

SECTION 2 – NATURAL RESOURCES INFORMATION

1. Soils

Soil Interpretations

Forest Land Interpretations

Forest Productivity with Site Index Base Age - MO1

This table presents information about productivity for each map unit in the survey area which is suitable for producing timber. Information on potential productivity includes common trees, site index, site index base age, volume of wood fiber, and trees to manage.

Potential Productivity

Common Trees: Trees which generally occur on the soil are listed regardless of economic importance.

Site Index: Average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years.

Site Index Base Age: The base age of the site index curve used to determine the Site index.

Volume: The amount of fiber, expressed in cubic feet per acre per year, produced in a fully stocked, even-aged, unmanaged stand.

Trees to Manage: Trees that are suitable for commercial wood production and that are adapted to the soil.

This report is available on the Web Soil Survey
(<http://websoilsurvey.nrcs.usda.gov/app/>) under
Vegetative Productivity

An additional report of interest is the ***Rangeland and Forest Vegetative Classification, Productivity, and Plant Composition***. This report combines the forestland and rangeland production and characteristic vegetation based on Ecological Site.

This report are available on the Web Soil Survey
(<http://websoilsurvey.nrcs.usda.gov/app/>) under
Vegetative Productivity.

Forest Land Management Interpretations

(Refer to section 537 of the National Forestry Manual for specific soil rating criteria.)

Construction Limitations for Haul Roads/Log Landings

Displayed in Forestland Log Landings and Haul Roads (FOR-1)

Description:

- Ratings reflect limitations for constructing haul roads and log landings.

Ratings assess:

- Earth moving activities to meet standards and specifications for haul roads and log landings.
- Excavating, removal and shaping of native soil materials to develop haul roads and log landings for forest harvesting and other management activities.
- Cuts and fills less than 10 feet in depth.
- The use of bladed crawler tractors, excavators, graders and other primary construction equipment.
- Year-round water tables, year-round ponding and permafrost.
- Frequency and duration of flooding.

Ratings assume:

- Construction activities occur during customary periods of such work for the local area.
- Roads are up to one mile in length with up to a 20-foot running surface.
- Ratings do not assess:
- Snow-covered soils.

Rating Classes (Crisp):

- Slight - Little or no limitations to construction activities.
- Moderate - One or more limitations that cause some difficulty.
- Severe - One or more limitations that make road or log landing construction very difficult or more costly.

Log Landing Suitability

(This interpretation is modified for use in ID,OR,WA.)

Displayed in Forestland Log Landings and Haul Roads (FOR-1)

Description:

- The suitability of the soil at the forest site to serve as a log landing.

Ratings assess:

- Efficient and effective use of equipment for the temporary storage and handling of logs.
- The use of grapple hooks, skidders, trucks, loaders, cable yarders and other similar equipment.
- Activities that disturb 100 percent of the soil surface area with rutting, puddling or displacement up to a depth of 18”.
- The landscape in its natural setting.
- Frequency and duration of flooding, ponding and depth and duration of water table.

Ratings assume:

- Vegetation and debris is cleared from an area sufficient in size for the road or landing before use begins.

Ratings do not assess:

- Non-soil obstacles, e.g., slash.
- Frozen or snow-covered soil.

Rating Classes (Crisp):

- Suited - Little or no restrictions to road or log landing suitability.
- Moderately Suited - One or more restrictions reduce site suitability.
- Poorly suited - One or more restrictions generally make the use of the site for a landing very difficult or unsafe.

Soil Rutting Hazard

Displayed in Forestland Log Landings and Haul Roads (FOR-1)

Description:

- Ratings indicate the hazard or risk of ruts in the uppermost soil surface layers by operation of forest equipment. Soil displacement and puddling (soil deformation and compaction) may occur simultaneously with rutting.

Ratings assess:

- The operation of equipment on forest sites (3-10 passes) when the soil moisture is near field capacity.
- The use of standard rubber-tired vehicles (non-flotation tires).
- Year-long water tables < 12 “.
- Soil displacement and puddling which may affect aesthetics, groundwater hydrology, and productivity of the site.

Ratings assume:

- Rutting depths usually range from 2” to 24” and depends, in part, on the weight of equipment (including carried or pulled loads) and shape and size of wheels.
- Lack of organic/vegetation surface cover.
- Conditions occurs on soil with slopes and other characteristics that allow use of ground-based equipment.

Ratings do not assess:

- Impacts of rutting on sloping sites that may channel surface water and affect hydrology.
- Frozen soil within 24" of the surface.

Rating Classes (Crisp):

- Slight - Little or no rutting.
- Moderate - Ruts are likely.
- Severe- Ruts readily.

Potential Erosion Hazard (Off-Road/Off-Trail)

Displayed in Forestland Erosion (FOR-2)

Description:

- Ratings indicate the hazard or risk of soil loss from off-road and off-trail areas after disturbance activities that expose the soil surface.

Ratings assess:

- Sheet and rill erosion from exposed soil surfaces caused by various silvicultural practices, grazing, mining, fire, firebreaks, etc.
- Activities that disturb the site resulting in 50 to 75 percent bare ground in the affected area
- The use of any equipment type or size and uncontrolled grazing by livestock.

Ratings assume:

- 50 to 75% exposed, roughened mineral surface layer

Ratings do not assess:

- Clean tillage and other similar activities that disturb up to nearly 100 percent of the area and change the character of the soil
- Histosols
- Individual precipitation or storm events.
- The impact of gully erosion.
- Sediment production/delivery ratio or streambank or streambed erosion for water courses on the site.
- Ground disturbing activities on the amount of surface or subsurface water runoff.

Rating Classes (Crisp):

- None - There is no erosion hazard associated with this activity.
- Slight - Erosion is unlikely under ordinary climatic conditions.
- Moderate - Some erosion is likely; control measures may be needed.
- Severe - Erosion is very likely; control measures for vegetation re-establishment on bare areas and structural measures are advised.

- Very Severe - Significant erosion is expected; loss of soil productivity and off-site damages are likely; control measures are costly and generally impractical.

Potential Erosion Hazard (Road/Trail)

Displayed in Forestland Erosion (FOR-2)

Description:

- The hazard or risk of soil loss from unsurfaced roads/trails. Refer to the National Forestry Manual for soil rating criteria.

Ratings assess:

- The force that natural precipitation events have to dislodge and move soil materials on roads/trails and firebreaks.
- Activities on roads and trails that result in bare ground, compaction, and reshaping of the soil surface.
- Use by trucks, skidders, off-road vehicles and other similar equipment.
- The impact on compacted, bare road/trail surface using the representative value for slope gradient of the soil component

Ratings assume:

- Roads and trails are generally linear, continuous, and narrow ranging up to 25 feet in width.

Ratings do not assess:

- Frozen or snow-covered soil.

Rating Classes (Crisp):

- No Erosion Hazard - There is no erosion hazard associated with this activity.
- Slight - Little or no erosion is likely.
- Moderate - Some erosion is likely; occasional maintenance may be needed; simple erosion control measures needed.
- Severe - Significant erosion can be expected; roads require frequent maintenance; costly erosion control measures are needed

Road Suitability (Natural Surface)

(This interpretation is modified for use in ID, OR, WA.)

Displayed in Forestland Erosion (FOR-2)

Description:

- Suitability for using the natural surface of the soil component for roads by trucks for the transport of logs and other wood products from the site.

Ratings assess:

- The efficient and safe transport of forest products from the site.
- The landscape in its natural setting.
- Frequency and duration of flooding, ponding and depth and duration of water table.
- The use of trucks (1/2-ton to log-transport capability).
- Activities that disturb 100 percent of the soil surface area with rutting, puddling or displacement up to a depth of 18".

Ratings assume:

- Vegetation and debris is cleared from an area sufficient in width for the road before use begins.
- Using the natural setting of the soil without cut and fill construction.
- Slopes are less than 20 percent gradient.
- Use occurs during customary periods of such activity for the local area.
- Roads are generally less than 1 mile in length with up to a 20-foot wide running surface.

Ratings do not assess:

- Non-soil obstacles, e.g., slash.
- Frozen or snow-covered soils.

Rating Classes (Crisp):

- Suited - Little or no restrictions to natural road suitability.
- Moderately Suited - One or more restrictions reduce site suitability.
- Poorly Suited - One or more restrictions generally make the use of the site for a natural road very difficult or unsafe.

Hand Planting Suitability

Displayed in Forestland Planting and Harvesting (FOR-3)

Description:

- Ratings indicate the expected difficulty of hand planting.

Ratings assess:

- Activities that include the proper placement of the root systems of tree and shrub seedlings to a depth of up to 12".
- The use of bareroot stock, tublings, containerized stock and cuttings.
- The use of spades, dibbles, planting bars or other similar planting tools.
- Year-round water tables and year-round ponding.

Ratings assume:

- Necessary site preparation is completed before hand planting.
- Planting activities occur during customary periods of such work for the local area.

Ratings do not assess:

- Non-soil obstacles, e.g., slash.
- Human-held powered equipment such as power augers.
- Human-caused compacted layers from harvesting or other site activities (only natural restrictive layers are considered).
- Frozen or snow-covered soils.

Rating Classes (Crisp):

- Well Suited - Little or no restrictions to hand planting; planting rates are not affected.
- Moderately Suited - One or more restrictions that impede planting and reduce planting rates.
- Poorly suited - One or more restrictions that severely impede planting and reduce planting.
- Unsited - Site factors and features prevent the proper planting of seedlings.

Mechanical Planting Suitability

Displayed in Forestland Planting and Harvesting (FOR-3)

Description:

- The difficulty of planting trees or shrubs using a mechanical planter.

Ratings assess:

- Activities that include the proper placement of the root systems of tree and shrub seedlings to a depth of up to 12”.
- The use of bareroot stock, tublings, containerized stock and cuttings.
- Year-round water tables and year-round ponding.
- The use of mechanical planters that create narrow furrows or trenches to a depth of 12” and are operated on the contour or cross-slope.
- The use of mechanical planters on a 3-point hitch with coulter, shank or trench shoe and packing wheel pulled by sufficiently powered equipment.

Ratings assume:

- Planting activities occur during customary periods of such work for the local area.
- Necessary site preparation is completed before mechanical planting.

Ratings do not assess:

- Non-soil obstacles, e.g., slash.
- Human-caused compacted layers from harvesting or other site activities (only natural restrictive layers are considered).
- Frozen or snow-covered soils.

Rating Classes (Crisp):

- Well Suited - Little or no restrictions to mechanical planting; planting rates are not affected.
- Moderately Suited - One or more restrictions that impede planting and reduce planting rates.
- Poorly Suited - One or more restrictions that severely impede planting and reduce planting rates.
- Unsuitable - Site factors and features prevent mechanical planting of seedlings.

Harvest Equipment Operability

Displayed in Forestland Planting and Harvesting (FOR-3)

Description:

- The suitability for operating harvesting equipment.

Ratings assess:

- The off-road transport or harvest of logs and/or wood products by ground-based wheeled or tracked equipment.
- The use of standard rubber-tire skidders and bulldozers used for ground-based harvesting and transport.
- Activities that disturb from 35 to 75 percent of the surface area with rutting, puddling or displacement up to a depth of 18".
- Year-round water tables and year-round ponding.

Ratings assume:

- Activities occur during customary periods of such work for the local area.

Ratings do not assess:

- Non-soil obstacles, e.g., slash.
- Frozen or snow-covered soils.

Rating Classes (Crisp):

- Well Suited- Little or no restrictions to equipment operability.
- Moderately Suited - One or more restrictions reduce the effective and safe use of equipment.
- Poorly suited - One or more restrictions make the use of equipment impractical or unsafe.

Mechanical Site Preparation (Surface)

Displayed in Forestland Site Preparation (FOR-4)

Description:

- Ratings indicate the suitability of using surface-altering soil tillage equipment.

Ratings Assess:

- Activities that include modifying the soil surface to prepare the site for planting or seeding.
- Activities that treat up to 50 to 75 percent of the site to 12" in depth. Features and characteristics from the surface to 12" in depth. The use of brush rakes, chisels, disks and other similar types of implements pulled by bulldozers or tractors (D6/D7, 150 h.p. tractor or equivalent).
- Year-round water tables and year-round ponding.

Ratings Assume:

- Activities for such work occur during customary periods for the local area.

Ratings do not assess:

- Non-soil obstacles, e.g., slash.
- Human-caused compacted layers from harvesting or other site activities (only natural restrictive layers are considered).
- Frozen or snow-covered soils.

Ratings:

- Suited - Little or no restrictions to surface mechanical site preparation.
- Poorly Suited - One or more restrictions reduce the effective and safe use of equipment.
- Unsited - One or more restrictions generally prevent the effective and safe use of equipment.

Mechanical Site Preparation (Deep)

Displayed in Forestland Site Preparation (FOR-4)

Description:

- Ratings indicate the suitability of using deep soil tillage equipment.

Ratings assess:

- Activities that include subsoiling, ripping and other subsurface soil disturbance across the slope.
- Activities that treat up to 50 to 75 percent of the site to 36" in depth to break up restrictive or compacted layers and increase infiltration for plant growth.
- Features and characteristics from the surface to 36" in depth.
- The use of rippers, subsoilers and other implements pulled by bulldozers (D8 or equivalent) that till at a depth greater than 12".
- Year-round water tables and year-round ponding.

Ratings assume:

Activities occur during customary periods of such work for the local area.

Ratings do not assess:

- Non-soil obstacles, e.g., slash.
- Human-caused compacted layers from harvesting or other site activities (only natural restrictive layers are considered).
- Frozen or snow-covered soils.

Rating Classes (Crisp):

- Suited - Little or no restrictions to deep mechanical site preparation.
- Poorly Suited - One or more restrictions reduce the effective and safe use of equipment.
- Unsited - One or more restrictions generally prevent a sufficient level of deep mechanical site preparation.

Potential Fire Damage Hazard

Displayed in Forestland Seedling Mortality and Damage by Fire (FOR-5)

Description:

- The potential hazard of damage to soil nutrient, physical, and biotic characteristics from fire.

Ratings assess:

- The impact of fires (prescribed or wildfire) of moderate fireline intensity (116-520 btu's/sec/ft) that provide the necessary heat to remove the duff layer and consume soil organic matter in the surface layer.

Ratings assume:

- Soils with a shallow surface layer lack the capacity to safely absorb the effects of fire.
- Steep slopes are more likely to erode if the protective duff layer is removed.
- Soil texture and rock fragment content relate to soil erodibility, vegetative recovery rate, and vegetative productivity.
- Medium textured soils, with their greater inherent water holding capacity, are more likely to be cooler and provide higher productivity potential
- Soils with large volumes of rock fragments transmit heat to a greater depth in a shorter period of time.
- Soils with less than 2 percent organic matter are more resistant to sheet and rill erosion and have greater water holding capacity.

Ratings do not assess:

- The time of year in which the fire occurs (winter versus summer).
- Fuel moisture content or volume.
- Weather conditions

Rating Classes (Crisp):

- *None - No impact to the soil characteristics are expected.
- Low - Little negative impact to the soil characteristics are expected.

- Moderate - Negative impacts to the soil characteristic may occur.
- High - Negative impact to the soil characteristics are expected.

Potential Seedling Mortality

Displayed in Forestland Seedling Mortality and Damage by Fire (FOR-5)

Description:

- The likelihood of death of naturally or artificially propagated tree seedlings, as influenced by soil characteristic, physiographic features and climatic conditions.

Ratings assess:

- The impact of soil, physiographic, and climatic conditions on the survivability of newly established tree seedlings.

Ratings assume:

- Site preparation is adequate for the establishment of tree seedlings.
- Artificially propagated tree seedlings are of adequate size and quality, are adapted to the site, are planted during a time sufficient to assure initial root growth with respect to moisture and temperature, and proper planting techniques are employed.
- Near normal monthly and yearly climatic conditions.

Ratings do not assess:

- Effects of overstory tree canopy greater than 15 feet in height.
- Effects of adjacent competing plants less than 15 feet in height.
- Effects of seedling pests (rodent, herbivore, insect, etc.).

Rating Classes (Crisp):

1. Low - Seedlings are expected to develop normally and become established.
2. Moderate - Root development is sufficiently retarded to cause death of some seedlings (up to 1 in 3) and establishment of surviving seedlings is delayed.
3. High - Seedlings are not expected to survive (at least 2 in 3 die) without special treatment or management.

All these reports are available on the Web Soil Survey (<http://websoilsurvey.nrcs.usda.gov/app/>) under *Land Management*.