SOIL SURVEY

Curry Area Oregon

Issued January 1970

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
OREGON AGRICULTURAL EXPERIMENT STATION

Major fieldwork for this soil survey was done in the period 1953–59. Soil names and descriptions were approved in 1965. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1959. This survey was made cooperatively by the Soil Conservation Service and the Oregon Agricultural Experiment Station as part of the assistance furnished to the Curry County Soil and Water Conservation District.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or can be purchased on individual order, from the Cartographic Division, Soil Conservation Service, USDA, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY of the Curry Area, Oregon, contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, or other structures; and in judging the suitability of tracts of land for agriculture, industry, or recreation.

Locating Soils

All of the soils of the Curry Area are shown on the detailed map at the back of this survey. This map consists of many sheets that are made from aerial photographs. Each sheet is numbered to correspond with numbers shown on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbol. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information in the survey. This guide lists all of the soils of the Area in alphabetic order by map symbol. It shows the page where each kind of soil is described, and also the page for the capability unit, woodland group, or any other group in which the soil has been placed.

Individual colored maps showing the relative suitability or limitations of soils for many specific purposes can be developed by using the soil map and information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils in the section that describes the soils and in the section that discusses management of the soils for crops and pasture and for woodland.

Foresters and others can refer to the section "Use of the Soils for Woodland," where the soils of the Area are grouped according to their suitability for trees.

Engineers and builders will find under "Use of the Soils for Engineering" tables that give engineering descriptions of the soils in the Area and that name soil features that affect engineering practices and structures.

Scientists and others can read about how the soils were formed and how they are classified in the section "Formation and Classification of Soils."

Newcomers in the Curry Area will be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the Area," which discusses the climate, settlement and development, and other subjects.

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UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE OREGON AGRICULTURAL EXPERIMENT STATION

THE CURRY AREA is in the southwestern part of Oregon along the shore of the Pacific Ocean (fig. 1). It is bounded on the north by Coos County, and on the south, by Del Norte County, Calif. To the east is the Siskiyou National Forest. The Area is irregular and ranges from 3 to 18 miles in width. It makes up about one-fourth of Curry County. The total extent of the Area is approximately 266,455 acres, or about 416 square miles.

The soils in the Curry Area are dominantly steep to very steep and are on forested hills and mountains. Much of the cutover acreage formerly was pastured. It now is managed for wood crops, which provide most of the cash income. Only a small acreage in the survey area is suitable for cultivation. The areas suitable for cultivation consist of nearly level to gently sloping soils on bottom lands along coastal streams and on marine terraces. They are used chiefly for specialty crops, such as bulbs and cranberries, for small grains, and for grasses and legumes that provide forage for livestock.

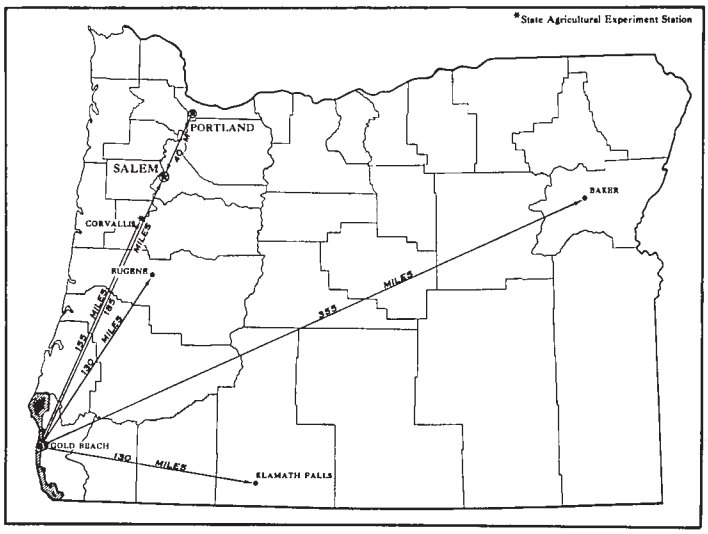

Figure 1.—Location of the Curry Area in Oregon.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in the Curry Area, where they are located, and how they can be used.

They went into the county knowing they likely would find many soils they had already seen, and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by roots of plants.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. For successful use of this survey, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Knappa and Orford, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that go with their behavior in the natural landscape. Soils of one series can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

Many soil series contain soils that differ in texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Knappa clay loam and Knappa silty clay loam are two soil types in the Knappa series. The difference in texture of their surface layers is apparent from their names.

Some types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map

as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Ferrelo loam, 0 to 7 percent slopes, is one of several phases of Ferrelo loam, a soil type that ranges from nearly level to steep.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that greatly help in drawing boundaries accurately. The soil map in the back of this survey was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil type or soil phase.

Most surveys include areas where the soil material is so rocky, so shallow, or so frequently worked by wind and water that it cannot be classified by soil series. These areas are shown on the map like other mapping units, but are given descriptive names, such as Active dune land or Rock outcrop, and are called land types.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soils. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in a way that is readily useful to different groups of readers, among them farmers, ranchers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used. On basis of the yield and practice tables and other data, the soil scientists set up trial groups, and then test them by further study and by consultation with farmers, agronomists, engineers, and others. Then, the scientists adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

After study of the soils in a locality and the way they are arranged, it is possible to make a general map that shows the main patterns of soils. Such a map is the colored general soil map in the back of this survey. The general soil areas are also called soil associations. Each kind of general soil area, or association, as a rule contains a few major soils and several minor soils, in a pattern that is characteristic although not strictly uniform.

The soils within any one association are likely to differ greatly among themselves in some properties; for example, slope, depth, stoniness, or natural drainage. Thus the general map does not show the kind of soil at any particular place, but a pattern that has in it several kinds of different soils.

The general soil areas are named for the major soil series in them, but as already noted, soils of other series may also be present. The major soil series of one general soil area may also be present in other areas, but in a pattern different enough to require a boundary.

The general map showing patterns of soils is useful to people who want a general idea of the soils, who want to compare different parts of a county, or who want to know the possible location of good-size areas suitable for a certain kind of farming or other land use.

In all of the associations in the Curry Area, the average annual temperature is 52° F. Precipitation ranges from 70 to 80 inches annually in all but association 7, where it ranges from 70 to 100 inches. The number of frost-free days ranges from 240 to 250 in associations 1 through 5; from 240 to 290 in association 6; from 160 to 200 in association 7; and from 240 to 260 in association 8.

The eight soil associations in this survey area are each described in the pages that follow. The terms for texture used in the title for several of the associations apply to the surface layer. For example, in the title for association 1, the words "moderately coarse textured and coarse textured" refer to texture of the surface layer.

1. Blacklock-Netarts-Active Dune Land Association

Nearly level to steep, moderately coarse textured and coarse textured soils that have coarse textured subsoil; on dunelike ridges and in intervening basins

This association consists of nearly level to steep soils on dunes. The areas typically are made up of rolling ridges that have convex slopes and of nearly level basins between the ridges. The basins are 1 to 10 acres in size. Relief ranges from low undulating hills that are 10 feet high to abrupt dunes and ridges that are as much as 80 feet high. Sitka spruce, Douglas-fir, salal, azalea, rhododendron, and evergreen huckleberry make up the native vegetation on areas farthest from the coast. Closer to the shore on Active dune land and nearby areas grow beachgrass, shore pine, and Scotch-broom. Elevation ranges from sea level, on the west side of the association, to 100 feet above sea level, on the east side. Some areas of this association are near Floras Lake in the northwestern part of the county, and others are near the Pistol River in the west-central part. The association occupies about 6 percent of the survey area.

Dominant in the association are the Blacklock and Netarts soils and Active dune land. Also in the association are small areas of Ferrelo soils and of Stabilized dune land. Blacklock soils make up about 36 percent of the association; Netarts soils, 27 percent; Active dune land, 17 percent; and the minor Ferrelo soils and Stabilized dune land, 14 and 6 percent, respectively.

Blacklock soils are in basins, and Netarts soils are on broad convex slopes in rolling areas. Active dune land borders the ocean beach in a strip that generally is 150 to 300 feet wide but in places is as much as one-half mile wide.

Ferrelo soils are inland from Netarts soils on convex slopes on low, gently rolling hills. Stabilized dune land occupies a strip 300 to 3,600 feet wide, inland from Active dune land.

Blacklock soils are poorly drained, Netarts soils are well drained, and Active dune land is excessively drained. Blacklock soils have a surface layer of very dark gray fine sandy loam. Just below is dark reddish-brown to yellowish-brown loam that is cemented. The substratum is pale yellow and is sandy. The surface layer of the Netarts soils is very dark gray sandy loam. It overlies dark reddish brown to olive-brown sandy loam and loamy fine sand that is underlain by yellowish-brown loamy fine sand. Active dune land consists of uniformly coarse sand 25 to 50 feet deep.

The minor Ferrelo soils have a surface layer of dark reddish-brown loam. Below is dark-brown fine sandy loam or loam underlain by yellowish-brown loamy fine sand and brownish-gray fine sandy loam. Stabilized dune land consists of grayish-brown loamy sand underlain by moderately coarse sand.

The native vegetation on this association provides forest greens for pickers, and this is the major use. Most of the areas have been burned over. Except for such forest greens as salal, azalea, evergreen huckleberry, and swordfern, the natural cover is not ready for harvest. Other than forest greens, Christmas trees grow on Blacklock soils; spruce and hemlock grow on Netarts soils; and hemlock, spruce, and Douglas-fir grow on Ferrelo soils. Jeffrey pine has been introduced on the Ferrelo soils.

Cranberries are the most valuable cultivated crop grown in this association. They are grown on the Blacklock soils in fields 1 to 5 acres in size. Mixtures of grasses and legumes for pasture also are grown on the Blacklock soils and on the Ferrelo soils.

Blacklock soils have limited potential as sites for suburban and recreational use or for wildlife, but the nearly level to moderately sloping areas of Ferrelo and Netarts soils have high potential for such uses. Active dune land and Stabilized dune land are used for limited recreation, though Stabilized dune land is also used as wildlife areas.

Soil blowing is a severe hazard on areas of this association that are left bare. Where cultivated crops are grown or where the natural vegetation is harvested, a protective cover of vegetation must be established. Low fertility and poor soil stability make it difficult, however, to establish vegetation in many areas.

2. Langlois-Chetco-Bayside Association

Nearly level, moderately fine textured and medium textured soils that have moderately fine textured and fine textured subsoil; on tidal flats, low terraces, and flood plains

The soils in this association are smooth and nearly level. Some of the soils formed in old clay and muck on tidal flats. Others formed in recent sediment washed onto flood plains by streams flowing from the uplands. The sediment came from soils on sedimentary or metamorphic rocks or from soils on basaltic igneous rock. Marsh grasses, rushes, sedges, hardwoods, and a scattering of spruce make up the native vegetation. Elevation ranges from 10 to 40 feet above sea level. The areas are west of Langlois or are along the lower reaches of Floras and Willow Creeks and of the Elk and Sixes Rivers. Most of the acreage is west of U.S. Highway 101 and extends intermittently to the shores of the Pacific Ocean. The association covers 2 percent of the survey area.

This association is 51 percent Langlois soils, 29 percent Chetco soils, and 20 percent Bayside soils. The Langlois soils are on tidal flats near the places where the streams enter the ocean, but they are far enough from the streams that the areas do not receive fresh deposits of alluvium. The Chetco soils occupy terraces, and the Bayside soils are on recent sediment adjacent to present streams.

The Langlois and Chetco soils are poorly drained, and the Bayside soils are somewhat poorly drained. Langlois soils have a surface layer of dark grayish-brown silt loam that generally is less than a foot thick over dark-gray, silty clay loam to silty clay tidal mud. This material is very slowly permeable. The surface layer of the Chetco soils is black silt loam. It overlies black and very dark grayish-brown silty clay. Bayside soils have a surface layer of very dark grayish-brown silty clay loam. Below is dark grayish-brown silty clay that is slowly permeable to very slowly permeable.

All of the soils in this association have moderate to high potential for producing forage. Wetness and soil fertility are the main problems. The soils all need drainage that removes excess surface water. Lack of suitable outlets and very slowly permeable underlying material make it difficult, however, to drain the Langlois soils. The Chetco and Bayside soils can readily be drained, though the Bayside soils are subject to flooding for short periods. If water is controlled and fertility is improved, grasses and legumes grow well and provide good pasture for cattle (fig. 2).

In this association the farms are larger than average for the survey area. The size of each dairy farm or beef-producing farm is about 200 acres.

All of the soils in this association have high potential for use as wildlife areas, but their use for recreation is limited. The soils are not suitable for urban use.

3. Knappa-Ferrelo-Blacklock Association

Nearly level to steep, moderately fine textured to moderately coarse textured soils that have moderately fine textured to coarse textured subsoil; on marine terraces

This association consists of nearly level to gently sloping soils on marine terraces and of moderately sloping to steep soils on side slopes of drainageways and along the front of the terraces. The soils formed chiefly in sediment laid down by wind and water on stratified marine deposits consisting of loam to sand. Sitka spruce, Douglas-fir, shore pine, grand fir, western hemlock, Oregon-myrtle, madrone, salal, rhododendron, and azalea make up the native vegetation. Gorse, a plant introduced from Europe, has encroached in all areas. Elevation ranges from 50 feet, on the west side of the association, to 300 feet on the east side. The areas occur along the coast from the Coos County line to near the California State line. Some of the largest areas are near Port Orford. The association occupies 6 percent of the survey area.

Dominant in this association are the Knappa, Ferrelo, and Blacklock soils. Also in the association are inextensive areas of Chitwood and Hebo soils. Knappa soils make

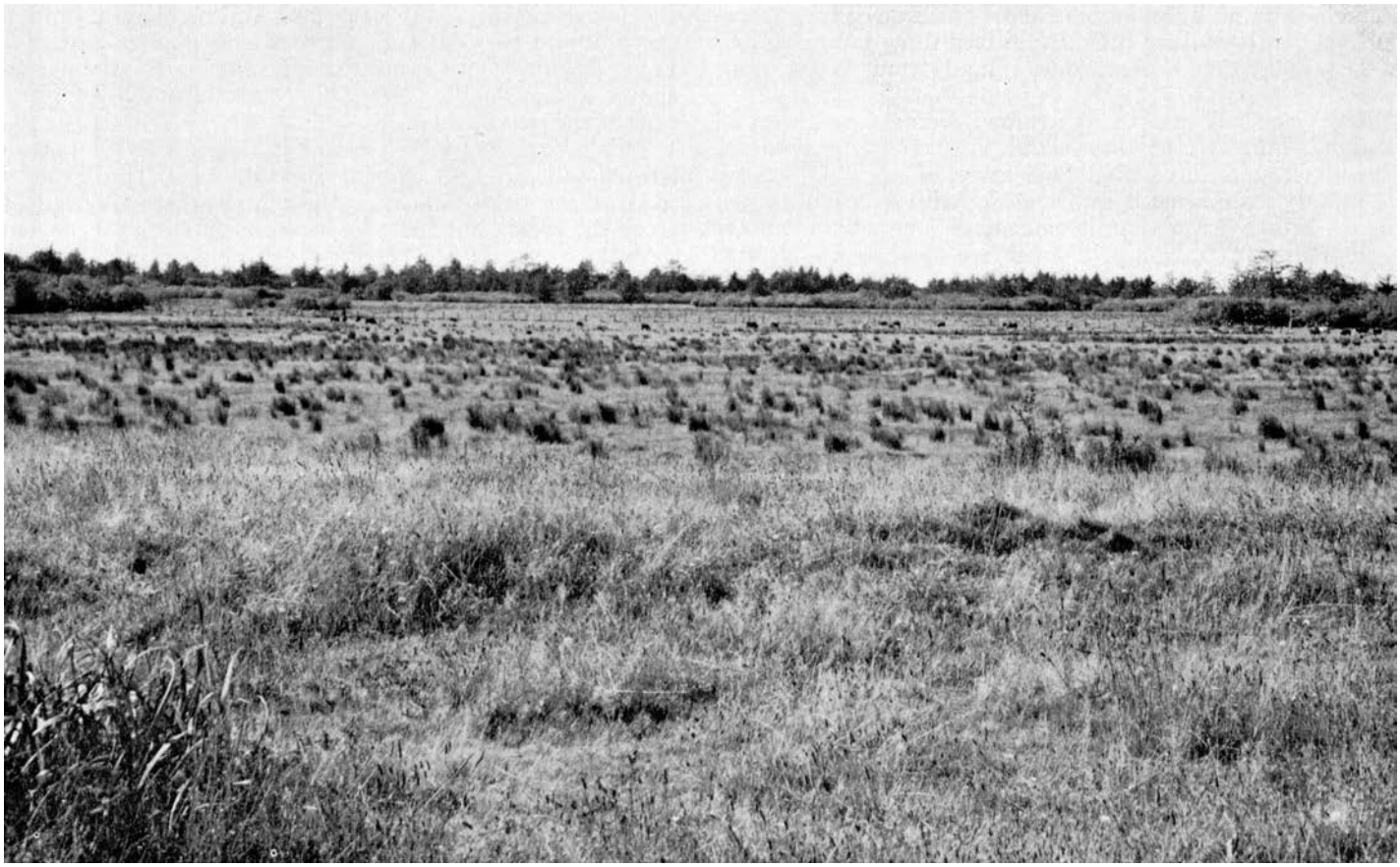

Figure 2.—Pasture on poorly drained Chetco silt loam, on low terraces west of Langlois.

up 58 percent of the association; Ferrelo soils, 21 percent; Blacklock soils, 14 percent; and the minor Chitwood and Hebo soils, 5 and 2 percent, respectively.

Knappa soils are nearly level to steep and are on top of the terraces. Ferrelo soils also are nearly level to steep. They are on the west side of the survey area on rolling hills, on side slopes of drainageways, and on the front of terraces. Blacklock soils occupy small basins within areas of Knappa and Ferrelo soils. The minor Chitwood and Hebo soils occupy small swales within areas of Knappa soils, chiefly on the east side of the survey area where Knappa soils border the uplands.

The Knappa and Ferrelo soils are well drained, and the Blacklock soils are poorly drained. Knappa soils are very deep and have a surface layer of silty clay loam. They are readily penetrated by water and plant roots. Ferrelo soils have a surface layer of loam. Compacted or weakly cemented lenses are at a depth of about 22 inches and moderately restrict penetration of roots unless the soils are saturated. The available water holding capacity is moderately low, and permeability of the subsoil is moderately rapid. Blacklock soils are moderately shallow. Their surface layer is fine sandy loam, and it overlies a strongly cemented subsoil. Below are successive layers of hardpan many feet deep. A perched water table tops each pan.

Most of this association grew up to gorse after a fire destroyed all of the natural cover in 1937. Gorse is a thorny weed, similar to Scotch-broom, which grows rapidly on the soils in this association. It quickly encroaches on all natural vegetation except forests that are well established. Second-growth trees are only now taking over the cover. Forest greens, therefore, are the only plants presently being harvested from the natural cover.

This soil association is the most important in the survey area for farming. The gently sloping to steep soils are used for cultivated crops, and such row crops as bulbs are grown on the nearly level and gently sloping soils. Where Knappa soils have moderate to steep slopes, the choice of crops and the length of the rotation that can be used are restricted. On the steep Ferrelo soils, the choice of crops is severely restricted. Selected areas of the Blacklock soils are used for cranberries. Areas that are wet are planted to legumes and grasses for pasture and hay where wetness is controlled, and these are the most valuable crops grown in the association. The Knappa and Ferrelo soils generally require fertilizer. Blacklock soils are subject to severe wind erosion if the surface is left bare, and fertility and wetness also are problems. Wetness is the major problem on the minor soils.

The soils in this association have high potential for urban use and for use as wildlife and recreational areas. A cover must be kept on all areas to protect the soils from wind erosion.

Farming is diversified in this association. The size of the farms is about the average for the survey area. Much of the acreage in the association is owned by large timber companies.

4. Knappa-Winchuck Association

Gently sloping and sloping, moderately fine textured and medium textured soils that have moderately fine textured and fine textured subsoil; on marine terraces

The soils in this association typically are gently sloping and sloping and are on marine terraces south of Brookings in the southwestern part of the survey area. A few areas, however, are made up of strongly sloping and steeply sloping soils on the fronts of terraces and on the sides of drainageways. The soils formed in marine sediment laid down by wind and water or in alluvium washed onto the areas from hills to the east. Originally native grasses, shrubs, hardwoods, and conifers made up the vegetation, but now most areas are cultivated. Elevation ranges from 20 to 200 feet above sea level. The association occupies less than 1 percent of the survey area.

Dominant in this association are the Knappa and Winchuck soils. Also in the association are small areas of Meda and Hebo soils. Knappa soils make up about 54 percent of the association, and Winchuck soils, about 34 percent. The minor Meda and Hebo soils make up about 9 and 3 percent of the association, respectively.

Knappa soils are adjacent to the ocean. They are along fans or are on terraces where streams flowing from areas underlain by serpentine flow onto the terraces. Further east and in areas above the Knappa soils are the Winchuck soils. Meda soils occupy small areas within areas of Winchuck soils. They are on fans where small streams flowing from areas underlain by sedimentary rock flow onto the terraces. Hebo soils occupy basins interspersed within areas of Knappa soils where drainage is poor. The basins range up to 2 acres in size.

The Knappa and Winchuck soils are very deep and are well drained. Knappa soils are dark colored. Their surface layer is thick, friable silty clay loam. Their subsoil is moderately permeable, and movement of water and growth of plant roots is moderately restricted. Winchuck soils have a surface layer of thick, friable silt loam underlain by a thick subsoil. Permeability of the subsoil is moderately slow, and movement of water and growth of plant roots are only slightly restricted.

Knappa soils have few restrictions in use and management. Fertility is likely to be low, however, in places where the ratio of calcium to magnesium is out of balance. The choice of crops, the kind and length of rotation, and the kind of practices that can be used are restricted on the steeply sloping parts of the Winchuck soils. On the Meda soils the choice of crops is only slightly restricted. Hebo soils are suitable only for grasses and legumes that tolerate wetness, and excess wetness must be controlled.

The more sloping Knappa and Winchuck soils on terrace fronts, and some areas of Meda soils adjacent to the uplands, require protection from erosion. In general, careful use of crop residues, cross-slope tillage, and short-term rotations are sufficient for control of erosion.

Most of this soil association has a cover of grasses and legumes grown for hay and pasture. Farming, however, is more intensive in this soil association than in any other association in the survey area. Almost all of the lily bulbs grown in the Curry Area are grown on soils in this association. Some nursery crops also are grown. Small grains are grown as needed in the lily bulb fields as a clean-up crop to improve the soils for lily bulbs.

Dairy farms in this association range from 80 to 120 acres in size. Farms on which specialty crops are grown range from 10 to 40 acres in size.

Some areas of the Knappa soils, and all areas of the Winchuck soils, have high potential as sites for urban and recreational use and for use for wildlife. In places the Knappa soils tend to slide and slump, and these areas have low potential as sites for urban and recreational use. The potential of the Meda soils as sites for urban and recreational use is moderate, and that of the Hebo soils is low. Meda soils have high potential for wildlife use, and Hebo soils have moderate potential.

5. Riverwash-Nehalem-Gardiner Association

Coarse textured Riverwash and medium textured and moderately coarse textured soils that have moderately fine textured and coarse textured substratum; on flood plains

This association consists of nearly level flood plains adjacent to major drainageways throughout the survey area. Sharp and smooth undulations mark the surface in some places, and stream channels and gravel bars occur at random adjacent to the streams. The soils formed in alluvium washed chiefly from soils in the uplands on siltstone, sandstone, serpentinite, metamorphic schistose slate, and basic igneous rock. In places, however, the alluvium came from soils on local marine terraces. The native vegetation consisted of such hardwoods as alder, myrtle, and ash and of such conifers as spruce, hemlock, and cedar. The understory was made up of laurel, azalea, and rhododendron and of sedges and grasses that tolerate wetness. Elevation ranges from sea level to 200 feet near the headwaters of streams. One of the largest areas of this association is along the Rogue River. The association covers about 2 percent of the survey area.

Dominant in this association are Riverwash and the Nehalem and Gardiner soils. Also in the association are minor areas of Bayside, Knappa, Meda, and Winchuck soils. Riverwash makes up about 40 percent of the association; Nehalem soils, 32 percent; Gardiner soils, 18 percent; and the minor soils, the remaining 10 percent.

Riverwash occurs along streams as bars and mounds of water-sorted material. On the first terraces adjacent to the streams are the Gardiner soils, and farther back from the streams in slightly higher areas are the Nehalem soils. Of the minor soils the Bayside are to the back of the bottoms, and the Knappa, Meda, and Winchuck occupy areas that border higher terraces and areas in the uplands.

Riverwash consists of stratified, water-sorted sand, gravel, cobblestones, and other stones. The deposits generally are more than 8 feet deep. Riverwash is not suitable for farming, but it is a good source of aggregate for highways and other construction purposes.

The Nehalem and Gardiner soils in this association make up about one-fourth of the tilled soils in the survey area. These soils are deep and are well drained. Most areas are subject to flooding and receive fresh deposits of overwash each year. The water table is high for part of each year.

Nehalem soils are moderately fine textured and are moderately permeable. They are fertile and can be farmed intensively under good management. Good management con-

sists of adding adequate amounts of fertilizer, applying supplemental irrigation, and keeping an adequate cover on the soils during winter.

Gardiner soils are moderately coarse textured to coarse textured. These soils are very porous and are rapidly permeable. Loamy sand to sand is at a depth of 4 feet. Fertility is low in these soils. The kinds of crops that can be grown successfully and the length of the rotation are somewhat limited. Large amounts of fertilizer and of irrigation water are needed. In addition cover crops must be kept on the areas in winter.

In general, the soils in this association have high potential for cultivated crops. Bulbs, row crops, small grains, specialty crops, and mixtures of grasses and legumes grown for pasture do well on the soils. Woodland crops also grow well, but the areas are too valuable for most woodland crops.

Much of this association is used for small dairy farms and for various kinds of specialty crops. The farms range from 30 to 80 acres in size.

Soils in this association have moderate to high potential for urban use. The potential for recreation or wildlife uses is high.

6. Sebastian-Winema Association

Gently sloping to very steep soils that are shallow to deep over serpentinite, siltstone, or sandstone; on grass-covered coastal hills

The soils in this association are smooth and are gently sloping to very steep. They are on grass-covered coastal hills inland from marine terraces along the Pacific Ocean. These soils formed in material weathered from serpentinite or from siltstone or sandstone. Bentgrass, sweet vernal, annual bluegrass, wild lotus, brackenfern, salal, and scattered browse plants of various kinds made up the native vegetation. Elevation ranges from 50 to 1,000 feet above sea level. The areas are scattered chiefly along the coast, though a few areas are along coastal streams several miles in from the coast. The association makes up about 4 percent of the survey area.

This association is about 67 percent Sebastian soils and 33 percent Winema soils. The Sebastian soils are on the higher parts of the coastal hills, and the Winema soils generally occupy somewhat lower areas. A few small areas of Orford soils are included.

The Sebastian soils are well drained. Their surface layer is very stony, is medium textured, and is very friable. It overlies a very stony, fine-textured subsoil that is moderately permeable. Depth to serpentinite bedrock is less than 20 inches. Sebastian soils have low fertility and available moisture holding capacity. The hazard of slipping is severe, both in the soils and in the bedrock. The erosion hazard is moderate to severe, depending on the slope.

Winema soils also are well drained. They have a thick, porous surface layer of very friable, very dark brown silty clay loam. The subsoil is fine textured and is moderately slowly permeable. Winema soils are moderately fertile and have high moisture-holding capacity. Even where slopes are moderate, limitations for cultivated crops are severe. Slipping and slumping is a severe hazard in many areas. The hazard of accelerated sheet and gully erosion is moderate.

This soil association is used mostly as pasture for sheep and cattle. Many areas of the Winema soils can be improved by seeding mixtures of grasses and legumes. On all areas in this association, the season of grazing and the number of livestock grazed must be carefully controlled.

Most of the acreage in this association is in ranch holdings that consist of several hundred acres each. Only a few small farmsteads are in the association. Except for U.S. Highway 101, few good roads are in the area.

Use of the soils in this association for cultivated crops or urban, recreational, or wildlife purposes is limited.

7. Trask-Edson Association

Moderately steep to very steep soils that are deep over slate; on forested uplands

This association consists of moderately steep to very steep soils on hills and ridges. The areas are dissected by steep, narrow valleys of streams and by intermittent drainageways. The ridges vary in length and width, and the ridgetops range from a few hundred feet to several hundred yards in width. Most of the soils overlie metamorphosed schistose slate, but some small included areas are on siltstone or sandstone. Trees on the areas are chiefly Douglas-fir, western hemlock, Oregon-myrtle, bigleaf maple, grand fir, and madrone. The understory consists of swordfern, dwarf Oregon-grape, red huckleberry, evergreen huckleberry, salal, and rhododendron. Elevation ranges from 500 to 1,500 feet. Most of the acreage is north of the Sixes River, east of U.S. Highway 101. Smaller areas are near Frankport and south of the town of Pistol River. The association occupies about 10 percent of the survey area.

Dominant in this association are the well-drained Trask and Edson soils. Also in the association are small areas of well-drained Orford soils. Included are some areas of soils 1/8 to 1/4 acre in size that are moderately well drained to poorly drained. Trask soils make up about 48 percent of the association; Edson soils, about 46 percent; and the minor soils, the remaining 6 percent. In general, Trask soils are on very steep ridges above moderately steep to very steep Edson soils on south- and west-facing slopes.

Trask soils have many fragments of slate in the surface soil and in the subsoil. The surface soil is friable, medium textured, and gravelly, and the subsoil is moderately fine textured and gravelly. The content of gravel increases with increasing depth. Highly fractured schistose slate occurs at varying depths. Trask soils are moderately fertile and have moderate available moisture holding capacity. Erosion is severe only on steep or very steep slopes that have been logged or burned.

Edson soils are deep and have a reddish-brown, moderately fine textured surface layer. Their subsoil is firm, fine textured, and moderately slowly permeable. These soils are highly fertile and have high available water holding capacity. The hazard of erosion is severe only on the very steep soils where the cover of vegetation has been disturbed.

The soils in this association are used only for woodland crops, and the Edson are the most productive soils in the survey area for this purpose. The potential of the soils for urban use is low. The soils, however, have high potential for recreational use and for selected wildlife uses.

Many logging roads traverse this soil association. In locating bridges and roads, the less well drained, included soils are important to consider.

This soil association is owned by a few large timber companies. Large areas of the soils, however, also occur in the Siskiyou National Forest to the east.

8. Orford Association

Strongly sloping to very steep soils that are deep over siltstone or sandstone; on forested mountains and foothills

This association consists of strongly sloping to very steep soils on mountains and foothills throughout the survey area. Many of the areas are on the first range of forested hills inland from the Pacific Ocean. The areas characteristically consist of narrow winding ridges dissected by deep, narrow valleys. The hills and mountain ridges are as much as several miles long, and the tops generally are several hundred feet wide. Most of the soil areas are on siltstone, but small areas on serpentinite are included.

Douglas-fir, hemlock, Port-Orford-cedar, Oregon-myrtle, red alder, bigleaf maple, grand fir, and Sitka spruce make up the forests on the lower, more moist and cool areas nearest the ocean. Some forested areas have been clear logged or burned and now have a cover mostly of bentgrass, sweet vernal, annual bluegrass, and bracken-fern. These plants provide natural cover while trees are being reestablished. Elevation ranges from near sea level to 1,000 feet. The association extends from the Coos County line on the north to the California State line on the south. It makes up about 69 percent of the survey area.

About 96 percent of this association is Orford soils. Of the remaining 4 percent, 2 percent is Sebastian soils and 1 percent each is Winema soils and Rock outcrop. In general, Orford soils are on the higher hills and ridges, and Winema soils are on grass-covered hills nearest the ocean. Areas of Sebastian soils are intermingled with areas of Orford and Winema soils on ridgetops and side slopes, where serpentinite crops out.

The Orford soils formed under forest and are deep over siltstone and sandstone. Their surface layer is moderately fine textured. The subsoil is fine textured and is moderately slowly permeable. Orford soils are moderately fertile and have moderate to high available water holding capacity. The minor Sebastian soils are on serpentinite. They are droughty and are low in fertility. The less extensive Winema soils are similar to the Orford soils and formed from similar parent material but formed under grass.

Most of this soil association is used for woodland crops. Orford soils are well suited to trees, and most of the timber produced in the Curry Area comes from trees on these soils. The small acreages of Sebastian and Winema soils are used occasionally as pasture or are used only as wildlife areas.

Changes in use of the soils in this association are not likely. Most of the acreage is owned by large timber companies. The areas now under grass are burned over Orford soils or are natural areas of grassland made up of small areas of Sebastian and Winema soils. These grassy areas generally are used for grazing livestock.

Individual farms in this association are mostly livestock farms or are homes for people who work in the lumbering industry. The farms generally range from several hundred acres to a thousand acres in size.

This soil association is fairly well serviced by roads. Good roads have been constructed by the county along major rivers and creeks in the association.

318-610—70——2

Descriptions of the Soils

This section describes the soil series and mapping units of the Curry Area in alphabetical order. The procedure is first to describe each soil series, and then to describe the mapping units in that series. Thus, to get full information on any mapping unit, it is necessary to read the description of that unit and also the description of the soil series to which it belongs.

The soil series contains a brief description of a soil profile, the major layers from the surface downward. This profile is considered typical for all the soils of the series. If the profile for a given mapping unit differs from this typical profile, the differences are stated in the description of the mapping unit, unless the differences are apparent in the name of the mapping unit.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Active dune land, for example, does not belong to a soil series, but, nevertheless, is listed in alphabetical order along with the soil series.

A technical description typical for the soil series is given under the first mapping unit described for the series. The technical description identifies layers by A, B, and C horizons and depth ranges. These technical descriptions are mainly for soil scientists, engineers, and others who need to make a more thorough and precise study of the soils. The technical profile descriptions, and the paragraph describing range in characteristics that follows, are placed in smaller type than the rest of the description of the soil. Those who want to have only a working knowledge of the soil and its management need only read the part set in larger type.

In describing the typical profile, the color of each horizon is described in words, such as yellowish brown, but it can also be indicated by symbols for the hue, value, and chroma, such as 10YR 5/4. These symbols, called Munsell color notations (*15*),[1] are used by soil scientists to evaluate the color of the soil precisely. For the profiles described, the names of the colors, the color symbols, and the soil consistence are for moist soil unless stated otherwise.

Following the name of each mapping unit, there is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the management group and the woodland group in which the mapping unit has been placed. The page on which each group is described can be found by referring to the "Guide to Mapping Units" at the back of this survey. Many terms in the soil descriptions are defined in the Glossary. The acreage and proportionate extent of the mapping units are shown in table 1. The location of the soils in the Area is shown on the detailed soil map at the back of this survey.

[1] Italic numbers in parentheses refer to Literature Cited, p. 65.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent
	Acres	*Percent*
Active dune land	2, 909	1. 1
Bayside silty clay loam	1, 261	. 4
Blacklock fine sandy loam, 0 to 7 percent slopes	8, 545	3. 2
Chetco silt loam	1, 520	. 6
Chitwood silt loam, 0 to 7 percent slopes	935	. 4
Edson clay loam, 12 to 30 percent slopes	9, 925	3. 7
Edson clay loam, 30 to 60 percent slopes	1, 970	. 7
Ferrelo loam, 0 to 7 percent slopes	3, 392	1. 3
Ferrelo loam, 7 to 20 percent slopes	1, 249	. 5
Ferrelo loam, 20 to 40 percent slopes	1, 289	. 5
Gardiner fine sandy loam	312	. 1
Gardiner fine sandy loam, moderately deep	430	. 2
Gardiner fine sandy loam, overflow	158	(1)
Hebo silty clay loam, 0 to 7 percent slopes	406	. 2
Knappa silty clay loam, 2 to 7 percent slopes	6, 420	2. 4
Knappa silty clay loam, 7 to 12 percent slopes	596	. 2
Knappa silty clay loam, 12 to 20 percent slopes	1, 676	. 6
Knappa silty clay loam, 20 to 30 percent slopes	2, 457	. 9
Knappa silty clay loam, heavy variant, 0 to 12 percent slopes	245	(1)
Knappa clay loam, dark surface variant, 0 to 3 percent slopes	299	. 1
Knappa clay loam, dark surface variant, 3 to 12 percent slopes	156	(1)
Langlois silty clay loam	2, 734	1. 0
Meda gravelly silt loam, 0 to 7 percent slopes	326	. 1
Nehalem silt loam	995	. 4
Nehalem silt loam, overflow	643	. 2
Netarts sandy loam, 0 to 12 percent slopes	2, 593	1. 0
Netarts sandy loam, 12 to 40 percent slopes	1, 978	. 7
Orford silty clay loam, 30 to 70 percent slopes	107, 191	40. 2
Orford silty clay loam, 12 to 30 percent slopes	50, 006	18. 8
Orford silty clay loam, 3 to 12 percent slopes	884	. 3
Orford silty clay loam, moderately deep, 20 to 30 percent slopes	9, 441	3. 6
Orford silty clay loam, moderately deep, 30 to 70 percent slopes	8, 699	3. 3
Riverwash	2, 042	. 8
Rock outcrop	1, 119	. 4
Sebastian very stony loam, 7 to 70 percent slopes	11, 686	4. 4
Stabilized dune land	983	. 4
Trask gravelly silt loam, 20 to 30 percent slopes	5, 852	2. 2
Trask gravelly silt loam, 30 to 70 percent slopes	6, 641	2. 5
Winchuck silt loam, 2 to 7 percent slopes	505	. 2
Winchuck silt loam, 7 to 12 percent slopes	422	. 2
Winchuck silt loam, 12 to 30 percent slopes	349	. 1
Winema silty clay loam, 12 to 30 percent slopes	1, 961	. 7
Winema silty clay loam, 30 to 70 percent slopes	3, 029	1. 1
Winema silty clay loam, 3 to 12 percent slopes	226	(1)
Total survey area	266, 455	100. 0

[1] Less than 0.1 percent.

Active Dune Land

Active dune land (Ad) consists of nearly level to steep areas of uniformly coarse beach sand on dunes. The areas lack vegetation and are along the shore of the ocean and on long, narrow, rolling ridges adjacent to the beaches. No horizon, color, or textural differences are apparent in the soil material.

This land type is unstable and subject to severe soil blowing because vegetation is lacking and breezes blow constantly from the ocean. The sand is droughty, and establishing vegetation is difficult. This land is suitable only for recreational purposes. Capability unit VIIIe–1; woodland group not assigned.

Bayside Series

The Bayside series consists of very deep, nearly level soils that are somewhat poorly drained. These soils formed in mixed alluvium washed from soils on siltstone, sandstone, and shale. They are on low terraces along coastal streams near the Chetco, Gardiner, Langlois, and Nehalem soils. Except for an occasional old stream channel, the surface is smooth. Slopes range from 150 to 600 feet in length. The natural vegetation consists of shrubs, grasses, spruce, and hemlock.

In a typical profile the surface layer is very dark grayish-brown silty clay loam about 24 inches thick. The subsoil is dark grayish-brown silty clay that is mottled. Below a depth of about 54 inches is dark-gray sandy clay loam.

Bayside soils are used mainly for forage crops.

Bayside silty clay loam (0 to 3 percent slopes) (Ba).—This is the only Bayside soil mapped in the survey area. It is nearly level and occupies fairly large areas on low, recent alluvial terraces. The largest areas are in the northwestern part of the survey area.

Typical profile under grasses and legumes (0.4 mile west of U.S. Highway 101 on Old Star Ranch Road, and then 100 feet south; NE¼ sec. 3, T. 31 S., R. 15 W.):

Ap—0 to 10 inches, very dark grayish-brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) when dry; cloddy; weak, coarse, subangular blocky structure; friable when moist, slightly hard when dry, plastic and sticky when wet; common fine pores; many roots; common, fine, distinct mottles; medium acid (pH 5.6); abrupt, smooth boundary. 6 to 11 inches thick.

A3—10 to 24 inches, very dark grayish-brown (10YR 3/2) silty clay loam, grayish brown (2.5Y 5/2) when dry; weak, coarse, subangular blocky structure; friable when moist, hard when dry, plastic and sticky when wet; many, fine, tubular pores; thin patchy coatings on ped surfaces; many roots; medium acid (pH 5.6); clear, smooth boundary. 8 to 15 inches thick.

B2—24 to 38 inches, dark grayish-brown (2.5Y 4/2) silty clay, light brownish gray (2.5Y 6/2) when dry; weak, coarse, prismatic structure; firm when moist, hard when dry, very plastic and very sticky when wet; common, medium and fine, tubular pores; a few fine roots; a few thin, patchy clay films in pores; common, fine, distinct, dark yellowish-brown (10YR 4/4) mottles; strongly acid (pH 5.5); gradual, wavy boundary. 10 to 18 inches thick.

B3—38 to 54 inches, grayish-brown (2.5Y 5/2) silty clay, light gray (2.5Y 7/2) when dry; massive; firm when moist, very hard when dry, very plastic and very sticky when wet; many fine and very fine pores; many, distinct, fine and medium, reddish-brown (5YR 4/4)

mottles; strongly acid (pH 5.4); abrupt, smooth boundary. 18 to 24 inches thick.

IIC—54 to 60 inches +, dark-gray (10YR 4/1) light sandy clay loam; massive; friable when moist, slightly hard when dry, slightly plastic and slightly sticky when wet; common, medium, tubular pores; a few, medium, faint, yellowish-brown (10YR 5/4) mottles; medium acid (pH 5.7).

The A horizon ranges from silt loam to silty clay loam but is dominantly silty clay loam. It ranges from 10YR to 2.5Y in hue. The B horizon ranges from weak structural to weak textural.

Runoff is slow on this soil. Permeability of the subsoil is slow, and available water holding capacity is high. Fertility is moderate. Because of restricted drainage this soil can be worked only when dry or when slightly moist. The main erosion hazard comes from flooding.

Included with this soil in mapping are many small areas of poorly drained Chetco soils and of well-drained Nehalem soils. Other included small areas consist of moderately coarse textured, well-drained Gardiner soils. Also included are a few areas of a gently sloping soil.

Most of Bayside silty clay loam is used to grow forage for livestock. Capability unit IIw–1; woodland group 13.

Blacklock Series

The Blacklock series consists of nearly level to gently sloping, dark-colored soils that are poorly drained. These soils formed in moderately coarse textured sediment laid down by wind and water. They occupy concave slopes on flats and in depressions on marine terraces. The natural vegetation is shore pine, Sitka spruce, Port-Orford-cedar, hemlock, huckleberry, salal, rhododendron, azalea, sword-fern, spirea, and sedges and rushes.

In a typical profile (fig. 3) the surface layer is fine sandy loam to a depth of about 18 inches. It is very dark gray in the upper part and gray below. It overlies a dark reddish-brown to yellowish-brown subsoil that is cemented in the upper part. Pale-yellow loamy fine sand is at a depth of about 48 inches.

Blacklock soils are important for producing forest greens for the floral trade and shore pine for Christmas trees. A few small areas are used intensively for cranberries or are seeded to pasture.

Blacklock fine sandy loam, 0 to 7 percent slopes (BcB).—This is the only Blacklock soil mapped in the survey area. It occupies small basins on marine terraces. Nearly all of it is in the northwestern part of the Area in tracts that extend from north of Port Orford to Langlois.

Typical profile in a wooded area (1.8 miles west of U.S. Highway 101 on Airport Road then 30 feet north of the road; sec. 32, T. 31 S., R. 15 W.):

02—3 inches to 0 of very strongly acid litter consisting of leaves, needles, and grass.

A1—0 to 8 inches, very dark gray (10YR 3/1) fine sandy loam, dark gray (10YR 4/1) when dry; moderate, fine, subangular blocky structure that breaks to moderate, fine, granular; very friable when moist, soft when dry, nonsticky and nonplastic when wet; many irregular pores; many roots; very strongly acid (pH 5.0); gradual, wavy boundary. 4 to 10 inches thick.

A2—8 to 18 inches, gray (N 5/0 to 6/0) fine sandy loam, white (N 8/0) when dry; massive; slightly hard when dry, friable when moist; nonsticky and nonplastic when wet; a few fine pores; many roots; strongly acid (pH 5.2); abrupt, wavy boundary, 6 to 10 inches thick.

Figure 3.—**Typical profile of Blacklock fine sandy loam, 0 to 7 percent slopes.**

B21h—18 to 22 inches, dark reddish-brown (5YR 2/2) loam, dark reddish gray (5YR 4/2) when dry; weak, medium, subangular blocky structure to massive; some cementation; very friable to firm and very firm when moist, soft when dry; many fine pores; many roots; very strongly acid (pH 5.0); abrupt, wavy boundary. 2 to 4 inches thick.

B22ir—22 to 32 inches, yellowish-brown (10YR 5/4 and 5/6) and dark reddish-brown (5YR 3/4) loamy sand; massive; very firm when moist, very hard when dry; common, medium and coarse, dark reddish-brown (5YR 3/4) mottles; a few fine pores; a few roots; strongly acid (pH 5.4); clear, wavy boundary. 6 to 12 inches thick.

B3—32 to 48 inches, yellowish-brown (10YR 5/4) loamy fine sand; massive; firm when moist, slightly hard when dry; many fine pores; a few, medium, distinct, strong-brown (7.5YR 5/6) mottles and a few, fine, prominent, dark reddish-brown (5YR 3/4) mottles; medium acid (pH 5.6); gradual, wavy boundary. 10 to 20 inches thick.

C—48 to 60 inches +, pale-yellow (2.5Y 8/4) loamy fine sand; massive to single grain; loose when moist, slightly hard when dry; reddish-brown concretions and yellowish-brown mottles; many fine pores; medium acid (pH 6.0).

The A1 horizon ranges from fine sandy loam to loam in texture, but it is dominantly fine sandy loam. Depth to the strongly cemented hardpan in the B2 horizon ranges from 12 to 30 inches. This restrictive layer is 6 to 12 inches thick.

Runoff is very slow on the soil, and the hazard of erosion is slight. Permeability of the subsoil is very slow. Available water holding capacity is low, effective root penetration is moderately shallow to moderately deep, and fertility is low. Workability is good.

Included with this soil in mapping are small areas of well-drained Ferrelo loam, 0 to 7 percent slopes, on knolls or ridges that are 100 to 200 feet long and are slightly higher than this Blacklock soil. Also included are small

areas of very deep, well-drained, silty Knappa soils that are near the shoreline side of the marine terraces. Other included small areas consist of gently sloping to moderately sloping, well-drained, sandy Netarts soils.

This Blacklock soil is poorly suited to most crops adapted to the survey area. Cranberries and a few other specialty crops can be grown, however, under special management. Most areas have a cover of shore pine, spruce, cedar, and various kinds of shrubs. A few shore pine are harvested annually for Christmas trees. From time to time forest greens are cut and shipped to florists in metropolitan areas. Pastures have been established in some areas by installing surface drains, adding large amounts of lime and commercial fertilizer, and seeding shallow-rooted grasses and legumes that tolerate wetness. Capability unit VIw–1; woodland group 1.

Chetco Series

Soils of the Chetco series are nearly level, dark colored, and poorly drained. They formed in fine-textured alluvium reworked by wind and tides. These soils are on smooth low terraces that no longer are subjected to tidal action. They are near Bayside and Langlois soils. Grasses and sedges, tussocks of grasses and sedges, and scattered spruce, alder, and willow make up the vegetation.

In a typical profile the surface layer is black silt loam about 8 inches thick. The subsoil is black and very dark grayish brown silty clay loam in the upper part and very dark gray silty clay to dark-gray heavy silty clay loam in the lower part. It is friable and sticky in the upper part and firm and very sticky or sticky below. Gray sandy clay is at a depth of about 31 inches. The surface soil is strongly acid, and the subsoil is strongly acid to slightly acid.

Chetco soils generally are used for forage. Native grasses and browse provide forage in undrained areas, and improved grasses and legumes are produced in drained areas.

Chetco silt loam (0 to 3 percent slopes) (Ch).—This is the only Chetco soil mapped in the Curry Area. It occupies medium-sized areas in the northwestern part of the Area.

Typical profile under grasses and legumes (center of sec. 34, T. 30 S., R. 15 W.):

Ap—0 to 8 inches, black (10YR 2/1) silt loam, gray (10YR 5/1) when dry; cloddy; moderate, medium, subangular blocky structure; friable when moist, hard when dry, slightly plastic and slightly sticky when wet; many, fine, distinct, yellowish-brown (10YR 5/6) mottles; many fine roots; many fine irregular pores; strongly acid; abrupt, smooth boundary. 6 to 8 inches thick.

B1—8 to 12 inches, black (10YR 2/1) and very dark grayish-brown (10YR 3/2) silty clay loam; grayish brown (10YR 5/2) and gray (10YR 5/1) when dry; moderate, medium, prismatic structure; friable when moist, hard when dry, sticky and plastic when wet; common, fine, distinct mottles; a few, fine and medium, black stains; many fine roots; many fine pores; strongly acid (pH 5.5); clear, smooth boundary. 3 to 8 inches thick.

B21—12 to 22 inches, very dark gray (5Y 3/1) silty clay, gray (5YR 6/1 and 5/1) when dry; strong, coarse, prismatic structure; firm when moist, very hard when dry, very sticky and very plastic when wet; many, fine and medium, distinct mottles; a few, fine, black concretions; many fine roots along prism faces; many fine pores; a few, medium, patchy clay films in pores; medium acid (pH 6.0); clear, smooth boundary. 8 to 14 inches thick.

B22—22 to 31 inches, dark-gray (5Y 4/1) heavy silty clay loam, gray (5Y 6/1) when dry; moderate, very coarse, prismatic structure; firm when moist, very hard when dry, sticky and very plastic when wet; many, fine and medium, distinct mottles; a few, fine, black concretions; many fine pores; many fine roots along prism faces; thin, patchy clay films in some pores; slightly acid (pH 6.3); clear, smooth boundary. 6 to 12 inches thick.

C1—31 to 54 inches, gray (5Y 5/1) sandy clay, gray (5Y 6/1) when dry; massive; firm when moist, sticky and very plastic when wet; many, fine and medium, distinct mottles; many fine pores; a few roots; stratified with clay that is similar in color and is 2 inches thick; slightly acid; clear, wavy boundary.

IIC2—54 to 60 inches +, olive-gray (5Y 5/2) clay, light olive gray (5Y 6/2) when dry; massive; firm when moist, very sticky and very plastic when wet; many, fine to coarse, distinct mottles; many fine pores; slightly acid.

The A horizon ranges from black to very dark grayish brown in color. The lighter colors come from recent overwash. The B horizon ranges from 10YR and yellower in hue, has a chroma of 1 or less, and a value of 3 or 4 when moist. Structure ranges from moderate to strong. Clay films are difficult to determine, but those that are present range from thin to moderately thick.

Runoff is very slow on this soil. Permeability of the subsoil is slow to very slow, and available moisture holding capacity is moderate. Effective root penetration is shallow to moderately deep. Fertility is moderate. Workability is fair to poor because the soil is wet for part of the year.

Included with this soil in mapping are small areas of Bayside silty clay loam. These included areas make up about 3 percent of the acreage of this soil.

Most of Chetco silt loam is used for forage crops. The response to management is fair. Capability unit IVw–1; woodland group not assigned.

Chitwood Series

The Chitwood soils are nearly level to gently sloping and are somewhat poorly drained. They formed in waterlaid material derived chiefly from siltstone. These soils are in slightly concave areas on marine terraces, generally near the Knappa and Ferrelo soils. Some areas are adjacent to the Orford and Winema soils, which are in the uplands. The natural vegetation is grasses, sedges, rushes, and scattered hemlocks.

In a typical profile the surface layer is very dark brown and dark-brown, friable silt loam about 12 inches thick. The subsoil is dark brown to yellowish brown or grayish brown and is mottled. It is heavy silt loam in the upper part and silty clay loam to silty clay and clay below.

Chitwood soils are used for forage crops or are left in native trees.

Chitwood silt loam, 0 to 7 percent slopes (CtB).—This is the only Chitwood soil mapped in the Curry Area, and it is fairly important. It occupies small concave areas in large marine terraces. The surface is smooth to gently undulating, and the slopes range from 150 to 400 feet in length. Some areas are on the marine terrace north of Port Orford between the Sixes River and Willow Creek.

Typical profile under pasture of grasses and legumes (30 feet south of the center of the north section line and 30 feet east of U.S. Highway 101; sec. 22, T. 31 S., R. 15 W.):

Ap—0 to 7 inches, very dark brown (10YR 2/2) silt loam, brown (7.5YR 5/2) when dry; strong, medium and fine, granular structure; friable when moist, slightly hard when dry, slightly plastic and slightly sticky when wet; many irregular pores; many roots; strongly acid (pH 5.2); clear, smooth boundary. 0 to 8 inches thick.

A12—7 to 12 inches, very dark brown (10YR 2/2) and dark-brown (10YR 3/3) silt loam, dark grayish brown (10YR 4/2) and brown (10YR 5/3) when dry; weak, medium, prismatic structure that breaks to moderate, medium and coarse, subangular blocky; friable when moist, hard when dry, plastic and slightly sticky when wet; many, fine and medium, tubular pores; strongly acid (pH 5.2); gradual, smooth boundary. 3 to 8 inches thick.

B1—12 to 18 inches, dark-brown (10YR 3/3) heavy silt loam, pale brown (10YR 6/3) when dry; moderate, coarse, subangular blocky structure; friable when moist, hard when dry, slightly sticky and plastic when wet; many fine and very fine pores; many fine roots; strongly acid (pH 5.2); clear, wavy boundary. 3 to 8 inches thick.

B21t—18 to 23 inches, mixed yellowish-brown (10YR 5/4), dark-brown (10YR 4/3), and dark grayish-brown (10YR 4/2) silty clay loam, very pale brown (10YR 7/4), pale brown (10YR 6/3), and light brownish gray (10YR 6/2) when dry; common, fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium and coarse, subangular blocky structure; firm when moist, hard when dry, plastic and sticky when wet; thin patchy clay films on ped surfaces and a few medium films in pores; common, fine and medium, tubular pores; many roots; strongly acid (pH 5.0); clear, wavy boundary. 6 to 8 inches thick.

B22t—23 to 30 inches, olive (5Y 5/3) silty clay, pale yellow (5Y 7/3) when dry; many, fine and medium, distinct, yellowish-brown (10YR 5/6) and grayish-brown (10 YR 5/2) mottles; weak, very coarse, prismatic structure; firm when moist, very hard when dry, very plastic and very sticky when wet; a few, thin, patchy clay films; a few patches of clean sand grains; a few, very fine and a few, coarse, tubular pores; a few roots; very strongly acid (pH 5.0); gradual, smooth boundary. 6 to 10 inches thick.

B23t—30 to 46 inches, grayish-brown (2.5Y 5/2) silty clay, white (2.5Y 8/2) and light gray (2.5Y 7/2) when dry; many, fine and medium, distinct, yellowish-brown (10YR 5/6 and 5/8) mottles; massive; firm when moist, very hard when dry, very plastic and very sticky when wet; a few, fine, black stains; very strongly acid (pH 4.8); gradual, wavy boundary. 10 to 20 inches thick.

B3—46 to 60 inches, grayish-brown (2.5Y 5/2) clay, light gray (2.5Y 7/2) when dry; many, medium and coarse, distinct, yellowish-brown (10YR 5/6 and 5/8) mottles; massive; firm when moist, very hard when dry, very sticky and very plastic when wet; a few clay bridges between sand grains; very strongly acid (pH 4.5).

The A horizon ranges from 10 to 20 inches in thickness and is faintly mottled in places. Its texture is dominantly silt loam. In the B horizon the hue is 10YR or yellower and the chroma is 3 or 2.

Runoff is slow to medium on this soil. Permeability of the subsoil is slow, and the available water holding capacity is high. Effective root penetration is moderately deep. Fertility is moderate. When this soil is dry or only slightly moist, workability is fair. The erosion hazard is slight.

Included with this soil in mapping are small areas of nearby Hebo silty clay loam, 0 to 7 percent slopes. Also included are small areas of the adjacent Ferrelo, Knappa, Orford, and Winema soils. Other included small areas consist of moderately deep or deep Chitwood soils, in narrow stringers on the edges of depressions, that are used and managed the same as this soil.

All of this Chitwood soil is used for forage crops. The reponse to management is fair. Capability unit IVw–2; woodland group 13.

Edson Series

The Edson series consists of deep, strongly sloping to very steep soils that are well drained. These soils formed on slate in mountainous areas that extend from the Rogue River northward to the Coos County line. Douglas-fir, western hemlock, tanoak, salal, rhododendron, evergreen huckleberry, and swordfern make up the natural vegetation.

A typical profile has a surface layer of reddish-brown, friable clay loam about 6 inches thick. The upper part of the subsoil is reddish-brown silty clay, and the lower part is yellowish-red and yellowish-brown silty clay loam. Schistose slate bedrock generally is at a depth of more than 40 inches. The surface soil is strongly acid, and the subsoil is strongly acid or very strongly acid.

Edson soils are the most productive woodland soils in the survey area. A few small areas have been cleared and are now pastured.

Edson clay loam, 12 to 30 percent slopes (EdE).—This soil occupies large areas in the higher uplands of the survey area. Slopes generally are 100 to 500 feet wide and extend along the side slopes of mountains for 200 to 300 yards.

Typical profile under a forest of Douglas-fir (about 3½ miles northeast of Ophir along Euchre Creek; northwest corner NW¼SW¼SE¼ sec. 35, T. 34 S., R. 14 W.):

A1—0 to 6 inches, reddish-brown (5YR 4/4) clay loam, yellowish red (5YR 5/6) when dry; moderate, medium, subangular blocky structure; friable when moist, hard when dry, sticky and plastic when wet; many roots; many very fine pores; strongly acid (pH 5.2); clear, smooth boundary. 4 to 8 inches thick.

B21t—6 to 20 inches, reddish-brown (5YR 4/4) silty clay, yellowish red (5YR 5/6) when dry; weak to moderate, medium, subangular blocky structure; firm when moist, hard when dry, sticky and very plastic when wet; many fine and medium pores; a few thin and thick clay films in tubular pores and on ped surfaces; many roots; very strongly acid (pH 5.0); diffuse, lower boundary. 8 to 20 inches thick.

B22t—20 to 36 inches, reddish-brown (5YR 4/4) silty clay, yellowish red (5YR 5/6) when dry; weak, medium, subangular blocky structure; firm when moist, hard when dry, sticky and very plastic when wet; many fine and medium pores; a few thin and thick clay films in tubular pores and on ped surfaces; many roots; strongly acid to very strongly acid; diffuse, smooth boundary. 10 to 20 inches thick.

B23t—36 to 46 inches, reddish-brown (5YR 4/4) silty clay, yellowish red (5YR 5/6) when dry; weak, medium and coarse, subangular blocky structure; firm when moist, hard when dry, sticky and very plastic when wet; a few very fine and medium pores and common fine and medium pores; a few thin and thick clay films in tubular pores and on ped surfaces; many roots; strongly acid to very strongly acid; diffuse, smooth boundary. 8 to 14 inches thick.

B24t—46 to 60 inches, yellowish-red (5YR 4/6) silty clay loam, yellowish red (5YR 5/6) when dry; weak, medium, subangular blocky structure; firm when moist, hard when dry, sticky and plastic when wet; a few very fine to medium pores; common, thin clay films in pores; a few roots; strongly acid to very strongly acid; clear, irregular boundary. 6 to 20 inches thick.

B3—60 inches +, yellowish-brown (10YR 5/6) silty clay loam, yellow (10YR 7/6) when dry; massive; firm when moist, hard when dry, sticky and plastic when wet; a few very fine to medium pores; common, thin clay films in pores; a few roots; very strongly acid.

The A horizon ranges from 7.5YR to 5YR in hue and from 2 to 4 in value when moist. It ranges from 3 to 5 in value and from 3 to 6 in chroma when dry. The B2 horizon ranges from 5YR to 2.5YR in hue and has a value close to 4 when moist and a chroma of 4 to 6. It ranges from weak to moderate in structure. Bedrock generally is at a depth of more than 40 inches.

Runoff is medium on this soil, and the hazard of erosion is moderate. Permeability of the subsoil is moderately slow. Available water holding capacity is high, effective root penetration is deep, and fertility is high.

Included with this soil in mapping are small knolls or ridges of Orford silty clay loam, 12 to 30 percent slopes, and of Trask gravelly silt loam, 20 to 30 percent slopes. These included soils make up about 10 percent of the acreage of this mapping unit. Also included are some areas of Edson clay loam on slopes of less than 12 percent that are too small to be mapped separately.

This Edson soil has the highest timber potential of any soil in the survey area and is used chiefly for timber. A few areas have been logged or burned, and the native browse on these areas is pastured. Capability unit VIe–1; woodland group 3.

Edson clay loam, 30 to 60 percent slopes (EdG).—This soil occupies broad areas throughout the higher parts of the mountains in the survey area. Except that slopes are steeper and longer, the profile of this soil is similar to the one described for the series. Slopes range from 200 to 500 feet in length. Runoff is rapid, and the erosion hazard is severe.

Included with this soil in mapping are small areas of Trask gravelly silt loam, 30 to 70 percent slopes, that make up about 10 percent of this mapping unit. Also included are small areas of Orford silty clay loam, 30 to 70 percent slopes, and of Orford silty clay loam, moderately deep, 30 to 70 percent slopes. These included soils are too small to be mapped separately.

All of this Edson soil is used for producing timber. Capability unit VIIe–1; woodland group 4.

Ferrelo Series

Soils of the Ferrelo series are deep, nearly level to steep, and well drained. They formed in weakly consolidated marine sediment. These soils are on marine terraces throughout the survey area. They are near the Blacklock, Knappa, and Netarts soils and Stabilized dune land. The native vegetation was Douglas-fir, grand fir, spruce, salal, azalea, rhododendron, and fern.

In a typical profile the surface layer is dark reddish-brown, very friable loam about 22 inches thick. The subsoil is dark-brown fine sandy loam or loam. Yellowish-brown loamy fine sand is at a depth of about 41 inches. The surface soil is strongly acid or medium acid, and the subsoil is medium acid.

Ferrelo soils are used chiefly for forage crops, though daffodils and lily bulbs are grown in small areas.

Ferrelo loam, 0 to 7 percent slopes (FeB).—This soil occupies large areas on many parts of marine terraces throughout the survey area.

Typical profile under a spruce forest (northwest corner of intersection of old U.S. Highway 101, and new U.S. Highway 101, south of Nesika Beach and north of Gold Beach; NW¼NW¼ sec. 6, T. 36 S., R. 14 W.):

O1&O2—2 inches to 0 of dark reddish-brown (5YR 3/2) undecomposed and decomposed litter, dark reddish brown (5YR 3/3) when dry; very strongly acid (pH 5.0); abrupt, smooth boundary. 1 to 3 inches thick.

A1—0 to 8 inches, dark reddish-brown (5YR 3/2) loam, dark reddish gray (5YR 4/2) when dry; moderate, fine, subangular blocky structure that breaks to moderate, fine, granular; very friable when moist, soft when dry, nonplastic and nonsticky when wet; common irregular pores; many roots; strongly acid (pH 5.2); clear, wavy boundary. 8 to 12 inches thick.

A3—8 to 22 inches, dark reddish-brown (5YR 3/2) loam; dark reddish gray (5YR 4/2) when dry; moderate, medium, subangular blocky structure that breaks to moderate, fine, granular; very friable when moist, soft when dry, nonplastic and nonsticky when wet; many, coarse and fine, tubular pores; many roots; medium acid (pH 5.6); clear, wavy boundary. 10 to 16 inches thick.

B21—22 to 27 inches, dark-brown (7.5YR 4/4) fine sandy loam or loam, brown (7.5YR 5/4) when dry; weak, medium, subangular blocky structure; friable when moist, hard when dry, slightly plastic and slightly sticky when wet; a few dark-brown (7.5YR 3/2) variegations; common yellowish-brown concretions; common, reddish-brown, iron concretions; common, thin, discontinuous, dark reddish-brown lenses that are very firm when moist and very hard when dry; these lenses appear to be slightly cemented when dry; common, fine, tubular pores; a few roots; medium acid (pH 5.6); clear, wavy boundary. 4 to 6 inches thick.

B22—27 to 41 inches, dark-brown (7.5YR 4/4) fine sandy loam, light yellowish brown (10YR 6/4) when dry; weak, medium, subangular blocky structure; friable when moist, hard when dry, slightly plastic and slightly sticky when wet; a few, fine, reddish-brown, iron concretions; a few, thin, discontinuous, reddish-brown lenses that are firm when moist and very hard when dry; these lenses appear to be slightly cemented when dry; a few, medium, tubular pores; a few roots; medium acid (pH 5.6); clear, wavy boundary. 12 to 16 inches thick.

IIC1—41 to 58 inches, yellowish-brown (10YR 5/6) loamy fine sand, light yellowish brown (10YR 6/4) when dry; massive; friable and firm when moist, slightly hard and hard when dry, nonsticky and nonplastic when wet; a few, medium, distinct, yellowish-brown (10YR 5/4) variegations; fine, reddish-brown, iron concretions; a few, moderately coarse, tubular pores; medium acid (pH 6.0); abrupt, wavy boundary. 10 to 20 inches thick.

IIIC2—58 to 68 inches, light brownish-gray (10YR 6/2) fine sandy loam, white (10YR 8/2) when dry; massive; firm when moist, nonsticky and nonplastic when wet; yellowish-brown (10YR 5/4) variegations, dark reddish-brown (5YR 3/2) root channels; a few, medium and fine, tubular pores; medium acid (pH 6.0).

The A horizon ranges from fine sandy loam to loam. The acreage of each is about equal. The B horizon is principally a color horizon and has slight accumulation of clay.

Runoff is slow on this soil. Permeability of the subsoil is moderately rapid, and available moisture holding capacity is moderately low. Effective root penetration is moderately deep. Workability is good. The hazard of water erosion is slight, but the hazard of wind erosion is moderate.

Included with this soil in mapping are small areas of Blacklock fine sandy loam, 0 to 7 percent slopes, and of Knappa silty clay loam, 2 to 7 percent slopes. These included areas are too small to be mapped separately.

A few small areas of this Ferrelo soil are used for growing flower bulbs. Of the remainder, about half is used for

forage crops and the other half is used for timber. The response to management is fairly good. Capability unit IIIe–2; woodland group 2.

Ferrelo loam, 7 to 20 percent slopes (FeD).—This soil is on the front of marine terraces on many narrow stringers. The surface is smooth to rolling. Slopes range from 100 to 400 feet in length and from 50 to 100 feet in width. Included in mapping are a few small moderately eroded areas.

Most of this soil is used for producing timber. Some areas, however, have been cleared and are used for pasture. Capability unit IVe–4; woodland group 2.

Ferrelo loam, 20 to 40 percent slopes (FeF).—Some areas of this soil are adjacent to steeper uplands, and others are on terrace escarpments. Slopes generally are 300 to 500 feet long and 50 to 150 feet wide.

Depth to lenses of weakly cemented soil material, and the thickness and the number of lenses, varies greatly. Runoff is rapid, and the erosion hazard is severe. Workability is poor. Except during heavy storms in winter, trafficability is good.

Included with this soil in mapping are small areas of moderately sloping and strongly sloping soils.

Most of this Ferrelo soil is used for producing timber. Cleared areas are used for grazing livestock. Capability unit VIe–3; woodland group 2.

Gardiner Series

In the Gardiner series are moderately coarse textured to coarse textured soils that are well drained. These soils formed in recent alluvium washed chiefly from soils on basalt, gabbro, greenstone, andesite, serpentinite, shale, siltstone, sandstone, and peridotite. They are on flood plains of coastal streams near the Bayside and Nehalem soils. Brush, grass, and hardwood trees made up the native vegetation.

A typical profile consists of very dark grayish-brown fine sandy loam to a depth of about 12 inches. Below is very dark grayish-brown fine sandy loam and dark grayish-brown loamy fine sand. Stratified coarse sand and gravel generally are at a depth of 60 inches or more. The surface layer is medium acid, but the layer just below is slightly acid.

Gardiner soils are used mainly for forage crops. Lily bulbs and daffodils are grown on a few small areas.

Gardiner fine sandy loam (0 to 3 percent slopes) (Ga).—This soil generally occupies small areas that are variable in shape and size and are on flood plains of the Chetco, Elk, Pistol, Rogue, Sixes, and Winchuck Rivers. Most of the areas are on streambanks and other high places on stream bottoms. Consequently, they are subject to only occasional flooding.

Typical profile in a cultivated field (1.6 miles east of the north end of the Rogue River Bridge on old U.S. Highway 101, then 400 feet south; NW¼SW¼ sec. 20, T. 36 S., R. 14 W.):

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) heavy fine sandy loam, grayish brown (10YR 5/2) when dry; weak, coarse, subangular blocky structure; friable when moist, soft when dry, slightly plastic and slightly sticky when wet; many irregular pores; many roots; medium acid (pH 6.0); clear, smooth boundary. 6 to 10 inches thick.

AC—8 to 12 inches, very dark grayish-brown (10YR 3/2) heavy fine sandy loam, gray (10YR 5/1) when dry; weak, medium, subangular blocky structure; friable when moist, soft when dry, nonplastic and nonsticky when wet; many irregular pores; many roots; slightly acid (pH 6.4); clear, smooth boundary. 3 to 6 inches thick.

C1—12 to 17 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; massive; loose when moist, nonsticky and nonplastic when wet; many irregular pores; slightly acid (pH 6.2); 3 to 6 inches thick.

C2—17 to 60 inches, dark grayish-brown (10YR 4/2) loamy fine sand; massive; very friable when moist, nonplastic and nonsticky when wet; many irregular pores; medium acid (pH 6.0); more than 36 inches thick.

The A horizon ranges from fine sandy loam to loamy sand in texture, but it is dominantly fine sandy loam. The C horizon is dominantly loamy fine sand, but in places it contains thin strata of fine sandy loam. Depth to stratified coarse sand and gravel ranges from less than 3 to 5 feet or more.

Runoff is very slow on this soil. Permeability is rapid, and available moisture holding capacity is low. Effective root penetration is deep. Fertility is low. Workability is good. Except where flooding causes moderate streambank cutting during the wet winter months, the hazard of erosion is slight.

Included with this soil in mapping are some areas of Bayside silty clay loam and of Nehalem soils that are too small to be mapped separately. Also included are small knolls or ridges of gently sloping to moderately sloping soils. Other included small areas consist of very deep Gardiner soils.

Most of this Gardiner soil is used for growing grasses and legumes. Lily bulbs and daffodils are grown on a small acreage. The response to careful management is fair. Capability unit IIIs–2; woodland group 15.

Gardiner fine sandy loam, moderately deep (0 to 3 percent slopes) (Gm).—This soil is on coastal flood plains. It generally is nearly level, but in many places swales and old stream channels make the surface sharply undulating. This soil is droughty. Stratified sand and gravel are at a depth between 20 and 36 inches. Runoff is very slow. Permeability of the subsoil is rapid, and available moisture holding capacity is very low. Fertility is low. Workability is good. Because of flooding and streambank cutting, the hazard of erosion is severe.

Included with this soil in mapping are small areas of loamy coarse sand on long narrow ridges and knolls. Also included are some small areas of gently sloping and moderately sloping soils.

All of this Gardiner soil is used for cultivated pasture, such as orchardgrass and white clover. Capability unit IVe–3; woodland group 15.

Gardiner fine sandy loam, overflow (0 to 3 percent slopes) (Go).—This soil occupies areas on flood plains immediately adjacent to coastal streams. Some of the areas are in sharp bends of the stream channels. In many places the surface is dissected by old stream channels and is gently undulating. Because of flooding and streambank cutting, the hazard of erosion is severe.

Included with this soil in mapping are small areas of soils on knolls or ridges that have slopes of 3 to 7 percent. These included areas are too small to be mapped separately.

All of this Gardiner soil is used for cultivated forage crops. Capability unit IVw–3; woodland group 15.

Hebo Series

The Hebo soils are nearly level to gently sloping and are poorly drained. They formed in mixed silty and clayey sediment washed from soils on sedimentary and igneous rocks. These soils are on fans and foot slopes that are near marine terraces in many places. Most areas are in the northern part of the survey area, though a few small scattered areas are in the southwestern part near the California State line. Skunkcabbage, sedges, rushes, willows, and a few spruce make up the vegetation.

In a typical profile the surface layer is strongly acid, very dark brown to very dark gray silty clay loam about 15 inches thick. The subsoil is light olive-brown, light olive-gray, and yellowish-red silty clay that is strongly mottled. Yellowish-red sandy clay is at a depth of about 58 inches.

Hebo soils are used for native and improved pasture and as woodland.

Hebo silty clay loam, 0 to 7 percent slopes (HeB).—This is the only Hebo soil mapped in the survey area. Most of the areas are in small basins on the coastal plain along the western edge of the survey area.

Typical profile under grasses and legumes (0.3 mile north of Willow Creek along U.S. Highway 101 and 200 feet east of the road; SE¼NW¼NE¼ sec. 15, T. 31 S., R. 15 W.):

Apg—0 to 10 inches, very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) when dry; weak, fine, subangular blocky structure; friable when moist, hard when dry, sticky and plastic when wet; many roots; many, medium, irregular pores; common, distinct, very fine, dark reddish-brown (5YR 3/4) mottles along root channels; strongly acid (pH 5.2); clear, smooth boundary. 6 to 12 inches thick.

A1g—10 to 15 inches, very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) when dry; moderate, medium and fine, subangular blocky structure; firm when moist, hard when dry, sticky and plastic when wet; many roots; many, medium, irregular pores; many, fine, prominent, strong-brown (7.5YR 5/6) to dark reddish-brown (5YR 3/4) mottles; many, very fine, shotlike aggregates that break down when wet; strongly acid (pH 5.4); gradual, smooth boundary. 5 to 10 inches thick.

B21tg—15 to 23 inches, light olive-brown (2.5Y 5/4) silty clay, light gray (2.5Y 7/2) when dry; moderate, coarse, prismatic structure that breaks to moderate, medium, subangular blocky; very firm when moist, very hard when dry, sticky and plastic when wet; common roots; many, medium and fine, continuous, vertical pores; thick continuous clay films on all vertical surfaces and on most horizontal ped surfaces; many, coarse, prominent, gray (2.5Y 5/1) to very dark grayish-brown (10YR 3/2) mottles; medium acid (pH 5.6); gradual, wavy boundary. 8 to 12 inches thick.

B22tg—23 to 35 inches, light olive-gray (5Y 6/2) silty clay, white (5Y 8/2) when dry; moderate, coarse to medium, prismatic structure that breaks to weak, very fine, blocky; very firm when moist, very hard when dry, very sticky and very plastic (waxy) when wet; a few fine roots; common, fine and very fine, vertical, tubular pores; thick continuous clay films; about 40 percent is coarse, prominent, yellowish-brown (10YR 5/8) mottles; medium acid (pH 5.8); gradual, smooth boundary. 12 to 17 inches thick.

B23tg—35 to 58 inches, yellowish-red (5YR 5/8) silty clay, reddish yellow (5YR 7/8) when dry, mixed in about equal parts with light-gray (N 7/0) and gray (N 5/0) silty clay; weak, very coarse, prismatic structure; very firm when moist, very hard when dry, very sticky and very plastic when wet; a few, very fine, vertical tubular pores; a few, thin, patchy clay films; medium acid (pH 6.0); clear, smooth boundary. 23 to 25 inches thick.

Cg—58 to 62 inches, yellowish-red (5YR 5/6) sandy clay, reddish yellow (5YR 7/6) when dry; massive; firm when moist, hard when dry, sticky and plastic when wet; about 30 percent is coarse, prominent, grayish-brown (2.5Y 5/2) mottles; light gray (2.5Y 7/2) when dry; slightly acid (pH 6.2).

In color the A horizon ranges from very dark brown to very dark gray. The subsoil generally has well-developed structure, though in a few places the subsoil is more clayey, has less well developed structure, and is more massive.

Runoff is slow to medium on this soil, and the hazard of erosion is slight. Permeability of the subsoil is very slow. Available moisture holding capacity is moderate, effective root penetration is moderately deep, and fertility is low. Workability is fair.

Included with this soil in mapping are a few small areas of Chitwood silt loam, 0 to 7 percent slopes, in transitional areas.

Most of this Hebo soil is used for improved pasture. Capability unit IVw–2; woodland group 13.

Knappa Series

Knappa soils are very deep, nearly level to steep, and well drained. These soils formed in sediment laid down by wind and water on smooth to undulating terraces and on the fronts of sharply dissected terraces. They occupy large areas along marine terraces near the Blacklock, Chitwood, Ferrelo, and Netarts soils. Douglas-fir, Port-Orford-cedar, Sitka spruce, hemlock, swordfern, salal, huckleberry, azalea, and rhododendron make up the natural vegetation.

In a typical profile the surface layer is strongly acid, friable silty clay loam about 30 inches thick. It is dark reddish brown in the upper half and dark brown in the lower half. The subsoil is strong-brown, friable silty clay loam that is medium acid.

Knappa soils are important in the survey area for production of forage crops, lily bulbs, daffodils, and timber.

Knappa silty clay loam, 2 to 7 percent slopes (KnB).—This soil is the most important soil for cultivated crops in the survey area and has the largest acreage used for that purpose. The areas are large and are adjacent to all marine terraces in the survey area.

Typical profile in a pasture seeded to grasses and legumes (0.6 mile west of U.S. Highway 101 on Floras Lake Road, then 0.1 mile west of road entering the Strain farm, in the southwest corner of a field north of a farm road; SW¼SW¼ sec. 10, T. 31 S., R. 15 W.):

Ap—0 to 6 inches, dark reddish-brown (5YR 3/2) silty clay loam, dark brown (7.5YR 4/2) when dry; moderate, medium, granular structure; friable when moist, slightly hard when dry, slightly sticky and slightly plastic when wet; many roots; many irregular pores; strongly acid (pH 5.4); clear, smooth boundary. 0 to 8 inches thick.

A1—6 to 18 inches, dark reddish-brown (5YR 3/2) silty clay loam, dark reddish gray (5YR 4/2) when dry; weak, medium, subangular blocky structure that breaks to moderate, fine, granular; very friable when moist, soft when dry; a few variegations; many irregular pores; many roots; strongly acid (pH 5.4); gradual, wavy boundary. 6 to 12 inches thick.

A3—18 to 30 inches, dark-brown (7.5YR 3/2) silty clay loam, brown (7.5YR 5/4) when dry; weak, medium, subangular blocky structure; friable when moist, slightly hard when dry, slightly plastic and slightly sticky when wet; a few variegations that are lighter colored

than the rest of the horizon; many, medium and fine, tubular pores; strongly acid (pH 5.5); gradual, wavy boundary. 6 to 12 inches thick.

B21—30 to 48 inches, strong-brown (7.5YR 5/6) silty clay loam, reddish yellow (7.5YR 6/6) when dry; moderate, medium, subangular blocky structure; friable when moist, hard when dry, plastic and sticky when wet; common, fine and medium, tubular pores; medium acid (pH 5.8); gradual, wavy boundary. 10 to 20 inches thick.

B22—48 to 60 inches, strong-brown (7.5YR 5/6) silty clay loam; weak, medium, subangular blocky structure; friable when moist, hard when dry, plastic and sticky when wet; medium acid (pH 5.8); common, fine, tubular pores. 6 to 12 inches thick.

The A1 and Ap horizons combined range from 12 to 20 inches in thickness. In the profile color ranges from 5YR to 7.5YR in hue. The soil is dominantly silty clay loam, but the lower part of the B horizon may range from silt loam to silty clay loam.

Runoff is slow on this soil, and the erosion hazard is slight. Permeability of the subsoil is moderate, and available water holding capacity is high. Effective root penetration is deep. Fertility is moderate, and workability is good.

Included with this soil in mapping are some areas of Blacklock fine sandy loam, 0 to 7 percent slopes; of Chitwood silt loam, 0 to 7 percent slopes; and of Ferrelo loam, 0 to 7 percent slopes. The areas are too small to be mapped separately.

This Knappa soil is used extensively for forage crops and lily bulbs, but some daffodils also are grown. Timber also is produced in some areas, though because of favorable topography and easy accessibility of the areas, more than half of the acreage has been cleared of trees. Capability unit IIe–1; woodland group 2.

Knappa silty clay loam, 7 to 12 percent slopes (KnC).—This soil occupies small areas adjacent to fans and foot slopes, where the terraces approach the uplands. Runoff is medium, and the erosion hazard is moderate.

Included with this soil in mapping are small areas of Knappa silty clay loam, heavy variant, in concave slopes. Also included are some small areas of Meda gravelly silt loam, 0 to 7 percent slopes.

About half of the acreage of this Knappa soil is used to provide forage for livestock. The remaining acreage is used as woodland. Capability unit IIIe–1; woodland group 2.

Knappa silty clay loam, 12 to 20 percent slopes (KnD).—Areas of this soil are on the fronts of marine terraces, are on side slopes adjacent to streams, or are where the terraces approach foot slopes of the uplands. Slopes are smooth and generally are 50 to 150 feet in length. Runoff is medium, and the erosion hazard is moderate.

Included with this soil in mapping are a few small areas of Meda gravelly silt loam, 0 to 7 percent slopes. Also included are small knolls of Orford or Winema soils along areas that are transitional to this Knappa soil.

Most of this Knappa soil is used to produce forage for livestock. Capability unit IVe–1; woodland group 2.

Knappa silty clay loam, 20 to 30 percent slopes (KnE).—This soil occupies short, somewhat abrupt fronts of terraces or side slopes adjacent to streams that dissect the marine terraces. Slopes range from 50 to 150 feet in length. Runoff is medium to rapid, and the erosion hazard is moderate to severe.

Including with this soil in mapping are some small areas of Meda gravelly silt loam, 0 to 7 percent slopes, on fans.

All of this Knappa soil is used for producing timber. Capability unit VIe–1; woodland group 2.

Knappa Series, Heavy Variant

These variants from the Knappa series are nearly level to rolling soils that are moderately well drained. The soils are on alluvial fans and foot slopes adjacent to Sebastian and Winema soils, which are in the uplands on serpentine and siltstone. The areas are small but occur all along the zone of contact between marine alluvial terraces and the uplands. Grasses, hardwoods, hemlock, and a scattering of spruce make up the natural vegetation.

In a typical profile the surface layer, about 5 inches thick, is black silty clay loam that is strongly acid. The subsoil, a very dark gray to very dark grayish-brown silt clay, has prominent reddish-brown to yellowish-red mottles and is sticky when wet. The subsoil extends to a depth of 60 inches and is medium acid.

These soils are used mostly for pasture plants, such as tall fescue, subterranean clover, and white clover, which are seeded following cultivation. A few small cultivated areas are used for lily bulbs.

Knappa silty clay loam, heavy variant, 0 to 12 percent slopes (KpC).—This is the only heavy variant from the normal Knappa series mapped in the county.

Typical profile in a seeded pasture (1.4 miles from the north end of the Rogue River Bridge on old U.S. Highway 101 and 75 feet north (NW¼SW¼ sec. 20, T. 36 S., R. 14 W.):

Ap—0 to 5 inches, black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) when dry; strong, medium, blocky structure; firm when moist, hard when dry, plastic and sticky when wet; many, fine, irregular pores; common roots; strongly acid (pH 5.4); abrupt, smooth boundary. 4 to 6 inches thick.

B1—5 to 19 inches, very dark gray (10YR 3/1) silty clay, gray (10YR 5/1 when dry; moderate, medium, prismatic structure that breaks to moderate, medium, subangular blocky; firm when moist, hard when dry, plastic and very sticky when wet; common, fine, tubular pores; a few roots; medium acid (pH 5.6); clear, smooth boundary. 12 to 17 inches thick.

B2—19 to 31 inches, very dark grayish-brown (10YR 3/2) silty clay, grayish brown (10YR 5/2) when dry; when moist and crushed, color is dark brown (10YR 3/3); moderate, medium, subangular blocky structure; firm when moist, hard when dry, plastic and very sticky when wet; fine, distinct, reddish-brown (5YR 4/4) variegations; many, fine and medium, tubular pores; a few siltstone fragments; a few roots; medium acid (pH 5.8); clear, smooth boundary. 10 to 14 inches thick.

B3—31 to 60 inches, very dark grayish-brown (10YR 3/2) silty clay, grayish brown (10YR 5/2) when dry; weak, medium, prismatic structure; firm when moist, very hard when dry, plastic and very sticky when wet; common, fine, prominent, reddish-brown to yellowish-red mottles; common, fine, tubular pores; brown variegations; a few fragments of siltstone and serpentinite; a few roots; medium acid (pH 5.8).

The A horizon ranges to 15 inches in thickness in places. It is dominantly silty clay loam.

Runoff is medium on this soil, and the erosion hazard is moderate. Permeability of the subsoil is slow, and available water holding capacity is moderate. Effective root

penetration is deep. Fertility is low. Workability is fair when the soil is dry or is slightly moist.

Included with this soil in mapping are many small areas of strongly sloping soils in places where the fans and foot slopes come into contact with the uplands. Among these included soils are the shallow Sebastian very stony loam, 7 to 70 percent slopes, and the dark-colored Winema silty clay loam.

This heavy variant from the Knappa series is used chiefly for cultivated pasture. A few small areas are used for lily bulbs. Response to management is fair. Capability unit IIIe–4; woodland group not assigned.

Knappa Series, Dark Surface Variant

These variants from the Knappa series are black, nearly level to rolling soils that are well drained. They occupy fairly large areas on marine terraces, mainly south of Brookings. The areas are smooth and are fairly broad. Slopes generally range from 200 to 700 feet in length. Grasses, hemlock, and a scattering of spruce make up the natural vegetation.

In a typical profile the surface layer is thick, black, friable clay loam that is strongly acid. Below is dark-brown to dark yellowish-brown, friable clay loam or silt loam that is strongly acid to medium acid. Gravelly material is at a depth of 48 inches.

Most areas of these soils are farmed intensively to lily bulbs and daffodils.

Knappa clay loam, dark surface variant, 0 to 3 percent slopes (KaA).—This soil has the profile described for the dark surface variant from the Knappa series. It occupies fairly large areas on marine terraces, mainly south of Brookings, but the total acreage in the survey area is small.

Typical profile in a pasture (0.7 mile west of U.S. Highway 101 along Pedrioli Road at the northwest corner of an intersection; northwest corner of NE¼ sec. 16, T. 41 S., R. 13 W.):

Ap—0 to 8 inches, black (10YR 2/1) clay loam, dark gray (10YR 4/1) when dry; moderate, coarse, subangular blocky structure that breaks to moderate, medium, granular; friable when moist, slightly hard when dry, slightly sticky and slightly plastic when wet; many irregular pores; many roots; strongly acid (pH 5.2); clear, smooth boundary. 6 to 10 inches thick.

A1—8 to 20 inches, black (10YR 2/1) clay loam, dark gray (10YR 4/1) when dry; strong, fine, subangular blocky structure; friable when moist, slightly hard when dry, slightly sticky and slightly plastic when wet; many, medium, tubular pores; many roots; strongly acid (pH 5.4); clear, smooth boundary. 10 to 14 inches thick.

AC—20 to 28 inches, dark-brown (10YR 3/3) clay loam, dark brown (10YR 4/3) when dry; moderate, coarse, subangular blocky structure; friable when moist, soft when dry, slightly sticky and slightly plastic when wet; many, fine, tubular pores; common roots; strongly acid (pH 5.4); abrupt, wavy boundary. 6 to 10 inches thick.

C1—28 to 48 inches, dark yellowish-brown (10YR 4/4) heavy silt loam or clay loam that feels gritty, light yellowish brown (10YR 6/4) when dry; weak, medium, subangular blocky structure; friable when moist, slightly hard when dry, slightly plastic and slightly sticky when wet; many, fine, tubular pores; a few roots; medium acid (pH 5.6); clear, smooth boundary. 12 to 30 inches thick.

C2—48 to 54 inches +, dark yellowish-brown (10YR 4/4) gravelly clay loam, light yellowish brown when dry; massive; common fine pores; friable when moist, hard when dry, slightly plastic and sticky when wet; medium acid (pH 5.6); this horizon is 55 percent medium and fine gravel.

The A horizon ranges from 18 to 28 inches in thickness. The upper part of the AC horizon ranges from clay loam to light silty clay loam in texture.

Runoff is slow on this soil, and the hazard of erosion is slight. Permeability of the subsoil is moderate, available moisture holding capacity is high, and effective root penetration is deep. Fertility is high, and workability is excellent.

Included with this soil in mapping are a few small areas of poorly drained Hebo silty clay loam, 0 to 7 percent slopes, in depressions.

This dark surface variant from the Knappa series is all under cultivation. It is one of the most productive soils in the survey area and is used mainly for lily bulbs (fig. 4) and such forage crops as ryegrass, orchardgrass, tall fescue, and white clover. Most lily bulbs produced commercially in the Curry Area are grown on this soil. Response to management is good. Capability unit I–1; woodland group 15.

Knappa clay loam, dark surface variant, 3 to 12 percent slopes (KaC).—This soil is on marine terraces south of Brookings. The areas are mainly near the uplands in places where the terraces come into contact with fans and foot slopes.

Included with this soil in mapping are small areas of strongly sloping soils. Also included are a few small areas of dark-colored Winema silty clay loams and of shallow Sebastian very stony loam, 7 to 70 percent slopes.

All of this dark surface variant is cultivated. The areas are used mainly for such forage crops as tall fescue or orchardgrass and subterranean clover or birdsfoot trefoil. Capability unit IIe–1; woodland group 15.

Langlois Series

The Langlois series consists of nearly level soils that are poorly drained. These soils formed in fine-textured marine alluvium reworked by tides. They are above high tide on low flat areas along the lower reaches of coastal streams. All of the areas are in the northwestern part of the survey area near the Bayside and Chetco soils. Spruce, willow, sedges, and grasses made up the native vegetation.

In a typical profile the surface layer is dark grayish-brown, friable, mottled silty clay loam that is about 10 inches thick. Below is dark-gray, firm, sticky silty clay loam that also is mottled. Dark-gray, firm, very sticky clay is at a depth of about 28 inches. The surface layer is strongly acid or medium acid, and the material below is medium acid.

Nearly all areas of the Langlois soils are used to produce forage for livestock.

Langlois silty clay loam (0 to 2 percent slopes) (La).—This is the only Langlois soil mapped in the survey area. The surface generally is smooth, but some areas include small depressions, swales, or old stream channels.

Typical profile under pasture (1.7 miles west of U.S. Highway 101 on Floras Lake Road, then 100 feet north; sec. 9, T. 31 S., R. 15 W.)

Figure 4.—**Lily bulbs growing on Knappa clay loam, dark surface variant, 0 to 3 percent slopes, in the foreground; steep to very steep soils, mainly of the Orford and Winema series, are on the hills in the background.**

Ap—0 to 10 inches, dark grayish-brown, (2.5Y 4/2) silty clay loam, light brownish gray (2.5Y 6/2) when dry; cloddy and weak, medium, subangular blocky structure; friable when moist, hard when dry, sticky and plastic when wet; many fine pores; many roots; many, fine and medium, distinct mottles mostly along root channels; strongly acid (pH 5.5); abrupt, smooth boundary. 4 to 10 inches thick.

C1—10 to 20 inches, dark-gray (2.5Y 4/1) silty clay loam, gray (2.5Y 6/1) when dry; massive; firm when moist, hard when dry, sticky and plastic when wet; many fine pores; many roots; many, fine and medium, distinct mottles; medium acid; gradual, smooth boundary. 6 to 18 inches thick.

C2—20 to 28 inches, material similar to that in the C1 horizon but mixed with partly decomposed woody fragments and other vegetative material; common, fine and medium, distinct mottles; medium acid; abrupt, smooth boundary. 6 to 12 inches thick.

IIC3—28 to 43 inches +, dark-gray (2.5Y 4/1) clay, light brownish gray (2.5Y 6/2) when dry; massive; firm when moist, very plastic and very sticky when wet; a few, fine, distinct mottles; a few fine pores; grades to similarly colored material that contains gravel and sand.

The Ap horizon ranges from silt loam to silty clay loam in texture, but it is dominantly silty clay loam. It ranges from 4 to 10 inches in thickness. The layers below are moderately fine textured, have a chroma of 1 or less, and a hue of 10YR or yellower. Structure is massive or weak, coarse, prismatic. Depth to clay ranges from 24 to 36 inches. In places thin layers of peaty material are at a depth of less than 30 inches.

Runoff is very slow on this soil. Permeability of the subsoil is slow to very slow, and available moisture holding capacity is moderate. Effective root penetration is moderately shallow. Because of the poor drainage and the moderately fine textured surface soil, workability is poor. Fertility is moderately low. The hazard of erosion is slight.

Included with this soil in mapping are small areas of poorly drained Chetco silt loam and of somewhat poorly drained Bayside silty clay loam. These included areas are too small to be mapped separately.

About half of the acreage of Langlois silty clay loam is used for forage crops, such as meadow foxtail and big trefoil, which are seeded following cultivation. The rest is used as native pasture (fig. 5). Crops on this soil respond fairly well to management. Capability unit IVw–1; woodland group not assigned.

Meda Series

In the Meda series are very deep, nearly level to gently sloping soils that are well drained. These soils formed in alluvium washed chiefly from sedimentary rock. They are on alluvial fans below areas of Orford soils, on siltstone, and above Knappa and Winchuck soils, on alluvial terraces. Douglas-fir, western hemlock, alder, red-cedar, and tanoak made up the native vegetation.

A typical profile has a surface layer of dark-brown gravelly silt loam about 9 inches thick. The subsoil is dark-brown gravelly silty clay loam in the upper part and dark-brown very gravelly clay loam in the lower part. Dark yellowish-brown very gravelly loam is at a depth of about 47 inches. It is underlain by brown light silty clay loam at a depth of about 53 inches. The surface layer is very strongly acid, and the subsoil and substratum are strongly acid.

Meda soils are used chiefly for forage crops and as woodland. Lily bulbs are grown on a few small fields.

Meda gravelly silt loam, 0 to 7 percent slopes (MeB).—Most of this soil is in the transitional zone between the uplands and old stream terraces or marine terraces. The areas are small and are distributed over the western border of the survey area. The surface is smooth to gently undulating. Slopes range from 200 to 500 feet in length.

Typical profile in a seeded pasture (3.8 miles east of U.S. Highway 101 on county road along Winchuck River, then 200 feet north; SW¼SW¼ sec. 5, T. 41 S., R. 12 W.):

Ap–0 to 9 inches, dark-brown (10YR 3/3) gravelly silt loam, grayish brown (10YR 5/2) when dry; moderate, fine, subangular blocky structure and moderate, medium granular; very friable when moist, soft when dry, slightly plastic and slightly sticky when wet; many, medium and coarse, irregular pores; many roots; very strongly acid; (pH 5.0); clear, wavy boundary. 8 to 12 inches thick.

B1—9 to 16 inches, dark-brown (10YR 3/3) light gravelly silty clay loam, brown (10YR 5/3) when dry; moderate, medium and fine, subangular blocky structure; friable when moist, soft when dry, slightly plastic and slightly sticky when wet; many fine to medium pores; many roots; strongly acid (pH 5.2); gradual, wavy boundary. 0 to 7 inches thick.

B2—16 to 27 inches, dark-brown (10YR 3/3) light gravelly silty clay loam, brown (10YR 5/3) when dry; moderate, medium and fine, subangular blocky structure; friable when moist, soft when dry, slightly plastic and slightly sticky when wet; many fine to medium pores; many roots; strongly acid (pH 5.1); abrupt, smooth boundary. 10 to 20 inches thick.

B3—27 to 47 inches, dark-brown (10YR 4/3) very gravelly clay loam, pale brown (10YR 6/3) when dry; weak, medium, subangular blocky structure; friable when moist, slightly sticky when wet; many medium pores; common roots; strongly acid (pH 5.2); abrupt, smooth boundary. 10 to 20 inches thick.

C1—47 to 53 inches, dark yellowish-brown (10YR 4/4) very gravelly loam, light yellowish brown (10YR 6/4) when dry; massive; friable to loose when moist, nonsticky and nonplastic when wet; many medium pores; a few roots; strongly acid (pH 5.3); abrupt, smooth boundary. More than 6 inches thick.

IIC2—53 to 60 inches +, brown (10YR 5/3) light silty clay loam; massive; firm when moist, hard when dry, sticky and plastic when wet; strongly acid (pH 5.3).

The A horizon ranges from 8 to 16 inches in thickness. It ranges from gravelly loam to gravelly silt loam in texture but is dominantly gravelly silt loam. The B horizon ranges from light silty clay loam or light clay loam to silty clay loam or clay loam in texture. The content of gravel ranges from as much as 35 percent in the surface soil to 50 percent in the lower horizons.

Runoff is medium on this soil. Permeability of the subsoil is moderate, and available water holding capacity is moderate to low. Effective root penetration is very deep. Fertility is moderate. Workability is fair, though in places the surface layer contains fine- and medium-sized gravel in amounts that hinder tillage. The hazard of erosion is moderate.

Included with this soil in mapping are small areas of Knappa and Winchuck soils and of Chitwood and Hebo soils. Also included are small areas of Orford and Winema soils. Small areas of strongly sloping Meda soils and of very gravelly and nongravelly Meda soils also are included.

Most of this soil is used for forage crops, such as orchardgrass, tall fescue, and white clover or birdsfoot trefoil, which are seeded following cultivation. A few small areas are used for growing lily bulbs, and some areas are used as woodland. The response to management is fair. Capability unit IIIe–3; woodland group 12.

Figure 5.—**Pasture on Langlois silty clay loam in the foreground; the soil in the background is Ferrelo loam, 20 to 40 percent slopes.**

Nehalem Series

The Nehalem series consists of deep, nearly level soils that are well drained. These soils formed in recent alluvium washed onto flood plains by streams. The alluvium was derived from various kinds of rocks. Nehalem soils are near the Bayside and Gardiner soils. Brush, grass, and scattered hardwoods make up the vegetation.

In a typical profile the surface layer, about 8 inches thick, is very dark grayish-brown, very friable silt loam

that is very strongly acid. Below, to a depth of several feet, is very dark grayish-brown clay loam that is slightly sticky when wet and is very strongly acid to medium acid.

Nehalem soils are used mostly for mixtures of grasses and legumes, for cereal crops, and for bulbs. Some areas are subject to flooding in winter.

Nehalem silt loam (0 to 3 percent slopes) (Nh).—This soil occupies long, narrow, small areas on flood plains that parallel streams in the west side of the survey area. The surface generally is smooth, but it is gently undulating where it is dissected by old stream channels.

Typical profile in a seeded pasture along the Winchuck River (0.7 mile east of U.S. Highway 101, center of north section line, sec. 25, T. 41 S., R. 13 W.) :

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) when dry; moderate, medium, subangular blocky structure that breaks to moderate, fine, granular; very friable when moist, soft when dry, slightly plastic and slightly sticky when wet; many irregular pores; many roots; very strongly acid (pH 5.0) ; clear, smooth boundary. 6 to 10 inches thick.

AC—8 to 24 inches, very dark grayish-brown (10YR 3/2) clay loam, grayish brown (10YR 5/2) when dry; weak, coarse, prismatic structure; friable when moist, slightly hard when dry; slightly plastic and slightly sticky when wet; a few, thin, patchy clay films; many, fine, tubular pores; many roots; very strongly acid (pH 5.0) ; gradual, wavy boundary. 0 to 20 inches thick.

C—24 to 48 inches +, very dark grayish-brown (10YR 3/2) clay loam; weak, medium, subangular blocky structure that breaks to weak, fine, subangular blocky; many, fine, tubular pores; common roots; friable when moist, slightly hard when dry, slightly sticky when wet; medium acid (pH 5.8).

The A horizon ranges from fine sandy loam to silt loam in texture, but it is dominantly silt loam. It ranges from 8 to 24 inches in thickness. Color in the profile ranges from 10YR to 2.5Y, in hue, and when moist, the value is 3 or less and the chroma is dominantly 2.

Runoff is slow on this soil. Permeability of the subsoil is moderate, and available moisture holding capacity is high. Fertility also is high. Effective root penetration is deep. The soil is easy to work. Except in places where streambank cutting by floodwater is a problem, the erosion hazard is slight.

Included with this soil are small areas of well-drained Gardiner soils along streams. Also included are small areas of Riverwash and of somewhat poory drained Bayside silty clay loam in depressions.

Nehalem silt loam is used for bulbs and for forage crops, such as orchardgrass, tall fescue, and white clover, which are seeded following cultivation. Response to management is good. Capability unit I–1; woodland group 15.

Nehalem silt loam, overflow (0 to 3 percent slopes) (No).—In most places this soil is adjacent to streams in low areas or is on stream bottoms in sharp bends of the streams. All of the areas are subject to frequent flooding in winter.

This soil has deposits of sand and silt on the surface and is dissected by old stream channels, but its profile otherwise is similar to the one described for the series. Slopes are smooth and nearly level or are slightly undulating. Overwash and streambank cutting cause a severe hazard of erosion.

Included with this soil in mapping are some very narrow, gently sloping soils and a few areas of a soil that is moderately deep to gravel. Also included are some small areas of Gardiner fine sandy loam, moderately deep.

Nehalem silt loam, overflow, is used chiefly for such pasture plants as orchardgrass, ryegrass, and white clover, which are seeded following cultivation. Applying supplemental nitrogen helps to keep a cover of plants that protects the soil during floods. Capability unit IVw–3; woodland group 15.

Netarts Series

The Netarts series consists of nearly level to very steep, moderately coarse textured and coarse textured soils that are well drained. These soils formed in deposits of arkosic sand laid down by wind. They are on marine terraces chiefly in the northern part of the survey area near Stabilized dune land and near Blacklock, Ferrelo, and Knappa soils. Douglas-fir, shore pine, salal, rhododendron, and grass made up the vegetation.

In a typical profile the surface layer is very friable, very dark gray and dark brown sandy loam about 7 inches thick. The subsoil is dark reddish-brown sandy loam in the upper part and olive-brown loamy fine sand in the lower part. Light olive-brown loamy fine sand is at a depth of about 40 inches. The surface layer is very strongly acid, and the subsoil is strongly acid to medium acid.

The Netarts soils are used mainly as woodland, but a few small areas are pastured.

Netarts sandy loam, 0 to 12 percent slopes (NtC).—This soil occupies large areas along the coast adjacent to Stabilized dune land. The surface is uneven, and slopes are short and abrupt.

Typical profile under forest (southeast corner of the intersection of Floras Lake Road and north line of sec. 17, T. 31 S., R. 15 W.) :

O1—2 inches to 0, leaf litter from coniferous trees; very strongly acid (pH 4.8).

A1—0 to 7 inches, very dark gray (10YR 3/1) and dark brown (7.5YR 3/2) sandy loam, brown (7.5YR 5/2) and light gray (10YR 7/1) when dry and crushed; weak, medium, subangular blocky structure; very friable when moist, soft when dry, nonsticky and nonplastic when wet; many irregular pores; many roots; very strongly acid (pH 4.8) ; clear, wavy boundary. 5 to 12 inches thick.

B2ir—7 to 24 inches, dark reddish-brown (5YR 3/4) light sandy loam; weak, medium, subangular blocky structure; very friable when moist, soft when dry, nonsticky and nonplastic when wet; many irregular pores; many roots; distinct color veins of iron accumulation that are discontinuous and contain small thin lenses of weakly cemented iron-humus material; strongly acid (pH 5.4) ; clear, wavy boundary. 15 to 20 inches thick.

B3—24 to 40 inches, olive-brown (2.5Y 4/4) loamy fine sand with dark-brown variegations, dark yellowish brown (10YR 4/4) when crushed; very weak, medium, subangular blocky structure; very friable to loose when moist, soft when dry, nonsticky and nonplastic when wet; a few roots; medium acid (pH 5.6) ; gradual, wavy boundary. 11 to 21 inches thick.

C—40 to 60 inches +, light olive-brown (2.5Y 5/4) loamy fine sand; massive; very friable to loose when moist, soft when dry; a few roots; many irregular pores; medium acid (pH 5.6). More than 20 inches thick.

The A1 horizon is as much as 12 inches thick in places. It ranges from sandy loam to loamy sand in texture, but it is dominantly sandy loam. The B2 horizon ranges from 5YR to 7.5YR in hue and has intermediate value and choma. In places faint mottling occurs in the B3 and C horizons.

Runoff is very slow on this soil. Permeability of the subsoil is rapid, and available moisture holding capacity is low. Effective root penetration is deep, and fertility is low. The hazard of water erosion is slight. The moderately coarse to coarse texture, weak structure, and loose consistence, however, make the soil highly susceptible to soil blowing unless a protective cover of vegetation is kept on the areas. The soil can be worked easily. Because of the severe hazard of soil blowing, however, the only tillage used should be that needed to establish seeded pastures.

Included with this soil in mapping are small areas of Stabilized dune land in transitional areas. Also included are small areas of Blacklock soil, in basins, and small areas of Ferrelo soils, on adjacent, older and higher terraces.

Most of this soil is used for producing timber and forage crops. The response to management is poor. Capability unit VIe–4; woodland group 5.

Netarts sandy loam, 12 to 40 percent slopes (NtF).—This soil occupies sandhill areas on marine terraces. The surface is strongly undulating to rolling. Slopes range from 50 to 200 feet in length. This soil is droughty. Runoff is slow. The hazard of soil blowing is severe, and the hazard of water erosion is moderate to severe. Included in mapping are small areas of Stabilized dune land.

All of this soil is used as woodland. Capability unit VIIe–3; woodland group 5.

Orford Series

Orford soils are well drained and are fine textured in the subsoil. They range from nearly level to very steep, but they are dominantly strongly sloping to very steep. These soils formed in material from siltstone and sandstone. They are the most extensive soils in the survey area and are associated with the Edson, Sebastian, and Winema soils. Douglas-fir, spruce, hemlock, grand fir, tanoak, madrone, salal, rhododendron, and swordfern make up the vegetation.

A typical profile has a surface layer of very dark brown, very friable silty clay loam. The subsoil is very dark grayish-brown silty clay loam in the uppermost part. It is dark-brown, dark yellowish-brown, and yellowish-brown silty clay in the lower part. Yellowish-brown to grayish-brown silty clay loam is at a depth of about 59 inches.

Orford soils are used chiefly for producing wood crops. A few areas are pastured.

Orford silty clay loam, 30 to 70 percent slopes (OrG).—This is the most extensive soil in the survey area. The areas are large and are distributed uniformly over the hilly forested uplands on the west side of the Area. Slopes range from 100 to 600 feet in width and from 600 to 1,000 feet in length.

Typical profile under forest (6 miles south of Hunter Creek Bridge on U.S. Highway 101, then 100 feet to the left of the road; sec. 31, T. 37 S., R. 14 W.):

O1&O2—2 inches to 0 very dark gray (10YR 3/1) needles, leaves, and decomposed litter, very dark brown (10YR 2/2) when dry; medium acid (pH 5.6).

A1—0 to 14 inches, very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) when dry; dark-brown (10YR 4/3) silt loam channels; strong, very fine and medium, granular structure; very friable when moist, soft when dry, slightly plastic and slightly sticky when wet; many roots; many fine pores; medium acid (pH 5.6); gradual, wavy boundary. 10 to 14 inches thick.

B1—14 to 22 inches, very dark grayish-brown (10YR 3/2) light silty clay loam, dark grayish brown (10YR 4/2) when dry; moderate, medium and fine, subangular blocky structure; friable when moist, slightly hard when dry, and slightly plastic and sticky when wet; many roots; many medium and fine pores; strongly acid (pH 5.5); gradual, wavy boundary. 4 to 8 inches thick.

B21t--22 to 33 inches, dark-brown (10YR 3/3) silty clay, dark brown (10YR 4/3) when dry; moderate, fine, subangular blocky structure; friable when moist, hard when dry, sticky and very plastic when wet; many roots; many medium and fine pores; thin nearly continuous clay films; strongly acid (pH 5.5); gradual, wavy boundary. 11 to 30 inches thick.

B22t—33 to 48 inches, dark yellowish-brown (10YR 4/4) silty clay, very pale brown (10YR 7/4) when dry; moderate, medium, subangular blocky structure; firm when moist, hard when dry, sticky and very plastic when wet; many fine pores; a few roots; common medium clay films; strongly acid (pH 5.3); clear, wavy boundary. 12 to 20 inches thick.

B23t—48 to 59 inches, yellowish-brown (10YR 5/6) silty clay, very pale brown (10YR 7/4) when dry; moderate, fine, subangular blocky structure; firm when moist, hard when dry, sticky and plastic when wet; a few roots; many medium and fine pores; a few thin clay films; strongly acid (pH 5.2); clear, wavy boundary. 10 to 20 inches thick.

C1—59 to 64 inches, yellowish-brown (10YR 5/4) to grayish-brown (10YR 5/2) silty clay loam, light yellowish brown (10YR 6/4) and light gray (10YR 7/2) when dry; weak to moderate, medium, angular blocky structure; firm when moist, hard when dry, sticky and plastic when wet; a few roots; many fine pores; many sandstone fragments; very strongly acid (pH 4.9); gradual, irregular boundary. 5 to 12 inches thick.

C2—64 to 70 inches +, yellowish-brown (10YR 5/4) silty clay loam; massive; firm when moist, sticky and plastic when wet; 50 percent is sandstone fragments.

The A horizon ranges from 10 to 14 inches in thickness and from 2 to 3 in value. Texture of the B horizon ranges from silty clay loam to clay, and hue in the horizon ranges from 10YR to 7.5YR. The solum ranges from 36 to 60 inches or more in thickness, but it is dominantly more than 4 feet thick. In places shotlike fragments or concretions occur throughout the profile.

Runoff is rapid on this soil. Permeability of the subsoil is moderately slow, and available moisture holding capacity is high. Effective root penetration is deep. Steep slopes prevent working this soil for tilled crops. The hazard of erosion is severe.

Included with this soil in mapping are a few small areas of Sebastian very stony loam, 7 to 70 percent slopes, adjacent to buttes of serpentine. Also included are small areas of Edson and Trask soils in areas of transition. Other included small areas consist of soils that have slopes of 12 to 30 percent.

Nearly all of this Orford soil is used as woodland. Capability unit VIIe–1; woodland group 8.

Orford silty clay loam, 12 to 30 percent slopes (OrE).—The surface layer of this extensive soil is fairly thick and dark colored (fig. 6). Runoff is medium, and the erosion hazard is moderate. This soil is in fairly good tilth and is moderately fertile.

Included with this soil in mapping are small areas of Orford silty clay loam, 3 to 12 percent slopes. Also included are small tracts of Winema soils in transitional areas and some small areas of stony Sebastian soils.

Most of this Orford soil is used for woodland crops, which respond well to management. A few areas on lower

Figure 6.—**Profile of Orford silty clay loam, 12 to 30 percent slopes. The measure shows depth in feet.**

foot slopes have been cleared or burned over and are now pastured. Capability unit VIe–1; woodland group 6.

Orford silty clay loam, 3 to 12 percent slopes (OrC).—This soil is on ridgetops and the lower part of foot slopes. It occupies transitional areas between the uplands and fans and terraces. Slopes range from 100 to 300 feet in length. Runoff is medium. Except for an occasional gully, the erosion hazard is moderate. Erosion is caused chiefly by runoff from adjacent higher areas. Fertility is moderate. Workability is good.

Included with this soil in mapping are small areas of Meda gravelly silt loam, 0 to 7 percent slopes; of Knappa silty clay loam, 7 to 12 percent slopes; and of Winchuck silt loam, 7 to 12 percent slopes. These included areas are on foot slopes transitional to fans or terraces.

This Orford soil is used for forage crops, such as orchardgrass, white clover, and birdsfoot trefoil, which are seeded following cultivation. It also is used as woodland. Capability unit IVe–1; woodland group 6.

Orford silty clay loam, moderately deep, 20 to 30 percent slopes (OsE).—This soil is 20 to 36 inches deep over siltstone bedrock, but otherwise its profile is similar to the one described for the series. Runoff is medium, available moisture holding capacity is low, and hazard of erosion is moderate.

Included with this soil in mapping are some small areas of Winema soils, in areas transitional to soils under grass. Small areas of Sebastian very stony loam, 7 to 70 percent slopes, on serpentinite bedrock, also are included.

Most of this Orford soil is used as woodland, though a few logged over areas are used for grazing livestock. Capability unit VIe–1; woodland group 7.

Orford silty clay loam, moderately deep, 30 to 70 percent slopes (OsG).—This soil is 20 to 36 inches deep over siltstone bedrock, but its profile otherwise is similar to the one described for the series. Runoff is rapid, available moisture holding capacity is low, and hazard of erosion is severe.

Included with this soil in mapping are a few small areas of Orford silty clay loam, 30 to 70 percent slopes. Also included are many small areas of Trask gravelly silt loam, 30 to 70 percent slopes, in areas transitional to soils associated with schistose slate bedrock.

Nearly all of this Orford soil is used for timber. Capability unit VIIe–1; woodland group 9.

Riverwash

Riverwash (Re) consists of loose, coarse sand, gravel, and cobblestones deposited by streams. Most of the acreage is subject to overflow during the rainy season. Riverwash has no value for farming but has value as a source of aggregate for construction. Capability unit VIIIw–2; woodland group not assigned.

Rock Outcrop

Rock outcrop (Ro) consists of steep areas where rocks crop out. The areas occur intermittently throughout the coastal hills and mountains. A few areas are made up of points or ledges along the outer escarpments of marine terraces. This land type has no value for farming. It is suitable mainly for use as wildlife or recreational areas. Capability unit VIIIs–1; woodland group not assigned.

Sebastian Series

The Sebastian series consists of moderately steep to very steep, shallow to very shallow, very stony soils that are well drained. These soils formed in material from serpentinite. They are on coastal hills and mountains near the Orford and Winema soils. The native vegetation was chiefly velvetgrass, annual peas, and bentgrass, but some trees were scattered over the areas.

In a typical profile the surface layer is dark reddish-brown very stony loam about 3 inches thick. The subsoil is dark reddish-brown very stony clay loam that is slightly acid. Reddish-brown soil material in cracks of serpentinite bedrock is at a depth of 14 inches or more.

Sebastian soils are used chiefly for pasture.

Sebastian very stony loam, 7 to 70 percent slopes (SeG).—This soil occupies medium-sized areas, mostly on coastal hills in the survey area. Most areas are steep, but a few areas on ridgetops and on the lower part of foot slopes are gently sloping to moderately sloping.

Typical profile under grass (0.8 mile south of Hunter Creek Bridge on U.S. Highway 101, then 0.2 mile to the right on a private road, then 25 feet to the left of the road; sec. 18, T. 37 S., R. 14 W.):

O1—1 inch to 0, grass litter.
A1—0 to 3 inches, dark reddish-brown (5YR 3/2) very stony loam, dark reddish gray (5YR 4/2) when dry; moderate, fine and very fine, subangular blocky structure that breaks to moderate, fine, granular; friable when moist, soft when dry, slightly sticky and slightly plastic when wet; many irregular pores and a few, moderately fine, tubular pores; many roots; medium acid (pH 6.0); clear, wavy boundary. 1 to 6 inches thick.
B2—3 to 14 inches, dark reddish-brown (5YR 3/3) very stony clay loam, reddish brown (5YR 5/3) when dry; moderate, fine, subangular blocky structure that breaks to moderate, fine, granular; friable when moist, hard when dry, plastic and sticky when wet; many, moderately fine, tubular pores; thin continuous clay films on peds and in worm casts; common roots; slightly acid (pH 6.5); gradual, irregular boundary.
R—14 to 18 inches, reddish-brown soil material between cracks of black and green serpentinite.

This soil varies greatly. The surface layer ranges from very stony loam to stony clay loam in texture, but it is dominantly very stony loam. It generally ranges from dark reddish gray to dark reddish brown in color, but in a few places it is dark grayish brown. The volume of rock fragments throughout the solum ranges from 20 to 50 percent. Depth to the R horizon ranges from 10 to 20 inches. In places outcrops of bedrock make up as much as 30 percent of the surface area.

Runoff is medium to very rapid on this soil. Permeability of the subsoil is moderate, and available moisture holding capacity is low. Effective root penetration is moderately shallow. Fertility is low, mainly because the proportion of magnesium to available calcium in the soil is excessive. Stoniness makes tillage difficult. The erosion hazard is moderate to very severe. When saturated with moisture during the wet winter months, this soil is likely to slip or slide off the slick and glossy serpentinite bedrock. In the steep areas slipping and sliding are severe hazards and frequently cause traffic delays on highways located in areas of this soil.

Included with this soil in mapping are small areas of Winema soils, and of Orford soils in transitional areas between this soil and soils of those series. Each of these included soils may make up as much as 10 percent of an area. Also included, in areas adjacent to fans, are small areas of Meda gravelly silt loam, 0 to 7 percent slopes, and of Knappa silty clay loam, heavy variant, 0 to 12 percent slopes. Adjacent to terraces are small included areas of Knappa silty clay loam, 7 to 12 percent slopes, and of Winchuck silt loam, 7 to 12 percent slopes.

Most of this Sebastian soil is pastured. The response to management is poor. Preventing landslides, especially in areas where highways are built, is a serious problem. Driving metal drain tubes into road cuts in this soil (fig. 7) carries off excess subterranean water and helps to stabilize the soil. Capability unit VIIe-4; woodland group not assigned.

Stabilized Dune Land

Stabilized dune land (St) consists of nearly level to steep, excessively drained, sandy material on dunes that have been stabilized with vegetation. The areas are adjacent to Active dune land and near the Blacklock and Netarts soils. They are along the western edge of the survey area. Shore pine, manzanita, kinnikinnick, scotch-broom, and grass make up the vegetation on the areas.

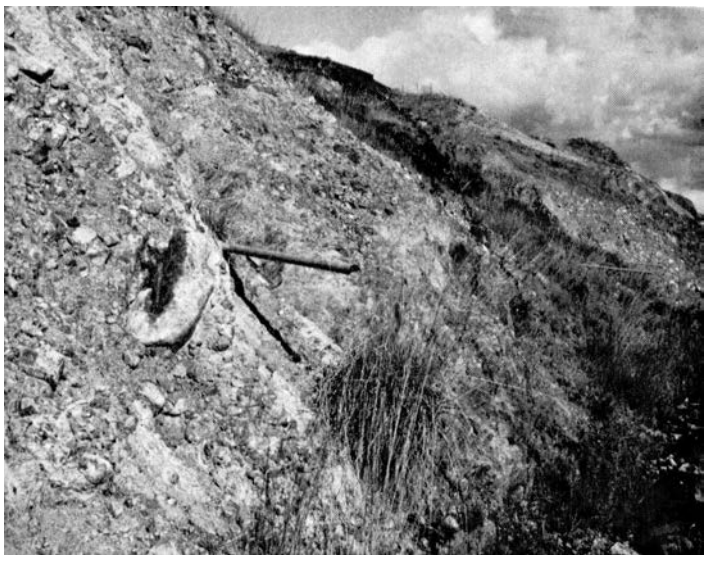

Figure 7.—**Pipes installed in road cuts drain away excess water and help to prevent landslides in Sebastian very stony loam, 7 to 70 percent slopes.**

Loose, very dark grayish-brown loamy sand as much as 6 inches thick makes up the upper part of Stabilized dune land. It is underlain by loose, noncoherent, medium to coarse sand.

Stabilized dune land is very low in fertility, is droughty, and is highly erodible. It does not respond to management under forest use. Because this land type is highly susceptible to soil blowing, it is not suitable for cultivation or for use as woodland. Use for recreational or wildlife purposes is limited. Capability unit VIIIe-1; woodland group 14.

Trask Series

In the Trask series are moderately deep, steep to very steep, gravelly soils that are well drained. These soils formed in material weathered from schistose slate. They are in the uplands near the Orford soils. The largest areas extend from the Sixes River northward to the Coos County line. Douglas-fir, western hemlock, tanoak, salal, rhododendron, and swordfern make up the natural vegetation.

A typical profile has a surface layer of very dark brown, friable gravelly silt loam about 5 inches thick. The subsoil is dark-brown to yellowish-brown gravelly loam or clay loam. Depth to bedrock is about 40 inches. The surface layer and subsoil are strongly acid.

Trask soils are used chiefly for wood crops.

Trask gravelly silt loam, 20 to 30 percent slopes (TrE).—This soil occupies broad areas in the highest part of the uplands in the central part of the survey area. The areas are rolling to hilly. Slopes range from 200 to 400 feet in length.

Typical profile in cutover timberland (NW¼ sec. 19, T. 31 S., R. 14 W.):

A1—0 to 5 inches, very dark brown (10YR 2/2) gravelly silt loam, dark grayish brown (10YR 4/2) when dry; moderate, fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; many, fine, irregular pores; many roots; many fine pebbles;

strongly acid (pH 5.4); clear, gradual boundary. 2 to 5 inches thick.

B1—5 to 11 inches, dark-brown (7.5YR 3/3) gravelly loam, brown (7.5YR 5/4) when dry; weak, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; common, fine, inped pores; many roots; many fine pebbles; strongly acid (pH 5.4); clear, wavy boundary. 6 to 8 inches thick.

B21—11 to 26 inches, yellowish-brown (10YR 5/4) gravelly loam or light clay loam, very pale brown (10YR 7/4) when dry; weak, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; common fine pores; many roots; strongly acid (pH 5.4); clear, wavy boundary. 5 to 15 inches thick.

B22—26 to 40 inches, yellowish-brown (10YR 5/4) gravelly loam or light clay loam, very pale brown (10YR 7/4) when dry; very weak, fine, subangular blocky structure; friable when moist, sticky and plastic when wet; a few fine pores; a few roots; many fine- and medium-sized pebbles; strongly acid (pH 5.4); clear, wavy boundary. 5 to 20 inches thick.

R—40 to 42 inches, schistose slate bedrock.

The B horizon ranges from medium to moderately fine in texture and is 25 to more than 50 percent gravel. It ranges from nearly massive to weak subangular blocky in structure. Depth to bedrock ranges from about 20 to 40 inches within a short distance.

Runoff is medium on this soil, and the hazard of erosion is moderate. Permeability of the subsoil is moderate, and available water holding capacity is medium to low. Effective root penetration is moderately deep. Most areas are too steep to till, but the soil is moderately fertile for woodland crops.

Included with this soil in mapping are small areas of Trask gravelly silt loam, 30 to 70 percent slopes, and of Edson clay loam, 12 to 30 percent slopes. Small included areas of Orford soils are in transitional areas to soils on siltstone bedrock.

All of this Trask soil is used for woodland crops. Capability unit VIe–1; woodland group 10.

Trask gravelly silt loam, 30 to 70 percent slopes (TrG).—This soil occupies large areas along the highest part of the uplands in the central part of the survey area. Runoff is rapid, and the erosion hazard is severe. The surface is smooth. Slopes are 400 to 1,000 feet in length.

Included with this soil in mapping are small areas of Trask soil that have slopes of less than 30 percent.

All of this Trask soil is used for woodland crops. Capability unit VIIe–1; woodland group 11.

Winchuck Series

Winchuck soils are very deep, nearly level to steep, and well drained. They formed in sediment derived chiefly from siltstone and sandstone. Some of the soils are nearly level to gently sloping and are on top of the terraces, and others are moderately sloping to steep and are on the front of the terraces. The areas are near the Meda and Orford soils and are along the Chetco, Elk, Pistol, Rogue, Sixes, and Winchuck Rivers. The vegetation consists chiefly of Douglas-fir, Oregon-myrtle, and alder but includes a few redwoods.

In a typical profile the surface layer is dark-brown, very friable silt loam about 8 inches thick. The subsoil is dark-brown, slightly sticky silty clay loam in the upper part. It is dark reddish-brown, sticky silty clay and dark-brown, sticky silty clay loam in the lower part. Strong-brown gravelly sandy clay loam is at a depth of about 46 inches. The profile is strongly acid throughout.

Winchuck soils are used for lily bulbs, forage crops, and timber.

Winchuck silt loam, 2 to 7 percent slopes (WcB).—This soil occupies fairly small areas on old stream terraces along coastal streams in the western part of the survey area. The areas are on small terraces near the base of steeply sloping Orford soils. The surface is smooth to gently undulating. Slopes generally are 100 to 300 feet in length.

Typical profile under pasture (3.6 miles on a county road along the Winchuck River, then 75 feet to the right of the road; SW¼NE¼ sec. 6, T. 41 S., R. 13 W.):

Ap—0 to 8 inches dark-brown (7.5YR 3/2) silt loam, brown (10YR 5/3) when dry; moderate, very fine, subangular blocky structure and moderate, fine, granular; very friable when moist, soft when dry, slightly sticky and slightly plastic when wet; many, very fine, irregular pores; many roots; strongly acid (pH 5.2); clear, smooth boundary. 6 to 10 inches thick.

B1—8 to 18 inches, dark-brown (7.5YR 3/2) silty clay loam, brown (10YR 5/3) when dry; strong, fine, subangular blocky structure; friable when moist, hard when dry, plastic and slightly sticky when wet; many, very fine, tubular pores; common thin clay films on ped surfaces and in pores; common roots; strongly acid (pH 5.2); clear, wavy boundary. 8 to 12 inches thick.

B21t—18 to 24 inches, dark reddish-brown (5YR 3/3) silty clay, reddish brown (5YR 5/4) when dry; moderate, medium, subangular blocky structure that breaks to strong, very fine, subangular blocky; firm when moist, hard when dry, plastic and sticky when wet; many, very fine, tubular and irregular pores; continuous thin clay films in pores and on ped surfaces; strongly acid (pH 5.2); gradual, wavy boundary. 4 to 8 inches thick.

B22t—24 to 34 inches, dark reddish-brown (5YR 3/4) silty clay, reddish brown (5YR 4/3) when dry; strong, coarse, subangular blocky structure that breaks to strong, very fine, subangular blocky; very firm when moist, very hard when dry, plastic and sticky when wet; many, very fine, tubular and irregular pores; continuous thin clay films on ped surfaces and in pores; a few roots; strongly acid (pH 5.2); clear, wavy boundary. 8 to 12 inches thick.

B3t—34 to 46 inches, dark-brown (7.5YR 4/4) heavy silty clay loam, brown (7.5YR 5/4) when dry; moderate, very fine, subangular blocky structure; firm when moist, hard when dry, plastic and sticky when wet; many, very fine, irregular and tubular pores; continuous thin clay films on ped surfaces and in pores; a few roots; strongly acid (pH 5.2); gradual, wavy boundary. 8 to 12 inches thick.

IIC—46 to 58 inches +, strong-brown (7.5YR 5/6) gravelly sandy clay loam, reddish yellow (7.5YR 6/6) when dry; massive; firm when moist, hard when dry; many, very fine, irregular pores; strongly acid (pH 5.4). More than 12 inches thick.

The A horizon is dominantly silt loam. It ranges from 10YR to 7.5YR in hue and from 6 to 18 inches in thickness. The B1 horizon ranges from 3 to 10 inches in thickness. The B horizons range from 7.5YR to 5YR in hue and from moderate to strong in structure. Depth to gravelly material is more than 36 inches.

Runoff is slow on this soil, and the hazard of erosion is slight. Permeability of the subsoil is moderately slow, and available moisture holding capacity is high. Effective root penetration is deep. Fertility is moderate. The soil is easy to work.

Included with this soil in mapping are small areas of Meda gravelly silt loam, 0 to 7 percent slopes, and of Knappa silty clay loam, heavy variant, 0 to 12 percent slopes. These included soils are adjacent to upland fans and foot slopes.

This Winchuck soil is used chiefly for forage crops, such as orchardgrass and birdsfoot trefoil, which are seeded following cultivation. Lily bulbs are grown on a few areas. Response to management is good. Capability unit IIe–1; woodland group 12.

Winchuck silt loam, 7 to 12 percent slopes (WcC).—This soil generally is on those parts of the terraces that are close to steep hills. The surface is smooth to undulating. Slopes range from 50 to 200 feet in length. The hazard of erosion is moderate. Because the slopes are stronger, this soil is more difficult to till than Winchuck silt loam, 2 to 7 percent slopes.

Included with this soil in mapping are a few small knolls of Winema silty clay loam, 3 to 12 percent slopes. Also included are small areas of Orford silty clay loam, 3 to 12 percent slopes.

Most of this Winchuck soil is used for orchardgrass, ryegrass, white clover, and similar forage crops that are seeded after cultivation. A small part is used as woodland. Capability unit IIIe–1; woodland group 12.

Winchuck silt loam, 12 to 30 percent slopes (WcE).—This soil occupies short slopes on the fronts and sides of terraces. Runoff is medium to rapid, and the erosion hazard is severe.

Included with this soil in mapping are small fans of Meda gravelly silt loam, 0 to 7 percent slopes.

This Winchuck soil is used mostly for producing tall fescue, orchardgrass, subterranean clover, and similar forage crops that are seeded following cultivation. Capability unit Ve–1; woodland group 12.

Winema Series

The Winema series consists of deep, gently sloping to very steep, well-drained soils on siltstone and sandstone. These soils are on coastal hills throughout the western part of the survey area near the Orford and Sebastian soils. The native vegetation was sweet vernal, bentgrass, velvetgrass, and fern.

In a typical profile the surface layer is very dark brown and very dark grayish-brown silty clay loam about 14 inches thick. The subsoil is very dark grayish-brown, friable silty clay loam in the uppermost part and dark grayish-brown, friable silty clay below. It overlies brown and olive-brown stony silty clay loam. Depth to brown siltstone and sandstone is about 54 inches. The soil is strongly acid throughout.

The Winema soils are used chiefly for pasture.

Winema silty clay loam, 12 to 30 percent slopes (WnE).—This soil occupies broad areas on the first range of hills inland from the Pacific Ocean. The surface is smooth to rolling but includes many slump areas about 50 feet across. Slopes range from 100 to 400 feet in length.

Typical profile under range (1.5 miles east of new U.S. Highway 101 on Geisel Monument Road and 0.6 mile to the left eastward on Old Radar Station Road, then 50 feet to the left of the road on a side slope; NW¼NW¼ sec. 18, T. 36 S., R. 14 W.):

A1—0 to 5 inches, very dark brown (10YR 2/2) silty clay loam, grayish brown (10YR 4/2) when dry; strong, fine, subangular blocky structure that breaks to strong, fine, granular; friable when moist, hard when dry, slightly plastic and slightly sticky when wet; many irregular pores; many roots; strongly acid (pH 5.3); clear, smooth boundary. 4 to 8 inches thick.

A3—5 to 14 inches, very dark grayish-brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) when dry; moderate, fine and medium, subangular blocky structure that breaks to strong, fine, granular; friable when moist, slightly hard when dry, slightly plastic and slightly sticky when wet; common irregular pores; many roots; strongly acid (pH 5.1); gradual, wavy boundary. 6 to 12 inches thick.

B1—14 to 24 inches, very dark grayish-brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) when dry; moderate, fine, subangular blocky structure; friable when moist, hard when dry, slightly plastic and sticky when wet; common, fine, tubular pores; many roots; strongly acid (pH 5.1); gradual, wavy boundary. 5 to 15 inches thick.

B2—24 to 40 inches, dark grayish-brown (10YR 4/2) light silty clay that includes some lighter colored material from the C horizon and some rock fragments, light brownish gray (10YR 6/2) when dry; moderate, fine, subangular blocky structure; friable when moist, slightly hard when dry, sticky and plastic when wet; many, fine, tubular pores; common roots; strongly acid (pH 5.1); abrupt, wavy boundary (irregular in places). 15 to 18 inches thick.

C—40 to 54 inches, brown (10YR 5/3) and olive-brown (2.5Y 4/4) stony silty clay loam, very pale brown (10YR 8/3) when dry; massive; firm when moist, hard when dry, slightly plastic and sticky when wet; common, fine, faint, yellowish-brown (10YR 5/4) variegations; a few roots; strongly acid (pH 5.1); gradual, wavy boundary. 9 to 18 inches thick.

R—54 to 60 inches, brown, fine-grained, soft siltstone or sandstone that is low in quartz.

The A horizon ranges from 10 to 20 inches in thickness. It is dominantly silty clay loam. Depth to the R horizon ranges from 30 to 60 inches, but it generally is near 50 inches.

Runoff is medium on this soil, and the erosion hazard is moderate. Permeability of the subsoil is moderately slow. Available moisture holding capacity is high, effective root penetration is deep, and fertility is moderate. The soil is difficult to cultivate, however, because of the steep slopes.

Included with this soil in mapping are a few small areas of Sebastian very stony loam, 7 to 70 percent slopes, adjacent to promontories of serpentine bedrock. Also included are small areas of Orford silty clay loam, 12 to 30 percent slopes, adjacent to forested areas.

All of this Winema soil is pastured. Response to management is fairly good. Capability unit VIe–2; woodland group not assigned.

Winema silty clay loam, 30 to 70 percent slopes (WnG).—This soil occupies broad areas on hills that on the west side are adjacent to marine terraces and that on the east side are adjacent to steep forested mountainous areas. Many slump or landslip areas 50 to 150 feet across make the surface uneven. Runoff is rapid to very rapid, and the erosion hazard is severe to very severe. Small areas of this soil tend to slip, and a few areas are cut by deep gullies.

Included with this soil in mapping are a few small areas of forested Orford soils.

All of this Winema soil is forested. Capability unit VIIe–2; woodland group not assigned.

Winema silty clay loam, 3 to 12 percent slopes (WnC).—This soil occupies small areas on the lower part of foot slopes or near the crest of ridgetops. The surface is smooth to undulating. Slopes range from 400 to 1,000 feet in length. Runoff is slow, and the erosion hazard is slight to moderate. Fertility is moderate. Workability is fair.

Included with this soil in mapping are small areas of Knappa silty clay loam, 7 to 12 percent slopes, adjacent

to fans and marine terraces. Also included are small areas of Knappa silty clay loam, heavy variant, 0 to 12 percent slopes, in concave areas. Other included small areas are made up of Meda gravelly silt loam, 0 to 7 percent slopes, or of Winchuck silt loam, 7 to 12 percent slopes.

Most of this Winema soil is used for orchardgrass and birdsfoot trefoil and similar forage crops that are seeded after cultivation. Capability unit IVe–2; woodland group not assigned.

Use and Management of the Soils

This section briefly describes the system of capability classification used by the Soil Conservation Service and discusses the management of the soils by capability groups. Then estimated yields are given for soils that are used for lily bulbs and for soils that are used for pasture. Also discussed in this section are suitability of the soils for use as woodland and use of the soils for engineering.

Capability Grouping of Soils

Capability classification is the grouping of soils to show, in a general way, their suitability for most kinds of farming. It is a practical classification based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment. The classification does not apply to horticultural crops, or to rice and other crops having special requirements. The soils are classified according to degree and kind of permanent limitation, but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soils; and without consideration of possible but unlikely major reclamation projects.

In the capability system, all kinds of soils are grouped at three levels, the capability class, subclass, and unit. These are discussed in the following paragraphs.

Capability Classes, the broadest grouping, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have some limitations that reduce the choice of plants or require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV soils have very severe limitations that restrict the choice of plants, require very careful management, or both.

Class V soils are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife food and cover. (None in the Curry Area.)

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife.

Class VIII soils and landforms have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes.

Capability Subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c* to the class numeral, for example, IIe. The letter *e* shows the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, but not in the Curry Area, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only subclasses indicated by *w*, *s*, and *c*, because the soils in it are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

Capability Units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other response to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–1 or IIIe–3. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation, and the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph. The Arabic numeral, specifically identifies the capability unit within each subclass.

Management by Capability Units [2]

In the pages that follow, the capability units in the Curry Area are described and suggestions for use and management for all the soils of each unit are given. The names of soil series represented are mentioned in the description of each capability unit, but this does not mean that all soils of a given series appear in the unit. The names of all soils in any given capability unit can be found by referring to the "Guide to Mapping Units" at the back of this survey.

Capability unit I–1

This unit consists of deep and very deep soils that are well drained. The soils are Knappa clay loam, dark surface variant, 0 to 3 percent slopes, and Nehalem silt loam. These soils are nearly level to very gently sloping and are on stream bottoms and marine terraces. Runoff is slow, permeability is moderate, and available water holding capacity is high. Fertility and content of organic matter are also high. The erosion hazard is slight.

These soils are used mainly for farm crops. All crops adapted to the climate do well on these soils. Suitable for

[2] By Lou Wester, extension agent for Curry County, Oreg.

the soils are lily bulbs, cut flowers, other row crops grown in the area, cereal crops, and mixtures of grasses and legumes grown for forage. The soils can be kept in good tilth and the content of organic matter can be maintained by growing a soil-conserving crop 10 to 25 percent of the time where lily bulbs or other row crops are grown.

Bulbs require intensive cultivation. They generally are grown in rotation with forage crops, mainly because this rotation helps to prevent contamination of the soil by nematodes. Also helpful in preventing infestation by nematodes is removing all residues that remain after the bulbs are harvested and fumigating the soils.

In most areas improved pastures on the soils in this unit consist of ryegrass or orchardgrass or of tall fescue and white clover (fig. 8). Supplemental irrigation, rotating the grazing, applying lime and fertilizer, clipping, harrowing, and controlling weeds are needed for establishing and maintaining the pasture.

On these soils bulbs, cut flowers, and pasture plants respond well to moderate amounts of nitrogen. Lime, phosphorus, and potassium should be applied if soil tests indicate a need for them.

Soils in this unit have high potential for urban or recreational use and for use as wildlife areas. Most of the stands of timber have been removed, but Sitka spruce is suitable for the Knappa variant. Suitable trees for the Nehalem soil are Douglas-fir, Sitka spruce, Oregon-myrtle, bigleaf maple, and red alder.

Capability unit IIe-1

In this unit are deep and very deep, well-drained soils of the Knappa and Winchuck series and of a variant from the Knappa series. These soils are gently sloping to moderately sloping and are on marine terraces and alluvial fans. The surface layer is silty clay loam, silt loam, or clay loam. Runoff is slow, permeability of the subsoil is moderate to moderately slow, and available water holding capacity is high. Fertility is moderate to high, and content of organic matter is high. The erosion hazard is slight.

All crops adapted to the climate of the area do well on these soils. Suitable for the soils are lily bulbs, cut flowers, all other row crops grown in the area, oats, rye, and mixtures of grasses and legumes grown for hay and pasture. Oats and rye generally are grown as green-manure crops

Figure 8.—**Seeded pasture on Nehalem silt loam, used to provide forage for sheep and for beef and dairy cattle.**

or as cover crops. The soils can be kept in good tilth and the content of organic matter can be maintained if a soil-conserving crop is grown 10 to 25 percent of the time.

Growing bulbs in rotation with forage crops helps to prevent contamination of the soils by nematodes. Other ways of preventing infestation by nematodes are removing all residues that remain after the bulbs are harvested and fumigating the soil.

Seeded pastures on these soils are in tall fescue or orchardgrass planted with subterranean clover or birdsfoot trefoil. Good management consists of applying lime and fertilizer, rotating the grazing, clipping, harrowing, and controlling weeds. The pastures can be improved by sprinkler irrigation where water is available for this purpose. The amount and rate of water to apply, and the interval between irrigations, can be determined by frequently checking the soil moisture at a depth of 10 to 18 inches in the field.

These soils require protection from erosion and from runoff from adjacent steeper soils. Suitable practices are tillage across the slope and use of diversion terraces and grassed waterways.

Lime, nitrogen, phosphorus, and potassium should be applied if soil tests indicate the need for them. Bulbs and cut flowers respond well to large amounts of nitrogen.

Soils in this unit have high potential for urban or recreational use. They also are well suited for use as woodland and for use as wildlife areas.

Capability unit IIw–1

Bayside silty clay loam is the only soil in this unit. It is very deep, is somewhat poorly drained, and has a fluctuating water table. The subsoil is fine textured. This soil is nearly level and is on low terraces, where flooding is common. Runoff is slow, permeability is slow, and available water holding capacity is high. Fertility and content of organic matter are moderate. The erosion hazard is slight.

All crops that are adapted to the climate and that can tolerate wetness grow moderately well on this soil. Most areas are not drained and are used for shallow-rooted grasses and legumes grown to provide feed for livestock. When drained, however, this soil is suitable for row crops and small grains. Drainage also permits use of better, deeper rooted varieties of grasses and legumes. Plants in drained soil also start growing earlier in the season and continue growing for a longer time.

If this soil is adequately drained, a good stand of high-quality grasses and legumes can be established and maintained by applying nitrogen, lime, phosphorus, and potassium as needed. Suitable grasses for this soil are tall fescue, meadow foxtail, and ryegrass; suitable legumes are big trefoil, white clover, and alsike clover.

Pasture management on this soil includes properly preparing the seedbed, rotating the grazing, harrowing, clipping, and controlling weeds. Livestock must be kept off the soil in winter when the soil is wet. If grazed at this time, the soil becomes compacted and growth of plants in spring is retarded.

If this soil is drained and cultivated, a winter cover crop is needed to protect it from erosion during floods. Protection also can be provided by leaving all crop residues on the surface or lightly working them into the soil. In a few places a diversion terrace with a sod waterway may be needed to protect the soil from runoff from higher areas. Lime, nitrogen, and phosphorus are needed, and some crops require potassium.

Tile drains or open drains can be used to provide drainage. The depth of the drainage system varies, depending on the depth of the water-bearing layer. This depth can be determined by soil borings in the field.

When drained, this soil responds well to irrigation. Irrigation water is readily available, and it can be applied by sprinklers. The amount and rate of water to apply, and the interval between irrigations, can be determined by frequently checking the soil moisture at a depth of 12 to 15 inches in the field.

Sitka spruce and red alder grow on small areas of this soil. Selected areas have moderate potential for woodland and wildlife uses.

Capability unit IIIe–1

In this unit are very deep, well-drained soils of the Knappa and Winchuck series. These soils are moderately sloping and are on marine terraces and alluvial fans. The surface layer is silty clay loam or silt loam. Runoff is medium, permeability of the subsoil is moderately slow to moderate, and available water holding capacity is high. Fertility, content of organic matter, and erosion hazard are moderate.

Most crops adapted to the area grow well on these soils. Forage crops are the chief crops grown. Suitable for the soils are small grains, such as rye and oats, and mixtures of grasses and legumes grown for hay and pasture. Growing soil-conserving crops 50 percent of the time helps to maintain tilth and the content of organic matter. It also helps to maintain a high rate of infiltration.

A good stand of high-quality grasses and legumes can be established and maintained by applying lime, phosphorus, and nitrogen. Potassium should be applied if soil tests indicate a need for it. Suitable grasses are tall fescue, ryegrass, and orchardgrass; suitable legumes are subterranean clover and white clover.

Pasture management on these soils includes properly preparing the seedbed, rotating the grazing, harrowing, clipping, and controlling weeds. Keeping livestock from grazing when the soils are wet avoids soil compaction and insures good growth of pasture plants in spring.

A cover crop is needed in winter to protect the soils during long wet periods. Seeding of the cover crop should be done early in fall to allow the plants to grow and provide cover. All crop residues should be worked lightly into the soils. The largest amount of organic material can be obtained from green-manure crops if the crops are turned under when at peak growth. In many places diversion ditches and grassed waterways are needed to remove runoff flowing from adjacent uplands. All tillage and seeding should be done on the contour or across the slope to slow runoff and to increase infiltration of water.

Water generally is available for irrigation. It can be applied by sprinklers to supplement the supply of moisture during long dry periods. The amount and rate of water to apply, and the interval between irrigations, can be determined by frequently checking the soil moisture at a depth of 10 to 18 inches in the field. Because of the slope, the water must be applied carefully for control of runoff and to prevent erosion.

Soils in this unit have high potential for urban and recreational use. Selected areas are suitable for use as woodland and as wildlife areas.

Capability unit IIIe–2

Ferrelo loam, 0 to 7 percent slopes, is the only soil in this unit. It is deep and is well drained. This soil is on marine terraces. Runoff is slow, permeability of the subsoil is moderately rapid, and available water holding capacity is moderately low. Intermittent lenses of compacted sandy material restrict penetration of roots and water. Fertility is low. Tilth and workability are good. The hazard of water erosion is slight, but the hazard of soil blowing is moderate.

This soil is moderately well suited to trees, to grasses and legumes grown for hay and pasture, to such small grains as rye and oats, and to intensive use for row crops. Even under good management, crops do not grow so well as on other soils in the survey area used by similar crops. About half of the acreage is in trees. Rye and oats are grown to provide crop residues or are grown as winter cover crops. Growing soil-conserving crops 50 percent of the time helps to maintain tilth and the content of organic matter and also helps to control soil blowing.

Forage crops require lime, phosphorus, and nitrogen. Except for legumes, large amounts of nitrogen are needed annually for all crops. Suitable grasses are tall fescue and orchardgrass; suitable legumes are subterranean clover and New Zealand white clover.

Using cross-slope tillage and leaving all crop residues on the soil are ways of controlling accelerated water erosion. The soil also can be protected from blowing if all crop residues are left on the surface or are worked lightly into the soil. A cover crop is needed to provide protection in winter. Seeding of the cover crop should be done early in fall to allow the plants to grow and to provide cover.

Pasture management on this soil includes rotating the grazing, clipping, and harrowing to spread animal droppings and smooth the surface. Allowing a rest period of 2 or 3 weeks in the rotation after a grazing gives the pasture time to recover from heavy grazing and keeps the plants in the stand healthy and vigorous. Keeping livestock from grazing in winter when the soil is wet avoids soil compaction. It also prevents trampling of young plants before they have time to develop adequate roots.

If water is available for irrigation, it generally can be applied by sprinkler. The amount and rate of water to apply, and the interval between irrigations, can be determined by checking the soil moisture at a depth of 12 to 18 inches in the field.

The soil in this unit has high potential for urban use. It also has high potential for use as recreational and wildlife areas.

Capability unit IIIe–3

Meda gravelly silt loam, 0 to 7 percent slopes, is the only soil in this unit. It is very deep and gravelly and is well drained. This soil is on alluvial fans. The subsoil is moderately fine textured. Runoff is medium, permeability of the subsoil is moderate, and available water holding capacity is moderate to low. Fertility is moderate. Workability varies, according to the amount of gravel in the surface layer. In some places the surface layer contains gravel in amounts that hinder tillage. The hazard of erosion is moderate.

All crops adapted to the climate do well on this soil. Timber and forage crops, however, are better suited than other kinds of crops. Suitable grasses are tall fescue, orchardgrass, and ryegrass; suitable legumes are birdsfoot trefoil and white clover. The soil can be kept in good tilth and the content of organic matter can be maintained if a soil-conserving crop is grown 50 percent of the time. Lime and fertilizer are needed.

Erosion can be controlled and productivity can be maintained by cultivating across the slope and working crop residues into the soil. Green-manure crops also should be plowed under from time to time. A way of keeping an area that has been pastured for a long time free of weeds and weed seeds is to plant grain as a cleanup crop before reworking the soil and reseeding the field to pasture grasses.

Good pasture management consists of preparing a firm seedbed, rotating the grazing, harrowing, clipping, and controlling weeds. Livestock must be kept off newly established stands of grasses in winter when the soil is wet to prevent trampling of the young plants.

Pastures on the soil in this unit generally need supplemental irrigation in July, August, and September. They respond well to sprinkler irrigation if water is available. The amount and rate of water to apply, and the interval between irrigations, can be determined by frequently checking the soil moisture at a depth of 1 to 2 feet in the field. The water must be applied more frequently and in smaller amounts than on less gravelly soils.

The soil in this unit has high potential for urban use. It also has high potential for use as recreational and wildlife area.

Capability unit IIIe–4

Knappa silty clay loam, heavy variant, 0 to 12 percent slopes, is the only soil in this unit. It is deep and is moderately well drained. This soil is on alluvial fans on material washed from soils in the uplands that overlie sedimentary rock or serpentine. The subsoil, a mottled clay, restricts movement of water and penetration of roots. Runoff is medium, permeability of the subsoil is slow, and available water holding capacity is moderate. The content of organic matter is medium. Fertility is low because of the wide variation in the proportion of calcium to magnesium in the material from serpentine. The hazard of erosion is moderate.

All crops that are adapted to the climate and that can tolerate slight wetness and a somewhat restricted root zone grow moderately well on this soil. Most of this soil, however, is being used less intensively than it could be used. Much of the acreage is not drained and is used for small grains, such as rye and oats, and for mixtures of grasses and legumes. When drained, however, better, deeper rooted varieties of grasses and legumes can be grown. Plants in drained soil also start growing earlier in the season and continue growing for a longer time. This soil can be kept in good tilth and the content of organic matter can be maintained by growing a soil-conserving crop at least 50 percent of the time.

A cover crop is needed in winter to protect the soils during the rainy season. Seeding of the cover crop should be done early in fall to allow the plants to grow and pro-

vide good cover. All crop residues and green-manure crops should be worked into the soil. Tillage and seeding must be done on the contour or across the slope. Installing grassed waterways and diversion ditches helps to remove runoff flowing from adjacent uplands.

If tile drains are used to provide drainage, the lines should be properly blinded with wood chips or coarse aggregates. Water then can move freely to the tile and fine sediment will be filtered out. The depth of the drainage or diversion system in the soil depends on the depth to the water-bearing layer. The depth to this layer can be determined by borings in the field.

A good stand of high-quality grasses and legumes can be established and maintained if this soil is drained and if fertilizer that contains phosphorus and nitrogen is applied. Tall fescue is a suitable grass, and subterranean clover and white clover are suitable legumes.

Successful pasture management on this soil includes properly preparing the seedbed, rotating grazing, harrowing, clipping, and controlling weeds. Keeping livestock from grazing when the soils are wet avoids soil compaction and insures good growth of pasture plants in spring.

Little of this soil is irrigated because water generally is not available. If supplemental water is available, however, it can be applied by sprinklers during long dry periods for increased growth of crops. The amount and rate of water to apply, and the interval between irrigations, can be determined by frequently checking the soil moisture at a depth of 10 to 18 inches in the field.

Much of this soil is used less intensively than it could be used. This soil has low potential for trees. The potential for urban, recreational, and wildlife uses also is low.

Capability unit IIIs–2

Gardiner fine sandy loam is the only soil in this unit. It is deep and is well drained. This soil is nearly level and is on bottom lands that are flooded occasionally. Runoff is very slow, and permeability of the subsoil is rapid. Fertility, content of organic matter, and available water holding capacity are low. Except for moderate streambank cutting, the hazard of erosion is slight.

All crops that are adapted to the climate grow moderately well on this soil. Much of this soil, however, is being used less intensively than it could be used. Bulbs, other row crops, such small grains as rye and oats, and mixtures of grasses and legumes are the main crops. The soil can be kept in good tilth and the content of organic matter can be maintained by growing a soil-conserving crop at least 50 percent of the time. Fertilizer and supplemental irrigation are needed for good growth of crops.

In general, crops on this soil require small amounts of lime and moderate amounts of nitrogen and phosphorus. Larger amounts of potassium may be needed for legumes and for other crops that require potassium for good growth. Applying the fertilizer in fields where crops are growing or in crop residues helps to reduce loss of fertilizer by leaching.

Irrigation water is readily available. This soil requires more frequent irrigation than less sandy soils. The amount and rate of water to apply, and the interval between irrigations, can be determined by frequently checking the soil moisture at a depth of 1 to 2 feet in the field.

If cultivated crops are grown, a cover crop is needed in winter. The crop protects the soil from erosion during heavy floods. Seeding of the cover crop should be done early in fall to allow the plants to grow and provide cover. In spring the cover crop can be turned under when the danger of flooding is past. At this time the plants are at peak growth and provide the largest amount of organic material. The supply of organic matter also can be increased by working crop residues lightly into the soil. In places streambank cutting is a problem. It can be controlled by shaping side slopes, providing a cover of vegetation, or using rock riprap.

A good stand of high-quality grasses and legumes can be maintained by applying moderate amounts of phosphorus and nitrogen. Lime and potassium should be applied if soil tests indicate a need for them. Suitable grasses are tall fescue, orchardgrass, and ryegrass; suitable legumes are subterranean clover or white clover.

Successful pasture management on this soil includes properly preparing the seedbed, rotating the grazing, harrowing, clipping, and controlling weeds. Livestock must be kept off this soil in winter when the soil is wet. If grazed at this time, the soil becomes compacted and growth of plants in spring is retarded.

This soil has moderate potential for urban use. The potential for recreational use is high, but for wildlife use, it is moderate.

Capability unit IVe–1

The soils in this unit are in the Knappa, Orford, and Winchuck series. They are deep and very deep and are well drained. The surface layer is silty clay loam or silt loam. Some of the soils are nearly level to moderately sloping and are in the uplands; others are strongly sloping and are on terrace fronts. Runoff is medium to rapid, permeability of the subsoil is moderate to moderately slow, and available water holding capacity is high. Fertility and content of organic matter are moderate. The hazard of erosion is moderate to severe.

These soils are moderately well suited to poorly suited to cultivated crops. Trees grow well. Mixtures of grasses and legumes adapted to the climate grow moderately well. Growing soil-conserving crops 75 percent of the time helps to maintain tilth and an adequate supply of organic matter.

Many cleared areas of these soils are tilled infrequently, and most areas have sufficient cover for control of erosion. If these soils are cultivated, cross-slope tillage is needed for control of erosion. In addition all crop residues must be left on the surface or worked lightly into the soil. A winter cover crop also is needed for protection from erosion.

Plants on these soils respond well if lime, phosphorus, and potassium are applied in amounts indicated by soil tests. Supplemental nitrogen must be applied annually.

A good stand of grasses and legumes can be established and maintained if a firm seedbed is prepared. In addition soil packing must be done to bring the moisture available into the surface layer where it can be used by the young seedlings. Growing a cleanup crop before seeding the grasses and legumes hinders growth of weeds and thus promotes good growth of the grasses and legumes. Suitable grasses for these soils are tall fescue and orchardgrass; suitable legumes are white clover, subterranean clover, and birdsfoot trefoil.

Pasture management on these soils includes rotating the grazing and harrowing and clipping. Allowing a rest period for 2 or 3 weeks after heavy grazing gives the pastures time to recover and keeps the plants in the stand healthy and vigorous. Clipping and harrowing can be done to even up a stand that is uneven because of grazing and animal droppings.

Sprinklers can be used to apply irrigation water. The amount and rate of water to apply, and the interval between irrigations, can be determined by checking the soil moisture at a depth of 12 to 18 inches in the field.

Soils in this unit have moderate potential for urban use. The potential for use as woodland and for recreational and wildlife purposes is high.

Capability unit IVe–2

Winema silty clay loam, 3 to 12 percent slopes, is the only soil in this unit. It is deep and is well drained. This soil is near the base of coastal hills. Runoff is slow, permeability of the subsoil is moderately slow, and available water holding capacity is high. Fertility is moderate, and content of organic matter is high. The hazard of erosion is slight to moderate, chiefly because of runoff from adjacent higher areas.

This soil is moderately well suited to cultivated crops. It is especially well suited to close-growing crops because of the erosion hazard. Small grains, such as oats and rye, are well suited. Suitable grasses are tall fescue, orchardgrass, and ryegrass; suitable legumes are birdsfoot trefoil and subterranean clover. The soil can be kept in good tilth and the content of organic matter can be maintained by growing a soil-conserving crop 75 percent of the time.

When cultivated crops are grown and when establishing grasses and legumes for pasture, cultivating across slope is a way of controlling erosion. Leaving all crop residues on the surface or lightly working them into the soil helps to increase the content of organic matter. Keeping a cover crop on newly plowed areas in winter also helps control erosion. The cover crop must be seeded early in fall to allow the plants to grow enough to provide cover. In some places interceptor ditches are needed for removing runoff from adjacent steeper areas in the uplands.

Lime, phosphorus, and potash are needed for all crops. They should be applied according to needs indicated by soil tests. Nitrogen is needed annually.

Good pasture management on this soil includes properly preparing the seedbed, rotating grazing, harrowing, clipping, and controlling weeds. Keeping livestock from grazing in winter when the soils are wet avoids trampling of young plants and compacting of the soil.

If irrigation water is available, it can be applied by sprinklers. The amount and rate of water to apply, and the interval between irrigations, can be determined by frequently checking the soil moisture at a depth of 12 to 18 inches in the field.

The soil in this unit generally is not used as woodland. Its potential for urban, recreational, and wildlife uses is high.

Capability unit IVe–3

Gardiner fine sandy loam, moderately deep, is the only soil in this unit. It is well drained and is 20 to 36 inches deep over sand and gravel. This soil is nearly level and is on low stream bottoms that generally are dissected by old channels. It is subject to flooding for short periods during major floods. Runoff is very slow, but permeability of the subsoil is rapid. Available water holding capacity is very low and fertility is low. Because of flooding and streambank cutting, the hazard of erosion is severe.

This soil is poorly suited to cultivated crops. Suitable for the soil are small grains, such as rye or oats, and mixtures of grasses and legumes. The content of organic matter can be maintained if a soil-conserving crop is grown at least 90 percent of the time. Streambank cutting can be controlled by realining the banks of streams and protecting them by planting willow cuttings and using rock riprap.

All crops on this soil require large amounts of phosphorus and nitrogen for good growth and also require frequent irrigations shortly after the rains cease. Lime and potassium can be applied if soil tests indicate a need for them. Adding the fertilizer in several applications in crop residues or growing crops helps to control leaching.

A cover crop is needed in winter to protect the soil during periods of major flooding. If a small grain is planted as a cover crop, it should be seeded early in fall to allow the plants to grow and provide cover.

A good stand of high-quality grasses and legumes can be established and maintained if large amounts of phosphorus and nitrogen are applied and if lime and potassium are applied as needed. Suitable grasses are orchardgrass and ryegrass; suitable legumes are subterranean clover or New Zealand white clover.

Successful pasture management on this soil includes properly preparing the seedbed, rotating the grazing, harrowing, clipping, and controlling weeds. Keeping livestock from grazing when the soil is wet avoids trampling young seedlings and destroying them.

This soil requires more frequent applications of small amounts of irrigation water than deeper, finer textured soils. Irrigation water is readily available. The amount and rate of water to apply, and the interval between irrigations, can be determined by frequently checking the soil moisture at a depth of 1 to 2 feet in the field.

The soil in this unit has low potential for use as woodland. Its potential for urban and recreational uses also is low. The potential for wildlife use is high.

Capability unit IVe–4

Ferrelo loam, 7 to 20 percent slopes, is the only soil in this unit. It is deep and well drained and is on marine terraces. Runoff is medium, permeability of the subsoil is moderately rapid, and available water holding capacity is moderately low. In places intermittent lenses of compacted sandy material restrict penetration of roots. Fertility is low. The hazard of erosion is moderate.

This soil is mostly in trees, to which it is well suited, but it could be used more intensively. It is poorly suited to cultivated crops. Mixtures of grasses and legumes and small grains, such as oats and barley, grow well. Suitable grasses are tall fescue and orchardgrass; suitable legumes are white clover and birdsfoot trefoil. The soil can be kept in good tilth and the content of organic matter can be maintained by growing a soil-conserving crop at least 75 percent of the time.

Large amounts of lime, phosphorus, potassium, and nitrogen are needed to keep plants healthy and to maintain the proportion of grasses and legumes in a stand. Nitrogen must be applied annually. All fertilizer should be applied

at the proper time and in amounts indicated by the results of soil tests.

Tillage across the slope is needed if this soil is cultivated. Leaving crop residues on the surface or working them lightly into the soil are ways of maintaining the content of organic matter. In tilled areas a cover crop is needed to provide protection during the wet winter months. A firm seedbed is needed for seeding mixtures of grasses and legumes. Intercepting runoff before it reaches the front of the terrace is a way of controlling erosion.

Pasture management on this soil includes rotating the grazing, clipping, and harrowing to spread animal droppings and smooth the surface. Allowing a rest period of 2 or 3 weeks in the rotation after a grazing gives the pasture time to recover from heavy grazing and keeps the plants in the stand healthy and vigorous. Keeping livestock from grazing in winter when the soil is wet avoids soil compaction. It also prevents trampling of young plants before they have time to develop adequate roots.

If water is available for irrigation, it generally can be applied by sprinklers. The amount and rate of water to apply, and the interval between irrigations, can be determined by checking the soil moisture at a depth of 12 to 18 inches in the field.

The soil in this unit has moderate potential for urban and recreational uses. Its potential for wildlife use is high.

Capability unit IVw–1

In this unit are nearly level, poorly drained soils of the Chetco and Langlois series. These soils are on marine terraces and old tidal flats. They have a fluctuating high water table. The surface layer is silt loam or silty clay loam. Runoff is very slow, and permeability of the subsoil is slow to very slow. The available water holding capacity is moderate, but in many areas free salt occurs in the lower part of the subsoil. Root penetration is moderately deep to moderately shallow, fertility is moderate to moderately low, and content of organic matter is high to very high. Lenses of muck or peat occur throughout these soils. The soils are subject to flooding for long periods each year, and the erosion hazard is slight to moderate. The natural cover is browse, rushes, grasses, and sedges that can tolerate wetness.

When drained, these soils are moderately well suited to selected cultivated uses. Even drained areas, however, are likely to be wet for long periods. Consequently, suitable crops are those that are shallow rooted and that can withstand long periods of wetness. Some grasses that do well are reed canarygrass and meadow foxtail. A suitable legume is big trefoil. In places wheat or oats can be planted in spring, as a cleanup crop for control of weeds, before seeding grasses and legumes.

Most areas of these soils are not used intensively and are only partly drained. Generally, the surface is smoothed to fill in depressions and surface ditches are used to provide drainage. Low dikes, deep open drains, and a pumping system for moving drainage water to outlets are needed to provide more complete drainage.

All crops on these soils require lime, phosphorus, and potash. Supplemental nitrogen is needed annually, and the amount used must be adjusted to the content of muck or peat in the soils.

Supplemental irrigation generally is desirable late in summer and early in fall. It commonly is not feasible, however, because of salt in the water supply. The rivers and creeks flowing through the areas are the only suitable sources of good water. If such water is available, it can be applied by sprinkler. The amount and rate of water to apply, and the interval between irrigations, can be determined by frequently checking the soil moisture at a depth of 12 inches in the field.

A few Sitka spruce and red alder grow on these soils, but they are too scattered to be managed as woodland. Selected areas have moderate potential for wildlife use.

Capability unit IVw–2

In this unit are nearly level to gently sloping, somewhat poorly drained to poorly drained soils of the Chitwood and Hebo series. These soils occupy concave areas on stream terraces and on the upper part of marine terraces adjacent to uplands. The surface layer is silt loam or silty clay loam. Runoff is slow to medium, permeability of the subsoil is slow to very slow, and available water holding capacity is high to moderate. Root penetration is moderately deep. Fertility is low to moderate, content of organic matter is moderate, and hazard of erosion is slight.

If these soils are drained, they are well suited to selected cultivated crops. Suitable grasses for drained areas are reed canarygrass and meadow foxtail; suitable legumes are big trefoil, alsike, and New Zealand white clover. Wheat or oats can be planted in spring as a cleanup crop for control of weeds before seeding the soils to grasses and legumes.

Deep interceptor drains are needed for removal of excess surface water and subsurface water moving onto these soils from adjacent higher areas. Closed tile drains also can be used for drainage if they are properly blinded.

Areas used for hay or pasture require at least partial drainage. Good management includes preparing a proper seedbed, planting improved varieties of seed, rotating the grazing, harrowing, clipping, and controlling weeds. When preparing the seedbed, cross-slope tillage is needed for control of runoff and erosion. Keeping livestock off the areas until the plants are well established, and when the soils are wet, are ways to avoid soil compaction and trampling of young plants.

Lime, nitrogen, phosphorus, and potassium are needed. They should be applied according to the needs indicated by results of soil tests. Nitrogen must be applied annually for good growth of hay and pasture plants.

Supplemental irrigation is desirable late in summer and early in fall for good growth of plants before the rainy season begins. Water from shallow wells or from streams generally is available. It can be satisfactorily applied by sprinklers. The amount and rate of water to apply, and the interval between irrigations, can be determined by frequently checking the soil moisture at a depth of 10 to 14 inches in the field.

Undrained areas of these soils have low potential for use as woodland and moderate potential for selected wildlife use. Drained areas have moderate and high potential, respectively, for such uses.

Capability unit IVw–3

Soils in this unit are in the Gardiner and Nehalem series. They are deep, nearly level, and well drained. These soils are on bottom lands that are dissected by old stream channels. They are subject to frequent flooding in winter

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and receive fresh deposits of silt and fine sand. The surface layer is fine sandy loam or silt loam. Runoff is slow and very slow, permeability of the subsoil is moderate to rapid, and available water holding capacity is low to high. Fertility and content of organic matter are high to low. Because of streambank cutting and overwash, the hazard of erosion is severe.

The soils in this unit are used mainly for forage crops, but they could be used more intensively. All crops adapted to the climate and that can withstand flooding in winter do well on these soils. Suitable crops are small grains, such as rye and oats, and mixtures of grasses and legumes. The soils can be kept in good tilth and the content of organic matter can be maintained by growing a soil-conserving crop 90 percent of the time.

A good stand of high-quality grasses and legumes can be established and maintained by applying lime, phosphorus, and nitrogen. Potassium should be applied if soil tests indicate a need for it. Suitable plants are ryegrass, orchardgrass, and New Zealand white clover.

Successful pasture management on these soils includes properly preparing the seedbed, rotating the grazing, harrowing, clipping, and controlling weeds. Keeping livestock from grazing when the soils are wet avoids soil compaction and insures good growth of pasture plants in spring.

A cover crop is needed on these soils in winter to protect them from flooding. Seeding of the cover crop should be done early in fall to allow the plants to grow and provide cover.

Most crops on these soils respond well if moderate to small amounts of lime and of phosphorus fertilizer are added. Some crops require potassium. Applying the fertilizer frequently, and in small amounts, in crop residues or growing plants helps to reduce leaching.

Streambank erosion can be controlled by shaping the banks and planting willow or using rock riprap to protect them. Keeping the channels of the streams clear hastens removal of excess water after flooding.

Water is readily available for irrigation. It can be applied by sprinklers to supplement the supply of moisture during long dry periods. The amount and rate of water to apply, and the interval between irrigations, can be determined by frequently checking soil moisture at a depth of 10 to 18 inches in the field. The Gardiner soil requires particular care in irrigating because of its lower water holding capacity.

Most of the stands of timber have been removed from these soils. The potential for woodland use is moderate to low. Soils in this unit have low potential for urban use, moderate potential for recreational use, and high potential for wildlife use.

Capability unit VIe–1

In this unit are moderately deep to very deep, well-drained soils of the Edson, Knappa, Orford, and Trask series. These soils are strongly sloping and are in the uplands. The surface layer is clay loam, silty clay loam, or gravelly silt loam. Runoff is medium to rapid, permeability of the subsoil is moderate to moderately slow, and available water holding capacity is low to high. Fertility and content of organic matter are moderate to high. The hazard of erosion is moderate to severe.

The soils in this unit are the most productive for woodland crops of any soils in the survey area. They are too steep for frequent tillage. Grasses and legumes adapted to the climate can be established in cleared areas under good management. Suitable for these soils are such grasses as tall fescue, orchardgrass, and ryegrass. Suitable legumes are subterranean clover and birdsfoot trefoil.

A permanent cover is needed on these soils. Tillage should be done only when needed for reestablishing the permanent cover. Erosion is a severe hazard in pastured areas that are overgrazed. It also is severe in wooded areas where improper cutting leaves the surface bare or seriously compacted.

In establishing forage crops, nitrogen is needed for good growth of grasses, and phosphorus, for good growth of legumes. When reestablishing legumes, the seed does not need to be inoculated if the same kinds of legumes have been grown for several years. Neither is inoculation needed if large amounts of nitrogen have been added to the areas in recent years. If different kinds of legumes are to be seeded, or if legumes have not been grown on the areas, then the legume seed should be inoculated. Lightly cultivating the soils on the contour, in strips, can be used for control of erosion. The strips can be worked into a firm seedbed. Planting is best done in fall because the supply of moisture in summer is short. Where feasible, use of a mechanical seeder is advisable.

Good pasture management on these soils includes properly distributing salt and watering developments throughout the areas, rotating the grazing, and deferring grazing. Restricting or prohibiting grazing when the soils are wet prevents compaction of the soil and trampling of young plants.

Soils in this unit have moderate potential for selected recreational use. The potential for wildlife use is high.

Capability unit VIe–2

Winema silty clay loam, 12 to 30 percent slopes, is the only soil in this unit. It is deep and well drained and has a fine-textured subsoil. This soil is strongly sloping and is on coastal hills. Runoff is medium, permeability of the subsoil is moderately slow, and available water holding capacity is high. Fertility is moderate, and content of organic matter is high. The hazards of erosion and slumping are moderate.

The soil in this unit is used mostly for forage (fig. 9). All forage crops that are adapted to the climate do well on this soil. The soil is too steep for cultivated crops, but it can be tilled enough to improve pastures. Suitable grasses are tall fescue, orchardgrass, and ryegrass; suitable legumes are subterranean clover and birdsfoot trefoil. Most areas would be more productive if improved varieties of grasses and legumes were seeded.

Lime, nitrogen, and phosphorus are needed. The lime and phosphorus should be applied according to the results indicated by soil tests.

Erosion can be controlled by cultivating on the contour, in strips. Also, all crop residues should be left on the surface or worked lightly into the soil. Where feasible, use of a mechanical seeder helps to insure a good stand.

A good stand of forage can be maintained and its productivity can be increased if phosphorus fertilizer is applied and if grazing is rotated and deferred. If the pastured acreage on a farm is divided into 5 or 6 pastures of equal size, then grazing can be rotated and each year one pasture can be allowed to go to seed. In this way a

Figure 9.—**Typical view of Winema silty clay loam, 12 to 30 percent slopes, under forage on hills in the survey area.**

permanent stand of vigorous grasses and legumes can be maintained.

The soil in this unit is not suited to use as woodland. It has low to moderate potential for urban and recreational use. The potential for selected wildlife use is low.

Capability unit VIe–3

Ferrelo loam, 20 to 40 percent slopes, is the only soil in this unit. It is deep and well drained and has compacted, stratified material in the subsoil. This soil is on the fronts of marine terraces and on areas of the terraces that adjoin the uplands. Runoff is rapid, permeability of the subsoil is moderately rapid, and available water holding capacity is moderately low. Fertility is low. The hazard of erosion is severe.

The soil in this unit is too steep to cultivate and should be kept under permanent cover. It is poorly suited to establishment of improved pastures. All trees that are adapted to the climate grow on this soil, but Douglas-fir, Sitka spruce, and grand fir are best suited. Careful management is needed to maintain the stands or to reestablish new stands. Use of equipment that disturbs the ground cover should be limited.

Cleared areas of this soil can be kept in soil-conserving crops. Because of the short steep slopes, hand broadcasting is the only feasible way to seed a cover crop. Broadcasting of ryegrass and subterranean clover can be done in fall as soon as adequate moisture is available. Pasture management otherwise is the same as for the soils in capability unit VIe–1.

The soil in this unit has low potential for use as wildlife areas.

Capability unit VIe–4

Netarts sandy loam, 0 to 12 percent slopes, is the only soil in this unit. It is deep and well drained. The areas are on sandhills. Runoff is very slow, permeability of the subsoil is rapid, and available water holding capacity is low. Fertility also is low. The hazard of water erosion is slight, but the hazard of soil blowing is severe.

The soil in this unit should be kept under a permanent cover of vegetation. It is better suited to woodland crops than to other uses. Trees on this soil are subject to severe blasting by wind. Any logging done along the edges of the coast should be in buffer strips parallel to the shoreline to provide windbreaks. Reestablishing trees as quickly as feasible in cleared areas helps to control erosion and keeps brush from encroaching.

Cleared areas of this soil that are pastured should be seeded to grasses and legumes that can withstand drought. A suitable mixture to use consists of perennial ryegrass, orchardgrass, tall fescue, and subterranean clover.

Cross-slope tillage can be used to help establish improved mixtures of grasses and legumes. Good results are obtained, however, if tillage is done only when the soil is moist. Applying phosphorus and potassium after lime has been added helps the seedlings to become established. Productivity can be maintained by adding nitrogen. The nitrogen also helps to maintain the ratio of grasses to legumes in the stand.

Pasture management on this soil includes restricting grazing until the grasses and legumes are well established. Keeping an 8-inch long stubble on the areas during the wet season helps to protect the soil and insures a stand of healthy plants.

The soil in this unit has moderate potential for urban, recreational, and wildlife uses.

Capability unit VIw–1

Blacklock fine sandy loam, 0 to 7 percent slopes, is the only soil in this unit. It has a strongly cemented hardpan at a depth of 12 to 30 inches and is poorly drained. The areas are on marine terraces. This soil is strongly acid. The subsoil is mottled. Runoff and permeability of the subsoil are very slow, and available water holding capacity is low. Fertility is low, and content of organic matter is high. The erosion hazard is slight.

Crops that are adapted to the climate and that tolerate wetness grow well on this soil. Cranberries, blueberries, floral greens, and grasses and legumes that tolerate wetness do well, and shore pine and Sitka spruce also grow well. The soil probably is better suited to cranberries, to shore pine grown for Christmas trees, and to such floral greens as salal and evergreen huckleberry than to other uses. Even when drained, the potential for selected cultivated crops is low. Adequate drainage can be provided only by use of deep ditches.

The cost of establishing a bog for cranberries is high, but the cranberries do well when established. In establishing a bog, a low flat area is selected. The top layer of the soil, which is high in organic matter, is removed and placed aside. Then the area is leveled and shaped to provide drainage and a means of controlling the level of the water. The material that was removed is then placed back of the area and spread evenly over it. After that the area is covered with a layer of sand 5 to 6 inches thick. The cranberries are planted by pressing the plants through the sand into the soil.

Sprinkler irrigation is needed for good growth of cranberries and for control of frost and heat in the bog. Lime is not needed. Split applications of nitrogen and of phosphorus and potassium, applied in spring and in fall, give good results. Installing a permanent irrigation system and applying all management practices early in spring eliminates the need for going into the bog when the berries are maturing and thus breaking the plants and crushing the berries.

Blueberries grow well on this soil, though few are produced commercially at this time. Nitrogen, phosphorus, and potassium fertilizers are needed.

A good stand of grasses and legumes can be established and maintained if large amounts of lime, phosphorus, and potassium are applied. Nitrogen should be applied annually. A suitable grass is meadow foxtail, and a suitable legume is big trefoil.

Pasture management includes rotating the grazing and clipping and harrowing. Rotating the grazing gives the pasture a chance to recover and to maintain a stand of healthy and vigorous plants. Clipping helps to even up a stand that has become uneven because of grazing. Harrowing the stand occasionally spreads out animal droppings and thus helps to even up a stand that has become uneven because of grazing.

In areas properly drained, pastures respond well if irrigated by sprinklers during the dry summer months. The amount and rate of water to apply, and the interval between irrigations, can be determined by frequently checking soil moisture at a depth of 12 inches in the field. Because the soil is fairly shallow to a hardpan and is poorly drained, care is needed in applying irrigation water.

A cover crop is needed in winter. The crop should be planted early in fall before heavy rains so that it can grow and provide good cover. Leaving all residues on the surface or working them lightly into the soil are ways of controlling soil blowing.

This soil has low potential for use as woodland or as wildlife areas. Suitable trees, such as Sitka spruce, shore pine, and Douglas-fir, grow slowly. In addition, windthrow is a constant hazard.

Capability unit VIIe–1

In this unit are moderately deep to very deep, well-drained soils of the Edson, Orford, and Trask series. These soils are steep to very steep and are in the mountainous uplands. Their surface layer is clay loam, silty clay loam, or gravelly silt loam. Runoff is rapid, permeability of the subsoil is moderate to moderately slow, and available water holding capacity is high to low. Fertility and content of organic matter are moderate to high. The hazard of erosion is severe.

Because of the slopes and erosion hazard, a cover of trees should be kept on the soils in this unit. All trees that are suited to the climate do well. Except when single seed trees are left in the open, windthrow is not a problem. Reestablishing trees on logged over areas as soon as feasible helps to control erosion and keeps brush from encroaching. Erosion also can be controlled by properly locating logging roads and skid trails and using cross drains and water bars to divert surface water.

Soils in this unit have moderate to low potential for recreational and wildlife use.

Capability unit VIIe–2

Winema silty clay loam, 30 to 70 percent slopes, is the only soil in this unit. It is deep and well drained and is on grass-covered hills. Runoff is rapid to very rapid, permeability is moderately slow, and available water holding capacity is high. Fertility is moderate. The hazard of erosion is severe to very severe.

This soil is better suited to pasture than to other uses, and most areas are under grass. Suitable forage plants that grow well on this soil are highland bentgrass, sweet vernal, velvetgrass, cheatgrass, bluegrass, and wild lotus.

Because of the steep and very steep slopes, establishing improved varieties of grasses and legumes can be done only by broadcasting ryegrass and subterranean clover. Broadcasting can be done in fall as soon as adequate moisture is available.

Pasture management on this soil includes distributing grazing, deferring grazing, and controlling brush. Properly locating salt and watering developments throughout the areas prevents overgrazing, which causes gullies to form and the soil to slump and slip. Deferring grazing allows the grasses, which are mostly annuals, to reseed and thus maintains productivity. Brush can be controlled by chemical or mechanical means and by permitting animals to browse in the areas.

The soil in this unit generally is not suited to trees. It has low potential for recreational use and moderate potential for wildlife use.

Capability unit VIIe–3

Netarts sandy loam, 12 to 40 percent slopes, is the only soil in this unit. It is deep and is well drained. The areas are on sandhills near the outer edges of marine terraces. Runoff is slow, permeability of the subsoil is rapid, and available water holding capacity is low. The hazard of water erosion is moderate to severe, and the hazard of soil blowing is severe.

This soil is better suited to woodland use than to other uses. All trees that are adapted to the climate do well on this soil. Some suitable trees are shore pine, Sitka spruce, and Douglas-fir.

The main concern of woodland management is keeping a cover on the areas for control of erosion. Logging should be limited to removing mature trees and weeding out undesirable kinds of trees. Use of equipment that disturbs the ground cover also should be limited.

The soil in this unit has low to moderate potential for recreational and wildlife uses.

Capability unit VIIe–4

Sebastian very stony loam, 7 to 70 percent slopes, is the only soil in this unit. It is a shallow, very stony soil that is well drained. The areas are on coastal hills under grass. Runoff is medium to very rapid, permeability is moderate, and available water holding capacity is low. Fertility is low. The hazard of erosion is moderate to very severe, and the hazard of slipping is severe.

This soil is better suited to growing grasses that are adapted to the climate than to other uses. Production of forage is low, and the soil is too steep, stony, and shallow for pasture improvement.

The main concern of pasture management is maintaining the existing stands by restricting grazing to spring and fall. The livestock should be removed early in fall to allow the grasses to grow and provide cover. In this way the soil is protected from erosion in the wet winter months. Deferring grazing allows the grasses, which are mostly annuals, to reseed and thus maintains productivity. Properly locating salt and watering developments in the areas encourages more uniform grazing.

The soil in this unit is not suited to trees. Its potential for recreational and wildlife uses is low.

Capability unit VIIIe-1

This unit consists of the land types Active dune land and Stabilized dune land. These land types are made up of wind-drifted deposits of medium and fine sand. The areas range from nearly level beaches to steep dunes. The soil material is very deep, coarse textured, and excessively drained. Runoff is very slow, permeability of the lower part of the material is very rapid, and available water holding capacity is very low. Fertility also is very low. The hazard of water erosion is slight, but the hazard of soil blowing is severe.

Areas of dune sand that are not stabilized are bare of vegetation or do not have enough vegetation on them to keep the sand from blowing. Active dune land is drifting inland. It shifts from place to place and covers and destroys pastures and forests. Stabilized dune land has a good cover of vegetation. It is subject to soil blowing if cultivated, overgrazed, or burned over.

These land types have no value for farming. They are suitable for some recreational uses and for use as wildlife habitats. A permanent cover is needed on the areas to prevent soil blowing and to protect adjacent soils that are suitable for farming from shifting sand. The cover also provides protection for highways, forests, resorts, and towns nearby.

Picket fences can be used to temporarily stabilize dunes. More permanent stabilization can be provided by vegetation. Suitable grasses to plant first are American beachgrass, European beachgrass, and Volga wildrye. After these are established, grasses, legumes, and trees are planted. Tall fescue and Clatsop red fescue are planted for sod; hairy vetch is planted as a nurse crop; and purple beachpea is planted as a long-lived legume. Scotch-broom also is planted, because it becomes established readily and supplies the soil with nitrogen.

For added protection and to beautify the areas, Monterey pine and shore pine can be planted. Shore pine is the chief tree growing on the areas. Planting generally is done during the period from November 1 to May 1. The planting is done as close to the ocean as feasible, but far enough from the beach to be out of reach of storm tides. In this way movement of the sand is checked at its source. Trees that are planted are 2 years old and are spaced 8 feet apart.

Careful management is needed if Stabilized dune land is used for any purpose. Soil blowing quickly causes severe damage. Prompt repair of breaks in the ground cover is needed. If trails or roads are built through the dunes, gravel, concrete, or blacktop is needed to cover the surface for control of soil blowing. Good fire protection is essential.

If areas of this unit are pastured, grazing must be carefully controlled at all times for protection of the ground cover. All practices that help to maintain a vigorous ground cover are needed.

Capability unit VIIIw-2

Riverwash makes up this unit. It consists of mixtures of poorly sorted sand, gravel, and cobblestones. The areas are in stream channels and on narrow strips adjacent to larger streams (fig. 10). They are only a few feet above normal overflow and may be flooded for long periods each year.

This land type supports little vegetation and has no value for farming. Some areas are a source of commercial sand and gravel. Little merchantable timber is on the areas.

Capability unit VIIIs-1

Rock outcrop makes up this unit. It consists of steep, rocky outcrops and precipitous cliffs. The areas occur intermittently throughout the coastal hills and mountains. A few areas occur as rocky points and ledges along escarpments of marine terraces.

This land type has no value for farming. Its value for recreational use and for use as wildlife habitats is limited. It supports little merchantable timber.

Estimated Yields

The estimated average acre yields for soils in the Curry Area that are suitable for lily bulbs and for those soils that are suitable for pasture are discussed in the paragraphs that follow. The data are based on estimates made in the field by agricultural workers familiar with the soils and on yields expected by farmers in the Area who grow bulbs and forage crops.

Soils suitable for lily bulbs are listed in table 2 and estimated yields of the bulbs under two levels of management are given. The management used to obtain the yields shown in column A is less intensive than that used to get the yields shown in column B. Under both kinds of management, the blossoms are removed to help keep a fungus from developing when the dead blossoms touch the plant. Also, in harvesting, a potato digger is used to plow up the bulbs. The bulbs are gathered by hand, and then they are sorted and bagged for market.

The yields in column A are obtained if the bulbs are grown in a rotation that includes 3 years of grass or grain grown as a soil-conserving or green-manure crop. The residues from the grass or grain add organic matter to the soil. In preparing the seedbed, a green-manure crop is turned under in June and the field is kept free of weeds until the bulbs are planted. In October harrowing is done

TABLE 2.—*Estimated average acre yield of lily bulbs under two levels of management*

Soil	Lily bulbs	
	A	B
	Number	*Number*
Ferrelo loam, 0 to 7 percent slopes [1]	8, 000	16, 000
Gardiner fine sandy loam	10, 000	20, 000
Knappa silty clay loam, 2 to 7 percent slopes	12, 000	30, 000
Knappa silty clay loam, heavy variant, 0 to 12 percent slopes [1]	8, 000	16, 000
Knappa clay loam, dark surface variant, 0 to 3 percent slopes	20, 000	35, 000
Knappa clay loam, dark surface variant, 3 to 12 percent slopes	20, 000	35, 000
Meda gravelly silt loam, 0 to 7 percent slopes [1]	12, 000	25, 000
Nehalem silt loam	20, 000	35, 000
Winchuck silt loam, 2 to 7 percent slopes [1]	12, 000	25, 000

[1] In many places bulbs are grown in small patches on the nearly level part of this soil.

Figure 10.—**In this view of the Pistol River near its entrance to the Pacific Ocean, Riverwash occupies long, narrow areas adjacent to the river; in the background adjacent to the ocean are small areas of Rock outcrop and some areas of Stabilized dune land.**

with a spike-tooth harrow and the soil is rolled to provide a firm seedbed. Then the bulbs are set 6 inches deep in rows 4 feet apart. After planting, the rows are hilled and a systemic insecticide is applied to help in control of aphids the following year. Under this management repeated cultivation keeps the fields free of weeds. Control of nematodes and symphilids is not adequate under this management. Nor is soil fertility kept high. The fields will therefore have to be abandoned for bulb growing if one or more of such factors prevail.

Under the management used to obtain the yields in column B, the bulbs are grown in a rotation that includes 3 years of grass or grain grown as a soil-conserving crop. This rotation conserves soil and moisture and helps to maintain fertility. The bulbs are grown continuously, and the rotation includes a cover crop. In preparation for the bulb crop, a green-manure crop is plowed under late in June after applying 50 pounds of nitrogen fertilizer to each acre. The nitrogen helps to decompose the crop residues. The soil then is cultivated to keep it free of weeds. In August the soil is fumigated for nematode control. At this time an insecticide also is applied for control of symphilids. Early in September 3 tons of lime per acre is added. Harrowing is done with a spike-tooth harrow, and the soil is rolled to provide a firm seedbed.

Planting is done in October. The bulbs are set 6 inches deep in rows 3 feet apart. During planting, phosphate fertilizer is placed under the rows of bulbs at the rate of 250 pounds an acre. After planting, the rows are hilled and a systemic insecticide is applied to help control aphids.

Also included under the management used to get yields in column B is use of a pre-emergence spray. This spray is applied early in December for control of weeds. If weeds appear after the bulbs have sprouted, they are removed by cultivation or by hand.

Nitrogen and potassium are added in split applications. They are applied in spring and early in summer at the rate of 80 pounds of nitrogen and 100 pounds of potassium per acre.

Also, a fungicide spray is applied about every 10 days for control of Botrytis blight. In addition a suitable insecticide spray is used at intervals for control of harmful insects.

Irrigation also is used to obtain the yields shown in column B. About 4 inches of water is applied by sprinkler during the growing season. The water generally is applied about every 14 days. The exact amount and rate of water to apply, and the interval between irrigations, can be determined by frequently checking soil moisture at a depth of 18 inches in the field.

Soils suitable for pasture are listed in table 3 and estimated average acre yields of forage from mixtures of grasses and legumes are given in terms of animal-unit months. Farmers in the Curry Area use three levels of management to obtain the yields in table 3.

The yields shown in column A can be expected if some drainage is provided and if the kinds and number of livestock grazing the areas are regulated. Grazing is rotated only in some areas.

The yields in column B can be expected if the soils are properly drained and if improved varieties of grasses and legumes that are adapted to the climate are seeded. Lime, nitrogen, phosphorus, and potassium fertilizers are applied, but not always in the proper amounts. The pastures are properly stocked. Grazing is rotated, and after each rotation the pastures are clipped and the animal droppings are spread to help even the stand. In addition weeds and rodents are partly controlled.

The yields in column C can be expected if in addition to the management needed to obtain the yields in column B, the seedbed is properly prepared and the stand is well established. In addition adequate amounts of lime and fertilizer are applied. Supplemental irrigation also is properly applied and managed.

TABLE 3.—*Estimated average acre yields of pasture, in animal-unit months, at three levels of management*

[Dashes in columns B and C indicate that management required to get yields higher than those shown to the left is not feasible]

Soil	Grass-legume forage		
	A	B	C
	A.U.M.[1]	*A.U.M.*[1]	*A.U.M.*[1]
Bayside silty clay loam	4	12	15
Blacklock fine sandy loam, 0 to 7 percent slopes	.50	3	-------
Chetco silt loam	1.50	8	-------
Chitwood silt loam, 0 to 7 percent slopes	1.50	10	12
Ferrelo loam, 0 to 7 percent slopes	1	8	12
Ferrelo loam, 7 to 20 percent slopes	1	6	-------
Ferrelo loam, 20 to 40 percent slopes	.75	-------	-------
Gardiner fine sandy loam	3	6	12
Gardiner fine sandy loam, moderately deep	2	6	12
Gardiner fine sandy loam, overflow	2	6	12
Hebo silty clay loam, 0 to 7 percent slopes	1.50	10	12
Knappa silty clay loam, 2 to 7 percent slopes	4	12	15
Knappa silty clay loam, 7 to 12 percent slopes	4	12	15
Knappa silty clay loam, 12 to 20 percent slopes	4	8	-------
Knappa silty clay loam, 20 to 30 percent slopes	3	6	-------
Knappa silty clay loam, heavy variant, 0 to 12 percent slopes	3	10	12
Knappa clay loam, dark surface variant, 0 to 3 percent slopes	6	15	24
Knappa clay loam, dark surface variant, 3 to 12 percent slopes	6	15	24
Langlois silty clay loam	1.50	7	-------
Meda gravelly silt loam, 0 to 7 percent slopes	3	12	15
Nehalem silt loam	6	15	24
Nehalem silt loam, overflow	6	15	24
Orford silty clay loam, 3 to 12 percent slopes	4	12	15
Orford silty clay loam, 12 to 30 percent slopes	[2] 3	6	-------
Winchuck silt loam, 2 to 7 percent slopes	6	12	15
Winchuck silt loam, 7 to 12 percent slopes	6	12	15
Winchuck silt loam, 12 to 30 percent slopes	3	8	-------
Winema silty clay loam, 3 to 12 percent slopes	6	12	15
Winema silty clay loam, 12 to 30 percent slopes	5	10	-------

[1] Animal-unit months is a term used to express the carrying capacity of pasture. It is the number of animal units, or 1,000 pounds of live weight, that can be grazed on an acre of pasture for a period of 30 days.

[2] Pasture seeded in slash.

Use of the Soils for Woodland [3]

About 84 percent of the survey area, or 223,546 acres, is in woodland. Much of the woodland is owned by large timber companies, though some of the woodland is part of farmsteads.

Douglas-fir is dominant in the survey area and is the tree that supports the local economy. Other conifers of economic importance are Sitka spruce, western hemlock, Port-Orford-cedar, grand fir, redwood, shore pine, and Jeffrey pine. Many other conifers are not economically important because their number is small or they have characteristics that make them of little value. Some of these are knobcone pine, ponderosa pine, sugar pine, western white pine, bishop pine, Brewer pine, Monterey pine (introduced), and Monterey cypress.

Oregon-myrtle is the only hardwood of economic importance in the natural cover. Other hardwoods that occur in sufficient numbers to be potentially important are madrone, chinquapin, Oregon white oak, canyon live oak, tanoak, red alder, bigleaf maple, vine maple, and Pacific waxmyrtle. Madrone and tanoak have good form and grow to a large size in this survey area.

The soils in the Curry survey area differ greatly in their suitability for trees. The species that grow on a particular soil area are determined largely by a combination of soil, climate, and other natural conditions. Three main kinds of soil areas in relation to trees were observed, chiefly on the basis of composition of the cover, potential yield, and kind of management needed. For each area, the kinds of soils, the kinds of trees that grow on them, and the major limitations are given, as follows.

1. *Upland areas consisting mainly of Edson and Orford soils.* In these areas the cover generally is dominated by Douglas-fir. In places in virgin stands, the subdominant trees are western hemlock, grand fir, and Port-Orford-cedar and the understory is vine maple, salmonberry, ocean spray, blueblossom, swordfern, and oxalis. Steep slopes are the major limitation to management in this area.
2. *Stabilized dune land and Netarts soils.* The cover in this area is dominated by second-growth stands of shore pine. Sitka spruce, and in a few places Douglas-fir, are dominant. The understory is made up of huckleberry, salal, rhododendron, azalea, Scotch-broom, and beachgrass. Soil blowing is the major limitation in this area.
3. *Wet areas.* Such soils as the Bayside, Chitwood, and Hebo are in these areas. Here Sitka spruce is dominant and western hemlock and red alder are subdominant. The understory consists of willow,

[3] By WILLIAM J. SAUERWEIN, woodland conservationist for western Oregon, Soil Conservation Service.

myrtle, swordfern, sedges, salmonberry, elderberry, and oxalis. The major limitations are slow permeability of the subsoil, a high water table, windthrow, and difficulty of building roads.

Locally other soil-plant relationships are important. Any of these are detailed in the discussion of the woodland groups that follow.

Woodland suitability groups

The soils in the Curry Area have been placed in woodland suitability groups on the basis of soil characteristics that affect the growth of trees. Each group is made up of soils that require similar management practices and that have about the same potential productivity for wood crops. The soils of the Chetco, Langlois, Sebastian, and Winema series, and Knappa series, heavy variant, and Active dune land, Riverwash, and Rock outcrop were not placed in these groups. These soils and land types were not placed in woodland groups because trees do not grow naturally on the areas.

In each woodland group, first the characteristics of the soils are described. Then information about suitable trees is given. This generally is followed by the estimated production potential in terms of site index. Ratings for certain limitations or hazards that affect management are also included. The names of the soils in each woodland group can be learned by referring to the "Guide to Mapping Units" at the back of this survey.

In the paragraphs that follow an explanation of site index and of the ratings of management hazards are given. Then each woodland group is discussed. The site index ratings indicated in the discussion of each group are based on measurements made in the field by Soil Conservation Service personnel in the period from 1959 through 1961. The ratings of management hazards are also based on the observations and experiences of employees of the Soil Conservation Service. All ratings are tentative and are subject to revision as more information becomes available.

SITE INDEX. Site index is the height, in feet, of dominant and codominant, free-growing trees of a given species at a specified age.

The average annual per acre yield at 100 years of age for well-stocked, unmanaged stands of Sitka spruce, western hemlock, and Douglas-fir are shown in figure 11. Data from this chart and from the average site index shown in the woodland group can be used by the landowner to determine the potential productivity of his soil for wood crops and to guide him in selecting the proper use of his land.

LIMITATIONS AND HAZARDS. Certain factors that affect the production of timber are related to the soils. Five such factors considered in the Curry Area are seedling mortality, plant competition, erosion hazard, windthrow hazard, and equipment limitation. These factors are rated as to whether the limitation is slight, moderate, or severe. They are explained in the paragraphs that follow.

Seedling mortality is the expected degree of loss of seedlings of forest trees caused by soil and other environmental factors. Mortality is rated *slight* if 75 percent or more of the seedlings survive; *moderate* if 50 to 75 percent of the seedlings survive; and *severe* if less than 50 percent of the seedlings survive.

Plant competition refers to the interference of the brushy understory, such as vine maple, alder, and other similar plants, with survival and growth of young forest trees, mainly Douglas-fir, hemlock, spruce, grand fir, and shore pine. Plant competition is rated *slight* if the undesirable plants do not hinder growth and establishment of seedlings of desirable kinds of forest trees. It is rated *moderate* when the undesirable species hinder but do not prevent growth and establishment of desirable forest-tree seedlings. The rating is *severe* when the undesirable plants must be reduced to allow desirable forest-tree seedlings to survive and grow.

Erosion hazard is rated according to the degree of susceptibility of the soil to erosion because of slopes or physical properties. As a rule, the hazard is rated *slight* for soils having slopes of 0 to 20 percent; *moderate* for slopes of 20 to 40 percent; and *severe* for slopes of 40 percent or more. The ratings may differ, regardless of slope, for soils that are subject to blowing or to overwash. It is assumed that logging roads are built to acceptable standards of grade and drainage.

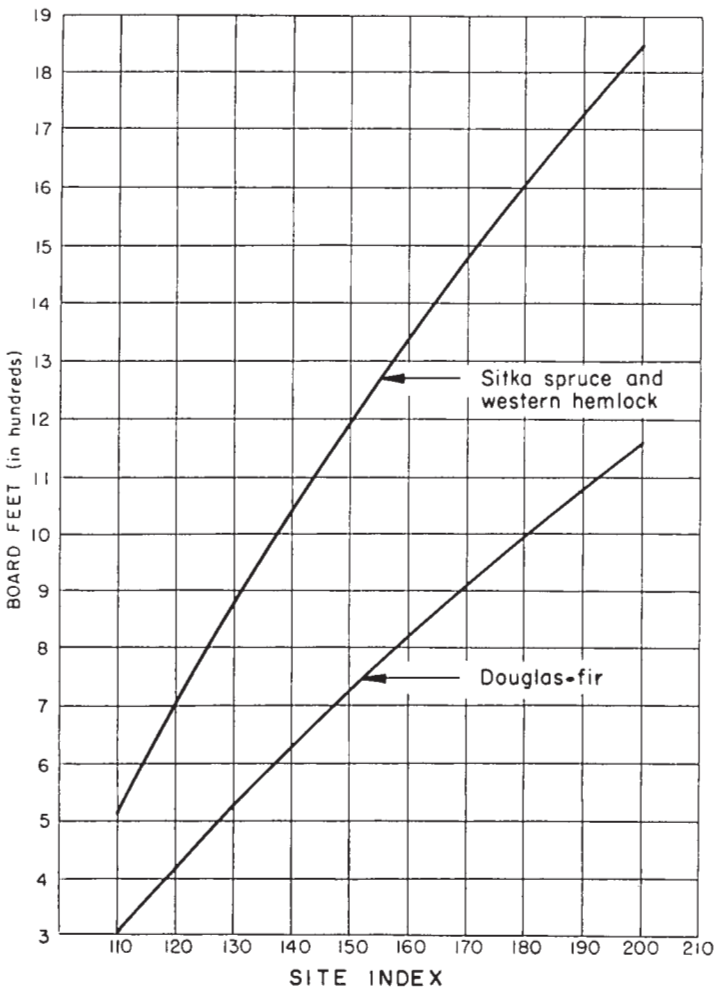

***Figure 11.*—Average annual per acre yield at 100 years of age for Sitka spruce, western hemlock, and Douglas-fir in well-stocked, unmanaged stands. Measurement is board feet, Scribner rule, for trees 12 inches and larger in diameter. (Adapted from the work of McArdle and Meyer (*8, 9*).)**

Windthrow is associated with soil drainage and soil depth, which affect rooting depth of trees. The ratings for this hazard refer to forest trees suited to each group of soils. The hazard of windthrow is rated *slight* on deep, well-drained soils that do not have a high water table. It is rated *moderate* on soils that have a moderate drainage restriction in the subsoil or that have a fluctuating water table. Windthrow is *severe* on soils that have poor drainage, a high water table, or are shallow to an impervious layer, or are in an area where the wind velocity is high.

Equipment limitation is an evaluation of soil characteristics that restrict the use of logging equipment, such as trucks, tractors, and high-lead gear, during specified seasons of the year for purpose of preventing damage to soil and trees. Soil characteristics and qualities used, either separately or in combination, to determine the degree of restriction are: Soil stability, gradient of slope, wetness, and stoniness. The restriction on type and use of equipment has been rated slight, moderate, and severe.

Slight means the type and use of equipment are restricted for less than 3 months per year; *moderate* means that the type and use of equipment are restricted for 3 to 4 months per year; and *severe* means that the type and use of equipment are restricted for 4 to 6 months per year.

WOODLAND GROUP 1

Blacklock fine sandy loam, 0 to 7 percent slopes, is the only soil in this group. It is poorly drained and has a hardpan cemented with iron at a depth of 12 to 30 inches. The areas are in basins on marine terraces. They are between dunes, where the soils are very deep and sandy, and higher old marine terraces, where the soils are very deep and silty. Runoff is very slow. Permeability of the cemented subsoil also is very slow.

Suitable trees for this soil are shore pine, Sitka spruce, Douglas-fir, and Port-Orford-cedar. Productivity of shore pine is high, and its average annual growth is about three-quarters of a cord.

Seedling mortality is slight. Except in ponded areas that are less suited to trees than other areas of this soil, the survival of seedlings is high.

Plant competition also is slight. Germination is excellent, and growth of seedlings generally is assured.

The hazard of erosion generally is slight. Soil blowing is a moderate hazard, however, if the surface is left bare during a long dry period.

Windthrow is a severe hazard because of a high water table perched above the cemented hardpan and because of high wind velocity. Particularly subject to windthrow are single trees in open areas and trees in newly thinned areas.

Equipment limitations are slight. Because of the dominantly fine sandy loam surface layer and nearly level slope, the areas provide excellent access to the trees. Except in depressional areas that are likely to be ponded in winter, equipment can be used throughout the year.

A cover of vegetation must be kept on this soil as much of the time as feasible. The soil is better suited to specialty crops than to other uses. Suitable crops are cranberries, shore pine grown for Christmas trees, and salal and evergreen huckleberry grown for floral greens. Trees grow too slowly for log production, and each year some trees are lost by windthrow.

318-610—70——4

WOODLAND GROUP 2

This group consists of very deep, nearly level to steep, well-drained soils of the Ferrelo and Knappa series. These soils are on marine terraces. Their surface layer is loam or silty clay loam. Runoff is slow to rapid. Permeability of the subsoil is moderately rapid to moderate.

Suitable trees for these soils are Sitka spruce, Douglas-fir, western hemlock, grand fir, Port-Orford-cedar, Monterey cypress, Monterey pine, and shore pine. The site index for Douglas-fir ranges from 125 to 150, and that for Sitka spruce, from 145 to 150.

Seedling mortality is slight. Survival is high if competition from other plants is controlled.

Plant competition is moderate. In places protection from competing plants must be provided for trees to develop and grow properly.

The hazard of erosion is slight to severe, depending on the degree of slope. Soil blowing is a hazard in areas adjacent to the coast if the vegetation has been removed and the areas are left bare.

Because areas of this group are near the coast and the wind velocity is high, windthrow is a moderate hazard. The hazard of windthrow is less in sheltered areas. Stands of sawtimber on soils in this group can be thinned lightly without damage by windthrow.

Equipment limitations are slight to moderate, depending on the degree of slope. Use of equipment is slightly limited in winter when rainfall is heavy.

Floral greens grow well on soils in this woodland group and are an important wood crop. They provide pickers an excellent source of material for use in floral sprays.

WOODLAND GROUP 3

Edson clay loam, 12 to 30 percent slopes, is the only soil in this group. It is a deep, reddish-brown, well-drained soil. The areas are in the uplands on weathered schistose rock. Slopes are smooth. Runoff is medium, and permeability of the subsoil is moderately slow.

Suitable trees for this soil are Douglas-fir, western hemlock, grand fir, and Port-Orford-cedar. The site index ranges from 155 to 195 for Douglas-fir.

Seedling mortality is slight. The survival of seedlings is high if plant competition is controlled.

Plant competition is severe. Plants encroach rapidly on the soil in this group after harvesting is done. Careful management is needed to insure release of seedlings.

The hazard of erosion is moderate. It varies according to the degree of slope. Excessive erosion on roads and trails can be controlled by use of standard practices.

Windthrow is a slight hazard on the soil in this group. In stands of sawtimber moderate thinning can be done in the crowns of the trees.

Equipment limitations are moderate. In winter, use of equipment should be limited to the times when the soil is the least wet. The use of caterpillar equipment for logging needs to be restricted when the soil is saturated to prevent damage to the soil.

WOODLAND GROUP 4

The only soil in this group is Edson clay loam, 30 to 60 percent slopes. It is a deep, reddish-brown, well-drained soil. The areas are in the uplands on weathered schistose rock. Runoff is rapid, and permeability of the subsoil is moderately slow.

Suitable trees for this soil are Douglas-fir, western hemlock, grand fir, and Port-Orford-cedar. The site index for Douglas-fir ranges from 155 to 190.

Seedling mortality is slight to moderate, depending on the aspect and the position of the slope. On the lower part of slopes and on slopes that face north and east, seedling mortality is slight. On the upper part of slopes and on slopes that face south and west, seedling mortality is moderate.

Plant competition is severe. Plants encroach rapidly on soils in this group after harvesting is done. Competition from other plants must be reduced for release and good growth of seedlings.

Because of the slopes, the hazard of erosion is severe. Consequently, when constructing roads and trails, care is needed to avoid damage by erosion.

Windthrow is a slight hazard, and no special practices are needed.

Equipment limitations are severe because of steep slopes and wetness during periods of heavy rainfall. Use of equipment must be restricted for a time each year to avoid soil damage.

WOODLAND GROUP 5

This group consists of very deep, well-drained soils of the Netarts series. These soils are gently sloping to moderately sloping and occupy stabilized areas on sand dunes. The surface layer is sandy loam. Runoff is slow to very slow, and permeability of the subsoil is rapid.

Suitable trees for these soils are shore pine, Sitka spruce, and Douglas-fir. The site index for Douglas-fir ranges from 120 to 130.

Seedling mortality is moderate. The soils in this group are somewhat droughty late in the growing season. Special care therefore is needed to get high survival of seedlings.

Plant competition is moderate. In areas cutover or burned over, evergreen brush encroaches, forms a dense cover, and somewhat restricts growth of seedlings. From time to time this dense vegetation needs to be cut away or otherwise removed for good growth of seedlings.

The hazard of erosion is severe. Windthrow is a moderate hazard, even though root penetration is deep. Winds of gale force are common, and a tree standing alone is likely to be blown over. Many trees also are deformed by the force of the wind.

Equipment limitations are slight. Woodland equipment can be operated the year round.

WOODLAND GROUP 6

In this group are deep, nearly level to moderately steep soils of the Orford series that are well drained. These soils are in the uplands on sandstone. Slopes are smooth. The surface layer is silty clay loam. Runoff is moderate, and permeability of the subsoil is moderately slow.

Suitable trees for these soils are Douglas-fir, Sitka spruce, Port-Orford-cedar, grand fir, and redwood. The site index for Douglas-fir ranges from 150 to 195.

Seedling mortality is slight. The survival of seedlings is good in areas that are free of dense growth of brush or other plants.

Plant competition is severe. In areas cutover or burned over, brush encroaches rapidly and hinders regeneration and growth of seedlings. Removal of the brush is necessary for good growth of seedlings.

The hazard of erosion is moderate, but the hazard of slumping is severe.

Windthrow is a moderate hazard on the soils in this group. The greatest number of trees are lost if the soil is saturated when wind velocity is high. A tree standing alone in an opening is particularly susceptible to windthrow.

Equipment limitations are moderate. Restricting use of equipment in winter when the soils are wet is necessary to avoid soil damage.

WOODLAND GROUP 7

Orford silty clay loam, moderately deep, 20 to 30 percent slopes, is the only soil in this group. It is well drained and is in the uplands on sandstone. Slopes are smooth. Runoff is medium, and permeability of the subsoil is moderately slow.

Suitable trees for this soil are Douglas-fir, Sitka spruce, Port-Orford-cedar, grand fir, and redwood. The site index for Douglas-fir ranges from 135 to 170.

Seedling mortality is moderate. The soil in this group is droughty late in the growing season. Special care therefore is needed for good survival of seedlings.

Plant competition is moderate. In a few places brush and hardwood must be removed for good growth of seedlings and saplings.

The hazard of erosion is moderate. When harvesting is done, extra care is needed for control of erosion.

Windthrow is a moderate hazard. Trees are likely to be blown over if the soil is saturated when winds are blowing at gale force. If thinning is done, windthrow can be controlled by avoiding the cutting of large openings in the stands. In addition single seed trees should not be left in open areas.

Equipment limitations are moderate. Restricting use of equipment when rainfall is heavy helps to prevent soil damage.

WOODLAND GROUP 8

The only soil in this group is Orford silty clay loam, 30 to 70 percent slopes. It is deep and well drained. The areas are in the uplands on material weathered from sandstone. Slopes are smooth. Runoff is rapid, and permeability of the subsoil is moderately slow.

Suitable trees for this soil are Douglas-fir, Sitka spruce, grand fir, Port-Orford-cedar, and redwood. The site index for Douglas-fir ranges from 150 to 185.

Seedling mortality is slight in areas that are free of dense growth of brush or other plants. Except in small included seepy areas or areas where rocks crop out, the survival of seedlings is good.

Plant competition is severe. It is hard for seedlings and saplings to survive unless the competing plants are destroyed.

The hazard of erosion is severe. Extra care is needed to divert excess water away from roads and trails and to keep gullies from forming. If the soil is saturated, it is likely to slip and slump.

Windthrow is a moderate hazard. In areas that are clear cut, some trees generally are blown down. Single seed trees should not be left in open areas.

Equipment limitations are severe on the soil in this group. A way to prevent excessive soil damage is to use

cable systems or similar methods suitable for logging in high-lying areas. Restricting logging in winter when the soil is wet also helps in the control of erosion.

WOODLAND GROUP 9

Orford silty clay loam, moderately deep, 30 to 70 percent slopes, is the only soil in this group. It is well drained and is in the uplands on material weathered from sandstone. Slopes are smooth. Runoff is rapid, and permeability of the subsoil is moderately slow.

Suitable trees for this soil are Douglas-fir, Sitka spruce, grand fir, Port-Orford-cedar, and redwood. The site index for Douglas-fir ranges from 150 to 175.

Seedling mortality is moderate. It is caused mainly by lack of moisture late in summer. Extra care therefore is needed for good survival of seedlings.

Plant competition also is moderate. In places protection from competing plants is needed for good survival and good growth of seedlings.

The hazard of erosion is severe. Extra care is needed for control of erosion, and special engineering is needed on roads and trails.

Windthrow is a moderate hazard. It is common in winter along the edges of areas from which timber has recently been cut. Single trees should not be left in open areas.

Equipment limitations are severe on the soil in this group. Cable systems or other high-lead logging methods are needed. Also, logging must be done only in dry seasons.

WOODLAND GROUP 10

Trask gravelly silt loam, 20 to 30 percent slopes, is the only soil in this group. It is deep and is well drained. The areas are in the uplands on schistose bedrock. Slopes are sharp. Runoff is medium, and permeability of the subsoil is moderate.

Suitable trees for this soil are Douglas-fir and western hemlock. The site index for Douglas-fir ranges from 145 to 195.

Seedling mortality is slight. Soil creep is likely to limit survival of seedlings in the steeper areas, but otherwise survival of seedlings is excellent.

Plant competition is moderate. In a few places competing plants must be removed for good growth of desirable trees.

The hazard of erosion is moderate. Good to very high engineering standards are needed in building roads and trails to prevent excessive erosion.

Windthrow is a moderate hazard. In areas of this soil, wind velocity is high. Trees along the edges of areas from which timber has recently been cut are likely to be damaged by windthrow.

Equipment limitations are moderate on the less steep areas and severe on the steep areas. The use of logging equipment generally must be discontinued for 2 or 3 months during the wet season to prevent damage to the soil.

WOODLAND GROUP 11

The only soil in this group is Trask gravelly silt loam, 30 to 70 percent slopes. It is moderately deep and is well drained. The areas are in the uplands on schistose bedrock. Slopes are sharp. Runoff is rapid, and permeability of the subsoil is moderate.

Suitable trees for this soil are Douglas-fir and western hemlock. The site index for Douglas-fir ranges from 135 to 165.

Seedling mortality is moderate to severe. Loss of seedlings is caused mainly by lack of moisture late in summer.

Plant competition is slight, and growth and establishment of seedlings are good.

The hazard of erosion is severe. Care is needed for control of erosion along roads and in drainage ditches. Runoff from the areas must be diverted at frequent intervals to prevent scouring and cutting. All logging must be done with care to help prevent erosion.

The hazard of windthrow is moderate to severe on this soil. The underlying rock prevents deep penetration of roots. Consequently, during severe storms in winter, trees along edges of areas from which timber has recently been cut are likely to be damaged by windthrow.

Equipment limitations are severe on slopes that face north and east, and they are very severe on slopes that face south and west. Cable systems or other high-lead logging methods are needed.

WOODLAND GROUP 12

This group consists of very deep, well-drained silt loams of the Meda and Winchuck series. These soils are nearly level to steep and are on alluvium on fans and old stream terraces. The Meda soil is gravelly. Runoff is slow to rapid on soils in this group. Permeability of the subsoil is moderate to moderately slow.

Suitable trees for these soils are Douglas-fir, Sitka spruce, grand fir, and redwood. The site index for Douglas-fir ranges from 165 to 180.

Seedling mortality is slight on these soils. If competing plants are removed, survival of seedlings generally is excellent.

Plant competition is severe. Removal of brush and hardwoods is necessary for proper growth and survival of seedlings and saplings.

The hazard of erosion is slight to severe, and the hazard of windthrow is slight.

Equipment limitations are slight on slopes of 0 to 20 percent, but they are moderate on slopes of 20 to 30 percent. The use of logging equipment must be discontinued for a short while in the wet season to prevent damage to the soil.

WOODLAND GROUP 13

Deep to very deep, somewhat poorly drained to poorly drained soils of the Bayside, Chitwood, and Hebo series are in this group. These soils are nearly level to gently sloping and are on marine terraces and flood plains. The surface layer is silty clay loam or silt loam. Runoff is slow to medium, and permeability of the subsoil is slow to very slow.

Suitable trees for these soils are Sitka spruce, Douglas-fir, western hemlock, and red alder. The site index for Douglas-fir ranges from 150 to 165.

Seedling mortality is moderate, mainly because of wetness in winter. Planting on mounds or near old stumps and avoiding planting in depressions are ways of assuring survival of seedlings.

The hazard of erosion is slight in forested areas of these soils, and no special practices are needed.

Windthrow is a severe hazard, especially in areas close to the coast. Because of the high water table, roots cannot penetrate deeply and they spread out just below the surface. Wind firmness can be promoted by widening the space between the young seedlings and thinning the trees lightly and frequently. No tree should be left standing alone in the open.

Equipment limitations are severe on these soils. Damage to the soils can be prevented by restricting the use of logging equipment for 3 to 9 months each year.

WOODLAND GROUP 14

Stabilized dune land is the only mapping unit in this group. It consists of very deep, coarse-textured material that is excessively drained. The areas are nearly level to steep and are on sand dunes. Runoff is very slow, and permeability of the subsoil is very rapid.

Shore pine is a suitable tree for this land type. Site index data is not available, but productivity generally is very low.

Seedling mortality is slight if adapted, deep-rooted stock is planted. Plant competition is slight because few other plants grow on the areas.

The hazard of erosion is severe on this land type. Soil blowing is a constant threat. A permanent cover must be kept on the areas, for if even a small area is exposed, the sand starts to move and encroach on vegetated areas. Planting beachgrass in areas where raw material is exposed and on roads and trails that are no longer in use helps control soil blowing. Concentrating slash in piles while logging is done and burning only piled slash also help to prevent soil blowing.

The hazard of windthrow is slight. Growing trees for sawtimber is questionable, however, because wind deforms many of the trees.

Equipment limitations are severe on this land type. Care is needed to avoid exposing the soil material, though otherwise logging machinery can be operated the year round. The use of heavy machinery that destroys ground cover must be avoided because it increases the hazard of soil blowing.

WOODLAND GROUP 15

This group consists of very deep to moderately deep, well-drained soils of the Gardiner and Nehalem series and of the dark surface variants from the Knappa series. These soils are nearly level to moderately sloping and are on flood plains and marine terraces. Permeability is moderate to rapid.

Most of the soils in this group are highly productive. The potential for cultivated crops is high; limitations to use and management are few. As a result, all areas have been cleared and are used for specialty crops, for small grains, or for mixtures of grasses and legumes grown for hay and pasture. The potential for all woodland crops adapted to the area is high, but site index data are not available.

Use of the Soils for Engineering [4]

Some soil properties are of special interest to engineers because they affect the construction and maintenance of engineering projects. The properties most important to engineers are permeability to water, shear strength, compaction characteristics, soil drainage, shrink-swell characteristics, grain size, plasticity, and reaction. Also important are depth to water table, flooding hazard, depth to bedrock, and relief. Such information is made available in this section. Engineers can use it to—

1. Make studies that will aid in selecting and developing sites for industries, businesses, residences, and recreational areas.
2. Make estimates of the engineering properties of soils for use in the planning of agricultural drainage systems, waterways, farm ponds, irrigation systems, and other structures for conserving soil and water.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting locations for highways, airports, pipelines, and cables, and in planning more detailed surveys of the soils at selected locations.
4. Locate probable sources of sand, gravel, rock, and other materials for use in construction.
5. Correlate pavement performance with soil mapping units, and thus develop information that will be useful in designing and maintaining the pavements.
6. Determine the suitability of soils for cross-country movement of vehicles and of construction and logging equipment.
7. Supplement information obtained from other published maps, reports, and aerial photographs for the purpose of making maps and reports that can be used readily by engineers.
8. Develop other preliminary estimates for construction purposes pertinent to the area.

It should be emphasized that the interpretations made in this soil survey are not a substitute for the sampling and testing needed at a site chosen for a specific engineering work that involves heavy loads or at a site where excavations are to be deeper than the depths of the layers here reported. Also, engineers should not apply specific values to the estimates for bearing capacity given in this survey. Nevertheless, by using this survey, an engineer can select and concentrate on those soil units most important for his proposed kind of construction, and in this manner reduce the number of soil samples taken for laboratory testing and complete an adequate soil investigation at minimum cost.

The soil mapping units shown on the maps in this survey may include small areas of a different soil material. These included soils may be as much as 2 acres in size. They are too small to be mapped separately and generally are not significant to the agriculture in the area but may be important in engineering planning.

Information of value in planning engineering work is given throughout the text, particularly in the sections "Descriptions of the Soils" and "Formation and Classification of Soils."

Some of the terms used by the scientist may be unfamiliar to the engineer, and some words—for example, soil, clay, silt, and sand—may have special meaning in soil science. These and other special terms used in the soil sur-

[4] ROY L. FOX, State conservation engineer, Soil Conservation Service, assisted with this section.

vey are defined in the Glossary at the back of this survey. Most of the information about engineering is given in tables 4, 5, and 6.

Engineering classification systems

Agricultural scientists of the United States Department of Agriculture classify soils according to texture. In some ways this system of naming textural classes is comparable to the systems most commonly used by engineers for classifying soils; that is, the system of the American Association of State Highway Officials (AASHO) and the Unified system.

Most highway engineers classify soil materials in accordance with the system approved by the American Association of State Highway Officials (*2*). In this system soil materials are classified in seven principal groups. The groups range from A–1 (gravelly soils having high bearing capacity, the best soils for subgrade), to A–7 (clayey soils having low strength when wet, the poorest soils for subgrade). Within each group the relative engineering value of the soil material is indicated by a group index number. Group index numbers range from 0 for the best material to 20 for the poorest. The group index number is shown in parentheses following the soil group symbol in table 4.

Some engineers prefer to use the Unified soil classification system (*17*). In this system soil materials are identified as coarse grained, eight classes; fine grained, six classes; and highly organic. The last column in table 4 gives the classification of the tested soils according to the Unified system.

Engineering test data

Soil samples from four soil profiles representing three extensive soil series in the Curry Area were sampled at representative locations by the Soil Conservation Service and by the Engineering Experiment Station, Oregon State University. These samples were tested in accordance with standard procedures of AASHO to help evaluate the soils for engineering purposes. The results of these tests and the classification of each soil sample according to both the AASHO and Unified systems are given in table 4.

The samples tested do not represent the entire range of soil characteristics in the Area, or even within the soil series sampled. The results of the tests, however, can be used as a general guide in estimating the physical properties of the soils in the county. Tests made were for moisture-density relationships, grain-size distribution, liquid limit, and plasticity index.

In the moisture density, or compaction test, a sample of the soil material is compacted several times with a constant compactive effort, each time at a successively higher moisture content. The moisture content increases until the optimum moisture content is reached. After that the density decreases with increase in moisture content. The highest density obtained in the compaction test is termed "maximum density." Moisture-density data are important in construction, for as a rule, optimum stability is obtained if the soil is compacted to about the maximum dry density when it is at approximately the optimum moisture content.

The results of the mechanical analysis, obtained by combined sieve and hydrometer methods, may be used to determine the relative proportions of the different size particles that make up the soil sample. The percentage of fine-grained material, obtained by the hydrometer method, which generally is used by engineers, should not be used in determining textural classes of soils.

The tests to determine liquid limit and plastic limit measure the effect of water on consistence of the soil material. As the moisture content of a clayey soil increases from a very dry state, the material changes from a semisolid to a plastic state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the soil material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and plastic limit. It indicates the range in moisture content within which a soil material is in a plastic condition.

Engineering properties

In table 5 the soil series and land types and the map symbols for each are listed and estimates of properties significant in engineering are given. The estimated physical properties are those of the typical soil. Where test data are available, that information was used. Where tests were not performed, the estimates shown are based on comparisons with the soils that were tested in the Curry Area and with similar soils in other counties. A single numerical entry in the table indicates an estimated average rating for the particular characteristics. A range is shown where the expected variation is reasonably certain.

Permeability of the soil as it occurs in place was estimated. The estimates are based on the structure, texture, and porosity of the soil material and on field observations.

The available water holding capacity, given in inches per inch of soil, refers to the approximate amount of capillary water in a soil that is wet to field capacity. When the soil is air dry, this amount of water will wet the soil material to a depth of 1 inch without deeper percolation.

Reaction gives the intensity of the acidity or alkalinity of the soil, expressed in pH values. A pH notation of 7.0 is neutral. A lower value indicates acidity; a higher value indicates alkalinity.

Dispersion refers to the degree and speed with which soil structure breaks down or slakes in water. High dispersion means that the soil slakes readily. The ratings are based on observations made in the field concerning the breaking up of soil aggregates because of rain.

All of the soils in the Curry Area are nonsaline, and this factor therefore is not given in the table. Shrink-swell potential also is not shown. The soils typically are moist to wet and seldom are dry. Based on behavior in the field, shrink-swell potential of the soils is low or moderate.

Engineering interpretations

Table 6 gives ratings of the suitability of the soils of the Curry Area as a source of topsoil and sand and gravel and for road fill. It also gives features that affect work on highways and on structures that conserve soil and water. The interpretations are based on test data and on field experience.

TABLE 4.—*Engineering*

[Tests performed by Oregon State University, in cooperation with the Oregon State Highway Department and the American Association of State

Soil name and location	Parent material	Oregon State University report No.	Depth	Moisture-density [1]	
				Maximum dry density	Optimum moisture
			Inches	*Lb. per cu. ft.*	*Percent*
Chetco silt loam:					
NW¼NW¼SE¼ sec. 34, T. 30 S., R. 15 W.	Tidal mud.	240–41	0–7	69	44
		240–42R	16–36	104	18
		240–43	36–60	111	17
Sebastian very stony loam:					
NW¼SW¼ sec. 18, T. 37 S., R. 14 W. (Modal)	Serpentine.	240–44R	3–14	77	36
		240–45R	14	88	28
Winema silty clay loam:					
NW¼NW¼ sec. 18, T. 36 S., R. 14 W. (Modal)	Sandstone, siltstone, or metamorphosed shale.	240–38	0–5	80	33
		240–39	24–40	100	23
		240–40R	40–54	98	22

[1] Based on AASHO Designation T–99–57, Method A (*2*).

[2] Mechanical analyses according to the AASHO Designation T 88–54. Results by this procedure frequently may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soils.

TABLE 5.—*Estimated engineering*

[Absence of information in a column indicates

Soil series, land types, and map symbols	Depth to bedrock	Depth to seasonally high water table	Depth from surface	Classification
				USDA texture
	In.	*In.*	*In.*	
Active dune land (Ad)	60+	60+	0–60	Sand
Bayside (Ba)	60+	[1] 18	0–24	Silty clay loam
			24–54	Silty clay
			54–60	Light sandy clay loam
Blacklock (BcB)	60+	[1] 8	0–8	Fine sandy loam
			8–18	Fine sandy loam
			18–32	Very firm loamy sand
			32–48	Loamy fine sand
Chetco (Ch)	60+	[1] 6	0–8	Silt loam
			8–31	Silty clay and silty clay loam
			31–60	Sandy clay and clay
Chitwood (CtB)	60+	60+	0–18	Silt loam
			18–46	Silty clay loam and silty clay
			46–60	Clay
Edson (EdE, EdG)	36+	60+	0–6	Clay loam
			6–46	Silty clay
			46–60	Silty clay loam
Ferrelo (FeB, FeD, FeF)	60+	60+	0–22	Loam
			22–41	Fine sandy loam
			41–68	Loamy fine sand and fine sandy loam

test data

U.S. Department of Commerce, Bureau of Public Roads (BPR), in accordance with standard procedures of the Highway Officials (AASHO)(*2*)]

Mechanical analysis [2]										Liquid limit	Plasticity index	Classification	
Percentage passing sieve—						Percentage smaller than—							
2-in.	3/4-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO	Unified [3]
--------	100	95	92	82	49	41	14	2	2	(4)	(4)	A–4(3)	SM
--------	--------	----------	100	99	91	84	60	36	23	38	14	A–6(10)	ML–CL
--------	--------	----------	100	99	71	62	44	27	21	30	8	A–4(7)	ML–CL
100	84	76	72	56	43	42	33	18	9	(4)	(4)	A–4(2)	SM
100	99	93	89	66	42	36	24	12	10	69	5	A–5(2)	SM
--------	--------	100	98	84	72	68	52	29	15	(4)	(4)	A–4(7)	ML
100	99	98	98	87	76	74	60	37	26	33	7	A–4(8)	ML
--------	100	99	99	94	84	80	66	44	32	37	13	A–6(9)	ML–CL

[3] Based on the Unified Soil Classification System, Tech. Memo. No. 3–357 (*17*). SCS and BPR have agreed to consider that all soils having plasticity indexes within two points from A-line are to be given a borderline classification. An example of a borderline classification obtained by this use is ML–CL.

[4] Nonplastic.

properties of the soils

information was not available or does not apply]

Classification—Continued		Percentage passing sieve—			Permeability	Available water holding capacity	Reaction	Dispersion
Unified	AASHO	No. 4	No. 10	No. 200				
					In./hr.	*In./in. of soil*	*pH*	
SP–SM	A–2 or A–3	100	95	5	5. 00–10. 00	0. 06	4. 5–5. 0	High.
ML	A–4	100	90	80	0. 80–2. 50	. 18	5. 6–6. 0	Moderate.
CL	A–7 or A–6	100	100	90	0. 05–0. 80	. 19	5. 1–5. 5	Low.
ML–CL	A–7 or A–6	100	90	75	0. 80–2. 50	. 18	5. 6–6. 0	Low.
OL or SM	A–2 or A–4	100	80	55	0. 80–2. 50	. 17	4. 5–5. 0	High.
SM	A–2	100	75	25	2. 50–5. 00	. 12	5. 1–5. 5	High.
SC	A–2	100	60	20	<0. 05	. 06	4. 5–5. 5	Low.
SM	A–2	100	60	20	5. 00–10. 00	. 08	5. 6–6. 0	High.
SM	A–4	95	92	49	0. 80–2. 50	. 18	5. 1–5. 5	Moderate.
ML–CL	A–7 or A–6	100	100	91	0. 05–0. 20	. 16	5. 5–6. 3	Low.
ML–CL	A–4	100	100	71	<0. 05–0. 20	. 18	6. 1–6. 5	Moderate.
ML	A–4	100	100	70	0. 80–2. 50	. 21	5. 1–5. 5	Moderate.
CL	A–7 or A–6	100	100	90	0. 05–0. 20	. 16	4. 5–5. 0	Low.
MH	A–4	100	100	95	0. 05–0. 20	. 15	4. 5–5. 0	Moderate.
OL	A–7 or A–6	100	100	74	0. 80–2. 50	. 17	5. 1–5. 5	Moderate.
MH	A–7 or A–6	100	100	80	0. 20–0. 80	. 17	4. 5–5. 5	Low.
MH	A–7 or A–6	95	80	62	0. 80–2. 50	. 17	4. 5–5. 5	Low.
ML	A–4	98	92	60	0. 80–2. 50	. 17	5. 1–6. 0	Moderate.
SM	A–4	95	85	45	2. 50–5. 00	. 14	5. 6–6. 0	Moderate.
SM	A–2	96	90	30	2. 50–10. 00	. 12	5. 6–6. 0	High.

TABLE 5.—*Estimated engineering*

[Absence of information in a column indicates

Soil series, land types, and map symbols	Depth to bedrock	Depth to seasonally high water table	Depth from surface	Classification: USDA texture
	In.	*In.*	*In.*	
Gardiner (Ga, Gm, Go)	60+	60+	0–17	Fine sandy loam
			17–60	Loamy fine sand
Hebo (HeB)	60+	60+	0–15	Silty clay loam
			15–58	Silty clay
			58–62	Sandy clay
Knappa:				
Silty clay loam (KnB, KnC, KnD, KnE)	60+	60+	0–60	Silty clay loam
Silty clay loam, heavy variant (KpC)	60+	60+	0–5	Silty clay loam
			5–60	Silty clay
Clay loam, dark surface variant (KaA, KaC)	60+	60+	0–48	Clay loam and heavy silt loam
			48–54	Gravelly clay loam
Langlois (La)	60+	[1] 18	0–28	Silty clay loam
			28–43	Clay
Meda (MeB)	60+	60+	0–9	Gravelly silt loam
			9–27	Gravelly silty clay loam
			27–53	Very gravelly clay loam and very gravelly loam.
Nehalem (Nh, No)	60+	60+	0–8	Silt loam
			8–48	Clay loam
Netarts (NtC, NtF)	60+	60+	0–24	Sandy loam
			24–40	Loamy fine sand
Orford (OrC, OrE, OrG, OsE, OsG)	[2] 60+	60+	0–22	Silty clay loam
			22–59	Silty clay
Riverwash (Re)	60+			
Rock outcrop (Ro)	[3]	60+		
Sebastian (SeG)	14	60+	0–3	Very stony loam
			3–14	Very stony clay loam
Stabilized dune land (St)	60+	60+	0–6	Loamy sand
			6–60	Sand
Trask (TrE, TrG)	20–40	60+	0–5	Gravelly silt loam
			5–40	Gravelly loam or light clay loam
Winchuck (WcB, WcC, WcE)	60+	60+	0–8	Silt loam
			8–46	Silty clay and silty clay loam
			46–58	Gravelly sandy clay loam
Winema (WnC, WnE, WnG)	30–60	60+	0–24	Silty clay loam
			24–40	Silty clay
			40–54	Silty clay loam

[1] From November through April in most years.
[2] Except in mapping units OsE and OsG, which are 20 to 36 inches deep to bedrock.
[3] Bedrock exposed.

properties of the soils—Continued

information was not available or does not apply]

Classification—Continued		Percentage passing sieve—			Permeability	Available water holding capacity	Reaction	Dispersion
Unified	AASHO	No. 4	No. 10	No. 200				
					In./hr.	*In./in. of soil*	*pH*	
SM	A–4	93	89	48	2. 50–5. 00	. 13	5. 6–6. 5	Moderate.
SM	A–4	95	92	45	5. 00–10. 0+	. 14	5. 6–6. 0	Moderate.
MH	A–7 or A–6	100	100	83	0. 80–2. 50	. 19	5. 1–5. 5	Moderate.
MH	A–7 or A–6	100	100	87	<0. 05	. 15	5. 6–6. 0	Low.
CL	A–7 or A–6	100	90	80	0. 20–0. 80	. 12	6. 1–6. 5	Low.
ML or CL	A–4	100	100	84	0. 80–2. 50	. 20	5. 1–6. 0	Moderate.
MH	A–4	100	100	85	0. 80–2. 50	. 20	5. 1–5. 5	Moderate.
CH	A–7 or A–6	100	100	95	0. 05–0. 20	. 15	5. 6–6. 0	Low.
OH	A–4	100	100	73	0. 80–2. 50	. 20	5. 1–6. 0	Moderate.
ML or CL	A–4	95	85	70	0. 80–2. 50	. 20	5. 6–6. 0	Moderate.
MH and CL	A–4	100	100	73	0. 05–0. 20	. 18	5. 1–6. 0	Moderate.
CH	A–7 or A–6	100	100	62	<0. 05–0. 20	. 16	5. 6–6. 0	Low.
ML or CL	A–4	90	75	62	0. 80–2. 50	. 17	4. 5–5. 0	Moderate.
ML or CL	A–4	95	85	75	0. 80–2. 50	. 15	5. 1–5. 5	Moderate.
SM or SC	A–4	80	65	46	0. 80–2. 50	. 12	5. 1–5. 5	Moderate.
ML	A–6	100	95	80	0. 80–2. 50	. 20	4. 5–5. 0	Moderate.
ML	A–6	100	98	90	0. 80–2. 50	. 20	4. 5–6. 0	Moderate.
SM	A–4	95	90	45	5. 00–10. 00	. 12	4. 5–5. 5	Moderate.
SM	A–5	90	75	38	5. 00–10. 00	. 10	5. 6–6. 0	High.
ML	A–4	100	100	74	0. 80–2. 50	. 17	5. 1–6. 0	Moderate.
MH	A–7 or A–6	100	100	80	0. 20–0. 80	. 17	5. 1–5. 5	Low.
GM	A–1–b							
SM	A–4	76	72	43	0. 80–2. 50	. 12	5. 6–6. 0	Moderate.
SM	A–4	76	72	43	0. 80–2. 50	. 16	6. 1–6. 5	Moderate.
SM or SC	A–5	100	100	40	2. 50–5. 00	. 10	6. 1–6. 5	High.
SM	A–2	100	100	32	5. 00–10. 00	. 16	6. 1–6. 5	High.
ML–SM	A–4	73	70	50	0. 80–2. 50	. 14	5. 1–5. 5	Low.
SM	A–4	73	70	41	0. 80–2. 50	. 11	5. 1–5. 5	Low.
MH	A–4	100	100	75	0. 80–2. 50	. 20	5. 1–5. 5	Moderate.
ML or CL	A–4	100	100	90	0. 20–0. 80	. 20	5. 1–5. 5	Moderate.
ML or CL	A–4	100	100	55	0. 80–2. 50	. 17	5. 1–5. 5	Moderate.
ML	A–4	100	98	72	0. 80–2. 50	. 17	5. 1–5. 5	Moderate.
ML	A–4	98	98	76	0. 20–0. 80	. 17	5. 1–5. 5	Moderate.
ML–CL	A–4	99	99	84	0. 80–2. 50	. 17	5. 1–5. 5	Moderate.

TABLE 6.—*Engineering*

Soil series, land types, and map symbol	Suitability as source of—				Trafficability	Soil features affecting suitability for—
	Topsoil	Sand	Gravel	Road fill		Highway location
Active dune land (Ad)	Not suitable	Not suitable for concrete.	Not suitable	Good if side slopes are protected.	Good when moist, poor when dry.	Unstable; extensive stabilization needed for both slopes and adjacent dunes.
Bayside (Ba)	Good	Not suitable	Not suitable	Good	Good	Seasonal high water table.
Blacklock (BcB)	Fair	Not suitable	Not suitable	Fair; topsoil should be removed.	Fair	Perched water table
Chetco (Ch)	Good	Not suitable	Not suitable	Fair	Poor	Subject to frequent flooding for long periods; difficult to drain; compressible subsoil.
Chitwood (CtB)	Good	Not suitable	Not suitable	Poor	Very poor	Internal drainage restricted; substratum is compressible.
Edson (EdE, EdG)	Good	Not suitable	Not suitable	Fair	Good	Steep slopes; subject to occasional slippage.
Ferrelo (FeB, FeD, FeF)	Good	Fine sand is at a depth of more than 5 feet.	Not suitable	Good	Good	No serious limitations
Gardiner (Ga, Gm, Go)	Fair	Stratified sand layers at a depth of more than 5 feet.	Not suitable	Good	Good	Subject to annual flooding.
Hebo (HeB)	Fair	Not suitable	Not suitable	Poor	Poor	Internal drainage is restricted; surface soil and subsoil are compressible.
Knappa:						
Silty clay loam (KnB, KnC, KnD, KnE).	Good	Not suitable	Not suitable	Fair	Good	No serious limitations
Silty clay loam, heavy variant (KpC).	Fair	Not suitable	Not suitable	Fair	Fair for light loads, but poor for heavier loads.	Restricted internal drainage; subsoil has medium compressibility.

interpretations

Soil features affecting suitability for—Continued					
Dikes	Farm ponds		Agricultural drainage	Irrigation	Waterways
	Reservoir area	Embankment			
Too porous	Too porous	Requires protection; can be used in outer shells of zoned fills.	Drifting dunes constrict or block drainage outlets in places.	Not applicable	Erodes readily; unstable; difficult to vegetate.
Moderately slow to slow permeability; susceptible to piping.	No serious limitations.	Medium dry density; close compaction control needed; subject to piping.	Moderately slow to slow permeability; subject to wetness caused by associated soils that are more permeable or less permeable; surface and subsurface drainage needed; interceptor drains are particularly needed.	High water-holding capacity; rapid intake rate.	Stable.
Upper part of the subsoil is suitable for low dikes around cranberry bogs.	Not applicable	Not applicable	Precise water table control needed for cranberry bogs.	Low water-holding capacity; rapid intake rate.	Not applicable.
Slow to very slow permeability; good to fair compaction.	Not applicable	Not applicable	Surface overflow must be removed; effective subsurface drainage probably would be difficult.	Needs drainage before irrigation; moderate water-holding capacity and moderate intake rate.	Stable.
Not applicable	Low seepage; the soil generally is in depressions.	Soil at a depth below 18 inches favorable for use in cores and and in cutoff trenches.	Surface and subsurface water trapped in depressions keeps the water table high.	High water-holding capacity; moderate intake rate; needs drainage before irrigation.	Quite stable; resists erosion.
Not applicable	No serious limitations.	Low dry density; moderately slow permeability; high compressibility; requires good compaction.	Not needed; soils are well drained.	High water-holding capacity; rapid intake rate.	Not applicable.
Not applicable	More permeable subsoil may preclude taking borrow material from reservoir area.	Requires protection; can be used in outer shells of zoned fills.	Not needed; soils are well drained.	Moderately low water-holding capacity; rapid intake rate.	Banks are subject to erosion; ditches require flat slopes.
Not suitable	Too porous	Requires protection; can be used in outer shells of zoned fills.	Not needed; soils are well drained.	Very low water-holding capacity; rapid intake rate.	Banks are subject to erosion; ditches require flat slopes.
Not applicable	Not applicable	Low dry density; very slow permeability; high compressibility; low shear strength.	Poorly drained; very slow permeability; subsurface water moves in from adjacent higher areas; effective drainage is difficult.	Moderate water-holding capacity and intake rate; very slowly permeable subsoil makes reduced rate of application necessary.	Stable.
Not applicable	No serious limitations.	Low dry density; moderate permeability; requires good compaction; medium compressibility.	Not needed; soils are well drained.	High water-holding capacity; rapid intake rate.	Not applicable.
Not applicable	No serious limitations.	Low dry density, compressibility, and resistance to shearing; soil at a depth below 18 inches suitable for use in cores and in cutoff trenches.	Subject to wetness because of subsurface water moving in from higher areas; open or closed interception drains needed.	Moderate water-holding capacity and intake rate; slowly permeable subsoil makes reduced rate of application necessary.	Stable.

TABLE 6.—*Engineering*

Soil series, land types, and map symbol	Suitability as source of—				Trafficability	Soil features affecting suitability for—
	Topsoil	Sand	Gravel	Road fill		Highway location
Knappa—Continued Clay loam, dark surface variant (KaA, KaC).	Very good	Not suitable	Not suitable	Fair at a depth below 20 inches; topsoil is highly organic and is unsuitable.	Good	No serious limitations
Langlois (La)	Good	Not suitable	Not suitable	Poor; slow to very slow permeability; very high compressibility.	Very poor	Subject to prolonged flooding; difficult to drain; very compressible.
Meda (MeB)	Good	Not suitable	Poor	Good	Good	No serious limitations
Nehalem (Nh, No)	Good	Not suitable	Not suitable	Fair	Fair	Subject to annual flooding.
Netarts (NtC, NtF)	Fair	Good at a depth below 40 inches.	Not suitable	Fair	Good when moist; poor when dry.	No serious limitations
Orford (OrC, OrE, OrG, OsE, OsG).	Good	Not suitable	Not suitable	Fair	Good	Steep slopes; subject to occasional slippage.
Riverwash (Re)	Not suitable	Can be obtained as a byproduct of processing gravel.	Good	Good source of permeable fill.	Good unless flooded.	Subject to frequent overflow.
Rock outcrop (Ro)	Not suitable	Not suitable	Can be used as a source of rock for crushing or for riprap.	Not applicable	Excellent	Blasting needed in cuts
Sebastian (SeG)	Poor	Not suitable	Not suitable	Fair	Good	Subject to slippage
Stabilized dune land (St)	Not suitable	Poorly graded in places; too salty for use in concrete.	Not suitable	Good if side slopes are protected.	Good when moist; poor when dry.	Both cut and fill slopes require extensive stabilization.
Trask (TrE, TrG)	Poor	Not suitable	Not suitable for concrete; fair for low grade roads.	Good	Good	No serious limitations
Winchuck (WcB, WcC, WcE).	Good	Not suitable	Not suitable	Fair	Good	No serious limitations
Winema (WnC, WnE, WnG).	Good	Not suitable	Not suitable	Good	Good	Bedrock at a depth of 30 to 60 inches; subject to frequent slippage at contact with bedrock.

interpretations—Continued

Soil features affecting suitability for—Continued					
Dikes	Farm ponds		Agricultural drainage	Irrigation	Waterways
	Reservoir area	Embankment			
Not applicable	Not applicable	Organic topsoil must be removed; low dry density and shear strength.	Not needed; soils are well drained.	High water-holding capacity; rapid intake rate.	Not applicable.
Many lenses of peat.	Not applicable	Not applicable	Surface overflow must be removed; effective subsurface drainage would be difficult.	Needs drainage before irrigation; moderate water-holding capacity and intake rate.	Stable.
Not applicable	Not applicable	Medium compressibility and dry density.	Not needed; soil is well drained.	Moderate to low water-holding capacity; moderate intake rate.	Stable.
Suitable for low dikes.	Not applicable	Medium dry density; close compaction control needed.	Not needed; soils are well drained.	High water-holding capacity; rapid intake rate.	Subject to streambank cutting.
Not applicable	Not applicable	Requires slope protection; can be used in outer shells of zoned fills.	Not needed; soils are well drained.	Not applicable	Not applicable.
Not applicable	Not applicable	Low dry density; moderately slow permeability; requires good compaction; high compressibility.	Not needed; soils are well drained.	High water-holding capacity; rapid intake rate.	Not applicable.
Too porous	Not applicable	Can be used for toe drains and for outer shells of zoned fills.	Not applicable	Not applicable	Not applicable.
Not applicable	Not applicable	Suitable as a source of rock for use as riprap.	Not applicable	Not applicable	Not applicable.
Not applicable	Not applicable	Moderate to high dry density; moderate permeability; slight compressibility.	Not needed; soils are well drained.	Not applicable	Not applicable.
Too porous	Too porous	Requires protection; can be used in outer shells of zoned fills.	Not needed; excessively drained.	Not applicable	Not applicabel
Not applicable	Not applicable	Medium dry density; moderate permeability; medium to slight compressibility.	Not applicable	Not applicable	Not applicable.
Not applicable	No serious limitations.	Low dry density; moderately slow permeability; requires good compaction; moderate compressibility.	Not needed; soils are well drained.	High water-holding capacity; rapid intake rate.	Not applicable.
Not applicable	Not applicable	Medium dry density; moderately slow permeability; slight compressibility.	Not needed; soils are well drained.	Not applicable	Not applicable.

In the Curry Area the climate, physiography, and geology greatly affect the engineering uses of the soils. The temperature is mild throughout the year. Average annual precipitation ranges from 70 to 100 inches and occurs as intermittent, low intensity rainfall. In most of the soils intake rate and permeability are rapid. The climate favors the accumulation of large amounts of organic matter in the surface layer of most of the soils. Consequently, most of the soils are a good source of topsoil, though such highly organic material must be removed for many engineering uses. In table 6 the suitability of the soils as a source of topsoil refers to soil material, preferably rich in organic matter, that is used as a topdressing for roadbanks, lawns, gardens, and other areas where a good seedbed is needed for establishment of vegetation.

Ratings of the suitability of the soils as a source of sand and gravel are based on the expected stratification and gradation of the material, the amount of fines in the material, and on other features that affect the source. A detailed investigation at the site of a probable source is needed to determine the suitability of sandy or gravelly material for a specific use.

Features considered in rating the soils for use as road fill are plasticity, wetness, compaction characteristics, hazard of erosion, stones in and on the soil, and depth to bedrock. Highly organic soils and some very highly plastic clays are not suitable for road fill.

The entire soil profile was rated to determine the suitability of the soils as locations for highways. The ratings were based on undisturbed soils without artificial drainage.

In the Curry Area the major highways, as well as most towns and housing developments, are on broad marine terraces and bottom lands adjacent to the ocean. The areas are cut by streams flowing in the same general direction, and the interfluves, or areas between the streams, are influenced by tidal action.

When locating a highway in the Curry Area, it also is important to know something about the geology. The hills south of Port Orford, adjacent to the ocean, consist of serpentine bedrock, which presents serious problems in highway construction. These rock masses are unstable and are subject to sliding or other movement, particularly after long periods of rainfall. In addition, landslides are a hazard on many grass-covered, rolling soils on hills adjacent to the coast.

Trafficability ratings of the soils in table 6 are based on suitability of the soils for off-road operation of equipment, such as that used in logging. Some of the soils are well suited to movement of equipment in all seasons; other soils can only bear a light load at certain times of the year. In most of the soils the structural aggregates are firm and resist breakdown under stress or dispersion in water. Dispersion (see table 5) is an important factor in rating trafficability of the soils. It is particularly important in considering use of the soils for logging purposes in mountainous areas. During long wet periods in mountainous areas stable soil conditions are essential if logging is to be done on the many side roads and skid trails needed for this purpose.

The suitability of the soils for dikes refers to use of the soils for constructing small dikes to protect areas along streams and tidal bays from frequent overflow. Many of the soils are rated as not suitable for this use because they occupy areas not likely to be used for such a purpose.

In determining ratings of the suitability of a soil for a farm pond, the entire soil profile is considered for the reservoir area and for the embankment material unless otherwise specified. Some features considered are the content of organic matter, permeability, depth to bedrock, and rate of seepage. Some of the soils in the Curry Area are too sloping or occupy topographic positions that make them unsuitable for reservoir areas. Such soils may be a good source for embankment material for use at nearby sites where the soils are different.

Factors that affect the suitability of the soils for agricultural drainage are also given in table 6. Some of the factors considered are the texture of the soil, rate of water movement into and through the soil, depth to a restricting layer or bedrock, depth to the water table, and the position of the soil on the landscape.

The main factors considered in rating the soils as to their suitability for irrigation are the water-holding capacity and the rate at which water moves into a soil. Also important are depth to the water table, depth to soil material that restricts growth of roots, and topography.

Also considered in the table are features that affect natural waterways and the layout and construction of waterways, the establishment and continued growth of vegetation in the waterways, and maintenance of the waterways. Some of the main factors affecting the suitability of the soils for this purpose are the reaction of the soils, the permeability, the fertility, and the hazard of erosion. A notation of "not applicable" means that waterways are not feasible because of the position of the soil on the landscape. It may also mean that waterways are of limited extent and are in an included area within the particular soil.

Ratings of the suitability of the soils for sewage disposal fields are not given in the table because of the limited need for such information. Information about a specific site can be obtained from local representatives of the Soil Conservation Service and of the Extension Service.

Formation and Classification of Soils

This section tells how the factors of soil formation affected the formation of soils in the Curry Area. Then the current system of soil classification is explained and the soil series are placed in higher categories. The soil series in the Area, including a profile representative of each series, are described in the section, "Descriptions of the Soils."

Factors of Soil Formation

Soil is formed by weathering and other processes that act on parent material. The characteristics of the soil at any given point depend upon parent material, climate, plants and animals, relief, and time.

Climate and plants and animals are the active forces of soil formation. They act on the parent material accumulated through the weathering of rocks and slowly change it into soil. All five factors come into play in the formation of every soil. The relative importance of each differs from place to place; sometimes one is more important and sometimes another. In extreme cases one factor

may dominate in the formation of a soil and fix most of its properties. In general, however, it is the combined action of the five factors that determines the present character of each soil.

Parent material

Soils of the Curry Area have formed through alteration of (1) colluvium on hills; (2) alluvium on terraces, fans, flood plains, and tidal flats; and (3) sand on beaches and in dunes. The size of the particles, hardness of rock fragments, mineralogy, and thickness of the parent material have influenced the characteristics of the soils.

Parent material is not completely altered in the process of soil formation. Consequently, the soils have many of the original characteristics of the parent material. Soils on flood plains, for example, inherited their texture directly from the parent alluvium. The kind and extent of alteration of parent materials are limited by the original characteristics of the material. For example, the Edson soils are redder than the Orford soils because the parent material of the Edson soils produces more reddish iron oxides than that of the Orford soils.

Some types of parent material determine the course and direction of their own alteration. For example, the very rapid permeability and low water-holding capacity of Stabilized dune land determine the kind of vegetation that will grow and the behavior of water in the soil material. Thus, permeability and water-holding capacity have influenced the trend of soil formation.

Colluvium forms through the weathering of bedrock on slopes of hills. It is no longer in place but has moved downslope. It tends to be silty or clayey, and it varies in amount of rock fragments and in thickness.

Most of the Curry Area is underlain by sedimentary rocks, such as sandstone and siltstone, and by metamorphic rocks, such as schistose slate, all of which are acidic. Smaller areas are underlain by serpentinite and by such igneous rocks as basalt and gabbro, all of which are basic. The Orford and Winema soils are examples of soils formed on sedimentary rocks, and the Sebastian soils, of those formed on serpentinite.

Colluvium that weathered from sedimentary rock tends to be higher in clay and thicker over bedrock, and it contains fewer and softer stones, than the colluvium from serpentinite and from basic igneous rocks. The content of minerals in both kinds of colluvium varies, and both therefore have a range in potential alteration in the process of soil formation. The quartz content in most of the sedimentary and metamorphic rocks is 35 to 55 percent, but it is less than 20 percent in the basic igneous rocks and in serpentinite. Sedimentary rocks and metamorphosed sedimentary rocks are high in feldspar, which is a clay-forming mineral, and contain some mica and some pockets of oxide of iron. The igneous rocks and serpentinite are high in iron, magnesium, and calcium.

Alluvium washed from the various kinds of rocks has been transported by water and deposited in a new location. It was mixed enough in moving from one place to another that the original characteristics are no longer distinct. The alluvium consequently is said to have a mixed mineralogy.

Old alluvium forms stream terraces. Young alluvium forms stream flood plains that merge into tidal flats, and it forms alluvial fans where small tributaries flow into valley streams. Soils formed in the old alluvium generally are silty or clayey, and their profile is better developed than that of soils formed in young alluvium. Bayside soils are examples of soils formed in old alluvium, and Gardiner soils, of those formed in young alluvium. On fans, the younger alluvium generally is not well sorted but is silty or loamy in texture and contains varying amounts of gravel and rock fragments.

Dune sand and beach sand are from the ocean. They probably weathered largely from basic igneous rocks and from moderately acidic sedimentary rocks, but the sorting and wearing action of the ocean has been severe. There is a narrow range in particle size and a concentration of feldspars.

Climate

Climate affects formation of soils through its influence on the rate and weathering of rocks and on the decomposition of minerals and organic matter. It also affects biological activity in the soils, growth of vegetation, and the leaching and movement of weathered materials.

The survey area has high annual rainfall, most of which falls in winter and early in spring. Temperatures are fairly uniform throughout the year. Freezing temperatures are rare in winter. Summers are cool.

Soil temperatures in the survey area probably are never high. On the other hand, the soil is seldom frozen. For about 6 months of the year, enough rain falls to allow frequent to almost continuous leaching. During the relatively dry summers, the soil moisture is somewhat reduced, but except for the shallow stony soils or the droughty sandy soils, the soils are dried to the wilting point only in the upper 12 inches. Thus, enough water is available the whole year for most processes of soil formation other than leaching.

More complete data about the climate in the Curry Area is provided under the subsection "Climate" in the section "General Nature of the Area."

Plants and animals

Plants, animals, bacteria, and other organisms are active in the soil-forming processes. The changes they bring about depend mainly on the kinds of life processes peculiar to each. The kinds of plants and animals that live on and in the soil are affected, in turn, by the climate, the parent material, relief, and age of the soil.

The soils in the survey area formed under four major kinds of natural vegetation. They are coniferous forest, shrubby grassland, shrub thicket, and marsh.

Coniferous forests make up the vegetation in most of the survey area, and particularly in the uplands. The typical forest consists of such trees as Douglas-fir, western hemlock, grand fir, Port-Orford-cedar, and Sitka spruce. Redwoods grow in a few small areas. Sitka spruce, Port-Orford-cedar, and grand fir grow best on the lower, cooler, more moist areas near the ocean. These trees withstand well the severe blasting by ocean winds. Douglas-fir also grows near the ocean, but it grows best in the more protected, drier, higher areas away from strong ocean winds on the Edson, Orford, and Trask soils. Swordfern, brackenfern, star flower, salal, evergreen huckleberry, rhododendron, azalea, and such hardwoods as tanoak, red alder, Oregon-myrtle, and bigleaf maple are the chief plants in the understory.

On the stream bottoms the young alluvial soils, such as the Gardiner and Nehalem, have been mostly cleared and cropped. The vegetation here probably was variable and tended towards shrubby grassland. In poorly drained soils, such as the Chetco and Hebo, Sitka spruce, grand fir, rushes, and skunkcabbage tend to exclude other species generally found in better drained areas of coniferous forest.

Shrubby grassland vegetation in well-drained areas consists of grasses, iris, rosebush and other herbaceous plants, and some salal and wild azaleas. The areas are on hills a distance away from the ocean. Most of these wooded upland areas have been burned over and grazed heavily by sheep, and some have been cultivated. As a result the natural plant composition is less well known than in other areas.

The presence of shrubby grassland in an area that is dominantly coniferous forest has not been explained. On uplands, shrubby grassland generally occurs on the first ridge of coastal hills inland from the ocean, and it commonly occurs on headlands that extend into the ocean. Areas of this vegetation also occur on uplands, however, that are as much as 15 miles from the ocean. Salt spray, wind, fog, and fire have been offered as explanations for the presence of shrubby grassland. More than one simple explanation probably is involved.

Shrub thicket consists of stands of shore pine, California lilac, wooly manzanita, evergreen huckleberry, salal, rhododendron, azalea, kinnikinnick, and spruce. This vegetation typically grows adjacent to the ocean on coarse-textured soils, such as the Blacklock and Netarts.

Marsh vegetation consists of rushes, tules, sedges, grasses, and other grasslike plants that tolerate wetness. It grows mainly in areas of poorly drained soils, such as the Langlois, which are along the lower reaches of coastal streams above high tide.

In general, vegetation influences soil formation by controlling the kinds and amounts of organic material added to the soil and the recirculation of nutrients. It also controls the degree of protection afforded the surface of the soil. Additions of organic matter influence the production of organic solutions, which take part in the leaching and rock decomposition processes. Recirculation of nutrients is the reutilization by plants of nutrients released by decay of leaves, roots, and other organic residue.

Marsh vegetation has not been a strong influence on soil formation. In areas where this vegetation grows, the soils are weakly developed and have a high water table.

The influence of shrub thicket vegetation is difficult to evaluate. This kind of vegetation grows mainly on sandy parent material, which may determine the character of the soils, as much as, or more than, the vegetation. A humic-iron ortstein in some of the soils, such as the Blacklock, however, suggests effective recirculation of nutrients.

Coniferous forests and shrubby grasslands have furnished large amounts of organic matter that have accumulated in the upper foot or more of soils. This is indicated by the laboratory data for the Knappa soil, as shown in the table in the section "Laboratory Data." Recirculation of nutrients evidently has maintained the meager supply of nutrients against a strong leaching potential.

Living organisms, such as earthworms, moles, and insects, influence the formation of soils by mixing, changing, or moving the soil material. Fungi and other micro-organisms hasten the decomposition of plant and animal materials into soil organic matter and the transformation of nutrient elements from one chemical form to another. In breaking down carbonaceous material, certain micro-organisms cause the particles to adhere together as aggregates. This aggregation could be the critical factor in producing the stable structure and firm consistence typical of the soils in the survey area.

Relief

Relief influences formation of soils through its effect on runoff, movement of water and air within the soil, and, to some extent, soil temperature. Relief is strongly related to the origin of parent material; thus, soils that formed in colluvium, such as the Trask, generally are on steep slopes of hills; soils such as the Nehalem, which formed in alluvium, are on nearly level surfaces of valleys; and soils, such as the Netarts, from dune sand and beach sand, are on short slopes in an irregular pattern of ridges and troughs.

Slope is an important part of relief. The amount of runoff increases as the slope of a soil increases. Most steeply sloping soils in the survey area readily take in water. Precipitation generally comes as steady, gentle rains. Except on the very steep, shallow, stony soils, rapid runoff is rare.

In some places water concentrates on the soil or is retained in it, so that the soil is wet for a significant part of the year. Several degrees of wetness are recognized in classifying natural drainage. Soils that are less than well drained have formed on terraces, flood plains, and tidal flats and in the swales or low areas of marine terraces. In general, these soils are wet because of their position. The water table is near the soil surface. Because of extreme wetness many of the soils have a slowly permeable, massive subsoil, and some, such as the Blacklock, have a slowly permeable ortstein. The Hebo soil, however, is slowly permeable, and the retention of water by the soil itself may contribute to its wetness.

Most of the soils in the survey area are moderately developed and are stable. If the soils are left under a cover of natural vegetation, they are resistant to water erosion, even on the steepest slopes. Mass movement of soil downslope, however, still occurs as it has in the past.

Time

Time is needed for soils to form from parent material. Factors other than time being equal, young soils have more weakly expressed horizons than old soils.

Soils that formed in colluvium on hills, and those that formed in old alluvium on terraces, are old enough to be moderately developed. Soils that formed in younger alluvium on flood plains are weakly developed. They are little different from the material as it was originally deposited. Soils that formed in alluvium on fans are more variable in their development, but they are mostly weakly developed.

Soils that formed in dune sand and beach sand may be fully as old as the soils formed in old alluvium, or they may be younger. They are less well developed, but the mineralogy and coarse texture of the sand restrict the rate and amount of development.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

Thus in classification, soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and used in managing farms, fields, and woodland; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*4*) and later revised (*14*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965. The current system is under continual study (*11*, *16*). Therefore, readers interested in developments of the current system should search the latest literature available. In table 7 the soil series of Curry Area are placed in some categories of the current system and in the great soil groups of the older system.

The current system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen, however, so that the soils of similar origin are grouped together. The classes of the current system are briefly defined in the following paragraphs.

ORDER. Ten soil orders are recognized. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate these soil orders are those that tend to give broad climatic groupings of soils. Two exceptions, the Entisols and Histosols, occur in many different kinds of climate. The four orders in the Curry Area are Alfisols Inceptisols, Spodosols, and Ultisols.

Inceptisols generally form on young, but not recent, land surfaces. These soils have weakly developed or incipient horizons.

Alfisols in the Curry Area have a thick, friable, dark-colored surface layer that is high in magnesium. Basic saturation is less than 50 percent.

Spodosols are soils that have an accumulation of amorphous material in the subsurface horizons.

Ultisols are soils that have a clay-enriched B horizon that has less than 35 percent base saturation, and the base saturation decreases with depth.

SUBORDER. Each order is subdivided into groups (suborders) that are based mostly on soil characteristics that seem to produce classes having the greatest similarity from the standpoint of their genesis. Suborders narrow the broad climatic range of soils that are in orders.

Soil characteristics used to separate suborders mainly reflect either the presence or absence of waterlogging, or soil differences produced through the effects of climate or

TABLE 7.—*Soil series classified according to the current system of classification and the 1938 system with its later revisions*[1]

Series	Current classification			1938 classification
	Family	Subgroup	Order	Great soil group
Bayside	Fine, mixed, nonacid, mesic	Fluventic Humaquepts	Inceptisols	Low-Humic Gley soils.
Blacklock	Sandy, mixed, mesic ortstein	Typic Sideraquods	Spodosols	Ground-Water Podzols.
Chetco	Fine, mixed, nonacid, mesic	Fluventic Humaquepts	Inceptisols	Humic Gley soils.
Chitwood	Clayey, mixed, mesic	Aquic Haplohumults	Ultisols	Humic Gley soils.
Edson	Clayey, mixed, mesic	Typic Haplohumults	Ultisols	Reddish-Brown Lateritic soils.
Ferrelo	Coarse-loamy, mixed, mesic	Typic Haplumbrepts	Inceptisols	Sols Bruns Acides.
Gardiner	Sandy, mixed, mesic	Fluventic Umbric Dystrochrepts.	Inceptisols	Alluvial soils.
Hebo	Clayey, mixed, mesic	Typic Umbraquults	Ultisols	Humic Gley soils.
Knappa	Fine-silty, mixed, mesic	Pachic Haplumbrepts	Inceptisols	Sols Bruns Acides.
Knappa, dark surface variant.	Fine-loamy, mixed, mesic	Pachic Haplumbrepts	Inceptisols	Ando soils.
Knappa, heavy variant	Fine, mixed, mesic	Pachic Haplumbrepts	Inceptisols	Andolike soils.
Langlois	Fine, mixed, nonacid, mesic	Fluventic Haplaquepts	Inceptisols	Low-Humic Gley soils.
Meda	Fine-loamy, mixed, mesic	Typic Haplumbrepts	Inceptisols	Alluvial soils.
Nehalem	Fine-silty, mixed, mesic	Fluventic Haplumbrepts	Inceptisols	Alluvial soils.
Netarts	Sandy, mixed, mesic	Entic Haplorthods	Spodosols	Podzols.
Orford	Clayey, mixed, mesic	Typic Haplohumults	Ultisols	Reddish-Brown Lateritic soils.
Sebastian	Loamy, mixed, mesic	Lithic Hapludalfs	Alfisols	Lithosols intergrading toward Brunizems.
Trask	Loamy-skeletal, mixed, mesic	Umbric Dystrochrepts	Inceptisols	Sols Bruns Acides.
Winchuck	Clayey, mixed, mesic	Typic Haplohumults	Ultisols	Reddish-Brown Lateritic soils.
Winema	Ashy, mesic	Typic Dystrandepts	Inceptisols	Andolike soils.

[1] Placement of some soil series in the current system of classification, particularly in families, may change as more information becomes available.

vegetation. The names of suborders contain two syllables, the last of which indicates the order. An example is Aquepts (*Aqu*, meaning water or wet, and *ept*, from Inceptisol).

GREAT GROUP. Soil suborders are separated into great groups on the basis of uniformity in kinds and sequence of major soil horizons and other features. The horizons used as a basis for distinguishing between great groups are those in which (1) clay, iron, or humus has accumulated; (2) a pan has formed that interferes with growth of roots, movement of water, or both; or (3) a thick, dark-colored surface horizon has developed. The other features commonly used are the self-mulching properties of clay, temperature of the soil, major differences in chemical composition (mainly the bases calcium, magnesium, sodium, and potassium), or the dark-red or dark-brown colors associated with soils formed in material weathered from basic rocks.

Names of the great groups consist of three or four syllables. They are made by adding a prefix to the name of the suborder. An example is Haplaquoll (*Hapl*, meaning usual, and *aquoll*, meaning soils seasonally saturated with water). The great group is not shown separately in table 7, because it is the last word in the name of the subgroup.

SUBGROUP. Great soil groups are subdivided into subgroups. One of these represents the central, or typic, segment of the group. Other subgroups have properties of the group but have one or more properties of another great group, suborder, or order, and these are called intergrades. Also, subgroups may be established for soils having properties that intergrade outside the range of any other great group, suborder, or order. The names of subgroups are formed by placing one or more adjectives ahead of the name of the great group. An example is Cumulic Humaquepts.

FAMILY. Families are separated within a subgroup, primarily on the basis of properties that are important to the growth of plants or to the behavior of soils used for engineering. The main properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. The names of families consist of a series of adjectives that precede the name of a subgroup. The adjectives used are the class names for soil texture, mineralogy, and so on (see table 7). An example is the fine, mixed, nonacid, mesic family of Cumulic Humaquepts.

SERIES. The series consists of a group of soils that formed from a particular kind of parent material and have genetic horizons, that, except for texture of the surface soils, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, structure, reaction, consistence, and mineralogical and chemical composition.

New soil series must be established and concepts of some established series, especially older ones that have been used little in recent years, must be revised in the course of the soil survey program across the country. A proposed new series has tentative status until review of the series concept at State, regional, and national levels of responsibility for soil classification results in a judgment that the new series should be established. Most of the soil series described in this publication have been established earlier. Seven of the soil series used in this survey had tentative status when the survey was sent to the printer. They are the Chetco, Edson, Ferrelo, Langlois, Orford, Sebastian, and Winchuck series.

Laboratory Data

The results of mechanical and chemical analyses of five soils in the Curry Area are shown in table 8. All results are expressed on an ovendry basis.

Particle size distribution was determined by the pipette method, with dispersion by sodium hexametaphosphate. The pH was determined on a 1 : 1 soil and water mixture by glass electrode; the organic carbon, by the Walkley-Black method; and the total nitrogen by the Kjeldahl method. Bulk density was determined on undisturbed 3-inch core samples. Extractable calcium, magnesium, sodium, and potassium were determined by use of the flame photometer and ammonium acetate; the cation-exchange capacity by the ammonium acetate method. For additional information on methods of soil analysis, the reader is referred to the work of Alban and Kellogg (*1*).

General Nature of the Area

This section is provided mainly for those who are not familiar with the area surveyed or with the county. It describes the physiography and drainage and geology of the Area and the climate, natural resources, and wildlife of the county. Then settlement and development is discussed and information about the agriculture is given.

Physiography and Drainage

All of the Curry Area is in the Pacific Border physiographic province (*7*). It is part of the Oregon Coast Range, in the Klamath Mountain section. The areas are dissected by stream valleys and include coastal plains or marine terraces along the Pacific Ocean. The Klamath Mountains extend beyond the survey area. They once were part of a gently sloping, continuous plain, but this plain has been differentially uplifted and deformed (*5*). The mountains are made up largely of strata older than the Tertiary period that have been steeply folded, faulted, and in places, intruded by serpentinized masses of ultrabasic rocks (*3*).

Most of the survey area is mountainous. A few promontories extend to elevations of more than 2,000 feet, but directly to the east of the survey area, the elevations of some mountain ridges are as much as 4,000 to 5,000 feet. Near the ocean the hills are 400 to 1,200 feet above sea level. These mountainous and hilly areas include grassy areas adjacent to the coast and much of the forested land in the survey area.

The survey area is dissected by many streams. The valleys of these streams are narrow in the upper part and have fairly steep slopes. The slopes are particularly steep where the underlying rock is hard and resists stream cutting. In the lower part, where the streams enter the ocean, the valleys range from ½ to 1 mile in width. Here, many of the soils are fertile. Much of the population and agriculture therefore is concentrated in areas on the lower valley floors.

The marine terraces, or coastal plains, in the survey area were formed by periodic submergence and emergence of

the land adjacent to the ocean. The soils on these terraces consist of sand, silt, clay, and gravel, and they are smooth to undulating. Most extensive is the terrace that extends north from Port Orford and continues into Coos County. It ranges from 4 to 6 miles in width, and its elevation ranges from 80 to 400 feet (*3*). A few remnants of old high marine terraces occur just below White Mountain and Summit Mountain, southeast of Langlois, at elevations of 1,000 to 1,500 feet. Smaller marine terraces are north of the Rogue River and from Brookings south to the California line. Many of the most fertile soils in the survey area are on the marine terraces. Also, some of the soils have an ortstein hardpan, which makes them suitable for use as cranberry bogs.

Drainage in the survey area is provided by many rivers and smaller streams. Except for the Rogue River, the source of all of the streams that drain the Area is in the western slopes of the Coast Range. The headwaters of the Rogue, which is the longest and largest of the rivers, are in the Cascade Range, far to the east. All of the other streams in the survey area are short and shallow. They have oversize channels for carrying the heavy load of runoff during the wet season. In general, the stream channels parallel each other and run from east to west into the Pacific Ocean. From the north to the south, the seven major streams in the survey area are Floras Creek, Willow Creek, the Sixes River, the Elk River, Hunter Creek, the Chetco River, and the Winchuck River.

Geology

Many differences in soil characteristics in the survey area are the result of differences in the rock formations underlying the Area. The rocks underlying much of the survey area are variable. They consist chiefly of sedimentary rocks formed during the Cenozoic and Mesozoic eras. In places these rocks are interbedded with lava flows, which are somewhat altered, and with intrusions of serpentinite olivine and peridotite. These sedimentary rocks consist of metamorphosed schist, of sandstone and shale, and of ultrabasic serpentine. Smaller areas are underlain by basic igneous bedrock, are on alluvium on marine terraces, or are on recent deposits laid down by water and reworked by wind.

Metamorphosed schist underlies some large areas, and rocks of the Colebrooke formation (*5*) are the oldest in the survey area. These rocks are believed to have formed in the Triassic period. They are silvery to grayish green in color. Colebrooke schist is platy or laminated and contains some feldspar and many veins of quartz. The quartz makes up more than 35 percent of the schist and contains some cavities that are filled with oxide of iron. Soils of the Edson and Trask series are from material weathered from Colebrooke schist, which accounts for some of their chemical characteristics.

The largest area on Colebrooke schist in the survey area is southeast of Port Orford near Mussel Creek. It is roughly triangular in shape and continues southeastward across the Rogue River. Other large areas are north of the Sixes River and east of Langlois.

Sandstone and shale of several formations underlie large tracts throughout the survey area. The Dothan formation, of Upper Jurassic time, is extensive, mainly from Gold Beach southward to the California line. It consists of medium-textured, indurated sandstone. In part, this sandstone is massive and thickly bedded, and in part, it is thinly bedded and contains intervening layers of dark-gray or black mudstone, shale, and siltstone that locally have slaty cleavage (*19*). Rocks of the Knoxville formation are extensive in the northern part of the survey area and in areas of coastal hills south of the Pistol River. These rocks are of Lower Cretaceous time. They consist chiefly of dark-gray sandstone, but some shale and massive conglomerate are at the base of the formation. Other sedimentary rock formations of Lower Cretaceous time are the Paskenta and Horsetown (*19*). These are mostly north and east of Port Orford. They consist of grayish-green, arkosic sandstone and siltstone and coarse-grained to fine-grained, dark-colored conglomerate. Soils of the Orford series are typical of soils formed on sandstone and shale.

Ultrabasic serpentinite underlies extensive areas. Here in Late Jurassic or Early Cretaceous time serpentinized peridotite was intruded into sedimentary rocks. In places the serpentinized peridotite may have been squeezed into fault zones at a much later time (*3*). Outcrops of these rocks occur at random throughout the survey area. The heavy variant from the Knappa series and soils of the Sebastian series are on ultrabasic serpentinite.

Basic igneous bedrock underlies small areas. Volcanic tuff crops out a few miles north of Brookings. Rocks of the Tertiary period form buttes or cliffs in scattered areas north and northeast of Port Orford. They make up many of the scenic headlands facing the ocean along the rugged part of the coast. These kinds of rocks stand out in the survey area, but their total extent is small. No soil series has formed solely on these rocks.

Marine terraces are fairly extensive in the survey area. During the Pleistocene epoch stratified deposits of arkosic sand were laid down on present terraces and on older and higher terraces that were as much as 1,000 feet above sea level. On this material are the marine terraces north of Port Orford, north of Gold Beach, and south of Brookings. The fertile soils of the Knappa and Winchuck series and of the dark surface variants from the Knappa series are from this parent material.

During the Recent and Pleistocene epochs, deposits of sand, silt, and gravel were washed onto bottom lands along present streams. Such deposits also occur at altitudes of as much as 300 feet above the present streams. These deposits consist of beach sand reworked by wind and piled into dunes. The dunes just south of Pistol River are active, and the dunes near Floras Lake, Nesika Beach, and just north of Brookings are stabilized. Examples of soils on the medium textured to moderately coarse textured alluvium are the Gardiner and Nehalem. The Netarts soils and Stabilized dune land are on the coarse-textured deposits worked by wind.

Climate [5]

The Curry survey area consists only of the strip along the coast in the western part of the county. Elevation increases rapidly away from the ocean, however, and the crest of the Coast Mountain Range is less than 15 air miles from

[5] By G. L. STERNES, Weather Bureau climatologist for Oregon, ESSA, U.S. Department of Commerce.

TABLE 8.—*Soil characterization data for*

[Leaders in columns indicate

Soil name, sample number, and location of sampled site	Depth from surface	Horizon	Particle-size distribution in millimeters						
			Coarse sand (1–0.5)	Fine sand (0.25–0.1)	Silt (0.05–0.002)	Clay (0.002)	Total sand	Particles	
								0.02–0.05	0.02–0.002
	Inches		*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Knappa clay loam, dark surface variant:									
S61 Oreg.-8–8–(1–5); NE. sec. 16, T. 41 S., R. 13 W.	0–8	Ap	11. 1	18. 4	33. 7	36. 6	29. 7	11. 2	22. 5
	8–20	A1	11. 0	18. 6	34. 5	35. 8	29. 7	10. 5	24. 0
	20–28	AC	10. 8	18. 9	36. 4	34. 0	29. 6	11. 0	25. 4
	28–48	C1	12. 9	21. 0	37. 2	28. 8	34. 0	11. 5	25. 7
	48–54	C2	29. 8	22. 7	32. 4	15. 0	52. 6	10. 1	22. 3
Knappa silty clay loam:									
S58 Oreg.-8–1–(1–5); SW¼ sec. 10, T. 31 S., R. 15 W.	0–6	Ap	2. 3	6. 1	53. 7	37. 9	8. 4	12. 2	41. 6
	6–18	A1	2. 7	5. 7	61. 9	29. 7	8. 4	13. 8	48. 1
	18–30	A3	2. 2	6. 1	61. 3	30. 4	8. 3	12. 9	48. 4
	30–48	B21	2. 9	7. 1	54. 2	35. 7	10. 1	10. 5	43. 7
	48–50	B22	4. 0	11. 1	62. 7	22. 2	15. 1	14. 0	48. 7
Orford silty clay loam:									
S61 Oreg.–8–13–(1–6); NW¼SW¼SE¼ sec. 31, T. 37 S., R. 14 W.	2–0	O1&O2	3. 9	13. 5	44. 5	37. 9	19. 6	12. 3	32. 2
	0–14	A1	3. 0	14. 6	43. 2	39. 1	17. 7	11. 6	31. 6
	14–22	B1	2. 5	13. 5	46. 2	37. 8	16. 0	13. 2	33. 0
	22–33	B21t	1. 6	11. 8	43. 2	43. 4	13. 4	10. 9	32. 3
	33–48	B22t	1. 3	15. 4	42. 8	40. 4	16. 8	10. 6	32. 2
	48–59	B23t	1. 7	11. 9	43. 4	43. 0	13. 6	13. 6	29. 4
	59–64	C1	4. 9	11. 4	48. 0	35. 7	16. 3	10. 4	37. 6
Winema silty clay:									
S61 Oreg.–8–14–(1–5); SW¼NW¼ sec. 18, T. 36 S., R. 14 W.	0–5	A1	3. 0	7. 4	48. 5	41. 2	10. 3	10. 5	38. 0
	5–14	A3	2. 9	3. 7	48. 9	43. 7	7. 4	10. 0	38. 9
	14–24	B1	1. 3	6. 8	49. 9	42. 0	8. 1	9. 7	40. 2
	24–40	B2	1. 0	3. 3	50. 0	45. 6	4. 4	7. 0	43. 0
	40–54	C	. 9	2. 7	58. 7	37. 6	3. 7	10. 5	48. 2

selected soils in the Curry Area, Oregon

data were not available]

pH (water 1:1)	Organic matter			Bulk density	Cation-exchange capacity (NH_4OAc)	Extractable cations (milliequivalent per 100 grams of soil)					Calcium-magnesium ratio
	Organic matter (OC/0.58)	Nitrogen	Carbon-nitrogen ratio			Calcium	Magnesium	Sodium	Potassium	Base saturation (NH_4OAc)	
	Percent	*Percent*		*Gm/cc*	*Percent*					*Percent*	
5.4	10.7	0.38	16.3	--------	28.4	8.7	1.3	0.56	0.88	40	6.7
5.1	9.5	.32	17.1	--------	27.6	4.7	<.1	.56	.73	22	6.7
5.2	7.9	.26	17.6	--------	22.1	2.6	<.1	.56	.71	21	3.3
5.1	2.3	.11	11.9	--------	12.9	.8	.3	.30	.35	6	3.0
5.0	1.7	.07	15.2	--------	10.8	.7	.1	.22	.20	5	7.0
5.1	13.2	.52	15	--------	36	3.2	1.2	.2	1.5	17	----------
5.5	8.5	.31	16	--------	32	1.0	.4	.2	.7	7	----------
5.6	4.8	.20	14	--------	23	.8	.4	.2	.6	9	----------
5.8	1.5	.08	11	--------	14	1.6	.8	.3	.7	24	----------
5.5	1.8	.08	13	--------	19	.6	.4	.2	.5	9	----------
5.5	22.1	.62	20.7	--------	45.4	12.6	7.1	.87	1.51	49	1.8
5.1	10.7	.37	16.6	0.74	30.5	2.3	2.2	.69	.9	20	1.1
5.2	6.8	.26	15.2	--------	23.1	2.6	2.6	.65	.51	9	1.0
5.5	2.9	.10	16.5	1.31	16.1	1.5	2.0	.61	.51	29	.8
5.3	.6	.04	8.6	--------	15.4	2.5	3.5	.61	.31	45	.7
5.2	.6	.04	7.4	--------	18.3	1.1	2.7	.61	.31	25	.4
4.9	.7	.05	8.0	--------	17.5	1.0	2.6	.52	.31	14	.4
5.2	10.7	.45	13.8	--------	29.4	6.7	6.1	.56	1.74	51	1.1
5.1	6.1	.27	13.4	1.08	25.9	5.5	5.3	.48	1.16	48	1.0
5.1	4.2	.18	13.8	--------	26.0	5.1	6.1	.48	.69	48	.8
5.0	1.3	.05	14.2	1.58	28.8	6.2	9.8	.56	.43	59	.6
5.0	.8	.05	10.0	--------	25.3	5.5	8.9	.48	.32	60	.6

TABLE 9.—*Temperature and*

COASTAL

Month	Temperature				Precipitation		
	Average daily maximum	Average daily minimum	2 years in 10 will have at least 4 days with—		Average monthly precipitation	One year in 10 will have—	
			Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—
	°F.	°F.	°F.	°F.	Inches	Inches	Inches
January	54	40	64	31	13.1	6.2	19.9
February	55	41	64	33	10.4	4.3	18.2
March	56	41	66	34	10.2	3.6	18.2
April	52	43	68	37	5.2	2.0	9.8
May	62	46	73	40	3.9	.8	8.3
June	66	49	77	44	2.2	.2	5.0
July	66	51	75	46	.5	0	1.9
August	68	51	76	47	.6	0	2.0
September	67	50	79	45	2.0	.5	4.2
October	63	48	74	41	6.8	2.0	12.2
November	52	44	68	35	10.3	2.6	20.6
December	56	42	64	32	13.2	6.1	21.3
Year	61	46	[3] 90	[3] 28	78.2	58.0	97.9

INLAND

January	47	35	57	25	15.7	6.8	26.2
February	53	37	62	29	12.7	4.3	23.8
March	59	37	73	30	10.6	5.8	16.2
April	67	40	83	34	4.7	1.4	9.1
May	73	44	88	37	3.7	.8	7.6
June	79	48	95	42	1.4	.3	3.2
July	89	52	102	45	.6	.1	1.6
August	88	51	102	46	.7	.2	1.4
September	83	49	99	42	1.7	.4	3.5
October	67	45	84	15	7.4	2.1	13.9
November	54	40	64	29	13.1	4.0	24.8
December	49	38	57	27	16.1	7.2	28.2
Year	67	43	[3] 103	[3] 22	83.3	61.4	112.9

[1] Trace.
[2] Less than one-half day.

precipitation in Curry County, Oregon

PLAIN

Precipitation—Continued									
Two years in 10 will have—		Three years in 10 will have—		Four years in 10 will have—		Average snow fall	Maximum depth of snow on ground	Average number of days with snow cover	Average depth of snow on days with snow cover
Less than—	More than—	Less than—	More than—	Less than—	More than—				
Inches	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Number*	*Inches*
7.6	16.7	9.1	14.7	10.4	19.1	(1)	2	(2)	2
5.9	14.7	7.1	12.7	8.2	11.1	(1)	(1)	0	0
5.1	14.4	6.4	12.2	7.6	10.5	(1)	(1)	0	0
2.7	7.7	3.3	6.4	4.0	5.5	(1)	0	0	0
1.1	6.2	1.6	4.3	2.2	4.0	0	0	0	0
.5	3.4	.7	2.6	1.1	2.1	0	0	0	0
(1)	1.1	.3	.3	.4	.6	0	0	0	0
(1)	1.4	.3	1.0	.4	.8	0	0	0	0
.8	3.1	1.0	2.5	1.3	2.1	0	0	0	0
3.0	9.5	3.8	7.9	4.0	6.7	0	0	0	0
3.9	15.5	5.1	12.4	6.7	10.1	(1)	0	0	0
7.8	17.7	9.4	15.5	10.7	13.7	(1)	0	0	0
63.8	90.1	68.3	84.7	72.3	80.3	(1)	2	(2)	2

VALLEYS

9.1	21.4	11.1	18.7	12.7	16.3	5	8	2	4
6.2	19.0	7.6	15.7	9.5	13.3	4	6	1	2
6.9	13.0	8.1	12.2	8.9	11.1	2	4	(2)	2
2.0	7.1	2.7	5.7	3.4	5.0	(1)	(1)	0	0
1.1	5.6	1.4	4.5	2.0	3.9	0	0	0	0
.4	2.4	.6	1.9	.8	1.6	0	0	0	0
.2	1.0	.2	.8	.3	.6	0	0	0	0
.2	1.1	.3	.8	.4	.7	0	0	0	0
.5	2.6	.7	2.0	.9	1.7	0	0	0	0
3.1	10.8	4.2	8.7	5.2	7.7	0	0	0	0
5.8	19.0	7.5	15.5	9.2	13.3	(1)	0	0	0
9.4	23.7	11.7	20.2	13.4	17.9	1	6	(2)	2
12.0	103.5	77.3	96.9	82.2	91.6	12	24	3	3

[3] The temperature that will be equaled or exceeded on at least 4 days in 2 out of 10 years.

the ocean. Thus, the climate is influenced greatly by areas outside the coastal strip that make up Curry County.

Curry County has a definite marine climate. The Pacific Ocean, which makes up the western border, is the dominant geographical feature. Winds blowing from the west over the ocean have already traveled several days over the water by the time they reach the county. When they reach the county, they are saturated and their temperature is near that of the ocean.

The ocean warms the air flowing over it in winter and cools it in summer. Temperatures in the county therefore are mild throughout the year. Relative humidity generally is high, and it seldom drops below 65 percent. About 100 days of fog can be expected along the coast each year. In the inland valleys, however, the number of foggy days may be about half this figure.

The Coast Range begins at the coastline, or within a few miles of it, and rises to elevations of more than 4,500 feet. In many places the crests of the ridges are more than 3,000 feet above sea level. Incoming air flowing over these mountains cools by as much as 3 to 5 degrees for each 1,000 feet of increase in elevation.

In winter, land masses cool to a much lower temperature than the ocean and they cool air masses correspondingly as the air moves up the mountain slopes. As this cooling takes place, air that was nearly saturated at sea level becomes oversaturated. As a result, precipitation increases with elevation. Annual rainfall averages between 75 and 80 inches along the coast, but it is more than 100 inches on the upper slopes of the mountains.

In summer, land masses heat more rapidly than the ocean. For this reason, the inland valleys, which are between 15 and 20 miles from the coast, are somewhat drier and warmer during the day than the coastal area. Because of the distinct differences in the climate of the coastal plains and of the inland valleys, climatic data is given for each, as indicated in table 9.

Precipitation.—More than 70 percent of the annual precipitation in Curry County falls as rain in the period November through March. The months of June, July, and August are dry. An average of about only 3 inches of rain falls during these three months. Rainfall of 0.01 inch or more occurs on an average of 150 to 200 days a year, and as much as 0.10 of an inch falls in 24 hours on 100 to 120 days each year.

On the coastal plain an average of less than 1 inch of snow accumulates in a year, and in most years no snow is recorded. Snow is more abundant in the inland valleys, and as much as 12 inches have been recorded in a year. Even here, however, snow is lacking in many years. The snow that falls generally melts in a few hours, or at most in a few days.

A knowledge of the amount and intensity of rainfall in the county is helpful to farmers, to growers of woodland crops, and to related industries. Table 10 gives the amount of rainfall, lasting for specified lengths of time ranging from 20 minutes to 24 hours, that can be expected once in the return periods indicated. For example, at least once in 2 years, 0.4 inch of rain can be expected to fall during a 20-minute period, but only once in 10 years is it likely that as much as 0.7 inch will fall during a period of 20 minutes. The table was prepared from graphs in U.S. Weather Bureau Technical Paper No. 28 (*18*). Representative areas along the north and south part of the coast and in the inland valleys were selected in preparing the table.

Temperature.—Along the coast the difference in the average temperature for January, the coldest month, and for August, the warmest month, is only about 14 degrees. In some places in the inland valleys, this difference may be as much as 20 degrees. The chance of temperatures in the coastal area falling below 20 degrees or rising above 100 degrees is probably less than 1 in 20. In the inland valleys, such extremes are recorded in less than a third of the years. Summer temperatures in certain places, such as the area around Brookings, may rise into the high nineties because of strong winds from the east or southeast.

Throughout the county the growing season, which is the interval between the last temperature of 32° F., or lower, in spring and the first such temperature in fall, is 238 days or more. In table 11 are listed for the coastal plain and for the inland valleys of the county the probability of given temperatures, or colder, in spring and fall for specified dates. The dates shown are based on the averages of several stations in and adjacent to Curry County, as computed by Eichorn (*6*).

Wind.—The growing use of airplanes in applying fertilizer, insecticides, and sprays and dusts for killing weeds has led to increased interest in wind velocities. Windspeed also is of interest because of its influence on the construction of farm buildings and on soil blowing in areas that

TABLE 10.—*Amount of rainfall of stated duration to be expected once in the specified number of years*

Duration	Return period of—						
	1 year	2 years	5 years	10 years	25 years	50 years	100 years
	Inches	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
North Coast							
20 minutes	0.3	0.4	0.6	0.7	0.9	1.0	1.2
30 minutes	.5	.6	.9	1.0	1.2	1.4	1.8
1 hour	.7	.9	1.3	1.5	1.8	2.0	2.3
2 hours	1.4	1.7	2.2	2.4	2.8	3.2	3.5
3 hours	1.7	2.1	2.6	2.9	3.4	3.8	4.3
6 hours	2.5	2.9	3.7	4.1	4.7	5.2	5.8
24 hours	4.0	4.9	6.4	7.3	8.5	9.6	10.8
South Coast							
20 minutes	.2	.3	.5	.6	.7	.8	.9
30 minutes	.4	.5	.7	.8	1.0	1.1	1.3
1 hour	.6	.8	1.1	1.3	1.5	1.8	2.0
2 hours	1.2	1.5	1.9	2.2	2.6	2.9	3.3
3 hours	1.7	2.0	2.6	2.9	3.3	3.8	4.2
6 hours	2.4	2.9	3.7	4.1	4.7	5.2	5.8
24 hours	3.8	4.8	6.2	7.1	8.3	9.3	10.6
Inland Valleys							
20 minutes	.2	.3	.4	.5	.6	.7	.8
30 minutes	.3	.4	.6	.7	.9	1.0	1.1
1 hour	.5	.7	1.0	1.2	1.4	1.6	1.8
2 hours	1.2	1.5	1.9	2.2	2.6	2.8	3.2
3 hours	1.7	2.0	2.6	2.8	3.3	3.8	4.2
6 hours	2.5	3.0	3.8	4.2	4.8	5.4	6.0
24 hours	4.4	5.5	7.1	8.1	9.4	10.7	12.1

TABLE 11.—*Probability of given temperatures and colder after specified dates in spring and before specified dates in fall*

Probability	Dates for given probability and temperature			
	24° or lower	28° or lower	32° or lower	36° or lower
Coastal Plain				
Spring:				
1 year in 10, later than	January 17	February 11	April 5	May 8
2 years in 10, later than	January 8	January 29	March 22	April 30
5 years in 10, later than	(1)	January 15	March 5	April 12
Fall:				
1 year in 10, earlier than	(1)	December 12	November 10	October 25
2 years in 10, earlier than	(1)	December 25	November 22	November 2
5 years in 10, earlier than	(1)	(1)	December 10	November 15
Inland Valleys				
Spring:				
1 year in 10, later than	March 1	April 8	May 20	June 23
2 years in 10, later than	February 14	March 31	May 14	June 16
5 years in 10, later than	January 23	March 20	May 1	May 29
Fall:				
1 year in 10, earlier than	November 3	October 21	September 19	August 14
2 years in 10, earlier than	November 16	October 31	September 28	August 27
5 years in 10, earlier than	December 16	November 17	October 24	September 21

[1] Date not calculated because occurrence of this temperature is rare.

are cultivated. In summer strong easterly winds bring very dry air to certain parts of the county. These winds deplete soil moisture, rapidly dry out plants, and often cause a critical danger of fire in large forested areas.

Along the coast winds occur a few times each year that have a peak gust of between 60 and 100 miles an hour. According to Thom (*13*), a fastest mile of wind, at a velocity of 45 to 50 miles an hour, can be expected along the coast once every other year; at 75 to 80 miles an hour, once in 50 years; and at 90 to 100 miles an hour, once in every 100 years. A *peak gust* may last for only 1 or 2 seconds; a *fastest mile* of wind last long enough for 1 mile of wind to pass a given point at the speed indicated.

In day to day farming, a knowledge of the probability of low windspeeds is of prime importance. Table 12 gives data on wind velocities based on hourly observations over a period of 5 years at the North Bend Airport in adjacent Coos County. The three ranges of speed shown were selected on the advice of agricultural meteorologists as having the most significance to the greatest number of farming interests. An accuracy of a tenth of a percent probably is not justified by the data used. This was the only way, however, that the relative frequency of winds of more than 38 miles an hour could be shown.

Humidity.—The relative humidity in Curry County is fairly high. It is highest at 4:00 a.m., and on the average, it is near 90 percent, or above this figure, throughout the year. Because of this, heavy dew is likely to remain on the areas for several hours after sunrise, even in the summer months. At 4:00 p.m., the humidity generally is lowest for the day, and on the average, monthly humidity for this time of the day is between 70 and 80 percent. If strong winds blow from the east or southeast, relative humidity may fall to the low twenties during the day.

TABLE 12.—*Percentage of time, for a 12-month period, that wind velocity falls within given velocity ranges*

Month	Velocity in miles per hour		
	0 to 12	13 to 38	38 and more
	Percen	*Percent*	*Percent*
January	58. 7	41. 0	0. 3
February	68. 1	31. 7	. 2
March	67. 1	32. 4	. 5
April	62. 7	37. 2	. 1
May	61. 7	38. 1	. 2
June	62. 7	37. 0	. 3
July	49. 0	50. 8	. 2
August	64. 0	35. 9	. 1
September	74. 4	25. 6	0
October	80. 6	19. 4	0
November	75. 0	24. 9	. 1
December	67. 3	32. 5	. 2

Table 13 shows the average relative humidity, by months, recorded four times a day, at representative coastal areas. Relative humidity in the inland valleys most likely would be slightly lower, but it is doubtful if the difference would be of agricultural significance.

Cloudiness and sunshine.—Considerable cloudiness can be expected in Curry County much of the year. On the average, about 67 percent of the days each year are cloudy (*12*). Many days, however, are clear and sunny, partic-

TABLE 13.—*Average relative humidity by month and time of day for the coastal area*

Month	Time of day			
	4:00 a.m.	10:00 a.m.	4:00 p.m.	10:00 p.m.
	Percent	*Percent*	*Percent*	*Percent*
January	89	86	82	89
February	90	82	78	89
March	89	76	72	87
April	90	73	71	86
May	91	73	72	88
June	92	76	74	88
July	93	73	73	90
August	94	75	74	92
September	95	76	73	93
October	94	80	76	91
November	91	81	80	89
December	89	85	80	89
Year	91	78	75	89

ularly in spring and summer. The amount of sunshine varies considerably. During January the sun shines only about 20 percent of the time, but in July, it shines about 70 percent of the time.

Storms.—Thunderstorms accompanied by lightning and light rainfall occur on an average of 5 to 10 times a year at lower elevations. These storms are more frequent at the higher elevations. Hail seldom occurs in the Curry Area. Any hail that does fall is small and causes little damage. Each winter winds of hurricane force strike the coast occasionally, but no true tornado has been recorded as occurring in Curry County.

Natural Resources

Timber and minerals are the chief natural resources in Curry County. About 93 percent of the county is forested, and timber products are the chief source of cash income. Most of the privately owned commercial timberland is along the coastal hills and on mountains facing the ocean. The better timber sites generally are in the coastal area, and many of the farms here include woodlots. The Siskiyou National Forest makes up most of the rest of the county, though some of the acreage is held by other public agencies.

Sand, gravel, and stone are the chief nonmetallic resources. Most of these come from stream channels in the coastal area and from rock outcrops in the hills.

Gold was discovered in the black beach sand near Port Orford in 1852 and gave employment to a few people. Not much gold has been mined in the county since the price of gold was frozen at the 1934 level.

Wildlife [6]

The habitat for wildlife in Curry County is greatly diversified. Much of the county is mountainous and thickly forested, but along the coast some of the areas are cultivated. Upland game birds and small animals, big-game animals, fur-bearing animals, waterfowl, and fish are present in considerable variety.

Upland game consists chiefly of valley and mountain quail, blue and ruffed grouse, and silver gray squirrel. European gray partridge has been introduced recently, however. Valley quail like to live near cultivated areas, and mountain quail frequent more mountainous areas. Blue grouse frequent fir forests. Ruffed grouse prefer more open country, and they often are referred to as native pheasant. Silver gray squirrel frequent wooded areas made up of a mixture of trees, such as oak, maple, and fir.

Black-tailed deer and Roosevelt elk are the chief big-game animals in the county. These animals roam the coastal area. They like to feed in recently cutover timberland, where the supply of food is plentiful.

Most of the waterfowl in the county are migratory, though a few nesting waterfowl stay in the northern part of the county throughout the year. Band-tailed pigeon and mourning dove are other migratory birds that come to the county.

Many fur-bearing animals frequent the county, but otter, marten, mink, and beaver have the most economic value. Other fur bearers in the county are skunk, raccoon, ring-tailed cat, and weasel.

Four predatory animals—the cougar, coyote, bobcat, and bear—roam the county. All of these animals have caused considerable losses to the livestock industry at some time or other.

Numerous ground squirrel, gophers, moles, chipmunks, brush rabbit, and varying hare are in the county. There are also several species of mice.

Game fish have high recreational value in the county. In the future, development of marine sport fishing is also likely to be important.

Salmon and steelhead trout are the most important game fish. Of the salmon, the chinook is the most common. Chinook can be taken in the Rogue River in spring and fall, and in all of the other large streams in fall. In addition, a few chinook salmon enter the Chetco River in spring. Fishermen can take silver salmon in all of these streams in the fall, but in fewer numbers. Steelhead can be found in the Rogue River in spring, fall, and winter, though they are most numerous in fall and winter. They also can be taken in winter in all of the other major streams. Other game fish found in the various streams are cutthroat trout, rainbow trout, black bass, and yellow perch.

Carp, shad, and suckers also are numerous in the waters of the county. All of these are used for food by some. In time, shad may become an important sport fish in the area.

Settlement and Development

As early as 1826 trappers explored the county, probably by way of the Rogue River. Then 2 years later another trapper, Jedediah Smith, traversed the coastal area from the California line north to the Umpqua River. The first white settlers came with Captain William Tichenor by ship in 1851. The next year gold was discovered near Ellensberg and more people came to the area. In 1855 a post office was established and the county was organized and named for George L. Curry, territorial governor. Gold Beach, then called Ellensberg, became the county seat in

[6] HENRY NIASTIN, field biologist, Oregon State Commission.

1858 (*10*). Whether they came out of curiosity or whether they came for adventure, most who came to the county stayed to make their home in this beautiful land.

The early settlers were practically self sustaining because the area was very isolated. They generally had a few fruit trees, two or three cows, a garden, a few hogs, and some sheep. The wilderness provided such game as elk, deer, and bear, and the ocean and streams provided abundant fish. No good roads were constructed in the area for many years. Wool and 50-pound barrels of bacon, ham, lard, cheese, and butter were packed out by horse to central points in the county. From these places the items were shipped to San Francisco by steam schooners or sailing vessels.

The lumber industry probably had its start in the early 1850's, and shortly three sawmills were operating in the county. A prosperous and stable dairy industry also was established at an early date. Cranberries were first grown in the county in 1885. It was not until 1930, however, that the marketing of fat lambs became an established practice. At about the same time, the growing of lily bulbs became important. From then until the late 1940's, when overproduction depressed the price, lily bulb crops added about 2 million dollars to the economy annually.

According to the U.S. Census, there were 13,983 people in the county in 1960. Most of these people live in the coastal area. The mountainous areas inland are sparsely settled.

Three high schools and several elementary schools are in the survey area. There are also three libraries. The only hospital in the county is also in the coastal area, at Gold Beach. A flying ambulance service provides emergency care for patients who need more specialized care in the larger medical centers in the cities outside the county.

Lumbering, fishing, and tourism are the chief industries. The chief source of income is the lumber industry, which employs nearly 3,000 persons. Operating in the county are nine sawmills, two combination plywood plants and sawmills, four green veneer mills, one combination green mill and sawmill, and one plywood plant. Most of these are in the survey area.

Sport fishing and commercial fishing add much to the economy. Fishing for salmon is popular along the Rogue, Chetco, and Winchuck Rivers and brings many sportsmen to the county. Small commercial fishing fleets operate out of the harbors of Port Orford and Brookings. These fleets fish mostly for crabs and shrimp, though abalone also is harvested near Brookings.

The tourist industry has grown rapidly in recent years. It undoubtedly will expand further as improved highway facilities are constructed to give access to scenic areas along the rugged ocean coast.

Transportation in the county is mainly by highway. The first road constructed in the area was built in 1890. It was a narrow wagon road that connected Gold Beach to the northern and southern parts of the county and to Crescent City in California. The road was mountainous and was deep in mud in winter. The principal highway in the county now is U.S. Highway 101. This road runs through the county from the north to the south along the coast. Roads maintained by the county cross the coastal plains area and extend inland for several miles along the major coastal streams. Public transportation is mainly by bus. Private and chartered planes operate out of three small airports. Three harbors provide shipping facilities, mainly for the lumbering and fishing industries.

Agriculture

Curry County had 109,878 acres in 263 farms in 1964, according to the U.S. Census of Agriculture. The average size of the farms was 417.8 acres. About 77 percent of the farms were operated by full owners; the rest by part owners and tenants.

Dairying accounts for much of the farm income. Most of the milk was sold as a grade A product to provide fresh milk for the communities in the county.

Much of the land in farms in the county is hilly. It therefore is better suited to sheep than to grazing by other livestock. The sheep provide wool for the market. Also, according to the 1964 census, more than 19,000 sheep and lambs were sold live from 100 farms.

Beef cattle operations are chiefly of the cow-calf type. Some operators, however, hold the calves for a second year and sell them as feeders. The animals are shipped chiefly to market outlets in Portland and San Francisco. A feedlot in the county supplies cattle to coastal slaughter houses.

Easter lily bulbs grow well in the county and are an important cash crop for some farmers. The raising of bulbs flourished for a time in the 1940's when the supply of imported bulbs was cut off during World War II. At the peak of production in 1947, 600 farmers grew bulbs on 600 acres. Overproduction caused the price for bulbs to decline, and in 1960 only 40 growers were producing bulbs on 250 acres. The operation is now mechanized, and production is almost as high as during the peak years.

Several other specialty crops are grown on some farms in the county. Among these are raspberries, blackberries and dewberries, boysenberries, blueberries, and cranberries.

Use of fertilizer and lime in the county is limited because of the distance to market centers and the cost of transporting the material to the farms. Most of the lime and fertilizer therefore is used on crops that provide a high cash return, such as lily bulbs.

Most farms in the county have adequate farm equipment. In 1964, according to the agricultural census, 302 tractors, other than garden tractors, were reported on the farms. In addition there were 17 pickup hay balers and 27 milking machines. Nearly all of the farms, and particularly those in the coastal area, have electricity. About 80 percent of the farms have telephones.

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Glossary

Acidity, soil. See Reaction, soil.

Aggregate, soil. Many fine particles held in a single mass or cluster, such as a clod, crumb, block, or prism.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Alluvial fan. A fan-shaped deposit of sand, gravel, and fine material dropped by a stream where its gradient lessens abruptly.

Available water holding capacity. Capacity of a soil to hold water that plants can use. Terms used in this survey expressed in inches of moisture per foot of soil are—

Very high--More than 12 inches.	Low-------3 to 6 inches.
High------9 to 12 inches.	Very low---Less than 3 inches.
Moderate--6 to 9 inches.	

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Blinding. The practice of placing permeable material, such as sawdust, woodchips, or coarse aggregate around newly installed drainage tile to filter out sand, silt, and clay but to allow water to enter the tile freely.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter (0.000079 inch) in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Claypan. A compact, slowly permeable soil horizon that contains more clay than the horizon above and below it. A claypan is commonly hard when dry and plastic or stiff when wet.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose. Noncoherent; will not hold together in a mass.
Friable. When moist, crushes easily under gentle to moderate pressure between thumb and forefinger and can be pressed together into a lump.
Firm. When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.
Plastic. When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.
Sticky. When wet, adheres to other material; tends to stretch somewhat and pull apart, rather than pull free from other material.
Hard. When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft. When dry, breaks into powder or individual grains under very slight pressure.
Cemented. Hard and brittle; little affected by moistening.

Cover crop. A close-growing crop grown primarily to improve and to protect the soil between periods of regular crop production; or a crop grown between trees and vines in orchards and vineyards.

Drainage, artificial. The removal of excess water on or within the soils by means of surface or subsurface (tile) drains.

Drainage, natural. Refers to the conditions that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural drainage are recognized.

Excessively drained soils commonly are very porous and rapidly permeable and have low water-holding capacity.
Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.
Well-drained soils are nearly free from mottling and commonly are of intermediate texture.
Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A horizon and in the upper part of the B horizon and have mottling in the lower part of the B horizon and in the C horizon.
Somewhat poorly drained soils are wet for significant periods but not all the time; the water table is within 12 to 24 inches of the surface for part of the year; and in some of the soils mottlings are below 6 to 16 inches in the lower part of the A horizon and in the B and C horizons.
Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.
Very poorly drained soils are wet nearly all the time. They have a dark-gray, or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Erosion hazard. The estimated risk of wind or water erosion if a soil is left bare for long periods. Terms used in this survey are *slight, moderate,* and *severe.*

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors, such as light, moisture, temperature, and the physical condition (or tilth) of the soil, are favorable. Terms used in this survey are *high, moderately high, medium, moderately low,* and *low.*

Flood plain. Nearly level land, consisting of stream sediment, that borders a stream and is subject to flooding unless protected artificially.

Green-manure crop. A crop grown for the purpose of being turned under in an early stage of maturity or soon after maturity for soil improvement.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material may be sandy or clayey, and it may be cemented by iron oxide, silica, calcium carbonate, or other substance.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, generally expressed in inches per hour. It may be limited either by the rate at which water can infiltrate into a soil under a given set of conditions or by the rate at which water is applied to the surface soil.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons.

O horizon. The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon. The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and it is therefore marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon. The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) prismatic or blocky structure; (3) redder or stronger colors than the A horizon; or (4) some combination of these. The combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon. The weathered rock material immediately beneath the solum. This layer, commonly called the soil parent material, is presumed to be like that from which the overlying horizons were formed in most soils. If the underlying material is known to be different from that in the solum, a Roman numeral precedes the letter, C.

R layer. Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Leaching. The removal of soluble materials from soils or other material by percolating water.

Lime. Chemically, lime is calcium oxide (CaO), but its meaning has been extended to include all limestone-derived materials applied to neutralize acid soils. Agricultural lime can be obtained as ground limestone, hydrated lime, or burned lime, with or without magnesium minerals. Basic slag, oystershells, and marl also contain calcium.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are: *Fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in elaboration of its food and tissue. Among the elements obtained from the soil are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc. Plant nutrients obtained largely from the air and water are carbon, hydrogen, and oxygen.

Open drain. A ditch constructed to remove surplus water from wet land; may also include cross-slope ditches on sloping land.

Parent material (soil). The disintegrated and partly weathered rock from which soil has formed; horizon C in the soil profile.

Percent, slope. The gradient of any particular slope expressed as the difference in elevation in feet between two points 100 feet apart horizontally.

Permeability, soil. The quality of a soil horizon that enables it to transmit air and water. The permeability of a soil may be limited by the presence of one nearly impermeable horizon even though the others are permeable. The following relative classes of soil permeability refer to estimated rates of movement of water in inches per hour through saturated undisturbed cores under a one-half inch head of water:

	Inches per hour		*Inches per hour*
Very slow	Less than 0.05	Moderately rapid	2.50 to 5.00
Slow	0.05 to 0.20	Rapid	5.00 to 10.00
Moderately slow	0.05 to 0.20	Very rapid	More than 10.00
Moderate	0.80 to 2.50		

pH. (See Reaction.)

Reaction, soil. The degree of acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. In words the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum. Unconsolidated, partly weathered mineral material that accumulates over disintegrating solid rock. Residual material is not soil but is frequently the material in which a soil is formed.

Riprap. Stone, brush and stone, or mixtures of brush and poles placed on earth surfaces, such as the faces of dams or the banks of streams, for protection against water erosion.

Rotation grazing. Grazing two or more pastures, or parts of a range, in regular order, with definite recovery periods between grazing periods. Contrasts with continuous grazing.

Runoff. Refers to the amount of water removed by flow over the surface of the soil. The amount and rapidity of runoff are affected by factors, such as texture, structure, and porosity of the surface soil; the vegetative covering; the prevailing climate; and the slope. The degree of runoff is expressed by the terms *very rapid, rapid, medium, slow, very slow,* and *ponded.*

Sand. Individual fragments of rocks or minerals that have diameters ranging from 0.05 (0.002 inch) to 2.0 (0.079 inch) millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The term sand also is applied to a soil that is 85 percent or more sand and not more than 10 percent clay.

Shaping. A local term used to refer to the removal of low knolls and ridges in cultivated areas so that ponded surface water can be removed, thereby aiding the surface drainage in that particular field or area.

Silt. Individual mineral particles of soil that range in diameter from 0.002 miliimeter (0.000079 inch) to 0.05 millimeter (0.002 inch) in diameter. The term silt also is applied to a soil that is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the surface of the earth that supports plants and that has properties resulting from the integrated effect of climate and living matter acting upon parent material, as conditioned by relief over periods of time.

Soil depth. The thickness of soil over a specified layer, generally one that does not permit the growth of roots. Classes used in this survey are—

	Inches		*Inches*
Moderately shallow	10 to 20	Deep	36 to 60
Moderately deep	20 to 36	Very deep	More than 60

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying parent material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are *platy,* (laminated), *prismatic,* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular),

and *granular. Structureless* soils are (1) *single grain* (each grain by itself, as in sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon of soils that have a distinct profile; roughly, the part of the profile below plow depth.

Substratum. Any layer lying beneath the solum, or true soil.

Surface soil. The upper part of the soil that is commonly stirred by tillage implements, or its equivalent in uncultivated soil; about 5 to 8 inches in thickness.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are ferquently called *second bottoms*, as contrasted to *flood plains*, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. (see also Clay, Sand, and Silt.) The basic textural classes, in order of increasing proportions of fine particles are as follows: sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The physical properties of the soil that affect the ease of cultivating it or its suitability for crops; implies the presence or absence of favorable soil structure.

Upland. Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than the alluvial plain or stream terrace. Land above the lowlands along rivers.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from the lower one by a dry zone.

Workability. A term used to express the ease with which a soil can be tilled. Generally expressed as *poor*, *fair*, or *good*.

GUIDE TO MAPPING UNITS

[For a full description of a mapping unit, read both the description of the mapping unit and the soil series to which the mapping unit belongs.

[See table 1, p. 8, for the approximate acreage and proportionate extent of the soils. Information about predicted yields can be obtained in the section beginning on p. 35 and information significant to engineering is in the section beginning on p. 42. Dashes in the "Woodland group" column mean that the particular mapping unit was not placed in a woodland group because trees do not grow naturally on the areas]

Map Symbol	Mapping unit	Page	Capability unit		Woodland group	
			Symbol	Page	Number	Page
Ad	Active dune land	8	VIIIe–1	35	--	--
Ba	Bayside silty clay loam	8	IIw–1	27	13	41
BcB	Blacklock fine sandy loam, 0 to 7 percent slopes	9	VIw–1	33	1	39
Ch	Chetco silt loam	10	IVw–1	31	--	--
CtB	Chitwood silt loam, 0 to 7 percent slopes	10	IVw–2	31	13	41
EdE	Edson clay loam, 12 to 30 percent slopes	11	VIe–1	32	3	39
EdG	Edson clay loam, 30 to 60 percent slopes	12	VIIe–1	34	4	39
FeB	Ferrelo loam, 0 to 7 percent slopes	12	IIIe–2	28	2	39
FeD	Ferrelo loam, 7 to 20 percent slopes	13	IVe–4	30	2	39
FeF	Ferrelo loam, 20 to 40 percent slopes	13	VIe–3	33	2	39
Ga	Gardiner fine sandy loam	13	IIIs–2	29	15	42
Gm	Gardiner fine sandy loam, moderately deep	13	IVe–3	30	15	42
Go	Gardiner fine sandy loam, overflow	13	IVw–3	31	15	42
HeB	Hebo silty clay loam, 0 to 7 percent slopes	14	IVw–2	31	13	41
KaA	Knappa clay loam, dark surface variant, 0 to 3 percent slopes	16	I–1	25	15	42
KaC	Knappa clay loam, dark surface variant, 3 to 12 percent slopes	16	IIe–1	26	15	42
KnB	Knappa silty clay loam, 2 to 7 percent slopes	14	IIe–1	26	2	39
KnC	Knappa silty clay loam, 7 to 12 percent slopes	15	IIIe–1	27	2	39
KnD	Knappa silty clay loam, 12 to 20 percent slopes	15	IVe–1	29	2	39
KnE	Knappa silty clay loam, 20 to 30 percent slopes	15	VIe–1	32	2	39
KpC	Knappa silty clay loam, heavy variant, 0 to 12 percent slopes	15	IIIe–4	28	--	--
La	Langlois silty clay loam	16	IVw–1	31	--	--
MeB	Meda gravelly silt loam, 0 to 7 percent slopes	18	IIIe–3	28	12	41
Nh	Nehalem silt loam	19	I–1	25	15	42
No	Nehalem silt loam, overflow	19	IVw–3	31	15	42
NtC	Netarts sandy loam, 0 to 12 percent slopes	19	VIe–4	33	5	40
NtF	Netarts sandy loam, 12 to 40 percent slopes	20	VIIe–3	34	5	40
OrC	Orford silty clay loam, 3 to 12 percent slopes	21	IVe–1	29	6	40
OrE	Orford silty clay loam, 12 to 30 percent slopes	20	VIe–1	32	6	40
OrG	Orford silty clay loam, 30 to 70 percent slopes	20	VIIe–1	34	8	40
OsE	Orford silty clay loam, moderately deep, 20 to 30 percent slopes	21	VIe–1	32	7	40
OsG	Orford silty clay loam, moderately deep, 30 to 70 percent slopes	21	VIIe–1	34	9	41
Re	Riverwash	21	VIIIw–2	35	--	--
Ro	Rock outcrop	21	VIIIs–1	35	--	--
SeG	Sebastian very stony loam, 7 to 70 percent slopes	21	VIIe–4	34	--	--
St	Stabilized dune land	22	VIIIe–1	35	14	42
TrE	Trask gravelly silt loam, 20 to 30 percent slopes	22	VIe–1	32	10	41
TrG	Trask gravelly silt loam, 30 to 70 percent slopes	23	VIIe–1	34	11	41
WcB	Winchuck silt loam, 2 to 7 percent slopes	23	IIe–1	26	12	41
WcC	Winchuck silt loam, 7 to 12 percent slopes	24	IIIe–1	27	12	41
WcE	Winchuck silt loam, 12 to 30 percent slopes	24	IVe–1	29	12	41
WnC	Winema silty clay loam, 3 to 12 percent slopes	24	IVe–2	30	--	--
WnE	Winema silty clay loam, 12 to 30 percent slopes	24	VIe–2	32	--	--
WnG	Winema silty clay loam, 30 to 70 percent slopes	24	VIIe–2	34	--	--

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