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BUREAU OF CHEMISTRY AND SOILS
In cooperation with the Florida Department of Agriculture

SOIL SURVEY
LAKE COUNTY, FLORIDA

BY

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Beginning with the 1923 Series, Soil Survey Reports will be issued separately. These reports of the individual areas will be sent to libraries as soon as they are available and should be filed, preserved, and ultimately bound to take the place of the bound volumes of the Field Operations which have previously been supplied by the department. The reports for each year will be consecutively numbered, the last report for a particular year bearing the conspicuous notice: "This number is the final and last Soil Survey Report for the Year 192–."

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[PUBLIC RESOLUTION—No. 9]

JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided,* That in addition to the number of copies above provided for there shall be printed as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for use of the Department of Agriculture.

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]

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DESCRIPTION OF THE AREA

Lake County lies in the central part of the Florida Peninsula, about midway between Jacksonville and Tampa. It is situated almost wholly in what is known as the Lake Region[1] of Florida.

It has an area of 1,015 square miles, or 649,600 acres.

The county may be separated into three main topographic divisions, the rolling uplands, locally known as the "Apopka Mountains," in the southern part of the county; the flatwoods, occurring in the extreme southern part of the survey, between Okahumpka and the Polk County line in the western part, and in a broad belt along the St. Johns and Wekiva Rivers in the extreme eastern and northeastern parts; and the undulating to gently rolling uplands, which comprise, very largely, the remainder of the county.

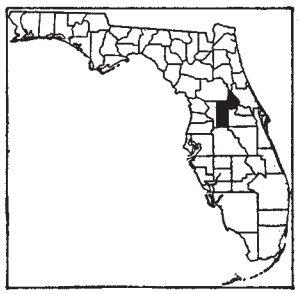

FIG. 14.—Sketch map showing location of the Lake County area, Florida

The rolling uplands consist of a belt, 2 to 6 miles wide, of ridges and hills dotted with numerous lakes, ponds, and depressions, and extending from the southern shore of Lake Harris southeast, passing into Orange County, southeast of Flat Lake.

The undulating to gently rolling upland, which comprises two-thirds of the county, is literally studded with lakes, ponds and depressions. (Pl. 12, figs. 1 and 2.)

The flatwoods consist of almost level regions frequently interrupted by slightly depressed areas, both large and small, shallow drainage ways, and low, gently undulating ridges.

Elevations, determined by local engineers, range, in the rolling upland, from 40 to over 300[2] feet above sea level, in the undulating to gently rolling uplands from 25 to 200 feet, and in the flatwoods from 15 to 40 feet +.

The drainage of the northeastern corner of Lake County flows into the St. Johns River; the region lying between Sorrento and Pittman drains into its tributary, the Wekiva River; and that embracing most of the southern and western parts of the county drains through the Falatlakaha Creek into the Ocklawaha River, another

[1] For a comprehensive description of this region, see Thirteenth Ann. Rept. Fla. Geol. Survey (1921), pp. 119–129.

[2] Working from U. S. bench mark, E. J. Close established a precise level of 313 feet. The maximum may be slightly greater than this.

tributary of the St. Johns. The extreme southern, southwestern, and extreme western parts of the county are drained by the Withlacoochee River and its tributaries. Extending back from these streams are intricate systems of smaller streams, which have their sources in lakes, swamps, and marshes. A striking feature of the Falatlakaha and Ocklawaha Rivers is that they connect chains of rather large inland lakes, the former connecting Lakes Louisa, Minnehaha, and Minneola; and the latter Lakes Apopka, Dora, Harris, Eustis, Griffin, and Yale.

There are numerous small lakes, ponds and swamps throughout the county that are without surface outlets. They may be of limestone-sink origin, the waters finding their way downward through underground passages or evaporating from the surface.

The rolling uplands and the undulating to gently rolling uplands, which comprise the greater part of the survey, are well drained, though there are few definite drainage channels. The rain waters pass largely into the soil to reappear as seepage at the foot of slopes, or in drainage depressions having no defined channels. In the flatwoods there are many surface drainage channels. Only the larger creeks and rivers are well defined. The streams have not developed valleys, are very sluggish, and generally head in swamps or bogs, and in their upper reaches are merely wet-weather branches. Both creeks and branches are fringed with a heavy growth of cypress and hardwoods.

The first settlers came into this region from the Carolinas, Georgia, and Alabama between 1840 and 1850. Lake County was organized in 1887. During the eighties and until the freeze of 1895 there was a strong immigration into Lake County from all States east of the Mississippi. A more recent immigration, which has been rapidly growing during the past decade, has been and is from all parts of the United States. The total population is reported in the census of 1920 as 12,744, with no towns in the county of more than 2,500 population, the entire population being classed as rural. According to a State census taken in 1925 the total population of the county is 18,870, and the population of Leesburg, the largest town, 3,030. On the classification basis used by the Federal census, this would make the rural population 15,840 in 1925. A large percentage of the farmers live in small towns, and go to and from their farms in automobiles. In the southern and northeastern parts of the county there are large uninhabited areas that are used only for grazing, turpentining, and lumbering.

Leesburg on Lake Griffin, Eustis, on Lake Eustis, Tavares, the county seat, in the central part of the county, Mount Dora, on Lake Dora, Clermont on Lake Minnehaha and Lake Minneola, Umatilla on Lake Umatilla, and Groveland, Howey, and Mascotte in the southwestern part of the county are the principal cities and towns. All of these, as well as a number of the smaller towns, have citrus packing houses and railroad facilities. Astor and Crows Bluff are located on the St. Johns River and have facilities for water transportation. Okahumpka, Fruitland Park, and Lady Lake are important shipping points for both citrus fruit and watermelons.

Lake County has good transportation facilities. The Atlantic Coast Line crosses the central part of the county east and west, run-

ning through Leesburg, Eustis, Tavares, Mount Dora, Sorrento, and Wekiva. A branch of this system crosses the southern part of the county in an east to west course, entering it just south of Lake Apopka, and leaving it just west of Mascotte, while another branch extends from Tavares northeastward through Eustis, Umatilla, Altoona, and Astor. The Seaboard Air Line extends from Wildwood, Sumter County, to Tavares and beyond. It also cuts the southwest corner of the area of survey. The Tavares & Gulf Railroad connects Tavares and Clermont, and has a branch entering the county near Montverde and extending to Clermont. Steamboats ply the St. Johns River from Sanford to Jacksonville.

Four State highways, of concrete or sand-clay construction, cross the county east and west, and two north and south. With the exception of the southern tier of townships and the northeast corner earth roads reach almost every part of the county.

The principal towns are connected by telephone lines and these are being rapidly extended into the rural districts. Rural and star routes reach most of the settlements.

Leesburg, Eustis, Tavares, Umatilla, Mount Dora, Clermont, and Groveland are the principal home markets. Watermelons and citrus fruits are shipped to all the large cities in the eastern half of the United States. Green beans, cucumbers, and celery are shipped chiefly from Mascotte.

CLIMATE

The climate of Lake County is subtropical. It differs from that of northern Florida in being warmer in winter and somewhat wetter in summer. Some years during the months of December, January, and February there are periods of about a day or two when the temperature may drop to the freezing point or below.

The mean annual temperature is 71.7° F. at Eustis and 72.8° F. at Clermont. The warmest weather normally occurs during July and August at both stations when an average of more than 82° F. is reached. Temperatures of 100° F. or more have been noted from May to September, inclusive. A maximum of 104° F. was reached in June and July at the Eustis station and in June at Clermont. January is the coldest month at both stations, but the aboslute minimum temperature recorded is 16° F. in December, 1894, and February, 1895 at Eustis and 18° F. in February, 1895 at Clermont. Such cold is extremely rare.

The mean annual precipitation is 48.9 inches at Clermont and 47.72 inches at Eustis. In general the wet season lasts from June to September, inclusive, and the rainfall is light during the winter and spring months, but November is normally the driest month at both stations. In 1913, the driest year recorded at Clermont, the total precipitation for June, July, August, and September, which normally is 27.74 inches, was 16.20 inches; and in 1917, the driest year recorded at Eustis, the total precipitation from December to May, inclusive, which in an average year is 16.40 inches, was only 7.15 inches. Furthermore, during 1912, the wettest year recorded at both Clermont and Eustis, the precipitation for January, which averages 2.63 inches at Clermont and 2.87 inches at Eustis was

7.82 inches at Clermont and 7.08 at Eustis; and for June, which averages 6.71 inches for Clermont and 6.14 inches for Eustis was 15.42 inches for Clermont and 14.15 inches for Eustis. Droughts severe enough to reduce very materially the crop of citrus fruits, watermelons, and vegetables sometimes occur in the spring, and on the other hand there have been years when excessive rainfalls during the summer and fall months have interfered very much with crop production.

The temperature and precipitation records cover a period of more than 30 years for each station. The frost records of the station at Eustis also cover a period of 30 years, during which time temperatures of 32° F., or lower, have occurred at various times between November 21 and March 25. For nearly half this period the Weather Bureau reports that no killing frost occurred. The frost record for Clermont is for 14 years only. During that time there was reported "no killing frost" in spring for 7 years and none in the fall for 11 years. In the other years frosts have occurred on some days between November 21 and March 1.

There is thus an apparent difference in the spring frost occurrence at these stations. This may be due to a difference in location of the observation points at Clermont and Eustis, in respect to air drainage, as at both stations temperature changes are moderated by the existence of comparatively large bodies of water. The observation point at Clermont is located on a comparatively high ridge between Lake Minnehaha and Lake Minneola, where the cold air, on a freezing night drains down steep slopes, which lead to the lakes; while at Eustis the slope leading from the lake to the observation point is gentle. The observations of many farmers throughout Lake County indicate that the location of land, with respect to air drainage, is of very great importance in the production of citrus fruits and winter truck crops. They report that groves and gardens on lower slopes and the floors of depressions are much more likely to suffer frost injury than those situated on ridges and higher slopes. Here, frost damage occurs only at times of general freezes, which, according to weather reports, come but once or twice in a period of 20 years. Citrus groves on islands and points extending into the larger lakes, where the modifying influence of water is most effective, have escaped all known freezes, even including the most severe one of 1895. Crops on certain parts of the lower lying areas, which are frequently blanketed by heavy fogs, also escape frost damage.

The following tables giving climatic data are compiled from the records of the Weather Bureau stations at Clermont and Eustis.

Normal monthly, seasonal, and annual temperature and precipitation at Clermont

[Elevation, 105 feet]

Month	Temperature			Precipitation		
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1913)	Total amount for the wettest year (1912)
	°F.	°F.	°F.	Inches	Inches	Inches
December	61.2	89	20	2.34	2.37	0.63
January	60.9	88	21	2.63	1.47	7.82
February	61.7	91	18	3.04	4.92	1.16
Winter	61.3	91	18	8.01	8.76	9.61
March	68.6	98	31	2.02	6.06	4.00
April	72.5	98	38	2.33	2.98	2.19
May	78.1	100	49	3.94	1.33	8.25
Spring	73.1	100	31	8.29	10.37	14.44
June	81.4	104	57	6.71	1.80	15.42
July	82.9	103	65	7.12	4.74	5.68
August	82.8	101	64	7.49	5.46	3.85
Summer	82.4	104	57	21.32	12.00	24.95
September	80.8	102	54	6.42	4.20	7.60
October	75.2	98	43	3.18	2.12	4.58
November	67.6	92	30	1.68	.20	2.50
Fall	74.5	102	30	11.28	6.52	14.68
Year	72.8	104	18	48.90	37.65	63.88

Normal monthly, seasonal, and annual temperature and precipitation at Eustis

[Elevation, 56 feet]

Month	Temperature			Precipitation		
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1917)	Total amount for the wettest year (1912)
	°F.	°F.	°F.	Inches	Inches	Inches
December	59.7	87	16	2.32	1.12	1.61
January	59.2	87	20	2.87	.73	7.08
February	60.9	90	16	2.87	.97	1.40
Winter	59.6	90	16	8.06	2.82	10.09
March	66.8	96	28	2.52	1.53	4.39
April	71.0	96	35	2.27	.86	2.06
May	77.3	100	47	3.55	1.94	6.51
Spring	71.7	100	28	8.34	4.33	12.96
June	80.9	104	54	6.14	5.06	14.15
July	82.4	104	63	7.00	7.95	5.71
August	82.4	102	63	6.32	6.77	4.26
Summer	81.9	104	54	19.46	19.78	24.12
September	79.8	100	52	6.19	6.17	8.44
October	73.5	98	36	3.59	1.77	3.95
November	65.6	91	26	2.08	.48	1.99
Fall	73.0	100	26	11.86	8.42	14.38
Year	71.7	104	16	47.72	35.35	61.55

AGRICULTURE

The first settlements in Lake County were made near where Leesburg now stands. The early settlers made clearings in the forests at first and grew subsistence crops exclusively. Important among these were corn, upland rice, peanuts, and vegetables of various kinds. Cattle and hogs were raised on the open range.

About seven years after the first settlement the citrus industry had its beginning in Lake County. Melton Haynes, in 1847, started the first seedling nursery on the north shore of Lake Harris. In 1869 T. C. Lanier began the budding of the wild orange trees at Orange Bend. The growing of oranges gradually increased in importance until 1895, when Lake County ranked among the first of the State in the production of citrus fruits. The freeze of that year killed over 99 per cent of the trees, and for a decade following very little interest was taken in reestablishing the citrus industry; but for the last 20 years the groves have been gradually extending.

Citrus-fruit growing is now the most important phase of farming in the area surveyed (Pl. 13, fig. 1). According to the census of 1920, there were in the county 253,431 orange trees of bearing age, with a production of 388,052 boxes in 1919; 49,105 grapefruit trees yielding 74,371 boxes; 1,023 tangerine trees, producing 1,641 boxes; and 731 lemon trees, with a yield of 1,053 boxes. According to records compiled by the county agent of Lake County in 1924, there has been a very marked increase in citrus-fruit acreage since 1919. Groves now occupy more than 30,000 acres. Of this total acreage, 17,000 acres is devoted to oranges; 10,000 acres to grapefruit; and 3,000 acres to mandarins. According to preliminary returns of the census for 1925, the total number of citrus trees of all ages was 1,433,190. The same authority gives the total for 1919 as 422,532.

The citrus fruit shipped from Lake County reaches practically all points between El Paso, Denver, Livingston, and Winnipeg on the west and the Atlantic Ocean on the east; and in addition shipments are made to London, Paris, and Berlin.

The leading variety of early oranges grown is the Parson Brown, maturing in October and November; of midseason, the Pineapple, maturing in December, January, and February; and of late season, the Valencia, maturing in March, April, May, and June. The main varieties of grapefruit listed in the order of maturing are the Triumph, Walters, and Duncan. The mandarin oranges most grown are the Owari (Satsuma type) ripening during October and November and the Dancy, which is ready for market from December to March. Another favorite of the mandarin, or "kid glove" type, is the King, maturing in February and March. Limes mature from January to March.

The census of 1920 states that there were 12,356 peach trees with a yield of 5,273 bushels in 1919. Most of the peaches are produced on trees planted as fillers in the young citrus groves, the trees being removed when the citrus trees come into bearing. The Jewel and Waldo are leading varieties. In addition to the fruits already mentioned, which are grown commercially, pears, plums, kumquats, figs, pecans, and strawberries are produced for home use.

Truck growing is next to the production of citrus fruits, both in acreage and in value of products. The 1920 census states that 2,871 acres were devoted to the production of vegetables in 1919. Cucumbers, string beans, tomatoes, and cabbage, ranking in value in the order named, are the leading truck crops. These crops are harvested in the winter and early spring and shipped to markets outside the State, chiefly to the large cities from the Mississippi to the Atlantic seaboard and north into Canada. Sweet potatoes and potatoes are grown by most farmers for home consumption and for the local markets. The most extensively grown variety of cucumbers is the Improved White Spine, of cabbage, the Charleston, and of sweet potato, the Nancy Hall.

Watermelons, first grown comercially in 1879, now occupy a larger acreage than all other truck crops combined. Over 3,000 acres, according to estimates of farmers, were planted to this crop in 1925. The more important varieties according to their acreage are the Tom Watson, Irish Gray, Kleckley Sweet, and Florida Favorite. Watermelons mature in May and June and are shipped to all cities in this country east of the Mississippi River and to those of southeastern Canada.

Many kinds of garden vegetables not grown extensively for shipment are produced for home consumption and the local markets.

Bananas are grown quite generally, but commercially only to a very small extent. The first plantings were made near Mount Dora in 1910. Although the bananas grown are smaller than the imported fruit, they are of good quality and are in demand in the local markets. Lady Finger and Cavendish are the leading varieties.

Some truckers have set out a few acres of bulbs, the narcissus, gladiolus, Easter lily, and amaryllis being the more important.

At Montverde and east of Lady Lake there are some profitable vineyards, and plantings of grapes are being rapidly extended. Among the leading varieties grown are Beacon, Carman, Munson, Ellen Scott, Armalada, Brilliant, Headlight, Thomas, and Scuppernong. The last two are Muscadine varieties. The vineyards are fertilized, one-half to 1 pound of a 5–8–5 fertilizer per vine being applied in the spring, summer, and fall. The fertilizer is supplemented with 5 to 10 tons of stable manure per acre, every two or three years, and in addition leguminous crops are turned under from time to time.

The census reports 4,144 acres planted to corn in 1919, producing 47,024 bushels; the preliminary figures for 1924 show a decline in acreage to 1,394 acres and in production to 15,940 bushels. A large part of the corn is allowed to mature, the grain being fed on the farms to work animals and hogs, and a small proportion is cut green and stored in silos. This is used largely in feeding dairy cattle. In the vicinity of Leesburg and Eustis some sweet corn is produced. It is marketed at these towns. The principal varieties of field corn grown are Hastings Prolific, Hickory King, and Cuban Flint. On the light sandy soils corn yields range from 8 to 20 bushels per acre. In the trucking sections corn follows the vegetables and yields 30 to 50 bushels per acre without the use of additional fertilizer.

In 1919, according to the census, there were 3,109 acres of tame or cultivated grasses cut for hay, which gave a production of 2,360

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tons, or 1.3 tons per acre. There were 220 acres of legumes, consisting mainly of beggarweed, velvet beans, and cowpeas, cut for hay. Oats and grass, the latter a volunteer growth, constitute a common hay crop. Relatively few farmers cut sufficient hay for their own use. Natal grass is an important hay and pasture grass and is extensively used as a mulch in the citrus groves.

According to the 1920 census, there were 281 acres in sea-island cotton in the county in 1919 yielding 52 bales, and 255 of sugar cane, from which 23,815 gallons of sirup were produced.

Within the last few years the growing of ferns has become a very important special industry in the vicinity of Tavares, Leesburg, Okahumpka, Howey, Clermont, and Montverde. Farmers report over 100 acres planted in 1925, of which area 90 per cent is devoted to the asparagus fern, and 10 per cent to the Boston fern. Ferns are grown under slat shades (Pl. 13, fig. 2), similar to those used in growing Sumatra tobacco, and require an overhead irrigation system, and the labor of one man to the acre. They are planted every 12 inches in rows 12 inches apart and require, annually, from 3 to 4 tons of 5–7–5 fertilizer. The cost of production is high, but so far the returns have been very satisfactory.

Dairying is not a very important industry. The 1910 census reports the value of dairy products, excluding home use, as $21,395, and the 1920 census giving the value of dairy products as $46,007. The preliminary returns of the census of 1925 show a slight increase in the number of dairy cattle since 1919.

Jersey cattle and grades of this breed predominate. There are some Guernsey and Holstein cattle, a few purebred, but mostly grades. Dairy cattle are kept on permanent pasture, but are given supplemental winter pasturage of oats, barley, and rye, and at other times of the year they are turned on cowpeas, velvet beans, and beggarweed. In addition to the pasturage, cottonseed meal and other concentrates, dry fodder, and silage consisting of corn, velvet beans, cowpeas, and Japanese cane are fed. It is estimated that 6 acres of wire grass are required to provide pasture for one cow; 1 acre of carpet grass or Natal grass for one cow, and 1 acre of Bermuda for two cows. Should the Texas fever tick be eradicated, it is believed that the dairy industry would grow rapidly.

The production of beef cattle is of some local importance. Herds of varying size roam over the large areas of woodland, living the year round without protection or feeding. Their principal food is wire grass. The cattle receive little attention and are infested with Texas fever ticks, and this, together with insufficient feed, causes many to die. The native cattle are of poor quality, and bring only $10 to $20 a head. The importation of purebred bulls is discouraged by the presence of the fever tick. However, a small number of Florida grade sires, of the Hereford, Shorthorn, and Polled Angus breeds, have been introduced into the herds with good results.

Hogs, like beef cattle, depend for much of the year on the open range for their subsistence, finding forage and mast in the swamps, hammocks, and flatwoods. However, they are mostly of the improved breeds, or grades thereof, and the typical "razorback" is uncommon. Duroc-Jersey, Poland-China, Berkshire, and Chester White, ranking in numbers in the order named, are the leading

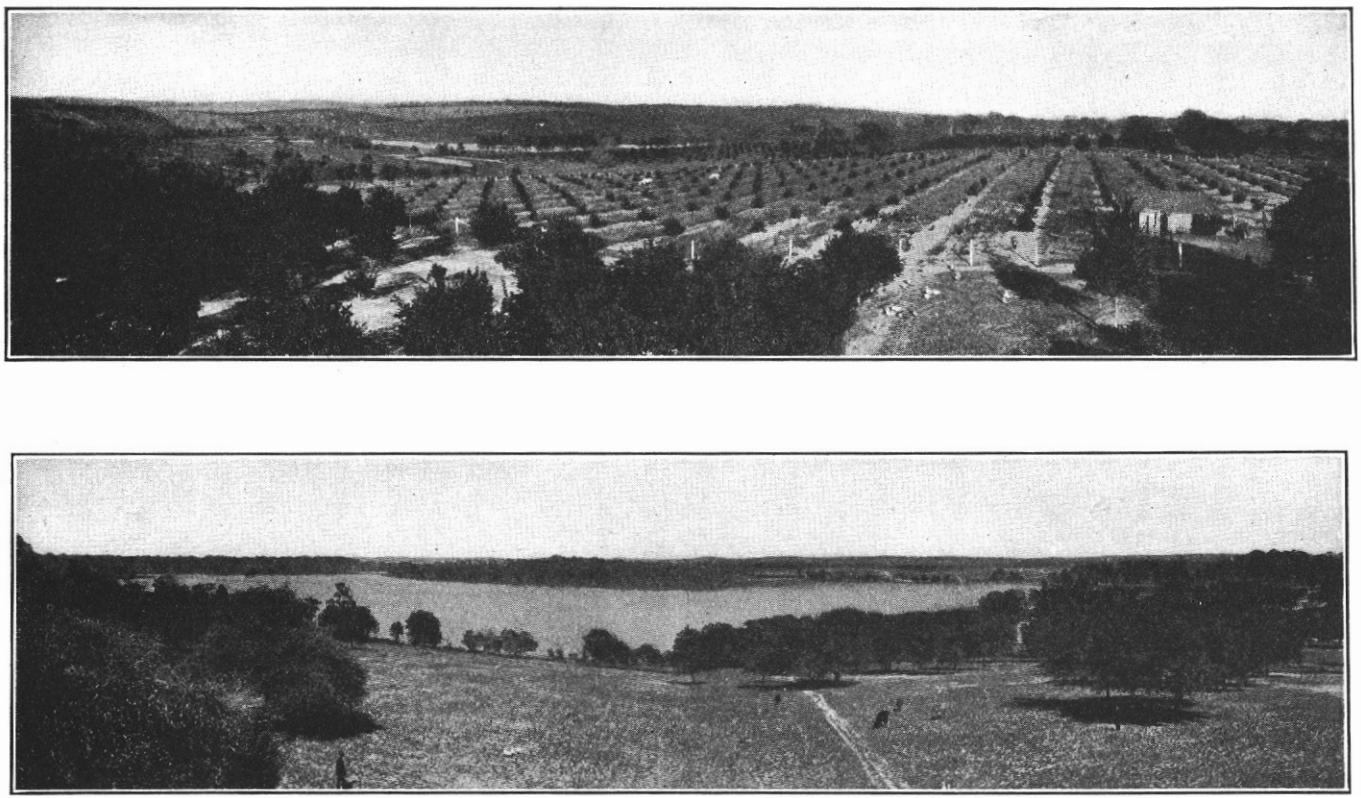
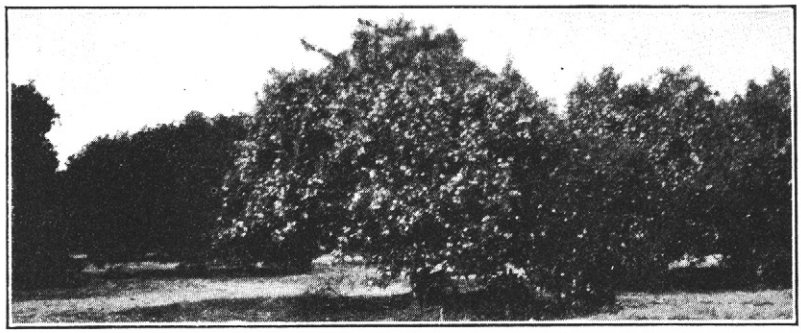


FIG. 2.—ONE OF THE SEVERAL HUNDRED LAKES SHOWN ON THE SOIL MAP

Many citrus groves are situated near lakes, where there is less likelihood of damage by frost



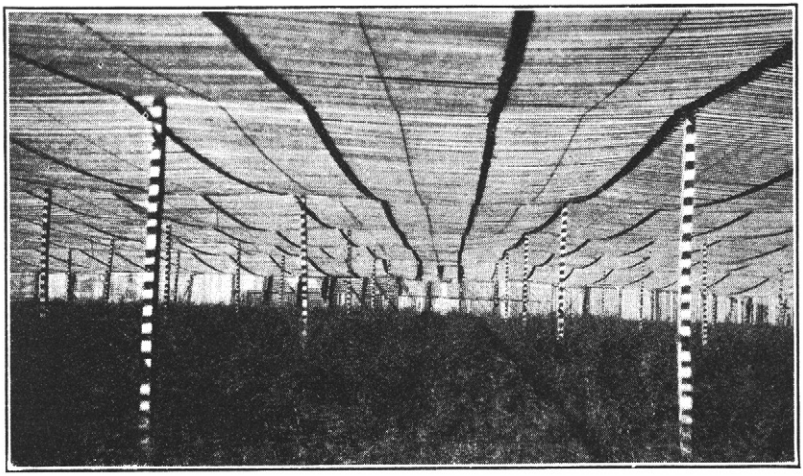


FIG. 2.—A FERNERY AT LEESBURG

breeds. Many farmers finish their hogs by first turning them in to velvet beans and peanuts or cowpeas and peanuts after the corn is harvested, and later, about five or six weeks prior to slaughtering, penning them and feeding corn. All the pork is consumed locally.

Mules are used largely and horses to some extent in farm work. Oxen are sometimes employed in lumbering. Almost all the work animals are shipped into the county.

Generally the farms have flocks of 50 to 100 chickens, and there are a number of small farms that specialize in poultry raising. The latter seem to prefer the White Leghorn; the average farmer more often carries the Rhode Island Red or Barred Plymouth Rock. Hatcheries are situated at Umatilla, Mount Dora, and Groveland.

Many farmers have considered the adaptation of their soils to crops, and since a large percentage of farms comprise more than one soil type, it is often possible to use different parts of the farm for the most suitable crops. The Norfolk, Eustis, Blanton, and Orlando fine sands usually are selected for the citrus orchards, watermelons, peaches, sweet potatoes, sugar cane, and asparagus fern, although the Balden soils when drained are considered well adapted to citrus fruit, sweet potatoes, and sugar cane. The Bladen fine sand, fine sandy loam, and clay loam, Blanton loamy fine sand, Portsmouth fine sand, hammock and prairie phases, and the Orlando fine sand are the favorite truck and corn soils. The loamy phase of the Leon fine sand, the St. Johns fine sand, and the Portsmouth fine sand are also recognized as truck and corn soils. With drainage and lime, the loamy phase of the Leon fine sand, has been found adapted to truck crops, corn, sweet potatoes, and sugar cane. The Bladen fine sandy loam has been found especially suited for pecans. The Boston fern is grown on the Bladen and Portsmouth soils. Owing to their lack of organic matter, incoherence and leachy nature the St. Lucie and Lakewood fine sands are considered by farmers as inferior soils, and are farmed to a very small extent. The Plummer fine sand cypress-swamp phase, because of its low content of organic matter and poorly drained conditions, is not farmed. Peaty muck, when reclaimed, has proved well adapted to onions, head lettuce, celery, corn, and cabbage.

The topographic position, as affecting air drainage, is considered a very important matter by those engaged in citrus fruit culture and trucking. The preferable situations are the higher elevations of the hills, southern exposures, and especially places where the cold air can readily move down to lower elevations. Situations close to comparatively large bodies of water, such as islands, peninsulas, and shores of the larger lakes also are preferred because of the less likelihood of erratic frost occurrence in such positions.

In growing oranges and grapefruit, new groves are started by planting in June, during the rainy season, or in early winter, 1-year-old or 2-year-old budded trees are set in rows or checks about 25 by 25 feet or 30 by 30 feet. During the dry season, winter and spring, the groves are cultivated about every two weeks to conserve the moisture, but when the rainy season starts in June the cultivation is discontinued. In trucking the land is thrown into beds. There are 8 to 16 of these beds in a plat. Between the plats are water furrows which are connected with ditches and used both

for drainage and irrigation. The water for irrigation is supplied by artesian wells. Corn usually follows tomatoes, string beans, cucumbers, and cabbage, thus getting the benefit of the residual effect of the fertilizer used on the truck crop. Velvet beans and sometimes peanuts are interplanted with corn. The beans are not harvested, but after the corn is harvested hogs are turned into the fields. Cowpeas are sown broadcast or planted in between the corn at the last cultivation, for hay and for pasturage for hogs.

The owners of the larger citrus groves usually have modern country houses thoroughly equipped with all conveniences, and fair barns are provided for the work animals and the storage of feed. Probably three-fourths of the farmhouses consist of small two to five-room cottages, often unpainted. As a rule the farms thus improved have only a shed for the accommodation of the livestock. Heavier teams, modern plows, and tractors have displaced, in most cases, the light pony and scooter plows, and light teams typical of an earlier stage in the development. There are a number of silos on dairy farms, but they are not common. A few farmers, cultivating the Bladen fine sandy loam, have tile-drained their fields; and where the tiles have been properly installed, a very material increase in crop production has resulted, repaying all costs of tiling within a few years.

Fertilizers are used on all the soils of the county. In the census of 1920, the total expenditure for fertilizer is given as $300,577, or $433.11 per farm. Citrus fruits receive fertilizer applications in the spring, summer, and fall. In fertilizing oranges a 4–8–5 or 4–8–3 mixture is used for young trees, and a 3–8–8 or 3–8–10 for old trees, in the spring. One-year-old trees receive 1 pound per application; 3-year-old trees, 3 pounds; 8-year-old trees, 10 to 12 pounds; and 30-year-old trees, 20 to 30 pounds. The applications are increased from 25 to 30 per cent for grapefruit and tangerines. The commercial fertilizers are supplemented by stable manure, and by growing and turning under leguminous crops, such as cowpeas, velvet beans, and beggarweed. Where corn is grown outside the trucking districts, 8–2–1 fertilizer is commonly used. Some farmers use about 400 pounds of cottonseed meal and acid phosphate for corn, applying half of it about 10 days before planting and the remainder as a top-dressing about six weeks after planting. About 800 to 1,200 pounds of cottonseed meal are used for sugar cane. Watermelons customarily receive from 800 to 1,000 pounds of a 5–7–4 or 7–7–5 fertilizer per acre, together with a side dressing of 150 pounds of sodium nitrate. A fertilizer analyzing about 5–6–4 is used, at the rate of 1 ton per acre, for cabbage, and a 5–6–5 fertilizer is used at the rate of 1 ton per acre for tomatoes. Cucumbers receive from 1,000 to 2,000 pounds of a 5–5–6 fertilizer per acre. From 5 to 10 tons of stable manure per acre are applied to grape vineyards every two or three years, and in addition from 600 to 1,000 pounds anually of a 5–8–5 fertilizer supplemented with 150 pounds of nitrate of soda. Applications are made in the spring, summer, and fall. Cotton usually receives from 200 to 600 pounds of a 3–6–3 fertilizer per acre, and bananas from 1,000 to 2,000 pounds of a 10–5–5 supplemented with 8 to 10 tons of stable manure, and sweet potatoes 1,000 pounds of a 5–7–6 supplemented with 8 to 10 tons of stable

manure. In some cases sweet potato land is fertilized by "cow-penning," which consists of penning the livestock at night on a few acres of land for two to six weeks prior to planting. A 7–4–4 fertilizer is used for potatoes at the rate of 1,500 to 2,000 pounds per acre.

Air-slaked lime, at the rate of 1,000 to 1,500 pounds per acre, has been used successfully by a few farmers on the poorly drained land, in correcting acidity.

There has been a scarcity of labor in Lake County for the last several years, owing to the higher wages and other inducements offered in the cities. The farm laborers are mainly colored. Monthly wages range from $40 to $65 with board. Day laborers receive $2 to $3.50. The census reports $248,751 paid for farm labor during the year 1919, or $422.33 for each of the 587 farms reporting.

In 1920, the number of farms in Lake County was given by the census as 876, or about 160 less than 10 years earlier. During the last five years the number has increased, the preliminary figures for 1925 being 1,380. The land in farms in 1920 was only 88,339 acres, and had more than doubled by January 1, 1925, the census preliminary statement making the total 197,431 acres. During this same five-year period, the value of farm property (land and buildings) shows a very decided increase, or from $9,152,175 to $24,014,770, the proportion of enhancement being more in the land, which rose from $7,544,815 to $21,555,461, than in the buildings, the value of which made a gain of about 50 per cent, or from $1,607,360 to $2,459,309. The value of land and buildings per farm is near the average for the United States, being $10,900 in 1920 and $17,000 in 1925.

The average size of farms increased from 91 acres in 1890 to 100.8 in 1920. About one-third the area of the county is in farms, but less than 10 per cent of the area is cultivated.

Of the total number of farms in 1919, 83.7 per cent were operated by owners, 8.4 per cent by managers, and 7.9 per cent by tenants. In leasing farms the cash-rent system is the most common. From $1 to $25 is paid per acre, the high rents being paid for truck land near towns or good transportation facilities. Under the share system, when the landlord furnishes the land, fertilizer, and seed and the tenant the labor, work stock, and equipment, each receives one-half of the crop.

Land values in Lake County are dependent upon the improvements, the character of the soil, topographic position in relation to air drainage, location in respect to lakes, and the proximity of improved roads, towns, and transportation facilities. The average assessed value in 1920 is given by the Federal census as $85.41 an acre, as compared with $13.41 an acre in 1900. Allowing for the difference in the value of the dollar in these years, it is apparent that the land values have increased very decidedly since the beginning of the present century. At the time of the survey improved citrus and truck land was selling for $200 to $1,000 an acre, and uncleared land for $5 to $100.

SOILS

The soils of Lake County have been derived from unconsolidated coastal plain deposits and developed in a timbered region under the

influence of a humid, subtropical climate. Weathering under these conditions of climate and vegetation has changed the chemical and physical properties of the soil material, so that the resulting soil is widely different in these respects from the parent geological formations.

The soils of this area are naturally divided into two major groups, the one being characterized by poor drainage, the other by fair to good drainage. The poorly drained soils are featured by dark-colored surfaces, comparatively thick organic layers and gray subsoils, whereas the well-drained soils have gray surfaces, comparatively thin organic layers, and a yellowish-gray, yellow, or brown subsoil. The poorly drained soils are strongly acid, except in rare instances where calcareous layers are encountered at depths of 3 to 5 feet. The well-drained soils usually show only a slight acid reaction. The dark surface color of the poorly drained soils is due, largely, to the presence of loose, partially decayed organic matter, which, to a considerable extent, is not well incorporated with the mineral particles and disappears with cultivation. On the other hand the light color of the well-drained soils is due to the area having been heavily timbered, and also, owing to the porous soil material, subjected to rapid leaching, both conditions being unfavorable for a heavy development of grass roots and thus unfavorable for the accumulation of much organic matter in the soil. However, there is a noticeable quantity of coarse vegetable matter in the first inch or two of the upper layer, but these plant remains have not been incorporated in the soil, as they are in areas with grass cover. A notable exception is that of the very dark grayish brown, well-drained Orlando soils, which have a thick, well-humified organic layer.

The typical section profile, which is developed over the well-drained uplands, has three distinct horizons, including the parent material. The surface layer (A–1) consists of a thin veneer of leaf mold immediately underlain by a gray to dark-gray horizon, commonly with rather high organic matter content. This layer varies in thickness from 2 to 4 inches. Underlying this is a layer (A–2) 3 to 15 feet thick, but ordinarily 5 to 7 feet, having a grayish-white, light-gray or yellow color and a loose consistency. Almost all the clay and silt that may have been present in the original material has been removed from this horizon.

The second horizon is distinctly heavier and more compact than the first horizon, becoming somewhat heavier with increase of depth. It has a gray to reddish-yellow color more or less mottled with shades of brown, and ranges in thickness from a mere film to 12 inches. The material underlying this horizon seems to be the parent material from which the other horizons have been formed, and consists of mottled red, yellow and brown fine sandy clay. Soils having this profile include the members of the Norfolk, Blanton, and Eustis series. The St. Lucie and Lakewood section profiles resemble the above described, but are more incoherent throughout the A horizon, and their A–2 layers range from 15 to 30 feet in thickness. The B horizon of the St. Lucie (as observed about 5 miles west of Orlando in Orange county,) is a grayish-white material, much heavier in texture than the A horizon.

The well-drained soils having thick organic layers have developed profiles showing fairly well developed horizons. The upper horizon consists of two layers, the upper 10 to 20 inches thick, being a very dark grayish brown to dark-gray, rather loamy fine sand, running high in organic matter. The lower layer, 20 to 40 inches thick, contains but little organic matter and has a gray color. The second horizon has a decidedly heavier texture than the first horizon. It has a light-gray color, mottled with various shades of brown or yellow. This horizon rests upon the third horizon, which seems to consist of the parent material. Soils having this profile belong to the Orlando series.

In some of the poorly drained soils a fairly uniform profile has been developed for the A horizon and the upper part of the B horizon.

The upper horizon consists of two layers, the upper, 4 to 12 inches thick, being a dark-gray to very dark-gray loamy material. The second layer, 8 to 50 inches thick, is very low in organic matter, has essentially the same texture and consistence as that of the layer above it, and has a light-gray to grayish-white color, which becomes mottled with various shades of gray and yellow in the lower part. The second horizon has a decidedly heavier texture than the first. It is very friable and has a mottled gray, brown, and yellow color. The line of demarcation between the second and third horizons is not well developed. Although a heavy, plastic clay usually underlies the second horizon, in some cases stratified beds of heavy plastic clay, friable clay, and fine sandy loam seem to comprise the third horizon. Soils having this profile belong to the Bladen series.

Another important group of poorly drained soils include the Leon and St. Johns series. These are the so-called typical hardpan soils of the State and they present rather unique profiles. There are developed three distinct layers within a depth of 3 or 4 feet. The brown to almost black layer or hardpan consisting of fine sand partially cemented with organic matter and a small amount of iron is the distinguishing feature. This layer is from 4 to 12 inches thick and occurs anywhere between 10 and 30 inches below the surface. Loamy variations of these soils are intimately associated with the Bladen, particularly as regards the presence of clay and heavy material at a few inches below the hardpan.

Other poorly drained soils belong to the Portsmouth and Plummer series. The hammock and prairie phases of the Portsmouth are slightly loamy, owing to the thick organic layers, but the Plummer soils are decidedly gray in the surface layer and lighter in color in the subsoil.

In the foregoing discussion, the soils of the county have been considered in two groups, a well-drained and a poorly drained group. Certain of the soils in both these groups are closely related in all respects except texture and these may be placed in series. This is the next step in classification, and results in 11 series groups, each with one or more types, the types, when two or more appear in a series differing in texture of the surface soil, i. e., in the proportions of sand of the different grades, of silt, and of clay which they contain. A brief description of these several series follows.

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The typical profile of the Norfolk series is characterized in Lake County by three horizons. The upper, or surface, horizon has two layers, a gray layer of 3 to 4 inches, lying immediately below a thin surface veneer of partially decayed leaves, twigs, and roots, and a second layer, ranging from 44 to 68 inches in thickness, of light-yellow to very light grayish-yellow color, and the same texture as the one overlying it. The second horizon, from 1 to 6 inches thick, has a light purplish-yellow color, and is distinctly heavier than the first horizon. The parent material, or third horizon, is a light purplish-yellow, yellowish-red, or mottled light-red and yellow material, slightly compact or hard, but friable and brittle. This layer is composed largely of fine sand. The surface is undulating to gently rolling, and both the surface and internal drainage are good. The Norfolk fine sand with the rolling and hammock phases and the sand are mapped.

The typical profile of virgin areas of the Eustis series has three horizons, including the parent material. The surface layer of the first or surface horizon consists of a thin covering of partially decayed leaves, twigs, and roots immediately underlain by a very dark grayish-brown to brown sandy material. The total thickness of this layer is 5 to 7 inches. The second layer of the first horizon has a light reddish-yellow to light yellowish-red color, and is from 43 to 48 inches thick. The second horizon, which ranges from 1 to 20 inches in thickness, has a yellowish-red color, and is much heavier than the surface material. Below the second horizon is the parent material, which consists of a mottled red, reddish-yellow, and yellowish-red material of about the same or lighter texture and more firmly compacted, being hard but brittle. The topography is undulating to gently rolling, and both the surface and internal drainage are good. The Eustis fine sand and its dark-colored phase are mapped.

The surface horizon of the types in the Blanton series is composed of an upper layer, 2 to 4 inches thick, of a gray-colored material, and a lower layer, 45 to 95 inches thick, of yellowish-gray or grayish-white material in the upper part and a very light gray in the lower. The second horizon, which consists of a light reddish-brown material, ranges from a fraction of an inch to 5 inches in thickness. This horizon is much heavier than the first. Below this appears the parent material, the color of which is red mottled with yellowish red, reddish yellow, white and grayish white. The material of this horizon is more compact than that of the second, and the texture is about the same or slightly lighter. The topography of the soils of this series is undulating, and the drainage is good. The Blanton fine sand and loamy fine sand are developed in Lake County.

The soils of the Orlando series are characterized by a dark brownish-gray surface layer extending to a depth of 12 to 18 inches. This is underlain by 8 to 12 inches of a brownish-gray material, and this in turn by a light yellowish-gray material. The series runs comparatively high in organic matter, has a level to gently rolling topography, and is well drained. The Orlando fine sand is mapped.

The surface layer of the Bladen types is loamy, dark gray to very dark gray, and 4 to 12 inches deep. The subsoil is light gray, grading downward into mottled gray and yellow material, which is

heavier than the material above. The surface is level and poorly drained. The Bladen fine sand, with a swamp phase, the fine sandy loam, with a swamp phase, and the clay loam, were mapped.

The soil of the St. Lucie series consists of white, incoherent fine sand extending to a depth of 6 to 30 feet, where it rests on a grayish-white, sandy clay. The surface is undulating, and the drainage is excessive. One type, the fine sand, is mapped.

The types included in the Lakewood series consist of very light gray to white layers, that pass into yellow or orange-yellow materials at about 8 to 20 inches. Both soil and subsoil are incoherent and are excessively drained. The Lakewood fine sand is the only type mapped.

The types of the Leon series consist of gray to dark-gray, incoherent to loamy fine sands, which grade at 2 to 5 inches into a light-gray or grayish-white fine sand. At about 20 to 30 inches there is a dense, compact layer of organic hardpan, ranging in thickness from about 2 to 6 inches, and from a dark brown to black in color. The material underlying the compact layer ranges from a loose white, to loamy yellow fine sand. The topography is prevailingly flat, and the drainage is poor. The Leon fine sand and its loamy phase are mapped.

The soils of the St. Johns series have a very dark gray to almost black top layer and a light-gray to whitish-gray lower layer, extending to 22 or 28 inches. A brown to black, organic, hardpan layer, usually 2 to 6 inches thick, appears in most areas at a depth of 22 to 28 inches. The surface of the soils of this series is level and the drainage is poor. The St. Johns fine sand is the only type mapped in Lake County.

The surface layer of the soils in the Portsmouth series is very dark gray to black, and normally runs high in organic matter. At a depth of 6 to 12 inches, the color changes to a gray, which becomes lighter with increasing depth. This material continues to a depth of 5 or 10 feet, where a heavier material, having a mottled gray, yellow, and red color, is reached. The surface is flat and wet. The Portsmouth fine sand and its swamp, hammock, and prairie phases are mapped.

The surface soils of the Plummer series are gray, and the subsoils are light gray to grayish white, and incoherent. The series occupies flat surfaces or shallow basins, and the drainage is very poor.

Peat and Peaty muck, the representatives of the cumulose soil group, have originated from the partial decomposition of organic material in the presence of water.

Besides soils already described the soil map accompanying this report also shows areas of Water and grass, and Swamp, which do not represent sufficiently definite material to be classed as true soil types.

The following table gives the names and acreage and proportionate extent of the several soils identified in Lake County.

Areas of different soils

Soil	Acres	Per cent	Soil	Acres	Per cent
Norfolk fine sand	106,624		St. Lucie fine sand	25,600	4.0
Rolling phase	36,160	23.7	Lakewood fine sand	23,232	3.6
Hammock phase	10,688		Orlando fine sand	15,104	2.3
Leon fine sand	54,208	14.8	Norfolk sand	14,976	2.3
Loamy phase	42,240		Plummer fine sand, cypress-swamp phase	13,056	2.0
Blanton fine sand	58,624	9.0	Bladen fine sandy loam	5,888	1.5
Swamp	55,296	8.5	Swamp phase	3,776	
Water and grass	43,008	6.6	Blanton loamy fine sand	6,464	1.0
Peaty muck	35,776	5.5	Bladen fine sand	1,792	.4
Portsmouth fine sand	18,240		Swamp phase	896	
Hammock phase	12,288	5.2	St. Johns fine sand	2,112	.3
Swamp phase	2,752		Bladen clay loam	1,408	.2
Prairie phase	640		Shell mounds	64	.1
Peat	30,464	4.7			
Eustis fine sand	27,520	4.3	Total	649,600	
Dark-colored phase	704				

NORFOLK SAND

The Norfolk sand consists of a gray sand, which at 3 to 4 inches gives way to a light-yellow to grayish-yellow sand. At 24 to 36 inches a very light grayish-yellow sand is reached. This continues to depths ranging from 50 to 70 inches, where it grades rather abruptly into a light purplish-yellow, loamy sand or sandy loam layer, which is from ½ to 6 inches thick. Below this is a light reddish-yellow loamy sand to sandy loam, loam or sandy clay loam. In some places, on slopes and crests of ridges, the light reddish-yellow loamy sand occurs at depths of 3 to 4 feet. The cultivated soil differs from the virgin in that the surface layers have been mixed, and the organic layer has been somewhat deepened by the plowing under of green-manure crops.

The principal developments of the Norfolk sand occur south of Lake Louisa, and between Lake Apopka and Big Prairie. The topography is undulating to gently rolling, and the drainage is good to excessive.

About 20 per cent of this type is cultivated. The forest growth consists principally of long-leaf pine,[3] turkey oak, and blackjack oak, the two first mentioned predominating on the better soils, and the last on the lighter soils. A scattered growth of scrub live oak is present in places. Wire grass is the principal grass. The crops, yields, and farm practices are essentially the same as in the case of the Norfolk fine sand, the description of which follows.

NORFOLK FINE SAND

The upper few inches of the Norfolk fine sand in the virgin soil has a gray color, with a tendency toward a darker gray in lower situations where there is a greater accumulation of organic matter. From about 3 to 4 inches the material becomes a light-yellow to light grayish-yellow fine sand, which at 28 to 32 inches changes to a very light grayish-yellow fine sand, extending to 48 to 70 inches.

[3] The common names of plants (largely those used locally) are employed in the body of this report. A list giving both botanical and common names is appended at the end of the report. The writer wishes to acknowledge valuable aid in identifying these plants afforded by a publication of the Florida Geological Survey, Geography of Central Florida, by Roland M. Harper

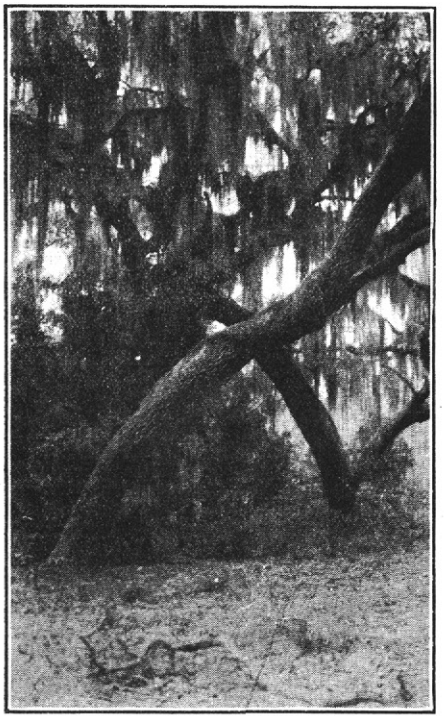

FIG. 1.—HAMMOCK GROWTH ON NORFOLK FINE SAND

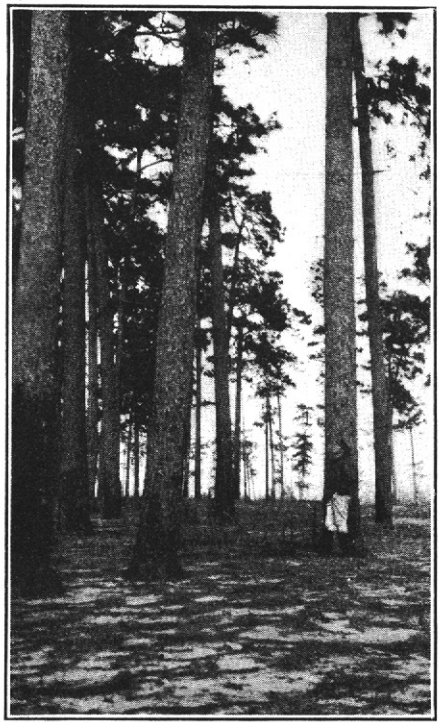

FIG. 2.—VIRGIN LONG-LEAF PINE ON NORFOLK FINE SAND

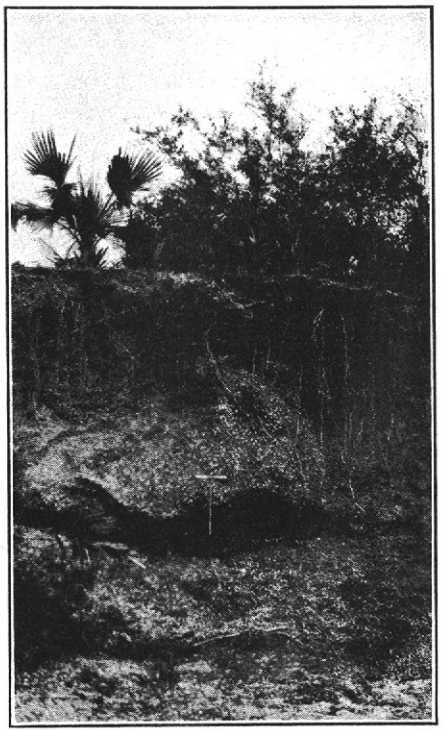

FIG. 3.—CUT IN A SHELL MOUND ALONG THE ST. JOHNS RIVER

FIG. 2.—WATER-AND-GRASS POND

In some places this is underlain abruptly by a layer, 1 to 6 inches thick, of light purplish-yellow, loamy fine sand, or fine sandy loam, beneath which there appears a light reddish-yellow loamy fine sand to fine sandy loam, loam, or sandy clay loam.

Variations from the typical characteristics of this soil occur in many places. Between Altoona and Astor and northwest of Cassia the organic layer is thinner, the material to a depth of 80 inches is incoherent, and the loamy fine sand or fine sandy loam appears at depths of 90 to 100 inches. In a few small areas, particularly on the upper slopes and crests of ridges in the northwestern part of the county, the light purplish-yellow loamy fine sand or fine sandy loam occurs at depths barely exceeding 3 feet. In the western part of the area both the soil and subsoil are coarser in texture, approaching and in places becoming a sand. Between Mount Dora and Crows Bluff, over rather extensive tracts, the subsoil is grayer than typical and somewhat resembles the subsoil of the Blanton fine sand.

The Norfolk fine sand is the most important citrus soil in the county. About 25 per cent of it is cultivated. In this state it differs from that in the virgin condition in that the surface layers have been mixed, considerable organic matter has been added by the growing and turning under of leguminous and other crops, and other modifications have been brought about through the application of commercial fertilizers and cultivation. With average moisture conditions the soil to a depth of 4 or 5 inches is gray, and when wet dark gray.

The Norfolk fine sand is the most extensive soil type of Lake County. Its topography ranges from undulating to gently rolling. In localities such as west of Lady Lake, and in the vicinity of Clermont, the areas are marked by large depressions. These depressions cover from 1 to 100 acres, often have steep slopes, and a difference in elevation of 40 to 100 feet between the floor and rim. Drainage is well established, and the areas on the crests of ridges and on the steeper slopes are inclined to suffer from excessive drainage by reason of the open, loose nature of the soil material.

The forest growth on this type is like that on the Norfolk sand. Plate 14, Figure 1, shows a bit of hammock vegetation and Plate 14, Figure 2, virgin long-leaf pine.

The Norfolk fine sand in central and southern Florida is well adapted to the growing of citrus fruits, and the majority of the orange and grapefruit trees in Lake County are located on this soil. Oranges are the chief crop, occupying an acreage about 40 per cent greater than that of grapefruit, the next most important crop. The mandarin or "kid glove" type of oranges, such as the King, and the tangerines are becoming important and rapidly growing in favor. The thrifty growth of oranges on this soil is shown in Plate 13, Figure 1. Relatively small quantities of lemons, limes, loquats, kumquats, and figs are produced. Corn, cowpeas, velvet beans, sweet potatoes, sugar cane, and peanuts are grown for home consumption. The acreage of grapes, including Muscadine and bunch varieties, is rapidly increasing. Peach trees are planted as fillers in some of the new citrus orchards, so that some return may be had from the land pending the time when the citrus trees come into bearing. Watermelons are grown extensively on newly cleared

fields. The production of the asparagus fern is rapidly growing in importance.

The agriculture consists in growing citrus fruit, supplemented, on possibly 25 per cent of the farms, with general farming and, in some places, with the growing of watermelons. Raising cattle and hogs on the open range constitutes a minor industry. The yield of oranges ranges from 100 to 600 boxes per acre, and averages about 200 boxes; bunch grapes 1 to 2 tons, corn 10 to 25 bushels, and watermelons 3 to 4 carloads per acre.

All the citrus-fruit growers use fertilizer, and many of them make four or five applications during the year for young trees and three for old trees in the winter, spring, and fall. A 4–8–3 or 4–8–5 fertilizer is used at the rate of 1 pound for trees 1 year old or 3 pounds for 3 years old, and a 3–8–5, 3–8–8, 3–8–10, or 2–8–10 is used at the rate of 10 to 12 pounds for trees 8 years old, and 25 to 30 pounds for trees 30 years old. Grapefruit and tangerines receive from 25 to 30 per cent more fertilizer at an application than oranges; but the number of applications at certain ages and the periods for fertilizing are the same. Watermelons receive from 800 to 1,000 pounds of a 5–7–4 or 7–7–5 fertilizer; and corn, at time of silking, about 150 pounds of a fertilizer running high in nitrogen. In some cases the soil is enriched for sweet potatoes by keeping the cattle during the nights in an inclosure of a few acres from about April until June. After this the soil is plowed and bedded, and the slips are set out. The following year either corn or sugar cane is grown in this field.

The selling price of the unimproved Norfolk fine sand ranges from $10 to $50 an acre, depending on location with respect to good roads, transportation facilities, towns, and schools. For improved citrus groves selling prices range from $300 to $1,000 an acre.

In the management of this type, one of the important aims is the increase and maintenance of organic matter. Organic matter aids in warming the soil by the absorption of heat, retains moisture during droughts, gives better tilth, and in decomposing supplies nitrogen and tends to liberate other plant foods. This soil constituent can best be supplied by growing leguminous crops, including velvet beans, cowpeas, and beggarweed. The destructive method of burning off vegetation should be discontinued.

The type, owing to its topographic relief and loose, open structure, is droughty during dry periods, so that irrigation is almost necessary for successful truck farming. Irrigation must be by the sprinkling method, as the deep, porous soil can not be subirrigated.

Norfolk fine sand, hammock phase.—The Norfolk fine sand, hammock phase, to a depth of 2 to 6 inches is a gray to dark-gray, somewhat loamy fine sand. This passes into a grayish-yellow or pale-yellow fine sand, which extends to a depth of about 3 feet, where a layer of very light grayish yellow fine sand exists. This, at 50 to 80 inches grades abruptly into a light reddish yellow loamy fine sand or fine sandy loam to sandy clay. In places a thin layer of light purplish-yellow loamy fine sand or fine sandy loam underlies the very light grayish-yellow fine sand. On Carters Island, in the southwestern part of the area, a brown to black, compact hardpan

layer, varying from a few inches to 10 feet or more in thickness underlies the very light grayish-yellow fine sand. The cultivated soil usually has a thicker organic layer than the virgin, owing to the repeated plowing under of velvet beans, cowpeas, beggarweed, and other cover crops.

On Edges and Wilson Islands in the bottoms of Falatlakaha Creek are developments of Norfolk loamy sand, hammock phase, which, because of small extent, are included with the Norfolk fine sand, hammock phase. In these developments the surface soil, to a depth of about 6 inches, is a dark-gray to grayish-brown loamy sand, with sufficient fine material to develop clods in cultivated fields. Below this depth the color changes to a yellowish brown, and at 18 to 22 inches there appears a grayish-yellow, slightly sticky loamy sand to sandy loam.

This phase is developed in small areas near the shores of Lake Yale, Lake Griffin, and Lake Harris, and between Big Prairie and Lake Apopka in the southern part of the county. The surface ranges from almost level to gently sloping.

This is a productive fine sand. About 40 per cent of it is planted in citrus groves, 10 per cent is devoted to general farming and 5 per cent to trucking. A distinguishing feature is its hammock growth, which consists principally of live oak, cabbage palmetto, hickory, magnolia, myrtle, dogwood, ironwood; a woody vine growth of rattan vine, Virginia creeper, and poison ivy; and a shrub growth of sumac and saw palmetto.

Methods of treatment are practically the same as for the typical soil, but the yields are considerably better.

Norfolk fine sand, rolling phase.—The Norfolk fine sand, rolling phase, consists of a gray, loose fine sand, grading, at 1 to 3 inches, into a light-yellow to light grayish-yellow fine sand layer, 20 to 30 inches thick. This is underlain by a light grayish-yellow fine sand, which in most areas, at 50 to 70 inches, rests upon a light reddish-yellow fine sandy loam or sandy clay, though in places it may be underlain by a layer, 1 to 6 inches thick, of light purplish-yellow loamy fine sand or fine sandy loam, which is underlain by the reddish-yellow material, ranging from a fine sandy loam to a fine sandy clay. On steep slopes and narrow ridges the reddish-yellow material is, in places, within 2 to 3 feet of the surface.

The most extensive tracts of the Norfolk fine sand, rolling phase, are found in the southern part of the county, and east of Lady Lake. Other areas of the phase are small and widely separated through the western part of the county. The topography is rolling to hilly and the surface is frequently broken by relatively deep depressions, which occupy from 1 to 100 acres. Drainage is excellent and in many places is excessive, owing to the open character of the soil material and substratum.

The tree growth, crops, yields, methods of treatment, and suggestions for improvement are practically the same as for the typical Norfolk fine sand.

The table following shows the results of mechanical analyses of samples of the soil and subsoil of the Norfolk fine sand.

Mechanical analyses of Norfolk fine sand

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
262209	Soil, 0 to 4 inches	2.8	14.7	12.1	64.2	2.0	2.0	2.4
262210	Subsoil, 4 to 62 inches	1.3	8.4	10.3	72.9	2.6	1.5	3.6
262220	Soil, 0 to 3 inches	9.5	15.8	10.7	58.8	2.0	2.3	1.2
262221	Subsoil, 3 to 48 inches	9.8	12.0	8.1	64.1	2.4	1.9	1.6
262222	Subsoil, 48 to 56 inches	3.1	6.5	6.4	44.3	1.4	4.2	34.5
262223	Subsoil, 56 to 70+ inches	7.0	8.4	7.0	56.8	1.2	2.2	16.9

EUSTIS FINE SAND

The Eustis fine sand in virgin areas, to a depth of 2 to 4 inches consists of a very dark-gray or dark grayish-brown fine sand, underlain by a dark grayish-brown to a very dark grayish-brown fine sand, which is tinged with yellow. This continues to a depth of 5 to 7 inches, where there appears a light reddish-yellow fine sand. Below an average depth of 9 inches the color varies from light reddish yellow to light yellowish red, and at 48 to 53 inches changes to a yellowish-red loamy fine sand or light fine sandy loam. At 53 to 73 inches there is reached a red fine sandy loam mottled with light reddish yellow, yellow, and deep red. This, at 73 to 90 inches, rests upon a mottled light reddish-yellow, yellowish-red and red fine sandy loam to light sandy clay loam.

The Eustis fine sand, as mapped, includes many patches of the Norfolk fine sand. Near Tavares, Eustis, and Leesburg the texture is notably coarser than typical, and in places the texture is medium sand.

About 70 per cent of the Eustis fine sand, in Lake County, is cultivated. In such areas the soil, under normal moisture conditions, has a very dark grayish-brown color to a depth of 7 inches.

The yields on this type are comparable with those on the Norfolk fine sand.

Rather extensive areas of this type occur east of Lake Eustis, south of Lake Yale, and east of Lake Harris. Small developments are found in many parts of the county.

The Eustis fine sand occupies undulating to gently rolling interlake areas. Its topographic position gives it excellent air drainage and protection from frosts. Both the surface and underdrainage are good to excessive.

The dominant tree growth of the virgin soil is long-leaf pine. Other trees growing on this soil are live oak, blackjack oak and turkey oak.

The Eustis fine sand is devoted almost entirely to the growing of citrus fruits, although small acreages of corn, sugar cane, sweet potatoes, cowpeas and velvet beans are grown. The methods of handling and fertilizing crops on this soil are practically the same as for the Norfolk fine sand; but the yields average somewhat higher.

Improved citrus groves on the Eustis fine sand sell for $300 to $1,000 an acre, depending upon the degree of improvement, the topographic position in respect to air drainage and large bodies of

water, and the distance from transportation facilities, good roads, and towns. Unimproved areas sell for $50 to $100 an acre.

This type is naturally low in organic matter. This deficiency, together with the open character of the soil, permits a ready leaching of soluble mineral plant foods. Where organic matter is supplied, the moisture holding capacity of the soil is increased and leaching decreased, and the soil, therefore, becomes better able to nourish crops during the dry periods. Recommendations offered for the permanent improvement of the Norfolk fine sand are equally applicable to the Eustis fine sand.

Eustis fine sand, dark-colored phase.—When dry and in the virgin state, the Eustis fine sand, dark-colored phase, to a depth of 10 to 12 inches, is a very dark reddish-brown, rather loamy fine sand. Below this surface layer is a dark reddish-brown fine sand, which at 15 to 20 inches passes into a reddish-yellow fine sand. At 24 to 30 inches is a light reddish-yellow fine sand, which becomes lighter in color with increase of depth, changing to a light reddish yellow at about 40 inches. This, at an average depth of 45 inches, grades into yellowish-red fine sandy loam, which is underlain at about 50 inches by a mottled reddish-yellow, yellowish-red, and red fine sandy loam to sandy clay loam. The soil in cultivated fields is very similar to that in the virgin areas.

This phase is inextensive, occurring principally in the vicinity of Montverde. Small areas are developed along the west shore of Lake Griffin, east of Lady Lake.

Probably 95 per cent of the Eustis fine sand, dark-colored phase, is under cultivation. The remainder supports a growth of vegetation similar to that of the Norfolk fine sand, hammock phase.

The principal crops are citrus fruits, truck crops, grapes, and corn. The yields are practically the same as those given for the Orlando fine sand; and the practices common to the county, described in the chapter on "Agriculture," are followed on this phase.

Suggestions offered for the improvement of the Orlando fine sand apply to the Eustis fine sand, dark-colored phase.

The results of mechanical analyses of samples of the soil and several layers of the subsoil of the typical Eustis fine sand are given in the following table:

Mechanical analyses of Eustis fine sand

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
262213	Soil, 0 to 3 inches	4.4	17.9	15.8	54.7	2.0	3.0	2.2
262214	Subsoil, 3 to 6 inches	3.2	16.4	15.0	58.4	2.0	2.2	2.8
262215	Subsoil, 6 to 9 inches	3.0	16.5	16.4	56.0	2.4	2.2	3.7
262216	Subsoil, 9 to 48 inches	2.1	14.5	15.8	59.4	2.8	2.2	3.3
262217	Subsoil, 48 to 53 inches	2.5	13.5	13.2	52.6	2.8	2.6	13.1
262218	Subsoil, 53 to 73 inches	1.5	8 8	10 2	31 6	.8	2.2	45.0
262219	Subsoil, 73 to 90+inches	2.8	29.4	17.9	28.4	.7	1.5	20.0

BLANTON FINE SAND

The Blanton fine sand consists of 2 to 4 inches of a gray to dark-gray fine sand. This is underlain by a yellowish-gray to grayish-white fine sand, 25 to 40 inches thick, resting upon a very light gray-

ish-yellow to light-gray fine sand. This passes, at some depth between 50 and 100 inches, into a red sandy clay strongly mottled with yellowish red, reddish yellow, grayish white, and white. In many places, a light reddish-brown fine sandy loam to fine sandy clay layer, ranging from a fraction of an inch to 5 inches in thickness, underlies the very light grayish-yellow to gray fine sand, and overlies the red sandy clay.

As mapped, this type includes many variations in the thickness of the organic layer, in color and texture. In the vicinity of Altoona, where this type supports a growth of long-leaf pine and live oak, the gray to gray-dark surface layer extends to depths ranging from 4 to 7 inches, and the subsoil is light gray to light yellowish-gray, but where it borders the St. Lucie fine sand or is covered with a scrub growth of blackjack oak the surface layer is gray in color and varies from 1 to 2½ inches in thickness. In the western part of the area the texture is decidedly coarser than typical, in places becoming a medium sand. In the vicinity of Leesburg, the yellowish-red sandy clay may lie within 3 or 4 feet of the surface. Throughout this type, as mapped, there are small inclusions of Norfolk fine sand, and east of Cassia small areas of the St. Lucie fine sand and the Lakewood fine sand are included.

The virgin soil, when plowed and cultivated, is quite materially changed, owing to the intermingling of the surface layers, to the increasing of organic matter in the surface soil by plowing under green crops, and by the use of commercial fertilizers. Under average moisture conditions the cultivated soil to a depth of 6 inches is a gray to dark-gray fine sand.

The Blanton fine sand occurs in large areas between Cassia and Sorrento, in the vicinity of Lake Dorr, Lake Murphy, and Lake Harris, in Leesburg, Mount Dora, and Okahumpka. Small areas are mapped in all parts of the county.

The topography of this type is characteristically gently undulating; but varies from level to gently rolling, and in rare instances the type occurs on steep slopes. The drainage is good. Probably 20 per cent of this type is cultivated. Uncleared areas support a forest of blackjack oak, long-leaf pine, turkey oak, and in some places live oak, magnolia, and hickory.

The same crops are produced on this soil as on the Norfolk fine sand, and the farm practices are identical. About 90 per cent of the cultivated land is devoted to the growing of citrus fruit, 5 per cent to watermelons, and 5 per cent to general farming.

Uncleared areas of the Blanton fine sand sell for $6 to $50 an acre, the price depending upon the condition of the roads, the amount and character of the standing timber, and the location in respect to towns and railroads. Improved land, excluding citrus groves, brings from $25 to $100 an acre.

The Blanton fine sand is deficient in organic matter. The plowing under of green-manure crops, preferably legumes, will supply this constituent, improve the physical character of the soil, and increase the productiveness.

The results of mechanical analyses of samples of the soil and various layers of the subsoil of the Blanton fine sand are presented in the table following:

Mechanical analyses of Blanton fine sand

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
262240	Soil, 0 to 3½ inches	0.7	5.5	6.6	79.8	4.0	1.7	1.8
262241	Subsoil, 3½ to 30 inches	1.5	6.0	6.5	81.4	2.2	.8	1.7
262242	Subsoil, 30 to 50 inches	.8	5.4	5.4	83.0	3.6	.9	.9
262243	Subsoil, 50 to 53 inches	.4	3.7	4.4	57.6	5.8	1.8	26.3
262244	Subsoil, 53 to 80 inches	.0	3.5	5.2	50.3	7.0	1.4	32.7

BLANTON LOAMY FINE SAND

The Blanton loamy fine sand, when dry and in the virgin state, consists of a layer of light-gray to gray, rather loamy fine sand, about 4 inches thick. Below this the color becomes a lighter gray, and from 46 to 54 inches a grayish-white loamy fine sand appears. This is underlain by a 6-inch layer of very light grayish-yellow fine sandy loam, and this in turn by a 4-inch layer of light yellowish-gray fine sandy loam to sandy clay loam, which grades downward into a mottled red, yellowish-red, light-gray, and light yellowish-gray heavy, plastic clay. Within the type as mapped are included in the western part of the county areas of Blanton loamy sand, whose extent did not warrant mapping as a distinct type. Such areas are similar to the loamy fine sand in all respects except texture. There is a distinctive variation of the subsoil near Lake Harris, where the grayish-white loamy fine sand extending from 45 to 55 inches rests upon a friable, white sandy clay.

About 80 per cent of the Blanton loamy fine sand in Lake County is tilled. The virgin soil is changed materially in cultivation, becoming a gray to dark-gray, loamy fine sand, with an average depth of 7 inches.

The principal developments of the Blanton loamy fine sand occur between Altoona and Lake Harris. Other areas are small and widely separated through the survey.

The surface is prevailingly level to slightly undulating and the drainage is good.

The principal tree growth on this type is long-leaf pine, cabbage palmetto, and live oak.

The area of this type under cultivation is about equally apportioned to the growing of citrus fruits, trucking, and general farming. All crops are grown with the aid of fertilizer. Corn yields from 20 to 40 bushels an acre, tomatoes from 250 to 550 crates, cucumbers from 200 to 250 hampers, sweet potatoes 75 to 100 bushels, grapes 2,000 to 4,000 pounds, watermelons 4 carloads, beggarweed hay 4 to 7 tons, and oranges, as well as other citrus fruit about the same as for the Eustis fine sand.

Land of the Blanton loamy fine sand has a somewhat higher value than the Blanton fine sand.

In improving and maintaining the fertility of the Blanton loamy fine sand steps should be taken to increase the organic matter. This can be accomplished by plowing under green-manure crops and by growing more legumes.

ORLANDO FINE SAND

The Orlando fine sand, to a depth of 12 to 18 inches, consists of a very dark brownish-gray loamy fine sand This is underlain by a slightly lighter brownish-gray material of similar texture, which changes at about 24 to 28 inches to a brownish-gray fine sand. At 34 to 38 inches this gives way to a light yellowish-gray to light brownish-gray fine sand, which continues to depths of 60 inches and more.

Considerable variation in the color of the surface soil occurs. Where this type adjoins the Blanton fine sand it is much lighter in color than typical, and the type differentiation is based largely upon the thicker dark-gray organic layer of the former. On the other hand, it is darker and more gray than typical in areas adjacent to the Portsmouth fine sand. In such places both types have 12 or more inches of very dark-gray to black, loamy fine sand at the surface, but the drainage of the former is good, whereas that of the latter is poor. In the vicinity of Lake Eldorado and Clear Lake the lower subsoil of this type is a yellowish-gray fine sand.

About 80 per cent of the Orlando fine sand in Lake County is cultivated. Modifications brought about by the depletion of the virgin humus, the addition of organic matter by manuring and plowing under legumes and other crops, and by the use of commercial fertilizers cause the cultivated soil to differ from the virgin. The cultivated soil under average moisture conditions is a very dark grayish-brown to very dark brownish-gray loamy fine sand. It is well supplied with organic matter, and the moisture-holding capacity is such that it withstands drought better than the other well-drained soils of the area.

The Orlando fine sand occupies a relatively small area, but is well distributed throughout the county. The principal developments are west of Umatilla, southeast of Lake Griffin, south and east of Eustis Meadows, around Lake Joanna, and west of Okahumpka. The type has a prevailingly level to gently undulating surface, except around Lake Eldorado, where it is developed on the slopes that extend upward from the lake. Both surface and internal drainage are ample.

Long-leaf pine is the principal tree in the virgin forests, and live oak is the second tree in importance. Cabbage palmetto, blackjack oak, and turkey oak are also trees of importance. Dogwood, hickory, ironwood, and many vines and bushes form an undergrowth.

This when properly cultivated and fertilized is a very productive soil. It is used in growing all the common crops of the county. The practices common to the county, described in the chapter on "Agriculture" and in the descriptions of the Norfolk and Bladen fine sands are followed on this type. The yields of oranges range from 200 boxes per acre for 8-year-old trees to 700 boxes per acre for trees 30 years old. Corn ranges from 25 to 50 bushels per acre; grapes, from 2,000 to 4,000 pounds; tomatoes, from 300 to 600 crates; and beggarweed hay, from 5 to 8 tons. Cucumbers average 400 hampers, and watermelons about 4 carloads per acre.

Land of the Orlando fine sand, excepting citrus groves, ranges in value from $100 to $500 an acre, depending on improvements, the

natural artesian water supply for irrigating, and location with respect to improved roads, transportation facilities, and towns.

Although this type is naturally well supplied with organic matter, continuous cropping, with the removal of most of the crop residues, soon reduces the supply, and the land becomes seriously deficient. In the handling of this type, it is important that green-manuring crops, especially legumes, should be incorporated with the soil.

BLADEN FINE SAND

The Bladen fine sand consists of a dark-gray to very dark-gray loamy fine sand, 4 to 12 inches deep, grading into a light-gray to grayish-white loamy fine sand, which passes at about 16 to 20 inches into a gray or mottled grayish and yellowish loamy fine sand. This continues to a depth of 30 to 36 inches, where normally the proportion of clay is sufficient to make the material slightly sticky. At 48 to 60 inches there is reached a mottled yellow and gray or gray, friable to plastic clay. Mapped with this type are small patches of the loamy phase of the Leon fine sand.

About 10 per cent of the Bladen fine sand is under cultivation. In cultivated fields the surface portion differs from that of the virgin soil. The upper layer is a composite of the natural layers, and has been changed by the depletion of the virgin humus, by the addition of organic matter from crop residues and green-manure crops and probably, since they are used so largely, by the application of fertilizers.

The most extensive tracts of this type are found in the northeastern part of the county where the surface is flat and the drainage poor. The soil is often soggy or covered with standing water during rainy periods. In the southern part of the county the drainage is fair to good.

The type has a fair supply of organic matter, and when properly drained is productive. The tree growth consisted principally of long-leaf pine, with some cabbage palmetto and live oak, hickory, magnolia, black pine, shortleaf pine, slash pine, and some saw palmetto.

Native grasses, such as wire grass and broom sedge, thrive on this soil, affording pasturage for the livestock.

This soil is devoted mainly to the production of truck crops, although it supports some excellent citrus groves. Corn and legumes lead in acreage, followed by tomatoes and cucumbers with potatoes, sweet potatoes, string beans, and cabbage. Sugar cane, head lettuce, velvet beans, onions, peanuts, Lima beans, Japanese cane, and grapes also are grown. With suitable applications of commercial fertilizers, corn yields from 30 to 40 bushels per acre, tomatoes 300 to 600 crates, and cucumbers about 300 hampers.

The methods of cultivation employed on this type do not differ from those prevailing in general throughout the county.

Increasing and maintaining the supply of organic matter and improving the drainage are essential to the best results in farming this type. The deficiency in organic matter can be corrected by applying stable manure and plowing under green crops, particularly velvet beans, cowpeas, and beggarweed.

The Bladen fine sand, swamp phase, consists of a dark-gray loamy or mucky fine sand, extending to depths of 6 to 10 inches where it grades into a gray loamy fine sand, which at 12 to 14 inches is underlain by a mottled gray, brown, and yellow loamy fine sand. At 30 to 40 inches the material becomes slightly sticky, and at 44 to 60 inches, a friable to plastic mottled gray, yellow, and brown clay is encountered.

This phase is developed chiefly north of Lake Murphy. It occupies low-lying situations along drainage ways and in shallow basins, and is covered with water most of the year.

The Bladen fine sand, swamp phase, is not farmed, but furnishes pasture for cattle and hogs. It supports about the same tree growth as the Bladen fine sandy loam, swamp phase.

When drained the land will be adapted to all crops grown on the typical Bladen fine sand.

BLADEN FINE SANDY LOAM

The surface soil of the Bladen fine sandy loam consists of a gray to dark-gray loamy fine sand, 6 to 12 inches deep. Below this depth the color becomes a light gray to gray, and from 14 to 20 inches is a light brownish-gray mottled with yellow. This is underlain by a light brownish-gray, to light grayish-brown plastic fine sandy clay loam, which continues to a depth of 25 to 30 inches, where it gradually changes to a mottled yellow, brown, and gray plastic clay. The depth at which the plastic clay appears is, however, decidedly variable; it may appear at any depth between 10 inches to 36 inches below the surface. In places the clay is very friable, owing to a relatively large admixture of fine and medium sand. There are areas where the materials of this type are gray throughout the profile. In others the upper subsoil is gray in color with faint mottlings of yellow, and the lower subsoil is yellow with faint mottlings of gray, while within a few yards the upper subsoil is yellow with faint mottlings of gray. There are included with this type as mapped, small patches of Leon fine sand, swamp phase.

Approximately 15 per cent of the Bladen fine sandy loam is tilled. Cultivation has modified the upper layers of this type, as it has of other types in the county and, under normal moisture conditions, it consists, to a depth of 8 inches, of a dark-gray loamy fine sand.

The larger developments of the Bladen fine sandy loam are in the vicinity of Leesburg, between Eustis and Umatilla, east of Lake Yale, and west of Lisbon. Other areas occur on Emeralda Island, in Cabbage Hammock, and in the southwestern part of the county. The areas have a characteristically flat surface, are relatively low lying, and very poorly drained. Before cultivation is possible, the land must be drained artificially. This is ordinarily done by means of open ditches.

With the exception of the hammock growth being more abundant, the tree, shrub, bush, and grass vegetation of this type is similar to that described for the Bladen fine sand.

This is the leading truck soil of the county and the farming operations center for the most part around the production of vegetables for the northern markets. In order of their importance, cucumbers, string beans, tomatoes, and cabbage are the leading crops.

These crops are crated and shipped to most cities of the United States lying east of the Mississippi River and to various points in Canada. Corn is grown for grain and silage, the former being used as feed for work animals and fattening hogs, and the latter for dairy cattle. Cowpeas, velvet beans, and beggarweed are important crops, both as supplying feed for the livestock and in soil improvement. Potatoes, sweet potatoes, sugar cane, head lettuce, peanuts, onions, and bananas are grown less extensively. There are some very good citrus groves on this soil. The trees require less fertilization than in case of the soils with less retentive subsoils, but the fruit is not so bright as that produced on the Norfolk, Eustis, and Orlando soils. The flavor of the fruit and the yield, however, are not excelled on any other soils in the county. Tomatoes yield from 200 to 600 crates per acre, cucumbers 300 hampers, and corn from 20 to 40 bushels.

Farmers are adopting such practices as rotation and the growing of legumes for soil improvement. They also use large quantities of fertilizers and manure where available. An average application of 2,000 pounds of a 5–6–5 fertilizer is used on tomatoes, 2,000 pounds of a 5–6–4 fertilizer or 5 to 10 tons of stable manure on cabbage, and 1,500 to 2,000 pounds of a 5–5–6 fertilizer for cucumbers. Corn follows the truck crops and receives the benefit of the fertilizer used on them. At time of silking, 150 pounds per acre of sodium nitrate is applied. The corn is succeeded by a leguminous crop, such as cowpeas, velvet beans, or beggarweed.

Most of the truck crops are harvested and marketed in the spring, at a time when there is very little competition from other States.

Improved areas of the Bladen fine sandy loam range in selling value from $100 to $600 an acre, depending upon the improvements and the location with respect to improved roads, transportation facilities, and towns. Unimproved land is held at $25 to $100 an acre.

The restoration and maintenance of the supply of organic matter by growing legumes, by green manuring, and by the application of stable manure is a very important step in the improvement of the Bladen fine sandy loam. Before cultivation, drainage is a necessity. This can be accomplished best by tiling. During dry periods, the tile systems are used successfully for subirrigation, the water supply coming from artesian wells. In St. Johns and Flagler Counties, the Bladen fine sandy loam is used extensively for the production of potatoes and it is considered one of the best general-purpose soils in eastern and central Florida.

Bladen fine sandy loam, swamp phase.—The Bladen fine sandy loam, swamp phase, consists of a dark-gray loamy fine sand, grading at depths ranging from 4 to 10 inches into a gray or mottled gray and yellow fine sand. Below 14 to 30 inches there appears a mottled gray, brown, and yellow, plastic to friable clay. In places a brown to black peaty muck layer, 1 to 12 inches thick, covers the surface.

The principal developments of this phase lie east of Lake Griffin, on the west side of Eustis Meadows, east of Lake Yale, and north of Lake Murphy. Water stands on the surface most of the time.

This soil is not cultivated, but is used as range for cattle and hogs. It supports a growth of slash pine, black pine, red maple,

shortleaf pine, sweet gum, black gum, bay, water oak, live oak, pond cypress, loblolly bay, willow, cabbage palmetto, and groundsel bush.

In the following table are given the results of mechanical analyses of samples of the soil and several layers of the subsoil of the typical Bladen fine sandy loam:

Mechanical analyses of Bladen fine sandy loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
262245	Soil, 0 to 8 inches	0.6	7.2	11.6	55.4	12.1	7.8	5.5
262246	Subsoil, 8 to 14 inches	.6	9.5	15.4	66.0	6.2	1.3	1.3
262247	Subsoil, 14 to 28 inches	1.3	14.6	17.2	56.4	5.8	1.7	3.2
262248	Subsoil, 28 to 32 inches	.6	9.1	13.2	49.2	5.7	2.2	19.9
262249	Subsoil, 32 to 40 inches	1.2	7.6	8.2	64.8	3.4	5.4	9.1
262250	Subsoil, 40 to 50 inches	1.3	6.9	6.8	43.8	8.4	16.3	16.6

BLADEN CLAY LOAM

The Bladen clay loam consists of a dark-gray loam, passing at 6 to 8 inches into a dark-gray, friable clay loam, which at about 10 to 14 inches merges into a gray, friable to plastic clay with yellow and brown mottlings. This, with increase of depth, becomes somewhat heavier and more plastic and is, in places, underlain with a marly clay at depths ranging from 30 to 48 inches. The type in cultivated fields is very similar to that in the virgin state. On Clay Island along the west side of Lake Apopka, this type includes some black to very dark-gray tough clay, underlain by a tough plastic gray to greenish clay mottled with rusty brown and light gray. At a depth of 3 to 5 feet a marly deposit is encountered in places.

The Bladen clay loam occurs west of Lisbon and in the southwestern part of the survey. The topography is flat, and the drainage is very poor.

Only a small area of this soil is found in Lake County, but about 50 per cent of it is under cultivation. The type supports a heavy hammock growth, similar to that on the Bladen fine sandy loam, swamp phase. It furnishes excellent pasturage for cattle.

This type is devoted mainly to the production of truck crops, but citrus fruits also are grown and give good yields. The color and flavor of the fruit compares favorably with the product of the Bladen fine sandy loam. Practically the same crops are grown and similar yields obtained on the Bladen clay loam as on the Bladen fine sandy loam.

In handling this soil the farmers recognize that it should not be plowed when wet. Under proper moisture conditions it is readily worked up into a mellow seed bed. Artificial drainage is always provided before any attempt is made at farming. With drainage and careful handling this should be the best hay and corn soil in the county.

ST. LUCIE FINE SAND

The immediate surface of St. Lucie fine sand consists of a fractional part of an inch of light-gray or grayish-white, incoherent fine sand, containing small fragments of partially decayed wood

material. Below this appears a white, incoherent fine sand, which extends to depths ranging from 6 to 30 feet, and rests on a grayish-white to white fine sandy clay, mottled with various shades of red and yellow, or a red clay with gray, white, and yellow mottlings. Where associated with the Leon fine sand, a brown to black organic hardpan layer, ranging from a few inches to several feet in thickness, lies at depths between 4 and 12 feet. Within the type are included numerous small patches of Norfolk, Leon, and Lakewood fine sands. In places this type was so intimately associated with the Lakewood that it was difficult to determine the predominant type. Locally the texture of both soil and subsoil becomes much coarser than typical, and in places approximates a medium sand, but owing to its small extent this is treated as a variation and not mapped as a separate type. East of Cassia, where the fine sand supports a scrubby hammock growth of live oak and red bay, the light-gray surface layer ranges in thickness from 1 to 3 inches.

The St. Lucie fine sand is developed in large areas in the northeastern part of the county. A number of small to medium-sized areas lies on the east side of Lake Harris, north of Mascotte, in the vicinity of Tavares and east of Groveland.

The surface is prevailingly undulating, but varies from level to gently rolling. Low ridges and slight knolls are common. This soil is very sterile and irretentive of moisture, and the surface soon dries even after heavy rains. The tree growth (known as "scrub") consists mainly of spruce pine and scrub live oak, and an undergrowth of saw palmetto, rosemary, a great variety of evergreen shrubs, and very little grass of any kind.

The St. Lucie fine sand is unimportant in the agriculture of the county. Possibly one-fourth of 1 per cent of this soil is cultivated. Some use of it is made as range for cattle and hogs, but its value for this purpose is negligible. The unimproved land has a value of $3 to $20 an acre, depending on the location, with respect to lakes, for future home sites, and upon the nearness of improved roads, shipping points, and towns.

Owing to its lack of organic matter, low content of potassium, phosphorus, and other elements of plant food, and its open, porous nature, this type should be left at present in its natural state. In this condition it affords some pasturage, though it supports comparatively little grass. It is now being farmed to a small extent, but the crops are small. The yields can be improved by adding fertilizers in large quantities and by increasing the supply of organic matter by growing legumes, turning under green crops and applying animal manures. Farther south along the coast this soil has been used for the production of pineapples.

LAKEWOOD FINE SAND

The Lakewood fine sand is a light-gray or grayish-white fine sand, grading at less than 1 inch into a white, incoherent fine sand layer 8 to 20 inches thick. This is underlain by a yellow to orange-yellow, loose fine sand, which continues to depths ranging from 6 to 30 feet, where there appears a gray to red clay, mottled with various shades of red, yellow, and gray. In places a brown to black hardpan layer,

ranging in thickness from 2 inches to 10 feet, occurs at 4 to 8 feet from the surface. A variation, occurring in rather large areas north of Lake Dalhousie, east of Lake Eldorado, and south of Loch Leven has the loose, orange-yellow or yellow fine sand layer immediately below the surface veneer.

North of Lake Dora, where this soil supports a hammock growth, the surface soil to a depth of 1 to 3 inches is a light-gray, incoherent fine sand, containing considerable loose, partially decayed particles of a woody character. Below this the profile is essentially the same as in the typical soil. Where associated with the St. Lucie, Norfolk, and Leon fine sands, there are numerous inclusions of these types, too small to be shown on the map. West of Lake Harris the texture becomes much coarser than typical.

The Lakewood fine sand occurs in medium to large bodies scattered, in particular, throughout the northeastern part of the county. These areas have a gently undulating to gently rolling surface. Owing to the porous character of the soil material, the drainage is excessive.

Only a small fraction of 1 per cent of this type is cleared and under cultivation. The rest supports a forest of the type locally known as "scrub," consisting mainly of spruce pine and scrub live oak, with an undergrowth of rosemary and saw palmetto. In the vicinity of Tavares there are small areas that have a scrub hammock growth of live oak and red bay.

The Lakewood fine sand has a value of $3 to $100 an acre, the variation being dependent largely upon its suitability for building sites.

Although it is possible through the incorporation of large quantities of organic matter and heavy fertilization to grow crops on this land, it is not economical under present conditions to incur the expense of clearing and preparing this land for farming.

LEON FINE SAND

The Leon fine sand consists of a gray to dark-gray fine sand, 2 to 5 inches deep, overlying a light-gray or grayish-white, incoherent fine sand, which at depths varying from 6 to 36 inches, ordinarily between 20 and 30 inches, passes into a reddish-brown, dark-brown to black compact sand—organic hardpan layer. This commonly ranges from 2 to 6 inches in thickness, but may vary from 1 to 150 inches or more. Below this is a moist, incoherent, grayish-white fine sand, which when disturbed has the nature of quicksand. This extends to depths ranging from 6 to 30 feet, where a reddish-brown sandy clay, with gray, yellow, and brown mottlings, appears. In some cases a second layer of reddish-brown to black organic hardpan, 2 to 10 feet thick, occurs at these depths instead of the sandy clay.

Examination of this organic hardpan shows that the maximum or minimum compactness, as well as the reddish-brown or black color, may be in the upper or lower part or at any intermediate position in the layer. In the majority of exposures examined, however, the upper part of the layer was most compact. It was also noted that where these organic hardpans were well above the ground-water level, that leaching often began at the bottom of the hardpan layer

and extended upward. Within some of the thicker layers are lenses of fine sand.

Variations from the typical soil are encountered where the type grades into other soils. Where the Leon fine sand passes into the Portsmouth fine sand the dark-gray surface layer may be 6 or 7 inches, and the hardpan layer lies from 36 to 44 inches beneath the surface. Included with this type and developed in small areas in the vicinity of Tavares and south of Okahumpka are areas of medium sand, which, except for texture, have the same profile as the Leon fine sand.

This type is developed in fairly large areas in the flatwoods section, in the southern part of the county, and in the eastern part, adjacent to the flood plains of the St. Johns and Wekiva Rivers, south of Lake Tracy, southeast of Lake Joanna, and east of Lake Dalhousie. Small areas occur in nearly all parts of the area of the survey.

The surface configuration of this type is prevailingly flat. The drainage is poor, water standing on the surface in the slight depressions for long periods during the rainy season. The hardpan prevents a free movement of the rainfall downward and hinders the rise of soil moisture from below.

Probably less than 1 per cent of the Leon fine sand is under cultivation, by far the greater part of it being used as a range for cattle and hogs. Practically all of the type supports a forest growth of long-leaf pine, which is either boxed for turpentine or is being cut for lumber. In the wetter situations slash pine is a common tree. Prominent in the undergrowth are saw palmetto, gall berry, huckleberry, and other shrubs. There is some wire grass in the growth.

Cultivation of this soil in most cases has been a failure, as numerous abandoned fields bear witness. When ditched, limed, and heavily fertilized, it has given only low yields of corn, sugar cane, sweet potatoes, cabbage, cucumbers, and tomatoes.

The value of land of this type is largely dependent upon the character of the range, the stand and quality of merchantable timber, and the distance from improved roads, lines of transportation, and towns. It is held at prices ranging from $3 to $30 an acre.

Owing to the high cost of clearing, due mainly to the presence of large palmetto trunks, the difficulty of drainage, on account of the ditches filling up with the loose, wet sand, and the inferior quality of the soil, the greater part of this type is best suited to grazing and forestry.

Leon fine sand, loamy phase.—The Leon fine sand, loamy phase, consists of a gray to dark-gray fine sand, 3 to 6 inches deep, grading into a light-gray or grayish-white fine sand, which, at 20 to 30 inches, rests upon a reddish-brown to black, compact, organic hardpan layer. This layer is in most areas from 2 to 6 inches thick, but may attain a maximum thickness of 15 feet. It is underlain by a gray or mottled grayish, brownish to yellowish fine sand which changes at depths of 40 to 60 inches, to a reddish-brown sandy clay, with gray, yellow and brown mottlings.

The material of this phase above the hardpan layer differs somewhat from the phase as mapped in Duval County, Fla., and elsewhere, in being rather incoherent instead of loamy.

As mapped, this phase is somewhat variable. In many places it is interrupted by small, depressed bodies of the Bladen fine sand. In small areas the sandy clay substratum has a nearly uniformly gray or yellow color, and in others it is a mottled red, yellow, and gray, compact, plastic clay. There are areas in which the hardpan layer rests upon the sandy clay. Included with this type are small areas of Leon fine sandy loam. In such cases the section profile is essentially the same as the Leon loamy fine sand, except that the sandy clay material lies 30 to 36 inches below the surface.

This phase occurs in large areas north of Eustis, north of Lake Murphy, and between Mascotte, Clermont, and the Polk County line. Small areas are developed throughout the survey. In all cases the surface is level and the drainage very poor, artificial drainage being necessary for the best returns from the land.

This is one of the less desirable soils and probably, owing in part to the poor drainage, not over 1 per cent is cultivated. Forested areas support essentially the same growth as the typical soil, but the trees are larger and the saw palmetto is of a rank growth.

Where this phase has been properly drained and has received from 1 to 2 tons per acre of air-slaked lime, it has given, with the same methods of treatment as are used for Bladen fine sandy loam, fair yields of corn, tomatoes, cucumbers, potatoes, string beans, and cabbage.

Unimproved land of the Leon fine sand, loamy phase, ranges in price from $5 to $35 an acre, depending principally upon location with respect to good roads, shipping points, and schools, and the amount and quality of marketable timber.

In handling this phase, the most essential requirements are the maintenance and increase of organic matter, liming, and drainage. An increase in the organic matter supply helps to retain moisture, makes the soil warmer and gives better tilth. The supply can be increased by plowing under stable manure, by growing legumes and by plowing under green manure. About 4 tons of finely pulverized limestone or 2 tons of air-slaked lime, followed every three or four years with 1 ton of finely pulverized limestone or one-half ton of air-slaked lime to the acre, will, with adequate drainage, aid greatly in obtaining stands of legumes, improve very much the quality of the hay and pasture, and increase the productiveness of the soil. Tile drainage is very beneficial. It causes the soil to dry out sooner after rains than open-ditch drainage, gives better aeration and oxidation of organic matter, favors the leaching out of injurious salts and acids, encourages during the wet part of the year the development of a better root system with which to endure the droughts that may come later, and warms the soil so that the growing period is lengthened. When drained and cultivated this soil can probably be successfully subirrigated, the hardpan and underlying clay aiding in retaining the moisture in contrast with those soils having open porous subsoils and substrata.

ST. JOHNS FINE SAND

The St. Johns fine sand, to a depth of 5 to 10 inches, consists of a very dark-gray to black loamy fine sand. Below this is a light-gray to grayish-white, incoherent fine sand, which is underlain at

depths ranging from 10 to 36 inches, but ordinarily 22 to 28 inches, by a dark-brown to black, compact, organic hardpan. The layer of hardpan, which ranges from 2 to 6 inches in thickness, rests upon a light-gray incoherent fine sand. The black color of the surface layer is due to the presence of organic matter, the content of which varies from merely enough to impart a dark color to quantities sufficient to give the material a mucky character. Where this type is associated with the Bladen soils or the loamy phase of the Leon, material below the hardpan in many places is slightly sticky and of a mottled light-gray and light grayish-yellow color.

The St. Johns fine sand is found in a number of small, scattered areas in the northern half of the county. It occupies level, poorly drained flatwoods country. The land is low and flat and does not have sufficient slope for run-off, so that the water seeps to the depressions, swamps, or branches, or is removed by evaporation.

Land of this type is not cultivated. The forest, "flatwoods" vegetation, is practically the same as that of the Leon fine sand.

Where the soil and subsoil, except the hardpan layer, are incoherent, this type should remain in forest and permanent grazing land, but where there is a loaminess in the material above and below the hardpan layer, it should upon reclamation become fairly productive land. Suggestions offered for the improvement of the Leon fine sand, loamy phase, apply to this type.

PORTSMOUTH FINE SAND

The Portsmouth fine sand in its typical development, to a depth of 6 to 12 inches, varies from a very dark gray to black, rather loamy fine sand, high in organic matter. Underlying this is a gray fine sand, which gradually becomes lighter in color to a depth of 14 to 20 inches. Below this, at depths ranging from 5 to 10 feet, is a mottled gray, yellow, and red, rather plastic clay. The cultivated soil resembles the virgin, except that the organic matter has been somewhat depleted.

The Portsmouth fine sand, as mapped, includes a considerable range in consistence of material. In fact the largest areas, which occur along Alexander Spring Creek, the Lake Tracy Canal, and both west and south of Crows Bluff, consist of about 10 inches of a very dark-gray or black fine sand, underlain by 10 to 40 inches of a brownish-gray, incoherent fine sand, which when saturated, tends to flow. Around shallow ponds, mapped as Grass and water, and where the type is associated with peaty muck, the surface soil is often a mucky fine sand. Along stream courses, and near the shores of lakes and Grass and water ponds, the material throughout the soil section is decidedly more loamy than typical, and at a depth of 3 feet, is a light-gray, sticky fine sand or fine sandy loam with mottlings of yellow.

The type occurs in large areas in the northeastern part of the county along the St. Johns River. Small areas are developed in nearly all parts of the county. The surface is flat and wet, and without artificial drainage this soil can not be cultivated.

About 1 per cent or less of this type is farmed. The forested areas support a growth of slash pine, long-leaf pine, black pine, cabbage

palmetto, and saw palmetto, myrtle, black root, wire grass, and many other plants.

The cultivated areas of this type are confined to the typical soil, and are used exclusively for trucking. The variety of truck crops and methods of treatment are practically the same as for the Bladen fine sandy loam, but the yields are somewhat lower.

Cultivated land of this type is valued at $50 to $200 an acre depending upon the improvement, and location with respect to improved roads, transportation, towns, and schools. Uncultivated land is valued at $3 to $50 an acre.

Suggestions offered for the improvement of the Bladen fine sandy loam are applicable to this type.

Portsmouth fine sand, swamp phase.—Except in drainage, the swamp phase of the Portsmouth fine sand, differs little from the typical soil. The surface layer is a dark-gray to almost black loamy fine sand, grading at about 8 to 14 inches into a gray fine sand. With increase of depth, the material becomes lighter in color, and at 16 to 20 inches, is a light-gray fine sand. This continues to a depth of 5 feet or more, where a mottled gray, yellow, and red, rather plastic clay in encountered.

This phase occupies flood plains along creeks and branches, small irregular areas around lakes and ponds, and shallow depressions. It remains in a swampy condition throughout the greater part of the year and supports a growth of pond cypress, water oak, sweet gum, maple, and other water-loving trees.

The phase is not under cultivation, but is used to pasture cattle and hogs.

Portsmouth fine sand, hammock phase.—The Portsmouth fine sand, hammock phase, consists of a very dark-gray to black loamy fine sand, passing at about 10 to 16 inches into a gray, loamy fine sand, which continues to a depth of 30 to 40 inches. Below this, the material assumes a mottled gray and yellow color, and a heavy, loamy fine sand or a light fine sandy loam texture.

Included with this phase are spots of a black, loamy, and in many places mucky, fine sand which, had these been of sufficient extent, would have been classed as Hyde fine sand. The soil extends to depths of 30 to 60 inches, where it gives way to a dark-gray fine sand layer of 2 to 12 inches thick. This rests upon a light-gray to grayish-white fine sand. Small areas occur north of Lake Dora, west of Tavares, on the shore of Lake Yale due west of Umatilla, north of Lake Akron, south of Little Lake Harris, in the vicinity of Sumner Lake, and south of Boggy Marsh. The topography is flat, and the resulting poor drainage prohibits cultivation. About 1 per cent of this included Hyde fine sand is farmed. The forest growth includes white bay, cabbage palmetto, gums, and cypress. Where drained this has proved to be a very fertile and productive soil, particularly adapted to the growing of truck crops, corn, and the Boston fern.

The Portsmouth fine sand, hammock phase, has its main development east and south of Cassia, in the higher flood plains of the St. Johns and Wekiva Rivers, and Black Water Creek and its tributaries. Smaller areas lie southwest of Cassia Station, south of Lake Tracy, and near Lake Yale and Lake Harris. The type occurs characteristically in stream flood plains, shallow basins, or low hammocky

areas, and is very poorly drained, water standing on the surface of a large part of the land during the rainy seasons.

The predominating tree growth on the hammock phase is sweet gum, water oak, cypress, loblolly bay, white bay, black pine, cabbage palmetto, red maple, slash pine, willow, poplar, hickory, and black gum.

A few acres of this soil have been drained and put under cultivation and have proved to be at least as productive for truck crops as any other soil of the area. With proper fertilization excellent yields of corn, cabbage, cucumbers, head lettuce, strawberries, potatoes, tomatoes, cowpeas, velvet beans, and oranges have been obtained from the small area so far brought under the plow. (Pl. 15, fig. 1.)

The greatest need of the Portsmouth fine sand, hammock phase, is protection from overflow. This will necessitate ditching, and in case of the lower-lying land diking and possibly pumping, in addition.

Portsmouth fine sand, prairie phase.—The Portsmouth fine sand, prairie phase, consists of a very dark-gray to black, very loamy fine sand to a light fine sandy loam, which grades at 14 to 20 inches into a very loamy gray fine sand or light fine sandy loam. This rests, at 36 to 46 inches, upon a gray fine sandy loam, and in some places on a grayish-white, marly fine sandy loam. In some areas the texture of both the soil and subsoil approaches medium sand.

This phase is developed 4 to 5 miles southeast of Cassia, in the flood plain of the Wekiva River and Black Water Creek. It is subject to annual overflow as a result of which a deposit of fine-grained sediment is added to the soil every year. The drainage is poor. The land supports a heavy growth of grasses, which provide excellent pasturage.

When reclaimed by diking and ditching, the prairie phase should prove to be exceptionally productive and especially well adapted to truck growing.

PLUMMER FINE SAND, CYPRESS POND PHASE

The Plummer fine sand, cypress-pond phase, consists of a gray, incoherent fine sand, 4 to 6 inches deep, grading into a light-gray to grayish-white loose fine sand, which continues to depths of 6 feet and more. In most virgin areas there is a surface layer of peat, varying from a fraction of an inch to several inches in thickness.

This phase has its principal occurrence in ponds in the southwestern corner of the county. Pond cypress and slash pine are characteristic trees.

Because of the incoherency throughout the profile and the occurrence in swamps, this soil is best suited to grazing and forestry.

PEATY MUCK

Peaty muck consists of dark-brown to black partially decayed fibrous plant remains or the same material in a finely divided state and of dark-brown color, mixed with varying though normally small proportions of mineral matter, mainly fine sand. This, at depths ranging from 1 to 8 or more feet, rests upon a layer of black or dark-gray loamy fine sand, which varies from 1 to 4 inches in thickness,

and passes into a light-gray to grayish-white, incoherent fine sand. Over the greater part of the beds the material is a raw, brown, fibrous peat, held together in felty masses, in which plant forms are still discernible. In contrast to this the material in some areas is fairly well decomposed and sufficiently plastic to be molded into forms by the hands.

Peaty muck areas are well distributed throughout the county, but the greater number of large areas lie in the eastern half. The type occupies swamp lands lying in depressions and along the streams. It is covered with water a large part of the year.

Less than 1 per cent of the Peaty muck of Lake County has been ditched and reclaimed. The forest growth differs with the character of the areas. In the cypress swamps cypress of different kinds predominates, and slash pine, water oak, and bay are important species; in the bay swamps the bay tree is the dominant growth; and on the peat marshes sawgrass is the distinctive plant.

Where drained and well fertilized fair to good yields of celery, cabbage, potatoes, and corn have been obtained. It is adapted to certain special crops, including bulbs.

PEAT

Peat consists of dark-brown, partly decayed fibrous vegetable matter, with little admixture of mineral matter, extending to depths ranging from 2 to 20 feet and resting on a bed of grayish-white fine sand.

The main developments are in the marshes that support a growth of saw grass, bonnet lilies, and water hyacinths in Lakes Griffin, Yale, Minneola, Harris, Eustis, Apopka, Cherry, Minnehaha, in Eustis Meadows, in the marsh west of Fruitland Park, and in Green Swamp.

Because of the raw and unfavorable physical condition of this material, the deficiency in plant food, and the location in marshes, where water stands the year around, it would seem that attempts at reclamation should not be made at the present time.

WATER AND GRASS

Water and grass is a term chosen to designate shallow ponds and bodies of water in which there occurs a vigorous growth of water-loving grasses and sedges. (Pl. 15, fig. 2.) The areas, which exist throughout the county, are, in most cases, covered with water the year round. The term comprises a rather large variety of soils, which, owing to their inaccessibility, could not be separated into types and series. Swamp phases of the Plummer, Portsmouth, and Bladen fine sands, muck, peaty muck, and peat are of common occurrence. With exception of the Bladen fine sand, all of these above mentioned types are, in many cases found within Water and grass areas of a few acres extent.

SWAMP

The areas classed as Swamp in Lake County comprise flood plains along streams and other low-lying areas that are covered with water throughout or during a large part of the year. Because of the

intermingling of soils, the dense undergrowth, and the wet condition, it was almost impossible to make proper type and series separations. Along the St. Johns and Wekiva Rivers to Black Water Creek, a layer of peaty muck or peat, ranging from 1 foot to 10 feet in thickness commonly overlies a light-gray fine sand, but in places along these streams, as well as along many other smaller streams throughout the county, the soils include the St. Johns fine sand, a dark-gray fine sand passing into gray or mottled gray and yellow fine sand, the Ochlockonee fine sand, a brown loamy fine sand, and the Bibb fine sand, which is a light-gray fine sand.

Swamp affords fair range for cattle and hogs. The tree growth is heavy, and includes most of the species given for the Peaty muck, and the swamp phases of the Bladen and Portsmouth types.

SHELL MOUNDS

The areas mapped as Shell mounds consist of low hillocks or ridges of small shells, in some places without admixture of fine earth and in others mixed fine sand. These mounds occur mainly along the banks of the St. Johns River. They range from less than a hundred to several hundred feet in diameter. The depth of the deposits varies from 1 to 6 feet or more. Shell-mound areas appear on the map at Silver Glen Spring in the extreme northern end of the county, and scattered along the St. Johns River south of Astor and at St. Francis.

Shells for surfacing roads are obtained from these mounds. One or two of them are cultivated in connection with adjoining soils, but their chief value is as a source of road-building material. Plate 15, Figure 3, shows a cut in one of these mounds, where the deposit has been mined. This illustration gives a very good idea of the character of the material.

SUMMARY

Lake County lies in the central part or lake region of the Florida Peninsula. It has an area of 1,015 square miles, or 649,600 acres.

The county comprises three topographic divisions, the rolling upland in the southern portion; the flatwoods in the extreme southern, southwestern, extreme eastern, and northeastern parts; and the undulating to gently rolling uplands in the remaining sections. The drainage of the flatwoods, which forms a comparatively small part of the county, is poor; that of the rolling and undulating to gently rolling uplands is good. A large number of beautiful lakes add to the attractiveness of the region.

The transportation facilities are good. Railroads touch most parts of the county and steamboats run regularly between Jacksonville and Sanford, touching Lake County at Crows Bluff and Astor. The county is fairly well supplied with concrete and sand-clay roads.

The climate is subtropical, being characterized by a long summer season and a short pleasant winter season. The mean annual temperature is about 72° F., and the mean annual precipitation about 48 inches. Most of the rainfall comes in the summer season.

Citrus-fruit culture is the leading agricultural interest, and trucking follows in importance. Watermelons, cucumbers, string beans,

tomatoes, and cabbage, ranking in value in the order named, are the principal truck crops. Corn is an important field crop. The grape and plum industries are rapidly growing.

The raising of cattle and hogs on the open range is a locally important industry.

The soils of Lake County may be separated into two broad groups, poorly drained and well drained. The poorly drained soils have dark-colored surfaces, comparatively thick organic layers, and gray subsoils; whereas the well drained soils are featured by gray surfaces, comparatively thin organic layers, and yellowish-gray, yellow, and brown subsoils. In texture the soils vary from loose sands to clay loams and Peat, but types of fine sand texture predominate.

The Norfolk, Blanton, Eustis, and Orlando fine sands, and phases of these types are the principal citrus soils of Lake County, and, in fact, in the whole State of Florida. Watermelons, grapes, and the asparagus fern are successfully produced on these soils, as well as a variety of garden vegetables on a small scale, and also corn, sweet potatoes, and leguminous crops.

The Bladen soils, especially when drained, are admirably adapted to the growing of potatoes, corn, and truck crops, while citrus fruits do exceptionally well.

Such soils as the Leon, St. Lucie, St. Johns, and Lakewood fine sands are little used for agricultural purposes in this county. They represent land of very low productivity.

The Portsmouth fine sand, particularly its hammock and prairie phases and the more loamy variations, when drained will be well suited to the production of truck crops, corn, and the Boston fern.

APPENDIX

The following list contains the common and scientific names of characteristic plants found in Lake County and the various soil types on which they are usually found. These plant and soil-type associations are to a certain extent significant; that is, certain plants are usually associated with certain types of soil and are an aid in identifying the soil type.

Bay, white (*Magnolia glauca*), Bladen fine sandy loam, swamp phase; Portsmouth fine sand, hammock phase and swamp phase.

Bay, loblolly (*Gordonia lasianthus*), Bladen fine sandy loam, swamp phase; Portsmouth fine sand, hammock phase.

Bay, red (*Persea humilis*), St. Lucie fine sand, Lakewood fine sand.

Beggarweed (*Meibomia purpurea*), Norfolk fine sand, Bladen fine sand, Bladen fine sandy loam.

Blackroot (*Pterocaulon undulatum*), Portsmouth fine sand.

Bonnet lily (*Nymphaea macrophylla*), Peat (and water).

Broom sedge (*Andropogon*, sp.), Bladen fine sand.

Carpet grass (*Anastrophus compressus*).

Crab grass (*Syntherisma sanguinalis*).

Cypress, bald (*Taxodium distichum*), Bladen fine sandy loam, swamp phase; Portsmouth fine sand, hammock phase; Peaty muck.

Cypress, pond (*Taxodium imbricarium*), Bladen fine sandy loam, swamp phase; Portsmouth fine sand, hammock phase; Plummer fine sand, cypress pond phase; Peaty muck.

Dogwood (*Cornus florida*), Norfolk fine sand, hammock phase; Orlando fine sand.

Gallberry (*Ilex glabra*), Leon fine sand.

Gum, black (*Nyssa biflora*), Bladen fine sandy loam, swamp phase; Portsmouth fine sand, hammock phase.

Gum, sweet (*Liquidambar styraciflua*), Portsmouth fine sand, hammock phase; Bladen fine sandy loam, swamp phase; Portsmouth fine sand, swamp phase.

Hickory (*Hicoria glabra* (?)), Norfolk fine sand, hammock phase; Portsmouth fine sand, hammock phase; Blanton fine sand; Orlando fine sand; Bladen fine sand.

Huckleberry (*Vaccinium nitidum*), Leon fine sand.

Ironwood (*Carpinus caroliniana*), Norfolk fine sand, nammock phase; Orlando fine sand.

Magnolia (*Magnolia grandiflora*), Norfolk fine sand, hammock phase; Blanton fine sand; Bladen fine sand.

Maple (*Acer*, sp.), Portsmouth fine sand, swamp phase.

Maple, red (*Acer rubrum*), Bladen fine sandy loam, swamp phase; Portsmouth fine sand, hammock phase.

Muscadine (*Vitis rotundifolia*, or more likely *Vitis munsoniana*), Norfolk fine sand.

Myrtle (*Myrica cerifera*), Norfolk fine sand, hammock phase; Portsmouth fine sand.

Oak, blackjack (*Quercus catesbaei*), Eustis fine sand, Norfolk sand, Blanton fine sand, Orlando fine sand.

Oak, live (*Quercus virginiana*, or *Quercus geminata*), Orlando fine sand; Bladen fine sand; Norfolk sand; Norfolk fine sand, hammock phase; Eustis fine sand; Blanton fine sand; Blanton loamy fine sand; Bladen fine sandy loam, swamp phase; St. Lucie fine sand.

Oak, runner (*Quercus minima* (and *pumila* ?)), St. Lucie fine sand; Lakewood fine sand.

Oak scrub (*Quercus myrtifolia*), Lakewood fine sand.

Oak, turkey (*Quercus cinerea*), Orlando fine sand; Norfolk sand; Eustis fine sand; Blanton loamy fine sand.

Oak, water (*Quercus nigra*), Portsmouth fine sand, swamp phase and hammock phase.

Palmetto (*Sabal glabra*), Norfolk fine sand, hammock phase.

Palmetto cabbage (*Sabal palmetto*), Orlando fine sand; Norfolk fine sand, hammock phase; Blanton loamy fine sand; Bladen fine sand; Bladen fine sandy loam, swamp phase; Portsmouth fine sand; Portsmouth fine sand, hammock phase.

Palmetto, saw (*Serenoa serrulata*), Norfolk fine sand, hammock phase; Lakewood fine sand; Leon fine sand; Bladen fine sand; St. Lucie fine sand; Leon fine sand, loamy phase; Portsmouth fine sand.

Pine, black (*Pinus serotina*), Bladen fine sand; Bladen fine sandy loam, swamp phase; Portsmouth fine sand; Portsmouth fine sand, hammock phase.

Pine, long-leaf (*Pinus palustris*), Bladen fine sand; Leon fine sand; Norfolk sand; Eustis fine sand; Blanton fine sand; Blanton loamy fine sand; Orlando fine sand; Portsmouth fine sand.

Pine, slash (*Pinus caribaea* or *Pinus elliottii*), Leon fine sand; Bladen fine sand; Bladen fine sandy loam, swamp phase; Portsmouth fine sand; Portsmouth fine sand, hammock phase; Plummer fine sand, cypress pond phase.

Pine, spruce (*Pinus clausa*), St. Lucie fine sand; Lakewood fine sand.

Poison ivy (*Rhus radicans*), Norfolk fine sand, hammock phase.

Poplar (*Liriodendron tulipifera*), Portsmouth fine sand, hammock phase.

Rattan vine (*Berchemia scandens*), Norfolk fine sand, hammock phase.

Rosemary (*Ceratiola ericoides*), St. Lucie fine sand; Lakewood fine sand.

Saw grass (*Cladium effusum*), Peat.

Sumac (*Rhus copallina*), Norfolk fine sand, hammock phase.

Virginia creeper (*Parthenocissus quinquefolia*), Norfolk fine sand, hammock phase.

Water hyacinth (*Piaropus crassipes*), Peat (and water).

Willow (*Salix longipes*), Bladen fine sandy loam, swamp phase.

Wire grass (*Aristida stricta*), Norfolk sand; Bladen fine sand; Leon fine sand; Portsmouth fine sand.

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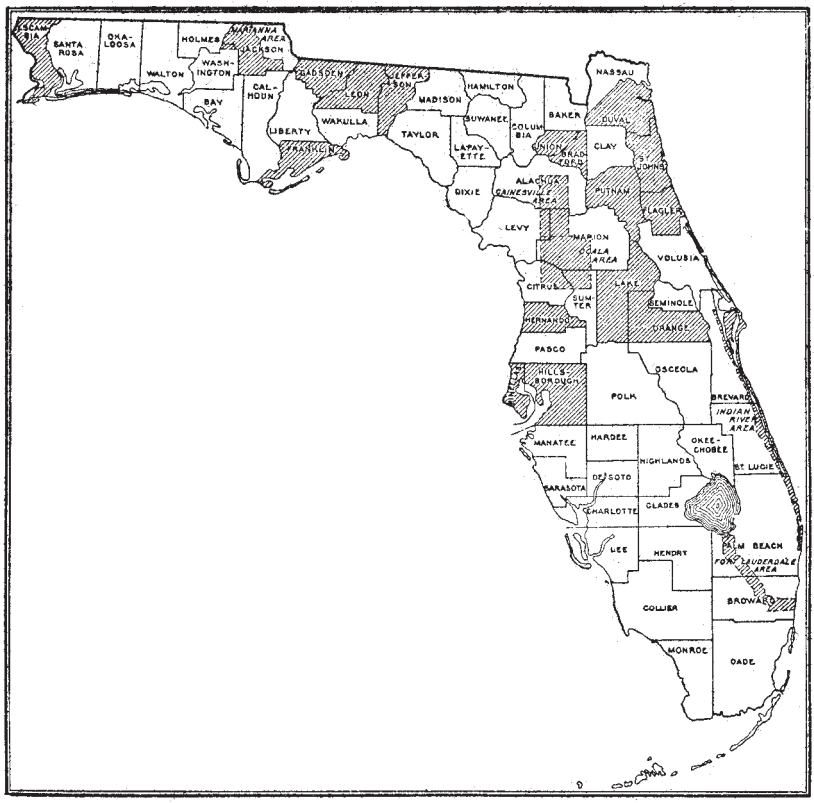

Areas surveyed in Florida shown by shading

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To File a Program Complaint

If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, found online at http://www.ascr.usda.gov/complaint_filing_cust.html or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter by mail to

U.S. Department of Agriculture; Director, Office of Adjudication; 1400 Independence Avenue, S.W.; Washington, D.C. 20250-9419; by fax to (202) 690-7442; or by email to program.intake@usda.gov.

Persons with Disabilities

If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).