DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

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FINAL ENVIRONMENTAL ASSESSMENT

Project Name:	Winifred Wastewater Treatment and Discharge
Proposed Implementation Date:	May 2023
Proponent:	Town of Winifred
Location:	47.561944°N, -109.375278°W
County:	Fergus

I. TYPE AND PURPOSE OF ACTION

The Town of Winifred's current wastewater treatment system is a single cell facultative lagoon completed in 1961. The design of the lagoon is outdated as related to current design standards and cannot properly treat the Town's wastewater. The volume of the lagoon has been reduced significantly by over 50 years of accumulated sludge and has a faulty liner, resulting in unmonitored discharge to groundwater. The lagoon has one discharge outlet to an unnamed tributary of Dog Creek. The existing system is currently under an Administrative Order of Consent (AOC) from the Montana Department of Environmental Quality (DEQ) due to repeated violations of the secondary treatment standards outlined in the Town's wastewater discharge permit. Finally, the existing system potentially lies within the original flow channel and floodplain of Dog Creek, which increases the risk of contamination to surface and ground water sources associated with the uncontrolled discharge of wastewater effluent.

The purpose of the proposed project is to address compliance challenges related to surface water discharge of the Town's single-celled lagoon system, which have resulted in the draft AOC. Existing public health and safety threats consist of unmonitored discharge to groundwater due to a damaged liner, with the potential for untreated effluent to enter Dog Creek during a flood event due to the current elevation of the lagoon. These issues may affect drinking water, as well as the public use of Dog Creek for swimming, fishing, creek-side recreation, and stock watering.

The proposed project is located in rural north-central Fergus County, Montana. The town's specific location is 47.561944°N, -109.375278°W in Winifred, approximately 39 miles from Lewistown. It's situated about 30 minutes south of the Missouri River and 20 minutes east of the Judith River. The town has a total area of 0.50 square miles and is entirely land.

The objectives of the project are to eliminate the Montana Pollutant Discharge Elimination System (MPDES) discharge permit, address public health concerns associated with noncompliant discharge, protect local groundwater, improve aquatic life conditions in Dog Creek, and develop a new water supply for beneficial use of a marketable crop (alfalfa) through spray irrigation. The planned project involves:

- Construction of a new 3-celled facultative lagoon north of the town
- An adjacent spray irrigation process for the disposal of effluent

- A new lift station to pump the existing sewer collection main on the northeast side of Winifred to the new treatment and disposal facilities, located approximately one-half mile due north of town.

Permit compliance issues will be addressed by installing a completely new wastewater treatment system for the town of Winifred, which will follow all the current DEQ design requirements. The existing treatment system, which has been issued the AOC, will be decommissioned.

Funding for the project will be provided through a grant from the Montana Department of Natural Resources and Conservation (DNRC) American Rescue Plan Act (ARPA). Project construction was projected to begin in the summer of 2024 with completion of construction and project closeout by the end of 2025.

II. PROJECT DEVELOPMENT

1. PUBLIC INVOLVEMENT, AGENCIES, GROUPS OR INDIVIDUALS CONTACTED:

Provide a brief chronology of the scoping and ongoing involvement for this project. List number of individuals contacted, number of responses received, and newspapers in which notices were placed and for how long. Briefly summarize issues received from the public.

The Town of Winifred has been in contact with DEQ regarding the Administrative Order of Consent and with the DNRC regarding the MPDES permit. A Request for Proposals was listed in the Great Falls Tribune for the design, planning, and grant administration of this project. No other public notices or Agency/group correspondence were able to be located or provided by the Proponent.

2. OTHER GOVERNMENTAL AGENCIES WITH JURISDICTION, LIST OF PERMITS NEEDED:

Examples: cost-share agreement with U.S. Forest Service, 124 Permit, 3A Authorization, Air Quality Major Open Burning Permit.

The Town of Winifred, Fergus County, DEQ, DNRC, Fergus County Floodplain Administrator (FPA), and Montana Fish, Wildlife and Parks (FWP) have overlapping jurisdiction within the project area.

The Town of Winifred will continue to work with their selected Contractor on the design, planning, and grant administration related to the new 3-celled facultative lagoon.

The Fergus County Floodplain Administrator and the Montana DNRC have authority over the regulatory floodplain of Dog Creek. Any project that has the potential to affect the floodplain requires a Floodplain Development Permit and will be coordinated with the FPA and the DNRC.

Montana FWP has regulatory authority over the Stream Protection Act (SPA) section 124 permits. Any SWIF project affecting the bed or banks of Dog Creek may require an SPA 124 permit.

DEQ has regulatory authority over the Administrative Order of Consent and the design of the new lagoon system. Additionally, a Montana Construction General Permit (CGP) and Stormwater Pollution Prevention Plan (SWPPP) will be required to be prepared and submitted to the DEQ for review and approval. If construction dewatering is necessary, a Construction Dewatering General Permit (CDGP) will also need to be prepared and submitted to the DEQ for review and approval.

3. ALTERNATIVE DEVELOPMENT:
Describe alternatives considered and, if applicable, provide brief description of how the alternatives were developed. List alternatives that were considered but eliminated from further analysis and why. Include the No Action alternative.

No Action Alternative – The existing wastewater lagoon will remain in operation. No other actions would be conducted.

Proposed Alternative – The proposed project involves construction of a new 3-celled facultative lagoon north of the town and an adjacent spray irrigation process for the disposal of effluent. A new lift station will pump from the existing sewer collection main on the northeast side of Town and pump to the new treatment and disposal facilities approximately one-half mile due north of town.

No documentation related to an analysis of the alternatives was provided by the Proponent.

III. IMPACTS ON THE PHYSICAL ENVIRONMENT

- *RESOURCES potentially impacted are listed on the form, followed by common issues that would be considered.*
- *Explain POTENTIAL IMPACTS AND MITIGATIONS following each resource heading.*
- *Enter "NONE" If no impacts are identified or the resource is not present.*

4. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE:
Consider the presence of fragile, compactable or unstable soils. Identify unusual geologic features. Specify any special reclamation considerations. Identify direct, indirect, and cumulative effects to soils.

The project area is located just north of Winifred, Montana. The United States Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey mapping application indicates that the soils near the project area consist of:

- Verson-Linnet clay loams, 2 to 8 percent slopes – 79.7 acres, 28.7% of project area
- Abor-Bascovy-Crago complex, 15 to 45 percent slopes – 63.2 acres, 22.7% of project area
- Tanna-Abor complex, 2 to 8 percent slopes – 34.7 acres, 12.5% of project area
- Ethridge silty clay loam, 0 to 2 percent slopes – 34.6 acres, 12.4% of project area
- Havre and Harlem soils, occasionally flooded – 30.6 acres, 11.0% of project area
- Frazer silty clay loam – 20.5 acres, 7.4% of project area
- Linnet clay loam, 2 to 8 percent slopes – 8.0 acres, 2.9% of project area
- Havre loam – 2.9 acres, 1.1% of project area
- Ethridge silty clay loam, 2 to 8 percent slopes – 1.8 acres, 0.7% of project area
- Absher-Nobe complex, 0 to 4 percent slopes – 1.7 acres, 0.6% of project area
- Abor-Yawdim silty clay loams, 4 to 15 percent slopes – 0.2 acres, 0.1% of project area

The Montana Bureau of Mines (MBMG) Open File No. 437 Geologic and Structure Contour Map of

the Winifred 30' x 60' Quadrangle, Central Montana, indicates the project is located within the Judith River Formation composed of fine- to coarse-grained sandstone with interbeds of gray to black carbonaceous shale, silty shale, and thin coal.

Proposed Alternative – Direct and indirect, potentially cumulative, minor, short- to long-term, localized, recurring adverse impacts. The project will negatively impact existing soil conditions through the construction phase and may negatively impact existing soil quality. Impacts to soil quality are most likely to come from compaction, reducing the ability for natural infiltration of stormwater and limiting oxygen supply to soil microbial populations. To mitigate these impacts the contractor should utilize best management practices (BMPs) to reduce erosion impacts. There are no anticipated impacts to the underlying geology.

No Action Alternative – No impact on the underlying geography, soil quality, stability, and moisture within the project area.

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5. WATER QUALITY, QUANTITY AND DISTRIBUTION:
Identify important surface or groundwater resources. Consider the potential for violation of ambient water quality standards, drinking water maximum contaminant levels, or degradation of water quality. Identify direct, indirect, and cumulative effects to water resources.

The project is located within one mile of a waterbody and a stream and is within 1 mile of a water discharger (NPDES) site. The poor integrity of the existing liner in the lagoon has resulted in unmonitored discharge of wastewater to groundwater. Additionally, the lagoon has one discharge outlet to an unnamed tributary to Dog Creek. The existing system is currently under an AOC due to repeated violations of the secondary treatment standards outlined in the Town's wastewater discharge permit. Furthermore, the existing system is potentially located within the original flow channel and the floodplain of Dog Creek, which increases the risk of water contamination associated with uncontrolled discharge of wastewater effluent to both the ground water and surface water.

Proposed Alternative – Potential minor adverse impacts to surface water from disturbed construction areas with stormwater runoff. To mitigate these impacts construction BMPs should be installed and maintained for the duration of the project. Although there is the potential for short-term adverse impacts, the short-term and long-term beneficial impacts of the proposed alternative are significant. Replacing the current lagoon with a new lagoon system would protect the groundwater from unmonitored discharges and also eliminate the need to discharge treated wastewater into Dog Creek. There would also be beneficial impacts to relocating the lagoon system so that it is outside of the Dog Creek floodplain.

No Action Alternative – Potentially direct, minor to major, short- and long-term, local adverse impacts. If no actions are taken to remove or rehabilitate the lagoon, unmonitored discharges of wastewater to groundwater will continue, treated wastewater will continue to be discharged into Dog Creek, and there is potential that the lagoon could flood due to its location within the floodplain leading to contaminated wastewater entering Dog Creek.

6. AIR QUALITY:

What pollutants or particulate would be produced (i.e. particulate matter from road use or harvesting, slash pile burning, prescribed burning, etc)? Identify the Airshed and Impact Zone (if any) according to the Montana/Idaho Airshed Group. Identify direct, indirect, and cumulative effects to air quality.

The project area is not listed in a non-attainment area or within 1/2-mile of a non-attainment area.

Proposed Alternative – Potentially direct, minor, short-term, local adverse impacts to air quality related to the dust and exhaust generated from equipment. Proper mitigation should take place within the machinery as well as some fugitive dust control (typically with a water truck). There is potential to have other gaseous hazards if gas lines are not properly labeled and marked. A digging permit through Montana 811 should be applied for, and proper labels should be laid out by Montana 811 to ensure pipe location. Pipe removal and installation should be carefully placed due to potential error in pipe location. Overall, there are no long-term adverse impacts expected during the project.

No Action Alternative – No impact on the air quality within the project area.

7. VEGETATION COVER, QUANTITY AND QUALITY:

What changes would the action cause to vegetative communities? Consider rare plants or cover types that would be affected. Identify direct, indirect, and cumulative effects to vegetation.

Records from the Montana Natural Heritage Program indicate the project area is 62% human land use, 14% grassland systems, 13% recently disturbed or modified, and 12% wetland and riparian systems. The land cover map was developed using the Natural Heritage Map Viewer to narrow the scope of land cover to just outside the project area. See MTNHP Environmental Summary Report (MTHNP repor to view other land cover types. There are four (4) potential plant Species of Concern listed that may potentially occur within the project area (MTNHP report).

Potential Species

Crawe's Sedge	*Carex crawei*
Long-sheath Waterweed	*Elodea bifoliata*
Small Yellow Lady's-slipper	*Cypripedium parviflorum*
Scribner's Ragwort	*Senecio integerrimus var. scribneri*

Proposed Alternative – Potentially direct, minor to moderate, short-term, localized adverse impacts to vegetation cover. Efforts should be made to preserve existing vegetation where applicable. BMPs should be installed and monitored. Actions in the preferred alternative will reduce the amount of vegetated area as existing vegetation within the footprint of new lagoon system would be permanently removed.

No Action Alternative – No impact on the vegetation cover within the project area.

8. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS:

Consider substantial habitat values and use of the area by wildlife, birds or fish. Identify direct, indirect, and cumulative effects to fish and wildlife.

Several surface waters and wetlands areas exist within and near the project area. These include the following:

- 20 acres of palustrine aquatic bed wetlands (wetlands with vegetation growing on or below the water surface for most of the growing season);
- 11 acres of palustrine unconsolidated shore wetlands (wetlands with less than 75% area cover of stones, boulders, or bedrock AND with less than 30% vegetative cover AND the wetland is irregularly exposed due to seasonal or irregular flooding and subsequent drying);
- 58 acres of emergent wetlands (wetlands with erect, rooted herbaceous vegetation present during most of the growing season);
- 1 acre of scrub-shrub wetland (wetlands dominated by woody vegetation less than 6m tall)
- 22 acres of lacustrine limnetic unconsolidated bottom lakes (deep waterbodies with mud or silt covering at least 25% of the bottom);
- 16 acres of unconsolidated bottom upper perennial riverine habitat (stream channels where the substrate is at least 25% mud, silt, or other fine particles);
- 4 acres of intermittent stream bed riverine habitat (active channel that contains periodic water flow);
- 5 acres of scrub-shrub lotic riparian habitat (riparian area dominated by woody vegetation that is less than 6m tall);
- 84 acres emergent lotic riparian habitat (riparian areas that have erect, rooted herbaceous vegetation during most of the growing season);
- 1 acre forested lentic riparian habitat (riparian area with woody vegetation that is greater than 6m tall).

The project location is not identified as a priority area for terrestrial conservation efforts within the Montana State Wildlife Action Plan (SWAP). The project area is not located in sage grouse general habitat according to the MT Sage Grouse Habitat Conservation Program.

The riverine systems that exist near the project area will not be impacted.

Records from the MTNHP indicate there are six (6) species of concern in and around the project region including the following:

Species Occurrences:

Long-eared Myotis	*Myotis evotis*
Hoary Bat	*Lasiurus cinereus*
Little Brown Myotis	*Myotis lucifugus*
Great Blue Heron	*Ardea herodias*
Greater Sage-Grouse	*Centrocercus urophasianus*
Pinyon Jay	*Gymnorhinus cyanocephalus*

MTNHP records (see attached MTNHP report) indicate 51 other observed and potential animal and plant species of concern, and potential species may exist in the area including the following:

Other Observations:

Northern Leopard Frog	*Lithobates pipiens*
Great Plains Toad	*Anaxyrus cognatus*
Long-billed Curlew	*Numenius americanus*
Loggerhead Shrike	*Lanius ludovicianus*
Ferruginous Hawk	*Buteo regalis*
Plumbeous Vireo	*Vireo plumbeus*
Sharp-tailed Grouse	*Tympanuchus phasianellus*
Short-eared Owl	*Asio flammeus*
Eastern Screech-Owl	*Megascops asio*
Bobolink	*Dolichonyx oryzivorus*
White-faced Ibis	*Plegadis chihi*
American White Pelican	*Pelecanus erythrorhynchos*
Bald Eagle	*Haliaeetus leucocephalus*
Sprague's Pipit	*Anthus spragueii*
Black-billed Cuckoo	*Coccyzus erythropthalmus*
Common Poorwill	*Phalaenoptilus nuttallii*
Veery	*Catharus fuscescens*
Baird's Sparrow	*Centronyx bairdii*
Brewer's Sparrow	*Spizella breweri*
Golden Eagle	*Aquila chrysaetos*
Black-necked Stilt	*Himantopus mexicanus*
Sage Thrasher	*Oreoscoptes montanus*
Burrowing Owl	*Athene cunicularia*
Black Tern	*Chlidonias niger*
Franklin's Gull	*Leucophaeus pipixcan*
Chestnut-collared Longspur	*Calcarius ornatus*
Thick-billed Longspur	*Rhynchophanes mccownii*
Ovenbird	*Seiurus aurocapilla*
American Bittern	*Botaurus lentiginosus*
Caspian Tern	*Hydroprogne caspia*
Eastern Bluebird	*Sialia sialis*
Brook Stickleback	*Culaea inconstans*
Monarch	*Danaus plexippus*
Suckley Cuckoo Bumble Bee	*Bombus suckleyi*
Silver-haired Bat	*Lasionycteris noctivagans*
North American Porcupine	*Erethizon dorsatum*
Dwarf Shrew	*Sorex nanus*
Merriam's Shrew	*Sorex merriami*

Black-tailed Prairie Dog	*Cynomys ludovicianus*
Hayden's Shrew	*Sorex haydeni*
Townsend's Big-eared Bat	*Corynorhinus townsendii*
Fringed Myotis	*Myotis thysanodes*
Eastern Red Bat	*Lasiurus borealis*
Swift Fox	*Vulpes velox*
Plains Hog-nosed Snake	*Heterodon nasicus*
Greater Short-horned Lizard	*Phrynosoma hernandesi*
Crawe's Sedge	*Carex crawei*
Long-sheath Waterweed	*Elodea bifoliata*
Small Yellow Lady's-slipper	*Cypripedium parviflorum*
Scribner's Ragwort	*Senecio integerrimus var. scribneri*

Proposed Alternative – Potentially direct, negligible, short-term, local, non-recurring adverse impacts to terrestrial, avian, and aquatic life and habitats during construction. The contractor shall be required to restore any disturbance to preexisting conditions. Although there is the potential for short-term adverse impacts, the short-term and long-term beneficial impacts of the proposed alternative are significant. Replacing the current lagoon with a new lagoon system would protect the groundwater from unmonitored discharges and also eliminate the need to discharge treated wastewater into Dog Creek. There would also be beneficial impacts to relocating the lagoon system so that it is outside of the Dog Creek floodplain.

No Action Alternative – Potential long-term adverse impacts to terrestrial, avian, and aquatic life due to unmonitored wastewater discharge from the lagoon to groundwater and the potential of contaminated wastewater entering Dog Creek in the event of a flood.

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9. UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES:
Consider any federally listed threatened or endangered species or habitat identified in the project area. Determine effects to wetlands. Consider Sensitive Species or Species of special concern. Identify direct, indirect, and cumulative effects to these species and their habitat.

According to records from the MTNHP there are no unique, endangered, fragile, or limited environmental resources within the project area. According to the USFWS, no critical habitat exists within the project area. The project does not have any identified unique natural features.

The water treatment lagoon is classified as a freshwater pond and emergent wetlands exist north of town and to the west of the lagoon, according to the MTNHP MapViewer. No other wetlands exist in the project area, however the adjacent area overlaps with freshwater emergent wetlands, freshwater pond habitat, and riverine habitat.

As mentioned in the previous section, there are 57 species of concern listed as present or potentially present using the project area as viable habitat. The U.S. Fish and Wildlife Service IPaC tool was utilized to generate a resource list summarizing any endangered or threatened species that are known or expected to be near the project area (Attachment 5). The IPaC list generated two

(2) Federally listed species under the Endangered Species Act as potentially occurring in the greater project area, including the Monarch Butterfly (*Danaus plexippus*) and the Grizzly Bear (*Ursus arctos horribilis*) and four (4) migratory bird species: Ferruginous Hawk (*Buteo regalis*), Lark Bunting (*Calamospiza melanocorys*), Marbled Godwit (*Limosa fedoa*), and Western Grebe (A*echmorphorus occidentalis*; USFWS IPaC Mapping tool, report attached). Bald Eagle and Golden Eagle species are protected under the Bald and Golden Eagle Protection Act of 1940 and Montana Bald Eagle Management Plan, Migratory Bird Treaty Act of 1918, and Lacey Act of 1900. Migratory Birds are also protected under the Migratory Birds Treaty Act of 1918 and Lacey Act of 1900.

Although no eagle nests have been mapped in the project area, Bald Eagles and Golden Eagles may be present in the project area. Several mapped Freshwater Emergent Wetlands, and lacustrine, palustrine, and riverine habitats are located in and around the project area. If an eagle nest is observed, MT FWP may need to be consulted. For any work planned within 0.5 miles of an eagle nest, FWP staff will be consulted to determine if the eagle nest is active. FWP recommends avoiding disturbance during the breeding season (February 1 – August 15) if the eagle nest is active and avoiding tree removal during the breeding season.

Proposed Alternative – Potentially direct and indirect, negligible, short-term, local, non-recurring adverse impacts to unique, endangered, fragile, or limited resources. The contractor shall be required to restore any disturbance to preexisting conditions. Replacing the current lagoon with a new lagoon system would protect the groundwater from unmonitored discharges and also eliminate the need to discharge treated wastewater into Dog Creek. There would also be beneficial impacts to relocating the lagoon system so that it is outside of the Dog Creek floodplain.

No Action Alternative – Potential long-term adverse impacts to unique, endangered, fragile, or limited resources due to unmonitored wastewater discharge from the lagoon to groundwater and the potential of contaminated wastewater entering Dog Creek in the event of a flood.

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10. HISTORICAL AND ARCHAEOLOGICAL SITES:

Identify and determine direct, indirect, and cumulative effects to historical, archaeological or paleontological resources.

No cultural or historical sites are expected to be within the construction extent for the project. The project proponent has not implemented a cultural survey. The Montana State Historic Preservation Office (SHPO) indicates that the Stafford (Winifred) Grocery Store is listed on the Nation Register of Historic Properties, however given that this property is within the Town limits and the lagoons are expected to be constructed north of Town, this property is considered outside the project area.

Proposed Alternative and No Action Alternative – No cultural or historical resource impacts are anticipated. However, if previously unknown cultural or paleontological materials are identified during project related activities, all work will cease until a professional assessment of such resources can be made.

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11. AESTHETICS:

Determine if the project is located on a prominent topographic feature, or may be visible from populated or scenic areas. What level of noise, light or visual change would be produced? Identify direct, indirect, and cumulative effects to aesthetics.

The project location is within an area of previously existing infrastructure and development. There will be temporary impacts to noise from construction equipment.

Proposed Alternative – Potentially indirect, negligible to minor, short-term, localized adverse impacts to aesthetics. Adverse nuisance impacts from heavy construction equipment will be temporary during the construction activities.

No Action Alternative – No impacts to aesthetics.

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12. DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR OR ENERGY:
Determine the amount of limited resources the project would require. Identify other activities nearby that the project would affect. Identify direct, indirect, and cumulative effects to environmental resources.

The proposed project involves construction of a new 3-celled facultative lagoon north of the town and an adjacent spray irrigation process for the disposal of effluent. A new lift station will pump from the existing sewer collection main on the northeast side of Town and pump to the new treatment and disposal facilities approximately one-half mile due north of town.

Proposed Alternative – Potential long-term adverse impacts. The construction of a new lagoon system will require land and the lift station will require energy. While energy and other resources are necessary to construct the new wastewater treatment facilities, these impacts are generally outweighed or offset by the support to residents provided by the project.

No Action Alternative – Potential long-term adverse impacts. If wastewater contamination impacts groundwater or Dog Creek either by leakage from the lagoon or a flood event, this could increase the demand for clean water for residential, commercial, and agricultural purposes.

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13. OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:
List other studies, plans or projects on this tract. Determine cumulative impacts likely to occur as a result of current private, state or federal actions in the analysis area, and from future proposed state actions in the analysis area that are under MEPA review (scoped) or permitting review by any state agency.

No additional environmental documents were provided by the Proponent. The consultant has not provided a completed DNRC Environmental Checklist.

IV. IMPACTS ON THE HUMAN POPULATION

- *RESOURCES potentially impacted are listed on the form, followed by common issues that would be considered.*
- *Explain POTENTIAL IMPACTS AND MITIGATIONS following each resource heading.*
- *Enter "NONE" If no impacts are identified or the resource is not present.*

14. HUMAN HEALTH AND SAFETY:
Identify any health and safety risks posed by the project.

The poor integrity of the existing liner in the lagoon has resulted in unmonitored discharge of wastewater to groundwater. Additionally, the lagoon has one discharge outlet to an unnamed tributary to Dog Creek. The existing system is currently under an AOC due to repeated violations of the secondary treatment standards outlined in the Town's wastewater discharge permit. Furthermore, it is possible the existing system lies within the original flow channel and the floodplain of Dog Creek, which increases the risk of water contamination associated with uncontrolled discharge of wastewater effluent to both the ground water and surface water

Proposed Alternative – There is a potential for short-term and long-term beneficial impacts related to protecting groundwater and surface water from contamination. Replacing the current lagoon with a new lagoon system would protect human health and safety by eliminating unmonitored discharges to groundwater and also eliminate the need to discharge treated wastewater into Dog Creek. There would also be beneficial impacts to relocating the lagoon system so that it is outside of the Dog Creek floodplain.

No Action Alternative – Potentially direct, minor to major, short- and long-term, local adverse impacts. If no actions are taken to remove or rehabilitate the lagoon, unmonitored discharges of wastewater to groundwater will continue, treated wastewater will continue to be discharged into Dog Creek, and there is potential that the lagoon could flood due to its location within the floodplain leading to contaminated wastewater entering Dog Creek.

15. INDUSTRIAL, COMMERCIAL AND AGRICULTURE ACTIVITIES AND PRODUCTION:
Identify how the project would add to or alter these activities.

There are no agricultural lands, or commercial or industrial facilities within the project area, but these lands and facilities do exist nearby to the project area.

Proposed Alternative – Potential long-term adverse impacts. The construction of a new lagoon system will require land to be converted and the operation of the lift station will require energy.

No Action Alternative – Potential long-term adverse impacts. If wastewater contamination impacts groundwater or Dog Creek either by leakage from the lagoon or a flood event, this could put a strain on water resources for commercial and agricultural purposes.

16. QUANTITY AND DISTRIBUTION OF EMPLOYMENT:
Estimate the number of jobs the project would create, move or eliminate. Identify direct, indirect, and cumulative effects to the employment market.

The project area is the Town of Winifred, in Fergus County. As of the 2024 Census, the County of Fergus had a population of 11,862 residents and the town of Winifred had a population of 176 residents. Median annual household income in the past 12 months is $63,717 for the county. There are 11.2% of the population in Fergus County under the poverty line.

Proposed Alternative – Potentially direct and indirect, temporary to long-term, local beneficial impacts to quantity or distribution of employment. The construction of the project may bring local

job opportunities that were not previously present. Operations and maintenance of the facility may provide jobs which were not previously present. The new wastewater facility could help provide job security by protecting the water quality of groundwater and surface water which would allow commercial and agricultural businesses to remain operational.

No Action Alternative – Potential short-term and long-term adverse impacts. If wastewater contamination impacts groundwater or Dog Creek either by leakage from the lagoon or a flood event, this could put a strain on water resources for commercial and agricultural purposes potentially leading to job loss.

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17. LOCAL AND STATE TAX BASE AND TAX REVENUES:

Estimate tax revenue the project would create or eliminate. Identify direct, indirect, and cumulative effects to taxes and revenue.

The construction of the wastewater facility is not likely to lower property values for nearby homes and businesses or impact tax values. The project is not likely to generate tax revenue.

Proposed Alternative – The proposed project is not expected to have any impact on local or state taxes.

No Action Alternative – Potentially direct and indirect, moderate to major, short- to long-term, localized adverse impacts to local and state tax base and revenues. Continued degradation of the existing treatment plant may lead to critical failure. Property values may diminish with a wastewater treatment system that is unable to keep up with demand, stagnating future growth and development.

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18. DEMAND FOR GOVERNMENT SERVICES:

Estimate increases in traffic and changes to traffic patterns. What changes would be needed to fire protection, police, schools, etc.? Identify direct, indirect, and cumulative effects of this and other projects on government services

Work is to be completed in or near the project area and there may be changes necessary to traffic patterns, fire protection, police, schools, or other government services during construction. Most construction is likely to occur away from roads, but some construction traffic may cause slight delays. When completed, the project will provide government services with additional wastewater processing capacity.

Proposed Alternative – As the proposed project area is located just north of town, it is unlikely that any government services would be impacted.

No Action Alternative – Potentially adverse impacts to the demand for government services in the event that the lagoon heavily contaminates groundwater or surface water. This may require a demand for government services related to clean-up activities or for services to supply clean water to the community.

19. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS:

List State, County, City, USFS, BLM, Tribal, and other zoning or management plans, and identify how they would affect this project.

The existing system is currently under an AOC due to repeated violations of the secondary treatment standards outlined in the Town's wastewater discharge permit.

Proposed Alternative – Potentially direct beneficial impacts to locally adopted environmental plans and goals. Action to address deficiencies in the wastewater treatment lagoon by creating new lagoons will have beneficial impacts to the town's ability to grow and develop, as well as improve water quality and protect water resources and public health.

No Action Alternative – Potential minor to major, short- to long-term, local, recurring adverse impacts to locally adopted environmental plans and goals. Continuing to utilize the existing lagoon would pose a threat to human health and safety due to on-going, unmonitored discharges of wastewater to groundwater, treated wastewater will continue to be discharged into Dog Creek, and there is potential that the lagoon could flood due to its location within the floodplain leading to contaminated wastewater entering Dog Creek.

20. ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES:

Identify any wilderness or recreational areas nearby or access routes through this tract. Determine the effects of the project on recreational potential within the tract. Identify direct, indirect, and cumulative effects to recreational and wilderness activities.

The project is not located in or on a designated recreational, Wild & Scenic River, or Wilderness Area. There are green spaces located within the project area.

Proposed Alternative and No Action Alternative – No direct impacts to access to and quality of recreational and wilderness activities. The preferred alternatives will not impact access to public lands, waterways, or public open spaces.

21. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING:

Estimate population changes and additional housing the project would require. Identify direct, indirect, and cumulative effects to population and housing.

The project is situated on the north side of the town of Winifred. No housing is expected to be impacted through construction of the project. The area around the project is sparsely populated and developed, although residential communities do exist to the south of the property.

Proposed Alternative and No Action Alternative – No impacts to density and distribution of population and housing as the proposed project is not expected to cause any changes in population demographics or housing conditions.

22. SOCIAL STRUCTURES AND MORES:

Identify potential disruption of native or traditional lifestyles or communities.

The town of Winifred is located on the traditional lands of the Niitsítpiis-stahkoii (Blackfoot / Niitsítapi); Cayuse, Umatilla, and Walla Walla; Michif Piyii (Métis); Očhéthi Šakówiŋ; and Apsáalooke (Crow) nations.

Proposed Alternative and No Action Alternative – The project is not anticipated to impact native or traditional lifestyles or communities.

23. CULTURAL UNIQUENESS AND DIVERSITY:

How would the action affect any unique quality of the area?

There are no unique facilities of unique culture or diversity in the project area.

Proposed Alternatives – Impacts on historic properties and cultural and archaeological resources are not anticipated as a result of the actions in the preferred alternative. No comments from SHPO or Tribal contacts were received regarding the project.

No Action Alternative – No impacts to cultural uniqueness and diversity.

24. OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES:

Include appropriate economic analysis. Identify potential future uses for the analysis area other than existing management. Identify direct, indirect, and cumulative economic and social effects likely to occur as a result of the proposed action.

Median income for the Town as of 2024 was $63,717.

Proposed Alternative – Potentially direct and indirect, negligible to minor, short-term, beneficial impacts to appropriate social and economic circumstances. Workers and materials required for the construction of the project may temporarily provide beneficial impacts to local businesses throughout construction.

No Action Alternative – Potentially direct, minor to major, short- to long-term adverse impacts to appropriate social and economic circumstances. If wastewater contamination impacts groundwater or Dog Creek either by leakage from the lagoon or a flood event, this could put a strain on water resources for commercial and agricultural purposes potentially leading to business closures and/or job loss.

25. DRINKING WATER AND/OR CLEAN WATER

Identify potential impacts to water and/or sewer infrastructure (e.g., community water supply, stormwater, sewage system, solid waste management) and identify direct, indirect, and cumulative effects likely to occur as a result of the proposed action.

The poor integrity of the existing liner in the lagoon has resulted in unmonitored discharge of wastewater to groundwater. Additionally, the lagoon has one discharge outlet to an unnamed tributary to Dog Creek. The existing system is currently under an AOC due to repeated violations of

the secondary treatment standards outlined in the Town's wastewater discharge permit. Furthermore, there is potential that the existing system lies within the original flow channel and the floodplain of Dog Creek, which increases the risk of water contamination associated with uncontrolled discharge of wastewater effluent to both the ground water and surface water.

Proposed Alternative – There is a potential for short-term and long-term beneficial impacts related to protecting groundwater and surface water from contamination. Replacing the current lagoon with a new lagoon system would protect the groundwater from unmonitored discharges and also eliminate the need to discharge treated wastewater into Dog Creek. There would also be beneficial impacts to relocating the lagoon system so that it is outside of the Dog Creek floodplain which would protect surface water and groundwater in the event of a flood.

No Action Alternative – Potentially direct, minor to major, short- and long-term, local adverse impacts. If no actions are taken to remove or rehabilitate the lagoon, unmonitored discharges of wastewater to groundwater will continue, treated wastewater will continue to be discharged into Dog Creek, and there is potential that the lagoon could flood due to its location within the floodplain leading to contaminated wastewater entering Dog Creek.

26. ENVIRONMENTAL JUSTICE

Will the proposed project result in disproportionately high or adverse human health or environmental effects on minority or low-income populations per the Environmental Justice Executive Order 12898? Identify potential impacts to and identify direct, indirect, and cumulative effects likely to occur as a result of the proposed action.

According to the 2015-2019 Montana Department of Commerce Census data, the Town of Winifred has 52.8% of the population considered "low to moderate" income, and 7.2% poverty rate.

Proposed Alternative and No Action Alternative – The majority of residences are of low to moderate income households, however the proposed alternative and the no action alternative will not result in disproportionately high or adverse human health or environmental effects on minority or low-income populations.

EA Prepared By:	**Name:**	Samantha Treu	**Date:**	5/19/2025
	Title:	MEPA/NEPA Coordinator	**Email:**	samantha.treu@mt.gov

V. FINDING

27. ALTERNATIVE SELECTED:

The planned project involves construction of a new 3-celled facultative lagoon north of the town and an adjacent spray irrigation process for the disposal of effluent. A new lift station will pump from the existing sewer collection main on the northeast side of Town and pump to the new treatment and disposal facilities approximately one-half mile due north of town.

The implementation of this new facility should eliminate the Montana Pollutant Discharge Elimination System (MPDES) discharge permit, address public health concerns associated with

noncompliant discharge, protect local groundwater, improve aquatic life conditions in Dog Creek, and develop a new water supply for beneficial use of a marketable crop (alfalfa) through spray irrigation.

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28. SIGNIFICANCE OF POTENTIAL IMPACTS:

GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE

Direct and indirect, potentially cumulative, minor, short- to long-term, localized, recurring adverse impacts. The project will negatively impact existing soil conditions through the construction phase and may negatively impact existing soil quality. Impacts to soil quality are most likely to come from compaction, reducing the ability for natural infiltration of stormwater and limiting oxygen supply to soil microbial populations. To mitigate these impacts the contractor should utilize best management practices (BMPs) to reduce erosion impacts. There are no anticipated impacts to the underlying geology.

WATER QUALITY, QUANTITY, AND DISTRIBUTION

Potential minor adverse impacts to surface water from disturbed construction areas with stormwater runoff. To mitigate these impacts construction BMPs should be installed and maintained for the duration of the project. Although there is the potential for short-term adverse impacts, the short-term and long-term beneficial impacts of the proposed alternative are significant. Replacing the current lagoon with a new lagoon system would protect the groundwater from unmonitored discharges and also eliminate the need to discharge treated wastewater into Dog Creek. There would also be beneficial impacts to relocating the lagoon system so that it is outside of the Dog Creek floodplain

AIR QUALITY

Potentially direct, minor, short-term, local adverse impacts to air quality related to the dust and exhaust generated from equipment. Proper mitigation should take place within the machinery as well as some fugitive dust control (typically with a water truck). There is potential to have other gaseous hazards if gas lines are not properly labeled and marked. A digging permit through Montana 811 should be applied for, and proper labels should be laid out by Montana 811 to ensure pipe location. Pipe removal and installation should be carefully placed due to potential error in pipe location. Overall, there are no long-term adverse impacts expected during the project.

VEGETATION COVER, QUANTITY, AND QUALITY

Potentially direct, minor to moderate, short-term, localized adverse impacts to vegetation cover. Efforts should be made to preserve existing vegetation where applicable. BMPs should be installed and monitored. Actions in the preferred alternative will reduce the amount of vegetated area as existing vegetation within the footprint of new lagoon system would be permanently removed.

TERRESTRIAL, AVIAN, AND AQUATIC LIFE AND HABITATS

Potentially direct, negligible, short-term, local, non-recurring adverse impacts to terrestrial, avian, and aquatic life and habitats during construction. The contractor shall be required to restore any disturbance to preexisting conditions. Although there is the potential for short-term adverse impacts, the short-term and long-term beneficial impacts of the proposed alternative are significant. Replacing the current lagoon with a new lagoon system would protect the groundwater from unmonitored discharges and also eliminate the need to discharge treated wastewater into Dog Creek. There would also be beneficial impacts to relocating the lagoon system so that it is outside of the Dog Creek floodplain.

UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES

Potentially direct and indirect, negligible, short-term, local, non-recurring adverse impacts to unique, endangered, fragile, or limited resources. The contractor shall be required to restore any disturbance to preexisting conditions. Replacing the current lagoon with a new lagoon system would protect the groundwater from unmonitored discharges and also eliminate the need to discharge treated wastewater into Dog Creek. There would also be beneficial impacts to relocating the lagoon system so that it is outside of the Dog Creek floodplain.

AESTHETICS

Potentially indirect, negligible to minor, short-term, localized adverse impacts to aesthetics. Adverse nuisance impacts from heavy construction equipment will be temporary during the construction activities.

DEMANDS OF ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR OR ENERGY

Potential long-term adverse impacts. The construction of a new lagoon system will require land and the lift station will require energy. While energy and other resources are necessary to construct the new wastewater treatment facilities, these impacts are generally outweighed or offset by the support to residents provided by the project

INDUSTRIAL, COMMERICAL AND AGRICULTURAL ACTIVITIES AND PRODUCTION

Potential long-term adverse impacts. The construction of a new lagoon system will require land to be converted and the operation of the lift station will require energy

STORMWATER

There is expected to be little to no impact on stormwater runoff based on the anticipated construction timing and scope of work. During construction, the contractor is required to prepare and submit a SWPPP and acquire the required permits for construction. BMPs should be installed and maintained according to the SWPPP.

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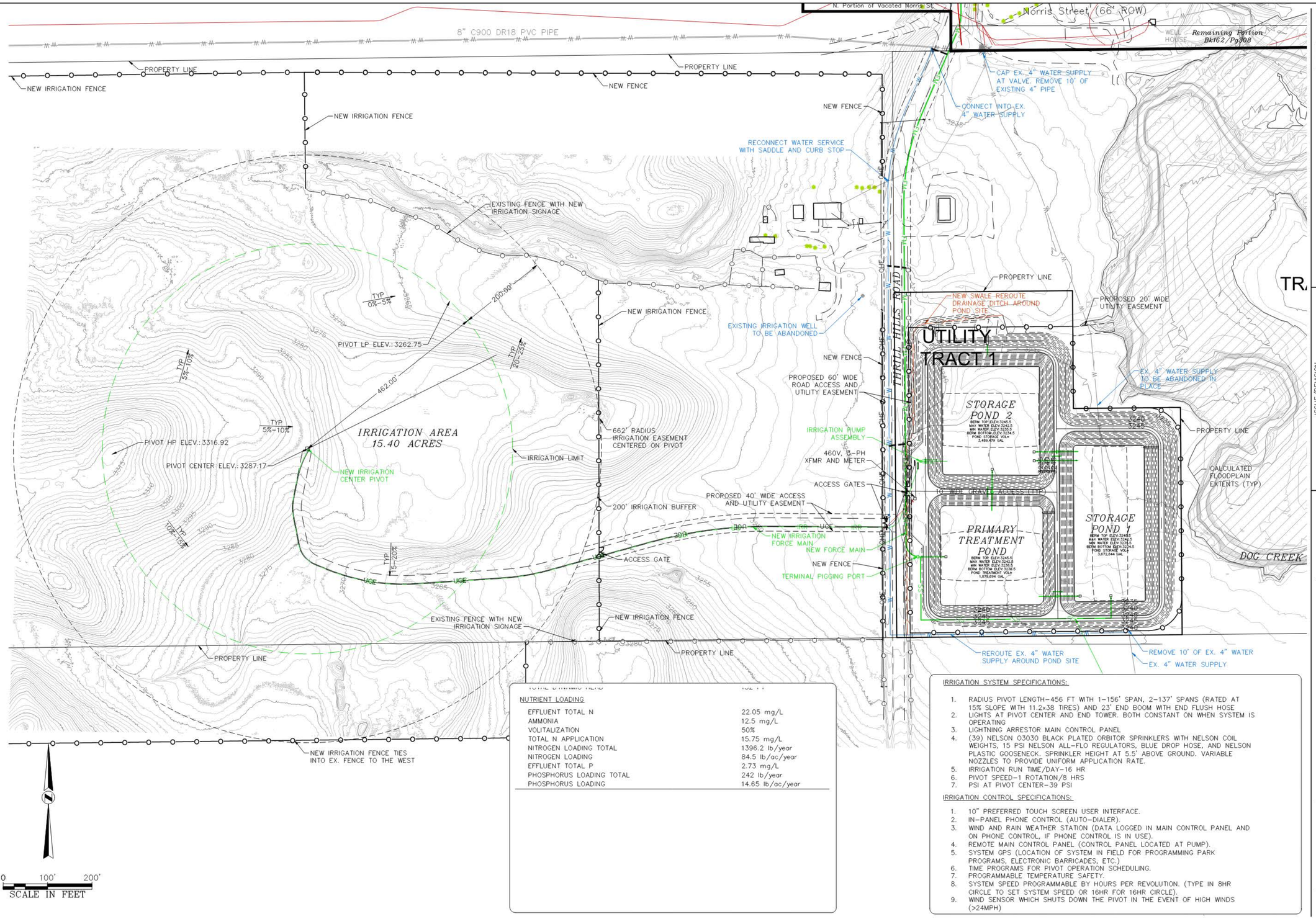
29. NEED FOR FURTHER ENVIRONMENTAL ANALYSIS:

No impacts appear to require a mitigated EA or EIS, however no alternatives analysis was conducted and DNRC cannot weigh the proposed alternative against other means to accomplish the same goal to fully understand the costs or benefits to the proposed alternative.

DNRC concludes that no significant adverse impacts will occur as a result of the proposed project work, and therefore no additional environmental review is required. The draft environmental assessment was posted for a 30-day public notice, and no public comments were received. This is the final environmental assessment, and the environmental review of this project is complete.

☐	EIS	☐	More Detailed EA	☒	No Further Analysis

EA Approved By:	**Name:** Mark W Bostrom **Title:** Division Administrator	
Signature: Mark W Bostrom		**Date**: 6/23/2025



NUTRIENT LOADING	
EFFLUENT TOTAL N	22.05 mg/L
AMMONIA	12.5 mg/L
VOLITALIZATION	50%
TOTAL N APPLICATION	15.75 mg/L
NITROGEN LOADING TOTAL	1396.2 lb/year
NITROGEN LOADING	84.5 lb/ac/year
EFFLUENT TOTAL P	2.73 mg/L
PHOSPHORUS LOADING TOTAL	242 lb/year
PHOSPHORUS LOADING	14.65 lb/ac/year

IRRIGATION SYSTEM SPECIFICATIONS:

1. RADIUS PIVOT LENGTH-456 FT WITH 1-156' SPAN, 2-137' SPANS (RATED AT 15% SLOPE WITH 11.2x38 TIRES) AND 23' END BOOM WITH END FLUSH HOSE
2. LIGHTS AT PIVOT CENTER AND END TOWER. BOTH CONSTANT ON WHEN SYSTEM IS OPERATING
3. LIGHTNING ARRESTOR MAIN CONTROL PANEL
4. (39) NELSON 03030 BLACK PLATED ORBITOR SPRINKLERS WITH NELSON COIL WEIGHTS, 15 PSI NELSON ALL-FLO REGULATORS, BLUE DROP HOSE, AND NELSON PLASTIC GOOSENECK. SPRINKLER HEIGHT AT 5.5' ABOVE GROUND. VARIABLE NOZZLES TO PROVIDE UNIFORM APPLICATION RATE.
5. IRRIGATION RUN TIME/DAY-16 HR
6. PIVOT SPEED-1 ROTATION/8 HRS
7. PSI AT PIVOT CENTER-39 PSI

IRRIGATION CONTROL SPECIFICATIONS:

1. 10" PREFERRED TOUCH SCREEN USER INTERFACE.
2. IN-PANEL PHONE CONTROL (AUTO-DIALER).
3. WIND AND RAIN WEATHER STATION (DATA LOGGED IN MAIN CONTROL PANEL AND ON PHONE CONTROL, IF PHONE CONTROL IS IN USE).
4. REMOTE MAIN CONTROL PANEL (CONTROL PANEL LOCATED AT PUMP).
5. SYSTEM GPS (LOCATION OF SYSTEM IN FIELD FOR PROGRAMMING PARK PROGRAMS, ELECTRONIC BARRICADES, ETC.)
6. TIME PROGRAMS FOR PIVOT OPERATION SCHEDULING.
7. PROGRAMMABLE TEMPERATURE SAFETY.
8. SYSTEM SPEED PROGRAMMABLE BY HOURS PER REVOLUTION. (TYPE IN 8HR CIRCLE TO SET SYSTEM SPEED OR 16HR FOR 16HR CIRCLE).
9. WIND SENSOR WHICH SHUTS DOWN THE PIVOT IN THE EVENT OF HIGH WINDS (>24MPH)

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PROFESSIONAL ENGINEERS & SURVEYORS
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851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
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Fax:(406)522-9528

ISSUE/REVISION

No.	DATE	DESCRIPTION	EOR	QCR
1	10/17/2024	HDR REVIEW	KWT	CDP
2	11/20/2024	DEQ SUBMITTAL	KWT	CDP
3	2/11/2025	DEQ RESUBMITTAL	KWT	CDP
4	3/20/2025	DEQ RESUBMITTAL	KWT	CDP
5				
6				
7				

KURT W. THOMSON 13499PE LICENSED PROFESSIONAL ENGINEER
3-20-25

TOWN OF WINIFRED WASTEWATER SYSTEM UPGRADES

FERGUS COUNTY, MONTANA

IRRIGATION SITE PLAN

SHEET
C1.3

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ISSUE/REVISION

No.	DATE	DESCRIPTION	EOR	QCR
1	3/28/25	REVIEW SET	DV	DV

TOWN OF WINIFRED
WASTEWATER SYSTEM
UPGRADES

FERGUS COUNTY,
MONTANA

OVERALL ELECTRICAL SITE PLAN

SHEET
E-301

MONTANA STATE LIBRARY

NATURAL HERITAGE PROGRAM mtnhp.org
1201 11th Ave ▫ P.O. Box 201800 ▫ Helena, MT 59620-1800 ▫ fax 406-444-0266 ▫ phone 406-444-3989

Environmental Summary

Latitude	Longitude
47.54033	-109.34467
47.58409	-109.40951

Summarized by:
021N018E026
(Buffered PLSS Section)

Suggested Citation
Montana Natural Heritage Program. Environmental Summary Report.
for Latitude 47.54033 to 47.58409 and Longitude -109.34467 to -109.40951. Retrieved on 9/28/2023.

The Montana Natural Heritage Program is part of the Montana State Library's Natural Resource Information System. Since 1985, it has served as a neutral and non-regulatory provider of easily accessible information on Montana's species and biological communities to inform all stakeholders in environmental review, permitting, and planning processes. The program is part of the NatureServe network that is composed of over 60 member programs across North America that work to provide current and comprehensive distribution and status information on species and biological communities.

MONTANA STATE LIBRARY NATURAL HERITAGE PROGRAM

NATURESERVE

Table of Contents

Introduction to Environmental Summary Report

Environmental Summary Reports from the Montana Natural Heritage Program (MTNHP) provide information on species and biological communities to inform all stakeholders in environmental review, permitting, and planning processes. For information on environmental permits in Montana, please see permitting overviews by the Montana Department of Environmental Quality, the Montana Department of Natural Resources and Conservation, the Index of Environmental Permits for Montana and our Suggested Contacts for Natural Resource Management Agencies. The report for your area of interest consists of introductory and related materials in this PDF and an Excel workbook with worksheets summarizing information managed in the MTNHP databases for: (1) species occurrences; (2) other observed species without species occurrences; (3) other species potentially present based on their range, presence of associated habitats, or predictive distribution model output if available; (4) structured surveys that follow a protocol capable of detecting one or more species; (5) land cover mapped as ecological systems; (6) wetland and riparian mapping; (7) land management categories; and (8) biological reports associated with plant and animal observations. If your area of interest corresponds to a statewide polygon layer (e.g., watersheds, counties, or public land survey sections) information summaries in your report will exactly match those boundaries. However, if your report is for a custom area, users should be aware that summaries do not correspond to the exact boundaries of the polygon they have specified, but instead are a summary across a layer of hexagons intersected by the polygon they specified as shown on the report cover. Summarizing by these hexagons which are one square mile in area and approximately one kilometer in length on each side allows for consistent and rapid delivery of summaries based on a uniform grid that has been used for planning efforts across North America.

In presenting this information, MTNHP is working towards assisting the user with rapidly assessing the known or potential species and biological communities, land management categories, and biological reports associated with the report area. Users are reminded that this information is likely incomplete and may be inaccurate as surveys to document species are lacking in many areas of the state, species' range polygons often include regions of unsuitable habitat, methods of predicting the presence of species or communities are constantly improving, and information is constantly being added and updated in our databases. **Field verification by professional biologists of the absence or presence of species and biological communities in a report area will always be an important obligation of users of our data. Users are encouraged to only use this environmental summary report as a starting point for more in depth analyses and are encouraged to contact state, federal, and tribal resource management agencies for additional data or management guidelines relevant to your efforts. Please see the Appendix for introductory materials to each section of the report, additional information resources, and a list of relevant agency contacts.**

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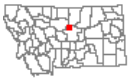
Model Icons	Habitat Icons	Range Icons	Num Obs
N Suitable (native range)	C Common	Y Native / Year-round	Count of obs with 'good precision' (<=1000m)
O Optimal Suitability	O Occasional	S Summer	+ indicates additional 'poor precision' obs (1001m-10,000m)
M Moderate Suitability		W Winter	
L Low Suitability		M Migratory	
I Suitable (introduced range)		N Non-native	
		H Historical	



Latitude	Longitude
47.54033	-109.34467
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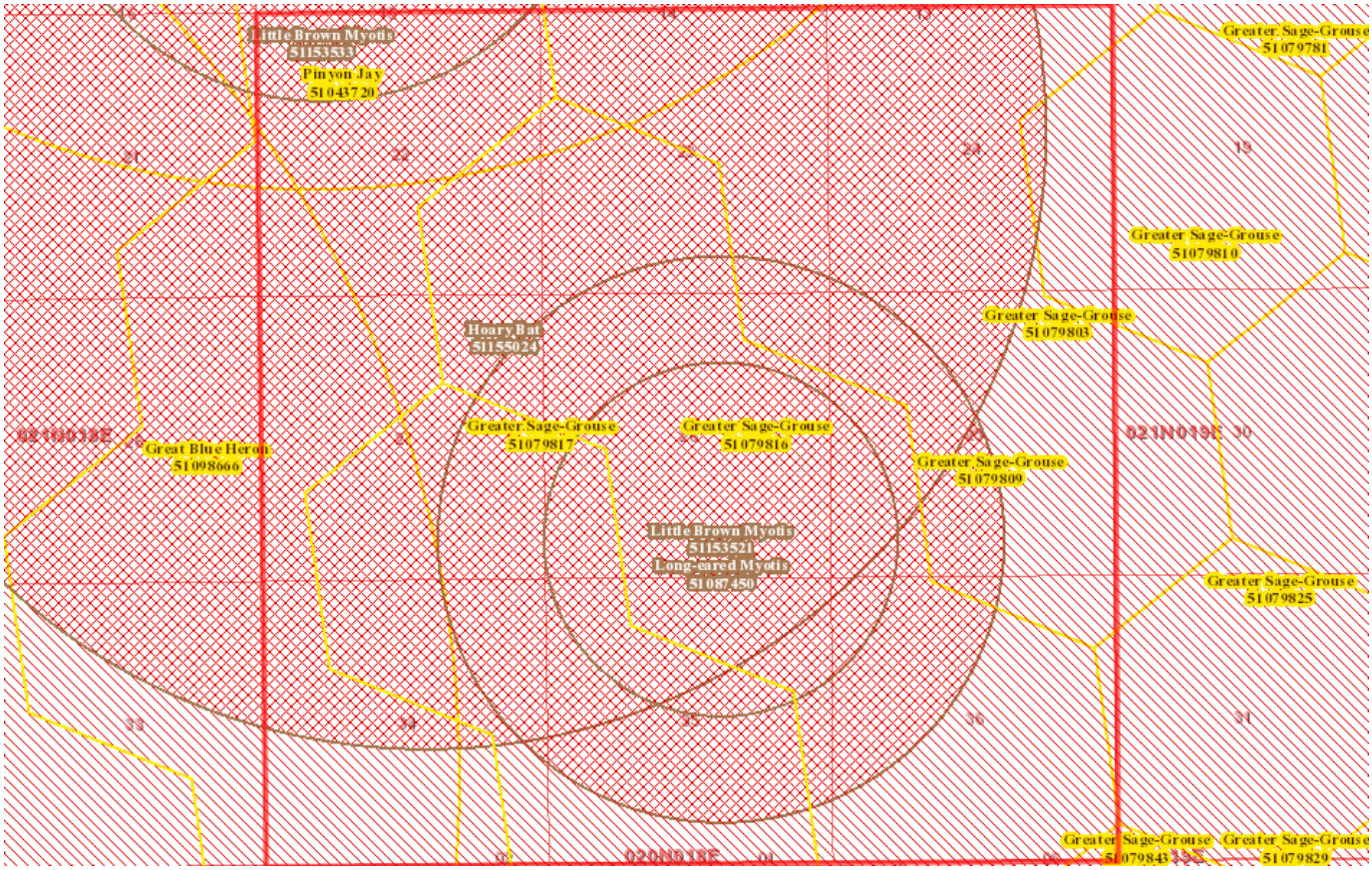
Native Species

Summarized by: **021N018E026** *(Buffered PLSS Section)*
Filtered by:
Native Species reports are filtered for Species with MT Status = Species of Concern, Special Status, Important Animal Habitat, Potential SOC



Species Occurrences

	USFWS Sec7	# SO	# Obs	Predicted Model	Range
M - Hoary Bat *(Lasiurus cinereus)* SOC		1	1		S M

View in Field Guide **View Predicted Models** **View Range Maps**

Species of Concern - Native Species Global: **G3G4** State: **S3B** BLM: **SENSITIVE** FWP SWAP: **SGCN3**

Delineation Criteria Confirmed area of occupancy based on the documented presence (mistnet captures, definitively identified acoustic recordings, and definitively identified roosting individuals) of adults or juveniles during the active season. Point observation location is buffered by a minimum distance of 3,500 meters in order to be conservative about encompassing the maximum reported foraging distance for the congeneric Lasiurus borealis and otherwise buffered by the locational uncertainty associated with the observation up to a maximum distance of 10,000 meters. (Last Updated: Jul 06, 2023)

Predicted Models: M 27% Moderate (inductive), L 73% Low (inductive)

M - Little Brown Myotis *(Myotis lucifugus)* SOC		2	1		Y

View in Field Guide **View Predicted Models** **View Range Maps**

Species of Concern - Native Species Global: **G3G4** State: **S3** FWP SWAP: **SGCN3**

Delineation Criteria Confirmed area of occupancy based on the documented presence (mistnet captures, definitively identified acoustic recordings, or definitively identified roosting individuals) of adults or juveniles. Point observation location is buffered by a distance of 1,600 meters in order to encompass the greater than 1,500 meters foraging distance reported for the species in New Brunswick, Canada and otherwise buffered by the locational uncertainty associated with the observation up to a maximum distance of 10,000 meters. When cave locations are involved, point observations are mapped in the center of a one-square mile hexagon to protect the exact location of the cave entrance as per the Federal Cave Resource Protection Act and associated regulations (U.S. Code Title 16 Chapter 63, Code of Federal Regulations Title 43 Subtitle A Part 37). The outer edges of the hexagon are then buffered by a distance of 1,600 meters and otherwise by the locational uncertainty associated with the observation up to a maximum distance of 10,000 meters. All of the one-square mile hexagons intersecting this buffered area are presented as the Species Occurrence record. (Last Updated: Jul 06, 2023)

Predicted Models: M 11% Moderate (inductive), L 89% Low (inductive)

B - Greater Sage-Grouse *(Centrocercus urophasianus)* SOC		7			Y

View in Field Guide **View Predicted Models** **View Range Maps**

USFS: **Sensitive - Known in Forests (BD)**

Species of Concern - Native Species Global: **G3G4** State: **S2** **Species of Conservation Concern in Forests (CG)** BLM: **SENSITIVE** FWP SWAP: **SGCN2** PIF: **1**

Delineation Criteria Confirmed breeding area based on the presence of a nest, chicks, juveniles, or adults on a lek. Point observations are mapped in the center of a one-square mile hexagon to protect the exact locations of leks. The outer edges of this hexagon are then buffered by a distance of 6,400 meters in order to encompass a body of research indicating that females typically nest within this distance of a lek and that lek numbers are negatively impacted by fossil fuel drilling activities within this distance of a lek. If the locational uncertainty associated with the observation is greater than this distance, it is buffered by the locational up to a maximum distance of 10,000 meters. All of the one-square mile hexagons intersecting this buffered area are presented as the Species Occurrence record. (Last Updated: Jan 25, 2023)

Predicted Models: M 1% Moderate (inductive), L 99% Low (inductive)

M - Long-eared Myotis *(Myotis evotis)* SOC — 1 — 1 — Y

Species of Concern - Native Species Global: **G5** State: **S3**

Delineation Criteria Confirmed area of occupancy based on the documented presence (mistnet captures, definitively identified acoustic recordings, and definitively identified roosting individuals) of adults or juveniles. Point observation location is buffered by a minimum distance of 1,000 meters in order to encompass the average distances traveled from capture locations to roosts and between roosts in western Montana, Alberta, and Oregon and otherwise buffered by the locational uncertainty associated with the observation up to a maximum distance of 10,000 meters. When cave locations are involved, point observations are mapped in the center of a one-square mile hexagon to protect the exact location of the cave entrance as per the Federal Cave Resource Protection Act and associated regulations (U.S. Code Title 16 Chapter 63, Code of Federal Regulations Title 43 Subtitle A Part 37). The outer edges of the hexagon are then buffered by a distance of 1,000 meters and otherwise by the locational uncertainty associated with the observation up to a maximum distance of 10,000 meters. All of the one-square mile hexagons intersecting this buffered area are presented as the Species Occurrence record. (Last Updated: Mar 22, 2023)

Predicted Models: L 92% Low (inductive)

B - Great Blue Heron *(Ardea herodias)* SOC — 1 — 2 — Y S — M

View in Field Guide **View Predicted Models** **View Range Maps**

Species of Concern - Native Species Global: **G5** State: **S3** USFWS: **MBTA** FWP SWAP: **SGCN3**

Delineation Criteria Confirmed nesting area buffered by a minimum distance of 6,500 meters in order to be conservative about encompassing the areas commonly used for foraging near the breeding colony and otherwise buffered by the locational uncertainty associated with the observation up to a maximum distance of 10,000 meters. (Last Updated: Jun 27, 2023)

Predicted Models: L 73% Low (inductive)

B - Pinyon Jay *(Gymnorhinus cyanocephalus)* SOC — 1 — Not Assessed — Y

View in Field Guide **View Range Maps**

Species of Concern - Native Species Global: **G3** State: **S3** USFWS: **MBTA; BCC10; BCC17** FWP SWAP: **SGCN3**

Delineation Criteria Observations with evidence of breeding activity buffered by a minimum distance of 4,500 meters in order to be conservative about encompassing the home ranges reported for flocks and otherwise buffered by the locational uncertainty associated with the observation up to a maximum distance of 10,000 meters. (Last Updated: Jan 04, 2023)

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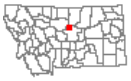
Model Icons
- Suitable (native range)
- Optimal Suitability
- Moderate Suitability
- Low Suitability
- Suitable (introduced range)

Habitat Icons
- Common
- Occasional

Range Icons
- Native / Year-round
- Summer
- Winter
- Migratory
- Non-native
- Historical

Num Obs
Count of obs with 'good precision' (<=1000m)
+ indicates additional 'poor precision' obs (1001m-10,000m)



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Native Species

Summarized by: **021N018E026** *(Buffered PLSS Section)*
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Native Species reports are filtered for Species with MT Status = Species of Concern, Special Status, Important Animal Habitat, Potential SOC

Other Observed Species

	USFWS Sec7	# Obs	Predicted Model	Range
B - Long-billed Curlew *(Numenius americanus)* SOC		2		S M
B - Loggerhead Shrike *(Lanius ludovicianus)* SOC		1		S M
B - Ferruginous Hawk *(Buteo regalis)* SOC		1		S M
M - Silver-haired Bat *(Lasionycteris noctivagans)* PSOC		1		Y
A - Northern Leopard Frog *(Lithobates pipiens)* SOC		1		Y
F - Brook Stickleback *(Culaea inconstans)* PSOC		1	Not Assessed	Y
B - Plumbeous Vireo *(Vireo plumbeus)* PSOC		1	Not Assessed	S M

View in Field Guide **View Predicted Models** **View Range Maps**
Species of Concern - Native Species Global: **G5** State: **S3B** USFWS: **MBTA; BCC11** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **2**
Predicted Models: M 58% Moderate (inductive), L 42% Low (inductive)

View in Field Guide **View Predicted Models** **View Range Maps**
Species of Concern - Native Species Global: **G4** State: **S3B** USFWS: **MBTA** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **2**
Predicted Models: M 11% Moderate (inductive), L 70% Low (inductive)

View in Field Guide **View Predicted Models** **View Range Maps**
Species of Concern - Native Species Global: **G4** State: **S3B** USFWS: **MBTA; BCC17** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **2**
Predicted Models: L 100% Low (inductive)

View in Field Guide **View Predicted Models** **View Range Maps**
Potential Species of Concern - Native Species Global: **G3G4** State: **S4**
Predicted Models: L 92% Low (inductive)

View in Field Guide **View Predicted Models** **View Range Maps**
Species of Concern - Native Species Global: **G5** State: **S1,S4** USFS: **Sensitive - Known in Forests (KOOT)** **Sensitive - Suspected in Forests (BRT, LOLO)** BLM: **SENSITIVE** FWP SWAP: **SGCN1**
Predicted Models: L 92% Low (inductive)

View in Field Guide **View Range Maps**
Potential Species of Concern - Native/Non-native Species - (depends on location or taxa) Global: **G5** State: **S4**

View in Field Guide **View Range Maps**
Potential Species of Concern - Native Species Global: **G5** State: **S3S4B** USFWS: **MBTA** PIF: **3**

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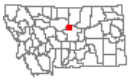
Model Icons	Habitat Icons	Range Icons	Num Obs
N Suitable (native range)	C Common	Y Native / Year-round	Count of obs with 'good precision' (<=1000m)
O Optimal Suitability	O Occasional	S Summer	+ indicates additional 'poor precision' obs (1001m-10,000m)
M Moderate Suitability		W Winter	
L Low Suitability		M Migratory	
I Suitable (introduced range)		N Non-native	
		H Historical	



Latitude	Longitude
47.54033	-109.34467
47.58409	-109.40951

Native Species

Summarized by: **021N018E026** *(Buffered PLSS Section)*
Filtered by:
Native Species reports are filtered for Species with MT Status = Species of Concern, Special Status, Important Animal Habitat, Potential SOC

Other Potential Species

	USFWS Sec7	Predicted Model	Range
B - Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC			Y
View in Field Guide **View Predicted Models** **View Range Maps**			
Species of Concern - Native Species Global: **G5** State: **SX,S4** FWP SWAP: **SGCN1** PIF: **2**			
Predicted Models: M 100% Moderate (inductive)			
B - Short-eared Owl *(Asio flammeus)* PSOC			Y
View in Field Guide **View Predicted Models** **View Range Maps**			
Potential Species of Concern - Native Species Global: **G5** State: **S4** USFWS: **MBTA; BCC11; BCC17** PIF: **3**			
Predicted Models: M 81% Moderate (inductive), L 19% Low (inductive)			
M - North American Porcupine *(Erethizon dorsatum)* PSOC			Y
View in Field Guide **View Predicted Models** **View Range Maps**			
Potential Species of Concern - Native Species Global: **G5** State: **S3S4** FWP SWAP: **SGIN**			
Predicted Models: M 64% Moderate (inductive), L 36% Low (inductive)			
B - Eastern Screech-Owl *(Megascops asio)* PSOC			Y
View in Field Guide **View Predicted Models** **View Range Maps**			
Potential Species of Concern - Native Species Global: **G5** State: **S3S4** USFWS: **MBTA** PIF: **3**			
Predicted Models: M 62% Moderate (inductive), L 38% Low (inductive)			
B - Bobolink *(Dolichonyx oryzivorus)* SOC			S M
View in Field Guide **View Predicted Models** **View Range Maps**			
Species of Concern - Native Species Global: **G5** State: **S3B** USFWS: **MBTA; BCC10; BCC11; BCC17** FWP SWAP: **SGCN3** PIF: **3**			
Predicted Models: M 29% Moderate (inductive), L 71% Low (inductive)			
V - Carex crawei *(Crawe's Sedge)* SOC			Y
View in Field Guide **View Predicted Models** **View Range Maps**			
Species of Concern - Native Species Global: **G5** State: **S2S3** Plant Threat Score: **Low**			
Predicted Models: M 21% Moderate (inductive), L 79% Low (inductive)			
B - White-faced Ibis *(Plegadis chihi)* SOC			S M
View in Field Guide **View Predicted Models** **View Range Maps**			
Species of Concern - Native Species Global: **G5** State: **S3B** USFWS: **MBTA** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **2**			
Predicted Models: M 21% Moderate (inductive), L 72% Low (inductive)			
M - Dwarf Shrew *(Sorex nanus)* SOC			Y
View in Field Guide **View Predicted Models** **View Range Maps**			
Species of Concern - Native Species Global: **G4** State: **S2S3** FWP SWAP: **SGCN2-3**			
Predicted Models: M 11% Moderate (inductive), L 89% Low (inductive)			
B - American White Pelican *(Pelecanus erythrorhynchos)* SOC			S M
View in Field Guide **View Predicted Models** **View Range Maps**			
Species of Concern - Native Species Global: **G4** State: **S3B** USFWS: **MBTA** FWP SWAP: **SGCN3** PIF: **3**			
Predicted Models: M 11% Moderate (inductive), L 89% Low (inductive)			
I - Danaus plexippus *(Monarch)* SOC			S
View in Field Guide **View Predicted Models** **View Range Maps**			
Species of Concern - Native Species Global: **G4** State: **S2S3** USFWS: **C**			
Predicted Models: M 11% Moderate (inductive), L 73% Low (inductive)			
M - Merriam's Shrew *(Sorex merriami)* SOC			Y
View in Field Guide **View Predicted Models** **View Range Maps**			
Species of Concern - Native Species Global: **G4** State: **S3** FWP SWAP: **SGCN3**			
Predicted Models: M 5% Moderate (inductive), L 95% Low (inductive)			
B - Bald Eagle *(Haliaeetus leucocephalus)* SSS			Y
View in Field Guide **View Predicted Models** **View Range Maps**			
Special Status Species - Native Species Global: **G5** State: **S4** USFWS: **BGEPA; MBTA** USFS: **Sensitive - Known in Forests (BD, BRT, KOOT, LOLO)** BLM: **SENSITIVE** PIF: **2**			
Predicted Models: M 5% Moderate (inductive), L 78% Low (inductive)			
B - Sprague's Pipit *(Anthus spragueii)* SOC	7		S M
View in Field Guide **View Predicted Models** **View Range Maps**			
Species of Concern - Native Species Global: **G3G4** State: **S3B** USFWS: **MBTA; BCC11; BCC17** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **1**			
Predicted Models: M 1% Moderate (inductive), L 99% Low (inductive)			

M - Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC

Species of Concern - Native Species Global: **G4** State: **S3** BLM: **SENSITIVE** FWP SWAP: **SGCN3**

Predicted Models: L 100% Low (inductive)

M - Hayden's Shrew *(Sorex haydeni)* PSOC

View in Field Guide View Predicted Models View Range Maps

Potential Species of Concern - Native Species Global: **G5** State: **S3S4**

Predicted Models: L 100% Low (inductive)

V - Elodea bifoliata *(Long-sheath Waterweed)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G4G5** State: **S2?** Plant Threat Score: **No Known Threats**

Predicted Models: L 100% Low (inductive)

B - Black-billed Cuckoo *(Coccyzus erythropthalmus)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3B** USFWS: **MBTA; BCC11; BCC17** BLM: **SENSITIVE** FWP SWAP: **SGCN3, SGIN** PIF: **2**

Predicted Models: L 100% Low (inductive)

B - Common Poorwill *(Phalaenoptilus nuttallii)* PSOC

View in Field Guide View Predicted Models View Range Maps

Potential Species of Concern - Native Species Global: **G5** State: **S4B** USFWS: **MBTA** FWP SWAP: **SGIN** PIF: **3**

Predicted Models: L 92% Low (inductive)

R - Plains Hog-nosed Snake *(Heterodon nasicus)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S2** BLM: **SENSITIVE** FWP SWAP: **SGCN2, SGIN**

Predicted Models: L 90% Low (inductive)

B - Veery *(Catharus fuscescens)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3B** USFWS: **MBTA** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **2**

Predicted Models: L 84% Low (inductive)

A - Great Plains Toad *(Anaxyrus cognatus)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S2** BLM: **SENSITIVE** FWP SWAP: **SGCN2**

Predicted Models: L 81% Low (inductive)

B - Baird's Sparrow *(Centronyx bairdii)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G4** State: **S3B** USFWS: **MBTA; BCC11; BCC17** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **1**

Predicted Models: L 76% Low (inductive)

B - Brewer's Sparrow *(Spizella breweri)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3B** USFWS: **MBTA** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **2**

Predicted Models: L 76% Low (inductive)

B - Golden Eagle *(Aquila chrysaetos)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3** USFWS: **BGEPA; MBTA** BLM: **SENSITIVE** FWP SWAP: **SGCN3**

Predicted Models: L 70% Low (inductive)

B - Black-necked Stilt *(Himantopus mexicanus)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3B** USFWS: **MBTA** FWP SWAP: **SGCN3** PIF: **3**

Predicted Models: L 68% Low (inductive)

B - Sage Thrasher *(Oreoscoptes montanus)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G4** State: **S3B** USFWS: **MBTA** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **3**

Predicted Models: L 67% Low (inductive)

M - Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G4** State: **S3** USFS: **Sensitive - Known in Forests (BD, BRT, KOOT, LOLO)** BLM: **SENSITIVE** FWP SWAP: **SGCN3**

Predicted Models: L 66% Low (inductive)

I - Bombus suckleyi *(Suckley Cuckoo Bumble Bee)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G2G3** State: **S1**

Predicted Models: L 63% Low (inductive)

R - Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3** BLM: **SENSITIVE** FWP SWAP: **SGCN3, SGIN**

Predicted Models: L 59% Low (inductive)

B - Burrowing Owl *(Athene cunicularia)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G4** State: **S3B** USFWS: **MBTA; BCC17** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **1**

Predicted Models: L 59% Low (inductive)

M - Fringed Myotis *(Myotis thysanodes)* SOC

Species of Concern - Native Species Global: **G4** State: **S3** BLM: **SENSITIVE** FWP SWAP: **SGCN3**

Predicted Models: L 51% Low (inductive)

M - Eastern Red Bat *(Lasiurus borealis)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G3G4** State: **S3B** BLM: **SENSITIVE**

Predicted Models: L 47% Low (inductive)

B - Black Tern *(Chlidonias niger)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G4G5** State: **S3B** USFWS: **MBTA; BCC10; BCC11; BCC17** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **2**

Predicted Models: L 46% Low (inductive)

B - Franklin's Gull *(Leucophaeus pipixcan)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3B** USFWS: **MBTA; BCC10; BCC11; BCC17** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **2**

Predicted Models: L 39% Low (inductive)

M - Swift Fox *(Vulpes velox)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G3** State: **S3** BLM: **SENSITIVE** FWP SWAP: **SGCN3**

Predicted Models: L 36% Low (inductive)

B - Chestnut-collared Longspur *(Calcarius ornatus)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S2B** USFWS: **MBTA; BCC11; BCC17** BLM: **SENSITIVE** FWP SWAP: **SGCN2** PIF: **2**

Predicted Models: L 35% Low (inductive)

B - Thick-billed Longspur *(Rhynchophanes mccownii)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G4** State: **S3B** USFWS: **MBTA; BCC10; BCC11; BCC17** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **2**

Predicted Models: L 35% Low (inductive)

B - Ovenbird *(Seiurus aurocapilla)* PSOC

View in Field Guide View Predicted Models View Range Maps

Potential Species of Concern - Native Species Global: **G5** State: **S4B** USFWS: **MBTA** PIF: **3**

Predicted Models: L 33% Low (inductive)

B - American Bittern *(Botaurus lentiginosus)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3B** USFWS: **MBTA** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **3**

Predicted Models: L 30% Low (inductive)

V - Cypripedium parviflorum *(Small Yellow Lady's-slipper)* PSOC

View in Field Guide View Predicted Models View Range Maps

USFS: **Sensitive - Known in Forests (KOOT, LOLO)**
Sensitive - Suspected in Forests (BRT)

Potential Species of Concern - Native Species Global: **G5** State: **S3S4** **Species of Conservation Concern in Forests (CG, HLC)**

Predicted Models: L 29% Low (inductive)

V - Senecio integerrimus var. scribneri *(Scribner's Ragwort)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5T2T3** State: **S2S3** Plant Threat Score: **No Known Threats** CCVI: **Less Vulnerable**

Predicted Models: L 29% Low (inductive)

B - Caspian Tern *(Hydroprogne caspia)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S2B** USFWS: **MBTA** BLM: **SENSITIVE** FWP SWAP: **SGCN2** PIF: **2**

Predicted Models: L 27% Low (inductive)

B - Eastern Bluebird *(Sialia sialis)* PSOC

View in Field Guide View Predicted Models View Range Maps

Potential Species of Concern - Native Species Global: **G5** State: **S4B** USFWS: **MBTA**

Predicted Models: L 25% Low (inductive)

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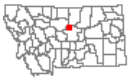

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Structured Surveys

Summarized by: **021N018E026** *(Buffered PLSS Section)*

The Montana Natural Heritage Program (MTNHP) records information on the locations where more than 80 different types of well-defined repeatable survey protocols capable of detecting an animal species or suite of animal species have been conducted by state, federal, tribal, university, or private consulting biologists. Examples of structured survey protocols tracked by MTNHP include: visual encounter and dip net surveys for pond breeding amphibians, point counts for birds, call playback surveys for selected bird species, visual surveys of migrating raptors, kick net stream reach surveys for macroinvertebrates, visual encounter cover object surveys for terrestrial mollusks, bat acoustic or mist net surveys, pitfall and/or snap trap surveys for small terrestrial mammals, track or camera trap surveys for large mammals, and trap surveys for turtles. Whenever possible, photographs of survey locations are stored in MTNHP databases.

MTNHP does not typically manage information on structured surveys for plants; surveys for invasive species may be a future exception.

Within the report area you have requested, structured surveys are summarized by the number of each type of structured survey protocol that has been conducted, the number of species detections/observations resulting from these surveys, and the most recent year a survey has been conducted.

AR-Amphibian/Reptile Lentic *(Lentic Amphibian/Reptile Surveys)*	**Survey Count**: 1	**Obs Count**: 2	**Recent Survey**: 2008
B-Raptor nest *(Raptor Nest Survey)*	**Survey Count**: 1	**Obs Count**: 1	**Recent Survey**: 2000
E-Eastern Heath Snail *(Eastern Heath Snail Survey)*	**Survey Count**: 1	**Obs Count**:	**Recent Survey**: 2012
E-Noxious Weed, Road-based *(Noxious Weed Road-based Visual Surveys)*	**Survey Count**: 4	**Obs Count**: 9	**Recent Survey**: 2003
F-Fish Other Survey *(Fish Other Survey (FWP Survey Type))*	**Survey Count**: 1	**Obs Count**: 1	**Recent Survey**: 1998
M-Bat Acoustic *(Bat Acoustic Survey)*	**Survey Count**: 2	**Obs Count**: 4	**Recent Survey**: 2008
M-Bat Mistnet *(Bat Mistnet Survey)*	**Survey Count**: 2	**Obs Count**:	**Recent Survey**: 2008
R-Reptile VES *(Visual Encounter Surveys for Reptiles)*	**Survey Count**: 1	**Obs Count**:	**Recent Survey**: 2008

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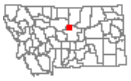

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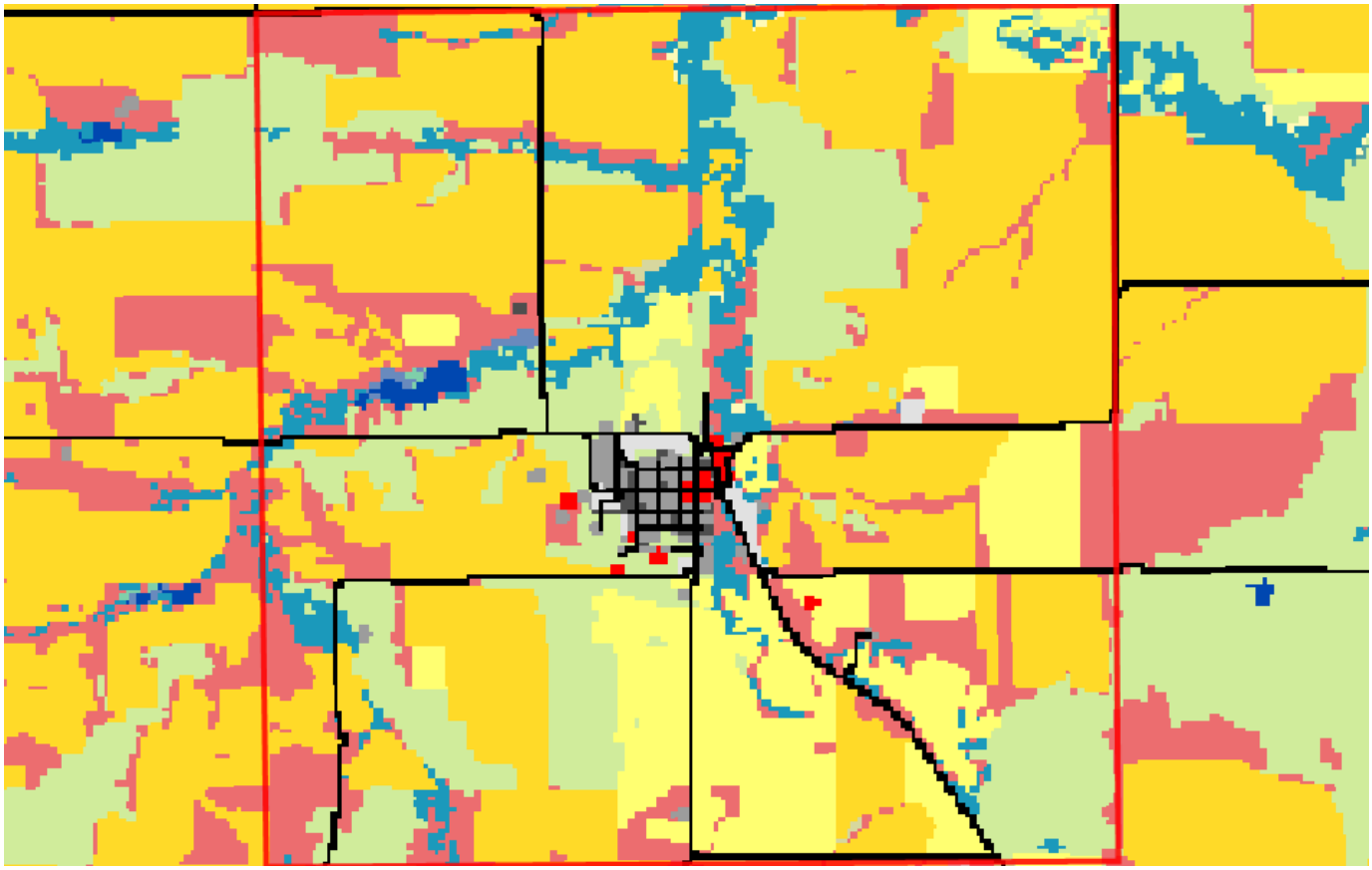
Land Cover

Summarized by: **021N018E026** *(Buffered PLSS Section)*



41% (*2,378 Acres*)

Human Land Use
Agriculture
Cultivated Crops

These areas used for the production of crops, such as corn, soybeans, small grains, sunflowers, vegetables, and cotton, typically on an annual cycle. Agricultural plant cover is variable depending on season and type of farming. Other areas include more stable land cover of orchards and vineyards.

19% (*1,116 Acres*)

Grassland Systems
Lowland/Prairie Grassland
Great Plains Mixedgrass Prairie

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. Soils are primarily fine and medium-textured. The growing season averages 115 days, ranging from 100 days on the Canadian border to 130 days on the Wyoming border. Climate is typical of mid-continental regions with long severe winters and hot summers. Grasses typically comprise the greatest canopy cover, and western wheatgrass (*Pascopyrum smithii*) is usually dominant. Other species include thickspike wheatgrass (*Elymus lanceolatus*), green needlegrass (*Nassella viridula*), blue grama (*Bouteloua gracilis*), and needle and thread (*Hesperostipa comata*). Near the Canadian border in north-central Montana, this system grades into rough fescue (*Festuca campestris)* and Idaho fescue (*Festuca idahoensis*) grasslands. Remnants of shortbristle needle and thread *(Hesperostipa curtiseta)* dominated vegetation are found in northernmost Montana and North Dakota, and are associated with productive sites, now mostly converted to farmland. 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 (*Artemisia tridentata* ssp. *wyomingensis/ Pascopyrum smithii*). 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 (*Poa pratensis*), smooth brome (*Bromus inermis*), and Japanese brome (*Bromus japonicus*) increase in dominance; both of these 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 (*Poa pratensis*)/western wheatgrass *(Pascopyrum smithii)* or into pure crested wheatgrass (*Agropyron cristatum)* stands.

14% (*792 Acres*)

Recently Disturbed or Modified
Introduced Vegetation
Introduced Upland Vegetation - Annual and Biennial Forbland

Land cover is significantly altered/disturbed by introduced annual and biennial forbs. Natural vegetation types are no longer recognizable. Typical species that dominate these areas are knapweed, oxeye daisy, Canada thistle, leafy spurge, pepperweed, and yellow sweetclover.

13% (*773 Acres*)

Pasture/Hay

These agriculture lands typically have perennial herbaceous cover (e.g. regularly-shaped plantings) used for livestock grazing or the production of hay. There are obvious signs of management such as irrigation and haying that distinguish it from natural grasslands. Identified CRP lands are included in this land cover type.

6% (*337 Acres*)

Wetland and Riparian Systems

Floodplain and Riparian

Great Plains Riparian

This system is associated with perennial to intermittent or ephemeral streams throughout the northwestern Great Plains. In Montana, it occurs along smaller tributaries of the Yellowstone and Missouri rivers, as well as tributaries to the large floodplain rivers that feed them (e.g. the Milk, Marias, Musselshell, Powder, Clarkâ€™s Fork Yellowstone, Tongue, etc). In areas adjacent to the mountain ranges of central and southeastern Montana, and near the Rocky Mountain Front, it grades into Rocky Mountain Lower Montane-Foothill Riparian Woodland and Shrubland systems. This system is found on alluvial soils in highly variable landscape settings, from confined, deep cut ravines to wide, braided streambeds. Channel migration occurs in less-confined areas, but within a more narrow range than would occur in broad, alluvial floodplains. Typically, the rivers are wadeable by mid-summer.

The primary inputs of water to these systems include groundwater discharge, overland flow, and subsurface interflow from the adjacent upland. Flooding is the key ecosystem process, creating suitable sites for seed dispersal and seedling establishment, and controlling vegetation succession. Communities within this system range from riparian forests and shrublands to tallgrass wet meadows and gravel/sand flats. Dominant species are similar to those found in the Great Plains Floodplain System. In the western part of the systemâ€™s range in Montana, the dominant overstory species is black cottonwood (*Populus balsamifera ssp. trichocarpa*) with narrowleaf cottonwood *(Populus angustifolia)* and Plains cottonwood (*Populus deltoides)* occurring as co-dominants in the riparian/floodplain interface near the mountains. Further east, narrowleaf cottonwood and Plains cottonwood become dominant. In wetter systems, the understory is typically willow (*Salix spp*.) and redosier dogwood (*Cornus stolonifera*) with graminoids such as western wheatgrass (*Pascopyrum smithii*) and forbs like American licorice (*Glycyrrhiza lepidota*). In areas where the channel is incised, the understory may be dominated by big sagebrush (*Artemisia tridentata*) or silver sagebrush (*Artemisia cana*). Like floodplain systems, riparian systems are often subjected to overgrazing and/or agriculture and can be heavily degraded, with salt cedar (*Tamarix ramosissima*) and Russian olive (*Eleagnus angustifolia*) replacing native woody vegetation and regrowth. Groundwater depletion and lack of fire have resulted in additional species changes.

No Image

3% (*145 Acres*)

Human Land Use

Developed

Other Roads

County, city and or rural roads generally open to motor vehicles.

Additional Limited Land Cover

1% (*57 Acres*) Major Roads
1% (*56 Acres*) Low Intensity Residential
1% (*29 Acres*) Developed, Open Space
<1% (*20 Acres*) Open Water
<1% (*15 Acres*) Commercial / Industrial
<1% (*12 Acres*) High Intensity Residential
<1% (*11 Acres*) Emergent Marsh
<1% (*7 Acres*) Big Sagebrush Steppe
<1% (*6 Acres*) Great Plains Sand Prairie
<1% (*2 Acres*) Great Plains Closed Depressional Wetland

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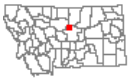

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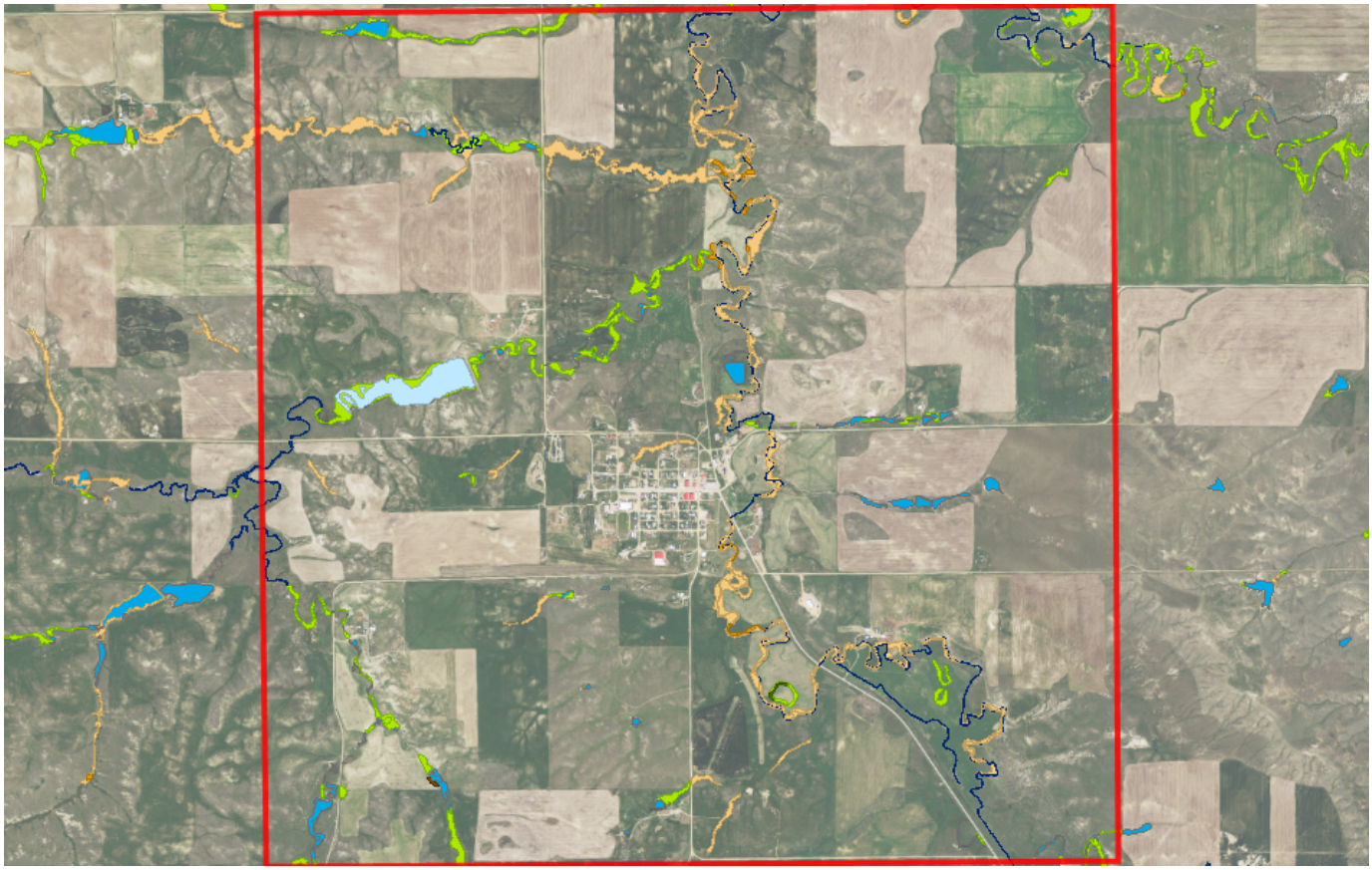
Wetland and Riparian

Summarized by: **021N018E026** *(Buffered PLSS Section)*



Wetland and Riparian Mapping

Explain

P - Palustrine

AB - Aquatic Bed

P - Palustrine, AB - Aquatic Bed
Wetlands with vegetation growing on or below the water surface for most of the growing season.

F - Semipermanently Flooded	17 Acres	
(no modifier)	**5 Acres**	**PABF**
h - Diked/Impounded	**12 Acres**	**PABFh**
x - Excavated	**<1 Acres**	**PABFx**
K - Artificially Flooded	3 Acres	
x - Excavated	**3 Acres**	**PABKx**

US - Unconsolidated Shore

P - Palustrine, US - Unconsolidated Shore
Wetlands with less than 75% areal cover of stones, boulders, or bedrock. AND with less than 30% vegetative cover AND the wetland is irregularly exposed due to seasonal or irregular flooding and subsequent drying.

A - Temporarily Flooded	11 Acres	
(no modifier)	**7 Acres**	**PUSA**
h - Diked/Impounded	**4 Acres**	**PUSAh**
C - Seasonally Flooded	<1 Acres	
(no modifier)	**<1 Acres**	**PUSC**
x - Excavated	**<1 Acres**	**PUSCx**

EM - Emergent

P - Palustrine, EM - Emergent
Wetlands with erect, rooted herbaceous vegetation present during most of the growing season.

A - Temporarily Flooded	45 Acres	
(no modifier)	**42 Acres**	**PEMA**
h - Diked/Impounded	**3 Acres**	**PEMAh**
x - Excavated	**<1 Acres**	**PEMAx**
C - Seasonally Flooded	5 Acres	
(no modifier)	**5 Acres**	**PEMC**
F - Semipermanently Flooded	8 Acres	
h - Diked/Impounded	**8 Acres**	**PEMFh**

SS - Scrub-Shrub

P - Palustrine, SS - Scrub-Shrub
Wetlands dominated by woody vegetation less than 6 meters (20 feet) tall. Woody vegetation includes tree saplings and trees that are stunted due to environmental conditions.

A - Temporarily Flooded	1 Acres	
(no modifier)	**1 Acres**	**PSSA**

L - Lacustrine (Lakes)

1 - Limnetic

UB - Unconsolidated Bottom

L - Lacustrine (Lakes), 1 - Limnetic, UB - Unconsolidated

h - Diked/Impounded **22 Acres** L1UBHh

dies with mud or silt covering at least 25% of the bottom.

R - Riverine (Rivers)

3 - Upper Perennial

UB - Unconsolidated Bottom

F - Semipermanently Flooded 16 Acres

(no modifier) **16 Acres** R3UBF

R - Riverine (Rivers), 3 - Upper Perennial, UB - Unconsolidated Bottom
Stream channels where the substrate is at least 25% mud, silt or other fine particles.

4 - Intermittent

SB - Stream Bed

A - Temporarily Flooded 1 Acres

x - Excavated **1 Acres** R4SBAx

C - Seasonally Flooded 3 Acres

(no modifier) **3 Acres** R4SBC

x - Excavated **<1 Acres** R4SBCx

R - Riverine (Rivers), 4 - Intermittent, SB - Stream Bed
Active channel that contains periodic water flow.

Rp - Riparian

1 - Lotic

SS - Scrub-Shrub

(no modifier) **5 Acres** Rp1SS

Rp - Riparian, 1 - Lotic, SS - Scrub-Shrub
This type of riparian area is dominated by woody vegetation that is less than 6 meters (20 feet) tall. Woody vegetation includes tree saplings and trees that are stunted due to environmental conditions.

EM - Emergent

(no modifier) **84 Acres** Rp1EM

Rp - Riparian, 1 - Lotic, EM - Emergent
Riparian areas that have erect, rooted herbaceous vegetation during most of the growing season.

2 - Lentic

FO - Forested

(no modifier) **<1 Acres** Rp2FO

Rp - Riparian, 2 - Lentic, FO - Forested
This riparian class has woody vegetation that is greater than 6 meters (20 feet) tall.

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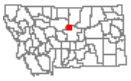
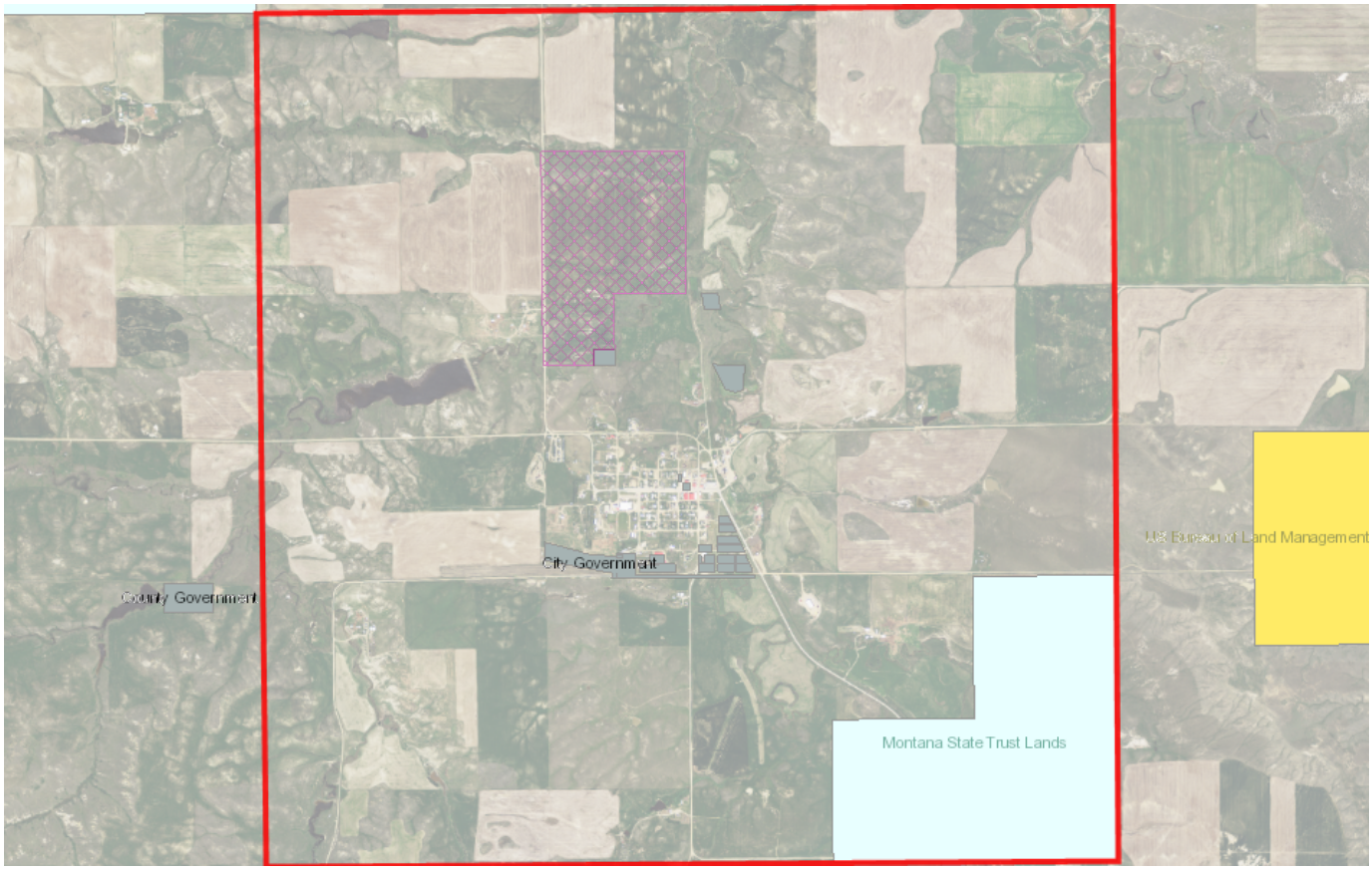


Latitude	Longitude
47.54033	-109.34467
47.58409	-109.40951

Land Management

Summarized by: **021N018E026** *(Buffered PLSS Section)*



Land Management Summary *Explain*

	Ownership	Tribal	Easements	Other Boundaries (possible overlap)
Public Lands	**517 Acres (9%)**			
State	478 Acres (8%)			
Montana State Trust Lands	478 Acres (8%)			
MT State Trust Owned	478 Acres (8%)			
Local	39 Acres (1%)			
Local Government	39 Acres (1%)			
Local Government Owned	39 Acres (1%)			
Conservation Easements			**199 Acres (3%)**	
Private			199 Acres (3%)	
Montana Land Reliance			199 Acres (3%)	
Private Lands or Unknown Ownership	**5,037 Acres (88%)**			

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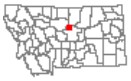

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Biological Reports

Summarized by: **021N018E026** *(Buffered PLSS Section)*

Within the report area you have requested, citations for all reports and publications associated with plant or animal observations in Montana Natural Heritage Program (MTNHP) databases are listed and, where possible, links to the documents are included.

The MTNHP plans to include reports associated with terrestrial and aquatic communities in the future as allowed for by staff resources. If you know of reports or publications associated with species or biological communities within the report area that are not shown in this report, please let us know: mtnhp@mt.gov

No Biological Reports were found in the selected area

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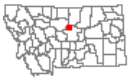
Model Icons
- N Suitable (native range)
- O Optimal Suitability
- M Moderate Suitability
- L Low Suitability
- I Suitable (introduced range)

Habitat Icons
- C Common
- O Occasional

Range Icons
- N Non-native

Num Obs
Count of obs with 'good precision' (<=1000m)
+ indicates additional 'poor precision' obs (1001m-10,000m)



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Invasive and Pest Species

Summarized by: **021N018E026** *(Buffered PLSS Section)*

	# Obs	Predicted Model	Range

Aquatic Invasive Species

V - Myriophyllum spicatum *(Eurasian Water-milfoil)* N2A/AIS

View in Field Guide | View Predicted Models | View Range Maps

Noxious Weed: Priority 2A - Aquatic Invasive Species - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: L 24% Low (inductive)

V - Nymphaea odorata *(American Water-lily)* AIS

View in Field Guide | View Predicted Models | View Range Maps

Aquatic Invasive Species - Non-native Species Global: **G5** State: **SNA**

Predicted Models: I 86% Suitable (introduced range) (deductive)

Noxious Weeds: Priority 1A

V - Centaurea solstitialis *(Yellow Starthistle)* N1A

View in Field Guide | View Predicted Models | View Range Maps

Noxious Weed: Priority 1A - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 16% Moderate (inductive), L 64% Low (inductive)

V - Isatis tinctoria *(Dyer's Woad)* N1A

View in Field Guide | View Predicted Models | View Range Maps

Noxious Weed: Priority 1A - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 11% Moderate (inductive), L 89% Low (inductive)

V - Taeniatherum caput-medusae *(Medusahead)* N1A

View in Field Guide | View Predicted Models | View Range Maps

Noxious Weed: Priority 1A - Non-native Species Global: **G4G5** State: **SNA**

Predicted Models: L 63% Low (inductive)

Noxious Weeds: Priority 1B

V - Lythrum salicaria *(Purple Loosestrife)* N1B

View in Field Guide | View Predicted Models | View Range Maps

Noxious Weed: Priority 1B - Non-native Species Global: **G5** State: **SNA**

Predicted Models: O 11% Optimal (inductive), M 22% Moderate (inductive), L 67% Low (inductive)

V - Cytisus scoparius *(Scotch Broom)* N1B

View in Field Guide | View Predicted Models | View Range Maps

Noxious Weed: Priority 1B - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: L 21% Low (inductive)

Noxious Weeds: Priority 2A

V - Rhamnus cathartica *(Common Buckthorn)* N2A

View in Field Guide | View Predicted Models | View Range Maps

Noxious Weed: Priority 2A - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 22% Moderate (inductive), L 27% Low (inductive)

V - Ventenata dubia *(Ventenata)* N2A

View in Field Guide | View Predicted Models | View Range Maps

Noxious Weed: Priority 2A - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 11% Moderate (inductive), L 89% Low (inductive)

V - Lepidium latifolium *(Perennial Pepperweed)* N2A

View in Field Guide | View Predicted Models | View Range Maps

Noxious Weed: Priority 2A - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: L 88% Low (inductive)

V - Myriophyllum spicatum *(Eurasian Water-milfoil)* N2A/AIS

View in Field Guide | View Predicted Models | View Range Maps

Noxious Weed: Priority 2A - Aquatic Invasive Species - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: L 24% Low (inductive)

Noxious Weeds: Priority 2B

V - Convolvulus arvensis *(Field Bindweed)* N2B

3

View in Field Guide | View Predicted Models | View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: O 11% Optimal (inductive), M 70% Moderate (inductive), L 19% Low (inductive)

V - Lepidium draba *(Whitetop)* N2B

View in Field Guide | View Predicted Models | View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: O 11% Optimal (inductive), M 70% Moderate (inductive), L 19% Low (inductive)

V - Centaurea stoebe *(Spotted Knapweed)* N2B

3

View in Field Guide | View Predicted Models | View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 79% Moderate (inductive), L 21% Low (inductive)

V - Cirsium arvense *(Canada Thistle)* N2B

Noxious Weed: Priority 2B - Non-native Species Global: **G5** State: **SNA**

Predicted Models: M 65% Moderate (inductive), L 35% Low (inductive)

V - Euphorbia virgata *(Leafy Spurge)* N2B

View in Field Guide View Predicted Models View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 49% Moderate (inductive), L 51% Low (inductive)

V - Acroptilon repens *(Russian Knapweed)* N2B

View in Field Guide View Predicted Models View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 37% Moderate (inductive), L 63% Low (inductive)

V - Linaria dalmatica *(Dalmatian Toadflax)* N2B

View in Field Guide View Predicted Models View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **G5** State: **SNA**

Predicted Models: M 22% Moderate (inductive), L 78% Low (inductive)

V - Cynoglossum officinale *(Common Hound's-tongue)* N2B

View in Field Guide View Predicted Models View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 11% Moderate (inductive), L 59% Low (inductive)

V - Centaurea diffusa *(Diffuse Knapweed)* N2B

View in Field Guide View Predicted Models View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 11% Moderate (inductive), L 46% Low (inductive)

V - Tamarix ramosissima *(Salt Cedar)* N2B

View in Field Guide View Predicted Models View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: L 100% Low (inductive)

Regulated Weeds: Priority 3

V - Elaeagnus angustifolia *(Russian Olive)* R3

View in Field Guide View Predicted Models View Range Maps

Regulated Weed: Priority 3 - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 22% Moderate (inductive), L 78% Low (inductive)

V - Bromus tectorum *(Cheatgrass)* R3

View in Field Guide View Predicted Models View Range Maps

Regulated Weed: Priority 3 - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: L 52% Low (inductive)

Biocontrol Species

I - Aphthona lacertosa *(Brown-legged Leafy Spurge Flea Beetle)* BIOCNTRL

View in Field Guide View Predicted Models View Range Maps

Biocontrol Species - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 14% Moderate (inductive), L 51% Low (inductive)

I - Mecinus janthiniformis *(Dalmatian Toadflax Stem-boring Weevil)* BIOCNTRL

View in Field Guide View Predicted Models View Range Maps

Biocontrol Species - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: L 100% Low (inductive)

Introduction to Montana Natural Heritage Program

PO Box 201800 • 1201 11th Avenue • Helena, MT 59620-1800 • fax 406.444.0266 • phone 406.444.3989 • mtnhp.org

Introduction

The Montana Natural Heritage Program (MTNHP) is Montana's source for reliable and objective information on Montana's native species and habitats, emphasizing those of conservation concern. MTNHP was created by the Montana legislature in 1983 as part of the Natural Resource Information System (NRIS) at the Montana State Library (MSL). MTNHP is "a program of information acquisition, storage, and retrieval for data relating to the flora, fauna, and biological community types of Montana" (MCA 90-15-102). MTNHP's activities are guided by statute as well as through ongoing interaction with, and feedback from, principal data source agencies such as Montana Fish, Wildlife, and Parks, the Montana Department of Environmental Quality, the Montana Department of Natural Resources and Conservation, the Montana University System, the US Forest Service, and the US Bureau of Land Management. Since the first staff was hired in 1985, the Program has logged a long record of success, and developed into a highly respected, service-oriented program. MTNHP is widely recognized as one of the most advanced and effective of over 60 natural heritage programs that are distributed across North America.

Vision

Our vision is that public agencies, the private sector, the education sector, and the general public will trust and rely upon MTNHP as the source for information and expertise on Montana's species and habitats, especially those of conservation concern. We strive to provide easy access to our information to allow users to save time and money, speed environmental reviews, and make informed decisions.

Core Values

- We endeavor to be a single statewide source of accurate and up-to-date information on Montana's plants, animals, and aquatic and terrestrial biological communities.
- We actively listen to our data users and work responsively to meet their information and training needs.
- We strive to provide neutral, trusted, timely, and equitable service to all of our information users.
- We make every effort to be transparent to our data users in setting work priorities and providing data products.

Confidentiality

All information requests made to the Montana Natural Heritage Program are considered library records and are protected from disclosure by the Montana Library Records Confidentiality Act (MCA 22-1-11).

Information Managed

Information managed at the Montana Natural Heritage Program is botanical, zoological, and ecological information that describes the distribution (e.g., observations, structured surveys, range polygons, predicted habitat suitability models), conservation status (e.g., global and state conservation status ranks, including threats), and other supporting information (e.g., accounts and references) on the biology and ecology of species and biological communities.

Data Use Terms and Conditions

- Montana Natural Heritage Program (MTNHP) products and services are based on biological data and the objective interpretation of those data by professional scientists. MTNHP does not advocate any particular philosophy of natural resource protection, management, development, or public policy.
- MTNHP has no natural resource management or regulatory authority. Products, statements, and services from MTNHP are intended to inform parties as to the state of scientific knowledge about certain natural resources, and to further develop that knowledge. The information is not intended as natural resource management guidelines or prescriptions or a determination of environmental impacts. MTNHP recommends consultation with appropriate state, federal, and tribal resource management agencies and authorities in the area where your project is located.
- Information on the status and spatial distribution of biological resources produced by MTNHP are intended to inform parties of the state-wide status, known occurrence, or the likelihood of the presence of those resources. **These products are not intended to substitute for field-collected data, nor are they intended to be the sole basis for natural resource management decisions.**
- MTNHP does not portray its data as exhaustive or comprehensive inventories of rare species or biological communities. **Field verification of the absence or presence of sensitive species and biological communities will always be an important obligation of users of our data.**
- MTNHP responds equally to all requests for products and services, regardless of the purpose or identity of the requester.
- Because MTNHP constantly updates and revises its databases with new data and information, products will become outdated over time. Interested parties are encouraged to obtain the most current information possible from MTNHP, rather than using older products. We add, review, update, and delete records on a daily basis. Consequently, we strongly advise that you update your MTNHP data sets at a minimum of every four months for most applications of our information.
- MTNHP data require a certain degree of biological expertise for proper analysis, interpretation, and application. Our staff is available to advise you on questions regarding the interpretation or appropriate use of the data that we provide. See Contact Information for MTNHP Staff
- The information provided to you by MTNHP may include sensitive data that if publicly released might jeopardize the welfare of threatened, endangered, or sensitive species or biological communities. This information is intended for distribution or use only within your department, agency, or business. Subcontractors may have access to the data during the course of any given project, but should not be given a copy for their use on subsequent, unrelated work.
- MTNHP data are made freely available. Duplication of hard-copy or digital MTNHP products with the intent to sell is prohibited without written consent by MTNHP. Should you be asked by individuals outside your organization for the type of data that we provide, please refer them to MTNHP.
- MTNHP and appropriate staff members should be appropriately acknowledged as an information source in any third-party product involving MTNHP data, reports, papers, publications, or in maps that incorporate MTNHP graphic elements.
- Sources of our data include museum specimens, published and unpublished scientific literature, field surveys by state and federal agencies and private contractors, and reports from knowledgeable individuals. MTNHP actively solicits and encourages additions, corrections and updates, new observations or collections, and comments on any of the data we provide.
- MTNHP staff and contractors do not enter or cross privately-owned lands without express permission from the landowner. However, the program cannot guarantee that information provided to us by others was obtained under adherence to this policy.

Suggested Contacts for Natural Resource Management Agencies

As required by Montana statute (MCA 90-15), the Montana Natural Heritage Program works with state, federal, tribal, nongovernmental organizations, and private partners to ensure that the latest animal and plant distribution and status information is incorporated into our databases so that it can be used to inform a variety of permitting and planning processes and management decisions. We encourage you to contact state, federal, and tribal resource management agencies in the area where your project is located and review the permitting overviews by the Montana Department of Environmental Quality, the Montana Department of Natural Resources and Conservation and the Index of Environmental Permits for Montana for guidelines relevant to your efforts. In particular, we encourage you to contact the Montana Department of Fish, Wildlife, and Parks for the latest data and management information regarding hunted and high-profile management species and to use the U.S. Fish and Wildlife Service's Information Planning and Consultation (IPAC) website regarding U.S. Endangered Species Act listed Threatened, Endangered, or Candidate species.

For your convenience, we have compiled a list of relevant agency contacts and links below:

Montana Fish, Wildlife, and Parks

Fish Species	Zachary Shattuck zshattuck@mt.gov (406) 444-1231 or Eric Roberts eroberts@mt.gov (406) 444-5334
American Bison Black-footed Ferret Black-tailed Prairie Dog Bald Eagle Golden Eagle Common Loon Least Tern Piping Plover Whooping Crane	Kristian Smucker KSmucker@mt.gov (406) 444-5209
Grizzly Bear Greater Sage Grouse Trumpeter Swan Big Game Upland Game Birds Furbearers	Brian Wakeling brian.wakeling@mt.gov (406) 444-3940
Managed Terrestrial Game Data	Cara Whalen– MFWP Data Analyst cara.whalen@mt.gov (406) 444-3759
Fisheries Data and Nongame Animal Data	Ryan Alger – MFWP Data Analyst ryan.alger@mt.gov (406) 444-5365
Wildlife and Fisheries Scientific Collector's Permits	https://fwp.mt.gov/buyandapply/commercialwildlifeandscientificpermits/scientific Kristina Smucker for Wildlife ksmucker@mt.gov (406) 444-5209 Dave Schmetterling for Fisheries dschmetterling@mt.gov (406) 542-5514
Fish and Wildlife Recommendations for Subdivision Development	Charlie Sperry csperry@mt.gov (406) 444-3888 See https://fwp.mt.gov/conservation/living-with-wildlife/subdivision-recommendations
Regional Contacts  	Region 1 (Kalispell) (406) 752-5501 fwprg12@mt.gov Region 2 (Missoula) (406) 542-5500 fwprg22@mt.gov Region 3 (Bozeman) (406) 577-7900 fwprg3@mt.gov Region 4 (Great Falls) (406) 454-5840 fwprg42@mt.gov Region 5 (Billings) (406) 247-2940 fwprg52@mt.gov Region 6 (Glasgow) (406) 228-3700 fwprg62@mt.gov Region 7 (Miles City) (406) 234-0900 fwprg72@mt.gov

Montana Department of Agriculture
General Contact Information: https://agr.mt.gov/About/Office-Locations/Office-Locations-and-Field-Offices
Noxious Weeds: https://agr.mt.gov/Noxious-Weeds

Montana Department of Environmental Quality
Permitting and Operator Assistance for all Environmental Permits: https://deq.mt.gov/Permitting

Montana Department of Natural Resources and Conservation
Overview of, and contacts for, licenses and permits for state lands, water, and forested lands: https://dnrc.mt.gov/Permits-Services

Stream Permitting (310 permits) and an overview of various water and stream related permits (e.g., Stream Protection Act 124, Federal Clean Water Act 404, Federal Rivers and Harbors Act Section 10, Short-term Water Quality Standard for Turbidity 318 Authorization, etc.).
https://dnrc.mt.gov/Licenses-and-Permits/Stream-Permitting

Wildfire Resources: https://dnrc.mt.gov/Forestry/Wildfire

Bureau of Land Management

Montana Field Office Contacts:

Billings	(406) 896-5013
Butte	(406) 533-7600
Dillon	(406) 683-8000
Glasgow	(406) 228-3750
Havre	(406) 262-2820
Lewistown	(406) 538-1900
Malta	(406) 654-5100
Miles City	(406) 233-2800
Missoula	(406) 329-3914

United States Army Corps of Engineers
Montana Regulatory Office for federal permits related to construction in water and wetlands
https://www.nwo.usace.army.mil/Missions/Regulatory-Program/Montana/ (406) 441-1375

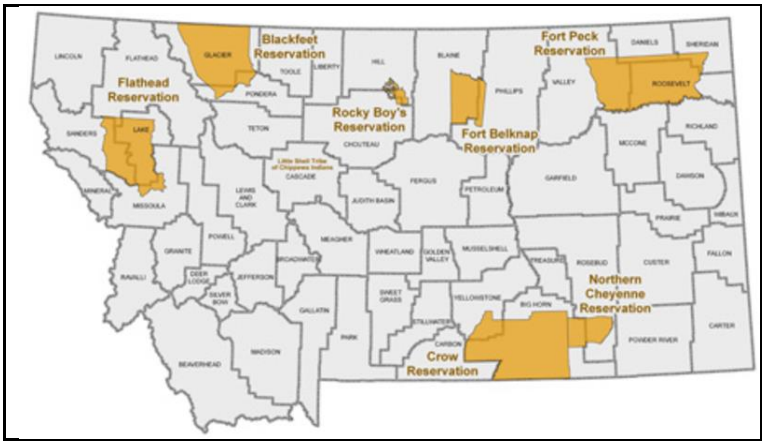
United States Environmental Protection Agency
Environmental information, notices, permitting, and contacts https://www.epa.gov/mt
Gateway to state resource locators https://www.envcap.org/srl/index.php

United States Fish and Wildlife Service
Information Planning and Conservation (IPAC) website: https://ipac.ecosphere.fws.gov
Montana Ecological Services Field Office: https://www.fws.gov/office/montana-ecological-services (406) 449-5225

United States Forest Service

Regional Office – Missoula, Montana Contacts			
Wildlife Program Leader	Tammy Fletcher	tammy.fletcher2@usda.gov	(406) 329-3086
Wildlife Ecologist	Cara Staab	cara.staab@usda.gov	(406) 329-3677
Aquatic Ecologist	Justin Jimenez	justin.jimenez@usda.gov	(435) 370-6830
TES Program	Lydia Allen	lydia.allen@usda.gov	(406) 329-3558
Interagency Grizzly Bear Coordinator	Scott Jackson	scott.jackson@usda.gov	(406) 329-3664
Regional Botanist	Amanda Hendrix	amanda.hendrix@usda.gov	(651) 447-3016
Regional Vegetation Ecologist	Mary Manning	marry.manning@usda.gov	(406) 329-3304
Invasive Species Program Manager	Michelle Cox	michelle.cox2@usda.gov	(406) 329-3669

Tribal Nations



[Assiniboine & Gros Ventre Tribes – Fort Belknap Reservation]

[Assiniboine & Sioux Tribes – Fort Peck Reservation]

[Blackfeet Tribe - Blackfeet Reservation]

[Chippewa Creek Tribe - Rocky Boy's Reservation]

[Crow Tribe – Crow Reservation]

[Little Shell Chippewa Tribe]

[Northern Cheyenne Tribe – Northern Cheyenne Reservation]

[Salish & Kootenai Tribes - Flathead Reservation]

Natural Heritage Programs and Conservation Data Centers in Surrounding States and Provinces

[Alberta Conservation Information Management System]
[British Columbia Conservation Data Centre]
[Idaho Natural Heritage Program]
[North Dakota Natural Heritage Program]
[Saskatchewan Conservation Data Centre]
[South Dakota Natural Heritage Program]
[Wyoming Natural Diversity Database]

Invasive Species Management Contacts and Information

Aquatic Invasive Species

[Montana Fish, Wildlife, and Parks Aquatic Invasive Species staff]
[Montana Department of Natural Resources and Conservation's Aquatic Invasive Species Grant Program]
[Montana Invasive Species Council (MISC)]
[Upper Columbia Conservation Commission (UC3)]

Noxious Weeds

[Montana Weed Control Association Contacts Webpage]
[Montana Biological Weed Control Coordination Project]
[Montana Department of Agriculture - Noxious Weeds]
[Montana Weed Control Association]
[Montana Fish, Wildlife, and Parks - Noxious Weeds]
[Montana State University Integrated Pest Management Extension]
[Integrated Noxious Weed Management after Wildfires]
[Fire Management and Invasive Plants]

Introduction to Native Species

Within the report area you have requested, separate summaries are provided for: (1) Species Occurrences (SO) for plant and animal Species of Concern, Special Status Species (SSS), Important Animal Habitat (IAH) and some Potential Plant Species of Concern; (2) other observed non Species of Concern or Species of Concern without suitable documentation to create Species Occurrence polygons; and (3) other non-documented species that are potentially present based on their range, predicted suitable habitat model output, or presence of associated habitats. Each of these summaries provides the following information when present for a species: (1) the number of Species Occurrences and associated delineation criteria for construction of these polygons that have long been used for considerations of documented Species of Concern in environmental reviews; (2) the number of observations of each species; (3) the geographic range polygons for each species that the report area overlaps; (4) predicted relative habitat suitability classes that are present if a predicted suitable habitat model has been created; (5) the percent of the report area that is mapped as commonly associated or occasionally associated habitat as listed for each species in the Montana Field Guide; and (6) a variety of conservation status ranks and links to species accounts in the Montana Field Guide. Details on each of these information categories are included under relevant section headers below or are defined on our Species Status Codes page. In presenting this information, the Montana Natural Heritage Program (MTNHP) is working towards assisting the user with rapidly determining what species have been documented and what species are potentially present in the report area. We remind users that this information is likely incomplete as surveys to document native and introduced species are lacking in many areas of the state, information on introduced species has only been tracked relatively recently, the MTNHP's staff and resources are restricted by budgets, and information is constantly being added and updated in our databases. **Thus, field verification by professional biologists of the absence or presence of species and biological communities will always be an important obligation of users of our data.**

If you are aware of observation datasets that the MTNHP is missing, please report them to the Program Botanist apipp@mt.gov or Senior Zoologist dbachen@mt.gov If you have animal or plant observations that you would like to contribute, you can also submit them via Excel spreadsheets, geodatabases, iNaturalist, or a Survey123 form. Various methods of data submission are reviewed in this playlist of videos: https://www.youtube.com/playlist?list=PLRaydtZpHu2qOHPoSPq9cnM9uXGmEXACx

Observations

The MTNHP manages information on several million animal and plant observations that have been reported by professional biologists and private citizens from across Montana. The majority of these observations are submitted in digital format from standardized databases associated with research or monitoring efforts and spreadsheets of incidental observations submitted by professional biologists and amateur naturalists. At a minimum, accepted observation records must contain a credible species identification (i.e. appropriate geographic range, date, and habitat and, if species are difficult to identify, a photograph and/or notes on key identifying features), a date or date range, observer name, locational information (ideally with latitude and longitude in decimal degrees), notes on numbers observed, and species behavior or habitat use (e.g., is the observation likely associated with reproduction). Bird records are also required to have information associated with date-appropriate breeding or overwintering status of the species observed. MTNHP reviews observation records to ensure that they are mapped correctly, occur within date ranges when the species is known to be present or detectable, occur within the known seasonal geographic range of the species, and occur in appropriate habitats. MTNHP also assigns each record a locational uncertainty value in meters to indicate the spatial precision associated with the record's mapped coordinates. Only records with locational uncertainty values of 10,000 meters or less are included in environmental summary reports and number summaries are only provided for records with locational uncertainty values of 1,000 meters or less.

Species Occurrences

The MTNHP evaluates plant and animal observation records for species of higher conservation concern to determine whether they are worthy of inclusion in the Species Occurrence (SO) layer for use in environmental reviews; observations not worthy of inclusion in this layer include long distance dispersal events, migrants observed away from key migratory stopover habitats, and winter observations. An SO is a polygon depicting what is known about a species occupancy from direct observation with a defined level of locational uncertainty and any inference that can be made about adjacent habitat use from the latest peer-reviewed science. If an observation can be associated with a map feature that can be tracked (e.g., a wetland boundary for a wetland associated plant) then this polygon feature is used to represent the SO. Areas that can be inferred as probable occupied habitat based on direct observation of a species location and what is known about the foraging area or home range size of the species may be incorporated into the SO. Species Occurrences generally belong to one of the following categories:

Plant Species Occurrences

A documented location of a specimen collection or observed plant population. In some instances, adjacent, spatially separated clusters are considered subpopulations and are grouped as one occurrence (e.g., the subpopulations occur in ecologically similar habitats, and their spatial proximity likely allows them to interbreed). Tabular information for multiple observations at the same SO location is generally linked to a single polygon. Plant SO's are only created for Species of Concern and Potential Species of Concern.

Animal Species Occurrences

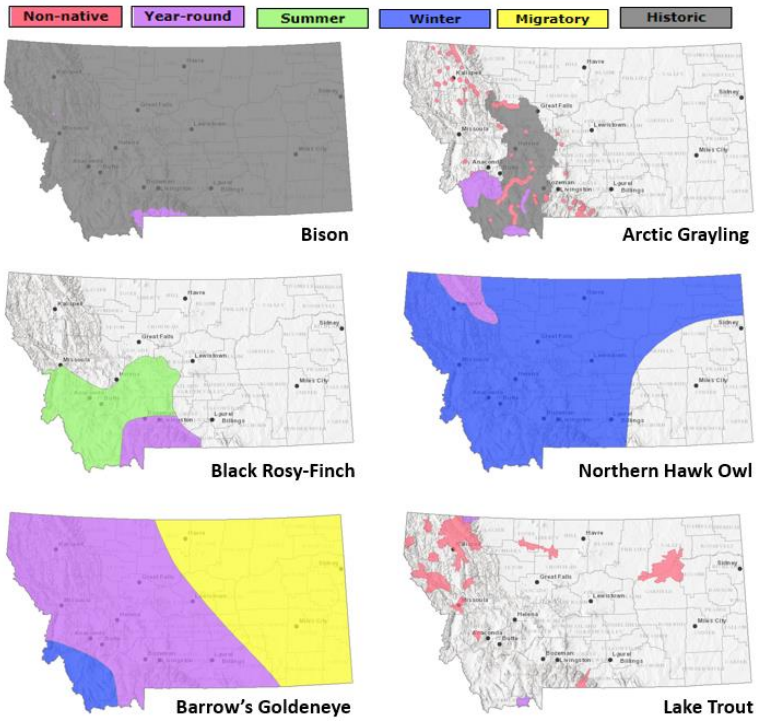
The location of a verified observation or specimen record typically known or assumed to represent a breeding population or a portion of a breeding population. Animal SO's are generally: (1) buffers of terrestrial point observations based on documented species' home range sizes; (2) buffers of stream segments to encompass occupied streams and immediate adjacent riparian habitats; (3) polygonal features encompassing known or likely breeding populations (e.g., a wetland for some amphibians or a forested portion of a mountain range for some wide-ranging carnivores); or (4) combinations of the above. Tabular information for multiple observations at the same SO location is generally linked to a single polygon. Species Occurrence polygons may encompass some unsuitable habitat in some instances in order to avoid heavy data processing associated with clipping out habitats that are readily assessed as unsuitable by the data user (e.g., a point buffer of a terrestrial species may overlap into a portion of a lake that is obviously inappropriate habitat for the species). Animal SO's are only created for Species of Concern and Special Status Species (e.g., Bald Eagle).

Other Occurrence Polygons

These include significant biological features not included in the above categories, such as Important Animal Habitats like bird rookeries and bat roosts, and peatlands or other wetland and riparian communities that support diverse plant and animal communities.

Geographic Range Polygons

Geographic range polygons are still under development for most plant and invertebrate species. Native year-round, summer, winter, migratory and historic geographic range polygons as well as polygons for introduced populations have been defined for most vertebrate animal species for which there are enough observations, surveys, and knowledge of appropriate seasonal habitat use to define them (see examples to left). These native or introduced range polygons bound the extent of known or likely occupied habitats for non-migratory and relative sedentary species and the regular extent of known or likely occupied habitats for migratory and long-distance dispersing species; polygons may include unsuitable intervening habitats. For most species, a single polygon can represent the year-round or seasonal range, but breeding ranges of some colonial nesting water birds and some introduced species are represented more patchily when supported by data. Some ranges are mapped more broadly than actual distributions in order to be visible on statewide maps (e.g., fish).



Predicted Suitable Habitat Models

Predicted habitat suitability models have been created for plant and animal Species of Concern and are undergoing development for non-Species of Concern. For species for which models have been completed, the environmental summary report includes simple rule-based associations with streams for aquatic species and seasonal habitats for game species as well as mathematically complex Maximum Entropy models (Phillips et al. 2006, Ecological Modeling 190:231-259) constructed from a variety of statewide biotic and abiotic layers and presence only data for individual species for most terrestrial species. For the Maximum Entropy models, we reclassified 90 x 90-meter continuous model output into suitability classes (unsuitable, low, moderate, and optimal) then aggregated that into the one square mile hexagons used in the environmental summary report; this is the finest spatial scale we suggest using this information in management decisions and survey planning. Full model write ups for individual species that discuss model goals, inputs, outputs, and evaluation in much greater detail are posted on the MTNHP's Predicted Suitable Habitat Models webpage. Evaluations of predictive accuracy and specific limitations are included with the metadata for models of individual species. **Model outputs should not be used in place of on-the-ground surveys for species. Instead model outputs should be used in conjunction with habitat evaluations to determine the need for on-the-ground surveys for species.** We suggest that the percentage of predicted optimal and moderate suitable habitat within the report area be used in conjunction with geographic range polygons and the percentage of commonly associated habitats to generate lists of potential species that may occupy broader landscapes for the purposes of landscape-level planning.

Associated Habitats

Within the boundary of the intersected hexagons, we provide the approximate percentage of commonly or occasionally associated habitat for vertebrate animal species that regularly breed, overwinter, or migrate through the state; a detailed list of commonly and occasionally associated habitats is provided in individual species accounts in the Montana Field Guide We assigned common or occasional use of each of the ecological

systems mapped in Montana by: (1) using personal knowledge and reviewing literature that summarizes the breeding, overwintering, or migratory habitat requirements of each species; (2) evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements; (3) examining the observation records for each species in the state-wide point observation database associated with each ecological system; and (4) calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of numbers of observations versus availability of habitat. Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in the scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association.

We suggest that the percentage of commonly associated habitat within the report area be used in conjunction with geographic range polygons and the percentage of predicted optimal and moderate suitable habitat from predictive models to generate lists of potential species that may occupy broader landscapes for the purposes of landscape-level planning. Users of this information should be aware that land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections).

Introduction to Land Cover

Land Use/Land Cover is one of 15 Montana Spatial Data Infrastructure framework layers considered vital for making statewide maps of Montana and understanding its geography. The layer records all Montana natural vegetation, land cover and land use, classified from satellite and aerial imagery, mapped at a scale of 1:100,000, and interpreted with supporting ground-level data. The baseline map is adapted from the Northwest ReGAP (NWGAP) project land cover classification, which used 30m resolution multi-spectral Landsat imagery acquired between 1999 and 2001. Vegetation classes were drawn from the Ecological System Classification developed by NatureServe (Comer et al. 2003). The land cover classes were developed by Anderson et al. (1976). The NWGAP effort encompasses 12 map zones. Montana overlaps seven of these zones. The two NWGAP teams responsible for the initial land cover mapping effort in Montana were Sanborn and NWGAP at the University of Idaho. Both Sanborn and NWGAP employed a similar modeling approach in which Classification and Regression Tree (CART) models were applied to Landsat ETM+ scenes. The Spatial Analysis Lab within the Montana Natural Heritage Program was responsible for developing a seamless Montana land cover map with a consistent statewide legend from these two separate products. Additionally, the Montana land cover layer incorporates several other land cover and land use products (e.g., MSDI Structures and Transportation themes and the Montana Department of Revenue Final Land Unit classification) and reclassifications based on plot-level data and the latest NAIP imagery to improve accuracy and enhance the usability of the theme. Updates are done as partner support and funding allow, or when other MSDI datasets can be incorporated. Recent updates include fire perimeters and agricultural land use (annually), energy developments such as wind, oil and gas installations (2014), roads, structures and other impervious surfaces (various years): and local updates/improvements to specific ecological systems (e.g., central Montana grassland and sagebrush ecosystems). Current and previous versions of the Land Use/Land Cover layer with full metadata are available for download from the Montana State Library's GIS Data List More information on the land cover layer is available at: https://msl.mt.gov/geoinfo/msdi/land_use_land_cover/

Within the report area you have requested, land cover is summarized by acres of Level 1, Level 2, and Level 3 Ecological Systems.

Literature Cited

Anderson, J.R. E.E. Hardy, J.T. Roach, and R.E. Witmer. 1976. A land use and land cover classification system for use with remote sensor data. U.S. Geological Survey Professional Paper 964.

Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schulz, K. Snow, and J. Teague. 2003. Ecological systems of the United States: A working classification of U.S. terrestrial systems. NatureServe, Arlington, VA.

Introduction to Wetland and Riparian

Within the report area you have requested, wetland and riparian mapping is summarized by acres of each classification present. Summaries are only provided for modern MTNHP wetland and riparian mapping and not for outdated (NWI Legacy) or incomplete (NWI Scalable) mapping efforts; described here. MTNHP has made all three of these datasets and associated metadata available for separate download on the Montana Wetland and Riparian Framework web page.

Wetland and Riparian mapping is one of 15 Montana Spatial Data Infrastructure framework layers considered vital for making statewide maps of Montana and understanding its geography. The wetland and riparian framework layer consists of spatial data representing the extent, type, and approximate location of wetlands, riparian areas, and deep water habitats in Montana.

Wetland and riparian mapping is completed through photointerpretation of 1-m resolution color infrared aerial imagery acquired from 2005 or later. A coding convention using letters and numbers is assigned to each mapped wetland. These letters and numbers describe the broad landscape context of the wetland, its vegetation type, its water regime, and the kind of alterations that may have occurred. Ancillary data layers such as topographic maps, digital elevation models, soils data, and other aerial imagery sources are also used to improve mapping accuracy. Wetland mapping follows the federal Wetland Mapping Standard and classifies wetlands according to the Cowardin classification system of the National Wetlands Inventory (NWI) (Cowardin et al. 1979, FGDC Wetlands Subcommittee 2013). Federal, State, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands differently than the NWI. Similar coding, based on U.S. Fish and Wildlife Service conventions, is applied to riparian areas (U.S. Fish and Wildlife Service 2009). These are mapped areas where vegetation composition and growth is influenced by nearby water bodies, but where soils, plant communities, and hydrology do not display true wetland characteristics. **These data are intended for use at a scale of 1:12,000 or smaller. Mapped wetland and riparian areas do not represent precise boundaries and digital wetland data cannot substitute for an on-site determination of jurisdictional wetlands.**

See detailed overviews, with examples, of both wetland and riparian classification systems and associated codes as a storymap and companion guide

Literature Cited

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Fish and Wildlife Service, FWS/OBS-79/31. Washington, D.C. 103pp.

Federal Geographic Data Committee. 2013. Classification of wetlands and deepwater habitats of the United States. FGDC-STD-004-2013. Second Edition. Wetlands Subcommittee, Federal Geographic Data Committee and U.S. Fish and Wildlife Service, Washington, D.C.

U.S. Fish and Wildlife Services. 2009. A system for mapping riparian areas in the western United States. Division of Habitat and Resource Conservation, Branch of Resource and Mapping Support, Arlington, Virginia.

Introduction to Land Management

Within the report area you have requested, land management information is summarized by acres of federal, state, and local government lands, tribal reservation boundaries, private conservation lands, and federal, state, local, and private conservation easements. Acreage for "Owned", "Tribal", or "Easement" categories represents non-overlapping areas that may be totaled. However, "Other Boundaries" represents managed areas such as National Forest boundaries containing private inholdings and other mixed ownership which may cause boundaries to overlap (e.g. a wilderness area within a forest). Therefore, acreages may not total in a straight-forward manner.

Because information on land stewardship is critical to effective land management, the Montana Natural Heritage Program (MTNHP) began compiling ownership and management data in 1997. The goal of the Montana Land Management Database is to manage a single, statewide digital data set that incorporates information from both public and private entities. The database assembles information on public lands, private conservation lands, and conservation easements held by state and federal agencies and land trusts and is updated on a regular basis. Since 2011, the Information Management group in the Montana State Library's Digital Library Division has led the Montana Land Management Database in partnership with the MTNHP.

Public and private conservation land polygons are attributed with the name of the entity that owns it. The data are derived from the statewide Montana Cadastral Parcel layer Conservation easement data shows land parcels on which a public agency or qualified land trust has placed a conservation easement in cooperation with the landowner. The dataset contains no information about ownership or status of the mineral estate. For questions about the dataset or to report errors, please contact the Montana Natural Heritage Program at (406) 444-5363 or mtnhp@mt.gov. You can download various components of the Land Management Database and view associated metadata at the Montana State Library's GIS Data List at the following links:

Public Lands
Conservation Easements
Private Conservation Lands
Managed Areas

Map features in the Montana Land Management Database or summaries provided in this report are not intended as a legal depiction of public or private surface land ownership boundaries and should not be used in place of a survey conducted by a licensed land surveyor. Similarly, map features do not imply public access to any lands. The Montana Natural Heritage Program makes no representations or warranties whatsoever with respect to the accuracy or completeness of this data and assumes no responsibility for the suitability of the data for a particular purpose. The Montana Natural Heritage Program will not be liable for any damages incurred as a result of errors displayed here. Consumers of this information should review or consult the primary data and information sources to ascertain the viability of the information for their purposes.

Introduction to Invasive and Pest Species

Within the report area you have requested, separate summaries are provided for: Aquatic Invasive Species, Noxious Weeds, Agricultural Pests, Forest Pests, and Biocontrol species that have been documented or potentially occur there based on the predicted suitability of habitat. Definitions for each of these invasive and pest species categories can be found on our Species Status Codes page.

Each of these summaries provides the following information when present for a species: (1) the number of observations of each species; (2) the geographic range polygons for each species, if developed, that the report area overlaps; (3) predicted relative habitat suitability classes that are present if a predicted suitable habitat model has been created; (4) the percent of the report area that is mapped as commonly associated or occasionally associated habitat as listed for each species in the Montana Field Guide; and (5) links to species accounts in the Montana Field Guide. Details on each of these information categories are included under relevant section headers under the Introduction to Native Species above or are defined on our Species Status Codes page. In presenting this information, the Montana Natural Heritage Program (MTNHP) is working towards assisting the user with rapidly determining what invasive and pest species have been documented and what species are potentially present in the report area. We remind users that this information is likely incomplete as surveys to document introduced species are lacking in many areas of the state, information on introduced species has only been tracked relatively recently, the MTNHP's staff and resources are limited, and information is constantly being added and updated in our databases. **Thus, field verification by professional biologists of the absence or presence of species will always be an important obligation of users of our data.**

If you are aware of observation or survey datasets for invasive or pest species that the MTNHP is missing, please report them to the Program Coordinator bmaxell@mt.gov Program Botanist apipp@mt.gov or Senior Zoologist dbachen@mt.gov If you have animal or plant observations that you would like to contribute, you can also submit them via Excel spreadsheets, geodatabases, iNaturalist, or a Survey123 form. Various methods of data submission are reviewed in this playlist of videos:
https://www.youtube.com/playlist?list=PLRaydtZpHu2qOHPoSPq9cnM9uXGmEXACx

Additional Information Resources

- MTNHP Staff Contact Information
- Montana Field Guide
- MTNHP Species of Concern Report - Animals and Plants
- MTNHP Species Status Codes - Explanation
- MTNHP Predicted Suitable Habitat Models (for select Animals and Plants)
- MTNHP Request Information page
- Montana Cadastral
- Montana Code Annotated
- Montana Fisheries Information System
- Montana Fish, Wildlife, and Parks Subdivision Recommendations
- Montana GIS Data Layers
- Montana GIS Data Bundler
- Montana Greater Sage-Grouse Project Submittal Site
- Montana Ground Water Information Center
- Montana Index of Environmental Permits, 21st Edition (2018)
- Montana Environmental Policy Act (MEPA)
- Montana Environmental Policy Act Analysis Resource List
- Laws, Treaties, Regulations, and Agreements on Animals and Plants
- Montana Spatial Data Infrastructure Layers
- Montana State Historic Preservation Office Review and Compliance
- Montana Stream Permitting: a guide for conservation district supervisors and others
- Montana Water Information System
- Montana Web Map Services
- National Environmental Policy Act
- Penalties for Misuse of Fish and Wildlife Location Data (MCA 87-6-222)
- U.S. Fish and Wildlife Service Information for Planning and Consultation (Section 7 Consultation)
- Web Soil Survey Tool

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Fergus County, Montana

Winifred

October 3, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

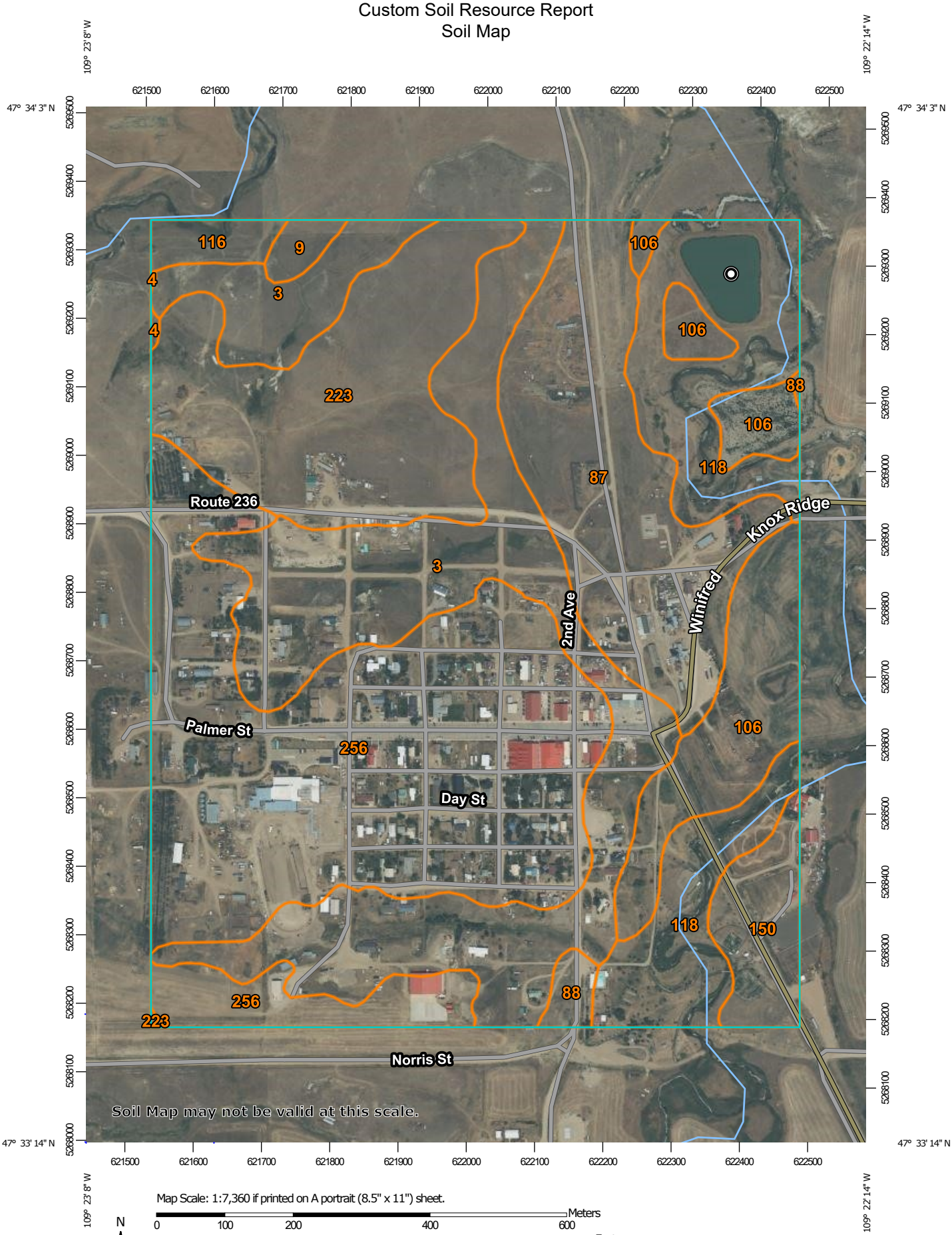
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:7,360 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 350 700 1400 2100

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Fergus County, Montana
Survey Area Data: Version 24, Aug 25, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 13, 2021—Sep 30, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3	Abor-Bascovy-Crago complex, 15 to 45 percent slopes	63.2	22.7%
4	Abor-Yawdim silty clay loams, 4 to 15 percent slopes	0.2	0.1%
9	Absher-Nobe complex, 0 to 4 percent slopes	1.7	0.6%
87	Ethridge silty clay loam, 0 to 2 percent slopes	34.6	12.4%
88	Ethridge silty clay loam, 2 to 8 percent slopes	1.8	0.7%
106	Frazer silty clay loam	20.5	7.4%
116	Havre loam	2.9	1.1%
118	Havre and Harlem soils, occasionally flooded	30.6	11.0%
150	Linnet clay loam, 2 to 8 percent slopes	8.0	2.9%
223	Tanna-Abor complex, 2 to 8 percent slopes	34.7	12.5%
256	Verson-Linnet clay loams, 2 to 8 percent slopes	79.7	28.7%
Totals for Area of Interest		**277.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties

and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Fergus County, Montana

3—Abor-Bascovy-Crago complex, 15 to 45 percent slopes

Map Unit Setting

National map unit symbol: 2yk19
Elevation: 2,400 to 4,500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 115 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Abor and similar soils: 35 percent
Bascovy and similar soils: 30 percent
Crago and similar soils: 15 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Abor

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey residuum weathered from shale

Typical profile

A - 0 to 2 inches: silty clay
Bkss - 2 to 13 inches: silty clay
Bky - 13 to 35 inches: silty clay
Cr - 35 to 60 inches: bedrock

Properties and qualities

Slope: 15 to 45 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Ecological site: R058AC049MT - Silty-Steep (SiStp) RRU 58A-C 11-14" p.z. (combined R058AC046MT, R058AC047MT & R058AC048MT into this site)
Hydric soil rating: No

Description of Bascovy

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey residuum weathered from shale

Typical profile

A - 0 to 3 inches: clay
Bss - 3 to 12 inches: clay
Bssy - 12 to 19 inches: clay
BCn - 19 to 34 inches: clay
Cr - 34 to 60 inches: bedrock

Properties and qualities

Slope: 15 to 45 percent
Depth to restrictive feature: 30 to 39 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 3 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 12.0
Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R058AC049MT - Silty-Steep (SiStp) RRU 58A-C 11-14" p.z. (combined R058AC046MT, R058AC047MT & R058AC048MT into this site)
Hydric soil rating: No

Description of Crago

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from limestone

Typical profile

A - 0 to 4 inches: gravelly loam
Bk1 - 4 to 21 inches: very gravelly loam

Bk2 - 21 to 37 inches: extremely gravelly sandy loam
2C - 37 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 15 to 45 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: R058AC040MT - Silty (Si) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Minor Components

Marias

Percent of map unit: 10 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AC041MT - Clayey (Cy) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Marvan

Percent of map unit: 10 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AC041MT - Clayey (Cy) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

4—Abor-Yawdim silty clay loams, 4 to 15 percent slopes

Map Unit Setting

National map unit symbol: chfn
Elevation: 2,400 to 4,500 feet

Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 115 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Abor and similar soils: 50 percent
Yawdim and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Abor

Setting

Landform: Hills, plains
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey residuum over semiconsolidated shale

Typical profile

A - 0 to 6 inches: silty clay loam
Bk - 6 to 30 inches: silty clay
Cr - 30 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 4 to 15 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R058AC041MT - Clayey (Cy) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Description of Yawdim

Setting

Landform: Plains, hills
Landform position (two-dimensional): Summit, shoulder
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey residuum over semiconsolidated shale

Typical profile

A - 0 to 3 inches: silty clay loam

C - 3 to 12 inches: silty clay loam
Cr - 12 to 60 inches: weathered bedrock

Properties and qualities

Slope: 4 to 15 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water supply, 0 to 60 inches: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R058AC057MT - Shallow (Sw) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Minor Components

Kobar

Percent of map unit: 7 percent
Landform: Stream terraces, alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AC041MT - Clayey (Cy) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Tanna

Percent of map unit: 7 percent
Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AC041MT - Clayey (Cy) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Gerdrum

Percent of map unit: 6 percent
Landform: Stream terraces, alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AC053MT - Dense Clay (DC) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

9—Absher-Nobe complex, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: 2zg6b
Elevation: 2,200 to 3,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 115 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Absher and similar soils: 45 percent
Nobe and similar soils: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Absher

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium derived from shale

Typical profile

E - 0 to 4 inches: clay loam
Btnkz - 4 to 10 inches: clay
Bknyz - 10 to 60 inches: clay

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: 0 to 9 inches to natric
Drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 39 to 79 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Strongly saline (16.0 to 30.0 mmhos/cm)
Sodium adsorption ratio, maximum: 69.0
Available water supply, 0 to 60 inches: Very low (about 0.3 inches)

Interpretive groups

Land capability classification (irrigated): 7s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D

Ecological site: R058AY706MT - Dense Clay Sodic 10-14
Hydric soil rating: No

Description of Nobe

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium derived from shale

Typical profile

E - 0 to 8 inches: clay
Bknyz - 8 to 60 inches: clay

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 39 to 79 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Strongly saline (16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 69.0
Available water supply, 0 to 60 inches: Very low (about 1.2 inches)

Interpretive groups

Land capability classification (irrigated): 6s
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: R058AY714MT - Saline Upland 10-14
Hydric soil rating: No

Minor Components

Vanda

Percent of map unit: 5 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AY706MT - Dense Clay Sodic 10-14
Hydric soil rating: No

Marvan

Percent of map unit: 5 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AY701MT - Clayey 10-14
Hydric soil rating: No

Creed

Percent of map unit: 5 percent

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AY703MT - Claypan 10-14
Hydric soil rating: No

Benz

Percent of map unit: 5 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AY714MT - Saline Upland 10-14
Hydric soil rating: No

87—Ethridge silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2wbyq
Elevation: 2,200 to 3,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 42 to 45 degrees F
Frost-free period: 105 to 135 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Ethridge and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ethridge

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium derived from sedimentary rock

Typical profile

A - 0 to 5 inches: silty clay loam
Bt - 5 to 12 inches: silty clay
Bk - 12 to 27 inches: silty clay loam
Bky - 27 to 60 inches: stratified silt loam to silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 3 percent
Maximum salinity: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R058AC041MT - Clayey (Cy) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Minor Components

Evanston

Percent of map unit: 5 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AC040MT - Silty (Si) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Kobase

Percent of map unit: 5 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AC041MT - Clayey (Cy) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Gerdrum

Percent of map unit: 3 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AC054MT - Claypan (Cp) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Verson

Percent of map unit: 2 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AC041MT - Clayey (Cy) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

88—Ethridge silty clay loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: chhc
Elevation: 2,200 to 3,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 36 to 45 degrees F
Frost-free period: 115 to 135 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Ethridge and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ethridge

Setting

Landform: Stream terraces, alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium

Typical profile

A - 0 to 6 inches: silty clay loam
Bt - 6 to 13 inches: silty clay
Bk - 13 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 3.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R058AC041MT - Clayey (Cy) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Minor Components

Evanston

Percent of map unit: 10 percent
Landform: Stream terraces, alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AC040MT - Silty (Si) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

106—Frazer silty clay loam

Map Unit Setting

National map unit symbol: ch6y
Elevation: 3,000 to 4,000 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 110 to 125 days
Farmland classification: Not prime farmland

Map Unit Composition

Frazer and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Frazer

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium

Typical profile

A - 0 to 6 inches: silty clay loam
Bky - 6 to 34 inches: silty clay loam
C - 34 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: RareNone
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Available water supply, 0 to 60 inches: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R046XN247MT - Clayey (Cy) RRU 46-N 13-19 PZ
Hydric soil rating: No

Minor Components

Korchea

Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R046XN248MT - Overflow (Ov) RRU 46-N 13-19 PZ
Hydric soil rating: No

Frazer

Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R046XN247MT - Clayey (Cy) RRU 46-N 13-19 PZ
Hydric soil rating: No

116—Havre loam

Map Unit Setting

National map unit symbol: ch79
Elevation: 2,200 to 3,600 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 110 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Havre and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Havre

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

A - 0 to 5 inches: loam
C - 5 to 62 inches: stratified fine sandy loam to clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: RareNone
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R046XC508MT - Silty (Si) RRU 46-C 13-19 PZ
Hydric soil rating: No

Minor Components

Havre

Percent of map unit: 4 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AC042MT - Sandy (Sy) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Ryell

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R052XN161MT - Silty (Si) 10-14" p.z.
Hydric soil rating: No

Havre

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R046XC508MT - Silty (Si) RRU 46-C 13-19 PZ
Hydric soil rating: No

118—Havre and Harlem soils, occasionally flooded

Map Unit Setting

National map unit symbol: ch7c
Elevation: 2,200 to 3,600 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 115 to 135 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Havre and similar soils: 50 percent
Harlem and similar soils: 45 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Havre

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

A - 0 to 5 inches: loam
C - 5 to 62 inches: stratified fine sandy loam to clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: NoneOccasional
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: B
Ecological site: R058AC045MT - Overflow (Ov) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Description of Harlem

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium

Typical profile

A - 0 to 8 inches: silty clay loam
C - 8 to 66 inches: stratified clay to silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: NoneOccasional
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 3.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): 6w
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: C
Ecological site: R058AC045MT - Overflow (Ov) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Minor Components

Kobar

Percent of map unit: 3 percent
Landform: Stream terraces, alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AC041MT - Clayey (Cy) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Yamac

Percent of map unit: 2 percent
Landform: Stream terraces, alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AY001MT - Loamy (Lo) 10-14 P.Z.
Hydric soil rating: No

150—Linnet clay loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: ch8j
Elevation: 2,300 to 3,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 41 to 45 degrees F
Frost-free period: 115 to 135 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Linnet and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Linnet

Setting

Landform: Terraces, alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium

Typical profile

A - 0 to 7 inches: clay loam
Bt - 7 to 16 inches: silty clay
Bk - 16 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 3.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R058AC041MT - Clayey (Cy) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Minor Components

Gerdrum

Percent of map unit: 5 percent
Landform: Alluvial fans, stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AC053MT - Dense Clay (DC) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Verson

Percent of map unit: 5 percent
Landform: Stream terraces, alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AC041MT - Clayey (Cy) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

223—Tanna-Abor complex, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: chc4
Elevation: 2,700 to 3,500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 115 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Tanna and similar soils: 60 percent
Abor and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tanna

Setting

Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy residuum over interbedded sedimentary rock

Typical profile

A - 0 to 6 inches: silty clay loam
Bt - 6 to 15 inches: silty clay loam
Bk - 15 to 32 inches: silty clay loam
Cr - 32 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 8 percent

Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 3.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: R058AC041MT - Clayey (Cy) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Description of Abor

Setting

Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey residuum over semiconsolidated shale

Typical profile

A - 0 to 6 inches: silty clay
Bw - 6 to 30 inches: silty clay
Cr - 30 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R058AC041MT - Clayey (Cy) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Minor Components

Kobar

Percent of map unit: 5 percent
Landform: Stream terraces, alluvial fans

Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AC041MT - Clayey (Cy) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Yawdim

Percent of map unit: 5 percent
Landform: Plains, hills
Landform position (two-dimensional): Summit, shoulder
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AC057MT - Shallow (Sw) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

256—Verson-Linnet clay loams, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: chd9
Elevation: 2,300 to 3,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 110 to 135 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Verson and similar soils: 50 percent
Linnet and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Verson

Setting

Landform: Stream terraces, alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 4 inches: clay loam
Bt - 4 to 12 inches: clay
Bk - 12 to 29 inches: silty clay loam
2C - 29 to 60 inches: extremely gravelly loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R058AC041MT - Clayey (Cy) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Description of Linnet

Setting

Landform: Terraces, alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium

Typical profile

A - 0 to 7 inches: clay loam
Bt - 7 to 16 inches: silty clay
Bk - 16 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 3.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R058AC041MT - Clayey (Cy) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Minor Components

Crago

Percent of map unit: 5 percent
Landform: Terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R058AC040MT - Silty (Si) RRU 58A-C 11-14" p.z.
Hydric soil rating: No

Danvers

Percent of map unit: 5 percent
Landform: Terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R046XN247MT - Clayey (Cy) RRU 46-N 13-19 PZ
Hydric soil rating: No

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Soil Chemical Properties

This folder contains a collection of tabular reports that present soil chemical properties. The reports (tables) include all selected map units and components for each map unit. Soil chemical properties are measured or inferred from direct observations in the field or laboratory. Examples of soil chemical properties include pH, cation exchange capacity, calcium carbonate, gypsum, and electrical conductivity.

Chemical Soil Properties

This table shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable cations plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. It is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced saturated hydraulic conductivity and aeration, and a general degradation of soil structure.

Chemical Soil Properties–Fergus County, Montana								
Map symbol and soil name	**Depth**	**Cation-exchange capacity**	**Effective cation-exchange capacity**	**Soil reaction**	**Calcium carbonate**	**Gypsum**	**Salinity**	**Sodium adsorption ratio**
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
3—Abor-Bascovy-Crago complex, 15 to 45 percent slopes								
Abor	0-2	29-39	—	7.4-8.4	1-3	0	0.0-4.0	0
	2-13	29-37	—	7.4-9.0	1-15	1-5	0.0-4.0	0
	13-35	29-37	—	7.4-9.0	1-15	1-5	0.0-4.0	0
	35-60	—	—	—	0	0	—	—
Bascovy	0-3	30-44	—	6.6-8.4	0	0	2.0-4.0	0-5
	3-12	29-43	—	6.1-8.4	0-3	0	2.0-4.0	5-10
	12-19	29-43	—	6.1-8.4	1-3	1-5	2.0-4.0	5-10
	19-34	26-42	—	5.1-8.4	0-3	1-5	2.0-8.0	10-12
	34-60	—	—	—	—	—	—	—
Crago	0-4	11-24	—	7.4-8.4	1-5	0	0.0-2.0	0
	4-21	12-17	—	7.9-8.4	5-30	0	0.0-2.0	0
	21-37	3.6-17	—	7.9-8.4	15-30	0	0.0-2.0	0
	37-60	0.4-12	—	7.9-8.4	15-25	0	0.0-2.0	0
4—Abor-Yawdim silty clay loams, 4 to 15 percent slopes								
Abor	0-6	25-30	—	7.4-8.4	1-5	0	0.0-4.0	0
	6-30	25-40	—	7.4-9.0	5-15	0	0.0-4.0	0-2
	30-60	—	—	—	—	—	—	—
Yawdim	0-3	20-25	—	6.6-7.8	0-5	0	0	0
	3-12	20-25	—	7.4-8.4	5-10	0	0	0
	12-60	—	—	—	—	—	—	—

Chemical Soil Properties–Fergus County, Montana								
Map symbol and soil name	**Depth**	**Cation-exchange capacity**	**Effective cation-exchange capacity**	**Soil reaction**	**Calcium carbonate**	**Gypsum**	**Salinity**	**Sodium adsorption ratio**
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
9—Absher-Nobe complex, 0 to 4 percent slopes								
Absher	0-4	22-26	—	6.6-8.0	0-2	0	4.0-8.0	0-5
	4-10	29-41	—	6.6-9.0	1-5	0	8.0-16.0	7-69
	10-60	26-34	—	7.9-8.2	4-15	1-5	16.0-30.0	18-69
Nobe	0-8	29-44	—	6.6-8.4	1-5	0	4.0-8.0	10-15
	8-60	29-43	—	7.8-9.6	5-10	1-5	16	15-69
87—Ethridge silty clay loam, 0 to 2 percent slopes								
Ethridge	0-5	22-28	—	6.6-7.8	0	0	0.0-2.0	0
	5-12	27-34	—	7.4-8.4	0-2	0	0.0-2.0	0
	12-27	22-30	—	7.4-8.4	5-15	0	0.0-2.0	1-5
	27-60	17-27	—	7.4-8.4	5-15	1-3	2.0-4.0	1-5
88—Ethridge silty clay loam, 2 to 8 percent slopes								
Ethridge	0-6	20-25	—	6.1-7.8	0	0	0	0
	6-13	25-30	—	6.6-8.4	0-5	0	0	0
	13-60	15-20	—	7.4-8.4	5-15	0	0.0-3.0	0
106—Frazer silty clay loam								
Frazer	0-6	20-25	—	7.4-8.4	0-5	0	0	0
	6-34	20-30	—	7.4-9.0	5-10	1-5	0.0-4.0	0
	34-60	20-30	—	7.4-9.0	1-5	0	0.0-4.0	0
116—Havre loam								
Havre	0-5	15-20	—	6.1-8.4	1-5	0	0.0-2.0	0
	5-62	15-25	—	7.4-9.0	1-5	0	0.0-4.0	0

Chemical Soil Properties–Fergus County, Montana								
Map symbol and soil name	**Depth**	**Cation-exchange capacity**	**Effective cation-exchange capacity**	**Soil reaction**	**Calcium carbonate**	**Gypsum**	**Salinity**	**Sodium adsorption ratio**
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
118—Havre and Harlem soils, occasionally flooded								
Havre	0-5	15-20	—	6.1-8.4	1-5	0	0.0-2.0	0
	5-62	15-25	—	7.4-9.0	1-5	0	0.0-4.0	0
Harlem	0-8	20-25	—	6.6-8.4	1-5	0	0.0-3.0	0-4
	8-66	25-35	—	7.4-8.4	5-10	0	0.0-3.0	4-10
150—Linnet clay loam, 2 to 8 percent slopes								
Linnet	0-7	20-25	—	6.1-7.3	0	0	0	0
	7-16	20-30	—	6.6-7.8	0	0	0	0
	16-60	20-25	—	7.9-8.4	1-5	0	0.0-3.0	0
223—Tanna-Abor complex, 2 to 8 percent slopes								
Tanna	0-6	20-25	—	6.6-7.8	0	0	0	0
	6-15	25-30	—	6.6-8.4	0	0	0.0-3.0	0
	15-32	25-30	—	6.6-8.4	5-15	0	0.0-3.0	0
	32-60	—	—	—	—	—	—	—
Abor	0-6	30-40	—	7.4-8.4	1-5	0	0.0-4.0	0
	6-30	25-40	—	7.4-9.0	5-15	0	0.0-4.0	0-2
	30-60	—	—	—	—	—	—	—

Chemical Soil Properties–Fergus County, Montana								
Map symbol and soil name	**Depth**	**Cation-exchange capacity**	**Effective cation-exchange capacity**	**Soil reaction**	**Calcium carbonate**	**Gypsum**	**Salinity**	**Sodium adsorption ratio**
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
256—Verson-Linnet clay loams, 2 to 8 percent slopes								
Verson	0-4	20-25	—	6.1-7.3	0	0	0	0
	4-12	25-35	—	6.1-7.8	0	0	0	0
	12-29	20-30	—	7.4-8.4	5-15	0	0	0
	29-60	5.0-10	—	7.4-8.4	5-15	0	0.0-2.0	0
Linnet	0-7	20-25	—	6.1-7.3	0	0	0	0
	7-16	20-30	—	6.6-7.8	0	0	0	0
	16-60	20-25	—	7.9-8.4	1-5	0	0.0-3.0	0

Soil Physical Properties

This folder contains a collection of tabular reports that present soil physical properties. The reports (tables) include all selected map units and components for each map unit. Soil physical properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell

potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Percentage of rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties–Fergus County, Montana														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
3—Abor-Bascovy-Crago complex, 15 to 45 percent slopes														
Abor	35	D	0-2	Silty clay	CH	A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	96-100-100	91-97-100	51-60-69	27-34-40
			2-13	Silty clay	CL, CH	A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	96-100-100	91-97-100	48-57-70	26-33-42
			13-35	Silty clay	CH, CL	A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	96-100-100	91-97-100	48-57-70	26-33-42
			35-60	Bedrock	—	—	—	—	—	—	—	—	—	—
Bascovy	30	D	0-3	Clay	CH	A-7-6, A-7-5	0- 3- 5	0- 8- 16	85-93-100	85-93-100	72-86-99	60-75-89	51-63-75	29-36-44
			3-12	Clay	CH	A-7-6	0- 1- 3	0- 9- 18	86-93-100	85-93-100	73-86-99	60-75-89	50-61-73	29-36-44
			12-19	Clay	CH	A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	85-92-99	71-81-89	50-61-73	29-36-44
			19-34	Clay	CH, CL	A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	85-92-99	71-81-89	49-60-72	29-36-44
			34-60	Bedrock	—	—	—	—	—	—	—	—	—	—
Crago	15	B	0-4	Gravelly loam	SC, CL	A-6, A-7-6, A-2-4	0- 0- 0	0- 7- 14	75-78-83	58-67-75	48-59-71	34-44-55	27-35-43	9-14-19
			4-21	Very gravelly loam	GC	A-2-6	0- 2- 5	7-13- 17	53-61-69	30-43-54	25-39-52	19-29-41	29-33-38	12-15-19
			21-37	Extremely gravelly sandy loam	SP-SC, SM, SW-SC	A-2-4, A-2-6	0- 2- 5	12-13-15	54-59-65	13-22-31	10-17-26	5- 9- 16	23-30-40	7-9 -12
			37-60	Extremely gravelly loamy sand	SP-SC, SP-SM, SW	A-1-a, A-2-4, A-1-b	0- 2- 5	11-13-15	54-60-66	14-23-32	10-19-28	3- 6- 12	0-25 -36	NP-6 -9

Engineering Properties–Fergus County, Montana														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
4—Abor-Yawdim silty clay loams, 4 to 15 percent slopes														
Abor	50	D	0-6	Silty clay loam	CL	A-6, A-7	0- 0- 0	0- 0- 0	80-90-100	75-88-100	65-83-100	60-75-90	35-40-45	15-20-25
			6-30	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0- 0- 0	0- 0- 0	80-90-100	75-88-100	65-83-100	60-78-95	35-50-65	20-33-45
			30-60	Unweathered bedrock	—	—	—	—	—	—	—	—	—	—
Yawdim	30	D	0-3	Silty clay loam	CL	A-6, A-7	0- 0- 0	0- 0- 0	100-100-100	100-100-100	90-95-100	80-85-90	30-38-45	10-15-20
			3-12	Silty clay loam, clay loam, clay	CH, CL	A-7	0- 0- 0	0- 0- 0	100-100-100	100-100-100	90-95-100	70-83-95	40-50-60	15-25-35
			12-60	Weathered bedrock	—	—	—	—	—	—	—	—	—	—
9—Absher-Nobe complex, 0 to 4 percent slopes														
Absher	45	D	0-4	Clay loam	CL, SC	A-7-6, A-6	0- 0- 0	0- 0- 0	95-96-100	71-84-100	61-77-96	46-60-79	38-42-49	18-21-25
			4-10	Clay	CH	A-7-6	0- 0- 0	0- 0- 0	95-96-100	71-84-100	63-77-97	52-67-88	50-58-73	28-34-44
			10-60	Clay	CL, CH	A-7-6	0- 0- 0	0- 0- 0	95-96-100	72-84-100	67-83-100	56-71-88	48-59-61	27-35-37
Nobe	35	D	0-8	Clay	CH	A-7-6, A-7-5	0- 0- 0	0- 0- 0	100-100-100	100-100-100	87-95-100	66-78-88	51-58-75	29-33-44
			8-60	Clay	CH	A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	84-92-98	67-80-89	51-60-73	29-35-44

Engineering Properties–Fergus County, Montana														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
87—Ethridge silty clay loam, 0 to 2 percent slopes														
Ethridge	85	C	0-5	Silty clay loam	CL	A-7-6	0- 0- 0	0- 0- 0	100-100-100	94-96-100	89-96-100	79-86-92	39-46-51	19-22-25
			5-12	Silty clay	CH	A-7-6	0- 0- 0	0- 0- 0	100-100-100	94-96-100	88-95-100	78-84-93	47-53-59	25-29-33
			12-27	Silty clay loam	CL	A-7-6	0- 0- 0	0- 0- 0	100-100-100	94-96-100	86-96-100	76-86-96	39-48-56	19-26-32
			27-60	Stratified silt loam to silty clay	CL	A-7-6	0- 0- 0	0- 0- 0	100-100-100	95-96-100	88-96-100	78-86-97	33-41-50	15-21-28
88—Ethridge silty clay loam, 2 to 8 percent slopes														
Ethridge	90	C	0-6	Silty clay loam	CL	A-6, A-7	0- 0- 0	0- 0- 0	100-100-100	95-98-100	90-95-100	85-90-95	25-35-45	10-15-20
			6-13	Silty clay, silty clay loam, clay	CL	A-7	0- 0- 0	0- 0- 0	100-100-100	95-98-100	95-98-100	90-93-95	40-45-50	20-25-30
			13-60	Silty clay loam, clay loam, clay	CL	A-6, A-7	0- 0- 0	0- 0- 0	80-90-100	75-88-100	60-78-95	55-73-90	30-40-50	10-18-25
106—Frazer silty clay loam														
Frazer	90	C	0-6	Silty clay loam	CL	A-6, A-7	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-98-100	85-90-95	30-38-45	10-15-20
			6-34	Silty clay loam, silty clay	CH, CL	A-6, A-7	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-98-100	85-90-95	35-45-55	15-23-30
			34-60	Silty clay loam, silty clay	CH, CL	A-6, A-7	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-98-100	85-90-95	35-45-55	15-23-30

Engineering Properties–Fergus County, Montana														
Map unit symbol and soil name	**Pct. of map unit**	**Hydrologic group**	**Depth**	**USDA texture**	**Classification**		**Pct Fragments**		**Percentage passing sieve number—**				**Liquid limit**	**Plasticity index**
					Unified	**AASHTO**	**>10 inches**	**3-10 inches**	**4**	**10**	**40**	**200**		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
116—Havre loam														
Havre	90	B	0-5	Loam	CL-ML	A-4	0- 0- 0	0- 0- 0	100-100-100	100-100-100	80-88-95	60-75-90	20-25-30	5-8 -10
			5-62	Stratified fine sandy loam to clay loam	CL, CL-ML	A-4, A-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	80-88-95	60-70-80	20-28-35	5-10-15
118—Havre and Harlem soils, occasionally flooded														
Havre	50	B	0-5	Loam	CL-ML	A-4	0- 0- 0	0- 0- 0	100-100-100	100-100-100	80-88-95	60-75-90	20-25-30	5-8 -10
			5-62	Stratified fine sandy loam to clay loam	CL, CL-ML	A-4, A-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	80-88-95	60-70-80	20-28-35	5-10-15
Harlem	45	C	0-8	Silty clay loam	CL	A-6, A-7	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-98-100	80-85-90	30-38-45	10-15-20
			8-66	Stratified clay to silty clay loam	CH, CL	A-7	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-98-100	85-90-95	40-55-70	15-30-45
150—Linnet clay loam, 2 to 8 percent slopes														
Linnet	90	C	0-7	Clay loam	CL	A-6, A-7	0- 0- 0	0- 0- 0	90-95-100	85-93-100	75-88-100	55-68-80	30-38-45	10-15-20
			7-16	Silty clay, clay	CH, CL	A-7	0- 0- 0	0- 0- 0	90-95-100	85-93-100	75-88-100	60-75-90	45-55-65	25-35-45
			16-60	Clay loam, silty clay loam, silty clay	CH, CL	A-6, A-7	0- 0- 0	0- 3- 5	85-93-100	80-90-100	65-80-95	50-68-85	35-45-55	15-25-35

Engineering Properties–Fergus County, Montana														
Map unit symbol and soil name	**Pct. of map unit**	**Hydrologic group**	**Depth**	**USDA texture**	**Classification**		**Pct Fragments**		**Percentage passing sieve number—**				**Liquid limit**	**Plasticity index**
					Unified	**AASHTO**	**>10 inches**	**3-10 inches**	**4**	**10**	**40**	**200**		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
223—Tanna-Abor complex, 2 to 8 percent slopes														
Tanna	60	D	0-6	Silty clay loam	CL	A-6	0- 0- 0	0- 3- 5	90-95-100	90-95-100	90-95-100	85-90-95	35-38-40	15-18-20
			6-15	Clay loam, clay, silty clay loam	CL	A-6, A-7	0- 0- 0	0- 3- 5	90-95-100	90-95-100	80-88-95	75-83-90	35-40-45	15-20-25
			15-32	Clay loam, clay, silty clay loam	CL	A-6, A-7	0- 0- 0	0- 3- 5	90-95-100	90-95-100	80-88-95	75-83-90	35-40-45	15-20-25
			32-60	Unweathered bedrock	—	—	—	—	—	—	—	—	—	—
Abor	30	D	0-6	Silty clay	CH, CL	A-7	0- 0- 0	0- 0- 0	95-98-100	90-95-100	80-90-100	75-85-95	40-50-60	20-28-35
			6-30	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0- 0- 0	0- 0- 0	80-90-100	75-88-100	65-83-100	60-78-95	35-50-65	20-33-45
			30-60	Unweathered bedrock	—	—	—	—	—	—	—	—	—	—

Engineering Properties–Fergus County, Montana														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
256—Verson-Linnet clay loams, 2 to 8 percent slopes														
Verson	50	C	0-4	Clay loam	CL, CL-ML	A-4, A-6	0- 0- 0	0- 3- 5	85-93-100	85-93-100	60-75-90	50-63-75	25-33-40	5-10-15
			4-12	Silty clay loam, clay loam, clay	CH, CL	A-6, A-7	0- 0- 0	0- 3- 5	90-95-100	85-93-100	70-83-95	65-78-90	35-45-55	15-23-30
			12-29	Silty clay loam, clay, gravelly clay loam	CL	A-6, A-7	0- 0- 0	0- 5- 10	80-88-95	70-83-95	60-75-90	55-68-80	35-43-50	15-20-25
			29-60	Very gravelly sandy loam, very gravelly loam, extremely gravelly loam	GM, GP-GM	A-1	0- 0- 0	10-13-15	20-35-50	15-28-40	10-20-30	5-15- 25	20-23-25	NP-3 -5
Linnet	40	C	0-7	Clay loam	CL	A-6, A-7	0- 0- 0	0- 0- 0	90-95-100	85-93-100	75-88-100	55-68-80	30-38-45	10-15-20
			7-16	Silty clay, clay	CH, CL	A-7	0- 0- 0	0- 0- 0	90-95-100	85-93-100	75-88-100	60-75-90	45-55-65	25-35-45
			16-60	Clay loam, silty clay loam, silty clay	CH, CL	A-6, A-7	0- 0- 0	0- 3- 5	85-93-100	80-90-100	65-80-95	50-68-85	35-45-55	15-25-35

Physical Soil Properties

This table shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In this table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In this table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, saturated hydraulic conductivity (Ksat), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3- or 1/10-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates in the table are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity (Ksat) is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In this table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of organic matter in a soil can be maintained by returning crop residue to the soil.

Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and Ksat. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the "National Soil Survey Handbook."

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Reference:
United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. (http://soils.usda.gov)

Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Physical Soil Properties–Fergus County, Montana														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
3—Abor-Bascovy-Crago complex, 15 to 45 percent slopes														
Abor	0-2	3- 6- 9	40-47- 55	40-48- 55	1.27-1.31-1.35	0.42-0.91-1.40	0.14-0.16-0.18	6.3- 8.7-11.4	1.0- 1.5-2.0	.24	.24	3	4	86
	2-13	3- 6- 9	40-47- 55	40-48- 58	1.33-1.41-1.48	0.42-0.91-1.40	0.12-0.14-0.16	4.7- 7.2-11.7	0.5- 0.8-1.0	.32	.32			
	13-35	3- 6- 9	40-47- 55	40-48- 58	1.33-1.41-1.48	0.42-0.91-1.40	0.12-0.14-0.16	4.7- 7.2-11.7	0.5- 0.8-1.0	.32	.32			
	35-60	—	—	—	—	0.02-0.20-2.00	—	—	—					
Bascovy	0-3	10-22- 30	10-28- 40	40-50- 60	1.18-1.28-1.37	0.01-0.21-0.42	0.13-0.15-0.17	5.9- 9.2-13.2	1.0- 1.5-2.0	.20	.20	3	4	86
	3-12	10-22- 30	10-28- 40	40-50- 60	1.29-1.32-1.34	0.01-0.21-0.42	0.12-0.14-0.16	5.8- 9.1-13.1	0.5- 0.8-1.0	.24	.24			
	12-19	10-22- 30	10-28- 40	40-50- 60	1.29-1.32-1.34	0.01-0.21-0.42	0.12-0.14-0.16	5.8- 9.1-13.1	0.5- 0.8-1.0	.24	.24			
	19-34	10-22- 30	10-28- 40	40-50- 60	1.25-1.33-1.40	0.01-0.21-0.42	0.12-0.14-0.16	5.4- 8.9-12.9	0.0- 0.3-0.5	.24	.24			
	34-60	—	—	—	—	0.02-0.20-2.00	—	—	—					
Crago	0-4	24-42- 52	28-37- 50	15-21- 27	1.34-1.42-1.49	4.00-9.00-14.00	0.12-0.14-0.16	1.0- 2.3- 3.9	1.0- 2.0-3.0	.15	.24	3	7	38
	4-21	24-37- 52	28-41- 50	20-22- 27	1.40-1.44-1.47	4.00-9.00-14.00	0.07-0.09-0.11	0.7- 1.4- 2.5	0.5- 0.8-1.0	.10	.37			
	21-37	43-65- 70	10-19- 40	15-16- 20	1.33-1.48-1.62	14.00-28.00-42.00	0.02-0.04-0.06	0.0- 0.4- 1.0	0.0- 2.5-5.0	.02	.20			
	37-60	70-81- 90	0- 9- 29	1-10- 15	1.52-1.58-1.63	42.00-91.00-141.00	0.02-0.03-0.04	0.0- 0.0- 0.6	0.0- 2.5-5.0	.02	.10			

Physical Soil Properties–Fergus County, Montana														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
4—Abor-Yawdim silty clay loams, 4 to 15 percent slopes														
Abor	0-6	- 8-	-55-	35-38- 40	1.20-1.30-1.40	1.40-3.00-4.00	0.16-0.18-0.20	3.0- 4.5- 5.9	1.0- 1.5-2.0	.37	.37	3	4	86
	6-30	- 6-	-47-	35-48- 60	1.30-1.43-1.55	0.01-0.21-0.42	0.14-0.15-0.16	6.0- 7.5- 8.9	0.5- 0.8-1.0	.32	.32			
	30-60	—	—	—	—	—	0.00-0.00-0.00	—	—					
Yawdim	0-3	-19-	-48-	27-34- 40	1.10-1.20-1.30	1.40-3.00-4.00	0.17-0.19-0.20	3.0- 4.5- 5.9	0.5- 0.8-1.0	.43	.43	2	6	48
	3-12	-18-	-44-	35-38- 50	1.20-1.30-1.40	0.42-1.00-1.40	0.15-0.17-0.18	6.0- 7.5- 8.9	0.0- 0.3-0.5	.37	.37			
	12-60	—	—	—	—	—	0.00-0.00-0.00	—	—					
9—Absher-Nobe complex, 0 to 4 percent slopes														
Absher	0-4	20-34- 45	20-37- 50	27-30- 35	1.30-1.36-1.42	1.40-2.70-4.00	0.06-0.08-0.09	2.9- 3.7- 6.1	1.0- 1.5-2.0	.37	.37	2	6	48
	4-10	20-23- 24	16-29- 40	40-48- 60	1.27-1.36-1.45	0.01-0.01-0.10	0.01-0.02-0.03	5.8- 8.3-12.8	0.5- 0.8-1.0	.28	.28			
	10-60	19-20- 27	24-30- 40	40-50- 50	1.32-1.38-1.43	0.01-0.01-0.10	0.01-0.01-0.02	5.2- 8.5- 9.9	0.0- 0.3-0.5	.28	.28			
Nobe	0-8	0-26- 45	0-29- 40	40-45- 60	1.29-1.33-1.37	0.01-0.21-0.42	0.04-0.09-0.11	7.5- 9.0-13.2	0.5- 1.3-2.0	.28	.28	5	4	86
	8-60	0-23- 45	0-29- 40	40-48- 60	1.31-1.36-1.41	0.01-0.01-0.10	0.01-0.01-0.02	7.5- 9.6-13.1	0.5- 0.8-1.0	.28	.28			

Physical Soil Properties–Fergus County, Montana														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
87—Ethridge silty clay loam, 0 to 2 percent slopes														
Ethridge	0-5	13-18- 20	45-50- 58	27-32- 35	1.30-1.33-1.35	1.40-2.70-4.00	0.18-0.20-0.22	3.3- 4.4- 6.2	1.0- 2.0-3.0	.43	.43	5	6	48
	5-12	13-18- 20	40-42- 42	40-40- 45	1.35-1.37-1.39	0.42-0.91-1.40	0.15-0.17-0.19	6.4- 7.2- 8.7	1.0- 1.5-2.0	.32	.32			
	12-27	14-18- 20	40-44- 56	30-38- 40	1.35-1.38-1.41	1.40-2.70-4.00	0.16-0.18-0.20	3.1- 5.6- 7.0	0.5- 0.8-1.0	.37	.37			
	27-60	13-18- 20	45-50- 52	28-32- 40	1.45-1.48-1.52	1.40-2.70-4.00	0.14-0.16-0.18	2.5- 3.7- 6.5	0.0- 0.3-0.5	.43	.43			
88—Ethridge silty clay loam, 2 to 8 percent slopes														
Ethridge	0-6	-20-	-49-	27-31- 35	1.15-1.25-1.35	1.40-3.00-4.00	0.16-0.18-0.20	3.0- 4.5- 5.9	1.0- 2.0-3.0	.37	.37	5	6	48
	6-13	- 8-	-52-	35-40- 45	1.30-1.40-1.50	0.42-1.00-1.40	0.12-0.14-0.15	6.0- 7.5- 8.9	1.0- 1.5-2.0	.37	.37			
	13-60	- 8-	-56-	27-36- 45	1.30-1.40-1.50	1.40-3.00-4.00	0.12-0.14-0.15	3.0- 4.5- 5.9	0.5- 0.8-1.0	.37	.37			
106—Frazer silty clay loam														
Frazer	0-6	-17-	-48-	30-35- 40	1.15-1.25-1.35	1.40-3.00-4.00	0.16-0.18-0.20	3.0- 4.5- 5.9	2.0- 3.0-4.0	.32	.32	5	6	48
	6-34	-19-	-44-	35-37- 45	1.25-1.35-1.45	0.42-1.00-1.40	0.14-0.16-0.18	6.0- 7.5- 8.9	0.5- 0.8-1.0	.37	.37			
	34-60	-19-	-44-	35-37- 45	1.25-1.35-1.45	0.42-1.00-1.40	0.14-0.16-0.18	6.0- 7.5- 8.9	0.5- 0.8-1.0	.37	.37			

Physical Soil Properties–Fergus County, Montana														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
116—Havre loam														
Havre	0-5	-42-	-37-	15-21- 27	1.15-1.25-1.35	4.00-9.00-14.00	0.16-0.18-0.20	0.0- 1.5- 2.9	0.5- 1.3- 2.0	.32	.32	5	6	48
	5-62	-61-	-13-	18-27- 35	1.35-1.45-1.55	4.00-9.00-14.00	0.14-0.16-0.18	0.0- 1.5- 2.9	0.5- 0.8- 1.0	.20	.20			
118—Havre and Harlem soils, occasionally flooded														
Havre	0-5	-42-	-37-	15-21- 27	1.15-1.25-1.35	4.00-9.00-14.00	0.16-0.18-0.20	0.0- 1.5- 2.9	0.5- 1.3- 2.0	.32	.32	5	6	48
	5-62	-61-	-13-	18-27- 35	1.35-1.45-1.55	4.00-9.00-14.00	0.14-0.16-0.18	0.0- 1.5- 2.9	0.5- 0.8- 1.0	.20	.20			
Harlem	0-8	-19-	-48-	27-34- 40	1.30-1.40-1.50	0.42-1.00-1.40	0.14-0.16-0.18	3.0- 4.5- 5.9	0.5- 0.8- 1.0	.37	.37	5	6	48
	8-66	-23-	-29-	35-48- 60	1.30-1.40-1.50	0.42-1.00-1.40	0.14-0.16-0.18	6.0- 7.5- 8.9	0.5- 0.8- 1.0	.24	.24			
150—Linnet clay loam, 2 to 8 percent slopes														
Linnet	0-7	-33-	-32-	30-35- 40	1.15-1.25-1.35	1.40-3.00-4.00	0.14-0.16-0.18	3.0- 4.5- 5.9	1.0- 2.0- 3.0	.24	.24	5	6	48
	7-16	- 3-	-45-	45-53- 60	1.30-1.40-1.50	0.42-1.00-1.40	0.13-0.15-0.16	6.0- 7.5- 8.9	0.5- 0.8- 1.0	.28	.28			
	16-60	-18-	-44-	35-38- 50	1.30-1.43-1.55	0.42-1.00-1.40	0.12-0.14-0.15	6.0- 7.5- 8.9	0.0- 0.3- 0.5	.37	.37			

Physical Soil Properties–Fergus County, Montana														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
223—Tanna-Abor complex, 2 to 8 percent slopes														
Tanna	0-6	-20-	-49-	27-31- 35	1.10-1.20-1.30	0.42-1.00-1.40	0.16-0.18-0.20	3.0- 4.5- 5.9	2.0- 3.0-4.0	.32	.32	3	6	48
	6-15	-18-	-43-	35-39- 45	1.30-1.40-1.50	0.42-1.00-1.40	0.14-0.16-0.17	3.0- 4.5- 5.9	1.0- 1.5-2.0	.32	.32			
	15-32	-18-	-43-	35-39- 45	1.30-1.40-1.50	0.42-1.00-1.40	0.14-0.16-0.17	3.0- 4.5- 5.9	1.0- 1.5-2.0	.32	.32			
	32-60	—	—	—	—	—	0.00-0.00-0.00	—	—					
Abor	0-6	- 6-	-47-	40-48- 55	1.20-1.30-1.40	1.40-3.00-4.00	0.14-0.16-0.18	6.0- 7.5- 8.9	1.0- 1.5-2.0	.28	.28	3	4	86
	6-30	- 6-	-47-	35-48- 60	1.30-1.43-1.55	0.01-0.21-0.42	0.14-0.15-0.16	6.0- 7.5- 8.9	0.5- 0.8-1.0	.32	.32			
	30-60	—	—	—	—	—	0.00-0.00-0.00	—	—					

Physical Soil Properties–Fergus County, Montana														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
256—Verson-Linnet clay loams, 2 to 8 percent slopes														
Verson	0-4	-35-	-34-	27-31- 35	1.15-1.25-1.35	1.40-3.00-4.00	0.17-0.19-0.20	0.0- 1.5- 2.9	2.0- 3.0-4.0	.24	.24	3	6	48
	4-12	-28-	-29-	35-43- 50	1.15-1.28-1.40	0.42-1.00-1.40	0.14-0.16-0.17	3.0- 4.5- 5.9	1.0- 1.5-2.0	.24	.24			
	12-29	-18-	-43-	35-39- 45	1.30-1.40-1.50	0.42-1.00-1.40	0.13-0.15-0.16	3.0- 4.5- 5.9	0.5- 0.8-1.0	.32	.32			
	29-60	-46-	-44-	5-10- 15	1.35-1.45-1.55	14.00-28.00-42.00	0.05-0.06-0.06	0.0- 1.5- 2.9	0.0- 0.3-0.5	.10	.43			
Linnet	0-7	-33-	-32-	30-35- 40	1.15-1.25-1.35	1.40-3.00-4.00	0.14-0.16-0.18	3.0- 4.5- 5.9	1.0- 2.0-3.0	.24	.24	5	6	48
	7-16	- 3-	-45-	45-53- 60	1.30-1.40-1.50	0.42-1.00-1.40	0.13-0.15-0.16	6.0- 7.5- 8.9	0.5- 0.8-1.0	.28	.28			
	16-60	-18-	-44-	35-38- 50	1.30-1.43-1.55	0.42-1.00-1.40	0.12-0.14-0.15	6.0- 7.5- 8.9	0.0- 0.3-0.5	.37	.37			

Water Management

This folder contains a collection of tabular reports that present soil interpretations related to water management. The reports (tables) include all selected map units and components for each map unit, limiting features and interpretive ratings. Water management interpretations are tools for evaluating the potential of the soil in the application of various water management practices. Example interpretations include pond reservoir area, embankments, dikes, levees, and excavated ponds.

Ponds and Embankments

This table gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the saturated hydraulic conductivity (Ksat) of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5

feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, Ksat of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Information in this table is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this table. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Report—Ponds and Embankments

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Ponds and Embankments–Fergus County, Montana							
Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Aquifer-fed excavated ponds		Pond reservoir areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
3—Abor-Bascovy-Crago complex, 15 to 45 percent slopes							
Abor	35	Somewhat limited		Very limited		Very limited	
		Hard to pack	0.76	Depth to water	1.00	Slope	1.00
		Thin layer	0.70			Depth to bedrock	0.04
		Dusty	0.33				
Bascovy	30	Very limited		Very limited		Very limited	
		Hard to pack	1.00	Depth to water	1.00	Slope	1.00
		Thin layer	0.74			Depth to bedrock	0.05
		Dusty	0.32				
Crago	15	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to water	1.00	Seepage	1.00
		Dusty	0.21			Slope	1.00
4—Abor-Yawdim silty clay loams, 4 to 15 percent slopes							
Abor	50	Somewhat limited		Very limited		Very limited	
		Hard to pack	0.72	Depth to water	1.00	Slope	1.00
		Dusty	0.33			Depth to bedrock	0.12
Yawdim	30	Somewhat limited		Very limited		Very limited	
		Dusty	0.33	Depth to water	1.00	Slope	1.00
		Hard to pack	0.13			Depth to bedrock	0.78

Ponds and Embankments–Fergus County, Montana							
Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Aquifer-fed excavated ponds		Pond reservoir areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
9—Absher-Nobe complex, 0 to 4 percent slopes							
Absher	45	Very limited		Very limited		Not limited	
		Salinity	1.00	Slow refill	1.00		
		Hard to pack	1.00	Salinity and saturated zone	1.00		
		Dusty	0.37	Depth to saturated zone	0.85		
				Unstable excavation walls	0.10		
Nobe	35	Very limited		Very limited		Not limited	
		Salinity	1.00	Slow refill	1.00		
		Hard to pack	1.00	Salinity and saturated zone	1.00		
		Dusty	0.36	Depth to saturated zone	0.85		
				Unstable excavation walls	0.10		
87—Ethridge silty clay loam, 0 to 2 percent slopes							
Ethridge	85	Somewhat limited		Very limited		Somewhat limited	
		Dusty	0.29	Depth to water	1.00	Seepage	0.03
88—Ethridge silty clay loam, 2 to 8 percent slopes							
Ethridge	90	Somewhat limited		Very limited		Somewhat limited	
		Dusty	0.33	Depth to water	1.00	Slope	0.32
						Seepage	0.05
106—Frazer silty clay loam							
Frazer	90	Somewhat limited		Very limited		Not limited	
		Dusty	0.15	Depth to water	1.00		
116—Havre loam							
Havre	90	Somewhat limited		Very limited		Somewhat limited	
		Piping	0.50	Depth to water	1.00	Seepage	0.70
		Dusty	0.06				

Ponds and Embankments–Fergus County, Montana							
Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Aquifer-fed excavated ponds		Pond reservoir areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
118—Havre and Harlem soils, occasionally flooded							
Havre	50	Somewhat limited		Very limited		Somewhat limited	
		Piping	0.50	Depth to water	1.00	Seepage	0.70
		Dusty	0.06				
Harlem	45	Somewhat limited		Very limited		Not limited	
		Hard to pack	0.72	Depth to water	1.00		
		Dusty	0.32				
150—Linnet clay loam, 2 to 8 percent slopes							
Linnet	90	Somewhat limited		Very limited		Somewhat limited	
		Dusty	0.42	Depth to water	1.00	Slope	0.32
223—Tanna-Abor complex, 2 to 8 percent slopes							
Tanna	60	Somewhat limited		Very limited		Somewhat limited	
		Dusty	0.33	Depth to water	1.00	Slope	0.32
						Depth to bedrock	0.08
Abor	30	Somewhat limited		Very limited		Somewhat limited	
		Hard to pack	0.72	Depth to water	1.00	Slope	0.32
		Dusty	0.33			Depth to bedrock	0.12
256—Verson-Linnet clay loams, 2 to 8 percent slopes							
Verson	50	Somewhat limited		Very limited		Very limited	
		Piping	0.50	Depth to water	1.00	Seepage	1.00
		Dusty	0.29			Slope	0.32
Linnet	40	Somewhat limited		Very limited		Somewhat limited	
		Dusty	0.42	Depth to water	1.00	Slope	0.32

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IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Fergus County, Montana

Local office

Montana Ecological Services Field Office

(406) 449-5225
(406) 449-5339

585 Shephard Way, Suite 1
Helena, MT 59601-6287

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).

2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Grizzly Bear Ursus arctos horribilis There is **proposed** critical habitat for this species. https://ecos.fws.gov/ecp/species/7642	Threatened

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

There are no documented cases of eagles being present at this location. However, if you believe eagles may be using your site, please reach out to the local Fish and Wildlife Service office.

Additional information can be found using the following links:

- Eagle Managment https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Ferruginous Hawk Buteo regalis This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/6038	Breeds Mar 15 to Aug 15

Lark Bunting Calamospiza melanocorys — Breeds May 10 to Aug 15
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Marbled Godwit Limosa fedoa — Breeds May 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9481

Western Grebe aechmophorus occidentalis — Breeds Jun 1 to Aug 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/6743

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

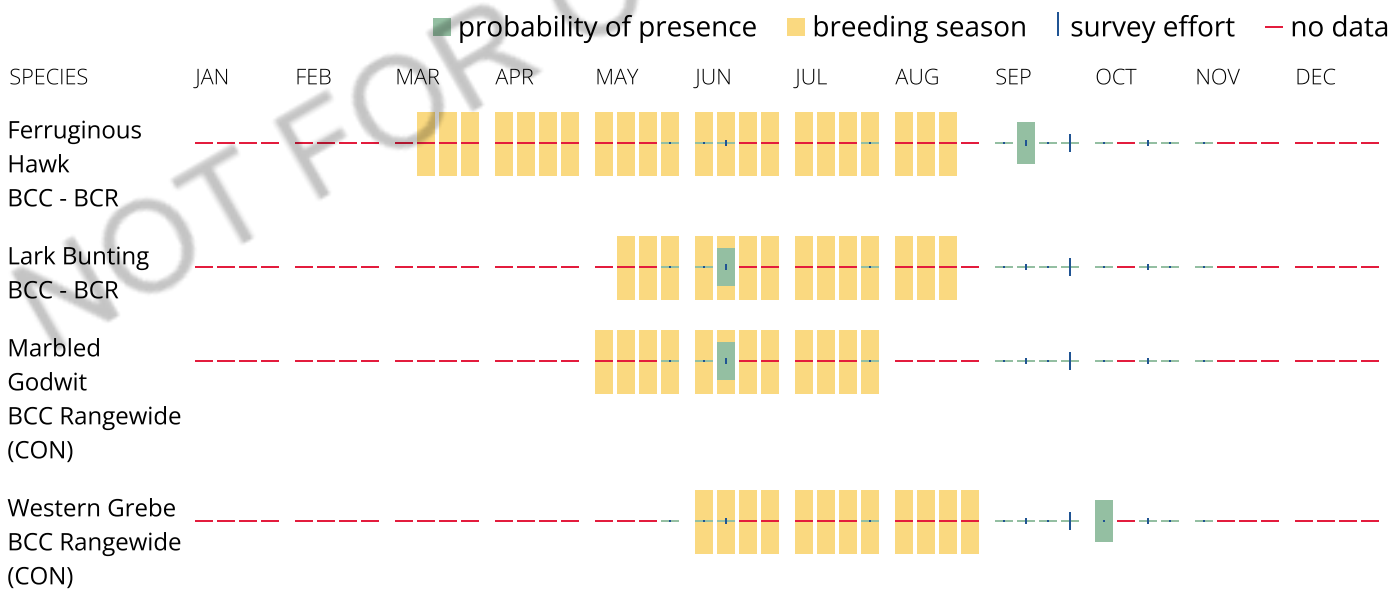
Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure.

To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and

3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

- PEM1A
- PEM1C

FRESHWATER POND

- PABKx
- PABF

RIVERINE

R4SBC
R3UBF

A full description for each wetland code can be found at the National Wetlands Inventory website

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

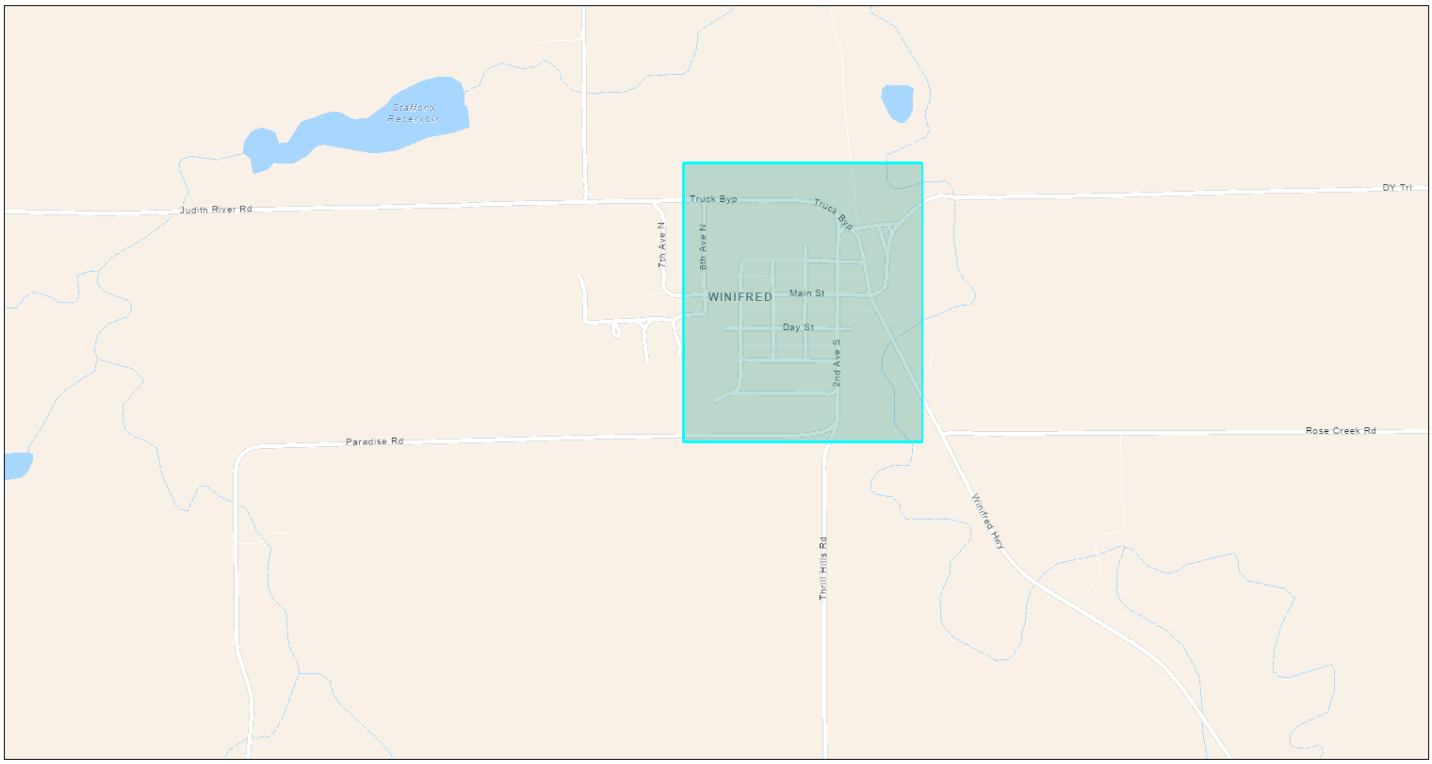
Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NEPAssist Report

Town of Winifred



May 22, 2025

Town of Winifred

1:18,058

0 0.15 0.3 0.6 mi

0 0.25 0.5 1 km

Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Input Coordinates: 47.563471,-109.383284,47.563471,-109.372401,47.554898,-109.372401,47.554898,-109.383284,47.563471,-109.383284	
Project Area	0.30 sq mi
Within 1 mile of an Ozone 1-hr (1979 standard) Non-Attainment/Maintenance Area?	no
Within 1 mile of an Ozone 8-hr (1997 standard) Non-Attainment/Maintenance Area?	no
Within 1 mile of an Ozone 8-hr (2008 standard) Non-Attainment/Maintenance Area?	no
Within 1 mile of an Ozone 8-hr (2015 standard) Non-Attainment/Maintenance Area?	no
Within 1 mile of a Lead (2008 standard) Non-Attainment/Maintenance Area?	no
Within 1 mile of a SO2 1-hr (2010 standard) Non-Attainment/Maintenance Area?	no
Within 1 mile of a PM2.5 24hr (2006 standard) Non-Attainment/Maintenance Area?	no
Within 1 mile of a PM2.5 Annual (1997 standard) Non-Attainment/Maintenance Area?	no
Within 1 mile of a PM2.5 Annual (2012 standard) Non-Attainment/Maintenance Area?	no
Within 1 mile of a PM10 (1987 standard) Non-Attainment/Maintenance Area?	no
Within 1 mile of a CO Annual (1971 standard) Non-Attainment/Maintenance Area?	no
Within 1 mile of a NO2 Annual (1971 standard) Non-Attainment/Maintenance Area?	no
Within 1 mile of a Federal Land?	no
Within 1 mile of an impaired stream?	no
Within 1 mile of an impaired waterbody?	no
Within 1 mile of a waterbody?	yes
Within 1 mile of a stream?	yes
Within 1 mile of an NWI wetland?	Available Online
Within 1 mile of a Brownfields site?	no

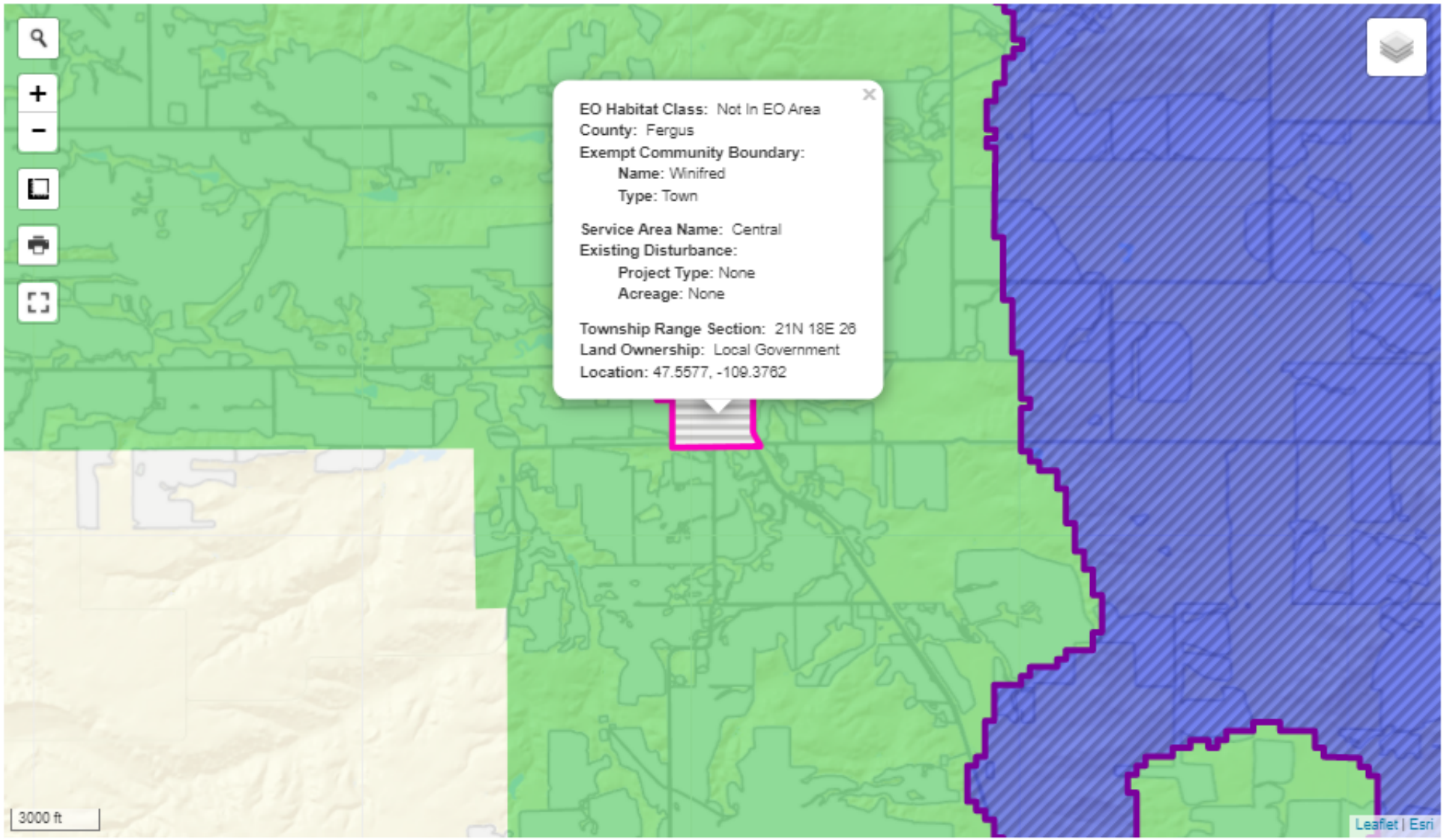
Within 1 mile of a Superfund site?	no
Within 1 mile of a Toxic Release Inventory (TRI) site?	no
Within 1 mile of a water discharger (NPDES)?	yes
Within 1 mile of a hazardous waste (RCRA) facility?	no
Within 1 mile of an air emission facility?	no
Within 1 mile of a school?	yes
Within 1 mile of an airport?	yes
Within 1 mile of a hospital?	no
Within 1 mile of a designated sole source aquifer?	no
Within 1 mile of a historic property on the National Register of Historic Places?	no
Within 1 mile of a Chemical Data Reporting (CDR) site?	no
Within 1 mile of a Land Cession Boundary?	yes
Within 1 mile of a tribal area (lower 48 states)?	no
Within 1 mile of the service area of a mitigation or conservation bank?	yes
Within 1 mile of the service area of an In-Lieu-Fee Program?	yes
Within 1 mile of a Public Property Boundary of the Formerly Used Defense Sites?	no
Within 1 mile of a Munitions Response Site?	no
Within 1 mile of an Essential Fish Habitat (EFH)?	no
Within 1 mile of a Habitat Area of Particular Concern (HAPC)?	no
Within 1 mile of an EFH Area Protected from Fishing (EFHA)?	no
Within 1 mile of a Bureau of Land Management Area of Critical Environmental Concern?	no
Within 1 mile of an ESA-designated Critical Habitat Area per U.S. Fish & Wildlife Service?	no
Within 1 mile of an ESA-designated Critical Habitat river, stream or water feature per U.S. Fish & Wildlife Service?	no

Created on: 5/22/2025 2:15:46 AM

Montana Sage Grouse Habitat Conservation Map

Use this map to view and explore types of sage grouse habitat designated as core (blue), general (green), connectivity (light-blue) habitats or BLM priority areas. To zoom into an area, hold the Shift key and draw a rectangle. Anyone proposing new development activities in sage grouse habitat must submit a development project application for consultation.

If your project is close to designated sage grouse habitat or BLM Priority area, or if you are unsure your project is within designated sage grouse habitat or BLM Priority area, please submit your project for review as permitting agencies will be checking to see if your project is located within these designated sage grouse habitats. If your permitting agency requires evidence that your project is outside of designated sage grouse habitat, we recommend that you log in and start a project application and take a screenshot of your project's location.



Montana Bureau of Mines and Geology
Open File No. 437

Geologic Map of the Winifred 30' x 60' Quadrangle, Central Montana

Edith M. Wilde and Karen W. Porter

2001

To view a full scale version of this map, click here.

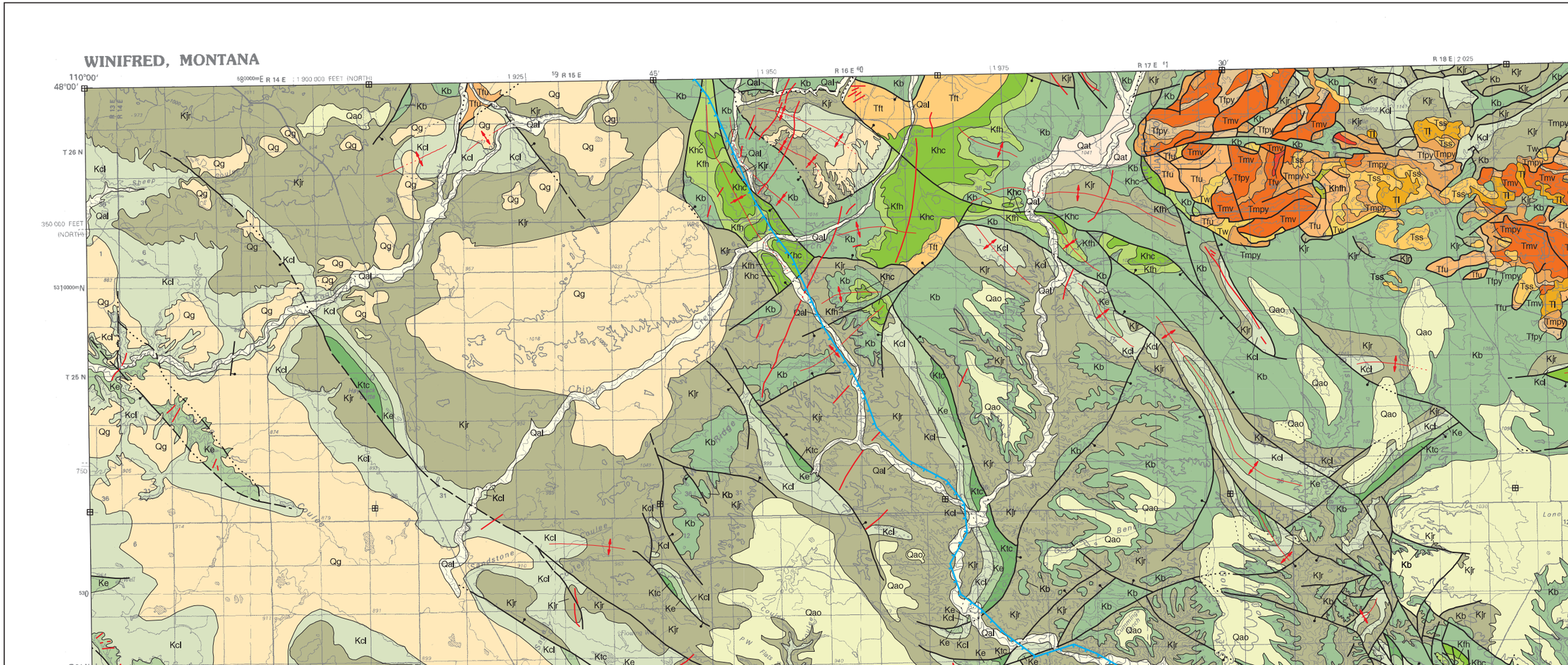
For the text files with the map information, click here.

Digital data link

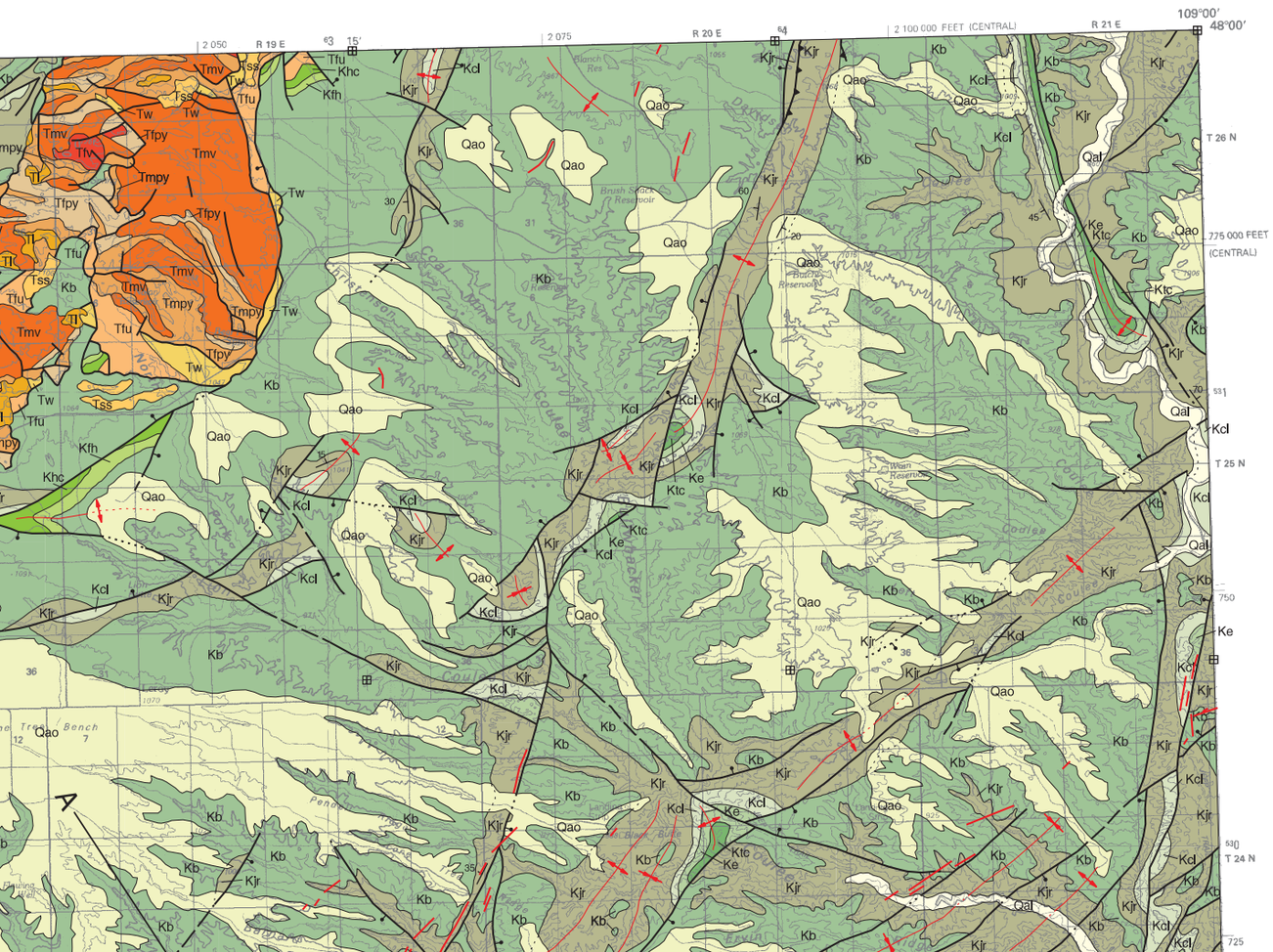
Note— This map was originally published at a scale of 1;100,000 but the page sizes have been modified to fit average printer capabilities (8½ x 14; legal size paper). There is a an eighth inch overlap on these pages. A full sized colored print of this map can be ordered from the MBMG Publication Sales Office, 1300 West Park Street, Butte, MT, 59701-8997.

Phone: 406-496-4167 Email: pubsales@mbmg.mtech.edu

Open File MBMG 437, Plate 1 of 1
Geologic Map, Winifred 30'x60' Quadrangle

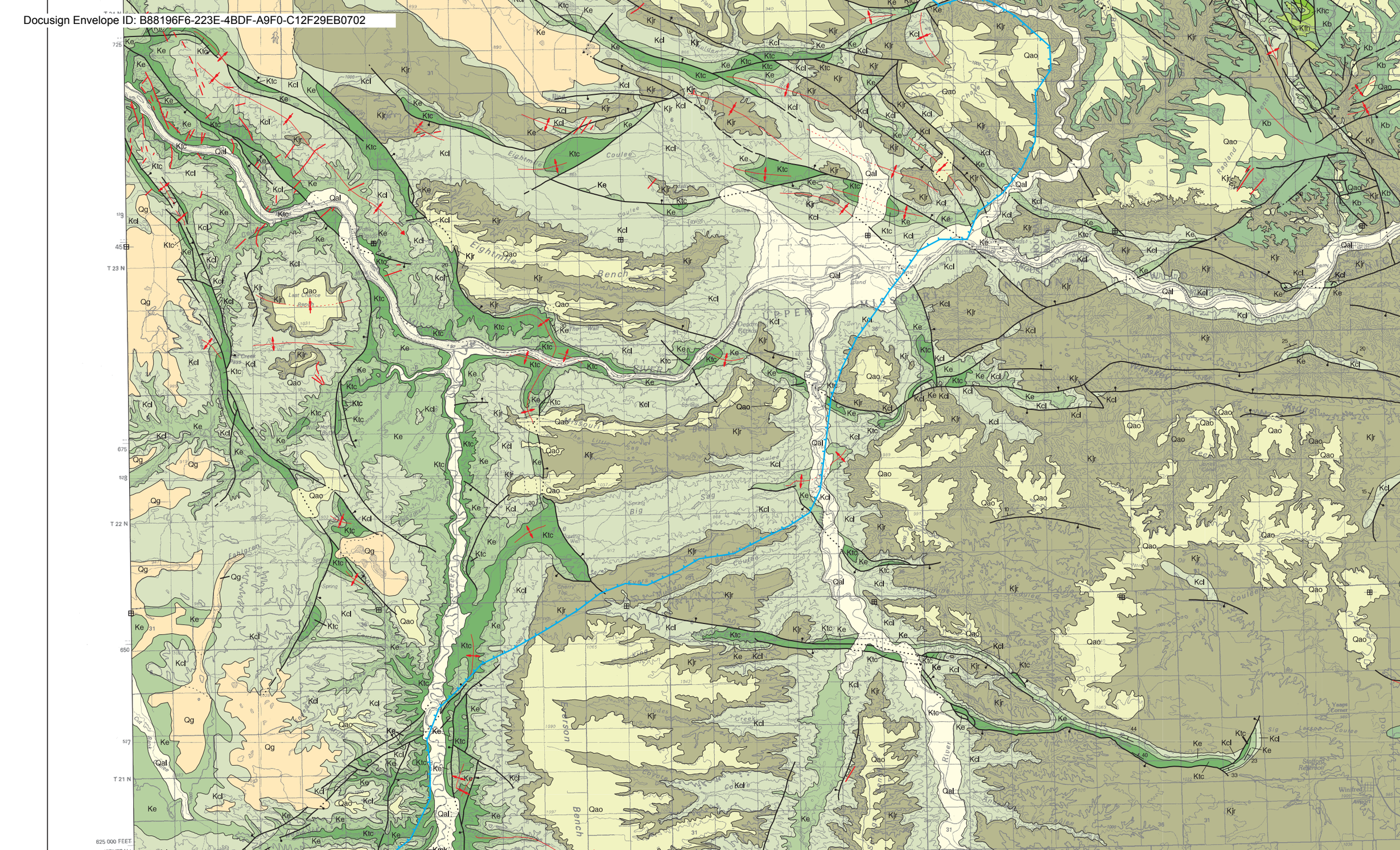


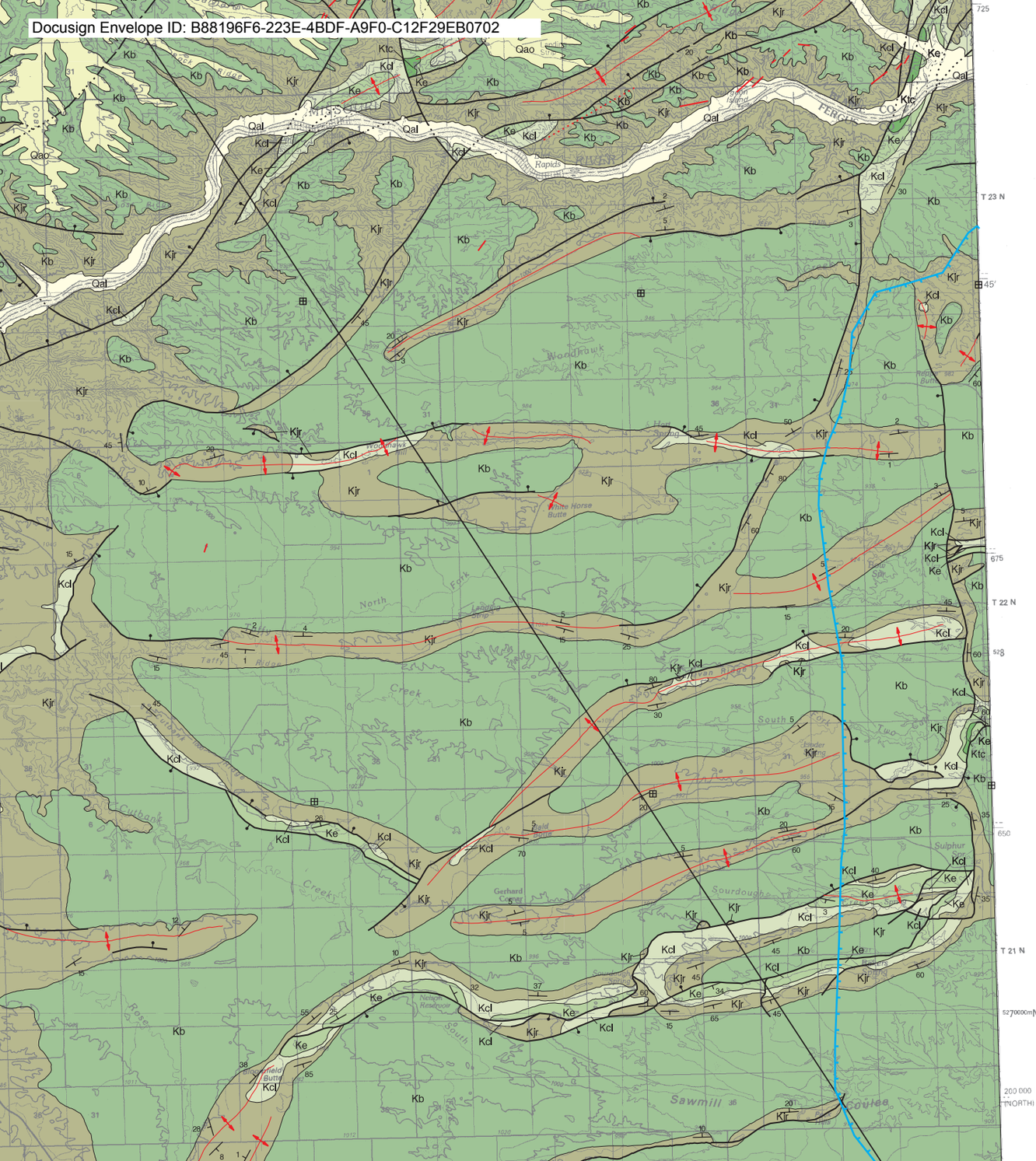
MONTANA BUREAU OF MINES AND GEOLOGY
A Department of Montana Tech of The University of Montana



MAP UNITS

Qal	Alluvium of modern channels and flood plains
Qat	Alluvium of alluvial terrace deposit
Qao	Alluvium, older, undivided
Qg	Glacial deposits, undivided
Qls	Landslide deposit
Tfv	Felsic volcanic rocks
Tfpy	Felsic pyroclastic rocks
Tmv	Mafic volcanic rocks
Tmpy	Mafic pyroclastic rocks
Tl	Latite and porphyritic latite
Tss	Shonkinite and syenite
Tw	Wasatch Formation
Tfu	Fort Union Formation, undivided

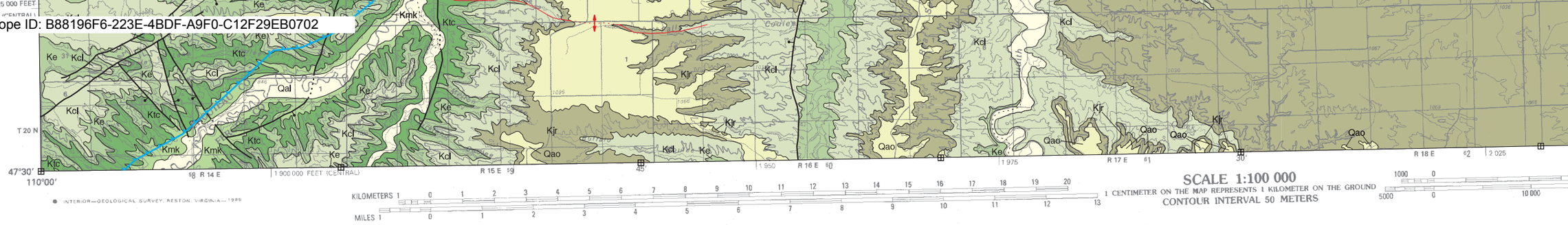


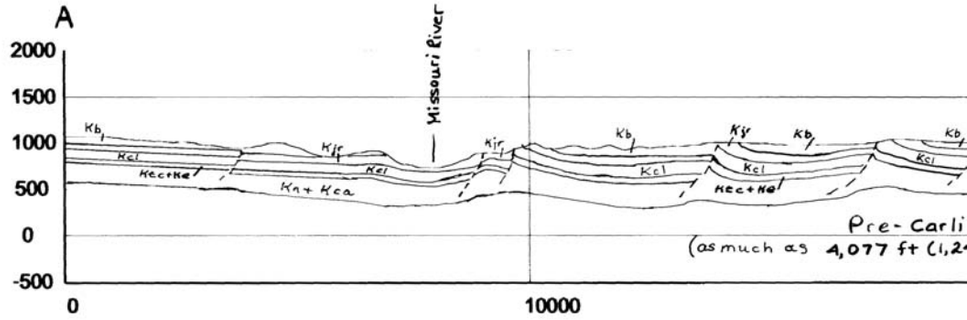


Tft	Tullock Member of Fort Union Formation
Khc	Hell Creek Formation
Kfh	Fox Hills Formation
Khfh	Hell Creek Formation and Fox Hills Formation, undivided
Kb	Bearpaw Shale
Kjr	Judith River Formation
Kcl	Claggett Shale
Ke	Eagle Formation
Ktc	Telegraph Creek Formation
Kmk	Kevin Member of Marias River Formation

Extent of glaciation

N





Elevation in meters
Datum: mean sea level

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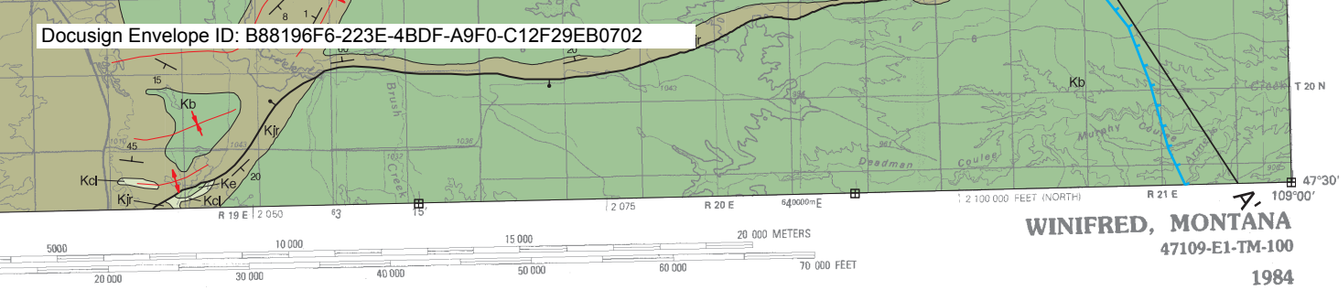
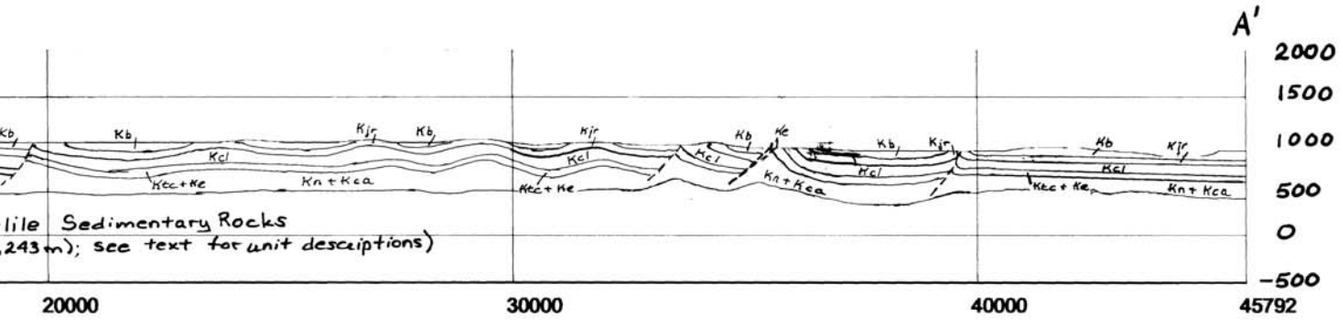
Partial support has been provided by th
Geologic Mapping Program of the U.S
0096

GIS production: Ken Sandau and Paul



WINIFRED, MONTANA
47109-E1-TM-100
1984

Cross Section A-A'
Vertical exaggeration x2.0



Distance in meters

Unit thickness, meters (ft/3.28)

Kb	1,300'; only lower part exposed	
Kjr	380'	116 m
Kcl	500'	152 m
Ke + Ktc	450'	137 m
Kn + Kca	630'	192 m

See text for unit names and descriptions
Surficial deposits not shown

y the STATEMAP component of the National Cooperative
U.S.Geological Survey under Contract Number 01-HQ-AG-

aul Thale, MBMG. Map layout: Susan Smith, MBMG.

Maps may be obtained from
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