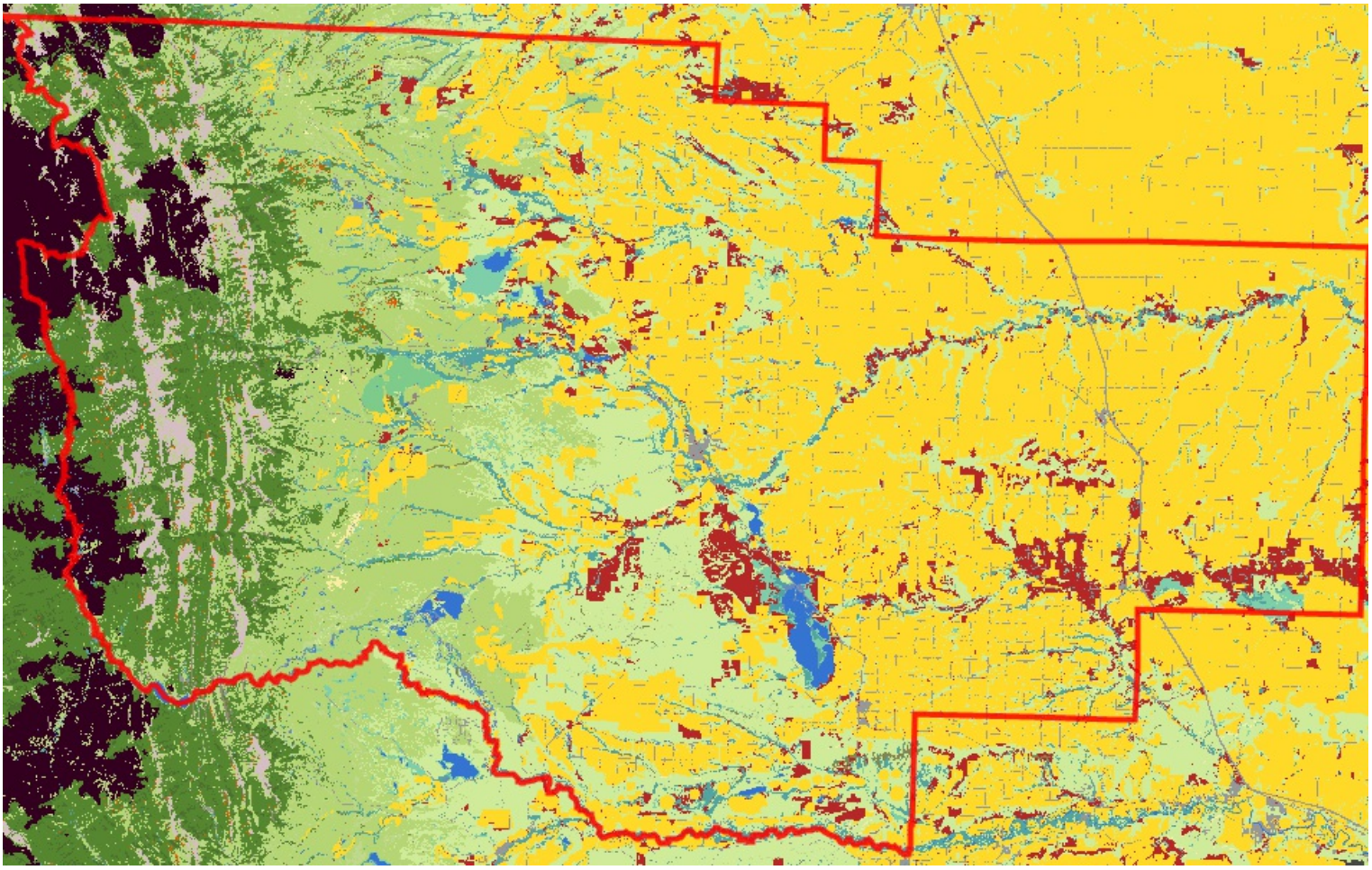
MONTANA Natural Heritage Program

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

Latitude	Longitude
47.47348	-111.41511
48.16815	-112.97126

Land Cover

Summarized by: **Teton** *(County)*



37% (*538,181 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.

17% (*244,795 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.

12% (*173,774 Acres*)

Grassland Systems
Montane Grassland
Rocky Mountain Lower Montane, Foothill, and Valley Grassland

This grassland system of the northern Rocky Mountains is found at lower montane to foothill elevations in mountains and valleys throughout Montana. These grasslands are floristically similar to Big Sagebrush Steppe but are defined by shorter summers, colder winters, and young soils derived from recent glacial and alluvial material. They are found at elevations from 548 - 1,650 meters (1,800-5,413 feet). In the lower montane zone, they range from small meadows to large open parks surrounded by conifers; below the lower treeline, they occur as extensive foothill and valley grasslands. Soils are relatively deep, fine-textured, often with coarse fragments, and non-saline. Microphytic crust may be present in high-quality occurrences. This system is typified by cool-season perennial bunch grasses and forbs (>25%) cover, with a sparse shrub cover (<10%). Rough fescue (*Festuca campestris*) is dominant in the northwestern portion of the state and Idaho fescue (*Festuca idahoensis*) is dominant or co-dominant throughout the range of the system. Bluebunch wheatgrass (*Pseudoroegneria spicata*) occurs as a co-dominant throughout the range as well, especially on xeric sites. Western wheatgrass (*Pascopyrum smithii*) is consistently present, often with appreciable coverage (>10%) in lower elevation occurrences in western Montana and virtually always present, with relatively high coverages (>25%), on the edge of the Northwestern Great Plains region. Species diversity ranges from a high of more than 50 per 400 square meter plot on mesic sites to 15 (or fewer) on xeric and disturbed sites. Most occurrences have at least 25 vascular species present. Farmland conversion, noxious species invasion, fire suppression, heavy grazing and oil and gas development are major threats to this system.

6% (*89,748 Acres*)

Forest and Woodland Systems
Conifer-dominated forest and woodland (xeric-mesic)
Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland

Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) make up a substantial part of the montane and lower subalpine forests of the Montana Rocky Mountains and mountain island ranges of north-central and west-central Montana. Spruceis usually associated with fir and occurs as either a climax co-dominant or as a persistent, long-lived seral species in most upper elevation firhabitat types. Dry to mesic spruce-dominated forests range from 884-1,585 meters (2,900-5,200 feet) west of the Continental Divide, and 1585-2,073 meters (5,200-6,800 feet) east of the Continental Divide in the northern and central portions of the state. This system can be found at elevations up to 2,896 meters (9,500 feet) in southwestern Montana. Forests are found on gentle to very steep mountain slopes, high-elevation ridge tops and upper slopes, plateau-like surfaces, basins, alluvial terraces, well-drained benches, and inactive stream terraces. Tree canopy characteristics are relatively uniform. In northern Montana, Engelmann spruce hybridizes with its boreal counterpart, white spruce (*Picea glauca*). Douglas-fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), and western larch (*Larix occidentalis*) (west of the Continental Divide) are seral but often present in these forests. The understory is comprised of a mixture of shrubs, forbs and graminoids tolerant of warmer and drier soil conditions than those found on the more mesic to wet spruce-fir system. The drier occurrences of this system are especially common on steep slopes at upper elevations throughout the easten Rocky Mountains, whereas the more mesic occurrences form substantial cover west of the Continental Divide in the Flathead, Lolo, Bitteroot and Kootenai river drainages.

4% (*65,207 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.

2% (*31,609 Acres*)

Recently Disturbed or Modified

Recently burned

Recently burned forest

Land cover is apparently modified by recent fires which have burned forest and woodland vegetation. Vegetation is a mixture of herbaceous, shrub, and tree species.

2% (*28,103 Acres*)

Alpine Systems

Alpine Sparse and Barren

Alpine Bedrock and Scree

This ecological system is restricted to the highest elevations of the Rocky Mountains, from Alberta and British Columbia south into New Mexico, and west into the highest mountain ranges of the Great Basin. It is composed of barren and sparsely vegetated alpine substrates, typically including both bedrock outcrop and scree slopes, with lichen- dominated communities. In Montana, alpine bedrock and scree are well represented throughout the northern Rocky Mountains and island mountain ranges. Elevations range from as low as 2,285 meters (7,500 feet) in northwestern Montana to 3,500 meters (11,500 feet) in southern Montana. Exposure to desiccating winds, rocky and sometimes unstable substrates, and a short growing season limit plant growth. Typically, there is sparse (less than 10%) cover of forbs, grasses, and low shrubs, with exposed, unstable scree, talus and bedrock constituting the remainder of cover. Diverse crustose and foliose lichen cover is high (often greater than 50%) on exposed talus and bedrock Soils on these windy, unproductive sites are very poorly developed, often only occurring in fractures of bedrock. This system is characterized by a very cold climate during winter, high winds, high UV radiation and high surface daytime temperatures during summer months on south and west facing aspects, and a very short growing season. Most scree- and bedrock-inhabiting plants are highly adapted to this xeric environment and occur as singular plants among the exposed rocks or in bedrock fractures. These species are typically cushioned, matted or succulent, or grow as flat rosettes, often with thick leaf cuticles or a dense cover of hairs. This system often occurs adjacent to or immediately below North American Alpine Ice Fields and intermingles with Rocky Mountain Alpine Fell Fields.

2% (*24,819 Acres*)

Grassland Systems

Montane Grassland

Rocky Mountain Subalpine-Upper Montane Grassland

These lush grassland systems are found in upper montane to subalpine, high-elevation,zones, and are shaped by short summers, cold winters, and young soils derived from recent glacial and alluvial material. In subalpine settings, dry grasslands may occur as small meadows or large open parks surrounded by higher elevational forests, but typicall will have no tree cover within them. In general, soil textures are much finer, and soils are often deeper than in the neighboring forests. Most precipitation occurs as heavy snowpack in the mountains with spring and early summer rains. This system is composed of bunch grass species, with a diversity of cool season forbs. It is similar to the Rocky Mountain Lower Montane, Foothill and Valley Grassland ecological system, but is found at higher elevations and has additional floristic components with more subalpine taxa. In Montana, this system generally occurs as two plant communities: a rough fescue-Idaho fescue (*Festuca campestris-Festuca idahoensis*) association occurring on moister sites, such as the north and east-facing slopes and benches in the mountains; and the Idaho Fescue-bluebunch wheatgrass (*Festuca idahoensis-Pseudoroegneria spicata*) association occurring on drier sites, such as ridges, hilltops, and south and west facing slopes and benches. At elevations greater than 2286 meters (7,500 feet), Idaho fescue becomes dominant, sometimes associated with slender wheatgrass (*Elymus trachycaulus*), or in certain areas, tufted hairgrass (*Deschampsia cespitosa*). Noxious species invasion, fire suppression, heavy grazing, and oil and gas development are major threats to this system.

2% (*22,760 Acres*)

Human Land Use

Agriculture

Pasture/Hay

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

Additional Limited Land Cover

1% (*21,873 Acres*) Rocky Mountain Subalpine Deciduous Shrubland

1% (*20,431 Acres*) Great Plains Shrubland

1% (*16,801 Acres*) Rocky Mountain Lower Montane-Foothill Riparian Woodland and Shrubland

1% (*16,415 Acres*) Other Roads

1% (*14,197 Acres*) Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland

1% (*13,977 Acres*) Rocky Mountain Subalpine Woodland and Parkland

1% (*10,639 Acres*) Great Plains Saline Depression Wetland

1% (*10,266 Acres*) Great Plains Floodplain

1% (*10,209 Acres*) Open Water

1% (*9,072 Acres*) Post-Fire Recovery

1% (*7,730 Acres*) Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland

1% (*7,698 Acres*) Great Plains Riparian

<1% (*6,655 Acres*) Rocky Mountain Foothill Limber Pine - Juniper Woodland

<1% (*6,564 Acres*) Great Plains Sand Prairie

<1% (*6,041 Acres*) Greasewood Flat

<1% (*4,873 Acres*) Great Plains Wooded Draw and Ravine
<1% (*4,763 Acres*) Rocky Mountain Subalpine-Montane Mesic Meadow
<1% (*4,494 Acres*) Emergent Marsh
<1% (*4,482 Acres*) Rocky Mountain Subalpine-Montane Fen
<1% (*4,291 Acres*) Rocky Mountain Lodgepole Pine Forest
<1% (*4,207 Acres*) Aspen Forest and Woodland
<1% (*4,041 Acres*) Rocky Mountain Cliff, Canyon and Massive Bedrock
<1% (*3,471 Acres*) Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest
<1% (*3,375 Acres*) Rocky Mountain Montane Douglas-fir Forest and Woodland
<1% (*3,313 Acres*) Insect-Killed Forest
<1% (*3,273 Acres*) Rocky Mountain Montane-Foothill Deciduous Shrubland
<1% (*2,722 Acres*) Alpine Fell-Field
<1% (*2,664 Acres*) Low Intensity Residential
<1% (*2,554 Acres*) Great Plains Closed Depressional Wetland
<1% (*2,465 Acres*) Major Roads
<1% (*2,359 Acres*) Recently burned grassland
<1% (*1,699 Acres*) Great Plains Badlands
<1% (*1,599 Acres*) Great Plains Open Freshwater Depression Wetland
<1% (*1,293 Acres*) Recently burned shrubland
<1% (*1,203 Acres*) Developed, Open Space
<1% (*1,189 Acres*) Interstate
<1% (*1,058 Acres*) Railroad
<1% (*623 Acres*) Aspen and Mixed Conifer Forest
<1% (*437 Acres*) Great Plains Cliff and Outcrop
<1% (*381 Acres*) Commercial / Industrial
<1% (*368 Acres*) Alpine-Montane Wet Meadow
<1% (*208 Acres*) High Intensity Residential
<1% (*114 Acres*) Rocky Mountain Poor Site Lodgepole Pine Forest
<1% (*106 Acres*) Alpine Dwarf-Shrubland
<1% (*47 Acres*) Alpine Turf
<1% (*46 Acres*) Rocky Mountain Mesic Montane Mixed Conifer Forest
<1% (*46 Acres*) Oil and Oil / Gas
<1% (*27 Acres*) Quarries, Strip Mines and Gravel Pits
<1% (*27 Acres*) Big Sagebrush Steppe
<1% (*12 Acres*) Rocky Mountain Conifer Swamp
<1% (*10 Acres*) Montane Sagebrush Steppe
<1% (*6 Acres*) Rocky Mountain Foothill Woodland-Steppe Transition
<1% (*5 Acres*) Gas and Gas Storage
<1% (*5 Acres*) Rocky Mountain Wooded Vernal Pool
<1% (*4 Acres*) Introduced Upland Vegetation - Perennial Grassland and Forbland
<1% (*2 Acres*) Injection
<1% (*1 Acres*) Rocky Mountain Ponderosa Pine Woodland and Savanna
<1% (*1 Acres*) Burned Sagebrush

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.