

## North Cascades Collapsed 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: Collapsed Glaciated Mountains



**Collapsed Glaciated Mountains** are areas shaped by past glaciers and are masked by more recent geomorphic processes. Along peaks and ridges there are indicators of past glacial action. The terrain is glacially scoured, with cirque basins. Since the cessation of glaciation in these areas, however, other

geomorphic processes have masked much of the glacial signature of the mid to lower slopes. Collapsed Glaciated Mountains are indicative of large-area landslides/mass wasting features that have entrained large extents of mountainsides. Landslide areas can cover many miles and may be from the pre-historic past or a recent and current development. Collapsed mountains consist of active and inactive zones. Many of these landslides are recognized and the more discreet, well-formed slide areas have been identified in geological maps.

Water routing through this landscape may be irregular due to recent and on-going slope failure with its accompanying surface and subsurface drainage diversions and impoundments. These areas are considered as sources of cool water to streams. Sediment recruitment by streams is significant along the margins of landslides. Sediment and water storage is locally significant. Because of irregular slopes and varied surface water availability, this Landform Association has a diverse upland habitat. The slide areas can hold deep soils, retain moisture and provide micro-climates that offer a variety of excellent resources for numerous floral and faunal communities.

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°)
<b>Collapsed Glaciated Mountains</b>	<b>0.2%</b>	<b>40</b>	<b>871</b>	<b>1441</b>	<b>1118</b>	<b>72%</b>	<b>28%</b>
Collapsed Glaciated Mountains, Douglas-Fir	39.9%	41	767	1283	985	71%	29%
Collapsed Glaciated Mountains, Grand Fir	52.7%	31	771	1636	1182	84%	16%
Collapsed Glaciated Mountains, Ponderosa Pine	3.7%	48	683	1226	877	43%	57%
Collapsed Glaciated Mountains, Subalpine Fir	3.7%	39	1367	1780	1563	92%	8%

## Climate:

Landtype Association	Mean Annual Precipitation (mm)	Mean Annual Temperature °C	AET/PET Ratio July, Aug, Sept
<b>Collapsed Glaciated Mountains</b>	<b>793</b>	<b>6</b>	<b>0.31</b>
Collapsed Glaciated Mountains, Douglas-Fir	747	7	0.33
Collapsed Glaciated Mountains, Grand Fir	827	6	0.33
Collapsed Glaciated Mountains, Ponderosa Pine	686	7	0.27
Collapsed Glaciated Mountains, Subalpine Fir	956	4	0.26

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).