**PLAINS LANDFORM ASSOCIATIONS**

**Fluvial Processes**

**Fluvial Plains** are an extensive, lowland area that ranges from level to gently sloping or undulating. Fluvial Plains are produced by migrating channels and floodplains of non-glacial streams. Locally, older deposits identified as terraces are included in this map unit. The bounds of fluvial plains conform to the surrounding uplands as they confine the streams.

Fluvial Plains have relict and abandoned stream landforms. Relict landforms in this map unit are those formed during a prior hydrologic regime of the glacial or pluvial epochs. As such, they consist of generally higher energy stream deposits – sandy to boulder gravel beds upwards of several meters in thickness. Relict landforms are generally present at the margins of fluvial plains where confined in mountain valleys. Channel, bar and terrace landforms are muted in morphology due to weathering and surface degradation over the thousands of year since their formation. Soil profiles are typically deep and high differentiated in horizon properties from the parent material. Soil taxa vary according to age and climatic regime, though Alfisols and Mollisols are common.

Abandoned stream landforms are generally younger in age and formed under a hydrologic regime similar to that of the present stream. These generally consist of variable energy (except in modern glacial watershed) stream deposits, including lower energy silt to sandy beds and flashy, high-energy debris flow deposits. Thickness of deposits is consequently variable between as well as within catchments. These are relatively young landforms and deposits, located adjacent to the modern stream channel, and soil profile development is immature – Entisols, Inceptisols and Mollisols are typical.

**Incised Fluvial Plains** are fluvial plains that have undergone deep incision by streams crossing the map unit. Uplift and or regional base level change leads t stream down cutting within fluvial plaiins. The streams have developed deep V-shape to box-shape channels, some of which classify as small canuns. Remnants of the original surface are low to moderately sloping and weathered to deep soils. Local erosion down to bedrock leaves thin, immature soils. This unit is transitional to Piedmonts, shich are more deeply incised.

**Megaflood Scour Plains** are extensive lowlands that formed by scour and erosion during glacial outburst floods (Missoula Floods) along the Columbia River system. The scoured plain consists largely of exhumed tabular basalt flow units within the Columbia Flood Basalts bedrock; the exhumation occurred along flow rock units coincident with elevation of the flood waters. Bare basalt rock is common with surrounding sheets of flood-derived gravelly sediments typically a few meters thick at most. Soil profile development is limited to these sheet sediments and are typically classified as Andisols and Mollisols.

**Piedmonts** are incised and eroded low sloping aprons at the front of a mountain, typically with underlying bedrock. Where incised by channels, rugged steep sided slopes and non-linear concave slopes feed into gully bottoms. Piedmonts can be so dissected by fluvial erosion so that isolated hills are formed. Piedmonts ridge-tops are the last vestiges of a once broad plain, typically formed by coalescing fluvial fans. These ridge-tops form accordant ridges which together define a planear surface some several meters below the elevation of the original piedmont surface (e.g. fluvial plain). Weathering and other processes have removed material at a relatively uniform rate to form relatively symmetrical ridge slopes. In the Blue Mountains the piedmont is a degradational transition from mountain to river bottom, not constructional.

Piedmont soils vary with geomorphic position, from relatively deep residual profiles on ridgetops to toeslope bottoms where soil profiles are deep and rich with organic matter, with shallow soils on the backslopes. Ridgetop soils have mima mounds and pattern ground. This map unit typically supports rangelands although those at higher elevations support mixed grassland and forest.

**Glacial Processes**

***Glacial***

**Glaciofluvial Plains** are an extensive, lowland area that ranges from level to gently sloping or undulating. Glaciofluvial Plains are produced by shifting sedimentation by glacial outwash or glacial meltwater streams. Parent streams were typically multi-threaded and carried heavy sediment loads. As a consequence, thick, sandy to gravelly deposits are the norm. It may be difficult to distinguish the two origins but fluvial processes are commonly more recent and overly or are inset to glacially derived sediments in the plain. The modern hydrologic and sediment regime supports a meandering stream course as a general rule. Migration of meanders leads to undercutting of bedrock valley walls or moraines and set up reaches with considerable bedrock or glacial gravel recruitment. The bounds of fluvial plains deposits identifiable as terraces are included in this map unit. The plains originate within glacial ice-contact areas of mountain valleys or adjacent lowlands; typically within the reach of recessional terminal moraines. Soil profiles are deep and well developed on older deposits and are classified as Andisols and Alfisols. Younger deposits and the soils developed thereon are locally organic rich and are classified as Fluvents, Inceptisols and Mollisols.

**Glaciovolcanic Plains** are plains derived from co-deposition of meltwater transported sediments and volcanic effusive deposits with rare flow rock. These plains front moraines of glacial valleys or margins of icecaplands. As such, they are similar to Outwash Plains. Glaciovolcanic Plains formed from braided water courses that deposited sediments in fans where unconfined and in long terraces where confined to valleys. Deposits are typically well sorted, ashy sands to ashy cobbly gravels. These deposits are typically many meters thick and yield deep Andisols. These deposits produce significant shallow aquifers.

**Outwash Plains** are broad flats lying downstream of and connected to glacial valleys and moraines by their parent streams which conveyed meltwater and entrained sediments. Upstream glacial action past or present continues to influence processes in this map unit. Outwash Plains were formed by braided water courses distributing sediments in fan-shaped depositions. Where unconfined by mountains, and in long terraces where confined to valleys. Deposits tend to be sandy to cobbly gravels which are well sorted. These deposits are typically many meters thick and yield deep, productive soils. These deposits produce significant shallow aquifers.

**Lacustrine Processes**

**Lacustrine Plains**

Lacustrine Plains are exposed lakebeds that are the relicts of (pluvial) Pleistocene lakes that were once ubiquitous in the Great Basin and the Northwest. This landform excludes relict lakebeds pluvially altered or incised by subsequent water flow and lakebeds that are the results of recent anthropogenic activities. The low angle or zero slope lakebed is the result of accumulated sediments in the lake bottoms. The collections of silt and clays provide productive soils when moisture is available. These deposits are sources of eolian dust and local sand dune fields. Soils on these deposits are typically Mollisols to Aridisols (especially along the margins of extant lakes where salts accumulate within the profile. Playas are at a smaller scale than the Lacustrine Plains and are in arid to semi-arid regions. Playas have oblong to circular shape. Lacustrine areas may or may not be connected to another watershed.

**Mass Wasting Processes**

**Sulcate Piedmonts** are advance weathering and degradation phase of Piedmonts. They are characterized by surfaces with longitudinal furrows with crests that are smoothly convex and swales that are v-shaped. Drainage sideslopes are planar convex. Sulcate Piedmonts have repeating landform patterns of accordant ridges and swales. Unlike Piedmonts, the accordant ridges of this map unit are of unknown depth of erosion beneath the presumed original surface of the parent surface.

Soils on ridgetops tend to be rich in patterned ground, do-called biscuit scabland or mima mound micro-topography. The pattern ground or scabs tend to elongate on the backslopes forming stony stripes that virtually feed accumulation piles of stones at the toeslope position. Soil taxa vary from Ultisols in the west to Mollisols in the east.

**Tectonic Processes**

**Faulted Glaciovolcanic Plains** are Glaciovolcanic Plains that have been displaced by post-glacial fault activity. Glaciovolcanic Plainsare plains derived from co-deposition of meltwater transported sediments and volcanic effusive deposits with rare flow rock. These plains front moraines of glacial valleys or margins of icecaplands. As such, they are similar to Outwash Plains. Glaciovolcanic Plains formed from braided water courses that deposited sediments in fans where unconfined and in long terraces where confined to valleys. Deposits are typically well sorted, ashy sands to ashy cobbly gravels. These deposits are typically many meters thick and yield deep Andisols. These deposits produce significant shallow aquifers.

The interruption of normal surface and subsurface water flow in the Faulted Glaciovolcanic Plains makes for a variably wet environment with wetlands common. Streams are captured and redirected by displacement of the fault blocks, giving the stream courses a zig-zag pattern. Stream sediments are impounded by fault scarps and in closed depressions. Soils are thicker and or have strong redoximorphic features in these locally deep and wet deposits. Soils are typically classified as Andisols.

**Faulted Incised Plains** are broad lowland areas with diverse, angulate drainages and hilly topography. Fluvial processes are responsible for the deposition of the parent material forming the plain. Faulted Incised Plains are disrupted by fault movement. Faults provided the path for magma to leak or vent. Potentially active, these areas are cut by faults or fault scarps. Streams are entrenched in the surrounding landform and not necessarily connected to a floodplain. The landform may have a low surface roughness and likely lacks the "V-like" plan view common with dissected landforms

Faulting displacement of the plain surface has created positive (uplands) and negative (drainages) patterns with repeating topographic elements. These plains are characterized by numerous joints and faults over a broad area up to several kilometers in extent. Many of these faults show movement during the recent geologic past.

Faulted Incised Plains have a high drainage density with many ephemeral channels that follow the pattern of faults and deformed plains. Streams are captured and redirected by displacement of the fault blocks. This gives a zig-zag appearance to catchment channels. The faults are lined by crushed sediments that are more easily eroded and set up water flows along these zones. Deeper drainages develop than would be expected because of the captured discharge. Sediment is sometimes impounded by fault scarps, in closed depressions, and at locations with lower slope angle. In these pockets of sediment accumulation, as well as along joints and faults, soils develop faster and deeper.

**Faulted Outwash Plains** are plains downstream of and connected to glacial valleys and moraines that have been faulted. Upstream past or present glacial action continues to influence processes in this domain. Previously channelized flow was the source providing the sediments that form the now very low relief plains. This landform fronts a much larger valley and is commonly the site of urbanization or farming. Productive thick soils and topography that focused travel and migration to and past these landforms contributed to human settlement. In active outwash landforms channelized and braided water courses are found moving over the fan shaped deposits. Faulted Outwash Plains are disrupted by fault displacement of the surface. Potentially active, these areas are cut by faults or fault scarps. Streams in this area are rerouted or blocked by the fault scarps.

**Volcanic Processes**

**Pumiced Plains** are smooth featureless plains surrounding the Crater Lake edifice that consists solely of pumiceous deposits derived from the eruption and collapse of Mt. Mazama during the middle Holocene. These deposits are hundreds of meters thick. Locally known as the “Pumice Desert”, these plains are barren save for localized tree islands. Soils are Andisols (Vitricryands) of about 2 meters in depth

**Volcanofluvial Plains** are plains largely derived from the lahars and other volcanically entrained sediments issued from the slopes of the Cascade stratovolcanoes, including the collapsed lahars of the Mt. St. Helens eruption of 1980. The energetic deposition of these sediments is evident by their valley wall-to wall and mountain-to-lowland extent. The sediments are typically uniformly silt to coarse sand in texture, where dominantly fluvial in deposition (such as Mt. St. Helens deposits in Toutle River) whereas, the sediments are more dimicton-like (random gran size) in areas dominated by debris flow. Soils are typically deep and class as Andisols.

**Volcanic Plains** are broad expanses of volcanic lava flows issued from extant or now-absent volcanoes or vents. They are characterized by undulating to irregular hill-flat flow topography typical of basalt. Locally vents and small cinder cones, as well as spatter mounds and lava flow pressure ridges form topographic highs on these plains. Tephra deposits and local stream deposits provide some weatherable materials on top of the volcanic flow rock. Soils classify as Andisols.

 Some mapped areas include faulted ground, fault scarps present normal displacement of the surface. Streams are incised through the scarps or form rapids or waterfalls.