

# CHAPTER 3

## SOIL SURVEY INFORMATION FOR FORESTLAND MANAGERS/MANAGEMENT OF SOIL EROSION

Steve Campbell

### Sources of soil survey information

Soil mapping is the systematic examination, description, and classification of soils in a given area. This information is compiled into soil surveys. Normally, soil observations are made at selected areas representing landform, slope, and other environmental conditions such as vegetation. You can get soil survey information from four sources.

#### 1. Hard-copy soil survey reports with soil maps and compact discs

Hard-copy soil survey reports are available for most soil survey areas from USDA Natural Resources Conservation Service state soil scientists. Because of updating, data in these reports may not be the current official soil survey data.

#### 2. Electronic files of soil survey reports and maps from the Web

Electronic soil survey reports are available at [http://soils.usda.gov/survey/printed\\_surveys/](http://soils.usda.gov/survey/printed_surveys/). These are just like the hard copies but in electronic form. The listed dates indicate when each report was published.

#### 3. Web Soil Survey

Web Soil Survey information is available at <http://websoilsurvey.nrcs.usda.gov/>. This is the most current soil survey data available online. You can customize these maps and reports using soil data that pertains to your properties and particular needs. A general step-by-step procedure on how to use the Web Soil Survey is available at [ftp://ftp-fc.sc.egov.usda.gov/MI/technical/soils/WSS\\_brochure.pdf](ftp://ftp-fc.sc.egov.usda.gov/MI/technical/soils/WSS_brochure.pdf), and for forestry use at <http://extension.oregonstate.edu/lincoln/sites/default/files/documents/Websoilsurvey-forestry.pdf>.

#### 4. Soil Data Mart

The Soil Data Mart website is available at <http://soildatamart.nrcs.usda.gov/>. It allows downloading of spatial and tabular soil survey data and generates reports of soil properties and interpretations.

All online versions of soil surveys have systematic “help” procedures to help you obtain the information you need.

Soil survey data helps you make informed forest management decisions about everything from property purchases to site-specific actions such as road building, harvesting, site preparation, planting, vegetation control, and thinning. For example, knowing soil physical properties—such as texture, rock fragment content, available water capacity, drainage class, depth to bedrock or other root-restricting layers, and erodibility—can help you determine road placement, harvest areas, harvest systems, what species to plant, and what areas might be prone to windthrow. Forest productivity information—such as site index and growth rate—can help you decide the intensity of management for each soil and landform condition and identify areas that are best managed at a low level of intensity or left undisturbed. And you can use soil properties to interpret ratings for forest management practices and risks associated with a certain type of soil.

The following list provides examples of soil interpretive ratings for various forest management activities:

- Construction limitations for haul roads/log landings
- Hand planting suitability
- Harvest equipment operability
- Log landing suitability

- Mechanical planting suitability
- Mechanical site preparation (deep)
- Mechanical site preparation (surface)
- Potential erosion hazard (off-road/off-trail)
- Potential erosion hazard (road/trail)
- Potential fire damage hazard
- Potential seedling mortality
- Road suitability (natural surface)
- Soil rutting hazard

## Management of soil erosion

### Soil properties that affect erosion hazard

Following are examples of soil properties that affect erosion:

- **Soil texture** is the proportion of sand, silt, and clay. The soil survey can show which areas on your property are sandy or clayey and the topography and slope associated with each of these soil types, allowing you to identify management units that are most hazardous for erosion.
- **Soil structure** is the aggregation of soil particles into structural units. Usually, granular structures allow for ease of water movement, whereas blocky and platy structures impede water movement and accelerate erosion.
- **Organic matter** binds soil particles together, reducing the erosion hazard. The higher the organic matter content, the lower the erosion hazard.
- **Permeability** is the rate at which water moves through the soil profile. The faster the permeability, the less the erosion hazard.
- **Steeper and longer slopes** present a greater erosion hazard.

### Practices to reduce erosion on forestlands

From the Web Soil Survey, you can identify which areas are high and low erosion hazards and what mitigation measures may be needed

to prevent soil erosion. Several practices can be used for erosion control, either individually or in combination depending on soils, slope, rainfall, organic matter content, and stage of forest growth. The most common practices include (1) maintaining road culverts and ditches and using water bars or rolling dips; (2) leaving slash and surface duff on site to reduce soil exposure, which is consistent with fire management and reforestation objectives designed to protect the soil surface from rainfall impact and runoff and minimize soil compaction and displacement during harvesting; (3) tilling soils to improve water infiltration on skid trails and landings; and (4) seeding noninvasive grasses on exposed soils in critical areas.

### Key references and other resources

- Garland, J. 2000. *Designing Woodland Roads*. EC 1137. Corvallis, OR: Oregon State University Extension Service. <http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/20520/ec1137.pdf>.
- Garland, J., and D.J. Jackson. 2002. *Planning Woodland Roads*. EC 1118. Corvallis, OR: Oregon State University Extension Service. <http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/18889/ec1118.pdf>.
- Helgerson, O.T., and R.E. Miller. 2008. *Keeping Your Forest Soils Healthy and Productive*. EB2019. Pullman, WA: Washington State University Extension. <http://cru.cahe.wsu.edu/CEPublications/eb2019/eb2019.pdf>.
- Washington State Department of Natural Resources. 2009. *Forest Practices Illustrated: A Simplified Guide to Forest Practices Rules in Washington State*. Olympia, WA: Washington State Department of Natural Resources, Forest Practices Division. [http://www.dnr.wa.gov/BusinessPermits/Topics/ForestPracticesRules/Pages/fp\\_fpi.aspx](http://www.dnr.wa.gov/BusinessPermits/Topics/ForestPracticesRules/Pages/fp_fpi.aspx).