**North Cascades Angulate 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: Angulate Glacial Mountains**



**Angulate Glacial Mountains** are areas shaped by present and past glaciers with bedrock structure and fracture patterns regulating erosional processes. The terrain is glacially scoured with cirque basins and scoured valleys apparent in the upper landscape positions. In many locations ice has scoured mountainsides and left recessional moraines in lower valley positions. Angulate Glacial Mountains have a strong prominent stream system of drainages at other than right angles. Orientations of the valleys and tributaries have an angulate pattern identified by sharp angles that follow underlying bedrock structure (bedding, foliation, fractures and joints). These drainage patterns follow planes of weakness in the rock. In angulate areas, supply of rock to stream channels is greater than other areas. Depending on the competence of the rock, as it erodes, it cleaves along fracture planes as a result of physical weathering processes. Water routing along drainages follows dominantly straight reaches which may lead to flashy discharges during storms.

Soils range from shallow soils to rock or exposed rock to deeper gravelly soils on lower slope positions and in valley bottoms. Runoff from this Landform Association is rapid due to shallow soils and strong bedrock features. Water will be stored on lower slope glacial depositions and in valley bottom sediments.

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.



**Climate:**



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).