

SWEET GRASS COUNTY LONG-RANGE PLAN

July 2023



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Section I – Introduction

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

Mission – To build alliances and strategically invest to effectively solve natural resource problems in Sweet Grass County, Montana.

Purpose – The purpose of this plan is to create a working document that describes the natural resources of Sweet Grass County, identifies resource problems as they currently exist, and prioritizes projects for USDA-Natural Resources Conservation Service (NRCS) technical and financial assistance to private landowners.

This plan documents locally identified resource issues and prioritizes the most critical ones in Sweet Grass County for work. These issues are identified through the Local Working Group (LWG) by annually gathering input from local stakeholders and partner organizations. It is a “living” document that will be reviewed annually and revised to reflect current resource concerns.

Time Frame – It is envisioned that this plan will be applicable for approximately 5 years, with annual edits completed as relevant information is obtained.

Contributors – Thanks are extended to the many parties who contributed to the creation of this document, including Sweet Grass County Conservation District (SGCD), Sweet Grass County Weed Department, Montana State University Extension Service, Boulder River Watershed Association (BRWA), Yellowstone River Conservation District Council (YRCDC), Montana Department of Fish, Wildlife, and Parks (FWP), Forest Service (USFS), Farm Service Agency (FSA), and NRCS.

Section II – Natural Resources Inventory

A – Humans

1 – General. Sweet Grass County is in the Upper Yellowstone River region of southcentral Montana, due north of Yellowstone National Park. It was first established in 1895, formed out of parts of Park, Meagher, and Yellowstone Counties, and was named after Sweet Grass Creek. From 1910 to 1920, parts of Sweet Grass County were taken to form Stillwater, Wheatland and Golden Valley Counties. It has been its present size since 1920. Neighboring counties include Park, Meagher, Wheatland, Golden Valley, and Stillwater. It is nearly 1,192,000 acres in size and land ownership is private, federal (which is mostly National Forest, but including some minimal BLM), and state (see Table 1, below, and Appendix, Figures 3 and 4).

2 – History. Native Americans lived in this area before people of European descent arrived. In the late 1600’s, the Crow moved into the area. By the mid-1700’s, several tribes used this area, primarily the Crow, but also the Arapaho, Blackfeet, Cheyenne, Shoshone, and Sioux. The Crazy Mountains are considered sacred by the Crow, who call them the Snow-Capped or Ominous Mountains. Chief Plenty Coups of the Crow tribe sought a vision atop Crazy

Peak, and seasonally camped on Porcupine Butte in the northwest part of the county. Native Americans in the region viewed this area as favored hunting grounds, possibly due to the wintertime “Chinook” winds that frequent the Upper Yellowstone region. The warm winds blow and melt snow off grasslands, providing winter forage for wildlife, resulting in large populations of deer, elk, antelope, and bison.

French fur traders and the Lewis and Clark Expedition were the first known visitors of European descent to the area. In 1806, on his return from the Pacific Coast, Captain William Clark camped along the Yellowstone River near its confluence with the Boulder River and Big Timber Creek, near the present-day town of Big Timber, referring to the site as “Rivers Across”. From 1806 to 1850, the only explorers to venture into the area were hunters, trappers, and Indian traders.

The Fort Laramie Treaty of 1851 recognized 3.5 million acres, mostly in the Yellowstone region, as Crow territory, including present-day Sweet Grass County. In 1868, the land north of the Yellowstone River (called “Elk River” by the Crow) was ceded to the U.S. Government and the Crow Reservation was established. In 1882, the land west of the Boulder River, and in 1892, the land east of the Boulder River were also ceded.

In the late 1860s, the first trail herds from Texas began coming into the area. The 1870s saw the boom of the cattle industry and the range wars in the west. The early cattle companies were large and grazed their cattle on the open range. Prior to the turn of the century, the public domain was controlled by stockmen and early miners until homestead settlement and the establishment of the Forest Reserve System effectively closed the open range.

The first stage road traversed the benches on the north bank of the Yellowstone River. A stage-stop situated at the mouth of Big Timber Creek was called Big Timber, after the creek. The year 1882 brought the Northern Pacific railroad into what is now Sweet Grass County. The settlement of Dornix sprang up at the mouth of the Boulder River, with several businesses, including a sawmill and a ferry for crossing the Yellowstone River. However, the railroad decided the site was poor for a stop due to the grade and built a depot on the high bench a mile to the west. Dornix picked up and moved there, and the town of Big Timber was established, named after the abandoned stage stop on the north bank of the river.

The Homestead Act of 1862, the Desert Land Act of 1877, and the railroad brought scores of settlers, many from Minnesota, into the area between the late 1870s and 1910. Many of the settlers were of Norwegian descent. Some farming was done, especially in the northeast part of the county, but wasn't sustained primarily due to the area's shallow, erodible soils and uneven terrain, which are better suited for livestock production. By the turn of the century, the railroad began selling its land holdings at competitive prices. Severe drought from 1918 to 1921 caused the abandonment of many homesteads. The settlers that stayed made their living from the land raising sheep and cattle, growing hay on the deeper, more productive soils along the creek bottoms where flood irrigation could be done.

During the 1880s and 1890s, Big Timber became one of the nation's largest shippers of wool and wool products. By 1900, the county had over six million head of sheep. There used to be over 20 "bands" of sheep (usually 1000 ewes or more, plus their lambs) that would trail up the Boulder River each summer to graze on National Forest allotments in the headwaters of the drainage, in what is now the Absaroka-Beartooth Wilderness Area. Due to a variety of factors, including market decline, increased predation, and allotment restrictions, there are no bands of sheep grazing in the high country up the Boulder River drainage anymore. Nationwide, the sheep industry has been in steady decline since the 1940s, falling to one-tenth the size it was during World War II. Sweet Grass County saw a sharp drop in sheep numbers during the 1990s and is now no longer a leading sheep producer in the state.

Mining, primarily for silver, chrome, gold, and other metals also played an important role in the early development of the county. In 1863, gold was discovered in the southern part of the county, near the headwaters of the Boulder River, and in the late 1880s, the Independence Mining Company was established. Eventually the camp supported between 400 and 500 miners. Mining also occurred in the Natural Bridge District. The silver crash during the Panic of 1893 essentially ended significant mining up the Boulder for a time, but prospecting for gold and silver continued.

In the 1980s, a large ore body of platinum-group elements, the Stillwater Complex, was discovered in the Stillwater-Boulder drainages of the Beartooth Mountains south of Big Timber. This is the only platinum-group deposit known in the United States. It produces primarily platinum and palladium, but also contains 75% of the known chromium resources in the U.S. and significant amounts of gold, silver, copper, lead, and zinc. Large-scale underground mines have been developed and continue to produce.

Around 1911, the state's first dude ranch was established in the eastern foothills of the Crazy Mountains. Dude ranches (now called "guest ranches") continue to be an important industry in the county.

Today, agriculture is still the principal industry, comprised mostly of cow/calf operations that market calves each fall to feedlots in the northern plains states. The platinum-palladium mine up the East Boulder River also contributes heavily to the county's economy.

3 – Land Cover/Land Use. Agriculture is the dominant land use. The county's area is approximately 69% rangeland, 20% forest, 9% cropland (including 37,000 acres irrigated hay and 18,000 acres dryland hay), and 2% introduced-species pasture (11,000 acres irrigated and 10,000 acres dryland). (See Table 1, below, and Appendix, Figure 7).

Table 1. Land Use and Percent of Land Area.

Land Cover/Use	Acres	Percent of Total
Grassland	738,951	62.0
Shrubland	83,430	7.0
Forest	238,371	20.0
Mixed Cropland	107,267	9.0
Water	1,236	0.1
Other	6,922	0.6

4 – Land Ownership. Over 70% of Sweet Grass County is private land; nearly one-quarter is federal land (USFS and BLM); the remainder is owned by the State of Montana. (See Table 2, below).

Table 2. Land Ownership (acres).

Ownership	Acres	Percent of Total
Private Lands	849,158	71.2
US Forest Service	278,415	23.4
Bureau of Land Mgmt.	15,817	1.3
State Lands	48,469	4.1
TOTAL	1,191,859	100%

5 – Demographics. The county population was 3,678 in 2020, as determined by the U.S. Census Bureau, and was estimated to be 3,715 in 2022. Big Timber, the centrally located county seat and principal town (population: 1,673), lies near the confluence of the Yellowstone and Boulder Rivers. Other communities include Melville, Springdale, McLeod, and Greycliff.

The population is currently 93% White, 3% Hispanic, 2% multiple race, and 2% American Indian, Alaska Native, Asian, or Black. Females comprise 49% of the population, and 26% of the citizens are 65 years or older. Other characteristics include:

- 322 persons are veterans
- 1% of the population is foreign-born
- 2% speak a language other than English at home
- 84% have internet service in their household
- 8% under the age of 65 have a disability
- 10% are considered to be in poverty

6 – Agricultural Profile. There are approximately 300 agricultural operations totaling 826,000 acres of private land, which primarily produce livestock and irrigated hay. There is also some dryland annual cropping in the northeast part of the county. Approximately 166 operations have cattle (almost all are cow/calf), totaling 24,000 cows. There are 29 operations with sheep, totaling 3,400 ewes and lambs. Almost half of the operations do at least some irrigating, totaling 39,000 acres. There are 41,000 acres of total cropland, with 38,000 devoted to hay and about 3,000 acres planted to annual dryland crops, mostly wheat, barley and oats.

Agriculture accounts for \$25.7 million in receipts annually, with \$22.6 million coming from animal sales. There were \$620,000 of federal government program receipts in 2017 by agricultural operations.

B – Physiography/Drainage

Sweet Grass County lies in a complicated structural setting at the intersection of three major physiographic provinces: The Northern Rocky Mountain Province, which includes the Crazy Mountains; the Middle Rocky Mountain Province, which includes the Beartooth Mountains; and the Unglaciaded Missouri Plateau of the Great Plains, which extends east from the Crazy Mountains. As a result, there are three distinct areas of the county – south of the Yellowstone River, the topography is mountainous and rugged, with significant relief; north of the river are the Crazy Mountains in the west; east of the Crazies is dominated by gentler, hilly topography, an area referred to as the Cayuse Hills. Elevations range from 3,755 feet where the Yellowstone River flows out of the county near Reed Point to 11,230 feet at the summit of Crazy Peak.

Most of the county is drained by the Yellowstone River and its tributaries. The northernmost part of the county drains to the Musselshell River from the Cayuse Hills divide. The Crazy Mountains are drained by relatively small, radiating streams, which flow into the Yellowstone between Springdale, at the west edge of the county, and Greycliff, a few miles southeast of Big Timber. Major tributaries originating in the Crazies include Big Timber Creek, Swamp Creek, Otter Creek, and Sweet Grass Creek. Major streams originating in the Beartooths and their foothills include the Boulder River (Main Boulder, West Boulder, and East Boulder), Upper and Lower Deer Creeks, and Bridger Creek. The Yellowstone Valley is relatively flat and wide throughout most of the county, ranging from 1 to 2 miles in width. There are no dams in the county on the Yellowstone River or any of its major tributaries, but there are two 350-acre off-stream irrigation reservoirs fed by

Sweet Grass Creek.

C – Geology/Soils

A basic understanding of the area's geology helps us make sense of how today's landforms have developed. It also informs us about the parent materials and mineral composition of today's soils and why and where various soil types are found on the landscape.

The geologic features of the county are largely the result of Cretaceous and Tertiary Period marine and non-marine sedimentation, igneous intrusion and volcanic material sedimentation, and folding and faulting of the strata. The Fort Union and Hell Creek formations dominate the landscape north of the Yellowstone River, except for the Crazy Mountains. South of the river, the Livingston Group contains a thick unit of rocks formed from a series of volcanic mudflows, which dominate the foothills and lower mountains that lie between the Yellowstone on the north and the main Beartooth front, extending west to east from Springdale to approximately Reed Point. Erosion has altered these features and has helped produce major stream valleys, including the Yellowstone River valley.

There are a variety of surficial Quaternary Period (the most recent geologic period) deposits in the county. Mostly, they are alluvium (riverwash), terrace deposits, and glacial moraines and outwash. They are generally unconsolidated and relatively thin. Only the major drainages contain significant amounts of Quaternary-aged alluvium.

The county's geology, landforms, relief, climate, and vegetation are diverse, and as a result, so are its soils. Loam and clay loam soil textures dominate the landscape. 1% of the private and state land soils are considered "prime farmland" and another 2% are considered prime if they are irrigated. (See Appendix, Figure 6).

The Sweet Grass County Soil Survey, which includes soil maps and data, was published by NRCS in 2004. Either digital (compact disc) or hard copies are available at the NRCS Field Office in Big Timber, or it may be accessed online on the Web Soil Survey website. This survey covers all private, state, and Bureau of Land Management (BLM) lands in the county. Custer-Gallatin National Forest lands are covered by the Soil Survey of Gallatin National Forest (1996).

D – Climate

In the lower elevations, such as at Big Timber (elev. 4100 ft.), summers are generally warm, averaging in the mid-80s, but with nighttime temperatures falling into the mid-50s. In the higher elevation plains and foothills, such as near Melville (elev. 5300 ft.), summer temperatures are cooler, with highs averaging in the mid-70s and lows in the upper 40s. The highest temperatures on record are 110° F (July 1931) at Big Timber and 95° F at Melville (July 2002).

In winter, average highs are in the upper 30s and lows in the upper teens at Big Timber, and about 5 degrees cooler at Melville. The lowest minimum temperatures recorded are -47° F at Big Timber (February 1936) and -45° F at Melville (December 2022). Big Timber typically has a 110-day growing season and Melville 75 days.

On lower-elevation lands, precipitation averages 15 to 18 inches annually, with about 70% falling as rain in April-September. Precipitation amounts in the mountains range from 20 inches in lower elevations up to 60 inches in the high country (see Appendix, Figure 5). Average annual snowfall is 31 inches at Big Timber and 45 inches at Melville. NRCS mountain SNOTEL (automated snowpack measurement) sites in the Beartooths normally peak at 11 inches of snow water equivalent at Box Canyon (elev. 6670 ft.), 25 inches at Monument Peak (elev. 8850 ft.), and 22 inches at Placer Basin (elev. 8830 ft.). There are no SNOTEL sites on the east side of the Crazy Mountains.

The Big Timber area is known for its Upper Yellowstone windy season, with November-March *averaging* over 10 mph, peaking at 13 mph in January. Winds of 20 to 40 mph are common during this time of year, and high-wind events can measure 50 to 70 mph or more. April-September is much calmer, averaging less than 10 mph, with the lowest average winds at 7 mph in July-August.

E – Water

1 – General. Most of Sweet Grass County lies in the Upper Yellowstone hydrologic sub-basin (HUC 10070002). The Yellowstone and Boulder Rivers, as well as smaller streams originating in the mountains, are driven by snowmelt runoff hydrology. Peak flows are generally in mid-June, but can vary, depending on temperatures and rainfall events. Lower elevation streams such as Otter Creek can have major runoff events in the winter, due to a combination of frozen ground and heavy snowfall, followed by Chinook winds and sudden temperature rises. The Boulder River experiences an average peak flow of 3,100 cubic feet per second (cfs); the Yellowstone's peak averages almost 14,000 cfs. Snowpack is quantified in Boulder drainage by four NRCS SNOTEL sites: Box Canyon (elev. 6670 ft.), Monument Peak (elev. 8850 ft.), East Boulder Mine (elev. 6335 ft.), and Placer Basin (elev. 8830 ft.). There are no SNOTEL sites on the east side of the Crazies.

2 – Irrigation. There are 39,000 acres of land that are irrigated in the county (see Appendix, Figure 7). Approximately 70% of the irrigation is flood irrigation, with the remainder being done by center pivot and wheel line sprinklers. Flood irrigation is the least efficient, requiring much more water to be applied to meet crop needs. However, the deep percolation of water with flood systems also provides summer and fall return flows to the streams and has created or enhanced wetlands and aquifers. Conversion of flood irrigation to sprinkler systems should be evaluated for effects on watershed hydrology before implementation.

The sources for almost all irrigation water in the county are the perennial streams, mainly the Boulder River and smaller Yellowstone tributaries, but also the Yellowstone River.

There are very few groundwater irrigation wells. Water right priority dates range from the late 1870s to the present. Usually, a diversion structure and headgate are the means for diversion into canals and ditches. Diversion structures are often permanent, while others can be temporary, such as “push-up” diversions that tend to wash out every spring during runoff.

Most irrigation ditches are privately owned, with a small number of users. The only formally organized ditch companies are Big Timber Creek Canal, Dry Creek Canal, Hogan Ditch, Hunter’s Hot Springs Canal, Kent Ditch, Pioneer Ditch, and Sweet Grass Canal & Reservoir Company.

In 1909 to 1910, a diversion, canals, and dams were constructed to deliver Sweet Grass Creek water to and from Upper and Lower Glasston Lakes (originally called Lake Adam and Lake Wolvoord). They have capacities of 11,000 and 14,000 acre-feet, respectively, and are the most significant irrigation reservoirs in the county. Approximately 2,700 acres are irrigated by this system.

The YRCDC completed a Physical Feature Inventory in 2001 (updated in 2011 and 2015) for the length of the Yellowstone River corridor from the Yellowstone National Park boundary in Park County to the confluence with the Missouri River, just into North Dakota, as part of their comprehensive Yellowstone River Corridor Comprehensive Study (also called the Cumulative Effects Analysis). BRWA did the Boulder River Stream Corridor Assessment in 2004. SGCD completed a similar assessment for Big Timber and Swamp Creeks in 2010. These inventories identify the type and location of irrigation and other manmade structures on these streams and identify priorities for needed actions. The Boulder River assessment resulted in several irrigation diversion and headgate structures being replaced with improved, fish-friendly structures, mostly with funding from the Montana Department of Natural Resources & Conservation (DNRC) Renewable Resources Grant and Loan Program and in-kind matches from the irrigators.

Typical irrigation system efficiencies range from 10 to 30% for flood irrigation to 60 to 80% for sprinklers. Irrigation system inefficiency, especially along Yellowstone River tributaries, was identified by the LWG as a priority resource concern, due to insufficient volumes of water being available for full-season flood irrigation on some streams, like the lower reaches of Big Timber Creek, in drier than normal and even average years.

3 – Livestock Water. One of the most important beneficial uses for water in the county is for livestock water. In many cases, livestock drink directly from streams and irrigation ditches. Historically, NRCS and FSA have worked with landowners to develop off-stream water sources for their livestock. In the Cayuse Hills area north of the Yellowstone and east of the Crazies, springs (both undeveloped and developed) have been heavily relied upon for decades. The downside is that, during drought, many of these springs dry up or flows decrease to the point of being completely inadequate to meet livestock needs, even at reduced stocking rates. This was most recently obvious during the drought of 1998 to 2006. Ranchers had to leave pasture gates open, so small bunches of livestock could

access pastures that had water, which concentrated grazing on fewer acres. The LWG identified this resource concern in 2019 as a high priority. Consequently, a Targeted Implementation Plan (TIP) for NRCS' Environmental Quality Incentives Program (EQIP) is being developed for the Cayuse Hills area for potential funding in 2020 or 2021. The focus of this effort is to help producers develop drought-resistant livestock water, mainly by drilling wells and using pipelines to deliver water to strategically located storage and drinking tanks. This will allow producers to continue using pastures that previously would have been without water during drought, which will benefit grazing land plant communities by spreading out grazing use, not concentrating it.

4 – Water Quality. Water quality in this headwaters area is generally good, meeting most beneficial uses. However, several stream reaches are on the State of Montana Department of Environmental Quality's (DEQ) 303(d) list of impaired streams. The following map is from their "Mapping DEQ's Data" webpage:

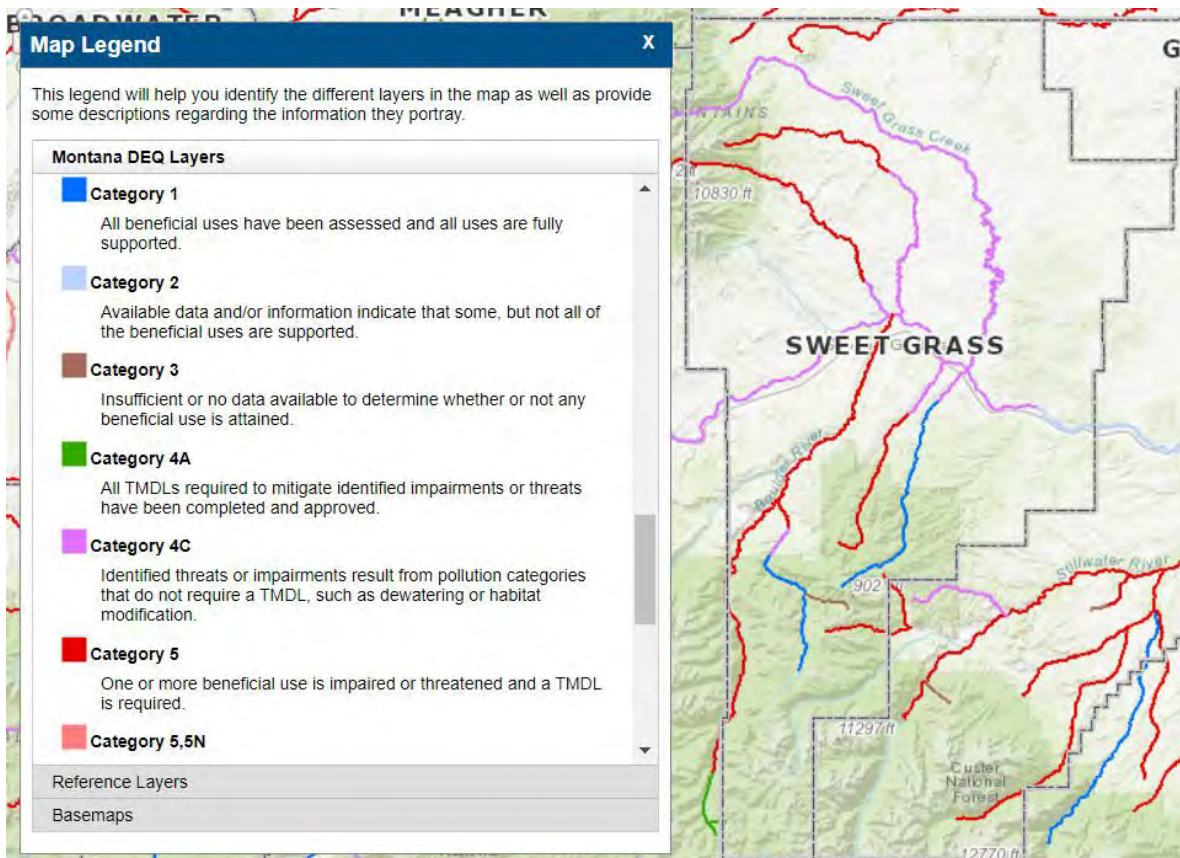


Figure 1. Map showing DEQ-designated Total Maximum Daily Load (TMDL) streams and categories.

Streams that are shown with impairments are:

- Otter Creek, headwaters to 2 miles downstream of Highway 191 bridge, sediment/siltation, metals
- Big Timber Creek, headwaters downstream to Swamp Creek, sediment/siltation, metals
- Upper Deer Creek, headwaters to Cartwright Gulch, sediment
- Boulder River, East Fork to Natural Bridge & Falls, nitrate/nitrite, phosphorus, total nitrogen
- Boulder River, Natural Bridge & Falls to Clayton Ditch, chromium, nickel, nitrate/nitrite, total nitrogen
- East Boulder River, Elk Creek to mouth, sedimentation/siltation

From 1987 to 1995, in response to Otter Creek being listed by Montana DEQ as impaired due to sediment, SGCD, the Soil Conservation Service (now NRCS), and the Agricultural Stabilization & Conservation Service (now FSA) developed and implemented the Otter Creek Water Quality Demonstration Project. The project area was from the Highway 191 bridge downstream to the mouth and included 12 cooperating landowners. Technical assistance to landowners was provided by SCS and DEQ, and financial assistance (cost-share) was provided by ASCS and DEQ. Practices implemented included streambank stabilization, irrigation return flow structures, riparian fencing, and willow planting. Results were encouraging, based on extensive water quality monitoring, but overall reduction of sediment was only modest, due to the very erodible soils the stream passes through and the volume of water that has been added to the streamflow annually by inter-basin transfer from Sweet Grass and Big Timber Creeks for over 100 years.

There are a small number of corrals with direct access to perennial streams. Two animal confinement areas have had conservation practices applied to resolve water quality issues through the Environmental Quality Incentives Program (EQIP).

There are no major groundwater or drinking water issues in the county currently.

F – Air and Energy

1 – Non-attainment and Maintenance Areas for Air Quality Standards. No areas of non-attainment are recognized in Sweet Grass County.

2 – Visibility Standards. Monitoring done to meet requirements of the Environmental Protection Agency (EPA) Regional Haze Rule by Montana Department of Environmental Quality (DEQ) has shown improved visibility on the clearest days in all Montana Class I Areas since the 2000 to 2004 baseline was established. (Class I Areas in Montana include Glacier and Yellowstone National Parks, plus 10 wilderness areas). Visibility on the haziest days has worsened at all but two of the state's Class I Areas. This is primarily due to smoke from increased wildfire activity (a natural contribution to particulate matter) both in and outside the state. The manmade pollutant contribution to haze has decreased at all but one area. There are no Class I Areas designated in Sweet Grass County.

3 – Utility/Power Company Coverage. Sweet Grass County has service provided by Park Electric (electric) and Northwestern Energy (electric and natural gas). Propane is used in much of the county, with several companies providing service. Due to remoteness and cost of extending electrical supply, ranchers are using more solar-powered devices, such as livestock water pumps and power fence energizers.

4 – Wind. The Big Timber area is known for its wind, which occurs especially from October through March. Figure 19 in the Appendix shows a map of Wind Power Classes. One wind energy facility has been developed in Sweet Grass County to date. The Big Timber (Greycliff) Wind Farm went online in 2018 and is Montana's newest facility, rated at 25 megawatts for 14 turbines. Another wind farm was in the development stages northeast of Springdale but was dropped in 2019 due to community concerns.

G – Plants

1 – General. The county is 69% native rangeland and 2% introduced-species pastureland. Plant communities vary considerably due to variable soils, rainfall, elevation, climate, slope and aspect. Shallow, shallow clay, very shallow, and silty ecological sites are the most common. Major Land Resource Areas include 58A Northern Rolling Plains - Northern Part, 46 Northern Rocky Mountain Foothills, and 43B Central Rocky Mountains.

2 – Rangeland. According to the Montana Natural Heritage Program (MTNHP), the rangeland consists of Lowland Prairie Grassland, Montana Grassland, and Sagebrush Steppe. Bluebunch (*Pseudoroegneria spicata*), western (*Pascopyrum smithii*), and thickspike (*Elymus lanceolatus*) wheatgrasses, green needlegrass (*Nasella viridula*), needle-and-thread (*Hesperostipa comata*), Idaho fescue (*Festuca idahoensis*) and Wyoming big sagebrush (*Artemisia tridentata*) are common native plants found on rangeland throughout the county. Rangeland is dominated by cool-season species due to the relatively cool climate here. The only significant warm-season grass found is blue grama (*Bouteloua gracilis*). A few specimens of little bluestem (*Schizachyrium scoparium*), sand bluestem (*Andropogon hallii*), and prairie sandreed (*Calamovilfa longifolia*) have been observed in the east part of the county. Spike fescue (*Leucopoa kingii*) is occasionally seen in the foothills above 6,000 feet elevation, but rough fescue (*Festuca campestris*) isn't known to occur anywhere in the county. There are unconfirmed reports of sweetgrass (*Hierochloa odorata*) in the Melville area. In the foothills, plant communities have a significantly higher percentage of forbs than lower elevations.

Rangeland plant community similarity to the estimated historical climax plant community typically ranges from 20 to 50%. Cheatgrass (*Bromus tectorum*) and Japanese brome (*Bromus japonicus*), both annual grasses, have invaded gradually over the years, but have increased substantially since the drought of 1998 to 2006, as has desert alyssum (*Alyssum desertorum*). In areas receiving 16 to 20 inches of precipitation (the foothills), the introduced species Kentucky bluegrass (*Poa pratensis*) and timothy (*Phleum pratense*) can dominate rangeland.

3 – Introduced Species Pasture. There are about 10,000 acres of dryland introduced-species pastures in the county. Many of these have become a monoculture of smooth brome (*Bromus inermis*) or crested wheatgrass (*Agropyron cristatum*) when the previously seeded alfalfa (*Medicago sativa*) has faded out. Re-establishing a legume component in the stands would be good for soil health, increase production, and provide diversity for wildlife.

4 – Riparian Areas. Riparian areas adjacent to the perennial streams are consistently rated as “At-risk” using the NRCS Riparian Assessment method. Most riparian areas that support cottonwoods (*Populus* spp.) are missing several age classes – often only mature/decadent trees are present, with few or no younger trees coming on to replace them. This is especially true in the Yellowstone tributaries that flow from the Crazy Mountains, where the drought years from 1998 to 2005 dried up water tables enough to kill many cottonwoods. Prolonged seasonal livestock grazing and browsing by wildlife are contributing factors. Introduced herbaceous species such as smooth brome, Kentucky bluegrass, reedtop (*Agrostis gigantea*), orchardgrass (*Dactylis glomerata*) and quackgrass (*Elymus repens*) dominate most riparian area understories. Russian olive (*Eleagnus angustifolia*) is not extensive, but light infestations are common along the Yellowstone River and its tributaries on the north side of the river. (See Appendix, Figure 17). So far, only a few salt cedar (*Tamarix ramosissima*) plants have been detected; all were along the Yellowstone River.

5 – Forest. Forest tree species on private land are mostly ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), limber pine (*Pinus flexilis*), and Rocky Mountain juniper (*Juniperus scopulorum*). Higher elevation forests include Douglas-fir, lodgepole pine (*Pinus contorta*), subalpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmannii*), and whitebark pine (*Pinus albicaulis*). Some aspen (*Populus tremuloides*) is found in the foothills and higher elevations. This area is a transitional area for cottonwood species in riparian areas: plains cottonwood (*Populus deltoides*) is found at the lowest elevations, but fades out near Big Timber; narrowleaf cottonwood (*Populus angustifolia*) is common at mid-elevation; and black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) occurs from about 4,000 feet elevation up to moderately high elevation sites.

Some conifers in the county have been hit by disease and insects in recent years. In the mid-1990s, the low elevation stands of limber pine were hit hard by *Dothistroma* needle blight, killing many, especially north and east of Big Timber. Douglas-fir beetle (*Dendroctonus pseudotsugae*) took out a significant amount of older-growth Douglas-fir in the late 1990s and early 2000s in the mid-elevations of the mountains. Mountain pine beetle (*Dendroctonus ponderosae*) attacked ponderosa pine stands in the hills north and east of Big Timber from about 2004 to 2012, but didn't cause extensive damage, as in some other areas of the state. However, the beetle (together with white pine blister rust) has decimated stands of whitebark pine which occur at tree-line in the Crazies and Beartooths. Whitebark pine is a Candidate species on the Endangered Species List (see Appendix, Figure 11). In the past decade, spruce budworm (*Choristoneura occidentalis*)

has infested Douglas fir in the Crazies and Beartooths, severely damaging or killing many younger trees.

6 – Sensitive or Declining Plant Communities. Sagebrush steppe grassland communities have gotten more attention in recent years due to declines in bird species such as the greater sage-grouse and Brewer’s sparrow. Wyoming big sagebrush extent in the county has decreased somewhat over the years due to herbicide treatment, but that is not commonly done anymore. Wildland fires in the southeast part of the county during the past 20 years have also reduced sagebrush stands temporarily.

Aspens are declining throughout the Rocky Mountains, including Sweet Grass County. This is due to a number of factors, but conifer encroachment is occurring in some stands.

7 – Invasive Species.

Noxious Weeds – Leafy spurge (*Euphorbia esula*) is common along waterways and ditches, but is also found in uplands, especially in the Boulder River drainage, where it first became established. Spotted knapweed (*Centaurea stoebe*) is scattered throughout the county along roadways and in perennial stream floodplains; it is also commonly found in the uplands east of Melville. Diffuse knapweed (*Centaurea diffusa*) is found in the uplands on either side of the Yellowstone River west of Big Timber and in the lower Big Timber and Otter Creek areas. Whitetop (*Lepidium draba*) occurs in the east part of the county in the Bridger Creek, Reed Point, and White Beaver Creek areas. Sulfur cinquefoil (*Potentilla recta*) is found in the Lower Deer Creek drainage. Common tansy (*Tanacetum vulgare*) is scattered along the Boulder and Yellowstone Rivers. Musk thistle (*Carduus nutans*) is mostly located in the West Boulder River and Deer Creeks drainages. (Dalmatian and yellow toadflaxes (*Linaria dalmatica* and *Linaria vulgaris*) are found in the Big Timber area and west toward Springdale. Canada thistle (*Cirsium arvense*), houndstongue (*Cynoglossum officinale*), and field bindweed (*Convolvulus arvensis*) are widespread, especially in disturbed areas. Russian olive and salt cedar occur along the Yellowstone River (see Riparian Areas, section 4, above, and Appendix, Figure 17). Ventenata (*Ventenata dubia*), an annual grass that has garnered much attention lately, is spreading into southcentral Montana and has been reported in two locations along Interstate 90 in the county.

Relative newcomers with localized infestations are hoary alyssum (*Berteroa incana*), dyer’s woad (*Isatis tinctoria*), and common St. Johnswort (*Hypericum perforatum*).

Other Invasives – Cheatgrass and Japanese brome are invasive annual grasses and likely occupy the largest acreage of invasive species in the county. Bulbous bluegrass (*Poa bulbosa*) has become common along highway roadsides.

H –Animals

1 – Animal Feeding Operations/Concentrated Animal Feeding Operations

(AFO/CAFOs). Numerous small AFOs (mostly corrals) exist in Sweet Grass County. Aerial photo evaluation shows that approximately 30 corrals have direct access to streams, with another 30 located near streams. These potentially are contributing to diminished water quality in streams and waterways. AFOs that have direct contact with surface water are considered CAFOs under the Clean Water Act.

2 – Fish. Mike Ruggles, FWP Region 5 Fisheries Manager, identified the following fisheries resource concerns:

In Sweet Grass County, water is very important for irrigation, recreation, and as aquatic habitat. Without adequate water, fish populations will be reduced or eliminated. Specific considerations include:

- *Dewatering of stream reaches particularly in Big Timber, East Boulder, Lower Deer, and Bridger Creeks as well as other smaller mountain and prairie streams. Drought and de-watering are stressful and in extreme conditions fatal to fish populations. (See Appendix, Figure 10, for dewatered stream locations).*
- *Fish entrainment in ditches has negative impacts to fish populations and should be addressed as opportunities are available.*
- *Habitat degradation and prevention of natural river function. This would include maintaining connectivity with appropriate size and types of stream and river crossings, reducing impacts of grazing on riparian areas, and other developments with a goal of maximizing normal sinuosity, depth, width, length and pool riffle ratios for streams.*
- *Increased water temperature, high summer water temperatures can be stressful for fish. Activities that influence temperature are canopy cover, water withdrawal, irrigation returns, bank condition and exposure.*
- *Aquatic invasive species and disease threats. Programmatic work on Invasive Species Management, education and compliance of private pond owners when importing or moving fish.*
- *Native species distribution range decreasing because of nonnative expansion and competition.*
- *Corrals and excessive nutrient inputs into streams, lakes and ponds, as well as other nonpoint sources.*

3 – Wildlife. Sweet Grass County is home to large numbers of mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), pronghorn (*Antilocapra americana*), and elk (*Cervus canadensis*). Mule deer populations are cyclical, experiencing substantial fluctuations. White-tailed deer are on the increase, including in forested areas. Antelope populations tend to fluctuate based on the severity of winters. Elk numbers have been steadily increasing, to the point of causing resource damage and landowner concern in some parts of the county.

Justin Paugh, FWP Upland Biologist for this area, provided the following resource concerns and priorities for upland wildlife:

- *Sagebrush is extremely valuable to our wildlife, big game and nongame, and anything we can do to maintain the sage brush we have and possibly allow it to spread into areas where it has been eradicated is a good thing.*

- *There are many fields/pastures in this area that were converted from native grasses and forbs to non-native, and in some cases, invasive grasses. Getting these fields back to a native state is often nearly impossible. However, incorporating native or non-native forb species into these stands would be a huge*
- *benefit to upland birds, song birds, antelope, deer and elk. These forbs increase cover and forage in the grass stands.*
- *An increasing threat to rangeland condition and wildlife is unfenced hay stacks during winter. Unfenced stacks are contributing to unnatural concentrations of whitetail, mule deer, elk, and in some cases antelope. These stacks cause big game animals to linger in small areas for extended periods of time, sometimes for months. These animals should be moving throughout their potential range in search of forage. These winter concentration areas reduce and degrade associated rangeland cover and vegetation. This unnatural wildlife concentration increases the potential for spread of diseases such as brucellosis and CWD among many others. These situations bring wild animals in close to cattle, increasing risk of disease transmission from wildlife to domestic livestock.*
- *On many of our streams, riparian conditions can be greatly improved. Modifications in fencing, location of watering facilities, and grazing timing and duration can all benefit riparian condition. A concern in this area is the noticeable lack of cottonwood regeneration in grazed riparian areas with old cottonwood stands.*
- *Although there isn't much aspen on private land in Sweet Grass County, taking actions to restore those old aspen stands that are not regenerating for numerous reasons is a high priority. These stands provide an important and rare habitat type in this area.*



Figure 2. Elk using riparian area habitat.

4 – Diseases in Wildlife. Sweet Grass County potentially has some notable diseases

in local wildlife that could significantly impact agricultural production and other revenue bases.

Brucellosis is a contagious disease caused by the bacteria *Brucella abortus*. It infects domestic livestock, wildlife, and humans internationally. It is a disease of cattle that spilled over into wildlife. It has been nearly eliminated from domestic livestock through eradication programs. Bison (*Bos bison*) and elk are the primary wildlife hosts. Bison and elk in the Greater Yellowstone Area of Montana, Wyoming, and Idaho are known to carry this bacterium. It has the potential to spread from wildlife to livestock, which could be economically damaging to affected livestock producers. The following information is taken from the FWP “Targeted Elk Brucellosis Surveillance Project - 2019 Annual Report”:

Montana Fish, Wildlife & Parks (MFWP) is conducting a multi-year targeted elk brucellosis surveillance project to evaluate 1) prevalence and spatial extent of brucellosis exposure in elk populations, 2) elk spatial overlap with livestock and interchange between elk populations, 3) risk of seropositive elk shedding and potentially transmitting Brucella abortus, and 4) effects of brucellosis management hazing and lethal removal on elk distributions and spatial overlap with livestock. Surveillance consists of screening blood serum for antibodies signifying exposure to Brucella abortus, the bacteria that causes the disease brucellosis. Brucellosis typically causes abortion in pregnant elk, typically from February through May (Cross et al. 2015) and is primarily transmitted through contact with infected fetuses, birthing fluids and material. Elk that test positive for exposure to B. abortus (seropositive) may or may not be actively infected with the bacteria. Although not a true indicator of infection or the ability of an animal to shed B. abortus on the landscape, detection of seropositive elk indicates brucellosis is present in the area and indicates the potential for elk to transmit the disease to livestock or other elk.

Based on its research, FWP estimates the prevalence of elk exposure to the bacterium *Brucella abortus*, the pathogen causing brucellosis, is about 1 to 3% in the Greeley Mountain, Deer Creeks, Greycliff Creek, and Work Creek herds. Fortunately, this is much lower than the estimates for some herds in the Paradise Valley area of Park County, just to the west.

Currently, the Montana Department of Livestock requires that: “All sexually intact female cattle and domestic bison 12 months of age and older in Beaverhead, Big Horn, Broadwater, Carbon, Gallatin, Jefferson, Madison, Park, Stillwater, and Sweet Grass Counties must be vaccinated against brucellosis. This includes cattle that enter these counties seasonally.” (MDOL press release, dated 2/4/2019). See Appendix, Figure 16, for Brucellosis Designated Surveillance Area map.

Chronic Wasting Disease (CWD) is a chronic and fatal neurodegenerative disease that affects cervids, including mule deer, white-tailed deer, elk and moose. This disease belongs to a family of disease referred to as Transmissible Spongiform Encephalopathies (TSEs). To date it has not been found in Sweet Grass County but has been detected in Carbon and Yellowstone Counties in southern Montana, not far to the east. (See Appendix, Figure 15, for FWP-designated CWD Management Zones).

5 – Threatened & Endangered (T&E) Species and Species of Concern (SOC). Species currently listed in Sweet Grass County by the U.S. Fish & Wildlife Service

(USFWS) as T&E and by the State of Montana as SOC are shown in the Appendix, Figures 11, 13, and 14.

The greater sage-grouse (*Centrocercus urophasianus*) is a Montana SOC and may still be present in small numbers in the county, especially in the northern part. There are no longer any known active leks in the county. A map of greater sage-grouse habitat delineations is shown in the Appendix, Figure 10. Sage-grouse decline is thought to be due to conifer encroachment, historical sagebrush control measures, wildfire, invasive annual grasses, and other factors affecting its habitat.

Canada lynx (*Lynx canadensis*) are a threatened species and have designated critical habitat in the southern portion of the county in the Beartooth Mountains, as shown in Figure 12 in the Appendix. Critical habitat in western Montana is montane spruce/fir forest. A Canada Lynx Habitat Determination Screen (MT-CPA-186) is used for NRCS conservation projects to determine and document the effects of proposed actions on the lynx and designated critical habitat.

Wolverine (*Gulo gulo luscus*) are proposed to be listed and are thought to be present in the Crazy and Beartooth Mountains.

The Greater Yellowstone population of grizzly bears (*Ursus arctos horribilis*) were briefly de-listed, but litigation contending that this population did not have connectivity with the Northern Rocky Mountain population to promote genetic diversity resulted in the re-listing as Threatened in October of 2018. Legislative action is being considered in Montana and Wyoming to de-list the bears. Grizzlies are present and becoming more numerous in the Beartooth Mountains in southern Sweet Grass County.

Section III – Conservation Activity Analysis

A – Natural Resources Conservation Service

NRCS currently has seven EQIP contracts covering 27,994 acres. These contracts address identified resource concerns on rangeland, introduced species pastures, irrigated land, and animal confinement areas and are located throughout the county. There are 11 Conservation Stewardship Program (CSP) contracts on 42,894 acres, addressing resource concerns on rangeland, pasture, and cropland. Two Grassland Reserve Program contracts cover 2,041 acres. There is a 150-acre Wetland Reserve Program permanent easement conserving a restored wetland. Conservation Technical Assistance (CTA) is provided to customers for a wide variety of resource issues, covering about 3000 acres per year. CTA requests often come from small-acreage landowners or those new to the area, but also from long-term agricultural producers that want NRCS technical expertise without financial assistance.

Focused conservation projects in the past have included:

- Water quality improvement in Otter Creek
- Wildfire recovery on the Derby, Jungle, Chichi, and Hobble Fires
- Noxious weed reduction in the Cayuse Hills east of Melville; the Deer Creeks; south of the Yellowstone River west of Big Timber; and east of the Crazy Mountains

- Predator deterrence to minimize wolf/livestock interaction in the Boulder drainage
- Development of spring creek spawning habitat for cutthroats near Greycliff

See Appendix, Figure 20, for a map of NRCS Program Participation from 2008 to 2018.

NRCS staff at the Big Timber Field Office currently consists of a District Conservationist. There is a Rangeland Management Specialist position that is vacant but is in the process of being filled. There is also a Soil Conservation Technician located in the Livingston Field Office that serves Sweet Grass, Park, and Meagher Counties.

B – Sweet Grass Conservation District

The following was provided by Dan Rostad and Guelda Halverson for SGCD:

The “Three-legged stool” partnership model has been very successful in Sweet Grass County. Sweet Grass County Conservation District, Montana Department of Natural Resources & Conservation-Montana Association of Conservation Districts, and USDA’s Natural Resource Conservation Service, have been extremely successful working together with the objective to provide locally led, common sense conservation. This partnership in Sweet Grass County has produced dozens of successful natural resource enhancement and protection projects including many model projects that have been replicated in other areas of the state.

SGCD is a very active Conservation District. The SGCD Board of Supervisors and staff work closely with their NRCS partners to provide useful, productive solutions that benefit natural resource enhancement and protection.

SGCD:

- *Obtained grants and sponsored projects for county-wide forest fuel reduction (BLM and DNRC grants)*
- *Obtained grants and coordinated fire recovery efforts such as the 210,000-acre Derby Fire (partnered EQIP and Montana Environmental Contingency Grant funds)*
- *Facilitated critical irrigation infrastructure replacement through the DNRC Renewable Resources Grant and Loan Program*
- *Participated in NRCS’ Wildlife Habitat Incentives Program and Emergency Watershed Protection Program to do spawning habitat and flood recovery projects*
- *Provides administrative support to Boulder River Watershed Association*
- *Chairs and convenes the Local Working Group and provides essential advice, input, and guidance to NRCS for conservation work throughout the county*
- *Has been instrumental in starting and continuing the biennial Sweet Grass County Farm Fair, a hands-on agricultural education event for 4th and 5th graders*
- *Sponsored a DNRC grant that established a water measurement program on the Sweet Grass Creek that has been on-going for the past 10 years. It not only*

provides real-time, accurate water information regarding water flows in Sweet Grass Creek but has helped alleviate misunderstandings and misgivings about water use and flow in the creek, which serves hundreds of irrigators and benefits thousands of acres of grazing and croplands. NRCS provided technical staff support

- *SGCD Board and NRCS staff work closely with the local Sweet Grass County Weed Department and Beartooth Resource Conservation & Development (RC&D). Partnership with these groups has improved native grasslands throughout the county and proven to be a boost to the local economy.*
- *Working with NRCS technical advisors, the Conservation District on behalf of the BRWA, has sponsored dozens of projects in the watershed that have improved irrigation infrastructure and diversion structures, provided baseline studies for resource improvement and protection and benefitted the overall health of the Boulder River.*
- *Completed comprehensive stream assessments on the Boulder River, including East and West Boulder tributaries, and Big Timber Creek and Swamp Creeks. TMDL studies were completed with assistance from NRCS staff and SGCD Board. These studies identified impairments harmful to stream health. An assessment of Big Timber Creek Canal was also completed, at the canal company's request.*
- *SGCD and NRCS also work closely with their Montana DNRC and FWP partners with the goal of providing wise counsel and productive solutions to landowners and residents of Sweet Grass County.*

C – Boulder River Watershed Association

The following was provided by Dan Rostad, BRWA Coordinator:

BRWA is a group of landowners that reside within the drainage basin of the Boulder River working to maintain and/or improve the health of their land and water resources. The group was formed nearly 20 years ago with the vision of:

- *Identifying/researching resource issues and concerns within the watershed*
- *Helping willing landowners/land managers to plan and implement innovative solutions*
- *Educating the general public about the efforts of landowners in the valley to care for the resources that provide for their way of life.*

The group seeks consensus regarding all issues in the watershed and seeks management action on a voluntary basis, stressing the importance of maintaining agriculture as the primary land use in the area. Ranchers settled the area, and the vision of BRWA is to perpetuate this lifestyle and maintain the values that make this area what it is. BRWA is committed to addressing the resource issues and concerns that are important to its members and the watershed.

The group has formed committees within its organizational structure to further study these issues with the end goal of developing and implementing effective conservation & management strategies:

Committees and Goals:

- *Riparian Health - Improve the health and function of riparian vegetative communities immediately adjacent to the stream*
- *Water Quality & Quantity - Enhance water quantity and quality for all beneficial uses*
- *Forest Health - Educate, coordinate, and assist in promoting forest management practices on both private and public land within the entire watershed*
- *Noxious Weeds - Control noxious weeds and educate landowners about their identification and management*
- *Range & Wildlife - Understand the habits and needs of wildlife species, how they interact with landowners, and assist landowners and appropriate agencies in dealing with their management*

BRWA initiated and completed a watershed-wide stream assessment of the Boulder River, which has served as the basis for prioritizing and doing conservation work throughout the watershed. It receives and manages project funding from Sibanye-Stillwater (owner of the East Boulder mine project) and has been awarded grants from the DNRC Renewable Resources Grant and Loan Program and other sources for addressing the highest priorities identified by the assessment.

D – Yellowstone River Conservation District Council

The following was provided by Dan Rostad, YRCDC Coordinator:

The YRCDC is an alliance of 12 Conservation Districts along the Yellowstone River, the longest free-flowing river in the contiguous U.S. It was formed in 1998 in response to the record 1997 flood and damage. YRCDC spearheaded the development of the 2015 “Yellowstone River Cumulative Effects Analysis” in cooperation with the U.S. Army Corps of Engineers (ACOE) and other agencies and organizations that are stakeholders in the river. The analysis primarily covered the river corridor, but some components encompassed the entire basin. This was a monumental task of great importance to the river’s present and future. A complementary effort resulted in the 2016 “Yellowstone River Recommended Practices & Position Statements – Practical Applications”, which is a guide for landowners, water users, land management agencies, county officials and others when making land management decisions within the river corridor.

The Council recently established two working groups in their efforts towards implementing the six voluntary recommended practices determined by the study results. Irrigation Water Management (IWM) and Invasive Woody Plant Control (IWPC) working groups have been working with local CDs, NRCS, DNRC staff, and other stakeholders to establish these working groups.

IWM Goals: Improve water use efficiency, water quality, soil health, fisheries and riparian habitat.

*IWPC Goals: Focused on Russian olive, common buckthorn (*Rhamnus cathartica*) and saltcedar, the Council's goal is to provide outreach, education and project assistance to mitigate the damage to the river's ecosystem and improve native plant conditions, forage production, wildlife habitat, and soil salinization.*

Locally, the YRCDC held a river tour highlighting successful and unsuccessful channel stabilization projects emphasizing the importance of the CEA's Channel Migration Zone (CMZ) maps. Emphasis was placed on the importance of the scientific information gained through the CEA process and how this information can be accessed through the Council's website. CEA information has also been beneficial to local CDs, NRCS offices and land use planners in their efforts to provide natural resource conservation.

The IWM working group includes representation from Montana DNRC which highlights the importance of the State's Water Plan for the Yellowstone River Corridor. The work group recently held a water measurement workshop for local irrigators with assistance from DNRC staff.

E – Sweet Grass County Noxious Weed Program

The noxious weed program has aggressively attacked the county's noxious weed infestations. It has received several large Montana Noxious Weed Trust Fund grants to help landowners reduce infestations of priority weeds in targeted areas in the county. It has also partnered with NRCS on four multi-year EQIP noxious weed special initiatives, mentioned previously. The department offers weed seminars annually to educate landowners on noxious weeds in the county and their management, sprayer calibration, and other pertinent topics. In favorable years, field days are held to collect leafy spurge flea beetles (*Aphthona flava* and *A. lacertosa*) for free distribution to county residents.

F – Montana State University Extension

The Extension program is very active here in the county through the county-wide 4-H program, the Sweet Grass County Fair, and supporting the Crazy Mountain Stockgrowers, Crazy Peak Cattle Women, Woolgrowers, and SG County Noxious Weed Program. Extension has worked together with NRCS to evaluate cover crops in hayland rotations to improve soil health.

G – Montana Fish, Wildlife & Parks

FWP faces difficult challenges in managing upland wildlife, especially elk, due to the varied interests of landowners and the general public. As elk numbers have continued to rise in the county, pressure to decrease populations to "management objective" levels has increased. In response, FWP has continued working with landowners to increase hunter access for elk harvest and to fence off haystacks. It has also implemented special management hunts and "shoulder" seasons to help mitigate damage to agricultural lands with varied success. Recently, FWP began offering 30-year conservation leases through the "Conservation Lease for Working Lands" program to help conserve native grass and shrub-lands, while improving hunter access.

FWP fisheries biologists have been working closely for many years with SGCD to administer the Montana Natural Streambed and Land Preservation Act (310 permits) for non-governmental individuals or entities proposing to do work in or near perennial streams on private or public land. The Montana Stream Protection Act (124 permits) is used for government entities proposing work involving the beds or banks of perennial streams.

FWP has teamed with SGCD and NRCS to develop spawning habitat, potentially for cutthroat trout, on a small spring creek tributary to the Yellowstone in the Greycliff area. FWP also conducted fish surveys using electrofishing in support of this project and the Otter Creek Water Quality Demonstration Project.

H – Montana Department of Environmental Quality

DEQ has identified the need for a Total Maximum Daily Load (TMDL) plan for the American Fork, Fish Creek, and portions of Otter Creek, Big Timber Creek, the Main Boulder and East Boulder Rivers, and Lower Deer Creek (see Figure 1 on pg. 13). DEQ administers the 319 grant program using Clean Water Act funds to help people deal with listed stream impairments in a coordinated manner.

I – Farm Services Agency

FSA has partnered with NRCS on the Otter Creek Water Quality Demonstration Project, the Conservation Reserve Program (CRP), the Grassland Reserve Program (GRP), the Emergency Conservation Program (ECP), and carrying out Conservation Compliance provisions with agricultural operators that participate in USDA programs.

Section IV – Natural Resource Problems and Desired Future Outcomes

A – Rangeland Health

Rangeland is the largest land use in the county, over 2/3 of the area, and its health varies widely, depending on past and present management, wildlife use, invasive species, and other factors. Based on NRCS Historic Climax Plant Community models, today's rangelands in the county have a fairly low similarity compared to what their potential is thought to be (20 to 50% Similarity Index, commonly). Due to the extent of rangeland, its health has a large effect on other resources, such as streams and aquatic life, riparian areas, wildlife, and communities. There is no one area of the county that needs rangeland health improvement more than another; every acre could be improved with better grazing practices. Many producers continue to work at improving their rangeland health by leaving more residual cover and increasing vegetative recovery periods. Acres that aren't improving or are in decline are more likely to be colonized and degraded by noxious and invasive species.

B – Riparian Area Health

Riparian areas in the county are frequently rated as “At-risk” using the NRCS assessment method, generally meaning that some characteristics have been compromised and need improvement. Typically, invasion by non-native herbaceous and woody species has caused a loss of deep, binding root masses that could help maintain streambank integrity and riparian area function. Loss of native plant diversity translates to loss of wildlife diversity. Extended growing season grazing/browsing by livestock and wildlife is a major factor in woody species decline. Return flows from flood irrigation can cause streambanks to become saturated and fail, causing over-widening of the stream channel and contributing excessive sediment to the stream.

The Yellowstone River riparian area has been impacted by the railroad, highways, streambank stabilization structures, and residential development and it will be difficult to mitigate these effects.

FWP identified riparian area condition as an issue for wildlife. Fencing, location of watering facilities, and grazing management can all benefit riparian condition. Of particular concern is the lack of cottonwood regeneration in grazed riparian areas with decadent stands of trees.

The LWG has identified riparian area condition as a high priority resource concern and it will be considered for Targeted Implementation Plan (TIP) development for possible funding through NRCS’ Environmental Quality Incentives Program (EQIP). No geographic area was designated, but the likely focus will be on Yellowstone tributaries that originate in the Crazyes.

C – Drought

Drought cycles have a huge impact on natural resources and agriculture in the semi-arid west. Water is the lifeblood of agriculture here, whether it’s used for irrigation, livestock water, hay or other crop production, or benefits grazing or forest lands. Since drought is a certainty from time to time, producers need to adopt practices that make their operations drought-resistant, develop contingency plans, and be flexible in their management, so they can ride out the dry years and rebound more quickly. This could include developing reliable livestock water wells, converting to a more efficient irrigation system, using cover crops to increase organic matter and conserve moisture, leaving more residual grazing land cover to mulch the ground surface, and more. Management of overstocked forest stands will help improve forest health, so trees are able withstand the ravages of drought and resulting insect epidemics.

NRCS can provide on-the-ground technical and financial assistance to make drought-resistance a reality. The LWG has identified developing reliable, drought-resistant livestock water as a high priority and a TIP proposal will be submitted to address this issue in the Cayuse Hills area in 2020.

D – Irrigation Inefficiency

With over 2/3 of the irrigated acreage in the county using wild flood systems, there is certainly potential to convert to more efficient systems. Roadblocks to this in some locations can be financial and/or physical. Center pivot sprinkler systems are costly and

usually take a number of years to pay for themselves. In many areas of the county, especially along the Yellowstone tributary streams, fields may be fairly small or irregularly-shaped and not good candidates for the use of sprinklers. NRCS can help assess feasibility and if appropriate provide technical and/or financial assistance for the adoption of these systems.

It is recognized that flood irrigation inefficiencies and transmission losses from ditches have resulted in locally higher water tables, wetlands, and extended-season streamflows. If flood irrigation was eliminated, the landscape would look much different than it did prior to development of these systems 110 to 140 years ago. It's important to evaluate the potential adverse effects to the natural resources that benefit from extra water before changing irrigation systems. That said, there are many benefits to using sprinklers including much lower irrigation water requirements, little or no runoff with sediment and nutrients reaching streams, reduction of stream temperatures, and large labor savings that free operators up to deal with other priorities.

NRCS locally has not aggressively marketed installing sprinklers, since the LWG has consistently ranked grazing land health issues as the top resource concern in the county.

E – Stream Dewatering

Most of the streams in the county are driven by snowmelt, so they're high in May and June and much lower in summer and fall. This low-water period coincides with peak irrigation demands, so many streams are dewatered during that time (see Appendix, Figure 9). Sprinkler use has increased in the past 20 years, but approximately 70% is still flood irrigated. Converting more acres to sprinkler irrigation would definitely increase stream flows during summer and fall, when streams are most stressed by dewatering. As stated in section D above, there are pros and cons with mass conversion to sprinklers that should be weighed before this is promoted as a preferred solution.

FWP and other entities offer opportunities for water right holders to do "in-stream flow" leases to increase stream flows in critical areas during low-water periods. FWP identified dewatering of stream reaches as an issue for fish; it is stressful for them, and in extreme conditions, fatal.

F – Forest Health

As natural fire cycles have been disrupted by 100 or more years of fire suppression, forests in the west have become overstocked, unhealthy, and susceptible to drought and landscape-scale insect attacks. This county is no exception. Mountain pine beetle and Douglas-fir beetle outbreaks occurred here during the early 2000s, but the current activity of western spruce budworm is causing far more damage.

Most of the private land Douglas-fir stands are along the east and south slopes of the Crazies. DNRC, NRCS, and MSU Extension could all contribute technical and/or financial assistance for treating forest health concerns, but there needs to be more landowner interest to justify efforts in that direction.

MTNHP estimates the extent of aspen in the county to be approximately 7,300 acres. The majority of that is on National Forest land in the montane areas, although there are some

acres in the foothills on private land. There is likely conifer encroachment occurring in some of these stands that could be treated if there is landowner interest.

G – Conifer Encroachment on Rangeland

Conifer encroachment has become a hot topic around the West, as evergreens have gradually spread out into historical rangeland areas, in part due to decades of fire suppression and interruption of the normal fire frequency interval. This has been happening in Sweet Grass County, too. Many acres of rangeland and forest have burned in the county in the last 20 years – the 2006 Derby fire consumed 125,000 acres in Sweet Grass County, the 2007 Chichi and 2003 Hobble Fires burned 12,000 acres each, and there have been several in the 3,000 to 5,000-acre range. The main areas of conifer encroachment, (primarily of ponderosa pine, Douglas-fir, and Rocky Mountain juniper) are in the unburned areas south of the Yellowstone, the foothills of the Crazies, and the Cayuse Hills area north of the Yellowstone.

H – Noxious/Invasive Species

As stated in Section II – Plants, there are many species of noxious weeds present. Leafy spurge, spotted knapweed, Canada thistle, houndstongue are widespread here, so the goal is containment, not eradication. Biological control efforts featuring approved insect releases likely offer the best and only realistic hope of long-term infestation reduction, especially on sensitive sites, like riparian areas. Eradication of new, small-scale introductions is possible, if they are aggressively treated.

There are on-going research efforts to reduce invasive annual grasses, such as cheatgrass, Japanese brome, and ventenata. A bacterium (*Pseudomonas fluorescens*) with promising suppressive activity on cheatgrass has been identified. However, further research has shown that it is ineffective under field conditions. A herbicide named indaziflam has been shown to provide good control of annual grasses. Currently it is not labeled for range or pasture use, but that labeling is being sought, and the herbicide also shows promise. In 2019, it received a Section 18 Emergency Exemption in Montana, Wyoming, and Utah on rangeland and pasture for control of medusahead (*Taeniatherum caput-mudusae*) and ventenata.

The County Noxious Weed Department is very active and regularly applies for Montana Department of Agriculture Noxious Weed Trust Fund grants to address noxious weeds in coordinated, community-wide projects.

I – AFO/CAFOs With Direct Access to Streams or Ditches

There are approximately 30 seasonal confinement areas (corrals) that have streams or ditches passing through them and a similar number that are very close to surface water. This allows animal waste and sediment to get into the water and affect downstream water users and resources. Livestock health issues can be caused by water in confinement areas. Ideally, all these facilities would be renovated or relocated to prevent these water quality issues, but treatment of 10 to 20% over the next 5 years would be considered positive progress.

J – Soil Health, Organic Matter, and Soil Monitoring

**Conifer encroachment has become a hot topic around the West, as evergreens have gradually spread out into historical rangeland areas, in part due to decades of fire suppression and interruption of the normal fire frequency interval. This has been happening in Sweet Grass County, too. Many acres of rangeland and forest have burned in the county in the last 20 years – the 2006 Derby fire consumed 125,000 acres in Sweet Grass County, the 2007 Chichi and 2003 Hobble Fires burned 12,000 acres each, and there have been several in the 3,000 to 5,000-acre range. The main areas of conifer encroachment, (primarily of ponderosa pine, Douglas-fir, and Rocky Mountain juniper) are in the unburned areas south of the Yellowstone, the foothills of the Crazyes, and the Cayuse Hills area north of the Yellowstone.

Section V – Prioritization of Natural Resource Problems and Desired Outcomes

Following is a summary of the February 2023 Sweet Grass County LWG meeting held in Big Timber to gather public input on natural resource concerns:

Top Natural Resource Concerns:

(number of votes received in parentheses)

- (32) Soil health, low organic matter, monitoring/testing soils
- (27) Irrigation efficiency and water management
- (19) Cover crops and field renovation
- (13) Invasive species and noxious weeds
- (10) Reliable (drought-resistant) livestock water
- (4) Erosion – bare ground, flood damage, irrigation-caused, streambank

All Resource Concerns Identified:

WATER

- Irrigation efficiency, irrigation water management (27)
- Flood/Erosion Damage to irrigation infrastructure and stream channels. (2)
- Repair and protection of riparian areas after flooding (2)

PLANTS

- Juniper/conifer encroachment (1)
- Invasive species (cheatgrass, Japanese brome, ventenata) / noxious weeds (13)
- Sagebrush maintenance for wildlife (1)
- Enhance introduced pastures to include forbs/legumes (19)
- Riparian area improvement/maintenance (4)
- Windbreaks for snow and water retention (1)

SOIL

- Erosion – bare ground, flood damage, irrigation-caused, streambank (2)
- Soil health, low soil organic matter (16)

ANIMALS

- Wildlife damage to haystacks, unfenced haystacks (1)
- Reliable (drought-resistant) livestock water (10)
- Protected species, need management options (eagles, grizzlies, prairie dogs) (3)
- Need for virtual fencing (1)

AIR

- Dust abatement - wind erosion (1)
- Smoke from wildfires (1)

ENERGY

- Future of wind and solar in county (2)

HUMANS

- Wildland/urban interface
- Respect for local processes (locally-led, like this process)
- Use of LWG and wide dissemination of results
- Respect your neighbor's concerns; property rights and community values
- Make TIPs County Wide (31)

No resource concern geographic areas were identified by the LWG at the meeting.

Section VI – Targeted Implementation Plans and Investment Portfolios

A – Cayuse Hills Drought Resistance & Resilience

A TIP, broken into three parts (North, East, and West Cayuse Hills), has been successfully established to help livestock producers in the Cayuse Hills area develop drought-resistant water sources (wells, pipelines, storage and drinking tanks) for their livestock. The Cayuse Hills are uplands north of the Yellowstone River forming the broad divide between the Yellowstone and Musselshell drainages. The landscape is dominated by rangeland. Livestock operations there rely heavily on the numerous small springs present. During drought periods, these springs diminish or dry up altogether. This seriously disrupts grazing rotations by forcing operators to leave pasture gates open so livestock can seek out enough water in multiple pastures. This in turn causes livestock to concentrate in pastures where the water sources are, encouraging overgrazing, and significantly impacting rangeland health, productivity, and ability to bounce back from drought quickly.

This resource concern was selected for the first TIP proposal based on LWG, SGCD, and producer input, as well as NRCS knowledge of the severity of this issue in the past. Producers are still consistently showing interest in participating. All 3 parts of this TIP are still active.

Outreach informational events are held regularly at Melville and Big Timber to further gauge level of interest and readiness to participate.

B – Yellowstone River North Tributaries Riparian Area Improvement

Most of the perennial streams that flow into the Yellowstone River from the north originate in the Crazy Mountains, such as Big Timber, Otter, and Sweet Grass Creeks. Their riparian areas often have suppressed tree and shrub communities and are considered “At-risk” by NRCS. As mentioned in Section II, during the drought of 1998 to 2005, the water tables in many of these riparian areas dropped enough to kill many mature and over-mature cottonwoods. Prolonged seasonal grazing and wildlife browsing contribute to the suppression or loss of woody species. Plants with deep, binding root masses such as woody species and sedges are necessary to hold riparian areas together, keeping them from unraveling and being severely damaged during high water events.

Riparian area recovery is usually most successful when management is used to foster woody species regeneration, versus doing expensive and rarely successful plantings. The NRCS grazing management practice, Prescribed Grazing, together with fencing and off-stream water developments, could be used to help landowners successfully help their riparian areas flourish.

Landowner interest will be measured to determine if there is enough interest to develop a TIP and, if so, on what specific streams.

C – Conifer Encroachment

Long-term landowners have for decades watched the gradual spread of conifers into rangeland areas that haven't been occupied by trees in the historical past and see the increase of conifers as a threat to forage production potential for livestock use.

There is little awareness of conifer encroachment as an issue for sage-grouse in the county, in part due to there being so few sage-grouse present. There are no known active leks and the county is not in a designated core area (there are designated habitat areas within a 15-mile radius around Big Timber and southwest of Melville).

The 2019 LWG public input meeting identified conifer encroachment as a priority resource concern. Further public input from landowners will be sought to assess interest and determine if a TIP proposal will be submitted.

D – Yellowstone River Tributaries Irrigation Efficiency

The LWG identified irrigation inefficiency as a priority resource concern, but no specific geographic areas were targeted as highest priority. However, there are several streams that are known to be dewatered, even in average years, and these would be a good place to start. Big Timber Creek, Sweet Grass Creek, Lower Deer Creek, Bridger Creek, and the East Boulder are often short on water. Irrigation withdrawals can cause reaches of these streams to go dry, making appropriation of irrigation water downstream difficult or impossible and making fish passage or survival a challenge.

Conversion of flood irrigation systems to sprinklers would help reduce stream dewatering. Also, reducing transmission losses from irrigation ditches would allow more water to stay in the streams. More efficient irrigation systems would also decrease runoff of sediment and nutrients.

Several producers are currently interested in improvements to their irrigation systems in these stream watersheds. A TIP will be developed to provide NRCS technical and financial assistance to irrigators.

E – Invasive Plants/Noxious Weeds

The LWG identified invasive species/noxious weeds as a priority resource concern, but no geographic areas were targeted as highest priority. A survey was sent out county-wide to gauge interest in potential TIPs, and to determine which herbaceous species was the most problematic. Out of 39 surveys that were received, 29 voted for a "Weeds TIP", and the top four species of concern were: Leafy Spurge, Spotted Knapweed, Canada Thistle, and Houndstongue. All of these species can negatively impact range, pasture, livestock, and riparian health and production by replacing native species and altering soil structure.

Due to the results of the surveys, and through collaboration with the County Weeds Department and the NRCS Area Office in Bozeman, it was determined that, since these weeds were not focused in any one area, it would be best to create a TIP that had 2 separate phases, which are the North and South. The South Weeds TIP will begin first by taking applications in 2025.

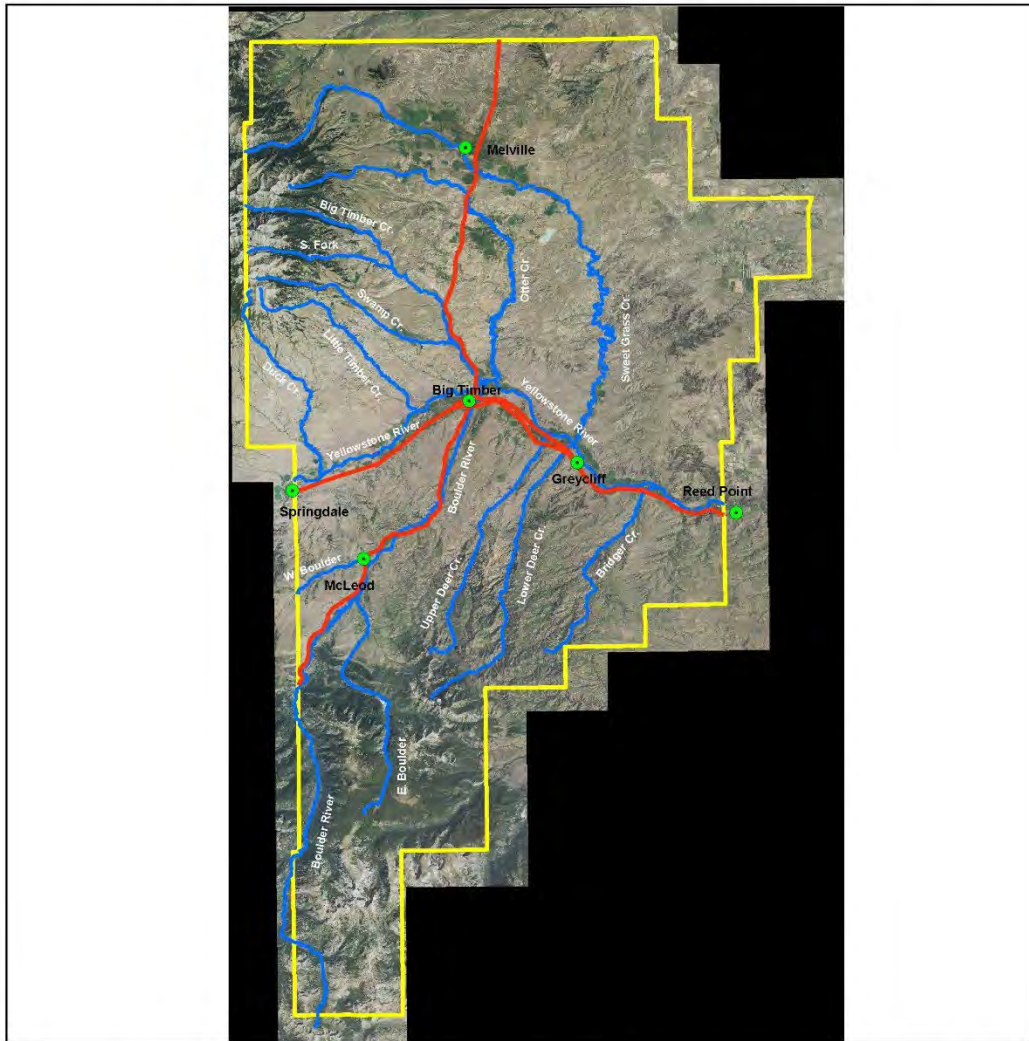
Appendix.

Sweet Grass County Map

Date: 10/28/2019

District: SWEET GRASS CONSERVATION DISTRICT

Field Office: BIG TIMBER FIELD OFFICE
Agency: USDA - NRCS
Sweet Grass County, Montana



Prepared with assistance from USDA-Natural Resources Conservation Service



Legend

- Communities
- Highways
- Major Streams
- Sweet Grass County Boundary



Figure 3. Sweet Grass County Map.

Sweet Grass County Public Lands

Date: 11/12/2019

District: SWEET GRASS CONSERVATION DISTRICT

Field Office: BIG TIMBER FIELD OFFICE
Agency: USDA-NRCS
Assisted By: C. Roloff

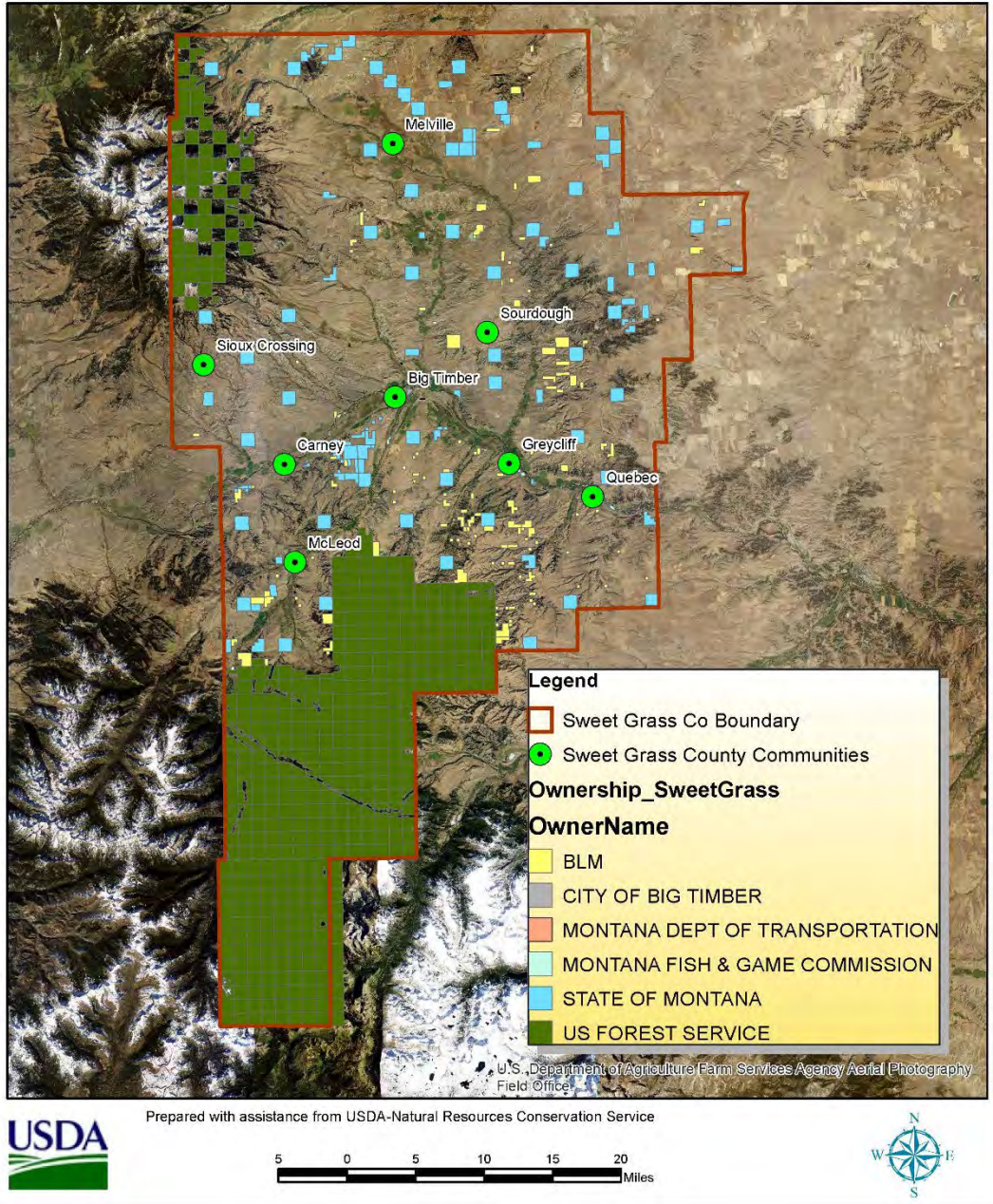


Figure 4. Public Lands in Sweet Grass County.

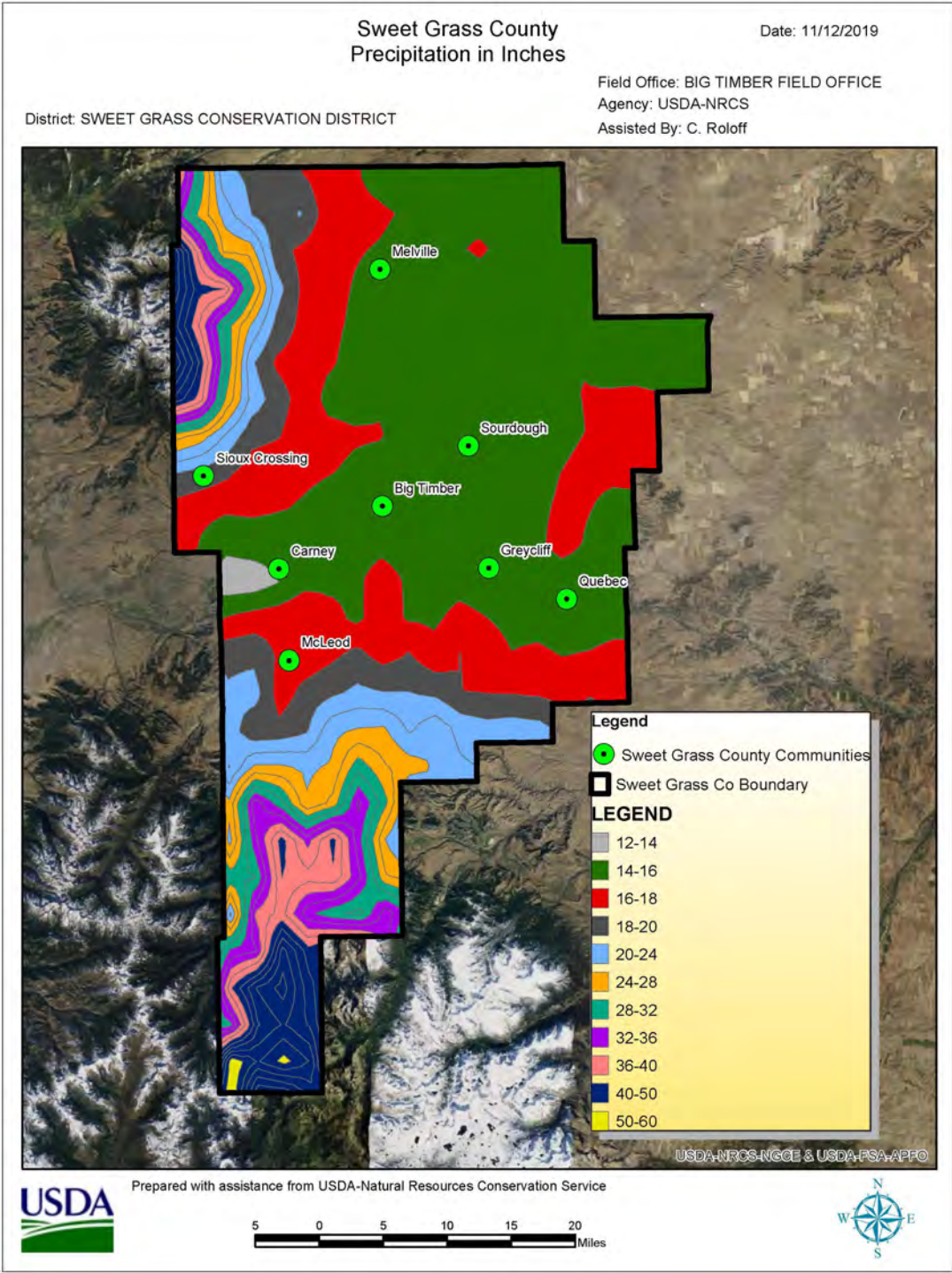


Figure 5. Precipitation Zones in Sweet Grass County.

Sweet Grass County
Prime and Important Farmlands

Date: 11/12/2019

District: SWEET GRASS CONSERVATION DISTRICT

Field Office: BIG TIMBER FIELD OFFICE
Agency: USDA-NRCS
Assisted By: C. Roloff

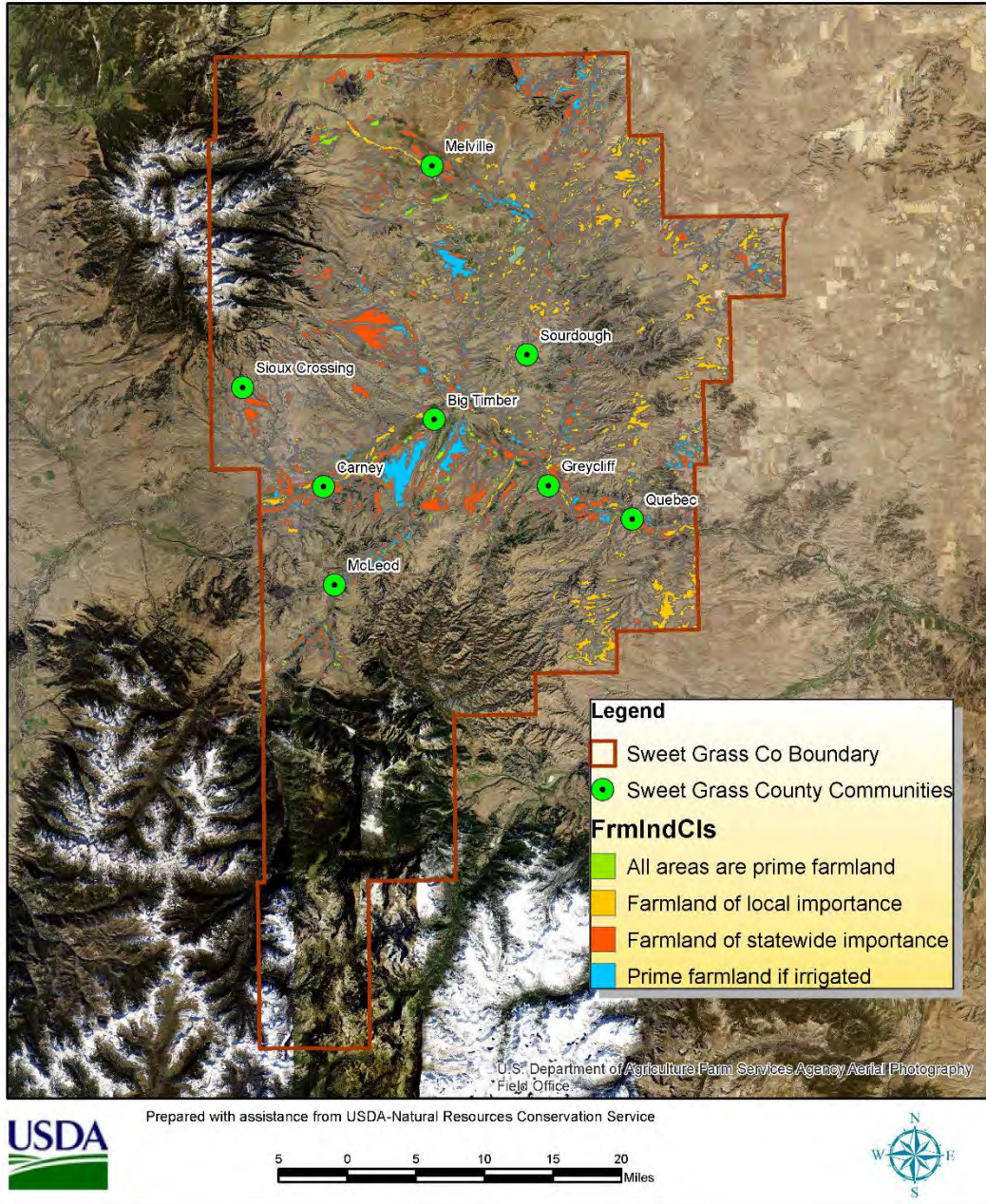


Figure 6. Prime and Important Soils in Sweet Grass County.

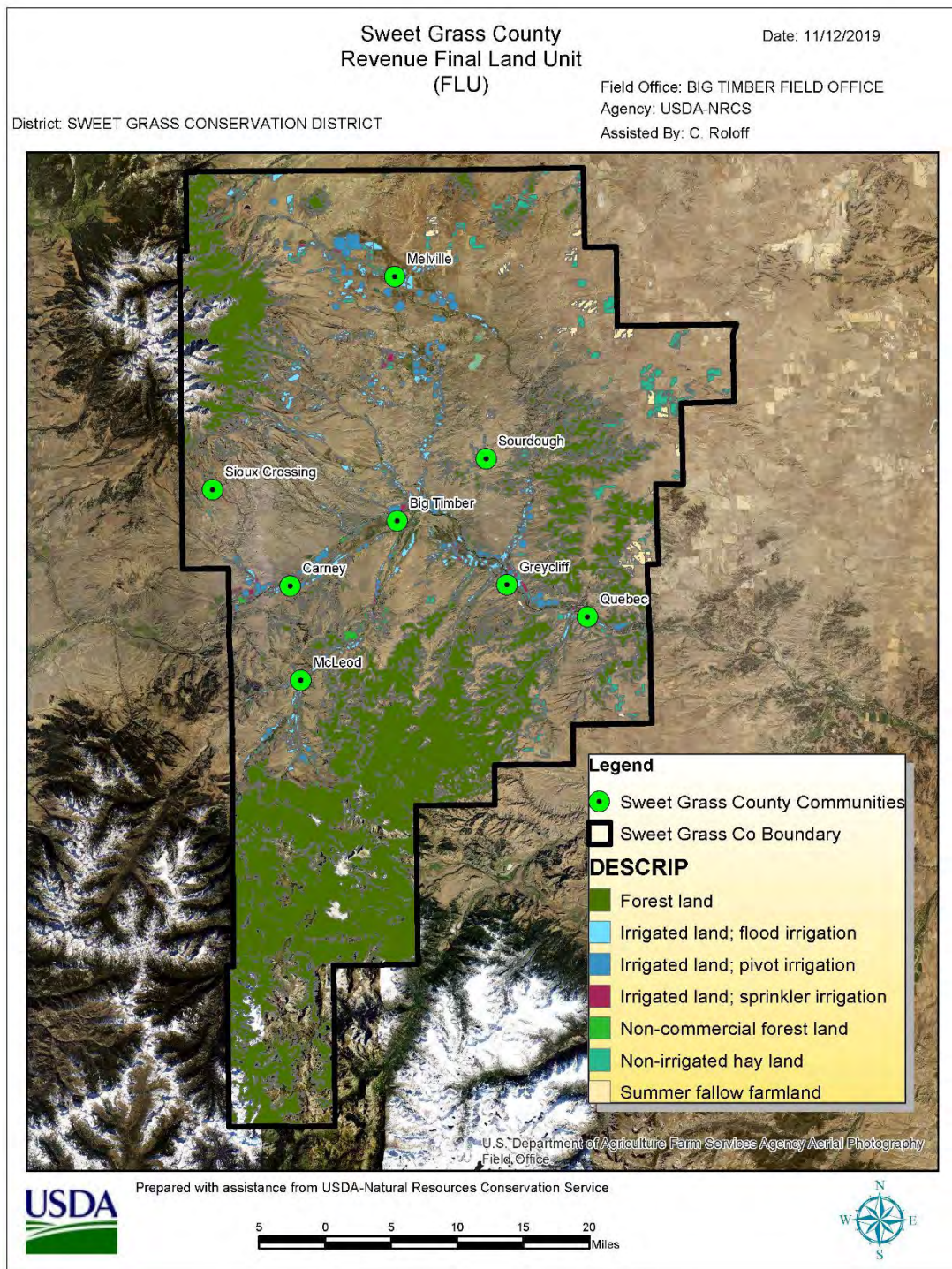


Figure 7. Forest, Irrigated, and Non-irrigated Hay Lands in Sweet Grass County.

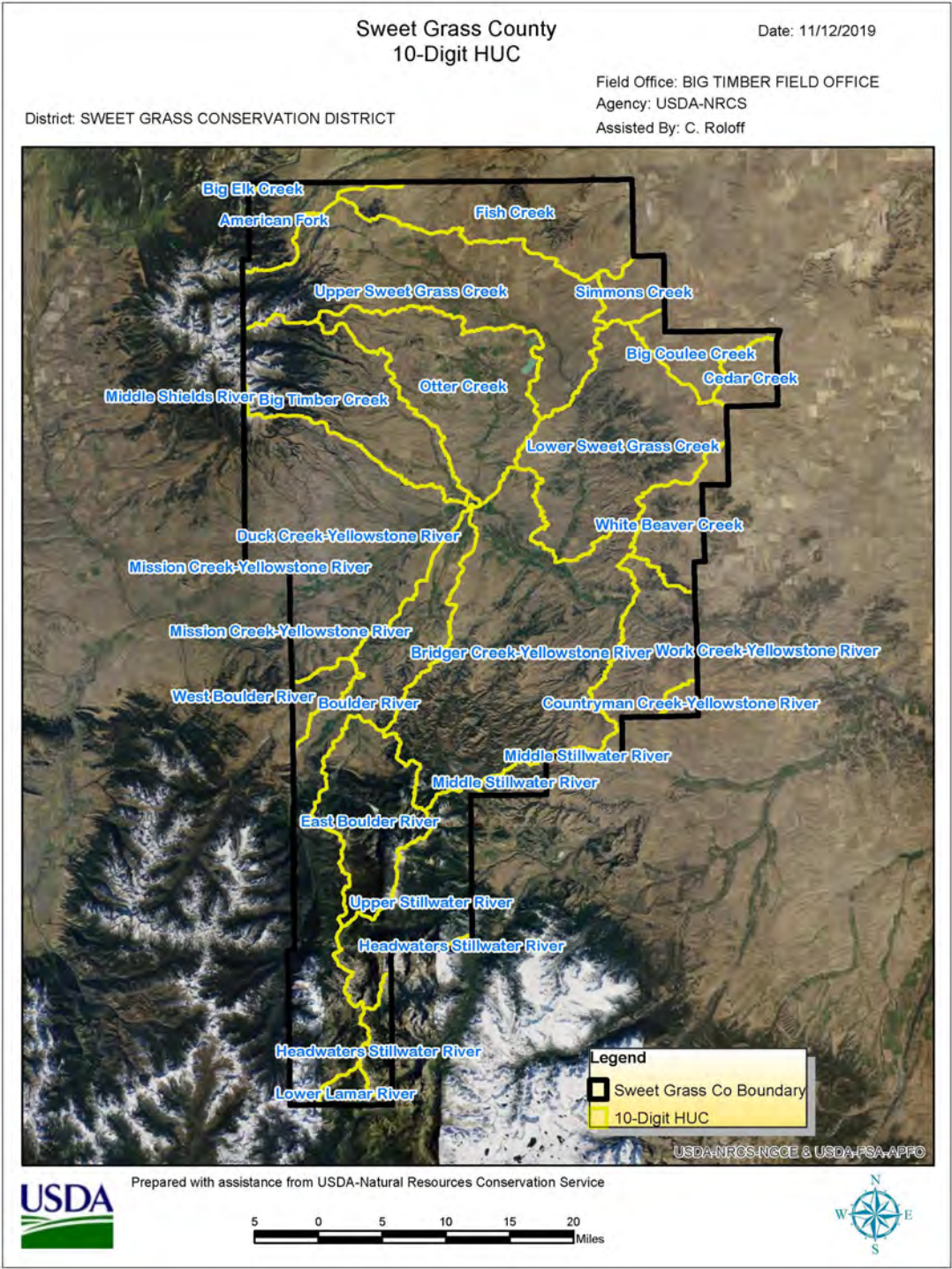


Figure 8. 10-Digit Hydrologic Unit Codes in Sweet Grass County.

Sweet Grass County
Dewatered Streams

Date: 11/12/2019

Field Office: BIG TIMBER FIELD OFFICE
Agency: USDA-NRCS
Assisted By: C. Roloff

District: SWEET GRASS CONSERVATION DISTRICT

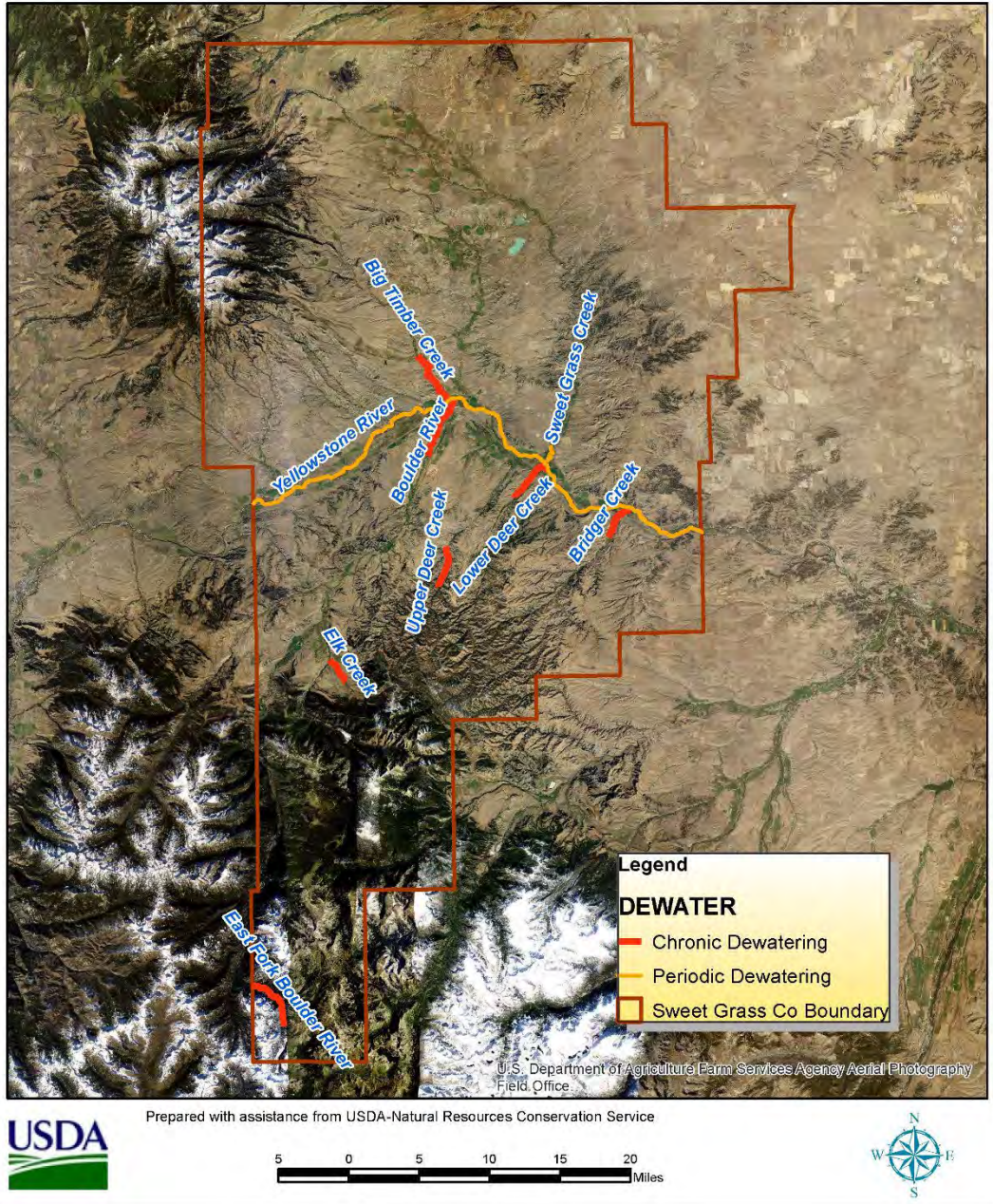


Figure 9. Dewatered Stream Reaches in Sweet Grass County.

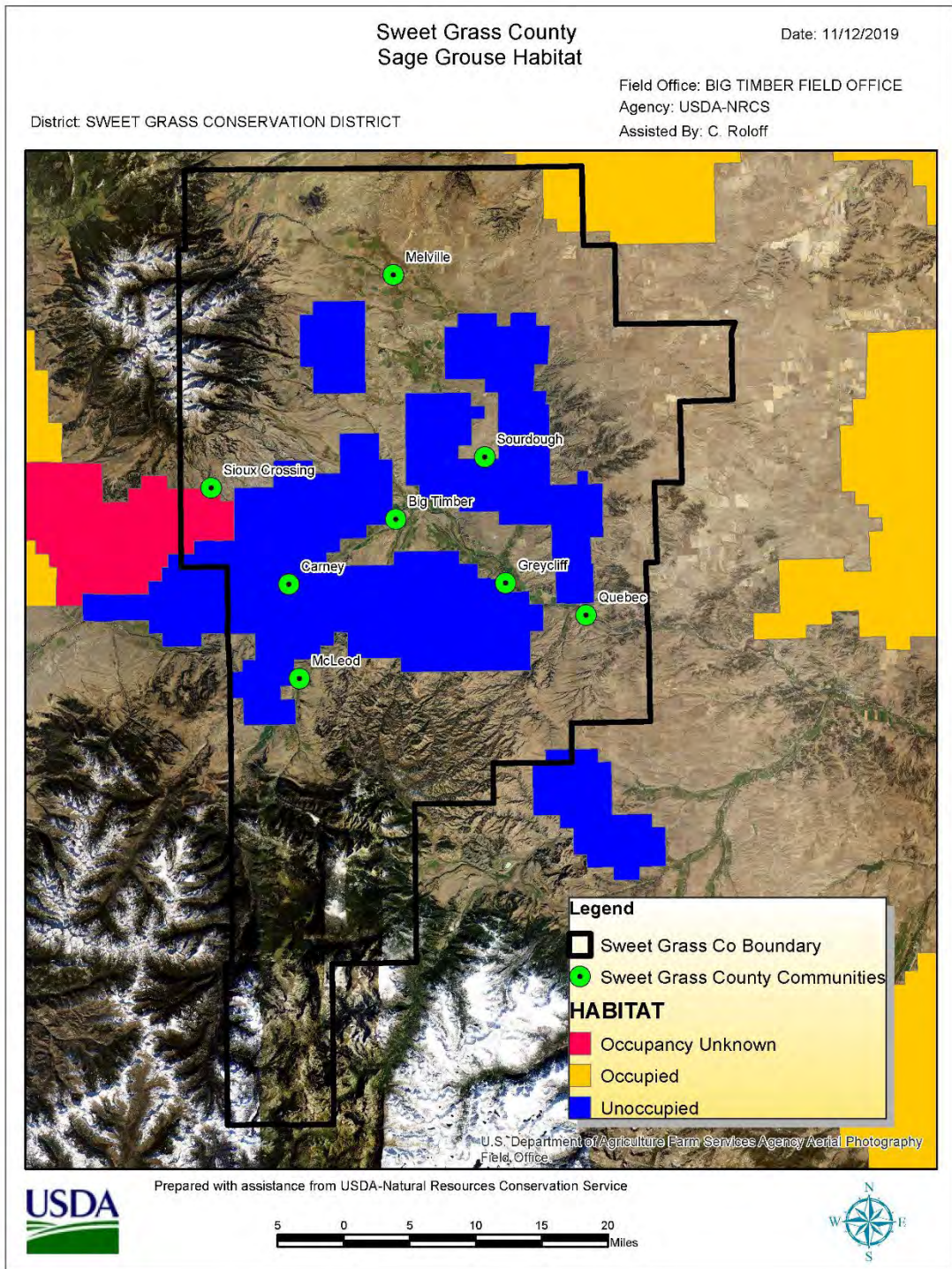


Figure 10. Greater Sage-grouse Habitat in Sweet Grass County.



United States Department of the Interior
Fish and Wildlife Service



Ecological Services
Montana Field Office
585 Shepard Way, Suite 1
Helena, Montana 59601-6287
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**ENDANGERED, THREATENED, PROPOSED AND CANDIDATE SPECIES
MONTANA COUNTIES*
Endangered Species Act**

October 8, 2019

C = Candidate
LT = Listed Threatened
LE = Listed Endangered
P = Proposed
PCH = Proposed Critical Habitat
CH = Designated Critical Habitat
XN = Experimental non-essential population

Note: Generally, this list identifies the counties where one would reasonably expect the species to occur, not necessarily every county where the species is listed.

Sweet Grass County

Scientific Name	Common Name	Status
<i>Lynx canadensis</i>	Canada Lynx	LT, CH
<i>Ursus arctos horribilus</i>	Grizzly Bear	LT
<i>Gulo gulo luscus</i>	Wolverine	P
<i>Pinus albicaulis</i>	Whitebark Pine	C

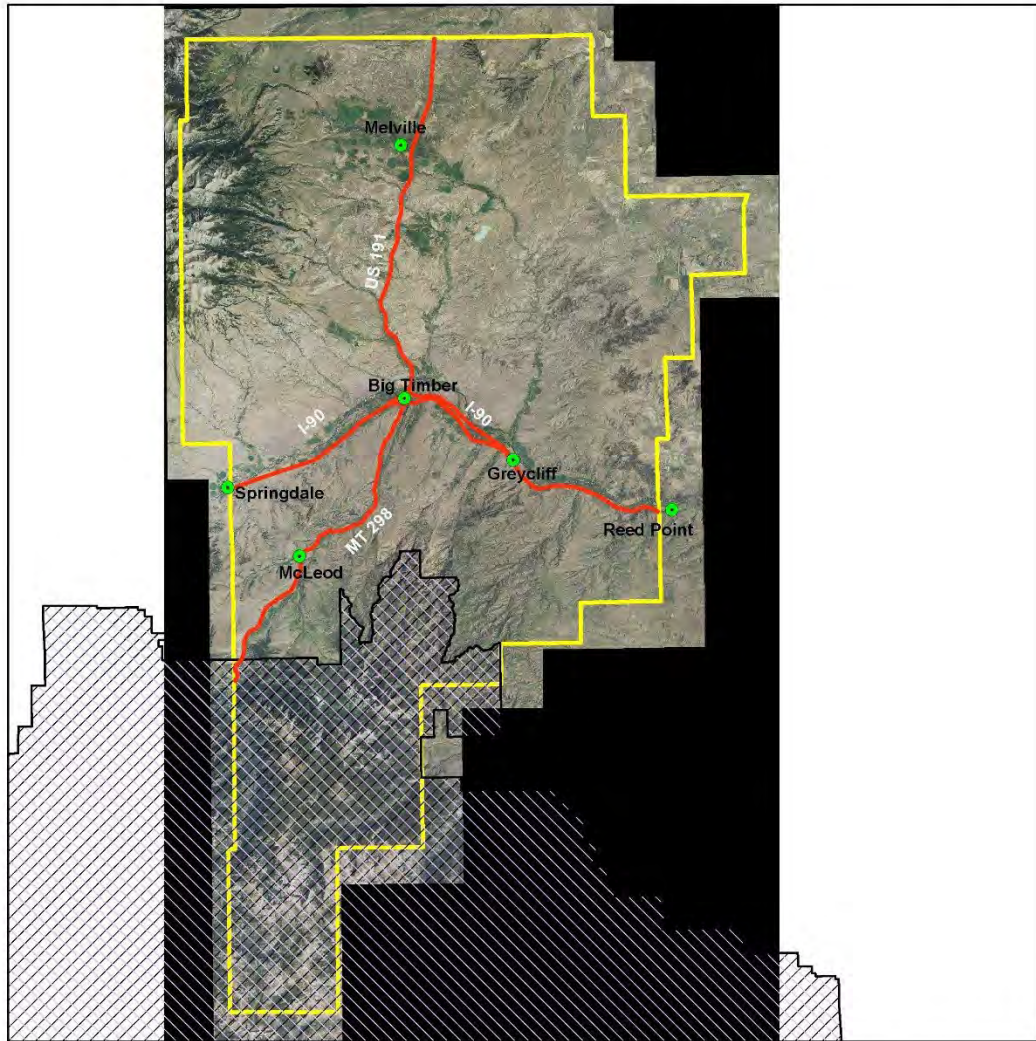
Figure 11. Endangered, Threatened, Proposed, and Candidate Species for Sweet Grass County.

Sweet Grass County Canada Lynx
Designated Critical Habitat Map

Date: 10/28/2019

District: SWEET GRASS CONSERVATION DISTRICT

Field Office: BIG TIMBER FIELD OFFICE
Agency: USDA - NRCS
Sweet Grass County, Montana



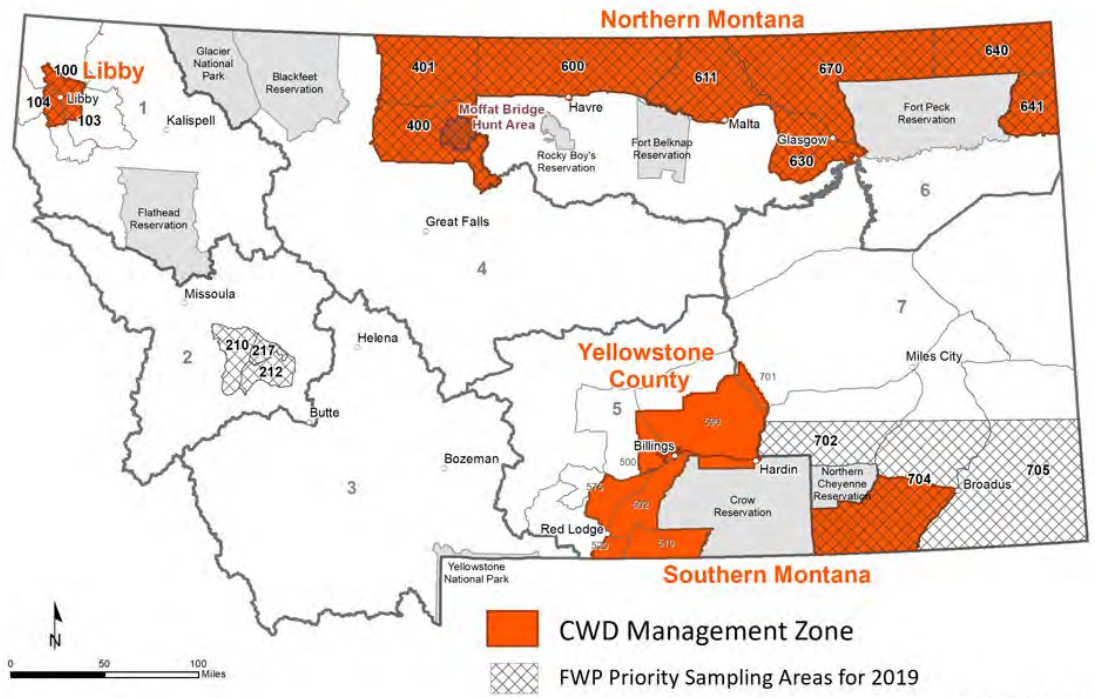
Legend

- Lynx Critical Habitat
- Sweet Grass County Boundary
- Communities
- Highways

Prepared with assistance from USDA-Natural Resources Conservation Service



Figure 12. Canada Lynx Designated Critical Habitat in Sweet Grass County.



Updated: 10/22/2019
MONTANA FWP

Figure 15. Chronic Wasting Disease Management Zones in Montana as of 10/2019.

Figure 13. Animal Species of Concern (SOC) for Sweet Grass County as of 11/2019.

Scientific Name	Common Name	Family	Family Common Name	G_Rank	S_Rank	Habitat
<i>Bos bison</i>	Bison	Bovidae	Bison/Goat/Sheep	G4	S2	Grasslands
<i>Cynomys ludovicianus</i>	Black-tailed Prairie Dog	Sciuridae	Squirrels	G4	S3	Grasslands
<i>Gulo gulo</i>	Wolverine	Mustellidae	Weasels	G4	S3	Boreal Forest and Alpine Habitats
<i>Lasiurus borealis</i>	Eastern Red Bat	Vespertilionidae	Bats	G3G4	S3	Riparian forest
<i>Lasiurus cinereus</i>	Hoary Bat	Vespertilionidae	Bats	G3G4	S3	Riparian and forest
<i>Lynx canadensis</i>	Canada Lynx	Felidae	Cats	G5	S3	Subalpine conifer forest
<i>Myotis lucifugus</i>	Little Brown Myotis	Vespertilionidae	Bats	G3	S3	Generalist
<i>Sorex merriami</i>	Merriam's Shrew	Soricidae	Shrews	G4	S3	Sagebrush grassland
<i>Sorex preblei</i>	Preble's Shrew	Soricidae	Shrews	G4	S3	Sagebrush grassland
<i>Ursus arctos</i>	Grizzly Bear	Ursidae	Bears	G4	S2S3	Conifer forest
<i>Accipiter gentilis</i>	Northern Goshawk	Accipitridae	Hawks/Kites/Eagles	G5	S3	Mixed conifer forests
<i>Anthus spragueii</i>	Sprague's Pipit	Motacillidae	Pipits	G3G4	S3B	Grasslands
<i>Aquila chrysaetos</i>	Golden Eagle	Accipitridae	Hawks/Kites/Eagles	G5	S3	Grasslands
<i>Ardea herodias</i>	Great Blue Heron	Ardeidae	Bitterns/Egrets/Herons/Night-Herons	G5	S3	Riparian forest
<i>Calcarius ornatus</i>	Chestnut-collared Longspur	Calcariidae	Longspurs and Snow Buntings	G5	S2B	Grasslands
<i>Catharus fuscescens</i>	Veery	Turdidae	Thrushes	G5	S3B	Riparian forest
<i>Centrocercus urophasianus</i>	Greater Sage-Grouse	Phasianidae	Upland Game Birds	G3G4	S2	Sagebrush
<i>Centronyx bairdii</i>	Baird's Sparrow	Passerellidae	New World Sparrows	G4	S3B	Grasslands
<i>Certhia americana</i>	Brown Creeper	Certhiidae	Creepers	G5	S3	Moist conifer forests
<i>Coccothraustes vespertinus</i>	Evening Grosbeak	Fringillidae	Finches	G5	S3	Conifer forest
<i>Dilochonyx oryzivorus</i>	Bobolink	Icteridae	Blackbirds	G5	S3B	Moist grasslands
<i>Falco peregrinus</i>	Peregrine Falcon	Falconidae	Falcons	G4	S3	Cliffs/canyons
<i>Gymnorhinus cyanocephalus</i>	Pinyon Jay	Corvidae	Jays/Crows/Magpies	G3	S3	Open conifer forests
<i>Haemorhous cassinii</i>	Cassin's Finch	Fringillidae	Finches	G5	S3	Drier conifer forest
<i>Histrionicus histrionicus</i>	Harlequin Duck	Anatidae	Swans/Geese/Ducks	G4	S2B	Mountain streams
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Laniidae	Shrikes	G4	S3B	Shrubland
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	Picidae	Woodpeckers	G5	S3B	Riparian forest
<i>Melanerpes lewis</i>	Lewis's Woodpecker	Picidae	Woodpeckers	G5	S3B	Riparian forest
<i>Nucifraga columbiana</i>	Clark's Nutcracker	Corvidae	Jays/Crows/Magpies	G5	S3	Conifer forest
<i>Numenius americanus</i>	Long-billed Curlew	Scolopacidae	Sandpipers	G5	S3B	Grasslands
<i>Oreoscoptes montanus</i>	Sage Thrasher	Mimidae	Thrashers/Mockingbirds/Catbirds	G4	S3B	Sagebrush
<i>Pipilo chlorurus</i>	Green-tailed Towhee	Passerellidae	New World Sparrows	G5	S3B	Shrub woodland
<i>Rhynchophanes mccownii</i>	McCown's Longspur	Calcariidae	Longspurs and Snow Buntings	G4	S3B	Grasslands
<i>Spizella breweri</i>	Brewer's Sparrow	Passerellidae	New World Sparrows	G5	S3B	Sagebrush
<i>Strix nebulosa</i>	Great Gray Owl	Strigidae	Owls	G5	S3	Conifer forest near open meadows
<i>Troglodytes pacificus</i>	Pacific Wren	Troglodytidae	Wrens	G5	S3	Moist conifer forests
<i>Apalone spinifera</i>	Spiny Softshell	Trionychidae	Softshell Turtles	G5	S3	Prairie rivers and larger streams
<i>Phrynosoma hernandesi</i>	Great Short-horned Lizard	Phrynosomatidae	Sagebrush/Spiny Lizards	G5	S3	Sandy/gravelly soils
<i>Chrosomus eos</i>	Northern Redbelly Dace	Cyprinidae	Minnows	G5	S3	Small prairie rivers
<i>Onocorhynchus clarkii bouvieri</i>	Yellowstone Cutthroat Trout	Salmonidae	Trout	G5T4	S2	Mountain streams, rivers, lake
<i>Isocapnia integra</i>	Alberta Snowfly	Capniidae	Small Winter Stoneflies	G4G5	S2	Mountain Streams to Rivers
<i>Discus shimelii</i>	Striate Disc	Discidae	Disca	G5	S1	Aspen, mesic/moist conifer woodlands

Figure 14. Plant Species of Concern (SOC) for Sweet Grass County as of 11/2019.

Scientific Name	Common Name	Family	Family Common Name	G_Rank	S_Rank	Habitat
<i>Botrychium</i> sp. (SOC)	Moonworts (SOC)	Ophioglossaceae	Adder's-Tongue/Moonworts	G1G3	S1S3	
<i>Pinus albicaulus</i>	Whitebark Pine	Pinaceae	Fir/Hemlock/Larch/Pine/Spruce	G3?	S3	Subalpine forest, timberline
<i>Artemisia tilesii</i>	Tilesius Wormwood	Asierceae	Aster/Sunflowers	G5	S3	Grassland, meadows
<i>Castilleja gracillima</i>	Slender Indian Paintbrush	Orobanchaceae	Broomrape Family	G3G4	S2	Wetland/Riparian
<i>Castilleja nivea</i>	Snow Indian Paintbrush	Orobanchaceae	Broomrape Family	G3	S3	Alpine
<i>Draba densifolia</i>	Dense-leaf Draba	Brassicaceae	Mustards	G5	S2	Alpine
<i>Erigeron flabellif olius</i>	Fan-leaved Fleabane	Asteraceae	Aster/Sunflowers	G3	S3	Alpine
<i>Gentianopsis simplex</i>	Hiker's Gentian	Gentianaceae	Gentians	G5	S2	Fens, wet meadows, seeps
<i>Papaver radicatatum</i> ssp. <i>Kluanensis</i>	Alpine Poppy	Papaveraceae	Poppy Family	G5T4	S2S3	Alpine
<i>Physaria saximontana</i> var. <i>dentata</i>	Rocky Mountain Twinpod	Brassicaceae	Mustards	G3T3	S3	Gravelly slopes/talus (Montane/subalpine)
<i>Ranunculus cardiophyllus</i>	Heart-leaved Buttercup	Ranunculaceae	Buttercup Family	G5	S3	Grasslands (Moist, Montane)
<i>Townsendia florifer</i>	Showy Townsend-daisy	Asteraceae	Aster/Sunflowers	G5	S2	Grasslands and Sagebrush
<i>Triodanis leptocarpa</i>	Slim-pod Venus-looking-glass	Campanulaceae	Bellflower Family	G5?	S3	
<i>Carex stenoptila</i>	Small-winged sedge	Cyperaceae	Sedges	G3	S2S3	Grasslands (Monyane)
<i>Eleocharis rostellata</i>	Beaked Spikerush	Cyperaceae	Sedges	G5	S3	Wetlands (Alkaline)
<i>Juncus covillei</i>	Coville's Rush	Juncaceae	Rushes	G5	S2S3	Wetland/Riparian
<i>Lilium philadelphicum</i>	Wood Lily	Liliaceae	Lillies	G5	S3	

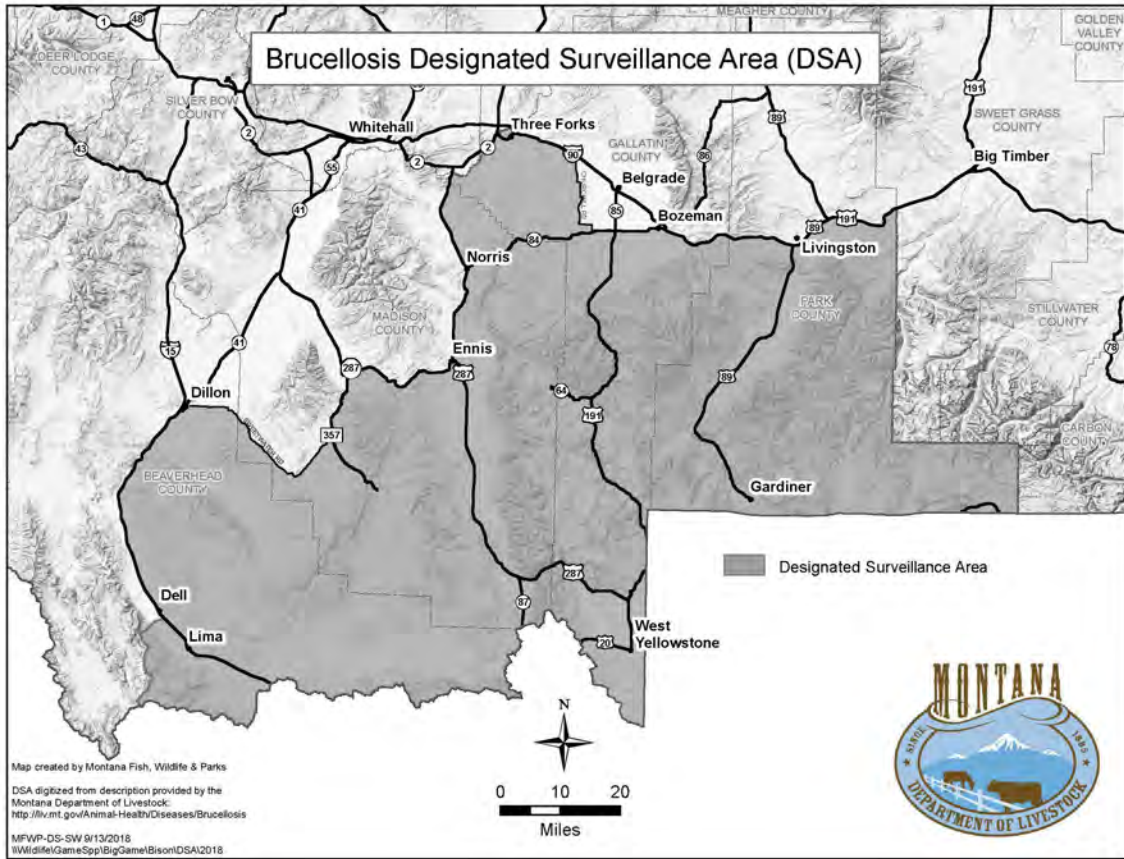


Figure 16. Brucellosis Designated Surveillance Area Map.

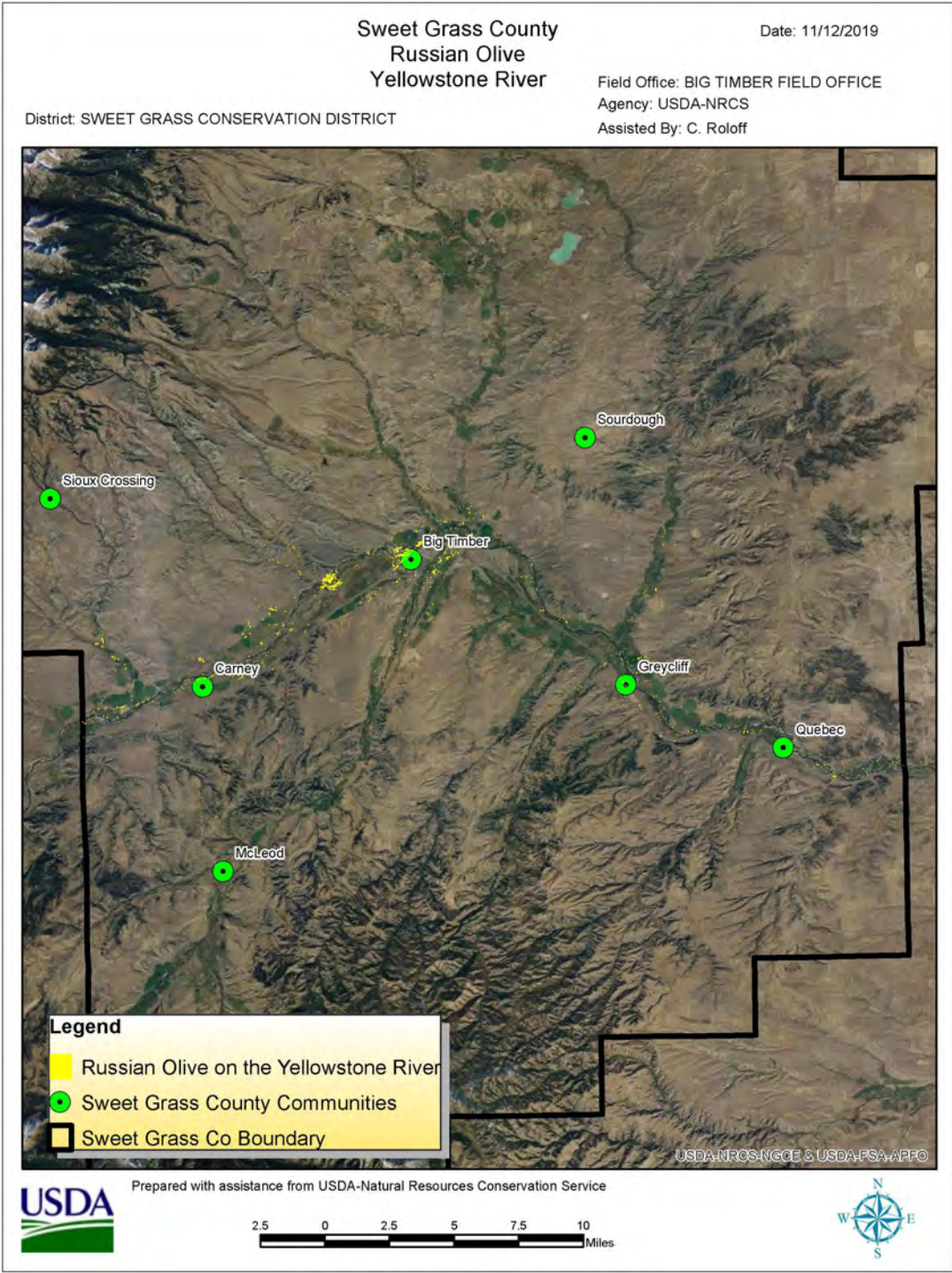


Figure 17. Russian Olive in Sweet Grass County.

Sweet Grass County Wind Power Potential

Date: 11/12/2019

Field Office: BIG TIMBER FIELD OFFICE
Agency: USDA-NRCS
Assisted By: C. Roloff

District: SWEET GRASS CONSERVATION DISTRICT

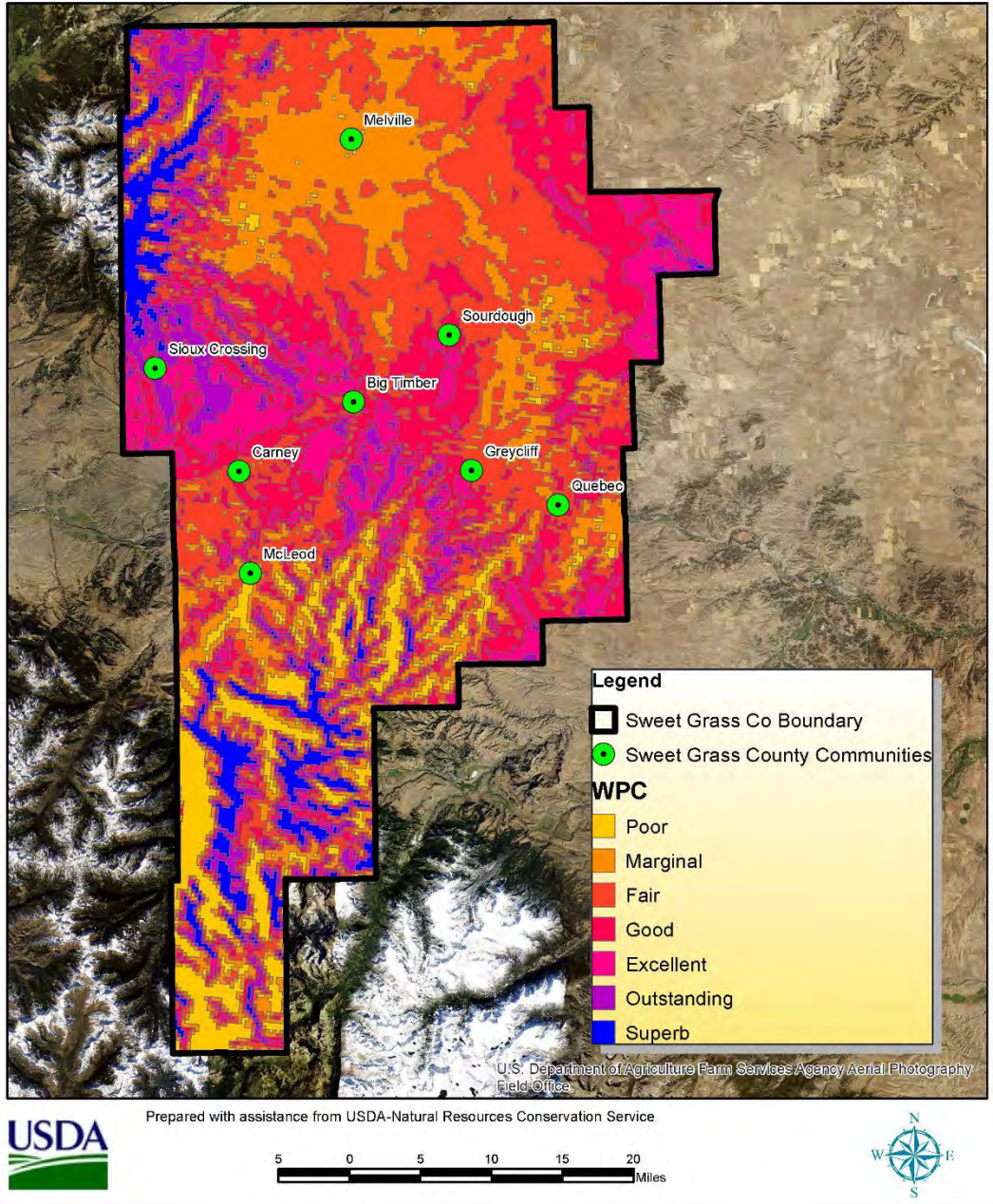


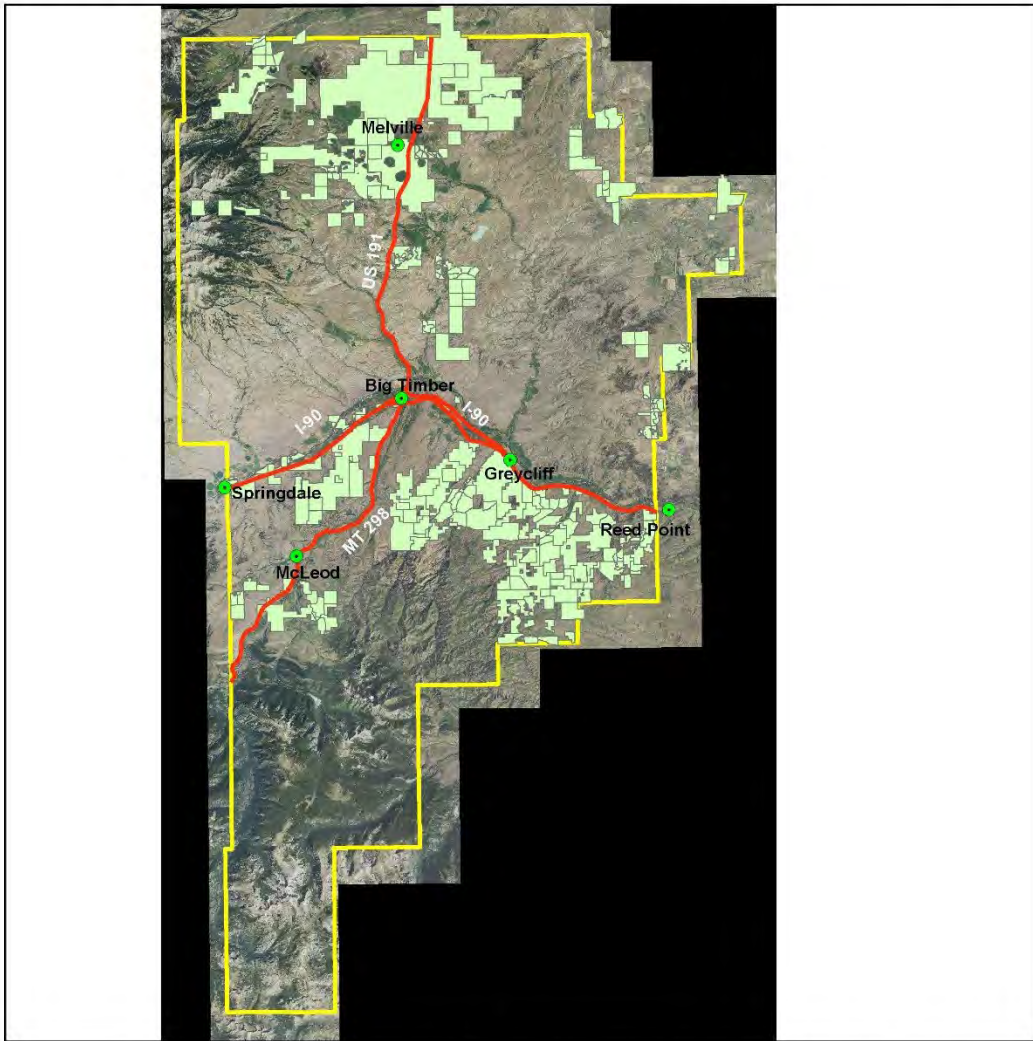
Figure 18. Wind Power Potential in Sweet Grass County.

Sweet Grass County NRCS Program Participation 2008-2018

Date: 10/28/2019

District: SWEET GRASS CONSERVATION DISTRICT

Field Office: BIG TIMBER FIELD OFFICE
Agency: USDA - NRCS
Sweet Grass County, Montana



Legend

- NRCS Program Participation
- Sweet Grass County Boundary
- Communities
- Highways



Prepared with assistance from USDA-Natural Resources Conservation Service



Figure 19. NRCS Program Participation in Sweet Grass County 2008-2018.