

Northern Rockies Alpine Glacial Mountains

Terrain Class: Mountains - No one process responsible for construction of mountains. They can be uplifted, tectonic, subduction of plates, folding, uplift, up and down warping of the mantle, inflation of molten lower crustal (batholiths), etc. Erosion of mountain systems occurs over time. The rate of erosion is dependent on the geomorphic process, the underlying rock structure, and the climate, including both freeze thaw and the amount and intensity of precipitation and runoff. Mountains are further defined and distinguished based on morphology, including the pattern and density of drainages, depth of drainages, overall morphology of the area between the drainages, evidence of a strong imprint of a surficial process such as glaciation, and presence of visible underlying rock structure.

Mountains have simple to very complex forms that have arisen due to inherited rock structure, rock history, and are the net result of local to regional spatial scales of competing rates of upbuilding/uplift and downgrading/erosion. Mountains will have an inherited history from weathering and degradation of the underlying stack of earth materials that forms them. Vegetation, habitat, water interception, collection and transport will share a similar history in the same type of uplift and rock.

Landform Association: Alpine Glacial Mountains



Alpine Glacial Mountains are the mountaintops that were above the maximal depth level but within the area covered by the Cordilleran Continental Icesheet. The terrain was carved by alpine glaciers is

glacially scoured, with hanging valleys, large U-shaped valleys, with vertical to near-vertical slopes and bedrock common throughout.

Soils range from shallow soils to rock or exposed rock. In many locations ice has cleared out all sediment. Water routing across this Landform Association is chiefly sheetwash that is slope dependent, with common ponds and lakes in low-lying areas. Shallow glacial soils are droughty even in rainy areas. What keeps them from drying out is replenishment from precipitation. These landscapes are most vulnerable to climate change. With a reduction in precipitation the glacial soils behave like ones in arid climates.

This Landform Association has a limited spatial extent on National Forest System Lands.

Landtype Associations: Landtype Associations are formed by intersecting vegetation series or groups of vegetation series with Landform Associations.

Topography:

The following tables represent the average conditions for the Landform Association. Only lands within and adjacent to National Forest System Lands were mapped by this project. The entire EPA Level III Ecoregion is not covered by this mapping.

The percent of Landform Association (% of LfA) in bold in the table below refers to the percent of the Ecoregion represented by that Landform Association. The (% of LfA) numbers not in bold in the table below refer to the percent of each Landtype Association within the Landform Association.

Landform Association/Landtype Association	% of LfA	Mean % Slope	Minimum Elevation (m)	Maximum Elevation (m)	Mean Elevation (m)	% Northerly Aspect (226° - 134°)	% Southerly Aspect (135° - 225°)
Angulate Glacial Mountains	0.3%	68	1080	1803	1443	70%	30%
Angulate Glacial Mountains, Douglas-Fir	8.3%	86	939	1922	1443	24%	76%
Angulate Glacial Mountains, Douglas-Fir - Subalpine Fir	3.0%	61	1042	1736	1420	51%	49%
Angulate Glacial Mountains, Mountain Hemlock	3.7%	68	1182	1811	1423	97%	3%
Angulate Glacial Mountains, Pacific Silver Fir	3.7%	46	906	1324	1072	77%	23%
Angulate Glacial Mountains, Parkland	18.0%	74	1295	1924	1635	78%	22%
Angulate Glacial Mountains, Parkland - Subalpine Fir	2.4%	78	1270	1980	1613	69%	31%
Angulate Glacial Mountains, Rock	10.4%	109	1437	2351	1916	79%	21%
Angulate Glacial Mountains, Rock - Douglas-Fir	4.7%	77	1203	2107	1697	39%	61%
Angulate Glacial Mountains, Subalpine Fir	5.5%	50	1042	1725	1375	86%	14%
Angulate Glacial Mountains, Subalpine Fir - Douglas-Fir	2.3%	66	1002	1777	1426	69%	31%
Angulate Glacial Mountains, Subalpine Fir - Parkland - mix	9.9%	78	1006	2089	1622	72%	28%
Angulate Glacial Mountains, Subalpine Fir - Western Hemlock	2.3%	51	1098	1751	1435	51%	49%
Angulate Glacial Mountains, Western Hemlock	23.0%	67	662	1760	1197	68%	32%
Angulate Glacial Mountains, Western Hemlock - Subalpine Fir	2.7%	69	1024	1658	1376	94%	6%

Climate:

Landtype Association	Mean Annual Precipitation (mm)	Mean Annual Temperature °C	AET/PET Ratio July, Aug, Sept
Alpine Glacial Mountains	987	5	0.41
Alpine Glacial Mountains, Douglas-Fir	746	6	0.39
Alpine Glacial Mountains, Douglas-Fir - Subalpine Fir	1081	5	0.48
Alpine Glacial Mountains, Douglas-Fir - Western Hemlock	927	5	0.43
Alpine Glacial Mountains, Parkland	1085	3	0.30
Alpine Glacial Mountains, Subalpine Fir	1143	4	0.43
Alpine Glacial Mountains, Subalpine Fir - Douglas-Fir	640	4	0.42
Alpine Glacial Mountains, Subalpine Fir - Western Hemlock	1284	3	0.47
Alpine Glacial Mountains, Western Hemlock	1092	5	0.44
Alpine Glacial Mountains, Western Hemlock - Douglas-Fir	1132	5	0.49
Alpine Glacial Mountains, Western Hemlock - Subalpine Fir	1234	4	0.42

The ratio of Actual Evapotranspiration to Potential Evapotranspiration (AET/PET) is used as a broad-scale indicator of potential drought stress. We obtained modeled actual and potential evapotranspiration datasets from the Numerical Terradynamic Simulation Group at the University of Montana (<http://www.ntsug.umt.edu/project/mod16>) for a 30 year climate average. AET/PET ratio in the table above is based on a scale of zero to one. A value closer to 1 means the vegetation is transpiring close to its potential. A value farther from 1 means that the Actual Evapotranspiration is below potential based on this climatic zone (Ringo, et. al. 2016 in draft).