

## Intermountain/Foothill Grassland Ecotype

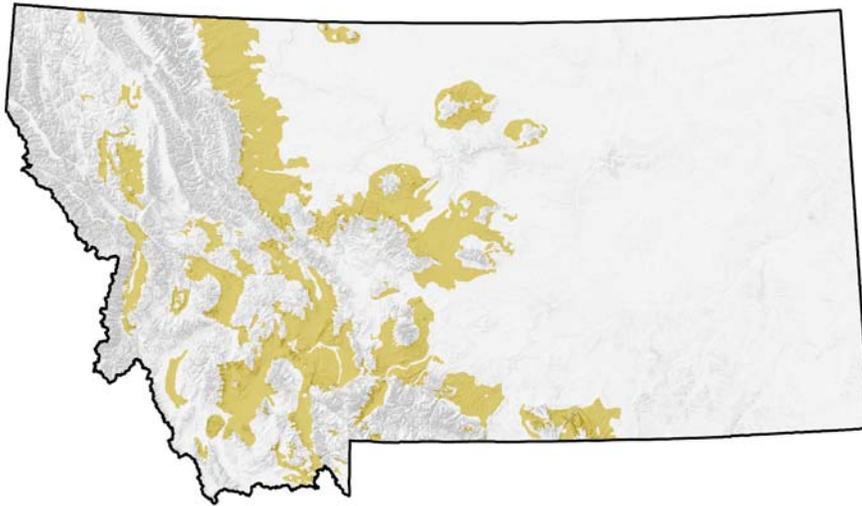


Figure 2. Intermountain/Foothill Grassland Ecotype

The intermountain/foothill grassland ecotype is a mosaic of private and public land that extends from the glaciated Flathead River Valley to the north, south to the Centennial Valley, and east to the Little Belt Foothills, where there remains some of Montana's most diverse fish and wildlife habitats. This western Montana ecotype harbors more wildlife communities than any other in Montana. It also harbors Montana's greatest concentration of human population in and near the towns of Kalispell, Missoula, Helena, and Bozeman. The attraction for wildlife and people is western Montana's broad, lush, and sweeping valleys cradled by the peaks of the Rocky Mountains. The intermountain/foothill grasslands are cut and formed by meandering rivers that create core riparian zones and wetland areas that often include glacial lakes and potholes that attract nesting waterbirds. Addressing the challenges that accompany the interface between human settlement and fish and wildlife and their habitats will be critical to the conservation of these areas.

### Landscape Characteristics

The intermountain/foothill grassland ecotype includes 13,414,271 acres and represents 14.3 percent of Montana's land area. The intermountain/foothill grassland ecotype generally lies on level to moderate topography at valley bottoms or lower slopes of mountains, with the Flathead, Clark Fork, Bitterroot, Missouri, Big Hole, Beaverhead, Jefferson, Gallatin, Madison, Yellowstone, and Blackfoot rivers cutting through the ecotype. Elevations are lowest in some of the northwestern valley locations, in some cases below 3,000 feet. Elevations between 3,000 and 4,000 feet occur broadly in the Flathead/Mission and Tobacco valleys. The upper Townsend, Gallatin, and Blackfoot valleys, as well as much of the foothill region to the east of the mountains, are mostly between

4,000 and 5,000 feet. The Jefferson, Madison, Shields/Smith, Paradise, and Deerlodge valleys range from 4,500 to 5,500 feet. Due to glaciation, the northern part of the Flathead Basin contains hundreds of potholes, many of which retain water throughout the average summer.

## **Soils**

Floors of the intermountain valleys of southwestern Montana are mostly composed of thousands of feet of tertiary valley fill deposited at the end of the first stage of mountain building. During the ice ages, the cordilleran ice sheet covered the northern part of the Flathead Basin at various times. Glacial Lake Missoula, formed from meltwater from this ice sheet, reached south into the Bitterroot Valley and west into what is now Washington. Sediments from this lake, plus outwash materials from the ice sheet, cover most of the valley bottoms of the southern part of the Flathead Basin (i.e., south Mission Valley and Hot Springs Valley). Lake sediments farther south (Missoula and Bitterroot valleys) apparently have been eroded away, exposing tertiary fill. The northern parts of the Flathead Basin as well as the Tobacco Valley are underlain by glacial till.

In some places the foothill areas are underlain by outwash from the adjacent mountains; however, more commonly the substrate is some form of sedimentary bedrock. The foothills along the eastern front (Bowman's Corner to the Canadian border), the area north and east of Livingston, and some of the area surrounding the Bears Paw and Little Rocky mountains is underlain by moderately hard sandstones and soft shales of the Cretaceous (beginning about 100 million years ago) Eagle to Willow Creek formations. Part of the foothill areas of these mountains also is composed of Cretaceous soft black marine shales (Colorado Group, Montana Group, Pierre Shale), Cretaceous soft sandstones, siltstones, and claystones (Fox Hills Sandstone, Kootenai Formation). Some of these sedimentary strata may be gently to steeply uplifted as a result of nearby mountain building.

Most of the soils in this ecotype (82 percent, 20,500 mi<sup>2</sup>) are described as well developed with dark topsoil horizons, clay "B" horizons, having a cool temperature regime, and occurring under semiarid to subhumid moisture conditions.

## **Climate**

The climate of the intermountain/foothills grassland ecotype varies considerably from one end to the other; generally there is more resemblance to the climate of the plains grassland than to the adjacent mountains. The northwestern valleys are influenced more by Pacific storms in winter and have a more maritime climate than the more southerly valleys. Temperatures there tend to be milder during the winter, and there is a greater proportion of precipitation received

during the winter. Arctic climate outbreaks affect the entire ecotype, although to a lesser extent in the northern foothills.

Annual temperatures average 44 degrees F throughout much of the Gallatin, Townsend, Helena, northern Jefferson, Bitterroot, and Flathead/Mission valleys. In these valleys some areas may have average annual temperatures of 45 degrees F. The Blackfoot, Madison, Paradise, and Jefferson/Beaverhead valleys are about a degree colder because of elevation and/or topography that favor the formation of extreme temperature inversions even in summer. Foothill areas in central and southern Montana experience about the same average annual temperatures as the colder intermountain valleys. The coldest portion of the ecotype is the northern foothills along the eastern front. Some parts of this area sustain average temperatures of 39 to 40 degrees F.

Although maximum daily temperatures in the northwest valleys are similar to those in the Gallatin, Townsend, and Helena valleys, nighttime temperatures average about 5 degrees warmer in the former areas. This generates mean January daily temperatures ranging from 22 to 25 degrees F in the northwest and 20 to 23 degrees in the lower southwest valleys. Temperatures in the colder valleys of the southwest and west central areas range from 19 to 21 degrees F in January. In the foothill locations, January temperatures range from 15 to 22 degrees F.

Mean daily temperatures in July are highest in the Gallatin, Townsend, Helena, northern Jefferson, Bitterroot, and Mission valleys. In the warmest parts of these valleys, daily maximums range from 85 to 86 degrees F. In the Madison, Jefferson/Beaverhead, Paradise, and Flathead valleys and most of the foothill areas, maximum daily temperatures are about a degree lower. The coldest valleys in the extreme southwest and west central areas attain maximums from 80 to 82 degrees F. Highest July nighttime temperatures in the ecotype occur in the Helena and Townsend valleys where they range from 49 to 50 degrees F. The Gallatin Valley is about a degree cooler. A degree cooler than that are the nighttime temperatures in the lower Jefferson, Bitterroot, and Flathead/Mission valleys and most of the foothill region. Nighttime temperatures of 43 to 46 degrees F are experienced in the west-central and extreme southwestern valleys.

The protection afforded the intermountain valleys by the mountains is reflected by the generally much higher annual extreme minimum temperatures contrasted with most of the area to the east. The Mission and Bitterroot valleys are the only parts of Montana with significant areas in plant hardiness zone 5 (mean annual minimums in the minus teens). The remaining area of these valleys, along with the Jefferson/Beaverhead, Gallatin, Madison, Townsend, Helena, Deerlodge, Blackfoot, Missoula, and Tobacco valleys, are in hardiness zone 4B (mean annual minimums in the minus 21 to 25 degrees F range). The central and southern foothill area is mostly in zone 4A (mean annual minimums in the minus

26 to 30 degrees F range). The northern foothill region is partially in zone 3 (mean annual minimums from minus 31 to 40 degrees F range).

The highest annual extreme maximum temperatures occur in the Mission Valley, where much of the area reaches 98 to 99 degrees F on average each year. The Flathead, Missoula, part of the Deerlodge, the lower Jefferson, Gallatin, Townsend, and Helena valleys normally reach 95 to 97 degrees F. This is also the case for the southern and central foothill region.

The longest frost-free season exists in the lower Helena Valley, and across the central and southern foothill sections. Here the season ranges from 120 to 130 days. Lower portions of the Gallatin Valley, the Townsend Valley, and the Flathead/Mission Valley have frost-free seasons ranging from 100 to 125 days. Seasons in the Jefferson, Madison, Paradise, Bitterroot, and Missoula valleys last from 90 to 110 days. Other valleys and the northern foothill areas have seasons ranging from 70 to 100 days.

The intermountain valleys and foothills are basically semiarid, but considerably wetter than the plains grasslands. Mean annual precipitation overall is 15.4 inches. The foothill portion of the ecotype generally is wetter than the intermountain valley portion. Much larger expanses of area receiving more than 16 inches annually occur in the former than the latter area. Broad areas receiving between 10 and 12 inches are found in the Jefferson/Beaverhead Valley, while parts of the Jefferson/Beaverhead/Centennial and Helena valleys get less than 10 inches annually. The Blackfoot Valley and eastern portions of the Flathead/Mission Valley receive between 12 and 16 inches, while western parts of the Flathead/Mission Valley tend to be drier.

Reflecting the stronger maritime influence in the northwest, those valleys tend to receive a smaller proportion of their precipitation in the growing season than do the southwestern valleys and most of the foothill regions. The percentage of moisture falling in the growing season for the Flathead/Mission, Missoula, and Bitterroot valleys ranges from 37 to 45 percent, with a portion of the Mission Valley slightly higher than that. The extreme southwestern valleys (Jefferson/Beaverhead, Madison) and the northern and central foothill region collect 52 to 60 percent of the water during the growing season. Most other areas are in the range of 45 to 55 percent.

### **Anthropogenic Uses**

The intermountain/foothill grassland ecotype is diverse both in land management and its uses by humans. Primary recreational activities include hiking, mountaineering, hunting, biking, snowmobiling, wildlife watching, and skiing. The primary industries in this ecotype are building/construction, farming, ranching, mining, and tourism. The breakdown of landowner stewardship for the intermountain/foothill grassland ecotype is as follows:

U.S. Federal Agencies: 1,007,758 acres, or 7.5% of total area, which include:

BLM: 494,520 acres, or 3.8% of total area

USFS: 408,403 acres, or 3.1% of total area

USFWS: 64,556 acres, 0.5% of total area

NPS: 18,286 acres, or 0.1% of total area

State Agencies: 892,545 acres, or 6.8% of total area

Tribal Lands: 1,091,650 acres, or 8.3% of total area

Private: 10,187,909 acres, or 77.2% of total area

City and County: 6,487 acres, or less than 0.1% of total area

## Vegetation

Plant community composition is influenced primarily by the total annual precipitation, which ranges from 8 to more than 20 inches, yearly precipitation distribution, and soil characteristics. The yearly precipitation distribution and, to a certain extent, the total precipitation are related to general geographic location. Northern valleys and foothills tend to receive more total precipitation than more southern areas, while northwestern valleys have a more maritime (winter/spring wet) precipitation. This has an impact on the distribution of major grass species. Most of the potential natural grassland communities within this ecotype can be perceived as different combinations of six or seven major grass species accompanied by a number of subordinate grass and forb species.

Rough fescue (*Festuca scabrella*) extends southward into Montana from Canada, its center of distribution (Moss and Campbell 1947, Coupland and Brayshaw 1953, Tisdale 1947, Stickney 1960). Rough fescue is most abundant and widespread in northwestern Montana on both sides of the Continental Divide, declining southward and penetrating below the 46th parallel only in the Gravelly and Madison ranges. The easternmost occurrences are near Lewistown at the foot of the Judith Mountains.

Idaho fescue (*Festuca idahoensis*) occurs throughout the intermountain/foothill ecotype wherever moisture conditions are favorable, becoming at least a subordinate species at 15 inches of annual precipitation (Ross and Hunter 1976). As well as being a component of most rough fescue communities, Idaho fescue forms habitat types with bluebunch wheatgrass (*Agropyron spicatum*) in most of the medium elevations of southwestern Montana and with western thickspike wheatgrass (*Agropyron dasystachyum*) in foothill areas just east of the mountains where there is enough moisture (Mueggler et al 1980). Idaho fescue rarely occurs as the sole dominant grass. The two Idaho fescue habitat types usually contain prairie junegrass (*Koeleria cristata*) as a subordinate grass. Forbs commonly associated with Idaho fescue include silky lupine (*Lupinus sericeus*), arrowleaf balsamroot (*Balsamorhiza sagittata*), sticky geranium (*Geranium viscosissimum*), phlox (*Phlox kelseyi*), blanketflower (*Gaillardia aristata*), and pussytoes (*Antennaria microphylla*).

Bluebunch wheatgrass is the most widely spread major forage grass in Montana, occurring at least as a codominant on some sites statewide. In the intermountain/foothill grassland ecotype it is a dominant grass on all upland sites within the 10- to 14-inch precipitation zone (Ross et al 1976). On finely textured soils bluebunch grass forms plant communities where western wheatgrass and thickspike wheatgrass are codominants. Prairie junegrass is usually present and fairly abundant. Other common species include big sagebrush (*Artemisia tridentata* spp. *wyomingensis*), milkvetches (*Astragalus* spp.), biscuitroot (*Lomatium* spp.), sandberg bluegrass (*Poa sandbergii*), hairy goldenaster (*Chrysopsis villosa*), and green needlegrass (*Stipa viridula*). Sites with medium textured, well-drained, shallow soils support little western wheatgrass compared to the finer textured soils but more species like needle-and-thread (*Stipa comata*), sandberg bluegrass, and sometimes blue grama (*Bouteloua gracilis*) as codominants. Such sites occupy about 9 percent (2,325 miles<sup>2</sup>) of the ecotype. These communities may contain a variety of shrub species, but those in which shrubs are dominants are included in the shrub grassland ecotype. On sandy sites, bluebunch wheatgrass is a major vegetation constituent along with needle-and-thread, Indian ricegrass (*Oryzopsis hymenoides*), and sometimes prairie sandreed (*Calamovilfa longifolia*). Other species that may be found are aromatic sumac (*Rhus aromatica*), threadleaf sedge (*Carex filifolia*), and yucca (*Yucca glauca*). Within the 15- to 19-inch precipitation zone, bluebunch wheatgrass shares dominance with rough fescue in the northwestern and Idaho fescue in the southwestern and south-central areas of Montana.

Needle-and-thread grass occurs as a community type in some valleys in Montana's extreme southwest (Mueggler et al 1980). This type is found on well-drained, shallow soils that might be limy. Other species include western and thickspike wheatgrass, prairie junegrass, threadleaf sedge, and fringed sedge (*Carex crinita*).

Other sites within the intermountain/foothill grassland ecotype include saline lowlands that support major grasses such as basin wildrye (*Elymus cinereus*), Nuttall alkaligrass (*Puccinellia nuttalliana*), alkali cordgrass (*Spartina gracilis*), saltgrass (*Distichlis stricata*), alkali bluegrass (*Poa juncifolia*), kelsey phlox (*Phlox kelseyi*), and occasionally greasewood (*Sarcobatus vermiculatus*). Also found are subirrigated areas and wetlands that are often dominated by various species of willow (*Salix* spp.) and a variety of hydromorphic grasses, sedges, and rushes. These might include Canada reedgrass (*Calamagrostis Canadensis*), cattails (*Typha latifolia*), Baltic rush (*Juncus balticus*), and basin wildrye (*Leymus cinereus*).