Table 2: Soil Moisture Equipment Operability Guide (USDA, Payette National Forest 2019)

Field Guide to Soil Moisture Conditions Relative to Operability of Logging Equipment

(Soil Textural Group and Moisture Conditions)*

Soil Moisture (% Increases Downward)	Coarse Soils (coarse sand, loamy sand, fine sand, very fine sand)	Light Soils (sandy loam, fine sandy loam, very fine sandy loam)	Medium Soils <35% clay (loam, silt loam, sandy clay loam, clay loam)	Heavy Soils >35% clay (heavy clay loam, silty clay loam, sandy clay, silty clay, clay)
Dry Soils	Dry, loose, single grained, flows thru fingers.	Dry, loose, flows thru fingers.	Powdery, dry, sometimes slightly crusted but breaks down into powdery conditions.	Hard, baked, cracked, sometimes has loose crumbs on surface
Slightly Moist Soils	Still appears dry, will not form a ball with pressure.	Still appears to be dry, will not form a ball. No water staining on hand.	Somewhat crumbly, but will hold together from pressure. Forms a ball that breaks under repeated tossing.	**Somewhat pliable, will form ball under pressure Will not break upon tossing. Forms a weak ribbon. light soil/water staining on hand**
Moist Soils	Still appears dry, will not form a ball with pressure.	Tends to ball under pressure. Ball breaks under tossing. light water staining on hand	**Forms a ball that will not break upon tossing. Pliable, forms a weak ribbon, very light water staining on hand At Plastic Limit.**	**Forms a ball, will not break upon tossing. Easily ribbons out between fingers, slick feeling. Medium to heavy water staining on hand At Plastic Limit.**
Very Moist Soils	Tends to stick together slightly, sometimes forms a very weak ball. Breaks upon tossing.	**Forms a weak ball, will not break upon tossing Will not slick. Wet outline on hand. Forms weak ribbon At Plastic Limit.**	**Forms a ball that will not break upon tossing Very pliable, forms ribbon easily. Light to heavy soil/water coating on hand. Slicks readily if high in clay. > Plastic Limit.**	**Easily ribbons out between fingers, has a sticky feeling. >Plastic Limit.**
Wet Soils	**Upon squeezing, free water may appear. Wet outline is left on hand. Nonplastic.**	**Forms a soft ball, can squeeze out free water medium to heavy soil/water coating on hand**	**Forms a soft ball, Can squeeze out free water. Medium to heavy soil/water coating on hand.**	**Forms a soft ball, Can squeeze out free water. Thick soil/water coating on hand, slick and sticky.**

* use with the **Thien soil texture diagram (see attachment)**

How to use:

1. Dig a small pit and sample 4 to 6 inches below the mineral soil surface (below the surface litter).
2. Determine soil textural group (coarse soils, light soils, medium soils, heavy soils) to use on chart above (see attached. Thien texture diagram; consult soil scientist if necessary).
3. Collect enough soil to form a 1 to 2 inch ball by molding with hand pressure. Pick out excessive rock fragments & squeeze with 6 directional squeezes.
4. If a ball is formed that holds together under repeated tosses (1 to 2 feet into the air), logging equipment (feller bunchers,skidders,off-road jammers) should be restricted to operations on designated primary constructed trails or roads.
5. The conditions described in the area **above the grey shaded zone** typically present a low to moderate risk of detrimental soil disturbance from logging equipment traffic and are considered suitable for logging equipment traffic.
6. The conditions **in the light grey shaded area** (very moist soils) commonly result in a high risk of detrimental soil disturbance from logging equipment traffic and are considered unsuitable for logging equipment traffic.
7. The conditions described in the **darker grey and cross-hatched area** (wet soils) present a very high risk of detrimental soil disturbance from logging equipment traffic and are considered unsuitable for logging equipment traffic.

NOTE:

a. Soils with higher clay contents are more susceptible to damage with lower amounts of moisture.
b. Plastic limit is the water content in the soil at the point of a solid and semisoild state--a condition highly susceptible to compaction.
c. Slick is the describer that denotes the amount of clay in the soil that creates a slippery feeling.
d. **Use with care**: this guide may not be appropriate for all conditions given the high variabilities in soils, topography and climate.
e. "Logging equipment" - typical: feller bunchers, skidders, off-road jammers; and others with >6 psi ground pressure

Figure 1: Thein Soil Texture Determination Diagram

Instructional diagram for determining soil texture by feel



