



**MONTANA
Natural Heritage
Program**

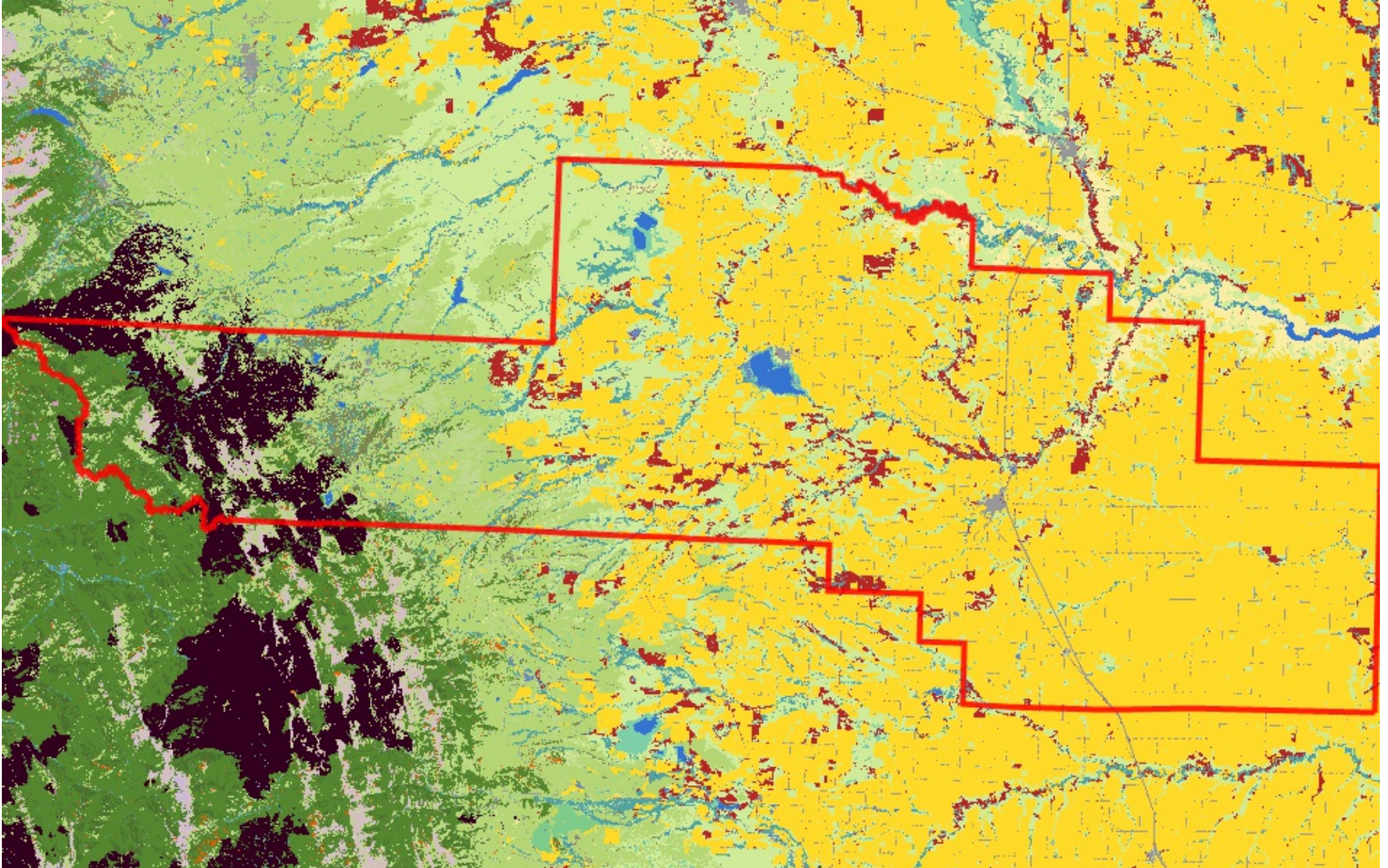
A program of the Montana State Library's
Natural Resource Information System
operated by the University of Montana.



Latitude Longitude
47.94011 -111.41960
48.50789 -113.32303

Land Cover

Summarized by: **Pondera** (County)



53%
**(553,508
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.



15%
(157,192
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 curtisetata*) 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.



5% (54,319
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.



4% (42,151
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.



3% (35,598
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% (21,491
Acres)

Shrubland, Steppe and Savanna Systems Deciduous Shrubland

Great Plains Shrubland

This ecological system is found from southern Alberta through northern Montana's glaciated and unglaciated plains, typically at elevations ranging from 1,220 to 1,524 meters (4,000-5,000 feet). It can occur on all aspects but is more common on mesic sites with moderately shallow or deep, fine to sandy loam soils. Often it is located on slopes near breaklands and on the edge of coulees, or on upper terraces of rivers and streams. It differs from the Northwestern Great Plains Mixedgrass Prairie in that shrub cover is more than 10%, although the grass component is similar, and may occur where fire suppression in grasslands has allowed shrubs to establish. Dominant shrubs include serviceberry (*Amelanchier alnifolia*), skunkbush sumac (*Rhus trilobata*), snowberry (*Symphoricarpos* species), silver buffaloberry (*Shepherdia argentea*), shrubby cinquefoil (*Dasiphora fruticosa* ssp. *floribunda*), silverberry (*Elaeagnus commutata*) and horizontal rug juniper (*Juniperus horizontalis*). Silver sage (*Artemisia cana* ssp. *cana*) shrublands may occur on flat alluvial deposits on floodplains, terraces or benches, and alluvial fans.



2% (19,744 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. Spruce is usually associated with fir and occurs as either a climax co-dominant or as a persistent, long-lived seral species in most upper elevation fir habitat 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 eastern Rocky Mountains, whereas the more mesic occurrences form substantial cover west of the Continental Divide in the Flathead, Lolo, Bitterroot and Kootenai river drainages.

Additional Limited Land Cover

1% (14,817 Acres) [Rocky Mountain Subalpine-Upper Montane Grassland](#)

1% (13,490 Acres) [Other Roads](#)

1% (11,236 Acres) [Great Plains Badlands](#)

1% (10,571 Acres) [Aspen Forest and Woodland](#)

1% (9,496 Acres) [Rocky Mountain Lower Montane-Foothill Riparian Woodland and Shrubland](#)

1% (8,630 Acres) [Rocky Mountain Subalpine Deciduous Shrubland](#)

1% (7,957 Acres) [Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland](#)

1% (7,784 Acres) [Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland](#)

1% (7,734 Acres) [Recently burned shrubland](#)

1% (7,034 Acres) [Great Plains Riparian](#)

1% (6,590 Acres) [Pasture/Hay](#)

1% (6,156 Acres) [Open Water](#)

1% (6,114 Acres) [Rocky Mountain Subalpine Woodland and Parkland](#)

<1% (4,934 Acres) [Alpine Bedrock and Scree](#)

<1% (4,209 Acres) [Great Plains Sand Prairie](#)

<1% (3,418 Acres) [Greasewood Flat](#)

<1% (3,409 Acres) [Post-Fire Recovery](#)

<1% (2,955 Acres) [Great Plains Saline Depression Wetland](#)

<1% (2,546 Acres) [Rocky Mountain Subalpine-Montane Mesic Meadow](#)

<1% (2,504 Acres) [Emergent Marsh](#)

<1% (2,169 Acres) [Major Roads](#)

<1% (2,043 Acres) [Great Plains Closed Depression Wetland](#)

<1% (1,972 Acres) [Recently burned grassland](#)

<1% (1,800 Acres) [Great Plains Floodplain](#)

<1% (1,741 Acres) [Interstate](#)

<1% (1,451 Acres) [Great Plains Wooded Draw and Ravine](#)

<1% (1,361 Acres) [Low Intensity Residential](#)

<1% (1,289 Acres) [Rocky Mountain Cliff, Canyon and Massive Bedrock](#)

<1% (1,205 Acres) [Rocky Mountain Montane Douglas-fir Forest and Woodland](#)

<1% (854 Acres) [Rocky Mountain Lodgepole Pine Forest](#)

<1% (842 Acres) [Railroad](#)

<1% (818 Acres) [Developed, Open Space](#)

<1% (770 Acres) [Aspen and Mixed Conifer Forest](#)

<1% (753 Acres) [Rocky Mountain Montane-Foothill Deciduous Shrubland](#)

<1% (740 Acres) [Rocky Mountain Foothill Limber Pine - Juniper Woodland](#)

<1% (718 Acres) [Great Plains Cliff and Outcrop](#)

<1% (704 Acres) [Great Plains Open Freshwater Depression Wetland](#)

<1% (675 Acres) [Alpine Fell-Field](#)

<1% (486 Acres) [Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest](#)

- <1% (475 Acres) ■ [Insect-Killed Forest](#)
- <1% (427 Acres) ■ [Alpine-Montane Wet Meadow](#)
- <1% (415 Acres) ■ [Commercial / Industrial](#)
- <1% (278 Acres) ■ [High Intensity Residential](#)
- <1% (83 Acres) ■ [Oil and Oil / Gas](#)
- <1% (46 Acres) ■ [Quarries, Strip Mines and Gravel Pits](#)
- <1% (38 Acres) ■ [Gas and Gas Storage](#)
- <1% (22 Acres) ■ [Rocky Mountain Subalpine-Montane Fen](#)
- <1% (20 Acres) ■ [Rocky Mountain Mesic Montane Mixed Conifer Forest](#)
- <1% (19 Acres) ■ [Injection](#)
- <1% (4 Acres) ■ [Rocky Mountain Poor Site Lodgepole Pine Forest](#)
- <1% (4 Acres) ■ [Rocky Mountain Wooded Vernal Pool](#)
- <1% (3 Acres) ■ [Alpine Dwarf-Shrubland](#)
- <1% (3 Acres) ■ [Rocky Mountain Foothill Woodland-Steppe Transition](#)
- <1% (2 Acres) ■ [Big Sagebrush Steppe](#)
- <1% (0 Acres) ■ [Montane Sagebrush Steppe](#)
- <1% (0 Acres) ■ [Rocky Mountain Conifer Swamp](#)

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.