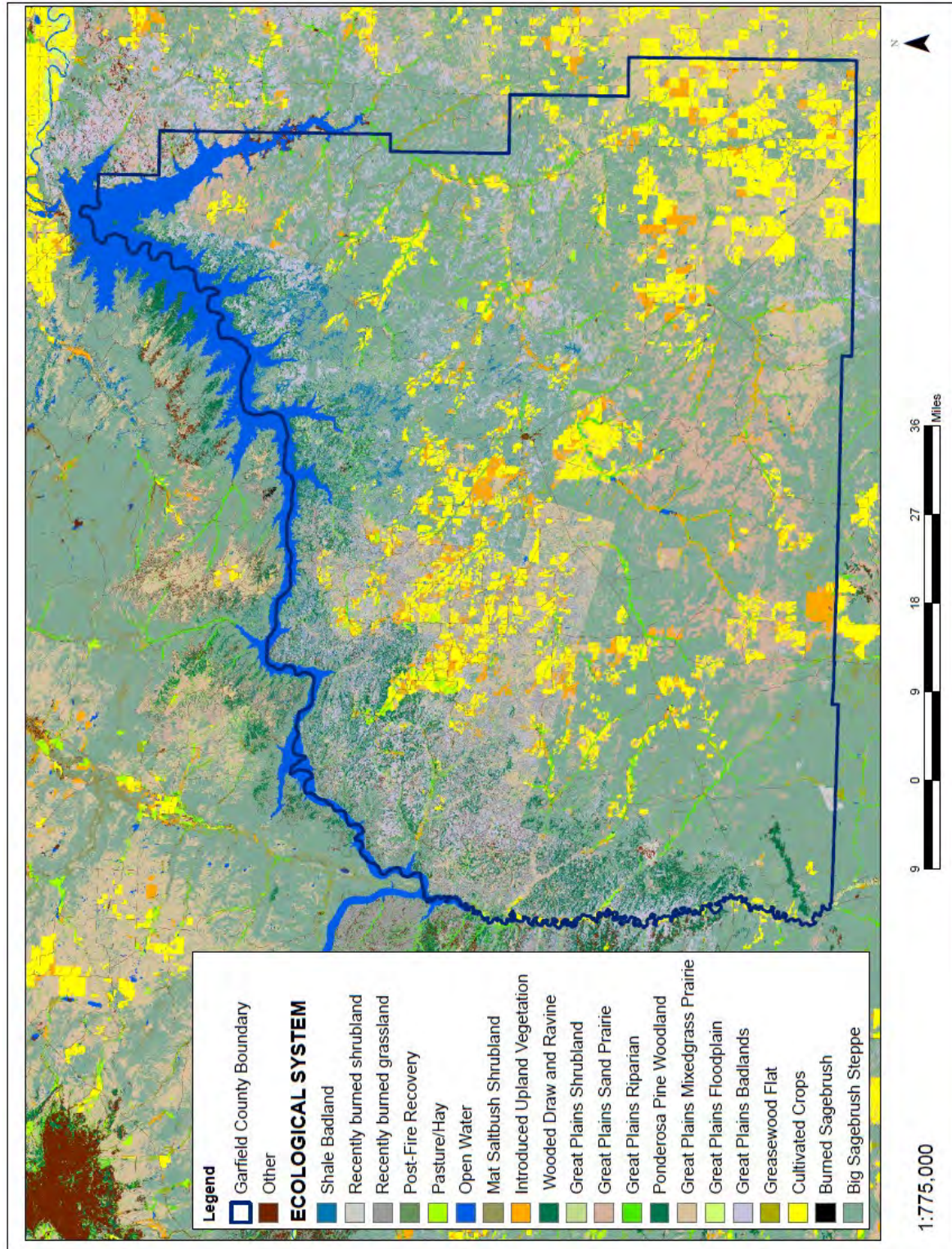
A2 Precipitation Ranges in Garfield County



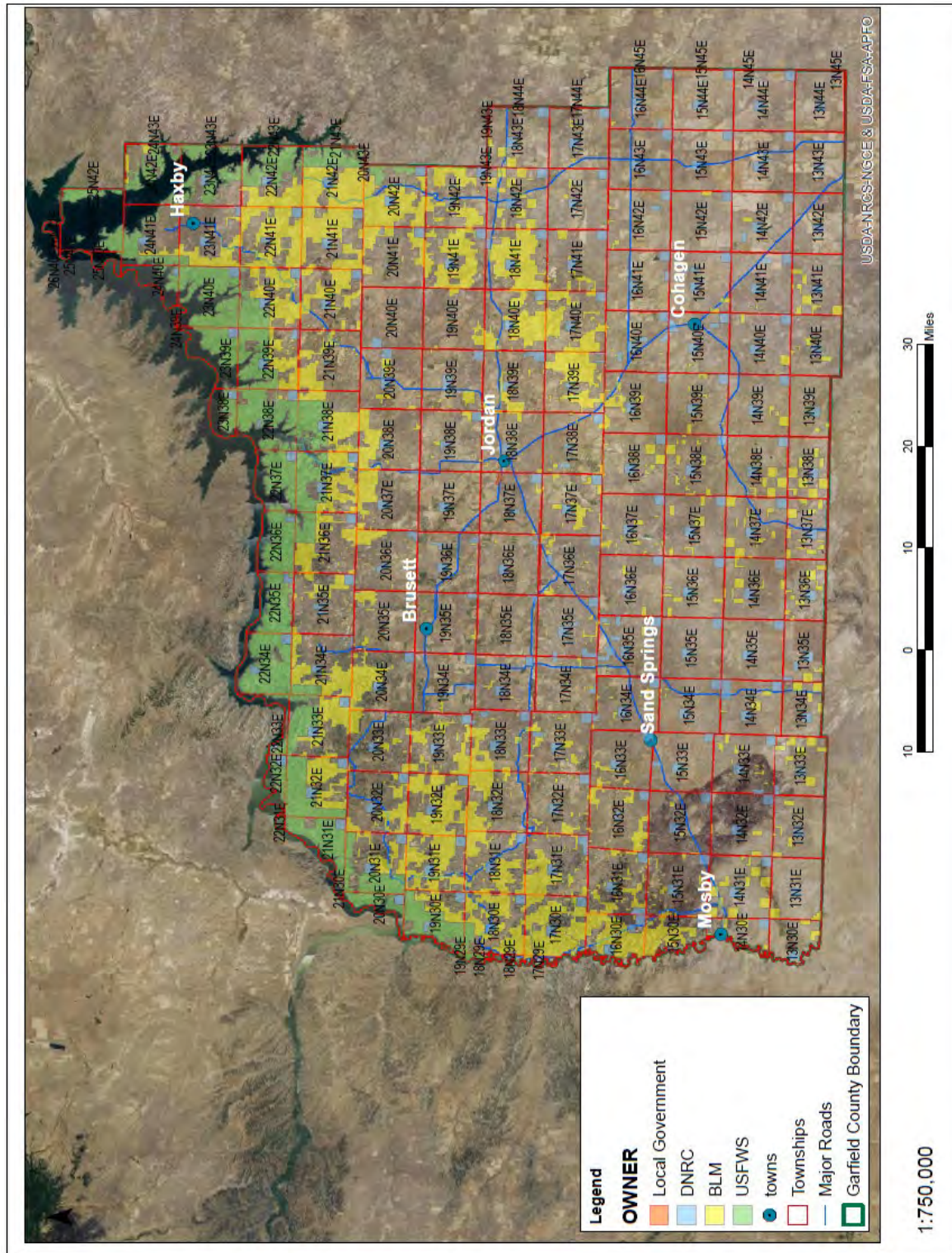
A3 Relative Effective Annual Precipitation



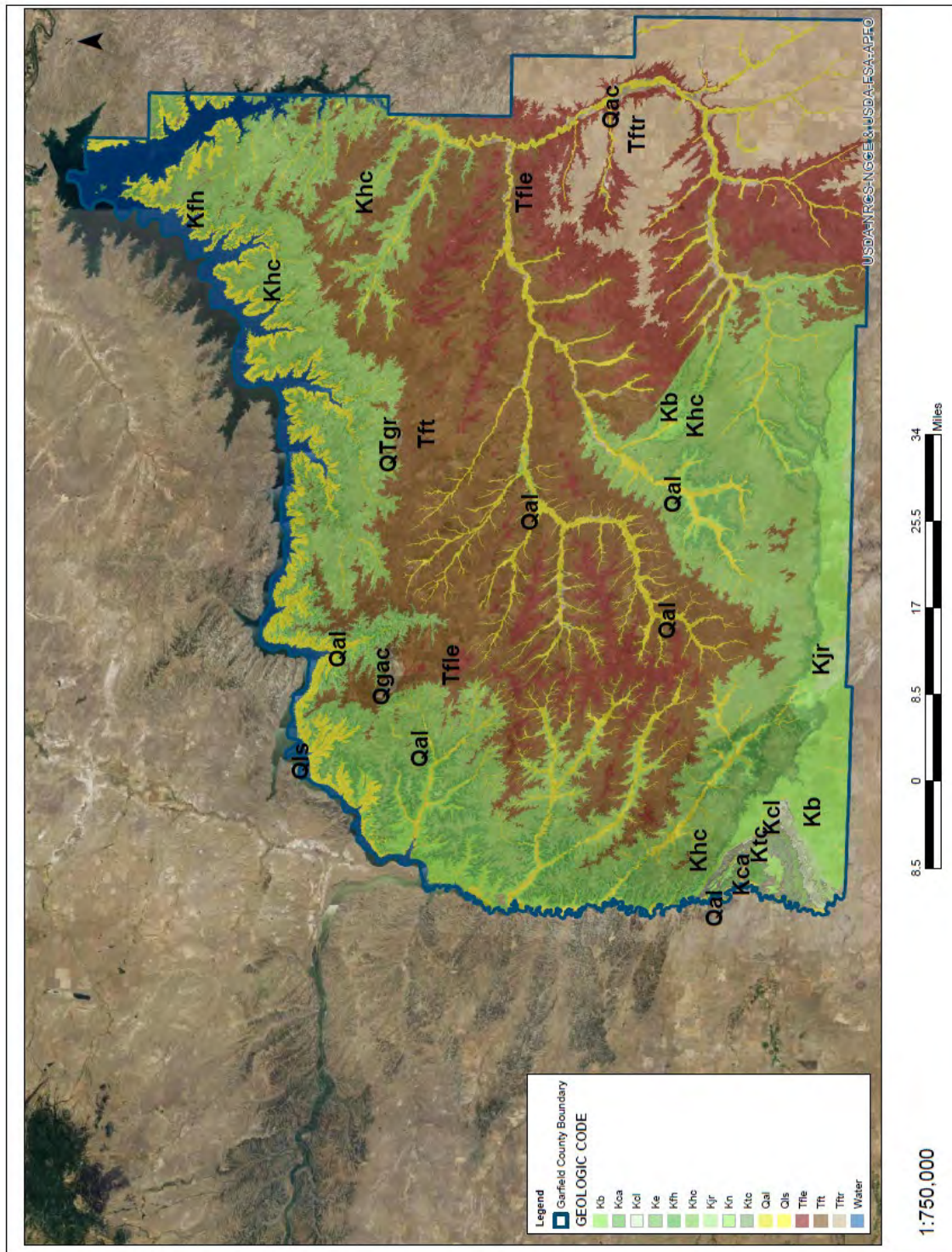
A4 Landcover



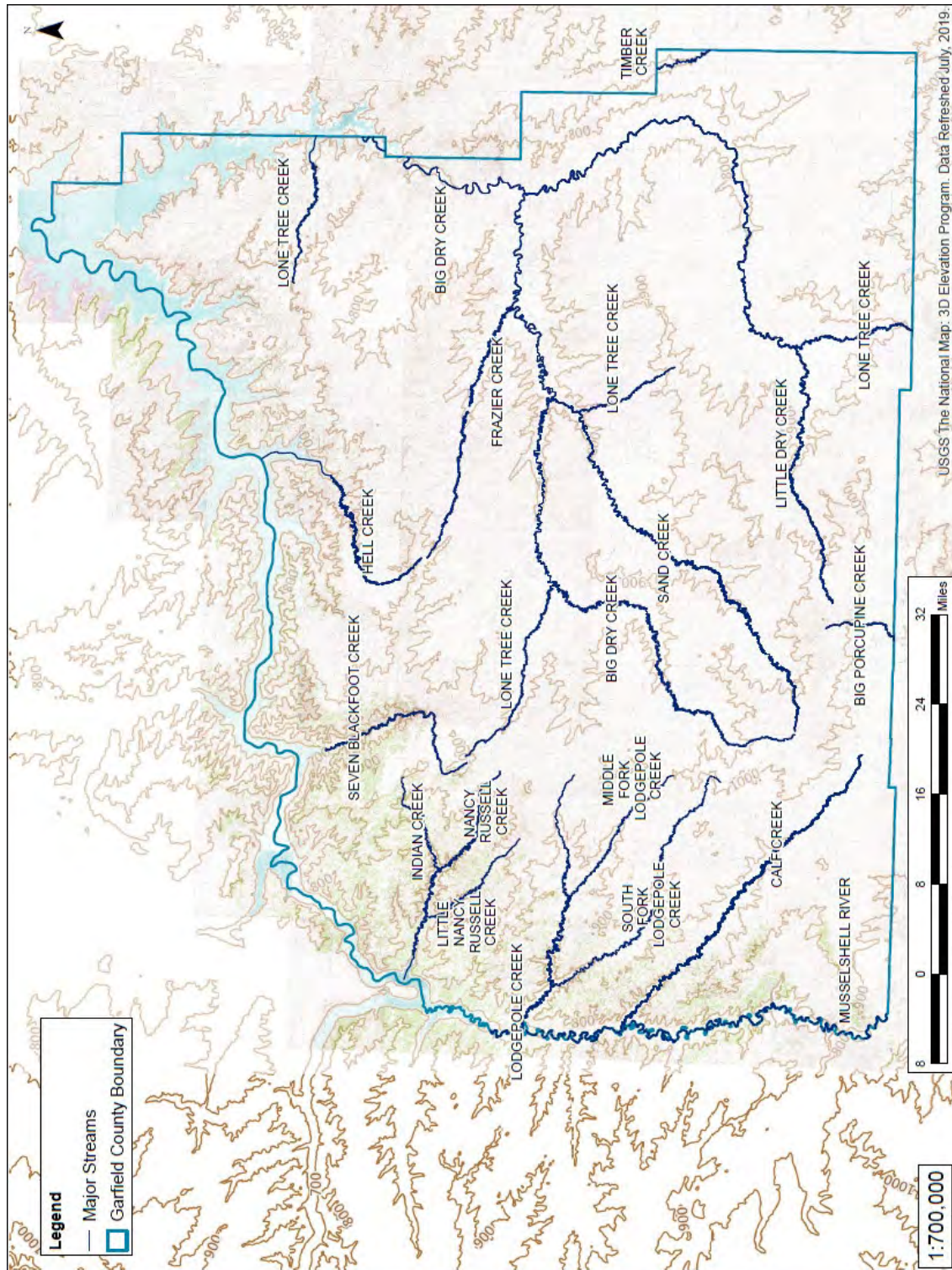
A5 Land Ownership, Garfield County, Montana



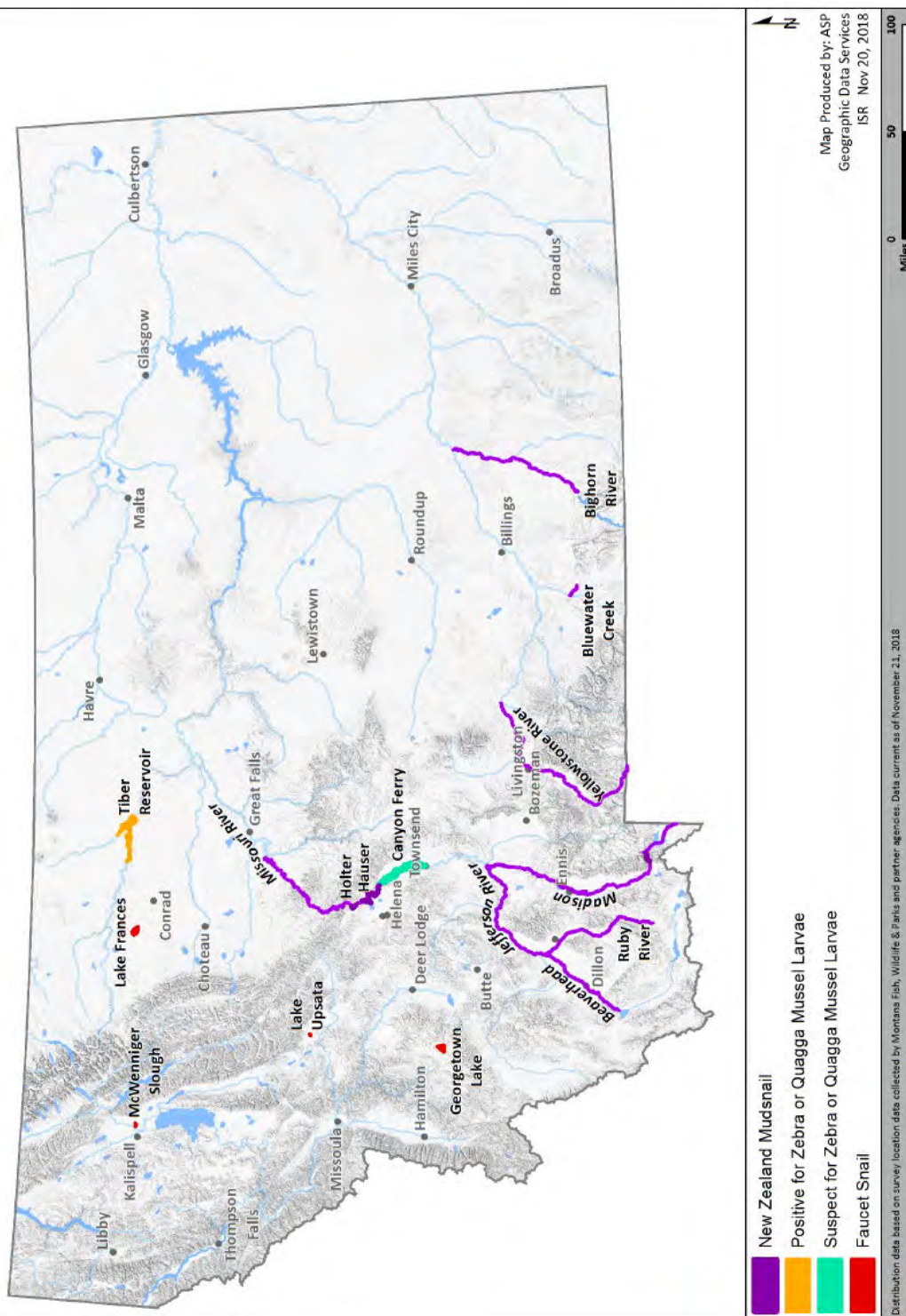
A6 Geologic Formations of Garfield County, Montana



A7 Major Streams, Garfield County, Montana



MONTANA FWP



APPENDIX B

B1 Montana Animal Species of Concern (MNHP, 2019)

Scientific Name	Common Name	Global Rank	State Rank	Habitat
<i>Corynorhinus townsendii</i>	Townsend's Big-eared Bat	G4	S3	Caves in forested habitats
<i>Cynomys ludovicianus</i>	Black-tailed Prairie Dog	G4	S3	Grasslands
<i>Lasiurus borealis</i>	Eastern Red Bat	G3G4	S3	Riparian forest
<i>Lasiurus cinereus</i>	Hoary Bat	G3G4	S3	Riparian and forest
<i>Mustela nigripes</i>	Black-footed Ferret	G1	S1	Grasslands
<i>Myotis lucifugus</i>	Little Brown Myotis	G3	S3	Generalist
<i>Vulpes velox</i>	Swift Fox	G3	S3	Grasslands
<i>Anthus spragueii</i>	Sprague's Pipit	G3G4	S3B	Grasslands
<i>Aquila chrysaetos</i>	Golden Eagle	G5	S3	Grasslands
<i>Ardea herodias</i>	Great Blue Heron	G5	S3	Riparian forest
<i>Athene cunicularia</i>	Burrowing Owl	G4	S3B	Grasslands
<i>Buteo regalis</i>	Ferruginous Hawk	G4	S3B	Sagebrush grassland
<i>Calcarius ornatus</i>	Chestnut-collared Longspur	G5	S2B	Grasslands
<i>Centrocercus urophasianus</i>	Greater Sage-Grouse	G3G4	S2	Sagebrush
<i>Charadrius melodus</i>	Piping Plover	G3	S2B	Prairie lakes and river shorelines
<i>Charadrius montanus</i>	Mountain Plover	G3	S2B	Grasslands
<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo	G5	S3B	Riparian forest
<i>Dolichonyx oryzivorus</i>	Bobolink	G5	S3B	Moist grasslands
<i>Gymnorhinus cyanocephalus</i>	Pinyon Jay	G3	S3	Open conifer forest
<i>Hydroprogne caspia</i>	Caspian Tern	G5	S2B	Large rivers, lakes
<i>Lanius ludovicianus</i>	Loggerhead Shrike	G4	S3B	Shrubland
<i>Numenius americanus</i>	Long-billed Curlew	G5	S3B	Grasslands
<i>Oreoscoptes montanus</i>	Sage Thrasher	G4	S3B	Sagebrush
<i>Pipilo chlorurus</i>	Green-tailed Towhee	G5	S3B	Shrub woodland
<i>Spizella breweri</i>	Brewer's Sparrow	G5	S3B	Sagebrush
<i>Sternula antillarum</i>	Least Tern	G4	S1B	Large prairie rivers
<i>Apalone spinifera</i>	Spiny Softshell	G5	S3	Prairie rivers and larger streams
<i>Chelydra serpentina</i>	Snapping Turtle	G5	S3	Prairie rivers and streams
<i>Heterodon nasicus</i>	Plains Hog-nosed Snake	G5	S2	Friable soils
<i>Lampropeltis gentilis</i>	Western Milksnake	G5	S2	Rock outcrops
<i>Phrynosoma hernandesi</i>	Greater Short-horned Lizard	G5	S3	Sandy / gravelly soils
<i>Anaxyrus cognatus</i>	Great Plains Toad	G5	S2	Wetlands, floodplain pools
<i>Cycleptus elongatus</i>	Blue Sucker	G3G4	S2S3	Large prairie rivers
<i>Polyodon spathula</i>	Paddlefish	G4	S2	Large prairie rivers
<i>Sander canadensis</i>	Sauger	G5	S2	Large prairie rivers
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	G2	S1	Large prairie rivers

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