Appendix E.—Criteria Used in Rating Soils for Woodland Management

Criteria for Rating Equipment Limitations [1]

Rating	Percent slope	Drainage class (wetness)	Stoniness class (surface)	Rockiness class (surface)	Texture
Slight	0 to 30	Excessive, somewhat excessive, well	None (0 to 3 percent) Stony (3 to 15 percent)	None (0 to 2 percent) Rocky (2 to 10 percent)	Coarse textured soils—loamy sands, sands, sandy loams Medium textured soils—very fine sandy loam, loam, silt loam, silt
Moderate	30 to 50 [2]	Moderately well, somewhat poor	Very stony (15 to 50 percent)	Very rocky (10 to 25 percent)	Moderately fine textured soils—clay loam, sandy clay loam, silty clay loam
Severe	50+	Poor, very poor	Extremely stony (50 to 90 percent) Rubble land (90+ percent)	Extremely rocky (25 to 50 percent) Rock outcrop (50 to 90 percent) Rubble land (90+ percent)	Fine textured soils—sandy clay loam, silty clay, clay

[1] Use the most limiting factor when ratings are made. Ratings are made for the principal timber-harvesting equipment, including logging trucks, bulldozers, and rubber-tired skidders. When the rating is severe, other timber-harvesting methods, including cable yarding systems and helicopters, should be given serious consideration or the logging should be postponed. The major factors influencing the ratings are slope, drainage, stoniness, rockiness, and content of clay. A combination of any two moderate ratings could classify as a severe overall rating.

Stone content (surface layer)

NSH	Class	Percent	Cropland	Range	Woodland
1	0	0 to .01	None	None	None
2	1	.01 to 0.1	Stony	None	None
3	2	0.1 to 3	Stony	None	None
4	3	3 to 15	Very stony	Stony	Stony
5	4	15 to 50	Extremely stony	Very stony	Very stony
6	5	50 to 90	Extremely stony	Extremely stony	Extremely stony
7	6	>90 (Rubble land)			

[2] Rate severe if a pickup is used in harvesting firewood.

Key for Rating Soils for Reforestation (Seedling Mortality)

This key was used to rate the soils of the survey area for seedling mortality. The adjectives used in the ratings are:

a) Slight
b) Moderate
c) Severe

The general meanings are as defined in the SCS Woodland Manual Sec. 537.11-2. The species rated in this key are redwood, Douglas-fir, ponderosa pine, and white fir. Other species can be added. Chemical toxicities, imbalances, pH problems, and other problems, such as serpentine, are not included. Any rating may be raised one or two classes for these problems, depending on their severity. Observations in a soil survey area may be used to modify the rating. Following is a flowchart that may be helpful in fitting other species or critical soil properties into the key.

1. Soil drainage class (if the soil is subject to flooding, use b):
   a) Very poor ..... severe
   b) Poor or somewhat poor 2
   c) Moderately well or better 3

2. Species being rated:
   a) Douglas-fir, ponderosa pine, or true fir ..... severe
   b) Redwood 3

3. Depth to water table, claypan, or other restrictive layer:
   a) Less than 12 inches ..... severe
   b) More than 12 inches 4

4. Species being rated:
   a) Redwood 5
   b) Douglas-fir 13
   c) Ponderosa pine 18
   d) White fir 19

5. Moisture-temperature regime:
   a) Aquic ..... severe
   b) Udic 6
   c) Ustic-isomesic 9
   d) Other than a, b, or c ..... severe

6. Surface gravel:
   a) Very gravelly (more than 35 percent) 7
   b) Not very gravelly (0 to 35 percent) ..... slight

7. Are surface coarse fragments sufficient to hinder reforestation (more than about 75 percent coarse fragments)?
   a) Yes ..... severe
   b) No 8

8. Steepness of slope:
   a) Less than 75 percent ..... slight
   b) More than 75 percent ..... moderate

9. AWC of top 24 inches of profile:
   a) More than 3.5 inches 6
   b) 2.5 to 3.5 inches 10
   c) Less than 2.5 inches ..... severe

10. Surface gravel:
    a) Very gravelly (more than 35 percent) 11
    b) Not very gravelly (0 to 35 percent) ..... moderate

Key for Rating Soils for Reforestation (Seedling Mortality)—Continued

11. Are surface coarse fragments sufficient to hinder reforestation (more than about 75 percent coarse fragments)?
    a) Yes ..... severe
    b) No 12

12. Steepness of slope:
    a) Less than 75 percent ..... moderate
    b) More than 75 percent ..... severe

13. Moisture-temperature regime:
    a) Xeric-mesic 17
    b) Ustic 14
    c) Udic 6
    d) Other than a, b, or c ..... severe

14. Aspect (if direction of slope is not important, use a):
    a) North or east—azimuth 270-135 degrees 15
    b) South—azimuth 135-270 degrees 16

15. AWC of top 24 inches of profile:
    a) More than 2.5 inches 6
    b) 1.5 to 2.5 inches 10
    c) Less than 1.5 inches ..... severe

16. AWC of top 24 inches of profile:
    a) More than 3.0 inches 6
    b) 2.0 to 3.0 inches 10
    c) Less than 2.0 inches ..... severe

17. Aspect (if direction of slope is not important, use a):
    a) North or east—azimuth 270-135 degrees 16
    b) South—azimuth 135-270 degrees 9

18. Moisture-temperature regime:
    a) Xeric-mesic 14
    b) Xeric-frigid 20

19. Annual precipitation:
    a) Less than 20 inches ..... severe
    b) More than 20 inches 18b

20. Aspect (if direction of slope is not important, use b):
    a) North 15
    b) South 21

21. AWC of top 24 inches of profile:
    a) More than 2.0 inches 6
    b) 1.5 to 2.0 inches 10
    c) Less than 1.5 inches ..... severe

Criteria for Rating Plant Competition [1]

Rating	Drainage	Depth	Site class	Total AWC
Slight	Excessive	Less than 10 inches	5, 6	Less than 4 inches
Moderate	Somewhat excessive	10 to 20 inches	3, 4	4 to 7 inches
Severe	Well, moderately well, somewhat poor, poor, very poor	More than 20 inches	1, 2	More than 7 inches

[1] Plant competition refers to the effect of other plants (all kinds) on the growth and survival of desirable tree species—both conifers and broad-leaved trees. In most cases the desirable trees will be conifers. Plant competition is related to soil fertility, depth, available water capacity, and drainage. On wet soils competition from phreatic plants will be severe. On droughty soils plant competition will be minimal. On frigid soils the available water capacity may be one class lower. On oak woodland the rating should be severe because of grass competition.

Criteria for Rating Susceptibility to Burning Damage (Prescribed Burning and Wildfire) [1]

Soil property	Rating guide	Rating guide	Rating guide	Rating assigned
Content of organic matter in the top 4 inches	>1 percent Rating=1	<1 percent Rating=2	---	#___
Content of coarse fragments in the top 4 inches	<35 percent Rating=1	35 to 65 percent Rating=2	>65 percent Rating=5	#___
Texture in the top 4 inches	SCL, CL, SICL, SC, SIC, C Rating=1	L, SIL, SI Rating=2	S, LS, SL Rating=3	#___
Slope (percent)	0 to 30 Rating=1	30 to 50 Rating=2	>50 Rating=3	#___
				Total=___

Total rating	*Susceptibility to burning damage* [2]
4 to 6	Slight
7 to 9	Moderate
10 to 13	Severe

[1] Soil damage can sometimes occur from burning. The risk of damage increases with the intensity of heat. The damage is mainly related to the loss of organic matter. Some soils have characteristics that enable them to withstand this loss better than other soils. These characteristics are used to rate the soils for their susceptibility to damage from burning, as expressed in the table. The rating system is intended to be used as a general guideline. Other factors not mentioned may alter the rating.

[2] Rate soils predominantly on southeast to west aspects (135 to 270 degrees azimuth) one category higher.

Criteria for Rating Soil Compaction Hazard [1]

USDA texture in the top 10 inches	Ochric epipedon		Mollic or umbric epipedon
	Weak or platy structure [2]	Moderate or strong structure	
Volume of coarse fragments >65 percent, all textures, and all ashy, ashy-skeletal, medial, medial-skeletal, and cindery material	Slight	Slight	Slight
Volume of coarse fragments 35 to 65 percent, all very gravelly textures (skeletal soils)	Moderate	Slight	Slight
Volume of coarse fragments < 35 percent:			
S, LS	Slight	Slight	Slight
SCL, SC, FS, LFS, FSL, SL	Severe	Moderate	Moderate
L, SIL, SICL	Severe	Moderate	Slight
C, SIC	Moderate	Slight	Slight

[1] A rating of severe indicates that the soil is easily compacted and compaction is not easily mitigated, moderate indicates that the soil is compacted with moderate effort and compaction is easily mitigated, and slight indicates that considerable effort is needed to compact the soil.

[2] Very coarse prismatic structure is regarded as weak, essentially massive.

Criteria for Rating Difficulty of Revegetating Exposed Subsoil

Subsoil horizons are frequently exposed during forest management activities. This exposure occurs on road cuts and fills and on some skid roads. Land managers may desire to revegetate these areas, and they may be required to do so by law or by regulations of an agency. Revegetation may be for erosion control or for timber production (as on old skid roads planted to trees). Separate ratings are given for revegetation with either grass or trees. The characteristics of the subsoil that influence planting conditions, germination, and the subsequent growth rate are considered in the ratings. These are general ratings; they do not preclude the need for onsite investigation of individual projects.

1. Soil moisture and/or temperature regime:
   Frigid=2; ustic=2; xeric-mesic=4; thermic=6; aquic or udic=0.
   Points: _____
2. General texture:
   Fine (SC, SIC, C)=5; moderately fine or coarser=0.
   Points: _____
3. Drainage class:
   Very poor=25; poor or somewhat poor=15; moderately well or better=0.
   Points: _____
4. Content of coarse fragments:
   0 to 35 percent=0; 35 to 65 percent=5; >65 percent=15.
   Points: _____
5. AWC of total soil profile:
   Very low (<3 inches)=10; low (3 to 6 inches)=5; moderate or higher (>6 inches)=0.
   Points: _____
6. Underlying rock or material:
   Hard bedrock with little fracturing=5; soft rock, unconsolidated material, or highly fractured rock=0.
   Points: _____
7. Original soil depth:
   >40 inches=0; 20 to 40 inches=4; 10 to 20 inches=8; <10 inches=10.
   Points: _____
8. Slope:
   0 to 30 percent=0; 30 to 50 percent=2; 50 to 75 percent=4; >75 percent=6.
   Points: _____
9. Nutrient deficiencies, imbalances, or toxicities:
   Increase rating according to the magnitude of the problem. Serpentinitic parent material is an example of the type of problem.

Add up points for each characteristic to obtain the rating—

For grass revegetation:	*Slight*	0 to 20 points
	Moderate	21 to 29 points
	Severe	30+ points
For tree revegetation:	*Slight*	0 to 13 points
	Moderate	14 to 22 points
	Severe	23+ points