Natural Resources Conservation Service

Long Range Strategic Plan

Prairie County, Montana

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Introduction

The Prairie County Natural Resources Conservation Service (NRCS) has developed a Long-Range Plan (LRP) for 2019-2024 to strategically address specific natural resource concerns within Prairie County, Montana. NRCS is collaborating with conservation partners that include federal, state, and local agencies and organizations to fulfill the objectives of this plan. The purpose of this plan is to examine the natural resource inventory of Prairie County as it relates to Soil, Water, Air, Plants, Animals, Humans and Energy.

The NRCS takes a leadership role in Prairie County addressing natural resource concerns through both technical and financial assistance. Over time, political structures change, as does the way NRCS does its work. Planning for the long term is an important strategy to ensure that NRCS is engaging in projects that will provide beneficial outcomes in the long-term regarding priority resource concerns.

The Prairie County Local Working Group (LWG) is one way NRCS gathers information to identify resource concerns. The LWG meets annually, with meetings held during the winter, to allow farmers, landowners, conservation partners and other members of the community to discuss the natural resource needs for the county. Based on feedback from those meetings, NRCS will update the county's LRP and develop new Targeted Implementation Plans (TIPs) to address those resource concerns. You may contact us anytime to express concerns or comments about the conservation needs in the county, and we encourage you to attend the next LWG meeting in Prairie County.

The Prairie County LWG is comprised of the Natural Resources Conservation Service, Prairie County Soil and Water Conservation District, Prairie County Farm Service Agency, Private Landowners, Buffalo Rapids Irrigation District #2, Prairie County Grazing District, Bureau of Land Management, the Terry Tribune, Coal Bed Methane Project, Prairie County Extension Service, American Bird Conservancy and other organizations. The LWG provides a forum for dialogue among different stakeholders giving NRCS feedback on their efforts in identifying and addressing primary resource concerns and addressing priority resource concerns within Prairie County.

Welcome to Prairie County, home of 186 farms averaging 4,135 acres in size[1].

Prairie County History[2]

The first permanent settlements in Prairie County were cavalry posts established by the United States Army. Settlements later expanded with the growth of railroads in the late 1800's. Prior to this period, the area was used primarily by the Crow, Cheyenne, and Sioux Tribes for hunting.

In 1806, William Clark passed through the area while traveling to meet Meriwether Lewis at the confluence of the Yellowstone and Missouri Rivers. Clark's expedition camped just below the mouth of the Powder River, on the north bank of the Yellowstone River. Following the Lewis and Clark expedition, the area was used mainly by French and American trappers and by the Crow, Cheyenne, and Sioux Nations until the mid to late 1800's, when the United States Army established cavalry posts at Ft. Keogh and Ft. Custer.

During the 1870's, the Northern Pacific Railroad began surveying and constructing a route to the West. With the growth of the railroad, permanent settlements began to be established. In the 1880's, large herds of cattle and sheep began to arrive by trail and railroad. Ranching became the major industry in the county until the Homestead Act, when the Chicago, Milwaukee, St. Paul, and Pacific Railroads brought new settlers to the area. Farming then became the principal industry in the area.

Homesteading was opened in 1909, and much of the county was settled. During the drought in the 1930's many of the homesteaders gave up their land which was reclaimed by the U.S. Government. This land subsequently became managed by the Bureau of Land Management (BLM) under the Taylor Grazing Act. This shows in the county through many small areas of "go back" grass and fields of crested wheatgrass mixed into the rangeland. Land ownership shows approximately 49% of Prairie County is managed by the BLM.

Prairie County was established in 1915 from parts of Dawson and Custer Counties. Terry, the county seat, is located along Interstate 94, which is a major east-west transportation route in Montana. Terry was incorporated in 1910. Named for General Alfred Howe Terry, a general in the Union Army, Terry is located along the historic Yellowstone Trail and along the Yellowstone River[24].

Prairie County's predominant industry is agriculture with a very small area of petroleum production in the far east. The Buffalo Rapids Irrigation Project, completed in 1944, provides irrigation water for the production of sugar beets, alfalfa, and corn.

II. Natural Resource Inventory

Prairie County Snapshot[3]

Area	1,737 mi^2	Number of Farms	186
Population	1,179	Average Farm Size	4,135 ac
County Seat	Terry		
Demographics		Number of Crops Grown	16
White	94.3%		
Hispanic/Latino	3.9%	Number of Organic Farms	0
American Indian	0.8%		
Other	1%		
Age		Average Age of Operator	58 years
Under 5 years	5%		
Under 18 years	18.4%		
65 and Over	30.7%		
Median Income	$50,850		
Persons in Poverty	12.0%		

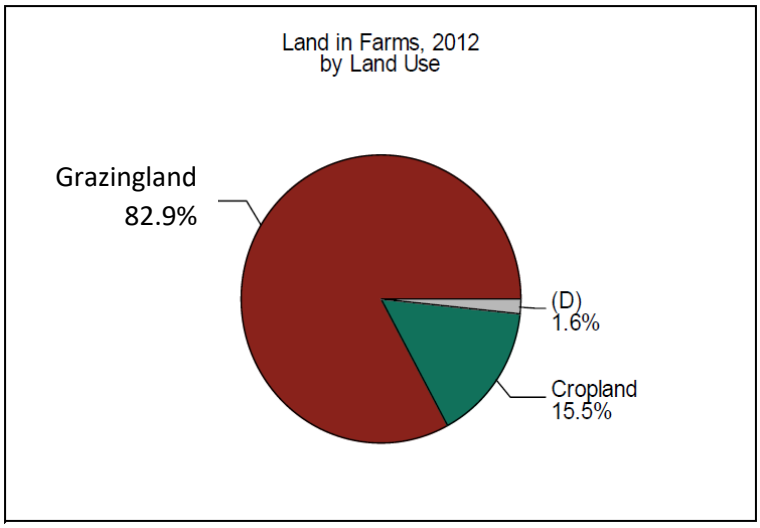


Figure 1. Prairie County Land Use

Land Ownership

With approximately 49% federally owned, 2% state owned and 49% privately owned, there is ample opportunity for the NRCS to continue to work with land owners in addressing local natural resource concerns. Past trends have shown a decrease in the number of farms while average farm size increases. The checkerboard of federal lands within the county (Figure 2) do present a challenge when implementing large-scale practices. These patterns play a major role in NRCS's ability to fulfill natural resource goals.

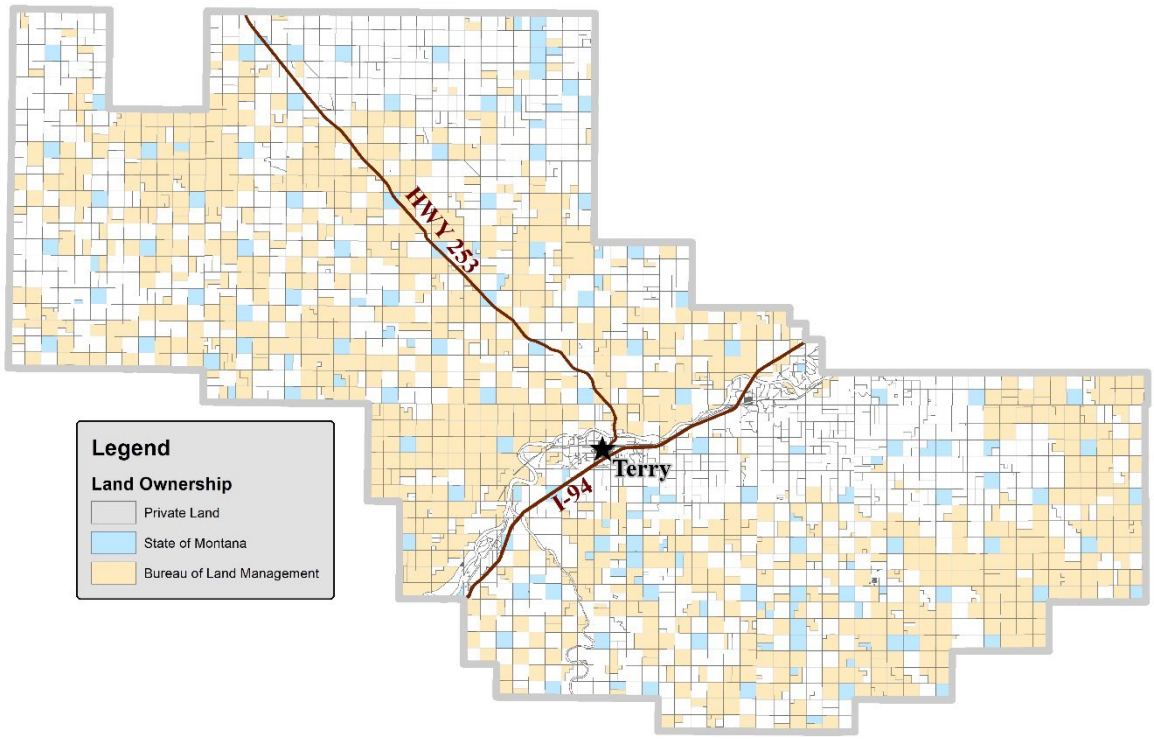


Figure 2. Prairie County Land Ownership

Land Use

Prairie County land use is divided between range or pasture land and crop land – 1,006,721 acres and 168,589 acres respectively (Figure 3).

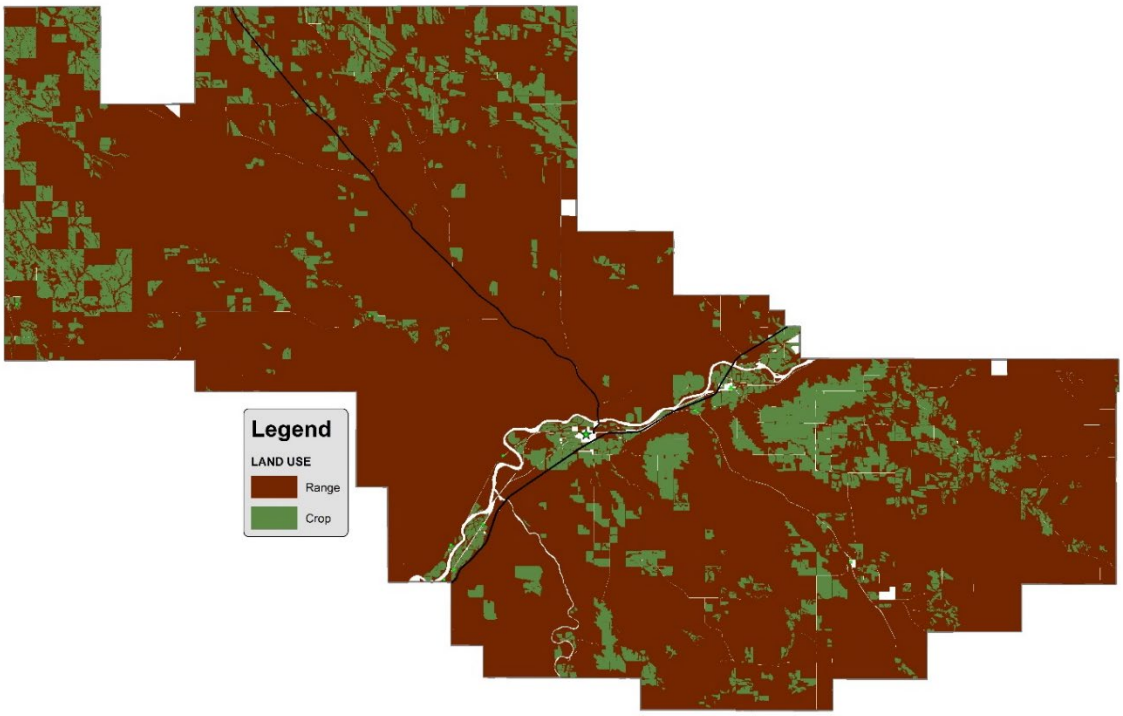


Figure 3. Prairie County Rangeland vs. Cropland (Farm Service Agency, 2019)

Topography of Prairie County

Elevations in Prairie county range from 2,115 feet in the flood plain of the Yellowstone valley to 3,596 feet at the top of Big Sheep Mountain (Figure 4).

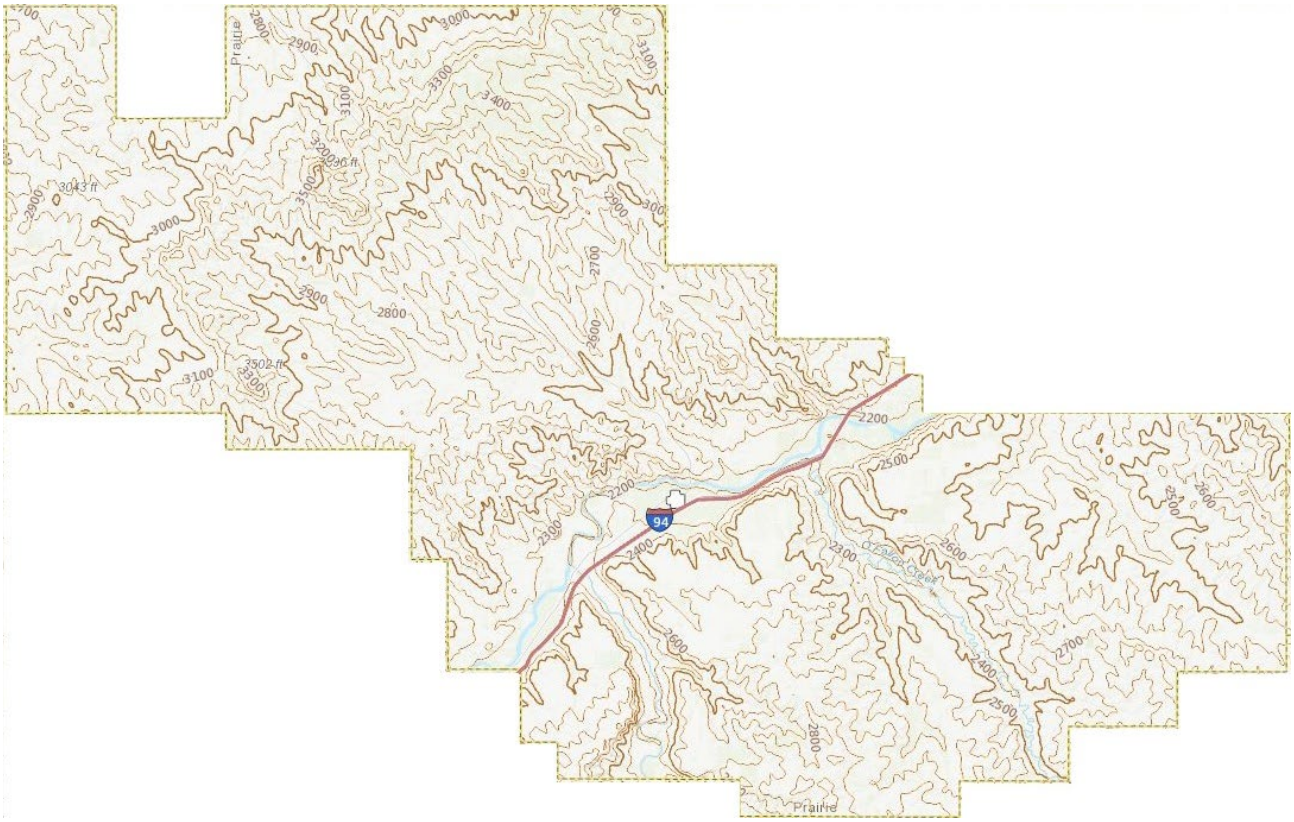


Figure 4. Topography of Prairie County

Physiography, Drainage, and Geology

Prairie County is in the Missouri Plateau section of the Northern Great Plains province. The surface does not resemble a plain, however, as some parts are rough and dissected, containing very pronounced features of relief. The Big Sheep Mountain Divide, which extends into the northwestern part of the county, is the most pronounced topographic feature. It rises 300 to 400 feet above the adjoining plains and consists of relatively flat beds of the Fort Union Formation. It is often capped by gravel deposits.

Elevation in the central and southern parts of Prairie County ranges from about 2,140 to 2,900 feet above sea level. The lowest elevations are on flood plains along the Yellowstone River at the northeast margin of the county. The highest elevations, with relief of about 760 feet, are in the upper tributary drainageways of the Powder River.

The geologic structure of Prairie County is comparatively simple. Strata are well exposed, and structural features are easily determined. Structures consist of gentle folds and a few faults of slight displacement. True faults are uncommon in Prairie County. When they occur,

the maximum displacement is approximately 3 to 10 feet. These faults are mostly covered and are not easily identifiable from a long distance.

The majority of the county lies within the westernmost extension of the Williston Basin. To the northeast, the county is flanked by a northwest-trending pair of structures - the Sheep Mountain syncline and the Cedar Creek anticline. The southeastern extent of the Williston Basin is defined by a small uplift southwest of Miles City, known as the Miles City arch. The surface topography does not reflect the geologic structure because portions near the center of the basin are at higher elevations than areas near the margin.

Most of the county is drained by the Yellowstone River and its tributaries. The Yellowstone River flows through the center of Prairie County in a northeasterly direction. The principal drainageways that flow from the north into the Yellowstone River include Crooked Creek, Cherry Creek, Cedar Creek, Brackett Creek, and Cottonwood Creek. South of the Yellowstone River, the Powder River, Ash Creek, O'Fallon Creek, and Cabin Creek are the largest drainageways. The northwestern part of Prairie County is drained by the Redwater River and its tributaries, which include Timber Creek, West and East Duck Creek, Ash Creek, Pasture Creek, and Tusler Creek. The Redwater River flows to the north and enters the Missouri River near Poplar, Montana.

Generally, the streams are bordered by belts of wide alluvial benches that are separated by low bedrock bluffs. The bluffs are gently sloping to steep and are several hundred feet high. The various topographic forms indicate the differences in the types of rock structure and their resistance to erosion.

The area may be described as an upland plain trenched by numerous drainageways. It is rolling, and creek valleys are deeply incised. Outcrops of resistant rock form isolated buttes and mesas. Soils of the uplands are shallow to very deep. In areas where streams have not cut deeply into the surface, dryland farming is practiced. The more rugged areas are used for grazing.

Bare, steep slopes of rugged badland occur in Prairie County. The areas of badland formed in soft, erosive shale of the Lebo Shale Member. An area of badland approximately six miles wide occurs north of the Yellowstone River and extends west to the county line. A broad band also extends south of the Yellowstone River, along both sides of the Powder River, to the southern border of the county. These areas are nearly impassable in places. The larger streams have cut broad and flat valleys through the badland. These valleys are bordered by low, mound-like hills.

Other areas in Prairie County have very different characteristics. These areas consist of gently rolling uplands dissected by a system of deep, narrow drainageways. Steep, bare buttes are rare. Where present, they are formed by resistant cap rock protecting the underlying strata from erosion. The cap is generally composed of clinker formed by coal beds burned along the outcrop. Small hills and knobs of unburned rock are coherent enough to form vertical cliffs but

are eroded rapidly by wind and water. Little Sheep Mountain is the most prominent landform of this type.

In Prairie County, the dissected remnants of at least four river terraces can be recognized. The highest terrace lies on the southeast flank of Little Sheep Mountain at an elevation of about 3,200 feet. A second terrace is on the north divide of Cherry Creek at an elevation of about 2,800 feet. The third terrace is best preserved south of the Yellowstone River near Terry. It has an elevation of approximately 2,600 feet. Younger terraces occur at the lower elevations. Prairie County has not been subjected to the physiographic changes characteristic of other portions of Montana. It has not been glaciated and has not been subjected to the major uplifts that have occurred in regions to the west and north. With the exception of the Powder River, major drainageways flow along the same courses that they have always followed.

Powder River, which joins the Yellowstone River at a point about 8 miles upstream from Terry, is bordered by a terrace several miles in width. In the past, the Powder River flowed through this broad valley plain and eventually went north to join the Yellowstone River near Terry. The Powder River is now entrenched in a much narrower area cut along the west side of the older valley. It joins the Yellowstone River about 8 to 10 miles further upstream than it once did.

The major river valleys are about 1 to 2 miles wide and are nearly level. Most of the irrigated farming in Prairie County is practiced along these stream valleys. The soils are coarse to fine alluvium and are very productive. The flat valley lands are separated from the uplands by steep, irregular slopes. Although these valleys have been repeatedly deepened, the area has not been subjected to the drastic drainage modification that occurred in northern Montana, where ice sheets blocked and reversed the flow of several rivers.

The present land surface in the area reflects long periods of sedimentation and erosion. Alternating layers of sand, silt, clay, and lime were deposited as the level of the seas receded, which covered much of Montana in the geologic past. These deposits were compacted, cemented, and hardened and eventually became shale and sandstone.

The sediments were nearly horizontal when they were deposited. During the late Eocene epoch, about 30 million years ago, they became tilted, folded, and faulted. The deformation occurred after the deposition of the highest beds of the Tongue River Member.

After deformation, four gravel-covered erosional surfaces developed in eastern Montana and adjacent parts of Canada. The highest surface, and therefore the oldest, is the Cypress Plain. At the top of Big Sheep Mountain in T. 15 N., R. 47 E., in Prairie County, well developed terrace deposits are at an elevation of about 3,600 feet. The terrace forms the divide between the Missouri and Yellowstone Rivers. It is capped with 20 to 30 feet of coarse, well rounded pebbles and some embedded sand. In places, the pebbles are cemented by calcium carbonate to form a conglomerate. The pebbles consist of porphyry and other crystalline rocks, a few granite fragments, numerous pink and reddish quartzite fragments, quartz, chert, and

silicified wood. The terrace is about 1,200 feet above the level of the Yellowstone River at Terry.

Terraces that have been assigned to the Flaxville Plain are below the Cypress Plain. They include terraces along the Yellowstone River and terraces east and southeast of Cherry Creek Divide, at a surface elevation of approximately 2,800 feet. The terraces consist of 20 to 30 feet of coarse, well rounded pebbles.

Along the Yellowstone Valley, well developed terraces that are younger than those of the Flaxville Plain are 100 to 400 feet above the Yellowstone River. The best preserved of these terraces forms a high bench on the south side of the river in T. 12 N., R. 50 and 51 E., and in Fallon Flats in the northern part of T. 12 and 13 N., R. 52 and 53 E.

The fourth stage of erosion resulted in the development of the lowest terraces along the Yellowstone River. The river has since incised into the valley 50 feet or more. The valley flats formed during and after the retreat of glacial ice from northern Montana. The streams are presently in a new cycle of downcutting. Exposed rock is sedimentary in origin and ranges in age from Upper Cretaceous to recent. The oldest beds occur in the northeast corner of the county in the Cedar Creek anticline.

Compressional faulting, folding, and uplift during the Laramide Orogeny of the Late Cretaceous and early Tertiary periods produced the structures in this region. Before the second phase of mountain building, during the middle Tertiary period, the mountains were subjected to erosional forces that continued until the surface was once again a flat, truncated plain. Erosional materials were spread for hundreds of miles over eastern Montana. The terrestrial Fort Union Formation of the early Tertiary period resulted from this erosional deposition.

The Fort Union section is the youngest Tertiary bedrock formation exposed in Prairie County. It ranges to 2,000 feet in thickness and consists of layers of dark shale and alternating thick beds of white sandy clay siltstone and sandstone. Surface deposits, ranging from Oligocene to recent in age, form a thin mantle over the eroded surface of the bedrock. These deposits include terrace gravel and alluvial fill along present streams.

Soils

Soil is a vital resource for the production of food and fiber. It provides other important functions like natural water filtration, controlling runoff, and diverting water into the water table. The time it takes for soil to be created is measured in **thousands** of years. The amount of time it takes to destroy soil is measured in **years or even days** depending on the severity of erosion.

Most of the highly erodible land (HEL) soils in Prairie County are located on the upland terraces that provide terrain conducive to farming. Prairie County has 151,045 acres of HEL soils, which equates to 13% of the county. This is a major concern for NRCS. In addition to the soil erosion concerns, water quality concerns come into play due to sediment

and chemical runoff pollution. NRCS has worked on numerous HEL plans each year that use practices such as cover crops and residue management to assist in the reduction of soil loss.

Soil Types as HEL Land

% HEL	13%
% Non-HEL	2%
% Not Determined	85%

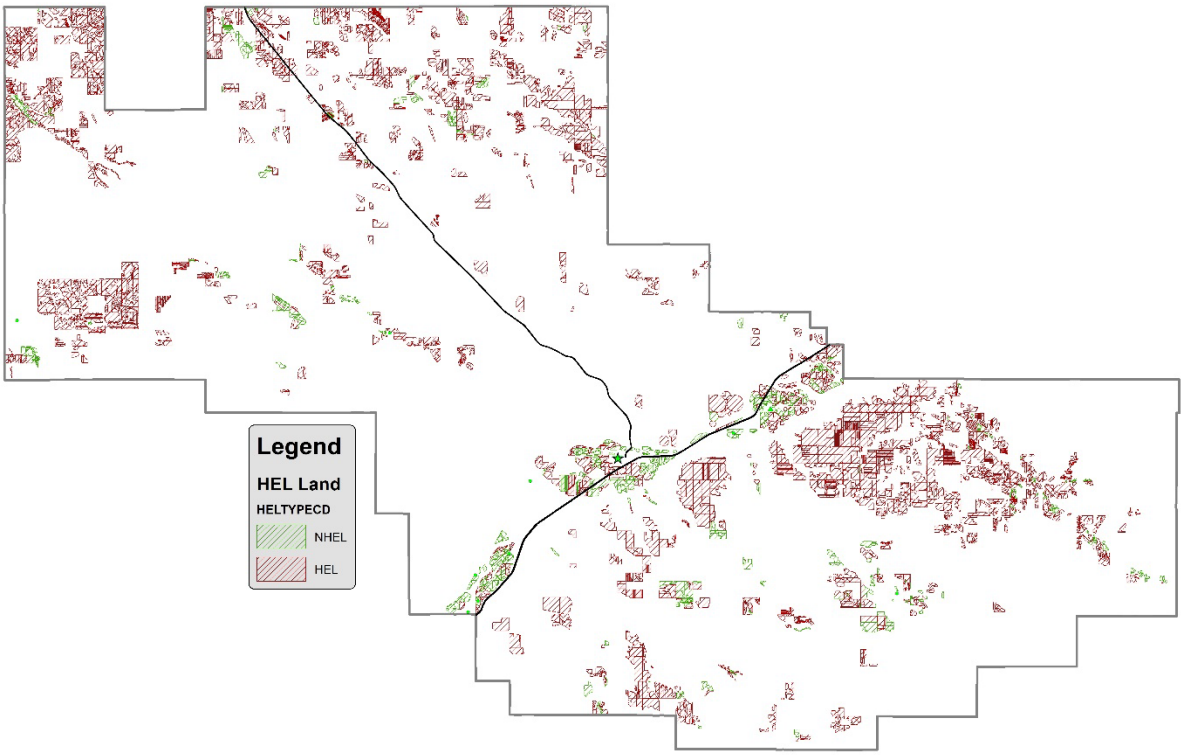


Figure 5. Prairie County Soil Types as NHEL & HEL Land (Farm Service Agency, 2019)

Prime Farmland[4]

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland. Most of the prime farmland in Prairie County is along and to the southeast of the Yellowstone River (Figure 6)

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and

dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods. Either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent.

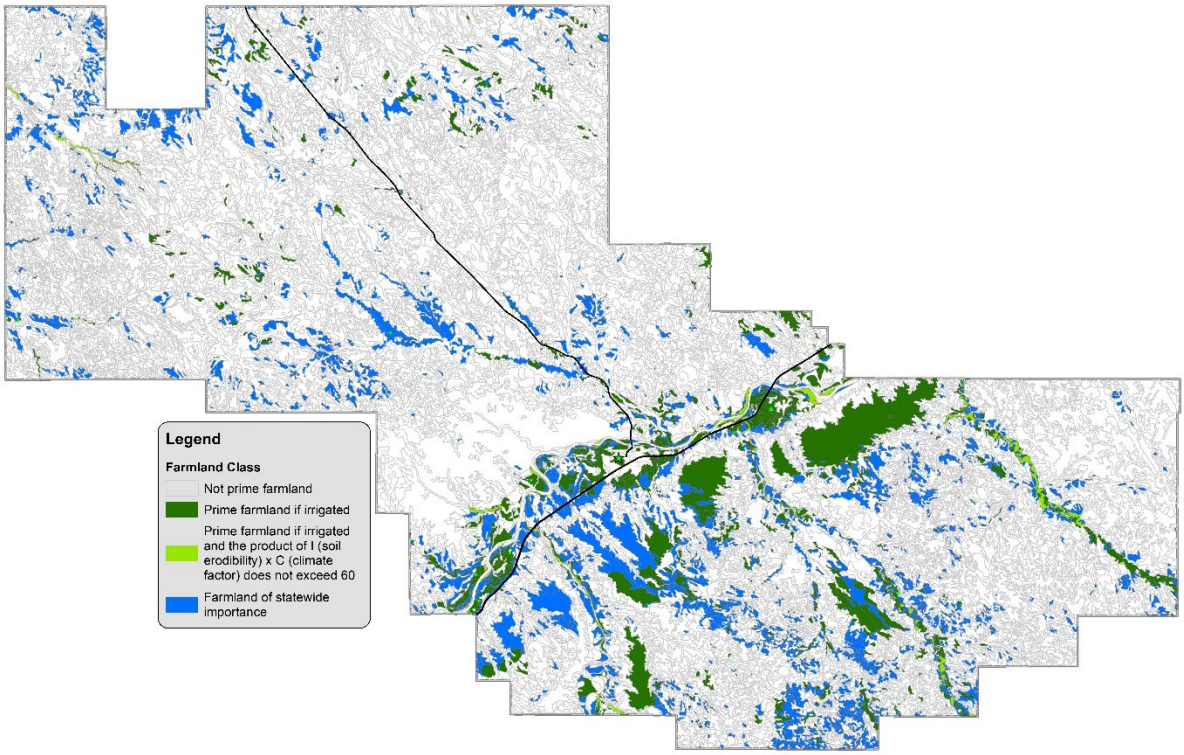


Figure 6. Prairie County Prime Farmland

Hydric Soils[5]

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

If soils are wet enough for a long enough period of time to be considered hydric, they typically exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils.

In Prairie County, hydric soils are predominantly found along waterways and low-lying drainages (Figure 7).

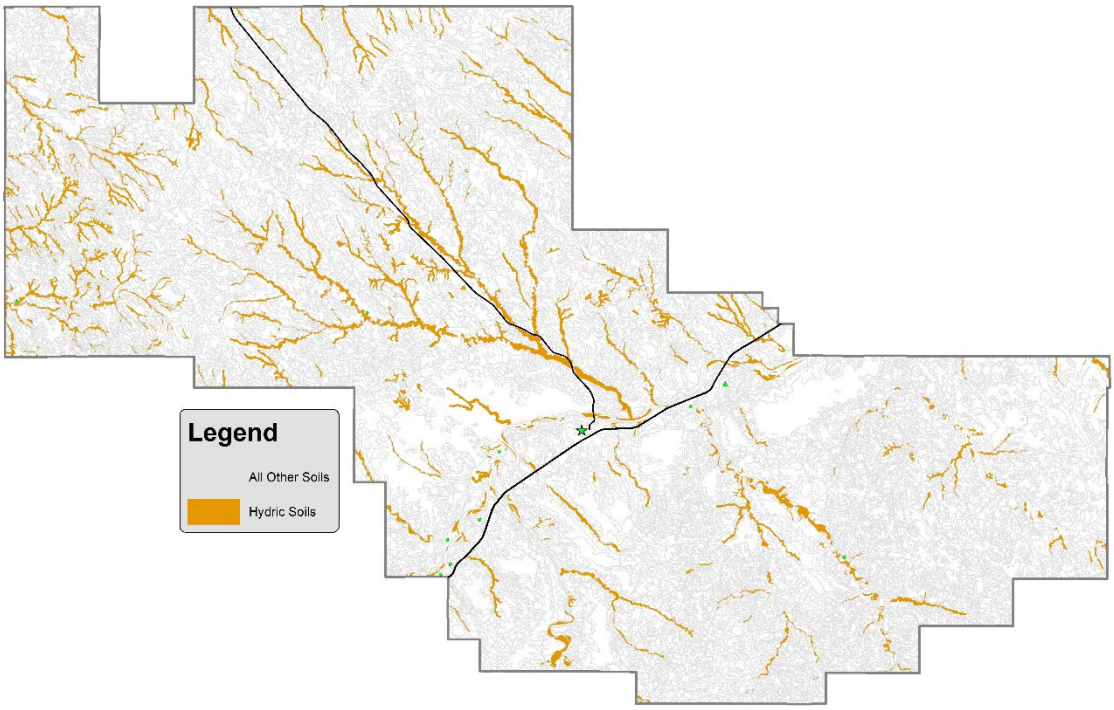


Figure 7. Prairie County Hydric Soils

Rock and Mineral Resources[2]

Rock and mineral resources can be divided into the following three groups: metals, fuels consisting of coal, oil, and gas, and nonmetallic or industrial minerals.

Prairie County does not have metal resources but has potential to produce natural gas and oil and has a large quantity of valuable coal deposits. Nonmetallic or industrial minerals have not been mined extensively in the county, except for sand and gravel. Montana agate can be found in and along the Yellowstone River. Except for the Cedar Creek anticline area, many of the geologic conditions that favor the accumulation of oil and gas are not present in Prairie County.

Mineable coal resources in Prairie County are plentiful. Coal in the Hell Creek Formation is in localized areas and does not have extensive potential for economic exploration. Several layers of coal are in the Lebo Shale Member of the Fort Union Formation, but they cannot be traced to any distance. The only deposit that extends over a large distance is the Big Dirty Bed, which reaches a thickness of 15 feet. Deposits of coal as much as 5 feet thick have been reported in localized areas of the Big Dirty Bed.

The producing coal beds in Prairie County are in the Tongue River Member of the Fort Union Formation. This member contains many coal beds that are uniformly of good quality, have relatively thin overburden, and are thick enough to be mined economically. The Terry Lignite Field and the Little Sheep Mountain coal field are both in areas of Prairie County.

The nonmetallic or industrial minerals are important resources in Prairie County. Sand and gravel deposits of fluvial or residual origin are mined extensively. These materials

are used in concrete and asphalt, in highway and other road construction, and as ballast on railroads. Clinker deposits in the area of the Tongue River Member are mined locally and are used on county and private roads.

Common Native Vegetation[15]

Prairie County is classified as Great Plains Mixedgrass Prairie by the Montana Natural Heritage Program. The system covers much of the eastern two-thirds of Montana, occurring continuously for hundreds of square kilometers, interrupted only by wetland/riparian areas or sand prairies. Grasses typically comprise the greatest canopy cover, and western wheatgrass is usually dominant. Other species include thickspike wheatgrass, green needlegrass, blue grama, and needle and thread. Near the Canadian border in north-central Montana, this system grades into rough fescue and Idaho fescue grasslands. Forb diversity is typically high. In areas of southeastern and central Montana 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 intensive grazing, cool season exotics such as Kentucky bluegrass, smooth brome, and Japanese brome increase in dominance; both rhizomatous species have been shown to markedly decrease species diversity. Previously cultivated acres that have been re-vegetated with non-native plants have been transformed into associations such as Kentucky bluegrass/western wheatgrass or into pure crested wheatgrass stands.

Major Land Resource Areas[6]

Prairie County is comprised of two major land resource areas – the larger part is 58A – Northern Rolling Plains. The lesser is 54 – Soft Shale Plains in the northern portion of the county (Figure 8).

Major Land Resource Area (MLRA) 58A in Montana is considered to have a continental climate characterized by cold winters, hot summers, low humidity, light rainfall, and much sunshine. Extremes in temperature are typical. The climate is the result of this MLRA's location in the geographic center of North America. There are few natural barriers on the northern Great Plains and the winds move freely across the plains and account for rapid changes in temperature. Seasonal precipitation is often limiting for plant growth. Annual fluctuations in species composition and total production are typical depending on the amount and timing of rainfall.

Temperatures can be very extreme in this part of Montana. Summer daytime temperatures are typically quite warm, generally averaging in the mid to lower 80º's F for July and August. Summertime temperatures will typically reach in the 100º's F at some point during the summer and can reach 90º F any month between May and September. Conversely, winter temperatures can be cold, averaging in the low teens º F or less for December and January. There will typically be several days of below zero temperatures each winter. It is not uncommon for temperatures to reach 30–40º F below zero, or even colder, most any winter. Spring can be windy throughout

this MLRA, with winds averaging over 10 mph about 15 percent of the time. Speeds of 50 mph or stronger can occasionally occur as a weather system crosses this part of Montana.

Most of the rangeland in MLRA 58A is within the 11 to 14 inch Mean Annual Precipitation (MAP) range (Figure 9). Of the total annual precipitation, about 7 inches, or 60 percent, usually falls in April through July. The growing season for most crops falls within this period. Thunderstorms occur on about 26 days each year. In some years, hailstorms cause severe local damage to crops.

Snowfall is not heavy in the area, averaging 17.6 inches. Heavy snowfall occurs infrequently, usually late in the winter or early spring. Snow cover is typically 1 to 3 inches and can remain on the ground for several weeks.

The frost-free (32° F) season averages about 90 to 125 days each year in the uplands, to about 135 days along the Yellowstone River Valley. The freeze-free (28° F) season averages about 110 to 155 days annually.

MLRA 54 is considered to have a continental climate - cold winters and hot summers, low humidity, light rainfall, and much sunshine. Extremes in temperature are characteristic.[6]

The climate is the result of this MLRA's location in the geographic center of North America. There are few natural barriers on the northern Great Plains. The air masses move unobstructed across the plains and account for rapid changes in temperature. Annual precipitation ranges from 14 to 18 inches per year (Figure 9).

The normal average annual temperature is about 42° F. January is the coldest month with average temperatures ranging from about 13° F (Beach, ND) to about 16° F (Bison, SD). July is the warmest month with temperatures averaging from about 69° F (Beach, ND) to about 72° F (Timber Lake, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 57° F. This large annual range attests to the continental nature of this MLRA's climate.

Hourly winds are estimated to average about 11 miles per hour annually, ranging from about 13 miles per hour during the spring to about 10 miles per hour during the summer. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 miles per hour.

Growth of native cool-season plants begins in late March and continues to early to mid-July. Native warm-season plants begin growth in mid-May and continue to the end of August. Green up of cool-season plants can occur in September and October when adequate soil moisture is present. The frost-free (32° F) season averages about 127 days each year in the uplands.

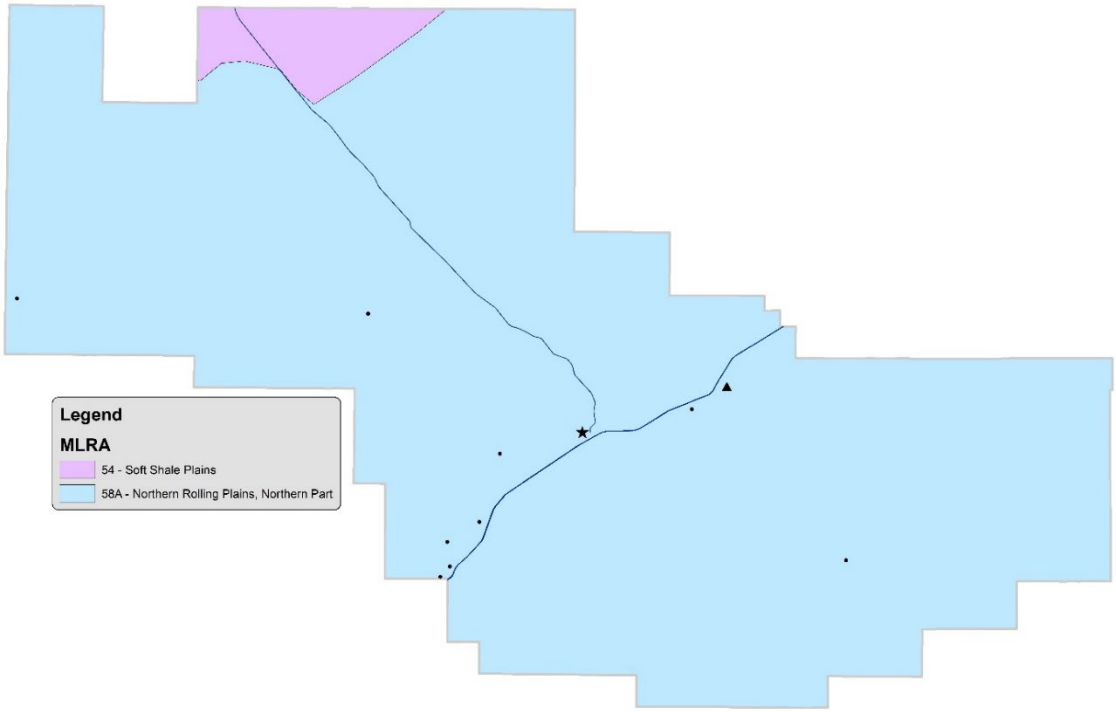


Figure 8. Prairie County Major Land Resource Areas

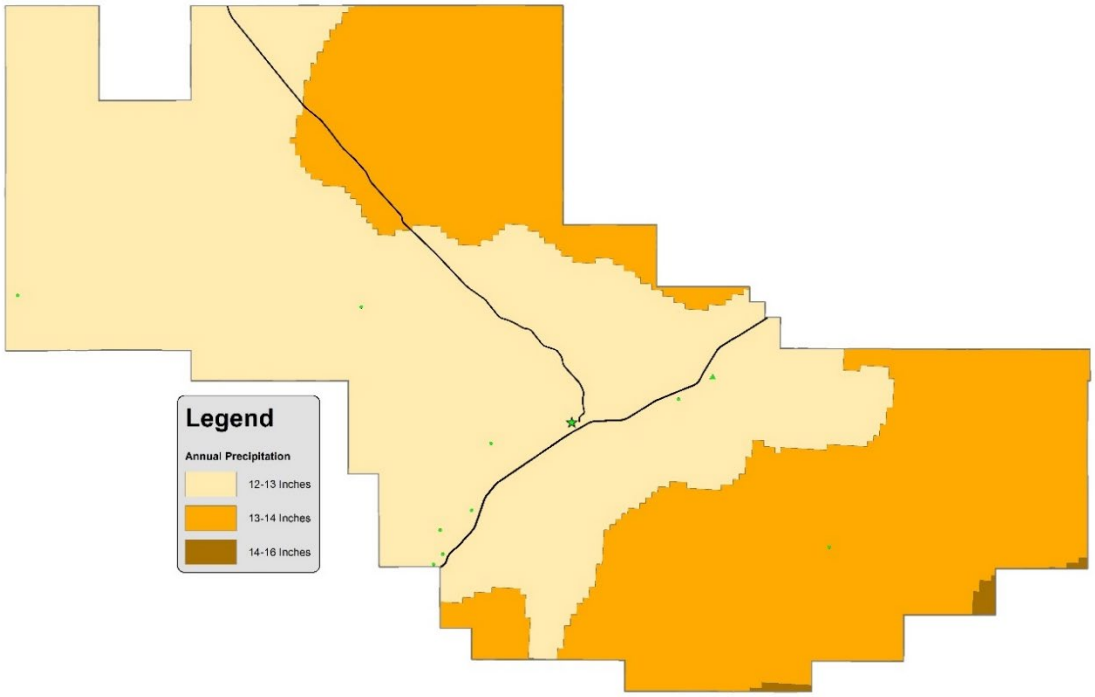


Figure 9. Prairie County Precipitation Zones

Watersheds and Streams

Prairie County's diverse topography and natural resource ecology contains seven different watershed sub basins (Figure 10).

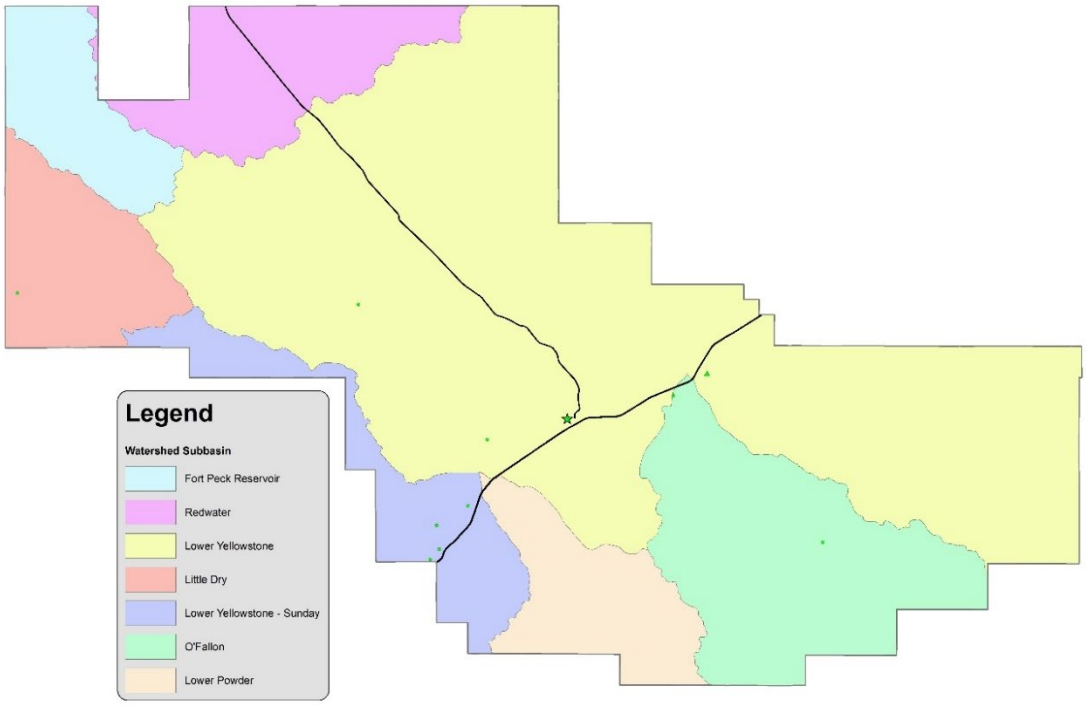


Figure 10. Prairie County Watersheds

Throughout Prairie County, there are five streams listed as Impaired on the 2018 Montana DEQ 303(d) list (Figure 11). Water bodies and streams that do not meet standards need pollution reduction studies, called Total Maximum Daily Loads. After study, plans are developed to improve water quality to eventually meet state-defined standards.[7]

2018 WATER QUALITY INFORMATION					
WATER NAME	CATEGORY	USE_CLASS	IMPAIRMENTS	PROBABLE SOURCES	ASSOCIATED USES
Timber Creek	4A	C-3	Nitrogen, Phosphorus, Total Kjehldahl Nitrogen (TKN)	Agriculture, Unknown, Natural	Aquatic Life
Powder River	5	C-3	Salinity	Unknown, Natural	Agriculture
Yellowstone River	4C	B-3	Fish Passage Barrier	Dam Construction	Aquatic Life
Cedar Creek	5	C-3	Alteration in stream-side or littoral vegetative covers, arsenic, copper, iron, lead	Grazing in Riparian or Shoreline Zones, Spills From Trucks or Trains, Natural Sources	Aquatic Life

Cedar Creek	5N	C-3	Copper, Iron, Lead, Selenium	Natural Sources	Aquatic Life
Cabin Creek	5	C-3	Dissolved Oxygen, Nitrogen, Sedimentation/Siltation	Natural Sources, Rangeland Grazing, Dam or Impoundment	Aquatic Life

Use Class

B-3: Waters classified as suitable for drinking, culinary, and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

C-3: Waters classified as suitable for drinking, culinary, and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply. The quality of these waters is naturally marginal for drinking, culinary and food processing purposes, agriculture, and industrial water supply.

Water Quality Category

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

4C - Identified threats or impairments result from pollution categories such as dewatering or habitat modification and, thus, a TMDL is not required.

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

5N - Available data and/or information indicate that a water quality standard is exceeded due to an apparent natural source in the absence of any identified manmade sources

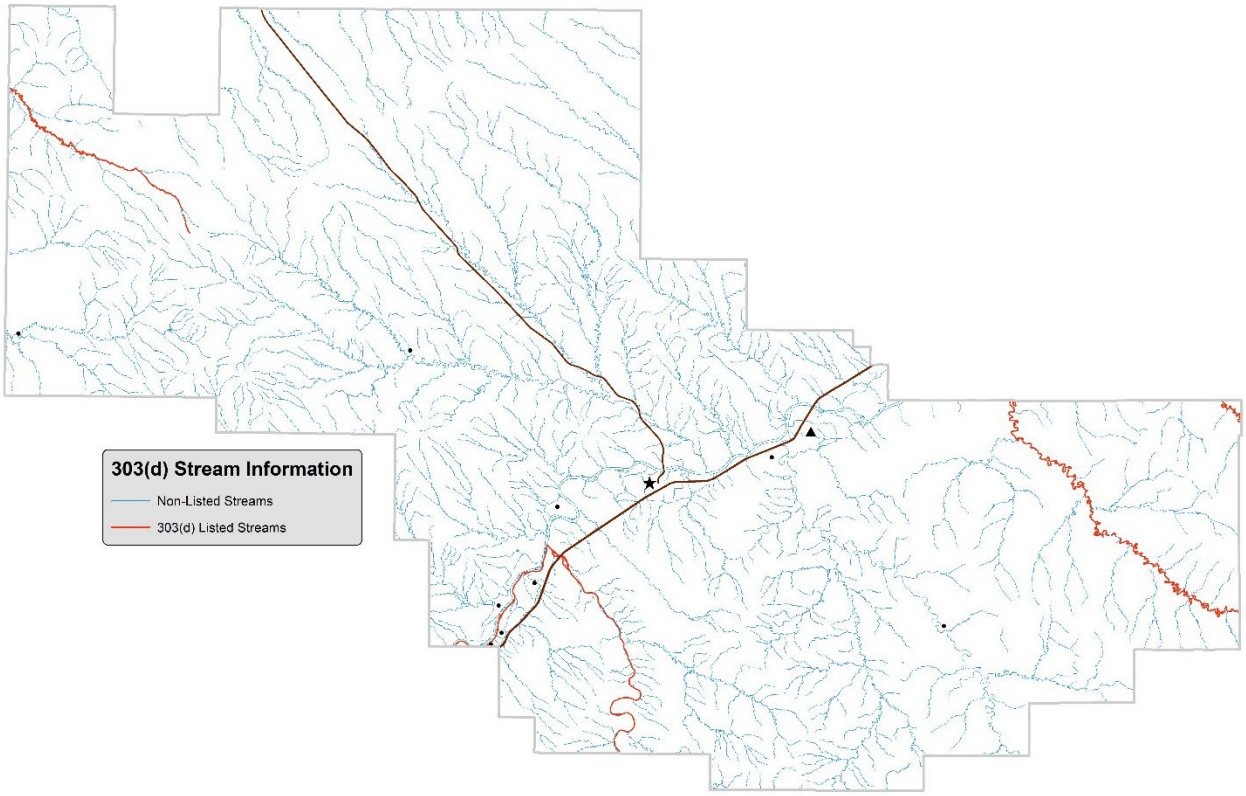


Figure 11. Prairie County Streams

Yellowstone River Corridor Study

In 2011, The US Army Corps of Engineers and the Yellowstone River Conservation District Council examined a 565-mile reach of the Yellowstone River, from Gardiner, Montana to the confluence with the Missouri River in North Dakota. The Cumulative Effects Analysis serves as the base tool for analyzing all hydraulic, biological, and socioeconomic impacts of human activity on the Yellowstone River. It can be found in its entirety at: Yellowstone Cumulative

Effects Study. Each of the four reaches contained in Prairie were thoroughly examined. More detailed explanations of their findings can be found in Appendix A.

Irrigated Land[8]

Prairie County irrigators farm 26,100 acres of irrigated lands each year. The irrigated producers of Prairie County are split between two irrigation districts – Buffalo Rapids District 1, which spans from the Fallon, Montana east pumphouse to Glendive in Dawson County, and Buffalo Rapids District 2, which runs from the Shirley Pumping plant in Custer County to the border for District 1 (Figure 12). Principal structures include five pumping plants that pump water directly from the Yellowstone River and one re-lift pumping plant to provide irrigation water for 22,719 acres of land in the vicinity of Glendive, Fallon, and Terry, Montana.

Settlers along the Yellowstone River between Miles City and Glendive first attempted irrigation of two tracts of land, one by diversion and the other by pumping. The diversion scheme failed because a suitable diversion dam was not provided. The pumping unit, driven by a fuel-operated powerplants, proved to be too costly. The greater part of the area, therefore, reverted to dry farming, which encountered serious difficulties during the extended drought of the 1930's.

To combat the depressed conditions, the local businessmen formed the Mid-Yellowstone Recovery Association in 1933 and obtained National Industrial Recovery Act funds for the Bureau of Reclamation to conduct an investigation. Based on the report of this investigation, the Glendive Unit was authorized to be constructed by the Bureau of Reclamation.

The Glendive Unit was approved by the President Roosevelt on September 17, 1937, to irrigate an estimated 15,500 acres with funds provided under the Emergency Relief Appropriation Act of 1937. Glendive Extension was approved by the President on May 15, 1940, for 3,000 acres under the Water Conservation and Utilization Act of May 10, 1939 (53 Stat. 685). The Glendive Unit and Extension constitute the First Division.

The Shirley, Terry, and Fallon Units of the Second Division were approved by the President on October 11, 1939, as well as a revised plan on May 15, 1940, under the Water Conservation and Utilization Program.

Construction on the Second Division, Shirley and Terry Units, commenced in September 1940. As with the First Division, work was carried out by workers from the WPA rolls and Civilian Conservation Corps (CCC) Camp enrollees, under supervision of the Bureau of Reclamation (USBR). The CCC Camp was discontinued in July 1942. In January 1943, WPA assistance was terminated and replaced by workers from the Civilian Public Service Camp. Even though wartime demands on time and money were stringent, work on the Units progressed steadily until completion of the Shirley Unit in 1943 and the Terry Unit in 1945. Water was first delivered to the Shirley lands in the 1944 irrigation season and to the Terry lands in 1945. Between 1941 and 1945, due to wartime demands on materials, the War Production Board had to approve any new construction works. USBR's request to begin construction on the Fallon Unit was denied so work was delayed until 1946. It was decided that work on the Unit would be carried out by contract instead of by Government manpower. The contract was awarded to

Long Construction Company of Billings, Montana on July 12, 1946, and work began later the same year. The contractor completed work on the Unit a year later on December 6, 1947. The Unit was subsequently placed in operation in 1950.[9]

Soils in the project are fertile and produce a large variety of crops when irrigated. Principal crops produced are alfalfa, sugar beets, beans, flax, potatoes, and wheat.

The Second Division serves 9,465 acres of irrigable land along the south bank of the Yellowstone River between Miles City and Fallon, Montana. Three separate tracts of irrigable land are designated as the Shirley, Terry, and Fallon Units. Water is pumped directly from the Yellowstone River for each unit.

Shirley, Terry, Fallon, and Fallon Relift Pumping Plants serve the Second Division. All the pumps are operated electrically with power supplied from the Pick-Sloan Missouri Basin Program. Each unit has a separate canal and lateral system with appurtenant water control structures to provide for distribution of water to the land. A total of 62 miles of canals and 96 miles of laterals is included in the project.

The most recent examination of this project was conducted by the USBR in October 2007. USBR personnel concluded that the general condition of the project and the condition of the main canals were very good. There were no Category 1 recommendations. There were twenty-three Category 2 recommendations, 7 of which were items that had been identified during the previous exanimation. Finally, there were three Category 3 recommendations.[10]

Most of the recommendations are related to infrastructure issues and include:

- Replacement of the intake structure at Fallon re-lift plant;
- Repair of the concrete on the aprons of the first and second siphons west of Cracker Box;
- Repair, replacement or removal of problematic bridges across the canal;
- Need to institute safety measures to cover holes in pumping plant floors created when equipment is removed for inspection/repair;
- Minor maintenance inside pumping plants such as replacing breaker box panels, cleaning service station transformers and protecting loose wiring with conduit.

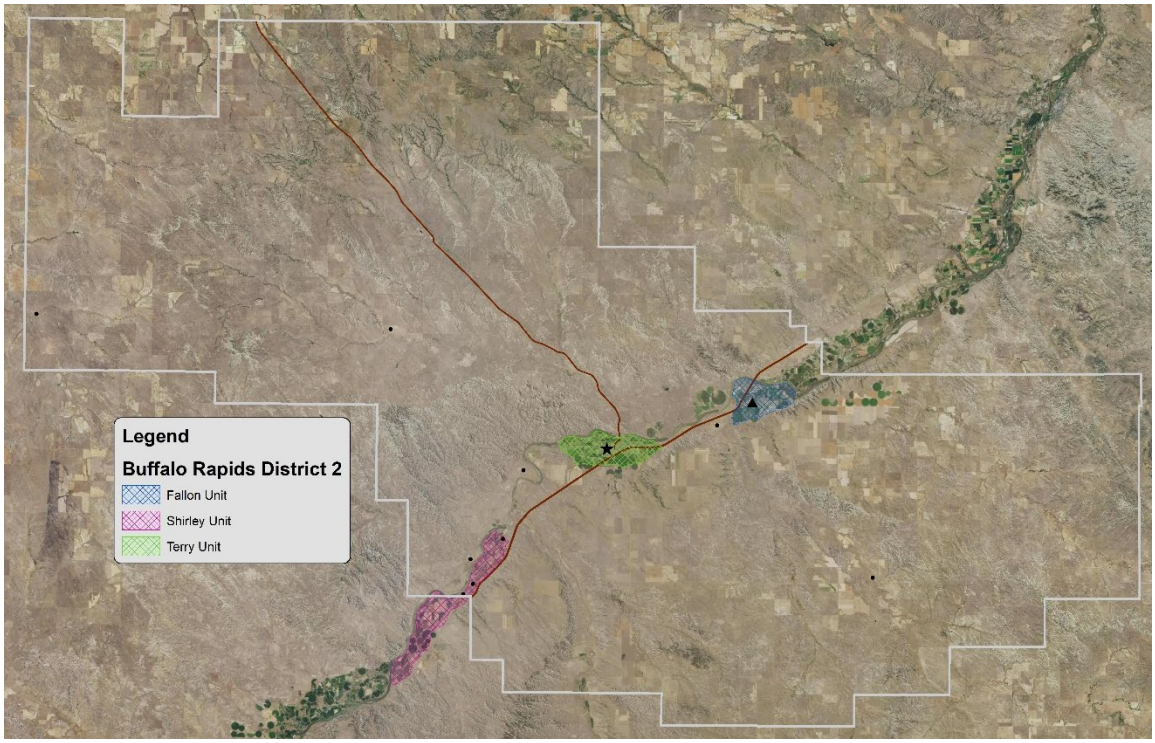


Figure 12. Buffalo Rapids Irrigation Districts

Water Rights

Water rights in Prairie County are largely held by private landowners in conjunction with Buffalo Rapids District 2 and as reserved water held by the Prairie County Conservation District.

In 1978, the Board of Natural Resources and Conservation granted water reservations to 14 conservation districts (CDs) in the Yellowstone River basin. [25]The order reserved water for municipal use, irrigation, off-stream storage, and instream flow. In this basin, qualified individual users can make use of a portion of the conservation districts' reserved water and take advantage of the December 15, 1978, priority date. Municipal uses were given priority over all other reserved water uses. Reservations of water for instream flows were given priority over the conservation districts' reservations above the mouth of the Bighorn River. For the conservation districts below the mouth of the Bighorn River, including the watershed of the Bighorn River, the districts' water reservations were given priority over the instream flow reservations.[11]

At the end of the 2016 irrigation season, there were a total of 222 CD water reservation projects in the Yellowstone River basin. These projects put 76,798 acre-feet of water to use. Prairie county currently holds a water reservation of 68,467 feet. There are currently 14 permits issued accounting for 8,107 acre-feet of water from the Yellowstone River and 178 acre-feet of water from the Powder River.

Stream Flow

Prairie County does not hold any stream flow stations but relies on those in the counties around us for reporting. The Yellowstone River and Powder Rivers are our main waterways that are monitored for flow – typically during the spring and summer during snowmelt and after large storm events.

Powder River Streamflow, ft^3/s

Yellowstone River, ft^3/s

Ground-Water Resources

Most water for domestic and livestock uses in Prairie County is obtained from wells ranging from shallow, dug wells along the creek valleys to deep, drilled wells in the upland areas. The wells are 15 to 2,500 feet deep. The deep wells are highly mineralized. The Yellowstone River offers an abundant supply of water for irrigation.

Ground water in the county is in a variety of aquifers that have been classified as alluvial deposits or terrace deposits of sand and gravel, or it is in bedrock formations of sandstone, coal, fissile sandy shale, or baked clinker beds. The Pierre and Lebo formations consist mainly of either highly mineralized shale that does not yield water or yields highly mineralized water that is not usable.

The most significant ground-water sources in Prairie County are within the alluvial deposits and terrace deposits along river valleys and in the inner valleys of most streams. The coarse deposits are the most permeable zones in the area. Yields from the aquifers range from 10 to 1,000 gallons of water per minute.

Water quality tends to vary greatly because of differences in chemical characteristics of the soils and the amount of precipitation in an area. The permeability and recharge characteristics of the aquifer influence water quality. In areas where the material has slow or very slow permeability, the aquifer recharge is low and water that moves through the material receives high concentrations of dissolved solids. Water from a shallow depth, or less than 125 feet, contains large amounts of calcium and magnesium and is therefore hard. Water from a greater depth contains only small amounts of calcium and magnesium and is therefore soft. The soft water, which is a mixture of sodium bicarbonate and water, is generally satisfactory for domestic purposes but may be unfit for irrigation.

The most important bedrock aquifers in Prairie County include the Fox Hills Sandstone, Hell Creek Sandstone, the Tongue River Member, and clinker and coal beds. Flowing artesian wells in the flood plains along the Yellowstone and Powder Rivers derive their water from the Fort Union and Hell Creek aquifers. Water from all of the flowing artesian wells is soft. The Fox Hills Sandstone is an excellent ground-water aquifer; the water is soft, and wells yield as much as 90 gallons per minute. Sandstone and coal beds in the Hell Creek aquifer can yield water in an adequate quality and volume for domestic and livestock use. The sandstone of the Tongue River can yield 6 to 15 gallons of water per minute.

Utilities

Power is supplied to the residents of Prairie County through two member-owned cooperatives – Tongue River Electric Cooperative and McCone Electric Cooperative – and the towns are supplied by Montana-Dakota Utilities.

Tongue River Electric Cooperative

Counties Served: Big Horn, Carter
Custer, Dawson, Fallon,
Powder River, Prairie, Rosebud
Total Members Served: 2,682
Total Miles of Line: 2,884
Date First Energized: 9/9/1949
Total Employees: 20
Power Supplier: Members 1st
Power Cooperative

McCone Electric Cooperative

Counties Served: Garfield, McCone,
Richland, Rosebud, Prairie, Dawson
Petroleum, Custer
Total Area Served: 14,000 mi^2
Date First Energized: 9/16/1942
Power Supplier: Touchstone Energy
Cooperatives

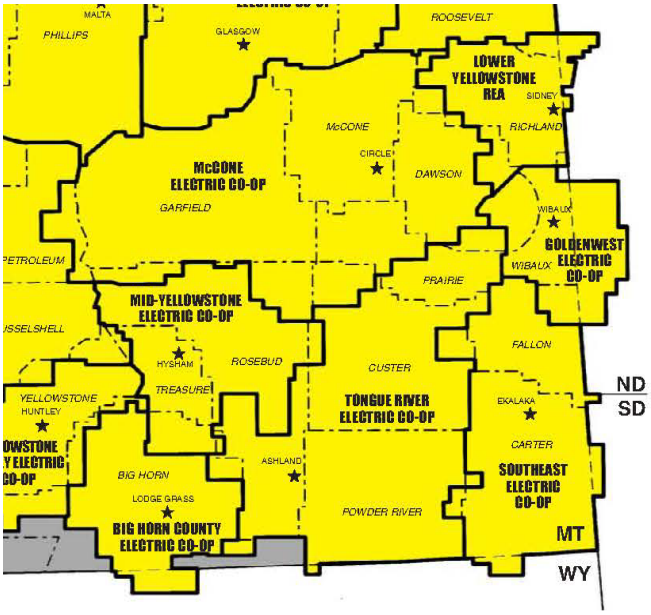


Figure 13. Eastern Montana Electric Cooperatives

Wilderness Study Area

The Terry Badlands Wilderness Study Area (WSA; Figure 14) consists of 44,000 acres of public lands, delineated on the map below by the pink boundary, and was established by the Bureau of Land Management (BLM) after wilderness reviews conducted in the late 1970s and early 1980s. The Terry Badlands WSA emerged as one of their premier WSAs in the northern plains. As such, the BLM must maintain the wilderness characteristics of the Terry Badlands until congress decides whether to add it to the National Wilderness Preservation System. Activities that are allowed in the WSA include camping, hiking, cross-country skiing, hunting and fishing. Off-road vehicle travel is prohibited.[12]

The badlands were formed from sedimentary rocks which have been eroded by eons of wind and water into impressive arches, bridges, flat tabletops, pinnacles, spires, and scoria escarpments. There are many unique ecological, biological, and geological sites including several sites of historical interest.

[13]Rolling benches are vegetated with grasses, wildflowers, and shrubs. Wildlife include mule and whitetail deer, pronghorn, elk, badgers, many raptors and reptiles. The WSA is high in cultural resources, including 1800s era U.S. Army troops graffiti on Sheridan Butte.

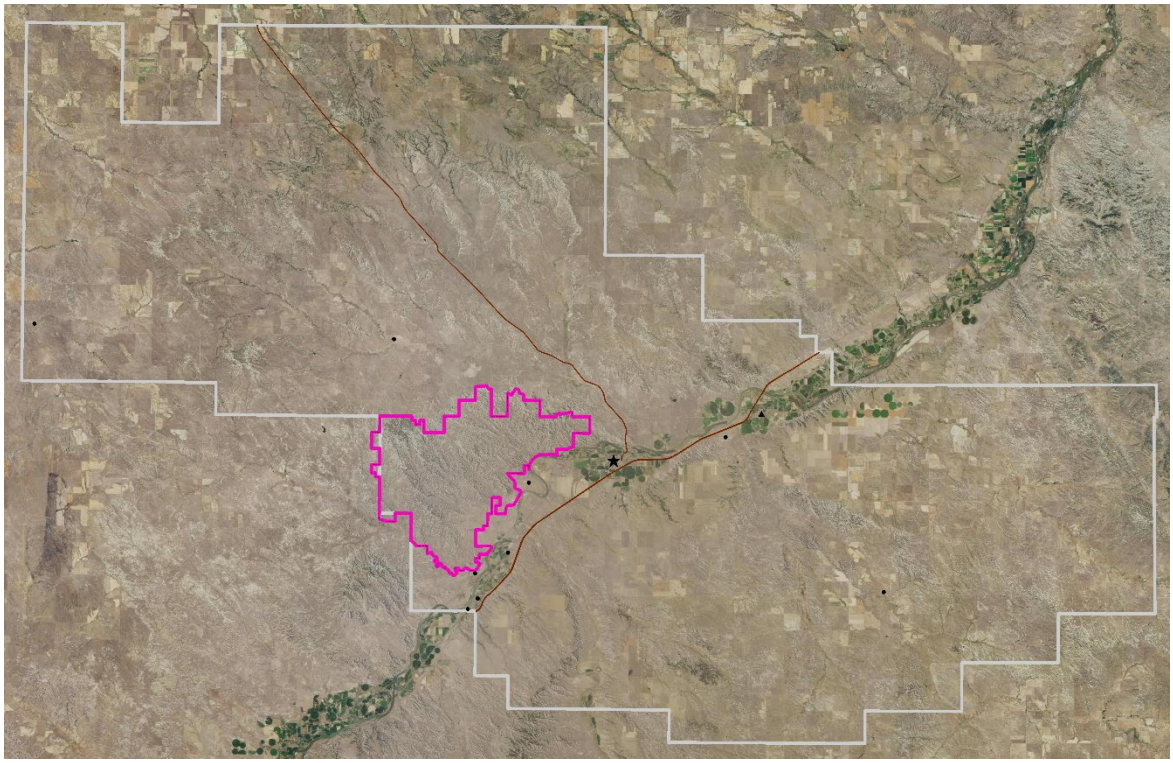


Figure 14. Terry Badlands Wilderness Study Area

Wildlife[15]

Prairie County hosts many species of wildlife. Of particular interest are big game species due to the large number of tourists and hunters drawn each fall during hunting seasons.

Pronghorn Antelope

Pronghorn antelope range over the entirety of Prairie County. Characterized by their rich russet-tan coat, large white rump patch and two white bands across the throat and white undersize, Pronghorn males have large black, curving horns. They favor open, rolling sagebrush and grasslands that allow feeding on forbs, browse (especially sagebrush) and small amounts of young grasses. Pronghorn breed in late September and give birth to two grayish-brown fawns the next spring. Fences can be a major obstacle for Pronghorn.

Mule Deer

Mule deer can be observed across the entirety of Prairie county. Characterized by their brownish-grey coat, dark forehead and brisket and white rump patch, mule deer also sport antlers with four to five tines on each side. They favor grasslands and badlands, which provide cover from hunters and predators. Migratory and feeding late in the day, preferred food includes bitterbrush, mountain mahogany, chokecherry, serviceberry, grasses and forbs. Mule deer breed in late October and November; calves are born the following spring.

White-tail Deer

White-tail deer occupy the irrigated valleys and waterways in Prairie County, occasionally straying to the surrounding rangeland. Sporting a reddish-brown coat and foot long white tail, mule deer have antlers with three to five tines on each side. They favor leaves, twigs, fruits

and berries of browse plants. White-tail deer breed in mid to late November and give birth the following spring to one or two fawns.

Elk

Though rare, elk are occasionally found in northern Prairie County. They favor open meadows and grasslands that host grasses, sedges, forbs, deciduous shrubs and young trees. Elk breed in late September and early October and give birth the following spring to one spotted calf. They shed antlers during March or April. The primary concerns for elk in Prairie County are habitat fragmentation and hunting.

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

On September 22, 2015 the U.S. Fish and Wildlife Service determined that the Greater Sage-Grouse did not warrant listing protections under the Endangered Species Act. It was decided that the primary threats to populations had been ameliorated by conservation efforts implemented by Federal, State, and private land owners. Much of Prairie County has been determined to be "General Habitat".

Species of Concern

The following species are listed on the Montana Natural Heritage Site (http://mtnhp.org/) as species of concern for Prairie County. To be included on the list, the species must be at risk or potentially at risk because of declining habitat within the state.[15]

Species Subgroup	Common Name	Scientific Name
Mammals (Mammalia)	Townsend's Big-eared Bat	*Corynorhinus townsendii*
	Black-tailed Prairie Dog	*Cynomys ludovicianus*
	Eastern Red Bat	*Lasiurus borealis*
	Hoary Bat	*Lasiurus cinereus*
	Little Brown Myotis/Bat	*Myotis lucifugus*
	Fringed Myotis	*Myotis thysanodes*
	Merriam's Shrew	*Sorex merriami*
	Swift Fox	*Vulpes velox*
Birds (Aves)	Sprague's Pipit	*Anthus spragueii*
	Golden Eagle	*Aquila chrysaetos*
	Great Blue Heron	*Ardea herodias*
	Burrowing Owl	*Athene cunicularia*
	Ferruginous Hawk	*Buteo regalis*
	Chestnut-collared Longspur	*Calcarius ornatus*
	Greater Sage-Grouse	*Centrocercus urophasianus*
	Baird's Sparrow	*Centronyx bairdii*
	Black-billed Cuckoo	*Coccyzus erythropthalmus*

	Bobolink	*Dolichonyx oryzivorus*
	Peregrine Falcon	*Falco peregrinus*
	Loggerhead Shrike	*Lanius ludovicianus*
	Red-headed Woodpecker	*Melanerpes erythrocephalus*
	Long-billed Curlew	*Numenius americanus*
	Sage Thrasher	*Oreoscoptes montanus*
	Brewer's Sparrow	*Spizella breweri*
	Least Tern	*Sternula antillarum*
Reptiles (Reptilia)	Spiny Softshell	*Apalone spinifera*
	Snapping Turtle	*Chelydra serpentina*
	Plains/Western Hog-nosed Snake	*Heterodon nasicus*
	Greater Short-horned Lizard	*Phrynosoma hernandesi*
Amphibians (Amphibia)	Great Plains Toad	*Anaxyrus cognatus*
Fish (Actinopterygii)	Blue Sucker	*Cycleptus elongatus*
	Shortnose Gar	*Lepisosteus platostomus*
	Sturgeon Chub	*Macrhybopsis gelida*
	Sicklefin Chub	*Macrhybopsis meeki*
	Paddlefish	*Polyodon spathula*
	Sauger	*Sander canadensis*
	Pallid Sturgeon	*Scaphirhynchus albus*
Invertebrates - Insects	Brimstone Clubtail	*Stylurus intricatus*
	A Sand-dwelling Mayfly	*Anepeorus rusticus*
Flowering Plants	Wyoming Thistle	*Cirsium pulcheriiumum*
	Silver Bladderpod	*Physaria ludoviciana*
	Crawe's Sedge	*Carex crawei*
	Red-root Flatsedge	*Cyperus erythrorhizos*

Federal Threatened or Endangered Species

United States Department of the Interior
Fish and Wildlife Service
Ecological Services
Montana Field Office
585 Shepard Way, Suite 1
Helena, Montana 59601-6287
Phone: (406) 449-5225, Fax: (406) 449-5339

ENDANGERED, THREATENED, PROPOSED AND CANDIDATE SPECIES
MONTANA COUNTIES*
Endangered Species Act

October 23, 2018

PRAIRIE COUNTY		
Scientific Name	Common Name	Status
Scaphirhynchus albus	**Pallid Sturgeon**	**Listed Endangered**
Sterna antillarum athalassos	**Interior Least Tern**	**Listed Endangered**
Grus Americana	**Whooping Crane**	**Listed Endangered**

Myotis spetentrionalis	Northern Long-Eared Bat	Listed Threatened
Charadrius melodus	Piping Plover	Listed Threatened

Further information for each of the listed species can be found in Appendix B.

Invasive Species

Prairie County is committed to the effective management and eradication of state and county declared noxious weeds. The Prairie County Weed District, in conjunction with the Montana State University (MSU) Cooperative Extension service, assists the public and landowners as to their responsibility of controlling noxious weeds. The county continues to upgrade programs to better manage weed problems on a large scale, including county, state and federal lands. Noxious weeds have a negative impact on nearly all aspects of life from aesthetics to actual loss of revenue.

Certain exotic plants listed in these rules are designated as statewide noxious weeds under the County Weed Control Act 7-22-2101 (5) MCA. All counties must implement management criteria developed under 7-22-2109 (2) b. of the act.

Montana Noxious Weed List[21]

Effective: February 2017

PRIORITY 1A These weeds are not present or have a very limited presence in Montana. Management criteria will require eradication if detected, education, and prevention:
(a) Yellow starthistle (*Centaurea solstitialis*)
(b) Dyer's woad *(Isatis tinctoria*)
(c) Common reed *(Phragmites australis ssp. australis)*
(d) Medusahead *(Taeniatherum caput-medusae)*

PRIORITY 1B These weeds have limited presence in Montana.
Management criteria will require eradication or containment and education:
(a) Knotweed complex (*Polygonum cuspidatum, P. sachalinense, P. × bohemicum, Fallopia japonica, F. sachalinensis, F. × bohemica, Reynoutria japonica, R. sachalinensis, and R.× bohemica*)
(b) Purple loosestrife (*Lythrum salicaria*)
(c) Rush skeletonweed (*Chondrilla juncea*)
(d) Scotch broom (*Cytisus scoparius*)
(e) Blueweed (*Echium vulgare*)

PRIORITY 2A These weeds are common in isolated areas of Montana. Management criteria will require eradication or containment where less abundant. Management shall be prioritized by local weed districts:
(a) Tansy ragwort (*Senecio jacobaea, Jacobaea vulgaris*)
(b) Meadow hawkweed complex (*Hieracium caespitosum, H. praealturm, H. floridundum, and Pilosella caespitosa*)
(c) Orange hawkweed (*Hieracium aurantiacum, Pilosella aurantiaca*)
(d) Tall buttercup (*Ranunculus acris*)
(e) Perennial pepperweed (*Lepidium latifolium*)
(f) Yellowflag iris (*Iris pseudacorus*)
(g) Eurasian watermilfoil (*Myriophyllum spicatum, Myriophyllum spicatum x Myriophyllum sibiricum*)
(h) Flowering rush (*Butomus umbellatus*)
(i) Common buckthorn *(Rhamnus cathartica L.)*

PRIORITY 2B These weeds are abundant in Montana and widespread in many counties. Management criteria will require eradication or containment where less abundant. Management shall be prioritized by local weed districts:
(a) Canada thistle (*Cirsium arvense*)
(b) Field bindweed (*Convolvulus arvensis*)
(c) Leafy spurge (*Euphorbia esula*)
(d) Whitetop (*Cardaria draba, Lepidium draba*)
(e) Russian knapweed (*Acroptilon repens, Rhaponticum repens*)
(f) Spotted knapweed (*Centaurea stoebe, C.maculosa*)
(g) Diffuse knapweed (*Centaurea diffusa*)
(h) Dalmatian toadflax (*Linaria dalmatica*)
(i) St. Johnswort (*Hypericum perforatum*)
(j) Sulfur cinquefoil (*Potentilla recta*)
(k) Common tansy (*Tanacetum vulgare*)
(l) Oxeye daisy (*Leucanthemum vulgare*)
(m) Houndstongue (*Cynoglossum officinale*)
(n) Yellow toadflax (*Linaria vulgaris*)
(o) Saltcedar (*Tamarix spp*.)
(p) Curlyleaf pondweed (*Potamogeton crispus*)
(q) Hoary alyssum (*Berteroa incana*)

PRIORITY 3 Regulated Plants: (NOT MONTANA LISTED NOXIOUS WEEDS)
These regulated plants have the potential to have significant negative impacts. The plant may not be intentionally spread or sold other than as a contaminant in agricultural products. The state recommends research, education and prevention to minimize the spread of the regulated plant.
(a) Cheatgrass (*Bromus tectorum*)
(b) Hydrilla (*Hydrilla verticillata*)
(c) Russian olive (*Elaeagnus angustifolia*)
(d) Brazilian waterweed (*Egeria densa*)
(e) Parrot feather watermilfoil (*Myriophyllum aquaticum or M. brasiliense*)

[22]The noxious weed species the Prairie County Weed District has reported to the Department of Ag as present are:

- **Field Bindweed** - widely distributed throughout the county
- **Leafy Spurge** - The Yellowstone River and Powder River corridors have large leafy spurge infestations. Patches are found on rangeland primarily south of the Yellowstone River with larger infestations along Cabin Creek. It is found to some extent North of the Yellowstone, with infestations getting less as you head North of the Yellowstone.
- **Canada Thistle** - present in patches all over the county, maybe more prevalent North of the Yellowstone
- **Houndstongue -** found mainly in rangeland with wooded draws especially in Northern Prairie County closer to the McCone County line, some found south of the Yellowstone River
- **Saltcedar -** found at the confluence of the Powder River and Yellowstone River and all along the Yellowstone River, some isolated trees found on rangeland
- **Spotted Knapweed, Diffuse Knapweed, and Russian Knapweed** - scattered, isolated patches on rangeland, most is found along HWY 253

Confined Animal Feeding Areas

According to Montana Code[14]:

1) "Animal feeding operation" means a lot or facility where the following conditions are met:
   a) animals have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period; and
   b) crops, vegetation, forage growth, or postharvest residues are not sustained in the normal growing season over any portion of the lot or facility.

(2) "Concentrated animal feeding operation (CAFO)" means an animal feeding operation that is defined as a large concentrated animal feeding operation or as a medium concentrated animal feeding operation or that is designated as a concentrated animal feeding operation in accordance with 40 CFR, part 122. Two or more animal feeding operations under common ownership are a single animal feeding operation for the purposes of determining the number of animals at an operation if they adjoin each other or if they use a common area or system for the disposal of wastes.

(3) "Large concentrated animal feeding operation" means an animal feeding operation that stables or confines at a minimum:

a) 700 mature dairy cows, whether milked or dry;
b) 1,000 cattle other than mature dairy cows or veal calves;
c) 10,000 sheep or lambs;

Within the county, animal feeding operations are primarily located along the Yellowstone River Valley in Prairie County, due to the proximity to the feed base associated with irrigated lands. All but one of these facilities are categorized as small or medium animal feeding operations and do not require a permit. The Large CAFO in the county has been issued a permit by the Montana Department of Environmental Quality.

Prairie County Grazing District

[23]Grazing districts are the result of the 1934 Taylor Grazing Act. Before this act was passed, land that was valued for grazing purposes was unappropriated and unreserved from the public domain. These lands were used, but during the controversy of sustainable grazing practices during the 1930's Dust Bowl, the rights to use this land led the government to act on grazing issues. The Taylor Grazing Act enabled locals to petition the Secretary of the Interior to create a local grazing district. Upon acceptance, a board would be formed to manage permits for grazing preferences, finances to maintain leases and range improvements, and to generally maintain order of the grazing on public lands within their grazing district.

Montana's leading industry is agriculture. Many people in production agriculture rely on public lands for grazing. Many of these lands are within the boundaries of the state's 27 grazing districts (Figure 15). The grazing districts have maintained strong partnerships with many federal and state agencies and non-governmental organizations (NGO) to promote stewardship and administration of public lands. The maintenance of Montana's public lands is vital to the members of the state grazing districts whose livelihood depends on a healthy relationship between the land and livestock and the economic success of Montana.

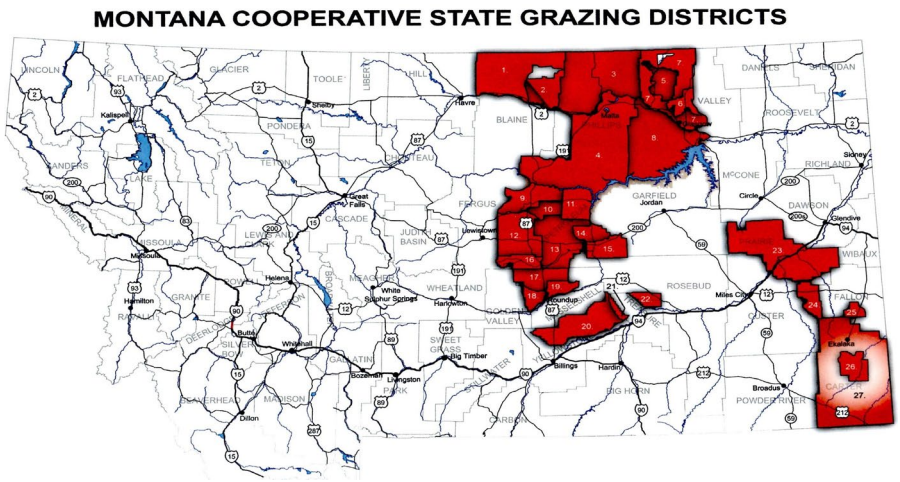


Figure 15 Montana Cooperative State Grazing Districts

Prairie County Cooperative State Grazing District was formed May 11, 1937 and encompasses the entire county. On 1,111,680 acres, there are over 100,000 AUMs available. The grazing district actively promotes water developments, good range practices, and helps to lower lease prices for producers. There are currently 107 permittees in the county. Board meetings are held monthly, with the annual meeting of the membership the last Friday in September each year.

III. Conservation Activity Analysis

From 2009 through 2019, NRCS has made over $2 million in incentive payments through the Environmental Quality Incentives Program (EQIP) and just over $4 million in incentive payments through the Conservation Security and Conservation Stewardship Programs (CSP). These payments have resulted in conservation on over 201,000 acres of range, crop and pasture lands.

EQIP Practice Summary
2009 - 2019

328	Conservation Crop Rotation	250	ac
340	Cover Crop	106	ac
345	Reduced Till/No Till	4,302	ac
362	Diversion	1720	ft
382	Fence	80,851	ft
393	Filter Strip	4	ac
430	Irrigation Water Conveyance, Pipeline, Rigid Gated Pipeline	20,407	ft
442	Sprinkler System - Pivot	355	ac
449	Irrigation Water Management	1,457	ac
512	Forage and Biomass Planting	25	ac
516	Livestock Pipeline	129,409	ft
528	Prescribed Grazing	29,555	ac
533	Pumping Plant	19	ea
560	Access Road	470	ft
561	Heavy Use Area Protection	8	ac
578	Stream Crossing	2	ea
587	Structure for Water Control	9	ea
590	Nutrient Management	3,636	ac
595	Pest Management Conservation System	3	ac
614	Watering Facility	50	ea
633	Waste Recycling	335	ac
635	Vegetated Treatment Area	5	ac
638	Water and Sediment Control Basin	4	ea
642	Water Well	4	ea
649	Structures for Wildlife - Fence Markers	10	ea

CSP Practice Summary
2009-2019

649	Structures for Wildlife	4	ea
ANM10	Harvest hay in a manner that allows wildlife to flush and escape	9,553	ac
ANM18	Retrofit watering facility for wildlife escape	13	ea
ANM27	Wildlife Friendly Fencing	1,500	ft
E382136Z	Incorporating "wildlife friendly" fencing for connectivity of wildlife food resources	5,708	ac
PLT01	Establish pollinator habitat	1	ea
PLT06	Renovation of a windbreak or shelter belt, or hedgerow for wildlife habitat	2	ea
595	Pest Management Conservation System	493	ac
E315134Z	Herbaceous weed control (plant pest pressures) for desired plant communities/habitats	77	ac
WQL13	High level Integrated Pest Management to reduce pesticide environmental risk	928	ac
528	Prescribed Grazing	5,217	ac
ANM09	Grazing management to improve wildlife habitat	36,886	ac
ANM17	Monitoring nutritional status of livestock using the NUTBAL PRO System	11,003	ac
ANM26	Managing Calving to Coincide with Forage Availability	42,459	ac
E528140Z1	Maintaining quantity and quality of forage for animal health and productivity	3,048	ac
PLT02	Monitor key grazing areas to improve grazing management	38,464	ac
WQL03	Rotation of supplement and feeding areas	113,927	ac
WQL15	Reduce the concentration of nutrients on livestock farms	928	ac
WQL23	Provide Livestock Protection Away from Sensitive Areas	954	ac
328	Conservation Crop Rotation	5,529	ac
329	Residue and Tillage Management, No-Till	4,392	ac
SOE01	Continuous no till with high residue	928	ac
SQL06	Conversion of cropped land to grass-based agriculture	42	ac
ANM03	Incorporate native grasses and/or legumes into 15% or more of the forage base	105	ac
E340107Z	Cover crop to minimize soil compaction	21	ac
SQL04	Use of Cover Crop Mixes	120	ac
SQL05	Use deep rooted crops to breakup soil compaction	80	ac
WQL17	Use of non-chemical methods to kill cover crops	1,624	ac
AIR01	Injecting or incorporating manure	40	ac
AIR04	Use drift reducing nozzles, low pressures, lower boom height and adjuvants to reduce pesticide drift	7,320	ac
AIR07	GPS, targeted spray application (SmartSprayer), or other chemical application electronic control tec	4,988	ac
WQL05	Apply nutrients no more than 30 days prior to planned planting date	6,305	ac
WQL06	Apply controlled release nitrogen fertilizer	6,024	ac
ENR03	Pumping plant powered by renewable energy	3	ea
WQT03	Irrigation pumping plant evaluation	1	ea
WQT04	Regional weather networks for irrigation scheduling	2,758	ac
449	Irrigation Water Management	928	ac

CTA Practice Summary 2009-2019			
100	Comprehensive Nutrient Management Plan	1	ea
327	Conservation Cover	3,443	ac
328	Conservation Crop Rotation	3,485	ac
329	No-Till	5,051	ac
344	Residue Management, Seasonal	2,022	ac
345	Reduced Till	41	ac
382	Fence	15,903	ft
386	Field Border	2	ft
393	Filter Strip	1	ac
430	Irrigation Pipeline	3,422	ft
442	Sprinkler System	194	ac
449	Irrigation Water Management	882	ac
511	Forage Harvest Management	18	ac
512	Forage and Biomass Planting	26	ac
516	Livestock Pipeline	45,034	ft
528	Prescribed Grazing	47,644	ac
587	Structure for Water Control	2	ea
590	Nutrient Management	4,065	ac
595	Pest Management Conservation System	2,374	ac
614	Watering Facility	18	ea
633	Waste Recycling	995	ea
642	Water Well	6	ea
644	Wetland Wildlife Habitat Management	1	ac
645	Upland Wildlife Habitat Management	2,054	ac
649	Structures for Wildlife	1	ea
PLT01	Establish pollinator habitat	1	ac

Partner Conservation Efforts

Prairie County Conservation District (PCCD) has been a very effective partner for conservation projects in the county. Prairie County Cooperative State Grazing District and Prairie County Extension are partners NRCS relies on regularly for assistance in outreach and education. Ongoing projects include participation in the Extension/Grazing District Winter Series, Tri-County Weed Tour and the annual Grazing District meeting. Bureau of Land Management is an ongoing partner due to the large proportion of federal lands in the county.

From 1996 through 2004, a major cooperative project was completed with Buffalo Rapids Irrigation District #2. Many of the laterals and canals were replaced with high pressure pipelines to deliver water directly to fields. Several producers also installed gated pipe systems on their fields. Through this project, irrigation water management was implemented on over 2,800 acres of crop land.

From 1998 through 2001, the Terry NRCS office and Prairie County Conservation District worked to complete an evaluation of all streams within the county that appeared on the 303(d) impaired stream list. Through this effort, all streams were removed from the list with the exception of five reaches.

Beginning in 2018, Terry NRCS and Montana Rangelands Partnership began a collaborative effort to increase the awareness and implementation of range monitoring across the county. The effort included a monitoring meeting and workshop in addition to on the ground assistance with producers to begin monitoring on their ranches. Since inception, more than 46,000 acres have implemented a monitoring program through this partnership. Among the attributes recorded with each monitoring site are plant species, bare ground, biomass and trend.

In 2019, a new partnership with American Bird Conservancy (ABC) was formed to bring awareness to and address threats to ground-nesting birds in our county. The mission of ABC is to conserve native birds and their habitats across the Americas.

Conservation Activity Progress

Prairie County Local Working Group (LWG) has been focused on rangeland health, cropland health and irrigation efficiency for the last five to 10 years. Structures such as livestock pipelines, watering facilities, conversion of open ditch to pipeline and sprinkler systems are a few of the common practices that were installed. Historical LWG meeting minutes can be found in Appendix B.

In 2019, the LWG embraced the programmatic changes and shift to a focused conservation effort. Those in attendance indicated that their primary resource concerns are: *Livestock Production – Lack of Adequate Water and Wildlife Habitat.* Concerns mentioned on the survey and at the LWG meeting include: soil erosion on trails, reservoir spillways and on the landscape as a whole, wildlife friendly fencing, pollinator habitat, flood to pivot/drip, weed seed transfer in irrigation water, decommissioning or valving artesian wells, and lining/pipelining irrigation canals and laterals.

IV. Natural Resource Problems and Desired Future Outcomes

The Prairie County Local Working Group identified *Livestock Production – Lack of Adequate Water & Wildlife Habitat* as their top two priorities in 2019 (see Appendix C).

Livestock Production – Lack of Adequate Water & Wildlife Habitat
Prairie County is a small county, approximately 1.1 million acres, that is about 82% rangeland. Ownership is 49% private, 49% Federal land managed by the Bureau of Land Management (BLM), and two percent State, all in a "checkerboard" pattern due to homesteads being turned back to the government. Historically, Prairie County land managers have been very progressive in implementing improvements to the grazing land. Many small dams have gradually been replaced with wells, windmills, pipelines and tanks where practical. A review of Prairie County in ArcMap shows a water development on approximately two thirds of the sections. Using the Rangeland Analysis Platform (https://rangelands.app/) estimated rangeland cover in Prairie County has seen an increase in perennial plant cover and a decrease in bare ground, to 66% and 10% respectively in 2018, over the past 10 years.

After hearing from other Natural Resources Conservation Service (NRCS) field offices that producer participation in Local Work Group (LWG) meetings had been low, the Terry Field Office and Prairie County Conservation District decided to take a different approach to the planning process. In March of 2019, a letter with a survey was sent to all producers listed in Farm Service Agency records (117 total) in Prairie County. The letter (attached) explained the new Focused Conservation process that is being implemented in Montana. The survey (attached) asked for producer feedback on an issue that had been repeatedly presented to the NRCS staff in recent years, replacing windmills with solar pumping units.

Forty-seven surveys were returned, 40%, with 25 producers stating they would be ready to contract immediately for this practice on 45 systems. There were seven additional producers and a total of 33 systems identified on BLM**.** Producers were encouraged to list other resource issues that they see in the county. There were 38 responses listing 15 resource issues that fall within the scope of six NRCS Resource Concerns (see the survey summary attached).

A LWG meeting was held May 15, 2019 with four producers and seven businesses and agencies represented. During the LWG meeting, it was noted by participants that in addition to providing livestock water, removal of the windmill tower would eliminate avian predation on ground nesting birds by removing the predator perch. It was also suggested that we add removal of non-functioning windmills and decommissioning the associated wells.

We followed up with a few partners who were unable to attend the LWG meeting. Prairie County Extension Service suggested adding Soil Health issues to the list of issues. As windmill towers present a perch from which avian predators can attack ground nesting birds and small mammals, American Bird Conservancy provided feedback on the benefits of this project in relation to wildlife habitat. Martin Ellenburg, Miles City NRCS area Biologist, suggested the addition of bird deterrent strips to discourage predators from perching on the solar panels.

By interpreting the information from the producer survey, there are an estimated 200 to 250 windmills in Prairie County on all land ownerships. Producers are concerned that many of these systems have passed their life expectancy and parts are very difficult to find to keep them functioning. Additionally, producers find that during the peak rangeland use period of June to September, the average high temperature in Terry is 82 degrees. Two in 10 years will see a maximum average high temperature of 102 degrees according to the Prairie County Soil Survey. During this same time the average daily wind speed to operate windmills drops to under 5 miles per hour (MT AGRIMET-Terry). Less than 5 mph wind speed is not enough to effectively run a windmill for pumping. NRCS specification requires 20 gallons of water storage per cow/calf per day; however, at 100 degrees the need could as much as 60 gallons per day, according to Church and Pond in the Second Edition of "Basic Animal Nutrition and Feeding". The combination of increased water needs and decreased power (wind) for pumping creates a significant problem for producers. Some have adequate water storage to maintain for a day or even two, but many are forced to supplement with a generator or small engine powered pump jack.

Removing the windmill towers from these sites will remove the protection that the structure has provided to the well and groundwater. These wells will need to be capped as abandoned wells are a direct source of nutrients, sediment and chemicals leaking into the ground water.

Two common ground nesting species in Prairie County are sharp-tailed grouse and greater sage-grouse. A review of the lek locations in relation to watering facilities found 1/2 of the leks are located within 1,700 feet of a watering facility, many of those are windmills, which serve as roosts for avian predators. Other prairie birds and small mammals are often preyed upon by the same predators. There are numerous other prairie birds that inhabit Prairie County, including the chestnut-collared longspur and Baird's sparrow which have been designated as priority species (http://mtnhp.org/).

The proposed solution is to remove windmills in Prairie County to provide adequate water via solar or generator systems for livestock and reduce perches for predators of ground nesting prairie birds and small mammals. If a windmill is associated with a non-functioning well, the windmill will be removed and the well decommissioned to eliminate the risk of contaminants entering the ground water. If a system has been changed and the windmill is no longer being used, it will be removed and adequate water storage would be added. Replacing the windmill powered water pumps with solar powered systems or generators will provide a more reliable summer water supply for livestock. Water storage to meet NRCS specifications will be provided in each grazing unit addressed.

To reduce the potential for the new solar system becoming a perch for avian predators, bird deterrent strips will be placed on the solar panels. This approach has been used in other areas to deter perching. An example is Wyoming's Upper Green River Basin Sage-Grouse Working Group, which completed a successful program to replace windmills powering water pumps for livestock troughs with solar panels

Looking ahead, Prairie County has other natural resource issues that will eventually need to be addressed.

Rangeland Health - Invasive Species and Proper Grazing Use

Many rangeland owners in Prairie County have varying levels of sustainability issues. Overgrazing, noxious weed invasion (including annual grasses), and insufficient livestock water and fencing to facilitate a prescribed grazing plan are a few of the contributing factors associated with the declining rangeland health. This is an issue that is a priority because the consequences of taking no action include: wildlife habitat degradation, continued loss of native plant diversity, forage loss for livestock, increased soil erosion, reduced ecological function and reduced economic viability of agricultural operations.

Invasive species encroachment has continued despite practices used to enhance the rangeland that include: cross fences, stock water improvements and basic grazing rotations. Although many of the invasive species have been in the area for decades, there has been an exponential increase over the past few decades according to producers and the Prairie County Extension Service. The recent increases may be due to fire suppression, improper grazing on private land and increased pathways for dispersal and conveyance of plant seed.

The primary goals are to stop the expansion of declining rangeland health and reduce the extent of the rangeland sustainability problem. To make a demonstrable impact on rangeland in the county a large percentage of the acreage needs to be treated for weeds and grazing management implemented. To accomplish this, we will need to conduce outreach and implement herbaceous weed control and facilite practices such as prescribed grazing, cross fencing and water developments.

Water Quality & Quantity

The Yellowstone and Powder Rivers are valuable spawning and rearing habitat for fish and are important for wildlife. Additionally, their uses for livestock water and irrigation are invaluable.

With low rainfall in the region, irrigation is necessary to support crop and hay production. Nearly all irrigated land in Prairie County is adjacent to the rivers and is supplied by diverted or pumped surface water. There are very few groundwater wells suitable for irrigation in Prairie County. The continued threat of upstream and senior water right holders using water is significant. Further, upstream contamination of surface water is a valid concern. There is a large opportunity to improve irrigation efficiencies through the conversion of open ditches to pipe, flood systems to sprinklers or drip, and irrigation water management.

Off-stream water for livestock is a significant concern in Prairie County. Recent drought years have resulted in producers with pastures that are under-utilized during the warm season when runoff water to fill reservoirs is scarce. This leaves producers little choice, forcing them

to over-utilize pastures that have previously developed water or riparian areas. Those pastures with riparian water are more prone to degradation from livestock.

A third lingering issue with water quantity are the innumerable free-flowing artesian wells throughout the county. As the water flows to the surface, the aquifer is continually depleted. The long-range implications of this issue are immense, and the solution is relatively simple. The number of systems needing improvements has decreased as more systems are upgraded; however, the problem persists as funding has continued to decrease. Off-stream water developments are occasionally funded, but there is still a substantial need in the county. The primary goal is to increase the development of off-stream water across the county and to cap the free-flowing artesian wells. This will take cooperation from the partners involved and the landowners. Outreach needs to occur to provide information to the landowners on the cost-share assistance programs and determine the landowners willing to participate.

Soil Health

As with rangelands, nearly every cropland producer in Prairie County has varying levels of sustainability regarding soil health. Soil health, or continued capacity of soil to function as a vital living ecosystem, is the key to water regulation, the ability to grow crops, filter and buffer potential pollutants, cycle nutrients and maintain structure. Poor infiltration, compaction, low diversity, and low organic matter are all symptoms of poor soil health. All of these symptoms are worsened by overuse of tillage, lack of diversity in the rotation and no cover on the soil surface. The consequences of taking no action has long-term implications for sustainability, profitability, and the production of food and fiber. Currently, only a handful of Prairie County producers utilize tools to improve their soil health and sustainability.

The primary goals are to improve the health of soils in Prairie County. To make a demonstrable impact on cropland, a large percentage of the acreage needs to have tillage operations reduced, crop diversity increased, and cover crops incorporated into the rotation. To accomplish this, we will need to conduct outreach to determine the number of landowners willing to participate by using reduced tillage, cover crops and other facilitating practices.

Appendix A
Yellowstone River Cumulative Effects Analysis
Reaches C21, D1, D2 & D3

County	Custer	**Upstream River Mile**	158.7
Classification	CM: Confined meandering	**Downstream River Mile**	149.2
General Location	To Powder River confluence	**Length**	9.50 mi (15.29 km)

Narrative Summary

Reach C21 is 9.5 miles long and extends from River Mile (RM) 158.7 downstream to the mouth of the Powder River at RM 149.2. It is a Confined Meandering (CM) reach type, as the river flows down a sinuous course that is highly confined by Fort Union Formation sandstones and younger erosion–resistant terraces.

Reach C21 has just over 4,000 feet of rock riprap and 71 feet of mapped flow deflectors, which collectively armor 4.1 percent of the total stream bank. About one half of the armor is protecting road embankments, and the other half is protecting the railroad.

Bear Rapids forms two distinct shoals as bedrock shelves in the river between RM 153 and RM 154 near the mouth of Camp Creek.

Between 1950 and 2001 there was about 53 net acres of riparian encroachment into the channel, and the bankfull channel area decreased by ~58 acres, indicating a diminishing river size over the last half-century. This trend is common below the mouth of the Bighorn River, where flow alterations have reduced peak flows and cause the active river channel to shrink. Consumptive water uses, primarily associated with irrigation, have contributed to the reduced flows.

Land use is dominated by agriculture with 164 acres of the ~7,000 acre mapping footprint occupied by transportation-related land uses. There is one ~0.6 acre series of corrals near the mouth of Mack Creek at RM 157.2R that are within 200 feet of the river. There are also several acres of corrals within 300 feet of the river on the left bank at RM 154.9L. At RM 153.3R there is another much larger series of corrals that are within 500 feet of Camp Creek.

There are 49 acres of Russian olive in the reach, which appears to dominate riparian areas.

A hydrologic evaluation of flow depletions indicates that flow alterations over the last century have been major in this reach. The 100-year flood has dropped by 19 percent. The 2-year flood, which strongly influences overall channel form, has dropped by 24 percent. Low flows have also been impacted; severe low flows described as 7Q10 (the lowest average 7-day flow anticipated every ten years) for summer months has dropped from an estimated 5,080 cfs to 3,140 cfs with human development, a reduction of 38 percent. More typical summer low flows, described as the summer 95% flow duration, have dropped from 6,730 cfs under unregulated conditions to 3,510 cfs under regulated conditions, a reduction of 48 percent.

CEA-Related observations in Reach C21 include:
- Natural channel stability provided by bedrock
- Minimal bank armoring

Recommended Practices (may include Yellowstone River Recommended Practices--YRRPs) for Reach C21 include:
- Russian olive removal
- Nutrient management at corrals at RM 157.2R and RM 153.2R, and 154.9L

Yellowstone River Reach Narratives — Reach C21

The following table summarizes some key CEA results that have been used to describe overall condition and types of human influences affecting the river. The values are specific to this single reach. Blanks indicate that a particular value was not available for this area. This information is consolidated from a large dataset that is presented in more detail in the full reach narrative report.

Discharge

	Undev.	Developed	% Change
2 Year (cfs)	63,900	48,600	-23.9%
100 Year (cfs)	119,000	96,800	-18.7%

"Undeveloped" flows represent conditions prior to significant human development, whereas "developed" flows reflect the current condition of both consumptive and non-consumptive water use.

Bankfull Channel Area (Ac)

1950	1976	1995	2001	1950-2001
973.2	929.6	936.0	914.8	-58.4

Bankful channel area is the total footprint of the river inundated at approx. the 2-year flood.

Physical Features

	2011 Length (ft)	% of Bankline	2001-2011 Change
Rock RipRap	4,024	4.0%	-41
Concrete Riprap	0	0.0%	0
Flow Deflectors	71	0.1%	71
Total	**4,096**	**4.1%**	**30**

There are additional types of bank armor such as car bodies and steel retaining walls, but they are relatively minor.

Length of Side Channels Blocked (ft)

Pre-1950s	Post-1950s
0	0

Numerous side channels have been blocked by small dikes.

Floodplain Turnover

	1950 - 1976	1976 - 2001
Total Acres	64.9	62.0
Acres/Year	2.5	2.5
Acres/Year/Valley Mile	0.3	0.3

1950-2001 In-channel riparian encroachment (negative number indicates retreat): 53.32 acres

The rate of floodplain turnover reflects how many acres of land are eroded by the river. Tunover is associated with the creation of riparian habitat.

Open Bar Area

	Point Bars	Bank Attached	Mid-Channel	Total
Change in Area '50 - '01 (Ac)	29.2	76.2	-1.1	104.4

The type and extent of open sand and gravel bars reflect in-stream habitat conditions that can be important to fish, amphibians, and ground-nesting birds such as least terns.

Floodplain Isolation

	Acres	% of FP
5 Year	95.2	35%
100 Year	12.7	3%

Floodplain isolation refers to area that historically was flooded, but has become isolated do to flow alterations or physical features such as levees.

Restricted Migration Area

Acres	% of CMZ
2.4	0%

Channel Migration Zone restrictions refer to the area and percent of the CMZ that has been isolated by features such as bank armor, dikes, levees, and transportation embankments.

Land Use

	1950	2011
Agricultural Land (Ac)	6,629.3	6,527.2
Ag. Infrastructure (Ac)	35.4	99.7
Exurban (Ac)	0.0	11.1
Urban (Ac)	0.0	0.0
Transportation (Ac)	100.5	163.8

	1950	2011
Flood (Ac)	1,799.1	1,915.9
Sprinkler (Ac)	0.0	0.0
Pivot (Ac)	0.0	0.0

Changes in land use reflect the development of the river corridor through time. The irrigated agricultural are is a sub-set of the mapped agricultural land.

1950s Riparian Vegetation Converted to a Developed Land Use (ac)

To Irrigated	To Other Use	Total Rip. Converted	% of 1950s Rip.
0.0	1.2	1.2	1.0%

Changes in the extents of riparian vegetation are influenced by land use changes within the corridor.

National Wetlands Inventory

	Acres	Acres per Valley Mi
Riverine	7.7	0.9
Emergent	61.4	7.2
Scrub/Shrub	10.5	1.2

Total Wetland Acres: **79.6**

Wetlands units summarized from National Wetlands Inventory Mapping include Riverine (typically open water sloughs), Emergent (marshes and wet meadows) and Shrub-Scrub (open bar areas with colonizing woody vegetation).

Russian Olive (2001) (Appx. 100-yr Floodplain)

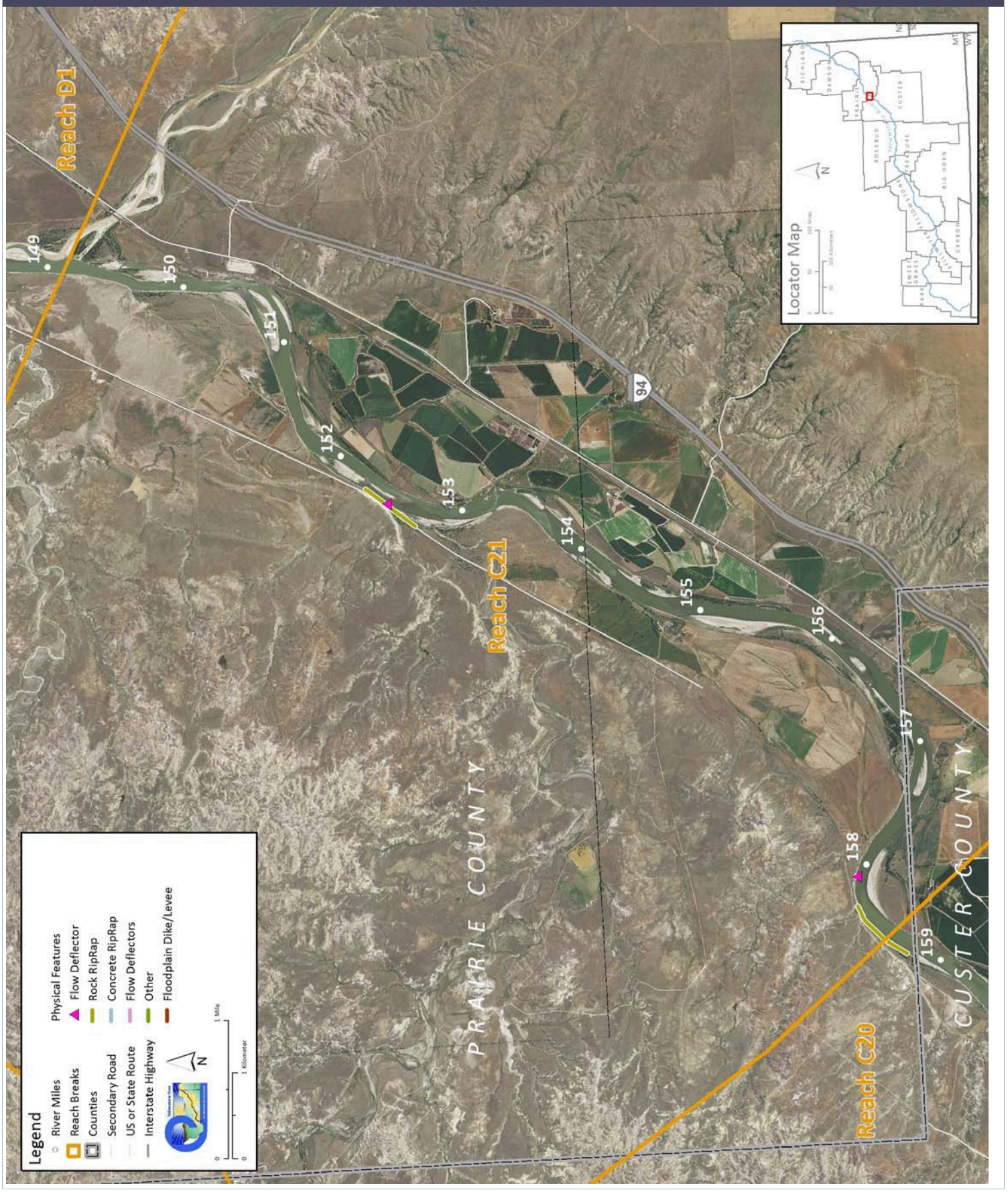
Acres	%
48.6	0.8%

Russian olive is considered an invasive species and its presence in the corridor is fairly recent. Its spread can be used as a general indicator of invasive plants within the corridor.

Riparian Forest at low risk of Cowbird Parasitism (Ac/Valley Mile)

1950	1976	2001	Change 1950-2011
8.9	3.3	7.5	-1.4

Cowbirds are associated with agricultural and residential development, displacing native bird species by parasitizing their nests.


Reach D1
149
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Reach C21
PRAIRIE COUNTY
CUSTER COUNTY
Reach C20
Locator Map
Legend
River Miles
Reach Breaks
Counties
Secondary Road
US or State Route
Interstate Highway
Physical Features
Flow Deflector
Rock RipRap
Concrete RipRap
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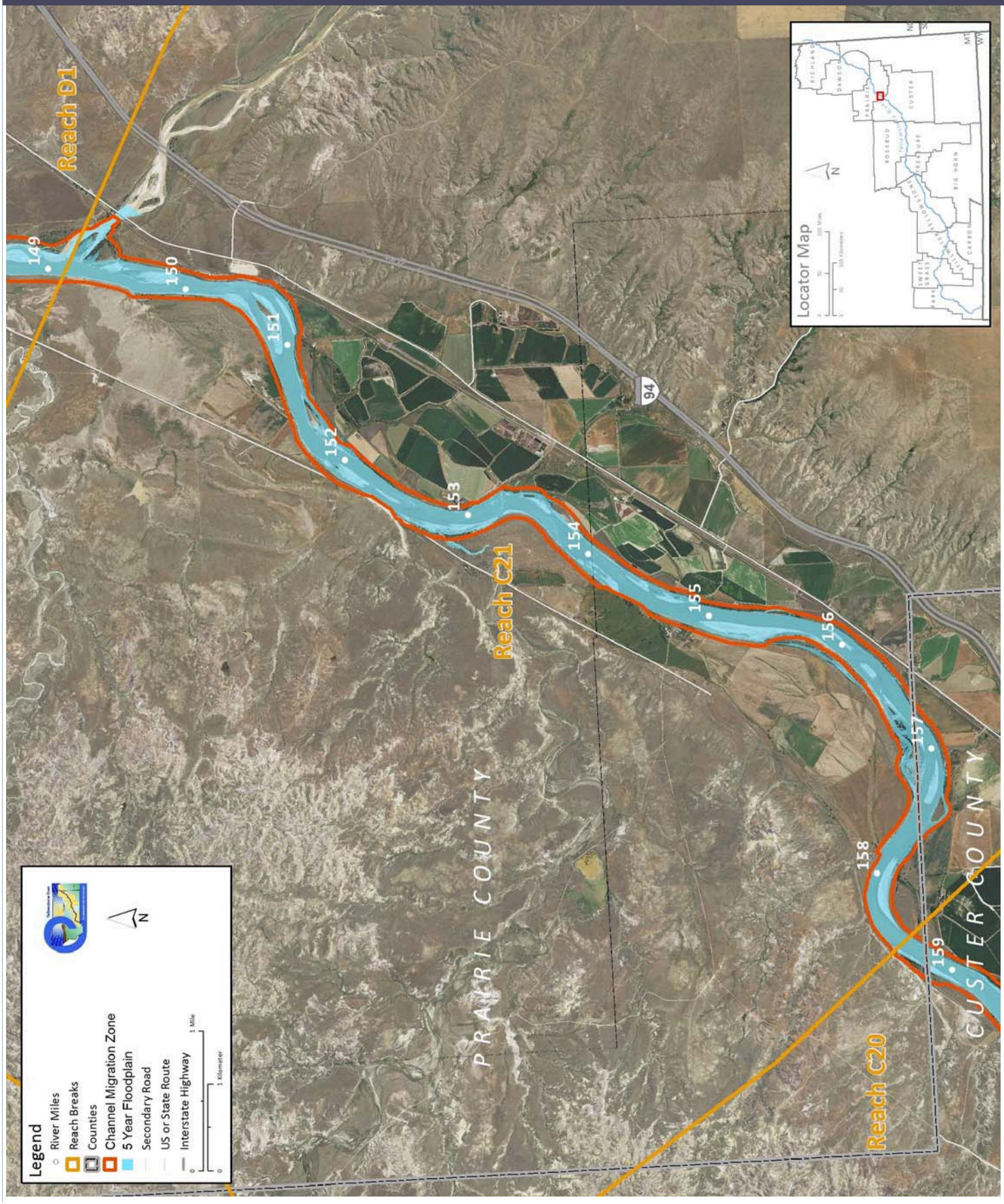
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Reach C21
PRAIRIE COUNTY
CUSTER COUNTY
Reach C20
Locator Map
Legend
River Miles
Reach Breaks
Counties
Channel Migration Zone
5 Year Floodplain
Secondary Road
US or State Route
Interstate Highway
1 Mile
1 Kilometer

Yellowstone River Reach Narratives — Reach D1

County	Prairie	**Upstream River Mile**	149.2
Classification	CM: Confined meandering	**Downstream River Mile**	137
General Location	To Terry Bridge	**Length**	12.20 mi (19.63 km)

Narrative Summary

Reach D1 is located in Prairie County, and extends from just below the mouth of the Powder River to Terry. The reach is a 12.2 mile long Confined Meandering (CM) reach type, indicating that the river flows along a meandering course that is confined by older geologic units. Sandstones of the Fort Union Formation and younger erosion-resistant terraces confine the channel through the reach. Because of the geologic confinement, channel migration rates are low and the riparian corridor is notably thin or absent. There is one Fishing Access Site at the upper end of the reach at the Powder River confluence (Powder River Depot).

There are less than 1000 feet of bank armor in the reach; including about 550 feet of rock riprap and 140 feet of flow deflectors. The flow deflectors were all built between 2001 and 2011. During that timeframe there was a loss of 650 feet or rock riprap where it was protecting an old railroad bridge at RM 144.5. The bridge was built in 1907 for the railroad and now serves County Road 42.

Wolf Rapids is located on the apex of a large meander at RM 146. These rapids are formed from an exposed bedrock shelf that extends across the entire river.

Reach D1 has lost almost a mile of side channel length since 1950, but none of this loss has been associated with intentional blockages. There has been 126 acres of riparian recruitment into abandoned 1950s channels.

Land use is predominantly agricultural, and there has been 310 acres of land developed under pivot irrigation. There are two animal handling facilities just north of Terry that are adjacent to old swales. One dump site was mapped on the right bank of the river at RM 137.5R, about ¾ miles upstream from the Terry Bridge.

About 51 percent of the historic 5-year floodplain has become isolated, primarily due to flow alterations. The abandoned Milwaukee rail line embankment has been breached by river erosion in several locations on the south side of the river.

A total of four ice jams have been reported in the reach. One of these events was in February (1996), and three occurred in March (1993, 2009, and 2011). No damages were reported.

There are about 20 acres of mapped Russian olive in the reach.

A hydrologic evaluation of flow depletions indicates that flow alterations over the last century have been major in this reach. The 2-year flood, which strongly influences overall channel form, has dropped by 22 percent. Low flows have also been impacted; severe low flows described as 7Q10 (the lowest average 7-day flow anticipated every ten years) for summer months has dropped from an estimated 4,850 cfs to 2,810 cfs with human development, a reduction of 42 percent. More typical summer low flows, described as the summer 95% flow duration, have dropped from 6,940 cfs under unregulated conditions to 3,270 cfs under regulated conditions, a reduction of 53 percent.

CEA-Related observations in Reach D1 include:
- Breaching of abandoned Milwaukee Railroad line

Recommended Practices (may include Yellowstone River Recommended Practices--YRRPs) for Reach D1 include:
- Dump site Practice at RM 137.5R
- Russian olive removal

Yellowstone River Reach Narratives — Reach D1

The following table summarizes some key CEA results that have been used to describe overall condition and types of human influences affecting the river. The values are specific to this single reach. Blanks indicate that a particular value was not available for this area. This information is consolidated from a large dataset that is presented in more detail in the full reach narrative report.

Discharge

"Undeveloped" flows represent conditions prior to significant human development, whereas "developed" flows reflect the current condition of both consumptive and non-consumptive water use.

	Undev.	Developed	% Change
2 Year (cfs)	68,200	53,000	-22.3%
100 Year (cfs)	140,000	119,000	-15.0%

Bankfull Channel Area (Ac)

Bankful channel area is the total footprint of the river inundated at approx. the 2-year flood.

1950	1976	1995	2001	1950-2001
1,265.9	1,213.5	1,213.1	1,230.9	-34.9

Physical Features

There are additional types of bank armor such as car bodies and steel retaining walls, but they are relatively minor.

	2011 Length (ft)	% of Bankline	2001-2011 Change
Rock RipRap	545	0.4%	-651
Concrete Riprap	0	0.0%	0
Flow Deflectors	243	0.2%	243
Total	**787**	**0.6%**	**-409**

Length of Side Channels Blocked (ft)

Numerous side channels have been blocked by small dikes.

Pre-1950s	Post-1950s
0	0

Floodplain Turnover

The rate of floodplain turnover reflects how many acres of land are eroded by the river. Tunover is associated with the creation of riparian habitat.

	1950 - 1976	1976 - 2001
Total Acres	88.0	68.1
Acres/Year	3.4	2.7
Acres/Year/Valley Mile	0.4	0.3

1950-2001 In-channel riparian encroachment (negative number indicates retreat)
7.17 acres

Open Bar Area

The type and extent of open sand and gravel bars reflect in-stream habitat conditions that can be important to fish, amphibians, and ground-nesting birds such as least terns.

	Point Bars	Bank Attached	Mid-Channel	Total
Change in Area '50 - '01 (Ac)	-50.3	92.6	12.9	55.2

Floodplain Isolation

Floodplain isolation refers to area that historically was flooded, but has become isolated do to flow alterations or physical features such as levees.

	Acres	% of FP
5 Year	95.5	51%
100 Year	14.9	3%

Restricted Migration Area

Channel Migration Zone restrictions refer to the area and percent of the CMZ that has been isolated by features such as bank armor, dikes, levees, and transportation embankments.

Acres	% of CMZ
11.8	1%

Land Use

Changes in land use reflect the development of the river corridor through time. The irrigated agricultural are is a sub-set of the mapped agricultural land.

	1950	2011
Agricultural Land (Ac)	6,528.5	6,539.6
Ag. Infrastructure (Ac)	7.0	56.6
Exurban (Ac)	0.0	16.2
Urban (Ac)	0.0	0.0
Transportation (Ac)	103.5	58.7

	1950	2011
Flood (Ac)	682.4	846.1
Sprinkler (Ac)	0.0	0.0
Pivot (Ac)	0.0	310.5

1950s Riparian Vegetation Converted to a Developed Land Use (ac)

Changes in the extents of riparian vegetation are influenced by land use changes within the corridor.

To Irrigated	To Other Use	Total Rip. Converted	% of 1950s Rip.
1.2	0.2	1.4	1.0%

National Wetlands Inventory

Wetlands units summarized from National Wetlands Inventory Mapping include Riverine (typically open water sloughs), Emergent (marshes and wet meadows) and Shrub-Scrub (open bar areas with colonizing woody vegetation).

	Acres	Acres per Valley Mi
Riverine	27.0	3.0
Emergent	18.0	2.0
Scrub/Shrub	0.0	0.0

Total Wetland Acres
45.0

Russian Olive (2001) (Appx. 100-yr Floodplain)

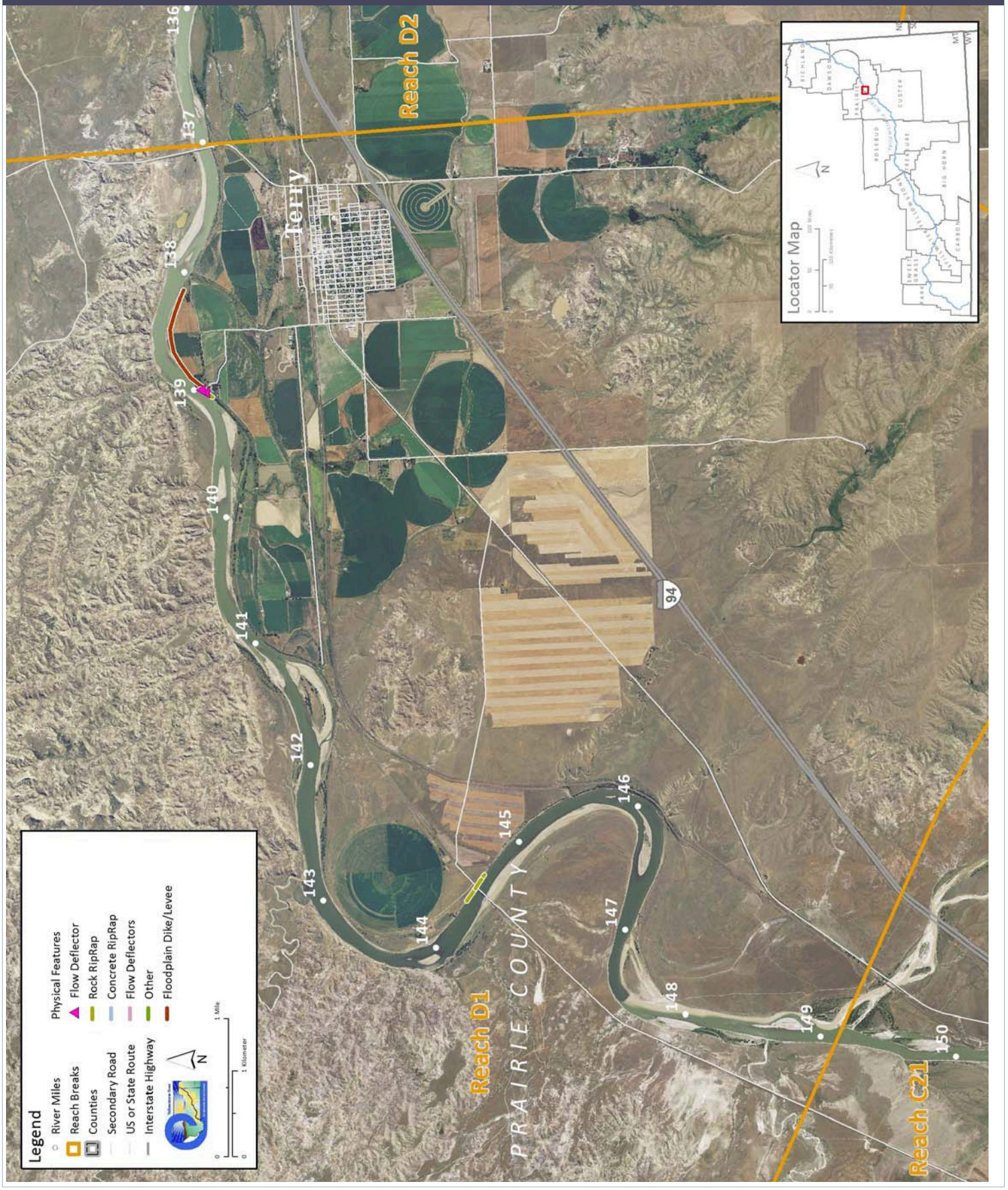
Russian olive is considered an invasive species and its presence in the corridor is fairly recent. Its spread can be used as a general indicator of invasive plants within the corridor.

Acres	%
19.9	1.4%

Riparian Forest at low risk of Cowbird Parasitism (Ac/Valley Mile)

Cowbirds are associated with agricultural and residential development, displacing native bird species by parasitizing their nests.

1950	1976	2001	Change 1950-2011
5.8	2.9	3.4	-2.4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Locator Map
Legend
River Miles
Reach Breaks
Counties
Secondary Road
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Interstate Highway
Physical Features
Flow Deflector
Rock RipRap
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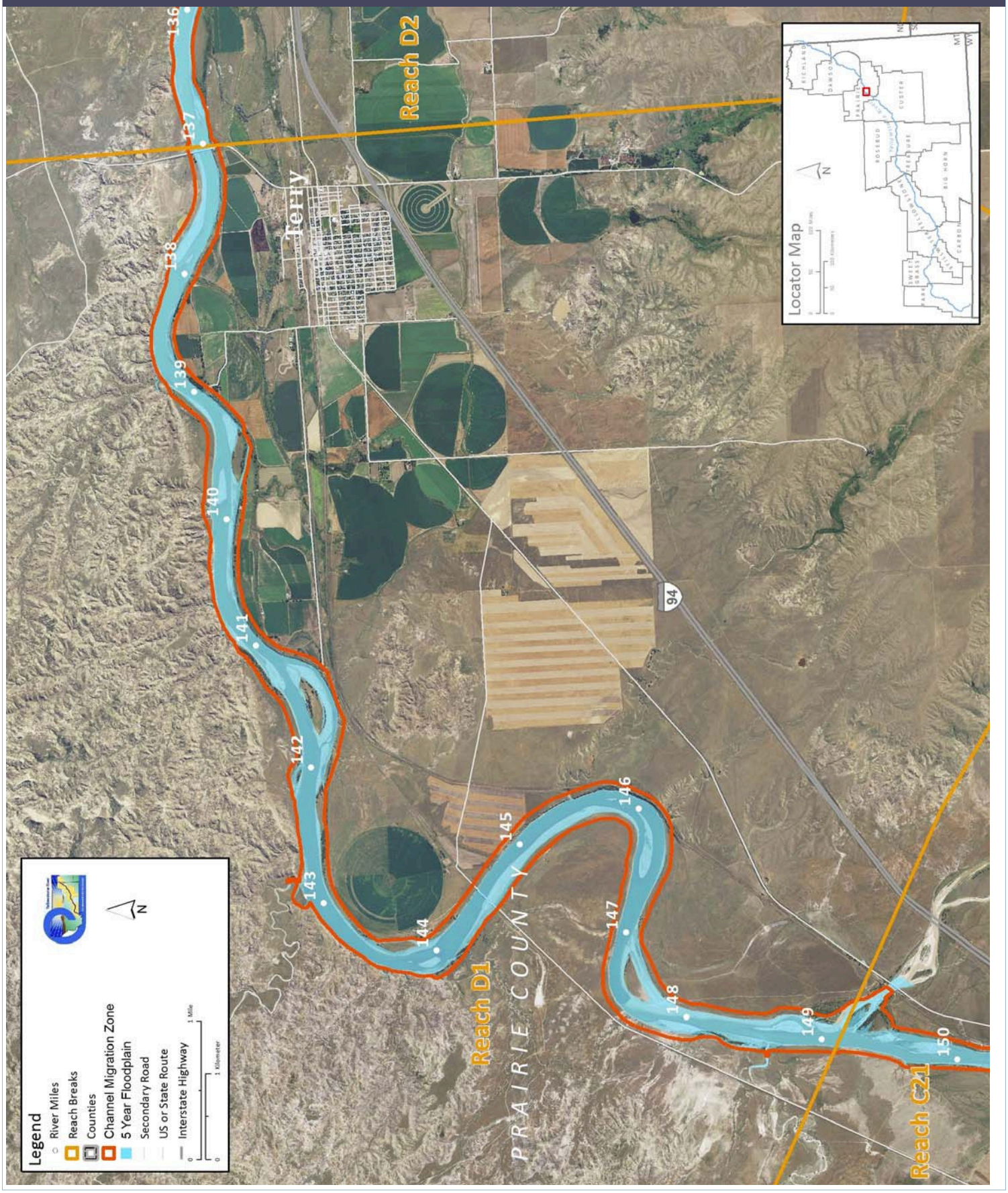
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Legend
River Miles
Reach Breaks
Counties
Channel Migration Zone
5 Year Floodplain
Secondary Road
US or State Route
Interstate Highway
1 Mile
1 Kilometer

Yellowstone River Reach Narratives — Reach D2

County	Prairie	**Upstream River Mile**	137
Classification	CM: Confined meandering	**Downstream River Mile**	126.5
General Location	To Fallon, I-90 Bridge	**Length**	10.50 mi (16.90 km)

Narrative Summary

Reach D2 is located in Prairie County, and extends from Terry to Fallon and the I-90 Bridge. The reach is a 10.5 mile long Confined Meandering (CM) reach type, indicating that the river flows along a meandering course that is confined by older geologic units. Sandstones of the Fort Union Formation and younger erosion-resistant terraces confine the channel through the reach. Because of the geologic confinement, channel migration rates are low and the riparian corridor is notably thin or absent. The Channel Migration Zone (CMZ) is extremely narrow because there has been essentially no bank migration in this reach since 1950.

There are just over 1,000 feet of bank armor in the reach; all of which is rock riprap that is protecting the Fallon Bridge.

Land use is predominantly agricultural with more acreage irrigated under pivot than under flood; as of 2011 there were 712 acres in flood and 1,070 acres in pivot in the reach. All of the pivots are on the north side of the river, and several of them extend to the river bank.

One dump site was mapped on the right bank at RM 135.1. There is also an animal handling facility on lower O'Fallon Creek near RM 130.

About 57 percent of the historic 5-year floodplain has become isolated, primarily due to flow alterations. There has been almost 50 acres of riparian encroachment in the reach, likely due to reduced 2-year flows.

Two ice jams have been reported in the reach. In early April of 1943, the breakup of ice jams at Fallon resulted in a 13 foot rise in the river stage at Intake. According to records, many of the farmers "remained in their homes, taking refuge in the attics and second floors of their homes, and some in the haylofts of their barns". More recently in February 1996, lowland flooding resulted from another ice jam breakup.

There are about 20 acres of mapped Russian olive in the reach.

Bluff pools and terrace pools make up 57 percent of the low flow fish habitat mapped in the reach, indicating that this reach may provide important areas for fish species that prefer this habitat type.

O'Fallon Creek enters the Yellowstone River at RM 129. The lowermost 3,100 feet of this creek has been diked off, and the channel now bypasses that remnant and flows directly into the Yellowstone. This abandoned channel supports some emergent wetland and could potentially provide excellent restoration opportunities for wetlands and slackwater areas connected to the Yellowstone River in this highly confined reach.

A hydrologic evaluation of flow depletions indicates that flow alterations over the last century have been major in this reach. The 2-year flood, which strongly influences overall channel form, has dropped by 22 percent. Low flows have also been impacted; severe low flows described as 7Q10 (the lowest average 7-day flow anticipated every ten years) for summer months has dropped from an estimated 4,850 cfs to 2,810 cfs with human development, a reduction of 43 percent. More typical summer low flows, described as the summer 95% flow duration, have dropped from 6,940 cfs under unregulated conditions to 3,270 cfs under regulated conditions, a reduction of 53 percent.

CEA-Related observations in Reach D2 include:
- Breaching of abandoned Milwaukee Railroad line
- Diking of lower O'Fallon Creek and isolation of ~3,000 feet of historic tributary channel

Recommended Practices (may include Yellowstone River Recommended Practices--YRRPs) for Reach D2 include:
- Dump site YRRP at RM 137.5R
- Nutrient management at animal handling facility on lower O'Fallon Creek RM 130
- Russian olive removal

Yellowstone River Reach Narratives — Reach D2

The following table summarizes some key CEA results that have been used to describe overall condition and types of human influences affecting the river. The values are specific to this single reach. Blanks indicate that a particular value was not available for this area. This information is consolidated from a large dataset that is presented in more detail in the full reach narrative report.

Discharge

	Undev.	Developed	% Change
2 Year (cfs)	68,300	53,100	-22.3%
100 Year (cfs)	141,000	120,000	-14.9%

"Undeveloped" flows represent conditions prior to significant human development, whereas "developed" flows reflect the current condition of both consumptive and non-consumptive water use.

Bankfull Channel Area (Ac)

1950	1976	1995	2001	1950-2001
1,007.7	979.9	984.9	993.8	-13.9

Bankful channel area is the total footprint of the river inundated at approx. the 2-year flood.

Physical Features

	2011 Length (ft)	% of Bankline	2001-2011 Change
Rock RipRap	1,055	0.9%	166
Concrete Riprap	0	0.0%	0
Flow Deflectors	0	0.0%	0
Total	**1,055**	**0.9%**	**166**

There are additional types of bank armor such as car bodies and steel retaining walls, but they are relatively minor.

Length of Side Channels Blocked (ft)

Pre-1950s	Post-1950s
0	0

Numerous side channels have been blocked by small dikes.

Floodplain Turnover

	1950 - 1976	1976 - 2001
Total Acres	48.8	32.3
Acres/Year	1.9	1.3
Acres/Year/Valley Mile	0.2	0.1

1950-2001 In-channel riparian encroachment (negative number indicates retreat): 48.3 acres

The rate of floodplain turnover reflects how many acres of land are eroded by the river. Tunover is associated with the creation of riparian habitat.

Open Bar Area

	Point Bars	Bank Attached	Mid-Channel	Total
Change in Area '50 - '01 (Ac)	-117	51.9	3.4	-61.7

The type and extent of open sand and gravel bars reflect in-stream habitat conditions that can be important to fish, amphibians, and ground-nesting birds such as least terns.

Floodplain Isolation

	Acres	% of FP
5 Year	100.7	57%
100 Year	39.7	7%

Floodplain isolation refers to area that historically was flooded, but has become isolated do to flow alterations or physical features such as levees.

Restricted Migration Area

Acres	% of CMZ
5.6	0%

Channel Migration Zone restrictions refer to the area and percent of the CMZ that has been isolated by features such as bank armor, dikes, levees, and transportation embankments.

Land Use

	1950	2011
Agricultural Land (Ac)	7,045.8	6,783.1
Ag. Infrastructure (Ac)	9.7	60.7
Exurban (Ac)	0.0	3.2
Urban (Ac)	0.0	0.0
Transportation (Ac)	142.2	348.3

	1950	2011
Flood (Ac)	630.5	711.7
Sprinkler (Ac)	0.0	0.0
Pivot (Ac)	0.0	1,070.2

Changes in land use reflect the development of the river corridor through time. The irrigated agricultural are is a sub-set of the mapped agricultural land.

1950s Riparian Vegetation Converted to a Developed Land Use (ac)

To Irrigated	To Other Use	Total Rip. Converted	% of 1950s Rip.
2.4	2.8	5.2	2.0%

Changes in the extents of riparian vegetation are influenced by land use changes within the corridor.

National Wetlands Inventory

	Acres	Acres per Valley Mi
Riverine	11.0	1.1
Emergent	22.9	2.3
Scrub/Shrub	4.5	0.5

Total Wetland Acres: **38.4**

Wetlands units summarized from National Wetlands Inventory Mapping include Riverine (typically open water sloughs), Emergent (marshes and wet meadows) and Shrub-Scrub (open bar areas with colonizing woody vegetation).

Russian Olive (2001) (Appx. 100-yr Floodplain)

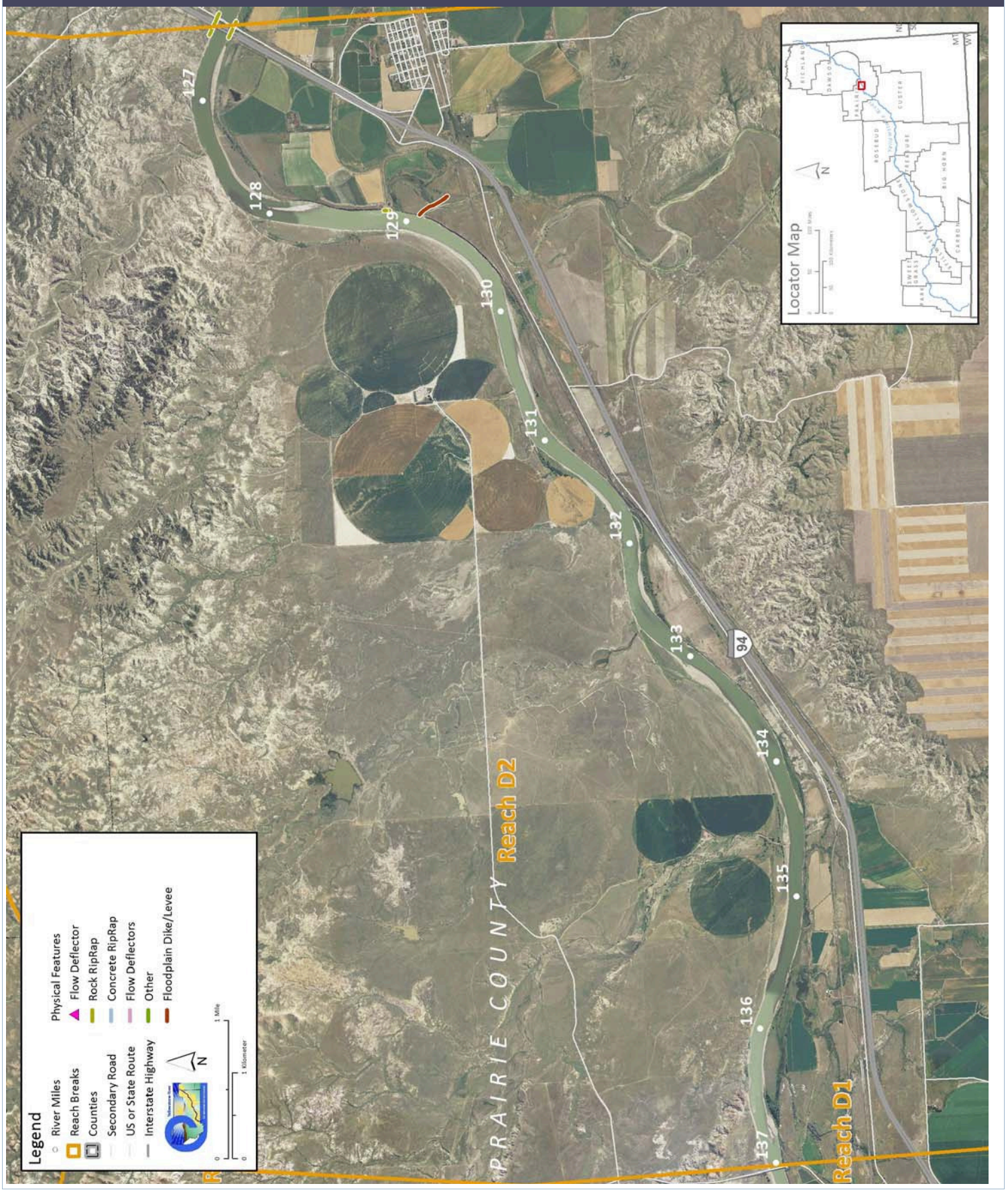
Acres	%
10.8	1.0%

Russian olive is considered an invasive species and its presence in the corridor is fairly recent. Its spread can be used as a general indicator of invasive plants within the corridor.

Riparian Forest at low risk of Cowbird Parasitism (Ac/Valley Mile)

1950	1976	2001	Change 1950-2011
7.2	1.6	7.4	0.2

Cowbirds are associated with agricultural and residential development, displacing native bird species by parasitizing their nests.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Physical Features
Flow Deflector
Rock RipRap
Concrete RipRap
Flow Deflectors
Other
Floodplain Dike/Levee
1 Mile
1 Kilometer
Locator Map
PRAIRIE COUNTY
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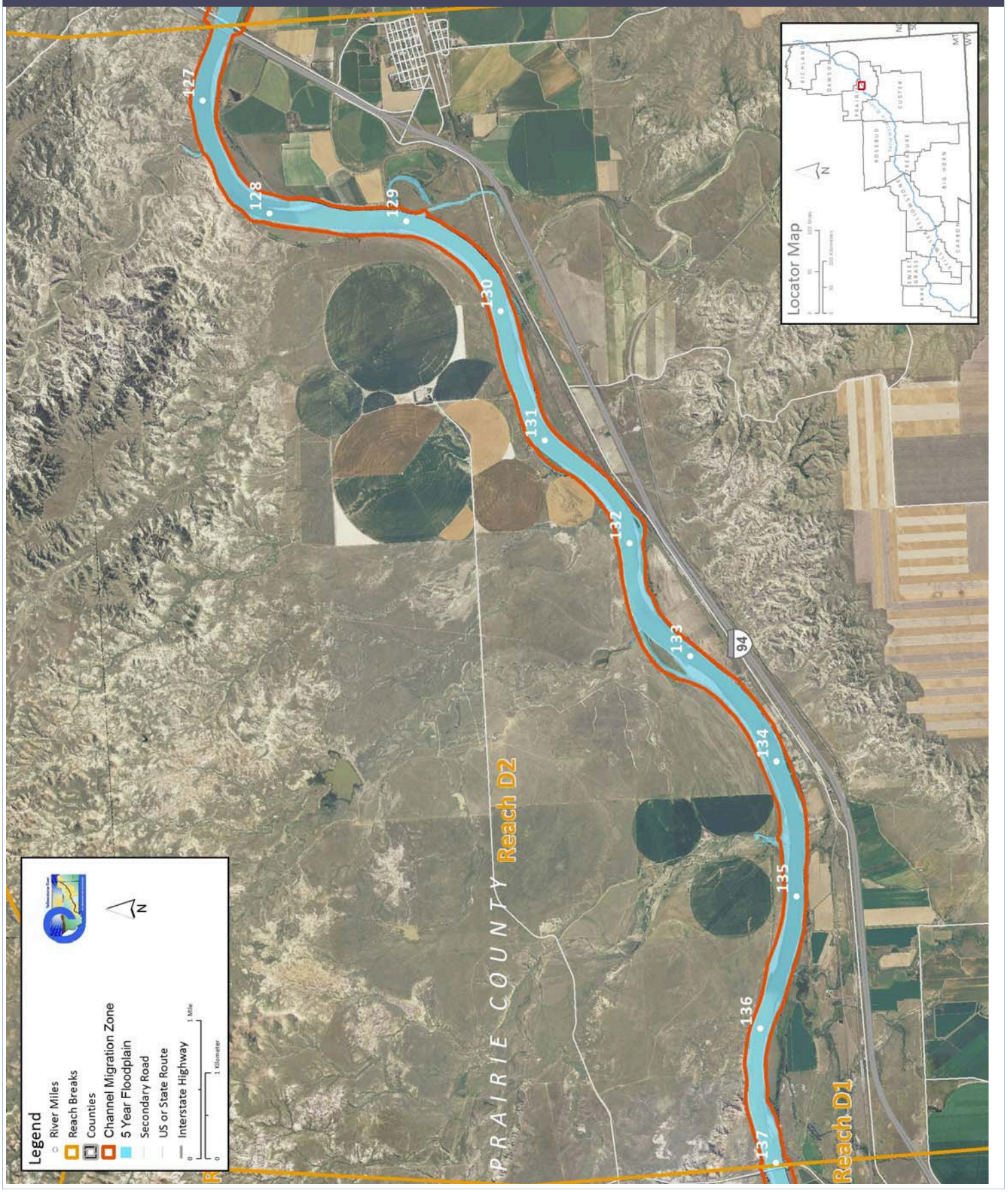
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Channel Migration Zone
5 Year Floodplain
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US or State Route
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1 Mile
1 Kilometer
Locator Map
PRAIRIE COUNTY
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Reach D1
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County	Prairie	**Upstream River Mile**	126.5
Classification	PCS: Partially confined straight	**Downstream River Mile**	118.1
General Location	Downstream of Fallon Bridge	**Length**	8.40 mi (13.52 km)

Narrative Summary

Reach D3 straddles the Prairie/Dawson County line, extending from the Fallon Bridge to about two miles into Dawson County. The reach is 8.4 miles long and has been classified as a Partially Confined Straight (PCS) reach type, indicating minimal meandering and some influence of the valley wall on river form and process. Sandstones of the Fort Union Formation typically form the south bank, and younger erosion-resistant terraces confine the channel to the north. Because of the geologic confinement, channel migration rates are low and the riparian corridor is notably thin or absent. The Channel Migration Zone (CMZ) is extremely narrow because there has been only minor bank migration in this reach since 1950. All of the migration measured in the reach was at RM 123, where the river abruptly hits the south valley wall and apparently backwaters as it has developed a series of islands that drive local bank movement. From 1950 to 2011, the right bank migrated almost 900 feet at this single location. These islands provide areas for riparian colonization and habitat for bird species such as least terns.

Approximately 1,500 feet of bank armor have been mapped in the reach; about 2/3 of that armor protects the Interstate Bridge, with the remainder (600 feet) protecting irrigated land. Two pipelines cross the river about 1,000 feet downstream from the Interstate Bridge. One is an 8-inch petroleum product line that has been abandoned and purged, and the other is a product line that was directionally drilled in 1999. About 4,000 feet downstream from the Fallon Bridge, three large bridge piers from an old trestle remain in the middle of the river.

The Glendive Pump Station #1 is located about two miles downstream of the Fallon Bridge at RM 124.5L and is part of the Glendive Unit of the Buffalo Rapids Project. Construction of the unit began November 12, 1937, with ground breaking for excavation of the main canal. The following April 1938, excavation began on the lateral system. The first operation of the pumping station occurred on September 26, 1939, before the Unit was completed; diverted water was allowed to flow about ten miles down the main canal. Ice damage in 2012 required in extensive repairs to the pumping station. The unit serves 16,500 acres of irrigated land.

Land use in Reach D3 is predominantly agricultural, with about 600 acres of pivot irrigation development since 1950. All of the pivots are on the north side of the river, and several of them extend to the river bank and into the CMZ. In total, 57 acres of land under pivot irrigation are within the CMZ, making them especially prone to the threat of bank erosion. Although there has been extensive pivot development, most irrigated land had remained in flood irrigation in 2011 (1,500 acres).

Dump sites were mapped on the banks or in adjacent riparian areas at RM 125.6R, RM 124.2L, and RM 122L.

The most recently available map of the proposed Keystone Pipeline route shows that the line would cross the Yellowstone River at the lower end of Reach D3, at approximately RM 118.2 (www.keystone.steamingmules.com). The river is at Milepost 198 on the proposed pipeline route.

About 108 acres or 49 percent of the historic 5-year floodplain has become isolated in Reach D3, primarily due to flow alterations.

There are 11 acres of mapped Russian olive in the reach.

Bluff pools and terrace pools make up 22 percent of the low flow fish habitat mapped in the reach, indicating that this reach may provide important areas for fish species that prefer this habitat type.

A hydrologic evaluation of flow depletions indicates that flow alterations over the last century have been major in this reach. The magnitude of the 100-year flood is now 20,000 cfs or 14 percent lower than it was pre-development. The 2-year flood, which strongly influences overall channel form, has dropped by 22 percent. Low flows have also been impacted; severe low flows described as 7Q10 (the lowest average 7-day flow anticipated every ten years) for summer months has dropped from an estimated 4,820 cfs to 2,750 cfs with human development, a reduction of 43 percent. More typical summer low flows, described as the summer 95% flow duration, have dropped from 6,970 cfs under unregulated conditions to 3,240 cfs under regulated conditions, a reduction of 55 percent.

Seasonal low flows have increased by 62 percent in the winter and 75 percent in the fall.

CEA-Related observations in Reach D3 include:
- Isolation of historic 5-year floodplain area due to flow alterations

Recommended Practices (may include Yellowstone River Recommended Practices--YRRPs) for Reach D3 include:
- Solid waste (dump site) removal at RM 125.6R, RM 124.2L, and RM 122L
- Pipeline crossing practices at RM 126.2
- Russian olive removal

The following table summarizes some key CEA results that have been used to describe overall condition and types of human influences affecting the river. The values are specific to this single reach. Blanks indicate that a particular value was not available for this area. This information is consolidated from a large dataset that is presented in more detail in the full reach narrative report.

Discharge	Undev.	Developed	% Change
2 Year (cfs)	68,900	53,700	-22.1%
100 Year (cfs)	143,000	123,000	-14.0%

"Undeveloped" flows represent conditions prior to significant human development, whereas "developed" flows reflect the current condition of both consumptive and non-consumptive water use.

Bankfull Channel Area (Ac)	1950	1976	1995	2001	1950-2001
	859.0	873.8	874.4	875.1	16.1

Bankful channel area is the total footprint of the river inundated at approx. the 2-year flood.

Physical Features	2011 Length (ft)	% of Bankline	2001-2011 Change
Rock RipRap	1,492	1.7%	210
Concrete Riprap	0	0.0%	0
Flow Deflectors	0	0.0%	0
Total	**1,492**	**1.7%**	**210**

There are additional types of bank armor such as car bodies and steel retaining walls, but they are relatively minor.

Length of Side Channels Blocked (ft)	Pre-1950s	Post-1950s
	0	0

Numerous side channels have been blocked by small dikes.

Floodplain Turnover	1950 - 1976	1976 - 2001
Total Acres	85.7	56.1
Acres/Year	3.3	2.2
Acres/Year/Valley Mile	0.4	0.3

1950-2001 In-channel riparian encroachment (negative number indicates retreat)
13.81 acres

The rate of floodplain turnover reflects how many acres of land are eroded by the river. Tunover is associated with the creation of riparian habitat.

Open Bar Area	Point Bars	Bank Attached	Mid-Channel	Total
Change in Area '50 - '01 (Ac)	-86.9	37	13.8	-36.1

The type and extent of open sand and gravel bars reflect in-stream habitat conditions that can be important to fish, amphibians, and ground-nesting birds such as least terns.

Floodplain Isolation	Acres	% of FP
5 Year	107.6	49%
100 Year	100.7	13%

Floodplain isolation refers to area that historically was flooded, but has become isolated do to flow alterations or physical features such as levees.

Restricted Migration Area	Acres	% of CMZ
	17.7	1%

Channel Migration Zone restrictions refer to the area and percent of the CMZ that has been isolated by features such as bank armor, dikes, levees, and transportation embankments.

Land Use	1950	2011
Agricultural Land (Ac)	5,808.1	5,698.2
Ag. Infrastructure (Ac)	21.5	69.3
Exurban (Ac)	0.0	0.0
Urban (Ac)	0.0	0.0
Transportation (Ac)	65.1	78.0

	1950	2011
Flood (Ac)	1,421.0	1,504.2
Sprinkler (Ac)	0.0	0.0
Pivot (Ac)	0.0	597.7

Changes in land use reflect the development of the river corridor through time. The irrigated agricultural are is a sub-set of the mapped agricultural land.

1950s Riparian Vegetation Converted to a Developed Land Use (ac)	To Irrigated	To Other Use	Total Rip. Converted	% of 1950s Rip.
	5.3	0.0	5.3	1.0%

Changes in the extents of riparian vegetation are influenced by land use changes within the corridor.

National Wetlands Inventory	Acres	Acres per Valley Mi
Riverine	12.1	1.5
Emergent	80.1	10.2
Scrub/Shrub	7.1	0.9

Total Wetland Acres
99.3

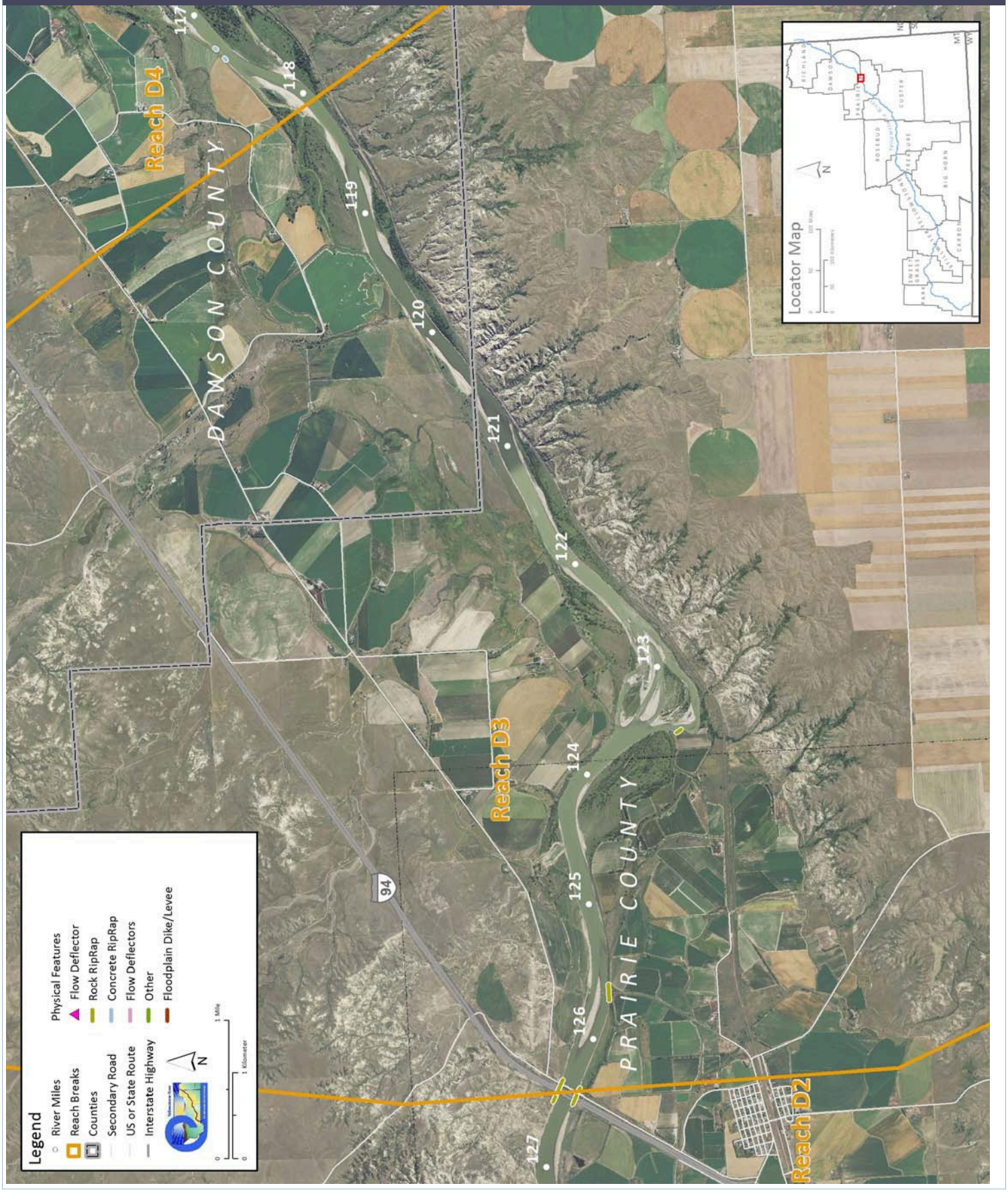
Wetlands units summarized from National Wetlands Inventory Mapping include Riverine (typically open water sloughs), Emergent (marshes and wet meadows) and Shrub-Scrub (open bar areas with colonizing woody vegetation).

Russian Olive (2001) (Appx. 100-yr Floodplain)	Acres	%
	10.7	0.9%

Russian olive is considered an invasive species and its presence in the corridor is fairly recent. Its spread can be used as a general indicator of invasive plants within the corridor.

Riparian Forest at low risk of Cowbird Parasitism (Ac/Valley Mile)	1950	1976	2001	Change 1950-2011
	30.6	7.8	5.5	-25.1

Cowbirds are associated with agricultural and residential development, displacing native bird species by parasitizing their nests.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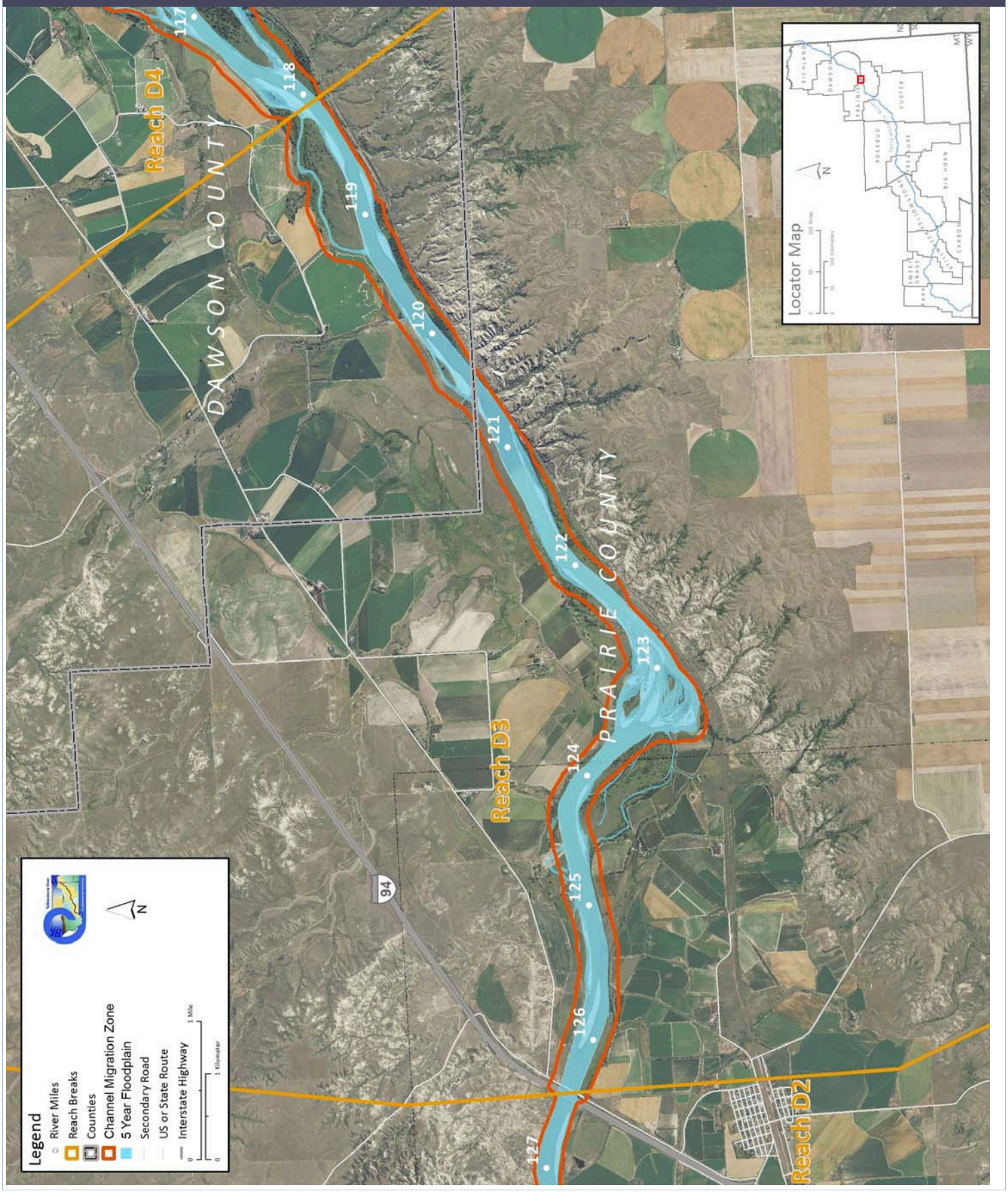
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1 Mile
1 Kilometer

Appendix B
Threatened & Endangered Species Information

[16]Pallid Sturgeon (*Scaphirhynchus albus*)

Description: Pallid sturgeons have a unique dinosaur-like appearance. They have a flattened snout, long slender tail and are armored with lengthwise rows of bony plates instead of scales. Their mouth is toothless and positioned under the snout for sucking small fishes and invertebrates from the river bottom. Pallid sturgeons can weigh up to 80 pounds and reach lengths of 6 feet, whereas the closely related shovelnose sturgeon rarely weights more than 8 pounds. The back and sides of pallid sturgeons are grayish-white versus the brown color of the shovelnose sturgeons.

Current Range and Status: Today, pallid sturgeons are scarce in the upper Missouri River above Ft. Peck Reservoir; scarce in the Missouri and lower Yellowstone Rivers between Ft. Peck Dam and Lake Sakakawea; very scarce in the other Missouri River reservoir reaches; scarce in the Missouri River downstream of Gavins Point Dam; scarce but slightly more common in the Mississippi and Atchafalaya Rivers; absent from other tributaries.

Habitat: Pallid sturgeons evolved and adapted to living close to the bottom of large, silty rivers with natural a hydrograph. Their preferred habitat has a diversity of depths and velocities formed by braided channels, sand bars, sand flats and gravel bars.

Life History and Reproductive Biology: Sexual maturity for males is estimated to be 7-9 years, with 2-3-year intervals between spawning. Females are not expected to not reach sexual maturity until 7-15 years, with up to 10-year intervals between spawning. Pallid sturgeons are long lived, with individuals perhaps reaching 50 years of age.

Reasons for Decline: All the 3,350 miles of riverine habitat within the pallid sturgeon's range have been adversely affected by man. Approximately 28% has been impounded, which has created unsuitable lake-like habitat; 51% has been channelized into deep, uniform channels; the remaining 21% is downstream of dams which have altered the river's hydrograph, temperature and turbidity. Commercial fishing and environmental contaminants may have also played a role in the pallid sturgeon's decline.

Recovery Activities: In 1997, through the combined effort of two Fishery Assistance offices, two National Fish Hatcheries, one Ecological Services office, and two State game and fish departments (North Dakota and Montana), two female and three male pallid sturgeons were spawned. Spawning pallid sturgeons from the upper Missouri River had been attempted since 1988, but to no avail. Currently, approximately 5,000 young pallid sturgeons are being reared at Gavins Point NFH. In August 1998, the Fish and Wildlife Service and state game and fish departments from North Dakota and Montana will stock up to 1,500 of these fish in two areas; at sites near the Missouri and Yellowstone River confluence, and in the Missouri River upstream of Ft. Peck Reservoir in Montana. This release will be the first under a multi-agency 6-year plan to augment doomed adult

populations. Since pallid sturgeons do not reach maturity and spawn for several years, we must stock now so that we have adults in the wild as habitats are restored. Without artificial propagation in hatcheries and subsequent population augmentation, this population will likely be extirpated. The juvenile pallid sturgeon we stock under this plan will be the founder population for recovery.

[17]Interior Least Tern (*Sternum antillarum athalassos*)

Description: Our smallest tern. Often seen flying low over the water, with quick deep wingbeats and shrill cries. Usually hovers before plunging into water for tiny prey; does more hovering than most terns. Populations are endangered in many areas because of human impacts on nesting areas, especially competition for use of beaches. However, Least Terns in some parts of the east are now nesting successfully on gravel roofs near the coast.

Feeding Behavior: Forages by flying over water, hovering, and plunging to catch prey just below water's surface. Sometimes dips down to take prey from surface of water or land and may catch insects in flight.

Eggs: 1-3, perhaps rarely more. Buff to pale green, blotched with black, brown, gray. Incubation is by both sexes; female may do more in early stages, male more later. In very hot weather, adult may dip into water and wet belly feathers to cool eggs. Incubation period 20-25 days.

Young: Leave nest a few days after hatching, find places to hide nearby. Both parents feed young. Age at first flight about 19-20 days; young may remain with parents another 2-3 months. One brood per year, sometimes two in south.

Habitat: Lest Terns nest on unvegetated or sparsely vegetated sandbars, sand-pebble beaches and islands of large reservoirs and rivers in northeastern and southeastern Montana, specifically the Yellowstone and Missouri river systems. These wide, open river channels, and lake and pothole shorelines provide the preferred characteristics for nesting Least Terns. Sites with gravel substrate provide the most suitable sites for nesting. One of the most limiting factors to nesting site selection is vegetational encroachment; Least Terns avoid areas where relatively thick vegetation provides cover for potential predators.[15]

Diet: Fish, crustaceans, insects. Diet varies with season and location; mostly small fish, crustaceans, and insects, also some small mollusks and marine worms.

Nesting: Nests in colonies, sometimes in isolated pairs. In courtship, male (carrying fish in bill) flies upward, followed by female, then both glide down. On ground, displays include courtship feeding. Nest site is on open ground (or on gravel roof). Nest is shallow scrape, sometimes lined with pebbles, grass, debris.

[18]Whooping Crane (*Grus americana*)

Description: The most noticeable characteristic of the whooping crane is the large red patch on the head. The red patch extends from the cheek along the bill and over the top of the head. The red patch is made of skin and is almost featherless. Aside from the patch of red, whooping cranes are almost entirely white. The body and wing feathers are a bright white, except on the tips of the outer wings. The tips of the primary feathers are black. Whooping cranes have yellow eyes and thin, black legs. With a height of approximately five feet (1.5 meters), whooping cranes are the tallest birds in North America. Whooping cranes have a 7.5-foot (2.3-meter) wingspan. They are lean birds, and despite their height, weigh only about 15 pounds (6.8 kilograms).

Range: Whooping cranes like wetlands, marshes, mudflats, wet prairies and fields. Researchers believe that whooping cranes once bred throughout the upper Midwest and northwestern Canada, and they wintered along the Gulf Coast near Texas. Today there are two migratory populations and one non-migratory population of whooping cranes. The largest flock is also the only natural migratory flock. It spends winters in Aransas National Wildlife Refuge in Texas and breeds in Wood Buffalo National Park in Canada. The non-natural migratory flock winters at the Chassahowitzka National Wildlife Refuge in Florida and breeds in the Necedah National Wildlife Refuge in Wisconsin. The non-migratory flock was formed in Florida as a reintroduction program. They live near Kissimmee in Florida year-round.

The whooping crane occasionally migrates across the eastern portion of Montana during both spring and fall migration, although their main migratory corridor is found to the east in the Dakotas.[15]

Habitat: The Whooping Crane has been observed in the marsh habitat present at Medicine Lake National Wildlife Refuge and Red Rock Lakes National Wildlife Refuge. Observations of individual birds in other areas of the state include grain and stubble fields as well as wet meadows, wet prairie habitat, and freshwater marshes that are usually shallow and broad with safe roosting sites and nearby foraging opportunities.[15]

[19]Northern Long-Eared Bat (*Myotis septentrionalis*)

Appearance: The northern long-eared bat is a medium-sized bat with a body length of 3 to 3.7 inches but a wingspan of 9 to 10 inches. Their fur color can be medium to dark brown on the back and tawny to pale-brown on the underside. As its name suggests, this bat is distinguished by its long ears, particularly as compared to other bats in its genus, *Myotis*.

Winter Habitat: Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. They use areas in various sized caves or mines with constant temperatures, high humidity, and no air currents. Within hibernacula, surveyors find them hibernating most often in small crevices or cracks, often with only the nose and ears visible.

Summer Habitat: During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and snags (dead trees). Males and non-reproductive females may also roost in cooler places, like caves and mines. Northern long-eared bats seem to be flexible in selecting roosts, choosing roost trees based on suitability to retain bark or provide cavities or crevices. This bat has also been found rarely roosting in structures, like barns and sheds.

Reproduction: Breeding begins in late summer or early fall when males begin to swarm near hibernacula. After copulation, females store sperm during hibernation until spring. In spring, they emerge from their hibernacula, ovulate and the stored sperm fertilizes an egg. This strategy is called delayed fertilization.

After fertilization, pregnant females migrate to summer areas where they roost in small colonies and give birth to a single pup. Maternity colonies of females and young generally have 30 to 60 bats at the beginning of the summer, although larger maternity colonies have also been seen. Numbers of individuals in roosts, typically decreases from pregnancy to post-lactation. Most bats within a maternity colony give birth around the same time, which may occur from late May or early June to late July, depending where the colony is located within the species' range. Young bats start flying by 18 to 21 days after birth. Maximum lifespan for the northern long-eared bat is estimated to be up to 18.5 years.

Feeding Habits: Like most bats, northern long-eared bats emerge at dusk to feed. They primarily fly through the understory of forested areas feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch while in flight using echolocation or by gleaning motionless insects from vegetation.

Range: The northern long-eared bat's range includes much of the eastern and north central United States, and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia.

[20]Piping Plover (*Charadrius melodus*)

Species Description: The piping plover (Charadrius melodus) is a small shorebird about the size of a robin. It has a sandy colored back and white underparts, with a single black neck band, a short stout orange bill and orange legs. Piping plovers arrive in the Northern Great Plains to breed around mid-April and fly south by mid to late August.

Location: The Northern Great Plains population of piping plovers nest on the shorelines and islands of alkali (salty) lakes in North Dakota and Montana. They nest on sandbar islands and reservoir shorelines along the Missouri River and reservoirs in Montana, North Dakota, South Dakota, and Nebraska. In Nebraska, they nest on the Platte River system, Niobrara, Loup, and Elkhorn rivers as well as limited locations in Minnesota and Colorado. Most of the Northern Great Plains plovers winter along the Texas coast, extending into Mexico.

Habitat: Piping Plovers primarily select unvegetated sand or pebble beaches on shorelines or islands in freshwater and saline wetlands. Vegetation, if present at all, consists of sparse, scattered clumps. Open shorelines and sandbars of rivers and large reservoirs in the eastern and north-central portions of the state provide prime breeding habitat. In Montana, and throughout the species' range, nesting may occur on a variety of habitat types. If conditions are right, alkali wetlands, lakes, reservoirs, and rivers can all provide the essential features required for nesting. The alkali wetlands and lakes found in the northeastern corner of the state generally contain wide, unvegetated, gravelly, salt-encrusted beaches. Rivers that flood adequately can supply open sandbars or gravelly beaches, as can large reservoirs, with their shoreline beaches, peninsulas, and islands of gravel or sand.[15]

Nesting: For nesting, piping plovers make shallow scrapes in the sand which they line with small pebbles or rocks. The female lays three to four eggs and both parents share in incubation duties. The eggs hatch after about 28 days, and the young leave the nest within hours. The chicks can forage for themselves immediately but remain near their parents for several weeks for protection and temperature control (brooding or shading). Depending on food availability, it takes the young from around 18 to 28 days to begin flying.

Appendix C
Local Working Group Meeting Minutes

Prairie County Local Work Group

Minutes 2/20/09

Meeting was called to order at 8:45 am by Chairman Dave Schwarz, Prairie Co. CD. In attendance were Sharla Sackman, Prairie Co Extension Service; Tim Krebsbach, Prairie Co FSA; Todd Devlin, Prairie Co Commissioners; Harold Gaub, Prairie Co Weed District, Richard Scheetz and Kathy Meidinger, Terry NRCS.

Dick explained the purpose of the meeting is to review the groups last recommendations for distributing EQIP funding to the various land uses, and reviewing the ranking questions associated with each landuse. Dick handed out copies of the past recommendations from the group, and the Statewide ranking questions.

Dick explained that Prairie County will receive a beginning balance of $95,000 for EQIP for FY 09 contracts. He also explained that Prairie County will be participating in a Special Initiative for Reduced Tillage on irrigated cropland. There are 2 current application that would be eligible for the SI. Dick also presented to the group that there is a possibility that Prairie County could receive funding from the Nation Economic Stimulus through the Small Watershed Program PL-566. If this funding is received the 3 current EQIP applications for conversion from flood to center pivot irrigation would be funded, and EQIP funds would not be needed for that land use.

There was discussion concerning the past ranking questions, what the practice numbers related to each question represented was explained. There was discussion concerning increasing the emphasis for Sage Grouse habitat enhancement.

Sharla moved that pending funds from PL-566 the fund distribution remain as before, 40% Grazingland, 40% irrigation, 20% dry cropland. If funds are received from PL-566 the funds would be distributed 60% Grazingland, 40% dry cropland. This was seconded by Todd and approved.

Sharla then moved to keep the ranking questions as they were in the past, except for minor changes needed to update changes in practice code. Todd again seconded and this was past.

There being no further business the meeting was closed at 10:00 am

Submitted by

Richard Scheetz District Conservationist NRCS

EQIP Local Work Group Recommendations for 2010

Please respond by December 1, 2009

I. Local Work Group (LWG) Information and Objectives

A. County: Prairie

B. LWG Chairperson: Dennis Teske

C. Meeting date(s): 12/1/2009

II. LWG Recommendations for EQIP Allocations

A. Top 5 local work group priority resource concerns.

1	**Water Quality & Quantity on Grazingland**
2	**Noxious Weeds**
3	**Low irrigation water use efficiency**
4	**Soil erosion**
5	**Loss of wetland habitat on rangeland (dams silting in)**

B. Funding Allocations - Allocations should be distributed by land use. Allocations can be distributed to one or up to five land use categories based on priorities defined by the LWG.

Funding Category	% Land in County		Percent of Allocation	
Dry Cropland	1	%		%
Grazing Land	86	%	70	%
Irrigated Land	13	%	30	%
Forest Land	0	%		%
Multiple Land Uses	----------	--		%

Local Work Group Minutes

Prairie County

2011

Those present Dennis Teske, Prairie Co Conservation District; Tim Krebsbach, FSA CED: Dick Scheetz, NRCS. It was noted that no individual notices for the meeting were mailed out this year, as in the past, but that a notice had been placed in the Terry Tribune.

Dennis called the meeting to order at 8:15 am.

Dick read the charge from the STC to ensure all were aware of the tasks needed.

Dennis asked what the priority resource concerns were, according to the participants. Dick handed out a list with explanations of the potential resource concerns. Dennis expressed his opinion that his number one concern had to be getting water to the livestock, so they use the entire rangeland. He also said he would like cross fencing to be encouraged to group the livestock and force them to eat the more undesirable plants as well as the preferred. Tim agreed that livestock water would be number one priority. As a second priority, Dennis thought the biggest bang for the dollars spent is to encourage conversion from flood irrigation to sprinkler. After going through the list of resource concerns it was decided the top one for Prairie County would be Domestic Animals – Lack of livestock water, with the second being Water Quantity – inefficient water use on irrigated land.

A discussion was held concerning those operators that are wanting to try no-tillage and intensifying their crop rotations. Dennis did not want to leave them out of the loop, as many of these are family farms with the younger generation trying the new methods. Financial assistance is warranted as there is a loss of income for 3 -5 years. It was decided to allow 20% of the EQIP funding to the County be spent on dry cropland operations to try this type of systems. The group agreed to allocate 40% to concern #1 and 40% to concern #2.

Discussion was held concerning a ranking tool. It was decided that a tool should be made that encourages first time participation, those who have not had an EQIP contract for the past 7 years would be high priority, between 7 years to current, medium and a current contract holder is low priority. This is to initiate the education process from the technical assistance form NRCS.

Also to be included is that anyone who has cancelled or had a contract terminated should be low priority.

The group decided to use the same questions for points as were used in last year’s ranking.

Local Work Group Meeting
Prairie County
5/15/19

180 invitations had been sent out on May 1, 2019.
In attendance were 4 Prairie County producers, representatives of the Prairie Co Conservation District, Prairie County Grazing District, Buffalo Rapids irrigation District #2, Prairie County Farm Services Agency, Terry Tribune, The Conservation District's Coal Bed Methane Project, BLM and NRCS. Prairie County Extension Service and American Bird Conservancy could not attend but had provided prior input.

Dick Scheetz, District Conservationist, welcomed attendees and asked for introductions around the table. He then explained the purpose of the meeting and reviewed the information provided by Prairie County producers through the survey that was sent in March. Dick reviewed the concerns that the producers had provided and the number of responses to each concern. See the 2019 Survey Summary document.

Dick informed the group that based on the response from that survey; 40% return rate, 25 commitments to contracts, the Targeted Implementation Plan for Prairie County for 2020 would be replacement of existing windmills with solar pumps. Discussion was had, and we decided to also include removal of existing windmill towers on wells that no longer function and decommissioning the underlying wells. BLM was asked how this project would affect wells on their land, they informed us that the wells are property of the US Gov't, but the pumps, ie. Windmills are owned by the permittee, and generally would be covered under maintenance of the system. They stated that the inventory on the well/tank site would generally include enough area to add more tank if needed to meet livestock needs. Decommissioning wells would need to be checked to see if they were historical in nature, but generally would not require additional permitting. The primary resource concerns addressed through this TIP will be Wildlife Habitat – Lack of Adequate Shelter, as predators use the windmill towers as roosts to prey on ground nesting birds using the associated mesic areas around the tank overflows, also Livestock Production – Lack of Adequate Water – due to lack of wind during the period of the summer when temperatures are at the highest, and livestock water needs are highest.

Johnna Cameron, MCAO then began facilitating the discussion and we then went around the group to add to the list of concerns in the County with the following being brought up;

Soil Erosion – in dam spillways
On trails/roads in the rangeland & around cropland
On irrigated field ends
Wildlife friendly fencing – changing existing fences to meet FWP/NRCS specs for wildlife
Pollinator strips on irrigated fields
Filtering irrigation water to reduce weed transfer
Converting flood irrigation to drip systems
Adding pressure tanks and valves on open ended livestock water pipelines
Decommissioning or valving artesian wells and addressing the saline areas associated with the overflows
Lining and/or pipelines for irrigation canals/laterals

As there was no further comments and discussion the meeting was adjourned.

Appendix D
References

[1] NASS 2012 Census of Agriculture

[2] Soil Survey of Prairie County Montana, Part I
https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/montana/prairieMT1996/prairieMT1996-1.pdf

[3] 2010 Census
https://www.census.gov/quickfacts/fact/table/prairiecountymontana,US/PST045218

[4] Prime Farmland
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcseprd1338623.html

[5] Hydric Soils
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcseprd1389479.html

[6] MLRA Climate Information, eFOTG Section II
https://efotg.sc.egov.usda.gov/#/details

[7] MT DEQ 303(d) List
http://deq.mt.gov/Water/Resources/Report

[8] Buffalo Rapids Irrigation Project
https://www.usbr.gov/projects/index.php?id=519

[9] BR construction Information
https://www.usbr.gov/projects/pdf.php?id=82

[10] Buffalo Rapids Irrigation Project Infrastructure Recommendations
http://dnrc.mt.gov/divisions/cardd/docs/publications/InventoryofIrrigationInfrastructureinMontana.pdf

[11] Reserved Water Information
http://dnrc.mt.gov/divisions/cardd/conservation-districts/water-reservations

[12] Terry Badlands WSA Map Guide

[13] Terry Badlands WSA Facts
https://www.blm.gov/site-page/programs-national-conservation-lands-montana-dakotas-terry-badlands-wsa

[14] Animal Feeding Operation Montana Code
https://leg.mt.gov/bills/mca/title_0750/chapter_0050/part_0080/section_0010/0750-0050-0080-0010.html

[15] Montana Natural Heritage Program
http://mtnhp.org/SpeciesOfConcern/?AorP=a

[16] Pallid Sturgeon
https://www.fws.gov/midwest/endangered/fishes/PallidSturgeon/palld_fc.html

[17] Interior Least Tern
https://www.audubon.org/field-guide/bird/least-tern#

[18] Whooping Crane
https://www.nwf.org/Educational-Resources/Wildlife-Guide/Birds/Whooping-Crane

[19] Northern Long-Eared Bat
https://www.fws.gov/midwest/endangered/mammals/nleb/nlebFactSheet.html

[20] Piping Plover
https://www.fws.gov/mountain-prairie/es/pipingPlover.php

[21] Montana Department of Agriculture Noxious Weed List
https://agr.mt.gov/Portals/168/Documents/Weeds/2017%20Noxious%20Weed%20List.pdf

[22] MSU Prairie County Extension Service

[23] Montana State Grazing Districts
http://dnrc.mt.gov/divisions/cardd/conservation-districts/montana-grass-conservation-commission

[24] Prairie County Chamber of Commerce
http://visitterrymt.com/timeline/

[25] Reserved Water Use
http://dnrc.mt.gov/divisions/cardd/docs/conservation-districts/training/supervisor-manual/g-water-reservations-jan-2013.pdf