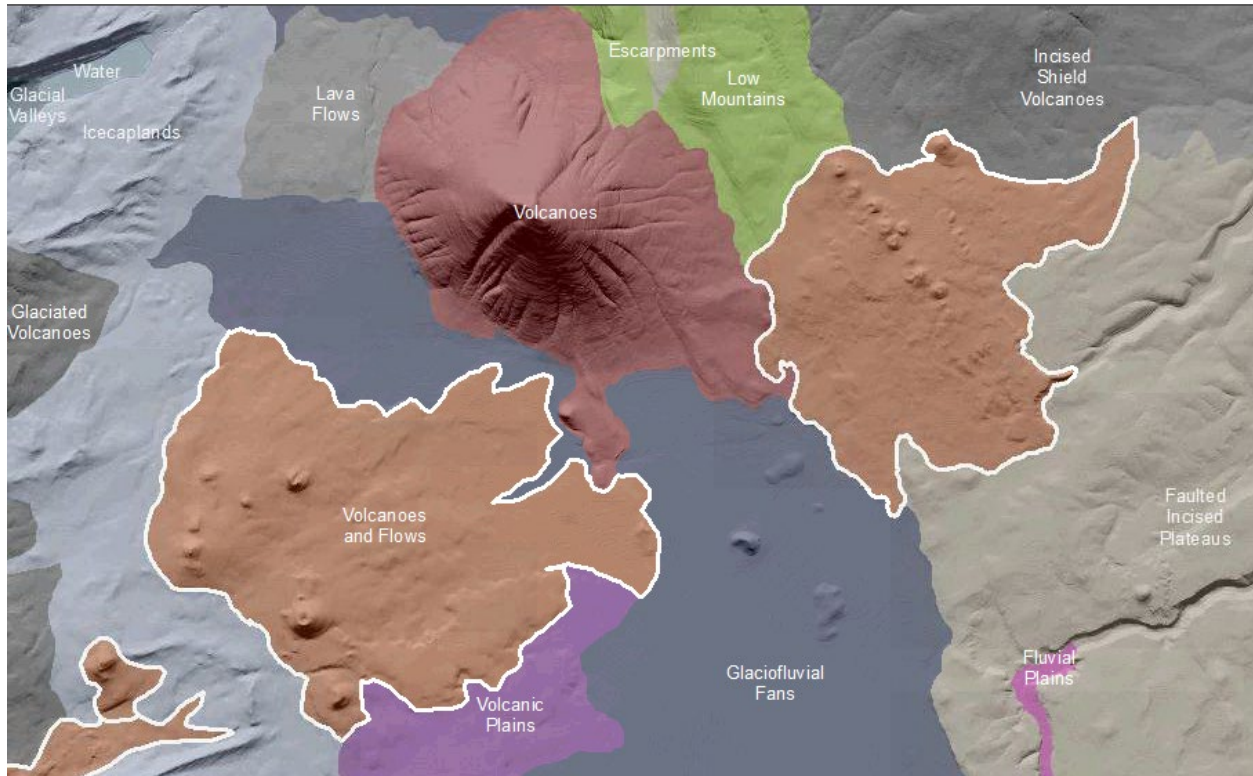


Cascades Volcanoes and Flows

Terrain Class - Volcanoes: **Volcanoes** are edifices, typically conical in shape, with a central summit vent that erupts effusive magmatic material as ash, cinder, blocks and or lava that accumulates and build up the landform.

Landform Association –Volcanoes and Flows:



Volcanoes and Flows are volcanoes and their associated lava flows. The volcanoes are typically cinder cones which are conical in shape with steep sides formed by pyroclastic flows and air fall blocks. The cone is often breached by asymmetric basalt flows less commonly by flows of andesite or obsidian. Cones can be constructed by the full range of volcanic materials from basalt to andesite to dacite. Volcano summits are typically rounded off and side slopes may have gullies indicating soil profile development and the consequent decrease in transmissivity. Stream incision styles range from a sinuous, single threaded mainstem channel with limited tributaries, to dense and equally distributed networks of branching V-shaped channels.

Differential erosion along the margins of volcanoes and their associated lava flows yields mesa or low-relief plateau types of landforms. The volcanic rock shields this landscape from erosional land lowering as fast as adjacent landscapes.

Soils on this landscape are mature and have developed horizons that impede transmission of soil water, thence leading to the development of drainage networks. Soil taxa range from Mollisols with duripans

(in dry climates) to Andisols (in humid climates). Lava flows can be recent exposures of raw lava or tree covered depending on environment.

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 Associations.

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°)
Volcanoes and Flows	0.6%	14	1361	1645	1485	82%	18%
Volcanoes and Flows, Douglas-Fir	3.1%	9	1040	1316	1170	86%	14%
Volcanoes and Flows, Douglas-Fir - Grand Fir-White Fir	0.5%	4	1006	1045	1027	86%	14%
Volcanoes and Flows, Grand Fir-White Fir	9.8%	11	1307	1501	1387	82%	18%
Volcanoes and Flows, Grand Fir-White Fir - Mountain Hemlock	1.0%	11	834	1050	970	89%	11%
Volcanoes and Flows, Grand Fir-White Fir - Pacific Silver Fir	0.6%	8	1154	1260	1199	98%	2%
Volcanoes and Flows, Grand Fir-White Fir - Rock	0.9%	18	1931	2137	2007	66%	34%
Volcanoes and Flows, Grasslands / Meadows - Parkland	0.6%	29	1401	1663	1479	93%	7%
Volcanoes and Flows, Mountain Hemlock	47.0%	19	1602	2009	1782	81%	19%
Volcanoes and Flows, Mountain Hemlock - Grand Fir-White Fir	0.5%	8	919	1036	972	82%	18%
Volcanoes and Flows, Pacific Silver Fir	8.4%	9	960	1253	1076	78%	22%
Volcanoes and Flows, Pacific Silver Fir - Douglas-Fir	0.7%	6	954	1094	1008	70%	30%
Volcanoes and Flows, Pacific Silver Fir - Mountain Hemlock	1.2%	20	1096	1358	1192	72%	28%
Volcanoes and Flows, Ponderosa Pine - Mountain Hemlock	0.5%	14	1877	2061	1934	78%	22%
Volcanoes and Flows, Rock	24.5%	12	1469	2029	1741	86%	14%
Volcanoes and Flows, Rock - Grand Fir-White Fir	0.0%	34	1954	2069	2021	100%	0%
Volcanoes and Flows, Subalpine Fir - Grand Fir-White Fir	0.7%	17	1370	1509	1429	65%	35%

Climate:

Landform Association/Landtype Association	Mean Annual Precipitation (mm)	Mean Annual Temperature °C	AET/PET Ratio July, Aug, Sept
Volcanoes and Flows	1613	6	0.29
Volcanoes and Flows, Douglas-Fir	2171	7	0.30
Volcanoes and Flows, Douglas-Fir - Grand Fir-White Fir	1973	7	0.37
Volcanoes and Flows, Grand Fir-White Fir	1501	6	0.32
Volcanoes and Flows, Grand Fir-White Fir - Mountain Hemlock	2177	8	0.34
Volcanoes and Flows, Grand Fir-White Fir - Pacific Silver Fir	2216	7	0.33
Volcanoes and Flows, Grand Fir-White Fir - Rock	758	5	0.14
Volcanoes and Flows, Grasslands / Meadows - Parkland	2062	5	0.28
Volcanoes and Flows, Mountain Hemlock	1443	5	0.24
Volcanoes and Flows, Mountain Hemlock - Grand Fir-White Fir	2085	7	0.39
Volcanoes and Flows, Pacific Silver Fir	2007	7	0.42
Volcanoes and Flows, Pacific Silver Fir - Douglas-Fir	1984	7	0.45
Volcanoes and Flows, Pacific Silver Fir - Mountain Hemlock	1822	6	0.40
Volcanoes and Flows, Ponderosa Pine - Mountain Hemlock	725	5	0.20
Volcanoes and Flows, Rock	1823	5	0.14
Volcanoes and Flows, Rock - Grand Fir-White Fir	740	4	0.25
Volcanoes and Flows, Subalpine Fir - Grand Fir-White Fir	876	6	0.35

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).