Upper Little Deschutes Restoration Project EA

Soils Input – Sarah Hash, District Soil Scientist

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A full soils report is not necessary for this project because all of the proposed activities will convey a net benefit to the soil resource if the included project design features (PDFs) are followed. Each of the Action Alternatives will meet Deschutes National Forest LRMP S&Gs and Region 6 Soil Quality Standards, and honor the intent of the overarching policies and regulations applicable to the soil resource. Proposed activities will not result in an increase in detrimental soil conditions in any area (LRMP SL-3 and SL-4), but rather will reduce the extent of detrimental soil conditions by restoring soil function in areas that have been degraded by past use and management. Sensitive soils (particularly meadows or wet areas) will be protected through PDFs that restrict timing, soil conditions, or location of heavy machinery use (LRMP SL-5).

Heavy equipment, passenger vehicles, and off-highway vehicles may displace, compact, and/or rut the soil. The removal of trees and other vegetation or displacement of surface layers can potentially cause adverse changes in organic matter levels. Damage to riparian soils can result in devegetation, erosion, and sediment contribution to streams. Conversely, decompacting soils through ripping or subsoiling may decrease bulk densities, increase infiltration rates, and increase pore space. Planting native vegetation or adding surface cover increases soil organic matter, improves soil structure, stabilizes soil, and protects against wind and water erosion.

The proposed management activities include road system adjustments (road closures, road decommissioning, and adding roads to the system), tree removal (cutting of encroaching lodgepole and removal of trees to be used as instream wood), closing, restoring and defining dispersed recreation sites, restoration/repair of riparian and streambank damage, and revegetation/planting activities. Because the proposed treatments in both Action Alternatives are largely focused on improving soil condition and function, the potential for increasing the extent of detrimental soil conditions in the project area is low. While the project does propose the addition of 6.1 miles of new road to the system, about four miles of road would be closed, 5.5 miles of system road would be decommissioned, and 14 miles of unauthorized road and trail would be decommissioned. Most of the identified dispersed recreation sites would have their footprints defined and shrunk, while four sites would be closed to vehicular traffic and rehabilitated.

I have reviewed the past, present, and reasonably foreseeable future actions listed in Chapter 3 of the EA. The cumulative soil disturbance incurred from those actions and the actions proposed in this project would not result in the exceedance of LRMP standards for soil detrimental condition, but would result in either no net change (where roads are closed, existing unauthorized routes are added to the system, encroaching lodgepole pine is removed, and wood placed in-stream) or in a meaningful increase in soil productivity and function (where roads are closed/decommissioned, where dispersed sites are defined, where dispersed sites and dump sites are closed/reclaimed, and where riparian areas and streambanks are repaired/restored).

Project Design Features

1. Restoration of user-created roads and decommissioning of system roads should incorporate both soil decompaction and surface cover placement, where possible. Restoration actions may include, but are not limited to, utilizing an excavator- or bulldozer-mounted subsoiling implement, using an excavator bucket to loosen compacted soils to a minimum depth of 16 inches, recontouring cuts and fills, mulching treated surfaces, pulling slash and woody materials over treated surfaces to establish effective ground cover protection where available, and or seeding/planting with native, locally-adapted species. See Table 2 in the EA for roads to be decommissioned.

2. Excavators, bulldozers, or other heavy equipment used for road closures, road decommissioning, and/or dispersed site restoration will remain on existing travelways or previously impacted surfaces at all times.

3. Excavators or other heavy equipment used for tree removal and/or in-stream wood placement will remain on upland soil areas and will be limited to two passes on any specific piece of ground. If more passes are required in a given location to achieve objectives, the excavator bucket will be used to scarify/decompact soils, place woody debris on the soil surface, and/or replace displaced soil.

4. All meadow restoration, recreation site rehab, and near-stream work where high water tables are present (saturated conditions within two feet of the soil surface, presence of riparian vegetation) will be either conducted by hand or conducted using tracked low ground pressure equipment when water tables are low enough and soil is dry enough to avoid damage. Machines may be permitted to reach in from upland areas, where feasible. Alternately, operating machinery over sufficient snow, frozen ground, or slash mats may be acceptable to limit detrimental soil disturbance.

5. All access routes and staging areas will be placed outside of sensitive/wet soil areas.

SOME MORE INFORMATION THAT MIGHT BE USEFUL FOR THE EA:

Geology, Landforms, and Topography

The ULDR Project Area is located in the central Oregon Cascades, which is relatively young physiographic province formed by volcanic eruptions that have occurred over the last 15 million years. The volcanic rocks resulting from these eruptions form the basement rocks of the entire area, but most of the area was buried by many meters of glacial outwash (mixed cobbles, gravels and sands) produced during glacial melt periods. The last glacial maximum (Crescent and Odell Lakes, just west of the project area, are products of this glaciation) occurred about 22,000 to 18,000 years ago, with substantial melt periods lasting for several thousand years more. Then, around 7,700 years ago, the entire area was covered by as much as ten feet of volcanic ash and pumice from the eruption of Mt. Mazama (present-day Crater Lake), which is located about 40 air miles to the south. The blanket of Mazama material varies in thickness depending on landscape position and aspect, with eroding areas having thinner mantles and accumulating areas having much thicker deposits. Surface soils in the project area are generally formed

in this Mazama blanket. The Little Deschutes River, which originates near Mule Peak in the Mt. Thielsen Wilderness at around 6,000 feet of elevation, is a low-gradient, meandering stream by the time it reaches the project area. Older terraces of the Little Deschutes are covered by the Mazama ash and pumice blanket described above, while soils in the current floodplain (typically 100-600 feet wide) are comprised of reworked and water-deposited mixed materials. Floodplain soils are high in organic matter, fine textured, and usually have a high water table for much of the year. These characteristics make them more susceptible to damage from recreational and vehicle impacts. These soils also support unique riparian communities (both vegetation and below-ground assemblages of microorganisms).

General Distribution and Characteristics of Soils

The Deschutes National Forest Soil Resource Inventory (SRI) (Larsen, 1976) catalogs the descriptions and distribution of different soils mapped in the project area. In general, soils across the project area have developed in relatively young volcanic materials, mostly coarse ash and pumice from the Mt. Mazama eruption. Because soils are young, they have undergone little biogeochemical weathering and development. Buried soils that underlie the ash and pumice are associated primarily with glacial outwash. Within the Little Deschutes River flood plain, rich alluvial soils have developed on top of the Mazama ash deposits. Alluvial soils may have high water tables for all or most of the year. **Error! Reference source not found.** and **Error! Reference source not found.** show the mapped extent of the SRI map units in the project area; Table 1 summarizes SRI descriptions and their acreages in the project area.

The majority of the project area (all but the southernmost 368 acres) is also covered by the Soil Survey of Upper Deschutes River Area, Oregon (including parts of Deschutes, Jefferson, and Klamath Counties) (USDA-NRCS, 1999). Mapping units in the project area roughly align with those of the Deschutes SRI, but provide additional soil profile descriptions and taxonomic classifications. For the purposes of this project, the mapping in the SRI is sufficient.

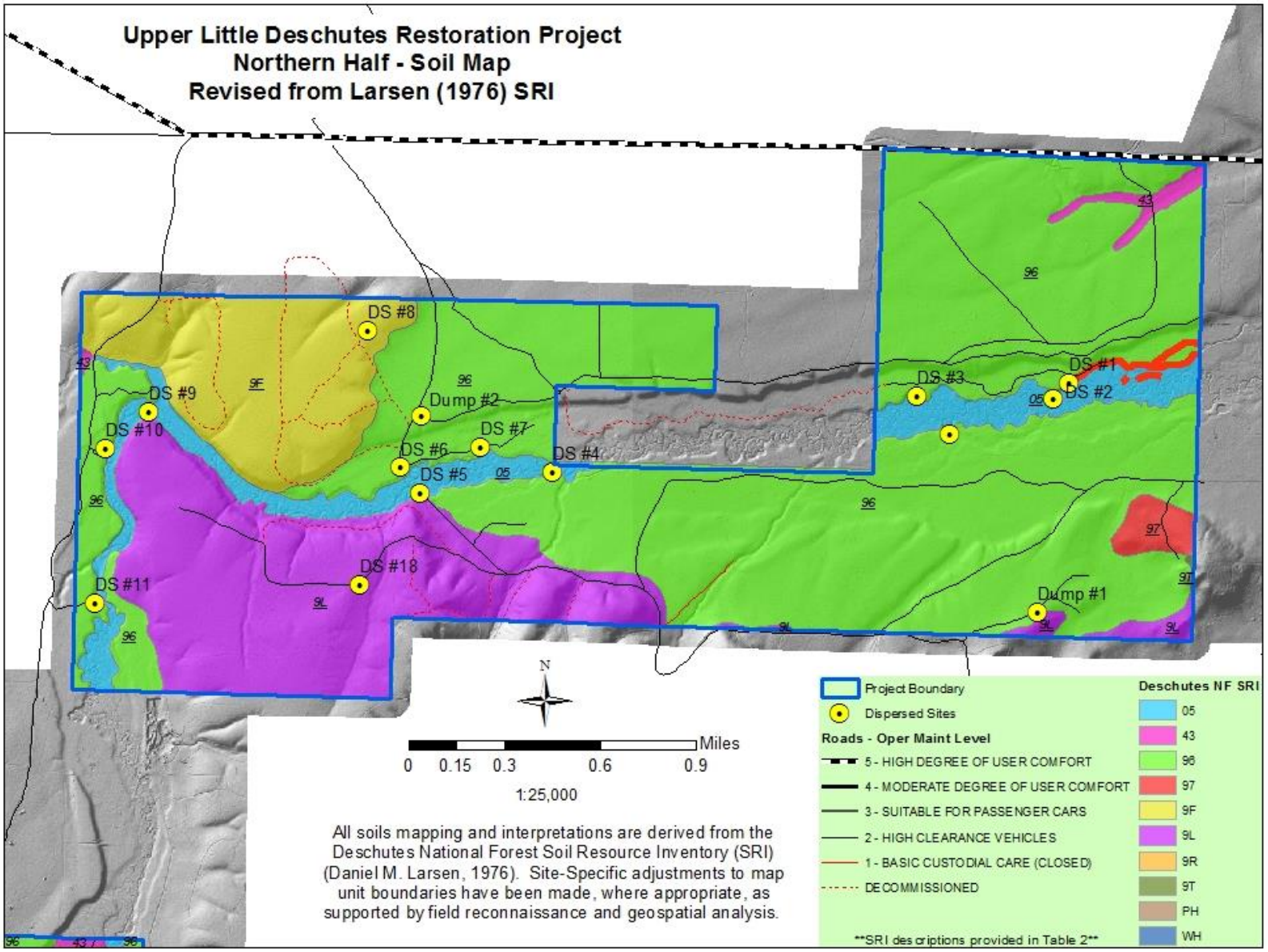

Figure 1 - Soil Map for the ULDR Project Area (North Half)

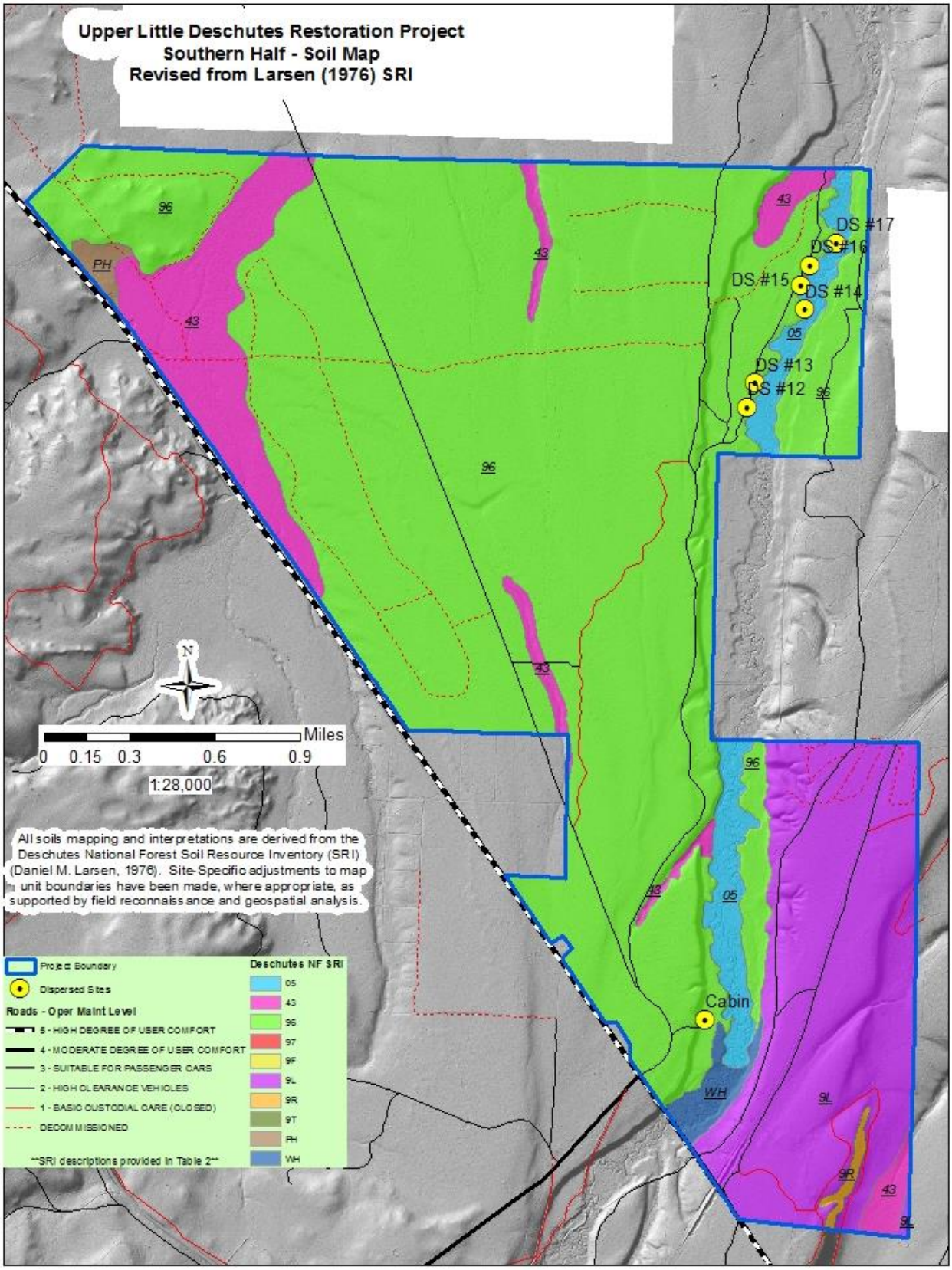

Figure 2 - Soil Map for the ULDR Project Area (South Half)

Table 1 - SRI Descriptions for the ULDR Project Area

SRI Mapping Unit	General Description	Total Acres / % of Project Area
5	Wet meadows – wet, nonforested areas, including meadows, wetlands, floodplains, depressions, and swampy areas. Soils may be wet for all or most of the year.	**293 acres / 5%**
15	Lodgepole basin frost pockets – depressions or nearly level land that supports lodgepole pine. Surface soils are generally pumiceous loamy sands and sands. Frost hazard is high due to limited air drainage and soil climatic and physical properties. Regeneration potential in this landtype is very low. (MAPPED ONLY IN COMPLEX – SEE SRI PH BELOW)	**(occurs only in complex – see SRI PH below)**
43	Nearly level glacial outwash plains, commonly near drainages. Slopes generally <5%. Lodgepole pine, forbs, grasses and sedges dominate. Poorly to somewhat poorly drained soils. Formed from ash, pumice, and alluvium over glacial outwash. Watertable typically present within two feet of soil surface; flooding common during spring runoff.	**325 acres / 5%**
96	Smooth, nearly level glacial outwash plains. Slopes generally <5% but may range up to 20%. Lodgepole pine, bitterbrush, squirreltail, needlegrass and sedges dominate. Excessively drained soils. Formed from thick to very thick layer of pumice and ash over older soils on glacial outwash deposits. Pumiceous loamy sands.	**4,248 acres / 68%**
97	Gentle to moderately sloping lava plains and toeslopes of major volcanoes. Slopes up to 30%. Ponderosa pine and lodgepole pine over bitterbrush, manzanita, sedges, squirreltail and needlegrass. Well to excessively drained soils. Formed from 40-60 inches of pumice and ash over older soils on basalts and andesites. Pumiceous loamy coarse sands. Depth to bedrock 40-80 inches.	**24 acres / <1%**
9F	Gently sloping glacial outwash and till plains. Slopes may range up to 30% but most <15%. Ponderosa pine, snowbrush, squirreltail, needlegrass, sedges dominate. Excessively drained soils. Formed from thick layer of pumice and ash over glacial outwash or till. Pumiceous loamy sands/coarse sands.	**262 acres / 4%**
9L	Gentle to moderately sloping lava plains, till plains, or outwash plains. Slopes up to 30%. Ponderosa pine, lodgepole pine, bitterbrush, manzanita, needlegrass, squirreltail, and sedges dominate. Excessively drained soils. Formed from a very thick (>60 inches) pumice mantle over an older soil on glacial deposits or lavas. Pumiceous loamy coarse sands over sandy pumice and pumice lapilli.	**1,086 acres / 17%**

SRI Mapping Unit	General Description	Total Acres / % of Project Area
9R	Steep, smooth to slightly dissected slopes along glacial valley walls, moraines, or volcanic ridges. Slopes 30-70%, aspects typically southerly. Ponderosa pine, manzanita, bitterbrush, snowbrush, sedges, and needlegrass dominate. Excessively drained soils. Formed from a very thick layer of pumice and volcanic ash over residuum and colluvium. Pumiceous loamy coarse sands.	**10 acres / <1%**
PH	Complex of 96 and 15	**15 acres / <1%**
WH	Complex of 5 and 43	**33 acres / <1%**
Total		**6,296 acres / 100%**

Sensitive Soils

Certain soil types in the project area are considered sensitive soil types. Sensitivity is a measure of both a soil's resistance, or degree of response to disturbance, and its resilience, or ability to recover after disturbance. On sensitive soil types, the magnitude of impairment resulting from treatment impacts may be greater and expected recovery rates may be slower than on non-sensitive soils. If it is expected that healthy soil function may be diminished after disturbance, protection or restoration actions may be warranted when planning landscape treatments. The Deschutes National Forest LRMP (1990) provides guidance on soil types that must be considered sensitive in the planning process (Appendix 14, Objective 5, p. Appendix 14-2). Criteria for sensitive soils include: slopes over 30%, frost pockets, seasonal or year-long high water tables, fine sandy loam or finer surface textures that will compact, extremely rocky soils, and/or high or extreme erosion hazard ratings. SRI mapping units in the ULDR project area that are considered sensitive, along with concerns and opportunities for these soil types, are displayed in Figure 3 and Table 2 below. Deschutes LRMP guidance requires that the use of mechanical equipment be regulated in sensitive soil areas to protect the soil resource (LRMP S&G SL-5). Specific design criteria were developed for operations on sensitive soil types.

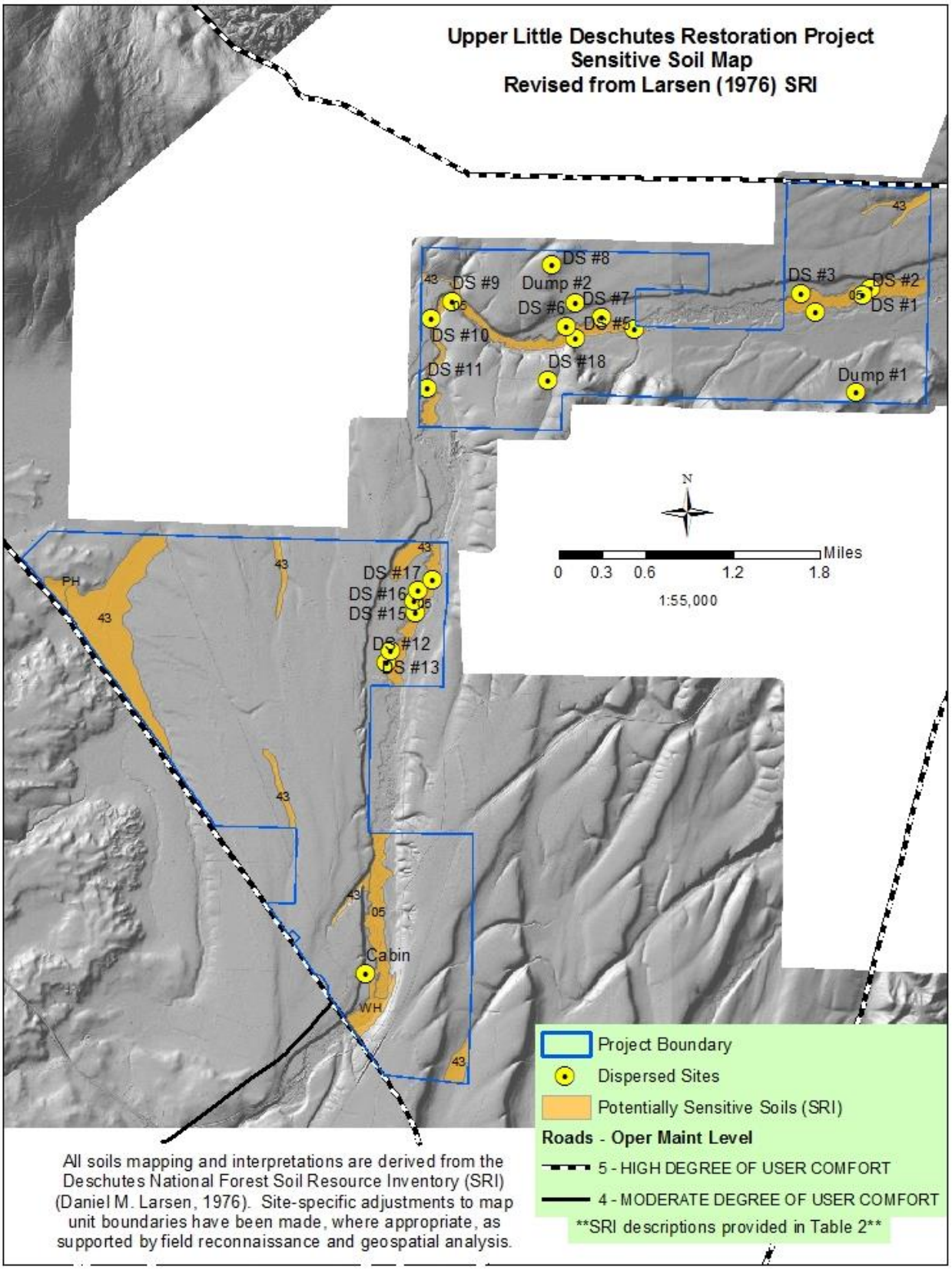

Figure 3 – Sensitive Soils Map for the ULDR Project Area

Table 2 - Sensitive Soil Types in the ULDR Project Area

SRI Unit	Description	Concern	Area Where Present	Total Acres in Project Area (% of Project Area)
5	Wet meadows	High water tables; unsuited for timber production	Floodplain of the Little Deschutes River	293 (5%)
15*	Lodgepole basins	High frost hazard limits regeneration success	Northwestern corner of southern block, along Highway 58	See complex PH below
43	Nearly level glacial outwash plains, commonly near drainages	High water tables, spring surface flooding ; high puddling/rutting hazard	Lower-lying landscape positions throughout project area	325 (5%)
PH (complex of 96 and 15)**	Nearly level glacial outwash plains with lodgepole basins	See SRI 15 above		15 (<1%)
WH (complex of SRIs 5 and 43)	Wet meadows and glacial outwash plains	See SRIs 5 and 43 above		33 (<1%)
Slopes over 30% not falling within another sensitive SRI Unit	Miscellaneous areas where slope exceeds 30 percent	High displacement and erosion hazard	Isolated areas along terraces	Negligible
TOTAL				**666 (11%)**

***Occurs only in complex, of limited extent in project area**
****Complex mapping unit where only one component is a potentially-sensitive soil type**