20b. Soil and Water: BMPs

Goal: Minimize soil mass movements as a result of management activities.

Objectives: Plan and conduct land use activities to avoid irreversible or serious and adverse effects on soil and water resources.

Slope Stability Question: *Are the soil and water conservation practices as described through the best management practices and site-specific prescriptions implemented and effective in minimizing soil erosion and maintaining State water quality standards?*

Landslide Inventory

In FY2000 the Tongass began a forest-wide landslide inventory effort. A forest-wide landslide inventory will be used for watershed assessment, timber harvest suitability and impacts and improvement of the mass movement index rating system for soil map units.

Landslide inventory is essential to understanding the effects of management activities on slope stability. The 1997 Forest Plan specifically described landslide inventory as a method for evaluating Region 10 Soil Quality Standards and Best Management Practice effectiveness. While not specifically mentioned in the 2008 Forest Plan, landslide inventory remains essential for documenting effectiveness of BMPs 13.5 and 14.7, Region 10 Soil Quality Standards, and evaluating watershed condition.

Monitoring Results

In FY 2014 initiation points were added to the landslide layer. Large storm events in January 2014 (40 new landslides on Prince of Wales) and 4 new landslides in a local storm in Starrigavan Valley resulted in additions to the landslide layer. Keeping the layer current with new landslide events is a challenge given the size of the forest and difficult or infrequent travel to many areas of the forest.

Soil and Water Photo 1. One of four landslides that occurred in the Starrigavan Valley in 2014. Photo by John Reed, Harris Air pilot.

Evaluation of Results

The goal of the once-over Tongass landslide inventory is to first map all landslides in all development land use designations and other areas where soil mapping exists. The once-over mapping was completed in FY 2012. The landslide inventory will be used for project and forest-wide watershed assessments.

The Forest Plan currently uses two metrics to assess slope stability in the tentatively suitable criteria for timber harvest. 1) slopes over 72 percent gradient are considered unsuitable pending an on-site analysis; and 2) soil map units with a mass movement index (MMI) of 4 are also considered unsuitable. Application of the two metrics does not create a similar map of potentially unstable areas. A few soil map units on slopes less than 72 percent gradient are considered

MMI 4 due to soil characteristics. And several soil map units on slopes over 72 percent gradient are considered MMI 3 due to soil characteristics. A further complicating factor is the lack of sufficient detail to be truly useful at the stand scale in both the digital elevation models (DEMs) and the soil map units. For these reasons the MMI is rarely discussed at the stand scale and stability analysis hinges on the identification and analysis of slopes over 72 percent gradient.

Action Plan

A preliminary overlay of landslide initiation points and the new land-type association layer was completed, but time constraints did not allow a full evaluation of the results.

The current slope layer for the Forest (20 meter DEM) likely will not provide sufficient detail to identify the microsites where landslides often initiate. A mapping project is underway to produce 5 to 10 meter DEMs for the entire state of Alaska. The projected date for delivery of the 5 to 10 meter DEMs for Southeast Alaska is from spring 2015 to mid-2017. At that time, the landslide initiation points should be overlain with the new DEMs to calculate landslide frequency by slope class.

The landslide layer needs additional quality control and periodic updates. At this time, the landslide layer receives updates only in project areas where other forest management activities are occurring. In FY2014, we did update the layer with landslides caused by the January 2014 storm on POW and the September 2014 storm in Sitka.

Once the new and greatly improved DEMs are available for the Forest, a landslide frequency analysis based on slope class should be conducted. Data from slope and MMI analysis will help improve our ability to identify and map unstable terrain.

In FY2013 the Tongass National Forest purchased a product called NetMap (Earth Sciences Institute). NetMap is a terrain-based model used primarily to map drainage networks. The NetMap slope stability model uses slope steepness and slope confluence to identify landslide prone areas. The NetMap slope stability model holds promise for better identification of unstable areas especially with the 5 to 10 meter DEM. Forest slope stability specialists should begin familiarizing themselves with the model when the new DEMs become available.

Harvest on Steep Slopes (>72 percent)

Evaluation of Results

In 2014, approximately 30 acres of timber harvest occurred on slopes over 72 percent gradient. About 18 acres were in the Tonka Timber Sale project area. About 12 acres were in the Eight Fathom Project Area.

In the Tonka Timber Sale project area, approximately 3 acres of harvest on slopes over 72 percent occurred in each of the following units: 109, 129, and 199. About 9 acres of timber harvest occurred on slopes over 72 percent in unit 605. The steep slope areas were harvested according to mitigation defined in the Tonka Timber Sale EIS. All steep slope areas were partial harvest with 66 percent retention and log removal was via helicopter.

The Eight Fathom Timber Sale was planned in 1996 before the 1997 Forest Plan standards and guidelines required on-site analysis of timber harvest proposed on steep slopes. Based on the available 20 meter DEM, about 12 acres of timber harvest on slopes over 72 percent gradient occurred in 2014. The steep slope harvest occurred in two units: 2608 (4 acres) and 2915 (8 acres). The unit card for unit 2915 describes gentle slopes with good deflection. The 20 meter DEM may not be accurate for this this unit. The unit card for unit 2608 also describes good deflection.

Action Plan

Regarding harvest on slopes over 72 percent gradient, no action is currently needed. The timber harvest activities discussed above are adhering to applicable standards and guidelines. Documentation in the current suite of NEPA documents is describing proposed harvest on slopes over 72 percent gradient by harvest unit.