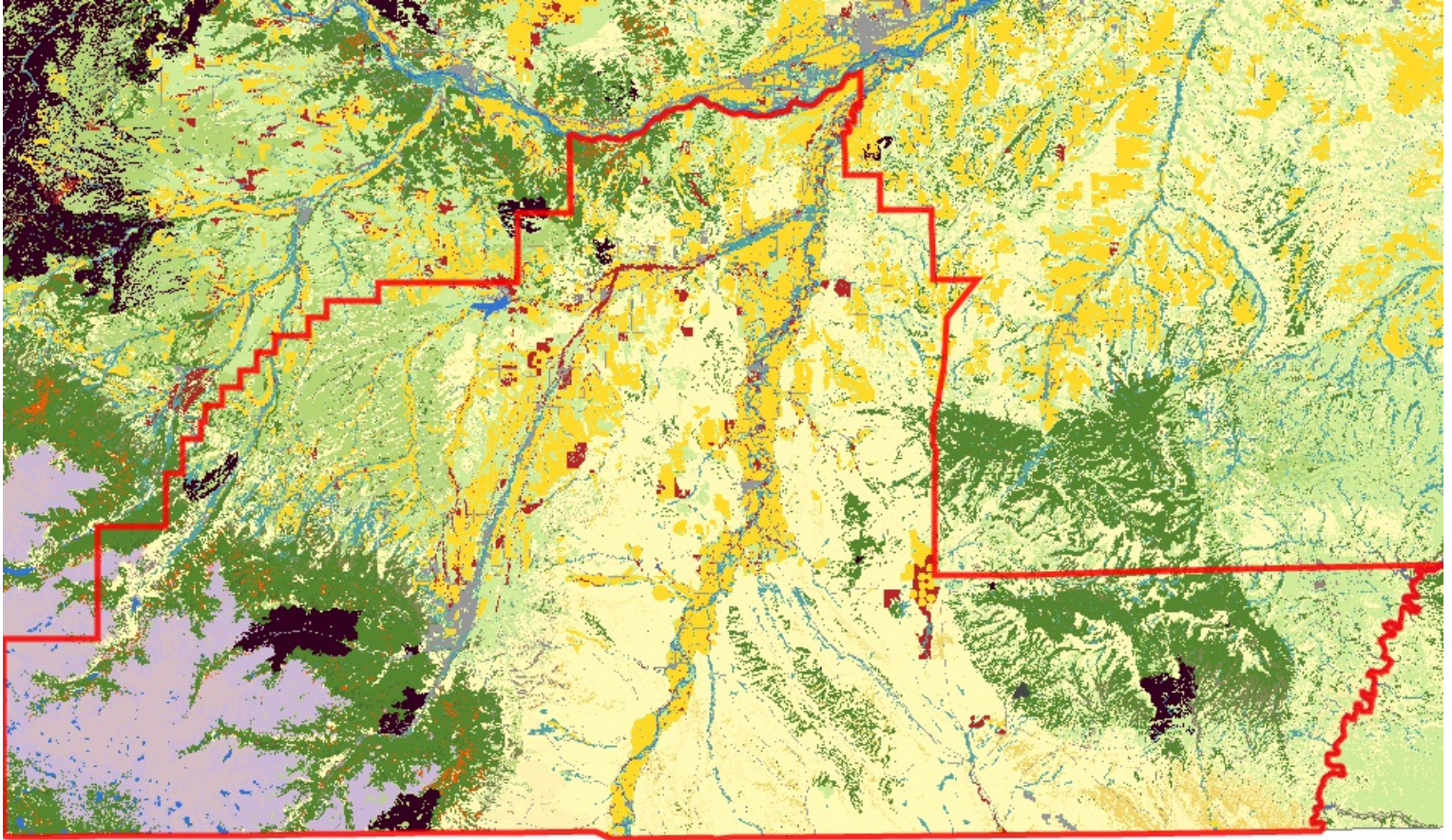




Land Cover

Summarized by: **Carbon** (County)



32%
(416,664
Acres)

Shrubland, Steppe and Savanna Systems Sagebrush Steppe

Big Sagebrush Steppe

This widespread ecological system occurs throughout much of central Montana, and north and east onto the western fringe of the Great Plains. In central Montana, where this system occurs on both glaciated and non-glaciated landscapes, it differs slightly, with more summer rain than winter precipitation and more precipitation annually. Throughout its distribution, soils are typically deep and non-saline, often with a microphytic crust. This shrub-steppe is dominated by perennial grasses and forbs with greater than 25% cover. Overall shrub cover is less than 10 percent. In Montana and Wyoming, stands are more mesic, with more biomass of grass, and have less shrub diversity than stands farther to the west, and 50 to 90% of the occurrences are dominated by Wyoming big sagebrush with western wheatgrass (*Pascopyrum smithii*). Japanese brome (*Bromus japonicus*) and cheatgrass (*Bromus tectorum*) are indicators of disturbance, but cheatgrass is typically not as abundant as in the Intermountain West, possibly due to a colder climate. The natural fire regime of this ecological system maintains a patchy distribution of shrubs, preserving the steppe character. Shrubs may increase following heavy grazing and/or with fire suppression. In central and eastern Montana, complexes of prairie dog towns are common in this ecological system.



10%
(125,447
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.



9%
(117,485
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.



4% (54,738
Acres)

Alpine Systems Alpine Grassland and Shrubland

Alpine Turf

In Montana, this system occurs above upper treeline throughout the Montana Rocky Mountain ranges, and east into the mountain island ranges. Elevation ranges from as low as 6,600 ft in northwestern to 10,500 feet in southwestern Montana. Turf communities form on gentle to moderate upper slopes, flat ridges, valleys, basins, and gentle summit ridges where soil has become relatively stabilized and the water supply persists until fall. At these elevations, the growing season typically ranges from 60 to 90 days. During the growing season, these areas are subjected to windy conditions and widely variable diurnal temperatures. Freezing temperatures and snow can occur throughout the summer months. Turf communities are composed of a diversity of rhizomatous sedges, rushes, woodrushes, grasses and forbs that form a dense turf that is rarely greater than 12 cm (5 inches) tall. Depending on slope protection, soil development, snow depth, turf communities can range from dry to mesic expressions.



4% (50,913
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.



Forest and Woodland Systems
Conifer-dominated forest and woodland (xeric-mesic)

4% (50,554 Acres)

Rocky Mountain Montane Douglas-fir Forest and Woodland

In Montana, this ecological system occurs on the east side of the Continental Divide, north to about the McDonald Pass area, and along the Rocky Mountain Front. This system is associated with a dry to submesic continental climate regime with annual precipitation ranging from 51 to 102 centimeters (20-40 inches), with a maximum in winter or late spring. Winter snowpacks typically melt off in early spring at lower elevations. Elevations range from valley bottoms to 1,980 meters (6500 feet) in northern Montana and up to 2,286 meters (7500 feet) on warm aspects in southern Montana. It occurs on north-facing aspects in most areas, and south-facing aspects at higher elevations. This is a Douglas-fir (*Pseudotsuga menziesii*) dominated system without any maritime floristic composition. Fire disturbance intervals are as infrequent as 500 years, and as a result, individual trees and forests can attain great age on some sites (500 to 1,500 years). In Montana, this system occurs from lower montane to lower subalpine environments and is prevalent on calcareous substrates. Common understory shrubs include common ninebark (*Physocarpus malvaceus*), common juniper (*Juniperus communis*), Rocky Mountain juniper (*Juniperus scopulorum*), birch-leaf spiraea (*Spiraea betulifolia*), snowberry (*Symphoricarpos* species), creeping Oregon grape (*Mahonia repens*) and Canadian buffaloberry (*Shepherdia canadensis*). The Douglas-fir/pinegrass (*Calamagrostis rubescens*) type is the most ubiquitous association found within this system in Montana.



Shrubland, Steppe and Savanna Systems
Sagebrush Steppe

4% (48,373 Acres)

Montane Sagebrush Steppe

This system dominates the montane and subalpine landscape of southwestern Montana from valley bottoms to subalpine ridges and is found as far north as Glacier National Park. It can also be seen in the island mountain ranges of the north-central and south-central portions of the state. It primarily occurs on deep-soiled to stony flats, ridges, nearly flat ridgetops, and mountain slopes. In general, this system occurs in areas of gentle topography, fine soils, subsurface moisture or mesic conditions, within zones of higher precipitation and areas of snow accumulation. It occurs on all slopes and aspects, variable substrates and all soil types. The shrub component of this system is generally dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). Other co-dominant shrubs include silver sagebrush (*Artemisia cana* ssp. *viscidula*), subalpine big sagebrush (*Artemisia tridentata* ssp. *spiciformis*), three tip sagebrush (*Artemisia tripartita* ssp. *tripartita*) and antelope bitterbrush (*Purshia tridentata*). Little sagebrush (*Artemisia arbuscula* ssp. *arbuscula*) shrublands are only found in southwestern Montana on sites with a perched water table. Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) sites may be included within this system if occurrences are at montane elevations, and are associated with montane graminoids such as Idaho fescue (*Festuca idahoensis*), spike fescue (*Leucopoa kingii*), or poverty oatgrass (*Danthonia intermedia*). In areas where sage has been eliminated by human activities like burning, disking or poisoning, other shrubs may be dominant, especially rubber rabbitbrush (*Ericameria nauseosa*), and green rabbitbrush (*Chrysothamnus viscidiflorus*). Because of the mesic site conditions, most occurrences support a diverse herbaceous undergrowth of grasses and forbs. Shrub canopy cover is extremely variable, ranging from 10 percent to as high as 40 or 50 percent.



Forest and Woodland Systems
Conifer-dominated forest and woodland (xeric-mesic)

3% (42,354 Acres)

Rocky Mountain Foothill Limber Pine - Juniper Woodland

This ecological system occurs in foothill and lower montane zones in the northern Rocky Mountains and island mountain ranges of Montana and on escarpments extending out to the western Great Plains grasslands. Elevation ranges from 1,219 to 2,286 meters (4,000-7,500 feet), occasionally higher in southwestern Montana. At higher elevations, it is limited to sites with thin soils on rock outcrops. Some of the most ecologically interesting examples occur along and within the mountains of the Rocky Mountain Front where it occurs most commonly on west and north facing aspects. At lower elevations, it can occur on all aspects and on relatively level terrain. Fire is infrequent and spotty because rocky substrates inhibit growth of the continuous canopy that would be needed to spread. This system occurs on sites that are characterized by extreme winter weather and droughty summer conditions. It is typically dominated by limber pine (*Pinus flexilis*) or Rocky Mountain juniper (*Juniperus scopulorum*). This system is usually found below continuous forests of Douglas-fir (*Pseudotsuga menziesii*), or rarely, ponderosa pine (*Pinus ponderosa*) or lodgepole pine (*Pinus contorta*) in the foothills. Rocky Mountain juniper stands often occur in complex transitional zones or grow on exposed or severe sites within other forest systems. These juniper stands can exhibit a savanna-like character in southwestern Montana. In the system as a whole, because sites are so marginal for tree growth, limber pine mortality from abiotic and biotic stresses may be high. East of the Continental Divide, limber pine can occur at the upper tree line, with whitebark pine (*Pinus albicaulis*) in Glacier National Park and the Sweetgrass Hills. The climate characteristic of these systems is marked by a relatively small amount of precipitation, with the wettest months during the growing season, very low humidity, and wide annual and diurnal temperature ranges. Winter conditions may be very cold but relatively dry, and often include rapid fluctuations in temperature associated with chinook winds. In Montana, limber pine and Rocky Mountain juniper stands are found mainly on calcareous substrates. Soils have a high rock component (generally over 50% cover) and are coarse- to fine-textured, often gravelly. Slopes are moderately steep to steep.



3% (41,170 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.



2% (26,288 Acres)

Forest and Woodland Systems

Conifer-dominated forest and woodland (xeric-mesic)

Rocky Mountain Lodgepole Pine Forest

This forested system is widespread in upper montane to subalpine zones of the Montana Rocky Mountains, and east into island ranges of north-central Montana and the Bighorn and Beartooth ranges of south-central Montana. These are montane to subalpine forests where the dominance of lodgepole pine (*Pinus contorta*) is related to fire history and topographic conditions. In Montana, elevation ranges from 975 to 2,743 meters (3,200-9000 feet). These forests occur on flats to slopes of all degrees and aspect, as well as valley bottoms. Fire is frequent, and stand-replacing fires are common. Following stand-replacing fires, lodgepole pine will rapidly colonize and develop into dense, even-aged stands. Most forests in this ecological system occur as early- to mid-successional forests persisting for 50-200 years on warmer, lower elevation forests, and 150-400 years in subalpine forests. They generally occur on dry to intermediate sites with a wide seasonal range of temperatures and long precipitation-free periods in summer. Snowfall is heavy and supplies the major source of soil water used for growth in early summer. Vigorous stands occur where the precipitation exceeds 533 millimeters (21 inches). These lodgepole forests are typically associated with rock types weathering to acidic substrates, such as granite and rhyolite. In west-central Montana ranges such as the Big Belts and the Rocky Mountain Front, these forests are found on limestone substrates. These systems are especially well developed on the broad ridges and high valleys near and east of the Continental Divide. Succession proceeds at different rates, moving relatively quickly on low-elevation, mesic sites and particularly slowly in high-elevation forests such as those along the Continental Divide in Montana.



2% (25,810 Acres)

Alpine Systems

Alpine Sparse and Barren

Alpine Fell-Field

This ecological system is found at alpine elevations throughout the Rocky Mountains, west into the mountainous areas of the Great Basin, and north into the Canadian Rockies. In Montana, alpine fell-fields are well represented throughout the Northern Rocky Mountains and island mountain ranges. Elevation ranges from as low as 1,981 meters (6,500 feet) in northwestern Montana to 3,200 meters (10,500 feet) in southwestern Montana. These are wind-scoured fell-fields that are often free of snow in the winter, such as ridgetops and exposed saddles, subjecting the vegetation to severe environmental stress. Soils on these windy, unproductive sites are shallow, stony, low in organic matter, and poorly developed; wind deflation often results in a gravelly pavement. This system is characterized by a very cold climate during winter, high winds, high ultraviolet radiation and surface temperatures during summer days, and a very short growing season. Ribbons of nitrogen-fixing arctic dryad (*Dryas octopetala*), shrubby cinquefoil (*Dasiphora fruticosa*) and alpine leguminous species occur on slopes subject to downward movement due to frost heaving. These ribbons or stair-step vegetation patterns form perpendicular to the slope. Plant cover can be low to moderate (15 to 50%) with exposed, stable scree and boulders constituting the remainder of cover. Most fell-field plants are highly adapted to this xeric environment and occur within these ribbons or as singular plants among exposed rocks. These species are typically cushioned, matted or succulent, or grow as flat rosettes, often with thick leaf cuticles or a dense cover of hairs. Crustose and foliose lichen species form significant cover on exposed rocks.



Alpine Systems
Alpine Sparse and Barren

2% (21,326 Acres)

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.



Sparse and Barren Systems
Bluff, Badland and Dune


2% (19,853 Acres)


Shale Badland


This system is represented in southwestern Montana, and at scattered locations along the Rocky Mountain Front in northwestern Montana. It is composed of barren and sparsely vegetated substrates with less than 10% plant cover. This system is primarily found on eroded, rounded hills and plains that form a rolling topography. A combination of factors such as elevation, rainfall, the carving action of water and wind, and parent material contribute to the development of this system. It is primarily a type of mature dissection with finely textured drainage pattern and moderately steep slopes. This system contains extremely dry and easily erodible, consolidated silty to clayey soils with bands of shale, siltstones, mudstones or isolated consolidates. Most commonly, the soils are alkaline silts or bentonite clays (water-weathered volcanic ash), typically derived from marine shales. Harsh soil properties and high rates of erosion and deposition are driving environmental variables supporting sparse dwarf-shrubs such as saltbush (*Atriplex* species), sagebrush (*Artemisia* species), green rabbitbrush (*Chrysothamnus viscidiflorus*), rubber rabbitbrush (*Ericameria nauseosa*), greasewood (*Sarcobatus vermiculatus*), and sparse herbaceous vegetation. Indian ricegrass (*Achnatherum hymenoides*) is characteristic of early-seral vegetation through much of this system's range. Grazing and oil and gas exploration constitute the major threats to this system.


Additional Limited Land Cover


- 1% (18,324 Acres) ■ [Mat Saltbush Shrubland](#)
- 1% (16,673 Acres) ■ [Great Plains Ponderosa Pine Woodland and Savanna](#)
- 1% (16,334 Acres) ■ [Recently burned forest](#)
- 1% (15,559 Acres) ■ [Great Plains Riparian](#)
- 1% (15,496 Acres) ■ [Other Roads](#)
- 1% (13,386 Acres) ■ [Pasture/Hay](#)
- 1% (12,598 Acres) ■ [Low Sagebrush Shrubland](#)
- 1% (11,633 Acres) ■ [Introduced Upland Vegetation - Annual and Biennial Forbland](#)
- 1% (10,709 Acres) ■ [Great Plains Floodplain](#)
- 1% (9,918 Acres) ■ [Mountain Mahogany Woodland and Shrubland](#)
- 1% (9,541 Acres) ■ [Alpine Dwarf-Shrubland](#)
- 1% (8,579 Acres) ■ [Great Plains Shrubland](#)
- 1% (8,569 Acres) ■ [Rocky Mountain Lower Montane-Foothill Riparian Woodland and Shrubland](#)
- 1% (8,413 Acres) ■ [Great Plains Badlands](#)
- 1% (8,216 Acres) ■ [Rocky Mountain Montane-Foothill Deciduous Shrubland](#)
- 1% (8,164 Acres) ■ [Aspen Forest and Woodland](#)
- 1% (7,856 Acres) ■ [Open Water](#)
- 1% (6,877 Acres) ■ [Introduced Riparian and Wetland Vegetation](#)
- <1% (6,582 Acres) ■ [Insect-Killed Forest](#)
- <1% (6,540 Acres) ■ [Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland](#)
- <1% (6,374 Acres) ■ [Greasewood Flat](#)
- <1% (5,434 Acres) ■ [Developed, Open Space](#)
- <1% (4,071 Acres) ■ [Low Intensity Residential](#)
- <1% (4,010 Acres) ■ [Rocky Mountain Subalpine-Montane Mesic Meadow](#)
- <1% (3,187 Acres) ■ [Rocky Mountain Cliff, Canyon and Massive Bedrock](#)
- <1% (3,074 Acres) ■ [Rocky Mountain Subalpine Woodland and Parkland](#)


<1% (3,032 Acres)  [Rocky Mountain Subalpine-Upper Montane Grassland](#)


<1% (2,975 Acres)  [Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest](#)


<1% (2,610 Acres)  [Major Roads](#)


<1% (2,236 Acres)  [Post-Fire Recovery](#)


<1% (2,054 Acres)  [Burned Sagebrush](#)


<1% (1,961 Acres)  [Glacier and Ice Field](#)


<1% (1,949 Acres)  [Great Plains Cliff and Outcrop](#)


<1% (1,810 Acres)  [Great Plains Wooded Draw and Ravine](#)


<1% (1,776 Acres)  [Recently burned shrubland](#)


<1% (1,653 Acres)  [Wyoming Basin Cliff and Canyon](#)


<1% (1,241 Acres)  [Rocky Mountain Subalpine-Montane Riparian Woodland](#)


<1% (1,207 Acres)  [Commercial / Industrial](#)


<1% (786 Acres)  [Rocky Mountain Subalpine Deciduous Shrubland](#)


<1% (767 Acres)  [Railroad](#)


<1% (764 Acres)  [Big Sagebrush Shrubland](#)


<1% (649 Acres)  [Great Plains Open Freshwater Depression Wetland](#)


<1% (485 Acres)  [Alpine-Montane Wet Meadow](#)


<1% (478 Acres)  [Rocky Mountain Foothill Woodland-Steppe Transition](#)


<1% (373 Acres)  [Quarries, Strip Mines and Gravel Pits](#)


<1% (343 Acres)  [Mixed Salt Desert Scrub](#)


<1% (335 Acres)  [Rocky Mountain Lower Montane-Foothill Shrubland](#)


<1% (332 Acres)  [Rocky Mountain Ponderosa Pine Woodland and Savanna](#)


<1% (304 Acres)  [Aspen and Mixed Conifer Forest](#)


<1% (232 Acres)  [High Intensity Residential](#)


<1% (198 Acres)  [Rocky Mountain Wooded Vernal Pool](#)


<1% (123 Acres)  [Great Plains Saline Depression Wetland](#)


<1% (110 Acres)  [Great Plains Sand Prairie](#)


<1% (103 Acres)  [Great Plains Closed Depressional Wetland](#)


<1% (85 Acres)  [Rocky Mountain Subalpine-Montane Riparian Shrubland](#)


<1% (84 Acres)  [Harvested forest-grass regeneration](#)


<1% (71 Acres)  [Rocky Mountain Poor Site Lodgepole Pine Forest](#)


<1% (49 Acres)  [Harvested forest-tree regeneration](#)


<1% (49 Acres)  [Emergent Marsh](#)


<1% (30 Acres)  [Oil and Oil / Gas](#)


<1% (14 Acres)  [Gas and Gas Storage](#)


<1% (11 Acres)  [Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland](#)


<1% (11 Acres)  [Harvested forest-shrub regeneration](#)

<1% (7 Acres)  [Injection](#)

<1% (2 Acres)  [Rocky Mountain Conifer Swamp](#)

<1% (1 Acres)  [Coal Bed Methane](#)

<1% (0 Acres)  [Rocky Mountain Mesic Montane Mixed Conifer Forest](#)

<1% (0 Acres)  [Rocky Mountain Subalpine-Montane Fen](#)

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.
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