FYS207 WOU Earth Corps

Introduction to Soils Lab Exercise

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FYS207 SOIL LAB PART 1. SOIL TEXTURE

Introduction

One of the most basic characteristics of soils is that of the composition and size of the mineral components. The size of the mineral components, or grains, that make up the soil is a fundamental characteristic that controls moisture content, erodibility, and agricultural fertility management. Soil texture classification considers three fundamental grain sizes of the fine sediment materials that make up the structure of the soil: Sand, Silt, and Clay. The triangular graph shown below is a visual tool that allows classification of soils based on their texture. A clay-rich soil is compactible and resists infiltration of rainfall ("poorly drained"), a sand-rich soil is loose and granular, with high rates of water infiltration ("well drained"), and a silt-rich soil is somewhere in between. The term "loam" refers to a soil with relative equal admixtures of sand, silt, and clay; and is generally in a sweet spot of texture with respect to soil structure, water retention / drainage, and fertility management.

Exercise – Plot Soil Sample Textures on the Triangular Diagram and Classify the Soil Texture

Table 1 below shows five soil samples (A, B, C, D, E) that have been analyzed for sediment grainsize of the three components, measured in grams of mass for each category, as measured on a mass balance in a lab. Your goal is to complete the data tables, then plot and label the 5 samples on the triangular graph below.

Step 1. Watch a tutorial video on how to plot three component systems on a ternary diagram. https://www.youtube.com/watch?v=h8tFnC4pNGc (Youtube Video ~ 7 minutes)

Step 2. Complete the data tables 1 and 2 for each sample, by converting the mass in grams for each of the sand-silt-clay fractions, into percent of total mass (add up the total mass for each sample, divide each fraction of mass by the total x 100% to derive percent sand, silt, and clay. Note: these percentages need to add up to 100% for reach sample). Total the mass and fill in Table 1, calculate sand-silt clay% in Table 2.

Step 3. Using the percentages of sand-silt-clay for each sample, plot and label each of the 5 samples as point on the ternary diagram, and classify the soil by it's textural terminology shown on the diagram; depending on where it plots. List the classification of the soil texture in Table 3.

Table 1. Soil Sample Mass (grams)

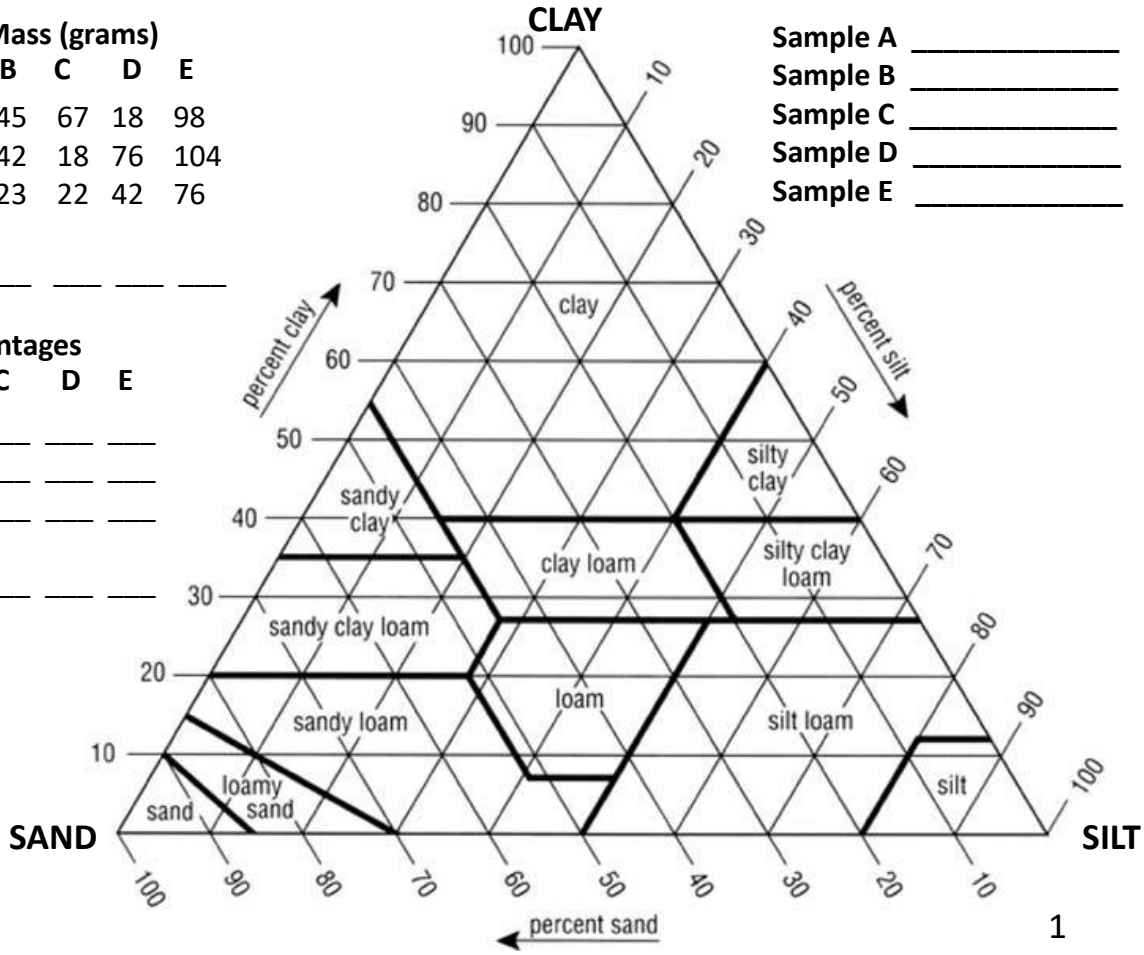
	A	B	C	D	E
Sand (g)	20	45	67	18	98
Silt (g)	50	42	18	76	104
Clay (g)	88	23	22	42	76
Total Mass (g)	___	___	___	___	___

Table 2. Soil Sample Percentages

	A	B	C	D	E
Sand (%)	___	___	___	___	___
Silt (%)	___	___	___	___	___
Clay (%)	___	___	___	___	___
Total %	___	___	___	___	___

Table 3. Soil Classification

Sample A _____
Sample B _____
Sample C _____
Sample D _____
Sample E _____



Part 2. Soil-Landscape Analysis for Mid-Willamette Valley (Coffin Butte Study Area, Benton County, OR)

Soil Surveys are represented by maps of soils prepared by scientists from the U.S. Natural Resources and Conservation Service (NRCS). Soil surveys are mapped on air photo base maps, with soil units primarily distinguished on the basis of texture, color, parent material and slope of the topography (amongst other characteristics). Soil surveys along with topographic and geologic maps, provide essential natural resource information needed for planning and design of sustainable human land-use systems.

Pages 4 through 20 show relevant maps and soils information for the Coffin Butte study area, located about 10 miles south of Monmouth on HWY99, just north of Corvallis in the Mid-Willamette Valley. Coffin Butte is associated with an active landfill and solid waste disposal facility operated by Republic Services, and is located in the Luckiamute River watershed which drains rivers from the Coast Range eastward to the Willamette River. The Luckiamute is a significant watershed in the Monmouth-Independence area, and provides water resources and ecological services for our local communities. All of the garbage and municipal waste from the Monmouth-Corvallis area is disposed of and managed at Coffin Butte. This area is also representative of typical topographic elements of the mid-Willamette Valley, in the vicinity of Monmouth; as well as the related soil types that are found in our area.

The following is a summary of maps and soil information provided below:

OBJECTIVES: The goal of the exercise is for students to engage basic map reading, and to answer thinking questions related to the landscape and soils of the Coffin Butte Study Area, Luckiamute Watershed, mid-Willamette Valley.

INTRUCTIONS: Follow the directions below, and answer the questions in the spaces provided.

Examine the base map of the Willamette Valley on p. 4. Locate Monmouth and Corvallis, the Coffin Butte site is located ~5 km due north of Corvallis. Answer questions 1-8.

1. What part of the Willamette Valley is the study site located?

2. Which mountain range lies west of the Willamette Valley?

3. Which mountain range lies east of the Willamette Valley?

4. The Northern Willamette Valley is separated by the Southern Willamette Valley by which to upland hill features west of Salem?

5. Using the bar scale provided, determine the straightline distance between the point marked as Corvallis, and the point marked as Portland on the base map. Answer in kilometers and miles. Show all of your math work.

6. The Willamette River flows downhill into the Columbia River, where they merge near Portland. In which direction is the Willamette River flows?

7. List the four major river tributaries shown that drain from the Cascade Range into the Willamette River.

8. Which way does water flow under the influence of gravity: from low elevation to high elevation or from high elevation to low elevation?

Examine the base maps for physiography and annual precipitation of the Luckiamute River Basin on p. 5-6. Note the Coffin Butte Study site is located at the map point "7" or "stop 7"; spot elevations are listed in meters relative to sea level. Answer Questions 9-19.

9. What is the highest elevation in the Luckiamute Watershed in meters?

10. What is the lowest elevation in the Luckiamute Watershed in meters?

11. Using the bar scale, measure the straight line distance in km between the highest point and lowest point marked on the map on p. 5.

12. Calculate the average slope or gradient of the Luckiamute River Basin using data from questions 9-11, and the following equation: Average Gradient = (High Elev. – Low Elev.) / Straight Line Distance
Answer in meters of elevation drop per kilometers of distance. Show all of your math work.

13. Examine the average annual precipitation (rainfall) data shown on maps from p. 5-6. Is the precipitation evenly distributed across the watershed or is it variable?

14. Identify the general locations of the highest average annual precipitation in the basin. (to east or west?)

15. Identify the general locations of the lowest average annual precipitation in the basin. (to east or west?)

16. Based on your weather knowledge, or googling… Which direction do storm systems track across Oregon? From west to east, from the ocean towards the land? Or from east to west, from the land towards the ocean?

17. On the map on p. 5, measure the straight-line distance from the highest average annual precipitation point to the lowest average annual precipitation point shown on the map. Similar to question 12 above, calculate the precipitation gradient across the basin in mm / km. Show all of your math work.

18. Based on the elevation data provide, in which direction is the Luckiamute River basin generally flowing? From north to south? South to north? East to west? Or west to east?

19. Which major river system does the Luckiamute drain into?

Examine the three-dimensional landscape model and topographic map of the Coffin Butte Study Area on pages 7 and 8; answer the following questions 20-25.

20. Identify the following labelled topographic features as either a upland "hill" or a "lowland" valley; and identify the slope as either "steep" or "gentle"

a. Coffin Butte
b. Poison Oak Hill
c. Berry Creek
d. Soap Creek
e. the location marked "Wellsdale"

21. Which direction is Soap Creek flowing to the north or south?

22. Which direction is Berry Creek flowing to the north or south?

23. Based on the 3-D block diagram shown on page 7, what type of rock material underlies the landscape below Coffin Butte, choose one: Sandstone, Granite, Basalt, Granodiorite, Marble or Shale?

24. What is the name of the soil that overlies the bedrock, near the surface. (see p. 7)

25. True or False: the rock material beneath Coffin Butte is devoid of groundwater, none available for use. (see p. 7)

READING SOIL SURVEY INSTRUCTIONS AND EXAMPLE: Examine the Coffin Butte Soil Survey Map on p. 9, and compare to the topographic map on p. 8. Note that the soils units are marked with black line polygons and labeled with letter designations, for example: Dne, WLG, Joc, WoA, etc. The explanation and descriptions of the letter codes for the soil units are provided on the tables on pages 10 and 11. For example, the feature labeled Coffin Butte on p. 9, is mapped with soil unit Dne; now refer to the explanation on page 10, soil unit Dne = Dixonville Silty Clay Loam 20-30 percent slopes. For more information on the details of this soil, all of the soil unit descriptions are provided on pages 13 – 20. Scan down the list of detailed soil descriptions in alphabetical order and find the "Dixonville" Series on p. 13. Here are some details of the description for unit Dne on Coffin Butte, "Dixonville" Series:

Dixonville Series

The Dixonville series consists of well-drained, moderately deep soils that formed in colluvium weathered from basic igneous rocks. These soils occupy low foothills and steep uplands. Slopes are 3 to 50 percent.

Where these soils are not cultivated, the vegetation is mainly annual grasses, weeds, scattered poison-oak, Oregon white oak, and wild rose. Douglas-fir is on some of the steeper slopes and at higher elevations. Elevation ranges from 350 to 1,000 feet. Average annual precipitation is 40 to 60 inches, average annual air temperature is 52° to 54° F., and the frost-free season is 165 to 200 days.

In a representative profile, the surface layer is very dark brown and very dark grayish-brown silty clay loam and silty clay about 13 inches thick. The subsoil is very dark brown and dark-brown silty clay and clay about 24 inches thick. Weathered basalt bedrock underlies the subsoil at a depth of about 37 inches.

Dixonville soils are used for pasture, cereal grain, homesites, recreation, water supply, woodland, and wildlife habitat.

Dixonville silty clay loam, 20 to 30 percent slopes (DnE).—This soil occupies long foot slopes on uplands. Slopes average about 25 percent.

Based on the process described for reading the soil survey information above, answer the following questions using the soil survey map and related information.

26. What is the soil unit that is located on top of Coffin Butte (see above)?

Read the detailed description, and follow below with answers on this soil type:

A. what type of parent rock is this soil typically formed on? Igneous, sedimentary or metamorphic?
B. what types of topographic features does this soil form: uplands/hillslopes or valley bottoms?
C. What is the typical natural vegetation that prefers to grow on these types of soils?
D. What types of crops are recommended to grow on these soils?
E. What color is the surface layer of the soil?

27. Examine the soil map on p. 9, what is the letter code of the soil found along Soap Creek (to west of Coffin Butte)? What is the name of this soil (from tables on p. 10-11)?

Locate the detailed soil description on p. Read the detailed description on p. 17. Answer questions below:

A. what type of parent rock is this soil typically formed on? Bedrock or river sediment?
B. what types of topographic features does this soil form: uplands/hillslopes or valley bottoms?
C. What is the typical natural vegetation that prefers to grow on these types of soils?
D. What types of crops are recommended to grow on these soils?
E. What color is the surface layer of the soil?

28. Examine the topographic map on p. 8, and soil map on p. 9. Locate Poison Oak Hill. what is the letter code of the soil found on this feature? What is the name of this soil (from tables on p. 10-11)?

Locate the detailed soil description on p. Read the detailed description on p. 19. Answer questions below:

A. what type of parent rock is this soil typically formed on? Igneous, Sedimentary or Metamorphic
B. what types of topographic features does this soil form: uplands/hillslopes or valley bottoms?
C. What is the typical natural vegetation that prefers to grow on these types of soils?
D. What types of crops are recommended to grow on these soils?
E. What color is the surface layer of the soil?

29. Based on your observations in questions 26-28 above, briefly describe (3-4 sentences) the differences in soil types and land-use observed in valley-bottom vs. upland topographic areas near Coffin Butte.

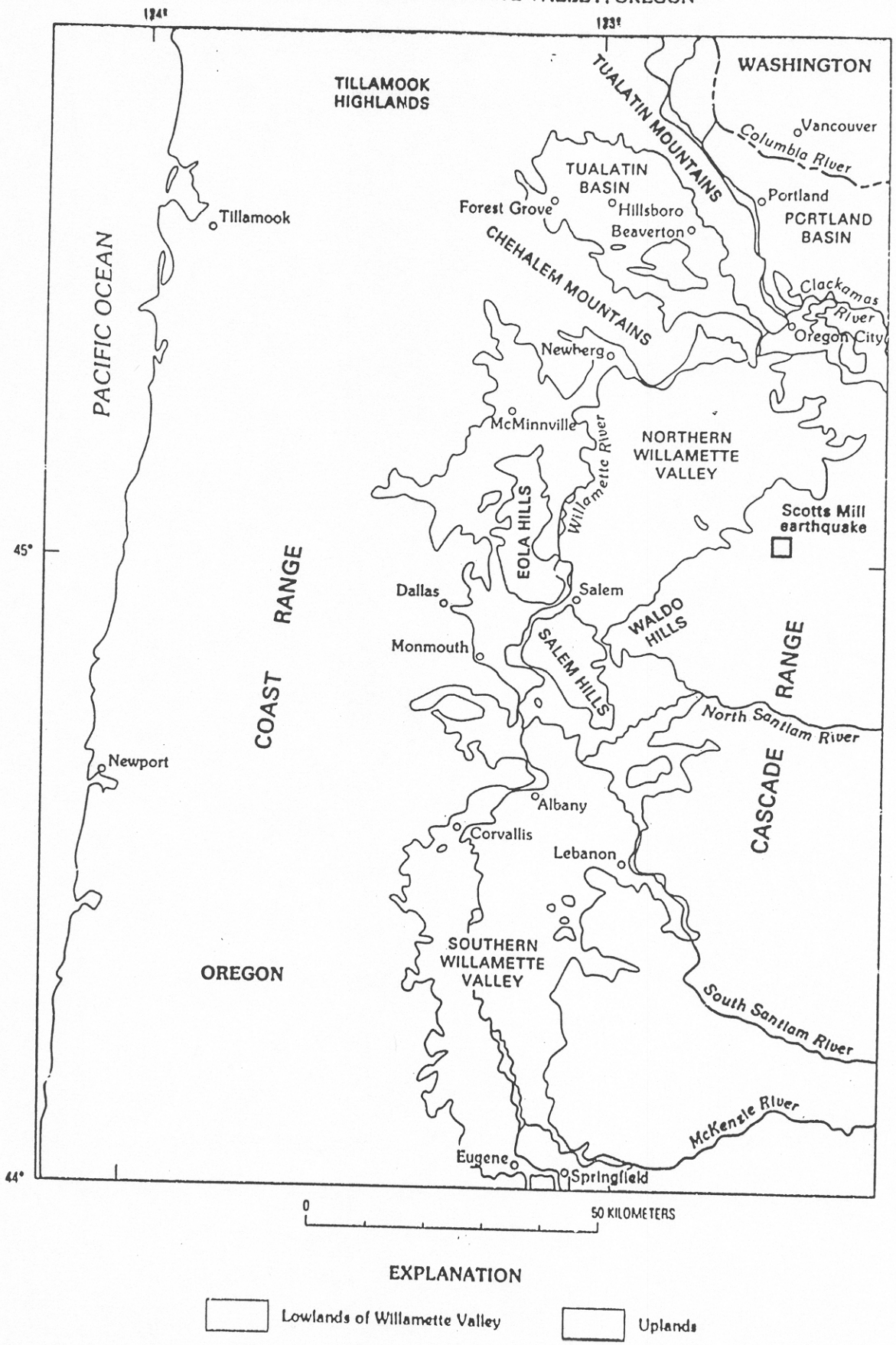


Figure 77. Geographic and physiographic features of the Willamette Valley and Portland and Tualatin basins, northwestern Oregon. The square indicates the epicenter of the March 25, 1993, Scotts Mills earthquake.

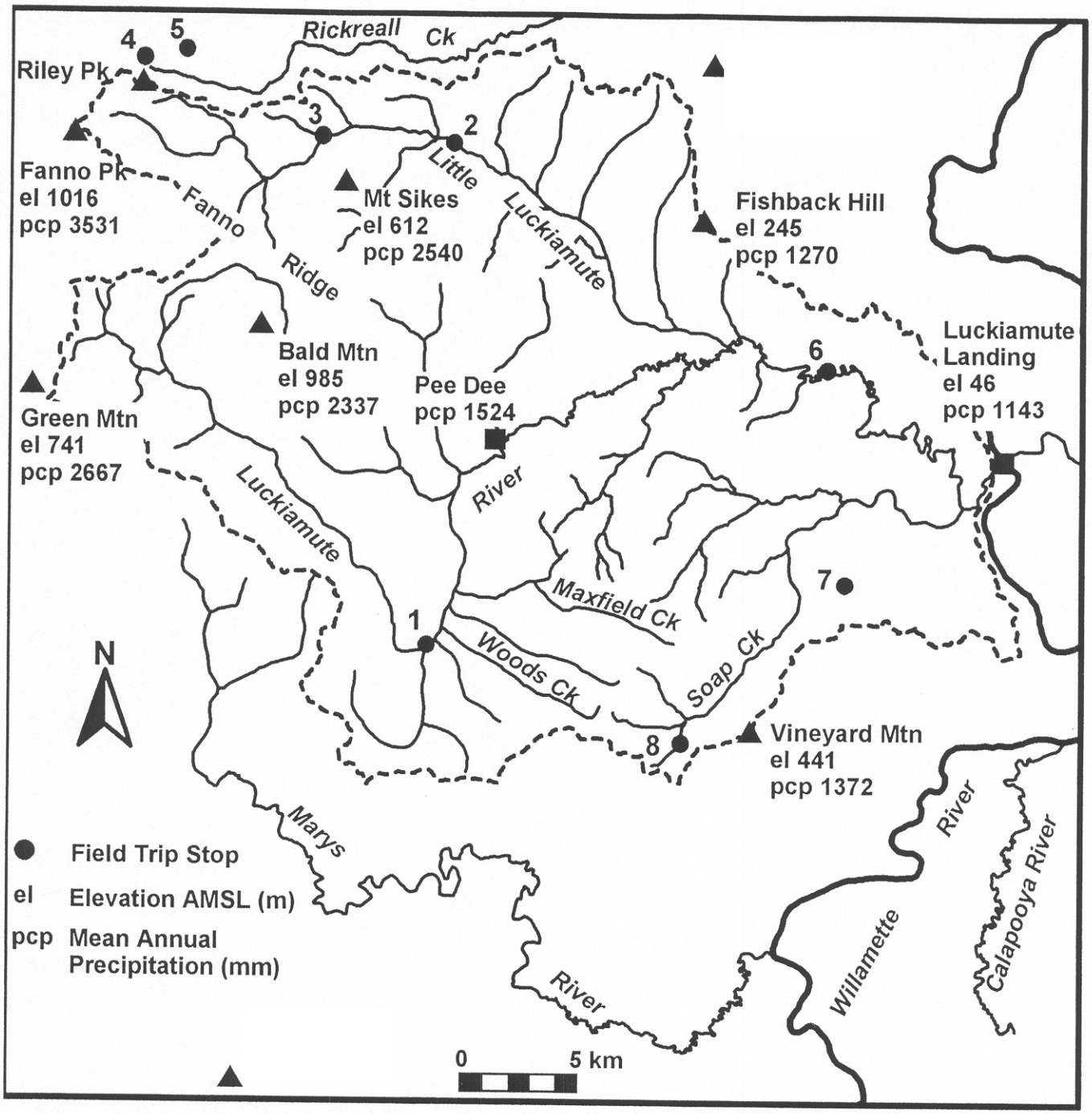
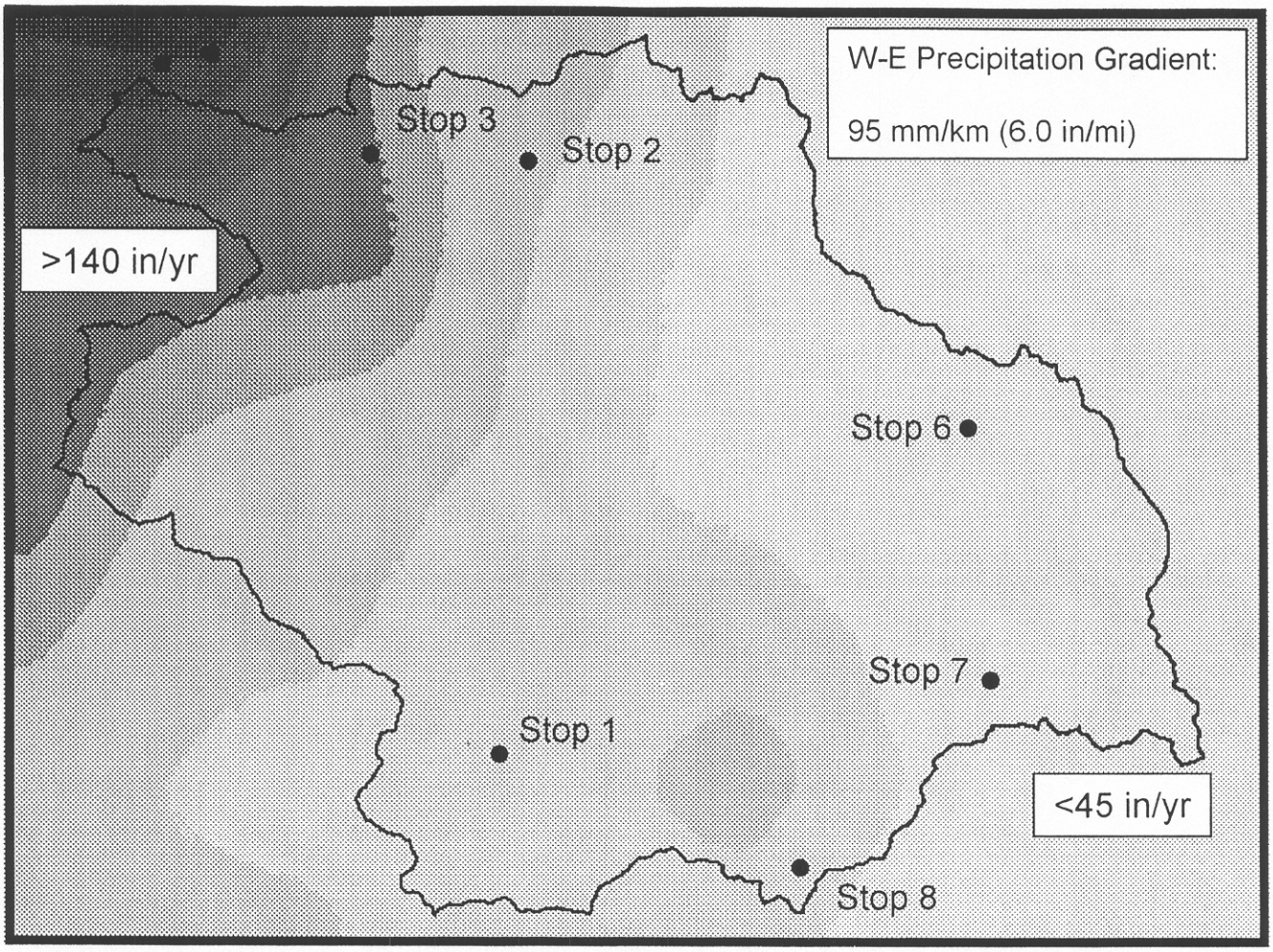


Figure 2. Physiographic map and spot annual precipitation for the Luckiamute Watershed.



- Tripstop.shp
- Luckbound.shp

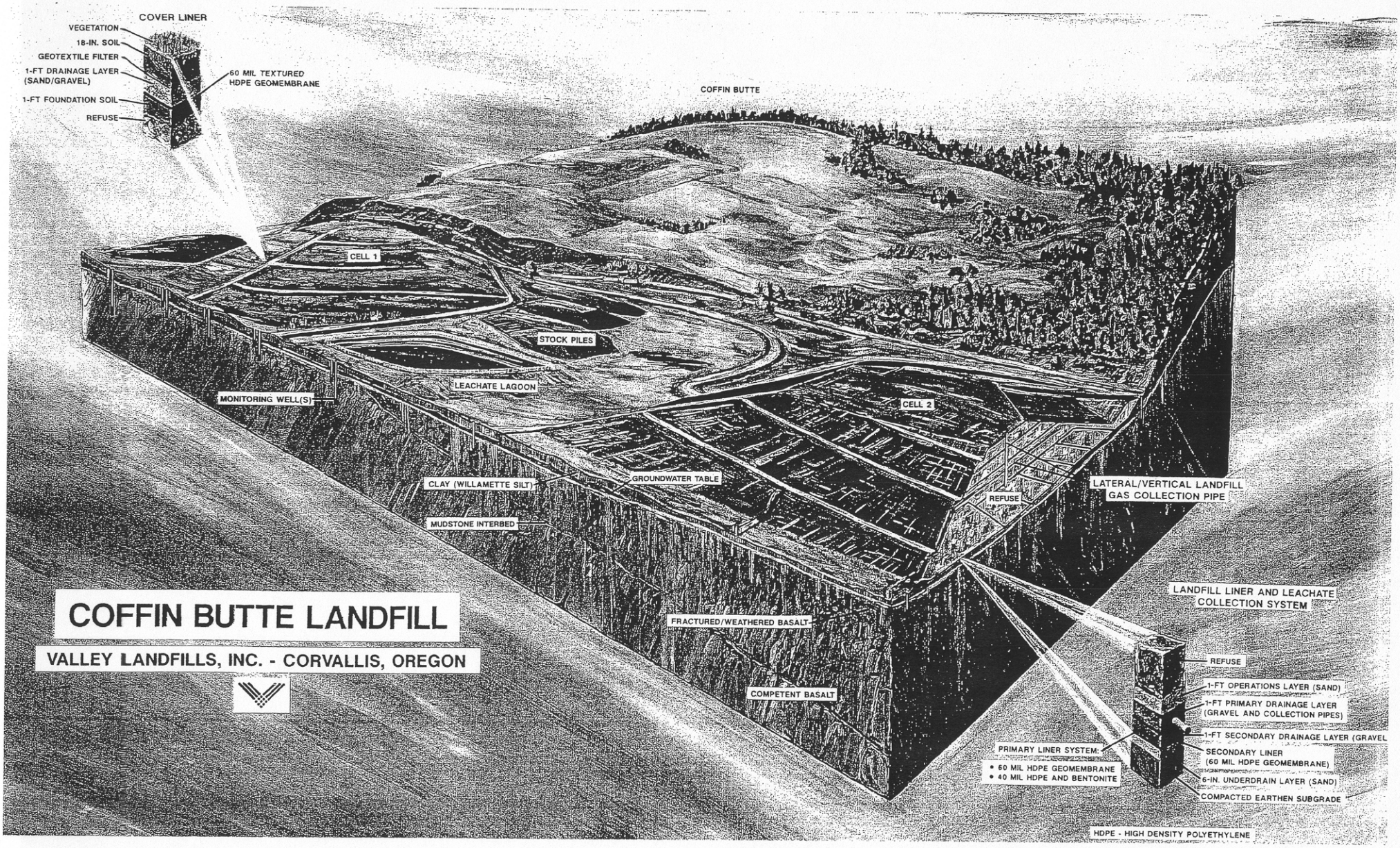
Precip_90 (inches)

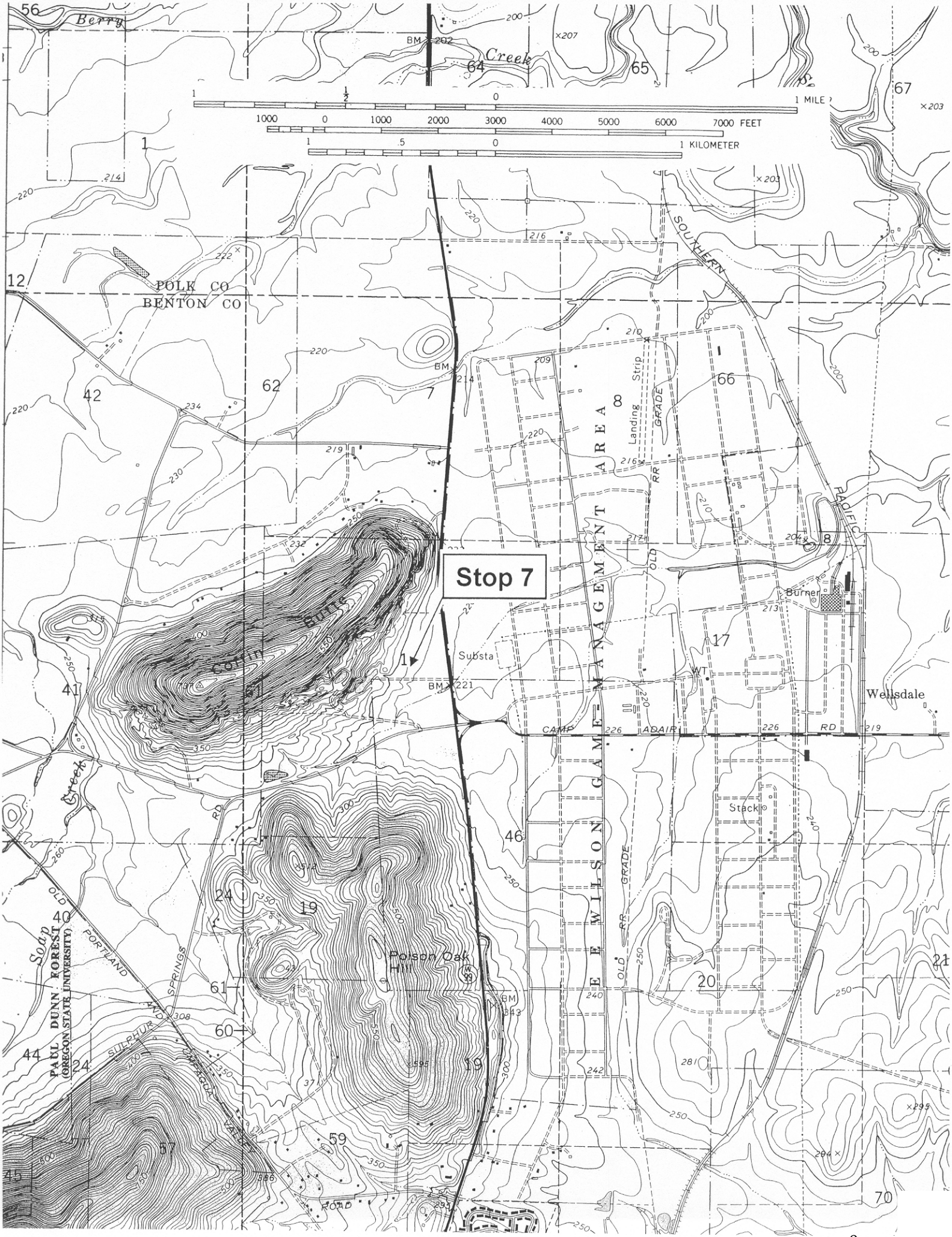
- 40 - 55
- 55 - 70
- 70 - 90
- 90 - 100
- 100 - 120
- 120 - 130
- 130 - 150
- 150 - 165
- 165 - 180
- No Data

1990 Average Annual Precipitation for the Luckiamute Watershed (inches) (from the Oregon Climate Service)

Annual Precipitation

Basin Maximum: 3600 mm (>140 in) – Divide
Basin Minimum: 1140 mm (~45 in) – Willamette Valley
Basin-wide Precipitation Average = 1894 mm (~75 in)
Seasonal Precipitation Cycle (October – March)


COVER LINER
VEGETATION
18-IN. SOIL
GEOTEXTILE FILTER
1-FT DRAINAGE LAYER (SAND/GRAVEL)
1-FT FOUNDATION SOIL
REFUSE
60 MIL TEXTURED HDPE GEOMEMBRANE
COFFIN BUTTE
CELL 1
STOCK PILES
LEACHATE LAGOON
MONITORING WELL(S)
CELL 2
CLAY (WILLAMETTE SILT)
GROUNDWATER TABLE
MUDSTONE INTERBED
REFUSE
LATERAL/VERTICAL LANDFILL GAS COLLECTION PIPE
FRACTURED/WEATHERED BASALT
COMPETENT BASALT
COFFIN BUTTE LANDFILL
VALLEY LANDFILLS, INC. - CORVALLIS, OREGON
LANDFILL LINER AND LEACHATE COLLECTION SYSTEM
REFUSE
1-FT OPERATIONS LAYER (SAND)
1-FT PRIMARY DRAINAGE LAYER (GRAVEL AND COLLECTION PIPES)
1-FT SECONDARY DRAINAGE LAYER (GRAVEL
PRIMARY LINER SYSTEM:
• 60 MIL HDPE GEOMEMBRANE
• 40 MIL HDPE AND BENTONITE
SECONDARY LINER (60 MIL HDPE GEOMEMBRANE)
6-IN. UNDERDRAIN LAYER (SAND)
COMPACTED EARTHEN SUBGRADE
HDPE - HIGH DENSITY POLYETHYLENE


Stop 7
POLK CO
BENTON CO
PAUL DUNN FOREST
(OREGON STATE UNIVERSITY)
Soap Creek
Berry Creek
Collin Butte
Poison Oak Hill
Wellsdale
Burner
Stack
Substa
WT
BM 214
BM 202
BM 221
BM 343
CAMP ADAIR RD
OLD PORTLAND AND SPRINGS SULPHUR SPRINGS AND CANYONVILLE ROAD
SOUTHERN PACIFIC RR GRADE
OLD RR GRADE
Landing Strip
E E WILSON GAME MANAGEMENT AREA
1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER


1 285 000 FEET
395 000 FEET
POLK COUNTY
WILSON
MANAGEMENT
PAUL DUNN STATE FOREST
Coffin Butte
QUARRY
QUARRY
Soap Creek
Soap Cr.
12
13
18
19
24
7
99 W
T. 10 S.
R. 5 W.
R. 4 W.
(Joins sheet 4)
WeA
WoA
WeC
Am
Da
Co
Wa
WkB
WLG
DnE
DnC
DnD
Ba
JoC
JoD
HeC
Cn
AbB
PrC
PrD
PhC
Mn
AbA

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series t
the introduction to the section it is in for general information about its management. Wildlif

Acreage and extent,
table 1, p. 12.
Predicted yields,
table 2, p. 56.

Map symbol	Mapping unit	Page	Capability unit		Woodland suitability group		Wildlife group
			Symbol	Page	Symbol	Page	Number
AbA	Abiqua silty clay loam, 0 to 3 percent slopes	11	I-1	46	---	--	1
AbB	Abiqua silty clay loam, 3 to 5 percent slopes	12	IIe-1	47	---	--	1
Am	Amity silt loam	13	IIw-1	48	---	--	2
ApC	Apt silty clay loam, 3 to 12 percent slopes	14	IIIe-4	51	2c1	64	4
ASD	Apt silty clay loam, 5 to 25 percent slopes	13	IVe-3	52	2c1	64	4
ASF	Apt silty clay loam, 25 to 50 percent slopes	14	VIe-1	54	2c3	65	4
ATD	Apt silty clay loam, uneven, 5 to 25 percent slopes	14	IVe-4	52	2c2	64	4
Ba	Bashaw silty clay loam	15	IVw-5	53	---	--	2
Bc	Bashaw clay	14	IVw-4	53	---	--	2
BeC	Bellpine silty clay loam, 3 to 12 percent slopes	15	IIe-2	47	2c4	65	4
BeD	Bellpine silty clay loam, 12 to 20 percent slopes	15	IIIe-1	50	2c4	65	4
BeE	Bellpine silty clay loam, 20 to 30 percent slopes	15	IVe-1	51	2c4	65	4
BeF	Bellpine silty clay loam, 30 to 50 percent slopes	15	VIe-2	54	2c5	65	4
BLE	Blachly silty clay loam, 3 to 30 percent slopes	16	IVe-4	52	2c2	64	5
BLF	Blachly silty clay loam, 30 to 50 percent slopes	16	VIe-1	54	2c3	65	5
BOF	Bohannon gravelly loam, 25 to 50 percent slopes	16	VIe-1	54	3r1	67	5
BOG	Bohannon gravelly loam, 50 to 75 percent slopes	17	VIIe-1	54	3r2	67	5
Bp	Brenner silt loam	17	IIIw-1	51	---	--	2
BrB	Briedwell gravelly loam, 0 to 7 percent slopes	18	IIIe-3	51	---	--	3
BrD	Briedwell gravelly loam, 7 to 20 percent slopes	18	IVe-2	52	---	--	3
Ca	Camas gravelly sandy loam	19	IVw-2	53	---	--	1
Ch	Chehalis silty clay loam	19	IIw-2	48	---	--	1
Cm	Cloquato silt loam	20	IIw-2	48	---	--	1
Cn	Coburg silty clay loam	20	IIw-3	48	---	--	1
Co	Concord silt loam	21	IIIw-1	51	---	--	2
Cs	Conser silty clay loam	22	IIIw-1	51	---	--	2
Da	Dayton silt loam	23	IVw-1	52	---	--	2
DnC	Dixonville silty clay loam, 3 to 12 percent slopes	24	IIe-2	47	4c1	68	3
DnD	Dixonville silty clay loam, 12 to 20 percent slopes	24	IIIe-1	50	4c1	68	3
DnE	Dixonville silty clay loam, 20 to 30 percent slopes	23	IVe-1	51	4c1	68	4
DnF	Dixonville silty clay loam, 30 to 50 percent slopes	24	VIe-2	54	4c1	68	4
DuC	Dupee silt loam, 3 to 12 percent slopes	24	IIIe-2	50	---	--	3
HaC	Hazelair silt loam, 3 to 12 percent slopes	25	IIIe-2	50	---	--	3
HeC	Hazelair complex, 3 to 12 percent slopes	25	IIIe-2	50	---	--	3
HeD	Hazelair complex, 12 to 20 percent slopes	25	IIIe-1	50	---	--	3
HgC	Honeygrove silty clay loam, 3 to 12 percent slopes	27	IIIe-4	51	2c1	64	4
HND	Honeygrove silty clay loam, 3 to 25 percent slopes	26	IVe-3	52	2c1	64	4
HNF	Honeygrove silty clay loam, 25 to 50 percent slopes	27	VIe-1	54	2c3	65	4
HOD	Honeygrove silty clay loam, uneven, 5 to 25 percent slopes	27	IVe-4	52	2c2	64	4
JoC	Jory silty clay loam, 2 to 12 percent slopes	27	IIe-2	47	2c4	65	3
JoD	Jory silty clay loam, 12 to 20 percent slopes	28	IIIe-1	50	2c4	65	3
JoE	Jory silty clay loam, 20 to 30 percent slopes	28	IVe-1	51	2c4	65	4
JRE	Jory silty clay loam, 2 to 30 percent slopes	28	IVe-1	51	2c4	65	4
JRF	Jory silty clay loam, 30 to 50 percent slopes	28	VIe-2	54	2c5	65	4
KHG	Kilchis very cobbly loam, 50 to 100 percent slopes	28	VIIs-1	55	5d1	68	5

ries to which the mapping unit belongs. In referring to a capability unit, a woodland group, or a wildlife group, read ildlife groups are described on pages 69 and 70. Other information is given in tables as follows:

Engineering uses of the soils, tables 5 and 6, pp. 72 to 91.
Degree and kinds of limitations for town and country planning, table 7, p. 94.

Map symbol	Mapping unit	Page	Capability unit		Woodland suitability group		Wildlife group
			Symbol	Page	Symbol	Page	Number
KKF	Klickitat gravelly clay loam, 30 to 50 percent slopes	29	VIs-1	54	3f2	67	5
KKG	Klickitat gravelly clay loam, 50 to 75 percent slopes	30	VIIs-1	55	3r2	67	5
Ma	Malabon silty clay loam	30	IIs-2	50	---	--	1
MGD	Marty gravelly loam, 3 to 25 percent slopes	31	IVe-3	52	2o1	66	5
MGF	Marty gravelly loam, 25 to 60 percent slopes	32	VIe-1	54	2r1	66	5
Mn	McAlpin silty clay loam	32	IIw-3	48	---	--	1
Ms	McBee silty clay loam	33	IIw-5	49	---	--	1
MX	Mixed alluvial land	33	VIIw-1	54	---	--	1
MYD	Mulkey loam, 5 to 25 percent slopes	33	VIe-1	54	5o1	68	5
Ne	Nehalem silt loam	34	IIw-6	49	---	--	1
Ng	Newberg fine sandy loam	34	IIw-4	49	---	--	1
Nm	Newberg loam	35	IIw-2	48	---	--	1
PEE	Peavine silty clay loam, 3 to 30 percent slopes	35	IVe-3	52	2c1	64	5
PEF	Peavine silty clay loam, 30 to 60 percent slopes	35	VIe-1	54	2c3	65	5
PhC	Philomath silty clay, 3 to 12 percent slopes	36	IVe-1	51	---	--	3
PhE	Philomath silty clay, 12 to 45 percent slopes	36	VIe-2	54	---	--	4
Pk	Pilchuck fine sandy loam	36	IVw-2	53	---	--	1
PrC	Price silty clay loam, 3 to 12 percent slopes	37	IIe-2	47	2c4	65	3
PrD	Price silty clay loam, 12 to 20 percent slopes	37	IIIe-1	50	2c4	65	3
PTE	Price-Ritner complex, 20 to 30 percent slopes	37	IVe-1	51	2c4	65	4
PTF	Price-Ritner complex, 30 to 60 percent slopes	37	VIe-2	54	2c5	65	4
RPE	Ritner-Price complex, 12 to 30 percent slopes	38	VIs-1	54	3f1	66	4
RPG	Ritner-Price complex, 30 to 75 percent slopes	38	VIIs-1	55	3r3	68	4
Rw	Riverwash	38	VIIIw-1	55	---	--	1
Sa	Salem gravelly loam	39	IIs-1	50	---	--	1
SLD	Slickrock gravelly loam, 3 to 25 percent slopes	39	IVe-3	52	2o1	66	5
SLF	Slickrock gravelly loam, 25 to 50 percent slopes	39	VIe-1	54	2r1	66	5
VeB	Veneta silt loam, 2 to 7 percent slopes	40	IIe-2	47	---	--	3
VeD	Veneta silt loam, 7 to 20 percent slopes	40	IIIe-1	50	---	--	3
VnB	Veneta loam, loamy subsoil variant, 2 to 7 percent slopes	40	IIe-2	47	---	--	3
VnD	Veneta loam, loamy subsoil variant, 7 to 20 percent slopes	41	IIIe-1	50	---	--	3
VnE	Veneta loam, loamy subsoil variant, 20 to 30 percent slopes	41	IVe-1	51	---	--	4
Wa	Waldo silty clay loam	41	IIIw-1	51	---	--	2
Wc	Wapato silty clay loam	42	IIIw-1	51	---	--	2
WeA	Willamette silt loam, 0 to 3 percent slopes	42	I-1	46	---	--	1
WeC	Willamette silt loam, 3 to 12 percent slopes	43	IIe-1	47	---	--	1
WhB	Winchuck silt loam, silty subsoil variant, 2 to 7 percent slopes	43	IIe-3	47	---	--	1
WkB	Witham silty clay loam, 2 to 7 percent slopes	43	IIIe-2	50	---	--	2
WLG	Witzel very cobbly loam, 30 to 75 percent slopes	44	VIIs-1	55	5d1	68	5
WoA	Woodburn silt loam, 0 to 3 percent slopes	45	IIw-3	48	---	--	1
WoC	Woodburn silt loam, 3 to 12 percent slopes	45	IIe-4	47	---	--	1

TABLE 8.—*Classification of soil series*

Series	Family	Subgroup	Order
Abiqua	Fine, mixed, mesic	Cumulic Ultic Haploxerolls	Mollisols.
Amity	Fine-silty, mixed, mesic	Argiaquic Xeric Agialbolls	Mollisols.
Apt	Clayey, mixed, mesic	Typic Haplohumults	Ultisols.
Bashaw	Very fine, montmorillonitic, mesic	Typic Pelloxererts	Vertisols.
Bellpine	Clayey, mixed, mesic	Xeric Haplohumults	Ultisols.
Blachly	Fine, mixed, mesic	Typic Dystrochrepts	Inceptisols.
Bohannon	Fine-loamy, mixed, mesic	Typic Haplumbrepts	Inceptisols.
Brenner	Fine, mixed, acid, mesic	Fluvaquentic Humaquepts	Inceptisols.
Briedwell	Loamy-skeletal, mixed mesic	Ultic Haploxerolls	Mollisols.
Camas	Sandy-skeletal, mixed, mesic	Fluventic Haploxerolls	Mollisols.
Chehalis	Fine-silty, mixed, mesic	Cumulic Ultic Haploxerolls	Mollisols.
Cloquato	Coarse-silty, mixed, mesic	Cumulic Ultic Haploxerolls	Mollisols.
Coburg	Fine, mixed, mesic	Pachic Ultic Argixerolls	Mollisols.
Concord	Fine, montmorillonitic, mesic	Typic Ochraqualfs	Alfisols.
Conser	Fine, mixed, mesic	Typic Argiaquolls	Mollisols.
Dayton	Fine, montmorillonitic, mesic	Typic Albaqualfs	Alfisols.
Dixonville	Fine, mixed, mesic	Pachic Ultic Argixerolls	Mollisols.
Dupee	Fine, mixed, mesic	Aquultic Haploxeralfs	Alfisols.
Hazelair	Very fine, mixed, mesic	Aquultic Haploxerolls	Mollisols.
Hazelair, well-drained variant.	Fine, mixed, mesic	Ultic Haploxerolls	Mollisols.
Honeygrove	Clayey, mixed, mesic	Typic Haplohumults	Ultisols.
Jory	Clayey, mixed, mesic	Xeric Haplohumults	Ultisols.
Kilchis	Loamy-skeletal, mixed, mesic	Lithic Haplumbrepts	Inceptisols.
Klickitat	Loamy-skeletal, mixed, mesic	Typic Haplumbrepts	Inceptisols.
Malabon	Fine, mixed, mesic	Pachic Ultic Argixerolls	Mollisols.
Marty	Medial, mesic	Andic Dystrochrepts	Inceptisols.
McAlpin	Fine, mixed, mesic	Cumulic Ultic Haploxerolls	Mollisols.
McBee	Fine-silty, mixed, mesic	Cumulic Ultic Haploxerolls	Mollisols.
Mulkey	Medial, frigid	Typic Dystrandepts	Inceptisols.
Nehalem	Fine-silty, mixed, mesic	Fluventic Haplumbrepts	Inceptisols.
Newberg	Coarse-loamy, mixed, mesic	Fluventic Haploxerolls	Mollisols.
Peavine	Clayey, mixed, mesic	Typic Haplohumults	Ultisols.
Philomath	Clayey, montmorillonitic, mesic, shallow	Vertic Haploxerolls	Mollisols.
Philchuck	Mixed, mesic	Dystric Xeropsamments	Entisols.
Price	Fine, mixed, mesic	Dystric Xerochrepts	Inceptisols.
Ritner	Clayey-skeletal, mixed, mesic	Dystric Xerochrepts	Inceptisols.
Salem	Fine-loamy over sandy or sandy-skeletal, mixed, mesic	Pachic Ultic Argixerolls	Mollisols.
Slickrock	Fine-loamy, mixed, mesic	Pachic Haplumbrepts	Inceptisols.
Veneta	Fine, mixed, mesic	Ultic Haploxeralfs	Alfisols.
Veneta, loamy subsoil variant.	Fine-loamy, mixed, mesic	Ultic Haploxeralfs	Alfisols.
Waldo	Fine, mixed, mesic	Fluvaquentic Haplaquolls	Mollisols.
Wapato	Fine-silty, mixed, mesic	Fluvaquentic Haplaquolls	Mollisols.
Willamette	Fine-silty, mixed, mesic	Pachic Ultic Argixerolls	Mollisols.
Winchuck, silty subsoil variant.	Fine-silty, mixed, mesic	Typic Haplohumults	Ultisols.
Witham	Fine, montmorillonitic, mesic	Vertic Haploxerolls	Mollisols.
Witzel	Loamy-skeletal, mixed, mesic	Lithic Ultic Haploxerolls	Mollisols.
Woodburn	Fine-silty, mixed, mesic	Aquultic Argixerolls	Mollisols.

retention is on crushed samples in a pressure membrane apparatus.

Cation exchange capacity, NH_4OAc.—The ability of the soil to hold cations is expressed in milliequivalents per 100 grams of soil. It is determined by saturating the soil with an ammonium acetate (pH 7.0) solution and measuring the amount of ammonium retained.

Cation exchange capacity, sum.—This is similar to cation-exchange capacity, NH_4OAc, but it is determined by adding the extractable cations and extractable acidity. Cation-exchange capacity, sum, is usually slightly larger than that of cation-exchange capacity, NH_4OAc.

Extractable cations.—These are the basic cations (Ca, Mg, Na, K) held by the soil, expressed in milliequivalents per 100 grams of soil. They are determined by measuring the amount of basic cations in the ammonium acetate solution used to saturate the soil in the cation exchange capacity determination.

Extractable acidity.—The acidity (mainly in acid aluminum compounds) of the soil is expressed in milliequivalents per 100 grams of soil and measured by extracting acidity with a triethanolamine solution of pH 8.2.

Base saturation.—This refers to the sum of bases expressed in percentage of the cation exchange capacity, as specified.

Profile descriptions for the tested soils from the Benton County Area follow. Laboratory data for other soils in the Benton County Area are available from the soil surveys of the Alsea Area and those of areas of Lane, Linn, Marion, and Yamhill Counties.

This soil is used mainly for grass seed, hay, and pasture crops. Limited acreages of hay and pasture are sprinkler irrigated. Capability unit IIIw–1; wildlife group 2.

Dayton Series

The Dayton series consists of deep, poorly drained soils. These soils formed in water-deposited silt underlain by older materials. They are in the Willamette Valley on terraces that parallel the flood plain along the Willamette River. Slopes are 0 to 2 percent.

Where these soils are not cultivated, the vegetation is Oregon white oak, shrubs, and grasses. Elevation ranges from 200 to 300 feet. Average annual precipitation is 40 to 45 inches, average annual air temperature is 52° to 54° F., and the average frost-free season is 165 to 210 days.

In a representative profile the surface layer is dark grayish-brown silt loam about 8 inches thick. The subsurface layer is gray silty clay loam about 7 inches thick. The subsoil is dark-gray and dark grayish-brown clay and silty clay about 30 inches thick. The substratum is brown silty clay loam that extends to a depth of 60 inches.

Dayton soils are used for hay, pasture, grass seed, and spring grain crops and for wildlife habitat.

Dayton silt loam (Da).—This soil occupies terraces in the Willamette Valley.

Representative profile, 3 miles south of the Corvallis Airport, in the NW¼SE¼ sec. 10, T. 13 S., R. 5 W.:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam gray (10YR 6/1) dry; common, fine, distinct, yellowish-red (5YR 6/1) dry; common, fine, distinct, yellow- structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial pores; medium acid; abrupt, smooth boundary. 5 to 9 inches thick.

A2—8 to 15 inches, gray (10YR 5/1) silty clay loam, light gray (10YR 7/1) dry; common, fine, distinct, dark-brown (7.5YR 4/4) mottles; weak, coarse, prismatic structure and moderate, very fine, subangular blocky structure; very hard, firm, sticky and plastic; many very fine roots; many very fine tubular pores; medium acid; abrupt, smooth boundary. 4 to 12 inches thick.

IIB2t—15 to 33 inches, dark-gray (2.5Y 4/1) clay, gray (N 5/0) dry; weak, coarse, prismatic structure; extremely hard, very firm, very sticky and very plastic; few very fine tubular pores; few coarse slickensides; few roots along ped faces; thin, continuous, thick clay films; medium acid; clear, smooth boundary. 10 to 20 inches thick.

IIB3t—33 to 45 inches, dark grayish-brown (10YR 4/2) silty clay, light brownish gray (10YR 6/2) dry; common, medium, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, coarse, subangular blocky structure; very hard, very firm, very sticky and very plastic; few very fine tubular pores; common moderately thick clay films in pores and few films on peds; few black concretions and stains; medium acid; clear, smooth boundary. 5 to 14 inches thick.

IIIC—45 to 60 inches, brown (10YR 5/3) silty clay loam, light gray (10YR 7/2) dry; common, medium, distinct, dark yellowish-brown (10YR 4/6 and 4/4), yellowish-brown (10YR 5/6), and grayish-brown (10YR 5/2) mottles; massive; firm, very hard, sticky and slightly plastic; few very fine pores; few, moderately thick, dark, reddish-brown (5YR 3/4) clay films pores; slightly acid.

The combined thickness of the A and B horizons ranges from 30 to 48 inches. The Ap horizon is very dark grayish brown or dark grayish brown when moist. The A2 horizon is silt loam or silty clay loam. Depth to the IIB2t horizon is 12 to 18 inches. The C horizon ranges from silty clay loam to silty clay or clay in texture.

Included with this soil in mapping was about 5 percent Amity and Concord soils.

Runoff is slow to ponded on this Dayton soil. The hazard of erosion is slight. Available water capacity above the clayey subsoil is 3.75 to 4.5 inches, and it is 7 to 9 inches to a depth of 5 feet. Permeability is very slow. Rooting depth is restricted by a fluctuating high water table and a clay or silty clay subsoil. This soil is subject to occasional flooding in areas that are along tributary streams.

This soil is used for grass seed, hay, pasture, and some spring grain crops. It is used for a wider range of crops where subsurface drainage is installed. Capability unit IVw–1; wildlife group 2.

Dixonville Series

The Dixonville series consists of well-drained, moderately deep soils that formed in colluvium weathered from basic igneous rocks. These soils occupy low foothills and steep uplands. Slopes are 3 to 50 percent.

Where these soils are not cultivated, the vegetation is mainly annual grasses, weeds, scattered poison-oak, Oregon white oak, and wild rose. Douglas-fir is on some of the steeper slopes and at higher elevations. Elevation ranges from 350 to 1,000 feet. Average annual precipitation is 40 to 60 inches, average annual air temperature is 52° to 54° F., and the frost-free season is 165 to 200 days.

In a representative profile, the surface layer is very dark brown and very dark grayish-brown silty clay loam and silty clay about 13 inches thick. The subsoil is very dark brown and dark-brown silty clay and clay about 24 inches thick. Weathered basalt bedrock underlies the subsoil at a depth of about 37 inches.

Dixonville soils are used for pasture, cereal grain, homesites, recreation, water supply, woodland, and wildlife habitat.

Dixonville silty clay loam, 20 to 30 percent slopes (DnE).—This soil occupies long foot slopes on uplands. Slopes average about 25 percent.

Representative profile, 2 miles northeast of Philomath, in the NE¼SW¼ sec. 31, T. 11 S., R. 5 W.:

A1—0 to 5 inches, very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; strong, fine, granular structure; hard, friable, sticky and plastic; many very fine roots; many, very fine interstitial pores; slightly acid; clear, smooth boundary. 4 to 6 inches thick.

A3—5 to 13 inches, very dark grayish-brown (10YR 3/2) silty clay, dark grayish brown (10YR 4/2) dry; moderate, fine, subangular blocky structure; hard, friable, very sticky and very plastic; many very fine roots; many very fine tubular pores; medium acid; clear, smooth boundary. 6 to 10 inches thick.

B2t—13 to 27 inches, very dark brown (7.5YR 2/2) clay, dark brown (7.5YR 4/2) dry; moderate, fine and medium, subangular blocky structure; very hard, firm, very sticky and very plastic; common very fine roots; many very fine tubular pores; few moderately thick clay films on peds; medium acid; clear, wavy boundary. 4 to 13 inches thick.

B3t—27 to 37 inches, dark-brown (7.5YR 4/4) silty clay, brown (7.5YR 5/4) dry; weak, medium, subangular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots; many very fine tubular pores; common moderately thick (7.5YR 3/2) clay films; medium acid; clear, smooth boundary. 6 to 17 inches thick.

C1—37 to 50 inches, variegated, light brownish-gray (10YR 6/2), dark yellowish-brown (10YR 4/4), and yellow-

ish-brown (10YR 5/6) saprolite; massive; very hard, very firm, sticky and plastic; few, moderately thick, dark reddish-brown clay films on fractures.

The A horizon ranges from 7.5YR to 10YR in hue. The content of coarse fragments is 0 to 10 percent pebbles and 0 to 5 percent cobblestones. The B horizon ranges from 7.5YR to 5YR in hue. Coarse fragments are 0 to 15 percent pebbles and 0 to 20 percent cobblestones. The depth to the underlying weathered basalt substratum or saprolite ranges from 20 to 40 inches.

Included with this soil in mapping were about 5 percent Philomath soils and 10 percent Ritner and Price soils.

Runoff is rapid on this Dixonville soil, and the hazard of erosion is high. Rooting depth ranges from 20 to 40 inches. Permeability is slow. Available water capacity is 3 to 7.5 inches.

This soil is used for unimproved pasture, woodland, water supply, and wildlife habitat. Capabiltiy unit IVe–1; woodland suitability group 4c1; wildlife group 4.

Dixonville silty clay loam, 3 to 12 percent slopes (DnC).—This soil is similar to Dixonville silty clay loam, 20 to 30 percent slopes.

Runoff is medium on this Dixonville soil, and the hazard of erosion is slight.

This soil is used for unimproved pasture, improved pasture, cereal grain, woodland, water supply, and wildlife habitat. Capability unit IIe–2; woodland suitability group 4c1; wildlife group 3.

Dixonville silty clay loam, 12 to 20 percent slopes (DnD).—This soil is similar to Dixonville silty clay loam, 20 to 30 percent slopes.

Runoff is medium on this Dixonville soil, and the hazard of erosion is moderate.

This soil is used for unimproved pasture, cereal grain, hay and improved pasture, water supply, and wildlife habitat. Capability unit IIIe–1; woodland suitability group 4c1; wildlife group 3.

Dixonville silty clay loam, 30 to 50 percent slopes (DnF).—This soil is similar to Dixonville silty clay loam, 20 to 30 percent slopes.

Runoff is very rapid on this Dixonville soil, and the hazard of erosion is high.

This soil is used for unimproved pasture, woodland, watershed, and wildlife habitat. Capability unit VIe–2; woodland suitability group 4c1; wildlife group 4.

Dupee Series

The Dupee series consists of deep, moderately well drained to somewhat poorly drained soils that formed in mixed colluvium underlain by sedimentary bedrock. These soils are in swales and depressions and on foot slopes on uplands. Slopes are 3 to 12 percent.

Where these soils are not cultivated, vegetation is Douglas-fir, oak, poison-oak, blackberry, and fern. Elevation ranges from 300 to 600 feet. Average annual precipitation ranges from 40 to 60 inches, average annual air temperature is 52° to 54° F., and the frost-free season is 165 to 200 days.

In a representative profile the surface layer is dark-brown silt loam about 14 inches thick. The subsoil is dark-brown heavy silty clay loam and clay about 38 inches thick. The substratum is dark-brown clay loam that extends to a depth of 60 inches or more.

Dupee soils are used for cereal grain, grass see pasture, and wildlife habitat.

Dupee silt loam, 3 to 12 percent slopes (DuC). soil is in swales and depressions on uplands. Slopes a about 7 percent.

Representative profile, 2 miles south of Inavale in the NW¼SW¼ sec. 20, T. 13 S., R. 5 W.:

Ap—0 to 6 inches, dark-brown (7.5YR 3/2) silt loa brown (7.5YR 4/2) dry; moderate, fine, g structure; slightly hard, friable, slightly stic plastic; many very fine roots; many very fine tial pores; medium acid; clear, smooth bounda 9 inches thick.

A3—6 to 14 inches, dark-brown (7.5YR 3/4) silt loam (7.5YR 5/4) dry; moderate, fine, subangular structure; slightly hard, friable, slightly stic plastic; many very fine roots; many very fine strongly acid; clear, smooth boundary. 0 to 8 thick.

B1—14 to 24 inches, dark-brown (7.5YR 4/4) heavy sil loam, brown (7.5YR 5/4) dry; common, fine, ish-red (5YR 5/6) variegations and dark (7.5YR 3/4) ped coatings; weak, medium, pr structure and moderate, medium, subangular structure; hard, firm, sticky and plastic; comm fine roots; many very fine pores; few thin cla in pores; strongly acid; clear, smooth boundar 12 inches thick.

B21t—24 to 33 inches, dark-brown (7.5YR 4/4) clay, (7.5YR 5/4) dry; common, fine, distinct, yell red (5YR 5/6) and dark grayish-brown (10YI mottles; moderate, medium, prismatic structure hard, firm, sticky and plastic; few very fine common very fine pores; common thin clay fil ped surfaces and in pores; few black coating common black and reddish-brown concretions mon, yellowish-brown, weathered particles 1 to 2 meters in size; strongly acid; gradual, wavy bou 6 to 10 inches thick.

B22t—33 to 52 inches, dark-brown (7.5YR 4/4) clay, brown (7.5YR 6/4) dry; many, fine and mediur tinct, yellowish-brown (5YR 5/6) and dark gr brown (10YR 4/2) mottles; few, medium, stains; moderate, medium, prismatic structure hard, firm, sticky and plastic; many fine and ver pores; few very fine and fine roots; common thi few moderately thick clay films on peds; commor silt coatings on ped surfaces; very strongly acid; wavy boundary. 10 to 22 inches thick.

C—52 to 60 inches, dark-brown (7.5YR 4/4) heavy clay light brown (7.5YR 6/4) dry; many, medium, dis brownish-yellow (10YR 5/6) and dark grayish-b (10YR 4/2) mottles; many, medium, black st massive; very hard, very firm, sticky and pla few very fine pores; few clay films in pores; strongly acid.

The A horizon ranges from 7.5YR to 10YR in hue. It moist value of 2 or 3. The B horizon ranges from 7.5Y 10YR in hue and has a moist value of 4 to 6. It ranges silty clay loam to clay in texture. Thickness of the solum ra from 30 to 60 inches, depth to distinct mottling ranges fro to 30 inches, and depth to underlying bedrock ranges fro inches to 60 inches or more.

Included with this soil in mapping was about 5 per Hazelair soils.

Runoff is moderately slow to medium on this Dupee and the hazard of erosion is moderate. Root penetratio deep, although it is slightly restricted by a fluctuating sonal high water table. Permeability is moderately sl Available water capacity is 8 to 14 inches.

This soil is used for grain, grass seed, hay and past and wildlife habitat. Small areas are in woodland and improved pasture. Capability unit IIIe–2; wild group 3.

The A horizon has a moist value of 2 or 3 and a dry value of 3 or 4. It is 7.5YR or 5YR in hue. The B horizon is 5YR or 2.5YR in hue. Depth to underlying sedimentary bedrock ranges from about 5 to 10 feet. The lower part of the B horizon is as much as 15 percent coarse fragments in some places.

Included with this soil in mapping was about 5 to 10 percent Apt and Peavine soils. Also included, where dikes of igneous rock intrude, was about 5 percent Klickitat soils. Because this soil is mapped only in forested areas, it is not so intensively mapped as cultivated areas.

Runoff is medium, and the hazard of erosion is moderate. Available water capacity is 8 to 10 inches. Permeability is moderately slow. Rooting depth is unrestricted and is deep.

This soil is used mainly for timber production (fig. 14), water supply, and wildlife habitat. About 10 percent of this soil is used for natural and improved pasture and for cereal grain. Capability unit IVe–3; woodland suitability group 2c1; wildlife group 4.

Honeygrove silty clay loam, 3 to 12 percent slopes (HgC).—This soil has slopes that average about 9 percent.

Runoff is medium. The hazard of erosion is moderate.

About 25 percent of the acreage of this soil is cultivated to cereal grain, hay, and improved pasture. The remaining acreage is in unimproved pasture and woodland. This soil is also used for wildlife habitat and water supply. Capability unit IIIe–4; woodland suitability group 2c1; wildlife group 4.

Honeygrove silty clay loam, 25 to 50 percent slopes (HNF).—This soil has slopes that average about 35 percent.

Runoff is rapid, and the hazard of erosion is high.

This soil is used for timber production, water supply, and wildlife habitat. Because slopes are steep, this soil is not suited to cultivation. Capability unit VIe–1; woodland suitability group 2c3; wildlife group 4.

Honeygrove silty clay loam, uneven, 5 to 25 percent slopes (HOD).—This soil has slopes that average about 15 percent.

The uneven slopes are small steplike benches at right angles to the direction of the slope. In a gross cross section the downward slope is generally interrupted and irregular like stairsteps. Uneven slopes are caused by sliding and slumping.

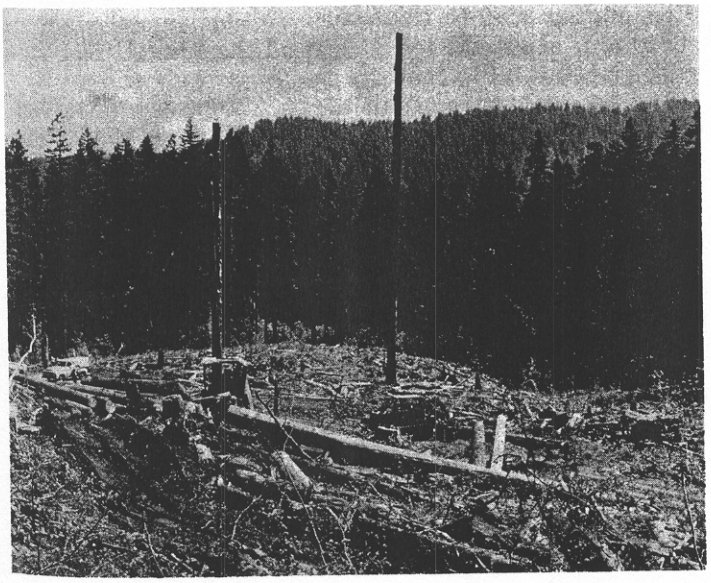


Figure 14.—**Cable logging Douglas-fir on Honeygrove silty clay loam, 3 to 25 percent slopes.**

Runoff is medium, and the hazard of erosion is moderate. The slide and slump hazard is severe.

This soil is used mainly for timber production, water supply, and wildlife habitat. Small areas are in pasture. Capability unit IVe–4; woodland suitability group 2c2; wildlife group 4.

Jory Series

The Jory series consists of deep, well-drained soils that formed in colluvium weathered from sedimentary and basic igneous rocks. These soils are on the higher rolling uplands that border the steeper mountainous areas. Slopes are 2 to 50 percent.

The vegetation is Douglas-fir, grand fir, and Oregon white oak and an understory of poison-oak, snowberry, grass, and fern. Elevation ranges from 400 to 1,200 feet. Average annual precipitation is 40 to 60 inches, average annual air temperature is 52° to 54° F., and the frost-free season is 165 to 200 days.

In a representative profile, the surface layer is dark reddish-brown silty clay loam about 15 inches thick. The subsoil is dark-red and dark reddish-brown silty clay and clay that extends to a depth of 60 inches.

Jory soils are used for small grain, grass seed, hay, timber production, recreation, water supply, and wildlife habitat.

Jory silty clay loam, 2 to 12 percent slopes (JoC).—This soil occupies broad ridges and side slopes. Slopes average about 7 percent.

Representative profile, 2 miles south of Inavale School, in the SW¼NW¼ sec. 20, T. 13 S., R. 5 W.:

A1—0 to 7 inches, dark reddish-brown (5YR 3/4) silty clay loam, reddish brown (5YR 4/3) dry; moderate, fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine interstitial pores; few fine concretions; very strongly acid; clear, smooth boundary. 5 to 8 inches thick.

A3—7 to 15 inches, dark reddish-brown (5YR 3/4) silty clay loam, reddish brown (5YR 4/4) dry; moderate, fine, granular structure and moderate, very fine, subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine roots; common very fine interstitial and tubular pores; very strongly acid; clear, wavy boundary. 4 to 12 inches thick.

B1—15 to 23 inches, dark reddish-brown (2.5YR 3/4) silty clay, red (2.5YR 4/6) dry; moderate, fine and very fine, subangular blocky structure; hard, friable, sticky and plastic; common very fine and fine and few medium and coarse roots; many very fine tubular pores; few, fine, reddish-brown and black concretions; very strongly acid; abrupt, wavy boundary. 7 to 12 inches thick.

IIB21t—23 to 35 inches, dark-red (2.5YR 3/6) clay, red (2.5YR 4/6) dry; moderate, medium, subangular blocky structure; very hard, very firm, sticky and very plastic; common very fine tubular pores; few very fine pores; common moderately thick clay films; many, coarse, black stains; very strongly acid; gradual, wavy boundary. 9 to 16 inches thick.

IIB22t—35 to 51 inches, dark-red (2.5YR 3/6) clay, red (2.5YR 4/5) dry; moderate, medium, subangular blocky structure; very hard, very firm, sticky and very plastic; common very fine tubular pores; few very fine roots; many moderately thick clay films; strong-brown (7.5YR 5/8) weathered fragments 2 to 5 millimeters

in size; common, medium, black stains; very strongly acid; gradual, wavy boundary. 10 to 21 inches thick.

IIB23t—51 to 60 inches, dark-red (2.5YR 3/6) silty clay, red (2.5YR 4/6) dry; weak, medium and coarse, subangular blocky structure; very hard, firm, sticky and plastic; common very fine tubular pores; no roots; common moderately thick clay films; many, medium and coarse, strong-brown (7.5YR 5/6), weathered fragments; very strongly acid.

The A horizon is 7.5YR or 5YR in hue. The B horizon ranges from 5YR to 2.5YR in hue and has a moist value of 3 or 4. Depth to the underlying bedrock ranges from 40 inches to many feet. As much as 15 percent coarse fragments are in the lower part of the B horizon in some places. The underying bedrock may be basic igneous rock or sedimentary rock.

Included with this soil in mapping were about 5 to 10 percent Price and Ritner soils, 5 percent Bellpine soils, and 1 percent Dupee soils.

Runoff is medium on this Jory soil. The hazard of erosion is slight. Available water capacity is 7 to 11 inches. Permeability is moderately slow. Root penetration is deep.

This soil is used mainly for cereal grain, grass seed, orchards, hay, and pasture. Some areas are used for timber production, water supply, wildlife habitat, and recreation (fig. 15). Capability unit IIe–2; woodland suitability group 2c4; wildlife group 3.

Jory silty clay loam, 12 to 20 percent slopes (JoD).—This soil is similar to Jory silty clay loam, 2 to 12 percent slopes.

Runoff is medium on this Jory soil, and the hazard of erosion is moderate.

About 40 percent of the acreage of this soil is used for grain, hay, and pasture. The remaining acreage is in woodland or natural pasture. This soil is also used for water supply, wildlife habitat, and recreation. Capability unit IIIe–1; woodland suitability group 2c4; wildlife group 3.

Figure 15.—**Picnic area on Jory silty clay loam, 2 to 12 percent slopes. Tabletop is solid plank, 85 feet long, from a Douglas-fir grown in Benton County Area.**

Jory silty clay loam, 20 to 30 percent slopes (JoE) This soil has slopes that average about 25 percent.

Runoff is medium, and the hazard of erosion is hi

About 15 percent of the acreage of this soil is used cereal crops and pasture. This soil is used mainly for ti ber production, natural pasture, water supply, wildl habitat, and recreation. Capability unit IVe–1; woodla suitability group 2c4; wildlife group 4.

Jory silty clay loam, 2 to 30 percent slopes (JRE) This soil has slopes that average about 20 percent. cause this soil is mapped only in forested areas, it is so intensively mapped as soils in cultivated areas.

Runoff is medium to rapid, and the hazard of eros is moderate to high.

This soil is used mainly for timber production, wa supply, and wildlife habitat. A few areas are in natu pasture. Capability unit IVe–1; woodland suitabil group 2c4; wildlife group 4.

Jory silty clay loam, 30 to 50 percent slopes (JRF) This soil is similar to Jory silty clay loam, 2 to 12 perc slopes, except that it is somewhat shallower, 40 to 48 inch to bedrock. This soil occupies steep uplands and has slo that average about 35 percent.

Runoff is rapid, and the hazard of erosion is high.

This soil is used for timber production, unimproved p ture, water supply, and wildlife habitat. Because slopes steep this soil is not suited to cultivation. Capability u VIe–2; woodland suitability group 2c5; wildlife group

Kilchis Series

The Kilchis series consists of shallow, well-drained excessively drained soils that formed in colluvi weathered from basic igneous rocks. These soils are mountainous topography in the Coast Range (fig. 1 Slopes are 50 to 100 percent.

The vegetation is Douglas-fir, hemlock, and noble fir a an understory of brackenfern, salal, and Oregongra Elevation ranges from 3,000 to 4,000 feet. Average ann precipitation is 60 to 120 inches, average annual air te perature is about 45° to 48° F., and the annual frost-f season is about 120 to 150 days.

In a representative profile the surface layer is dark re dish-brown very cobbly loam about 5 inches thick. T subsoil is a dark reddish-brown very cobbly loam abo 14 inches thick. It is underlain by fractured diorite be rock at a depth of about 19 inches.

This soil is used for timber production, water supp wildlife habitat, and recreation.

Kilchis very cobbly loam, 50 to 100 percent slop (KHG).—This soil has average slopes of about 65 perce

Representative profile, 1 mile northwest of the summ of Marys Peak, in the SE¼SW¼ sec. 20, T. 12 S., R. 7 W

A1—0 to 5 inches, dark reddish-brown (5YR 3/2) very cobl loam, dark brown (7.5YR 4/4) dry; moderate, ve fine, granular structure; soft, very friable, sligh sticky and slightly plastic; many very fine roo many fine interstitial pores; 40 percent angular cobb stones and 15 percent pebbles; very strongly aci clear, wavy boundary. 4 to 8 inches thick.

B1—5 to 13 inches, dark reddish-brown (5YR 3/2) very c bly loam, dark brown (7.5YR 4/4) dry; moderate, ve fine, subangular blocky structure; slightly hard, ve friable, slightly sticky and slightly plastic; many ve

few thin clay films; few medium and large manganese stains; medium acid; abrupt, wavy boundary. 6 to 15 inches thick.

IIB22t—33 to 40 inches, strong-brown (7.5YR 5/6) heavy clay loam, light-brown (7.5YR 6/4) dry; moderate, fine and medium, subangular blocky structure; hard, firm, sticky and plastic; common fine and very fine roots; common fine and very fine tubular pores; many, moderately thick, dark-brown (7.5YR 4/4) clay films; 10 percent fragments of weathered sandstone; common large and medium manganese stains; medium acid; clear, wavy boundary. 6 to 10 inches thick.

IIC—40 inches, weathered sandstone.

The A horizon ranges from 10YR to 7.5YR in hue and has a dry value of 5 or 6. The B horizon ranges from 10YR to 7.5YR in hue. In the B2 horizon the content of coarse fragments of sedimentary rock ranges from few to 20 percent. Depth to sedimentary bedrock ranges from 30 to 40 inches.

Included with this soil in mapping were about 5 to 10 percent Hazelair soils and 5 percent other Veneta soils.

Runoff is slow to medium on this Veneta soil, loamy subsoil variant, and the hazard of erosion is slight. Root penetration is moderately deep. Permeability is moderately slow. Available water capacity is 6 to 8 inches.

This soil is used for cereal grain, grass seed, hay, pasture, orchards, wildlife habitat, and homesites. Capability unit IIe–2; wildlife group 3.

Veneta loam, loamy subsoil variant, 7 to 20 percent slopes (VnD).—This soil has slopes that average about 15 percent.

Runoff is medium, and the hazard of erosion is moderate.

This soil is used for cereal grain, hay, pasture, orchards, and wildlife habitat. Capability unit IIIe–1; wildlife group 3.

Veneta loam, loamy subsoil variant, 20 to 30 percent slopes (VnE).—This soil has slopes that average about 25 percent.

Runoff is rapid, and the hazard of erosion is high.

This soil is used mostly for natural and cultivated pasture and wildlife habitat. Small areas are in woodland. Capability unit IVe–1; wildlife group 4.

Waldo Series Wa

The Waldo series consists of deep, poorly drained soils that formed in recent alluvium. These soils are on bottom lands of streams and drainageways in the tributary valleys of the foothills. Slopes are 0 to 3 percent.

Where these soils are not cultivated, the vegetation is tussock, sedge, willow, ash, and grass. Elevation ranges from 250 to 450 feet. Average annual precipitation is 40 to 60 inches, average temperature is 50° to 52° F., and the frost-free season is 165 to 210 days.

In a representative profile the surface layer is black heavy silty clay loam and silty clay about 11 inches thick. The subsoil is dark-gray and gray clay about 37 inches thick. The substratum is gray silty clay that extends to a depth of 60 inches or more.

Waldo soils are used for pasture, hay, small grain, grass seed, wildlife habitat, and recreation.

Waldo silty clay loam (Wa).—This soil is in areas along the streams and drainageways of the foothills. Slopes are 0 to 3 percent.

Representative profile, one-half mile south of Inavale School, in the NW¼SE¼ sec. 7, T. 13 S., R. 5 W.:

Ap—0 to 6 inches, black (10YR 2/1) heavy silty clay loam, dark gray (10YR 4/1) dry; strong, fine, granular structure; hard, friable, sticky and very plastic; many very fine interstitial pores; strongly acid; abrupt, smooth boundary. 4 to 7 inches thick.

A12—6 to 11 inches, black (10YR 2/1) silty clay, dark gray (10YR 4/1) dry; reddish-brown mottles along root channels; moderate, fine, granular structure and very fine, subangular blocky structure; hard, friable, very sticky and very plastic; many very fine roots; many very fine interstitial and tubular pores; strongly acid; clear, smooth boundary. 3 to 6 inches thick.

B21g—11 to 21 inches, dark-gray (N 4/0) clay, gray (N 6/0) dry; common, medium, prominent, reddish-brown (5YR 4/4) and strong-brown (7.5YR 5/6) mottles; weak, medium, prismatic structure and moderate, medium, angular blocky structure; extremely hard, very firm, very sticky and very plastic; common very fine roots; common very fine tubular pores; few, thin, black coatings on ped surfaces; strongly acid; gradual, smooth boundary. 6 to 12 inches thick.

B22g—21 to 31 inches, dark-gray (N 4/0) clay, gray (N 6/0) dry; common, coarse, prominent, strong-brown (7.5YR 5/6) mottles; weak, medium, prismatic structure and moderate, medium, angular blocky structure; extremely hard, very firm, very sticky and very plastic; common very fine roots; common very fine tubular pores; strongly acid; clear, smooth boundary. 7 to 12 inches thick.

B23g—31 to 48 inches, gray (N 5/0) clay, light gray (N 7/0) dry; common, coarse, prominent, yellowish-red (5YR 5/6) mottles; moderate, medium, angular blocky structure; very hard, very firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; strongly acid; clear, smooth boundary. 0 to 20 inches thick.

Cg—48 to 60 inches, gray (5Y 5/1) silty clay, light gray (N 7/0) dry; many, coarse, prominent, strong-brown (7.5YR 5/8) mottles; massive; hard, firm, sticky and very plastic; medium acid.

The A horizon ranges from 10YR to 7.5YR in hue and has a moist chroma of 1 or 2. The B horizon is neutral or 2.5Y to 5Y in hue. It has a moist value of 3 or 4 in the upper part and 4 or 5 in the lower part. Depth to the C horizon ranges from 30 to 48 inches. In some areas a few pebbles and cobblestones of basalt are throughout the profile.

Included with this soil in mapping were about 5 percent McAlpin soils and 5 percent Bashaw soils.

Runoff is slow on this Waldo soil, and the hazard of erosion is slight. Rooting depth is limited by a seasonal high water table. Permeability is slow. Available water capacity is 9 to 11 inches. Workability is fair.

This soil is used for pasture, hay, small grain, grass seed, wildlife habitat, and recreation. Capability unt IIIw–1; wildlife group 2.

Wapato Series Wc

The Wapato series consists of deep, poorly drained soils that formed in mixed alluvium. These soils are in swales and depressional areas on recent alluvial flood plains. Slopes are 0 to 3 percent.

Where these soils are not cultivated, the vegetation is willow, ash, tussock, sedge, and grass. Elevation ranges from 190 to 300 feet. Average annual precipitation is 40 to 45 inches, average annual air temperature is 52° to 54° F., and the frost-free season is 165 to 210 days.

In a representative profile the surface layer is very dark grayish-brown silty clay loam about 14 inches thick. The subsoil is dark grayish-brown, dark-gray, and gray silty clay loam that extends to a depth of 60 inches or more.

stains; massive; hard, friable, slightly sticky and slightly plastic; many very fine pores; few, moderately thick, dark reddish-brown (7.5YR 4/4) clay films in pores; slightly acid.

The A horizon has a dry color value of 4 or 5 and a dry chroma of 2 or 3. In places faint mottles that have a chroma higher than 2 are between depths of 30 and 40 inches; distinct mottles are below a depth of 40 inches.

Included with this soil in mapping were 10 percent Woodburn soils and 5 percent Amity soils.

Runoff is slow on this Willamette soil, and the hazard of erosion is none to slight. Rooting depth is unrestricted. Permeability is moderate. Available water capacity is 11 to 13 inches.

This soil is used for pasture, hay, small grain, orchards, grass seed, wildlife habitat, and recreation. It is used for vegetable and specialty crops when irrigated. Capability unit I–1; wildlife group 1.

Willamette silt loam, 3 to 12 percent slopes (WeC).—This soil has slopes that average about 7 percent.

Runoff is medium, and the hazard of erosion is moderate.

This soil is used for small grain, hay and pasture, orchards, grass seed, vegetable crops, berries, wildlife habitat, and recreation. Capability unit IIe–1; wildlife group 1.

Winchuck Series, Silty Subsoil Variant

The Winchuck series, silty subsoil variant, consists of deep, well-drained soils that formed in mixed alluvium weathered from sedimentary and basic igneous rocks. These soils are on stream and river terraces, alluvial fans, and foothills in tributary valleys of the Coast Range. Slopes are 2 to 7 percent.

Where these soils are not cultivated, the vegetation is Douglas-fir, hemlock, alder, and western redcedar and an understory of shrubs and fern. Elevation ranges from 400 to 700 feet. Average annual precipitation is 60 to 90 inches. average annual air temperature is 48° to 50° F., and the average frost-free season is 160 to 190 days.

In a representative profile the surface layer is dark-brown silt loam about 6 inches thick. The subsoil is dark-brown, dark yellowish-brown, and yellowish-brown silty clay loam, silt loam, and loam that extends to a depth of 60 inches or more.

Most of the acreage of Winchuck soils, silty subsoil variant, has been cleared for cultivation. It is used mainly for hay, pasture, wildlife habitat, and recreation.

Winchuck silt loam, silty subsoil variant, 2 to 7 percent slopes (WhB).—This soil is in tributary valleys of the Coast Range. Slopes average about 4 percent.

Representative profile, one-half mile east of the Lincoln County line, in the SW¼SE¼ sec. 19, T. 11 S., R. 7 W.:

Ap—0 to 6 inches, dark-brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate, fine, granular structure; hard, friable, slightly sticky and slightly plastic; many roots; many interstitial pores; very strongly acid; clear, smooth boundary. 4 to 8 inches thick.

B1—6 to 11 inches, dark-brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; fine, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many roots; many fine and medium interstitial pores; very strongly acid; clear, wavy boundary. 4 to 7 inches thick.

B21t—11 to 18 inches, dark yellowish-brown (10YR 3/4) silty clay loam, (10YR 4/4, crushed) brown (10YR 5/3) dry; moderate, fine and medium, subangular blocky structure; hard, friable, sticky and plastic; many roots; many fine and very fine pores; few thin clay films; few, fine, black stains; very strongly acid; clear, wavy boundary. 6 to 10 inches thick.

B22t—18 to 24 inches, dark yellowish-brown (10YR 4/4) silty clay loam, yellowish brown (10YR 5/4) dry; moderate, medium, subangular blocky structure; hard, firm, sticky and plastic; many roots; many very fine tubular pores; few, moderately thick and common, thin, dark-brown (7.5YR 3/4) clay films; very strongly acid; gradual, wavy boundary. 5 to 8 inches thick.

B22t—24 to 32 inches, dark yellowish-brown (10YR 4/4) silty clay loam, yellowish brown (10YR 5/4) dry; moderate, medium, subangular blocky structure; hard, firm, sticky and plastic; few roots; many very fine and fine pores; common, moderately thick, dark-brown (7.5YR 3/4) clay films; extremely acid; gradual, wavy boundary. 6 to 12 inches thick.

B31t—32 to 44 inches, dark yellowish-brown (10YR 4/4) silt loam, yellowish brown (10YR 5/4) dry; weak, coarse, subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few roots; many fine and very fine pores; common thin clay films; extremely acid; gradual, wavy boundary. 6 to 10 inches thick.

IIB32t—44 to 60 inches, yellowish-brown (10YR 5/4) loam, light yellowish brown (10YR 6/4) dry; many, medium, light brownish-gray (10YR 6/2) mottles; weak, coarse, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; no roots; common fine pores; few moderately thick clay films; common black stains; extremely acid.

The A horizon has a moist value and chroma of 2 or 3. The B horizon ranges from slit loam or loam to silty clay loam in texture. Distinct mottles or gravel occurs at a depth of 40 inches or more in places.

Included with this soil in mapping were 5 percent Nehalem soils and 2 percent Brenner soils.

Runoff is slow on this Winchuck soil, silty subsoil variant, and the hazard of erosion is slight to moderate. Root penetration is unrestricted. Permeability is moderate, and the available water capacity is 9 to 12 inches.

This soil is used mainly for hay, pasture, wildlife habitat, and recreation. Most of this soil has been cleared of forest vegetation. Capability unit IIe–3; wildlife group 1.

Witham Series

The Witham series consists of deep, somewhat poorly drained soils that formed in alluvium. These soils are on terraces, foot slopes, and fans. Slopes are 2 to 7 percent.

Where these soils are not cultivated, the vegetation is Oregon white oak, Douglas-fir, wild rose, poison-oak, snowberry, and grass. Elevation ranges from 250 to 450 feet. Average annual precipitation is 40 to 60 inches, average annual air temperature is 52° to 54° F., and the average frost-free season is 165 to 210 days.

In a representative profile the surface layer is very dark grayish-brown silty clay loam about 4 inches thick. The subsoil is very dark grayish-brown and dark-brown silty clay and clay about 25 inches thick. The substratum is very dark grayish-brown clay that extends to a depth of 60 inches or more.

Witham soils are used for hay, pasture, cereal grain, and wildlife habitat.

Witham silty clay loam, 2 to 7 percent slopes (WkB).—This soil is on alluvial terraces and fans. Slopes are 2 to 7 percent (fig. 21).

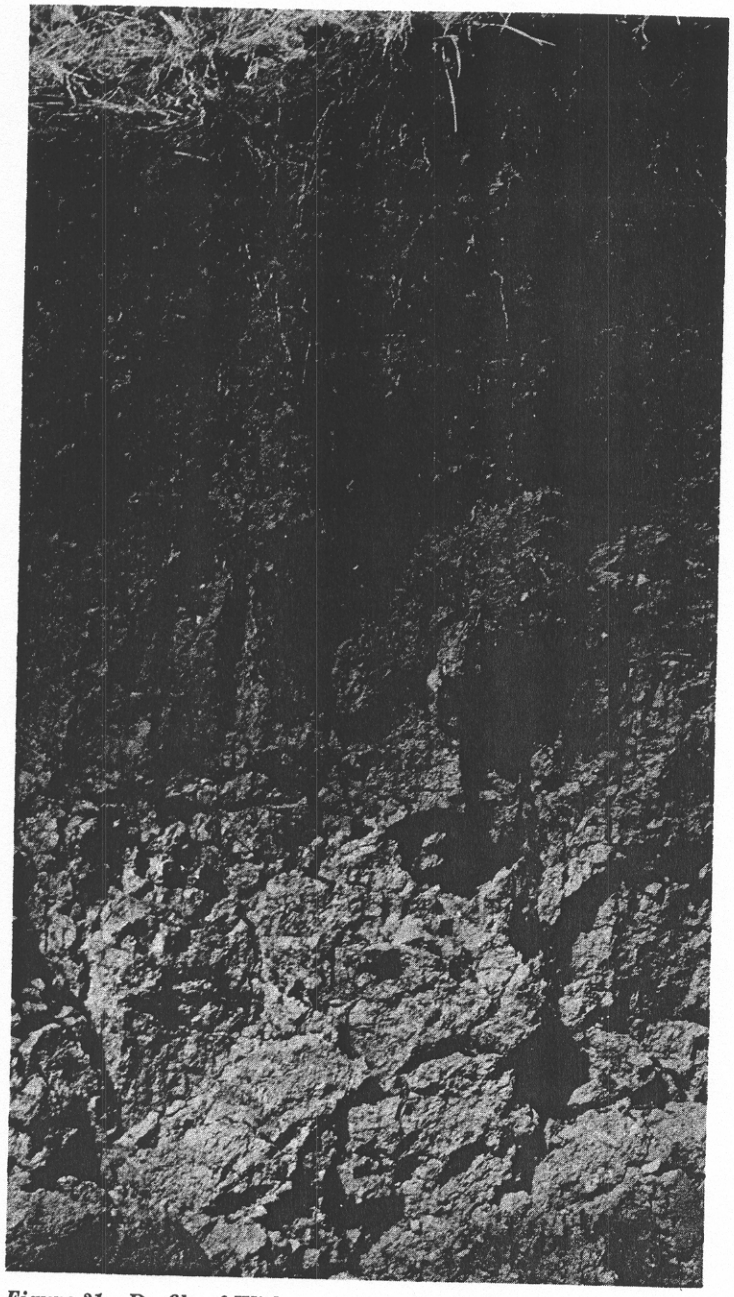


Figure 21.—**Profile of Witham silty clay loam, 2 to 7 percent slopes, showing vertical cracks caused by clayey subsoil that has high shrink-swell potential.**

Representative profile, 2½ north of Corvallis, in the SW¼SW¼NW¼ sec. 15, T. 11 S., R. 5 W.:

A1—0 to 4 inches, very dark grayish-brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate, medium and fine, granular structure; slightly hard, friable, sticky and plastic; many very fine roots; many interstitial pores; strongly acid; clear, smooth boundary. 3 to 6 inches thick.

B1—4 to 12 inches, very dark grayish-brown (10YR 3/2) silty clay, dark grayish brown (10YR 4/2) dry; moderate, coarse and medium, subangular blocky structure; very hard, firm, very sticky and very plastic; common very fine roots; many interstitial pores; very dark brown (10YR 2/2) coatings on peds; strongly acid; gradual, smooth boundary. 0 to 12 inches thick.

B21—12 to 21 inches, dark-brown (10YR lay, dark b (10YR 4/3) dry; weak, coarse, matic stru and moderate, coarse, subangular blocky struc extremely hard, very firm, very sticky and very pl few very fine roots; many very fine tubular pores fine, black concretions; common, yellowish-b weathered fragments 1 to 2 millimeters in size few hard pebbles; few slickensides that do not sect; medium acid; gradual, smooth boundary. 12 inches thick.

B22—21 to 29 inches, dark-brown (10YR 3/3) clay, b (10YR 5/3) dry; few, fine, distinct, yellowish-b 10YR 5/4 and 10YR 5/6) and dark-brown (7.5YR mottles; weak, coarse, prismatic structure and coarse, subangular blocky structure; extremely very firm, very sticky and very plastic; few very roots; many fine and very fine tubular pores; fine, black concretions and pebbles; many, yello brown, weathered fragments 1 to 2 millimeters in few slickensides that do not intersect; medium gradual, wavy boundary. 6 to 12 inches thick.

C—29 to 60 inches, very dark grayish-brown (10YR 3/2) many, medium, distinct, strong-brown (7.5YR mottles; massive; extremely hard, very firm, sticky and very plastic; few very fine roots; few pebbles; few very fine pores; common fine and me slickensides that do not intersect; common, me black stains; medium acid.

The A horizon ranges from silty clay loam to silty cla texture. It has a moist chroma and value of 2 or 3. It is 1 or 2.5Y in hue. Depth to distinct mottles ranges from 16 inches. Depth to bedrock or gravel ranges from 40 to 60 in or more.

Included with this soil in mapping were about 10 cent Waldo and Bashaw soils and 5 percent Dixon soils.

Runoff is slow to medium on this Witham soil, and hazard of erosion is slight. Rooting depth is restricted the clayey texture and by a high seasonal water table. I meability is very slow, and the available water capa is 6 to 9 inches.

This soil is used for hay, pasture, cereal grain, and w life habitat. Most areas of this soil are in unimpro pasture. Capability unit IIIe–2; wildlife group 2.

Witzel Series

The Witzel series consists of shallow, well-drained s that formed in colluvium weathered from basic igne rocks. Slopes are 30 to 75 percent.

The vegetation is Douglas-fir, Oregon white oak, sn berry, poison-oak, grass, and brackenfern. Elevat ranges from 500 to 1,700 feet. Average annual precipi tion is 40 to 60 inches, average annual air temperatur 50° to 52° F., and the average frost-free season is 165 200 days.

In a representative profile the surface layer is da brown very cobbly loam about 6 inches thick. The subs is dark reddish-brown very cobbly clay loam about 9 incl thick and is underlain by fractured basalt bedrock a depth of about 15 inches.

Witzel soils are used for timber production, grazi water supply, and wildlife habitat.

Witzel very cobbly loam, 30 to 75 percent slop (WLG).—This soil is on sides of hills. Slopes average abo 60 percent.

Representative profile, 4½ miles north of Corvallis, the NE¼SE¼ sec. 3, T. 11 S., R. 5 W.:

A1—0 to 6 inches, dark-brown (7.5YR 3/2) very cobbly loa brown (7.5YR 4/4) dry; moderate, very fine and fi

granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial pores; 20 percent pebbles and 30 percent cobblestones; medium acid; gradual, smooth boundary. 4 to 6 inches thick.

B2—6 to 15 inches, dark reddish-brown (5YR 3/3) very cobbly clay loam, reddish-brown (5YR 4/4) dry; weak, fine, subangular blocky structure parting to very fine and fine, granular structure; slightly hard, friable, sticky and plastic; many very fine roots; many very fine interstitial pores; 35 percent cobblestones, 15 percent stones, and 15 percent pebbles; medium acid; irregular boundary. 7 to 15 inches thick.

IIR—15 inches, fractured basalt bedrock that has thin tongues of material from the B2 horizon in fractures.

The A horizon is very cobbly loam, very cobbly clay loam, or cobbly silt loam in texture. The content of coarse fragments ranges from 20 to 60 percent. The A horizon ranges from 7.5YR to 5YR in hue. The B horizon ranges from very cobbly clay loam to very cobbly silty clay loam in texture. The content of coarse fragments ranges from 50 to 65 percent. Depth to bedrock ranges from 12 to 20 inches.

Included with this soil in mapping were about 5 percent rice soils and 10 percent Ritner and Dixonville soils.

Runoff is very rapid on this Witzel soil, and the hazard f erosion is high. Available water capacity is 1 to 2 inches. ermeability is moderately slow. Root penetration is lim-ed to a depth of about 12 to 20 inches by the underlying asalt bedrock.

This soil is used for timber production, grazing, water upply, and wildlife habitat. It has severe limitations to se because of shallow depth, a high content of coarse frag-ients, and very steep slopes; and it is unsuitable for culti-ation. Because of the shallow depth the rooting zone for rees is very limited. Capability unit VIIs–1; woodland iitability group 5d1; wildlife group 5.

Woodburn Series

The Woodburn series consists of deep, moderately well rained soils that formed in silty alluvium. These soils are n broad terraces above the flood plain in the Willamette alley. Slopes are 0 to 3 percent.

Where these soils are not cultivated, the vegetation is ative grass, hazelnut, poison-oak, wild blackberry, Doug-as-fir, and Oregon white oak. Elevation ranges from 200 o 300 feet. Average annual precipitation is 40 to 45 inches, verage annual air temperature is 52° to 54° F., and the rost-free season is 165 to 210 days.

In a representative profile the surface layer is very dark rayish-brown and dark-brown silt loam about 16 inches hick. The subsoil is dark-brown silt loam and silty clay oam that extends to a depth of 60 inches or more.

Woodburn soils are used for pasture, hay, small grain, egetable crops, orchards, grass seed, berries, wildlife hab-tat, and recreation.

Woodburn silt loam, 0 to 3 percent slopes (WoA).—his soil is on broad valley terraces.

Representative profile, 5 miles northeast of Corvallis, n the NW¼SE¼ sec. 4, T. 11 S., R. 4 W.:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate, fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial pores; medium acid; abrupt, smooth boundary. 6 to 10 inches thick.

A3—8 to 16 inches, dark-brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate, fine, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine rots; many very fine pores; medium acid; clear, wavy boundary. 0 to 8 inches thick.

B1—16 to 24 inches, dark-brown (10YR 4/3) silt loam, brown (10YR 5/3) dry; moderate, fine, subangular blocky structure; hard, friable, slightly sticky and plastic; common very fine roots; many very fine tubular pores; thin, clean, sand and silt grains on ped surfaces; medium acid; clear, smooth boundary. 0 to 9 inches thick.

B21t—24 to 32 inches, dark-brown (10YR 4/3) silty clay loam, pale brown (10YR 6/3) dry; common, medium, distinct, dark-brown (7.5YR 4/4) and grayish-brown (10YR 5/2) mottles; weak, medium, prismatic structure and moderate, medium, subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; many very fine and fine tubular pores; common, clean, fine sand and silt coatings on ped surfaces; common, thin, dark-brown (10YR 3/3) clay films on ped surfaces and in pores; few fine concretions and few black stains; medium acid; clear, smooth boundary. 7 to 11 inches thick.

B22t—32 to 48 inches, dark-brown (10YR 4/3) silty clay loam, pale brown (10YR 6/3) dry; common, medium, distinct, dark-brown (7.5YR 4/4) and grayish-brown (10YR 5/2) mottles and a few, dark reddish-brown (5YR 3/3) and black (N 2/0) mottles; weak, medium, prismatic structure parting to moderate, coarse, subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; many very fine tubular pores; common moderately thick and thin clay films on ped surfaces and in pores; slightly acid; clear, smooth boundary. 6 to 21 inches thick.

B3t—48 to 60 inches, dark-brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; common, fine, distinct, dark-brown (7.5YR 4/4) and dark reddish-brown (5YR 3/2) mottles; weak, coarse, subangular blocky structure; hard, friable, sticky and plastic; many very fine and fine tubular pores; few moderately thick clay films in pores and few thin clay films on peds; slightly acid.

The A horizon has a dry value of 4 or 5 and a dry chroma of 2 or 3. The B horizon has a moist chroma of 2 or 3 and ranges from 10YR to 7.5YR in hue. Depth to distinct mottles ranges from 20 to 30 inches.

Included with this soil in mapping were about 5 percent Amity soils and 10 percent Willamette soils.

Runoff is slow to medium on this Woodburn soil, and the hazard of erosion is none to slight. Available water capacity is 11 to 13 inches. Permeability is slow. Rooting depth is somewhat restricted by a seasonal water table in winter and in spring. Workability is good.

This soil is used for pasture, hay, small grain, grass seed, vegetable crops, berries, wildlife habitat, and recreation. Capability unit IIw–3; wildlife group 1.

Woodburn silt loam, 3 to 12 percent slopes (WoC).—This soil is on fans and foot slopes in the low foothills. Slopes average about 6 percent. The profile of this soil is similar to the profile of Woodburn silt loam, 0 to 3 percent slopes, except that a layer of clay is at a depth between 30 and 40 inches or more in some places. Also, where this soil merges into the foothills, coarse fragments of sedimentary rock make up as much as 35 percent of the lower part of the B horizon. Sedimentary bedrock is at a depth of 40 inches or more.

Included with this soil in mapping were as much as 20 percent similar soils and as much as 15 percent contrasting soils. Some soils that have a silty clay loam surface layer and a silty clay subsoil were also included, as well as some soils that are somewhat poorly drained.

Runoff is slow to medium, and the hazard of erosion is slight to moderate.