

## **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.

### **Results**

In FY 2012, internal review and quality control was accomplished on approximately 3 million acres of landslide inventory including the Craig, Thorne Bay, and Ketchikan Ranger Districts. .

The de Montigny et. al.(2011) report referenced in the 2011 M&E report provided several recommendations regarding future monitoring of slope stability related to timber harvest. The main recommendation requires maintenance and updating of the forest-wide landslide layer. As of 2012 the forest-wide landslide layer covers 11 million acres but landslides continue to occur and to date quality control was only completed on the southern third of the forest.

An initial analysis of the landslide layer overlain with soil map units recommends changing the mass movement interpretation for 29 soil map units involving almost a million acres (300,000 acres to Mass Movement Index 4 and 635,300 acres from MMI 4). While the MMI is good forest or project-level planning tool the soil mapping is not detailed enough to use the MMI interpretation for site specific or even stand-level applications.

### **Evaluation of Results**

The goal of the once-over Tongass landslide Inventory is to first map all landslides in all development LUDS and other areas where soil mapping exists. The once-over mapping was completed in FY 2012. The landslide inventory will be used for forest-wide watershed assessments and to improve the forest's mass movement index. The initial overlay of SMU and

landslides indicated numerous problems with the analysis, including lack of initiation zones in the landslide layer and lack of sufficient detail in the soil map unit layer.

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. 2) Soil Map Units with a Mass Movement Index 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 a bunch of slopes over 72 percent gradient are considered MMI 3 due to soil characteristics. A further complicating factor is the lack of sufficient detail in both the DEMs and the soil map units to be truly useful at the stand scale. 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 (see Part C below).

### **Action plans**

FY 2013 marks the completion of the once-over landslide inventory at which time it will be entered into corporate databases. A frequency analysis of landslides and soil map units is ongoing, but proving difficult due to the factors described in the results and evaluation sections.

The landslide layer needs additional quality control and periodic updates. The Mass Movement Index analysis based on the landslide layer needs to be completed and changes made to the soil look up table. Currently the soil look up table for mass movement index does not match forest plan direction for defining slopes over 72 percent as MMI 4. An option to updating the MMI would be for the forest to obtain a much improved DEM (with 10 meters or better resolution) and use slope alone for the soil stability standard in the forest plan.

### **Harvest on Steep Slopes (>72%)**

#### **Evaluation of Results**

In 2012, approximately 133.5 acres of timber harvest occurred on slopes over 72 percent gradient. The harvest occurred in 6 harvest units analyzed in the Logjam Timber Sale Environmental Impact Statement and one unit analyzed in the Boundary Timber Sale EA. The areas were harvested according to mitigation defined in the NEPA documents. In the same 7 units, 92 acres of harvest were deferred due to slope stability concerns. The numbers of acres logged on slopes over 72 percent were higher in 2012 than in 2011 because the cable and shovel portions of the Logjam timber sales were logged in 2011 and in 2012 the helicopter portions were logged.

The timber harvest activities discussed above are adhering to applicable standards and guidelines. The soil scientists on the forest need to define training needs and documentation needs for slopes over 72 percent gradient harvested or deferred.

### **Action plans**

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.

