

# NATURAL RESOURCES AND CONSERVATION



GREG GIANFORTE, GOVERNOR

1539 ELEVENTH AVENUE

## STATE OF MONTANA

DIRECTOR'S OFFICE: (406) 444-2074  
FAX: (406) 444-2684PO BOX 201601  
HELENA, MONTANA 59620-1601

### FINAL ENVIRONMENTAL ASSESSMENT

|                                      |  |
|--------------------------------------|--|
| <b>Project Name:</b>                 | Stillwater Conservation District, Clarks Fork Yellowstone River – Orchard Canal Headgate Replacement Project |
| <b>Proposed Implementation Date:</b> | June 2023  |
| <b>Proponent:</b>                    | Stillwater Conservation District   |
| <b>Location:</b>                     | 45.28000, -108.90188   |
| <b>County:</b>                       | Carbon   |

#### I. TYPE AND PURPOSE OF ACTION

The Orchard Canal serves approximately 5,485 to 7,130.71 acres, depending on resource information, of irrigated agricultural land in Carbon County, Montana. The section of the canal associated with this project is located approximately 1-mile south of Bridger, Montana and east of Hwy 310. In June 2022, flooding destroyed the Orchard Canal headgate, concrete abutments, and control structure. An unquantified volume of riverbank and canal bank were washed away resulting in a widened canal with unstable banks and rock, sand, and gravel deposition in the canal bottom. A private bridge located approximately 1,500-feet from the headgate used to access fields on the east side of the canal was also displaced by the flood. As of September 2022, the full extent of damages had not yet been surveyed and documented.

Excess flows are being routed through the first 3,600-feet of canal then returned to the river through a waste channel. This section of the canal has been significantly eroded and widened which has altered the canal profile and resulted in unstable banks that continue to erode and contribute excess sedimentation to the Clarks Fork Yellowstone River. The Clarks Fork Yellowstone River is listed on the 303(d) list for impaired waterbodies with one of several impairments being sedimentation. A figure showing the project location is attached.

The purpose of this project is to repair flood damage to the Orchard Canal irrigation infrastructure and to regain control of flow into the canal so that irrigation water can once again be provided efficiently to users of the canal.

Project objectives include completing the following:

- Preliminary engineering design which will include surveying the ditch, evaluating LiDAR data to determine the extent of damages, and completing a geomorphological assessment.
- Alternatives analysis for evaluation by Orchard Canal shareholders.
- Final engineering design and permitting.
- Construction contract procurement.
- Project implementation which is expected to include replacing the headgate and control structure; removing rock, sand, and gravel deposition from the canal; regrading and

stabilizing the impacted areas of riverbank and canal bank; repairing and replacing the access roadway; and finish grading and seeding.

Preliminary engineering design and completion of subsequent objectives are expected to be begin upon Department of Natural Resource and Conservation (DNRC) approval of American Rescue Plan (ARPA) grant funding for the project. Preliminary engineering design was projected to begin in October 2022 with completion of construction and project closeout projected for August 2023.

## 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.*

DNRC, the National Resources Conservation Service (NRCS), and the Natural Resource Damage Program have been contacted regarding financial assistance for the project. In addition to the DNRC ARPA grant, a NRCS Emergency Watershed Protection (EWP) application was submitted in July 2022. As of submittal of the DNRC ARPA grant application in September 2, 2022, letters of commitment had not yet been received from non-DNRC potential funding agencies.

A conceptual design is provided in the DNRC ARPA grant application; however, no preliminary engineering design has been completed.

No public involvement activities or project notices placed in any newspapers are known to have been completed.

### 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.*

In addition to the \$250,000 of DNRC ARPA grant money being requested, the Stillwater Conservation District applied for a \$170,625 NRCS EWP grant. As of submittal of the DNRC ARPA grant application in September 2, 2022, a letter of commitment had not yet been received from NRCS. The Stillwater Conservation District has committed \$129,365 for the project.

The applicant identified the following permits as being needed to complete the project:

- U.S. Army Corp of Engineers permits.
- 318 authorization and 401 certification from the Department of Environmental Quality (DEQ).
- Floodplain permit.

### 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.*

A “No Action” alternative and “stabilize bank erosion and protect property” alternatives were evaluated as part of a NRCS environmental evaluation worksheet. Currently, no other alternatives have been developed or analyzed. Additional analysis of alternatives is planned to occur during the preliminary engineering design which will also include evaluation of LiDAR data and a geomorphological assessment.

The project conceptual design includes the following:

- Replacing the headgate and control structure.
- Removing rock, sand, and gravel deposition from the canal.
- Regrading and stabilizing the impacted areas of riverbank and canal bank.
- Repairing and replacing the access roadway.
- Finish grading and seeding.

### 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.*

##### Soils

As of submittal of the DNRC ARPA grant application on September 2, 2022, the full extent of damages had not yet been surveyed. Based on information provided in the DNRC ARPA grant application, the total area along the Orchard Canal from the headgate to the waste channel (3,600-foot downstream) where water is returned to the river is approximately 15.4-acres.

The Natural Resource Conservation Service (NRCS) Web Soil Survey mapping application shows that soils within this 15.4-acre area consist of the following:

- Glenberg loam, gravel substratum (Gb)
  - 0.8 acres, 5.1% of total area
  - Slope: 0-2%
  - Typical soil profile: 0-6 inches, loam  
6-24 inches, stratified very fine sandy loam to silt loam  
24-60 inches, very gravelly sand
  - Farmland of statewide importance
- Haverson silty clay loam (Hm)
  - 1.2 acres, 7.6% of total area
  - Slope: 0-2%

- Typical soil profile: 0-10 inches, silty clay loam  
10-60 inches, stratified fine sandy loam to clay loam
- Prime farmland if irrigated
- Heldt silty clay loam (Hs)
  - 0.1 acres, 0.6% of total area
  - Slope: 0-2%
  - Typical soil profile: 0-7 inches, silty clay loam  
7-18 inches, silty clay loam  
18-60 inches, silty clay loam
  - Farmland of statewide importance
- Heldt silty clay loam, saline, 0 to 6% slopes (Hw)
  - 5.5 acres, 36.0% of total area
  - Slope: 0-6%
  - Typical soil profile: 0-7 inches, silty clay loam  
7-30 inches, stratified clay loam to silty clay  
30-60 inches, stratified loam to silty clay loam
  - Not prime farmland
- Kyle clay, 0 to 2% slopes (Kc)
  - 5.7 acres, 36.8% of total area
  - Slope: 0-2%
  - Typical soil profile: 0-2 inches, clay  
2-24 inches, clay  
24-44 inches, clay  
44-60 inches, clay
  - Farmland of statewide importance
- Riverwash (Rh)
  - 0.0 acres, 0.0% of total area
  - Not prime farmland
- Water (W)
  - 2.1 acres, 14.0% of total area

*Fragile, Compactable, or Unstable Soils*

Post flooding, the canal roughly doubled its width resulting in unstable banks susceptible to continued erosion.

*Special Reclamation Considerations*

A preliminary engineering design has not yet been completed; therefore, no special reclamation considerations have been identified.

*Unusual Geologic Features*

No unusual geologic features have been identified.

*Proposed Alternative* – Temporary, short-term, direct adverse impacts to soil stability. The soils along the riverbank and canal bank where work will occur will be disturbed due to the nature of construction techniques required to regrade and stabilize the banks.

No long-term direct, indirect, or cumulative adverse impacts are expected. Stabilizing impacted riverbanks and canal banks will prevent further erosion and loss of soil to sedimentation. Application of seed is also planned as part of finish grading activities. Reestablishment of vegetation will further stabilize soils and prevent erosion.

*No Action Alternative* – Continued direct, indirect, and cumulative adverse impact to soil quality and stability. Impacted riverbanks and canal banks will continue to be unstable and susceptible to erosion. This has the potential to adversely impact the stability of the surrounding soils and may eventually impact banks and inland soils both upstream and downstream of the current impacted areas.

---

## **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 Orchard Canal headgate is located along the Clarks Fork Yellowstone River which is 303(d) listed for impairments that include mercury, copper, temperature, nitrate/nitrite, sediment, iron, ammonia, total phosphorus, lead, and total nitrogen (Discover DEQ Throughout Montana web mapping application).

The Montana Bureau of Mine and Geology Ground Water Information Center (GWIC) web mapping shows that most of the wells within the project area are used for domestic and stock water purposes.

*Proposed Alternative* – Potential direct, temporary, adverse impacts to water quality during construction of the project. Since work will be occurring along river and canal banks, there is the potential for temporary violations of surface water quality standards for turbidity. These adverse impacts are temporary, short-term and will not have long-term direct, indirect, or cumulative adverse impacts to water quality. DEQ 318 Authorization permit that allows for a short-term water quality turbidity standard for construction activities is planned to be obtained. The 318 permit outlines activities that must be carried out to protect water quality and minimize sedimentation. Construction work is also planned to occur during periods of low flow to minimize impacts.

*No Action Alternative* – Continued direct adverse impacts to water quality from continued erosion of unstable river and canal bank materials into the Clarks Fork Yellowstone River which is already 303(d) listed as impaired for sedimentation.

---

## **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 is not located within any air quality non-attainment/maintenance areas (Discover DEQ Throughout Montana web mapping application and EPA NEPAAssist web mapping application).

*Proposed Alternative* – Potential temporary and short-term direct adverse impacts to air quality (i.e., dust) may occur during construction due to ground disturbance caused by construction activities. The section of the Orchard Canal associated with the project is located within an agricultural area, and any air quality impacts are expected to only affect the immediate area surrounding construction areas. It is not expected that any of the rural, private residences in the area will be adversely impacted by dust. Common construction dust suppression techniques (i.e., water application) are expected. Long-term adverse impacts are not expected. The project is short-term and projected to take three months to construct.

*No Action Alternative* – No direct, indirect, or cumulative adverse impacts to air quality are expected.

---

## **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.*

The Montana Natural Heritage Program identifies land cover (>1%) within a 1-mile buffer of the project area as the following (total of 5,759.7 acres):

- Cultivated Crops, 45% (2,567 acres)
- Big Sagebrush Steppe, 24% (1,355 acres)
- Great Plains Floodplain, 7% (381 acres)
- Other Roads, 5% (267 acres)
- Great Plains Mixedgrass Prairie, 5% (263 acres)
- Low Intensity Residential, 2% (141 acres)
- Introduced Riparian and Wetland Vegetation, 2% (130 acres)
- Commercial/Industrial, 2% (114 acres)
- Open Water, 2% (102 acres)
- Rocky Mountain Foothill Limber Pine – Juniper Woodland, 2% (90 acres)

Commercial crops produced on land irrigated by the Orchard Canal include corn, malt barley, sugar beets, northern beans, soybeans, alfalfa, and grass hay.

The Montana Natural Heritage Program provides the following information related to vascular plant species within a 1-mile radius of the project area. Any US Fish and Wildlife Service (USFWS) threatened or endangered, United States Forest Service (USFS) sensitive, or Bureau of Land Management (BLM) threatened or sensitive species classifications are also identified below.

### **Confirmed As Occurring Or Observed Within A 1-Mile Radius Of The Project Area**

#### *Montana Special Status Species (SSS)*

- None identified

#### *Montana Species of Concern (SOC)*

- Dwarf mentzelia (*Mentzelia pumila*)

#### *Montana Potential Species of Concern (PSOC)*

- None identified

## Other Observed Species

### *Montana SSS*

- None identified

### *Montana SOC*

- None identified

### *Montana PSOC*

- None identified

## Potentially Present Species

### *Montana SSS*

- None identified

### *Montana SOC*

- Gray's Milkvetch (*Astragalus grayi*)
- Beaked Spikerush (*Eleocharis rostellata*) – USFS Sensitive
- Panic Grass (*Dichanthelium acuminatum*)
- Beartooth Large-flowered Goldenweed (*Pyrrocoma carthamoides* var. *subsquarrosa*) – USFS Sensitive, BLM Sensitive
- Yellow Beeplant (*Cleome lutea*)
- Parry's Fleabane (*Erigeron parryi*)
- Spiny Hopsage (*Grayia spinosa*)
- Wyoming Thistle (*Cirsium pulcherrimum*)
- Big Horn Fleabane (*Erigeron allocotus*) – BLM Sensitive
- Matted Prickly-phlox (*Leptodactylon caespitosum*)
- Double Bladderpod (*Physaria brassicoides*)
- Fleshy Stitchwort (*Stellaria crassifolia*)
- Crawe's Sedge (*Carex crawei*)
- Spotted Joepye-weed (*Eupatorium maculatum*)
- Geyer's Milkvetch (*Astragalus geyeri*)

### *Montana PSOC*

- Streptanthella (*Streptanthella longirostris*)
- Tweedy's Gilia (*Gilia tweedyi*)
- Larch-leaf Beardtongue (*Penstemon laricifolius*)

*Proposed Alternative* – No direct, indirect, or cumulative adverse impacts to vegetation cover, quantity, and quality are expected. Vegetation cover, quantity, and quality were all adversely impacted by flooding that damaged river and canal banks. The project will have direct, indirect, and cumulative beneficial impacts to vegetation cover, quantity, and quality. Stabilizing river and canal banks will prevent further soil erosion which will allow for a more stable surface to reestablish

vegetation. Seed is also planned to be placed as part of finish grading activities. With time, vegetation cover, quantity, and quality along impacted banks is expected to improve which will benefit the stability of surrounding non-impacted vegetation and area wildlife.

*No Action Alternative* – Potential continued direct, indirect, and cumulative adverse impact to vegetation cover, quantity, and quality. Vegetation currently present along impacted river and canal banks may be threatened due to continued erosion of unstable banks. These soils may continue to erode into the river and canal along with the existing vegetation. Vegetation not currently impacted and vegetation both upstream and downstream of the river and canal may eventually be impacted as erosion continues to cut into the banks and wash away the soil (i.e., growth media) necessary for vegetative growth.

---

## **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.*

Per Montana Fish, Wildlife and Parks and the USFWS, the project is not located within a wildlife habitat protection area or critical habitat for threatened and endangered species (FWP Wildlife Habitat Protection Area and USFWS Critical Habitat for Threatened and Endangered Species web mapping applications).

According to the Montana Sage Grouse Habitat Conservation Map mapping application, the project is located within sage grouse executive order (EO) habitat classification core area (EO-Core Area), BLM priority habitat management area, and Wyoming Basins Management Zone.

Per the Montana Natural Heritage Program, bat roost (non-cave) important animal habitat (IAH) is confirmed as occurring or observed within a 1-mile radius of the project area.

The Montana Natural Heritage Program provides the following information related to terrestrial, avian, and aquatic life species within a 1-mile radius of the project area. Any USFWS threatened or endangered, USFS sensitive, or BLM threatened or sensitive species classifications are also identified below.

### **Confirmed As Occurring Or Observed Within A 1-Mile Radius Of The Project Area**

#### *Montana Special Status Species (SSS)*

- Bald Eagle (*Haliaeetus leucocephalus*) – USFS Sensitive, BLM Sensitive

#### *Montana Species of Concern (SOC)*

- Golden Eagle (*Aquila chrysaetos*) – BLM Sensitive
- Great Blue Heron (*Ardea herodias*)
- Sage Thrasher (*Oreoscoptes montanus*) – BLM Sensitive
- Bobolink (*Dolichonyx oryzivorus*)
- Brewer's Sparrow (*Spizella breweri*) – BLM Sensitive
- Greater Sage-Grouse (*Centrocercus urophasianus*) – USFS Sensitive, BLM Sensitive
- Loggerhead Shrike (*Lanius ludovicianus*) – BLM Sensitive
- Yellowstone Cutthroat Trout (*Oncorhynchus clarkii bouvieri*) – USFS Sensitive, BLM Sensitive

- Monarch (*Danaus plexippus*)
- Grizzly Bear (*Ursus arctos*) – USFWS Threatened, BLM Threatened
- Western Milksnake (*Lampropeltis gentilis*) – USFS Sensitive, BLM Sensitive
- Greater Short-horned Lizard (*Phrynosoma hernandesi*) – USFS Sensitive, BLM Sensitive
- Spiny Softshell (*Apalone spinifera*) – BLM Sensitive

*Montana Potential Species of Concern (PSOC)*

- None identified

**Other Observed Species**

*Montana SSS*

- None identified

*Montana SOC*

- Northern Leopard Frog (*Lithobates pipiens*) – USFS Sensitive, BLM Sensitive
- American White Pelican (*Pelecanus erythrorhynchos*)
- Pinyon Jay (*Gymnorhinus cyanocephalus*)
- Long-billed Curlew (*Numenius americanus*) – BLM Sensitive
- Franklin's Gull (*Leucophaeus pipixcan*) – BLM Sensitive
- Clark's Grebe (*Aechmophorus clarkia*)
- White-tailed Prairie Dog (*Cynomys leucurus*) – USFS Sensitive, BLM Sensitive

*Montana PSOC*

- Dickcissel (*Spiza americana*)

**Potentially Present Species**

*Montana SSS*

- None identified

*Montana SOC*

- Great Plains Toad (*Anaxyrus cognatus*) – USFS Sensitive, BLM Sensitive
- Yellow-billed Cuckoo (*Coccyzus americanus*) – USFWS Threatened, BLM Threatened
- Blue-gray Gnatcatcher (*Polioptila caerulea*) – USFS Sensitive, BLM Sensitive
- White-faced Ibis (*Plegadis chihi*) – BLM Sensitive
- Black-billed Cuckoo (*Coccyzus erythrophthalmus*) – BLM Sensitive
- Green-tailed Towhee (*Pipilo chlorurus*)
- Sharp-tailed Grouse (*Tympanuchus phasianellus*)
- Veery (*Catharus fuscescens*) – BLM Sensitive
- Black-necked Stilt (*Himantopus mexicanus*)
- American Bittern (*Botaurus lentiginosus*) – BLM Sensitive
- Lewis's Woodpecker (*Melanerpes lewis*) – BLM Sensitive
- Black-crowned Night-Heron (*Nycticorax nycticorax*)
- Cassin's Finch (*Haemorhous cassinii*)

- Harlequin Duck (*Histrionicus histrionicus*) – USFS Sensitive
- Sprague's Pipit (*Anthus spragueii*) – BLM Sensitive
- Suckley Cuckoo Bumble Bee (*Bombus suckleyi*)
- Pallid Bat (*Antrozous pallidus*) – USFS Sensitive, BLM Sensitive
- Little Brown Myotis (*Myotis lucifugus*)
- Townsend's Big-eared Bat (*Corynorhinus townsendii*) – USFS Sensitive, BLM Sensitive
- Merriam's Shrew (*Sorex merriami*)
- Eastern Red Bat (*Lasiurus borealis*) – BLM Sensitive
- Dwarf Shrew (*Sorex nanus*)
- Long-legged Myotis (*Myotis Volans*)
- Spotted Bat (*Euderma maculatum*) – USFS Sensitive, BLM Sensitive
- Fringed Myotis (*Myotis thysanodes*) – BLM Sensitive
- Long-eared Myotis (*Myotis evotis*)
- Hoary Bat (*Lasiurus cinereus*) – BLM Sensitive
- Black-tailed Prairie Dog (*Cynomys ludovicianus*) – USFS Sensitive, BLM Sensitive
- Snapping Turtle (*Chelydra serpentina*) – BLM Sensitive
- Plains Hog-nosed Snake (*Heterodon nasicus*) – USFS Sensitive, BLM Sensitive

#### *Montana PSOC*

- Hooded Merganser (*Lophodytes cucullatus*)
- Eastern Screech-Owl (*Megascops asio*)
- Broad-tailed Hummingbird (*Selasphorus platycercus*)
- Plumbeous Vireo (*Vireo plumbeus*)
- Barrow's Goldeneye (*Bucephala islandica*)
- Chimney Swift (*Chaetura pelagica*)
- Common Poorwill (*Phalaenoptilus nuttallii*)
- Short-eared Owl (*Asio flammeus*)
- Eastern Bluebird (*Sialia sialis*)
- Rufous Hummingbird (*Selasphorus rufus*)
- Ovenbird (*Seiurus aurocapilla*)
- Burbot (*Lota lota*)
- Western Spotted Skunk (*Spilogale gracilis*)
- North American Porcupine (*Erethizon dorsatum*)
- Silver-haired Bat (*Lasionycteris noctivagans*)
- Hayden's Shrew (*Sorex haydeni*)

*Proposed Alternative* – Potential temporary, short-term, direct adverse impacts to terrestrial, avian, and aquatic life and habitats along the river and canal banks due to the nature of construction activities. People and heavy equipment will be present during the project which may disturb and disrupt normal fish and wildlife activities within the immediate vicinity of work areas. Adverse impacts are expected to be short-term with the project expected to take several months and occur during low water conditions to reduce impacts.

The project is also located within sage grouse EO habitat classification core area and a BLM priority habitat management area. Therefore, there is also a potential direct adverse impact to sage grouse habitat. Per the Montana Sage Grouse Habitat Conservation Map web map application “Anyone proposing new development activities in sage grouse habitat must submit a development project application for consultation”. The application is available at <https://sagegrouse.mt.gov/ProgramMap>.

Long-term direct, indirect, and cumulative beneficial impacts outweigh the short-term direct adverse impacts. The 2022 flood event impacted the habitat by intensifying the erosion along the river and canal banks, washing away soils and vegetation, and disturbing wildlife, bird, and fish habitats present within the project and surrounding areas. The project proposes to stabilize banks, repair the canal profile, and replace the headgate and control structure. This will allow for the river and canal flows in and around the headgate and within the canal to stabilize which can contribute to consistent and desirable environmental conditions and wildlife, bird, and fish habitat enhancement around the headgate and river/canal banks.

*No Action Alternative* – Potential direct, indirect, and cumulative adverse impacts to terrestrial, avian, and aquatic life and habitat. Unstable river and canal banks will continue to erode into the river and contribute to sedimentation in the river. This has the potential to impact wildlife, bird, and fish habitat present along the river and canal banks and inland areas.

---

#### **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.*

The Montana Natural Heritage Program identifies the following federally listed threatened and endangered species, sensitive species, species of special concern (SOC), or special status species (SSS) as either confirmed or observed as occurring, other observed species, or potentially present within a 1-mile radius of the project area.

#### **Federally Listed Threatened or Endangered Species**

##### *Mammals*

- Grizzly Bear (*Ursus arctos*) – USFWS Threatened, BLM Threatened, Montana SOC

##### *Birds*

- Yellow-billed Cuckoo (*Coccyzus americanus*) - USFWS Threatened, BLM Threatened, Montana SOC

#### **Sensitive Species, Species of Special Concern (SOC), or Special Status Species (SSS)**

##### *Vascular Plants*

- Dwarf mentzelia (*Mentzelia pumila*) – Montana SOC
- Gray's Milkvetch (*Astragalus grayi*) – Montana SOC
- Beaked Spikerush (*Eleocharis rostellata*) – Montana SOC, USFS Sensitive
- Panic Grass (*Dichanthelium acuminatum*) – Montana SOC
- Beartooth Large-flowered Goldenweed (*Pyrrcoma carthamoides var. subsquarrosa*) –

Montana SOC, USFS Sensitive, BLM Sensitive

- Yellow Beeplant (*Cleome lutea*) – Montana SOC
- Parry's Fleabane (*Erigeron parryi*) – Montana SOC
- Spiny Hopsage (*Grayia spinosa*) – Montana SOC
- Wyoming Thistle (*Cirsium pulcherrimum*) – Montana SOC
- Big Horn Fleabane (*Erigeron allocotus*) – Montana SOC, BLM Sensitive
- Matted Prickly-phlox (*Leptodactylon caespitosum*) – Montana SOC
- Double Bladderpod (*Physaria brassicoides*) – Montana SOC
- Fleshy Stitchwort (*Stellaria crassifolia*) – Montana SOC
- Crawe's Sedge (*Carex crawei*) – Montana SOC
- Spotted Joepyee-weed (*Eupatorium maculatum*) – Montana SOC
- Geyer's Milkvetch (*Astragalus geyeri*) – Montana SOC

#### Mammals

- White-tailed Prairie Dog (*Cynomys leucurus*) – Montana SOC, USFS Sensitive, BLM Sensitive
- Pallid Bat (*Antrozous pallidus*) – Montana SOC, USFS Sensitive, BLM Sensitive
- Little Brown Myotis (*Myotis lucifugus*) - Montana SOC
- Townsend's Big-eared Bat (*Corynorhinus townsendii*) – Montana SOC, USFS Sensitive, BLM Sensitive
- Merriam's Shrew (*Sorex merriami*) - Montana SOC
- Eastern Red Bat (*Lasiurus borealis*) – Montana SOC, BLM Sensitive
- Dwarf Shrew (*Sorex nanus*) - Montana SOC
- Long-legged Myotis (*Myotis Volans*) - Montana SOC
- Spotted Bat (*Euderma maculatum*) – Montana SOC, USFS Sensitive, BLM Sensitive
- Fringed Myotis (*Myotis thysanodes*) – Montana SOC, BLM Sensitive
- Long-eared Myotis (*Myotis evotis*) - Montana SOC
- Hoary Bat (*Lasiurus cinereus*) – Montana SOC, BLM Sensitive
- Black-tailed Prairie Dog (*Cynomys ludovicianus*) – Montana SOC, USFS Sensitive, BLM Sensitive

#### Fish

- Yellowstone Cutthroat Trout (*Oncorhynchus clarkii bouvieri*) – Montana SOC, USFS Sensitive, BLM Sensitive

#### Invertebrates

- Monarch (*Danaus plexippus*) – Montana SOC
- Suckley Cuckoo Bumble Bee (*Bombus suckleyi*) - Montana SOC

#### Reptiles

- Western Milksnake (*Lampropeltis gentilis*) – Montana SOC, USFS Sensitive, BLM Sensitive
- Greater Short-horned Lizard (*Phrynosoma hernandesi*) – Montana SOC, USFS Sensitive, BLM Sensitive

- Spiny Softshell (*Apalone spinifera*) – Montana SOC, BLM Sensitive
- Snapping Turtle (*Chelydra serpentina*) – Montana SOC, BLM Sensitive
- Plains Hog-nosed Snake (*Heterodon nasicus*) – Montana SOC, USFS Sensitive, BLM Sensitive

#### *Amphibians*

- Northern Leopard Frog (*Lithobates pipiens*) – Montana SOC, USFS Sensitive, BLM Sensitive
- Great Plains Toad (*Anaxyrus cognatus*) – Montana SOC, USFS Sensitive, BLM Sensitive

#### *Birds*

- Bald Eagle (*Haliaeetus leucocephalus*) – Montana SSS, USFS Sensitive, BLM Sensitive
- Golden Eagle (*Aquila chrysaetos*) – Montana SOC, BLM Sensitive
- Great Blue Heron (*Ardea Herodias*) – Montana SOC
- Sage Thrasher (*Oreoscoptes montanus*) – Montana SOC, BLM Sensitive
- Bobolink (*Dolichonyx oryzivorus*) – Montana SOC
- Brewer's Sparrow (*Spizella breweri*) – Montana SOC, BLM Sensitive
- Greater Sage-Grouse (*Centrocercus urophasianus*) – Montana SOC, USFS Sensitive, BLM Sensitive
- Loggerhead Shrike (*Lanius ludovicianus*) – Montana SOC, BLM Sensitive
- American White Pelican (*Pelecanus erythrorhynchos*) - Montana SOC
- Pinyon Jay (*Gymnorhinus cyanocephalus*) - Montana SOC
- Long-billed Curlew (*Numenius americanus*) – Montana SOC, BLM Sensitive
- Franklin's Gull (*Leucophaeus pipixcan*) – Montana SOC, BLM Sensitive
- Clark's Grebe (*Aechmophorus clarkia*) - Montana SOC
- Blue-gray Gnatcatcher (*Polioptila caerulea*) – Montana SOC, USFS Sensitive, BLM Sensitive
- White-faced Ibis (*Plegadis chihi*) – Montana SOC, BLM Sensitive
- Black-billed Cuckoo (*Coccyzus erythrophthalmus*) – Montana SOC, BLM Sensitive
- Green-tailed Towhee (*Pipilo chlorurus*) - Montana SOC
- Sharp-tailed Grouse (*Tympanuchus phasianellus*) - Montana SOC
- Veery (*Catharus fuscescens*) – Montana SOC, BLM Sensitive
- Black-necked Stilt (*Himantopus mexicanus*) - Montana SOC
- American Bittern (*Botaurus lentiginosus*) – Montana SOC, BLM Sensitive
- Lewis's Woodpecker (*Melanerpes lewis*) – Montana SOC, BLM Sensitive
- Black-crowned Night-Heron (*Nycticorax nycticorax*) - Montana SOC
- Cassin's Finch (*Haemorhous cassinii*) - Montana SOC
- Harlequin Duck (*Histrionicus histrionicus*) – Montana SOC, USFS Sensitive
- Sprague's Pipit (*Anthus spragueii*) – Montana SOC, BLM Sensitive

### **Critical Habitat**

According to the Montana Sage Grouse Habitat Conservation Map mapping application, the project is located within sage grouse EO habitat classification core area (EO-Core Area), BLM priority habitat management area, and Wyoming Basins Management Zone.

Per the Montana Natural Heritage Program, bat roost (non-cave) IAH is confirmed as occurring or observed within a 1-mile radius of the project area.

### **Wetlands and Riparian Zones**

The National Wetlands Inventory web mapping application identifies freshwater emergent wetland and forested/shrub riparian habitat present within the project area.

*Proposed Alternative:*

### **USFWS Federally Listed Threatened or Endangered Species and Critical Habitat**

No direct, indirect, or cumulative adverse impacts to the federally listed threatened and endangered species Grizzly Bear and Yellow-billed Cuckoo are expected. The project is located within an area that is predominantly cultivated cropland which is not expected to be preferred habitat for these species. The project also involves repair and replacement of manmade structures which is also not expected to be preferred habitat for these species.

### **Sensitive Species, Species of Special Concern (SOC), or Special Status Species (SSS) & Critical Habitat**

The project is located within sage grouse EO habitat classification core area and a BLM priority habitat management area. Therefore, there is also a potential direct adverse impact to the Greater Sage-Grouse which is a Montana SOC, USFS Sensitive, and BLM Sensitive species. Per the Montana Sage Grouse Habitat Conservation Map web map application "Anyone proposing new development activities in sage grouse habitat must submit a development project application for consultation". The application is available at <https://sagegrouse.mt.gov/ProgramMap>.

No direct, indirect, or cumulative adverse impacts to other SOC or SSS are expected. When stabilizing impacted river and canal banks, there is similar type habitat readily available both upstream and downstream of project work areas.

### **Wetlands and Riparian Zones**

Potential direct adverse impacts to wetland and riparian zones during construction. Freshwater emergent wetland and forested/shrub riparian habitat may be directly and adversely impacted during stabilization of river and canal banks since these wetland and riparian habitats may be located adjacent to project work areas. Adverse impacts are expected to be limited to river and canal banks only and not adversely impact wetland and riparian areas that are located more inland. Long-term beneficial impacts outweigh the adverse impacts since river and canal banks that are currently susceptible to erosion will be stabilized which will further stabilize the wetland and riparian areas surrounding the impacted banks.

*No Action Alternative* – No direct, indirect, or cumulative adverse impacts to federally listed threatened or endangered species, critical habitat, SOC, or SSS. Potential direct adverse impacts to wetland and riparian zones located along and adjacent to impacted river and canal banks. Unstable soils will continue to erode into the river which may adversely impact the adjacent wetland and riparian areas.

---

**10. HISTORICAL AND ARCHAEOLOGICAL SITES:**

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

The EPA NEPAAssist web mapping application does not identify any National Register of Historic Places within the project area. Consultation with the State Historic Preservation Office (SHPO) is planned to be completed prior to construction unless the site is considered exigent (NRCS Environmental Evaluation Worksheet).

*Proposed Alternative* – No direct, indirect, or cumulative adverse impacts to historical and archaeological sites.

*No Action Alternative* – No direct, indirect, or cumulative adverse impacts to historical and archaeological sites.

---

**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 is located on private agricultural farmland approximately 1-mile southeast of Bridger, Montana. The project area is not readily accessible by the public and is not visible from populated or scenic areas. The Clarks Fork Yellowstone River is not considered a Wild and Scenic River per the National Wild and Scenic Rivers Act (EPA NEPAAssist web mapping application). The surrounding area includes agricultural farmland and rural, private residences. The nearest private residence is located approximately 900-feet southwest of the Orchard Canal head gate. No prominent topographic features have been identified.

*Proposed Alternative* – Potential temporary and short-term direct adverse impacts on aesthetics due to noise and dust associated with general construction activities. Private residents may hear noise throughout the duration of the project which is projected to last three months. The project site is not accessible to the public, so any dust generated by construction activities will be localized to project work areas and is not expected to adversely impact any of the surrounding residential properties. Common dust suppression techniques (i.e., application of water) associated with construction activities is expected. Given the nature of the work and safety hazards associated with working around water and working at night, it is expected that construction will take place during daylight hours, so no adverse impacts from light are expected.

No long-term direct, indirect, or cumulative adverse impacts to aesthetics are expected. Any adverse noise and dust impacts will be short-term and will only occur during construction of the project. Long-term beneficial impacts to aesthetics are expected since the damaged headgate and control structure will be replaced with a new headgate and control structure which is more visually pleasing. Rock, sand, and gravel deposition in the canal is planned to be cleaned out and eroded banks stabilized which will return the canal to a more “eye pleasing” functional irrigation canal.

*No Action Alternative* – Potential adverse impact to aesthetics. The destroyed headgate and control structure, eroded banks, and erosion cuts into existing roads may present a visual eyesore to local

residences living and working within the impacted area.

---

**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 project is expected to be short-term and performed by local contractors and project personnel living and working within Carbon County and the local area.

No limited resources that the project would require have been identified.

*Proposed Alternative* – No direct, indirect, or cumulative adverse impacts to demands on limited environmental resources of land, water, air, or energy beyond the expected fuel consumption associated with operation of heavy construction equipment are expected. Quotes for a replacement headgate and control structure have been obtained from suppliers, and these materials are not expected to be a limited resource. Equipment and materials necessary to clean out accumulated rock, sand, and gravel deposition from the canal and stabilize the banks are expected to be locally available and are also not expected to be limited resources. No other activities nearby that the project would have a short-term or long-term adverse impact on have been identified.

The project is expected to have direct, indirect, and cumulative long-term beneficial impacts to land and water. Installing a new headgate and control structure, cleaning out the canal, and stabilizing the banks will return the canal to a functional irrigation water supply canal. This will allow more efficient use of irrigation water which may result in better crop production. Reduced erosion and sedimentation to the Clarks Fork Yellowstone River is also expected which may contribute to improved water quality.

*No Action Alternative* – Continued direct adverse impact to water resources due to the widened canal and increased erosion and sedimentation to the Clarks Fork Yellowstone River.

---

**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.*

Per the Discover DEQ Throughout Montana web mapping application, the project is located within the Clarks Fork Yellowstone Pre-TMDL Assessment and Clarks Fork Yellowstone Watershed Restoration Plan development area. No other current studies, plans, or projects within the project area have been identified. No other current private, state, or federal actions within the project area have been identified.

According to the Montana Natural Heritage Program, there have been a few structured surveys within the project area that include:

- Nocturnal breeding amphibian calling survey (2005)
- Raptor nest survey (2022)
- Eastern Heath Snail survey (2012)
- Rake tows/pulls for Eurasian Water-milfoil (2022)
- Plankton tows for veligers of invasive mussels (2018)
- Kicknet collection survey for invasive mussels and snails (2022)
- Noxious weed road-based visual surveys (2003)
- Noxious weed visual surveys (2008)
- Visual encounter surveys for aquatic invasives on shorelines or underwater (2021)
- Invertebrate lotic site dipnet and visual encounter survey (2007)
- Bumble Bee collection surveys (2011)
- Visual encounter survey for Damselfly/Dragonfly/Butterfly (1995)
- Bat roost (active season) survey (2003)
- Prairie dog town ground survey (1995)
- Turtle trapping surveys (2019)

*Proposed Alternative* – No direct, indirect, or cumulative adverse impacts on other environmental documents pertinent to the area are expected. Stabilizing the canal banks and eliminating continued erosion and corresponding sediment load to the river may have a direct benefit to DEQ's pre-TMDL assessment and watershed restoration plan for the Clarks Fork Yellowstone assessment area and resulting environmental documents.

*No Action Alternative* – No direct, indirect, or cumulative adverse impacts to other environmental documents pertinent to the area are expected.

#### **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 Burlington Northern Santa Fe (BNSF) Derailment Bridger State Superfund (SSU) site is located approximately 0.8-miles northwest of the Orchard Canal headgate. Given the distance and nature of the derailment to the project work area and scope of work associated with this project, this SSU site is not expected to present any human health and safety risks. No other potential human health and safety risks within the larger area surrounding the project have been identified (Discover DEQ Throughout Montana web mapping application and EPA NEPAAssist web mapping application).

*Proposed Alternative* – Potential direct adverse impact to human health and safety due to safety risks associated with the operation of heavy construction equipment, working on a construction

site, and working near waterbodies are present during completion of the project. Potential adverse impacts to human health and safety are expected to impact project personal only and not impact any nearby residences. It is expected that any construction contractor would develop a health and safety plan that identifies human health and safety risks associated with the project and mitigation measures prior to starting construction.

*No Action Alternative* – Continued direct adverse impact to human health and safety for operation and maintenance personnel working and maintaining the Orchard Canal due to an inoperative headgate and control structure and widened canal.

---

## **15. INDUSTRIAL, COMMERCIAL AND AGRICULTURE ACTIVITIES AND PRODUCTION:**

*Identify how the project would add to or alter these activities.*

From the DNRC ARPA grant application:

“The total acreage served by the Orchard Canal (and Edgar extension) is listed at 5,485 acres in the 1966 Water Resources Survey of Carbon County, and 7,130.71 acres in the MT DNRC Water Rights Database (Accessed 7/27/2022).”

Based on the 2017 Census for Agricultural for Carbon County, there is 815,758-acres of land in farms of which 98,757 (12%) is irrigated. Agricultural crops produced on land serviced by the Orchard Canal include corn, malt barley, sugar beets, northern beans, soybeans, alfalfa, and grass hay. The dollar loss in crops due to flooding and damage to the Orchard Canal could not be estimated as of September 2, 2022, when the DNRC ARPA grant application was submitted since the full extent of damages had not yet been assessed. In 2017, the total market value of agricultural products sold in Carbon County was \$99,023,000 of which \$33,059,000 was crops (2017 Census for Agricultural for Carbon County). Crops produced on lands serviced the Orchard Canal contribute to the total market value of agricultural products produced in Carbon County.

*Proposed Alternative* – No direct, indirect, or cumulative adverse impacts to industrial, commercial, and agricultural activities and production. The project would result in direct, indirect, and cumulative beneficial impacts to users of the Orchard Canal, agricultural production, and agricultural related activities in Carbon County. Restoring controlled flow irrigation water to the Orchard Canal will allow irrigators to have predictable and reliable irrigation water for crop production, thus supporting related industrial and commercial agricultural related businesses and activities.

*No Action Alternative* – Direct, indirect, and cumulative adverse impacts to the Orchard Canal, irrigation users, and the industrial, commercial, and agricultural activities and productions in Carbon County due to the inability to supply consistent and reliable irrigation water to farmland that relies on the Orchard Canal irrigation water for production.

---

**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 population of Carbon County in 2020 was 10,473 (United States Census Bureau). Implementation of the project is expected to use standard construction equipment, materials, and supplies that are expected to be locally available. Construction of the project is expected to be performed by existing local contractors and project personnel living and working within Carbon County and the local area.

*Proposed Alternative* – No direct, indirect, and cumulative adverse impacts to quantity and distribution of employment. Potentially short-term direct and indirect beneficial impacts to the local employment market and suppliers by creating a job opportunity for local contractors and material suppliers. It is not expected that the project would create, move, or eliminate jobs.

*No Action Alternative* – No direct, indirect, and cumulative adverse impacts to quantity or distribution of employment.

---

**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 project is in Carbon County where over 62% of land is classified as farmland. In 2019, the market value of all property in Carbon County was approximately \$2 billion. The taxable value was \$44 million. Agricultural property comprised 5% (\$2,310,984) of the county's taxable value (Montana State University Extension, Economic Impact of Agriculture, Carbon County, January 2021). Although the full extent of impacts to the Orchard Canal had not been fully assessed as of September 2, 2022, based on Montana Cadastral, property ownership in and around the Orchard Canal is privately owned agricultural farmland.

Per the Montana Department of Revenue Electronic Property Record Card Application, the 2023 value of the parcel on which the Orchard Canal head gate and control structure are located is:

- Type: vacant land-rural, mixture of grazing and irrigated land, market value \$72,011, taxable value \$1,555.

*Proposed Alternative* – No direct, indirect, or cumulative adverse impacts to local and state tax base and tax revenues. Direct, indirect, and cumulative beneficial impacts are expected. Installing a new head gate and control structure, removing depositional accumulation, and stabilizing the banks would restore the canal back to pre-flood conditions and restore consistent and reliable irrigation water to users of the Orchard Canal. This may result in increased crop production and increased local and state tax revenues associated with agricultural production and sales.

*No Action Alternative* – Direct, indirect, and cumulative adverse impacts to the local and state tax base and revenues. The farmland serviced by the Orchard Canal contributes to Carbon County's tax base both through taxes on the land itself and taxes associated with the production, processing, and distribution of agricultural products produced on these lands. If reliable irrigation water is not available, crop production may decrease resulting in decreased tax revenues associated with

agricultural production and crop sales. Property values and tax revenues associated with parcels serviced by the Orchard Canal may also be directly adversely impacted. Availability of irrigation water is a resource that contributes to the value of land. If irrigation water is not available, the value of the land may decrease.

---

**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*

The project is located on private agricultural farmland approximately 1-mile southeast of Bridger, Montana where there is a local fire department, police department, and public schools. The project area is accessed via rural roads and roads bordering privately owned farm fields.

*Proposed Alternative* – No direct, indirect, or cumulative adverse impacts to demand for government services is expected. Deliveries of equipment and materials necessary to construct the project are expected to use existing roadways and follow existing traffic patterns. Based on the extent of actual damage and exact work locations, localized traffic control may be necessary. Given the rural setting of the project, no increases to traffic are expected. No changes to fire protection, police, schools, etc. are expected beyond basic fire control measures and equipment expected at any type of construction project (i.e., fire extinguisher, shovels, buckets, extra water). Depending on the extent of damage along the eastern bank of the canal, special considerations (i.e., weight restrictions) may need to be given if a contractor proposes to haul materials and equipment over the private bridge that crosses the canal approximately 1,500-feet from the headgate. This bridge is used to access farm fields on the east side of the canal.

*No Action Alternative* – No direct, indirect, and cumulative adverse impacts to demand for government services.

---

**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.*

According to the Montana Sage Grouse Habitat Conservation Map web mapping application, the project is located within sage grouse EO habitat classification core area (EO-Core Area), BLM priority habitat management area, and Wyoming Basins Management Zone. There are no other known State, County, City, USFS, BLM, Tribal, and other zoning or management plans within the project area (Environmental Protection Agency NEPAAssist and Montana DEQ Discover DEQ Throughout Montanan web mapping applications).

*Proposed Alternative* – Potential direct adverse impact to sage grouse EO habitat classification core area and BLM priority habitat management area. Per the Montana Sage Grouse Habitat Conservation Map web map application “Anyone proposing new development activities in sage grouse habitat must submit a development project application for consultation”. The application is available at <https://sagegrouse.mt.gov/ProgramMap>.

*No Action Alternative* – No direct, indirect, and cumulative adverse impacts to locally adopted

environmental plans and goals.

---

**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 located on private, agricultural farmland approximately 1-mile southeast of Bridger, Montana in an area that is primarily used for agricultural production and not recreation. No wilderness areas are located within the larger project area. A Montana Fish, Wildlife, and Parks (FWP) Clarks Fork of the Yellowstone FWP fishing access site is located approximately 2-miles south of Bridger, Montana on State Highway 72 (approximately 2-miles upriver from the project area). This site consists of 176.6 acres of land managed by FWP and a parking area (Montana Fish, Wildlife, and Parks).

*Proposed Alternative* – No direct, indirect, or cumulative adverse impacts to access to and quality of recreational and wilderness activities is expected. No public recreational areas are accessed through the project area. Access to the Clarks Fork Yellowstone River within the project area is through private property. The project area is used for agricultural crop production and not recreational uses. Any floaters on the river may see construction equipment at the existing diversion location; however, it is not expected that it would affect the quality of their recreational experience since a manmade diversion was previously present within the project work area.

*No Action Alternative* – No direct, indirect, and cumulative adverse impact to access to and quality of recreational and wilderness activities.

---

**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.*

According to the United States Census Bureau, the population of Carbon County in 2020 was 10,473 with 6,463 housing units reported in July 2022. The population of Bridger, Montana was 662 individuals; however, the United States Census Bureau does not report the number of housing units.

*Proposed Alternative* – No direct, indirect, or cumulative adverse impacts to the density and distribution of the population within Bridger or Carbon County, Montana are expected. Implementation of the project is expected to use standard construction equipment that is also expected to be locally available. Construction of the project is expected to be performed by existing local contractors and project personnel living and working within Carbon County and the local area; no additional housing is expected.

*No Action Alternative* – No direct, indirect, or cumulative adverse impacts to density and distribution of population and housing.

---

**22. SOCIAL STRUCTURES AND MORES:**

*Identify potential disruption of native or traditional lifestyles or communities.*

The project area primarily consists of cultivated farmland and low intensity residential properties

(Montana Natural Heritage Program). No federally recognized Tribal land is within the project area. The larger project area was traditionally inhabited or used by the Crow Tribe (Native Land Digital web mapping application).

*Proposed Alternative* – No direct, indirect, or cumulative adverse impacts to social structures and/or traditional lifestyles or communities are expected. The project is restoring an existing manmade structure to pre-2022 flood conditions and stabilizing banks associated with a manmade canal. Current communities and lifestyles are expected to remain as is and not change because of the project.

Potential direct, indirect, and cumulative beneficial impacts to the existing agricultural community may result since the headgate and control structure will be replaced allowing for the proper and functional intake of water into the canal. The canal will also be cleaned of rock, sand, and gravel deposition and banks stabilized to restore proper functionality of the canal. A properly functioning canal will be able to reliably deliver irrigation water to users which will support crop production and benefit the local agricultural community.

*No Action Alternative* – Direct, indirect, and cumulative adverse impacts to the local agricultural community serviced by the Orchard canal. The headgate and control structure will remain damaged and inoperable. The canal will continue to be filled with rock, sand, and gravel deposition, have unstable banks that will continue to erode and contribute to sedimentation to the river, and not be able to reliably deliver irrigation water to Orchard Canal users.

---

### **23. CULTURAL UNIQUENESS AND DIVERSITY:**

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

No cultural uniqueness and diversity have been identified. The area surrounding the project is primarily cultivated farmland that supports an agriculturally based community.

*Proposed Alternative* – No direct, indirect, or cumulative adverse impacts to any unique quality of the project area, local residents, or nearby communities are expected. The project is repairing an existing manmade structure and canal to pre-2022 flood condition. The postconstruction project area is expected to resemble pre-2022 flood conditions.

*No Action Alternative* – Potential direct, indirect, and cumulative adverse impacts to the local agriculturally based community. The Orchard Canal will continue to not operate at optimal conditions. This will adversely impact irrigation users and crop productions which will in turn adversely impact the local agricultural community.

---

### **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.*

Livestock production is the principal source of income on farms in Carbon County. Hay, small grains, corn, and silage are grown to supplement livestock feed. Other crops include barley, spring wheat, alfalfa seed, dry edible beans, corn, and sugar beets (USDA, Natural Resources Conservation Service). Per the 2017 Census of Agriculture for Carbon County, 725 farms are present which

encompass 815,758 acres of farmland. Of which, 17% of land in farms is cropland and 12% (98,757 acres) of land in farms is irrigated. The total market value of agricultural products sold was \$99,023,000 of which \$33,059,000 was crops and \$65,965,000 was livestock. The per farm average market value of products (crops plus livestock) sold was \$136,584. The 5,485 to 7,130.71 acres of land irrigated by the Orchard Canal contributes to the overall economics associated with agriculture in Carbon County. The inability to efficiently supply irrigation water to users of the Orchard Canal will adversely impact crop production which will in turn adversely impact the overall economics associated with agriculture and crop production in Carbon County. The future uses of land serviced by the Orchard Canal are likely to remain the same as its current uses.

*Proposed Alternative* – No direct, indirect, or cumulative adverse impacts to other appropriate social and economic circumstances are expected. Direct, indirect, and cumulative beneficial impacts for users of the Orchard Canal and associated agricultural related businesses are expected. The project will result in restoring a functional canal system that can reliably deliver water to irrigation users thus supporting crop production and economic revenues associated with agricultural production in Carbon County.

*No Action Alternative* – Potential direct, indirect, and cumulative negative adverse impacts to the agricultural community serviced by the Orchard Canal and associated agricultural economics. The headgate and control structure will remain inoperable. The canal will remain filled with rock, sand, and gravel deposition and continue to have widened, unstable banks. These factors prohibit the Orchard Canal from reliably providing water to irrigation users thus adversely impacting crop production. Reduced crop yields would adversely impact the local agricultural community and economic revenues associated with agriculture in Carbon County.

---

## **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.*

No water and/or sewer infrastructure has been identified within the project area. Scattered, rural residential properties primarily rely on domestic groundwater supply wells for water (Montana Groundwater Information System web mapping application). Septic systems are commonly used in lieu of sewer infrastructure for rural residences.

*Proposed Alternative* – No direct, indirect, or cumulative adverse impacts to drinking water and/or clean water are expected since no water and/or sewer infrastructure has been identified within the project area.

*No Action Alternative* – No direct, indirect, or cumulative adverse impacts to drinking water and/or clean water are expected since no water and/or sewer infrastructure has been identified within the project area. However, widened, unstable canal banks may continue to erode and have a direct, indirect, and cumulative adverse impact to water quality in the Clarks Fork Yellowstone River due to increased sedimentation to the river.

---

**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.*

In 2021, the median household income in Carbon County was \$62,841 which is a 16.8% increase from 2016 to 2021. In 2021, people in poverty were 9.2% which is a 1.1% decrease from 2016 to 2021 (Montana Department of Commerce).

*Proposed Alternative* – No direct, indirect, or cumulative adverse impacts are expected as the project will not result in disproportionately high or adverse human health or environmental effects on minority or low-income populations. Direct, indirect, and cumulative beneficial impacts are expected to affect users of the Orchard Canal proportionality. No disproportionate effects among any portion of the community or users of the irrigation system are expected.

*No Action Alternative* – No direct, indirect, or cumulative adverse impacts to environmental justice.

|                            |                                     |                                    |
|----------------------------|-------------------------------------|------------------------------------|
| <b>EA Prepared<br/>By:</b> | <b>Name:</b> Samantha Treu          | <b>Date:</b> 09/29/2023            |
|                            | <b>Title:</b> MEPA/NEPA Coordinator | <b>Email:</b> samantha.treu@mt.gov |

---

**V. FINDING**

---

**27. ALTERNATIVE SELECTED:**

As of submittal of the DNRC ARPA grant application on September 2, 2022, damages had not yet been fully surveyed, and no alternatives had been developed. Analysis of alternatives is planned to occur during the preliminary engineering design which will also include evaluation of LiDAR data and a geomorphological assessment.

The project conceptual design includes the following:

- Replacing the headgate and control structure.
- Removing rock, sand, and gravel deposition from the canal.
- Regrading and stabilizing the impacted areas of riverbank and canal bank.
- Repairing and replacing the access roadway.
- Finish grading and seeding.

---

**28. SIGNIFICANCE OF POTENTIAL IMPACTS:****Public Involvement, Agencies, Groups, or Individual Contacted**

No public involvement activities or project notices placed in any newspapers are known to have been completed.

**Alternative Development**

A “No Action” alternative and “stabilize bank erosion and protect property” alternatives were evaluated as part of a NRCS environmental evaluation worksheet. Currently, no other alternatives have been developed or analyzed. Additional analysis of alternatives is planned to occur during the preliminary engineering design which will also include evaluation of LiDAR data and a geomorphological assessment. A conceptual design was provided as part of the DNRC ARPA grant application.

### **Geology and Soil Quality, Stability, and Moisture**

Temporary and short-term direct adverse impacts to soil stability. The soils along the riverbank and canal bank where work will occur will be disturbed due to the nature of construction techniques required to regrade and stabilize the banks.

No long-term direct, indirect, or cumulative adverse impacts are expected. Stabilizing impacted riverbanks and canal banks will prevent further erosion and loss of soil to sedimentation. Application of seed is also planned as part of finish grading activities. Reestablishment of vegetation will further stabilize soils and prevent erosion.

### **Water Quality, Quantity, and Distribution**

Potential direct and temporary adverse impacts to water quality during construction of the project. Since work will be occurring along river and canal banks, there is the potential for temporary violations of surface water quality standards for turbidity. These adverse impacts are temporary, short-term and will not have long-term direct, indirect, or cumulative adverse impacts to water quality. DEQ 318 Authorization permit that allows for a short-term water quality turbidity standard for construction activities is planned to be obtained. The 318 permit outlines activities that must be carried out to protect water quality and minimize sedimentation. Construction work is also planned to occur during periods of low flow to minimize impacts.

### **Air Quality**

Potential temporary and short-term direct adverse impacts to air quality (i.e., dust) may occur during construction due to ground disturbance caused by construction activities. The section of the Orchard Canal associated with the project is located within an agricultural area, and any air quality impacts are expected to only affect the immediate area surrounding construction areas. It is not expected that any of the rural, private residences in the area will be adversely impacted by dust. Common construction dust suppression techniques (i.e., water application) are expected. Long-term adverse impacts are not expected. The project is short-term and projected to take three months to construct.

### **Terrestrial, Avian, and Aquatic Life and Habitats**

Potential temporary and short-term direct adverse impacts to terrestrial, avian, and aquatic life and habitats along the river and canal banks due to the nature of construction activities. People and heavy equipment will be present during the project which may disturb and disrupt normal fish and wildlife activities within the immediate vicinity of work areas. Adverse impacts are expected to be short-term with the project expected to take several months and occur during low water conditions to reduce impacts.

The project is also located within sage grouse EO habitat classification core area and a BLM priority habitat management area. Therefore, there is also a potential direct adverse impact to sage grouse habitat. Per the Montana Sage Grouse Habitat Conservation Map web map application “Anyone

proposing new development activities in sage grouse habitat must submit a development project application for consultation". The application is available at <https://sagegrouse.mt.gov/ProgramMap>.

Long-term direct, indirect, and cumulative beneficial impacts outweigh the short-term direct adverse impacts. The 2022 flood event impacted the habitat by intensifying the erosion along the river and canal banks, washing away soils and vegetation, and disturbing wildlife, bird, and fish habitats present within the project and surrounding areas. The project proposes to stabilize banks, repair the canal profile, and replace the headgate and control structure. This will allow for the river and canal flows in and around the headgate and within the canal to stabilize which can contribute to consistent and desirable environmental conditions and wildlife, bird, and fish habitat enhancement around the headgate and river/canal banks.

### **Unique, Endangered, Fragile, or Limited Environmental Resources**

The project is located within sage grouse EO habitat classification core area and a BLM priority habitat management area. Therefore, there is also a potential direct adverse impact to the Greater Sage-Grouse which is a Montana SOC, USFS Sensitive, and BLM Sensitive species. Per the Montana Sage Grouse Habitat Conservation Map web map application "Anyone proposing new development activities in sage grouse habitat must submit a development project application for consultation". The application is available at <https://sagegrouse.mt.gov/ProgramMap>.

Potential direct adverse impacts to wetland and riparian zones during construction. Freshwater emergent wetland and forested/shrub riparian habitat may be directly and adversely impacted during stabilization of river and canal banks since these wetland and riparian habitats may be located adjacent to project work areas. Adverse impacts are expected to be limited to river and canal banks only and not adversely impact wetland and riparian areas that are located more inland. Long-term beneficial impacts outweigh the adverse impacts since river and canal banks that are currently susceptible to erosion will be stabilized which will further stabilize the wetland and riparian areas surrounding the impacted banks.

### **Aesthetics**

Potential temporary and short-term direct adverse impacts on aesthetics due to noise and dust associated with general construction activities. Private residents may hear noise throughout the duration of the project which is projected to last three months. The project site is not accessible to the public, so any dust generated by construction activities will be localized to project work areas and is not expected to adversely impact any of the surrounding residential properties. Common dust suppression techniques (i.e., application of water) associated with construction activities is expected. Given the nature of the work and safety hazards associated with working around water and working at night, it is expected that construction will take place during daylight hours, so no adverse impacts from light are expected.

No long-term direct, indirect, or cumulative adverse impacts to aesthetics are expected. Any adverse noise and dust impacts will be short-term and will only occur during construction of the project. Long-term beneficial impacts to aesthetics are expected since the damaged headgate and control structure will be replaced with a new headgate and control structure which is more visually pleasing. Rock, sand, and gravel deposition in the canal is planned to be cleaned out and eroded banks stabilized which will return the canal to a more "eye pleasing" functional irrigation canal.

### **Human Health and Safety**

Potential direct adverse impact to human health and safety due to safety risks associated with the operation of heavy construction equipment, working on a construction site, and working near waterbodies are present during completion of the project. Potential adverse impacts to human health and safety are expected to impact project personal only and not impact any nearby residences. It is expected that any construction contractor would develop a health and safety plan that identifies human health and safety risks associated with the project and mitigation measures prior to starting construction.

**Locally Adopted Environmental Plans and Goals**

Potential direct adverse impact to sage grouse EO habitat classification core area and BLM priority habitat management area. Per the Montana Sage Grouse Habitat Conservation Map web map application "Anyone proposing new development activities in sage grouse habitat must submit a development project application for consultation". The application is available at <https://sagegrouse.mt.gov/ProgramMap>.

---

**29. NEED FOR FURTHER ENVIRONMENTAL ANALYSIS:**

This is the final environmental review.

EIS

More Detailed EA

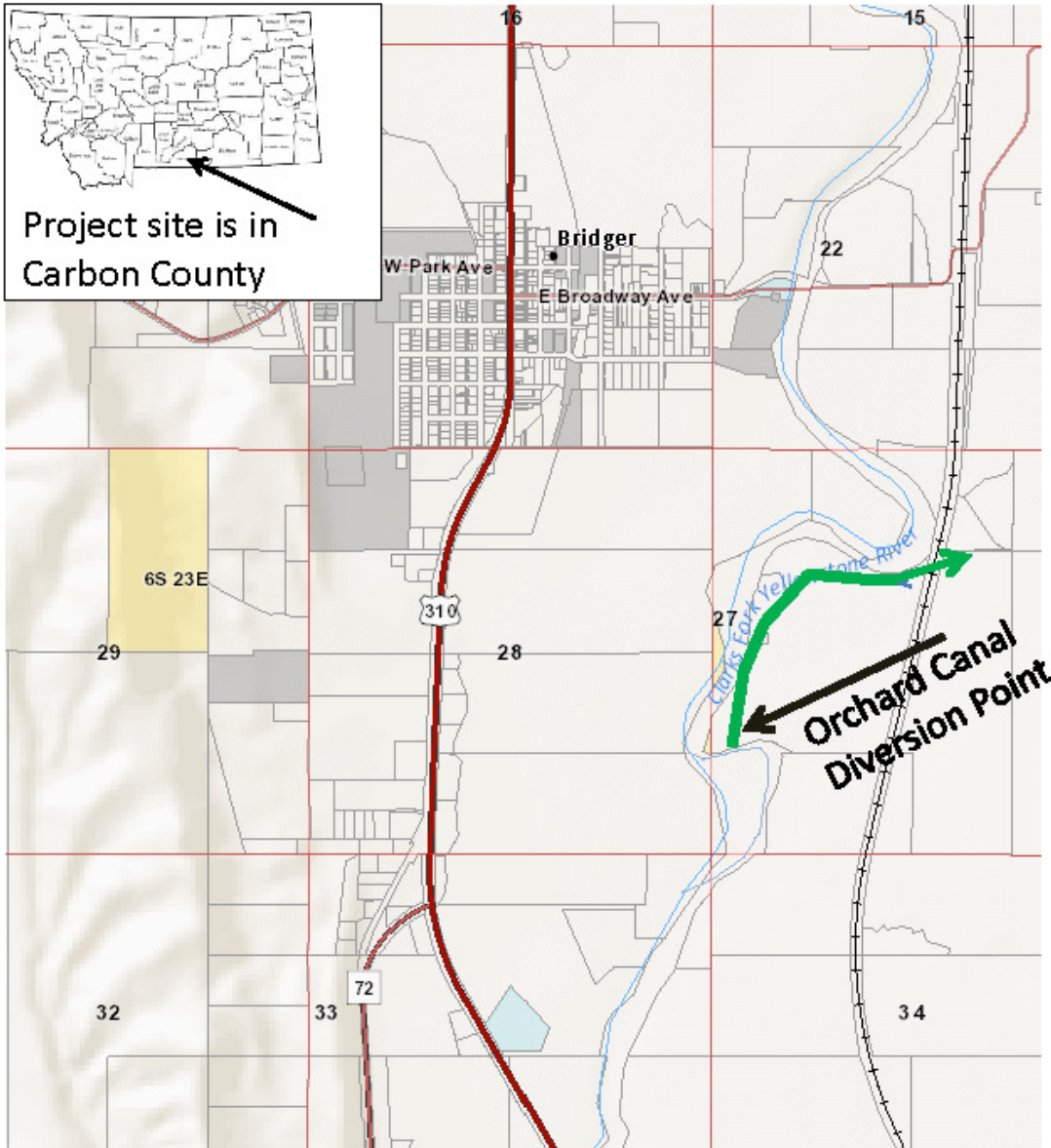
No Further Analysis

|                        |   |
|------------------------|---|
| <b>EA Approved By:</b> | <b>Name:</b> Mark W Bostrom             |
|                        | <b>Title:</b> Division Administrator    |
| <b>Signature:</b>      | <b>Date:</b> 11/3/2023   5:38:31 PM MDT |

DocuSigned by: Mark W Bostrom

BF7A1C3062AF4DE...

### Project Location



Map 1. The Orchard Canal point of diversion is located in south-central Montana, near the town of Bridger. The head gate locations is indicated with black arrow. The first 4,000 feet of the canal and the northward flow direction is indicated by the green poly-line and arrow. North is up on the map.



# MONTANA STATE LIBRARY

NATURAL HERITAGE PROGRAM [mtnhp.org](http://mtnhp.org)

1201 11th Ave • P.O. Box 201800 • Helena, MT 59620-1800 • fax 406-444-0266 • phone 406-444-3989

## Species Occurrences

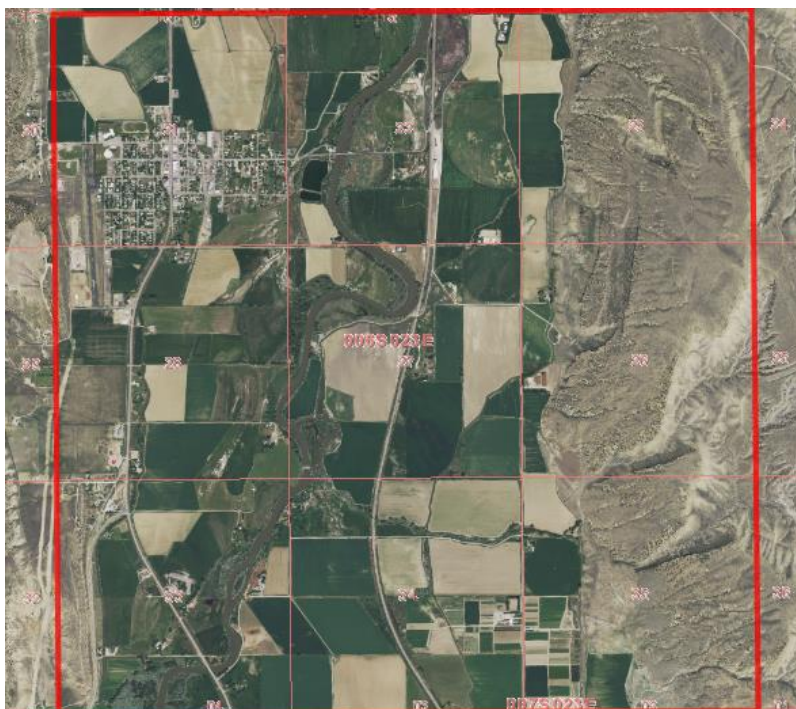
### from Environmental Summary



| Latitude | Longitude  |
|----------|------------|
| 45.26137 | -108.86246 |
| 45.30482 | -108.92489 |

Summarized by: 006S023E027 (Buffered PLSS Section)

Filtered by: Species with MT Status = Species of Concern, Special Status, Important Animal Habitat, Potential SOC



Suggested Citation: Montana Natural Heritage Program. Environmental Summary Report. Custom Field Guide. Summarized by: 006S023E027 (Buffered PLSS Section). Filtered by: Species with MT Status = Species of Concern, Special Status, Important Animal Habitat, Potential SOC. Retrieved on 8/11/2023.

**Note:** This PDF version of the Montana Field Guide is intended to assist in offline identification and field work. It is not intended to replace the online Field Guide, as that version contains more information and is updated daily. For the most up-to-date information on Montana species, please visit [FieldGuide.mt.gov](http://FieldGuide.mt.gov)

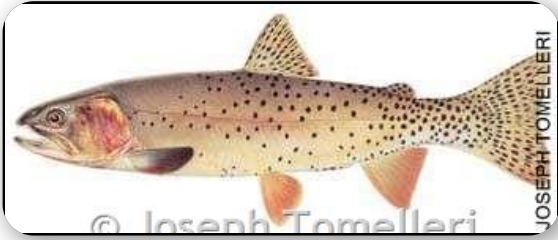
The Montana Natural Heritage Program is part of the Montana State Library's Natural Resource Information System. Since 1985, it has served as a neutral and non-regulatory provider of easily accessible information on Montana's species and biological communities to inform all stakeholders in environmental 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.





## Yellowstone Cutthroat Trout

*Oncorhynchus clarkii bouvieri*

[View in Field Guide](#)


**Species of Concern**  
**Native/Non-native Species**  
 (depends on location or taxa)  
**Global Rank:** G5T4  
**State Rank:** S2

**Agency Status**  
**USFWS:**  
**USFS:** SENSITIVE  
**BLM:** SENSITIVE  
**FWP SWAP:** SGCN2

### General Description

The Yellowstone Cutthroat Trout is one of two subspecies of native cutthroat found in the state. Together they have been designated Montana's state fish, the Blackspotted Cutthroat Trout. They have a golden coloration and larger spots more widely distributed on their sides than the Westslope Cutthroat Trout. The Yellowstone Cutthroat, as the name implies, is native to the Yellowstone River drainage of southwest and south-central Montana. Originally their range was as far downstream as the Tongue River, but today pure, unhybridized populations are limited to some headwaters streams and Yellowstone National Park. Yellowstone Cutthroat Trout are a Montana Fish of Special Concern. Much of their spawning habitat in tributaries of the upper Yellowstone River has been lost to irrigation withdrawals which dewater the streams before spawning and egg-incubation are completed in July and August. The Big Timber hatchery of the Montana Department of Fish, Wildlife, and Parks maintains a pure Yellowstone Cutthroat broodstock. Yellowstone Cutthroat Trout are used extensively for mountain lake stocking on the east slope of the Rocky Mountains and in the Absaroka-Beartooth Wilderness where they can grow to sizes up to 15 pounds. In general, Yellowstone Cutthroat Trout are larger than Westslope Cutthroat Trout and more prone to eat fish as part of their diet.

For a comprehensive review of the ecology, conservation status, threats, and management of this and other Montana fish species of concern, please see Montana Chapter of the American Fisheries Society Species of Concern Status Reviews.

### Diagnostic Characteristics

The Yellowstone Cutthroat Trout is visually distinguished from other trout species by its two prominent red slashes on the lower jaw, and from other cutthroat trout subspecies by its medium-large, black spots that tend to be concentrated posteriorly, and its drab brownish, yellowish, or silvery coloration, with brighter colors generally absent even in mature fish (Behnke 1992, Baxter and Stone 1995, Montana AFS Species Status Account).

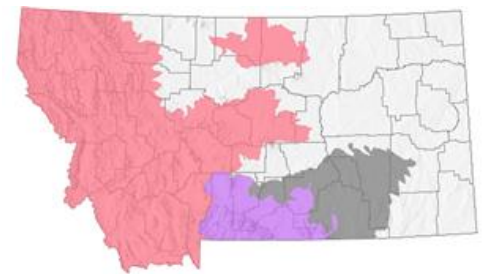
Tiny teeth are usually present on the floor of the mouth behind the tongue. These are embedded in tissue and difficult to see but may be felt if brushed with the side of a needle. Red on the side of the head and gill cover becomes intense in the breeding male.

### Habitat

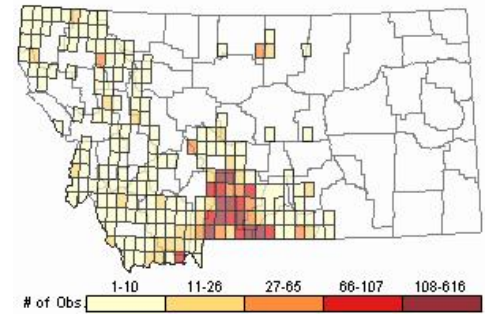
Yellowstone Cutthroat Trout inhabit relatively clear, cold streams, rivers, and lakes. Optimal temperatures have been reported to be from 4 to 15 degrees C., with occupied waters ranging from 0 to 27 degrees C. (Gresswell 1995, Montana AFS Species Status Account).

### Management

To maintain healthy populations of Yellowstone Cutthroat Trout and to ensure the wide-ranging persistence of this subspecies in Montana and elsewhere, a number of tactics have been proposed in recent status assessments (Yellowstone Cutthroat Trout Working Group 1994, Gresswell 1995, May 1996, May et al. 1998, Dufek et al. 1999, Wyoming Game and Fish Department 2000). These include field surveys, harvest management, habitat

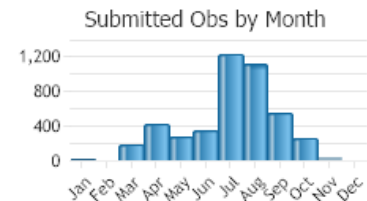


Range ■ Native ■ Non-native ■ Historical



# of Obs ■ 1-10 ■ 11-26 ■ 27-65 ■ 66-107 ■ 108-616

# Observations: 4460



protection and improvement, non-native species control, and broodstock management ([Montana AFS Species Status Account](#)).



## Dwarf mentzelia

*Mentzelia pumila*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G4

State Rank: S2S3

#### Agency Status

USFWS:

USFS:

BLM:

State Threat Score:

Unknown

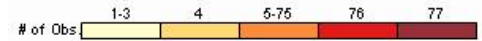
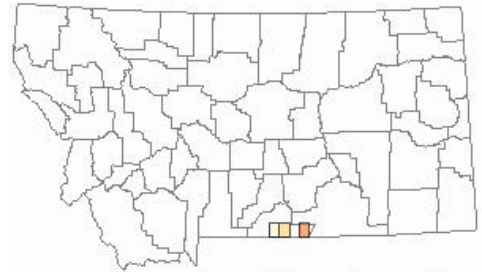
CCVI: Moderately

Vulnerable

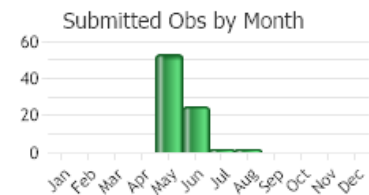
C-value:



Range  Native



# Observations: 82



## General Description

**PLANTS:** An herbaceous, biennial or short-lived perennial herb with a solitary, erect stem that is highly branched. Stems are white, 8-30 cm long, and arise from a stout taproot. Source: Lesica et al. 2012.

**LEAVES:** Basal and alternate on the stem. The grayish-green leaves are narrowly lance-shaped, 2-10 cm long, and deeply pinnate with 8-14 lobes that are usually perpendicular to the leaf axis. Lower leaves have short petioles. Leaves become sessile, smaller, and more deeply lobed higher on the stem. The foliage is covered with short, barbed hairs of different types that grab like velcro. Source: Lesica et al. 2012.

**INFLORESCENCE:** Golden-yellow flowers are arranged in flat to convex racemes with unequal pedicels (corymb), but sometimes are singular. The short flowering stems arise from axils of the reduced upper leaves or bracts. Bracts occur below the flower and are lance-shaped with toothed margins. Sepals are united with 5 lobes, 5-10 mm long. Yellow petals, apparently 10, are spatulate, and 9-15 mm long. Sources : Brown and Kaul 1981; Lesica et al. 2012.

The genus *Mentzelia* is named for the German botanist C. Mentzel who lived from 1622 to 1701. *Pumila* means dwarf or small.

## Phenology

Montana plants flower in June and July ([www.pnwherberia.org](http://www.pnwherberia.org)). Across its range flowering has been observed from May to August (Hufford, Schenk, and Brokaw *in* Flora of North America [FNA] 2016).

## Diagnostic Characteristics

Montana has six *Mentzelia* species. White-stem Stickleaf (*Mentzelia albicaulis*) and Mada Stickleaf (*Mentzelia dispersa*) are annual plants with very short sepals (1-4 mm long). All other *Mentzelia* species are perennial with longer sepals of at least 5 mm and can be separated from Dwarf Mentzelia as follows:

### Dwarf Mentzelia – *Mentzelia pumila*, SOC

\*Sepals: 0.5-1 cm long.

\*Petals: 5, yellow, 0.9-1.5 cm long, with 5 sterile stamens that appear like petals (petaloid).

\*Leaves: Margins are deeply serrate to lobed and 2-10 cm long.

### Ten-petal Blazingstar – *Mentzelia decapetala*

\*Sepals: 2-4 cm long.

\*Petals: 5, white, 3-6 cm long, with 5 petaloid sterile stamens.

\*Leaves: Margins are deeply serrate and 4- 15 cm long.

### Giant Blazingstar – *Mentzelia laevicaulis*

\*Sepals: 2-3 cm mm long.

\*Petals: 5, light yellow, and 3-6 cm long (petaloid sterile stamens much narrower).

\*Leaves: Margins are deeply lobed to serrate and 4-12 cm long.

**Bractless Blazingstar** - *Mentzelia nuda*, SOC

\*Sepals: 1-2 cm long.

\*Petals: 5, white, 2-4 cm long with 5 petaloid sterile stamens.

\*Leaves: Margins are serrate and 3-5 cm long.

#### **TAXONOMY**

The name of *Mentzelia pumila* has been widely applied in regional floras and in other taxonomic treatments; however, the Flora of North America (2016) and Lesica et al. (2012) treat *Mentzelia pumila* as a species found only in Wyoming, Montana, Colorado, and Utah.

#### **Habitat**

---

In Montana, Dwarf *Mentzelia* grows in barren sandy soil of shrub-steppe and juniper woodlands in valleys and foothills of the Pryor Mountain Desert (Lesica et al. 2012).

Species in the genus *Mentzelia* in North America often grow on sparsely vegetated sites. They are found in disturbance-prone environments, such as arroyos, sand dunes, cliffs, or talus slopes. They are frequently associated with distinctive substrates, including gypsum, limestone, serpentine, or volcanic tuff. Some may be edaphically restricted (Hufford, Schenk, and Brokaw *in* FNA 2016).



## Monarch

*Danaus plexippus*

[View in Field Guide](#)


### Species of Concern

**Native Species**

**Global Rank:** G4

**State Rank:** S2S3

### Agency Status

**USFWS:** C

**USFS:**

**BLM:**

## General Description

[From Ferris and Brown 1981; Scott 1986; Opler and Wright 1999; Glassberg 2001; Pyle 2002] Forewing 5.2-5.8 cm. Large, forewing long and drawn-out. Uppersurface with large orange ovals in tip of forewing, males bright orange with black scent patch in middle of hindwing, females duller orange with thicker black scaling of veins and no black scent patch; black border has two rows of tiny white spots; hindwing lacks black postmedian line.

## Phenology

Five or more flights, all year in California and southern Florida; several flights, March to November in New Mexico and southern Nevada; one or two flights, May to October (Scott 1986). Mainly March/April to October/November (Glassberg 2001); early June to early October in Oregon and Washington (Pyle 2002).

## Diagnostic Characteristics

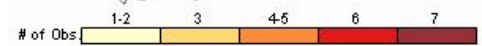
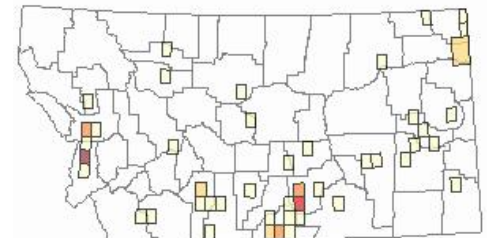
Distinctive; best told by color and large size, black border with two rows of tiny white spots, hindwing lacking black postmedian line.

## Habitat

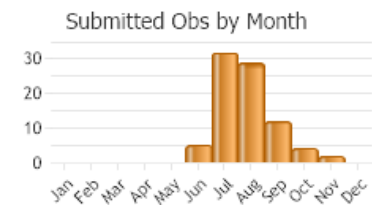
Open places, native prairie, foothills, open valley bottoms, open weedy fields, roadsides, pastures, marshes, suburban areas, rarely above treeline in alpine terrain during migration (Scott 1986; Opler and Wright 1999; Glassberg 2001; Pyle 2002). Reported in Glacier National Park, Montana in mesic montane meadows (Debinski 1993).



Range Summer



# Observations: 85





## Western Milksnake *Lampropeltis gentilis*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S2

#### Agency Status

USFWS:

USFS: SENSITIVE

BLM: SENSITIVE

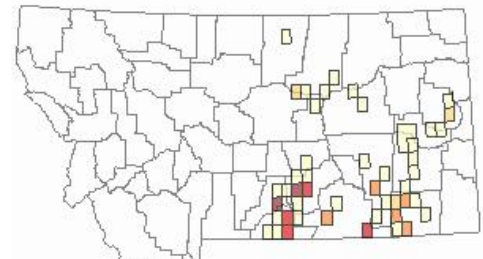
FWP SWAP: SGCN2

## General Description

The back and sides of the body of the Milksnake are marked with whitish, black, and reddish or orange bands, with the reddish-orange bands bordered by the black; the snout is blackish and sometimes with whitish flecking. The bands often extend across the belly, but sometimes may be incomplete or absent, in which case the belly is whitish. Dorsal scales are smooth (unkeeled). The anal scale is not divided, as are most of the scales on the ventral surface of the tail. The neck is relatively short and thick. Total length of adults in the western Great Plains is usually 39 to 85 centimeters. Hatchlings are similar in appearance to adults, and 16 to 29 centimeters in total length. Eggs are slightly granular and range from 29 to 44 millimeters by 13 to 16 millimeters in length and breadth, depending on locality.

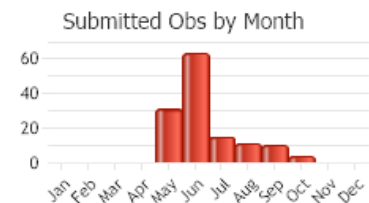


Range  Native



# of Obs: 1-2 3-4 5-6 7-8 9-25

# Observations: 156



## Diagnostic Characteristics

The whitish, black, and reddish to orange banding or rings around the body, an undivided anal scale, and smooth (unkeeled) dorsal scales distinguish the Milksnake from all other snakes native to Montana.

## Habitat

Little specific information is available. Milksnakes have been reported in areas of open sagebrush-grassland habitat (Dood 1980) and ponderosa pine savannah with sandy soils (Hendricks 1999), most often in or near areas of rocky outcrops and hillsides or badland scarps, sometimes within city limits.



## Bald Eagle

*Haliaeetus leucocephalus*

[View in Field Guide](#)


### Special Status Species

#### Native Species

Global Rank: G5

State Rank: S4

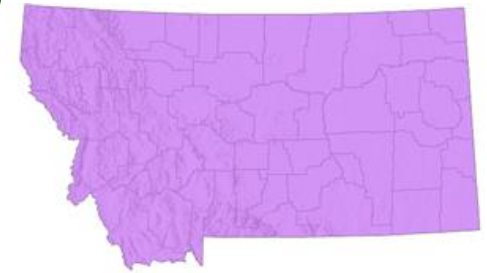
#### Agency Status

USFWS: BGEPA; MBTA

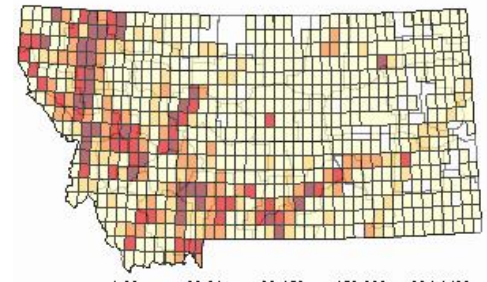
USFS: SENSITIVE

BLM: SENSITIVE

PIF: 2

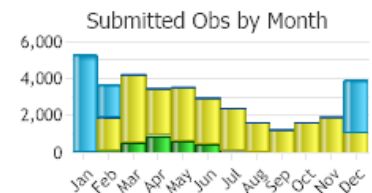


Range  Year-round



# of Obs: 1-38 39-81 82-158 159-283 284-1483

# Observations: 45870



## General Description

With a white head and tail contrasting with a dark brown body and wings, the adult plumage of the Bald Eagle, attained at approximately 5 years of age, is unmistakable. In addition to the obvious white head and tail, other distinguishing features include the yellow bill, cere, iris, legs and feet. Second in size of North American birds of prey only to the California Condor (*Gymnogyps californianus*), the Bald Eagle ranges in total length from 71 to 96 cm, with an average wingspan of 168 to 244 cm and a body mass ranging from 3.0 to 6.3 kg (Buehler 2000). In general appearance the sexes are similar with females approximately 25 percent larger than males. The plumage of the juvenile birds is much less distinct, being dark brown overall. The head, body, wings, and tail are dark brown with limited mottling on the underside of the wings and on the belly. While the legs and feet of the young bird are yellow like those of adults, the bill and cere are dark gray and the iris is dark brown.

The voice of the Bald Eagle is a weak series of chirps. The vocalization is described as flat chirping, stuttering whistles, given in a halting fashion, with the immature calls generally harsher and more shrill than those of the adults (Buehler 2000, Sibley 2000).

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

In adult plumage, the Bald Eagle is unlikely to be confused with any other species. Juvenile Bald Eagles may be confused with Golden Eagles (*Aquila chrysaetos*), especially with adult Golden Eagles. A few characteristics differentiate these two species. The Bald Eagle has unfeathered legs, while those of the Golden Eagle are feathered. During flight, the head and neck of the Bald Eagle extend to about half the length of the tail, while the Golden Eagle is considerably less. This distinction is true for all age classes of both species. The terminal tail band on the Golden Eagle is dark and well defined, especially on the juveniles. In addition, the underwing and belly of the Bald Eagle show a greater amount of white compared to the Golden Eagle, whose white feathering is restricted to the base of the flight feathers (Buehler 2000).

## Habitat

In Montana, as elsewhere, the Bald Eagle is primarily a species of riparian and lacustrine habitats (forested areas along rivers and lakes), especially during the breeding season. Important year-round habitat includes wetlands, major water bodies, spring spawning streams, ungulate winter ranges and open water areas (Bureau of Land Management 1986). Wintering habitat may include upland sites. Nesting sites are generally located within larger

forested areas near large lakes and rivers where nests are usually built in the tallest, oldest, large diameter trees. Nesting site selection is dependent upon maximum local food availability and minimum disturbance from human activity (Montana Bald Eagle Working Group 1994). See the Montana Bald Eagle Management Plan (1994) for further details including home range sizes and habitat requirements of fledgling birds.



## Golden Eagle *Aquila chrysaetos*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S3

#### Agency Status

USFWS: BGEPA; MBTA

USFS:

BLM: SENSITIVE

FWP SWAP: SGCN3

PIF:

## General Description

Adults are brown overall, gold on head and neck feathers, with light brown bands in the tail. Immature birds have white patches on the wings and white at the base of the tail feathers. Golden Eagles often soar with their wings held nearly flat, but slightly upturned. The legs are heavily feathered down to the tops of the toes. Golden Eagles range in length from 33 to 38 inches, and have a wingspan of 6-1/2 to 7-1/2 feet. A very large raptor with mostly brown plumage, a golden wash on the back of the head and neck, and a mostly horn-colored bill; tail is faintly banded; immatures have white at the base of the primaries and white tail with a dark terminal band; total length 76 to 102 cm, wingspan 203 to 224 cm.

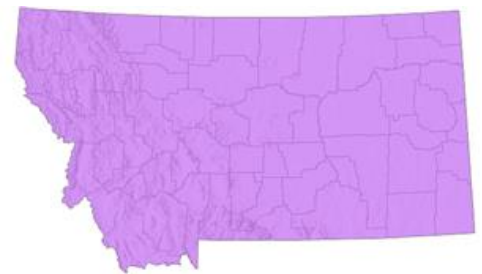
For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

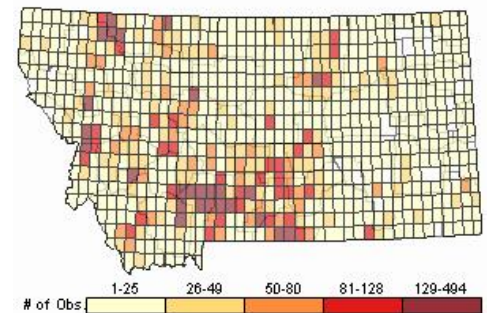
Bald Eagles have feathers only part way down the leg, and usually soar with wings held completely flat. Immature Bald Eagles usually have a strip of white along the underside of the wing, rather than in a round patch on the flight feathers like the immature Golden Eagle. Older immature Bald Eagles have irregular patches of white on their bodies, instead of the sharply defined patterns on Golden Eagles. Turkey Vultures soar with wings held in a more pronounced "V".

## Habitat

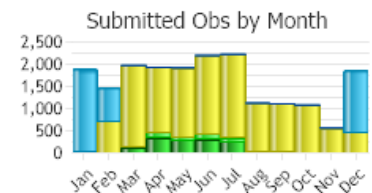
Golden Eagles nest on cliffs and in large trees (occasionally on power poles), and hunt over prairie and open woodlands; some nest sites in the Fallon area include scoracious badland pillars (Cameron 1905), another near Knowlton was in a ponderosa pine (Cameron 1907). In the Livingston area 62% of 92 nests were on cliffs, 29% in Douglas-fir, and 2-3% each in ponderosa pine, cottonwood, snags, and on the ground (McGahan 1968). About 70% of cliff nests were oriented to the south or east, most nests were found between 4000-6000 ft elevation, and sites were associated with sagebrush/grassland hunting areas (McGahan 1968). In the Bozeman area, Golden Eagles move from mountains to valleys in the winter (Skaar 1969).



Range  Year-round



# Observations: 20532





## Greater Short-horned Lizard

*Phrynosoma hernandesi*

[View in Field Guide](#)


### Species of Concern

**Native Species**

**Global Rank:** G5

**State Rank:** S3

### Agency Status

**USFWS:**

**USFS:** SENSITIVE

**BLM:** SENSITIVE

**FWP SWAP:** SGCN3, SGIN

## General Description

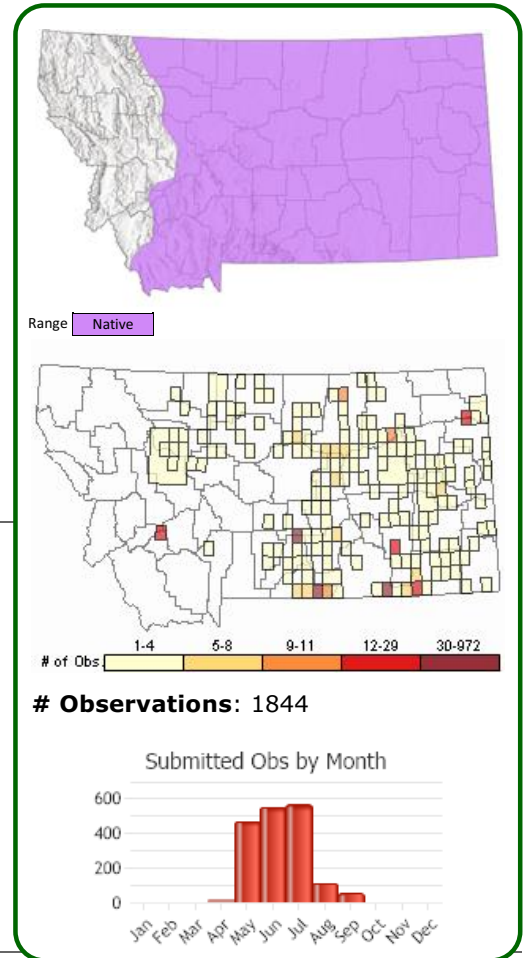
The body of the Greater Short-horned Lizard is broad and flattened. The back is spiny, with an especially noticeable single row of scales fringing each side of the body. The spines at the back of the head are about as long as they are wide at the base. The coloration of the back usually blends cryptically with the soil and can vary somewhat from region to region and at single localities. The maximum total length is about 15 centimeters. In males, there is a swelling at the base of the tail, and the tail is proportionally longer than in females. Newborn young have the broad and flattened body shape, and are about 2.0 to 2.5 centimeters snout-vent length and up to 3.8 centimeters by the time of first hibernation.

## Diagnostic Characteristics

The broad, flattened body separates this lizard from the other three lizard species regularly documented in Montana, and the range overlaps only with the Common Sagebrush Lizard. The Pygmy Short-horned Lizard has been reported from extreme southwestern Montana, in the Centennial Valley, Beaverhead County (Maxell et al. 2003), but adults of this species are much smaller than Greater Short-horned Lizards, the small horns on the back of the head project almost vertically rather than horizontally, and they lack the wide notch between the horns on the back of the head that gives the head of Greater Short-horned Lizards a "heart-shaped" appearance when viewed from above (St. John 2002).

## Habitat

Habitat use in Montana is poorly described, but appears to be similar to other regions. Reports mention individuals on ridge crests between coulees, and in sparse, short grass and sagebrush with sun-baked soil (Mosimann and Rabb 1952, Dood 1980). On the southern exposures of the Pryor Mountains, Carbon County, individuals occur among limestone outcrops in canyon bottoms of sandy soil with an open canopy of limber pine-Utah juniper, and are also present on flats of relatively pebbly or stony soil with sparse grass and sagebrush cover (Paul Hendricks, personal observation).





## Great Blue Heron

*Ardea herodias*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S3

#### Agency Status

USFWS: MBTA

USFS:

BLM:

FWP SWAP: SGCN3

PIF:

## General Description

Largest heron in North America, 60 cm tall, 97 to 135 cm long, 2.1 to 2.5 kg mass. Wings long and rounded, bill long and tapered, tail short. Upper parts are gray, fore-neck is streaked with white, black, and rust-brown. Bill yellowish. Legs brownish or greenish. In flight, folds neck in an "S" shape and extends legs along the body axis; wing beats are deep slow wing. Adults have long occipital plumes (Butler 1992).

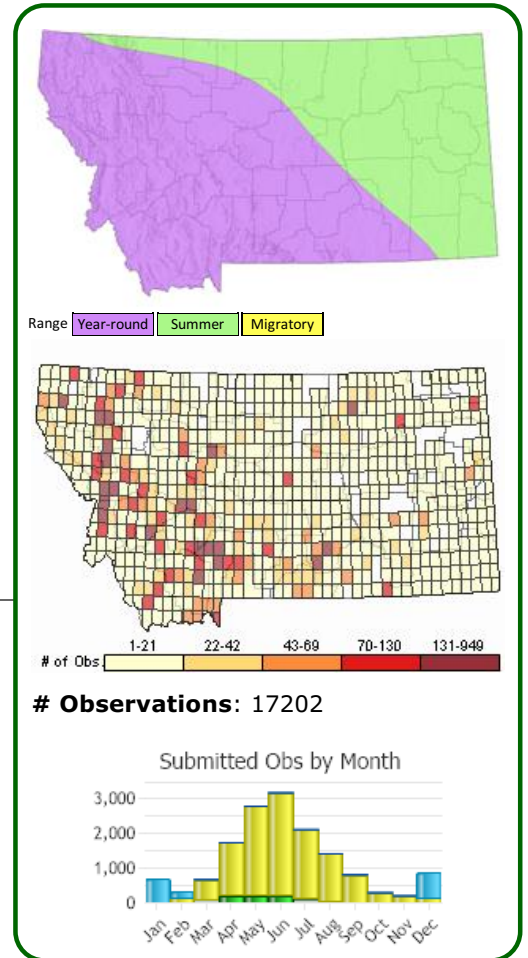
For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

No other heron in Montana is the size or color of the Great Blue Heron, nor are other herons likely to be encountered in Montana during winter.

## Habitat

Great Blue Herons are equally at home in urban wetlands and wilderness settings. Most Montana nesting colonies are in cottonwoods along major rivers and lakes; a smaller number occur in riparian ponderosa pines and on islands in prairie wetlands. Nesting trees are the largest available. Active colonies are farther from rivers than inactive colonies. The number of nests in the colony corresponds to the distance from roads (Parker 1980). Great Blue Herons build bulky stick nests high in the trees when nesting near the shores of rivers and lakes and on the ground or in low shrubs when nesting on treeless islands.





## Sage Thrasher

*Oreoscoptes montanus*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G4

State Rank: S3B

#### Agency Status

USFWS: MBTA

USFS:

BLM: SENSITIVE

FWP SWAP: SGCN3

PIF: 3

## General Description

The Sage Thrasher is North America's smallest thrasher with a relatively short bill and tail. Its long, melodious, mockingbird-like song, originally earned it the name of Mountain Mockingbird (Reynolds et al. 1999). Genetic work indicates this species may, in fact, be more closely related to the mockingbirds (*Mimus*) than to other thrashers (Sibley and Ahlquist 1984). The Sage Thrasher, considered a sagebrush obligate species, is dependent upon large, unfragmented sagebrush habitats for breeding (Reynolds et al. 1999).

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Phenology

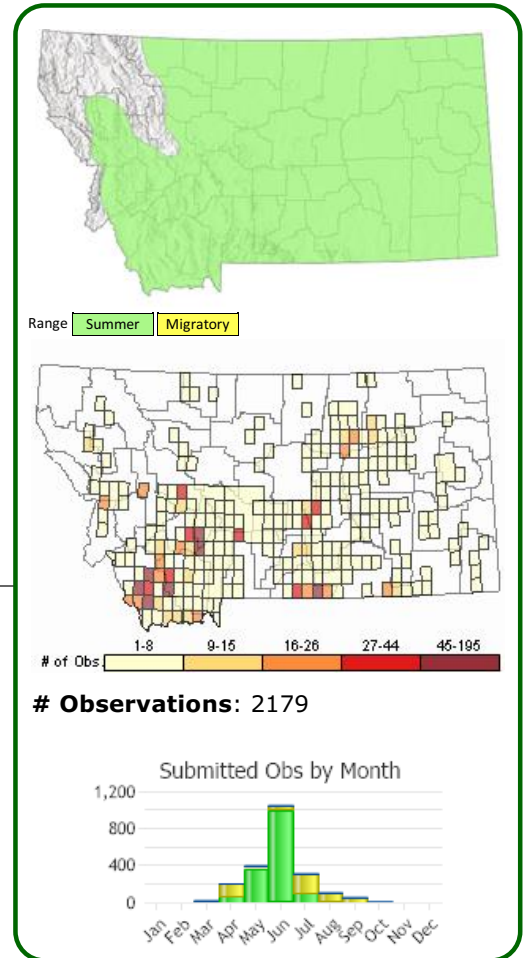
Migrants arrive in Montana in late April through mid-May (Montana Bird Distribution Committee 2012). Records of adults incubating and feeding nestlings have been recorded in early June. Observations of adults feeding fledged young have been recorded from July through August.

## Diagnostic Characteristics

The bill and tail of this thrasher are relatively short compared to those of other thrashers. Sexes are similar in plumage characteristics with males slightly larger than females. Adults are brownish-grey with some indistinct dark streaking on the back and crown. A dark streak through the eye separates the upper and lower lighter areas of the face. The cheek is also light with a darker line present along the sides of the throat. The bill is dark and short, and the eyes are yellow to amber in color. Underparts are generally off-white with bold dark marks (Reynolds et al. 1999).

## Habitat

In Montana, the Sage Thrasher breeds in habitats dominated by Big Sagebrush. Sage Thrasher abundance is positively correlated with sagebrush cover and negatively correlated with grass cover. The Sage Thrasher uses sagebrush habitats, grasslands, and other semi-arid habitats during spring and fall migration and tends to avoid areas of human habitation (Reynolds et al. 1999).





## Spiny Softshell *Apalone spinifera*

[View in Field Guide](#)


### Species of Concern

**Native Species**

**Global Rank:** G5

**State Rank:** S3

### Agency Status

**USFWS:**

**USFS:**

**BLM:** SENSITIVE

**FWP SWAP:** SGCN3

## General Description

### EGGS:

The eggs are hard and white with a smooth and spherical shape. The shell is thick and brittle, approximately 24-32 mm (0.94-1.26 inches) in diameter. Clutch size can range from as few as 4 eggs to as many as 40 (typically 12-18), with eggs deposited in flask-shaped nests that are covered with soil (Webb 1962, Miller et al. 1989, Ernst et al. 1994, Hammerson 1999).

### HATCHLINGS:

The carapace is olive to tan, with small dark circles, spots, or dashes, and a yellowish margin bordered by a black line. Carapace is approximately 3-4 cm (1.2-1.6 inches) in length.

### JUVENILES AND ADULTS:

Juveniles have characteristics that are female-like, except the carapace coloration, which is male-like.

The shell is flattened (pancake-like), with flexible edges and covered with leathery skin. The tail is thick and long, with the vent well beyond the rear edge of the carapace. Small conical tubercles or "spines" are present on the front edge of the carapace above the neck. The snout is tubular and flexible, with a ridge along the inner margin of each nostril. This allows this species to remain beneath the surface with just the snout exposed. The lips are fleshy and cover sharp-edged jaws. Limbs are flat, and the toes are broadly webbed. Carapace coloration is olive-brown, brown, or grayish, with a cream or yellowish margin. The plastron is unmarked and cream to yellowish in coloration (Webb 1962, Ernst et al. 1994, Hammerson 1999, Stebbins 2003).

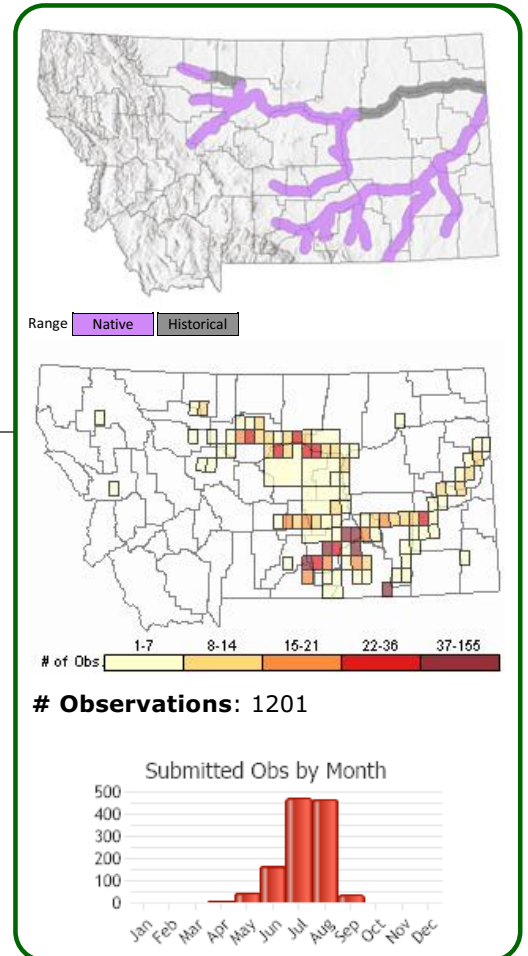
In mature males, the carapace has the texture of sandpaper, and marked with small dark spots or circles. The tail is thick and long, with the vent well beyond the rear edge of the carapace. In mature females, the carapace does not have the texture of sandpaper with more mottled or marked with blotches. Tubercles at the front edge of the carapace are more prominent than in males, and the tail is relatively short. Adult females can reach 54 cm (21.3 inches) in carapace length (CL), while males are smaller by an average of 10 cm (3.9 inches) and reach about 22 cm (8.7 inches) in carapace length. For example, a study in southeastern Montana produced fourteen males ranging from 14.8-21.6 cm (5.8-8.5 inches) CL (290-730 grams), and 23 males ranging from 28.3-43.8 cm (11.1-17.2 inches) CL (2080-6700 grams) (Gates 2005).

## Diagnostic Characteristics

The Spiny Softshell (*Apalone spinifera*) differs from other Montana turtles by having a flattened and leathery shell that is soft and by the presence of a pointed snout with tubular nostrils. The Smooth Softshell (*A. muticus*), which occurs in the Missouri River in South Dakota and southern North Dakota (Hoberg and Gause 1989, Ballinger et al. 2000), differs from the Spiny Softshell by lacking the ridge on the inner margin of each tubular nostril and the absence of tubercles or spines along the front edge of the carapace (Ernst et al. 1994).

## Habitat

The Spiny Softshell is primarily an animal of riverine systems, but also inhabits marshy creeks, bayous, oxbows, lakes, irrigation canals, and impoundments (Webb 1962, Ernst et al. 1994, Hammerson 1999, Stebbins 2003). A



soft bottom in permanent bodies of water with some aquatic vegetation appears to be essential, and sandbars and/or mudflats, as well as partially submerged debris (trees, fallen logs, brush), are usually present. In shallow water, young Spiny Softshell bury themselves in soft sand and silt to seek refuge and concealment (Baxter and Stone 1985). In Iowa, females seemed to prefer open water more than males (Williams and Christiansen 1981). Eggs are laid in nests dug in open areas in sand, gravel, or soft soil near water (Baxter and Stone 1985, Ernst et al. 1994, Hammerson 1999, Stebbins 2003).

Habitat use by Spiny Softshell in Montana is probably similar to elsewhere in the range, but studies are lacking and there is little qualitative information available. They are encountered most often in the larger rivers and their tributaries. Adult males and females have been observed basking together on partially submerged logs in backwater sites of slow-moving water, on sandy and muddy riverbanks, and on partially submerged rocks in shallow water along major rivers. Hatchlings have been found in shallow water at the edge of rivers, burrowing into silty substrate with emergent vegetation present (Paul Hendricks, personal observation). A small-scale trapping and visual encounter survey conducted on a six-mile stretch of the upper Tongue River in southeastern Montana concluded that the most successful trapping locations were near sandbar islands adjacent to pools with a soft organic bottom. Additionally, stretches of river with exposed boulders and basking logs produced the most visual observations (Gates 2005).



## Bobolink

*Dolichonyx oryzivorus*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S3B

#### Agency Status

USFWS: MBTA; BCC10;  
BCC11; BCC17

#### USFS:

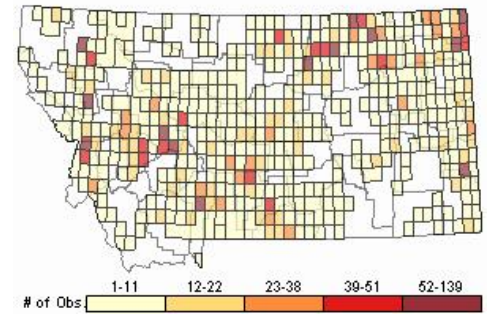
BLM:

FWP SWAP: SGCN3

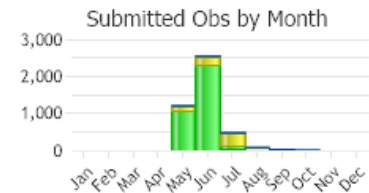
PIF: 3



Range  Summer  Migratory



# Observations: 4398



## General Description

The Bobolink is approximately 18 centimeters long with a stout, relatively short, pointed bill and sharply pointed tail feathers. The breeding male is black below, with a buff to whitish hind-neck, white scapulars, and white rump; early in spring the male has pale feather edgings. The breeding female is buffy with dark streaks on the back, rump, sides, and head. The juvenile resembles the breeding female but lacks streaks below. Fall adults and immatures resemble breeding female but are darker above and richer buff below. (Renfrew et al. 2015)

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

Breeding males are unique among North American passerines in being entirely black underneath and lighter above (Renfrew et al. 2015).

## Habitat

Nests built in tall grass and mixed-grass prairies. Prefers "old" hay fields with high grass-to-legume ratios.



## Brewer's Sparrow

*Spizella breweri*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S3B

#### Agency Status

USFWS: MBTA

USFS:

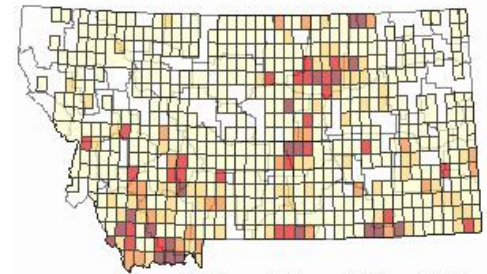
BLM: SENSITIVE

FWP SWAP: SGCN3

PIF: 2

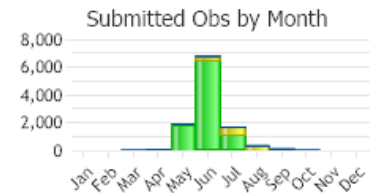


Range  Summer  Migratory



# of Obs 1-19 20-38 39-64 65-104 105-254

# Observations: 10985



## General Description

The Brewer's Sparrow is a nondescript sparrow of sagebrush habitats. In suitable habitat, the Brewer's Sparrow can be the most abundant species present. Its song, a series of distinctive long and short buzzy trills, can be heard throughout the breeding season (Rotenberry et al. 1999).

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Phenology

Arrives on breeding grounds by late April. Nests with eggs observed as early as late May. Nestlings observed as early as early June and fledglings by early July (Montana Natural Heritage Program Point Observation Database 2014).

## Diagnostic Characteristics

Sexes are similar in appearance. The crown is finely streaked brown; pale gray eyebrow, complete white eye-ring, and a grayish mustache. Underparts dull white, with grayish flanks; breast unstreaked in adult, although sometimes flanks are streaked. Back and rump brown, the latter streaked with black (Rotenberry et al. 1999).

## Habitat

The Brewer's Sparrow typically breeds in shrubsteppe habitats dominated by sagebrush. Densities of Brewer's Sparrow correlated with some aspect of total shrub cover (Rotenberry et al. 1999). In sagebrush areas in central Montana, Brewer's Sparrows nested in sagebrush averaging 16 inches high (Best 1970).



## Greater Sage-Grouse

*Centrocercus urophasianus*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G3G4

State Rank: S2

#### Agency Status

USFWS:

USFS: SENSITIVE

BLM: SENSITIVE

FWP SWAP: SGCN2

PIF: 1

## General Description

[From Schroeder et al. 1999] North America's largest grouse. Males 1.7-2.9 kg and 65-75 cm long, females 1.0-1.8 kg and 50-60 cm long. Both sexes with relatively long, pointed tails, feathered legs, and mottled gray-brown, buff, and black plumage. Males have a blackish-brown throat patch and an inconspicuous yellow eye comb. Both sexes have blackish bellies which contrast sharply with white under-wing coverts when birds in flight. Females appear to dip from side to side while flying.

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Phenology

In central Montana, males occupy leks from early March to early June with peaks in late April to early May, females attend leks mid-March to late May with peaks in early to mid-April, copulations early April to late May (Eng 1963; Wallestad 1975b; Jenni and Hartzler 1978). Nesting begins mid-April, first eggs hatch in late May with peak by first half of June (42% of nests in south-central Montana hatch prior to mid-June), hatching extends to late June and early July (Eng 1963; Wallestad 1975b; Eustace 2002). In southeastern Alberta, peak hen attendance at leks early April, incubation at first nests initiated late April to early May (mean = 3 May), second nest attempts late May to mid-June (Aldridge and Brigham 2001). Birds in north-central Montana move to wintering grounds in November, remain there until mid-March and early April (Tack et al. 2011; Smith 2013); in southwest Montana, move to wintering areas sometime in September/October, return to leks in late February (Roscoe 2002).

## Diagnostic Characteristics

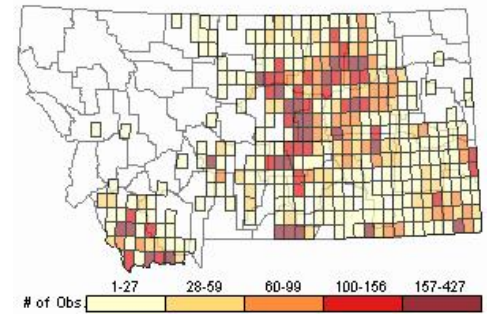
Female Ring-necked Pheasant (*Phasianus colchicus*) can possibly be confused with female or young Greater Sage-Grouse. Female pheasants have a brown belly and bare legs, female Greater Sage-Grouse have a black belly patch and feathered legs. Differ from Sharp-tailed Grouse (*Tympanuchus phasianellus*) in having a black belly and lacking white outer tail feathers. Hybrid Greater Sage-Grouse X Sharp-tailed Grouse infrequent across range but reported in central Montana, southeastern Alberta, western North Dakota (Eng 1971; Kohn and Kobriger 1986; Aldridge et al. 2001).

## Habitat

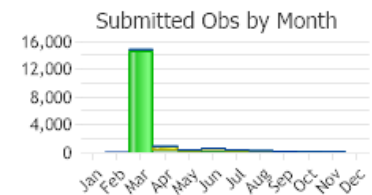
Closely associated with sagebrush habitat types. Adapted to a broad mosaic throughout range, including relatively tall sagebrush (*Artemisia tridentata*, *A. tripartita*, *A. cana*), relatively low sagebrush (*A. arbuscula*, *A. nova*), forb-rich mosaics with low and tall sagebrush, riparian meadows, steppe, scrub willow, sagebrush savanna (with juniper, ponderosa pine, aspen). Use altered habitats, such as alfalfa, wheat, crested wheatgrass, but degree depends on association with native habitat. Leks in sites with reduced herbaceous and shrub cover surrounded by potential nesting habitat, often on broad ridgetops, grassy swales, disturbed sites, dry lake beds,



Range  Year-round



# Observations: 17929



cultivated fields. Nesting habitat usually in thick shrub cover dominated by sagebrush, sometimes grass or other shrub species. Brood habitat a mosaic of sagebrush, riparian meadow, greasewood, alfalfa, grain fields, rich in forbs and insects. Winter range similar to breeding range and dominated by sagebrush cover types (Schroeder et al. 1999; Crawford et al. 2004). Annual variation in habitat use in Montana similar to most surrounding areas (Dusek et al. 2002); sagebrush removal results in decline or loss of sage-grouse (Martin 1970; Wallestad 1975a; Swenson et al. 1987), as does habitat fragmentation/disturbance of sagebrush related to coal-bed natural gas energy development (Walker et al. 2007).

Leks in Montana often in clearings surrounded by sagebrush, including natural clearings, old burns, clearings around abandoned homesteads. When not on lek, males in central Montana feed and loaf predominantly where sagebrush cover is 20-50% (mean = 32%), avoid sagebrush cover < 10% (Wallestad and Schladweiler 1974; Wallestad 1975b; Dusek et al. 2002). In Beaverhead County, some males moved from leks to irrigated hayfields/wetlands with adjacent sagebrush patches, others to a variety of sagebrush habitats (Wyoming big sage, mountain big sage, three-tip sage), eventually to high elevation dense sagebrush (25-35% canopy cover) surrounded by forest (Roscoe 2002).

Females establish nests where sagebrush cover exceeds 15%, height of sagebrush averages 40.4 cm (Wallestad and Pyrah 1974). Similar results for Powder River Basin (including southeastern Montana), with average sagebrush canopy cover of 19.1% at nests; sites much more likely to be used for nesting when 75% of area within 100 m (patches of sage at least 200 m diameter) was high-density sagebrush (> 40% canopy cover) (Doherty et al. 2010); 99% of 258 nests in Phillips County established under shrubs, most of these (92%) under sagebrush (Moynahan et al. 2007). In Beaverhead County, hens nest in some cases near irrigated hayfields/wet meadows with adjacent sagebrush patches (Roscoe 2002). In southeastern Alberta, 90% of 29 nests placed under silver sage in locations where sage was taller and denser than at random: mean sage canopy cover = 32%, mean sagebrush height = 41.3 cm (Aldridge and Brigham 2002).

Brood habitat in central Montana dominated by relatively open stands of sagebrush. In one study (Peterson 1970), 100% of brood occurrences in sagebrush in June, declining to 50% by September (with corresponding increase in use of grass and greasewood); average cover of sagebrush on brood sites increased from 6% in June to 12% in August, with average height of sagebrush ranging from 40.6 cm in June to 50.8 cm in September. In a second study, (Wallestad 1971, 1975b) sagebrush cover at brood sites averaged 14% in June, 10% in August, 21% in September, with overall forb cover in two years of 17-27% and grass cover 47-51%; mean shrub heights were 17.8 cm in June, 25.4 cm in August. In Beaverhead County, Montana brood canopy cover during June-September averaged 24% shrubs (mostly sagebrush), 35% grass, 22% forbs, with average height of sagebrush 22.9-38.1 cm at brood locations (Martin 1970). In southeastern Alberta, brood habitat was in silver sagebrush denser and taller than at random: 20.9% mean sagebrush canopy cover, 32.0 cm mean sagebrush height (Aldridge and Brigham 2002).

Winter habitat in central Montana generally relatively tall, dense, and extensive sagebrush stands with 20% or greater mean canopy cover (range= 6.4-53.9%) for both feeding/loafing and roosting sites (about 78-82% of all observations fall in this cover category); height of sagebrush for feeding/loafing and roosting sites averages about 25.4 cm (Eng and Schladweiler 1972; Wallestad 1975b). More open stands used as weather moderates prior to lek formation. In Powder River Basin (including Bighorn, Rosebud, Powder River counties, Montana), use areas where sagebrush and grass >95% of total vegetation cover on landscape, with sagebrush cover averaging 75% (Doherty et al. 2008). Tall dense stands of sagebrush the primary winter habitat in Beaverhead County (Roscoe 2002).



## Loggerhead Shrike *Lanius ludovicianus*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G4

State Rank: S3B

#### Agency Status

USFWS: MBTA

USFS:

BLM: SENSITIVE

FWP SWAP: SGCN3

PIF: 2

## General Description

Slightly smaller than the American Robin (*Turdus migratorius*), the total length of this bird averages 23 cm. Males and females are similar in appearance. This species has a stout, hooked bill that has dark upper and lower mandibles. It has a broad black mask extending above the eye and thinly across top of bill. Its head and back are covered with a bluish-gray cowl, while its underparts and rump are white or grayish-white (underparts are very faintly barred in adults). It has a black tail with white tip and large white patches on black wings. Juveniles are paler and barred overall, with brownish-gray upperparts and buffy wing patches (Miller 1931, Fraser and Luukkonen 1986). Most nests are made of coarse twigs with a lining of plant material and animal hair (Fraser and Luukkonen 1986).

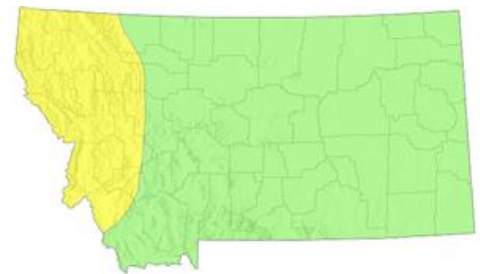
For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

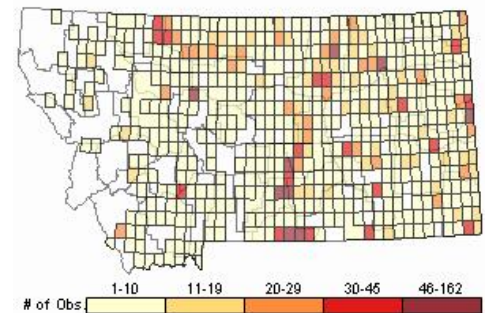
Loggerhead Shrikes differ from Northern Shrikes (*Lanius excubitor*) by having the base of the lower mandible black instead of pale, unbarred or barely barred underparts (adults), a shorter and less hooked bill, a darker head and back, and a more extensive black mask. They differ from the Northern Mockingbird (*Mimus polyglottos*) by having a black mask and a shorter, less curved bill.

## Habitat

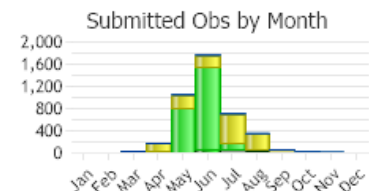
Open landscapes with short vegetation, including pastures with fence rows, mowed roadsides, agricultural fields, riparian areas, and open woodlands (Yosef 1996). In Idaho, nests are found in sagebrush (65%), bitterbush, and greasewood, and are equally successful in all three (Woods and Cade 1996).



Range Summer Migratory



# Observations: 4191





## Grizzly Bear

*Ursus arctos*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G4

State Rank: S2S3

#### Agency Status

USFWS: LT

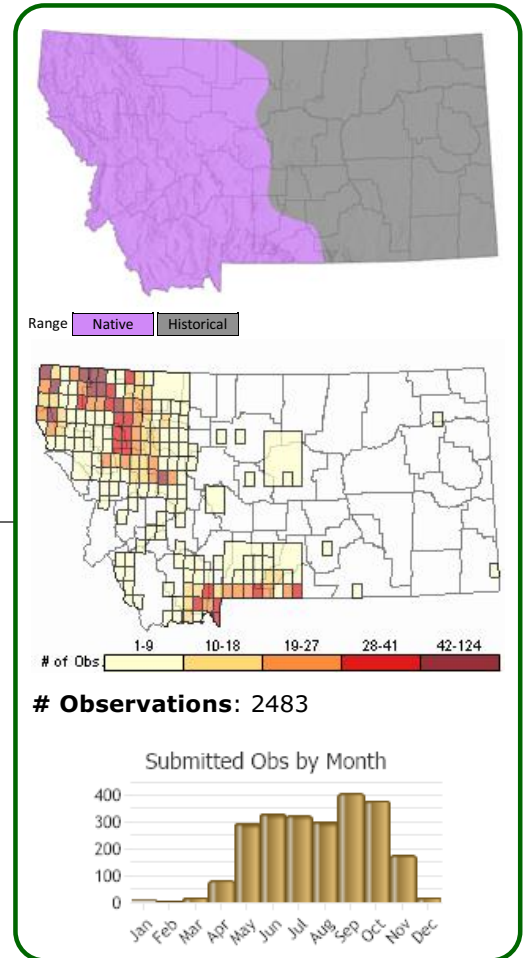
USFS:

BLM: THREATENED

FWP SWAP: SGCN2-3

## General Description

Grizzly Bears have a massive head with a prominent nose, rounded inconspicuous ears, small eyes, short tail and a large, powerful body (Pasitschnaik-Arts 1993). The facial profile is concave and there is a noticeable hump above the shoulders. The claws on the front feet of adults are about 4 inches long and slightly curved. Grizzly Bears range widely in color and size. The most prevalent coloration of Grizzly Bears in Montana is medium to dark brown underfur, brown legs, hump and underparts, with light to medium grizzling on the head and back and a light patch behind the front legs. Other forms, lighter or darker with varying levels of grizzled hair patches, occur in lesser numbers. Although extremely variable depending on the season, adults are around 185 centimeters long (Foresman 2012) and weigh around 200 kilograms in males and 130 kilograms in females (Kasworm and Manley 1988).



## Diagnostic Characteristics

Adult Grizzly Bears differ from American Black Bears (*Ursus americanus*) in being larger and by having a hump above the shoulders, a concave (rather than straight or convex) facial profile, shorter and more rounded ears, a rump lower than the shoulder hump, and longer, less curved claws usually evident in the tracks. Identification can be difficult at times and Montana Fish, Wildlife and Parks has developed an Online Bear ID Test to help people better distinguish between American Black Bears and Grizzly Bears.

## Habitat

In Montana, Grizzly Bears primarily use meadows, seeps, riparian zones, mixed shrub fields, closed timber, open timber, sidehill parks, snow chutes, and alpine slabrock habitats. Habitat use is highly variable between areas, seasons, local populations, and individuals (Servheen 1983, Craighead and Mitchell 1982, Aune et al. 1984). Historically, the Grizzly Bear was primarily a plains species occurring in higher densities throughout most of eastern Montana.



**Bat Roost (Non-Cave)**  
*Bat Roost (Non-Cave)*

[View in Field Guide](#)

**Important Animal Habitat**

**Native Species**

Global Rank: **GNR**

State Rank: **SNR**

**# Observations:** 1624

**No photos are currently available**

**Agency Status**

USFWS:

USFS:

BLM:

**General Description**

---

Information on this species is incomplete.



# MONTANA STATE LIBRARY

NATURAL HERITAGE PROGRAM [mtnhp.org](http://mtnhp.org)

1201 11th Ave • P.O. Box 201800 • Helena, MT 59620-1800 • fax 406-444-0266 • phone 406-444-3989

## Other Observed Species

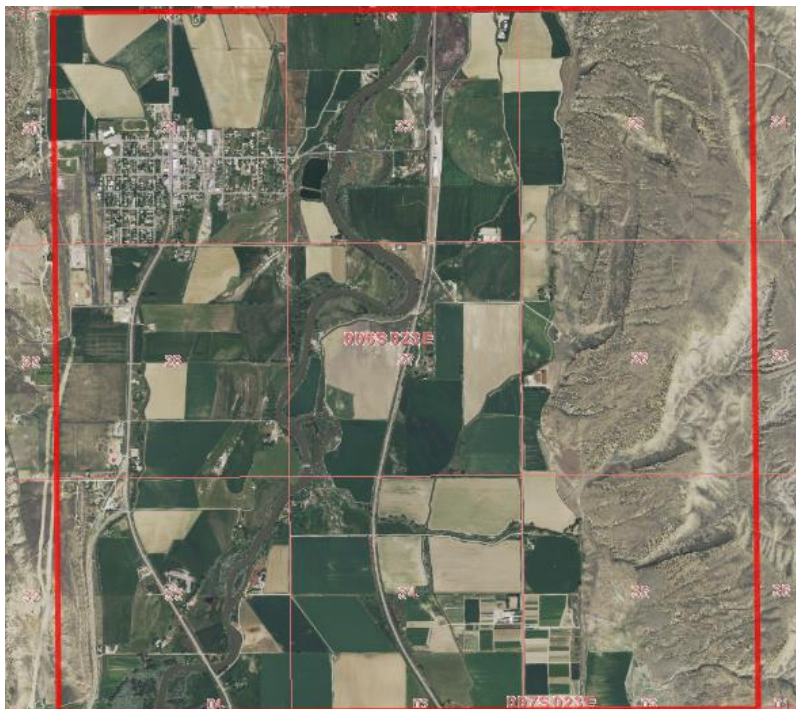
### from Environmental Summary



| Latitude | Longitude  |
|----------|------------|
| 45.26137 | -108.86246 |
| 45.30482 | -108.92489 |

Summarized by: 006S023E027 (Buffered PLSS Section)

Filtered by: Species with MT Status = Species of Concern, Special Status, Important Animal Habitat, Potential SOC



Suggested Citation: Montana Natural Heritage Program. Environmental Summary Report. Custom Field Guide. Summarized by: 006S023E027 (Buffered PLSS Section). Filtered by: Species with MT Status = Species of Concern, Special Status, Important Animal Habitat, Potential SOC. Retrieved on 8/11/2023.

**Note:** This PDF version of the Montana Field Guide is intended to assist in offline identification and field work. It is not intended to replace the online Field Guide, as that version contains more information and is updated daily. For the most up-to-date information on Montana species, please visit [FieldGuide.mt.gov](http://FieldGuide.mt.gov)

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.





## White-tailed Prairie Dog

*Cynomys leucurus*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: **G4**

State Rank: **S1**

#### Agency Status

USFWS:

USFS: **SENSITIVE**

BLM: **SENSITIVE**

FWP SWAP: **SGCN1**

## General Description

White-tailed prairie dogs are medium-sized squirrel-like rodents. Adults weigh around 500-1000 grams; males are about 36 centimeters long and females 31 centimeters long (Foresman 2012). Legs are short and feet have well developed claws for digging. The tail is short and flattened with a whitish tip. The back is a yellowish-buff mixed with black that becomes lighter on the belly. Distinctive brownish-black patches are present above the eyes and on the cheeks.

## Diagnostic Characteristics

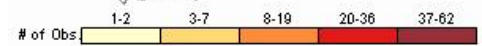
Distinguished from the only other prairie dog found in Montana, the black-tailed prairie dog (*Cynomys ludovicianus*), by its smaller size and white-tipped tail (Foresman 2012).

## Habitat

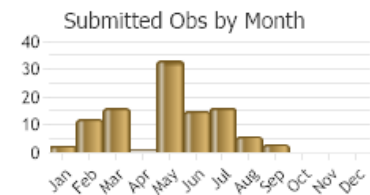
Throughout their range, white-tailed prairie dogs inhabit xeric sites with mixed stands of shrubs and grasses. In Montana they inhabit these habitats dominated by two types of vegetation: areas with Gardener's saltbush (*Atriplex gardneri*) with lesser amounts of big sage, and areas with small-flowered marsh-elder (*Iva axillaris*) and winterfat (*Krascheninnikovia lanata*) (Flath and Paulick 1979). They live at higher elevations and in meadows with more diverse grass and herb cover than do black-tailed prairie dogs (Wilson and Ruff 1999) although their range in Montana is at relatively lower elevations than other areas across their distribution (Foresman 2012).



Range  Native



# Observations: 128





## American White Pelican

*Pelecanus erythrorhynchos*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G4

State Rank: S3B

#### Agency Status

USFWS: MBTA

USFS:

BLM:

FWP SWAP: SGCN3

PIF: 3

## General Description

The American White Pelican is a large, white bird (length: 127 to 165 cm; weight: most birds 5.0 to 9.0 kg; wingspan: 2.4 to 2.9 m) with black primaries and outer secondaries, an enormous bill with distensible gular pouch, and totipalmate webbed feet. It is often seen in flocks, and when in flight it flies with the head withdrawn. In the early breeding season the bill and legs are bright orange, the head has white plumes, and there is a laterally flattened horn on the upper mandible. Later the leg color fades, the head darkens, and the plumes and horn are lost (Evans and Knopf 1993).

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

The American White Pelican is unlike other North American birds, except the Brown Pelican (*Pelecanus occidentalis*), which does not occur inland, and is smaller with generally darker body plumage, and often forages by plunge-diving, whereas the American White Pelican does not (Evans and Knopf 1993). The Snow Goose (*Chen caerulescens*) and Whooping Crane (*Grus americana*) display contrasting black primaries and a white body when in flight, similar to the American White Pelican, but are quite different otherwise in appearance and behavior. Snow Geese are much smaller and fly with their neck extended. Whooping Cranes are often confused with American White Pelicans but are easily distinguished because they fly with their legs and neck extended.

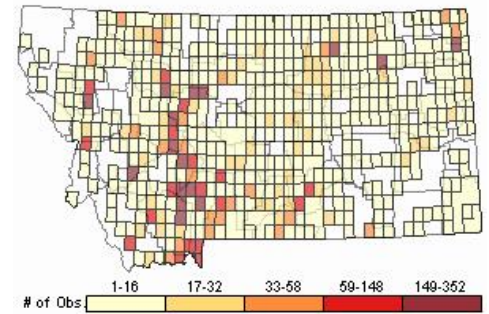
## Habitat

Habitat use in Montana appears similar to other areas within the breeding range. American White Pelicans occur on a variety of aquatic and wetland habitats, including rivers, lakes, reservoirs (both large and small), estuaries, bays, marshes, and sometimes in inshore marine habitats. These habitats are used variously for nesting, loafing, and feeding. They rest on islands and peninsulas, as well as exposed rocks in rivers. Nesting colonies usually are situated on islands or peninsulas in brackish or freshwater lakes, where they are isolated from mammalian predators. Nests are built on the ground in slight depressions or on mounds of earth and debris, usually on low, flat, or gently sloping terrain. They may use dredge spoil or natural islands. Usually nests are built in an open area, but often near vegetation, driftwood, or large rocks (Spendelov and Patton 1988). There is increasing concentration and feeding at catfish aquaculture operations during the non-breeding season (King and Grewe 2001).

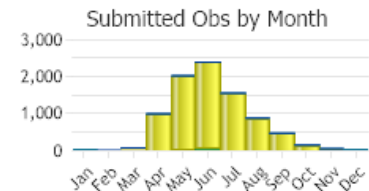
Montana breeding colonies are located in the eastern prairie regions on islands or peninsulas of low topographic relief at lakes and reservoirs. Cover at some colonies is minimal, with nests mostly or completely exposed, but nests are often under extensive stands of chokecherry (*Prunus virginiana*) in the main sub-colony at Medicine Lake (Hendricks and Johnson 2002). Feeding occurs near the colony as well as at remote locations (> 100 km) away from the colony in reservoirs, lakes, and along rivers.



Range Summer Migratory



# Observations: 9653





## Dickcissel

*Spiza americana*

[View in Field Guide](#)


**Potential Species of Concern**

**Native Species**  
**Global Rank:** G5  
**State Rank:** S4B

**Agency Status**  
**USFWS:** MBTA  
**USFS:**  
**BLM:**  
**PIF:**

### General Description

The Dickcissel is a sparrow-sized bird about 6 inches long with males about 10 to 20% larger than females (Temple 2002). Males have an overall grayish head with a striking yellow line above the eye (supercilium). The chin is white, bordered by yellow malar stripes with a black throat patch beneath. Males also have lateral throat stripes on either side of the black patch. The breast is bright yellow and the belly is white-gray. The back is streaked brownish and the tail and wings are blackish. The wings also have a significant brown or chestnut color at the shoulders (Temple 2002). Adult females have a less distinct head and facial pattern with no black throat patch, smaller, less obvious lateral throat stripes and a duller yellow breast. Also, the chestnut colored shoulder patches are much more pale compared to the adult male (Temple 2002). Immature Dickcissels are fairly similar in appearance to the adult female, but have a drabber plumage than the adult female (Temple 2002).

The song of the male Dickcissel is obvious when heard, as the bird appears to state its own name by singing "dick, dick, cissel" or "see, see, dick, dick, ciss, ciss, ciss" (National Geographic Society 1987, Temple 2002). The flight call, given by both sexes is often described as an electric buzz or buzzer-like "bzrrrt" or "fpppt."

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

### Diagnostic Characteristics

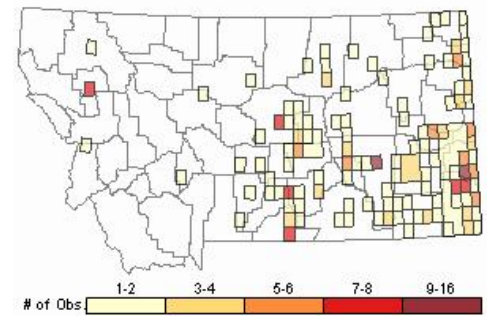
The combination of black throat patch, bright yellow breast and chestnut colored shoulder patches distinguish the male Dickcissel. No other species in North America has this combination of characteristics (Temple 2002). The female and juvenile Dickcissel have similarities in size and coloration to the female House Sparrow (*Passer domesticus*). However, female and juvenile Dickcissels have lateral throat stripes, paler and longer bills, and streaked thighs, where the House Sparrow does not (Temple 2002). They are also slimmer in appearance than the House Sparrow.

### Habitat

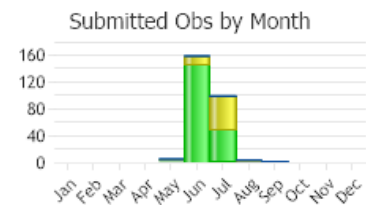
No specific habitat information for Montana is currently available, as systematic surveys for Dickcissels have not been done. Habitat information from other Dickcissel sources state that breeding habitat is grasslands, meadows, savanna, cultivated lands, and brushy fields (American Ornithologists Union 1998). They nest on the ground in grass or rank herbage, or raised a little above ground, in grass tufts or tall weeds, or in low shrubs or trees, up to about 2 meters above the ground but usually low (Harrison 1978). They prefer habitat with dense, moderate to tall vegetation (particularly with some forbs) and moderately deep litter. Suitable habitats are found in old fields, hayfields, fencerows, hedgerows, road rights-of-way, planted cover (e.g., Conservation Reserve Program [CRP] fields and dense nesting cover), and moderately grazed and idle prairie. A high abundance of forbs provides perches, nesting cover, nest support, and possibly increased invertebrate abundance.



Range Summer Migratory



# Observations: 268



Nests are elevated in grasses, forbs, shrubs, or trees, and less commonly on the ground in thick vegetation (Gross 1921, Overmire 1962, 1963, Meanley 1963, Zimmerman 1966, Blankespoor 1970, Fretwell 1977, Frawley 1989, Winter 1998). Nest heights range from 0 to 2 meters (Taber 1947, Ely 1957, Meanley 1963, Von Steen 1965, Gross 1968, Berry 1971, Roth 1980, Laubach 1984, Winter 1998). Hayland is used more frequently for nesting than cropland (Gross 1968, Faanes and Lingle 1995). Occasionally they will nest in strip cover such as roadside ditches, fencerows, and grassed waterways (Gross 1921, Meanley 1963, Basore et al. 1986, Bryan and Best 1991, 1994, Camp and Best 1994, Warner 1994). Nests in road rights-of-way or other edge habitats, however, can experience high rates of depredation (Basore et al. 1986, Camp and Best 1994).

The non-breeding habitat of Dickcissels consists mainly of a variety of open habitats, second growth, and scrub (American Ornithologists Union 1998). They are also often found in rice-growing regions in winter (Ehrlich et al. 1992). They prefer to roost in sugarcane (*Saccharum spp.*) fields, but if not available, they will utilize bamboo, cattail marshes, grasses, and shrubs (Basili and Temple 1999).



## Pinyon Jay

*Gymnorhinus cyanocephalus*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G3

State Rank: S3

#### Agency Status

USFWS: MBTA; BCC10;  
BCC17

#### USFS:

BLM:

FWP SWAP: SGCN3

PIF:

## General Description

Pinyon Jays are small-medium and crestless, about 26-29 cm in total length. The bill is more pointed and the tail shorter than in other jays. Adult plumage is entirely dull blue, except chin, throat and breast region streaked whitish, and inner webs of primaries black. Sexes are alike in appearance, except crown is slightly deeper blue in males and female bill is slightly longer.

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

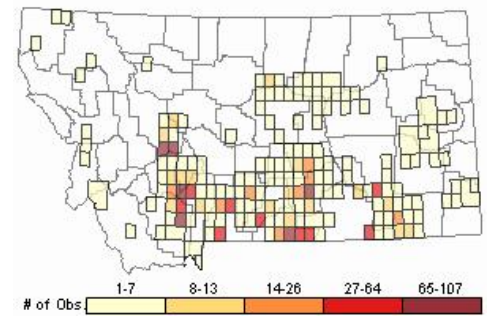
Distinguished from all other sympatric jays by the combination of overall blue color, shorter tail, and lack of crest.

## Habitat

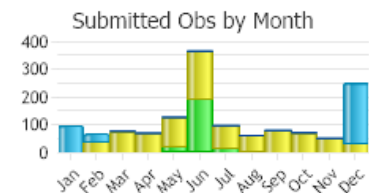
Pinyon Jays are closely associated with pinyon-juniper habitat in the southwestern U.S., but in Montana they occur in low-elevation ponderosa pine and limber pine-juniper woodlands. They build bulky cup nests of twigs and grasses and place them on horizontal limbs of pines. The few nests reported from Montana have been in ponderosa pines (Cameron 1907) or limber pines (T. McEaney, personal communication).



Range  Year-round



# Observations: 1583





## Long-billed Curlew

*Numenius americanus*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S3B

#### Agency Status

USFWS: MBTA; BCC11

USFS:

BLM: SENSITIVE

FWP SWAP: SGCN3

PIF: 2

## General Description

The Long-billed Curlew is the largest shorebird in North America. It is considered an endemic to the Great Plains. The Long-billed Curlew's long, decurved bill is adapted for capturing invertebrates living in mudflats on its wintering grounds (Dugger and Dugger 2002). Its familiar "curlew" call can be heard throughout the mixedgrass prairie of Montana during the spring and summer.

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Phenology

Migrants arrive in Montana late March to mid-April. Adults observed on nests with eggs in mid- to late-May. Adults with young birds observed in early June to early July. Females leave breeding grounds before males; tagged females left around June 28 and tagged males left July 28 (see Migration, below).

## Diagnostic Characteristics

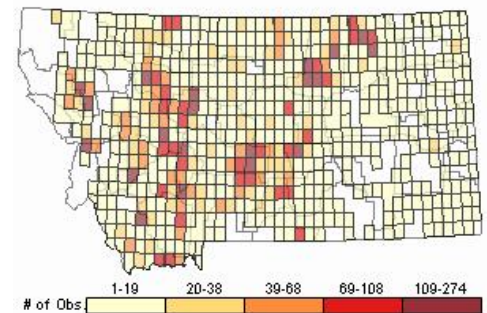
The large size, long decurved bill, and cinnamon color is diagnostic of this species. Sexes are similar in appearance, but females average slightly larger than males. Plumages are similar throughout the year. Body is a rich buff tinged with cinnamon or pink. Upperparts are streaked with dark brown. Juveniles are similar to adults except the bill is much shorter (Dugger and Dugger 2002).

## Habitat

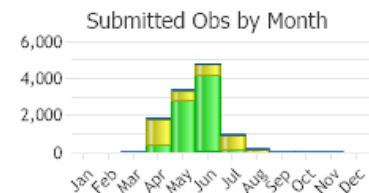
The Long-billed Curlew breeds in mixedgrass prairie habitats and moist meadows throughout Montana. It prefers to nest in open, short-statured grasslands and avoids areas with trees, dense shrubs, or tall, dense grasses (Dugger and Dugger 2002).



Range  Summer  Migratory



# Observations: 11377





## Northern Leopard Frog

*Lithobates pipiens*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S1,S4

#### Agency Status

USFWS:

USFS: SENSITIVE

BLM: SENSITIVE

FWP SWAP: SGCN1

## General Description

### EGGS:

Eggs are laid in a single orange to grapefruit-sized, somewhat flattened globular mass and are usually attached to submerged vegetation. Egg masses are laid individually or communally in groups of up to three dozen egg masses (Nussbaum et al. 1983). Egg masses contain from 645 to 6,272 eggs ( $X = 3,045$ ,  $N = 68$  for completely counted egg masses at five sites in Colorado and Wyoming) (Corn and Livo 1989). Each ovum is black above, white below, and is surrounded by two jelly layers (Livezey and Wright 1947). Ovum diameters are approximately 1.7 mm, but total egg diameters, including the jelly layers, are approximately 5.0 mm (Livezey and Wright 1947).

### LARVAE:

Body and tail musculature are dark brown to olive or gray with flecks of light gold or silver and black (Bryce Maxell, personal observation). The tail musculature may be pale (Corkran and Thoms 2006). The lateral body surface has a larger proportion of light gold or silver flecks, and the ventral body surface is silvery white to transparent. The tail fin is clear to yellowish with black and light gold or silver flecks and is less than 1.5 times the body length. (Bryce Maxell, personal observation). The dorsal tail fin begins anterior to the tail musculature when viewed from the side. The anus is on the right side in front of the fin, not on the midline. The eyes fall within the outline of the head when viewed from above. Lateral oral papillae are strongly indented toward the corners of the mouth, and the lower mandible is noticeably thicker than the upper. (Werner et al. 2004). Tadpoles have a total length of 5.5-100 mm (Livo 1981 as cited in Hammerson 1999, Hammerson 1999).

### JUVENILES AND ADULTS:

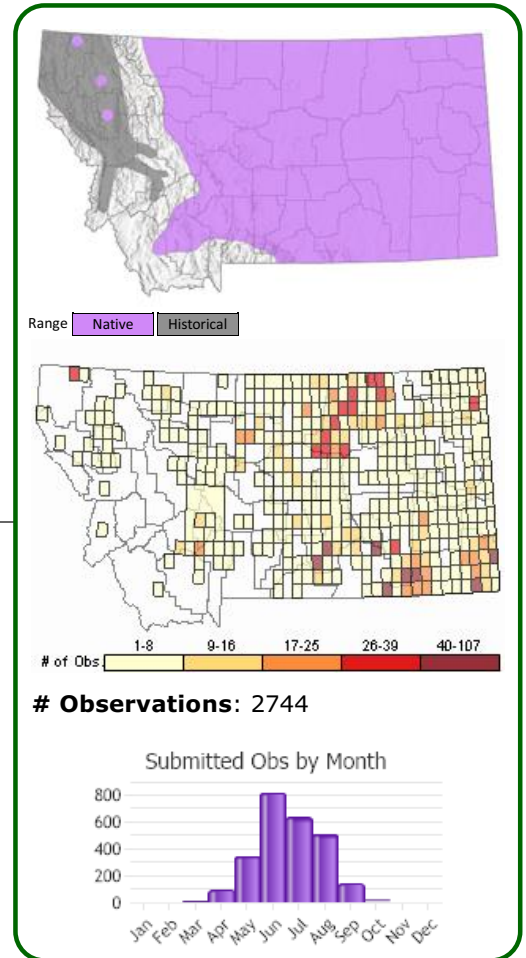
White to cream stripes extend from the tip of the snout laterally underneath the eye to just above the base of the front limb and from just behind each eye to the base of the hind limbs (Bryce Maxell, personal observation). Dorsal base color is either green or brown with large, oval shaped, black spots that are regular in outline and are surrounded with a light halo (Fogleman et al. 1980). Individuals occasionally have a blue to light blue base color (Black 1969a, Hammerson 1999). Ventral color is white to cream with some pinkish patches, especially on the feet. The hind feet have extensive webbing (Bryce Maxell, personal observation). Snout-vent Length (SVL) of 18-110 mm (Nussbaum et al. 1983, Hammerson 1999).

### VOICE:

Although both male and female frogs can make croaks, males are typically louder. The mating calls are short (2-3 seconds) and grating sequence of notes with chortles followed by guttural clucking, grunts and squeaks (Werner et al. 2004). Calls are not very loud and can be heard up to a distance of 20 meters (approximately 65 feet) (Bryce Maxell, personal communication).

## Diagnostic Characteristics

Adult Columbia Spotted Frogs (*Rana luteiventris*) often have red or salmon color on their ventral surface. Their dorsal surface has small, irregularly shaped black spots with white or light-yellow centers. Adult Bullfrogs (*Lithobates catesbeianus*) lack the white to yellowish stripe on the lateral portion of the snout and have



tympanums that are the same size or larger than their eye. There is a fold of skin that extends from the back of their eye, over their tympanum, down to their front leg.

Larval Columbia Spotted Frogs have tails that are usually twice their body length with large flecks of black on their body or tail. They often have a metallic copper sheen on the lateral edges of their ventral surfaces. Larvae of the American Bullfrog have a bright to creamy yellow ventral surface with perfectly round black dots on their dorsal surface and tail musculature. The tadpole of this species is much larger in size.

The eggs of Columbia Spotted Frog have diameters approximately twice those of the Northern Leopard Frog because their jelly envelopes are much larger (see descriptions). Additionally, the egg masses of the Columbia Spotted Frog are usually at the water's surface and not attached to vegetation (Ross et al. 1994b). American Bullfrog eggs are laid in the middle of the summer and are spread out in a thin layer over the surface or bottom of a pond rather than a globular mass.

In Montana, extant populations of Northern Leopard Frog overlap Columbia Spotted Frog and American Bullfrog in very few locations. Northern Leopard Frogs are present mostly across the prairies of the eastern two-thirds of the state while the Columbia Spotted Frog and most American Bullfrog populations are in the mountainous western third. See species accounts for distribution to identify possible regions of co-occurrence.

## **Habitat**

---

In Montana, the Northern Leopard Frog is typically found in and adjacent to low elevation and valley bottom ponds, spillway ponds, beaver ponds, stock reservoirs, lakes, creeks, pools in intermittent streams, warm water springs, potholes, and marshes (Brunson and Demaree 1951, Mosimann and Rabb 1952, Black 1969a, Miller 1978, Dood 1980, Reichel 1995a, 1995b, Hendricks and Reichel 1996a, 1996b, Hendricks 1999a). Habitats tend to be permanent slow moving or standing water bodies with considerable rooted aquatic vegetation. However, individuals may range widely into moist meadows, grassy woodlands, and even agricultural areas (Nussbaum et al. 1983). In Montana adults are found primarily in riparian habitats or on the prairies near permanent waters without tall dense vegetation (Mosimann and Rabb 1952, Black 1969a, Miller 1978). There is no evidence that this species in Montana has ever occupied high elevation wetlands, in contrast to Wyoming and Colorado (Baxter and Stone 1985, Hammerson 1999).

Northern Leopard Frogs require a mosaic of habitats to meet annual requirements of all life stages. Generally separate sites are used for breeding and overwintering, but this may occur in the same pond in some cases. In summer, adults and juveniles commonly feed in open or semi-open wet meadows and fields with shorter vegetation, usually near the margins of water bodies, and seek cover underwater; taller, denser vegetation seems to be avoided. Adults overwinter on the bottom surface of permanent water bodies, under rubble in streams, or in underground crevices that do not freeze and are well oxygenated (Rand 1950, Emery et al. 1972, Baxter and Stone 1985, Cunjak 1986, Russell and Bauer 1993, Wagner 1997, Hammerson 1999).



## Franklin's Gull

*Leucophaeus pipixcan*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S3B

#### Agency Status

USFWS: MBTA; BCC10;  
BCC11; BCC17

#### USFS:

BLM: SENSITIVE

FWP SWAP: SGCN3

PIF: 2

## General Description

The Franklin's Gull is a small gull of wetlands in the interior of North America. In breeding plumage, this species has a black hood and a dark red bill with a black mark near the tip. The dark gray of the back extends to the upperpart of the wings. The underparts of the bird, including the wings, are white. The hindneck, the area between the black hood and the gray back, is also white. The underparts are sometimes tinged with pink, a coloration that earned the species the early name of Rosy or Prairie Dove (Burger and Gochfeld 1994). The legs are brownish-black or dusky (Burger and Gochfeld 1994). Broad white arcs directly above and below the black eye are apparent during the breeding season. The gray wings are tipped with a white band, then a black margin, and ultimately with large white primary ends.

In non-breeding plumage, the species loses the redness in the bill, and it becomes black. The black hood is reduced to an area from the eye to the back of the head, revealing a white forehead, throat, and splotchy crown. The bird averages 37 cm (14.5 inches) long with a wingspan of 91 cm (36 inches); the male tends to be slightly larger than the female (Sibley 2000). The vocalization of the Franklin's Gull is described as a nasal, laughing, hollow sound. A "kooiii" or "queel" are used to define the common call (Sibley 2000).

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

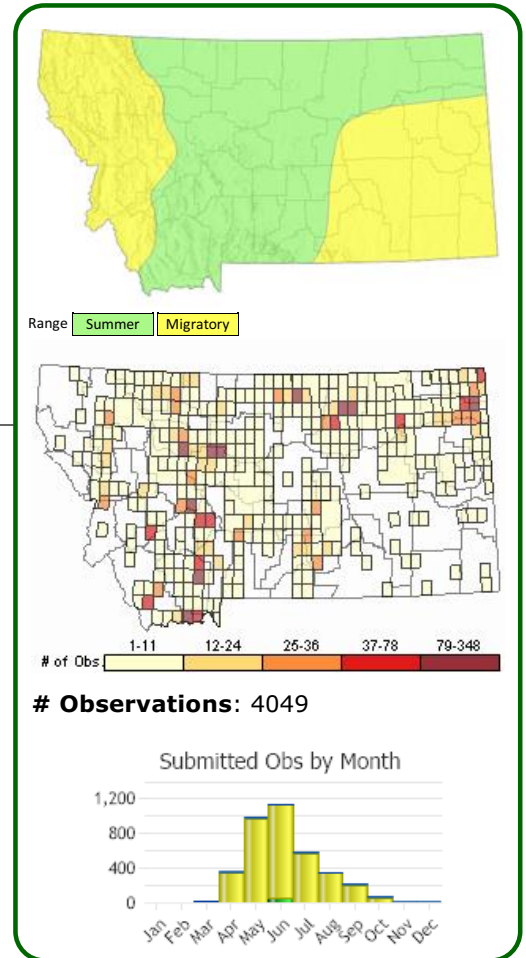
## Diagnostic Characteristics

The most likely species with which the Franklin's Gull could be confused is the Laughing Gull, a rare species in Montana. The Franklin's Gull is slightly smaller, with proportionately smaller legs and bill. The bill is thinner and does not droop at the tip as it does on the Laughing Gull (Burger and Gochfeld 1994). The arcs of white around the Franklin's Gull's eye are more apparent as are the large white primary tips of the wings; the wingtips on the Laughing Gull have white on them, but the white is small and is not always evident (Sibley 2000).

Differentiating the Franklin's Gull from the Bonaparte's Gull can be made by several distinguishing features. The Franklin's Gull is larger; the bill color is red in the Franklin's Gull compared to black in the Bonaparte's Gull; and unlike the indistinct white around the Bonaparte's Gull's eye, the white eye-arcs of the Franklin's Gull are obvious (Sibley 2000).

## Habitat

Preferring large, relatively permanent prairie marsh complexes, the Franklin's Gull builds its nests over water on a supporting structure of emergent vegetation. Nesting is noted to occur in cattails (*Typha* spp.) and bulrushes (*Scirpus* spp.) (Berger and Gochfeld 1994). Typical water depth is 30 to 60 cm. Nesting over water differs from the nesting habits of Montana's other, generally ground nesting, gulls (Johnsgard 1992). Franklin's Gulls prefer to nest at sites with intermediate vegetation density, interspersed with open water of various sizes (Burger and Gochfeld 1994). Preferred nesting sites within a wetland can change from year to year because of changes in water level and associated changes in vegetation (Burger and Gochfeld 1994). One key feature of selected nesting sites is that the water levels remain high enough throughout the nesting period, or at least until the young can fledge, in order to provide protection from predators (Casey 2000). During migration, including the



Bozeman area, the Franklin's Gull can be found feeding on dry land, especially in cultivated fields prior to planting (Skaar 1969, Johnsgard 1992).



## Clark's Grebe

*Aechmophorus clarkii*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S3B

#### Agency Status

USFWS: MBTA; BCC10;  
BCC11

#### USFS:

BLM:

FWP SWAP: SGCN3

PIF: 3

## General Description

Sexes similar in size and plumage. Clark's Grebe possesses a black crown, yellow bill, a narrow body with a long and thin white neck; back of neck gray. Top of body is mostly gray with speckled white spots. Coverts white with speckled gray.

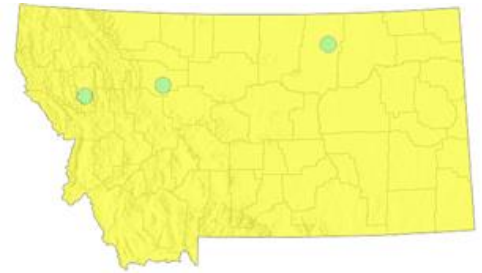
For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

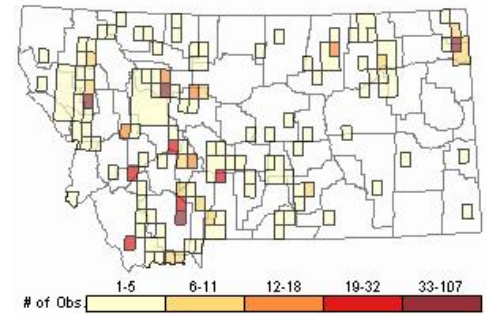
Clarks Grebe best distinguished from the Western Grebe by having white up the side of the head to include the eye (the black crown of Western Grebe extends down the side of the head to include the eye) and a yellow bill (not yellowish-green).

## Habitat

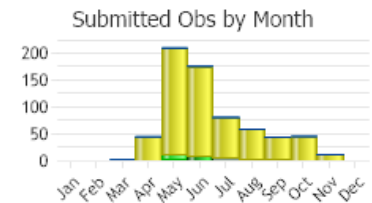
Clark's Grebes are reported breeding only at very large lakes and reservoirs in Montana.



Range  Summer  Migratory



# Observations: 751





# MONTANA STATE LIBRARY

NATURAL HERITAGE PROGRAM [mtnhp.org](http://mtnhp.org)  
1201 11th Ave • P.O. Box 201800 • Helena, MT 59620-1800 • fax 406-444-0266 • phone 406-444-3989

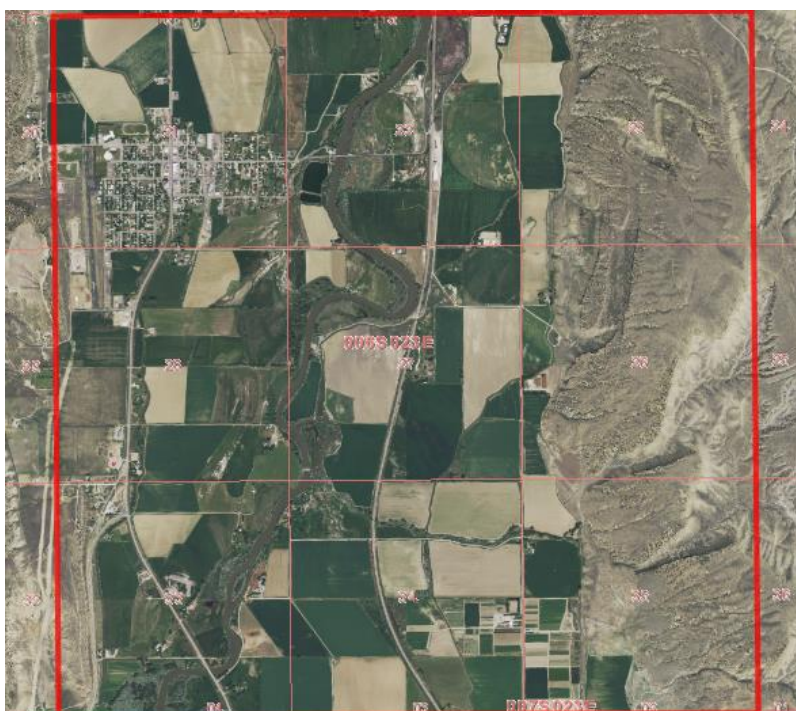
## Other Potential Species

### from Environmental Summary



| Latitude | Longitude  |
|----------|------------|
| 45.26137 | -108.86246 |
| 45.30482 | -108.92489 |

Summarized by: 006S023E027 (Buffered PLSS Section)  
Filtered by: Species with MT Status = Species of Concern, Special Status, Important Animal Habitat, Potential SOC



Suggested Citation: Montana Natural Heritage Program. Environmental Summary Report. Custom Field Guide. Summarized by: 006S023E027 (Buffered PLSS Section). Filtered by: Species with MT Status = Species of Concern, Special Status, Important Animal Habitat, Potential SOC. Retrieved on 8/11/2023.

**Note:** This PDF version of the Montana Field Guide is intended to assist in offline identification and field work. It is not intended to replace the online Field Guide, as that version contains more information and is updated daily. For the most up-to-date information on Montana species, please visit [FieldGuide.mt.gov](http://FieldGuide.mt.gov)

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.





# Burbot

*Lota lota*

[View in Field Guide](#)


**Potential Species of Concern**

**Native Species**

**Global Rank: G5**

**State Rank: S4**

**Agency Status**

**USFWS:**

**USFS:**

**BLM:**

## General Description

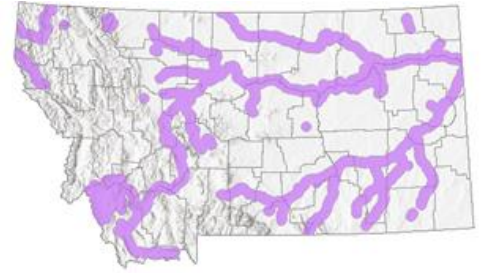
The burbot is easily recognized by its single chin barbel. It is native to most of Canada and the northern United States and is found in all three major river drainages in Montana. Burbot, also known as ling, are usually found in larger streams and cold, deep lakes and reservoirs. They are peculiar in that they spawn during winter, under the ice. They are also largely nocturnal and have an enthusiastic following among fishermen. Burbot are voracious predators and opportunistic feeders. Like other codfish, burbot have livers which contain oils high in vitamins A and D. Despite their unconventional appearance, fishermen rate burbot tops for table fare.

## Diagnostic Characteristics

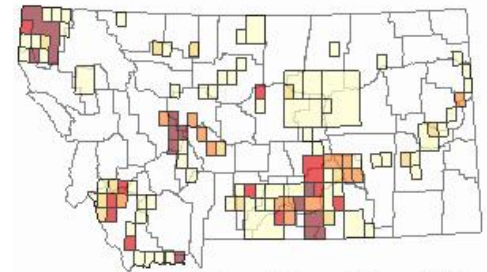
The skin of the burbot appears smooth, but tiny embedded scales are present.

## Habitat

Burbot habitat includes large rivers and cold, deep lakes and reservoirs. They spawn in shallow water, usually in rocky areas.

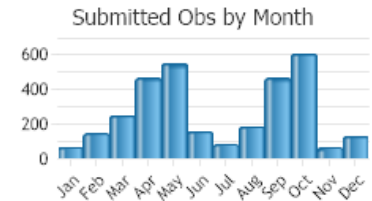


Range  Native



# of Obs 1-10 11-20 21-33 34-65 66-466

**# Observations: 3178**





## Hooded Merganser

*Lophodytes cucullatus*

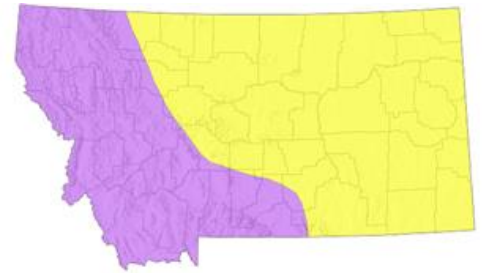
[View in Field Guide](#)


### Potential Species of Concern

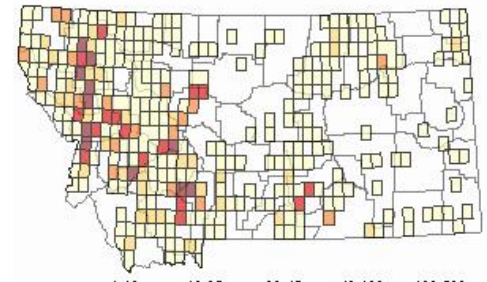
**Native Species**  
**Global Rank:** G5  
**State Rank:** S4

### Agency Status

**USFWS:** MBTA  
**USFS:**  
**BLM:**  
**FWP SWAP:** SGIN  
**PIF:** 2

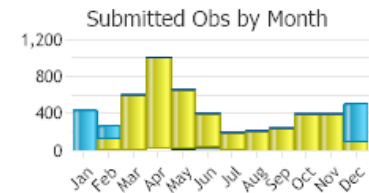


Range  Year-round  Migratory



# of Obs: 1-12 13-25 26-45 46-132 133-506

**# Observations:** 6235



## General Description

The Hooded Merganser is a small (length 46 cm) duck with a thin, serrated bill and a puffy crest. The adult male has a black head with a large white patch on each side, a dark back, brown flanks, and a white chest with two black bars on each side. The adult female is brownish overall, with a yellowish lower mandible. The first-winter male resembles the female. In flight, both sexes show black-and-white inner secondaries (Peterson 1980).

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

They differ from other mergansers in being smaller, having white head patches (males), and by lacking a red bill. They differ from the Bufflehead by lacking white sides.

## Habitat

Closely associated with forested wetland systems range-wide; a broad range of breeding habitats includes emergent marshes, small lakes, ponds, beaver wetlands, forested creeks and rivers, and swamps (Dugger et al. 2009). Hooded Mergansers are generally found in river areas bounded by woods and supporting good fish populations associated with clear water (Johnsgard 1992).



## Gray's Milkvetch

*Astragalus grayi*

[View in Field Guide](#)


### Species of Concern

**Native Species**

**Global Rank:** G4?

**State Rank:** S2S3

### Agency Status

**USFWS:**

**BLM:**

**State Threat Score:**

No Known Threats

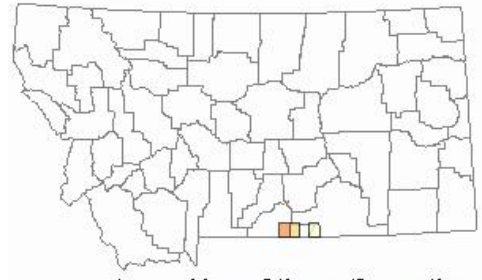
**CCVI:** Moderately

Vulnerable

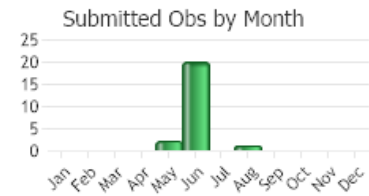
**C-value:**



Range  Native



# Observations: 23



## General Description

Gray's Milkvetch is an herbaceous perennial with numerous, simple or branched stems, 20-35 cm long and arising together from a branched rootcrown just below the ground. Alternate, pinnately compound leaves are 4-10 cm long with 3-11 wire-like leaflets. Leaves are rather stiff and often held erect or ascending. Foliage is thinly covered with long hairs. Unbranched inflorescences, 2-7 cm long, arise from the axils of upper leaves and have 9-27 somewhat congested, ascending flowers. Cream-colored, pea-like flowers have a partly reflexed upper petal that is 15-23 mm long and a calyx that is 6-10 mm long and thinly to densely covered with long white or black hairs. Oblong pods are green and fleshy, glabrous, round in cross section, and 9-18 mm long.

## Phenology

Flowering and fruiting in June.

## Diagnostic Characteristics

The combination of narrow, wire-like leaflets, no wider than the axis of the leaf, and erect stems and fruits is diagnostic. *Astragalus pectinatus* has similar foliage, but the pods are deflexed, and the stems often lie on the ground.

## Habitat

Open soil in sagebrush steppe in the valley zone.



## Yellow-billed Cuckoo

*Coccyzus americanus*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S3B

#### Agency Status

USFWS: PS: LT; MBTA

USFS:

BLM: THREATENED

FWP SWAP: SGCN3, SGIN

PIF: 2

## General Description

A slender bird with a long, distinctly patterned tail and white throat and breast. The back and head of the Yellow-billed Cuckoo are a plain grayish-brown. Consistent with its common name, the stout, somewhat curved bill is primarily yellow (the upper mandible is mostly black, with some yellow, while the lower mandible is yellow in its entirety). The boldly white and black patterned outer tail feathers, or rectrices, which from underneath give the appearance of 6 large white spots, can generally be observed during perching and in flight. The rufous primary feathers of this cuckoo are largely only visible in flight. The bird is generally 26 to 30 cm in length and weighs an average 55 to 65 grams (Hughes 1999). Females are slightly larger than males. The feet of the Yellow-billed Cuckoo are similar to that of the woodpeckers; they are zygodactylous; the two outer toes point backward while the two inner toes point forward (Hughes 1999).

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

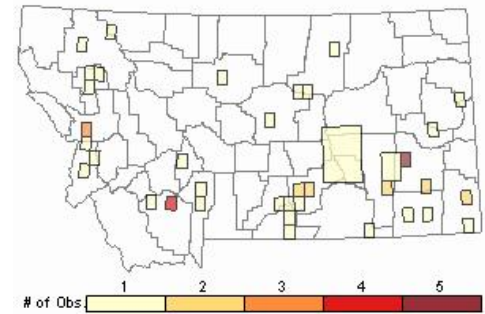
Characteristics of the Black-billed Cuckoo (*C. erythrophthalmus*), may cause some uncertainty in identification. In addition to a completely black bill, however, the Black-billed Cuckoo has a buffy throat, small distinct white tips on the rectrices (not large and obvious as on the Yellow-billed Cuckoo), little to no rufous on the wings, and a red orbital ring around the eyes. The juveniles are more easily confused (see Hughes 1999, for a comparative description of juvenile birds).

## Habitat

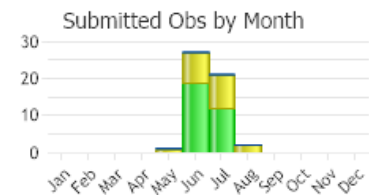
Throughout their range, preferred breeding habitat includes open woodland (especially where undergrowth is thick), parks, and deciduous riparian woodland. In the West, they nest in tall cottonwood and willow riparian woodlands. Nests are found in trees, shrubs or vines, an average of 1 to 3 meters above ground (Harrison 1979). Western subspecies require patches of at least 10 hectares (25 acres) of dense, riparian forest with a canopy cover of at least 50 percent in both the understory and overstory. Nests are typically found in mature willows (Biosystems Analysis, Inc. 1989). This bird is rarely found at higher elevations (Johnsgard 1986).



Range Summer Migratory



# Observations: 52





## Western Spotted Skunk *Spilogale gracilis*

[View in Field Guide](#)


**Potential Species of Concern**

**Native Species**

**Global Rank: G5**

**State Rank: SU**

**Agency Status**

**USFWS:**

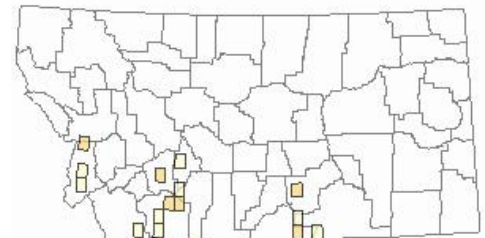
**USFS:**

**BLM:**

**FWP SWAP: SGIN**

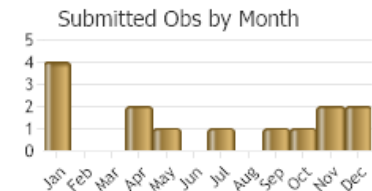


Range  Native



# of Obs: 1 2 3 4 5

**# Observations: 24**



### General Description

The Western Spotted Skunk is a small, relatively slender skunk with glossy black fur interrupted with distinct white stripes on the forward part of the body. The posterior part of the body has two interrupted white bands with one white spot on each side of the rump and two more at the base of the tail. The pattern of white lines and spots is individually unique. The top of the tail is black and the underside is extensively white. The tip of the tail is white. A white spot is present on the forehead and another in front of each ear. External measurements in males average 411 millimeters in total length, 122 millimeters for the tail and 50 millimeters for the hind foot. In females, external measurements average 387 millimeters in total length, 116 millimeters for the tail, and 47 millimeters for the hind foot. Males weigh about 630 grams, whereas females weigh about 450 grams (Foresman 2012).

### Diagnostic Characteristics

The distinctive black and white pattern of spots and stripes and much smaller size of the Western Spotted Skunk distinguish them from the more common Stripped Skunk (*Mephitis mephitis*), which have two solid white stripes along the side of the body and are nearly twice as large.

The color pattern resembles that of the Eastern Spotted Skunk, but the white markings are more extensive. The black and white stripes on the upper back are nearly equal in width whereas in the Eastern Spotted Skunk the black areas are much more extensive than the white. The tip of the tail is white while the tail tips of Eastern Spotted Skunks are black. In addition to external characteristics, the breeding cycle of the spotted skunks are different (see Reproduction below).

Only Western Spotted Skunks and Striped Skunks are known to occur in Montana, however Eastern Spotted Skunks may also occur in the southeastern part of the state (Foresman 2012).

### Habitat

The habitat of the Western Spotted Skunk in Montana is not well known, but they have been found in arid, rocky and brushy canyons and hillsides. Information from other portions of its range suggest that when they are inactive or bearing young they occupy a den in rocks, burrows, hollow logs, brush piles, or under buildings.



## Beaked Spikerush

*Eleocharis rostellata*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S3

#### Agency Status

USFWS:

USFS: SENSITIVE

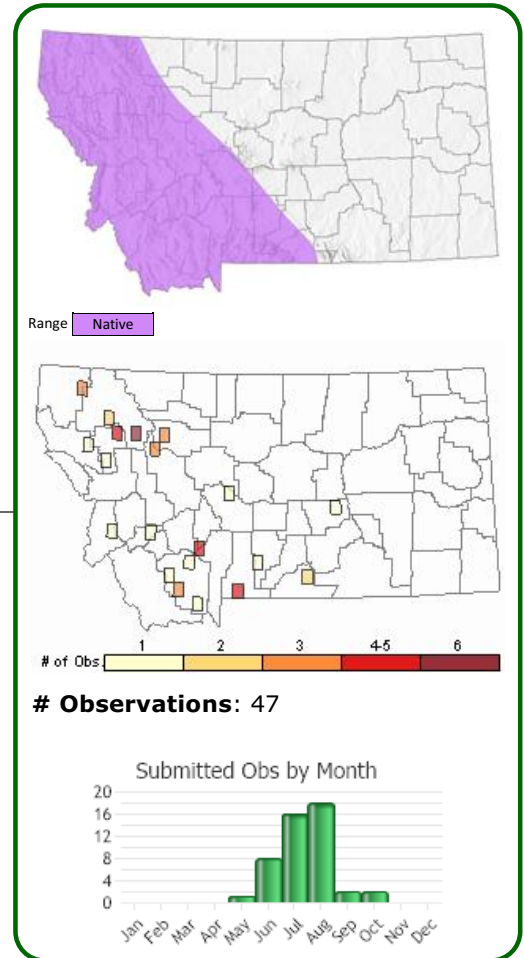
BLM:

State Threat Score:

Unknown

CCVI: Less Vulnerable

C-value: 9



## General Description

**PLANTS:** Cespitose, perennial herbs with erect or arching stems reaching 10 to 80 cm tall. Plants have short shallow rhizomes and may also root at the stem tip by means of an apical bulbil. Source: Lesica et al. 2012.

**LEAVES:** Leaves are bladeless and reduced to 2 sheaths on the lower stem. The sheath of the distal leaf is firm and persistent. Leaf tip obtuse to subacute without a tooth-like projection. Source: Lesica et al. 2012.

**INFLORESCENCE:** A 4 to 15 mm long single spikelet with few to many flowers. Florets are tightly packed and spirally arranged. Source: Lesica et al. 2012.

The specific epithet *rostellata* originates from the Latin adjective *rostellatus* meaning "equipped with a beak" or "beaklike" (Arsenijevic et al. 1995). *Eleocharis* is made up of the two Greek words *hele-* and *-charis* meaning "marsh" and "grace" respectively (Merriam-Webster).

## Phenology

Beaked Spikerush flowers in July; mature fruits develop from July to August (Smith *in* Flora of North America (FNA) 2002).

## Diagnostic Characteristics

Montana has eight *Eleocharis* species. They are generally mat-forming wetland herbs with inflorescences consisting of a single, solitary spikelet (Lesica et al. 2012).

### Beaked Spikerush - *Eleocharis rostellata*, SOC

\*Habit: A low-growing, tufted (cespitose) perennial. Stems are erect or arching and rooting at the tips.

\*Stems: More or less flat, some arching to the ground and rooting at the tips. Plants are 10-80 cm tall.

\*Spikelets: 4-10 mm long with few to many flowers.

\*Achenes: Grayish-green, about 2 mm long. The upper portion of the achene is conical and confluent with the lower portion that is 3-sided to nearly round in cross section.

\*Stigmas: 3

### Creeping Spikerush - *Eleocharis palustris*,

\*Habit: An erect, rhizomatous perennial.

\*Stems: More or less cylindrical stems that are 7-90 cm tall with purple bases.

\*Spikelets: 5-25 mm long with numerous flowers.

\*Achenes: A yellow to brown, smooth, obovate achene that is 2-3 mm long. The upper portion of the achene is pyramidal in shape and appearing separated from the lower portion which is orbicular to lenticular in shape.

\*Stigmas: 2

**Few-flower Spikerush** - *Eleocharis quinqueflora*,

\*Habit: An erect, short-rhizomatous perennial.

\*Stems: 5-25 cm tall and tufted.

\*Spikelets: 4-8 mm long and usually with 5 flowers.

\*Achenes: Brown, smooth, narrowly obovate, and 2-3 mm long. The upper portion of the achene forms a distinct beak that is confluent with the lower portion that is 3-sided.

\*Stigmas: 3

**Habitat**

---

*Eleocharis rostellata* prefers wet, often alkaline soils, associated with warm springs or fens in the valley and foothills zones of Montana (Lesica et al. 2012). It may also occur in various other types of alkaline wetlands including salt and brackish marshes, tidal flats, alkaline seeps, bogs, stream margins, hot spring edges, and swamps (Carey 1994).



## Pallid Bat

*Antrozous pallidus*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G4

State Rank: S3

#### Agency Status

USFWS:

USFS: SENSITIVE

BLM: SENSITIVE

FWP SWAP: SGCN3

## General Description

The Pallid Bat is large and pale, with large ears (not joined at base), large eyes, a simple muzzle, and a yellowish drab dorsal pelage that is paler towards the hair tips and darker at the base (palest in deserts, darkest along coast). The calcar lacks a keel. The total length is 92 to 135 millimeters, tail length is 35 to 53 millimeters, hind foot length is 11 to 16 millimeters, ear length is 21 to 37 millimeters, forearm length is 45 to 60 millimeters, and skull length is 18.6 to 24 millimeters. Females tend to be larger than males (mass 13.6 to 24.1 grams in males, 13.9 to 28.0 grams in females) (Hermanson and O'Shea 1983). The skull has 28 teeth (dental formula: I 1/2, C 1/1, P 1/2, M 3/3) (Nagorsen and Brigham 1993).

## Diagnostic Characteristics

The Pallid Bat differs from most other Vespertilionids found in Montana in having much larger ears, larger eyes, and paler pelage. The "pig-like" nostrils are also diagnostic. It differs from the Townsend's Big-eared Bat (*Corynorhinus townsendii*) by lacking the lumps on the nose, having ears that are not joined at the base, a pale rather than brownish pelage, and a larger body size. It differs from the Spotted Bat (*Euderma maculatum*) most noticeably by lacking the dark pelage with the prominent white spots. It is the only bat species found in Montana with two pair of lower incisors. Pallid Bats also have a distinctive skunky odor.

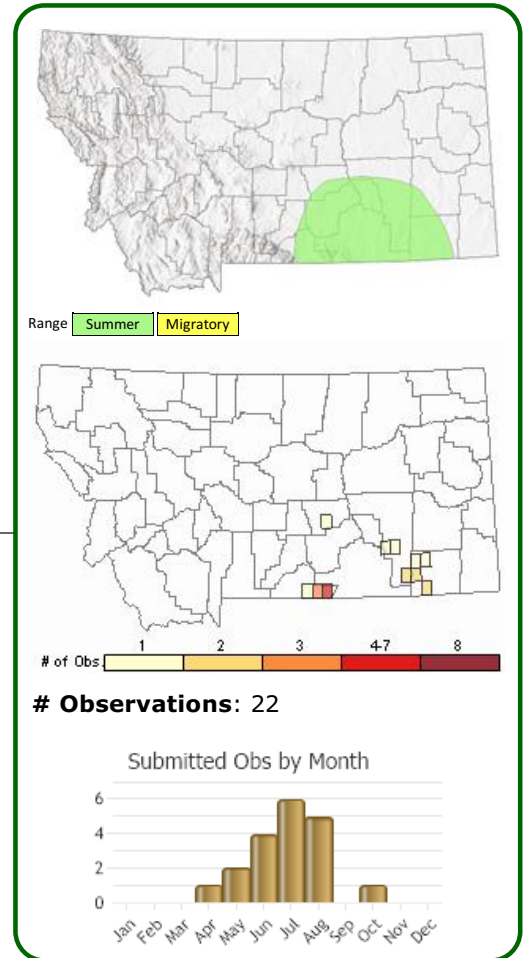
The species is readily identified in-hand, and both roost surveys and mist netting are effective survey tools for detection. Visual encounter surveys of rock outcrops where the observer looks under rocks and in cracks and crevices with a high-powered light have been effective as documenting this species, although detection rates are low. Mist-net captures at drinking sites have been the most effective survey technique. The species is typically captured at moderately sized reservoirs and ponds or smaller water sources that have adequate flyways to allow approach and departure of this large bat.

Detection using acoustic methods is possible. Three long-term detector stations have recorded Pallid Bat call sequences, but confidence in species identification is typically low and high volumes of calls are needed to determine presence.

## Habitat

Habitat at the Carbon County sites is Utah juniper (*Juniperus osteosperma*) and black sagebrush (*Artemisia nova*). The Rosebud County site is in an area of ponderosa pine (*Pinus ponderosa*) and big sagebrush (*Artemisia tridentata*). Both areas have rock outcrops (limestone or sandstone) in the immediate vicinity or within short flying distance. This species has not yet been detected at caves or abandoned mines in Montana, but has been found using crevices in sandstone outcrops; most observations have been at water sources (spring-fed streams or ponds; e.g. Carbon County) (Shryer and Flath 1980). However, habitat use in Montana by this species remains poorly known and unstudied.

At other locations, Pallid Bats have been found in arid deserts, juniper woodlands, sagebrush shrub-steppe, and



grasslands, often with rocky outcrops and water nearby. They are less abundant in evergreen and mixed conifer woodlands, but in British Columbia are found in ponderosa pine forest near cliffs (Nagorsen and Brigham 1993). They typically roost in rock crevices or buildings, less often in caves, tree hollows, under bridges, and in abandoned mines (Hermanson and O'Shea 1983, Verts and Carraway 1998); night roosts often are in caves in Oklahoma (Caire et al. 1989). Four summer roosts in Wyoming were in rock shelters (1), caves (2), and mines (1) (Priday and Luce 1997). Day and night roosts are usually distinct. In Oregon, night roosts were in buildings, under rock overhangs, and under bridges; Pallid Bats generally were faithful to particular night roosts both within and between years (Lewis 1994). Night roosts in British Columbia were often in cavities in ponderosa pine (Nagorsen and Brigham 1993). Day roosts include rock piles, tree hollows, and rock crevices. Pallid Bats found in caves or mines usually use crevices within these places (Hermanson and O'Shea 1983, Caire et al. 1989). Maternity colonies are often located in horizontal crevices in rock outcrops and man-made structures, where temperatures are a fairly constant 30 degrees.



## North American Porcupine

*Erethizon dorsatum*

[View in Field Guide](#)


**Potential Species of Concern**

**Native Species**

**Global Rank: G5**

**State Rank: S3S4**

**Agency Status**

**USFWS:**

**USFS:**

**BLM:**

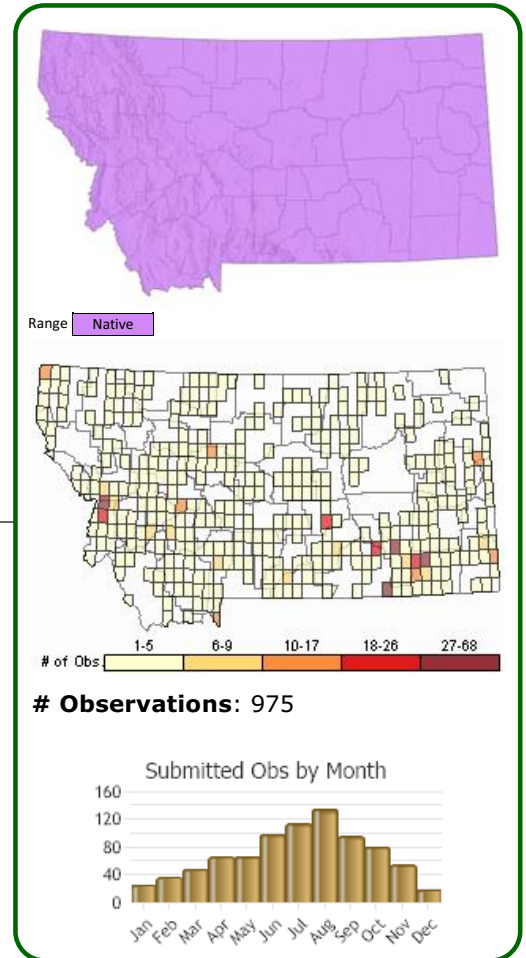
**FWP SWAP: SGIN**

### General Description

North American Porcupine adults in the Northwest average 30 inches long and 20 pounds in weight. Round, short-legged, and slow in movement, they are protected by a coat of quills that covers all but their underside and the insides of their legs. Up to 30,000 of these modified hairs, yellowish white and black- or brown-tipped, mix with coarse guard hairs, and lay over thick, brownish underfur. The hollow quill shafts may be up to 5 inches in length and the guard hairs twice as long. They concentrate on the rump and short tail. The Porcupine sheds this coat yearly. Long, heavy claws enable the Porcupine to climb and curl up in trees. Its excellent hearing and sense of smell make up for poor vision (Foresman 2012). At night the Porcupine's bright eyes appear red. Its grunts and high-pitched cries can be heard from a distance (Burt and Grossenheider 1964). Newborns are born with teeth, eyes open, and soft quills that harden within an hour. They can climb the same day.

### Habitat

Common in montane forests of western Montana, also occurs in brushy badlands, sagebrush semi-desert and along streams and rivers (Hoffmann and Pattie 1968). Rockfall caves, ledge caves, hollow trees, or brushpiles for dens (Dodge 1982).





## Eastern Screech-Owl

*Megascops asio*

[View in Field Guide](#)


### Potential Species of Concern

#### Native Species

Global Rank: G5

State Rank: S3S4

#### Agency Status

USFWS: MBTA

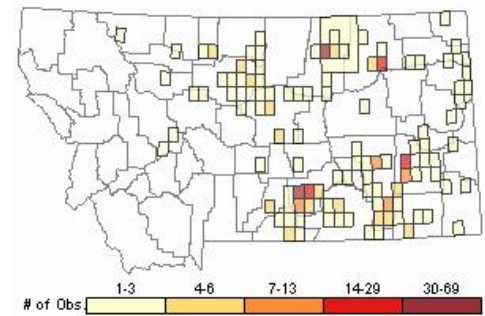
USFS:

BLM:

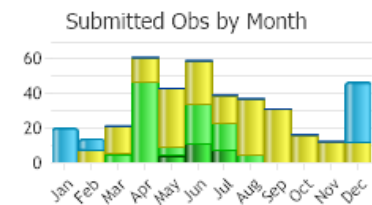
PIF: 3



Range  Year-round



# Observations: 421



## General Description

In the Eastern Screech-Owl, tufts are present, the eyes are yellow, the bill yellow-green or yellow-white. The facial disk is gray-white surrounded by black fringe. Ventrally, they are pale brown to whitish with scattered dark brown streaks extending from the chest along the sides and flanks. Dorsally, they are buffy-gray throughout. Also, Eastern Screech-Owls inhabiting deciduous forests of the eastern United States have a rufous (rust) color phase. A specimen of this color phase has yet to be secured in Montana. The size is eight to 10 inches. The weight is six to seven ounces. The voice has two parts. The first part is a quavering, drawn out ascending whistle, "Wheeeee" similar to a horse's whinny. The second part is a vibrating low whistle, "Quohohoho" run together. Calls are short.

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

The Western Screech-Owl is similar in size, although slightly larger. The Western Screech-Owl bill is black to gray-green or gray-black and the overall plumage is gray.

## Habitat

Habitat is primarily cottonwood bottoms.



## Little Brown Myotis

*Myotis lucifugus*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G3G4

State Rank: S3

#### Agency Status

USFWS:

USFS:

BLM:

FWP SWAP: SGCN3

## General Description

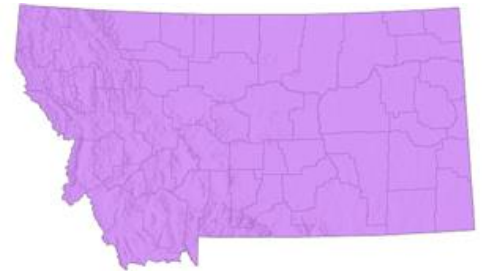
The most common bat species in Montana (Foresman 2012). Cinnamon-buff to dark brown above, buffy to pale gray below; hairs on back have long glossy tips; ears, when laid forward, reach approximately to the nostril; tragus about half as high as ear; calcar without keel; length of head and body 41 to 54 mm, ear 11.0 to 15.5 mm, forearm 33 to 41 mm; braincase rises gradually from rostrum; greatest length of skull 14 to 16 mm; length of upper toothrow 5.0 to 6.6 mm (Hall 1981).

## Diagnostic Characteristics

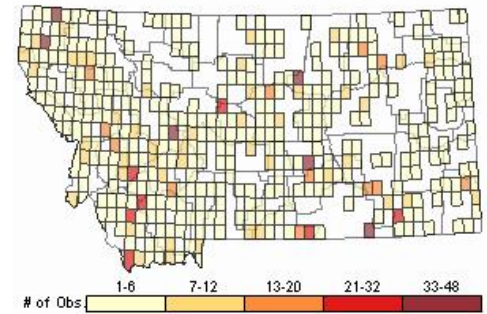
Can be distinguished from all but one of the seven *Myotis* species in Montana by the absence of a fringe of hair around the uropatagium and the absence of a keeled calcar. Can be distinguished from Yuma myotis by the glossy appearance of the dorsal hair and dark brown ear color. (Foresman 2012)

## Habitat

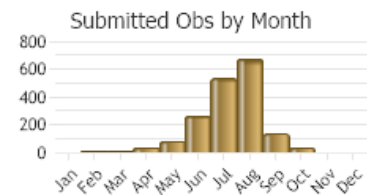
Found in a variety of habitats across a large elevation gradient. Commonly forages over water. Summer day roosts include attics, barns, bridges, snags, loose bark, and bat houses. Known maternity roosts in Montana are primarily buildings. Hibernacula include caves and mines.



Range  Native



# Observations: 1821





## Townsend's Big-eared Bat

*Corynorhinus townsendii*

[View in Field Guide](#)


### Species of Concern

**Native Species**

**Global Rank:** G4

**State Rank:** S3

### Agency Status

**USFWS:**

**USFS:** SENSITIVE

**BLM:** SENSITIVE

**FWP SWAP:** SGCN3

## General Description

Townsend's Big-eared Bat is a moderately sized bat found throughout the state where suitable habitat exists, primarily near caves, mines, rock outcrops, and badlands. As the common name suggests, the species has large ears compared to its overall size. Although it never appear to be common in any portion of the state, it's distribution is widespread and is among the most commonly observed species during cave surveys.

The species has large ears (30 to 39 millimeters) joined across forehead are a prominent feature in Townsend's Big-eared Bat; the tragus is long and pointed. The dorsal hairs are brownish at the tips, contrasting a little or considerably with the lighter underfur; ventral hairs are dark brownish-gray in color with brown to cinnamon tips. The hairs on the toes do not project beyond the toenails. There are two large, fleshy lumps on the snout, the basis for one of its common names, "lump-nosed bat." Total length is 90 to 113 millimeters; forearm length is 39.0 to 47.6 millimeters; adult mass is 5.0 to 13.5 grams. The greatest length of the skull is 15.2 to 17.4 millimeters; the skull has 36 teeth (Handley 1959, Kunz and Martin 1982, Nagorsen and Brigham 1993).

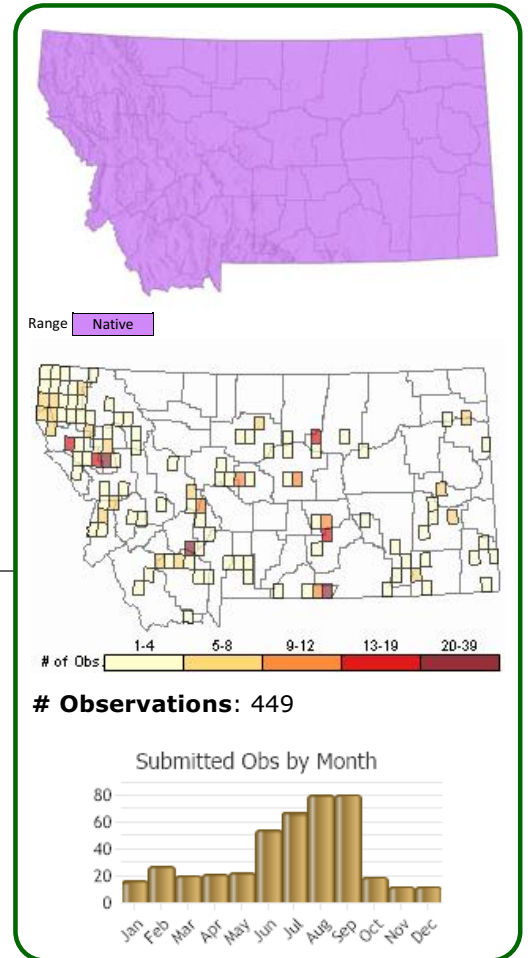
## Diagnostic Characteristics

Townsend's Big-eared Bat differs from other Montana bats by its combination of extremely long, brownish ears that are joined at the base, the prominent lumps on the nose, the absence of large, white spots in the pelage (as with the Spotted Bat) and a dorsal pelage that is darker at the tips than the base (opposite that of the Pallid Bat, which is also larger-bodied).

The species is infrequently captured in mist nets. Nets set over water can be used, but captures are typically rare. The species is more frequently captured by placing nets within tight flyways in high clutter environments such as tall brush and densely forested areas. Surveys of caves and mines are an efficient way to detect the species as it is one of the most commonly encountered species within these features, particularly in the winter. Acoustic methods are effective and call sequences distinct, but echolocation is typically much quieter than other bat species and microphones must be placed close to roosts or foraging areas to ensure any individuals in the area are recorded.

## Habitat

Of all of Montana's bat species, Townsend's Big-eared Bat is the most closely associated with caves, mines, and other similar features such as talus caves and erosion cavities found in badlands and river breaks. Caves and abandoned mines are used for maternity roosts and hibernacula (Worthington 1991, Hendricks et al. 1996, Hendricks 2000, Hendricks et al. 2000, Foresman 2012, Hendricks and Kampwerth 2001); use of buildings in late summer has also been reported (Swenson and Shanks 1979). In hibernacula, ambient temperatures ranged from -1.0 to 8.0 degrees (30 to 46 when torpid Townsend's Big-eared Bats were present) (Hendricks and Kampwerth 2001). Temperatures at maternity roosts are poorly documented; the temperature was 12 degrees



(54 in mid-July near a colony in an abandoned mine in Lake County), and 18 degrees (66 in August near a colony in a large and relatively open cave chamber in Lewis and Clark County). Most caves and mines in Montana appear to be too cool in summer for use as maternity roosts.



## Merriam's Shrew

*Sorex merriami*

[View in Field Guide](#)

### Species of Concern

**Native Species**

**Global Rank:** G4

**State Rank:** S3

### Agency Status

**USFWS:**

**USFS:**

**BLM:**

**FWP SWAP:** SGCN3

**No photos are currently available**

## General Description

Merriam's Shrew is a relatively small, pale shrew. The upperparts in summer are grayish drab, becoming paler on the flanks, with nearly white underparts (faintly tinged with buff). In winter the pelage is brighter, drab above, and paler below. The tail is distinctly bicolored, sparsely haired, drab above, and white below. Ranges in external measurements (in millimeters) are: total length 88 to 107, tail length 33 to 42, hind foot 11 to 13, and mass 3.3 to 6.5 grams. Condylbasal length of the skull is 15.0 to 17.1 millimeters, and maxillary breadth is 4.9 to 5.6 millimeters. The skull has 32 teeth (dental formula: I 3/1, C 1/1, P 3/1, M 3/3); the 5 upper teeth with single cusps that are posterior to the first incisor are termed the unicusps (U), and include 2 incisors, 1 canine, and 2 premolars. The medial edge of the first incisor lacks a tine; U3 is as large or larger than U4 (Armstrong and Jones 1971, Junge and Hoffmann 1981, Verts and Carraway 1998, Foresman 2012).

## Diagnostic Characteristics

Merriam's Shrew differs from other members of the genus in Montana by the combination of small size, pale coloration, lack of a medial tine on I1, broad palate (maxillary breadth more than 5.0 millimeters), and U3 as large or larger than U4. Habitat of occurrence, when used in conjunction with the preceding, is also useful for identifying this species (Junge and Hoffmann 1981, Mullican and Carraway 1990). A key based on dentaries identifies the unique characteristics for this species (Carraway 1995), including height of the coronoid process more than 3.9 millimeters, length of C1-M3 more than 4.3 millimeters, and length of dentary usually greater than 6.6 millimeters. These characters separate *S. merriami* from *S. nanus*, *S. preblei*, and *S. hoyi*, each of which may occur in sympatry.

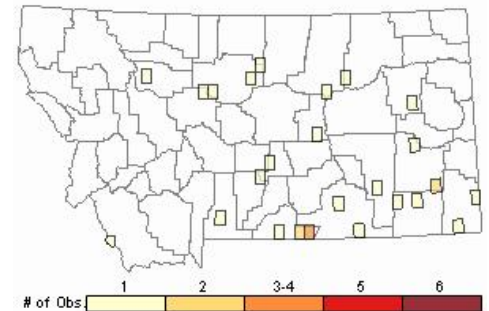
## Habitat

Merriam's Shrews in Montana have been captured mostly in arid sagebrush-grassland habitats (Hoffmann et al. 1969, Pefaur and Hoffmann 1971, MacCracken et al. 1985, Foresman 2012), but also in non-native grasses and forbs, such as timothy and sweet clover (Hooper 1944). It has also been taken in poorly developed riparian habitat at creekside in a shrub-steppe and grassland region (Dood 1980). Bare ground was more than 20% in a Carter County capture location (MacCracken et al. 1985); and on a north-facing grassland slope (elevation of 1040 meters) (Pefaur and Hoffmann 1971).

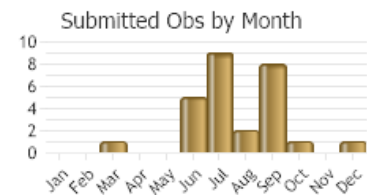
Across its range, Merriam's Shrew is identified as occupying arid Upper Sonoran and Lower Transition life zones. It has been captured in sagebrush-steppe, pine woodland, mountain mahogany, open ponderosa pine stands, spruce-aspen stands, forb-dominated mine-reclamation land, bunchgrass grassland, and dunes (Hudson and Bacon 1956, Brown 1967, Allred 1973, George 1990, Kirkland et al. 1997, Verts and Carraway 1998, Benedict et al. 1999, Nagorsen et al. 2001, Hafner and Stahlecker 2002). Merriam's Shrew seems to prefer drier habitats than do other shrews, and may also utilize burrows and runways of various microtines and other mice (Armstrong and Jones 1971). Shrub cover in British Columbia was as low as 5% (Nagorsen et al. 2001), and ranged from 28 to 71% in Idaho (Allred 1973), sometimes with 30% juniper cover.



Range  Native



**# Observations:** 30





## Panic Grass

*Dichanthelium acuminatum*

[View in Field Guide](#)

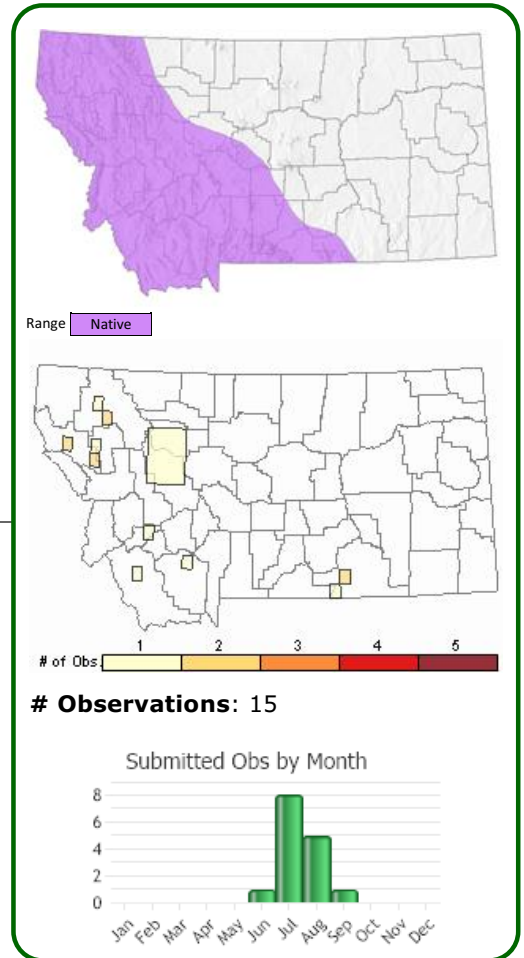

### Species of Concern

#### Native Species

Global Rank: G5  
State Rank: S2S3

#### Agency Status

USFWS:  
USFS:  
BLM:  
State Threat Score:  
Unknown  
CCVI:  
C-value: 9



### General Description

**PLANTS:** Cool season, bunched, perennial grass, 10-30 cm tall. Plants have a large showy, dark panicle which greatly exceeds the cauline leaves at reproductive maturity.

**LEAVES:** Basal and cauline alike, generally 5 to 10 mm wide, the 4-7 cauline with a ligule of long (2-6mm) hairs. Fall shoots arising from all but the upper nodes.

**INFLORESCENCE:** A diffuse, open panicle. The panicle may appear dark due to the second glume becoming purplish at maturity. **Spikelets** 1.5–2 mm long with 1 fertile floret. **Glumes** hairy and unequal in length. First glume 0.5–0.75 mm long and second glume 1.5–2 mm long. **Lemmas** are blunt, globe-like. **Palea** is enclosed in the floret.

Montana plants are subspecies *sericeum* (Lesica et al. 2012).

Sources: Lesica et al. 2012; Freckman & Lelong *in* FNA 2007; Flora of the Great Plains (1986).

### Diagnostic Characteristics

*Dichanthelium* has been segregated from *Panicum*. Montana has 3 species of *Dichanthelium*. Members of *Dichanthelium*:

- \* Develop a rosette of short, broad basal leaves during the cool season, while *Panicum* species do not.
- \* Grow during the cool and warm seasons, whereas, *Panicum* species grow in the warm season.
- \* Produce cleistogamous (self-pollinating) florets, which are often found on small axillary inflorescences during the late summer to fall.

**Panic Grass** – *Dichanthelium acuminatum* subsp. *sericeum*, native, SOC

- \* Stems 10-30 cm tall.
- \* Spikelets 1.5-2.5 mm long.
- \* At maturity the larger second glume is often purplish.
- \* Upper and lower leaf surfaces hairy.
- \* Ligules 2-6 tall.
- \* Often in wet soils around hot springs.

**Wilcox's Panic Grass** – *Dichanthelium wilcoxianum*, native

- \* Stems 10-20 cm tall.
- \* Spikelets less than 2.5 mm long.
- \* Upper and lower leaf surfaces hairy.
- \* Ligules 1.0 mm or less tall.
- \* Grasslands and open Ponderosa Pine forests in eastern Montana.

**Scribner's Panic Grass** – *Dichanthelium oligosanthes* var. *scribnerianum*, native, SOC

- \* Stems 20-50 cm tall.

- \* Spikelets 2-5 mm long.
- \* Upper leaf surface is glabrous. Lower leaf surface is hairy.
- \* Ligules 1-3 mm tall.
- \* Disturbed sites and open understory in northwest and southeast Montana.

**Switchgrass** (*Panicum virgatum*) is a rhizomatous, perennial grass while Montana's other ***Panicum*** species are annuals.

## **Habitat**

---

Often forming dense stands on wet soils around edges of hot springs (Lesica et al. 2012).



## Snapping Turtle

*Chelydra serpentina*

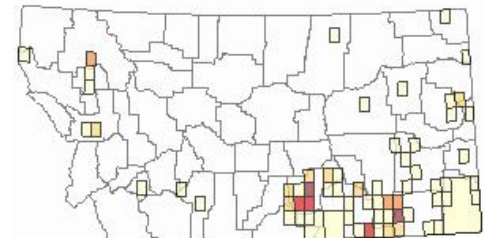
[View in Field Guide](#)


**Species of Concern**  
**Native/Non-native Species**  
 (depends on location or taxa)  
**Global Rank:** G5  
**State Rank:** S3

**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:** SENSITIVE  
**FWP SWAP:** SGCN3, SGIN

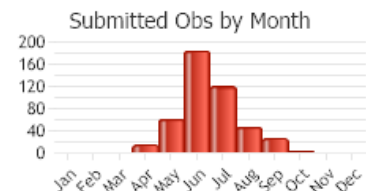


Range Native Non-native



# of Obs 1-3 4-6 7-12 13-22 23-227

# **Observations:** 480



### General Description

#### EGGS:

Eggs are white and round. They range from 23-33 mm in length, averaging 27-28 mm. The shell is leathery and is somewhat pliable. Clutch size ranges from 6-109 eggs (Werner et al. 2004).

#### HATCHLINGS:

Hatchlings are dark brown to black with conspicuous ridges on their carapace. The carapace measure 2.5-3.8 cm (1-1.5 inches) in length (Ernst et al. 1994, Werner et al. 2004).

#### JUVENILES AND ADULTS:

This species are large, stout turtles with an adult carapace length (CL) typically 20-35 cm (8-14 inches), but grow larger in populations of the southern United States (Degenhardt et al. 1996). Adults usually weigh 4.5-16 kilograms (10-35 lbs). However, one Montana individual found in the Redwater River reached 32 pounds (Aderhold 1980) and another Montana specimen reportedly reached 48 pounds (Werner et al. 2004). Their tails are long about the length of the carapace (dorsal shell), with three rows of distinct sawtooth-shaped projections. The plastron (ventral shell) is brown with three keels that are more easily discerned in younger individuals. In older individuals, a good portion of the carapace is usually covered with algae. The cream-yellow plastron is greatly reduced compared to other turtles, and forms a cross-like shape. It has a large head with slightly hooked upper jaw. They have long necks with tubercles on the dorsal surface. They have webbed toes and powerful claws. The anal vent of the male usually extends past the posterior edge of the carapace, whereas it is found anterior to the rim in females. Males will usually grow larger than females (Hammerson 1999).

### Diagnostic Characteristics

The Snapping Turtle is the only turtle in Montana with a reduced plastron covering less than half of the ventral surface, keeled scutes on the carapace, and a tail approximately as long as the carapace. There is no bright orange or yellow coloration as found on the Painted Turtle (*Chrysemys picta*), and their carapace is hard, unlike the soft, leathery shell of the Spiny Softshell (*Apalone spinifera*) (Black 1970c, Black and Black 1971, Werner et al. 2004).

### Habitat

Habitats used in Montana are probably similar to other areas in their range, but local studies are lacking and there is little qualitative information available. They have been captured or observed in backwaters along major rivers, at smaller reservoirs, and in smaller streams and creeks with permanent flowing water and sandy or muddy bottoms (Reichel 1995b, Hendricks and Reichel 1996b, Gates 2005, Paul Hendricks, personal observation). They have also been observed in temporary pools along small intermittent streams near Decker, Montana (M. Gates, personal observation). Nesting habitat and nest sites have not been described.

Freshwater habitats with a soft mud bottom and cover such as abundant aquatic vegetation or submerged brush and logs are preferred (Hammerson 1999) and brackish water in some areas. Although found most often in shallower water, an Ontario, Canada individual was observed by R. J. Brooks regularly diving 10 m to the bottom of a lake (Ernst et al. 1994). Temporary ponds and reservoirs may also be occupied. Hatchlings and juveniles tend to occupy shallower sites than mature individuals in the same water bodies. They are mostly bottom dwellers, where they spend much of their time. Although highly aquatic, they may make long movements overland if their pond or marsh dries (Baxter and Stone 1985, Ernest et al. 1994, Hammerson 1999). Snapping Turtles have a high-water loss gradient (0.64 grams/hour); therefore, they are at risk out of water in warm or dry conditions and rarely bask out of water. Aerial basking is more common in cooler environments in the northern portions of their range (Ernst et al. 1994) and has been observed on the Tongue River of southeastern Montana (Matt Gates, personal observation). They hibernate singly or in groups in streams, lakes, ponds, or marshes; in bottom mud, in or under submerged logs or debris, under an overhanging bank, or in Muskrat (*Ondatra zibethicus* spp.) tunnels; often in shallow water; sometimes in anoxic sites (Brown and Brooks 1994).

## Management

---

The following was taken from the Status and Conservation section for the Snapping Turtle account in [Maxell et al. 2009](#)

Although this species is common in many parts of its range, it is rare in Montana, having been recorded in only a few watersheds of southeastern Montana. Due to this restricted range and the lack of information this species in Montana, it is considered a state species of concern, and is listed as sensitive by the Bureau of Land Management. Studies identifying or addressing specific risk factors for *C. serpentina* in Montana are lacking. However, documented studies and other issues pertaining to their conservation include the following: (1) Roads often have negative impacts on population size and distribution of reptiles, and particularly turtles. High road density has been positively correlated to low population size. This has led to absence of species in road-developed areas and lead to local extirpations. (Rudolph et al. 1998, Jochimsen et al. 2004). *C. serpentina* females often migrate over a kilometer to reach suitable nesting sites (Obbard and Brooks 1981a), which makes them particularly vulnerable to roadkill. During a three-year study in Ontario, Haxton (2000) noted that 30.5% of all turtles observed were killed on roads. (2) Snapping Turtles, particularly in northern populations take over 15 years to attain sexual maturity, have extended reproductive lifespans, high natural adult survival rates, and extended longevity. Egg and hatchling mortality is also often very high attributing to a low annual reproductive potential. These life history traits are typical of long-lived species vulnerable to adult mortality. Minimum levels of natural (e.g., winter kill) or human-caused mortality to mature adults can have serious negative impacts to populations. Due to this low reproductive potential, seriously diminished populations can take years to recover (Brooks et al. 1988, Brooks et al. 1991, Congdon et al. 1994, Congdon et al. 1995). (3) Snapping Turtles are a long-lived bottom dweller that can store environmental contaminants in their body fat, muscle tissue, liver, and eggs making them particularly susceptible to bioaccumulation. They often carry high concentrations of organochlorine contaminants such as polychlorinated biphenyls (PCBs) (Brooks et al. 1988, Harding 1997). (4) Popular for meat and soup dishes, *C. serpentina* are managed as game animals in many states. Due to their low reproductive potential, overharvesting can decimate local populations, which can take years to recover (Brooks et al. 1988). Harvesting of adults is more detrimental to long-term population viability than high levels of egg and hatchling mortality, which normally occur. Human harvesting of *C. serpentina* in Montana is not well documented but may occur where they are abundant. (5) Dams and large reservoirs on rivers (e.g., Fort Peck Dam and Reservoir) may inhibit population continuity to some degree, judging by the apparent lack of viable populations on the Missouri River in Montana (Maxell et al. 2003). However, there is no quantitative data to verify this. Snapping Turtles will travel large distances overland and therefore may be able to bypass some dams.



## Blue-gray Gnatcatcher

*Polioptila caerulea*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S3B

#### Agency Status

USFWS: MBTA

USFS: SENSITIVE

BLM: SENSITIVE

FWP SWAP: SGCN2

PIF:

## General Description

The Blue-gray Gnatcatcher is a very small (10.0 to 11.5 cm in length, 5 to 7 grams in weight), bluish-gray, long-tailed songbird; tail length constitutes about 45% of the total length. The bill is fine-tipped and narrow with a slight lateral flattening at the base, which is surrounded by prominent rictal bristles. Upperparts are medium plumbeous mixed with ultramarine, and there is a prominent white eye-ring. Males in alternate plumage show a narrow black line over the bill and extending over and behind the eyes. Underparts are white, and the tail is black with outer retrices edged in white. The tail is frequently fanned and waved, showing the white edging. Females appear slightly paler (grayer) overall (Ellison 1992).

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

Only gnatcatcher in Montana.

## Habitat

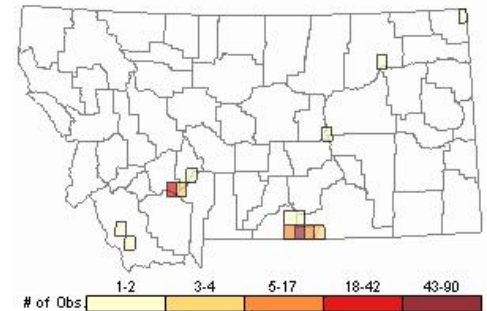
Breeding habitat in Montana is restricted to open stands of Utah Juniper (*Juniperus osteosperma*) and Limber Pine (*Pinus flexilis*) with intermixed Big Sagebrush (*Artemisia tridentata*). All nests found have occurred 0.8 to 1.7 meters above ground in Utah Juniper or Big Sagebrush growing on the lower slopes or bottoms of canyons (P. Hendricks unpublished data).

Throughout their range Blue-gray Gnatcatchers typically inhabit deciduous forest, riparian woodland, open woodland, second-growth, scrub, brushy areas and chaparral in the east, south, and coastal west (Tropical to lower Temperate zones) (American Ornithologists' Union 1983, Ellison 1992). In the Great Basin region of the west they also occupy open pine woodland, where (in Wyoming) they are associated with rosaceous shrubs and rock outcrops (Pavlacky and Anderson 2001).

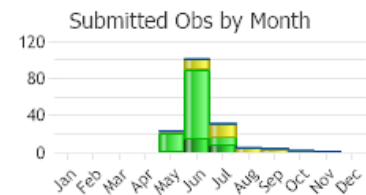
They nest especially where tracts of brush, scrub, or chaparral are intermixed with taller vegetation (e.g., forest edge, riparian corridors); nesting often occurs near water. Nests are built on branches or forks of trees or shrubs, usually 1 to 25 meters above ground (Harrison 1978) and both sexes participate in nest construction. A broad range of brushy habitats is occupied during winter (Ellison 1992).



Range Summer Migratory



# Observations: 173





## Plains Hog-nosed Snake

*Heterodon nasicus*

[View in Field Guide](#)


### Species of Concern

**Native Species**

**Global Rank:** G5

**State Rank:** S2

### Agency Status

**USFWS:**

**USFS:** SENSITIVE

**BLM:** SENSITIVE

**FWP SWAP:** SGCN2, SGIN

## General Description

This is a heavy-bodied snake with a broad neck and dark blotches on the back extending from the back of the head onto the tail. There is a large amount of black pigmentation on the underside of the body, with contrasting patches of white, yellow, and orange. The anal scale is divided. The snout is upturned, with an enlarged rostral scale that is spade-like and keeled. The dorsal scales are also keeled. There are enlarged ungrooved teeth near the rear of the upper jaws. The maximum total length is about 90 centimeters, but most individuals are less than 65 centimeters. Hatchlings are similar to adults in appearance and about 17 to 20 centimeters total length. Eggs are smooth and elongate (usually 26 to 38 millimeters by 14 to 23 millimeters in length and breadth).

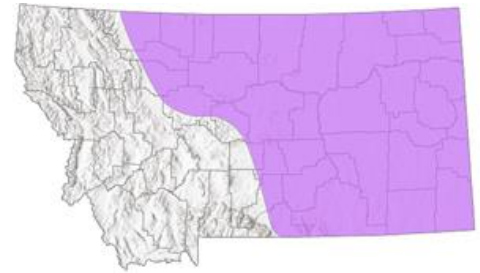
## Diagnostic Characteristics

The presence of an upturned snout that is spade-like and keeled, in combination with keeled dorsal scales, a dark-patterned belly, a divided anal scale, and the absence of tail rattles and facial pit, distinguishes the Western Hog-nosed Snake from all other snakes native to Montana. The color pattern is described as similar to both the Gophersnake and the Prairie Rattlesnake, but neither of these, nor any other snake in Montana, has an upturned nose like the Western Hog-nosed Snake.

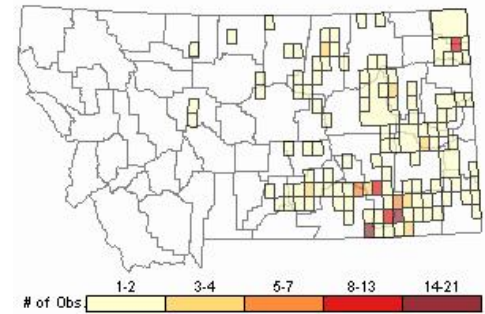
## Habitat

Little specific information for the state is available. They have been reported in areas of sagebrush-grassland habitat (Dood 1980) and near pine savannah in grassland underlain by sandy soil (Reichel 1995, Hendricks 1999).

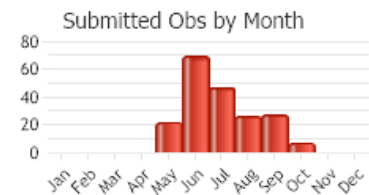
In other locations, their apparent preference for arid areas, farmlands, and floodplains, particularly those with gravelly or sandy soil, has been noted. They occupy burrows or dig into soil, and less often are found under rocks or debris, during periods of inactivity (Baxter and Stone 1985, Hammerson 1999, Stebbins 2003).



Range  Native



**# Observations:** 241





## Broad-tailed Hummingbird

*Selasphorus platycercus*

[View in Field Guide](#)


### Potential Species of Concern

#### Native Species

Global Rank: **G5**

State Rank: **S4B**

#### Agency Status

USFWS: **MBTA; BCC10**

USFS:

BLM:

FWP SWAP: **SGIN**

PIF:

## General Description

A hummingbird of medium size, the Broad-tailed Hummingbird is fairly long-bodied, 9 cm (3.5 inches), and has a relatively long wingspan, 13 cm (5.25 inches). The female is generally the larger of the two sexes. The male has a rose-magenta throat patch, or gorget, while the throat of the female is white with varying amounts of speckling of faint bronze, iridescent green, or the rose-magenta feather color typical of the male's gorget. Both sexes have an iridescent green back and a long broad tail, the latter of which extends beyond the wingtips. The base of the outer tail feathers is rufous in color, beyond which a thin line of green is edged in a thicker band of black or purplish-black and terminated in white. The majority of the tail is green. The center of the male's breast is white, with green and buffy flanks, while the flanks of the female are primarily buff or pale cinnamon in color. The male has a line joining the white of the neck to white on the chin via a line at the back of the gorget traveling through the eye-ring. The eye-ring of the female is pale from which a pale white line travels behind the spotted cheeks to join the white throat (Calder and Calder 1992, Johnsgard 1986, Sibley 2000). The bill is black, iris brown, and feet dusky (Calder and Calder 1992).

Without a true song, vocalizations of the Broad-tailed Hummingbird are generally described as a "chitter, chitter, chitter" or "tiputi, tiputi," produced by the male to intruders into established territory, while females produce a similar sound when protecting nesting or feeding sites (Calder and Calder 1992, Sibley 2000). The long tapered wing tips on the male create a trill during flight. This is especially evident during territorial defense (and mating display) dives, which may descend from 40 feet. This sound is described as similar to the call of a Cedar Waxwing, or as a buzzy, insect-like trill (Johnsgard 1986, Sibley 2000).

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

The broad, lengthy tail is the most notable feature that distinguishes the Broad-tailed Hummingbird from other hummingbird species. The Rufous Hummingbird has a tail primarily rufous in color, whereas the Broad-tailed Hummingbird's tail is dominated by green, black and white, with rufous coloration only the base of the outer tail feathers (Sibley 2000). The combination of the broad tail, overall larger size, and buff or buff-and-green flanks distinguish this from other hummingbird species common in the state.

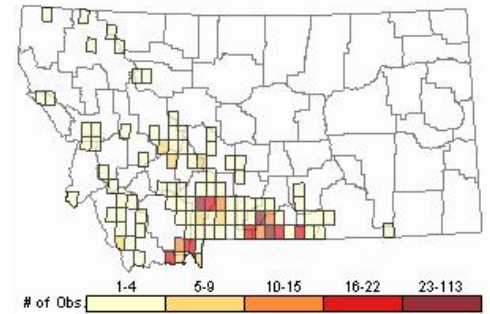
## Habitat

No specific habitat information is available for Montana. Reported use in surrounding states (Idaho, Wyoming, and Colorado) includes habitat similar to that found in Montana and may include ponderosa pine (*Pinus ponderosa*) and aspen (*Populus tremuloides*) groves, as well as mountain meadows and pinyon-juniper woodlands (Johnsgard 1986).

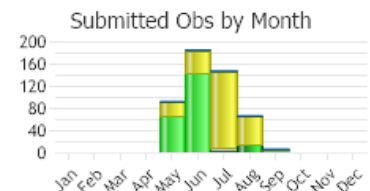
Elsewhere, the species is typically found in open woodland, especially pinyon-juniper, pine-oak, and conifer-



Range Summer Migratory



# Observations: 507



aspen associations. The Broad-tailed Hummingbird can be found on brushy hillsides in montane scrub and thickets. During migration and winter, they may select open areas in lowlands replete with flowering shrubs. Movement to higher elevations after breeding is not uncommon (Johnsgard 1983).



## Beartooth Large-flowered Goldenweed

*Pyrrocoma carthamoides* var. *subsquarrosa*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G4G5T3

State Rank: S3

#### Agency Status

USFWS:

USFS: SENSITIVE

BLM: SENSITIVE

State Threat Score:

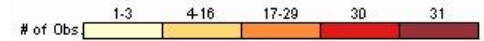
No Known Threats

CCVI: Less Vulnerable

C-value:



Range Native



# Observations: 48



### General Description

Information on this species is incomplete.

### Phenology

Flowering occurs in late July - August.

### Diagnostic Characteristics

Beartooth large-flowered goldenweed is distinguished from similar composites in south-central Montana by its spiny-margined leaves and involucre bracts, and large heads with inconspicuous yellow rays.

### Habitat

The Beartooth large-flowered goldenweed typically occurs in grassland and sagebrush habitats dominated by *Festuca idahoensis*/*Agropyron spicatum*, *Artemisia tridentata*/*Festuca idahoensis*, and *Artemisia arbuscula*/*Agropyron spicatum* (Lesica 1995). Shrub cover is typically low (1-5%), compared to that of graminoids (20-50%) and forbs (30-75%); bare ground ranges from 5-30%. Some sites support scattered *Pinus flexilis*.

This plant is found most frequently and abundantly on moderate to steep slopes (10-50%) with a cool aspect (NW, N, NE, E) (Lesica 1995); on warmer exposures, it tends to be sparser. Soils tend to be moderately deep, sandy, and high in coarse fragments. It occurs largely on soils derived, at least in part, from Madison limestone, though small satellite populations occur on soils derived from granitic materials (in the Rock Creek valley) and volcanics (in Wyoming).



## Eastern Red Bat

*Lasiurus borealis*

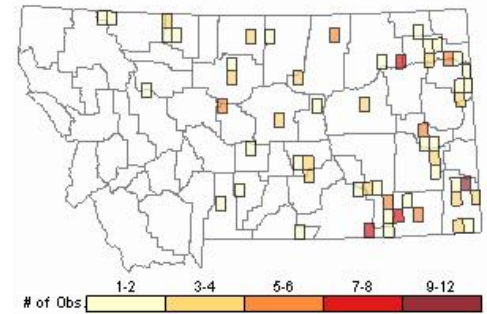
[View in Field Guide](#)


**Species of Concern**  
**Native Species**  
**Global Rank:** G3G4  
**State Rank:** S3B

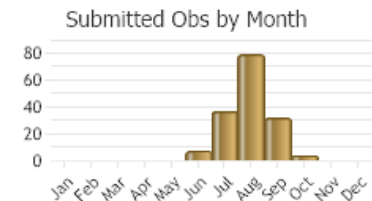
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:** SENSITIVE



Range Summer Migratory



**# Observations:** 160



### General Description

The Eastern Red Bat is a moderately-sized lasurine (7 to 15 g) with long pointed wings and heavily-furred interfemoral membrane. Pelage overall is reddish, lighter on the belly than the back. Ears are low and rounded, tragus triangular, forearm length about 39 to 41 mm. It has large teeth; the dental formula is I 1/3, C 1/1, P 2/2, M 3/3 (Shump and Shump 1982a, Adams 2003).

### Diagnostic Characteristics

Eastern Red Bat has a distinctive pelage: upper parts are brick-red to rusty-red washed with white, under parts are slightly paler. Only one other bat species in Montana, Hoary Bat, has an interfemoral membrane completely furred on the dorsal surface. The Hoary Bat is much larger (2.0-2.5 X in body weight, 17-20% longer in total length) than the Eastern Red Bat, and its dorsal pelage is mixed grayish and brownish, tinged with white, giving it a frosty or hoary appearance, not uniformly reddish (Shump and Shump 1982a). Definitive Eastern Red Bat calls are also of higher characteristic frequency: 38-50 kHz lasting > 10 milliseconds for Eastern Red versus < 23 kHz lasting up to 20 milliseconds for Hoary.

### Habitat

The Eastern Red Bat migrates through eastern Montana, particularly along wooded and riparian areas. In other parts of its range, it is reported to prefer elm, box elder, wild plum, willow, hawthorn, sumac, and a variety of other woody plants for roosting, and hibernates in woodpecker holes, tree foliage, and under loose bark (Shump and Shump 1982a, Jones et al. 1983, van Zyll de Jong 1985).



## White-faced Ibis

*Plegadis chihi*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S3B

#### Agency Status

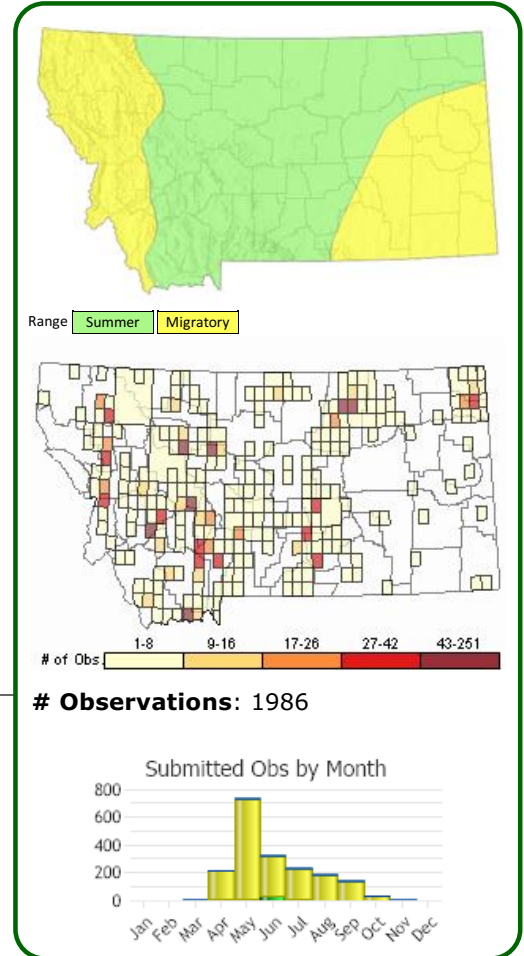
USFWS: MBTA

USFS:

BLM: SENSITIVE

FWP SWAP: SGCN3

PIF: 2



## General Description

The White-faced Ibis is a medium-sized wading bird with dark maroon or brown plumage, a long neck and legs, and a long, decurved bill. Males are almost always larger than females and adults are larger than juveniles for the first 6 to 9 months (Ryder and Manry 1994). The adult body length ranges from 46 to 56 cm (18.1 to 22.0 inches) with wingspans ranging from 94 to 99 cm (37 to 39 inches). Weight varies ranging from 450 to 525 grams (1.0 to 1.2 lb.) and the bill length averages between 15 to 18 cm (6 to 7 inches) (Ryder and Manry 1994).

Male and female plumages cannot be distinguished. In the adult breeding plumage, the head, neck, upper back, wing coverts, and undersides are a dark maroon or brown with a metallic green and bronze sheen. The head of the White-faced Ibis has bare facial skin that is reddish or purple. White feathers on the head separate the forehead from the face and also encircle the eye. The eye itself is red (Ryder and Manry 1994). The bill is cream with some shades of red (Pratt 1976) and the legs are bright red. The non-breeding plumage is similar to the breeding plumage without the presence of the white face feathers. Also, the overall plumage is less glossy (Oberholser 1974), and the bill and legs become an olive-gray color (Pratt 1976). The juvenile plumage has a fuscous foreneck and anterior surface. The back, tail and wings are a dull metallic, greenish-olive and often appears oily (Palmer 1962, Oberholser 1974). When observing immature White-faced Ibises, it can be extremely difficult to separate from the closely related Glossy Ibis.

White-faced Ibises have a limited vocalization array. Single birds, pairs, and flocks often give an "oink oink" or "ka-onk ka-onk" sound (Oberholser 1974). During nest building, they often give a guttural babbling sound. Vocalizations during interspecific aggression are long "gheeeeeee" sounds and the greeting call by the male to the female is a "geeeeeek, geeeeeek, geeeeeek" sound (Belknap 1957).

White-faced Ibis eggs are elliptically-ovate to round shaped and range in color from a pale bluish-green to a deep turquoise, with no markings (Bent 1926, Belknap 1957, Kotter 1970, King et al. 1980). Dimensions average 51.2 to 52.26 mm by 36.0 to 37.0 mm (Kaneko 1972, Belknap 1957), and weights average 28.4 to 43.7 grams (Kotter 1970). White-faced Ibises are a single brood species, but will attempt to renest after an early nest failure.

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

The White-faced Ibis is very similar in appearance to the closely related Glossy Ibis and identification can be difficult. Distinguishing characteristics which separate the two species include the red iris versus a more brownish or dark iris, bright red legs versus more grayish ones, the bare facial skin colored red and trim of white

feathers which surround the eye versus a darker face with only small white lines connecting the bill to the eye (Ryder and Manry 1994), and the olive-gray bill versus a more brown colored bill (Sibley 2000).

## **Habitat**

---

The White-faced Ibis breeding habitat is typically freshwater wetlands, including ponds, swamps and marshes with pockets of emergent vegetation. They also use flooded hay meadows and agricultural fields as feeding locations. Ibises nest in areas where water surrounds emergent vegetation, bushes, shrubs, or low trees. In Montana, White-faced Ibises usually use old stems in cattails (*Typha* spp.), hardstem bulrush (*Scirpus acutus*) or alkali bulrush (*S. paludosus*) over shallow water as their nesting habitat (DuBois 1989). Water conditions usually determine whether nesting occurs in a particular area. Therefore, White-faced Ibis nesting sites can often move around from year to year. However, they are a fairly adaptable species and the primary breeding requirement is colony and roosting site isolation. During migration, White-faced Ibises use more varied habitats for resting and feeding sites, ranging from wooded streams, mudflats, and grassy fields to small marshes and sewage ponds (Duebbert 1968, Locatelli and Blankenship 1973, Ducey 1988, Baumgartner and Baumgartner 1992).



## Yellow Beeplant

*Cleome lutea*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S1S2

#### Agency Status

USFWS:

USFS:

BLM:

State Threat Score:

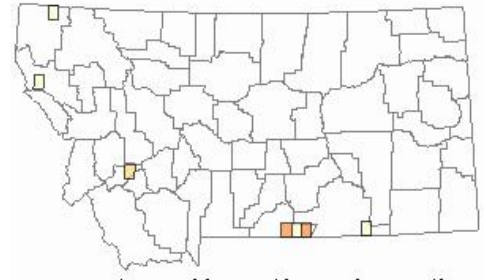
No Known Threats

CCVI:

C-value:

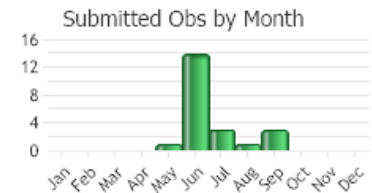


Range  Native



# of Obs: 1 2-3 4-8 9 10

# Observations: 23



## General Description

Yellow Bee Plant is an annual herb with simple to branched stems that are 10-30 cm high. The leaves have long, 2-6 cm petioles and 3-5 narrowly lance-shaped, 2-6 cm long leaflets that are arranged like the fingers on a hand. Foliage is glabrous to sparsely hairy with a thin, pale, waxy coating. The yellow flowers are borne on 10-20 mm long, ascending stalks, and are densely clustered in a globular inflorescence that greatly expands as the fruit matures. Each flower is subtended by a green bract; the lowest flowers resemble leaves, while the uppermost are short and narrow. Flowers have a 4-lobed calyx and 4 separate petals that are 5-8 mm long. There are 6 stamens, which are greatly exerted beyond the petals. The pod-like capsules are 15-35 mm long and borne on arching stalks that are as long as the fruit.

This species is now being placed in the genus *Peritoma* in more recent classifications.

## Phenology

Flowering in June-July; fruiting in July.

## Diagnostic Characteristics

The palmately compound leaves and the yellow, 4-parted flowers with strongly exerted stamens distinguish this species from other species of *Cleome*; the latter in our area have pinkish flowers.

## Habitat

Open, often sandy soil of sagebrush steppe in the valleys.



## Dwarf Shrew

*Sorex nanus*

[View in Field Guide](#)

### Species of Concern

#### Native Species

Global Rank: G4

State Rank: S2S3

#### Agency Status

USFWS:

USFS:

BLM:

FWP SWAP: SGCN2-3

**No photos are currently available**

## General Description

The Dwarf Shrew is a small, grayish-brown shrew. Summer pelage is brown above, gray and somewhat buffy below; the tail is indistinctly bicolored to the tip, dark above and buff below; the winter pelage is paler and grayer, especially dorsally. Ranges in external measurements (in millimeters) are: total length 82 to 105, tail length 27 to 45, mass 1.8 to 3.2 grams. Condylbasal length of the skull is less than 15.2 millimeters. The skull has 32 teeth (dental formula: I 3/1, C 1/1, P 3/1, M 3/3); the 5 upper teeth with single cusps that are posterior to the first incisor are termed the unicuspid (U), and include 2 incisors, 1 canine, and 2 premolars. There is a medial tine on I1, and U3 and U5 are smaller than U4 (Hoffmann and Owen 1980, Junge and Hoffmann 1981).

## Diagnostic Characteristics

The Dwarf Shrew differs from other shrews in Montana through a combination of the following: small body size, medial tine on I1, U3 smaller than U4, and condylbasal length less than 15.2 millimeters (Junge and Hoffmann 1981). This species differs from *S. tenellus* in averaging slightly smaller and having slightly darker pelage (Hoffmann and Owen 1980). On each half of the lower jaw (dentary), the height of the coronoid process is usually less than 3.1 millimeters, the angle of insertion of I1 is more than 8 degrees from the horizontal ramus of the dentary, and the length of the dentary is usually less than 6.5 millimeters (Carraway 1995).

## Habitat

In general, the Dwarf Shrew is found in a variety of habitats, including rocky areas and meadows in alpine tundra and subalpine coniferous forest (spruce-fir), rocky slopes and meadows in lower-elevation forest (e.g., ponderosa pine, aspen, Douglas-fir) with a mixed shrub component, sedge marsh, subalpine meadow, arid sagebrush slopes, arid shortgrass prairie, dry stubble fields, and pinyon-juniper woodland (Hoffmann and Owen 1980, Berna 1990, Kirkland et al. 1997, Rickart and Heaney 2001, Hafner and Stahlecker 2002).

Habitats where Dwarf Shrews have been documented in Montana are similar in variety to those occupied elsewhere in the global range. Many have been taken in rocky locations in alpine terrain and subalpine talus (2 to 10 centimeters diameter) bordered by spruce-fir, lodgepole pine, or Douglas-fir and aspen; lesser numbers have been captured in montane grassland, sagebrush-grassland with 22% bare ground, and prairie riparian habitat dominated by green ash, rose, and timothy (Hoffmann and Taber 1960, Pattie and Verbeek 1967, Hoffmann et al. 1969, Thompson 1977, MacCracken et al. 1985, Foresman 2012).

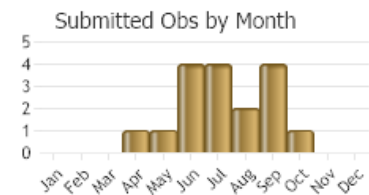


Range Native



# of Obs 1 2 3-7 8 9

# Observations: 20





## Parry's Fleabane

*Erigeron parryi*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G2G3

State Rank: S2S3

#### Agency Status

USFWS:

USFS:

BLM:

State Threat Score:

No Known Threats

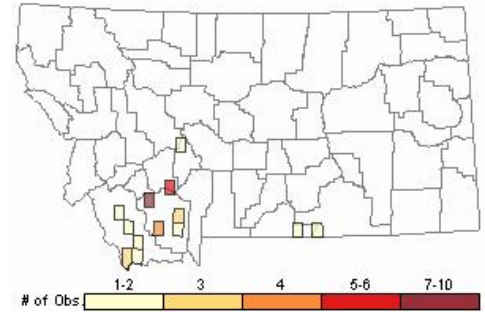
CCVI: Moderately

Vulnerable

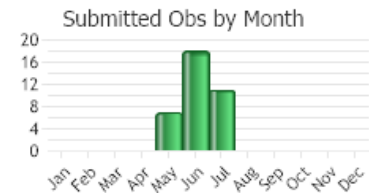
C-value:



Range: Native



# Observations: 36



## General Description

Taprooted perennial with a simple or branched caudex. Stems erect, 2–15 cm. Herbage hirsute with ascending to spreading hairs. Leaves basal and cauline, linear, entire, 1–6 cm long. Heads 1 to 3, radiate. Involucres hemispheric, 4–9 mm high; phyllaries in 1 or 2 series, densely hirsute with white-septate hairs, minutely glandular. Rays 20 to 40, white, usually erect; ligules 5–8 mm long. Disk corollas 2–4 mm long. Achenes ca. 2 mm long (Lesica et al. 2012. Manual of Montana Vascular Plants. BRIT Press. Fort Worth, TX).

## Phenology

Flowering occurs in June and early July.

## Diagnostic Characteristics

*Erigeron radicans* has smaller heads and disk flowers. *Erigeron ochroleucus* has appressed hair on the stems, and sparsely hairy leaves; old leaf bases are generally not apparent on the caudex. Spreading hairs on the stems of *E. pumilus* are about 1 mm long.

*Erigeron parryi* was first described over 100 years ago based on a single collection made by Frank Tweedy along Grasshopper Creek in Beaverhead County, Montana. Over 50 years ago Arthur Cronquist recognized *E. parryi* in his monograph on the genus *Erigeron* (Cronquist 1947). He stated that the species was similar to *E. ochroleucus*, but the hair of leaves and stems was strikingly different. He hinted that *E. parryi* might be better considered a variety of *E. ochroleucus*, but since there was still only one collection, he did not formally propose a new nomenclatural combination. Eight years later Cronquist merged *E. parryi* into *E. ochroleucus*, stating that it was a rare form with spreading-hairy herbage (Cronquist 1955). Since that time several additional populations of *E. parryi* have been located in southwest Montana.

## Habitat

*Erigeron parryi* occurs on skeletal, limestone-derived soils of ridge crests, slopes and outcrops at 4,500–7,000 feet. Associated vegetation is sparse and dominated by cushion plants, other low forbs and bluebunch wheatgrass. Dominant vegetation in nearby areas with more developed soils is sagebrush steppe or juniper woodland.



## Long-legged Myotis

*Myotis volans*

[View in Field Guide](#)


**Species of Concern**  
**Native Species**  
**Global Rank: G4G5**  
**State Rank: S3**

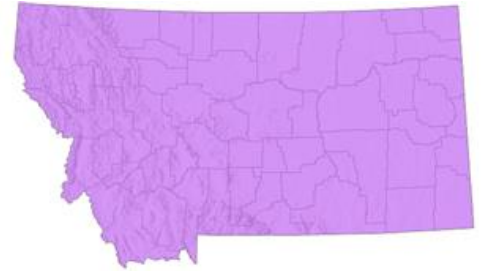
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**

### General Description

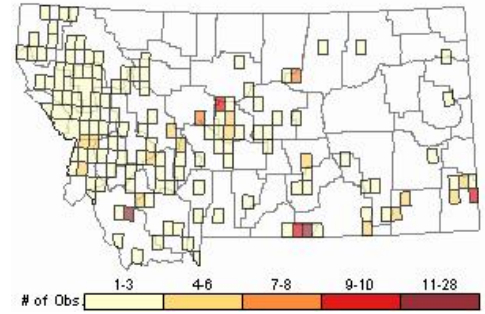
Similar in appearance to the Little Brown Myotis, but is slightly larger, fur extends from the ventral surface to the elbow on the wing underside, and the calcar is keeled. Wingspan is 10-12 inches (25-30 centimeters) and weight ranges from 0.2-0.3 ounces (6-9 grams) (Adams 2003).

### Habitat

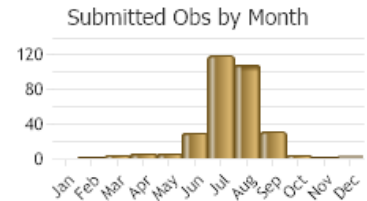
Occurs mostly in forested mountain regions and river bottoms, also at high elevations. Summer day roosts include trees, rock crevices, fissures in stream banks, abandoned buildings. Hibernacula include caves and mines.



Range  Native



# Observations: 341





## Plumbeous Vireo

*Vireo plumbeus*

[View in Field Guide](#)


### Potential Species of Concern

#### Native Species

Global Rank: G5

State Rank: S3S4B

#### Agency Status

USFWS: MBTA

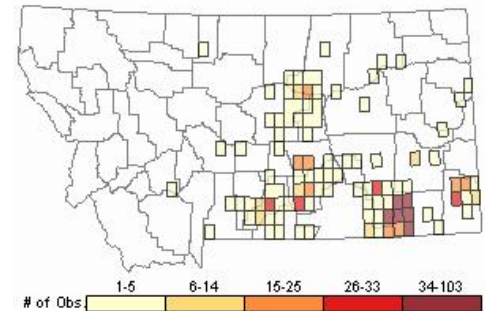
USFS:

BLM:

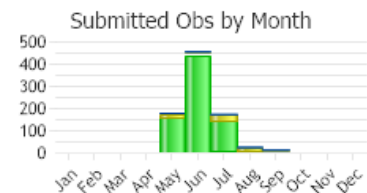
PIF: 3



Range  Summer  Migratory



# Observations: 870



## General Description

Small passerine: total length 124 to 138 mm, mass 12 to 20 g. Upperparts smooth neutral gray; rump tinged olive green. Underparts near-white; sides of breast smudged pale grayish olive; flanks very pale sulfur yellow in some individuals and dull white in others. Head has broad white supraloral stripe and eye-ring, the latter interrupted by dusky loreal streak. Wings and tail blackish neutral gray, with 2 broad wing-bars; outer rectrix broadly edged white. Remiges and rectrices edged pale olive gray (appearing near-white in the field) or rarely, olive yellow. Iris brown; bill black with bluish gray base; legs grayish blue. Sexes monomorphic by plumage and size. Female distinguished by a vascularized brood patch. (Goguen and Curson 2012)

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

Most similar to Cassin's Vireo, which is slightly smaller, greener on the back, slightly browner gray on the head, yellowish white wing-bars and undertail-coverts, and brighter, more extensively yellow flanks. The two species are not always distinguishable in the field. The Plumbeous Vireo also is similar to an accidental in Montana, the Blue-headed Vireo, which is slightly smaller and distinctly more colorful (bright olive green on the black with sulfur yellow flanks and yellowish undertail-coverts). (Goguen and Curson 2012)

## Habitat

Breeds in warm, dry montane forests of pine, oak and juniper. Typical habitat in the U.S. is dominated by ponderosa pine. (Goguen and Curson 2012)



## Spiny Hopsage

*Grayia spinosa*

[View in Field Guide](#)


### Species of Concern

**Native Species**

**Global Rank:** G5

**State Rank:** S2

### Agency Status

**USFWS:**

**USFS:**

**BLM:**

**State Threat Score:**

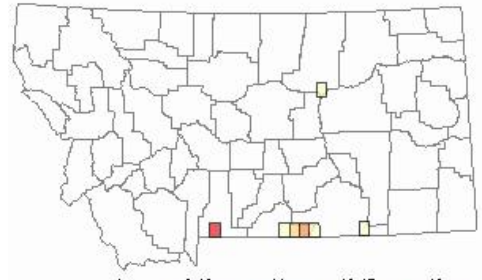
Unknown

**CCVI:** Less Vulnerable

**C-value:**

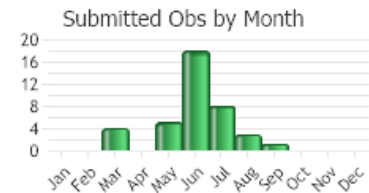


Range  Native



# of Obs: 1 2-10 11 12-17 18

**# Observations:** 43



## General Description

Spiny Hopsage is a rounded, profusely branched shrub that is up to 15 dm high and has erect or spreading, gray-barked, spine-tipped stems. The fleshy, broadly lance-shaped leaves are 10-25 mm long and have entire margins and a short stalk. Foliage is covered with small, star-shaped hairs that easily rub off. Male flowers are on different plants than female flowers, making the plant dioecious. There are 2-5 small, green, sessile male flowers that are 1-2 mm long with a 4-lobed calyx, 4 stamens, and no petals; they occur in the axils of the smaller upper leaves, or bracts. Female flowers are arranged in small spikes in the upper leaf axils. Each flower has an ovary surrounded by 2 green, nearly circular bracts. When mature, the bracts enlarge to be 8-15 mm wide; they are pale to red with thin margins.

## Phenology

Flowering and fruiting in May-June.

## Diagnostic Characteristics

*Atriplex canescens* is similar in appearance, though the combination of fleshy leaves with circular, entire-margined, female fruiting bracts distinguishes *Grayia spinosa*.

## Habitat

Dry shrublands in the valleys and foothills usually on sandy-textured, alkaline soils at elevations below 5,000 ft (5,600 ft near Gardiner). Typical associated species in Montana include *Artemisia tridentata* var. *wyomingensis*, *Atriplex confertifolia*, *Stipa comata*, *Juniperus* spp., *Chrysothamnus nauseosus*, *Chrysothamnus viscidiflorus*, *Bouteloua gracilis* and *Sarcobatus vermiculatus*.



## Wyoming Thistle

*Cirsium pulcherrimum*

[View in Field Guide](#)


© MTNHP - Scott Mincemoyer

### Species of Concern

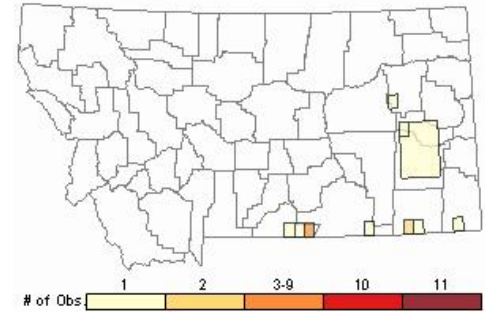
**Native Species**  
**Global Rank:** G5  
**State Rank:** S3

### Agency Status

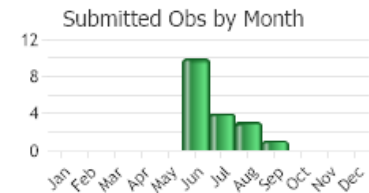
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:** Low  
**CCVI:** Less Vulnerable  
**C-value:**



Range  Native



# Observations: 19



## General Description

Taprooted perennial with 1-few erect or ascending stems that are arachnoid-tomentose or sometimes glabrate. Flowers are pink to purple, 18-25 mm long, tubes 7-9 mm, throats 5.5-7.5 mm, lobes 4-8 mm; style tips 3-5.5 mm. The 1 to several heads are borne singly or in 2-3-headed clusters at the tips of the main stem and branches in an open, congested, or flat-topped fashion, heads sometimes also in present in distal axils. Peduncles 0-15 cm. Leaf blades are linear to oblong, oblanceolate, or elliptic, 5-25 × 0.6-7 cm, unlobed and merely spinulose or spiny-dentate to regularly pinnatifid, typically with 5-8 pairs of lobes, well separated, and usually with broad, U-shaped sinuses to crowded, linear to triangular-ovate, ascending-spreading to retrorse, merely spinulose to coarsely dentate or few lobed, primary spines are slender, 2-7 mm long. Lower leaf surfaces are usually densely arachnoid-tomentose, while upper surfaces are typically green, glabrous or less commonly thinly to densely gray-tomentose; basal leaves often present at flowering, spiny winged-petiolate; principal cauline well distributed along stem, gradually reduced upwards, lower leaves usually winged-petiolate, while mid and upper leaves typically are sessile, leaves decurrent along stem for 1.5-3.5 cm. Involucres are ovoid to campanulate, 1.8-2.7 × 1-2 cm, thinly arachnoid-tomentose or glabrate. Bracts are in 6-7 series, ± imbricate, green or with a dark subapical patch or appendage, linear to linear-lanceolate, margins entire, abaxial faces with narrow glutinous ridge; outer and middle bases appressed, apical appendages spreading to stiffly ascending, linear-lanceolate to acicular, entire, spines spreading or ascending, stout, 2-7 mm, often flattened; apices of inner stiffly erect or sometimes flexuous, narrow, flat. Pappus is 14-16 mm long. (adapted from FNA treatment vol 19).

## Phenology

Flowering in June-July.

## Diagnostic Characteristics

Similar species include *Cirsium canescens* and *C. flodmanii* both of which occur in eastern Montana. The former can usually be distinguished by having the upper leaf surfaces being slightly tomentose and by the leaf lobes being over 3.5 times as long as wide. The latter species usually has stem leaves that only clasp the stem or are short-decurrent compared to the typically, long-decurrent leaves (middle leaves with wings usually >15 mm long) of *C. pulcherrimum*. A technical manual should be consulted for positive identification.

## Habitat

Sparsely-vegetated soils of washes and steep, eroded gullies in dissected or badlands topography. Associated species include *Juniperus scopulorum*, *Chrysothamnus nauseosus*, *Artemisia ludoviciana*, *Atriplex confertifolia*

and *Elymus trachycaulis*. In other areas, this species is listed as typically growing in rocky or stony soils. However, in our area the species has also been noted from fine-textured soils.



## Spotted Bat

*Euderma maculatum*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G4

State Rank: S3

#### Agency Status

USFWS:

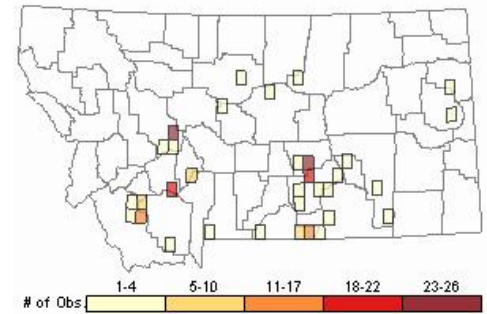
USFS: SENSITIVE

BLM: SENSITIVE

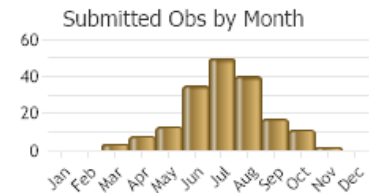
FWP SWAP: SGCN3, SGIN



Range Summer Migratory



# Observations: 185



## General Description

Spotted Bats have huge pink ears (37 to 50 millimeters long), the dorsum is blackish with a large white spot on each shoulder and on the rump, and white patches at the posterior base of each ear. Total length is 107 to 115 millimeters, forearm length is 48 to 51 millimeters, and weight is 16 to 20 grams. The greatest length of the skull is 18.4 to 19.0 millimeters (small sample). The supraorbital region of the skull is sharply ridged, but a median sagittal crest is absent; 34 teeth are present (Watkins 1977). The newborn young lack any indication of having the adult color pattern (Van Zyll de Jong 1985). Four hours after birth, a male weighed 4 grams and measured 59 millimeters in length; tail length was 20 millimeters, hind foot 11 millimeters, ear 12 millimeters, and forearm 21 millimeters.

## Diagnostic Characteristics

Spotted Bats differ from other bats in Montana by the unique patterning of the fur and the extremely large ears. Their echolocation calls (an insect-like clicking) are audible to the unaided human ear.

## Habitat

Spotted Bats have been encountered or detected most often in open arid habitats dominated by Utah juniper (*Juniperus osteosperma*) and sagebrush (*Artemisia tridentata* and *A. nova*), sometimes intermixed with limber pine or Douglas-fir, or in grassy meadows in ponderosa pine savannah (Fenton et al. 1987, Worthington 1991a, Hendricks and Carlson 2001). Cliffs, rocky outcrops, and water are other attributes of sites where Spotted Bats have been found (Foresman 2012), typical for the global range. Spotted Bats have been captured foraging over an isolated pond within a few kilometers of huge limestone escarpments in the Big Horn Canyon National Recreation Area, Carbon County (Worthington 1991a, 1991b), and the first record for the state was of an individual that flew in an open window at a private residence in Billings, Yellowstone County (Nicholson 1950). Roost habitats and sites have not been documented in Montana.

In other areas, Spotted Bats have been detected at water sources and in meadow openings, often with large cliffs nearby (Leonard and Fenton 1983, Storz 1995, Perry et al. 1997, Rabe et al. 1998, Gitzen et al. 2001).

Spotted Bats roost in caves, and in cracks and crevices in cliffs and canyons, with which this species is consistently associated; it can crawl with ease on both horizontal and vertical surfaces (Snow 1974, Van Zyll de Jong 1985). In British Columbia, individuals used the same roost each night during May through July, but not after early August (Wai-Ping and Fenton 1989). Winter habitat is poorly documented. A possible explanation for the early paucity of collections in natural situations is the Spotted Bat's narrow habitat tolerance (Handley 1959, Snow 1974).



## Black-billed Cuckoo

*Coccyzus erythrophthalmus*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5  
State Rank: S3B

#### Agency Status

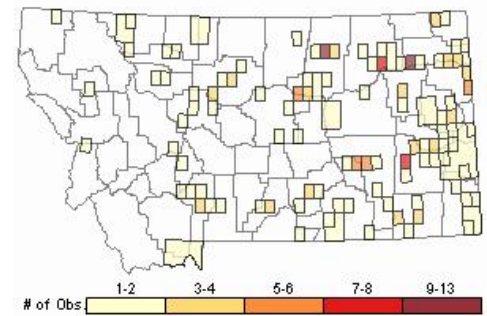
USFWS: MBTA; BCC11;  
BCC17

#### USFS:

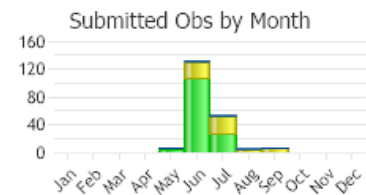
BLM: SENSITIVE  
FWP SWAP: SGCN3, SGIN  
PIF: 2



Range Summer Migratory



# Observations: 212



## General Description

The Black-billed Cuckoo is a 31 centimeter-long bird with a stout slightly decurved bill, zygodactyl feet, grayish-brown dorsum, white venter (except tail), and a long tail that is patterned on the underside in gray with white feather tips. The bill is usually all dark, and may show yellow at the base of the lower mandible. There is a reddish eye ring. In juveniles, the undertail is whiter, the eye ring is buffy, the pale underparts may have a buffy tinge, and there may be some rusty-brown color on the outer wing.

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

The Black-billed Cuckoo differs from the Yellow-billed Cuckoo (*Coccyzus americanus*) by lacking rufous primaries and the absence of an extensively yellow lower mandible.

## Habitat

Black-billed Cuckoos are birds of wooded draws, forest edges, thickets, and shelterbelts. In Montana they are found most often in riparian cottonwoods, green ashes, and American elms with a shrubby understory of willows, box elders, and alders; they also occur in foothill deciduous woodlands (Skaar 1969; Walcheck 1969, 1970; Kroodsmas 1973; Jones and Hansen 2009).



# Streptanthella

## *Streptanthella longirostris*

[View in Field Guide](#)


**Potential Species of Concern**

**Native Species**

**Global Rank: G5**

**State Rank: S3S4**

**Agency Status**

**USFWS:**

**USFS:**

**BLM:**

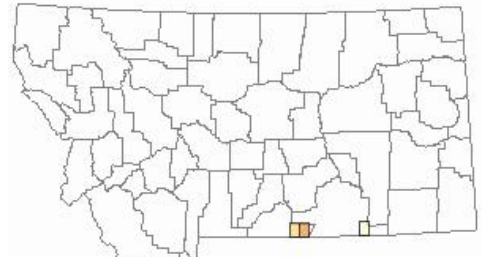
**State Threat Score:**

**CCVI:**

**C-value:**

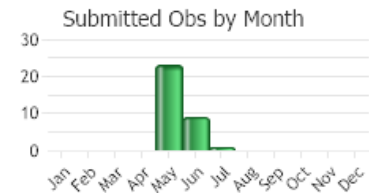


Range  Native



# of Obs: 1 2-11 12-22 23 24

**# Observations: 34**



### General Description

Glabrous, taprooted annual. Stems erect, branched, 15–40 cm. Leaves all cauline, sessile, narrowly oblanceolate, 3–5 cm long, entire to weakly dentate. Inflorescence an ebracteate raceme. Flowers white; petals 4–6 mm long. Fruits linear siliques, 3–6 cm long with a beak 4–6 mm long; style absent; seeds in 1 row per locule; pedicels reflexed, 1–3 mm long (Lesica et al. 2012. Manual of Montana Vascular Plants. BRIT Press. Fort Worth, TX).

### Habitat

Open, often sandy soil in sagebrush grassland, desert shrubland, and juniper woodland in the valley and foothill zones.



## Barrow's Goldeneye

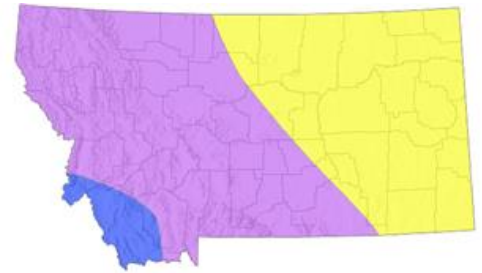
*Bucephala islandica*

[View in Field Guide](#)

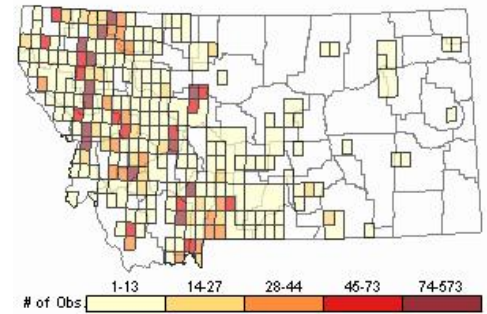

### Potential Species of Concern

**Native Species**  
**Global Rank:** G5  
**State Rank:** S4

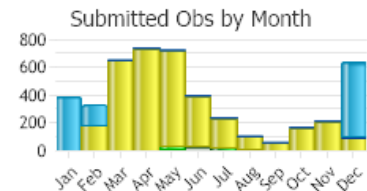
**Agency Status**  
**USFWS:** MBTA  
**USFS:**  
**BLM:**  
**FWP SWAP:** SGIN  
**PIF:** 2



Range  Year-round  Winter  Migratory



# Observations: 5075



### General Description

Medium-sized diving duck. Total length, early-spring mass: male 48.4 cm, 1,278 g; female 43.2 cm, 818 g. Compact, chunky appearance with short neck and round body, with relatively large rounded head and short gray-black bill. Adult sexes are strongly dimorphic in size and plumage most of the year. Breeding male has striking pattern of iridescent, purplish-black head with bright, white crescent-patch between bill and eye; brilliant white sides, breast, belly and secondaries contrasted against black back, wings, and tail. Female has dark chocolate-brown head; slate-gray back, wings, and tail; and white flanks, belly, and breast. Both sexes have bright amber irides (hence the name "goldeneye"). Wing-beat is rapid with relatively deep arc; produces a distinctive "whistle." (Eadie et al. 2000).

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

### Diagnostic Characteristics

See Tobish (1987) for details on identification of Barrow's and Common Goldeneyes in all plumages.

### Habitat

Chiefly a bird of the western montane region of North America. This species is generally restricted to areas west of the Continental Divide. Prefers alkaline to freshwater lakes in parkland areas; to lesser extent, subalpine and alpine lakes, beaver ponds, and small sloughs (Eadie et al. 2000).



## Chimney Swift

*Chaetura pelagica*

[View in Field Guide](#)


### Potential Species of Concern

#### Native Species

Global Rank: G4G5

State Rank: S3S4B

#### Agency Status

USFWS: MBTA; BCC11

USFS:

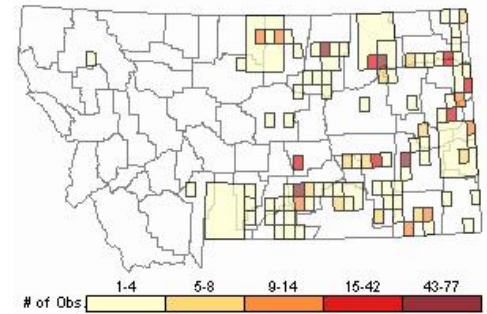
BLM:

FWP SWAP: SGIN

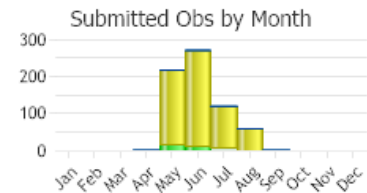
PIF: 3



Range  Summer  Migratory



# Observations: 685



## General Description

Small, dark and uniformly colored. Sexes similar in appearance, but slightly different in size. Plain dark olive or brown above and plain grayish brown below, throat, chin, and cheeks pale colored. When viewed up close, wings slightly darker and more blackish than grayer rump and upper tail-coverts; very short rounded tail with spiny tips sometimes visible. Plumage slightly glossy, especially on wings.

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

Most likely to be confused with Vaux's Swift, which is smaller with shorter wings and usually paler rump and ventral body plumage. The two species' ranges barely overlap.

## Habitat

Nests and roosts in chimneys in urban settlements.



## Fringed Myotis

*Myotis thysanodes*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G4

State Rank: S3

#### Agency Status

USFWS:

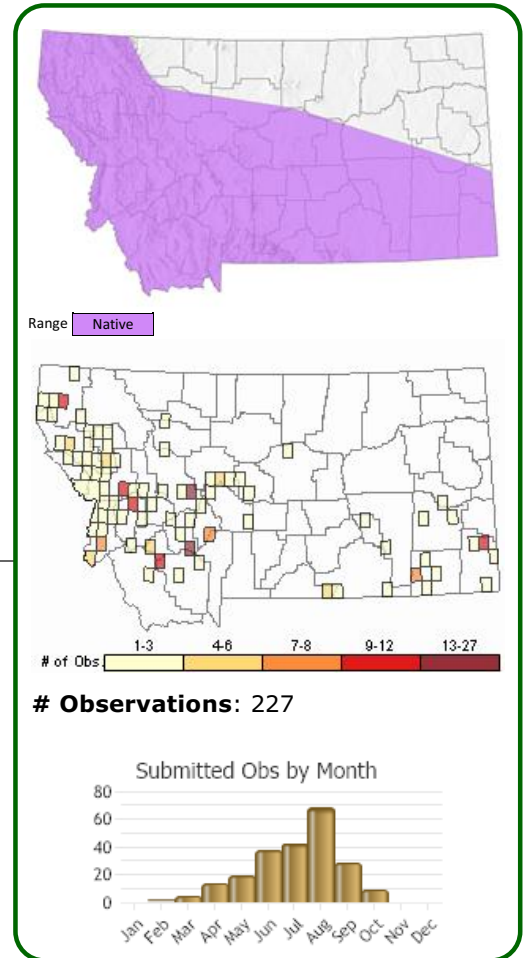
USFS:

BLM: SENSITIVE

FWP SWAP: SGCN3

## General Description

The Fringed Myotis is a member of the long-eared myotis group. Although similar to Western Long-eared Myotis (*Myotis evotis*), it is the only species with a well-developed fringe of hairs on the posterior margin of the uropatagium, and is larger than most other *Myotis*, except in ear size. The robust calcar is not distinctly keeled. The skull is relatively large, with a well-developed sagittal crest, and 38 teeth (dental formula: I 2/3, C 1/1, P 3/3, M 3/3). Color of the pelage varies from yellowish-brown to darker olivaceous tones; color tends to be darker in northern populations. The ears and membranes are blackish-brown and tend to contrast with the pelage. Length of the head and body is 43 to 59 millimeters, length of the tail is 34 to 45 millimeters, length of the ear is 16 to 20 millimeters, length of the forearm is 40 to 47 millimeters, and weight is 5.4 to 10.0 grams. Females are significantly larger in head, body and forearm size (O'Farrell and Studier 1980, Nagorsen and Brigham 1993, Foresman 2012).



## Diagnostic Characteristics

The presence of a well-developed fringe of hairs along the posterior edge of the uropatagium is unique among the *Myotis* found in Montana, including the other long-eared species. The forearm is longer (usually more than 40 millimeters) than all other species of *Myotis* except some individuals of *M. evotis* (a long-eared species) and *M. volans* (a short-eared species with a keeled calcar). The skull is broader than other *Myotis* species, with a distance across the upper molars more than 6.2 millimeters.

## Habitat

The few Montana records indicate that the habitats in Montana that are used by the Fringed Myotis are similar to other regions in the interior West (Foresman 2012). It has been captured in ponderosa pine and Douglas-fir forest while foraging over willow/cottonwood areas along creeks and over pools, and taken in caves (Lewis and Clark Caverns); one individual was captured in an urban setting in Missoula (Hoffmann et al. 1969, Butts 1993, Dubois 1999).

Habitat information gathered from range-wide studies state the Fringed Myotis is found primarily in desert shrublands, sagebrush-grassland, and woodland habitats (ponderosa pine forest, oak and pine habitats, Douglas-fir), although it has been recorded in spruce-fir habitat in New Mexico. It also occurs at low elevations along the Pacific Coast, and in badlands in the northern Great Plains (Jones et al. 1983, Humes et al. 1999). It roosts in caves, mines, rock crevices, buildings, and other protected sites. Nursery colonies occur in caves, mines, and sometimes buildings (Easterla 1973, O'Farrell and Studier 1980, Jones et al. 1983). Fringed Myotis in riparian areas tend to be more active over intermittent streams with wider channels (5.5 to 10.5 meters) than ones with channels less than 2.0 meters wide (Seidman and Zabel 2001).



## Green-tailed Towhee *Pipilo chlorurus*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S3B

#### Agency Status

USFWS: MBTA

USFS:

BLM:

FWP SWAP: SGCN3

PIF: 3

## General Description

The Green-tailed Towhee is a large, secretive sparrow of shrub-steppe habitats, spending much of its time scratching the ground to move leaf litter in search of food. Its catlike "mew" calls and vigorous foraging method often reveal its presence. Males sing a song of jumbled notes and trills (Dobbs et al. 2012).

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Phenology

Singing males observed in suitable habitat in May. Several records of nestlings and/or fledglings in June and July. Nests with eggs observed as late as July 4, and a late observation of an adult feeding recently fledged young recorded in early September. Observations in December-February suggest this species occasionally overwinters in portions of Montana (Montana Natural Heritage Program Point Observation Database 2014).

## Diagnostic Characteristics

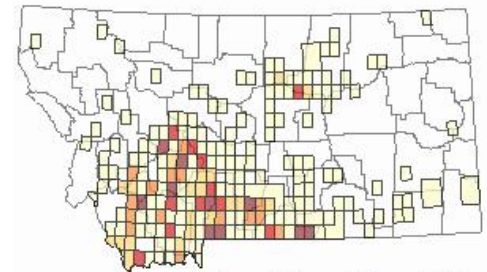
Sexes similar in appearance, but some females show slightly duller plumage than males, especially on crown. Upperparts are olive green with gray breast, long greenish tail, and conspicuous reddish brown cap. White spot above the cheek, a white mustache, and white chin, throat, and belly contrast with gray on head and breast. Juvenile lacks contrasts, mainly brownish gray above and white below (Dobbs et al. 2012).

## Habitat

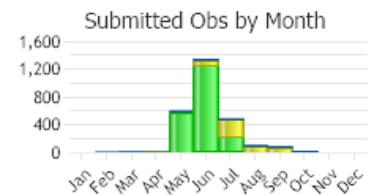
Habitat selected for breeding varies with elevation, prefers species-rich shrub communities. Typically occurs along the ecotone, or edge, of sagebrush communities and other mixed-species shrub communities such as Chokecherry, snowberry, serviceberry, and mountain mahogany (Dobbs et al. 2012).



Range Summer Migratory



# Observations: 2664





## Long-eared Myotis

*Myotis evotis*

[View in Field Guide](#)


### Species of Concern

**Native Species**

**Global Rank: G5**

**State Rank: S3**

### Agency Status

**USFWS:**

**USFS:**

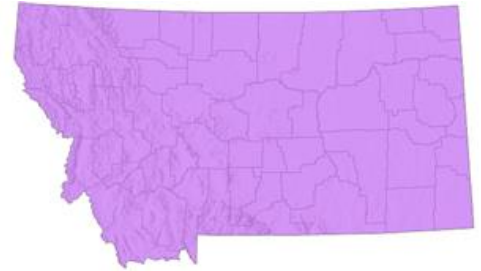
**BLM:**

## General Description

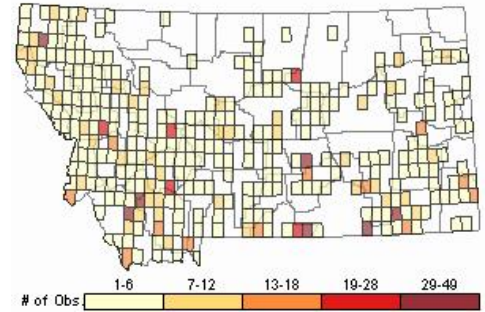
Ears are black and the longest of any other North American bat in the genus *Myotis*; > 0.84 inches (>21 millimeters). When bent forward, ears extend > 5 millimeters beyond the tip of the nose. Wingspan of 10-12 inches (25-30 centimeters) and weighs 0.2-0.3 inches (5-8 grams). Coat color is dull brown to straw-colored with individual hairs black at the base (Adams 2003).

## Habitat

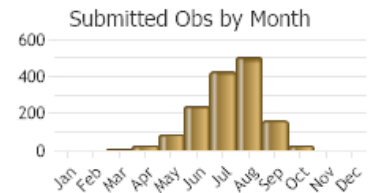
Occupy a wide range of rocky and forested habitats over a broad elevation gradient (Jones et al. 1973). Summer day roosts include abandoned buildings, bridges, hollow trees, stumps, under loose bark, and rock fissures. Hibernacula include caves and abandoned mines. The species has been located hibernating in a mine in riverbreaks habitat in northeastern Montana (Swenson and Shanks 1979).



Range  Native



**# Observations: 1512**





## Big Horn Fleabane

*Erigeron allocotus*

[View in Field Guide](#)


### Species of Concern

**Native Species**

**Global Rank:** G3

**State Rank:** S3

### Agency Status

**USFWS:**

**USFS:**

**BLM:** SENSITIVE

**State Threat Score:**

No Known Threats

**CCVI:** Less Vulnerable

**C-value:**

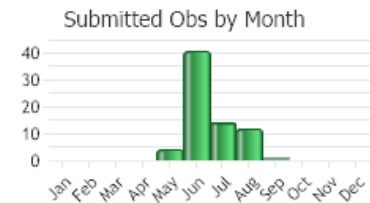


Range  Native



# of Obs: 1 2 3-5 6-63 64

**# Observations:** 72



## General Description

Taprooted perennial with a usually branched caudex. Stems ascending to erect, 5–10 cm. Herbage hirsute, minutely glandular. Leaves mainly basal; blades spatulate, 1–2 cm long, mostly 3-lobed at the tip. Heads 1 to 4, radiate. Involucres campanulate, 4–6 mm high; phyllaries in 2 to 3 series, glandular, sparsely hirsute. Rays white to pink, 20 to 40 ligules filiform, 3–6 mm long. Disk corollas ca. 3 mm long. Achenes ca. 2 mm long (Lesica et al. 2012. Manual of Montana Vascular Plants. BRIT Press. Fort Worth, TX).

## Phenology

Flowering in May to early July.

## Diagnostic Characteristics

*Erigeron compositus* has leafless or almost leafless stems that are cleft into 5-10 narrow segments.

## Habitat

Stony, sparsely vegetated, limestone or calcareous sandstone-derived soil of exposed ridges and cliffs in the valleys and montane zone.



## Matted Prickly-phlox

*Leptodactylon caespitosum*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G4

State Rank: S2S3

#### Agency Status

USFWS:

USFS:

BLM:

State Threat Score: Low

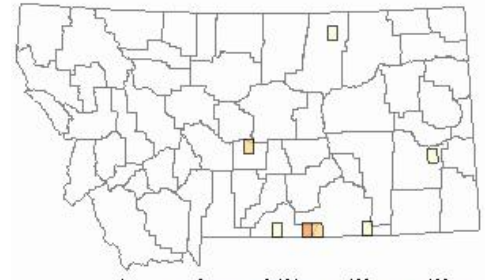
CCVI: Moderately

Vulnerable

C-value:

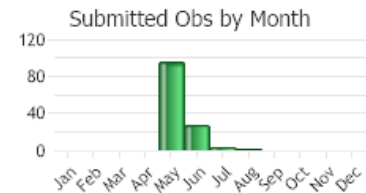


Range  Native



# of Obs: 1 2 3-121 122 123

# Observations: 129



## General Description

**PLANTS:** A taprooted, cushion-forming perennial with a highly branched root crown that gives rise to numerous ascending to erect stems, 2-6 cm high. Plants form dense mats, 10-60 cm across. Source: Lesica et al. 2012.

**LEAVES:** Stems have closely spaced internodes which are obscured by the opposite leaves and axillary fascicles. Most leaves are deeply palmately divided into 2-3 equally-lobed segments (ternate), rigid, and spine-tipped (mucronate). The foliage is nearly glabrous to sparsely glandular and ciliate. Sources: McGregor et al. 1986; Lesica et al. 2012.

**INFLORESCENCE:** Solitary flowers are borne at the stem tips. The calyx is united with 4 sparsely hairy uneven lobes, 4-7 mm long. The white (or sometimes cream, salmon, or pink-colored) corolla has a tube, 10-15 mm long, and 4 spreading lobes, each 3-5 mm long. Four anthers are borne near the top of the tube. The fruit is a round capsule. Source: Lesica et al. 2012.

"*Leptodactylon*" means thin fingers, referring to the narrow leaf segments.

## Phenology

Flowering occurs in May-June, and capsules ripen in June.

## Diagnostic Characteristics

In the Phlox Family (Polemoniaceae), some low-growing **Phlox** can resemble ***Leptodactylon caespitosum***:

### ***Leptodactylon***

- \*Subshrubs that are mat-forming or openly branched.
- \*Leaves are deeply divided and either alternate or opposite on the stem.
- \*Flowers are either 4- or 5-merous.

### **Phlox**

- \*Herbaceous, but many species form dense to loose mats.
- \*Leaves are simple and alternate on the stem.
- \*Flowers are 5-merous.
- \*Possible look-alikes: *Phlox bryoides*, *Phlox hoodii*, and other low-growing *Phlox*.

### **Matted Prickly-phlox** - *Leptodactylon caespitosum*, SOC, native

- \*Subshrubs with dense, ascending branches that form mats or cushions (caespitose).
- \*Leaves are deeply divided and opposite on the stem.
- \*Flowers are 4-merous.
- \*Plants are known to occur on Chugwater sandstone.

**Granite Prickly-phlox** - *Leptodactylon pungens*, native

\*Subshrubs with open, ascending branching.

\*Leaves are deeply divided and alternate on the stem.

\*Flowers are 5-merous.

## **Habitat**

---

Matted Prickly-phlox grows in sparsely vegetated steppe and juniper woodlands in the valley zones of Montana (Lesica et al. 2012). Specifically, this species is restricted to the foothills of the Pryor Mountains (below 5000 ft). It is typically found on north- or east-facing slopes in dry, open sandy breaks confined to barren eroding outcrops of Chugwater sandstone, an unusual though locally common substrate (Lesica and Achuff 1992). The Chugwater Formation consists mainly of siltstones and shales with interspersed sandstones. The formation is brick-red in color, caused by the oxidation of iron minerals in the rock (Cavaroc and Flores 1991). In Montana, the Chugwater sandstone is interbedded with gypsum. Elsewhere, it also appears to be confined to calcareous soils (Cronquist et al. 1984; Welsh et al. 1993).



## Common Poorwill

*Phalaenoptilus nuttallii*

[View in Field Guide](#)


### Potential Species of Concern

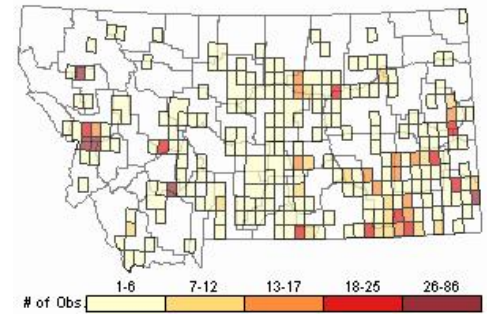
**Native Species**  
**Global Rank:** G5  
**State Rank:** S4B

### Agency Status

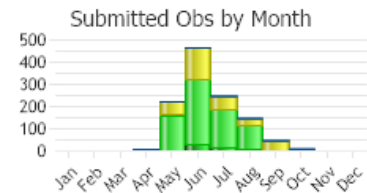
**USFWS:** MBTA  
**USFS:**  
**BLM:**  
**FWP SWAP:** SGIN  
**PIF:** 3



Range  Summer  Migratory



# Observations: 1178



### General Description

Small (19-21 cm long and 31-58 g). Head large and flattened, large eyes, small bill with immense gape. Short and rounded tail and wings. Plumage soft brown and gray streaked with black and white; underside is paler. Broad white band crosses dark throat and chest. Rectrices in males have white tips, buff colored in females. Plumage does not change seasonally. Noted for its distinctive "poor-will" call. (Woods et al. 2005)

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

### Diagnostic Characteristics

Distinguished from the Common Nighthawk by its lack of white wing stripe, presence of rictal bristles, and white or buff colored tail tips. (Woods et al. 2005)

### Habitat

Dry, open, grassy or shrubby areas; high rolling prairies, semi-arid flats, and rocky foothills (Woods et al. 2005).



## Double Bladderpod

*Physaria brassicoides*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S3

#### Agency Status

USFWS:

USFS:

BLM:

State Threat Score:

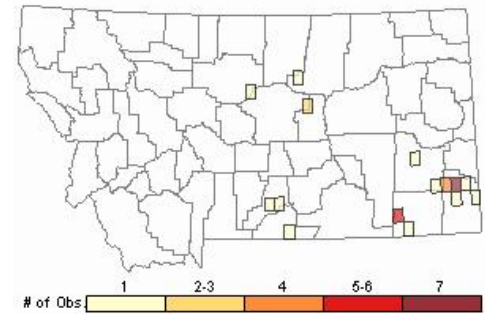
No Known Threats

CCVI:

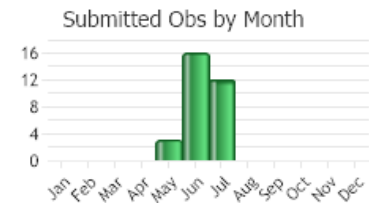
C-value:



Range Native



# Observations: 31



## General Description

Double Bladderpod is a perennial herb with numerous ascending stems that are 2-17 cm long and arising from a basal rosette that surmounts a branched crown and large taproot. The basal leaves are 2-8 cm long and are spoon-shaped with long petioles. The few, alternate stem leaves are broadly lance-shaped. Foliage is covered with silvery, star-shaped hairs appressed to the surface. The yellow, stalked flowers are borne at the tops of the stems in a narrow inflorescence that elongates as the fruit matures. Each flower has 4 separate petals that are 9-12 mm long and 4 separate sepals. The ascending, inflated fruits are 1-2 cm long, at least as wide, and flattened on top. They are 2-lobed with the locules (lobes) more deeply defined above than below. There are 2 ovules in each of the locules, attached at the top of the replum (suture between the two locules), and the replum has a linear outline. The style is 6-9 mm long.

## Phenology

Flowering takes place in May and early June, and fruiting in June and July.

## Diagnostic Characteristics

*Physaria brassicoides* is distinguished from other bladderpods primarily by its fruit, which is more constricted above than below and has 2 ovules per locule and a narrow, linear-shaped replum. Ovules often abort, making the number of seeds an unreliable diagnostic character, however, ovule number can be determined by counting the funiculi -- the tiny pegs that attach the ovules to the margin of the replum and are visible even after the ovules abort.

### Double Bladderpod - *Physaria brassicoides*, SOC

\*Pedicels are spreading, straight, or sigmoid, 5-20 mm long.

\*Fruits inflated and 2-lobed, 7-10 mm wide. Replum (thin wall that separates the lobes) is narrow and constricted in the middle.

### Thick-leaf Bladderpod - *Physaria pachyphylla*, SOC

\*Pedicels curve upwards (ascend), 3-10 mm long.

\*Fruits inflated, not 2-lobed, and narrowly elliptic to ovoid, 3-6 mm tall. Style is more than half the length of the fruit (silicle).

\*Basal leaves have distinct petioles and blades. Blades are spatulate to oblanceolate in shape, nearly 1 mm thick and cupped (but not folded), and with entire margins [key characteristic].

\*Plants grow on pinkish or reddish soils derived from limestone on exposed slopes and ridges in valleys.

## Habitat

---

All Montana populations occur on sparsely vegetated, steep, eroding, south-facing slopes of highly dissected breaklands and badlands (Vanderhorst et al. 1998). Substrate parent materials include both sandstone and shale, and these plants sometimes grow at the contact zone where sandstone overlies shale. The soft, eroding shale slopes do not support stable vegetation and have 80-90% exposed substrate. Associates include skunkbush (*Rhus aromatica*) and yucca (*Yucca glauca*), Indian ricegrasses (*Oryzopsis hymenoides*), little bluestem (*Schizachyrium scoparium*), *Chaenactis douglasii* and *Dalea candida*.

On the Custer National Forest, double bladderpod occurs mostly on barren substrate with less than 10 percent vegetation cover. Typical shrubs are *Rhus aromatica*, and low forms of *Amelanchier alnifolia* and *Prunus virginiana*. Clumps of western wheatgrass and little bluestem are present at one site and *Oryzopsis hymenoides* at another. Typically the upper soil is loose and shifting, and may be bounded above and below by clay or shale bedrock. One subpopulation occurs along a sandy slump just above a roadcut (Heidel and Dueholm 1995).



## Silver-haired Bat

*Lasionycteris noctivagans*

[View in Field Guide](#)


**Potential Species of Concern**

**Native Species**

**Global Rank: G3G4**

**State Rank: S4**

**Agency Status**

**USFWS:**

**USFS:**

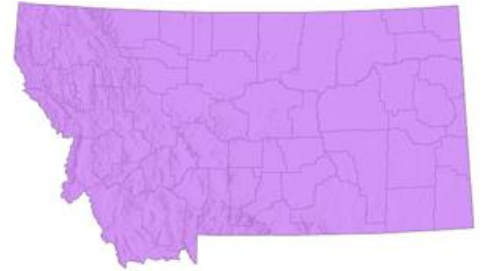
**BLM:**

### General Description

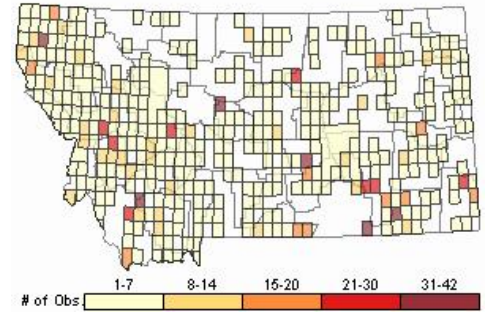
A mostly black bat with back hairs having silvery-white tips. Flight membranes are black. The tail membrane has fur on the dorsal side to the tip of the tail. Ears are bare, short, and rounded with a lighter patch at the front base of the ear.

### Habitat

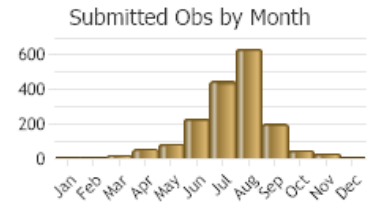
Occupy mature conifer and deciduous forests, riparian woodlands and aspen. Summer day roosts include tree cavities, under loose bark, also bird nests, sheds, and barns. Hibernacula include tree cavities, rock crevices, and buildings.



Range  Native



**# Observations: 1785**





## Sharp-tailed Grouse

*Tympanuchus phasianellus*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: SX,S4

#### Agency Status

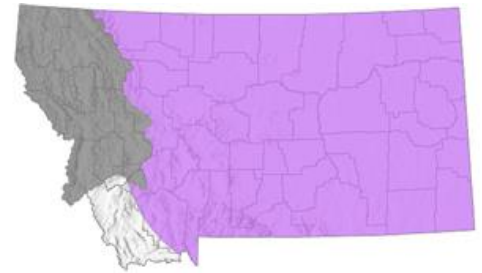
USFWS:

USFS:

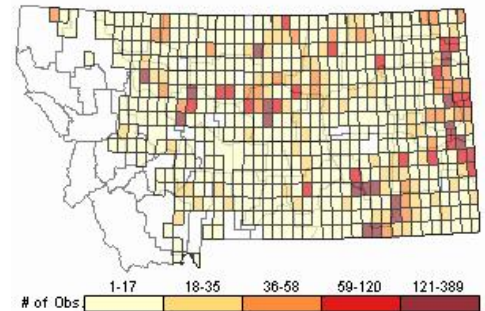
BLM:

FWP SWAP: SGCN1

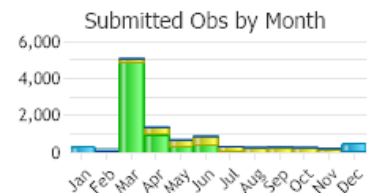
PIF: 2



Range  Year-round  Historical



# Observations: 10571



## General Description

Sexes are similar, although males have inconspicuous yellow eye combs and pale violet air sacs on the neck. Both sexes have feathered legs and upper parts mottled with white, buff, brown, and black. The wings have conspicuous white spots, and the breast and flanks have V-shaped brown markings on a snow-white background. Adult males and females average from 16.5 to 18.5 inches in length; adult males average 33 ounces and adult females 29 ounces in weight. Populations west of the Continental Divide that are thought to have been extirpated were, until recently, believed to be a smaller subspecies, the Columbian Sharp-tailed Grouse (*Tympanuchus phasianellus columbianus*). These populations tended to have grayer plumage, more pronounced spotting on the throat, and narrower markings on the underparts (Hoffman and Thomas 2007). However, nuclear and mitochondrial DNA of populations east and west of the Continental Divide overlap almost completely, indicating that Columbian Sharp-tailed Grouse likely never inhabited western Montana and that the declines observed in that region were in populations genetically similar to those on the Great Plains (Spaulding et al. 2006, Wood et al. 2010).

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

Female Ring-necked Pheasants, especially in the early fall, can be confused with Sharp-tailed Grouse. Sharp-tailed Grouse, however, have much shorter tails, feathered legs, and white bellies (female Ring-necked Pheasants are mottled brown throughout).

## Habitat

The habitat is primarily grasslands interspersed with shrub and brush-filled coulees. They prefer stands of intermixed tree and shrub grasslands. With high population, they spread into islands of native grassland, usually along drainages surrounded by grainfields. Sharp-tailed Grouse persist only on native bunchgrass-shrub stands. In Idaho, Saab and Marks (1992) found birds selected big sage habitat types during summer. They appeared to prefer range habitats that were in good condition.

Until recently, Sharp-tailed Grouse in Montana were found west of the Continental Divide in larger mountain valleys with extensive native bunchgrass-shrub stands. However, they have now apparently been extirpated, or nearly extirpated, from this historic range (Hoffman and Thomas 2007).



## Hoary Bat

*Lasiurus cinereus*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G3G4

State Rank: S3B

#### Agency Status

USFWS:

USFS:

BLM: SENSITIVE

FWP SWAP: SGCN3

## General Description

The Hoary Bat is a large lasurine (20 to 35 g) with long pointed wings and heavily-furred interfemoral membrane. Pelage overall is frosted or hoary (mixed brownish and grayish with white-tipped hairs, wrist and shoulder patches whitish), yellowish on the throat, forearm length about 46 to 55 mm. Ears are short and rounded, rimmed in dark brown or black, tragus short and broad. It has large teeth; dental formula I 1/3, C 1/1, P 2/2, M 3/3 (Shump and Shump 1982, Adams 2003).

## Diagnostic Characteristics

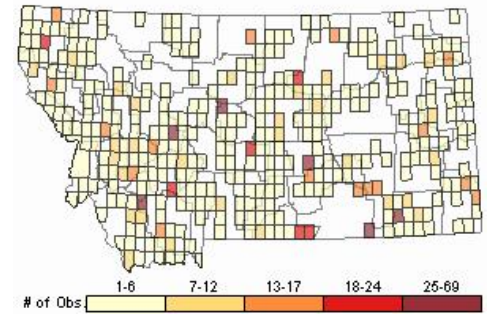
Hoary Bat is the largest bat species found in Montana, and only one of two with an interfemoral membrane completely furred on the dorsal surface, the other being the Eastern Red Bat. The Hoary Bat has a distinctive appearance along with its large size (35 g in weight, to about 140 mm in total length): dorsal pelage in is a mixture of browns and grays, tinged with white, giving the bat a frosted or hoary appearance (Shump and Shump 1982), unlike the reddish dorsal pelage of the smaller Eastern Red Bat. Definitive Hoary Bat calls are also of lower characteristic frequency and appearance: < 23 kHz lasting up to 20 milliseconds for Hoary versus 38-50 kHz lasting > 10 milliseconds for Eastern Red.

## Habitat

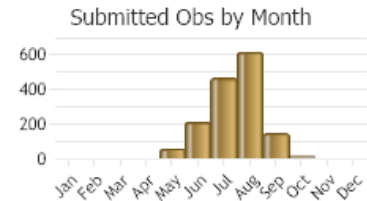
During the summer, Hoary Bats occupy forested areas. A female with two naked pups was found in mid-July using a wooden bridge in Stillwater County as a temporary day roost (Hendricks et al. 2005) but no other Montana roosts have been reported. Often captured foraging over water sources embedded within forested terrain, both conifer and hardwood, as well as along riparian corridors. Reported in Montana over a broad elevation range (579 to 2774 m; 1900 to 9100 ft) during August, the highest record from treeline along the Gravelly Range road (Madison County), the lowest from the Yellowstone River near Sidney (Richland County); probably most common throughout summer in Montana at lower elevations.



Range Summer Migratory



# Observations: 1533





## Suckley Cuckoo Bumble Bee

*Bombus suckleyi*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G2G3

State Rank: S1

#### Agency Status

USFWS:

USFS:

BLM:

## General Description

For definitions and diagrams of bumble bee morphology please see the Montana State Entomology Collection's Bumble Bee Morphology page. Medium sized and short-tongued: queens 18-23 mm (no workers). Outer surface of hind-leg tibia convex and densely hairy, lacks a pollen basket. Hair short and even, black on the face, predominantly yellow on sides of the thorax, black continuously along midline to anterior region of T4. Males 13-16 mm, hair color on sides of thorax yellow, T2 extensively yellow, T4 mostly yellow sometimes with narrow area of black hairs along midline, T7 black, antenna medium length, flagellum 3x longer than the scape (Williams et al. 2014).

## Phenology

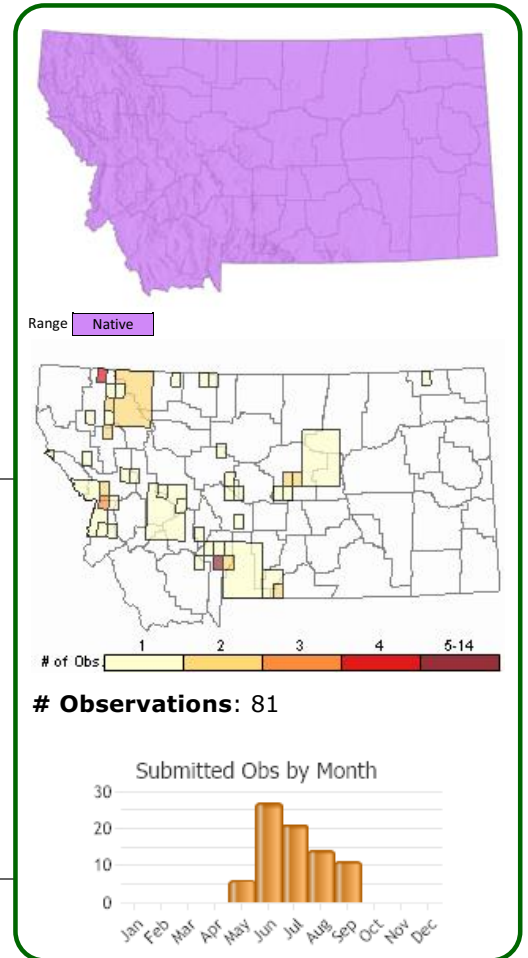
Queens reported April through August, males June through October (Koch et al. 2012, Williams et al 2014). In California, queens reported late May to late October, males early July to late September (Thorp et al. 1983).

## Diagnostic Characteristics

Please see the Montana State Entomology Collection's Key to Female Bumble Bees in Montana. Outer surface of the hind tibia convex, densely hairy and lacking a pollen basket separates *B. suckleyi* from other *Bombus* except other cuckoo bumble bees. Predominantly black occiput separates *B. suckleyi* from other western cuckoo bumble bees, which have predominantly yellow hairs covering the occiput (Koch et al. 2012).

## Habitat

Reported in grassland and shrub-steppe along the Snake River Plain of southeastern Washington, and in conifer forest uplands nearby (Mayer et al. 2000). In the Lower Fraser Valley of British Columbia, they were not detected in commercial berry (*Vaccinium*, *Rhubus*) fields, instead preferring native vegetation, and found in greater numbers as distance from commercial operations increased (MacKenzie and Winston 1984). Present in montane to subalpine mesic and wet meadows in Colorado (Macior 1974).





## Hayden's Shrew

*Sorex haydeni*

[View in Field Guide](#)


**Potential Species of Concern**

**Native Species**

**Global Rank: G5**

**State Rank: S3S4**

**Agency Status**

**USFWS:**

**USFS:**

**BLM:**

### General Description

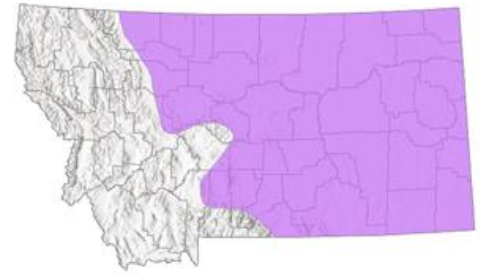
Also known as the prairie shrew, Hayden's shrew is small (total length about 8 cm) and brown across the back, blending to lighter brown on the sides and a whitish belly. Its tail is short relative to other species, and has a tuft of hair at its tip, brownish when viewed from below. (Foresman 2012)

### Diagnostic Characteristics

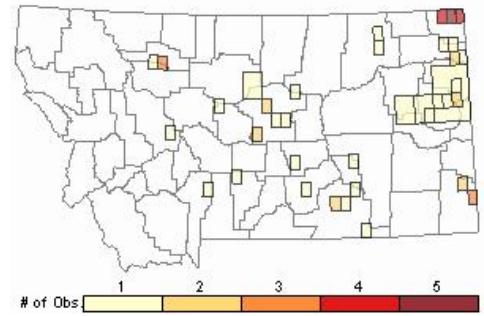
Easily confused with the masked shrew (*Sorex cinereus*), though careful observation of the habitat where an individual is found may help distinguish the two. Positive identification requires detailed analysis of the skull. (Foresman 2012)

### Habitat

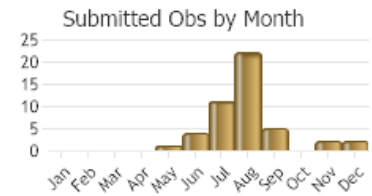
At the northern limits of its range in Canada, prefers drier, grassier habitats than does *S. cinereus*; in areas where the two species coexist, habitat segregation may occur (Foresman 2012).



Range  Native



**# Observations: 58**





## Fleshy Stitchwort

*Stellaria crassifolia*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S2

#### Agency Status

USFWS:

USFS:

BLM:

State Threat Score:

No Known Threats

CCVI:

C-value: 5

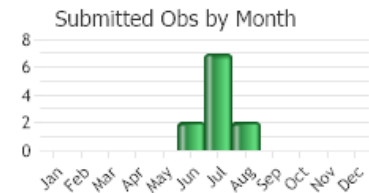


Range  Native



# of Obs: 1 2 3-4 5 6

# Observations: 11



## General Description

Fleshy Stichwort is a glabrous perennial herb with numerous, often matted, ascending to nearly prostrate stems that are 5-15 cm long and arising from slender roots. The opposite, narrowly lance-shaped leaves are 5-10 mm long, lack petioles, and have entire margins. Solitary flowers are borne on long spreading stalks in the upper leaf axils. The 5 separate, lance-shaped sepals are 2-3 mm long and have membranous margins. The 5 white, deeply bilobed petals are slightly longer. The fruit is a narrowly egg-shaped capsule that is 1-2 mm longer than the sepals at maturity.

## Phenology

Flowering in August, mature fruit in August-September.

## Diagnostic Characteristics

The more common *S. longipes* has stiff leaves and sepals greater than 3 mm long. *Stellaria calycantha* and *S. umbellata* have petals, if present, that are shorter than the sepals. A hand lens will likely be needed for identification.

## Habitat

Moist or wet meadows, often along streams, in the foothills to alpine zones.



## Veery *Catharus fuscescens*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S3B

#### Agency Status

USFWS: MBTA

USFS:

BLM: SENSITIVE

FWP SWAP: SGCN3

PIF: 2

## General Description

The Veery is an 18-cm-long bird with a reddish brown dorsum, white belly, gray flanks, grayish face, small spots (often indistinct) on the breast, indistinct grayish eyering, and straight slim bill. Western populations have a darker dorsum and more breast spotting than do eastern populations.

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

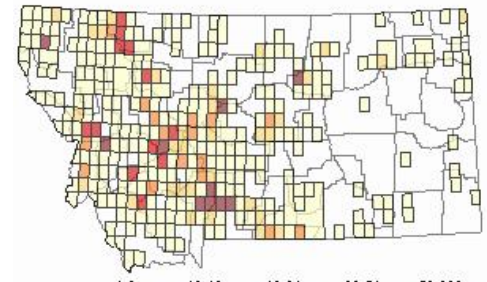
Veerys differ from other thrushes by having less breast spotting (less distinct and more restricted). They differ from Pacific coast populations of Swainson's Thrush (*Catharus ustulatus*) in having gray, instead of buffy brown, flanks.

## Habitat

Generally inhabits damp, deciduous forests in the east. Has a strong preference for riparian habitats in several regions, including the Great Plains. Prefers disturbed forest, probably because denser understory is not found in undisturbed forests (Moskoff 1995). In Montana, Veerys are often associated with willow thickets and cottonwood along streams and lakes in valleys and lower mountain canyons (Saunders 1921, Hand 1969, Skaar 1969), including the Flathead and Lewistown regions (Silloway 1901, 1903a). It also occupies riparian cottonwood stands along the lower Missouri River (Kroodsmma 1973). Along Beaver Creek in the Bears Paw Mountains, Veerys were present in a variety of plant community types (box elder, alder, aspen, cottonwood, and lodgepole pine) so long as willow was a significant component (Walcheck 1969).

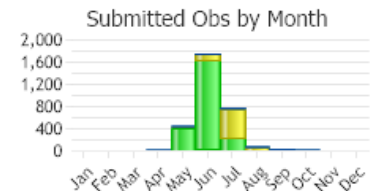


Range  Summer  Migratory



# of Obs  1-9  10-18  19-31  32-51  52-296

# Observations: 3061





## Black-necked Stilt

*Himantopus mexicanus*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S3B

#### Agency Status

USFWS: MBTA

USFS:

BLM:

FWP SWAP: SGCN3

PIF: 3

### General Description

The Black-necked Stilt is a tall, slender wader with a long, straight, and slender bill, the upperparts glossy black (male) or duller black tinged with brown (female) with a white spot above the eye, underparts white, the legs and feet very long and red or pink. The iris is red. Immatures have buffy edges on the dark brown feathers of the upperparts.

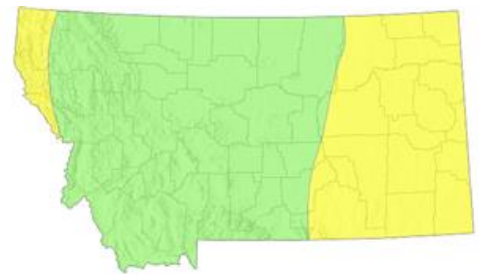
For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

### Diagnostic Characteristics

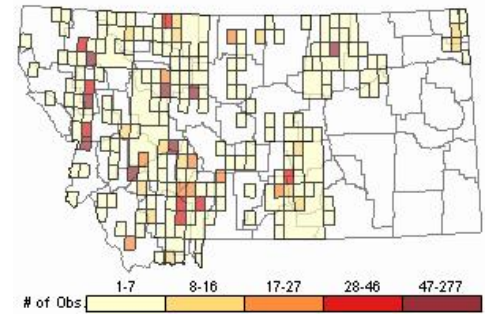
The black and white plumage and very long red legs of this species are unique and diagnostic.

### Habitat

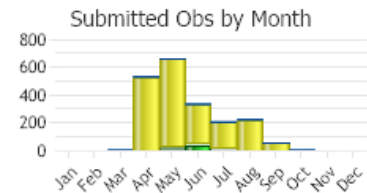
Black-necked Stilts breed on the edges of shallow marshes, often on islands, building a scrape that is lined with vegetation, pebbles, and feathers. Nests may be out in the open or among low vegetation and are usually within 50 m of water (Robinson et al. 1999). Taking full advantage of their long legs, almost all feeding occurs in the water. In Montana, Black-necked Stilts nest in medium to large wetland complexes of open marshes and meadows, often in alkali wetlands. Habitats used during migration similar to those used in other seasons, but they also occur on coastal mud flats.



Range Summer Migratory



# Observations: 2230





## Crawe's Sedge

*Carex crawei*

[View in Field Guide](#)


### Species of Concern

**Native Species**

**Global Rank:** G5

**State Rank:** S2S3

### Agency Status

**USFWS:**

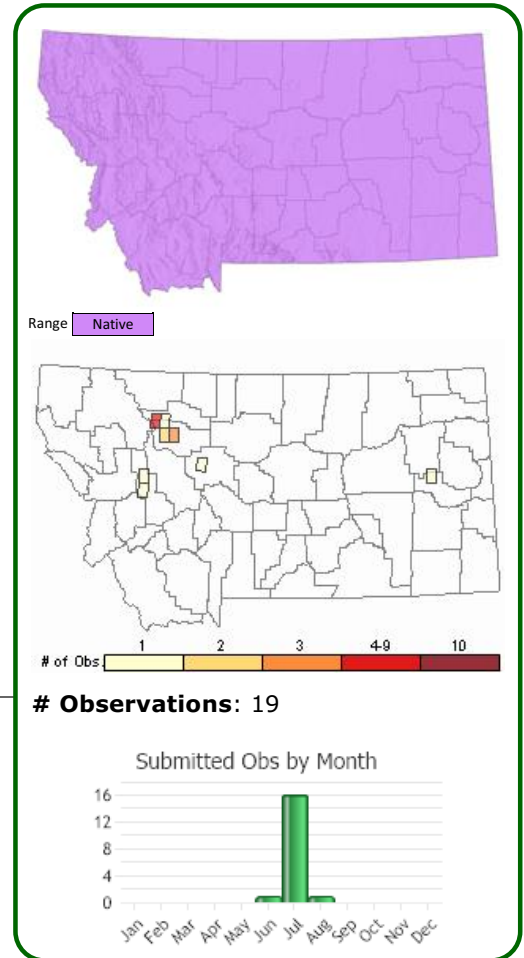
**USFS:**

**BLM:**

**State Threat Score:** Low

**CCVI:**

**C-value:** 6



## General Description

Rhizomatous. Stems erect, 5–20 cm. Leaves basal and cauline; blades 1–4 mm wide. Inflorescence of 2 to 5 well-separated spikes; the lowest bract shorter than the inflorescence. Spikes ascending; the uppermost male, 1–2 cm long; the lower female, 8–20 mm long, pedunculate, sometimes arising from the base. Perigynia spreading to ascending, green to tan, glabrous, ovoid, 2.5–3.5 mm long with an obscure beak; stigmas 3. Female scales ovate, tan with pale margins and a green midvein, shorter and narrower than the perigynia. Achene 3-sided, partly filling the perigynium (Lesica et al. 2012. Manual of Montana Vascular Plants. BRIT Press. Fort Worth, TX).

## Phenology

The fruit matures in July.

## Diagnostic Characteristics

*Carex* is a large genus in Montana; the following collection of characters separate Crawe's sedge from others in the state. Crawe's sedge has 3-sided achenes and a slender, terminal male spike less than 20 mm long. It has erect, rather than spreading or drooping, female spikes, and the glabrous, yellow-green perigynia do not have distinct beaks. Of the similar species, *Carex livida* has whitish perigynia and always grows in peat, and both *Carex lanuginosa* and *C. lasiocarpa* have hairy perigynia.

## Habitat

Crawe's sedge grows in wet, gravelly or sandy soil along streams or pond margins, often where there is some natural wave or flow disturbance. It occurs in the valleys and montane foothills, especially where the dominant parent material is calcareous. Common associates include *Carex oederi*, *C. lanuginosa*, *C. aurea*, *Juncus balticus*, and *Potentilla fruticosa*.



## American Bittern

*Botaurus lentiginosus*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S3B

#### Agency Status

USFWS: MBTA

USFS:

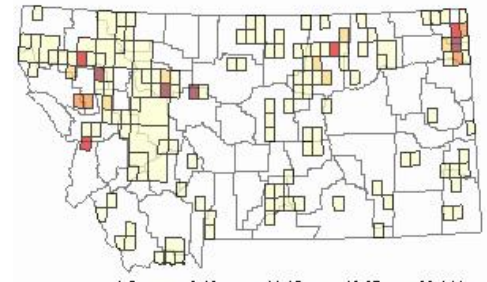
BLM: SENSITIVE

FWP SWAP: SGCN3

PIF: 3

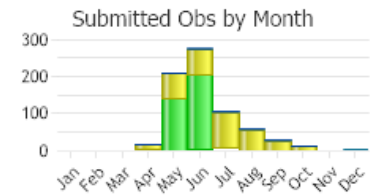


Range Summer Migratory



# of Obs 1-5 6-10 11-15 16-37 38-144

# Observations: 721



## General Description

A stocky wading bird with a straight pointed bill, relatively short neck and legs, and somewhat pointed wings; darker flight feathers; bill dull yellow with a dusky tip on the upper mandible; legs and feet are greenish yellow; breeding feathering includes generally inconspicuous white ruffs on the shoulders and two small green patches on the back; wing span 107 cm. The American Bittern is a brown, medium-sized heron, 60-85 cm long, with a stout body and neck and relatively short legs (Palmer 1962, Cramp 1977, Hancock and Kushlan 1984). Adult plumage is all brown above and finely flecked with black; heavily streaked with brown and white below. The crown is rusty-brown. An elongated, black patch extends from below the eye down the side of the neck, a characteristic unique among herons (Hancock and Kushlan 1984). The throat is white. Sexes are similar, except that the male is slightly larger (Gibbs et al. 1992). Juveniles differ only in lacking black neck patches, which are obtained in the first winter. Plumage does not change seasonally.

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

Differs from night-herons in the following ways: wings are pointed rather than rounded; flight feathers are much darker than back (vs. no contrast), upperparts lack white spotting; and bill is more slender. Much larger than the Least Bittern (average length 71 cm vs. 33 cm). Differs from similar juvenile Green Heron in being larger (length 71 cm vs. 46 cm) and in having flight feathers of wings obviously darker than the middle of the back.

## Habitat

American Bitterns favor large freshwater wetlands with tall emergent vegetation such as cattails and bulrushes. Sparsely vegetated wetlands are occupied occasionally, tidal marshes rarely. The typical nest is a platform of dried rushes, sedges, and cattails placed in dense emergent vegetation over shallow water (Gibbs et al. 1992). Bitterns forage along shorelines, in dense marsh vegetation, and in wet meadows. Winter range include areas where temperatures stay above freezing and waters remain open. Managed wetlands, such as those at wildlife refuges, are often used.



## Great Plains Toad

*Anaxyrus cognatus*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: **G5**

State Rank: **S2**

#### Agency Status

USFWS:

USFWS: **SENSITIVE**

BLM: **SENSITIVE**

FWP SWAP: **SGCN2**

## General Description

### EGGS

Laid communally in single or more rarely double strings containing 1,342 to 45,054 eggs (Bragg 1937a, Krupa 1994). Each ovum is black above, shaded progressively lighter to white below. There are two jelly layers surrounding each ovum, including the outer jelly layer that composes the string (Bragg 1937a). Ovum diameters are approximately 1.2-1.3 mm, but total egg diameters, including the two jelly layers are approximately 2.0 mm. The jelly string is constricted between eggs to approximately 1.7 mm (Bragg 1937a).

### LARVAE

Mottled brown and gray dorsally with a light greenish-yellow and reddish iridescence ventrally (Bragg 1936). The dorsal tail fin is dendritically pigmented and highly arched while the ventral tail fin is of uniform width and transparent (Bragg 1936). The dorsal pattern of large, paired blotches appears before metamorphosis is complete. The upper mandible is highly arched and labial tooth rows are usually 2/3 with oral papillae restricted to the sides of the mouth. Eyes are located dorsally. Total length (TL) of 8-29 mm (Bragg 1936, Bragg 1940a).

### JUVENILES AND ADULTS

The skin is covered with numerous small warts. Juveniles typically have reddish colored warts. A white stripe usually extends down the center of the back and large paired green to brown blotches are present dorsally. These blotches are outlined or separated by white bands. The ventral side is cream to white colored (Krupa 1990). Large parotid glands are present behind the eyes. The underside of the hind foot often has a sharp-edged tubercle and a smaller dark-tipped tubercle. Except for small metamorphs, a large bony plate or hard lump (boss) covers the snout from the tip to the front of the eyes. In addition, cranial crests are present behind the eyes and converge toward the boss on the snout to form a "V" between the eyes (Krupa 1990). Snout-vent length (SVL) of males is typically less than 95 mm and females can reach up to 115 mm (Bragg 1937b; Bragg 1940a; Krupa 1990). Males have dark, loose throat skin and a dark patch on the inner surface of the innermost digit of the forefeet during breeding. The vocal sac, when inflated, may extend beyond the front of the face.

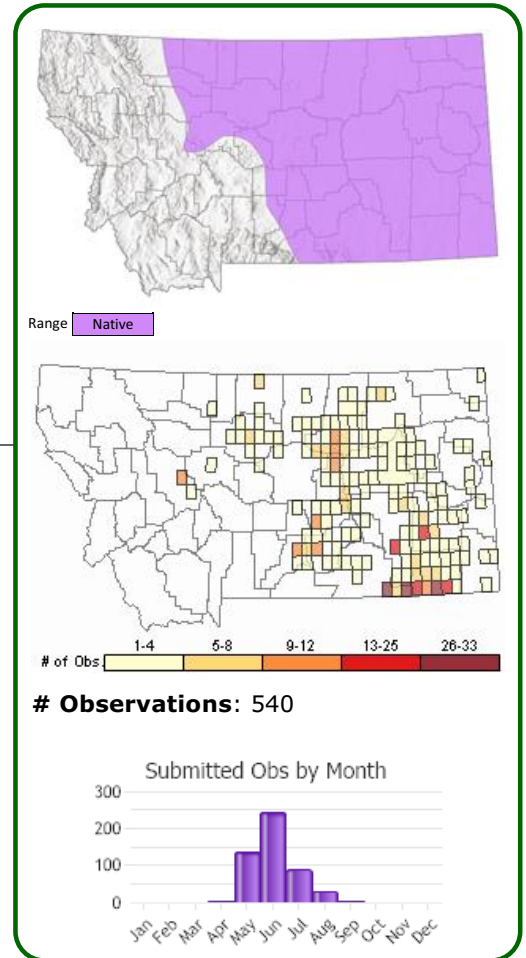
### VOICE:

The breeding call of this species is loud and can carry over a distance of 1600 meters (approximately 5,250 feet) (Bryce Maxell, personal communication). These calls are a repetitive and vibrating trill lasting 25-50 seconds with a 10-60 second interval. Sound has been characterized as a high-pitched jackhammer (Werner et al. 2004).

## Diagnostic Characteristics

The geographic range of Western Toad (*Anaxyrus boreas*) does not overlap with the geographic range of Great Plains Toad and adult Western Toad lack cranial crests. If present in Montana, the Canadian Toad (*Anaxyrus hemiophrys*) are probably limited to the extreme northeast corner of the state and adults either lack or have weakly developed cranial crests behind the eyes.

Although overlap in habitat use exists, Woodhouse's Toad (*Anaxyrus woodhousii*) seem to be more commonly associated with sandy soils on floodplains while the Great Plains Toad is more commonly associated with heavier



soils in upland habitats (Timken and Dunlap 1965). Eggs and larvae of Woodhouse's and Great Plains Toad are very similar and may not be differentiable by even thoroughly trained herpetologists. However, Woodhouse's Toad tadpoles lack the strongly arched tail fin and eggs are enclosed in a single jelly layer. In addition, eggs and larvae of Woodhouse's Toad are much more likely to be found in permanent or semi-permanent waters than those of Great Plains Toad (Bragg 1940a). Adult Woodhouse's Toad lack the shield or 'boss' on the tip of the snout and have "L" shaped cranial crests between and behind each eye. Metamorph Woodhouse's Toad lack the large paired dorsal blotches that are present on Great Plains Toad (Bragg 1937b).

## **Habitat**

---

Little specific information on the habitat of Great Plains Toad is available. The Great Plains Toad can be found in floodplain habitats but are more common in upland grasslands with harder packed soils (Bragg 1940a, Smith and Bragg 1949, Timken and Dunlap 1965). Great Plains Toads have been reported from sagebrush-grassland, rainwater pools in road ruts, in stream valleys, at small reservoirs and stock ponds, and around rural farms; breeding has been documented in small reservoirs and backwater sites along streams (Mosimann and Rabb 1952, Dood 1980, Hendricks 1999a, Hossack et al. 2003). When inactive, adults lie dormant in rodent or self-excavated burrows and under rocks and wood when terrestrial conditions are not favorable. When conditions are warmer and moist, they will emerge to feed (Bragg 1937a, Smith and Bragg 1949, Dimmitt and Ruibal 1980, Flowers and Graves 1994, 1995).



## Black-tailed Prairie Dog

*Cynomys ludovicianus*

[View in Field Guide](#)


### Species of Concern

**Native Species**

**Global Rank:** G4

**State Rank:** S3

### Agency Status

**USFWS:**

**USFS:** SENSITIVE

**BLM:** SENSITIVE

**FWP SWAP:** SGCN3

## General Description

The Black-tailed Prairie Dog is the largest of the prairie dog species, weighing 700 to 1500 grams and measuring 28 to 33 centimeters from nose to tail (Burt and Grossenheider 1976, Hoogland and Foltz 1982). The overall color of the back and upper sides of the body and tail is generally dark cinnamon with buff coloring on the underside (Anderson 1972, Burt and Grossenheider 1976, Hall 1981). The distal third of the tail is black or dark brown (Hall 1981). They molt twice per year, prior to summer and prior to winter. The skull is about 60 centimeters long, with 22 teeth (Burt and Grossenheider 1976).

## Diagnostic Characteristics

Black-tailed Prairie Dogs are easily separated from the similar White-tailed Prairie Dogs by the black color of the distal one-third of the tail tip. The Black-tailed Prairie Dog also lacks the distinctive dark face patches of the White-tailed Prairie Dog. Black-tailed Prairie Dogs are also found in more dense colonies than are White-tailed Prairie Dogs. Features of the skull and teeth can also be used to separate the two species of prairie dogs in Montana (Foresman 2012).

Black-tailed Prairie Dogs may also be confused with a number of ground squirrel (*Spermophilus*) species, but are distinguished by their much more robust body conformation and relatively short tail and their habit of living in much denser colonies with more developed burrow systems.

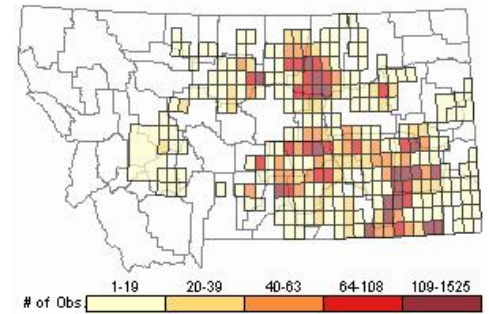
## Habitat

Black-tailed Prairie Dog colonies are found on flat, open grasslands and shrub/grasslands with low, relatively sparse vegetation. The most frequently occupied habitat in Montana is dominated by western wheatgrass, blue grama and big sagebrush (Montana Prairie Dog Working Group 2002). Colonies are associated with silty clay loams, sandy clay loams, and loams (Thorp 1949, Bonham and Lerwick 1976, Klatt and Hein 1978, Agnew et al. 1986) and fine to medium textured soils are preferred (Merriam 1902, Thorp 1949, Koford 1958), presumably because burrows and other structures tend to retain their shape and strength better than in coarse, loose soils. Encroachment into sands (e.g., loamy fine sand) occurs if the habitat is needed for colony expansion (Osborn 1942).

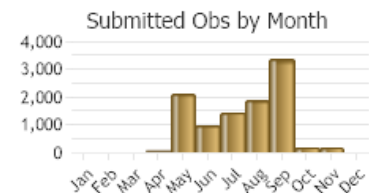
Shallow slopes of less than 10% are preferred (Koford 1958, Hillman et al. 1979, Dalsted et al. 1981), presumably in part because such areas drain well and are only slightly prone to flooding. By colonizing areas with low vegetative stature, Black-tailed Prairie Dogs often select areas with past human (as well as animal) disturbance. In Montana, colonies tended to be associated with areas heavily used by cattle, such as water tanks and long-term supplemental feeding sites (Licht and Sanchez 1993, FaunaWest 1998).



Range  Native



# Observations: 10985





## Lewis's Woodpecker

*Melanerpes lewis*

[View in Field Guide](#)


### Species of Concern

#### Native Species

**Global Rank:** G4

**State Rank:** S2B

#### Agency Status

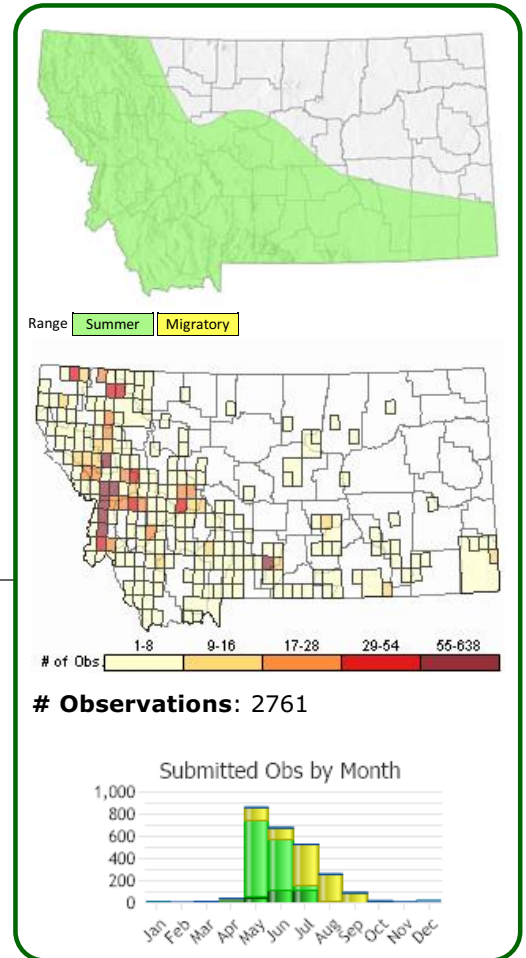
**USFWS:** MBTA; BCC10;  
BCC17

#### USFS:

**BLM:** SENSITIVE

**FWP SWAP:** SGCN2

**PIF:** 2



## General Description

The Lewis's Woodpecker is a medium sized woodpecker, approximately 10 to 11 inches in length. They weigh about 115 grams. Their wings and tail are relatively long (Sibley 2000). The head, back, wings and tail are greenish-black. They have a silver-pale collar and upper breast. The face is dark red and the belly and lower breast is pinkish or salmon-red. The sexes are similar in appearance, but males are usually larger than females (Tobalske 1997). Juvenile birds are distinct from adults, having an overall dark appearance with more brownish-black on the back. They usually lack the silver color of the neck, the pinkish belly color, as well as the red on the face (Tobalske 1997).

Lewis's Woodpeckers are quieter than other woodpeckers. They commonly call during the breeding season only. During breeding male Lewis's Woodpeckers will give a harsh "CHURR" call which is repeated 3 to 8 times. Males will also give a chatter call throughout the year and commonly during the breeding season (Tobalske 1997).

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

The plumage of the Lewis's Woodpecker will easily distinguish it from any other woodpecker species. Also the flight pattern is unique for woodpeckers. Lewis's Woodpecker flight is slow and direct and will often include long glides and aerial maneuvers (Tobalske 1997). From long distances, Lewis's Woodpeckers may be mistaken for an American Crow or jay, but closer observation of the plumage and form will eliminate any confusion.

## Habitat

In the Bozeman area, Lewis's Woodpeckers are known to occur in river bottom woods and forest edge habitats (Skarr 1969). Habitat information from other Lewis's Woodpecker sources state that the breeding habitat is open forest and woodland, often logged or burned, including oak and coniferous forest; primarily ponderosa pine (*Pinus ponderosa*), riparian woodland and orchards, and less commonly in pinyon-juniper *Pinus* spp.-*Juniperus* spp.) (American Ornithologists' Union 1983). Lewis's Woodpecker distribution is closely associated with open ponderosa pine forest in western North America, and is strongly associated with fire-maintained old-growth ponderosa pine (Diem and Zveloff 1980, Tobalske 1997, Saab and Dudley 1998).

Important habitat features include an open tree canopy, a brushy understory with ground cover, dead trees for nest cavities, dead or downed woody debris, perch sites, and abundant insects. Lewis's Woodpeckers use open ponderosa pine forests, open riparian woodlands dominated by cottonwood (*Populus* spp.), and logged or burned pine. They also use oak (*Quercus* spp.) woodlands, orchards, pinyon-juniper woodlands, other open coniferous forests, and agricultural lands. Apparently the species prefers open ponderosa pine at high elevations and open riparian forests at lower elevations (Bock 1970, Tobalske 1997). In the Blue Mountains of Oregon, they showed a

preference for open stands near water (Thomas et al. 1979). Because the species catches insects from the air, perches near openings or in open canopy are important for foraging habitat (Bock 1970, Tobalske 1997).

Lewis's Woodpeckers often use burned pine forests, although suitability of post-fire habitats varies with the age, size, and intensity of the burn, density of remaining snags, and the geographic region. Birds may move to unburned stands once the young fledge (Block and Brennan 1987, Tobalske 1997, Saab and Dudley 1998). They have been generally considered a species of older burns rather than new ones, moving in several years post-fire once dead trees begin to fall and brush develops, five to thirty years after fire (Bock 1970, Block and Brennan 1987, Caton 1996, Linder and Anderson 1998). However, on a two- to four-year-old burn in Idaho they were the most common cavity-nester, and occurred in the highest nesting densities ever recorded for the species (Saab and Dudley 1998). As habitat suitability declines, however, numbers decline. For example, in Wyoming, the species was more common in a seven-year-old burn than in a twenty-year-old burn (Linder and Anderson 1998). Overall, suitable conditions include an open canopy, availability of nest cavities and perches, abundant arthropod prey, and a shrubby understory (Linder and Anderson 1998, Saab and Dudley 1998).

Unlike other woodpeckers, Lewis's Woodpeckers are not morphologically well adapted to excavate cavities in hard wood. They tend to nest in a natural cavity, abandoned Northern Flicker (*Colaptes auratus*) hole, or previously used cavity, 1 to 52 meters above ground. Sometimes they will excavate a new cavity in a soft snag (standing dead tree), dead branch of a living tree, or rotting utility pole (Harrison 1979, Tobalske 1997). The mated pair may return to the same nest site in successive years. On partially logged burns with high nesting densities in Idaho, nest sites were characterized by the presence of large, soft snags and an average of 62 snags per hectare that had more than 23-centimeter diameter at breast height (dbh) (Saab and Dudley 1998).

In late summer, wandering flocks move from valleys into mountains or from breeding habitat to orchards. In winter, they use oak woodlands and nut and fruit orchards. An important habitat feature in many wintering areas is the availability of storage sites for grains or mast, such as tree bark (e.g. bark of mature cottonwood trees) or power poles with desiccation cracks (Bock 1970, Tobalske 1997). In southwestern Arizona and southeastern California, Lewis's Woodpeckers may use scrub oak, pecan orchards, and cottonwoods, but more study is needed in this area (Bock 1970). In Mexico, they use open and semi-open woodlands, especially those with oaks (Howell and Webb 1995).



## Spotted Joeepy-weed

*Eupatorium maculatum*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S1S2

#### Agency Status

USFWS:

USFS:

BLM:

State Threat Score:

No Known Threats

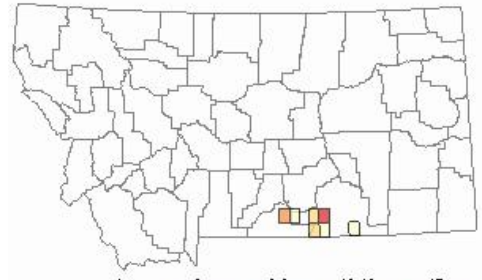
CCVI: Moderately

Vulnerable

C-value: 5

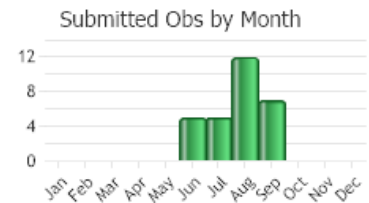


Range  Native



# of Obs: 1 2 3-9 10-16 17

# Observations: 33



## General Description

Fibrous-rooted perennial. Stems erect, 50–150 cm, simple, purplish. Herbage puberulent, glandular above. Leaves cauline, short-petiolate, simple, in whorls of 3 or 4; blades lanceolate, 6–15 cm long, serrate. Inflorescence corymbiform, flat-topped, terminal or in upper leaf axils. Heads discoid; involucre tubular, 6–9 mm high; phyllaries imbricate in 3 to 5 series, white to purplish, ovate to oblanceolate, glabrous; receptacle convex, naked. Disk flowers perfect, tubular, 9 to 22, purple; corolla 4–6 mm long; style branches clavate. Achenes obconic, 5-angled, 3–5 mm long, glandular; pappus 1 series of capillary bristles (Lesica et al. 2012. Manual of Montana Vascular Plants. BRIT Press. Fort Worth, TX).

Our plants are variety *bruneri* (A.Gray) Breitung.

## Phenology

Flowering in August.

## Habitat

Moist meadows, springs, margins of spring-fed streams, and swamp thickets in the valleys and on the plains.



## Black-crowned Night-Heron

*Nycticorax nycticorax*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S3B

#### Agency Status

USFWS: MBTA

USFS:

BLM:

FWP SWAP: SGCN3

PIF: 3

## General Description

The Black-crowned Night-Heron is a medium sized wading bird (length 58 to 66 cm) of stocky build, with a relatively large head, and fairly short neck and legs. Males and females are similar in plumage, with the males of slightly larger size. The adults are dominated by gray plumage, complete with black crown, black bill, and yellow to yellow-green legs. The eye, which start out as a grayish-olive at hatching, quickly turn to light yellow, bright yellow, orange, and finally to bright red by 2 to 3 years of age (Davis 1993). During the breeding season, adults also have long white occipital plumes (average of 2 to 3) extending from the distinctly black crown (Davis 1993, Sibley 2000). Juveniles have broad streaks of light brown-over-white on the breast and the wing coverts are covered in large, white spots. They lack the gray, black, and white plumage distinctive in the adults (Sibley 2000).

The common call of the Black-crowned Night-Heron includes a "Qua, Quak, Quark" or "Squawk," on the part of adults. An advertising call, identified as a hissing "Plup", is given from the nest, while the common call is given in flight or while perching (Davis 1993). The vocalization of the young varies as the birds age, from newly hatched to grown young, from a "Pip, Pip, Pip" to a "Chuck, Chuck-a-chuck, Chuck, Chuck" (Davis 1993).

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

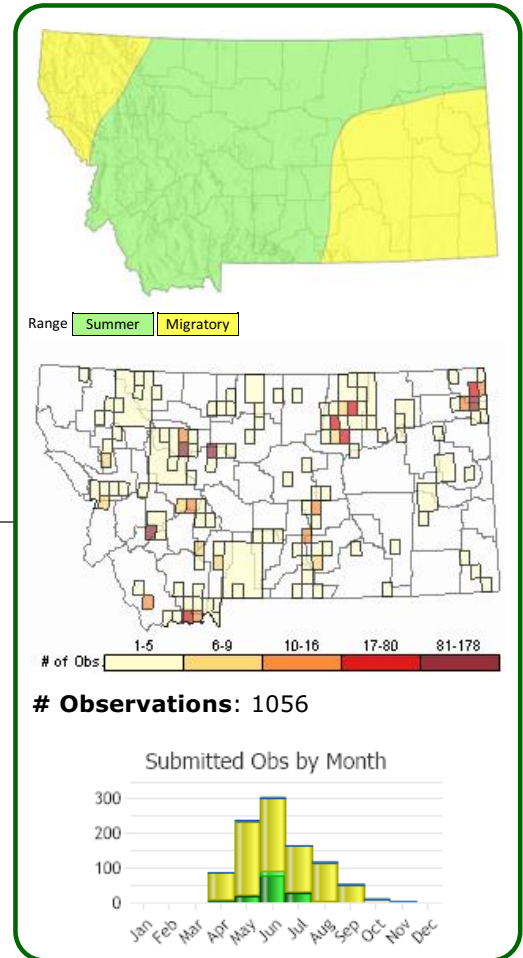
## Diagnostic Characteristics

The distinctive black crown and back, in addition to the gray body and yellow legs, make it hard to confuse this species with any other found in the state. The species to which it is most similar in appearance is the Yellow-crowned Night-Heron (*Nyctanassa violacea*), but this species lacks a black back, has a bold head pattern with a white cheek patch, and is very rare in Montana, having been recorded on only three occasions (Montana Bird Distribution Committee 2012). Young Black-crowned Night-Herons may sometimes be confused with American Bittern (*Botaurus lentiginosus*), but the American Bittern has a long, conspicuous mark on the side of the neck, bold stripes on the breast, dark flight feathers compared to the rest of the back, and lacks the large, pale spots on the underparts (Davis 1993, Sibley 2000).

## Habitat

Although highly adaptable to a variety of habitats, the Black-crowed Night-Heron is likely to use shallow bulrush (*Scirpus* spp.) or cattail (*Typha* spp.) marshes, most often within a grassland landscape (Johnsgard 1992). In addition, they will also nest in cottonwoods, willows, or other wetland vegetation that allows them to nest over water or on islands that may afford them protection from mammalian predators (Davis 1993, Casey 2000). Most colonies are located in large wetland complexes, typically with a one-to-one ratio of open water and emergent vegetation (Davis 1993).

In general, Black-crowned Night-Herons are found in marshes, swamps, wooded streams, mangroves, shores of



lakes, ponds, lagoons, in salt water, brackish, and freshwater areas. Foraging habitat is typically in the shallow, vegetated edges of these ponds, lakes, creeks, and marshes. This heron roosts by day in mangroves or swampy woodland. Eggs are laid in a platform nest in groves of trees near coastal marshes or on marine islands, swamps, marsh vegetation, clumps of grass on dry ground, orchards, and in many other locations. Nesting usually occurs in the same locality with other heron species.



## Short-eared Owl

*Asio flammeus*

[View in Field Guide](#)


### Potential Species of Concern

#### Native Species

Global Rank: G5

State Rank: S4

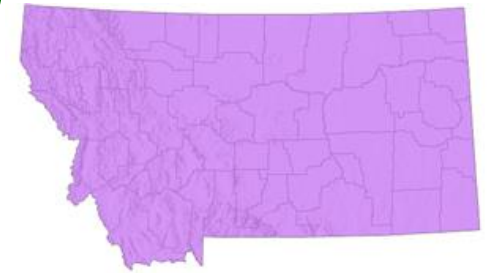
#### Agency Status

USFWS: MBTA; BCC11;  
BCC17

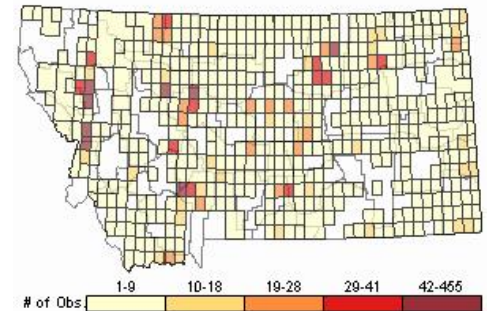
USFS:

BLM:

PIF: 3

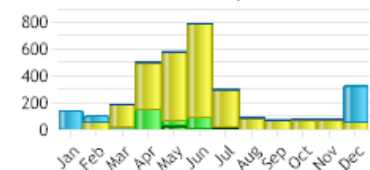


Range Year-round



# Observations: 3368

#### Submitted Obs by Month



## General Description

Short-eared Owls are a small to medium-sized owl. Published lengths range from 37 to 39 centimeters (Cramp 1985) to 34 to 42 centimeters (Mikkola 1983), with females slightly larger than males and considerably heavier, averaging 411 grams compared to 350 grams for males (Mikkola 1983). They are excellent flyers with long wings (95 to 110 centimeters) (Cramp 1985), and light wing-loading (0.333 gram per centimeter squared) (Clark 1975). There is little difference in wing length between the sexes (Clark and Ward 1974). The back and upper wing surfaces are tawny-brown to buff-colored with heavy but indistinct streaking. The ventral surfaces are much lighter, with bold, vertical brown streaking on the breast, and a pair of barely visible ear tufts close together at the top of the facial disk. The belly is pale, lightly streaked; the wings are long and have a buffy patch beyond the wrist above and a dark patch at the base of the primaries below; the dark facial disk contrasts with yellow eyes; and the legs and feet are feathered. Mature males are bright white on the underwing, while mature females show somewhat more buff coloration (Bent 1938, Village 1987). It is, nonetheless, difficult to sex or age these birds in the field. Females are generally darker than males but young birds are also darker than older ones (Mikkola 1983), thus a young male may be darker than an old female. Both sexes have a distinct, black carpal bar and dark wingtips. Juveniles possess full adult plumage by October of the first year (Bent 1938, Cramp 1985). The facial disc is circular and whitish with dark areas around the bright, yellow eyes, black bill. Recently fledged and juvenile Short-eared Owls show much darker coloration overall and a much darker facial disc which whitens with age. The Short-eared Owl gets its common name from the small ear tufts over the eyes. These inconspicuous tufts are part of the facial disc and are generally not seen except when female is in camouflage position on nest or erected when the bird is annoyed or alert. They may possibly aid in making birds more cryptic when in vegetation by breaking the line of the circular facial disc.

The bird is generally silent but does vocalize in courtship (a low, repeated, hooting "voo, hoo, hoo, hoo", or in conjunction with defensive behavior or annoyance, yaps or barks). The call is given approximately 15 times during courtship flight and is also accompanied by an audible wing-clap and dive between calls. Young give a food-begging call ("pssssip") that apparently aids adults in locating them from the time they leave the nest until after fledging. Adults may squeal while feigning injury during broken-wing acts to distract intruders from nests or young. Both young and adults will clack their bills when annoyed or in defense. Apparently, no data exist on the use of broadcasting tape-recorded vocalizations for detection or monitoring purposes.

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

Short-eared Owls can be distinguished by large "wrist" patches and moth-like flight. Long-eared Owl (*Asio otis*) has a smaller "wrist" patch, buffy underwings, and a darker belly. Although Long-eared Owls hunt similarly to

Short-eared Owls, they are rarely seen hunting during the day. Short-eared Owls are probably the most diurnal of owls (Lockie 1955, Clark 1975) and may often be observed from late afternoon until nightfall, or at dawn. A crow-sized owl seen abroad during daylight in open country will most likely be a Short-eared Owl. However, they also hunt at night. They are easily recognized by their blunt-headed profile and the fact that they glide with their wings held horizontally. This contrasts with the shallow v-shape of the Northern Harrier (*Circus cyaneus*) with which the Short-eared Owl often shares habitat and may be confused. Northern Harriers may also be distinguished by their white rump patch. Habitat is useful in separating Short-eared Owls from Long-eared Owls, the latter being predominantly a woodland dweller. The Long-eared Owl is also more slender with much longer ear tufts. Burrowing Owl also inhabits open country but is smaller (24 centimeters vs. 38 centimeters), has relatively longer legs, a yellow to whitish bill, and (in adults) has at least some horizontal barring on the breast. The Short-eared Owl's style of flight is unique and has at times been called mechanical, moth-like, or even slovenly (Peterson 1934).

## **Habitat**

---

Open grasslands, plains, and agricultural areas with suitable vegetation and food.



## Geyer's Milkvetch

*Astragalus geyeri*

[View in Field Guide](#)


### Species of Concern

**Native Species**

**Global Rank:** G4

**State Rank:** S2

### Agency Status

**USFWS:**

**BLM:**

**State Threat Score:**

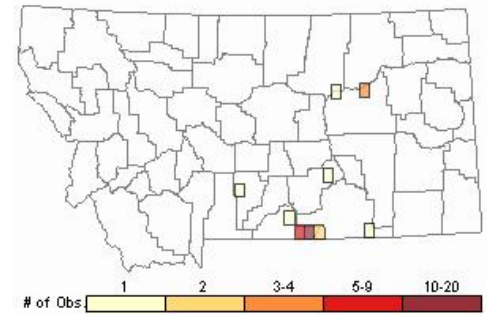
No Known Threats

**CCVI:** Highly Vulnerable

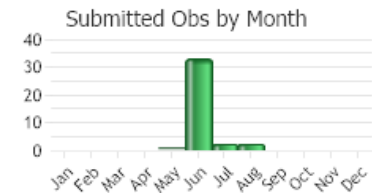
**C-value:**



Range  Native



**# Observations:** 40



## General Description

Geyer's Milkvetch is a small annual herb with simple or branched stems arising 5-20 cm high from a slender taproot. The pinnately compound leaves are 2-10 cm long with 5-13 linear to narrowly elliptic leaflets. Foliage is sparsely hairy. Ascending flower stalks arise from the leaf axils and are 6-25 mm long with 2-8 flowers. Each nodding pea-like flower is 3-15 mm long with a somewhat recurved upper petal that is 5-8 mm long, and a calyx that is 2-4 mm long and sparsely covered with light-colored hairs. Greenish, bladderly, pendant fruits are 15-24 mm long and shaped like a half moon.

## Phenology

Plants bloom in late May and June, then become dry and many break off by the middle of the growing season (Heidel 1994).

## Diagnostic Characteristics

Geyer's milkvetch is unusual among our *Astragalus* species, being a taprooted annual lacking multiple stems. The only species similar in this regard is *A. lotiflorus*, which has hairy pods that are flattened top to bottom. *Astragalus agrestis* and *A. leptaleus* also have unbranched stems but they arise from a rhizome rather than a taproot and are usually found in moist habitats. Only var. *geyeri* occurs in Montana.

## Habitat

This milkvetch occupies loose, sandy soils with little or no organic matter and soil development; most Montana records are from sandy alluvial plains and terraces. In the Pryor Mountains, Geyer's milkvetch is restricted to sandy alluvial plains and terraces. Associates there include *Artemisia tridentata*, *Stipa comata* and *Bouteloua gracilis*. In the Hell Creek Recreation Area (Garfield County), it grows in very early, unstable successional habitat dominated by *Calamovilfa longifolia* and *Oryzopsis hymenoides*, near but not intermingled with *Psoralea lanceolata*, *Astragalus kentrophyta* and *Lupinus pusillus*.

In the CM Russell National Wildlife Refuge of Garfield County, Geyer's milkvetch grows on outcrops of Fox Hill sandstone along the shore of Fort Peck Reservoir. Sandstone outcrops are widespread in the Fort Union Formation along the Mussellshell valley and above the Fox Hill sandstone, but they are not as easily eroded as Fox Hill sandstone, and numerous searches there have failed to locate this species.



## Cassin's Finch

*Haemorhous cassinii*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G5

State Rank: S3

#### Agency Status

USFWS: MBTA; BCC10

USFS:

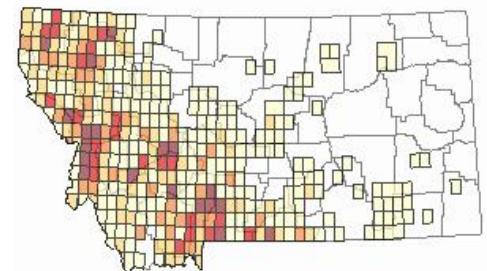
BLM:

FWP SWAP: SGCN3

PIF: 3

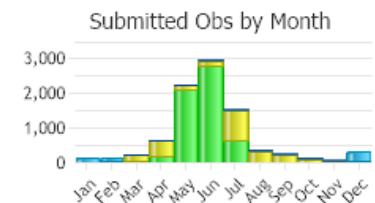


Range  Year-round



# of Obs: 1-18 19-35 36-54 55-94 95-389

# Observations: 9386



## General Description

Cassin's Finch is the largest of the North American *Carpodacus* finches (includes Purple Finch and House Finch); length is 14.5-15.5 cm (5.7-6.1 inches). Adults are sexually dimorphic in plumate traits. Adult males have rose-red coloration on the head throat and upper breast, the crown is bright pinkish-red contrasting with the paler nape and back; rump and upper tail coverts are dull rose-pink and streaked with brown. The lower breast and belly appear generally whitish, the undertail coverts with fine brown streaks. Females have an overall brownish plumage; the head has supercillium and submoustacial regions with fine brown streaks, back and rump dusky and streaked with brown, the throat, breast and flanks whitish with crisp brown streaks. Juneniles and immatures resemble females.

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

Male Cassin's Finch has fine streaking on the undertail coverts and flanks, in contrast to pure white of the Purple Finch. In females and immature males, breast and flanks more cleanly white and more finely streaked in Cassin's Finch than in Purple Finch. Larger and more chunky than the House Finch. Red on male House Finch is usually brighter and oranger, not rose-red. Male Cassin's Finch is much less streaked on the lower breast and belly than male House Finch; female Cassin's Finch with a noticeable supercilliary stripe lacking in female House Finches, and the breast streaking more distinct and less diffuse. Cassin's Finch the only of the three *Carpodacus* finches routinely encountered higher in the mountains.

## Habitat

Cassin's Finches occur in every major forest type and timber-harvest regime in Montana, including riparian cottonwood, but are especially common in ponderosa pine and postfire forests; they occur less often in lodgepole pine, sagebrush, and grassland (Manuwal 1983, Hutto and Young 1999). They often visit bird feeders and occasionally venture into alpine terrain (Johnson 1966, Pattie and Verbeek 1966).



## Eastern Bluebird

*Sialia sialis*

[View in Field Guide](#)


**Potential Species of Concern**

**Native Species**

**Global Rank: G5**

**State Rank: S4B**

**Agency Status**

**USFWS: MBTA**

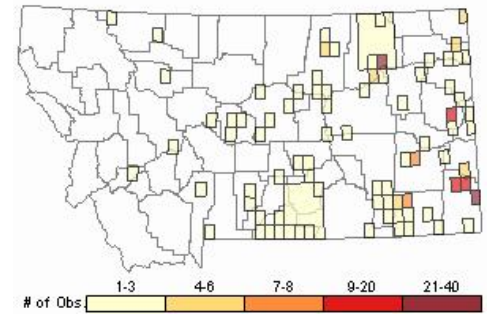
**USFS:**

**BLM:**

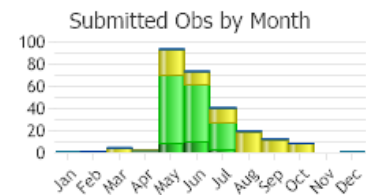
**PIF:**



Range Summer Migratory



**# Observations: 263**



### General Description

The Eastern Bluebird is a small thrush (16 to 21 cm long) with a wingspan of approximately 33 cm. The male has a bright blue back, head, wings, and tail. The throat, sides of the neck, and upper breast are orange, with the orange on the breast extending down the flanks. The white belly is bright and apparent. The female is similarly colored, but is duller overall. The head and back are more of a gray or gray-blue than blue, but the wings and tail are primarily blue. Unlike the male, the female has a white throat. On both sexes, the eye is black, and the bill is dark and stout, with a yellow gape (Gowaty and Plissner 1998, Sibley 2000).

Vocalization of the Eastern Bluebird is described as a song of mellow whistles sounding somewhat like "*chiti WEEW wewidoo*" or "*Tu-a-wee*" (Gowaty and Plissner 1998, Sibley 2000). The male sings loudly from high, conspicuous perches, sometimes during flight (Gowaty and Plissner 1998).

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, *Birds of Montana*.

### Diagnostic Characteristics

The plumage of the male Eastern Bluebird is most similar to that of the Western Bluebird. The Eastern Bluebird is discernable by its white belly, orange throat and blue scapulars, while the Western Bluebird has a blue belly and throat and chestnut scapulars. The features distinguishing the female Eastern, Western, and Mountain Bluebirds are less distinct. The Eastern Bluebird female is distinguishable from the Western Bluebird by the white throat, rufous on the sides of the neck, and more distinct rufous flanks. The Eastern Bluebird is darker overall than the Mountain Bluebird, with more rufous-orange on the flanks, upper breast, and sides of the neck. The Western Bluebird and Mountain Bluebird females lack the white throat. In addition, the bill of the Eastern Bluebird is thicker and stouter than that of the two other bluebird species.

### Habitat

Limited specific information exists on habitat use by Eastern Bluebirds in Montana, but the species may generally be limited to the deciduous trees (primarily cottonwood, *Populus* spp.), along the rivers of eastern Montana, which can provide significant habitat where nest boxes haven't supplanted these natural nesting sites (Johnsgard 1986, Gowaty and Plissner 1998).

Other frequently used habitats can include pastures, roadsides, farmlands, meadows, yards, and other open grassy areas that might provide adequate foraging habitat (Northern Prairie Research Center 2003). Reports of breeding in the state indicate the use of nesting boxes, with other potential nesting sites including old woodpecker holes and natural cavities in riparian forests, shelterbelts, farmsteads and city parks (Johnsgard 1986, Montana Bird Distribution Committee 2012).



## Tweedy's Gilia

*Gilia tweedyi*

[View in Field Guide](#)


### Potential Species of Concern

#### Native Species

Global Rank: G4G5Q

State Rank: S3S4

#### Agency Status

USFWS:

USFS:

BLM:

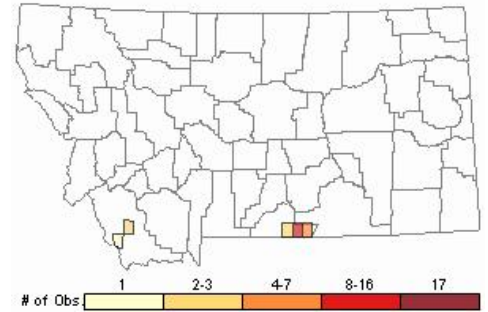
State Threat Score:

CCVI:

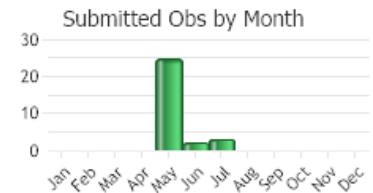
C-value:



Range  Native



# Observations: 30



## General Description

Stems erect, 5–25 cm, usually branched above. Herbage loosely tomentose, stipitate-glandular especially above. Leaves: basal oblanceolate, 2–5 cm long, deeply pinnately lobed, lobes lance-linear, mucronate; cauline few. Inflorescence terminal, leafy-bracteate cymes with ascending pedicels. Flowers: calyx 3–5 mm long, purple spotted, swollen in fruit; corolla funnelform, blue, with a yellow throat, tube 4–5 mm long; lobes ca. 1 mm long. Capsule 4–5 mm long with several seeds per locule (Lesica et al. 2012. Manual of Montana Vascular Plants. BRIT Press. Fort Worth, TX).

## Phenology

Blooming in May and June.

## Habitat

Open, sandy soil in juniper woodlands, sagebrush and desert shrublands in the valleys and foothills.



## Harlequin Duck

*Histrionicus histrionicus*

[View in Field Guide](#)


### Species of Concern

#### Native Species

Global Rank: G4

State Rank: S2B

#### Agency Status

USFWS: MBTA

USFS: SENSITIVE

BLM:

FWP SWAP: SGCN2

PIF: 1

## General Description

The Harlequin Duck is unique among North American waterfowl for breeding and foraging in clear, fast-flowing rivers and streams. The breeding plumage of adult males is unmistakable, with slate blue, white, black, and chestnut markings. This species is also unusual in its vocalizations; males and females give a mouselike squeak. The Harlequin Duck overwinters along coastal rocky shorelines (Robertson and Goudie 1999).

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Phenology

In Montana, adults arrive from late April to early May (Kuchel 1977, Reichel and Genter 1996). Males depart breeding grounds in June while females and young depart from late July to early September (Kuchel 1977, Reichel and Genter 1994). Egg-laying occurs between April 30 and July 4 (Kuchel 1977, Reichel and Genter 1996). Kuchel (1977) estimated hatching dates for broods on McDonald Creek, Glacier National Park: 13 of 15 occurred between June 27 and July 7 with extremes on June 11 and August 2. Young fledge in Montana between July 15 and September 10, with most fledging between July 25 and August 15 (Kuchel 1977, Reichel and Genter 1996). Transients and winter observations recorded from October-March. Pairs observed beginning in April and May (Montana Natural Heritage Program Point Observation Database 2014).

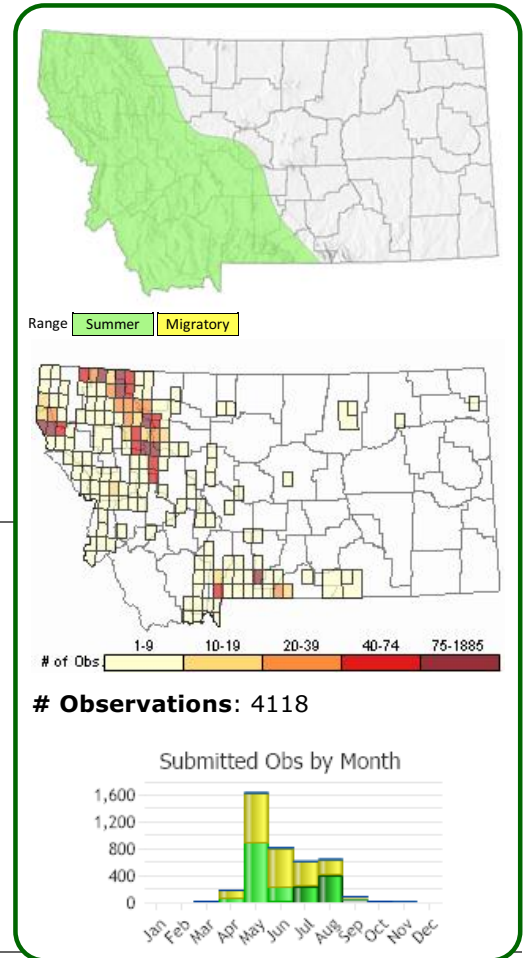
## Diagnostic Characteristics

The Harlequin Duck is a small diving duck. Male is larger than female. Breeding plumage of male is unmistakable: the body is slate blue with white bands and collars, bordered with black lines on chest and neck; large white crescent in front of eye with small white circular patch near ear; white vertical stripe on side of neck; black streak bordered by white and amber lines on top of head; iridescent blue secondaries; dark-slate-blue belly and chestnut-brown flanks. Adult female has brown body plumage, a white belly, with brown checks or spots, a round white spot behind ear, faded variable white patches in front of eye, and occasionally white streaks on back of head. Juveniles and immatures are similar to female, but feet are typically yellow, not gray (Robertson and Goudie 1999).

## Habitat

In Montana, Harlequin Ducks inhabit fast moving, low gradient, clear mountain streams. In Glacier National Park, birds used primarily old-growth or mature forest (90%); and 2) most birds in streams on the Rocky Mountain Front were observed in pole-sized timber (Diamond and Finnegan 1993). Banks are most often covered with a mosaic of trees and shrubs, but the only significant positive correlation is with overhanging vegetation (Diamond and Finnegan 1993, Ashley 1994).

The strongest stream section factor in Montana appears to be for stream reaches with at least two loafing sites



per 10 meters (Kuchel 1977, Diamond and Finnegan 1993, Ashley 1994). Broods may preferentially use backwater areas, especially shortly after hatching (Kuchel 1977), though this is not apparent in data from other studies (Ashley 1994). Stream width ranges from 3 m to 35 m in Montana. Harlequin Ducks in Glacier National Park used straight, curved, meandering, and braided stream reaches in proportion to their availability (Ashley 1994).



## Rufous Hummingbird

*Selasphorus rufus*

[View in Field Guide](#)


### Potential Species of Concern

#### Native Species

Global Rank: G4

State Rank: S4B

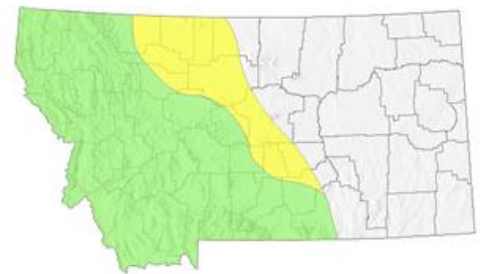
#### Agency Status

USFWS: MBTA; BCC10

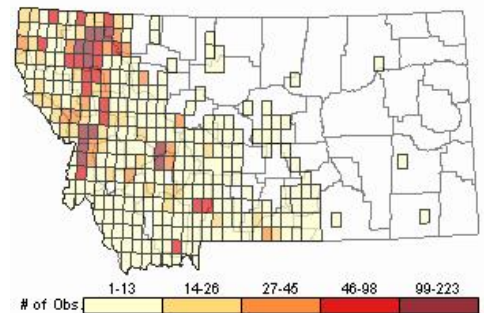
USFS:

BLM:

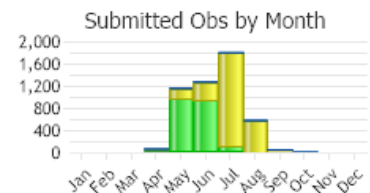
PIF: 3



Range  Summer  Migratory



# Observations: 5219



### General Description

Widely known for its aggressive nature. Short-bodied, stubby and rusty in appearance. Sexually dimorphic. Male's dorsal plumage is a non-iridescent rusty red. Female and juvenile dorsal plumage is a green iridescence. Male gorget is brilliant orange-scarlet. Female throat varies from clear or streaked with bronze-green, to multiple scarlet spots or large central gorget patch of male-like colors. Male's wings emit a metallic whine. Juveniles resemble females with green iridescent backs and white-tipped rectrices. (Healy and Calder 2006)

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

### Diagnostic Characteristics

Broad-tailed Hummingbirds are larger with broad, lengthy tails and buff or buff-and-green flanks. Calliope Hummingbirds are smaller, with shorter bills and noticeably shorter tails. Black-chinned Hummingbirds are a dull metallic bronze-green above; males have the black chin and throat that give the species its name.

### Habitat

Generally cool environments. Principally secondary succession communities and openings, forested and brushy habitats of the Pacific northwest through the Gulf of Alaska coastal forests and inland to northern Rocky Mountains. Typically nests in second growth and mature forests. (Healy and Calder 2006)



## Ovenbird

*Seiurus aurocapilla*

[View in Field Guide](#)


### Potential Species of Concern

**Native Species**  
**Global Rank:** G5  
**State Rank:** S4B

### Agency Status

**USFWS:** MBTA  
**USFS:**  
**BLM:**  
**PIF:** 3

## General Description

The Ovenbird is a large, plump-looking warbler, 15 cm long, with a thin pointed bill and pinkish legs; grayish-olive upperparts; and white underparts with blackish-streaked spots on the lower throat, breast, and sides. Sexes are identical. (Porneluzi et al. 2011)

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

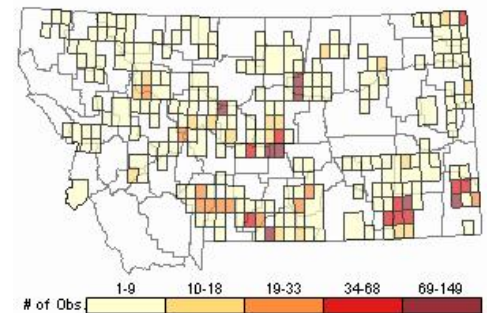
Most likely to be confused with the Northern Waterthrush, the Ovenbird is distinguished by its bold white eyering, russet crown bordered by dark stripes, absence of a buffy or white eye stripe, rounder shape, and olive (vs. brown) back. (Porneluzi et al. 2011)

## Habitat

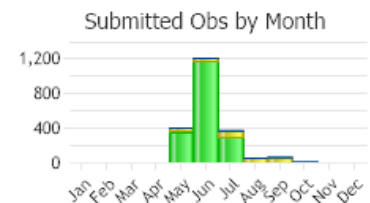
Relatively mature, large, contiguous tracts of deciduous or mixed coniferous/deciduous forest with closed canopy (Porneluzi et al. 2011).



Range  Summer  Migratory



# Observations: 2128





## Larch-leaf Beardtongue

*Penstemon laricifolius*

[View in Field Guide](#)


### Potential Species of Concern

#### Native Species

Global Rank: G4

State Rank: S3S4

#### Agency Status

USFWS:

USFS:

BLM:

State Threat Score:

CCVI:

C-value:

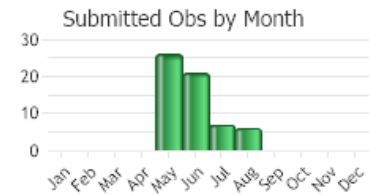


Range  Native



# of Obs: 1-2 3-4 5-17 18-36 37

# Observations: 61



## General Description

Stems 5–20 cm. Herbage glabrous, often with puberulent stems. Basal leaf blades densely clustered, filiform, entire, 1–4 cm long. Stem leaves similar. Inflorescence an open, glabrous raceme or panicle. Flowers: calyx 3–6 mm long; sepals lanceolate, acuminate, basally scarious-margined; corolla rose to burgundy, 11–20 mm long, glabrous; anthers glabrous, opening across their full length. Capsule ca. 5 mm long (Lesica et al. 2012. Manual of Montana Vascular Plants. BRIT Press. Fort Worth, TX).

## Phenology

Blooming in June.

## Habitat

Occurs in sandy, often limestone-derived, soils in juniper, *Cercocarpus ledifolius* and *Artemisia arbuscula* woodlands and shrublands typically between 4500 and 6000 ft (1370 to 1800 m).



## Sprague's Pipit

*Anthus spragueii*

[View in Field Guide](#)


© CC BY-SA 2.0 - Dominic Sherohy

### Species of Concern

#### Native Species

Global Rank: G3G4

State Rank: S3B

#### Agency Status

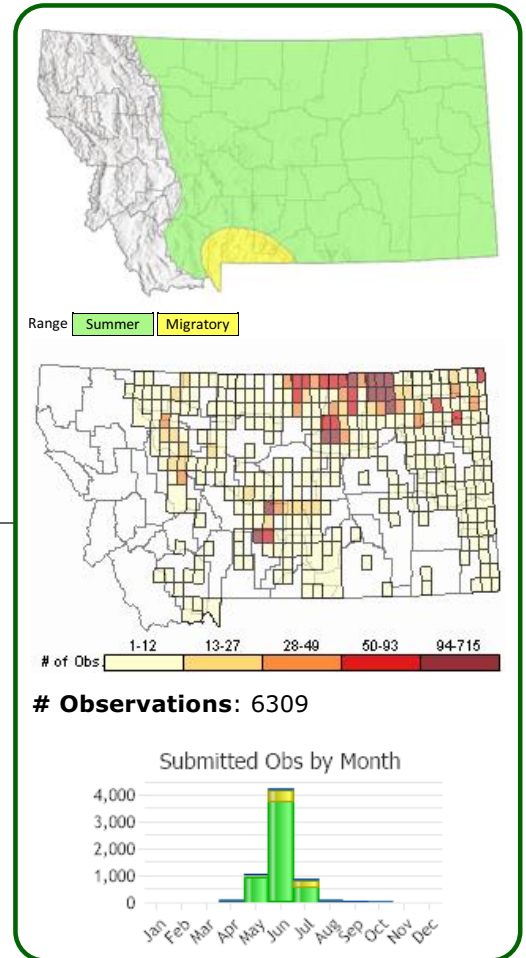
USFWS: MBTA; BCC11;  
BCC17

#### USFS:

BLM: SENSITIVE

FWP SWAP: SGCN3

PIF: 1



## General Description

The adult Sprague's Pipit is a pale, slender, sparrow-sized bird with white outer tail feathers, a thin bill, pale legs, and a heavily streaked back. Adults reach a length of 6.5 inches (16.5 cm), with a wingspan of 10 inches (25.4 cm), and a weight of 23.7 to 24.0 grams. The sexes are alike. The sides of the head and indistinct buffy eye-rings are pale. The lores contrast with dark brown eyes and the ear coverts are plain brownish-buff, usually with a slight reddish tinge. The crown, sides and rear of neck are buffy with sharply defined black streaks. The back is light sandy-brown with broad black streaks, with a paler more prominent buffy stripe down each side. The wings, 7.7 to 8.5 cm long, have blackish-brown feathers with whitish to buffy-brown edging, and two whitish wing bars. The rump and upper tail coverts, paler than the back, are sandy-brown with narrow black streaks. The blackish-brown feathers of the tail have buffy edging and the outer two pairs of feathers are white. The breast is a bright dark buff with a necklace of narrow black streaks. The flanks are brownish-buff and without streaks. The legs of the adults are pale brown, flesh or yellowish-brown, while they are pinkish in the juveniles (Godfrey 1966, Maher 1979, King 1981, Robbins and Dale 1999).

On the ground, the bird is extremely secretive and flies away in a long, undulating flight when approached. It walks instead of hops and usually only lands on the ground. The bird is most easily detected by its unique flight song given high overhead (as high as 75 meters); a high-pitched, thin "jingling" sound that can continue for as long as an hour (Peterson 2002, King 1981). Johnsgard (1992) notes that the species' spectacular circular song-flight display around its territory, during which its white outer tail feathers are conspicuously spread, compensates for its particularly inconspicuous plumage.

For a comprehensive review of the conservation status, habitat use, and ecology of this and other Montana bird species, please see Marks et al. 2016, Birds of Montana.

## Diagnostic Characteristics

The buffy-brown back with blackish streaking, white wing bars, dark streaked crown, and pale legs distinguish this pipit from the American Pipit, the other species with whom its plumage is most similar (Robbins and Dale 1999, Sibley 2000). Additional characteristics identifying Sprague's Pipit include pale buffy to whitish ear coverts, extensive white on the outer tail feathers, a pale lower mandible, a darker upper mandible, and a diagnostic single-syllable, squeaky, quick call (Robbins and Dale 1999, Sibley 2000). While the Sprague's Pipit is a species of the prairie, the American Pipit typically favors wetter areas and perches more conspicuously (on fences, telephone wires, and treetops) than the Sprague's Pipit (Robbins and Dale 1999).

## Habitat

An endemic grassland bird, the Sprague's Pipit prefers native, medium to intermediate height prairie (Casey 2000) and in a short grass prairie landscape, can often be found in areas with taller grasses (Samson and Knopf 1996). The Sprague's Pipit is significantly more abundant in native prairie than in exotic vegetation (Dechant et

al. 2001). Dechant (2001) also notes that the species has been shown to be area sensitive, requiring relatively large areas of appropriate habitat; the minimum area requirement in a Saskatchewan study was 190 hectares (470 acres). This pipit is also known to utilize and breed in alkaline meadows and around the edges of alkaline lakes (Johnsgard 1992).



# MONTANA STATE LIBRARY

NATURAL HERITAGE PROGRAM [mtnhp.org](http://mtnhp.org)  
1201 11th Ave • P.O. Box 201800 • Helena, MT 59620-1800 • fax 406-444-0266 • phone 406-444-3989

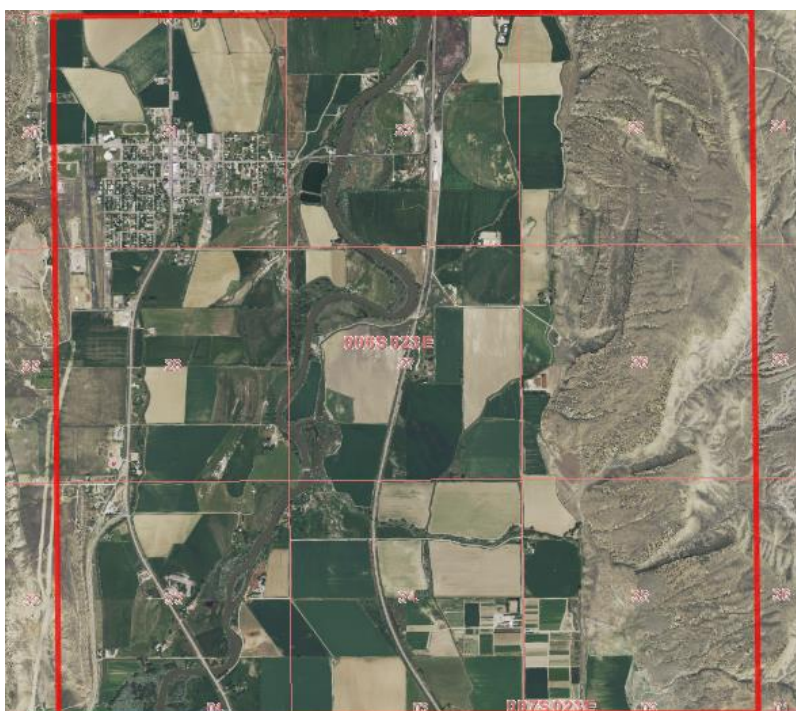
## Invasive and Pest Species

### from Environmental Summary



| Latitude | Longitude  |
|----------|------------|
| 45.26137 | -108.86246 |
| 45.30482 | -108.92489 |

Summarized by: 006S023E027 (Buffered PLSS Section)  
Filtered by: Species with MT Status = Species of Concern, Special Status, Important Animal Habitat, Potential SOC



Suggested Citation: Montana Natural Heritage Program. Environmental Summary Report. Custom Field Guide. Summarized by: 006S023E027 (Buffered PLSS Section). Filtered by: Species with MT Status = Species of Concern, Special Status, Important Animal Habitat, Potential SOC. Retrieved on 8/11/2023.

**Note:** This PDF version of the Montana Field Guide is intended to assist in offline identification and field work. It is not intended to replace the online Field Guide, as that version contains more information and is updated daily. For the most up-to-date information on Montana species, please visit [FieldGuide.mt.gov](http://FieldGuide.mt.gov)

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.





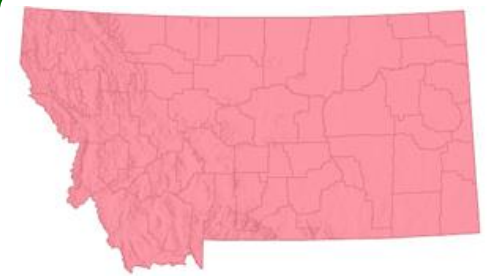
## Eurasian Water-milfoil

### *Myriophyllum spicatum*

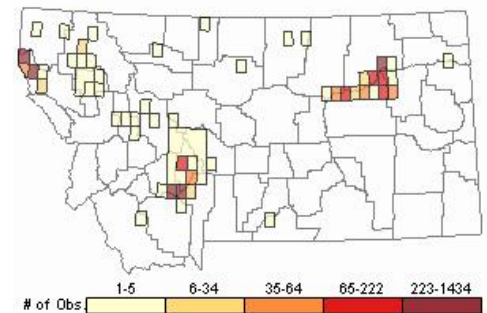
[View in Field Guide](#)


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

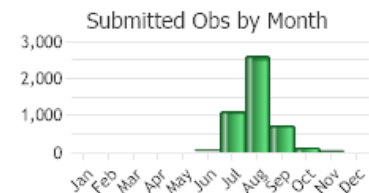
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



# Observations: 4869



## General Description

**PLANTS:** Aquatic perennials with rhizomes and finely dissected, whorled leaves. Stems are branched and tawny colored when dry. Wintering buds (turions) are absent. Sources: DiTomaso and Healy 2003; Parkinson et al. 2011.

**LEAVES:** Submerged leaves are well-developed, in whorls of 4 to 5, and to 25 mm long. Each submerged leaf is pinnately divided into 24 to 50 linear segments. Emergent leaves are actually bracts; they are small, grow during flowering (or when water levels recede), occur below the flowers, and are oppositely arranged. Sources: DiTomaso and Healy 2003; Lesica et al. 2012.

**INFLORESCENCE:** Terminal spike of 4-8 cm long that grows erect above the water (emerged). The spike consists of separate male and female flowers growing in the axils of oppositely arranged leaf-like bracts. Sources: DiTomaso and Healy 2003; DiTomaso and Healy 2003.

## Phenology

Flowering in Montana has been observed from July through September.

## Diagnostic Characteristics

Montana has 1 exotic and 3 native Water-milfoil species. Their identification requires a close examination and users should consult either the *Manual of Montana Vascular Plants* (Lesica et al. 2012) or *Flora of the Pacific Northwest-2nd Edition* (Giblin et al. [eds] 2018).

**Eurasian Water-milfoil** - *Myriophyllum spicatum*, exotic, noxious, invasive:

- \* Combination of flowering spikes with emergent leaves less than 4 mm and whorled submerged leaves with 14 to 24 pairs of segments that ascend.
- \* Submerged leaves have linear segments that are mostly equal in length.
- \* Vegetative shoot tips are often dense.
- \* Plants readily collapse when removed from water.
- \* Turions (cylinders or balls of small leaves) are absent.

**Common Water-milfoil** - *Myriophyllum sibiricum*, native, desirable:

- \* Combination of flowering spikes with emergent leaves less than 4 mm and whorled submerged leaves with 4 to 16 pairs of segments that mostly spread or are perpendicular to the apex.
- \* Submerged leaves are often in whorls of 4 with 6-16(-24) segments. Segments spread or lay perpendicular to the rachis at base, but may ascend towards the apex.

- \* Plants remain stiff when removed from water.
- \* Lower pair of segments are longest and gradually shorten towards the leaf tip.
- \* Turions present: dark green, broadly cylindrical, composed of reduced and thickened leaves, and may remain persistent on next year's new growth.

**Hybrid Eurasian X Common Water-milfoil**, exotic, noxious, invasive:

Historically, the relationship of *Myriophyllum spicatum* and *Myriophyllum sibiricum* has been unclear, but recent treatments indicate they are unique species. Where both species are present, the populations can intergrade producing hybrids with intermediate characteristics (DiTomaso and Healy 2003). Genetic testing is necessary when morphological characteristics are in doubt (Thum personal communication). In Montana the hybrid has been found in waterbodies where both species occur and will grow invasively. Hybrids have not been found in water bodies that lack one of these species, indicating they are self-reproducing (Thum personal communication). Herbicides that traditionally control Eurasian Water-milfoil are not effective on hybrid plants (Thum personal communication).

**Whorled Water-milfoil** - *Myriophyllum verticillatum*, native, desirable:

- \* Emergent leaves are longer than the flowers and fruits and pinnately divided or lobed more than half-way to mid-vein.
- \* Flowers have 8 stamens.
- \* Submerged leaves are generally in whorls of 4, often with 12-22 segments.
- \* Fruit segments are round(-ish) with shallow, longitudinal ridges and no wings or cross-ribs.
- \* Turions present (balls of small leaves that develop from tips of vigorous vegetative shoots): brown to red-brown and 1-5 cm long.

**Common Hornwort** - *Ceratophyllum demersum*, native, desirable:

- \* Submerged leaves have linear-forked segments that whorl around the stem. They are not pinnately divided (no central mid-rib).
- \* Flowers are submerged, but usually plants are sterile and reproduction is mostly by overwintering turions (Lesica et al. 2012).

## Habitat

---

Open water of reservoirs; valleys (Lesica 2012). It tolerates moving water and wave action facilitates fragmentation (Parkinson et al. 2011).

## Management

---

Eurasian Water-milfoil spreads primarily through plant fragments on boat trailers, recreational equipment, and waterfowl. It can also disperse between water bodies by wind and water flow. Following introduction, populations expand rapidly and may be undergo cycles of dominance and dieback.

**DETECTION** [Adapted from Newton et al. 2016]

A traditional polymerase chain reaction (PCR) assay was developed to detect pure and hybridized Eurasian Water-milfoil. In 2013 a pilot study tested its use in the laboratory and at four sites in Jefferson Slough, Jefferson County, Montana and Half Moon Lake, Michigan. Results showed that the environmental DNA (eDNA) PCR assay was able to detect both pure and hybridized Eurasian Water-milfoil. The research recommended that further studies to refine the sensitivity of the assay be conducted. The technique of using eDNA for early detection of Eurasian Water-milfoil is possible.

**PREVENTION** [Adapted from Parkinson et al. 2011]

- \* Thoroughly rinse any mud and debris from all equipment and wading gear, and drain the water from the boat before leaving access areas. Pump the bilge before entering another water body as Eurasian Water-milfoil can remain alive in bilge water for several days. Use boat-washing stations when available.
- \* Remove all plant fragments from the boat, propeller, and boat trailer. Fragments as little as 1-inch long with two nodes are able to root and colonize.
- \* Dry boats and equipment for 5 days before transporting them to a new water body.
- \* Do not dispose aquarium water or plants into water bodies.
- \* Desiccate plant material and/or dispose by securely sealing in plastic bags and placing in the trash for disposal.
- \* Learn to identify Eurasian Water-milfoil and report findings to the Montana Department of Agriculture; Montana Fish, Wildlife and Parks; County Extension agent; or Weed Coordinator.

**CHEMICAL CONTROL** [Adapted from Parkinson et al. 2011]

Diquat, Endothall, 2,4-D, Triclopy, and Fluridone have been used to herbicide Eurasian Water-milfoil plants in

water bodies. Native water-milfoil are also susceptible to some of these herbicides. The herbicide concentration, exposure time before dissipating, timing of chemical control, and other factors are critical to effectively hinder Eurasian Water-milfoil and reduce impacts to native vegetation – see Parkinson et al. 2011, and always follow chemical label instructions and use restrictions. These herbicides must be applied by applicators with an Aquatic Pest Control license. Consult your County Extension Agent and/or Weed District for more information on herbicidal control.

**MECHANICAL CONTROL** [Adapted from Parkinson et al. 2011]

Raking and hand-harvesting can be effective for controlling small populations or early infestations. However, the risk of spread by fragmenting the plants is very high. Fragment barriers around harvest operations have been developed. All plant material should be bagged and desiccated before placing in the trash for disposal. Single harvests should be done when biomass is at its peak. It is recommended to harvest several times during the growing season, and for consecutive years. Areas harvested once can re-generate.

**PHYSICAL CONTROL** [Adapted from Parkinson et al. 2011]

Benthic barriers are mats laid down on the floor of the water body around docks and other high-use areas. They prevent light from penetrating and prevent plants from rooting. They are usually effective, but kill all vegetation. They are removable once the infestation has been destroyed. Barriers must be monitored because sediment will accumulate and provide a substrate for Eurasian Water-milfoil to colonize. Plants can root in 4 cm (1.5 inches) of soil.

Drawdowns lower the water levels to expose plants. This method has been effective at killing plants and reducing infestations when timed with freezing temperatures for 96 hours. This control may require extensive planning and permitting, and may hurt non-targeted vegetation and animal life.

**BIOLOGICAL CONTROL** [Adapted from Parkinson et al. 2011]

Two insects are being studied for their ability to control Eurasian Water-milfoil: Watermilfoil Moth (*Acentria ephemerella*) [native to Europe] and milfoil weevil (*Euhrychiopsis lecontei*) [native to North America].

**CULTURAL CONTROL** [Adapted from Parkinson et al. 2011]

Non-native water-garden plants should never be dumped near to or within wetlands, streams, rivers, lakes, or ponds. Before purchasing plants, verify that the plant is not invasive.

Contact information for Aquatic Invasive Species personnel:

[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 \(UC3\)](#)



## Yellowflag Iris

*Iris pseudacorus*

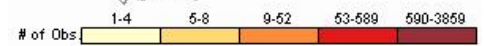
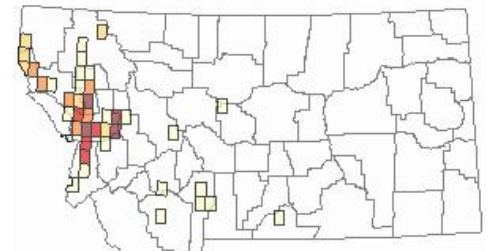
[View in Field Guide](#)


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

**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



# **Observations:** 9335



### General Description

**PLANTS:** Herbaceous perennials that grow from 1 to 1.5 meters tall with showy flowers and thick rhizomes (DiTomaso and Healy 2003). Stems are clumped (Lesica 2012). Rhizomes are up to 5 inches wide, have black sap, and produce roots that range from 4 to 12 inches long (Jacobs et al. 2011).

**LEAVES:** Each plant has up to several equitant leaves that fold in half length-wise and enclose the base of the next higher leaf (Jacobs et al. 2011; Lesica 2012). Thus, leaves emerge from the ground resembling a spreading fan (Jacobs et al. 2011). Each leaf resembles a sword's tip, and is from 50-100 cm (20-40 inches) tall and 10-30 cm (0.4-1.2 inches) wide.

**INFLORESCENCE:** An erect raceme of 3-10 yellow flowers, that branches in its upper portion (Lesica 2012). Bracts (spathes) are leaf-like, 4-7 cm long, and enfold the stem; the outer are keeled (Lesica 2012).

The genus name "Iris" is derived from Iris, the greek goddess of the rainbow and messenger to the gods (Ramey and Peichel 2001). The specific epithet name "pseudacorus" means false (pseud) sweet flag (Acorus) referring to the similarity with the genus Acorus (Ramey and Peichel 2001).

### Phenology

Flowers bloom from May to July, and are pollinated by insects. Seeds are produced between July and October. Germination primarily occurs the following spring.

### Diagnostic Characteristics

Montana has two *Iris* species: Rocky Mountain Iris (*Iris missouriensis*) and Yellowflag. The native Rocky Mountain Iris has a similar appearance, but develops 1-3 blue flowers and Yellowflag Iris has 3-10 yellow flowers. Both iris species occupy similar habitats. Rocky Mountain Iris grows in moist to wet meadows and irrigation ditches, but can tolerate drier conditions (thickets and woodlands). Yellowflag Iris requires moist to wetter habitats. In addition, Rocky Mountain Iris plants tend to be shorter (10-50 cm), have shorter (10-40 cm) and narrower (3-8 mm) leaves, and their rhizomes lack the black sap (Jacobs et al. 2011; Lesica 2012).

Cattail (*Typha latifolia* and *T. angustifolia*) leaves sheath at the base and appear similar when young, but their stems are round (not flattened).

### Habitat

Disturbed wetland habitats: marshes, wet meadows, irrigation ditches, pond margins, and riparian areas in the valleys (Lesica 2012).

## Management

---

Montana's Yellowflag Iris Task Force is led by Jed Little who can be contacted at: (406) 258-4220 or [mapping@missoulaeduplace.org](mailto:mapping@missoulaeduplace.org)

Yellowflag Iris was introduced to North America as a horticultural plant. Many cultivars of this species have been developed (Tu 2003). Because of its growth form, Yellowflag Iris has been planted for erosion control and in sewage treatment ponds (Tu 2003). It has been used to collect sediment and to remove copper and iron heavy metals from wastewater (Tu 2003).

### PREVENTION

It is a beautiful plant that will continue to be spread by gardeners, garden dealers, and sales on the internet until the sale of the species is banned. Preventing new infestations is the best means for controlling the plant. It is difficult to eradicate because it reproduces vegetatively and by seed, is adaptable to a wide range of moisture and soil conditions, and has few pests or predators (Tu 2003).

### CHEMICAL CONTROL [Adapted from Tu 2003.]

Herbicides are effective at controlling populations. However, the type of herbicide, herbicide concentration, timing of chemical control, and other factors will determine its effectiveness. Always wear protective clothing designed for chemicals, follow chemical label instructions, and use restrictions. Many herbicides must be applied by applicators with an Aquatic Pest Control license. Consult your County Extension Agent and/or Weed District for more information on herbicidal control.

Because it grows in or adjacent to water, an aquatic-labelled herbicide and adjuvant must be used. Glyphosate, under the trade names of Rodeo®, Aquamaster® or Glypro®, has been used successfully to kill Yellowflag Iris; however, plants are resistant to Terbutryne. Use Glyphosate in a 25 percent solution (13 percent a.i.) with a driplless wick/wiper applicator, or spray it using a 5-8 percent solution, and in combination with the appropriate non-ionic surfactant adjuvant. It is recommended to use a dye to better track sprays. The herbicide can be applied directly to leaves or to freshly cut leaves/stems. Spot-treat plants and do not broadcast spray in order to protect other native plants, animals, and water quality.

### MECHANICAL CONTROL [Adapted from Tu 2003.]

Mechanical control is labor-intensive, but new or small patches can be controlled by physically removing the entire plant. It is essential to remove the entire rhizome, since small pieces of rhizome can re-sprout. Protective gear should be worn since resinous substances in the leaves and rhizomes can irritate the skin.

Mowing can provide control if done annually, but it will not remove the plant. Likewise, removing the flowers/fruits (dead-heading) will reduce its ability to spread, but will not kill the plant. Plants are poisonous if ingested by grazing animals.

### BIOLOGICAL CONTROL [Adapted from Tu 2003.]

There are no known biological controls available for Yellowflag Iris. Many invertebrates and fungi do feed upon iris, and specific species are listed in the document, Element Stewardship Abstract for *Iris pseudacorus* L. by Mandy Tu of The Nature Conservancy (2003). In addition, the iris root rot called *Pseudomonas iridis* causes leaves to yellow and rhizomes to rot. However, none of these insects, fungi, or pathogen significantly kill plants or control populations.

### CULTURAL [Adapted from Tu 2003.]

Prescribed fire is not recommended for controlling Yellowflag Iris. Plants grow in wet environments which are often poorly affected by fire and where other native plants are not adapted to fire. Rhizomes can re-sprout in response to low-severity fires.

Contact information for local county Weed District Coordinators can be found on the [Montana Weed Control Association Contacts Webpage](#).

Contact information for Aquatic Invasive Species personnel:

[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 \(UC3\)](#)

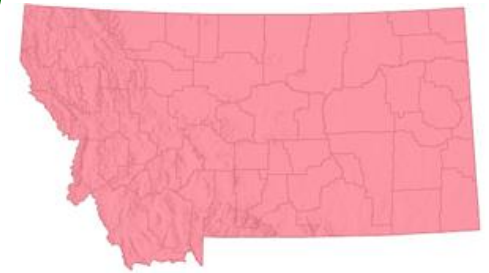


## American Water-lily *Nymphaea odorata*

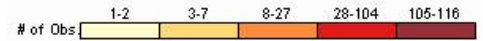
[View in Field Guide](#)


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

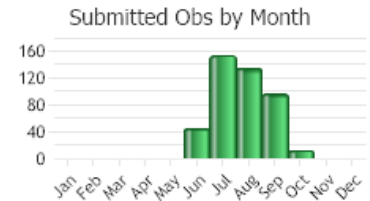
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value:** 0



Range **Non-native**



# **Observations:** 441



### General Description

**PLANTS:** Aquatic perennials with floating leaves and floating, showy flowers. Rhizomes are 2-3 cm in diameter, long, branched, creeping, and covered with short, black hairs. Sources: Lesica et al. 2012; DiTomaso and Healy 2003.

**LEAVES:** Large, floating, nearly orbicular, and 8-20 cm long. Leaves are green above and green to purple below. Margins are entire (smooth) and bases are cordate-shaped, like the top of a heart. Petioles are long and attached to a rhizome. Sources: Wiersema *in* FNA; Lesica et al. 2012.

**INFLORESCENCE:** Singular flowers have at least 17 white, showy petals, 4 green or reddened sepals of at least 3 cm long, and float with a long flower stem (peduncle). Sources: Wiersema *in* FNA; Lesica et al. 2012.

### Phenology

Flowering occurs from spring to summer, or into early fall for more southern populations (DiTomaso and Healy 2003).

### Diagnostic Characteristics

In Montana three genera represent the "water-lily family": *Brasenia* (water shield), *Nuphar* (pond-lily), and *Nymphaea* (water-lily).

***Brasenia*** species have round to elliptical floating leaves with no basal sinus or split in the leaf.

***Nuphar*** species have heart-shaped floating leaves that appear split, yellowish sepals, and inconspicuous petals.

***Nymphaea*** species have heart-shaped floating leaves that appear split, 4 green sepals, and numerous white petals. In Montana *Nymphaea odorata* and *Nymphaea leibergii* differ in their fragrance, sepal length, and number of petals. *Nymphaea odorata* has fragrant flowers (Hitchcock et al. 1964), at least 17 white petals, and sepals of at least 3 cm long (Lesica et al. 2012). *Nymphaea leibergii* lacks fragrant flowers (Hitchcock et al. 1964), has 7 to 15 petals, and sepals of 3 or less cm long (Lesica et al. 2012).

Our plants in Montana are *Nymphaea odorata* subspecies *odorata*.

### Habitat

Acidic to alkaline lakes and ponds in valleys (DiTomaso and Healy 2003; Lesica 2012).

## **Management**

---

The Missoula County Weed Board received a petition on March 3, 2020 to list Fragrant Water-lily as a noxious county plant (Slotnick et al. 2020). The County Weed Board reviewed the status and known impacts of the species in neighboring Montana counties, states, and provinces and recommended that listing as noxious was in the best interest of the public (Slotnick et al. 2020). On December 10, 2020 the Board of Missoula County Commissioners passed a resolution to designate *Nymphaea odorata* Aiton as noxious in Missoula County, Montana (Slotnick et al. 2020).

Contact information for Aquatic Invasive Species personnel:

[Montana Fish, Wildlife, and Parks Aquatic Invasive Species staff](#)

[Montana Department of Natural Resources and Conservation's Aquatic Invasive Species Grant Program](#)

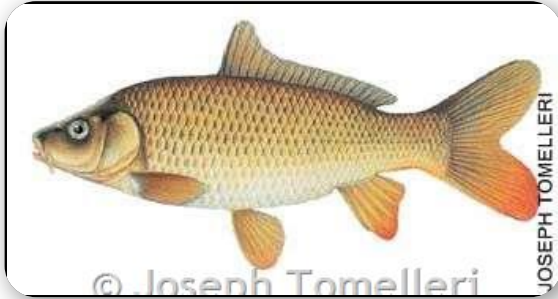
[Montana Invasive Species Council \(MISC\)](#)

[Upper Columbia Conservation Commission \(UC3\)](#)



## Common Carp

*Cyprinus carpio*

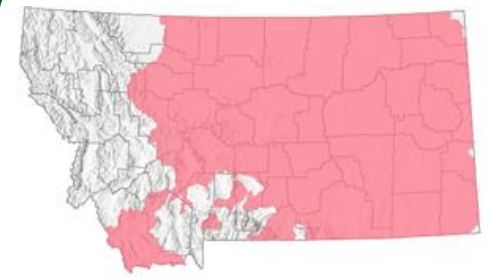
[View in Field Guide](#)


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

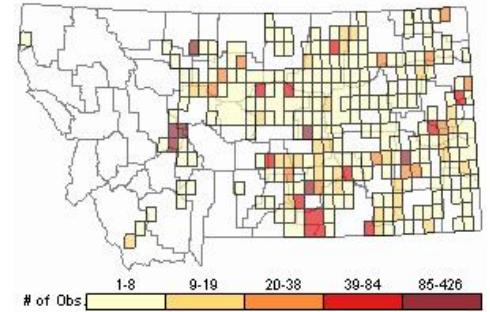
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**

### General Description

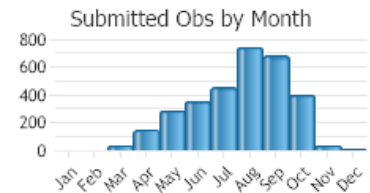
Common carp are easily recognized by the two barbels or "whiskers" on each side of the mouth, golden-brown coloration and the "saw-toothed" hardened ray in the front of the dorsal and anal fins. The introduction of carp into North America from Asia is considered to be one of the greatest mistakes in the history of American fisheries management by biologists who have documented the widespread loss of native fish and habitat to this aggressive intruder. Carp are a popular food fish in Eurasia, so they were introduced into North America to serve the same function. However, they are not desirable to North American consumers because they are bony, often have an unpalatable taste and because there are more attractive alternatives. There is some commercial fishing for carp, and they can be processed so that the problems with the fine bones between their muscles are eliminated. Carp are also despised because they compete with more desirable sport fishes, muddy the water by their bottom feeding, and reduce the available food for waterfowl by eating submerged plants. They are extremely hardy omnivores, which means that they eat almost anything. Carp can attain a weight of 40 pounds in productive waters. In Montana, carp are widespread in our eastern drainages. They attain their greatest numbers in lakes and reservoirs.



Range **Non-native**



# **Observations:** 3171



### Diagnostic Characteristics

Overall bronze with a dark brown to olive green back and yellowish underside. Some individuals, called mirror carp, have enlarged scales scattered over the body with bare patches in between. Leather carp are scaleless. From Scott and Crossman (1973), Jester (1974), and Pflieger (1975): adult length 12-25 in (30.5-63.5 cm) or more; large individuals may reach 20-60 lbs (9.1-27.2 kg); two barbels on each side of upper jaw, posterior pair more conspicuous; relatively small, toothless mouth, with the upper jaw slightly protruding; throat teeth 1,1,3-3,1,1, with teeth in main row broad and molar-like; lateral line complete, with 35 to 38 scales; one long dorsal fin with 17-21 soft rays, and a stout saw-toothed spine in front of dorsal and anal fins; pectoral fins with 14-17 rays; pelvic fins thoracic, originating beneath origin of dorsal fin, 8 or 9 rays; 1 anal fin with 5 branched rays; scales cycloid, large, thick; 35-36 vertebrae; 21-27 gill rakers on first gill arch; color variable: back and sides olivaceous, gold, greenish-olive, reddish-brown, or blackish-red, silver or yellowish-white below; fins dusky, often with red on tail fin and yellow or orange on lower fins; peritoneum gray, often more or less speckled.

### Habitat

Primarily lakes and reservoirs, where it seeks moderately warm water and shallows. Also rivers, where it prefers pools and backwaters. Congregates in areas of organic enrichment, such as sewage outfalls. Tolerates turbid water and low dissolved oxygen; avoids cold and swift, rocky streams. (Holton 2003) Spawns in shallow weedy areas (Brown 1971).

### Management

Carp have been the target of large eradication projects in several states that have generally only temporarily reduced populations. Stocked ponds with outlets to nearby rivers can be poisoned to prevent their unintentional spread. Once established in a water body, common carp is difficult and expensive to eliminate (e.g., Cahoon 1953). DeVaney et al. (2009) performed ecological niche modeling to examine the invasion potential for common carp and three other invasive cyprinids (grass carp *Ctenopharyngodon idella*, black carp

Mylopharyngodon piceus, and tench Tinca tinca). The majority of the areas where common carp have been collected, stocked, or have become established had a high predicted ecological suitability for this species.

Contact information for Aquatic Invasive Species personnel:

[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 \(UC3\)](#)



## Virile Crayfish

*Faxonius virilis*

[View in Field Guide](#)


**Aquatic Invasive Species**  
**Native/Non-native Species**  
 (depends on location or taxa)

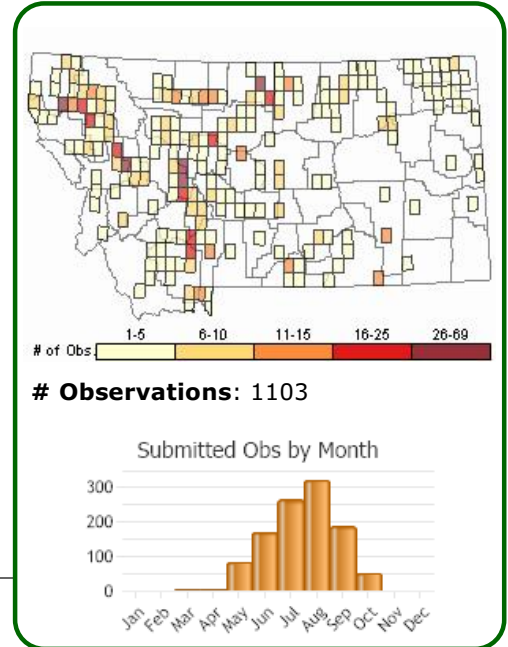
**Global Rank: G5**  
**State Rank: S5**

**Agency Status**

**USFWS:**

**USFS:**

**BLM:**



### General Description

A medium-large crayfish (5-6 inches max length) that is native to eastern Montana but has been invading westward the last 30 years. Most distinguishing features are the red/orange tips on the ends of the claws.

The rostrum is acuminate, acarinate, margins slightly converging and terminating in spines or sharply angular shoulders; cervical spines present; areola narrow with 2-3 punctations in narrowest part; male with hooks on ischia of 3rd pereopods; male 1st pleopod terminating in 2 somewhat divergent slightly curved elements constituting 50% of total length of pleopod, central projection longer and with distal third smoothly curved so that apex directed caudally, lacking shoulder on cephalic margin of pleopod (Hobbs 1976). [LENGTH: 70mm Carapace Length to 150mm Total Length].

### Diagnostic Characteristics

Narrow aerola (longitudinal space band) on the top of carapace (Signal Crayfish has a wide band). Red or orange tips of claws whereas *Orconectes immunis* has blue tips or no tip coloration. *O. immunis* has a large notch in the gap of the chelea (claw) where *O. virilis* is smooth.

### Habitat

According to (Collicut 1998), *O. virilis* can be found in lakes, rivers, streams and ponds. They are found in permanent bodies of water deep enough not to freeze solid or experience low oxygen levels. *O. virilis* requires shelter in the form of rocks, logs, or thick vegetation in which to hide from predators during daylight hours. In Montana, this species needs perennial water bodies and can survive in both flowing streams and rivers or pooled-up prairie streams, prefers cobbles and large woody debris for protection but can inhabit some silted areas if aquatic vegetation is present.

### Management

This species is included on the Global Invasive Species database, because of its invasive migratory pattern and highly competitive nature; this species is moving across Montana in a westerly (east to west) direction and upstream into drainages where they did not exist before. Although native to eastern Montana their spread has affected other watersheds and native species where they invade. Most recent reported sightings show them to be in the Thompson Chain of Lakes, the furthest western populations in Montana. These newest locations were most likely started with "bucket biology" techniques; a serious management issue spreading Aquatic Nuisance Species.

Contact information for Aquatic Invasive Species personnel:

[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 \(UC3\)](#)



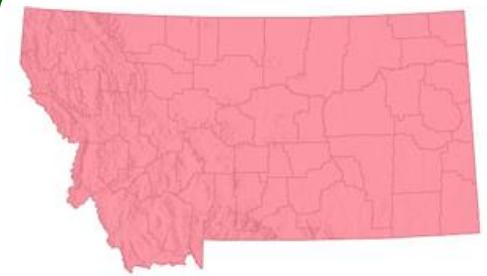
## Yellow Starthistle

*Centaurea solstitialis*

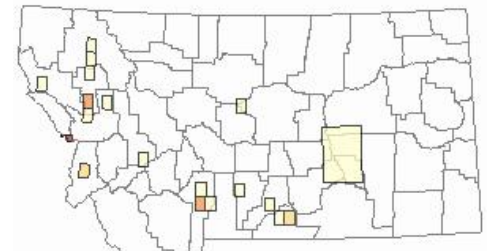
[View in Field Guide](#)


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

**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



# of Obs: 1 2 3 4 5

# **Observations: 33**

Submitted Obs by Month



### General Description

**PLANTS:** An annual with erect, branched, and winged stems that grow 10–80 cm (Lesica et al. 2012). Plants are scabrous and gray-tomentose (Lesica et al. 2012).

**LEAVES:** Basal leaves form a rosette and are deeply lobed and approximately 5 cm wide and 20 cm long (Sheley and Petroff 1999). Stem leaves are entire, linear-oblongate, 5–15 cm long, short-petiolate, and have thin woolly hairs (Sheley and Petroff 2009; Lesica et al. 2012).

**INFLORESCENCE:** Corymbiform. Yellow flower heads are solitary on open leafy stems (FNA 2006). Involucres are ovoid and 13–17 mm tall (Lesica et al. 2012). The outer bracts are pale green and armed with a stout, straw-colored spine of 1–2 inches (2.5–5 cm) long (Sheley and Petroff 2009; Lesica et al. 2012). The spines radiate out into a star-shape. The inner bracts are lanceolate with swollen tips (Lesica et al. 2012). Corollas are 13–20 mm long. Pappus is absent or of white, unequal bristles of 2–4 mm long (FNA 2006). Fruits (cypselae) are 2–3 mm long and of two types: outer fruits are dark brown without a pappus and inner fruits are mottled white/light brown and with a pappus (FNA 2006).

### Phenology

Flowering mostly from summer through autumn, but year-round in frost-free coastal areas (FNA 2006).

### Diagnostic Characteristics

Yellow Starthistle is a winter annual with bright yellow flowers. The flower head (involucral) bracts are tipped with stout, straw-colored spines of 2.5–5.0 cm (1–2 inches) long (Sheley and Petroff 1999). The spines radiate from the flower head in a star shape. In the western U.S. and depending upon the growing conditions plants can be 10 cm to 1.5 meters tall (Sheley and Petroff 1999).

### Habitat

Grasslands, rangeland, pastures, woodlands, roadsides, and wastelands (FNA 2006; Lesica et al. 2012).

### Management

Successful control requires integrating strategies to prevent new, eradicate or containing existing, and controlling large populations.

**PREVENTION** [Adapted from Sheley et al. *in* Sheley and Petroff 1999]

Targeting actions that prevent or reduce seed production will hinder its ability to grow and spread. Spread can be

reduced through many actions, such as, a) preventing vehicles from driving through and animals from grazing within infested areas, b) thoroughly washing the undercarriage of vehicles that have travel through infested areas, c) developing educational campaigns to teach people to not pick and transport the yellow flowers, and d) encouraging landowners to frequently monitor their land for new infestations and, when found to implement effective control methods.

**BIOLOGICAL CONTROL** [Adapted from Sheley et al. *in* Sheley and Petroff 1999]

As of 1996 three weevils (*Bangasternus orientalis*, *Eustenopus villosus*, *Larinus curtus*) and three flies (*Chaetorellia australis*, *Urophora sirunaseva*, *Urophora jaculata*) that attack Yellow Starthistle flower heads have been approved for released. They were released on plants in Canada and the Pacific Northwest, but apparently are not in Montana.

**CHEMICAL CONTROL** [Adapted from Sheley et al. *in* Sheley and Petroff 1999]

Herbicides are effective, especially when properly managed with other tactics. The herbicide type and concentration, timing of chemical control, soil properties, and other factors will determine its effectiveness and impact to non-target species. Strict adherence to application requirements defined on the herbicide label will reduce risks to human and environmental health. Many herbicides must be applied by applicators with an Aquatic Pest Control license. Consult your County Extension Agent and/or Weed District for more information on herbicidal control.

Picloram at the 0.25 pound per acre rate can provide selective control when applied to seedlings, rosettes, or plants beginning to bolt without harm to well-established grasses. It cannot be used in sandy soils, near surface waters, or in areas with a high-water table.

**2,4-D** at the 0.5 pound per acre rate can be effectively used in riparian areas or around homesteads.

Clopyralid at the 1.2 pound per acre rate can be applied before plants produce flower buds and in areas with high water tables.

Glyphosate at the one pint per acre rate will kill all plants and can be used in revegetation projects that need to prepare an initial seedbed for seeding desirable vegetation.

**PHYSICAL & CULTURAL CONTROLS** [Adapted from Sheley et al. *in* Sheley and Petroff 1999]

Hand-pulling is very effective because it is an annual. Pulled plants should be bagged and dessicated or preferably burned before disposing to ensure that seeds are not viable. Hand-pulling small infestations, around gardens and homesites, and within crop fields, riparian areas, and along waterways will eradicate or slowing its spread. Systematic surveys and repeated removal should be conducted every 2-4 weeks throughout the growing season.

Tilling and discing severs roots below the soil surface and will kill plants, but it should be done periodically through the growing season. This will deplete the seed source and lessen the severity for re-invasion. Once the ability for re-invasion has been controlled then desirable plants can be established.

Mowing is not effective because plants respond by growing more prostrate. Mowing in dry years might reduce seed production. Mowing before it rains will stimulate growth and increase seed production.

Burning populations will increase infestations. Fire releases nutrients and Yellow Starthistle seeds are quick to capture them, germinate, and grow.

Revegetation should follow any control method. A mix of perennial grass cover is best to interrupt the cycle of re-invasion because they compete strongly for light, nutrients, and water resources. This may require the use of particular cultivars of exotic and/or native grasses. Successful seeding will depend upon the particular grass species/cultivars, the density that establishes, environmental conditions, and the land manager's ability to maintain grass vigor. It is recommended to not fertilize new grass seedings that are infested with yellow starthistle because it will increase the forb's production.

**GRAZING CONTROLS** [Adapted from Sheley et al. *in* Sheley and Petroff 1999]

Grazing and grazing management can be effective at controlling Yellow Starthistle. Cattle or sheep can suppress Yellow Starthistle if grazed when plants bolt, but before they develop spines. Prior to developing spines, the crude protein content of plants ranges from 5-10%. Repeated grazing is necessary to suppress growth, but the intensity and frequency should depend upon environmental conditions. In revegetated areas, the desirable rangeland plants should achieve full recovery before being grazed, to ensure they are most competitive against Yellow Starthistle.

**Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



## Dyer's Woad

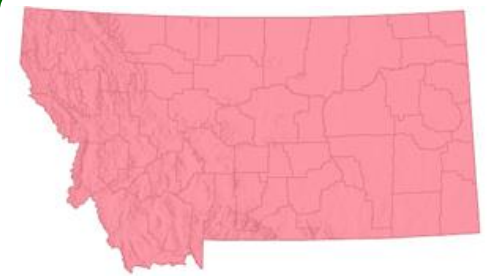
*Isatis tinctoria*

[View in Field Guide](#)

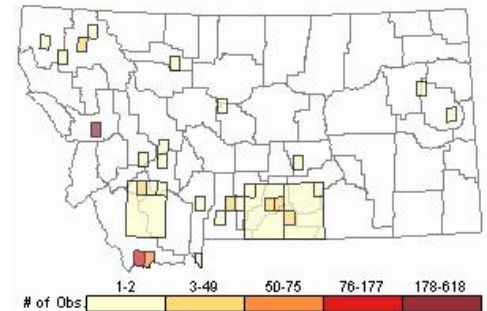

© Matt Lavin

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

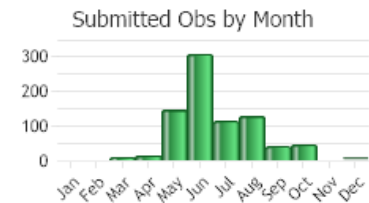
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



**# Observations: 972**



### General Description

**PLANTS:** Typical biennial forbs. Stems are erect, simple, and 30–100 cm tall. Plants develop a taproot and several lateral roots. The taproot can be 3-5 feet long to access deeper water sources. Within the upper 12 inches of soil, several lateral roots grow outwards to access shallow water sources.

**LEAVES:** Basal leaves form a rosette where blades are blue-green, petiolate, oblanceolate, 5–18 cm long, and with entire margins. Stem leaves are arranged alternately. Stem leaves have blades that are blue-green, lanceolate, sessile, and clasp the stem (auriculate). Vestiture hirsute with simple hair at the stem base, otherwise glabrous.

**INFLORESCENCE:** Collectively, the inflorescence is branched (panicle); yellow flowers are arranged in a raceme on each of the upper branches. At maturity flowers appear bright yellow with a hint of chartreuse green. Sources: McConnell et al. *in* Sheley and Petroff 1999; Lesica et al. 2012.

The genus *Isatis* comes from a Greek word used for a dye plant (FNA 2010).

### Phenology

Flowers April through June. Fruits June through July.

### Diagnostic Characteristics

See also General Description and Reproductive Characteristics.

Unlike most mustards, the fruits of Dyer's Woad do not split open to expose the seeds, but rather fall intact. Basal and stem leaves have a cream-colored midrib on the upper surface.

### Habitat

Roadsides, fields, pastures, grasslands, sagebrush hillsides, prairies, railroad embankments, waste areas (FNA 2010). Valleys in Montana (Lesica et al. 2012).

### Management

**PREVENTION** [Adapted from McConnell et al. *in* Sheley and Petroff 1999]

Successful management seeks to prevent infestations and to inventory land annually to detect occurrences early.

**MECHANICAL and PHYSICAL CONTROL** [Adapted from McConnell et al. *in* Sheley and Petroff 1999]

**Hand-pulling** is very effective for containment or control because plants are easy to identify and easy for volunteer groups to remove. It works well in difficult to reach areas, like fence rows, and in difficult or sensitive

areas. Pulling sessions should be timed with approaching full bloom. The entire plant and taproot must be removed to prevent re-growth. A follow-up session should occur 3-4 weeks later to pull any plants that re-grew or that were missed from the first session. Plants should be bagged and burned or be allowed to fully desiccate before disposing in the landfill. Plants with green pods are capable of germinating. Several examples in Montana, Utah, and other places have shown the effectiveness of hand-pulling in areas as large as 62 acres over an 8 year period. The level of effort required also diminishes with time, even after one treatment.

Mowing done during the flower bloom stage (before fruit development) will reduce seed production and may increase plant mortality.

Cultivation: Tillage works to reduce Dyer's Woad in fields planted with annual or row crops. Seedlings that emerge after tilling cannot bolt and mature until after they undergo a cold period. Herbicides in combination with tillage can remove late emerging plants. Alfalfa crops that are not irrigated can be cultivated in the spring with a flex-tine harrow. A combination of crop rotation, tillage, and herbicide treatments should be used where Dyer's Woad has infested alfalfa fields.

**CHEMICAL CONTROL** [Adapted from McConnell et al. *in* Sheley and Petroff 1999]

The most effective herbicide treatment to control Dyer's Woad is Metsulfuron (0.75 ounce per acre) or Chlorsulfuron (1.0 ounce per acre) combined with 2,4-D (3 pints per acre). Using either Metsulfuron or Chlorsulfuron also requires applying a nonionic surfactant. The herbicide mixture should be applied to rosettes and stems up to the late bloom stage in order to prevent seed set and viable seed production.

On its own 2,4-D will kill rosettes, but when applied to flowering plants it will not prevent seed production.

Imazapic (8-12 ounces per acre) with methyalted seed oil (MSO 1 quart per acre) will kill rosettes or bolting plants. Alternatively, flowering stalks could be removed manually (and bagged) and their rosettes and stem herbicided.

**GRAZING MANAGEMENT** [Adapted from McConnell et al. *in* Sheley and Petroff 1999]

A study in Utah found that sheep ate at about 16% of Dyer Woad plants and about 39% of the leaves on rosettes up to May 18th. Afterwards, sheep selected other plants.

**BIOLOGICAL CONTROL** [Adapted from McConnell et al. *in* Sheley and Petroff 1999]

*Puccinia thlaspeos* is a native rust pathogen that infects Dyer's Woad plants and prevents seed production. Studies have focused on abilities to inoculate this rust into Dyer's Woad populations and on the interactions among rust, herbicides, and plants.

Montana's Dyer's Woad Task Force is led by Amber Burch who can be contacted at: (406) 683-3790 or [aburch@beaverheadcounty.org](mailto:aburch@beaverheadcounty.org)

**Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



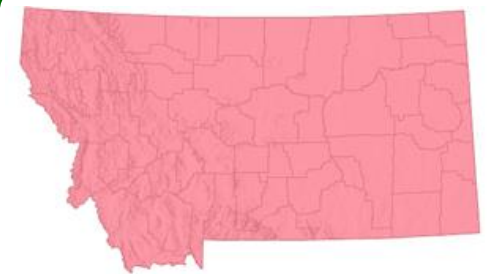
## Purple Loosestrife

*Lythrum salicaria*

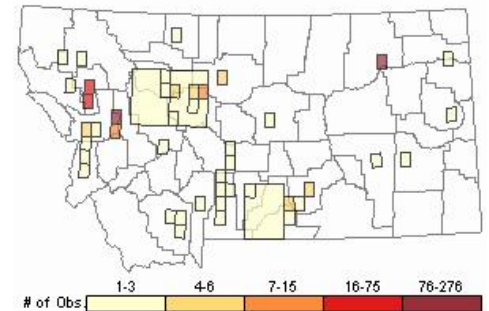
[View in Field Guide](#)


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

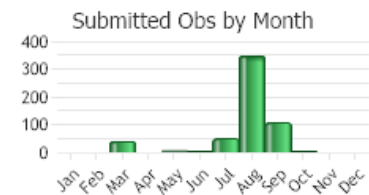
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



**# Observations: 580**



### General Description

**PLANTS:** An erect perennial forb that grows to 3 meters tall, often forming clusters or clumps (DiTomaso and Healy 2003). Plants are nearly hairless (glabrate) to pubescent (hairy) (Lesica 2012).

**LEAVES:** Leaves are oppositely arranged, sessile (no leaf stem), and entire (smooth leaf margin). Leaves are narrowly lanceolate, about 3-10 cm long, and with a cordate leaf-base (Lesica 2012). Upper stem leaves become alternate (DiTomaso and Healy 2003). Sometimes lower stem leaves are whorled (DiTomaso and Healy 2003).

**INFLORESCENCE:** Spike-like panicles of showy pinkish-purple to magenta flowers and leaf-like bracts terminate stems (Lesica 2012; DiTomaso and Healy 2003).

### Diagnostic Characteristics

Species of *Lysimachia* are also called Loosestrife, but are native members of the Myrsine Family (Myrsinaceae), or in older taxonomic treatments are placed in the Primrose Family (Primulaceae). Our native Montana *Lysimachia* species also have opposite, entire leaves, and grow in moist areas to wetlands, but their flowers are 5-6 parted and yellow. Depending upon the species, leaves are sessile or not. Users of this field guide are encouraged to identify specimens using the Manual of Montana Vascular Plants (Lesica 2012).

### Habitat

Perennial and seasonal wetland habitats, especially where disturbed: marshes, pond margins, ditches, and streams in valleys (DiTomaso and Healy 2003; Lesica 2012). Plants tolerate a wide range of soil types (clay, sand, muck, and silt), but grow best in slightly acidic to neutral soils (The Nature Conservancy 1987; DiTomaso and Healy 2003). During the growing season, plants do not tolerate inundation (DiTomaso and Healy 2003). It usually grows in full sun, but can tolerate 50 percent shade (The Nature Conservancy 1987).

### Management

Montana's Purple Loosestrife Task Force is led by Dave Burch who can be contacted at: (406) 444-3140 or [dburch@mt.gov](mailto:dburch@mt.gov)

Purple Loosestrife was introduced from Eurasia for its ornamental and medicinal qualities, but escaped cultivation and has become a noxious weed in many portions of North America (DiTomaso and Healy 2003). Surveys to identify populations should be conducted in July and August when the plant is flowering (TNC 1987). The magenta colored flowers are easy to locate, and may be identifiable from aerial photographs.

### CHEMICAL CONTROL

Glyphosate controls Purple Loosestrife (TNC 1987). On dry land trade names of RoundUp and Rodeo (developed by Monsanto) can be used. On water aquatic-labeled formulas must be used in combination with a non-ionic

surfactant (TNC 1987). Herbicide applications should spot-spray (and not broadcast spray) plants because they are non-selective and will kill all plants. The safest method for applying a glyphosate herbicide is to cut stems to a height of about 6 inches and then paint or drip the cut surface with a 20-30 percent solution (TNC 1987).

Other recommendations for using glyphosate products include spraying plants after their peak bloom, spraying no more than 50 percent of the foliage to prevent damage to desirable plants, and to follow-up in the same growing season in order to assess effectiveness and control missed plants (TNC 1987). It is important to maintain strong competition from the desirable plant community or else Purple Loosestrife will return to dominate (TNC 1987).

Herbicides designed to kill only broadleaf (dicot) plants, such as 2,4-D have also controlled Purple Loosestrife infestations. Broadleaf herbicides will not harm monocots, which includes all grasses, sedges and rushes (*Juncus* spp.). Herbicides such as 2,4-D can be applied to Purple Loosestrife in the spring after the plants have obtained 10-15 percent of their mature growth (TNC 1987). A combination of 2,4-D and Dicamba have also been used with good success (TNC 1987).

#### MECHANICAL CONTROL

Newly established plants should be hand-pulled before they develop flowers to ensure that seeds have not developed (DiTomaso and Healy 2003). This will prevent their spread. Root fragments that remain in the soil can re-sprout. All parts of the Purple Loosestrife plants must be bagged and removed from the site to ensure that they do not re-sprout (TNC1987). If possible, bagged plants should be tied and left in the hot sun to wither and die before disposing. It is important to not damage the desirable plant community in order to keep them competitive against Purple Loosestrife's will to survive (TNC 1987).

Wetlands should be seeded with native and desirable plant species. If Purple Loosestrife is mixed with desirable plants, then returning to help distribute seeds from desirable species may help. Otherwise a native seed mix of 5-9 species that are also appropriate for the site should be developed and applied using best standards and practices.

#### BIOCONTROL

The Black-margined (*Galerucella californiensis*) beetle, Golden Loosestrife (*Galerucella pusilla*) beetle, and Loosestrife Root-Weevil (*Hylobius transversovittatus*) were released in 1992 into some northern states (DiTomaso and Healy 2003). By 1994 the beetles were established in Washington, Oregon, Montana, and Idaho (DiTomaso and Healy 2003). As of 2017 in Lake County, Montana, *Galerucella pusilla* and *Hylobius transversovittatus* are thriving and inhibiting the plant's abilities to develop viable seed heads (Lake County Weed District Coordinator, personal communication). These insects are moving on their own to other areas where Purple Loosestrife occurs (Lake County Weed District Coordinator, personal communication).

The loosestrife flower-feeding weevil (*Nanophyes marmoratus*) was released in 1994 into Washington, Oregon, Montana, and Colorado (DiTomaso and Healy 2003). However, its status in Montana is unknown (Lake County Weed District Coordinator, personal communication).

#### Useful Links:

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



## Blueweed *Echium vulgare*

[View in Field Guide](#)

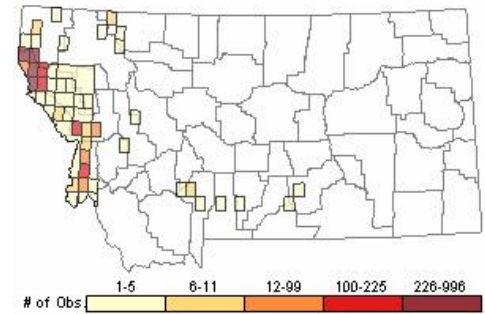

© Andrew Curtis, [CC BY-SA 2.0], Wikimedia Commons

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

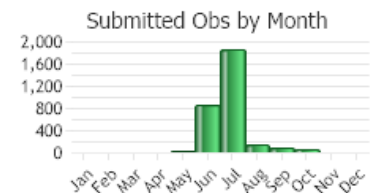
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



# **Observations:** 3045



### General Description

**PLANTS:** A taprooted biennial or short-lived perennial forb. Stems are single to many, erect, and 20–80 cm tall. Plants have two types of hairs: hispid hairs that are stout, spreading, and have a swollen red, purple, or black base, and strigose hairs that are smaller, stiff, straight, sharp, and appressed. The hispid hairs with the swollen base give the plant a spotted appearance. Sources: Graves et al. 2010; Lesica et al. 2012.

**LEAVES:** Leaves are basal and cauline and have the same hair types found on the stems. Basal leaves are simple with entire margins, oblanceolate in shape, petiolate, and about 6–20 cm long by 0.5–3.0 inches wide. Stem leaves are arranged alternately, linear-lanceolate in shape, and become smaller and sessile above. Sources: Graves et al. 2010; Lesica et al. 2012.

**INFLORESCENCE:** An elongate, bracteate raceme of helicoid cymes. Plants may have up to 50 cymes with each cyme bearing up to 20 flowers. Source: Graves et al. 2010; Lesica et al. 2012.

### Phenology

Flowers June to October.

### Diagnostic Characteristics

Blueweed could be confused with *Phacelia* species or members of the Borage Family.

**Blueweed** is identified by the following characteristics:

basal rosette with long, lance-shaped leaves; upper stem leaves are sessile; stems and leaves with both long and short hair types; stem appears spotted due to the swollen hairs; brightly colored blue funnel, shaped flowers growing on curled cymes; and bright pink or red stamens with 5 stamens of unequal length.

**Linearleaf Phacelia - *Phacelia linearis*** is differentiated by these characteristics:

Annual plants that lack a basal rosette; stem leaves have short-petioles (stalks); flowers are similar, but petals are lavender and more bell-shaped; the 5 stamens are exserted, but white; and the calyx is also hispid. Plants don't have a spotted appearance.

**Common Hound's-tongue - *Cynoglossom officinale*** is differentiated by these characteristics:

Plants have one hair type (villous) which are dense long, crooked, but unmated. Flowers (petals) are reddish-purple. Plants don't have a spotted appearance.

### **Common Bugloss - *Anchusa officinalis***

Plants have one hair type, spreading hispid hairs which lack a swollen, colored base. Flowers (petals) are purple-blue and expand from a tube (salverform), and are not funnel-shaped. The 5 stamens are short and inserted within the length of the petals. Plants don't have a spotted appearance.

### **Habitat**

---

Roadsides, fields, vacant lots, waterways, overgrazed pastures, and other disturbed areas (Graves et al. 2010). In Montana it grows in valleys (Lesica et al. 2012).

### **Management**

---

Successful management of Blueweed requires an integrated weed management strategy that promotes a weed-resistant plant community and uses surveying, monitoring, and/or grazing management strategies in combination with hand-pulling, herbicide control, and/or revegetation.

#### **PHYSICAL and CULTURAL CONTROLS** [Adapted from Graves et al. 2010]

Hand-pulling is effective for smaller infestations if the soil is moist. Pulling should be done before flowering to avoid dispersing seeds. The entire taproot should be removed in order to prevent re-sprouting. Plants should be burned (see "burning" below) or bagged and left to desiccate before disposing into the landfill. Standard practice for hand-pulling any plant includes protecting yourself by using long-sleeves and gloves. Blueweed's stiff hairs can irritate the skin.

Mowing can reduce seed production, but will allow plants to re-sprout and produce flowers and seeds below the blade level.

Proper vegetation management will discourage invasion. Blueweed prefers sites with low soil nutrients and sparse vegetation. Over-grazing creates gaps in the vegetation, allowing blueweed (and other weeds) to colonize. Proper management of lawns, pastures, and rangelands will promote viable populations of desirable plants. Lawns and pastures should be fertilized to increase soil fertility and competitiveness of desirable plants. Revegetation of disturbed sites may be necessary (refer to Revegetation Guidelines for Western Montana: Considering Invasive Weeds by Goodwin et al. 2006).

Burning is not an effective control because plants do not dry out well and large-scale burns can maintain a disturbed environment which favors Blueweed. Blueweed plants do not burn well, and after hand-pulling will likely require several days of air drying.

#### **CHEMICAL CONTROL** [Adapted from Graves et al. 2010]

Herbicides may be effective, especially when properly managed with other tactics. The herbicide type and concentration, timing of chemical control, soil properties, and other factors will determine its effectiveness and impact to non-target species. Strict adherence to application requirements defined on the herbicide label will reduce risks to human and environmental health. Many herbicides must be applied by applicators with an Aquatic Pest Control license. Consult your County Extension Agent and/or Weed District for more information on herbicidal control.

Studies in Ravalli County, Montana found Metsulfuron at 1 ounce per acre or Chlorsulfuron at 1 ounce per acre applied to rosettes in the spring or fall provided nearly 100% control one year after treatment. These studies also found that Metsulfuron (0.5 ounce per acre) mixed with Chlorsulfuron at (0.5 ounce per acre) provided nearly 100% control one year after treatment.

Pasture formulations containing 2,4-D LVE (1-2 quarts per acre) successfully controlled Blueweed when applied to the rosette state during active growth. For complete control, several applications may be necessary.

#### **BIOLOGICAL CONTROL** [Adapted from Graves et al. 2010]

There are no biological control organisms established in the U.S. for use on Blueweed. However, in the eastern U.S. three insect species are known to feed on Blueweed: a lace bug (*Dictyla ealii*), a moth (*Ethmia bipunctella*), and a chrysomelid beetle (*Longitarsus melanurus*). All have been observed to cause damage to plants. These species are not present in the western U.S., though related species of the moth and beetle are present in Montana.

Montana's Blueweed Task Force is led by Kelliann Morris who can be contacted at: (406) 777-5842 or [kmorris@rc.mt.gov](mailto:kmorris@rc.mt.gov)

### **Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



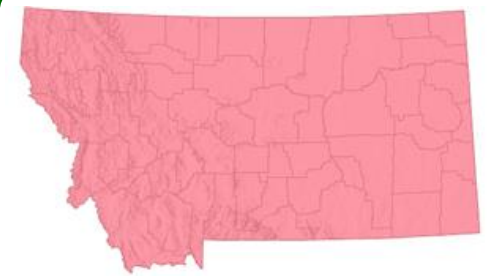
## Japanese Knotweed

*Polygonum cuspidatum*

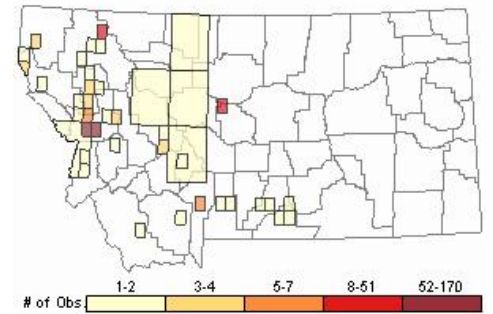
[View in Field Guide](#)


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

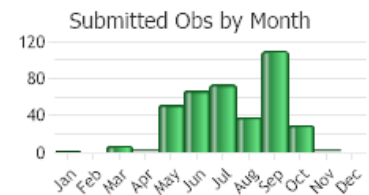
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value:** 0



Range **Non-native**



**# Observations:** 388



### General Description

**PLANTS:** Large, rhizomatous, herbaceous perennials with erect, branched stems that reach to 2 meters (6 feet) tall in Montana. In other states they may reach to almost 6 meters (19 feet) in height. Sources: Parkinson and Mangold 2017; Lesica et al. 2012.

**LEAVES:** Petiolate and alternately arranged. Blades are ovate, 8–20 cm long with pointed tips and a truncate base. Stipules occur at leaf nodes and are brown, glabrous, and 4–6 mm long. Source: Lesica et al. 2012.

**INFLORESCENCE:** Flowers arranged in panicles at leaf axils. The greenish-white to creamy-white flowers appear perfect with stamens and pistils, but functionally are unisexual. Each flower is 5–7 mm long with a tubular base and pedicels (stems) of 3–5 mm long. The petals and sepals look-alike (tepals) and are white to pink. Fruit is an achene that is shiny-brown, 2–4 mm long, 3-sided, and enclosed by an inflated perianth (tepals). Source: FNA 2005; Lesica et al. 2012.

### Phenology

Flowering occurs in August to September and fruits/seeds develop in September (Parkinson and Mangold 2017).

### Diagnostic Characteristics

The **Japanese Knotweed complex** includes Japanese Knotweed, Giant Knotweed, and Bohemian Knotweed which is a hybrid between the Japanese and Giant Knotweeds. Japanese, Giant, and Bohemian plants are often mis-identified with each other. A strong hand-lens is required. Schutter Diagnostic Laboratory at Montana State University, Bozeman can assist in identifying good quality plant specimens.

Plants in the **Japanese Knotweed complex** exhibit flowers with fringed stigmas and erect, hollow stems that grow in clumps, resembling bamboo. Unlike bamboo, leaves of the knotweed complex are ovate in shape and have brown papery or membranous sheaths at the leaf nodes. Other **Polygonum** species may be commonly called **Knotweed** or **Smartweed**, but are either less than 1 meter tall or are vines or have mostly basal leaves and few stem leaves, and species in the “complex” only have hollow stems.

**Japanese Knotweed** - *Polygonum cuspidatum*, *Fallopia japonica*, or *Reynoutria japonica*

- \* Leaf blades are 1-4 inches (3-10 cm) long.
- \* The leaf tip is abrupt and also acuminate.
- \* Veins on the lower surface of leaf are minutely scabrous (roughened) with swollen cells or knobs. Hairs if present are short, less than 0.1mm tall, unicellular, and with blunt tips.
- \* Mid-branch leaves with a leaf base that is flat where it joins the petiole - truncate to rarely slightly cuneate in shape.
- \* Inflorescence is usually longer than the subtending mid-branch leaf.
- \* Plants are approximately 5-8 feet (1.5-2.5 meters) tall, tending to be shortest in the complex.

- \* Plants usually don't produce seeds.

**Giant Knotweed** - *Polygonum sachalinense*, *Fallopia sachalinensis*, or *Reynoutria sachalinensis*

- \* Leaf blades are 7.8-16 inches (20-40 cm) long.
- \* The leaf is more evenly tapered to a blunt or acute tip.
- \* Veins on the lower surface of leaf have multicellular hairs of 0.2-0.6 mm tall.
- \* Mid-branch leaves with a leaf base that is deeply heart-shaped where it joins the petiole - cordate in shape.
- \* Inflorescence is much shorter than the subtending mid-branch leaf.
- \* Plants are approximately 9.9-19.8 feet (3-6 meters) tall and branches sparingly. It is the tallest in the complex.
- \* Plants usually produce seeds.

**Bohemian Knotweed** - *Fallopia xbohemica*, a hybrid

- \* Leaf blades are 2-12 inches (5-30 cm) long. Largest mid-stem leaves are usually greater than 20 cm long.
- \* The leaf tip is usually not abrupt (cuspidate), but is acuminate.
- \* Veins on the lower surface of leaf are obscure (puberulent), not roughened, short, and acute at the tip.
- \* Mid-stem leaves with a leaf base that is flat to slightly heart-shaped where it joins the petiole - truncate to slightly cordate in shape.
- \* Inflorescence is either shorter or longer than the subtending mid-branch leaf.
- \* Plants are approximately 6.6-16.5 feet (2-5 meters) tall.
- \* Plants occasionally produce seeds.

Sources: Zika and Jacobson 2003; Flora of North America 2005; Lesica et al. 2012; Parkinson and Mangold 2017.

## Habitat

---

In its native habitat it is an early successional plant and can colonize volcanic slopes (Parkinson and Mangold 2017). In Europe and North America it was planted into yards and managed landscapes, but has escaped into moist habitats that include riverbanks, canals, wetlands, lakeshores, utility right-of-ways, strip-mining areas, and roadways (Parkinson and Mangold 2017). In Montana it grows in gardens and lawns and along streambanks and reservoirs in valleys (Lesica et al. 2012).

Japanese Knotweed is considered shade intolerant and has been found in soil with pH ranging from 4.5 to 7.4 (Parkinson and Mangold 2017). Plants are not limited by soil type and can establish, grow, and have good survival rates in nutrient-poor to nutrient-rich soils. In the Cascade Range, Japanese Knotweed has been found in open canopies with Black Poplar (*Populus nigra*), Red Alder (*Alnus rubra*), and Douglas-fir (*Pseudotsuga menziesii*) which implies that open-canopy forests in Montana could be vulnerable (Parkinson and Mangold 2017).

## Management

---

Proper identification, early detection, and control of Japanese Knotweed in previously non-infested sites is the key to preventing establishment of new colonies in Montana. Plants are found scattered in Montana, but have not yet developed impenetrable patches along our roadways and rivers; therefore, we must prevent spread while suppressing and eradicating existing infestations. Efforts to control Japanese Knotweed will require a combination of techniques for many years (Parkinson and Mangold 2017). Upon eradication or control, a 60-foot swatch around the population should be monitored yearly to determine if growth resumes.

**PREVENTION** [Adapted from Parkinson and Mangold 2017.]

Identify and suppress existing patches. Do not spread soil from infested areas because the soil will contain root fragments that can re-generate in other areas.

**MECHANICAL and PHYSICAL CONTROLS** [Adapted from Parkinson and Mangold 2017.]

Placing a heavy black plastic tarp tightly to the ground for more than one year can suppress plants. This is recommended for small infestations. However, rhizomes can go dormant for 20 years and frequently monitoring is required to document presence/absence.

Hand-pulling or digging is effective for small populations where plants are young. Plants should be pulled in moist soil and twice each month to remove new sprouts.

Stem Cutting is labor intensive, but effective. Cutting should occur 3 times each year for consecutive, multiple years, in order to reduce the reserves in the rhizomes. Further the last cutting in a year should occur before plants lose their leaves (which is near the onset of winter).

Mowing is effective if done close to the ground and repeated when plants reach 6 inches tall. Mowing should occur through the entire growing season.

Tilling alone is not recommended because it breaks rhizomes and encourages re-sprouting. However, it can be effective to stimulate leaf growth prior to a herbicide application.

Revegetation in combination with other techniques is recommended. On its own Revegetating sites will not be enough. Sites that appear to be eradicated or greatly suppressed, should be planted with competitive shrubs that are appropriate for the site. Competitive grasses can also be used in combination with shrubs. Potential shrubs could include species of willow (*Salix* spp.), Blue Elderberry (*Sambucus cerulean*), Red/Black Elderberry (*Sambucus racemosa*), Green Alder (*Alnus viridis*), Speckled Alder (*Alnus incana*). Potential grasses to plant with shrubs could include: Streambank Wheatgrass (*Elymus lanceolatus*) or great Basin Wildrye (*Elymus cinereus*).

#### **CHEMICAL CONTROL** [Adapted from Parkinson and Mangold 2017.]

Herbicides are effective, especially when properly managed with other tactics. The herbicide type and concentration, timing of chemical control, soil properties, and other factors will determine its effectiveness and impact to non-target species. Strict adherence to application requirements defined on the herbicide label will reduce risks to human and environmental health. Many herbicides must be applied by applicators with an Aquatic Pest Control license. Consult your County Extension Agent and/or Weed District for more information on herbicidal control. Chemical information is also available at [Greenbook](#).

Stem injection is commonly used and involves using a hand-operated injection device that delivers repeated, pre-measured doses. Prior to injection, a hole must be made using an awl or similar tool. All stems must be treated. Glyphosate (0.17 ounce or 5 mL) injected into the hollow stem between the second and third node or about six inches above the ground has been used successfully. Glyphosate and 2,4-D (0.2 ounce or 6 mL) injected into the hollow stem between the second and third node has been used successfully.

Foliar applications have been used successfully. Aminopyralid broadcast sprayed at 7-14 ounces per acre when plants are 3-4 feet tall has been used successfully. Imazapyr and Metsulfuron Methyl chemicals are not selective and kill all plants and should only be used in non-crop sites. These chemicals have been broadcast sprayed at 25 ounces per acre after plants emerge. Imazapyr can also be applied at 4-6 pints per acre when plants are actively growing and a surfactant is recommended. In and around water, Imazapyr can be used on actively growing foliate at 3-4 pints per acre and use an adjuvant that is approved for aquatic use.

#### **GRAZING CONTROLS** [Adapted from Parkinson and Mangold 2017.]

Young shoots are palatable to sheep, goats, cattle, and horses. Grazing does not kill plants, but does weaken them. When grazing pressure is high, the establishment and growth of Japanese Knotweed is reduced.

#### **BIOLOGICAL CONTROL** [Adapted from Parkinson and Mangold 2017.]

No bio-control insects, pathogens, or fungi have been approved there are candidates being tested and screened for use in the U.S.

#### **Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



## Bohemian Knotweed

*Polygonum x bohemicum*

[View in Field Guide](#)


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

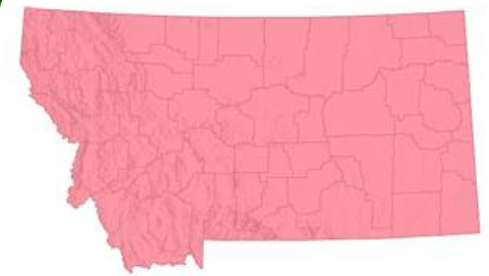
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**

### General Description

**PLANTS:** Large, rhizomatous, herbaceous perennials with erect, branched stems that reach to heights of 2-5 meters. Sources: FNA 2005; Parkinson and Mangold 2017.

**LEAVES:** Petiolate and alternately arranged. Blades are ovate, 5-20 cm long with acute tips and a slightly heart-shaped (cordate) base. Stipules occur at leaf nodes and are brown, glabrous, and 4-6(10) mm long. Sources: FNA 2005; Parkinson and Mangold 2017.

**INFLORESCENCE:** Flowers arranged in panicles at leaf axils or are terminal on branches. The greenish-white to creamy-white flowers appear perfect (with stamens and pistils) but may function unisexually or are just female (with pistils). Each flower with pedicel (stem) is 4.5–6.5 mm long with a tubular base. The petals and sepals look-alike (tepals) and are greenish-white to creamy-white. Fruit is an achene that is shiny, smooth, dark brown, 2.6–3.2 mm long, 3-sided, and enclosed by an inflated perianth (tepals). Sources: FNA 2005; Parkinson and Mangold 2017.



Range **Non-native**



# of Obs: 1 2 3 4 5

**# Observations: 11**



### Phenology

Flowers July through October (FNA 2005).

### Diagnostic Characteristics

The **Japanese Knotweed complex** includes Japanese Knotweed, Giant Knotweed, and Bohemian Knotweed which is a hybrid between the Japanese and Giant Knotweeds. Japanese, Giant, and Bohemian plants are often mis-identified with each other. A strong hand-lens is required. Schutter Diagnostic Laboratory at Montana State University, Bozeman can assist in identifying good quality plant specimens.

Plants in the **Japanese Knotweed complex** exhibit flowers with fringed stigmas and erect, hollow stems that grow in clumps, resembling bamboo. Unlike bamboo, leaves of the knotweed complex are ovate in shape and have brown papery or membranous sheaths at the leaf nodes. Other **Polygonum** species may be commonly called **Knotweed** or **Smartweed**, but are either less than 1 meter tall or are vines or have mostly basal leaves and few stem leaves, and species in the “complex” only have hollow stems.

**Japanese Knotweed** - *Polygonum cuspidatum*, *Fallopia japonica*, or *Reynoutria japonica*

- \* Leaf blades are 1-4 inches (3-10 cm) long.
- \* The leaf tip is abrupt and also acuminate.
- \* Veins on the lower surface of leaf are minutely scabrous (roughened) with swollen cells or knobs. Hairs if present are short, less than 0.1mm tall, unicellular, and with blunt tips.
- \* Mid-branch leaves with a leaf base that is flat where it joins the petiole - truncate to rarely slightly cuneate in shape.
- \* Inflorescence is usually longer than the subtending mid-branch leaf.
- \* Plants are approximately 5-8 feet (1.5-2.5 meters) tall, tending to be shortest in the complex.
- \* Plants usually don't produce seeds.

**Giant Knotweed** - *Polygonum sachalinense*, *Fallopia sachalinensis*, or *Reynoutria sachalinensis*

- \* Leaf blades are 7.8-16 inches (20-40 cm) long
- \* The leaf is more evenly tapered to a blunt or acute tip.
- \* Veins on the lower surface of leaf have multicellular hairs of 0.2-0.6 mm tall.
- \* Mid-branch leaves with a leaf base that is deeply heart-shaped where it joins the petiole - cordate in shape.
- \* Inflorescence is much shorter than the subtending mid-branch leaf.
- \* Plants are approximately 9.9-19.8 feet (3-6 meters) tall and branches sparingly. It is the tallest in the complex.
- \* Plants usually produce seeds.

**Bohemian Knotweed** - *Fallopia xbohemica*, a hybrid

- \* Leaf blades are 2-12 inches (5-30 cm) long. Largest mid-stem leaves are usually greater than 20 cm long.
- \* The leaf tip is usually not abrupt (not cuspidate), but is acuminate.
- \* Veins on the lower surface of leaf are obscure (puberulent), not roughened, short, and acute at the tip.
- \* Mid-stem leaves with a leaf base that is flat to slightly heart-shaped where it joins the petiole - truncate to slightly cordate in shape.
- \* Inflorescence is either shorter or longer than the subtending mid-branch leaf.
- \* Plants are approximately 6.6-16.5 feet (2-5 meters) tall.
- \* Plants occasionally produce seeds.

Sources: Zika and Jacobson 2003; Flora of North America 2005; Lesica et al. 2012; Parkinson and Mangold 2017.

## Habitat

---

In Montana it grows along Noxon Reservoir and the St. Regis River (Consortium of Pacific Northwest Herbaria; <https://www.pnwherbaria.org>).

## Management

---

Proper identification, early detection, and control of Bohemian Knotweed in Montana is key to preventing its establishment. It is assumed that efforts to control Bohemian Knotweed will require a combination of techniques for many years (Parkinson and Mangold 2017). It is assumed that the management techniques used for Japanese Knotweed will apply successfully to Bohemian Knotweed.

**PREVENTION** [Adapted from Parkinson and Mangold 2017.]

Identify and suppress any found populations. Do not spread soil from infested areas because the soil will contain root fragments that can re-generate in other areas.

**MECHANICAL and PHYSICAL CONTROLS** [Adapted from Parkinson and Mangold 2017.]

Placing a heavy black plastic tarp tightly to the ground for more than one year can suppress plants. This is recommended for small infestations. However, rhizomes can go dormant for 20 years and frequently monitoring is required to document presence/absence.

Hand-pulling or digging is effective for small populations where plants are young. Plants should be pulled in moist soil and twice each month to remove new sprouts.

Stem Cutting is labor intensive, but effective. Cutting should occur 3 times each year for consecutive, multiple years, in order to reduce the reserves in the rhizomes. Further the last cutting in a year should occur before plants lose their leaves (which is near the onset of winter).

Mowing is effective if done close to the ground and repeated when plants reach 6 inches tall. Mowing should occur through the entire growing season.

Tilling alone is not recommended because it breaks rhizomes and encourages re-sprouting. However, it can be effective to stimulate leaf growth prior to a herbicide application.

Revegetation in combination with other techniques is recommended. On its own Revegetating sites will not be enough. Sites that appear to be eradicated or greatly suppressed, should be planted with competitive shrubs that are appropriate for the site. Competitive grasses can also be used in combination with shrubs. Potential shrubs could include species of willow (*Salix* spp.), Blue Elderberry (*Sambucus cerulean*), Red/Black Elderberry (*Sambucus racemosa*), Green Alder (*Alnus viridis*), Speckled Alder (*Alnus incana*). Potential grasses to plant with shrubs could include: Streambank Wheatgrass (*Elymus lanceolatus*) or great Basin Wildrye (*Elymus cinereus*).

**CHEMICAL CONTROL** [Adapted from Parkinson and Mangold 2017.]

Herbicides are effective, especially when properly managed with other tactics. The herbicide type and concentration, timing of chemical control, soil properties, and other factors will determine its effectiveness and impact to non-target species. Strict adherence to application requirements defined on the herbicide label will reduce risks to human and environmental health. Many herbicides must be applied by applicators with an Aquatic Pest Control license. Consult your County Extension Agent and/or Weed District for more information on herbicidal control. Chemical information is also available at [Greenbook](#).

Stem injection is commonly used and involves using a hand-operated injection device that delivers repeated, pre-measured doses. Prior to injection, a hole must be made using an awl or similar tool. All stems must be treated. Glyphosate (0.17 ounce or 5 mL) injected into the hollow stem between the second and third node or about six inches above the ground has been used successfully. Glyphosate and 2,4-D (0.2 ounce or 6 mL) injected into the hollow stem between the second and third node has been used successfully.

Foliar applications have been used successfully. Aminopyralid broadcast sprayed at 7-14 ounces per acre when plants are 3-4 feet tall has been used successfully. Imazapyr and Metsulfuron Methyl chemicals are not selective and kill all plants and should only be used in non-crop sites. These chemicals have been broadcast sprayed at 25 ounces per acre after plants emerge. Imazapyr can also be applied at 4-6 pints per acre when plants are actively growing and a surfactant is recommended. In and around water, Imazapyr can be used on actively growing foliate at 3-4 pints per acre and use an adjuvant that is approved for aquatic use.

**GRAZING CONTROLS** [Adapted from Parkinson and Mangold 2017.]

Young shoots of Japanese Knotweed are palatable to sheep, goats, cattle, and horses. Grazing does not kill plants, but does weaken them. When grazing pressure is high, the establishment and growth of Japanese Knotweed is reduced.

**BIOLOGICAL CONTROL** [Adapted from Parkinson and Mangold 2017.]

No bio-control insects, pathogens, or fungi have been approved there are candidates being tested and screened for use in the U.S.

**Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



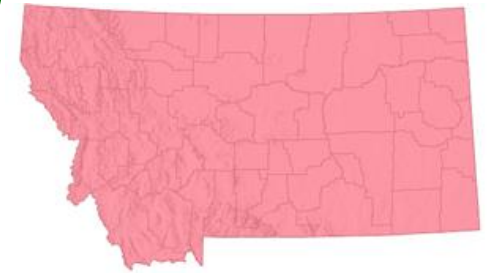
## Common Buckthorn

### *Rhamnus cathartica*

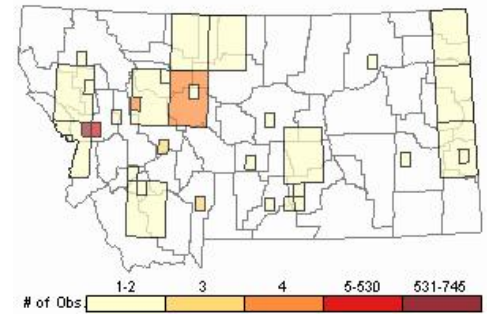
[View in Field Guide](#)


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

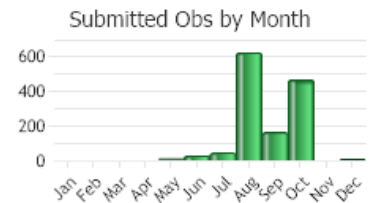
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



**# Observations: 1359**



## General Description

**PLANTS:** Large shrubs or small trees that have deciduous leaves and grow 2-6 meters tall. Twigs sometimes end in thorns. Source: Lesica et al. 2012

**LEAVES:** Both alternate and opposite leaf and bud arrangement can be found on the plant. Young twigs often have opposite or sub-opposite leaf arrangement. Leaf blades are simple, oval, dark green, and glossy. Leaf blades have 3-6 pairs of veins that arc from the mid-vein towards the leaf tip. Leaf margins are finely-toothed. Source: Lesica et al. 2012; Davis and Mangold 2018.

**INFLORESCENCE:** Plants are either male or female (dioecious). Female plants bear fruit. Female flowers are green, not showy, and have 4 sepals of 1-3 mm long that are longer than the erect petals. Fruits are a 4-seeded drupe, berry-like, and purplish-black at maturity. Source: Lesica et al. 2012; Davis and Mangold 2018.

The genus *Rhamnus* comes from the Greek word *rhamnos* meaning prickly shrubs, such as buckthorn (FNA 2016).

## Phenology

April through June (FNA 2016).

## Diagnostic Characteristics

**Common Buckthorn** – *Rhamnus cathartica*, exotic and Noxious:

- \* has both alternate and opposite to sub-opposite leaves and buds.
- \* Leaf blades have 3-6 pairs of veins that arc from the mid-vein towards the leaf tip.
- \* Leaf tips gradually narrow to a pointed tip.
- \* Flowers have 4 sepals and petals.

**Cascara False Buckthorn** – *Frangula purshiana*, exotic:

- \* has both alternate leaves and buds.
- \* Leaf blades have more than 8 pairs of parallel veins that angle from the mid-vein to the leaf margin.
- \* Leaf tips abruptly narrow to a short acuminate tip.
- \* Inflorescence has 4-40 flowers. Flowers have 5 sepals and petals.

**Alderleaf Buckthorn** – *Rhamnus alnifolia*, native and desirable:

- \* has both alternate leaves and buds.
- \* Leaf blades have fewer than 8 pairs of parallel veins that angle from the mid-vein to the leaf margin.
- \* Leaf tips are rounded to acute to abruptly short acuminate tip.
- \* Inflorescence has 2-5 flowers. Flowers have 5 sepals and petals.

**Common Chokecherry** – *Prunus virginiana*, native and desirable:

- \* has both alternate leaves and buds.
- \* Leaf blades have somewhat parallel veins that angle from the mid-vein, but arc near the leaf margin.
- \* Leaf blades are similar in shape, have finely toothed margins, and gradually narrow to a pointed tip.
- \* On the leaf petiole, but below the blade are two bumps (raised glands).
- \* Flowers are arranged in a 3- to 6- inch long raceme, which is conspicuous in the axils of the leaves. Flowers have 5 noticeable, white petals.

---

## Habitat

In Montana, Common Buckthorn grows in fields, vacant lots, roadsides, fence rows, and riparian corridors in the plains and valleys (Lesica et al. 2012; Davis and Mangold 2018). It is more abundant in urban areas and adjacent forests (Davis and Mangold 2018). It grows best in moist areas that are not saturated, but have full sun to partial shade, such as along the edge of a forest (Davis and Mangold 2018). It also requires alkaline soils (Davis and Mangold 2018).

---

## Management

Common Buckthorn was added to the Montana noxious weed list in 2017 (Davis and Mangold 2018).

Proper identification, early detection, and eradication is the best way to prevent Common Buckthorn from establishing. Large infestations are difficult to control. Methods should focus on controlling female shrubs which bear fruit and are responsible for dispersal. Control methods usually involve both mechanical and chemical methods. When prioritizing, sites with low-densities should be targeted because they are less costly to recover, are more likely to be returned to a native-dominant habitat, and efforts will aid in reducing spread by seed production (Davis and Mangold 2018).

### PREVENTION

Landowners should frequently monitor their land for new infestations and, when found to implement effective control methods.

### PHYSICAL and CULTURAL CONTROLS [Adapted from Davis and Mangold 2018]

Hand-pulling or mowing can be done on seedlings with stems up to 1.5 inches in diameter. Mowing will not kill plants.

Prescribed burning can kill plants, but will likely not eliminate plants. Spring burns can kill first-year seedlings and may eliminate established plants depending upon the burn (Panke and Renz 2012). However, burning also stimulates germination from the seed bank. Repeated burning or burning in combination with herbicides may be more effective. A 5-second exposure of flame around the stem with a propane torch will kill plants with a diameter of up to 2-inches (Panke and Renz 2012).

### GRAZING CONTROLS

Currently information is unknown.

### CHEMICAL CONTROLS [Adapted from Davis and Mangold 2018]

The herbicide type and concentration, application time and method, environmental constraints, land use practices, local regulations, and other factors will determine its effectiveness and impact to non-target species. Strict adherence to application requirements defined on the herbicide label will reduce risks to human and environmental health. Consult your County Extension Agent and/or Weed District for information on herbicidal control. Consult your County Extension Agent and/or Weed District for more information on herbicidal control. Chemical information is also available at [Greenbook](#).

It is recommended that foliar applications of herbicides be applied in the late fall to reduce negative impacts to native and/or desirable vegetation and wildlife. Foliar applications of glyphosate, triclopyr, or mixed triclopyr and 2,4-D have been used on dense stands of small individuals.

Glyphosate is a systemic herbicide that will kill the root system, but it also is not selective and can kill all plants.

For large female shrubs with stems greater than 6 inches in diameter, control can occur by cutting and applying an herbicide. Stems that are girdled or cut, but not herbicided will develop new shoots. In riparian areas, female shrubs can be cut and piled. If there are fruits the pile should be burned to prevent seed dispersal. Additional chemical information used in the mid-west can be found at Panke and Renz 2012.

## **BIOLOGICAL CONTROLS**

Currently no biological control agents are available.

### **Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



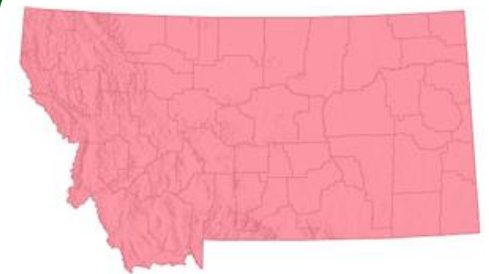
## Ventenata

*Ventenata dubia*

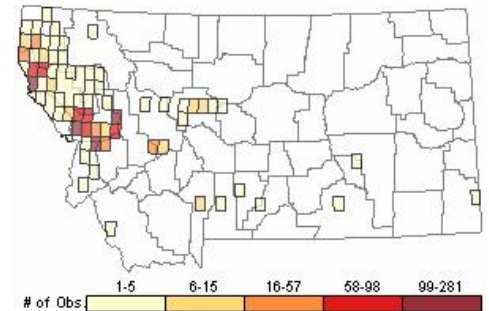
[View in Field Guide](#)


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

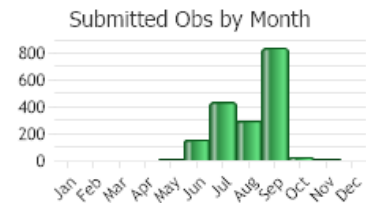
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



**# Observations: 1788**



### General Description

Cool season, annual bunchgrass. Stems few-bunched, 50–70 cm. Leaves: blades 1–3 mm broad, inrolled and ascending; sheaths with overlapping margins; ligule membranous. Inflorescence an open panicle, 2–4 dm long, only the very distal branch ends bearing spikelets. Spikelets 6–10 mm long, mostly with 3 florets, callus of spikelet well developed, glumes distinctly ribbed or veined, enveloping the florets. Lemmas dimorphic; the lowermost staminate and persistent straight awn; the upper lemmas fertile and with a bent and twisted awn, readily disarticulating; callus bearded; palea well developed. Disarticulation above and below glumes; unit of dispersal the floret (Lavin in Lesica et al. 2012. Manual of Montana Vascular Plants. BRIT Press. Fort Worth, TX).

See video on identifying Invasive Annual Grasses in Montana. Also see video on Identifying Ventana early in the season.

### Habitat

Sporadic in MT along roadsides and pastures and range with a significant disturbance history (Lavin in Lesica et al. 2012. Manual of Montana Vascular Plants. BRIT Press. Fort Worth, TX).

### Management

#### Useful Links:

- [Montana Invasive Species website](#)
- [Montana Biological Weed Control Coordination Project](#)
- [Montana Department of Agriculture - Noxious Weeds](#)
- [Montana Weed Control Association](#)
- [Montana Weed Control Association Contacts Webpage.](#)
- [Montana Fish, Wildlife, and Parks - Noxious Weeds](#)
- [Montana State University Integrated Pest Management Extension](#)
- [Weed Publications at Montana State University Extension - MontGuides](#)



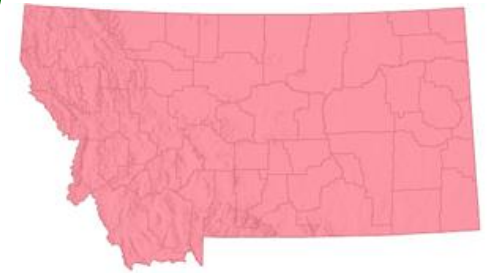
## Perennial Pepperweed

*Lepidium latifolium*

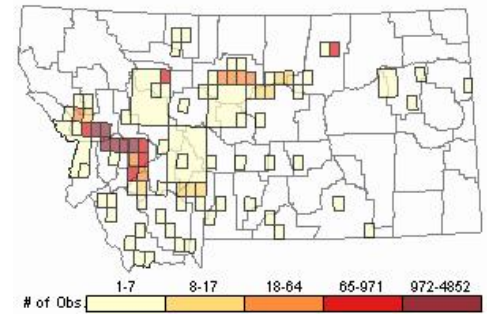
[View in Field Guide](#)


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

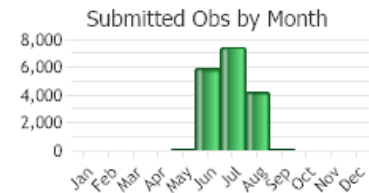
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



# **Observations:** 17811



### General Description

**PLANTS:** Rhizomatous perennial forbs with stiff stems that grow erect, branch above the ground, and are 40-100 cm tall. The lower stems are semi-woody. Plants lack hairs (Lesica et al. 2012) though the Flora of North America (FNA 2010) states they can be pubescent. Sources: FNA 2010; Lesica et al. 2012

**LEAVES:** Leaves are bright green to grey-green. Basal leaves are petiolate with narrowly oval-shaped blades that have toothed (serrate) margins and are 1-9(14) cm long. Basal leaves wither by flowering time. Stem leaves are alternately arranged with short petioles becoming sessile. Stem blades are oblong to elliptic-ovate or lanceolate, 2-9 cm long by 3-45 mm wide with a cuneate base (that is not auriculate) and with entire to serrate margins. Sources: FNA 2010; Lesica et al. 2012

**INFLORESCENCE:** Flowers are clustered in branched racemes. Flowers have 4 white petals of 1.5–2 mm long, 4 greenish-white sepals of 1-1.4 mm long, stamens 6 (4 long and 2 short), and 1 pistil. Sources: FNA 2010; Lesica et al. 2012

### Phenology

Flowering June through September (FNA 2010).

### Diagnostic Characteristics

There are many white-flowered species in the Mustard Family, both native and exotic. It is recommended that identifications be made using a plant manual designed for Montana. Mustards have flowers with 4 sepals, 4 petals, and 6 stamens (4 long and 2 short) among other characteristics.

**Perennial Pepperweed** – *Lepidium latifolium*, exotic and Noxious:

- \* White-flowered plants that grow from creeping roots (rhizomes) and have mature silicles (fruits) that are not notched at their tip.
- \* Silicles are glabrous or sparsely pilose (long soft hairs) with a very short style of 0.1 mm long or less. Silicle stems (pedicels) are 2-5 mm long.
- \* Stem leaves are sessile, but do not clasp around the stem.

**Whitetop** – *Lepidium draba*, exotic and Noxious:

- \* White-flowered plants that grow from creeping roots (rhizomes) and have mature silicles (fruits) that are not notched at their tip.
- \* Silicles are glabrous (lack hairs), flattened, and their base is cordate (heart-shaped or indented). Silicles are tipped with a style of 1-1.5 mm long. Silicle stems (pedicels) are 5-12 mm long.
- \* Stem leaves are auriculate (lobed like an arrow) and clasping around the stem.

**Globe-podded Whitetop** – *Lepidium appelianum*, exotic:

- \* White-flowered plants that grow from creeping roots (rhizomes) and have mature silicles (fruits) that are not

notched at their tip.

- \* Silicles are pubescent (have hairs), inflated (globe-shaped), and with a short style of 0.4-1.0 mm long. Silicle stems (pedicels) are 4-11 mm long.
- \* Stem leaves are auriculate (lobed like an arrow) and clasping around the stem.

**Lenspod Whitetop** – *Lepidium chalepense*, exotic:

- \* White-flowered plants that grow from creeping roots (rhizomes) and have mature silicles (fruits) that are not notched at their tip.
- \* Silicles are glabrous (lack hairs), partially inflated and round (compressed-globose), not cordate (is pointed to its stem), and topped with a style 1-2 mm long. Silicle stems (pedicels) are 8-15 mm long.
- \* Stem leaves are auriculate (lobed like an arrow) and clasping around the stem.

The other Montana **Lepidium** species (using MTNHP preferred name) have mature silicles with a notch of at least 0.1 mm deep at their top and are not rhizomatous.

**Hoary False-alyssum** – *Berteroa incana*, exotic and Noxious:

- \* White-flowered, annual plants that grow from taproots and have mature silicles (fruits) that are not notched at their tip.
- \* Each of the 4 petals are notched, making the flower appear 8-petaled.
- \* Plants have star-shaped hairs; whereas, *Lepidium* species have simple hairs or none.
- \* Stem leaves are widest near their tip (oblongate), sessile on the stem, and point upwards.

**Field Pennycress** – *Thlaspi arvense*, exotic:

- \* Easily differentiated if in fruit and easily confused with other species if only of leaves.
- \* White-flowered, annual plants that grow from taproots and have mature silicles (fruits) that are large, deeply notched at their tip, flat, and with wide wings, resembling a penny.
- \* Lower stem leaves have petioles. Upper stem leaves are sessile, clasping, auriculate (lobed like an arrow), and with smooth to toothed margins.

**Common Yarrow** – *Achillea millifolium*, native and desirable:

- \* Member of the Aster/Sunflower Family.
- \* Bright-white flowers arranged closely in a flat-topped inflorescence.
- \* Leaves are 2-3 times pinnately dissected, appearing fern-like or bushy like a squirrel's tail.

Sources: Jacobs and Mangold 2007; FNA 2010; Graves-Medley and Mangold 2011; Lesica et al. 2012.

## Habitat

---

In Montana Perennial Pepperweed grows in riparian areas that are moist or periodically flood, but can adapt to drier upland conditions (Jacobs and Mangold 2007). It can grow along lake shores and in riparian areas, wetlands, fields, pastures, grasslands, rangelands, roadsides, and urban areas in valleys (Jacobs and Mangold 2007; Lesica et al. 2012).

## Management

---

An integrated vegetative management approach provides the best long-term control, and requires that land-use objectives and a desired plant community be identified (Shelly et al. *in* Sheley and Petroff 1999). Once identified an integrated weed management strategy can be developed. An integrated weed management strategy promotes a weed-resistant plant community and serves other land-use objectives such as livestock forage, wildlife habitat, or recreation can be developed, making control of Perennial Pepperweed possible (Shelly et al. *in* Sheley and Petroff 1999).

### PREVENTION

Preventing vehicles from driving through and animals from grazing within infested areas will reduce spread. Hay that is weed-free will reduce spread. Maintaining an intact plant community and reducing soil disturbance will prevent or slow down spread.

### PHYSICAL and CULTURAL CONTROLS [Adapted from Jacobs and Mangold 2007]

Hand-pulling can be effective for small populations or to eliminate re-growth from a herbicide treatment. Its rhizomatous growth makes it difficult to pull the entire root stem and will stimulate re-growth plus any fragments can re-sprout. Pulled plants must be bagged, dried, and disposed of in the trash, but should really be burned to truly prevent spreading it.

Mowing has been shown to reduce Perennial Pepperweed by 46% for one year. Mowing should occur at the first

signs of flowering and at a stubble height of 4 inches or greater. The root's carbohydrate reserve is at its lowest when the plant begins to flower. A stubble height of at least 4 inches should remove flowers and buds while allowing desirable plants to better survive. Do not mow if plants are in seed because that will increase spread. However, plants will re-sprout and could flower and repeated mowing is likely necessary. A more effective control is to combine mowing with an herbicide treatment.

Tilling will fragment the rhizomes and increase re-sprouting. Repeated tilling without or in combination with an herbicide treatment may control Perennial Pepperweed.

Revegetation that is timed properly with the appropriate desirable plants can create competition to suppress or to prevent re-invasion by Perennial Pepperweed. The Plant Materials Technical Note 46, "Seeding Rates and Recommended Cultivars" and the Extension Bulletin EB19, "Dryland Pasture Species for Montana and Wyoming" might be useful for your project.

#### **CHEMICAL CONTROLS** [Adapted from Jacobs and Mangold 2007]

Herbicides are effective, especially when properly integrated with intensive pasture management. The herbicide type and concentration, application time and method, environmental constraints, land use practices, local regulations, and other factors will determine its effectiveness and impact to non-target species. Strict adherence to application requirements defined on the herbicide label will reduce risks to human and environmental health. Consult your County Extension Agent and/or Weed District for information on herbicidal control. Chemical information is also available at [Greenbook](#).

Perennial Pepperweed has been suppressed for 1-2 years using:

- \* Metsulfuron at the 1.0 ounce per acre rate applied to actively growing plants before full bloom. A nonionic surfactant is needed.
- \* Chlorsulfuron at the 1.0 ounce per acre rate applied when plants are in flower bud to early flowering. A nonionic surfactant is needed.
- \* Imazapic at the 8-12 ounce per acre rate mixed with methylated seed oil at the 1 quart per acre MSO rate applied after plants are in full bloom.

2,4-D at the rate of 2 quarts per acre will kill stems, but not the root crowns. Root crowns will re-sprout and require a different follow-up treatment.

Glyphosate at the rate of 2 quarts per acre will kill all plants (broad-leaf and grass plants).

#### **GRAZING CONTROLS** [Adapted from Jacobs and Mangold 2007]

Cattle and sheep can control Perennial Pepperweed in stands that are not dense. One study found Perennial Pepperweed was reduced in a pasture by 78% for one year. Sheep grazing has reduced Perennial Pepperweed plants without reducing native plant species. Perennial Pepperweed seeds remain viable after passing through the digestive tract. In fact, germination rates increased by 5% to 40% for ingested seeds. Animals that have grazed in areas with Perennial Pepperweed should be contained and fed weed-free forage for 5 days before moving into weed-free areas.

Poisoning has been reported for horses feeding on Perennial Pepperweed contaminated hay.

#### **BIOLOGICAL CONTROLS**

There are no biological controls available because Perennial Pepperweed is a member of the mustard family, which includes numerous important crops (cabbages, broccoli, mustard, canola, and others).

#### **Useful Links:**

- [Montana Invasive Species website](#)
- [Montana Biological Weed Control Coordination Project](#)
- [Montana Department of Agriculture - Noxious Weeds](#)
- [Montana Weed Control Association](#)
- [Montana Weed Control Association Contacts Webpage.](#)
- [Montana Fish, Wildlife, and Parks - Noxious Weeds](#)
- [Montana State University Integrated Pest Management Extension](#)
- [Weed Publications at Montana State University Extension - MontGuides](#)



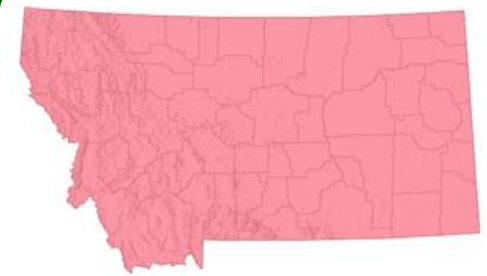
## Eurasian Water-milfoil

### *Myriophyllum spicatum*

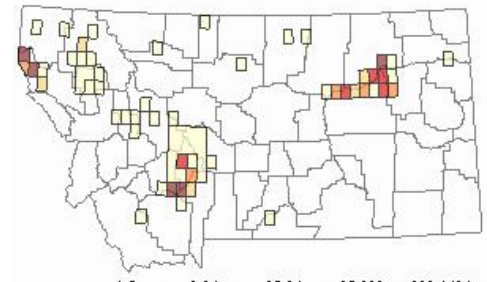
[View in Field Guide](#)


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

**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**

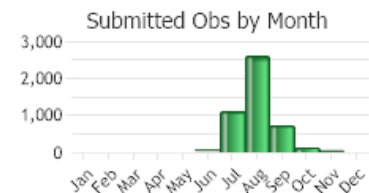


Range **Non-native**



# of Obs ■ 1-5 ■ 6-34 ■ 35-64 ■ 65-222 ■ 223-1434

# **Observations:** 4869



## General Description

**PLANTS:** Aquatic perennials with rhizomes and finely dissected, whorled leaves. Stems are branched and tawny colored when dry. Wintering buds (turions) are absent. Sources: DiTomaso and Healy 2003; Parkinson et al. 2011.

**LEAVES:** Submerged leaves are well-developed, in whorls of 4 to 5, and to 25 mm long. Each submerged leaf is pinnately divided into 24 to 50 linear segments. Emergent leaves are actually bracts; they are small, grow during flowering (or when water levels recede), occur below the flowers, and are oppositely arranged. Sources: DiTomaso and Healy 2003; Lesica et al. 2012.

**INFLORESCENCE:** Terminal spike of 4-8 cm long that grows erect above the water (emerged). The spike consists of separate male and female flowers growing in the axils of oppositely arranged leaf-like bracts. Sources: DiTomaso and Healy 2003; DiTomaso and Healy 2003.

## Phenology

Flowering in Montana has been observed from July through September.

## Diagnostic Characteristics

Montana has 1 exotic and 3 native Water-milfoil species. Their identification requires a close examination and users should consult either the *Manual of Montana Vascular Plants* (Lesica et al. 2012) or *Flora of the Pacific Northwest-2nd Edition* (Giblin et al. [eds] 2018).

**Eurasian Water-milfoil** - *Myriophyllum spicatum*, exotic, noxious, invasive:

- \* Combination of flowering spikes with emergent leaves less than 4 mm and whorled submerged leaves with 14 to 24 pairs of segments that ascend.
- \* Submerged leaves have linear segments that are mostly equal in length.
- \* Vegetative shoot tips are often dense.
- \* Plants readily collapse when removed from water.
- \* Turions (cylinders or balls of small leaves) are absent.

**Common Water-milfoil** - *Myriophyllum sibiricum*, native, desirable:

- \* Combination of flowering spikes with emergent leaves less than 4 mm and whorled submerged leaves with 4 to 16 pairs of segments that mostly spread or are perpendicular to the apex.
- \* Submerged leaves are often in whorls of 4 with 6-16(-24) segments. Segments spread or lay perpendicular to the rachis at base, but may ascend towards the apex.

- \* Plants remain stiff when removed from water.
- \* Lower pair of segments are longest and gradually shorten towards the leaf tip.
- \* Turions present: dark green, broadly cylindrical, composed of reduced and thickened leaves, and may remain persistent on next year's new growth.

**Hybrid Eurasian X Common Water-milfoil**, exotic, noxious, invasive:

Historically, the relationship of *Myriophyllum spicatum* and *Myriophyllum sibiricum* has been unclear, but recent treatments indicate they are unique species. Where both species are present, the populations can intergrade producing hybrids with intermediate characteristics (DiTomaso and Healy 2003). Genetic testing is necessary when morphological characteristics are in doubt (Thum personal communication). In Montana the hybrid has been found in waterbodies where both species occur and will grow invasively. Hybrids have not been found in water bodies that lack one of these species, indicating they are self-reproducing (Thum personal communication). Herbicides that traditionally control Eurasian Water-milfoil are not effective on hybrid plants (Thum personal communication).

**Whorled Water-milfoil** - *Myriophyllum verticillatum*, native, desirable:

- \* Emergent leaves are longer than the flowers and fruits and pinnately divided or lobed more than half-way to mid-vein.
- \* Flowers have 8 stamens.
- \* Submerged leaves are generally in whorls of 4, often with 12-22 segments.
- \* Fruit segments are round(-ish) with shallow, longitudinal ridges and no wings or cross-ribs.
- \* Turions present (balls of small leaves that develop from tips of vigorous vegetative shoots): brown to red-brown and 1-5 cm long.

**Common Hornwort** - *Ceratophyllum demersum*, native, desirable:

- \* Submerged leaves have linear-forked segments that whorl around the stem. They are not pinnately divided (no central mid-rib).
- \* Flowers are submerged, but usually plants are sterile and reproduction is mostly by overwintering turions (Lesica et al. 2012).

## Habitat

---

Open water of reservoirs; valleys (Lesica 2012). It tolerates moving water and wave action facilitates fragmentation (Parkinson et al. 2011).

## Management

---

Eurasian Water-milfoil spreads primarily through plant fragments on boat trailers, recreational equipment, and waterfowl. It can also disperse between water bodies by wind and water flow. Following introduction, populations expand rapidly and may be undergo cycles of dominance and dieback.

**DETECTION** [Adapted from Newton et al. 2016]

A traditional polymerase chain reaction (PCR) assay was developed to detect pure and hybridized Eurasian Water-milfoil. In 2013 a pilot study tested its use in the laboratory and at four sites in Jefferson Slough, Jefferson County, Montana and Half Moon Lake, Michigan. Results showed that the environmental DNA (eDNA) PCR assay was able to detect both pure and hybridized Eurasian Water-milfoil. The research recommended that further studies to refine the sensitivity of the assay be conducted. The technique of using eDNA for early detection of Eurasian Water-milfoil is possible.

**PREVENTION** [Adapted from Parkinson et al. 2011]

- \* Thoroughly rinse any mud and debris from all equipment and wading gear, and drain the water from the boat before leaving access areas. Pump the bilge before entering another water body as Eurasian Water-milfoil can remain alive in bilge water for several days. Use boat-washing stations when available.
- \* Remove all plant fragments from the boat, propeller, and boat trailer. Fragments as little as 1-inch long with two nodes are able to root and colonize.
- \* Dry boats and equipment for 5 days before transporting them to a new water body.
- \* Do not dispose aquarium water or plants into water bodies.
- \* Desiccate plant material and/or dispose by securely sealing in plastic bags and placing in the trash for disposal.
- \* Learn to identify Eurasian Water-milfoil and report findings to the Montana Department of Agriculture; Montana Fish, Wildlife and Parks; County Extension agent; or Weed Coordinator.

**CHEMICAL CONTROL** [Adapted from Parkinson et al. 2011]

Diquat, Endothall, 2,4-D, Triclopy, and Fluridone have been used to herbicide Eurasian Water-milfoil plants in

water bodies. Native water-milfoil are also susceptible to some of these herbicides. The herbicide concentration, exposure time before dissipating, timing of chemical control, and other factors are critical to effectively hinder Eurasian Water-milfoil and reduce impacts to native vegetation – see Parkinson et al. 2011, and always follow chemical label instructions and use restrictions. These herbicides must be applied by applicators with an Aquatic Pest Control license. Consult your County Extension Agent and/or Weed District for more information on herbicidal control.

**MECHANICAL CONTROL** [Adapted from Parkinson et al. 2011]

Raking and hand-harvesting can be effective for controlling small populations or early infestations. However, the risk of spread by fragmenting the plants is very high. Fragment barriers around harvest operations have been developed. All plant material should be bagged and desiccated before placing in the trash for disposal. Single harvests should be done when biomass is at its peak. It is recommended to harvest several times during the growing season, and for consecutive years. Areas harvested once can re-generate.

**PHYSICAL CONTROL** [Adapted from Parkinson et al. 2011]

Benthic barriers are mats laid down on the floor of the water body around docks and other high-use areas. They prevent light from penetrating and prevent plants from rooting. They are usually effective, but kill all vegetation. They are removable once the infestation has been destroyed. Barriers must be monitored because sediment will accumulate and provide a substrate for Eurasian Water-milfoil to colonize. Plants can root in 4 cm (1.5 inches) of soil.

Drawdowns lower the water levels to expose plants. This method has been effective at killing plants and reducing infestations when timed with freezing temperatures for 96 hours. This control may require extensive planning and permitting, and may hurt non-targeted vegetation and animal life.

**BIOLOGICAL CONTROL** [Adapted from Parkinson et al. 2011]

Two insects are being studied for their ability to control Eurasian Water-milfoil: Watermilfoil Moth (*Acentria ephemerella*) [native to Europe] and milfoil weevil (*Euhrychiopsis lecontei*) [native to North America].

**CULTURAL CONTROL** [Adapted from Parkinson et al. 2011]

Non-native water-garden plants should never be dumped near to or within wetlands, streams, rivers, lakes, or ponds. Before purchasing plants, verify that the plant is not invasive.

Contact information for Aquatic Invasive Species personnel:

[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 \(UC3\)](#)



## Yellowflag Iris

*Iris pseudacorus*

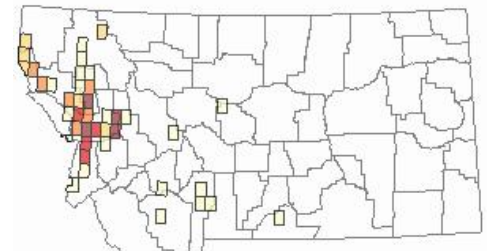
[View in Field Guide](#)


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

**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



# **Observations:** 9335



### General Description

**PLANTS:** Herbaceous perennials that grow from 1 to 1.5 meters tall with showy flowers and thick rhizomes (DiTomaso and Healy 2003). Stems are clumped (Lesica 2012). Rhizomes are up to 5 inches wide, have black sap, and produce roots that range from 4 to 12 inches long (Jacobs et al. 2011).

**LEAVES:** Each plant has up to several equitant leaves that fold in half length-wise and enclose the base of the next higher leaf (Jacobs et al. 2011; Lesica 2012). Thus, leaves emerge from the ground resembling a spreading fan (Jacobs et al. 2011). Each leaf resembles a sword's tip, and is from 50-100 cm (20-40 inches) tall and 10-30 cm (0.4-1.2 inches) wide.

**INFLORESCENCE:** An erect raceme of 3-10 yellow flowers, that branches in its upper portion (Lesica 2012). Bracts (spathes) are leaf-like, 4-7 cm long, and enfold the stem; the outer are keeled (Lesica 2012).

The genus name "Iris" is derived from Iris, the greek goddess of the rainbow and messenger to the gods (Ramey and Peichel 2001). The specific epithet name "pseudacorus" means false (pseud) sweet flag (Acorus) referring to the similarity with the genus Acorus (Ramey and Peichel 2001).

### Phenology

Flowers bloom from May to July, and are pollinated by insects. Seeds are produced between July and October. Germination primarily occurs the following spring.

### Diagnostic Characteristics

Montana has two *Iris* species: Rocky Mountain Iris (*Iris missouriensis*) and Yellowflag. The native Rocky Mountain Iris has a similar appearance, but develops 1-3 blue flowers and Yellowflag Iris has 3-10 yellow flowers. Both iris species occupy similar habitats. Rocky Mountain Iris grows in moist to wet meadows and irrigation ditches, but can tolerate drier conditions (thickets and woodlands). Yellowflag Iris requires moist to wetter habitats. In addition, Rocky Mountain Iris plants tend to be shorter (10-50 cm), have shorter (10-40 cm) and narrower (3-8 mm) leaves, and their rhizomes lack the black sap (Jacobs et al. 2011; Lesica 2012).

Cattail (*Typha latifolia* and *T. angustifolia*) leaves sheath at the base and appear similar when young, but their stems are round (not flattened).

### Habitat

Disturbed wetland habitats: marshes, wet meadows, irrigation ditches, pond margins, and riparian areas in the valleys (Lesica 2012).

## Management

---

Montana's Yellowflag Iris Task Force is led by Jed Little who can be contacted at: (406) 258-4220 or [mapping@missoulaeduplace.org](mailto:mapping@missoulaeduplace.org)

Yellowflag Iris was introduced to North America as a horticultural plant. Many cultivars of this species have been developed (Tu 2003). Because of its growth form, Yellowflag Iris has been planted for erosion control and in sewage treatment ponds (Tu 2003). It has been used to collect sediment and to remove copper and iron heavy metals from wastewater (Tu 2003).

### PREVENTION

It is a beautiful plant that will continue to be spread by gardeners, garden dealers, and sales on the internet until the sale of the species is banned. Preventing new infestations is the best means for controlling the plant. It is difficult to eradicate because it reproduces vegetatively and by seed, is adaptable to a wide range of moisture and soil conditions, and has few pests or predators (Tu 2003).

### CHEMICAL CONTROL [Adapted from Tu 2003.]

Herbicides are effective at controlling populations. However, the type of herbicide, herbicide concentration, timing of chemical control, and other factors will determine its effectiveness. Always wear protective clothing designed for chemicals, follow chemical label instructions, and use restrictions. Many herbicides must be applied by applicators with an Aquatic Pest Control license. Consult your County Extension Agent and/or Weed District for more information on herbicidal control.

Because it grows in or adjacent to water, an aquatic-labelled herbicide and adjuvant must be used. Glyphosate, under the trade names of Rodeo®, Aquamaster® or Glypro®, has been used successfully to kill Yellowflag Iris; however, plants are resistant to Terbutryne. Use Glyphosate in a 25 percent solution (13 percent a.i.) with a driplless wick/wiper applicator, or spray it using a 5-8 percent solution, and in combination with the appropriate non-ionic surfactant adjuvant. It is recommended to use a dye to better track sprays. The herbicide can be applied directly to leaves or to freshly cut leaves/stems. Spot-treat plants and do not broadcast spray in order to protect other native plants, animals, and water quality.

### MECHANICAL CONTROL [Adapted from Tu 2003.]

Mechanical control is labor-intensive, but new or small patches can be controlled by physically removing the entire plant. It is essential to remove the entire rhizome, since small pieces of rhizome can re-sprout. Protective gear should be worn since resinous substances in the leaves and rhizomes can irritate the skin.

Mowing can provide control if done annually, but it will not remove the plant. Likewise, removing the flowers/fruits (dead-heading) will reduce its ability to spread, but will not kill the plant. Plants are poisonous if ingested by grazing animals.

### BIOLOGICAL CONTROL [Adapted from Tu 2003.]

There are no known biological controls available for Yellowflag Iris. Many invertebrates and fungi do feed upon iris, and specific species are listed in the document, Element Stewardship Abstract for *Iris pseudacorus* L. by Mandy Tu of The Nature Conservancy (2003). In addition, the iris root rot called *Pseudomonas iridis* causes leaves to yellow and rhizomes to rot. However, none of these insects, fungi, or pathogen significantly kill plants or control populations.

### CULTURAL [Adapted from Tu 2003.]

Prescribed fire is not recommended for controlling Yellowflag Iris. Plants grow in wet environments which are often poorly affected by fire and where other native plants are not adapted to fire. Rhizomes can re-sprout in response to low-severity fires.

Contact information for local county Weed District Coordinators can be found on the [Montana Weed Control Association Contacts Webpage](#).

Contact information for Aquatic Invasive Species personnel:

[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 \(UC3\)](#)



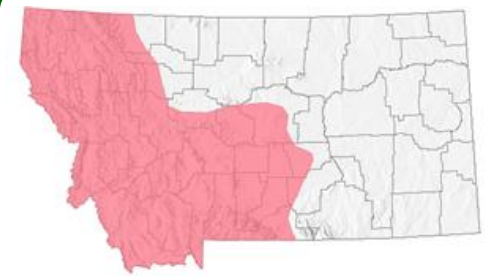
## Tall Buttercup

*Ranunculus acris*

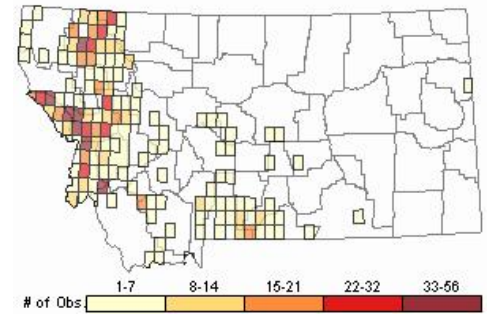
[View in Field Guide](#)


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

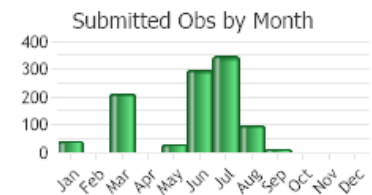
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



**# Observations: 1201**



### General Description

**PLANTS:** Perennial forbs with hirsute (straight, stiff hairs) foliage and erect stems 25–80 cm tall. Plants are rhizomatous. Source: Lesica et al. 2012

**LEAVES:** 40-50 basal leaves have long petioles, up to 20 cm, that each terminate into a single leaf blade. Basal leaf blades are 3-6 cm long and pentagonal (5-sided) in shape that are mostly deeply divided into about 3 palmate lobes that again deeply divided into 2-3 acute segments. Stem leaves resemble basal leaves, but alternately arranged and become smaller and sessile upwards. The upper stem leaves become reduced to 3- to 5-lobed bracts. Source: FNA 1997; Lesica et al. 2012; Jacobs et al. 2015.

**INFLORESCENCE:** Yellow flowers are arranged in diffuse, open cymes. The 5 sepals are symmetrical, greenish, bend downwards, and have soft, spreading hairs. The 5 petals are symmetrical, 8–10 mm long (twice as long as the sepals), buttercup yellow, and shiny. Source: FNA 1997; Lesica et al. 2012; Jacobs et al. 2015.

The genus *Ranunculus* comes from the latin words *rana* for frog and *unculus* for little, and is in allusion to the wet habitats in which some species grow (FNA 1997).

### Phenology

May through September (FNA 1997).

### Diagnostic Characteristics

***Ranunculus*** and ***Potentilla*** can be look-alikes because some species exhibit symmetrical flowers composed of 5 green sepals and 5 bright yellow petals that surround many ovate achenes (fruits).

***Ranunculus*** species are in Family Ranunculaceae. Flowers exhibit shiny yellow petals, sepals that are separated to their base, and lack bracts between the sepals. In generalizing and looking from a distance, plants don't appear hairy and seem rather darker green and glossier. Achenes are beaked.

***Potentilla*** species are in the Family Rosaceae. Yellow-flowered forbs tend to have matted yellow petals, sepals united at their base and at least partially united to the ovary (forming a hypanthium), and often have bracts between the sepals. In generalizing and looking from a distance, plants often appear hairy and lighter or dull green. Achenes are not beaked.

**Tall Buttercup** - *Ranunculus acris*, exotic and Noxious:

- \* Basal leaf blades pentagonal (5-sided) in shape that are mostly deeply divided into about 3 palmate lobes that again deeply divided into 2-3 acute segments. Ultimate leaf segments are more numerous.
- \* Beak of the achene is about 0.5 mm long.
- \* Sepals spread outwards.
- \* Collectively the fruits are globose in side-view.

**Sharpleaf Buttercup** - *Ranunculus acriformis*, native and desirable:

- \* Basal leaf blades are broadly ovate to cordate in outline, deeply 3-divided (ternate). Sepals reflexed. Ultimate leaf segments are less numerous.
- \* Beak of the achene is about 1mm long and more compressed.
- \* Collectively the fruits are hemispheric in side-view.

## Habitat

---

In its native range, Tall Buttercup is common in damp meadows and pastures on calcareous or neutral soils (Jacobs et al. 2015). On the British Isles it grows on rock ledges, gullies, and occasionally on mountain top detritus (Jacobs et al. 2015). In the Netherlands it grows in floodplains along rivers, preferring areas with about 30 days of flooding per year (Jacobs et al. 2015).

In Montana, Tall Buttercup predominately grows in moist meadows and pastures, especially irrigated hay fields (Lesica et al. 2012; Jacobs et al. 2015). It is less abundant in wildland habitats (Lesica et al. 2012). It also grows along roads, along ditches and natural waterways, and in borrow pits and parking lots (Jacobs et al. 2015). It occurs in valleys and occasionally at higher elevations (Lesica et al. 2012).

## Management

---

Tall Buttercup is predominately a weed problem in hay meadows and pastures. Successful management of Tall Buttercup requires that land-use objectives and a desired plant community be identified (Sheley and Petroff 1999). Once identified then an integrated weed management strategy that promotes a weed-resistant plant community and serves other land-use objectives such as livestock forage, wildlife habitat, or recreation can be developed, making control of Tall Buttercup possible (Sheley and Petroff 1999).

### PREVENTION

- \* Prevent vehicles from driving through and animals from grazing within infested areas,
- \* Thoroughly wash the undercarriage of vehicles and wheels in a designated area before moving to an uninfested area,
- \* Encourage landowners to monitor their land for new infestations and, when found to implement effective control methods.
- \* Maintain proper livestock grazing management that maintains desirable, competitive vegetation.
- \* Develop educational campaigns to teach people to not pick and transport the buttercup flowers.

### PHYSICAL and CULTURAL CONTROLS [Adapted from Jacobs et al. 2015]

Hand-pulling that extracts all the rootstock can be effective to temporarily reduce small infestations and scattered plants. It works best to eliminate new plants or those persisting after herbicide treatments. Rhizomes that remain in the soil will regenerate and follow-up hand-pulling or other controls will be needed. Pull new plants from rhizomes or the seed bank will reduce seed production.

Mowing can aid in reducing flowering/seed production if timed correctly with a frequency that promotes desirable plants to grow. Plants that are mowed will re-grow. Mowing that maintains an open site with little plant diversity will encourage Tall Buttercup to flourish.

Tilling is not recommended unless it is combined with an Integrated Weed Management plan. The disturbance caused by tilling allows rhizomes to re-sprout, seeds to germinate, and reduces plant competition, all of which favors colonization by Tall Buttercup.

Irrigation can promote Tall Buttercup because it prefers moist conditions and can tolerate flooding. However, an Integrated Weed Management plan that carefully manages irrigation with other control practices can be effective at reducing or eliminating Tall Buttercup. In irrigated and sub-irrigated pastures and hayland, properly timed irrigation can increase competitiveness from appropriate forage crops when also timed appropriately with fertilization and grazing and/or harvest practices.

Nutrient management with a judicious use of herbicides and crop rotation is recommended where Tall Buttercup invades non-native pastures and hay meadows. Applications of nitrogen, phosphorus, and potassium may reduce the abundance of Tall Buttercup where the growth of grasses can over-top and shade it. However, in disturbed

settings fertilizers may have little effect on Tall Buttercup perhaps because high-light and/or low competition remains.

Prescribed burning is not commonly used in the moist habitats where Tall Buttercup grows. Fire can re-generate rhizomes and germinate seeds. However, fire is often used to retain vigor and density in grasslands because it reduces plant litter and releases nitrogen. Fire used in combination with other control methods might be appropriate to reduce Tall Buttercup populations.

#### **GRAZING CONTROLS** [Adapted from Jacobs et al. 2015]

Tall Buttercup contains glycoside ranunculin which if ingested by livestock can potentially be fatal. Livestock typically avoid Tall Buttercup. The palatability of Tall Buttercup to sheep or goats is unknown.

Several studies from Finland, Iceland, and Great Britain suggest that Tall Buttercup increases with grazing. In these studies, litter removal, exposure of bare ground, and suppression of competitive grasses were thought to facilitate the increase of Tall Buttercup. However, a prescribed grazing management plan that uses livestock to promote the competitiveness of desirable forage plants will prevent Tall Buttercup invasion or re-invasion after weed control. In sites with Tall Buttercup spring grazing is not recommended because it will likely remove desirable plants, limiting their growth and ability to shade it out. In addition, Tall Buttercup exhibits its most leafy stage in the spring.

#### **CHEMICAL CONTROLS** [Adapted from Jacobs et al. 2015]

The herbicide type and concentration, application time and method, environmental constraints, land use practices, local regulations, and other factors will determine its effectiveness and impact to non-target species. Strict adherence to application requirements defined on the herbicide label will reduce risks to human and environmental health. Consult your County Extension Agent and/or Weed District for information on herbicidal control. Consult your County Extension Agent and/or Weed District for more information on herbicidal control. Chemical information is also available at [Greenbook](#).

Aminopyralid and dicamba herbicides have been used to control Tall Buttercup. The leafy phase prior to flowering stem development (late spring) is the optimal time to apply herbicides.

In New Zealand plants have become resistant to the phenoxy herbicide MPCA. To avoid the development of herbicidal resistant populations, integrate herbicidal control with other practices and use herbicides with different modes of action.

#### **BIOLOGICAL CONTROLS** [Adapted from Jacobs et al. 2015]

Currently no biological control agents are available.

Montana's Tall Buttercup Task Force is led by Margie Edsall who can be contacted at: (406) 842-5595 or [medsall@madisoncountymt.gov](mailto:medsall@madisoncountymt.gov)

#### **Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



## Salt Cedar

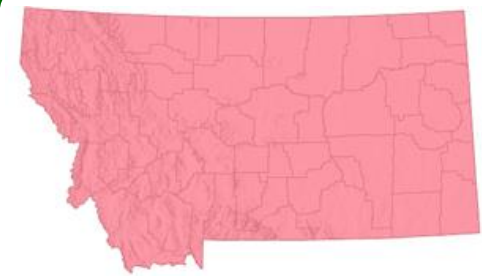
*Tamarix ramosissima*

[View in Field Guide](#)

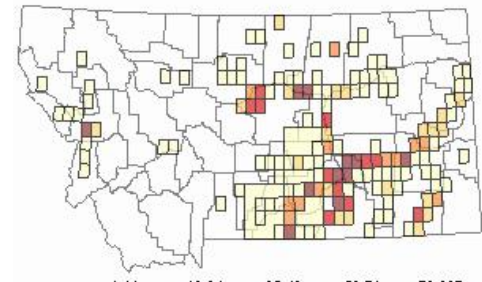


**Noxious Weed: Priority 2B**  
**Non-native Species**  
**Global Rank: GNR**  
**State Rank: SNA**

**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**

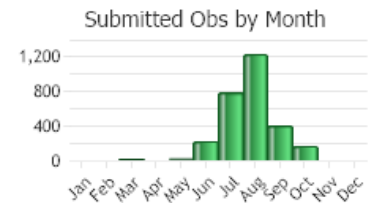


Range **Non-native**



# of Obs 1-11 12-24 25-49 50-71 72-337

# Observations: 3281



### General Description

**PLANTS:** Deciduous large shrubs from 1-5 meters tall. Numerous slender stems arise from a branched caudex. Bark is thin, reddish-brown, but with age becomes furrowed and ridged. Source: Lesica et al. 2012; Jacobs and Sing 2012.

**LEAVES:** Leaves are arranged alternately. Leaves resemble cedar because they are small, 1-2mm, scale-like, and clasping the branches; however, unlike cedar leaves are deciduous. Leaves are succulent and broadly lanceolate. On the underside of leaves are salt-secreting glands. Source: Lesica et al. 2012; Jacobs and Sing 2012.

**INFLORESCENCE:** Small pink (occasionally white) flowers are arranged in narrow, drooping clusters (spike-like, bracteate racemes) of 15-40 mm long. Flowers are perfect, regular, hypogenous. The 5 sepals are separate, and 1 mm or less long. The 5 pink petals are separate, ovate, about 2 mm long. Flower have 5 stamens and 3-4 stigmas. Source: Lesica et al. 2012; Jacobs and Sing 2012.

Tamarisk is from the Arabic *tamr* which refers to a tree with dark bark (Gaskin in FNA 2015). *Tamarix* is derived from the Tambre River which in ancient times was referred to as Tamaris River in Spain (Jacobs and Sing 2012).

### Phenology

Flowers from spring through September, sometimes October (Jacobs and Sing 2012).

### Diagnostic Characteristics

5-Stamen Tamarisk (*Tamarix chinensis*) and Salt Cedar (*Tamarix ramosissima*) are genetically distinct species that do not naturally overlap in native geographical ranges. 5-Stamen Tamarisk occurs from western China to Japan which is east of central China. Salt Cedar occurs from Turkey to Japan, which is west of central China. In North America where both species have been introduced, hybrids have been found (Gaskin in FNA 2015). Hybrids occur in Montana as well. Montana's plants best fit *Tamarix ramosissima* (Lesica et al. 2012). Hybridized specimens as well as sterile collections of Salt Cedar have led to many misidentifications (Gaskin in FNA 2015). Directions for how to dissect flowers and find the nectar disc and other characteristics is described by Gaskin in FNA 2015.

**Salt Cedar** - *Tamarix ramosissima*, exotic and noxious:

- \* Wispy shrubby growth form that often grows in riparian areas.
- \* Deciduous leaves that are very small, grey-green, and are appressed to twigs.
- \* Short racemes of tiny pink flowers that can cover the shrub for most of the growing season.

- \* Margins of sepals are denticulate.
- \* Stamen filaments originate from the edge of the nectar disc.
- \* Montana herbarium specimens at time of publication appear to better represent Salt Cedar (Lesica et al. 2012).
- \* It will rarely hybridize with Athel Tamarisk > (*Tamarix aphylla*) (Gaskin in FNA 2015).

**5-Stamen Tamarisk** - *Tamarix chinensis*, exotic and noxious:

- \* Wispy shrubby growth form that often grows in riparian areas.
- \* Deciduous leaves that are very small, grey-green, and appressed to twigs.
- \* Short racemes of tiny pink flowers that can cover the shrub for most of the growing season.
- \* Margins of sepals entire.
- \* Some or all filaments originate from below the nectar disc.
- \* Reported to occur in Montana by Gaskin in FNA 2015; however, University of Montana and Montana State herbarium specimens appear to better resemble Salt Cedar (Lesica et al. 2012).
- \* It will rarely hybridize with Athel Tamarisk (*Tamarix aphylla*).

**Rocky Mountain Juniper** - *Juniperus scopulorum*, native:

- \* An evergreen shrub or small tree that can grow in some riparian areas and in upland habitats.
- \* Leaves are small, dark green, and appressed to twigs. First year needles are short and needle-like.
- \* Plants are a true conifer with separate male and female plants. Male plants produce ephemeral cones and female plants produce glaucous-blue berries.

**Western Redcedar** - *Thuja plicata*, native and desirable:

- \* An evergreen large tree that grow in some riparian areas and other moist habitats.
- \* Leaves are small, dark green, glossy, and appressed to twigs. Twigs are flattened and drooping.
- \* Plants are a true conifer that bear female and male cones.

**Cedar**, exotic and cultivated:

- \* An evergreen shrub and true conifer (cultivated) planted as row hedges and in yards.

## Habitat

---

Salt Cedar grows along streams, stream terraces, saline meadows along waterways, lakes, irrigation ditches, and reservoirs in the plains zone of Montana (Lesica et al. 2012). It grows well in areas that exhibit repeated cycles of inundation and drawdown, particularly where there is disturbance, depressional wetlands, or stock ponds, and where prolonged inundation is absent (Lesica and Miles 2004).

## Management

---

An integrated vegetative management approach provides the best long-term control, and requires that land-use objectives and a desired plant community be identified (Shelly et al. in Sheley and Petroff 1999). Once identified an integrated weed management strategy that promotes a weed-resistant plant community and serves other land-use objectives such as livestock forage, wildlife habitat, or recreation can be developed.

- \* Where willows and cottonwood grow, beavers might need to be controlled in order to allow native shrubs to mature and provide the shade that will reduce Salt Cedar from establishing (Lesica and Miles 2004).
- \* Areas that exhibit repeated cycles of inundation and drawdown will be susceptible to Salt Cedar invasion, particularly where there is disturbance, depressional wetlands, or stock ponds and where prolonged inundation is absent (Lesica and Miles 2004).
- \* Management can curtail Salt Cedar by promoting actions that favor native cottonwoods and willows, such as reducing livestock damage and maintaining flood flows that are timed with cottonwood seed dispersal (Lesica and Mills 2001).

**PREVENTION** [Adapted from Jacobs and Sing 2012]

In riparian areas that are not infested with Salt Cedar, surveys should be conducted every 3 years in order to detect new populations. In riparian areas within 25 miles of known populations, intensive surveys should be conducted to detect new populations and prevent establishment. Implement control(s) to eradicate new populations.

Other ways to prevent or reduce spread includes:

- \* Learn how to accurately identify Common St. John's-wort in order to detect occurrences and know where to implement control methods.
- \* Prevent vehicles from driving through and animals from grazing within infested areas.

- \* Thoroughly wash the undercarriage of vehicles and wheels in a designated area before moving to uninfested areas.
- \* Frequently monitor for new plants, and when found implement effective control methods.
- \* Maintain proper grazing management that creates resilience to noxious weed invasion.
- \* Do not pick the flowers or transport plants. Where possible, contribute to or develop educational campaigns to help eradicate or reduce Common St. John's-wort populations.

#### **PHYSICAL and CULTURAL CONTROLS** [Adapted from Jacobs and Sing 2012]

Hand-pulling is not usually effective because a huge number of seedlings germinate when conditions are good. Most seedlings won't survive. Those that become established are too difficult to hand-pull.

Mowing, Chaining, Cutting, Prescribed Burning and Tilling are not effective because these stimulate re-sprouting and require follow-up treatments.

Controlled flooding for greater than 3 months at reservoirs and stock ponds may reduce Salt Cedar populations, as well as native trees and shrubs. After flooding re-vegetation may be necessary.

Natural flooding cycles on free-flowing streams is believed to control Salt Cedar establishment. It can scour seedlings, deposits of salt, and accumulations of leaf litter. Manipulating water releases from dams that mimics natural flows may favor establishment of native woody riparian vegetation and select against Salt Cedar. Salt Cedar seedlings of up to 5 weeks old are more susceptible to summer flooding than are established plants. Prolonged flooding of 3 or more months can kill Salt Cedar (Lesica and Miles 2004).

Re-vegetation that uses native plants adapted to the particular site conditions creates shade that will negatively impact Salt Cedar. Guidance on seeding and planting techniques can be found in the Riparian Forest Buffer (Code 391) and Riparian Herbaceous Cover (Code 390) practice standards and specifications.

#### **BIOLOGICAL CONTROL** [Adapted from Jacobs and Sing 2012]

Biological control has been restricted due to the perceived threat posed to the federally threatened Southwestern sub-species of the Willow Flycatcher (*Empidonax traillii*).

The Northern Tamarisk Beetle (*Diorhabda carinulata*) which originates from northwestern China and eastern Kazakhstan has been released in Montana. The adult and larval stages feed mostly on young leaves and less on mature leaves. They can occasionally feed on the epidermis of twigs and first-year shoots which can cause the tip and of the twig to dry-up and fall off. In Montana the beetles have not been successful possibly due to predation or environment factors of spring drought or spring flooding.

#### **CHEMICAL CONTROL** [Adapted from Jacobs and Sing 2012]

Herbicides can be effective, especially when properly integrated with intensive pasture management. The herbicide type and concentration, application time and method, environmental constraints, land use practices, local regulations, and other factors will determine its effectiveness and impact to non-target species. Strict adherence to application requirements defined on the herbicide label will reduce risks to human and environmental health. Consult your County Extension Agent and/or Weed District for information on herbicidal control. Chemical information is also available at Greenbook.

Basal Bark Treatment: For scattered shrubs, a single low volume basal bark treatment using a 30% solution of triclopyr mixed with a commercially available basal bark oil, number 1 or 2 diesel fuel, or kerosene is high effective and practical. The circumference of all stems from the basal root crown upwards to 18 inches should be sprayed until thoroughly wet but not dripping. The treatment can be used except when the ground is frozen or flooded. It will take 1-2 years for the herbicide to move through the plant, particularly its roots, and kill it. This chemical can be used along non-irrigation ditch banks, seasonally dry wetlands, and transitional areas between wetlands and uplands where surface water is not present.

Cut Stump Treatment: In areas where stems can be cut, triclopyr or glyphosate can be applied directly to the cut stump. It must be applied within 1 hour to prevent the plant from sprouting. The herbicide can be applied to wet the wood and surrounding cambium. The treatment can be used except when the ground is frozen or flooded. Stems that are removed should be burned in order to make sure they don't re-sprout.

Foliar Treatment: Where stands are dense, imazapyr (2 quarts per acre) or imazapyr plus glyphosate (1 quart per acre each) are the most effective for spraying Salt Cedar foliage. Applications in late summer or early fall (August to September) are most effective. Spot treatments can be followed by a 1 percent solution of imazapyr with a surfactant.

#### **GRAZING CONTROL** [Adapted from Jacobs and Sing 2012]

Salt Cedar is nutritionally poor for cattle, sheep, and goats; however, they will eat it. Livestock tend to select native species over Salt Cedar, which then favors the establishment of Salt Cedar. When Salt Cedar is eaten, cattle graze on young sprouts in the early spring. Confining domesticated animals to graze Salt Cedar can work to remove above ground foliage, but will encourage sprouting. Boer Goats have been used to intensively graze Salt Cedar. Intensive grazing following by a chemical application will improve the effectiveness of the herbicide.

In areas where cottonwood and willows grow, livestock management should encourage the regeneration and growth of these native woody species because their shade will later discourage Salt Cedar (Lesica and Miles 2004).

Montana's Salt Cedar Task Force is led by Rachel Frost who can be contacted at: (406) 454-0056 or [mrcdc@macdnet.org](mailto:mrcdc@macdnet.org)

**Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



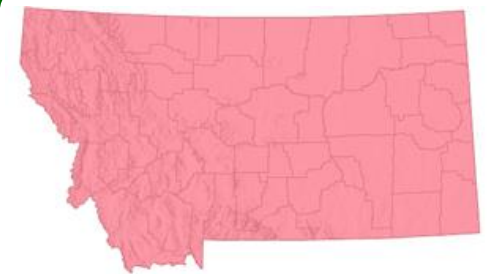
## Dalmatian Toadflax

*Linaria dalmatica*

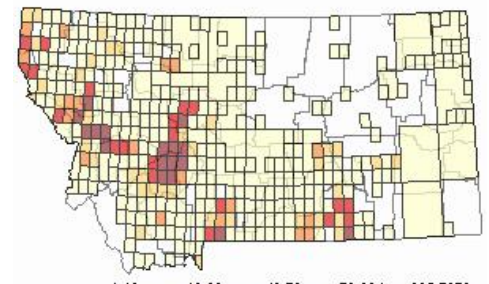
[View in Field Guide](#)


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

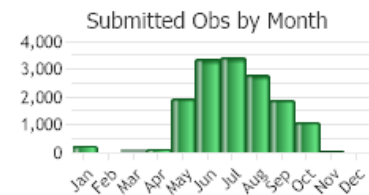
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



# Observations: 19981



### General Description

**PLANTS:** Short-lived perennial forbs that are rhizomatous from a caudex. Stems are erect, branched, and 40–80 cm tall. Plants are glabrous (no hairs), succulent, and waxy with a bluish to whitish cast. Sources: Lajeunesse *in* Sheley and Petroff 1999; Lesica et al. 2012.

**LEAVES:** Alternate on the stem. Blades are ovate, acute tipped, 2–5 cm long, sessile, and clasping around the stem.

**INFLORESCENCE:** A terminal bracteate raceme. Bright yellow flowers with orange centers and yellow spurs are snapdragon shaped and grow from the upper leaf nodes (leaf base).

Dalmatian Toadflax was named for the district of Dalmatia to where it is native in Eurasia (Alex 1959).

### Phenology

Flowers develop in June through July with seed dispersal beginning in early July. Plant can continue to flower until winter arrives. Germination can occur in the fall, but primarily occurs the following April to May. Source: (Lajeunesse *in* Sheley and Petroff 1999).

### Diagnostic Characteristics

Montana's two exotic Toadflax are both rhizomatous with similar snapdragon type flowers, but are easily separated by their leaves. Hybrids between the species can be produced in the lab, but are not known to occur under natural conditions (Lajeunesse *in* Sheley and Petroff 1999).

***Linaria dalmatica*** leaves are ovate, less than 8 times as long as wide, and clasp around the stem.

***Linaria vulgaris*** leaves are linear, more than 8 times as long as wide, and do not clasp the stem.

**Narrow-leaf Dalmatian Toadflax** or **Brown-leaved Toadflax** (*Linaria genistifolia* (L.) Mill.) is considered a subspecies of Broad-leaved Dalmatian Toadflax (*Linaria dalmatica* (L.) Mill.). Narrow-leaved Dalmatian Toadflax was separated based on smaller flowers (1.5-2 cm long), on average narrower leaves, 1.5-4.5 cm by 2-10(12) mm, and leaves that do not strongly clasp the stem.

### Habitat

Fields, roadsides, grasslands, often in stony soil; plains, valleys (Lesica et al. 2012).

## Management

---

Successful control requires the use of several management strategies because of the plants genetic variability. Seedlings and first-year rosette plants are vulnerable stages that managers should take advantage of to control Dalmatian Toadflax. Strategies to prevent young plants from producing flowers (hence seed production) will be effective to prevent spread or infestations. Once infestations are established, control will be labor-intensive, costly, and difficult.

### **PREVENTION** [Adapted from Lajeunesse *in* Sheley and Petroff 1999]

New infestations originate from seeds and vegetative buds on roots. Farm operations and equipment, vehicles, recreational activities, and other human actions can transport seeds. Check and clean all equipment before moving from an infested to an uninfested area. Use fill material that is weed-free, particularly in uninfested areas. When moving sheep or cattle from infested to uninfested areas, hold them in corrals/pastures for 11 or 6 days respectively, to allow time for viable seeds to pass through their digestive tracts. Monitor and control Toadflax in the holding areas. Purchase weed-free seed or hay.

### **CHEMICAL CONTROL** [Adapted from Lajeunesse *in* Sheley and Petroff 1999]

Dalmatian Toadflax is difficult to control with herbicides due to its high genetic variability, waxy leaf surface, soil type, and biology. Herbicides must be applied using a surfactant because leaves have a waxy surface (cuticle) which acts as a protective barrier, hindering uptake. Herbicides are more likely to leach when applied to plants growing in sandy soils or soils low in organic matter, which could result in indirect negative impacts. Even where herbicides appear effective, long-term control may not be achieved and reinvasion from dormant seeds may occur. Where herbicides are effective, infestations should be treated every 3-4 years for at least 12 years in order to eradicate the plant. Through time sites may require higher rates of herbicide.

In studies Picloram ranges from not effective to effective and it depends upon the site. Fall applications appear more effective than spring applications. Fall applications should be timed with 1-3 inches of fall-regrowth which indicates plants roots are storing energy for the winter. Fall applications of 0.5 or 1.0 pound (lb) active ingredient per acre (ai/ac) for up to 2 or 3 years, respectively, have given up to 98% control on some sites. At the higher rate Picloram will kill many broadleaf plants, which may be desirable at the site. Under dry conditions, Picloram is not moved into the soil and can be reduced from exposure to the sunlight within 3-4 weeks.

In a study Dicamba applied prior to blooming at the rate of 4 lbs ai/ac provided excellent control for 1 year. In a study, Picloram (0.5 lb ai/ac) and 2,4-D (1 lb ai/ac) mixed in a tank and applied prior to blooming provided 90-100% control (see Sebastian and Beck 1989; Sebastian et al. 1990). In a study, a tank mixture of 2,4-D, Triclopyr, and 2,4-D Amine was ineffective when applied prior to blooming. Ferrell and Whitson (1989) found Triclopyr and Fluroxypyr to be ineffective whether used in combination or alone.

### **MECHANICAL and PHYSICAL CONTROL** [Adapted from Lajeunesse *in* Sheley and Petroff 1999]

Hand-pulling can be effective for small infestations, particularly when soil is moist or where sandy. To delete the root reserves, pulling annually for 5-6 years and removing the lateral roots is necessary. To remove first-year seedlings, a site needs to be re-visited annually for 10-15 years.

Mowing is often not practical on most sites and is not very effective since a lot of growth occurs by rhizomes.

Cultivation: Sweep-type cultivators used from at least early June and repeated every 7-10 days can control Toadflax. To eradicate, 4-5 cultivations are required in the second year. However, inconsistent tillage can spread plants. Machinery should be thoroughly cleaned to prevent spreading root fragments.

Burning can remove standing biomass of Toadflax, but will also stimulate seed germination and root sprouting. Therefore, burning is not a recommended control method.

### **REVEGETATION** [Adapted from Lajeunesse *in* Sheley and Petroff 1999]

Management practices, seeding, and plantings that encourage growth of desirable plants and those well-adapted to the environment will increase competition against Dalmatian Toadflax seedlings and rosettes. Revegetation or seeding should use several species that root at shallow, intermediate, and deep depths (least as deeply as Dalmatian Toadflax) in order to maximize competition for water, nutrients, and space. The mixture of species should provide active growth for as much of the year as possible, and include winter and summer annuals and shallow-rooted perennials. Desirable winter and summer annuals might compete well against Dalmatian Toadflax seedlings.

### **GRAZING MANAGEMENT** [Adapted from Lajeunesse *in* Sheley and Petroff 1999]

Cattle usually avoid Dalmatian and Yellow Toadflax, though casual browsing has been observed along with reports of mild poisoning. Sheep can consume Dalmatian Toadflax as a major food source and not show signs of poisoning.

The timing of grazing is important in developing and maintaining competitive, desirable plant communities. Overgrazing sites encourages Dalmatian Toadflax germination and growth. This is particularly true in the spring because seedlings can capture available soil moisture and other resources better than overgrazed plants.

Preliminary results from several Montana studies indicated that sheep can suppress stands of Dalmatian Toadflax and limit seed production. The studies placed 1,000 ewes and lambs on a hilly rangeland where Dalmatian toad occupied 25-100% of existing plant coverage. Approximately 35-45% of the Toadflax foliage was stripped, and after three weeks they were regularly consuming plants, even when other forage plants were available. The sheep also maintained good weight gain.

When moving livestock from an infested to an uninfested area, hold cattle for 6 days and sheep for 11 days in corrals or small pastures until viable seeds have time to pass through their digestive tract. Monitor these areas for seedling establishment and provide control where seen. Avoid purchasing feed or seed that is contaminated by weeds.

#### **BIOLOGICAL CONTROL** [Adapted from Lajeunesse *in* Sheley and Petroff 1999]

In general, it is recommended that at least 200 insects be established to create a sustainable population. Infestations should be at least 2 acres with sizeable populations. It may take 2-3 years for the insect population to establish.

As of 1998 6 insects have been approved and released in the U.S. and Canada for use on both Dalmatian and Yellow Toadflaxes. In Montana, *Brachyterolus pulicarius*, *Gymnaetron antirrhini*, *Mecinus janthinus*, and *Mecinus janthiniformis* are actively released for Dalmatian Toadflax. All have been effective, particularly *Mecinus janthinus* and *Mecinus janthiniformis*.

**Toadflax Flower Beetle** (*Brachyterolus pulicarius*) is thought to have been accidentally introduced, and now occurs throughout North America. Adult beetles feed primarily on growing shoot tips and axillary buds, but can also feed on pollen, anthers, and ovaries. Larvae feed entirely on pollen, anthers, ovaries, and immature seeds.

**Toadflax Seedhead Weevils** (*Gymnaetron antirrhini* and *Rhinusa neta*) are thought to be accidentally introduced to North America. *Gymnaetron antirrhini* is more widely distributed. They impact seeds by stimulating the development of a gall, and their larvae feed on both deformed and normal seeds. *Rhinusa neta* larvae also feed on seeds, but without the development of a gall.

The timing of maturity between *Brachyterolus pulicarius* and *Rhinusa* species can result in an interaction where *B. pulicarius* larvae predate upon the eggs of *Rhinusa* species.

**Toadflax Brocade Moth** *Calophasia lunula* larvae feed on the lower leaves and stems of Yellow Toadflax. Their feeding can exhibit significant mortality to seedlings and young plants. However, pathogens within this insect constrains it from building a large enough population that is needed to significant impact Yellow Toadflax.

**Root-mining Cosmet Moth** *Eteobalea intermediella* has showed great promise for controlling Yellow Toadflax in studies, but for unexplained reasons this insect has not established well in North America.

**Toadflax Stem-boring Weevil** *Mecinus janthinus* was originally collected from Yellow Toadflax in its native range. While this biocontrol insect has impacted Dalmatian Toadflax populations very well, it has not affected Yellow Toadflax in western North America, and researchers do not know why. Researchers are now evaluating *M. heydeni* for targeting Yellow Toadflax.

**Dalmatian Toadflax Stem-boring Weevil** *Mecinus janthiniformis* is effective.

#### **Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



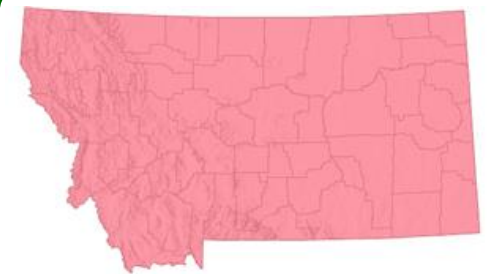
## Russian Knapweed

*Acroptilon repens*

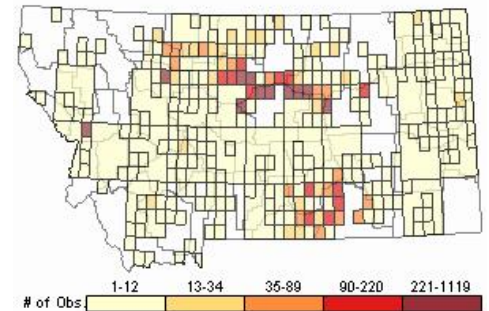
[View in Field Guide](#)


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

**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



**# Observations: 8502**



### General Description

**PLANTS:** Rhizomatous perennials that grow in terrestrial habitats (FNA 2006; Lesica et al. 2012). Stems are erect, branched, and grow about 23-100 cm tall. Plants are somewhat cobwebby-tomentose and resin-gland-dotted.

**LEAVES:** Leaves of the rosette (basal) and lower stem are often absent by maturity (FNA 2006; Lesica et al. 2012). Stem leaves are oblong, 3-10(15) cm long, becoming sessile and smaller upwards. Leaf margins are entire to pinnately lobed.

**INFLORESCENCE:** Paniculiform or corymbiform. Flower heads are solitary on the ends of leafy branches (Jacobs 2007b). Involucres are broadly ovoid, 9–13 mm high, and somewhat cobwebby (FNA 2006; Lesica et al. 2012). Involucral bracts (phyllaries) are broadly ovate, green or tan below, scarious above, and sharp-pointed. The receptacle is flat with fine scales.

### Phenology

Flowering May to September (FNA 2006).

### Diagnostic Characteristics

Until more recently the American literature has placed Russian knapweed within the genus *Centaurea*. Molecular phylogenetic studies of the relationships of *Cynareae* genera support the separation of *Acroptilon* from *Centaurea* (Susanna et al. 1995; FNA 2006). *Acroptilon* is also morphologically distinct in that attachment scars on the cypselae occur near the base as opposed to the sides and flower heads lack sterile outer florets (FNA 2006). In addition, *Centaurea* species have a dense bristly receptacle while *Acroptilon* species have a receptacle that is naked, with fine scales, or pubescent (Lesica et al. 2012).

### Habitat

Grasslands, roadsides, meadows, fields, and most often on stream terraces; plains, valleys (Lesica et al. 2012). It invades open, disturbed land, particularly where dry (Sheley and Petroff 1999).

### Management

Successful management of Russian knapweed targets its extensive root system because it poorly reproduces by seed (Jacobs and Denny 2007). Developing land-use objectives, a desired plant community, and an integrated

weed management strategy will make control of Russian knapweed possible (Sheley and Petroff 1999).

**BIOCONTROL** [Adapted from Jacobs and Denny 2007]

Biological control has been limited and is not effective since Russian knapweed poorly develops and disperses by seed. The Russian Knapweed Stem-gall Nematode (*Subanguina picridis*) has been introduced and established with limited success.

**CHEMICAL CONTROL** [Adapted from Jacobs and Denny 2007]

Herbicides are effective when properly managed with other tactics. Herbicides that translocate the chemical directly to the roots will be most cost-effective. Surfactants improve the uptake of each chemical listed below. The herbicide type and concentration, timing of chemical control, soil properties, and other factors will determine its effectiveness and impact to non-target species. Strict adherence to application requirements defined on the herbicide label will reduce risks to human and environmental health. Many herbicides must be applied by applicators with an Aquatic Pest Control license. Consult your County Extension Agent and/or Weed District for more information on herbicidal control.

Picloram (0.50 pound per acre) applied to the bloom stage has been shown to provide long-term suppression in Montana.

Aminopyralid, clopyralid, and imazapic have also suppressed Russian knapweed when applied during the stages from flower bud to mid-flowering or during fall re-growth; and could be used where Picloram cannot. In Fergus County, clopyralid plus 2,4,-D applied to the bloom stage reduced the density of plants. Further, it accompanied an increase in perennial grasses.

Chlorsulfuron applied in the bloom to post-bloom stage may provide short-term control.

**CULTURAL and GRAZING CONTROLS** [Adapted from Jacobs and Denny 2007]

Hand-pulling is not a practical control method because of its deep, rhizomatous growth.

Mowing is not very effective at reducing plant density. It may suppress growth initially, but later stimulates regeneration. It might be useful in combination with a herbicide treatment.

Burning can reduce plant biomass, but is not effective at preventing growth, germination, or flowering.

Grazing. There is little information available. Horses that have grazed Russian knapweed for an extended period developed equine chewing disease (*Nigropallidal encephalomalacia*) which is a fatal neurodegenerative disorder (Jacobs and Denny 2007). Russian Knapweed plants have proteins levels similar to alfalfa hay but are too bitter for livestock to eat (Sheley and Petroff 1999).

Revegetation. Grasses used for long-term control must have the following characteristics: a) adapted to the soil and climate, b) easy to establish, c) competitive with weeds, d) palatable and nutritive, particularly for late-season use, e) dry matter productivity, and f) stand longevity (Sheley and Petroff 1999). Although Russian knapweed is allelopathic, control through plant competition should be exploited (Sheley and Petroff 1999). Studies have found that monocultures of Winter Rye (*Secale cereal*) or Wheat (*Triticum aestivum*) reduced Russian Knapweed (Sheley and Petroff 1999). Other research found that Russian Knapweed and Smooth Brome (*Bromus inermis*) competed for limited resources while Russian Knapweed and Western Wheatgrass (*Elymus smithii*) did not compete (Sheley and Petroff 1999).

**Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



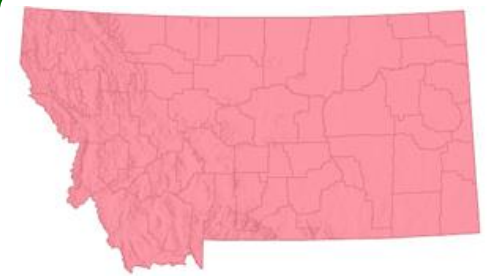
## Spotted Knapweed

*Centaurea stoebe*

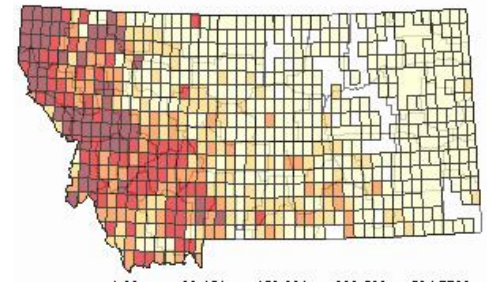
[View in Field Guide](#)


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

**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**

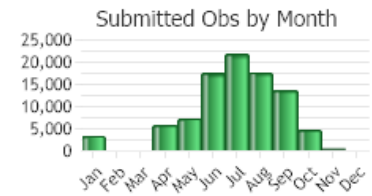


Range **Non-native**



# of Obs: 1-68 69-151 152-261 262-523 524-7793

# **Observations:** 144060



### General Description

**PLANTS:** Taprooted, rosette-forming perennials that grow in terrestrial habitats (Parkinson et al. 2011). Stems are erect, branched, and grow up to 100 cm tall (Lesica 2012). Plants are sparsely gray tomentose and resin-gland-dotted (FNA 2006).

**LEAVES:** Leaves of the rosette (basal) and lower stem are long-petiolate (Lesica 2012). Leaf blades are ovate, 3–12 cm long, and deeply pinnate (1 to 2 times divided) into linear-ob lanceolate lobes.

**INFLORESCENCE:** Corymbiform with several heads of purplish flowers that occur on the ends of leafy branches (Lesica 2012, Sheley and Petroff 2009). Involucres are ovoid and 8–13 mm high. Involucral bracts (phyllaries) are spine-tipped. Bracts are also marked with fine vertical streaks and tipped with a dark comb-like fringe (Parkinson et al. 2011). Inner bracts are lanceolate with swollen tips (Lesica 2012).

Plants in North America are subspecies *micranthos* (FNA 2006).

### Phenology

Flowering June to September, or into October.

### Diagnostic Characteristics

The Montana Natural Heritage Botany Program follows the *Centaurea* treatment by Keil and Ochsmann in FNA Volume 19 (2006). The Manual of Montana Vascular Plants (Lesica et al. 2012) treats this plant as *Centaurea maculosa* Lam.

For over 200 years there has been a lot of confusion in the European literature regarding the nomenclature used for *Centaurea stoebe* (FNA 2006). The names used in this group (*C. stoebe*, *C. rhenana*, *C. maculosa*, *C. biebersteinii*) have been applied to different taxa by different authors using different concepts. This was apparent between western and eastern Europe and was not taken into consideration in the treatment by J. Dostal (1976) (FNA 2006).

Recent studies have shown that the American plants are a tetraploid perennial that is very distinct from the diploid, biennial plants native to central Europe (FNA 2006). *Centaurea stoebe* ssp. *micranthos* being in America while plants in central Europe are known by the names of *C. stoebe* Linnaeus ssp. *stoebe*, *C. rhenana* Boreau, or *C. maculosa* Lamarck. In most American literature the name *Centaurea maculosa* Lamarck was misapplied to *C. stoebe* spp. *micranthos*. Others, such as W.A. Weber (1987, 1990) accepted the name of *Acosta maculosa* based on a treatment of about 100 plants in the *Centaurea* sect. *Acrolophus* Cassini (J. Holub et al. 1972). However,

the genus *Acosta* is not supported by morphologic and molecular characteristics and is not widely accepted in Europe (FNA 2006).

**Spotted Knapweed (*Centaurea stoebe* ssp. *micranthos*)** has unique involucre bracts that have a dark colored tip and fringe that appear as "spots" from a distance.

**Diffuse Knapweed (*Centaurea diffusa*)** also grows a single, branched stem from a similar looking rosette. However, its growth develops a ball-shaped appearance and a tumbleweed mobility (Parkinson et al. 2011). Flowers are usually white or occasionally light purple. The flower bracts may have dark-colored tips but lack the dark fringe found in Spotted Knapweed. Bracts possess a rigid terminal spine (1/4 to 1/3 of an inch long) with 4-5 pairs of shorter, lateral spines (Parkinson et al. 2011).

*Centaurea stoebe* ssp. *micranthos* readily hybridizes with *Centaurea diffusa* (FNA 2006; Parkinson et al. 2011). These fertile hybrids have been named *Centaurea xpsammogena* G. Gayer. Characteristics of the hybrids are variable, except for the cypselae (fruit) which always bears a pappus and the flower heads are always conspicuously radiant (composed of ray florets). Hybrids are often mis-identified as diffuse knapweed and may occur where their parent's ranges overlap or are separate.

**Russian Knapweed (*Acroptilon repens*)** is rhizomatous, whereas, spotted knapweed is taprooted. The involucre bracts are green at the base with papery, translucent tips and are covered with light, thin hairs (Parkinson et al. 2011). The rosette leaves differ in being less dissected and wider (Parkinson et al. 2011).

## Habitat

---

Grasslands, roadsides, meadows, open forest, and woodlands, particularly where land has been disturbed (Lesica et al. 2012; FNA 2006). Plains, valleys, and montane (Lesica et al. 2012).

## Management

---

Successful management of spotted knapweed requires that land-use objectives and a desired plant community be identified (Sheley and Petroff 1999). Once identified then an integrated weed management strategy that promotes a weed-resistant plant community and serves other land-use objectives such as livestock forage, wildlife habitat, or recreation can be developed, making control of spotted knapweed possible (Sheley and Petroff 1999).

### **PREVENTION** [Adapted from Sheley and Petroff 1999]

Spotted knapweed is spread by wind and movement through established stands. Preventing vehicles from driving through and animals from grazing within infested areas will reduce spread. Hay that is weed-free will reduce spread. Maintaining an intact plant community and reducing soil disturbance will prevent or slow down spread.

### **BIOCONTROL** [Adapted from Jacobs 2007]

At least 200 insects are recommended for establishing a sustainable population. Infestations should be at least 2 acres with sizeable populations. It may take 2-3 years for the insect population to establish. Spotted knapweed is best controlled when at least two insects (specializing in seed heads and roots) are used together. Bio-control insects have been shown in MT to reduce spotted knapweed populations, but control is most effective when used in combination with other tactics. Mouse populations have increased in some areas as Knapweed seed head bio-control species have become their new food source.

In the U.S. 8 flower seedhead and 5 root-boring insect species have been approved for release as bio-control on spotted knapweed.

Knapweed Gall Flies (*Urophora affinis*, *U. quadrifasciata*) were released over 20 years ago in Montana and now are well-established in the western U.S. They have been found to reduce seed production by 50%.

Knapweed Seed Head Weevils (*Larinus minutus*, *L. obtusus*) feed on foliage and flowers and are widely distributed and established.

Knapweed Root Boring Weevil (*Cyphocleonus aschates*) is well established and larvae feed on taproots.

Sulphur Knapweed Moth (*Agapeta zoegana*) is established in parts of Montana and prefer hot, dry, open sites where larvae attack roots.

Bronze Knapweed Root Borer (*Sphenoptera jugoslavica*) is well established in parts of Montana and prefer hot, dry, open sites where larvae attack roots.

### **CHEMICAL CONTROL** [Adapted from Sheley and Petroff 1999; Jacobs 2007]

Herbicides are effective, especially when properly managed with other tactics. The herbicide type and concentration, timing of chemical control, soil properties, and other factors will determine its effectiveness and

impact to non-target species. Strict adherence to application requirements defined on the herbicide label will reduce risks to human and environmental health. Many herbicides must be applied by applicators with an Aquatic Pest Control license. Consult your County Extension Agent and/or Weed District for more information on herbicidal control.

Picloram used at 0.25 pound per acre is the standard recommendation and can reduce spotted knapweed populations by 90% on loamy soils with a well-maintained grassland community. It cannot be used in sandy soils, near surface waters, or in areas with a high-water table.

2,4-D is a broadleaf-selective herbicide that works best when used after seeds germinate and before plants develop flowers.

Clopyralid or triclopyr herbicides do not injure non-target forbs.

Aminopyralid is a more recently developed chemical that has a lower application rate and a shorter soil half-life.

#### **PHYSICAL and CULTURAL CONTROLS** [Adapted from Sheley and Petroff 1999; Jacobs 2007]

Hand-pulling that extracts the full taproot is effective, particularly when soil is moist. All plant material should be bagged and desiccated before placing in the trash for disposal. Gloves should be worn to protect skin.

Mowing after plants bolt and before flowering will reduce energy reserves and seed production. Repeated mowing may be necessary. Mowed plants will develop flower heads below the mower blade's height.

Tilling that severs the taproot near, but below the root crown can reduce populations. However, seed germination may increase until the seed bank is gone.

Burning is not effective, and may stimulate growth or germination.

Revegetation that establishes a desirable perennial plant community will compete against Spotted Knapweed for water, nutrients, and light. Proper revegetation of disturbed sites are necessary to reduce knapweed populations.

#### **GRAZING CONTROLS** [Adapted from Sheley and Petroff 1999; Jacobs 2007]

Plants can tolerate defoliation, but severe defoliation will reduce root, crown, and above ground growth. Grazing by cattle is not as effective as by sheep or goat. Cattle prefer grasses over spotted knapweed. Sheep and goats will eat more knapweed, especially when combined with other management tactics. Grazing an area first by cattle and later by sheep, increasing grazing pressures by using electrical fences, or irrigating land followed by repeated sheep grazing are some useful tactics to reduce knapweed. Animals grazing on knapweed should be held for at least 5 days before moving to weed-free areas.

#### **Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)

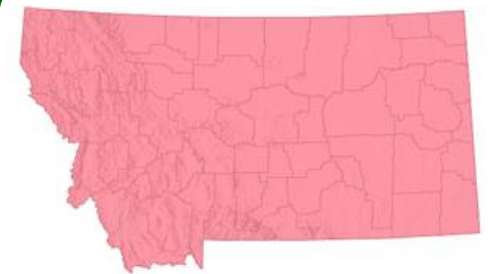


## Whitetop *Lepidium draba*

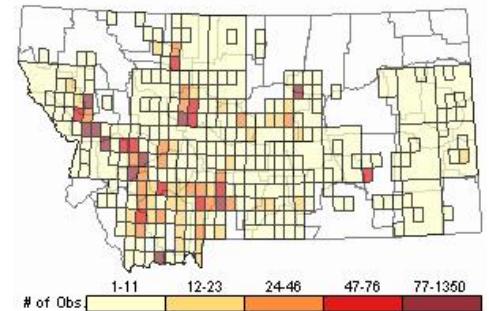
[View in Field Guide](#)


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

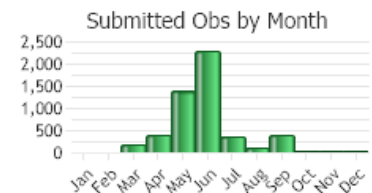
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



**# Observations: 6805**



### General Description

**PLANTS:** Perennial, rhizomatous forbs that grow 20 to 50 cm tall. Stems are single, branching above the ground and at their base grow either erect or decumbent. Sources: FNA 2010; Lesica et al. 2012

**LEAVES:** Basal leaves (rosette) are grayish-green and gradually narrow to a petiole that connects to the root crown. Basal leaves wither early. Stem leaves are alternately arranged, grayish-green, arrowhead-shaped, clasp the stem, and have entire to unevenly toothed margins. Leaf surfaces may be without hairs (glabrous) or with soft white hairs (pubescent). Sources: FNA 2010; Lesica et al. 2012

**INFLORESCENCE:** White flowers are arranged in flat-topped racemes (corymbose). As fruits mature the stem of the raceme may elongate, thus losing its flat-topped appearance. Flowers have 4 white petals of 2.5-4.5 mm long, 4 greenish-white sepals of 1.5-2.5 mm long, stamens 6 (4 long and 2 short), and 1 pistil. Sources: FNA 2010; Lesica et al. 2012

### Phenology

Flowering April to August (FNA 2010).

### Diagnostic Characteristics

Botanists A. Thellung (1906), C.L. Hitchcock (1936), and C. Linnaeus correctly placed *Lepidium draba* into the genus *Lepidium*, which is now supported on phylogenetic and taxonomic grounds (FNA 2010). Further, *Lepidium appelianum*, *Lepidium chalepense*, and *Lepidium campestre* are also correctly placed (FNA 2010). However, the placement of these species into the genus *Cardaria* does not make sense from both phylogenetic and taxonomic grounds (FNA 2010).

There are many white-flowered species in the Mustard Family, both native and exotic. It is recommended that identifications be made using a plant manual designed for Montana. Mustards have flowers with 4 sepals, 4 petals, and 6 stamens (4 long and 2 short) among other characteristics.

**Whitetop** – *Lepidium draba*, exotic and Noxious:

- \* White-flowered plants that grow from creeping roots (rhizomes) and have mature silicles (fruits) that are not notched at their tip.
- \* Silicles are glabrous (lack hairs), flattened, and their base is cordate (heart-shaped or indented). Silicles are tipped with a style of 1-1.5 mm long. Silicle stems (pedicels) are 5-12 mm long.
- \* Stem leaves are auriculate (lobed like an arrow) and clasping around the stem.

**Globe-podded Whitetop** – *Lepidium appelianum*, exotic:

- \* White-flowered plants that grow from creeping roots (rhizomes) and have mature silicles (fruits) that are not notched at their tip.

- \* Silicles are pubescent (have hairs), inflated (globe-shaped), and with a short style of 0.4-1.0 mm long. Silicle stems (pedicels) are 4-11 mm long.
- \* Stem leaves are auriculate (lobed like an arrow) and clasping around the stem.

**Perennial Pepperweed** – *Lepidium latifolium*, exotic and Noxious:

- \* White-flowered plants that grow from creeping roots (rhizomes) and have mature silicles (fruits) that are not notched at their tip.
- \* Silicles are glabrous or sparsely pilose (long soft hairs) with a very short style of 0.1 mm long or less. Silicle stems (pedicels) are 2-5 mm long.
- \* Stem leaves are sessile, but do not clasp around the stem.

**Lenspod Whitetop** – *Lepidium chalepense*, exotic:

- \* White-flowered plants that grow from creeping roots (rhizomes) and have mature silicles (fruits) that are not notched at their tip.
- \* Silicles are glabrous (lack hairs), partially inflated and round (compressed-globose), not cordate (is pointed to its stem), and topped with a style 1-2 mm long. Silicle stems (pedicels) are 8-15 mm long.
- \* Stem leaves are auriculate (lobed like an arrow) and clasping around the stem.

The other Montana **Lepidium** species (using MTNHP preferred name) have mature silicles with a notch of at least 0.1 mm deep at their top and are not rhizomatous.

**Hoary False-alyssum** – *Berteroa incana*, exotic and Noxious:

- \* White-flowered, annual plants that grow from taproots and have mature silicles (fruits) that are not notched at their tip.
- \* Each of the 4 petals are notched, making the flower appear 8-petaled.
- \* Plants have star-shaped hairs; whereas, *Lepidium* species have simple hairs or none.
- \* Stem leaves are widest near their tip (oblanceolate), sessile on the stem, and point upwards.

**Field Pennycress** – *Thlaspi arvense*, exotic:

- \* Easily differentiated if in fruit and easily confused with other species if only of leaves.
- \* White-flowered, annual plants that grow from taproots and have mature silicles (fruits) that are large, deeply notched at their tip, flat, and with wide wings, resembling a penny.
- \* Lower stem leaves have petioles. Upper stem leaves are sessile, clasping, auriculate (lobed like an arrow), and with smooth to toothed margins.

**Common Yarrow** – *Achillea millifolium*, native and desirable:

- \* Member of the Aster/Sunflower Family.
- \* Bright-white flowers arranged closely in a flat-topped inflorescence.
- \* Leaves are 2-3 times pinnately dissected, appearing fern-like or bushy like a squirrel's tail.

Sources: Jacobs and Mangold 2007; FNA 2010; Graves-Medley and Mangold 2011; Lesica et al. 2012.

## Habitat

---

Whitetop is best adapted to moderately moist sites where annual precipitation ranges from 12-16 inches and to alkaline soils that can stay moist into late spring (Graves-Medley and Mangold 2011). In Montana Whitetop is most abundant in irrigated fields with saline soil and roadsides in the valleys (Lesica et al. 2012). Whitetop grows best in open, unshaded sites.

## Management

---

Successful control requires integrating strategies to prevent new, eradicate or containing existing, and controlling large populations.

**PREVENTION** [Adapted from Graves-Medley and Mangold 2011]

Seed development must be prevented to reduce or stop spread. Spread can be reduced by:

- \* Preventing vehicles from driving through and animals from grazing within infested areas,
- \* Thoroughly washing the undercarriage of vehicles that have travel through infested areas,
- \* Encouraging landowners to frequently monitor their land for new infestations and, when found to implement effective control methods.
- \* Maintain proper livestock grazing management that is more resilient to Whitetop invasion, and
- \* Developing educational campaigns to teach people to not pick and transport the white flowers.

**PHYSICAL and CULTURAL CONTROLS** [Adapted from Graves-Medley and Mangold 2011]

Hand-pulling can provide control to small or new populations and around homesteads, gardens, and other urban areas. Plants must be pulled within 10 days of emerging and repeated (if re-emerged) throughout the growing season for another 2-4 years to ensure it is eliminated from the site. Plants grow fast and preventing them from seeding is key to controlling the population. Rhizomes must also be fully removed or they will re-sprout. Weeding is more successful if done when soil is moist.

Tilling must be done within 10 days of emergence and repeated throughout the growing season for 2-4 years to exhaust reserves in the rhizomes.

Revegetation that establishes a desirable perennial plant community will compete best against Whitetop. Crop plants that are competitive include alfalfa and legumes.

Flooding can control Whitetop, particularly where soil textures are heavy and hold onto water with little seepage and/or where continuous submersion from May through September could occur. Flooding is more appropriate for riparian areas and places that naturally exhibit intermittent or ephemeral flooding. Flooding may be inappropriate in many habitats and could damage native or other desirable plants.

#### **CHEMICAL CONTROLS** [Adapted from Jacobs and Mangold 2007]

Herbicides can control Whitetop, but require an aggressive re-application program and should be part of an integrated weed management plan. The herbicide type and concentration, application time and method, environmental constraints, land use practices, local regulations, and other factors will determine its effectiveness and impact to non-target species. Strict adherence to application requirements defined on the herbicide label will reduce risks to human and environmental health. Consult your County Extension Agent and/or Weed District for information on herbicidal control. Chemical information is also available at [Greenbook](#).

These herbicides have been used on rangeland, roadsides, and waste areas and applied to actively growing rosettes in the early spring, to re-growth before flower buds develop, or to fall re-growth before frosts kill plants. Herbicides should be applied with adequate water (at least 10 gallons per acre) and with a nonionic surfactant at the label rate:

- \* Metsulfuron at the 0.5-1.0 ounce per acre rate,
- \* mixed Metsulfuron and Chlorsulfuron at the 2.0 ounce per acre rate, or
- \* Chlorsulfuron at the 0.5-1.0 ounce per acre rate.

2,4-D has been somewhat effective if applied before the flower-bud stage. at the rate of 2 quarts per acre will kill stems, but not the root crowns. Root crowns will re-sprout and require a different follow-up treatment.

#### **GRAZING CONTROLS** [Adapted from Jacobs and Mangold 2007]

Livestock should not graze infested areas during flowering and seed-set periods. Animals that have grazed in areas with Whitetop should be contained and fed weed-free forage for 10-14 days before moving into weed-free areas. This provides the necessary time for seeds to be digested and excreted.

#### **BIOLOGICAL CONTROLS**

Several insects are being tested for use as a biological control agent, but it is difficult since Whitetop is a member of the mustard family, which includes numerous important crops (cabbages, broccoli, mustard, canola, and others). Insects being investigated include a gall-forming weevil (*Ceutorhynchus cardariae*), a seed-feeding weevil (*Ceutorhynchus turbatus*), a root-mining weevil (*Melanobaris semistriata*), a shoot mining flea beetle (*Psylliodes wrasei*), and a gall mite (*Aceria drabae*).

#### **Useful Links:**

[Montana Invasive Species website](#)  
[Montana Biological Weed Control Coordination Project](#)  
[Montana Department of Agriculture - Noxious Weeds](#)  
[Montana Weed Control Association](#)  
[Montana Weed Control Association Contacts Webpage.](#)  
[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)  
[Montana State University Integrated Pest Management Extension](#)  
[Weed Publications at Montana State University Extension - MontGuides](#)



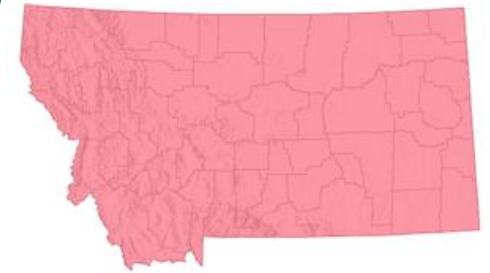
## Common Hound's-tongue

*Cynoglossum officinale*

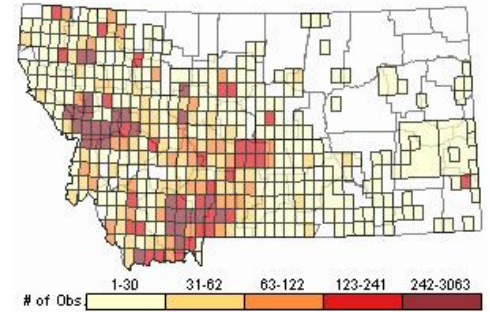
[View in Field Guide](#)


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

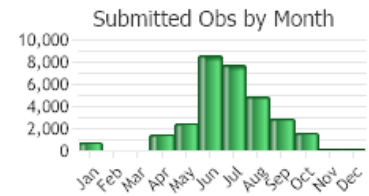
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



# **Observations:** 32662



### General Description

**PLANTS:** Taprooted, biennial or short-lived perennial forbs that are densely hairy (villous) and have erect stems of 30–100 cm tall. Source: Lesica et al. 2012

**LEAVES:** Basal leaves are grey-green to dull green, petiolate, large, 7–25 cm long and 2–5 cm wide, and covered with dense soft hairs (villous). Blades are simple, have smooth (entire) margins, and oblanceolate to lanceolate in shape. Stem leaves are petiolate but become sessile upwards. Source: Jacobs and Sing 2007; Lesica et al. 2012

**INFLORESCENCE:** Flowers arranged in racemes that grow from the axils of branches and tips of stems. Pedicels are short and spreading to reflexed at maturity. Dark, reddish-purple (occasionally white) flowers are composed 5 triangular-lobed sepals that are fused to form a star-shaped calyx, and 5 petals that are fused to form a funnel-shaped corolla. Flowers are 4–5 mm long and 6–9 mm across. In fruit sepals are oblong, 5–7 mm long. The 5 stamens alternate with the fornications. The pistil has a deeply lobed ovary and a single, short, and entire style. Nutlets are ovoid, 4–7 mm long, with barbed prickles that spread at maturity. Source: Jacobs and Sing 2007; Lesica et al. 2012

The Greek words *Kynos* and *glossa* meaning 'dog' and 'tongue' combine to form *Cynoglossum* (Jacobs and Sing 2007). It refers to the shape and texture of the basal leaves.

### Diagnostic Characteristics

Common Hound's-tongue is characterized as a robust plant, with large hairy basal leaves, thick stems that terminate into racemes of burgundy-red flowers that each produce 4-prickly nutlets that catch your clothing like VELCRO. Occasionally flowers are white (see photo). Montana has no other *Cynoglossum* species.

In winter as the snow accumulates Common Hound's-tongue plants are easy to identify from a distance. Plants remain upright and retain some of the 4-prickly nutlets.

Possible look-alikes can be found in the Family Boraginaceae where many species have prickly or sticky seeds that catch your clothing. Check out members of *Lappula* (Stickseed) or *Hackelia* (Stickseed). Species may differ in not being stout or robust plants, having flowers with different morphology, having blue flowers, having nutlets that are smaller or differently-shaped, and/or other characteristics.

### Habitat

Hound's-tongue is found in disturbed ground of pastures, fields, roadsides, grasslands, meadows, woodlands, riparian thickets in Montana (Lesica et al. 2012). It occurs in the plains and valleys of Montana (Lesica et al. 2012).

In England, plants occur on sandy soils and old dune-grasslands (Jacobs and Sing 2007). In the Netherlands it has been reported from calcareous coastal dunes (Jacobs and Sing 2007).

## Management

Common Hound's-tongue establishes, grows, and expands its populations where land is disturbed (Jacobs and Sing 2007). Plants are characterized as having a relatively low growth rate and weak ability to compete (Jacobs and Sing 2007). Thus, rapid restoration, reclamation, and/or revegetation of disturbed sites will prevent or reduce its establishment. Early detection and prevention of seed production are critical to avoiding problematic infestations (Jacobs and Sing 2007).

Management should target the flowering stages to get control on the population (Jacob and Sing 2007). An integrated vegetative management approach provides the best long-term control; it requires that land-use objectives and a desired plant community be identified (Shelly et al. *in* Sheley and Petroff 1999). Once identified an integrated weed management strategy can be developed. An integrated weed management strategy promotes a weed-resistant plant community and serves other land-use objectives such as livestock forage, wildlife habitat, or recreation can be developed, making control of Common Hound's-tongue possible.

### **PREVENTION** [Adapted from Jacobs and Sing 2007]

Successful management seeks to control flowering to prevent seed formation and dispersal. Once established large infestations are difficult to control.

### **MECHANICAL and PHYSICAL CONTROL** [Adapted from Jacobs and Sing 2007]

Hand-pulling can be effective, especially for small infestations. It is best to pull plants before they produce seeds. Plants should be bagged and deposited in the landfill. Pulling plants with seeds (in fruit) easily distributes them. Therefore, plants with seeds should be bagged and burned, or bagged and allowed to desiccate or rot before disposing in the landfill. The general rule, regardless of species, is to wear gloves when weeding. It is wise to protect one's-self against the prickly seeds and high levels of pyrrolizidine alkaloids by wearing gloves. Soil should be moist so that the entire taproot can be extracted. Roots left in the soil can re-sprout. Using a shovel might make pulling more effective because roots tend to break at the root crown.

Mowing will cut stems and reduce or prevent flowering/seeding, but will not remove plants (rosettes).

Prescribed Burning in late summer and early fall may reduce the spread of Common Hound's-tongue because it can damage or kill plants and seeds. However, the disturbance can maintain good conditions (bare soil, low plant competition, and open canopy) for Common Hound's-tongue to re-establish. Fire can promote seed germination from the seedbank and taproots to re-grow. A revegetation plan that encourages competitive, desirable plants should be implemented as soon as is appropriate after the prescribed burn.

Where plants have invaded cropland, a single, shallow tilling can kill rosettes and root crowns.

Revegetating disturbed sites will prevent or greatly reduce establishment by Common Hound's-tongue and many other exotic plants. Sustainable suppression requires revegetating with desirable plants that compete well for light, water, and nutrients. Desirable vegetation should be appropriate for the management objectives, adapted to the site conditions, and be competitive. Planting with appropriate native plants is highly encouraged. Refer to Montana Plant Materials Technical Note 46, *Seeding Rates for Conservation Species for Montana*, and Extension Bulletin EB0019, *Dryland Pasture Species for Montana and Wyoming* for possible species selection and seeding rates.

Revegetating land should be used, appropriately, in combination with herbicide treatment, grazing management, prescribed burning, hand-pulling and other control methods.

### **CHEMICAL CONTROLS** [Adapted from Jacobs and Sing 2007]

Dicamba (but not picloram) and 2,4-D are auxin-type herbicides that can kill first-year rosettes. They are less effective on plants that have bolted. It is necessary to use a nonionic surfactant because the hairy leaves impedes penetration by the herbicide.

Chlorsulfuron, metsulfuron and trisulfuron are effective at killing Common Hound's-tongue plants at all growth stages. Metsulfuron (0.5 ounce per acre rate) applied at the first sign of flowering will kill plants and prevent

seed production. It is necessary to use a nonionic surfactant because the hairy leaves impedes penetration by the herbicide.

**Imazapic** (8-12 ounces per acre) should be applied with 1 quart of methylated seed oil to rosettes or bolting plants.

Although Common Hound's-tongue is normally ignored by livestock, herbicide treatment could make plants more palatable. Therefore, grazing by domesticated animals should be suspended for 2 weeks after herbicide treatment to avoid potential poisoning.

**GRAZING CONTROLS** [Adapted from Jacobs and Sing 2007]

Livestock, sheep, and goats are not practical to use for controlling Common Hound's-tongue. Plants are toxic and the risk of poisoning is possible.

Using grazing management techniques to maintain healthy, viable plant communities will resist Common Hound's-tongue invasion.

**BIOLOGICAL CONTROL** [Adapted from Jacobs and Sing 2007]

Since 1988 five biological control insects have been identified for controlling Common Hound's-tongue:

- \* Root-mining Hoverfly - *Cheilisia pascuorum*,
- \* Hound's-tongue Seed-feeding Weevil - *Mogulones borraginis*,
- \* Hound's-tongue Stem-feeding Weevil - *Mogulones trisignatus*,
- \* Root-mining Flea Beetle - *Longitarsus quadriguttatus*, and
- \* Hound's-tongue Root Mining Weevil - *Mogulones cruciger*.

The Root-mining Flea Beetle and Hound's-tongue Root Mining Weevil were released in British Columbia, Canada from 1997 to 1998. The Hound's-tongue Root Mining Weevil has established better and is now distributed in Alberta. They have been significantly effective in reducing Common Hound's-tongue.

In the U.S. release of bio-control has not been approved. This is primarily because test results also showed that insects damaged two native plants, Stickseed (*Hackelia floribunda*) and Miner's Candle (*Cryptantha elosioides*). There are also concerns that bio-control insects could hurt *Cryptantha crassipes*, a federally-listed endangered plant (not in Montana).

**Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



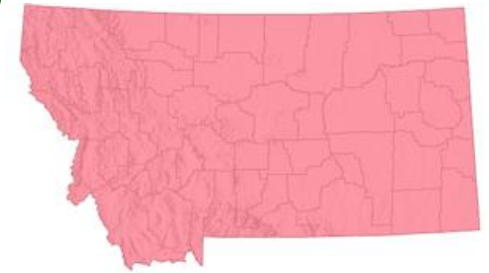
## Field Bindweed *Convolvulus arvensis*

[View in Field Guide](#)

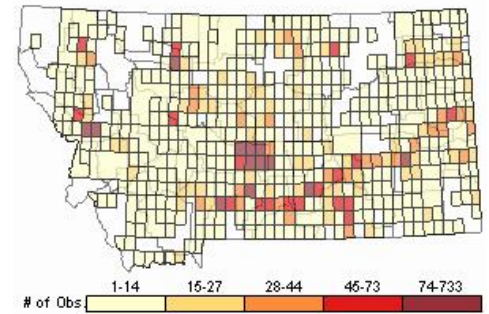

© Bruce Selyem

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

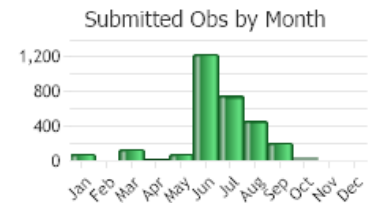
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



# Observations: 7119



### General Description

**PLANTS:** A rhizomatous, perennial vine. Stems are pubescent, prostrate or twining, branched at the base, and grow 1-6 feet long. Stems are corrugated longitudinally with a thick cuticle. Sources: Jacob 2007; Lesica et al. 2012.

**LEAVES:** Alternately arranged with blades 1-5 cm long and petioles (leaf stem) 5-25 mm long. Blades are arrowhead-shaped with rounded tips and 2 basal lobes that point backwards and outwards (sagittate). Margins are smooth (entire). Sources: Jacob 2007; Lesica et al. 2012.

**INFLORESCENCE:** Flowers are solitary and whitish, turning pinkish with age. The 5 petals are fused to form a funnel-shaped flower with almost indistinguishable lobes. The funnel-shape widens upward and flares outward at the edges. The 5 sepals are green with pink margins and overlap. Flower stem (peduncle) is 1-5 cm long with a pair of small bracts just below the flower. Source: Lesica et al. 2012.

The scientific name was given by Linnaeus in 1753. *Convolvulus* comes from a Latin verb "to roll together" or "to entwine" and *arvensis* is Latin adjective for "of the field" (Jacobs 2007). Since the time of Ancient Greeks this plant has been given at least 84 names (Jacobs 2007). The Romans' name meant "a large worm that wraps itself in vines". "Byndweeded" was first applied in England during the 1500s.

### Phenology

Plants emerge in spring, flower throughout the summer with appropriate moisture, and die-back with freezing temperatures. See LIFE CYCLE / REPRODUCTIVE CHARACTERISTICS.

### Diagnostic Characteristics

Whether by scientific name, common name, or looks these plants are often confused with each other:

**Field Bindweed** - *Convolvulus arvensis*, exotic and Noxious:

- \* Vine in the Morning Glory Family (Convolvulcaeeae) with a perennial life cycle.
- \* Flowers are showy, whitish, and solitary.
- \* Corolla is smaller, 1-3 cm long AND the bracts below the calyx are linear.
- \* Narrowly arrow-like leaves, but tips are mostly rounded.

**Hedge False Bindweed** - *Calystegia sepium*, exotic and undesirable:

- \* Vine in the Morning Glory Family (Convolvulcaeeae) with a perennial life cycle.
- \* Flowers are showy, whitish, and solitary.

- \* Corolla is larger, 3-7 cm long AND the bracts below the calyx also enclose the calyx.
- \* Heart-shaped or arrow-like leaves, but tips are pointed.

**Black Bindweed** - *Polygonum convolvulus*, exotic and undesirable:

- \* Vine in the Buckwheat Family (Polygonaceae) with an annual life cycle.
- \* Flowers are very small (not showy), green, and clustered in leaf axils.
- \* Leaves are more heart-shaped (broader), but with pointed tips AND basal lobes.

Several *Ipomoea* species resemble Field Bindweed, but have an annual habit, capitate stigma, longer sepals, and a blue or purple corolla.

## Habitat

---

Field Bindweed grows in cultivated fields, pastures, gardens, lawns, roadsides, railroad beds, and waste places (Jacobs 2007). It tolerates drought (Jacobs 2007). It grows best in rich, fertile soils that are dry to moderately moist, but will persist on poor, gravelly soils (Jacobs 2007). In Montana it is found in the plains and valleys (Lesica et al. 2012).

## Management

---

Persistent control over many years is required to significantly suppress Field Bindweed because of its extensive root system. Combining techniques of cultural, mechanical, biological, and chemical controls will best exhaust the nutrients in its root system (but must be designed to the site's specific conditions). An integrated vegetative management approach provides the best long-term control, and requires that land-use objectives and a desired plant community be identified (Shelly et al. *in* Sheley and Petroff 1999). Once identified an integrated weed management strategy can be developed that can promote a weed-resistant plant community and serves other land-use objectives such as livestock forage, wildlife habitat, or recreation.

**PREVENTION** [Adapted from Sheley and Petroff 1999]

Preventing the establishment of Field Bindweed can be accomplished by many practices:

- \* Learn how to accurately identify Field Bindweed in order to detect occurrences and know where to implement control methods.
- \* Prevent vehicles from driving through and animals from grazing within infested areas.
- \* Thoroughly wash the undercarriage of vehicles and wheels in a designated area before moving to uninfested areas.
- \* Frequently monitor for new plants, and when found implement effective control methods.
- \* Maintain proper grazing management that creates resilience to noxious weed invasion.
- \* Do not pick the flowers or transport plants. Where possible, contribute to or develop educational campaigns to help eradicate or reduce Field Bindweed populations.

**PHYSICAL and CULTURAL CONTROLS** [Adapted from Jacobs et al. 2007]

Hand-pulling is effective for young populations and small confined spaces if done several times each season to starve the root-system. Hand-pulling plants in combination with other control methods will likely be more successful at longer-term removal of the population.

Tilling fragments the rhizomes allowing Field Bindweed to increase in abundance. A chisel plow encourages re-growth of Field Bindweed. However, tilling every 8-12 days after re-growth for 3-5 consecutive years will reduce root reserves and deplete the seed bank in the soil. Tilling the plant when in flower can be more effective because root reserves of carbohydrates and nitrogen are at their lowest. Upon re-growth, a sweep plow can be used to remove top growth and keep it on the soil surface. After tilling, fields should be re-vegetated as soon as is practical. Appropriate herbicides could be used at the appropriate time to suppress or eradicate Field Bindweed.

Revegetating land with competitive, locally adapted, and desirable forbs and grasses or crops will suppress Field Bindweed populations. Field Bindweed grows in full sunlight and can be suppressed by plants that actively and densely grow in the spring, creating shade. Nonetheless, Field Bindweed will twine upwards around other plants, decreasing their competitive advantage. Establishing competitive, perennial grasses and forbs on disturbed land followed by a prescribed grazing management plan to maintain grass vigor will suppress Field Bindweed and reduce spread by seed. Planting with appropriate native plants is highly encouraged. Refer to Montana Plant Materials Technical Note 46, Seeding Rates for Conservation Species for Montana, and Extension Bulletin EB0019, Dryland Pasture Species for Montana and Wyoming for possible species selection and seeding rates.

Mowing is not generally effective because plants grow along the ground and remain under the height of the blade. Timing mowing with flowering (to decrease seed production) is difficult because plants flower throughout

the season and flowers are viable for one-day. Mowing can spread the biological control mite *Aceria malherbae*.

#### **CHEMICAL CONTROLS** [Adapted from Jacob 2007]

Biotypes of Field Bindweeds have different tolerances to herbicides. Herbicides can suppress Field Bindweed, will not be 100% effective, and will be more effective when properly integrated with an intensive pasture management. The herbicide type and concentration, application time and method, environmental constraints, land use practices, local regulations, and other factors will determine its effectiveness and impact to non-target species. Strict adherence to application requirements defined on the herbicide label will reduce risks to human and environmental health. Consult your County Extension Agent and/or Weed District for information on herbicidal control. Chemical information is also available at [Greenbook](#).

Plants growing in high light and low humidity environments have a thicker leaf cuticle and will absorb less herbicide than leaves of plants grown in a low light and high humidity environment. Herbicide absorption decreases when applied to dusty leaves in fields.

[Picloram](#) (1 quart per acre) or in combination with [Glyphosate](#), [2,4-D](#), or [Dicamba](#) can control Field Bindweed for at least one year. [Picloram](#) is a restricted-use herbicide because it is persistent, yet mobile in the soil, and can contaminate water and has a long-residual activity.

Many chemical types and techniques for controlling Field Bindweed in cropland are available by consulting your County's Farm Service agency, Weed Coordinators, and MSU extension service (Jacobs 2007).

#### **BIOLOGICAL CONTROLS** [Adapted from Jacobs et al. 2007]

[Bindweed Gall Mite](#) (*Aceria malherbae*) is native from central and southern Europe to northern Africa. Adults are minute (need a microscope), soft-bodied, and worm-like. They have ring-like body segments and 2-pairs of legs on their head and thorax. The nymphs look similar to adults but lack external genitalia. Adults and nymphs are destructive to Field Bindweed. When attacked galls form on actively growing leaves, petioles, and stem tips. Infected leaves fold or twist upward along the mid-vein. Attacked buds don't elongate, but will form a compact cluster of stunted leaves. Bindweed Gall Mites have multiple generations per year. Adults and nymphs overwinter on the root buds of Field Bindweed.

Bindweed Gall Mites can be collected as adults or nymphs during the growing season by selecting stems with galls and then wrapping them around actively growing stem tips of Field Bindweed at other sites. Transplanting releases in the spring or early summer will provide more time for establishment. Mowing can spread this mite. Herbicide treatment and tilling can hurt it.

[Field Bindweed Moth](#) (*Tyta luctuosa*) is native from Europe to southern Scandinavia, Asia east to Turkistan and south into India, and Northern Africa. First generation adult moths emerge in May and are active until June. Second generation adult moths are active from July to September. Larvae are caterpillar-like and feed on the plant from May through September. At night they feed on Field Bindweed flowers and leaves and during the day they feed on plant litter. Thus, it is the larvae that damage Field Bindweed plants. Both adults and larvae overwinter on root buds of Field Bindweed. Numerous releases in 2002 in the U.S. have not successfully established this insect.

**Bindweed Gall Mite and Field Bindweed Moth can also attack other bindweed plants in the genus *Calystegia*. Information on attacks to non-target species should be shared with the Montana Natural Program Heritage Program Botanist.**

#### **GRAZING CONTROLS** [Adapted from Jacobs et al. 2007]

Horses may develop an intestinal fibrosis because of the alkaloid pseudotropine that is found in Field Bindweed. Cattle, sheep, and goats will eat the leaves and stems of Field Bindweed. Chickens and hogs will eat leaves, stems, exposed roots and rhizomes, and crowns. However ingestion will cause Field Bindweed to spread. It has been found that the hard seed coat can keep the seeds viable for 144 hours in migratory animals.

#### **Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)

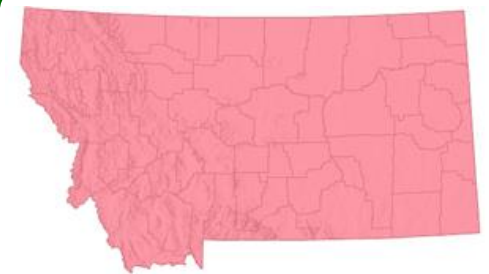


## Common Tansy *Tanacetum vulgare*

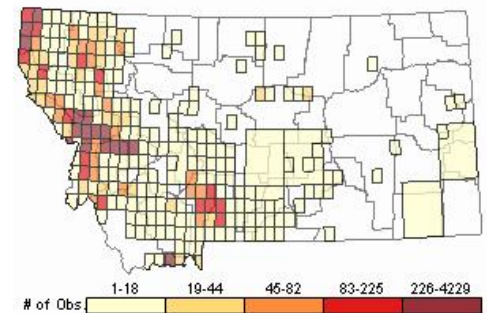
[View in Field Guide](#)


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

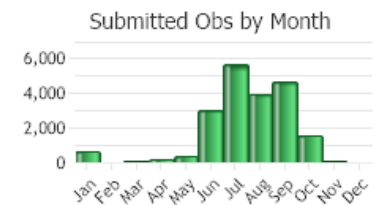
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



# **Observations:** 21656



### General Description

**PLANTS:** Rhizomatous, perennial forbs with single, erect stems that grow 40-120 cm tall. Plants have few hairs (glabrate), milky sap, and 'fern-like' leaves. Source: Jacobs 2008; Lesica et al. 2012.

**LEAVES:** Basal leaves wither early. Stem leaves are alternately arranged and petiolate but become sessile upwards. Leaf blades are about 5-15 cm long, pinnately divided into lanceolate, serrate to sharply lobed leaflets. Leaves are glabrate and gland-dotted (punctate). The main stem between leaflets (rachis) is somewhat winged. Sources: Watson *in* FNA 2006; Lesica et al. 2012.

**INFLORESCENCE:** Flat-topped corymbiform. 20-200 yellow, rayless, button-like flowers are arranged in flat-topped, compact clusters. Flower heads have an involucre of 5-10 mm across, composed of subequal-sized bracts forming 2-3 rows. Flowerheads lack ray florets (lack petals) and are composed of only yellow disc florets, 1-3 mm tall. The involucre is composed of green, overlapping bracts that have dry, thin, membranous, and translucent margins and tips. The pappus is either crown-like or absent. Sources: Watson *in* FNA 2006; Lesica et al. 2012.

The genus *Tanacetum* is authored by Carl Linnaeus and is derived from the word *athanotos* which implies 'immortality' and references its uses in medicine and preservation. This plant was also called *tanazetum* or *athanacetum* in medieval Latin, and the Old French changed it to *tanesie* which sounds similar to 'tansy'. The specific epithet of *vulgare* is from Latin meaning 'ordinary' or 'common'. Sources: Watson *in* FNA 2006; Jacobs 2008.

### Phenology

Flowering July through September (Watson *in* FNA 2006).

### Diagnostic Characteristics

Common Tansy and Tansy Ragwort are often confused with one another.

**Common Tansy** – *Tanacetum vulgare*, exotic and Noxious:

- \* Yellow flowers lack petals. Flowers have yellow disc florets and lack ray florets.
- \* Leaves pinnately deeply divided into equal-sized, sharp-toothed lobes.
- \* Plants have few hairs and leaves are gland-dotted.
- \* Crushed leaves have a strong menthol- or camphor-like smell from volatile oils.

**Tansy Ragwort** – *Senecio jacobaea*, exotic and Noxious:

- \* A biennial to short-lived perennial – pull a mature plant to find a dark-colored taproot.
- \* Stem leaves similar in size from base to top.
- \* Flowers with showy, yellow petals. Flower have both yellow ray and disc florets.
- \* Leaves pinnately deeply-divided into lobes that are shallowly divided.
- \* Lobe tips of leaves are rounded (not pointed).
- \* Plants have hairs, often cobwebby hairs when young leaves

Montana has 2 other *Tanacetum* species, both exotic:

**Coastmary** – *Tanacetum balsamita*, exotic:

- \* Yellow flowers lack petals. Flowers have yellow disc florets and lack ray florets.
- \* Leaves are simple and not lobed.

**Feverfew** – *Tanacetum parthenium*, exotic:

- \* Flowers have white petals (ray florets) and yellow centers (disc florets).
- \* Plants are minutely hairy.
- \* Leaves are pinnately lobed.

## Habitat

---

In Montana it grows in moist, disturbed meadows, often along streams or lakes, along roadsides and railroad tracks in the plains and valleys (Jacobs 2008; Lesica et al. 2012).

## Management

---

An integrated vegetative management approach provides the best long-term control, and requires that land-use objectives and a desired plant community be identified (Shelly et al. *in* Sheley and Petroff 1999). Once identified then an integrated weed management strategy that promotes a weed-resistant plant community and serves other land-use objectives such as livestock forage, wildlife habitat, or recreation can be developed, making control of spotted knapweed possible (Shelly et al. *in* Sheley and Petroff 1999).

**PREVENTION** [Adapted from Jacobs 2008]

Seed development must be prevented to reduce or stop spread.

- \* Prevent vehicles from driving through and animals from grazing within infested areas,
- \* Thoroughly wash the undercarriage of vehicles and wheels in a designated area before moving to an uninfested area,
- \* Encourage landowners to frequently monitor their land for new infestations and, when found to implement effective control methods.
- \* Maintain proper livestock grazing management that is more resilient to Common Tansy invasion, and
- \* Develop educational campaigns to teach people to not pick and transport the yellow flowers.

**PHYSICAL and CULTURAL CONTROLS** [Adapted from Jacobs 2008]

Hand-pulling is effective for small populations. Hand-pulling should be done when soils are moist in order to remove all rhizomes. Rhizomes can re-sprout. Follow-up treatments will be necessary until all rhizomes and the seed bank are deleted.

Mowing reduces flower and seed production if done before the bloom stage. To maintain the vigor of desirable plants it is recommended to keep a 4-inch or greater stubble height. Plants in seed should not be mowed because it will spread them. Mowers must be carefully and thoroughly cleaned to prevent spreading seeds.

Tilling can control Common Tansy where it occurs in fields. However, disturbing the soil can cause germination and/or fragmented rhizomes to grow. Follow-up treatments will be necessary until all rhizomes and the seed bank are deleted. Farming equipment must be carefully and thoroughly cleaned to prevent spreading seeds.

Prescribed burning should be integrated with other control methods, such as herbicide, grazing, and revegetation management. Burned plants can regenerate from rhizomes. Burning can remove dense dried-up litter. Burning can be used on actively growing plants to remove dead material in preparation for an herbicide application.

Revegetation should be integrated with other control methods, such as herbicide or hand-pulling. Plant competition reduces the invasiveness of Common Tansy and increases the effectiveness of control applications. Suppressing the population through hand-pulling or an herbicide application will help in re-vegetation efforts. Species selected for re-vegetating should be appropriate for management objectives, adapted to the site conditions, and be competitive. Planting with appropriate native plants is highly encouraged. Refer to Montana

Plant Materials Technical Note 46, *Seeding Rates for Conservation Species for Montana*, and Extension Bulletin EB0019, *Dryland Pasture Species for Montana and Wyoming* for possible species selection and seeding rates. Common tansy is often found in all the hydrologic zones of stream banks and riparian areas. Conservation practices that address riparian restoration, such as Channel Bank Vegetation (Code 322), may be needed after common tansy control to maintain hydrological cycles and prevent soil and water resource concerns such as erosion and sedimentation.

**GRAZING CONTROLS** [Adapted from Jacobs 2008]

Common Tansy is reported to be toxic to livestock. Cattle in the mid-west have reported to abort their fetus. Some ingestion might be okay and wild ungulates might be more tolerant to the plant. It has been suggested that herbivores have a toxin blood-level feedback mechanism, whereby, that when a certain threshold is reached animals will no longer graze Common Tansy.

Sheep have been used to manage Common Tansy in Montana. However, it is recommended that that female sheep be removed from areas with Common Tansy four weeks prior to breeding to avoid any potential reproductive problems. In a Montana study, sheep reduced the above-ground biomass of Common Tansy by 90% while consuming similar levels of perennial grasses. Long-term effects from grazing are unknown, but it is hypothesized that Common Tansy populations would decline allowing perennial grasses to increase.

**CHEMICAL CONTROLS** [Adapted from Jacobs 2008]

An integrated vegetative management approach provides the best long-term control, and requires that land-use objectives and a desired plant community be identified (Shelly et al. *in* Sheley and Petroff 1999). Once identified then an integrated weed management strategy that promotes a weed-resistant plant community and serves other land-use objectives such as livestock forage, wildlife habitat, or recreation can be developed, making control of spotted knapweed possible (Shelly et al. *in* Sheley and Petroff 1999). For up to date information on herbicides, consult [Greenbook](#).

Common Tansy had been controlled using Metsulfuron, chlorsulfuron, or by mixing them. These chemicals are not selective and can kill shrubs, grasses, and other broad-leaf plants. Applications can be applied to plants growing to the water's edge, but must not be applied directly to surface water of any depth. A non-ionic surfactant at 0.5% volume/volume or methylated seed oil at 2% volume/volume in a spray solution is recommended. Visible effects of the herbicides may not be apparent until 45 days after the treatment.

\* [metsulfuron](#) applied at a broadcast rate of 0.5 ounces per acre at the late bud stage (late June) provided almost 100% control for one year for a population growing on moist soil.

\* [metsulfuron](#) and [chlorosulfuron](#) mixed together at the individual rate of 0.25 ounce per acre had similar results as above.

At sites without a high water table, [Picloram](#) applied to actively growing plants in the bud to bloom stages can be used to control Common Tansy. [Picloram](#) mixed with [dicamba](#) and applied to the bud stage provided 98% control for 24 months after treatment.

Where Common Tansy is growing in water, [imazapyr](#) applied at 1 quart per acre may provide some control.

**Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



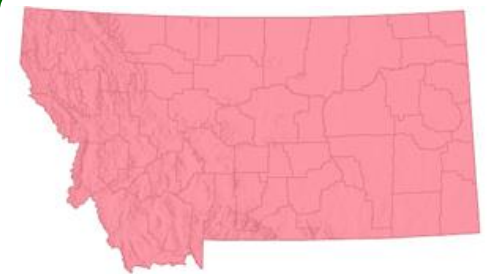
## Diffuse Knapweed

*Centaurea diffusa*

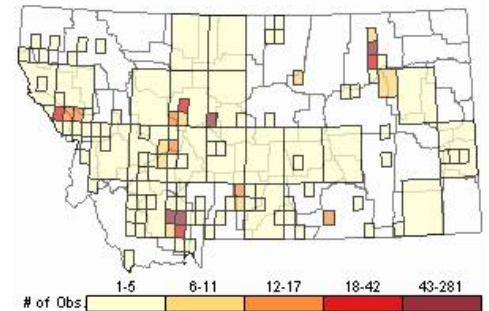
[View in Field Guide](#)


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

**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**

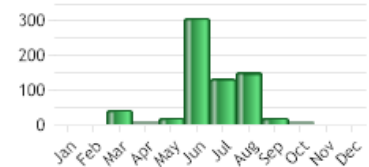


Range **Non-native**



**# Observations: 937**

Submitted Obs by Month



### General Description

**PLANTS:** Taprooted, annuals or rarely short-lived perennials that grow in terrestrial habitats (Parkinson et al. 2011; Lesica et al. 2012). Stems are erect, branched, and grow about 20-100 cm tall (FNA 2006; Lesica et al. 2012). Plants are sparsely gray tomentose and resin-gland-dotted.

**LEAVES:** Leaves of the rosette (basal) and lower stem are long-petiolate, and often shrivel by maturity (FNA 2006; Lesica et al. 2012). Leaf blades are ovate, 3–12(20) cm long, and deeply pinnate (1 to 2 times divided) into linear-oblanceolate lobes. Leaves become sessile, smaller, and less dissected upwards.

**INFLORESCENCE:** Paniculate with several heads of whitish (sometimes purplish) flowers that occur on the ends of leafy branches (Lesica 2012; Sheley and Petroff 2009). Involucres are ovoid and 8–13 mm high. Involucral bracts (phyllaries) are pale green, ovate to lanceolate, and glabrous or finely tomentose. The margins of the bracts (appendages) are fringed with spines and end with a long, spreading spine of 1-5mm long (FNA 2006; Sheley and Petroff 2009).

### Phenology

Flowering June to September, sometimes October.

### Diagnostic Characteristics

The Montana Natural Heritage Botany Programs follows the *Centaurea* treatment by Keil and Ochsmann in FNA Volume 19 (2006). The *Manual of Montana Vascular Plants* (Lesica et al. 2012) treats this plant as *Centaurea maculosa* Lam.

For over 200 years there has been a lot of confusion in the European literature regarding the nomenclature used for *Centaurea stoebe* (FNA 2006). The names used in this group (*C. stoebe*, *C. rhenana*, *C. maculosa*, *C. biebersteinii*) have been applied to different taxa by different authors using different concepts. This was apparent between western and eastern Europe and was not taken into consideration in the treatment by J. Dostal (1976) (FNA 2006).

Recent studies have shown that the American plants are a tetraploid perennial that is very distinct from the diploid, biennial plants native to central Europe (FNA 2006). *Centaurea stoebe* ssp. *micranthos* being in America while plants in central Europe are known by the names of *C. stoebe* Linnaeus ssp. *stoebe*, *C. rhenana* Boreau, or *C. maculosa* Lamarck. In most American literature the name *Centaurea maculosa* Lamarck was misapplied to *C. stoebe* ssp. *micranthos*. Others, such as W.A. Weber (1987, 1990) accepted the name of *Acosta maculosa* based on a treatment of about 100 plants in the *Centaurea* sect. *Acrolophus* Cassini (J. Holub et al. 1972). However, the genus *Acosta* is not supported by morphologic and molecular characteristics and is not widely accepted in Europe (FNA 2006).

**Spotted Knapweed (*Centaurea stoebe* ssp. *micranthos*)** has unique involucre bracts that have a dark colored tip and fringe that appear as "spots" from a distance.

**Diffuse Knapweed (*Centaurea diffusa*)** also grows a single, branched stem from a similar looking rosette. However, its growth develops a ball-shaped appearance and a tumbleweed mobility (Parkinson et al. 2011). Flowers are usually white or occasionally light purple. The flower bracts may have dark-colored tips but lack the dark fringe found in Spotted Knapweed. Bracts possess a rigid terminal spine (1/4 to 1/3 of an inch long) with 4-5 pairs of shorter, lateral spines (Parkinson et al. 2011).

*Centaurea stoebe* ssp. *micranthos* readily hybridizes with *Centaurea diffusa* (FNA 2006; Parkinson et al. 2011). These fertile hybrids have been named *Centaurea xpsammogena* G. Gayer. Characteristics of the hybrids are variable, except for the cypselae (fruit) which always bears a pappus and the flower heads are always conspicuously radiant (composed of ray florets). Hybrids are often mis-identified as diffuse knapweed and may occur where their parent's ranges overlap or are separate.

---

## Habitat

Grasslands, roadsides, meadows, open forest, woodlands; plains, valleys, montane (Lesica et al. 2012).

---

## Management

Successful management of diffuse knapweed requires that land-use objectives and a desired plant community be identified (Sheley and Petroff 1999). Once identified then an integrated weed management strategy that promotes a weed-resistant plant community and serves other land-use objectives such as livestock forage, wildlife habitat, or recreation can be developed, making control of diffuse knapweed possible.

### **BIOCONTROL** [Adapted from Sheley and Petroff 1999]

At least 200 insects are recommended for establishing a sustainable population. Infestations should be at least 2 acres with sizeable populations. It may take 2-3 years for the insect population to establish.

In the U.S. 12 flower seedhead and root-boring insect species are known to attack diffuse knapweed.

Knapweed Gall Flies (*Urophora affinis*, *U. quadrifasciata*) were released over 20 years ago in Montana and now are well-established in the western U.S. Flies have been shown to have high occupancy rates in the flower heads, yet a reduction in seed production was not apparent.

Knapweed Seed Head Weevils (*Larinus minutus*, *L. obtusus*) feed on foliage and flowers and are widely distributed and established.

Knapweed Root Boring Weevil (*Cyphocleonus aschates*) is well established. Larvae feed on taproots.

Sulphur Knapweed Moth (*Agapeta zoegana*) is established in parts of Montana. Larvae of these moths feed on the roots.

Bronze Knapweed Root Borer (*Sphenoptera jugoslavica*) is well established in parts of Montana. On hot, dry sites where there is competition with perennial plants, the larvae can weaken diffuse knapweed rosettes. It is presumed to be less damaging on cooler, moister sites because female beetles need five days of higher temperatures to lay eggs and larvae survival improves with dry conditions.

### **CHEMICAL CONTROL** [Adapted from Sheley and Petroff 1999]

Herbicides are effective, especially when properly managed with other tactics. The herbicide type and concentration, timing of chemical control, soil properties, and other factors will determine its effectiveness and impact to non-target species. Strict adherence to application requirements defined on the herbicide label will reduce risks to human and environmental health. Many herbicides must be applied by applicators with an Aquatic Pest Control license. Consult your County Extension Agent and/or Weed District for more information on herbicidal control.

Herbicides are more effective when applied to the rosette stage. Registered herbicides for Diffuse Knapweed include: Picloram (0.25-0.50 pound per acre), clopyralid (0.25-0.50 pounds per acre), Curtail® (2-5 quarts per acre), and 2,4,-D (1-2 pounds per acre).

### **CULTURAL and GRAZING CONTROLS** [Adapted from Sheley and Petroff 1999]

Hand-pulling that extracts the full taproot is effective, particularly when soil is moist. In the rosette stage, taproots that are severed directly below the root crown have a higher rate of re-growth than when severed 2-4 inches below the crown. All plant material should be bagged, desiccated or burned, before placing in the trash for disposal. Gloves should be worn to protect skin.

Mowing is not very effective at reducing seed production. When mowed in the early flowering stage plants often re-grow and produce abundant late-season seeds.

Burning can damage plants, but is not effective at preventing growth, germination, or flowering.

Grazing. Diffuse knapweed is more likely to be grazed: a) by sheep than by cattle, b) when it is green and succulent (stages from rosette to flower bud), especially if adjacent vegetation is curing, and c) when it is the only available plant. Grazing should be timed to minimize damage during critical stages of growth for the desirable vegetation.

Revegetation that establishes a desirable perennial plant community will compete against diffuse knapweed for water, nutrients, and light. Proper revegetation of disturbed sites are necessary to reduce knapweed populations.

**Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



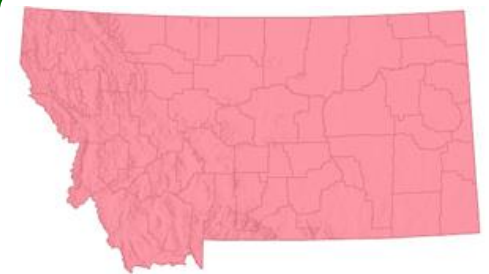
## Canada Thistle

*Cirsium arvense*

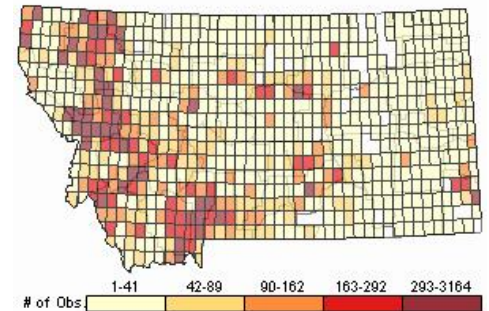
[View in Field Guide](#)


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

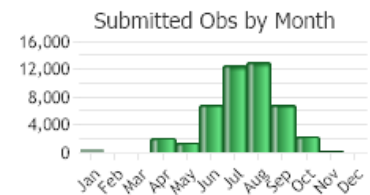
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



# Observations: 54018



### General Description

**PLANTS:** Strongly rhizomatous, perennial forbs. Stems are erect, often branched above, and 30–100 cm. Stems have sparse hairs (glabrate). Individual stems are unisexual. Source: Lesica et al. 2012

**LEAVES:** Basal leaves have regularly spaced, coarse, marginal hairs, and shallowly lobed. Stem leaves are alternately arranged with short petioles. Leaf blades are oblanceolate to elliptic, usually with crinkled edges and spiny-toothed margins, very irregularly lobed, 3-15 cm long, and terminate in a spine. Leaves are sometimes tomentose beneath. Upper leaves become small and decurrent. The lowest leaves usually become deciduous. Sources: Morishita *in* Sheley and Petroff 1999; Lesica et al. 2012.

**INFLORESCENCE:** Purple flower heads are arranged as several per stem in a corymbiform array with peduncles (stalks) of 0–4 cm long. Involucres are 1–2 cm high. Involucral bracts are imbricate in 6 to 8 rows. The outer bracts are ovate with a darkened resinous keel-tip. The inner bracts are linear, Bracts either have short or absent spines. Source: Lesica et al. 2012

### Diagnostic Characteristics

On first-glance thistles can look similar, but upon closer inspection differences become apparent. Thistles belong to the genera of *Cirsium*, *Carduus*, and *Onopordum*. They are separated by:

#### ***Cirsium***

- \* Feathery (plumose) pappus, which have fine, long hairs on each side of the main bristle.
- \* Receptacle of flower head has bristles. Look between florets within a flower head to find them.

#### ***Carduus***

- \* Capillary pappus, which are minutely barbed, narrow bristles.
- \* Receptacle of flower head has bristles. Look between florets within a flower head to find them.

#### ***Onopordum***

- \* Receptacle of flower head has no bristles. Look between florets within a flower head to find nothing.
- \* Entire lengths of stems have spiny wings.
- \* Foliage is silvery gray.

**Native versus Exotic** (Source: Parkinson and Mangold 2015)

- \* Native thistles tend to have involucral bracts adhere to the flower head for most of their length (except for the spine).

- \* Native thistles tend to grow scattered across a habitat, spreading slowly with disturbance, and contribute to plant diversity.
- \* Exotic thistles grow quickly with disturbance, form dense patches that interfere with access, and through competition often reduces plant diversity.

**Montana has 12 species of *Cirsium*, and only 5 are described below.**

**Canada Thistle** - *Cirsium arvense*, exotic and Noxious

- \* Flower heads have involucre less than 2 cm tall [examine larger heads].
- \* Each flower head consists of either male florets or female florets.
- \* Leaves are arachnoid-villous, but the green leaf remains visible.
- \* Stems lack an obvious winged stem.
- \* Plants are strongly rhizomatous.

**Bull Thistle** - *Cirsium vulgare*, exotic and undesirable

- \* Flower heads are mostly single at stem tips and arranged in an open inflorescence.
- \* Flower heads have involucre more than 2 cm tall [examine larger heads].
- \* On the flower head the outer bracts tend to point outwards and upwards, are needle-like and long.
- \* Leaves are deeply lobed, green beneath with cobwebby hairs and obvious white veins.
- \* Leaves have many sharp, short spines. Entire plant has spines, some very long, making it difficult to touch without injury.
- \* Plants are taprooted.

**Wavyleaf Thistle** - *Cirsium undulatum*, native and desirable

- \* Upper leaf surface lacks spines AND white-tomentose hairs making it appear gray.
- \* Involucral bracts tend to point upwards with inner bracts acuminate.
- \* Flower heads have involucre more than 2 cm tall [examine larger heads].
- \* Most flower heads not clustered and peduncles more than 2 cm long.

**Flodman's Thistle** - *Cirsium flodmanii*, native and desirable

- \* Upper leaf surface lacks spines AND has sparse white-tomentose hairs making it appear green.
- \* Involucral bracts tend to point upwards with inner bracts acuminate.
- \* Flower heads have involucre more than 2 cm tall [examine larger heads].
- \* Most flower heads are not clustered and some peduncles are more than 2 cm long.

**Long-styled Thistle** - *Cirsium longistylum*, native, Montana endemic, and SOC

- \* Upper leaf surface lacks spines.
- \* Inner and outer bracts are wide, scarious, and with erose tips AND outer bracts have a raised, darkened, and resinous keel.
- \* Flower heads have involucre more than 2 cm tall [examine larger heads].

**Scotch Thistle** - *Onopordum acanthium*, exotic and undesirable

- \* Receptacle of flower head has no bristles.
- \* Entire lengths of stems have spiny wings, becoming broad and spiny.
- \* Foliage is silvery gray and can grow taller than 6 feet.

**Musk Thistle** - *Carduus nutans*, exotic and undesirable

- \* Flower heads have involucral bracts that are broadly triangular, have smooth margins, and a short spine-tip.
- \* Heads nod as flowers mature.

## Habitat

---

In Montana it occurs in moist, usually disturbed soil of fields, meadows, thickets, roadsides, woodlands, open forests, often along streams, wetlands in the plains, valleys, and montane zones (Lesica et al. 2012).

It frequently occurs along roadsides, railroad rights-of-way, rangeland, forest land, lawns, gardens, cropland, abandoned fields, stream banks, lake shores, and other riparian habitats (Morishita *in* Sheley and Petroff 1999). It infrequently occurs in sand dunes and open sandy areas (Morishita *in* Sheley and Petroff 1999). It has been observed that the diversity of annual broadleaf species increases near patches of Canada thistle (Morishita *in* Sheley and Petroff 1999).

Canada Thistle grows best where temperatures range from 32 to 90 degrees Fahrenheit and precipitation levels range from 16 to 30 inches per year (Moore 1975). It colonizes clay soils very well, is adaptable to many other soil types, and is most productive in well-aerated soils (Morishita *in* Sheley and Petroff 1999). It tends to survive

dry conditions better than wet conditions (Morishita *in* Sheley and Petroff 1999).

## Management

---

Persistent control over many years is required to eliminate Canada Thistle because of its extensive root system. Combining cultural, mechanical, biological, and chemical techniques will best exhaust the nutrients in its root system (but must be designed to the site's specific conditions). An integrated vegetative management approach provides the best long-term control and requires that land-use objectives and a desired plant community be identified (Shelly et al. *in* Sheley and Petroff 1999). Once identified an integrated weed management strategy can be developed that can promote a weed-resistant plant community and serves other land-use objectives such as livestock forage, wildlife habitat, or recreation.

### **PREVENTION** [Adapted from Jacobs et al. 2007]

Preventing the establishment of Canada Thistle can be accomplished by many practices:

- \* Learn how to accurately identify Canada Thistle in order to detect occurrences and know where to implement control methods.
- \* Prevent vehicles from driving through and animals from grazing within infested areas.
- \* Thoroughly wash the undercarriage of vehicles and wheels in a designated area before moving to uninfested areas.
- \* Frequently monitor for new plants, and when found implement effective control methods.
- \* Maintain proper grazing management that creates resilience to noxious weed invasion.
- \* Do not pick the flowers or transport plants. Where possible, contribute to or develop educational campaigns to help eradicate or reduce Canada Thistle populations.

### **PHYSICAL and CULTURAL CONTROLS** [Adapted from Jacobs et al. 2007]

Hand-pulling is effective for young populations if done several times each season to starve the root-system. Hand-pulling plants in combination with other control methods will likely be more successful at removing the population.

Tilling fragments the rhizomes allowing Canada thistle to increase in abundance. Suppression might occur where tilled at 21-day intervals throughout the growing season followed by establishing perennial forage plants or winter annual cereals; these plants emerge in early spring and can inhibit the emergence of late Canada Thistle shoots.

Prescribed Burning that is done in early spring can encourage growth (sprouting and reproduction). Prescribed burning in late spring (May to June) may help control Canada Thistle organic matter and deletes nutrients, creating conditions that favor its re-establishment.

Mowing can be effective when done 3 or more times during the growing season for several consecutive years. Mowing in combination with using herbicides such as piclorum, piclorum + 2,4-D, or Dicamba can be more effective. In Canada mowing Canada Thistle 3 or 4 times each year almost eliminated it after 3 years, but at other sites only worked to prevent flowering.

### **CHEMICAL CONTROLS** [Adapted from Jacobs et al. 2007]

Herbicides can be effective, especially when properly integrated with intensive pasture management. The herbicide type and concentration, application time and method, environmental constraints, land use practices, local regulations, and other factors will determine its effectiveness and impact to non-target species. Strict adherence to application requirements defined on the herbicide label will reduce risks to human and environmental health. Consult your County Extension Agent and/or Weed District for information on herbicidal control. Chemical information is also available at [Greenbook](#).

Effective control of Canada Thistle requires that an appropriate toxic level of the active ingredient be put into the root system. This means applying the appropriate herbicide on enough leaf area at a time when the plant translocates it to the root system is necessary. Avoid mixing a fast-acting herbicide with a systemic herbicide because the foliage will die before the plant can move the active ingredient into the root system.

Herbicides can be applied in the bud stage or in fall re-growth. In the bud stage leaf area is maximized and root reserves are depleted. In the fall, translocation to the root system will be at its greatest. Canada Thistle plants convert starch into sugar in their roots. A study has found that a fall herbicide treatment can prevent the conversion of starch into sugars in the roots. The sugars act as an anti-freeze by preventing ice-crystals from forming within root cells. Without sugars, roots are susceptible to winter kill. Applying the herbicide onto the correct plant is important, because roots of crops (especially legumes) can also be damaged.

Aminopyralid, clopyralid, and Picloram provide similar suppression in pastures and rangelands when applied at

label rates and at times when the plant can get it into the root system. Picloram is a restrict-use herbicide because it is persistent, yet mobile in the soil, and can contaminate water.

**BIOLOGICAL CONTROLS** [Adapted from Jacobs et al. 2007]

Canada Thistle Stem Weevil (*Hadroplontus litura*) is a stem-boring weevil that attacks Canada Thistle rosettes. Adults lay a few eggs into a cavity (1-2.5 mm wide) on the underside of leaves that are at least 5 cm long over a 4 to 5 week period. Larvae emerge and mine down the leaf's mid-veins into the root crown and sometimes the upper root to feed on callus tissues. Older larvae mine the stem and then emerge to pupate, impacting root reserves for overwintering (<https://integratedweedcontrol.com>). Canada Thistle Stem Weevil will cause the most damage if it attacks the stem before it grows. Larvae pupate in cocoons of soil particles and the adults emerge in late summer to early fall to feed on the upper leaves and stems. They over-winter in soil litter, and in the spring will emerge to eat rosette leaves by puncturing them. While this will not usually kill the plant, the holes left in the root crown makes the plant susceptible to a fatal rust fungus.

Thistle Seed Head Weevil (*Rhinocyllus conicus*) is the most widely distributed insect for thistle control in the U.S.; however, the U.S. Department of Agriculture prohibits moving these weevils between states because it can feed on native thistles. It has been shown to reduce 90-95% of thistles over an 8 to 9 year period.

Leaf Beetle (*Altica carduorum*) adults feed on all *Cirsium* species; although, it is predicted that it will favor Canada Thistle.

Canada Thistle Stem Gall Fly (*Urophora cardui*) adults lay eggs into stem tissue (<https://integratedweedcontrol.com>). The developing larvae then cause the plant's formation of a hard woody gall, which takes energy from the plant. Stems, buds, foliage, and flowers above the galls are often malformed or stunted and prone to dry up ahead of unattacked stems, thereby, not contributing energy to root reserves.

**GRAZING CONTROLS** [Adapted from Jacobs et al. 2007]

Canada Thistle leaves are spiny and unpalatable to most livestock, and thus grazing is not usually used to control populations. However, in Australia intensive sheep grazing reduced the spread of Canada Thistle when compared to ungrazed pastures. In Canada goats have been observed to eat plants, preventing it from flowering.

**Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)

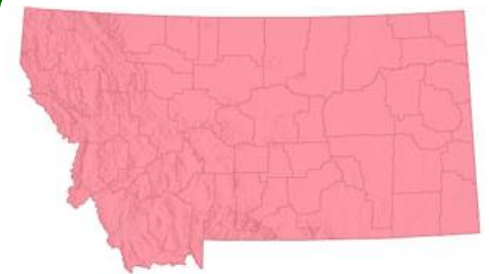


## Leafy Spurge *Euphorbia virgata*

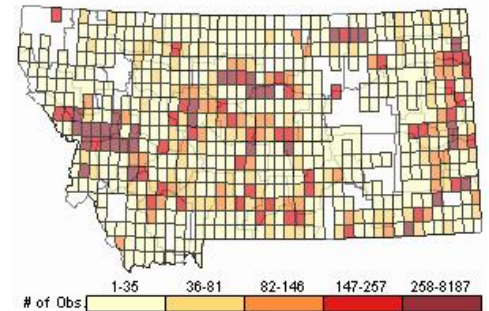
[View in Field Guide](#)


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

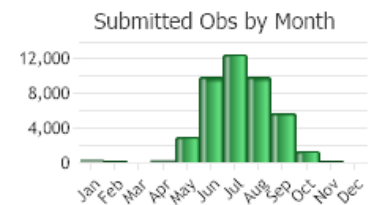
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



# Observations: 59188



### General Description

**PLANTS:** Glabrous, perennial forb with spreading roots and branched stems that are 30–80 cm tall. Plants produce vegetative and flowering stems that when cut exude a white, milky latex. Stems are pale green to blue-green. Sources: Jacobs 2007; Lesica et al. 2012

**LEAVES:** Stem leaves are alternately arranged and sessile or with very short petioles. Leaf blades are green to blue-green, linear-oblongate in shape, 2–6 cm long, and have entire (smooth) margins. When cut leaves cut exude a white, milky latex. Sources: Jacobs 2007; Lesica et al. 2012

**INFLORESCENCE:** A terminal umbel of yellow-green, ovate bracts containing inconspicuous flowers that lack petals and sepals. The bracts are 8-16 mm long. Above the bracts, the true flowers are green and occur within a cup-like involucre called a cyathium (plural is cyathia). Each cyathium contains one seed (female) flower, 3 (male) pollen flowers, are 2–3 mm long, and have 4 yellowish glands with a lunate appendage. Fruits are a capsule, about 4 mm long, lobed and nearly smooth. Sources: Jacobs 2007; Stein 2011; Lesica et al. 2012

### Phenology

Flowering and fruiting in spring through fall (FNA 2016).

### Diagnostic Characteristics

**Leafy Spurge** - *Euphorbia virgata*, exotic and Noxious

- \* A rhizomatous perennial.
- \* Stems are blue-green to pale green.
- \* Stem leaves are alternate below the inflorescence. Leaf blades are linear, linear-oblongate, or linear-oblong, 6-15 times longer than wide, margins are (almost) parallel at the middle, leaf apex is acute, and leaf base is truncate to abruptly attenuate.
- \* Leaf margins smooth (entire).

**David's Spurge** - *Euphorbia davidii*, invasive exotic

- \* Annual with a taproot; not rhizomatous.
- \* Stem leaves all opposite.
- \* Capsules and seeds are larger. Seeds are essential for identification.
- \* Leaves are more elliptic and thicker with toothed margins.
- \* Hairs are shorter and stiffer.

**Yellow Toadflax** - *Linaria vulgaris*, exotic and Noxious.

- \* Non-flowering plants are similar. Leaves are glabrous, long, and narrow.
- \* Flowers are snapdragon-like, yellow, and lack leafy bracts.

## TAXONOMY & NOMENCLATURE

Leafy Spurge is part of a taxonomically complex group of species native to Europe and Asia (Berry et al. *in* Flora of North America (FNA) 2016).

The true ***Euphorbia esula*** Linnaeus is restricted to certain parts of Europe where it shows little tendency to weediness (Berry et al. *in* FNA 2016). It is distinguished from *Euphorbia virgata* Waldstein & Kitaibel by leaf shape. *Euphorbia esula* Linnaeus has leaves that are oblanceolate to obovate-elliptic in shape, margins that are not parallel at the mid-leaf, an apex that is rounded to subacute, a base that is gradually attenuate to cuneate, and general size that is 3-8(-10) times longer than wide (Berry et al. *in* FNA 2016). Herbarium specimens of *Euphorbia esula* Linnaeus indicate plants were present in North America, but apparently have not persisted, and are assumed absent (Berry et al. *in* FNA 2016).

***Euphorbia virgata*** Waldstein & Kitaibel is widespread across Europe and temperate Asia, where it shows the same weedy characteristics found in North America (Berry et al. *in* FNA 2016). *Euphorbia virgata* Waldstein & Kitaibel retains the common name of "**Leafy Spurge**" (Berry et al. *in* FNA 2016).

## Habitat

---

Grasslands, meadows, woodlands, and riparian forests in the plains and valleys of Montana (Lesica et al. 2012).

## Management

---

An integrated vegetative management approach provides the best long-term control for Leafy Spurge. It requires that land-use objectives and a desired plant community be identified (Shelly et al. *in* Sheley and Petroff 1999). Once identified the integrated weed management strategy can promote a weed-resistant plant community that serves other land-use objectives such as livestock forage, wildlife habitat, or recreation (Shelly et al. *in* Sheley and Petroff 1999).

### PREVENTION [Adapted from Lajeunesse et al. *in* Sheley and Petroff 1999]

Preventing the establishment of Leafy Spurge can be accomplished by many practices:

- \* Learn how to accurately identify Leafy Spurge in order to detect occurrences and know where to implement control methods.
- \* Prevent vehicles from driving through and animals from grazing within infested areas.
- \* Thoroughly wash the undercarriage of vehicles and wheels in a designated area before moving to uninfested areas.
- \* Frequently monitor for new plants, and when found implement effective control methods.
- \* Maintain proper grazing management that creates resilience to noxious weed invasion.
- \* Use certified weed-free seeds and hay, including feed for pack animals.
- \* Before moving animals from infested areas, hold cattle for 6 days and sheep for 11 days in corrals or pastures to allow seed to pass through the digestive tract before moving to uninfested areas. Monitor and treat the holding area for emerging Leafy Spurge.
- \* Do not pick the flowers or transport plants. Where possible, contribute to or develop educational campaigns to help eradicate or reduce Leafy Spurge populations.

### PHYSICAL and CULTURAL CONTROLS [Adapted from Lajeunesse et al. *in* Sheley and Petroff 1999]

Hand-pulling can be done for small infestations. However, it is considered ineffective because of the deep depth of the root system and its numerous buds.

Mowing may remove flowering stems, but is ineffective for controlling Leafy Spurge because it re-sprouts from buds on the spreading roots.

Tilling can be effective if done intensively throughout the growing season or only during fall. The intensive program would begin in the spring, use a duckfoot cultivator that tills 4 inches deep, and repeats the tilling every 3 weeks until the soil freezes for 1 to 2 growing season. The schedule must not be interrupted because fragmented rootstock will quickly re-sprout. Machinery must be thoroughly cleaned to prevent contaminated the field and other areas. Fall-only cultivation would occur in the autumn when Leafy Spurge is 3-6 inches tall, cultivate 1-2 times after harvest, and for 3 years. Fall-only cultivation allows crops to grow, limits organic matter degradation, and reduces soil erosion. Combining the Fall-only cultivation with other methods could provide better control.

Prescribed burning by itself is ineffective for controlling Leafy Spurge because fire stimulates seed germination and re-sprouting of the buds on the root crown and spreading roots. However, herbicide absorption might be improved when integrated with a burning plan. Burning removes all of the above-ground biomass and provides a uniform surface for re-growth to be seen and for the herbicide to be applied uniformly. After burning about 5 weeks of re-growth should occur before the herbicide is applied. The combination does not control Leafy Spurge any better, but provides a better surface for herbicides to be applied and absorbed into the plant.

#### **BIOLOGICAL CONTROLS** [Adapted from Jacobs 2007]

14 insects have been approved for introduction into the U.S. as biological control for leafy spurge by the U.S. Department of Agriculture.

Of all the biocontrol insects for Leafy Spurge *Aphthona* Flea Beetles are widespread and have reduced Leafy Spurge the most in Montana. The exception is Minute Spurge Flea Beetle (*Aphthona abdominalis*) which is reported as not established in Montana and not available in the U.S. The Leafy Spurge Flea Beetles are capable of surviving cold, sub-freezing winter temperatures. Larvae of *Aphthona* Flea Beetles develop in the soil, and cool soil temperatures can delay development and establishment. Herbicide applications, grazing, or mowing that reduces the density of Leafy Spurge has been observed to improve flea beetle establishment. Ants are predators on these insects and releases should not occur where there are ant mounds. Some bio-control companies sell or provide mixed releases to boost success since release sites vary in soil type, canopy cover, and moisture.

\* Brown Dot Leafy Spurge Flea Beetle (*Aphthona cyparissiae*): Best where soils are 40 to 60 % sand and Leafy Spurge stems are taller than 21 inches and 50-121 stems per square yard based on research in Canada. Green Needle Grass (*Stipa viridula*) is an indicator of suitable habitat in Canada.

\* Black Leafy Spurge Flea Beetle (*Aphthona czwalinae*): It not does establish well in clay or acidic soils or in deeply shaded areas.

\* Copper Leafy Spurge Flea Beetle (*Aphthona flava*)

\* Brown-legged Leafy Spurge Flea Beetle (*Aphthona lacertosa*): Best where sites are open, sunny, mesic to moderately dry, but can do well on wet sites too.

\* Black Dot Leafy Spurge Flea Beetle (*Aphthona nigriscutis*): Best suited for dry sites with full solar exposure, well-drained soils with less than 3% organic matter, and Leafy Spurge plants of less than 30 inches tall and fewer than 60 stems per square yard (Jacobs 2007). It has been found to feed on the native Euphorbia brachycera, which is a plant that occurs in Montana.

Clearwing Moth (*Chamaesphecia crassicornis*): Moth where larvae attack roots and stems.

Hungarian Clearwing Moth (*Chamaesphecia hungarica*): Moth where larvae attack roots.

Spurge Hawkmoth (*Hyles euphorbiae*): Best where Leafy Spurge plants are dense within open areas near trees. Larvae consume leaves and can kill the plants. Larvae pass through five growth stages before becoming adults. Larvae have toxins that deter predators; however, their pupae are eaten by birds, ground squirrels, and other small mammals.

Red-headed Leafy Spurge Stem Borer (*Oberea erythrocephala*): It seems to establish best in riparian areas and mesic sites with trees. When adults lay eggs they girdle and often kill Leafy Spurge stems. Larvae will kill stems when feeding, which reduces the plant's ability to store energy or produce seeds. They are compatible with *Aphthona* Flea Beetles, causing greater negative impacts to Leafy Spurge.

Leafy Spurge Tip Gall Midges (*Spurgia esulae*): Best where sites are have cooler areas (partially shaded) with dense Leafy Spurge. The insect forms a gall at the tip of the stem. From the gall larvae attack the growing shoot tips, which prevents flowering but stimulates branching and shoot re-growth. The insect can produce up to three generations each summer which attack the new shoots.

#### **Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



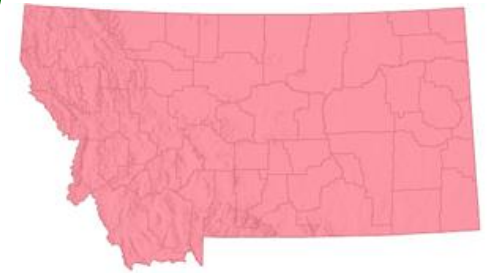
## Hoary False-alyssum

*Berteroa incana*

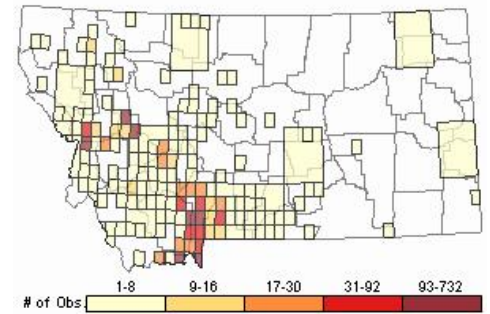
[View in Field Guide](#)


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

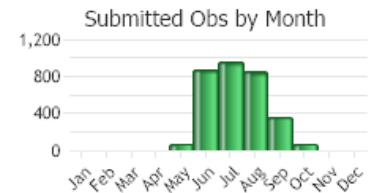
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



# Observations: 3225



### General Description

**PLANTS:** Annuals with erect, branched stems and 20–75 cm tall. Plants are densely hairy with star-shaped, appressed trichomes (stellate pubescence) that give it a gray appearance. Source: Lesica et al. 2012.

**LEAVES:** Basal leaves have petioles, are widest near their tip (oblanceolate) with entire (smooth) margins, and whither by flowering. Stem leaves are sessile, oblanceolate, 1–3 cm long, and grow erect but become reduced upwards. Source: Lesica et al. 2012.

**INFLORESCENCE:** A narrow, simple or compound, many-flowered raceme. Flowers consist of 4 green sepals with white margins of 2–3 mm long and 4 white petals of 4–6 mm long. Petals are narrow at the base, flare upwards, and are deeply notched, and may appear 8-petaled. Sources: Lesica et al. 2012; Parkinson et al. 2017.

*Berteroa* is named for Carlo Giuseppe Bertero, 1789-1831, an Italian physician and botanist who settled in Chile (FNA 2003). The common name of Hoary False-alyssum references the plant's grayish appearance from stellate hairs (hoary) and its original treatment by Carl Linnaeus who placed it in the genus *Alyssum*.

### Phenology

Flowering May through September (FNA 2003).

### Diagnostic Characteristics

There are many white-flowered members of the Mustard Family, both native and exotic. It is recommended that identifications be made using a plant manual designed for Montana. Mustards have flowers with 4 sepals, 4 petals, and 6 stamens (4 long and 2 short) among other characteristics.

**Hoary Alyssum** – *Berteroa incana*, exotic and Noxious:

- \* White-flowered, annual plants that grow from taproots and have mature silicles (fruits) that are not notched at their tip.
- \* Each of the 4 petals are notched, making the flower appear 8-petaled.
- \* Plants have star-shaped hairs; whereas, *Lepidium* species have simple hairs or none.
- \* Stem leaves are widest near their tip (oblanceolate), sessile on the stem, and point upwards.

**Field Pennycress** – *Thlaspi arvense*, exotic:

- \* White-flowered, annual plants that grow from taproots and have mature silicles (fruits) that are large, deeply notched at their tip, flat, and with very wide wings, resembling a penny.

- \* Lower stem leaves have petioles. Upper stem leaves are sessile, clasping, auriculate (lobed like an arrow), and with smooth to toothed margins.

**Little Seed False Flax** – *Camelina microcarpa*, exotic:

- \* Pale yellow-flowered, annual plants that grow from taproots and have mature silicles that lack a notch, lack hairs (glabrous), have a style (beak) of 5-7 mm long and a stalk of 9-15 mm long.
- \* Plants have simple or branched hairs, but not star-shaped hairs.

**Perennial Pepperweed** – *Lepidium latifolium*, exotic and Noxious:

- \* White-flowered plants that grow from creeping roots (rhizomes) and have mature silicles (fruits) that are not notched at their tip.
- \* White petals are not notched.
- \* Silicles are glabrous or sparsely pilose (long soft hairs) with a very short style of 0.1 mm long or less. Silicle stems (pedicels) are 2-5 mm long.
- \* Stem leaves are sessile, but do not clasp around the stem.

**Whitetop** – *Lepidium draba*, exotic and Noxious:

- \* White-flowered plants that grow from creeping roots (rhizomes) and have mature silicles (fruits) that are not notched at their tip.
- \* White petals are not notched.
- \* Silicles are glabrous (lack hairs), flattened, and their base is cordate (heart-shaped or indented). Silicles are tipped with a style of 1-1.5 mm long. Silicle stems (pedicels) are 5-12 mm long.
- \* Stem leaves are auriculate (lobed like an arrow) and clasping around the stem.

**Common Yarrow** – *Achillea millifolium*, native and desirable:

- \* Member of the Aster or Sunflower Family.
- \* Bright-white flowers arranged closely in a flat-topped inflorescence.
- \* Leaves are 2-3 times pinnately dissected, appearing fern-like or bushy like a squirrel's tail.

Sources: Jacobs and Mangold 2007; FNA 2010; Graves-Medley and Mangold 2011; Lesica et al. 2012.

---

## Habitat

Hoary False-alyssum commonly grows in fields, along roadways, on trails, and along gravelly banks of streams and lakes in the plains, valleys, and montane areas of Montana (Lesica et al. 2012; Parkinson et al. 2017).

---

## Management

An integrated vegetative management approach provides the best long-term control, and requires that land-use objectives and a desired plant community be identified (Shelly et al. *in* Sheley and Petroff 1999). Once identified an integrated weed management strategy can be developed to promote a weed-resistant plant community and serves other land-use objectives such as livestock forage, wildlife habitat, or recreation can be developed, making control of Hoary False-alyssum possible.

Plants are easily spread across long distances in contaminated hay, lawn, and other forage seed and across short distances by vehicles, farm equipment, and animal grazing (Parkinson et al. 2017).

### **PREVENTION** [Adapted from Parkinson et al. 2017]

Seed development must be prevented to reduce or stop spread. Spread can be prevented or reduced by:

- \* Preventing vehicles from driving through and animals from grazing within infested areas,
- \* Thoroughly wash the undercarriage of vehicles and wheels in a designated area before moving to an uninfested area,
- \* Encouraging landowners to frequently monitor their land for new infestations and, when found to implement effective control methods.
- \* Maintain proper livestock grazing management that is more resilient to Hoary False-alyssum invasion, and
- \* Developing educational campaigns to teach people to not pick and transport the white flowers.

### **PHYSICAL and CULTURAL CONTROLS** [Adapted from Parkinson et al. 2017]

Hand-pulling is effective because the plants are annuals with shallow taproots. Plants should be pulled when soil is moist to better extract the entire root; roots that remain in the soil could re-generate. Hand-pulling needs to occur repeatedly until the seed bank is depleted. Plants with seeds should be burned if conditions permit or sealed in plastic to desiccate or rot before disposing into the trash

Mowing will not control Hoary False-alyssum and does remove other plants that could shade-out or compete

against it. Mowing also disperses seeds. In certain situations and when combined with irrigation and nutrient management mowing to a 6-inch stubble height could increase the vigor of desirable plants that would shade-out and reduce Hoary False-alyssum seed production. Mowers must be carefully and thoroughly cleaned to prevent spreading seeds.

Shallow Tilling that severs the tap root below the root crown will kill plants and increase seed germination. Therefore, repeated tilling should occur to deplete the seed bank. Alternatively, tilling in combination with other treatments (example, hand-pull, herbicide, revegetation) can control Hoary False-alyssum.

Prescribed Burning can kill plants and seed if done before silicles open. However, burning exposes soils and creates a high light condition that might be conducive for invasion. Fire in combination with other treatments might be useful. An integrated weed management plan and diligent monitoring is necessary to develop an effective plan.

Revegetation is effective at controlling Hoary False-alyssum plants and seed production. Sustainable suppression requires revegetation with desirable plants that compete well for light, water, and nutrients. Desirable vegetation should be appropriate for the management objectives, adapted to the site conditions, be competitive. Planting with appropriate native plants is highly encouraged. Refer to Montana Plant Materials Technical Note 46, *Seeding Rates for Conservation Species for Montana*, and Extension Bulletin EB0019, *Dryland Pasture Species for Montana and Wyoming* for possible species selection and seeding rates.

Irrigation and Fertilization can be used to increase production of other plants because Hoary False-alyssum prefers drier conditions and thrives on sites with poor soil fertility. Used together proper irrigation and nutrient management can prevent invasion or reduce infestations. However, these treatments should also be appropriate for the site conditions and land management objectives. Revegetation should also likely be included in the treatment plan.

#### **CHEMICAL CONTROLS** [Adapted from Parkinson et al. 2017]

As of 2018 few herbicide formulations list Hoary False-alyssum on their labels. For up to date information on herbicides, consult [Greenbook](#).

For control in rangelands and grass pastures products that contain the active ingredient Metsulfuron-Methyl can be effective. An anecdotal report suggests that 2,4-D at the rate of 1 quart per acre provides effective and economical control in rangelands and pastures.

As of 2018 there are no broadleaf herbicides labeled for control of Hoary False-alyssum on grass/legume mixed pastures because these chemicals can harm legumes. For highly disturbed areas with Hoary False-alyssum Glyphosate applied at 1-2 quarts per acre controls all plants, but must be followed with a revegetation plan.

It is often standard to apply herbicides to actively growing plants before they bolt. The research in southwest Montana found that several herbicides decreased Hoary False-alyssum seed production and viability across various growth stages from early to late flowering.

#### **GRAZING CONTROLS** [Adapted from Parkinson et al. 2017]

Hoary False-alyssum establishes and reproduces best in overgrazed land; therefore, proper grazing management techniques that maintain the competitiveness of forage plants is necessary.

In general grazing animals have not been used to control Hoary False-alyssum. Cattle can eat Hoary False-alyssum, but will generally select for more digestible plants. In a study goats were found to select for weed-free hay more than for hay mixed with Hoary False-alyssum. In a forage field study conducted in Minnesota, lambs rejected Hoary False-alyssum. In sufficient quantities Hoary False-alyssum is toxic to horses (refer to the Ecology Section).

#### **BIOLOGICAL CONTROL** [Adapted from Parkinson et al. 2017]

Currently no biological control agents are available.

#### **Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



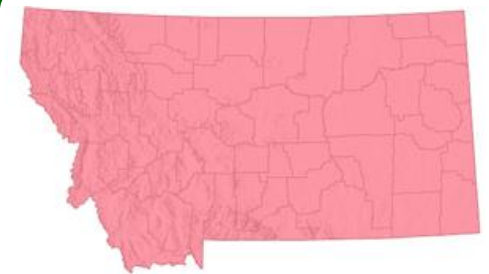
## Sulphur Cinquefoil

*Potentilla recta*

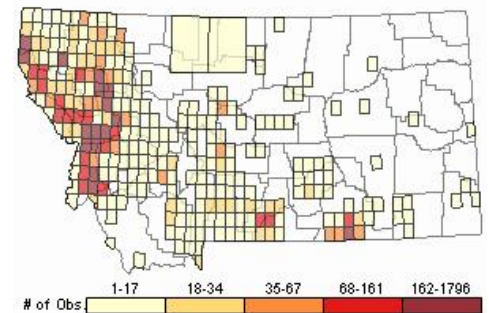
[View in Field Guide](#)


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

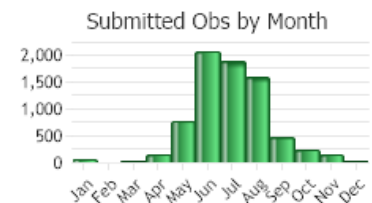
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



**# Observations: 12253**



### General Description

**PLANTS:** Perennial forb that grows from a simple to branched caudex. Stems are singular to several, erect, and 20-50 cm tall. Stems have hispid hairs – long, straight, stiff, and perpendicular to the stem. Plants grow from a taproot with some shallow, spreading roots. Source: Rice *in* Sheley and Petroff 1999; Lesica et al. 2012

**LEAVES:** Leaves are arranged alternately. In outline leaf blades are somewhat round and 2-7 cm long. Leaves are palmately divided into 5 to 7 lanceolate, dentate leaflets with spreading hairs. Leaf size decreases upwards on stem. Petioles have hispid hairs which are perpendicular to the stalk. Basal leaves are similar. Source: Lesica et al. 2012

**INFLORESCENCE:** Yellow flowers are arranged in an open, flat-topped cyme (above the height of the leaves). 5 green sepals are lanceolate in shape, strongly veined, and 4–7 mm long. Bracteoles alternate with and appear similar to the sepals. 5 petals are light (sulphur) yellow, 6–10 mm long, longer than the sepals, and notched. Source: Lesica et al. 2012

### Phenology

Flowers in late spring through summer (Ertter and Reveal *in* FNA 2014).

### Diagnostic Characteristics

Montana has at least 30 *Potentilla* or Cinquefoil species (Lesica et al. 2012). Readers are encouraged to learn their identifiable traits before implementing control on an unrecognized plant!

#### **Sulphur Cinquefoil** – *Potentilla recta*, exotic and Noxious:

- \* Fewer basal leaves with numerous stem leaves.
- \* Plants with long hairs perpendicular to their surface.
- \* Inflorescence 'flat-topped' and bright, light-yellow flowers.
- \* Taproot has short branches.
- \* Plants are more yellowish-green in comparison to other *Potentilla* plants.
- \* Leaflets are serrated about half-way to their mid-veins.
- \* Seeds with a net-like pattern on their coat.

#### **Fanleaf Cinquefoil** – *Potentilla gracilis*, native and desirable:

- \* Many basal leaves and relatively fewer stem leaves.
- \* Plants with short, spreading hairs.
- \* Underside of leaves have dense, woolly hairs.
- \* Plants are rhizomatous.
- \* Flowers are brighter/darker yellow.
- \* Leaves are green to gray-green.

- \* Leaflets are serrated more than half-way to their mid-veins.
- \* Seeds have a smooth coat.

## Habitat

---

Grasslands, meadows, pastures, and disturbed forests in the plains, valleys, and montane zones of Montana (Lesica et al. 2012).

## Management

---

An integrated vegetative management approach provides the best long-term control, and requires that land-use objectives and a desired plant community be identified (Shelly et al. *in* Sheley and Petroff 1999). Once identified an integrated weed management strategy can be developed to promote a weed-resistant plant community and that serves other land-use objectives such as livestock forage, wildlife habitat, or recreation.

### **PREVENTION** [Adapted from Rice *in* Sheley and Petroff 1999]

Preventing the establishment of Sulphur Cinquefoil can be accomplished by many practices:

- \* Learn to accurately identify Sulphur Cinquefoil in order to detect occurrences and know where to implement control methods.
- \* Prevent vehicles from driving through and animals from grazing within infested areas.
- \* Thoroughly wash the undercarriage of vehicles and wheels in a designated area before moving to uninfested areas.
- \* Frequently monitor for new plants, and when found implement effective control methods.
- \* Maintain proper grazing management that creates resilience to noxious weed invasion.
- \* Do not pick the flowers or transport plants. Where possible, contribute to or develop educational campaigns to help eradicate or reduce Sulphur Cinquefoil populations.

### **PHYSICAL and CULTURAL CONTROLS** [Adapted from Rice *in* Sheley and Petroff 1999]

Hand-digging is effective for removing plants and eradicating small populations. As with any plants, long-sleeves and gloves should be worn to protect one's skin. Hand-digging is easiest when soils are moist. Digging tools can easily be placed under the root-crown to remove the plant.

Mowing is not effective because the plants respond by developing heftier roots and more above ground stems.

### **CHEMICAL CONTROLS** [Adapted from Rice *in* Sheley and Petroff 1999]

Herbicides can be effective, especially when properly integrated with intensive pasture management. The herbicide type and concentration, application time and method, environmental constraints, land use practices, local regulations, and other factors will determine its effectiveness and impact to non-target species. Strict adherence to application requirements defined on the herbicide label will reduce risks to human and environmental health. Consult your County Extension Agent and/or Weed District for information on herbicidal control. Chemical information is also available at [Greenbook](#).

Picloram (0.25 pound acid equivalent (ae) per acre) applied in the spring to plants up to late bud stage or in the fall can provide several years of control. Residual activity of Picloram suppresses re-establishment from seed germination, but should only be used on upland sites and not around water.

2,4-D ester (1.0 pounds ae per acre) applied in the spring to plants at the rosette to bud stages will provide one year of good control. It may be better to use at sites near water.

Clopyralid is not effective on Sulphur Cinquefoil plants.

### **GRAZING CONTROLS** [Adapted from Rice *in* Sheley and Petroff 1999]

Sulphur Cinquefoil is unpalatable to most livestock because of its high tannin content. On open range or in places with low stocking rates livestock have been found to eat the flowers of Spotted Knapweed (*Centaurea stoebe*) while ignoring Sulphur Cinquefoil in places where they co-exist. When Sulphur Cinquefoil is eaten it tends to be flowers or buds scattered across plants. Therefore, domestic grazing can favor the replacement of Spotted Knapweed, which is a short-lived perennial, with the longer-lived Sulphur Cinquefoil and the continual decline of native forbs and grasses.

Sheep and goats can eat Sulphur Cinquefoil, but is not shown to be very effective. Where animals are known to eat Sulphur Cinquefoil, they should be corralled for at least 3 days before moving into uninfested areas (Frost et al. 2013?).

**BIOLOGICAL CONTROLS** [Adapted from Rice *in* Sheley and Petroff 1999]

Using biological control organisms on Sulphur Cinquefoil has been problematic because of its genetically close relationship to strawberries (*Fragaria* spp.). Some root- and crown-boring insects found on Sulphur Cinquefoil plants in Montana were also found to be pests on strawberries (Rice *in* Sheley and Petroff 1999).

**Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



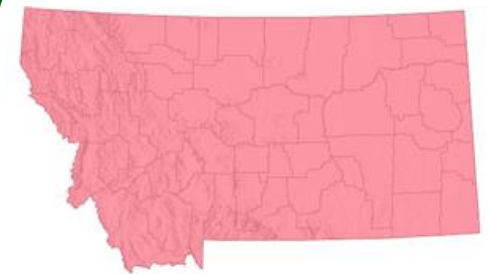
## Oxeye Daisy

*Leucanthemum vulgare*

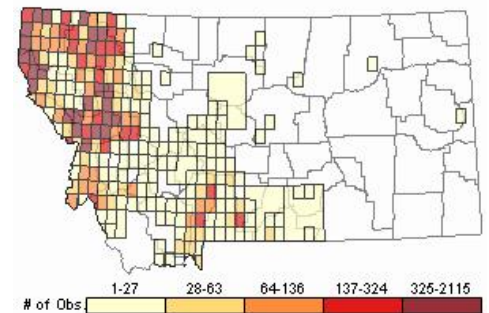
[View in Field Guide](#)


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

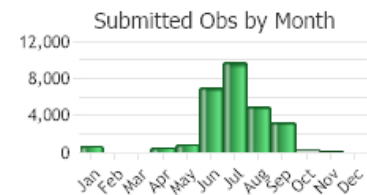
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



# **Observations:** 29051



### General Description

**PLANTS:** A rhizomatous perennial forb with erect stems that grow 20-80 cm tall. Plants are glabrous (lacks hairs). Plants have basal and erect stems. Source: Lesica et al. 2012

**LEAVES:** Basal leaves have long petioles (stalks). Basal leaf blades are spoon-shaped to round and shallowly lobed (crenate). Cauline leaves are alternately arranged, petiolate but become sessile upwards. Sources: Lesica et al. 2012; Davis and Mangold 2018.

**INFLORESCENCE:** Flower heads are mostly solitary on long peduncles (stems). Flower heads are 1-2 cm wide and have white ray florets and yellow disk florets. Involucral bracts are, uneven, in 2-4 rows, and green with brown scarious margins. The flower head's receptacle is nearly flat and naked (lacks awns, scales or bristles between the disk florets/achenes). The 15-35 ray florets have white petals of 1-2 cm and are fertile. The numerous disk florets have yellow petals, lack a pappus, are 2-3 mm tall, and have flattened style branches. Sources: Lesica et al. 2012; Davis and Mangold 2018.

The genus *Leucanthemum* comes from the Greek words *leuco-* for white and *antheon* for flower. The specific epithet *vulgare* means common.

### Phenology

Oxeye Daisy flowers from spring to fall (FNA 2006).

### Diagnostic Characteristics

**Oxeye Daisy** – *Leucanthemum vulgare*, exotic and noxious:

- \* Tall plants (20-80 cm) that have the stereotypical "daisy" appearance of white petals with yellow centers.
- \* Leaves are lobed or toothed less than half-way to their mid-vein.
- \* Involucral bracts are in 2 to 5 rows and unequal, and with very few hairs (glabrate).

**Lawn Daisy** - *Bellis perennial*, exotic and undesirable:

- \* Short (5-15 cm) plants that have the stereotypical "daisy" appearance of white petals with yellow centers.
- \* Leaves are entire to toothed.
- \* Involucral bracts are in a single row, narrowly ovate, and with hairs (strigose).

### Habitat

In Montana Oxeye Daisy grows mostly in moist area along roadsides and in fields, meadows, forest openings, and pastures converted from forest in the valleys to montane zones (Lesica et al. 2012). Elsewhere it is also found along railroad embankments and waste areas.

## Management

---

An integrated vegetative management approach provides the best long-term control of Oxeye Daisy. It requires that land-use objectives and a desired plant community be identified (Shelly et al. *in* Sheley and Petroff 1999). Once identified the integrated weed management strategy can promote a weed-resistant plant community and serves other land-use objectives such as livestock forage, wildlife habitat, or recreation can be developed, making control of Oxeye Daisy possible.

### PREVENTION

Oxeye Daisy is often encouraged as an ornamental to plant, and has been found in numerous seed mixes. Users should carefully read packaging labels and not purchase if its scientific names or common names or any synonyms are listed.

Seed development must be prevented to reduce or stop spread.

- \* Prevent vehicles from driving through and animals from grazing within infested areas,
- \* Thoroughly wash the undercarriage of vehicles and wheels in a designated area before moving to an uninfested area,
- \* Encourage landowners to frequently monitor their land for new infestations and, when found to implement effective control methods.
- \* Maintain proper livestock grazing management to encourage competitive vegetation, and
- \* Develop educational campaigns to teach people to not pick and transport the white flowers.

### PHYSICAL and CULTURAL CONTROLS [Adapted from Olson and Wallander *in* Sheley and Petroff 1999]

Hand-pulling can be effective for small or new infestations. It should be done before plants have flowered. Gloves should be worn to protect skin. Plants should be bagged, allowed to desiccate or rot, and then be deposited in the landfill.

mowing as soon as flower buds develop is effective to reduce seed production. However, mowing will stimulate shoot production, and subsequent flowering could occur if conditions are good. Not mowing fields with Oxeye Daisy is also not a good control method because over-time Oxeye Daisy will likely succeed.

Tilling that is repeated in the same growing season can kill plants because rhizomes grow shallow in the soil profile. Seeds in the seedbank will germinate, and require follow-up treatment.

### GRAZING CONTROLS [Adapted from Olson and Wallander *in* Sheley and Petroff 1999]

Horses, sheep and goats will graze Oxeye Daisy, while cattle and pigs avoid it because it is acrid. Information on how horses, sheep, or goats can be used to control Oxeye Daisy was not found.

Horses, sheep, and goats that graze where Oxeye Daisy grows should be retained in a holding pen before moving into uninfested areas.

Grazing management that maintain vigorous growth of desirable plants will help compete against Oxeye Daisy.

### CHEMICAL CONTROLS [Adapted from Olson and Wallander *in* Sheley and Petroff 1999]

The herbicide type and concentration, application time and method, environmental constraints, land use practices, local regulations, and other factors will determine its effectiveness and impact to non-target species. Strict adherence to application requirements defined on the herbicide label will reduce risks to human and environmental health. Consult your County Extension Agent and/or Weed District for information on herbicidal control. Consult your County Extension Agent and/or Weed District for more information on herbicidal control. Chemical information is also available at [Greenbook](#).

Oxeye daisy is moderately resistant to some 2,4-D-based herbicides except at high rates of 5 pounds per acre.

One study found that applying 80 pounds of nitrogen fertilizer was a more cost-effective treatment after 7 years that using herbicide alone or in combination with fertilizer. The treatment increased grass yields by 500% over this time. Herbicides can kill plants, while fertilizers promote growth of desirable forage.

Picloram (1.5 pint per acre) mixed with 2,4-D (1 quart) per acre was applied to a heavily infested Oxeye Daisy site in 1990. The treatment provided 100% control, but is not recommended to use for a long-term control method. Herbicides often have to be re-applied every 2-3 years because of the seed bank.

The seed bank and long length of seed viability will allow Oxeye Daisy to return for many years. Therefore, control methods that encourage the growth of vigorous, competitive desirable plants is recommended.

**BIOLOGICAL CONTROLS** [Adapted from Jacobs et al. 2015]  
Currently no biological control agents are available.

**Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



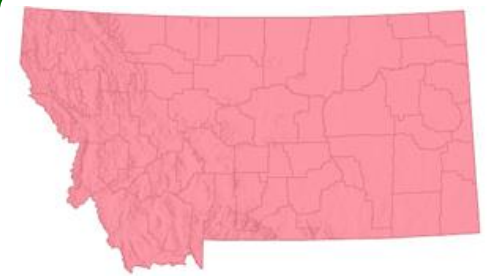
## Yellow Toadflax

*Linaria vulgaris*

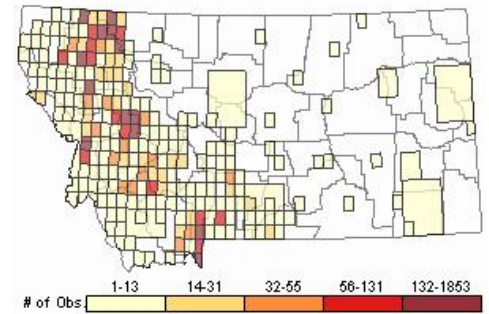
[View in Field Guide](#)


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

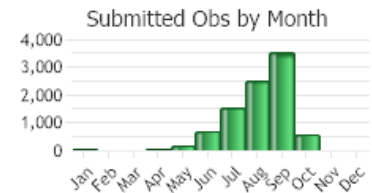
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



**# Observations: 9410**



### General Description

**PLANTS:** Taprooted perennial forbs that are somewhat woody at the base. Stems are clustered, erect, mostly simple (little branched), and 15–60 cm tall. Plants are most glabrous and pale green. Glandular hairs can be present in the upper stems/flowers. Sources: Lajeunesse *in* Sheley and Petroff 1999; Jacobs and Sing 2007; Lesica et al. 2012.

**LEAVES:** Alternate on the stem and numerous. Blades are narrow, linear-oblongate, and 1–5 cm long. Leaves are somewhat pointed on both ends.

**INFLORESCENCE:** A terminal bracteate raceme. Light yellow (butter-colored) flowers with orange centers and yellow spurs are snapdragon shaped and grow from the upper leaf nodes (leaf base).

The name "Toadflax" is in reference to its similarity to flax and is derived from "Tode Flax" or wild flax (Jacobs and Sing 2007). Carl Linnaeus derived the genus, *Linaria*, from *Linum*, the genus for Flax (Jacobs and Sing 2007). The specific epithet, *vulgaris* means "common"(Jacobs and Sing 2007).

### Phenology

Flowering can begin in May and continues until October. Plants flowers along the upper stems while producing seed in the lower flowers. Source: (Lajeunesse *in* Sheley and Petroff 1999).

### Diagnostic Characteristics

Montana's two exotic Toadflax species are both rhizomatous with similar snapdragon type flowers, but are easily separated by their leaves. Hybrids between the species can be produced in the lab, but are not known to occur under natural conditions (Lajeunesse *in* Sheley and Petroff 1999).

***Linaria vulgaris*** leaves are linear, more than 8 times as long as wide, and do not clasp the stem.

***Linaria dalmatica*** leaves are ovate, less than 8 times as long as wide, and clasp around the stem.

In the vegetative stage, **Leafy Spurge** (*Euphorbia virgata*) resembles Yellow Toadflax. The leaves of Leafy Spurge are glabrous, linear-oblongate in shape, 2-6 cm long, and with entire margins.

### Habitat

Roadsides, dry fields, grainfields, waste areas, gravel pits, pastures and rangeland, clearings, clearcuts, vacant

lots, and railroad yards. In the plains, valleys, montane, and subalpine habitats in Montana. Sources: Lajeunesse *in* Sheley and Petroff 1999; Lesica et al. 2012.

In Montana and Idaho, localized infestations can grow at high elevations (MTNHP Botanist personal communication). In the Big Sky area of Montana logging operations from the 1960's to 1980's created localized infestations, which have been spreading from residential development.

## Management

---

Successful control requires the use of several management strategies because of the plants genetic variability. Strategies for Yellow Toadflax should focus on preventing vegetative spread more than on reducing seed production. Once infestations are established, control will be labor-intensive, costly, and difficult.

### **PREVENTION** [Adapted from Lajeunesse *in* Sheley and Petroff 1999]

New infestations originate from seeds and vegetative buds on roots. Farm operations and equipment, vehicles, recreational activities, and other human actions can transport seeds. Check and clean all equipment before moving from an infested to an uninfested area. Use fill material that is weed-free, particularly in uninfested areas. When moving sheep or cattle from infested to uninfested areas, hold them in corrals/pastures for 11 or 6 days respectively, to allow time for viable seeds to pass through their digestive tracts. Monitor and control Toadflax in the holding areas. Purchase weed-free seed or hay.

### **CHEMICAL CONTROL** [Adapted from Lajeunesse *in* Sheley and Petroff 1999]

Yellow Toadflax is difficult to control with herbicides due to its high genetic variability, waxy leaf surface, soil type, and biology. Herbicides must be applied using a surfactant because leaves have a waxy surface (cuticle) which acts as a protective barrier, hindering uptake. Herbicides are more likely to leach when applied to plants growing in sandy soils or soils low in organic matter, which could result in indirect negative impacts. Even where herbicides appear effective, long-term control may not be achieved and reinvasion from dormant seeds may occur. Where herbicides are effective, infestations should be treated annually for 3 years (Jacobs and Sing 2007). Herbicides are more effective when applied in the spring before blooming (to reduce seed production), during flowering, and/or during fall re-growth (Jacobs and Sing 2007).

In a Colorado study, Picloram applied at 0.5 pounds per acre at the flowering stage at three different sites resulted in either 100, 69, or 35 percent control.

In a study Picloram (1.12 kg ai/ha) mixed with Fluroxypyr (0.89 kg ai/ha) applied to just before blooming resulted in fair to good control.

Chlorsulfuron applied at 1.25 ounces per acre at flowering or in the fall found 84% control after one year.

Studies using 2,4-D, 2,4-DB, MCPA, or MCPB were ineffective. Spot treatments in low-till cropland using Glyphosate, Amitrole, diquat or Picloram have been used. Applying Glyphosate along with cultivation has been effective for reducing Yellow Toadflax for up to 2 years.

Additional study results can be found in the Natural Resources and Conservation Service pamphlet by Jacobs and Sing 2007.

### **MECHANICAL and PHYSICAL CONTROL** [Adapted from Lajeunesse *in* Sheley and Petroff 1999]

Hand-pulling can be effective for small infestations, particularly when soil is moist or where sandy. To delete the root reserves, pulling annually for 5-6 years and removing the lateral roots is necessary. To remove first-year seedlings, a site needs to be re-visited annually for 10-15 years.

Mowing is often not practical on most sites and is not very effective since a lot of growth occurs by rhizomes.

Cultivation: Sweep-type cultivators used from at least early June and repeated every 7-10 days can control Toadflax. To eradicate, 4-5 cultivations are required in the second year. However, inconsistent tillage can spread plants. Machinery should be thoroughly cleaned to prevent spreading root fragments.

Burning can remove standing biomass of Toadflax, but will also stimulate seed germination and root sprouting. Therefore, burning is not a recommended control method.

### **REVEGETATION** [Adapted from Lajeunesse *in* Sheley and Petroff 1999]

Management practices, seeding, and plantings that encourage growth of desirable plants and those well-adapted to the environment will increase competition against Yellow Toadflax seedlings and rosettes. Revegetation strategies can be effective since Yellow Toadflax seed production and viability are low. Revegetation or seeding

should use several species that root at shallow, intermediate, and deep depths (least as deeply as Yellow Toadflax) in order to maximize competition for water, nutrients, and space. The mixture of species should provide active growth for as much of the year as possible, and include winter and summer annuals and shallow-rooted perennials. Desirable winter and summer annuals might compete well against Yellow Toadflax seedlings.

For information on revegetation species and seeding rates refer to Montana Plant Materials Technical Note 46, "Seeding Rates and Recommended Cultivars" and Extension Bulletin EB19 "Dryland Pasture species for Montana and Wyoming".

#### **GRAZING MANAGEMENT** [Adapted from Lajeunesse *in* Sheley and Petroff 1999]

Cattle usually avoid Dalmatian and Yellow Toadflax, though casual browsing has been observed along with reports of mild poisoning. Sheep can consume Dalmatian Toadflax as a major food source and not show signs of poisoning.

The timing of grazing is important in developing and maintaining competitive, desirable plant communities. Overgrazing sites encourages Yellow Toadflax germination and growth. This is particularly true in the spring because seedlings can capture available soil moisture and other resources better than overgrazed plants.

When moving livestock from an infested to an uninfested area, hold cattle for 6 days and sheep for 11 days in corrals or small pastures until viable seeds have time to pass through their digestive tract. Monitor these areas for seedling establishment and provide control where seen. Avoid purchasing feed or seed that is contaminated by weeds.

#### **BIOLOGICAL CONTROL** [Sources Lajeunesse *in* Sheley and Petroff 1999; Jacobs and Sing 2007.]

In general, it is recommended that at least 200 insects be established to create a sustainable population. Infestations should be at least 2 acres with sizeable populations. It may take 2-3 years for the insect population to establish.

As of 1998 6 insects have been approved and released in the U.S. and Canada for use on both Dalmatian and Yellow Toadflaxes. In Montana, none of these bio-control insects have proved to be highly effective on killing Yellow Toadflax foliage, but have reduced its fitness.

**Toadflax Flower Beetle** (*Brachypterolus pulicarius*) is thought to have been accidentally introduced, and now occurs throughout North America. Adult beetles feed primarily on growing shoot tips and axillary buds, but can also feed on pollen, anthers, and ovaries. Larvae feed entirely on pollen, anthers, ovaries, and immature seeds.

**Toadflax Seedhead Weevils** (*Gymnaetron antirrhini* and *Rhinusa neta*) are thought to be accidentally introduced to North America. *Rhinusa antirrhini* is more widely distributed. They impact seeds by stimulating the development of a gall, and their larvae feed on both deformed and normal seeds. *R. neta* larvae also feed on seeds, but without the development of a gall.

The timing of maturity between *Brachypterolus pulicarius* and *Gymnaetron* species can result in an interaction where *B. pulicarius* larvae predate upon the eggs of *Gymnaetron* species.

**Toadflax Brocade Moth** *Calophasia lunula* larvae feed on the lower leaves and stems of Yellow Toadflax. Their feeding can exhibit significant mortality to seedlings and young plants. However, pathogens within this insect constrains it from building a large enough population that is needed to significant impact Yellow Toadflax.

**Root-mining Cosmet Moth** *Eteobalea intermediella* has showed great promise for controlling Yellow Toadflax in studies, but for unexplained reasons this insect has not established well in North America.

**Toadflax Stem-boring Weevil** *Mecinus janthinus* was originally collected from Yellow Toadflax in its native range. While this biocontrol insect has impacted Dalmatian Toadflax populations very well, it has not affected Yellow Toadflax in western North America, and researchers do not know why. Researchers are now evaluating *M. heydeni* for targeting Yellow Toadflax.

#### **Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



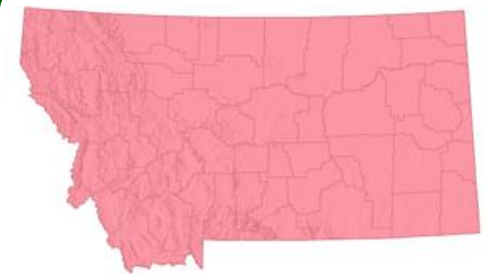
## Russian Olive

*Elaeagnus angustifolia*

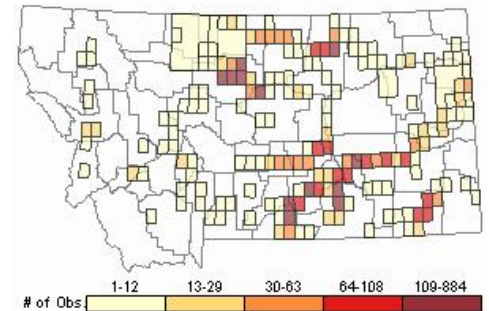
[View in Field Guide](#)


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

**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



# **Observations:** 5674



### General Description

**PLANTS:** Large shrubs or small trees that grow to 8 meters tall. Stems are thorny with a color and texture that is silvery-mealy becoming orange-brown. Source: Lesica et al. 2012

**LEAVES:** Alternately arranged. Blades are narrowly lanceolate with smooth (entire) margins, white-mealy, silvery beneath, and 3–10 cm long. Petioles are short. Source: Lesica et al. 2012

**INFLORESCENCE:** 1-4 stemmed (pedicillate) flowers grow in leaf axils or on short first-year twigs. Flowers have 4-sepals that are silvery on the outside and yellow within, and no petals. Sepals are 2-4mm long. The sepals and stamens form a tube (hypanthium) that surrounds but does not attach to the superior ovary (perigynous). The tube is 5–6 mm long, silvery. The fruit is olive-like, becoming green. Source: Lesica et al. 2012

### Phenology

Fruits mature in late summer.

### Diagnostic Characteristics

**Russian Olive** – *Elaeagnus angustifolia*, exotic, undesirable, and Regulated:

- \* Tall shrubs or small trees with twigs that have white-mealy hairs (trichomes), becoming orange-brown.
- \* Leaves are alternately arranged, narrowly lanceolate, white-mealy above, and silvery below.
- \* Twigs have thorns.
- \* Fruits are silvery-green and dry (olive-like).

**American Silverberry** – *Elaeagnus commutata*, native and desirable:

- \* Shrubs with twigs that have white-mealy hairs (trichomes), becoming gray.
- \* Leaves are alternately arranged, ovate to elliptic, white-mealy above, and silvery below.
- \* Twigs lack thorns.
- \* Fruits are silvery-green and dry (olive-like).

**Silver Buffaloberry** - *Shepherdia argentea*, native and desirable:

- \* Shrubs with twigs that have white-mealy hairs (trichomes), becoming gray.
- \* Leaves are oppositely arranged, oblanceolate, and white-mealy below.
- \* Twigs have thorns.
- \* Fruits are orange to red, juicy berries.

**Canada Buffaloberry** - *Shepherdia canadensis*, native and desirable:

- \* Shrubs with twigs that have brown-mealy hairs (trichomes), becoming gray.
- \* Leaves are oppositely arranged, narrowly ovate, and brown-mealy below.
- \* Twigs lack thorns.

\* Fruits are orange to red, juicy berries.

## Habitat

---

In Montana Russian Olive grows in woodlands, thickets, riparian forests, and moist meadows around wetlands in the plains and valleys (Lesica et al. 2012). Plants grow in soils with low to moderate soluble salt concentrations, and are somewhat tolerant of saline soil (Lesica and Miles 2001; Lesica et al. 2012).

## Management

---

Russian Olive will likely continue to increase along Montana's rivers because it is immune to beavers, is shade-tolerant, and can colonize a variety of moist habitats in the floodplains along our regulated and free-flowing floodplains. It may likely replace cottonwood trees along rivers where overbank alluvial deposition provides the only establishment for cottonwood seedlings (Lesica and Miles 2001). Russian Olive will tend to become dominant in reaches where the riparian zone is less dynamic and the stream is entrenched or channelized (Lesica and Miles 2001). Eradicating mature Russian Olive trees every 10 years or all trees every 30 years could be an effective strategy to control its populations and affects on native wildlife and plants (Lesica and Miles 2001).

### PREVENTION

To avoid the development of new infestations Russian Olive should not be planted near to riparian areas, overflow areas, or irrigation ditches (Lesica and Miles 2001).

### PHYSICAL and CULTURAL CONTROLS

**Revegetation:** Russian Olive is invasive, despite that it has a history of being used in restoration and other improvement-type land projects. There are many alternative species that should be used in conservation plantings and readers should consult [Species Alternatives for Russian Olive in Conservation Plantings](#) (Tober et al. 2006).

### CHEMICAL CONTROLS [Adapted from Piper *in* Sheley and Petroff 1999]

The herbicide type and concentration, application time and method, environmental constraints, land use practices, local regulations, and other factors will determine its effectiveness and impact to non-target species. Strict adherence to application requirements defined on the herbicide label will reduce risks to human and environmental health. Consult your County Extension Agent and/or Weed District for information on herbicidal control. Chemical information is also available at [Greenbook](#).

### Useful Links:

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



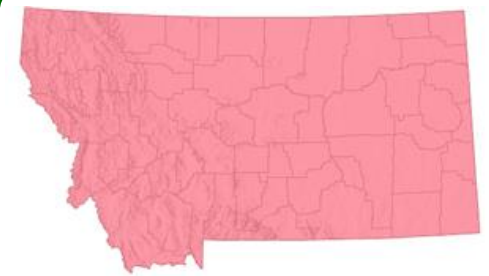
## Cheatgrass

*Bromus tectorum*

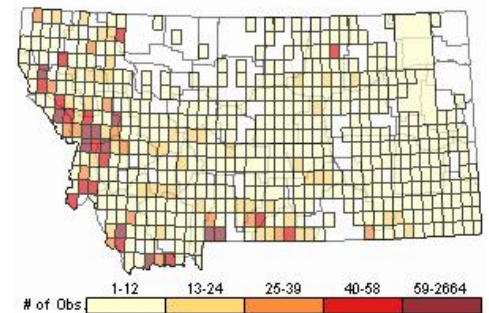
[View in Field Guide](#)


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

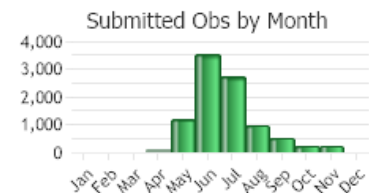
**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**  
**State Threat Score:**  
**CCVI:**  
**C-value: 0**



Range **Non-native**



# **Observations:** 9881



### General Description

**PLANTS:** An annual bunchgrass. Stems are erect, slender, and grow from 20–50 cm tall, depending upon soil moisture and plant density. Plants are green, but upon maturity turn red-brown. Stems are sparsely hairy (puberulent) below the inflorescence. Sources: Barkworth *in* Flora of North America (FNA) 2007; Lesica et al. 2012.

**LEAVES:** Blades are 2–4 mm wide, up to 16cm long, and are softly hair on both sides. Sheaths are often densely and softly retrorsely pubescent to pilose, though sometimes the upper sheaths are glabrous. Ligules are membranous. Sources: Barkworth *in* FNA 2007; Lesica et al. 2012.

**INFLORESCENCE:** An open, often nodding panicle of 2–15 cm long. Spikelets are 10–17 mm long with 3 to 6 florets. At maturity spikelets are red-brown to purple. Lemmas are 9–12 mm long, gradually tapered into two narrow teeth. The awn is straight or twisted, 12–20 mm long, and attached to the lemma. Sources: Barkworth *in* FNA 2007; Lesica et al. 2012.

The common name "Downy Brome" refers to the numerous, fine hairs on its leaves.

The common name "Cheatgrass" comes from pioneering farmers who noticed it reduced their wheat yields, and in feeling cheated named it "cheatgrass".

See video on Identifying Invasive Annual Grasses in Montana.

### Phenology

Cheatgrass is a winter annual (see REPRODUCTIVE CHARACTERISTICS section).

### Diagnostic Characteristics

Montana has 7 species of annual Bromes (*Bromus*), and only 3 are described below. A technical manual is recommended, such as Manual of Montana Vascular Plants (Lesica et al. 2012).

**Cheatgrass** – *Bromus tectorum*, exotic, undesirable, and State-Regulated

- \* Seedlings have very hairy blades and sheaths.
- \* Awns are reddish-purple at maturity and easily stick to clothing and fur, and can get into the nostrils and eyes of animals.
- \* Glumes and lemmas are usually hairy. 1st Glume is 1-veined.
- \* Lemmas taper into 2 narrow teeth: bodies are 9-12 mm long and awns are greater than 10 mm.

**Ripgut Brome** - *Bromus diandrus*, exotic and undesirable

- \* Lemmas taper into 2 narrow teeth: bodies are 20-35 mm long and awns are greater than 10 mm.
- \* 1st Glume is 1-veined.

**Japanese Brome** – *Bromus japonica*, exotic and undesirable

- \* Plants tend to grow in more moist sites than does Cheatgrass (but can co-occur).
- \* Awns are straight or curved outward, less than 10 mm long.
- \* Glumes and awns not usually hairy
- \* 1st Glume is 3-to 5-veined.
- \* Spikelets often several from branch ends.

## **Habitat**

---

Cheatgrass grows on overgrazed rangelands, fields, roadsides, waste places, sagebrush steppe, and open, dry understory (Lesica et al. 2012).

## **Management**

---

Wherever Cheatgrass establishes it will be persistent, and eradication is not a reasonable goal in most situations. The strategy chosen to suppress Cheatgrass will determine its level of abundance and role in the community. Sites need to be evaluated to determine how much of the community still has perennial shrubs, forbs, and grasses. In sites devoid of perennial plants, the Cheatgrass community is likely stable and self-perpetuating and control techniques do not need to consider impacts to perennial plants. In sites with seral plant communities that have Cheatgrass, but also have perennial shrubs, forbs, and/or grasses, control techniques that do not harm the perennial vegetation should be implemented.

An integrated vegetative management approach provides the best long-term control, and requires that land-use objectives and a desired plant community be identified (Shelly et al. *in* Sheley and Petroff 1999). Once identified an integrated weed management strategy to promote a weed-resistant plant community and serve other land-use objectives such as livestock forage, wildlife habitat, or recreation, can be developed.

### **PREVENTION** [Adapted from Sheley and Petroff 1999]

Preventing the establishment of Cheatgrass can be accomplished by many practices:

- \* Learn how to accurately identify Cheatgrass in order to detect occurrences and know where to implement control methods.
- \* Implement measures to reduce soil disturbance and improve conditions for perennial plant reproduction.
- \* Prevent vehicles from driving through and animals from grazing within infested areas.
- \* Thoroughly wash the undercarriage of vehicles and wheels in a designated area before moving to uninfested areas.
- \* Frequently monitor for new plants, and when found implement effective control methods.
- \* Maintain proper grazing management that creates resilience to noxious weed invasion.

### **PHYSICAL and CULTURAL CONTROLS** [Adapted from Mosley *in* Sheley and Petroff 1999]

Hand-pulling is effective and easy in small areas, gardens, alleys, and other places, particularly when soils are moist. The shallow, fibrous roots system makes it easier for the entire plant to be pulled and bagged. If plants are in the fruit/seed stage then plants should be allowed to desiccate within sealed bags before depositing in the landfill. Hand-pulling should be done at intervals until the seed source is depleted.

Disking creates favorable soil conditions, stimulates seed germination, and is usually not effective. To be effective, tillage must be 10-15 cm deep in order to bury seeds and prevent their germination and be repeated during the season. Increasing the soil bulk density of the soil will inhibit Cheatgrass, but should not be done if it will impact desirable plants.

Revegetating land with competitive, locally adapted, and competitive grasses, forbs, and shrubs will develop a plant community that is more resilient to Cheatgrass. However, establishing the community can be difficult because cheatgrass plants quickly absorb available soil moisture and nutrients. It is necessary to use revegetation in combination with disking, herbicides, or prescribed fire on rangeland to be more effective in reducing Cheatgrass. Details at combining techniques can be found in Mosley *in* Sheley and Petroff 1999 and with your local County Weed or Farm agents.

**NOTE:** Cultivars of native grasses do not break down and degrade like true native plants, and will contribute to fuel loads and harming biological soil crusts.

Prescribed Burning is not an effective control method. Burning will decrease above ground biomass, but stimulates seed germination, and decreases competition from desirable plants. Cheatgrass plants that establish after a fire produce more seed per plant.

Mowing is not an effective control method because it distributes seeds, decreases competition from adjacent

plants, and maintains conditions that are favorable to Cheatgrass.

**CHEMICAL CONTROLS** [Adapted from Mosley *in* Sheley and Petroff 1999]

Herbicides can be effective, when desired perennial plants are still abundant in the community. A single year of herbicide application will temporarily reduce the population, but increase seed production. Chemical control must be repeated for 2 to 5 consecutive years. Combining revegetation with herbicide control can be more effective if done properly. Details at combining techniques can be found in Mosley *in* Sheley and Petroff 1999.

The herbicide type and concentration, application time and method, environmental constraints, land use practices, local regulations, and other factors will determine its effectiveness and impact to non-target species. Strict adherence to application requirements defined on the herbicide label will reduce risks to human and environmental health. Consult your County Extension Agent and/or Weed District for information on herbicidal control. Chemical information is also available at [Greenbook](#).

**Paraquat** (0.5 pounds active ingredient (ai) per acre) applied in the spring to the vegetative stage or early dough stage of seed development will provide control if repeated for 2 consecutive years. A surfactant will increase the effectiveness of paraquat.

**Glyphosate** (0.6 pounds ai per acre) applied in the spring will kill desirable perennial grasses. For Cheatgrass glyphosate (0.5 pounds ai per acre) applied in the spring to the vegetative stage or early dough stage of seed development will provide control if repeated for 3 consecutive years. For Cheatgrass glyphosate (0.4 pounds ai per acre) applied in the spring to the early dough stage of seed development will provide control if repeated for 3 consecutive years.

**BIOLOGICAL CONTROLS** [Adapted from Mosley *in* Sheley and Petroff 1999]

No biological control agents are available. Cheatgrass seedheads are susceptible to Ergot, a fungus which will kill seeds.

**GRAZING CONTROLS** [Adapted from Mosley *in* Sheley and Petroff 1999]

Livestock grazing can be purposely designed to control Cheatgrass (Megee 1938; Daubenmire 1940; Valentine and Stevens 1994; and Mosely 1996). As a tool it works best when targeted to local areas for the purpose of protecting existing perennial plants from fire or aiding seeding restoration in severely depleted sites.

To control Cheatgrass targeted grazing must be done at least twice per season for at least two consecutive years. The grazing intensity should be light enough to maintain a minimum 8 cm (3 inches) stubble height on desirable grasses. The first grazing should be done in the spring when plants are tall enough to become accessible and palatable, but before plants turn purplish (before they reach the soft dough stage of seed development). This will prevent most seed development. The second grazing should occur in late spring during the boot stage, then allowed to re-grow for 3-4 weeks before re-grazing.

Grazing intensities in winter can be moderate to heavy without damaging perennial plants, as long as soils are dry and firm.

Prescribed grazing can also reduce litter build-up, disrupting the fire cycle, reducing the fuel loads, and enhance the competitiveness from perennial plants. Grazed firelines should be at least 75 meters (250 feet) wide.

**Useful Links:**

[Montana Invasive Species website](#)

[Montana Biological Weed Control Coordination Project](#)

[Montana Department of Agriculture - Noxious Weeds](#)

[Montana Weed Control Association](#)

[Montana Weed Control Association Contacts Webpage.](#)

[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)

[Montana State University Integrated Pest Management Extension](#)

[Weed Publications at Montana State University Extension - MontGuides](#)



## Red-headed Leafy Spurge Stem Borer

*Oberea erythrocephala*

[View in Field Guide](#)

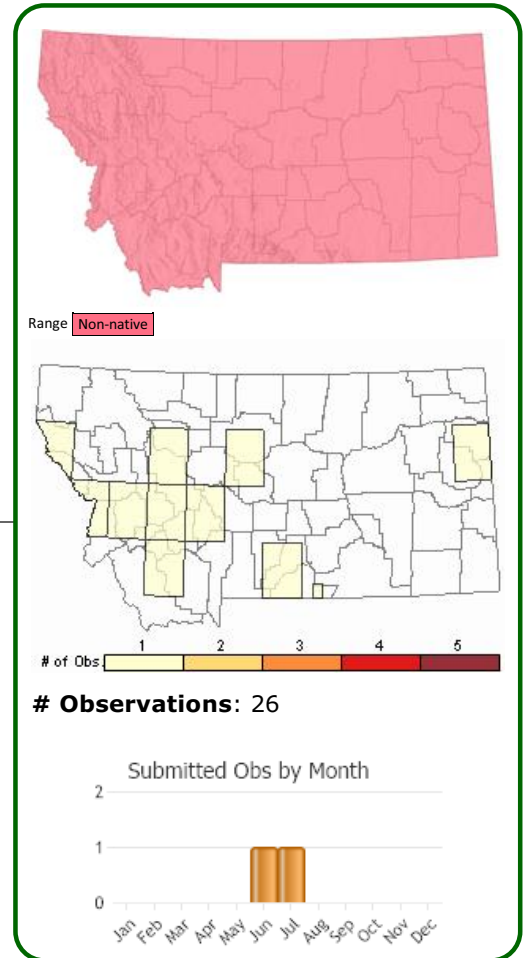

**Biocontrol Species**  
**Non-native Species**  
**Global Rank:** GNR  
**State Rank:** SNA

**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**

### General Description

[From Schroeder 1980:238-239] Subgenus *Amaurostoma*: eyes smaller, not bordering base of mandible; mandibles long and slender with protrusions at base; labrum mat without long hairs on front border; elytra on base of epipleura without colored markings.

*O. erythrocephala*: Length 6.0-14.0 mm, width 1.5-3.0 mm; very slender; antennae a little shorter than body (male) or much shorter (female), the 3rd segment longer than the 4th, much longer than the scape. Lower lobes of eyes as long as gena; front 1.5X the width of one lobe (male) or almost 2X as wide (female). Head and pronotum densely punctate; pronotum transverse, scutellum large and triangular. Elytra very long (3X head length and pronotum combined), parallel and somewhat cut at ends, densely and grossly punctate, the points partly in lines, rather faint towards ends of the elytra. Lateral parts densely punctate. Hind femora slightly extending over posterior border of first abdominal segment. Hind tibia 2/3 longer than hind tarsae. Body red in color with yellowish pubescence. Antennae black with a dark brown pubescence. Tips of mandibles, anterior and posterior borders of pronotum, scutellum, elytra, and sterna all black with grayish pubescence. Mesepisternum and metaepisternum covered with dense brownish-yellow pubescence. First 3 abdominal segments with a large central black band (reduced in width from 1st to 3rd segment); part of 5th segment blackish.



### Phenology

Adults active from late May (males emerge several days before females) to early August in Austria, Germany, Italy, Switzerland, overwinter as larvae in host plant and continue to feed the following spring (Schroeder 1980); similar phenology in North American populations, although may require 2 years to complete life cycle in northern part of range (Schroeder 1980; Rees et al. 1996; Hansen et al. 1997).

### Diagnostic Characteristics

Smaller eye size, the elytra on base of epipleura without colored markings, and longer more slender mandibles distinguishes members of the subgenus *Amaurostoma* (of which *Oberea erythrocephala* is a member) from members of the Old World subgenus *Oberea*. Features described in General Description (see above) and host plant specificity (*Euphorbia* rather than woody trees and shrubs) should help distinguish this species from native North American members of the genus in Montana (see Hart et al. 2013 for a list of *Oberea* species).

### Habitat

Uncultivated fields, pastures, rangelands, and cultivated croplands where Leafy Spurge (*Euphorbia esula*) and related *Euphorbia* species present; established best in riparian areas with some tree cover (Schroeder 1980; Rees et al. 1986; Rees et al. 1996; Hansen et al. 1997; Lajeunesse et al. 1997).

## Management

---

Biological control agents are most effective when integrated with other biocontrol and traditional methods (Lajeunesse et al. 1997; Lym 2005). This approach applies to use of *Oberea erythrocephala* for controlling leafy spurge. Although this biocontrol agent has potential to greatly depress leafy spurge populations, it attacks only specific biotypes of spurge, which inhibits beetle population growth sufficiently in many areas to greatly reduce its effectiveness. Adult feeding on host leaves and stems does not greatly affect leafy spurge survival. However, girdling and subsequent egg-laying by adult females results in shoot death. Larval feeding in stem pith causes stem death, and larval feeding in root crown and roots greatly reduces the plant's root reserves. Larvae live and feed in host plants with stem diameters >3.0 mm (Rees et al. 1996).

The following general suggestions (from Lajeunesse et al. 1997) may help insure successful collection and establishment of biocontrol insects:

- 1) Determine beforehand the habitat requirements for biocontrol insects to be used. Avoid sites with high ant and grasshopper populations, and seek areas free from grazing, herbicide or pesticide use. Initial release sites should be protected for up to 10 years, secondary sites need less protected time.
- 2) Collection should be made with minimum stress to the insects. Beetles can be collected by using a sweep net through the upper portions of leafy spurge plants 8-10 times, then dumping content into a container.
- 3) Release insects as quickly as possible. If moved more than 80 km or held for more than a few hours, the biocontrol species should be sorted out from other species of arthropods captured during sweeping. Biocontrol insects should be kept cool during transport through use of a cooler with refrigerated (not frozen) coolant packs.
- 4) Release biocontrol insects during the cool parts of a day by sprinkling over a small area (10-15 square meters) on a leafy spurge infestation of moderate density. Avoid tall, dense stands that may provide too much shade and high humidity.
- 5) Permits are required to transport biocontrol insects across state or provincial borders; in Montana, permits can be obtained from the Montana Department of Agriculture.

Specifically to *Oberea erythrocephala*, adult beetles are the life stage to transfer and introduce. Adults can be obtained by sweep-netting or hand-collecting at sites with established beetle populations. These can be stored for up to several weeks if kept cool and then allowed to warm up three times per week for two-hour periods to exercise and feed. They can be shipped in a cool environment with plant stems and leaves for food. However, release should occur within six days once shipped (Rees et al. 1996). They should be released directly on the leafy spurge plants (Lajeunesse et al. 1997)

Melissa Maggio-Kassner is the coordinator for the Montana Biological Weed Control Project. She can be reached at (406) 258-4223 or [mmaggio@missoulaeduplace.org](mailto:mmaggio@missoulaeduplace.org)

### Useful Links:

[Montana Invasive Species website](#)  
[Montana Biological Weed Control Coordination Project](#)  
[Montana Department of Agriculture - Noxious Weeds](#)  
[Montana Weed Control Association](#)  
[Montana Weed Control Association Contacts Webpage.](#)  
[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)  
[Montana State University Integrated Pest Management Extension](#)  
[Weed Publications at Montana State University Extension - MontGuides](#)



## Dalmatian Toadflax Stem-boring Weevil

### *Mecinus janthiniformis*

[View in Field Guide](#)


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

**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**

### General Description

Following many North American introductions of what was thought to be a single species, *Mecinus janthinus*, for use as a biocontrol agent against exotic toadflax (*Linaria* spp.), *Mecinus janthiniformis* is now recognized as a distinct cryptic species of *M. janthinus* (Tosevski et al. 2011). Because of the early failure to recognize the two species, some of what follows in the species account may pertain to both species.

[From Carney et al. 2004; Schat et al. 2007; Tosevski et al. 2011]  
 Length 3.1-6.0 mm (rostrum excluded); mean length of males 4.1 mm (range 3.2-6.0 mm), females 4.1 mm (range 3.3-6.0 mm). Integument black except pronotum and elytra dark blue with metallic reflections. Rostrum in lateral view moderately and regularly curved, moderately long in male (about 0.80-0.88X as long as pronotum length), somewhat longer and apical portion more strongly curved in female (about 1.03-1.09X as long as pronotum length); rostrum moderately striate-punctured with numerous stout setae to apex (male) or striate-punctured with stout setae only in basal half then almost smooth (female). Pronotum sculpture formed by deep and small punctures more densely appressed, intervals between punctures narrow, smooth and shiny, clearly visible between sparse seta-like long white scales, widest at basal third. Elytra very long, about 2X as long as wide, with interstriae roughly sculptured and covered with recumbent seta-like white scales almost completely arranged in two rows (not a single median row). Profemora with distinct sharp tooth in male, unarmed in female. Aedeagus with sides slightly more abruptly narrowed in subapical part (not gradually narrowing in distal third), toward apex ending in form of subtruncate tip.

### Phenology

In Eurasia, adults overwinter in host plant stems, emerge early April, egg-laying early May to mid-July (Tosevski et al. 2011). In North America, adults active early April to mid-August (overwinter other months), eggs early May to early July, larvae mid-May to mid-August, pupae mid-June to mid-September (Jeanneret and Schroeder 1992; Wilson et al. 2005; McClay and Hughes 2007).

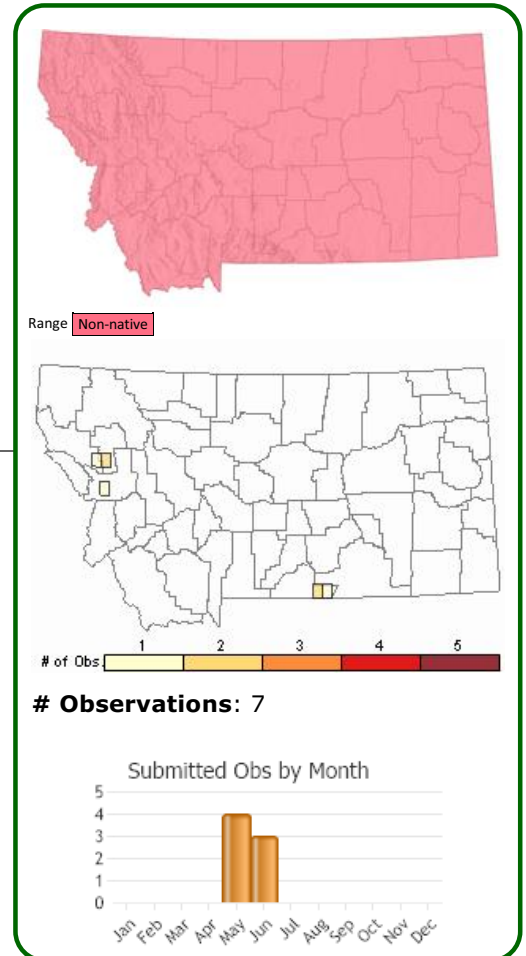
### Diagnostic Characteristics

Probably best differentiated from closely-related species by host plant specificity, larger body size (length), apical portion of female rostrum in lateral view more curved, punctures on pronotum slightly smaller and more densely addressed, scales of elytral interstriae denser and arranged in two rows on parts of several interstriae (not one median row), aedeagus with sides more abruptly narrowed (not parallel) and ending in form of subtruncate tip (not subacute tip).

### Habitat

Arid forest, montane meadows and pastures, rangeland supporting large-stemmed toadflaxes (*Linaria*) (Wilson et al. 2005; Tosevski et al. 2011).

### Management



## management

---

Biological control agents are most effective when integrated with other biocontrol and traditional methods. With [Dalmatian Toadflax \(\*Linaria dalmatica\*\)](#), eight introduced insect species attack various parts or stages of the host plant (including flowers, seed capsules, foliage, and roots). *Mecinus janthiniformis*, a stem-boring agent, does not appear to shift feeding preference to most native North American (non-target) *Linaria* and related Scrophulariaceae species when given opportunity to do so (Sing et al. 2005). However, given the potential to develop on non-target native host plants, some of which are rare species in some states, additional testing under multiple-choice conditions and postrelease monitoring is required to determine host ranges of this biocontrol beetle (Hinz et al. 2014).

The following general suggestions (from Wilson et al. 2005) may help insure successful collection and establishment of biocontrol insects for toadflax:

- 1) Determine beforehand the efficacy (ability to control the target weed), host plant specificity, and biocontrol availability for the biocontrol insects to be used.
- 2) Select release sites based on their desired function. Field nursery sites (for future biocontrol collection and redistribution) should exceed 10 acres with fairly continuous distribution of toadflax, be safe from disturbance, and be accessible for regular monitoring. Sites for long-term monitoring should be buffered from other weed management programs and disturbance (grazing) for up to 10 years. Sites not intended for monitoring or biocontrol collection should be sufficiently large and free from disturbance to provide the agents the best possible chance to survive and flourish.
- 3) Agents should be stored and transported in sturdy containers that are kept shaded, cool, and well ventilated. An example is a pint-sized, nonwaxed, paperboard carton. Plastic containers can work with large holes cut in lid and protected with mesh screening. Avoid glass or metal containers. Prepare containers for agents by adding cut leafy stem pieces of toadflax for food, shelter, moisture. Do not add water. Transport containers in a large cooler with pre-frozen icepacks.

Specifically to *Mecinus janthiniformis*, adult beetles are the life stage to transfer and introduce. Adults can be obtained at sites with established beetle populations by tapping plants over tubs (tray sampling) to dislodge beetles, or sweep netting, then aspirated and transferred to containers. At least 200 adult beetles are recommended for initial release of stem-boring weevils, which can be collected in 30 minutes or less if the source population is appropriately large to support redistribution collections. Collect adults that are actively feeding and mating on top portions of plants. Transport and release agents as soon as possible (preferably within 24 hours). Release should occur in good weather in cooler early morning or evening hours. Release on the ground at the base of stems in a dense stand of young host plants in full sunlight.

Melissa Maggio-Kassner is the coordinator for the Montana Biological Weed Control Project. She can be reached at (406) 258-4223 or [mmaggio@missoulaeduplace.org](mailto:mmaggio@missoulaeduplace.org)

### Useful Links:

[Montana Invasive Species website](#)  
[Montana Biological Weed Control Coordination Project](#)  
[Montana Department of Agriculture - Noxious Weeds](#)  
[Montana Weed Control Association](#)  
[Montana Weed Control Association Contacts Webpage.](#)  
[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)  
[Montana State University Integrated Pest Management Extension](#)  
[Weed Publications at Montana State University Extension - MontGuides](#)



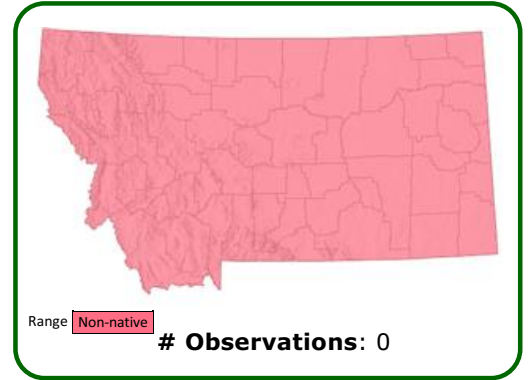
## Brown-legged Leafy Spurge Flea Beetle

*Aphthona lacertosa*

[View in Field Guide](#)


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

**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**



### General Description

Genus *Aphthona*: Front carinate, frontal tubercles well developed and clearly marginated, antennae longer than half the body length, prothorax broader than long, pronotum lacking both longitudinal and transverse grooves, elytra wider at base than pronotum, elytral punctuation confused or (sometimes) in irregular rows, procoxal cavities open, tibial spurs simple and inserted at outer corner of tibia, first hind tarsi usually distinctly shorter than 1/2 length of hind tibia. Male with first segment of front tarsus enlarged (not enlarged in female), posterior margin of last visible abdominal sternite distinctly lobate (evenly rounded in female), males smaller and more slender on average than females; female antennae proportionally shorter (LeSage and Paquin 1996).

*Aphthona lacertosa*: adults about 3.0-4.0 mm in body length; dorsal and ventral body surfaces black with strong blue metallic reflections (occasionally dark green); hind femora partly brown, tibia yellowish with small dark area on dorsal surface; tip of male aedeagus nipple-shaped; female receptacle ovoid, dorsal surface of receptacle convex; female styli elongate, 10X as long as wide (Gassmann et al. 1996; LeSage and Paquin 1996; Rees et al. 1996).

### Phenology

Adults emerge late May through July, eggs throughout mid-June to August, larvae fall to spring of following year, pupae late spring to early summer (Gassmann et al. 1996; Rees et al. 1996; Lajeunesse et al. 1997; Skinner et al. 2004, 2006; Lym 2005; Joshi 2008).

### Diagnostic Characteristics

See General Description (above) for distinguishing *Aphthona* from other beetles. *A. lacertosa* differs from *A. nigricutis* externally by having an overall black appearance (except the legs) with metallic blue to dark green reflections of the body instead of being brown with a contrasting black dot behind the thorax at the leading edge of the wings.

### Habitat

Uncultivated fields, pastures, rangelands, and disturbed sites (such as railroad right-of-ways) where Leafy Spurge (*Euphorbia esula*) and related *Euphorbia* species present, particularly slightly moist to wet sites with loamy soils and well-developed herbaceous vegetation; possibly sites with clay soils but not very dry sites with sandy soils or those prone to flooding (Gassmann et al. 1996; Rees et al. 1996; Lajeunesse et al. 1997; Lym and Nelson 2000); in western North Dakota, beetle densities highest in shrub and grassland habitats, lowest in woodland and river bottom habitats (Larson and Grace 2004).

### Management

Biological control agents are most effective when integrated with other biocontrol and traditional methods, such as herbicides, grazing, fire, and reseeding (Lajeunesse et al. 1997; Lym 2005; Joshi 2008). *Aphthona lacertosa* does not appear to shift feeding preference to native North American (non-target) *Euphorbia* when given opportunity to do so (Wacker and Butler 2006).

The following general suggestions (from Lajeunesse et al. 1997) may help insure successful collection and establishment of biocontrol insects:

- 1) Determine beforehand the habitat requirements for biocontrol insects to be used. Avoid sites with high ant and grasshopper populations, and seek areas free from grazing, herbicide or pesticide use. Initial release sites should be protected for up to 10 years, secondary sites need less protected time.
- 2) Collection should be made with minimum stress to the insects. Beetles can be collected by using a sweep net through the upper portions of leafy spurge plants 8-10 times, then dumping content into a container.
- 3) Release insects as quickly as possible. If moved more than 80 km or held for more than a few hours, the biocontrol species should be sorted out from other species of arthropods captured during sweeping. Biocontrol insects should be kept cool during transport through use of a cooler with refrigerated (not frozen) coolant packs.
- 4) Release biocontrol insects during the cool parts of a day by sprinkling over a small area (10-15 square meters) on a leafy spurge infestation of moderate density. Avoid tall, dense stands that may provide too much shade and high humidity.
- 5) Permits are required to transport biocontrol insects across state or provincial borders; in Montana, permits can be obtained from the Montana Department of Agriculture.

Specifically to *Apthona lacertosa*, adult beetles are the life stage to transfer and introduce. Adults can be obtained by sweep-netting at sites with established beetle populations. These can be stored for several days in cardboard containers with leafy spurge leaves if kept cool, and exercised and fed periodically under warmer conditions. Overwintering larvae can be dug from frozen host plant roots and soil material, and kept frozen until several weeks before adults are desired, at which time samples are removed from cold storage and allowed to warm to ambient or room temperature, thereby permitting larvae to develop and become adults. Adults should be sprinkled directly on leafy spurge plants (Rees et al. 1996; Lajeunesse et al. 1997)

Melissa Maggio-Kassner is the coordinator for the Montana Biological Weed Control Project. She can be reached at (406) 258-4223 or [mmaggio@missoulaeduplace.org](mailto:mmaggio@missoulaeduplace.org)

**Useful Links:**

- [Montana Invasive Species website](#)
- [Montana Biological Weed Control Coordination Project](#)
- [Montana Department of Agriculture - Noxious Weeds](#)
- [Montana Weed Control Association](#)
- [Montana Weed Control Association Contacts Webpage.](#)
- [Montana Fish, Wildlife, and Parks - Noxious Weeds](#)
- [Montana State University Integrated Pest Management Extension](#)
- [Weed Publications at Montana State University Extension - MontGuides](#)



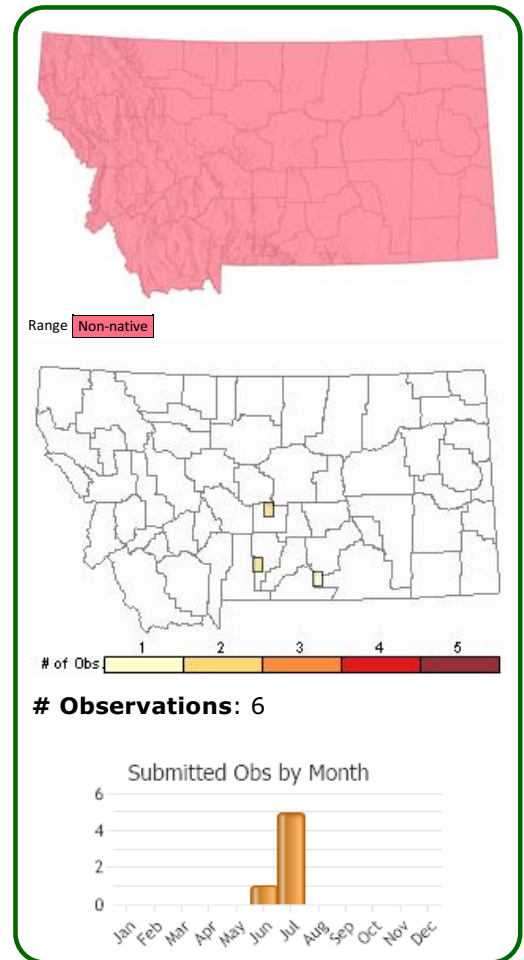
## Black Dot Leafy Spurge Flea Beetle

*Aphthona nigriscutis*

[View in Field Guide](#)


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

**Agency Status**  
**USFWS:**  
**USFS:**  
**BLM:**



### General Description

Genus *Aphthona*: Front carinate, frontal tubercles well developed and clearly margined, antennae longer than half the body length, prothorax broader than long, pronotum lacking both longitudinal and transverse grooves, elytra wider at base than pronotum, elytral punctation confused or (sometimes) in irregular rows, procoxal cavities open, tibial spurs simple and inserted at outer corner of tibia, first hind tarsi usually distinctly shorter than 1/2 length of hind tibia. Male with first segment of front tarsus enlarged (not enlarged in female), posterior margin of last visible abdominal sternite distinctly lobate (evenly rounded in female), males smaller and more slender on average than females; female antennae proportionally shorter (LeSage and Paquin 1996).

*Aphthona nigriscutis*: adults 3.0-3.5 mm in body length; dorsal and ventral body surfaces brown or brownish; scutellum dark brown, contrasting with paler color of pronotum and elytra; hind femora yellowish; tip of male aedeagus nipple-shaped; female spermathecae declivous portion of spermathecal duct bent at obtuse angle from longitudinal axis of receptacle viewpoint, dorsal surface of receptacle concave; female styli with pair of short setae at apex, dark brown markings usually sharply contrasting over pale areas of styli (LeSage and Paquin 1996; Rees et al. 1996).

### Phenology

Adults June to August, eggs June to August, larvae July to May of following year, pupae early spring to May (Rees et al. 1996; Jackson 1997; Lajeunesse et al. 1997; Skinner et al. 2006).

### Diagnostic Characteristics

See General Description (above) for distinguishing *Aphthona* from other beetles. *A. nigriscutis* differs from *A. lacertosa* externally by being brown with a contrasting black dot behind the thorax at the leading edge of the wings instead of having an overall black appearance (except the legs) with metallic blue to dark green reflections

of the body.

## Habitat

---

Uncultivated fields, pastures, rangelands, and disturbed sites (such as railroad right-of-ways) where Leafy Spurge (*Euphorbia esula*) and related *Euphorbia* species present, particularly in dry open habitats on hilltops with well-drained and coarse sandy soils (Gassmann et al. 1996; Rees et al. 1996; Lajeunesse et al. 1997; Lym and Nelson 2000); beetle densities highest in shrub and grassland habitats, lowest in woodland and river bottom habitats in western North Dakota (Larson and Grace 2004). For xeric sites in eastern Montana with annual precipitation of 280-380 mm, beetle densities greatest in sites with high annual precipitation; beetle density not related to sand content of soils nor total stem density of leafy spurge, but was positively related to density of flowering leafy spurge stems and distance from beetle release points (Jacobs et al. 2001).

## Management

---

Biological control agents are most effective when integrated with other biocontrol and traditional methods, such as herbicides, grazing, fire, and reseeding (Lajeunesse et al. 1997; Lym 2005). When using fire, beetles are more successful when released on plots in habitats already suitable for beetles and burned prior to their release, possibly because fire reduces accumulated litter and further bares the soil (Fellows and Newton 1999). *Aphthona nigriscutis* does not appear to shift feeding preference to native North American (non-target) *Euphorbia* when given opportunity to do so (Wacker and Butler 2006).

The following general suggestions (from Lajeunesse et al. 1997) may help insure successful collection and establishment of biocontrol insects:

- 1) Determine beforehand the habitat requirements for biocontrol insects to be used. Avoid sites with high ant and grasshopper populations, and seek areas free from grazing, herbicide or pesticide use. Initial release sites should be protected for up to 10 years, secondary sites need less protected time.
- 2) Collection should be made with minimum stress to the insects. Beetles can be collected by using a sweep net through the upper portions of leafy spurge plants 8-10 times, then dumping content into a container.
- 3) Release insects as quickly as possible. If moved more than 80 km or held for more than a few hours, the biocontrol species should be sorted out from other species of arthropods captured during sweeping. Biocontrol insects should be kept cool during transport through use of a cooler with refrigerated (not frozen) coolant packs.
- 4) Release biocontrol insects during the cool parts of a day by sprinkling over a small area (10-15 square meters) on a leafy spurge infestation of moderate density. Avoid tall, dense stands that may provide too much shade and high humidity.
- 5) Permits are required to transport biocontrol insects across state or provincial borders; in Montana, permits can be obtained from the Montana Department of Agriculture.

Specifically to *Aphthona nigriscutis*, adult beetles are the life stage to transfer and introduce. Adults can be obtained by sweep-netting at sites with established beetle populations. These can be stored for several days in cardboard containers with leafy spurge leaves if kept cool, and exercised and fed periodically under warmer conditions. Overwintering larvae can be dug from frozen host plant roots and soil material, and kept frozen until several weeks before adults are desired, at which time samples are removed from cold storage and allowed to warm to ambient or room temperature, thereby permitting larvae to develop and become adults. Adults should be sprinkled directly on leafy spurge plants (Rees et al. 1996; Lajeunesse et al. 1997)

Melissa Maggio-Kassner is the coordinator for the Montana Biological Weed Control Project. She can be reached at (406) 258-4223 or [mmaggio@missoulaeduplace.org](mailto:mmaggio@missoulaeduplace.org)

### Useful Links:

[Montana Invasive Species website](#)  
[Montana Biological Weed Control Coordination Project](#)  
[Montana Department of Agriculture - Noxious Weeds](#)  
[Montana Weed Control Association](#)  
[Montana Weed Control Association Contacts Webpage.](#)  
[Montana Fish, Wildlife, and Parks - Noxious Weeds](#)  
[Montana State University Integrated Pest Management Extension](#)  
[Weed Publications at Montana State University Extension - MontGuides](#)

| U.S. Department of Agriculture<br>Natural Resources Conservation Service<br><br><b>ENVIRONMENTAL EVALUATION WORKSHEET</b>   |  | NRCS-CPA-52<br>11/2019<br><b>A. Client Name:</b> Orchard Canal<br><b>B. Conservation Plan ID #</b> (as applicable):<br>Program Authority (optional): EWP<br><b>C. Identification #</b> (farm, tract, field #, etc. as required): |  |                             |                          |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
|---|--|--|--|-----------------------------|--------------------------|---------------|--|---------------|--|-----------------------------|-----------------------|-----------------------------|-----------------------|-----------------------------|-----------------------|--|-----------------------|--|--|--|--|--|--|-------------|--|--|--|--|--|--|--|--------------------------|--|--------------------------|--------------------------|--|--|-------------|--|-------------|-------------|--|--|--------------------------|--|--------------------------|--------------------------|--|--|-------------|--|-------------|-------------|--------------|--|--|--|--|--|--------------------------------|--|--------------------------|--|--------------------------|--------------------------|--|--|-------------|--|-------------|-------------|---|--|--|--|--|--|-----------|--|---------------|--|---------------|--|-----------------------------|-----------------------|-----------------------------|-----------------------|-----------------------------|-----------------------|--|--|--|--|--|--|------------|--|--|--|--|--|--------------------------------|--|--------------------------|--|--------------------------|--------------------------|--|--|-------------|--|-------------|-------------|
| <b>D. Client's Objective(s) (purpose):</b><br>To stabilize bank erosion to reduce risk to property  |  |  |  |                             |                          |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| <b>E. Need for Action:</b><br>Flooding event in June of 2022 resulted in bank erosion that is threatening property. Action is needed to protect property from further damage.     | <b>H. Alternatives</b><br><table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:33%;">No Action</th> <th style="width:10%;"></th> <th style="width:33%;">Alternative 1</th> <th style="width:10%;"></th> <th style="width:33%;">Alternative 2</th> <th style="width:10%;"></th> </tr> <tr> <th>Amount, Status, Description</th> <th>√ if does NOT meet PC</th> <th>Amount, Status, Description</th> <th>√ if does NOT meet PC</th> <th>Amount, Status, Description</th> <th>√ if does NOT meet PC</th> </tr> </thead> <tbody> <tr> <td colspan="6">                     The no action alternative would be to do nothing and allow bank erosion to continue and likely worsen resulting in higher threat and risk to property.                 </td> </tr> <tr> <td colspan="6">                     Alternative 1 is to stabilize bank erosion and protect property.                 </td> </tr> </tbody> </table>  |  |  | No Action                   |                          | Alternative 1 |  | Alternative 2 |  | Amount, Status, Description | √ if does NOT meet PC | Amount, Status, Description | √ if does NOT meet PC | Amount, Status, Description | √ if does NOT meet PC | The no action alternative would be to do nothing and allow bank erosion to continue and likely worsen resulting in higher threat and risk to property. |                       |  |  |  |  | Alternative 1 is to stabilize bank erosion and protect property. |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| No Action   |  | Alternative 1  |  | Alternative 2               |                          |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| Amount, Status, Description   | √ if does NOT meet PC  | Amount, Status, Description  | √ if does NOT meet PC  | Amount, Status, Description | √ if does NOT meet PC    |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| The no action alternative would be to do nothing and allow bank erosion to continue and likely worsen resulting in higher threat and risk to property.                            |  |  |  |                             |                          |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| Alternative 1 is to stabilize bank erosion and protect property.  |  |  |  |                             |                          |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| <b>Resource Concerns</b>  |  |  |  |                             |                          |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| In Section "F" below, analyze, record, and address concerns identified through the Resources Inventory process. (See FOTG Section III - Resource Planning Criteria for guidance). |  |  |  |                             |                          |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| <b>F. Resource Concerns and Existing/Benchmark Conditions</b><br>(Analyze and record the existing/benchmark conditions for each identified concern)                               | <b>I. Effects of Alternatives</b><br><table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:33%;">No Action</th> <th style="width:10%;"></th> <th style="width:33%;">Alternative 1</th> <th style="width:10%;"></th> <th style="width:33%;">Alternative 2</th> <th style="width:10%;"></th> </tr> <tr> <th>Amount, Status, Description</th> <th>√ if does NOT meet PC</th> <th>Amount, Status, Description</th> <th>√ if does NOT meet PC</th> <th>Amount, Status, Description</th> <th>√ if does NOT meet PC</th> </tr> </thead> <tbody> <tr> <td colspan="6" style="text-align: center;"> <i>(Document both short and long term impacts)</i> </td> </tr> <tr style="background-color: #00B050; color: white;"> <td colspan="6"><b>SOIL</b></td> </tr> <tr> <td style="background-color: #00B050; color: white;">Bank erosion from streams, shorelines or water conveyance channels</td> <td>Bank erosion is likely to increase in the short and long term if no action is taken.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td>It is likely that bank erosion will be stabilized and result in reduced bank erosion in the short and long term and will help to protect at-risk property.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="background-color: #00B050; color: white;">Flood waters have eroded banks and are threatening further bank erosion and damage to property as a result</td> <td></td> <td style="text-align: center;">NOT meet PC</td> <td></td> <td style="text-align: center;">NOT meet PC</td> <td style="text-align: center;">NOT meet PC</td> </tr> <tr> <td style="background-color: #00B050; color: white;"></td> <td></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="background-color: #00B050; color: white;"></td> <td></td> <td style="text-align: center;">NOT meet PC</td> <td></td> <td style="text-align: center;">NOT meet PC</td> <td style="text-align: center;">NOT meet PC</td> </tr> <tr style="background-color: #00B050; color: white;"> <td colspan="6"><b>WATER</b></td> </tr> <tr> <td style="background-color: #00B050; color: white;">No resource concern identified</td> <td></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="background-color: #00B050; color: white;"></td> <td></td> <td style="text-align: center;">NOT meet PC</td> <td></td> <td style="text-align: center;">NOT meet PC</td> <td style="text-align: center;">NOT meet PC</td> </tr> <tr> <td style="vertical-align: top;"> <b>F. Resource Concerns and Existing/Benchmark Conditions</b><br/>                 (Analyze and record the existing/benchmark conditions for each identified concern)             </td> <td colspan="5" style="vertical-align: top;"> <b>I. (continued)</b><br/> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:33%;">No Action</th> <th style="width:10%;"></th> <th style="width:33%;">Alternative 1</th> <th style="width:10%;"></th> <th style="width:33%;">Alternative 2</th> <th style="width:10%;"></th> </tr> <tr> <th>Amount, Status, Description</th> <th>√ if does NOT meet PC</th> <th>Amount, Status, Description</th> <th>√ if does NOT meet PC</th> <th>Amount, Status, Description</th> <th>√ if does NOT meet PC</th> </tr> </thead> <tbody> <tr> <td colspan="6" style="text-align: center;"> <i>(Document both short and long term impacts)</i> </td> </tr> <tr style="background-color: #ADD8E6;"> <td colspan="6"><b>AIR</b></td> </tr> <tr> <td style="background-color: #ADD8E6; color: white;">No resource concern identified</td> <td></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="background-color: #ADD8E6; color: white;"></td> <td></td> <td style="text-align: center;">NOT meet PC</td> <td></td> <td style="text-align: center;">NOT meet PC</td> <td style="text-align: center;">NOT meet PC</td> </tr> </tbody> </table> </td> </tr> </tbody></table> |  |  |                             |                          | No Action     |  | Alternative 1 |  | Alternative 2               |                       | Amount, Status, Description | √ if does NOT meet PC | Amount, Status, Description | √ if does NOT meet PC | Amount, Status, Description  | √ if does NOT meet PC | <i>(Document both short and long term impacts)</i> |  |  |  |  |  | <b>SOIL</b> |  |  |  |  |  | Bank erosion from streams, shorelines or water conveyance channels | Bank erosion is likely to increase in the short and long term if no action is taken. | <input type="checkbox"/> | It is likely that bank erosion will be stabilized and result in reduced bank erosion in the short and long term and will help to protect at-risk property. | <input type="checkbox"/> | <input type="checkbox"/> | Flood waters have eroded banks and are threatening further bank erosion and damage to property as a result |  | NOT meet PC |  | NOT meet PC | NOT meet PC |  |  | <input type="checkbox"/> |  | <input type="checkbox"/> | <input type="checkbox"/> |  |  | NOT meet PC |  | NOT meet PC | NOT meet PC | <b>WATER</b> |  |  |  |  |  | No resource concern identified |  | <input type="checkbox"/> |  | <input type="checkbox"/> | <input type="checkbox"/> |  |  | NOT meet PC |  | NOT meet PC | NOT meet PC | <b>F. Resource Concerns and Existing/Benchmark Conditions</b><br>(Analyze and record the existing/benchmark conditions for each identified concern) | <b>I. (continued)</b><br><table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:33%;">No Action</th> <th style="width:10%;"></th> <th style="width:33%;">Alternative 1</th> <th style="width:10%;"></th> <th style="width:33%;">Alternative 2</th> <th style="width:10%;"></th> </tr> <tr> <th>Amount, Status, Description</th> <th>√ if does NOT meet PC</th> <th>Amount, Status, Description</th> <th>√ if does NOT meet PC</th> <th>Amount, Status, Description</th> <th>√ if does NOT meet PC</th> </tr> </thead> <tbody> <tr> <td colspan="6" style="text-align: center;"> <i>(Document both short and long term impacts)</i> </td> </tr> <tr style="background-color: #ADD8E6;"> <td colspan="6"><b>AIR</b></td> </tr> <tr> <td style="background-color: #ADD8E6; color: white;">No resource concern identified</td> <td></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="background-color: #ADD8E6; color: white;"></td> <td></td> <td style="text-align: center;">NOT meet PC</td> <td></td> <td style="text-align: center;">NOT meet PC</td> <td style="text-align: center;">NOT meet PC</td> </tr> </tbody> </table> |  |  |  |  | No Action |  | Alternative 1 |  | Alternative 2 |  | Amount, Status, Description | √ if does NOT meet PC | Amount, Status, Description | √ if does NOT meet PC | Amount, Status, Description | √ if does NOT meet PC | <i>(Document both short and long term impacts)</i> |  |  |  |  |  | <b>AIR</b> |  |  |  |  |  | No resource concern identified |  | <input type="checkbox"/> |  | <input type="checkbox"/> | <input type="checkbox"/> |  |  | NOT meet PC |  | NOT meet PC | NOT meet PC |
| No Action   |  | Alternative 1  |  | Alternative 2               |                          |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| Amount, Status, Description   | √ if does NOT meet PC  | Amount, Status, Description  | √ if does NOT meet PC  | Amount, Status, Description | √ if does NOT meet PC    |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| <i>(Document both short and long term impacts)</i>  |  |  |  |                             |                          |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| <b>SOIL</b>   |  |  |  |                             |                          |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| Bank erosion from streams, shorelines or water conveyance channels  | Bank erosion is likely to increase in the short and long term if no action is taken.   | <input type="checkbox"/>   | It is likely that bank erosion will be stabilized and result in reduced bank erosion in the short and long term and will help to protect at-risk property. | <input type="checkbox"/>    | <input type="checkbox"/> |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| Flood waters have eroded banks and are threatening further bank erosion and damage to property as a result  |  | NOT meet PC  |  | NOT meet PC                 | NOT meet PC              |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
|   |  | <input type="checkbox"/>   |  | <input type="checkbox"/>    | <input type="checkbox"/> |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
|   |  | NOT meet PC  |  | NOT meet PC                 | NOT meet PC              |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| <b>WATER</b>  |  |  |  |                             |                          |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| No resource concern identified  |  | <input type="checkbox"/>   |  | <input type="checkbox"/>    | <input type="checkbox"/> |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
|   |  | NOT meet PC  |  | NOT meet PC                 | NOT meet PC              |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| <b>F. Resource Concerns and Existing/Benchmark Conditions</b><br>(Analyze and record the existing/benchmark conditions for each identified concern)                               | <b>I. (continued)</b><br><table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:33%;">No Action</th> <th style="width:10%;"></th> <th style="width:33%;">Alternative 1</th> <th style="width:10%;"></th> <th style="width:33%;">Alternative 2</th> <th style="width:10%;"></th> </tr> <tr> <th>Amount, Status, Description</th> <th>√ if does NOT meet PC</th> <th>Amount, Status, Description</th> <th>√ if does NOT meet PC</th> <th>Amount, Status, Description</th> <th>√ if does NOT meet PC</th> </tr> </thead> <tbody> <tr> <td colspan="6" style="text-align: center;"> <i>(Document both short and long term impacts)</i> </td> </tr> <tr style="background-color: #ADD8E6;"> <td colspan="6"><b>AIR</b></td> </tr> <tr> <td style="background-color: #ADD8E6; color: white;">No resource concern identified</td> <td></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="background-color: #ADD8E6; color: white;"></td> <td></td> <td style="text-align: center;">NOT meet PC</td> <td></td> <td style="text-align: center;">NOT meet PC</td> <td style="text-align: center;">NOT meet PC</td> </tr> </tbody> </table>   |  |  |                             |                          | No Action     |  | Alternative 1 |  | Alternative 2               |                       | Amount, Status, Description | √ if does NOT meet PC | Amount, Status, Description | √ if does NOT meet PC | Amount, Status, Description  | √ if does NOT meet PC | <i>(Document both short and long term impacts)</i> |  |  |  |  |  | <b>AIR</b>  |  |  |  |  |  | No resource concern identified                                     |  | <input type="checkbox"/> |  | <input type="checkbox"/> | <input type="checkbox"/> |  |  | NOT meet PC |  | NOT meet PC | NOT meet PC |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| No Action   |  | Alternative 1  |  | Alternative 2               |                          |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| Amount, Status, Description   | √ if does NOT meet PC  | Amount, Status, Description  | √ if does NOT meet PC  | Amount, Status, Description | √ if does NOT meet PC    |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| <i>(Document both short and long term impacts)</i>  |  |  |  |                             |                          |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| <b>AIR</b>  |  |  |  |                             |                          |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
| No resource concern identified  |  | <input type="checkbox"/>   |  | <input type="checkbox"/>    | <input type="checkbox"/> |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |
|   |  | NOT meet PC  |  | NOT meet PC                 | NOT meet PC              |               |  |               |  |                             |                       |                             |                       |                             |                       |  |                       |  |  |  |  |  |  |             |  |  |  |  |  |  |  |                          |  |                          |                          |  |  |             |  |             |             |  |  |                          |  |                          |                          |  |  |             |  |             |             |              |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |   |  |  |  |  |  |           |  |               |  |               |  |                             |                       |                             |                       |                             |                       |  |  |  |  |  |  |            |  |  |  |  |  |                                |  |                          |  |                          |                          |  |  |             |  |             |             |

| PLANTS                         |  |                          |  |                          |                          |
|--------------------------------|--|--------------------------|--|--------------------------|--------------------------|
| No resource concern identified |  | <input type="checkbox"/> |  | <input type="checkbox"/> | <input type="checkbox"/> |
|                                |  | NOT meet PC              |  | NOT meet PC              | NOT meet PC              |
|                                |  | <input type="checkbox"/> |  | <input type="checkbox"/> | <input type="checkbox"/> |
|                                |  | NOT meet PC              |  | NOT meet PC              | NOT meet PC              |
| ANIMALS                        |  |                          |  |                          |                          |
| No resource concern identified |  | <input type="checkbox"/> |  | <input type="checkbox"/> | <input type="checkbox"/> |
|                                |  | NOT meet PC              |  | NOT meet PC              | NOT meet PC              |
|                                |  | <input type="checkbox"/> |  | <input type="checkbox"/> | <input type="checkbox"/> |
|                                |  | NOT meet PC              |  | NOT meet PC              | NOT meet PC              |
|                                |  | <input type="checkbox"/> |  | <input type="checkbox"/> | <input type="checkbox"/> |

| ENERGY                                   |   |                          |  |                          |  |
|--|---|--------------------------|--|--------------------------|--|
| No resource concern identified           |   | <input type="checkbox"/> |  | <input type="checkbox"/> |  |
|  |   | NOT<br>meet<br>PC        |  | NOT<br>meet<br>PC        |  |
| Human Economic and Social Considerations |   |                          |  |                          |  |
| Management Level                         | Bank erosion monitoring and management is expected to increase with the no action alternative |                          | Management level will increase in the short term with bank erosion protection. Levels are expected to decrease in the long term with bank stabilization efforts. |                          |  |
| Capital                                  | Capital levels are not expected to change with the no action alternative                      |                          | Capital levels will likely increase in the short term.   |                          |  |
| Labor                                    | No change expected from benchmark.  |                          | Labor needs will increase in the short term but if bank erosion is stabilized then labor needs are expected to decrease in the long term.                        |                          |  |
| Risk                                     | If action is not taken, risk to life and property is expected to increase                     |                          | Risk to life and property is expected to decrease in the short and long term with the implementation of this alternative.  |                          |  |
|  | As a result of the June 2022 flooding event the risk to property and life is elevated         |                          |  |                          |  |

| Special Environmental Concerns: Environmental Laws, Executive Orders, policies, etc.  |  |                           |  |                           |   |                           |
|---|--|---------------------------|--|---------------------------|---|---------------------------|
| In Section "G" complete and attach Environmental Procedures Guide Sheets for documentation as applicable. Items with a "•" may require a federal permit or consultation/coordination between the lead agency and another government agency. In these cases, effects may need to be determined in consultation with another agency. Planning and practice implementation may proceed for practices not involved in consultation. |  |                           |  |                           |   |                           |
| G. Special Environmental Concerns<br>(Document existing/ benchmark conditions)  | J. Impacts to Special Environmental Concerns   |                           |  |                           |   |                           |
|   | No Action  |                           | Alternative 1  |                           | Alternative 2   |                           |
|   | Document all impacts<br>(Attach Guide Sheets as applicable)  | √ if needs further action | Document all impacts<br>(Attach Guide Sheets as applicable)  | √ if needs further action | Document all impacts<br>(Attach Guide Sheets as applicable) | √ if needs further action |
| •Clean Air Act<br><a href="#">Guide Sheet</a><br>No air quality resource concerns identified.   | No Effect<br>No action alternative will have no effect   | <input type="checkbox"/>  | No Effect<br>The proposed action or alternative is not expected to increase the emission rate of any regulated air pollutant.  | <input type="checkbox"/>  |   | <input type="checkbox"/>  |
| •Clean Water Act / Waters of the U.S.<br><br><a href="#">Guide Sheet</a><br>Site is considered Waters of the U.S.   | No Effect<br>No action alternative will likely result in additional bank erosion and increased sediment load in the water body. This would not be considered a federal action. | <input type="checkbox"/>  | May Effect<br>This alternative will likely require a 404 permit and a NPDES permit.  | <input type="checkbox"/>  |   | <input type="checkbox"/>  |
| •Coastal Zone Management<br><a href="#">Guide Sheet</a><br>Not in project area  | No Effect<br>Not within Coastal Zone Management Area.  | <input type="checkbox"/>  | No Effect<br>Not within Coastal zone Management Area.  | <input type="checkbox"/>  |   | <input type="checkbox"/>  |
| Coral Reefs<br><a href="#">Guide Sheet</a><br><br>Not in project area   | No Effect<br>Not present in project area.  | <input type="checkbox"/>  | No Effect<br>Not present in project area.  | <input type="checkbox"/>  |   | <input type="checkbox"/>  |
| •Cultural Resources / Historic Properties<br><br><a href="#">Guide Sheet</a>  | No Effect<br>No effect with the no action alternative.   | <input type="checkbox"/>  | No Effect<br>SHPO consultation will be completed prior to construction unless this site is considered exigent.   | <input type="checkbox"/>  |   | <input type="checkbox"/>  |
| •Endangered and Threatened Species<br><br><a href="#">Guide Sheet</a><br>Canada lynx, Grizzly bear, and Western Glacier Stonefly are all listed species in the county   | No Effect<br>MTNHP information was consulted and this stream is not considered habitat for any of the species listed in the county   | <input type="checkbox"/>  | No Effect<br>MTNHP information was consulted and this stream is not considered habitat for any of the species listed in the county   | <input type="checkbox"/>  |   | <input type="checkbox"/>  |
| Environmental Justice<br><a href="#">Guide Sheet</a><br>Current condition has no effect.  | No Effect<br>No effect with this no action alternative   | <input type="checkbox"/>  | No Effect<br>There are no low-income populations, minority populations, Indian Tribes, or other specified populations that would experience disproportionately high and adverse human health impacts resulting from the proposed action or alternative                 | <input type="checkbox"/>  |   | <input type="checkbox"/>  |
| •Essential Fish Habitat<br><a href="#">Guide Sheet</a><br>Not in project area   | No Effect<br>None in MT  | <input type="checkbox"/>  | No Effect<br>None in MT  | <input type="checkbox"/>  |   | <input type="checkbox"/>  |
| Floodplain Management<br>Current condition is unlikely to increase flood frequency.   | No Effect<br>No effect with this no action alternative   | <input type="checkbox"/>  | May Effect<br>Over the short or long term, the proposed action will not likely result in an increased flood hazard, incompatible development, or other adverse effect to the existing natural and beneficial values of the floodplain or lands adjacent or downstream. | <input type="checkbox"/>  |   | <input type="checkbox"/>  |
| Invasive Species<br><a href="#">Guide Sheet</a><br>Some noxious weeds are present in the planning area  | No Effect<br>Invasive species will continue to be managed and controlled in accordance with county and state weed regulations.   | <input type="checkbox"/>  | No Effect<br>Invasive species will continue to be managed and controlled in accordance with county and state weed regulations.   | <input type="checkbox"/>  |   | <input type="checkbox"/>  |

|   |   |                          |   |                          |  |                          |
|---|---|--------------------------|---|--------------------------|--|--------------------------|
| <p>•Migratory Birds/Bald and Golden Eagle Protection Act<br/><a href="#">Guide Sheet</a><br/>Current condition has no effect.</p> | <p>No Effect<br/>The action will not result in a take (intentionally or unintentionally) to any migratory bird, occupied nest or egg.</p> | <input type="checkbox"/> | <p>No Effect<br/>The action will not result in a take (intentionally or unintentionally) to any migratory bird, occupied nest or egg.</p> | <input type="checkbox"/> |  | <input type="checkbox"/> |
|---|---|--------------------------|---|--------------------------|--|--------------------------|

|  |  |                          |  |                          |  |                          |
|--|--|--------------------------|--|--------------------------|--|--------------------------|
| Natural Areas<br><a href="#">Guide Sheet</a><br>No Natural Areas within project area.                                  | No Effect<br>No Natural Areas within project area.                             | <input type="checkbox"/> | No Effect<br>No Natural Areas within project area.                             | <input type="checkbox"/> |  | <input type="checkbox"/> |
| Prime and Unique Farmlands<br><a href="#">Guide Sheet</a><br>Land use will not change with either proposed alternative | No Effect<br>Land use will not change  | <input type="checkbox"/> | No Effect<br>Land use will not change  | <input type="checkbox"/> |  | <input type="checkbox"/> |
| Riparian Area<br><a href="#">Guide Sheet</a>   | No Effect<br>Riparian function will not change as a result of this alternative | <input type="checkbox"/> | No Effect<br>Riparian function will not change as a result of this alternative | <input type="checkbox"/> |  | <input type="checkbox"/> |
| Scenic Beauty<br><a href="#">Guide Sheet</a>   | No Effect<br>No effect to the scenic quality of the general landscape          | <input type="checkbox"/> | No Effect<br>No effect to the scenic quality of the general landscape          | <input type="checkbox"/> |  | <input type="checkbox"/> |

|  |   |                          |  |                          |                          |
|--|---|--------------------------|--|--------------------------|--------------------------|
| •Wetlands<br><a href="#">Guide Sheet</a><br>None observed  | No Effect<br>None observed  | <input type="checkbox"/> | No Effect<br>none observed   | <input type="checkbox"/> | <input type="checkbox"/> |
| •Wild and Scenic Rivers<br><a href="#">Guide Sheet</a><br>Current condition has no effect on wild and scenic rivers.   | No Effect<br>None present.  | <input type="checkbox"/> | No Effect<br>None present.   | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>K. Other Agencies and Broad Public Concerns</b>   | <b>No Action</b>  |                          | <b>Alternative 1</b>   |                          | <b>Alternative 2</b>     |
| Easements, Permissions, Public Review, or Permits Required and Agencies Consulted.   | No easements, permission, or permits required. Consulted FWS and MFWP through T&E and SOC queries. Consulted SHPO through CR inquiry. |                          | Participant is responsible for obtaining 310, 404, and NPDES permits where applicable and required by statute. Consulted FWS and MTFWP through T&E and SOC queries. Consulted SHPO through CR inquiry. |                          |                          |
| Cumulative Effects Narrative (Describe the cumulative impacts considered, including past, present and known future actions regardless of who performed the actions)  | None  |                          | None.  |                          |                          |
| <b>L. Mitigation</b><br>(Record actions to avoid, minimize, and compensate)  | None needed   |                          | None needed unless required through permitting process.  |                          |                          |
| <b>M. Preferred Alternative</b>  | √ preferred alternative   | <input type="checkbox"/> | <input checked="" type="checkbox"/>  | <input type="checkbox"/> |                          |
|  | Supporting reason   |                          | This is the chosen alternative because it addresses the resource concern and meets client objectives   |                          |                          |
| <b>N. Context</b> (Record context of alternatives analysis)  |   | local                    | local  |                          |                          |
| The significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality.  |   |                          |  |                          |                          |
| <b>O. To the best of my knowledge, the data shown on this form is accurate and complete:</b>   |   |                          |  |                          |                          |
| In the case where a non-NRCS person (e.g. a TSP) assists with planning they are to sign the first signature block and then NRCS is to sign the second block to verify the information's accuracy.  |   |                          |  |                          |                          |
| Signature (TSP if applicable)  |   | Title                    |  | Date                     |                          |
| <i>Joel LaLiberty</i>  |   | ARC-T                    |  | 6/30/2022                |                          |
| Signature (NRCS)   |   | Title                    |  | Date                     |                          |
| If preferred alternative is not a federal action where NRCS has control or responsibility and this NRCS-CPA-52 is shared with someone other than the client then indicate to whom this is being provided.  |   |                          |  |                          |                          |
| <b>The following sections are to be completed by the Responsible Federal Official (RFO)</b>  |   |                          |  |                          |                          |
| NRCS is the RFO if the action is subject to NRCS control and responsibility (e.g., actions financed, funded, assisted, conducted, regulated, or approved by NRCS). These actions do not include situations in which NRCS is only providing technical assistance because NRCS cannot control what the client ultimately does with that assistance and situations where NRCS is making a technical determination (such as Farm Bill HEL or wetland determinations) not associated with the planning process. |   |                          |  |                          |                          |

**P. Determination of Significance or Extraordinary Circumstances**

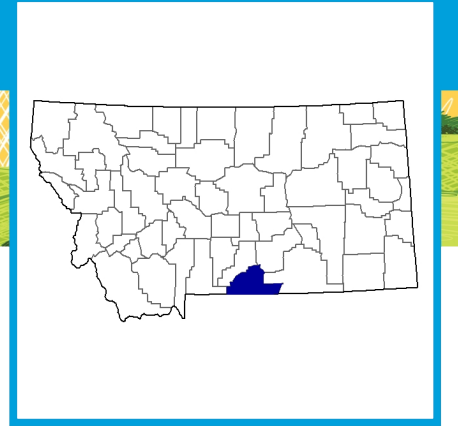
To answer the questions below, consider the severity (intensity) of impacts in the contexts identified above. Impacts may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

**If you answer ANY of the below questions "yes" then contact the State Environmental Liaison as there may be extraordinary circumstances and significance issues to consider and a site specific NEPA analysis may be required.**

| Yes                      | No                                  |  |
|--------------------------|-------------------------------------|--|
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | ● Is the preferred alternative expected to cause significant effects on public health or safety?   |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | ● Is the preferred alternative expected to significantly affect unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas?  |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | ● Are the effects of the preferred alternative on the quality of the human environment likely to be highly controversial?  |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | ● Does the preferred alternative have highly uncertain effects or involve unique or unknown risks on the human environment?  |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | ● Does the preferred alternative establish a precedent for future actions with significant impacts or represent a decision in principle about a future consideration?  |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | ● Is the preferred alternative known or reasonably expected to have potentially significant environment impacts to the quality of the human environment either individually or cumulatively over time?   |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | ● Will the preferred alternative likely have a significant adverse effect on ANY of the special environmental concerns? Use the Evaluation Procedure Guide Sheets to assist in this determination. This includes, but is not limited to, concerns such as cultural or historical resources, endangered and threatened species, environmental justice, wetlands, floodplains, coastal zones, coral reefs, essential fish habitat, wild and scenic rivers, clean air, riparian areas, natural areas, and invasive species. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | ● Will the preferred alternative threaten a violation of Federal, State, or local law or requirements for the protection of the environment?   |



# 2017 CENSUS OF AGRICULTURE County Profile



## Carbon County Montana

### Total and Per Farm Overview, 2017 and change since 2012

|   | 2017        | % change since 2012 |
|---|-------------|---------------------|
| Number of farms                                     | 725         | (Z)                 |
| Land in farms (acres)                               | 815,758     | +3                  |
| Average size of farm (acres)                        | 1,125       | +3                  |
| <b>Total</b>  | <b>(\$)</b> |                     |
| Market value of products sold                       | 99,023,000  | +29                 |
| Government payments                                 | 1,388,000   | -18                 |
| Farm-related income                                 | 3,045,000   | -18                 |
| Total farm production expenses                      | 79,430,000  | +6                  |
| Net cash farm income                                | 24,027,000  | +222                |
| <b>Per farm average</b>                             | <b>(\$)</b> |                     |
| Market value of products sold                       | 136,584     | +29                 |
| Government payments<br>(average per farm receiving) | 5,882       | -11                 |
| Farm-related income                                 | 8,724       | -29                 |
| Total farm production expenses                      | 109,558     | +6                  |
| Net cash farm income                                | 33,140      | +223                |

**3** Percent of state agriculture sales

#### Share of Sales by Type (%)

|                                  |    |
|----------------------------------|----|
| Crops                            | 33 |
| Livestock, poultry, and products | 67 |

#### Land in Farms by Use (%) <sup>a</sup>

|             |    |
|-------------|----|
| Cropland    | 17 |
| Pastureland | 78 |
| Woodland    | 3  |
| Other       | 2  |

**Acres irrigated: 98,757**

12% of land in farms

#### Land Use Practices (% of farms)

|                |    |
|----------------|----|
| No till        | 7  |
| Reduced till   | 11 |
| Intensive till | 15 |
| Cover crop     | 5  |

### Farms by Value of Sales

|                      | Number | Percent of Total <sup>a</sup> |
|----------------------|--------|-------------------------------|
| Less than \$2,500    | 196    | 27                            |
| \$2,500 to \$4,999   | 49     | 7                             |
| \$5,000 to \$9,999   | 62     | 9                             |
| \$10,000 to \$24,999 | 87     | 12                            |
| \$25,000 to \$49,999 | 91     | 13                            |
| \$50,000 to \$99,999 | 71     | 10                            |
| \$100,000 or more    | 169    | 23                            |

### Farms by Size

|                  | Number | Percent of Total <sup>a</sup> |
|------------------|--------|-------------------------------|
| 1 to 9 acres     | 49     | 7                             |
| 10 to 49 acres   | 154    | 21                            |
| 50 to 179 acres  | 150    | 21                            |
| 180 to 499 acres | 127    | 18                            |
| 500 to 999 acres | 73     | 10                            |
| 1,000 + acres    | 172    | 24                            |



## Market Value of Agricultural Products Sold

|   | Sales<br>(\$1,000) | Rank<br>in<br>State <sup>b</sup> | Counties<br>Producing<br>Item | Rank<br>in<br>U.S. <sup>b</sup> | Counties<br>Producing<br>Item |
|---|--------------------|----------------------------------|-------------------------------|---------------------------------|-------------------------------|
| <b>Total</b>  | <b>99,023</b>      | <b>12</b>                        | <b>56</b>                     | <b>1,152</b>                    | <b>3,077</b>                  |
| <b>Crops</b>  | <b>33,059</b>      | <b>18</b>                        | <b>56</b>                     | <b>1,360</b>                    | <b>3,073</b>                  |
| Grains, oilseeds, dry beans, dry peas                     | 15,528             | 24                               | 54                            | 1,237                           | 2,916                         |
| Tobacco   | -                  | -                                | -                             | -                               | 323                           |
| Cotton and cottonseed                                     | -                  | -                                | -                             | -                               | 647                           |
| Vegetables, melons, potatoes, sweet potatoes              | 66                 | 21                               | 42                            | 1,696                           | 2,821                         |
| Fruits, tree nuts, berries                                | 34                 | 9                                | 27                            | 1,627                           | 2,748                         |
| Nursery, greenhouse, floriculture, sod                    | 73                 | 19                               | 35                            | 1,466                           | 2,601                         |
| Cultivated Christmas trees, short rotation<br>woody crops | -                  | -                                | 9                             | -                               | 1,384                         |
| Other crops and hay                                       | 17,358             | 3                                | 56                            | 142                             | 3,040                         |
| <b>Livestock, poultry, and products</b>                   | <b>65,965</b>      | <b>5</b>                         | <b>56</b>                     | <b>761</b>                      | <b>3,073</b>                  |
| Poultry and eggs  | 19                 | 26                               | 53                            | 1,601                           | 3,007                         |
| Cattle and calves   | 64,403             | 5                                | 56                            | 212                             | 3,055                         |
| Milk from cows  | -                  | -                                | 25                            | -                               | 1,892                         |
| Hogs and pigs   | 32                 | 25                               | 54                            | 1,246                           | 2,856                         |
| Sheep, goats, wool, mohair, milk                          | 1,110              | 11                               | 55                            | 157                             | 2,984                         |
| Horses, ponies, mules, burros, donkeys                    | 353                | 14                               | 56                            | 605                             | 2,970                         |
| Aquaculture   | (D)                | 9                                | 13                            | (D)                             | 1,251                         |
| Other animals and animal products                         | (D)                | 41                               | 52                            | (D)                             | 2,878                         |

|                                     |              |                               |   |        |
|-------------------------------------|--------------|-------------------------------|---|--------|
| <b>Total Producers <sup>c</sup></b> | <b>1,288</b> | <b>Percent of farms that:</b> | <b>Top Crops in Acres <sup>d</sup></b>    |        |
| <b>Sex</b>                          |              | Have internet access          | 82  |        |
| Male                                | 800          |                               |   |        |
| Female                              | 488          |                               |   |        |
| <b>Age</b>                          |              | Farm organically              | -   |        |
| <35                                 | 109          |                               |   |        |
| 35 – 64                             | 705          |                               |   |        |
| 65 and older                        | 474          |                               |   |        |
| <b>Race</b>                         |              | Sell directly to consumers    | 4   |        |
| American Indian/Alaska Native       | 10           |                               |   |        |
| Asian                               | -            |                               |   |        |
| Black or African American           | 1            |                               |   |        |
| Native Hawaiian/Pacific Islander    | -            |                               |   |        |
| White                               | 1,276        | Hire farm labor               | 26  |        |
| More than one race                  | 1            |                               |   |        |
| <b>Other characteristics</b>        |              | Are family farms              | 93  |        |
| Hispanic, Latino, Spanish origin    | 14           |                               |   |        |
| With military service               | 168          |                               |   |        |
| New and beginning farmers           | 332          |                               |   |        |
|                                     |              |                               | <b>Livestock Inventory (Dec 31, 2017)</b> |        |
|                                     |              |                               | Broilers and other meat-type chickens     | 263    |
|                                     |              |                               | Cattle and calves                         | 78,558 |
|                                     |              |                               | Goats                                     | 434    |
|                                     |              |                               | Hogs and pigs                             | 154    |
|                                     |              |                               | Horses and ponies                         | 2,377  |
|                                     |              |                               | Layers                                    | 1,680  |
|                                     |              |                               | Pullets                                   | 99     |
|                                     |              |                               | Sheep and lambs                           | 6,765  |
|                                     |              |                               | Turkeys                                   | 64     |

See 2017 Census of Agriculture, U.S. Summary and State Data, for complete footnotes, explanations, definitions, commodity descriptions, and methodology.

<sup>a</sup> May not add to 100% due to rounding. <sup>b</sup> Among counties whose rank can be displayed. <sup>c</sup> Data collected for a maximum of four producers per farm.








<sup>d</sup> Crop commodity names may be shortened; see full names at [www.nass.usda.gov/go/cropnames.pdf](http://www.nass.usda.gov/go/cropnames.pdf). <sup>e</sup> Position below the line does not indicate rank.

(D) Withheld to avoid disclosing data for individual operations. (NA) Not available. (Z) Less than half of the unit shown. (-) Represents zero.



August 11, 2023

**Wetlands**

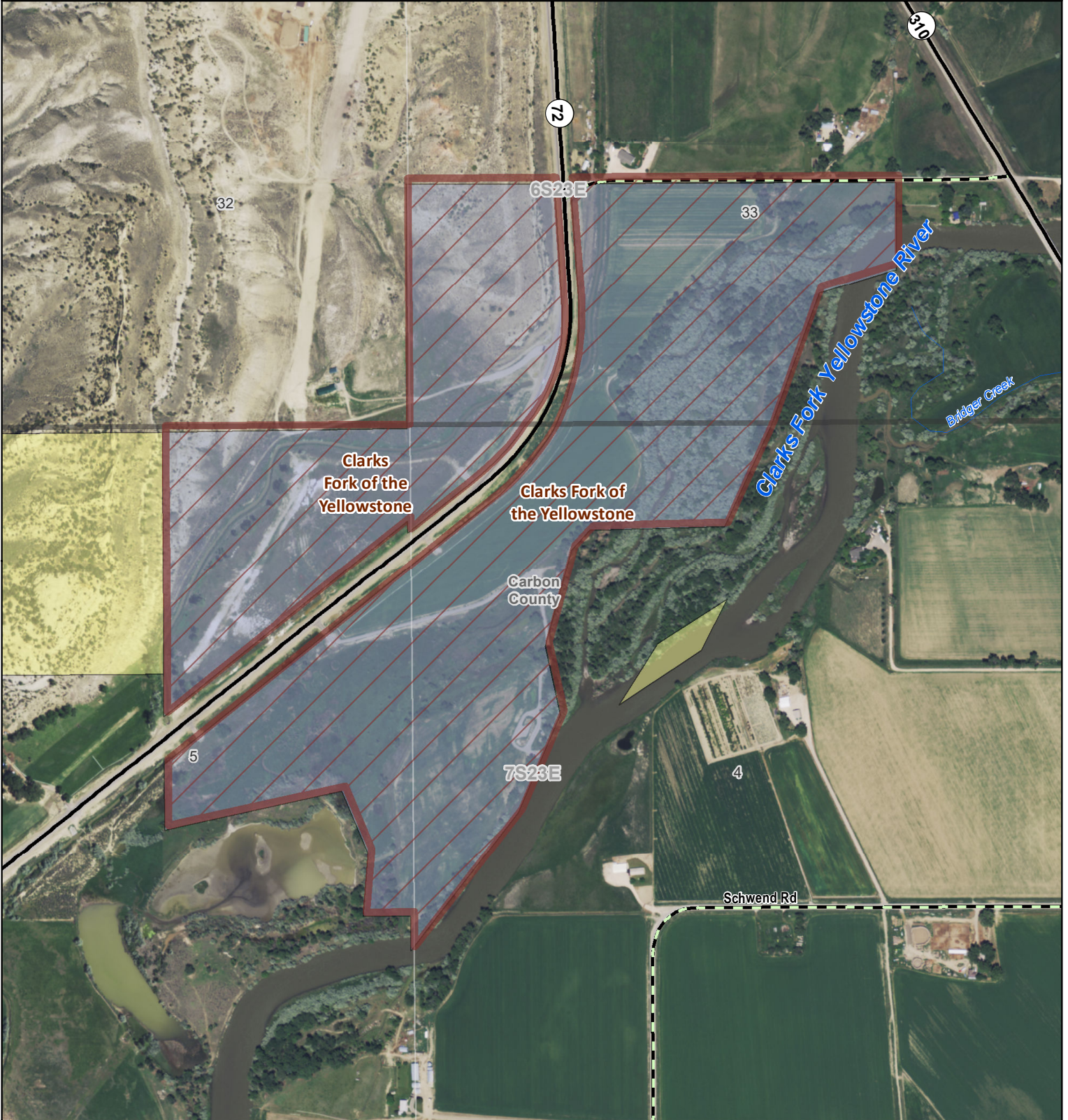
- |  |   |  |
|--|---|--|
|  Estuarine and Marine Deepwater |  Freshwater Emergent Wetland       |  Lake     |
|  Estuarine and Marine Wetland   |  Freshwater Forested/Shrub Wetland |  Other    |
|  |  Freshwater Pond                   |  Riverine |




This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

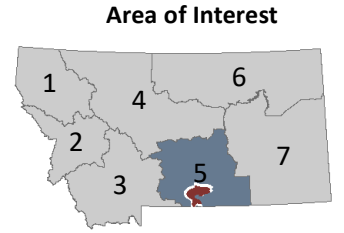
# Clarks Fork of the Yellowstone

# MONTANA FWP

Fishing Access Site

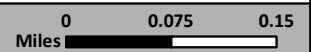


-  Boundary
-  BLM
-  MT Fish, Wildlife & Parks



39754253.pdf  
Date: 12/18/2019

Disclaimer - This map is not intended to depict property ownership outside the Wildlife Management Area. Contact the appropriate land management agency for information on public land ownership and travel guidelines.



# NEPAssist Report

## Stillwater CD - Orchard Canal

Input Coordinates: 45.286556,-108.893726,45.285258,-108.893533,45.284880,-108.896022,45.284926,-108.898189,45.284443,-108.900035,45.282661,-108.900399,45.280381,-108.900807,45.279506,-108.899155,45.278358,-108.898876,45.278011,-108.899369,45.278992,-108.902331,45.280185,-108.902588,45.281785,-108.901880,45.283854,-108.901987,45.285107,-108.901794,45.285862,-108.899391,45.286103,-108.896065,45.286556,-108.893726

| Project Area   | 0.07 sq mi       |
|--|------------------|
| Within an Ozone 8-hr (1997 standard) Non-Attainment/Maintenance Area?                                      | no               |
| Within an Ozone 8-hr (2008 standard) Non-Attainment/Maintenance Area?                                      | no               |
| Within a Lead (2008 standard) Non-Attainment/Maintenance Area?   | no               |
| Within a SO2 1-hr (2010 standard) Non-Attainment/Maintenance Area?   | no               |
| Within a PM2.5 24hr (2006 standard) Non-Attainment/Maintenance Area?                                       | no               |
| Within a PM2.5 Annual (1997 standard) Non-Attainment/Maintenance Area?                                     | no               |
| Within a PM2.5 Annual (2012 standard) Non-Attainment/Maintenance Area?                                     | no               |
| Within a PM10 (1987 standard) Non-Attainment/Maintenance Area?   | no               |
| Within a Federal Land?   | no               |
| Within an impaired stream?   | yes              |
| Within an impaired waterbody?  | no               |
| Within a waterbody?  | yes              |
| Within a stream?   | yes              |
| Within an NWI wetland?   | Available Online |
| Within a Brownfields site?   | no               |
| Within a Superfund site?   | no               |
| Within a Toxic Release Inventory (TRI) site?   | no               |
| Within a water discharger (NPDES)?   | no               |
| Within a hazardous waste (RCRA) facility?  | no               |
| Within an air emission facility?   | no               |
| Within a school?   | no               |
| Within an airport?   | no               |
| Within a hospital?   | no               |
| Within a designated sole source aquifer?   | no               |
| Within a historic property on the National Register of Historic Places?                                    | no               |
| Within a Toxic Substances Control Act (TSCA) site?   | no               |
| Within a Land Cession Boundary?  | yes              |
| Within a tribal area (lower 48 states)?  | no               |
| Within the service area of a mitigation or conservation bank?  | yes              |
| Within the service area of an In-Lieu-Fee Program?   | yes              |
| Within a Public Property Boundary of the Formerly Used Defense Sites?                                      | no               |
| Within a Munitions Response Site?  | no               |
| Within an Essential Fish Habitat (EFH)?  | no               |
| Within a Habitat Area of Particular Concern (HAPC)?  | no               |
| Within an EFH Area Protected from Fishing (EFHA)?  | no               |
| Within a Bureau of Land Management Area of Critical Environmental Concern?                                 | no               |
| Within an ESA-designated Critical Habitat Area per U.S. Fish & Wildlife Service?                           | no               |
| Within an ESA-designated Critical Habitat river, stream or water feature per U.S. Fish & Wildlife Service? | no               |

Soil Map—Carbon County Area, Montana  
(Stillwater Conservation District - Orchard Canal)



Map Scale: 1:5,700 if printed on A portrait (8.5" x 11") sheet.

0 50 100 200 300 Meters

0 250 500 1000 1500 Feet


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



Soil Map—Carbon County Area, Montana  
(Stillwater Conservation District - Orchard Canal)

**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: Carbon County Area, Montana  
Survey Area Data: Version 18, Aug 30, 2022

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

Date(s) aerial images were photographed: Jun 22, 2021—Oct 4, 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 |
|------------------------------------|--|--------------|----------------|
| Gb                                 | Glenberg loam, gravel substratum                     | 0.8          | 5.1%           |
| Hm                                 | Haverson silty clay loam, 0 to 2 percent slopes      | 1.2          | 7.6%           |
| Hs                                 | Heldt silty clay loam, 0 to 2 percent slopes         | 0.1          | 0.6%           |
| Hw                                 | Heldt silty clay loam, saline, 0 to 6 percent slopes | 5.5          | 36.0%          |
| Kc                                 | Kyle clay, 0 to 2 percent slopes                     | 5.7          | 36.8%          |
| Rh                                 | Riverwash  | 0.0          | 0.0%           |
| W                                  | Water  | 2.1          | 14.0%          |
| <b>Totals for Area of Interest</b> |  | <b>15.4</b>  | <b>100.0%</b>  |

### Layers

**Get started**  
You can explore maps, add layers, and more without signing in. To save your work, sign in before creating your map.  
[Learn more about Map Viewer](#)

▼ USFWS Critical Habitat

- Critical Habitat - Polygon Features - Final
- Critical Habitat - Linear Features - Final
- Critical Habitat - Polygon Features - Proposed
- Critical Habitat - Linear Features - Proposed

Add ▼



Map navigation controls: Search, Full Screen, Home, Zoom In (+), Zoom Out (-)

45.28000, -108.90188

10-0449-27-3-02-01-0000

**General Information**

|                       |                                     |
|-----------------------|-------------------------------------|
| Property Number       | 10-0449-27-3-02-01-0000             |
| Assessment Code       | 0014145010                          |
| County                | Carbon                              |
| Levy District         | 10-1058                             |
| Neighborhood          | 210.003                             |
| Situs Address         |                                     |
| Legal Description     | S27, T06 S, R23 E, TR 1 COS 2302 FT |
| Owner Name            | FLUER SCOTT LOUIS & KELLY LYNN      |
| Property Last Updated | 8/3/2023                            |

**Value History**

| Year | Market Value | Taxable Value |
|------|--------------|---------------|
| 2021 | \$65,028     | \$1,405       |
| 2022 | \$65,028     | \$1,405       |
| 2023 | \$72,011     | \$1,555       |

**Property Characteristics**

|                   |                             |  |  |
|-------------------|-----------------------------|--|--|
| Type              | VAC_R - Vacant Land - Rural |  |  |
| Living Units      |                             |  |  |
| Topography        | Utilities                   |  |  |
| Access            |                             |  |  |
| Location          |                             |  |  |
| Fronting          |                             |  |  |
| Parking           | Parking Qty.                |  |  |
| Parking Proximity |                             |  |  |

**Agricultural Land**

| Type | Acres | Productivity | Value |
|------|-------|--------------|-------|
|      |       |              |       |



10-0449-27-3-04-01-0000

**General Information**

|                       |                                   |
|-----------------------|-----------------------------------|
| Property Number       | 10-0449-27-3-04-01-0000           |
| Assessment Code       | 0001431000                        |
| County                | Carbon                            |
| Levy District         | 10-1058                           |
| Neighborhood          | 210.003                           |
| Situs Address         |                                   |
| Legal Description     | S27, T06 S, R23 E, SE4SW4, LOT 10 |
| Owner Name            | RICHARDS MARK L                   |
| Property Last Updated | 8/3/2023                          |

**Value History**

| Year | Market Value | Taxable Value |
|------|--------------|---------------|
| 2021 | \$28,328     | \$612         |
| 2022 | \$28,328     | \$612         |
| 2023 | \$31,474     | \$680         |

**Property Characteristics**

|                   |                             |  |  |
|-------------------|-----------------------------|--|--|
| Type              | VAC_R - Vacant Land - Rural |  |  |
| Living Units      |                             |  |  |
| Topography        | Utilities                   |  |  |
| Access            |                             |  |  |
| Location          |                             |  |  |
| Fronting          |                             |  |  |
| Parking           | Parking Qty.                |  |  |
| Parking Proximity |                             |  |  |

**Agricultural Land**

| Type | Acres | Productivity | Value |
|------|-------|--------------|-------|
|      |       |              |       |





HUNT

FISH

STATE PARKS

ACTIVITIES

CONSERVATION

EDUCATION

ABOUT FWP

BUY & APPLY

NEWS

MYFWP

FWP MENU

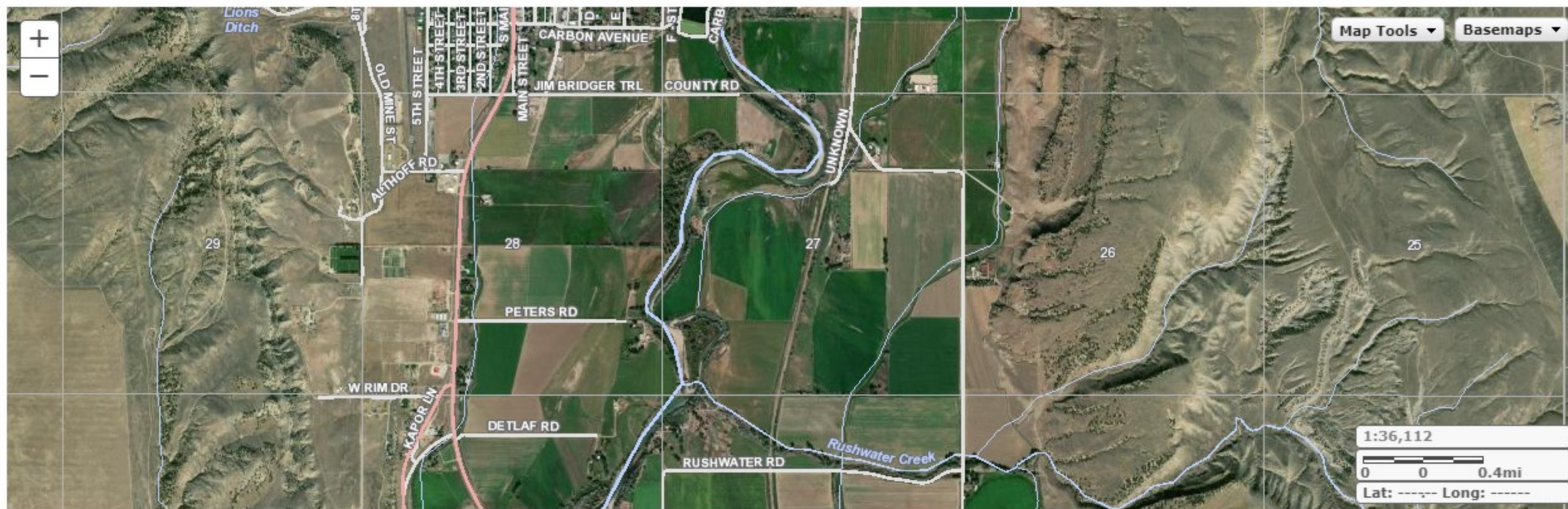
RESTRICTIONS AND CLOSURES

WILDLIFE MANAGEMENT AREAS

HATCHERIES

WILDLIFE HABITAT PROTECTION AREA SEARCH

Select a Wildlife Habitat Protection Area on the map to view information. Or search for a Wildlife Habitat Protection Area from the dropdown below.



Visit a Wildlife Habitat Protection Area

Select a Wildlife Habitat Protection Area

Find by Activities

Select an Activity

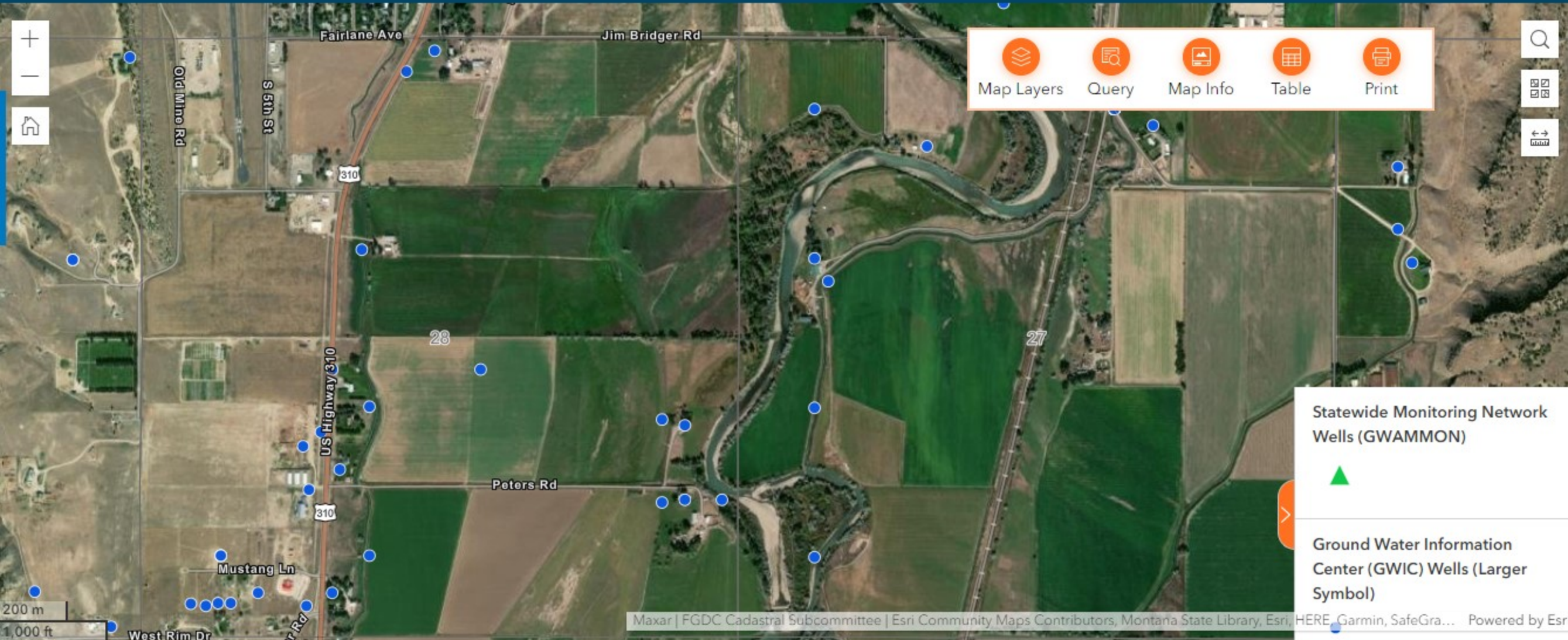
Find by Hunting / Trapping Opportunities

Select a Species

# Groundwater Monitoring

Main Map

Hydrographs



Map Layers Query Map Info Table Print

Statewide Monitoring Network Wells (GWAMMON)

Ground Water Information Center (GWIC) Wells (Larger Symbol)

15.28000, -108.90188

Basemap Imagery Draw Erase Save Session Tools More Data

### Draw

You can select from the below to draw a point, line, area, rectangle or enter your own coordinates for your project area. You may draw more than one project area on the map.



Click on the map 3 or more times to draw a polygon. Click on the starting point to finish the polygon.

Symbol:

Fill Color:

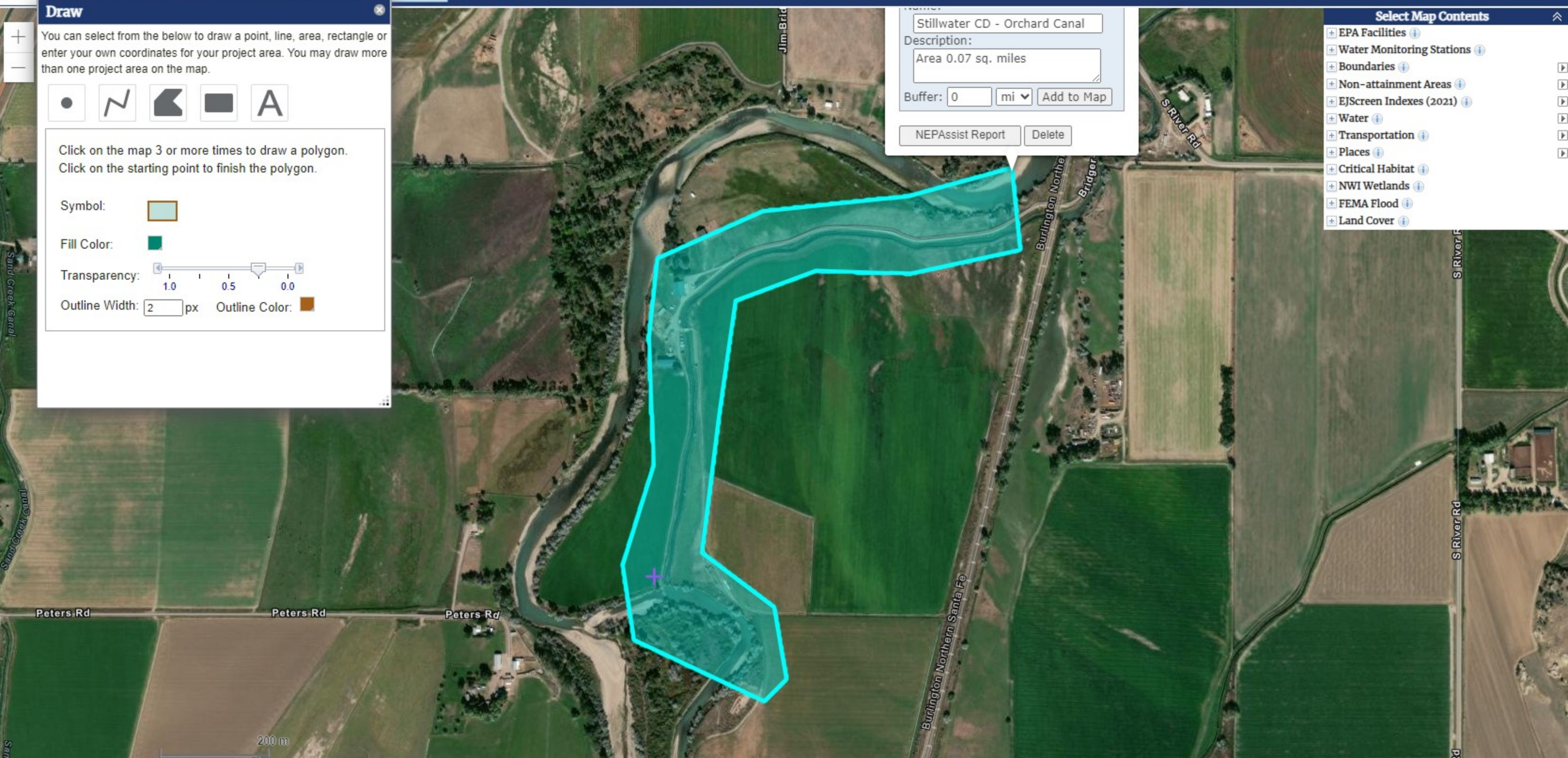
Transparency:

Outline Width:  px Outline Color:

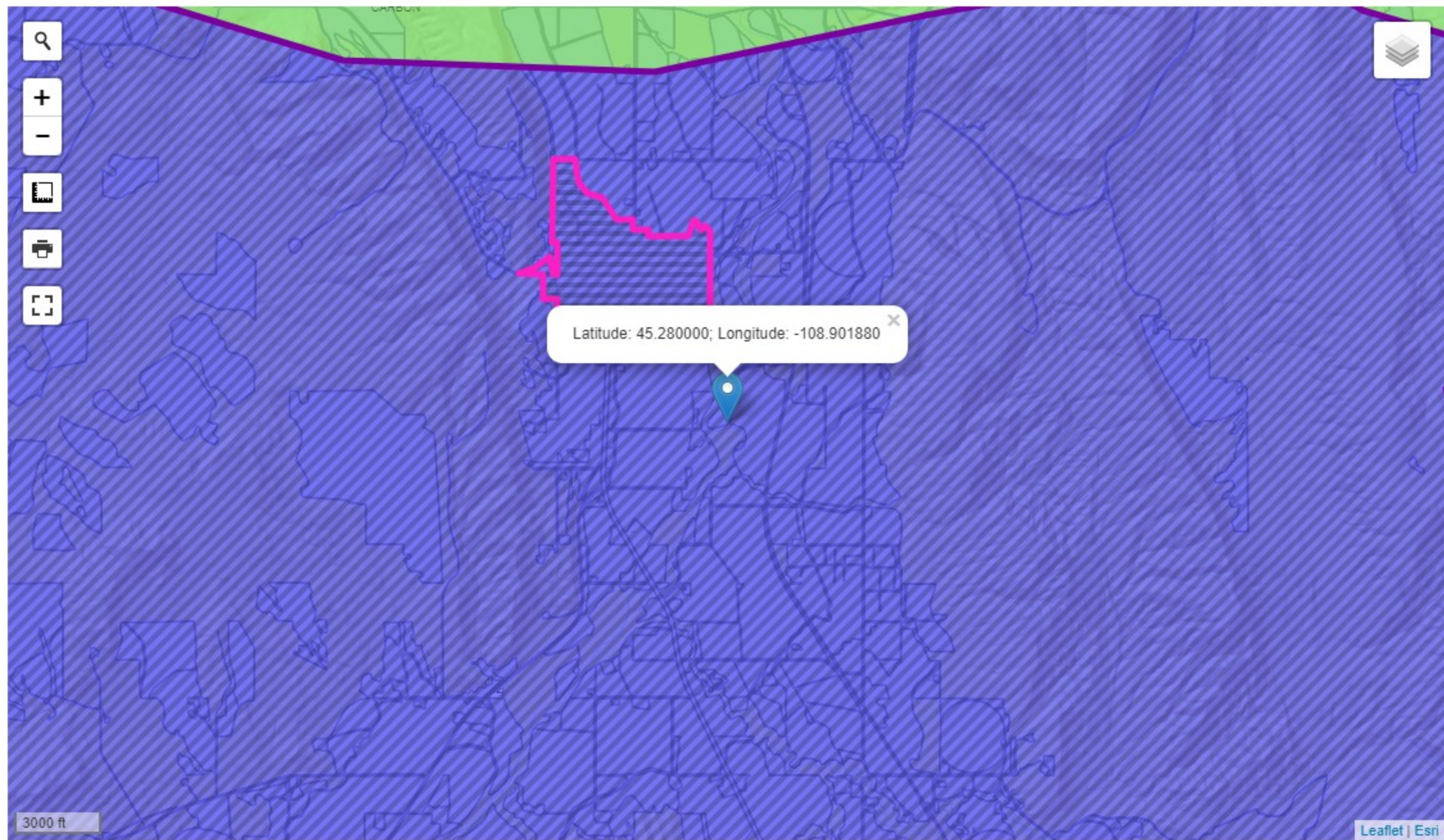
Stillwater CD - Orchard Canal  
Description:  
Area 0.07 sq. miles  
Buffer:  mi

### Select Map Contents

- EPA Facilities
- Water Monitoring Stations
- Boundaries
- Non-attainment Areas
- EJScreen Indexes (2021)
- Water
- Transportation
- Places
- Critical Habitat
- NWI Wetlands
- FEMA Flood
- Land Cover



200 m



# NATURAL RESOURCES AND CONSERVATION



GREG GIANFORTE, GOVERNOR

1539 ELEVENTH AVENUE

## STATE OF MONTANA

DIRECTOR'S OFFICE: (406) 444-2074  
FAX: (406) 444-2684PO BOX 201601  
HELENA, MONTANA 59620-1601

### Conservation and Resource Development Division Environmental Checklist Instructions

#### **Purpose of This Document:**

All applicants must consider the potential environmental impacts of their projects. Consideration of these impacts on the location, design, or construction actions may help avoid expensive costs. A project will not be eligible for funding if it results in significant environmental degradation.

DNRC requires compliance with the Montana Environmental Policy Act (MEPA) per state law and associated DNRC Administrative Rules (ARM 36.2.523). MEPA requires state agencies to prepare a detailed statement on any project, program, or activity directly undertaken by the agency; a project or activity supported through a contract, grant, subsidy, loan, or other form of funding assistance from the agency; and a project or activity involving the issuance of a lease, permit, license, certificate, or other entitlement for use or permission by the agency (MCA Title 75, Chapter 1). Thus, all project applications will be subject to MEPA review.

#### ***What Does This Mean for Applicants?***

- All applicants must complete the Environmental Checklist in its entirety and provide sufficient documentation on public participation.
- Public participation, or scoping, of the project must include stakeholder, landowner, and community engagement. These efforts can be in the form of documented public meetings (e.g., meeting minutes, pdf presentations) or letters of support.
  - The public meeting must be properly noticed (advertised) and the public must be provided with an opportunity at the meeting to comment on the project.
  - Minutes of the meeting should reflect what was discussed about the project, including all comments received from the public.
  - Letters of support must be included from any identified or interested stakeholders.
- Agency Comment Letters (see instructions below)
- Please submit these items with your application.
- Provide Affidavit of Publication or Meeting Minutes for the public comment period notice on the draft EA

#### ***How Will DNRC Use the Information Provided?***

The information provided within the Environmental Checklist will be subject to a MEPA review by DNRC. If this review should result in an Environmental Assessment, please be aware that DNRC will draft the Environmental Assessment. The drafted Environmental Assessment decision will be posted for a public comment period of up to 30 days dependent on the level of environmental impact.

When the draft EA is posted, we require the project proponent to post the notice in either one local newspaper outlet in the legal advertising section or provide the notice during a publicly held meeting. The applicant must then provide the affidavit of publication if posted in the newspaper or meeting minutes if discussed in a public meeting. Please note this public comment period does not suffice for the public participation component mentioned above. The MEPA document will then require a final decision by DNRC before funds are awarded.

It is also important to note for projects with no environmental impacts, or those that do not lead directly to construction or any other sort of environmental degradation, will not be subject to an environmental assessment and the checklist/public participation does not need to be completed. Examples of these sorts of activities include, but are not limited to, development of a PER (professional engineering report), planning, and education/informational outreach. Please let us know if there are additional questions on what other projects may fall under this category.

**Instructions:**

Complete the Environmental Checklist on the following pages after the instructions below. DNRC retains the ultimate decision-making authority on all MEPA decisions. If DNRC determines this section to be incomplete, additional information will be required before consideration for funding.

| Example   |   |   |   |
|---|---|---|---|
| Impact Code   | Impact Type   | Permits/<br>Mitigation<br>Required?   | Explanation of Impact to Resource   |
| <b>1. Soil Suitability, Topographic and/or Geologic Constraints (example: soil slump, steep slopes, subsidence, seismic activity)</b> |   |   |   |
| <input type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse                         | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA | <i>Current Conditions:</i><br><br><i>Preferred Alternative Environmental Narrative:</i> |

**1. Impact Code:** In the first column, identify the impact that the preferred alternative will have on each resource (e.g. 1. Soil Suitability, Topographic and/or Geologic Constraints) in the project area. Select from the following impact codes:

- No Impact: No impact to the resource is anticipated or this is not applicable to this project.
- Beneficial: Potentially beneficial impact to the resource.
- Adverse: Potentially adverse impact to the resource.

*Please note that a resource may have more than one impact. Identify all possible impacts to the resource in the space provided. For example, the preferred alternative may have a short-term direct negative impact and a long-term direct and indirect positive impact on the resource. Check all boxes that apply and use the space provided in the final column "Explanation of Impact to Resource" to explain.*

| Example     |             |                                     |                                   |
|-------------|-------------|-------------------------------------|-----------------------------------|
| Impact Code | Impact Type | Permits/<br>Mitigation<br>Required? | Explanation of Impact to Resource |
|             |             |                                     |                                   |

| 1. Soil Suitability, Topographic and/or Geologic Constraints (example: soil slump, steep slopes, subsidence, seismic activity) |                                     |                                     |   |
|--|-------------------------------------|-------------------------------------|---|
| <input type="checkbox"/> No Impact   | <input type="checkbox"/> Direct     | <input type="checkbox"/> Permit     | <i>Current Conditions:</i>                            |
| <input type="checkbox"/> Beneficial  | <input type="checkbox"/> Indirect   | <input type="checkbox"/> Mitigation | <i>Preferred Alternative Environmental Narrative:</i> |
| <input type="checkbox"/> Adverse   | <input type="checkbox"/> Cumulative | <input type="checkbox"/> NA         |   |

**2. Impact Type:** In the second column, identify the type(s) of impact to the resource from the preferred alternative. (Impacts may be direct, indirect or cumulative).

- Direct impacts: Occur at the same time and place as the proposed project.
- Indirect or secondary impacts: Occur at a different location or later time than the proposed project.
- Cumulative impacts: Collective impacts on the environment when considered in conjunction with other past, present, and future actions related to the proposed project. Cumulative impact analysis includes a review of all state and nonstate activities that have occurred, are occurring, or may occur that have impacted or may impact the same resource as the proposed project.

*Just as above, please note that a resource may have more than one impact. Identify all possible impacts to the resource in the space provided. For example, the preferred alternative may have a short-term direct negative impact and a long-term direct and indirect positive impact on the resource. Check all boxes that apply and use the space provided in the final column "Explanation of Impact to Resource" to explain.*

| Example   |                                     |                                     |   |
|---|-------------------------------------|-------------------------------------|---|
| Impact Code   | Impact Type                         | Permits/<br>Mitigation<br>Required? | Explanation of Impact to Resource                     |
| <b>1. Soil Suitability, Topographic and/or Geologic Constraints (example: soil slump, steep slopes, subsidence, seismic activity)</b> |                                     |                                     |   |
| <input type="checkbox"/> No Impact  | <input type="checkbox"/> Direct     | <input type="checkbox"/> Permit     | <i>Current Conditions:</i>                            |
| <input type="checkbox"/> Beneficial   | <input type="checkbox"/> Indirect   | <input type="checkbox"/> Mitigation | <i>Preferred Alternative Environmental Narrative:</i> |
| <input type="checkbox"/> Adverse  | <input type="checkbox"/> Cumulative | <input type="checkbox"/> NA         |   |

**3. Permits/Mitigation Required:** In the third column, please select if a permit and/or mitigation is required for the project (e.g., 310, USACE Section 404 Nationwide).

- Please make sure to include which permits (if any) are required for the particular resource and what mitigation techniques will be used if impacts are to occur.

| Example     |             |                                     |                                   |
|-------------|-------------|-------------------------------------|-----------------------------------|
| Impact Code | Impact Type | Permits/<br>Mitigation<br>Required? | Explanation of Impact to Resource |
|             |             |                                     |                                   |

| 1. Soil Suitability, Topographic and/or Geologic Constraints (example: soil slump, steep slopes, subsidence, seismic activity) |                                     |                                     |   |
|--|-------------------------------------|-------------------------------------|---|
| <input type="checkbox"/> No Impact   | <input type="checkbox"/> Direct     | <input type="checkbox"/> Permit     | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text. |
| <input type="checkbox"/> Beneficial  | <input type="checkbox"/> Indirect   | <input type="checkbox"/> Mitigation |   |
| <input type="checkbox"/> Adverse   | <input type="checkbox"/> Cumulative | <input type="checkbox"/> NA         |   |

**4. Explanation of Impact to Resource:** In the final column, use the space provided on the Environmental Checklist to summarize the following information:

- **Current Conditions**
  - Describe the current environmental resources of the affected area including the impact of no action. Your description of the current natural resources will provide a baseline to compare all alternatives and their associated environmental impacts.
- **Preferred Alternative Environmental Narrative:**
  - Describe the impact of the preferred alternative or *indicate why there is no impact* from the project.
  - Identify any reasonable cumulative impacts that may result from implementing the preferred alternative. Cumulative impacts are the collective impacts on the environment when considered in conjunction with other past, present, and future actions related to the proposed project.
  - If a potentially adverse impact is identified for the preferred alternative, the applicant must provide the following:
    - An analysis of the severity, duration, extent, and frequency of the impact. Please specify and describe the following:
      - Severity: negligible, minor, or major.
      - Duration: short-term or long-term.
      - Extent: local, regional, or statewide.
      - Frequency: non-recurring or recurring.
    - An explanation of short- and/or long-term measures to mitigate the impact with a discussion on the effects of those mitigative measures on the proposed project.
  - Identify any required permits.

**5. Additional Information:** Underneath the table the following information must be provided:

- Cultural Survey Acknowledgement
- Sources of Information: Identify all sources consulted for the completion of the Environmental Checklist. Sources may include studies, plans, documents, or the persons, organizations, or agencies contacted for assistance.

Certain sections of this Environmental Checklist require specialized knowledge. Please contact the following agencies and attach comments provided by those agencies to your application. Below are contacts for certain sections that require additional review by other agencies:

- *Physical Environment, Section #5 – Surface Water Quality* – Montana Department of Environmental Quality, (406) 444 - 3080.
- *Physical Environment, Section #6 – Floodplains and Floodplain Management* – Contact the Local Floodplain Administrator for your County and/or Community

(<http://dnrc.mt.gov/divisions/water/operations/floodplain-management/contacts/20210924FPAs2021.1.pdf>) or visit the Department of Natural Resources Water Resources Division, (406) 444 – 0860, <http://dnrc.mt.gov/divisions/water/operations/floodplain-management>.

- *Physical Environment, Section #7 – Wetlands* – U.S. Department of the Army Corps of Engineers, (406) 441 - 1375 or [montana.reg@usace.army.mil](mailto:montana.reg@usace.army.mil).
- *Physical Environment, Section #9 – Vegetation and Wildlife Species and Habitats* – Montana Fish, Wildlife and Parks, Wildlife Office (406) 444 - 2612 or find your Regional Office at <https://fwp.mt.gov/aboutfwp/contact-us>.
- *Physical Environment, Section #10 – Unique, Endangered, Fragile or Limited Environmental Resources* – U.S. Fish and Wildlife Service for consultation on potential impacts to endangered or limited plants, fish, or other wildlife, (406) 449 - 5225.
- *Human Environment, Section #4 – Historic Properties, Cultural or Archaeological Resources* – Montana State Historic Preservation Office (SHPO), (406) 444 - 7767 or [dmurdo@mt.gov](mailto:dmurdo@mt.gov).

For assistance in preparing the Environmental Checklist, contact DNRC grant manager listed on grant application.

## Environmental Checklist

**Environmental Checklist Prepared by:**

On: 4/21/2023

Beau Downing

Tetra Tech

Name of Person 1

Organization

(406) 437-9865

[Beau.downing@tetrattech.com](mailto:Beau.downing@tetrattech.com)

Phone Number

Email

Click or tap here to enter text.

Click or tap here to enter text.

Name of Person 2

Organization

Click or tap here to enter text.

Click or tap here to enter text.

Phone Number

Email

Click or tap here to enter text.

List additional people above. Include organization, phone number and email for all.

| Physical Environment |             |                                     |                                   |
|----------------------|-------------|-------------------------------------|-----------------------------------|
| Impact Code          | Impact Type | Permits/<br>Mitigation<br>Required? | Explanation of Impact to Resource |
|                      |             |                                     |                                   |

|  |  |   |  |
|--|--|---|--|
| <b>1. Soil Suitability, Topographic and/or Geologic Constraints (example: soil slump, steep slopes, subsidence, seismic activity)</b>  |  |   |  |
| <input type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input checked="" type="checkbox"/> Adverse   | <input checked="" type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input checked="" type="checkbox"/> Cumulative            | <input checked="" type="checkbox"/> Permit<br><input checked="" type="checkbox"/> Mitigation<br><input type="checkbox"/> NA | <u>Current Conditions:</u><br>Emergency Rip Rap installed under EWP. Temporary water control gates into Danford Ditch<br><u>Preferred Alternative Environmental Narrative:</u><br>The preferred Alternative is to replace the temporary headgates with a permanent fixed in place (concrete) structure with headgates sized for delivery of legal water right quantities. Installation of permanent structures in fluvial environments are designed to resist natural erosion and therefore sediment requirement in the river. Cumulative effects are minor in relation to overall river function. Direct and cumulative impacts are mitigated through minimization and/or avoidance of the bed and banks of the Clark's Fork River. |
| <b>2. Hazardous Facilities (example: power lines, hazardous waste sites, acceptable distance from explosive and flammable hazards including chemical/petrochemical storage tanks, underground fuel storage tanks, and related facilities such as natural gas storage facilities and propane storage tanks)</b> |  |   |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                                  | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input checked="" type="checkbox"/> NA            | <u>Current Conditions:</u><br>No Hazardous Facilities Present<br><u>Preferred Alternative Environmental Narrative:</u><br>No impact  |
| <b>3. Surrounding Air Quality (example: dust, odors, emissions)</b>  |  |   |  |
| <input type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input checked="" type="checkbox"/> Adverse   | <input checked="" type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                       | <input type="checkbox"/> Permit<br><input checked="" type="checkbox"/> Mitigation<br><input type="checkbox"/> NA            | <u>Current Conditions:</u><br>Dust is generated during wind events from exposed streambanks and upland areas.<br><u>Preferred Alternative Environmental Narrative:</u><br>The preferred alternative will have minor direct impacts during construction from dust generated along access routes and during excavation. Exhaust from construction equipment will occur during construction. Direct effects are minor and temporary. Use of dust control measures (e.g., water application to haul routes) will minimize fugitive dust and impacts to air quality.  |
| <b>4. Groundwater Resources and Aquifers (example: quantity, quality, distribution, depth to groundwater, sole source aquifers)</b>  |  |   |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                                  | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA                       | <u>Current Conditions:</u><br><a href="#">Click or tap here to enter text.</a><br><u>Preferred Alternative Environmental Narrative:</u><br><a href="#">Click or tap here to enter text.</a>  |
| <b>5. Surface Water/Water Quality, Quantity and Distribution (example: streams, lakes, storm runoff, irrigation systems, canals)</b>   |  |   |  |
| <input type="checkbox"/> No Impact<br><input checked="" type="checkbox"/> Beneficial<br><input checked="" type="checkbox"/> Adverse  | <input checked="" type="checkbox"/> Direct<br><input checked="" type="checkbox"/> Indirect<br><input checked="" type="checkbox"/> Cumulative | <input checked="" type="checkbox"/> Permit<br><input checked="" type="checkbox"/> Mitigation<br><input type="checkbox"/> NA | <u>Current Conditions:</u><br>Current streambank in stabilized and temporary headgate structures are installed.<br><u>Preferred Alternative Environmental Narrative:</u><br>The preferred alternative will involve installation of permanent structures to control irrigation water delivery. Beneficial direct, indirect, and cumulative effects are expected   |

|  |  |  |  |
|--|--|--|--|
|  |  |  | related to irrigation systems. Adverse direct, indirect, and cumulative effects are minor, and localized.  |
| <b>6. Floodplains and Floodplain Management (Identify any floodplains within one mile of the boundary of the project.)</b>   |  |  |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                                  | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA            | <u>Current Conditions:</u><br>Rip Rap bank and temporary headgates.<br><u>Preferred Alternative Environmental Narrative:</u><br>Preferred alternative does not impact the baseflow elevation or access to floodplains compared to the existing condition.  |
| <b>7. Wetlands (Identify any wetlands within one mile of the boundary of the project and state potential impacts.)</b>   |  |  |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                                  | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA            | <u>Current Conditions:</u><br>No wetland present<br><u>Preferred Alternative Environmental Narrative:</u><br><a href="#">Click or tap here to enter text.</a>  |
| <b>8. Agricultural Lands, Production, and Farmland Protection (example: grazing, forestry, cropland, prime or unique agricultural lands) Identify any prime or important farm ground or forest lands within one mile of the boundary of the project.</b> |  |  |  |
| <input type="checkbox"/> No Impact<br><input checked="" type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input checked="" type="checkbox"/> Direct<br><input checked="" type="checkbox"/> Indirect<br><input checked="" type="checkbox"/> Cumulative | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA            | <u>Current Conditions:</u><br>Rip Rap bank with temporary headgate structures<br><u>Preferred Alternative Environmental Narrative:</u><br>The preferred alternative has a net beneficial direct, indirect, and cumulative effect on agriculture by ensuring effective delivery of legal water rights.  |
| <b>9. Vegetation and Wildlife Species and Habitats, Including Fish (example: terrestrial, avian and aquatic life and habitats)</b>   |  |  |  |
| <input type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input checked="" type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input checked="" type="checkbox"/> Indirect<br><input checked="" type="checkbox"/> Cumulative            | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input checked="" type="checkbox"/> NA | <u>Current Conditions:</u><br>Rip rap bank with temporary headgate structures.<br><u>Preferred Alternative Environmental Narrative:</u><br>Preferred alternative has no direct impact to fish or wildlife. Indirect effects are minor and localized and result from sediment recruitment reduction and large woody debris recruitment. Cumulative effects are minor, long-term, and localized. |
| <b>10. Unique, Endangered, Fragile, or Limited Environmental Resources, Including Endangered Species (example: plants, fish or wildlife)</b>   |  |  |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                                  | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA            | <u>Current Conditions:</u><br><a href="#">Click or tap here to enter text.</a><br><u>Preferred Alternative Environmental Narrative:</u><br><a href="#">Click or tap here to enter text.</a>  |
| <b>11. Unique Natural Features (example: geologic features)</b>  |  |  |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                                  | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA            | <u>Current Conditions:</u><br><a href="#">Click or tap here to enter text.</a><br><u>Preferred Alternative Environmental Narrative:</u><br><a href="#">Click or tap here to enter text.</a>  |
| <b>12. Access to, and Quality of, Recreational and Wilderness Activities, Public Lands and Waterways (including Federally Designated Wild &amp; Scenic Rivers), and Public Open Space</b>  |  |  |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                                  | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA            | <u>Current Conditions:</u><br><a href="#">Click or tap here to enter text.</a><br><u>Preferred Alternative Environmental Narrative:</u><br><a href="#">Click or tap here to enter text.</a>  |

| Human Environment  |  |  |  |
|--|--|--|--|
| Impact Code  | Impact Type  | Resource   |  |
| <b>1. Visual Quality – Coherence, Diversity, Compatibility of Use and Scale, Aesthetics</b>  |  |  |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative            | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA            | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text.  |
| <b>2. Nuisances (example: glare, fumes)</b>  |  |  |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative            | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA            | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text.  |
| <b>3. Noise – Suitable Separation Between Housing and Other Noise Sensitive Activities and Major Noise Sources (example: aircraft, highways and railroads.)</b>                                |  |  |  |
| <input type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input checked="" type="checkbox"/> Adverse   | <input checked="" type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative | <input type="checkbox"/> Permit<br><input checked="" type="checkbox"/> Mitigation<br><input type="checkbox"/> NA | <u>Current Conditions:</u><br>No construction is occurring – and noise matches background.<br><u>Preferred Alternative Environmental Narrative:</u><br>Construction of the preferred alternative will result in short-term direct impacts to noise in the immediate area. Work will only occur during daylight hours to minimize noise impacts to the surrounding areas.                                   |
| <b>4. Historic Properties, Cultural, and Archaeological Resources** (Please see end of Environmental Checklist for details if Cultural Survey has not been performed per SHPO Section 106)</b> |  |  |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative            | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA            | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text.  |
| <b>5. Changes in Demographic (Population) Characteristics (example: quantity, distribution, density)</b>   |  |  |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative            | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA            | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text.  |
| <b>6. General Housing Conditions – Quality, Quantity, Affordability</b>  |  |  |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative            | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA            | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text.  |
| <b>7. Businesses or Residents (example: loss of, displacement, or relocation)</b>  |  |  |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative            | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA            | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text.  |
| <b>8. Public Health and Safety</b>   |  |  |  |
| <input type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input checked="" type="checkbox"/> Adverse   | <input checked="" type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative | <input type="checkbox"/> Permit<br><input checked="" type="checkbox"/> Mitigation<br><input type="checkbox"/> NA | <u>Current Conditions:</u><br>No construction activity.<br><u>Preferred Alternative Environmental Narrative:</u><br>Construction activities are inherently dangerous, and construction of the preferred alternative poses risks to onsite workers. Direct impacts are minor, short-term, and localized. Health and safety risks are mitigated through onsite health and safety plans and OSHA regulations. |

|  |   |  |   |
|--|---|--|---|
| <b>9. Local Employment – Quantity or Distribution of Employment, Economic Impact</b>   |   |  |   |
| <input type="checkbox"/> No Impact<br><input checked="" type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input checked="" type="checkbox"/> Direct<br><input checked="" type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input checked="" type="checkbox"/> NA | <u>Current Conditions:</u><br>Irrigation infrastructure supports local agricultural communities.<br><u>Preferred Alternative Environmental Narrative:</u><br>The preferred alternative benefits water users, local retailers, and laborers during construction.                               |
| <b>10. Income Patterns – Economic Impact</b>   |   |  |   |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                       | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA            | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text.   |
| <b>11. Local and State Tax Base and Revenues</b>   |   |  |   |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                       | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA            | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text.   |
| <b>12. Community and Government Services and Facilities (example: educational facilities; health and medical services and facilities; police; emergency medical services; and parks, playgrounds and open space)</b> |   |  |   |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                       | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA            | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text.   |
| <b>13. Commercial and Industrial Facilities – Production and Activity, Growth or Decline</b>   |   |  |   |
| <input type="checkbox"/> No Impact<br><input checked="" type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input checked="" type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative            | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input checked="" type="checkbox"/> NA | <u>Current Conditions:</u><br>Temporary headgates deliver water. Flooding limited irrigation effectiveness in 2022.<br><u>Preferred Alternative Environmental Narrative:</u><br>The preferred alternative improves long-term viability of irrigation infrastructure and therefore production. |
| <b>14. Social Structures and Mores (example: standards of social conduct/social conventions)</b>   |   |  |   |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                       | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA            | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text.   |
| <b>15. Land Use Compatibility (example: growth, land use change, development activity, adjacent land uses and potential conflicts)</b>   |   |  |   |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                       | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA            | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text.   |
| <b>16. Energy Resources – Consumption and Conservation</b>   |   |  |   |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                       | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA            | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text.   |

|  |   |   |  |
|--|---|---|--|
| <b>17. Solid Waste Management</b>  |   |   |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                       | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text.  |
| <b>18. Wastewater Treatment – Sewage System</b>  |   |   |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                       | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text.  |
| <b>19. Storm Water – Surface Drainage</b>  |   |   |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                       | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text.  |
| <b>20. Community Water Supply</b>  |   |   |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                       | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text.  |
| <b>21. Fire Protection – Hazards</b>   |   |   |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                       | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text.  |
| <b>22. Cultural Facilities, Cultural Uniqueness and Diversity</b>  |   |   |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                       | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text.  |
| <b>23. Transportation Networks and Traffic Flow Conflicts (example: rail; auto including local traffic; airport runway clear zones – avoidance of incompatible land use in airport runway clear zones)</b> |   |   |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                       | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text.  |
| <b>24. Consistency with Local Ordinances, Resolutions, or Plans (example: conformance with local comprehensive plans, zoning, or capital improvement plans.)</b>   |   |   |  |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative                       | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text.  |
| <b>25. Private Property Rights (example: a regulatory action or project activity that reduces, minimizes, or eliminates the use of private property.)</b>  |   |   |  |
| <input type="checkbox"/> No Impact<br><input checked="" type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse   | <input checked="" type="checkbox"/> Direct<br><input checked="" type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA | <u>Current Conditions:</u><br>Site is protected under emergency action, and protects existing property owners and their right to use of said property.<br><u>Preferred Alternative Environmental Narrative:</u><br>The preferred alternative provides long-term protection of property and associated property rights. |

|   |   |   |   |
|---|---|---|---|
| <b>26. Environmental Justice (example: does the project avoid placing lower income households in areas where environmental degradation has occurred, such as adjacent to brownfield sites?)</b> |   |   |   |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse  | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text. |
| <b>27. Lead Based Paint and/or Asbestos (example: does the project replace asbestos-lined pipes? Do any structures qualify as containing lead-based paint?)</b>                                 |   |   |   |
| <input checked="" type="checkbox"/> No Impact<br><input type="checkbox"/> Beneficial<br><input type="checkbox"/> Adverse  | <input type="checkbox"/> Direct<br><input type="checkbox"/> Indirect<br><input type="checkbox"/> Cumulative | <input type="checkbox"/> Permit<br><input type="checkbox"/> Mitigation<br><input type="checkbox"/> NA | <u>Current Conditions:</u><br>Click or tap here to enter text.<br><u>Preferred Alternative Environmental Narrative:</u><br>Click or tap here to enter text. |

**Additional Information**

**\*\*If no cultural survey has been performed, or is not expected to be needed, applicant must agree to the following statement:**

I hereby agree that, to my knowledge, there are no cultural or paleontological materials in the proposed project site. If previously unknown cultural or paleontological materials are identified during project related activities, the DNRC grant manager will be notified, and all work will cease until a professional assessment of such resources can be made.

**List all sources of information used to complete the Environmental Checklist. Sources may include studies, plans, documents, or the individuals, organizations, or agencies contacted for assistance. For individuals, groups, or agencies, please include a contact person and phone number. List any scoping documents or meetings and/or public meetings during project development.**

This document was completed following a site visit and site survey, aerial photo collection, emergency design plans, preliminary design plans. Evaluation of potential environmental impacts were evaluated using applicable floodplain maps, watershed studies, interviews and discussions with water users and landowners. Potential impacts to fish and wildlife resources were based on discussions with resource managers and professional judgement.

**Below is a list of electronic resources available for data gathering to aid in the development of the Environmental Checklist:**

Abandoned Mines (DEQ): <https://deq.mt.gov/cleanupandrec/Programs/aml>

Agricultural Statistics (USDA): [USDA - National Agricultural Statistics Service - Data and Statistics](#)

**Air Quality**

- Nonattainment Areas: [Plan and Rule Development | Montana DEQ \(mt.gov\)](#)
- Opening Burning Guidelines: [Open Burning | Montana DEQ \(mt.gov\)](#)

Army Corps of Engineers: <http://www.usace.army.mil/Home.aspx>

Bureau of Business and Economic Research, UM: <http://www.bber.umt.edu/>

Cadastral (for property ownership info): <http://svc.mt.gov/msl/mtcadastral>

Census Information, MT Dept. of Commerce: <http://ceic.mt.gov>

Conservation Districts, MT: <http://macdnet.org/>

Cultural Records

- Montana Historical Society: <https://mhs.mt.gov/Shpo/CulturalRecords>

DEQ data search tools: [Montana DEQ's GIS Portal \(mt.gov\)](#)

- Including Clean Water Act Info Center, Hazardous Waste Handlers, Petroleum Release Fund Claims, Unpermitted Releases, Underground Storage Tanks, Source Water Protection

EPA Enforcement and Compliance History Online <http://echo.epa.gov/>

Farmland Classification: <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>

Fish (Also See Wildlife)

- Montana Fisheries Information System: [Montana Fish, Wildlife & Parks GIS Data \(arcgis.com\)](#)
- Aquatic Invasive Species: [Montana FWP AIS Surveys Dashboard 2021 \(arcgis.com\)](#)

Floodplain Maps, FEMA: <https://msc.fema.gov/portal>

Geographic Information, Natural Resources Information System: <http://nris.mt.gov/gis>

Geologic Information - [MBMG - Publications - Download Geologic Maps \(mtech.edu\)](#)

Maps of Montana for species observations, land cover, wetland and riparian areas, land management: [Montana Natural Heritage Program \(mtnhp.org\)](#); <http://mtnhp.org/mapviewer/?t=6>

Montana Department of Transportation: <https://www.mdt.mt.gov/>

- Environmental Manual: <http://www.mdt.mt.gov/publications/docs/manuals/env/preface.pdf>
- Environmental Manual - Chapter 29, Permits Required: <https://www.mdt.mt.gov/publications/docs/manuals/env/Chapter%2029%20PERMITS%20REQUIRED.pdf>

Montana Board of Oil and Gas Conservation Information System:

- <http://bogc.dnrc.mt.gov/webApps/DataMiner/>

Plants

- Plant database, USDA Natural Resources Conservation Service: <http://plants.usda.gov/java>
- Plant Species, MT Field Guide: <http://fieldguide.mt.gov/default.aspx>
- Plant Species of Concern: <http://mtnhp.org/SpeciesOfConcern/Default.aspx?AorP=p>
- Threatened, Endangered and Rare Plants, USDA: <https://plants.usda.gov/home/raritySearch>

Soils

- USDA Natural Resource Conservation Service database: <https://websoilsurvey.nrcs.usda.gov/app/>
- Montana soil and water conservation districts: <http://swcdmi.org/>

State Historic Preservation Office: <http://mhs.mt.gov/Shpo>

Tourism, UM – Institute of Tourism & Recreation Research: <http://www.itrr.umt.edu>

Tribal Resources:

- Blackfeet Tribal Environmental Permits: <http://www.blackfeetenvironmental.com>
- CSKT Natural Resources Department: <http://nrd.csktribes.org/>
- Montana Office of Indian Affairs: <http://tribalnations.mt.gov/>
- Tribal Historic Preservation Officer List: [Search - NATHPO](#)
- Tribal Directory Assessment Tool (TDAT): <https://egis.hud.gov/tdat/>

Vehicle Traffic Count (MDT): <http://www.mdt.mt.gov/publications/datastats/traffic.shtml>

Water

- Stream Record Extension Facilitator, USGS: [USGS | National Water Dashboard](#)
- Streamstats basin characteristics, USGS: <http://water.usgs.gov/osw/streamstats/>
- Water Resources Division, DNRC: <http://dnrc.mt.gov/divisions/water> ; [ArcGIS Web Application \(mt.gov\)](#)
- Water Rights Bureau, DNRC: <http://dnrc.mt.gov/divisions/water/water-rights>
- Water Right Query System, DNRC: [DNRC Water Right Query System \(mt.gov\)](#)
- Wetlands database, USFWS: <http://www.fws.gov/wetlands/Data/mapper.html>

Wild and Scenic Rivers: <http://www.rivers.gov/montana.php>

Wildlife

- Animal Species, MT Field Guide: <http://fieldguide.mt.gov/default.aspx>
- Animal Species of Concern: <http://mtnhp.org/SpeciesOfConcern/Default.aspx?AorP=a>
- Aquatic Invasive Species: [Montana FWP AIS Surveys Dashboard 2021 \(arcgis.com\)](#)
- Critical Habitat Mapper, USFWS: <http://ecos.fws.gov/crithab/>
- Crucial Areas Planning System/Habitat Assessment Tool: [Habitat MT \(HB 526\) Funded Lands \(arcgis.com\)](#)
- FWP Contact Map: <http://fwp.mt.gov/gis/maps/contactUs/> (includes biologist responsibility areas)
- Maps and GIS Data, FWP: [Montana Fish, Wildlife & Parks GIS Data \(arcgis.com\)](#)

- Sage grouse management, FWP: [Montana Fish, Wildlife & Parks GIS Data : Sage-grouse Habitat/Current Distribution \(Montana\) : Sage-grouse Habitat/Current Distribution \(Montana\) \(arcgis.com\)](#)
- Sage grouse habitat conservation program, DNRC: <http://sagegrouse.mt.gov/>
- Sage grouse habitat map: <https://sagegrouse.mt.gov/ProgramMap>