

# Descriptions of the Level IV Ecoregions of Montana

Second Edition

## 15. Northern Rockies

**15a** The **Grave Creek Range-Nine Mile Divide** ecoregion is composed of northwest-southeast trending, forested mountains that are partially mantled by volcanic ash and underlain by Precambrian argillite, argillaceous rocks, and quartzite. It is more rugged than the Salish Mountains (15b) and has a different topographic orientation than either the wester Clark Fork Valley and the lithologically distinct **Townsend-Horseshoe-London** Sedimentary Hills (17a) and **Deer Lodge-Phillipsburg-Avon** Garnet-Sapphire Mountains (17a). The climate is generally drier than that of the neighboring Clark Fork Valley and Mountains (15b) and Bitterroot-Frenchtown Valley (17b). Logging, mining, and recreation are the common land uses.

**15b** The treeless **Camas Valley** ecoregion is largely underlain by Quaternary lacustrine deposits. It is in the rainshadow of the Salish Mountains. The average annual precipitation is 12 to 16 inches and maximums are lower than those of the nearby Flathead Valley (15c). Flowing springs, hot springs, wetlands, accumulations of alkali salts, and sodium-affected soils occur locally and huge riparian marks are found in the Camas Prairie Basin. Stream density is low and much of the aquatic biota is different from surrounding ecoregions. The potential natural vegetation is foothills prairie which is distinct from the subalpine fir, Douglas-fir, grand fir, and ponderosa pine forests of the nearby Flathead Hills and Mountains (15c). Sagebrush has largely replaced bunch grass and is now common. Grazing is the prevalent land use. The land use mosaic contrasts with that of Ecogion 15c.

**15c** The broad, intermediate **Flathead Valley** ecoregion is largely treeless. It lies west of the Canadian Rockies (41), contains Flathead Lake, and is underlain by Quaternary glacial outwash, lake sediments, and alluvium. Considerable climatic diversity occurs within the valley; the north experiences frequent outbreaks of arctic air during the winter, near shore areas are lake-modulated, and low-lying areas can be cold. The average growing season approaches 150 days in the most favorable sites and can be less than 90 days in the least favorable sites. Average annual precipitation ranges from about 14 to just over 25 inches. Typically, the eastern and northern areas receive the most rainfall, and maximums exceed those of the Camas Valley (15b). Potential natural vegetation is mostly foothills prairie and is distinct from that of the Northern Rockies (41) and the Crested Alpine-Subalpine Zone (41b) that occur by microlimate. Unirrigated-irrigated agriculture, rural residential, suburban, and commercial activity dominates the region and orchards are found in especially mild locations. Alkali accumulation has occurred locally as a result of irrigation.

**15d** The treeless **Tobacco Plains** ecoregion lies to the west of the Canadian Rockies (41) in the Rocky Mountain Trench at an elevation of 4,600 to 4,800 feet. The ecoregion is covered by Quaternary drift, lacustrine, and alluvial deposits. It contains lakes and the only extensive drainin field in Montana. The Tobacco Plains (41c) is physiographically distinct from the higher and more rugged Western Canadian Rockies (41d) and Salish Mountains (15b). Xeric and frigid habitats, high-altitude alpine, and tundra communities are common here. These grasslands are rare in the surrounding, mountainous ecoregions. Climate vegetation is foothills prairie and contrasts with the subalpine fir, Douglas-fir, grand fir, and Engelmann spruce forests of Ecogions 15i and 41c. Lumber mills, sand and gravel operations, grazing, and residential-commercial activity occur; the land use mosaic is distinct from that of Ecogions 15i, 15t, and 41c which are dominated by logging and forest recreation.

**15e** The semi-arid to subhumid **Flathead Hills and Mountains** ecoregion is underlain by Precambrian argillite, argillaceous rocks, and quartzites. It is in the rainshadow of the Salish Mountains (15b) and average annual precipitation ranges from 16 to just over 25 inches and is less than that received by the higher Grave Creek Range-Nine Mile Divide (15a) and Salish Mountains (15b) to the west. Climate vegetation is mapped as subalpine fir, Douglas-fir, grand fir, and ponderosa pine forests and the tree cover is commonly sparser than in wetter ecoregions.

**15h** The wet, glaciated mountains of the **High Northern Rockies** ecoregion are underlain by mixed rock types. It is differentiated from lower ecoregions by its characteristic rockland, talus, and/or mixed high elevation climates vegetation. It is similar to the High Idaho Batholith (16b), Alpine Zone (17a), and the Crested Alpine-Subalpine Zone (41b) that occur by different level III ecoregions. Above treeline, tundra, alpine grassland, subnival meadows, and wetlands are found. At or below treeline, subalpine parkland and

## 16. Idaho Batholith

**16a** The **Eastern Batholith** ecoregion is forested and mountainous and lies northwest of the Continental Divide. Characteristically, Ecogion 16a is underlain by intrusive rocks of the Cretaceous Idaho Batholith and, in consequence, its surface waters are very low in alkalinity. The Eastern Batholith ecoregion is lithologically distinct from the Precambrian Belt rocks of Ecogion 17x and lacks the nearly parallel, ice-glazed valleys and numerous lakes and wetlands of the Glaciated Bitterroot Mountains and Canyons (16c). Average annual precipitation ranges from 14 to 25 inches and maximums are more extensive than in the wester Batholith. The climate vegetation is mapped as subalpine fir, Douglas-fir, grand fir, and ponderosa pine forests and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a). The climate vegetation is subalpine fir, Douglas-fir, and ponderosa pine and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a) which lack the mapped ponderosa pine element. Logging, grazing, mining, and recreation are the common land uses.

**16b** The mountains **Loches Uplands** ecoregion is dissected but not as deeply as Ecogion 16c. It is underlain by volcanic ash and igneous intrusions that increase the fertility and water retention of upland soils. Grand fir and Douglas-fir are common, Engelmann spruce and subalpine pine forest are high elevations, and mountain meadows and tundra communities are common. Marine influence is less to the north but greater than to the south. Logging and road building cause landslides and stream sedimentation.

**16c** The forested, north-south trending, **Glaciated Bitterroot Mountains and Canyons** ecoregion is composed of jagged peaks, lakes, wetlands, and distinctive ice-glazed

## 17. Middle Rockies

The glaciated **Eastern Gravelly Mountains** ecoregion has subdued, topohline-studded terrain and is mostly forested. Climate vegetation is mapped as subalpine fir and Douglas-fir forests and is more extensive than in the wester Batholith. The climate vegetation is mapped as subalpine fir, Douglas-fir, and ponderosa pine forests and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a). The climate vegetation is subalpine fir, Douglas-fir, and ponderosa pine and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a) which lack the mapped ponderosa pine element. Logging, grazing, mining, and recreation are the common land uses.

**17e** The partially forested, **Barren Mountains** ecoregion is commonly underlain by carbonate-rich sedimentary rocks. Elevations range from about 5,600 to just over 11,100 feet but only a few areas are forested. High, forested peaks are mainly composed of carbonate-rich Mesozoic and Paleozoic sedimentary rocks and Tertiary volcanics. Lower, less forested slopes are underlain by Precambrian argillite, argillaceous rocks, and quartzite. The climate vegetation is mapped as subalpine fir and Douglas-fir forests; Pacific Coast forest elements are absent in the higher elevations. The climate vegetation is mapped as subalpine fir and Douglas-fir forests and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a) which lack the mapped ponderosa pine element. Logging, grazing, mining, and recreation are the primary land uses.

**17f** The rugged, forested, glaciated **Crazy Mountains** ecoregion is geologically distinct from surrounding mountainous ecoregions. Its core is composed of Tertiary coarse-grained intrusive rocks and both dikes and sills radiate from the core, late-Cretaceous water-laid volcanics of the Livingston Formation are common. Average annual precipitation ranges from 16 to just over 50 inches; maximums are greater than in the mountainous ecoregions to the north and less than in the ranges to the south. The climate vegetation is mapped as subalpine fir and Douglas-fir forests. Logging is the major land use.

**17g** The carbonate-rich **Mid-Elevation Sedimentary Mountains** ecoregion is mostly forested and partially dissected and less rugged than the neighboring Gneissic-Schistose Forested Mountains (17i) and Absaroka-Gallatin Volcanics (17h). Ecogion 17g is characterized underlain by faulted and folded Mesozoic and Paleozoic sedimentary rocks, including limestone. Stream quality, surficial water availability, and aquatic biota are also different. Average annual precipitation ranges from less than 20 to just over 40 inches. Climate vegetation is mapped as subalpine fir and Douglas-fir forests. Logging, grazing, mining, and recreation are the common land uses.

**17h** The high, wet, severely exposed **Alpine Zone** ecoregion was glaciated and is characterized by jagged peaks, mixed high altitude vegetation, many rocks, rockland, and batholith (16b). The climate vegetation is mapped as subalpine fir, Douglas-fir, and the Crested Alpine-Subalpine Zone (41b) that occur in different level III ecoregions. Elevations range from about 8,500 to just over 12,500 feet. Average annual precipitation ranges from 30 to 100 inches and exceeds that surrounding, but lower, ecoregions. Ecogion 17h is often snow-capped for most of the year; permafrost occurs sporadically and solifluction and crested patterned-ground in the alpine areas of the Beartooth Plateau. The soils are Udic, Cryc, Inceptisols and are typically very gravelly to stony. They support subalpine fir and whitebark pine forests to glaberrima, above timberline, alpine tundra, subnival meadows, and wetlands occur. Krummholz vegetation occupies windswept areas between the forest and higher alpine areas.

**17i** The high, forested, partially glaciated **Absaroka-Gallatin Volcanics** ecoregion has forested outcrops, volcanic mud flows, and extensive glacial drift and colluvial deposits. Ecogion 17i is underlain primarily by pyroclastic material, Tertiary volcanic flows, and water-laid volcanics; it is lithologically distinct from the Mid-Elevation Sedimentary Mountains (17g) and Gneissic-Schistose Forested Mountains (17h). Its air-fall volcanics readily weather to clay and tend to muddy the streams of Ecogion 17i making them turbid and less navigable. The climate vegetation is mapped as subalpine fir, Douglas-fir, and ponderosa pine forests and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a) which lack the mapped ponderosa pine element. Logging, grazing, mining and recreation are the common land uses.

open, wind-blown stands of nonmarketable subalpine fir, Engelmann spruce, and whitebark pine occur. Subalpine fir, whitebark pine, mountain hemlock, and alpine larch forests are found in glacial cirques. Elevations range from about 6,000 to just over 10,600 feet and are sufficient to trap large amounts of Pacific moisture. Average annual precipitation is commonly 60 to 100 inches. The soils are often gravelly to stony and, especially in the northwest, acidic.

**17k** The rugged, wet, forested **Clark Fork Valley and Mountains** ecoregion is affected by Pacific moisture and, in consequence, its surface waters are very low in alkalinity. The climate vegetation is mapped as subalpine fir, Douglas-fir, and ponderosa pine forests and is different from that of the neighboring Clark Fork Valley and Mountains (15b) and Bitterroot-Frenchtown Valley (17b). Logging, mining, and recreation are the common land uses.

**17l** The treeless **Camas Valley** ecoregion is forested and underlain by Precambrian Belt rocks. Its volcanic ash-mantled crests rarely exceed an elevation of 7,000 feet and lack the alpine zones that occur in higher mountains. Average precipitation is about 20 to 50 inches per year and is markedly lower than that of the Purcell-Cabinet-North Bitterroot Mountains (15g) and the Canadian Rockies (41). Ecogion 17l's northern portion receives more precipitation than the south; it was glaciated by the Cordilleran ice sheet which modified physiography and deposited the till. Forest cover is less than in the more westerly Barren-Cabinet-North Bitterroot Mountains (15g). Soils are often deep and derived from volcanic ash which increases the fertility and water holding capacity of the soil. Ash is a very common soil constituent in Ecogion 17l that is further south Ecogion 16c. Ecogion 17l experiences more of the Pacific maritime influence than more easterly and southerly ecoregions. Pacific air masses increase both cloudiness and precipitation. Average annual maximum precipitation can exceed 100 inches, which is characteristically much greater than that of neighboring, more easterly ecoregions. Climate vegetation is mapped as subalpine fir, grand fir, and Douglas-fir forests; Engelmann spruce and Pacific species such as western redcedar and western hemlock also occur. Land uses include intensive logging and recreation.

**17m** The **Salish Mountains** ecoregion is forested and underlain by Precambrian Belt rocks. Its volcanic ash-mantled crests rarely exceed an elevation of 7,000 feet and lack the alpine zones that occur in higher mountains. Average precipitation is about 20 to 50 inches per year and is markedly lower than that of the Purcell-Cabinet-North Bitterroot Mountains (15g) and the Canadian Rockies (41). Ecogion 17m's northern portion receives more precipitation than the south; it was glaciated by the Cordilleran ice sheet which modified physiography and deposited the till. Forest cover is less than in the more westerly Barren-Cabinet-North Bitterroot Mountains (15g). Soils are often deep and derived from volcanic ash which increases the fertility and water holding capacity of the soil. Ash is a very common soil constituent in Ecogion 17m that is further south Ecogion 16c. Ecogion 17m experiences more of the Pacific maritime influence than more easterly and southerly ecoregions. Pacific air masses increase both cloudiness and precipitation. Average annual maximum precipitation can exceed 100 inches, which is characteristically much greater than that of neighboring, more easterly ecoregions. Climate vegetation is mapped as subalpine fir, grand fir, and Douglas-fir forests; Engelmann spruce and Pacific species such as western redcedar and western hemlock also occur. Land uses include intensive logging and recreation.

**17n** The **Paradise Valley** is an intermediate valley containing grasslands and meadows. It is mostly composed of Quaternary alluvium and Tertiary sedimentary rock; glacial drift deposits and Tertiary volcanics also occur. Potential natural vegetation is foothills prairie and is characterized by the predominance of fescues and wheatgrasses. Today, the Paradise Valley (17a) is used for rangeland, cropland, recreation, rural residential developments, and commercial activities.

The partially glaciated **Big Belt Forested Highlands** ecoregion lies to the east of the Continental Divide. The highest areas are composed of igneous intrusive rocks but, generally, Ecogion 17n is underlain by Precambrian limestone and is lithologically distinct from the nearby Seated Eastern Igneous-Cone Mountains (17i), Elkhorn Mountains-Boulder Batholith (17a), Eastern Divide Mountains (17a), Mid-Elevation Sedimentary Mountains (17g), and Big Snowy-Little Belt Carbonate Mountains (17a). Climate vegetation is mapped as subalpine fir, Douglas-fir, and ponderosa pine forests and differs from that of Ecogions 17g, 17i, 43a, and 43a. Logging, grazing, mining, and recreation are the most common land uses.

**17w** The broad, semi-arid, largely treeless **Townsend Basin** lies east of the Continental Divide and contains floodplains, stream terraces, alluvial fans, and hills. It is mostly composed of Quaternary alluvium and Tertiary valley fill unlike the more rugged Townsend-Horseshoe-London Sedimentary Hills (17y). Dry Gneissic-Schistose-Volcanic Hills (17ab), Northern Rockies (15), and Middle Rockies (17). Elevations tend to be lower and the growing season longer than in the Shield-Smith Valleys (43a) or the surrounding mountains. Ecogion 17w's climate is drier than the valleys west of the Continental Divide but wetter than the Dry Intermontane Sagebrush Valleys (17a) to the southwest. Potential natural vegetation consists of foothills prairie and grama-needlegrass-wheatgrass; it differs from the forests of Ecogions 15g and the sagebrush steppes of Ecogions 17a, 17ab, and 43c. Today, cropland, rangeland, and urban-suburban-industrial development occur.

**17x** The cold, subnival, largely forested **Eastern Divide Mountains** ecoregion is mantled by volcanic ash and underlain by quartzite and argillaceous rocks. Slopes are more stable and there is less stream denudation after disturbance than in nearby granitic and schistic areas; related management issues are also different. Drier deposits occur but continental ice did not extend further south into the Clark Fork Valley and Mountains (15k). Cedar-hemlock-pine forest and, at higher elevations, western spruce fir forest occur. Western hemlock is more widespread and marine influence is stronger than in Ecogion 16c.

The long **Stillwater-Swan Wooded Valley** ecoregion contains numerous wetlands and ponds and its forests are often dominated by western larch, Douglas-fir, or Engelmann spruce. The valley is much lower, drier, and warmer than the adjacent Salish Mountains (15l) and Canadian Rockies (41). Thick Quaternary alluvial and glacial drift deposits are characteristic and nonirrigated drainage and hummocky areas occur. The climate vegetation is mapped as subalpine fir and Douglas-fir forests and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a) which lack the mapped ponderosa pine element. Logging, grazing, mining, and recreation are the common land uses. Ecogion 15t extends into Canada.

valleys. Characteristically, it is underlain by the Cretaceous Idaho Batholith, and its surface waters have very low alkalinity. The rocks of Ecogion 16a are lithologically distinct from the Precambrian argillite, quartzite, and argillaceous rocks that compose the nearby Grave Creek Range-Nine Mile Divide (15a) and the Ratelsoke-Blackfoot-South Swan-Northern Garnet-Sapphire Mountains (17a). Alpine glaciers descended to an elevation of about 4,000 feet; till is common and outwash deposits are found in low mountain valleys north of Hamilton, Montana. The climate vegetation is mapped as subalpine fir, Douglas-fir, and ponderosa pine forests and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a) which lack the mapped ponderosa pine element. Logging, grazing, mining, and recreation are the common land uses.

**16b** The wet, severely exposed, glaciated **High Idaho Batholith** contains jagged peaks, talus, and rockland. It is often snow-capped and annual precipitation is greater than in nearby, lower ecoregions. Soils are shallow, stony, and have a arctic temperature regime. Ecogion 16b includes alpine areas, subalpine fir, lodgepole pine, spruce, and Douglas-fir forests, and very high elevations are underlain by subalpine fir and whitebark pine. Tundra, alpine grassland, subnival meadows, and wetlands are found above treeline.

**17j** The forested **Yellowstone Plateau** ecoregion is characterized by subdued topography and contains lakes, springs, hot springs, wetlands, and hills. It is physiographically distinct from the more rugged mountains to the west. The climate vegetation is mapped as subalpine fir, Douglas-fir, and ponderosa pine forests and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a) which lack the mapped ponderosa pine element. Logging, grazing, mining, and recreation are the common land uses.

**17k** The wet, glaciated **Subalpine Zone** ecoregion is forested and characterized by lake-studded terrain that is far less rugged than the surrounding Middle Rockies (17c). Quaternary colluvium and alluvium are common. Elevations range from more than 6,500 to 7,000 feet and is lithologically distinct from the adjacent Absaroka-Gallatin Volcanics (17h). Climate vegetation is mapped as subalpine fir and Douglas-fir forests and is distinct from that of the Alpine Zone (17h).

**17l** The rugged, glaciated **Gneissic-Schistose Forested Mountains** ecoregion is wet and mostly forested. Ecogion 17l is characteristically underlain by Precambrian pre-Belt rocks and is more rugged than the neighboring Absaroka-Gallatin Volcanics (17h). The climate vegetation is mapped as subalpine fir, Douglas-fir, and ponderosa pine forests and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a) which lack the mapped ponderosa pine element. Logging, grazing, mining, and recreation are the common land uses.

**17m** The forested **Yellowstone Plateau** ecoregion is characterized by subdued topography and contains lakes, springs, hot springs, wetlands, and hills. It is physiographically distinct from the more rugged mountains to the west. The climate vegetation is mapped as subalpine fir, Douglas-fir, and ponderosa pine forests and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a) which lack the mapped ponderosa pine element. Logging, grazing, mining, and recreation are the common land uses.

**17n** The wet, glaciated **Subalpine Zone** ecoregion is forested and characterized by lake-studded terrain that is far less rugged than the surrounding Middle Rockies (17c). Quaternary colluvium and alluvium are common. Elevations range from more than 6,500 to 7,000 feet and is lithologically distinct from the adjacent Absaroka-Gallatin Volcanics (17h). Climate vegetation is mapped as subalpine fir and Douglas-fir forests and is distinct from that of the Alpine Zone (17h).

**17o** The rugged, glaciated **Gneissic-Schistose Forested Mountains** ecoregion is wet and mostly forested. Ecogion 17n is characteristically underlain by Precambrian pre-Belt rocks and is more rugged than the neighboring Absaroka-Gallatin Volcanics (17h). The climate vegetation is mapped as subalpine fir, Douglas-fir, and ponderosa pine forests and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a) which lack the mapped ponderosa pine element. Logging, grazing, mining, and recreation are the common land uses.

**17p** The forested **Yellowstone Plateau** ecoregion is characterized by subdued topography and contains lakes, springs, hot springs, wetlands, and hills. It is physiographically distinct from the more rugged mountains to the west. The climate vegetation is mapped as subalpine fir, Douglas-fir, and ponderosa pine forests and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a) which lack the mapped ponderosa pine element. Logging, grazing, mining, and recreation are the common land uses.

**17q** The forested **Yellowstone Plateau** ecoregion is characterized by subdued topography and contains lakes, springs, hot springs, wetlands, and hills. It is physiographically distinct from the more rugged mountains to the west. The climate vegetation is mapped as subalpine fir, Douglas-fir, and ponderosa pine forests and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a) which lack the mapped ponderosa pine element. Logging, grazing, mining, and recreation are the common land uses.

**17r** The forested **Yellowstone Plateau** ecoregion is characterized by subdued topography and contains lakes, springs, hot springs, wetlands, and hills. It is physiographically distinct from the more rugged mountains to the west. The climate vegetation is mapped as subalpine fir, Douglas-fir, and ponderosa pine forests and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a) which lack the mapped ponderosa pine element. Logging, grazing, mining, and recreation are the common land uses.

**17s** The forested **Yellowstone Plateau** ecoregion is characterized by subdued topography and contains lakes, springs, hot springs, wetlands, and hills. It is physiographically distinct from the more rugged mountains to the west. The climate vegetation is mapped as subalpine fir, Douglas-fir, and ponderosa pine forests and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a) which lack the mapped ponderosa pine element. Logging, grazing, mining, and recreation are the common land uses.

**17t** The forested **Yellowstone Plateau** ecoregion is characterized by subdued topography and contains lakes, springs, hot springs, wetlands, and hills. It is physiographically distinct from the more rugged mountains to the west. The climate vegetation is mapped as subalpine fir, Douglas-fir, and ponderosa pine forests and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a) which lack the mapped ponderosa pine element. Logging, grazing, mining, and recreation are the common land uses.

**17u** The forested **Yellowstone Plateau** ecoregion is characterized by subdued topography and contains lakes, springs, hot springs, wetlands, and hills. It is physiographically distinct from the more rugged mountains to the west. The climate vegetation is mapped as subalpine fir, Douglas-fir, and ponderosa pine forests and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a) which lack the mapped ponderosa pine element. Logging, grazing, mining, and recreation are the common land uses.

**17v** The forested **Yellowstone Plateau** ecoregion is characterized by subdued topography and contains lakes, springs, hot springs, wetlands, and hills. It is physiographically distinct from the more rugged mountains to the west. The climate vegetation is mapped as subalpine fir, Douglas-fir, and ponderosa pine forests and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a) which lack the mapped ponderosa pine element. Logging, grazing, mining, and recreation are the common land uses.

**17w** The forested **Yellowstone Plateau** ecoregion is characterized by subdued topography and contains lakes, springs, hot springs, wetlands, and hills. It is physiographically distinct from the more rugged mountains to the west. The climate vegetation is mapped as subalpine fir, Douglas-fir, and ponderosa pine forests and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a) which lack the mapped ponderosa pine element. Logging, grazing, mining, and recreation are the common land uses.

## 17. Middle Rockies (continued)

**17x** The **Bitterroot-Frenchtown Valley** ecoregion is sheltered from high winds and severe weather by surrounding mountains. It is composed of floodplains, terraces, hills, fans, wildlife-rich wetlands, and riparian forests. Thick alluvial and lacustrine deposits are common; mudflows and glacial outwash also occur. Overall, it is lithologically distinct from the Eastern Pioneer Sedimentary Mountains (17ab), Southern Garnet Sedimentary Volcanic Mountains (17a), and the mixed rock of the neighboring Flint Creek-Anaconda Mountains (17am). The climate vegetation is mapped as subalpine fir, Douglas-fir, and ponderosa pine forests and is distinct from Ecogions 15a, 17a, 17m, 17p, and 17r. The forested mountains are typically drier than the ecoregions to the northwest and west but are wetter than those to the east of the Continental Divide. They are used for logging and recreation.

**17y** The partially wooded **Townsend-Horseshoe-London Sedimentary Hills** ecoregion lies in the rainshadow of the Elkhorn Mountains and is rather dry. It is largely composed of Mesozoic and Paleozoic sedimentary rock; limestone is common and both caverns and dry valleys occur. The Townsend-Horseshoe-London Sedimentary Hills (17y) ecoregion is lithologically distinct from the nearby Dry Gneissic-Schistose-Volcanic Hills (17ab) and related stream quality, surficial water availability, and aquatic biota are also different. Elevations range from about 4,000 to 8,200 feet and are intermediate between the higher, forested Northern Rockies (15) and the lower Townsend Basin (17w). Grazing, logging, and mining are the common land uses.

**17z** The glaciated, forested **Roost Mountains** ecoregion is characterized by a Tertiary granitic core and is geographically isolated from neighboring mountainous ecoregions. Ecogion 17z is steeper and more rugged than the Elkhorn Mountains-Boulder Batholith (17a) and its core is lithologically distinct from the Gneissic-Schistose Forested Mountains (17h). Average annual precipitation ranges from about 16 to 40 inches which is greater than for Ecogion 17a. The climate vegetation is mapped as subalpine fir and Douglas-fir. Logging, grazing, mining, and recreation are the primary land uses.

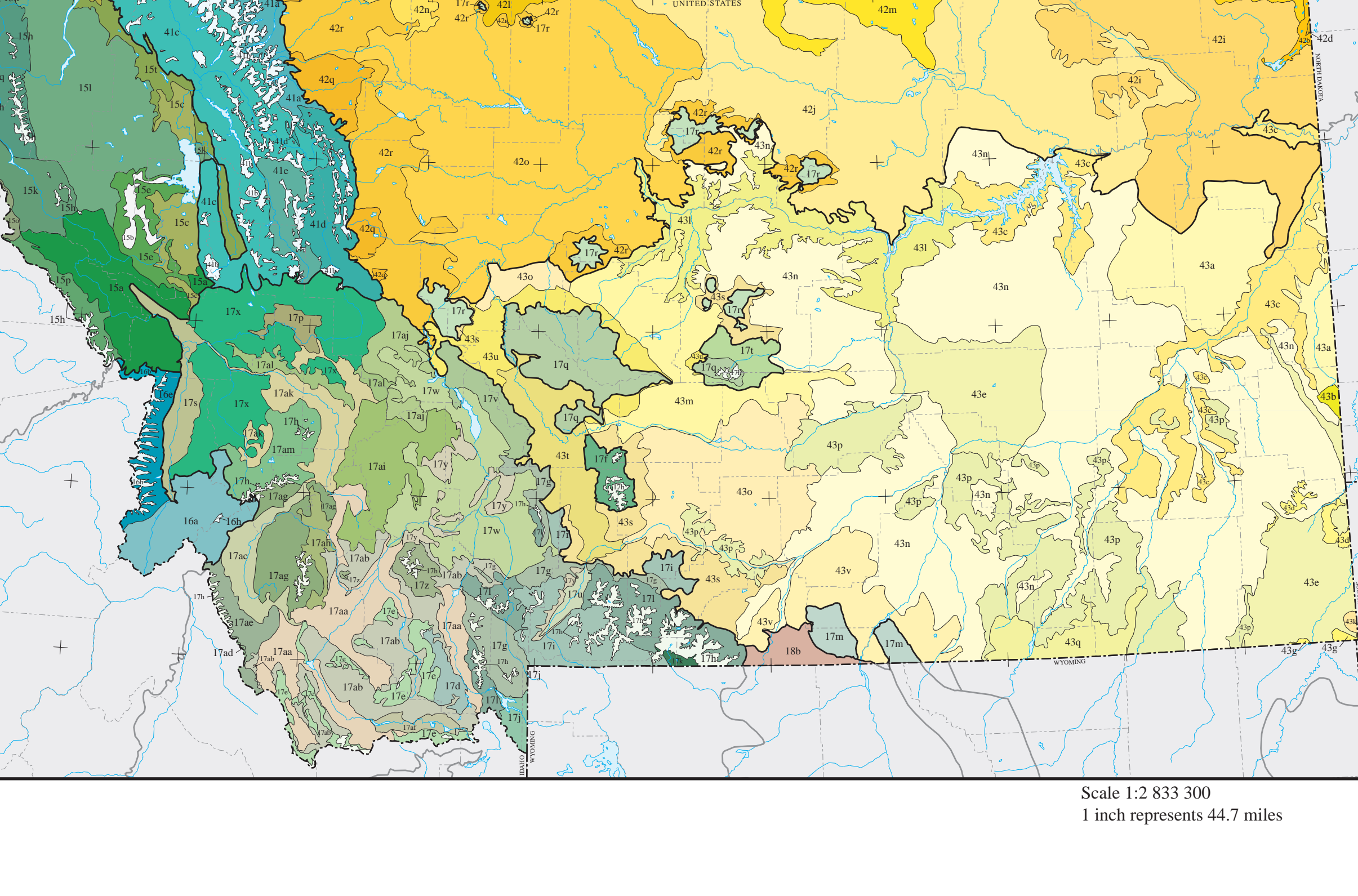
**17a** The **Paradise Valley** is an intermediate valley containing grasslands and meadows. It is mostly composed of Quaternary alluvium and Tertiary sedimentary rock; glacial drift deposits and Tertiary volcanics also occur. Potential natural vegetation is foothills prairie and is characterized by the predominance of fescues and wheatgrasses. Today, the Paradise Valley (17a) is used for rangeland, cropland, recreation, rural residential developments, and commercial activities.

The partially glaciated **Big Belt Forested Highlands** ecoregion lies to the east of the Continental Divide. The highest areas are composed of igneous intrusive rocks but, generally, Ecogion 17 is underlain by Precambrian limestone and is lithologically distinct from the nearby Seated Eastern Igneous-Cone Mountains (17i), Elkhorn Mountains-Boulder Batholith (17a), Eastern Divide Mountains (17a), Mid-Elevation Sedimentary Mountains (17g), and Big Snowy-Little Belt Carbonate Mountains (17a). Climate vegetation is mapped as subalpine fir, Douglas-fir, and ponderosa pine forests and differs from that of Ecogions 17g, 17i, 43a, and 43a. Logging, grazing, mining, and recreation are the most common land uses.

**17w** The broad, semi-arid, largely treeless **Townsend Basin** lies east of the Continental Divide and contains floodplains, stream terraces, alluvial fans, and hills. It is mostly composed of Quaternary alluvium and Tertiary valley fill unlike the more rugged Townsend-Horseshoe-London Sedimentary Hills (17y). Dry Gneissic-Schistose-Volcanic Hills (17ab), Northern Rockies (15), and Middle Rockies (17). Elevations tend to be lower and the growing season longer than in the Shield-Smith Valleys (43a) or the surrounding mountains. Ecogion 17w's climate is drier than the valleys west of the Continental Divide but wetter than the Dry Intermontane Sagebrush Valleys (17a) to the southwest. Potential natural vegetation consists of foothills prairie and grama-needlegrass-wheatgrass; it differs from the forests of Ecogions 15g and the sagebrush steppes of Ecogions 17a, 17ab, and 43c. Today, cropland, rangeland, and urban-suburban-industrial development occur.

**17ac** The cold, subnival, largely forested **Eastern Divide Mountains** ecoregion is mantled by volcanic ash and underlain by quartzite and argillaceous rocks. Slopes are more stable and there is less stream denudation after disturbance than in nearby granitic and schistic areas; related management issues are also different. Drier deposits occur but continental ice did not extend further south into the Clark Fork Valley and Mountains (15k). Cedar-hemlock-pine forest and, at higher elevations, western spruce fir forest occur. Western hemlock is more widespread and marine influence is stronger than in Ecogion 16c.

The long **Stillwater-Swan Wooded Valley** ecoregion contains numerous wetlands and ponds and its forests are often dominated by western larch, Douglas-fir, or Engelmann spruce. The valley is much lower, drier, and warmer than the adjacent Salish Mountains (15l) and Canadian Rockies (41). Thick Quaternary alluvial and glacial drift deposits are characteristic and nonirrigated drainage and hummocky areas occur. The climate vegetation is mapped as subalpine fir and Douglas-fir forests and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a) which lack the mapped ponderosa pine element. Logging, grazing, mining, and recreation are the common land uses. Ecogion 15t extends into Canada.



## 17. Middle Rockies (continued)

**17a** The **Western Beaverhead Mountains** ecoregion occupies the elevational band between the **Alpine Zone** (17h) and the lower, less rugged **Ecogion 17ab**. It is underlain by quartzite and argillite; the lithologic mosaic and related slope stability and water quality issues are unlike those of Ecogion 16c. Vegetation is affected by elevation and slope aspect. Mountain big sagebrush, mountain brush, and understory grasses grow on south-facing slopes and Douglas-fir, lodgepole pine, spruce, and subalpine fir occur on north-facing slopes. Land uses include grazing, mining, recreation, and logging.

**17ac** The glaciated, forested **Beaverhead Mountains** ecoregion is characterized by subdued topography and contains lakes, springs, hot springs, wetlands, and hills. It is physiographically distinct from the more rugged mountains to the west. The climate vegetation is mapped as subalpine fir, Douglas-fir, and ponderosa pine forests and is different from that of the Forested Beaverhead Mountains (17a) and the Pioneer-Anaconda Ranges (17a) which lack the mapped ponderosa pine element. Logging, grazing, mining, and recreation are the common land uses.

**17ab** The semi-arid to subhumid, largely forested **Eastern Divide Mountains** ecoregion is underlain by Precambrian Belt formations and is lithologically distinct from the Big Snowy-Little Belt Carbonate Mountains (17a). Scattered Eastern Igneous-Cone Mountains (17i), Elkhorn Mountains-Boulder Batholith (17a), and Southern Garnet Sedimentary Volcanic Mountains (17a). Climate vegetation is mapped as subalpine fir and Douglas-fir forests. Ecogion 17ab receives an average annual precipitation of 20 to just over 40 inches; maximums are much greater north of the Continental Divide in Ecogion 16e where the climate vegetation is also different. Streams are typically low in turbidity except during high discharge events which accompany thunderstorms and spring snow melt. Grazing, mining, recreation, and logging are the principal land uses.

**17af** The very high and cold, low-relief **Centennial Basin** ecoregion is distinctively subnival. It contains grasslands, meadows, lakes, and extensive wetlands; sand plains, dunes, and lake deposits are common. Elevations range from more than 6,500 to 7,000 feet and the growing season is only about 50 days. Its aquatic, cryic soils reflect its environment and are taxonomically distinct from those of the neighboring Dry Intermontane Sagebrush Valleys (17a) and the Pioneer-Anaconda Ranges (17a). Climate vegetation is mapped as subalpine fir and Douglas-fir forests and is distinct from that found on the opposite side of the Continental Divide in the wester Batholith (16a). Average annual precipitation ranges from 16 to about 40 inches; maximums are more than in the Barren Mountains (17e) to the west. The climate vegetation is mapped as subalpine fir and Douglas-fir forests and is distinct from that found on the opposite side of the Continental Divide in the wester Batholith (16a). Average annual precipitation ranges from 16 to about 40 inches; maximums are more than in the Barren Mountains (17e) to the west. The climate vegetation is mapped as subalpine fir and Douglas-fir forests and is distinct from that found on the opposite side of the Continental Divide in the wester Batholith (16a). Average annual precipitation ranges from 16 to about 40 inches; maximums are more than in the Barren Mountains (17e) to the west. The climate vegetation is mapped as subalpine fir and Douglas-fir forests and is distinct from that found on the opposite side of the Continental Divide in the wester Batholith (16a). Average annual precipitation ranges from 16 to about 40 inches; maximums are more than in the Barren Mountains (17e) to the west. The climate vegetation is mapped as subalpine fir and Douglas-fir forests and is distinct from that found on the opposite side of the Continental Divide in the wester Batholith (16a). Average annual precipitation ranges from 16 to about 40 inches; maximums are more than in the Barren Mountains (17e) to the west. The climate vegetation is mapped as subalpine fir and Douglas-fir forests and is distinct from that found on the opposite side of the Continental Divide in the wester Batholith (16a). Average annual precipitation ranges from 16 to about 40 inches; maximums are more than in the Barren Mountains (17e) to the west. The climate vegetation is mapped as subalpine fir and Douglas-fir forests and is distinct from that found on the opposite side of the Continental Divide in the wester Batholith (16a). Average annual precipitation ranges from 16 to about 40 inches; maximums are more than in the Barren Mountains (17e) to the west. The climate vegetation is mapped as subalpine fir and Douglas-fir forests and is distinct from that found on the opposite side of the Continental Divide in the wester Batholith (16a). Average annual precipitation ranges from 16 to about 40 inches; maximums are more than in the Barren Mountains (17e) to the west. The climate vegetation is mapped as subalpine fir and Douglas-fir forests and is distinct from that found on the opposite side of the Continental Divide in the wester Batholith (16a). Average annual precipitation ranges from 16 to about 40 inches; maximums are more than in the Barren Mountains (17e) to the west. The climate vegetation is mapped as subalpine fir and Douglas-fir forests and is distinct from that found on the opposite side of the Continental Divide in the wester Batholith (16a). Average annual precipitation ranges from 16 to about 40 inches; maximums are more than in the Barren Mountains (17e) to the west. The climate vegetation is mapped as subalpine fir and Douglas-fir forests and is distinct from that found on the opposite side of the Continental Divide in the wester Batholith (16a). Average annual precipitation ranges from 16 to about 40 inches; maximums are more than in the Barren Mountains (17e) to the west. The climate vegetation is mapped as subalpine fir and Douglas-fir forests and is distinct from that found on the opposite side of the Continental Divide in the wester Batholith (16a). Average annual precipitation ranges from 16 to about 40 inches; maximums are more than in the Barren Mountains (17e) to the west. The climate vegetation is mapped as subalpine fir and Douglas-fir forests and is distinct from that found on the opposite side of the Continental Divide in the wester Batholith (16a). Average annual precipitation ranges from 16 to about 40 inches; maximums are more than in the Barren Mountains (17e) to