



TOP: Technician creating a landform map in the field.

Parks where I&M Data is collected:

Ebey's Landing National Historic Reserve
Mount Rainier National Park
North Cascades National Park Complex
Olympic National Park
San Juan Island National Historical Park

Contact: Stephen_Dorsch@nps.gov

Surficial Geology - Landform Mapping

Understanding surficial processes and materials in mountain parks is critical for resource managers. Surficial processes such as landslides, floods, and glaciation directly impact the human use and management of rugged landscapes. The materials produced by these processes influence soil and vegetation patterns and provide information on geologic hazards, prehistoric landscape use, habitat, and ecological disturbance. Knowledge of surficial processes and distribution of landforms assists the National Park Service in selection of ecological reference sites, identification of rare or threatened habitat, and management of geologic hazards and cultural resources. Landform maps are being created as a way to inventory the surficial geology of national parks within the North Coast and Cascades Network (NCCN). Landform maps are currently being utilized as an input in the creation of soils distribution maps for North Cascades and Mount Rainier national parks.

Status and Trends:

The characteristic landforms of NOCA are the impossibly steep valley walls, jagged horns and arêtes, deep cirque basins, and U-shaped valleys created by multiple glaciations. Within NOCA, 62% is valley wall and 14% is high elevation cirque; with only 2% as riparian (floodplain and valley bottom). One unique and interesting landform found at NOCA are snow avalanche impact landforms, or SAILS. These are elliptical depressions with corresponding ridge-like deposits created by a snow avalanche impact with unconsolidated sediments on valley floors.

At Mount Rainier National Park (MORA), the volcanic edifice of Mount Rainier dominates the skyline, however it is the steep valley walls found throughout the park that is the prevailing landform. MORA is 51% valley wall, 10% volcanic cone and 7% cirque; with 5% as riparian. Glaciers cover most of

the volcanic cone and descend into the mountain's main river valleys flanked by large Neoglacial moraines, which record glacial advances. The stunning parklands of Mount Rainier are volcanic plateaus that have been scoured by glacial erosion during ice ages. They are often found adjacent to the volcanic cone, but are also found on or near discontinuous ridge tops, valley wall and debris apron benches and cirques; or can occasionally stand alone as individual plateaus. Vegetation on parklands is often subalpine meadow; some of these areas attract many visitors and include Paradise and Sunrise.

Discussion

This inventory of landforms provides resource managers with baseline surficial geology data that can be used to track future disturbance and landscape evolution, key components to ongoing landscape monitoring by the NCCN. The active landscapes in these parks



TOP: October 20, 2003: a debris avalanche on lower Goodell Creek. One example of the dynamic nature of mountain landforms.

contain a predominance of disturbance landforms (e.g. debris cones, debris avalanches and rock falls). The distribution of rock falls, or talus slopes, provide researchers with a quick delineation of potential pika habitat. Other landforms, such as Neoglacial moraines are indicators of climate change as they mark the extent of glacial retreat over the past century.

Field mapping at North Cascades and Mount Rainier national parks is now

complete. GIS coverage for these two parks became available on the National Park Service Data Store in 2011; full reports on the landform mapping results were published as part of the National Resource Technical Reports series in 2011. Field mapping at Olympic National Park is over 60% complete. NPS field crews worked there in the summer of 2011 focusing on the Queets and Dungeness watersheds.