SOIL SURVEY OF

Yolo County, California

United States Department of Agriculture
Soil Conservation Service
In cooperation with
University of California
Agricultural Experiment Station

Issued June 1972

Major fieldwork for this soil survey was done in the period of 1958–67. Soil names and descriptions were approved in 1968. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1968. This survey was made cooperatively by the Soil Conservation Service and the University of California Agricultural Experiment Station with financial assistance from the Northern Yolo Soil Conservation District and Yolo County. It is part of the technical assistance furnished to the Capay Valley, Northern Yolo, and Western Yolo Soil Conservation Districts. Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, United States Department of Agriculture, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

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

Locating Soils

All the soils of Yolo County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. 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. This guide lists all the soils of the county in alphabetical order by map symbol. It shows the page where each soil is described and the page for the capability unit and the range site in which the soil has been placed. It also lists the vegetative soil group, Storie index, and wildlife group for each soil.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the 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 soil descriptions and in the section that discusses management of the soils by capability groups and their use for cultivated crops and pasture.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Wildlife."

Ranchers and others can find, under "Range," groupings of the soils according to their suitability for range, and also the names of many of the plants that grow on each range site.

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

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

Newcomers in Yolo County will be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given in the section "General Nature of the County."

Cover: Almond orchard that has a volunteer cover. It is not tilled, but it is rotary mowed and is irrigated by sprinkler.

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SOIL SURVEY OF YOLO COUNTY, CALIFORNIA

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UNITED STATES DEPARTMENT OF AGRICULTURE, IN COOPERATION WITH UNIVERSITY OF CALIFORNIA AGRICULTURAL EXPERIMENT STATION

YOLO COUNTY is in the lower part of the Sacramento Valley (fig. 1). It has a land area of 661,760 acres, or 1,034 square miles.

In the eastern two-thirds of the county, the soils are nearly level and are irrigated and intensively cultivated. The soils in the remaining acreage are gently rolling to very steep and are used for dryfarmed grain and range. Most urban and industrial areas in the county are adjacent to the Sacramento River across the river from the city of Sacramento and near the cities of Davis and Woodland.

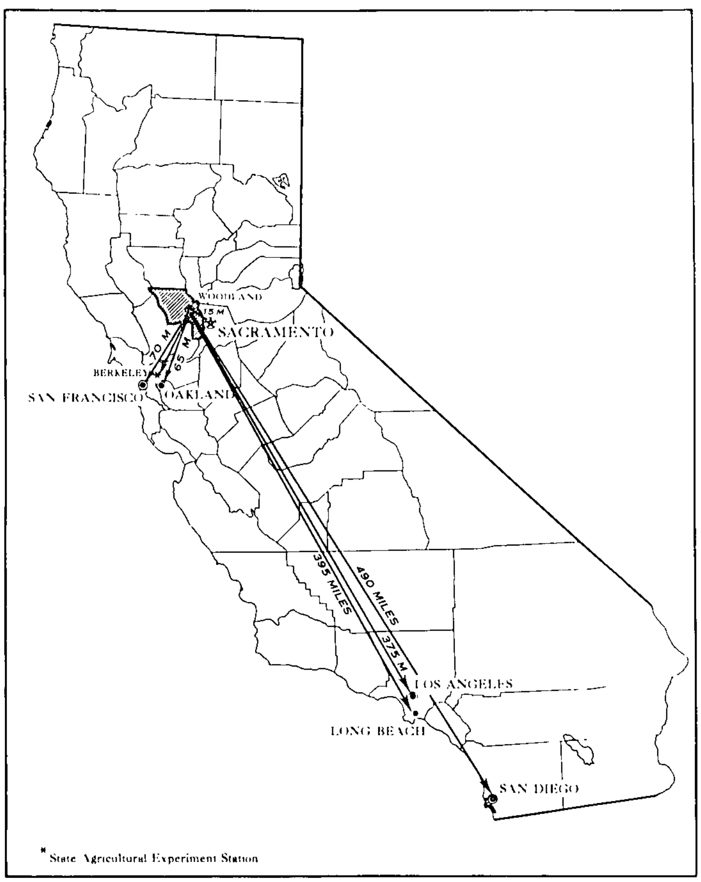

Figure 1.—Location of Yolo County in California.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Yolo County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the kinds of plants or crops, the 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 the action of plant roots.

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. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

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. Arbuckle and Valdez, 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 affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Lang sandy loam is one of several phases within the Lang series.

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 roads, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map in the back of this publication 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 the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. 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 phase.

Some mapping units are made up of soils of different series, or of different phases within one series. Two such kinds of mapping units are shown on the soil map of Yolo County—soil complexes and undifferentiated groups.

A soil complex consists of areas of two or more soils, so intermingled or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex ordinarily consists of the names of the dominant soils, joined by a hyphen. An example is Balcom-Dibble complex, 30 to 50 percent slopes, eroded.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. Pescadero soils, flooded, is an example. The name of an undifferentiated group ordinarily consists of the names of the dominant soils joined by "and."

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Made land is a land type in Yolo County.

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 soil 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 soil. 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 such a way as to be readily useful to different groups of users, among them farmers, managers of rangeland, and engineers.

On the basis of yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others, then 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

The general soil map at the back of this survey shows, in color, the soil associations in Yolo County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is also useful in determining the value of an association for a watershed, for wildlife habitat, for engineering works, for recreational areas, and for community development. A general soil map is not suitable for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect management.

The 12 soil associations in Yolo County are discussed in the following paragraphs. Seven of the associations are on alluvial fans or in basins, and five are on uplands and terraces. The terms for texture used in the title for all of the associations apply to the surface layer. For example, in the title for association 1, the words "silt loams to silty clay loams" refer to the texture of the surface layer.

Well Drained to Poorly Drained Soils on Alluvial Fans, Basin Rims and Terraces, and in Basins

These soils are well-drained to poorly drained sandy loams to clays that formed in alluvium on fans and in basins. Slopes range from 0 to 2 percent. Elevation ranges from 5 feet below sea level to 600 feet. The annual rainfall is 16 to 22 inches, and the annual air temperature is 60° to 62° F. The frost-free season is 230 to 280 days.

Seven of the associations in Yolo County are on alluvium. They make up 63 percent of the county.

1. Yolo-Brentwood association

Well-drained, nearly level silt loams to silty clay loams; on alluvial fans

This association consists of well-drained silt loams and silty clay loams. These soils formed in alluvium from sedimentary rock. Slopes range from 0 to 2 percent. Elevation ranges from 25 to 400 feet, and the annual rainfall ranges from 16 to 22 inches. The annual temperature is 60° to 62° F., and the frost-free season is 230 to 280 days. In uncultivated areas the vegetation is annual grasses and forbs.

This association makes up about 16 percent of the county. Yolo soils make up about 45 percent of the association; Brentwood soils, 25 percent; and minor soils, the remaining 30 percent.

Yolo soils have a surface layer of grayish-brown silt loam or silty clay loam, and a substratum of brown, pale-brown, and grayish-brown silt loam and silty clay loam. Brentwood soils have a surface layer of grayish-brown silty clay loam, a subsoil of grayish-brown heavy silty clay loam and silt loam, and a substratum of pale-brown silty clay loam.

Minor soils of this association are the Myers, Reiff, Sycamore, and Zamora.

The soils of this association are used chiefly for irrigated orchards, row crops, and field crops. Apricots, almonds, English walnuts, sugar beets, tomatoes, alfalfa, and milo are the main crops. The soils are also used for truck crops, irrigated pasture, dryfarmed grain, recreational areas, and wildlife habitat. The wildlife is mainly upland game.

2. Rincon-Marvin-Tehama association

Well drained and somewhat poorly drained, nearly level silty clay loams to loams; on alluvial fans and basin rims

This association consists of well-drained and somewhat poorly drained loams to silty clay loams on alluvial fans and basin rims. These soils formed in alluvium derived from sedimentary rock. They have a subsoil of clay loam, silty clay loam, or silty clay. Slopes range from 0 to 2 percent. Elevation ranges from 20 to 500 feet, and the annual rainfall ranges from 16 to 20 inches. The annual temperature is 61° to 62° F., and the frost-free season is 265 to 280 days. In areas not cultivated the vegetation is mainly annual grasses and forbs, but oaks grow in scattered areas.

This association makes up about 11 percent of the county. Rincon soils make up about 40 percent of the association; Marvin soils, about 30 percent; Tehama soils, about 25 percent; and minor soils, the remaining 5 percent.

Rincon soils are well drained and have a surface layer of grayish-brown silty clay loam, a subsoil of grayish-brown silty clay loam and silty clay, and a substratum of light yellowish-brown and pale-brown clay loam. Marvin soils are somewhat poorly drained and have a surface layer of grayish-brown silty clay loam and light silty clay, a subsoil of dark grayish-brown and grayish-brown silty clay, and a mottled substratum of light brownish-gray and pale-brown silty clay loam. Tehama soils are well drained and have a surface layer of pale-brown loam, a subsoil of brown, yellowish-brown, and light yellowish-brown clay loam and gravelly loam, and a substratum of light yellowish-brown sandy loam.

Minor soils of this association are the Capay, Clear Lake, and Hillgate.

The soils of this association are used chiefly for irrigated orchards, row crops, and field crops. Apricots, almonds, sugar beets, tomatoes, grain sorghum, alfalfa, and rice are the main crops. The soils are also used for dryfarmed grain, for recreation areas, and as wildlife habitat. The wildlife is mainly upland game.

3. Capay-Clear Lake association

Moderately well drained to poorly drained, nearly level silty clays and clays; on basin rims and in basins

This association consists of silty clays and clays on basin rims and in basins. These soils formed in alluvium from sedimentary rock under moderately good to poor drainage, but the drainage has been improved. Slopes range from 0 to 2 percent. Elevation ranges from 10 to 400 feet, and the average annual rainfall ranges from 16 to 20 inches. The annual temperature is 62° F., and the frost-free season is about 280 days. In areas not cultivated the vegetation is annual grasses and forbs.

This association makes up about 10 percent of the county. Capay soils make up about 65 percent of this association; Clear Lake soils, about 25 percent; and minor soils, the remaining 10 percent.

Capay soils are moderately well drained and have a surface layer of grayish-brown and dark grayish-brown silty clay and a substratum of pale-brown silty clay. Clear Lake soils are poorly drained and have a surface layer of dark-gray and very dark-gray clay and a substratum of olive-gray clay.

Of minor extent in this association are the Sycamore soils and recent deposits of material that has a coarser textured surface layer than that in the major soils. In a few areas drainage has not been improved, and the soils are subject to ponding.

The soils of this association are used chiefly for irrigated row crops, field crops, dryfarmed field crops, and pasture. Sugar beets, tomatoes, grain sorghum, alfalfa, rice, safflower, and barley are the main crops. The soils are also used for recreation areas and as wildlife habitat. Wildlife consists of upland game and waterfowl.

4. Sycamore-Tyndall association

Somewhat poorly drained, nearly level very fine sandy loams to silty clay loams; on alluvial fans

This association consists of somewhat poorly drained silty clay loams to fine sandy loams on alluvial fans. These soils formed in alluvium derived from mixed sources. In some areas drainage has been improved and the water table lowered. Slopes are less than 1 percent. Elevation ranges from sea level to 70 feet, and the annual rainfall is 16 to 18 inches. The annual temperature is about 62° F., and the frost-free season is about 280 days. In areas not cultivated the vegetation is annual grasses and forbs.

This association makes up about 5 percent of the county. Sycamore soils make up about 60 percent of the association; Tyndall soils, about 25 percent; and minor soils, the remaining 15 percent.

Sycamore soils have a surface layer of grayish-brown silt loam or silty clay loam, a subsoil of mottled light yellowish-brown silt loam or silty clay loam, and a substratum of mottled pale-olive loam. Tyndall soils have a surface layer of grayish-brown and light brownish-gray very fine sandy loam. They have a subsoil of light brownish-gray, mottled dark yellowish-brown, and prominently mottled pale-olive very fine sandy loam. The substratum is distinctly mottled light brownish-gray and mottled yellowish-brown stratified sandy loam to very fine sandy loam.

Lang is a minor soil in this association. Also in this association are small areas affected by alkali and a few small areas that have a silty clay substratum.

The soils of this association are used chiefly for row crops, hay crops, orchards, irrigated pasture, and dryfarmed grain. Sugar beets, tomatoes, alfalfa, barley, safflower, pears, and prunes are the main crops. The soils are also used for recreation areas and as wildlife habitat. The wildlife is mainly upland game.

5. Sacramento association

Poorly drained, nearly level silty clay loams and clays; in basins

This association consists of poorly drained, dominantly clay soils, in basins. These soils formed in alluvium from mixed sources. In a few areas soil drainage has been improved. Slopes are less than 1 percent. Elevation ranges from 5 feet below sea level to 60 feet above sea level, and the annual rainfall from 16 to 19 inches. The annual temperature is about 60° F., and the frost-free season is about 275 days. In areas not cultivated the vegetation is annual grasses and forbs.

This association makes up about 8 percent of the county. Sacramento soils make up about 80 percent of this association, and minor soils the remaining 20 percent.

Sacramento soils have a surface layer of mottled gray clay or silty clay loam and a substratum of mottled gray clay.

Of minor extent in this association are an unnamed coarse-textured soil near sloughs and a few alkali spots in depressions.

The soils of this association are used chiefly for irrigated row crops, truck crops, and dryfarmed field crops. Rice, alfalfa, sugar beets, tomatoes, asparagus, irrigated pasture, and safflower are the main crops. The soils are also used for recreation areas and as wildlife habitat. The wildlife is mainly upland game.

6. Willows-Pescadero association

Poorly drained, nearly level, saline-alkali silty clay loams to clays; in basins

This association consists of poorly drained, saline-alkali silty clay loams and clays in basins. These soils formed in alluvium from mixed and sedimentary rocks. In a few areas soil drainage has been improved. Because of a flowage easement, other areas are subject to flooding once in 3 years. Slopes are less than 1 percent. Elevation ranges from sea level to 100 feet above sea level, and the annual rainfall from 16 to 20 inches. The annual temperature is 60° to 62° F., and the frost-free season is about 280 days. In areas not cultivated the vegetation is annual grasses, forbs, salt grass, pickleweed, and other salt-tolerant plants.

This association makes up about 4 percent of the county. Willows soils make up 50 percent of this association; Pescadero soils, about 35 percent; and minor soils, the remaining 15 percent.

Willows soils have a surface layer of mottled gray and olive-gray clay or silty clay loam and a substratum of mottled olive-gray clay. Pescadero soils have a surface layer of light-gray silty clay loam or silty clay; a subsoil of gray, light olive-gray, and pale-brown silty clay and silty clay loam; and a substratum of mottled pale-brown and very pale-brown clay loam and silt loam.

Minor soils of this association are the Lang, Laugenour, and Sacramento.

The soils of this association are used chiefly for alkali-tolerant, irrigated row crops, field crops, and pasture plants and as wildlife habitat. Rice and sugar beets are the main crops. The soils are also used for dryfarmed grain and field crops, dryland pasture, and recreational areas. The wildlife is mainly waterfowl.

7. Capay-Sacramento association

Moderately well drained to poorly drained, nearly level silty clay loams to clays; in basins

This association consists of moderately well drained to poorly drained silty clays, silty clay loams, or clays in basins in the Yolo By-Pass. These soils formed in alluvium from mixed sources. Most of the areas are subject to flooding once in 3 years because of a flowage easement. Slopes are less than 1 percent. Elevation ranges from 5 feet below sea level to about 60 feet above sea level. The annual rainfall is 16 to 20 inches, the annual temperature is 60° to 62° F., and the frost-free season is 275 to 280 days. In areas not cultivated the vegetation is annual grasses and forbs.

This association makes up about 9 percent of the county. Capay soils make up about 45 percent of the association; Sacramento soils, about 40 percent; and minor soils, the remaining 15 percent.

Capay soils are moderately well drained and have a surface layer of grayish-brown and dark grayish-brown silty clay and a substratum of pale-brown silty clay. Sacramento soils are poorly drained and have a surface layer of mottled gray clay or silty clay loam and a substratum of mottled gray clay.

Minor soils of this association are the Lang, Laugenour, and Sycamore.

The soils of this association are used chiefly for summer irrigated row crops, field crops, and pasture and for dryfarmed field crops and grain. Sugar beets, grain sorghum, rice, and safflower are the main crops. The soils are also used for recreation and as wildlife habitat. Waterfowl and upland game are the main wildlife.

Somewhat Excessively Drained to Well-Drained Soils on Uplands and High Terraces

These soils are somewhat excessively drained and well-drained loams or gravelly loams to clays. They formed on uplands or terraces in material weathered from sandstone, shale, and siltstone. Slopes range from 2 to 75 percent. Elevation ranges from 15 to 3,000 feet, and the annual rainfall from 16 to 24 inches. The annual temperature is 59° to 61° F., and the frost-free season is 230 to 280 days.

Five of the associations in Yolo County are on uplands and high terraces. They make up about 37 percent of the county.

8. *Corning-Hillgate association*

Well-drained, gently sloping to moderately steep gravelly loams or loams; on terraces

This association consists of well-drained gravelly loams and loams on terraces. These soils formed in alluvium from sedimentary rock and mixed sources. They have a very slowly permeable subsoil at a depth between 10 and 30 inches. Slopes range from 2 to 30 percent. Elevation ranges from 15 to 600 feet, and the annual rainfall ranges from 16 to 20 inches. The annual temperature is about 61° F., and the frost-free season is 265 to 280 days. The vegetation is chiefly annual grasses and forbs, though a few oaks grow in scattered areas and patches of brush occur in a few places.

This association makes up about 7 percent of the county. Corning soils make up about 50 percent of the association; Hillgate soils, about 20 percent; and minor soils, the remaining 30 percent.

Corning soils have a surface layer of light-brown gravelly loam and loam and a subsoil of red, reddish-yellow, and yellowish-red clay and very gravelly clay. The substratum is reddish-yellow very gravelly clay. Hillgate soils have a surface layer of brown loam, a subsoil of strong-brown clay, and a substratum of yellowish-brown clay loam. Depth to the clay subsoil in both the Corning and Hillgate soils ranges from 10 to 30 inches.

Minor soils of this association are the Positas, San Ysidro, and Sehorn. Also in this association are a few areas of soil that are moderately deep over clay subsoil, and a few severely eroded areas where the clay subsoil is exposed.

The soils of this association are used chiefly for dry-farmed grain, pasture, range, recreation areas, and as wildlife habitat. Barley is the main grain grown. The wildlife is mainly upland game.

9. *Sehorn-Balcom association*

Well-drained, gently sloping to steep silty clay loams and clays; on sandstone

This association consists of well-drained silty clay loams and clays on dissected uplands. These soils formed in softly consolidated sediment. Slopes range from 2 to 50 percent. Elevation ranges from 100 to 2,000 feet, and the annual rainfall from 17 to 24 inches. The annual temperature is about 61° F., and the frost-free season is about 250 days. In areas not cultivated the vegetation is annual grasses and forbs.

This association makes up about 9 percent of the county. Sehorn soils make up about 55 percent of the association; Balcom soils, about 30 percent; and minor soils, the remaining 15 percent.

Sehorn soils are well drained and have a surface layer of grayish-brown and olive-gray clay or cobbly clay underlain by olive-gray clay. Below, at a depth of 24 to 60 inches, is olive-gray, soft, fine-grained sandstone. Balcom soils are well drained and have a surface layer of pale-brown silty clay loam, underlain by mottled very pale brown silty clay loam. Depth to mottled pale-brown, soft, calcareous sandstone is 10 to 47 inches.

Minor soils of this association are the Corning, Millsholm, and Positas.

The soils of this association are used chiefly for dry-farmed field crops, dryland pasture, range, recreation areas, and as wildlife habitat. Barley is the main small grain grown. The wildlife is mainly upland game.

10. *Dibble-Millsholm association*

Well-drained, steep to very steep loams to silty clay loams; over sandstone

This association consists of well-drained clay loams and silty clay loams on dissected terraces and uplands. These soils are underlain by sandstone and shale. Slopes range from 30 to 75 percent. Elevation ranges from 300 to 2,500 feet, and the annual rainfall from 17 to 24 inches. The annual temperature is 59° to 61° F., and the frost-free season ranges from 230 to 250 days. The vegetation is mainly annual grasses and forbs, but oak and perennial grasses grow in places.

This association makes up about 12 percent of the county. Dibble soils make up about 45 percent of the association; Millsholm soils, about 40 percent; and minor soils, the remaining 15 percent.

Dibble soils have a surface layer of brown clay loam. They have a subsoil of yellowish-brown and light olive-brown silty clay and clay that is underlain by pale-olive very fine sandstone at a depth of 20 to 36 inches. Millsholm soils have a surface layer of light brownish-gray loam. They have a subsoil of pale-brown loam and stony loam underlain by light brownish-gray shattered shale at a depth of 10 to 25 inches. Exposed bedrock covers 2 to 10 percent of the surface of Millsholm soils.

Minor soils of this association are the Balcom and Positas.

The soils of this association are used for range, recreation areas, and as wildlife habitat. The wildlife is mainly deer.

11. *Positas association*

Well-drained, moderately steep to steep gravelly loams; on old alluvium

This association consists of well-drained gravelly loams on dissected terraces. These soils have a very slowly permeable gravelly clay subsoil. Slopes range from 15 to 50 percent. Elevation ranges from 400 to 1,500 feet, and the annual rainfall from 18 to 24 inches. The annual temperature is about 60° F., and the frost-free season is about 230 days. The vegetation is annual grasses, forbs, scattered oaks, and patches of brush.

This association makes up about 3 percent of the county. Positas soils make up about 80 percent of the association, and minor soils the remaining 20 percent.

Positas soils have a surface layer of brown gravelly loam and gravelly sandy clay loam and a subsoil of yellowish-red gravelly clay and reddish-brown very gravelly clay.

Minor soils in this association are the Balcom and Millsholm.

The soils in this association are used for range, for recreation and watershed areas, and as wildlife habitat. The wildlife is mainly deer.

12. *Rock land association*

Steep to very steep areas that are 50 to 90 percent rock outcrops

This association consists of bare rock and of areas of sandy loam that are very shallow to sandstone and shale. Slopes range from 30 to 75 percent. Elevation ranges from 500 to 3,000 feet, and the annual rainfall from 20 to 24 inches. The annual temperature is about 61° F., and the frost-free season is about 230 days. In areas that have sufficient soil material to support plants, the vegetation is chamise.

This association makes up about 6 percent of the county. Rock land makes up about 85 percent of this association, and minor soils the remaining 15 percent.

Exposed bedrock covers 50 to 90 percent of the surface of the land in this association. In places a very thin mantle of brown to light yellowish-brown sandy loam covers sandstone, shale, or serpentine bedrock.

Minor soils of this association are the Millsholm and Positas.

This land type is used as wildlife habitat and for recreation and watershed areas. The wildlife is mainly deer.

Descriptions of the Soils

This section provides detailed information about the soils in Yolo County. It describes each soil series, and then each soil, or mapping unit. The soils are described in alphabetical order.

The description of a soil series mentions features that apply to all of the soils of that series. Differences among the soils of one series are pointed out in the descriptions of the individual soils, or are apparent in the name.

A profile representative of each series is described in detail in the first mapping unit. This representative profile is for scientists, engineers, and others who need to make highly technical soil interpretations. The layers, or horizons, are designated by symbols such as A1, B21t, and C1. These symbols have special meaning for soil scientists. Many readers, however, need only remember that symbols beginning with "A" are for surface layer; those with "B" are for subsoil; those with "C" are for substratum, or parent material; and those with "R" are for bedrock. All measurements refer to depth from the surface.

The color of each horizon is described in words, such as yellowish brown, and is also indicated by symbols for hue, value, and chroma, such as 10YR 5/4. These symbols, which are called Munsell color notations, are used by soil scientists to evaluate the color of the soil precisely (*25*) [1]. Unless otherwise stated, all color terms in the survey are for dry soil.

The texture of the soil refers to the content of sand, silt, and clay. It is determined by the way the soil feels when rubbed between the fingers, and it is identified by a textural class name, such as "fine sandy loam." This name refers to the texture of the surface layer or A horizon.

[1] Italic numbers in parentheses refer to Literature Cited, page 100.

The structure is indicated by the way the individual soil particles are arranged in larger grains, or aggregates, and the amount of pore space between grains. The structure of the soil is described by terms that denote strength or grade, size, and shape of soil materials such as "weak, fine, angular blocky structure."

Boundaries between the horizons are described so as to indicate their thickness and shape. The terms for thickness are *abrupt*, *clear*, *gradual*, and *diffuse*. The shape of the boundary is described as *smooth*, *wavy*, *irregular*, or *broken*.

Other terms used for describing the soils are defined in the Glossary. For more general information about the soils, the reader can refer to the section "General Soil Map," in which the broad patterns of soils are described. The approximate acreage and proportionate extent of the soils are given in table 1, and their location and extent are shown on the detailed soil map at the back of this survey.

Arbuckle Series

The Arbuckle series consists of well-drained gravelly loams on alluvial fans. These soils have a subsoil of dominantly gravelly clay loam and gravelly sandy clay loam. Slopes range from 0 to 5 percent. The soils formed in alluvium from mixed sources. Elevation ranges from 50 to 400 feet. Annual rainfall is 16 to 18 inches, annual temperature is 61° F., and the frost-free season is about 265 days. In uncultivated areas the vegetation is annual grasses, forbs, and oak trees and brush in some areas. Arbuckle soils are associated principally with Tehama and Zamora soils.

In a typical profile, the surface layer is brown, pale-brown, and light yellowish-brown gravelly loam about 10 inches thick. The subsoil is light yellowish-brown and brown gravelly heavy loam, gravelly light clay loam, and very gravelly sandy clay loam about 36 inches thick. This is underlain by brown very gravelly sandy clay loam that extends to a depth of more than 60 inches.

Arbuckle soils are used for orchards, irrigated row crops, forage crops, dryfarmed grain, pasture, wildlife habitat, and recreation.

Arbuckle gravelly loam, 2 to 5 percent slopes (AaB).—This soil is on alluvial fans.

Representative profile, in a barley stubble field on a west-facing slope of 3 percent, 50 feet west and 156 feet north of the southeast corner of sec. 2, T. 12 N., R. 2 W., Mount Diablo Base Meridian, about 5 miles northwest of Dunnigan; the profile, when examined, was moist throughout, and the water table was at a depth of 61 inches:

Ap1—0 to 3 inches, brown (10YR 5/3) gravelly loam, dark yellowish brown (10YR 3/4) when moist; moderate, fine, granular structure; soft, very friable, nonsticky and nonplastic; many micro and very fine interstitial and vesicular pores; medium acid (pH 6.0); gradual, smooth lower boundary. (3 to 5 inches thick)

Ap2—3 to 10 inches, pale-brown (10YR 6/3) and light yellowish-brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 3/4) when moist; weak, fine, angular blocky structure; soft, very friable, nonsticky and nonplastic; common micro and very fine roots concentrated along vertical ped faces; many very fine interstitial and vesicular pores; medium acid (pH 6.0); abrupt, wavy lower boundary. (5 to 7 inches thick)

AB—10 to 14 inches, light yellowish-brown (10YR 6/4) gravelly heavy loam, brown (7.5YR 4/4) when moist; weak, fine, angular blocky structure; soft, very friable, slightly sticky and nonplastic; common micro and very fine roots concentrated along vertical ped faces; common very fine interstitial and vesicular pores; few thin clay films in pores and on ped faces; slightly acid (pH 6.5); gradual, smooth lower boundary. (2 to 4 inches thick)

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

Soil	Area	Extent
	Acres	*Percent*
Arbuckle gravelly loam, 0 to 2 percent slopes	2, 275	0. 3
Arbuckle gravelly loam, 2 to 5 percent slopes	1, 447	. 2
Balcom silty clay loam, 5 to 15 percent slopes, severely eroded	265	[1]
Balcom silty clay loam, 15 to 30 percent slopes, eroded	4, 550	. 7
Balcom silty clay loam, 30 to 50 percent slopes, eroded	13, 076	2. 0
Balcom silty clay loam, 50 to 75 percent slopes, severely eroded	266	[1]
Balcom-Dibble complex, 30 to 50 percent slopes, eroded	16, 560	2. 5
Brentwood silty clay loam, 0 to 2 percent slopes	24, 663	3. 7
Capay silty clay	36, 460	5. 5
Capay silty clay, flooded	1, 876	. 3
Capay soils, flooded	11, 055	1. 7
Clear Lake silty clay loam	360	. 1
Clear Lake clay	7, 165	1. 1
Clear Lake soils, flooded	11, 515	1. 7
Climara clay, 2 to 30 percent slopes, eroded	324	[1]
Corning gravelly loam, 2 to 15 percent slopes, eroded	22, 810	3. 4
Corning gravelly loam, 15 to 30 percent slopes, eroded	1, 346	. 2
Dibble clay loam, 30 to 50 percent slopes, eroded	22, 133	3. 3
Dibble clay loam, 50 to 75 percent slopes, eroded	2, 695	. 4
Dibble-Millsholm complex, 9 to 30 percent slopes, eroded	764	. 1
Dibble-Millsholm complex, 30 to 50 percent slopes, eroded	1, 816	. 3
Dibble-Millsholm complex, 50 to 75 percent slopes, eroded	7, 321	1. 1
Hillgate loam, 0 to 2 percent slopes	3, 400	. 5
Hillgate loam, 2 to 9 percent slopes, eroded	1, 032	. 2
Hillgate loam, moderately deep, 0 to 2 percent slopes	3, 032	. 5
Hillgate loam, moderately deep, 2 to 9 percent slopes	1, 062	. 2
Lang sandy loam	2, 675	. 4
Lang sandy loam, deep	2, 595	. 4
Lang sandy loam, deep, flooded	320	[1]
Lang silt loam	770	. 1
Laugenour very fine sandy loam	2, 187	. 3
Laugenour very fine sandy loam, flooded	1, 020	. 2
Laugenour very fine sandy loam, deep, flooded	1, 190	. 2
Loamy alluvial land	1, 743	. 3
Made land	3, 820	. 6
Maria silt loam	1, 650	. 2
Maria silt loam, flooded	662	. 1
Maria silt loam, deep	1, 635	. 2
Marvin silty clay loam	22, 372	3. 4
Merritt silty clay loam	2, 465	. 4
Merritt silty clay loam, deep	2, 105	. 3
Merritt silty clay loam, deep, drained	1, 740	. 3
Merritt complex, saline-alkali	656	. 1
Millsholm rocky loam, 15 to 75 percent slopes, eroded	31, 308	4. 7
Myers clay	3, 203	. 5
Omni silty clay loam	520	. 1
Omni silty clay	3, 245	. 5
Pescadero silty clay	830	. 1
Pescadero silty clay, saline-alkali	5, 224	. 8
Pescadero soils, flooded	3, 507	. 5
Positas gravelly loam, 15 to 30 percent slopes, eroded	1, 711	. 3
Positas gravelly loam, 30 to 50 percent slopes, eroded	8, 620	1. 3
Positas gravelly loam, 30 to 50 percent slopes, severely eroded	5, 080	. 8
Reiff very fine sandy loam	6, 678	1. 0
Reiff gravelly loam	1, 813	. 3
Rincon silty clay loam	25, 931	3. 9
Riverwash	4, 148	. 6
Riz loam	1, 172	. 2
Riz loam, flooded	820	. 1
Rock land	36, 199	5. 5
Sacramento silty clay loam	5, 865	. 9
Sacramento silty clay loam, drained	2, 535	. 4
Sacramento clay	36, 783	5. 6
Sacramento clay, drained	2, 055	. 3
Sacramento clay, flooded	370	. 1
Sacramento clay, deep	588	. 1
Sacramento soils, flooded	12, 535	1. 9
San Ysidro loam	5, 085	. 8
Sehorn clay, 2 to 15 percent slopes	5, 721	. 9
Sehorn clay, 15 to 30 percent slopes, eroded	2, 643	. 4
Sehorn clay, 30 to 50 percent slopes, eroded	2, 895	. 4
Sehorn cobbly clay, 2 to 15 percent slopes	2, 102	. 3
Sehorn-Balcom complex, 2 to 15 percent slopes	17, 348	2. 6
Sehorn-Balcom complex, 15 to 30 percent slopes, eroded	17, 616	2. 7
Sehorn-Balcom complex, 30 to 50 percent slopes, eroded	12, 914	1. 9
Soboba gravelly sandy loam	2, 019	. 3
Sycamore silt loam	4, 220	. 6
Sycamore silt loam, drained	6, 407	1. 0
Sycamore silt loam, flooded	2, 213	. 3
Sycamore silty clay loam	5, 702	. 9
Sycamore silty clay loam, drained	7, 758	1. 2
Sycamore complex	3, 325	. 5
Sycamore complex, drained	9, 045	1. 4
Sycamore complex, flooded	5, 785	. 9
Tehama loam, 0 to 2 percent slopes	16, 564	2. 5
Tehama loam, 2 to 5 percent slopes	1, 326	. 2
Tyndall very fine sandy loam	4, 043	. 6
Tyndall very fine sandy loam, drained	1, 940	. 3
Tyndall very fine sandy loam, flooded	755	. 1
Tyndall very fine sandy loam, deep	2, 357	. 4
Tyndall silty clay loam	725	. 1
Valdez silt loam	552	. 1
Valdez silt loam, deep	2, 350	. 4
Valdez complex, flooded	710	. 1
Willows silty clay loam	1, 420	. 2
Willows clay	5, 826	. 9
Willows clay, alkali	2, 809	. 4
Willows clay, alkali, drained	580	. 1
Willows clay, alkali, flooded	2, 957	. 4
Willows soils, flooded	1, 520	. 2
Willows clay, marly variant	1, 499	. 2
Willows clay, marly variant, saline-alkali	535	. 1
Yolo silt loam	42, 422	6. 4
Yolo silty clay loam	4, 983	. 7
Zamora loam	3, 476	. 5
Total	661, 760	100. 0

[1] Less than 0.1 percent; acreage of all soils bearing this footnote totals 0.24 percent of the area.

424–779—72——2

B21t—14 to 27 inches, light yellowish-brown (10YR 6/4) gravelly heavy loam, reddish brown (5YR 4/4) when moist; weak, fine, angular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; few micro and very fine roots concentrated along vertical ped faces; common micro and very fine interstitial and vesicular pores; many thin clay films on ped faces and in pores; slightly acid (pH 6.5); diffuse, wavy lower boundary. (9 to 15 inches thick)

B22t—27 to 36 inches, brown (7.5YR 5/4) gravelly light clay loam, dark reddish brown (5YR 3/4) when moist; moderate, fine, angular blocky structure; hard, friable, slightly sticky and slightly plastic; few micro and very fine roots concentrated along vertical ped faces; many medium interstitial and vesicular pores; continuous moderately thick clay films on ped faces and in pores; neutral (pH 6.8); diffuse, wavy boundary. (7 to 10 inches thick)

B3—36 to 46 inches, brown (7.5YR 5/4) very gravelly sandy clay loam, brown (7.5YR 4/4) when moist; weak, fine, angular blocky structure; hard, friable, slightly sticky and nonplastic; no roots; many medium interstitial and vesicular pores; continuous thin clay films on ped faces and in pores; neutral (pH 7.0); gradual, smooth boundary. (5 to 10 inches thick)

C—46 to 60 inches, brown (7.5YR 5/4) very gravelly sandy clay loam, brown to dark brown (7.5YR 4/4) when moist; massive; slightly hard, friable, slightly sticky and plastic; neutral (pH 7.0).

The A horizon ranges in color from pale brown to brown or light yellowish brown and in texture from gravelly fine sandy loam to gravelly loam that contains 15 to 35 percent gravel. This horizon is medium acid to slightly acid. The B2t horizon ranges in texture from gravelly loam to gravelly clay loam that contains 15 to 35 percent gravel. This horizon is slightly acid to neutral. The C horizon ranges in texture from very gravelly sandy clay loam to very gravelly loam which may be an unrelated, softly consolidated material. Gravel content ranges from 35 to 75 percent.

Included in mapping are small areas of Corning gravelly loam, Tehama loam, and Yolo silt loam. A few areas are also included that contain less than 15 percent gravel in the surface layer.

Permeability of this Arbuckle soil is moderately slow. Surface runoff is slow, and the erosion hazard is slight. The available moisture holding capacity is 6.0 to 7.0 inches. The effective rooting depth is more than 60 inches. Natural fertility is moderate.

This soil is used for almonds, dryland barley, and pasture. Other uses include irrigated alfalfa, grain sorghum, wildlife habitat, and recreation. Capability unit IIe-1 (17).

Arbuckle gravelly loam, 0 to 2 percent slopes (AaA).—This soil is similar to Arbuckle gravelly loam, 2 to 5 percent slopes, except that it is less sloping.

Included in mapping are small areas of Tehama loam, Reiff gravelly loam, and Yolo silt loam.

Surface runoff of this Arbuckle soil is very slow, and the erosion hazard is none to slight.

This soil is used mainly for almonds, irrigated alfalfa, grain sorghum, and tomatoes. Other uses include dryfarmed barley, pasture, wildlife habitat, and recreation. Capability unit IIs-4 (17).

Balcom Series

The Balcom series consists of well-drained, calcareous silty clay loams on uplands. Slopes range from 5 to 75 percent. These soils overlie soft, calcareous sandstone or siltstone at a depth of 1 to 4 feet. Elevation ranges from 300 to 1,000 feet. The annual temperature is 61° F., the annual rainfall is 17 to 20 inches, and the frost-free season is about 250 days. In uncultivated areas the vegetation is annual grasses and, at the higher elevations, scattered oaks. Balcom soils are associated principally with Dibble and Sehorn soils.

In a typical profile, the surface layer is pale-brown, calcareous silty clay loam about 24 inches thick. The next layer is mottled very pale brown and white, highly calcareous silty clay loam about 13 inches thick. This is underlain, at a depth of about 37 inches, by mottled pale-brown and white, soft, calcareous sandstone.

These soils are used for range, for dryfarmed grain and pasture, as wildlife habitat, for watershed, and for recreation.

Balcom silty clay loam, 15 to 30 percent slopes, eroded (BaE2).—This soil is on dissected uplands.

Representative profile on a convex, south-facing slope of 20 percent, located in an annual grass pasture, 2.42 miles west of Road 85 on Road 10 and farm road, 430 feet south of farm road, about 7 miles southwest of Dunnigan; the profile, when examined, was moist below a depth of 1 inch:

Ap—0 to 9 inches, pale-brown (10YR 6/3) silty clay loam, dark grayish brown (10YR 4/2) and brown (10YR 4/3) rubbed when moist; moderate, medium, subangular blocky structure; hard, friable, slightly sticky and plastic; many micro and very fine random roots; many micro and fine tubular pores; moderately alkaline (pH 8.0), strongly effervescent with lime disseminated and segregated in soft masses; clear, wavy boundary. (6 to 10 inches thick)

A1—9 to 24 inches, pale-brown (10YR 6/3) silty clay loam, brown (10YR 4/3) when moist; weak, medium, subangular blocky structure; very hard, friable, sticky and plastic; common micro and very fine random roots; many micro and fine tubular pores; many thin clay films on ped faces; moderately alkaline (pH 8.0), violently effervescent with lime disseminated and segregated in soft masses; clear, wavy boundary. (10 to 20 inches thick)

C1ca—24 to 37 inches, mottled very pale brown (10YR 7/3) and white (10YR 8/2) silty clay loam, yellowish brown (10YR 5/4) and white (10YR 8/2) when moist; massive; slightly hard, friable, sticky and plastic; few micro and very fine random roots; many micro and fine tubular and interstitial pores; moderately alkaline (pH 8.0); violently effervescent with lime disseminated and segregated in irregular shaped concretions; clear, wavy boundary. (10 to 17 inches thick)

C2—37 inches, mottled pale-brown (10YR 6/3) and white (10YR 8/2), soft sandstone, light olive brown (2.5Y 5/4) when moist; massive; moderately alkaline (pH 8.0); strongly effervescent with lime disseminated and segregated in seams and concretions.

The A horizon ranges from light brownish gray to pale brown in color and from silt loam to silty clay loam in texture. This horizon is mildly alkaline to moderately alkaline. The C horizon ranges from pale brown through very pale brown to white, but in many places it is mottled with these colors. The C horizon ranges from loam to silty clay loam in the upper part; in the lower part it consists of softly consolidated sandstone or shale. Depth to softly consolidated material ranges from 26 to 47 inches.

Included in mapping are small areas of Corning gravelly loam, Dibble clay loam, Positas gravelly loam, and Sehorn clay.

Permeability of this Balcom soil is moderately slow. Surface runoff is medium to rapid, and the erosion hazard is moderate to high. The available water holding capacity is 5.0 to 7.0 inches. Effective rooting depth is 26 to 47 inches. Natural fertility is moderate.

This soil is used principally for dryfarmed barley and pasture. Other uses include range, wildlife habitat, and watershed. Capability unit IVe–1 (15); Fine Loamy range site.

Balcom silty clay loam, 5 to 15 percent slopes, severely eroded (BaD3).—This soil is similar to Balcom silty clay loam, 15 to 30 percent slopes, eroded, except that the depth to softly consolidated sandstone or shale is only 10 to 20 inches. Because it is severely eroded, this soil is shallower than Balcom soils recognized elsewhere in California. The present surface layer is light gray or light brownish gray in color.

Included with this soil in mapping are small areas of Corning gravelly loam, Positas gravelly loam, and Sehorn clay. Also included are small areas where softly consolidated sandstone or shale is exposed.

This Balcom soil has medium runoff, and the erosion hazard is moderate. The available water holding capacity is 2.0 to 3.0 inches. The effective rooting depth is 10 to 20 inches. Natural fertility is moderate to low.

This soil is used mainly for pasture and range. Among its other uses are wildlife habitat, recreation, and watershed. Capability unit VIe–1 (15); Fine Loamy range site.

Balcom silty clay loam, 30 to 50 percent slopes, eroded (BaF2).—This soil is similar to Balcom silty clay loam, 15 to 30 percent slopes, eroded, but it is steeper and its depth to softly consolidated sandstone or shale is 20 to 36 inches.

Included in mapping are small areas of Dibble clay loam, Positas gravelly loam, and Sehorn clay.

Runoff is rapid on this Balcom soil, and the hazard of erosion is high. Effective rooting depth is 20 to 36 inches. The available water holding capacity is 4.0 to 5.0 inches.

This soil is used mainly for range. Other uses include wildlife habitat, recreation, and watershed. Capability unit VIe–1 (15); Fine Loamy range site.

Balcom silty clay loam, 50 to 75 percent slopes, severely eroded (BaG3).—This soil is similar to Balcom silty clay loam, 15 to 30 percent slopes, eroded, but it is steeper and more severely eroded and its depth to softly consolidated sandstone or shale is only 10 to 20 inches. The surface layer is light gray to light brownish gray. Because of severe erosion, this soil is shallower than Balcom soils recognized elsewhere in California.

Included in mapping are small areas of Dibble clay loam, Positas gravelly loam, and Sehorn clay. Also, there are small included areas in which softly consolidated sandstone or shale is exposed.

Surface runoff is very rapid, and the hazard of erosion is very high. The available water holding capacity is 2.0 to 3.0 inches. The effective rooting depth is 10 to 20 inches. Natural fertility is low.

This soil is used for wildlife habitat, recreation, and watershed. Capability unit VIIIe–1 (15).

Balcom-Dibble complex, 30 to 50 percent slopes, eroded (BdF2).—This mapping unit is about 45 percent Balcom silty clay loam, eroded; about 40 percent Dibble clay loam, eroded; and 15 percent small areas of other soils included in mapping.

The Balcom soil is similar to Balcom silty clay loam, 15 to 30 percent slopes, eroded, except that the depth to softly consolidated sandstone or shale is 20 to 36 inches. The Dibble soil is similar to Dibble clay loam, 30 to 50 percent slopes, which is described under the Dibble series.

Soils of this complex are used mainly for range. Other uses include wildlife habitat, recreation, and watershed. Capability unit VIe–1 (15); Fine Loamy range site.

Brentwood Series

The Brentwood series consists of well-drained silty clay loams on alluvial fans. Slopes range from 0 to 2 percent. These soils formed in alluvium from sedimentary rocks. Elevation ranges from 50 to 400 feet. The annual temperature is 62° F., annual rainfall is 16 to 20 inches, and the frost-free season is about 280 days. In uncultivated areas the vegetation is annual grasses and forbs. Brentwood soils are associated principally with Yolo and Zamora soils.

In a typical profile, the surface layer is grayish-brown silty clay loam about 10 inches thick. The subsoil is grayish-brown heavy silty clay loam and silt loam about 25 inches thick. This is underlain by pale-brown silty clay loam that extends to a depth of more than 60 inches.

Brentwood soils are used for irrigated orchards, row crops, forage crops, dryfarmed small grain, wildlife habitat, and recreation.

Brentwood silty clay loam, 0 to 2 percent slopes (BrA).—This soil is on alluvial fans. The average slope is less than 1 percent.

Representative profile, in a field that had been treated with beet lime, 0.5 mile west of Road 96B, 0.5 mile south of Road 17, and 10 feet south of field road, about 1 mile west of the town of Yolo; the profile, when examined, was moist below a depth of 10 inches:

Ap1—0 to 4 inches, grayish-brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) when moist; massive; hard, friable, sticky and slightly plastic; common micro random roots and common medium and coarse vertical roots; common micro interstitial and tubular pores; mildly alkaline (pH 7.5); abrupt, smooth boundary. (3 to 10 inches thick)

Ap2—4 to 10 inches, grayish-brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) when moist; moderate, medium and coarse, subangular blocky structure; hard, friable, sticky and plastic; common micro and fine random roots and common medium and coarse vertical roots; common very fine vesicular, interstitial, and tubular pores; moderately alkaline (pH 8.0); very slightly effervescent; clear, wavy boundary. (4 to 7 inches thick)

B21—10 to 15 inches, grayish-brown (10YR 5/2) heavy silty clay loam, very dark grayish brown (10YR 3/2) when moist; weak, coarse, subangular blocky structure; hard, friable, slightly sticky and plastic; common micro and very fine random roots and common medium and coarse vertical roots; common micro interstitial and tubular pores; few thin clay films on ped faces and common moderately thick clay films in pores; moderately alkaline (pH 8.0); strongly effervescent; gradual, wavy boundary. (4 to 10 inches thick)

B22—15 to 20 inches, grayish-brown (10YR 5/2) heavy silty clay loam, very dark grayish brown (10YR 3/2) when moist; weak, coarse, subangular blocky structure; hard, friable, slightly sticky and slightly plastic;

common micro and very fine random roots and common medium and coarse vertical roots; common very fine vesicular and tubular pores; few thin clay films on ped faces and few moderately thick clay films in pores; moderately alkaline (pH 8.0); very slightly effervescent; clear, wavy boundary. (4 to 6 inches thick)

B3—20 to 35 inches, grayish-brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) when moist; massive; hard, very friable, nonsticky and slightly plastic; common micro and very fine random roots and common medium and coarse vertical roots; many very fine and fine vesicular, interstitial, and tubular pores; common thin clay films in pores; moderately alkaline (pH 8.0); slightly effervescent; 3-inch krotovina present, filled with surface material; gradual, smooth boundary. (10 to 20 inches thick)

C—35 to 60 inches, pale-brown (10YR 6/3) silty clay loam, dark brown (10YR 4/3) when moist; massive; hard, very friable, slightly sticky and plastic; common micro and very fine random roots and common medium and coarse vertical roots; many very fine and fine vesicular, interstitial, and tubular pores; few thin clay films in pores; moderately alkaline (pH 8.0); very slightly effervescent.

The A horizon ranges in color from grayish brown to dark brown and dark grayish brown and in texture from silty clay loam to light silty clay. This horizon is neutral to moderately alkaline. The B2 horizon ranges in color from grayish brown to dark grayish brown to yellowish brown and in texture from heavy silty clay loam to light clay that contains more than 35 percent clay, becoming coarser with depth. This horizon is neutral to moderately alkaline. The C horizon ranges in color from pale brown to light yellowish brown to yellowish brown. This horizon is neutral to moderately alkaline. A few faint mottles may occur below a depth of 36 inches.

Included in mapping are small areas of Myers clay, Rincon silty clay loam, Yolo silty clay loam, and Zamora loam. Also included are some areas where the surface layer is pale brown. Some areas are also included where slopes range up to 5 percent.

Permeability of this Brentwood soil is moderately slow. Runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 11.0 to 13.0 inches. The effective rooting depth is more than 60 inches. Natural fertility is high.

This soil is used mainly for irrigated almonds, walnuts, sugar beets, tomatoes, alfalfa, and dryland barley. Other uses include wildlife habitat and recreation. Capability unit I–1 (17).

Capay Series

The Capay series consists of moderately well drained silty clays that occupy basin rims. Slopes range from 0 to 2 percent. These soils formed in alluvium from sedimentary rock sources. Elevation ranges from 10 to 300 feet. Annual temperature is 62° F., annual rainfall is 16 to 20 inches, and the frost-free season is about 280 days. In uncultivated areas the vegetation is annual grasses and forbs. Capay soils are associated principally with Marvin and Rincon soils.

In a typical profile, the soil is grayish-brown, dark grayish-brown, and pale-brown silty clay that extends to a depth of more than 60 inches.

Capay soils are used for irrigated row crops, field crops, dryfarmed grain, and wildlife habitat.

Capay silty clay (Ca).—This soil is on basin rims. Average slope is less than 1 percent.

Representative profile in a sudangrass field, 100 feet south of the northeast corner of the NW¼ SW¼ of sec. 2, T. 9 N., R. 1 W., Mount Diablo Base Meridian, about 9 miles west of Woodland; the profile, when examined, was moist below a depth of 5 inches. Mottling in the A horizon is a result of previous rice culture:

Ap—0 to 11 inches, grayish-brown (2.5Y 5/2) silty clay; common, fine, faint, brown (7.5YR 5/4) mottles; very dark grayish brown (2.5Y 3/2) and common, fine, distinct mottles of dark brown (7.5YR 4/4) when moist; moderate, very coarse, prismatic structure; hard, very firm, sticky and very plastic; common micro and very fine and few fine random roots; common micro vesicular and interstitial pores; moderately alkaline (pH 8.0); clear, smooth boundary. (8 to 14 inches thick)

A11—11 to 18 inches, grayish-brown (2.5Y 5/2) silty clay; common, fine, distinct, yellowish-brown (10YR 5/6) mottles; very dark grayish brown (2.5Y 3/2) and common, fine, distinct, dark-brown (10YR 4/3) mottles when moist; moderate, very coarse, prismatic structure; very hard, very firm, sticky and very plastic; common micro and very fine random roots; common micro tubular pores; mildly alkaline (pH 7.5); gradual, wavy boundary. (6 to 10 inches thick)

A12—18 to 36 inches, dark grayish-brown (2.5Y 4/2) silty clay; very dark grayish brown (2.5Y 3/2) when moist; moderate, very coarse, prismatic structure; very hard, very firm, sticky and very plastic; few micro and very fine random roots; common micro tubular pores; many prominent intersecting slickensides; moderately alkaline (pH 8.0); clear, wavy boundary. (15 to 20 inches thick)

ACca—36 to 49 inches, grayish-brown (10YR 5/2) silty clay; dark grayish brown (2.5Y 4/2) and very dark grayish-brown (2.5Y 3/2) cleavage faces when moist; massive; very hard, very firm, sticky and very plastic; few micro and very fine random roots; common micro tubular pores; many prominent intersecting slickensides; moderately alkaline (pH 8.2); strongly effervescent with lime occurring in concretions; gradual, wavy boundary. (10 to 18 inches thick)

C—49 to 64 inches, pale-brown (10YR 6/3) silty clay, brown (10YR 4/3) when moist; massive; very hard, very firm, sticky and plastic; few micro random roots; common micro tubular pores; many prominent intersecting slickensides; moderately alkaline (pH 8.3); slightly effervescent with disseminated lime.

The A horizon ranges in color from dark gray to dark grayish brown to grayish brown; the clay content ranges from 40 to 55 percent. This horizon is neutral to moderately alkaline. The C horizon ranges in color from grayish brown to dark yellowish brown to light olive brown to pale brown and in texture from silty clay to silty clay loam. Mottling may be present below a depth of 30 inches; where rice has been grown it may occur above a depth of 20 inches. Depth to calcareous material ranges from 20 to 36 inches. Some uncultivated areas have a bleached crust on the surface.

Included in mapping are small areas of Clear Lake clay, Marvin silty clay loam, Myers clay, and Willows clay. Some areas are also included that have lime throughout the profile.

Permeability of this Capay soil is slow. Surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 6.5 to 8.0 inches. The effective rooting depth is more than 60 inches. Natural fertility is high.

This soil is used principally for irrigated sugar beets, tomatoes, rice, dryfarmed barley, and dryfarmed safflower. Other uses include irrigated pasture, wildlife habitat, and recreation. Capability unit IIs–5 (17).

Capay silty clay, flooded (Cb).—This soil is similar to Capay silty clay, except that it is subject to flooding on an average of at least 1 year out of 2 for a duration of more than 48 hours.

Included in mapping are small areas of Clear Lake clay, Marvin silty clay loam, and Willows clay.

This soil is in the Yolo By-Pass and is used mainly for rice, safflower, tomatoes, grain sorghum, and sugar beets and as pasture. Other uses include wildlife habitat and recreation. Capability unit IVw-5 (17).

Capay soils, flooded (Cc).—These soils are similar to Capay silty clay, except that in some areas they have 8 to 20 inches of light grayish-brown overwash material that ranges in texture from sandy loam to silty clay. These soils are subject to flooding at least 1 year out of 3 because of flowage easements.

Included in mapping are areas of Clear Lake soils, flooded; Sacramento soils, flooded; and Willows soils, flooded.

These Capay soils are subject to deposition.

These soils are in the Yolo By-Pass and are used mainly for rice, dryfarmed safflower, grain sorghum, tomatoes, sugar beets, and pasture. Other uses include wildlife habitat and recreation. Capability unit IVw-3 (17).

Clear Lake Series

The Clear Lake series consists of poorly drained clays in basins. Slopes range from 0 to 2 percent. The soils formed in alluvium mainly from sedimentary rock. Elevation ranges from 10 to 400 feet. Annual temperature is 62° F., annual rainfall is 16 to 20 inches, and the frost-free season is about 280 days. In uncultivated areas the vegetation is annual grasses and forbs. Clear Lake soils are associated principally with Sacramento and Willows soils.

In a typical profile, the surface layer is dark-gray clay about 25 inches thick. Below this is very dark gray clay about 10 inches thick. It is underlain by olive-gray clay that extends to a depth of more than 60 inches.

Clear Lake soils are used for irrigated row crops, field crops, pasture, dryfarmed field crops, wildlife habitat, and recreation.

Clear Lake clay (Ck).—This soil occurs in basins. Slopes are less than 1 percent.

Representative profile in an alfalfa field that was formerly a rice field, 4,700 feet east and 1,600 feet south of the corner of County Roads 102 and 14, on the west side of field road, about 1.5 miles south of Knights Landing; the profile, when examined, was moist below a depth of 5 inches:

Ap1—0 to 3 inches, dark-gray (5Y 4/1) clay, black (5Y 2/1) when moist; common, fine, faint, black (N 2/0) mottles and a few, fine, prominent, dark-brown (7.5YR 4/4) mottles; moderate, medium, subangular blocky structure; slightly hard, friable, sticky and very plastic; many micro and very fine random roots; many very fine tubular and interstitial pores; mildly alkaline (pH 7.5); clear, smooth boundary. (2 to 10 inches thick)

Ap2—3 to 15 inches, dark-gray (5Y 4/1) clay, black (5Y 2/1) when moist; common, fine, prominent, reddish-brown (5YR 4/4) mottles and dark olive-gray (5Y 3/2) slickensides; strong, coarse, prismatic structure; hard, friable, sticky and very plastic; many micro and very fine random roots; many very fine tubular and interstitial pores; moderately alkaline (pH 8.2); gradual, wavy boundary. (5 to 15 inches thick)

A1—15 to 25 inches, dark-gray (5Y 4/1) clay, very dark gray (5Y 3/1) when moist; common, fine, prominent, dark reddish-brown (5YR 3/4) mottles; moderate, coarse, prismatic structure; hard, friable, sticky and very plastic; common micro and very fine random roots; common very fine tubular pores; few slickensides; moderately alkaline (pH 8.4); very slightly effervescent with disseminated lime; clear, wavy boundary. (8 to 12 inches thick)

AC—25 to 35 inches, very dark gray (5Y 3/1) clay, black (5Y 2/1) when moist; few, fine, prominent, reddish-brown (5YR 5/4) mottles; massive; hard, friable, sticky and very plastic; common micro and very fine vertical roots; common very fine tubular pores; few slickensides; moderately alkaline (pH 8.4); slightly effervescent with disseminated lime; diffuse, wavy boundary. (8 to 15 inches thick)

C—35 to 60 inches, olive-gray (5Y 4/2) clay, dark olive gray (5Y 3/2) when moist and has few, fine, prominent, dark-brown (7.5YR 4/4) mottles; massive; hard, friable, sticky and very plastic; few micro and very fine vertical roots; common very fine tubular pores; many prominent slickensides; moderately alkaline (pH 8.4); strongly effervescent with disseminated lime.

The A horizon ranges in color from gray to very dark gray. Mottles occur at times in areas subject to overflow or where rice has been grown. This horizon is neutral to moderately alkaline. Depth to the calcareous material varies from 0 to 30 inches. Intersecting slickensides are few to common. The C horizon ranges in color from olive gray to light yellowish brown to pale olive. The horizon is mildly alkaline to moderately alkaline, and it is typically calcareous. Intersecting slickensides are many to common.

Included in mapping are small areas of Capay silty clay, Riz loam, Sacramento clay, Willows clay, and Willows clay, marly variant.

The drainage of this Clear Lake soil has been improved by land leveling and open drains. Permeability is slow. Surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 8.0 to 10.0 inches, and the effective rooting depth is more than 60 inches in areas that have been drained. Natural fertility is high.

This soil is used mainly for irrigated alfalfa, sugar beets, tomatoes, rice, and dryland safflower. Other uses include irrigated pasture, wildlife habitat, and recreation. Capability unit IIs-5 (17).

Clear Lake silty clay loam (Ch).—This soil is similar to Clear Lake clay, except that it has 8 to 20 inches of light grayish-brown to grayish-brown silty clay loam material that overlies the clay.

Included in mapping are small areas of Willows silty clay loam and a few areas that have more than 20 inches of overwash material.

Natural fertility of this soil is moderately high.

This soil is used mainly for rice, sugar beets, and safflower. Other uses include alfalfa, tomatoes, grains, pasture, wildlife habitat, and recreation. Capability unit IIs-3 (17).

Clear Lake soils, flooded (Cn).—These soils are similar to Clear Lake clay, except that they have 8 to 20 inches of overwash material that ranges in texture from sandy loam to silty clay and in color from light brownish gray to grayish brown. They are also subject to flooding at least 1 year out of 3 because of flowage easements.

Included in mapping are areas of Capay soils, flooded; Sacramento soils, flooded; and Willows soils, flooded.

These poorly drained Clear Lake soils have a deposition and erosion hazard. Natural fertility is moderately high.

These soils are in the Yolo By-Pass and are used mainly for rice, sugar beets, grain sorghum, pasture, and dryland safflower. Other uses include wildlife habitat and recreation. Capability unit IVw-3 (17).

Climara Series

The Climara series consists of well-drained clays on uplands. Slopes range from 2 to 30 percent. The soils formed in colluvium from sedimentary and serpentine rocks that overlie serpentine bedrock at a depth of 3 to 4 feet. Elevation ranges from 1,400 to 1,600 feet. The annual temperature is 59° F., annual rainfall is 20 to 24 inches, and the frost-free season is about 225 days. The vegetation is annual grasses, forbs, and scattered oaks and patches of brush. Climara soils are associated principally with Dibble and Millsholm soils.

In a typical profile, the surface layer is very dark gray, grayish-brown, and olive-gray clay about 22 inches thick. The substratum is light olive-gray clay about 27 inches thick. This is underlain by serpentine bedrock.

Climara soils are used for pasture, native hay, wildlife habitat, recreation, and watershed.

Climara clay, 2 to 30 percent slopes, eroded (CrE2).—This soil is on uplands. The dominant slopes are 20 to 25 percent.

Representative profile, on a south-facing slope of 25 percent, vegetation consisting of annual grasses, 0.5 mile east of the Reed mine in the northwest corner of the county, southeast corner of the NE¼NW¼ of sec. 25, T. 12 N., R. 5 W., Mount Diablo Base Meridian; the profile, when examined, was dry. Fragments of serpentine rock occur throughout the profile:

A11—0 to 2 inches, very dark gray (10YR 3/1) clay, black (10YR 2/1) when moist; strong, medium, subangular blocky structure; hard, friable, nonsticky and plastic; many, fine, random, inped and exped roots; common, fine, random continuous pores; moderately alkaline (pH 8.0); clear, wavy boundary. (1 to 2 inches thick)

A12—2 to 7 inches, grayish-brown (2.5Y 5/2) clay, very dark grayish brown (2.5Y 3/2) when moist; strong, coarse, prismatic structure; hard, friable, slightly sticky and plastic; many, fine, random, inped and exped roots; common, fine, random, continuous pores; many slickensides; moderately alkaline (pH 8.0); gradual, wavy boundary. (3 to 6 inches thick)

A13—7 to 22 inches, olive-gray (5Y 5/2) clay, dark olive gray (5Y 3/2) when moist; strong, coarse, prismatic structure; very hard, firm, slightly sticky and very plastic; common, fine, vertical, inped and exped roots; common, fine, continuous, random pores; many slickensides; moderately alkaline (pH 8.0); diffuse, wavy boundary. (10 to 16 inches thick)

AC—22 to 40 inches, light olive-gray (5Y 6/2) clay, dark olive gray (5Y 3/2) when moist; strong, coarse, prismatic structure; extremely hard, very firm, slightly sticky and very plastic; common, fine, vertical, exped roots; no pores; many slickensides; slightly effervescent; moderately alkaline (pH 8.0); diffuse, wavy boundary. (15 to 20 inches thick)

Cca—40 to 49 inches, light olive-gray (5Y 6/2) clay, dark olive gray (5Y 3/2) when moist; massive; hard, firm, nonsticky and plastic; violently effervescent; moderately alkaline (pH 8.0); abrupt, wavy boundary. (6 to 10 inches thick)

R—49 inches, serpentine bedrock.

The A horizon ranges in texture from heavy clay loam to clay. The C horizon ranges in color from light olive gray to pale olive. Depth to the serpentine bedrock ranges from 35 to 54 inches.

Included in mapping are small areas of Millsholm rocky loam and Rock land.

Permeability of this Climara soil is slow. Surface runoff is slow to rapid, and the erosion hazard is slight to high. The available water holding capacity is 5.0 to 9.0 inches. The effective rooting depth is 35 to 54 inches. Natural fertility is low.

This soil is used for pasture, dryland hay, grain, and range. Other uses include wildlife habitat, recreation, and watershed. Capability unit IVe-5 (15); Clayey range site.

Corning Series

The Corning series consists of well-drained gravelly loams on dissected terraces. These soils have a subsoil of clay. Slopes range from 2 to 30 percent. The soils formed in softly consolidated, mixed gravelly alluvium. Elevation ranges from 125 to 600 feet. The annual temperature is 61° F., annual rainfall is 16 to 20 inches, and the frost-free season is about 265 days. Vegetation is chiefly annual grasses, forbs, and a few scattered oaks and patches of brush. The Corning soils are associated principally with Sehorn and Balcom soils.

In a typical profile, the surface layer is light-brown gravelly loam and loam about 14 inches thick. The subsoil is red and reddish-yellow clay and yellowish-red very gravelly clay about 24 inches thick. This is underlain by reddish-yellow very gravelly clay.

Corning soils are used for dryfarmed grain and pasture, for range, as wildlife habitat, as watershed, and for recreation.

Corning gravelly loam, 2 to 15 percent slopes, eroded (CtD2).—This soil is on terraces.

Representative profile on an east-facing slope of 5 percent, 0.15 mile north of Road 23 and 160 feet west of the center of Road 85B in T. 10 N., R. 2 W., Mount Diablo Base Meridian, about one-eighth mile southwest of Esparto; the profile, when examined, was moist throughout:

Ap—0 to 6 inches, light-brown (7.5YR 6/4) gravelly loam, brown (7.5YR 4/2) when moist; weak, medium, angular blocky structure; hard, friable, slightly sticky and plastic; many micro and common very fine vertical roots; common micro and very fine vesicular, interstitial, and tubular pores and a few, fine, closed, tubular pores; strongly acid (pH 5.5); 15 percent gravel by volume; abrupt, smooth boundary. (5 to 8 inches thick)

A11—6 to 11 inches, light-brown (7.5YR 6/4) loam, dark brown (7.5YR 4/2) when moist; weak, medium, angular blocky structure; hard, friable, slightly sticky and plastic; common micro and very fine random roots; common micro and very fine vesicular, interstitial, and tubular pores and a few, fine, closed ,tubular pores;

medium acid (pH 5.7) ; 10 percent gravel by volume; clear, wavy boundary. (5 to 7 inches thick)

A12—11 to 14 inches, light-brown (7.5YR 6/4) gravelly loam, reddish brown (5YR 4/4) when moist; weak, medium, subangular blocky structure; hard, friable, slightly sticky and plastic; few micro and very fine random roots; common micro and very fine vesicular, interstitial, and tubular pores, and a few fine tubular pores; medium acid (pH 6.0) ; 15 percent gravel by volume; abrupt, wavy boundary. (0 to 5 inches thick)

B21t—14 to 22 inches, red (2.5YR 4/6) clay, red (2.5YR 4/6) when moist; weak, medium, angular blocky structure; extremely hard, very firm, sticky and very plastic; no roots; common micro tubular pores; continuous, thick, yellowish-red (5YR 5/6) clay films on ped faces and in pores; strongly acid (pH 5.5) ; 12 percent gravel by volume; clear, wavy boundary. (7 to 13 inches thick)

B22t—22 to 27 inches, reddish-yellow (5YR 6/6) clay, reddish yellow (7.5YR 6/6) when moist; weak, medium, angular blocky structure; extremely hard, very firm, sticky and very plastic; no roots; common micro tubular pores; continuous thick clay films on ped faces and in pores; medium acid (pH 6.0) ; no gravel; clear, wavy boundary. (4 to 8 inches thick)

B3t—27 to 38 inches, yellowish-red (5YR 5/6) very gravelly clay, yellowish red (5YR 4/6) when moist; weak, medium, angular blocky structure; hard, very firm, sticky and very plastic; no roots; common micro tubular pores and many very fine interstitial pores; continuous thick clay films on ped faces and in pores and bridges of sand grains; slightly acid (pH 6.5) ; 50 percent gravel by volume; clear, wavy boundary. (6 to 12 inches thick)

C—38 to 60 inches, reddish-yellow (5YR 6/6) very gravelly clay, strong brown (7.5YR 5/6) when moist; massive; very hard, firm, slightly sticky and plastic; no roots; common micro tubular pores and many very fine interstitial pores; continuous thick clay films in pores and bridges of sand grains; neutral (pH 7.0) ; 70 percent gravel by volume.

The A horizon ranges in color from light brown to reddish yellow to brown and in texture from gravelly very fine sandy loam or loam to gravelly sandy clay loam that contains 10 to 30 percent gravel. This horizon is strongly acid to medium acid. The B2t horizon ranges in color from yellowish red and reddish yellow to red and in texture from gravelly clay to clay that contains 0 to 20 percent gravel. The B3 horizon contains 30 to 60 percent gravel. The B horizon is strongly acid to slightly acid. The C horizon is generally made up of very gravelly clay that contains 50 to 70 percent gravel. In places this horizon is weakly cemented. In places the C horizon is soft, semiconsolidated sandstone that contains variable amounts of gravel and is many feet thick.

Included in mapping are small areas of Balcom silty clay loam, Hillgate loam, Positas gravelly loam, and Sehorn clay. Also included are areas where the surface layer is 20 to 30 inches thick.

Permeability of this Corning soil is very slow. Surface runoff is slow to medium, and the erosion hazard is moderate. The available water holding capacity is 2.0 to 3.0 inches. The effective rooting depth is 10 to 20 inches to the clay subsoil. Natural fertility is low.

This soil is used mainly for dryfarmed barley, dryland hay, pasture, and range. Other uses include wildlife habitat, recreation, and watershed. Capability unit IVe-3 (17); Claypan range site.

Corning gravelly loam, 15 to 30 percent slopes, eroded (CtE2).—This soil is similar to Corning gravelly loam, 2 to 15 percent slopes, eroded, except that it is more sloping.

Included in mapping are small areas of Balcom silty clay loam, Positas gravelly loam, and Sehorn clay.

The surface runoff of this Corning soil is medium to rapid, and the erosion hazard is moderate to high.

This soil is used for dryfarmed pasture and for range. Other uses include wildlife habitat, recreation, and watershed. Capability unit VIe-3 (15); Claypan range site.

Dibble Series

The Dibble series consists of well-drained clay loams on uplands. These soils have a subsoil of silty clay. Slopes range from 9 to 75 percent. The soils overlie sandstone and shale. Elevation ranges from 500 to 2,000 feet. Annual temperature is 60° F., annual rainfall is 20 to 24 inches, and the frost-free season is about 230 days. The vegetation is mainly annual grasses, forbs, and scattered oaks; some perennials, such as needlegrass, grow at the higher elevations. Dibble soils are associated principally with Balcom and Millsholm soils.

In a typical profile, the surface layer is brown clay loam about 4 inches thick. The subsoil is yellowish-brown and light olive-brown silty clay and clay about 26 inches thick. This is underlain by pale-olive very fine grained sandstone.

Dibble soils are used for pasture, range, wildlife habitat, recreation, and watershed.

Dibble clay loam, 30 to 50 percent slopes, eroded (DaF2).—This soil is on uplands.

Representative profile, in an annual grass range on a south-facing slope of 34 percent, SW¼NE¼SE¼ of sec. 27, T. 9 N., R. 2 W., Mount Diablo Base Meridian, 1.5 miles west of the Scott Ranch headquarters at the end of Road 29; the profile, when examined, was moist:

A1—0 to 4 inches, brown (10YR 5/3) clay loam, dark brown (10YR 4/3) when moist; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and plastic; many fine and very fine vertical roots; many fine and very fine pores; medium acid (pH 6.0) ; thin intermittent organic duff on the immediate surface; clear, smooth boundary. (3 to 6 inches thick)

B21t—4 to 15 inches, yellowish-brown (10YR 5/4) silty clay, dark yellowish brown (10YR 4/4) when moist; weak, medium, angular blocky structure; hard, firm, sticky and very plastic; common fine and very fine vertical roots; many fine and very fine pores; continuous moderately thick clay films on ped faces and in pores; medium acid (pH 5.8) ; gradual, smooth boundary. (7 to 12 inches thick)

B22t—15 to 20 inches, yellowish-brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) when moist; weak, medium, angular blocky structure; hard, firm, sticky and very plastic; few fine and very fine vertical roots; many micro and very fine pores; many thin clay films on ped faces and in pores; medium acid (pH 5.8) ; gradual, smooth boundary. (3 to 7 inches thick)

B3t—20 to 30 inches, light olive-brown (2.5Y 5/4) silty clay, olive brown (2.5Y 4/4 and 5/4) when moist; massive; very hard, firm, sticky and very plastic; few very fine roots; few very fine pores; few thin clay films in pores; slightly acid (pH 6.5) ; gradual, smooth boundary. (7 to 11 inches thick)

C—30 inches, pale-olive (5Y 6/3) very fine grained sandstone that has yellowish-brown (10YR 5/6) mottles; olive (5Y 4/3) when moist; moderately alkaline (pH 8.0).

The A horizon ranges in color from yellowish brown to brown and in texture from silt loam to clay loam. This horizon is medium acid to slightly acid. The Bt horizon ranges in color from brown to yellowish brown to light olive brown and in texture from heavy clay loam to clay or silty clay. This horizon is medium acid to slightly acid. The C horizon is soft interbedded sandstone or shale that is at depths of 20 to 36 inches.

Included in mapping are areas of Balcom silty clay loam, Millsholm rocky loam, Positas gravelly loam, and Sehorn clay.

Permeability of this Dibble soil is slow. The surface runoff is rapid, and the erosion hazard is high. The available water holding capacity is 3.0 to 6.0 inches. The effective rooting depth is 20 to 36 inches. Natural fertility is moderate.

This soil is used principally for range. Other uses include wildlife habitat, recreation, and watershed. Capability unit VIe–3 (15); Fine Loamy range site.

Dibble clay loam, 50 to 75 percent slopes, eroded (DaG2).—This soil is similar to Dibble clay loam, 30 to 50 percent slopes, eroded, except that it is more sloping. The depth to bedrock is typically 20 to 30 inches.

Included in mapping are areas of Millsholm loam, Positas gravelly loam, and Rock land.

The surface runoff of this Dibble soil is very rapid, and the erosion hazard is very high. The available water holding capacity is 3.0 to 5.0 inches. Effective rooting depth is 20 to 30 inches.

This soil is used mainly for range. Other uses include wildlife habitat, recreation, and watershed. Capability unit VIIe–3 (15); Fine Loamy range site.

Dibble-Millsholm complex, 9 to 30 percent slopes, eroded (DbE2).—This mapping unit is about 55 percent Dibble clay loam, eroded; about 30 percent Millsholm rocky loam; and about 15 percent areas of Balcom silty clay loam, Positas gravelly loam, and Sehorn clay. The Millsholm soil is deeper than typical, ranging from 10 to 25 inches to bedrock; rock outcroppings comprise less than 2 percent of the surface.

Permeability of the Dibble soil is slow. Permeability of the Millsholm soil is moderate. Surface runoff is medium to rapid, and the erosion hazard is moderate to high. The available water holding capacity of the Dibble soil is 3.0 to 6.0 inches. Available water holding capacity of the Millsholm soil is 2.0 to 3.0 inches. The effective rooting depth of the Dibble soil is 20 to 36 inches; natural fertility is moderate. Effective rooting depth of the Millsholm soil is 10 to 25 inches; its natural fertility is moderate to low.

This complex is used mainly for range. Other uses include wildlife habitat, recreation, and watershed. Capability unit VIe–3 (15); Fine Loamy range site.

Dibble-Millsholm complex, 30 to 50 percent slopes, eroded (DbF2).—This mapping unit consists of about 45 percent Dibble clay loam, eroded; about 40 percent Millsholm rocky loam, eroded; and about 15 percent areas of Balcom silty clay loam, Positas gravelly loam, Sehorn clay, and Rock land.

Permeability is slow in the Dibble soil and moderate in the Millsholm soil. For both soils surface runoff is rapid and the erosion hazard is high. The available water holding capacity is 3.0 to 6.0 inches for the Dibble soil and 2.0 to 3.0 inches for the Millsholm soil. The effective rooting depth of the Dibble soil is 20 to 36 inches; natural fertility is moderate. The effective rooting depth of the Millsholm soil is 10 to 25 inches; natural fertility is moderate to low.

This complex is used principally for range. Other uses include wildlife habitat, recreation, and watershed. Capability unit VIIe–8 (15); Shallow Loamy range site.

Dibble-Millsholm complex, 50 to 75 percent slopes, eroded (DbG2).—This mapping unit consists of about 60 percent Dibble clay loam, eroded; about 30 percent Millsholm rocky loam, eroded; and about 10 percent Rock land.

Permeability is slow in the Dibble soil and moderate in the Millsholm soil. The surface runoff of both soils is very rapid, and the erosion hazard is very high. Available water holding capacity of the Dibble soil is 3.0 to 6.0 inches, and that of the Millsholm soil is 2.0 to 3.0 inches. The effective rooting depth of the Dibble soil is 20 to 36 inches; natural fertility is moderate. The effective rooting depth of the Millsholm soil is 10 to 25 inches; natural fertility is moderate to low.

This complex is used mainly for range. Other uses include wildlife habitat, recreation, and watershed. Capability unit VIIe–8 (15); Shallow Loamy range site.

Hillgate Series

The Hillgate series consists of well-drained loams on terraces. These soils have a subsoil of clay. Slopes range from 0 to 9 percent. The soils formed in alluvium from sedimentary rock. Elevation ranges from 15 to 350 feet. Annual temperature is 61° F., annual rainfall is 16 to 20 inches, and the frost-free season is about 280 days. The vegetation is annual grasses and forbs. The Hillgate soils are associated principally with Tehama and San Ysidro soils.

In a typical profile, the surface layer is brown loam about 11 inches thick. The subsoil is strong-brown clay about 19 inches thick. This is underlain by yellowish-brown clay loam that extends to a depth of more than 60 inches.

Hillgate soils are used for dryfarmed grain, shallow-rooted irrigated row crops, irrigated pasture, wildlife habitat, and recreation.

Hillgate loam, 2 to 9 percent slopes, eroded (HcC2).—This soil is on terraces. The average slope is about 5 percent.

Representative profile, on a south-facing, convex slope of 4 percent, 750 feet south of Road 22A and 40 feet east of Road 85B, about 1 mile southwest of Esparto; the profile, when examined, was dry:

Ap—0 to 6 inches, brown (10YR 5/3) loam, dark brown (10YR 4/3) when moist; moderate, coarse, granular structure; soft, very friable, nonsticky and nonplastic; many roots; many micro and very fine pores; occasional gravel; slightly acid (pH 6.5); clear, wavy boundary. (6 to 10 inches)

A3—6 to 11 inches, brown (7.5YR 4/4) loam, dark brown (7.5YR 3/4) when moist; massive; very hard, friable, nonsticky and nonplastic; common root holes; moderately porous; slightly acid (pH 6.2); abrupt, wavy boundary. (4 to 10 inches thick)

B2t—11 to 30 inches, strong-brown (7.5YR 5/6) clay, strong brown (7.5YR 5/6) when moist; weak, coarse, prismatic structure; very hard, firm, very sticky and very plastic; few fine tubular pores; continuous thick clay films in pores and on ped faces; medium acid (pH 6.0); gradual, wavy boundary. (15 to 20 inches thick)

C1—30 to 58 inches, yellowish-brown (10YR 5/6) clay loam, yellowish brown (10YR 5/8) when moist; moderate, coarse, angular blocky structure; very hard, firm, sticky and plastic; common very fine and fine pores; many thick clay films on ped faces and in pores; neutral (pH 7.0); diffuse boundary. (20 to 35 inches thick)

C2—58 to 70 inches, yellowish-brown (10YR 5/6) clay loam, dark yellowish brown (10YR 4/6) when moist; massive; hard, friable, sticky and plastic; mildly alkaline (pH 7.5).

The A horizon ranges in color from dark brown to pale brown and in texture from loam to clay loam. This horizon is medium acid to slightly acid. The Bt horizon ranges in color from strong brown to brown or dark brown. This horizon is medium acid to neutral. The C horizon ranges in color from yellowish brown to dark yellowish brown and in texture from clay loam to silty clay that is sometimes weakly consolidated. This horizon is neutral to mildly alkaline and is calcareous in a few places.

Included in mapping are small areas of Corning gravelly loam, Tehama loam, San Ysidro loam, and Sehorn clay. Also included are a few areas where the depth to the clay is less than 10 inches.

Permeability of this Hillgate soil is very slow. The surface runoff is slow to medium, and the erosion hazard is slight to moderate. The available water holding capacity is 2.0 to 3.0 inches. The effective rooting depth is 10 to 20 inches. Natural fertility is low.

This soil is used mainly for dryfarmed barley. Other uses include irrigated and dryland pasture, grass hay, wildlife habitat, and recreation. Capability unit IVe–3 (17).

Hillgate loam, 0 to 2 percent slopes (HcA).—This soil is similar to Hillgate loam, 2 to 9 percent slopes, eroded, except that it is on terraces where average slopes range from 1 to 2 percent.

Included in mapping are small areas of Corning gravelly loam, Tehama loam, and San Ysidro loam.

The surface runoff of this Hillgate soil is very slow, and the erosion hazard is none to slight.

This soil is used principally for irrigated grain sorghum, tomatoes, and dryfarmed barley. Other uses include irrigated pasture, wildlife habitat, and recreation. Capability unit IVs–3 (17).

Hillgate loam, moderately deep, 0 to 2 percent slopes (HdA).—This soil is similar to Hillgate loam, 2 to 9 percent slopes, eroded, except that it is on terraces where the average slopes range from 1 to 2 percent and has a pale-brown surface layer about 20 to 30 inches thick.

Included in mapping are small areas of Tehama loam and San Ysidro loam.

The surface runoff of this Hillgate soil is very slow, and the erosion hazard is none to slight. The available water holding capacity is 4.0 to 6.0 inches. The effective rooting depth is 20 to 30 inches.

This soil is used mainly for irrigated grain sorghum, corn, tomatoes, and pasture. Other uses include dryfarmed barley, wildlife habitat, and recreation. Capability unit IIIs–3 (17).

Hillgate loam, moderately deep, 2 to 9 percent slopes (HdC).—This soil is similar to Hillgate loam, 2 to 9 percent slopes, eroded, except that the surface is pale brown and is 20 to 30 inches thick.

Included in mapping are small areas of Corning gravelly loam, Tehama loam, San Ysidro loam, and Sehorn clay.

The available water holding capacity of this Hillgate soil is 4.0 to 6.0 inches. The effective rooting depth is 20 to 30 inches.

This soil is used mainly for dryfarmed barley and pasture. Other uses include grain hay, irrigated pasture, wildlife habitat, and recreation. Capability unit IIIe–3 (17).

Lang Series

The Lang series consists of somewhat poorly drained soils on alluvial fans. These soils have a subsoil of loamy fine sand. Slopes are less than 1 percent. The soils formed in stratified sandy alluvium from mixed sources. Elevation ranges from 15 to 30 feet. Annual temperature is 62° F., annual rainfall is 16 to 20 inches, and the frost-free season is about 280 days. The vegetation in uncultivated areas consists of oaks, cottonwoods, willow trees, grapevines, annual grasses, and forbs. The Lang soils are associated principally with Tyndall and Sacramento soils.

In a typical profile, the surface layer is pale-brown sandy loam and loamy fine sand about 13 inches thick. The next layer is mottled light brownish-gray and brownish-yellow loamy fine sand about 6 inches thick. This is underlain by mottled light-gray, gray, reddish-yellow, yellowish-red, and light brownish-gray stratified fine sand, loamy fine sand, and silt loam that extend to a depth of more than 60 inches. In some areas the surface layer is silt loam.

Lang soils are used for orchards, irrigated row crops, forage crops, truck crops, hops, wildlife habitat, and recreation.

Lang sandy loam (La).—This soil is on alluvial fans. Slopes are less than 1 percent.

Representative profile, 0.4 mile south of Road 16 on Road 117 and 265 feet west of Road 117, about 10 miles northeast of Woodland:

Ap—0 to 6 inches, pale-brown (10YR 6/3) sandy loam, dark brown (10YR 4/3) when moist; massive; soft, very friable, nonsticky and nonplastic; common micro and very fine vertical roots; few very fine tubular pores; medium acid (pH 6.0); clear, smooth boundary. (5 to 12 inches thick)

A1—6 to 13 inches, pale-brown (10YR 6/3) loamy fine sand; many, fine, distinct, brownish-yellow (10YR 6/8) mottles; dark yellowish brown (10YR 4/4) and has many, fine, distinct, yellowish-brown (10YR 5/8) mottles when moist; massive; soft, very friable, nonsticky and nonplastic; few micro and very fine vertical roots and few fine and medium random roots; very few very fine tubular pores; strongly acid (pH 5.5); clear, wavy boundary. (0 to 11 inches thick)

AC—13 to 19 inches, mottled light brownish-gray (10YR 6/2) and brownish-yellow (10YR 6/6) loamy fine sand; brown (10YR 4/3), yellowish brown (10YR 5/6), and grayish brown (10YR 5/2) when moist; massive; soft, very friable, nonsticky and nonplastic; few fine and common medium and coarse random roots; very few very fine tubular pores; slightly acid (pH 6.5); abrupt, wavy boundary. (1 to 7 inches)

C1—19 to 35 inches, light-gray (10YR 7/1) fine sand; light brownish gray (10YR 6/2) with common, medium, distinct, yellowish-brown (10YR 5/6) mottles when moist; single grain; loose when dry and when moist, nonsticky and nonplastic; few fine random roots; slightly acid (pH 6.5); abrupt, wavy boundary. (15 to 30 inches)

C2—35 to 47 inches, light brownish-gray (10YR 6/2) loamy fine sand; many, medium, distinct, reddish-yellow (7.5YR 6/8) mottles; yellowish-brown (10YR 5/4) and has strong-brown (7.5YR 5/8) mottles when moist; massive; soft, very friable, nonsticky and nonplastic; common medium and coarse random roots; few very fine tubular pores; neutral (pH 7.0); clear, wavy boundary. (8 to 17 inches)

IIC3—47 to 52 inches, mottled gray (5Y 5/1), reddish-yellow (7.5YR 6/6), and yellowish-red (5YR 4/8) silt loam; olive gray (5Y 5/2), dark reddish brown (5YR 3/4), and strong brown (7.5YR 5/8) when moist; massive; soft, friable, slightly sticky and nonplastic; few fine random roots; common micro, very fine, and fine tubular pores; neutral (pH 7.0); abrupt, wavy boundary. (2 to 17 inches thick)

IIIC4—52 to 72 inches, light-gray (10YR 7/1) loamy fine sand; many, medium, prominent, reddish-yellow (5YR 6/8) mottles; light brownish gray (10YR 6/2) and has many, medium, prominent, yellowish-red (5YR 5/8) mottles when moist; massive; soft, very friable, nonsticky and nonplastic; few fine random roots; slightly acid (pH 6.5).

The A horizon ranges in color from light brownish gray to pale brown and in texture from sandy loam to loamy fine sand or loamy sand. This horizon is slightly acid to strongly acid. The C horizon ranges in color from gray to light gray to light brownish gray or reddish yellow to yellowish red, and has distinct mottles. The C horizon ranges in texture from fine sand to silt loam; this horizon is slightly acid to neutral. Depth to the mottles is less than 20 inches.

Included in mapping are small areas of Sycamore silt loam and Sycamore silty clay loam, Tyndall very fine sandy loam, Valdez silt loam, and a few areas that have silt lenses within 40 inches.

This Lang soil has an intermittent water table at a depth of 36 to 60 inches. Permeability is rapid. The surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 5.0 to 6.0 inches. The effective rooting depth is restricted by the water table. Natural fertility is low.

This soil is used mainly for irrigated corn, grain sorghum, and tomatoes. Walnuts are grown in areas where the water table is lowered or where it remains at a constant depth. Other uses include hops and wildlife habitat. Capability unit IIw-2 (17).

Lang sandy loam, deep (Lb).—This soil is similar to Lang sandy loam, except that it has a subsoil of clay or heavy silty clay loam at a depth of from 40 to 60 inches.

Included in mapping are small areas of Sycamore silt loam, Tyndall very fine sandy loam, and Valdez silt loam. Also included are a few areas where the depth to the buried clay or heavy silty clay loam is less than 40 inches.

Permeability of this Lang soil is rapid over slow. The available water holding capacity is 5.0 to 6.0 inches. The effective rooting depth is from 40 to 60 inches.

This soil is used mainly for irrigated alfalfa, corn, carrots, sugar beets, and tomatoes. Other uses include hops, wildlife habitat, and recreation. Walnuts are grown where the water table is maintained at a constant depth and does not fluctuate. Capability unit IIIw-3 (17).

Lang sandy loam, deep, flooded (Lc).—This soil is similar to Lang sandy loam, except that it has a layer of clay or heavy silty clay loam at a depth of from 40 to 60 inches and is subject to flooding at least 1 year out of 3 because of flowage easements. Texture of the surface layer ranges from loamy sand to silt loam.

Included in mapping are small areas of Tyndall very fine sandy loam, flooded; and Valdez complex, flooded. Also included are a few areas where the depth to the buried clay or heavy silty clay loam is less than 40 inches.

This Lang soil is adversely affected by flooding and deposition. Permeability is rapid over slow, and the available water holding capacity is 5.0 to 6.0 inches. The effective rooting depth is 40 to 60 inches.

This soil is used mainly for dryland pasture. Other uses include a bypass for river water during flood stage, wildlife habitat, and recreation. Capability unit IVw-3 (17).

Lang silt loam (Ld).—This soil is similar to Lang sandy loam, except that it has a silt loam surface layer from 10 to 16 inches thick and a layer of clay or heavy silty clay loam at a depth of from 40 to 60 inches.

Included in mapping are small areas of Tyndall very fine sandy loam, deep; and Valdez silt loam, deep. Also included are a few areas where the depth to the buried clay or heavy silty clay loam is less than 40 inches.

Permeability of this Lang soil is rapid over slow. The available water holding capacity is 5.0 to 7.0 inches. The effective rooting depth is 40 to 60 inches. Natural fertility is moderate to low.

This soil is used for irrigated alfalfa, carrots, corn, sugar beets, and tomatoes. Other uses include wildlife habitat and recreation. Walnuts are grown where the water table is maintained at a constant depth. Capability unit IIIw-3 (17).

Laugenour Series

The Laugenour series consists of poorly drained very fine sandy loams on alluvial fans. Slopes are less than 1 percent. These soils formed in alluvium from mixed sources. Drainage has been improved in places by levees and drains. Elevation ranges from 10 to 50 feet. Annual temperature is 62° F., annual rainfall is 16 to 20 inches, and the frost-free season is about 280 days. The vegetation in uncultivated areas is annual grasses and forbs. Laugenour soils are associated principally with Maria and Sycamore soils.

In a typical profile, the surface layer is light brownish-gray very fine sandy loam about 11 inches thick. The subsoil is mottled light-brownish gray very fine sandy loam about 9 inches thick. The substratum is mottled pale-olive and variegated stratified fine sandy loam and loamy sand that extend to a depth of more than 60 inches.

Laugenour soils are used for orchards, forage crops, truck crops, row crops, wildlife habitat, and recreation.

Laugenour very fine sandy loam (Lg).—This soil is on alluvial fans. Slopes are less than 1 percent.

Representative profile, in a barley stubble field, 0.65 mile east of Road 102 and 0.4 mile south of Road 17, about 5 miles northeast of Woodland; the profile, when examined, was moist below a depth of 11 inches:

Ap—0 to 11 inches, light brownish-gray (2.5Y 6/2) very fine sandy loam, dark grayish brown (2.5Y 4/2) when moist; massive; slightly hard, friable, slightly sticky and plastic; many micro and very fine random roots; few micro and very fine tubular pores; moderately alkaline (pH 8.0); very slightly effervescent with disseminated lime; clear, smooth boundary. (4 to 12 inches thick)

B2—11 to 20 inches, light brownish-gray (2.5Y 6/2) very fine sandy loam, dark grayish brown (2.5Y 4/2) when moist; common, fine, prominent mottles of strong brown (7.5YR 5/8) when dry, and dark brown (7.5YR 4/4) when moist; weak, coarse, subangular blocky structure; slightly hard, friable, slightly sticky and plastic; many micro and very fine random roots; common micro and very fine tubular pores; moderately alkaline (pH 8.0), slightly effervescent with disseminated lime; abrupt, wavy boundary. (4 to 14 inches thick)

IIC1—20 to 30 inches, variegated loamy sand; common, medium, distinct mottles of dark reddish brown (5YR 3/4) when dry and moist; massive; soft, very friable, nonsticky and nonplastic; few micro and very fine random roots; common micro and very fine interstitial pores; moderately alkaline (pH 8.0); many thin strata of fine sandy loam or very fine sandy loam; abrupt, smooth boundary. (5 to 15 inches thick)

IIIC2—30 to 68 inches, pale-olive (5Y 6/3) fine sandy loam; common, fine, prominent mottles of yellowish red (5YR 4/6) and common, medium, prominent mottles of strong brown (7.5YR 5/6); olive (5Y 4/3) and common, fine, prominent mottles of dark reddish brown (5YR 3/4) and common, medium, prominent mottles of dark brown (7.5YR 4/4) when moist; massive; soft, very friable, slightly sticky and slightly plastic; few micro and very fine random roots; common micro and very fine pores and few fine tubular pores; moderately alkaline (pH 8.2); slightly effervescent with disseminated lime; one-inch discontinuous lenses of loamy sand, silt loam, and silt occur at random; abrupt, smooth boundary. (20 to 40 inches thick)

The A horizon ranges in color from pale brown to light brownish gray or grayish brown and in texture from loamy fine sand to silt loam. This horizon is slightly acid to moderately alkaline; lime is usually present above a depth of 10 inches. The B2 horizon ranges in color from light brownish gray to pale olive that has distinct or prominent mottles and in texture from sandy loam to very fine sandy loam that contains silt loam lenses up to 4 inches thick. This horizon is mildly alkaline to moderately alkaline. The C horizon is stratified and ranges in color from pale olive to light olive brown that has distinct or prominent mottles. Variegated colors are common in the loamy sand and sand horizons. The C horizon ranges in texture from loamy sand to fine sandy loam, and lenses of gravel, sand, silt loam, or silty clay loam are common. This horizon is mildly alkaline to moderately alkaline with lime; lime is absent in some of the loamy sand or sand lenses. Sand and gravel may occur at a depth of more than 40 inches.

Included in mapping are small areas of Lang sandy loam and silt loam, Maria silt loam, Soboba gravelly sandy loam, and Tyndall very fine sandy loam. A few small areas are also included that have a layer of clay below a depth of 40 inches.

Drainage of this Laugenour soil has been improved by levees and by open or closed drains. The permeability is moderately rapid. Surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 7.5 to 8.5 inches. The effective rooting depth is more than 60 inches. Natural fertility is moderately high.

This soil is used for alfalfa, sugar beets, and tomatoes. Other uses include walnuts, asparagus, dry-farmed barley, wildlife habitat, and recreation. Capability unit I-1 (17).

Laugenour very fine sandy loam, flooded (Lh).—This soil is similar to Laugenour very fine sandy loam, except that it is subject to flooding at least 1 year out of 3 because of flowage easements.

Included in mapping are small areas of Lang sandy loam, deep, flooded; and Maria silt loam, flooded.

This Laugenour soil is subject to deposition.

This soil is a part of the Yolo By-Pass and is used mainly for sugar beets, grain sorghum, and tomatoes. Other uses include pasture, wildlife habitat, and recreation. Capability unit IVw-2 (17).

Laugenour very fine sandy loam, deep, flooded (Lk).—This soil is similar to Laugenour very fine sandy loam, except that it is underlain at a depth of 40 to 60 inches by mottled dark-gray silty clay loam. It is subject to flooding at least 1 year out of 3 because of flowage easements.

Included in mapping are small areas of Lang sandy loam, deep, flooded; and Maria silt loam, flooded.

Permeability of this Laugenour soil moderately rapid over slow. The soil is subject to deposition. The effective rooting depth is 40 to 60 inches, and a water table occurs at a depth of 24 to 60 inches.

This soil is a part of the Yolo By-Pass and is used mainly for sugar beets, grain sorghum, and tomatoes. Other uses include pasture, wildlife habitat, and recreation. Capability unit IVw-3 (17).

Loamy Alluvial Land

Loamy alluvial land (Lm) is a land type that consists of such highly variable soils that, for the purposes of this survey, it was impractical to classify and map them separately. These soils are nearly level and excessively drained. They formed in mixed, stratified alluvium recently deposited adjacent to streams. They have a texture of sand, sandy loam, loam, and silt loam, and they are underlain, at a depth of 24 to 40 inches, by sand and gravel. Slopes are 0 to 2 percent. Elevation ranges from 25 to 400 feet. The annual temperature is 62° F., the annual rainfall is 16 to 20 inches, and the frost-free season is about 270 days. The vegetation is chiefly annual grasses, forbs, willows, tamarix, and cottonwood. Loamy alluvial land is associated principally with Reiff and Soboba soils.

Included in mapping are small areas of Reiff gravelly loam, Soboba gravelly sandy loam, and Yolo silt loam. Also included, near the Colusa County line and the Colusa drainage canal, is an area that is subject to flooding for a period of more than 48 hours about once in every 2 years.

Permeability is rapid. Surface runoff is very slow, and there is little or no erosion hazard. The available water holding capacity is 2.0 to 4.0 inches. Rooting depth is 24 to 40 inches. Natural fertility is moderately high.

This land type is used mainly for dryland pasture, alfalfa, tomatoes, and almonds. It also is used as wildlife habitat and for recreation. Capability unit IVs-4 (17).

Made Land

Made land (Ma) is a miscellaneous land type that consists of randomly mixed material redeposited by the construction of the Sacramento-Yolo Deep Water Channel, turning basin, and navigational locks. There are also a few small areas in which deep fills have been made in old sloughs. Made land occurs mainly along the Sacramento-Yolo Deep Water Channel and in the vicinity of the Sacramento-Yolo Port. These soils are well drained and have slopes of less than 1 percent. Elevation ranges from 5 to 20 feet. Annual temperature is 61° F., annual rainfall is 16 to 20 inches, and the frost-free season is about 270 days. Vegetation is annual grasses and forbs.

Included in mapping is a small narrow strip adjacent to the channel which is Clear Lake clay, Sacramento clay, or Willows clay.

The profile is a stratified, heterogeneous mixture of soil that ranges in texture from sand to clay and in some places consists of uniform texture that ranges from sand to clay and has some gravelly areas. Depth of the material ranges from 5 to 10 feet near the deep water channel and up to 15 feet in the vicinity of the turning basin.

Permeability is rapid to slow. The surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is variable, and the effective rooting depth is variable. Natural fertility is variable.

This land type is used mainly for dryland pasture and industrial sites. Other uses include apiculture and limited cultivation. Capability unit IIs-3 (17).

Maria Series

The Maria series consists of poorly drained silt loams on alluvial fans. Slopes are 1 percent. The soils formed in alluvium from sedimentary rocks. Elevation ranges from 15 to 80 feet. The annual temperature is 62° F., annual rainfall is 16 to 20 inches, and the frost-free season is about 280 days. In uncultivated areas the vegetation is annual grasses and forbs. Maria soils are associated principally with Laugenour and Sycamore soils.

In a typical profile, the surface layer is light brownish-gray silt loam about 13 inches thick. The subsoil is mottled light brownish-gray silt loam about 25 inches thick. This is underlain by mottled light olive-gray and grayish-brown silt loam that extends to a depth of more than 60 inches.

Maria soils are used for row crops, forage crops, orchard, dryfarmed grain, wildlife habitat, and recreation.

Maria silt loam (Mb).—This soil is on alluvial fans. Slopes are less than 1 percent.

Representative profile, in a disked field of sugar beets, 1.55 miles east of Road 102 or seven-eighths of a mile west of the Knights Landing ridge cut on Road 17, and 200 feet south of Road 17, about 4.5 miles northeast of Woodland; the profile, when examined, was moist below a depth of 3 inches.

Ap1—0 to 8 inches, light brownish-gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) when moist; massive; slightly hard, friable, slightly sticky and plastic; few micro and very fine vertical roots; few micro and very fine tubular pores; slightly effervescent with disseminated lime; moderately alkaline (pH 8.2); diffuse, smooth boundary. (8 to 10 inches thick)

Ap2—8 to 13 inches, light brownish-gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) when moist; massive; slightly hard, friable, slightly sticky and plastic; few micro and very fine random roots; common micro and very fine tubular pores; slightly effervescent with disseminated lime; moderately alkaline (pH 8.2); clear, wavy boundary. (4 to 10 inches thick)

B21—13 to 23 inches, light brownish-gray (2.5Y 6/2) silt loam; few, fine, distinct, reddish-yellow (7.5YR 6/8) mottles; dark grayish brown (2.5Y 4/2) when moist and brown (7.5YR 4/4) mottles; massive; slightly hard, friable, slightly sticky and plastic; common micro and very fine random roots; many micro and very fine tubular pores; slightly effervescent with disseminated lime; moderately alkaline (pH 8.2); gradual, wavy boundary. (6 to 15 inches thick)

B22—23 to 38 inches, light brownish-gray (2.5Y 6/2) silt loam; common, fine, prominent, reddish-brown (5YR 5/4) mottles; dark grayish brown (2.5Y 4/2) when moist and dark reddish-brown (5YR 3/4) mottles; massive; slightly hard, friable, slightly sticky and plastic; few micro and very fine random roots; many micro and very fine tubular pores; slightly effervescent with disseminated lime; moderately alkaline (pH 8.2); few iron-manganese shot and carbon present; clear, wavy boundary. (10 to 20 inches thick)

C1—38 to 40 inches, mottled light olive-gray (5Y 6/2) and grayish-brown (2.5Y 5/2) heavy silt loam; very dark grayish brown (2.5Y 3/2) and light olive brown (2.5Y 5/4) when moist; massive; slightly hard, friable, sticky and plastic; few micro and very fine random roots; many micro and very fine tubular pores; strongly effervescent with disseminated lime; moderately alkaline (pH 8.2); black (N 2/0) carbon over 10 percent of area; clear, wavy boundary. (2 to 6 inches thick)

C2—40 to 51 inches, light olive-gray (5Y 6/2) silt loam; common, fine, prominent, yellowish-brown (10YR 5/6) mottles; olive gray (5Y 4/2) and dark yellowish-brown (10YR 4/4) and strong-brown (7.5YR 5/6) mottles when moist; massive; slightly hard, friable, slightly sticky and plastic; few micro and very fine random roots; common micro and very fine tubular pores; strongly effervescent with disseminated lime; moderately alkaline (pH 8.2); black (N 2/0) carbon over 10 percent of area; clear, irregular boundary. (6 to 13 inches thick)

C3—51 to 57 inches, light olive-gray (5Y 6/2) silt loam; many, medium, prominent, strong-brown (7.5YR 5/6) and reddish-brown (5YR 4/3) mottles; olive gray (5Y 4/2) and dark reddish-brown (5YR 3/4) and yellowish-brown (10YR 5/4) mottles when moist; massive; slightly hard, friable, slightly sticky and plastic; few micro and very fine random roots; few micro and very fine tubular pores; strongly effervescent with disseminated lime; moderately alkaline (pH 8.2); clear, wavy boundary. (5 to 8 inches thick)

C4g—57 to 72 inches, light olive-gray (5Y 6/2) silt loam; many, medium, prominent, dark-gray (5Y 4/1), strong-brown (7.5YR 5/6), and dark reddish-brown (5YR 3/3) mottles; olive (5Y 4/3) with greenish-gray (5GY 5/1), yellowish-brown (10YR 5/4), dark reddish-brown (5YR 3/4), and reddish-brown (5YR 4/4) mottles when moist; massive; slightly hard, friable, slightly sticky and plastic; few micro and very fine random roots; few micro and very fine tubular pores; strongly effervescent with disseminated lime; moderately alkaline (pH 8.2).

The A horizon ranges in color from pale brown, grayish brown, or light brownish gray to pale olive to light olive gray and in texture from loam or silt loam to silty clay loam. This horizon is slightly to strongly calcareous. The B2 horizon ranges in color from light brownish gray to light olive gray, in mottling from distinct to prominent, and in texture from silt loam to silty clay loam. This horizon is slightly to strongly calcareous. The C horizon ranges in color from dark gray or gray to light gray, light olive gray, pale olive, light brownish gray, and pale brown, and in texture from silt to loam that has stratified lenses of very fine sandy loam to silty clay loam. This horizon is slightly to strongly calcareous.

Included in mapping are small areas of Laugenour very fine sandy loam, Merritt silty clay loam, Riverwash, and Sycamore silt loam. Also included are a few areas that have an overwash of loamy sand to loamy very fine sand that is 10 to 15 inches thick.

Drainage of this Maria soil has been improved by the natural deepening of channels and by reclamation structures. A water table is at a depth of more than 60 inches. Permeability is moderate. The surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 11.0 to 13.0 inches. The effective rooting depth is more than 60 inches. Natural fertility is moderately high.

This soil is used mainly for sugar beets, tomatoes, and alfalfa. Other uses include walnuts, almonds, dryfarmed barley, wildlife habitat, and recreation. Capability unit I–1 (17).

Maria silt loam, flooded (Mc).—This soil is similar to Maria silt loam, except that it is subject to flooding at least 1 year out of 3 because of flowage easements.

Included in mapping are areas of Laugenour very fine sandy loam, flooded, and of Riverwash.

This soil is subject to deposition by flooding.

This soil is a part of the Yolo By-Pass and is used mainly for sugar beets, grain sorghum, and tomatoes. Other uses include dryfarmed pasture, wildlife habitat, and recreation. Capability unit IVw–2 (17).

Maria silt loam, deep (Md).—This soil is similar to Maria silt loam, except that it is underlain by buried clay at a depth of 40 to 60 inches.

Included in mapping are small areas of Merritt silty clay loam, deep, drained.

Drainage of this Maria soil has been improved by deepening of channels and reclamation structures. Permeability is moderate over slow. The available water holding capacity is 10.0 to 12.5 inches. The effective rooting depth is 40 to 60 inches and is limited by the clay substratum.

This soil is used for sugar beets, tomatoes, and alfalfa. Other uses include almonds, wildlife habitat, and recreation. Capability unit IIs–3 (17).

Marvin Series

The Marvin series consists of somewhat poorly drained silty clay loams on basin rims. These soils have a subsoil of silty clay. Slopes range from 0 to 2 percent. The soils formed in alluvium from sedimentary rocks. Elevation ranges from 20 to 100 feet. Annual temperature is 62° F., annual rainfall is 16 to 20 inches, and the frost-free season is about 280 days. In uncultivated areas the vegetation is annual grasses and forbs. Marvin soils are associated mainly with Capay and Rincon soils.

In a typical profile, the surface layer is grayish-brown silty clay loam and light silty clay about 12 inches thick. The subsoil is dark grayish-brown and grayish-brown silty clay about 29 inches thick. This is underlain by mottled light brownish-gray and pale-brown silty clay loam that extends to a depth of more than 60 inches.

Marvin soils are used for row crops, field crops, dryfarmed grain, wildlife habitat, and recreation.

Marvin silty clay loam (Mf).—This soil is on basin rims. Slopes are less than 1 percent.

Representative profile, in a barley field that had been leveled, 0.5 mile north of Road 13 and 220 feet east of Road 96, northwest corner of NE¼NW¼SW¼ of sec. 14, T. 11 N., R. 1 E., Mount Diablo Base Meridian, about 2.5 miles east of Zamora; the profile, when examined, was slightly moist below a depth of 5 inches:

Ap—0 to 5 inches, grayish-brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) when moist; strong, medium, subangular blocky structure; very hard, friable, sticky and plastic; many micro and fine random roots; common micro, vesicular, interstitial, and tubular pores; neutral (pH 7.0); clear, smooth boundary. (5 to 8 inches thick)

A3—5 to 12 inches, grayish-brown (10YR 5/2) light silty clay, very dark grayish brown (10YR 3/2) when moist; strong, coarse, subangular blocky structure; very hard, firm, sticky and plastic; many micro and very fine random roots; many micro and very fine interstitial and tubular pores; many thin clay films in pores; mildly alkaline (pH 7.5); clear, wavy boundary. (3 to 8 inches thick)

B2t—12 to 28 inches, dark grayish-brown (2.5Y 4/2) silty clay, very dark grayish brown (2.5Y 3/2) when moist; strong, coarse, prismatic structure; hard, firm, very sticky and very plastic; common micro and very fine random roots; many micro and very fine tubular pores; continuous moderately thick clay films on ped faces and in pores; moderately alkaline (pH 8.2); gradual, wavy boundary. (10 to 20 inches thick)

B3t—28 to 41 inches, grayish-brown (2.5Y 5/2) light silty clay; common, fine, distinct mottles of pale brown (10YR 6/3); dark grayish brown (2.5Y 4/2) and has common, fine, distinct mottles of dark yellowish brown (10YR 4/4) when moist; moderate, coarse, angular blocky structure; hard, friable, sticky and plastic; common micro and very fine random roots; many micro and very fine tubular pores; many moderately thick clay films on ped faces and in pores; moderately alkaline (pH 8.2); strongly effervescent with lime occurring in seams; clear, irregular boundary. (12 to 20 inches thick)

C—41 to 60 inches, mottled light brownish-gray (2.5Y 6/2) and pale-brown (10YR 6/3) silty clay loam; coatings of grayish brown (2.5Y 5/2) in root channels and pores; dark grayish brown (2.5Y 4/2) and dark yellowish brown (10YR 4/4) when moist; massive; slightly hard, friable, sticky and plastic; few micro and very fine random roots; many micro and very fine tubular pores; common moderately thick clay films on cleavage planes and many moderately thick clay films in pores; moderately alkaline (pH 8.2); strongly effervescent with disseminated lime.

The A horizon ranges in color from grayish brown to dark grayish brown. Mottling of this horizon occurs in some areas where rice has been grown. This horizon is slightly acid to mildly alkaline. The Bt horizon ranges in color from grayish brown to dark grayish brown. Faint to distinct mottles occur in the Bt horizon. The texture of the Bt horizon ranges from silty clay to clay. This horizon is mildly alkaline to moderately alkaline and in some places is calcareous. The C horizon ranges in color from light brownish gray to light yellowish brown, yellowish brown, or pale brown, and is mottled in places. The C horizon ranges in texture from fine sandy loam to silty clay loam. This horizon is moderately alkaline to strongly alkaline.

Included in mapping are small areas of Capay silty clay, Rincon silty clay loam, and Pescadero silty clay.

Also included are a few areas which are noncalcareous or have altered surface reactions because of the addition of soil amendments. Some areas are underlain by an old terrace remnant at a depth of more than 36 inches. Also included are some small areas that are subject to flooding.

Drainage of this Marvin soil has been improved by leveling and by open drains. Permeability is slow. The surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 10 to 12 inches. The effective rooting depth is more than 60 inches. Natural fertility is high.

This soil is used mainly for irrigated alfalfa, sugar beets, tomatoes, and rice. Other uses include irrigated pasture, dryfarmed barley, safflower, wildlife habitat, and recreation. Capability unit IIs–3 (17).

Merritt Series

The Merritt series consists of poorly drained silty clay loams on alluvial fans. Slopes are 0 to 2 percent. These soils formed in alluvium from mixed sources. Elevation ranges from 5 feet below sea level to 60 feet above. The annual temperature is 60° F., the annual rainfall is 16 to 19 inches, and the frost-free season is about 275 days. In uncultivated areas the vegetation is annual grasses and forbs. Merritt soils are associated mainly with Sacramento and Sycamore soils.

In a typical profile, the surface layer is gray and grayish-brown silty clay loam about 18 inches thick. The subsoil is mottled light brownish-gray heavy silt loam about 9 inches thick. This is underlain by mottled, light olive-gray and light-gray, stratified heavy very fine sandy loam and light fine sandy loam that extend to a depth of more than 60 inches.

Merritt soils are used for row crops, forage crops, truck crops, dryfarmed grain, wildlife habitat, and recreation.

Merritt silty clay loam (Mk).—This soil is on alluvial fans. Slopes are less than 1 percent.

Representative profile in a field of disked safflower, 1.3 miles north and east following the South River Road from the intersection of the South River Road and Pumphouse Road and 0.4 mile north of the South River Road, 1.5 miles north, and 0.4 mile east of Clarksburg (sec. 23, T. 7 N., R. 4 E. projected); the profile, when examined, was moist below a depth of 2 inches, and the water table was at a depth of 68 inches:

Ap—0 to 10 inches, gray (5Y 5/1) silty clay loam, very dark gray (5Y 3/1) when moist; moderate, medium, subangular blocky structure; hard, friable, sticky and plastic; many micro and fine random roots; few micro and very fine interstitial and tubular pores; moderately alkaline (pH 8.4); strongly effervescent with disseminated lime; clear, smooth boundary. (5 to 10 inches thick)

A1ca—10 to 18 inches, grayish-brown (2.5Y 5/2) silty clay loam, very dark grayish brown (2.5Y 3/2) when moist; moderate, medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common micro random roots and few fine vertical roots; common micro, fine, and medium tubular pores; moderately alkaline (pH 8.4); violently effervescent with disseminated lime and fine and medium lime concretions; clear, wavy boundary. (6 to 9 inches thick)

B2ca—18 to 27 inches, light brownish-gray (2.5Y 6/2) heavy silt loam; common, fine, distinct mottles of grayish brown (10YR 5/2); dark grayish brown (2.5Y 4/2) and common, fine, distinct mottles of dark brown (10YR 3/3) when moist; massive; hard, friable, slightly sticky and slightly plastic; common micro and very fine vertical and horizontal roots; common micro, fine, and medium tubular pores; moderately alkaline (pH 8.4); violently effervescent with disseminated lime and fine lime filaments and threads; clear, irregular boundary. (4 to 12 inches thick)

C1—27 to 42 inches, mottled light olive-gray (5Y 6/2) and light yellowish-brown (10YR 6/4) heavy very fine sandy loam, olive gray (5Y 5/2), dark grayish brown (2.5Y 4/2), and brown (10YR 4/3) and has few, fine, prominent, yellowish-brown (10YR 5/6) mottles when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few micro and very fine vertical and horizontal roots; common micro, fine, and medium tubular pores; moderately alkaline (pH 8.0); very slightly effervescent with disseminated lime; clear, wavy boundary. (8 to 17 inches thick)

C2—42 to 54 inches, mottled light-gray (5Y 6/1), pale-brown (10YR 6/3), and strong-brown (7.5YR 5/6) light fine sandy loam; olive gray (5Y 5/2), dark brown (10YR 4/3), and brown (7.5YR 4/4) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few micro and very fine vertical and oblique roots; common micro, very fine, and medium tubular pores; mildly alkaline (pH 7.5); clear, smooth boundary. (10 to 15 inches thick)

C3g—54 to 70 inches, light olive-gray (5Y 6/2) light fine sandy loam; many, medium, prominent, yellowish-red (5YR 5/8) and dark greenish-gray (5GY 4/1) mottles; common, medium, distinct mottles of olive gray (5Y 5/2) and many, medium, prominent mottles of reddish brown (5YR 4/4) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few micro and very fine vertical and oblique roots; common micro, very fine, and medium tubular pores; mildly alkaline (pH 7.5).

The A horizon ranges in color from gray to grayish brown and in texture from silt loam to silty clay loam. This horizon is neutral to moderately alkaline. The B2 horizon ranges in color from light brownish gray to light gray, gray, olive gray, or light olive gray. Mottling in this horizon is distinct to prominent. The texture ranges from silt loam to silty clay loam. The B2 horizon is moderately alkaline to strongly alkaline and is strongly to violently effervescent with disseminated lime. The upper part of the C horizon ranges in mottled colors from light olive gray, light yellowish brown, or pale brown to light brownish gray or light gray to olive gray. Mottling in this horizon is distinct to prominent, and the texture ranges from very fine sandy loam to silty clay loam. This horizon is moderately alkaline to strongly alkaline, is slightly to moderately saline-alkali in some areas, and is strongly to violently effervescent with disseminated lime. The lower part of the C horizon ranges in color from grayish brown to light olive gray to greenish gray or contains distinct to prominent mottles. The texture of this horizon ranges from silt loam to very fine sandy loam or loamy fine sand. This horizon is mildly alkaline to moderately alkaline, and in a few places it is noncalcareous. Strongly to violently effervescent lime concretions occur at a depth of 14 to 60 inches in the profile.

Included in mapping are small areas of Omni silty clay, Sacramento clay, Sycamore silty clay loam, and Tyndall silty clay loam. Also included are some areas affected by salts and alkali.

Permeability of this Merritt soil is moderate. Surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 7.0 to 10.0 inches in areas that have been drained. The effective rooting depth is 20 to 36 inches and is restricted by the water table. Natural fertility is high.

This soil is used mainly for alfalfa, sugar beets, and tomatoes. Other uses include dryfarmed barley, safflower, wildlife habitat, and recreation. Capability unit IIw-2 (17).

Merritt silty clay loam, deep (Mn).—This soil is similar to Merritt silty clay loam, except that it is underlain at a depth of 40 to 60 inches by buried clay. It is slightly affected by saline-alkali salts.

Included in mapping are small areas of Marvin silty clay loam, Sacramento silty clay loam, and Sycamore complex. Also included are areas where the depth to buried clay is less than 40 inches.

Permeability of this Merritt soil is moderately slow over the slowly permeable clay substratum. A water table occurs at a depth of 36 to more than 60 inches.

This soil is used mainly for alfalfa, sugar beets, corn, and tomatoes. Other uses include irrigated pasture, dryfarmed barley, safflower, wildlife habitat, and recreation. Capability unit IIIw-3 (17).

Merritt silty clay loam, deep, drained (Mo).—This soil is similar to Merritt silty clay loam, except that it is underlain at a depth of 42 to 48 inches by buried clay, and the water table is below a depth of 60 inches.

Included in mapping are small areas of Marvin silty clay loam, Sacramento silty clay loam, and Sycamore complex. Also included are a few areas where the depth to buried clay is less than 42 inches.

The drainage of the Merritt soil has been improved by natural deepening of channels and by use of reclamation structures. Permeability is moderately slow over slow. The available water holding capacity is 7.0 to 10.0 inches. The effective rooting depth is 42 to 48 inches and is limited by the clay substratum.

This soil is used mainly for alfalfa, sugar beets, and tomatoes. Other uses include rice, irrigated pasture, dryfarmed barley, safflower, wildlife habitat, and recreation. Capability unit IIs-3 (17).

Merritt complex, saline-alkali (Mp).—This complex is about 60 percent Merritt silty clay loam; about 30 percent Merritt silty clay loam, deep; and about 10 percent small areas of Marvin silty clay loam, Sacramento clay, Sycamore complex, and Willows clay included in mapping. The soils are moderately affected by salts and alkali.

Drainage of these soils has been improved by open drains. Permeability of the Merritt silty clay loam is moderate. Permeability of Merritt silty clay loam, deep, is moderately slow and contains a slowly permeable clay substratum at a depth of between 40 and 60 inches. The available water holding capacity is 4.0 to 6.0 inches and is reduced by the salts and alkali. These soils are moderately high in fertility. A water table is at a depth of 30 to 60 inches.

This complex is used mainly for sugar beets and rice. Other uses include irrigated pasture, dryland pasture, wildlife habitat, and recreation. Capability unit IVw-6 (17).

Millsholm Series

The Millsholm series consists of well-drained loams on uplands. These soils overlie bedded sandstone and shale at a depth of 11 to 20 inches. Slopes are 15 to 75 percent. Elevation ranges from 500 to 2,500 feet. Annual temperature is 59° F., annual rainfall is 20 to 24 inches, and the frost-free season is about 230 days. Vegetation is annual grasses, forbs, a few perennials, and scattered oak. Millsholm soils are associated principally with Dibble soils.

In a typical profile, the surface layer is light brownish-gray loam about 4 inches thick. The subsoil is pale-brown loam and stony loam about 15 inches thick. This is underlain by light brownish-gray shattered shale.

Millsholm soils are used for range, wildlife habitat, recreation, and watershed.

Millsholm rocky loam, 15 to 75 percent slopes, eroded (MrG2).—This soil is on uplands (fig. 2). Rock outcrops cover 2 to 10 percent of the surface.

Representative profile, on a west-facing slope of 61 percent, 1,200 feet north of the southwest corner of sec. 28, T. 9 N., R. 2 W., Mount Diablo Base Meridian, 30 feet west of a north and south trail, about 7.5 miles northwest of Winters:

A1—0 to 4 inches, light brownish-gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) when moist; moderate, fine, angular blocky structure; hard, very friable, slightly sticky and slightly plastic; many micro and fine random roots and common micro and coarse horizontal roots; common very fine and fine

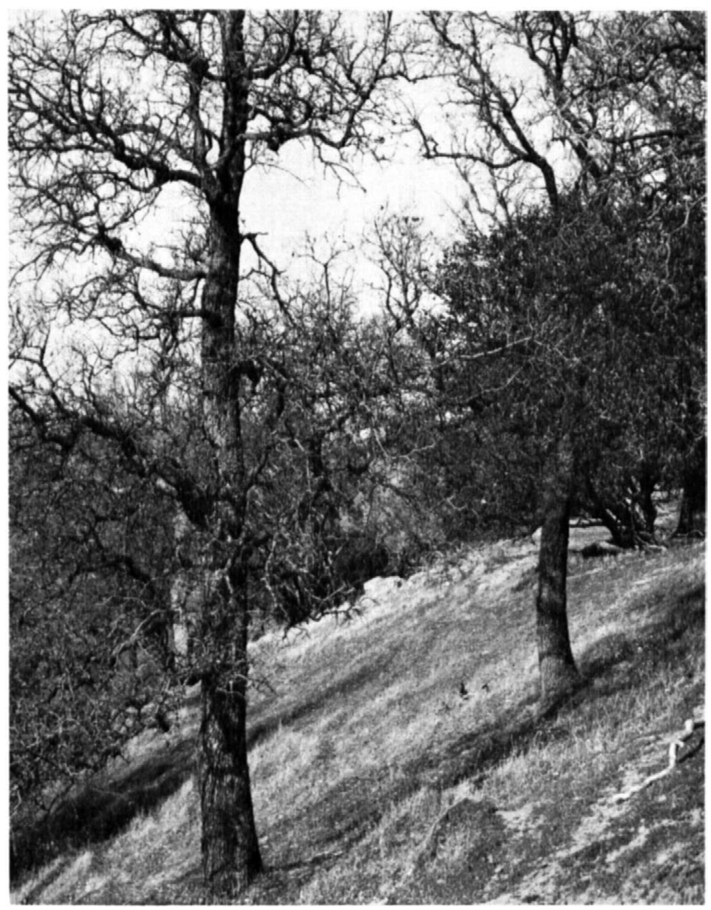

Figure 2.—Millsholm rocky loam, 15 to 75 percent slopes.

interstitial and tubular pores; slightly acid (pH 6.5); gradual, wavy boundary. (3 to 5 inches thick)

B21—4 to 11 inches, pale-brown (10YR 6/3) loam, brown (10YR 4/3) when moist; moderate, fine, angular blocky structure; hard, very friable, sticky and slightly plastic; many micro and fine random roots and common medium and coarse horizontal roots; common very fine and fine interstitial and tubular pores; neutral (pH 6.7); clear, irregular boundary. (3 to 7 inches thick)

B22—11 to 19 inches, pale-brown (10YR 6/3) stony loam, brown (10YR 4/3) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common micro and very fine vertical roots and common medium and coarse horizontal roots; many very fine and fine interstitial pores; neutral (pH 7.0); abrupt, wavy boundary. (5 to 8 inches thick)

R—19 inches, light brownish-gray (2.5Y 6/2) shattered shale, very dark grayish brown (2.5Y 3/2) when moist; neutral (pH 7.2).

The A horizon ranges in color from light yellowish brown to brown or light brownish gray and in texture from loam to silty clay loam. The B2 horizon ranges in color from pale brown to brown and in texture from loam to light clay loam that has 0 to 20 percent stones. Shale or sandstone fragments are found in places throughout the profile. The R horizon consists of interbedded shale and sandstone.

Included in mapping are small areas of Balcom silty clay loam, Corning gravelly loam, Dibble clay loam, Positas gravelly loam, and Rock land. A few areas are also included where the depth to the bedrock is more than 20 inches.

Permeability of this Millsholm soil is moderate. The surface runoff is medium to very rapid, and the erosion hazard is moderate to very high. The available water holding capacity is 2.0 to 3.0 inches. The effective rooting depth is 11 to 20 inches. Natural fertility is moderate to low.

This soil is used mainly for range. Other uses include wildlife habitat, recreation, and watershed. Capability unit VIIe-8 (15); Shallow Loamy range site.

Myers Series

The Myers series is made up of well-drained clays on alluvial fans. They formed in alluvium derived from sedimentary rocks. Slopes are less than 1 percent. Elevation ranges from 25 to 150 feet. The annual temperature is 62° F., the annual rainfall is 16 to 18 inches, and the frost-free season is about 280 days. Where the soils are not cultivated, the vegetation is annual grasses and forbs. The Myers soils are associated principally with the Brentwood and Capay soils.

In a typical profile, the surface layer is light brownish-gray clay about 40 inches thick. This is underlain by yellowish-brown clay that extends to a depth of more than 60 inches.

Myers soils are used for irrigated row crops and field crops, dryfarmed field crops, wildlife habitat, and recreation.

Myers clay (Ms).—This soil is on alluvial fans. Slopes are less than 1 percent.

Representative profile in a grainfield, located 90 feet south of Road 9B and 90 feet west of U.S. Highway No. 99W, 3.5 miles southeast of Dunnigan; the profile, when examined, was moist below a depth of 10 inches:

Ap—0 to 5 inches, light brownish-gray (10YR 6/2) clay, dark grayish brown (10YR 4/2) when moist; moderate, coarse, prismatic structure; very hard, firm, sticky and very plastic; many micro and very fine random roots; many micro and fine vesicular, interstitial, and tubular pores; mildly alkaline (pH 7.5); clear, smooth boundary. (4 to 10 inches thick)

A11—5 to 12 inches, light brownish-gray (10YR 6/2) clay, dark grayish brown (10YR 4/2) when moist; moderate, coarse, prismatic structure; very hard, firm, sticky and very plastic; common micro and fine random roots; many micro and very fine tubular and interstitial pores; moderately alkaline (pH 8.0); clear, wavy boundary. (5 to 10 inches thick)

A12—12 to 40 inches, similar to the A11 horizon, except that the color is dark brown (10YR 4/3) when moist; slickensides are plentiful; gradual, wavy boundary. (20 to 30 inches thick)

AC—40 to 47 inches, yellowish-brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) when moist; weak to moderate, coarse, angular blocky structure; very hard, firm, sticky and very plastic; common micro and very fine random roots; many micro and very fine tubular pores; plentiful slickensides; strongly alkaline (pH 8.6); gradual, wavy boundary. (5 to 10 inches thick)

C—47 to 60 inches, yellowish-brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) when moist; massive; very hard, firm, sticky and very plastic; common micro and very fine random roots; many micro and very fine tubular pores; plentiful slickensides; moderately alkaline (pH 8.2).

The A horizon is light brownish gray or pale brown in color and ranges from heavy clay loam to clay in texture. In areas that have never been cultivated, a thin, bleached, loamy crust is on the surface in many places. The C horizon ranges from light yellowish brown to yellowish brown and from clay loam to clay. In some places the lower part of the A horizon, as well as the C horizon, are calcareous. In a few places below a depth of 30 inches, there are few to common, fine, faint and distinct mottles and also some iron-manganese "shot." In some areas a buried horizon of softly consolidated loam occurs between depths of 40 to 60 inches.

Included in mapping are small areas of Brentwood silty clay loam, Capay silty clay, and Rincon silty clay loam. Also included are small areas of a soil consisting of grayish-brown or dark-brown clay.

This Myers soil is slowly permeable. Surface runoff is very slow, and there is little or no hazard of erosion. The available water holding capacity is 8.0 to 10.0 inches. The effective rooting depth is more than 60 inches. Natural fertility is high.

This soil is used mainly for irrigated alfalfa, sugar beets, tomatoes, and rice. Other uses include prunes, irrigated pasture, dryfarmed barley and safflower, wildlife habitat, and recreation. Capability unit IIs-5 (17).

Omni Series

The Omni series consists of poorly drained, calcareous silty clays in basins. Slopes are less than 1 percent. The soils formed in alluvium from mixed sources. Elevation ranges from 5 feet below sea level to 20 feet above. Annual temperature is 58° F., annual rainfall is 17 to 18 inches, and the frost-free season is about 265 days. In uncultivated areas the vegetation is annual grasses and forbs. Omni soils are associated mainly with Merritt and Sacramento soils.

In a typical profile, the surface layer is gray silty clay about 12 inches thick. The subsoil is mottled light-gray silty clay and heavy clay loam about 15 inches thick. This is underlain by stratified, mottled predominantly black, very dark gray, gray, dark gray and light olive-gray silty clay and light clay loam that extend to a depth of more than 60 inches.

Omni soils are used for row crops, forage crops, truck crops, dryfarmed field crops, wildlife habitat, and recreation.

Omni silty clay (Ob).—This soil is in basins. Slopes are less than 1 percent.

Representative profile in a disked field of sugar beets (fig. 3), 0.4 mile northeast of Clarksburg Road and main canal, 0.15 mile west of the Sacramento Northern Railroad, about 1.75 miles west of Clarksburg; the profile, when examined, was moist to a depth of 42 inches:

Ap—0 to 12 inches, gray (10YR 5/1) silty clay, very dark gray (10YR 3/1) when moist; strong, coarse, prismatic structure; very hard, firm, sticky and plastic; many micro and medium random roots and common coarse vertical roots; many micro and medium tubular pores; moderately alkaline (pH 8.2); very slightly effervescent with lime segregated in a few, fine, soft masses; common, fine, pale-yellow (5Y 7/3) and red (2.5YR 4/8) iron concretions; abrupt, wavy boundary. (8 to 20 inches thick)

B21cag—12 to 21 inches, light-gray (5Y 6/1) matrix, gray (N 5/0) ped faces, silty clay with common, medium, distinct mottles of pale olive (5Y 6/3) and thick discontinuous bands of very dark gray (N 3/0) organic matter; olive-gray (5Y 4/2) matrix, very dark gray (5Y 3/1) ped faces with many, medium, distinct mottles of olive (5Y 4/3) and thick discontinuous bands of black (N 2/0) organic matter when moist; medium, coarse, prismatic structure and medium, coarse, angular blocky structure; very hard, firm, sticky and plastic; many micro and medium random roots; many micro and fine and common medium tubular and vesicular pores; moderately alkaline (pH 8.4); strongly effervescent with lime in seams and filaments; few, medium, irregularly shaped, soft masses of gypsum; abrupt, wavy boundary. (8 to 14 inches thick)

B22g—21 to 27 inches, light-gray (5Y 6/1) heavy clay loam; many, medium, distinct mottles of light brownish gray (2.5Y 6/2); very dark gray (5Y 3/1), and many, medium, distinct mottles of very dark grayish brown (2.5Y 3/2) when moist; moderate, coarse, prismatic structure and moderate, coarse, angular blocky structure; very hard, friable, sticky and plastic; many micro and fine random roots; many micro and fine tubular pores; moderately alkaline (pH 8.4); slightly effervescent with disseminated lime; many light yellowish-brown (2.5Y 6/4) and few, fine, red (2.5YR 4/8), soft masses when moist; abrupt, wavy boundary. (5 to 10 inches thick)

A11bg—27 to 34 inches, mottled black (5Y 2/1), gray (5Y 5/1), light olive-gray (5Y 6/2), and olive (5Y 5/4) silty clay, mottled black (5Y 2/1), very dark gray (5Y 3/1), and olive (5Y 4/4) when moist; moderate, medium, prismatic structure and moderate, medium, angular blocky structure; very hard, friable, slightly sticky and plastic; many micro and fine random roots; many micro and medium tubular pores; moderately alkaline (pH 8.3); very slightly effervescent with disseminated lime; abrupt, wavy boundary. (6 to 14 inches thick)

A12bg—34 to 42 inches, mottled very dark gray (N 3/0), dark-gray (5Y 4/1), and pale-olive (5Y 6/4) silty clay; mottled black (5Y 2/1), very dark gray (5Y 3/1), dark gray (5Y 4/1), and olive (5Y 4/3) when moist; massive; very hard, firm, sticky and plastic; many micro and fine random roots; many micro and medium tubular pores; moderately alkaline (pH 8.2); very slightly effervescent with disseminated lime; abrupt, smooth boundary. (6 to 14 inches thick)

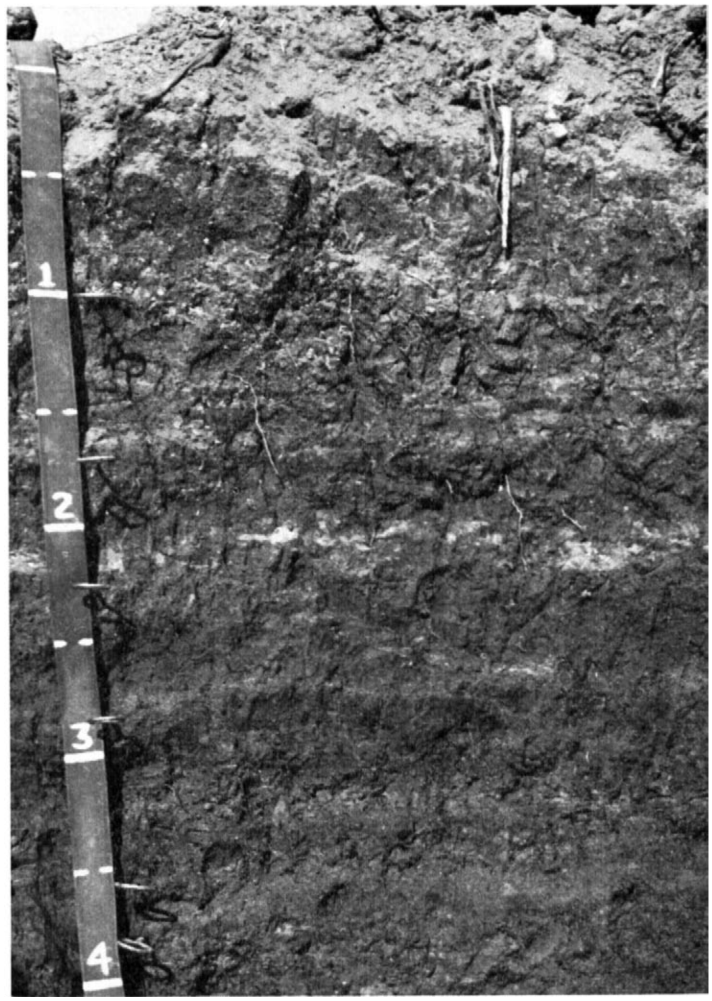

Figure 3.—Typical profile of Omni silty clay.

Cb—42 to 45 inches, mottled light olive-gray (5Y 6/2), pale-olive (5Y 6/3), and light brownish-gray (2.5Y 6/2) light clay loam, olive brown (2.5Y 4/4) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many micro and fine random roots; common micro and fine tubular pores; moderately alkaline (pH 8.2); common, fine, reddish-yellow (5YR 6/6), soft masses, red (2.5YR 4/8) when moist; abrupt, smooth boundary. (1 to 4 inches thick)

A13bg—45 to 48 inches, mottled dark-gray (5Y 4/1) and pale-yellow (5Y 7/3) silty clay, mottled very dark gray (5Y 3/1), dark gray (5Y 4/1), and olive gray (5Y 4/2) when moist; massive; extremely hard, firm, slightly sticky and very plastic; many micro and fine random roots; many micro and fine tubular pores; moderately alkaline (pH 8.2); no lime; abrupt, smooth boundary. (1 to 4 inches thick)

ACbg—48 to 60 inches, similar to the two C and A13bg horizons, present in alternate bands 1 to 4 inches thick.

The A horizon ranges in color from gray to grayish brown and in texture from heavy silty clay loam to silty clay or clay. This horizon is mildly alkaline to moderately alkaline; lime is present at a depth of 0 to 10 inches. The B2 horizon ranges in color from light gray to pale olive and has distinct or prominent mottles. This horizon ranges in texture from heavy clay loam to silty clay to clay and is moderately alkaline to strongly alkaline; accumulations of lime occur in the upper portions and decrease with depth. Many soft masses and concretions of pale yellow or red are typical in the lower portion of the horizon. The C horizon, when present, ranges in color from mottled light gray to pale olive or light yellowish brown and in texture from clay loam to silty clay. Lime is present in some areas. The buried soils are typically variable in color and are stratified. Lime content varies in these strata, but it typically decreases with depth or, in a few places, is absent. Depth to the water table varies from 24 to 48 inches.

Included in mapping are small areas of Merritt silty clay loam, Sacramento clay, and Tyndall silty clay loam.

Permeability of this Omni soil is slow. Surface runoff is very slow, and the hazard of erosion is none to slight. In areas that have been drained, the available water holding capacity is 8.0 to 10.0 inches. The effective rooting depth is 24 to 48 inches and is restricted by the water table. Natural fertility is high.

This soil is used mainly for alfalfa, sugar beets, and corn. Other uses include carrot seed, dryfarmed barley, wheat, safflower, wildlife habitat, and recreation. Capability unit IIIw-5 (17)

Omni silty clay loam (Oa).—This soil is similar to Omni silty clay, except that the surface layer is light brownish-gray to light-gray silty clay loam overwash material that ranges in thickness from 8 to 16 inches.

Included in mapping are areas where the overwash material is as thick as 20 inches. Areas of Merritt silty clay loam and Sacramento silty clay loam are also included.

This soil is used mainly for alfalfa, sugar beets, and corn. Other uses include carrot seed, dryfarmed barley, wheat, safflower, wildlife habitat, and recreation. Capability unit IIIw-3 (17).

Pescadero Series

The Pescadero series consists of poorly drained silty clays in basins. Slopes are less than 1 percent. The soils formed in alluvium from sedimentary rocks. Elevation ranges from 5 to 100 feet. Annual temperature is 60° F., annual rainfall is 16 to 19 inches, and the frost-free season is about 280 days. Vegetation is saltgrass, pickleweed, and other plants that tolerate salt. Pescadero soils are associated principally with Capay and Willows soils.

In a typical profile, the surface layer is light-gray silty clay loam about 3 inches thick. The subsoil is gray and mottled light olive-gray and pale-brown silty clay and silty clay loam about 64 inches thick. It is underlain by mottled pale-brown clay loam.

Pescadero soils are used for irrigated row crops, field crops, and irrigated pasture where reclaimed and for dryland pasture, wildlife habitat, and recreation.

Pescadero silty clay, saline-alkali (Pb).—This soil occupies basins. Slopes are less than 1 percent.

Representative profile in native pasture, 0.3 mile south of Road 24 and 0.25 mile east of Road 102, in the SE¼NW¼NW¼ of sec. 2, T. 9 N., R. 2 E., Mount Diablo Base Meridian, 2 miles southeast of Woodland:

A1—0 to 3 inches, light-gray (2.5Y 7/2) silty clay loam; dark grayish brown (2.5Y 4/2) when moist; weak, medium, platy structure; very hard, friable, sticky and plastic; common micro random roots; common micro tubular pores; mildly alkaline (pH 7.7) on the immediate surface, moderately alkaline (pH 8.0) about one to three inches below the surface; abrupt, wavy boundary. (1 to 4 inches thick)

B21t—3 to 13 inches, gray (5Y 5/1) silty clay, very dark gray (5Y 3/1) when moist; strong, very coarse, prismatic structure; very hard, friable, sticky and plastic; common micro and many medium roots; many micro tubular pores; many moderately thick clay films on ped faces and in pores; strongly alkaline (pH 8.9); gradual, wavy boundary. (6 to 12 inches thick)

B22tca—13 to 26 inches, light olive-gray (5Y 6/2) silty clay; common, fine, distinct, strong-brown (7.5YR 5/6) and gray (N5/0) mottles; olive (5Y 4/3), dark brown (7.5YR 4/4), and very dark gray (N 3/0) when moist; moderate, medium, prismatic structure and moderate, medium and coarse, angular blocky structure; very hard, firm, sticky and plastic; common micro and many medium roots; common micro tubular pores; many moderately thick clay films on ped faces and in pores; slightly effervescent with segregated lime in soft masses; strongly alkaline (pH 8.6); clear, wavy boundary. (5 to 15 inches thick)

B23tca—26 to 40 inches, light olive-gray (5Y 6/2) silty clay; many, fine, distinct, strong-brown (7.5YR 5/6) mottles; olive gray (5Y 4/2) and has yellowish-red (5YR 4/6) and very dark grayish-brown (2.5Y 3/2) mottles when moist; moderate, medium, prismatic structure and moderate, medium and coarse, angular blocky structure; very hard, firm, sticky and plastic; few micro and common medium roots; many micro tubular pores; many moderately thick clay films in pores and continuous moderately thick clay films on ped faces; slightly effervescent with segregated lime in seams and soft masses; moderately alkaline (pH 8.1); gradual, wavy boundary. (7 to 15 inches thick)

B31ca—40 to 52 inches, light olive-gray (5Y 6/2) silty clay loam; many, fine, distinct, strong-brown (7.5YR 5/6) mottles; olive gray (5Y 4/2) and yellowish-red (5YR 4/6) mottles when moist; moderate, medium, prismatic structure and moderate, medium and coarse, angular blocky structure; hard, firm, sticky and plastic; few micro and fine roots; many micro tubular pores; continuous thin clay films on ped faces and many moderately thick clay films in pores; strongly effervescent with disseminated and segregated lime in seams; moderately alkaline (pH 7.9); gradual, wavy boundary. (9 to 15 inches thick)

B32ca—52 to 67 inches, pale-brown (10YR 6/3) silty clay loam; many, fine, distinct, strong-brown (7.5YR 5/8) mottles; brown (10YR 4/3) and has dark-brown (7.5YR 4/4) mottles when moist; strong, medium, prismatic structure and strong, medium and coarse, angular blocky structure; hard, friable, sticky and plastic; very few micro roots; many micro tubular pores; continuous thin clay films on ped faces and common thin clay films in pores; violently effervescent with lime segregated in seams; moderately alkaline (pH 8.0); gradual, wavy boundary. (8 to 15 inches thick)

Cca—67 to 72 inches, pale-brown (10YR 6/3) clay loam; many, fine, distinct, strong-brown (7.5YR 5/8) mottles; brown (10YR 4/3) and dark-brown (7.5YR 4/4) mottles when moist; moderate, medium, prismatic structure and strong, coarse, angular blocky structure; slightly hard, friable, sticky and plastic; many micro tubular pores; continuous thin clay films on ped faces; violently effervescent with lime segregated in seams; moderately alkaline (pH 8.1).

The A horizon ranges in color from light gray to pale brown and in texture from loam to silty clay. This horizon is medium acid to moderately alkaline. The Bt horizon ranges in color from gray to grayish brown to dark gray or light olive gray that has mottles, and in texture from silty clay to clay. This horizon is moderately alkaline to very strongly alkaline. The C horizon ranges in color from pale brown or very pale brown to light yellowish brown to pale olive that has mottles, and in texture from loam to silty clay loam.

Included in mapping are areas of Capay silty clay, Marvin silty clay loam, Riz loam, and Willows clay.

This Pescadero soil is slowly permeable. Surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 4.0 to 6.0 inches in areas that have been drained. The effective rooting depth is 20 to 36 inches and is restricted by a high water table. Natural fertility is moderately high. The exchangeable sodium percentage is greater than 20 percent; the high content of sodium accounts for the lower water-holding capacity.

This soil is used mainly for dryland pasture. Other uses include rice, sugar beets, wildlife habitat, and recreation. Capability unit IVw–6 (17).

Pescadero silty clay (Pa).—This soil is similar to Pescadero silty clay, saline-alkali, except that it contains less than 15 percent exchangeable sodium. The surface layer is light olive gray. The subsoil is gray clay and is moderately alkaline. The substratum is mottled, light brownish-gray silty clay.

Included in mapping are small areas of Capay silty clay, Marvin silty clay loam, and Willows clay.

The available water holding capacity of this Pescadero soil is 5.0 to 8.0 inches for a drained and reclaimed soil. The effective rooting depth is 30 to 48 inches and is limited by a water table.

This soil is used mainly for irrigated pasture, sugar beets, and rice. Other uses include wildlife habitat and recreation. Capability unit IIIw–5 (17).

Pescadero soils, flooded (Pc).—These soils are similar to Pescadero silty clay, saline-alkali, except that they are subject to flooding at least 1 year out of 3 because of flowage easements. In places on the surface they have 10 to 20 inches of overwash material that ranges in texture from sandy loam to silty clay.

Included in mapping are small areas of Capay silty clay and Willows clay. Also included, in the vicinity of the Colusa Drainage Canal, are areas that are subject to flooding 1 year out of 2 for a duration of more than 48 hours.

These soils are in the Yolo By-Pass and are used mainly for rice and sugar beets. Other uses include wildlife habitat and recreation. Capability unit IVw–3 (17).

Positas Series

The Positas series consists of well-drained gravelly loams on terraces. These soils have a subsoil of gravelly clay. Slopes range from 15 to 50 percent. The soils formed in softly consolidated very gravelly clay alluvium from mixed sources. Elevation ranges from 400 to 1,500 feet. The annual temperature is 60° F., annual rainfall is 18 to 24 inches, and the frost-free season is about 230 days. Vegetation is annual grasses, forbs, and scattered oak and patches of brush. The Positas soils are associated principally with Balcom and Dibble soils.

In a typical profile, the surface layer is brown gravelly loam and gravelly sandy clay loam about 14 inches thick. The subsoil is yellowish-red gravelly clay and reddish-brown very gravelly clay and extends to a depth of 60 inches or more.

Positas soils are used for range, pasture, wildlife habitat, and recreation.

Positas gravelly loam, 30 to 50 percent slopes, eroded (PfF2).—This soil is on terraces.

Representative profile, on a south-facing slope of 35 percent, 600 feet north and 500 feet east of the southwest corner of sec. 24, T. 8 N., R. 2 W., Mount Diablo Base Meridian, 4.0 miles west of Winters; the profile, when examined, was moist below a depth of 8 inches:

A1—0 to 8 inches, brown (10YR 5/3) gravelly loam, dark brown (7.5YR 3/2) when moist; moderate, fine, angular blocky structure and moderate, medium, angular blocky structure; soft, very friable, slightly sticky and slightly plastic; many micro and very fine vertical roots; many very fine interstitial pores and few fine tubular pores; slightly acid (pH 6.5); gradual, wavy boundary. (6 to 12 inches thick)

A3—8 to 14 inches, brown (7.5YR 5/2) gravelly sandy clay loam, dark brown (7.5YR 3/2) when moist; moderate, medium, angular blocky structure; slightly hard, friable, sticky and plastic; common micro and fine random roots; commonly moderately thick clay films on ped faces and continuous moderately thick clay films along root channels and around sand grains; neutral (pH 7.0); abrupt, wavy boundary. (4 to 8 inches thick)

B21t—14 to 21 inches, yellowish-red (5YR 4/6) gravelly clay, yellowish red (5YR 4/6) when moist; strong, coarse, prismatic structure and strong, coarse, angular blocky structure; hard, very firm, very sticky and very plastic; many micro and fine random roots and common medium oblique roots along the upper boundary; continuous moderately thick dark-red (2.5YR 3/6) clay films along ped faces, around sand grains, and along root channels; neutral (pH 7.0); abrupt, wavy boundary. (4 to 16 inches thick)

B22t—21 to 31 inches, yellowish-red (5YR 4/6) gravelly clay, yellowish red (10YR 4/6) when moist; weak, coarse, prismatic structure; hard, very firm, very sticky and very plastic; few micro and very fine and many medium and coarse oblique roots, mostly along upper horizon boundary; continuous, thick, dark-red (2.5YR 3/6) clay films along ped faces, around sand grains, and along root channels; neutral (pH 7.0); clear, wavy boundary. (8 to 12 inches thick)

B23t—31 to 60 inches, reddish-brown (5YR 4/4) very gravelly clay, reddish brown (5YR 4/4) when moist; weak, medium, angular blocky structure; hard, very firm, very sticky and very plastic; few micro, very fine, and coarse oblique roots; continuous thick clay films bridging sand grains and on ped faces; neutral (pH 7.0).

The A horizon ranges in color from brown to grayish brown and in texture from gravelly loam to gravelly clay loam; the gravel content ranges from 15 to 35 percent. The upper Bt horizon ranges in color from yellowish red to strong brown or yellowish brown; the texture is gravelly clay, and the gravel content ranges from 15 to 30 percent. This horizon is medium acid to neutral. The lower part of the Bt or C horizon, if present, ranges in structure from massive to angular blocky and is softly consolidated very gravelly clay that has a gravel content that ranges from 50 to 75 percent. Depth to the softly consolidated material ranges from 22 to 48 inches.

Included in mapping are small areas of Balcom silty clay loam, Corning gravelly loam, Dibble clay loam, and Millsholm rocky loam.

Permeability of this Positas soil is very slow. Surface runoff is rapid, and the erosion hazard is high. The available water holding capacity is 2.0 to 3.0 inches. The effective rooting depth is 10 to 20 inches and is limited by the clay subsoil. Natural fertility is low.

This soil is used for range. Other uses include wildlife habitat, recreation, and watershed. Capability unit VIIe–3 (15); Claypan range site.

Positas gravelly loam, 15 to 30 percent slopes, eroded (PfE2).—This soil is similar to Positas gravelly loam, 30 to 50 percent slopes, eroded, except that it is less sloping.

Included in mapping are small areas of Balcom silty clay loam, Corning gravelly loam, and Dibble clay loam.

Surface runoff of this Positas soil is medium to rapid, and the erosion hazard is moderate to high. Natural fertility is moderate to low.

This soil is used primarily for range and pasture. Other uses include wildlife habitat, recreation, and watershed. Capability unit VIe-3 (15); Claypan range site.

Positas gravelly loam, 30 to 50 percent slopes, severely eroded (PfF3).—This soil is similar to Positas gravelly loam, 30 to 50 percent slopes, eroded, except that the surface layer is 5 to 15 inches thick, and the subsoil is exposed in some areas.

Included in mapping are small areas of Balcom silty clay loam, Millsholm rocky loam, and Rock land. Also included are areas where the surface layer is very gravelly loam.

This soil has a total available water holding capacity of less than 1.5 inches. The effective rooting depth is 5 to 15 inches.

This soil is used for range, wildlife habitat, recreation, and watershed. Capability unit VIIe-3 (15); Claypan range site.

Reiff Series

The Reiff series consists of well-drained very fine sandy loams on alluvial fans. Slopes are less than 1 percent. The soils formed in material weathered from sedimentary rocks. Elevation ranges from 30 to 70 feet.

Annual temperature is 62° F., annual rainfall is 16 to 20 inches, and the frost-free season is about 275 days. In uncultivated areas the vegetation is annual grasses and forbs. Reiff soils are associated principally with Yolo and Zamora soils.

In a typical profile, the surface layer is grayish-brown very fine sandy loam and loam about 16 inches thick. It is underlain by grayish-brown and brown fine sandy loam that extends to a depth of more than 60 inches. In some areas the profile is gravelly throughout.

Reiff soils are used for orchards, irrigated row crops, forage crops, dryfarmed grain, wildlife habitat, and recreation.

Reiff very fine sandy loam (Ra).—This soil is on alluvial fans. Slopes are less than 1 percent.

Representative profile, 0.75 mile west of Road 102 and 100 feet north of Road 14, 100 feet northwest of the southeast corner of SE¼SW¼SW¼ of sec. 22, T. 11 N., R. 2 E., Mount Diablo Base Meridian, 2 miles southwest of Knights Landing; the profile, when examined, was moist below a depth of 2 inches:

Ap—0 to 3 inches, grayish-brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) when moist; moderate, fine, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few coarse vertical roots and common micro and very fine random roots; many vesicular, interstitial, and tubular pores; slightly acid (pH 6.5); abrupt, smooth boundary. (3 to 10 inches thick)

A1—3 to 16 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; weak, coarse, prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; common medium and coarse vertical roots and many micro and very fine random roots; many vesicular and interstitial pores and common tubular pores; colloidal stains in pores; neutral (pH 7.0); clear, wavy boundary. (8 to 15 inches thick)

AC—16 to 24 inches, grayish-brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common medium and many micro and fine random roots; many vesicular, interstitial, and common tubular pores; colloidal stains in pores; mildly alkaline (pH 7.5); clear, irregular boundary. (6 to 10 inches thick)

C1—24 to 43 inches, brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common medium and many micro and fine random roots; many tubular pores; colloidal stains in pores; moderately alkaline (pH 8.0); diffuse, wavy boundary. (15 to 25 inches thick)

C2—43 to 60 inches, brown (10YR 5/3) fine sandy loam, dark grayish brown (10YR 4/2) when moist; massive; soft, very friable, slightly sticky and nonplastic; common medium and many micro and fine random roots; many tubular pores; colloidal stains in pores; moderately alkaline (pH 8.0).

The A horizon ranges in color from grayish brown to brown and in texture from loam, very fine sandy loam, and fine sandy loam to sandy loam that contains 12 to 18 percent clay. This horizon is slightly acid to moderately alkaline. The C horizon ranges in color from grayish brown or brown to pale brown and in texture from loam or fine sandy loam to sandy loam. This horizon is neutral to moderately alkaline and in a few places is calcareous. Silt, sand, and gravel lenses are common in the profile. Few, fine, faint mottles occur in a few places within the profile. Common, fine, prominent mottles occur in places in silt lenses below a depth of 40 inches.

Included in mapping are small areas of Sycamore silt loam, Tyndall very fine sandy loam, and Yolo silt loam. Also included are a few small areas that are underlain by a silty clay loam layer at a depth of 40 to 60 inches.

The permeability of this Reiff soil is moderately rapid. Surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 8.5 to 10.0 inches. The effective rooting depth is more than 60 inches. Natural fertility is high.

This soil is used mainly for almonds, walnuts, sugar beets, tomatoes, and alfalfa. Other uses include dryfarmed barley, wildlife habitat, and recreation. Capability unit I-1 (17).

Reiff gravelly loam (Rb).—This soil is similar to Reiff very fine sandy loam, except that it is loam in texture and contains 15 to 30 percent gravel throughout the profile.

Included in mapping are small areas of Arbuckle gravelly loam, Loamy alluvial land, and Yolo silt loam.

The available water holding capacity of this Reiff soil is 7.0 to 8.5 inches.

This soil is used mainly for almonds, walnuts, tomatoes, and alfalfa. Other uses include dryfarmed barley, wildlife habitat, and recreation. Capability unit IIs-4 (17).

Rincon Series

The Rincon series consists of well-drained silty clay loams on alluvial fans. These soils have a subsoil of heavy silty clay loam. Slopes are 0 to 2 percent. The soils formed in material weathered from sedimentary rocks. Elevation ranges from 50 to 350 feet. Annual temperature is 61° F., annual rainfall is 16 to 17 inches, and the frost-free season is about 275 days. In uncultivated areas the vegetation is annual grasses and forbs. Rincon soils are associated principally with Brentwood and Tehama soils.

In a typical profile, the surface layer is grayish-brown silty clay loam about 15 inches thick. The upper part of the subsoil is grayish-brown heavy silty clay loam about 41 inches thick. The lower part of the subsoil is light yellowish-brown silty clay loam that extends to a depth of more than 60 inches.

Rincon soils are used for irrigated row crops, forage crops, orchards, dryfarmed grain, wildlife habitat, and recreation.

Rincon silty clay loam (Rg).—This soil is on alluvial fans. Slopes are less than 1 percent.

Representative profile, one-eighth mile west of Road 95B and three-eighths of a mile north of Road 18A, 2.5 miles southwest of the town of Yolo; the profile, when examined, was moist below a depth of 15 inches:

Ap—0 to 8 inches, grayish-brown (2.5Y 5/2) silty clay loam, very dark grayish brown (10YR 3/2) when moist; surface 3 inches disturbed, below that depth has strong, coarse, prismatic structure; very hard, friable, sticky and plastic; common micro and fine random roots; common micro and very fine tubular and interstitial pores; moderately alkaline (pH 8.0); clear, smooth boundary. (5 to 10 inches thick)

A1—8 to 15 inches, grayish-brown (2.5Y 5/2) silty clay loam, very dark grayish brown (10YR 3/2) when moist; strong, coarse, prismatic structure; very hard, friable, sticky and plastic; common micro and fine random roots and few medium vertical roots; many micro and very fine tubular and interstitial pores; moderately alkaline (pH 8.0); clear, wavy boundary. (3 to 12 inches thick)

B1—15 to 21 inches, grayish-brown (2.5Y 5/2) heavy silty clay loam, very dark grayish brown (10YR 3/2) when moist; moderate, coarse, prismatic structure; hard, firm, sticky (slightly stickier than A horizon) and plastic; common micro and very fine random roots and common fine vertical roots; common micro and fine tubular pores; common thin clay films on ped faces and in pores; moderately alkaline (pH 8.0); clear, wavy boundary. (4 to 9 inches thick)

B21t—21 to 29 inches, grayish-brown (2.5Y 5/2) heavy silty clay loam, very dark grayish brown (10YR 3/2) when moist; moderate, coarse, prismatic structure and moderate, coarse, angular blocky structure; hard, very firm, sticky and plastic; common micro and very fine random roots and common fine vertical roots; common micro and very fine tubular pores; many thin clay films on ped faces and in pores; moderately alkaline (pH 8.0); gradual, wavy boundary. (7 to 10 inches thick)

B22t—29 to 43 inches, grayish-brown (2.5Y 5/2) heavy silty clay loam, very dark grayish brown (10YR 3/2) when moist; moderate, coarse, angular blocky structure; hard, very firm, sticky and plastic; common micro and very fine random roots and common fine vertical roots; common micro tubular pores; many moderately thick clay films on ped faces and in pores; moderately alkaline (pH 8.0); gradual, wavy boundary. (8 to 15 inches thick)

B23t—43 to 56 inches, grayish-brown (10YR 5/2) and pale-brown (10YR 6/3) heavy silty clay loam, very dark grayish brown (10YR 3/2) and dark brown (10YR 4/3) when moist (darker color is due to colloidal stains); moderate, medium, prismatic structure; hard, firm, sticky and plastic; common micro and very fine random roots and common fine vertical roots; many micro and very fine tubular and vesicular pores; many moderately thick clay films on ped faces and in pores; moderately alkaline (pH 8.0); gradual, wavy boundary. (7 to 15 inches thick)

B3—56 to 72 inches, light yellowish-brown (10YR 6/4) and brown (10YR 5/3) silty clay loam, dark yellowish brown (10YR 4/4) and dark brown (10YR 3/3) when moist; massive; hard, firm, sticky and plastic; common micro and very fine random roots and common fine vertical roots; many micro and very fine vesicular and tubular pores; few moderately thick clay films on ped faces and many thin clay films in pores; moderately alkaline (pH 8.0); strongly effervescent with lime occurring in soft masses.

The A horizon ranges in color from dark grayish brown to grayish brown and in texture from heavy loam to silty clay loam. The Bt horizon ranges in color from grayish brown or brown to yellowish brown or pale brown and in texture from heavy silty clay loam to silty clay or clay. The B3 horizon and the C horizon are calcareous in a few places.

Included in mapping are small areas of Brentwood silty clay loam, Tehama loam, Marvin silty clay loam, Yolo silty clay loam, and Zamora loam.

This Rincon soil is slowly permeable. Surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 7.0 to 9.0 inches. The effective rooting depth is more than 60 inches. Natural fertility is high.

This soil is used mainly for sugar beets, tomatoes, and alfalfa. Other uses include dryfarmed barley, irrigated pasture, almonds, rice, wildlife habitat, and recreation. Capability unit IIs-3 (17).

Riverwash

Riverwash (Rh) is a land type consisting of excessively drained, sandy, gravelly, or stony stream and river deposits. Riverwash occupies stream channels and is subject to overflow. Elevation ranges from 5 to 500 feet. The annual temperature is 61° F.; annual rainfall is 16 to 20 inches. Vegetation on this land type is scattered and consists mostly of cottonwood, willow, and saltcedar. Riverwash is associated principally with Loamy alluvial land and Soboba soils.

Included in mapping are small areas of Loamy alluvial land and of Soboba gravelly sandy loam.

Permeability is very rapid. Surface runoff is very slow when the land is not flooded, and the available water holding capacity is variable. Riverwash is subject to scouring and deposition. The effective rooting depth is variable, and natural fertility is very low.

This land type is used mainly as a source of sand and gravel. It is also used as wildlife habitat and for recreation. Capability unit VIIIw-4 (17).

Riz Series

The Riz series consists of poorly drained loams on old terrace remnants. These soils have a subsoil of clay. Slopes are less than 1 percent. The soils formed in alluvium from mixed sources. Elevation ranges from 10 to 30 feet.

Annual temperature is 61° F., annual rainfall is 16 to 18 inches, and the frost-free season is about 280 days. Vegetation is annual grasses, forbs, and perennial grasses that tolerate salt. Riz soils are associated principally with Pescadero and Willows soils.

In a typical profile, the surface layer is light brownish-gray loam about 10 inches thick. The subsoil is mottled, light brownish-gray, brown, and yellowish-brown heavy clay loam and clay about 27 inches thick. This is underlain by mottled, light yellowish-brown and yellowish-brown clay loam and loam that extend to a depth of more than 60 inches.

Riz soils are used for rice, irrigated row crops, field crops, and pasture, for dryfarmed small grain, as wildlife habitat, and for recreation.

Riz loam (Rk).—This soil is on terrace remnants in basin areas. Slopes are less than 1 percent.

Representative profile, 0.2 mile south of Thorpe Road, 0.3 mile east of the Sacramento-Yolo deep water channel, 1.5 miles southwest of West Sacramento; the profile, when examined, was moist below a depth of 14 inches:

Ap—0 to 10 inches, light brownish-gray (2.5Y 6/2) loam; few, fine, prominent mottles of strong brown (7.5YR 5/8), dark grayish brown (10YR 4/2) and few, fine, distinct mottles of yellowish brown (10YR 5/8) when moist; moderate, coarse, prismatic structure; hard, friable, slightly sticky and plastic; common micro and very fine random roots and few fine oblique roots; common micro and very fine vesicular, interstitial and tubular pores; moderately alkaline (pH 8.2); no lime; abrupt, smooth boundary. (9 to 20 inches thick)

B1t—10 to 14 inches, mottled light brownish-gray (2.5Y 6/2), brown (10YR 5/3), and yellowish-brown (10YR 5/6) heavy clay loam, dark grayish brown (10YR 4/2) and common, fine, prominent mottles of yellowish red (5YR 4/6) and common, medium, faint mottles of dark yellowish brown (10YR 4/4) when moist; moderate, coarse, prismatic structure and moderate, coarse, angular blocky structure; hard, friable, sticky and very plastic; common micro and very fine random roots and few fine horizontal roots; common micro and very fine interstitial and tubular pores; few thin clay films on ped faces and in pores; moderately alkaline (pH 8.2); no lime; plentiful manganese shot 1 to 2 millimeters in size; clear, smooth boundary. (0 to 6 inches thick)

B21t—14 to 19 inches, yellowish-brown (10YR 5/4) clay, brown (10YR 4/3) when moist; moderate, coarse, prismatic structure and moderate, coarse, angular blocky structure; very hard, firm, very sticky and very plastic; common micro random roots; common micro interstitial and tubular pores; continuous moderately thick clay films on ped faces and in pores; strongly alkaline (pH 8.6); no lime; plentiful manganese shot 1 to 2 millimeters in size; very dark grayish brown (10YR 3/2) when moist; coatings in very fine and fine old root channels; gradual, wavy boundary. (4 to 10 inches thick)

B22t—19 to 33 inches, yellowish-brown (10YR 5/4) clay brown (10YR 4/3) and few, fine, distinct mottles of strong brown (7.5YR 5/8) when moist; moderate, coarse, prismatic structure and moderate, coarse, angular blocky structure; very hard, firm, very sticky and very plastic; few micro vertical roots; common micro interstitial and tubular pores; continuous moderately thick clay films on ped faces and in pores; strongly alkaline (pH 8.8); slightly effervescent with segregated lime; plentiful manganese shot 1 to 2 millimeters in size; clear, wavy boundary. (10 to 24 inches thick)

B3tca—33 to 37 inches, yellowish-brown (10YR 5/4) clay; common, fine, distinct mottles of strong brown (7.5YR 5/6) and very pale brown (10YR 7/3), dark yellowish brown (10YR 4/4) and common, fine, distinct mottles of strong brown (7.5YR 5/8) when moist; weak, coarse, prismatic structure and moderate, coarse, subangular blocky structure; very hard, firm, very sticky and very plastic; few micro random roots; few micro vesicular and tubular pores; many moderately thick clay films on ped faces and in pores; strongly alkaline (pH 8.6); violently effervescent with lime segregated in filaments up to one-half inch wide throughout the horizon and extends 1 to 4 inches into adjacent horizons; plentiful manganese shot 1 to 2 millimeters in size; clear, irregular boundary. (4 to 8 inches thick)

C1—37 to 44 inches, light yellowish-brown (10YR 6/4) clay loam; common, fine, distinct mottles of dark brown (7.5YR 4/4), dark yellowish brown (10YR 4/4) and common, fine, distinct mottles of dark brown (7.5YR 3/2) when moist; massive; hard, friable, sticky and plastic; few micro random roots; common micro interstitial and tubular pores; common thin clay films in pores; moderately alkaline (pH 8.4); slightly effervescent with disseminated lime and strongly effervescent with lime segregated into filaments; clear, wavy boundary. (6 to 14 inches thick)

C2—44 to 60 inches, light yellowish-brown (10YR 6/4) loam; common, fine, distinct mottles of dark brown (7.5YR 4/4), dark yellowish brown (10YR 4/4) and common, fine, prominent mottles of dark reddish brown (5YR 3/4) when moist; massive; slightly hard, friable, slightly sticky and plastic; no roots; common fine tubular pores and common micro and very fine interstitial and tubular pores; moderately alkaline (pH 8.4); slightly effervescent with disseminated lime and strongly effervescent with lime segregated into filaments; many manganese or organic stains; numerous concretions of gypsum up to one-half inch in size.

The A horizon ranges in color from light brownish gray to pale brown and in texture from loam to clay loam. This horizon is neutral to moderately alkaline. The B2t horizons range in color from brown to yellowish brown. These horizons are moderately alkaline to strongly alkaline, and the exchangeable sodium percentage ranges from 15 to 20. The C horizons range in color from yellowish brown to light yellowish brown and in texture from loam to heavy clay loam. These horizons are moderately alkaline to strongly alkaline.

Included in mapping are small areas of Capay silty clay, Clear Lake clay, Pescadero silty clay, and Willows clay. Also included are areas where the surface layer is grayish brown or dark grayish brown.

This soil has been improved by open drains, and the water table is now below a depth of 60 inches. Permeability of this Riz soil is very slow. Surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity in the rooting depth is 2.0 to 4.0 inches. The effective rooting depth is 9 to 26 inches and is limited by the clay subsoil. Natural fertility is low.

This soil is used mainly for rice, grain sorghum, and tomatoes. Other uses include wildlife habitat and recreation. Capability unit IVs–3 (17).

Riz loam, flooded (Rn).—This soil is similar to Riz loam, except that it is subject to flooding at least 1 year out of 3 because of flowage easements. The exchangeable sodium percentage ranges from 15 to 30.

Included in mapping are areas of Clear Lake soils, flooded; Pescadero soils, flooded; and Willows soils, flooded.

This Riz soil is subject to deposition.

This soil is a part of the Yolo By-Pass and is used mainly for rice and grain sorghum. Other uses include wildlife habitat and recreation. Capability unit IVw–3 (17).

Rock Land

Rock land (RoG) is a miscellaneous land type that consists of excessively drained bare rock or bedrock that has a very shallow sandy loam soil mantle. Fifty to 90 percent of the surface is exposed bedrock. Where soil material is present, it is less than 10 inches thick. Rock land is on mountainous uplands. Slopes range from 30 to 75 percent. Elevation ranges from 500 to 3,000 feet. The annual temperature is about 61° F., annual rainfall is 20 to 24 inches, and the frost-free season is less than 230 days. The vegetation is chamise. Rock land is associated principally with Climara and Millsholm soils. Included in mapping are small areas of Millsholm loam.

This land type is excessively drained, and its permeability is variable. Surface runoff is very rapid, and the erosion hazard is very high. The available water holding capacity is variable. The effective rooting depth is variable.

This land is used mainly for wildlife habitat, recreation, and watershed. Capability unit VIIIs–1 (15).

Sacramento Series

The Sacramento series consists of poorly drained clays in basins. Slopes are less than 1 percent. The soils formed in alluvium from mixed sources. Elevation ranges from 5 feet below sea level to 60 feet above. Annual temperature is about 60° F., annual rainfall is 16 to 19 inches, and the frost-free season is about 275 days. The vegetation in uncultivated areas is annual grasses and forbs. Sacramento soils are associated principally with Clear Lake and Sycamore soils.

In a typical profile, the soil is dominantly mottled gray clay that extends to a depth of more than 60 inches.

Sacramento soils are used for irrigated row crops, field crops, truck crops, dryfarmed field crops, wildlife habitat, and recreation.

Sacramento clay (Sc).—This soil is in basins. Slopes are less than 1 percent.

Representative profile, 100 feet east of the intersection of State Highway 45 and Road 112, 2.25 miles northwest of Knights Landing, sec. 3, T. 11 N., R. 2 E., Mt. Diablo Base Meridian, projected; the profile, when examined, was moist below a depth of 7 inches:

Apg—0 to 7 inches, gray (5Y 5/1) clay that has common, fine, distinct mottles of strong brown (7.5YR 5/6); very dark gray (5Y 3/1) and has common, fine, distinct mottles of reddish brown (5YR 4/4) when moist; strong, medium and coarse, angular blocky structure and moderate, coarse, granular structure; hard, firm, sticky and very plastic; few very fine roots; common very fine tubular pores; medium acid (pH 6.0); abrupt, smooth boundary. (6 to 10 inches thick)

A11g—7 to 16 inches, gray (5Y 5/1) clay that has many, medium, distinct mottles of strong brown (7.5YR 5/6); very dark gray (5Y 3/1) and has many, medium, distinct mottles of dark reddish brown (5YR 3/4) when moist; massive; hard, very firm, sticky and very plastic; common micro and few very fine vertical roots; common micro tubular pores; continuous films on pressure faces; neutral (pH 6.7); clear, wavy boundary. (2 to 10 inches thick)

A12g—16 to 31 inches, gray (5Y 5/1) clay; common, fine, distinct mottles of strong brown (7.5YR 5/6); very dark gray (5Y 3/1) and common, fine, distinct mottles of brown (7.5YR 4/4) when moist; moderate, coarse, prismatic structure and moderate, coarse, angular blocky structure; hard, firm, sticky and very plastic; common micro and few very fine vertical roots; many micro and few very fine tubular pores; continuous films on pressure faces; moderately alkaline (pH 8.0); very slightly effervescent with disseminated lime; diffuse boundary. (10 to 20 inches thick)

A13g—31 to 38 inches, mottled, gray (5Y 5/1), light olive-gray (5Y 6/2), and strong-brown (7.5YR 5/6) clay; very dark gray (5Y 3/1), olive (5Y 5/3), and reddish brown (5YR 4/4) when moist; moderate, coarse, prismatic structure and moderate, coarse, angular blocky structure; hard, very firm, sticky and very plastic; common micro and few very fine vertical roots; many micro and few very fine tubular pores; continuous films on pressure faces; moderately alkaline (pH 8.0); very slightly effervescent with disseminated lime; clear, wavy boundary. (6 to 10 inches thick)

A14g—38 to 53 inches, gray (5Y 5/1) clay; common, fine, distinct, strong-brown (7.5YR 5/6) mottles; very dark gray (5Y 3/1) and olive gray (5Y 5/2) and reddish-brown (5YR 4/4) mottles when moist; moderate, coarse, angular blocky structure; hard, very firm, sticky and very plastic; common micro and few very fine vertical roots; many micro and common very fine tubular pores; continuous films on pressure faces; very slightly effervescent with disseminated lime; moderately alkaline (pH 8.0); clear, wavy boundary. (12 to 17 inches thick)

Cg—53 to 60 inches, gray (5Y 5/1) clay; common, fine, distinct, strong-brown (7.5YR 5/6) mottles; very dark gray (5Y 3/1) and olive-gray (5Y 5/2) and reddish-brown (5YR 4/4) mottles when moist; massive; hard, firm, sticky and very plastic; few micro random roots; many micro and few very fine tubular pores; continuous films on pressure faces; very slightly effervescent with disseminated lime; moderately alkaline (pH 8.0).

The A horizons range in color from gray to dark gray and to olive gray in areas where rice has been grown. The texture ranges from silty clay to clay. These horizons are medium acid to moderately alkaline; because of heavy applications of soil amendments such as lime or iron sulphate, the reaction may range from strongly acid to moderately alkaline on the surface. The C horizon ranges in color from gray to light gray to greenish gray. The texture is dominantly clay or silty clay that contains lenses of loam. This horizon is neutral to moderately alkaline, and lime is present in a few places.

Included in mapping are small areas of Clear Lake clay, Merritt silty clay loam, Omni silty clay, Sycamore silty clay loam, and Willows clay.

Soil drainage has been improved by reclamation structures. The water table is below a depth of 34 inches. Permeability of this Sacramento soil is slow. Surface runoff is very slow, and the erosion hazard is none to slight. In areas that have been drained, the available water holding capacity is 5.5 to 7.0 inches. The effective rooting depth is 34 to 60 inches. Natural fertility is high.

This soil is used mainly for rice, alfalfa, sugar beets, tomatoes, and asparagus. Other uses include irrigated pasture, dryland safflower, wildlife habitat, and recreation. Capability unit IIIw–5 (17).

Sacramento silty clay loam (Sa).—This soil is similar to Sacramento clay, except that it has a grayish-brown silty clay loam overwash material that is from 8 to 20 inches thick.

Included in mapping are small areas of Merritt silty clay loam, deep; of Sycamore complex; and of Omni silty clay loam.

The soil qualities are similar to Sacramento clay.

This soil is used mainly for rice, alfalfa, sugar beets, tomatoes, and melons. Other uses include dryland safflower, wildlife habitat, and recreation. Capability unit IIIw-3 (17).

Sacramento silty clay loam, drained (Sb).—This soil is similar to Sacramento clay, except that it has grayish-brown silty clay loam overwash material that is from 8 to 20 inches thick and a water table at a depth of more than 60 inches.

Included in mapping are small areas of Merritt silty clay loam, deep, drained; of Sycamore complex, drained; and of Willows silty clay loam.

Drainage of this Sacramento soil has been improved by reclamation structures. The available water holding capacity is 7.0 to 9.0 inches, and the effective rooting depth is more than 60 inches.

This soil is used mainly for rice, alfalfa, sugar beets, tomatoes, and melons. Other uses include dryfarmed safflower, wildlife habitat, and recreation. Capability unit IIs-3 (17).

Sacramento clay, drained (Sd).—This soil is similar to Sacramento clay, except that the water table is at a depth of more than 60 inches.

Included in mapping are small areas of Clear Lake clay; Merritt silty clay loam; Sycamore silty clay loam, drained; and Willows clay.

Drainage of this Sacramento soil has been improved by reclamation structures. The available water holding capacity is 7.0 to 9.0 inches, and the effective rooting depth is more than 60 inches.

The soil is used mainly for rice, alfalfa, sugar beets, tomatoes, and melons. Other uses include dryfarmed safflower, wildlife habitat, and recreation. Capability unit IIs-5 (17).

Sacramento clay, flooded (Se).—This soil is similar to Sacramento clay, except that it is subject to flooding on the average of at least 1 year out of 2 for a duration of more than 48 hours.

Included in mapping are small areas of Clear Lake soils, flooded; Sycamore silt loam, flooded; and Willows clay, alkali, flooded.

This Sacramento soil has qualities similar to those of Sacramento clay.

This soil is in the Yolo By-Pass and is used mainly for rice, sugar beets, and grain sorghum. Other uses include dryfarmed safflower, wildlife habitat, and recreation. Capability unit IVw-5 (17).

Sacramento clay, deep (Sf).—This soil is similar to Sacramento clay, except that it has a dark-gray to black heavy silty clay loam layer. This layer contains 5 to 15 percent organic matter and occurs at a depth of from 36 to 48 inches.

Included in mapping are small areas of Merritt silty clay loam and Omni silty clay.

Permeability is moderately slow in the highly organic layer of this Sacramento soil.

This soil is used principally for corn, sugar beets, alfalfa, and asparagus. Other uses include dryfarmed safflower, wildlife habitat, and recreation. Capability unit IIIw-5 (17).

Sacramento soils, flooded (Sg).—These soils are similar to Sacramento clay, except that they have 8 to 20 inches of gray overwash material that ranges in texture from sandy loam to silty clay. They are subject to flooding at least 1 year out of 3 because of flowage easements.

Included in mapping are areas of Capay soils, flooded; Clear Lake soils, flooded; and Willows soils, flooded.

These Sacramento soils are subject to deposition.

These soils are part of the Yolo By-Pass and are used mainly for rice, grain sorghum, and sugar beets. Other uses include wildlife habitat and recreation. Capability unit IVw-3 (17).

San Ysidro Series

The San Ysidro series consists of moderately well-drained soils on terraces. These soils have a subsoil of silty clay. Slopes range from 0 to 2 percent. The soils formed in alluvium from sedimentary rocks. Elevation ranges from 20 to 400 feet. Annual temperature is about 60° F., annual rainfall is 16 to 18 inches, and the frost-free season is about 280 days. In uncultivated areas the vegetation is annual grasses and forbs. San Ysidro soils are associated principally with Tehama and Hillgate soils.

In a typical profile, the surface layer is pale-brown loam about 14 inches thick that is underlain by 6 inches of mottled very pale brown, light yellowish-brown, strong-brown, and reddish-yellow loam. The subsoil is brown silty clay and clay about 35 inches thick. This is underlain by yellowish-brown clay loam.

San Ysidro soils are used for shallow-rooted, irrigated row crops, as pasture, for dryfarmed grain, as wildlife habitat, and for recreation.

San Ysidro loam (Sh).—This soil occurs on low terraces. Slopes are 1 percent.

Representative profile, 2,800 feet north of Road 25 on Road 86A and 400 feet west of Road 86A in the SE¼SW¼NE¼ of sec. 1, T. 9 N., R. 2 W., Mount Diablo Base Meridian, 2.5 miles south of Esparto; the profile, when examined, was moist below a depth of 20 inches:

Ap—0 to 5 inches, pale-brown (10YR 6/3) loam, brown (7.5YR 4/4) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common coarse vertical roots and common micro and fine random roots; many micro and very fine interstitial pores; medium acid (pH 6.0); clear, wavy boundary. (3 to 6 inches thick)

A1—5 to 14 inches, pale-brown (10YR 6/3) loam, brown (10YR 4/3) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common coarse vertical roots and common micro and fine random roots; many micro and very fine interstitial pores; strongly acid (pH 5.5); gradual, smooth boundary. (8 to 12 inches thick)

A2—14 to 20 inches, mottled, very pale brown (10YR 7/3, 10YR 7/4), light yellowish-brown (10YR 6/4), strong-brown (7.5YR 5/6), and reddish-yellow (7.5YR 7/8) loam; yellowish brown (10YR 5/4) and many, fine, faint, yellowish-brown (10YR 5/6) mottles when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few medium and coarse, and common micro and fine horizontal roots, and few micro and fine vertical roots; many micro and very fine interstitial pores and common very fine tubular pores; medium acid (pH 6.0); abrupt, wavy boundary. (1 to 7 inches thick)

B21t—20 to 38 inches, brown (7.5YR 5/4) silty clay, dark brown (7.5YR 4/4) when moist; moderate, coarse, prismatic structure; extremely hard, extremely firm, sticky and plastic; common micro and fine random roots; common micro and very fine tubular pores; many moderately thick clay films on ped faces and continuous moderately thick clay films in pores; slightly acid (pH 6.5); diffuse, wavy boundary. (10 to 20 inches thick)

B22t—38 to 55 inches, brown (7.5YR 5/4) clay, dark brown (7.5YR 4/4) when moist; moderate, coarse, prismatic structure; very hard, very firm, slightly sticky and plastic; few micro and very fine random roots; common micro and very fine tubular pores; many moderately thick clay films on ped faces and continuous moderately thick clay films in pores; slightly acid (pH 6.5); gradual, wavy boundary. (10 to 20 inches thick)

C—55 to 60 inches, yellowish-brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) when moist; weak, coarse, angular blocky structure; very hard, very firm, slightly sticky and plastic; few micro and very fine random roots; common micro and very fine tubular pores; many thick clay films in pores and on ped faces; mildly alkaline (pH 7.8).

The A1 horizons range in color from pale brown to brown and in texture from sandy loam to loam. These horizons are strongly acid to slightly acid. The A2 horizon ranges in texture from fine sandy loam to loam and is medium acid to neutral. The Bt horizons range in color from yellowish brown to brown and in texture from silty clay to clay. These horizons are slightly acid to mildly alkaline. The C horizon ranges in texture from clay loam to silty clay loam and is mildly alkaline to moderately alkaline. Depth to the clay B horizon ranges from 12 to 25 inches but is typically more than 20 inches.

Included in mapping are small areas of Tehama loam and Hillgate loam. Also included are areas that have clay loam surface textures.

Permeability of this San Ysidro soil is very slow. The surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 2.0 to 4.0 inches. The effective rooting depth is 12 to 25 inches. Natural fertility is low.

This soil is used principally for grain sorghum, sugar beets, and dryfarmed barley. Other uses include irrigated pasture, wildlife habitat, and recreation. Capability unit IVs-3 (17).

Sehorn Series

The Sehorn series consists of well-drained clays on dissected uplands. Slopes are 2 to 50 percent. The soils overlie soft calcareous siltstone or sandstone at a depth of 2 to 5 feet. Elevation ranges from 100 to 2,000 feet. The annual temperature is about 61° F., annual rainfall is 18 to 24 inches, and the frost-free season is about 250 days. In uncultivated areas the vegetation is annual grasses and forbs. The Sehorn soils are associated principally with Balcom and Dibble soils.

In a typical profile, the soil is grayish-brown and olive-gray clay to a depth of about 38 inches. This is underlain by soft, calcareous, olive-gray fine-grained sandstones and siltstones. In some areas the surface layer is cobbly clay.

Sehorn soils are used for dryfarmed grain, pasture, range, wildlife habitat, and recreation.

Sehorn clay, 15 to 30 percent slopes, eroded (SkE2).—This soil is on terraces.

Representative profile, 0.25 mile north of the Scott Ranch headquarters at the end of Road 29 in the SW¼NE¼NE¼ of sec. 26, T. 9 N., R. 2 W., Mount Diablo Base Meridian, about 7 miles northwest of Winters; the profile, when examined, was moist below a depth of 8 inches:

Ap—0 to 3 inches, grayish-brown (10YR 5/2) clay, dark grayish brown (2.5Y 4/2) when moist; moderate, medium, angular blocky structure; very hard, firm, sticky and very plastic; many very fine vertical roots in peds and along ped faces; few micro and very fine, discontinuous, vertically inped and exped, open, tubular pores; slightly acid (pH 6.1); clear, smooth boundary. (3 to 6 inches thick)

A11—3 to 8 inches, olive-gray (5Y 5/2) clay, olive (5Y 4/3) when moist; moderate, medium, subangular blocky structure; very hard, firm, sticky and very plastic; common very fine vertical roots in peds and along ped faces; few micro and very fine, discontinuous, vertically inped and exped, open, tubular pores; slightly acid (pH 6.5); clear, wavy boundary. (4 to 10 inches thick)

A12—8 to 28 inches, olive-gray (5Y 5/2) clay, olive (5Y 4/3) when moist; strong, very coarse, prismatic structure; extremely hard, very firm, very sticky and very plastic; common micro and very fine vertical roots along ped faces; very few micro tubular pores occurring vertically; prominent slickensides, half-inch vertical cracks; moderately alkaline (pH 8.0); slightly effervescent with lime in irregular fine concretions; clear, smooth boundary. (10 to 21 inches thick)

C1—28 to 38 inches, olive-gray (5Y 5/2) clay that has common, fine, distinct, strong-brown (7.5YR 5/6) mottles; olive (5Y 4/3) when moist and common, fine, distinct, dark-brown (10YR 4/3) mottles; massive; extremely hard, very firm, very sticky and very plastic; common micro and very fine vertical roots; nonporous; moderately alkaline (pH 8.0); slightly effervescent with lime disseminated and in irregular concretions; gradual, smooth boundary. (10 to 12 inches thick)

C2—38 to 50 inches, olive-gray (5Y 5/2), soft, fine-grained sandstone or siltstone; common, medium, prominent, strong-brown (7.5YR 5/6) mottles; olive gray (5Y 4/2) when moist; moderately alkaline (pH 8.0); slightly effervescent with lime segregated in medium concretions and disseminated.

The A horizon ranges in color from grayish brown to brown or olive gray and in texture from heavy silty clay loam or silty clay to clay. This horizon is medium acid to neutral on the surface and neutral to moderately alkaline in the lower part. The lower part is typically calcareous, but in some areas is noncalcareous. The C horizon ranges in color from olive gray to light gray or light olive gray to light olive brown and in texture from silty clay loam to clay. Depth to softly consolidated sandstone and siltstone ranges from 24 to 49 inches.

Included in mapping are small areas of Balcom silty clay loam, Corning gravelly loam, Myers clay, and Positas gravelly loam.

Permeability of this Sehorn soil is slow. The surface runoff is medium to rapid, and the erosion hazard is moderate to high. The available water holding capacity is 4.0 to 8.0 inches. The effective rooting depth is 24 to 49 inches. Natural fertility is high.

This soil is used mainly for dryfarmed barley and pasture. Other uses include range, wildlife habitat, recreation, and watershed. Capability unit IVe-5 (15); Clayey range site.

Sehorn clay, 2 to 15 percent slopes (SkD).—This soil is similar to Sehorn clay, 15 to 30 percent slopes, eroded, except that it is less sloping and is not eroded.

Included in mapping are small areas of Capay silty clay, Balcom silty clay loam, Corning gravelly loam, Myers clay, and Positas gravelly loam.

Surface runoff of this Sehorn soil is slow to medium, and the erosion hazard is slight to moderate. The available water holding capacity is 6.0 to 10.0 inches. The effective rooting depth is 36 to 60 inches.

This soil is used mainly for dryfarmed barley and pasture. Other uses include range, wildlife habitat, recreation, and watershed. Capability unit IIIe–5 (15); Clayey range site.

Sehorn clay, 30 to 50 percent slopes, eroded (SkF2).—This soil is similar to Sehorn clay, 15 to 30 percent slopes, eroded, except that it is steep.

Included in mapping are areas of Balcom silty clay loam, Corning gravelly loam, Dibble clay loam, and Positas gravelly loam.

Surface runoff of this Sehorn soil is rapid, and the erosion hazard is high. The available water holding capacity is 4.0 to 6.0 inches. The effective rooting depth is 24 to 36 inches.

This soil is used mainly for range. Other uses include wildlife habitat, recreation, and watershed. Capability unit VIe–5 (15); Clayey range site.

Sehorn cobbly clay, 2 to 15 percent slopes (SlD).—This soil is similar to Sehorn clay, 16 to 30 percent slopes, eroded, except that it is less sloping and contains 15 to 35 percent cobblestones and gravel in the surface layer. The substratum may or may not contain cobblestones and gravel.

Included in mapping are small areas of Capay silty clay, Corning gravelly loam, Myers clay, and Willows clay, marly variant.

Surface runoff of this Sehorn soil is slow to medium, and the erosion hazard is slight to moderate. The available water holding capacity is 5.0 to 9.0 inches. The effective rooting depth is 36 to 60 inches. Natural fertility is moderately high.

This soil is used mainly for dryfarmed barley and pasture. Other uses include wildlife habitat, recreation, and watershed. Capability unit IVe–5 (15); Clayey range site.

Sehorn-Balcom complex, 2 to 15 percent slopes (SmD).—This mapping unit consists of about 60 percent Sehorn clay and about 30 percent Balcom silty clay loam. These soils are on dissected uplands where slopes are 2 to 15 percent. They have profiles similar to the ones described as typical for their respective series.

Included in mapping are small areas, or about 10 percent, of Corning gravelly loam, Myers clay, Positas gravelly loam, and a dark grayish-brown soil that is calcareous throughout the profile and occurs in swales.

These soils are well drained. Permeability is slow in the Sehorn soil and moderately slow in the Balcom soils. Surface runoff is slow to medium, and the erosion hazard is slight to moderate for both soils. The available water holding capacity is 6.0 to 10.0 inches for the Sehorn soil and 4.0 to 6.0 inches for the Balcom soil. The effective rooting depth is 36 to 60 inches. Natural fertility is moderate to high.

These soils are used mainly for dryfarmed barley (fig. 4) and pasture. Other uses include wildlife habitat, recreation, and watershed. Capability unit IIIe–5 (15); Clayey range site.

Sehorn-Balcom complex, 15 to 30 percent slopes, eroded (SmE2).—This mapping unit consists of about 50 percent Sehorn clay and about 40 percent Balcom silty clay loam. These soils are on dissected uplands and have profiles similar to the ones described as typical for their respective series.

Included in mapping are about 10 percent of Corning gravelly loam, Positas gravelly loam, and areas which are steeper, shallower, and severely eroded.

These soils are well drained. Permeability is slow in the Sehorn soil and moderately slow in the Balcom soil. Surface runoff is medium to rapid, and the erosion hazard is moderate to high for both soils. The available water holding capacity is 6.0 to 8.0 inches for the Sehorn soil and 4.0 to 6.0 inches for the Balcom soil. The effective rooting depth is 24 to 40 inches. Natural fertility is moderate to high.

These soils are used mainly for dryfarmed barley. Other uses include range, wildlife habitat, recreation, and watershed. Capability unit IVe–5 (15); Clayey range site.

Sehorn-Balcom complex, 30 to 50 percent slopes, eroded (SmF2).—This mapping unit consists of about 55

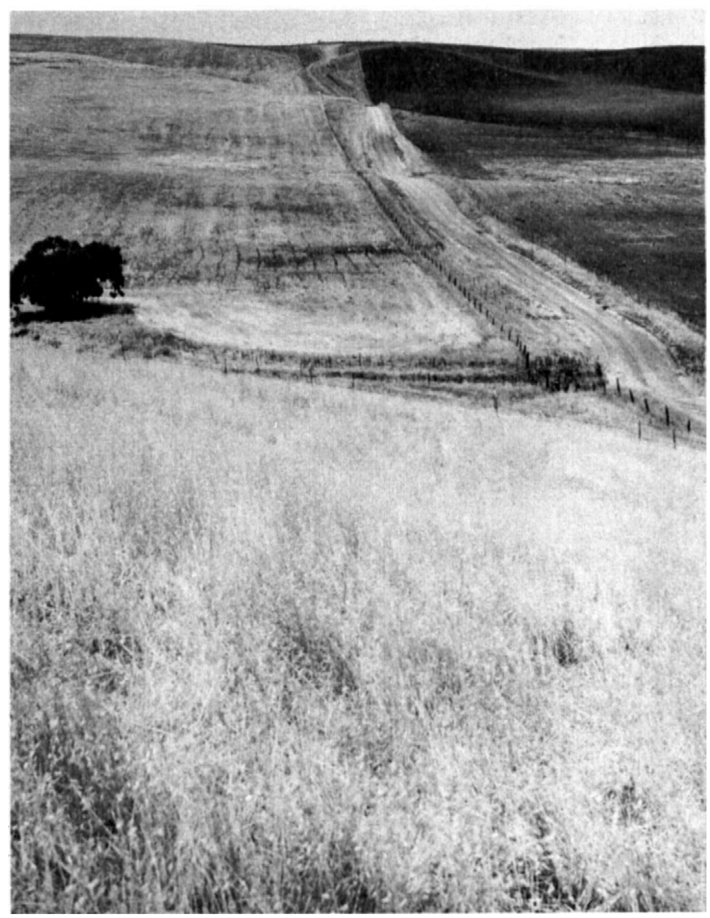

Figure 4.—**Dryfarmed grain on Sehorn-Balcom complex, 2 to 15 percent slopes.**

percent Sehorn clay and about 35 percent Balcom silty clay loam. These soils are on dissected uplands and have profiles similar to the ones described as typical for their respective series.

Included in mapping are about 10 percent of Dibble clay loam and Positas gravelly loam, areas which are on slopes of more than 50 percent, and areas that are severely eroded.

These soils are well drained to somewhat excessively drained. Permeability is slow in this Sehorn soil and moderately slow in the Balcom soil. Surface runoff is rapid, and the erosion hazard is high for both soils. The available water holding capacity is 6.0 to 8.0 inches for the Sehorn soil and 4.0 to 6.0 inches for the Balcom soil. The effective rooting depth is 24 to 40 inches. Natural fertility is moderate to high.

These soils are used mainly for range. Other uses include wildlife habitat, recreation, and watershed. Capability unit VIe–5 (15); Clayey range site.

Soboba Series

The Soboba series consists of excessively drained very gravelly loamy sands on alluvial fans. Slopes are less than 1 percent. The soils formed in alluvium from sedimentary rocks. Elevation ranges from 25 to 400 feet. Annual temperature is about 61° F., annual rainfall is 16 to 20 inches, and the frost-free season is about 260 days. Vegetation consists of annual grasses, forbs, scattered oaks, saltcedar, and willow. Soboba soils are associated principally with Loamy alluvial land and Riverwash.

In a typical profile, the surface layer is pale-brown gravelly sandy loam and very gravelly loamy sand about 11 inches thick. The substratum is light brownish-gray very gravelly loamy sand that is highly stratified with sand and gravel lenses to a depth of more than 60 inches.

Soboba soils are used for irrigated row crops, irrigated pasture, dryland pasture, wildlife habitat, and recreation.

Soboba gravelly sandy loam (Sn).—This soil is on alluvial fans. Slopes are less than 1 percent.

Representative profile, 1,000 feet north of the west end of the big barn of the Fulton Stephens Ranch headquarters, 1.5 miles northwest of Esparto; the profile, when examined, was moist below a depth of 17 inches:

A11—0 to 4 inches, pale-brown (10YR 6/3) gravelly sandy loam, dark grayish brown (10YR 4/2) when moist; weak, medium, subangular blocky structure; soft, very friable, nonsticky and nonplastic; common micro vertically inped roots; many random, micro, discontinuous, closed, inped pores; slightly acid (pH 6.5); clear, wavy boundary. (3 to 4 inches thick)

A12—4 to 11 inches, pale-brown (10YR 6/3) very gravelly loamy sand, dark grayish brown (10YR 4/2) when moist; single grain; loose, dry and moist, nonsticky and nonplastic; common micro vertical roots; neutral (pH 7.0); abrupt, wavy boundary. (6 to 8 inches thick)

C—11 to 60 inches, light brownish-gray (10YR 6/2) very gravelly loamy sand, dark grayish brown (10YR 4/2) when moist; single grain; loose, dry and moist, nonsticky and nonplastic; very few micro vertical roots; moderately alkaline (pH 8.0); highly stratified with sand and gravel lenses.

The A horizon ranges in color from pale brown to brown and in texture from gravelly sandy loam to very gravelly loamy sand; the content of gravel ranges from 25 to 75 percent. This horizon is slightly acid to mildly alkaline. The C horizon ranges in percent of gravel from 65 to 90, except for the gravel-free sand lenses. There are 5 to 15 percent cobblestones throughout the profile.

Included in mapping are small areas of Arbuckle gravelly loam, Loamy alluvial land, Reiff very fine sandy loam, Reiff gravelly loam, and Riverwash.

This Soboba soil is very rapidly permeable. Surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 2.5 to 3.5 inches. The effective rooting depth is more than 60 inches. Natural fertility is low.

This soil is used mainly for dryland pasture. Other uses include irrigated grain sorghum and irrigated pasture, wildlife habitat, and recreation. Capability unit IVs–4 (17).

Sycamore Series

The Sycamore series consists of somewhat poorly drained silty clay loams on alluvial fans. Slopes are less than 1 percent. The soils formed in alluvium from mixed sources. Elevation ranges from 5 to 60 feet. Annual temperature is about 62° F., annual rainfall is 16 to 18 inches, and the frost-free season is about 280 days. In uncultivated areas the vegetation is annual grasses and forbs. Sycamore soils are principally associated with Tyndall and Yolo soils.

In a typical profile, the surface layer is grayish-brown silty clay loam about 14 inches thick. The subsoil is mottled, dominantly light yellowish-brown silty clay loam about 30 inches thick. The substratum is mottled pale-olive loam that extends to a depth of more than 60 inches. In some areas the soil is silt loam throughout the profile.

Sycamore soils are used for irrigated row crops, forage crops, truck crops, orchards, pasture, dryfarmed grain, wildlife habitat, and recreation.

Sycamore silty clay loam, drained (St).—This soil is on alluvial fans. Slopes are less than 1 percent.

Representative profile 0.5 mile west of Road 102 and 100 feet south of State Highway 113 in the NE¼NE¼NW¼ of sec. 22, T. 11 N., R. 2 E., Mount Diablo Base Meridian, about 1.0 mile west of Knights Landing; the profile, when examined, was moist below a depth of 4 inches:

Ap—0 to 4 inches, grayish-brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) when moist; weak, medium, subangular blocky structure; hard, friable, sticky and plastic; few micro and very fine random roots; many micro and medium vesicular, interstitial, and tubular pores; slightly acid (pH 6.5); clear, smooth boundary. (4 to 10 inches thick)

A1—4 to 14 inches, grayish-brown (10YR 5/2) silty clay loam; common, fine, distinct yellowish-brown (10YR 5/6) mottles; very dark grayish brown (10YR 3/2) and common, fine, distinct mottles of dark yellowish brown (10YR 4/4) when moist; moderate, coarse, prismatic structure; hard, friable, sticky and plastic; common micro and fine random roots; common micro and medium vesicular and tubular pores; neutral (pH 7.0); organic stains on ped faces; gradual, wavy boundary. (8 to 12 inches thick)

B21—14 to 26 inches, mottled, light yellowish-brown (2.5Y 6/4), dark-gray (10YR 4/1), and brownish-yellow (10YR 6/6) silty clay loam; mottled, dark yellowish brown (10YR 4/4), very dark gray (10YR 3/1), and strong brown (7.5YR 5/6) when moist; weak, coarse, prismatic structure; slightly hard, very friable, slightly sticky and plastic; common micro and fine random roots and few medium horizontal roots; common micro and fine tubular pores; mildly alkaline (pH 7.5); organic stains on ped faces; gradual, wavy boundary. (8 to 20 inches thick)

B22—26 to 44 inches, mottled, light yellowish-brown (2.5Y 6/4), olive-gray (5Y 5/2), and brownish-yellow (10YR 6/8) silty clay loam; olive brown (2.5Y 4/4), olive gray (5Y 4/2), and strong brown (7.5YR 5/6) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common micro and fine random roots; many micro and very fine tubular pores; moderately alkaline (pH 8.0); slightly effervescent lime occurs in threads; diffuse, wavy boundary. (12 to 21 inches thick)

C—44 to 60 inches, pale-olive (5Y 6/3) loam that has many, fine, prominent mottles of light yellowish brown (10YR 6/4); olive (5Y 4/3) and has dark yellowish-brown (10YR 4/4) mottles when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common micro and fine random roots; many micro and very fine tubular pores; moderately alkaline (pH 8.0); strongly effervescent with disseminated lime.

The A horizon ranges in color from gray to grayish brown and in texture from silty clay loam to heavy clay loam or light clay. This horizon is slightly acid to mildly alkaline and in some places is moderately alkaline in the lower part. The B horizon is olive gray, light yellowish brown, dark gray, olive gray, or brownish yellow and has prominent mottles. This horizon is neutral to moderately alkaline. The C horizon ranges in color from light yellowish brown to pale olive and has prominent mottles. It ranges in texture from strata of sandy loam to silty clay. Depth to limy material is more than 20 inches; it may be free of lime throughout. Depth to distinct or prominent mottles ranges from 4 to 10 inches.

Included in mapping are small areas of Brentwood silty clay loam, Maria silt loam, Marvin silty clay loam, Merritt silty clay loam, Tyndall silty clay loam, and Yolo silty clay loam.

The drainage of this Sycamore soil has been improved by natural deepening of channels and by reclamation structures. Permeability is moderately slow. Surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 10.0 to 12.0 inches. The effective rooting depth is more than 60 inches. Natural fertility is high.

This soil is used mainly for irrigated sugar beets, tomatoes, alfalfa, asparagus, walnuts, and pears. Other uses include dryfarmed barley, wildlife habitat, and recreation. Capability unit I–1 (17).

Sycamore silt loam (So).—This soil is similar to Sycamore silty clay loam, drained, except that it has a silt loam texture throughout the profile, and depth to the seasonal water table is 36 to 60 inches.

Included in mapping are small areas of Maria silt loam, Merritt silty clay loam, Tyndall very fine sandy loam, and Yolo silt loam.

Permeability of this Sycamore soil is moderate. The available water holding capacity is 10.0 to 12.0 inches in areas that have been drained. The effective rooting depth is 36 to 60 inches and is restricted by the water table.

This soil is used principally for irrigated sugar beets, corn, alfalfa, asparagus, and prunes. Other uses include dryfarmed barley, wildlife habitat, and recreation. Capability unit IIw–2 (17).

Sycamore silt loam, drained (Sp).—This soil is similar to Sycamore silty clay loam, drained, except that it has a silt loam texture throughout the profile.

Included in mapping are small areas of Maria silt loam, Merritt silty clay loam, Tyndall very fine sandy loam, Valdez silt loam, and Yolo silt loam.

This Sycamore soil is moderately permeable. The available water holding capacity is 10.0 to 12.0 inches. The effective rooting depth is more than 60 inches.

This soil is used mainly for irrigated sugar beets, tomatoes, alfalfa, asparagus, almonds, and walnuts. Other uses include dryfarmed barley, wildlife habitat, and recreation. Capability unit I–1 (17).

Sycamore silt loam, flooded (Sr).—This soil is similar to Sycamore silty clay loam, drained, except that it has silt loam texture throughout the profile. It is subject to flooding at least 1 year out of 3 because of flowage easements, and it has a seasonal water table at a depth of from 36 to 60 inches.

Included in mapping are small areas of Maria silt loam, Merritt silty clay loam, Tyndall very fine sandy loam, and Valdez complex, flooded. Also included are areas that have pale-brown overwash that extends to a depth of less than 20 inches.

This Sycamore soil is moderately permeable. The available water holding capacity is 10.0 to 12.0 inches in areas that have been drained. The effective rooting depth is 36 to 60 inches and is restricted by the water table.

This soil is part of the Yolo By-Pass and is used mainly for sugar beets, tomatoes, and grain sorghum. Other uses include dryfarmed safflower, wildlife habitat, and recreation. Capability unit IVw–2 (17).

Sycamore silty clay loam (Ss).—This soil is similar to Sycamore silty clay loam, drained, except that drainage has not been improved. The depth to the water table ranges from 36 to 60 inches.

Included in mapping are small areas of Maria silt loam, Merritt silty clay loam, Marvin silty clay loam, and Tyndall very fine sandy loam.

The available water holding capacity is 10.0 to 12.0 inches in areas that have been drained. Effective rooting depth is 36 to 60 inches.

This soil is used mainly for sugar beets, tomatoes, and alfalfa. Other uses include prunes, dryfarmed barley, dryfarmed safflower, wildlife habitat, and recreation. Capability unit IIw–2 (17).

Sycamore complex (Su).—This mapping unit consists of about 60 percent Sycamore silty clay loam and about 30 percent Sycamore silt loam. These soils are underlain by silty clay at a depth that ranges from 40 to 60 inches. The individual soils have profiles similar to those described as representative for their respective series.

Included are small areas, or about 10 percent, of Merritt silty clay loam, deep, Marvin silty clay loam, Sacramento silty clay loam, and a few areas that have a pale-brown loam surface layer less than 20 inches thick.

Permeability of the substratum of these Sycamore soils is slow. Effective rooting depth is 40 to 60 inches and is restricted by a water table and clay substrata.

The available water holding capacity is 8.0 to 10.0 inches in areas that have been drained.

This complex is used mainly for sugar beets, tomatoes, and alfalfa. Other uses include dryfarmed safflower, dryfarmed barley, wildlife habitat, and recreation. Capability unit IIIw-3 (17).

Sycamore complex, drained (Sv).—This mapping unit consists of about 60 percent Sycamore silty clay loam and about 25 percent Sycamore silt loam. These soils are underlain by a silty clay soil at a depth that ranges from 40 to 60 inches. The individual soils have profiles similar to those described as representative of their respective series.

Included are small areas, or about 15 percent, Merritt silty clay loam, deep, Marvin silty clay loam, Sacramento silty clay loam, and areas that have a pale-brown loam surface layer less than 20 inches deep.

Soil drainage has lowered the water table to a depth of more than 60 inches. Permeability of the clay substratum is slow. Effective rooting depth is 40 to 60 inches, and the available water holding holding capacity is 8.0 to 10.0 inches.

These soils are used mainly for sugar beets, tomatoes, and alfalfa. Other uses include dryfarmed safflower, dryfarmed barley, wildlife habitat, and recreation. Capability unit IIs-3 (17).

Sycamore complex, flooded (Sw).—This mapping unit consists of about 60 percent Sycamore silty clay loam and about 25 percent Sycamore silt loam. These soils are underlain by silty clay at a depth of 40 to 60 inches. These soils are subject to flooding 1 year out of 3 because of flowage easements. The individual soils have profiles similar to those described as representative for their respective series.

Included are small areas, or about 15 percent, Maria silt loam, Merritt silty clay loam, deep, Sacramento soils, flooded, and a small area near the Colusa Basin Drainage Canal which is subject to flooding on an average of 1 year out of 2 for a duration of more than 48 hours. Some areas are also included where the depth to the buried silty clay is less than 40 inches.

Permeability of the clay substratum is slow. The effective rooting depth is 36 to 60 inches and is restricted by the water table and the clay substratum. Available water holding capacity is 8.0 to 10.0 inches in areas that have been drained.

These soils are part of the Yolo By-Pass and are used mainly for sugar beets, grain sorghum, and rice. Other uses include dryfarmed safflower, wildlife habitat, and recreation. Capability unit IVw-3 (17).

Tehama Series

The Tehama series consists of well-drained loams on alluvial fans. These soils have a subsoil of clay loam. Slopes are 0 to 5 percent. The soils formed in mixed alluvium from sedimentary rocks. Elevation ranges from 50 to 500 feet. The annual temperature is about 62° F., annual rainfall ranges from 16 to 20 inches, and the frost-free season is about 265 days. In uncultivated areas the vegetation is annual grasses and scattered oak. Tehama soils are associated principally with Hillgate and Rincon soils.

In a typical profile, the surface layer is pale-brown loam about 10 inches thick. The subsoil is brown, yellowish-brown, and light yellowish-brown clay loam, loam, and gravelly loam about 53 inches thick. This is underlain by light yellowish-brown sandy loam.

Tehama soils are used for dryfarmed grain, irrigated forage crops, row crops, orchards, wildlife habitat, and recreation.

Tehama loam, 0 to 2 percent slopes (TaA).—This soil occurs on alluvial fans.

Representative profile, 0.2 mile west of the intersection of Roads 89B and 8, and 50 feet south of Road 8 in the northwest corner of the SE¼ of sec. 27, T. 12 N., R. 1 W., Mount Diablo Base Meridian, about 2 miles south of Dunnigan:

Ap—0 to 10 inches, pale-brown (10YR 6/3) loam, dark brown (10YR 4/3) when moist; massive and moderate, thin, platy structure; hard, friable, nonsticky and slightly plastic; slightly acid (pH 6.4); abrupt, smooth boundary. (8 to 20 inches thick)

B21t—10 to 15 inches, brown (10YR 5/3) clay loam, dark brown (10YR 4/3) when moist; moderate, coarse, prismatic structure; very hard, friable, slightly sticky and plastic; very few very fine roots; many micro and few fine tubular pores; common thin clay films on ped faces and in pores; neutral (pH 6.9); clear, smooth boundary. (3 to 6 inches thick)

B22t—15 to 29 inches, yellowish-brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) when moist; moderate, coarse, prismatic structure; extremely hard, firm, sticky and very plastic; very few micro roots; many micro tubular pores; many moderately thick clay films on ped faces and in pores; mildly alkaline (pH 7.5); gradual, smooth boundary. (9 to 17 inches thick)

B23t—29 to 40 inches, yellowish-brown (10YR 5/4) clay loam, dark yellowish brown (10YR 3/4) when moist; moderate, coarse, angular blocky structure; extremely hard, firm, sticky and very plastic; many micro tubular and interstitial pores; many thin clay films on ped faces, in pores, and as bridges between sand grains; mildly alkaline (pH 7.8); clear, smooth boundary. (7 to 15 inches thick)

B31t—40 to 53 inches, light yellowish-brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 4/4) when moist; weak, medium, angular blocky structure; very hard, firm, slightly sticky and plastic; many micro tubular and interstitial pores; common thin clay films on ped faces, in pores, and as bridges between sand grains; mildly alkaline (pH 7.7); diffuse, wavy boundary. (4 to 16 inches thick)

B32t—53 to 63 inches, light yellowish-brown (2.5Y 6/4) loam, dark yellowish brown (10YR 4/4) when moist; weak, medium, angular blocky structure; very hard, firm, sticky and slightly plastic; many micro and very fine tubular and interstitial pores; common thin clay films on ped faces, in pores, and as bridges between sand grains; moderately alkaline (pH 7.9); clear, wavy boundary. (8 to 20 inches thick)

C—63 to 75 inches, light yellowish-brown (2.5Y 6/4) sandy loam, olive brown (2.5Y 4/4) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many micro tubular pores; few thin clay films in pores; slightly effervescent; moderately alkaline (pH 8.0).

The A horizon ranges in color from pale brown to very pale brown and in texture from loam to light clay loam. This horizon is medium acid to neutral. The B2t horizon ranges in color from brown or light yellowish brown to yellowish brown and in texture from loam to clay loam and contains less than 35 percent clay. This horizon is slightly acid to mildly alkaline. The C horizon ranges in color from light yellowish brown to yellowish brown and in texture from sandy loam to clay loam. This horizon is calcareous in some places. The lower B3t and C horizons contain 0 to 35 percent gravel.

Included in mapping are small areas of Brentwood silty clay loam, Rincon silty clay loam, Yolo silt loam, and Zamora loam.

Permeability of this Tehama soil is slow. Surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 8.0 to 10.0 inches. The effective rooting depth is more than 60 inches. Natural fertility is moderate.

This soil is used for dryland barley, alfalfa, sugar beets, tomatoes, almonds, and apricots. Other uses include irrigated pasture, wildlife habitat, and recreation. Capability unit IIs-3 (17).

Tehama loam, 2 to 5 percent slopes (TaB).—This soil is similar to Tehama loam, 0 to 2 percent slopes, except that it is more sloping. It occurs on alluvial fans where the average slope is 3 percent.

Included in mapping are small areas of Rincon silty clay loam.

Surface runoff of this Tehama soil is slow, and the erosion hazard is slight.

This soil is used mainly for dryfarmed barley and alfalfa. Other uses include irrigated sugar beets, almonds, apricots, irrigated pasture, and wildlife habitat. Capability unit IIe-3 (17).

Tyndall Series

The Tyndall series consists of somewhat poorly drained very fine sandy loams on alluvial fans. Slopes are less than 1 percent. The soils formed in alluvium from mixed sources. Elevation ranges from sea level to 70 feet above. The annual temperature is about 62° F., annual rainfall is 16 to 18 inches, and the frost-free season is about 280 days. In uncultivated areas the vegetation is annual grasses and forbs. Tyndall soils are associated principally with Laugenour and Sycamore soils.

In a typical profile, the surface layer is grayish-brown and light brownish-gray very fine sandy loam about 16 inches thick. The subsoil is prominently mottled, light brownish-gray, dark yellowish-brown, brownish-yellow, and pale-olive very fine sandy loam and fine sandy loam about 30 inches thick. This is underlain by stratified light brownish-gray sandy loam that has distinct mottles and highly mottled yellowish-brown very fine sandy loam that extend to a depth of more than 60 inches.

Tyndall soils are used mainly for row crops, forage crops, truck crops, orchard, dryfarmed grain, pasture, wildlife habitat, and recreation.

Tyndall very fine sandy loam (Tb).—This soil is on alluvial fans. Average slopes are less than 1 percent.

Representative profile, 255 feet north of State Highway 45 and 0.5 mile west of Reclamation District 108 pump in the SW¼NW¼NW¼ of sec. 30, T. 12 N., R. 2 E., Mount Diablo Base Meridian, about 6 miles northwest of Knights Landing; the profile, when examined, was moist below a depth of 3 inches:

Ap—0 to 8 inches, grayish-brown (2.5Y 5/2) heavy very fine sandy loam, very dark grayish brown (2.5Y 3/2) when moist; cloddy over massive; soft, very friable, slightly sticky and slightly plastic; common micro and very fine random roots; common very fine tubular pores; mildly alkaline (pH 7.5); very slightly effervescent with disseminated lime; abrupt, smooth boundary. (7 to 13 inches thick)

A3—8 to 16 inches, light brownish-gray (2.5Y 6/2) very fine sandy loam, dark grayish brown (2.5Y 4/2) when moist; massive; soft, very friable, slightly sticky and slightly plastic; common micro and very fine vertical and oblique roots and few fine vertical roots; common micro and very fine tubular pores and few very fine interstitial pores; moderately alkaline (pH 8.0); slightly effervescent with disseminated lime; abrupt, smooth boundary. (3 to 12 inches thick)

B21—16 to 24 inches, light brownish-gray (2.5Y 6/2) very fine sandy loam; many, medium, prominent, brownish-yellow (10YR 6/6) mottles; dark grayish brown (2.5Y 4/2) and many, medium, prominent, dark yellowish-brown (10YR 4/4) mottles when moist; massive; soft, very friable, slightly sticky and slightly plastic; common micro and very fine vertical and oblique roots and few fine vertical roots; common micro and very fine tubular pores and few very fine interstitial pores; moderately alkaline (pH 8.0); strongly effervescent with disseminated lime; abrupt, wavy boundary. (6 to 10 inches thick)

B22—24 to 41 inches, mottled dark yellowish-brown (10YR 4/4), brownish-yellow (10YR 6/6), and light brownish-gray (2.5Y 6/2) fine sandy loam; dark grayish brown (2.5Y 4/2), olive gray (5Y 4/2), and dark yellowish brown (10YR 3/4 and 10YR 4/4) when moist; massive; soft, very friable, slightly sticky and slightly plastic; common micro and very fine random roots; common micro and very fine and few fine tubular pores and few very fine interstitial pores; moderately alkaline (pH 8.4); slightly effervescent with disseminated lime; abrupt, smooth boundary. (10 to 20 inches thick)

B23—41 to 46 inches, pale-olive (5Y 6/3) very fine sandy loam; many, medium, prominent, brownish-yellow (10YR 6/6) and dark yellowish-brown (10YR 4/4) mottles; olive (5Y 4/3) and many, medium, prominent, yellowish-brown (10YR 5/6) and dark yellowish-brown (10YR 4/4) mottles when moist; massive; soft, friable, slightly sticky and slightly plastic; common micro and few very fine oblique roots; common micro and very fine and few fine tubular pores and few very fine interstitial pores; strongly alkaline (pH 9.0); strongly effervescent with disseminated lime; medium, irregularly-shaped manganese concretions; abrupt, smooth boundary. (3 to 7 inches thick)

C1—46 to 48 inches, light brownish-gray (2.5Y 6/2) sandy loam; common, medium, distinct, yellowish-brown (10YR 5/4) mottles; dark grayish brown (2.5Y 4/2) and common, medium, distinct, dark yellowish-brown (10YR 4/4) mottles when moist; massive; soft, very friable, nonsticky and nonplastic; few very fine oblique roots; common micro and very fine tubular pores; strongly alkaline (pH 8.8); strongly effervescent with disseminated lime; variegated sand grain colors; abrupt, smooth boundary. (1 to 5 inches thick)

C2—48 to 60 inches, mottled yellowish-brown (10YR 5/6), brownish-yellow (10YR 6/6), and pale-olive (5Y 6/3) very fine sandy loam; dark yellowish brown (10YR 4/4), yellowish brown (10YR 5/6), and olive (5Y 4/3) when moist; massive; soft, friable, slightly sticky and slightly plastic; few very fine oblique roots; common micro and very fine and few fine tubular pores and few very fine vesicular pores; strongly alkaline (pH 9.0); strongly effervescent with disseminated lime; medium, irregularly-shaped manganese concretions.

The A horizon ranges in color from gray, grayish brown, or dark grayish brown to light brownish gray and in texture from fine sandy loam to silt loam. This horizon is slightly acid to moderately alkaline. The B2 horizons range in color from light brownish gray to light yellowish brown, dark yellowish brown, light olive gray, or pale olive and have many distinct or prominent mottles that occur at a depth of from 3 to 11 inches below the A horizon. The texture ranges from loamy sand to silt loam; fine sandy loam is dominant. These horizons are moderately alkaline to strongly alkaline. The C horizon ranges in color from light brownish gray to pale olive and yellowish brown or brownish yellow that has common distinct mottles. Texture and reaction are similar to the B horizons. The soil is typically calcareous throughout, but is noncalcareous in a few places at a depth of 0 to 30 inches.

Included in mapping are small areas of Lang sandy loam, Laugenour very fine sandy loam, Reiff very fine sandy loam, and Sycamore silt loam. Also included are a few small areas that have clay below a depth of 40 inches and a few slightly saline-alkali areas.

Permeability of this Tyndall soil is moderately rapid. Surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 8.0 to 10.0 inches in areas that have been drained. The effective rooting depth is 36 to 60 inches and is restricted by the water table. Natural fertility is moderately high.

This soil is used mainly for pears, sugar beets, tomatoes, alfalfa, and asparagus. Other uses include irrigated pasture, dryfarmed barley, wildlife habitat, and recreation. Capability unit IIw–2 (17).

Tyndall very fine sandy loam, drained (Tc).—This soil is similar to Tyndall very fine sandy loam, except that the drainage has been improved.

Included in mapping are small areas of Laugenour very fine sandy loam, Loamy alluvial land, and Sycamore silt loam. Also included are areas where there is a clay layer at a depth of from 40 to 60 inches.

This Tyndall soil has been improved by reclamation structures, and the water table is below a depth of 60 inches. Effective rooting depth is more than 60 inches.

This soil is used principally for walnuts, pears, sugar beets, tomatoes, alfalfa, and asparagus. Other uses include irrigated pasture, wildlife habitat, and recreation. Capability unit I–1 (17).

Tyndall very fine sandy loam, flooded (Td).—This soil is similar to Tyndall very fine sandy loam, except that it is subject to flooding at least 1 year out of 3 because of flowage easements.

Included in mapping are small areas of Lang sandy loam, deep, flooded; Laugenour very fine sandy loam, flooded; and a few areas that have buried clay at a depth of from 45 to 50 inches.

This Tyndall soil has a deposition hazard.

This soil is in the Yolo By-Pass and is mainly used for irrigated pasture. Other uses include sugar beets, grain sorghum, wildlife habitat, and recreation. Capability unit IVw–2 (17).

Tyndall very fine sandy loam, deep (Te).—This soil is similar to Tyndall very fine sandy loam, except that it is underlain by buried clay at a depth that ranges from 40 to 60 inches. The surface layer ranges from fine sandy loam to silt loam.

Included in mapping are small areas of Lang sandy loam, deep, and of Sycamore complex. Also included are some areas that are moderately well drained and a few areas that have buried clay at a depth of up to 40 inches.

Permeability of the substratum at a depth of 40 to 60 inches is slow. Available water holding capacity is 6.0 to 8.0 inches.

This soil is used mainly for sugar beets, tomatoes, and alfalfa. Other uses include prunes, irrigated pasture, wildlife habitat, and recreation. Capability unit IIIw–3 (17).

Tyndall silty clay loam (Tf).—This soil is similar to, and has the same qualities as, Tyndall very fine sandy loam, except that the surface layer is dark-gray silty clay loam overwash material that is from 9 to 15 inches thick.

Included in mapping are small areas of Sycamore silty clay loam and some areas where the surface material is silty clay.

This soil is used mainly for irrigated sugar beets, tomatoes, and alfalfa. Other uses include pears, prunes, dryfarmed barley, wildlife habitat, and recreation. Capability unit IIw–2 (17).

Valdez Series

The Valdez series consists of poorly drained silt loams on alluvial fans. Slopes are 0 to 2 percent. The soils formed in alluvium from mixed sources. Elevation ranges from 5 feet below sea level to 20 feet above. The annual temperature is about 60° F., annual rainfall is 16 to 19 inches, and the frost-free season is about 275 days. In uncultivated areas the vegetation is annual grasses and forbs. Valdez soils are associated principally with Merritt and Tyndall soils.

In a typical profile, the surface layer is pale-brown silt loam about 14 inches thick. The subsoil is light-gray very fine sandy loam that has prominent mottles and is about 7 inches thick. This is underlain by pale-brown and light yellowish-brown silt loam that has prominent mottles and extends to a depth of more than 60 inches.

Valdez soils are used for irrigated row crops, forage crops, truck crops, dryfarmed grain, wildlife habitat, and recreation.

Valdez silt loam (Va).—This soil is on alluvial fans. Average slopes are less than 1 percent.

Representative profile, 0.4 mile south of Sutter Road, 0.25 mile east of Sacramento Northern Railroad, 50 feet south of irrigation ditch, about 8 miles southwest of Clarksburg; lime has been added to the surface 14 inches, and the profile, when examined, was moist below a depth of 21 inches. The water table was at a depth of 60 inches:

Ap—0 to 14 inches, pale-brown (10YR 6/3) silt loam; few, fine, faint, brownish-yellow (10YR 6/8) mottles; brown (10YR 4/3) and few, fine, faint, dark-brown (7.5YR 4/4) mottles when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common micro and very fine roots and few medium and coarse roots; few very fine tubular pores and common fine interstitial pores; moderately alkaline (pH 8.0); slightly effervescent with lime segregated in rounded, fine, soft masses (beet lime was applied); abrupt, smooth boundary. (5 to 18 inches thick)

B2—14 to 21 inches, light-gray (10YR 7/2) very fine sandy loam; many, medium, prominent, dark-brown (7.5YR 4/4) and strong-brown (7.5YR 6/5) mottles; grayish brown (10YR 5/2) and many, medium, prominent, dark reddish-brown (5YR 3/2) and reddish-brown (5YR 4/4) mottles when moist; massive; weak tillage pan; slightly hard, very friable, nonsticky and nonplastic; common micro and very fine vertical roots; few very fine and fine tubular pores; neutral (pH 7.0); common mica flakes; abrupt, smooth boundary. (6 to 30 inches thick)

C1—21 to 49 inches, pale-brown (10YR 6/3) silt loam; common, fine, prominent, strong-brown (7.5YR 5/6) mottles and pale olive (5Y 6/3) in bands, pores, root channels, and cleavage planes; brown (10YR 4/3) and yellowish-red (5YR 4/6) mottles and olive (5Y 5/3) in bands, pores, root channels, and cleavage planes when moist; strong, very thin and medium, platy structure; mica visible on ped faces; slightly hard, friable, slightly sticky and slightly plastic; common micro and very fine horizontal and vertical roots; common, very fine, vertical, tubular pores and many, micro and very fine, horizontal, tubular pores; mildly alkaline (pH 7.5); clear, wavy boundary. (10 to 30 inches thick)

C2—49 to 65 inches, light yellowish-brown (10YR 6/4) silt loam; common, medium, prominent, strong-brown (7.5YR 5/8) mottles; dark yellowish-brown (10YR 4/4) and yellowish-red (5YR 4/8) mottles when moist; strong, very thin and medium, platy structure; mica visible on ped faces; hard, firm, slightly sticky and nonplastic; common micro and very fine horizontal and vertical roots; common, micro and very fine, vertical and horizontal, tubular pores; neutral (pH 7.0).

The A horizon ranges in color from light gray to pale brown, light brownish gray, light olive gray, or pale olive, and in a few places has faint to prominent mottles. It ranges in texture from very fine sandy loam to silty clay loam. This horizon is medium acid to moderately alkaline. The B2 horizon ranges in color from light gray to pale olive and has distinct or prominent mottles; it ranges in texture from fine sandy loam to silty clay loam. This horizon is medium acid to neutral. The C horizon ranges in color from light gray, light yellowish brown, or pale brown to pale olive and has distinct or prominent mottles. The lower portion may be gleyed. It ranges in texture from sandy loam to silty clay loam and is typically stratified. This horizon is slightly acid to moderately alkaline and in some places is calcareous in the lower portion. Lime occurs in the surface layer only where it has been applied as a soil amendment.

Included in mapping are small areas of Lang silt loam, Laugenour very fine sandy loam, Maria silt loam, Sycamore silt loam, and Tyndall very fine sandy loam. Also included are a few areas of soils that have a sandy loam subsoil and a few areas of soils that have a silty clay surface layer.

Permeability of this Valdez soil is moderate. Surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 9.0 to 11.0 inches in areas that have been drained. The effective rooting depth is 30 to 60 inches and is restricted by a water table. Natural fertility is moderately high.

This soil is used mainly for corn, sugar beets, and alfalfa. Other uses include dryfarmed safflower, dryfarmed barley, wildlife habitat, and recreation. Capability unit IIw–2 (17).

Valdez silt loam, deep (Vb).—This soil is similar to Valdez silt loam, except that it is underlain by dark clay at a depth of from 40 to 50 inches.

Included in mapping are small areas of Lang sandy loam, deep; Laugenour very fine sandy loam; Maria silt loam, deep; Sycamore complex; and Tyndall very fine sandy loam, deep. A few areas of soils are also included that have a sandy loam subsoil.

Permeability of this Valdez soil is moderate over slow.

This soil is used mainly for irrigated corn, sugar beets, and alfalfa. Other uses include pears, irrigated pasture, dryfarmed safflower, wildlife habitat, and recreation. Capability unit IIIw–3 (17).

Valdez complex, flooded (Vc).—This mapping unit consists of about 40 percent Valdez silt loam; about 45 percent Valdez silt loam, deep; and about 10 percent areas that have an overwash material consisting of stratified fine sands, silts, and clays. The individual soils have profiles similar to those described as representative of their respective series. These soils are subject to flooding at least 1 year out of 3 due to flowage easements.

Included are about 5 percent of Sacramento soils, flooded, and a few areas that have a sandy loam or light loam layer between a depth of 10 and 40 inches.

Permeability of the Valdez silt loam is moderate. The Valdez silt loam, deep, is underlain by clay at a depth of from 40 to 60 inches; permeability of the clay layer is slow. Depth to the water table is from 30 to 60 inches, and the available water holding capacity is 8.0 to 10.0 inches in areas that have been drained. Runoff is slow, and the erosion hazard is none to slight.

These soils are part of the Yolo By-Pass and are used mainly for sugar beets and grain sorghum. Other uses include dryland safflower, wildlife habitat, and recreation. Capability unit IVw–3 (17).

Willows Series

The Willows series consists of poorly drained clays in basins. Slopes are less than 1 percent. The soils formed in alluvium from mixed sources. Elevation ranges from sea level to 100 feet above. The annual temperature is about 62° F., annual rainfall is 16 to 20 inches, and the frost-free season is about 280 days. In uncultivated areas the vegetation is annual grasses and forbs. Willows soils are associated principally with Capay and Sacramento soils.

In a typical profile, the soil is mottled gray and olive-gray clay that extends to a depth of more than 60 inches.

Willows soils are used for row crops, field crops, pasture, dryfarmed grain, wildlife habitat, and recreation.

Willows clay (Wb).—This soil occurs in basins where slopes are less than 1 percent.

Representative profile, 1.25 miles east of Road 103 and three-quarters of a mile south of Highway 16, in the central part of the SW¼ of sec. 31, T. 10 N., R. 3 E., Mount Diablo Base Meridian, 3.25 miles east of Woodland; the profile, when examined, was moist below a depth of 13 inches:

Ap—0 to 4 inches, gray (5Y 5/1) clay; many, fine, prominent, strong-brown (7.5YR 5/6) mottles; very dark gray (5Y 3/1) and many, fine, prominent, yellowish-brown (10YR 5/6) mottles when moist; granular structure; extremely hard, very firm, sticky and very plastic; common micro and very fine roots; many micro tubular pores; neutral (pH 6.6); abrupt, smooth boundary. (2 to 10 inches thick)

A11—4 to 13 inches, gray (5Y 5/1) clay; many, fine, prominent, strong-brown (7.5YR 5/6) mottles; very dark gray (5Y 3/1) and yellowish-brown (10YR 5/6) mottles when moist; strong, very coarse, prismatic structure; extremely hard, very firm, sticky and very plastic; many micro and very fine exped roots and common micro inped roots; few micro tubular pores; many, prominent, intersecting slickensides; neutral (pH 6.7); clear, smooth boundary. (3 to 10 inches thick)

A12—13 to 28 inches, olive-gray (5Y 4/2) clay, very dark gray (5Y 3/1) when moist; strong, very coarse, prismatic structure; very hard, very firm, sticky and very plastic; common micro roots; many micro and common very fine tubular pores; many prominent intersecting slickensides; slightly effervescent with segregated lime in soft masses; moderately alkaline (pH 8.4); exchangeable sodium is 12 percent; diffuse, wavy boundary. (10 to 20 inches thick)

A13—28 to 38 inches, olive-gray (5Y 4/2) clay, very dark gray (5Y 3/1) when moist; strong, coarse, prismatic structure; very hard, very firm, sticky and very plastic; few micro roots; many micro and few fine tubular pores; many prominent intersecting slickensides; slightly effervescent with disseminated lime; strongly alkaline (pH 8.7); exchangeable sodium greater than 15 percent; clear, smooth boundary. (8 to 20 inches thick)

C1ca—38 to 48 inches, olive-gray (5Y 5/2) clay, olive gray (5Y 4/2) when moist; moderate, coarse, prismatic structure; very hard, very firm, sticky and very plastic; very few micro roots; many micro tubular pores; many prominent intersecting slickensides; strongly effervescent with disseminated lime; strongly alkaline (pH 8.5); exchangeable sodium greater than 15 percent; diffuse, wavy boundary. (4 to 13 inches thick)

C2—48 to 61 inches, olive-gray (5Y 5/2) clay, olive gray (5Y 4/2) when moist; moderate, coarse, prismatic structure; hard, very firm, sticky and very plastic; no roots; many micro tubular pores; many prominent intersecting slickensides; slightly effervescent with disseminated lime; strongly alkaline (pH 8.6); diffuse, wavy boundary. (10 to 15 inches thick)

C3—61 to 72 inches, olive-gray (5Y 5/2) clay, olive gray (5Y 4/2) when moist; weak, medium, prismatic structure; hard, very firm, sticky and very plastic; many micro tubular pores; many prominent intersecting slickensides; slightly effervescent with disseminated lime; strongly alkaline (pH 8.6).

The A horizon ranges in color from dark gray or olive gray to gray and has strong-brown to brown mottles; it ranges in texture from silty clay to clay. This horizon ranges from slightly acid near the surface to strongly alkaline. In some places it is calcareous on the surface, but lime occurs dominantly in the lower A or upper C horizons. The exchangeable sodium percentage ranges from 10 to 20 percent from a depth of from 10 to 40 inches. The C horizon ranges in color from brown to olive gray, pale olive, gray, or light olive gray and has mottles of dark greenish gray, olive, yellowish brown, dark yellowish brown, or strong brown, or is not mottled. It ranges in texture from silty clay loam to clay. Lime is concentrated in the Cca horizon, but in a few places the C horizon is strongly calcareous throughout. In a few places the lower portion of the C horizon has gypsum and lime, or gypsum or lime concretions.

Included in mapping are small areas of Capay silty clay, Marvin silty clay loam, Pescadero silty clay, Riz loam, and Sacramento clay.

This Willows soil has been improved by construction of reclamation structures. Permeability is slow. Surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 7.0 to 9.0 inches in areas that have been drained. The effective rooting depth is from 36 to more than 60 inches and is restricted by a water table at a depth of 36 to 60 inches. Natural fertility is moderately high. The soil is affected by alkali.

This soil is used mainly for rice and sugar beets. Other uses include dryfarmed safflower, irrigated pasture, wildlife habitat, and recreation. Capability unit IIIw-5 (17).

Willows silty clay loam (Wa).—This soil is similar to Willows clay, except that it has a surface layer of silt loam and silty clay loam overwash material that is from 8 to 20 inches thick.

Included in mapping are small areas of Clear Lake clay, Clear Lake silty clay loam, Pescadero silty clay, Sacramento clay, Sacramento silty clay loam, and Willows clay.

This soil has qualities similar to those of Willows clay.

This soil is used mainly for rice and sugar beets. Other uses include dryfarmed safflower, irrigated pasture, wildlife habitat, and recreation. Capability unit IIIw-3 (17).

Willows clay, alkali (Wc).—This soil has a profile similar to that of Willows clay, except that the content of sodium is so high that only crops that tolerate alkali can be grown. The percentage of exchangeable sodium is more than 20 at a depth of 10 to 40 inches.

Included in mapping are small areas of Pescadero silty clay, Riz loam, and Willows clay.

The available water holding capacity is 6.0 to 8.0 inches in areas that have been drained. Natural fertility is moderate, and the soil is moderately affected by alkali.

This soil is used mainly for rice and sugar beets. Other uses include irrigated pasture, wildlife habitat, and recreation. Capability unit IVw-6 (17).

Willows clay, alkali, drained (Wd).—This soil has a profile similar to that of Willows clay, except that the content of sodium is so high that only crops that tolerate alkali can be grown. The percentage of exchangeable sodium is more than 20 at a depth of 10 to 40 inches.

Included in mapping are small areas of Capay silty clay, Clear Lake clay, and some undrained areas.

This Willows soil has an available water holding capacity of 6.0 to 8.0 inches. Soil drainage has lowered the water table to a depth of more than 60 inches. Natural fertility is moderate, and the soil is moderately affected by alkali.

This soil is used mainly for rice and sugar beets. Other uses include irrigated pasture, wildlife habitat, and recreation. Capability unit IVw-6 (17).

Willows clay, alkali, flooded (Wf).—This soil has a profile similar to that of Willows clay, except that the content of sodium is so high that only crops that tolerate alkali can be grown. The percentage of exchangeable sodium is more than 20 at a depth of 10 to 40 inches. This soil is subject to surface ponding and flooding that occur on an average of at least 1 year out of 2 for a duration of more than 48 hours.

Included in mapping are small areas of Capay silty clay, flooded; Clear Lake soils, flooded; Pescadero soils, flooded; Sacramento clay, flooded; and Willows clay.

Natural fertility is moderate, and the soil is moderately affected by alkali. The available water holding capacity is 6.0 to 8.0 inches, based on a drained profile.

This soil is part of the Yolo By-Pass and is used mainly for rice and sugar beets. Other uses include wildlife habitat and recreation. Capability unit IVw-5 (17).

Willows soils, flooded (Wg).—These soils are similar to Willows clay, except that they have up to 20 inches of overwash material that ranges in texture from sandy loam to silty clay loam, and they are subject to flooding at least 1 year out of 3 because of flowage easements.

Included in mapping are small areas of Capay soils, flooded; Clear Lake soils, flooded; Sacramento soils, flooded; and Sycamore complex, flooded.

These soils have a deposition hazard.

These soils are in Yolo By-Pass and are used mainly for rice and sugar beets. Other uses include dryfarmed safflower, irrigated pasture, wildlife habitat, and recreation. Capability unit IVw-3 (17).

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Willows Series, Marly Variant

The Willows marly variant consists of somewhat poorly drained clays in basins. Slopes are less than 1 percent. Soils in this series formed in alluvium from sedimentary rocks. Elevation ranges from 50 to 200 feet. The annual temperature is about 62° F., annual rainfall is 16 to 18 inches, and the frost-free season is about 280 days. In uncultivated areas the vegetation is annual grasses and forbs. Willows marly variant is associated principally with Capay and Willows soils.

In a typical profile the surface layer is dark-gray and gray clay about 36 inches thick. This is underlain by mottled olive-gray and white clay and mottled white, pale-olive, and pale-yellow clay loam that extend to a depth of more than 60 inches.

Willows marly variant is used for row crops, field crops, irrigated pasture, dryfarmed grain, wildlife habitat, and recreation.

Willows clay, marly variant (Wm).—This soil is in basins. Slopes are less than 1 percent.

Representative profile, 45 feet south of Road 25 and 150 feet west of Road 93, about 6 miles southwest of Woodland:

Ap—0 to 8 inches, dark-gray (N 4/0) clay, black (5Y 2/1) when moist; moderate, very coarse, prismatic structure and moderate, coarse, subangular blocky structure, granular structure upper one-eighth inch; three-eighths inch to one-half inch cracks extend to a depth of 24 inches; very hard, firm, sticky and very plastic; common micro and very fine random roots; few micro tubular pores and common micro and very fine vesicular and interstitial pores; moderately alkaline (pH 8.3); violently effervescent with lime segregated in rounded fine concretions; clear, wavy boundary. (7 to 12 inches thick)

A11—8 to 24 inches, dark-gray (5Y 4/1) clay, very dark gray (5Y 3/1) when moist; moderate, very coarse, prismatic structure and moderate, very coarse, angular blocky structure; hard, firm, sticky and very plastic; common micro and very fine random roots and few fine random roots; many micro and very fine tubular pores; common fine tubular pores, and common micro interstitial pores; strongly alkaline (pH 8.6); violently effervescent with lime segregated in medium-sized seams and slightly effervescent with disseminated lime; prominent intersecting slickensides; clear, wavy boundary. (8 to 16 inches thick)

A12—24 to 36 inches, gray (5Y 5/1) clay that has few, fine, faint, dark-gray (5Y 4/1) mottles; dark gray (5Y 4/1) and has olive (5Y 5/3) mottles when moist; moderate, coarse, angular blocky structure; hard, firm, sticky and very plastic; common micro and very fine random roots; many micro and very fine tubular pores and common micro interstitial pores; strongly alkaline (pH 8.6); violently effervescent with lime segregated in medium-sized seams and in irregularly shaped soft masses and slightly effervescent with disseminated lime; distinct intersecting slickensides; clear, irregular boundary. (8 to 14 inches thick)

AC—36 to 46 inches, mottled, olive-gray (5Y 5/2) and white (2.5Y 8/2) clay, olive gray (5Y 4/2), olive (5Y 5/3) broken and pale olive (5Y 6/4) when moist; moderate, medium, angular blocky structure; hard, firm, sticky and very plastic; common micro and few very fine random roots; many micro and very fine tubular pores and common micro interstitial pores; moderately alkaline (pH 8.4); violently effervescent with lime segregated in medium-sized, irregularly shaped soft masses and slightly effervescent with disseminated lime; distinct intersecting slickensides; clear, wavy boundary. (8 to 12 inches thick)

IIC1ca—46 to 53 inches, white (2.5Y 8/2) heavy clay loam that has many, large, distinct, light olive-gray (5Y 6/2) mottles; pale yellow (5Y 7/3) and olive gray (5Y 5/2) when moist; massive; hard, friable, sticky and plastic; few micro and very fine random roots; many micro and very fine tubular pores and common micro interstitial pores; moderately alkaline (pH 8.4); violently effervescent with lime in large, irregularly shaped, soft masses and strongly effervescent with disseminated lime; no slickensides; abrupt, irregular boundary. (6 to 8 inches thick)

IIC2ca—53 to 60 inches, mottled white (2.5Y 8/2), pale-olive (5Y 6/3), and pale-yellow (2.5Y 7/4) clay loam; white (5Y 8/2), light olive gray (5Y 6/2), and yellow (2.5Y 7/6) when moist; massive; slightly hard, friable, sticky and plastic; no roots; many micro and very fine tubular pores and common micro and very fine vesicular and interstitial pores; strongly alkaline (pH 8.6); violently effervescent with disseminated lime and lime concretions; no slickensides.

The A horizon ranges in color from gray to dark gray or very dark gray to black and in texture from heavy clay loam to clay. This horizon is moderately alkaline to very strongly alkaline and is highly calcareous, but in a few places lime is absent above a depth of 10 inches. When dry, the immediate surface may become granular. The Cca horizon ranges in color from mottled white to pale yellow to pale olive and is moderately alkaline to strongly alkaline. It is softly consolidated and restrictive to roots. Cracks extend down to the C horizon. Depth to the softly consolidated marly material ranges from 31 to 54 inches.

Included in mapping are small areas of Capay silty clay, Clear Lake clay, Pescadero silty clay, and Willows clay.

Permeability of this Willows marly variant is slow. Surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 4.0 to 8.0 inches. The effective rooting depth is 31 to 54 inches. Natural fertility is moderately high, and the soil is slightly affected in some places by salts and alkali. The water table is at a depth of 36 to 60 inches.

This soil is used mainly for rice and sugar beets. Other uses include irrigated pasture, dryfarmed barley, dryfarmed safflower, wildlife habitat, and recreation. Capability unit IIIw–5 (17).

Willows clay, marly variant, saline-alkali (Wn).—This soil has a profile similar to Willows clay, marly variant, except the depth to the softly consolidated marly material ranges from 20 to 35 inches. The content of sodium is so high that only crops that tolerate alkali can be grown. The percentage of exchangeable sodium is more than 20 at a depth of 10 to 40 inches.

Included in mapping are small areas of Capay silty clay; Pescadero silty clay, saline-alkali; and Willows clay, alkali. Also included are a few areas that have been drained and have less salts and alkali.

This soil has an available water holding capacity of 3.0 to 5.0 inches. The effective rooting depth is 20 to 35 inches. Natural fertility is moderate, and the soil is moderately affected by saline-alkali salts. The water table is at a depth of from 36 to 60 inches.

This soil is used mainly for irrigated pasture and sugar beets. Other uses include rice, wildlife habitat, and recreation. Capability unit IVw–6 (17).

Yolo Series

The Yolo series consists of well-drained silt loams and silty clay loams on alluvial fans. Slopes are 0 to 2 percent. The soils formed in alluvium from sedimentary rocks. Elevation ranges from 25 to 400 feet. The average annual temperature is 60° F., the annual rainfall is 16 to 22 inches, and the frost-free season is about 270 days. In uncultivated areas the vegetation is annual grasses and forbs. Yolo soils are associated principally with Brentwood and Reiff soils.

In a typical profile, the soil is grayish-brown to pale-brown silt loam and silty clay loam that extends to a depth of more than 60 inches. In some areas the soil is silty clay loam throughout the profile.

Yolo soils are used for orchard, row crops, forage crops, truck crops, irrigated pasture, dryfarmed grain, wildlife habitat, and recreation.

Yolo silt loam (Yo).—This soil is on alluvial fans. Slopes are less than 1 percent.

Representative profile (fig. 5), 90 feet east of center of field road, 3,150 feet west of State Highway 113, and 160 feet south of center of Hutchinson Drive on the property of the University of California at Davis; the profile, when examined, was moist below a depth of 2 inches:

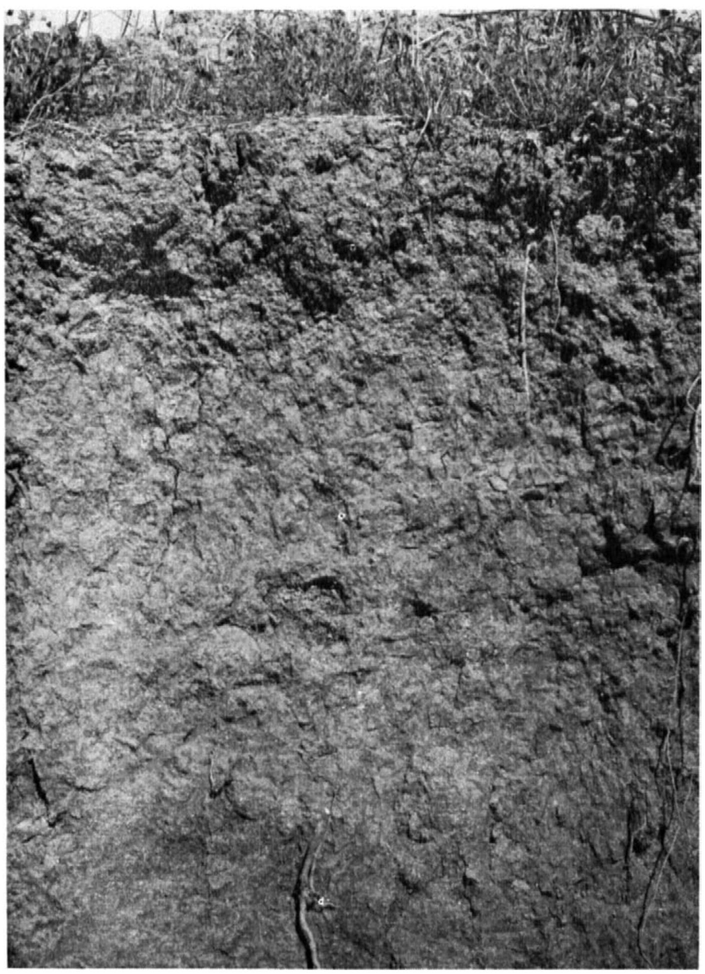

Figure 5.—**Typical profile of Yolo silt loam.**

Ap1—0 to 2 inches, grayish-brown (2.5Y 5/2) silt loam, very dark grayish brown (10YR 3/2) when moist; moderate, thick, platy structure; hard, friable, slightly sticky and plastic; many micro and very fine random roots; many micro and very fine interstitial and tubular pores; neutral (pH 6.7); abrupt, slightly wavy boundary. (2 to 10 inches thick)

Ap2—2 to 8 inches, grayish-brown (2.5Y 5/2) silt loam, dark brown (10YR 3/3) when moist; massive; probable tillage pan; hard, friable, sticky and plastic; many micro and very fine random roots; common micro tubular pores; neutral (pH 7.1); clear, wavy boundary. (3 to 10 inches thick)

A11—8 to 19 inches, grayish-brown (2.5Y 5/2) silt loam, dark brown (10YR 3/3) rubbed, and very dark grayish-brown (10YR 3/2) coatings when moist; weak, coarse, subangular blocky structure; hard, friable, slightly sticky and plastic; common micro and very fine random roots; many micro and very fine tubular pores and clusters of interstitial pores that have wormcasts; few thin clay films on ped faces and continuous thin clay films in pores; neutral (pH 7.2); clear, wavy boundary. (6 to 12 inches thick)

A12—19 to 26 inches, grayish-brown (2.5Y 5/2) silt loam, very dark grayish brown (10YR 3/2) when moist; massive; slightly hard, friable, slightly sticky and plastic; many micro and very fine and few fine random roots; many micro and very fine tubular pores; neutral (pH 7.3); clear, irregular boundary. (6 to 13 inches thick)

C1—26 to 33 inches, brown (10YR 5/3) silt loam, olive brown (2.5Y 4/4) when moist; massive; slightly hard, friable, slightly sticky and plastic; common micro and very fine random roots; common micro and very fine tubular pores and clusters of interstitial pores; wormcasts; mildly alkaline (pH 7.4); clear, irregular boundary. (7 to 24 inches thick)

C2—33 to 41 inches, pale-brown (10YR 6/3) silt loam, olive brown (2.5Y 4/4) when moist; has dark grayish-brown (2.5Y 4/2) stains in root channels; massive; soft, very friable, slightly sticky and slightly plastic; few micro and very fine random roots; common micro and very fine tubular pores and many micro interstitial pores; mildly alkaline (pH 7.4); abrupt, wavy boundary. (8 to 30 inches thick)

Ab—41 to 58 inches, grayish-brown (2.5Y 5/2) silty clay loam, very dark grayish brown (2.5Y 3/2) when moist; massive; slightly hard, friable, very sticky and plastic; very few micro and very fine random roots; common micro and very fine tubular pores; mildly alkaline (pH 7.4); clear, wavy boundary. (0 to 18 inches thick)

C3—58 to 65 inches, pale-brown (10YR 6/3) silt loam, mottled olive brown (2.5Y 4/4) and olive (5Y 4/3) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; very few micro and very fine random roots; many micro and very fine tubular and interstitial pores; mildly alkaline (pH 7.5).

The A horizon ranges in color from brown or grayish brown to dark grayish brown and in texture from fine sandy loam to silt loam. This horizon is slightly acid to mildly alkaline. The C horizon ranges in color from pale brown to light yellowish brown or grayish brown to brown, and the texture is silt loam; in a few places it contains thin lenses of clay or sandy loam. This horizon is neutral to moderately alkaline; there is lime in a few places at a depth of more than 40 inches.

Included in mapping are small areas of Arbuckle gravelly loam, Brentwood silty clay loam, Loamy alluvial land, Reiff very fine sandy loam, Soboba gravelly sandy loam, Sycamore silt loam, and Zamora loam. Also included are some areas where slopes are 2 to 5 percent.

This Yolo soil is moderately permeable. Surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 9.0 to 11.0 inches. The effective rooting depth is more than 60 inches. Natural fertility is high.

This soil is used mainly for almonds, walnuts, corn, sugar beets, tomatoes, alfalfa, and melons. Other uses include dryfarmed barley, wildlife habitat, and recreation. Capability unit I–1 (17).

Yolo silty clay loam (Yb).—This soil is similar to Yolo silt loam, except that its texture is silty clay loam throughout the profile.

Included in mapping are small areas of Brentwood silty clay loam, Sycamore silty clay loam, and Zamora loam. Also included are a few small areas of Yolo silt loam.

Permeability of this Yolo soil is moderately slow. The available water holding capacity is 10.0 to 12.0 inches.

This soil is used mainly for almonds, walnuts, sugar beets, tomatoes, and alfalfa. Other uses include dryfarmed barley, urban development, wildlife habitat, and recreation. Capability unit I–1 (17).

Zamora Series

The Zamora series consists of well-drained loams on alluvial fans. These soils have a subsoil of clay loam. Slopes are less than 1 percent. The soils formed in alluvium from sedimentary rocks. Elevation ranges from 30 to 400 feet. The annual temperature is 61° F., annual rainfall is 16 to 19 inches, and the frost-free season is about 280 days. In uncultivated areas the vegetation is annual grasses and forbs. Zamora soils are associated principally with Brentwood and Rincon soils.

In a typical profile, the surface layer is grayish-brown loam about 10 inches thick. The subsoil is brown clay loam about 30 inches thick. This is underlain by yellowish-brown loam and gravelly loam that extend to a depth of more than 60 inches.

Zamora soils are used for orchard, irrigated forage crops, row crops, dryfarmed grain, pasture, wildlife habitat, and recreation.

Zamora loam (Za).—This soil is on alluvial fans. Slopes are less than 1 percent.

Representative profile, 0.36 mile north of intersection of Roads 16A and 85 and 45 feet east of Road 85 in the SW¼NW¼NW¼ of sec. 1, T. 10 N., R. 2 W., Mount Diablo Base Meridian, about 3 miles north of Capay; the profile, when examined, was moist below a depth of 8 inches.

Ap—0 to 10 inches, grayish-brown (2.5Y 5/2) loam, very dark grayish brown (10YR 3/2) when moist; massive; hard, friable, slightly sticky and slightly plastic; many micro and very fine and few fine random roots; common micro and very fine tubular pores; slightly acid (pH 6.2); clear, wavy boundary. (8 to 14 inches thick)

B21t—10 to 24 inches, brown (10YR 5/3) clay loam, dark brown (10YR 3/3) when moist; weak, coarse, angular blocky structure; hard, friable, sticky and plastic; many micro and very fine and few fine random roots; common micro and very fine tubular pores; few thin clay films on ped faces and lining pores; neutral (pH 7.0); gradual, wavy boundary. (12 to 15 inches thick)

B22t—24 to 40 inches, brown (10YR 5/3) clay loam, dark brown (10YR 4/3) when moist; weak, coarse, angular blocky structure; hard, friable, sticky and plastic; common micro and very fine and few fine random roots; common micro and very fine tubular pores; continuous moderately thick clay films on ped faces and lining pores; neutral (pH 7.0); gradual, wavy boundary. (15 to 17 inches thick)

C1—40 to 51 inches, yellowish-brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common micro and very fine and few fine random roots; common micro and very fine tubular pores; few thin clay films lining pores; neutral (pH 7.0); clear, wavy boundary. (10 to 15 inches thick)

C2—51 to 60 inches, yellowish-brown (10YR 5/4) gravelly loam, dark yellowish brown (10YR 4/4) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few micro and very fine random roots; common micro and very fine tubular pores; slightly effervescent with lime segregated in medium concretions; mildly alkaline (pH 7.5).

The A horizon ranges in color from grayish brown or dark grayish brown to brown and in texture from loam to silt loam. This horizon is slightly acid to neutral. The B2t horizon ranges in color from grayish brown to brown and in texture from clay loam to silty clay loam. This horizon is neutral to mildly alkaline. The C horizon ranges in color from pale brown or yellowish brown to light olive brown and in texture from gravelly loam or loam to silt loam. This horizon is neutral to moderately alkaline and is calcareous in a few places.

Included in mapping are small areas of Brentwood silty clay loam, Tehama loam, Rincon silty clay loam, Yolo silt loam, and Yolo silty clay loam.

Permeability of this Zamora soil is moderately slow. Surface runoff is very slow, and the erosion hazard is none to slight. The available water holding capacity is 9.0 to 11.0 inches. The effective rooting depth is more than 60 inches. Natural fertility is high.

This soil is used mainly for almonds, walnuts, sugar beets, tomatoes, and alfalfa. Other uses include irrigated pasture, dryfarmed barley, wildlife habitat, and recreation. Capability unit I–1 (17).

Use and Management of the Soils

In this section the system of capability classification commonly used by the Soil Conservation Service is described with modifications that are necessary because of climatic differences in the two land resource areas in the county. Then the capability units are explained and suggestions for managing the soils in each capability unit are given. Following this, estimated acre yields of the principal crops are given for those soils in the county that are widely used for crops, and the management required to obtain those yields is described. Then the Storie index and the vegetative soil groups are explained. After that management of range sites and wildlife groups are described and engineering uses of the soils are discussed.

Capability Grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or engineering.

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 groups, 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 moderate limitations that reduce the choice of plants or that 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 reduce the choice of plants, require very careful management, or both.
- Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife. (None in Yolo County.)
- 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.
- Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife.
- Class VIII soils and landforms have limitations that preclude their use for commercial plants 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 that the main limitation is a 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, 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 the subclasses indicated by *w*, *s*, and *c*, because the soils in class V 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 responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils.

Capability units in California are given Arabic numbers that suggest the chief kind of limitation responsible for placement of the soil in the capability class and subclass. For this reason, some of the units within the subclasses are not numbered consecutively, and their symbols are a partial key to some of the soil features. The numerals used to designate units within the classes and subclasses are these:

0. A problem or limitation caused by sand or gravel in the substratum (not used in this county).
1. An actual or potential erosion hazard.
2. A problem or limitation of wetness caused by poor drainage or flooding.
3. A problem or limitation caused by slow or very slow permeability of the subsoil or substratum.
4. A problem or limitation caused by coarse soil texture or excessive gravel.
5. A problem or limitation caused by moderately fine or fine textured soil.
6. A problem or limitation caused by salt or alkali.
7. A problem or limitation caused by cobblestones, other stones, or rock outcrops (not used in this county).
8. A problem or limitation caused by a shallow depth to soil bedrock or hardpan.
9. A problem or limitation caused by low fertility, acidity, or by toxicity.

Land Resource Areas

In Yolo County, capability classification is further refined by designating the land resource area in which the soils in a unit occur (*5*). A land resource area is a broad geographic area that has a distinct combination of climate, soils, vegetation, management needs, and kinds of crops that can be grown. The 48 conterminous States in the Nation have been divided into 156 land resource areas. Parts of two of these are in Yolo County. These areas and their numbers are Central California Coast Range (15), and Sacramento-San Joaquin Valleys (17). The number of the resource area is added in parentheses, to the class, subclass, and unit designation.

Land Resource Area 15.—This resource area makes up about one-third of the county. It includes the mountainous uplands and the dissected terraces in the western and north-central parts of the county. These soils are mostly gently sloping to very steep, though in a few mountain valleys the soils are nearly level.

Elevations in the resource area range from 125 to 3,000 feet. Rainfall ranges from 16 to 24 inches, and less than an inch falls in summer. Dryland grain and pasture are the main crops grown on the nearly level soils, and the steeper soils are used mainly for range.

The actual evapotranspiration for this resource area in Yolo County ranges from 10 to 12 inches (*3*). Water is not available for irrigation in most areas. Irrigated soils within this area, such as Corning gravelly loam, 2 to 15 percent slopes, eroded, are managed like the soils in Land Resource Area 17.

Land Resource Area 17.—Only the valley part of the county is in this resource area, and it comprises about two-thirds of the county. The soils are nearly level to hilly.

Elevations in this resource area range from below sea level to 500 feet above. Rainfall ranges from 16 to 22 inches, and less than an inch falls in summer. Most of the nearly level soils in this resource area are irrigated and are intensively cultivated. The other soils are used for dryfarmed grain and pasture.

The land capability classification for the soils in this resource area is based on the assumption that water is available for irrigation. The areas in the Sacramento River By-Pass that are subject to flooding are assumed to have continuing overflow problems. Other areas subject to flooding also have continuing overflow problems, but flood control is not restricted by law. The salts and alkali in most saline or alkali soils can be improved or reduced, even though they cannot be completely eliminated.

Management by Capability Units

In the following pages the capability units in Yolo County are described and suggestions for use and management of the soils are given. Soil series names are mentioned in each capability unit, but this does not mean that all mapping units of the series are in that particular unit. The soils in each unit are listed in the "Guide to Mapping Units" at the back of the survey.

Capability unit I-1 (17)

This unit consists of very fine sandy loams to silty clay loams of the Brentwood, Laugenour, Maria, Reiff, Sycamore, Tyndall, Yolo, and Zamora series. These soils formed on fans in alluvium derived from mixed sources. They are well drained, or drainage has been improved and the water table is no longer a concern to management. Slopes range from 0 to 2 percent. The annual rainfall is 16 to 22 inches, and the frost-free season is 270 to 280 days. Permeability is moderately rapid to moderately slow. Runoff is very slow, and the erosion hazard is none to slight. Roots can penetrate to a depth of more than 60 inches. Total available water holding capacity is 7.5 to 13.0 inches. Fertility is moderately high to high.

Soils in this unit are suited to row crops, forage crops, orchards, and dryfarmed grain. Sugar beets, tomatoes, alfalfa, almonds, and barley are among the main crops.

A suitable cropping system for conserving soil and water includes crops that produce large amounts of residue. Returning all crop residue to the soils helps to maintain tilth, and proper tillage minimizes soil compaction. In orchards soil tilth and water intake can be improved by growing cover crops and green-manure crops, and mulching, or by using a program for weed control that does not include tillage. Irrigation water should be applied only in amounts to meet the needs of the crop grown. Overirrigation wastes water and leaches nutrients from the soils. Land leveling is needed for good management of irrigation water, and it can be done without difficulty.

Nitrogen and phosphorus are needed for good crop growth. The supply of potassium is sufficient for most crops, though potassium and zinc generally are deficient in cuts made along slough channels by leveling.

Capability unit IIe-1 (17)

Arbuckle gravelly loam, 2 to 5 percent slopes, is the only soil in this unit. It has a subsoil of gravelly loam and gravelly clay loam. It is well drained. This soil formed in alluvium derived from sedimentary rock. The annual rainfall is 16 to 18 inches, and the frost-free season is about 265 days. Permeability is moderately slow. Runoff is slow, and the erosion hazard is slight. Roots can penetrate to a depth of more than 60 inches. Total available water holding capacity is 6.0 to 7.0 inches. Fertility is moderate.

This soil is suited to orchards, dryfarmed grain, pasture, row crops, and forage crops. Almonds, barley, tomatoes, and alfalfa are the main crops.

A suitable cropping system for conserving soil and water includes legumes and crops that produce large amounts of residue. Returning all crop residue to the soil helps to maintain tilth, improve water intake, reduce runoff, and control erosion. Proper tillage minimizes soil compaction, and helps to reduce runoff and control erosion. In orchards (fig. 6) soil tilth and water intake can be improved and runoff and erosion reduced by growing cover crops and green-manure crops, and mulching, or by using a program for weed control that does not include tillage. Irrigation water should be applied only in amounts to meet the needs of the crop grown. The water generally is applied by sprinklers. Where land leveling is done, care is needed to avoid deep cuts that expose the subsoil. Nitrogen and phosphorus are needed for good crop growth.

Capability unit IIe-3 (17)

Tehama loam, 2 to 5 percent slopes, is the only soil in this unit. It has a subsoil of clay loam. This soil formed on fans in alluvium derived from sedimentary rock. The annual rainfall is 16 to 20 inches, and the frost-free season is about 265 days. Permeability is slow. Runoff is slow, and the erosion hazard is slight. Roots can penetrate to a depth of more than 60 inches. Total available water holding capacity is 8.0 to 10.0 inches. Fertility is moderate.

This soil is suited to dryfarmed grain, forage crops, row crops, orchards, and irrigated pasture. Barley, sugar beets, and tomatoes are the main crops.

A suitable cropping system for conserving soil and water includes legumes and crops that produce large amounts of residue. Returning all crop residue to the soil helps to maintain tilth, improve water intake, reduce runoff, and control erosion. Proper tillage minimizes soil compaction and helps to reduce runoff and control erosion. In orchards (fig. 7) soil tilth and water intake can be improved and erosion reduced by growing cover crops

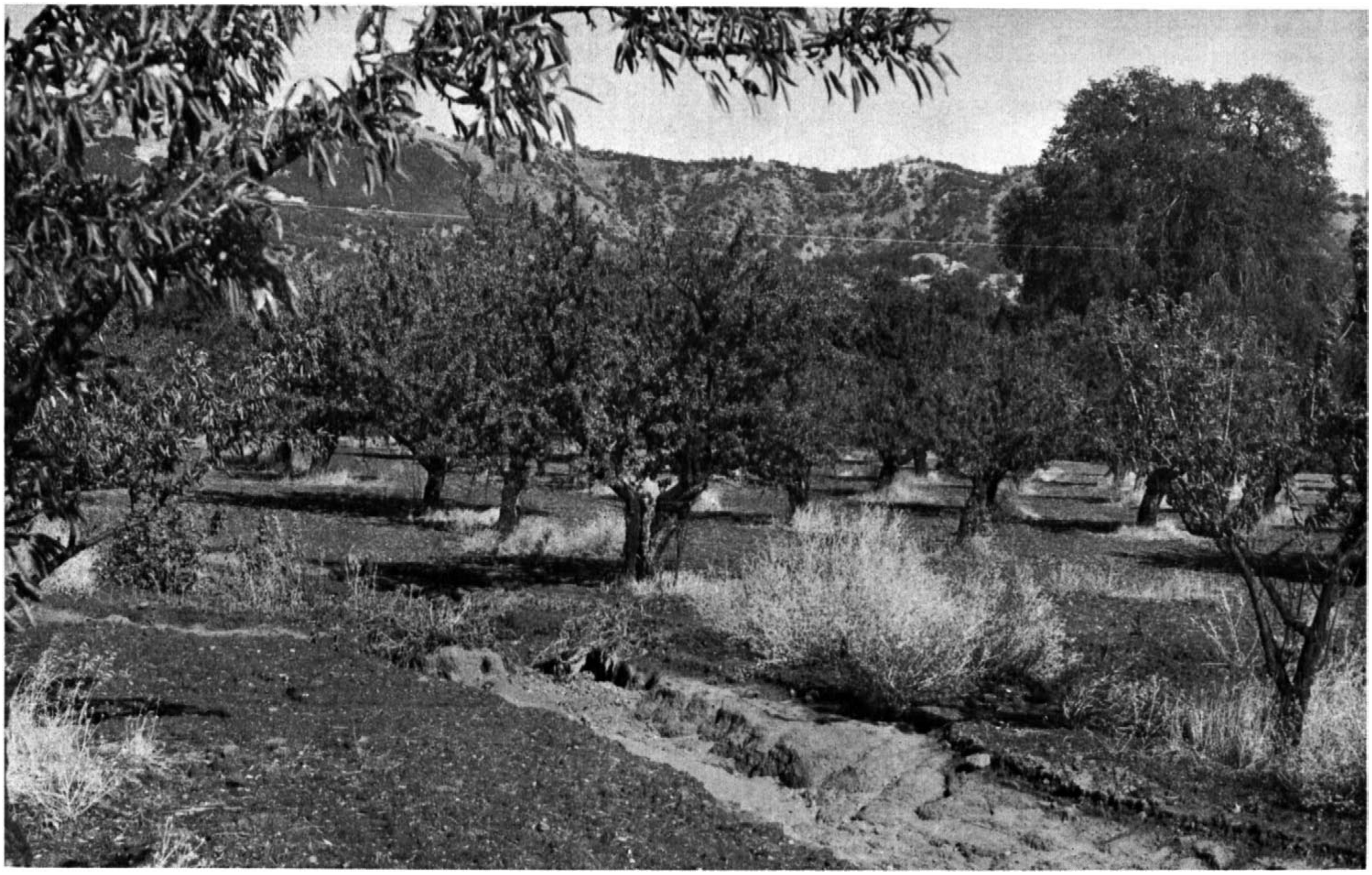

Figure 6.—**Erosion on Arbuckle gravelly loam, 2 to 5 percent slopes, that lacks a cover crop.**

and green-manure crops, and mulching, or by using a program for weed control that does not include tillage. Proper application of irrigation water is needed to conserve water and to help control erosion. Where land leveling is done, care is needed to avoid deep cuts that expose the subsoil. Nitrogen and phosphorus are needed for good crop growth.

Capability unit IIw–2 (17)

This unit consists of sandy loams to silty clay loams of the Lang, Merritt, Sycamore, Tyndall, and Valdez series. Most of these soils are somewhat poorly drained, but the Merritt is poorly drained. All of the soils formed on fans in alluvium derived from mixed sources. Slopes range from 0 to 2 percent. The annual rainfall is 16 to 20 inches, and the frost-free season is 255 to 280 days. Permeability is moderately rapid to moderately slow. Runoff is very slow, and the erosion hazard is none to slight. Roots can penetrate to a depth of 30 to 60 inches, but they are restricted at this depth by a seasonal water table. Total available water holding capacity is 5.0 to 11.0 inches. Fertility is moderately high to high.

These soils are suited to row crops, forage crops, and dryfarmed grain. Sugar beets, tomatoes, alfalfa, barley, and safflower are the main crops. Deciduous fruit and nut trees that are deep rooted and live a long time are not well suited.

A suitable cropping system for conserving soil and water includes legumes and crops that produce large amounts of residue. Returning all crop residue to the soil helps to maintain tilth, and proper tillage minimizes soil compaction. Open ditches or tile drains help to maintain the water table at a uniform depth. Disposal of excess surface water also is needed to help control the water table. Proper application of irrigation water is needed to keep the water table below the root zone of the crops grown. Limited land leveling can be done to provide good distribution of irrigation water. Nitrogen and phosphorus are needed for good crop growth. Potassium and zinc are deficient in places, particularly in deep cuts made in land leveling.

Capability unit IIs–3 (17)

This unit consists of silt loams to silty clay loams of the Clear Lake, Maria, Marvin, Merritt, Rincon, Sacramento, Sycamore, and Tehama series. The land type, Made land, also is in this unit. The soils in this unit have a subsoil or buried soil of silty clay loam to silty clay. These soils formed on fans and in basins in alluvium derived from mixed sources. They are well drained or drainage has been improved and the water table is no longer a concern to management. Slopes are less than 2 percent. The annual rainfall is 16 to 20 inches, and the frost-free season is 265 to 280 days. Permeability is slow in the subsoil and

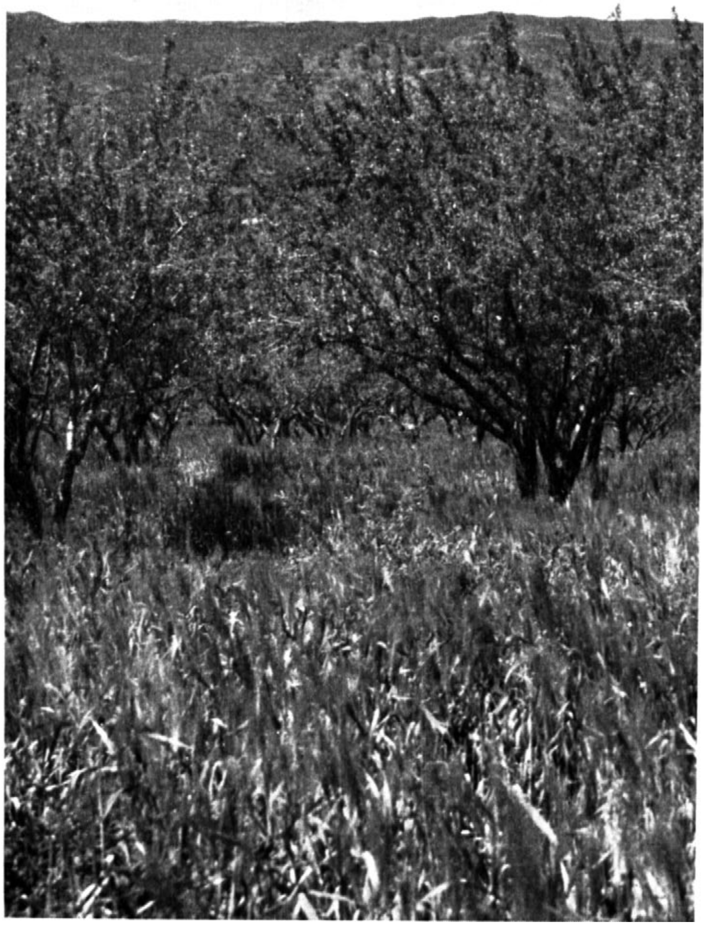

Figure 7.—**Oats and vetch provide cover in an orchard on Tehama loam, 2 to 5 percent slopes, in capability unit IIe-3 (17).**

substratum. Runoff is very slow, and the erosion hazard is none to slight. Roots can penetrate to a depth of 40 to more than 60 inches. Total available water holding capacity is 7.0 to 12.5 inches. Fertility is moderately high to high.

Soils in this unit are suited to row crops, forage crops, orchards, and dryfarmed grain. Sugar beets, tomatoes, alfalfa, almonds, and barley are the main crops.

A suitable cropping system for conserving soil and water includes legumes and crops that produce large amounts of residue. Returning all crop residue to the soils helps to maintain tilth and to improve water intake. In orchards soil tilth and water intake can be improved by growing cover crops and green-manure crops and mulching, or by using a program for weed control that does not include tillage. Proper application of irrigation water is needed to help control waterlogging and to keep a perched water table from forming. Where land leveling is done, care is needed to avoid deep cuts that expose the subsoil. Nitrogen and phosphorus are needed for good crop growth.

Capability unit IIs-4 (17)

This unit consists of gravelly loams of the Arbuckle and Reiff series. These soils formed in alluvium derived from sedimentary rock. They are well drained. Slopes are less than 2 percent. The annual rainfall is 16 to 20 inches, and the frost-free season is 265 to 280 days. Permeabilty is moderately rapid to moderately slow. Runoff is very slow, and the erosion hazard is none to slight. Roots can penetrate to a depth of more than 60 inches. Total available water holding capacity is 6.0 to 8.5 inches. Fertility is moderate to high.

These soils are suited to orchards, row crops, forage crops, and dryfarmed grain. Almonds, tomatoes, alfalfa, and barley are the main crops.

A suitable cropping system for conserving soil and water includes legumes and crops that produce large amounts of residue. Returning all crop residue to the soil helps to maintain tilth and improve water intake. Proper tillage minimizes soil compaction. In orchards soil tilth and water intake can be improved by growing cover crops and green-manure crops, and mulching, or by using a program for weed control that does not include tillage. Irrigation water should be applied only in amounts to meet the needs of the crop grown. Overirrigation wastes water and leaches nutrients from the soils. Land leveling is needed for good management of irrigation water, and it can be done without difficulty. Nitrogen and phosphorus are needed for good crop growth.

Capability unit IIs-5 (17)

This unit consists of clays of the Capay, Clear Lake, Myers, and Sacramento series. These soils formed on basin rims and in basins in alluvium derived from mixed sources. They are well drained or moderately well drained, or were poorly drained, but the water table has been lowered and is now at a depth of more than 60 inches. Slopes are less than 1 percent. The annual rainfall is 16 to 20 inches, and the frost-free season is 275 to 280 days. Permeability is slow. Runoff is very slow, and the erosion hazard is none to slight. Roots can penetrate to a depth of more than 60 inches. Total available water holding capacity is 8.0 to 10.0 inches. Fertility is high.

These soils are suited to row crops, field crops, dryfarmed field crops, and orchards. Sugar beets, tomatoes, alfalfa, rice, barley, and safflower are the main crops.

A suitable cropping system for conserving soil and water consists of legumes and crops that produce large amounts of residue. Returning all crop residue to the soil helps to maintain tilth and improve water intake. Proper tillage minimizes soil compaction. Adequate drainage of excess surface water is needed. In applying irrigation water, infrequent slow applications of long duration are needed because of the slow infiltration rate and permeability of these soils. Land leveling is needed for good management of irrigation water, and it generally can be done without difficulty. It also prevents surface ponding during the rainy season. Working these soils when they are too dry or too wet causes large clods to form or the soils to puddle and seal over. Nitrogen and phosphorus are needed for good crop growth.

Capability unit IIIe-3 (17)

Hillgate loam, moderately deep, 2 to 9 percent slopes, is the only soil in this unit. It is well drained and has a subsoil of clay. This soil formed on terraces in alluvium derived from sedimentary rock. The annual rainfall is 16 to 20 inches, and the frost-free season is about 280 days. Permeability is very slow. Runoff is slow to medium, and the erosion hazard is slight to moderate. Roots can penetrate to a depth of 20 to 30 inches. Total available water holding capacity is 4.0 to 6.0 inches. Fertility is low.

This soil is suited to dryfarmed grain, pasture, hay, and irrigated pasture. Barley is the principal small grain. In irrigated areas shallow-rooted grasses and legumes are well suited. Excess pasture can be used for hay.

A suitable cropping system for conserving soil and water consists of legumes and crops that produce large amounts of residue. Returning all crop residue to the soil helps to maintain tilth, improve water intake, and control erosion. Cultivating across the slope helps to reduce runoff and control erosion. Irrigation water must be applied carefully to avoid saturating the soil above the clay subsoil, for improper application could cause root rot, erosion, and leaching of plant nutrients. Sprinkler irrigation is well suited. If land leveling is done, care is needed to avoid deep cuts that expose the subsoil. Outlets and waterways need to be controlled to help prevent gullying. Nitrogen and phosphorus are needed for good crop growth.

Capability unit IIIe-5 (15)

This unit consists of silty clay loams and clays of the Balcom and Sehorn series. These soils are well drained. They formed in soft calcareous material derived from siltstone or sandstone. Slopes range from 2 to 15 percent. The annual rainfall is 17 to 24 inches, and the frost-free season is about 250 days. Permeability is moderately slow to slow. Runoff is slow to medium, and the erosion hazard is slight to moderate. Roots can penetrate to a depth of 26 to 60 inches. Total available water holding capacity is 4.0 to 10.0 inches. Fertility is moderate to high.

These soils are suited to dryfarmed grain, pasture, and hay. Barley is the main dryland grain. Pasture can be cut for hay.

A suitable cropping system for conserving soil and water consists of legumes and crops that produce large amounts of residue. The soils can be cultivated 1 year in 3. Returning all crop residue to the soil helps to maintain soil tilth, improve water intake, and control erosion. Proper tillage minimizes soil compaction, and it also helps to reduce runoff and to control erosion. Keeping a cover of vegetation in waterways helps to protect them from erosion. Growing cover crops in winter and spring also helps to control erosion. The intake of water can be improved and the hazard of erosion reduced by cultivating across the slope or on the contour. Crops on these soils respond if nitrogen and phosphorus are applied.

Capability unit IIIw-3 (17)

This unit consists of sandy loams to silty clay loams of the Lang, Merritt, Omni, Sacramento, Sycamore, Tyndall, Valdez, and Willows series. Some of these soils have a buried layer of clay at a depth of 40 to 60 inches, and others are deep and have as much as 20 inches of overwash on them. These soils are somewhat poorly drained to poorly drained. They formed on fans and in basins in alluvium derived from mixed sources. Slopes are less than 1 percent. The annual rainfall is 16 to 20 inches, and the frost-free season is 265 to 280 days. These soils have a slowly permeable clay subsoil or a clay substratum. Runoff is very slow, and the erosion hazard is none to slight. Roots can penetrate to a depth of 24 to 60 inches and are restricted at this depth by a water table or by a buried clay substratum. Total available water holding capacity is 4.0 to 10.0 inches. Fertility is low to high.

Soils in this unit are suited to row crops, field crops, and irrigated pasture. Sugar beets, tomatoes, corn, alfalfa, and rice are the main crops. Unless they are drained, the soils in this unit are not suited to deep-rooted tree crops except for the Lang soils, where the water table does not fluctuate.

A suitable cropping system for conserving soil and water includes legumes and crops that produce large amounts of residue. Returning all crop residue to the soil helps to maintain tilth and improve water intake, and proper tillage minimizes soil compaction. In orchards soil tilth and water intake can be improved by growing cover crops and green-manure crops, and mulching, or by using a program for weed control that does not include tillage. Open or closed drains are needed to lower the water table and to help provide favorable conditions in the root zone. Surface drainage is needed to remove excess water. The use of sprinkler and surface irrigation leaches salts from the root zone and helps to prevent a toxic buildup. Properly applying irrigation water conserves water, prevents waterlogging, and helps to control the water table. If land leveling is done, care is needed to avoid deep cuts that expose the clay substratum. Nitrogen and phosphorus are needed for good crop growth.

Capability unit IIIw-5 (17)

This unit consists of Omni, Pescadero, Sacramento, Willows, and Willows, marly variant, silty clays and clays. These soils formed in basins in alluvium derived from mixed rock sources. They are somewhat poorly drained and poorly drained. Slopes are less than 1 percent. The annual rainfall is 16 to 20 inches, and the frost-free season is 265 to 280 days. Permeability is slow. Runoff is very slow, and the erosion hazard is none to slight. Roots can penetrate to a depth of 24 to 60 inches, but they are restricted at this depth by a water table or by an unrelated marly substratum. Total available water holding capacity is 4.0 to 10.0 inches. Fertility is moderately high to high. A few of these soils are slightly affected by salts and alkali.

These soils are suited to field crops, row crops, truck crops, irrigated pasture, and dryland field crops. Rice, alfalfa, sugar beets, tomatoes, asparagus, and safflower are the main crops.

A suitable cropping system for conserving soil and water includes legumes and crops that produce large amounts of residue. Returning all crop residue to the soil helps to maintain tilth and improve water intake, and proper tillage minimizes soil compaction. The use of adequate facilities to provide drainage helps to remove excess surface water and to maintain the desired root zone for the crops grown. Drainage is also needed to maintain a favorable salt balance in the soils that are slightly affected by salts. Soil amendments can be used to help reduce the content of salts and alkali. Proper application of irrigation water is needed to help control waterlogging and to keep the water table from rising. Land leveling is needed for good management of irrigation water and of surface drainage, and it can be done without difficulty. If these soils are tilled when too dry, large clods form, and if they are tilled when too wet, the soils are likely to seal over. Nitrogen and phosphorus are needed for good crop growth.

Capability unit IIIs-3 (17)

Hillgate loam, moderately deep, 0 to 2 percent slopes, is the only soil in this unit. It has a subsoil of clay. This soil formed on low terraces in alluvium derived from sedimentary rock. It is well drained. The annual rainfall is 16 to 30 inches, and the frost-free season is about 280 days. Permeability is very slow. Runoff is very slow, and the erosion hazard is none to slight. Roots can penetrate to a depth of 20 to 30 inches. Total available water holding capacity is 4.0 to 6.0 inches. Fertility is low.

This soil is suited to shallow-rooted crops, irrigated pasture, and dryfarmed grain. Sugar beets, tomatoes, grain sorghum, and barley are the main crops.

A suitable cropping system for conserving soil and water includes legumes and crops that produce large amounts of residue. Returning all crop residue to the soil helps to maintain tilth and improve water intake. Care in application of irrigation water is needed to prevent temporary waterlogging and to keep a perched water table from forming over the clay subsoil. If land leveling is done, care is needed to avoid deep cuts that reduce the depth to which roots can readily penetrate or that expose the clay subsoil. Crops on this soil respond if nitrogen and phosphorus are added, and in places if sulfur is applied.

Capability unit IVe-1 (15)

Balcom silty clay loam, 15 to 30 percent slopes, eroded, is the only soil in this unit. It is 26 to 47 inches deep to soft sandstone. The annual rainfall is 17 to 20 inches, and the frost-free season is about 250 days. Runoff is medium to rapid, and the erosion hazard is moderate to high. Permeability is moderately slow. Available water holding capacity is 5.0 to 7.0 inches. Fertility is moderate.

This soil is suited to range, pasture, dryfarmed grain, and grass hay. Barley is the principal grain.

Grains are rotated with hay or dryland pasture every 3 years. Returning all crop residue and all stubble to the soil helps to reduce runoff, maintain tilth, and improve the water intake. Farming across the slope also helps to control runoff and conserve water. Control of grazing is needed to protect the soil from erosion. Grain and forage plants on this soil respond if fertilizer that contains nitrogen and phosphorus is applied.

Capability unit IVe-3 (17)

This unit consists of gravelly loams or loams of the Corning and Hillgate series that have a subsoil of clay. These soils are well drained. They formed on terraces in alluvium derived from sedimentary rock. Slopes range from 2 to 15 percent. The annual rainfall is 16 to 20 inches, and the frost-free season is 265 to 280 days. Permeability is very slow. Runoff is slow to medium. The erosion hazard is slight to moderate, and these soils are eroded. Roots can penetrate to a depth of 10 to 20 inches. Total available water holding capacity is 2.0 to 3.0 inches. Fertility is low.

These soils are suited to dryfarmed grain, dryland pasture, and irrigated pasture. Barley is the main small grain.

A suitable cropping system for conserving soil and water includes legumes and crops that produce large amounts of residue. Returning all crop residue to the soil helps to maintain soil tilth, improve water intake, reduce runoff, and control erosion. Doing all tillage across the slope or on the contour helps to control erosion. Sprinkler irrigation is an effective means of applying irrigation water and controlling erosion. Control of grazing is needed to protect the soil from erosion. Using diversions that have protected outlets remove excess water from the surface, reduce runoff, and help to control erosion. Nitrogen and phosphorus are needed for good crop growth.

Capability unit IVe-5 (15)

This unit consists of cobbly clays and clays of the Climara and Sehorn series, and silty clay loams of the Balcom series. These soils formed in material weathered from soft calcareous sandstone, siltstone, and ultrabasic rock. They are well drained. Slopes range from 2 to 30 percent. The annual rainfall is 18 to 24 inches, and the frost-free season is 225 to 250 days. Permeability is slow. Runoff is slow to rapid. The erosion hazard is slight to high, and most areas are eroded. Roots can penetrate to a depth of 27 to 60 inches. Total available water holding capacity is 4.0 to 9.0 inches. Fertility is low to high.

Soils in this unit are suited to dryfarmed grain, pasture, and wildlife habitat. Barley is the main grain crop.

A suitable cropping system for conserving soil and water includes legumes and crops that produce large amounts of residue. Use for cultivated crops should be limited to 1 year in 4. Returning all crop residue to the soil helps to maintain soil tilth, reduce runoff, and control erosion. Proper tillage minimizes soil compaction and also helps to control erosion. Waterways should not be cultivated and should be seeded if necessary to maintain a vegetative cover. Controlling grazing provides adequate plant cover, and thus helps to reduce erosion. Cultivating across the slope or on the contour slows runoff and also reduces erosion. Diversions that have safe outlets are needed in places to remove excess water from the surface. Crops on these soils generally respond if fertilizer that contains nitrogen and phosphorus is applied.

Capability unit IVw-2 (17)

This unit consists of very fine sandy loams and silt loams of the Laugenour, Maria, Sycamore, and Tyndall series. These soils formed on fans in alluvium derived from mixed sources. They are somewhat poorly drained to poorly drained and are subject to flooding at least 1 year out of 3 because of flowage easements. Slopes range from 0 to 2 percent. The annual rainfall is 16 to 20 inches, and the frost-free season is about 280 days. Permeability is moderately rapid to moderate. Runoff is very slow, and the erosion hazard is none to slight, but the soils are subject to deposition. Depth to the water table is 36 to 60 inches, and roots readily penetrate to this depth. Total available water holding capacity is 7.0 to 12.0 inches. Fertility ranges from moderately high to high.

These soils are suited to summer grown irrigated row crops, field crops, and pasture and to dryland pasture and field crops. Sugar beets, tomatoes, rice, and safflower are the main crops.

Because of the hazard of flooding, all crops are grown in summer on these soils. A suitable cropping system for conserving soil and water includes crops that produce large amounts of residue. Returning all crop residue to the soil helps to maintain soil tilth and improve water intake. Proper tillage minimizes soil compaction. Drainage facilities are needed to dispose of excess surface water. Irrigation water should be applied lightly and frequently to help prevent leaching of nutrients and to keep a perched water table from forming. Land leveling can be done without difficulty, but leveling may be needed frequently because of deposition. Nitrogen and phosphorus are needed for good crop growth.

Capability unit IVw-3 (17)

This unit consists of sandy loams to silty clay loams of the Capay, Clear Lake, Lang, Laugenour, Pescadero, Riz, Sacramento, Sycamore, Valdez, and Willows series. These soils have a subsoil of clay or are underlain by clay at depths of 20 to 60 inches. They formed on fans and in basins in alluvium derived from mixed sources. Soils in this unit are somewhat poorly drained and poorly drained. They are subject to flooding at least 1 year in 3 for 48 hours because of flowage easements. Slopes range from 0 to 2 percent. The annual rainfall is 16 to 20 inches, and the frost-free season is 275 to 280 days. Permeability is slow to very slow. Runoff is very slow, and the erosion hazard is none to slight. These soils are subject to deposition. Roots can penetrate to a depth of 9 to 60 inches. Total available water holding capacity is 2.0 to 10.0 inches. Fertility ranges from low to high.

These soils are suited to summer-grown irrigated row crops, field crops, and pasture and to dryfarmed field crops. Sugar beets, grain sorghum, rice, and safflower are the main crops.

A suitable cropping system for conserving soil and water includes legumes and crops that produce large amounts of residue. Returning all crop residue to the soil helps to maintain tilth and improve water intake. Proper tillage minimizes soil compaction. Drainage systems are needed to remove excess water from the surface and subsoil. Careful management of irrigation water is necessary to prevent waterlogging and to lower the water table and keep it below the root zone. If land leveling is done, care is needed to avoid deep cuts that expose the clay subsoil or substratum. Land leveling helps redistribute the recently deposited material and is needed in many places. Crops on these soils respond if fertilizer that contains nitrogen and phosphorus is applied.

Capability unit IVw-5 (17)

This unit consists of silty clays and clays of the Capay, Sacramento, and Willows series. These soils formed on basin rims and in basins in alluvium derived from mixed sources. They are moderately well drained to poorly drained. These soils are subject to ponding and flooding at least 1 year in 2 for more than 48 hours. Slopes are less than 1 percent. The annual rainfall is 16 to 20 inches, and the frost-free season is 275 to 280 days. Permeability is slow. Runoff is very slow, and the erosion hazard is none to slight. The water table is at a depth of 34 to 60 inches, and roots can readily penetrate to this depth. Total available water holding capacity is 6.0 to 10.0 inches. Fertility is moderate to high.

Soils in this unit are suited to row crops, field crops, and dryfarmed field crops grown in summer. Sugar beets, tomatoes, rice, and safflower are the main crops.

A suitable cropping system for conserving soil and water includes crops that produce large amounts of residue. All crops are grown in summer because of the flooding hazard in winter. Returning all crop residue to the soil helps to maintain tilth and improve water intake, and proper tillage minimizes soil compaction. Drainage is needed to remove water from the surface and subsurface quickly so that summer crops can be planted. Careful management of irrigation water is needed to prevent waterlogging and to avoid raising the water table. Because of the slow intake rate, water should be applied very slowly. Land leveling can be done without difficulty. The building of levees to protect some of these soils from flooding may be feasible. Crops on these soils generally respond if fertilizer that contains nitrogen and phosphorus is applied.

Capability unit IVw-6 (17)

This unit consists of silty clay loams to clays of the Merritt, Pescadero, and Willows series, and of the marly variant of the Willows series. These soils are moderately to strongly affected by salts and alkali. They formed in basins in alluvium from mixed sources. Soils in this unit are subject to flooding 1 year in 2. Slopes are less than 1 percent. The annual rainfall is 16 to 20 inches, and the frost-free season is 275 to 280 days. Permeability is slow. Runoff is very slow, and the erosion hazard is none to slight. The water table is at a depth of 20 to more than 60 inches and roots can readily penetrate to this depth. Total available water holding capacity is 3.0 to 8.0 inches. Fertility is moderate to moderately high.

Soils in this unit are suited to irrigated pasture, row crops, and field crops and to dryland pasture. Sugar beets and rice are the main crops. Irrigated pasture consists of grasses and legumes that tolerate salts.

A suitable cropping system for conserving soil and water includes legumes and crops that produce large amounts of residue. Returning all crop residue to the soil helps to improve soil tilth, and proper tillage minimizes soil compaction. Drainage is needed to remove excess surface and subsurface water. Adequate drainage is needed before applying such soil amendments as gypsum or sulfur. In addition large amounts of water are required for leaching excess salts and alkali from the upper part of the profile. Generally the upper 12 inches of the surface layer can be reclaimed and maintained. Because of the slow permeability and slow water intake rate, applying irrigation water on these soils is difficult. Land leveling is needed for good management of irrigation water, and it can be done without difficulty. All crops on these soils generally respond if fertilizer that contains nitrogen and phosphorus is applied.

Capability unit IVs-3 (17)

This unit consists of loams of the Hillgate, Riz, and San Ysidro series. These soils have a subsoil of clay. They are well drained and moderately well drained, or drainage has been improved and the water table lowered. These soils formed on old terraces in alluvium derived from sedimentary rock. Slopes range from 0 to 2 percent. The annual rainfall is 16 to 20 inches, and the frost-free season is about 280 days. Permeability is very slow. Runoff is very slow, and the erosion hazard is none to slight. Roots can penetrate to a depth of 9 to 26 inches. Total available water holding capacity is 2.0 to 4.0 inches. Fertility is low.

Soils in this unit are suited to shallow-rooted row crops, field crops, irrigated pasture, and dryfarmed grain. Grain sorghum, tomatoes, and barley are the main crops.

A suitable cropping system for conserving soil and water includes legumes and crops that produce large amounts of residue. Returning all crop residue to the soil helps to maintain soil tilth and improve water intake, and proper tillage minimizes soil compaction. Applying irrigation water lightly and frequently helps to prevent waterlogging and keeps a perched water table from forming. If land leveling is done, care is needed to avoid exposing the clay subsoil. Crops on these soils respond well if fertilizer that contains nitrogen and phosphorus is applied.

Capability unit IVs-4 (17)

Soboba gravelly sandy loam and the land type Loamy alluvial land are in this unit. The Soboba soil is excessively drained, and the land type is well drained. Both formed on fans in alluvium derived from sedimentary rock and have a very gravelly and sandy substratum. Slopes range from 0 to 2 percent. The annual rainfall is 16 to 20 inches, and the frost-free season is 260 to 270 days. Permeability is very rapid to rapid. Runoff is very slow, and the erosion hazard is none to slight. Roots can penetrate to a depth of 24 to more than 60 inches. Total available water holding capacity is 2.5 to 4.0 inches. Fertility is low.

These soils are suited to irrigated row crops and pasture and to dryland pasture. Grain sorghum is the main crop.

A suitable cropping system for conserving soil and water includes legumes and crops that produce large amounts of residue. Returning all crop residue to the soil helps to improve soil tilth and maintain fertility, and proper tillage minimizes soil compaction. Applying irrigation water lightly and frequently helps to prevent leaching of nutrients and the loss of water by deep percolation. If land leveling is done, care is needed to avoid deep cuts that expose the very gravelly loamy sand substratum. Crops on these soils respond well if nitrogen and phosphorus fertilizer are applied.

Capability unit VIe-1 (15)

This unit consists of silty clay loams of the Balcom and Dibble series. These soils formed in place in material weathered from soft sandstone. They are well drained. Slopes range from 5 to 50 percent. The annual rainfall is 17 to 20 inches, and the frost-free season is about 250 days. Permeability is moderately slow. Runoff is medium to rapid. The erosion hazard is moderate to high, and the soils are eroded or severely eroded. Roots can penetrate to a depth of 20 to 36 inches in the least eroded soil, and to 10 to 20 inches in the severely eroded ones. Available water holding capacity is 2.0 to 6.0 inches. Fertility is moderate to low.

Soils in this unit are suited to range, to wildlife habitat, to watershed, and to recreation.

Control of grazing helps to increase the vegetation and usable forage and helps to provide an adequate cover for control of erosion. Seeding of improved varieties of grasses and legumes helps to extend the grazing season. Returning all residue to the soils helps to reduce runoff and control erosion. Grasses and legumes on these soils respond if fertilizer that contains nitrogen, phosphorus, and sulfur is applied.

Capability unit VIe-3 (15)

This unit consists of gravelly loams and clay loams of the Corning, Dibble, and Positas series, and rocky loam of the Millsholm series. These soils have a subsoil of clay. They formed on dissected terraces and on uplands in material derived from sedimentary rock. Slopes range from 15 to 30 percent on the shallower soils, and from 30 to 50 percent on the deeper soils. The annual rainfall is 16 to 24 inches, and the frost-free season is 230 to 265 days. Permeability is very slow to slow. Runoff is medium to rapid. The erosion hazard is moderate to high, and these soils are eroded. Roots can penetrate to a depth of 10 to 20 inches to clay or 20 to 36 inches to shale. Total available water holding capacity is 2.0 to 6.0 inches. Fertility is moderate to low.

The soils in this unit are suited to range and to use as wildlife habitat.

Seeding improved varieties of grasses and legumes increases the amount of forage on these soils. Control of grazing helps to increase the supply of usable forage. It also helps to provide an adequate cover to reduce runoff and help to control erosion. Applying fertilizer that contains nitrogen, phosphorus, and sulfur promotes good plant growth, increases the amount of forage, and extends the grazing period.

Capability unit VIe-5 (15)

This unit consists of clays of the Sehorn series and silty clay loam of the Balcom series. These soils formed on uplands in material derived from soft calcareous sandstone or siltstone. They are well drained. Slopes range from 30 to 50 percent. The annual rainfall is 18 to 24 inches, and the frost-free season is about 250 days. Permeability is slow, and runoff is rapid. The erosion hazard is high, and these soils are eroded or severely eroded. Roots can penetrate to a depth of 24 to 36 inches. Total available water holding capacity is 4.0 to 6.0 inches.

The soils in this unit are suitable for use as wildlife habitat and range.

Seeding improved varieties of grasses and legumes increases the amount of forage on these soils. Control of grazing helps to increase the quantity of desirable kinds of plants and of usable forage. It also helps to provide adequate cover to reduce runoff and helps to control erosion. Applying fertilizer that contains nitrogen, phosphorus, and sulfur increases the amount of forage and helps to extend the grazing period.

Capability unit VIIe-3 (15)

This unit consists of gravelly loams and clay loams of the Dibble and Positas series. These are well drained. They formed on steep terraces in gravelly alluvium derived from sedimentary rock, and on uplands in material derived from sandstone. Slopes range from 30 to 75 percent. The annual rainfall is 18 to 24 inches, and the frost-free season is about 230 days. Permeability is very slow or slow, and runoff is rapid to very rapid. The erosion hazard is high to very high, and the soils are eroded or severely eroded. Roots can penetrate to a depth of 10 to 20 inches on the least sloping soils, and from 20 to 30 inches on the steeper soils. Total available water holding capacity is 2.0 to 5.0 inches. Fertility is low to moderate.

The soils in this unit are suitable for use as wildlife habitat and range.

Controlling grazing on these soils helps to maintain an adequate cover of plants for control of erosion. It also helps to increase the desirable kinds of plants and to increase the amount of forage. In years when rainfall is light, excluding grazing on the steeper slopes helps to maintain sufficient cover for control of erosion. Seeding suitable grasses and legumes helps to replace the vegetation lost by fire or by other means and thus also helps to control erosion.

Capability unit VIIe-8 (15)

This unit consists of loams and clay loams of the Dibble and Millsholm series. These soils are well drained. They formed on uplands in material weathered from sandstone and shale. Slopes range from 15 to 75 percent. In places sandstone and shale crop out on 2 to 10 percent on the surface. The annual rainfall is 20 to 24 inches, and the frost-free season is about 230 days. Permeability is moderate to slow, and runoff is moderate to very rapid. The erosion hazard is moderate to very high, and these soils are eroded. Roots can penetrate to a depth of 10 to 36 inches. Total available water holding capacity is 3.0 to 6.0 inches in the Dibble soils, and 2.0 to 3.0 inches in the Millsholm soils. Fertility is moderate.

Soils in this unit are suitable for use as wildlife habitat and range.

Controlling grazing on these soils helps to increase the quantity of desirable kinds of plants and of the usable forage. It also helps to maintain an adequate cover of plants for control of erosion. In years when rainfall is light, excluding grazing on the steeper slopes helps to maintain sufficient cover for control of erosion. Seeding in burned areas should be done only for control of erosion.

Capability unit VIIIe-1 (15)

Balcom silty clay loam, 50 to 75 percent slopes, severely eroded, is the only soil in this unit. It is somewhat excessively drained. This soil formed on dissected uplands in soft, calcareous material weathered from sandstone and siltstone. The annual rainfall is 17 to 20 inches, and the frost-free season is about 250 days. Permeability is moderately slow. Runoff is very rapid, and the erosion hazard is very high. Roots can penetrate to a depth of 10 to 20 inches. Total available water holding capacity is 2.0 to 3.0 inches. Fertility is low.

This soil is severely eroded and should not be grazed. Protection from fire is needed.

This soil is suitable for use as recreation and watershed areas and as wildlife habitat.

Capability unit VIIIw-4 (17)

Only Riverwash is in this unit. It consists of excessively drained, sandy, gravelly, or stony deposits laid down by rivers and other streams. Riverwash is subject to overflow. Slopes range from 0 to 2 percent. The annual rainfall is 16 to 20 inches, and the frost-free season varies. Permeability is very rapid. Runoff is very slow. The areas are subject to further deposition. Depth to which roots can penetrate and available water holding capacity vary. Fertility is very low.

Riverwash is suitable for use as wildlife habitat and watershed areas.

Alinement of channels and protection of streambanks are the main practices needed for conserving soil and water.

Capability unit VIIIs-1 (15)

Only Rock land is in this unit. It consists of bare rock or of bedrock on uplands. Rock land has a very shallow mantle of soil, and drainage is excessive. From 50 to 90 percent of the surface area is sandstone, shale, or serpentine. Slopes range from 30 to 75 percent. The annual rainfall is 20 to 24 inches, and the frost-free season is about 230 days. Permeability varies. Runoff is rapid to very rapid, and the erosion hazard is high to very high. Depth to which roots can penetrate and the available water holding capacity vary.

This land type is suitable for use as wildlife habitat and watershed and for recreation areas.

Preventing fire and controlling fire are the main concerns of management.

Estimated Yields and Management Guides [2]

This subsection gives estimated yields of the principal crops grown in Yolo County and discusses some of the management practices used to obtain those yields. The estimates are given in table 2. These estimates are based on information furnished by farmers, and on observations made by soil scientists who surveyed the county. They also are based on suggestions furnished by crop specialists in the Soil Conservation Service, the California Agricultural Extension Service, and the University of California Agricultural Experiment Station. If little or no information was available on yield of a given crop on a particular soil or if the crop specified is not grown on the soil, estimates were made by comparing this soil with similar soils for which yield information was available.

Table 2 gives the yields of the principal irrigated and dryland crops grown in the county under the optimum level of management. The optimum or best level of management known is the level of management that, according to experience, field trials, and research findings, would give the highest possible returns at the present time.

[2] By CLARENCE U. FINCH, Jr., conservation agronomist, Soil Conservation Service.

TABLE 2.—*Estimated average acre yields of principal*

[No estimates are given for soils on which a particular crop

Soil	Irrigated crops		
	Almonds	Apricots	Alfalfa
	Pounds	*Tons*	*Tons*
Arbuckle gravelly loam, 0 to 2 percent slopes	2, 250	7. 0	7. 0
Arbuckle gravelly loam, 2 to 5 percent slopes	2, 000	7. 0	6. 0
Balcom silty clay loam, 15 to 30 percent slopes, eroded			
Brentwood silty clay loam, 0 to 2 percent slopes	2, 300	8. 0	8. 5
Capay silty clay			7. 5
Capay silty clay, flooded			
Capay soils, flooded			
Clear Lake silty clay loam			7. 0
Clear Lake clay			7. 5
Clear Lake soils, flooded			
Climara clay, 2 to 30 percent slopes, eroded			
Corning gravelly loam, 2 to 15 percent slopes, eroded			
Dibble-Millsholm complex, 9 to 30 percent slopes, eroded			
Hillgate loam, 0 to 2 percent slopes			
Hillgate loam, 2 to 9 percent slopes, eroded			
Hillgate loam, moderately deep, 0 to 2 percent slopes			
Hillgate loam, moderately deep, 2 to 9 percent slopes			
Lang sandy loam	1, 500	7. 0	
Lang sandy loam, deep	1, 500		6. 0
Lang sandy loam, deep, flooded			
Lang silt loam	1, 500		6. 0
Laugenour very fine sandy loam	2, 200		7. 5
Laugenour very fine sandy loam, flooded			
Laugenour very fine sandy loam, deep, flooded			
Loamy alluvial land	1, 500	6. 5	6. 0
Made land			
Maria silt loam	2, 300		8. 5
Maria silt loam, flooded			
Maria silt loam, deep	2, 000	7. 0	8. 0
Marvin silty clay loam			8. 0
Merritt silty clay loam			8. 0
Merritt silty clay loam, deep			7. 0
Merritt silty clay loam, deep, drained	1, 700	7. 0	8. 0
Merritt complex, saline-alkali			
Myers clay			7. 5
Omni silty clay loam			7. 0
Omni silty clay			7. 5
Pescadero silty clay			7. 5
Pescadero silty clay, saline-alkali			
Pescadero soils, flooded			
Reiff very fine sandy loam	2, 250	8. 0	8. 5
Reiff gravelly loam	2, 250	7. 0	8. 0
Rincon silty clay loam	2, 000	7. 0	7. 0
Riz loam			
Riz loam, flooded			
Sacramento silty clay loam			7. 0
Sacramento silty clay loam, drained			7. 0
Sacramento clay			7. 5
Sacramento clay, drained			7. 5
Sacramento clay, flooded			
Sacramento clay, deep			7. 5
Sacramento soils, flooded			
San Ysidro loam			
Sehorn clay, 2 to 15 percent slopes			
Sehorn clay, 15 to 30 percent slopes, eroded			
Sehorn cobbly clay, 2 to 15 percent slopes			
Sehorn-Balcom complex, 2 to 15 percent slopes			
Sehorn-Balcom complex, 15 to 30 percent slopes, eroded			
Soboba gravelly sandy loam			
Sycamore silt loam			8. 0
Sycamore silt loam, drained	2, 300	8. 0	8. 5
Sycamore silt loam, flooded			
Sycamore silty clay loam			8. 0
Sycamore silty clay loam, drained	2, 300	8. 0	8. 5
Sycamore complex			7. 0

See footnote at end of table.

irrigated and dryland crops under optimum management

is not grown or for soils to which a crop is not suited]

Irrigated crops—Continued							Dryland crops	
Corn	Grain sorghum	Pasture	Rice	Sugar beets	Tomatoes	Walnuts	Barley	Safflower
Hundred weight	*Hundred weight*	*Animal-unit months* [1]	*Hundred weight*	*Tons*	*Tons*	*Tons*	*Hundred weight*	*Pounds*
-----	65	12	-----	20	27	2	25	-----
-----	45	12	-----	17	23	2	25	-----
-----	-----	-----	-----	-----	-----	-----	22	-----
96	70	24	-----	30	30	2	36	24
100	75	20	55	25	25	-----	30	22
-----	65	10	50	25	25	-----	-----	30
-----	65	10	50	25	27	-----	-----	30
85	65	21	55	25	26	-----	30	20
100	75	21	55	25	25	-----	30	22
-----	65	12	50	25	27	-----	-----	30
-----	-----	-----	-----	-----	-----	-----	18	-----
-----	-----	-----	-----	-----	-----	-----	16	-----
-----	-----	-----	-----	-----	-----	-----	20	-----
-----	55	15	-----	-----	20	-----	16	-----
-----	-----	12	-----	-----	-----	-----	16	-----
80	60	15	-----	10	20	-----	20	-----
-----	-----	15	-----	-----	-----	-----	20	-----
70	60	12	-----	22	25	1. 5	20	-----
70	60	12	-----	22	25	1. 5	-----	-----
-----	-----	12	-----	22	25	-----	-----	-----
70	60	15	-----	22	25	1. 5	-----	-----
-----	65	15	-----	27	30	1. 5	25	-----
-----	65	14	-----	22	25	-----	-----	-----
80	65	10	-----	22	25	-----	-----	-----
70	65	15	-----	20	20	-----	-----	-----
-----	-----	10	-----	15	-----	-----	-----	-----
90	70	20	-----	30	30	2	35	20
-----	65	15	-----	22	25	-----	-----	-----
80	60	18	-----	25	30	-----	30	18
80	60	20	55	25	30	-----	32	20
120	70	22. 5	50	24	30	-----	32	40
100	60	20	55	24	30	-----	32	40
80	65	20	55	25	30	-----	32	20
-----	-----	10	45	20	20	-----	-----	-----
100	75	21	55	25	25	-----	30	20
110	60	21	55	24	30	-----	32	30
120	60	21	55	21	30	-----	30	30
-----	-----	18	50	21	25	-----	-----	-----
-----	-----	9	40	20	-----	-----	-----	-----
-----	-----	10	45	21	25	-----	-----	-----
90	65	18	-----	27	30	2	30	-----
-----	65	15	-----	-----	25	2	30	-----
80	65	20	55	27	30	-----	32	20
-----	55	12	45	-----	18	-----	20	-----
-----	60	12	50	21	25	-----	-----	-----
110	65	21	55	24	30	-----	30	35
90	65	20	55	27	30	-----	30	20
120	70	21	55	24	30	-----	35	35
120	75	21	55	25	25	-----	35	30
100	65	12	50	25	25	-----	-----	30
120	70	21	55	24	30	-----	35	40
100	65	12	50	25	25	-----	-----	35
80	60	15	18	22	20	-----	20	-----
-----	-----	-----	-----	-----	-----	-----	25	-----
-----	-----	-----	-----	-----	-----	-----	22	-----
-----	-----	-----	-----	-----	-----	-----	22	-----
-----	-----	-----	-----	-----	-----	-----	25	-----
-----	-----	-----	-----	-----	-----	-----	22	-----
-----	45	10	-----	-----	-----	-----	-----	-----
100	70	22	-----	24	30	-----	35	40
90	70	22	-----	30	26	2	35	24
100	65	16	50	24	27	-----	-----	20
120	70	22	-----	24	30	-----	36	35
95	70	24	-----	30	30	2	36	24
100	65	20	55	24	30	-----	30	35

TABLE 2.—*Estimated average acre yields of principal irrigated*

Soil	Irrigated crops		
	Almonds	Apricots	Alfalfa
	Pounds	*Tons*	*Tons*
Sycamore complex, drained	2, 000	7. 0	7. 0
Sycamore complex, flooded			
Tehama loam, 0 to 2 percent slopes	2, 000	7. 0	7. 0
Tehama loam, 2 to 5 percent slopes	2, 000	7. 0	6. 5
Tyndall very fine sandy loam			8. 0
Tyndall very fine sandy loam, drained	2, 250	8. 0	8. 5
Tyndall very fine sandy loam, flooded			
Tyndall very fine sandy loam, deep			7. 0
Tyndall silty clay loam			8. 0
Valdez silt loam			8. 0
Valdez silt loam, deep			7. 0
Valdez complex, flooded			
Willows silty clay loam			
Willows clay			
Willows clay, alkali			
Willows clay, alkali, drained			
Willows clay, alkali, flooded			
Willows soils, flooded			
Willows clay, marly variant			
Willows clay, marly variant, saline-alkali			
Yolo silt loam	2, 300	8. 0	8. 5
Yolo silty clay loam	2, 300	8. 0	8. 5
Zamora loam	2, 300	8. 0	8. 5

[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.

The estimated yields and suggested management are based on current information. New developments in crop breeding, control of insects and diseases, use of fertilizer, tillage, irrigation, and drainage will change some of the practices suggested and yields predicted. Up-to-date information can readily be substituted, and State and Federal farm advisory services are always ready to provide the latest information available.

Estimates of yields are of most use when the management practices under which such yields can be produced are specified. The following information for each principal crop, and for the soils of specific capability units, shows combinations of practices that will produce the yields given in table 2 for the defined optimum level of management.

All requirements for plant nutrients are for the elemental form, for example, in pounds per acre of the element phosphorus. The gross irrigation requirement is the total annual plant need per acre less the average effective precipitation. The irrigation requirement is calculated on the assumption that the irrigation system is 70 percent efficient. The peak use is the period of maximum water use. Except for dryland barley, safflower, and pasture, the crops named generally are irrigated.

ALMONDS. Selective pruning and insect and disease control measures are used as needed. Harvesting is by mechanical means.

Management practices include disking twice, springtooth harrowing three times and land leveling or the use of nontillage and mowing of cover crops. If a plowpan is present, it is broken by ripping. About 40 to 60 pounds of nitrogen are applied per acre. A suitable cover crop is planted. Soils are not tilled when wet.

In the paragraphs that follow, specific factors important in management are listed by capability units for four groups of soils; the fifth group lists capability units in which irrigated almonds are not suited.

Group 1.—Soils of capability units I–1 (17) and IIs–3 (17) are in this group. About 1.7 acre-feet of water is used annually. Water is applied by basins, borders, furrows, or sprinklers. Irrigation frequency is about 42 days during peak use.

Group 2.—Soils of capability units IIe–1 (17) and IIe–3 (17) are in this group. About 1.7 acre-feet of water is used annually. Water is applied by basins, borders, furrows, and sprinklers. Irrigation frequency is about 42 days during peak use. All tillage is done across the slope or on the contour.

Group 3.—Soils of capability units IIs–4 (17) and IVs–4 (17) are in this group. About 3.5 acre-feet of water is used annually. Water is applied by furrows or sprinklers, and sprinklers are used on the more sandy soils. Irrigation frequency is 10 to 15 days during peak use.

Group 4.—Soils of capability unit IIIw–3 (17) are in this group. About 3.5 acre-feet of water is used annually. Water is applied by furrows or sprinklers. Irrigation frequency is 20 to 24 days during peak use. Tile drains or ditches are needed to maintain the water table below the root zone.

Group 5.—Soils of capability unit IIw–2 (17), IIs–5 (17), IIIe–3 (17), IIIe–5 (15), IIIw–5 (17), IIIs–3 (17), *and dryland crops under optimum management*—Continued

Irrigated crops—Continued							Dryland crops	
Corn	Grain sorghum	Pasture	Rice	Sugar beets	Tomatoes	Walnuts	Barley	Safflower
Hundred weight	*Hundred weight*	*Animal-unit months* [1]	*Hundred weight*	*Tons*	*Tons*	*Tons*	*Hundred weight*	*Pounds*
90	65	20	55	25	25	------------	30	20
95	60	12	50	25	27	------------	------------	35
80	60	18	--------------	25	25	------------	30	18
75	55	18	--------------	22	23	------------	30	16
100	70	18	--------------	24	30	------------	30	30
90	70	20	--------------	27	26	2	30	------------
100	65	14	--------------	22	25	------------	------------	------------
100	60	18	--------------	24	30	------------	------------	------------
100	70	20	--------------	24	30	------------	35	30
110	70	20	--------------	24	30	------------	35	35
100	60	18	--------------	22	30	------------	------------	35
95	60	10	--------------	22	25	------------	------------	30
--------------	60	18	55	22	25	------------	------------	35
--------------	65	20	55	22	25	------------	30	35
--------------	--------------	12	45	22	------------	------------	------------	------------
--------------	--------------	10	45	25	------------	------------	------------	------------
--------------	--------------	10	45	25	------------	------------	------------	25
--------------	60	12	50	25	25	------------	------------	30
--------------	65	21	50	21	25	------------	30	35
--------------	--------------	10	45	21	------------	------------	------------	------------
95	70	22	--------------	30	30	2	35	20
100	70	24	--------------	30	30	2	36	24
95	70	24	--------------	30	30	2	35	20

IVe–1 (15), IVe–3 (17), IVe–5 (15), IVw–2 (17), IVw–3 (17), IVw–5 (17), IVw–6 (17), IVs–3 (17), VIe–1 (15), VIe–3 (15), VIe–5 (15), VIIe–3 (15), VIIe–8 (15), VIIIe–1 (15), VIIIw–4 (17), and VIIIs–1 (15) are in this group. Some of the soils in this group are not used for irrigated almonds because they are too shallow, fine textured, steep, or saline. Others are not used because of a high water table or flooding, or because they are in areas where irrigation water is not available or the climate is not suited.

Apricots. Selective pruning and insect and disease control measures are used as needed. Harvesting is done by hand.

Management practices include disking twice, springtooth harrowing three times, and the use of nontillage and mowing of cover crops. If a plowpan is present, it is broken by chiseling. About 40 to 60 pounds of nitrogen are applied per acre. Soils are not tilled when wet.

In the paragraphs that follow, specific factors important in management are listed by capability units for three groups of soils; the fourth group lists capability units in which irrigated apricots are not suited.

Group 1.—Soils of capability units I–1 (17) and IIs–3 (17) are in this group. About 1.7 acre-feet of water is used annually. Water is applied by basins, furrows, borders, or sprinklers. Irrigation frequency is about 40 days during peak use. Cover crops of grasses or legumes are used.

Group 2.—Soils of capability units IIe–1 (17) and IIe–3 (17) are in this group. About 1.7 acre-feet of water is used annually. On sloping soils irrigation is by furrows across the slope or by sprinklers. Irrigation frequency is about 40 days during peak use. All management practices are done across the slope or on the contour.

Group 3.—Soils of capability units IIs–4 (17) and IVs–4 (17) are in this group. About 2.5 acre-feet of water is used annually. Water is applied by furrows or sprinklers, and sprinklers are used on the more sandy soils. Irrigation frequency is about 15 to 22 days during peak use.

Group 4.—Soils of capability units IIw–2 (17), IIs–5 (17), IIIe–3 (17), IIIe–5 (15), IIIw–3 (17), IIIw–5 (17), IIIs–3 (17), IVe–1 (15), IVe–3 (17), IVe–5 (15), IVw–2 (17), IVw–3 (17), IVw–5 (17), IVw–6 (17), IVs–3 (17), VIe–1 (15), VIe–3 (15), VIe–5 (15), VIIe–3 (15), VIIe–8 (15), VIIIe–1 (15), VIIIw–4 (17), VIIIs–1 (15) are in this group. Some of the soils in this group are not used for irrigated apricots because they are too shallow, fine textured, steep, or saline. Others are not used because of a high water table or flooding, or because they are in areas where irrigation water is not available or the climate is not suited.

Alfalfa. A typical cropping sequence consists of 3 to 5 years of alfalfa and 1 year each of sugar beets, tomatoes, corn or milo, and dryland barley. A locally adopted variety of seed is drilled at a rate of 15 pounds per acre. Alfalfa is cut about six times a year at 0.1 bloom. Insect and disease control measures are used as border checked, deep chiseled when dry; irrigated to

In preparing the seedbed the soil is disked, leveled, needed.

germinate weeds, and then spring toothed to control the weeds; rolled or dragged to make a smooth seedbed; seeded, and rolled or harrowed after seeding. Other management practices include the application of phosphorus at the rate of 18 to 27 pounds per acre, and spring-tooth harrowing of fields during the dormant period.

In the paragraphs that follow, specific factors important in management are listed by capability units for five groups of soils; the sixth group lists capability units in which irrigated alfalfa is not suited.

Group 1.—Soils of capability units I-1 (17) and IIs-3 (17) are in this group. About 4.3 acre-feet of water is used annually. Water is applied by sprinklers or borders. Irrigation frequency is about 24 days during peak use.

Group 2.—Soils of capability units IIe-1 (17) and IIe-3 (17) are in this group. About 4.3 acre-feet of water is used annually. Water is applied by sprinklers. Irrigation frequency is about 24 days during peak use. All tillage is done across the slope.

Group 3.—Soils of capability units IIs-4 (17) and IVs-4 (17) are in this group. About 3.5 to 4.0 acre-feet of water is used annually. Water is applied by sprinklers. Irrigation frequency is about 12 days during peak use.

Group 4.—Soils of capability unit IIs-5 (17) are in this group. About 4.3 acre-feet of water is used annually. Water is applied by borders or sprinklers. Irrigation frequency is about 11 days during peak use.

Group 5.—Soils of capability units IIw-2 (17), IIIw-3 (17), and IIIw-5 (17) are in this group. About 3.7 to 4.0 acre-feet of water is used annually. Water is applied by borders or sprinklers. Irrigation frequency is about 13 days during peak use. Tile drains or ditches are needed to maintain the water table below the root zone.

Group 6.—Soils of capability units IIIe-3 (17), IIIe-5 (15), IIIs-3 (17), IVe-1 (15), IVe-3 (17), IVe-5 (15), IVw-2 (17), IVw-3 (17), IVw-5 (17), IVw-6 (17), IVs-3 (17), VIe-1 (15), VIe-3 (15), VIe-5 (15), VIIe-3 (15), VIIe-8 (15), VIIIe-1 (15), VIIIw-4 (17), and VIIIs-1 (15) are in this group.

Some of the soils in this group are not used for irrigated alfalfa because they are too shallow, steep, or saline. Others are not used because they are in areas where irrigation water is not available.

CORN. A typical cropping sequence consists of 3 to 5 years of alfalfa and 1 year each of sugar beets, tomatoes, corn, and dryland barley. An adapted hybrid variety of seed is planted at the rate of 15 pounds per acre. Harvesting is by mechanical means.

Management practices include land leveling, disking, plowing, chiseling in the fall, harrowing, and rolling. Other practices include the application of 175 to 200 pounds of nitrogen, 16 to 20 pounds of phosphorus, and 38 to 46 pounds of potassium per acre. Insects and diseases are controlled by sprays as needed, and weeds are controlled by two or three mechanical cultivations and by use of herbicides. Crop residues are returned to the soil. The soil is not worked when wet.

In the paragraphs that follow, specific factors important in management are listed by capability units for six groups of soils; the seventh group lists capability units in which irrigated corn is not suited.

Group 1.—Soils of capability units I-1 (17) and IIs-3 (17) are in this group. About 3.0 acre-feet of water is used annually. Water is applied by sprinklers or furrows. Irrigation frequency is 12 to 18 days during peak use.

Group 2.—Soils of capability units IIe-1 (17) and IIe-3 (17) are in this group. About 3.0 acre-feet of water is used annually. Water is applied by sprinklers or by furrows across the slope or on the contour. Irrigation frequency is about 12 to 18 days during peak use. All tillage is kept to a minimum and is done across the slope or on the contour.

Group 3.—Soils of capability unit IIIs-3 (17) are in this group. About 3.8 acre-feet of water is used annually. Water is applied by borders, furrows, or sprinklers. Irrigation frequency is about 10 days during peak use.

Group 4.—Soils of capability unit IIs-5 (17) are in this group. Seedbed preparation includes disking, plowing, land leveling, chiseling, disking, and land leveling. About 3.8 acre-feet of water is used annually. Water is applied by furrows or sprinklers. Irrigation frequency is about 17 days during peak use.

Group 5.—Soils of capability units IIw-2 (17), IIIw-3 (17), IIIw-5 (17), IVw-2 (17), IVw-3 (17), and IVw-5 (17) are in this group. About 4.0 acre-feet of water is used annually. Water is applied by furrows or sprinklers. Irrigation frequency is about 23 days during peak use. Tile drains or ditches are needed to maintain the water table below the root zone and to provide for removal of excess water from the ends of fields.

Group 6.—Soils of capability unit IVs-4 are in this group. About 4.5 acre-feet of water is used annually. Water is applied by borders, furrows, or sprinklers. Irrigation frequency is about 10 days during peak use.

Group 7.—Soils of capability units IIs-4 (17), IIIe-3 (17), IIIe-5 (15), IVe-1 (15), IVe-3 (17), IVe-5 (15), IVw-6 (17), IVs-3 (17), VIe-1 (15), VIe-3 (15), VIe-5 (15), VIIe-3 (15), VIIe-8 (15), VIIIe-1 (15), VIIIw-4 (17), and VIIIs-1 (15) are in this group. These soils are too shallow, steep, or saline for irrigated corn, or they are in areas where irrigation water is not available.

GRAIN SORGHUM. Milo is the grain sorghum generally grown in Yolo County. A typical cropping sequence consists of 3 to 5 years of alfalfa and 1 year each of sugar beets, tomatoes, milo, and dryland barley. An adapted variety of treated hybrid seed is planted at the rate of 15 to 20 pounds per acre.

Management practices include chiseling, land leveling, furrowing, preirrigating to emerge weeds, and rolling. Other practices include the application of 75 to 125 pounds of nitrogen and 11 to 22 pounds of phosphorus per acre. Weeds are controlled by two or three mechanical cultivations. Crop residues are returned to the soil. The soil is not worked when wet.

In the paragraphs that follow, specific factors important in management are listed by capability units for six groups of soils; the seventh group lists capability units in which irrigated grain sorghum is not suited.

Group 1.—Soils of capability units I-1 (17) and IIs-3 (17) are in this group. About 3.5 acre-feet of water is used annually. Water is applied by furrows, borders, or sprinklers. Irrigation frequency is about 23 days during peak use.

Group 2.—Soils of capability units IIe-1 (17) and IIe-3 (17) are in this group. About 3.5 acre-feet of water is used annually. Water is applied by sprinkler or by furrow across the slope. Irrigation frequency is about 23 days during peak use. All tillage is done across the slope or on the contour.

Group 3.—Soils of capability units IIs-4 (17) and IVs-4 (17) are in this group. About 3.8 acre-feet of water is used annually. Water is applied by borders or sprinklers. Irrigation frequency is about 13 days during peak use.

Group 4.—Soils of capability unit IIs-5 (17) are in this group. About 3.3 acre-feet of water is used annually. Water is applied by furrows, borders, or sprinklers. The irrigation frequency is about 18 days during peak use.

Group 5.—Soils of capability units IIIs-3 (17) and IVs-3 (17) are in this group. About 3.8 acre-feet of water is used annually. Water is applied by borders, sprinklers, or furrows. Irrigation frequency is about 10 days during peak use.

Group 6.—Soils of capability units IIw-2 (17), IIIw-3 (17), IIIw-5 (17), IVw-2 (17), IVw-3 (17), and IVw-5 (17) are in this group. A typical cropping sequence for the soils in this group consists of 1 year each of milo, tomatoes, and dryland safflower or dryland barley. About 3.3 acre-feet of water is used annually. Water is applied by borders, furrows, or sprinklers. Irrigation frequency is about 18 to 23 days during peak use. Tile drains or ditches are needed to keep the water table below the root zone. Ditches also help to provide for the removal of runoff water from the ends of fields.

Group 7.—Soils of capability units IIIe-3 (17), IIIe-5 (15), IVe-1 (15), IVe-3 (17), IVe-5 (15), IVw-6 (17), VIe-1 (15), VIe-3 (15), VIe-5 (15), VIIe-3 (15), VIIe-8 (15), VIIIe-1 (15), VIIIw-4 (17), and VIIIs-1 (15), are in this group. The soils in this group are not used for milo because they are too steep or too saline, or because they occur in areas where irrigation water is not available.

PASTURE. A typical cropping sequence includes 5 years of irrigated pasture and 1 year each of milo and dryland barley. A seeding mixture is drilled into the soil. Legume seeds are inoculated and grass seeds are treated with fungicide.

Management practices customarily include preparing the seedbed by disking, chiseling, land leveling, spring-tooth harrowing, bordering, harrowing, and cultipacking. Other practices include the application of 125 to 150 pounds of nitrogen and 30 to 40 pounds of phosphorus per acre. Nitrogen is added in four or five applications at the time of, or prior to, irrigation. Drains are used to remove excess water from the ends of borders. New pasture is mowed when the grass reaches a height of 4 inches to control weeds. The pasture is grazed when seeded grass reaches a height of 8 inches, but it is not grazed closer than 4 inches. Wet soils are not grazed. Pastures are divided into 3 or more fields by fences, and livestock are rotated every 21 to 35 days. This practice permits a suitable period for regrowth.

In the paragraphs that follow, specific factors important in management are listed by capability units for five groups of soils; the sixth group lists capability units in which irrigated pasture is not suited.

Group 1.—Soils of capability units I-1 (17), IIe-1 (17), IIe-3 (17), IIs-3 (17), IIs-4 (17), and IIs-5 (17) are in this group. A typical seeding mixture for the soils in this group includes 2 pounds of alfalfa or 3 pounds of narrowleaf trefoil and either 8 pounds of Goars tall fescue or 5 pounds of Akaroa orchardgrass and 8 pounds of prairie brome. About 4.3 acre-feet of water is used annually. Water is applied by borders or sprinklers. Irrigation frequency is 8 to 10 days during peak use.

Group 2.—Soils of capability units IIw-2 (17), IIIw-3 (17), IIIw-5 (17), IVw-2 (17), IVw-3 (17), IVw-5 (17) are in this group. A typical seeding mixture for the soils in this group is 2 pounds of Ladino clover or 3 pounds of narrowleaf trefoil and 8 pounds of Goars tall fescue per acre. About 4.3 acre-feet of water is used annually. Water is applied by borders or sprinklers. Irrigation frequency is about 10 days during peak use.

Group 3.—Soils of capability units IIIe-3 (17), IIIs-3 (17), IVe-3 (17), IVs-3 (17) are in this group. A typical seeding mixture includes 2 pounds of Ladino clover or 3 pounds of narrow leaf trefoil and 8 pounds of Goars tall fescue, or 5 pounds of Akaroa orchardgrass per acre. About 4.3 acre-feet of water is used annually. Water is applied by borders or sprinklers. Irrigation frequency is 8 to 10 days during peak use.

Group 4.—Soils of capability unit IVs-4 (17) are in this group. A typical seeding mixture is 2 pounds of alfalfa or 3 pounds of narrowleaf trefoil and 8 pounds of Goars tall fescue. Management practices for this group include disking, land leveling, spring-tooth harrowing, bordering, harrowing, cultipacking, and planting. About 4.8 acre-feet of water is used annually. Water is applied by borders or sprinklers. Irrigation frequency is 6 to 8 days during peak use.

Group 5.—Soils of capability unit IVw-6 (17) are in this group. A typical seeding mixture includes 5 pounds of narrowleaf trefoil and 10 pounds of Goars tall fescue per acre. About 4.3 acre-feet of water is used annually. Water is applied by borders and sprinklers. Irrigation frequency is 8 to 10 days. About 4,000 pounds of gypsum is applied per acre to help correct the alkali condition and to leach salts from the soil. Tile drains and ditches are needed to help remove excess water.

Group 6.—Soils of capability units IIIe-5 (15), IVe-1 (15), IVe-5 (15), VIe-1 (15), VIe-3 (15), VIe-5 (15), VIIe-3 (15), VIIe-8 (15), VIIIe-1 (15), VIIIw-4 (17), and VIIIs-1 (15) are in this group. The soils in this group are not used for irrigated pasture because they are too steep or too shallow, or because they occur in areas where irrigation water is not available.

RICE. Seed treated with fungicide is planted at a rate of 150 pounds per acre. Nitrogen is applied at a rate of 130 to 150 pounds per acre, and phosphorus is applied at a rate of 60 to 65 pounds per acre. Water is applied by contour basin and maintained at a height of 6 to 8 inches. Insecticides and herbicides are applied as needed by airplane.

In the paragraphs that follow, specific factors important in management are listed by capability units for three groups of soils; the fourth group lists capability units in which irrigated rice is not suited.

Group 1.—Soils of capability units IIs–3 (17), IIs–5 (17), and IIIs–3 (17) are in this group. A typical cropping sequence includes 2 years of rice; a green-manure crop of purple vetch planted between rice crops; and then 1 year each of dryland safflower, sugar beets, and fallow. Seedbed preparation consists of plowing, disking, dragging, sweede harrowing, contour checking, fertilizing, harrowing, and flood irrigating. About 8 acre-feet of water is used annually.

Group 2.—Soils of capability units IIIw–3 (17), IIIw–5 (17), IVw–2 (17), IVw–3 (17), IVw–5 (17), and IVs–3 (17) are in this group. A typical cropping sequence includes 2 years of rice, a green-manure crop of purple vetch between rice crops, and then 1 year each of dryland safflower and fallow. Seedbed preparation consists of disking, harrowing, land leveling, constructing borders, and planting the seed. About 7 acre-feet of water is used annually.

Group 3.—Soils of capability unit IVw–6 (17) are in this group. A typical cropping sequence includes 2 years of rice, a green-manure crop of purple vetch between rice crops, and then 1 year each of dryland safflower, sugar beets, and fallow. Seedbed preparation consists of plowing, disking, dragging, sweede harrowing, contour checking, fertilizing, harrowing, and flood irrigating. About 8 acre-feet of water is used annually. Gypsum is applied as indicated by soil tests. The soil is chiseled to a depth of 2 to 2½ feet.

Group 4.—Soils of capability units I–1 (17), IIe–1 (17), IIe–3 (17), IIw–2 (17), IIs–4 (17), IIIe–3 (17), IIIe–5 (15), IVe–1 (15), IVe–3 (17), IVe–5 (15), IVs–4 (17), VIe–1 (15), VIe–3 (15), VIe–5 (15), VIIe–3 (15), VIIe–8 (15), VIIIe–1 (15), VIIIw–4 (17), VIIIs–1 (15) are in this group. Soils in this group are not suited to rice because they are too steep or rapidly permeable or occur in areas that lack water for irrigation.

Sugar beets. Sugar beets are planted from February 1 to March 15 and from April 1 to May 15. They are planted at the rate of 4 to 8 pounds of seed per acre. A typical cropping sequence includes 3 to 5 years of alfalfa and 1 year each of sugar beets, tomatoes, corn or milo, and dryland barley. Seedbed preparation for early planting consists of land leveling, chiseling in fall, disking, spring-tooth harrowing, rolling, and planting. Seedbed preparation for the later planting consists of disking, chiseling, spring-tooth harrowing, rolling, bed shaping, preirrigating, and planting. Nitrogen is applied at a rate of 150 pounds per acre. Thinning is either mechanical or by hand. All crop residues are returned to the soil. The soils are not worked when wet. Irrigation water is applied by furrows or sprinklers.

In the paragraphs that follow, specific factors important in management are listed by capability units for five groups of soils; the sixth group lists capability units in which irrigated sugar beets are not suited.

Group 1.—Soils of capability units I–1 (17), IIs–3 (17), IIs–4 (17), and IIs–5 (17) are in this group. About 3.3 acre-feet of water is used annually. Irrigation frequency is 20 to 24 days during peak use.

Group 2.—Soils of capability units IIe–1 (17) and IIe–3 (17) are in this group. About 3.3 acre-feet of water is used annually. Water is applied by furrows across the slope or on the contour. Irrigation frequency is 20 to 24 days during peak use.

Group 3.—Soils of capability unit IIIs–3 (17) are in this group. About 3.3 acre-feet of water is used annually. Irrigation frequency is 7 days during peak use.

Group 4.—Soils of capability units IIw–2 (17), IIw–3 (17), IIIw–5 (17), IVw–2 (17), IVw–3 (17), IVw–5 (17), and IVw–6 (17) are in this group. Seedbed preparation for the later planting on soils in this group includes land leveling, harrowing, shaping the beds, and planting. About 3.8 acre-feet of water is used annually. Irrigation frequency is about 12 days during peak use. Tile drains or ditches are needed to keep the water table below the root zone.

Group 5.—Soils of capability unit IVs–4 (17) are in this group. Tillage operations include disking, land leveling, spring-tooth harrowing, rolling, furrowing, preirrigation, and planting. About 4.8 acre-feet of water is used annually. Irrigation frequency is about 11 days during peak use.

Group 6.—Soils of capability units IIIe–3 (17), IIIe–5 (17), IVe–1 (15), IVe–3 (17), IVe–5 (15), IVs–3 (17), VIe–1 (15), VIe–3 (15), VIe–5 (15), VIIe–3 (15), VIIe–8 (15), VIIIe–1 (15), VIIIw–4 (17), and VIIIs–1 (15) are in this group. Soils in this group are not suited to irrigated sugar beets because they are too steep or too shallow, or because they occur in areas that lack an adequate supply of water for irrigation.

Tomatoes. A typical cropping sequence includes 3 to 5 years of alfalfa and 1 year each of sugar beets, tomatoes, corn or milo, and dryland barley. Seedbed preparation includes disking, land leveling, chiseling, leaving over the winter, disking, spring-tooth harrowing, and rolling. Seed treated with fungicide is planted at the rate of one-third of a pound per acre. Tomatoes are harvested two or three times either mechanically or by hand. About 75 to 100 pounds of nitrogen and 55 to 77 pounds of phosphorus are applied per acre. Weeds are controlled by three to five shallow mechanical cultivations. All crop residues are returned to the soil. The soil is not worked when wet.

In the paragraphs that follow, specific factors important in management are listed by capability units for five groups of soils; the sixth group lists capability units in which irrigated tomatoes are not suited.

Group 1.—Soils of capability units I–1 (17), IIs–3 (17), and IIs–5 (17) are in this group. About 3.3 acre-feet of water is used annually. Water is applied by furrows. Irrigation frequency is about 18 to 20 days.

Group 2.—Soils of capability units IIe–1 (17) and IIe–3 (17) are in this group. About 3.3 acre-feet of water is used annually. Water is applied by furrows across the slope or on the contour. Irrigation frequency is about 18 to 20 days.

Group 3.—Soils of capability units IIs–4 (17) and IVs–4 (17) are in this group. About 3.8 acre-feet of water is used annually. Water is applied by furrows. Irrigation frequency is about 12 days.

Group 4.—Soils of capability units IIw–2 (17), IIIw–3 (17), IIIw–5 (17), IVw–2 (17), IVw–3 (17), IVw–5 (17), and IVw–6 (17) are in this group. About 3.3 acre-feet of water is used annually. Water is applied by furrows. Irrigation frequency is about 22 days during peak use. Tile drains and ditches help to maintain the water table below the root zone.

Group 5.—Soils of capability units IIIs–3 (17) and IVs–3 (17) are in this group. Nitrogen is applied at the rate of 75 to 125 pounds per acre and phosphorus is applied at the rate of 33 to 55 pounds per acre. About 3.3 acre-feet of water is used annually. Water is applied by furrows. Irrigation frequency is about 6 to 8 days during peak use.

Group 6.—Soils of capability units IIIe–3 (17), IIIe–5 (15), IVe–1 (15), IVe–3 (17), IVe–5 (15), VIe–1 (15), VIe–3 (15), VIe–5 (15), VIIe–3 (15), VIIe–8 (15), VIIIe–1 (15), VIIIw–4 (17), and VIIIs–1 (15) are in this group. Soils in this group are not used for irrigated tomatoes because they are too steep, or because they occur in areas that lack irrigation water.

Walnuts. Selective pruning and insect disease control measures are used as needed. Harvesting is by mechanical shaking. A cover crop of grasses and legumes is used.

Management practices include disking the cover crop and prunings into the soil, Cook's plowing, and spring-tooth harrowing. Furrows or ridges need reconstructing at least twice during the season. Irrigation water is applied by borders, furrows, basins, or sprinklers. The soil is not worked when wet.

In the paragraphs that follow, specific factors important in management are listed by capability units for four groups of soils; the fifth group lists capability units in which irrigated walnuts are not suited.

Group 1.—Soils of capability unit I–1 (17) are in this group. About 3.8 acre-feet of water is used annually. Irrigation frequency is about 40 days during peak use.

Group 2.—Soils of capability unit IIe–1 (17) are in this group. About 3.8 acre-feet of water is used annually. Water is applied by sprinklers or by furrows across the slope or on the contour. Irrigation frequency is about 40 days during peak use. All tillage operations are across the slope or on the contour.

Group 3.—Soils of capability unit IIs–4 (17) are in this group. About 3.8 acre-feet of water is used annually. Irrigation frequency is about 33 days during peak use.

Group 4.—Soils of capability unit IIIw–3 (17) are in this group. About 3.3 acre-feet of water is used annually. Irrigation frequency is about 32 days during peak use. Tile drains or ditches help to maintain the water table below the root zone.

Group 5.—Soils of capability units IIe–3 (17), IIw–2 (17), IIs–3 (17), IIs–5 (17), IIIe–3 (17), IIIe–5 (15), IIIw–5 (17), IIIs–3 (17), IVe–1 (15), IVe–3 (17), IVe–5 (15), IVw–2 (17), IVw–3 (17), IVw–5 (17), IVw–6 (17), IVs–3 (17), IVs–4 (17), VIe–1 (15), VIe–3 (15), VIe–5 (15), VIIe–3 (15), VIIe–8 (15), VIIIe–1 (15), VIIIw–4 (17), and VIIIs–1 (15) are in this group. Some of the soils in this group generally are not used for walnuts because they are too shallow, fine textured, steep or slowly permeable. Others are not used because of a high water table, flooding, or because they occur in areas that lack sufficient irrigation water.

Dryland barley. A typical cropping sequence consists of 3 to 5 years of alfalfa and 1 year each of sugar beets, tomatoes, corn or milo, and dryland barley. A common seeding sequence is to disk twice, harrow, and plant. After treatment with fungicide, the seed is planted at a rate of 80 to 100 pounds per acre. Clay soils are chiseled to a depth of 2 to 3 feet to provide for better root and moisture penetration. Soils are not worked when wet. Crop residues are returned to the soil. Herbicides generally are used to control weeds.

In the paragraphs that follow, specific factors important in management are listed by capability units for three groups of soils; the fourth group lists capability units in which dryland barley are not suited.

Group 1.—Soils of capability units I–1 (17), IIs–3 (17), IIs–4 (17), and IIs–5 (17) are in this group. The foregoing general management described is applicable to these soils.

Group 2.—Soils of capability units IIIw–3 (17) and IIIw–5 (17) are in this group. Tile drains or ditches help to maintain the water table below the root zone. The drains were installed for other crops, but they help the growth of barley.

Group 3.—Soils of capability units IIe–1 (17), IIe–3 (17), IIIe–3 (17), IIIe–5 (15), IIIs–3 (17), IVe–1 (15), IVe–3 (17), IVe–5 (15), and IVs–3 (17) are in this group. A typical cropping sequence for the soils in this group consists of 1 year each of dryland barley, annual pasture, and fallow. The common seeding sequence includes plowing in spring after the green feed period, disking to control weeds, drilling, and broadcasting or seeding by airplane. Where feasible, tillage should be across the slope or on the contour. On the steeper slopes diversions that have adequate outlets help to dispose of excess runoff.

Group 4.—Soils of capability units IIw–2 (17), IVw–2 (17), IVw–3 (17), IVw–5 (17), IVw–6 (17), IVs–4 (17), VIe–1 (15), VIe–3 (15), VIIe–3 (15), VIIe–8 (15), VIIIe–1 (15), VIIIw–4 (17), VIIIs–1 (15) are in this group. The soils in this group are not used for dryland barley because they are too steep, shallow, or saline, or because they have a high water table.

Dryland safflower. Seedbed preparation includes plowing in the fall, disking, springtooth harrowing, and disking. The seed is planted at the rate of 30 pounds per acre. About 40 to 60 pounds of nitrogen are applied per acre. Weeds are controlled by spraying. Crop residues are returned to the soil. The soil is not worked when wet.

In the paragraphs that follow specific factors important in management are listed by capability units for three groups of soils; the fourth group lists capability units in which dryland barley are not suited.

Group 1.—Soils of capability unit I–1 (17) are in this group. A typical cropping sequence consists of 3 to 5 years of alfalfa and 1 year each of sugar beets, tomatoes, corn or milo, and dryland safflower. The foregoing general management described is applicable to these soils.

Group 2.—Soils of capability units IIe–1 (17) and IIe–3 (17) are in this group. A typical cropping sequence consists of 3 to 5 years of alfalfa and 1 year each of sugar beets, tomatoes, corn or milo, and dryland safflower. All tillage is done across the slope or on the contour.

Group 3.—Soils of capability units IIs–3 (17) and IIs–5 (17) are in this group. A typical cropping sequence for these soils includes 3 to 5 years of alfalfa, and 1 year each of sugar beets, tomatoes, corn or milo, and safflower, and for some soils, 2 years of rice.

Group 4.—Soils of capability units IIw–2 (17), IIIw–3 (17), and IIIw–5 (17) are in this group. A typical cropping sequence includes 3 to 5 years of alfalfa, 1 year each of sugar beets, corn or milo, and dryland safflower. On soils of capability units IIIw–3 (17) and IIIw–5 (17), 2 years of rice can be added. Tile drains or ditches help to maintain the water table below the root zone.

Group 5.—Soils of capability units IVw–2 (17), IVw–3 (17), and IVw–5 (17) are in this group. A typical cropping sequence consists of 2 years of rice and 1 year each of safflower and fallow. Tile drains or ditches help to maintain the water table below the root zone.

Group 6.—Soils of capability units IIs–4 (17), IIIe–3 (17), IIIe–5 (15), IIIs–3 (17), IVe–1 (15), IVe–3 (17), IVe–5 (15), IVw–6 (17), IVs–3 (17), IVs–4 (17), VIe–1 (15), VIe–3 (15), VIe–5 (15), VIIe–3 (15), VIIe–8 (15), VIIIe–1 (17), VIIIw–4 (15), and VIIIs–1 (15) are in this group. The soils in this group are not used for dryland safflower because they are too shallow, droughty, or steep, or because they occur in areas where the climate is unfavorable.

Dryland pasture. The estimated average acre yield of dryland pasture is not given in table 2. Suggested management, however, is given in the following paragraphs.

Seedbed preparation includes plowing where feasible, disking and harrowing. All tillage is done across the slope or on the contour where practicable. Grazing starts after the plants reach a height of 6 to 8 inches, and the plants are grazed to a height of 2 inches.

In the paragraphs that follow, specific factors important in management are listed by capability units for two groups of soils; the third group lists capability units in which dryland pasture are not suited.

Group 1.—Soils of capability units II–e (17), IIe–3 (17), IIs–3 (17), IIw–2 (17), IIIe–3 (17), IIIe–5 (15), IVs–4 (17), IVw–2 (17), IVw–3 (17), and IVw–6 (17) are in this group. Seed is drilled at a rate of 10 pounds of Lana vetch and 4 pounds of Blando brome per acre, or at the rate of 4 pounds of hardinggrass and 2 pounds of alfalfa per acre. Initially nitrogen is applied at the rate of 55 to 70 pounds per acre and phosphorus at the rate of 30 to 40 pounds per acre. On established fields nitrogen is applied at the rate of 30 to 40 pounds per acre and phosphorus at the rate of 15 to 20 pounds per acre. Hardinggrass is not fertilized the first year.

Group 2.—Soils of capability units IVe–1 (15), IVe–3 (17), IVe–5 (15), VIe–1 (15), VIe–3 (15) and VIe–5 (15) are in this group. About 10 pounds of Lana vetch and 4 pounds of Blando brome or 6 pounds of Wimmera *62* ryegrass are planted directly into plant residue or into ash after a burn. About 10 pounds of Lana vetch is planted on soils that have adequate grass cover. Initially nitrogen is applied at a rate of 60 to 100 pounds per acre and phosphorus at the rate of 22 to 40 pounds per acre. On established fields nitrogen is applied at the rate of 30 to 60 pounds per acre and phosphorus at the rate of 13 to 26 pounds per acre.

Group 3.—Soils of capability units I–1 (17), IIs–4 (17), IIs–5 (17), IIIw–3 (17), IIIw–5 (17), IVw–5 (17), IVs–3 (17), VIIe–3 (15), VIIe–8 (15), VIIIe–1 (15), VIIIw–4 (17), and VIIIs–1 (15) are in this group. The soils in this group are not used for dryland pasture because they are too steep or shallow, or because they are used for more intensive farming.

Storie Index Rating [3]

The soils of Yolo County are rated according to the Storie index (*22*) in the "Guide to Mapping Units" at the back of this survey. This index expresses numerically the relative degree of suitability, or value, of a soil for intensive agriculture. The rating is based on soil characteristics only. It does not take into account other factors, such as availability of water for irrigation, climate, and distance from markets, which might determine the desirability of growing specific crops in a given locality. For these reasons, the index, in itself, cannot be considered an index for land valuation.

Four factors that represent the inherent characteristics and qualities of the soil are considered in the index rating. Each factor is rated or evaluated separately in terms of percentage of the ideal, or 100 percent. The factors are:

Factor A, Profile characteristics. Factor A expresses relative suitability of a profile for the growth of plant roots. Soils that have deep permeable profiles are rated 100 percent. Those that have a dense clay layer or a hardpan or are shallow over bedrock are rated less than 100 percent. The rating depends upon the extent to which root penetration is limited.

Factor B, Texture of the surface layer. Factor B is rated according to the texture of the surface layer, which affects the ease of tillage and the capacity of the soil to hold water. The moderately coarse and medium textures—fine sandy loam and silt loam—are the most desirable and are rated as 100 percent. The coarser and finer textures, such as sand and clay, are rated less than 100 percent.

Factor C, Slope. Factor C is particularly important if the soil is irrigated. The amount of water that runs off a soil and its susceptibility to erosion are influenced by the slope of the soil. Smooth, nearly level or very gently sloping soils are rated 100 percent. The rating decreases as the slope increases.

Factor X, Other conditions. Factor X is used to evaluate any limitations to use of the soil, such as poor drainage or a high water table, erosion, salts, or alkali, low fertility, acidity, or unfavorable microrelief. If more than one limitation exists, the values of each are multiplied together to get the X factor.

The index rating of a soil is obtained by multiplying the four factors A, B, C, and X; thus, any one factor may dominate or control the final rating. For example,

[3] Ratings by E. L. Begg, soil specialist, University of California, Davis.

a soil may have an excellent profile justifying a rating of 100 percent for factor A, excellent texture of the surface layer justifying 100 percent for factor B, a smooth, nearly level surface justifying 100 percent for factor C, but a high accumulation of salts or alkali that would give a rating of 20 percent for factor X. Multiplying these four ratings gives an index rating of 20 for this soil. The high accumulation of salts or alkali dominates, makes the soil unproductive for crops, and justifies the low index rating of 20.

Soils are placed in grades according to their suitability for agricultural use as shown by their Storie index ratings. The six grades and their range in index ratings are—

	Index rating
Grade 1	80 to 100
Grade 2	60 to 80
Grade 3	40 to 60
Grade 4	20 to 40
Grade 5	10 to 20
Grade 6	Less than 10

Soils of grade 1 have few or no limitations that restrict their use for crops. Soils of grade 2 are suitable for most crops, but they have minor limitations that narrow the choice of crops and have few special management needs. Grade 3 soils are suited to a few crops or to special crops and require special management. Grade 4 soils are severely limited for crops. If used for crops, they require careful management. Grade 5 soils are not suited to cultivated crops but can be used for pasture and range. Grade 6 consists of soils and land types that generally are not suited to farming.

Vegetative Soil Groups

A vegetative soil group is a grouping of soils that have similar properties and qualities from the standpoint of plant adaptation and use. The grouping is used chiefly for determining the plants most suitable for conservation practices and production of forage when the major limiting soil feature or problem is known. The possibility of irrigation and such climatic factors as precipitation, maximum and minimum temperatures, and length of growing season are separate factors and are not covered here. The system is statewide, and eight of the vegetative soil groups are recognized in Yolo County. The soils in each vegetative group can be determined by referring to the "Guide to Mapping Units" at the back of this survey. The groups are defined in the paragraphs that follow.

Group A—Choice of plants not limited by the soils. Soils are deep to very deep. The texture is moderately coarse to medium. Permeability is moderately rapid to moderately slow, drainage is moderately good to good, and available water holding capacity is at least 1.5 inches per foot of soil. Soils in this group may be slightly saline or are alkali.

Group B—Choice of plants limited by droughtiness and low fertility. Soils are deep to very deep. The surface layer is coarse textured to medium textured and is gravelly in places. The substratum is gravelly coarse sand in places. Permeability is rapid, drainage is excessive, and available water capacity is less than 1.5 inches per foot of soil.

Group C—Choice of plants limited by fine texture. Soils are moderately deep to very deep. The texture is moderately fine to fine. Permeability is moderately slow to slow, and drainage is good.

Group D—Choice of plants limited by subsoil permeability. Soils are shallow to moderately deep to a slowly or very slowly permeable clay subsoil. They are moderately coarse textured to moderately fine textured, and well drained.

Group E—Choice of plants limited by wetness. Soils are deep to very deep. The texture is coarse to fine. Drainage is somewhat poor to very poor; in places salts and alkali are present. Soils are placed in vegetative groups according to their current drainage status.

Group F—Choice of plants limited by salts and alkali. Soils are moderately deep to very deep. The texture is coarse to fine. Drainage is somewhat poor to poor in places, and salts and alkali are moderate to strong.

Group G—Choice of plants limited by depth. Soils are shallow to moderately deep to hardpan, bedrock, or other unfractured dense material.

Group J—Choice of plants depends upon onsite investigation. Most of the soils or land types in this group are in the nonarable category.

Range [4]

About 190,000 acres, or about 29 percent of the total acreage in Yolo County, are used for range. Generally, the soils used for range are not suited to cultivation. Forage production can be increased, however, in selected areas by adding fertilizer, controlling brush, and seeding adapted grasses and legumes.

Most of the important range forage plants in the county are introduced. The original forage plants were perennials and annuals, but the introduced plants are mainly annuals. In places, however, remnant perennials still grow at the higher elevations.

Management of grazing is needed to encourage a desirable mixture of annual plants. Livestock graze selectively, and they seek out the palatable and nutritious plants. If grazing is not carefully regulated, the more desirable plants are weakened or eliminated. Less desirable plants then increase. If grazing pressure continues, the less desirable plants are thinned out or eliminated and undesirable, unpalatable plants take their place or the soil is left bare.

Range sites

The soils used for grazing in Yolo County have been grouped into range sites. Each site differs from the others in its ability to produce significantly different kinds and amounts of vegetation and in the management needed to keep the site in good condition. Important changes in the kinds of grasses often take place gradually. They can be overlooked by an operator who is not familiar with his range plants and soils. If the range operator knows the different kinds of soil in his holdings and the plants each kind is capable of growing, he can then manage the range to favor the best forage plants on each kind of soil.

[4] By ROCHE D. BUSH, range conservationist, Soil Conservation Service.

In the pages that follow, brief descriptions of the four range sites in Yolo County are given. Annual air-dry production is estimated for each site. These estimates are based on a limited number of clippings and on knowledge of the soils in the sites. The estimated annual yields of forage are for unfertilized range. These yields vary according to the precipitation received, and extremes in weather can cause even greater fluctuation in production.

The names of soil series are given in each range site, but this does not mean that all the soils in a series are in the range site. The soils in each site can be determined by referring to the "Guide to Mapping Units" at the back of this survey.

FINE LOAMY SITE

This site consists of silty clay loams and clay loams in the Balcom, Dibble, and Millsholm series. These moderately deep soils have a subsoil of silty clay loam and clay. Slopes are dominantly 30 to 75 percent, but in places they are less than 30 percent. Elevation ranges from 500 to 2,000 feet, and annual precipitation is 17 to 24 inches. This site occupies about 56,000 acres.

Available water holding capacity generally is 4.0 to 6.0 inches. In some more shallow areas, however, it is 2.0 to 4.0 inches. Fertility is moderate.

The plant cover on this site is typically open grass or oak and grass. The vegetation is mostly annual grasses and forbs. If the vegetation is producing at maximum, about 70 percent is a mixture of soft chess, wild oats, stipa, California brome, blue wildrye, burclover, filaree, annual clover, Spanish clover, and other desirable plants. About 20 percent of the vegetation is less desirable kinds of plants, such as ripgut, brome, red brome, wild barley, squirreltail, and annual lupine. The rest consists of annual fescue, medusahead, dogtail grass, nitgrass, silver hairgrass, tarweed, popcornflower, fiddleneck, turkey mullein, thistle, and other undesirable plants. In poor condition this site contains a few desirable and less desirable plants, but undesirable plants are dominant.

The soils in this site that have slopes of less than 50 percent can be seeded to hardinggrass, annual grasses, and legumes. Forage plants on these soils respond well if fertilizer that contains nitrogen, phosphorus, and sulfur is applied. Seeding, fertilizing, and clearing should not be done on soils that have slopes of more than 50 percent, unless the need is critical.

The total estimated annual air-dry production on this site is 3,300 pounds per acre in years of favorable moisture, and 1,600 pounds per acre in years of unfavorable moisture. The total estimated annual production that would provide forage for livestock is 2,800 pounds per acre in years of favorable moisture and 1,400 pounds per acre in years of unfavorable moisture (fig. 8).

CLAYEY SITE

This site consists of cobbly clays and clays in the Climara and Sehorn series and silty clay loams in the Balcom series. These moderately deep to deep soils are

Figure 8.—**Clearing of trees on a Balcom silty clay loam can improve forage production.**

underlain by soft consolidated sandstone, shale, or serpentine. Slopes are 2 to 75 percent. Small areas of the more gently sloping soils are arable but are used for range. Elevation ranges from 100 to 2,000 feet, and annual precipitation is 18 to 24 inches. This site occupies about 62,000 acres.

Permeability of these soils is slow. Available water holding capacity is 4.0 to 10.0 inches, and fertility is low to high. Erosion is a hazard if a good cover of plants is not maintained.

The plant cover on this site is typically open grass or oak and grass. A few dense thickets of oak occur in areas that face north. The vegetation is mostly annual grasses and forbs. If the vegetation is producing at maximum, about 70 percent is a mixture of soft chess, ryegrass, filaree, annual clover, burclover, wild oats, remnants of perennial grasses, and other desirable plants. About 20 percent of the vegetation is less desirable kinds of plants, such as ripgut brome, red brome, wild barley, squirreltail, and annual lupine. The rest consists of annual fescue, mesudahead, nitgrass, dogtail grass, tarweed, fiddleneck, popcornflower, vinegar weed, turkey mullein, thistles, mustard, and other undesirable plants. In poor condition this site contains a few desirable and less desirable plants, but undesirable plants are dominant.

The soils in this site that have slopes of less than 50 percent can be seeded to hardinggrass, annual grasses, and legumes. Forage plants on these soils respond well if fertilizer that contains nitrogen, phosphorus, and sulfur is applied.

The total estimated annual air-dry production on this site is 3,600 pounds per acre in years of favorable moisture and 2,000 pounds per acre in years of unfavorable moisture. The total estimated annual production that would provide forage for livestock is 3,300 pounds per acre in years of favorable moisture and 1,800 pounds per acre in years of unfavorable moisture.

CLAYPAN SITE

This site consists of gravelly loams in the Corning and Positas series. These soils have a subsoil of clay. They are 10 to 20 inches deep to soft consolidated material. Slopes are 2 to 50 percent. Elevation ranges from 125 to 1,500 feet. The annual precipitation is 16 to 24 inches. This site occupies about 33,000 acres. It includes large acreage that are arable but are being used for range.

Permeability of these soils is very slow. Available water holding capacity is 2.0 to 3.0 inches, but the clay subsoil provides additional slowly available moisture. Fertility is low.

The plant cover on this site is typically open grass or grass and oak. A few areas of brush occur in areas that face north. The vegetation is mostly annual grasses and forbs. If the vegetation is producing at maximum, about 70 percent is a mixture of soft chess, wild oats, filaree, Spanish clover, annual clover, a small amount of burclover, and remnants of perennial grasses and other desirable plants. About 20 percent of the vegetation is less desirable kinds of plants, such as ripgut brome, red brome, wild barley, wild carrot, and annual lupine. The rest consists of annual fescue, medusahead, dogtail grass, silver hairgrass, nitgrass, plantain, thistle, fiddleneck, tarweed, popcornflower, and other undesirable plants. In poor condition this site contains a few desirable and less desirable plants, but undesirable plants are dominant.

The soils in this site that have slopes of less than 30 percent can be seeded to annual grasses and legumes. Forage plants on these soils respond well if fertilizer that contains nitrogen, phosphorus, and sulfur is applied. If chamise has invaded, growth of forage can be expected to be better where the areas are cleared of chamise.

The total estimated annual air-dry production on this site is 2,000 pounds per acre in years of favorable moisture and 1,000 pounds per acre in years of unfavorable moisture. The total estimated annual production that would provide forage for cattle is 1,400 pounds per acre and for sheep and deer 1,700 pounds per acre in years of favorable moisture. It is 500 pounds per acre for cattle and 700 pounds per acre for sheep and deer in years of unfavorable moisture.

SHALLOW LOAMY SITE

This site consists of loams in the Dibble and Millsholm series. These soils are 10 to 25 inches deep to shale or sandstone. Slopes are 9 to 75 percent. In a few areas rocks crop out and cover 2 to 10 percent of the surface. Elevation ranges from 500 to 2,500 feet. The annual precipitation is 20 to 24 inches. This site occupies about 39,000 acres.

Available water holding capacity is 2.0 to 3.0 inches. Fertility is moderate to low.

The plant cover on this site is typically open grass or grass and oak. A few dense thickets of brush occur in areas that face north. The vegetation is mostly annual grasses and forbs. If the vegetation is producing at maximum, about 70 percent is a mixture of soft chess, wild oats, filaree, burclover, annual clover, Spanish clover, annual lupine, and remnants of perennial grasses and other desirable plants. About 20 percent of the vegetation is less desirable kinds of plants, such as ripgut brome, wild barley, wild carrot, yarrow, and lupine. The rest consists of annual fescue, nitgrass, silver hairgrass, dogtail grass, popcornflower, fiddleneck. tarweed, thistle, and other undesirable plants. In poor condition this site contains a few desirable and less desirable plants, but undesirable plants are dominant.

Brush clearing and the adding of fertilizer have only limited application on this site. A few areas that have slopes of less than 30 percent can be seeded.

The total estimated annual air-dry production on this site is 2,400 pounds per acre in years of favorable moisture and 1,200 pounds per acre in years of unfavorable moisture. The total estimated annual production that would provide forage for cattle is 1,800 pounds per acre and for sheep and deer 2,200 pounds per acre in years of favorable moisture. It is 700 pounds per acre for cattle and 1,000 pounds per acre for sheep and deer in years of unfavorable moisture.

Wildlife

Game and fish are important in Yolo County for the recreational opportunities they provide for hunting and fishing. Many kinds of wildlife are also beneficial in control of undesirable rodents and insects. Others eat weed seeds that hinder growth of farm crops.

Pheasant, quail, and mourning dove are common in the uplands of the county. Duck and geese are the main waterfowl in the county, and small mammals include jackrabbits, cottontail rabbits, gray squirrels, ground squirrels, coyotes, and bobcats. Deer is the only big game animal of significance. Various kinds of waterfowl and fish frequent the streams of the county. Trout are taken from Putah Creek. Bluegill, black bass, catfish, and nongame fish are plentiful in Cache Creek and in sloughs and canals. Salmon, steelhead, striped bass, catfish, and sturgeon frequent the Sacramento River.

Suitability of the soils for various kinds of wildlife varies according to the depth of the soil, its slope and texture, drainage, and the available water holding capacity. Location, position on the landscape, and presence of water also are important. The soils and their fertility influence the quality of the habitats for any particular kind of wildlife including the food and cover plants that characterize specific habitats.

The soils have been placed in nine wildlife groups according to the suitability of the soils for growth of plants important in developing habitat for wildlife. Considered in making these groupings were three main kinds of wildlife for which habitat could be developed for recreation or economic return. These were upland game, waterfowl, and big game. Suitability for commercial fishponds or for recreational use also was considered. Only the kinds of wildlife that provide hunting or fishing were considered.

Suitability of the wildlife groups for various kinds of plants is shown in table 3. Also shown in table 3 is suitability of the various plants listed for use by stated kinds of wildlife. The wildlife groups are discussed in the pages that follow. The soils in each group can be determined by referring to the "Guide to Mapping Units" at the back of this survey.

Wildlife group 1

This group consists of deep to very deep soils that are well drained to poorly drained. These soils are on alluvial fans. Slopes range from 0 to 5 percent. Water is available for irrigation in most areas.

The surface layer of the soils in this group ranges from gravelly loam or sandy loam to silty clay loam. Permeability is moderately rapid to moderately slow. Available water holding capacity is more than 6.0 inches.

All soils in this group are well suited to plants (table 3) that provide food and cover for such upland game as pheasant, quail, doves, and rabbits. Suitability of the soils for ponding of water for such waterfowl as ducks and geese, or fish is moderate to poor. Developing the areas as habitat for deer may not be compatible with farming uses of the soils. The leasing of hunting rights for pheasant and quail has potential for good economic returns.

Wildlife group 2

This group consists of soils that are more than 10 inches deep and are excessively drained to poorly drained. These soils are on alluvial fans. Slopes range from 0 to 2 percent. Water is available for irrigation in most areas.

The soils in this group have a surface layer of gravelly sandy loam, sandy loam, and silt loam. Some of the soils have a slowly permeable substratum at a depth of 40 to 60 inches. Permeability is very rapid to rapid. Available water holding capacity is mostly less than 6.0 inches.

All soils in this group are moderately well suited to plants (table 3) that provide food and cover for such upland game as pheasant, quail, doves, and rabbits. They are not suitable for ponding of water for waterfowl or fish. Developing the areas as habitat for deer is not feasible, because cultivated crops are grown on much of these soils. The leasing of hunting rights for pheasant, quail, and doves has potential for good economic returns.

Wildlife group 3

This group consists of soils that are more than 10 inches deep and are somewhat poorly drained to poorly drained. Drainage has lowered the water table to a depth of more than 60 inches. These soils are in basins and on old terraces, alluvial fans, and basin rims. Slopes are less than 2 percent. Water is available for irrigation in most areas.

The surface layer of the soils in this group ranges from loam to clay. These soils have a subsoil of clay to silty clay. Permeability is slow to very slow. Available water holding capacity is more than 2.0 inches.

Soils in this group are well suited to plants (table 3) that provide food and cover for such upland game as pheasant, quail, doves, and rabbits. The soils are well suited for ponding of water for such waterfowl as ducks and geese, or for fish. Developing these soils as habitat for deer may not be compatible with farming uses of these soils.

The development of ponds for waterfowl and fish must take into account possible economic returns from such farm crops as tomatoes. The leasing of hunting rights on these soils for upland game has potential for good economic returns.

Wildlife group 4

This group consists of soils that are more than 20 inches deep and that are somewhat poorly drained to very poorly drained. These soils are in basins, on basin rims, and on alluvial fans. Slopes are less than 2 percent. Water is available for irrigation in most areas.

The surface layer of the soils in this group ranges from loam to clay. Permeability is moderate to very slow. Available water holding capacity is more than 3.0 inches.

Soils in this group are well suited to plants (table 3) that provide food and cover for pheasant, and they are moderately well suited to plants that provide food and cover for doves, quail, and rabbits. These soils are well suited to ponding of water for such waterfowl as ducks and geese, and for fish. They are only moderately well suited to development of habitat for deer. Furthermore, developing habitat for deer may not be compatible with the farming uses of the soils. Development of duck

TABLE 3.—*Suitability of specified plants in Yolo County for wildlife groups of soils and for specified kinds of wildlife*

[An Arabic number 1 means the plant named is suited to the wildlife group or has high value for the kind of wildlife; 2 means suitability of the plant is fair to marginal for the wildlife group or kind of wildlife; dashes in the columns mean the plant is not suited to soils of the wildlife group or its suitability is not known, or that the plant seldom is used by the particular kind of wildlife or its use is not known]

Plant	Wildlife group and rating									Kind of wildlife rating						
	1	2	3	4	5	6	7	8	9	Deer	Quail	Dove	Pheasant	Rabbits	Ducks	Geese
Alfalfa	1	2	1	1	–	2	2	–	–	1	2	–	1	1	–	2
Alkali bulrush	1	–	1	1	1	–	–	–	–	–	–	–	–	–	2	1
Arizona cypress	1	1	1	2	–	1	1	2	–	–	1	2	2	1	–	–
Barley	1	2	1	1	2	1	1	2	–	1	1	2	1	1	1	1
Birchleaf mahogony	1	1	2	–	–	1	2	1	2	1	2	–	–	2	–	–
Blackberry	1	1	1	1	2	1	1	1	–	2	1	–	1	1	–	–
Blue oak	1	1	2	–	–	1	2	1	–	1	2	1	–	–	–	–
Buckbrush	1	1	–	–	–	1	–	1	2	1	2	–	–	1	–	–
Burclover	1	2	1	1	2	1	1	2	–	1	1	–	–	1	–	–
Canarygrass (annual)	1	2	1	1	2	1	2	–	–	–	1	1	1	2	–	–
Chamise	1	1	–	–	–	1	–	1	2	1	2	–	–	2	–	–
Christmas berry (Toyon)	1	1	2	–	–	1	2	2	2	2	1	–	2	2	–	–
Corn	1	2	1	1	–	1	2	–	–	1	2	2	1	1	1	1
Cotoneaster	1	1	1	2	–	1	1	2	–	–	1	2	1	1	–	–
Deervetch	1	1	–	–	–	1	–	1	–	1	1	2	–	2	–	–
Dwarf bluegum	1	1	1	2	2	1	1	2	–	–	1	2	2	–	–	–
Fiddleneck	1	1	1	2	–	1	1	2	–	–	1	1	2	–	–	–
Filaree	1	1	1	2	–	1	1	2	–	2	1	2	2	1	–	–
Gooseberry	1	1	2	–	–	1	2	1	–	2	1	–	2	1	–	–
Hardinggrass	1	2	1	2	–	1	1	–	–	2	1	2	2	1	–	–
Lana vetch	1	1	1	1	–	1	1	–	–	1	1	1	2	1	–	–
Live oak	1	1	2	1	–	1	2	2	–	1	1	2	–	–	–	–
Lupine (annual)	1	1	1	2	–	1	1	2	–	2	1	2	–	–	–	–
Manzanita	1	1	–	–	–	1	2	1	2	2	2	–	–	2	–	–
Milkthistle	1	2	1	2	–	1	1	2	–	2	1	1	1	–	–	–
Milo	1	2	1	1	–	1	2	–	–	1	1	1	1	1	2	2
Multiflora rose	1	2	1	2	–	1	2	–	–	–	1	–	1	1	–	–
Olive	1	1	1	2	–	1	1	–	–	–	1	1	1	2	–	–
Pampasgrass	1	1	1	2	2	1	1	–	–	–	2	2	2	1	–	–
Popcornflower	1	1	1	2	–	1	1	2	2	2	1	1	1	2	–	–
Pyracantha	1	1	1	2	–	1	1	2	–	–	1	1	1	1	–	–
Quailbush	1	2	1	1	1	1	1	2	–	–	1	2	2	1	–	–
Rice	2	–	1	1	1	–	–	–	–	–	–	–	1	–	1	1
Ryegrass	1	1	1	1	–	1	1	2	–	1	2	–	2	1	–	–
Safflower	1	2	1	1	–	1	2	–	–	–	1	1	1	–	2	–
Saltcedar	1	1	1	1	1	1	1	2	–	–	2	2	2	2	–	–
Soft chess	1	1	1	2	–	1	1	1	–	1	2	–	–	1	–	–
Sudangrass	1	2	1	1	–	1	2	–	–	1	1	–	1	1	2	2
Sunflower	1	1	1	1	–	1	2	2	–	–	1	1	1	–	–	–
Sweetclover	1	2	1	1	1	1	1	–	–	2	1	–	1	1	–	–
Trefoil	1	1	1	1	2	1	1	2	–	1	2	2	1	2	2	2
Turkey mullein	1	1	1	2	–	1	1	2	2	–	1	1	2	–	–	–
Valley oak	1	1	2	1	–	1	2	–	–	1	2	1	–	–	–	–
Watergrass	1	–	1	1	2	–	–	–	–	–	2	2	1	–	1	1
Wild oats	1	1	1	2	–	1	1	1	–	2	2	2	1	1	2	–
Wheat	1	1	1	2	–	2	1	–	–	1	1	1	1	1	1	1

clubs and of areas for hunting pheasant has potential for good economic returns. If the areas are protected from flooding, development of commercial fish ponds has potential for good economic returns.

Wildlife group 5

This group consists of soils that are more than 20 inches deep and that are moderately well drained to poorly drained. These soils are in basins and on basin rims. Slopes are less than 1 percent. Water is available for irrigation in most areas.

The surface layer of the soils in this group ranges from clay loam to clay. Permeability is slow. Available water holding capacity is more than 3.0 inches.

Soils in this group are well suited to plants (table 3) that provide food and cover for pheasant, particularly where rice is grown, but they are poorly suited to plants that provide food and cover for quail, doves, and rabbits. Their suitability for providing habitat for deer is poor. Suitability of the soils for ponding of water for such waterfowl as ducks and geese and for fish is good. Economic returns are likely to be good.

Wildlife group 6

This group consists of soils that are more than 10 inches deep and are well drained. These soils are on terraces. Slopes range from 2 to 50 percent. Irrigation generally is not available.

The surface layer of the soils in this group is gravelly loam or loam. These soils have a subsoil of clay. Permeability is very slow. Available water holding capacity is more than 2.0 inches.

The soils in this group are well suited to plants (table 3) that provide food and cover for such upland game as quail, doves, and deer if drinking water is available. Suitable habitat can be developed for pheasants on the more gently sloping soils if drinking water is available and if adequate irrigation water is available for establishing plants to provide food and cover. The suitability of the soils for developing habitat for deer is good, particularly on the steeper soils where the deer are likely to be more compatible with farming uses. Because of the slopes these soils generally are not suitable for large impoundments of water for waterfowl. The more gently sloping soils, however, are moderately well suited to development of small ponds for fishing and other recreation. The leasing of hunting rights for deer, quail, and doves has potential for good economic returns. Also, the gently sloping soils are moderately well suited to development of habitat for pheasants for commercial purposes.

Wildlife group 7

In this group are soils that are more than 20 inches deep and that are well drained to somewhat excessively drained. These soils are on dissected terraces and uplands. Slopes range from 2 to 75 percent. Water for irrigation generally is not available.

The surface layer of the soils in this group is silty clay loam, clay loam, and clay. Permeability is moderately slow to slow. Available water holding capacity is more than 3.0 inches.

Soils in this group are well suited to plants (table 3) that provide food and cover for such upland game as quail, doves, and rabbits. Drinking water must be provided if not available. Suitable habitat can be developed for pheasants on the more nearly level soils if adequate water is available for establishing plants to provide food and cover. The suitability of these soils for developing habitat for deer is good, especially on the steeper slopes where the deer are more compatible with farming uses. Steep soils make these soils poorly suited to large impoundments of water for waterfowl. The more nearly level soils, however, are moderately well suited to small ponds for fish and wildlife where impoundment sites exist. Development of the soils as habitat for deer, quail, and doves has potential for good economic returns.

Wildlife group 8

This group consists of soils that are less than 25 inches deep and are well drained to somewhat excessively drained. These soils are on uplands and dissected terraces. Slopes range from 5 to 75 percent. Water for irrigation generally is not available.

The surface layer of the soils in this group is gravelly loam, loam, and silty clay loam. Permeability is moderate to very slow. Available water holding capacity is mostly less than 3.0 inches.

These soils are well suited to the management of the existing habitat for deer and quail. They are not suited to the development of habitat for pheasant or waterfowl. Also, the soils of this group are not suited to the development of small ponds for fish except where suitable impoundment sites occur. The leasing of hunting rights for deer has potential for good economic returns.

Wildlife group 9

This group consists of rocky land on uplands and sandy, gravelly, or stony deposits along streams and rivers. Soil depth and available water holding capacity are variable. Slopes range from 0 to 75 percent. Water is not available for irrigation.

Areas of this group are poorly suited for development of habitat for all kinds of wildlife. The soils are fairly well suited to a few plants (table 3) that could provide food and cover for wildlife. Some of the plants provide food and cover for deer and quail in upland areas. In places along streams the habitat is suitable for pheasant, doves, and quail. The leasing of hunting rights on these soils may be the only potential for economic returns.

Engineering Uses of the Soils [5]

Some soil properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, and pipelines, the foundations of buildings, facilities for storing water, structures for controlling erosion, drainage systems, and systems for disposing of sewage. The properties most important to the engineer are permeability, shear strength, compaction characteristics, soil drainage, shrink swell, available water holding capacity, particle 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 this information to—

1. Make soil and land use 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 drainage improvements, farm ponds, irrigation systems, and other structures for conservation of soil and water.
3. Make preliminary evaluations of soil conditions that will aid in selecting locations for highways, pipelines, and cables and in planning more detailed surveys for the selected locations.
4. Locate probable sources of sand, gravel, and other materials suitable for construction needs.
5. Correlate performance of engineering structures with mapping units to develop information for general planning that will be useful in designing and maintaining the structures.
6. Determine the suitability of the soils for cross-country movement of vehicles and construction equipment.
7. Supplement information obtained from other published maps and aerial photographs.

[5] By O. T. GERBAZ, Area engineer, Soil Conservation Service.

8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

Used with the soil map to identify the soils, the engineering interpretations in this section can be used for many purposes. It should be emphasized, however, that the interpretations do not eliminate the need for sampling and testing at the site of specific engineering work that involves heavy loads or where the excavations are deeper than the depths of the layers here reported. Even in these situations, the soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that can be expected.

The soil mapping units shown on the maps in this survey may include small areas of a different soil material. These included soils 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, Morphology, and Classification of Soils."

Some of the terms used by the soil scientist may be unfamiliar to the engineer, and some words—for example, soil, clay, silt, and sand—may have a special meaning in soil science. These and other special terms used in the soil survey 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

Most highway engineers classify soil material according to the system approved by the American Association of State Highway Officials (AASHO) (*1*). In this system soil materials are placed in seven principal groups based on field performance. The groups range from A–1, consisting of gravelly and coarse sandy soils of high bearing capacity, to A–7, consisting of clayey soils having low strength when wet. 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 materials to 49 for the poorest. The group index for the soils tested is shown in parentheses after the soil group symbol in table 4.

Some engineers prefer to use the Unified soil classification system developed by the U.S. Army Corps of Engineers and adopted by the U.S. Department of Defense (*29*). This system is based on the texture and plasticity of soils and the performance of soils as material for engineering works. In this system soil materials are classified as coarse grained (eight classes), fine grained (six classes), or highly organic (one class). An approximate classification can be made in the field. Table 4 shows the classification of the tested soils according to the Unified systems.

Engineering test data

Table 4 gives test data for samples collected from selected soils and tested by the California Division of Highways. The data in the table show the moisture density, the mechanical analysis, liquid limit, and plasticity index. Also shown is the classification of the samples under the American Association of State Highway Officials (AASHO) system and the Unified system.

In the moisture-density, or compaction test, a sample of the soil material is compacted several times using the same compactive effort, but each time at a higher content of moisture. The dry density, or unit weight, of the compacted material increases until the optimum moisture content is reached. After that, the density decreases with increase in the moisture content. The highest dry density obtained is termed "maximum density," and the corresponding moisture content is termed "optimum moisture." 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 mechanical analysis was determined by the sieve and hydrometer method. The data show the relative proportions of the different size particles in the soil material. The amount of the clay fraction was determined by the hydrometer method. Sand and coarser particles do not pass through the No. 200 sieve, but silt and clay do.

The tests for liquid limit and plasticity index measure the effect of water on the strength and 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 a soil passes from a plastic to liquid state. The *plasticity index* is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is in a plastic conditon. When the plastic limit is equal to or higher than the liquid limit, the plasticity index is reported as nonplastic.

Estimated engineering properties

Table 5 lists the soil series in Yolo County and the map symbols for each mapping unit and gives estimates of soil properties significant to some engineering work.

Given in table 5 are the depth to bedrock, depth to seasonal high water table, and depth from surface in a typical profile. In addition the estimated USDA, Unified, and AASHO classifications, and the percentages of material passing the various sieves are given. Also shown are estimates of Atterberg values, permeability, available water holding capacity, reaction, shrink-swell potential, and corrosivity of uncoated steel. The estimates are based partly on examinations made in the field and partly on results of test data shown in table 4. As the estimates are only for typical soils, considerable variation from these values should be anticipated. More information on the range of properties of the soils can be obtained in other parts of this survey, particularly in the section "Descriptions of the Soils."

Depth to bedrock, expressed in feet, gives the observed or estimated range of depth from the surface to bedrock.

TABLE 4.—*Engineering*

Soil name and location	Parent material	California report No. 65	Depth	Moisture-density [2]	
				Maximum dry density	Optimum moisture
			In.	*Lb. per cu. ft.*	*Pct.*
Balcom silty clay loam: 2.42 miles west of Road No. 10 and Road No. 85, 430 feet south of farm road, SE¼NE¼ sec. 33, T. 12 N., R. 2 W.	Soft sandstone.	0117 0118 0119	0–9 9–24 24–37	114 113 112	13 15 17
Brentwood silty clay loam: 0.5 mile west of Road No. 96B, 0.5 mile south of Road No. 17, 10 feet south of farm road, T. 10 N., R. 1 E.	Mixed alluvium.	0054 0055	10–15 35–60	103 107	17 17
Capay silty clay: 100 feet south of NE. corner of NW¼SW¼ sec. 2, T. 9 N., R. 1 W.	Alluvium from sedimentary rock.	0096 0097 0098	0–11 18–36 49–64	108 113 113	17 16 15
Corning gravelly loam: 648 feet west of Highland Canal, 72 feet north of south section line of sec. 9, T. 8 N., R. 1 W.	Semiconsolidated alluvium from sedimentary rock.	0050 0051 0052	0–7 17–27 33–43	131 112 123	10 15 14
Dibble clay loam: 1.5 miles west of Scott Ranch Headquarters at end of Road No. 29, SW¼NE¼SE¼ sec. 27, T. 9 N., R. 2 W.	Bedded and folded shale and very fine sandstone.	0047 0048 0049	0–4 4–15 20–30	116 116 112	13 14 14
Marvin silty clay loam: 0.5 mile north of Road No. 13 and 220 feet east of Road No. 96 in NW. corner of NE¼NW¼SW¼ sec. 14, T. 11 N., R. 1 E.	Mixed alluvium.	0082 0083 0084	0–5 12–28 41–60	108 111 110	14 14 13
Millsholm loam: 1,200 feet north of SW. corner of sec. 28, T. 9 N., R. 2 W.	Sandstone and shale.	0111 0112	0–4 11–19	103 114	14 16
Myers clay: 90 feet south of Road No. 9B and 500 feet east of NW. corner of NW¼SW¼ sec. 36, T. 12 N., R. 1 W.	Fine-textured mixed alluvium.	0085 0086	12–40 47–60	117 113	13 14
Pescadero silty clay: 0.3 mile south of Road No. 24 and 0.25 mile east of Road No. 102, SE¼NW¼NW¼ sec. 2, T. 9 N., R. 2 E.	Fine-textured alluvium from sedimentary rock.	0094	13–26	109	16
Reiff very fine sandy loam: 100 feet northwest of SE. corner of SE¼SW¼SW¼ sec. 22, T. 11 N., R. 2 E.	Mixed alluvium.	0078 0079	0–3 24–43	121 117	11 15
Rincon silty clay loam: 1/8 mile west of Road No. 95B and 3/8 mile north of Road No. 18A, T. 10 N., R. 1 E.	Alluvium from sedimentary rock.	0102 0103 0104	8–15 29–43 72–76	109 109 114	16 14 12
Sacramento clay: 100 feet east of intersection of State Highway No. 45 and Road No. 112, T. 12 N., R. 2 E.	Mixed fine alluvium.	0087 0088	0–7 16–31	98 95	20 24
Sehorn clay: 0.3 mile east of NW. corner of sec. 29, T. 11 N., R. 1 W.	Semiconsolidated calcareous sandstone.	0113 0114	0–7 15–34	95 101	25 19
Sycamore silty clay loam: 0.5 mile west of Road No. 102 and 100 feet south of State Highway No. 113, NE¼NE¼NW¼ sec. 22, T. 11 N., R. 2 E.	Mixed alluvium.	0080	0–4	108	14

See footnotes at end of table.

test data [1]

Mechanical analysis [3]								Liquid limit	Plasticity index	Classification	
Percentage passing sieve—				Percentage smaller than—						AASHO [5]	Unified [6]
No. 4 (4.7 mm.)	No. 10 [4] (2.0 mm.)	No. 40 [4] (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
---------	100	97	74	69	56	39	24	32	14	A-6(11)	CL
---------	100	97	80	76	64	45	24	39	21	A-6(17)	CL
100	96	90	78	73	62	44	26	39	18	A-6(14)	CL
---------	-----------	100	99	92	75	51	34	45	20	A-7-6(21)	CL
---------	-----------	100	98	91	74	47	34	45	19	A-7-6(20)	CL
---------	-----------	100	93	88	74	55	42	41	17	A-7-6(18)	CL
---------	-----------	100	94	90	78	61	46	47	23	A-7-6(24)	CL
---------	-----------	100	96	91	78	59	41	51	29	A-7-6(25)	CH
100	96	80	54	51	40	23	17	21	[7] NP	A-4(2)	ML
100	94	78	57	56	48	37	30	44	27	A-7-6(11)	CL
[8] 51	40	25	16	15	12	9	7	54	26	A-2-7(0)	SC
---------	100	98	71	66	56	41	31	28	11	A-6(6)	CL
---------	100	98	83	78	65	48	38	38	19	A-6(16)	CL
100	98	96	91	77	73	52	38	38	14	A-6(15)	CL
---------	-----------	100	96	88	72	49	33	35	10	A-4(11)	ML
---------	-----------	100	98	92	78	59	42	47	28	A-7-6(30)	CL
---------	-----------	100	94	83	64	35	28	31	7	A-4(9)	ML
---------	100	97	77	70	56	35	23	41	16	A-7-6(13)	CL
100	98	95	72	68	55	34	24	38	17	A-6(11)	CL
---------	-----------	100	86	81	71	58	44	41	22	A-7-6(21)	CL
---------	-----------	100	88	82	72	58	40	39	16	A-6(15)	CL
---------	100	97	95	90	79	62	42	56	26	A-7-5(29)	MH
---------	100	99	63	58	43	22	17	23	NP	A-4(4)	ML
---------	-----------	100	63	57	40	17	13	25	NP	A-4(4)	ML
---------	-----------	100	97	89	61	47	33	39	19	A-6(21)	CL
---------	-----------	100	98	92	77	53	40	46	24	A-7-6(26)	CL
---------	100	98	90	82	61	29	25	34	13	A-6(12)	CL
---------	-----------	100	97	94	82	64	44	62	37	A-7-6(40)	CH
---------	100	96	92	88	77	61	40	66	33	A-7-5(37)	MH
---------	100	97	94	91	81	66	47	70	41	A-7-6(45)	CH
100	97	95	92	87	79	67	37	75	45	A-7-6(49)	CH
---------	-----------	100	90	85	74	47	37	39	16	A-6(16)	CL

TABLE 4.—*Engineering*

Soil name and location	Parent material	California report No. 65	Depth	Moisture-density [2]	
				Maximum dry density	Optimum moisture
			In.	*Lb. per cu. ft.*	*Pct.*
Tehama loam: 0.2 mile west of intersection of Road Nos. 89B and 8, and 50 feet south of Road No. 8, SE¼ sec. 27, T. 12 N., R. 1 W.	Alluvium from sedimentary rocks.	0108	0–10	125	11
		0109	15–29	118	12
		0110	63–75	126	11
Willows clay: Center of SW¼ sec. 31, T. 10 N., R. 3 E.	Mixed fine alluvium.	0099	0–4	102	16
		0100	13–28	111	16
		0101	61–72	113	15
Yolo silt loam: 0.3 mile west of Road No. 96 and 50 feet south of Road No. 14 in NW¼NE¼ sec. 27, T. 11 N., R. 1 E.	Mixed alluvium.	0056	5–14	121	12
		0057	40–60	121	12

[1] Tests performed by California Division of Highways in accordance with procedures given in "California Materials Manual for Testing and Control Procedures" (*13*).
[2] Based on the method of test for relative compaction of untreated and treated soils and aggregates, test method No. Calif. 216E (*13*).
[3] Mechanical analyses by the procedure of California Division of Highways Methods 202 and 203 (*13*). Results by this procedure frequently may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the California 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 SCS 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*

[Not included in this table, because their properties are too variable to be estimated, are the miscellaneous land types Loamy alluvial land would not be applicable. >=greater than and <=less than. An asterisk in the first column indicates that at least one mapping unit this reason, it is necessary to follow carefully the instructions for referring to other series that appear in the first column of this table]

Soil series and map symbols	Depth to—		Depth from surface in typical profile	Classification		
	Bedrock	Seasonal high water table		Dominant USDA texture	Unified	AASHO
	Feet	*Feet*	*Inches*			
Arbuckle: AaA, AaB	>5	(1)	0–27	Gravelly loam	ML or SC	A–4
			27–36	Gravelly clay loam	CL	A–6
			36–60	Very gravelly sandy clay loam.	GM or GC	A–2
*Balcom: BaD3, BaE2, BaF2, BaG3, BdF2. (For properties of Dibble soil in mapping unit BdF2, refer to the Dibble series.)	1–4	(1)	0–37	Silty clay loam	CL	A–6 or A–7
			37	Soft sandstone.		
Brentwood: BrA	>5	(1)	0–60	Heavy silty clay loam and silt loam.	CL	A–7
Capay: Ca, Cb, Cc	>5	(1)	0–64	Silty clay	CL or CH	A–7

See footnotes at end of table.

test data [1]—Continued

Mechanical analysis [3]								Liquid limit	Plasticity index	Classification	
Percentage passing sieve—				Percentage smaller than—						AASHO [5]	Unified [6]
No. 4 (4.7 mm.)	No. 10 [4] (2.0 mm.)	No. 40 [4] (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
100	98	94	69	54	44	28	19	16	2	A-4(4)	ML
---------	100	95	76	72	62	46	37	36	17	A-6(12)	CL
---------	100	93	43	42	35	24	20	20	6	A-4(1)	SM-SC
---------	-----------	100	97	92	82	66	49	68	38	A-7-5(43)	CH
---------	-----------	100	97	94	83	68	54	65	41	A-7-6(43)	CH
100	98	95	93	89	80	66	53	66	45	A-7-6(47)	CH
---------	-----------	100	66	63	49	29	22	25	8	A-4(4)	CL
---------	-----------	100	57	53	41	22	17	24	NP	A-4(3)	ML

[4] Percentages passing sieve size Nos. 10 and 40 were interpolations based on laboratory data for sieve size Nos. 8, 16, 30, and 50.
[5] Based on AASHO Designation M 145-49 (*1*).
[6] Based on the Unified Soil Classification System (*29*).
[7] NP=Nonplastic.
[8] 100 percent of the soil material passes the 3-inch sieve, 96 percent passes the 1½-inch sieve, 89 percent passes the ¾-inch sieve, and 73 percent passes the ⅜-inch sieve.

properties of soils

(Lm), Made land (Ma), Riverwash (Rh), and Rock land (RoG). Absence of information indicates an estimate was not made or that it in this series is made up of two or more kinds of soil. The soils in such mapping units may have different properties and limitations, and for

Percentage passing sieve—					Atterberg values		Permeability	Available water holding capacity	Reaction	Shrink-swell potential	Corrosivity (uncoated steel)
3 inches	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Liquid limit	Plastic index					
					Percent		*Inches per hour*	*Inches per inch of soil*	*pH value*		
100	70-90	65-85	50-65	40-60	10-30	(2)	0. 63-2. 0	0. 10-0. 12	5. 6-6. 5	Low	Low.
100	70-90	65-85	60-70	50-60	20-40	10-20	0. 2-0. 63	0. 12-0. 15	6. 1-7. 3	Moderate	Moderate.
100	30-65	25-50	20-40	10-25	15-30	5-10	0. 2-0. 63	0. 07-0. 09	6. 6-7. 3	Low	Low.
100	100	95-100	90-100	70-80	35-45	15-25	0. 2-0. 63	0. 19-0. 21	7. 4-8. 4	Moderate	Moderate.
100	100	100	95-100	90-100	40-50	15-25	0. 2-0. 63	0. 19-0. 21	6. 6-8. 4	High	High.
100	100	100	95-100	90-100	40-55	15-30	0. 06-0. 2	0. 11-0. 13	6. 6-8. 4	High	High.

TABLE 5.—*Estimated engineering*

Soil series and map symbols	Depth to—		Depth from surface in typical profile	Classification		
	Bedrock	Seasonal high water table		Dominant USDA texture	Unified	AASHO
	Feet	*Feet*	*Inches*			
Clear Lake:						
Ch, Cn	>5	(1)	0–20	Silty clay loam and sandy loam.	CL	A–6
			20–60	Clay	CH	A–7
Ck	>5	(1)	0–60	Clay	CH	A–7
Climara: CrE2	3–4½	(1)	0–49	Clay	CH	A–7
			49	Serpentine.		
Corning: CtD2, CtE2	>5	(1)	0–14	Gravelly loam and loam	ML or SM	A–4
			14–27	Clay	CL	A–7
			27–60	Very gravelly clay	GC	A–2
*Dibble: DaF2, DaG2, DbE2, DbF2, DbG2. (For properties of the Millsholm soils in mapping units DbE2, DbF2, and DbG2, refer to the Millsholm series.)	1½–3	(1)	0–30	Silty clay and clay	CL	A–6
			30	Sandstone.		
Hillgate: HcA, HcC2, HdA, HdC	>5	(1)	0–11	Loam	ML or CL	A–4 or A–6
			11–30	Clay	CL	A–7
			30–70	Clay loam	CL	A–6
Lang:						
La	>5	3–5	0–6	Sandy loam	SM	A–2
			6–60	Loamy fine sand and fine sand.	SM	A–2
Lb, Lc, Ld	>5	3–5	0–6	Sandy loam	SM	A–2
			6–40	Loamy fine sand	SM	A–2
			40–60	Clay	CH or MH	A–7
Laugenour:						
Lg, Lh	>5	(1)	0–20	Very fine sandy loam	ML	A–4
			20–30	Loamy sand	SM	A–2
			30–68	Fine sandy loam	SM	A–4
Lk	>5	2–5	0–20	Very fine sandy loam	ML	A–4
			20–40	Loamy sand	SM	A–2
			40–60	Silty clay loam	CL	A–6
Maria:						
Mb, Mc	>5	(1)	0–60	Silt loam	CL or ML	A–4 or A–6
Md	>5	(1)	0–48	Silt loam	CL or ML	A–4 or A–6
			48–60	Clay	CH	A–7
Marvin: Mf	>5	(1)	0–12	Silty clay loam and silty clay	ML or CL	A–4 or A–6
			12–41	Silty clay	CL	A–7
			41–60	Silty clay loam	ML or CL	A–4 or A–6
Merritt:						
Mk, Mp	>5	1½–5	0–18	Silty clay loam	CL or ML	A–4 or A–6
			18–42	Silt loam and very fine sandy loam.	CL or ML	A–4 or A–6
			42–70	Fine sandy loam	SM	A–4
Mn, Mo	>5	3–5	0–42	Silty clay loam	CL or ML	A–4 or A–6
			42–60	Clay	CH	A–7
Millsholm: MrG2	1–1½	(1)	0–19	Loam and stony loam	CL or ML	A–4 or A–6
			19	Sandstone and shale.		

See footnotes at end of table.

properties of soils—Continued

Percentage passing sieve—					Atterberg values		Permeability	Available water holding capacity	Reaction	Shrink-swell potential	Corrosivity (uncoated steel)
3 inches	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Liquid limit	Plastic index					
						Percent	*Inches per hour*	*Inches per inch of soil*	*pH value*		
100	100	100	95–100	90–95	30–40	15–25	0. 2–0. 63	0. 19–0. 21	6. 6–8. 4	Moderate	High.
100	100	95–100	90–95	75–95	50–70	35–55	0. 06–0. 2	0. 14–0. 16	7. 4–8. 4	High	High.
100	100	95–100	90–100	75–95	50–70	35–55	0. 06–0. 2	0. 14–0. 16	6. 6–8. 4	High	High.
100	100	100	90–100	75–95	50–70	30–40	0. 06–0. 2	0. 14–0. 16	7. 9–8. 4	High	High.
100	75–95	70–90	65–85	40–60	15–30	0–10	0. 63–2. 0	0. 10–0. 12	5. 1–6. 0	Low	Low.
100	85–100	80–100	75–85	55–65	40–50	25–35	<0. 06	0. 05–0. 07	5. 1–6. 5	High	High.
100	35–55	30–50	25–35	15–25	50–60	25–35	0. 06–0. 2	0. 05–0. 07	5. 1–7. 3	Low	Moderate.
100	100	95–100	95–100	85–95	30–40	10–25	0. 06–0. 2	0. 15–0. 17	5. 6–6. 5	High	High.
100	100	100	85–95	60–75	20–30	0–15	0. 2–0. 63	0. 13–0. 15	5. 6–6. 5	Moderate	Low.
100	100	100	90–100	75–95	40–50	15–35	<0. 06	0. 05–0. 07	5. 6–7. 3	High	High.
100	100	100	90–100	70–80	30–40	15–25	0. 06–0. 2	0. 16–0. 18	6. 6–7. 8	Moderate	Moderate.
100	100	100	60–70	25–35	10–20	0–10	2. 0–6. 3	0. 11–0. 13	5. 1–6. 5	Low	Moderate.
100	100	100	50–75	15–25	--------	[2]	6. 3–20. 0	0. 08–0. 10	6. 1–7. 3	Low	Moderate.
100	100	100	60–70	25–35	10–20	0–10	2. 0–6. 3	0. 11–0. 13	5. 1–6. 5	Low	Moderate.
100	100	100	50–75	15–25	--------	[2]	6. 3–20. 0	0. 08–0. 10	6. 1–7. 3	Low	Moderate.
100	100	100	95–100	75–95	50–60	25–35	0. 06–0. 2	0. 14–0. 16	6. 6–7. 3	High	High.
100	100	100	70–85	50–60	10–25	0–10	2. 0–6. 3	0. 15–0. 17	6. 6–8. 4	Low	Low.
100	100	100	60–75	15–25	--------	[2]	2. 0–6. 3	0. 06–0. 08	7. 4–8. 4	Low	Low.
100	100	100	70–85	40–50	10–20	0–5	2. 0–6. 3	0. 13–0. 15	7. 4–8. 4	Low	High.
100	100	100	70–85	50–60	10–25	0–10	2. 0–6. 3	0. 15–0. 17	6. 6–8. 4	Low	Low.
100	100	100	60–75	15–25	--------	[2]	2. 0–6. 3	0. 06–0. 08	7. 4–8. 4	Low	Low.
100	100	100	95–100	75–95	30–40	15–25	0. 06–0. 2	0. 17–0. 19	7. 9–8. 4	Moderate	High.
100	100	100	90–100	70–90	20–30	0–15	0. 63–2. 0	0. 19–0. 21	7. 9–8. 4	Moderate	Moderate.
100	100	100	90–100	70–90	20–30	0–15	0. 63–2. 0	0. 19–0. 21	7. 9–8. 4	Moderate	Moderate.
100	100	100	90–100	75–95	50–60	25–35	0. 06–0. 2	0. 14–0. 16	7. 9–8. 4	High	High.
100	100	100	95–100	90–100	30–40	5–15	0. 2–0. 63	0. 19–0. 21	6. 6–7. 8	Moderate	High.
100	100	100	95–100	90–100	40–50	25–35	0. 06–0. 2	0. 15–0. 17	7. 9–8. 4	High	High.
100	100	100	95–100	90–100	30–40	5–15	0. 2–0. 63	0. 19–0. 21	7. 9–8. 4	Moderate	High.
100	100	100	95–100	85–95	30–40	5–15	0. 2–0. 63	0. 19–0. 21	6. 6–8. 4	Moderate	High.
100	100	100	95–100	50–65	20–30	5–15	0. 63–2. 0	0. 16–0. 18	7. 9–9. 0	Moderate	High.
100	100	100	70–85	40–50	10–20	0–5	2. 0–6. 3	0. 13–0. 15	7. 4–8. 4	Low	High.
100	100	100	95–100	85–95	30–40	5–15	0. 2–0. 63	0. 19–0. 21	7. 9–8. 4	Moderate	High.
100	100	100	90–100	75–95	50–60	25–35	0. 06–0. 2	0. 14–0. 16	7. 9–8. 4	High	High.
90–100	85–95	80–90	70–90	60–80	20–30	5–15	0. 63–2. 0	0. 12–0. 16	6. 1–7. 3	Moderate	Moderate.

TABLE 5.—*Estimated engineering*

Soil series and map symbols	Depth to— Bedrock	Seasonal high water table	Depth from surface in typical profile	Classification: Dominant USDA texture	Unified	AASHO
	Feet	*Feet*	*Inches*			
Myers: Ms	>5	(1)	0–60	Clay	CL	A–7
Omni: Oa, Ob	>5	2–4	0–60	Silty clay and clay loam (Surface 8 to 16 inches silty clay loam in places.)	CH or MH	A–7
Pescadero: Pa, Pb, Pc	>5	2–4	0–40	Silty clay (10 to 20 inches of overwash in places.)	CH	A–7
			40–72	Silty clay loam	CL	A–6
Positas: PfE2, PfF2, PfF3	>5	(1)	0–14	Gravelly loam and gravelly sandy clay loam.	SM or SC	A–4
			14–31	Gravelly clay	CL	A–7
			31–60	Very gravelly clay	GC	A–2
Reiff:						
Ra	>5	(1)	0–60	Fine sandy loam and loam	SM or ML	A–4
Rb	>5	(1)	0–60	Gravelly loam	SM	A–4
Rincon: Rg	>5	(1)	0–15	Silty clay loam	CL	A–6 or A–7
			15–56	Heavy silty clay loam	CL	A–7
			56–72	Clay loam	CL	A–6
Riz: Rk, Rn	>5	(1)	0–10	Loam	ML	A–4
			10–37	Clay	CH	A–7
			37–69	Loam	ML	A–4
Sacramento:						
Sc, Sd, Se, Sf	>5	3–5	0–60	Clay	CH or MH	A–7
Sa, Sb, Sg	>5	3–5	0–20	Silty clay loam	CL	A–7
			20–60	Clay	CH or MH	A–7
San Ysidro: Sh	>5	(1)	0–20	Loam	ML	A–4
			20–55	Silty clay and clay	CH	A–7
			55–60	Clay loam	CL	A–6
*Schorn:						
SkD, SkE2, SkF2, SmD, SmE2, SmF2. (For properties of Balcom soils in mapping units SmD, SmE2, and SmF2, refer to the Balcom series.)	2–5	(1)	0–38	Clay	CH	A–7
			38	Siltstone.		
SlD	2–5	(1)	0–38	Cobbly clay	CH	A–7
			38	Siltstone.		
Soboba: Sn	>5	(1)	0–60	Very gravelly loamy sand	GM or SM	A–1
Sycamore:						
So, Sp, Sr, Ss, St	>5	3–5	0–44	Silty clay loam or silt loam	CL or ML	A–4 or A–6
			44–60	Loam or silt loam	ML	A–4
Su, Sv, Sw	>5	3–5	0–40	Silty clay loam	CL	A–6
			40–60	Silty clay	CH	A–7
Tehama: TaA, TaB	>5	(1)	0–10	Loam	ML	A–4
			10–40	Clay loam	CL	A–6
			40–63	Loam and gravelly loam	SM or ML	A–4

See footnotes at end of table.

properties of soils—Continued

Percentage passing sieve—					Atterberg values		Permeability	Available water holding capacity	Reaction	Shrink-swell potential	Corrosivity (uncoated steel)
3 inches	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Liquid limit	Plastic index					
						Percent	*Inches per hour*	*Inches per inch of soil*	*pH value*		
100	100	100	90–100	85–95	40–50	15–25	0.06–0.2	0.14–0.16	7.4–9.0	High	High.
100	100	100	95–100	90–100	50–60	20–35	0.06–0.2	0.15–0.17	7.4–9.0	High	High.
100	100	100	90–100	90–100	50–60	20–35	0.06–0.2	0.06–0.10	7.4–9.4	High	High.
100	100	100	90–100	85–95	30–40	10–20	0.06–0.2	0.09–0.14	7.9–9.4	Moderate	High.
100	70–90	65–85	55–70	40–50	25–40	5–10	0.63–2.0	0.12–0.14	5.6–7.3	Moderate	Low.
100	75–90	70–85	60–70	50–60	40–50	25–40	<0.06	0.05–0.07	5.6–7.3	High	High.
90–100	30–55	25–50	20–45	10–25	35–50	25–40	0.06–0.2	0.05–0.07	6.6–7.3	Low	Moderate.
100	100	100	80–90	45–55	20–30	0–10	2.0–6.3	0.14–0.16	6.1–8.4	Low	Low.
100	75–90	70–85	60–70	40–50	20–30	5–10	2.0–6.3	0.12–0.14	6.1–8.4	Low	Low.
100	100	100	95–100	90–100	30–40	15–25	0.2–0.63	0.12–0.14	7.9–8.4	Moderate	Moderate.
100	100	100	95–100	90–100	40–50	20–30	0.06–0.2	0.11–0.13	7.9–8.4	High	High.
100	100	100	95–100	85–95	30–40	10–20	0.2–0.63	0.11–0.13	7.9–8.4	Moderate	Moderate.
100	100	100	85–95	60–70	20–30	5–10	0.63–2.0	0.13–0.15	6.6–8.4	Moderate	Moderate.
100	100	100	95–100	85–95	50–60	25–35	<0.06	0.04–0.06	7.9–9.0	High	High.
100	100	100	85–95	60–70	20–30	5–10	0.02–0.63	0.04–0.06	7.9–9.0	Moderate	High.
100	100	100	95–100	90–100	60–70	30–40	0.06–0.2	0.09–0.11	5.6–8.4	High	High.
100	100	100	95–100	85–95	40–50	15–25	0.2–0.63	0.19–0.21	6.6–7.3	Moderate	High.
100	100	100	90–100	90–100	60–70	30–40	0.06–0.2	0.09–0.11	7.9–8.4	High	High.
100	100	100	90–100	60–70	20–30	0–10	0.63–2.0	0.16–0.18	5.6–7.3	Moderate	Moderate.
100	100	100	95–100	85–95	50–60	5–20	<0.06	0.04–0.06	6.1–7.8	High	High.
100	100	100	90–100	70–80	30–40	10–20	0.2–0.63	0.10–0.14	7.4–8.4	Moderate	Moderate.
100	95–100	90–100	85–100	85–95	70–80	40–50	0.06–0.2	0.14–0.16	5.6–8.4	High	High.
70–90	65–85	60–80	55–75	50–60	70–80	40–50	0.06–0.2	0.11–0.13	5.6–8.4	High	High.
85–95	30–80	25–75	10–25	5–15	--------	(2)	>20	0.04–0.06	6.1–8.4	Low	Low.
100	100	100	95–100	80–90	30–40	15–25	0.2–2.0	0.19–0.21	6.1–8.4	Moderate	High.
100	100	100	80–100	60–80	20–30	5–10	0.63–2.0	0.16–0.18	7.9–8.4	Moderate	High.
100	100	100	95–100	80–90	30–40	15–25	0.2–0.63	0.19–0.21	6.1–8.4	Moderate	High.
100	100	100	90–100	90–100	60–70	30–40	0.06–0.2	0.14–0.16	7.9–8.4	High	High.
100	100	95–100	85–95	65–75	15–25	0–10	0.63–2.0	0.16–0.18	6.1–7.3	Moderate	Low.
100	100	100	90–100	70–80	30–40	15–25	0.06–0.2	0.19–0.21	6.1–7.8	Moderate	Moderate.
100	90–100	85–100	80–95	40–60	15–25	0–10	0.63–2.0	0.14–0.16	7.4–8.4	Moderate	Low.

TABLE 5.—*Estimated engineering*

Soil series and map symbols	Depth to— Bedrock	Seasonal high water table	Depth from surface in typical profile	Classification: Dominant USDA texture	Unified	AASHO
	Feet	*Feet*	*Inches*			
Tyndall:						
Tb, Tc, Td, Tf	>5	3–5	0–60	Very fine sandy loam and fine sandy loam. (Surface 9 to 15 inches silty clay loam in places.)	ML	A–4
Te	>5	3–5	0–40 40–60	Very fine sandy loam Clay	ML CH or MH	A–4 A–7
Valdez:						
Va, Vc	>5	2½–5	0–65	Silt loam	ML	A–4
Vb	>5	2½–5	0–40 40–60	Silt loam Clay	ML CH or MH	A–4 A–7
Willows:						
Wa, Wb, Wc, Wd, Wf, Wg	>5	3–5	0–60	Clay (Silty clay loam surface layer 8 to 20 inches thick in Wa.)	CH	A–7
Marly variant, Wm, Wn	>5	3–5	0–46 46–60	Clay Clay loam	CH or MH CL	A–7 A–6
Yolo:						
Ya	>5	(1)	0–65	Silt loam and silty clay loam	ML	A–4
Yb	>5	(1)	0–60	Silty clay loam	CL	A–6
Zamora: Za	>5	(1)	0–10 10–40 40–60	Loam Clay loam Loam and gravelly loam	ML CL ML or SM	A–4 A–6 A–4

[1] Soil not affected by seasonal high water table to depth of 5 feet.

TABLE 6.—*Engineering*

[Not included in this table, because their characteristics are too variable for engineering use, are the land types Loamy alluvial land (Lm), this series is made up of two or more kinds of soil. The soils in such mapping units may have different properties and limitations, and for

Soil series and map symbols	Suitability as source of— Topsoil	Road fill	Soil features affecting— Road location	Water retention— Embankments
Arbuckle: AaA, AaB	Fair: gravelly loam and clay loam.	Fair to poor to a depth of 36 inches: A–4, A–6. Good below 36 inches: A–2.	Moderate shrink-swell potential; slopes 0 to 5 percent.	Medium compressibility; medium strength; fair to poor stability; fair to good resistance to piping and cracking.
*Balcom: BaD3, BaE2, BaF2, BaG3, BdF2. (For properties of Dibble soil in mapping unit BdF2, refer to the Dibble series.)	Fair: silty clay loam; bedrock at depth of 1 to 4 feet.	Poor: A–6, A–7	Moderate shrink-swell potential; bedrock at depth of 1 to 4 feet; slopes 5 to 75 percent.	Medium compressibility; medium strength; fair to good stability; good resistance to piping and cracking.

properties of soils—Continued

Percentage passing sieve—					Atterberg values		Permeability	Available water holding capacity	Reaction	Shrink-swell potential	Corrosivity (uncoated steel)
3 inches	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Liquid limit	Plastic index					
						Percent	*Inches per hour*	*Inches per inch of soil*	*pH value*		
100	100	90–100	80–90	50–60	10–30	0–10	2. 0–6. 3	0. 15–0. 17	7. 4–9. 0	Low	High.
100	100	90–100	80–90	50–60	10–30	0–10	2. 0–6. 3	0. 15–0. 17	7. 4–9. 0	Low	High.
100	100	100	90–100	75–95	50–70	35–50	0. 06–0. 2	0. 14–0. 16	7. 9–9. 0	High	High.
100	100	100	90–100	60–70	20–30	0–10	0. 63–2. 0	0. 18–0. 20	5. 6–8. 4	Moderate	High.
100	100	100	90–100	60–70	20–30	0–10	0. 63–2. 0	0. 16–0. 18	5. 6–8. 4	Moderate	High.
100	100	100	90–100	75–95	50–70	35–50	0. 06–0. 2	0. 15–0. 17	7. 4–8. 4	High	High.
100	100	100	95–100	90–100	60–70	35–50	0. 06–0. 2	0. 12–0. 14	6. 6–9. 0	High	High.
100	100	100	90–100	85–95	50–60	25–40	0. 06–0. 2	0. 12–0. 14	7. 9–9. 6	High	High.
100	100	100	90–100	70–80	30–40	15–35	0. 2–0. 63	0. 04–0. 06	7. 9–9. 0	Moderate	High.
100	100	100	95–100	80–90	20–30	0–10	0. 63–2. 0	0. 16–0. 18	6. 6–8. 4	Moderate	Low.
100	100	100	95–100	85–95	30–40	15–25	0. 2–0. 63	0. 19–0. 21	6. 6–8. 4	Moderate	Moderate.
100	100	100	85–95	65–75	20–30	0–10	0. 63–2. 0	0. 16–0. 18	6. 1–7. 3	Moderate	Low.
100	100	100	90–100	70–80	30–40	15–25	0. 2–0. 63	0. 19–0. 21	6. 6–7. 8	Moderate	Moderate.
100	90–100	75–90	70–85	40–60	15–25	0–10	0. 63–2. 0	0. 14–0. 16	6. 6–8. 4	Moderate	Low.

[2] Nonplastic.

interpretations

Made land (Ma), Riverwash (Rh), and Rock land (RoG). An asterisk in the first column indicates that at least one mapping unit in this reason, it is necessary to follow carefully the instructions for referring to other series that appear in the first column of this table]

Soil features affecting—Continued			Soil limitations for septic tank filter field	Hydrologic soil group
Water retention—Continued	Agricultural drainage	Irrigation		
Reservoir area				
Moderately slow permeability; slopes 0 to 5 percent.	Moderately slow permeability.	Moderate available water holding capacity; medium intake rate; slopes 0 to 5 percent.	Severe: moderately slow permeability.	B.
Moderately slow permeability; slopes 5 to 75 percent; bedrock at depth of 1 to 4 feet.	Moderately slow permeability; bedrock at depth of 1 to 4 feet.	Low to moderate available water holding capacity; medium intake rate; slopes 5 to 75 percent; bedrock at depth of 1 to 4 feet.	Severe: moderately slow permeability; slopes 5 to 75 percent.	B: BaE2, BaF2, and Balcom part of BdF2. C: BaD3, BaG3.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—		Soil features affecting—	
	Topsoil	Road fill	Road location	Water retention—Embankments
Brentwood: BrA	Fair: silty clay loam.	Poor: A–7	High shrink-swell potential.	Medium to high compressibility; medium to low strength; fair stability; good resistance to piping and cracking.
Capay: Ca, Cb, Cc	Poor: silty clay	Poor: A–7	High shrink-swell potential; Cb and Cc subject to flooding.	Medium compressibility; medium strength; fair to good stability; good resistance to piping and cracking.
Clear Lake: Ch, Ck, Cn	Poor: clay	Poor: A–7	High shrink-swell potential; Cn subject to flooding.	High compressibility; medium to low strength; fair to poor stability; good resistance to piping and cracking.
Climara: CrE2	Poor: clay	Poor: A–7	High shrink-swell potential; slopes 2 to 30 percent; bedrock at depth of 3 to 4½ feet.	High compressibility; low strength; fair to poor stability; good resistance to piping and cracking.
Corning: CtD2, CtE2	Poor: gravelly loam over clay.	Fair to poor to depth of 27 inches: A–4, A–7. Good below 27 inches: A–2.	High shrink-swell potential; slopes 2 to 30 percent.	Slight to high compressibility; high to medium strength; fair to poor stability; good resistance to piping and cracking.
*Dibble: DaF2, DaG2, DbE2, DbF2, DbG2. (For properties of the Millsholm soils in mapping units DbE2, DbF2, and DbG2, refer to the Millsholm series.)	Poor: silty clay and clay.	Poor: A–6, A–7	High shrink-swell potential; slopes 9 to 75 percent; bedrock at depth of 1½ to 3 feet.	Medium compressibility; medium strength; fair to poor stability; good to poor resistance to piping and cracking.
Hillgate: HcA, HcC2, HdA, HdC.	Fair to poor: loam over clay.	Poor: mostly A–6, A–7.	High shrink-swell potential; slopes 0 to 9 percent.	Medium compressibility; medium strength; fair to good stability; good resistance to piping and cracking.
Lang:				
La	Fair to poor: mostly loamy fine sand and fine sand.	Good: A–2	Low shrink-swell potential; water table at depth of 3 to 5 feet.	Slight compressibility; high strength; fair stability; poor resistance to piping and cracking.
Lb, Lc, Ld	Poor: mostly loamy fine sand over clay.	Good to depth of 40 inches: A–2. Poor below 40 inches: A–7.	High shrink-swell potential below depth of 40 inches; water table at depth of 3 to 5 feet; Lc subject to flooding.	Slight compressibility and high strength to depth of 40 inches; high compressibility and low strength in substratum; fair to poor stability; poor resistance to piping and cracking.

interpretations—Continued

Soil features affecting—Continued			Soil limitations for septic tank filter field	Hydrologic soil group
Water retention—Continued	Agricultural drainage	Irrigation		
Reservoir area				
Moderately slow permeability; slopes 0 to 2 percent.	Moderately slow permeability.	High available water holding capacity; moderately slow intake rate.	Severe: moderately slow permeability.	B.
Slow permeability; slopes 0 to 2 percent.	Slow permeability; Cb and Cc subject to flooding.	High available water holding capacity; slow intake rate.	Severe: slow permeability; subject to flooding.	D.
Slow permeability; slopes 0 to 2 percent.	Slow permeability; Cn subject to flooding.	High available water holding capacity; slow intake rate.	Severe: slow permeability.	D.
Slow permeability; slopes 2 to 30 percent; bedrock at depth of 3 to 4½ feet.	Slow permeability; bedrock at depth of 3 to 4½ feet.	Moderate available water holding capacity; slow intake rate; slopes 2 to 30 percent; bedrock at depth of 3 to 4½ feet.	Severe: slow permeability; slopes 2 to 30 percent.	D.
Very slow permeability; slopes 2 to 30 percent.	Very slow permeability	Low available water holding capacity; medium intake rate; slopes 2 to 30 percent.	Severe: very slow permeability; slopes 2 to 30 percent.	D.
Slow permeability; slopes 9 to 75 percent; bedrock at depth of 1½ to 3 feet.	Slow permeability; bedrock at depth of 1½ to 3 feet.	Moderate available water holding capacity; slow intake rate; slopes 9 to 75 percent; bedrock at depth of 1½ to 3 feet.	Severe: slow permeability; slopes 9 to 75 percent.	C.
Very slow permeability; slopes 0 to 9 percent.	Very slow permeability	Low available water holding capacity; medium intake rate; slopes 0 to 9 percent.	Severe: very slow permeability.	D.
Rapid permeability; water table at depth of 3 to 5 feet; slopes 0 to 2 percent.	Rapid permeability; water table at depth of 3 to 5 feet.	Moderate available water holding capacity; moderately rapid intake rate; water table at depth of 3 to 5 feet.	Moderate: water table at depth of 3 to 5 feet.	B, drained; C, undrained.
Rapid permeability to depth of 40 inches; slow permeability in clayey substratum; water table at depth of 3 to 5 feet; slopes 0 to 2 percent.	Rapid permeability to depth of 40 inches; slow permeability in clayey substratum; water table at depth of 3 to 5 feet; Lc subject to flooding.	Moderate available water holding capacity; moderately rapid intake rate; water table at depth of 3 to 5 feet.	Severe: slow permeability in clayey substratum; water table at depth of 3 to 5 feet.	B, drained; C, undrained.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—		Soil features affecting—	
	Topsoil	Road fill	Road location	Water retention—Embankments
Laugenour:				
Lg, Lh	Good	Fair to good: A–4, A–2.	Low shrink-swell potential; Lh subject to flooding.	Slight to medium compressibility; high to medium strength; fair to poor stability; poor resistance to piping and cracking.
Lk	Good	Fair to good to depth of 40 inches: A–4, A–2. Poor below 40 inches: A–6.	High shrink-swell potential below depth of 40 inches; water table at depth of 2 to 5 feet; subject to flooding.	Slight to medium compressibility; high to medium strength; fair to poor stability; poor to good resistance to piping and cracking.
Maria:				
Mb, Mc	Good	Fair to poor: A–4, A–6.	Moderate shrink-swell potential; Mc subject to flooding.	Medium compressibility; medium strength; fair to poor stability; good to poor resistance to piping and cracking.
Md	Good	Fair to poor: A–4, A–6, A–7.	High shrink-swell potential below depth of 40 inches; subject to flooding.	Medium compressibility; medium strength; fair to poor stability; good to poor resistance to piping and cracking.
Marvin: Mf	Poor: silty clay loam over silty clay.	Fair to poor: A–4, A–6, A–7.	High shrink-swell potential.	Medium compressibility; medium strength; fair to poor stability; good to poor resistance to piping and cracking.
Merritt:				
Mk, Mp	Fair to good: silty clay loam over silt loam to fine sandy loam.	Fair to poor: A–4, A–6.	Moderate shrink-swell potential; water table at depth of 1½ to 5 feet.	Medium compressibility; medium strength; fair to poor stability; good to poor resistance to piping and cracking.
Mn, Mo	Poor: silty clay loam over clay.	Fair to poor: A–4, A–6, A–7.	High shrink-swell potential below depth of 42 inches; water table at depth of 3 to 5 feet.	Medium compressibility; medium strength; fair to poor stability; good to poor resistance to piping and cracking.
Millsholm: MrG2	Poor: bedrock at depth of 1 to 1½ feet.	Fair to poor: A–6, A–4.	Moderate shrink-swell potential; bedrock at depth of 1 to 1½ feet; slopes 15 to 75 percent.	Medium compressibility; medium strength; fair to poor stability; good to poor resistance to piping and cracking.
Myers: Ms	Poor: clay	Poor: A–7	High shrink-swell potential.	Medium compressibility; medium strength; fair to good stability; good resistance to piping and cracking.
Omni: Oa, Ob	Poor: silty clay	Poor: A–7	High shrink-swell potential; water table at depth of 2 to 4 feet.	High compressibility; fair to poor stability; low strength; good to poor resistance to piping and cracking.

interpretations—Continued

Soil features affecting—Continued			Soil limitations for septic tank filter field	Hydrologic soil group
Water retention—Continued	Agricultural drainage	Irrigation		
Reservoir area				
Moderately rapid permeability; slopes 0 to 2 percent.	Moderately rapid permeability; unit Lh subject to flooding.	Moderate available water capacity; moderately rapid intake rate; unit Lh subject to flooding.	Slight: Lg. Severe: Lh subject to flooding.	B.
Moderately rapid permeability to depth of substratum; slow permeability in clayey substratum; water table at depth of 2 to 5 feet; slopes 0 to 2 percent.	Moderately rapid permeability to depth of substratum; slow permeability in substratum; water table at depth of 2 to 5 feet; subject to flooding.	Moderate available water holding capacity; moderately rapid intake rate; water table at depth of 2 to 5 feet; subject to flooding.	Severe: water table at depth of 2 to 5 feet; subject to flooding.	D.
Moderate permeability; slopes 0 to 2 percent.	Moderate permeability; unit Mc subject to flooding.	High available water holding capacity; medium intake rate; unit Mc subject to flooding.	Moderate: Mb, moderate permeability. Severe: Mc, subject to flooding.	B.
Moderate permeability to depth of 4 feet; slow permeability in clay substratum; slopes 0 to 2 percent.	Moderate permeability to depth of 4 feet; slow permeability in clay substratum; subject to flooding.	Moderate to high available water holding capacity; medium intake rate; subject to flooding.	Severe: slow permeability.	C.
Slow permeability; slopes 0 to 2 percent.	Slow permeability	High available water holding capacity; slow intake rate.	Severe: slow permeability.	C.
Moderate permeability; slopes 0 to 2 percent; water table at depth of 1½ to 5 feet.	Moderate permeability; water table at depth of 1½ to 5 feet.	High available water holding capacity; slow intake rate; water table at depth of 1½ to 5 feet; unit Mp saline-alkali.	Severe: water table at depth of 1½ to 5 feet.	C.
Slow permeability; water table at depth of 3 to 5 feet; slopes 0 to 2 percent.	Slow permeability; water table at depth of 3 to 5 feet.	High available water holding capacity; slow intake rate; water table at depth of 3 to 5 feet.	Severe: slow permeability; water table at depth of 3 to 5 feet.	C: Mn. B: Mo.
Moderate permeability; slopes 15 to 75 percent; bedrock at depth of 1 to 1½ feet.	Moderate permeability; bedrock at depth of 1 to 1½ feet.	Low available water holding capacity; medium intake rate; slopes 15 to 75 percent; bedrock at depth of 1 to 1½ feet.	Severe: slopes 15 to 75 percent; bedrock at depth of 1 to 1½ feet.	D.
Slow permeability; slopes 0 to 2 percent.	Slow permeability	High available water holding capacity; slow intake rate.	Severe: slow permeability.	D.
Slow permeability; slopes 0 to 2 percent; water table at depth of 2 to 4 feet.	Slow permeability; water table at depth of 2 to 4 feet.	Moderate to high available water holding capacity; slow intake rate; water table at depth of 2 to 4 feet.	Severe: slow permeability; water table at depth of 2 to 4 feet.	C.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—		Soil features affecting—	
	Topsoil	Road fill	Road location	Water retention—Embankments
Pescadero: Pa, Pb, Pc	Poor: silty clay	Poor: A–7	High shrink-swell potential; water table at depth of 2 to 4 feet; Pc subject to flooding.	High compressibility; low strength; fair to poor stability; good resistance to piping and cracking.
Positas: PfE2, PfF2, PfF3	Poor: gravelly loam over gravelly clay.	Fair to poor to depth of 31 inches: A–4, A–7. Good below this depth: A–2.	High shrink-swell potential; slopes 15 to 50 percent.	Slight to medium compressibility; high to medium strength; fair stability; poor to good resistance to piping and cracking.
Reiff: Ra, Rb	Good: Ra, Fair: Rb, gravelly loam.	Fair: A–4	Low shrink-swell potential.	Medium compressibility; medium strength; poor stability; poor resistance to piping and cracking.
Rincon: Rg	Poor: silty clay loam over heavy silty clay loam.	Poor: A–7, A–6	High shrink-swell potential.	Medium compressibility; medium strength; fair to good stability; good resistance to piping and cracking.
Riz: Rk, Rn	Poor: loam over clay.	Fair to poor: A–4, A–7.	High shrink-swell potential; unit Rn subject to flooding.	Medium compressibility; medium strength; fair to poor stability; good to poor resistance to piping and cracking.
Sacramento: Sa, Sb, Sc, Sd, Se, Sf, Sg.	Poor: mostly clay	Poor: A–7	High shrink-swell potential; water table at depth of 3 to 5 feet; Se and Sg subject to flooding.	High compressibility; low strength; poor stability; good to poor resistance to piping and cracking.
San Ysidro: Sh	Poor: loam over clay.	Fair to poor: A–4, A–6, A–7.	High shrink-swell potential.	Medium to high compressibility; medium to low strength; poor stability; poor resistance to piping and cracking.
*Schorn: SkD, SkE2, SkF2, SlD, SmD, SmE2, SmF2. (For properties of Balcom soils in mapping units SmD, SmE2, and SmF2, refer to the Balcom series.)	Poor: clay and cobbly clay.	Poor: A–7	High shrink-swell potential; bedrock at depth of 2 to 5 feet; slopes 2 to 50 percent; cobbly in unit SlD.	High compressibility; low strength; fair to poor stability; good resistance to piping and cracking.
Soboba: Sn	Poor: very gravelly loamy sand.	Good: A–1	Low shrink-swell potential; very gravelly.	Slight compressibility; high strength; fair stability; poor resistance to piping and cracking.

See footnote at end of table.

interpretations—Continued

Soil features affecting—Continued			Soil limitations for septic tank filter field	Hydrologic soil group
Water retention—Continued	Agricultural drainage	Irrigation		
Reservoir area				
Slow permeability; slopes 0 to 2 percent; water table at depth of 2 to 4 feet.	Slow permeability; water table at depth of 2 to 4 feet; Pc subject to flooding.	Moderate to high available water holding capacity; slow intake rate; water table at depth of 2 to 4 feet; Pc subject to flooding; Pb saline-alkali.	Severe: slow permeability; water table at depth of 2 to 4 feet.	D.
Very slow permeability; slopes 15 to 50 percent.	Very slow permeability	Low available water holding capacity; medium intake rate; slopes 15 to 50 percent.	Severe: very slow permeability; slopes 15 to 50 percent.	D.
Moderately rapid permeability; slopes 0 to 2 percent.	Moderately rapid permeability.	Moderate to high available water holding capacity; medium intake rate.	Slight	B.
Slow permeability; slopes 0 to 2 percent.	Slow permeability	High available water holding capacity; slow intake rate.	Severe: slow permeability.	C.
Very slow permeability; slopes 0 to 2 percent.	Very slow permeability; Rn subject to flooding.	Low available water holding capacity; medium intake rate.	Severe: very slow permeability.	D.
Slow permeability; slopes 0 to 2 percent; water table at depth of 3 to 5 feet.	Slow permeability; water table at depth of 3 to 5 feet; Se and Sg subject to flooding.	High available water holding capacity; slow intake rate; water table at depth of 3 to 5 feet; Se and Sg subject to flooding.	Severe: slow permeability; water table at depth of 3 to 5 feet.	C: Sa, Sb, Sc, Sd. D: Se, Sf, Sg.
Very slow permeability; slopes 0 to 2 percent.	Very slow permeability	Low available water holding capacity; medium intake rate.	Severe: very slow permeability.	D.
Slow permeability; slopes 2 to 50 percent; bedrock at depth of 2 to 5 feet; SlD is cobbly.	Slow permeability; bedrock at depth of 2 to 5 feet.	Low to moderate available water holding capacity; slow intake rate; slopes 2 to 50 percent; bedrock at depth of 2 to 5 feet.	Severe: slow permeability; slopes 2 to 50 percent.	D.
Very rapid permeability; slopes 0 to 2 percent.	Very rapid permeability	Low available water holding capacity; rapid intake rate.	Slight [1]	A.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—		Soil features affecting—	
	Topsoil	Road fill	Road location	Water retention—Embankments
Sycamore: So, Sp, Sr, Ss, St	Fair: silt loam or silty clay loam over loam.	Poor to fair: A–4, A–6.	Moderate shrink-swell potential; water table at depth of 3 to 5 feet; unit Sr subject to flooding.	Medium compressibility; medium strength; fair to poor stability; good to poor resistance to piping and cracking.
Su, Sv, Sw	Poor: silty clay loam over silty clay.	Poor: A–6, A–7	Moderate to high shrink-swell potential; water table at depth of 3 to 5 feet; unit Sw subject to flooding.	Medium to high compressibility; medium to low strength; fair stability; good resistance to piping and cracking.
Tehama: TaA, TaB	Fair: loam over clay loam.	Fair to poor: A–4, A–6.	Moderate shrink-swell potential; slopes 0 to 5 percent.	Slight to medium compressibility; high to medium strength; fair to poor stability; good to poor resistance to piping and cracking.
Tyndall: Tb, Tc, Td, Tf	Fair: moderately alkaline to strongly alkaline; very fine sandy loam.	Fair: A–4	Low shrink-swell potential; water table at depth of 3 to 5 feet; unit Td subject to flooding.	Medium compressibility; medium strength; poor stability; poor resistance to piping and cracking.
Te	Fair to poor: moderately alkaline to strongly alkaline; very fine sandy loam over clay.	Fair to poor: A–4, A–7.	High shrink-swell potential; water table at depth of 3 to 5 feet.	Medium to high compressibility; medium to low strength; poor stability; poor resistance to piping and cracking.
Valdez: Va, Vc	Good: silt loam	Fair: A–4	Moderate shrink-swell potential; water table at depth of 2½ to 5 feet; unit Vc subject to flooding.	Medium compressibility; medium strength; poor stability; poor resistance to piping and cracking.
Vb	Fair: silt loam over clay.	Fair to poor: A–4, A–7.	High shrink-swell potential; water table at depth of 2½ to 5 feet.	Medium to high compressibility; medium to low strength; poor stability; good to poor resistance to piping and cracking.
Willows: Wa, Wb, Wc, Wd, Wf, Wg.	Poor: clay	Poor: A–7	High shrink-swell potential; water table at depth of 3 to 5 feet; Wf and Wg subject to flooding.	High compressibility; medium to low strength; fair to poor stability; good resistance to piping and cracking.
Marly variant: Wm, Wn.	Poor: clay	Poor: A–6, A–7	High shrink-swell potential; water table at depth of 3 to 5 feet.	High compressibility; low strength; fair to poor stability; good to poor resistance to piping and cracking.

interpretations—Continued

Soil features affecting—Continued			Soil limitations for septic tank filter field	Hydrologic soil group
Water retention—Continued	Agricultural drainage	Irrigation		
Reservoir area				
Moderate to moderately slow permeability; slopes 0 to 2 percent; water table at depth of 3 to 5 feet.	Moderate to moderately slow permeability; water table at depth of 3 to 5 feet; unit Sr subject to flooding.	High available water holding capacity; moderately slow intake rate; water table at depth of 3 to 5 feet; unit Sr subject to flooding.	Severe: St, So, Sr, Ss; moderately slow permeability; water table at depth of 3 to 5 feet. Moderate: Sp, moderate permeability.	B: St, Sp. C: So, Sr, Ss.
Slow permeability; slopes 0 to 2 percent; water table at depth of 3 to 5 feet.	Slow permeability; water table at depth of 3 to 5 feet; unit Sw subject to flooding.	High available water holding capacity; slow intake rate; water table at depth of 3 to 5 feet; unit Sw subject to flooding.	Severe: slow permeability; water table at depth of 3 to 5 feet.	C.
Slow permeability; slopes 0 to 5 percent.	Slow permeability	High available water holding capacity; medium intake rate; slopes 0 to 5 percent.	Severe: slow permeability.	C.
Moderately rapid permeability; slopes 0 to 2 percent; water table at depth of 3 to 5 feet.	Moderately rapid permeability; water table at depth of 3 to 5 feet; unit Td subject to flooding.	High available water holding capacity; medium intake rate; water table at depth of 3 to 5 feet; unit Td subject to flooding.	Severe: Tb, Td, Tf water table at depth of 3 to 5 feet. Slight: Tc.	B: Tc. C: Tb, Td, Tf.
Slow permeability; slopes 0 to 2 percent; water table at depth of 3 to 5 feet.	Slow permeability; water table at depth of 3 to 5 feet.	High available water holding capacity; slow intake rate; water table at depth of 3 to 5 feet.	Severe: slow permeability; water table at depth of 3 to 5 feet.	C.
Moderate permeability; slopes 0 to 2 percent; water table at depth of 2½ to 5 feet.	Moderate permeability; water table at depth of 2½ to 5 feet; unit Vc subject to flooding.	High available water holding capacity; medium intake rate; water table at depth of 2½ to 5 feet; unit Vc subject to flooding.	Severe: water table at depth of 2½ to 5 feet.	C.
Slow permeability; slopes 0 to 2 percent; water table at depth of 2½ to 5 feet.	Slow permeability; water table at depth of 2½ to 5 feet.	High available water holding capacity; medium intake rate; water table at depth of 2½ to 5 feet.	Severe: slow permeability; water table at depth of 2½ to 5 feet.	C.
Slow permeability; slopes 0 to 2 percent; water table at depth of 3 to 5 feet.	Slow permeability; water table at depth of 3 to 5 feet; units Wf and Wg subject to flooding.	High available water holding capacity; slow intake rate; water table at depth of 3 to 5 feet; Wf and Wg subject to flooding; Wa, Wc, and Wd are alkaline.	Severe: slow permeability; water table at depth of 3 to 5 feet.	D.
Slow permeability; slopes 0 to 2 percent; water table at depth of 3 to 5 feet.	Slow permeability; water table at depth of 3 to 5 feet.	High available water holding capacity; slow intake rate; water table at depth of 3 to 5 feet; Wn saline-alkali.	Severe: slow permeability; water table at depth of 3 to 5 feet.	D.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—		Soil features affecting—	
	Topsoil	Road fill	Road location	Water retention— Embankments
Yolo: Ya, Yb	Good: Ya. Fair: Yb, silty clay loam.	Fair to poor: A–4, A–6.	Moderate shrink-swell potential.	Medium compressibility; medium strength; fair to poor stability; good to poor resistance to piping and cracking.
Zamora: Za	Fair: loam over clay loam.	Fair to poor: A–4, A–6.	Moderate shrink-swell potential.	Medium compressibility; medium strength; fair to poor stability; good to poor resistance to piping and cracking.

[1] Very rapid permeability of soil may contribute to contamination of ground water supplies.

Depth to seasonal high water table, expressed in feet, gives the observed or estimated range of depth from the surface to the shallowest level reached by a seasonal water table.

According to the system used by soil scientists of the U.S. Department of Agriculture, the basic textural class name is based on the size distribution of the material smaller than 2.0 millimeters in diameter. The material smaller than 2.0 millimeters in diameter is classified into three size fractions—sand, silt, or clay. The percentage of the three size fractions determines the textural classification.

The columns headed "Percentage passing sieve" show the estimated range in percentage of material passing sieve numbers 4, 10, 40, and 200. It should not be assumed that all samples of a specific soil will fall within the range of the typical profile shown or that the engineering classification will be the same as shown. The range of estimated physical properties is broad for some of the soils, and as a result the soils may be in several classification groups.

Soil permeability is the ability of a soil to transmit air or water. The rates given in table 5 are for the soils as they occur in place.

The available water holding capacity, expressed in inches per inch of soil depth, is the capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between amount of soil water at field capacity and the amount at wilting point.

Reaction as shown in table 5 is the estimated range in pH values for each major horizon as determined in the field. It indicates the acidity or alkalinity of the soils. A notation of pH 7.0, for example, is neutral. A lower value indicates acidity and a higher value indicates alkalinity.

Salinity is not given in table 5 because few of the soils in Yolo County are saline. The Merritt, Pescadero Willows, and Willows marly variant series, however, are considered moderately to severely saline. Salinity affects stability, corrosivity, and the suitability of a soil for crop production.

The shrink-swell potential, rated low, moderate, or high in table 5, is that quality of the soil that indicates the expected volume change with change in content of moisture. It is estimated on the basis of the kind and amount of clay in the soil layers. In general, soils that have a high content of clay have high shrink-swell potential (fig. 9), and coarser textured soils that contain less clay have low shrink-swell potential. Much damage to building foundations, roads, and other structures is caused by the shrinking and swelling of soils as they become dry or wet.

The corrosivity ratings of low, moderate, or high indicate the potential damage to uncoated steel structures through chemical action that dissolves or weakens the structural material. Corrosivity correlates with the physical, chemical, and biological characteristics of the soil (*19*). The soil was evaluated in an undisturbed state. The corrosion probability generally is greater for extensive installations that intersect soil boundaries or soil horizons than for installations in one kind of soil or soil horizon. Compacting the soil by loading of buildings or otherwise can decrease the permeability of soil and increase the probability of corrosion. Mechanical agitation or excavation that results in mixing of soil horizons also is likely to accelerate corrosivity. In addition corrosivity, particularly for steel pipes or other structures, is likely to be increased by electrical leaks from underground cables and by electrical charges because of the use of metals of dissimilar composition.

Engineering interpretations

Table 6 rates the soils according to their suitability as a source of topsoil and road fill. It also gives features that affect the suitability of the soils as sites for roads, water retention structures, agricultural drainage, and irrigation systems. Also given are the limitations of the soils for use as septic tank filter fields. Then the hydrologic soil group is given. The soil features listed are those that are important for the construction, operation,

interpretations—Continued

Soil features affecting—Continued			Soil limitations for septic tank filter field	Hydrologic soil group
Water retention—Continued	Agricultural drainage	Irrigation		
Reservoir area				
Moderate to moderately slow permeability; slopes 0 to 2 percent.	Moderate to moderately slow permeability.	High available water holding capacity; moderately slow intake rate.	Moderate: Ya, moderate permeability. Severe: Yb, moderately slow permeability.	B.
Moderately slow permeability; slopes 0 to 2 percent.	Moderately slow permeability.	High available water holding capacity; medium intake rate.	Severe: moderately slow permeability.	B.

***Figure 9.*—Cracking of Capay silty clay that has a high shrink-swell potential.**

or maintenance of the structure or practice shown. They should be taken into account in considering a soil for the stated use. Loamy alluvial land, Made land, Riverwash, and Rock land are not listed in the table. These land types are too variable in characteristics to be rated or otherwise are not suitable for engineering.

Because the estimates in table 6 are for a typical profile, some variation from the values given should be expected. A description of a typical profile for each series in Yolo County is in the section "Descriptions of the Soils."

The ratings used for the soils as a source of topsoil and road fill are *good*, *fair*, and *poor*. Ratings of the soils as a source of topsoil are for use on slopes, shoulders of roads, and along ditches. The ratings are according to suitability of the soils for growth of vegetation.

Suitability ratings as a source of sand or gravel are not given in table 6, because few soils in Yolo County are suitable for this use. Soboba soils are a good source of sand and gravel. Corning and Positas soils are a fair source of sand and gravel, though they contain a few silty fines. Riverwash has a minimum overburden and is an excellent source of sand and gravel for use in concrete, and materials from Cache Creek are a good source of high quality sand and gravel.

Suitability of the soils for use as a source of road fill indicate the performance of the soil material if moved from borrow areas and used as fill for subgrade. The estimates are based on the AASHO classification and on judgment of the appropriate soil properties. Ratings used are *good*, *fair*, and *poor*.

The location of roads is influenced by features of the undisturbed soil that affect construction and maintenance of unsurfaced roads. Some of the features that adversely affect the location of roads are slope, shrink-swell potential, depth to bedrock and water table, and hazard of flooding.

In evaluating the use of the soil for water-retention structures, soil features that affect both the embankment and floor, or reservoir, need to be considered. Water retention embankments serve as dams (fig. 10). Among the soil features affecting the use of soils for constructing embankments are strength, piping, cracking, stability, compressibility, depth to bedrock, and shrink-swell potential. The reservoir area is affected mainly by loss of water through seepage. Consequently, the soil features affecting the floor are those that influence seepage, such as permeability, slope, and depth to bedrock or to the water table.

Agricultural drainage is influenced by the need for drainage and the soil features that relate to the effectiveness of a drainage system. Some soil features that affect the installation and performance of surface and subsurface drainage practices are slope, permeability, hazard of flooding, and depth to bedrock and to the water table.

Suitability of a soil for irrigation is based chiefly on its water-holding capacity, permeability, drainage, flooding, intake rate, depth to bedrock, depth to water table, and slope. Also considered is the presence of salts and alkali.

Use of a soil as a septic tank filter field is related to the ability of the soil to uniformly absorb sewage effluent in a reasonable period of time. Septic tank filter fields are affected mainly by permeability, slope, location of the water table, and hazard of flooding (*30*). The degree of limitation and the principal reasons for moderate or severe limitations are given. It must be considered that a porous soil that has a slight limitation may present a contamination hazard to underground water supplies. In this survey, sewage lagoons are considered as water retention structures. Features given for "Embankments" and "Reservoir Area" relate to the ability of the soil to accommodate shallow lakes to hold sewage for the time required for bacterial decomposition. The suitability of a soil for use as a floor for the impoundment and to provide material for the embankment also should be taken into consideration.

Engineers and soil scientists have classified the soil series in the county into four hydrologic groups. The grouping is based on estimates of the intake of water during the latter part of a storm of long duration, after the soil profile is wet and has an opportunity to swell, without the protective effect of any vegetation. The grouping is tentative and subject to change as further data and experience are gained. The four groups are:

A. Soils that have a high infiltration rate even when thoroughly wetted. These soils have a high rate of water transmission and low runoff potential. They are deep, are well drained or excessively drained, and consist chiefly of sand, gravel, or both.

B. Soils that have a moderate infiltration rate when thoroughly wetted. These soils have a moderate rate of water transmission and moderate runoff potential. They are moderately deep or deep, are moderately well drained or well drained, and are medium textured to moderately coarse textured.

Figure 10.—**Reservoir constructed in a Balcom silty clay loam.**

C. Soils that have a slow infiltration rate when thoroughly wetted. These soils have a slow rate of water transmission and high runoff potential. They have a layer that impedes downward movement of water, or they are moderately fine textured or fine textured and have a slow infiltration rate.

D. Soils that have a slow infiltration rate when thoroughly wetted. The rate of water transmission is very slow, and runoff potential is very high. In this group are (1) clay soils that have high shrink-swell potential; (2) soils that have a permanent high water table; (3) soils that have a claypan or clay layer at or near the surface; and (4) soils that are shallow over nearly impervious material.

Formation, Morphology, and Classification of Soils

In this section the factors that affect the formation of the soils in Yolo County are discussed, and important processes in the morphology of the soils are described. Then the classification of the soils by higher categories is given.

Factors of Soil Formation [6]

Soil is a natural formation on the surface of the earth in which plants grow; it is composed of organic and mineral material. Soils differ in their appearance, combination, productivity, and management requirements in different localities and even within short distances. The five soil forming factors that cause soils to differ are parent material, relief, climate, plants and animals, and time. The relative effect of each of these factors varies from one soil to another.

The processes of soil formation are quite complex. Their influence and relationship are more easily described by relating soils within areas of a similar landform or geomorphic unit. In the paragraphs that follow, the climate is described separately first, and then the factors of parent material, relief, time, and plants and animals are considered in the relationship of the soils within geomorphic units.

Climate

In Yolo County the climate is fairly uniform from one locality to another. The effect of climate on different soils varies because of its complex interreactions with other factors, but some properties are common to many soils because of the similarity in climate.

Yolo County is warm to hot and dry in summer and moderately cool and moist in winter. The average temperature at Woodland is 45.9° F. in January and 77.1° F. in July. Annual rainfall in the county ranges from 16 to 24 inches, and 90 percent of it falls during the months of November through April. The rainfall is heavy at times during winter storms.

During the rainy period the soils become saturated and lose moisture through runoff or deep percolation. The soils rarely freeze. In most years, soil moisture in the uppermost 20 inches falls below the wilting point late in May or during June. The soils become dry and remain dry until the fall rains.

Data from soil moisture calculations at Woodland (*15*) and Sacramento (*2*) show that from 3.0 to 5.0 inches of moisture not lost by evapotranspiration during the winter months on a soil that stores 4 inches of moisture available to plants is lost by runoff or by percolation. Soils that have a greater water-holding capacity than this are common in the county, but they have less surplus moisture for percolation except during the wetter years.

The small amounts of surplus moisture presently available prevent active leaching of the soils. The rate of redistribution of carbonates and translocation of clays by leaching therefore is slow. Most of the soils have a good supply of bases, and many of the soils lack prominent argillic horizons. The alternate wet and dry periods cause soils high in montmorillonitic clays to shrink and swell. Wide cracks develop in summer in such soils as those of the Capay series. The sloughing of soil from the surface horizons into cracks mixes the surface soil material with the horizons below and restricts textural differentiation in the profile.

The warm temperature when the soils are moist and the generally warm temperature throughout the year provide an environment for rapid decomposition of organic matter and soil minerals. The soils also are not subject to freezing and thawing, and this is one of the reasons why the surface layer of the soils is not well granulated. The soils are dry to a depth of more than 20 inches, unless they are irrigated for several months in summer. During this dry period many biological and chemical processes are retarded. Most of the soils have a surface layer that is massive and is crusted and hard when dry but is friable when moist.

Soil formation by geomorphic units

Yolo County lies within the Great Valley province. This province includes the Sacramento and San Joaquin Valleys and a small part of the Coast Ranges, which is a series of mountain ranges adjacent to the California coast (*12*). The Coast Ranges parallel the Great Valley on the west. Yolo County is in five separate geomorphic units (*18*). These are (1) flood plains and natural levees; (2) flood basins; (3) low alluvial plains, fans, and terraces; (4) low hills and dissected terraces, and (5) uplands of the Coast Ranges. The relationship of the soil-forming factors varies within each unit.

FLOOD PLAINS AND NATURAL LEVEES

The flood plains and natural river levees are mainly along the Sacramento River. Small areas also occur in narrow areas along Putah Creek and Cache Creek.

The Sacramento River forms the eastern boundary of Yolo County. Its channel is 600 or more feet wide and has broad, gentle bends and fairly long straight reaches. The river is confined by narrow, artificial levees and dikes and by broader, natural levees that slope gently away from the river. The river surface is

[6] By GRANT M. KENNEDY, soil specialist, Soil Conservation Service.

as high as the flood basins that lie beyond the levees or may be higher. Elevation of the river channel is low enough that tidal effects have been observed at Sacramento. At present, artificial levees protect most of the soils from frequent flooding. Most of the soils originally were more poorly drained than at present, but because drainage has been provided, they now range from well drained to somewhat poorly drained or poorly drained. The water table fluctuates according to changes in streamflow.

The alluvium that makes up the flood plains and natural levees is mostly moderately coarse textured to moderately fine textured. The sediment laid down by the Sacramento River is especially heterogeneous because the minerals originated from a variety of sources. The most recent deposits were laid down when hydraulic mining in the area choked the river channels with debris. At this time millions of cubic yards of material from the foothills of the Sierra Nevada was dumped into the upper tributaries of the Sacramento River and carried in suspension into the river. As a result, the tailings encroached in valleys and filled riverbeds (*17*). Sediment is still accumulating from these sources, as well as from more recent sources.

The natural vegetation on the flood plains and natural levees was mostly a jungle of cottonwood trees, willows, and grapevines. A few small tracts of undeveloped land along the Sacramento River still have this kind of cover.

Soils of the Lang, Laugenour, Maria, Sycamore, Tyndall, and Valdez series formed on flood plains and natural levees. These soils have few prominent morphological features. They are distinguished mainly by differences in the texture of their control section. Lang soils are sandy, Laugenour and Tyndall soils are sandy loams, Sycamore and Maria soils are silty, and Valdez soils consist of stratified silt and fine sand. The Tyndall and Sycamore soils have been in place long enough to accumulate organic matter that has appreciably darkened their surface horizon. The Lang, Laugenour, Maria, and Valdez soils consist of material so recently deposited that the surface horizon is the same pale color as the parent alluvium. The subsoil and substratum of these soils have mottles of high chroma because of a fluctuating water table. The Valdez soils have pronounced platy structure. The plates are coated with yellowish-red and olive films and the soil material has the appearance of slickens.

FLOOD BASINS

Many of the flood basins are large and occur west of the Sacramento River between the natural levees and the low alluvial plains to the west. Several smaller isolated basins occur on the alluvial plains where the land surface was slightly depressed or where drainage has been blocked by small ridges. Colusa basin in the north and the Yolo basin, which extends from east of Woodland southward to the Solano County line, are two large basins. One of the smaller more significant basins occurs on the alluvial plains in the south-central part of the County in the Capay-Clear Lake association. Minor streams that flow from the Coast Range eastward empty into the basins.

The basins are nearly level and contain small depressions and low ridges formed by tributaries that empty into the basins. A ridge formed by Cache Creek extends nearly to Knights Landing on the Sacramento River and separates the Colusa basin and the Yolo basin. The Plainfield ridge extends north and south from Cache Creek to Putah Creek. It partly blocks drainage to the east, and it could have been a factor in the formation of the isolated basin in the south-central part of the county. Along their western limit the basins gradually merge with the alluvial plains and form the rim of the basin. Here the ground elevation is slightly higher, or natural drainage was somewhat better, than in the basin itself.

Originally, when the Sacramento River and its tributaries overflowed, it filled the basins. As the floods subsided the water drained slowly back into the main channels. Artificial levees now prevent flooding. Parts of the natural basins are diked and form a channel for the purpose of carrying floodwater. These channels are known as bypasses, where part of the riverflow is diverted from its natural channel during flood stage.

Before reclamation, the basins were swampy and in places had a cover of marsh grasses and tules. Along the basin rims the vegetation was similar to the vegetation on the prairies and consisted mostly of perennial grasses. In the smaller isolated basins on the alluvial plains, the vegetation was mostly perennial grasses similar to that on the basin rims.

The parent material of the soils in the basins is rather recent in geologic time. It consists primarily of clay and silt that settled out of suspension from slack water left after floods. In the bypass areas, fresh sediment is still being deposited in layers of pale-colored silt and clay and forms an overwash. The overwash contrasts with the darker colored underlying soils on the original surface of the basin.

The soils in the basins originally were very poorly drained to somewhat poorly drained. Drainage has been altered, however, by reclamation works and structures, and in some places by natural processes. The poor drainage favored the reduction of iron compounds, particularly in the swampy areas.

Soils of the Capay, Clear Lake, Marvin, Merritt, Omni, Pescadero, Sacramento, and Willows series are in the flood basins. The Capay and Marvin soils are at somewhat higher elevations than the other soils on the basin rims, and soils of the Pescadero and Willows series are on the basin rims at slightly lower elevations. The Clear Lake, Omni, and Sacramento soils occur at the lower elevations in the basins. The Merritt soils, associated with the soils of the Sacramento and Omni series, were deposited by moving water. Merritt soils formed in silty alluvium, but the Sacramento and Omni soils formed in clay.

All of the basin soils have a surface layer that is high in organic matter and is dark colored. The organic matter accumulated from the dense vegetative cover of marsh grasses and tules. Laboratory data show that the Ap horizon in the Sacramento soils is about 3.5 percent organic matter. The content of organic matter decreases with depth, but it is more than 1 percent to a depth of 48 inches. Colors in these soils have low chromas. The soils are mottled, and they have an olive or gleyed subsoil. The ground water in the basins carries carbonates, and these are located in the profile in relation to the position of a past permanent water table. The Omni and Merritt soils are calcareous at or near the surface. In these soils lime was concentrated in the soil from the capillary fringe of a permanent high water table. Sacramento soils are not so calcareous as Omni soils and lime occurs at a greater depth. Clear Lake soils formed under an intermittent high water table that drops to as low as 4 to 10 feet below the surface during the dry season.

The Capay, Marvin, Pescadero, and Willows soils occur on the basin rims and formed under somewhat better drainage than the Merritt, Omni, and Sacramento soils. All of these soils formed in fine-textured alluvium, except for the Marvin and Pescadero soils, and they formed in silty clay loam alluvium. Except for differences in color, the Capay and Willows soils have few distinct morphological features. Because of their recent origin and high shrink-swell potential, argillic horizons are lacking. The Marvin and Pescadero soils have somewhat less shrink-swell potential and have developed argillic horizons. The Willows and Pescadero soils are affected by sodium, which may be related to a combination of ground water, content of organic matter, and anaerobic conditions (*31*).

The vegetation on the Capay and Pescadero soils was similar to that of prairies. It was favorable for accumulations of moderate amounts of organic matter.

Because the soils of the basins are nearly level, are near inexpensive irrigation water, and are slowly permeable, they are often used for growing rice. The soils in fields used for rice have prominent reddish-brown mottles to a depth of about 20 inches. These mottles remain in the soil for years after use of the fields for rice is discontinued and other crops are grown on the soil.

Natural drainage in the basins has been improved. Lowering the water table and protecting the soils from overflow have permitted the clays in the basins to become dry to a greater depth. In addition the filling of cracks by tillage has accelerated the self-churning action of these soils.

ALLUVIAL PLAINS, LOW FANS, AND LOW TERRACES

The alluvial plains, fans, and low terraces lie west of the basins. They occupy a narrow area that extends from north to south throughout the county. The area is about 2 miles wide near Dunnigan and widens as it extends southward to the county line near the town of Winters. It projects westward as it extends between 7 and 10 miles up Cache Creek in Capay Valley and northward around the south end of the hills at Dunnigan to include Hungry Hollow (*18*). The relief is that of a very gently sloping plain that slopes toward the east. A few knolls project above the plain, and a few stream channels traverse the plain. The knolls are not steep, and the channels are not deeply incised.

This geomorphic unit formed as the streams eroded the adjacent Coast Ranges and low hills and high terraces. The streams continually shifted their drainage courses as they deposited their sediment. The older alluvium was left as low terraces surrounded by younger alluvium. In places differences in relief between the two are not readily apparent.

The source of most of the deposits on the alluvial plains, low fans, and terraces is old marine sediment from the adjacent hills and Coast Ranges (*10*, *11*). The calcareous shale and fine-grained sandstone are a source of material that has a high content of silt and that contains some carbonates. In places the sediment came from high gravelly terraces that were dissected and the material redeposited as gravelly alluvium.

Dense oak forest once covered the plains along Cache and Putah Creeks and their alluvial fans (*8*). Later more open stands of oak and perennial grasses covered the higher fans and low terraces (*7*).

Soils of the alluvial plains, low fans, and terraces are the Arbuckle, Brentwood, Reiff, Yolo, and Zamora that formed in young alluvium and the Hillgate, Rincon, San Ysidro, and Tehama that formed in older alluvium. The Brentwood, Yolo, and Zamora soils are high in content of silt. Reiff soils are sandy loams and Arbuckle soils are gravelly. The Yolo, Brentwood, and Reiff soils formed under a dense oak forest. Because of the resulting accumulation of organic matter, these soils have thick, dark-colored upper horizons.

The soils within this geomorphic unit are not old in geological terms. Most of the landscapes evolved since Pleistocene time. The Hillgate, Rincon, San Ysidro, Tehama, and Zamora soils have developed argillic horizons. The older alluvium, however, has had sufficient time to develop finer textured horizons, as in the Hillgate, Rincon, and San Ysidro soils, through the translocation of silicate clays. There is only a slight clay increase from the A to the B horizon in the Rincon soils. In the Hillgate and San Ysidro soils, which have abrupt boundaries, there is more than a 20 percent clay increase from the A horizon to the B horizon. The Tehama soils also have abrupt boundaries and more than a 20 percent increase from the A horizon to the B horizon, but they have less than 35 percent clay in the B horizon. The Zamora soils formed in younger alluvium. They have only a slight clay increase between the A horizon and the B horizon and have a clear boundary between these horizons.

The soils in this geomorphic unit for the most part have been farmed intensively. Many of the soils have been altered by land leveling and have been irrigated for many years. The surface layers have been mixed with material from the underlying layers, but in general, the cuts and fills have been shallow. Yolo, Reiff, and Brentwood soils have few morphological features other than a thick dark surface layer. After alteration, they are still similar morphologically to those soils that have little soil disturbance other than smoothing or plowing. These soils were mapped and classified as they occurred before leveling. The adding of such soil amendments as sugar beet time, fertilizer, and insecticides, and the formation of tillage pans have altered physical and chemical properties in many of these soils. These anthropic influences are important considerations in soil use and management and will significantly affect formation of the soils in the future.

LOW HILLS AND DISSECTED TERRACES

The soils of the low hills and dissected terraces parallel and rise fairly abruptly above the alluvial plains, fans, and low terraces to form the western boundary of the county. This geomorphic unit consists of the hills at Dunnigan north of Cache Creek and extends to the Colusa County line and the foothills of the Coast Range that are south of Cache Creek and extend to the Solano County line. Included are a few knolls that project above the valley plain west and south of the city of Woodland in an area known as Plainfield ridge (*18*).

The soils on hills of this unit formed in material from the Tehama Formation (*10*, *11*). This formation consists of interbedded fine-grained sand, silt, and clay that are compacted but not cemented. On the terraces the soils formed in material from poorly sorted gravelly and cobbly alluvium of the Red Bluff Formation, which overlies the Tehama Formation. Several cycles of gentle uplifting followed by erosion have formed the hilly and rolling relief and level to sloping terrace cappings. The native vegetation was open perennial grasses and open stands of oak at the higher elevations (*7*). The perennials have been replaced by annual grasses and forbs.

The Balcom and Sehorn soils formed in material from the Tehama Formation. Balcom soils are steeper than the Sehorn. Geologic erosion of the relatively soft sediment has about kept pace with soil formation. As a result, the Balcom soils are shallow to deep to soft calcareous sandstone and shale. They have not been in place long enough for distinct horizons to form. The less sloping Sehorn soils are on foot slopes. These soils formed in fine-textured material. Because of their position downslope, they receive more moisture than the Balcom soils, and have more vegetative cover. The combination of more vegetative cover, gentler slopes, more stable soil conditions, and adequate moisture for weathering have been factors that contributed to forming the deeper solum of the Sehorn soils.

In the process of geologic erosion, remnants of the Red Bluff Formation were left as sloping to nearly level terraces. These terraces resisted complete removal by erosion partly because of the resistance to erosion of their cobbly and gravelly surface, a feature inherited from their parent material. These are some of the older land surfaces in Yolo County. The soils here have had more time for intensive weathering and translocation of silicate clays than other soils within the county.

The Corning and the Positas soils formed on the terraces. The Corning and Positas soils have a subsoil of clay and gravelly clay and an abrupt increase of clay from the A horizon to the Bt horizon. The Corning soils have a red and reddish-yellow clay Bt horizon. The Positas soils have a brown A horizon and a yellowish-red and reddish-brown gravelly and very gravelly clay Bt horizon. The cobblestones and gravel contain many fragments of chert, quartzite, and other siliceous metamorphic rocks. These materials are highly resistant to weathering. No soil has formed from this material, even though it has been subject to weathering for a long period.

Grain has been grown on some of the soils on the low hills and dissected terraces. Erosion has been accelerated by tillage because of the steep slope, shallow soil depth, and other unfavorable soil conditions. Erosion is particularly noticeable on the Balcom soils. White calcareous material is exposed in numerous spots, and in particular on ridge crests where erosion has truncated the soil profile to expose the parent material.

UPLANDS OF THE COAST RANGE

The uplands of the Coast Range unit consist of a narrow segment of rugged terrain parallel to the western boundary of the county. The areas consist of several highly northwestward trending ridges and intervening narrow valleys and steep uplands (*10*, *11*). Drainage follows the valleys, which parallel the ridges, and then cut eastward to drain toward the Sacramento Valley. Elevation ranges from 2,500 to 3,000 feet along the crest of the ridge that forms the Napa County boundary to the west. The bedrock consists mostly of interbedded shale and sandstone that have been folded and faulted. Oak and grass and open to thick stands of chaparral make up the vegetation (*7*).

The underlying rocks are old geologically. The soils, however, are of recent origin, because since Pleistocene times erosion has been continuous in the Coast Range.

The Dibble and Millsholm soils are in this geomorphic unit. Both are underlain by sandstone or shale. In most places Millsholm soils have been dominated more by sandstone, even though they are underlain by shale. These soils are steep. The Dibble soils are dominated mainly by shale, even though they may be underlain by sandstone. They typically are less sloping than Millsholm soils. Millsholm soils are shallow, because geological erosion has kept pace with soil formation. The deeper Dibble soils formed in more easily weathered materials in less sloping areas where erosion was less severe. The material in which they formed was subject to more weathering. As a result textural Bt horizons formed in Dibble soils.

A large part of this geomorphic unit consists of the miscellaneous land type Rock land. Rock land is steep to very steep and has no vegetative cover or a cover of chaparral. Erosion has removed the parent material faster than weathering occurred. As a result the rock is left bare or, at the most, 2 to 3 inches of coarse soil material remains over the bedrock.

Grazing livestock and fires have reduced the effectiveness of vegetative cover for erosion control. In places the A horizon of the Dibble and Millsholm soils is truncated, and scattered gullies and small erosion scars are evident.

Morphology of Soils

Many different kinds of soils have formed in Yolo County. Many of the soils have prominent characteristics (*27*), others have few prominent characteristics, and still others have weakly expressed features. The differentiation of horizons in soils in this county is the result of one or more of the following processes: (1) weathering of parent material, (2) accumulation and decomposition of organic matter, and (3) translocation of mineral and organic material.

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 form 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 (*6*) and later revised (*23*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965. It is under continual study (*20*, *21*, *27*). Therefore, readers interested in developments of the current system should search the latest literature available. The soil series of Yolo County are placed in some categories of the current system in table 7.

ORDERS: Ten soil orders are recognized in the current system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties that differentiate these soil orders are those that give broad climatic groupings of soils. Two exceptions, the Entisols and Histosols, occur in many different kinds of climate. The five soil orders in Yolo County are Alfisols, Entisols, Inceptisols, Mollisols, and Vertisols.

Alfisols are soils containing a clay-enriched B horizon that has medium or high base saturation. In Yolo County three groups of Alfisols that have one to four subgroups are recognized in the county.

Typic Natraqualfs are poorly drained soils that have low chromas, or have brown mottles to a depth of 20 inches. Also, they have significant amounts of soluble salts and exchangeable sodium.

Typic Haploxeralfs are well-drained soils low in content of organic matter. *Aquic Haploxeralfs* are somewhat poorly drained and have distinct mottles to a depth of 30 inches. They are dark in color, and are hard and massive when dry. *Mollic Haploxeralfs* are well-drained soils that have a dark surface layer high in content of organic matter. These soils are hard and massive when dry, particularly after cultivation, because of the high content of silt and the warm, dry climate. The Rincon series is in this subgroup.

TABLE 7.—*Soil series classified according to the current system of classification* [1]

Series	Family	Subgroup	Order
Arbuckle	Fine-loamy, mixed, thermic	Typic Haploxeralfs	Alfisols.
Balcom	Fine-loamy, mixed, calcareous, thermic	Typic Xerorthents	Entisols.
Brentwood	Fine, montmorillonitic, thermic	Typic Xerochrepts	Inceptisols.
Capay	Fine, montmorillonitic, thermic	Typic Chromoxererts	Vertisols.
Clear Lake	Fine, montmorillonitic, thermic	Typic Pelloxererts	Vertisols.
Climara [2]	Fine, montmorillonitic, thermic	Chromic Pelloxererts	Vertisols.
Corning	Fine, montmorillonitic, thermic	Typic Palexeralfs	Alfisols.
Dibble	Fine, montmorillonitic, thermic	Typic Haploxeralfs	Alfisols.
Hillgate	Fine, montmorillonitic, thermic	Typic Palexeralfs	Alfisols.
Lang	Sandy, mixed, thermic	Typic Psammaquents	Entisols.
Laugenour	Coarse-loamy, mixed, calcareous, thermic	Aeric Fluventic Haplaquepts	Inceptisols.
Maria	Fine-silty, mixed, calcareous, thermic	Typic Haplaquepts	Inceptisols.
Marvin	Fine, montmorillonitic, thermic	Aquic Haploxeralfs	Alfisols.
Merritt	Fine-silty, mixed, calcareous, thermic	Typic Haplaquolls	Mollisols.
Millsholm	Loamy, mixed, thermic	Lithic Xerochrepts	Inceptisols.
Myers	Fine, montmorillonitic, thermic	Entic Chromoxererts	Vertisols.
Omni	Fine, montmorillonitic, calcareous, thermic	Fluventic Haplaquolls	Mollisols.
Pescadero	Fine, montmorillonitic, thermic	Typic Natraqualfs	Alfisols.
Positas	Fine, montmorillonitic, thermic	Mollic Palexeralfs	Alfisols.
Reiff	Coarse-loamy, mixed, nonacid, thermic	Typic Xerorthents	Entisols.
Rincon	Fine, montmorillonitic, thermic	Mollic Haploxeralfs	Alfisols.
Riz	Fine, montmorillonitic, thermic	Typic Natrixeralfs	Alfisols.
Sacramento	Fine, montmorillonitic, noncalcareous, thermic	Cumulic Haplaquolls	Mollisols.
San Ysidro	Fine, montmorillonitic, thermic	Typic Palexeralfs	Alfisols.
Schorn	Fine, montmorillonitic, thermic	Entic Chromoxererts	Vertisols.
Soboba	Sandy-skeletal, mixed, thermic	Typic Xeropsamments	Entisols.
Sycamore	Fine-silty, mixed, nonacid, thermic	Aeric Haplaquepts	Inceptisols.
Tehama	Fine-loamy, mixed, thermic	Typic Haploxeralfs	Alfisols.
Tyndall	Coarse-loamy, mixed, thermic	Aquic Haploxerolls	Mollisols.
Valdez	Fine-silty, mixed, nonacid, thermic	Fluventic Haplaquepts	Inceptisols.
Willows	Fine, montmorillonitic, thermic	Typic Pelloxererts	Vertisols.
Yolo	Fine-silty, mixed, nonacid, thermic	Typic Xerorthents	Entisols.
Zamora	Fine-silty, mixed, thermic	Mollic Haploxeralfs	Alfisols.

[1] Placement of some soil series in the current system of classification, particularly in families, may change as more precise information becomes available.

[2] In this county the major portion of the unit has chroma of 2, and the soils are technically Typic Chromoxererts.

Typic Natrixeralfs are poorly drained soils that have more than 15 percent exchangeable sodium within the Natric horizon and have prismatic structure.

Palexeralfs are well-drained soils that have an absolute increase of 15 percent clay within 1 inch. The total clay content of the Bt horizon is more than 35 percent. *Typic Palexeralfs* are low in content of organic matter and have a light-colored surface layer. The soils of the Hillgate series are in this subgroup. *Mollic Palexeralfs* have a dark-colored surface layer. The Positas series is in this subgroup.

Entisols are young mineral soils that do not have genetic horizons. Three subgroups of this order are recognized in Yolo County. These are *Typic Psammaquents*, *Typic Xerorthents*, and *Typic Xeropsamments*.

Typic Psammaquents in the county formed on recent alluvial deposits of sandy material along the Sacramento River. Some areas of fill created by pumping sand out of the river are included. These soils are poorly drained and have a water table that fluctuates to within 20 inches of the surface. Control of the height of the river has helped to drain some soils. The water table is directly affected by the river. The Lang series in this subgroup has a high water table within a depth of 20 inches of the surface. Because of the short time the soil material has been in place, the low inherent fertility, and the low water-holding capacity, little organic matter has accumulated in these soils. The Reiff and Yolo series in this subgroup formed in recently deposited alluvium that is very fine sandy loam or finer in texture and is high in content of silt. *Typic Xerorthents* contain a significant amount of organic matter, though it is not sufficient to maintain structure. Soils in the Reiff and Yolo series are hard and massive when dry, particularly after cultivation. The Balcom series, also in this subgroup, formed in material weathered from soft, calcareous sandstone or shale. These soils are on dissected uplands and generally have convex slopes. The rate of weathering of the substratum has kept pace with the erosion. Significant accumulation of organic matter or movement of carbonates has not occurred.

Typic Xeropsamments in the county occur in material recently deposited by stream channels. They are well drained and are low in content of organic matter because of their recent origin and their low water-holding capacity. Soils of the Soboba series are in this subgroup.

Inceptisols are mineral soils in which horizons have definitely started to develop. They generally are on young, but not recent, land surfaces. The Inceptisols in Yolo County consist of two groups. One is divided into three subgroups, *Typic*, *Aeric*, and *Fluventic Haplaquepts*, and the other has two subgroups, *Typic* and *Lithic Xerochrepts*.

Haplaquepts are somewhat poorly drained to poorly drained soils on alluvial fans. They have brown and yellow mottles at a depth of less than 20 inches, and because of their recent origin are typically low in content of organic matter. *Typic Haplaquepts* are low in content of organic matter. The organic matter, however, decreases with depth. *Aeric Haplaquepts* are dark colored because of somewhat greater amounts of organic matter, which indicates that the soil has been in place for a longer period of time. The Sycamore series, for example, contains somewhat more organic matter, but when cultivated it does not have sufficient amounts to maintain structure. *Fluventic Haplaquepts* are stratified and have a dark-colored buried horizon that contains accumulated organic matter.

Xerochrepts are well-drained soils that are low in organic matter or that have a surface layer that is hard and massive when dry, particularly after cultivation. *Typic Xerochrepts* occur on fine-textured alluvial fans. The favorable moisture relationship and high natural fertility has induced sufficient vegetation to produce a significant amount of organic matter but not enough to maintain structure. *Xerochrepts* are high in silt and clay. They are hard and massive when dry, particularly after they have been cultivated. In the Brentwood series some of the clay is oriented and appears as films on ped faces and in pores. *Lithic Xerochrepts* occur on steep uplands over hard sandstone or shale. Erosion is sufficient to maintain the depth at less than 20 inches and to restrict the accumulation of organic matter.

Mollisols have formed mostly under grass. They have a thick, friable, dark-colored surface layer. Base saturation is more than 50 percent. The Mollisols in Yolo County consist of two groups. One is divided into three subgroups, *Typic*, *Cumulic*, and *Fluventic Haplaquolls*, and the other has one subgroup, *Aquic Haploxerolls*.

Haplaquolls are soils that are poorly drained or have been artificially drained. They have mottles of brown or olive within a depth of 20 inches of their surface, and chromas are low on the surface and in the substratum. They occur in basins or on alluvial fans associated with basins. *Typic Haplaquolls* are on slightly higher positions and have somewhat thinner surface horizons than the *Cumulic Haplaquolls*. Merritt soils are classified in the *Typic Haplaquolls* subgroup, and Sacramento series are classified in the *Cumulic Haplaquolls* subgroup. *Fluventic Haplaquolls* are recent stratified soils that have buried surface horizons. Omni series is classified in this subgroup.

Aquic Haploxerolls are somewhat poorly drained very fine sandy loams that occur on alluvial fans. They have been in place for sufficient time to accumulate significant amounts of organic matter. Even after cultivation the organic matter and their coarse texture keep them from being hard or massive when dry. Past drainage has been such that mottling occurs within 20 inches but not immediately below the mollic epipedon. Tyndall series is classified in this subgroup.

Vertisols are clayey soils that crack, shrink, and swell in all seasons and that have wide, deep cracks during dry periods. In Yolo County there are two groups of Vertisols, and both have two subgroups. One is divided into *Typic* and *Entic Chromoxererts*, and the other is divided into *Typic* and *Chromic Pelloxererts*.

Chromoxererts are soils that formed under somewhat poorly drained to well-drained conditions and that have brownish colors within a depth of 12 inches. They occur on alluvial fans, on basins rims, on dissected terraces, and in uplands. They formed in fine-textured alluvium or in fine-textured material weathered from parent rock. *Typic Chromoxererts* have a dark-colored surface layer at least 12 inches thick. The Capay series classified in this subgroup is dark colored as a result of organic-matter accumulation. *Entic Chromoxererts* have somewhat lower content of organic matter than Capay soils. Myers series are classified in this subgroup.

Pelloxererts are soils that formed under poor drainage in basins. They have gray surface colors. *Typic Pelloxererts* formed under slightly wetter conditions than the *Chromic Pelloxererts* and have a thicker and darker A horizon and a lower chroma.

SUBORDERS: Each order is subdivided into suborders, primarily on the basis of soil characteristics that seem to produce classes having the greatest genetic similarity. The suborders have a narrower climatic range than the orders. The criteria for suborders chiefly reflect the presence or absence of waterlogging or soil differences resulting from the climate or vegetation.

GREAT GROUPS: Each suborder is divided into great groups according to the presence or absence of genetic horizons and the arrangement of these horizons.

SUBGROUPS: Each great group is subdivided into subgroups. One of these subgroups represents the central (typic) segment of the great group, and the others, called intergrades, contain those soils having properties of soils in another group, suborder, or order.

FAMILIES: Each subgroup is divided into families, primarily on the basis of properties important to the growth of plants. Among the properties considered are texture, mineralogy, reaction, soil temperature, and thickness of horizons.

SERIES: The series consists of a group of soils that formed from a particular kind of parent material and having 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, texture, structure, consistence, reaction, and mineralogical and chemical composition.

Laboratory Analyses

The results of the physical and chemical analyses of representative soils of the county are given in tables 8 and 9. The data are for selected soils of 7 soil series that are extensive in the county, and they are based on the profile that is described as representative for the series in the section "Descriptions of the Soils." Some of the samples were analyzed by the University of California, Department of Soils and Plant Nutrition, Davis, Calif., and some were analyzed by the Soil Survey Laboratory, Soil Conservation Service, Riverside, Calif.

All samples were taken from carefully selected pits, and only the soil material smaller in grain size than 1 inch was removed from the field. If the soil consisted of fragments larger than 1 inch, volume estimates were made of this material.

The soil samples were air dried and crushed with a rolling pin so that the material would pass through a 2-millimeter, round-hole sieve. The gravel and stones larger than 2 millimeters in diameter were reported as a weight percentage of the total sample. Most determinations, except those for bulk density, were made on the soil material smaller than 2 millimeters in diameter. All results are expressed on an ovendry basis. Methods that were used in obtaining the data are described in the paragraphs that follow.

Size class and diameter of particles—Separation of particles into size classes and ranges of diameters for particle-size distribution data as shown in table 8 were made by sieve and by pipette or hydrometer analyses. The pipette method was used in the soil survey laboratory. After treatment of the sample to remove organic matter and soluble salts, particles were dispersed with sodium hexametaphosphate and mechanical shaking (*28*). The amount of clay or silt as analyzed in the University of California laboratory was made by the hydrometer method (*26*).

Percent organic carbon—The percent of organic carbon (table 9) was determined by acid-dichromate digestion and ferrous sulfate titration, a modification of the Walkley-Black method (*28*).

Percent total nitrogen—The total nitrogen (table 9) in the soil sample was determined by Kjeldahl analysis. A modification of the method described by the association of Official Agricultural Chemists was used (*4*).

Extractable iron.—To reduce and extract the iron (table 9) the soil sample was treated with a citrate-buffered, sodium dithionite solution. The extractable iron was measured colormetrically and the percent iron was reported as *Fe* (*28*).

Percent carbonate.—The percent carbonate, reported as equivalent to calcium carbonate (table 9), was measured from the amount of carbon dioxide evolved on acidification of the soil sample (*32*).

Bulk density.—The bulk densities for one-third bar water content and for ovendryness (table 9) are for saran-coated natural soil clods (*28*).The clod was equilibrated to a one-third bar water content on a pressure plate apparatus, and the volume of the clod was determined by the displacement of water. If the clod contained gravel-size particles, calculations were made to correct for their weight and volume, and the data were reported on the soil fabric smaller than 2 millimeters.

Water content.—The water content at one-third bar (table 9) was determined from saran-coated clods (*28*); and at 15 bars, the water content was determined on the fragmented soil material by the use of a pressure membrane apparatus (*24*, *26*).

Extensibility.—Extensibility (table 9) is an estimate of the change in dimension that occurs in a natural soil clod if the water content changes. The coefficient of linear extensibility (COLE) of the soil fabric is estimated from laboratory bulk density data and the coarse-fragment conversion factor (*28*).

Reaction.—Soil reaction (table 9), expressed in pH value, was obtained by glass electrode pH meter using soil-water ratios of 1:1 and 1:10 (*26*, *28*).

Extractable bases.—Calcium, magnesium, sodium, and potassium (table 9) were extracted with neutral, normal ammonium acetate (*28*). Calcium was precipitated as an oxalate and titrated, magnesium was determined gravimetrically as magnesium pyrophosphates (*4*, *28*), and sodium and potassium were analyzed by flame photometer (*16*).

Cation-exchange capacity.—The cation-exchange capacity (table 9) was determined after the sample had been sodium saturated by mixing it with a solution of sodium acetate. The amount of exchangeable sodium that was later extracted by ammonium acetate represented the cation-capacity (*26*). The cation-exchange capacity was measured by flame photometer analysis of barium (*14*). The barium from a barium chloride-saturated sample was extracted with a magnesium nitrate solution.

Ions in saturation extract.—The ions in the saturation extract, (table 9) expressed as milliequivalents per liter, were determined by analyzing the water extracted from saturated soil paste. The saturated paste was formed by adding water to the soil until the mixture would just begin to flow (*26*). The percentage of moisture at saturation represents a weight difference between the soil paste and the oven-dried subsample. The water was removed by vacuum filtration and the soluble ions were determined by the following procedures: Calcium and magnesium by the versenate method; bicarbonate by titration with acid; chloride by titration with silver nitrate (*4*, *26*); and sodium and potassium by flame photometer.

Electrical conductivity.—Electrical conductivity (table 9) as an estimate of soluble salts in the saturation extract was measured by Wheatstone bridge. The conductivity is reported in millimhos per centimeter at the standard temperature of 25°C (*26*).

Exchangeable sodium percentage.—The exchangeable sodium percentage, (table 9) or the degree of saturation of the exchange complex with sodium, is a value derived by dividing the exchangeable sodium by the cation-exchange capacity and multiplying the result by one hundred (*26*).

Base saturation.—The percent base saturation (table 9) was determined by dividing the sum of the extractable bases by the cation-exchange capacity and multiplying the result by one hundred.

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TABLE 8.—*Physical analyses of selected soils*

[Absence of information indicates that a quantity of less than the minimum reportable value was detected]

Soil name and sample number	Depth from surface	Size class and diameter of particles—									
		Total		Sand					Silt		
		Silt (0.05–0.002 mm.)	Clay (0.002 mm.)	Very coarse (2.0–1.0 mm.)	Coarse (1.0–0.5 mm.)	Medium (0.5–0.25 mm.)	Fine (0.25–0.1 mm.)	Very fine (0.1–.05 mm.)	(0.05–0.02 mm.)	(0.02–0.002 mm.)	Gravel larger than 2 mm.
	In.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct. of whole soil*
Capay silty clay [1] (S64Calif–57–13).	0–11	46. 4	45. 6	0. 2	0. 4	0. 8	3. 1	3. 5	12. 6	33. 8	0
	11–18	47. 7	42. 9	. 1	. 4	. 8	3. 4	4. 7	12. 4	35. 3	0
	18–36	41. 0	51. 7	([2])	. 2	. 7	2. 7	3. 7	10. 1	30. 9	0
	36–49	42. 8	50. 8	([2])	. 2	. 5	2. 3	3. 4	9. 9	32. 9	0
	49–64	49. 0	46. 0	([2])	. 2	. 4	1. 8	2. 6	12. 1	36. 9	0
Pescadero silty clay, saline-alkali [1] (S64Calif–57–12).	0–3	54. 9	39. 9	. 3	. 5	. 5	1. 6	2. 3	8. 7	46. 2	0
	3–13	46. 0	52. 0	. 1	. 1	. 1	. 5	1. 2	6. 6	39. 4	0
	13–26	49. 8	48. 1	. 3	. 3	. 1	. 5	. 9	6. 2	43. 6	0
	26–40	51. 2	40. 3	. 5	. 8	. 4	1. 8	5. 0	12. 0	39. 2	0
	40–52	48. 6	34. 7	1. 0	1. 1	. 6	3. 8	10. 2	19. 2	29. 4	0
	52–67	46. 2	36. 1	. 2	. 5	. 4	4. 1	12. 5	21. 0	25. 2	0
	67–72	46. 0	31. 6	. 2	. 2	. 3	5. 0	16. 7	21. 7	24. 3	0
Rincon silty clay loam [1] (S64Calif–57–16).	0–8	61. 6	31. 3	. 2	. 2	. 1	1. 4	5. 2	21. 1	40. 5	0
	8–15	61. 0	32. 9	. 2	. 1	. 1	1. 1	4. 6	20. 9	40. 1	0
	15–21	59. 5	37. 4	([2])	. 1	([2])	. 5	2. 5	16. 6	42. 9	0
	21–29	58. 6	37. 4	([2])	([2])	. 1	. 6	3. 3	20. 3	38. 3	0
	29–43	57. 0	39. 3	([2])	. 1	([2])	. 5	3. 1	18. 3	38. 7	0
	43–56	59. 4	36. 3	([2])	([2])	([2])	. 7	3. 6	17. 2	42. 2	0
	56–72	60. 3	32. 9	. 1	. 2	. 1	1. 2	5. 2	16. 9	43. 4	0
Sacramento clay [1] (S64Calif–57–10).	0–7	42. 4	56. 9	. 1	. 1	. 1	. 2	. 2	3. 2	39. 2	0
	7–16	41. 5	57. 7	([2])	. 1	. 1	. 3	. 3	3. 5	38. 0	0
	16–31	38. 4	60. 9	([2])	. 1	. 2	. 2	. 2	4. 0	34. 4	0
	31–38	35. 2	63. 3	([2])	. 1	. 3	. 6	. 5	2. 1	33. 1	0
	38–53	33. 6	62. 9	([2])	. 2	. 7	1. 7	. 9	1. 7	31. 9	0
	53–60	37. 0	58. 7	. 7	1. 1	. 8	1. 1	. 6	3. 3	33. 7	0
Tehama loam [1] (S64Calif–57–18).	0–10	49. 5	14. 9	2. 2	2. 6	3. 6	12. 7	14. 5	23. 1	26. 4	1
	10–15	36. 0	34. 7	1. 7	2. 4	3. 4	10. 4	11. 4	17. 5	18. 5	0
	15–29	42. 4	31. 7	. 9	1. 6	2. 8	9. 8	10. 8	16. 8	25. 6	0
	29–40	35. 4	29. 3	3. 9	3. 5	4. 4	11. 9	11. 6	15. 7	19. 7	3
	40–53	33. 3	22. 5	6. 7	6. 3	6. 3	12. 5	12. 4	16. 6	16. 7	24
	53–63	29. 2	20. 3	5. 9	6. 8	9. 5	18. 6	9. 7	12. 3	16. 9	5
	63–75	21. 9	18. 1	1. 2	4. 3	13. 0	32. 7	8. 8	8. 8	13. 1	0
Willows clay [1] (S64Calif–57–15).	0–4	36. 3	62. 7	. 1	. 1	. 1	. 3	. 4	2. 8	33. 5	0
	4–13	34. 3	64. 7	([2])	. 1	. 1	. 4	. 4	2. 1	32. 2	0
	13–28	35. 2	63. 2	([2])	. 2	. 3	. 6	. 5	2. 1	33. 1	0
	28–38	36. 5	61. 6	([2])	. 3	. 3	. 6	. 7	2. 6	33. 9	0
	38–48	38. 2	60. 0	. 1	. 3	. 3	. 5	. 6	3. 4	34. 8	0
	48–61	40. 1	57. 7	. 1	. 4	. 3	. 6	. 8	4. 9	35. 2	0
	61–72	41. 0	55. 7	. 5	. 6	. 4	. 6	1. 2	6. 4	34. 6	0
Yolo silt loam [3] (S65Calif–57–8).	0–2	46. 4	24. 9	--------	. 4	. 7	5. 1	22. 5	--------	--------	--------
	2–8	46. 8	27. 1	--------	. 1	. 2	11. 3	14. 5	--------	--------	--------
	8–19	50. 3	28. 2	--------	. 1	. 2	. 4	20. 8	--------	--------	--------
	19–26	56. 5	27. 2	--------	. 1	. 2	3. 6	12. 4	--------	--------	--------
	26–33	54. 7	25. 2	--------	. 1	. 2	2. 4	17. 4	--------	--------	--------
	33–41	51. 8	22. 8	--------	. 1	. 2	5. 3	19. 8	--------	--------	--------
	41–58	48. 0	29. 5	. 2	1. 0	2. 6	2. 7	16. 0	--------	--------	--------
	58–65	31. 8	22. 9	. 2	1. 1	2. 6	19. 0	22. 4	--------	--------	--------

[1] Analyses made by the Soil Conservation Service, Soil Survey Laboratory at Riverside.
[2] Trace.
[3] Analyses made by the University of California, Department of Soils and Plant Nutrition, at Davis.

General Nature of the County

In this section the physiography and drainage of Yolo County are discussed. Then facts are given about the climate, water supply, settlement and development, and farming.

Physiography and Drainage

Yolo County is partly in the hilly to steep, mountainous uplands of the California Coast Ranges and partly in the Sacramento Valley. The western part of the county is in the Coast Ranges and consists of parallel ridges and valleys that trend slightly west of north. The streams follow the strike valleys for considerable distances and then cut eastward across the ridges through narrow gaps. The soils are moderately deep to very shallow, though much of the area is bare. The soils in this part of the county are used principally for range; the less productive areas are used as wildlife habitat and for watershed.

Gently sloping to hilly dissected terraces occupy the area to the east of the Coast Ranges. This area consists of well-rounded hills and broad slopes that drain to the east. The soils are moderately deep to softly consolidated material or are shallow to a claypan. They are used for dryland small grains and pasture.

About two-thirds of the county is in the Sacramento Valley between the Coast Ranges and the Sacramento River. The nearly level soils here are irrigable, though a few areas are not now irrigated. The soils are used for many irrigated crops, orchards, and dryland crops.

The county is drained by the Sacramento River on the east. Two major streams, Cache Creek and Putah Creek, cross the county from west to east, but they drain little of the county. The Cottonwood and Willow Sloughs drain the area between Putah Creek and Cache Creek in the southern part of the county. The northern part of the county is drained by intermittent streams, such as Oat Creek and Bird Creek, which drain into the Colusa Basin Drainage Canal. When the Sacramento River reaches a specific height, it flows into the Yolo By-Pass that extends along the eastern side of the county from about 4 miles southeast of the town of Knights Landing to the southernmost part of the county. The area in the southeastern part of the county between the Yolo By-Pass and the Sacramento River is mostly drained by pumping.

Climate [7]

Yolo County has a Mediterranean climate characterized by warm, dry summers and cool, moist winters.

The annual temperature ranges from 50° to 62° F.; the maximum temperature, from 95° to 98°; and the extreme temperature, from 110° to 117°. The southern part of the county is cooler than the north-central part because cool air from the ocean flows through the Carquinez Strait into the Sacramento Valley in summer.

[7] By C. ROBERT ELFORD, State climatologist, National Weather Service, U.S. Department of Commerce.

Annual rainfall is 16 to 24 inches. Rainstorms move eastward from the Pacific Coast into the county in winter and early in spring, but rains occur infrequently in summer. The heaviest rainfall occurs in the Coast Ranges, as well as infrequent snowfall of short duration.

Wind direction depends on the orientation of the Sacramento Valley and the flow of marine air from the Carquinez Strait.

The wind blows from the south two-thirds of the time, and from the northeast for much of the remaining time. The velocity of the southerly winds is about 10 miles per hour, but the velocity of the winds from the northeast is likely to be stronger. Strong, dry winds that persist for several days early in fall or late in fall cause a serious fire hazard. The hazard of fire is particularly serious on soils used for range and as wildlife habitat. Strong north winds that follow a winter storm frequently cause a sudden drop in temperature.

Relative humidity in winter is about 90 percent at night and about 80 percent during the day. The combination of low wind velocities, cold air drainage from the surrounding uplands, and relatively moist, warm soil causes fog to form in the Sacramento Valley that lasts from several days to several weeks and is known locally as tule or valley fog. Relative humidity in summer and early in fall is 25 to 40 percent during the day. The sun shines 95 percent of the daylight hours during July and August.

The growing season is about 230 to 280 days long. It is lowest in the uplands at the higher elevations. Irrigation is needed to obtain good growth of most crops. Dryfarmed grain is planted early in winter and is harvested in June, relying on rainfall for moisture. In some areas where the soils are doublecropped, dryfarmed grain is followed by a row crop that is harvested in fall.

Range consists primarily of annual grasses and forbs. Growth of these plants is limited to the first winter rains after germination and until the latter part of May. The kind of plants that grow and how well they grow depends on the amount and distribution of the rainfall and the temperature. Such undesirable plants as star thistle and tarweed are encouraged to grow by late spring rains after the annual grasses and grain have matured.

Water Supply

The four main sources of water in Yolo County are the Cache Creek, ground water, the Sacramento River, and the Colusa Basin Drainage Canal.

Clear Lake is the source of water for Cache Creek, which in turn supplies water to the Rumsey Water Users Association and the Clear Lake Water Company. The Rumsey Water Users Association provides water for irrigation to about 600 acres in the upper Capay Valley. The Clear Lake Water Company distributes water to about 31,000 acres in the south-central part of the county, but a few acres adjacent to Cache Creek receive irrigation water directly from the creek. The remaining 170,000 (*9*) acres are irrigated from wells, from the Colusa Basin Drainage Canal, and from the Sacramento River.

TABLE 9.—*Physical and chemical*

[Absence of information indicates that a quantity of

Soil name and sample number	Depth from surface	Organic carbon	Total nitrogen	Extractable iron as Fe	Carbonate as $CaCO_3$	Bulk density		Water content		Extensibility (COLE)	Reaction		Extractable bases (meq. per 100 gms. of soil)			
						1/3 bar	Oven dry	1/3 bar	15 bars		1:1	1:10	Ca	Mg	Na	K
	In.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Gm./cc.*	*Gm./cc.*	*Pct.*	*Pct.*	*In./in.*	*pH*	*pH*				
Capay silty clay [2] (S64Calif-57-13).	0-11	1. 16	0. 102	1. 7	------	1. 45	1. 82	24. 3	16. 9	0. 078	7. 2	7. 8	13. 5	19. 6	1. 0	0. 8
	11-18	. 59	. 066	1. 8	------	1. 53	1. 87	23. 4	17. 2	. 070	7. 0	7. 8	13. 4	17. 7	1. 2	. 4
	18-36	. 53	. 057	2. 1	------	1. 52	1. 94	25. 6	19. 1	. 084	7. 4	8. 2	17. 2	20. 0	2. 1	. 4
	36-49	. 43	------	2. 0	(3)	1. 57	1. 92	24. 6	19. 1	. 070	8. 0	8. 5	18. 5	20. 0	2. 9	. 5
	49-64	. 31	------	2. 0	(3)	------	------	24. 6	18. 8	. 068	8. 2	8. 8	17. 2	17. 0	3. 6	. 4
Pescadero silty clay, saline-alkali [2] (S64-Calif-57-12).	0-3	2. 84	. 200	1. 4	------	1. 60	1. 85	24. 0	11. 0	. 050	7. 7	8. 3	4. 8	9. 5	12. 6	1. 8
	3-13	1. 01	. 081	1. 8	------	1. 33	1. 68	33. 0	20. 8	. 080	8. 9	9. 6	3. 5	9. 6	34. 4	. 4
	13-26	. 58	. 055	1. 7	3	1. 45	1. 78	27. 9	27. 7	. 070	8. 6	9. 6	4. 7	15. 0	32. 2	. 3
	26-40	. 43	. 043	1. 8	5	1. 56	1. 75	23. 3	21. 3	. 040	8. 1	9. 3	10. 2	18. 8	21. 6	. 3
	40-52	. 26	------	1. 7	3	1. 67	1. 81	19. 1	18. 5	. 028	7. 9	8. 7	15. 5	18. 8	5. 6	. 5
	52-67	. 19	------	1. 7	2	1. 69	1. 89	18. 7	13. 7	. 038	8. 0	8. 7	18. 5	17. 7	3. 9	. 4
	67-72	. 15	------	1. 6	2	1. 67	1. 88	19. 4	14. 6	. 041	8. 1	8. 8	16. 4	16. 0	1. 4	. 4
Rincon silty clay loam [2] (S64Calif-57-16).	0-8	1. 74	. 156	1. 8	------	1. 48	1. 68	24. 8	14. 3	. 043	7. 7	8. 1	16. 8	10. 9	1. 1	1. 4
	8-15	1. 47	. 141	1. 8	------	1. 57	1. 76	22. 7	15. 5	. 037	8. 0	8. 4	16. 0	11. 2	1. 0	1. 1
	15-21	1. 42	. 135	1. 9	------	1. 45	1. 67	23. 6	16. 8	. 048	7. 8	8. 5	15. 8	13. 2	1. 4	. 9
	21-29	1. 11	. 111	2. 0	------	1. 47	1. 70	24. 8	17. 1	. 050	7. 9	8. 6	16. 0	14. 5	1. 6	. 7
	29-43	. 79	. 086	2. 0	------	1. 58	1. 81	22. 0	17. 0	. 045	8. 0	8. 6	14. 8	15. 0	1. 3	. 5
	43-56	. 61	. 061	1. 9	------	1. 43	1. 62	22. 7	16. 2	. 043	8. 0	8. 5	12. 4	16. 4	1. 0	. 5
	56-72	. 40	------	1. 8	2	1. 38	1. 55	25. 1	14. 7	. 039	8. 3	8. 9	13. 5	18. 5	. 8	. 5
Sacramento clay [2] (S64Calif-57-10).	0-7	1. 77	. 161	1. 6	------	1. 43	1. 76	29. 3	25. 2	. 072	6. 0	6. 6	20. 7	15. 8	. 4	. 8
	7-16	1. 38	. 130	1. 9	------	1. 33	1. 64	33. 3	27. 1	. 070	6. 7	7. 4	22. 6	17. 4	. 5	. 5
	16-31	. 79	. 110	1. 4	(3)	1. 29	1. 63	32. 9	25. 8	. 081	7. 5	8. 2	27. 0	21. 1	1. 1	. 6
	31-38	. 84	. 107	2. 1	(3)	1. 30	1. 65	33. 1	29. 3	. 082	7. 9	8. 5	30. 0	23. 3	1. 4	. 4
	38-53	. 82	. 069	2. 4	(3)	1. 26	1. 56	36. 5	30. 9	. 075	7. 9	8. 4	30. 2	22. 2	1. 4	. 4
	53-60	. 59	------	1. 9	(3)	1. 25	1. 59	35. 6	27. 9	. 085	7. 8	8. 5	31. 5	22. 2	1. 5	. 4
Tehama loam [2] (S64Calif-57-18).	0-10	. 52	. 052	------	------	------	------	------	6. 1	--------	6. 3	6. 4	4. 5	4. 7	. 2	. 4
	10-15	. 32	. 050	------	------	------	------	------	10. 7	--------	6. 4	6. 9	7. 5	9. 9	. 2	. 4
	15-29	. 30	. 049	------	------	------	------	------	14. 5	--------	7. 1	7. 5	9. 5	15. 0	. 4	. 5
	29-40	. 17	------	------	------	------	------	------	11. 3	--------	7. 5	7. 8	8. 1	12. 0	. 4	. 4
	40-53	. 10	------	------	------	------	------	------	9. 1	--------	8. 1	7. 7	6. 2	10. 0	. 4	. 4
	53-63	. 10	------	------	------	------	------	------	8. 4	--------	8. 2	7. 9	6. 4	8. 8	. 6	. 3
	63-75	. 06	------	------	------	------	------	------	7. 5	--------	8. 3	8. 0	5. 8	8. 4	. 6	. 3
Willows clay [2] (S64Calif-57-15).	0-4	1. 92	. 162	1. 9	------	------	------	------	21. 3	--------	6. 6	7. 1	17. 1	24. 6	1. 1	1. 4
	4-13	1. 34	. 121	1. 9	------	1. 44	1. 90	28. 5	21. 5	. 099	6. 7	7. 6	17. 2	25. 0	1. 2	. 9
	13-28	. 86	. 077	1. 7	1	1. 54	2. 00	26. 6	21. 0	. 091	8. 4	9. 5	16. 9	28. 7	6. 0	. 5
	28-38	. 73	. 067	1. 7	1	1. 45	1. 94	28. 5	21. 3	. 103	8. 7	9. 7	15. 0	27. 7	8. 9	. 5
	38-48	. 61	. 059	1. 8	1	1. 45	1. 93	27. 8	21. 7	. 100	8. 5	9. 7	14. 8	27. 1	9. 4	. 5
	48-61	. 48	------	1. 6	2	1. 49	1. 94	27. 8	20. 1	. 092	8. 8	9. 7	12. 4	26. 2	7. 5	. 5
	61-72	. 40	------	1. 6	2	1. 53	1. 97	25. 5	19. 3	. 089	8. 6	9. 6	12. 5	25. 7	8. 2	. 5
Yolo silt loam [4] (S65Calif-57-8):	0-2	1. 38	. 125	------	------	------	------	------	12. 3	--------	6. 7	-----	10. 5	10. 8	. 3	. 1
	2-8	1. 24	. 092	------	------	------	------	------	12. 5	--------	7. 1	-----	11. 2	11. 5	. 3	. 1
	8-19	1. 05	. 084	------	------	------	------	------	13. 1	--------	7. 2	-----	12. 1	12. 8	. 4	. 4
	19-26	. 94	. 076	------	------	------	------	------	13. 3	--------	7. 3	-----	13. 1	13. 1	. 6	. 2
	26-33	. 78	. 066	------	------	------	------	------	12. 5	--------	7. 4	-----	12. 3	13. 7	. 6	. 2
	33-41	. 65	. 058	------	------	------	------	------	11. 9	--------	7. 4	-----	11. 6	13. 0	. 6	. 2
	41-58	. 83	. 068	------	------	------	------	------	13. 7	--------	7. 4	-----	11. 8	15. 4	. 6	. 2
	58-65	. 36	. 034	------	------	------	------	------	10. 7	--------	7. 5	-----	9. 4	12. 5	. 6	. 2

[1] Exchangeable sodium (NH_4OAc extractable sodium minus sodium in the saturation extract).
[2] Analyses made by the Soil Conservation Service, Soil Survey Laboratory, at Riverside.
[3] Trace.

analyses of selected soils

less than the minimum reportable value was detected]

Sum of bases	Cation-exchange capacity	Ions in saturation extract (meq. per. liter)								Electrical conductivity (millimhos/cm. at 25°C.)	Water at saturation	Sodium absorption ratio	Exchangeable sodium percentage	Exchangeable sodium [1]	Base saturation
		Ca	Mg	Na	K	CO_3	HCO_3	Cl	SO_4						
Meq./100 gms.	*Meq./100 gms.*										*Pct.*			*Meq./100 gms.*	*Pct.*
34. 9	33. 9	0. 6	1. 6	2. 8	0. 2	------	1. 5	1. 2	------	0. 44	49. 8	3	2	0. 8	--------
32. 7	33. 4	. 3	. 8	2. 1	. 1	------	. 5	1. 1	------	. 33	44. 0	3	3	1. 1	--------
39. 7	42. 2	. 5	. 5	2. 4	. 1	------	1. 0	. 7	------	. 34	50. 2	3	5	2. 0	--------
41. 9	39. 8	. 6	. 6	4. 8	. 1	------	2. 3	. 5	------	. 67	53. 4	6	7	2. 7	--------
38. 2	38. 0	. 5	. 6	5. 8	. 1	------	2. 4	1. 0	------	. 72	50. 6	8	9	3. 3	--------
28. 7	28. 9	1. 2	2. 2	61. 2	. 7	------	4. 1	50. 2	6. 6	6. 6	55. 0	47	32	9. 2	--------
47. 9	38. 0	. 5	. 8	73. 8	. 2	5. 4	2. 0	35. 5	25. 6	7. 0	110. 6	91	69	26. 2	--------
52. 2	33. 3	. 4	4. 9	136. 0	. 7	------	6. 8	64. 7	66. 3	13. 0	106. 8	84	53	17. 7	--------
50. 9	29. 7	4. 4	25. 8	170. 0	. 7	------	6. 5	6. 5	81. 8	15. 8	67. 3	44	34	10. 2	--------
40. 4	25. 1	13. 2	35. 1	49. 8	. 4	------	1. 9	69. 4	15. 8	9. 4	47. 7	10	13	3. 2	--------
40. 5	28. 1	10. 6	22. 8	31. 8	. 2	------	2. 2	51. 8	12. 2	6. 2	47. 8	8	8	2. 4	--------
34. 2	25. 1	3. 3	5. 4	6. 4	. 1	------	2. 3	10. 3	2. 5	1. 64	44. 6	3	5	1. 2	--------
30. 2	28. 1	3. 4	4. 1	5. 2	. 4	------	5. 8	4. 2	------	1. 18	45. 1	------	4	--------	--------
29. 3	26. 5	------	------	------	------	------	------	------	------	. 59	47. 8	------	4	--------	--------
31. 3	32. 8	------	------	------	------	------	------	------	------	. 52	50. 7	------	4	--------	95. 0
32. 8	34. 2	------	------	------	------	------	------	------	------	. 45	46. 9	------	5	--------	96. 0
31. 6	32. 8	------	------	------	------	------	------	------	------	. 49	48. 9	------	4	--------	96. 0
30. 3	28. 8	------	------	------	------	------	------	------	------	. 52	50. 3	------	3	--------	96. 0
33. 3	28. 8	------	------	------	------	------	------	------	------	. 62	52. 3	------	3	--------	--------
37. 7	42. 6	2. 1	2. 5	1. 3	. 2	------	. 1	1. 5	------	. 62	64. 5	1	1	. 3	--------
41. 0	48. 8	. 6	. 6	. 7	. 1	------	. 9	. 3	------	. 16	61. 3	1	1	. 4	--------
49. 8	53. 6	1. 2	1. 2	1. 7	. 1	------	1. 8	. 4	------	. 41	67. 3	2	2	1. 0	--------
55. 1	54. 8	1. 0	. 8	2. 2	. 2	------	1. 8	. 2	------	. 40	70. 3	2	3	1. 3	--------
54. 2	54. 8	1. 0	1. 0	2. 2	. 2	------	1. 4	. 7	------	. 41	72. 4	2	3	1. 2	--------
55. 6	58. 3	1. 4	1. 2	2. 6	([3])	------	1. 3	1. 6	------	. 52	72. 9	2	3	1. 3	--------
9. 8	13. 2	------	------	------	------	------	------	------	------	. 24	26. 8	------	2	--------	74. 0
18. 0	22. 8	------	------	------	------	------	------	------	------	. 19	34. 6	------	1	--------	79. 0
25. 4	26. 9	------	------	------	------	------	------	------	------	. 25	45. 5	------	2	--------	94. 0
20. 9	22. 1	------	------	------	------	------	------	------	------	. 26	39. 8	------	2	--------	95. 0
17. 0	18. 0	------	------	------	------	------	------	------	------	. 32	37. 9	------	2	--------	94. 0
16. 1	16. 2	------	------	------	------	------	------	------	------	. 34	36. 7	------	4	--------	99. 0
15. 1	15. 8	------	------	------	------	------	------	------	------	. 40	32. 0	------	4	--------	96. 0
44. 2	47. 3	2. 6	4. 7	3. 4	2. 4	------	1. 4	3. 0	5. 8	1. 04	73. 9	2	2	. 8	--------
44. 3	46. 9	. 9	1. 4	2. 6	. 1	------	1. 0	. 8	2. 7	. 50	72. 7	2	2	1. 0	--------
52. 1	42. 4	. 3	. 9	9. 9	. 1	------	6. 1	. 5	2. 8	. 96	71. 4	13	12	5. 3	--------
52. 1	40. 1	. 4	. 8	13. 1	([3])	. 6	5. 2	1. 4	5. 7	1. 34	86. 3	17	19	7. 8	--------
51. 8	38. 2	. 6	. 7	13. 0	. 1	. 8	5. 1	1. 0	6. 0	1. 35	89. 9	16	21	8. 2	--------
46. 6	37. 6	. 5	. 6	13. 4	([3])	------	5. 1	2. 8	5. 2	1. 36	80. 9	18	17	6. 4	--------
46. 9	35. 4	. 4	. 6	13. 8	([3])	------	4. 2	2. 3	6. 6	1. 46	82. 4	19	20	7. 1	--------
--------	[5] 26. 5	------	------	------	------	------	------	------	------	. 8	------	------	--------	--------	81. 9
--------	[5] 27. 0	------	------	------	------	------	------	------	------	. 4	------	------	--------	--------	85. 6
--------	[5] 29. 0	------	------	------	------	------	------	------	------	. 3	------	------	--------	--------	88. 6
--------	[5] 30. 2	------	------	------	------	------	------	------	------	. 3	------	------	--------	--------	89. 4
--------	[5] 29. 4	------	------	------	------	------	------	------	------	. 2	------	------	--------	--------	91. 2
--------	[5] 27. 8	------	------	------	------	------	------	------	------	. 3	------	------	--------	--------	91. 4
--------	[5] 30. 6	------	------	------	------	------	------	------	------	. 2	------	------	--------	--------	91. 5
--------	[5] 23. 2	------	------	------	------	------	------	------	------	. 2	------	------	--------	--------	97. 4

[4] Analyses made by the University of California, Department of Soils and Plant Nutrition, at Davis.
[5] Cation-exchange capacity determined by the $BaCl_2$-TEA, pH 8.2 method.

Ground water in the county is recharged by Cache Creek in the south-central part, and by the watershed to the west in the north-central part of the county. The Sacramento River contributes to the ground water supply in areas adjacent to the river.

Settlement and Development

Indians lived in Yolo County for many centuries. Little evidence of the Indian period remains, however, though the name of the county comes from the Patwin word "Yoloy," which means a place thick with rushes.

Hunters and furtrappers visited the area that is now Yolo County in 1820. The first white men in the county settled on Spanish land grants along Cache Creek, Putah Creek, and the Sacramento River. The first of these grants was made to William Gordon in 1843. Yolo County has mainly been a farming community since

In recent years industrial enterprises have come into the county. These include a variety of manufacturing plants that range from food processing to electrical batteries and polyethylene bags.

According to the U.S. Census, a total of 90,794 persons were living in the county in 1970.

Farming

The Sacramento Valley part of Yolo County is intensively cultivated. It is used mainly for irrigated row crops, field crops, and orchards. In a few small areas, remnants of native vegetation remain. Dryland grain is grown in some areas that are irrigable but do not have an adequate supply of irrigation water. The rolling terraces are used for dryland grain and for pasture of annual grass. The mountainous uplands have a cover mainly of annual grasses and oaks, but brush grows on large areas of the very shallow soils.

According to the 1964 Census of Agriculture, 89.8 percent of the land area of Yolo County is in farms. The farms number 861 and the average size is about 690 acres.

In 1966, the Yolo County Agricultural Crop Report listed about 67 different crops grown on a commercial scale. These include fruits and nuts, and field, vegetation, forage, and seed crops.

Much of the income from farms in the county comes from livestock and livestock products. In 1966 the main kinds of livestock and their number in the county were as follows:

	Number
Sheep	38,360
Cattle	35,700
Hogs	8,000
Poultry	43,000

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; but that in a poorly aerated soil is considerably high in carbon dioxide and low in oxygen.

Alkali soil. Generally, a strongly alkaline soil. Specifically, an alkali soil has so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that the growth of most crop plants is low from this cause.

Alkaline soil. Any soil that has a pH greater than 7.0. See Reaction.

Amendment. Any material, such as lime, gypsum, sawdust, or synthetic conditioner, that is worked into the soil to make it more productive. A fertilizer is also an amendment, but the term "amendment" is used most commonly for material other than fertilizer that is added to soil.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Buried soil. A soil, once exposed but now overlain by more recently formed soil.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter 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.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.

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 when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle 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, and tends to stretch somewhat and pull apart, rather than to 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.

Drainage, natural. The conditions that existed during the formation 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 are commonly very porous and rapidly permeable and have a 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 are commonly 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 and upper B horizons and have mottling in the lower B and C horizons.

Somewhat poorly drained soils are wet for significant periods; soils commonly are mottled below a depth of 6 to 16 inches in the lower A horizon and in the B and C horizons.

Poorly drained soils are wet for long periods and 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 deeper parts of the profile.

Dryfarming. Production of crops that require some tillage in a subhumid or semiarid region, without irrigation. Usually involves use of periods of fallow, during which time enough moisture accumulates in the soil to allow production of a cultivated crop.

Erodible. Susceptible to erosion.

Effective rooting depth. The depth to which a soil is readily penetrated by roots and used for extraction of water and plant nutrients. Depth classes are:

	Inches		*Inches*
Very deep	More than 60	Shallow	10 to 20
Deep	40 to 60	Very shallow	Less than 10
Moderately deep	20 to 40		

Evapotranspiration. The combined loss of water from a given area, and during a specified period of time, by evaporation from the soil surface and by transpiration from plants.

Exchangeable sodium. See Alkali soil.

Flood plain. Nearly level land, consisting of stream sediment, that borders a stream and is subject to flooding unless protected artificially.

Gleyed soil. A soil in which waterlogging and lack of oxygen have caused the material in one or more horizons to be neutral gray in color. The term "gleyed" is applied to soil horizons with yellow and gray mottling caused by intermittent waterlogging.

Gravelly soil material. From 15 to 50 percent of material, by volume, consists of rounded or angular rock fragments that are not prominently flattened and are up to 3 inches in diameter.

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 therefore is 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) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. 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. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the 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.

Illuviation. The accumulation of material in a soil horizon through the deposition of suspended material and organic matter removed from horizons above. Since the part of the fine clay in the B horizon (or subsoil) of many soils has moved into the B horizon from the A horizon above, the B horizon is called an illuvial horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Mottling, soil. 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 these: *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.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10 YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Parent material. Disintegrated and partly weathered rock from which soil has formed.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Plowpan. A compacted layer formed in the soil immediately below the plowed layer.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

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. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. The degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Saline-alkali soil. A soil that contains a harmful concentration of salts and exchangeable sodium; or contains harmful salts and has a highly alkaline reaction; or contains harmful salts and exchangeable sodium and is strongly alkaline in reaction. The salts, exchangeable sodium, and alkaline reaction occur in the soil in such location the growth of most crop plants is less than normal.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Series, soil. A group of soils formed from a particular type of parent material and having genetic horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the profile.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on relatively steep slopes and in swelling clays, where there is marked change in moisture content.

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 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 dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically the part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently 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. The basic textural classes, in order of increasing proportion of fine particles, are *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."

Variant, soil. A soil that has properties sufficiently different from other known soils to justify a new series name, but making up such a limited geographic area that establishing a new series is not justified.

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 a lower one by a dry zone.

Wilting point (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which plants (specifically sunflower) wilt so much that they do not recover when placed in a dark, humid atmosphere.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. In referring to a capability unit, a range site, or a wildlife group read the introduction to the section it is in for general information about its management. Dashes in the range site column mean that the particular mapping unit is not used for range. Other information is given in tables or text as follows:

Acreage and extent, table 1, page 7.
Estimated yields, table 2, page 52.
Engineering uses of the soils, tables 4, 5, and 6, pages 68 through 87.

Map symbol		Page	Capability unit		Range site		Vegetative group	Storie index	Wildlife group
			Symbol	Page	Name	Page			
AaA	Arbuckle gravelly loam, 0 to 2 percent slopes	8	IIs-4 (17)	46	--------------	--	A	68	1
AaB	Arbuckle gravelly loam, 2 to 5 percent slopes	6	IIe-1 (17)	44	--------------	--	A	64	1
BaD3	Balcom silty clay loam, 5 to 15 percent slopes, severely eroded	9	VIe-1 (15)	50	Fine Loamy	62	G	29	8
BaE2	Balcom silty clay loam, 15 to 30 percent slopes, eroded	8	IVe-1 (15)	48	Fine Loamy	62	G	43	7
BaF2	Balcom silty clay loam, 30 to 50 percent slopes, eroded	9	VIe-1 (15)	50	Fine Loamy	62	G	22	7
BaG3	Balcom silty clay loam, 50 to 75 percent slopes, severely eroded	9	VIIIe-1 (15)	51	--------------	--	J	7	8
BdF2	Balcom-Dibble complex, 30 to 50 percent slopes, eroded	9	VIe-1 (15)	50	Fine Loamy	62	G	22, 19	7
BrA	Brentwood silty clay loam, 0 to 2 percent slopes	9	I-1 (17)	44	--------------	--	A	81	1
Ca	Capay silty clay	10	IIs-5 (17)	46	--------------	--	C	50	3
Cb	Capay silty clay, flooded	11	IVw-5 (17)	49	--------------	--	E	35	4
Cc	Capay soils, flooded	11	IVw-3 (17)	49	--------------	--	E	34	4
Ch	Clear Lake silty clay loam	11	IIs-3 (17)	45	--------------	--	C	61	3
Ck	Clear Lake clay	11	IIs-5 (17)	46	--------------	--	C	41	3
Cn	Clear Lake soils, flooded	11	IVw-3 (17)	49	--------------	--	E	31	4
CrE2	Climara clay, 2 to 30 percent slopes, eroded	12	IVe-5 (15)	48	Clayey	62	C	26	7
CtD2	Corning gravelly loam, 2 to 15 percent slopes, eroded	12	IVe-3 (17)	48	Claypan	63	D	25	6
CtE2	Corning gravelly loam, 15 to 30 percent slopes, eroded	13	VIe-3 (15)	50	Claypan	63	D	21	6
DaF2	Dibble clay loam, 30 to 50 percent slopes, eroded	13	VIe-3 (15)	50	Fine Loamy	62	G	19	7
DaG2	Dibble clay loam, 50 to 75 percent slopes, eroded	14	VIIe-3 (15)	51	Fine Loamy	62	J	11	7
DbE2	Dibble-Millsholm complex, 9 to 30 percent slopes, eroded	14	VIe-3 (15)	50	Fine Loamy	62	G	35, 26	7
DbF2	Dibble-Millsholm complex, 30 to 50 percent slopes, eroded	14	VIIe-8 (15)	51	Shallow Loamy	63	G, J	19, 11	7
DbG2	Dibble-Millsholm complex, 50 to 75 percent slopes, eroded	14	VIIe-8 (15)	51	Shallow Loamy	63	J	11, 7	7
HcA	Hillgate loam, 0 to 2 percent slopes	15	IVs-3 (17)	50	--------------	--	D	54	3
HcC2	Hillgate loam, 2 to 9 percent slopes, eroded	14	IVe-3 (17)	48	--------------	--	D	49	3
HdA	Hillgate loam, moderately deep, 0 to 2 percent slopes	15	IIIs-3 (17)	48	--------------	--	D	63	3
HdC	Hillgate loam, moderately deep, 2 to 9 percent slopes	15	IIIe-3 (17)	47	--------------	--	D	60	6
La	Lang sandy loam	15	IIw-2 (17)	45	--------------	--	E	65	2

Map symbol		Page	Capability unit Symbol	Capability unit Page	Range site Name	Range site Page	Vegetative group	Storie index	Wildlife group
Lb	Lang sandy loam, deep-----------	16	IIIw-3 (17)	47	--------------	--	E	58	2
Lc	Lang sandy loam, deep, flooded---	16	IVw-3 (17)	49	--------------	--	E	29	2
Ld	Lang silt loam-------------------	16	IIIw-3 (17)	47	--------------	--	E	61	2
Lg	Laugenour very fine sandy loam---	16	I-1 (17)	44	--------------	--	A	81	1
Lh	Laugenour very fine sandy loam, flooded-----------------------	17	IVw-2 (17)	48	--------------	--	E	41	1
Lk	Laugenour very fine sandy loam, deep, flooded-----------------	17	IVw-3 (17)	49	--------------	--	E	36	1
Lm	Loamy alluvial land--------------	17	IVs-4 (17)	50	--------------	--	B	59	2
Ma	Made land------------------------	18	IIs-3 (17)	45	--------------	--	C	--	3
Mb	Maria silt loam------------------	18	I-1 (17)	44	--------------	--	A	90	1
Mc	Maria silt loam, flooded---------	19	IVw-2 (17)	48	--------------	--	E	43	1
Md	Maria silt loam, deep------------	19	IIs-3 (17)	45	--------------	--	A	81	3
Mf	Marvin silty clay loam-----------	19	IIs-3 (17)	45	--------------	--	A	65	3
Mk	Merritt silty clay loam----------	20	IIw-2 (17)	45	--------------	--	E	65	1
Mn	Merritt silty clay loam, deep----	21	IIIw-3 (17)	47	--------------	--	E	36	4
Mo	Merritt silty clay loam, deep, drained-----------------------	21	IIs-3 (17)	45	--------------	--	A	65	3
Mp	Merritt complex, saline-alkali---	21	IVw-6 (17)	49	--------------	--	F	27-34	5
MrG2	Millsholm rocky loam, 15 to 75 percent slopes, eroded---------	21	VIIe-8 (15)	51	Shallow Loamy	63	J	8	8
Ms	Myers clay-----------------------	22	IIs-5 (17)	46	--------------	--	C	51	3
Oa	Omni silty clay loam-------------	24	IIIw-3 (17)	47	--------------	--	E	62	4
Ob	Omni silty clay------------------	23	IIIw-5 (17)	47	--------------	--	E	39	4
Pa	Pescadero silty clay-------------	25	IIIw-5 (17)	47	--------------	--	E	35	4
Pb	Pescadero silty clay, saline-alkali------------------------	24	IVw-6 (17)	49	--------------	--	E	14	5
Pc	Pescadero soils, flooded---------	25	IVw-3 (17)	49	--------------	--	E	15-21	5
PfE2	Positas gravelly loam, 15 to 30 percent slopes, eroded---------	26	VIe-3 (15)	50	Claypan	63	D	24	6
PfF2	Positas gravelly loam, 30 to 50 percent slopes, eroded---------	25	VIIe-3 (15)	51	Claypan	63	J	13	6
PfF3	Positas gravelly loam, 30 to 50 percent slopes, severely eroded------------------------	26	VIIe-3 (15)	51	Claypan	63	J	10	8
Ra	Reiff very fine sandy loam-------	26	I-1 (17)	44	--------------	--	A	100	1
Rb	Reiff gravelly loam--------------	26	IIs-4 (17)	46	--------------	--	A	71	1
Rg	Rincon silty clay loam------------	27	IIs-3 (17)	45	--------------	--	A	73	3
Rh	Riverwash------------------------	27	VIIIw-4 (17)	51	--------------	--	J	--	9
Rk	Riz loam-------------------------	28	IVs-3 (17)	50	--------------	--	D	45	3
Rn	Riz loam, flooded----------------	28	IVw-3 (17)	49	--------------	--	E	24	4
RoG	Rock land------------------------	29	VIIIs-1 (15)	51	--------------	--	J	5	9
Sa	Sacramento silty clay loam-------	29	IIIw-3 (17)	47	--------------	--	E	65	4
Sb	Sacramento silty clay loam, drained-----------------------	30	IIs-3 (17)	45	--------------	--	C	73	3
Sc	Sacramento clay------------------	29	IIIw-5 (17)	47	--------------	--	E	38	4
Sd	Sacramento clay, drained---------	30	IIs-5 (17)	46	--------------	--	C	46	3
Se	Sacramento clay, flooded---------	30	IVw-5 (17)	49	--------------	--	E	34	4
Sf	Sacramento clay, deep------------	30	IIIw-5 (17)	47	--------------	--	E	41	4
Sg	Sacramento soils, flooded--------	30	IVw-3 (17)	49	--------------	--	E	30	4
Sh	San Ysidro loam------------------	30	IVs-3 (17)	50	--------------	--	D	50	3
SkD	Sehorn clay, 2 to 15 percent slopes------------------------	32	IIIe-5 (15)	47	Clayey	62	C	41	7
SkE2	Sehorn clay, 15 to 30 percent slopes, eroded-----------------	31	IVe-5 (15)	48	Clayey	62	C	29	7
SkF2	Sehorn clay, 30 to 50 percent slopes, eroded-----------------	32	VIe-5 (15)	50	Clayey	62	C	14	7
SlD	Sehorn cobbly clay, 2 to 15 percent slopes-----------------	32	IVe-5 (15)	48	Clayey	62	C	32	7

Map symbol		Page	Capability unit Symbol	Capability unit Page	Range site Name	Range site Page	Vegetative group	Storie index	Wildlife group
SmD	Sehorn-Balcom complex, 2 to 15 percent slopes-------------------	32	IIIe-5 (15)	47	Clayey	62	C, G	41, 62	7
SmE2	Sehorn-Balcom complex, 15 to 30 percent slopes, eroded----------	32	IVe-5 (15)	48	Clayey	62	C, G	29, 43	7
SmF2	Sehorn-Balcom complex, 30 to 50 percent slopes, eroded----------	32	VIe-5 (15)	50	Clayey	62	C, G	14, 22	7
Sn	Soboba gravelly sandy loam---------	33	IVs-4 (17)	50	-------------	--	B	25	2
So	Sycamore silt loam-----------------	34	IIw-2 (17)	45	-------------	--	E	76	1
Sp	Sycamore silt loam, drained--------	34	I-1 (17)	44	-------------	--	A	90	1
Sr	Sycamore silt loam, flooded--------	34	IVw-2 (17)	48	-------------	--	E	45	1
Ss	Sycamore silty clay loam-----------	34	IIw-2 (17)	45	-------------	--	E	65	1
St	Sycamore silty clay loam, drained-------------------------	33	I-1 (17)	44	-------------	--	A	77	1
Su	Sycamore complex-------------------	34	IIIw-3 (17)	47	-------------	--	E	51-64	4
Sv	Sycamore complex, drained----------	35	IIs-3 (17)	45	-------------	--	C	61-76	3
Sw	Sycamore complex, flooded----------	35	IVw-3 (17)	49	-------------	--	E	26-32	4
TaA	Tehama loam, 0 to 2 percent slopes--------------------------	35	IIs-3 (17)	45	-------------	--	A	72	3
TaB	Tehama loam, 2 to 5 percent slopes--------------------------	36	IIe-3 (17)	44	-------------	--	A	69	3
Tb	Tyndall very fine sandy loam-------	36	IIw-2 (17)	45	-------------	--	E	77	1
Tc	Tyndall very fine sandy loam, drained-------------------------	37	I-1 (17)	44	-------------	--	A	81	1
Td	Tyndall very fine sandy loam, flooded-------------------------	37	IVw-2 (17)	48	-------------	--	E	38	1
Te	Tyndall very fine sandy loam, deep----------------------------	37	IIIw-3 (17)	47	-------------	--	E	69	1
Tf	Tyndall silty clay loam------------	37	IIw-2 (17)	45	-------------	--	E	69	1
Va	Valdez silt loam-------------------	37	IIw-2 (17)	45	-------------	--	E	81	1
Vb	Valdez silt loam, deep-------------	38	IIIw-3 (17)	47	-------------	--	E	77	4
Vc	Valdez complex, flooded------------	38	IVw-3 (17)	49	-------------	--	E	41	4
Wa	Willows silty clay loam------------	39	IIIw-3 (17)	47	-------------	--	E	31	4
Wb	Willows clay-----------------------	38	IIIw-5 (17)	47	-------------	--	E	29	4
Wc	Willows clay, alkali---------------	39	IVw-6 (17)	49	-------------	--	F	10	5
Wd	Willows clay, alkali, drained------	39	IVw-6 (17)	49	-------------	--	F	22	5
Wf	Willows clay, alkali, flooded------	39	IVw-5 (17)	49	-------------	--	F	14	5
Wg	Willows soils, flooded-------------	39	IVw-3 (17)	49	-------------	--	E	15	4
Wm	Willows clay, marly variant--------	40	IIIw-5 (17)	47	-------------	--	E	34	4
Wn	Willows clay, marly variant, saline-alkali--------------------	40	IVw-6 (17)	49	-------------	--	F	11	5
Ya	Yolo silt loam---------------------	41	I-1 (17)	44	-------------	--	A	100	1
Yb	Yolo silty clay loam---------------	42	I-1 (17)	44	-------------	--	A	90	1
Za	Zamora loam------------------------	42	I-1 (17)	44	-------------	--	A	95	1

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