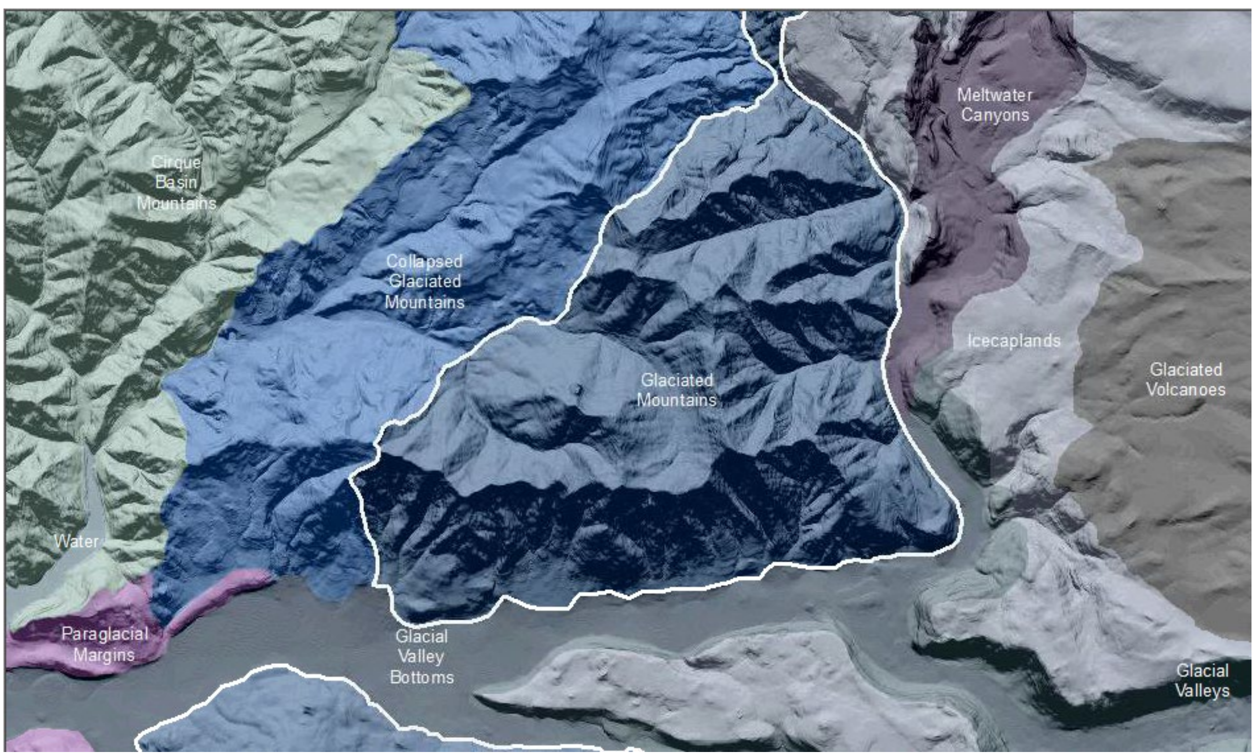
North Cascades Glaciated Mountains

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: Glaciated Mountains



Glaciated Mountains are areas shaped by past glaciers and are somewhat masked more recent geomorphic processes. The terrain is glacially scoured, with hanging valleys, cirque basins, icefields, and large U-shaped valleys, with vertical to near-vertical slopes in bedrock common throughout.. Since the cessation of glaciation in these areas, however, surface, mass wasting (shallow rapid or deepseated earthflow, rockfall, etc.) or fluvial erosion processes have dominated and masked much of the glacial signature of the mid to lower slopes.

Soils in Glaciated Mountains are highly variable depending on the scour and deposition and subsequent fluvial and mass wasting erosion.

This Landform Association has a common 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°)
Glaciated Mountains	**6.0%**	**49**	**824**	**1459**	**1132**	**65%**	**35%**
Glaciated Mountains, Douglas-Fir	44.9%	52	758	1405	1073	64%	36%
Glaciated Mountains, Douglas-Fir - Ponderosa Pine	0.1%	63	868	1415	1101	29%	71%
Glaciated Mountains, Grand Fir	24.7%	43	857	1684	1250	68%	32%
Glaciated Mountains, Grand Fir - Douglas-Fir	0.4%	53	1168	1668	1434	57%	43%
Glaciated Mountains, Grand Fir - Pacific Silver Fir	0.1%	39	1288	1699	1494	50%	50%
Glaciated Mountains, Grand Fir - Western Hemlock	0.6%	62	731	1690	1134	92%	8%
Glaciated Mountains, Pacific Silver Fir - Grand Fir	0.1%	47	1055	1547	1302	68%	32%
Glaciated Mountains, Parkland	1.2%	51	1794	2173	1990	88%	12%
Glaciated Mountains, Ponderosa Pine	5.4%	51	464	1091	745	52%	48%
Glaciated Mountains, Ponderosa Pine - Shrub-Steppe	0.2%	58	328	1087	694	35%	65%
Glaciated Mountains, Shrub-Steppe	0.1%	48	268	588	423	69%	31%
Glaciated Mountains, Shrub-Steppe - Developed	0.1%	40	289	565	388	75%	25%
Glaciated Mountains, Shrub-Steppe - Ponderosa Pine	0.3%	64	374	1089	697	27%	73%
Glaciated Mountains, Subalpine Fir	20.7%	38	1257	1878	1616	84%	16%
Glaciated Mountains, Subalpine Fir - Grand Fir	0.2%	44	1350	1905	1652	63%	37%
Glaciated Mountains, Western Hemlock	0.7%	45	1061	1625	1327	99%	1%
Glaciated Mountains, Western Hemlock - Grand Fir	0.2%	52	947	1548	1195	99%	1%

Climate:

Landtype Assocation	Mean Annual Precipitation (mm)	Mean Annual Temperature °C	AET/PET Ratio July, Aug, Sept
Glaciated Mountains	**774**	**6**	**0.31**
Glaciated Mountains, Douglas-Fir	768	7	0.33
Glaciated Mountains, Douglas-Fir - Ponderosa Pine	754	7	0.39
Glaciated Mountains, Grand Fir	871	6	0.39
Glaciated Mountains, Grand Fir - Douglas-Fir	1017	5	0.38
Glaciated Mountains, Grand Fir - Pacific Silver Fir	993	5	0.34
Glaciated Mountains, Grand Fir - Western Hemlock	759	6	0.35
Glaciated Mountains, Pacific Silver Fir - Grand Fir	991	5	0.35
Glaciated Mountains, Parkland	1250	2	0.27
Glaciated Mountains, Ponderosa Pine	489	8	0.21
Glaciated Mountains, Ponderosa Pine - Shrub-Steppe	393	9	0.16
Glaciated Mountains, Shrub-Steppe	376	10	0.21
Glaciated Mountains, Shrub-Steppe - Developed	426	10	0.20
Glaciated Mountains, Shrub-Steppe - Ponderosa Pine	439	9	0.19
Glaciated Mountains, Subalpine Fir	1039	4	0.33
Glaciated Mountains, Subalpine Fir - Grand Fir	1083	4	0.36
Glaciated Mountains, Western Hemlock	969	5	0.42
Glaciated Mountains, Western Hemlock - Grand Fir	913	6	0.43

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.ntsg.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 1means that the Actual Evapotranspiration is below potential based on this climatic zone (Ringo, et. al. 2016 in draft).