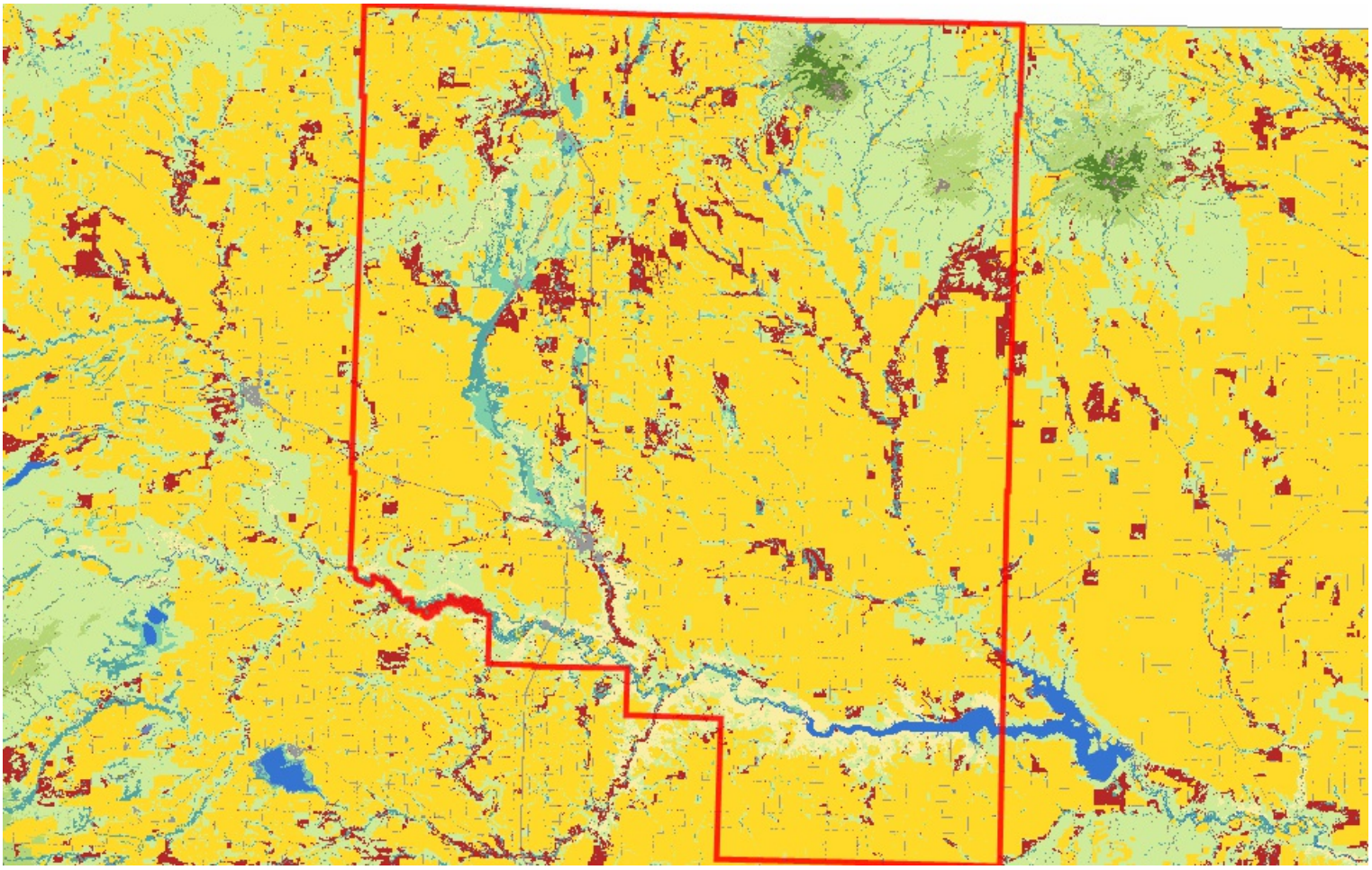
MONTANA Natural Heritage Program

A program of the **Montana State Library's Natural Resource Information System** operated by the **University of Montana**.

Latitude	Longitude
48.20254	-111.27050
49.01578	-112.17069

Land Cover

Summarized by: **Toole** *(County)*



58%
(*724,982 Acres*)

Human Land Use

Agriculture

Cultivated Crops

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

22% (*272,116 Acres*)

Grassland Systems
Lowland/Prairie Grassland
Great Plains Mixedgrass Prairie

The system covers much of the eastern two-thirds of Montana, occurring continuously for hundreds of square kilometers, interrupted only by wetland/riparian areas or sand prairies. Soils are primarily fine and medium-textured. The growing season averages 115 days, ranging from 100 days on the Canadian border to 130 days on the Wyoming border. Climate is typical of mid-continental regions with long severe winters and hot summers. Grasses typically comprise the greatest canopy cover, and western wheatgrass (*Pascopyrum smithii*) is usually dominant. Other species include thickspike wheatgrass (*Elymus lanceolatus*), green needlegrass (*Nassella viridula*), blue grama (*Bouteloua gracilis*), and needle and thread (*Hesperostipa comata*). Near the Canadian border in north-central Montana, this system grades into rough fescue (*Festuca campestris)* and Idaho fescue (*Festuca idahoensis*) grasslands. Remnants of shortbristle needle and thread *(Hesperostipa curtiseta)* dominated vegetation are found in northernmost Montana and North Dakota, and are associated with productive sites, now mostly converted to farmland. Forb diversity is typically high. In areas of southeastern and central Montana where sagebrush steppe borders the mixed grass prairie, common plant associations include Wyoming big sagebrush-western wheatgrass (*Artemisia tridentata* ssp. *wyomingensis/ Pascopyrum smithii*). Fire and grazing are the primary drivers of this system. Drought can also impact it, in general favoring the shortgrass component at the expense of the mid-height grasses. With intensive grazing, cool season exotics such as Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis*), and Japanese brome (*Bromus japonicus*) increase in dominance; both of these rhizomatous species have been shown to markedly decrease species diversity. Previously cultivated acres that have been re-vegetated with non-native plants have been transformed into associations such as Kentucky bluegrass (*Poa pratensis*)/western wheatgrass *(Pascopyrum smithii)* or into pure crested wheatgrass (*Agropyron cristatum)* stands.

6% (*70,802 Acres*)

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

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

3% (*39,925 Acres*)

Sparse and Barren Systems
Bluff, Badland and Dune
Great Plains Badlands

The Western Great Plains Badlands ecological system occurs within the mixed grass and sand prairie regions of eastern and southeastern Montana, where the land lies well above or below its local base level, shaped by the carving action of streams, erosion, and erosible parent material. It is easily recognized by its rugged, eroded, and often colorful land formations, and the relative absence of vegetative cover. In those areas with vegetation, species can include scattered individuals of many dryland shrubs or herbaceous taxa, including curlycup gumweed (*Grindelia squarrosa*), threadleaf snakeweed (*Gutierrezia sarothrae*) (especially with overuse and grazing), greasewood (*Sarcobatus vermiculatus*), Gardnerâ€™s saltbush (*Atriplex gardneri*), buckwheat (*Eriogonum* species), plains muhly (*Muhlenbergia cuspidata*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and Hookerâ€™s sandwort (*Arenaria hookeri*). Patches of sagebrush (*Artemisia* spp.) can also occur. Climate is typical of mid continental regions with long severe winters and warm summers. Precipitation ranges from 7 to 14 inches per year, with two-thirds of the precipitation falling during the summer, and a third falling in the spring. The sedimentary parent material of exposed rocks and the resultant eroded clay soils are derived from Cretaceous sea beds and are often fossil-rich. Dominant soil types are in the order Entisols. These mineral soils are found primarily on uplands, slopes, and creek bottoms and are easily erodible. The growing season is short, averaging 115 days, with a range from 100 days on the Canadian border to 130 days on the Wyoming border. Land use is limited, except for off-highway vehicle recreation and incidental grazing.

Additional Limited Land Cover

1% (*16,674 Acres*) Greasewood Flat
1% (*13,821 Acres*) Other Roads
1% (*13,705 Acres*) Rocky Mountain Lower Montane, Foothill, and Valley Grassland
1% (*13,352 Acres*) Great Plains Riparian
1% (*12,765 Acres*) Great Plains Sand Prairie
1% (*11,957 Acres*) Great Plains Saline Depression Wetland
1% (*7,750 Acres*) Pasture/Hay
1% (*7,654 Acres*) Open Water
<1% (*5,707 Acres*) Great Plains Floodplain
<1% (*5,333 Acres*) Great Plains Shrubland
<1% (*3,163 Acres*) Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest
<1% (*3,160 Acres*) Great Plains Closed Depressional Wetland
<1% (*2,542 Acres*) Major Roads
<1% (*2,243 Acres*) Interstate
<1% (*2,069 Acres*) Great Plains Wooded Draw and Ravine
<1% (*1,908 Acres*) Emergent Marsh
<1% (*1,426 Acres*) Great Plains Cliff and Outcrop

<1% (*1,366 Acres*) Railroad
<1% (*1,194 Acres*) Rocky Mountain Cliff, Canyon and Massive Bedrock
<1% (*1,161 Acres*) Low Intensity Residential
<1% (*962 Acres*) Developed, Open Space
<1% (*951 Acres*) Mat Saltbush Shrubland
<1% (*869 Acres*) Great Plains Open Freshwater Depression Wetland
<1% (*796 Acres*) Rocky Mountain Lower Montane-Foothill Riparian Woodland and Shrubland
<1% (*771 Acres*) Rocky Mountain Foothill Limber Pine - Juniper Woodland
<1% (*691 Acres*) Commercial / Industrial
<1% (*575 Acres*) Oil and Oil / Gas
<1% (*355 Acres*) Great Plains Prairie Pothole
<1% (*322 Acres*) Rocky Mountain Montane-Foothill Deciduous Shrubland
<1% (*259 Acres*) Gas and Gas Storage
<1% (*232 Acres*) High Intensity Residential
<1% (*189 Acres*) Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland
<1% (*138 Acres*) Big Sagebrush Steppe
<1% (*53 Acres*) Quarries, Strip Mines and Gravel Pits
<1% (*41 Acres*) Rocky Mountain Foothill Woodland-Steppe Transition
<1% (*35 Acres*) Wind Turbine
<1% (*25 Acres*) Rocky Mountain Subalpine-Montane Riparian Shrubland
<1% (*19 Acres*) Injection
<1% (*9 Acres*) Great Plains Ponderosa Pine Woodland and Savanna

Introduction to Land Cover

Land Use/Land Cover is one of 15 Montana Spatial Data Infrastructure framework layers considered vital for making statewide maps of Montana and understanding its geography. The layer records all Montana natural vegetation, land cover and land use, classified from satellite and aerial imagery, mapped at a scale of 1:100000, and interpreted with supporting ground-level data. The baseline map is adapted from the Northwest ReGAP (NWGAP) project land cover classification, which used 30m resolution multi-spectral Landsat imagery acquired between 1999 and 2001. Vegetation classes were drawn from the Ecological System Classification developed by NatureServe (Comer et al. 2003). The land cover classes were developed by Anderson et al. (1976). The NWGAP effort encompasses 12 map zones. Montana overlaps seven of these zones. The two NWGAP teams responsible for the initial land cover mapping effort in Montana were Sanborn and NWGAP at the University of Idaho. Both Sanborn and NWGAP employed a similar modeling approach in which Classification and Regression Tree (CART) models were applied to Landsat ETM+ scenes. The Spatial Analysis Lab within the Montana Natural Heritage Program was responsible for developing a seamless Montana land cover map with a consistent statewide legend from these two separate products. Additionally, the Montana land cover layer incorporates several other land cover and land use products (e.g., MSDI Structures and Transportation themes and the Montana Department of Revenue Final Land Unit classification) and reclassifications based on plot-level data and the latest NAIP imagery to improve accuracy and enhance the usability of the theme. Updates are done as partner support and funding allow, or when other MSDI datasets can be incorporated. Recent updates include fire perimeters and agricultural land use (annually), energy developments such as wind, oil and gas installations (2014), roads, structures and other impervious surfaces (various years): and local updates/improvements to specific ecological systems (e.g., central Montana grassland and sagebrush ecosystems). Current and previous versions of the Land Use/Land Cover layer with full metadata are available for download at the Montana State Library's Geographic Information Clearinghouse.

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

Literature Cited

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

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