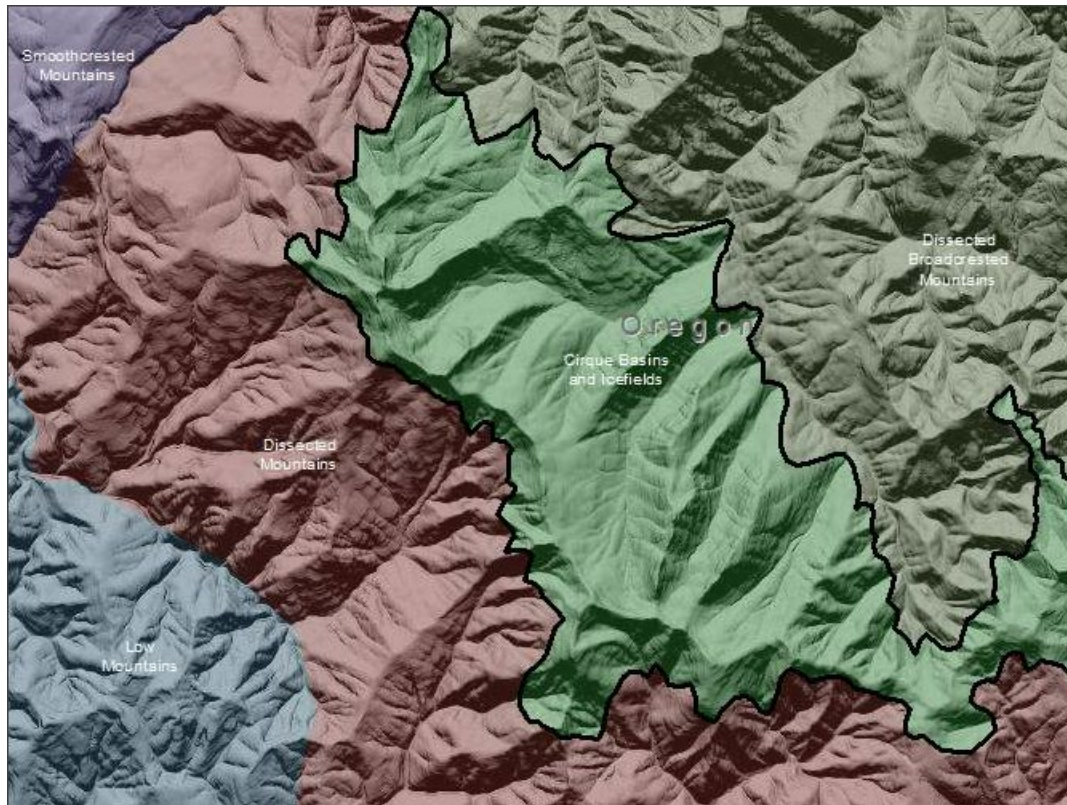


East Cascades Cirque Basins and Icefields

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: Cirque Basins and Icefields



Cirque Basins and Icefields are mountain areas that hosted extensive icefields resulting in interconnected valley glaciers which scoured high elevation landforms. Alpine glaciers moved down valley from these icefields and resulted in cirque features which are semi-circular bowl like excavation in a hanging valley or the head of a valley. An aerial view of a cirque shows a horseshoe like shape with the

open end of the shoe pointing away from the steep headwall and surrounding side slopes. This open end of the shoe is a raised threshold often supplemented by a recessional moraine. The closed depression of the cirque frequently hosts a meadow, lake or tarn. In the Northern Hemisphere cirque basins usually have a north to northeastern aspect.

The Icefield landform is the result of freeze thaw cycles and mass wasting of the long gone ice sheet. The terrain is usually worn down to bedrock. These areas host zero and first order drainages. The mass wasting and freeze thaw cycles of nivation features which include erosion of the ground beneath and at the sides of a snow banks, mainly as a result of alternate freezing and thawing which left small dimples and a bowl-like trend of the shoulder to footslope transitions. Rubble ridges from the receding glacier toe and till benches remain. Talus is present; there is little if any vegetation or soil. This landform has a flashy runoff regime and droughty soils which are reliant on continual moisture.

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°)
Cirque Basins and Icefields	0.6%	26	1797	2345	2071	74%	26%
Cirque Basins and Icefields, Grand Fir-White Fir	98.2%	31	1647	2438	2036	84%	16%
Cirque Basins and Icefields, Parkland	1.1%	15	2274	2395	2344	82%	18%
Cirque Basins and Icefields, Western Juniper - Jeffrey Pine	0.7%	20	1770	2015	1906	38%	62%

Climate:

Landtype Association	Mean Annual Precipitation (mm)	Mean Annual Temperature °C	AET/PET Ratio July, Aug, Sept
Cirque Basins and Icefields	815	5	0.14
Cirque Basins and Icefields, Grand Fir-White Fir	779	5	0.15
Cirque Basins and Icefields, Parkland	1173	4	0.14
Cirque Basins and Icefields, Western Juniper - Jeffrey Pine	565	6	0.10

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