

Eastern Cascades Faulted Stratal Low 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: Faulted Stratal Low Mountains



Faulted Stratal Low Mountains are mountains with morphologies which reflect both the underlying rock structure and faulting which exposes the bedrock stratigraphy. Low mountains refer to the fact that the land surface is relatively lower in relief than neighboring area or other similar landform group.

The Faulted Stratal Low Mountains are cut by parallel and sub-parallel faults. Typically these are normal faults with small amounts of lateral displacement. The faulting has created positive (uplands) and negative (drainages) patterns with repeating topographic elements. These Faulted Stratal Low Mountains are characterized by numerous parallel faults over a broad area up to several kilometers in extent. The stratigraphy is a consequence of degradation or denudation of an upland area by hillslope and fluvial processes. Stratigraphy is present and visible, as well as lineations such as unusually straight drainage reaches, indicative of faults in bedrock. Erosional exhumation reveals obvious layering of the underlying rock structure, including dip and anti-dip slopes. Synonymous terms used for these features are *cuesta* and *cuestaform*. Anti-dip slopes are benchy, rocky and relatively steep slopes. Following the colluvium downhill on an anti-dip slope you find a repeating pattern of bedrock outcrops with intervening areas of accumulated sediment. Habitat and vegetation distribution corresponds to this pattern. Dip slopes, on the other hand, are broad plains with shallow slopes underlain by relatively deep soils over rock. The dip slope is an almost featureless terrain with few features to orient by. Potential vegetation and habitat are largely invariable across these sloping plains. In this map unit, drainage patterns are more influenced by the faults or fault zones, leading to rectilinear or angulate drainage patterns and consequently diverse routing of surface water through this type of landscape.

The drainages in the Faulted Stratal Low Mountains are captured and redirected by displacement of the faults blocks. The rearrangement and redirection of precipitation runoff by the fault blocks gives a zig-zag appearance to catchment channels. The faults are zones of weakness and set up water flows along these zones. Sediment is impounded by fault scarps, in closed depressions, and at locations with lower slope angle. In these pockets of sediment accumulation there is increased soil development.

There are bedrock slopes that have appeared because of tectonic activity not erosion. These slopes have little if any soil mantle developed. The tectonic created slopes are steeper than the angle of repose of slopes created by erosion. The slopes in this landform are a mix of steep (tectonic) and not so steep (erosion processes) slope. There are valleys with flows that have been diverted or captured flow by other drainages. These captured or diverted drainages are essentially “hanging valleys”. These hanging valleys have sheet flow at a reduced rate and sediment transport is reduced.

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° -	% Southerly Aspect (135° -
Faulted Stratal Low Mountains, Grand Fir-White Fir	61.6%	24	1479	2003	1746	88%	12%
Faulted Stratal Low Mountains, Ponderosa Pine	12.7%	24	1545	1817	1661	67%	33%
Faulted Stratal Low Mountains, Ponderosa Pine - Grand Fir-White Fir	9.2%	19	1549	1753	1630	84%	16%
Faulted Stratal Low Mountains, Ponderosa Pine - Grasslands / Meadows	0.8%	19	1663	1836	1729	63%	37%
Faulted Stratal Low Mountains, Ponderosa Pine - Riparian Shrub / Hardwood Forest - mix	0.4%	7	1478	1541	1494	72%	28%
Faulted Stratal Low Mountains, Ponderosa Pine - Western Juniper	0.7%	33	1581	1930	1762	32%	68%
Faulted Stratal Low Mountains, Shrub-Steppe - Riparian Shrub / Hardwood Forest	0.6%	4	1521	1567	1534	76%	24%
Faulted Stratal Low Mountains, Western Juniper	11.4%	10	1504	1700	1563	80%	20%
Faulted Stratal Low Mountains, Western Juniper - Ponderosa Pine	0.8%	22	1561	1832	1703	30%	70%
Faulted Stratal Low Mountains, Western Juniper - Shrub-Steppe	1.7%	13	1518	1677	1576	80%	20%

Climate:

Landform Association/Landtype Association	Mean Annual Precipitation (mm)	Mean Annual Temperature °C	AET/PET Ratio July, Aug, Sept
Faulted Stratal Low Mountains	430	7	0.12
Faulted Stratal Low Mountains, Grand Fir-White Fir	454	7	0.14
Faulted Stratal Low Mountains, Ponderosa Pine	418	7	0.14
Faulted Stratal Low Mountains, Ponderosa Pine - Grand Fir-White Fir	469	7	0.11
Faulted Stratal Low Mountains, Ponderosa Pine - Grasslands / Meadows	483	7	0.14
Faulted Stratal Low Mountains, Ponderosa Pine - Riparian Shrub / Hardwood Forest - mix	333	7	0.08
Faulted Stratal Low Mountains, Ponderosa Pine - Western Juniper	436	7	0.14
Faulted Stratal Low Mountains, Shrub-Steppe - Riparian Shrub / Hardwood Forest	474	7	0.07
Faulted Stratal Low Mountains, Western Juniper	437	7	0.06
Faulted Stratal Low Mountains, Western Juniper - Ponderosa Pine	453	7	0.10
Faulted Stratal Low Mountains, Western Juniper - Shrub-Steppe	386	7	0.08

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).